

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

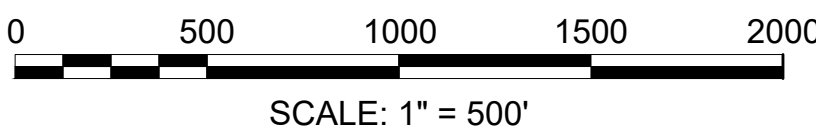
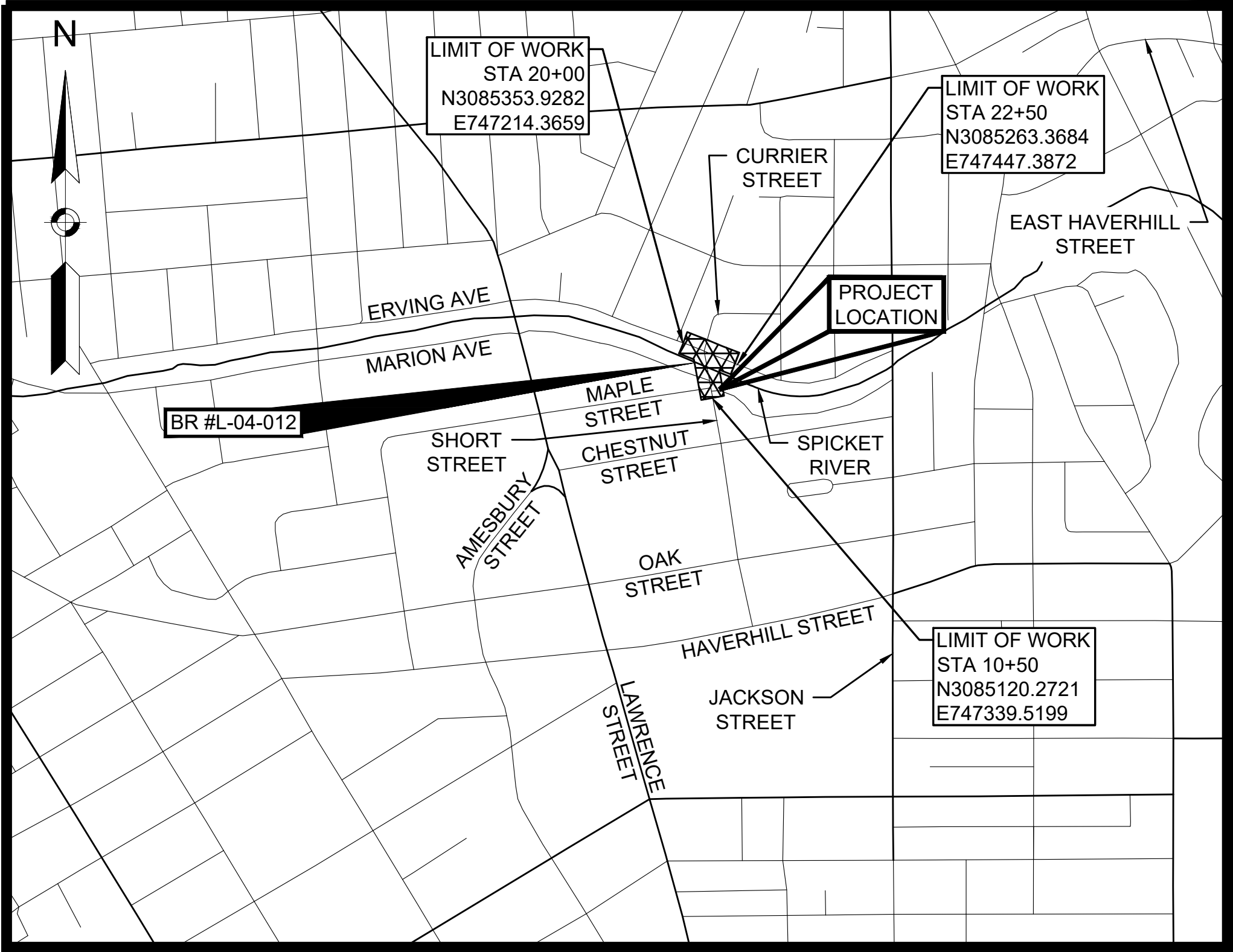
PLAN AND PROFILE OF
SHORT STREET
(BRIDGE NO. L-04-012)

IN THE CITY OF
LAWRENCE
ESSEX COUNTY

FEDERAL AID PROJECT NO.

25% SUBMITTAL

SHEET NO.	DESCRIPTION
1	TITLE SHEET & INDEX
2	LEGEND & ABBREVIATIONS
3	CONSTRUCTION NOTES
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5	TYPICAL SECTIONS & PAVEMENT NOTES
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TOTAL LENGTH OF PROJECT = 450.00 FEET = 0.085 MILES
SHORT STREET = 200.00 FEET = 0.038 MILES
ERVING AVENUE = 250.00 FEET = 0.047 MILES

LAWRENCE
SHORT STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	18
PROJECT FILE NO.		612074	

TITLE SHEET

THESE PLANS ARE SUPPLEMENTED BY 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.

DESIGN DESIGNATION

	SHORT STREET	ERVING AVENUE
DESIGN SPEED	25 MPH	25 MPH
ADT (2024)	2,765	4,195
ADT (2044)	3,075	4,660
K	10.5%	8.8%
D	67.1% SB	50.8% WB
T (PEAK HOUR)	2.4%	2.5%
T (AVERAGE DAY)	1.5%	1.8%
DHV	322	410
DDHV	217	208
FUNCTIONAL CLASSIFICATION	LOCAL	LOCAL

DRAFT
NOT FOR CONSTRUCTION



282 Merrimack St
2nd Floor
Lawrence, MA 01843
978-794-1792

311 Main Street
2nd Floor
Worcester, MA 01608
508-868-5104

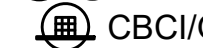
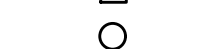
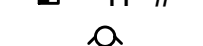
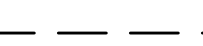
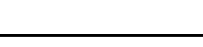
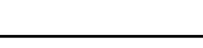
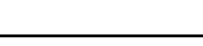
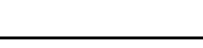
169 Ocean Blvd
PO Box 249
Hampton, NH 03842
603-601-8154

