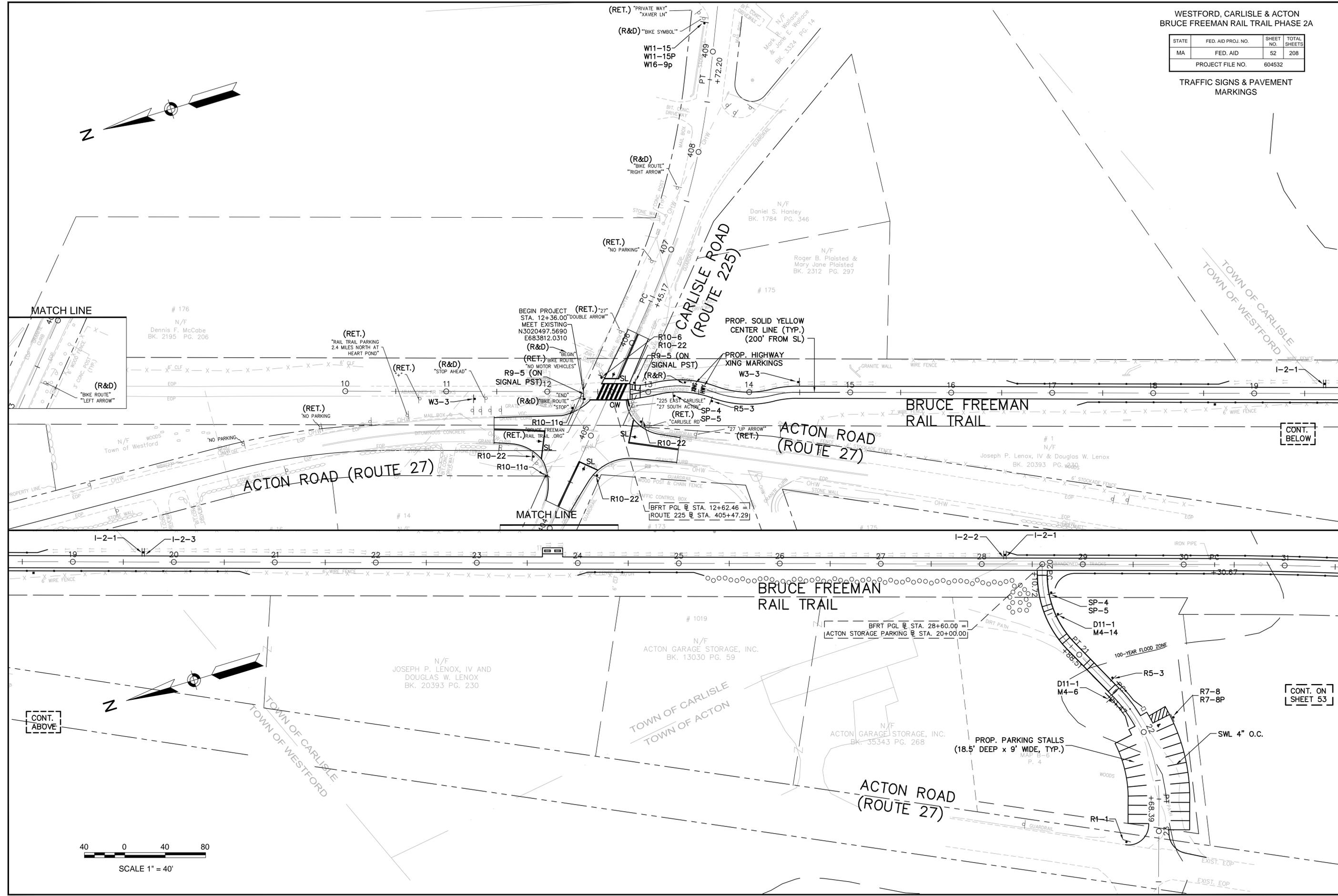
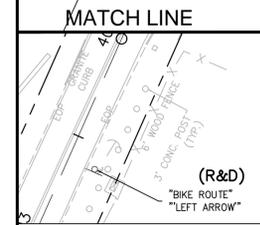
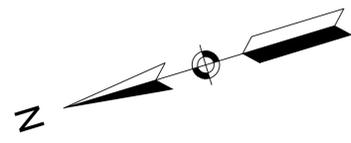


WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	52	208
PROJECT FILE NO. 604532			

TRAFFIC SIGNS & PAVEMENT MARKINGS

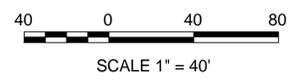
10031_2A_PM&S.DWG 13-Mar-2014



CONT. BELOW

CONT. ON SHEET 53

CONT. ABOVE

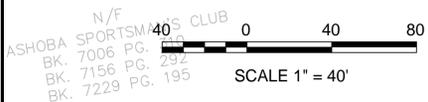
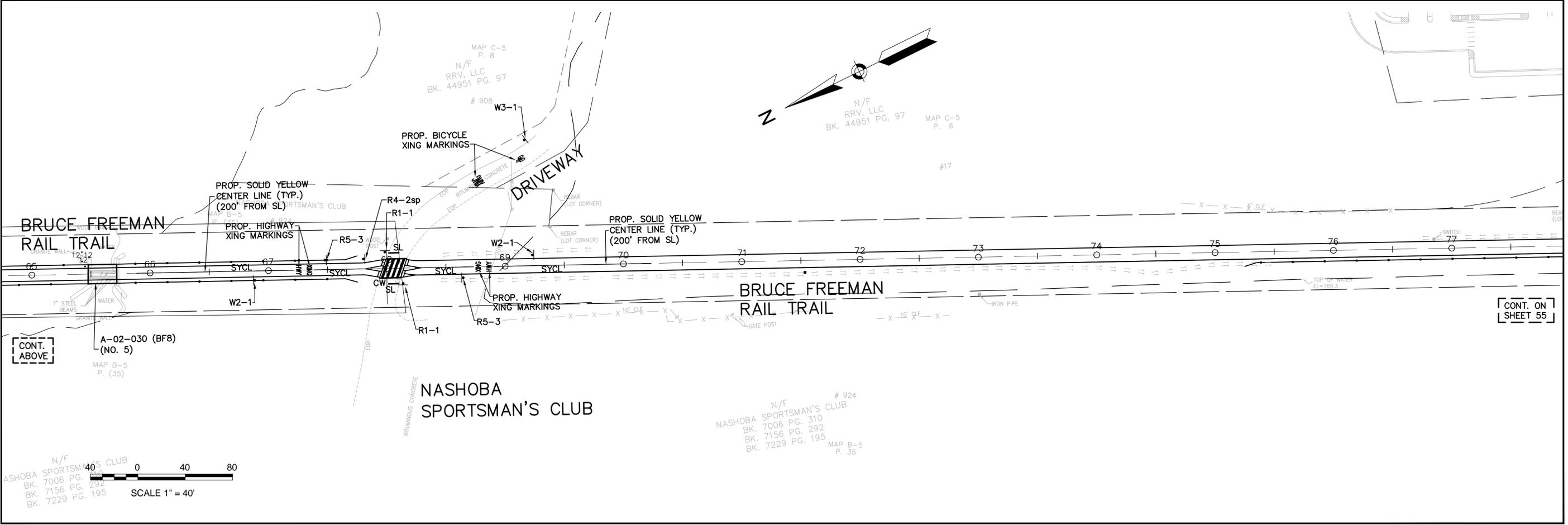
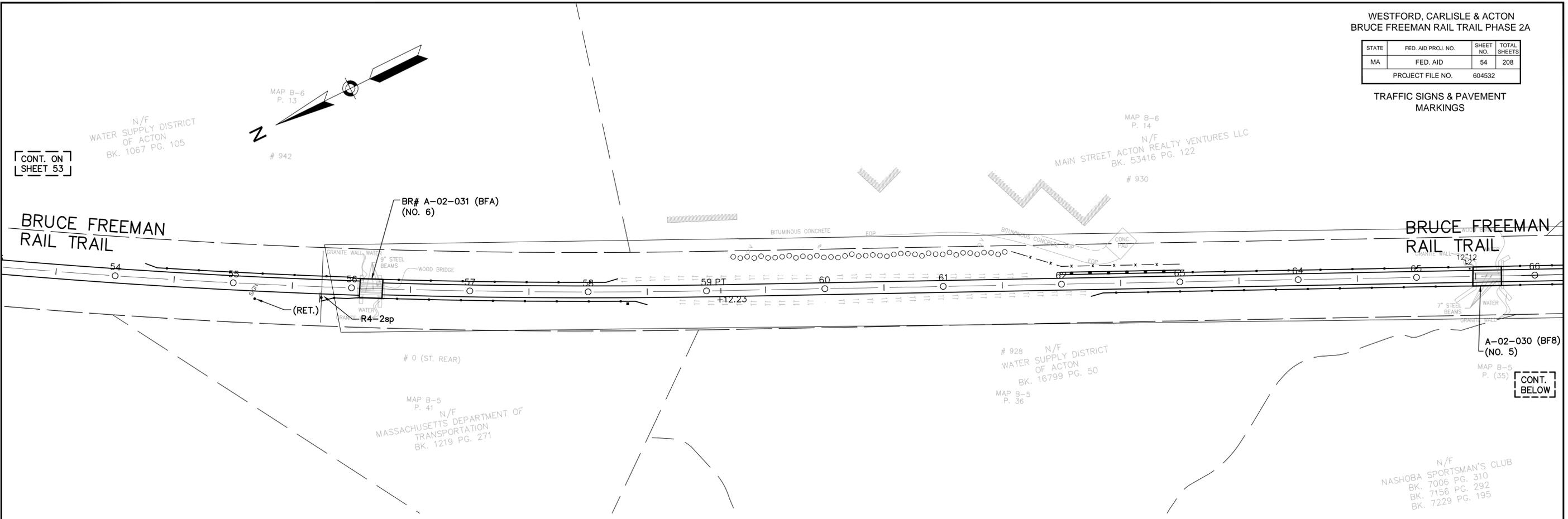


WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	54	208
PROJECT FILE NO.		604532	

TRAFFIC SIGNS & PAVEMENT MARKINGS

10031_2A_PM&S.DWG 13-Mar-2014



WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	55	208
PROJECT FILE NO. 604532			

TRAFFIC SIGNS & PAVEMENT MARKINGS

N/F
848 MAIN STREET NOMINEE TRUST, u/d/t
BK. 53416 PG. 128
MAP C-5
P. 39
848

REX LUMBER COMPANY
N/F
REX LUMBER COMPANY
BK. 15986 PG. 480
9

ROBBINS BROOK CONDOMINIUM
MASTER DEED
BK. 34644 PG. 65

NASHOBA SPORTSMAN'S CLUB, INC.
BK. 25055 PG. 0460
9

MAP C-5
P. 38

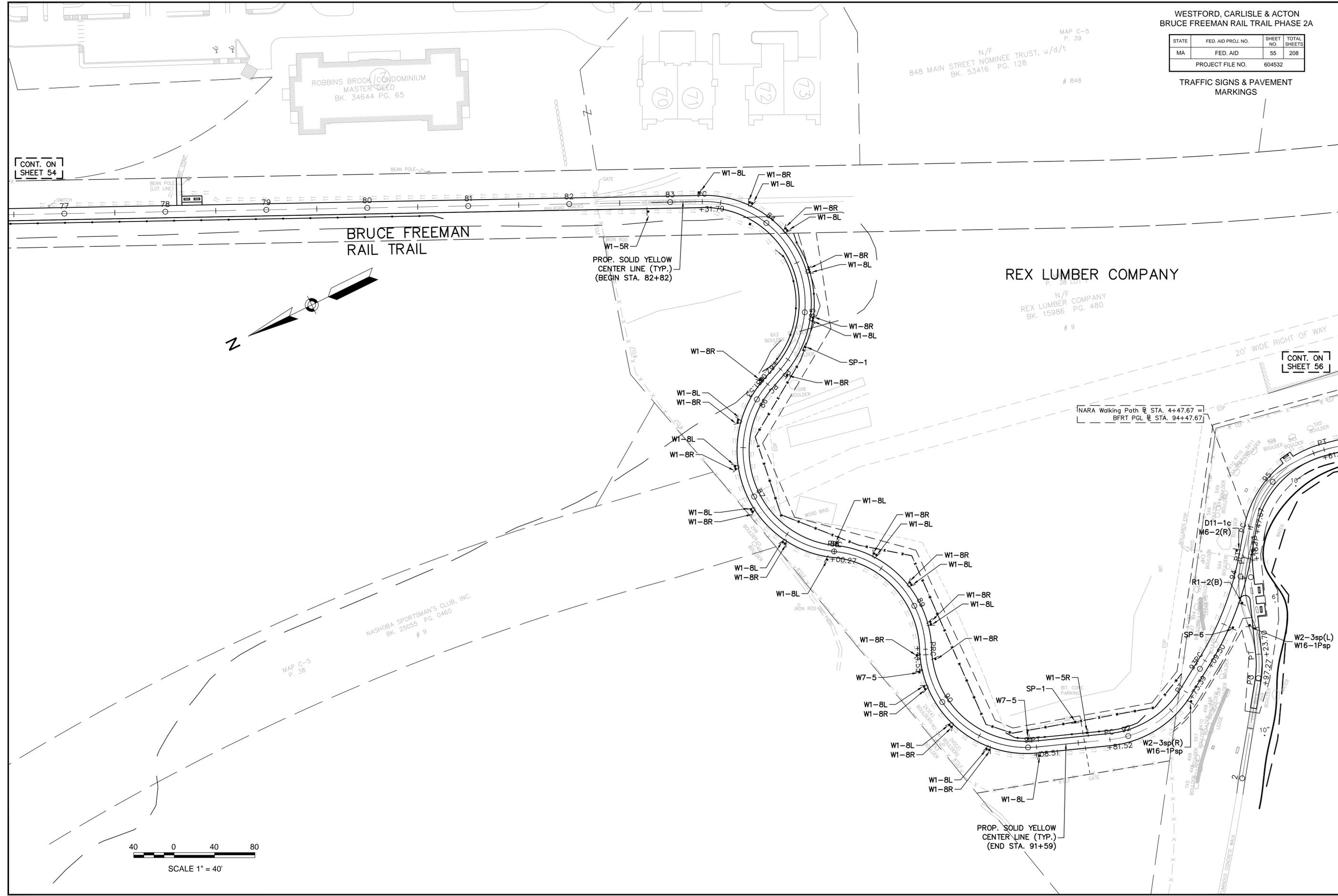
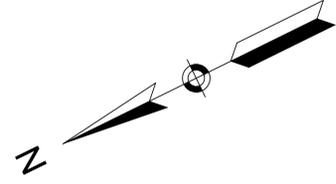
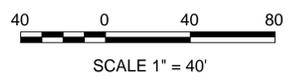
CONT. ON
SHEET 54

CONT. ON
SHEET 56

BRUCE FREEMAN
RAIL TRAIL

PROP. SOLID YELLOW
CENTER LINE (TYP.)
(BEGIN STA. 82+82)

PROP. SOLID YELLOW
CENTER LINE (TYP.)
(END STA. 91+59)

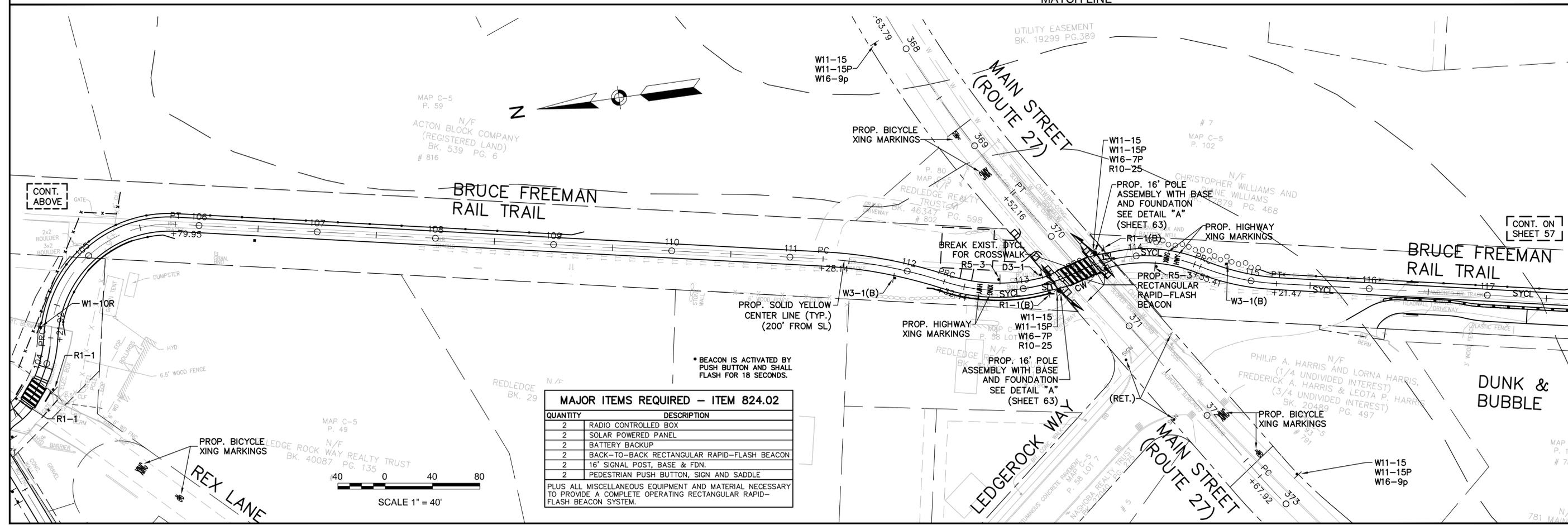
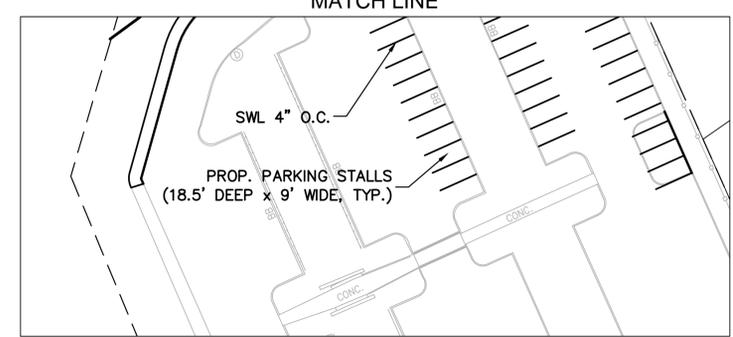
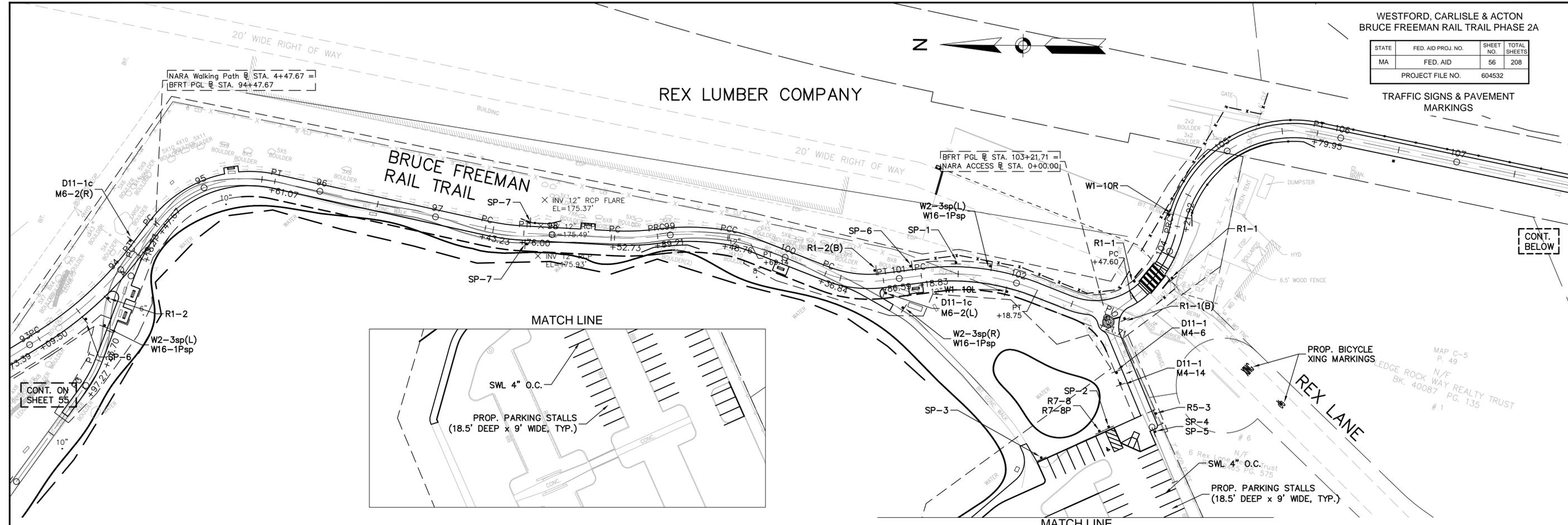


STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	56	208
PROJECT FILE NO. 604532			

TRAFFIC SIGNS & PAVEMENT MARKINGS



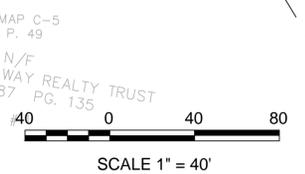
REX LUMBER COMPANY



MAJOR ITEMS REQUIRED - ITEM 824.02

QUANTITY	DESCRIPTION
2	RADIO CONTROLLED BOX
2	SOLAR POWERED PANEL
2	BATTERY BACKUP
2	BACK-TO-BACK RECTANGULAR RAPID-FLASH BEACON
2	16' SIGNAL POST, BASE & FDN.
2	PEDESTRIAN PUSH BUTTON, SIGN AND SADDLE

PLUS ALL MISCELLANEOUS EQUIPMENT AND MATERIAL NECESSARY TO PROVIDE A COMPLETE OPERATING RECTANGULAR RAPID-FLASH BEACON SYSTEM.



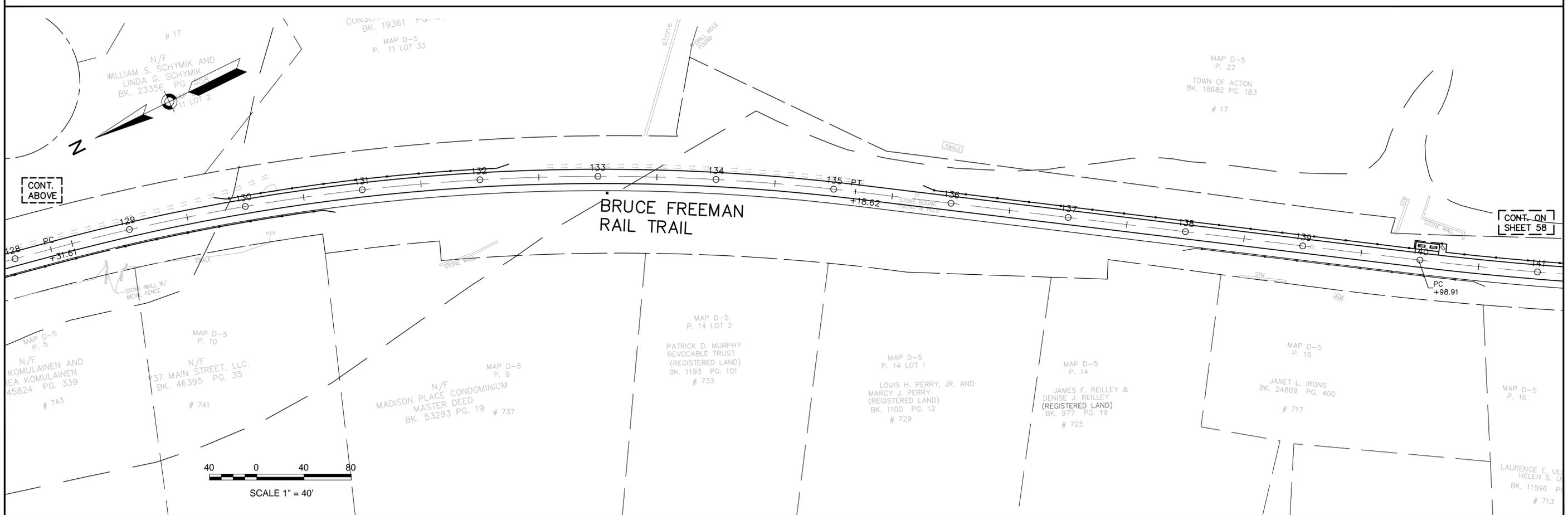
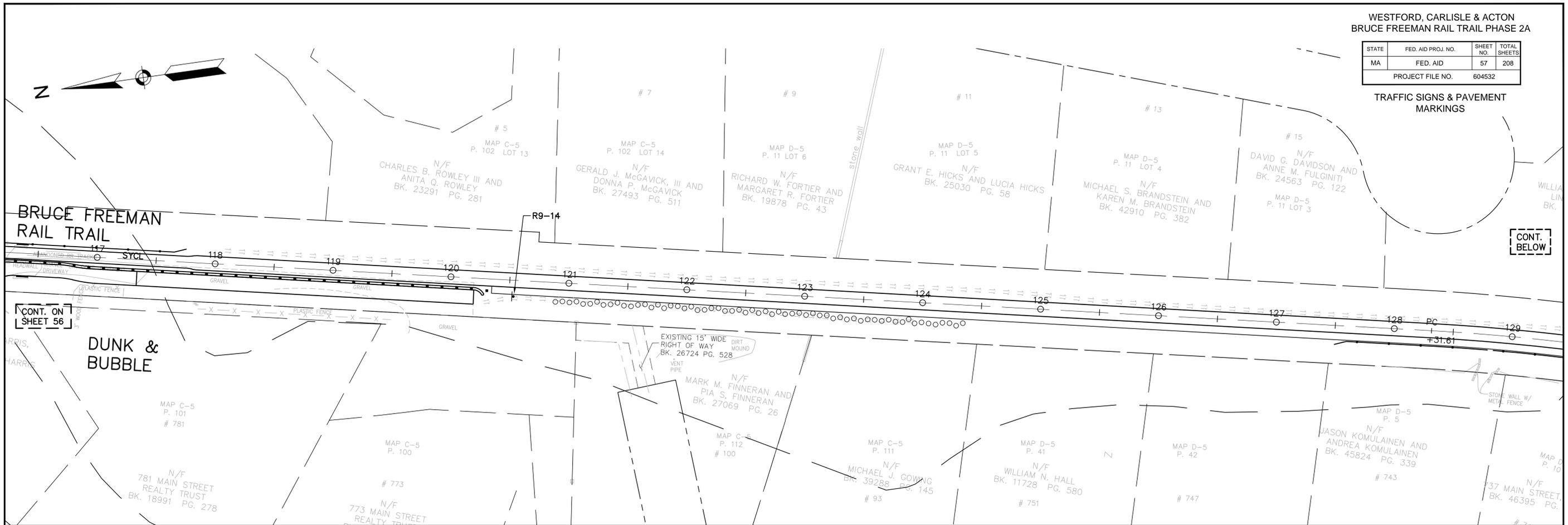
13-Mar-2014 10031_2A_P1M&S.DWG

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	57	208
PROJECT FILE NO. 604532			

TRAFFIC SIGNS & PAVEMENT MARKINGS

10031_2A_P1M&S.DWG 13-Mar-2014



WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

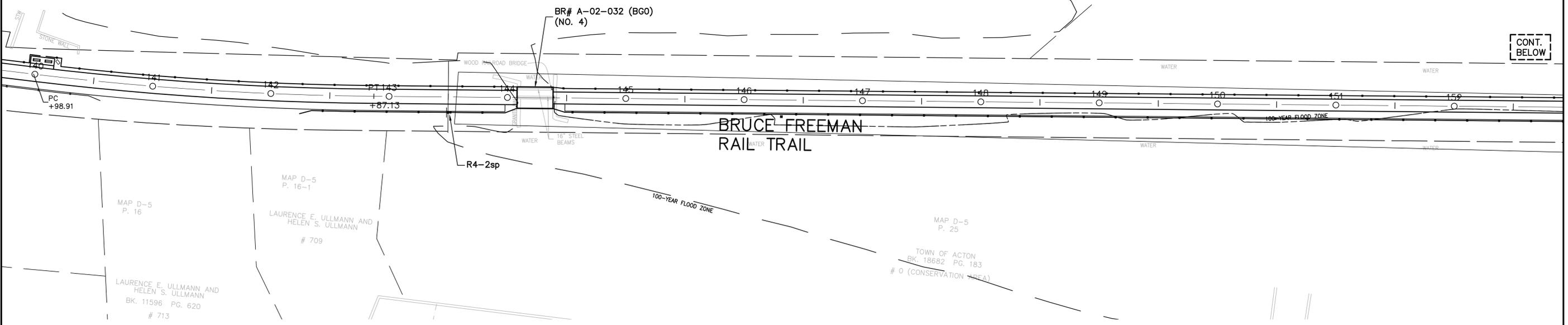
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	58	208
PROJECT FILE NO. 604532			

TRAFFIC SIGNS & PAVEMENT MARKINGS

10031_2A_PM&S.DWG 13-Mar-2014

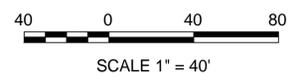
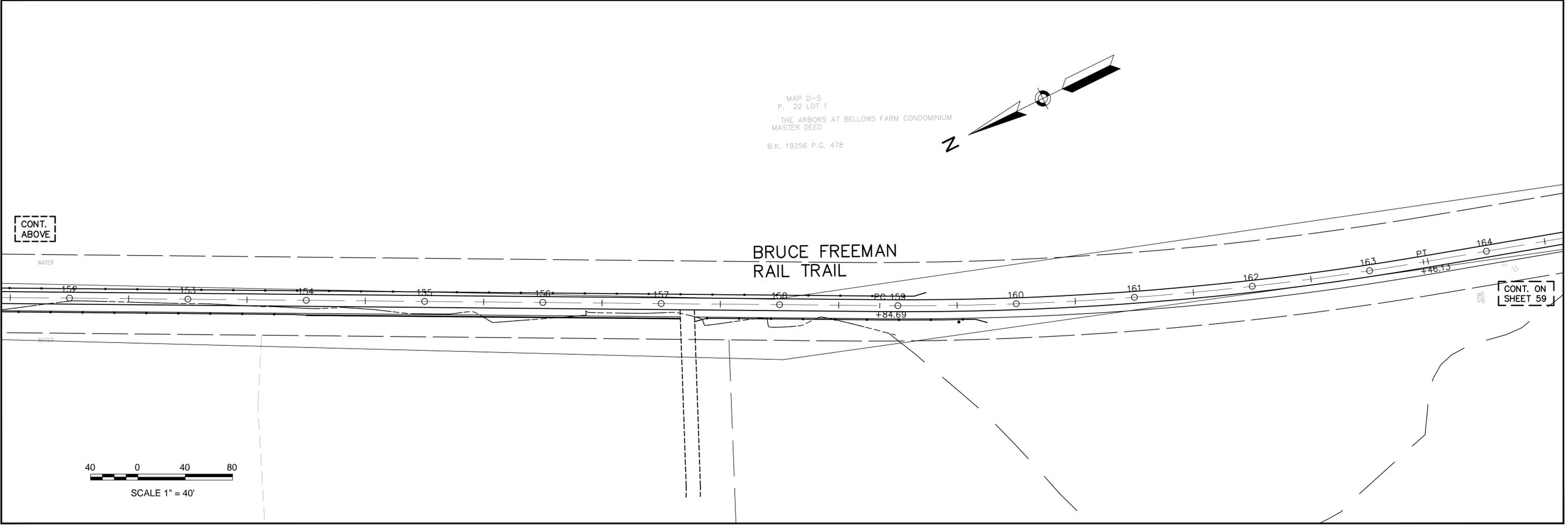
CONT. ON SHEET 57

CONT. BELOW



CONT. ABOVE

CONT. ON SHEET 59



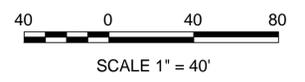
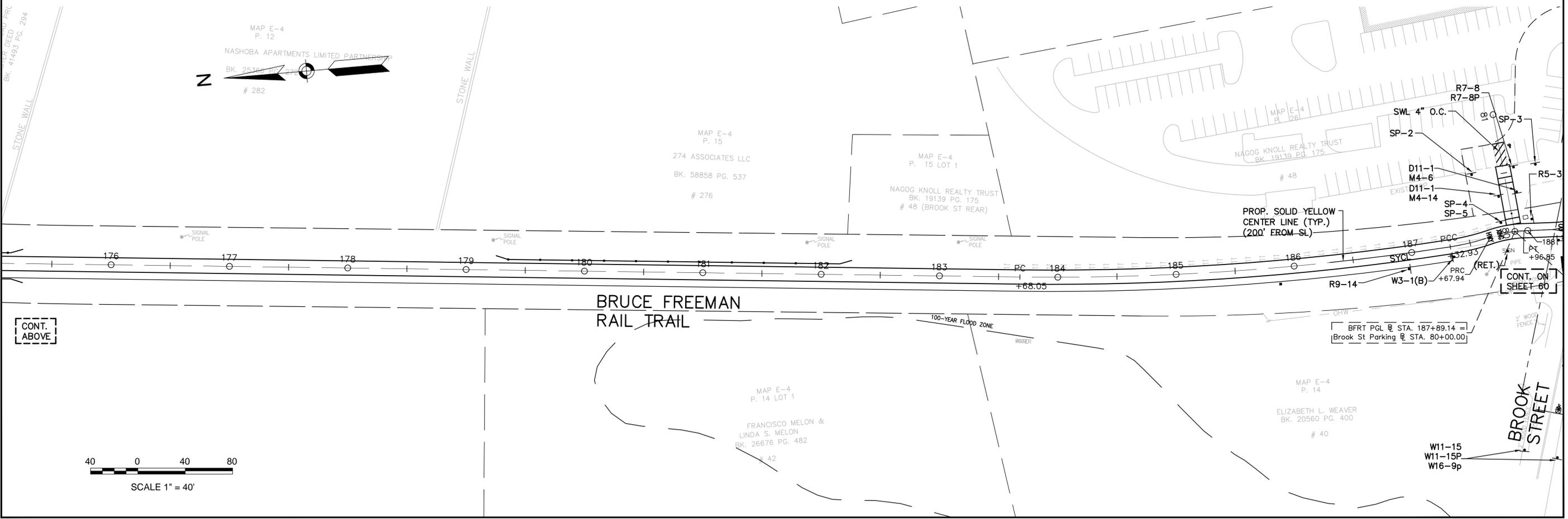
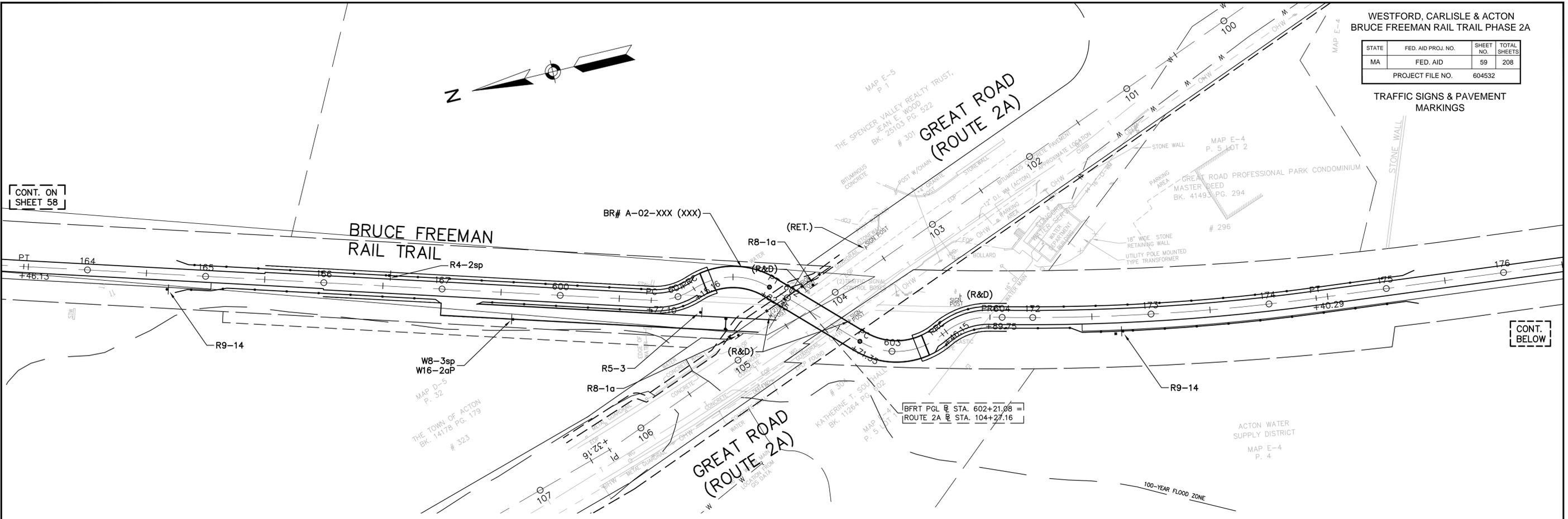
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	59	208
PROJECT FILE NO. 604532			

TRAFFIC SIGNS & PAVEMENT MARKINGS

CONT. ON SHEET 58

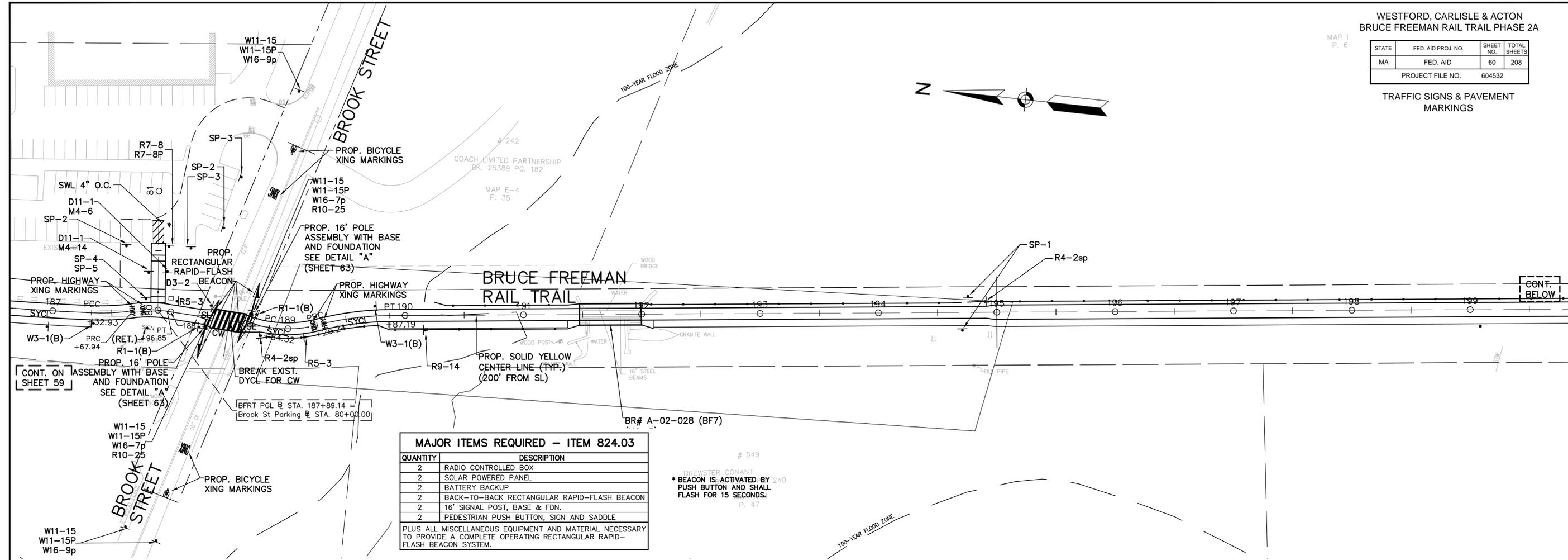
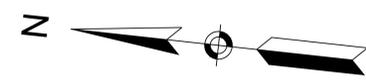
CONT. BELOW



STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	60	208
PROJECT FILE NO. 604532			

TRAFFIC SIGNS & PAVEMENT MARKINGS

10031_2A_P1M&S.DWG 13-Mar-2014



MAJOR ITEMS REQUIRED - ITEM 824.03

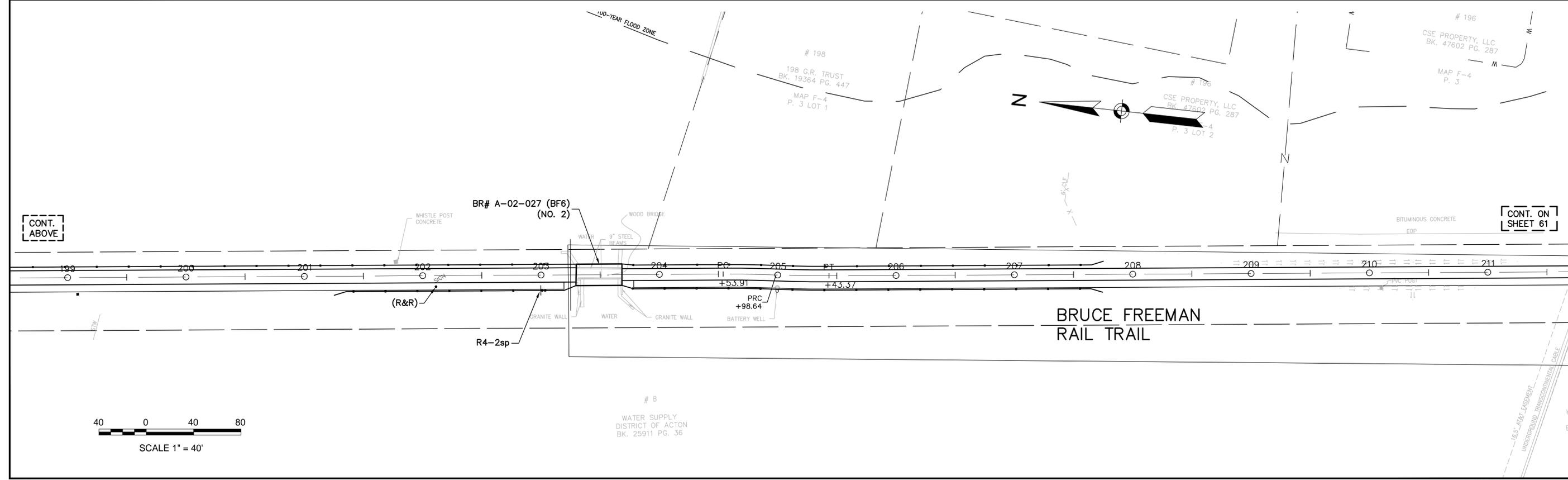
QUANTITY	DESCRIPTION
2	RADIO CONTROLLED BOX
2	SOLAR POWERED PANEL
2	BATTERY BACKUP
2	BACK-TO-BACK RECTANGULAR RAPID-FLASH BEACON
2	16' SIGNAL POST, BASE & FDN.
2	PEDESTRIAN PUSH BUTTON, SIGN AND SADDLE

PLUS ALL MISCELLANEOUS EQUIPMENT AND MATERIAL NECESSARY TO PROVIDE A COMPLETE OPERATING RECTANGULAR RAPID-FLASH BEACON SYSTEM.

* BEACON IS ACTIVATED BY 240 PUSH BUTTON AND SHALL FLASH FOR 15 SECONDS.
P. 47

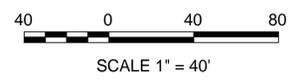
CONT. ON SHEET 59

CONT. BELOW



CONT. ABOVE

CONT. ON SHEET 61

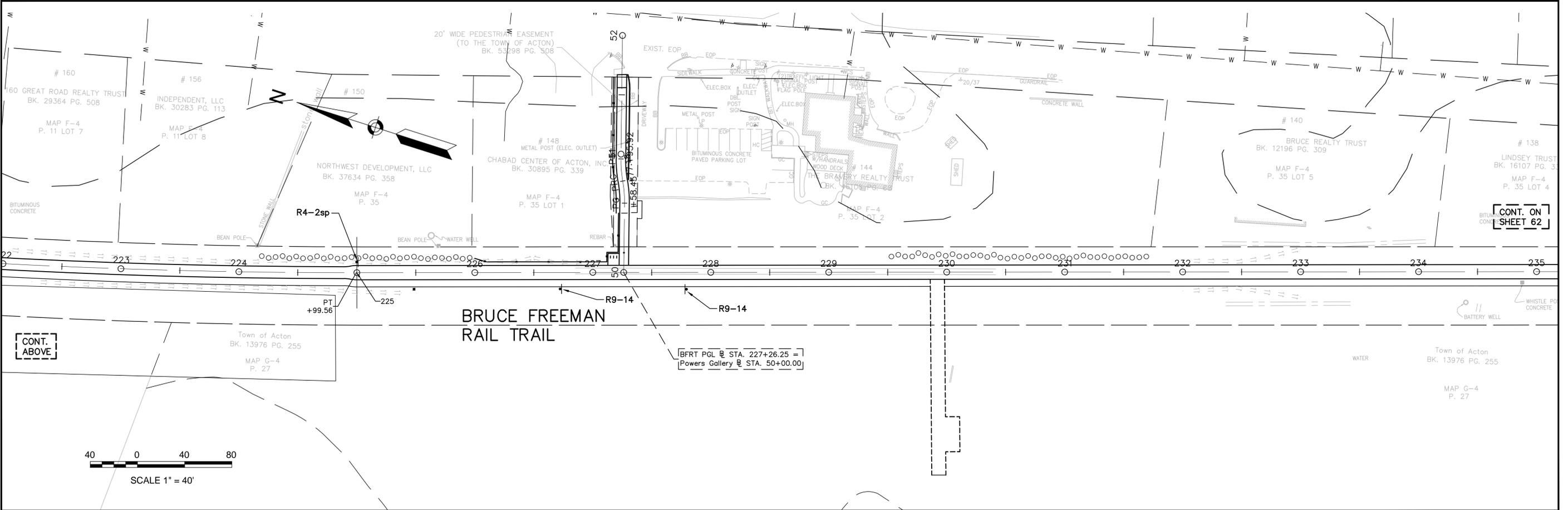
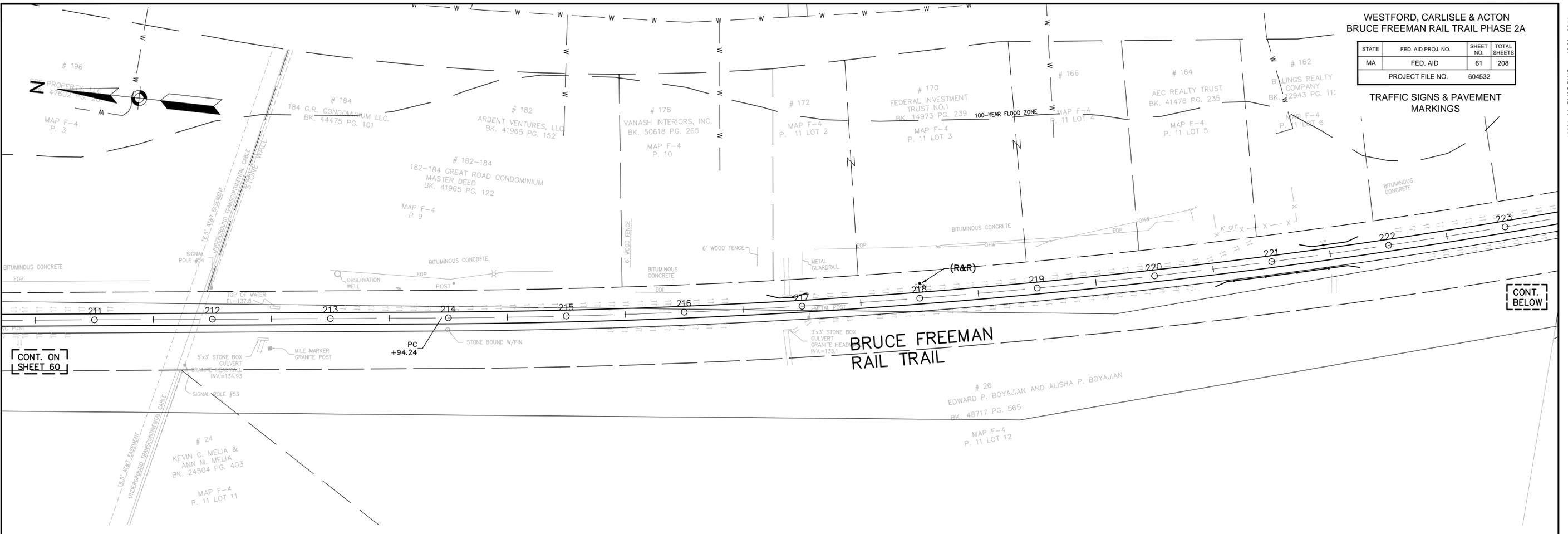


8
WATER SUPPLY
DISTRICT OF ACTON
BK. 25911 PG. 36

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	61	208
PROJECT FILE NO. 604532			

TRAFFIC SIGNS & PAVEMENT MARKINGS

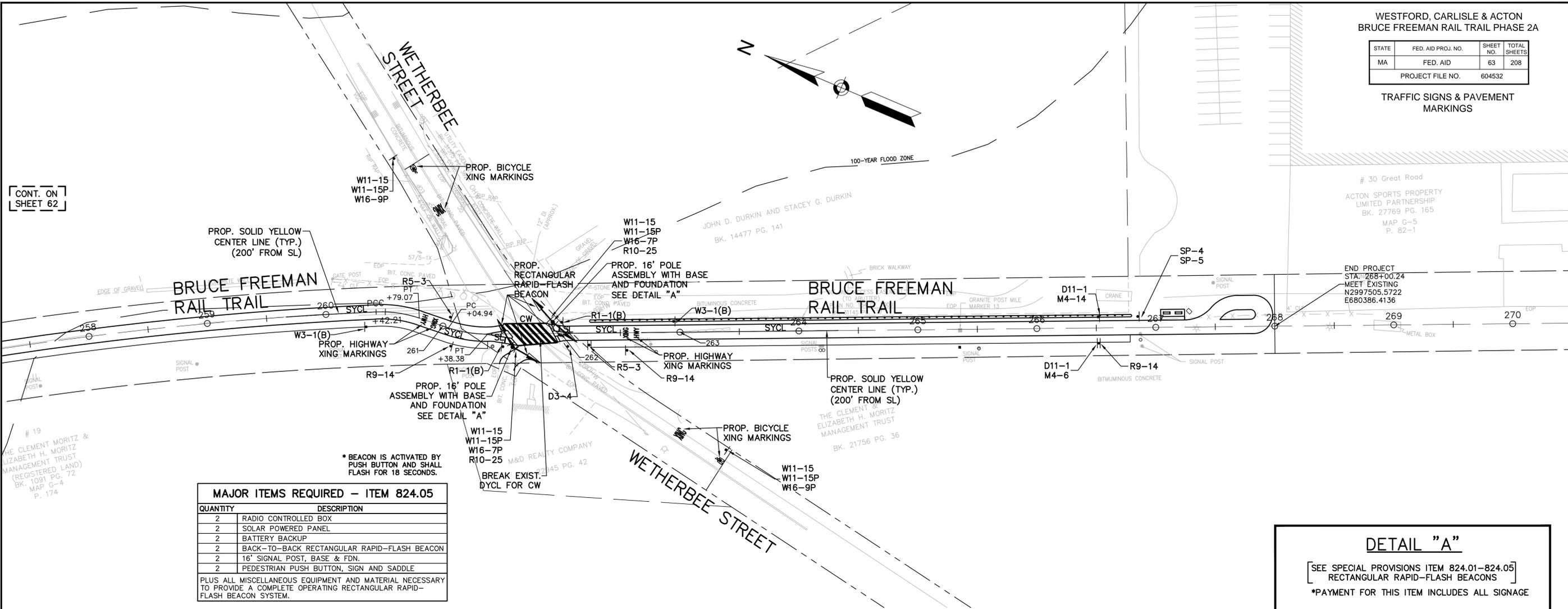


10031_2A_P1M&S.DWG 13-Mar-2014

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	63	208
PROJECT FILE NO. 604532			

TRAFFIC SIGNS & PAVEMENT MARKINGS

10031_2A_P1M&S.DWG 13-Mar-2014



CONT. ON SHEET 62

PROP. SOLID YELLOW CENTER LINE (TYP.) (200' FROM SL)

W11-15
W11-15P
W16-9P

PROP. BICYCLE XING MARKINGS

W11-15
W11-15P
W16-7P
R10-25

PROP. 16' POLE ASSEMBLY WITH BASE AND FOUNDATION SEE DETAIL "A"

BRUCE FREEMAN RAIL TRAIL

SP-4
SP-5

END PROJECT STA. 268+00.24 MEET EXISTING N2997505.5722 E680386.4136

* BEACON IS ACTIVATED BY PUSH BUTTON AND SHALL FLASH FOR 18 SECONDS.

