

# LOWELL AVENUE TRAFFIC CALMING IMPROVEMENTS

NEWTON  
LOWELL AVENUE  
TITLE SHEET & INDEX  
SHEET 1 OF 21

IN THE CITY OF  
NEWTON  
MIDDLESEX COUNTY

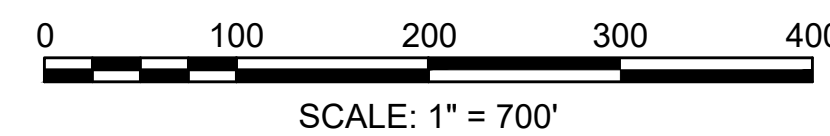
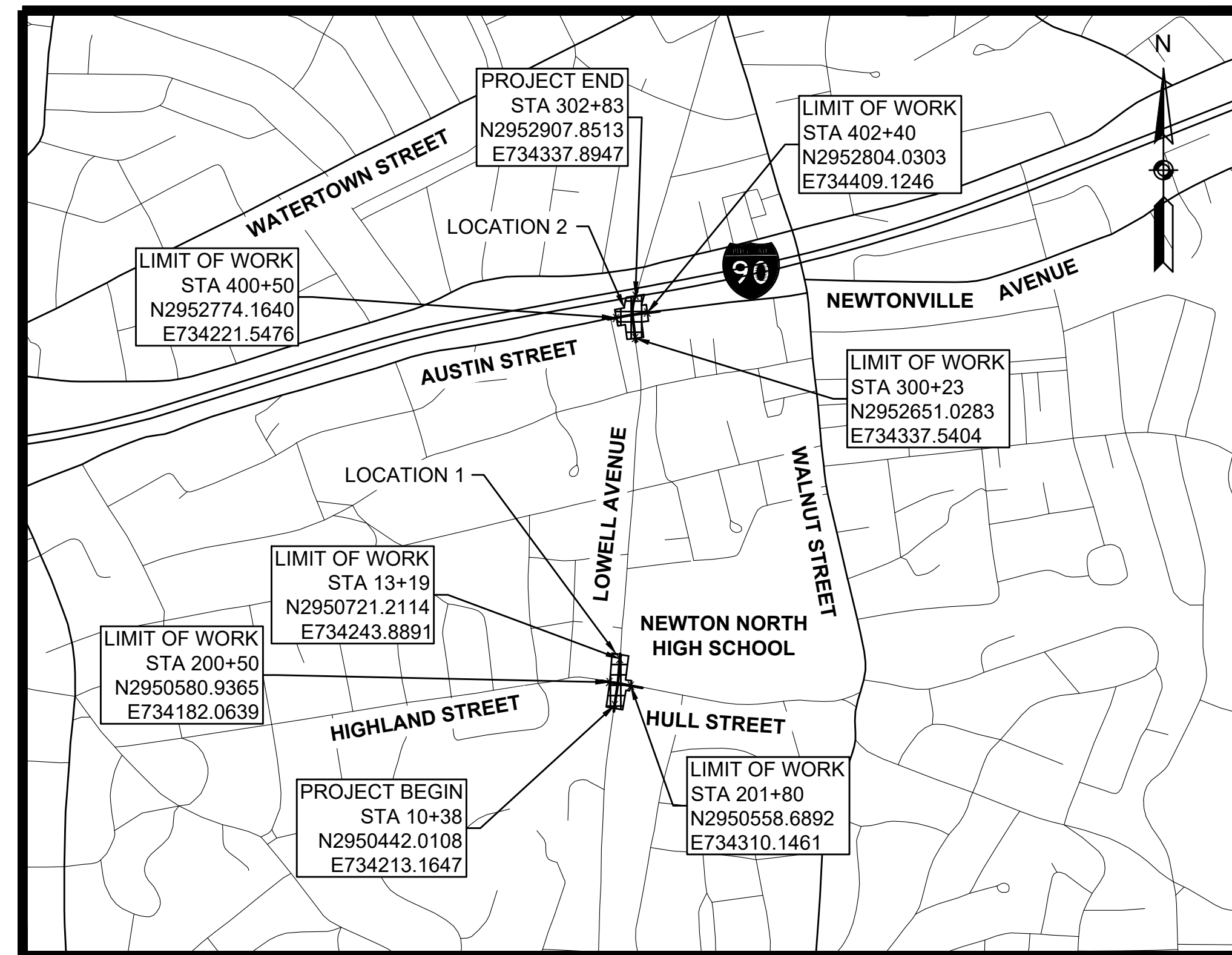
COMMONWEALTH OF MASSACHUSETTS

THE LATEST CITY OF NEWTON GENERAL CONSTRUCTION DETAILS AND STANDARD SPECIFICATIONS, THE 2022 MASSDOT STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, THE LATEST SUPPLEMENTAL SPECIFICATIONS, THE OCTOBER 2017 CONSTRUCTION STANDARD DETAILS, THE 2015 OVERHEAD SIGNAL STRUCTURE AND FOUNDATION STANDARD DRAWINGS, MASSDOT TRAFFIC MANAGEMENT PLANS AND DETAIL DRAWINGS, THE 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS, THE 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING, AND THE LATEST EDITION OF THE AMERICAN STANDARD FOR NURSERY STOCK WILL GOVERN.

## ISSUED FOR BIDDING

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LENGTH OF PROJECT (LOCATION 1) = 281.00 FEET = 0.053 MILES  
LENGTH OF PROJECT (LOCATION 2) = 260.00 FEET = 0.049 MILES

PREPARED FOR:  
CITY OF NEWTON  
DEPARTMENT OF PUBLIC WORKS  
110 CRAFTS STREET  
NEWTON, MA 02458

12/14/2022	ISSUED FOR BIDDING	4
10/12/2022	MASSDOT SHAPS COMMENTS	3
8/18/2022	REVISED PS&E SUBMITTAL	2
6/08/2022	PS&E SUBMITTAL	1
2/24/2022	50% SUBMITTAL	-
DATE	DESCRIPTION	REV #

**TEC**  
The Engineering Corp

282 Merrimack Street 2nd Floor Lawrence, MA 01843 978-794-1792	311 Main Street 2nd Floor Worcester, MA 01608 508-868-5104	169 Ocean Blvd, Unit 3 PO Box 249 Hampton, NH 03842 603-601-8154
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www.TheEngineeringCorp.com

CITY OF NEWTON  
MASSACHUSETTS

DESIGNED BY: JFZ  
DESIGN DRAFTED BY: JFZ  
CHECKED BY: LSA  
APPROVED BY: JAR

**GENERAL SYMBOLS**

EXISTING	PROPOSED	DESCRIPTION
		JERSEY BARRIER
		CATCH BASIN
		CATCH BASIN CURB INLET
		FLAG POLE
		GAS PUMP
		MAIL BOX
		POST SQUARE
		POST CIRCULAR
		WELL
		ELECTRIC HANDHOLE
		FENCE GATE POST
		GAS GATE
		BORING HOLE
		MONITORING WELL
		TEST PIT
		HYDRANT
		LIGHT POLE
		COUNTY BOUND
		GPS POINT
		CABLE MANHOLE
		DRAINAGE MANHOLE
		ELECTRIC MANHOLE
		GAS MANHOLE
		MISC MANHOLE
		SEWER MANHOLE
		TELEPHONE MANHOLE
		WATER MANHOLE
		MASSACHUSETTS HIGHWAY BOUND
		MONUMENT
		STONE BOUND
		TOWN OR CITY BOUND
		TRAVERSE OR TRIANGULATION STATION
		TROLLEY POLE OR GUY POLE
		UTILITY POLE W/ FIREBOX
		UTILITY POLE WITH DOUBLE LIGHT
		UTILITY POLE W / 1 LIGHT
		UTILITY POLE
		BUSH
		TREE
		STUMP
		SWAMP / MARSH
		WATER GATE
		PARKING METER
		OVERHEAD CABLE/WIRE
		CURBING
		CONTOURS (ON-THE-GROUND SURVEY DATA)
		CONTOURS (PHOTOGRAMMETRIC DATA)
		UNDERGROUND DRAIN PIPE (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND ELECTRIC DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND GAS MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND SEWER MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND TELEPHONE DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND WATER MAIN (DOUBLE LINE 24 INCH AND OVER)
		BALANCED STONE WALL
		GUARD RAIL - STEEL POSTS
		GUARD RAIL - WOOD POSTS
		GUARD RAIL - DOUBLE FACE - STEEL POSTS
		GUARD RAIL - DOUBLE FACE - WOOD POSTS
		CHAIN LINK OR METAL FENCE
		WOOD FENCE
		HAY BALES/SILT FENCE
		TREE LINE
		SAWCUT LINE
		TOP OR BOTTOM OF SLOPE
		LIMIT OF EDGE OF PAVEMENT OR COLD PLANE AND OVERLAY
		BANK OF RIVER OR STREAM
		BORDER OF WETLAND
		100 FT WETLAND BUFFER
		200 FT RIVERFRONT BUFFER
		STATE HIGHWAY LAYOUT
		TOWN OR CITY LAYOUT
		COUNTY LAYOUT
		RAILROAD SIDELINE
		TOWN OR CITY BOUNDARY LINE
		PROPERTY LINE OR APPROXIMATE PROPERTY LINE
		EASEMENT

**TRAFFIC SYMBOLS**

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

**PAVEMENT MARKINGS SYMBOLS**

EXISTING	PROPOSED	DESCRIPTION
		PAVEMENT ARROW - WHITE
		LEGEND "ONLY" - WHITE
		STOP LINE
		CROSSWALK
		SOLID WHITE LINE
		SOLID YELLOW LINE
		BROKEN WHITE LINE
		BROKEN YELLOW LINE
		DOTTED WHITE LINE
		DOTTED YELLOW LINE
		DOTTED WHITE LINE EXTENSION
		DOTTED YELLOW LINE EXTENSION
		DOUBLE WHITE LINE
		DOUBLE YELLOW LINE

**ABBREVIATIONS**

GENERAL		ABBREVIATIONS (cont.)	
AADT	ANNUAL AVERAGE DAILY TRAFFIC	PVMT	PAVEMENT
ABAN	ABANDON	PWW	PAVED WATER WAY
ADJ	ADJUST	R	RADIUS OF CURVATURE
APPROX.	APPROXIMATE	R&D	REMOVE AND DISPOSE
A.C.	ASPHALT CONCRETE	RCP	REINFORCED CONCRETE PIPE
ACCM PIPE	ASPHALT COATED CORRUGATED METAL PIPE	RD	ROAD
BIT.	BITUMINOUS	RDWY	ROADWAY
BC	BOTTOM OF CURB	REM	REMOVE
BD.	BOUND	RET	RETAIN
BL	BASELINE	RET WALL	RETAINING WALL
BLDG	BUILDING	ROW	RIGHT OF WAY
BM	BENCHMARK	RR	RAILROAD
BO	BY OTHERS	R&R	REMOVE AND RESET
BOS	BOTTOM OF SLOPE	R&S	REMOVE AND STACK
BR.	BRIDGE	RT	RIGHT
CB	CATCH BASIN	SB	STONE BOUND
CBCI	CATCH BASIN WITH CURB INLET	SHLD	SHOULDER
CC	CEMENT CONCRETE	SMH	SEWER MANHOLE
CCM	CEMENT CONCRETE MASONRY	ST	STREET
CEM	CEMENT	STA	STATION
CI	CURB INLET	SSD	STOPPING SIGHT DISTANCE
CIP	CAST IRON PIPE	SHLO	STATE HIGHWAY LAYOUT LINE
CLF	CHAIN LINK FENCE	SW	SIDEWALK
CL	CENTERLINE	T	TANGENT DISTANCE OF CURVE/TRUCK %
CMP	CORRUGATED METAL PIPE	TAN	TANGENT
CSP	CORRUGATED STEEL PIPE	TEMP	TEMPORARY
CO.	COUNTY	TC	TOP OF CURB
CONC	CONCRETE	TOS	TOP OF SLOPE
CONT	CONTINUOUS	TYP	TYPICAL
CONST	CONSTRUCTION	UP	UTILITY POLE
CR GR	CROWN GRADE	VAR	VARIES
DHV	DESIGN HOURLY VOLUME	VERT	VERTICAL
DI	DROP INLET	VC	VERTICAL CURVE
DIA	DIAMETER	WCR	WHEEL CHAIR RAMP
DIP	DUCTILE IRON PIPE	WG	WATER GATE
DW	STEADY DON'T WALK - PORTLAND ORANGE	WIP	WROUGHT IRON PIPE
DWY	DRIVEWAY	WM	WATER METER/WATER MAIN
ELEV (or EL.)	ELEVATION	X-SECT	CROSS SECTION
EMB	EMBANKMENT		
EOP	EDGE OF PAVEMENT		
EXIST (or EX)	EXISTING		
EXC	EXCAVATION		
F&C	FRAME AND COVER		
F&G	FRAME AND GRATE		
FDN.	FOUNDATION		
FLDSTN	FIELDSTONE		
GAR	GARAGE		
GC	GRANITE CURB		
GD	GROUND		
GG	GAS GATE		
GI	GUTTER INLET		
GIP	GALVANIZED IRON PIPE		
GRAN	GRANITE		
GRAV	GRAVEL		
GRD	GUARD		
HDW	HEADWALL		
HMA	HOT MIX ASPHALT		
HOR	HORIZONTAL		
HYD	HYDRANT		
INV	INVERT		
JCT	JUNCTION		
L	LENGTH OF CURVE		
LB	LEACH BASIN		
LP	LIGHT POLE		
L&S	LOAM AND SEED		
LT	LEFT		
MAX	MAXIMUM		
MB	MAILBOX		
MH	MANHOLE		
MHB	MASSACHUSETTS HIGHWAY BOUND		
MIN	MINIMUM		
NIC	NOT IN CONTRACT		
NO.	NUMBER		
PC	POINT OF CURVATURE		
PCC	POINT OF COMPOUND CURVATURE		
P.G.L.	PROFILE GRADE LINE		
PI	POINT OF INTERSECTION		
POC	POINT ON CURVE		
POT	POINT ON TANGENT		
PRC	POINT OF REVERSE CURVATURE		
PROJ	PROJECT		
PROP	PROPOSED		
PSB	PLANTABLE SOIL BORROW		
PT	POINT OF TANGENCY		
PVC	POINT OF VERTICAL CURVATURE		
PVI	POINT OF VERTICAL INTERSECTION		
PVT	POINT OF VERTICAL TANGENCY		

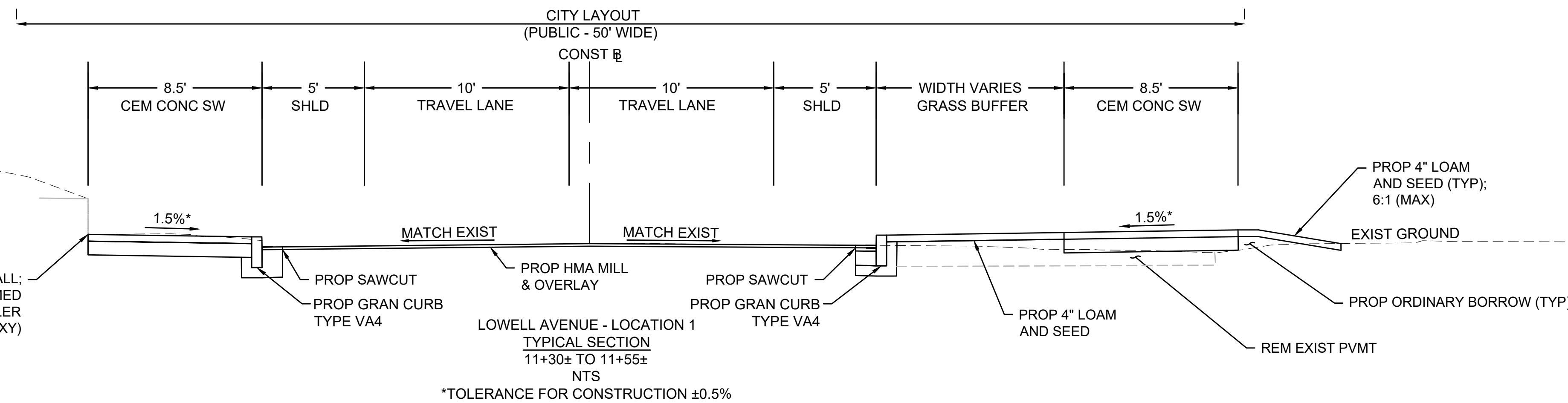
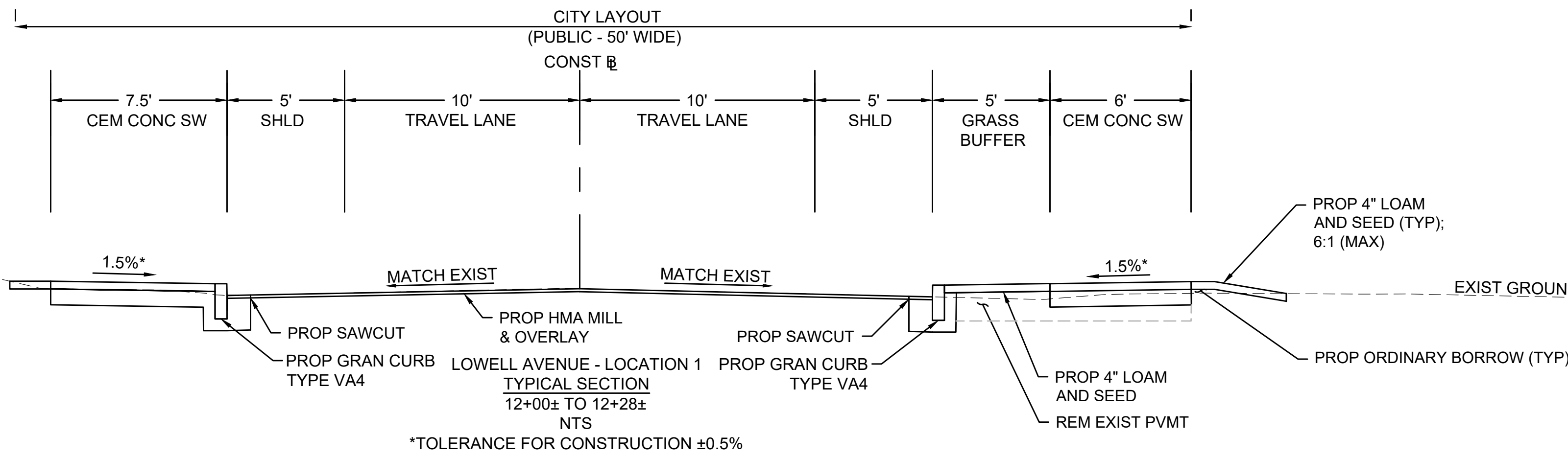
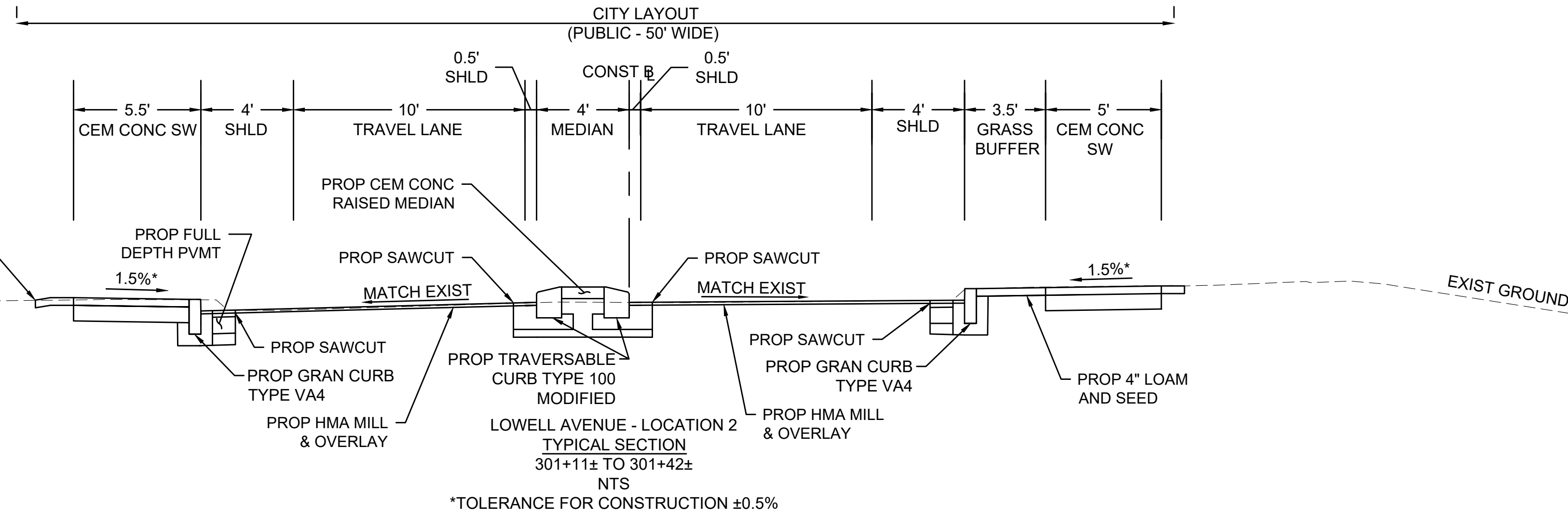
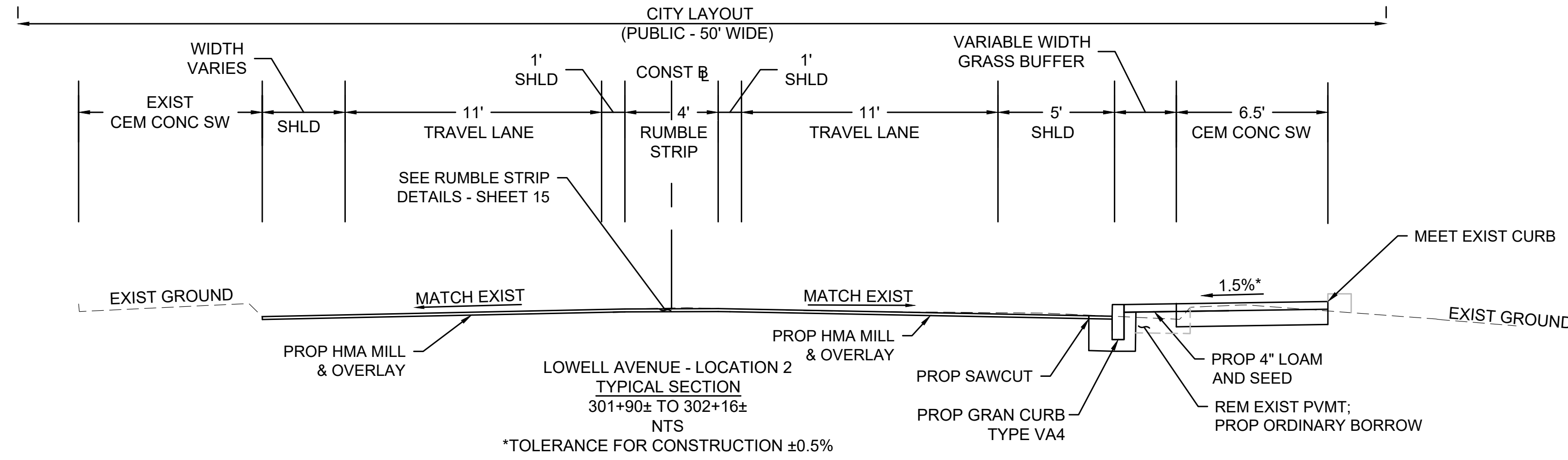
CITY OF NEWTON  
MASSACHUSETTS

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 DESIGN DRAFTED BY: JFZ  
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 APPROVED BY: JAR

CONSTRUCTION NOTES:

1. EXISTING CONDITIONS INFORMATION COMPILED FROM AN ON-THE-GROUND INSTRUMENT SURVEY PERFORMED BY HANCOCK ASSOCIATES, IN JULY, 2021  
HORIZONTAL DATUM = NAD83 (MASSACHUSETTS STATE PLANE COORDINATES)  
VERTICAL DATUM = NAVD88
2. THE CONTRACTOR SHALL CONTACT DIGSAFE (1-888-DIGSAFE) AND THE CITY OF NEWTON UTILITIES DIVISION A MINIMUM OF 72 HOURS PRIOR TO ANY CONSTRUCTION TO VERIFY THE LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
3. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED TO THE ENGINEER FOR RESOLUTION OF THE CONFLICT.
4. ALL MUNICIPALLY OWNED UTILITY STRUCTURES (CATCH BASINS, DRAIN MANHOLES, WATER GATES, ETC.) SHALL BE ADJUSTED BY THE CONTRACTOR TO FINISHED GRADE UNLESS DIRECTED OTHERWISE.
5. ALL PRIVATELY OWNED UTILITY STRUCTURES (GAS GATES, ELECTRIC /TELEPHONE MANHOLES, ETC.) SHALL BE ADJUSTED TO FINISHED GRADE BY THE PRIVATE UTILITY COMPANY, UNLESS DIRECTED OTHERWISE. THE CONTRACTOR SHALL COORDINATE WITH PRIVATE UTILITY COMPANIES FOR THE ALTERATION AND ADJUSTMENT, AS NECESSARY.
6. AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT THE CONTRACTORS EXPENSE.
7. THE TERM "PROPOSED" (PROP) MEANS WORK TO BE CONSTRUCTED USING NEW MATERIALS OR, WHERE APPLICABLE, RE-USING EXISTING MATERIALS IDENTIFIED AS "REMOVE AND RESET" (R&R), AS APPROVED BY THE ENGINEER.
8. ANY UTILITY STRUCTURE WITHIN THE PROPOSED OR EXISTING ACCESSIBLE SURFACE SHALL BE ADJUSTED TO BE FLUSH WITH THE CURB RAMP SURFACE.
9. THE TERM "MEET EXIST" MEANS TO MEET BOTH THE EXISTING ALIGNMENT AND ELEVATION.
10. ALL EXISTING TREES WITHIN THE PROJECT LIMITS SHALL BE RETAINED UNLESS INDICATED OTHERWISE ON THE DRAWINGS. ALL PROVIDED DIMENSIONS REFER TO THE DIAMETER AT BREAST HEIGHT.
11. AN UNOBSTRUCTED PATH OF TRAVEL WITH A MINIMUM WIDTH OF 3'-0" (EXCLUDING THE WIDTH OF THE CURB) SHALL BE MAINTAINED PAST ALL VERTICAL OBSTRUCTIONS (UTILITY POLES, LIGHT POLES, SIGNS, MAILBOXES, ETC.)
12. ALL EXISTING GRANITE CURB THAT MEETS SPECIFICATIONS SHALL BE RE-USED WITHIN THE PROPOSED WORK, EXCEPT CURVED STONES OF A DIFFERENT RADIUS THAN THAT PROPOSED.
13. THE CONTRACTOR IS LIMITED TO WORK ON ONE SIDE OF EACH INTERSECTION AT A TIME UNTIL IT IS COMPLETED (I.E. CEMENT CONCRETE SIDEWALK & RAMPS ARE COMPLETED) BEFORE EXCAVATING THE OPPOSITE SIDE OF THE ROAD THIS IS TO ENSURE ONE UNOBSTRUCTED SIDEWALK IS MAINTAINED DURING CONSTRUCTION.
14. CATCH BASINS WITHIN THE CONSTRUCTION ZONE SHALL HAVE SILTATION CONTROL MEASURE INSTALLED AND MAINTAINED FOR THE DURATION, IF HEAVY RAINS ARE PREDICATED THE CONTRACTOR SHALL ENSURE THAT STREET OR PRIVATE PROPERTY IS NOT FLOODED. AT THE END OF ALL CONSTRUCTION ALL SILTATION CONTROLS SHALL BE REMOVED AND THE CATCH BASIN SHALL BE CLEANED.
15. CONTRACTOR SHALL NOTE PRESENCE OF EXISTING 8"-12" DEEP CONCRETE PANELS REINFORCED IN TWO-DIRECTIONS BENEATH ASPHALT ON LOWELL AVE. EXISTING TRANSVERSE AND LONGITUDINAL JOINTS SHALL BE CLEANED OF EXISTING SEALANTS AND RESEALED.
16. NO CONSTRUCTION STAGING WILL BE PERMITTED ON ELMWOOD PARK GRASS AREA OR CITY GRASS AREA AT SOUTHWEST CORNER OF LOWELL AVE/AUSTIN ST INTERSECTION.