www.TheEngineeringCorp.com

APPROVED

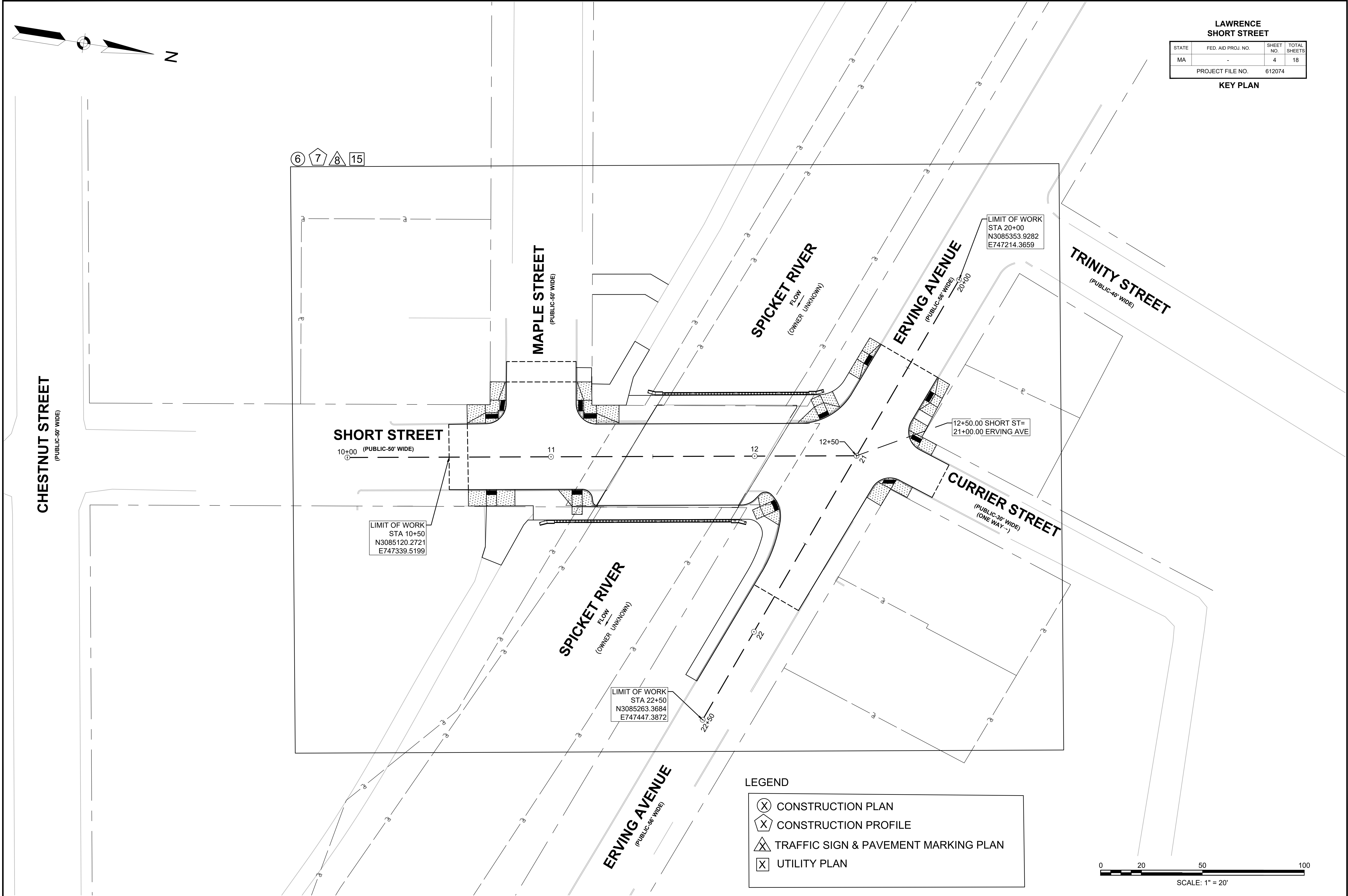
CHIEF ENGINEER

DATE

GENERAL SYMBOLS			TRAFFIC SYMBOLS			ABBREVIATIONS	
EXISTING	PROPOSED	DESCRIPTION	EXISTING	PROPOSED	DESCRIPTION	GENERAL	
		JERSEY BARRIER			CONTROLLER CABINET, FOUNDATION	AADT	ANNUAL AVERAGE DAILY TRAFFIC
		CATCH BASIN OR GUTTER INLET			CONTROLLER CABINET, FOUNDATION, CONC. PAD	ABAN	ABANDON
		CATCH BASIN OR GUTTER INLET W/ CURB INLET			MAST ARM FOUNDATION (SCALE OF BLOCK = DIAMETER IN INCHES)	ADJ	ADJUST
		FLAG POLE			MAST ARM (LENGTH NOTED)	APPROX.	APPROXIMATE
		GAS PUMP			EMERGENCY PREEMPTION CONFIRMATION STROBE LIGHT	A.C.	ASPHALT CONCRETE
		MAIL BOX			EMERGENCY PRE-EMPTION CONFIRMATION STROBE	ACCM PIPE	ASPHALT COATED CORRUGATED METAL PIPE
		POST SQUARE			PEDESTRIAN SIGNAL HEAD	AP	ANGLE POINT
		POST CIRCULAR			VEHICULAR SIGNAL HEAD	BIT.	BITUMINOUS
		WELL			PEDESTRIAN SIGNAL HEAD	BC	BOTTOM OF CURB
		ELECTRIC HANDHOLE			MAST ARM OR TS POLE MOUNTED SIGN	BD.	BOUND
		FENCE GATE POST			EMERGENCY PRE-EMPTION RECEIVER	BL	BASELINE
		GAS GATE			EMERGENCY PRE-EMPTION RECEIVER	BLDG	BUILDING
		BORING HOLE			EMERGENCY PRE-EMPTION CONFIRMATION STROBE	BM	BENCHMARK
		MONITORING WELL			PEDESTRIAN PUSH BUTTON	BO	BY OTHERS
		TEST PIT			YAGI ANTENNA	BOS	BOTTOM OF SLOPE
		HYDRANT			BICYCLE WIRE LOOP DETECTOR (SIZE AS NOTED)	BR.	BRIDGE
		LIGHT POLE			WIRE LOOP DETECTOR (SIZE AND TYPE NOTED)	CB	CATCH BASIN
		COUNTY BOUND			TRAFFIC SIGN (1 POST)	CBCI	CATCH BASIN WITH CURB INLET
		GPS POINT			TRAFFIC SIGN (2 POST)	CC	CEMENT CONCRETE
		CABLE MANHOLE			PULL BOX 12"x12" (OR AS NOTED)	CCM	CEMENT CONCRETE MASONRY
		DRAINAGE MANHOLE			ELECTRIC HANDHOLE 12"x24" (OR AS NOTED)	CEM	CEMENT
		ELECTRIC MANHOLE			TRAFFIC SIGNAL CONDUIT	CI	CURB INLET
		GAS MANHOLE				CIP	CAST IRON PIPE
		MISC MANHOLE				CLF	CHAIN LINK FENCE
		SEWER MANHOLE				CL	CENTERLINE
		TELEPHONE MANHOLE				CMP	CORRUGATED METAL PIPE
		WATER MANHOLE				CSP	CORRUGATED STEEL PIPE
		MASSACHUSETTS HIGHWAY BOUND				CO.	COUNTY
		MONUMENT				COMM	COMMUNICATIONS
		STONE BOUND				CONC	CONCRETE
		TOWN OR CITY BOUND				CONT	CONTINUOUS
		TRAVERSE OR TRIANGULATION STATION				CONST	CONSTRUCTION
		TROLLEY POLE OR GUY POLE				CR GR	CROWN GRADE
		TRANSMISSION POLE				CU	CONNECTION UNKNOWN
		UTILITY POLE W/ FIREBOX				DHV	DESIGN HOURLY VOLUME
		UTILITY POLE WITH DOUBLE LIGHT				DI	DROP INLET
		UTILITY POLE W / 1 LIGHT				DIA	DIAMETER
		UTILITY POLE				DIP	DUCTILE IRON PIPE
		BUSH				DW	STEADY DON'T WALK - PORTLAND ORANGE
		TREE				DWY	DRIVEWAY
		STUMP				ELEC	ELECTRICAL
		SWAMP / MARSH				ELEV (or EL.)	ELEVATION
		WATER GATE				EMB	EMBANKMENT
		PARKING METER				EOP	EDGE OF PAVEMENT
		OVERHEAD CABLE/WIRE				EXIST (or EX)	EXISTING
		CURBING				EXC	EXCAVATION
		CONTOURS (ON-THE-GROUND SURVEY DATA)				F&C	FRAME AND COVER
		CONTOURS (PHOTOGRAMMETRIC DATA)				F&G	FRAME AND GRATE
		UNDERGROUND DRAIN PIPE (DOUBLE LINE 24 INCH AND OVER)				FDP	FULL DEPTH PAVEMENT
		UNDERGROUND ELECTRIC DUCT (DOUBLE LINE 24 INCH AND OVER)				FDN	FOUNDATION
		UNDERGROUND GAS MAIN (DOUBLE LINE 24 INCH AND OVER)				FLDSTN	FIELDSTONE
		UNDERGROUND SEWER MAIN (DOUBLE LINE 24 INCH AND OVER)					

CONSTRUCTION NOTES:

1. EXISTING CONDITIONS INFORMATION COMPILED FROM AN ON-THE-GROUND INSTRUMENT SURVEY PERFORMED BY HANCOCK ASSOCIATES FROM MARCH 2023 TO MAY 2023.
- HORIZONTAL DATUM = NAD83 (MASSACHUSETTS STATE PLANE COORDINATES)
VERTICAL DATUM = NAVD88
2. ALL EXISTING STATE, COUNTY, AND CITY LOCATION LINES HAVE BEEN ESTABLISHED FROM AN ACTUAL ON-THE-GROUND SURVEY. ALL PRIVATE PROPERTY LINES HAVE BEEN ESTABLISHED FROM AVAILABLE INFORMATION AND THEIR EXACT LOCATIONS ARE NOT GUARANTEED.
3. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL CONTACT DIGSAFE (1-888-DIGSAFE) 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.
4. 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.
5. ALL MUNICIPALLY OWNED UTILITY STRUCTURES (CATCH BASINS, DRAIN MANHOLES, WATER GATES, SEWER MANHOLES, ETC.) WITHIN THE PROJECT LIMITS SHALL BE ADJUSTED BY THE CONTRACTOR TO FINISHED GRADE UNLESS DIRECTED OTHERWISE.
6. ALL PRIVATELY OWNED UTILITY STRUCTURES (GAS GATES, ELECTRIC / TELEPHONE MANHOLES, ETC.) WITHIN THE PROJECT LIMITS 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.
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. THE TERM "MEET EXIST" MEANS TO MEET BOTH THE EXISTING ALIGNMENT AND ELEVATION.
9. DETECTABLE WARNING PANELS ARE REQUIRED ON ALL PROPOSED PEDESTRIAN CURB RAMPS AND SHALL BE INSTALLED IN ACCORDANCE WITH MASSDOT CONSTRUCTION STANDARDS. PROPOSED DETECTABLE WARNING PANELS SHALL BE RED. CONTRACTOR TO COORDINATE WITH CITY OF LAWRENCE ON EXACT COLOR.
10. 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 CONTRACTOR'S EXPENSE.
11. ALL DISTURBED AREAS OUTSIDE THE CURBLINE SHALL BE STABILIZED WITH 4" LOAM AND SEED, UNLESS OTHERWISE NOTED.
12. ALL EXISTING GRANITE CURB THAT MEETS SPECIFICATIONS SHALL BE REUSED IN THE PROPOSED WORK, AS APPROVED BY THE ENGINEER.
13. 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.
14. AN UNOBSTRUCTED PATH OF TRAVEL WITH A MINIMUM WIDTH OF 4'-0" (EXCLUDING THE WIDTH OF CURB) SHALL BE MAINTAINED PAST ALL OBSTRUCTIONS (UTILITY POLES, LIGHT POLES, SIGNS, MAILBOXES, ALONG DRIVEWAY OPENINGS, ETC.)
15. ALL OBJECTS SHALL BE A MINIMUM DISTANCE OF 3'-0" (EXCLUDING THE WIDTH OF CURB) FROM THE SHARED USE PATH (UTILITY POLES, LIGHT POLES, SIGNS, MAILBOXES, ALONG DRIVEWAY OPENINGS, ETC.).
16. IN INSTANCES WHERE AN EXISTING MANHOLE, HANDHOLE, OR OTHER "SURFACE" TYPE STRUCTURE THAT IS NOT CALLED OUT TO BE REMOVED OR RESET IS WITHIN THE PROPOSED OR EXISTING (IF RECIPROCAL OR WITHIN PROJECT LIMITS) ACCESSIBLE SURFACE, THE STRUCTURE SHALL BE CAREFULLY ADJUSTED SUCH THAT THE TOP MOST SURFACES OR THE STRUCTURE COVER SHALL BE FLUSH WITH THE CURB RAMP SURFACE.
17. CONTRACTOR TO TAKE CARE TO ENSURE PROPOSED GUARDRAIL POSTS DO NOT CONFLICT WITH PROPOSED AND EXISTING UNDERGROUND UTILITIES.



LAWRENCE
SHORT STREET

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MA	-	5	18
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TYPICAL SECTIONS & PAVEMENT NOTES

PAVEMENT NOTES

PROPOSED HMA MILL & OVERLAY
SURFACE: 1 1/2" SUPERPAVE BRIDGE SURFACE COURSE - 9.5 POLYMER (SSC-B - 9.5 - P) OVER
1 1/2" DEPTH PAVEMENT FINE MILLING

PROPOSED FULL DEPTH PAVEMENT

SURFACE: 1 1/2" SUPERPAVE BRIDGE SURFACE COURSE - 9.5 POLYMER (SSC-B - 9.5 - P) OVER
2" SUPERPAVE INTERMEDIATE COURSE - 12.5 POLYMER (SIC - 12.5 - P) OVER

BASE: 4" SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5) OVER

SUBBASE: 4" DENSE GRADED CRUSHED STONE FOR SUB-BASE OVER
8" GRAVEL BORROW, TYPE b OVER

SUBGRADE: SPECIAL BORROW AS REQUIRED BASED ON EXISTING SUBGRADE MATERIALS

PROPOSED BRIDGE PAVEMENT

SURFACE: 1 1/2" SUPERPAVE BRIDGE SURFACE COURSE - 9.5 POLYMER (SSC-B - 9.5 - P) OVER
1 1/2" SUPERPAVE BRIDGE PROTECTIVE COURSE - 9.5 POLYMER (SPC-B - 9.5-P)

PROPOSED TEMPORARY TRENCH PATCH

SURFACE: 2 1/2" HMA FOR TEMPORARY ASPHALT PATCHING

BASE: EXISTING MATERIAL SUITABLE FOR RE-USE

PROPOSED PERMANENT PAVEMENT TRENCH PATCH

SURFACE: 1 1/2" SUPERPAVE BRIDGE SURFACE COURSE - 9.5 POLYMER (SSC-B - 9.5 - P) OVER
2" SUPERPAVE INTERMEDIATE COURSE - 12.5 POLYMER (SIC - 12.5 - P) OVER
VARIABLE DEPTH SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC - 19.0)
(COMPACTED IN 2 1/4" (MIN) AND 3 1/2" (MAX) LIFTS)
(SEE GENERAL PAVEMENT NOTE 6) OVER

BASE: 8" GRAVEL BORROW, TYPE b OVER

SUBBASE: EXISTING MATERIAL SUITABLE FOR RE-USE SUPPLEMENTED WITH
GRAVEL BORROW AS NECESSARY TO MATCH GRADE
(SEE VARIOUS TRENCH DETAILS)

PROPOSED CEMENT CONCRETE PEDESTRIAN CURB RAMPS / SIDEWALKS

SURFACE: 4" CEMENT CONCRETE (4000 PSI, 3/4", 610)