MAJOR ITEMS REQUIRED - ITEM 824.05

QUANTITY	DESCRIPTION
2	RADIO CONTROLLED BOX
2	SOLAR POWERED PANEL
2	BATTERY BACKUP
2	BACK-TO-BACK RECTANGULAR RAPID-FLASH BEACON
2	16' SIGNAL POST, BASE & FDN.
2	PEDESTRIAN PUSH BUTTON, SIGN AND SADDLE

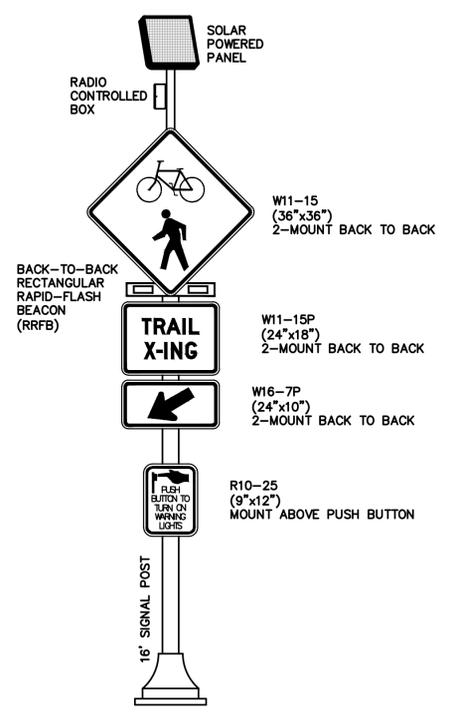
PLUS ALL MISCELLANEOUS EQUIPMENT AND MATERIAL NECESSARY TO PROVIDE A COMPLETE OPERATING RECTANGULAR RAPID-FLASH BEACON SYSTEM.



SCALE 1" = 40'

DETAIL "A"

SEE SPECIAL PROVISIONS ITEM 824.01-824.05
RECTANGULAR RAPID-FLASH BEACONS
*PAYMENT FOR THIS ITEM INCLUDES ALL SIGNAGE



STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	64	208
PROJECT FILE NO.		604532	

TRAFFIC SIGN SUMMARY SHEET

IDENTIFICATION NUMBER	SIZE OF SIGN		TEXT	TEXT DIMENSIONS (INCHES)		NUMBER OF SIGNS REQUIRED	COLOR			POST SIZE AND NUMBER REQUIRED	UNIT AREA IN SQUARE FEET	AREA IN SQUARE FEET		
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING		BACK-GROUND	LEGEND	BORDER					
R1-1	30"	30"		MUTCD STANDARD		5	RED	WHITE	WHITE	P5 (5 REQ'D)	6.25	31.25		
R1-1(B)	18"	18"				11	RED	WHITE	WHITE	P5 (11 REQ'D)	2.25	24.75		
R1-2(B)	18"	18"				2	RED	WHITE	WHITE	P5 (2 REQ'D)	2.25	4.50		
R4-2sp	18"	24"				8	WHITE	BLACK	BLACK	P5 (8 REQ'D)	3.00	24.00		
R5-3	24"	24"				16	WHITE	BLACK	BLACK	P5 (16 REQ'D)	4.00	64.00		
R7-8	12"	18"				3	WHITE	GREEN/BLUE	GREEN	P5 (3 REQ'D)	1.50	4.50		
R7-8P	18"	9"				3	WHITE	GREEN	GREEN	MNT w/R7-8	1.125	3.375		
R8-1a	24"	30"				2	RED	WHITE	WHITE	P5 (2 REQ'D)	5.00	10.00		
R8-3a	18"	24"		MUTCD STANDARD		2	RED	WHITE	WHITE	P5 (2 REQ'D)	3.00	6.00		
R9-5	12"	18"				2	WHITE	BLACK	BLACK	2 MNT ON SIGNAL POST	1.50	3.00		
R9-14	18"	18"				12	WHITE	BLACK/RED	BLACK	P5 (12 REQ'D)	2.25	27.00		
R10-3e	9"	15"				2	WHITE	BLACK	BLACK	2 MNT ON SIGNAL POST ABOVE PUSH BUTTON	PAY UNDER ITEM 816.01			
R10-6	24"	36"				1	WHITE	BLACK	BLACK	P5 (1 REQ'D)	6.00	6.00		
R10-11a	30"	36"				2	WHITE	BLACK	BLACK	2 MNT ON M.A. POST	5.00	10.00		
R10-22	18"	24"				4	WHITE	BLACK	BLACK	3 ON P5; 1 MNT w/R10-6	3.00	12.00		
R10-25 ^①	9"	12"				10	WHITE	BLACK	BLACK	MNT ON BEACON POST	PAY UNDER ITEM 824.01-.05			
W1-5R	18"	18"		MUTCD STANDARD		2	YELLOW	BLACK	BLACK	P5 (2 REQ'D)	2.25	4.50		
W1-8L	12"	18"				18	YELLOW	BLACK	NONE	P5 (18 REQ'D)	1.50	27.00		
W1-8R	12"	18"				18	YELLOW	BLACK	NONE	P5 (18 REQ'D)	1.50	27.00		
W1-10L	18"	18"				1	YELLOW	BLACK	BLACK	P5 (1 REQ'D)	2.25	2.25		
W1-10R	18"	18"				1	YELLOW	BLACK	BLACK	P5 (1 REQ'D)	2.25	2.25		
W2-1	18"	18"				MUTCD STANDARD		2	YELLOW	BLACK	BLACK	P5 (2 REQ'D)	2.25	4.50
W2-3sp(L)	18"	18"						2	YELLOW	BLACK	BLACK	P5 (2 REQ'D)	2.25	4.50
W2-3sp(R)	18"	18"						2	YELLOW	BLACK	BLACK	P5 (2 REQ'D)	2.25	4.50
W3-1	30"	30"		1	YELLOW			BLACK/RED	BLACK	P5 (1 REQ'D)	2.25	2.25		
W3-1(B)	18"	18"		10	YELLOW			BLACK/RED	BLACK	P5 (10 REQ'D)	2.25	22.50		
W3-3	18"	18"		2	YELLOW			BLACK/RED/GREEN	BLACK	P5 (2 REQ'D)	2.25	4.50		
W7-5	18"	18"		2	YELLOW			BLACK	BLACK	P5 (2 REQ'D)	2.25	4.50		
W8-3sp	18"	18"		1	YELLOW			BLACK	BLACK	P5 (1 REQ'D)	2.25	2.25		
W11-15 ^①	36"	36"		32	YELLOW	BLACK	BLACK	12 ON P5; 20 MNT ON BEACON POST	9.00	108.00	PAY UNDER ITEM 824.01-.05			
W11-15P ^①	24"	18"		32	YELLOW	BLACK	BLACK	12 w/W11-15; 20 MNT ON BEACON POST	3.00	36.00	PAY UNDER ITEM 824.01-.05			
W16-1Psp	18"	18"		4	YELLOW	BLACK	BLACK	MNT w/W2-3sp	2.25	9.00				
W16-2aP	18"	9"		1	YELLOW	BLACK	BLACK	MNT w/W8-3sp	1.13	1.13				
W16-7P ^①	24"	12"		20	YELLOW	BLACK	BLACK	MNT ON BEACON POST	PAY UNDER ITEM 824.01-.05					
W16-9P	24"	12"		12	YELLOW	BLACK	BLACK	MNT w/W11-15	2.00	24.00				
SP-1	24"	12"		5	WHITE	RED	RED	P5 (5 REQ'D)	2.00	10.00				
SP-2	24"	18"		3	WHITE	RED	RED	P5 (3 REQ'D)	3.00	9.00				
SP-3	24"	18"		3	WHITE	RED	RED	P5 (3 REQ'D)	3.00	9.00				

IDENTIFICATION NUMBER	SIZE OF SIGN		TEXT	TEXT DIMENSIONS (INCHES)		NUMBER OF SIGNS REQUIRED	COLOR			POST SIZE AND NUMBER REQUIRED	UNIT AREA IN SQUARE FEET	AREA IN SQUARE FEET
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING		BACK-GROUND	LEGEND	BORDER			
W2-1	18"	18"		MUTCD STANDARD		2	YELLOW	BLACK	BLACK	P5 (2 REQ'D)	2.25	4.50
W2-3sp(L)	18"	18"				2	YELLOW	BLACK	BLACK	P5 (2 REQ'D)	2.25	4.50
W2-3sp(R)	18"	18"				2	YELLOW	BLACK	BLACK	P5 (2 REQ'D)	2.25	4.50
W3-1	30"	30"				1	YELLOW	BLACK/RED	BLACK	P5 (1 REQ'D)	2.25	2.25
W3-1(B)	18"	18"				10	YELLOW	BLACK/RED	BLACK	P5 (10 REQ'D)	2.25	22.50
W3-3	18"	18"				2	YELLOW	BLACK/RED/GREEN	BLACK	P5 (2 REQ'D)	2.25	4.50
W7-5	18"	18"				2	YELLOW	BLACK	BLACK	P5 (2 REQ'D)	2.25	4.50
W8-3sp	18"	18"				1	YELLOW	BLACK	BLACK	P5 (1 REQ'D)	2.25	2.25
W11-15 ^①	36"	36"		32	YELLOW	BLACK	BLACK	12 ON P5; 20 MNT ON BEACON POST	9.00	108.00	PAY UNDER ITEM 824.01-.05	
W11-15P ^①	24"	18"		32	YELLOW	BLACK	BLACK	12 w/W11-15; 20 MNT ON BEACON POST	3.00	36.00	PAY UNDER ITEM 824.01-.05	
W16-1Psp	18"	18"		4	YELLOW	BLACK	BLACK	MNT w/W2-3sp	2.25	9.00		
W16-2aP	18"	9"		1	YELLOW	BLACK	BLACK	MNT w/W8-3sp	1.13	1.13		
W16-7P ^①	24"	12"		20	YELLOW	BLACK	BLACK	MNT ON BEACON POST	PAY UNDER ITEM 824.01-.05			
W16-9P	24"	12"		12	YELLOW	BLACK	BLACK	MNT w/W11-15	2.00	24.00		
SP-1	24"	12"		5	WHITE	RED	RED	P5 (5 REQ'D)	2.00	10.00		
SP-2	24"	18"		3	WHITE	RED	RED	P5 (3 REQ'D)	3.00	9.00		
SP-3	24"	18"		3	WHITE	RED	RED	P5 (3 REQ'D)	3.00	9.00		

① NOTE: SIGNS ASSOCIATED WITH ITEM 824.01-824.05 RECTANGULAR RAPID FLASHING BEACON ARE PAID FOR UNDER ITEM 824.01-824.05.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	65	208
PROJECT FILE NO.		604532	

TRAFFIC SIGN SUMMARY SHEET

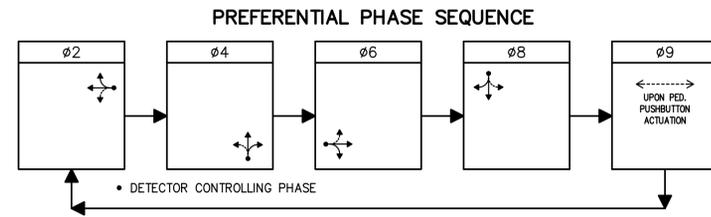
IDENTIFICATION NUMBER	SIZE OF SIGN		TEXT	TEXT DIMENSIONS (INCHES)		NUMBER OF SIGNS REQUIRED	COLOR			POST SIZE AND NUMBER REQUIRED	UNIT AREA IN SQUARE FEET	AREA IN SQUARE FEET
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING		BACK-GROUND	LEGEND	BORDER			
SP-4	30"	24"		4"B 4"B 4"B	3" 3" 3"	5	BROWN	WHITE	WHITE	P5 (5 REQ'D)	5.00	25.00
SP-5	24"	36"	TRAIL RULES SIGN (REF. SPEC. 832.1)			5	WHITE	BLACK	BLACK	MNT w/SP-4	PAY UNDER ITEM 832.1	
SP-6	24"	36"	NARA PARK RULES SIGN (REF. SPEC. 832.2)			2	WHITE	BLACK	BLACK	P5 (2 REQ'D)	PAY UNDER ITEM 832.2	
SP-7	24"	30"		6"x6" 3"C 3"B 6"x6"	1.5" 1" 1" 1.5"	2	BROWN	WHITE	WHITE	P5 (2 REQ'D)	5.00	10.00
D3-1 (PBS)	VAR.	8"		4"C/3"C	2" 2"	2	GREEN	WHITE	WHITE	P5 (2 REQ'D)	PAY UNDER ITEM 874.	
D3-2 (PBS)	VAR.	8"		4"C/3"C	2" 2"	1	GREEN	WHITE	WHITE	P5 (1 REQ'D)	PAY UNDER ITEM 874.	
D3-3 (PBS)	VAR.	8"		4"C/3"C	2" 2"	1	GREEN	WHITE	WHITE	P5 (1 REQ'D)	PAY UNDER ITEM 874.	
D3-4 (PBS)	VAR.	8"		4"C/3"C	2" 2"	1	GREEN	WHITE	WHITE	P5 (1 REQ'D)	PAY UNDER ITEM 874.	
I-2-1	30"	18"		MUTCD STANDARD	↑ ↓	2	GREEN	WHITE	WHITE	P5 (2 REQ'D)	3.75	7.50
I-2-2	24"	18"				1	GREEN	WHITE	WHITE	MNT w/I-2-1	3.00	3.00
I-2-3	30"	18"				1	GREEN	WHITE	WHITE	MNT w/I-2-1	3.75	3.75
D11-1	24"	18"				8	GREEN	WHITE	WHITE	P5 (8 REQ'D)	3.00	24.00
D11-1c	24"	18"				2	GREEN	WHITE	WHITE	P5 (2 REQ'D)	3.00	6.00
M4-6	12"	6"				4	GREEN	WHITE	WHITE	MNT w/D11-1	0.50	2.00
M4-14	12"	6"				4	GREEN	WHITE	WHITE	MNT w/D11-1	0.50	2.00
M6-2(L)	12"	9"		1	GREEN	WHITE	WHITE	MNT w/D11-1c	0.75	0.75		
M6-2(R)	12"	9"		1	GREEN	WHITE	WHITE	MNT w/D11-1c	0.75	0.75		

- NOTES: 1. ALL WARNING, REGULATORY AND ROUTE MARKERS SHALL BE FABRICATED WITH HIGH INTENSITY ENCAPSULATED LENS REFLECTIVE SHEETING (SEE SECTION M9.30.0) TYPE III OR IV.
2. ALL SIGNS NOTED AS "(R&R)" SHALL BE MOUNTED ON NEW P5 POSTS OR AS OTHERWISE INDICATED.
3. ALL P5 POSTS SHALL BE TELESCOPIC BREAKAWAY SQUARE TUBE POSTS.
4. QUANTITIES OF SIGNS AND POSTS SHOWN ON THIS SHEET MAY DIFFER FROM THE PAVEMENT MARKING AND SIGNING PLANS. WHERE DIFFERENCES OCCUR, THE PAVEMENT MARKINGS AND SIGNING PLANS SHALL PREVAIL.
5. ALL STOP AND YIELD SIGNS PROPOSED IN THIS CONTRACT ARE SUBJECT TO FIELD INVESTIGATION BY THE DISTRICT OFFICE OF THE MASSACHUSETTS HIGHWAY DEPARTMENT TO JUSTIFY WARRANTS BEFORE INSTALLATION.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	66	208
PROJECT FILE NO. 604532			

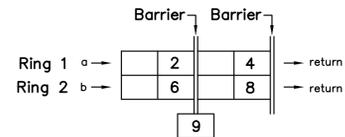
TRAFFIC SIGNAL PLANS

TRAFFIC CONTROLLER DATA	
PARAMETER	SELECTION
PHASE ASSIGNMENTS	STD. NEMA
OVERLAPS	STD. NEMA
RINGS	DUAL
DUAL ENTRY	ON (ø2)(ø4)
SIMULTANEOUS GAP OUT DISABLED	YES
MINIMUM YELLOW IN SECONDS	3
MAX II BY INTERNAL CLOCK	YES
NIGHT TIME FLASH BY INTERNAL CLOCK	NOT USED



FULLY-ACTUATED	<input checked="" type="checkbox"/>	ISOLATED	<input checked="" type="checkbox"/>	ø2+ø6	ø4+ø8	ø9
SEMI-ACTUATED	<input type="checkbox"/>	COORDINATED	<input type="checkbox"/>			
PRE-TIMED	<input type="checkbox"/>	WIRE	<input type="checkbox"/>	TBCU	<input type="checkbox"/>	

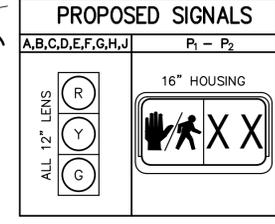
RING STRUCTURE



SEQUENCE AND TIMING

STREET	DIRECTION	HOUSINGS	1	2	3	4	5	6	7	8	9	FLASH OPER.
ACTON ROAD (ROUTE 27)	NB	F,G	G	Y	R	R	R	R	R	R	R	FR
ACTON ROAD (ROUTE 27)	SB	H,J	G	Y	R	R	R	R	R	R	R	FR
CARLISLE ROAD (ROUTE 225)	EB	A,B	R	R	R	G	Y	R	R	R	R	FY
CARLISLE ROAD (ROUTE 225)	WB	C,D,E	R	R	R	G	Y	R	R	R	R	FY

PEDESTRIAN	P1-P2	DW	DW	DW	DW	DW	DW	W	FDW	DW	OUT
MINIMUM INITIAL		6			6						
PASSAGE		3			3						
MAXIMUM 1		30			36						
MAXIMUM 2		30			36						
CHANGE		4	2		4	2					
PEDESTRIAN								7	10	1	
RECALL		OFF			SOFT				OFF		
MEMORY		NON-LOCKING			NON-LOCKING				LOCKING		

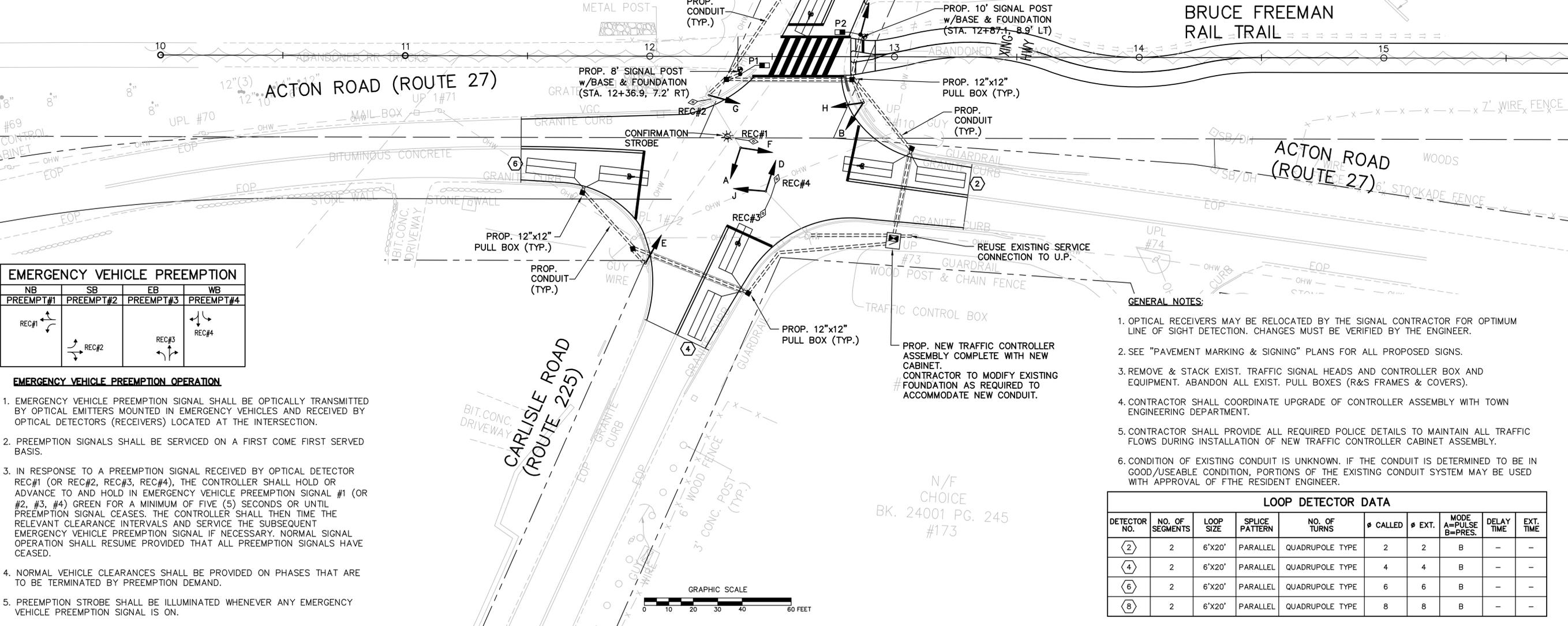


MAJOR ITEMS REQUIRED	
QUANTITY	DESCRIPTION
1	TRAFFIC CONTROLLER & CABINET NEMA TS2-TYPE 1 ON EXISTING FOUNDATION
1	SERVICE CONNECTION (OVERHEAD FROM UTILITY POLE)
1	10' SIGNAL POST, BASE & FDN.
1	8' SIGNAL POST, BASE & FDN.
9	SIGNAL HEAD, 3 SECTION
2	PEDESTRIAN HOUSING GRAPHIC LED w/COUNTDOWN TIMER
2	AUDIBLE & VIBRO-TACTILE PEDESTRIAN PUSH BUTTON INTEGRATED R10-3e SIGN & SADDLE w/LED CONFIRMATION LIGHT
8	ROADWAY LOOP DETECTOR QUADRUPOLE TYPE (6'x20')
3	DUAL CHANNEL LOOP DETECTOR AMPLIFIER INCLUDING 1 SPARE
4	UNIDIRECTIONAL SINGLE CHANNEL OPTICAL DETECTOR (RECEIVER)
1	PREEMPTION 4-CHANNEL PHASE SELECTOR
1	PREEMPTION CONFIRMATION STROBE (CLEAR)
7	PULL BOX 12"x12" - SD2.031 (PAY SEPARATELY UNDER ITEM 811.31)

PLUS ALL MISCELLANEOUS EQUIPMENT AND MATERIAL NECESSARY TO PROVIDE A COMPLETE OPERATING TRAFFIC CONTROL SIGNAL.

NOTES:

- ALL INDICATIONS SHALL BE "LED" TYPE LENS IN ACCORDANCE WITH THE SPECIAL PROVISIONS.
- ALL SIGNAL HEADS SHALL BE EQUIPPED WITH TUNNEL VISORS.
- ALL PEDESTRIAN DISPLAY SHALL BE "FULL" DISPLAYS. NO OUTLINE SYMBOL SHALL BE PERMITTED.
- REPLACE ALL INTERSECTION CONDUIT AND FIELD WIRING.



EMERGENCY VEHICLE PREEMPTION			
NB	SB	EB	WB
PREEMPT#1	PREEMPT#2	PREEMPT#3	PREEMPT#4
REC#1	REC#2	REC#3	REC#4

EMERGENCY VEHICLE PREEMPTION OPERATION

- EMERGENCY VEHICLE PREEMPTION SIGNAL SHALL BE OPTICALLY TRANSMITTED BY OPTICAL EMITTERS MOUNTED IN EMERGENCY VEHICLES AND RECEIVED BY OPTICAL DETECTORS (RECEIVERS) LOCATED AT THE INTERSECTION.
- PREEMPTION SIGNALS SHALL BE SERVICED ON A FIRST COME FIRST SERVED BASIS.
- IN RESPONSE TO A PREEMPTION SIGNAL RECEIVED BY OPTICAL DETECTOR REC#1 (OR REC#2, REC#3, REC#4), THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY VEHICLE PREEMPTION SIGNAL #1 (OR #2, #3, #4) GREEN FOR A MINIMUM OF FIVE (5) SECONDS OR UNTIL PREEMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME THE RELEVANT CLEARANCE INTERVALS AND SERVICE THE SUBSEQUENT EMERGENCY VEHICLE PREEMPTION SIGNAL IF NECESSARY. NORMAL SIGNAL OPERATION SHALL RESUME PROVIDED THAT ALL PREEMPTION SIGNALS HAVE CEASED.
- NORMAL VEHICLE CLEARANCES SHALL BE PROVIDED ON PHASES THAT ARE TO BE TERMINATED BY PREEMPTION DEMAND.
- PREEMPTION STROBE SHALL BE ILLUMINATED WHENEVER ANY EMERGENCY VEHICLE PREEMPTION SIGNAL IS ON.

GENERAL NOTES:

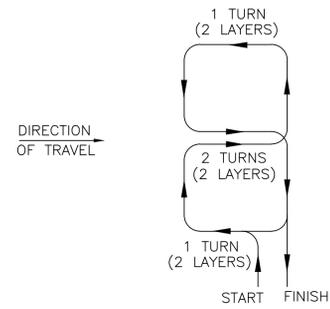
- OPTICAL RECEIVERS MAY BE RELOCATED BY THE SIGNAL CONTRACTOR FOR OPTIMUM LINE OF SIGHT DETECTION. CHANGES MUST BE VERIFIED BY THE ENGINEER.
- SEE "PAVEMENT MARKING & SIGNING" PLANS FOR ALL PROPOSED SIGNS.
- REMOVE & STACK EXIST. TRAFFIC SIGNAL HEADS AND CONTROLLER BOX AND EQUIPMENT. ABANDON ALL EXIST. PULL BOXES (R&S FRAMES & COVERS).
- CONTRACTOR SHALL COORDINATE UPGRADE OF CONTROLLER ASSEMBLY WITH TOWN ENGINEERING DEPARTMENT.
- CONTRACTOR SHALL PROVIDE ALL REQUIRED POLICE DETAILS TO MAINTAIN ALL TRAFFIC FLOWS DURING INSTALLATION OF NEW TRAFFIC CONTROLLER CABINET ASSEMBLY.
- CONDITION OF EXISTING CONDUIT IS UNKNOWN. IF THE CONDUIT IS DETERMINED TO BE IN GOOD/USEABLE CONDITION, PORTIONS OF THE EXISTING CONDUIT SYSTEM MAY BE USED WITH APPROVAL OF FTHE RESIDENT ENGINEER.

LOOP DETECTOR DATA									
DETECTOR NO.	NO. OF SEGMENTS	LOOP SIZE	SPLICE PATTERN	NO. OF TURNS	ø CALLED	ø EXT.	MODE A=PULSE B=PRES.	DELAY TIME	EXT. TIME
ø2	2	6'x20'	PARALLEL	QUADRUPOLE TYPE	2	2	B	-	-
ø4	2	6'x20'	PARALLEL	QUADRUPOLE TYPE	4	4	B	-	-
ø6	2	6'x20'	PARALLEL	QUADRUPOLE TYPE	6	6	B	-	-
ø8	2	6'x20'	PARALLEL	QUADRUPOLE TYPE	8	8	B	-	-

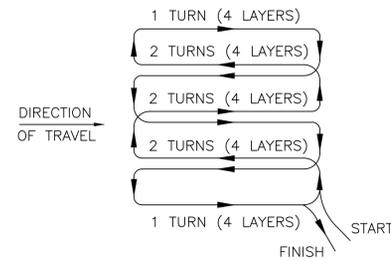
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	67	208
PROJECT FILE NO.		604532	

TRAFFIC SIGNAL DETAILS

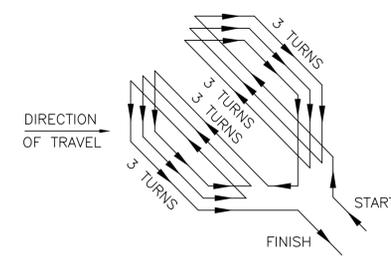
WINDING DETAILS



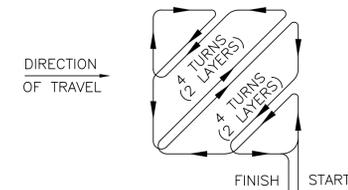
TYPE Q DETECTOR



TYPE D-Q DETECTOR

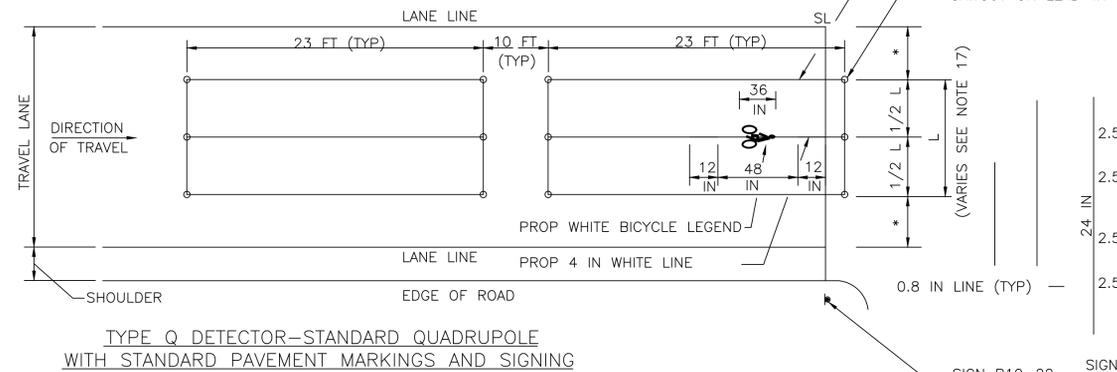


TYPE D-1 DETECTOR

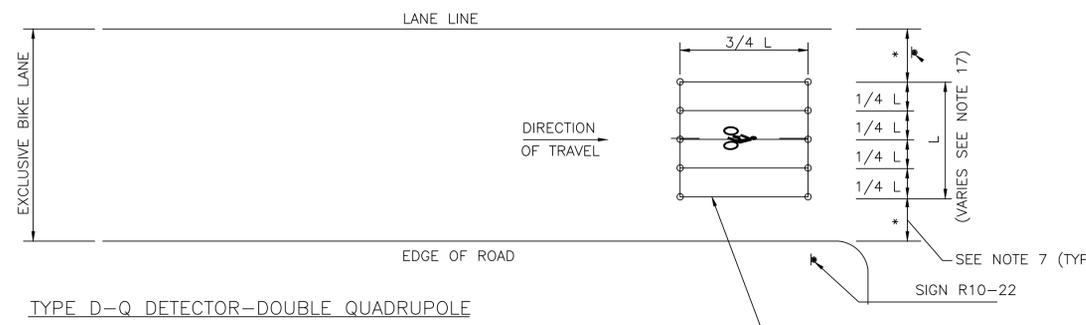


TYPE D-2 DETECTOR

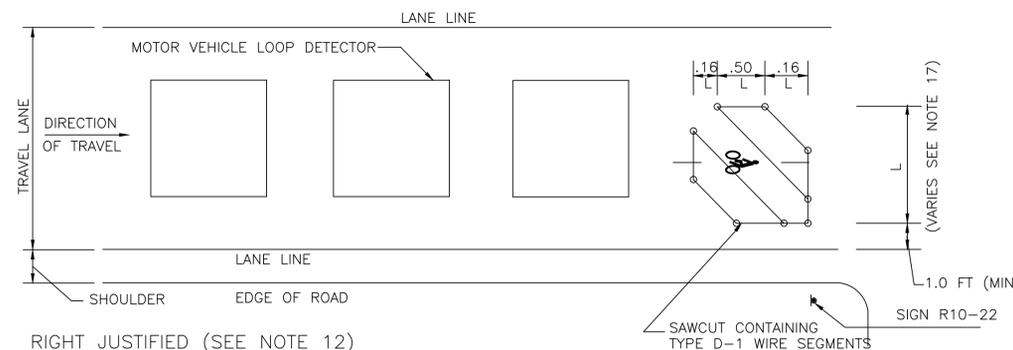
INSTALLATION DETAILS



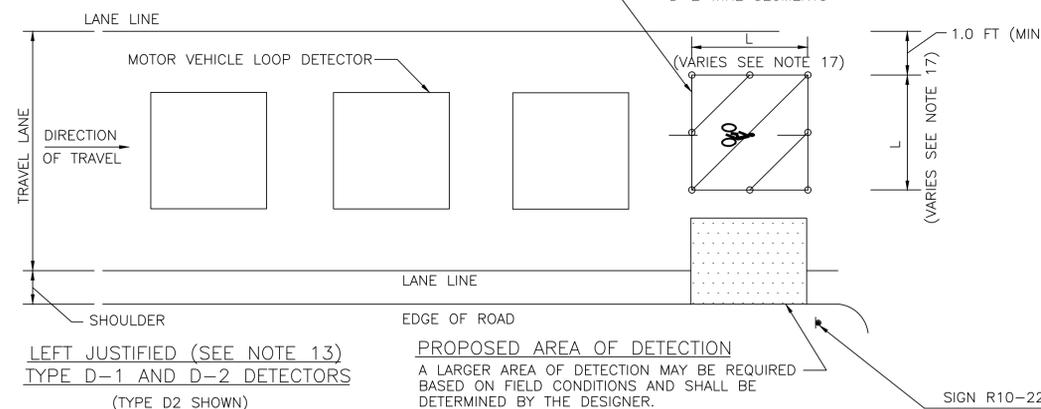
TYPE Q DETECTOR—STANDARD QUADRUPOLE WITH STANDARD PAVEMENT MARKINGS AND SIGNING



TYPE D-Q DETECTOR—DOUBLE QUADRUPOLE



RIGHT JUSTIFIED (SEE NOTE 12)
TYPE D-1 AND D-2 DETECTORS
(TYPE D1 SHOWN)



LEFT JUSTIFIED (SEE NOTE 13)
TYPE D-1 AND D-2 DETECTORS
(TYPE D2 SHOWN)

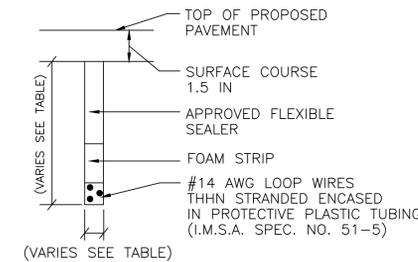
PROPOSED AREA OF DETECTION
A LARGER AREA OF DETECTION MAY BE REQUIRED BASED ON FIELD CONDITIONS AND SHALL BE DETERMINED BY THE DESIGNER.

SIGN R10-22



SIGN BORDER: R=1.5, TH=0.5, INS=.38
WHITE BACKGROUND
BLACK LEGEND AND LINES

NOTE: ALL SIGN DIMENSIONS IN INCHES
NOTE: SIGN PANEL NOT SHOWN TO SCALE



SECTION THRU LOOP DETECTOR

TURNS OF WIRE	SLOT SIZE	
	DEPTH (IN)	WIDTH (IN)
1	1.5	0.5
2	1.5	0.5
3	1.5	0.5
4	2.0	0.5
5	2.0	0.5
6	2.0	0.5
7	2.0	0.5
8	2.0	0.5

BICYCLE LOOP DETECTOR DETAILS

NOTES:

- REFER TO VEHICLE LOOP DETECTOR DETAIL SHEET FOR ADDITIONAL NOTES AND CONSTRUCTION DETAILS.
- ALL DETAILS ARE GRAPHICAL WITH NO SCALE.
- THE NUMBER, SIZE, LOCATION AND LENGTH OF DETECTION AREA VARIES AND SHALL BE DETERMINED BY THE DESIGNER REFER TO TRAFFIC SIGNAL PLAN.
- BICYCLE LOOPS SHALL BE CONNECTED TO SEPARATE LOOP DETECTOR AMPLIFIERS CAPABLE OF HIGHER LEVELS OF SENSITIVITY.
- BICYCLE LOOPS SHALL BE INSTALLED IN THE BASE COURSE OF EXISTING PAVEMENT. THE EXISTING PAVEMENT SHALL BE COLD PLANED TO THE BASE COURSE AND SAWCUT FOR LOOP INSTALLATION.
- SIGNS AND PAVEMENT MARKINGS SHALL BE INSTALLED FOR ALL BICYCLE DETECTORS TO INFORM CYCLISTS OF THE DETECTION AREA.
- OFFSETS FROM LANE LINE EQUAL UNLESS OTHERWISE NOTED. SEE PLANS.
- TYPE Q DETECTORS SHALL BE WIRED IN A FIGURE EIGHT PATTERN WITH A DOUBLE LAYER DESIGN (2-4-2) WITH 2 TURNS IN THE PERIMETER SLOTS AND 4 TURNS IN THE CENTER SLOT AS SHOWN IN THE WINDING DETAIL.
- BICYCLES WILL BE DETECTED WITHIN 4 IN. OF THE INTERIOR LONGITUDINAL LOOP WIRES FOR TYPE Q AND D-Q DETECTORS.
- PROVIDE 3 TURNS FOR TYPE D-1 DETECTORS.
- INSTALL 2 LAYERS OF WIRE WOUND IN THE SAME DIRECTION IN BOTH LAYERS FOR TYPE D-2 DETECTORS. THE RESULT IS 4 TURNS IN EACH DIAGONAL.
- RIGHT JUSTIFIED LOOP DETECTORS SHALL BE CONSIDERED FOR THE FOLLOWING CONDITIONS:
 - BICYCLE STOPPING ON THE RIGHT SIDE OF A THRU TRAVEL LANE.
 - BICYCLE STOPPING ON THE RIGHT SIDE OF AN EXCLUSIVE LEFT TURN LANE.
- LEFT JUSTIFIED LOOP DETECTORS SHALL BE CONSIDERED FOR THE FOLLOWING CONDITIONS:
 - BICYCLE STOPPING ON THE LEFT SIDE OF A SHARED LEFT/THRU LANE.
 - BICYCLE STOPPING JUST TO THE RIGHT OF THE CENTERLINE WHEN TURNING LEFT ON A TWO-LANE ROADWAY.
- RECTANGULAR LOOP DETECTORS SHALL BE CONSIDERED FOR BICYCLES STOPPING ON EITHER THE LEFT OR RIGHT SIDE OF A TWO-LANE ROADWAY. THE MINIMUM OFFSET FROM LANE LINE OR CURB LINE SHALL BE 1.0 FT.
- PAVEMENT CORES OR TEST PITS MAY BE REQUIRED TO DETERMINE THE DEPTH OF EXISTING PAVEMENT AND CONFIRM THAT THE DETECTION OPTION CHOSEN AND CORRESPONDING WINDING PATTERN CAN BE ACCOMMODATED.
- THESE DETAILS APPLY TO BICYCLE LOOPS INSTALLED IN ROADWAYS. PUSH BUTTON ACTUATION SHALL BE CONSIDERED FOR RECREATIONAL BIKE PATHS.
- THE MINIMUM DIMENSION FOR L SHALL BE 6 FT MIN. FOR DETECTORS TYPE D-Q, D-1 & D-2. FINAL DIMENSIONS SHALL BE DETERMINED BY THE DESIGN ENGINEER.

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TRAFFIC LEGEND ABBREVIATIONS & NOTES

10031_2A_TL.DWG 13-Mar-2014

TRAFFIC SIGNAL LEGEND

EXISTING	PROPOSED	
		CONTROL CABINET GROUND MOUNTED (WITH & WITHOUT CONC. PAD)
		CONTROL CABINET POLE MOUNTED
		FLASHING BEACON CONTROL & METER PEDESTAL
		PULL BOX (12" x 12" OR AS NOTED)
		MAST ARM, SHAFT & BASE (ARM LENGTH AS NOTED)
		SIGNAL POST & BASE (ALPHA-NUMERIC DESIGNATION NOTED)
		VEHICULAR SIGNAL HEAD (ALPHA-NUMERIC DESIGNATION NOTED)
		VEHICULAR SIGNAL HEAD, OPTICALLY PROGRAMMED (ALPHA-NUMERIC DESIGNATION NOTED)
		FLASHING BEACON (ALPHA-NUMERIC DESIGNATION NOTED)
		PEDESTRIAN SIGNAL HEAD (ALPHA-NUMERIC DESIGNATION NOTED)
		EMERGENCY PREEMPTION DETECTOR (OPTICAL)
		PEDESTRIAN PUSH BUTTON, SIGN & SADDLE
		WIRE LOOP DETECTOR (6' x 6' OR AS NOTED)
		HIGH MAST POLE OR TOWER
		MAGNETOMETER
		RADAR DETECTOR
		SIGNAL & LIGHTING MAST ARM
		TRAFFIC SIGN & POST
		CONTROLLER PHASE ACTUATED
		ZONE OF DETECTION FOR SPECIAL DETECTORS
		ZONE OF VISIBILITY FOR PROGRAMMED SIGNAL
		TRAFFIC SIGNAL HEAD (12" LENSES OR AS NOTED)
		OVERHEAD WIRE(S)
		DIRECT BURIAL CABLE
		TRAFFIC SIGNAL CONDUIT
		CONDUIT CROSSING ROADWAY WITH FLOWABLE FILL

GENERAL ABBREVIATIONS

MAX	MAXIMUM
MIN	MINIMUM
BO	BY OTHERS
PROP	PROPOSED
R&D	REMOVE AND DISPOSE
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
REM	REMOVE
RET	RETAIN

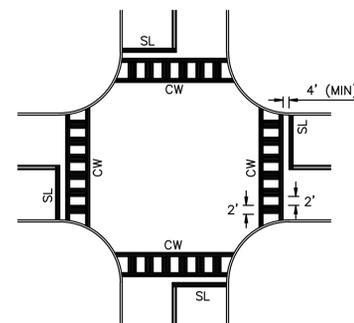
TRAFFIC ABBREVIATIONS

R	STEADY CIRCULAR RED	
Y	STEADY CIRCULAR AMBER	
G	STEADY CIRCULAR GREEN	
RL	STEADY RED LEFT ARROW	
YL	STEADY AMBER LEFT ARROW	
GL	STEADY GREEN LEFT ARROW	
GV	STEADY GREEN VERTICAL ARROW	
RR	STEADY RED RIGHT ARROW	
YR	STEADY AMBER RIGHT ARROW	
GR	STEADY GREEN RIGHT ARROW	
FR	FLASHING CIRCULAR RED	
FY	FLASHING CIRCULAR AMBER	
FRL	FLASHING RED LEFT ARROW	
FRR	FLASHING RED RIGHT ARROW	
W	WALK - LUNAR WHITE	
DW	DON'T WALK - PORTLAND ORANGE	
FDW	FLASHING DON'T WALK - PORTLAND ORANGE	
L	DETECTOR - LOCK	
NL	DETECTOR - NON-LOCK	
	VEHICLE MOVEMENT	} ONLY SHOWN ON PHASING DIAGRAMS
	PEDESTRIAN MOVEMENT	
	PERMISSIVE VEHICULAR MOVEMENT	
	DETECTOR CONTROLLING PHASE	
	DON'T WALK / WALK / COUNTDOWN TIMER	

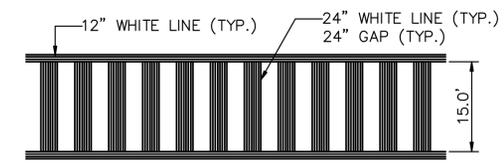
PAVEMENT MARKING LEGEND

EXISTING	PROPOSED	
		STOP LINE - 12"
		CROSSWALK - 12" WHITE LINES
		SOLID WHITE LANE LINE - 6"
		SOLID WHITE EDGE LINE - 6"
		SOLID WHITE GORE LINE - 8"
		* BROKEN WHITE LANE LINE - 6"
		* BROKEN YELLOW LANE LINE - 6"
		WHITE GORE LINE - 12"
		** DOTTED WHITE LINE - 6"
		** DOTTED YELLOW LINE - 6"
		SOLID YELLOW CENTER LINE - 6"
		SOLID YELLOW EDGE LINE - 6"
		SOLID YELLOW GORE LINE - 8"
		YELLOW GORE LINE - 12"
		DOUBLE YELLOW LINE - 6"
		DOUBLE YELLOW CENTER LINE - 6"
		PAVEMENT ARROW & LEGEND
		PAVEMENT ARROWS

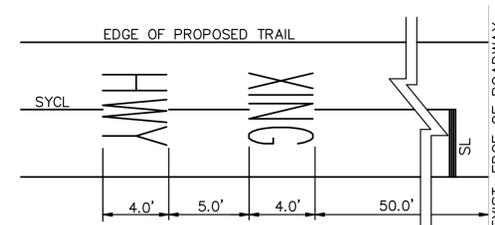
* BROKEN LANE LINES TO BE 10' IN LENGTH WITH 30' GAP (TYP.)
 BROKEN LINES ON SHARED-USE PATHS TO BE 3' IN LENGTH WITH 9' GAP (TYP.)
 ** DOTTED LINES TO BE 2' IN LENGTH WITH 2'-6' GAP (TYP.)