PAVEMENT NOTES

PROPOSED MILL & HOT MIX ASPHALT (HMA) OVERLAY

SURFACE: 1½" SUPERPAVE SURFACE COURSE - 12.5 (SSC - 12.5) OVER VARIABLE THICKNESS SUPERPAVE LEVELING COURSE - 9.5 (SLC - 9.5) (AS REQUIRED TO MEET PROPOSED GRADES)  
1½" PAVEMENT MICROMILLING

PROPOSED CEMENT CONCRETE PEDESTRIAN CURB RAMPS/ SIDEWALK

SURFACE: 8" CEMENT CONCRETE WITH LAMP BLACK 2LB/CLF EMULSIFIED 7% AIR ENTRAINED, 4000 PSI, ¾" 610 (PER MASSDOT STD SPEC M4.02.00)

BASE: 8" GRAVEL BORROW, TYPE b (SEE NOTE 5 BELOW)

PROPOSED FULL DEPTH PAVEMENT LESS THAN 4' WIDE

SURFACE: 1½" HMA SURFACE COURSE-12.5 (SSC-12.5) OVER 2" SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC-12.5)

BASE: 6" HIGH EARLY STRENGTH CEMENT CONCRETE BASE COURSE OVER

SUBBASE: 8" GRAVEL BORROW, TYPE b

PROPOSED CEMENT CONCRETE RAISED MEDIAN

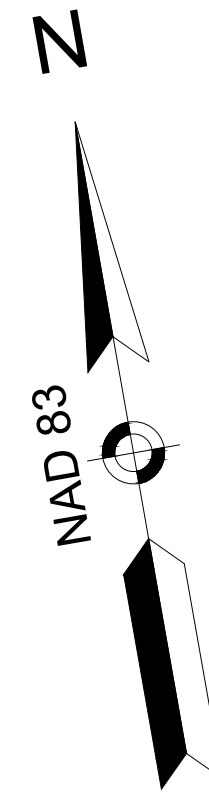
SURFACE: 6" CEMENT CONCRETE (AIR ENTRAINED, 4000 PSI, ¾", 610)

BASE: 8" GRAVEL BORROW, TYPE b (SEE NOTE 5 BELOW)

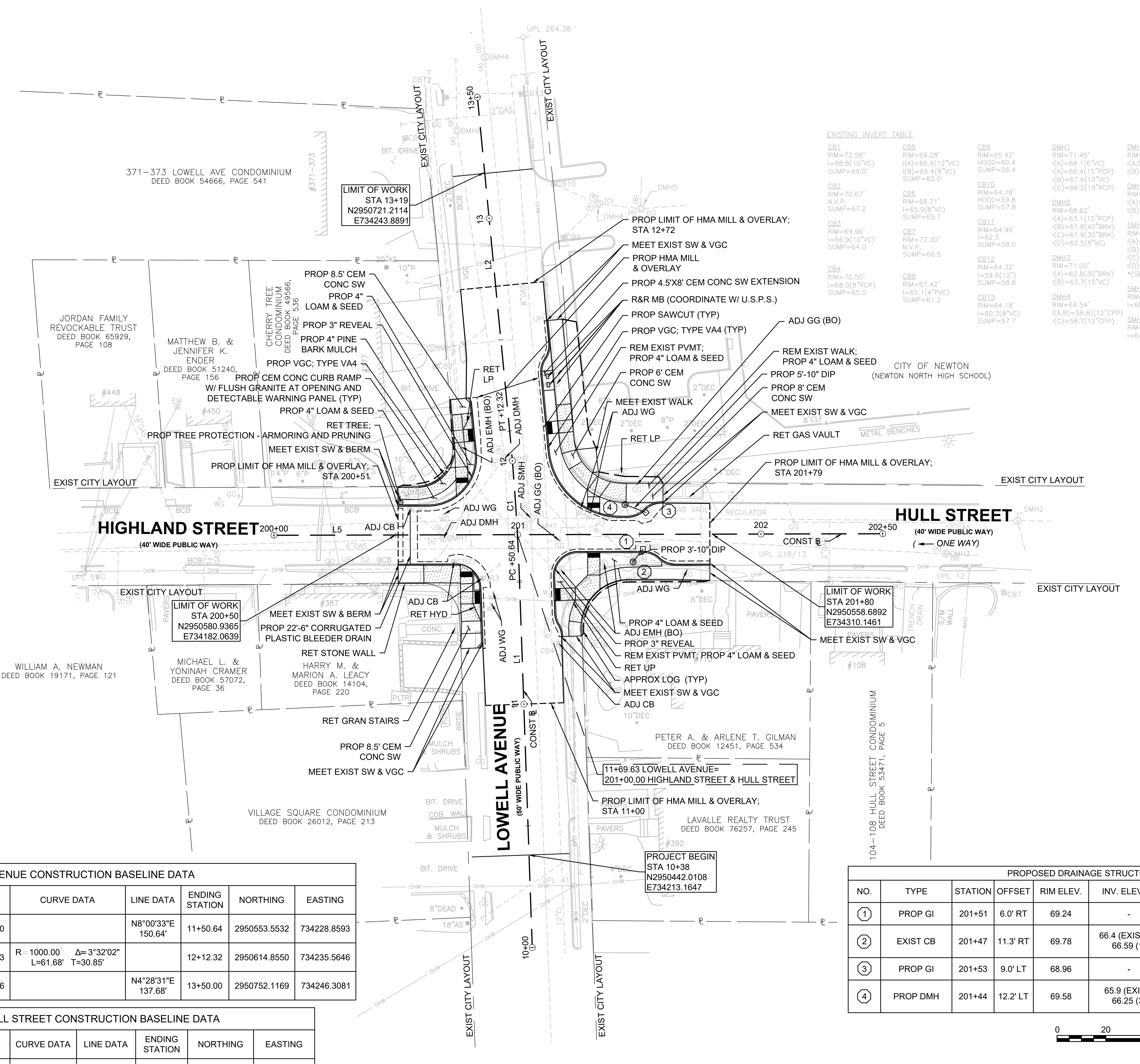
GENERAL PAVEMENT NOTES:

1. ASPHALT EMULSION FOR TACK COAT SHALL BE APPLIED BETWEEN ALL ASPHALT SURFACES AND SAWCUT JOINTS BEFORE PAVING. HMA JOINT ADHESIVE SHALL BE APPLIED TO ALL COLD JOINTS (LONGITUDINAL AND TRANSVERSE) BEFORE PAVING SURFACE COURSE. ASPHALT EMULSION FOR TACK COAT SHALL BE APPLIED AT A RATE CONSISTENT WITH STANDARD SPECIFICATION 450.43G2. ALL SURFACES SHALL BE CLEAN OF ALL ORGANICS, DEBRIS, AND SAND PRIOR TO PAVING.
2. ALL HMA SHALL BE IN ACCORDANCE WITH SECTION 450.
3. ASPHALT EMULSION FOR TACK COAT SHALL BE ANIONIC EMULSION GRADE RS-1H TO RESIST TRACKING OF TACK BY HAUL VEHICLES.
4. HMA FOR WALKS AND DRIVEWAYS SHALL BE IN ACCORDANCE WITH SUBSECTION 702.
5. ALL GRAVEL BORROW MEETING SPECIFICATION SHALL BE RETAINED IN PLACE, COMPACTED, AND LEVELED AS REQUIRED. CONTRACTOR SHALL PROVIDE TEST RESULT SUBMITTALS TO THE ENGINEER FOR APPROVAL.





CITY OF NEWTON  
MASSACHUSETTS



EXISTING INVERT TABLE

CB1 RIM=72.58' I=68.8(10°VC) SUMP=69.0'	CB5 RIM=69.28' I(A)=66.6(12°VC) I(B)=66.4(8°VC) SUMP=62.0	CB9 RIM=65.42' HOOD=60.4 SUMP=56.4	DMH1 RIM=71.45' I(A)=68.1(6°VC) I(B)=66.4(15°RCP) I(C)=67.6(10°VC) I(D)=66.2(15°RCP)	DMH5 RIM=64.35' I(A,C)=55.3(12°CPP) I(B)=55.0(12°CPP)	SMH4 RIM=64.39' I(A)=54.7(15°VC) I(B)=54.6(15°VC)
CB2 RIM=70.67' N.V.P. SUMP=67.2	CB6 RIM=68.71' I=65.9(8°VC) SUMP=65.7	CB10 RIM=64.78' HOOD=59.8 SUMP=57.8	DMH2 RIM=68.62' I(A)=63.1(15°RCP) I(B)=61.8(40°BRK) I(C)=61.9(30°BRK) I(D)=59.5(15°VC)	SMH1 RIM=69.26' I(A)=59.8(8°VC) I(B)=59.5(15°VC) I(C)=59.6(12°VC) I(D)=59.7(12°VC) *(SEE NOTE 5)	SMH2 RIM=72.22' I=60.7(12°VC)
CB3 RIM=69.96' I=66.9(10°VC) SUMP=64.0	CB7 RIM=72.30' N.V.P. SUMP=66.5	CB11 RIM=64.99' I=62.5 SUMP=58.0	DMH3 RIM=71.00' I(A)=62.8(30°BRK) I(B)=63.7(15°VC)	SMH3 RIM=67.56' I=64.8(6°PVC)	
CB4 RIM=70.50' I=68.0(8°RCP) SUMP=65.0	CB8 RIM=67.42' I=65.1(4°PVC) SUMP=61.2	CB12 RIM=64.32' I=59.6(12°) SUMP=58.8	DMH4 RIM=64.54' I(A,B)=58.8((12°CPP) I(C)=58.7(12°CPP)		
		CB13 RIM=64.18' I=60.3(8°VC) SUMP=57.7			

LOWELL AVENUE CONSTRUCTION BASELINE DATA

NUMBER	STARTING STATION	NORTHING	EASTING	CURVE DATA	LINE DATA	ENDING STATION	NORTHING	EASTING
L1	10+00.00	2950404.3815	734207.8700		N8°00'33"E 150.64'	11+50.64	2950553.5532	734228.8593
C1	11+50.64	2950553.5532	734228.8593	R=1000.00' Δ=3°32'02" L=61.68' T=30.85'		12+12.32	2950614.8550	734235.5646
L2	12+12.32	2950614.8550	734235.5646		N4°28'31"E 137.68'	13+50.00	2950752.1169	734246.3081

HIGHLAND STREET & HULL STREET CONSTRUCTION BASELINE DATA

NUMBER	STARTING STATION	NORTHING	EASTING	CURVE DATA	LINE DATA	ENDING STATION	NORTHING	EASTING
L5	200+00.00	2950589.4932	734132.8015		S80°08'47"E 250.00'	202+50.00	2950546.7099	734379.1135

PROPOSED DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
1	PROP GI	201+51	6.0' RT	69.24	-	66.74	
2	EXIST CB	201+47	11.3' RT	69.78	66.4 (EXIST 8") 66.59 (1)	66.6 (EXIST 12")	CIT TO DMH RET EX SUMP CORE HOLE IN EX
3	PROP GI	201+53	9.0' LT	68.96	-	66.5	
4	PROP DMH	201+44	12.2' LT	69.58	65.9 (EXIST) 66.25 (3)	-	REM EXIST CB



DESIGNED BY: JFZ  
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 APPROVED BY: JAR

CONSTRUCTION NOTES:

1. THE CONTRACTOR WILL BE FULLY RESPONSIBLE FOR THE REPAIR AND MAINTENANCE OF DAMAGED STRUCTURES SUCH AS THE BRIDGE DECK WATERPROOFING MEMBRANE, BRIDGE DECK JOINT, AND APPROACH SLAB OF THE BRIDGE DUE TO PROPOSED CONSTRUCTION ACTIVITIES. ALL REPAIR DETAILS ARE TO BE APPROVED BY MASSDOT PRIOR TO THE START OF WORK.
2. THE CONTRACTOR SHALL CONTACT THE CITY FORESTER (MARC WELCH, 617-796-1516) FOR DIRECTION ON APPROPRIATE MITIGATION MEASURES REGARDING ANY LARGE TREE ROOTS FOUND THAT DIRECTLY CONFLICT THE WORK.

LOWELL AVENUE 2 CONSTRUCTION BASELINE DATA								
NUMBER	STARTING STATION	NORTHING	EASTING	CURVE DATA	LINE DATA	ENDING STATION	NORTHING	EASTING
L3	300+00.00	2952628.2039	734340.3775		N7°05'08"W 151.93'	301+51.93	2952778.9711	734321.6370
C2	301+51.93	2952778.9711	734321.6370	R=250.00' Δ=23°19'23" L=101.77' T=51.60'		302+53.69	2952879.7141	734329.7001
L4	302+53.69	2952879.7141	734329.7001		N16°14'15"E 76.31'	303+30.00	2952952.9765	734351.0369

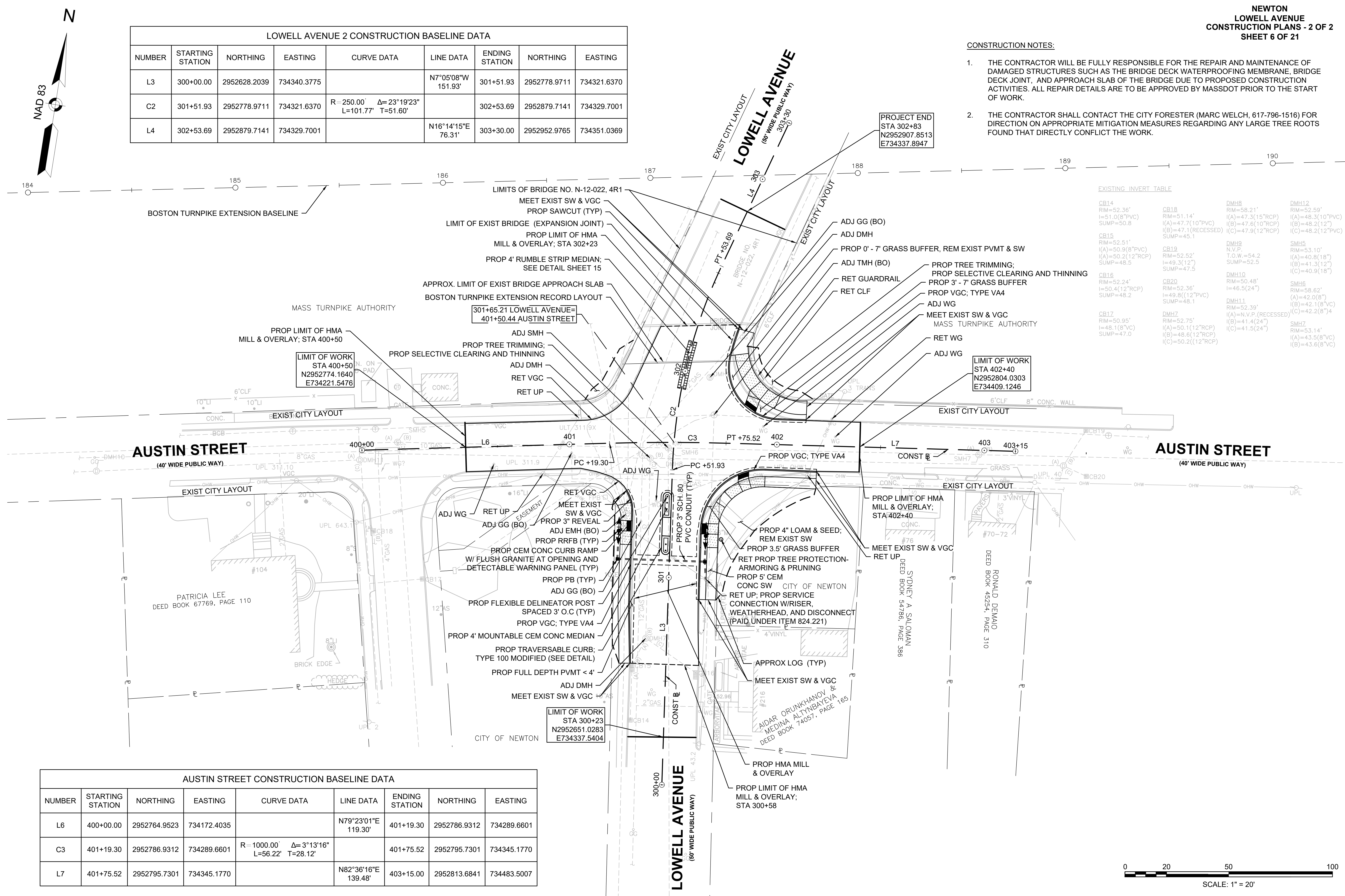
EXISTING INVERT TABLE

CB14 RIM=52.36' I=51.0(8"RCP) SUMP=50.8	CB18 RIM=51.14' (A)=47.7(10"RCP) (B)=47.6(10"RCP) (C)=47.1(RECESSED) SUMP=45.1	DMH8 RIM=58.21' (A)=47.3(15"RCP) (B)=47.9(12"RCP) (C)=47.9(12"RCP)	DMH12 RIM=52.59' (A)=48.3(10"RCP) (B)=48.2(12") (C)=48.2(12"RCP)
CB15 RIM=52.51' (A)=50.9(8"RCP) (B)=50.2(12"RCP) SUMP=48.5	CB19 RIM=52.52' I=49.3(12") SUMP=47.5	DMH9 N.V.P. T.O.W.=54.2 SUMP=52.5	SMH5 RIM=53.10' (A)=40.8(18") (B)=41.3(12") (C)=40.9(18")
CB16 RIM=52.24' I=50.4(12"RCP) SUMP=48.2	CB20 RIM=52.36' I=49.8(12"RCP) SUMP=48.1	DMH10 RIM=50.48' I=46.5(24")	SMH6 RIM=58.62' (A)=42.0(8") (B)=42.1(8"VC) (C)=42.2(8")4
CB17 RIM=50.95' I=48.1(8"VC) SUMP=47.0	DMH7 RIM=52.75' (A)=50.1(12"RCP) (B)=48.6(12"RCP) (C)=50.2(12"RCP)	DMH11 RIM=52.39' (A)=N.V.P.(RECESSED) (B)=41.4(24") (C)=41.5(24")	SMH7 RIM=53.14' (A)=43.5(8"VC) (B)=43.6(8"VC)

CITY OF NEWTON  
MASSACHUSETTS

DESIGNED BY: JFZ  
DRAWN BY: JFZ  
CHECKED BY: LSA  
APPROVED BY: JAR

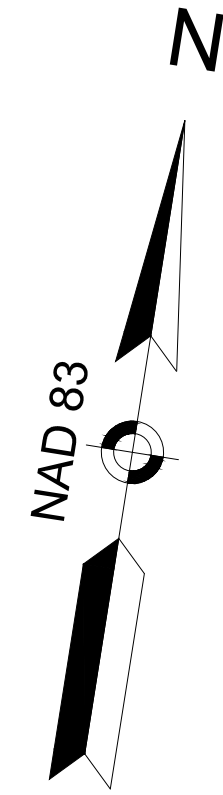
AUSTIN STREET CONSTRUCTION BASELINE DATA								
NUMBER	STARTING STATION	NORTHING	EASTING	CURVE DATA	LINE DATA	ENDING STATION	NORTHING	EASTING
L6	400+00.00	2952764.9523	734172.4035		N79°23'01"E 119.30'	401+19.30	2952786.9312	734289.6601
C3	401+19.30	2952786.9312	734289.6601	R=1000.00' Δ=3°13'16" L=56.22' T=28.12'		401+75.52	2952795.7301	734345.1770
L7	401+75.52	2952795.7301	734345.1770		N82°36'16"E 139.48'	403+15.00	2952813.6841	734483.5007











BOSTON TURNPIKE EXTENSION BASELINE

MASS TURNPIKE AUTHORITY

BOSTON TURNPIKE EXTENSION RECORD LAYOUT

MASS TURNPIKE AUTHORITY

**AUSTIN STREET**  
(40' WIDE PUBLIC WAY)

**AUSTIN STREET**  
(40' WIDE PUBLIC WAY)

**LOWELL AVENUE**  
(60' WIDE PUBLIC WAY)

**LOWELL AVENUE**  
(60' WIDE PUBLIC WAY)

LIMIT OF WORK  
STA 400+50  
N2952774.1640  
E734221.5476

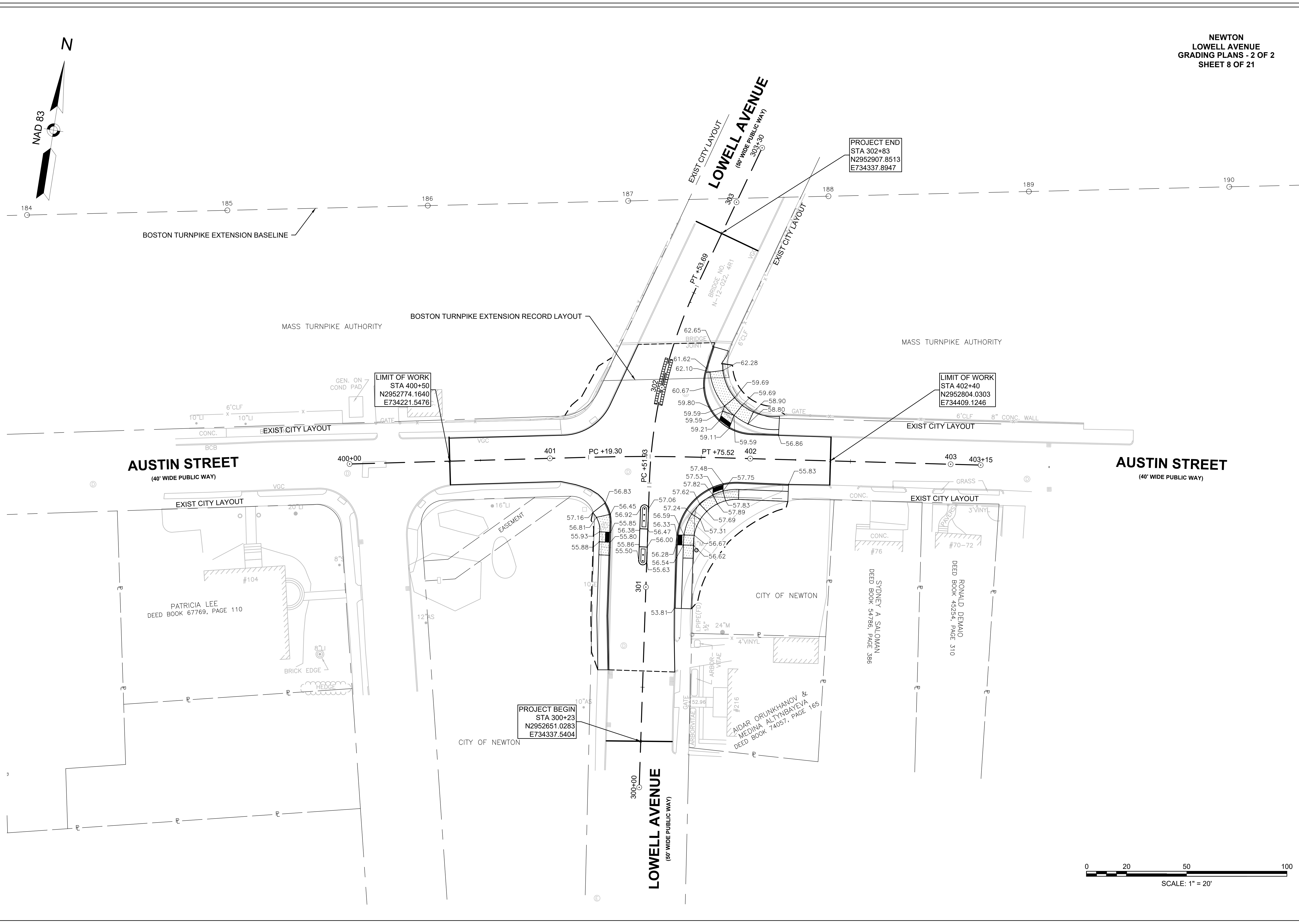
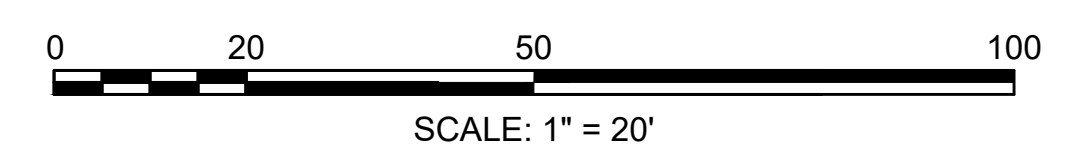
LIMIT OF WORK  
STA 402+40  
N2952804.0303  
E734409.1246