BASE: 8" SUITABLE EXISTING GRAVEL;
ADD GRAVEL BORROW, TYPE b AS REQUIRED

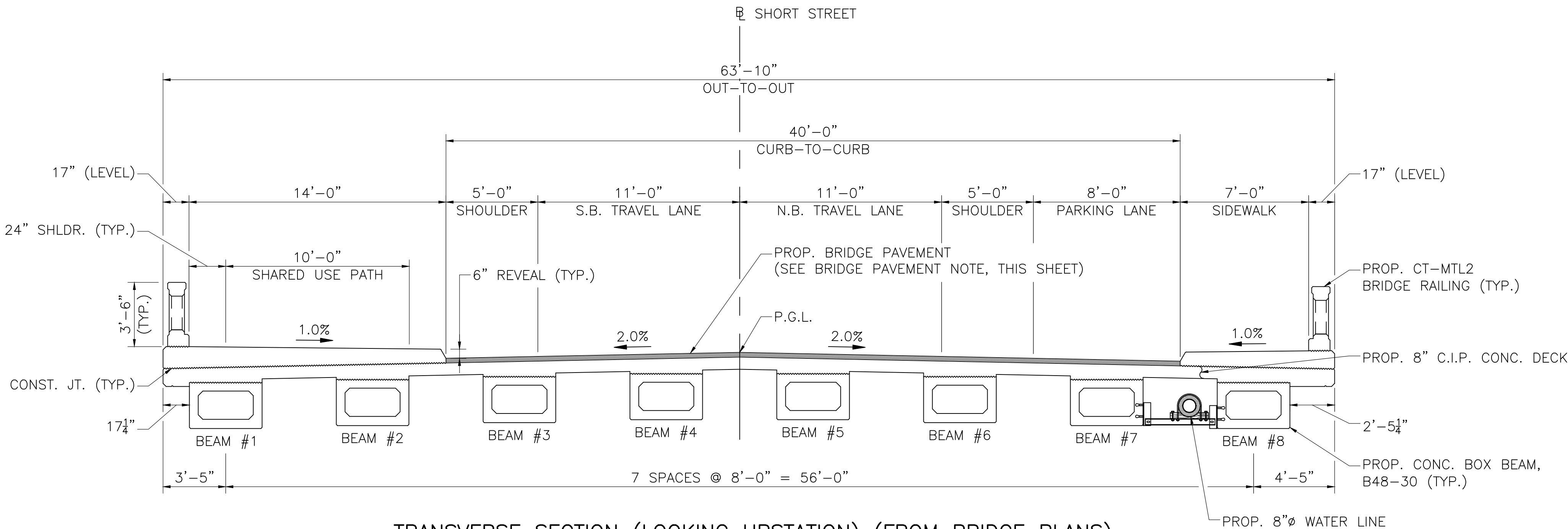
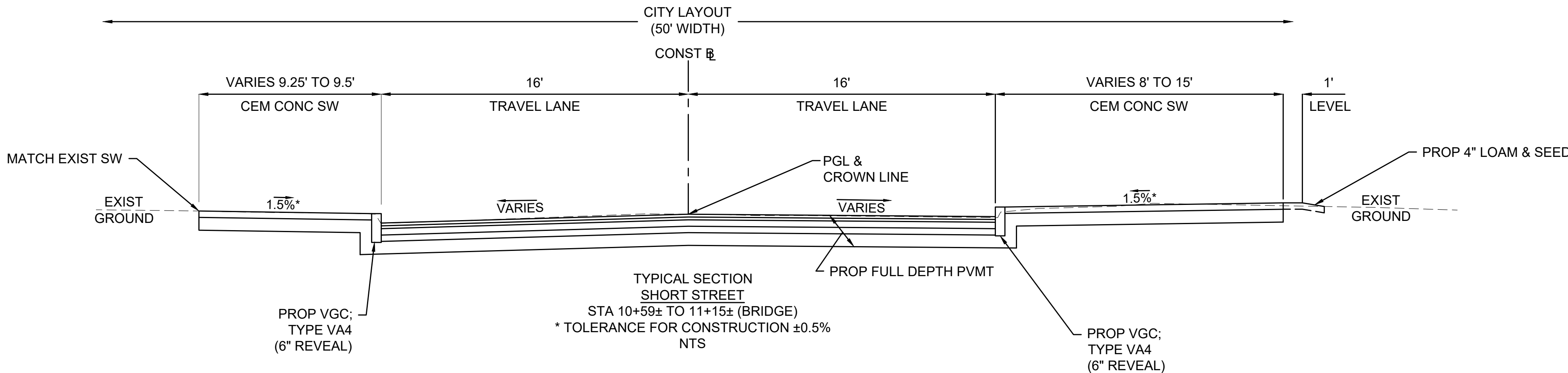
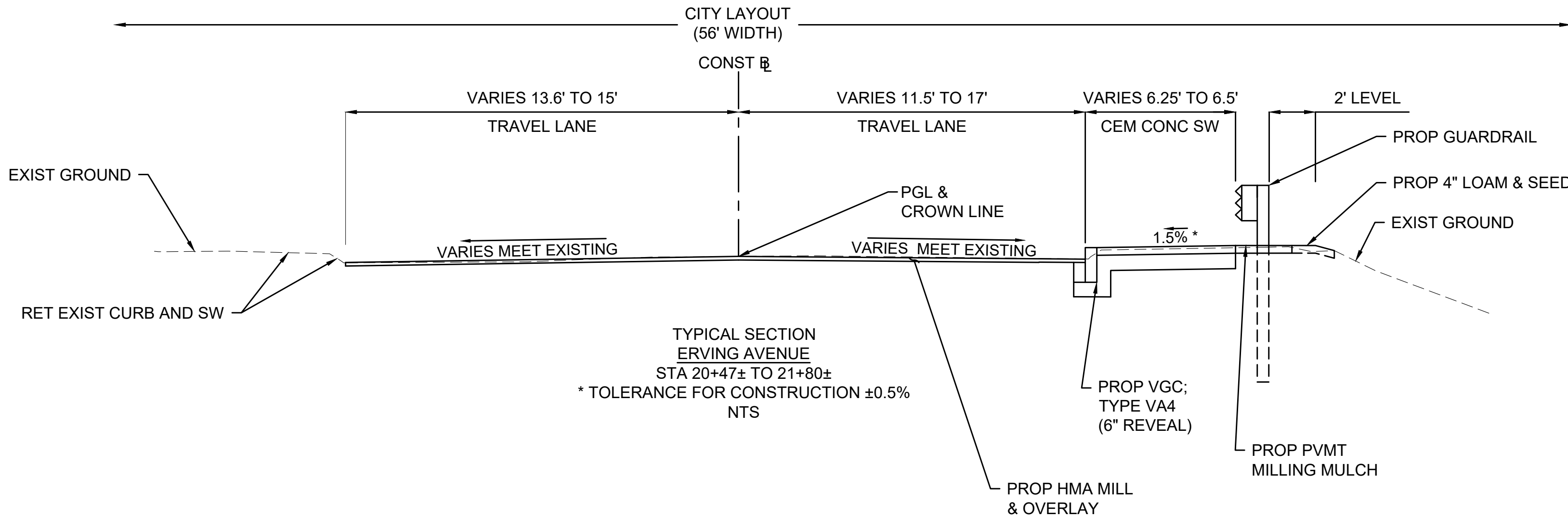
PROPOSED HMA SIDEWALK

SURFACE: 1 1/4" SUPERPAVE SURFACE COURSE - 9.5 (SSC - 9.5) OVER
1 3/4" SUPERPAVE SURFACE COURSE - 12.5 (SSC - 12.5) OVER

BASE: 8" SUITABLE EXISTING GRAVEL;
ADD GRAVEL BORROW, TYPE b AS REQUIRED

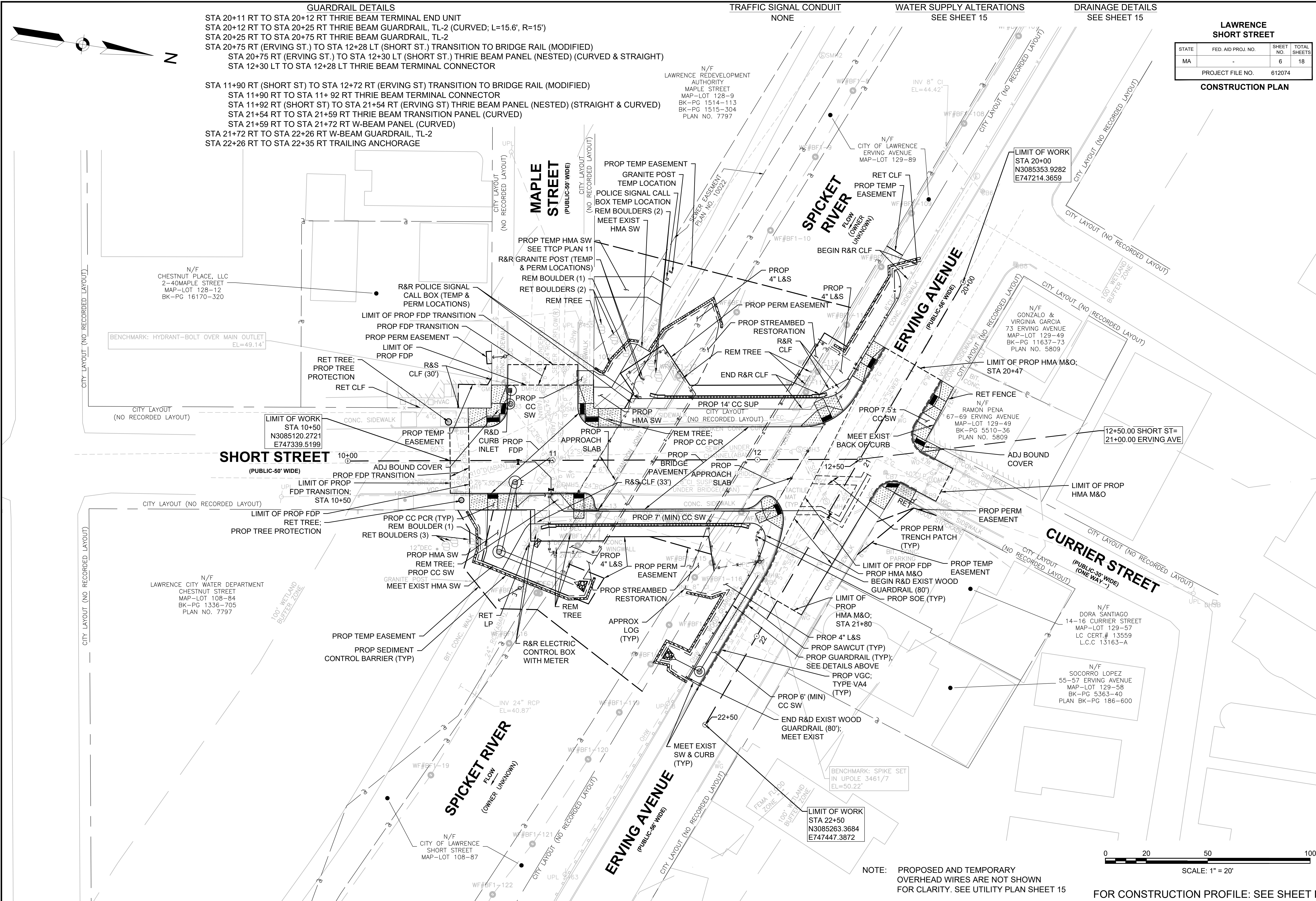
GENERAL PAVEMENT NOTES:

- ALL HMA SHALL BE IN ACCORDANCE WITH SECTION 450.
- 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.
- ASPHALT EMULSION FOR TACK COAT SHALL BE RS-1H TO RESIST TRACKING OF TACK BY HAUL VEHICLES.
- ALL EMBANKMENT SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES SECTIONS 100, 400 AND SECTION M MATERIALS. ALL EXISTING GRAVEL MEETING MATERIAL SPECIFICATIONS SHALL BE RETAINED IN-PLACE, COMPACTED, AND LEVELED AS REQUIRED.
- HMA FOR WALKS SHALL BE IN ACCORDANCE WITH SECTION 702.
- TOTAL DEPTH OF PROPOSED PAVEMENT IN PERMANENT TRENCH PATCH SHALL BE 7" OR SHALL MATCH EXISTING PAVEMENT DEPTH, WHICHEVER DEPTH IS DEEPER.