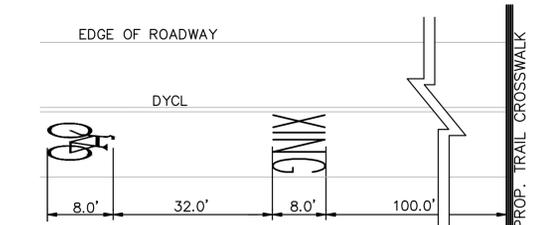
TYPICAL INTERSECTION MARKINGS
NOT TO SCALE



CROSSWALK DETAIL
NOT TO SCALE



ADVANCE TRAIL MARKINGS
AT ROADWAY XING
NOT TO SCALE



ADVANCE ROADWAY MARKINGS
AT TRAIL XING
NOT TO SCALE

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TRAFFIC LEGEND ABBREVIATIONS
& NOTES

GENERAL NOTES

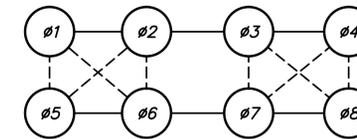
1. ALL EXISTING SIGNS WITHIN THE PROJECT LIMITS SHALL BE RETAINED UNLESS NOTED OTHERWISE.
2. ALL PROPOSED PAVEMENT MARKINGS FOR THE ROADWAY SHALL BE THERMOPLASTIC. ALL PROPOSED PAVEMENT MARKINGS FOR THE BIKE PATH SHALL BE PAINTED.
3. ALL GROUND MOUNTED SIGNS SHALL HAVE A LATERAL CLEARANCE OF 3 FEET TO 6 FEET MEASURED FROM THE NEAR EDGE OF THE SIGN TO THE NEAR EDGE OF THE BIKE TRAIL.
4. ALL GROUND MOUNTED SIGNS SHALL HAVE A HEIGHT OF 7 FEET MEASURED FROM THE BOTTOM EDGE OF THE SIGN TO THE NEAR EDGE OF THE BIKE TRAIL SURFACE.
5. THE LOCATIONS OF ALL PROPOSED BOLLARDS ARE SHOWN ON THE CONSTRUCTION PLANS.
6. TO AVOID CONFUSION WITH THE BASELINE, THE CENTERLINE STRIPE FOR THE BIKE TRAIL IS NOT SHOWN ON THE TRAFFIC PLANS. THE SOLID YELLOW CENTER LINE SHALL RUN 200' IN ADVANCE OF EACH STOP LINE PROPOSED AT ROADWAY CROSSINGS.

TRAFFIC SIGNAL NOTES

1. SEE CONSTRUCTION AND TRAFFIC PLANS FOR ADDITIONAL DETAILS.
2. PROPOSED CONTROLLERS SHALL BE A NEMA TS2, KEYBOARD ENTRY, MENU-DRIVEN TYPE WITH INTERNAL COORDINATION CAPABILITIES, UNLESS OTHERWISE NOTED IN MAJOR ITEMS.
3. POLE-MOUNTED SIGNALS SHALL BE MOUNTED TO PROVIDE A 2-FOOT MINIMUM CLEARANCE BETWEEN VERTICAL PROJECTION OF THE CURBLINE AND THE SIGNAL VISOR. WHEN FEASIBLE, INSTALL AT BACK OF SIDEWALK UNLESS OTHERWISE NOTED. PROVIDE SPECIAL MOUNTING HARDWARE AS REQUIRED.
4. CONSTRUCTION OF THE TRAFFIC CONTROL SIGNAL SYSTEMS SHOWN ON THE FOLLOWING DRAWINGS SHALL CONFORM TO THE MASSACHUSETTS HIGHWAY DEPARTMENT'S "STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES", 1988 ED. AS AMENDED, AND THE FEDERAL HIGHWAY ADMINISTRATION'S "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", 2003 EDITION AS AMENDED.
5. ALL TRAFFIC CONTROL SIGNAL EQUIPMENT SHALL BE LISTED ON THE CURRENT MASS. HIGHWAY DEPARTMENT'S "APPROVED LIST" AND IS SUBJECT TO THE APPROVAL OF THE DESIGN ENGINEER AND/OR THE MASS. HIGHWAY DEPARTMENT.
6. ALL OVERHEAD CONDUCTORS FOR SIGNAL HOUSINGS SHALL BE STRANDED WIRE.
7. ALL PROPOSED LENSES SHALL HAVE TUNNEL VISORS. ALL MAST ARM MOUNTED SIGNALS SHALL BE RIGIDLY MOUNTED.
8. ALL PROPOSED WIRE LOOP DETECTORS SHALL BE CENTERED WITHIN RESPECTIVE LANES UNLESS OTHERWISE NOTED.
9. FLASHING OPERATION PER CHAPTER 4 OF THE 2009 M.U.T.C.D.
10. IF THE ASSIGNED RIGHT OF WAY FOR ANY TRAFFIC MOVEMENT IS TO REMAIN IN EFFECT DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATIONS FOR THAT TRAFFIC MOVEMENT SHALL NOT CHANGE DURING THE CHANGE INTERVAL(S).
11. ALL NEW TRAFFIC CONTROLLER CABINETS SHALL BE EQUIPPED WITH A LEVER-TYPE METER BY-PASS. SPECIFICATIONS FOR THE BY-PASS MUST BE APPROVED BY THE APPROPRIATE UTILITY COMPANY.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING AND VERIFYING THAT THERE IS SUFFICIENT CLEARANCE BETWEEN ALL PROPOSED TRAFFIC SIGNAL POLES AND EXISTING AND RELOCATED OVERHEAD UTILITY LINES. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR COORDINATING WITH THE AFFECTED UTILITY COMPANIES RELATIVE TO THE SCOPE OF ANY REQUIRED RELOCATIONS. THIS SHALL BE PERFORMED WITHIN TEN DAYS AFTER AWARD OF THE CONTRACT. THE COST FOR RELOCATION OF UTILITIES SHALL BE BORNE BY THE OWNER.
13. WHERE CALLED FOR ON THE PLANS, THE PROPOSED LOCATIONS OF THE OPTICAL DETECTOR UNITS AND CONFIRMATION BEACON ARE PERCEIVED BEST BUT NOT FINAL. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ENSURE OPTIMUM PLACEMENT IN COOPERATION WITH THE LOCAL MUNICIPALITY'S FIRE FIGHTING DEPARTMENT. THE OPTICAL DETECTOR UNITS SHALL HAVE AN UNOBSTRUCTED LINE-OF-SIGHT VIEW ALONG THE ROUTE OF APPROACHING PRIORITY VEHICLE.
14. THE CONTRACTOR SHALL REMOVE AND STACK ALL EXISTING TRAFFIC SIGNAL EQUIPMENT WITHIN THE PROJECT LIMITS EXCEPT FOR EQUIPMENT NOTED ON THE PLANS.

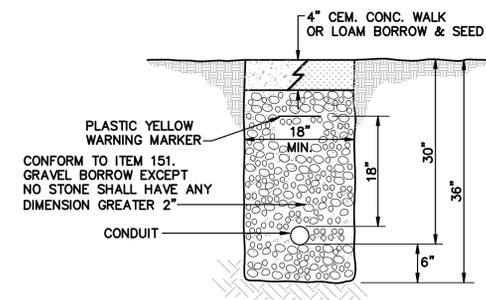
NEMA DUAL RING PHASING NOTES

1. PHASES ASSOCIATED BY A SOLID LINE SHALL NOT OPERATE CONCURRENTLY.
2. PHASES ASSOCIATED BY A DASHED LINE MAY OPERATE CONCURRENTLY.

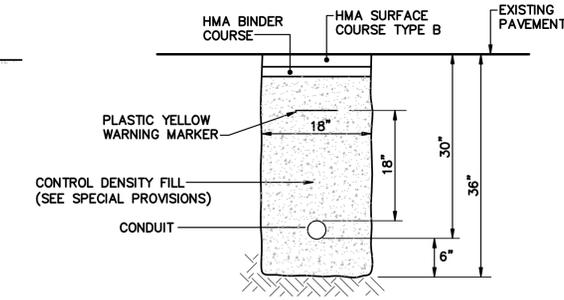


LOOP DETECTOR NOTES

1. SEE LOOP DETECTOR DETAIL SHEET FOR SPLICE PATTERN AND OTHER INFORMATION.
2. DELAY AND EXTENSION TIMES ARE IN SECONDS.
3. DELAY TIME SHALL BE EFFECTIVE ONLY DURING THE RED PORTION OF THE PHASE THAT IS CALLED BY A DETECTOR.



TRAFFIC SIGNAL CONDUIT TRENCH DETAIL
(IN SIDEWALK OR LANDSCAPE AREA)
NOT TO SCALE



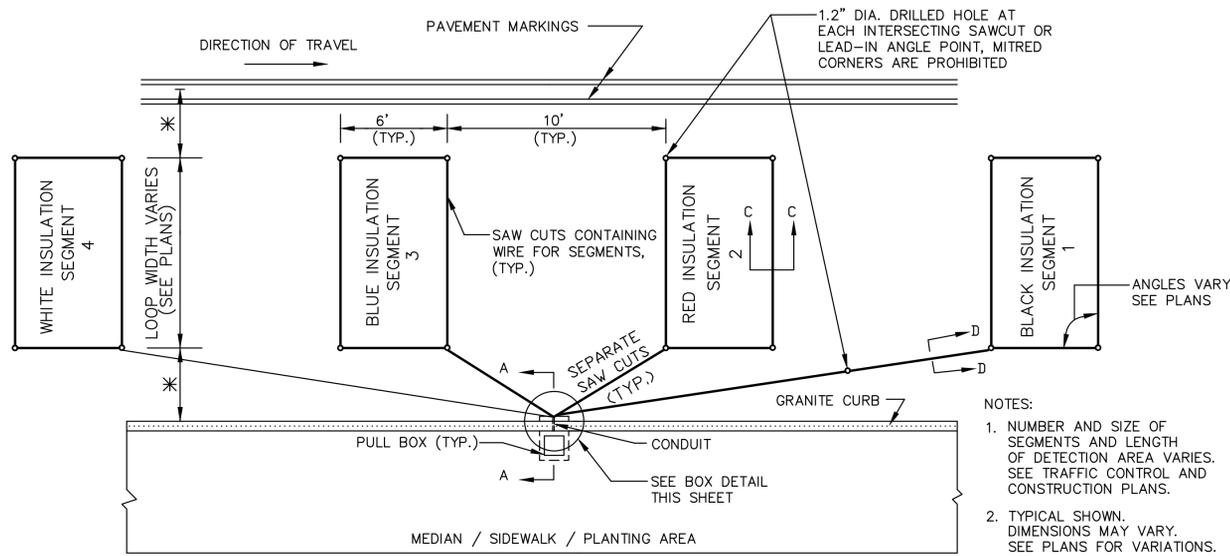
TRAFFIC SIGNAL CONDUIT TRENCH DETAIL
CROSSING ROADWAY
(OUTSIDE FULL DEPTH AREA)
NOT TO SCALE

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	70	208
PROJECT FILE NO.		604532	

LOOP DETECTOR DETAILS

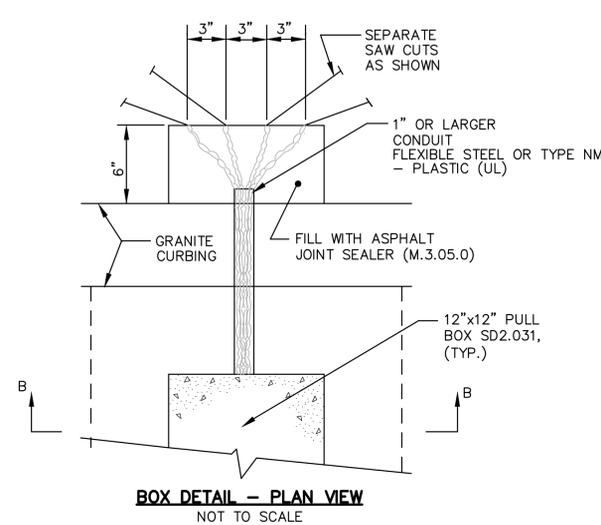
DETECTOR NOTES

- IN PULL BOX, SPLICE ALL SEGMENTS TO TYPE II-SHIELDED LOOP DETECTOR LEAD-IN CABLE I.M.S.A. SPEC. NO. 50-2 (M8. 16. II). SEGMENTS SHALL BE SPLICED IN PARALLEL, IN SERIES, OR IN A COMBINATION OF PARALLEL & SERIES AS SHOWN ON THE PLAN SHEET FOR EACH DETECTOR. NUMBER OF TURNS OF WIRE SHALL ALSO BE AS SHOWN ON THE PLAN SHEET FOR EACH DETECTOR. SEE NOTES 12 & 13 BELOW.
- SEE SPECIAL PROVISIONS FOR REQUIREMENTS OF DETECTOR AMPLIFIER
- LEAD IN WIRES SHALL BE TWISTED FROM SEGMENT TO SPLICE WITH SHIELDED CABLE AT FIVE TURNS PER FOOT.
- BEFORE STARTING ANY SPLICING, THE ELECTRICAL CONTRACTOR SHALL FURNISH DATA SHEETS ON THE MATERIALS AND/OR METHODS TO BE USED IN ACCORDANCE WITH THE DEPARTMENT'S STANDARD OPERATING PROCEDURES FOR APPROVAL OF SHOP DRAWINGS SEE SECTION 815.64, ESPECIALLY PARAGRAPH 1.
- THE METALLIC SHIELD WHICH SHALL ENCASE THE DETECTOR LEADS FROM A SPLICE (TYPICALLY LOCATED IN A PULL BOX NEAR THE ROADWAY COMPONENT OF THE DETECTOR) TO THE CONTROLLER, AND THE DRAIN WIRE UNDER THE METALLIC SHIELD, SHALL NOT BE GROUNDED TO THE EARTH GROUNDING BUSS IN THE CONTROLLER, AND THE SHIELD AND DRAIN WIRE SHALL BE CAREFULLY INSULATED FROM THE TRANSFORMER NEUTRAL OR FROM EARTH GROUND AT ALL POINTS ALONG ITS LENGTH. SPECIFICALLY, THIS INCLUDES CAREFUL INSULATION OF THE EXPOSED PORTION OF THE SHIELD AND THE DRAIN WIRE AT THE END AWAY FROM THE CONTROLLER WHERE IT IS SPLICED TO WIRES LEADING TO THE ROADWAY COMPONENT OF THE DETECTOR. THIS IS IMPORTANT TO AVOID A GROUND RETURN LOOP.
- FILL ALL CONDUIT OPENINGS WITH DUCT SEAL.
- AFTER SAW CUTS ARE COMPLETE, BLOW OUT WATER WITH OIL-FREE COMPRESSED AIR UNTIL CUTS ARE CLEAN AND DRY. INSERT WIRE INTO CLEAN SLOT WITH A BLUNT, SMOOTH, ROUND EGED TOOL OF WOOD OR PLASTIC SUCH AS A PAINT STIRRER. DO NOT USE A SCREWDRIVER. THEN INSERT FOAM PLASTIC HOLD-DOWN STRIPS, SIMILAR TO ETHA FOAM SB[®] STRIPS SHALL BE ABOUT 2" LONG, PLACED IN THE SLOT ABOUT EVERY 2'. THEN POUR SEALER, TAKING CARE TO ELIMINATE BUBBLES. DO NOT ALLOW OVERFLOW TO REMAIN ON TOP COURSE OF PAVEMENT.
- THE COMBINED ROADWAY LOOP, TWISTED LEAD-IN WIRES, SPLICE AND SHIELDED LEAD-IN CABLE SHALL HAVE A RESISTANCE TO GROUND OF AT LEAST 100 MEGOHMS. SEE SPECIAL PROVISIONS FOR ADDITIONAL REQUIREMENTS.
- FOR INSTALLATION OF SINGLE (ONE SEGMENT) SMALL WIRE LOOP DETECTOR, DETAIL IS THE SAME.
- CUT LOOPS IN SURFACE COURSE IN ALL CASES UNLESS ROADWAY OWNER REQUIRES OTHERWISE.
- DETECTOR WIRE SHALL BE A DIFFERENT COLOR FOR EACH SEGMENT OF A DETECTOR GROUP. SEE DETAIL.
- SPLICING PATTERN S/P = SERIES/PARALLEL: SPLICE SEGMENTS 1 AND 3 OF AN INDIVIDUAL DETECTOR IN SERIES. SPLICE SEGMENTS 2 AND 4 IN SERIES. SPLICE THE RESULTANT TWO GROUPS IN PARALLEL. SPLICE THE RESULTANT COMBINATION TO ONE LEAD-IN CABLE. CONNECT THIS CABLE TO AN OTHERWISE UNUSED AMPLIFIER CHANNEL.
- SPLICING PATTERN S = SERIES: SPLICE ALL SEGMENTS (TYPICALLY FOUR, BUT MAY BE LESS) OF AN INDIVIDUAL DETECTOR IN SERIES. SPLICE THE RESULTANT COMBINATION TO ONE LEAD-IN CABLE TO AN OTHERWISE UNUSED AMPLIFIER CHANNEL. P = PARALLEL: SPLICE ALL SEGMENTS OF AN INDIVIDUAL DETECTOR IN PARALLEL. SPLICE THE RESULTANT COMBINATION TO ONE LEAD-IN CABLE TO AN OTHERWISE UNUSED AMPLIFIER CHANNEL.
- FOR THIS PROJECT, USE POLYETHYLENE SEALER. DO NOT USE EPOXY PRODUCTS.
- ALL DIMENSIONS ARE IN INCHES UNLESS SHOWN OTHERWISE.

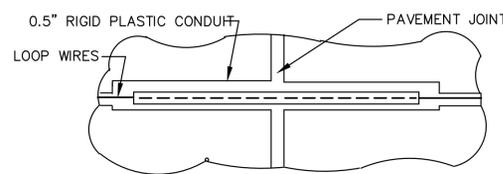


* OFFSETS FROM CURB TO LOOP AND EDGE OF LANE TO LOOP EQUAL IF NOT SHOWN.

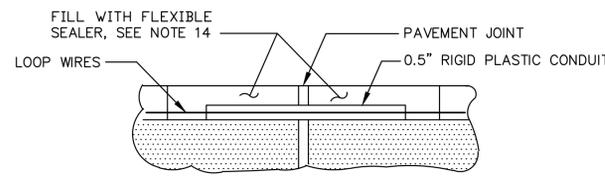
PLAN OF SEGMENTED DETECTOR DETAIL
NOT TO SCALE



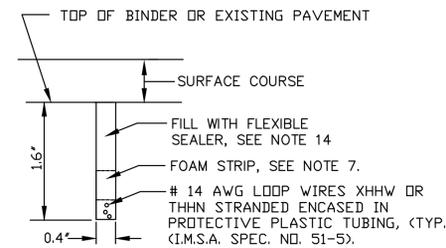
BOX DETAIL - PLAN VIEW
NOT TO SCALE



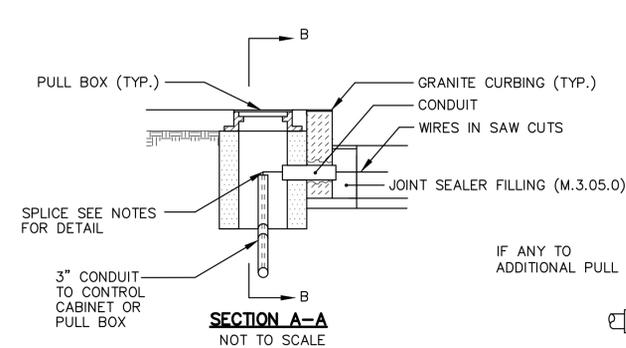
PLAN
TREATMENT AT PAVEMENT JOINTS
NOT TO SCALE



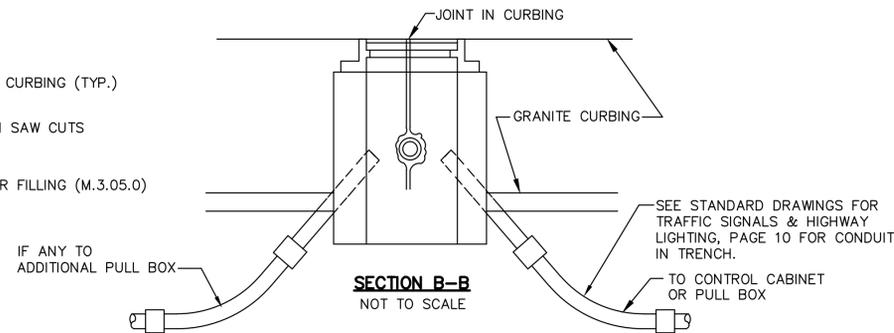
VERTICAL SECTION
TREATMENT AT PAVEMENT JOINTS
NOT TO SCALE



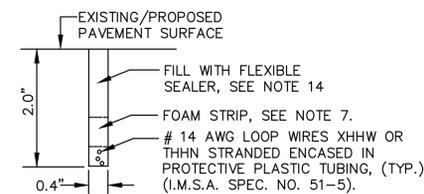
SECTION C-C & D-D
LOOPS IN BINDER COURSE
NOT TO SCALE



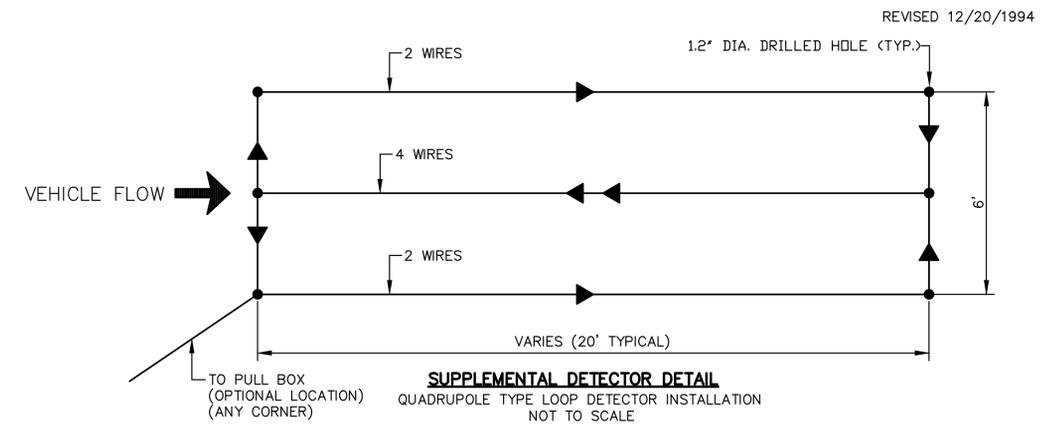
SECTION A-A
NOT TO SCALE



SECTION B-B
NOT TO SCALE



SECTION C-C & D-D
LOOPS IN SURFACE COURSE
NOT TO SCALE



SUPPLEMENTAL DETECTOR DETAIL
QUADRUPOLE TYPE LOOP DETECTOR INSTALLATION
NOT TO SCALE

THIS DETAIL IS INTENDED TO SHOW THE LOOP DETECTOR CONFIGURATION ONLY. REFER TO THE STANDARD LOOP DETECTOR DETAILS (SHOWN ON THIS SHEET) FOR OTHER DETAILS SUCH AS PULL BOXES, SAW CUTTING, ETC.

THE TYPICAL QUADRUPOLE TYPE LOOP DETECTOR INSTALLATION CONSISTS OF ONE OR MORE 6' x 20' RECTANGULAR LOOP(S) WITH A CENTER CUT WHICH HAS TWICE THE WINDINGS AS THE PERIMETER CUTS. FOR A 6m LONG INSTALLATION, THE WIRES WILL CONSIST OF A "2-4-2" CONFIGURATION INDICATING 2 PERIMETER WIRES AND 4 CENTER WIRES. FOR A 6' x 40' OR 6' x 50' LOOP, THE NUMBER OF WINDINGS AND CONFIGURATION WILL BE "1-2-1".

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	71	208
PROJECT FILE NO.		604532	

TEMPORARY TRAFFIC CONTROL PLANS

TRAFFIC MANAGEMENT NOTES

GENERAL

- ALL TEMPORARY TRAFFIC CONTROL MEASURES SHALL CONFORM TO THE 2009 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (M.U.T.C.D.) FOR STREETS AND HIGHWAYS, THE STANDARD SPECIFICATIONS AND THE FOLLOWING NOTES.
- THE TEMPORARY TRAFFIC CONTROL PLANS CONTAINED HEREIN ARE GIVEN AS A GUIDE FOR TYPICAL WORK ZONE TRAFFIC CONTROL APPLICATIONS FOR THE TYPES OF WORK ANTICIPATED FOR THIS PROJECT. THEY ARE NOT INTENDED TO COVER ALL POSSIBLE CONSTRUCTION OPERATIONS WHICH THE CONTRACTOR MAY CHOOSE TO EMPLOY. WORK ZONE TRAFFIC CONTROL FOR OTHER CONSTRUCTION OPERATIONS OR OTHER TRAFFIC SITUATIONS IF APPLICABLE SHALL BE IN ACCORDANCE WITH THE M.U.T.C.D. AND AS APPROVED OR DIRECTED BY THE ENGINEER.
- LANE RESTRICTIONS MAY NOT REMAIN OVERNIGHT OR DURING NON-WORKING HOURS. AFTER EACH WORKING DAY, TRAFFIC CONTROL DEVICES THAT ARE NOT REQUIRED SHALL BE MOVED OFF THE ROADWAY OR FULL DEPTH CONSTRUCTION AREA AND PLACED SO AS NOT TO IMPEDE PEDESTRIAN AREAS, ABUTTER ACCESS OR CAUSE CONFUSION TO MOTORISTS.
- CONTRACTOR SHALL PROVIDE A SAFE TEMPORARY PEDESTRIAN AND/OR BICYCLIST ACCESS WHERE EXISTING SIDEWALKS OR OTHER PEDESTRIAN AND/OR BICYCLIST AREAS ARE AFFECTED BY CONSTRUCTION WORK. CONTRACTOR SHALL MAINTAIN ABUTTER ACCESS AT ALL TIMES EXCEPT FOR SHORT PERIODS APPROVED BY THE ENGINEER.
- CONTRACTOR SHALL PLACE ALL CONSTRUCTION SIGNING, TRAFFIC CONTROL DEVICES AND TEMPORARY PAVEMENT MARKINGS FOR EACH PHASE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
- ONE (1) THRU TRAVEL LANE HAVING A MINIMUM WIDTH OF 11'-0" SHALL BE PROVIDED FOR BOTH DIRECTIONS (LANE TO BE SHARED AND DIRECTION OF TRAVEL TO ALTERNATE UNDER POLICE OFFICER CONTROL) DURING ALL PHASES OF CONSTRUCTION AS SHOWN ON THE TEMPORARY TRAFFIC CONTROL PLANS, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
- WHEN WORK INFRINGES UPON THE TRAVELED WAY, WORK SHALL BE RESTRICTED TO OFF-PEAK HOURS ONLY (NORMALLY 9:00am TO 3:00 pm, MONDAY TO FRIDAY).
- TAPER LENGTH FORMULAE FOR CHANNELIZATION DEVICES:
L = WS FOR SPEED EQUAL TO OR GREATER THAN 45 M.P.H.
L = WS²/60 FOR SPEED EQUAL TO OR LESS THAN 40 M.P.H.
WHERE: L = MIN. LENGTH OF TAPER, S = POSTED SPEED, W = OFFSET WIDTH.
- ADVISORY SPEED LIMIT SHALL BE SET IN THE FIELD BY THE ENGINEER. W13-1 PLATES SHALL BE USED WHERE APPROPRIATE.
- FLASHING ARROW PANEL SHALL BE SET IN "CAUTION MODE" WHEN NOT USED FOR ACTUAL LANE CLOSURES.
- DISTANCES SHOWN ON THE TEMPORARY TRAFFIC CONTROL PLANS ARE A GUIDE ONLY, AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER IN ACCORDANCE WITH THE 2009 MUTCD STANDARDS.

GRADE DIFFERENCES

- WHERE THERE IS A LONGITUDINAL DIFFERENCE IN ELEVATION BETWEEN EXISTING PAVEMENT AND COLD PLANED OR NEW PAVEMENT, THE CONTRACTOR SHALL PATCH A TEMPORARY HOT MIX ASPHALT WEDGE WITH A 12:1 (OR FLATTER) SLOPE FOR SMOOTH TRANSITION. SEE DETAIL, THIS SHEET.
- CROSS-SECTIONAL GRADE DIFFERENCES IN EXCESS OF 2" DURING NON-WORKING HOURS WILL REQUIRE DELINEATION BY USE OF REFLECTORIZED DRUMS.
- CROSS-SECTIONAL GRADE DIFFERENCES IN EXCESS OF 4" DURING NON-WORKING HOURS SHALL BE PROTECTED BY BACKFILLING WITH A WEDGE OF EARTHWORK TO BE COMPACTED AT 4:1 (OR FLATTER) SLOPE AND WILL ALSO REQUIRE DELINEATION BY USE OF DRUMS.
- A SLOPE OF 4:1 (OR FLATTER) MUST BE MAINTAINED AFTER WORKING HOURS DURING SUBBASE AND BASE COURSE INSTALLATION ALONG EDGE OF THE TRAVELWAY (SEE DETAIL, THIS SHEET). A SLOPE OF 8:1 (OR FLATTER) MUST BE MAINTAINED ON ALL ABUTTER ACCESS DRIVES AND A SLOPE OF 12:1 (OR FLATTER) MUST BE MAINTAINED ON ALL SIDEWALKS.

CONSTRUCTION SIGNING

- THE FIRST CONSTRUCTION SIGN IN A SERIES ON EACH APPROACH TO THE PROJECT SHALL BE FLUORESCENT ORANGE, HIGH PERFORMANCE (OR HIGH INTENSITY) SHEETING.
- ALL CONSTRUCTION SIGNS SHALL BE BLACK LEGEND ON A REFLECTORIZED ORANGE BACKGROUND UNLESS OTHERWISE NOTED. SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY MUST MEET THE CRITERIA SET FORTH IN THE NCHRP 350 REPORT. SIGNS ARE NOT TO BE MOUNTED ON PLASTIC DRUMS.
- EXISTING GUIDE SIGNS SHALL BE TEMPORARILY RESET AS DIRECTED BY THE ENGINEER.
- ALL SIGNS, INCLUDING EXISTING, THAT ARE NOT REPRESENTATIVE OF ACTUAL WORK CONDITIONS SHALL BE EITHER COVERED OR REMOVED WHEN NOT APPLICABLE.
- IF USED, ALL W20-4 AND W20-5 SIGNS SHALL BE TAKEN DOWN OR COVERED AT THE CLOSE OF EACH DAY.
- USE W20-8 SIGNS ONLY WHILE POLICE ARE DIRECTING TRAFFIC. THEY SHALL BE TAKEN DOWN OR COVERED AT THE CLOSE OF EACH DAY.
- SIGNS MUST BE PROFESSIONALLY LETTERED. NO HANDWRITTEN/PAINTED SIGNS SHALL BE ALLOWED.

PAVEMENT MARKINGS

- PAVEMENT MARKINGS THAT ARE NO LONGER APPLICABLE SHALL BE REMOVED. APPLY TEMPORARY MARKINGS WHERE SHOWN ON THE TEMPORARY TRAFFIC CONTROL PLANS OR AS DIRECTED BY THE ENGINEER.
- ON PROJECTS WHERE PAVEMENT OVERLAY IS NOT DESIGNATED, EXISTING PAVEMENT MARKINGS WHICH ARE IN CONFLICT WITH TEMPORARY TRAFFIC CONTROLS SHOULD BE COVERED TEMPORARILY WITH BLACKOUT PAINT OR TAPE, AS DIRECTED BY THE ENGINEER, FOR THE FULL DURATION OF THE PHASE IN PROGRESS. TEMPORARY PAINTED OR REMOVABLE TAPE MARKINGS SHALL BE USED AS NECESSARY FOR ALL PHASES OF CONSTRUCTION.

CHANNELIZATION

- THE MAXIMUM SPACING BETWEEN CHANNELIZATION DEVICES (DRUMS OR CONES) SHALL BE APPROXIMATELY EQUAL IN FEET TO THE POSTED SPEED LIMIT. THE MINIMUM SPACING SHALL BE 20' O.C.
- REFLECTORIZED CONES SHALL BE MINIMUM 36" HIGH.
- FLASHING OR STEADY BURN WARNING LIGHTS SHALL ALSO BE USED ON BARRICADES, JERSEY BARRIERS OR WHERE DIRECTED BY THE ENGINEER.
- METAL DRUMS ARE PROHIBITED FROM USE ON ALL STATE HIGHWAY PROJECTS.
- PLASTIC DRUMS WITH SOME FORM OF LIGHTING DEVICE MOUNTED ON THEM MUST PASS THE CRITERIA SET FORTH IN NCHRP 350 "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES." IF THEY DO NOT MEET THESE CRITERIA, THEY MUST BE REMOVED FROM THE PROJECT.
- TEMPORARY IMPACT ATTENUATORS MUST MEET THE PERFORMANCE STANDARDS OF NCHRP 350.
- SIGNS AND SIGN SUPPORT LOCATED ON OR NEAR THE TRAVELED WAY MUST PASS THE CRITERIA SET FORTH IN NCHRP 350 "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES." IF THEY DO NOT MEET THIS CRITERIA, THEY MUST BE REMOVED FROM THE PROJECT.

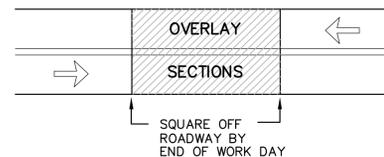
TRAFFIC MANAGEMENT LEGEND

- WORK AREA
- DIRECTION OF TRAVEL
- REFLECTORIZED DRUM (OR CONE)
- REFLECTORIZED DRUM WITH TYPE 'A' FLASHING WARNING LIGHT
- POLICE OFFICER CONTROL
- PORTABLE TYPE III BARRICADE (4' WIDE, MIN.)
- REMOVABLE JERSEY BARRIER
- FLASHING ARROW BOARD (30"x 60" STD. SIZE WITH 13 LAMPS, MIN.)

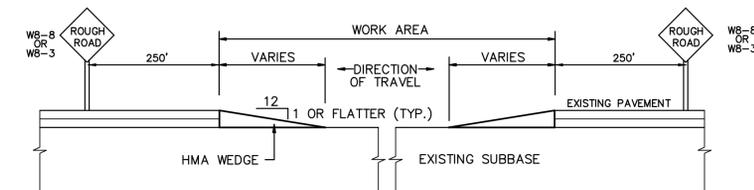
GUIDELINE FOR LENGTH OF BUFFER SPACE

SPEED* (MPH)	LENGTH (FEET)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495

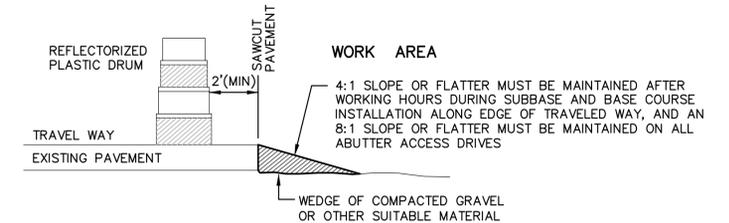
*POSTED SPEED, OFF-PEAK 85th PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH.



AFTER WORK HOURS TREATMENT FOR AREAS RECEIVING OVERLAY



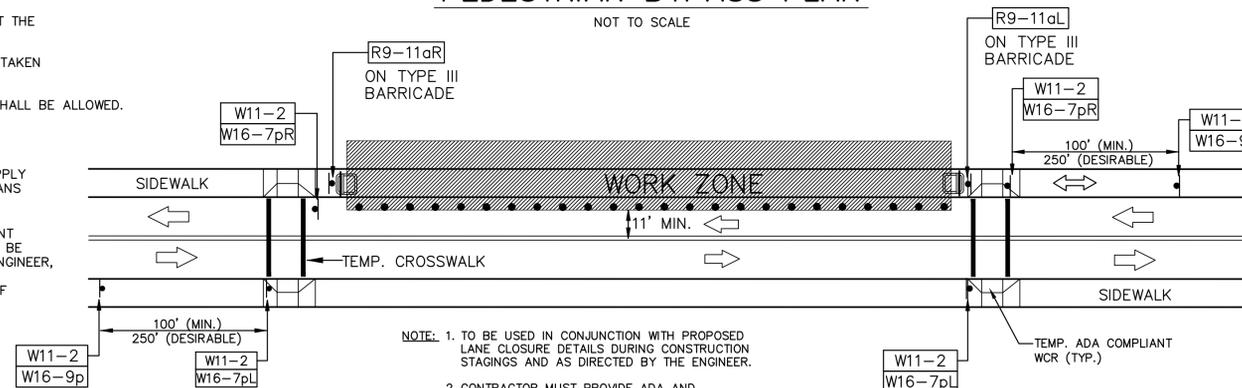
TEMPORARY RAMP



AFTER WORK HOURS TREATMENT FOR LATERAL SLOPING

PEDESTRIAN BYPASS PLAN

NOT TO SCALE



NOTE: 1. TO BE USED IN CONJUNCTION WITH PROPOSED LANE CLOSURE DETAILS DURING CONSTRUCTION STAGINGS AND AS DIRECTED BY THE ENGINEER.
2. CONTRACTOR MUST PROVIDE ADA AND MASSACHUSETTS AAB COMPLIANT ACCESS AROUND WORK ZONE AT ALL TIMES.

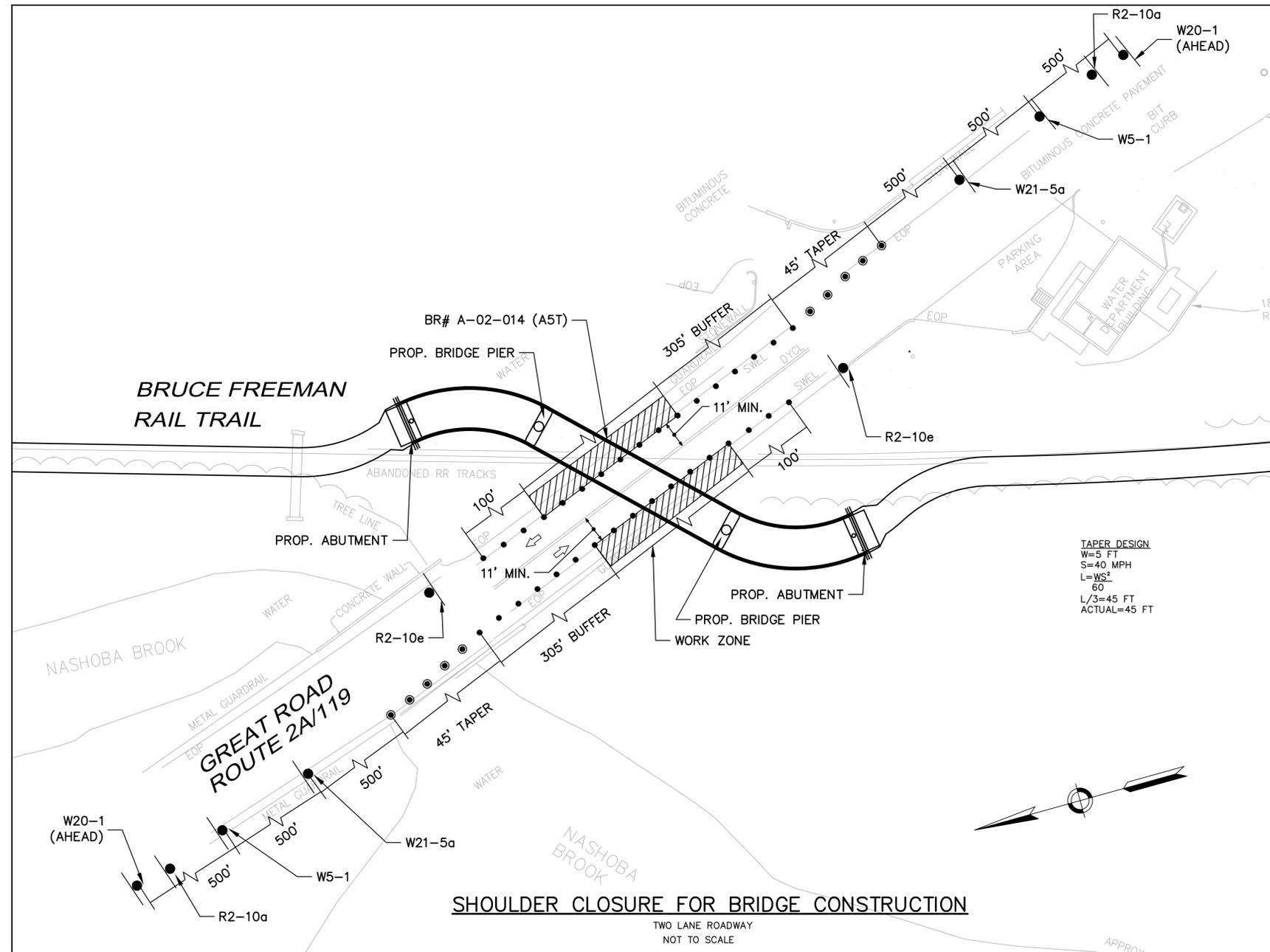
TEMPORARY SIGNING FOR CONSTRUCTION OPERATION

IDENTIFICATION NUMBER	SIZE OF SIGN		TEXT	COLOR		
	WIDTH	HEIGHT		BACK-GROUND	LEGEND	BORDER
R2-10a	36"	48"	WORK ZONE SPEEDING FINES DOUBLED	ORANGE/ WHITE	BLACK	BLACK
R2-10e	36"	48"	END ROAD DOUBLE FINES END	ORANGE/ WHITE	BLACK	BLACK
R9-11aL	24"	12"	SIDEWALK CLOSED ← CROSS HERE	WHITE	BLACK	BLACK
R9-11aR	24"	12"	SIDEWALK CLOSED → CROSS HERE	WHITE	BLACK	BLACK
W1-4L	30"	30"		ORANGE	BLACK	BLACK
W1-4R	30"	30"		ORANGE	BLACK	BLACK
W5-1	36"	36"		ORANGE	BLACK	BLACK
W8-3	36"	36"		ORANGE	BLACK	BLACK
W8-8	30"	30"		ORANGE	BLACK	BLACK
W11-2	30"	30"		ORANGE	BLACK	BLACK
W13-1	24"	24"		ORANGE	BLACK	BLACK
W16-7pL	21"	15"		ORANGE	BLACK	BLACK
W16-7pR	21"	15"		ORANGE	BLACK	BLACK
W16-9P	24"	12"	AHEAD	ORANGE	BLACK	BLACK
W20-1 (1500)	36"	36"		ORANGE	BLACK	BLACK
W20-1 (AHEAD)	36"	36"		ORANGE	BLACK	BLACK
W20-4 (1000)	36"	36"		ORANGE	BLACK	BLACK
W20-7a	36"	36"		ORANGE	BLACK	BLACK
W20-8	36"	36"		ORANGE	BLACK	BLACK
W21-5a	30"	30"		ORANGE	BLACK	BLACK

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	72	208
PROJECT FILE NO. 604532		604532	

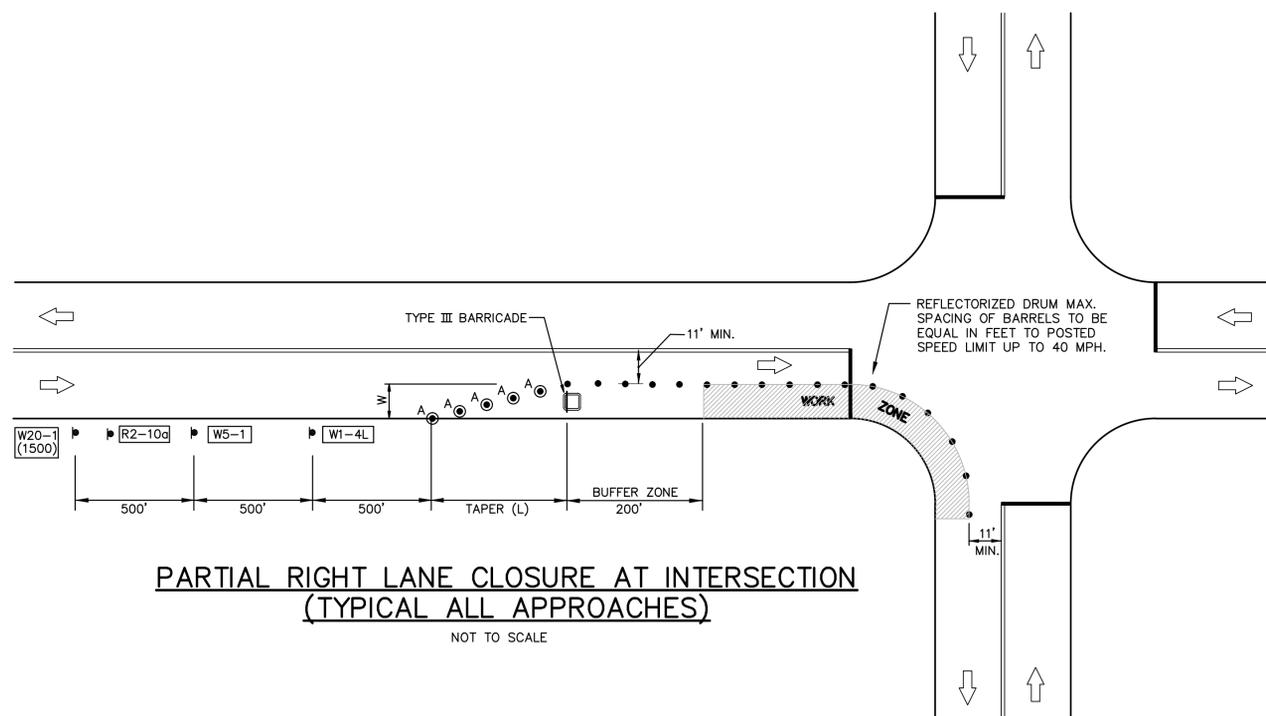
TEMPORARY TRAFFIC CONTROL PLANS



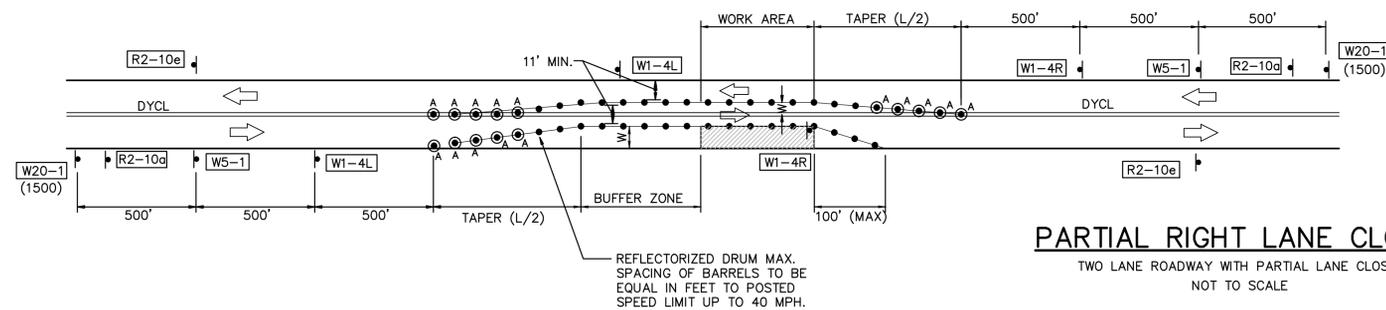
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	73	208
PROJECT FILE NO.		604532	