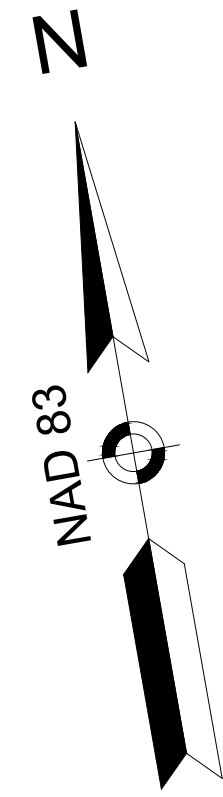
PROJECT BEGIN  
STA 300+23  
N2952651.0283  
E734337.5404

PROJECT END  
STA 302+83  
N2952907.8513  
E734337.8947

CITY OF NEWTON  
MASSACHUSETTS

DESIGNED BY: JFZ  
DESIGN DRAFTED BY: JFZ  
CHECKED BY: LSA  
APPROVED BY: JAR

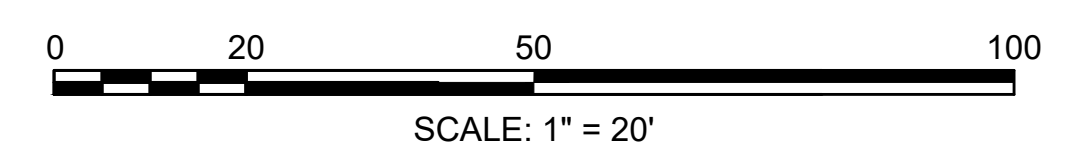
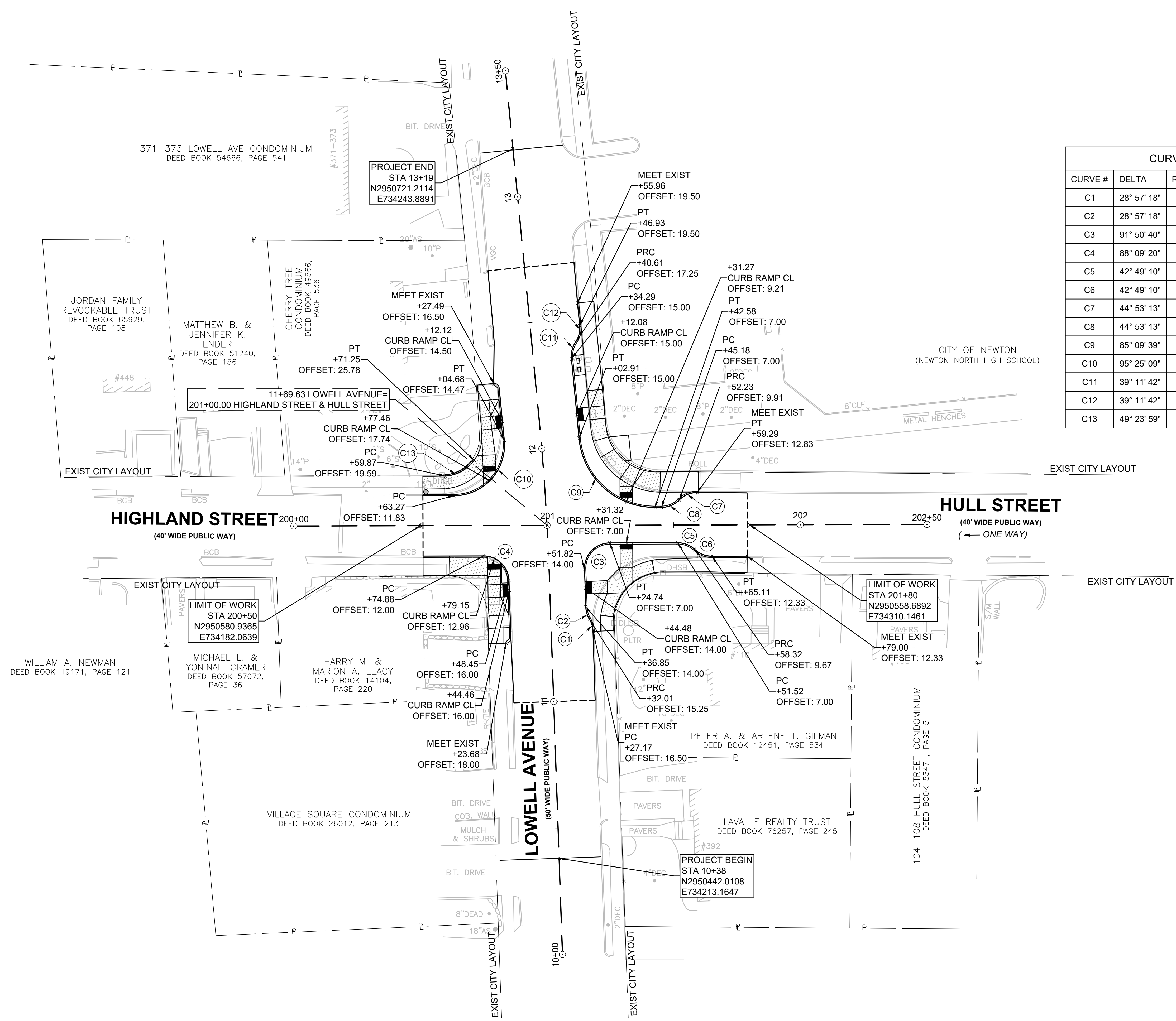


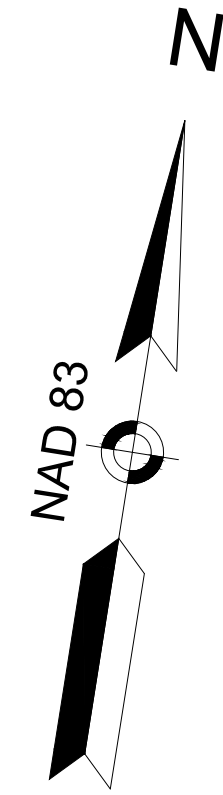


CURVE TABLE																													
CURVE #	DELTA	RADIUS	LENGTH	TANGENT																									
C1	28° 57' 18"	10.00	5.05	2.58																									
C2	28° 57' 18"	10.00	5.05	2.58																									
C3	91° 50' 40"	10.00	16.03	10.33																									
C4	88° 09' 20"	10.00	15.39	9.68																									
C5	42° 49' 10"	10.00	7.47	3.92																									
C6	42° 49' 10"	10.00	7.47	3.92																									
C7	44° 53' 13"	10.00	7.83	4.13																									
C8	44° 53' 13"	10.00	7.83	4.13 </tr <tr> <td>C9</td> <td>85° 09' 39"</td> <td>30.00</td> <td>44.59</td> <td>27.57</td> </tr> <tr> <td>C10</td> <td>95° 25' 09"</td> <td>20.00</td> <td>33.31</td> <td>21.99</td> </tr> <tr> <td>C11</td> <td>39° 11' 42"</td> <td>10.00</td> <td>6.84</td> <td>3.56</td> </tr> <tr> <td>C12</td> <td>39° 11' 42"</td> <td>10.00</td> <td>6.84</td> <td>3.56</td> </tr> <tr> <td>C13</td> <td>49° 23' 59"</td> <td>15.50</td> <td>13.36</td> <td>7.13</td> </tr>	C9	85° 09' 39"	30.00	44.59	27.57	C10	95° 25' 09"	20.00	33.31	21.99	C11	39° 11' 42"	10.00	6.84	3.56	C12	39° 11' 42"	10.00	6.84	3.56	C13	49° 23' 59"	15.50	13.36	7.13
C9	85° 09' 39"	30.00	44.59	27.57																									
C10	95° 25' 09"	20.00	33.31	21.99																									
C11	39° 11' 42"	10.00	6.84	3.56																									
C12	39° 11' 42"	10.00	6.84	3.56																									
C13	49° 23' 59"	15.50	13.36	7.13																									

CITY OF NEWTON  
MASSACHUSETTS

DESIGNED BY: JFZ  
DESIGN DRAFTED BY: JFZ  
CHECKED BY: LSA  
APPROVED BY: JAR





BOSTON TURNPIKE EXTENSION BASELINE

MASS TURNPIKE AUTHORITY

BOSTON TURNPIKE EXTENSION RECORD LAYOUT

301+65.21 LOWELL AVENUE=  
401+50.44 AUSTIN STREET

PROJECT END  
STA 302+83  
N2952907.8513  
E734337.8947

CURVE TABLE				
CURVE #	DELTA	RADIUS	LENGTH	TANGENT
C14	179° 59' 56"	2.00	6.28	197815.01
C15	90° 25' 57"	30.00	47.35	30.23
C16	19° 05' 55"	15.00	5.00	2.52
C17	15° 48' 24"	18.50	5.10	2.57
C18	180° 00' 06"	2.00	6.28	127976.61
C19	104° 36' 16"	25.00	45.64	32.35

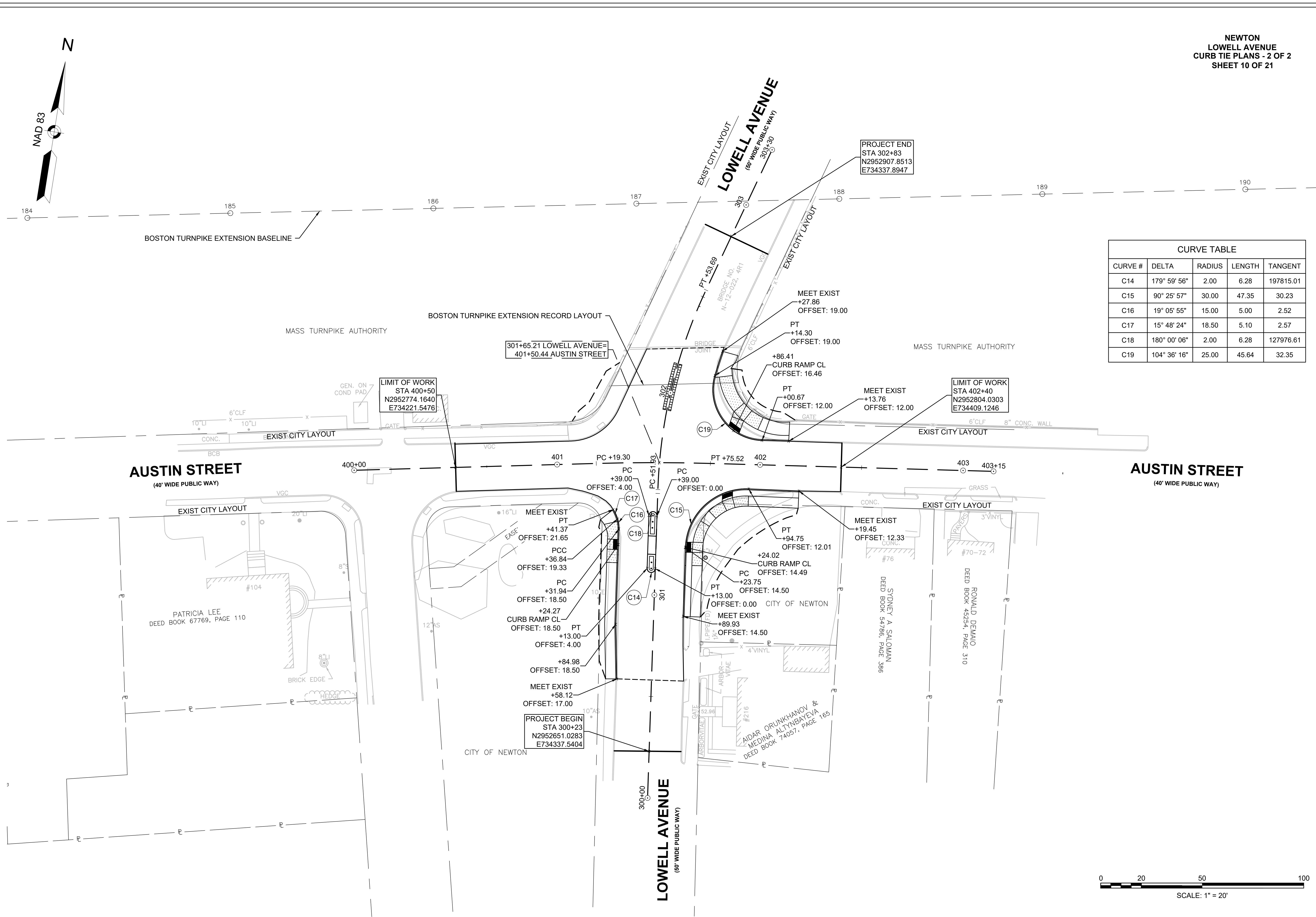
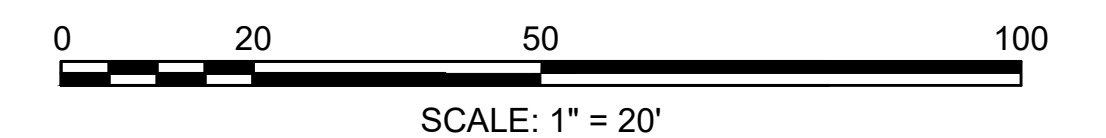
CITY OF NEWTON  
MASSACHUSETTS

AUSTIN STREET  
(40' WIDE PUBLIC WAY)

AUSTIN STREET  
(40' WIDE PUBLIC WAY)

LOWELL AVENUE  
(60' WIDE PUBLIC WAY)

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LIMIT OF WORK  
STA 400+50  
N2952774.1640  
E734221.5476

LIMIT OF WORK  
STA 402+40  
N2952804.0303  
E734409.1246

PROJECT BEGIN  
STA 300+23  
N2952651.0283  
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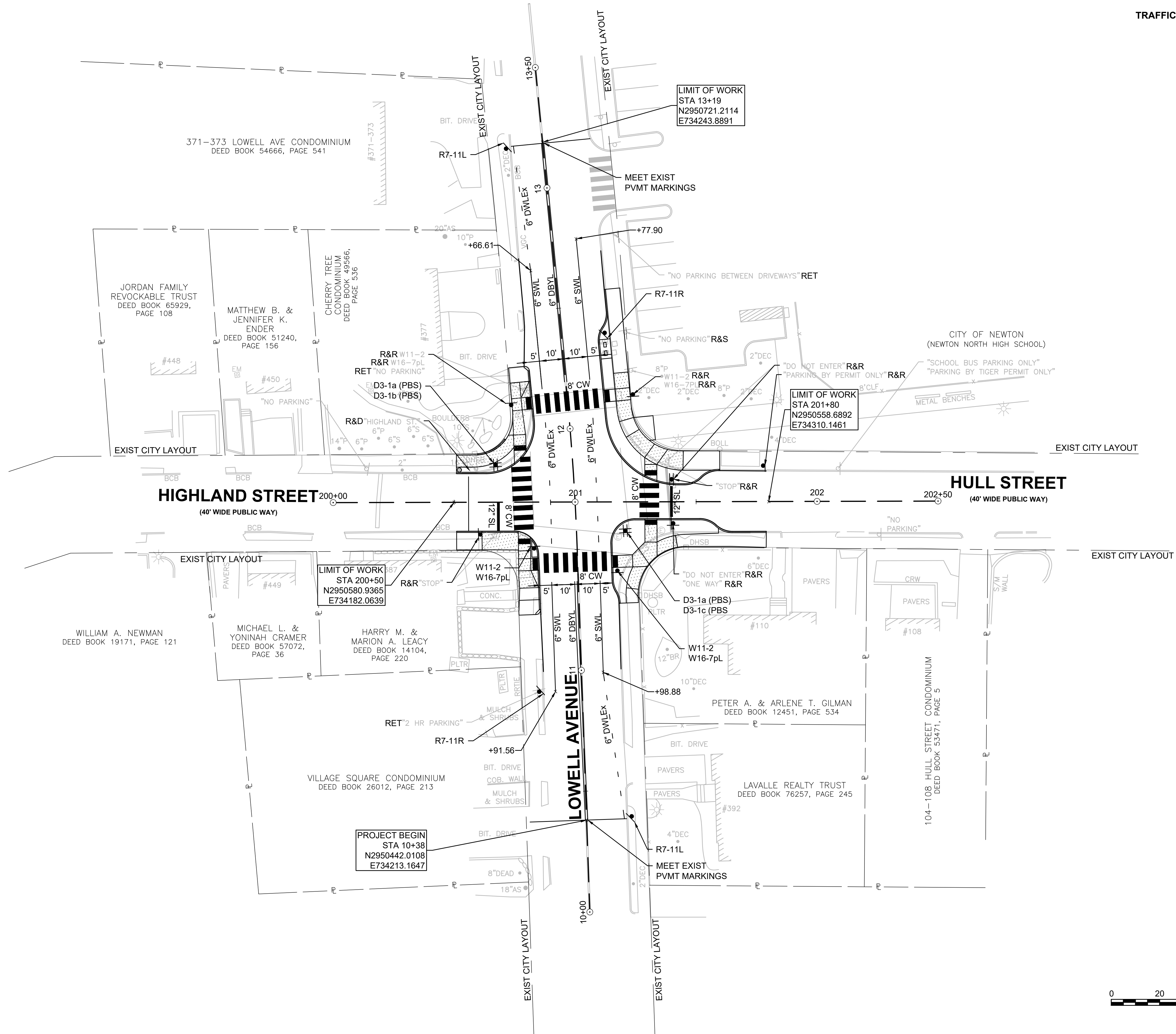
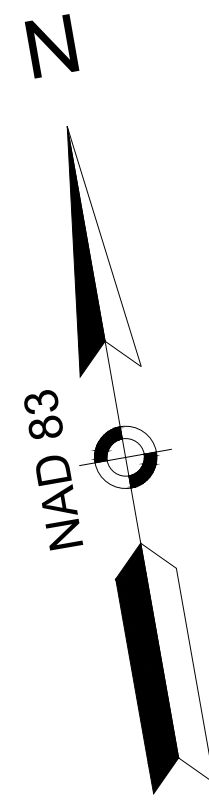
PATRICIA LEE  
DEED BOOK 67769, PAGE 110

SYDNEY A. SALOMAN  
DEED BOOK 54768, PAGE 386

RONALD DELMAIO  
DEED BOOK 45254, PAGE 310

AIDAR ORUNKHANOV &  
MEDINA ALTYNBAYEVA  
DEED BOOK 74057, PAGE 165





CITY OF NEWTON  
 MASSACHUSETTS

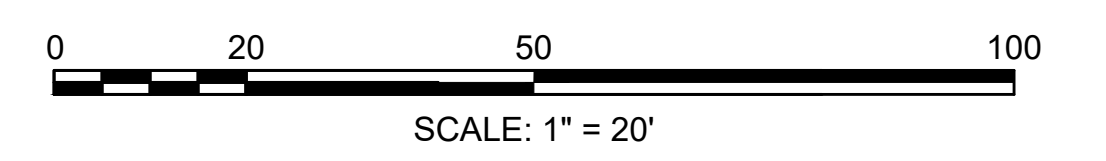
DESIGNED BY: JFZ  
 DESIGN DRAFTED BY: JFZ  
 CHECKED BY: LSA  
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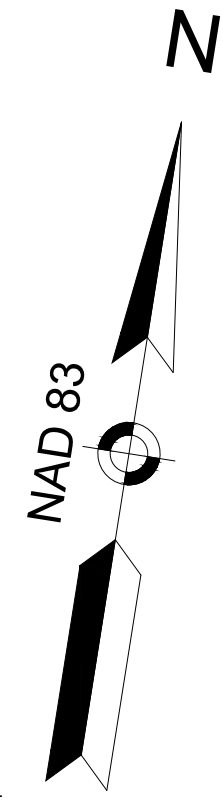
LIMIT OF WORK  
 STA 200+50  
 N2950580.9365  
 E734182.0639

PROJECT BEGIN  
 STA 10+38  
 N2950442.0108  
 E734213.1647

LIMIT OF WORK  
 STA 13+19  
 N2950721.2114  
 E734243.8891

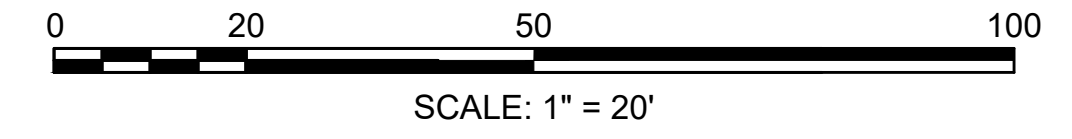
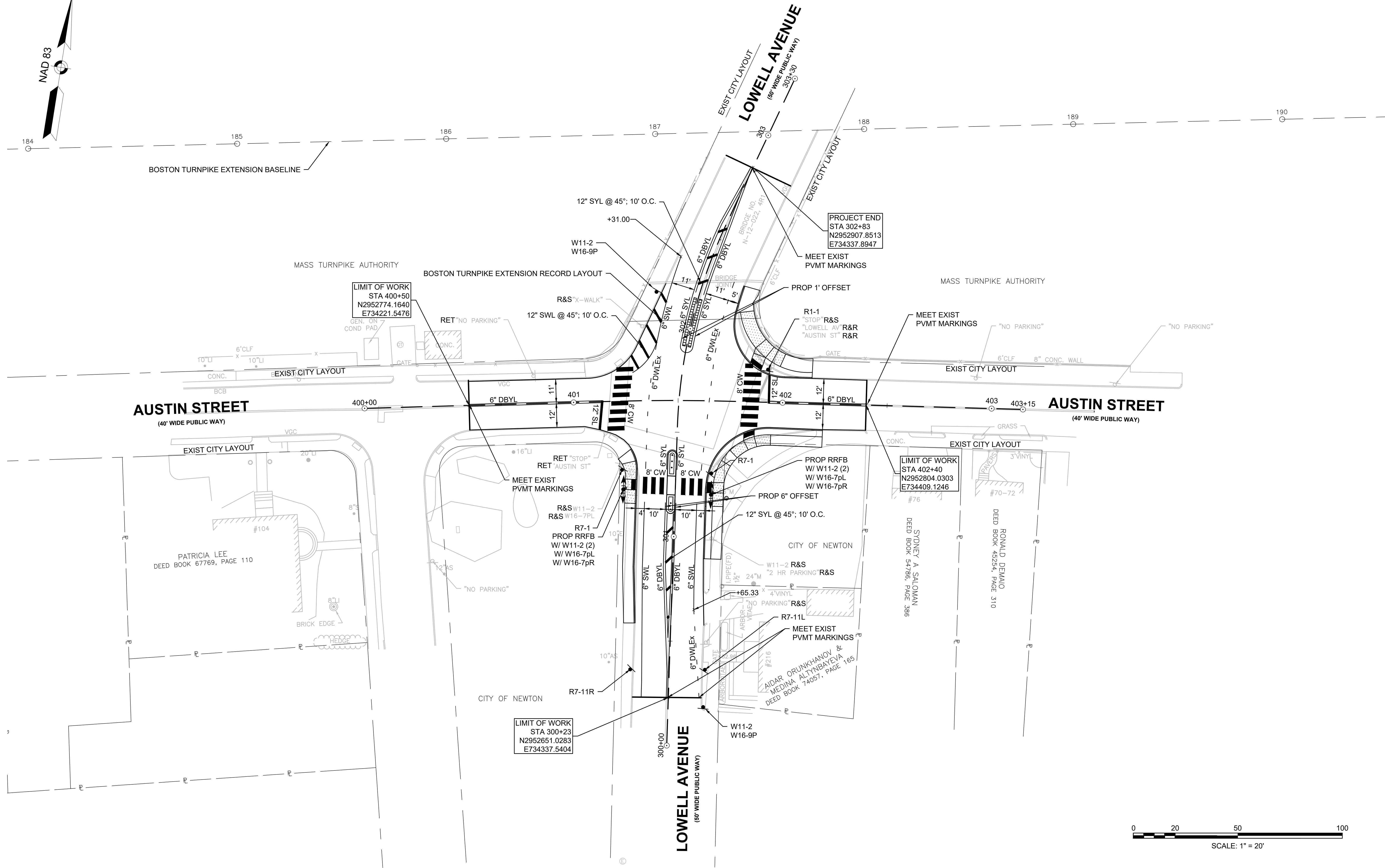
LIMIT OF WORK  
 STA 201+80  
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 E734310.1461






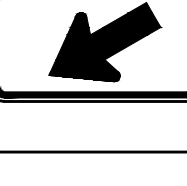






CITY OF NEWTON  
 MASSACHUSETTS

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 DESIGN DRAFTED BY: JFZ  
 CHECKED BY: LSA  
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TRAFFIC SIGN SUMMARY													
IDENTIFICATION NUMBER	SIZE OF SIGN (in)		LEGEND	TEXT DIMENSIONS (in)			NUMBER OF SIGNS REQUIRED	COLOR			NUMBER OF P-5 POSTS REQUIRED	UNIT AREA (SF)	TOTAL AREA (SF)
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING	ARROW RTE. MKR		BACK-GROUND	LEGEND	BORDER			
R1-1	30	30			①		1	RED	WHITE	WHITE	1	6.25	6.25
R7-1	12	18					2	WHITE	RED	RED	2	1.50	3.00
R7-11L	12	18					3	WHITE	RED	RED	3	1.50	4.50
R7-11R	12	18					3	WHITE	RED	RED	3	1.50	4.50
W11-2	30	30					4	FL. YELLOW-GREEN	BLACK	BLACK	4	6.25	25.00
							4	FL. YELLOW-GREEN	BLACK	BLACK	0 MOUNT ON RRFB	PAID UNDER ITEM 824.221	
W16-7pL	24	12					2	FL. YELLOW-GREEN	BLACK	BLACK	2	2.00	4.00
							2	FL. YELLOW-GREEN	BLACK	BLACK	0 MOUNT ON RRFB	PAID UNDER ITEM 824.221	
W16-7pR	24	12					2	FL. YELLOW-GREEN	BLACK	BLACK	2	2.00	4.00
							2	FL. YELLOW-GREEN	BLACK	BLACK	0 MOUNT ON RRFB	PAID UNDER ITEM 824.221	
W16-9p	24	12					2	FL. YELLOW-GREEN	BLACK	BLACK	2	2.00	4.00

STREET NAME SIGN SUMMARY													
IDENTIFICATION NUMBER	SIZE OF SIGN (in)		LEGEND	TEXT DIMENSIONS (in)			NUMBER OF SIGNS REQUIRED	COLOR			SIZE AND NUMBER OF POSTS REQUIRED	UNIT AREA (SF)	TOTAL AREA (SF)
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING	ARROW RTE. MKR		BACK-GROUND	LEGEND	BORDER			
D3-1a (PBS)	36	12	SEE BELOW	6B / 4B	3 3	N/A	2	GREEN	WHITE	WHITE	2	PAID UNDER ITEM 874.	
D3-1b (PBS)	39	12	SEE BELOW	6B / 4B	2.75 3.25	N/A	1	GREEN	WHITE	WHITE	0 MOUNT W/ D3-1a	PAID UNDER ITEM 874.	
D3-1c (PBS)	27	12	SEE BELOW	6B / 4B	3 3	N/A	1	GREEN	WHITE	WHITE	0 MOUNT W/ D3-1a	PAID UNDER ITEM 874.	