TRANSVERSE SECTION (LOOKING UPSTATION) (FROM BRIDGE PLANS)

SCALE: 1/4" = 1'-0"



- GUARDRAIL DETAILS**
STA 20+11 RT TO STA 20+12 RT THRIE BEAM TERMINAL END UNIT
STA 20+12 RT TO STA 20+25 RT THRIE BEAM GUARDRAIL, TL-2 (CURVED; L=15.6', R=15')
STA 20+25 RT TO STA 20+75 RT THRIE BEAM GUARDRAIL, TL-2
STA 20+75 RT (ERVING ST.) TO STA 12+28 LT (SHORT ST.) TRANSITION TO BRIDGE RAIL (MODIFIED)
STA 20+75 RT (ERVING ST.) TO STA 12+30 LT (SHORT ST.) THRIE BEAM PANEL (NESTED) (CURVED & STRAIGHT)
STA 12+30 LT TO STA 12+28 LT THRIE BEAM TERMINAL CONNECTOR
- STA 11+90 RT (SHORT ST) TO STA 12+72 RT (ERVING ST) TRANSITION TO BRIDGE RAIL (MODIFIED)
STA 11+92 RT (SHORT ST) TO STA 21+54 RT (ERVING ST) THRIE BEAM PANEL (NESTED) (STRAIGHT & CURVED)
STA 21+54 RT TO STA 21+59 RT THRIE BEAM TRANSITION PANEL (CURVED)
STA 21+59 RT TO STA 21+72 RT W-BEAM PANEL (CURVED)
STA 21+72 RT TO STA 22+26 RT W-BEAM GUARDRAIL, TL-2
STA 22+26 RT TO STA 22+35 RT TRAILING ANCHORAGE

TRAFFIC SIGNAL CONDUIT
NONE

WATER SUPPLY ALTERATIONS
SEE SHEET 15

DRAINAGE DETAILS
SEE SHEET 15

LAWRENCE SHORT STREET			
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	6	18
PROJECT FILE NO.		612074	
CONSTRUCTION PLAN			

NOTE: PROPOSED AND TEMPORARY
OVERHEAD WIRES ARE NOT SHOWN
FOR CLARITY. SEE UTILITY PLAN SHEET 15

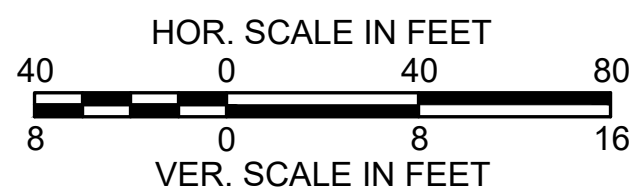
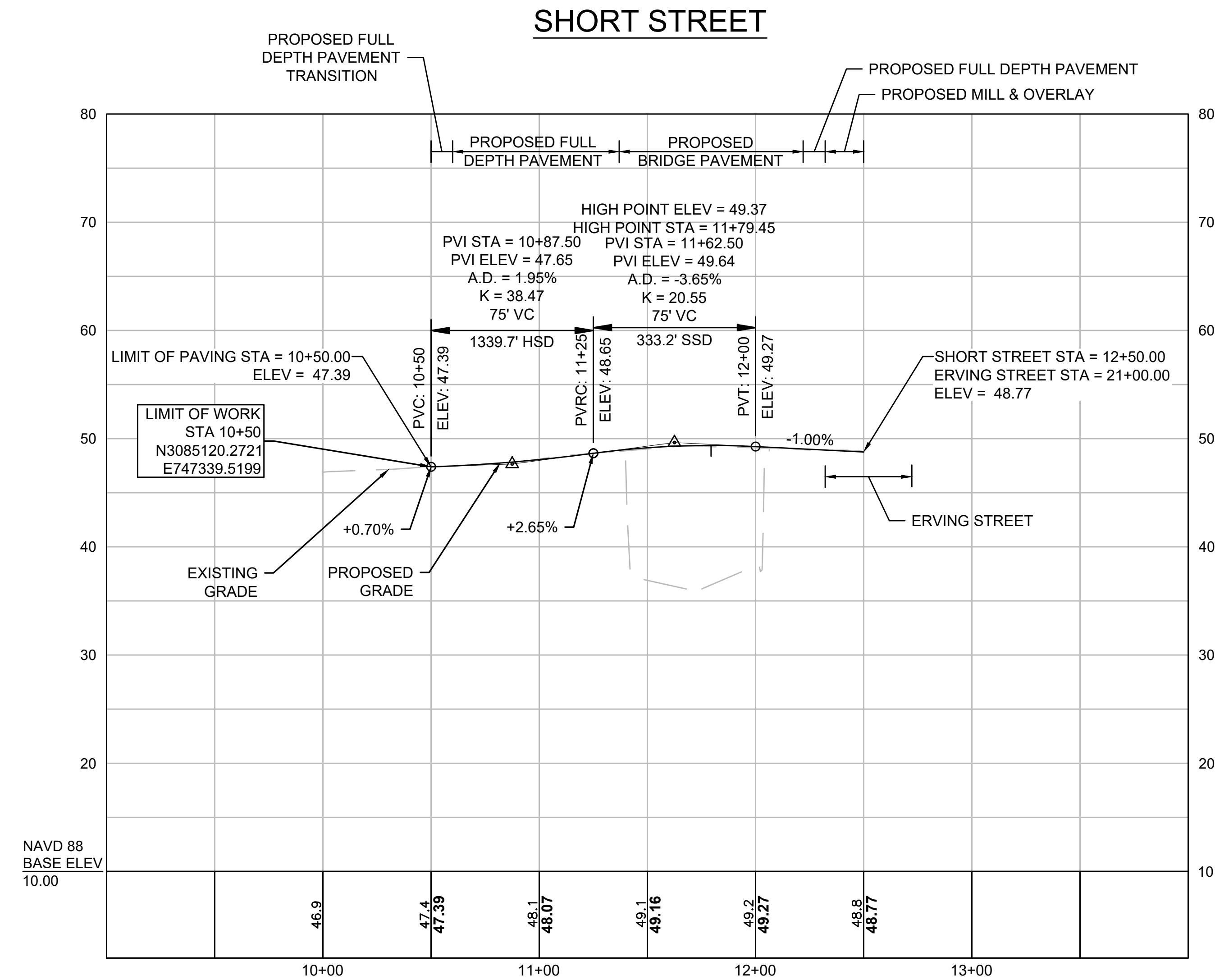