TEMPORARY TRAFFIC CONTROL
PLANS

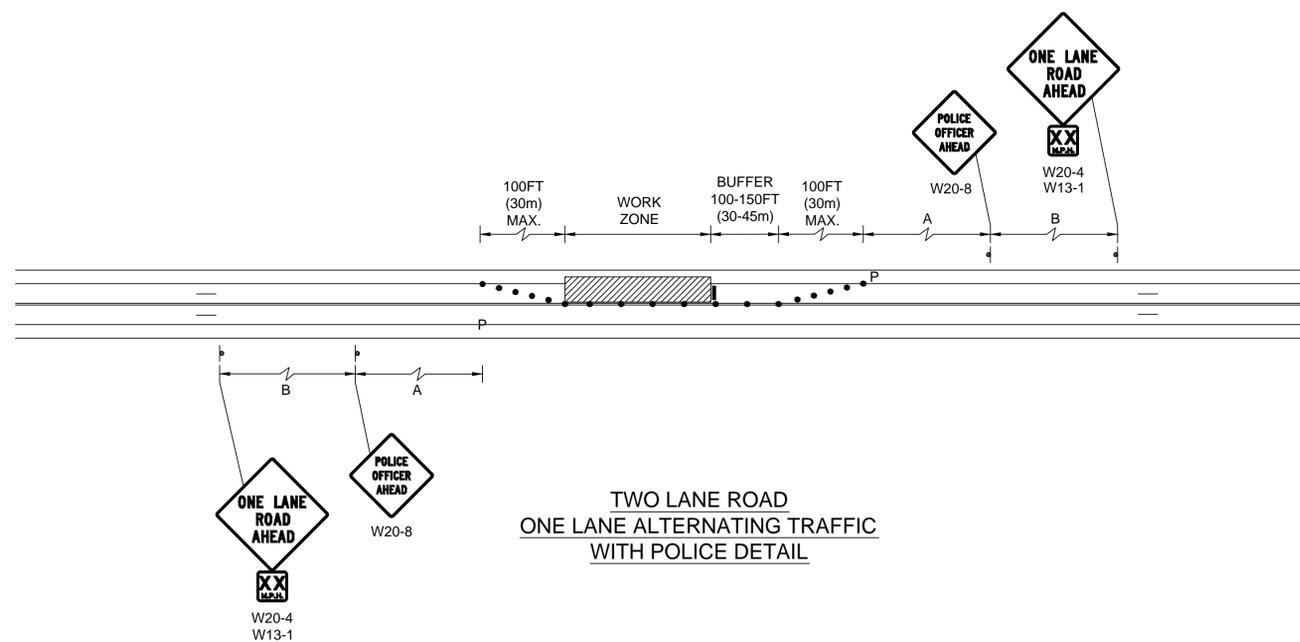
10031_2A_TTM.DWG 13-Mar-2014



**PARTIAL RIGHT LANE CLOSURE AT INTERSECTION
(TYPICAL ALL APPROACHES)**
NOT TO SCALE



PARTIAL RIGHT LANE CLOSURE
TWO LANE ROADWAY WITH PARTIAL LANE CLOSURE
NOT TO SCALE



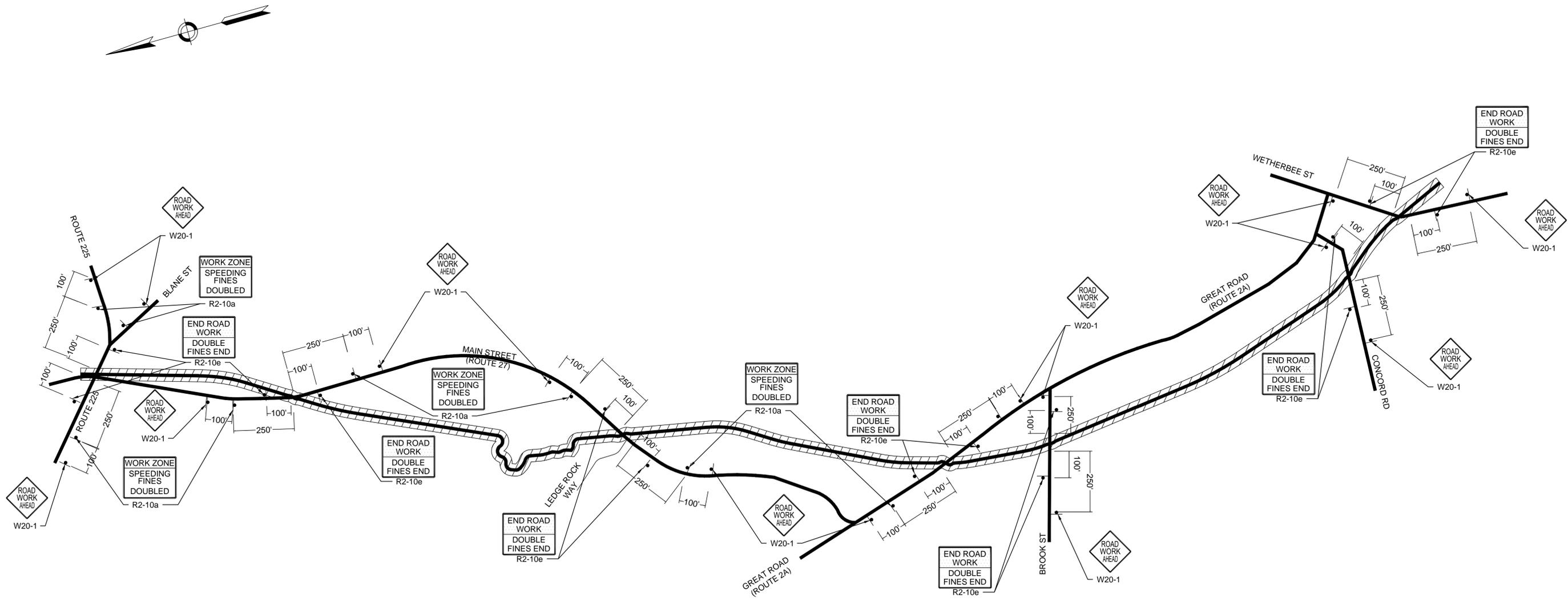
**TWO LANE ROAD
ONE LANE ALTERNATING TRAFFIC
WITH POLICE DETAIL**

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	74	208
PROJECT FILE NO.		604532	

TEMPORARY TRAFFIC CONTROL
PLANS

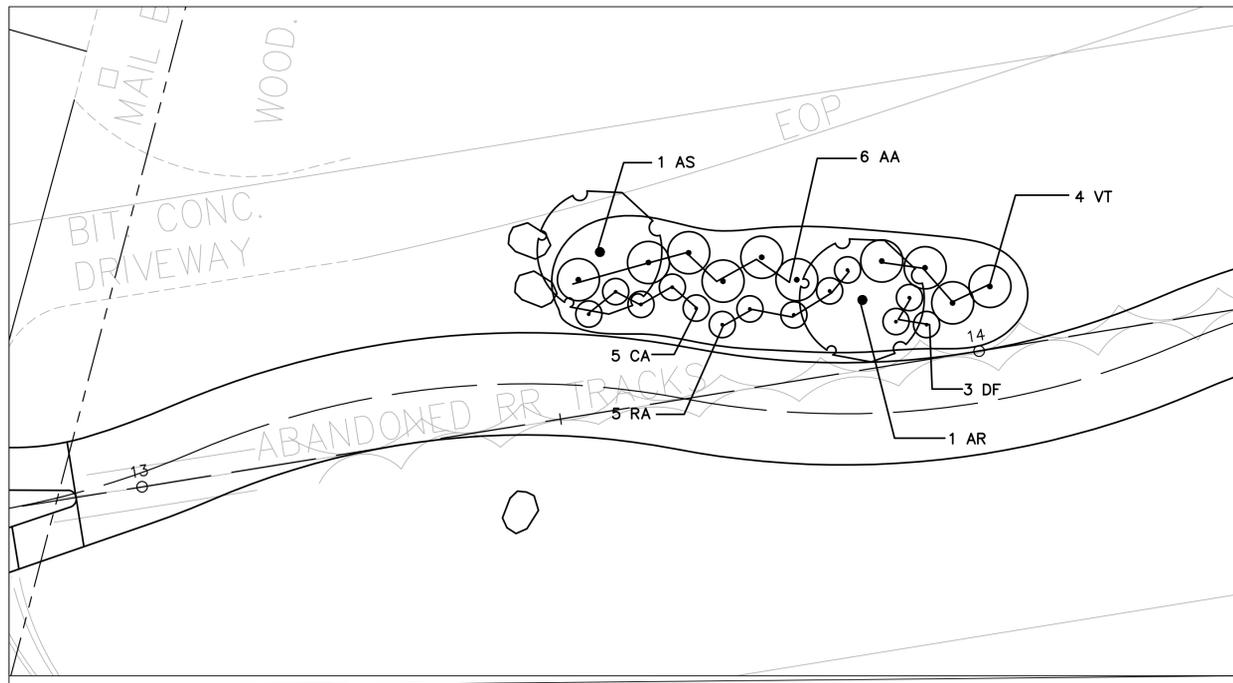
10031_2A_TTM.DWG 13-Mar-2014



ADVANCE WARNING SIGNING PLAN
NOT TO SCALE

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		75	208
PROJECT FILE NO.		604532	

LANDSCAPING PLANS AND DETAILS

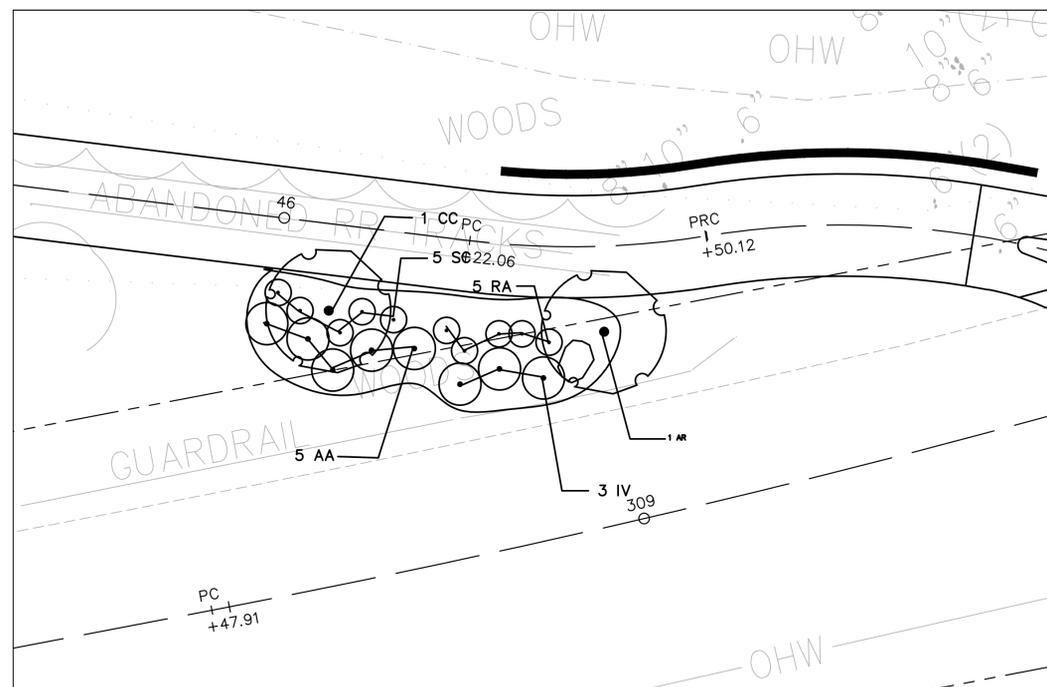


LANDSCAPING DETAIL 1
SCALE: 1" = 10'

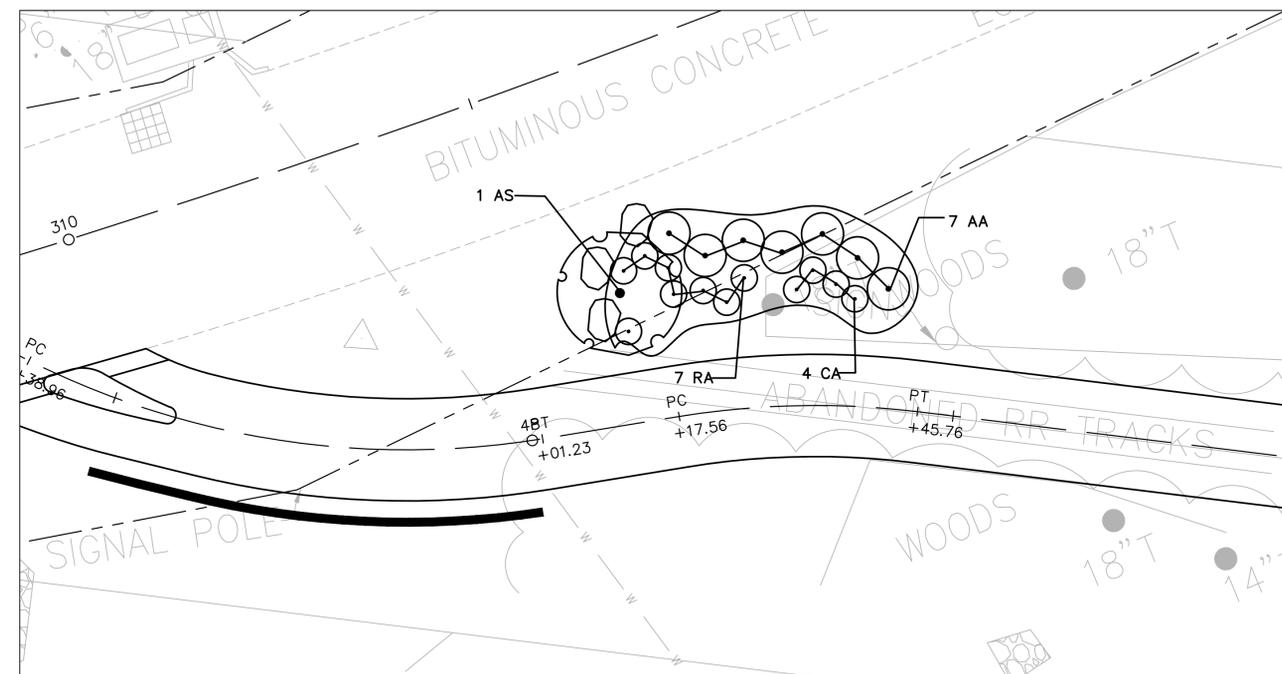
PLANT LIST				
SYMBOL	QUANTITY	BOTANICAL NAME	COMMON NAME	SIZE
SHRUBS				
VT	4	VIBURNUM TRILOBUM	CRANBERRY BUSH - AMERICAN	3' - 4 HT
CA	9	CLETHRA ALNIFOLIA	SUMMERSWEET SHRUB	24"-30" HT
IVM	1	ILEX VERTICILLATA	WINTERBERRY - MALE	24"-30" HT
IVF	2	ILEX VERTICILLATA	WINTERBERRY - FEMALE	24"-30" HT
SC	5	SYMPHORICARPOS XCHENAULTI	CORALBERRY SHRUB - CHENAULT	24"-30" HT
DF	3	FOTHERGILLA GARDENII	FOTHERGILLA - DWARF	18" - 24"
RA	12	RHUS AROMATICA 'GROW LOW'	GROW LOW FRAGRANT SUMAC	18" - 24"
AA	18	ARONIA ARBUTIFOLIA 'BRILLIANTISSIMA'	BRILLIANTISSIMA CHOKEBERRY	18" - 24"
TREES				
CC	1	CERCIS CANADENSIS	EASTERN REDBUD	8'-10' MULTI-STEM
AR	2	ACER RUBRA 'OCTOBER GLORY'	RED MAPLE	3"-3.5" cal
AS	2	AMELANCHIER 'ROBIN HILL'	ROBIN HILL SERVICEBERRY	3"-3.5" cal

NOTES:

1. LOCATIONS FOR PROPOSED TREES ARE APPROXIMATE ONLY. THE TOWN ENGINEER (OR OTHER TOWN REPRESENTATIVE DESIGNATED BY THE TOWN ENGINEER) SHALL APPROVE FINAL LOCATION OF TREES IN THE FIELD IN COORDINATION WITH THE ENGINEER.



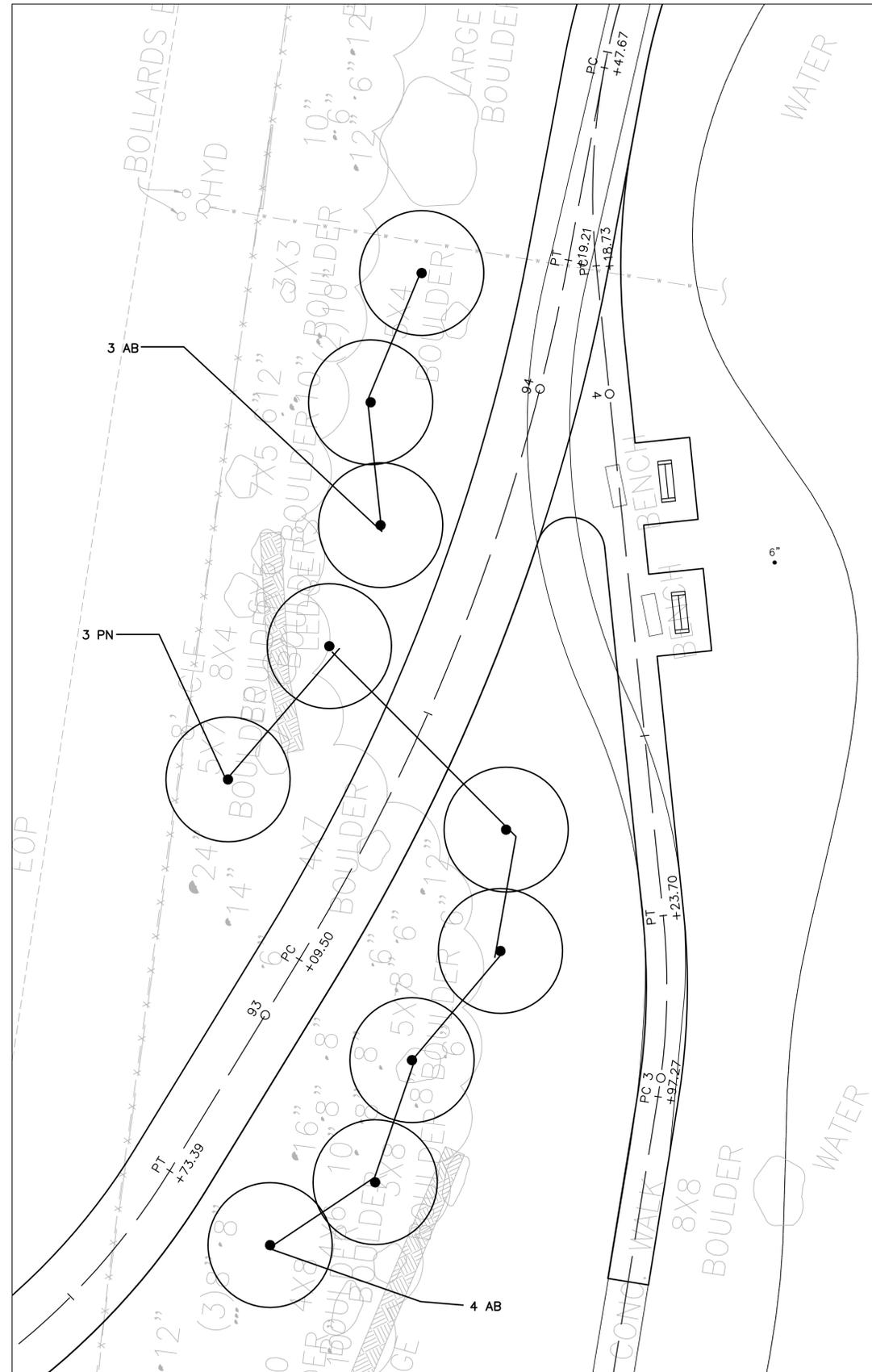
LANDSCAPING DETAIL 2
SCALE: 1" = 10'



LANDSCAPING DETAIL 3
SCALE: 1" = 10'

LANDSCAPING DETAIL 4

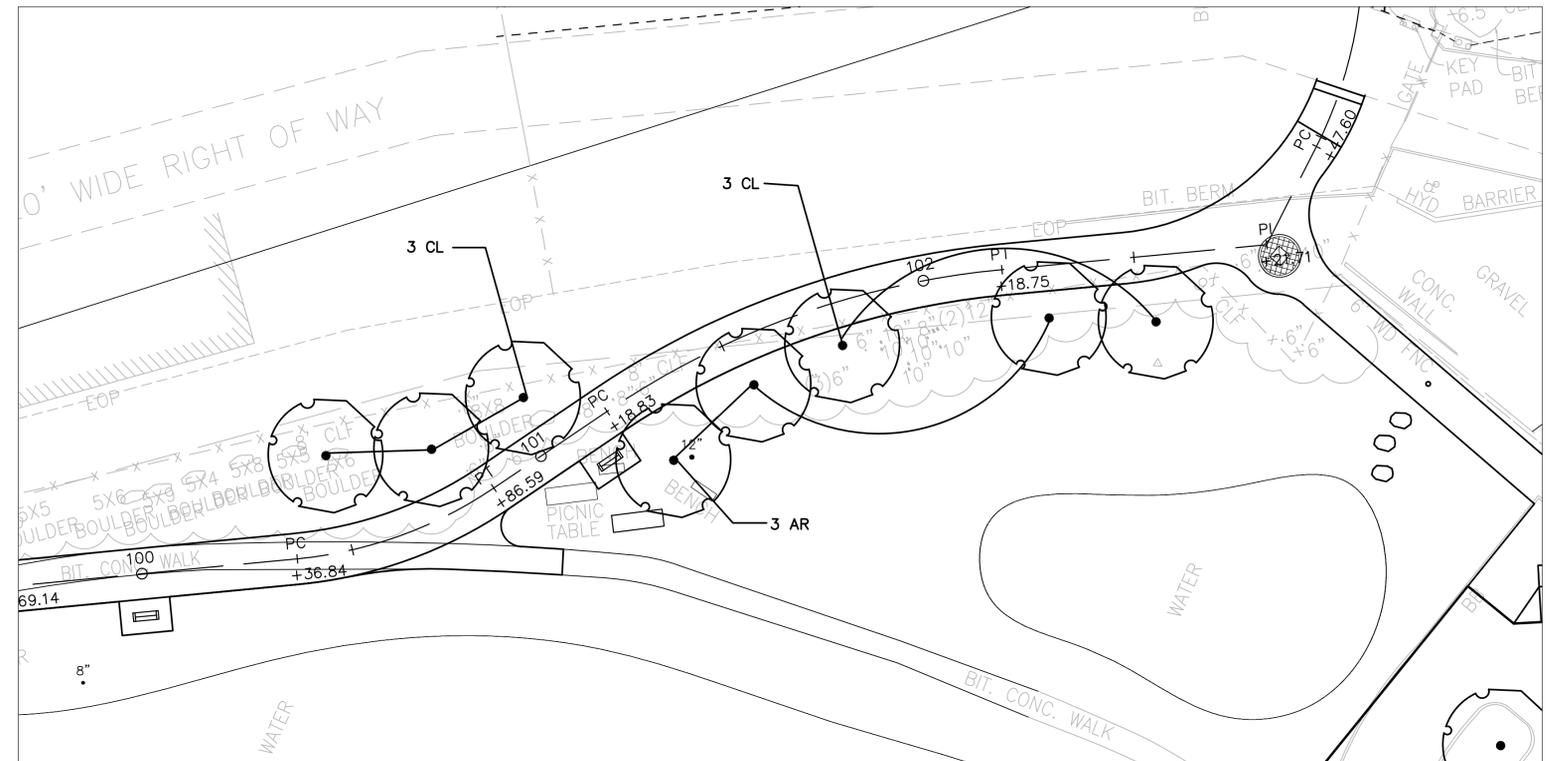
SCALE: 1" = 10'



BRUCE FREEMAN RAIL TRAIL PHASE 2A
WESTFORD, CARLISLE & ACTON

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	76	208
PROJECT FILE NO. 604532			

LANDSCAPING PLANS AND
DETAILS

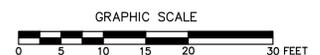


LANDSCAPING DETAIL 5

SCALE: 1" = 20'

PLANT LIST

SYMBOL	QUANTITY	BOTANICAL NAME	COMMON NAME	SIZE
TREES				
CL	6	CLADRASTIS LUTEA	YELLOWWOOD	3"-3.5" cal
AR	3	ACER RUBRA 'OCTOBER GLORY'	RED MAPLE	3"-3.5" cal
PN	3	PINUS STROBUS	EASTERN WHITE PINE	8'-10' HT
AB	7	ABIES BALSAMEA PHANEROLEPIS	CANAAN FIR	8'-10' HT



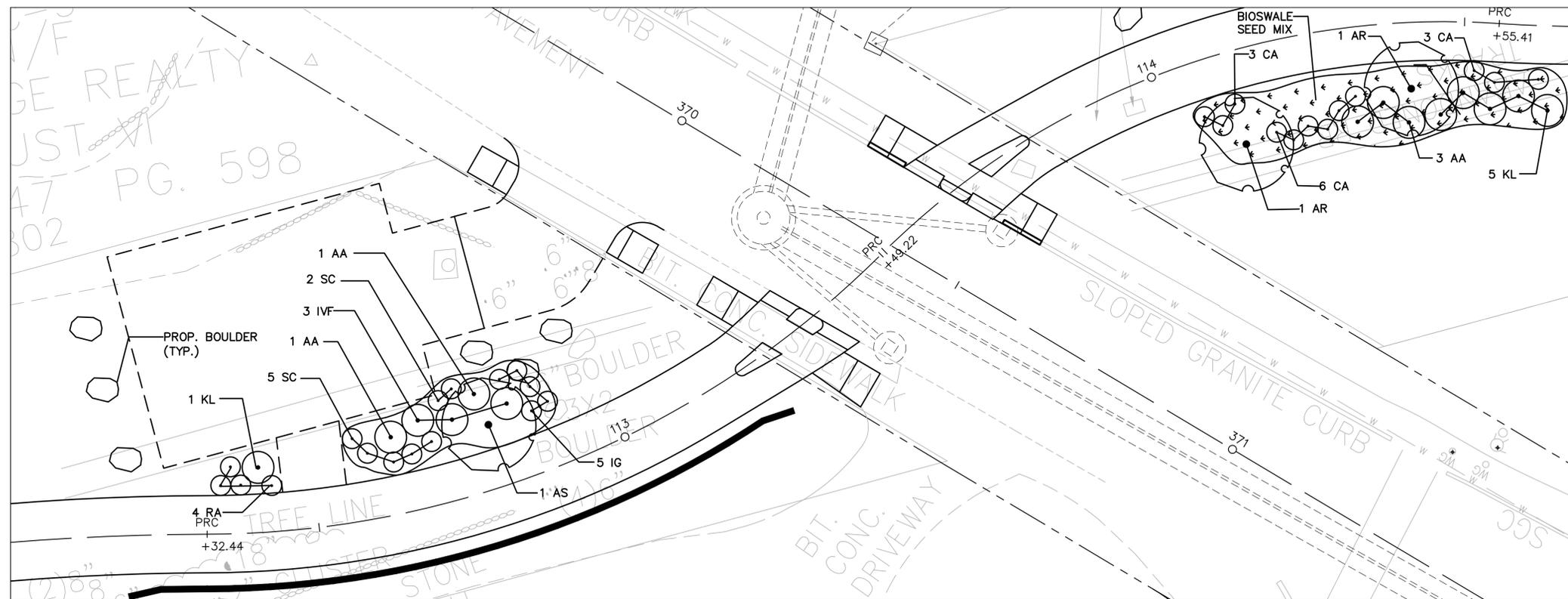
**BRUCE FREEMAN RAIL TRAIL PHASE 2A
WESTFORD, CARLISLE & ACTON**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		77	208
PROJECT FILE NO.		604532	

**LANDSCAPING PLANS AND
DETAILS**

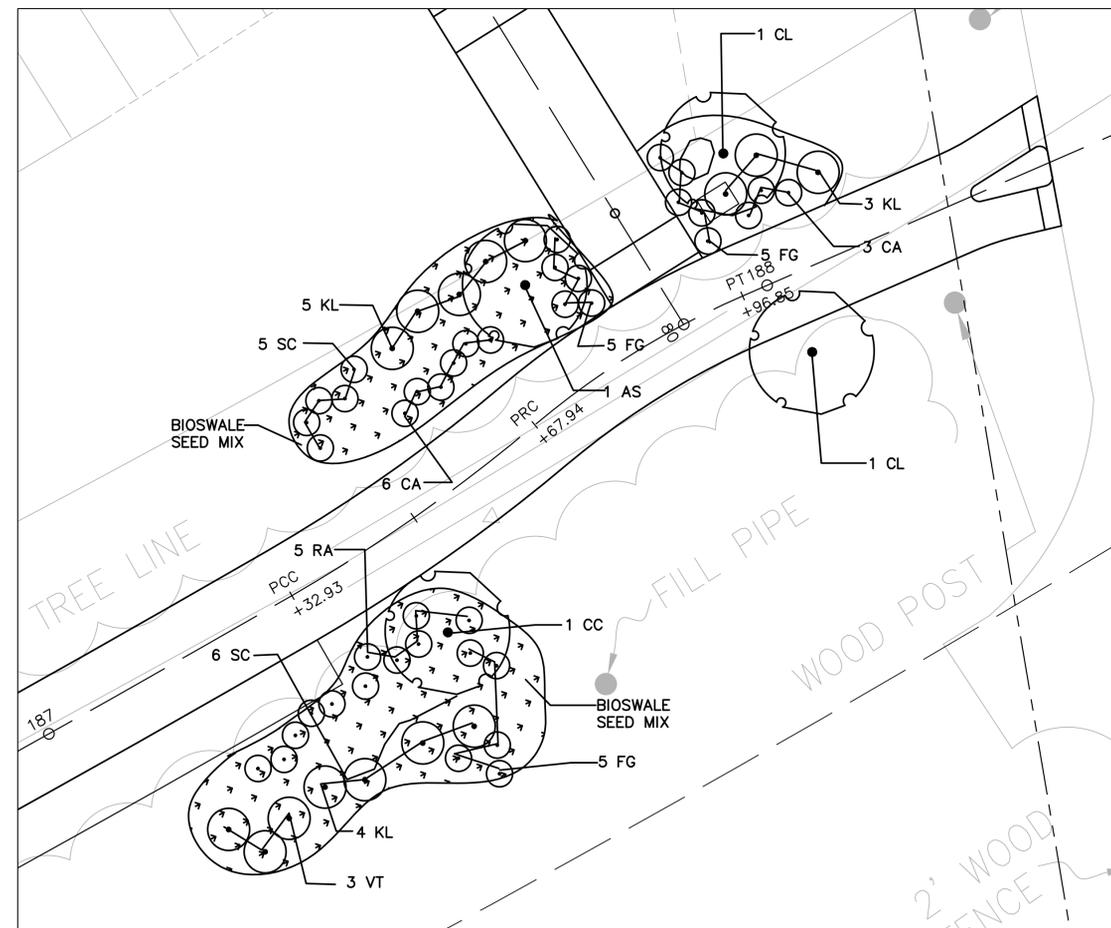
NOTES:

1. LOCATIONS FOR PROPOSED TREES ARE APPROXIMATE ONLY. THE TOWN ENGINEER (OR OTHER TOWN REPRESENTATIVE DESIGNATED BY THE TOWN ENGINEER) SHALL APPROVE FINAL LOCATION OF TREES IN THE FIELD IN COORDINATION WITH THE ENGINEER.



LANDSCAPING DETAIL 6

SCALE: 1" = 10'



LANDSCAPING DETAIL 7

SCALE: 1" = 10'

BIOSWALE SEED MIX

- VIRGINIA WILD RYE, (ELYMUS VIRGINICUS)
- CREeping RED FESCUE, (FESTUCA RUBRA)
- LITTLE BLUESTEM, (SCHIZACHYRIUM SCOPARIUM)
- BIG BLUESTEM, (ANDROPOGON GERARDII)
- FOX SEDGE, (CAREX VULPINOIDEA)
- SWITCH GRASS, (PANICUM VIRGATUM)
- ROUGH BENTGRASS, (AGROSTIS SCABRA)
- NEW ENGLAND ASTER, (ASTER NOVAE-ANGLIAE)
- BONESET, (EUPATORIUM PERFOLIATUM)
- GRASS LEAVED GOLDENROD, (EUTHAMIA GRAMINIFOLIA)
- GREEN BULRUSH, (SCIRPUS ATROVIRENS)
- BLUE VERVAIN, (VERBENA HASTATA)
- SOFT RUSH, (JUNCUS EFFUSUS)
- WOOL GRASS, (SCIRPUS CYPERINUS)

PLANT LIST

SYMBOL	QUANTITY	BOTANICAL NAME	COMMON NAME	SIZE
SHRUBS				
VT	3	VIBURNUM TRILOBUM	CRANBERRY BUSH - AMERICAN	2 - 3 FEET
CA	21	CLETHRA ALNIFOLIA	SUMMERSWEET SHRUB	2 - 3 FEET
KL	18	KLAMIA LATIFOLIA	MOUNTAIN LAUREL	24 - 30 INCH
IVF	3	ILEX VERTICILLATA	WINTERBERRY - FEMALE	24 - 30 INCH
IG	5	ILEX GLABRA 'COMPACTA'	INKBERRY - COMPACT	24 - 30 INCH
SC	18	SYMPHORICARPOS XCHENAULTI	CORALBERRY SHRUB - CHENAULT	2 - 3 FEET
FG	15	FOTHERGILLA GARDENII	FOTHERGILLA - DWARF	18 - 24 INCH
RA	9	RHUS AROMATICA 'GROW LOW'	GROW LOW FRAGRANT SUMAC	18 - 24 INCH
AA	5	ARONIA ARBUTIFOLIA 'BRILLIANTISSIMA'	BRILLIANTISSIMA CHOKEBERRY	18 - 24 INCH
TREES				
CC	1	CERCIS CANADENSIS	EASTERN REDBUD	8'-10' MULTI-STEM
AR	2	ACER RUBRA 'OCTOBER GLORY'	RED MAPLE	3"-3.5" cal
AS	2	AMELANCHIER 'ROBIN HILL'	ROBIN HILL SERVICEBERRY	3"-3.5" cal
CL	1	CLADRASTIS LUTEA	YELLOWWOOD	3"-3.5" cal

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	78	208
PROJECT FILE NO.		604532	

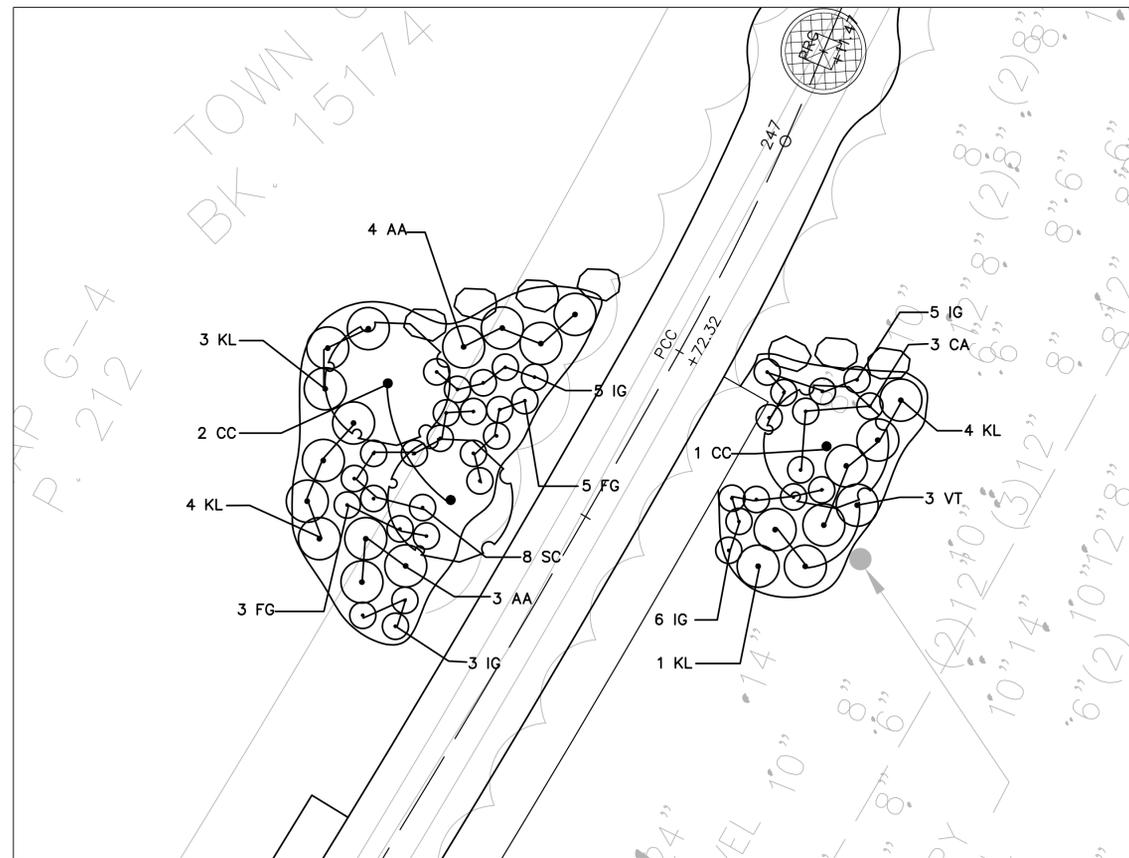
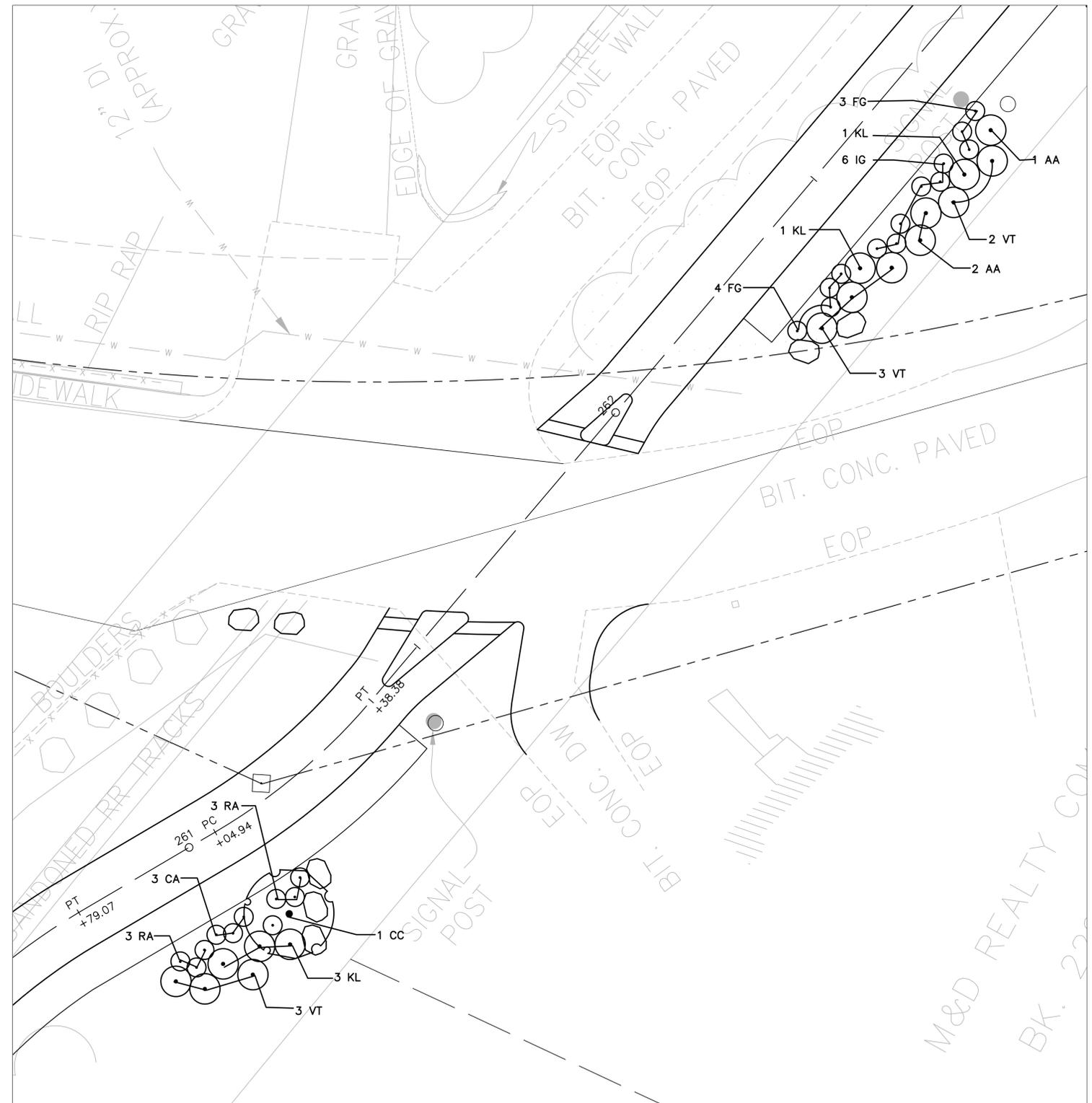
LANDSCAPING PLANS AND DETAILS

NOTES:

1. LOCATIONS FOR PROPOSED TREES ARE APPROXIMATE ONLY. THE TOWN ENGINEER (OR OTHER TOWN REPRESENTATIVE DESIGNATED BY THE TOWN ENGINEER) SHALL APPROVE FINAL LOCATION OF TREES IN THE FIELD IN COORDINATION WITH THE ENGINEER.

LANDSCAPING DETAIL 9

SCALE: 1" = 10'



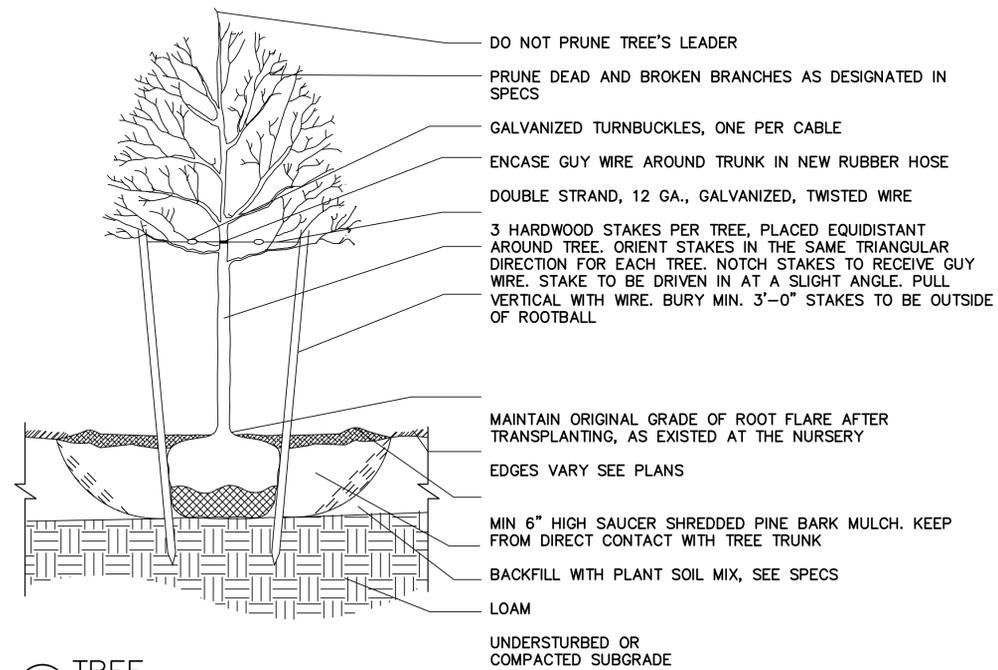
LANDSCAPING DETAIL 8

SCALE: 1" = 10'

PLANT LIST

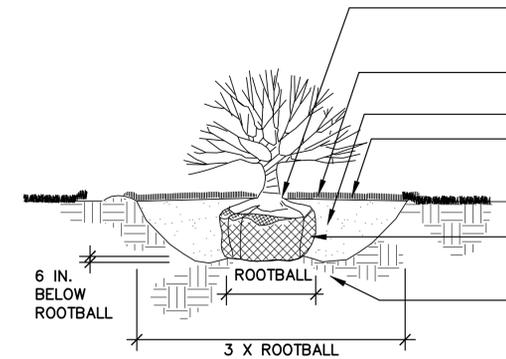
SYMBOL	QUANTITY	BOTANICAL NAME	COMMON NAME	SIZE
SHRUBS				
VT	11	VIBURNUM TRILOBUM	CRANBERRY BUSH – AMERICAN	2 – 3 FEET
CA	6	CLETHRA ALNIFOLIA	SUMMERSWEET SHRUB	2 – 3 FEET
KL	17	KLAMIA LATIFOLIA	MOUNTAIN LAUREL	24 – 30 INCH
IG	25	ILEX GLABRA 'COMPACTA'	INKBERRY – COMPACT	24 – 30 INCH
SC	8	SYMPHORICARPOS XCHENAUATI	CORALBERRY SHRUB – CHENAUAT	2 – 3 FEET
FG	15	FOTHERGILLA GARDENII	FOTHERGILLA – DWARF	18 – 24 INCH
RA	6	RHUS AROMATICA 'GROW LOW'	GROW LOW FRAGRANT SUMAC	18 – 24 INCH
AA	10	ARONIA ARBUTIFOLIA 'BRILLIANTISSIMA'	BRILLIANTISSIMA CHOKEBERRY	18 – 24 INCH
TREES				
CC	3	CERCIS CANADENSIS	EASTERN REDBUD	8'-10' MULTI-STEM

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	79	208
PROJECT FILE NO.		604532	

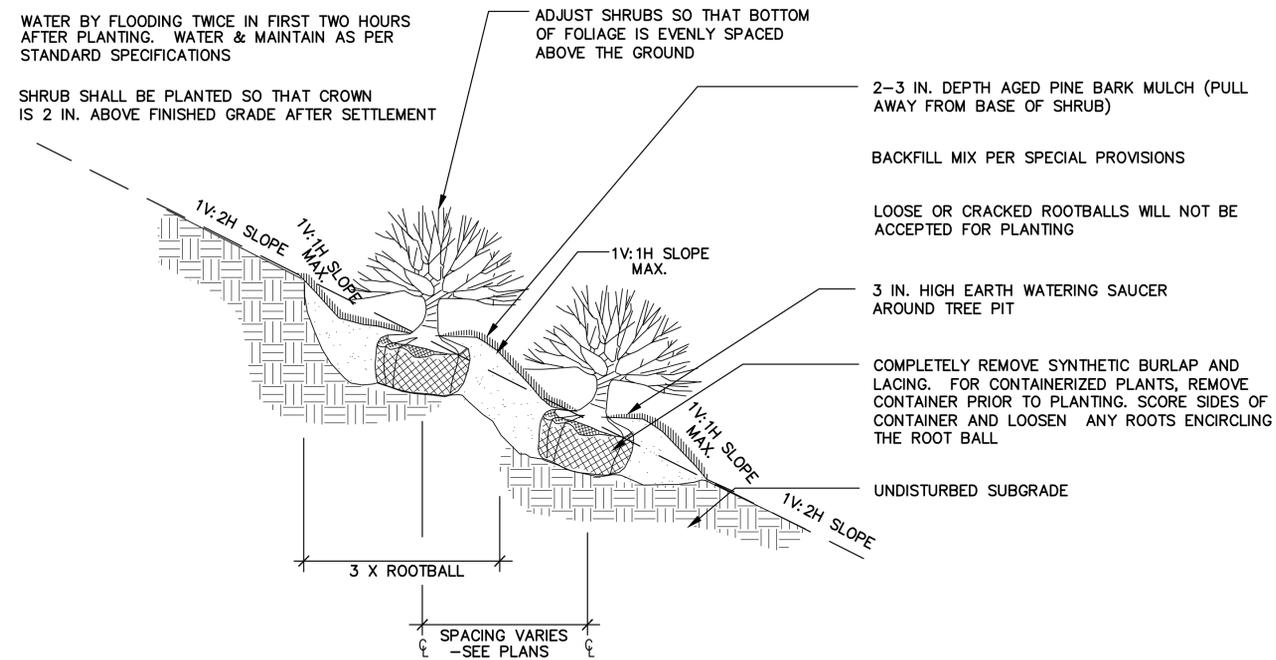


○ TREE
NOT TO SCALE

EXCAVATE TO REQUIRED DEPTH AND BACKFILL WITH PLANTING MIX



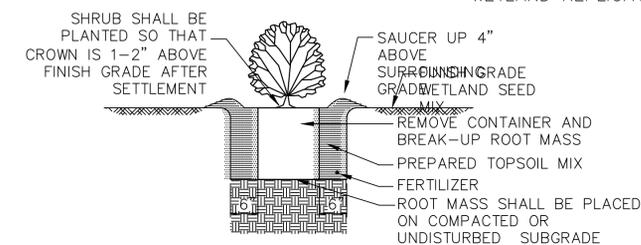
○ SHRUB PLANTING
NOT TO SCALE



○ CONTAINERIZED SHRUB PLANTING (SLOPE)
NOT TO SCALE

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	80	208
PROJECT FILE NO. 604532			

WETLAND REPLICATION PLANS

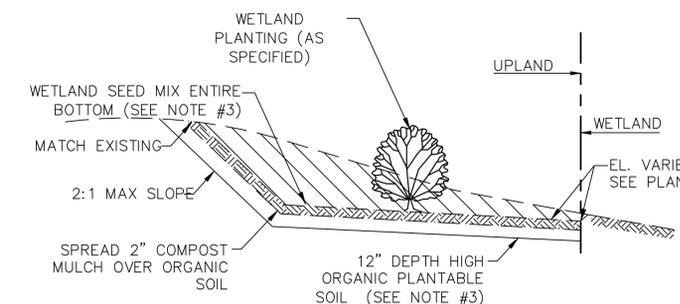


- 1.) PREPARED TOPSOIL MIX SHALL CONSIST OF HIGH ORGANIC SOIL WITH NO LESS THAN 10% ORGANIC MATTER.
- 2.) ALL PLANTS SHALL BE FLOODED WITH WATER TWICE WITHIN THE FIRST TWENTY-FOUR HOUR PERIOD AFTER PLANTING.