D3-1a



D3-1b

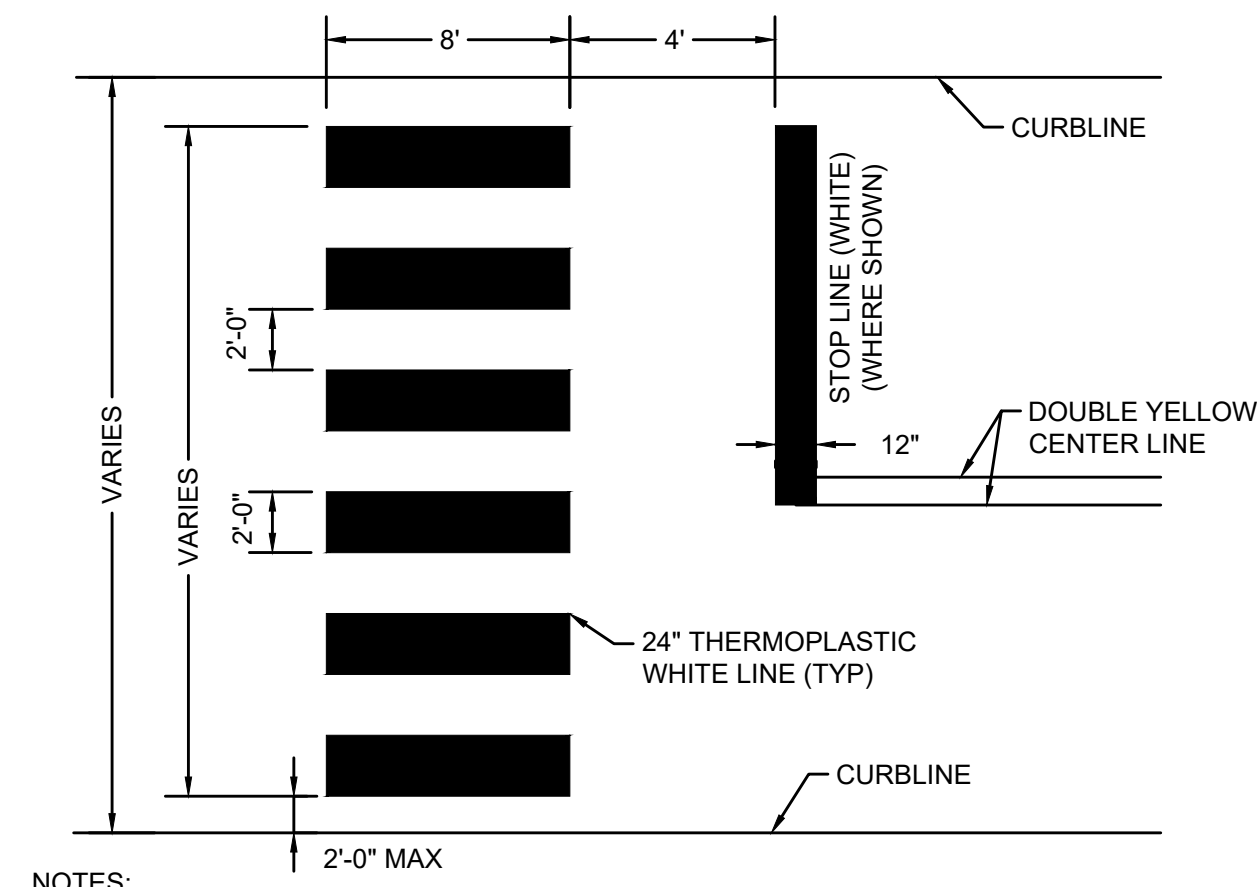


D3-1c

**NOTES:**

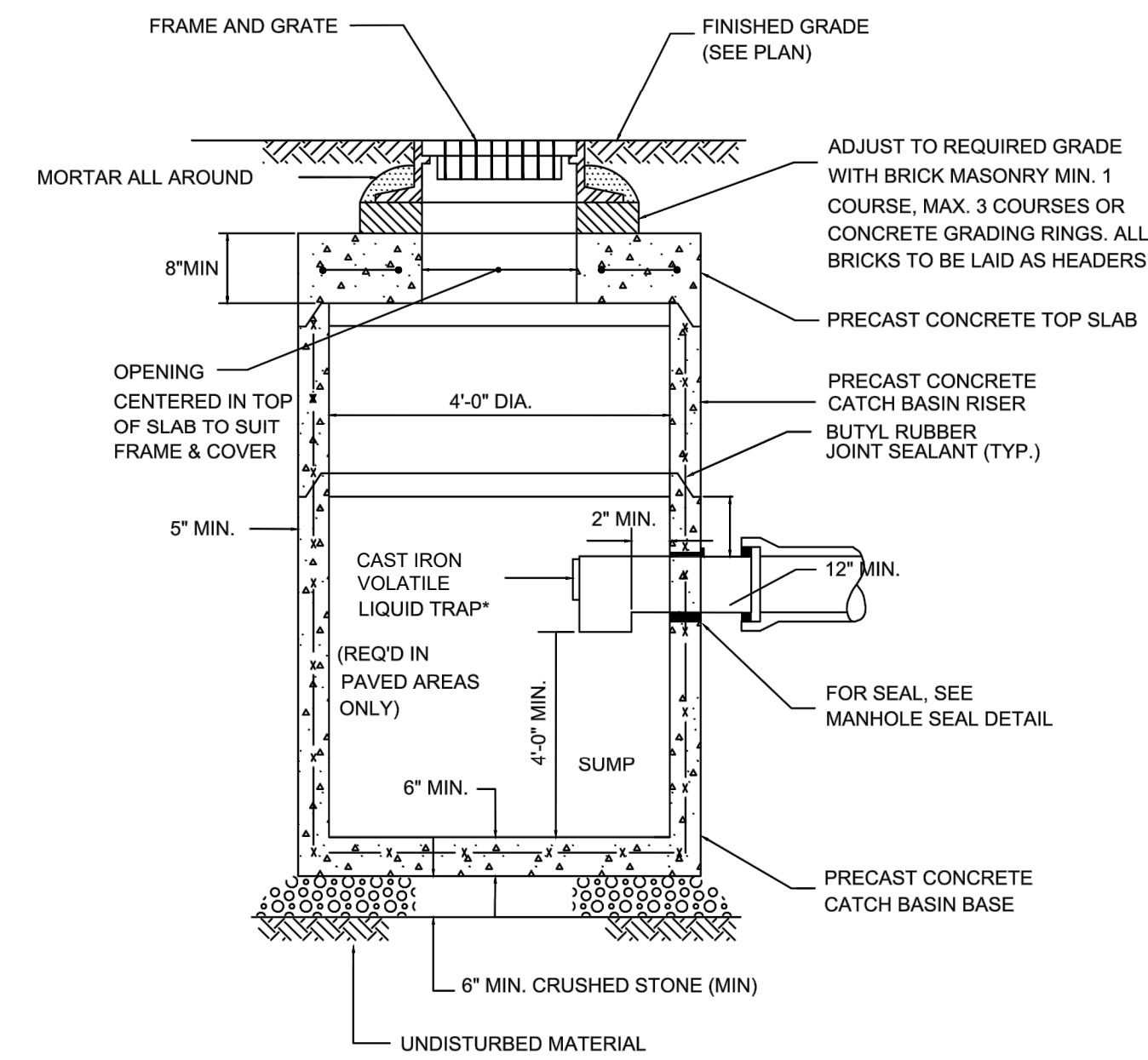
- ① SEE 2009 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS FOR TEXT AND LEGEND DIMENSIONS.
2. THE MINIMUM MOUNTING HEIGHT OF POST-MOUNTED SIGNS, MEASURED VERTICALLY FROM THE BOTTOM OF THE SIGN TO THE TOP OF CURB OR SIDEWALK, OR THE ELEVATION OF THE NEAR EDGE OF TRAVEL WAY, SHALL BE 7 FEET UNLESS OTHERWISE SPECIFIED.
3. A MINIMUM OF 3'-0" PATH OF TRAVEL CLEARANCE, EXCLUDING CURB, IS REQUIRED WHEN PLACING SIGNS.
4. ALL SIGN POSTS SHALL BE PAINTED BLACK.





NOTES:  
1. ALL 12" LINES SHALL BE APPLIED IN ONE APPLICATION. NO COMBINATION OF LINES (TWO - 6" LINES) WILL BE ACCEPTED. ALL 24" LINES MAY BE EITHER ONE 24" LINE OR A COMBINATION OF TWO - 12" LINES.  
2. LAYOUT OF CROSSWALKS SHALL BE APPROVED BY THE ENGINEER PRIOR TO APPLICATION.  
3. CROSSWALK BARS SHALL BE PLACED OUTSIDE THE VEHICULAR WHEEL PATH WHEREVER POSSIBLE.

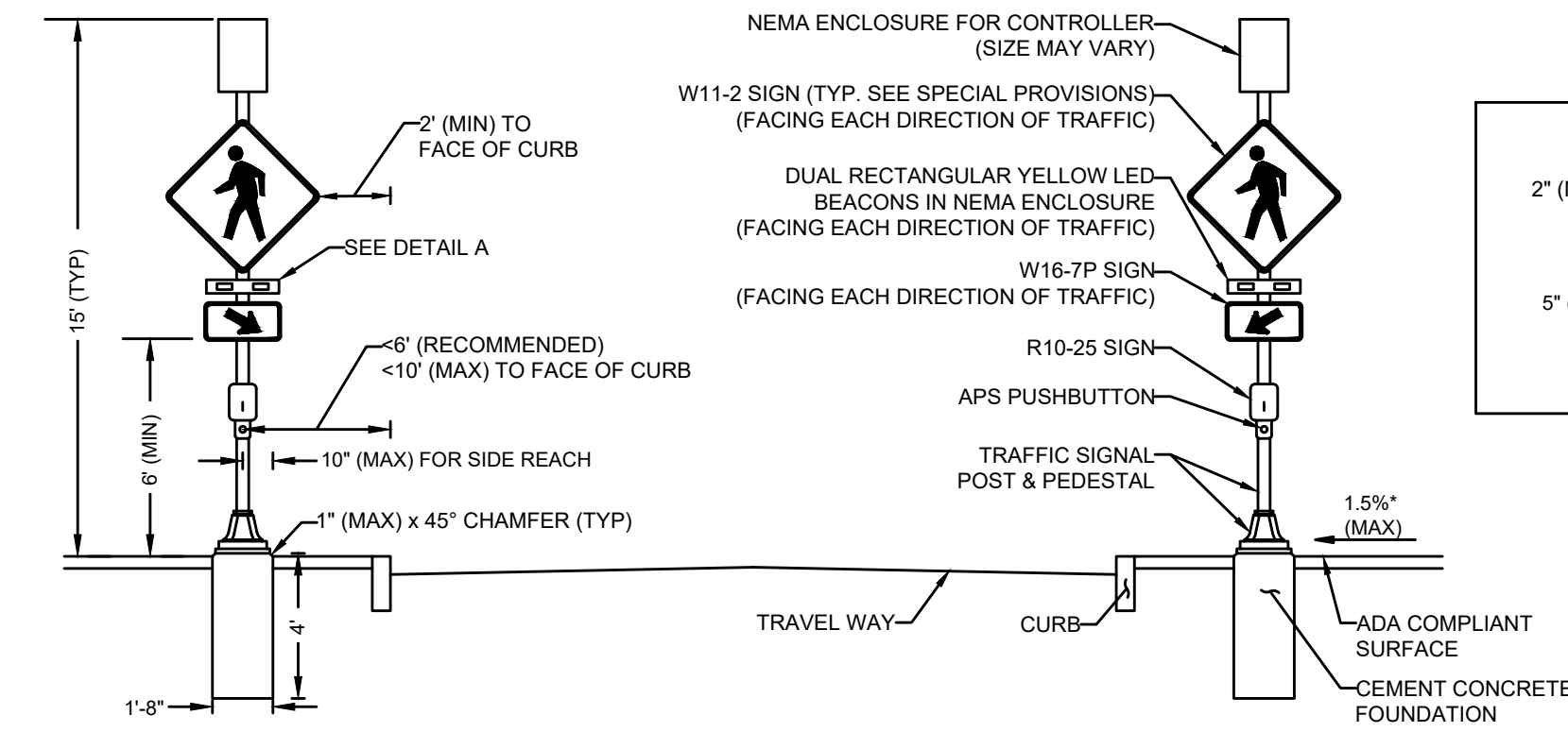
**CROSSWALK PAVEMENT MARKING**  
N.T.S.



NOTE:  
1. STEEL REINFORCING TO MEET OR EXCEED H20 LOADING.  
2. TOP SLAB SHALL BE CONCENTRIC WHEN NO CURBING IS USED ECCENTRIC WHEN CURBING IS USED.

\*GAS TRAP SHALL BE NEEHAH R-3705 OR APPROVED EQUAL.

**DEEP SUMP CATCH BASIN**  
N.T.S.

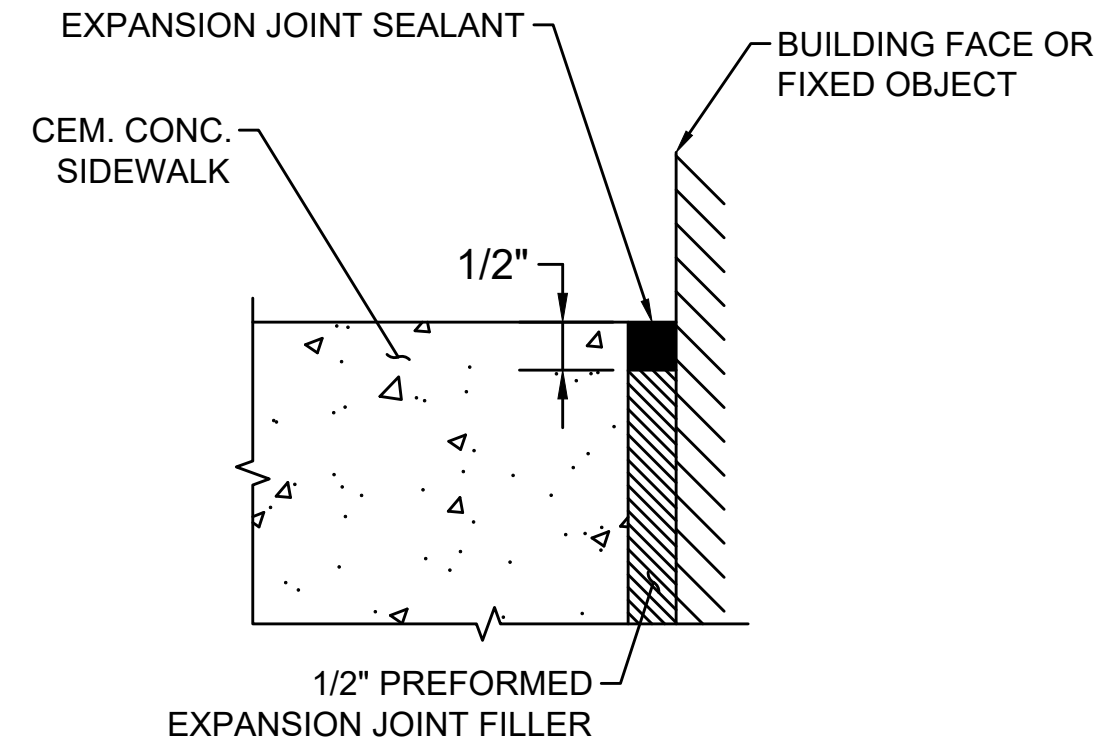


NOTES:  
1. CROSSWALK AND ADA-COMPLIANT RAMPS NOT SHOWN. SEE PLANS FOR LOCATIONS.  
2. REFER TO THE SPECIAL PROVISIONS FOR SIGN DIMENSIONS.  
3. ALL CONDUIT, PULL BOXES, AND EQUIPMENT GROUNDING REQUIRED FOR AC POWER IS NOT SHOWN IN THIS DETAIL AND SHALL BE PAID FOR SEPARATELY UNDER THEIR RESPECTIVE PAY ITEMS.  
4. ACCESS TO ALL PEDESTRIAN ACTUATED CONTROLS SHALL BE ADA/AAB COMPLIANT.  
5. \*0.5% CONSTRUCTION TOLERANCE FOR CROSS-SLOPE.

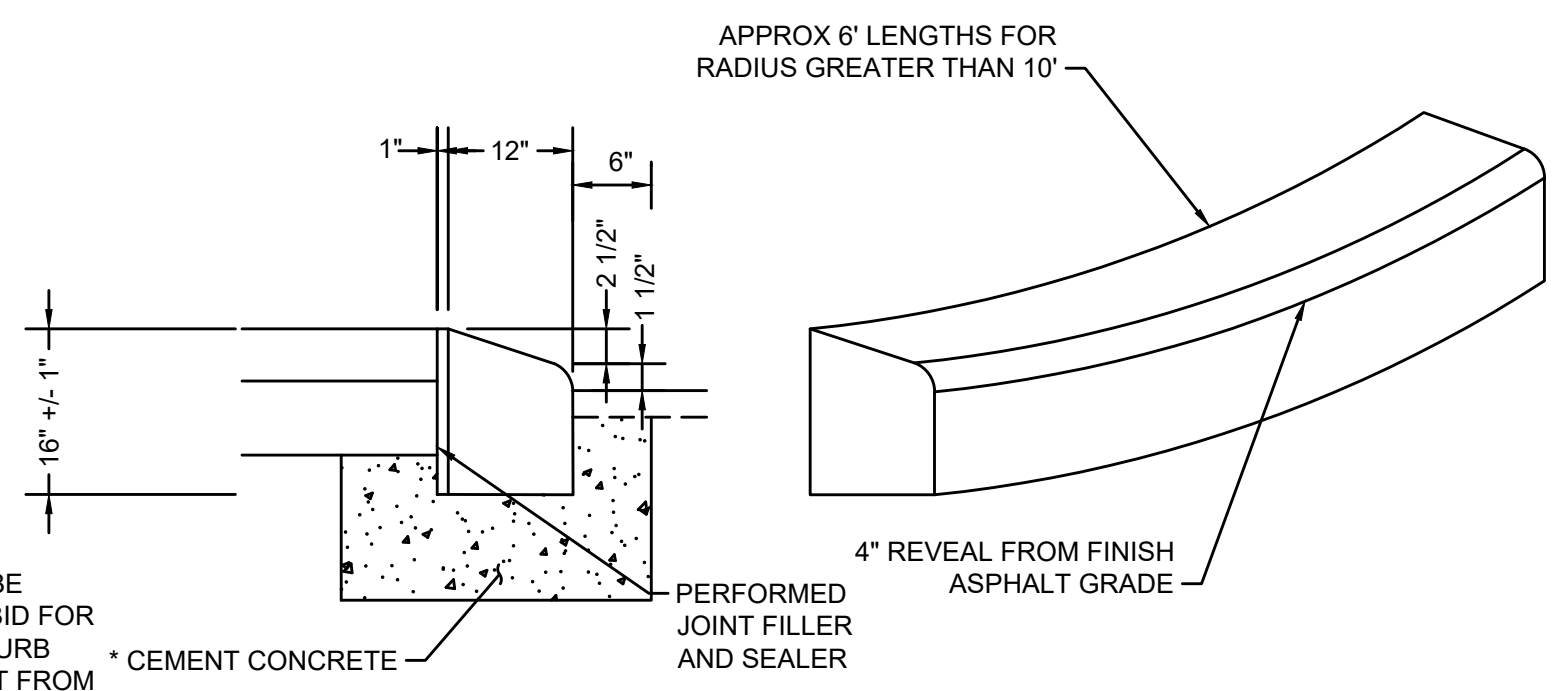
**MAJOR ITEMS LIST**  
2 CEMENT CONCRETE FOUNDATIONS PER 812.30.1  
2 15' TRAFFIC SIGNAL POSTS & PEDESTALS  
2 APS PUSHBUTTON SYSTEMS  
4 DUAL RECTANGULAR YELLOW LED BEACONS IN NEMA ENCLOSURES  
2 R10-25 SIGNS  
4 W11-2 SIGNS  
2 W16-7pL SIGNS  
2 W16-7pR SIGNS  
2 NEMA ENCLOSURES FOR ALL COMPONENTS NEEDED TO MEET FUNCTIONAL REQUIREMENTS PER SPECIAL PROVISIONS  
1 AC-POWER SERVICE CONNECTION

PLUS ALL MOUNTING AND SUPPORTING HARDWARE AND WIRING NECESSARY TO COMPLETE A WORKING SYSTEM.

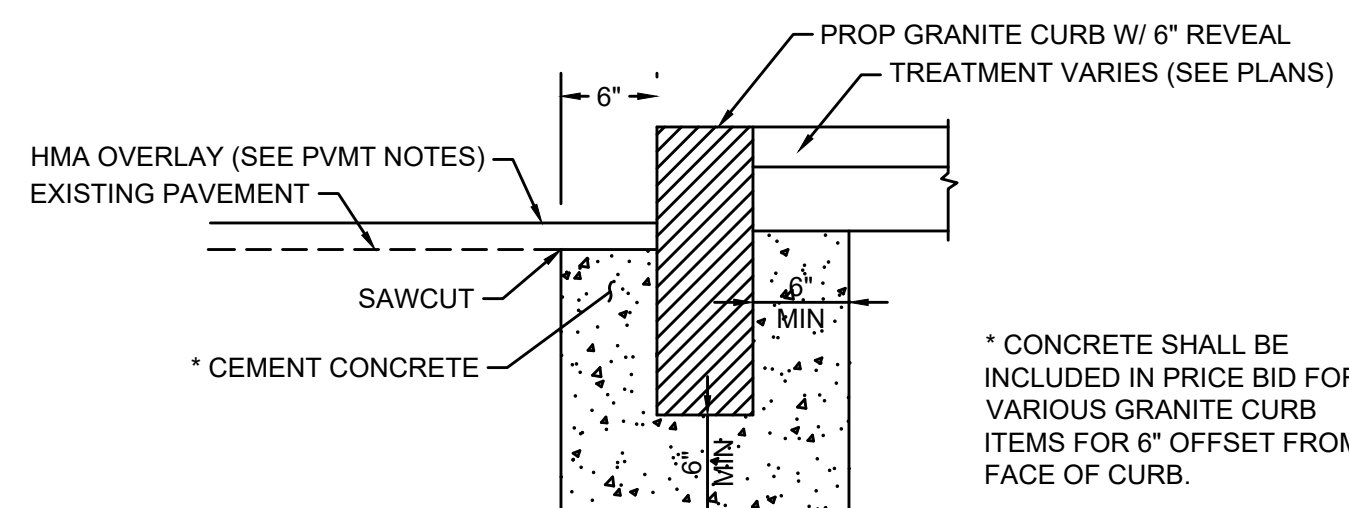
**RECTANGULAR RAPID FLASHING BEACON (RRFB), AC POWER**  
N.T.S.



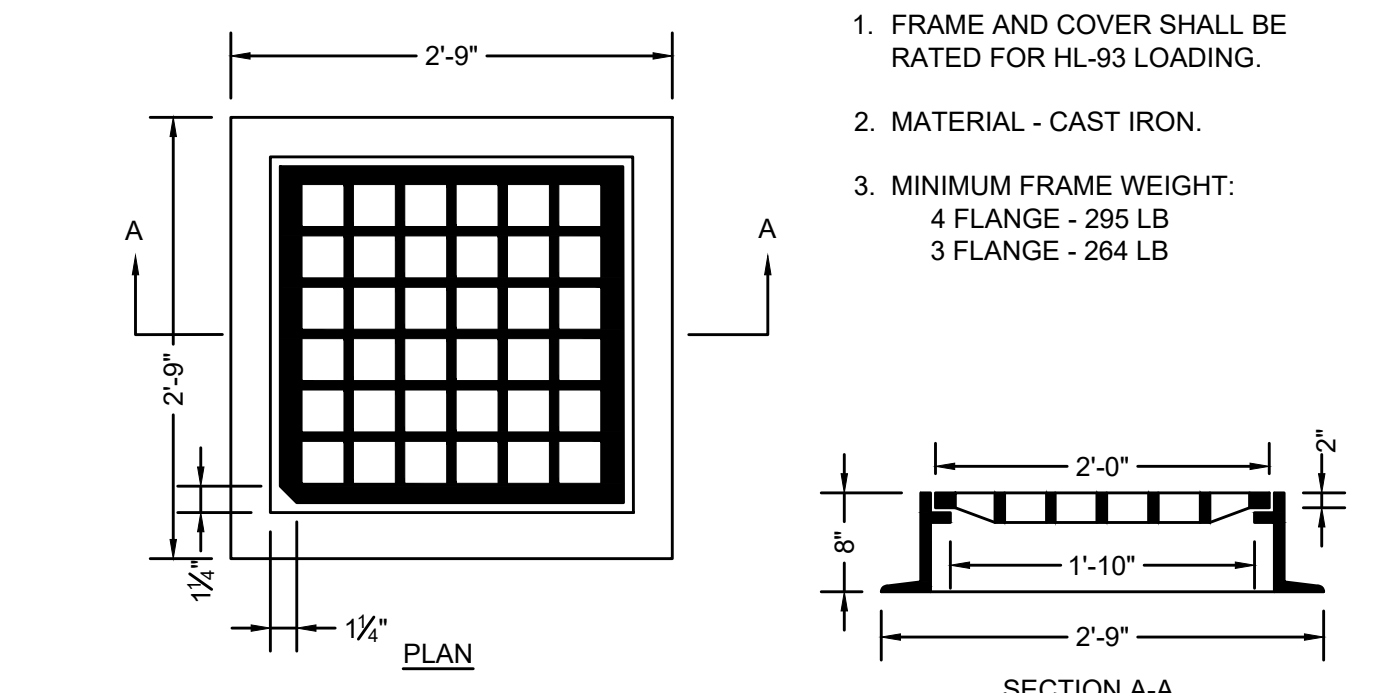
**PREFORMED EXPANSION JOINT FILLER**  
N.T.S.