FOR CONSTRUCTION PROFILE: SEE SHEET NO. 7

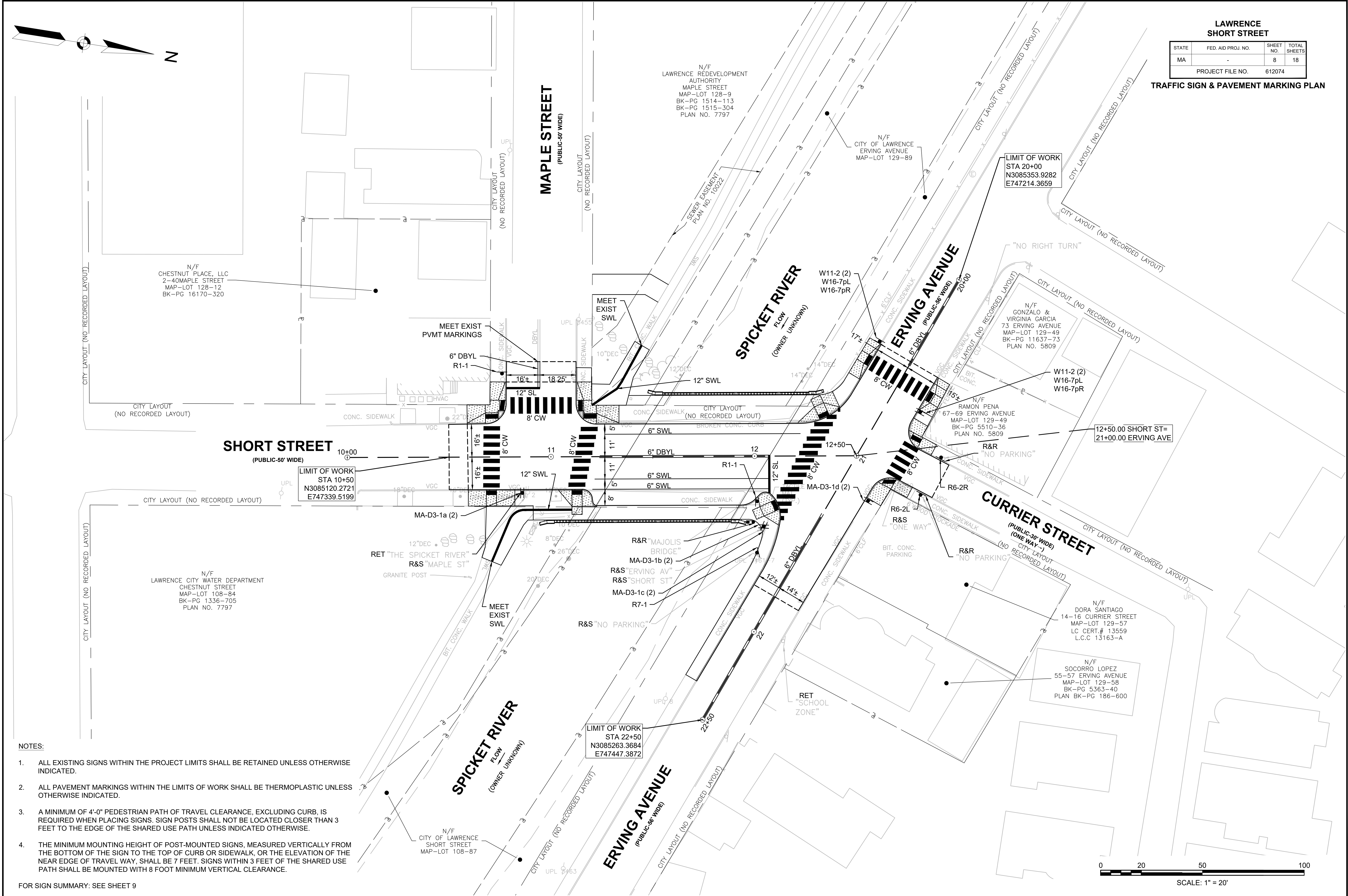
LAWRENCE
SHORT STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	7	18
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PROFILE



FOR CONSTRUCTION PLAN: SEE SHEET NO. 6



TRAFFIC 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			
MA-D3-1a	39	12	SEE BELOW	6D/4D	2.75 3.25	N/A	2	GREEN	WHITE	WHITE	P5 1	PAID FOR UNDER ITEM 874.	
MA-D3-1b	36	12	SEE BELOW	6D/4D	3.00 3.00	N/A	2	GREEN	WHITE	WHITE	P5 1	PAID FOR UNDER ITEM 874.	
MA-D3-1c	45	12	SEE BELOW	6D/4D	2.75 3.25	N/A	2	GREEN	WHITE	WHITE	0 MOUNT W/ MA-D3-1b (1)	PAID FOR UNDER ITEM 874.	
MA-D3-1d	42	12	SEE BELOW	6D/4D	3.00 3.00	N/A	2	GREEN	WHITE	WHITE	P5 1	PAID FOR UNDER ITEM 874.	
R1-1	30	30		①			2	RED	WHITE	WHITE	P5 2	6.25	12.50
R6-2L	24	30					1	WHITE	BLACK	BLACK	P5 1	5.00	5.00
R6-2R	24	30					1	WHITE	BLACK	BLACK	P5 1	5.00	5.00
R7-1	12	18					1	WHITE	RED	RED	P5 1	1.50	1.50
W11-2	30	30					4	FL. YELLOW- GREEN	BLACK	BLACK	P5 2	6.25	25.00
W16-7pL	21	15					2	FL. YELLOW- GREEN	BLACK	BLACK	0 MOUNT W/ W11-2 (2)	2.19	4.38
W16-7pR	21	15					2	FL. YELLOW- GREEN	BLACK	BLACK	0 MOUNT W/ W11-2 (2)	2.19	4.38

Maple St

MA-D3-1a

Short St

MA-D3-1b

Erving Ave

MA-D3-1c

Currier St

MA-D3-1d

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 THE CURB OR SIDEWALK SHALL BE 7 FEET. SIGNS WITHIN 3 FEET OF THE SHARED USE PATH SHALL BE MOUNTED WITH 8 FOOT MINIMUM VERTICAL CLEARANCE.
3. A MINIMUM OF 4'-0" PATH OF TRAVEL CLEARANCE, EXCLUDING CURB, IS REQUIRED WHEN PLACING SIGNS. SIGN POSTS SHALL NOT BE LOCATED CLOSER THAN 3 FEET TO THE EDGE OF THE SHARED USE PATH UNLESS INDICATED OTHERWISE.

LAWRENCE
SHORT STREET

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TEMPORARY TRAFFIC CONTROL PLANS - 1 OF 5

TEMPORARY TRAFFIC CONTROL LEGEND			
	WORK ZONE		REFLECTORIZED DRUM W/ SEQUENTIAL FLASHING LIGHTS
	DIRECTION OF TRAVEL		CONSTRUCTION BARRIER W/ REFLECTORS OR WARNING LIGHTS
	SIGN		TYPE III BARRICADES
	TRAFFIC SIGNAL		IMPACT ATTENUATOR
	ARROW BOARD		PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)
	REFLECTORIZED PLASTIC DRUM OR 36" CONE		

TAPER LENGTH CRITERIA FOR TEMPORARY TRAFFIC CONTROL ZONES

TAPER TYPE	TAPER LENGTH
MERGING TAPER	AT LEAST L
SHIFTING TAPER	AT LEAST 0.5L
SHOULDER TAPER	AT LEAST 0.33L
ONE-LANE, TWO-WAY TRAFFIC TAPER	50 FEET MIN, 100 FEET MAX
DOWNSTREAM TAPER	50 FEET MIN., 100 FEET MAX (PER LANE)
TANGENT LENGTH	AT LEAST 2L

BUFFER SPACING

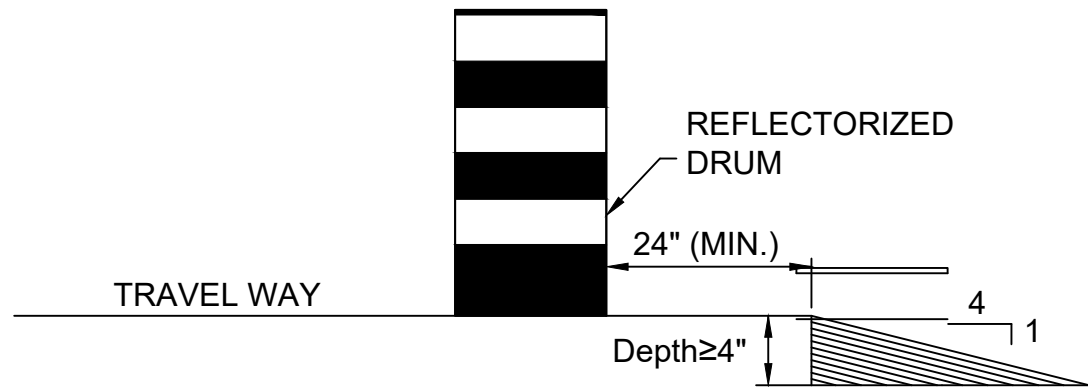
SPEED (MPH)	DISTANCE (FEET)
20	115
25	155
30	200
35	250
40	305

BUFFER SPACING NOTES:

- SPEED NOTED EQUALED TO POSTED SPEED, OFF-PEAK 85TH PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED.