SHRUB PLANTING DETAIL
NOT TO SCALE

PLANTING NOTES

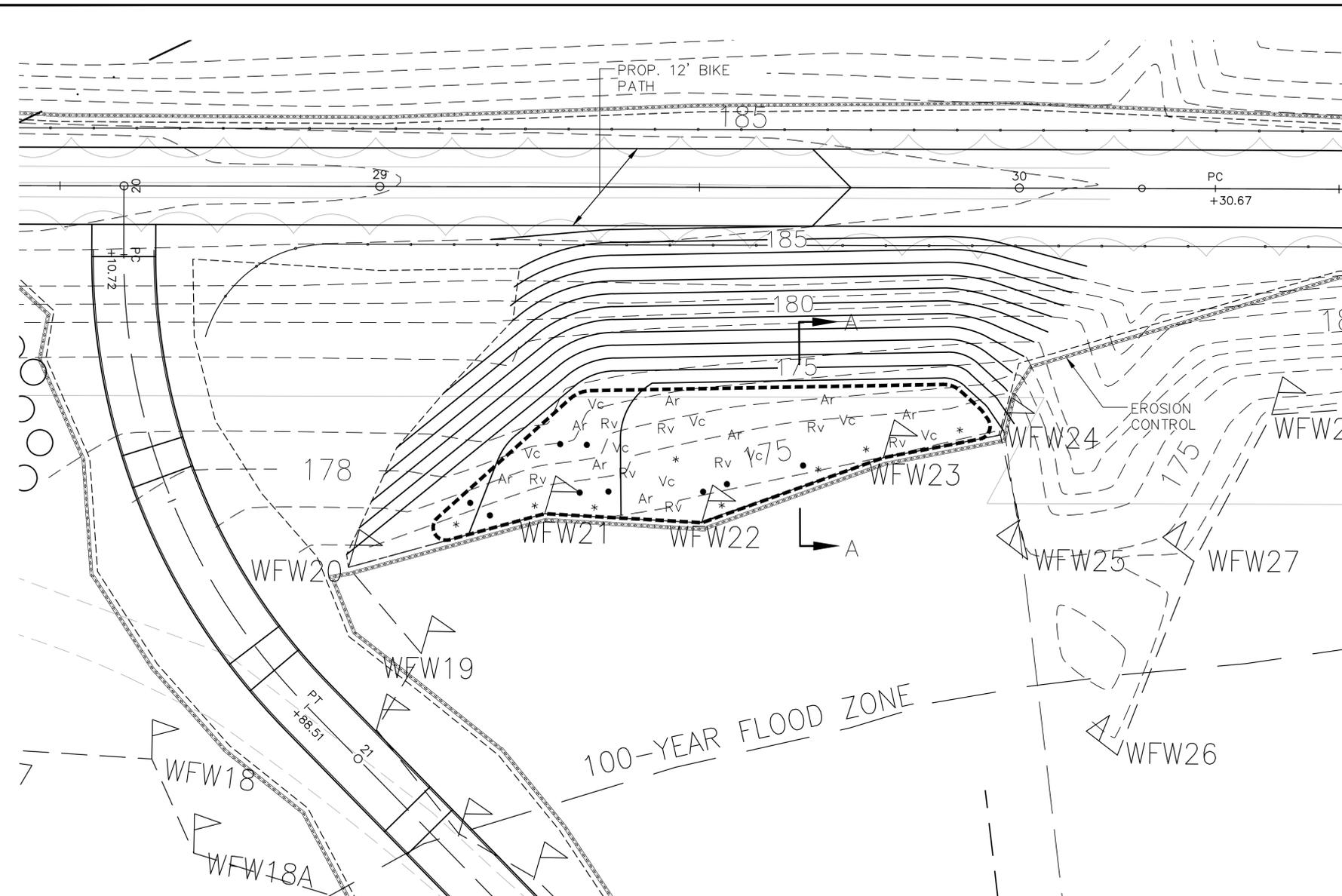
	DIAMETER	DEPTH
SHRUBS B&B	BALL + 1'-0" MIN	BALL DEPTH
CONTAINER GROWN MATERIAL	CONT. DIA. + 1'-0" MIN	CONT. DEPTH



SECTION A-A OF
WETLAND REPLICATION AREA
N.T.S.

NOTES:

1. FOR LOCATION, SEE CONSTRUCTION PLANS
2. FOR WETLAND SECTIONS A-A, SEE THIS DWG.
3. MITIGATION AREA SHALL BE TREATED WITH TWELVE (12") INCHES OF HIGH ORGANIC GRANULAR TOPSOIL, 2" COMPOST TOPSOIL AND SEEDED WITH A MANUFACTURED WETLAND SEED MIX APPLIED AT A RATE OF 0.5 LB./1,000 S.F.



PLANTING PLAN



PLANTING SPECIFICATIONS

SYMBOL	SCIENTIFIC NAME	COMMON NAME	QTY
Ar	ACER RUBRUM	RED MAPLE	8
Vc	VACCINIUM CORYMBOSUM	HIGHBUSH BLUEBERRY	8
Rv	RHODODENDRON VISCOSUM	SWAMP AZALEA	8
•	OSMUNDA CINNAMOMEA	CINNAMON FERN	9
*	ONOCLEA SENSIBILIS	SENSITIVE FERN	9

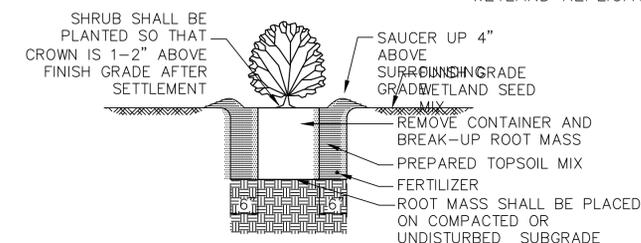
WETLAND SEED MIX

SCIENTIFIC NAME	COMMON NAME	%
CAREX VULPINOIDEA	FOX SEDGE	25
ELYMUS VIRGINICUS	VIRGINIA WILD RYE	25
CAREX LUPULINA	HOP SEDGE	12
CAREX COMOSA	BRISTLY SEDGE	6
VERBENA HASTATA	BLUE VERVAIN	6
JUNCUS EFFUSUS	SOFT RUSH	6
ASTER NOVAE-ANGLIAE	NEW ENGLAND ASTER	4
SCIRPUS ATROVIRENS	GREEN BULRUSH	4
SCIRPUS CYPERINUS	WOOLGRASS	4
EUPATORIUM PERFOLIATUM	BONESET	2
EUPATORIUM MACULATUM	SPOTTED JOE PYE WEED	2
EUTHAMIA GRAMINIFOLIA (SOLIDAGO G)	GRASSLEAF GOLDENROD	2
GLYCERIA GRANDIS	AMERICAN MANNA GRASS	2
TOTAL		100



STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	81	208
PROJECT FILE NO. 604532			

WETLAND REPLICATION PLANS

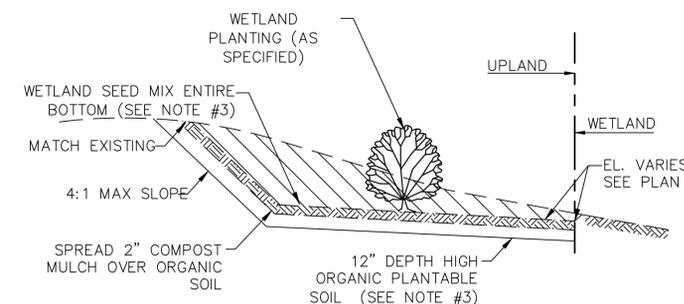


- 1.) PREPARED TOPSOIL MIX SHALL CONSIST OF HIGH ORGANIC SOIL WITH NO LESS THAN 10% ORGANIC MATTER.
- 2.) ALL PLANTS SHALL BE FLOODED WITH WATER TWICE WITHIN THE FIRST TWENTY-FOUR HOUR PERIOD AFTER PLANTING.

SHRUB PLANTING DETAIL
NOT TO SCALE

PLANTING NOTES

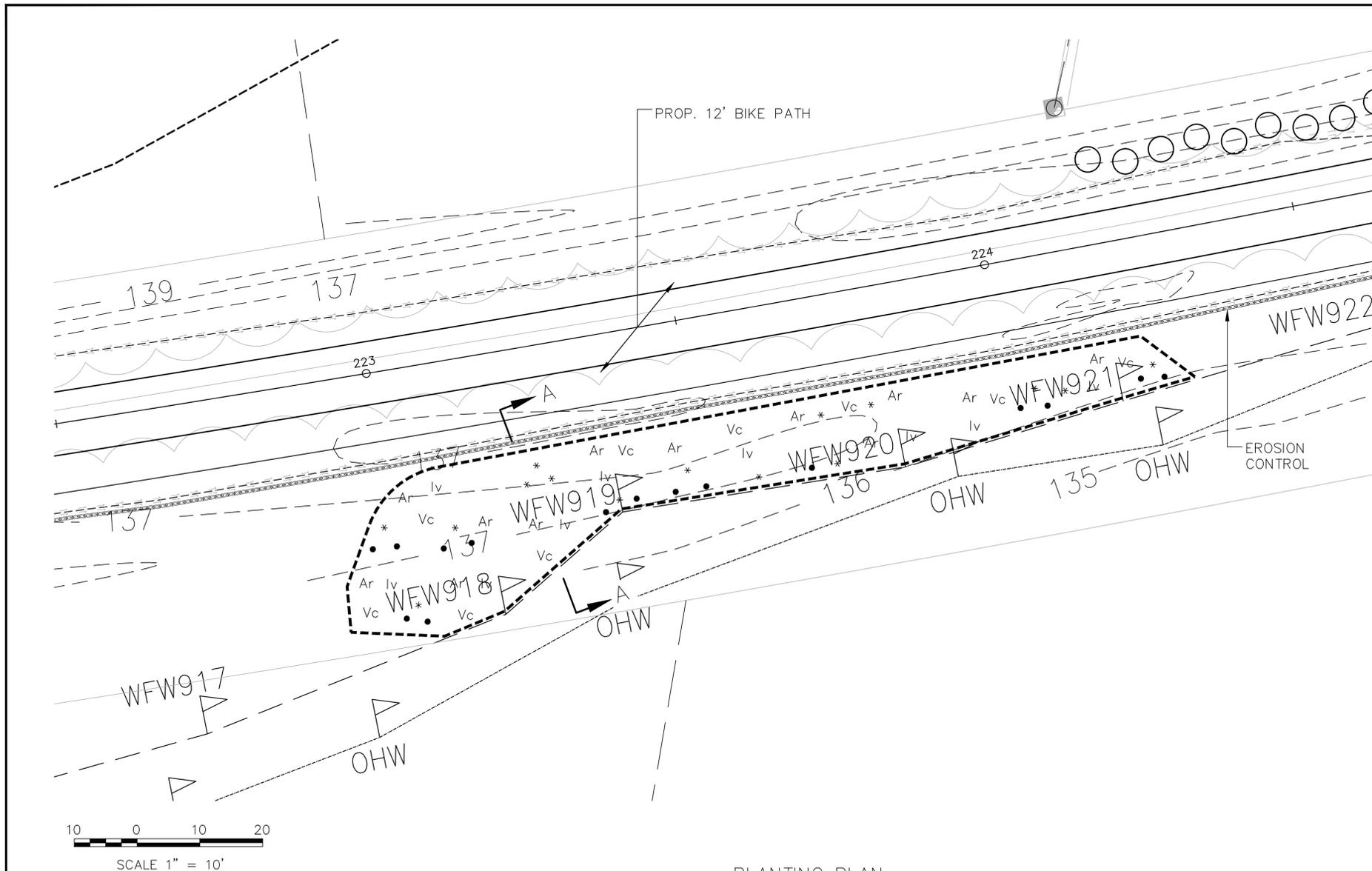
	DIAMETER	DEPTH
SHRUBS B&B	BALL + 1'-0" MIN	BALL DEPTH
CONTAINER GROWN MATERIAL	CONT. DIA. + 1'-0" MIN	CONT. DEPTH



SECTION A-A OF
WETLAND REPLICATION AREA
N.T.S.

NOTES:

1. FOR LOCATION, SEE CONSTRUCTION PLANS.
2. FOR WETLAND SECTIONS A-A, SEE THIS DWG.
3. MITIGATION AREA SHALL BE TREATED WITH TWELVE (12") INCHES OF HIGH ORGANIC GRANULAR TOPSOIL, 2" COMPOST TOPSOIL AND SEEDED WITH A MANUFACTURED WETLAND SEED MIX APPLIED AT A RATE OF 0.5 LB./1,000 S.F.



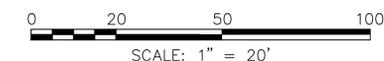
PLANTING PLAN

PLANTING SPECIFICATIONS

SYMBOL	SCIENTIFIC NAME	COMMON NAME	QTY
Ar	ACER RUBRUM	RED MAPLE	12
Vc	VACCINIUM CORYMBOSUM	HIGHBUSH BLUEBERRY	9
Iv	ILEX VERTICILLATA	WINTERBERRY	9
•	OSMUNDA CINNAMOMEA	CINNAMON FERN	15
*	OSMUNDA REGALIS	ROYAL FERN	15

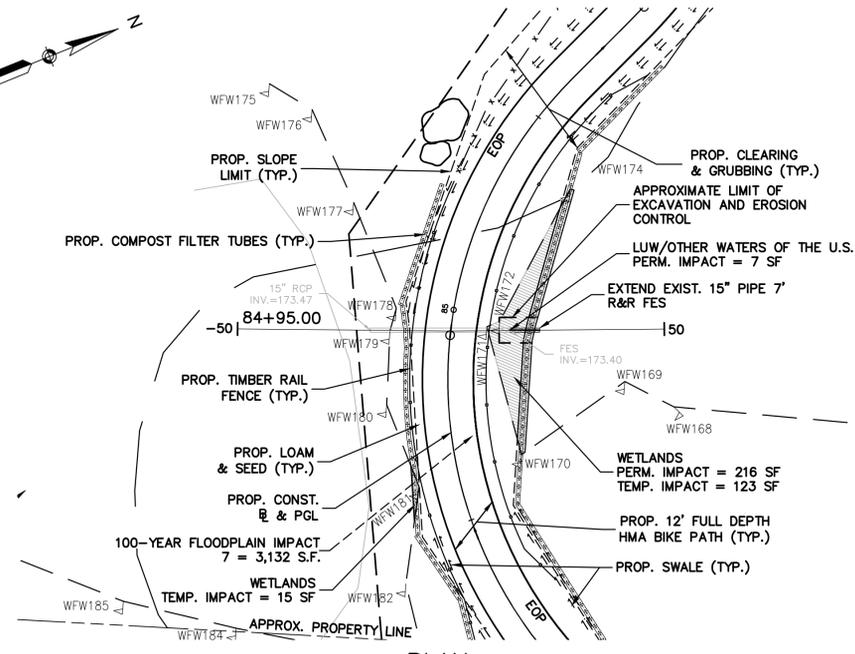
WETLAND SEED MIX

SCIENTIFIC NAME	COMMON NAME	%
CAREX VULPINOIDEA	FOX SEDGE	25
ELYMUS VIRGINICUS	VIRGINIA WILDRIE	25
CAREX LUPULINA	HOP SEDGE	12
CAREX COMOSA	BRISTLY SEDGE	6
VERBENA HASTATA	BLUE VERVAIN	6
JUNCUS EFFUSUS	SOFT RUSH	6
ASTER NOVAE-ANGLIAE	NEW ENGLAND ASTER	4
SCIRPUS ATROVIRENS	GREEN BULRUSH	4
SCIRPUS CYPERINUS	WOOLGRASS	4
EUPATORIUM PERFOLIATUM	BONESET	2
EUPATORIUM MACULATUM	SPOTTED JOE PYE WEED	2
EUTHAMIA GRAMINIFOLIA (SOLIDAGO G)	GRASSLEAF GOLDENROD	2
GLYCERIA GRANDIS	AMERICAN MANNA GRASS	2
TOTAL		100

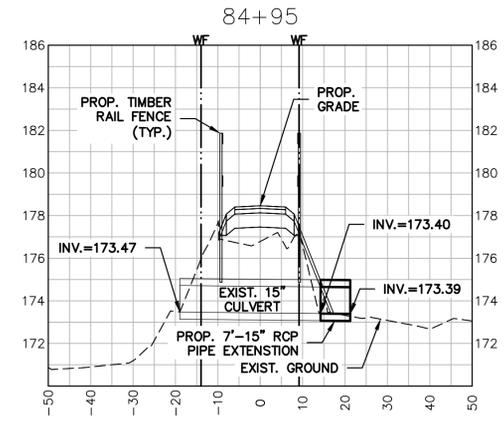


STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	82	208
MA	PROJECT FILE NO.	604532	

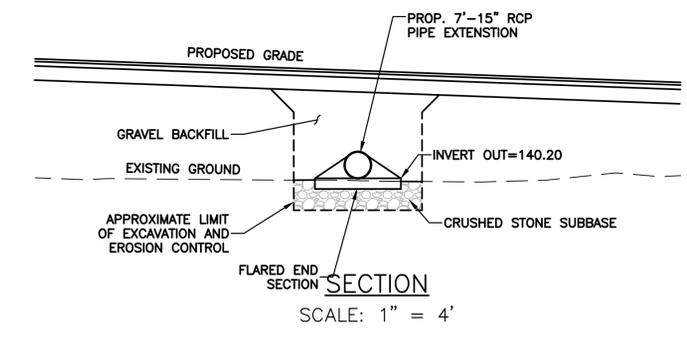
CULVERT DETAILS



PLAN
SCALE: 1" = 20'

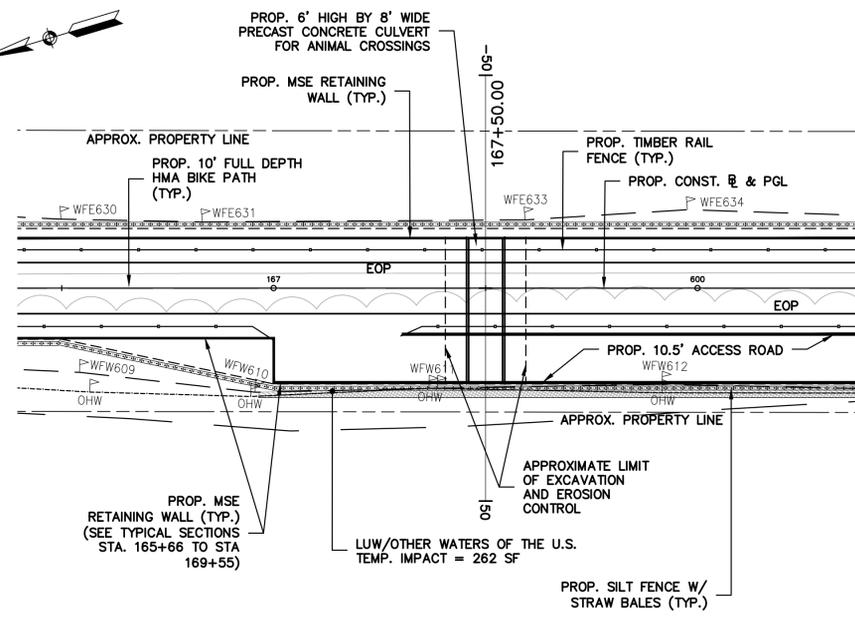


PROFILE
SCALE: 1" = 20' (HORIZONTAL)
1" = 4' (VERTICAL)

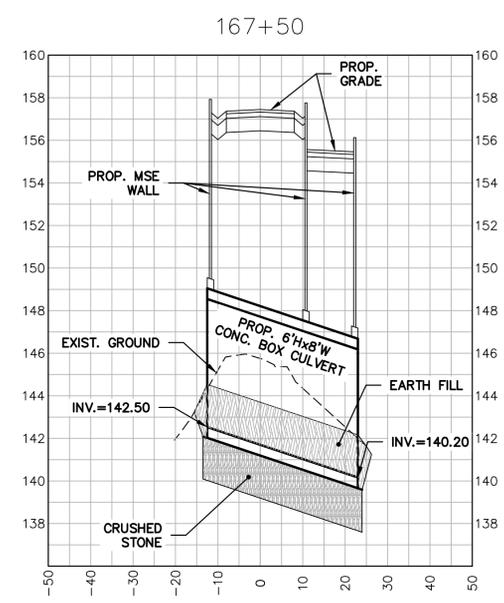


SECTION
SCALE: 1" = 4'

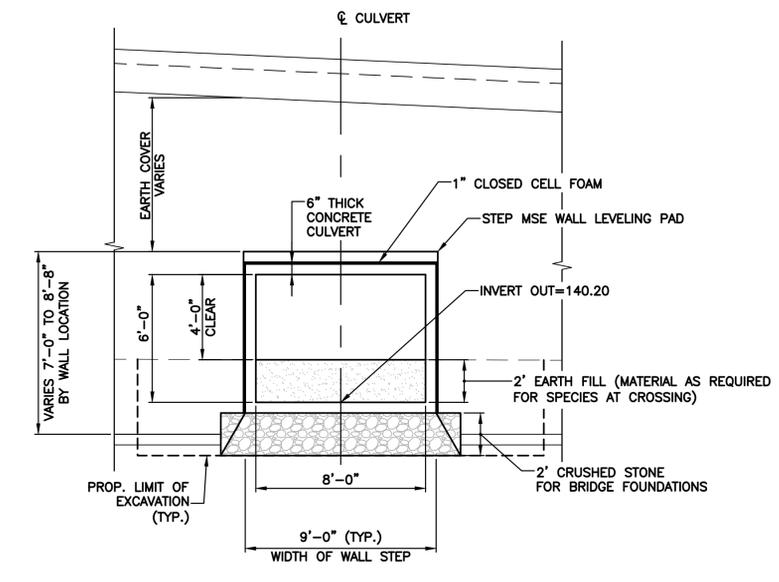
15" CULVERT EXTENSION
STA 84+95
SCALE: AS NOTED



PLAN
SCALE: 1" = 20'



PROFILE
SCALE: 1" = 20' (HORIZONTAL)
1" = 4' (VERTICAL)

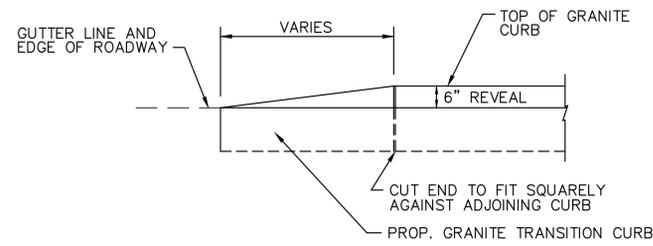


SECTION
SCALE: 1" = 4'

CONCRETE CULVERT FOR WILDLIFE CROSSING
STA 167+50
SCALE: AS NOTED

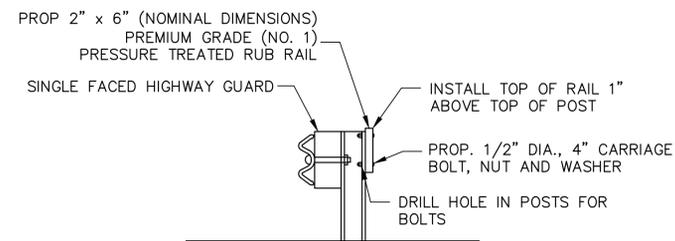
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	84	208
PROJECT FILE NO.		604532	

CONSTRUCTION DETAILS



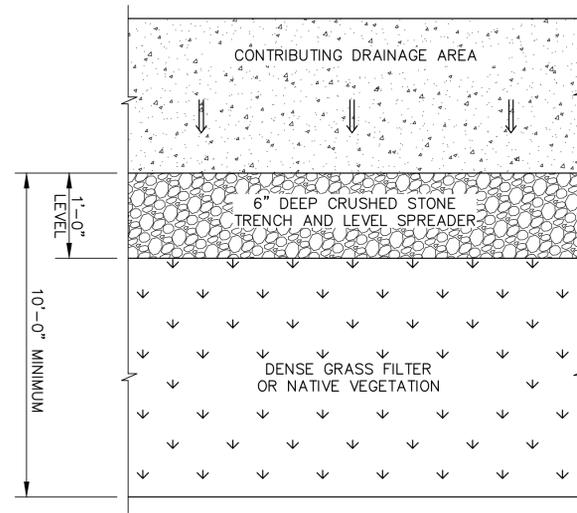
TRANSITION CURB DETAIL

TO BE USED AT ALL LOCATIONS WHERE VERTICAL GRANITE CURB ENDS

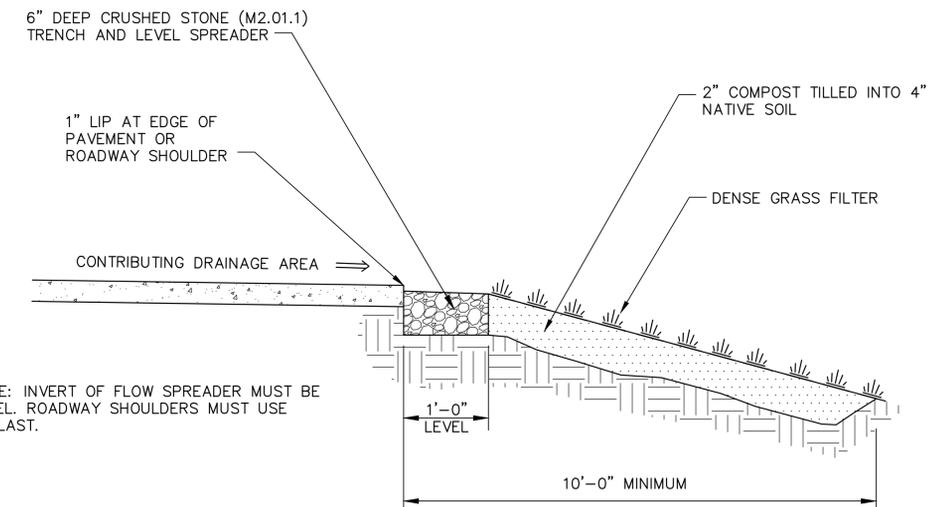


HIGHWAY GUARD W/TIMBER RUB RAIL

N.T.S.



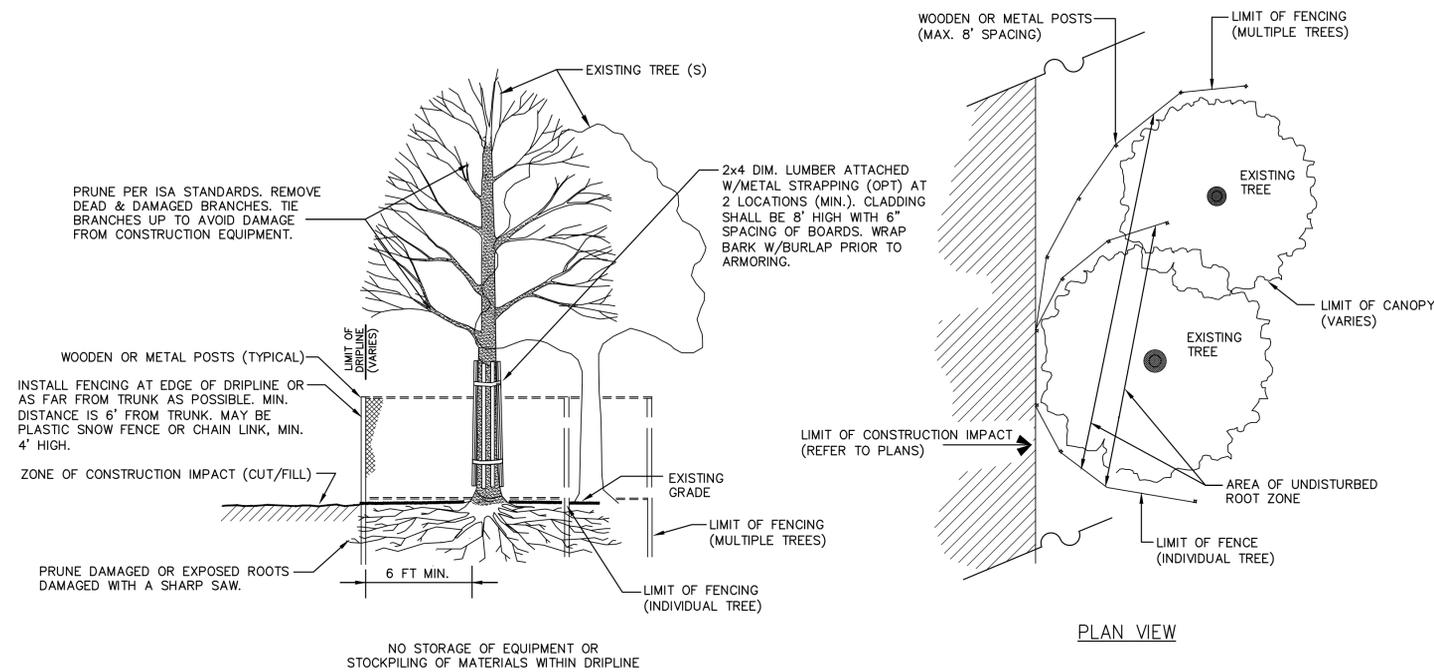
PLAN



NOTE: INVERT OF FLOW SPREADER MUST BE LEVEL. ROADWAY SHOULDERS MUST USE BALLAST.

FILTER STRIP DETAILS

N.T.S.

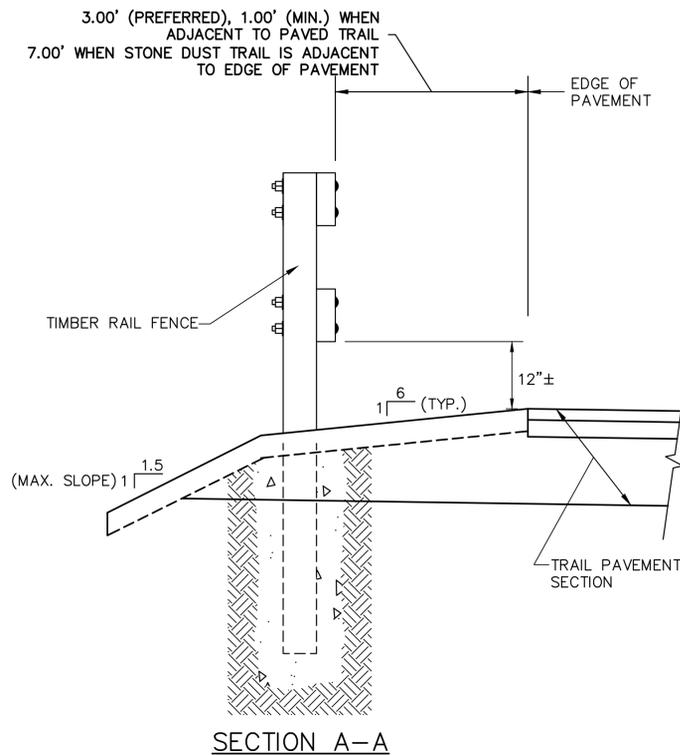
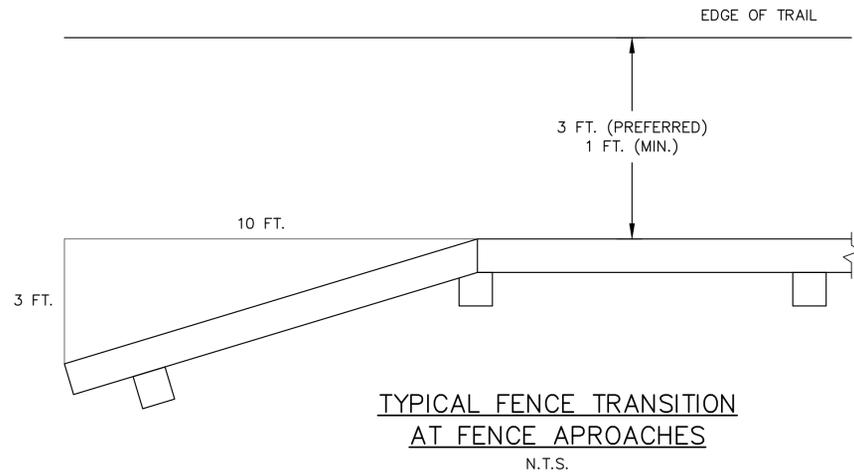


TREE PROTECTION PLAN

NOT TO SCALE

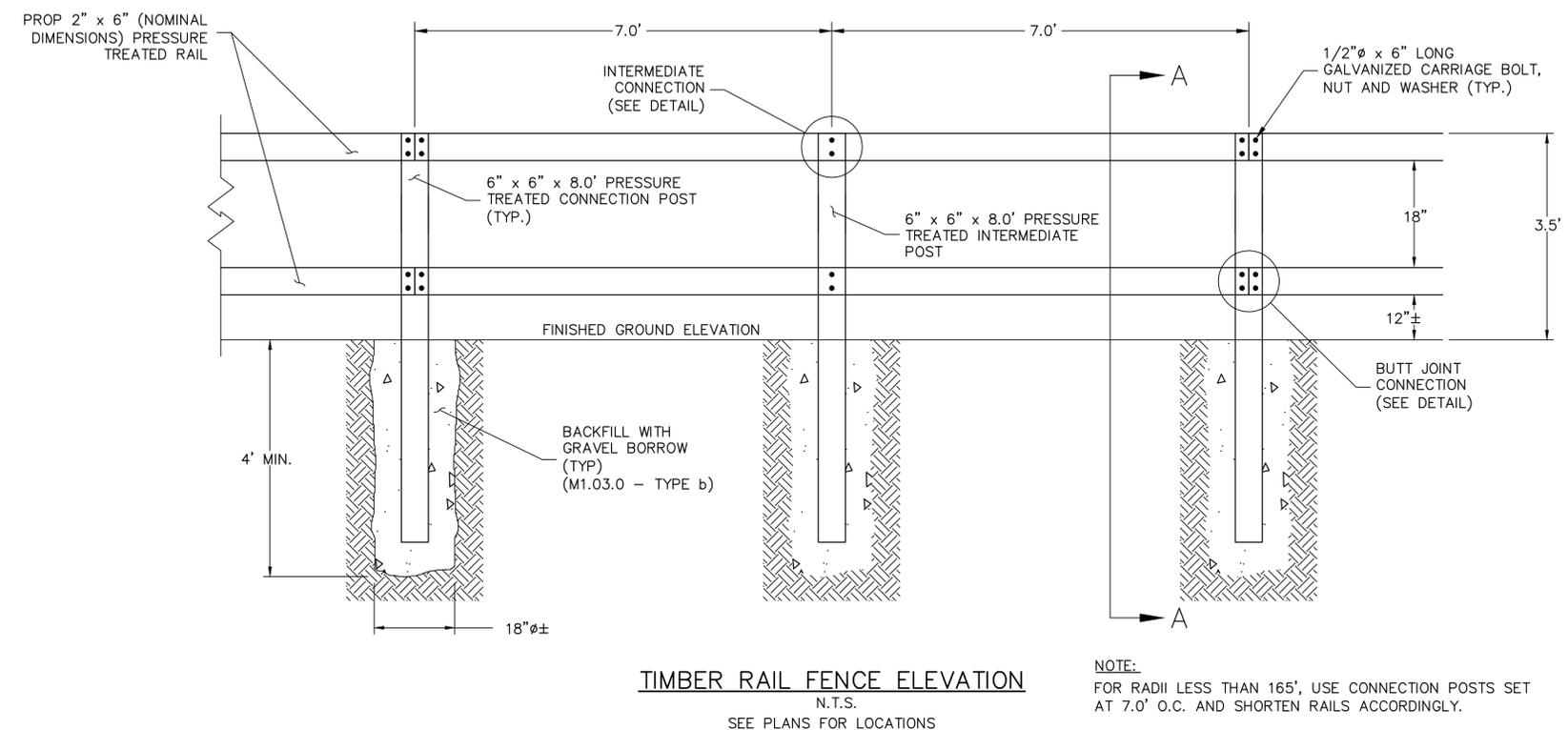
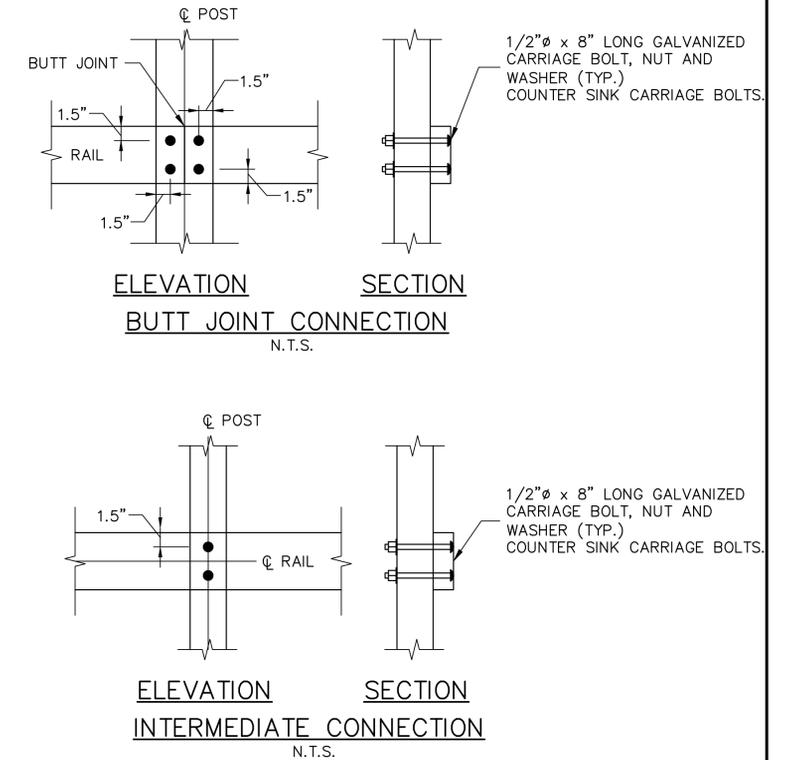
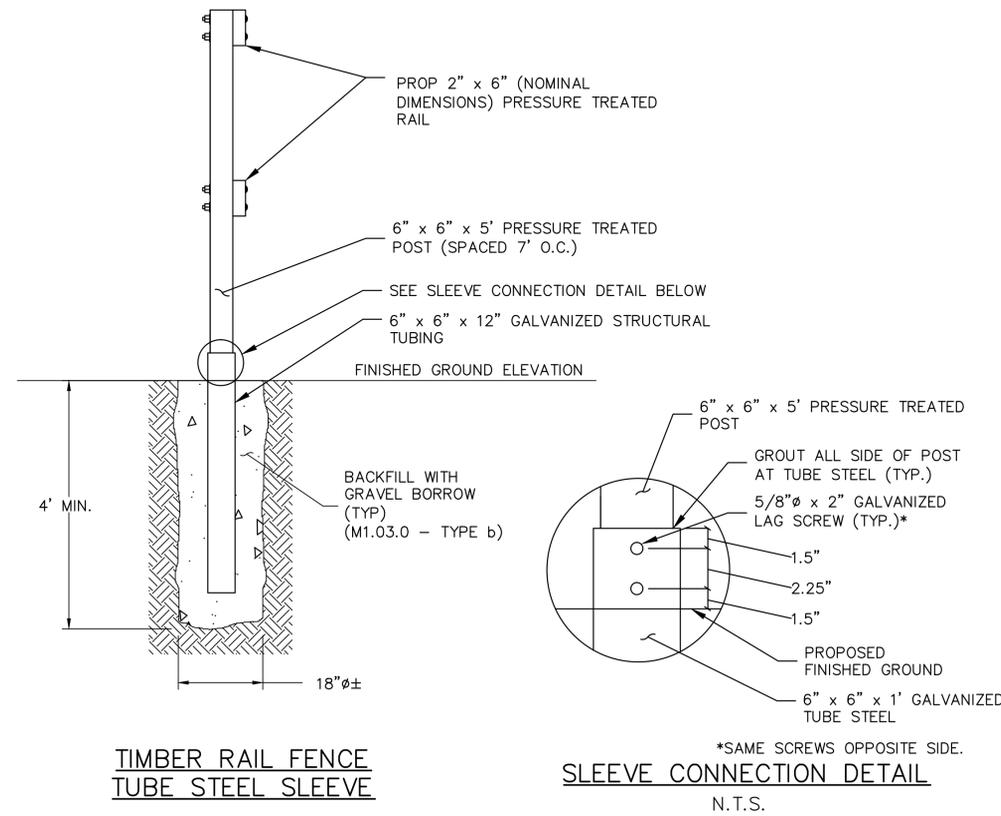
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	85	208
PROJECT FILE NO. 604532			

CONSTRUCTION DETAILS



SUGGESTED TIMBER RAIL FENCE CONSTRUCTION SEQUENCE

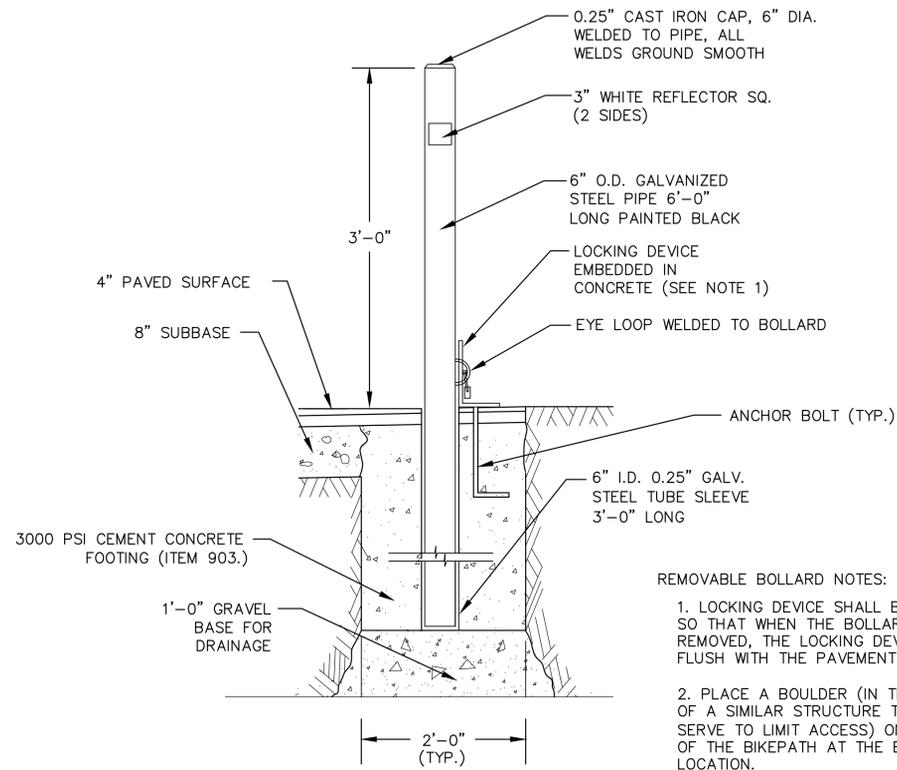
1. AUGER OR DIG POST HOLE TO REQUIRED DIMENSIONS.
2. IF GROUND IS SATURATED, USE TUBE STEEL SLEEVE. SEE DETAIL ON THIS SHEET.
3. BACKFILL BOTTOM 6"± OF HOLE WITH GRAVEL AND COMPACT THOROUGHLY.
4. SET POST AND HOLD PLUMB DURING BACKFILLING.
5. BACKFILL WITH GRAVEL IN 12" LIFTS. COMPACT EACH LIFT THOROUGHLY.
6. CLAMP RAILS TO POSTS AND FIELD DRILL BOLT HOLES.
7. SET BOLTS, WASHERS AND NUTS.
8. IF CCA PRESSURE TREATED LUMBER IS NOT READILY AVAILABLE AT THE TIME OF CONSTRUCTION OR IT IS DEEMED ENVIRONMENTALLY UNACCEPTABLE FOR COMMERCIAL USES BY THE EPA, USE ACQ PRESSURE TREATED LUMBER.



NOTE:
FOR RADII LESS THAN 165', USE CONNECTION POSTS SET AT 7.0' O.C. AND SHORTEN RAILS ACCORDINGLY.

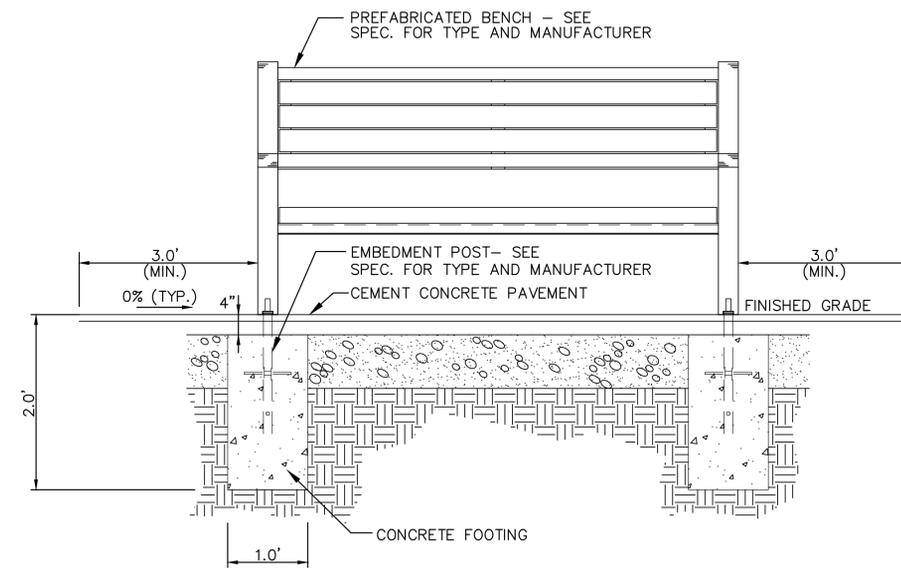
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	86	208
PROJECT FILE NO. 604532			

CONSTRUCTION DETAILS



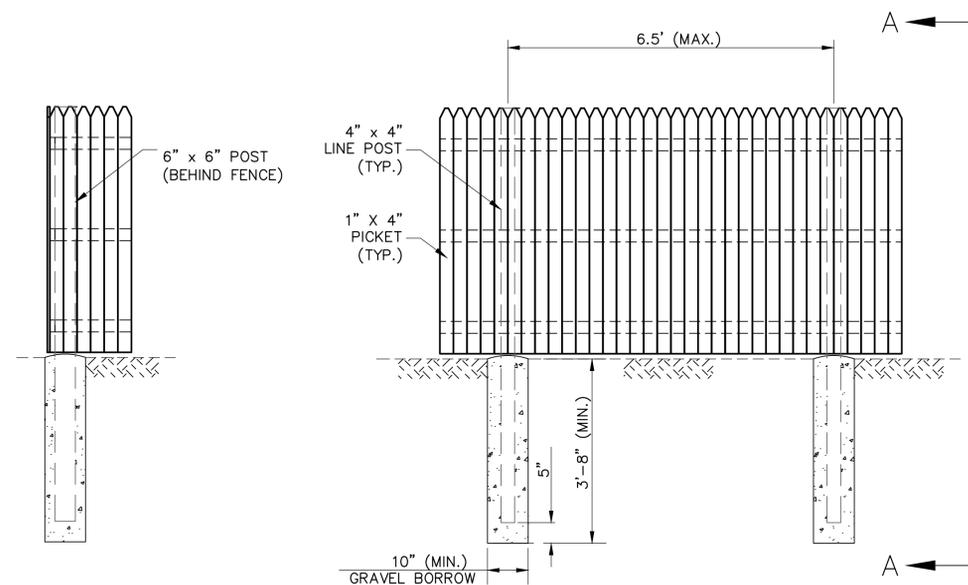
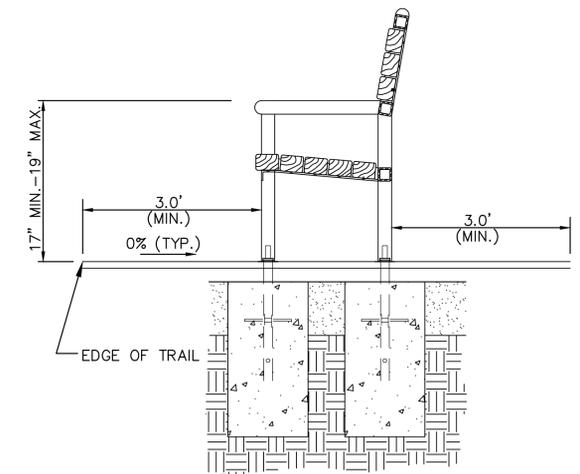
- REMOVABLE BOLLARD NOTES:
1. LOCKING DEVICE SHALL BE HINGED SO THAT WHEN THE BOLLARD IS REMOVED, THE LOCKING DEVICE IS FLUSH WITH THE PAVEMENT.
 2. PLACE A BOULDER (IN THE ABSENCE OF A SIMILAR STRUCTURE THAT WILL SERVE TO LIMIT ACCESS) ON EACH SIDE OF THE BIKEPATH AT THE BOLLARD LOCATION.