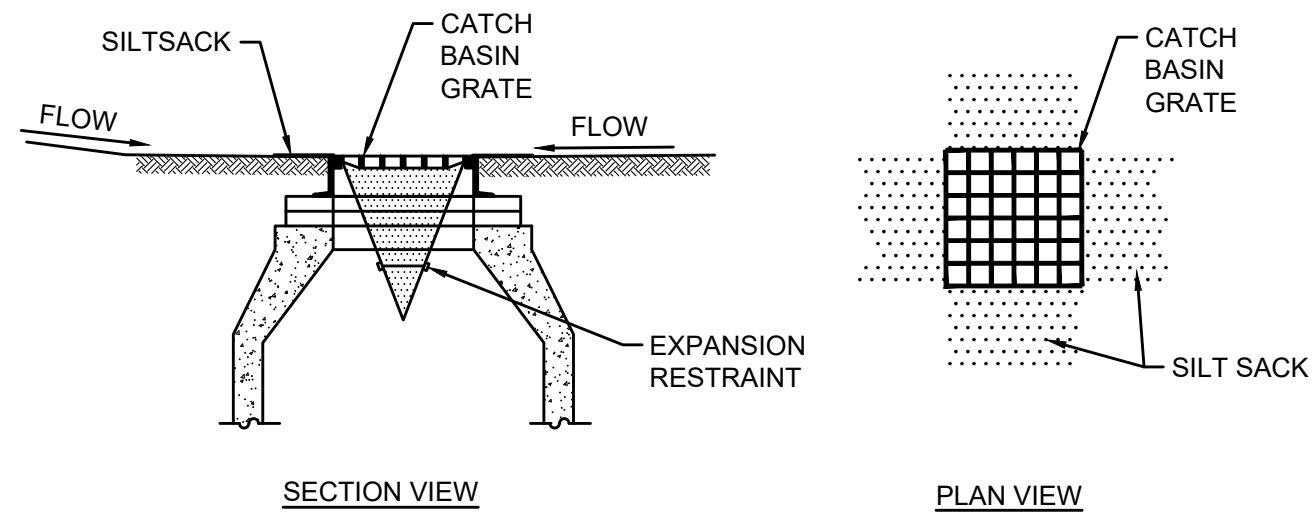
**GRANITE CURB TRAVERSABLE TYPE T-100 MODIFIED**  
N.T.S.



**GRANITE CURB IN EXISTING PAVEMENT WITH HMA OVERLAY**  
N.T.S.

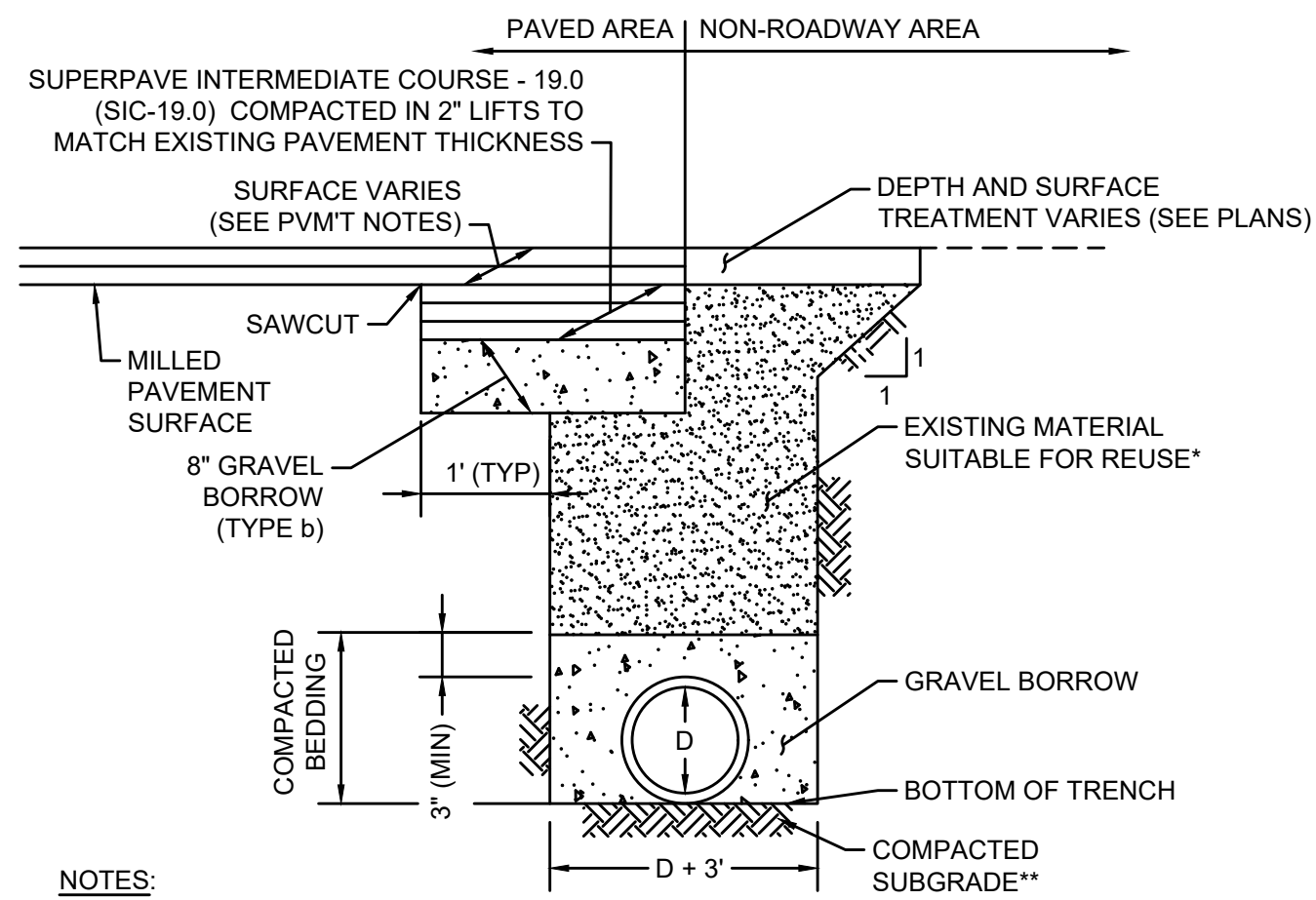


**CATCH BASIN FRAME & GRATE (MUNICIPAL STANDARD)**  
N.T.S.



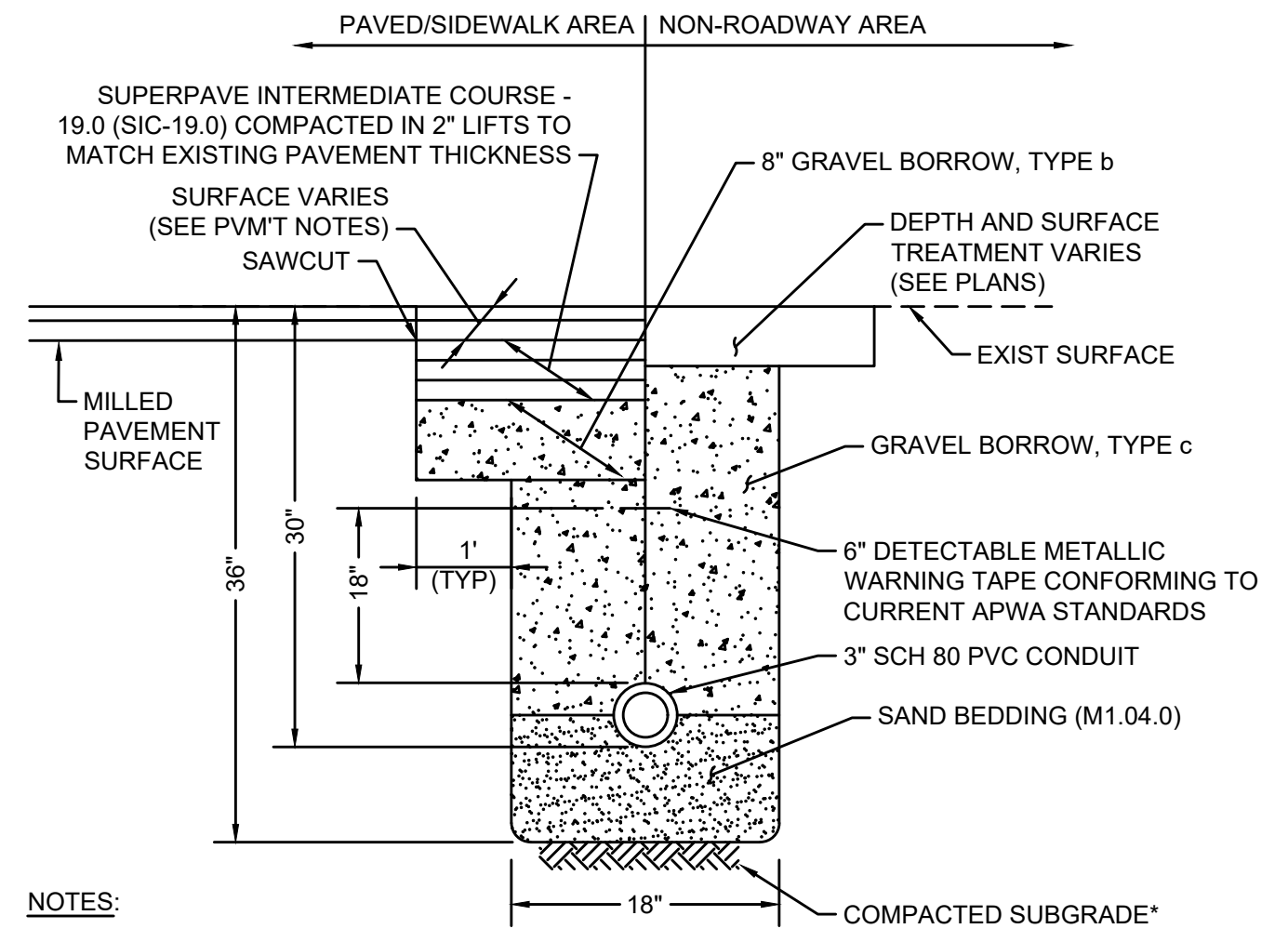
NOTES:  
1. INSTALL SILT SACK IN EXISTING CATCH BASINS BEFORE COMMENCING WORK, AND IN NEW CATCH BASINS IMMEDIATELY AFTER INSTALLATION OF STRUCTURE. MAINTAIN UNTIL BINDER COURSE PAVING IS COMPLETE OR A PERMANENT STAND OF GRASS HAS BEEN ESTABLISHED.  
2. GRATE TO BE PLACED OVER SILT SACK.  
3. SILT SACK SHALL BE INSPECTED PERIODICALLY AND AFTER ALL STORM EVENTS AND CLEANING OR REPLACEMENT SHALL BE PERFORMED PROMPTLY AS NEEDED.

**INLET PROTECTION SILT SACK IN CATCH BASIN**  
N.T.S.



NOTES:  
\* EXISTING MATERIAL OBTAINED FROM EXCAVATION THAT IS DETERMINED TO BE SUITABLE, AND APPROVED BY THE ENGINEER SHALL BE USED. BACKFILL SHALL BE PLACED IN LAYERS NO MORE THAN 6" IN DEPTH AND THOROUGHLY COMPACTED. BACKFILLING TO A POINT 2' OVER THE PIPE SHALL CONTAIN NO STONES LARGER THAN 3".  
\*\*SOFT OR UNSUITABLE MATERIAL EXISTING BELOW THE REQUIRED BEDDING GRADE SHALL BE REMOVED AS DIRECTED AND REPLACED WITH SAND, GRAVEL, CRUSHED STONE OR OTHER SUITABLE MATERIAL AND THOROUGHLY COMPACTED.

**UTILITY TRENCH**  
N.T.S.

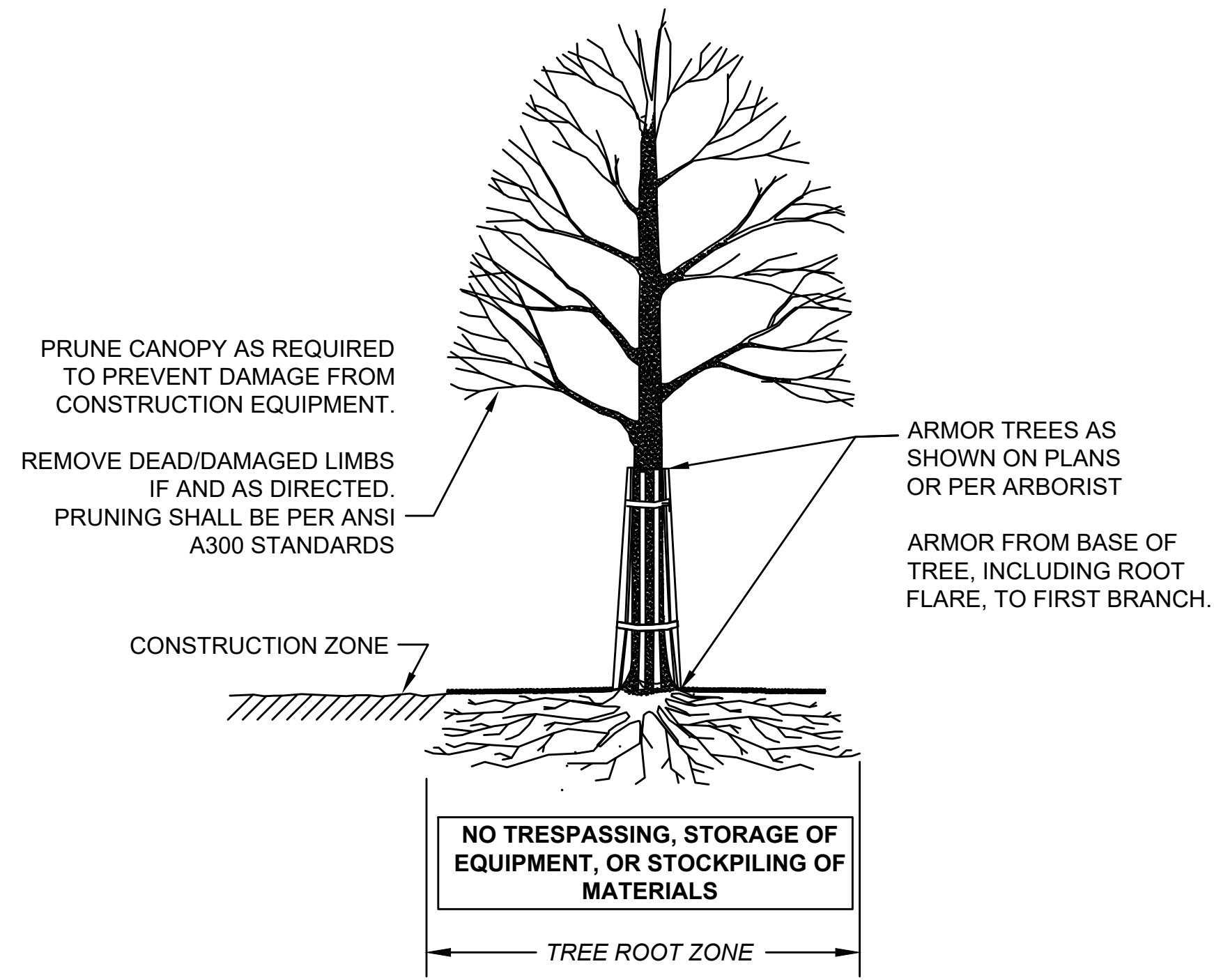


NOTES:  
\* SOFT OR UNSUITABLE MATERIAL EXISTING BELOW THE REQUIRED BEDDING GRADE SHALL BE REMOVED AS DIRECTED AND REPLACED WITH SAND, GRAVEL, CRUSHED STONE OR OTHER SUITABLE MATERIAL AND THOROUGHLY COMPACTED.

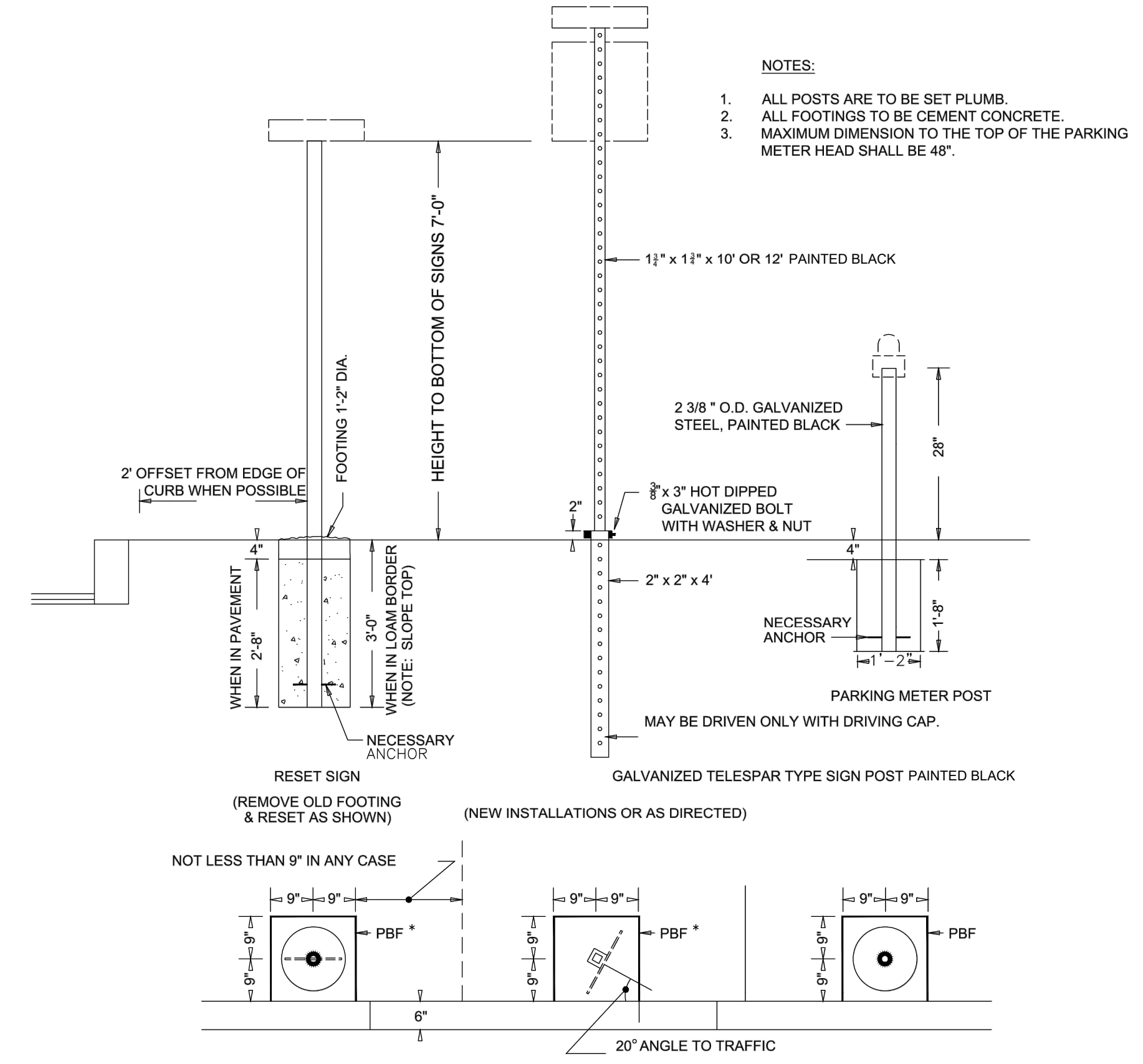
**CONDUIT TRENCH**  
N.T.S.

CITY OF NEWTON  
MASSACHUSETTS

DESIGNED BY: JFZ  
CHECKED BY: JSA  
APPROVED BY: JAR

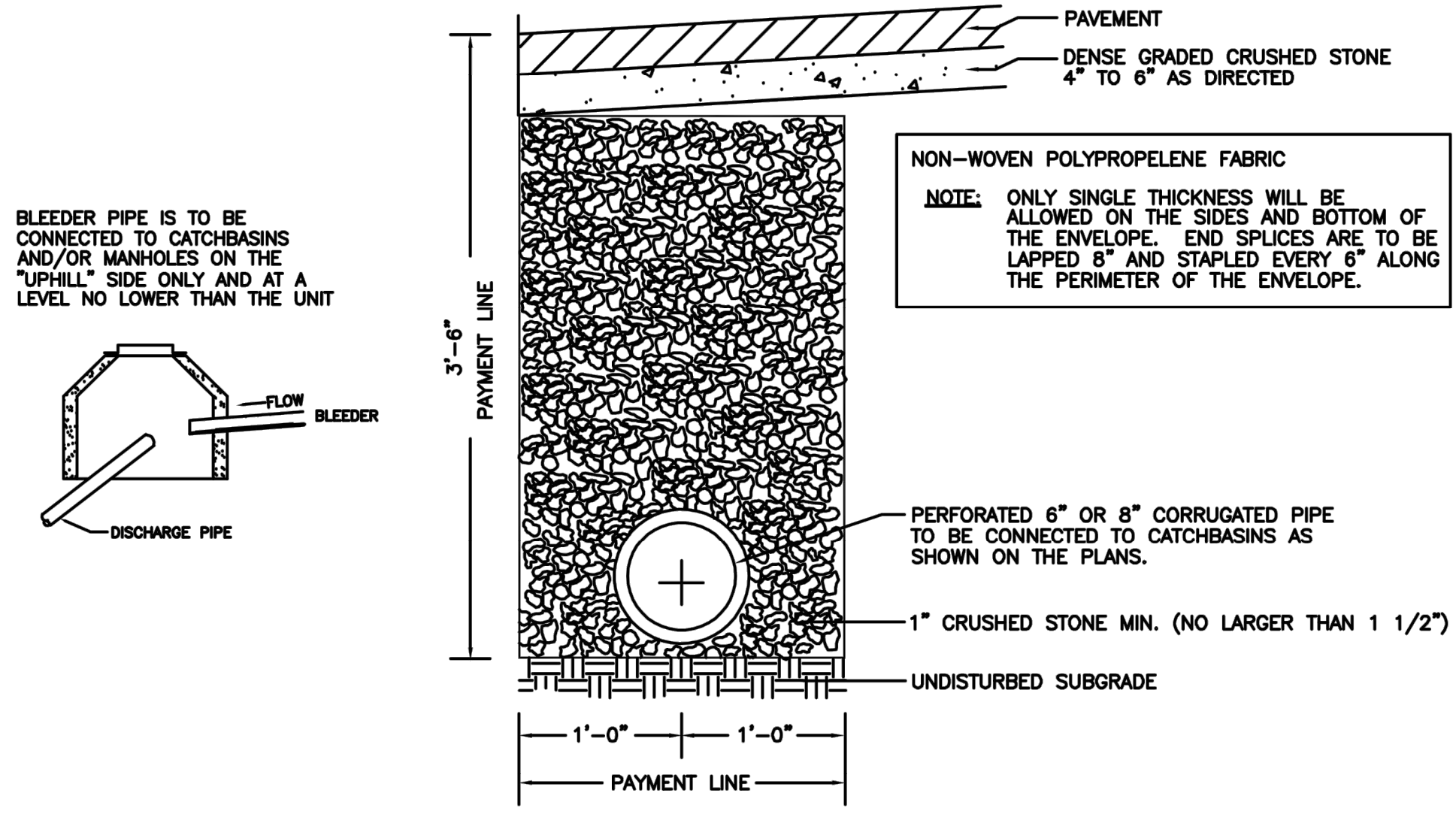


SECTION - TRUNK ARMORING & PRUNING  
TREE PROTECTION - TRUNK  
N.T.S.