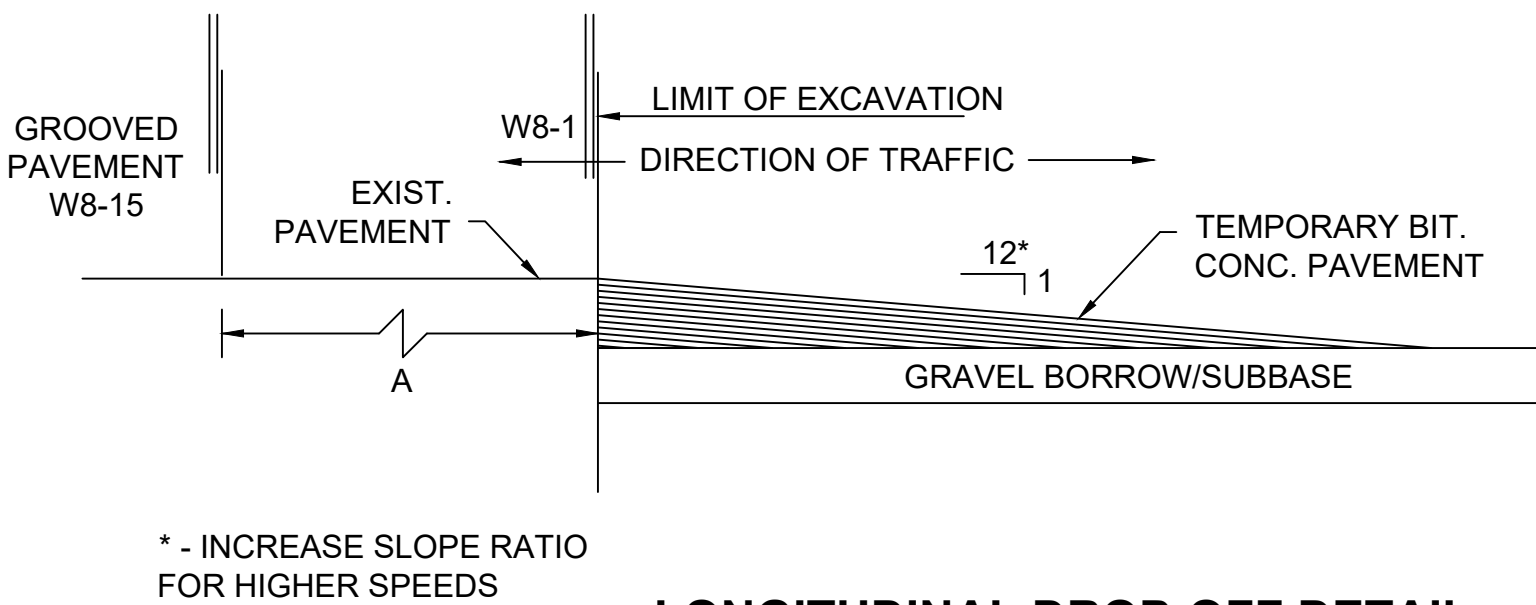
SUGGESTED WORK ZONE WARNING SIGN SPACING

ROAD TYPE	DISTANCE BETWEEN SIGNS			
	A	B	C	D
URBAN (30MPH OR LESS)	100 FEET	100 FEET	100 FEET	100 FEET



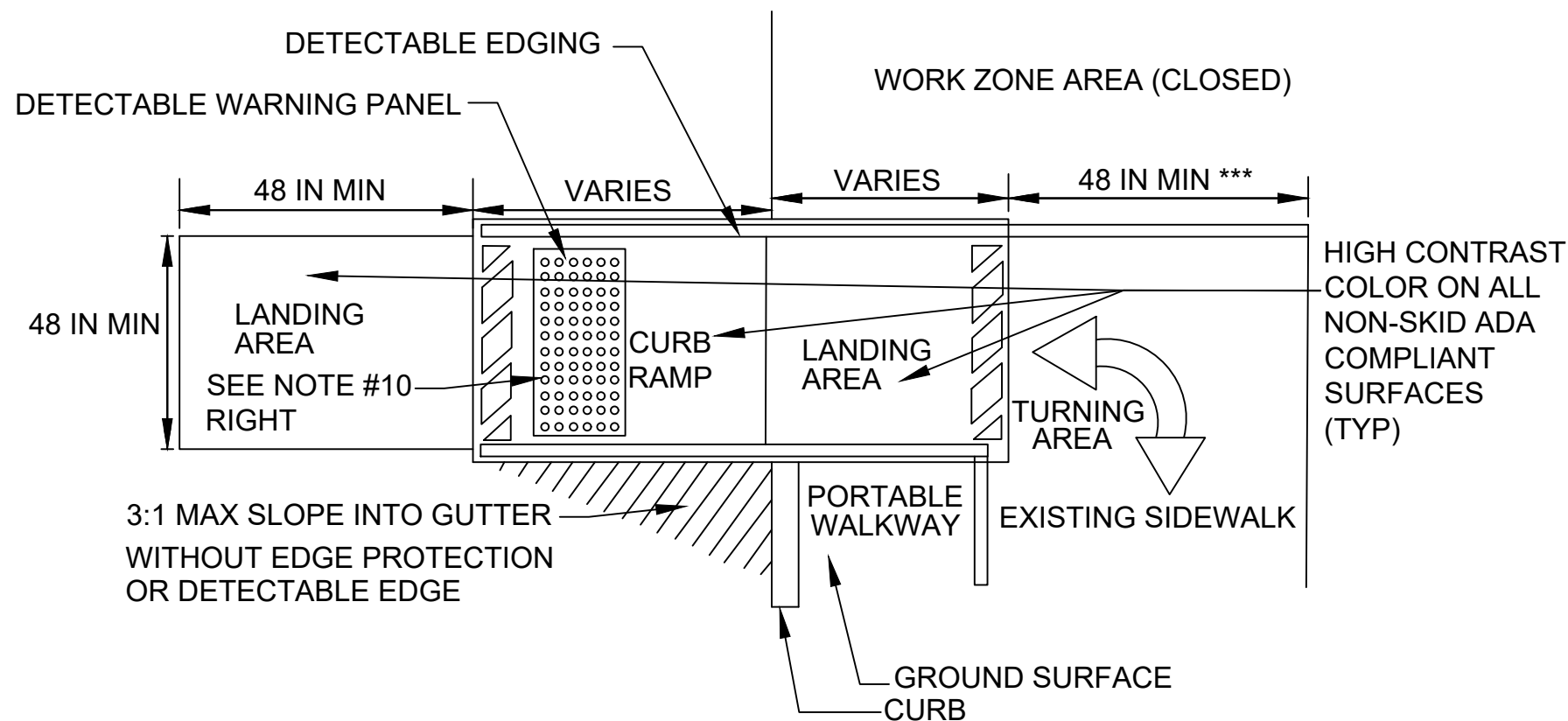
LATERAL DROP-OFF DETAIL

NOT TO SCALE



LONGITUDINAL DROP-OFF DETAIL

NOT TO SCALE

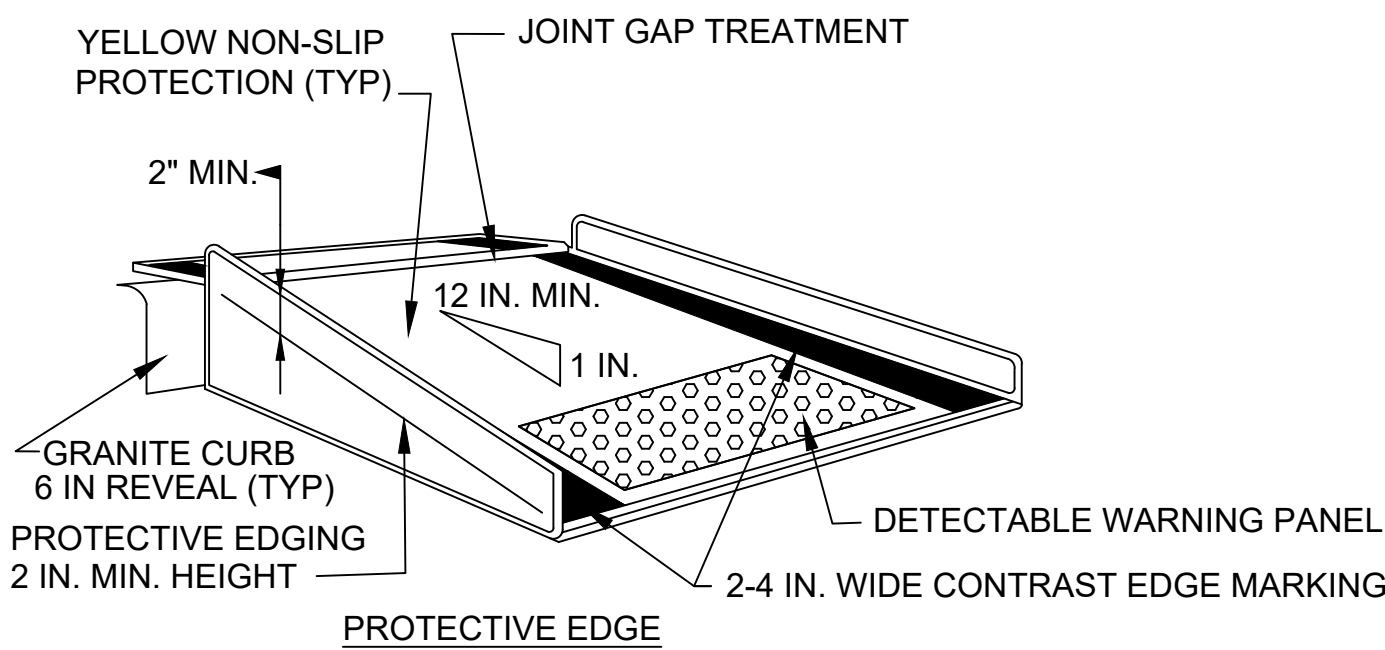


* -LANDING AREA USED TO OVERLAP NON-ADA COMPLIANT SURFACES.

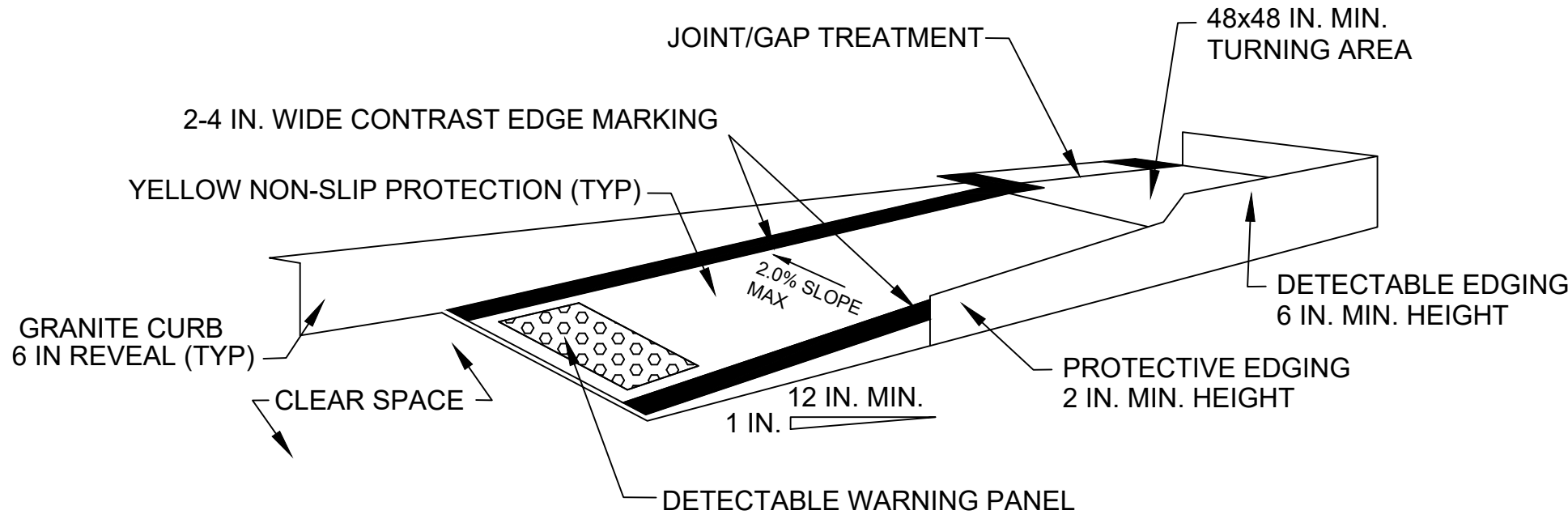
** -DETECTABLE EDGE REMOVED IF A CONTINUOUS SIDEWALK.

*** -60 INCH IF AN OBSTRUCTION IS AT BACK OF SIDEWALK

TEMPORARY CURB RAMP-TYPE 2



TEMPORARY CURB RAMP-PERPENDICULAR TO CURB



TEMPORARY CURB RAMP PARALLEL TO CURB

SIGN SPACING NOTES:

- ROAD TYPE TO BE DETERMINED BY MASSDOT OFFICE OF TRANSPORTATION PLANNING
- THE "A" DIMENSION SHOULD BE MEASURED FROM THE START OF THE TRAVEL LANE RESTRICTION OR THE SHOULDER / BREAKDOWN LANE RESTRICTION, WHICHEVER IS APPLICABLE.
- THE "D" DIMENSION SHOULD BE THE DISTANCE FOLLOWING THE TERMINATION OF THE WORK ZONE TO THE PLACEMENT OF THE MA-R2-10e "END WORK ZONE - DOUBLE FINES END" SIGN.
- MA-R2-10a SIGNS SHALL BE PLACED HALFWAY BETWEEN THE SECOND AND THIRD SIGNS NOTED ABOVE.
- SIGN SPACING MAY NEED TO BE INCREASED IF ADDITIONAL SIGNS ARE REQUIRED PER THE DETAIL / TYPICAL SETUP FIGURES.

TEMPORARY PEDESTRIAN CONTROL NOTES:

- PEDESTRIAN DETOUR ROUTES MUST BE ADA/AAB COMPLIANT.