REMOVABLE BOLLARD
N.T.S.
SEE PLANS FOR LOCATIONS



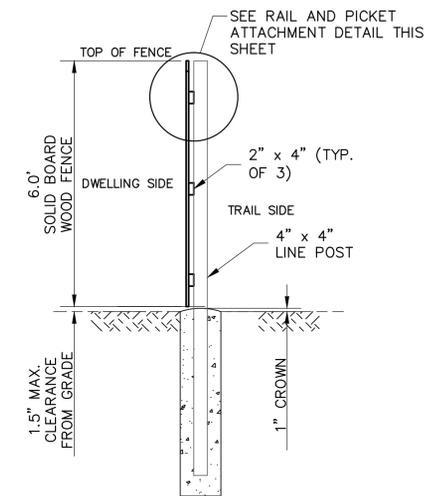
NOTE: MINIMUM SETBACK OF 3' FROM TRAIL SURFACE

BENCH
N.T.S.

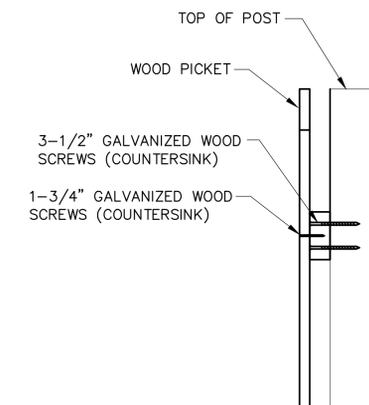


CORNER POST
SCALE: N.T.S.

ELEVATION
SCALE: N.T.S.



SECTION A-A
SCALE: N.T.S.



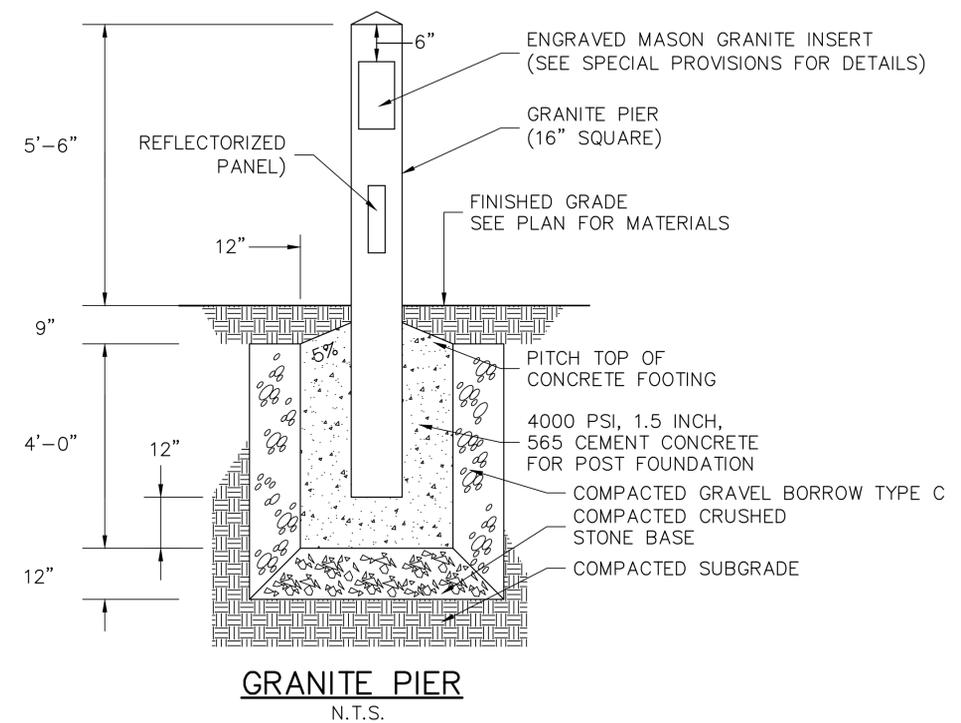
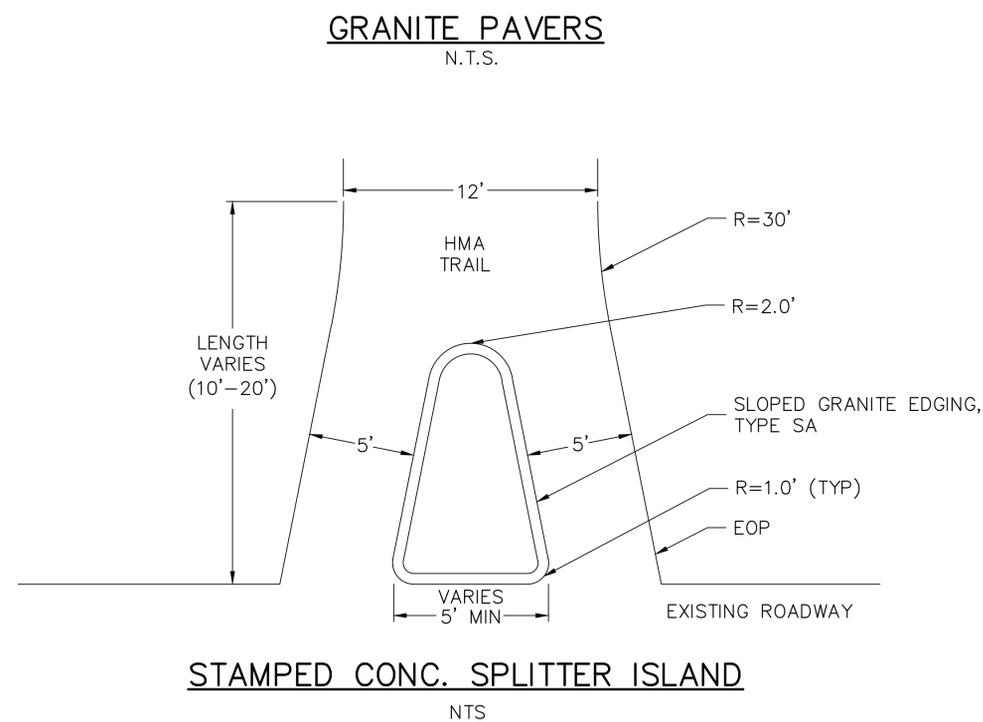
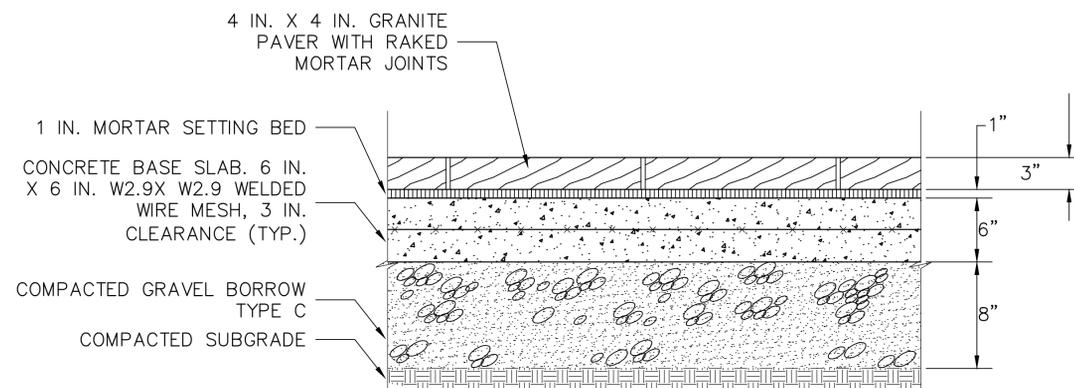
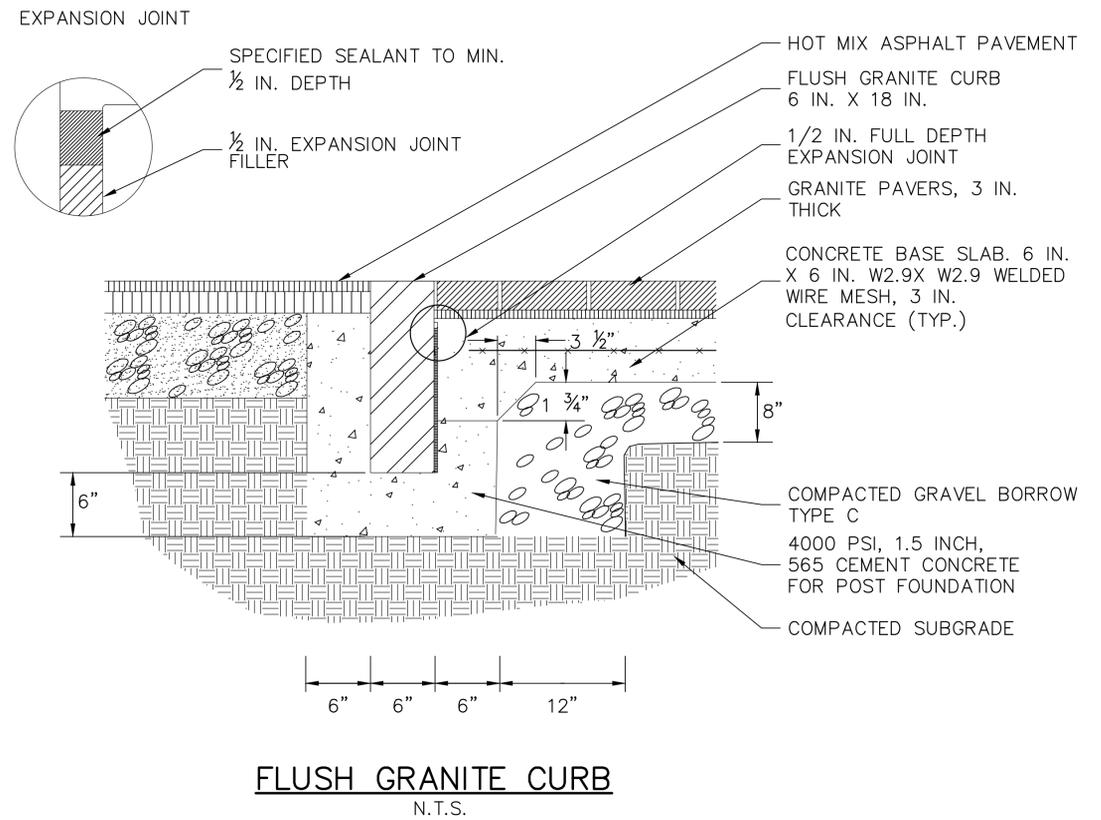
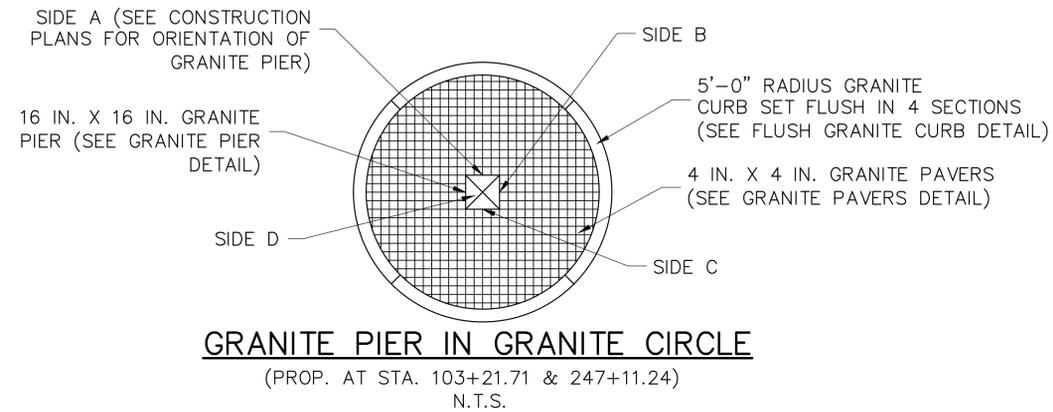
RAIL AND PICKET ATTACHMENT DETAIL
SCALE: N.T.S.

TYPICAL STOCKADE FENCING

1. ALL WOOD FENCE POSTS AND RAILS TO BE NO. 2 PINE PRESSURE TREATED LUMBER.
2. PICKETS TO BE 1" THICK CEDAR. CORNER AND GATE POSTS TO BE 6" X 6" NO. 2 PINE PRESSURE TREATED LUMBER.
3. LINE POSTS TO BE 4" X 4" NO. 2 PINE PRESSURE TREATED LUMBER.
4. ALL HARDWARE TO BE HOT DIP GALVANIZED.
5. PICKETS SHALL ALWAYS FACE DWELLINGS.

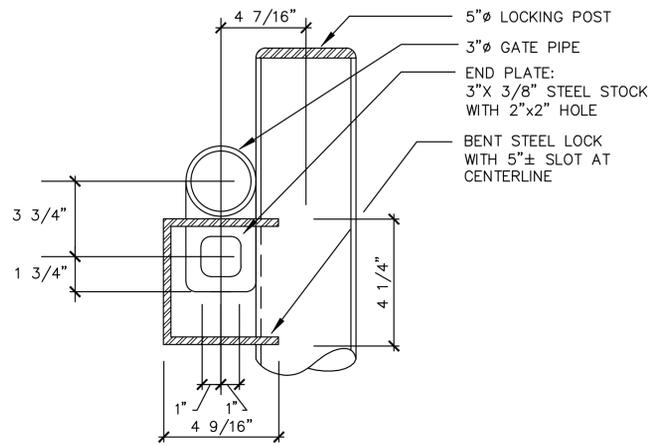
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	87	208
PROJECT FILE NO.		604532	

CONSTRUCTION DETAILS

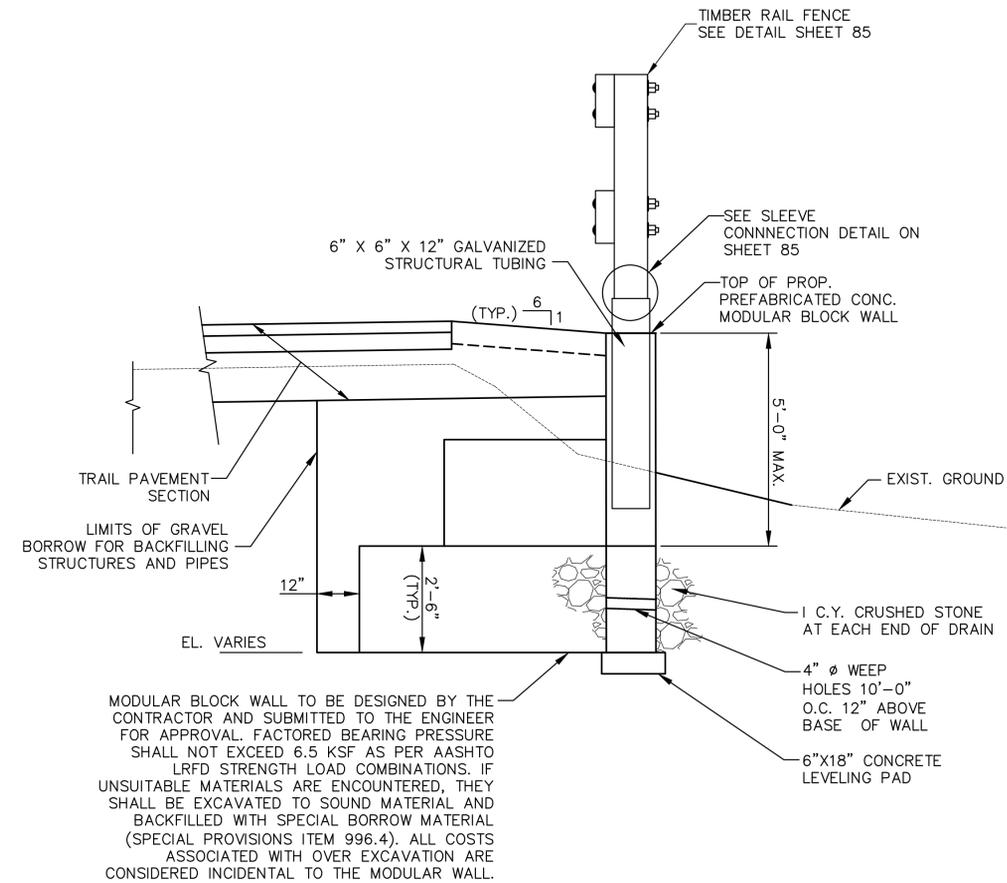


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MA	FED. AID	88	208
PROJECT FILE NO.		604532	

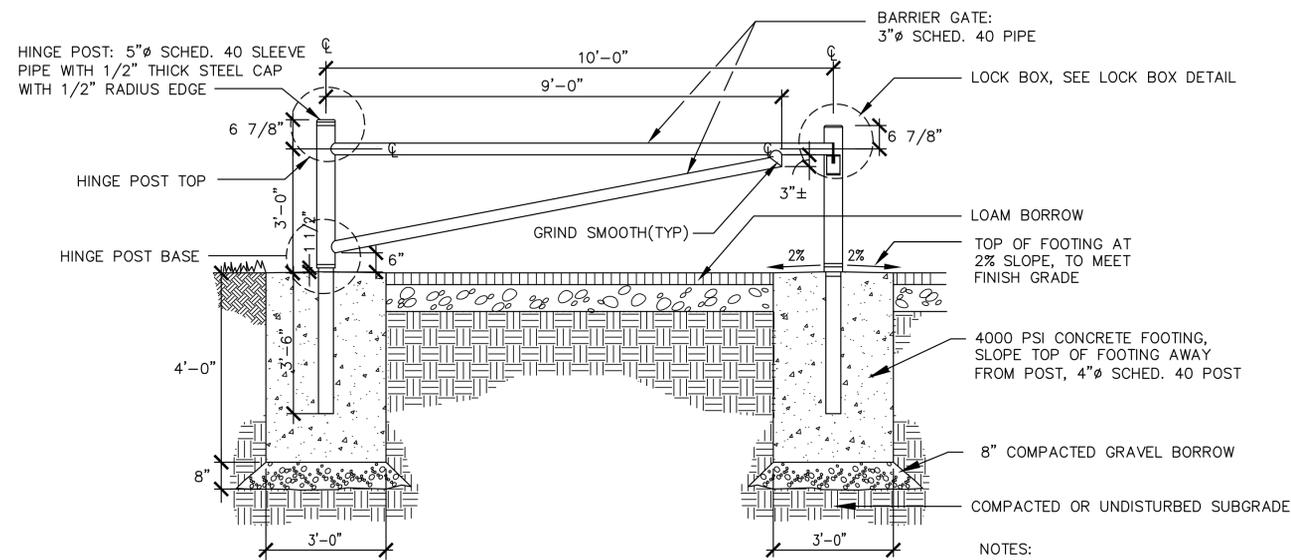
CONSTRUCTION DETAILS



LOCK BOX DETAIL
N.T.S.

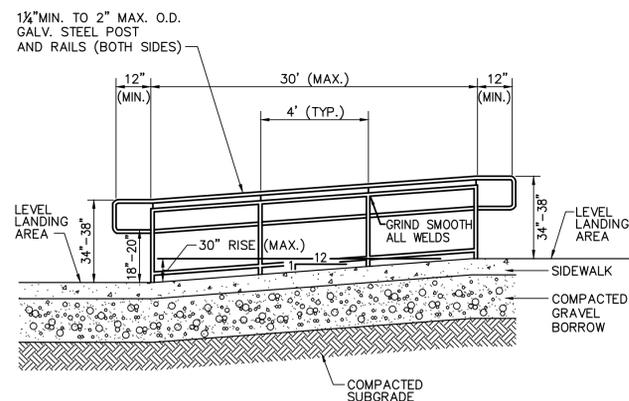


MODULAR BLOCK WALL SECTION
NOT TO SCALE

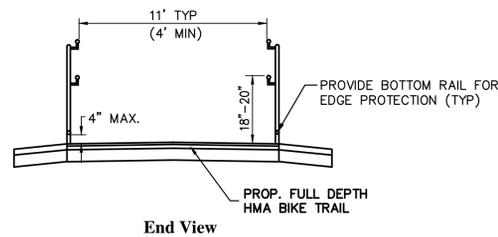


STEEL PIPE ACCESS GATE
N.T.S.

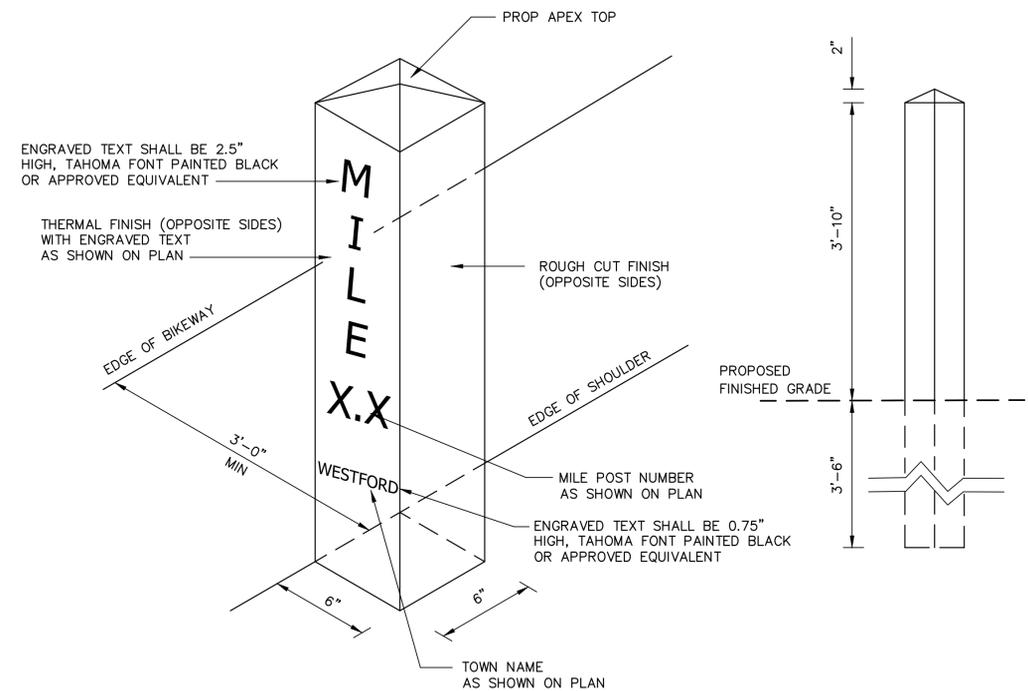
- NOTES:
1. ALL STEEL SHALL BE GALVANIZED INSIDE AND OUT.
 2. PROVIDE 1/2" Ø WEEP HOLES AT WELDED CONNECTIONS (3 PLACES).
 3. INSTALL BRASS BUSHINGS AFTER GALVANIZING.



RAMP WITH HANDRAIL
N.T.S.



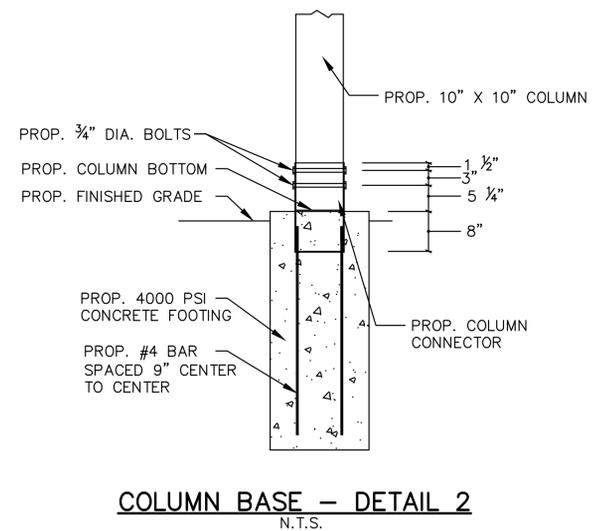
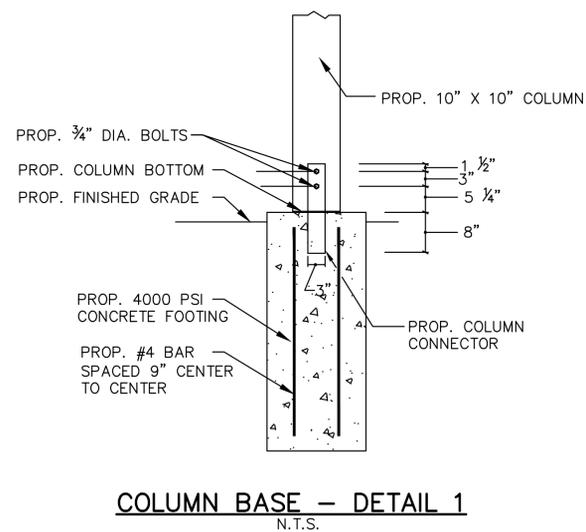
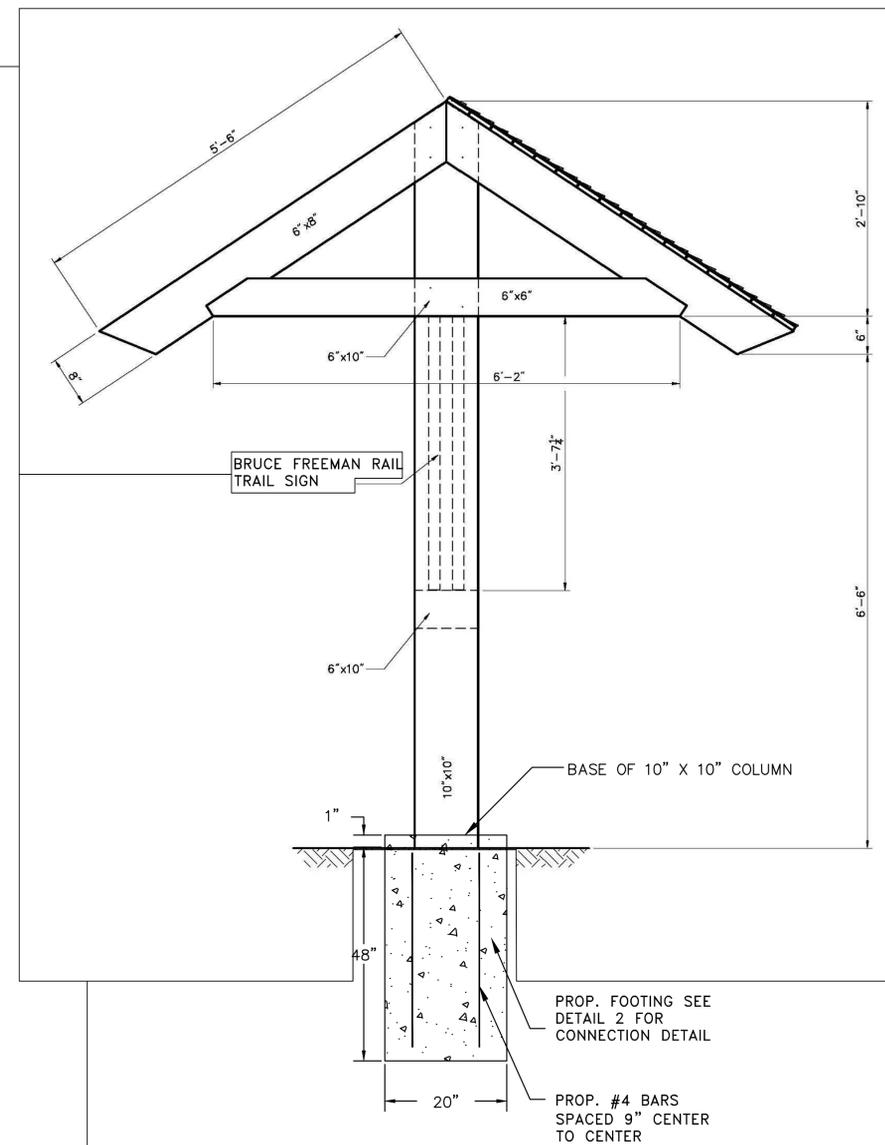
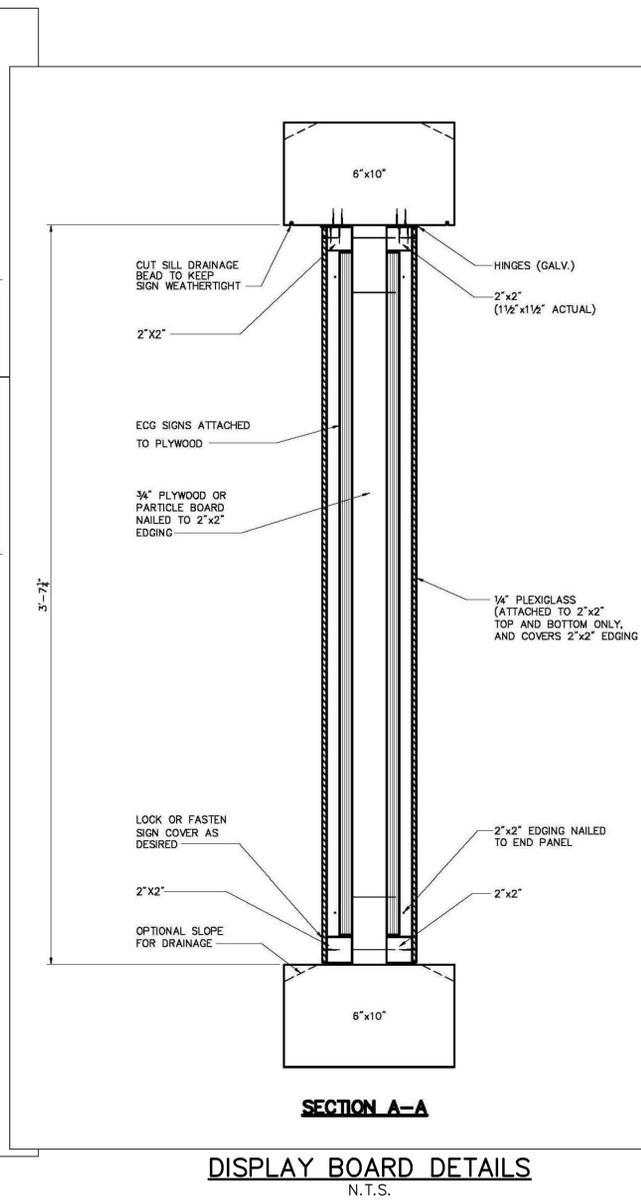
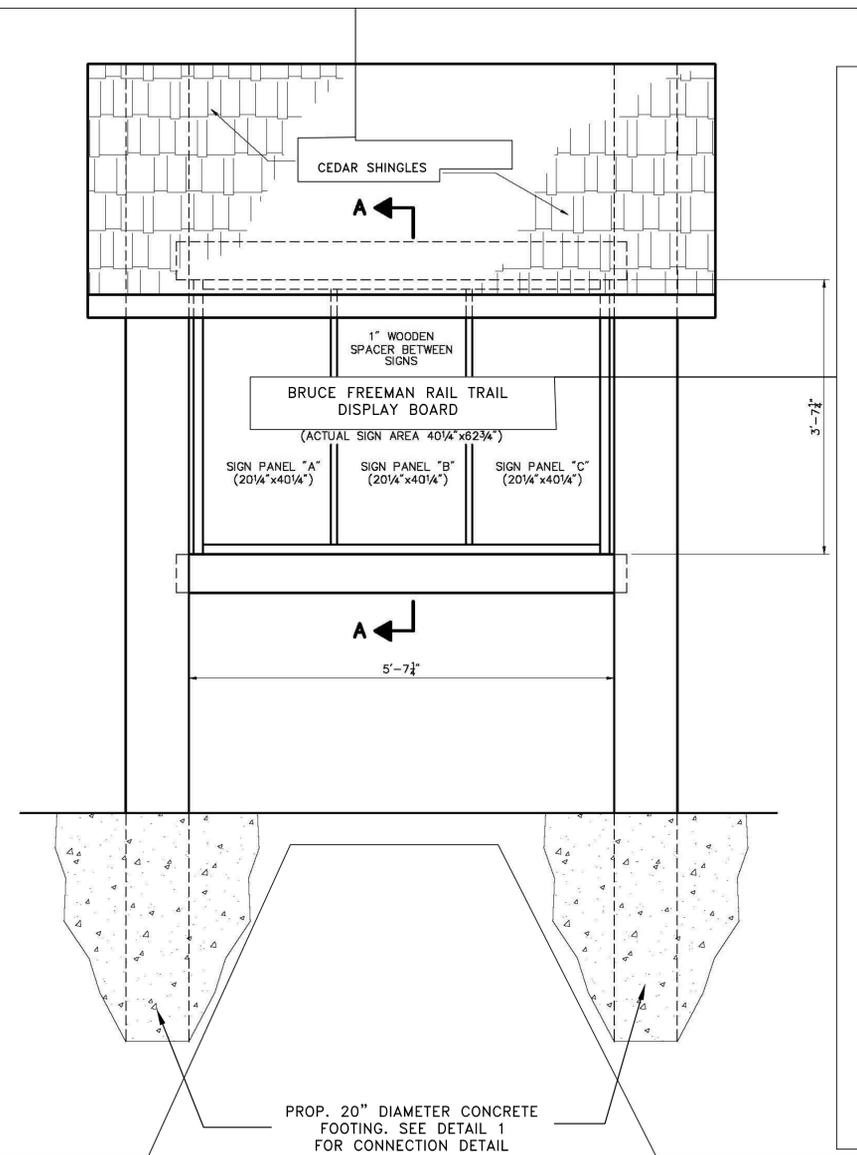
- NOTE:
1. FOR ADDITIONAL DETAIL SEE 521 CMR 24.00 RAMP.



GRANITE MARKER
N.T.S.

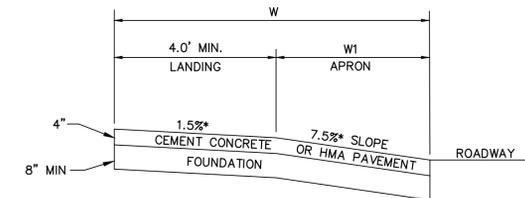
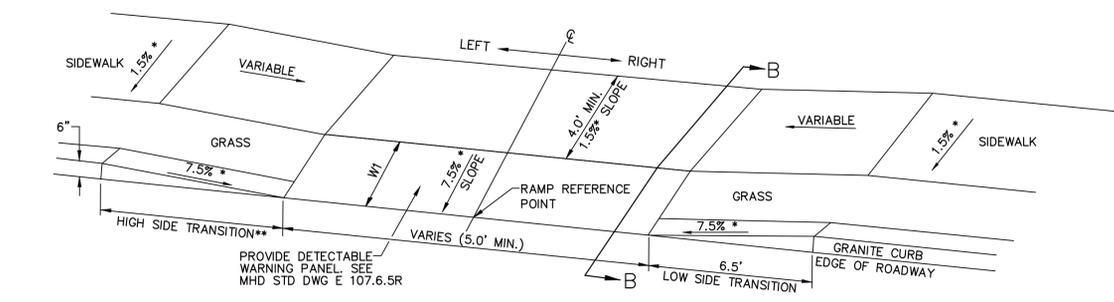
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	90	208
PROJECT FILE NO.		604532	

CONSTRUCTION DETAILS



STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	91	208
PROJECT FILE NO.		604532	

WHEELCHAIR RAMP DETAILS



SECTION B-B

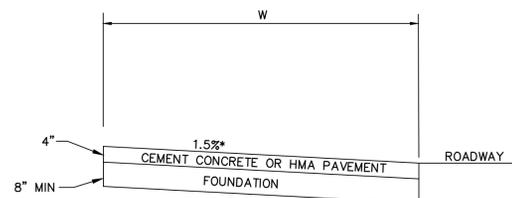
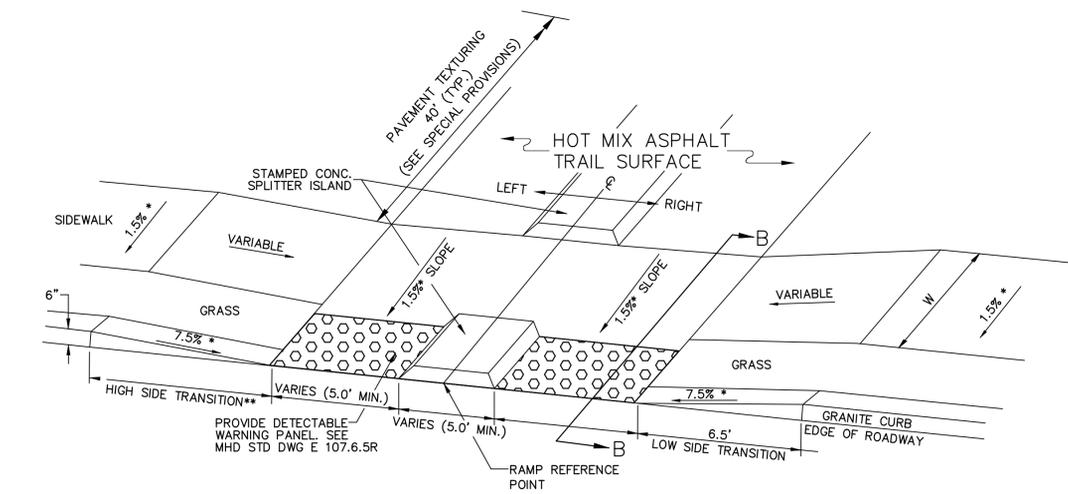
RAMP REFERENCE POINT		LENGTH OF PRIMARY RAMP (W1)	WIDTH OF SIDEWALK (W)	WIDTH OF RAMP ENTRANCE MIN. 5.0'	DEPTH OF LEVEL LANDING MIN. 4.0'	ROADWAY GUTTER SLOPE	TRANSITION LENGTH	
STATION	OFFSET						LEFT SIDE	RIGHT SIDE
113+15	38' L	3.0'	5.0'	18.0'	4.5'	0.1%	6.5	6.5

NOTES:

- * CONSTRUCTION TOLERANCE ±0.5%
SEE CONSTRUCTION STANDARD M/E 107.2.0
- ** SEE CONSTRUCTION STANDARD M/E 107.9.0

SIDEWALK THROUGH DRIVEWAY WITH GRASS STRIP

NOT TO SCALE

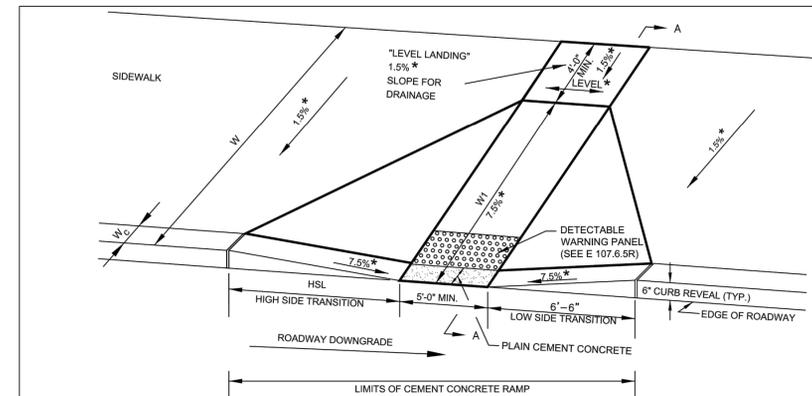


SECTION B-B

RAMP REFERENCE POINT		WIDTH OF SIDEWALK (W)	WIDTH OF RAMP ENTRANCE MIN. 5.0'	DEPTH OF LEVEL LANDING MIN. 4.0'	ROADWAY GUTTER SLOPE	TRANSITION LENGTH	
STATION	OFFSET					LEFT SIDE	RIGHT SIDE
113+35	0	5.0'	5.0'	10.0'	0.5%	6.5'	6.5'
248+07	0	5.0'	5.0'	10.0'	0.8%	6.5'	6.5'

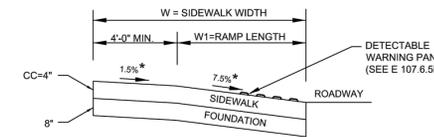
SIDEWALK THROUGH BIKE PATH WITH GRASS STRIP

NOT TO SCALE



LEGEND

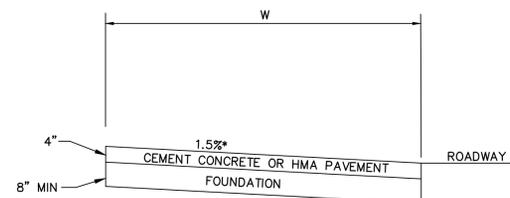
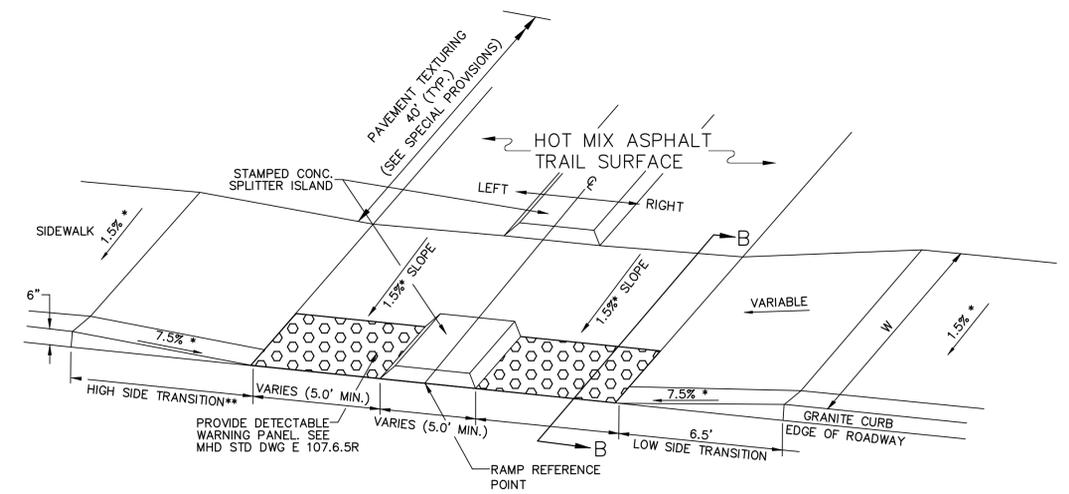
- HSL = HIGH SIDE TRANSITION LENGTH (SEE E 107.9.0R)
- W = SIDEWALK WIDTH
- W_C = CURB WIDTH
- W₁ = PERPENDICULAR RAMP LENGTH
- Cc = CEMENT CONCRETE
- * = TOLERANCE FOR CONSTRUCTION ±0.5%
- USABLE SIDEWALK WIDTH PER AAB = W-W_C
- RAMP LENGTH, W₁ = W-4'-0" Min



SECTION A-A

WCR #	RAMP REFERENCE POINT			LENGTH OF PRIMARY RAMP (W1)	WIDTH OF SIDEWALK	WIDTH OF RAMP MIN. 5'-0"	DEPTH OF LEVEL LANDING MIN. 4'-0"	ROADWAY GUTTER SLOPE	TRANSITION LENGTH	
	BASELINE	STATION	OFFSET						LEFT SIDE	RIGHT SIDE
1	BFRT CONST.	103+22	111.1'	8.3'	-	5.0'	15.0'	-1.0%	6'-6"	7'-8"

WHEELCHAIR RAMP GREATER THAN 12'-4" SIDEWALK



SECTION B-B

RAMP REFERENCE POINT		WIDTH OF SIDEWALK (W)	WIDTH OF RAMP ENTRANCE MIN. 5.0'	DEPTH OF LEVEL LANDING MIN. 4.0'	ROADWAY GUTTER SLOPE	TRANSITION LENGTH	
STATION	OFFSET					LEFT SIDE	RIGHT SIDE
113+63	0	5.0'	5.0'	10.0'	-0.5%	7.67'	6.5'

SIDEWALK THROUGH BIKE PATH

NOT TO SCALE

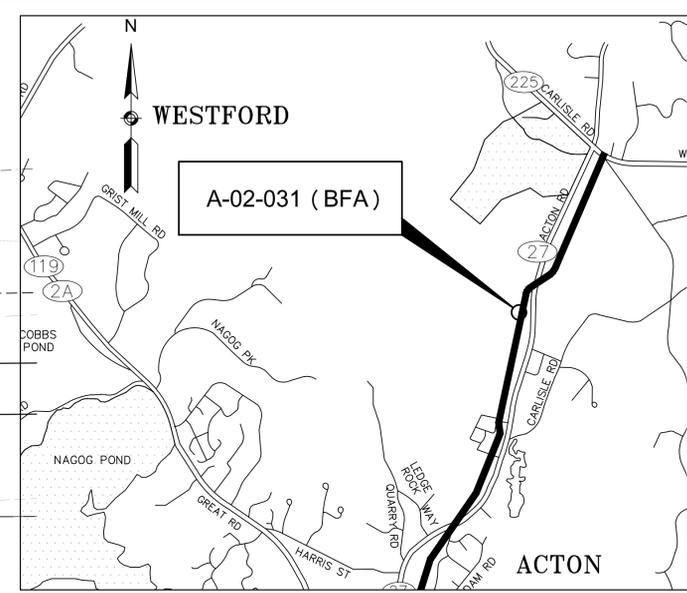
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	92	208

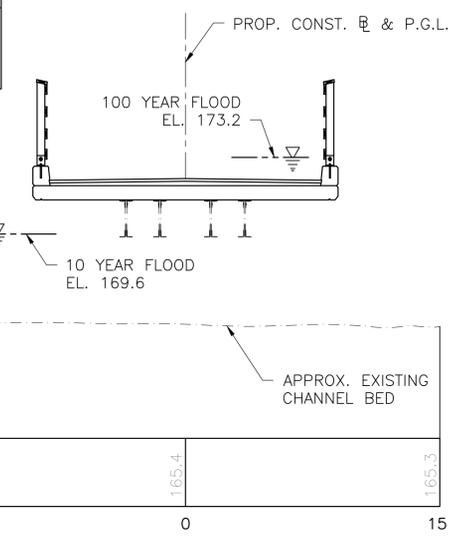
PROJECT FILE NO. 604532
KEY PLAN, LOCUS MAP, PROFILES AND QUANTITIES

INDEX OF DRAWINGS

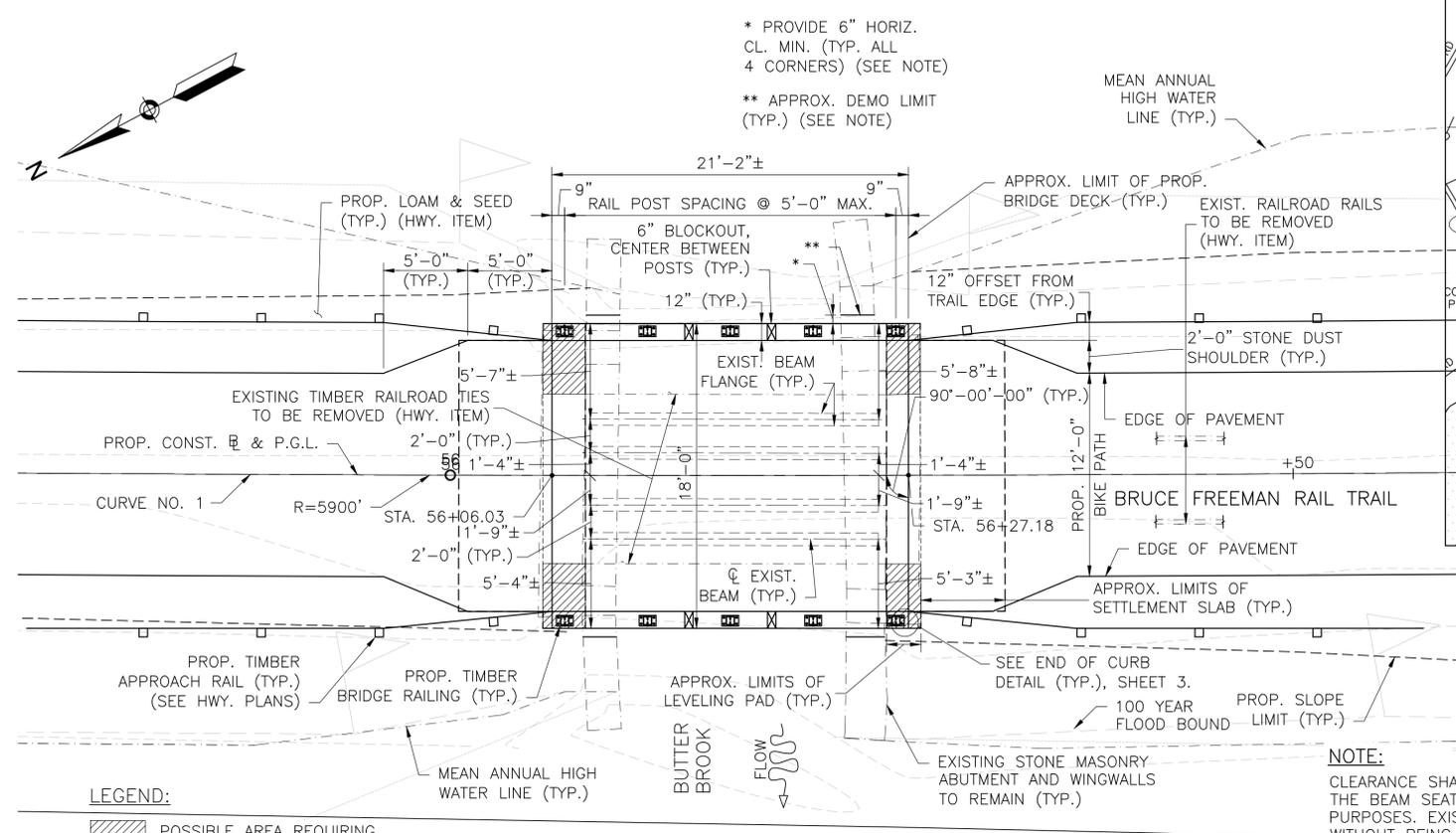
1. KEY PLAN, LOCUS MAP, PROFILES, AND QUANTITIES
2. PROPOSED CROSS SECTION, ELEVATION, AND GENERAL NOTES
3. DETAILS



LOCUS
SCALE: 1" = 2000'



PROFILE - ALONG BUTTER BROOK
SCALE: 1" = 5' HORIZ.
1/4" = 1'-0" VERT.