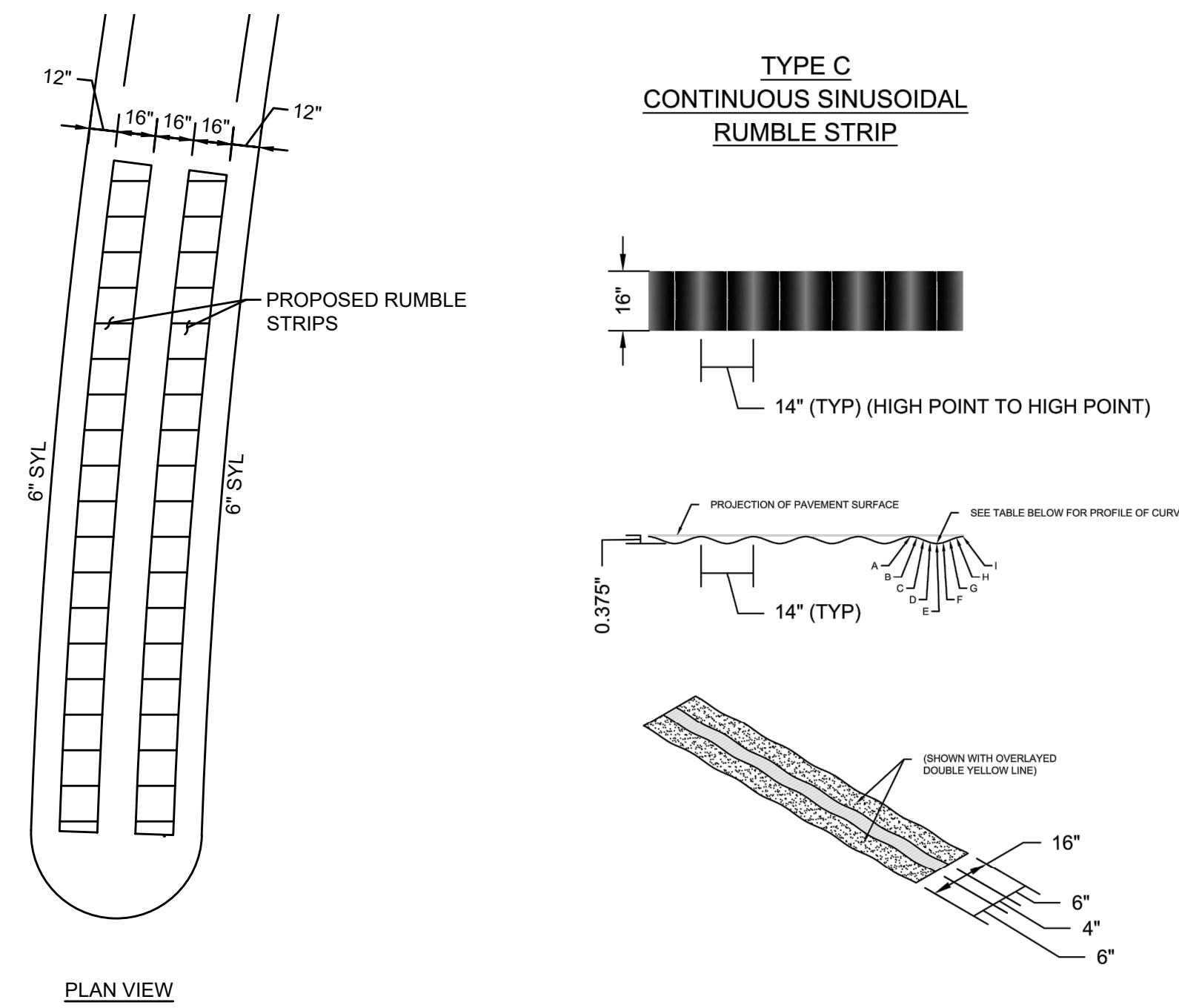


- NOTES:
- MIN. 0.91 GA. EXTRUDED ALUMINUM SIGN BLADE WITH HIGH INTENSITY SHEETING (GREEN BACKGROUND WITH 4" MIN SILVER COPY AND 3/8" SILVER BORDER.)
  - EACH SIGN SHALL HAVE LEGEND ON BOTH SIDES.
  - POSTS SHALL HAVE A MIN. 0.64" WALL ON BOTH SIDES
  - WHEN APPLICABLE: STREET SIGNS ARE REQUIRED TO BE INSTALLED BY THE DEVELOPER, FOLLOWING THE INSTALLATION OF THE BASE COURSE OF THE ROADWAY.
  - ALL SIGNS SHALL BE MAINTAINED BY THE DEVELOPER OR CONTRACTOR UNTIL ALL WAYS ARE ACCEPTED BY THE CITY.
  - ALL POSTS ARE TO BE SET PLUMB.
  - ALL FOOTINGS ARE TO BE CEMENT CONCRETE CLASS B MIN.
  - ALL SIGN POSTS SHALL BE PAINTED BLACK.

SIGN & METER POSTS  
N.T.S.



TYPICAL UNDERDRAIN AND HEADWALL  
N.T.S.



DESIGN OF CURVE PROFILE FOR SINUSOIDAL RUMBLE STRIP

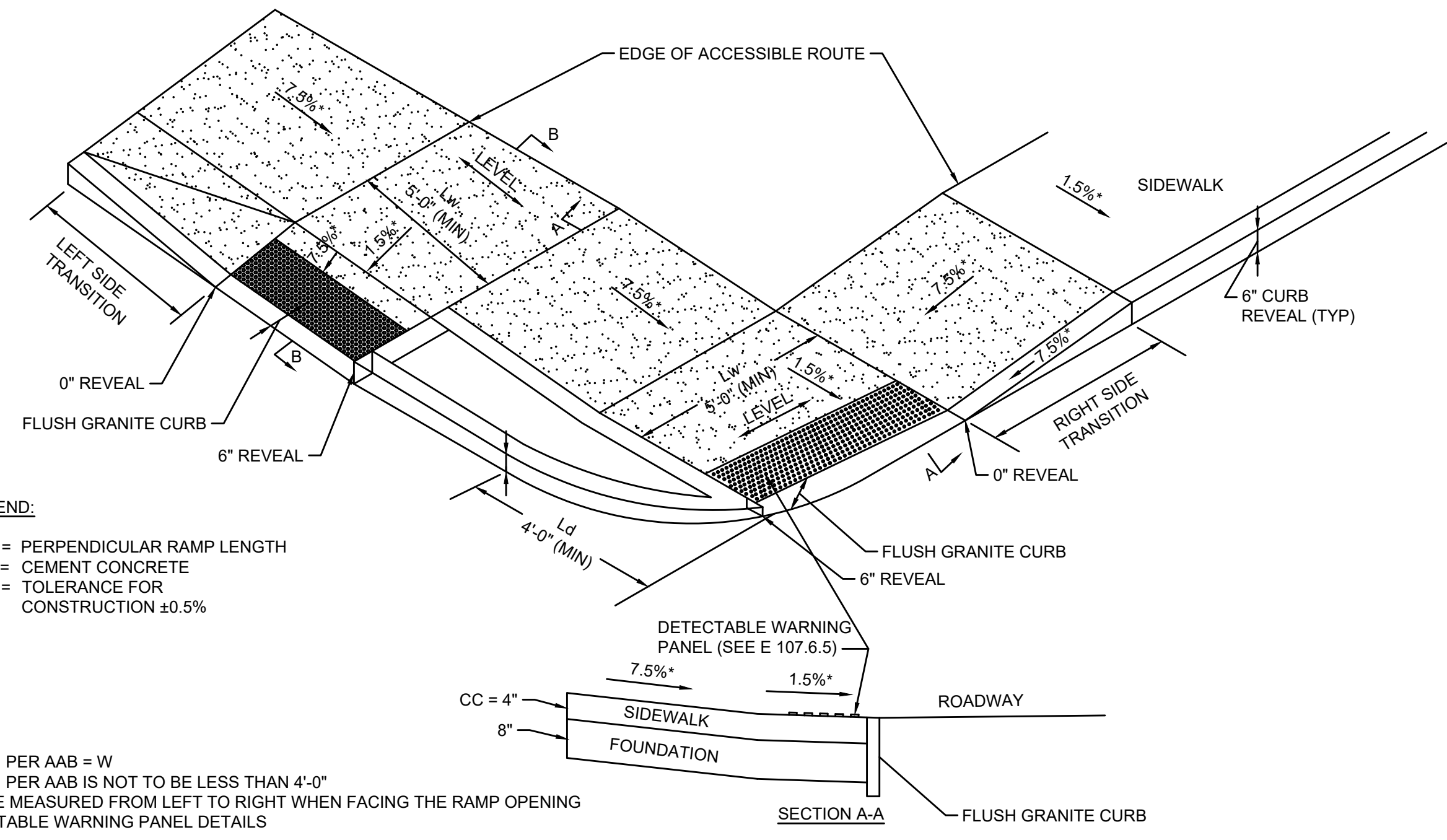
POINT	A	B	C	D	E	F	G	H	I
DEPTH FROM PAVEMENT SURFACE (IN.)	1/16	1/8	7/32	11/32	3/8	11/32	7/32	1/8	1/16
DISTANCE FROM HIGH POINT "A" (IN.)	0	1.75	3.5	5.25	7	8.75	10.5	12.25	14

RUMBLE STRIP  
N.T.S.

- NOTES:
- NOT TO SCALE. SOME LINE WORK EXAGGERATED FOR CLARITY.
  - SEE PLANS FOR LOCATION(S) AND START AND END STATIONS FOR ALL RUMBLE STRIP INSTALLATIONS.
  - HIGH POINT OF SINUSOIDAL RUMBLE STRIP LOCATED 1/16" BELOW PAVEMENT SURFACE.

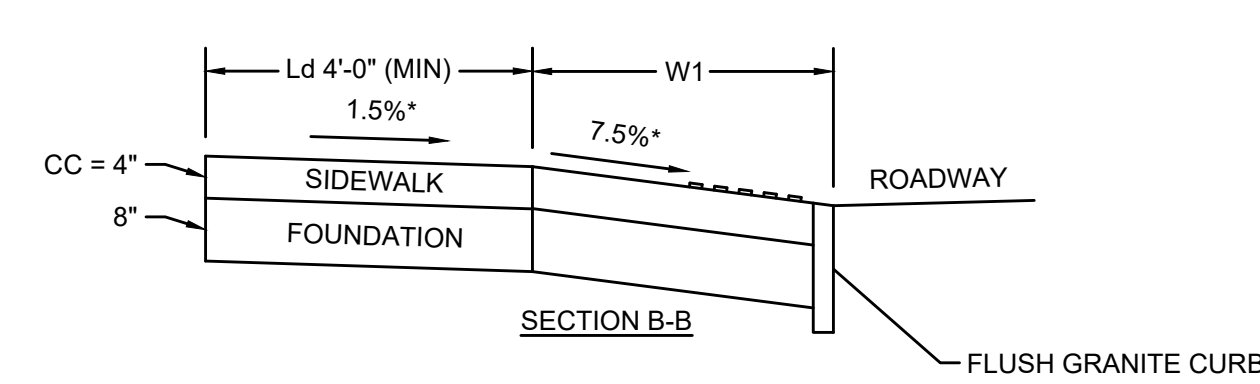
CITY OF NEWTON  
MASSACHUSETTS

DESIGNED BY: JFZ  
DESIGN DRAFTED BY: JFZ  
CHECKED BY: LSA  
APPROVED BY: JAR



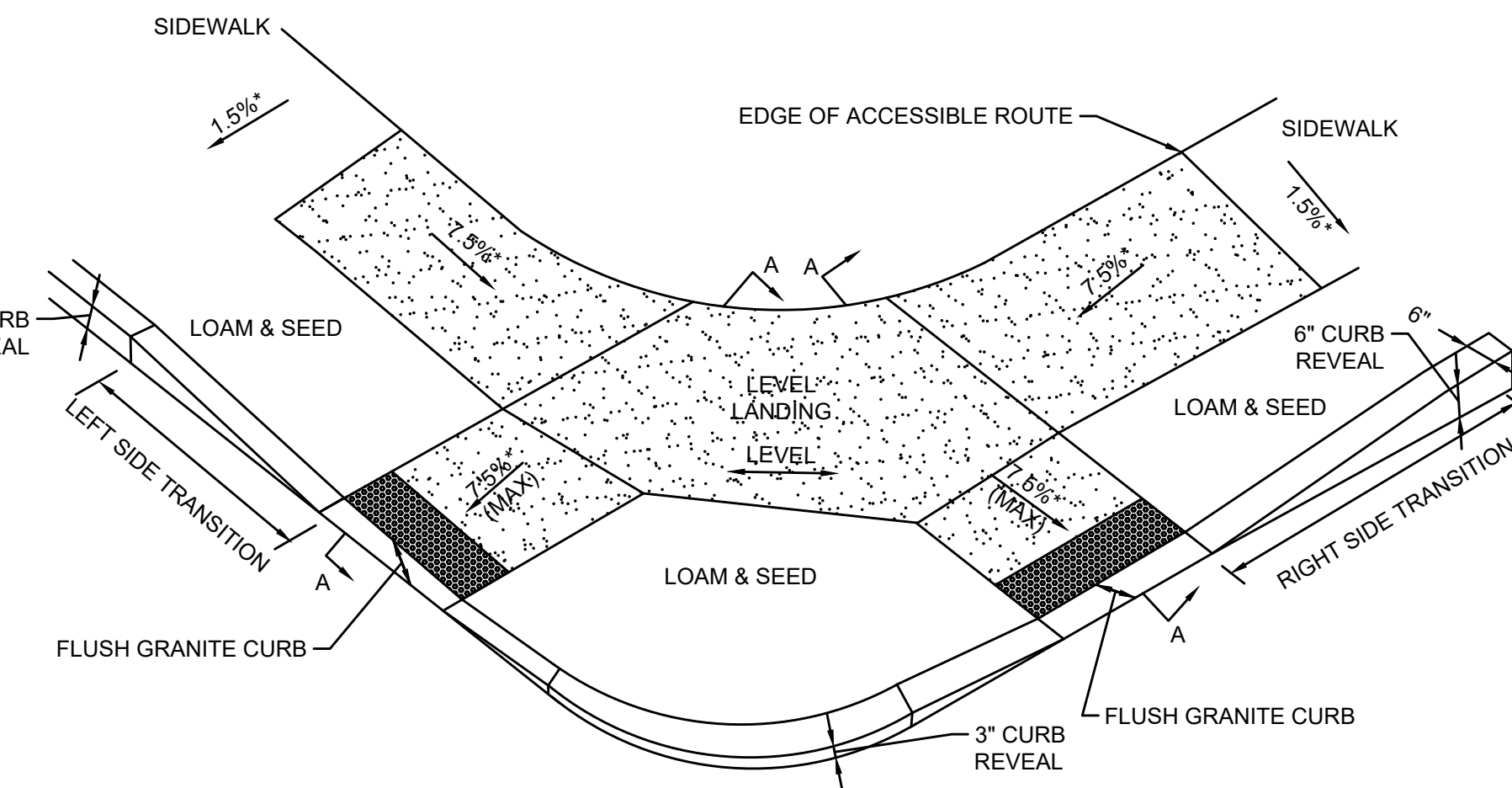
LEGEND:  
W1 = PERPENDICULAR RAMP LENGTH  
CC = CEMENT CONCRETE  
\* = TOLERANCE FOR CONSTRUCTION ±0.5%

- NOTES:
1. USABLE SIDEWALK WIDTH PER AAB = W
  2. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0"
  3. ROADWAY GUTTER SLOPE MEASURED FROM LEFT TO RIGHT WHEN FACING THE RAMP OPENING
  4. SEE E 107.6.5 FOR DETECTABLE WARNING PANEL DETAILS



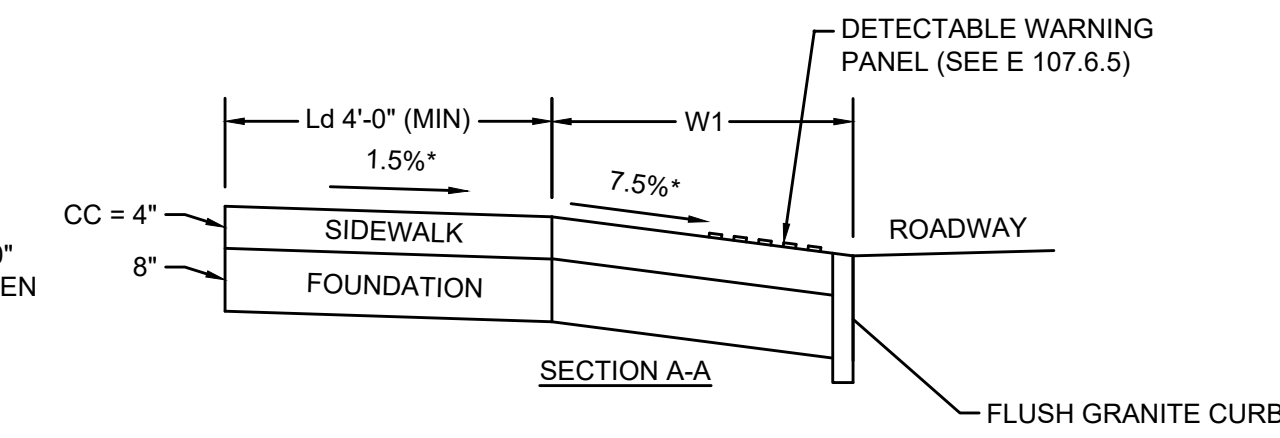
PEDESTRIAN CURB RAMP TYPE A

N.T.S.



LEGEND:  
W = SIDEWALK WIDTH  
CC = CEMENT CONCRETE  
\* = TOLERANCE FOR CONSTRUCTION ±0.5%

- NOTES:
1. USABLE SIDEWALK WIDTH PER AAB = W-6"
  2. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0"
  3. ROADWAY GUTTER SLOPE MEASURED FROM LEFT TO RIGHT WHEN FACING THE RAMP OPENING
  4. SEE E 107.6.5 FOR DETECTABLE WARNING PANEL DETAILS
  5. SEE E 107.6.0 FOR ALL OTHER DETAILS



PEDESTRIAN CURB RAMP TYPE B

N.T.S.

1. MAXIMUM ALLOWABLE SLOPE OF ACCESSIBLE ROUTE EXCLUDING CURB RAMPS SHALL BE DESIGNED TO 4.5% ±0.5% (7.5% ±0.5% FOR CURB RAMPS)
2. A MINIMUM OF 3'-0" CLEAR SHALL BE MAINTAINED AT ANY PERMANENT OBSTACLE IN ACCESSIBLE ROUTE (I.E., HYDRANTS, UTILITY POLES, TREE WELLS, SIGNS, ETC.).
3. CURB TREATMENT VARIES, SEE PLANS FOR CURB TYPE.
4. RAMP, CURB AND ADJACENT PAVEMENTS SHALL BE GRADED TO PREVENT PONDING.
5. WHERE ACCESSIBLE ROUTES ARE LESS THAN 5' IN WIDTH (EXCLUDING CURBING) A 5'x5' PASSING AREA SHALL BE PROVIDED AT INTERVALS NOT TO EXCEED 200 FT.
6. RETAIN CURBING AT RAMP WHERE IT ABUTS ROADWAY.
7. DETECTABLE WARNING PANELS ARE REQUIRED ON ALL OF THE PROPOSED CURB RAMPS AND ARE TO BE INSTALLED IN ACCORDANCE WITH CONSTRUCTION STANDARD E 107.6.5 (OCTOBER 2017). CONTRACTOR SHALL PROVIDE 6" BETWEEN DETECTABLE WARNING PANEL AND EDGE OF CONCRETE WHERE IT ABUTS LOAM & SEED.
8. CURB RAMP SLOPES AND CROSS SLOPES SHALL HAVE A CONSTRUCTION TOLERANCE OF ±0.5%.
9. DETECTABLE WARNING PANELS SHALL BE YELLOW IN COLOR AS APPROVED BY THE ENGINEER.
10. REFER TO MAAB VARIANCE IN CONTRACT DOCUMENTS FOR ALLOWABLE DEVIATIONS FROM STANDARDS AND DETAILS SHOWN.

CURB RAMP NOTES

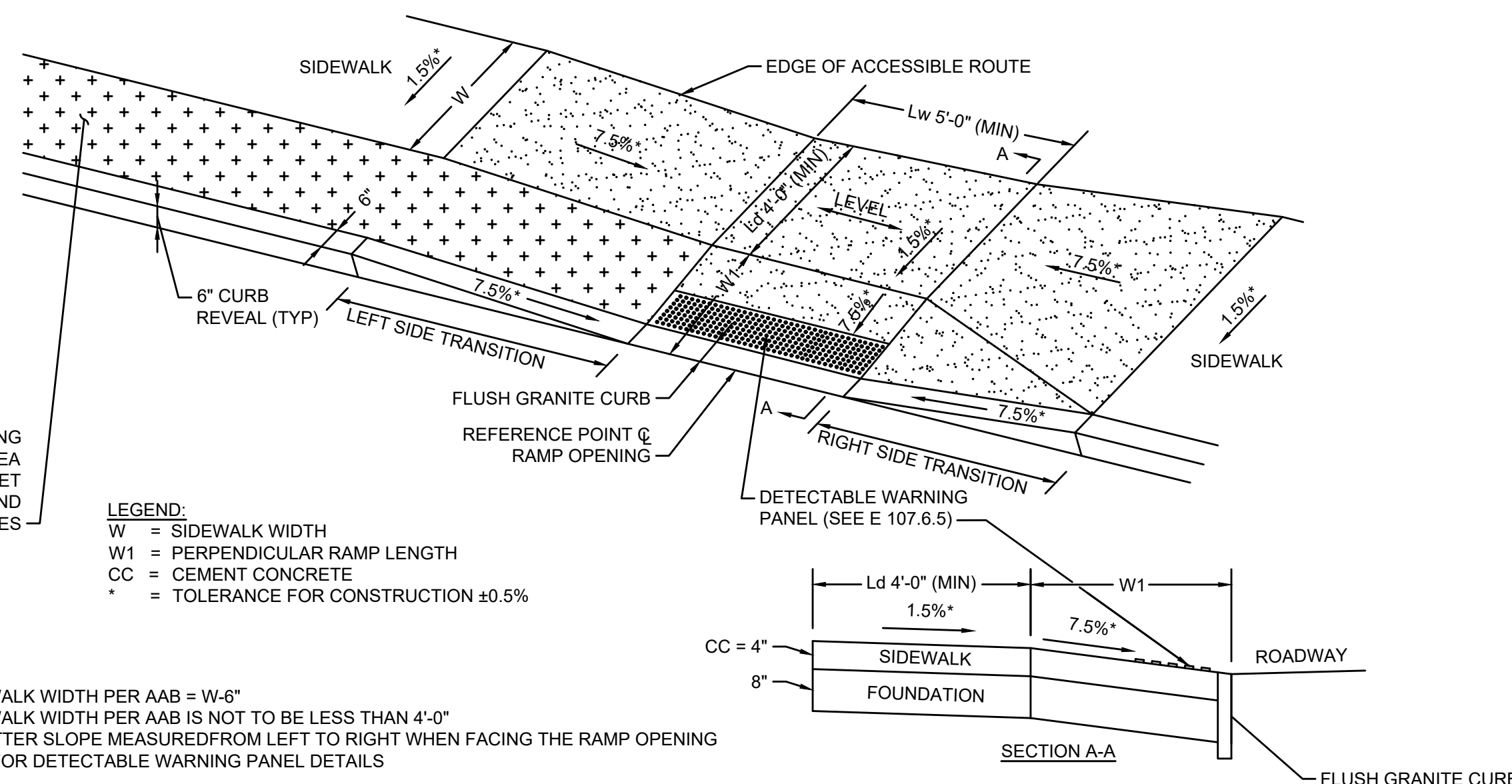
N.T.S.

ROADWAY PROFILE GRADE	*HIGH SIDE TRANSITION LENGTH
%	ENGLISH UNITS
0%	6'-6"
>0% TO 1%	7'-8"
>1% TO 2%	9'-0"
>2% TO 3%	11'-0"
>3% TO 4%	14'-0"
>4% TO 5%	15'-0" - MAX

NOTE:  
\* BASED ON A DESIGN SLOPE OF 7.5% AND A REVEAL OF 6".

CURB TRANSITION LENGTH FOR PEDESTRIAN CURB RAMPS

N.T.S.



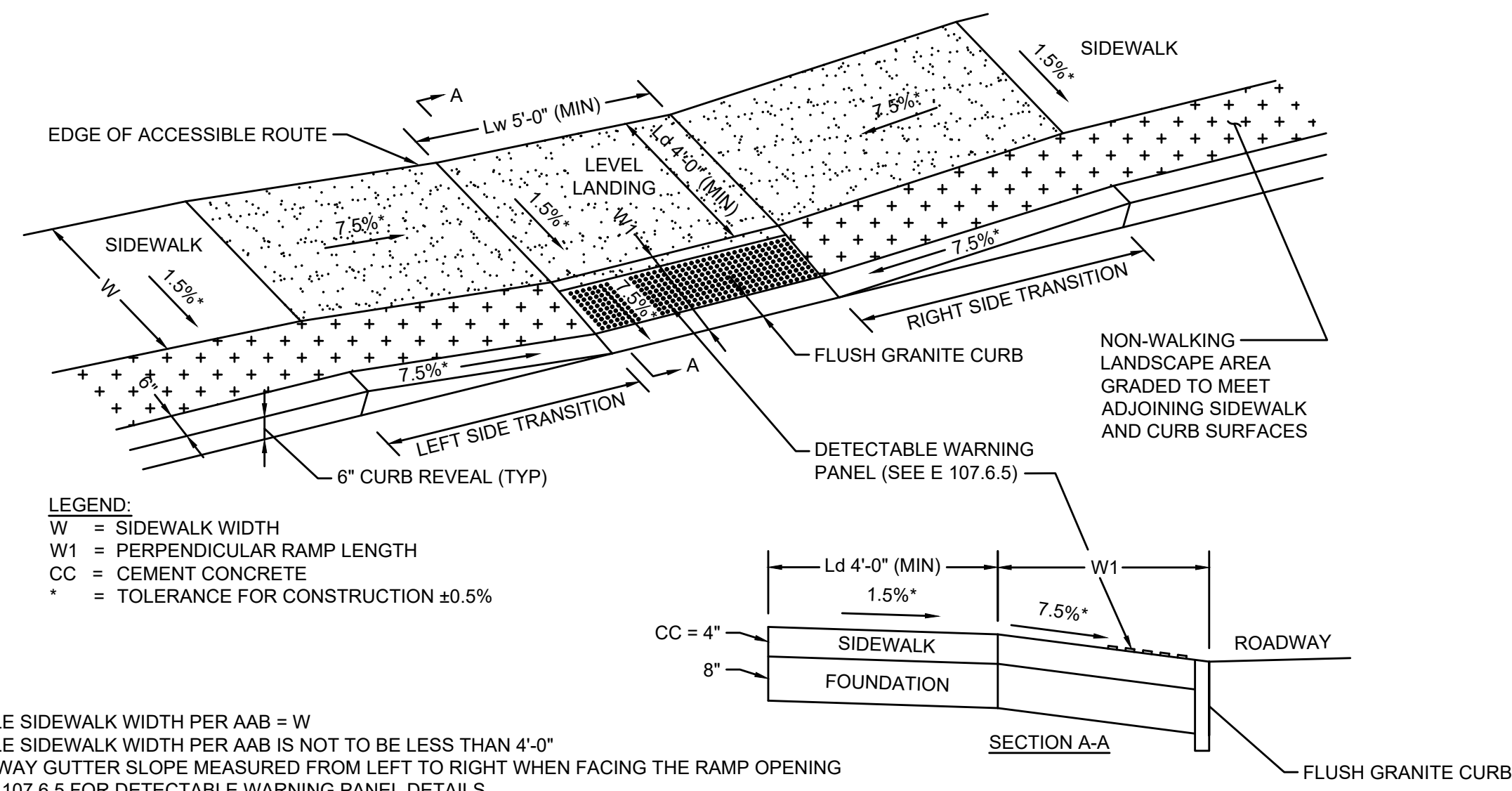
LEGEND:  
W = SIDEWALK WIDTH  
W1 = PERPENDICULAR RAMP LENGTH  
CC = CEMENT CONCRETE  
\* = TOLERANCE FOR CONSTRUCTION ±0.5%

- NOTES:
1. USABLE SIDEWALK WIDTH PER AAB = W-6"
  2. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0"
  3. ROADWAY GUTTER SLOPE MEASURED FROM LEFT TO RIGHT WHEN FACING THE RAMP OPENING
  4. SEE E 107.6.5 FOR DETECTABLE WARNING PANEL DETAILS

PEDESTRIAN CURB RAMP TYPE C

N.T.S.