LEGEND:
 POSSIBLE AREA REQUIRING LEVELING PAD GREATER THAN 10", SEE SHEET 3.

KEY PLAN
SCALE: 1" = 5'

CURVE DATA - BRUCE FREEMAN RAIL TRAIL CONST. & P.G.L.

CURVE NO.	BEGIN STATION	END STATION	RADIUS	DELTA	LENGTH
1	50+86.85	59+12.23	5900'	8°00'56"	825.39'

NOTE:
CLEARANCE SHALL EXTEND VERTICALLY DOWN TO THE BEAM SEAT ELEVATION FOR INSPECTION PURPOSES. EXISTING WALLS SHALL BE MAINTAINED WITHOUT BEING DISTURBED AS PRACTICALLY POSSIBLE.

ESTIMATED QUANTITIES
(NOT GUARANTEED)

ITEM	QUANTITY	UNIT
SUBSTRUCTURE DEMOLITION	6	CY
BRIDGE EXCAVATION	13	CY
GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES	5	CY
SUPERPAVE BRIDGE SURFACE COURSE-12.5 (SSC-B-12.5)	4	TON
SUPERPAVE BRIDGE PROTECTIVE COURSE-12.5 (SPC-B-12.5)	5	TON
SAWING AND SEALING JOINTS IN ASPHALT PAVEMENT AT BRIDGES	32	FT
TIMBER RAIL FENCE ON BRIDGE	43	FT
4000 PSI, 1 1/2" IN., 565 CEMENT CONCRETE	8	CY
4000 PSI, 3/4" IN., 585 HP CEMENT CONCRETE	11	CY
STEEL REINFORCEMENT FOR STRUCTURES	3565	LB
MEMBRANE WATERPROOFING FOR BRIDGE DECKS	40	SY

CONCRETE MIXES:

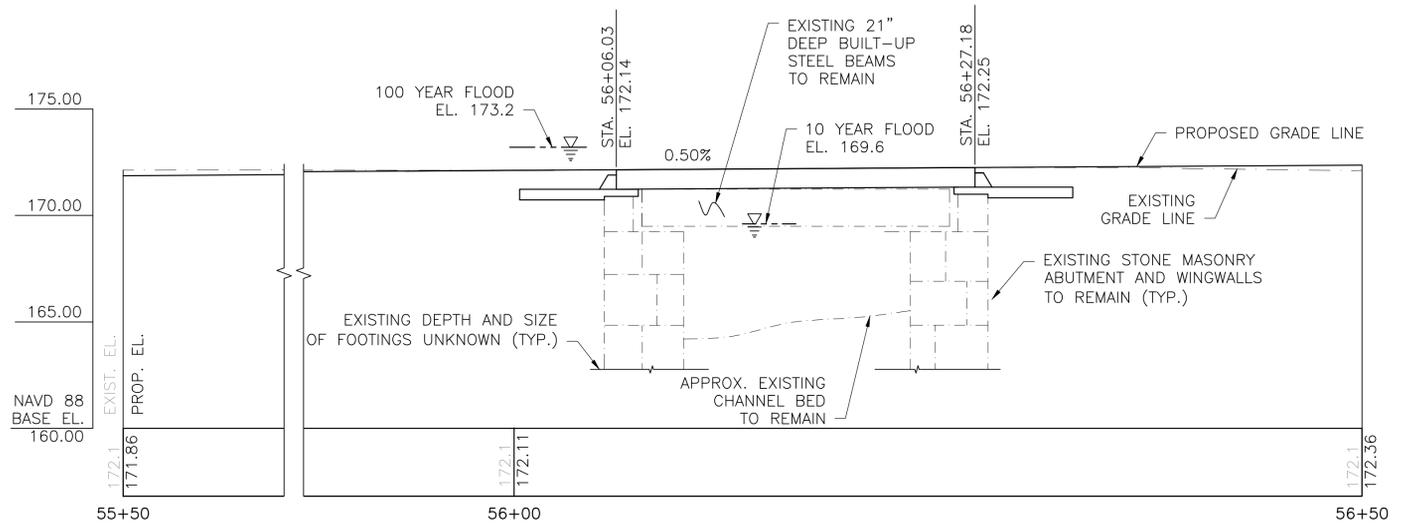
(1)	(2)	(3)	
4000	1 1/2"	565	LEVELING PAD & SETTLEMENT SLAB
4000	3/4"	585 HP	DECK & CONCRETE CURB

(1) 28 DAY COMPRESSIVE STRENGTH (PSI)
 (2) MAXIMUM AGGREGATE SIZE (INCH)
 (3) CEMENTITIOUS CONTENT (POUNDS/CY)

CONSTRUCTION ACCESS RESTRICTION:

THE CONTRACTOR SHALL NOT BE ALLOWED TO TRAVEL OVER THE EXISTING BRIDGE STRUCTURE WITH ANY CONSTRUCTION EQUIPMENT. HOWEVER, THE CONTRACTOR MAY ELECT TO SUBMIT CALCULATIONS AND DRAWINGS DEMONSTRATING THAT PROPOSED CONSTRUCTION LOADS CAN SAFELY TRAVEL OVER THE STRUCTURE. ALL CALCULATIONS AND DRAWINGS FOR SUCH PURPOSE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL AND BE STAMPED BY A PROFESSIONAL ENGINEER REGISTERED IN THE COMMONWEALTH OF MASSACHUSETTS.

THE CONTRACTOR IS DIRECTED TO SUPPLEMENTAL SPECIFICATION SECTION 901.67 FOR RESTRICTIONS OF LOADING ON THE NEWLY CONSTRUCTED BRIDGE. ANY LOADING EXCEEDING THE DESIGN LOADING SHALL BE RESTRICTED FROM TRAVELING OVER THE BRIDGE.



PROFILE - ALONG CONST. & P.G.L.
SCALE: 1" = 5' HORIZ.
1/4" = 1'-0" VERT.

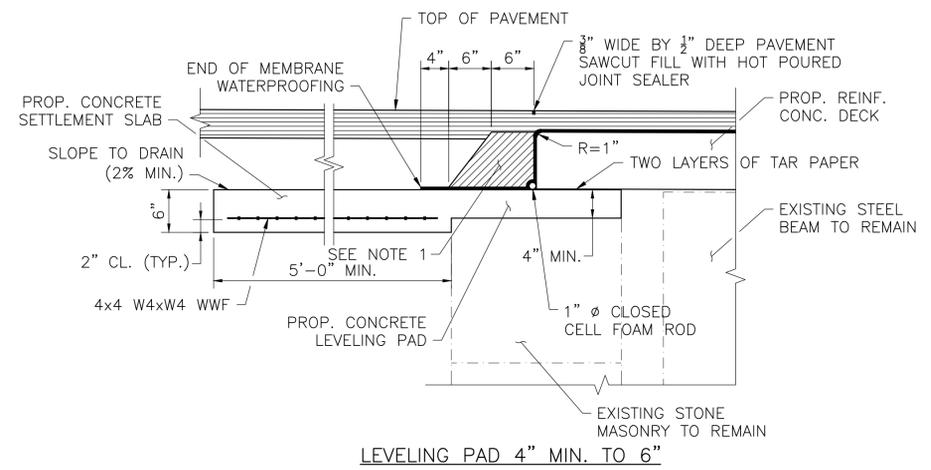
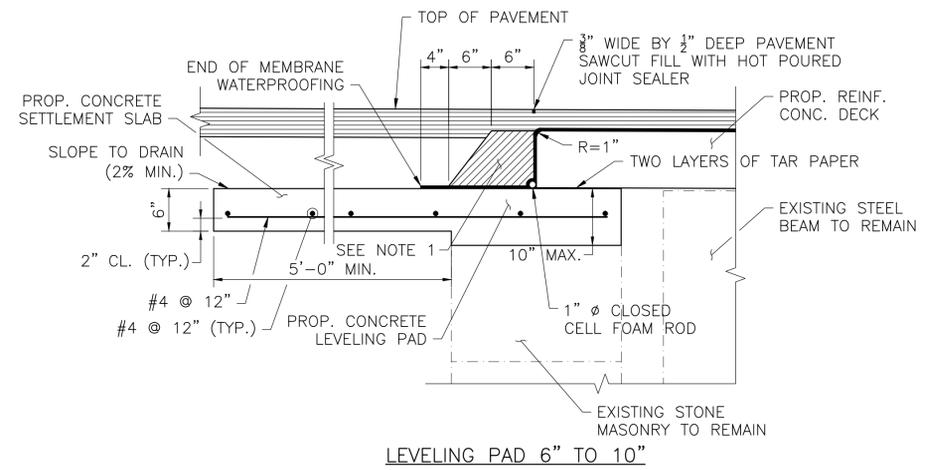
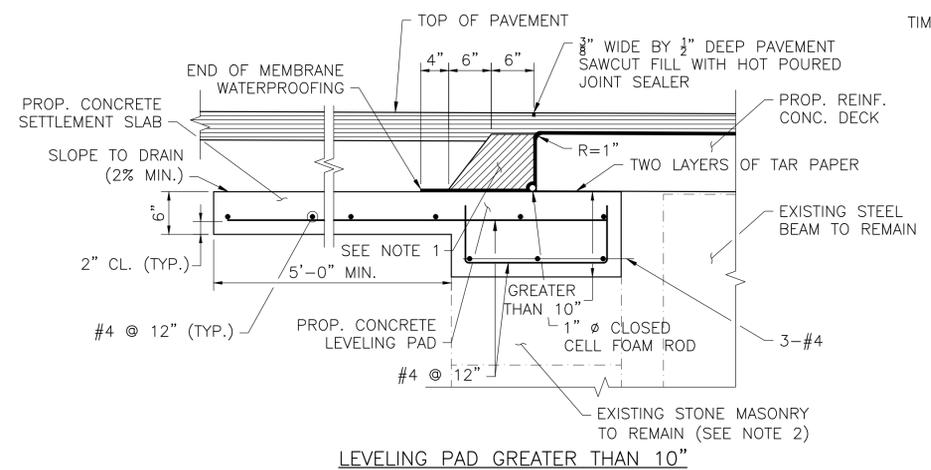
Greenman-Pedersen, Inc. GPI 181 Ballardvale Street, Suite 202 Wilmington, MA 01887	MONTH DD, YYYY	ISSUED FOR CONSTRUCTION
	 PROPOSED BRIDGE REHABILITATION ACTON BRUCE FREEMAN RAIL TRAIL OVER BUTTER BROOK MASSACHUSETTS DEPARTMENT OF TRANSPORTATION HIGHWAY DIVISION 10 PARK PLAZA BOSTON, MASS	
	TITLE:	CHIEF ENGINEER

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	94	208

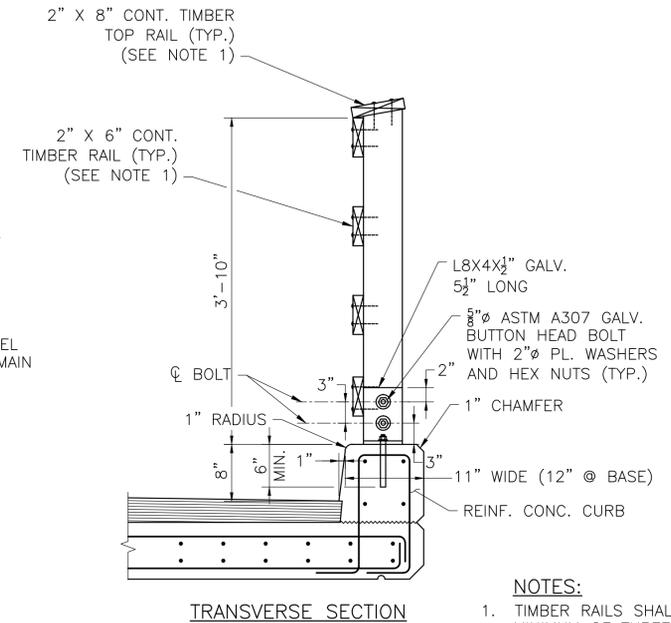
PROJECT FILE NO. 604532

DETAILS



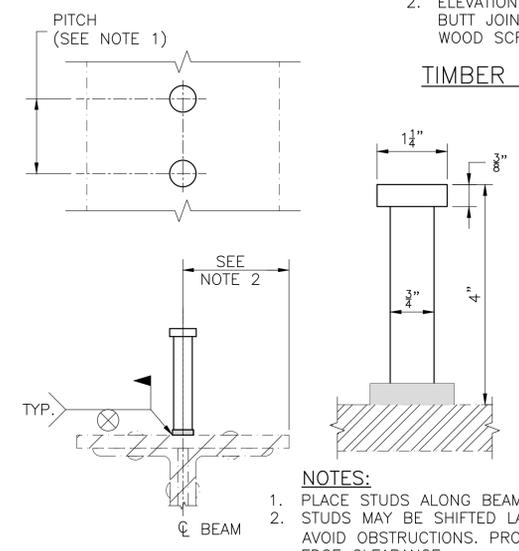
- NOTES:**
1. PROTECTIVE COURSE TO BE HOT MIX ASPHALT PLACED IN 2" LAYERS AND COMPACTED WITH A MECHANICAL HAND-GUIDED TAMPER WITHIN 12 HOURS AFTER PLACING MEMBRANE WATERPROOFING.
 2. A 12" LEVELING PAD, USING THE LEVELING PAD GREATER THAN 10" DETAIL, SHALL BE USED IF STONE MASONRY IS NOT ENCOUNTERED. IN-SITU SOILS SHALL BE COMPACTED IF DISTURBED PRIOR TO PLACEMENT OF CONCRETE.

DETAILS AT END OF SLAB
SCALE: 1" = 1'-0"



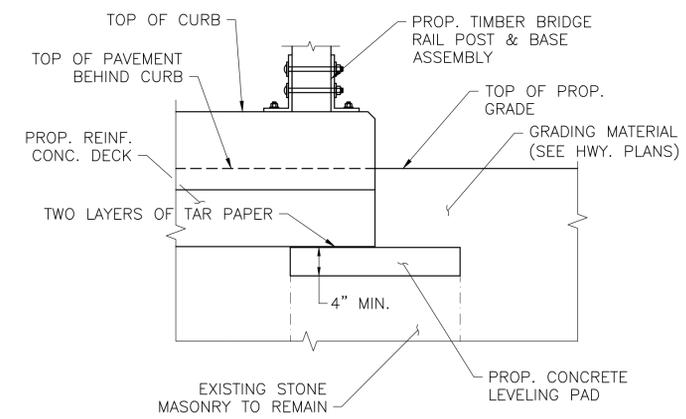
- NOTES:**
1. TIMBER RAILS SHALL BE CONTINUOUS OVER A MINIMUM OF THREE POSTS WHERE POSSIBLE.
 2. ELEVATION SHOWN REFLECTS LOCATION OF RAIL BUTT JOINT, AT INTERMEDIATE JOINT ONLY TWO WOOD SCREWS REQUIRED PER RAILING.

TIMBER BRIDGE RAILING DETAILS
SCALE: 1" = 1'-0"

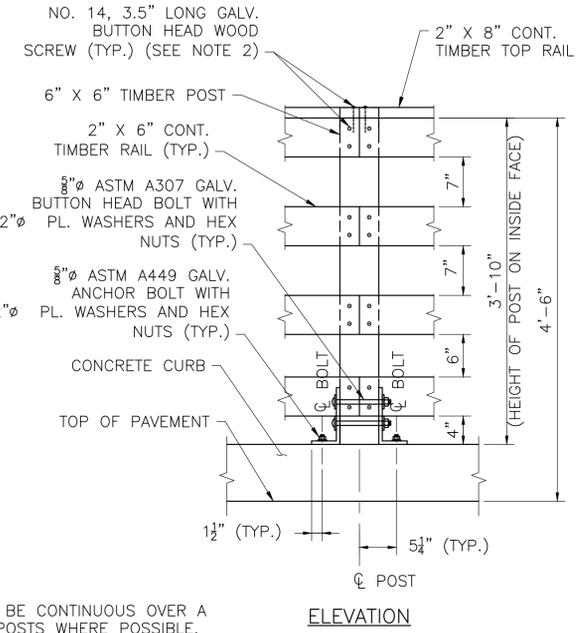


- NOTES:**
1. PLACE STUDS ALONG BEAM AT 12" ± O.C.
 2. STUDS MAY BE SHIFTED LATERALLY TO AVOID OBSTRUCTIONS. PROVIDE 1" MIN. EDGE CLEARANCE.

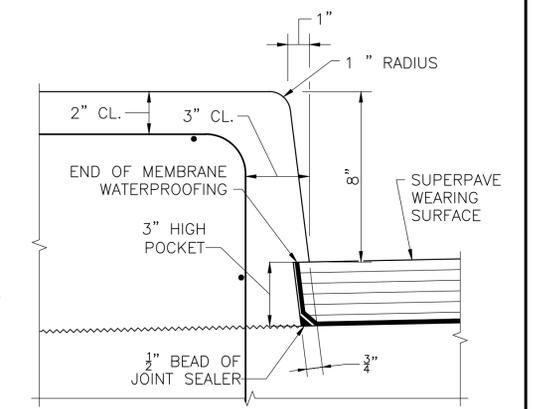
SCALE: N.T.S.



SCALE: 1" = 1'-0"

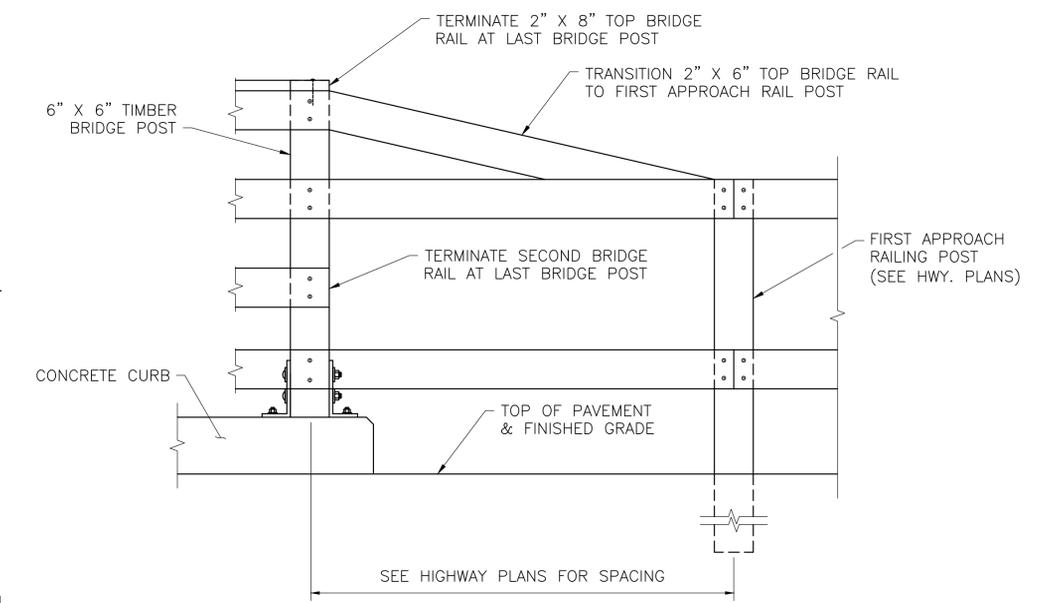


SCALE: 1" = 1'-0"



- NOTES:**
1. TURN MEMBRANE UP INTO 3" HIGH POCKET.

SCALE: 3" = 1'-0"



SCALE: 1" = 1'-0"

MONTH DD, YYYY	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
USE ONLY PRINTS OF LATEST DATE	

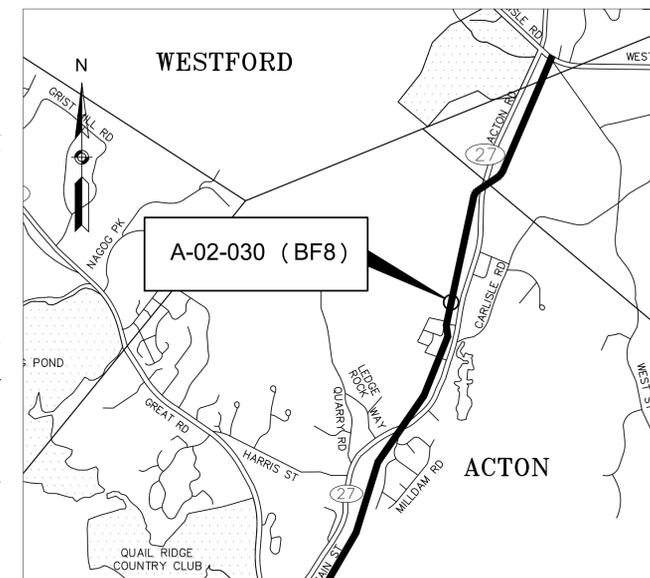
**WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	95	208
PROJECT FILE NO. 604532			

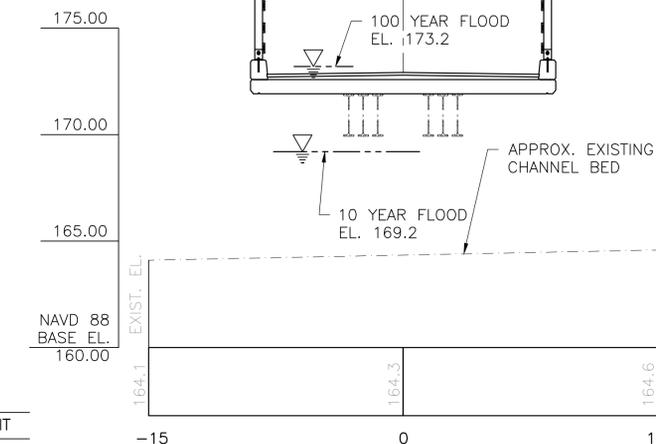
KEY PLAN, LOCUS MAP, PROFILES AND QUANTITIES

INDEX OF DRAWINGS

1. KEY PLAN, LOCUS MAP, PROFILES, AND QUANTITIES
2. PROPOSED CROSS SECTION, ELEVATION, AND GENERAL NOTES
3. DETAILS



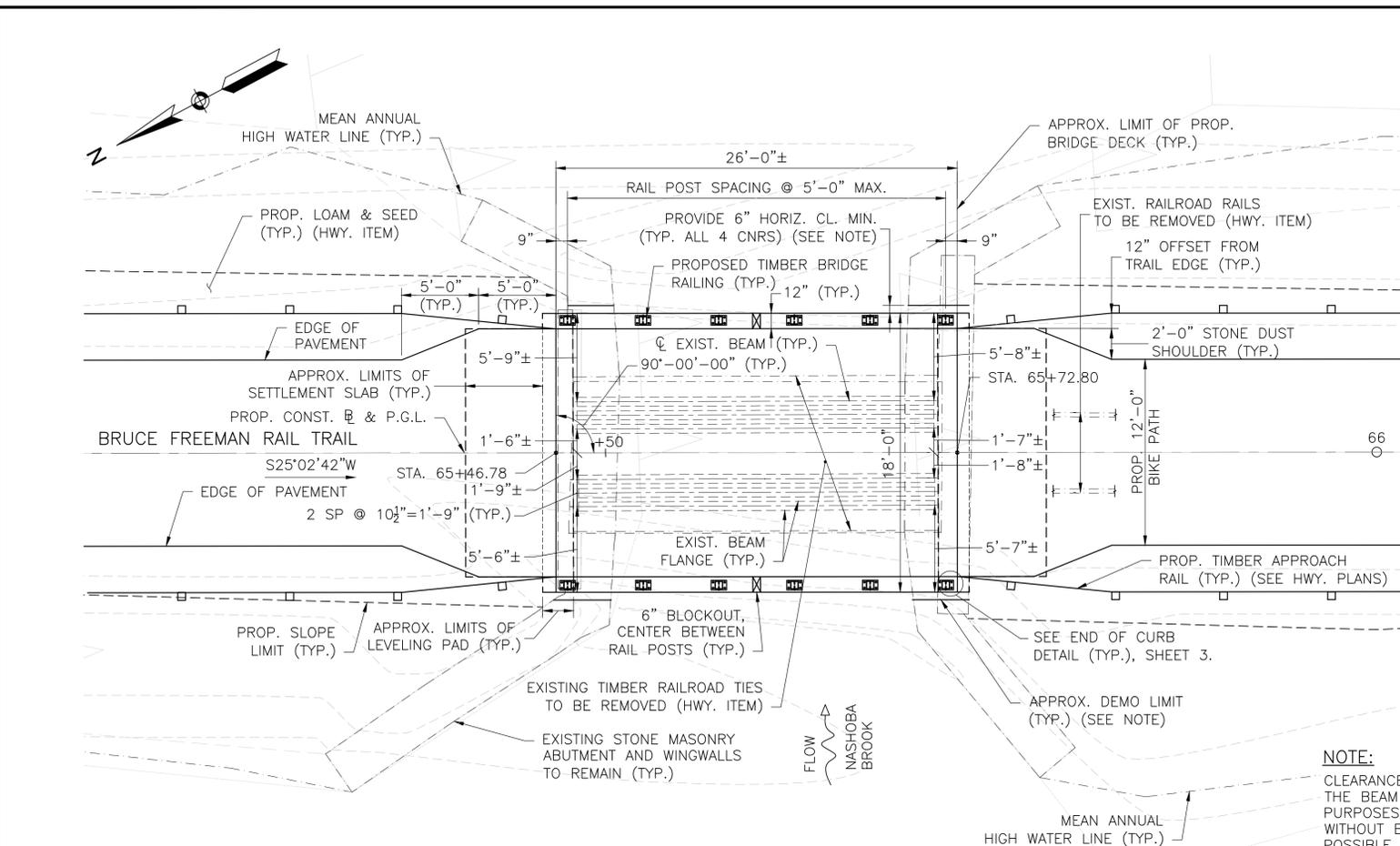
LOCUS
SCALE: 1" = 2000'



PROFILE - ALONG NASHOBA BROOK
SCALE: 1" = 5' HORIZ.
1/4" = 1'-0" VERT.

CONSTRUCTION ACCESS RESTRICTION:
THE CONTRACTOR SHALL NOT BE ALLOWED TO TRAVEL OVER THE EXISTING BRIDGE STRUCTURE WITH ANY CONSTRUCTION EQUIPMENT. HOWEVER, THE CONTRACTOR MAY ELECT TO SUBMIT CALCULATIONS AND DRAWINGS DEMONSTRATING THAT PROPOSED CONSTRUCTION LOADS CAN SAFELY TRAVEL OVER THE STRUCTURE. ALL CALCULATIONS AND DRAWINGS FOR SUCH PURPOSE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL AND BE STAMPED BY A PROFESSIONAL ENGINEER REGISTERED IN THE COMMONWEALTH OF MASSACHUSETTS.

THE CONTRACTOR IS DIRECTED TO SUPPLEMENTAL SPECIFICATION SECTION 901.67 FOR RESTRICTIONS OF LOADING ON THE NEWLY CONSTRUCTED BRIDGE. ANY LOADING EXCEEDING THE DESIGN LOADING SHALL BE RESTRICTED FROM TRAVELING OVER THE BRIDGE.



KEY PLAN
SCALE: 1" = 5'

NOTE:
CLEARANCE SHALL EXTEND VERTICALLY DOWN TO THE BEAM SEAT ELEVATION FOR INSPECTION PURPOSES. EXISTING WALLS SHALL BE MAINTAINED WITHOUT BEING DISTURBED AS PRACTICALLY POSSIBLE.

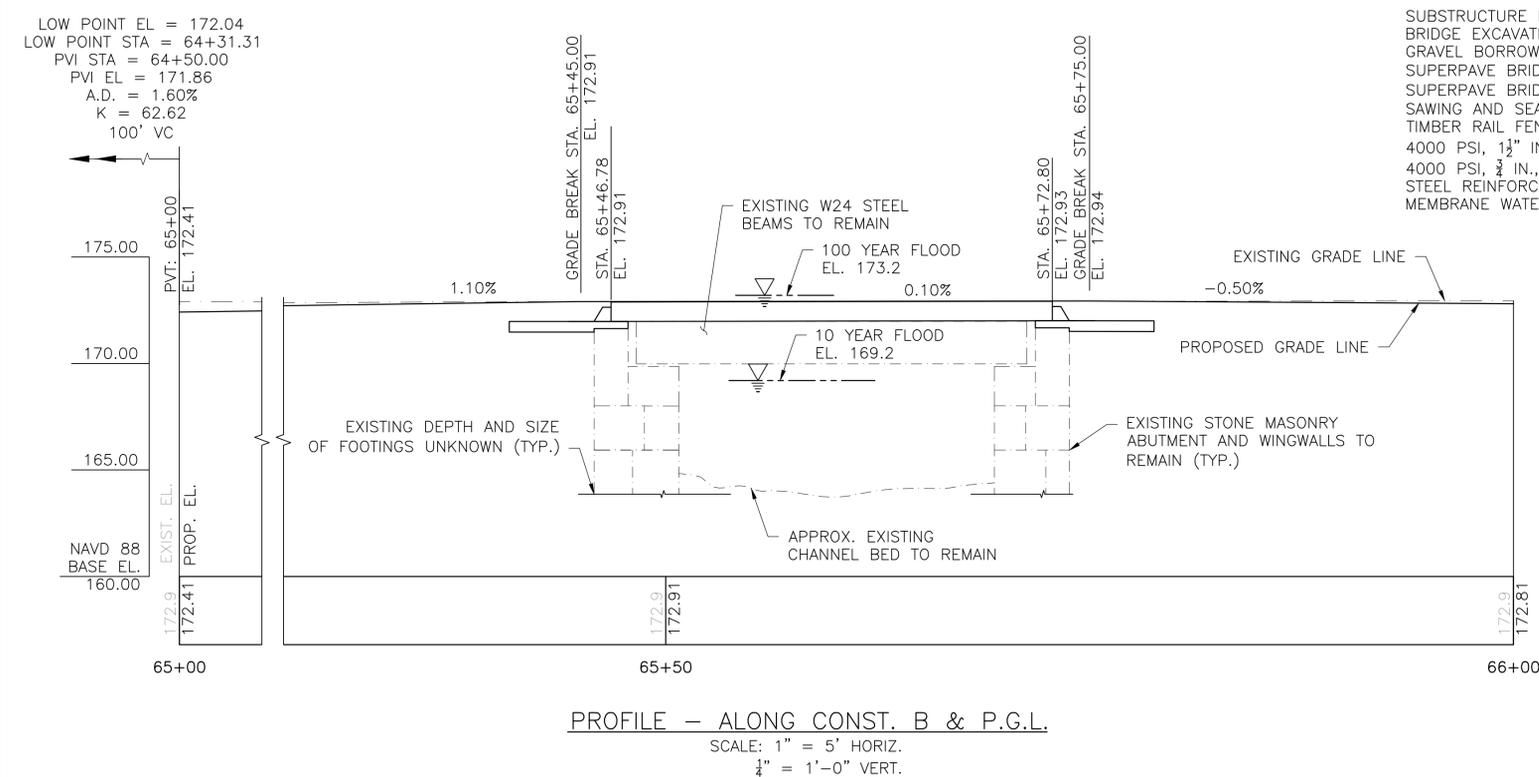
ESTIMATED QUANTITIES (NOT GUARANTEED)

ITEM	QUANTITY	UNIT
SUBSTRUCTURE DEMOLITION	4	CY
BRIDGE EXCAVATION	13	CY
GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES	5	CY
SUPERPAVE BRIDGE SURFACE COURSE-12.5 (SSC-B-12.5)	4	TON
SUPERPAVE BRIDGE PROTECTIVE COURSE-12.5 (SPC-B-12.5)	6	TON
SAWING AND SEALING JOINTS IN ASPHALT PAVEMENT AT BRIDGES	32	FT
TIMBER RAIL FENCE ON BRIDGE	52	FT
4000 PSI, 1 1/2" IN., 565 CEMENT CONCRETE	5	CY
4000 PSI, 3/4" IN., 585 HP CEMENT CONCRETE	14	CY
STEEL REINFORCEMENT FOR STRUCTURES	4070	LB
MEMBRANE WATERPROOFING FOR BRIDGE DECKS	47	SY

CONCRETE MIXES:

(1) 4000	(2) 1 1/2"	(3) 565	LEVELING PAD & SETTLEMENT SLAB
4000	3/4"	585 HP	DECK & CONCRETE CURB

(1) 28 DAY COMPRESSIVE STRENGTH (PSI)
(2) MAXIMUM AGGREGATE SIZE (INCH)
(3) CEMENTITIOUS CONTENT (POUNDS/CY)



PROFILE - ALONG CONST. B & P.G.L.
SCALE: 1" = 5' HORIZ.
1/4" = 1'-0" VERT.

<p>Greenman-Pedersen, Inc.</p> <p>GPI</p> <p>181 Ballardvale Street, Suite 202 Wilmington, MA 01887</p>	<p>MONTH DD, YYYY</p> <p>ISSUED FOR CONSTRUCTION</p> <p>massDOT Highway Division</p> <p>PROPOSED BRIDGE REHABILITATION ACTON</p> <p>BRUCE FREEMAN RAIL TRAIL OVER NASHOBA BROOK</p> <p>MASSACHUSETTS DEPARTMENT OF TRANSPORTATION HIGHWAY DIVISION 10 PARK PLAZA BOSTON, MASS</p>
	<p>TITLE: _____</p> <p>CHIEF ENGINEER _____</p>

13-Mar-2014
02-PROPOSED CROSS SECTION, ELEVATION & GENERAL NOTES.DWG
604532 Structural Submittal (S1) 06-February-2014

**WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	96	208
PROJECT FILE NO. 604532			

**PROPOSED CROSS SECTION,
ELEVATION AND GENERAL NOTES**

GENERAL NOTES

DESIGN:
IN ACCORDANCE WITH THE AASHTO LRFD GUIDE SPECIFICATIONS FOR DESIGN OF PEDESTRIAN BRIDGES, 2nd EDITION, DECEMBER 2009, OF THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) FOR H-10 LOAD.

EXISTING BRIDGE PLANS:
PLANS OF THE EXISTING BRIDGE (A-02-030) DO NOT EXIST.

EXISTING CONDITIONS:
DIMENSIONS SHOWN ON THE EXISTING DETAILS ARE TAKEN FROM LIMITED SITE EXPLORATIONS AND ARE NOT GUARANTEED. THE CONTRACTOR SHALL DETERMINE AND ESTABLISH ALL DIMENSIONS AND DETAILS NECESSARY FOR COMPLETION OF ALL WORK BY FIELD MEASUREMENT AND SURVEY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR AND NOT ORDER ANY MATERIAL OR COMMENCE ANY WORK UNTIL HE HAS MADE THE REQUIRED MEASUREMENTS ON THE EXISTING BRIDGE.

MASSDOT BENCH MARK:
MAG NAIL
N 3015709.3256, E 681612.7446, ELEV.172.99

ELEVATIONS ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988.

HORIZONTAL CONTROL IS BASED UPON THE MASSACHUSETTS MAINLAND NORTH AMERICAN DATUM (NAD) OF 1983.

MASSDOT SURVEY NOTEBOOKS:
COPIES OF ELECTRONIC SURVEY FILES MAY BE OBTAINED FROM THE MASSACHUSETTS DEPARTMENT OF TRANSPORTATION-HIGHWAY DIVISION

UNSUITABLE MATERIAL:
ALL UNSUITABLE MATERIAL SHALL BE REMOVED WITHIN THE LIMITS OF THE FOUNDATIONS OF THE STRUCTURE, AS DIRECTED BY THE ENGINEER.

REINFORCEMENT:
REINFORCING STEEL SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M31 GRADE 60. UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWINGS, ALL BARS SHALL BE LAPPED AS FOLLOWS:

MODIFICATION CONDITION:	#4 BARS	#5 BARS
1. NONE	21"	26"
2. 12 INCHES OF CONCRETE BELOW BAR	29"	36"
3. COATED BARS, COVER <3db, OR CLEAR SPACING < 6db	31"	39"
4. COATED BARS, ALL OTHER CASES	25"	31"
5. CONDITION 2 AND 3	35"	44"
6. CONDITION 2 AND 4	34"	43"

IF THE ABOVE BARS ARE SPACED 6 INCHES OR MORE ON CENTER, THE LAP LENGTH SHALL BE 80% OF THE LAP LENGTH GIVEN ABOVE. ALL OTHER BARS SHALL BE LAPPED AS SHOWN ON THE CONSTRUCTION DRAWINGS.

TIMBER NOTES:
RAILS ARE TO BE VISUALLY GRADED DOUGLAS FIR LARCH SELECT STRUCTURAL
F_{bo}=1.50 KSI, F_{vo}=0.18 KSI, F_{cpo}=0.625 KSI, F_{co}=1.70 KSI, E=1,900 KSI

POSTS ARE TO BE VISUALLY GRADED DOUGLAS FIR LARCH SELECT STRUCTURAL
F_{bo}=1.50 KSI, F_{vo}=0.17 KSI, F_{cpo}=0.625 KSI, F_{co}=1.15 KSI, E=1,600 KSI

ALL WOOD FOR STRUCTURAL PURPOSES IN EXPOSED APPLICATIONS SHALL BE PRESSURE IMPREGNATED WITH WOOD PRESERVATIVES IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO M133.

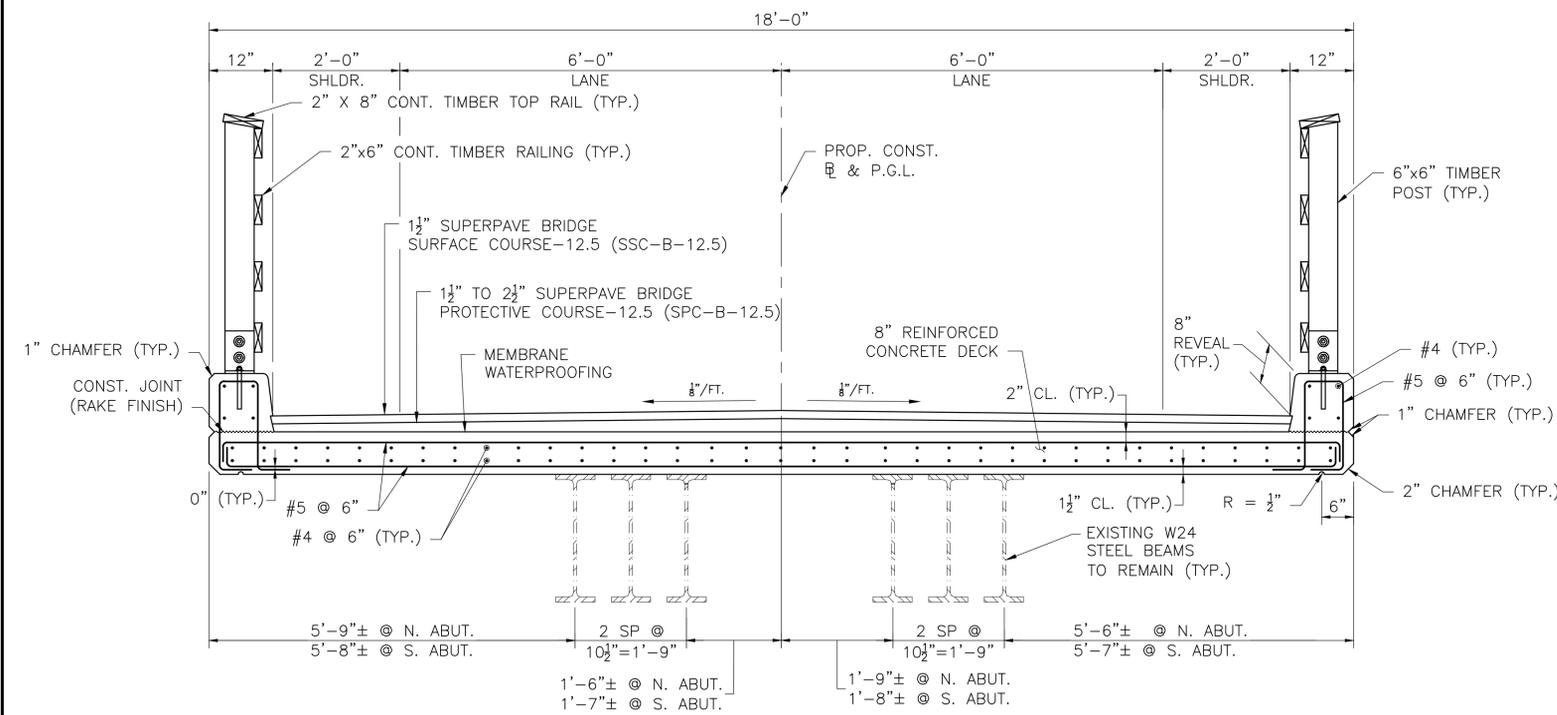
HYDRAULIC DATA:

DRAINAGE AREA:	11.5 SQUARE MILES
DESIGN DISCHARGE:	411 CUBIC FEET PER SECOND
DESIGN FLOOD FREQUENCY:	10 YEARS
DESIGN FLOOD STAGE:	169.2 FEET
DESIGN VELOCITY:	UNKNOWN

BASE (100 YEAR) FLOOD DATA	
100 YEAR FLOOD DISCHARGE:	842 CUBIC FEET PER SECOND
100 YEAR FLOOD STAGE:	173.2 FEET

FLOOD OF RECORD	
DISCHARGE:	UNKNOWN
STAGE:	UNKNOWN

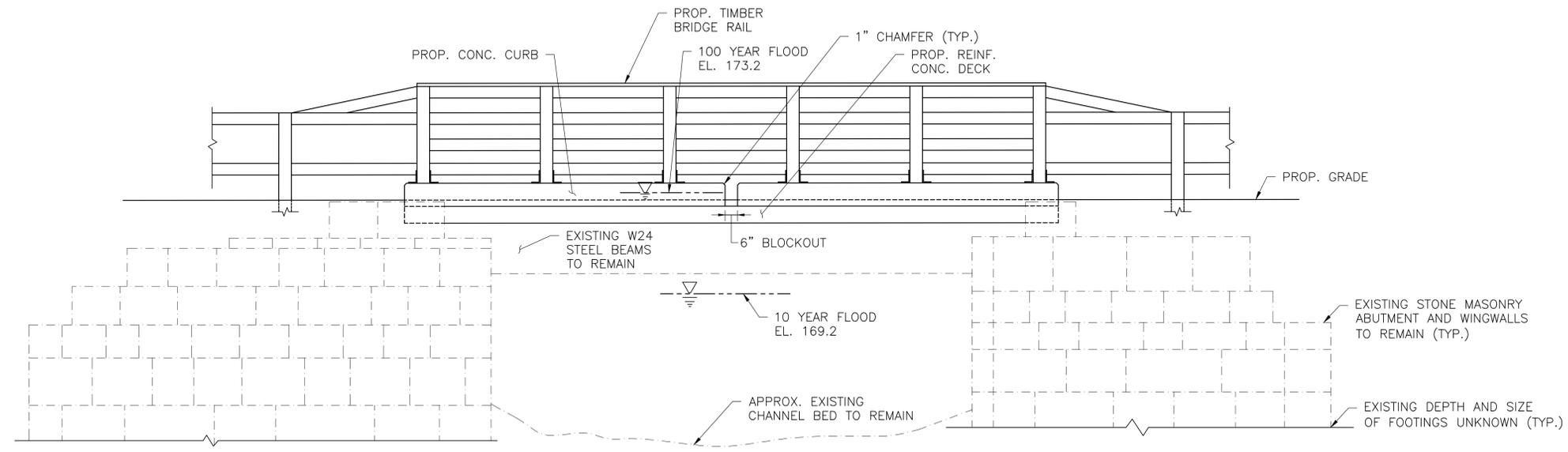
HISTORY OF ICE FLOES: NONE DOCUMENTED IN NBIS DATABASE
EVIDENCE OF SCOUR OR EROSION: NONE



- NOTES:**
1. BEAM SPACING SHOWN AT NORTH ABUTMENT.
 2. DECK SHALL BE FORMED WITH REMOVABLE FORMS.

PROPOSED CROSS SECTION

SCALE: 3/8" = 1'-0"



ELEVATION

SCALE: 3/8" = 1'-0"

MONTH DD, YYYY	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
USE ONLY PRINTS OF LATEST DATE	

**WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A**

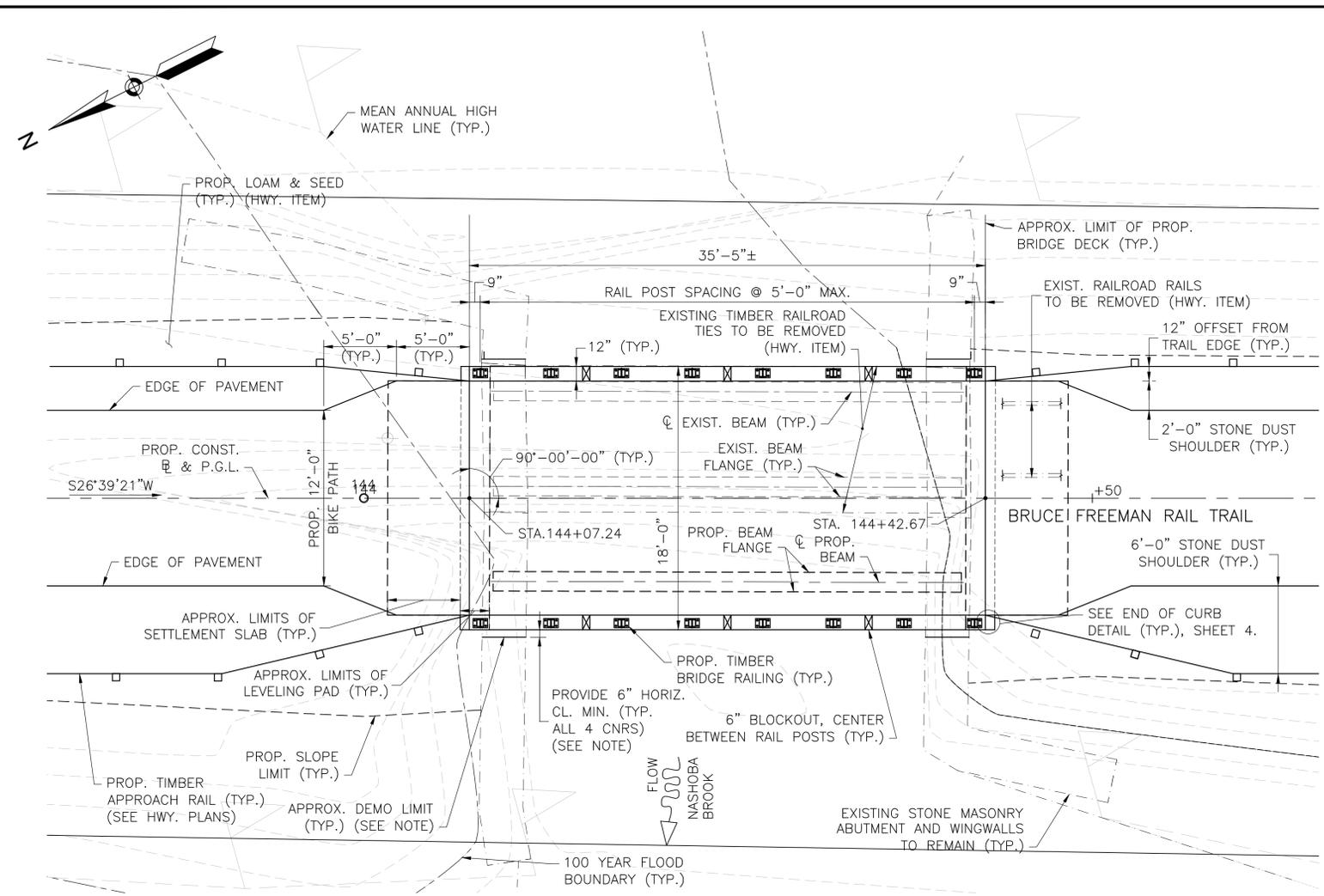
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	98	208

PROJECT FILE NO. 604532

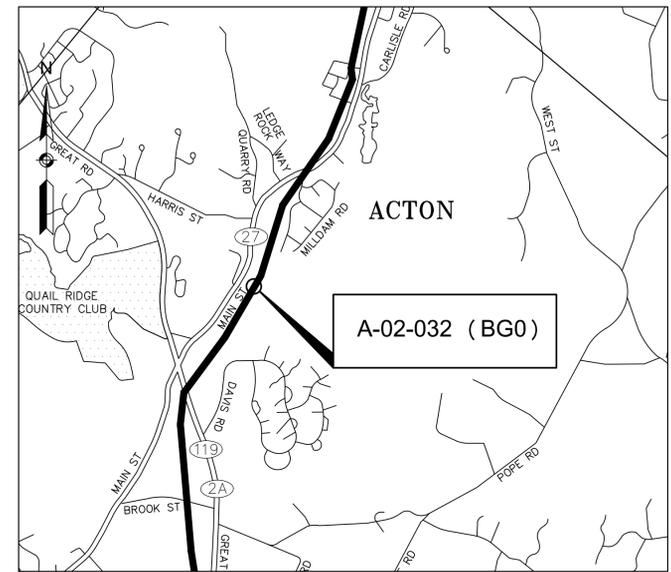
KEY PLAN, LOCUS MAP, PROFILES AND QUANTITIES

INDEX OF DRAWINGS

1. KEY PLAN, LOCUS MAP, PROFILES, AND QUANTITIES
2. PROPOSED CROSS SECTION, ELEVATION, AND GENERAL NOTES
3. ABUTMENT AND STRUCTURAL STEEL DETAILS
4. DETAILS

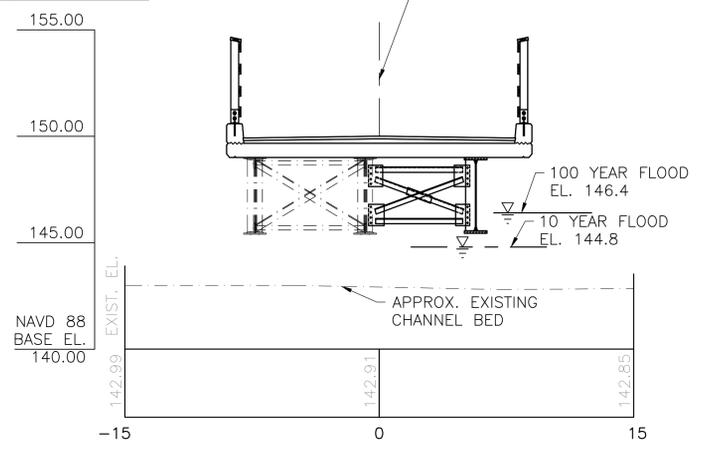


KEY PLAN
SCALE: 1" = 5'



LOCUS
SCALE: 1" = 2000'

NOTE:
CLEARANCE SHALL EXTEND VERTICALLY DOWN TO THE BEAM SEAT ELEVATION FOR INSPECTION PURPOSES. EXISTING WALLS SHALL BE MAINTAINED WITHOUT BEING DISTURBED AS PRACTICALLY POSSIBLE.