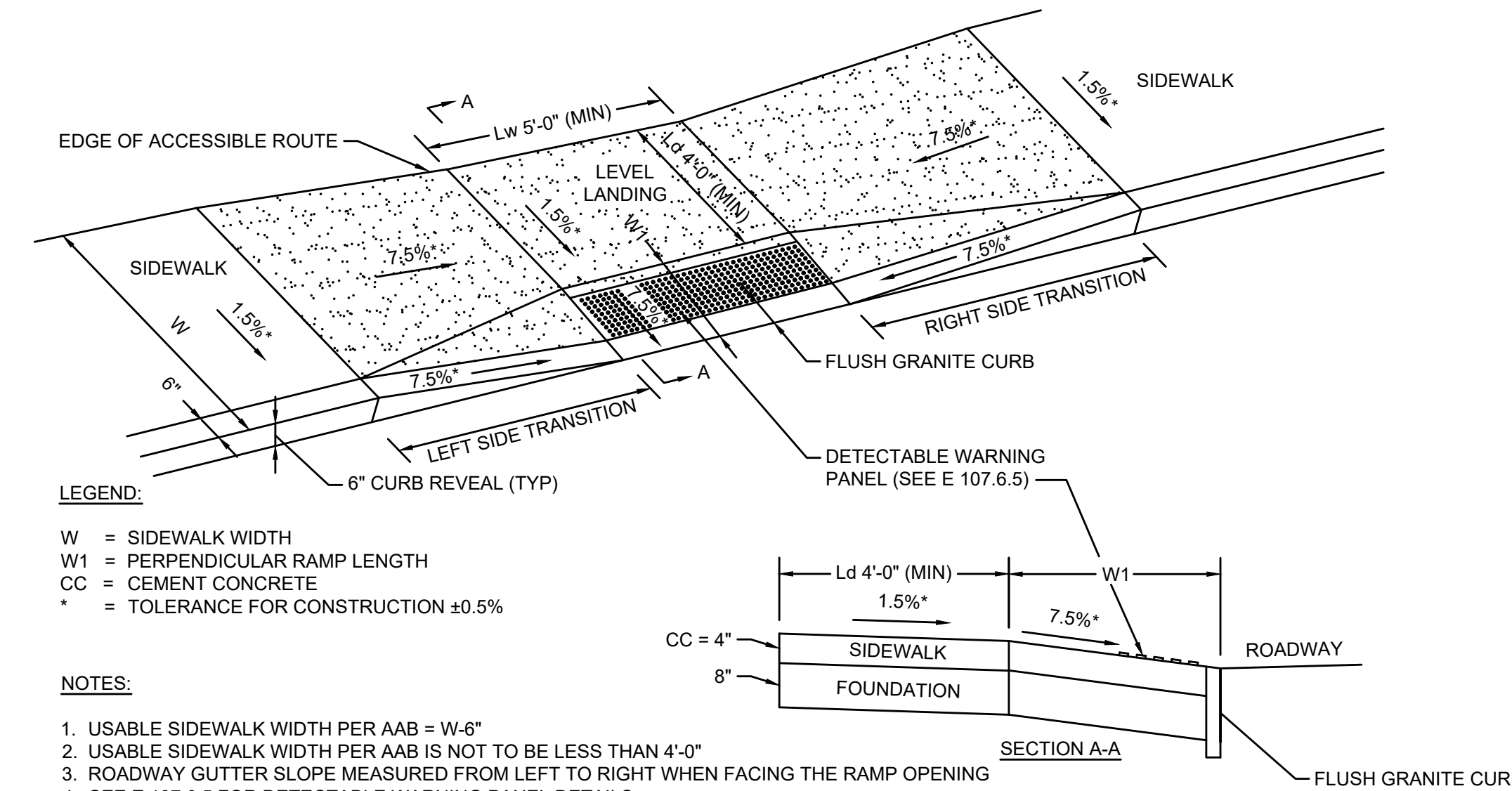




**LEGEND:**  
 W = SIDEWALK WIDTH  
 W1 = PERPENDICULAR RAMP LENGTH  
 CC = CEMENT CONCRETE  
 \* = TOLERANCE FOR CONSTRUCTION ±0.5%

- NOTES:**
1. USABLE SIDEWALK WIDTH PER AAB = W
  2. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0"
  3. ROADWAY GUTTER SLOPE MEASURED FROM LEFT TO RIGHT WHEN FACING THE RAMP OPENING
  4. SEE E 107.6.5 FOR DETECTABLE WARNING PANEL DETAILS

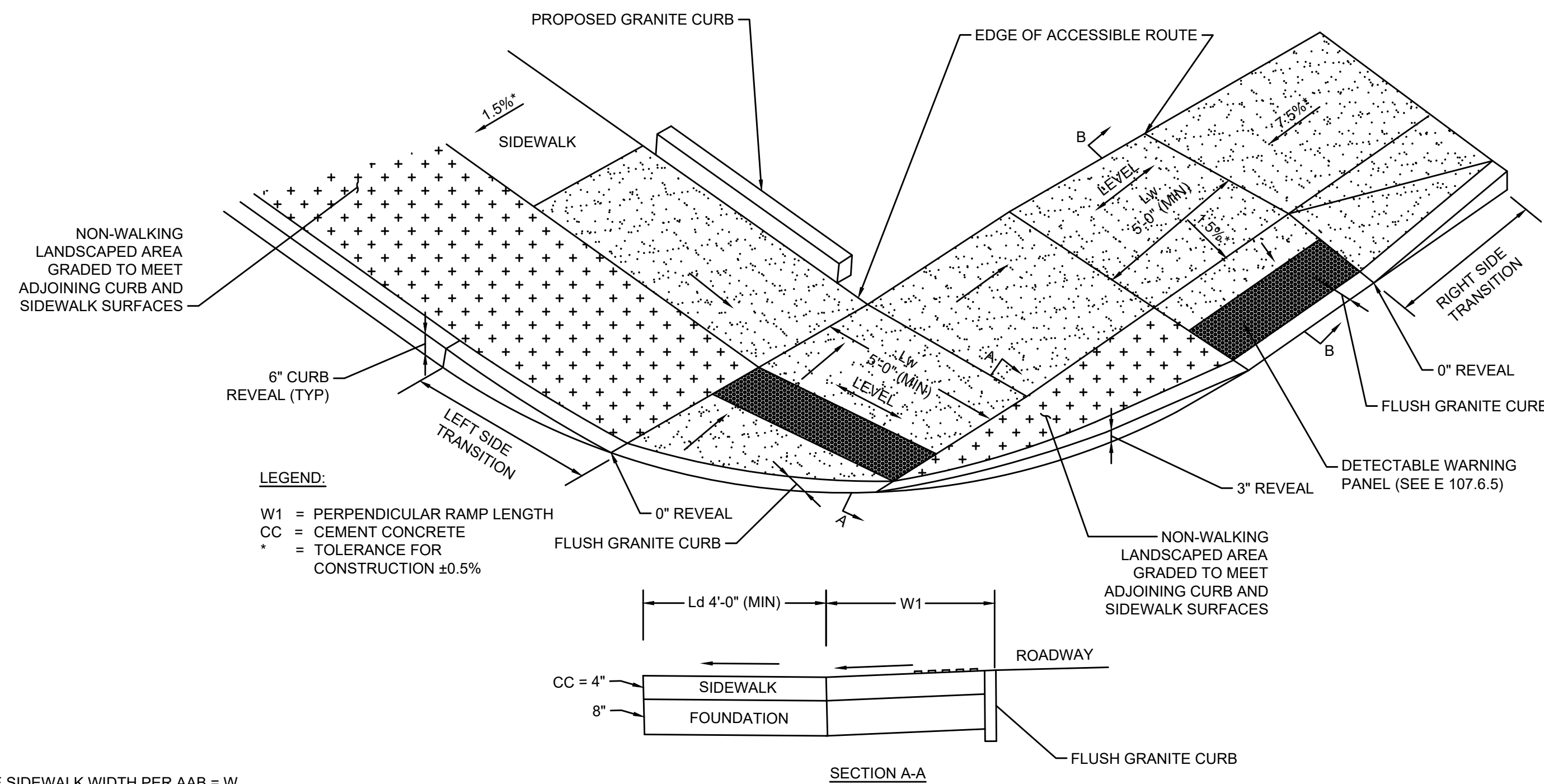
**PEDESTRIAN CURB RAMP TYPE D**  
 N.T.S.



**LEGEND:**  
 W = SIDEWALK WIDTH  
 W1 = PERPENDICULAR RAMP LENGTH  
 CC = CEMENT CONCRETE  
 \* = TOLERANCE FOR CONSTRUCTION ±0.5%

- NOTES:**
1. USABLE SIDEWALK WIDTH PER AAB = W-6"
  2. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0"
  3. ROADWAY GUTTER SLOPE MEASURED FROM LEFT TO RIGHT WHEN FACING THE RAMP OPENING
  4. SEE E 107.6.5 FOR DETECTABLE WARNING PANEL DETAILS

**PEDESTRIAN CURB RAMP TYPE E**  
 N.T.S.



**LEGEND:**  
 W1 = PERPENDICULAR RAMP LENGTH  
 CC = CEMENT CONCRETE  
 \* = TOLERANCE FOR CONSTRUCTION ±0.5%

- NOTES:**
1. USABLE SIDEWALK WIDTH PER AAB = W
  2. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0"
  3. ROADWAY GUTTER SLOPE MEASURED FROM LEFT TO RIGHT WHEN FACING THE RAMP OPENING
  4. SEE E 107.6.5 FOR DETECTABLE WARNING PANEL DETAILS

**PEDESTRIAN CURB RAMP TYPE F**  
 N.T.S.

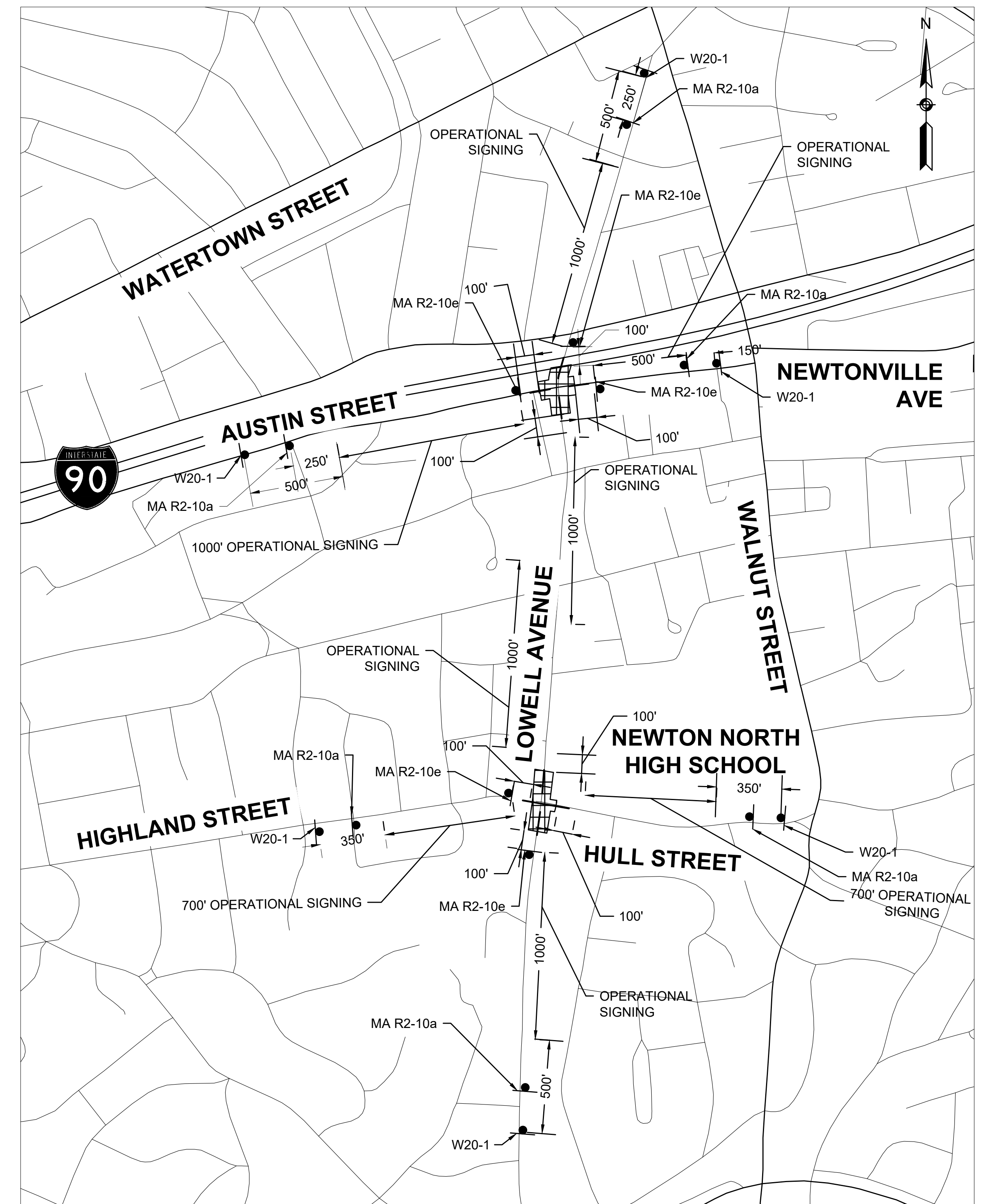
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 MASSACHUSETTS

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 DESIGN DRAFTED BY: JFZ  
 CHECKED BY: LSA  
 APPROVED BY: JAR

IDENTIFICATION NUMBER	SIZE OF SIGN (in)		LEGEND	TEXT DIMENSIONS (in)			NUMBER OF SIGNS REQUIRED	COLOR			UNIT AREA (SF)	TOTAL AREA (SF)
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING	ARROW RTE. MKR		BACK-GROUND	LEGEND	BORDER		
MA-R2-10a	48	36		MASSDOT STANDARD SIGN			6	FL. ORANGE WHITE	BLACK BLACK	BLACK BLACK	12.00	72.00
MA-R2-10e	36	48		↓			5	FL. ORANGE WHITE	BLACK BLACK	BLACK BLACK	12.00	60.00
R4-7	24	30		SEE 2009 MUTCD FOR DIMENSIONS			2	WHITE	BLACK	BLACK	5.00	10.00
R9-9	24	12					2	WHITE	BLACK	BLACK	2.00	4.00
R9-11aL	24	12					1	WHITE	BLACK	BLACK	2.00	2.00
R9-11aR	24	12					1	WHITE	BLACK	BLACK	2.00	2.00
W1-4L	36	36					2	FL. ORANGE	BLACK	BLACK	9.00	18.00
W1-4R	36	36					2	FL. ORANGE	BLACK	BLACK	9.00	18.00
W5-1	36	36					9	FL. ORANGE	BLACK	BLACK	9.00	81.00
W8-1	36	36					1	FL. ORANGE	BLACK	BLACK	9.00	9.00
W8-15	36	36					1	FL. ORANGE	BLACK	BLACK	9.00	9.00
W11-2	36	36					4	FL. ORANGE	BLACK	BLACK	9.00	36.00
W16-7pL	24	12					4	FL. ORANGE	BLACK	BLACK	2.00	8.00
W20-1	36	36					6	FL. ORANGE	BLACK	BLACK	9.00	54.00
W20-4	36	36		↓			4	FL. ORANGE	BLACK	BLACK	9.00	36.00
MA-W20-7b	36	36		MASSDOT STANDARD SIGN			8	FL. ORANGE	BLACK	BLACK	9.00	72.00
W21-5aR	36	36		SEE 2009 MUTCD FOR DIMENSIONS			1	FL. ORANGE	BLACK	BLACK	9.00	9.00
MA-W30-8R	36	36		MASSDOT STANDARD SIGN			2	FL. ORANGE	BLACK	BLACK	9.00	18.00

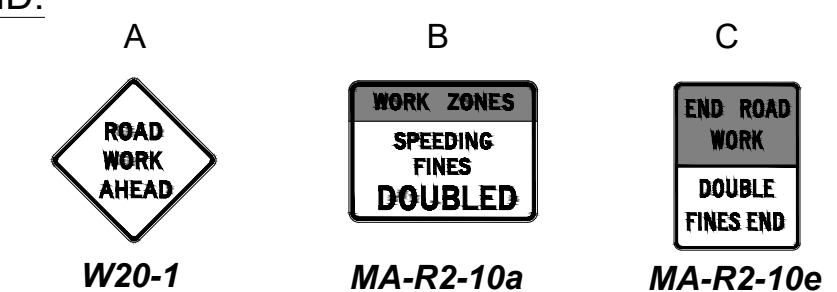
CITY OF NEWTON  
MASSACHUSETTS

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ADVANCE SIGNING SCHEMATIC  
N.T.S.

LEGEND:



**LEGEND:**

- REFLECTORIZED PLASTIC DRUM OR 36" CONE
- ▨ WORK ZONE
- DIRECTION OF TRAFFIC
- ▭ WORK VEHICLE
- P/F POLICE/FLAGGER DETAIL
- ⊕ IMPACT ATTENUATOR
- ▭ TRUCK MOUNTED ATTENUATOR
- ▨ TYPE III BARRICADE
- ▭ TEMPORARY BARRIER (TL-2)
- ⊕ TRAFFIC OR PEDESTRIAN SIGNAL
- ▭ CHANGEABLE MESSAGE SIGN
- ▭ MEDIAN BARRIER WITH WARNING LIGHTS
- ⊕ SIGN
- ▭ ARROW BOARD

**SUGGESTED WORK ZONE WARNING SIGN SPACING**

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

\* ROAD TYPE TO BE DETERMINED BY MASSDOT OFFICE OF TRANSPORTATION PLANNING.

\*\* DISTANCES ARE SHOWN IN FEET. THE COLUMN HEADINGS A, B, AND C ARE THE DIMENSIONS SHOWN IN THE DETAIL/ TYPICAL SETUP FIGURES. THE A DIMENSION IS THE DISTANCE FROM THE TRANSITION OR POINT OF RESTRICTION TO THE FIRST SIGN. THE B DIMENSION IS THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS. THE C DIMENSION IS THE DISTANCE BETWEEN THE SECOND AND THIRD SIGNS. (THE "THIRD" SIGN IS THE FIRST ONE TYPICALLY ENCOUNTERED BY A DRIVER APPROACHING A TEMPORARY TRAFFIC CONTROL (TTC) ZONE.)

THE "THIRD" SIGN ABOVE IS TYPICALLY REFERRED TO AS AN "ADVANCE WARNING" SIGN ON THE TTCP SETUPS. THESE ADVANCE WARNING SIGNS ARE LOCATED PRIOR TO THE PROJECT LIMITS ON ALL APPROACHES (I.E. THE W20-1 SERIES (ROAD WORK XX FT) SIGNS), AND USUALLY REMAIN FOR THE DURATION OF THE PROJECT. ADDITIONAL SIGNS (I.E. "RIGHT LANE CLOSED 1 MILE" AND "LEFT LANE CLOSED 1 MILE") HAVE BEEN SHOWN IN SOME FIGURES AS EXAMPLES OF REINFORCEMENT SIGN PLACEMENT BUT ARE USED IN RARE OCCASIONS.

THE FIRST AND SECOND WARNING SIGNS ABOVE ARE REFERRED TO AS THE OPERATIONAL (DAY-TO-DAY) WORK ZONE SIGNS AND MAY BE MOVED DEPENDING ON WHERE THE SPECIFIC ROADWAY WORK FOR THAT DAY IS LOCATED.

R2-10a SIGNS SHALL BE PLACED BETWEEN THE SECOND AND THIRD SIGNS AS DESCRIBED ABOVE.

R2-10a, R2-10e, AND W20-1 SERIES SIGNS ARE TO BE INCLUDED ON ALL DETAILS/TYPICAL SETUPS.

**TAPER LENGTH CRITERIA FOR TEMPORARY TRAFFIC CONTROL ZONES**

TYPE OF TAPER	TAPER LENGTH (L)
MERGING TAPER	AT LEAST L
SHIFTING TAPER	AT LEAST 0.5L
SHOULDER TAPER	AT LEAST 0.33L
ONE-LANE, TWO-WAY TRAFFIC TAPER	50 FT MIN. 100 FT MAX.
DOWNSTREAM TAPER	50 FT MIN. 100 FT MAX. PER LANE

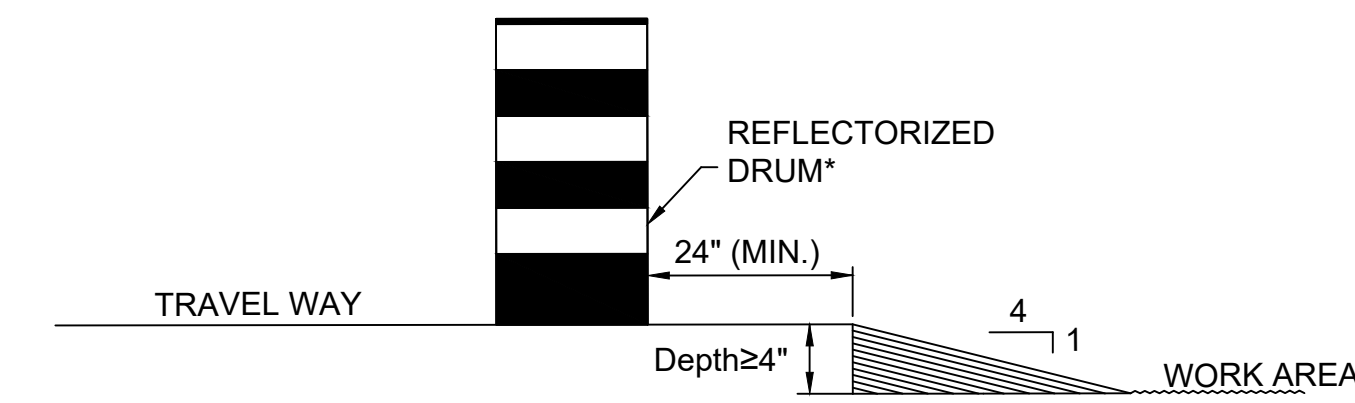
**FORMULAS FOR DETERMINING TAPER LENGTHS**

SPEED LIMIT (S)	TAPER LENGTH (L) FEET
40 MPH OR LESS	$L = \frac{WS^2}{60}$
45 MPH OR MORE	$L = WS$

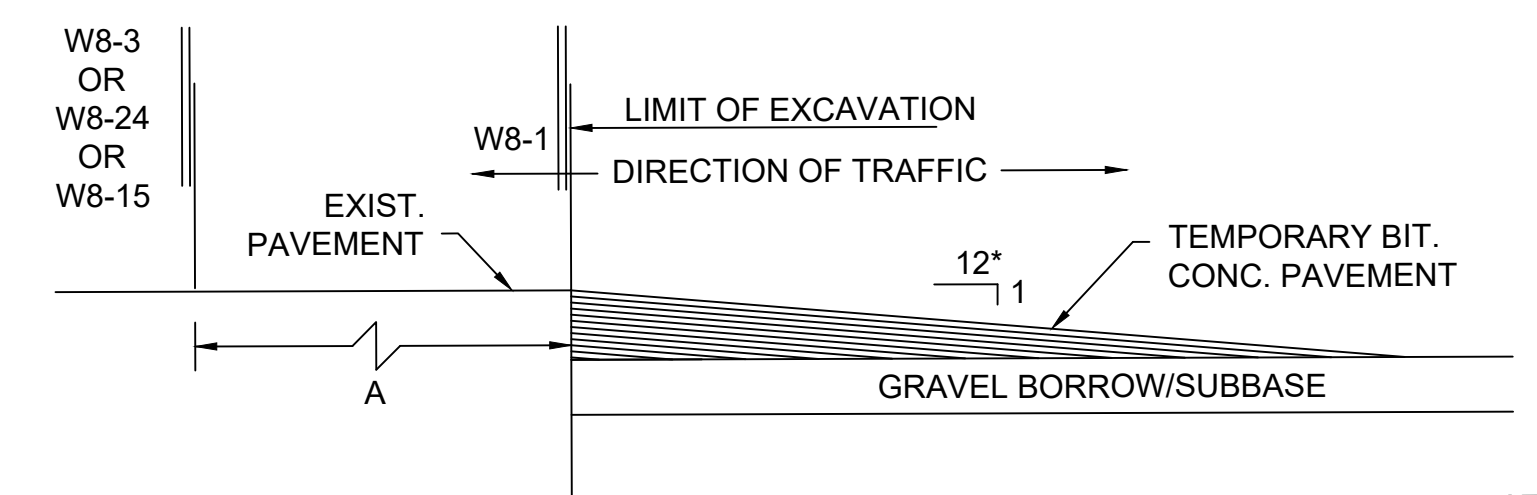
WHERE: L = TAPER LENGTH IN FEET  
W = WIDTH OF OFFSET IN FEET  
S = POSTED SPEED LIMIT, OR OFF-PEAK 85TH-PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH

**NOTES:**

- ALL TEMPORARY TRAFFIC CONTROL WORK SHALL CONFORM TO THE LATEST EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND ALL REVISIONS, UNLESS SUPERCEDED BY THESE PLANS.
- ALL SIGN LEGENDS, BORDERS, AND MOUNTING SHALL BE IN ACCORDANCE WITH THE MUTCD.
- TEMPORARY CONSTRUCTION SIGNING AND ALL OTHER TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY WORK.
- TEMPORARY CONSTRUCTION SIGNING, BARRICADES, AND ALL OTHER NECESSARY WORK ZONE TRAFFIC CONTROL DEVICES SHALL BE REMOVED FROM THE HIGHWAY OR COVERED WHEN THEY ARE NOT REQUIRED FOR CONTROL OF TRAFFIC.
- SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY, CHANNELIZING DEVICES, BARRIERS, AND CRASH ATTENUATORS MUST PASS THE CRITERIA SET FORTH IN THE "MANUAL FOR ASSESSING SAFETY HARDWARE" (MASH).
- CONTRACTORS SHALL NOTIFY EACH ADJUTTER AT LEAST 24 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE THE TEMPORARY CLOSURE OF ACCESS, SUCH AS CONDUIT INSTALLATION, EXISTING PAVEMENT EXCAVATION, TEMPORARY DRIVEWAY PAVEMENT PLACEMENT, AND SIMILAR OPERATIONS.
- THE FIRST TEN PLASTIC DRUMS OF A TAPER SHALL BE MOUNTED WITH SEQUENTIAL FLASHING LIGHTS.
- THE ADVISORY SPEED LIMIT, IF REQUIRED, SHALL BE DETERMINED BY THE ENGINEER.
- DISTANCES ARE A GUIDE AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.
- MAXIMUM SPACING OF TRAFFIC DEVICES IN A TAPER (DRUMS OR CONES) IS EQUAL IN FEET TO THE SPEED LIMIT IN MPH.
- MINIMUM LANE WIDTH IS TO BE 11 FEET UNLESS OTHERWISE SHOWN. MINIMUM LANE WIDTH TO BE MEASURED FROM THE EDGE OF DRUMS OR MEDIAN BARRIER.
- ALL SIGNS SHALL BE MOUNTED ON THEIR OWN STANDARD SIGN SUPPORTS.
- NO WORK THAT IMPACTS THE TRAVELED WAY SHALL BE PERMITTED DURING PEAK HOUR TRAFFIC. PEAK HOUR IS DEFINED AS WEEKDAYS FROM 7-9 AM & 4-6 PM.



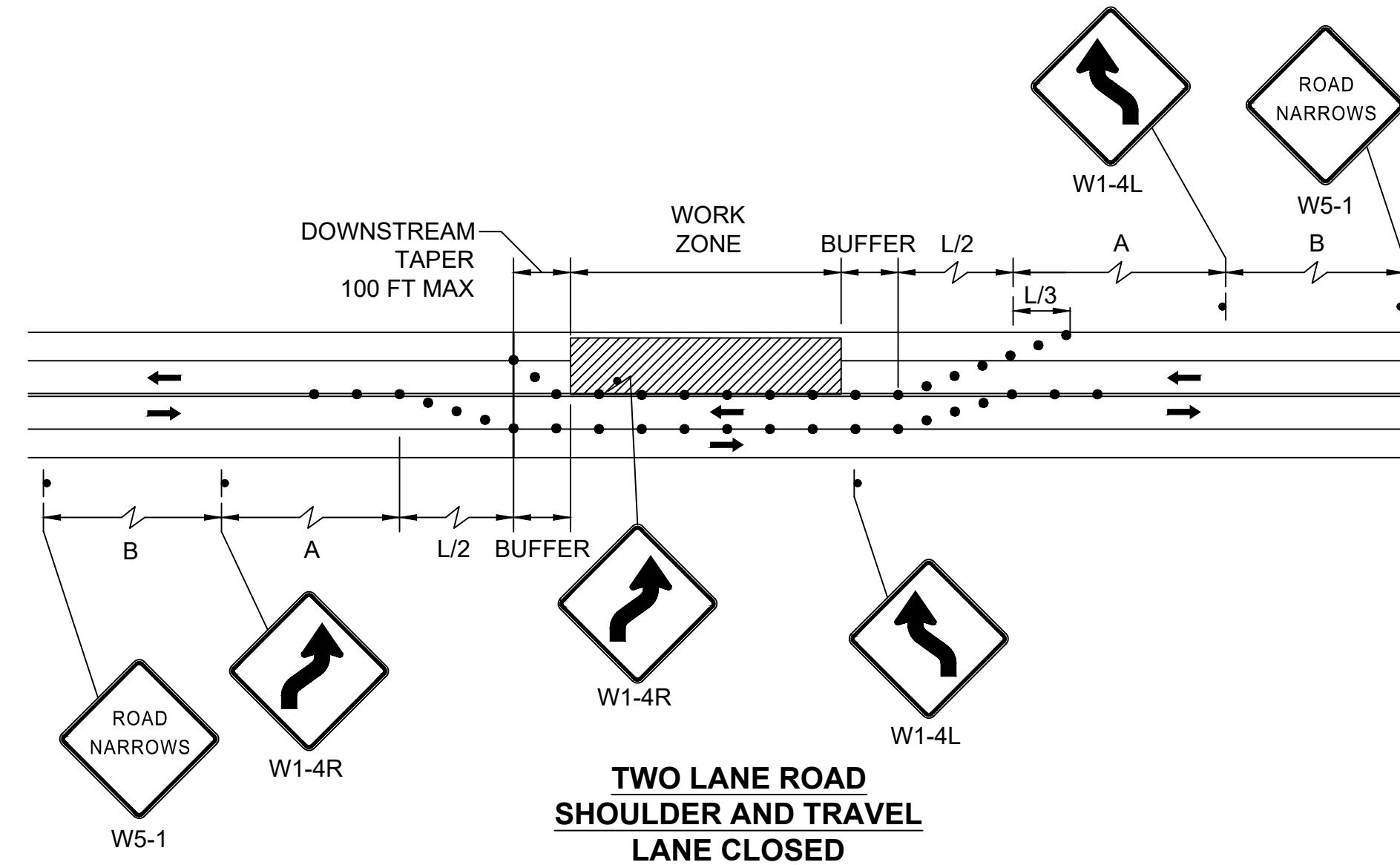
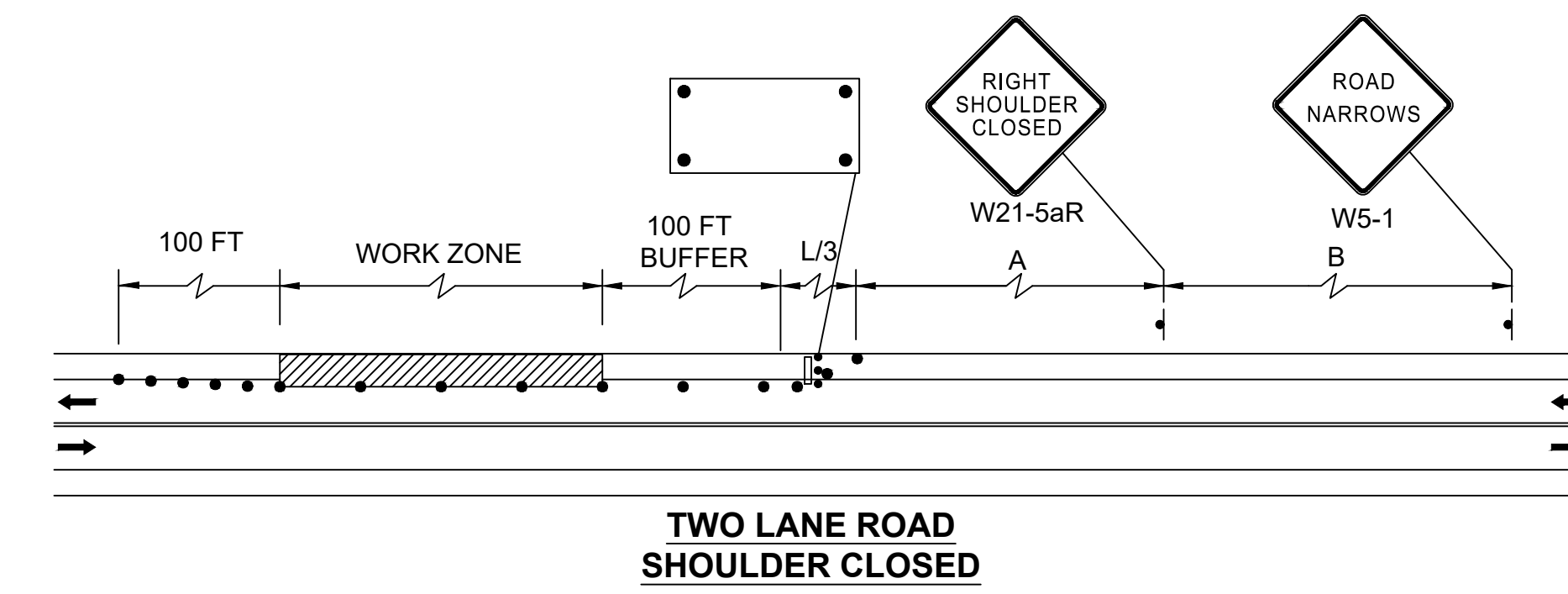
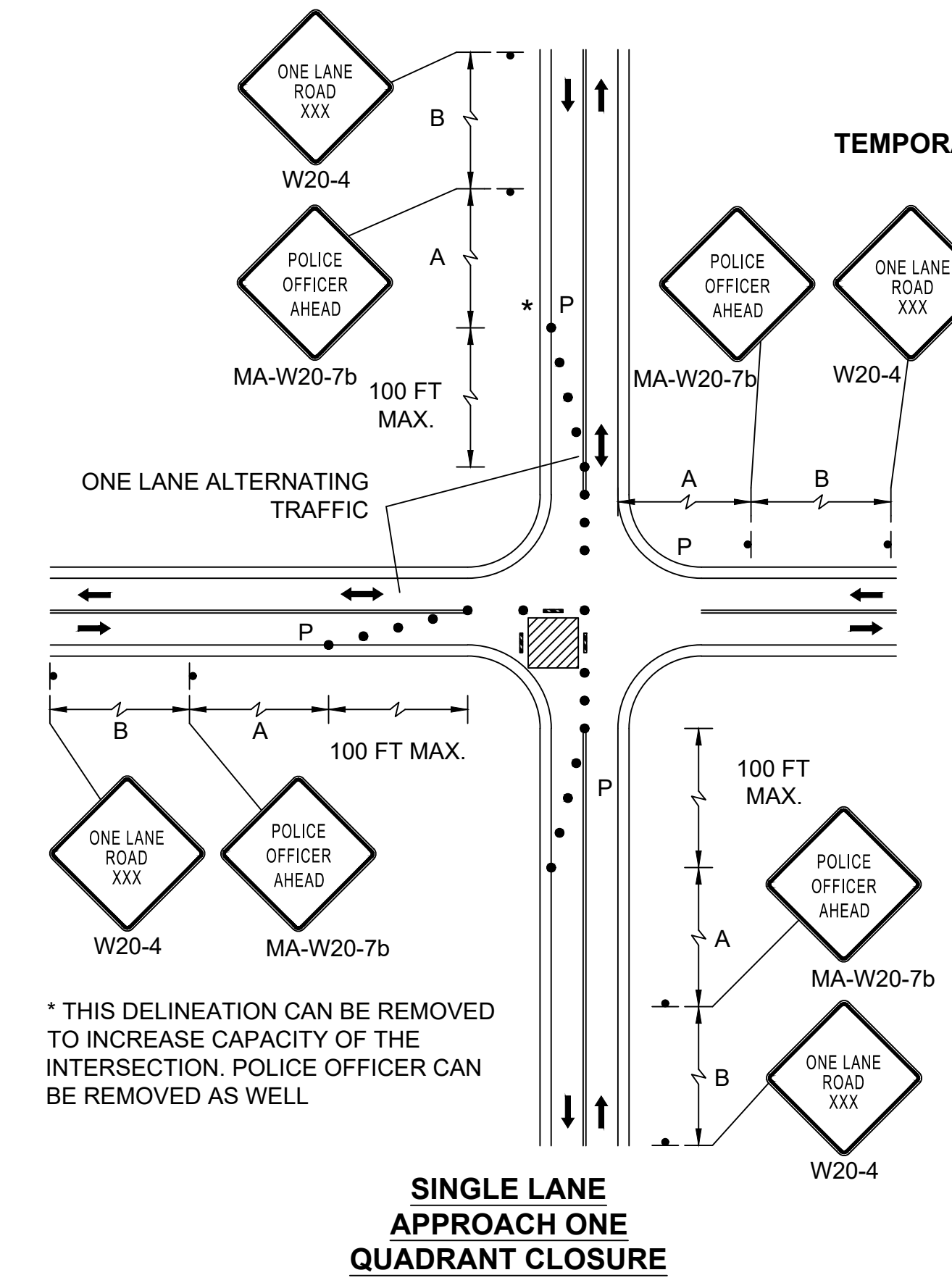
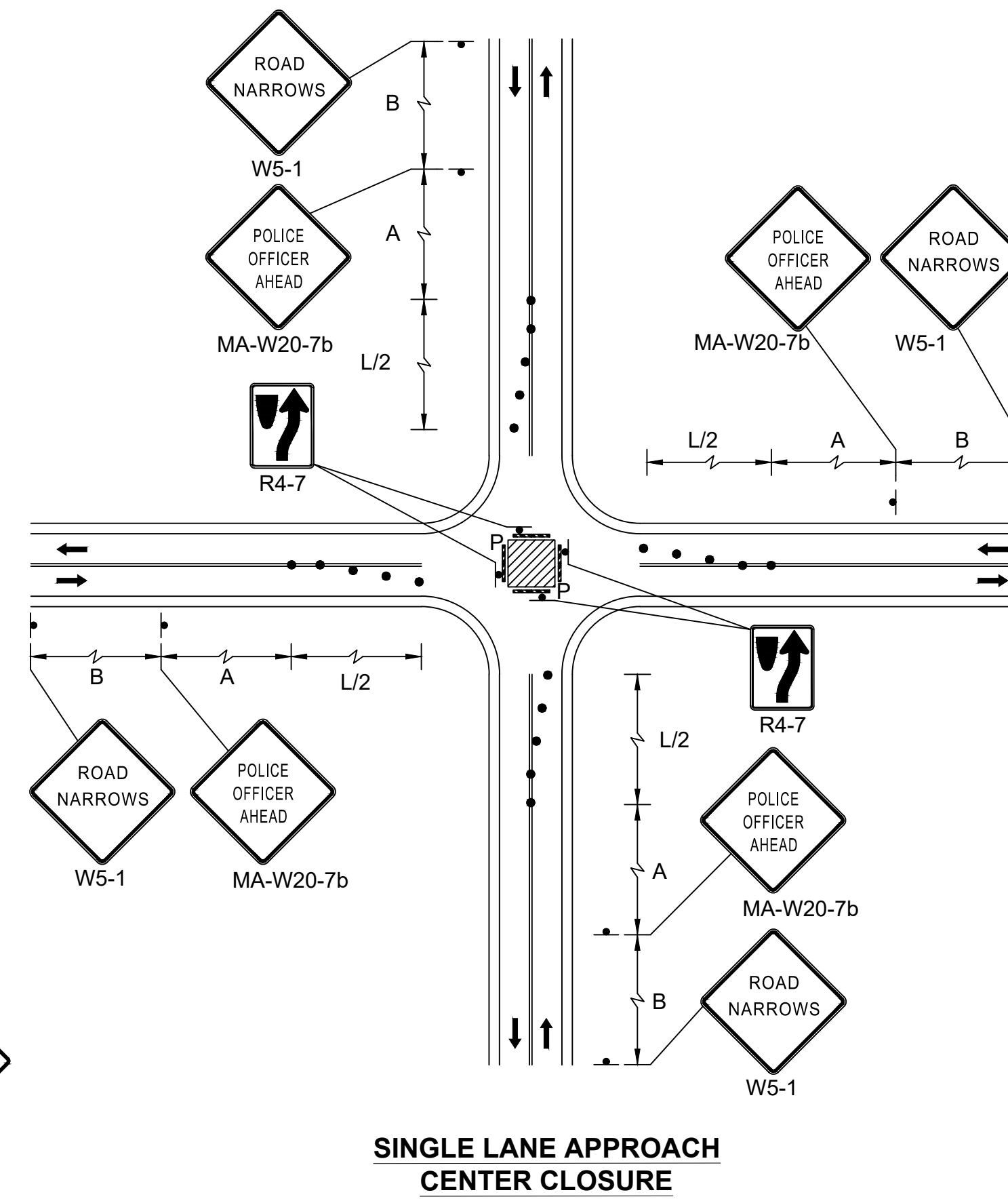
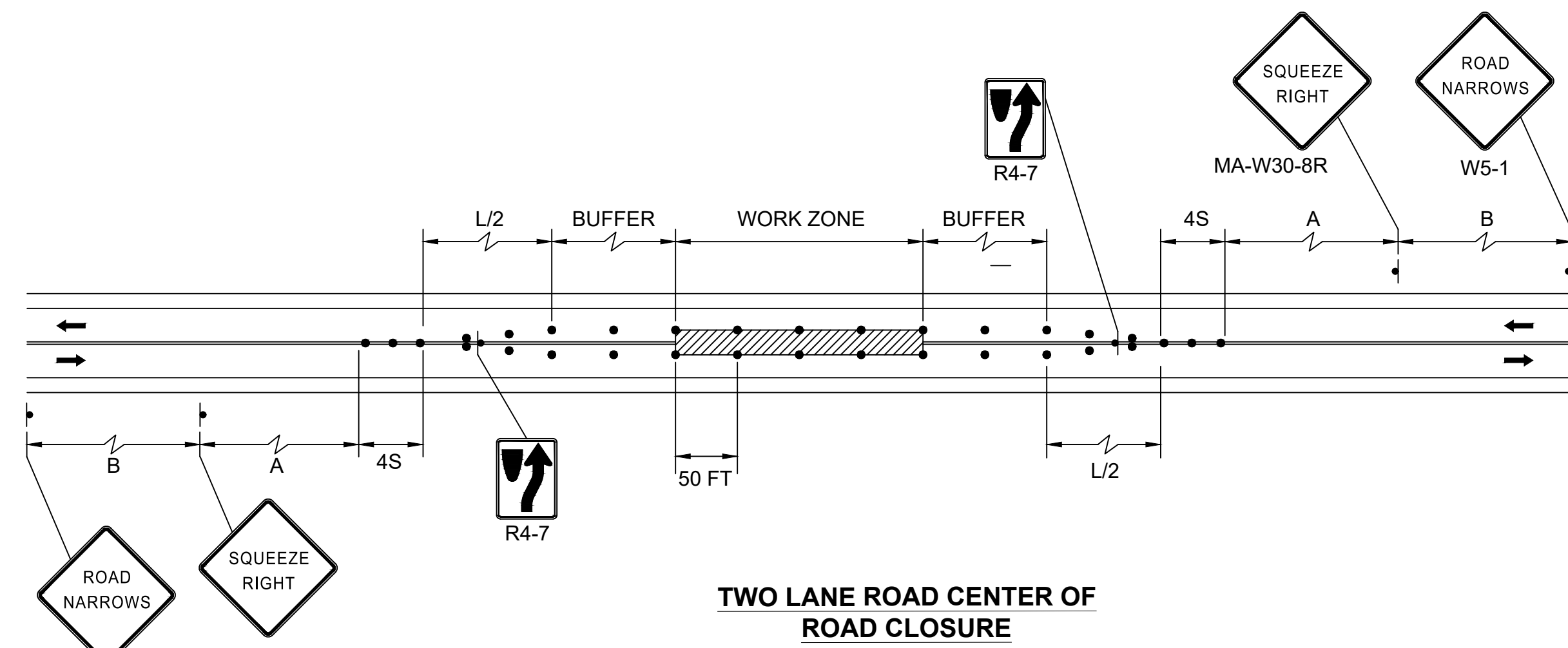
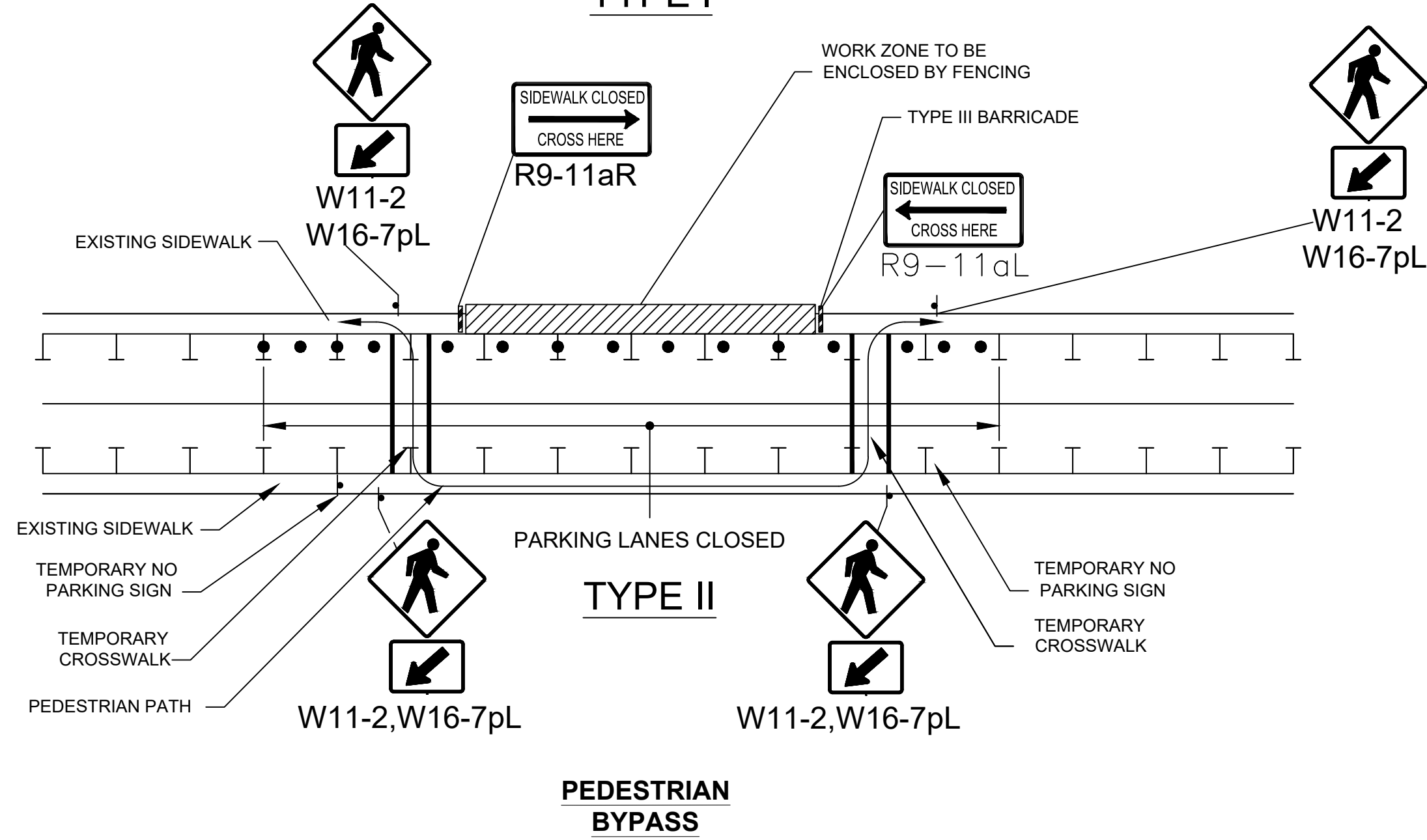
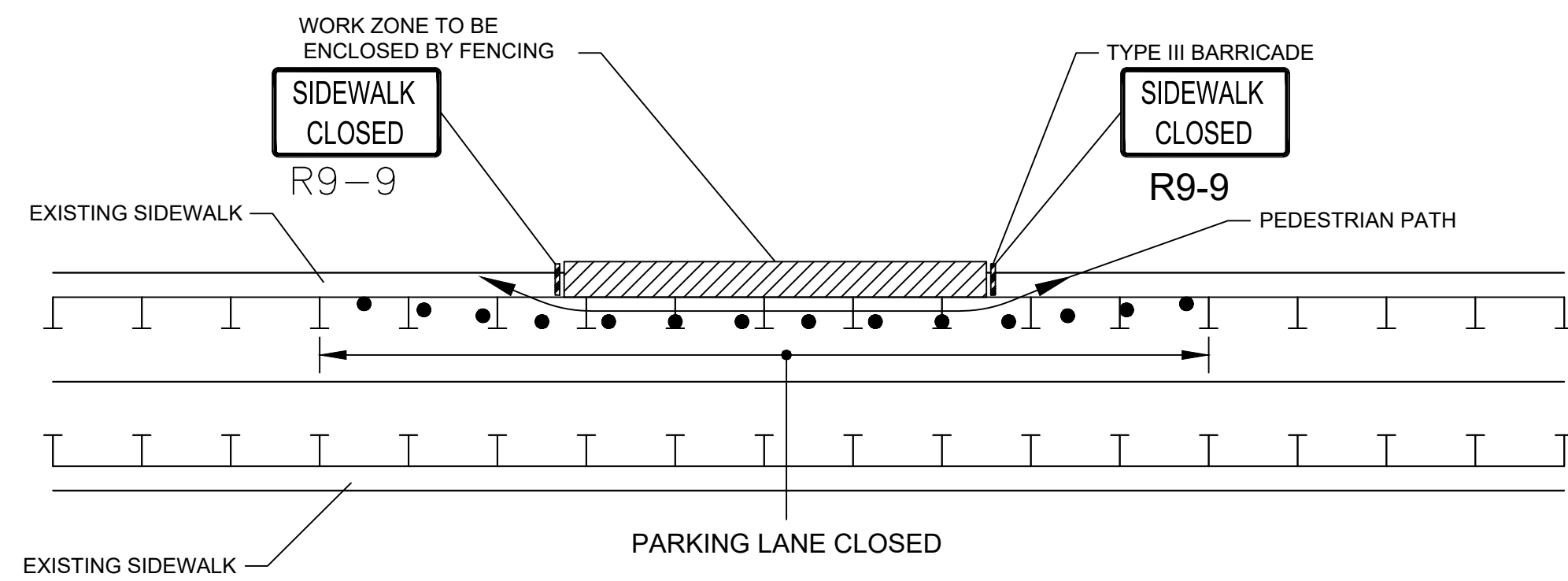
**LATERAL DROP-OFF DETAIL**  
NOT TO SCALE



**LONGITUDINAL DROP-OFF DETAIL**  
NOT TO SCALE

\* - INCREASE SLOPE RATIO FOR HIGHER SPEEDS





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MASSACHUSETTS

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