PROFILE - ALONG NASHOBA BROOK
SCALE: 1" = 5' HORIZ.
1/4" = 1'-0" VERT.

ESTIMATED QUANTITIES
(NOT GUARANTEED)

ITEM	QUANTITY	UNIT
SUBSTRUCTURE DEMOLITION	13	CY
BRIDGE EXCAVATION	17	CY
GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES	5	CY
SUPERPAVE BRIDGE SURFACE COURSE-12.5 (SSC-B-12.5)	6	TON
SUPERPAVE BRIDGE PROTECTIVE COURSE-12.5 (SPC-B-12.5)	8	TON
SAWING AND SEALING JOINTS IN ASPHALT PAVEMENT AT BRIDGES	32	FT
TIMBER RAIL FENCE ON BRIDGE	71	FT
STONE MASONRY WALL REMOVED AND REBUILT DRY	8	CY
4000 PSI, 1 1/2" IN., 565 CEMENT CONCRETE	8	CY
4000 PSI, 3/4" IN., 585 HP CEMENT CONCRETE	20	CY
STEEL REINFORCEMENT FOR STRUCTURES	5705	LB
STRUCTURAL STEEL - COATED STEEL	8200	LB
MEMBRANE WATERPROOFING FOR BRIDGE DECKS	65	SY

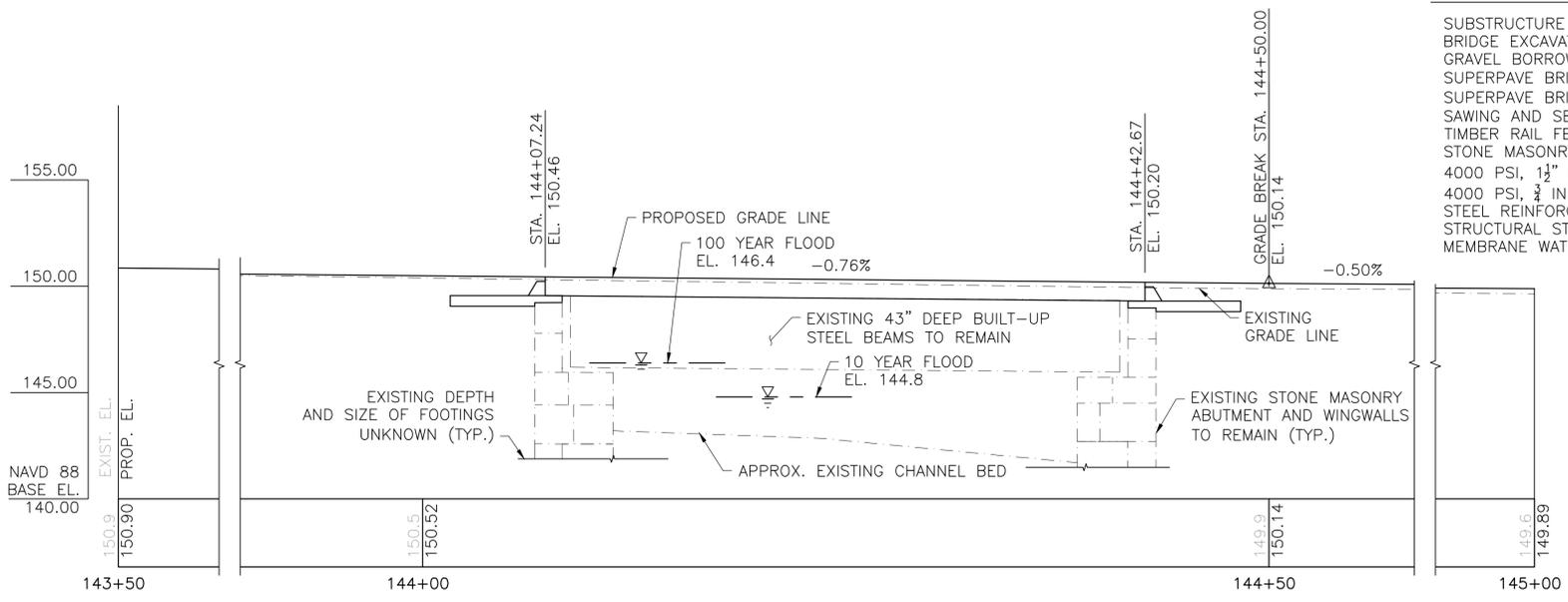
CONCRETE MIXES:

- | | | | |
|----------|------------|---------|--------------------------------|
| (1) 4000 | (2) 1 1/2" | (3) 565 | LEVELING PAD & SETTLEMENT SLAB |
| 4000 | 3/4" | 585 HP | DECK & CONCRETE CURB |
- (1) 28 DAY COMPRESSIVE STRENGTH (PSI)
 (2) MAXIMUM AGGREGATE SIZE (INCH)
 (3) CEMENTITIOUS CONTENT (POUNDS/CY)

CONSTRUCTION ACCESS RESTRICTION:

THE CONTRACTOR SHALL NOT BE ALLOWED TO TRAVEL OVER THE EXISTING BRIDGE STRUCTURE WITH ANY CONSTRUCTION EQUIPMENT. HOWEVER, THE CONTRACTOR MAY ELECT TO SUBMIT CALCULATIONS AND DRAWINGS DEMONSTRATING THAT PROPOSED CONSTRUCTION LOADS CAN SAFELY TRAVEL OVER THE STRUCTURE. ALL CALCULATIONS AND DRAWINGS FOR SUCH PURPOSE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL AND BE STAMPED BY A PROFESSIONAL ENGINEER REGISTERED IN THE COMMONWEALTH OF MASSACHUSETTS.

THE CONTRACTOR IS DIRECTED TO SUPPLEMENTAL SPECIFICATION SECTION 901.67 FOR RESTRICTIONS OF LOADING ON THE NEWLY CONSTRUCTED BRIDGE. ANY LOADING EXCEEDING THE DESIGN LOADING SHALL BE RESTRICTED FROM TRAVELING OVER THE BRIDGE.



PROFILE - ALONG CONST. B & P.G.L.
SCALE: 1" = 5' HORIZ.
1/4" = 1'-0" VERT.

<p>Greenman-Pedersen, Inc.</p> <p>GPI</p> <p>181 Ballardvale Street, Suite 202 Wilmington, MA 01887</p>	<p>ISSUED FOR CONSTRUCTION</p> <p>massDOT Highway Division</p> <p>PROPOSED BRIDGE REHABILITATION ACTON</p> <p>BRUCE FREEMAN RAIL TRAIL OVER NASHOBA BROOK</p> <p>MASSACHUSETTS DEPARTMENT OF TRANSPORTATION HIGHWAY DIVISION 10 PARK PLAZA BOSTON, MASS</p>
	<p>MONTH DD, YYYY</p> <p>TITLE: _____</p> <p>CHIEF ENGINEER</p>

13-Mar-2014
02-PROPOSED CROSS SECTION, ELEVATION & GENERAL NOTES.DWG
604532 Structural Submittal (S1) 06-February-2014

**WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	99	208
PROJECT FILE NO. 604532			

**PROPOSED CROSS SECTION,
ELEVATION AND GENERAL NOTES**

GENERAL NOTES

DESIGN:
IN ACCORDANCE WITH THE AASHTO LRFD GUIDE SPECIFICATIONS FOR DESIGN OF PEDESTRIAN BRIDGES, 2nd EDITION, DECEMBER 2009, OF THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) FOR H-10 LOAD.

EXISTING BRIDGE PLANS:
PLANS OF THE EXISTING BRIDGE (A-02-032) DO NOT EXIST.

EXISTING CONDITIONS:
DIMENSIONS SHOWN ON THE EXISTING DETAILS ARE TAKEN FROM LIMITED SITE EXPLORATIONS AND ARE NOT GUARANTEED. THE CONTRACTOR SHALL DETERMINE AND ESTABLISH ALL DIMENSIONS AND DETAILS NECESSARY FOR COMPLETION OF ALL WORK BY FIELD MEASUREMENT AND SURVEY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR AND NOT ORDER ANY MATERIAL OR COMMENCE ANY WORK UNTIL HE HAS MADE THE REQUIRED MEASUREMENTS ON THE EXISTING BRIDGE.

MASSDOT BENCH MARK:
MAG NAIL
N 3009175.9131, E 679274.6228 ELEV.150.57

ELEVATIONS ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988.

HORIZONTAL CONTROL IS BASED UPON THE MASSACHUSETTS MAINLAND NORTH AMERICAN DATUM (NAD) OF 1983.

MASSDOT SURVEY NOTEBOOKS:
COPIES OF ELECTRONIC SURVEY FILES MAY BE OBTAINED FROM THE MASSACHUSETTS DEPARTMENT OF TRANSPORTATION-HIGHWAY DIVISION

UNSUITABLE MATERIAL:
ALL UNSUITABLE MATERIAL SHALL BE REMOVED WITHIN THE LIMITS OF THE FOUNDATIONS OF THE STRUCTURE, AS DIRECTED BY THE ENGINEER.

REINFORCEMENT:
REINFORCING STEEL SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M31 GRADE 60. UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWINGS, ALL BARS SHALL BE LAPPED AS FOLLOWS:

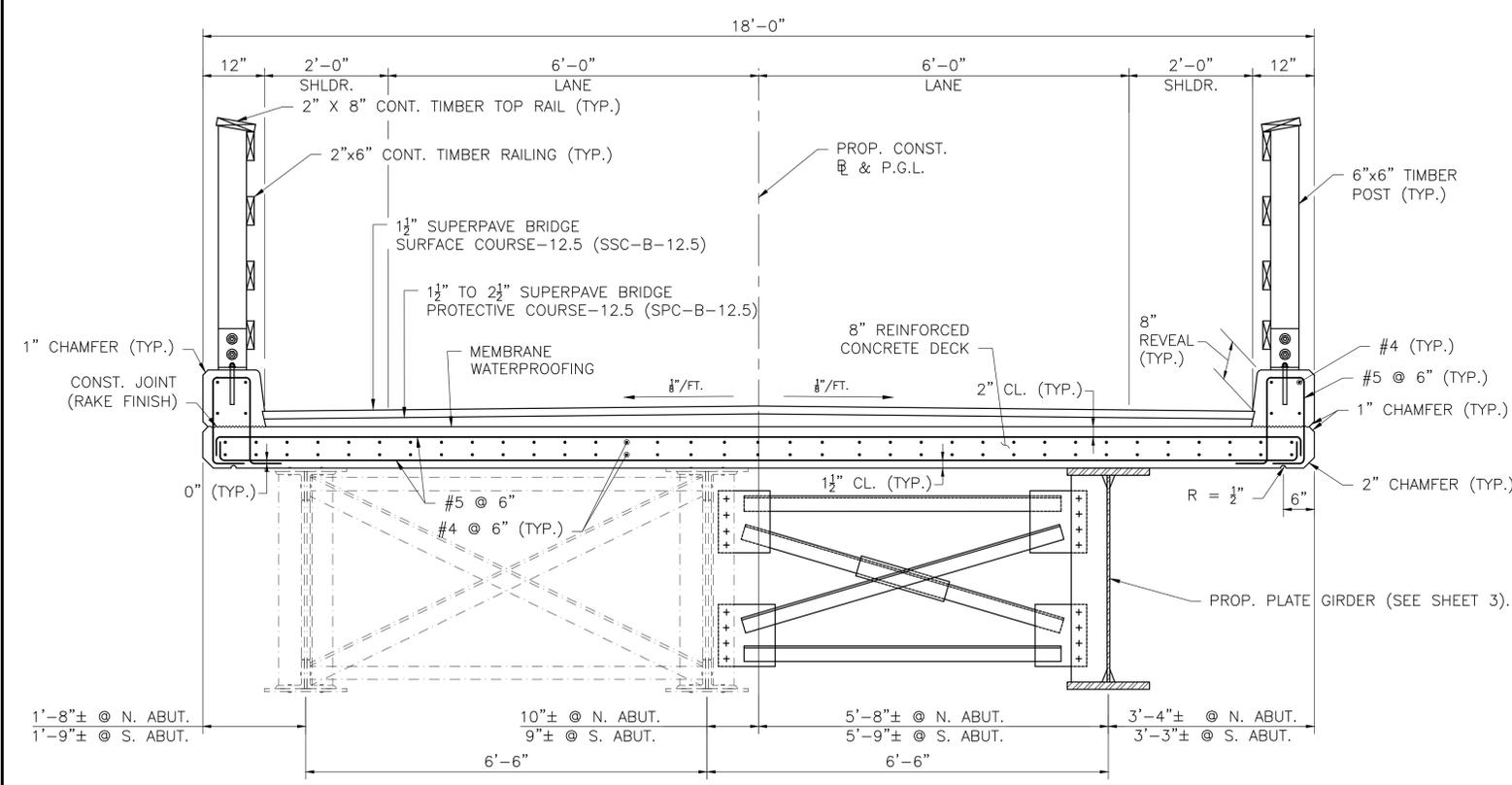
MODIFICATION CONDITION:	#4 BARS	#5 BARS
1. NONE	21"	26"
2. 12 INCHES OF CONCRETE BELOW BAR	29"	36"
3. COATED BARS, COVER <3db, OR CLEAR SPACING < 6db	31"	39"
4. COATED BARS, ALL OTHER CASES	25"	31"
5. CONDITION 2 AND 3	35"	44"
6. CONDITION 2 AND 4	34"	43"

IF THE ABOVE BARS ARE SPACED 6 INCHES OR MORE ON CENTER, THE LAP LENGTH SHALL BE 80% OF THE LAP LENGTH GIVEN ABOVE. ALL OTHER BARS SHALL BE LAPPED AS SHOWN ON THE CONSTRUCTION DRAWINGS.

TIMBER NOTES:
RAILS ARE TO BE VISUALLY GRADED DOUGLAS FIR LARCH SELECT STRUCTURAL
F_{bo}=1.50 KSI, F_{vo}=0.18 KSI, F_{cpo}=0.625 KSI, F_{co}=1.70 KSI, E=1,900 KSI

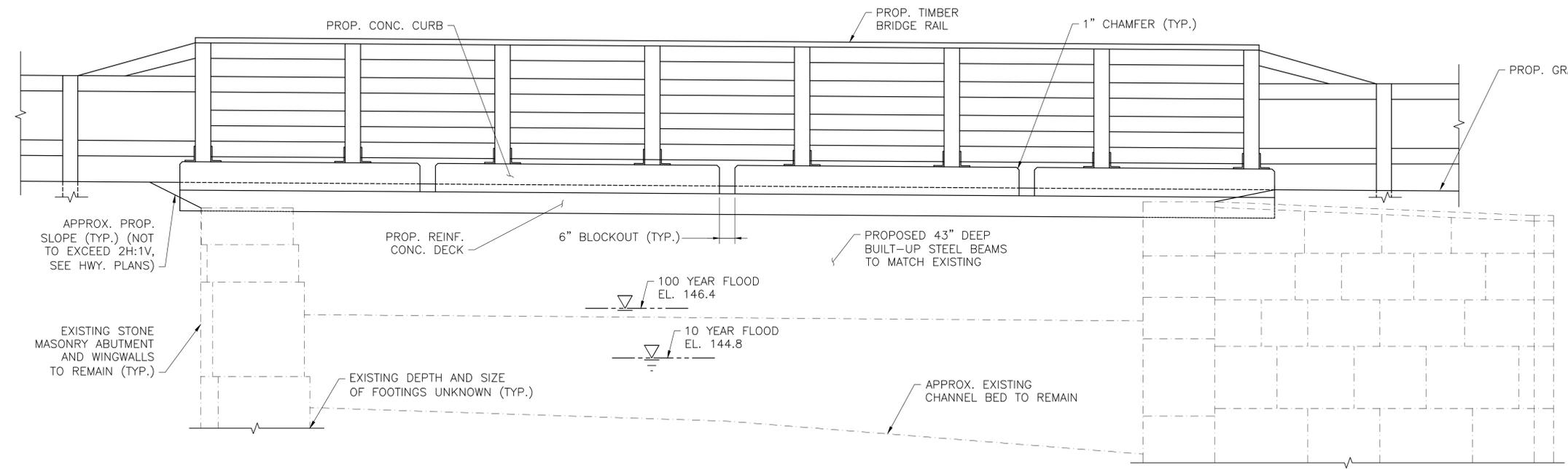
POSTS ARE TO BE VISUALLY GRADED DOUGLAS FIR LARCH SELECT STRUCTURAL
F_{bo}=1.50 KSI, F_{vo}=0.17 KSI, F_{cpo}=0.625 KSI, F_{co}=1.15 KSI, E=1,600 KSI

ALL WOOD FOR STRUCTURAL PURPOSES IN EXPOSED APPLICATIONS SHALL BE PRESSURE IMPREGNATED WITH WOOD PRESERVATIVES IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO M133.



- NOTES:**
1. BEAM SPACING SHOWN AT NORTH ABUTMENT.
 2. DECK SHALL BE FORMED WITH REMOVABLE FORMS.

PROPOSED CROSS SECTION
SCALE: 3/4" = 1'-0"



HYDRAULIC DATA:

DRAINAGE AREA: 13.2 SQUARE MILES
DESIGN DISCHARGE: 418 CUBIC FEET PER SECOND
DESIGN FLOOD FREQUENCY: 10 YEARS
DESIGN FLOOD STAGE: 144.8 FEET
DESIGN VELOCITY: UNKNOWN

BASE (100 YEAR) FLOOD DATA
100 YEAR FLOOD DISCHARGE: 815 CUBIC FEET PER SECOND
100 YEAR FLOOD STAGE: 146.4 FEET

FLOOD OF RECORD
DISCHARGE: UNKNOWN
STAGE: UNKNOWN
DATE: UNKNOWN

HISTORY OF ICE FLOES: NONE DOCUMENTED IN NBIS DATABASE
EVIDENCE OF SCOUR OR EROSION: NONE

ELEVATION
SCALE: 1/2" = 1'-0"

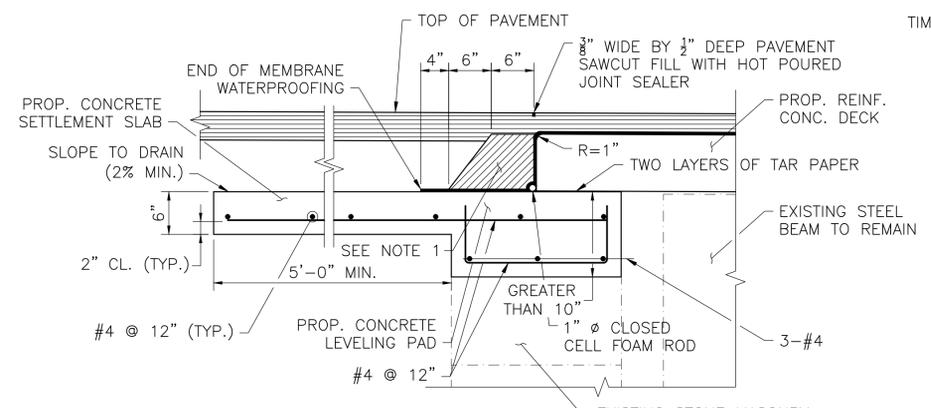
MONTH DD, YYYY	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
USE ONLY PRINTS OF LATEST DATE	

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

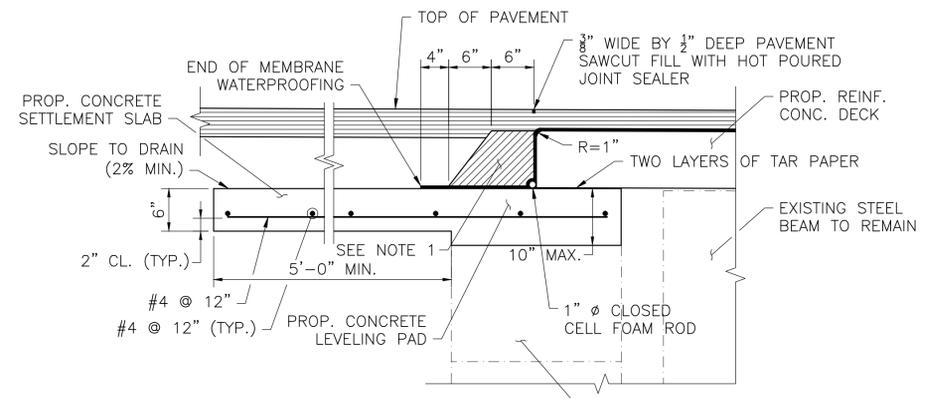
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	101	208

PROJECT FILE NO. 604532

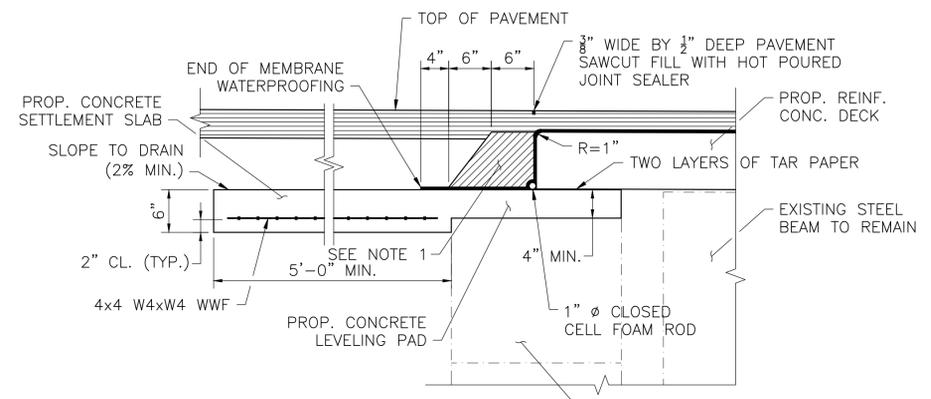
DETAILS



LEVELING PAD GREATER THAN 10"



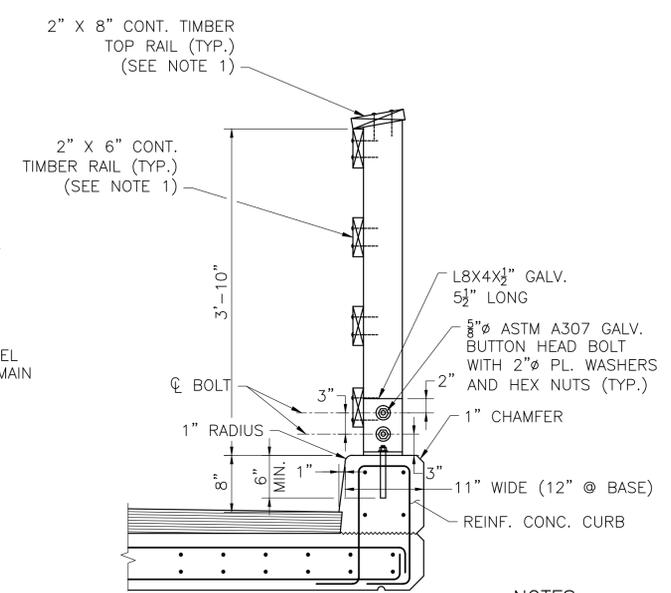
LEVELING PAD 6" TO 10"



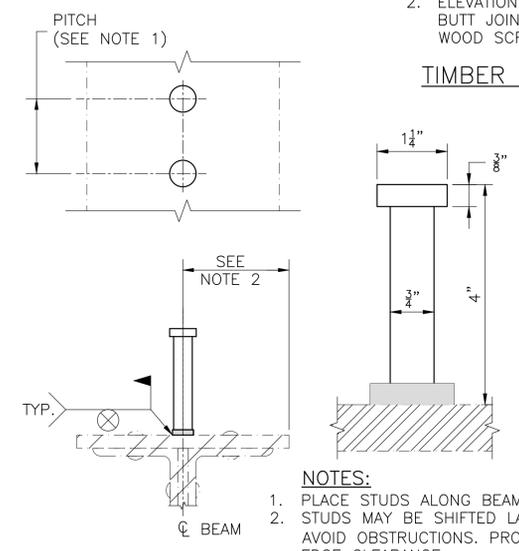
LEVELING PAD 4" MIN. TO 6"

- NOTES:**
1. PROTECTIVE COURSE TO BE HOT MIX ASPHALT PLACED IN 2" LAYERS AND COMPACTED WITH A MECHANICAL HAND-GUIDED TAMPER WITHIN 12 HOURS AFTER PLACING MEMBRANE WATERPROOFING.
 2. A 12" LEVELING PAD, USING THE LEVELING PAD GREATER THAN 10" DETAIL, SHALL BE USED IF STONE MASONRY IS NOT ENCOUNTERED. IN-SITU SOILS SHALL BE COMPACTED IF DISTURBED PRIOR TO PLACEMENT OF CONCRETE.

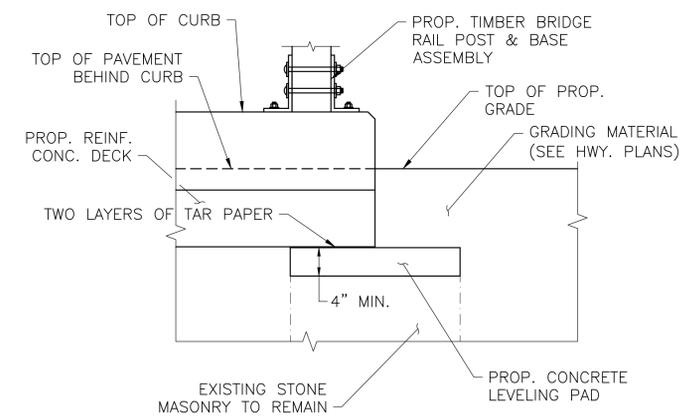
DETAILS AT END OF SLAB
SCALE: 1" = 1'-0"



TRANSVERSE SECTION



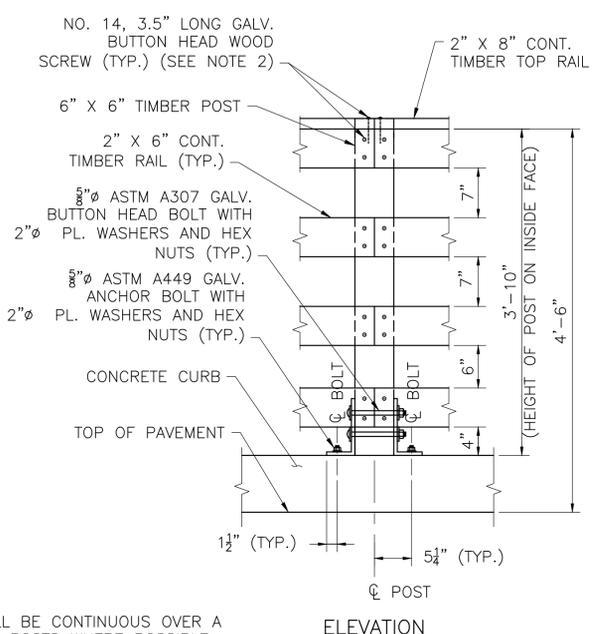
STUD SHEAR CONNECTORS
SCALE: N.T.S.



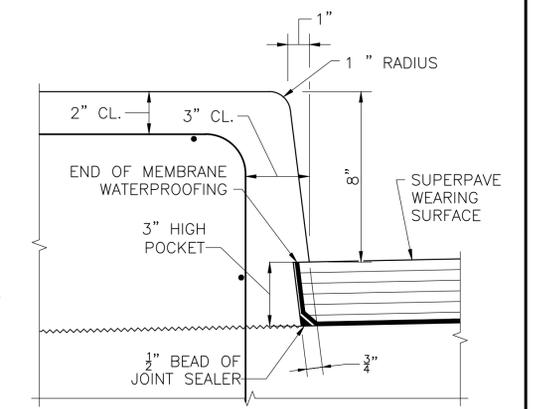
END OF CURB DETAIL
SCALE: 1" = 1'-0"

- NOTES:**
1. TIMBER RAILS SHALL BE CONTINUOUS OVER A MINIMUM OF THREE POSTS WHERE POSSIBLE.
 2. ELEVATION SHOWN REFLECTS LOCATION OF RAIL BUTT JOINT, AT INTERMEDIATE JOINT ONLY TWO WOOD SCREWS REQUIRED PER RAILING.

TIMBER BRIDGE RAILING DETAILS
SCALE: 1" = 1'-0"

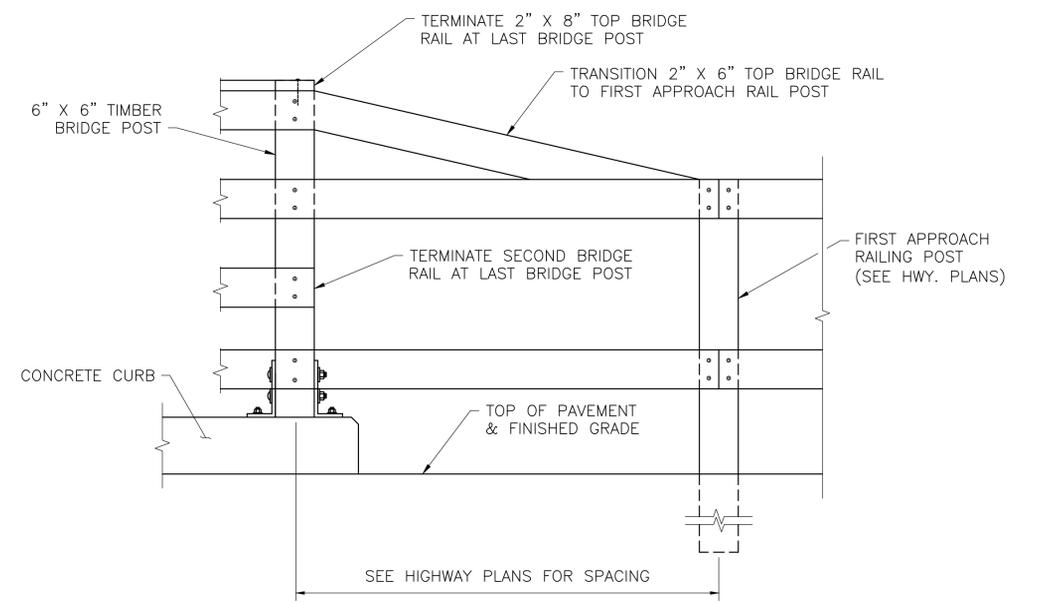


ELEVATION



- NOTES:**
1. TURN MEMBRANE UP INTO 3" HIGH POCKET.

FACE OF CURB DETAILS
SCALE: 3" = 1'-0"



TIMBER BRIDGE RAILING TRANSITION TO APPROACH RAILING
SCALE: 1" = 1'-0"

MONTH DD, YYYY	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
USE ONLY PRINTS OF LATEST DATE	

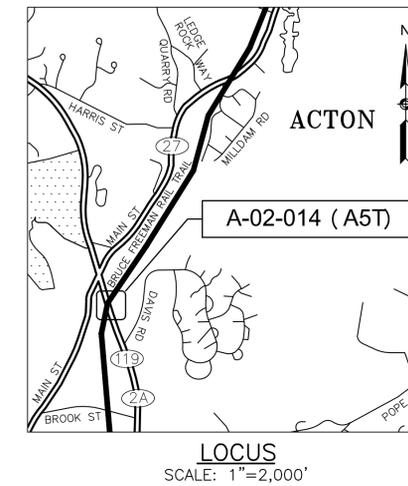
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	102	208

PROJECT FILE NO. 604532
KEY PLAN, LOCUS MAP, AND PROFILES

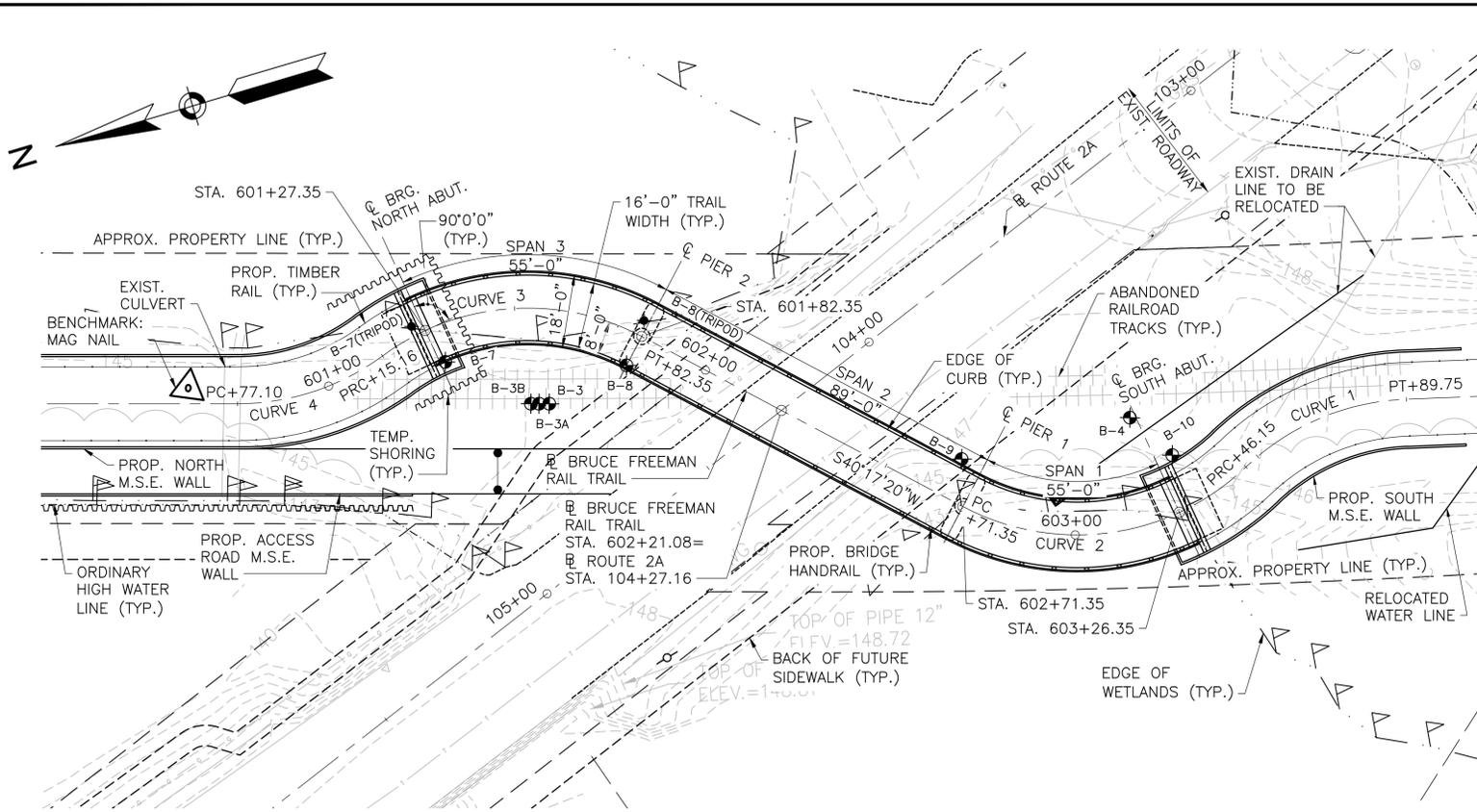
INDEX OF BRIDGE SHEETS

1. KEY PLAN, LOCUS MAP, AND PROFILES
2. GENERAL NOTES AND ESTIMATED QUANTITIES
3. BORING LOGS (1 OF 4)
4. BORING LOGS (2 OF 4)
5. BORING LOGS (3 OF 4)
6. BORING LOGS (4 OF 4)
7. PLAN AND ELEVATION
8. ABUTMENT PLAN, ELEVATION, AND SECTION
9. MSE WALL SECTIONS
10. MSE WALL PLAN AND ELEVATION (1 OF 2)
11. MSE WALL PLAN AND ELEVATION (2 OF 2)
12. APPROACH SLAB PLAN AND DETAILS
13. PIER PLAN, ELEVATION, AND DETAILS
14. DRILLED SHAFT DETAILS
15. FRAMING PLAN AND BEAM ELEVATIONS
16. STRUCTURAL STEEL DETAILS
17. TOF ELEVATIONS AND CAMBER TABLE
18. DECK SECTION AND DETAILS
19. BEARING DETAILS
20. RAILING AND PROTECTIVE SCREEN DETAILS
21. TIMBER RAIL TRANSITION

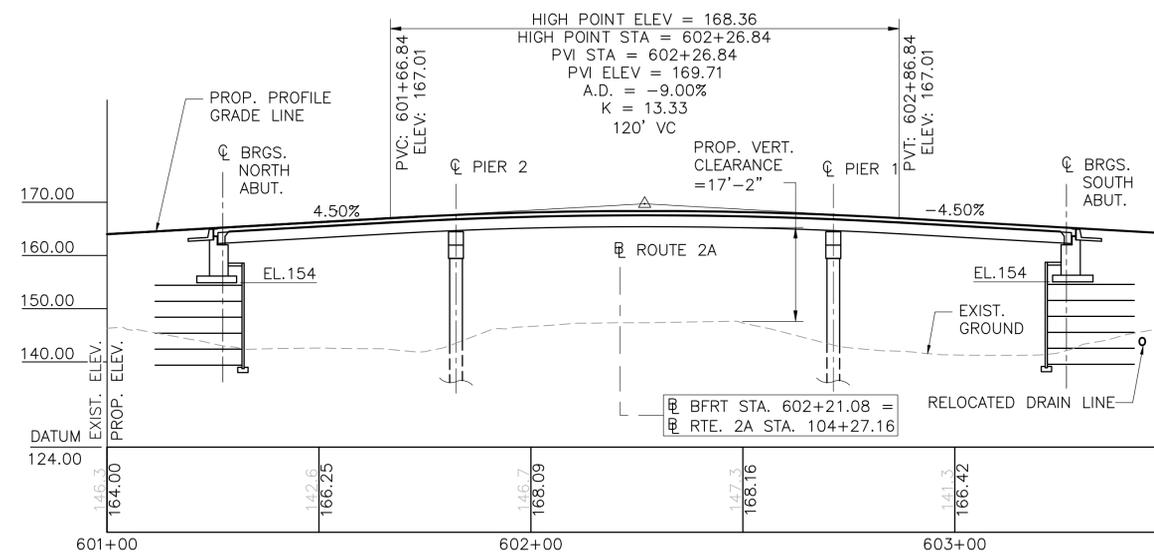


CURVE DATA:

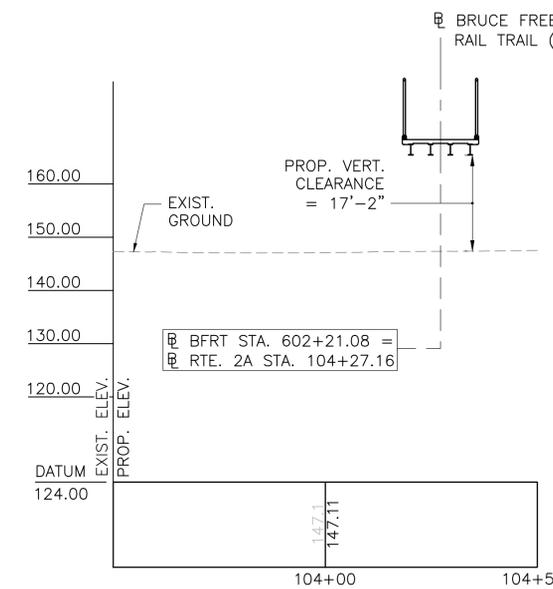
CURVE	PT	PC	PRC	R	L	Δ	T
CURVE 1	PT 603+89.75	PC 603+46.15	PRC 603+46.15	R=60.00'	L=43.59'	Δ=41°37'44.77"	T=22.81'
CURVE 2	PC 602+71.35	PRC 603+46.15	PC 602+71.35	R=60.00'	L=74.81'	Δ=71°26'08.58"	T=43.14'
CURVE 3	PT 601+82.35	PC 601+15.16	PRC 601+15.16	R=60.00'	L=67.18'	Δ=64°09'14.68"	T=37.60'
CURVE 4	PC 600+77.10	PRC 600+77.10	PC 600+77.10	R=60.00'	L=38.07'	Δ=36°21'09.16"	T=19.70'



KEY PLAN
SCALE: 1" = 20'



PROFILE - ALONG CONST. BRIDGE & P.G.L.
SCALE: HORIZ: 1" = 20'-0"
VERT: 1/16" = 1'-0"



PROFILE - ROUTE 2A
SCALE: HORIZ: 1" = 20'-0"
VERT: 1/16" = 1'-0"

Greenman-Pedersen, Inc. GPI 181 Ballardvale Street, Suite 202 Wilmington, MA 01887	MONTH DD, YYYY	ISSUED FOR CONSTRUCTION
	 PROPOSED BRIDGE ACTON BRUCE FREEMAN RAIL TRAIL OVER ROUTE 2A MASSACHUSETTS DEPARTMENT OF TRANSPORTATION HIGHWAY DIVISION 10 PARK PLAZA BOSTON, MASS	
	TITLE: _____	CHIEF ENGINEER _____

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	103	208
PROJECT FILE NO. 604532			

GENERAL NOTES AND ESTIMATED QUANTITIES

GENERAL NOTES

DESIGN:

IN ACCORDANCE WITH THE 2012 SPECIFICATIONS OF THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) WITH CURRENT INTERIM SPECIFICATIONS THROUGH 2013, FOR H10 LOADING. DESIGN ALSO IN ACCORDANCE WITH AASHTO LRFD GUIDE SPECIFICATIONS FOR THE DESIGN OF PEDESTRIAN BRIDGES FOR PEDESTRIAN LOADING.

MASSDOT BENCH MARK:

BRUCE FREEMAN RAIL TRAIL, BENCH MARK - MAG NAIL
ELEV. 145.97 STA. 600+65.01 OFFSET 3.83' LT
N 3006925.2622 E 678292.3911
ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988.

MASSDOT SURVEY NOTEBOOKS:

COPIES OF ELECTRONIC SURVEY FILES MAY BE OBTAINED FROM THE MASSACHUSETTS DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION.

FOUNDATIONS:

FOUNDATIONS MAY BE ALTERED, IF NECESSARY, TO SUIT CONDITIONS ENCOUNTERED DURING CONSTRUCTION, WITH THE APPROVAL OF THE ENGINEER.

UNSUITABLE MATERIAL:

ALL UNSUITABLE MATERIAL SHALL BE REMOVED WITHIN THE LIMITS OF THE FOUNDATIONS OF THE STRUCTURE, AS DIRECTED BY THE ENGINEER.

SEISMIC GROUND SHAKING HAZARD:

DESIGN SPECTRA:

As = 0.16
Sds = 0.26
Sd1 = 0.14

SITE CLASS = D

SEISMIC DESIGN CATEGORY = A

ANCHOR BOLTS:

ALL BRIDGE BEARING ANCHOR BOLTS SHALL BE SET BY TEMPLATE BEFORE THE CONCRETE IS PLACED, EXCEPT AT ABUTMENTS, WHERE CORING AND GROUTING MAY BE USED AT THE CONTRACTOR'S OPTION, PROVIDED THAT THE METHOD OF INSTALLATION WILL NOT CUT REINFORCING STEEL.

REINFORCEMENT:

REINFORCING STEEL SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M 31 GRADE 60. UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWINGS, ALL BARS SHALL BE LAPPED AS FOLLOWS:

MODIFICATION CONDITION	#4 BARS	#5 BARS
1. NONE	21"	26"
2. 12" OF CONCRETE BELOW BAR	29"	36"
3. COATED BARS, COVER < 3db, OR CLEAR SPACING < 6db	31"	39"
4. COATED BARS, ALL OTHER CASES	25"	31"
5. CONDITION 2. AND 3.	35"	44"
6. CONDITION 2. AND 4.	34"	43"

IF THE ABOVE BARS ARE SPACED 6" OR MORE ON CENTER, THE LAP LENGTH SHALL BE 80% OF THE LAP LENGTH GIVEN ABOVE. ALL OTHER BARS SHALL BE LAPPED AS SHOWN ON THE CONSTRUCTION DRAWINGS.

CONCRETE MIXES:

(1)	(2)	(3)	TO BE USED IN CONSTRUCTION OF:
4000	1½	565	ABUTMENTS, FOOTINGS, APPROACH SLAB
4000	¾	610	ABUTMENT BACKWALLS
4000	¾	585 HP CEMENT CONCRETE	DECK, END DIAPHRAGMS, PIER CAP, PIER COLUMN, SAFETY CURB
4000	¾	660 HP CEMENT CONCRETE	DRILLED SHAFT

- (1) 28 DAY COMPRESSIVE STRENGTH (PSI)
- (2) MAXIMUM AGGREGATE SIZE (IN)
- (3) CEMENTITIOUS CONTENT (POUND/C.Y.)

ESTIMATED QUANTITIES (NOT GUARENTEED)		
ITEM	QUANTITY	UNIT
BRIDGE EXCAVATION	145	CY
CRUSHED STONE FOR BRIDGE FOUNDATION	200	TON
TIMBER POST RAIL - 54" TALL	830	FT
TIMBER RAIL MOUNTED	220	FT
DRILLED SHAFT EXCAVATION 4.0 FOOT DIAMETER	66	FT
ROCK SOCKET EXCAVATION 3.5 FOOT DIAMETER	20	FT
OBSTRUCTION EXCAVATION 4.0 FOOT DIAMETER	15	FT
DRILLED SHAFT 3.5 FOOT DIAMETER	20	FT
DRILLED SHAFT 4.0 FOOT DIAMETER	70	FT
CROSS HOLE SONIC TESTING ACCESS PIPES	85	FT
CROSS HOLE SONIC TEST	2	EA
TEMPORARY SHORING	1	LS
CONTROL OF WATER - STRUCTURE NO. A-XX-XXX	1	LS
BRIDGE STRUCTURE, BRIDGE NO. A-02-014 (A5T)	1	LS
CULVERT STRUCTURE, CULVERT NO. _____	1	LS
MECHANICALLY STABILIZED EARTH WALL	2430	SY
MSE WALL MANUFACTURER'S REPRESENTATIVE	30	DAY