- WHEN EXISTING PEDESTRIAN FACILITIES ARE DISRUPTED, CLOSED, OR RELOCATED IN A TTC ZONE, TEMPORARY FACILITIES SHALL BE PROVIDED AND THEY SHALL BE DETECTABLE AND INCLUDE ACCESSIBILITY FEATURES CONSISTENT WITH THE FEATURES PRESENT IN THE EXISTING PEDESTRIAN FACILITY.
- A PEDESTRIAN CHANNELIZING DEVICE THAT IS DETECTABLE BY A PERSON WITH A VISUAL DISABILITY TRAVELING WITH THE AID OF A LONG CANE SHALL BE PLACED ACROSS THE FULL WIDTH OF THE CLOSED SIDEWALK.
- WHEN USED, TEMPORARY RAMPS SHALL COMPLY WITH AMERICANS WITH DISABILITIES ACT (SEE PEDESTRIAN TYPICAL DETAILS).
- THE ALTERNATE PATHWAY SHOULD HAVE A SMOOTH CONTINUOUS HARD SURFACE FOR THE ENTIRE LENGTH OF THE TEMPORARY PEDESTRIAN FACILITY.
- THE PROTECTIVE REQUIREMENTS OF A TTC SITUATION HAVE PRIORITY IN DETERMINING THE NEED FOR TEMPORARY TRAFFIC BARRIERS AND THEIR USE IN THIS SITUATION SHOULD BE BASED ON ENGINEERING JUDGEMENT.
- AUDIBLE INFORMATION DEVICES SHOULD BE CONSIDERED WHERE MIDBLOCK CLOSINGS AND CHANGED CROSSWALK AREAS CAUSE INADEQUATE COMMUNICATION TO BE PROVIDED TO PEDESTRIANS WHO HAVE VISUAL DISABILITIES.
- FOR LONG TERM SIDEWALK CLOSURES (AT A MINIMUM OVERNIGHT) A FORM OF SPEECH MESSAGING FOR PEDESTRIANS WITH VISUAL DISABILITIES SHALL BE PROVIDED. AUDIBLE INFORMATION DEVICES SUCH AS DETECTABLE BARRIERS OR BARRICADES AND OTHER PASSIVE PEDESTRIAN ACTIVATION (MOTION ACTIVATED) DEVICES SHOULD BE CONSIDERED FOR THESE CASES. THESE AUDIBLE DEVICES CAN BE MOUNTABLE OR STAND ALONE.

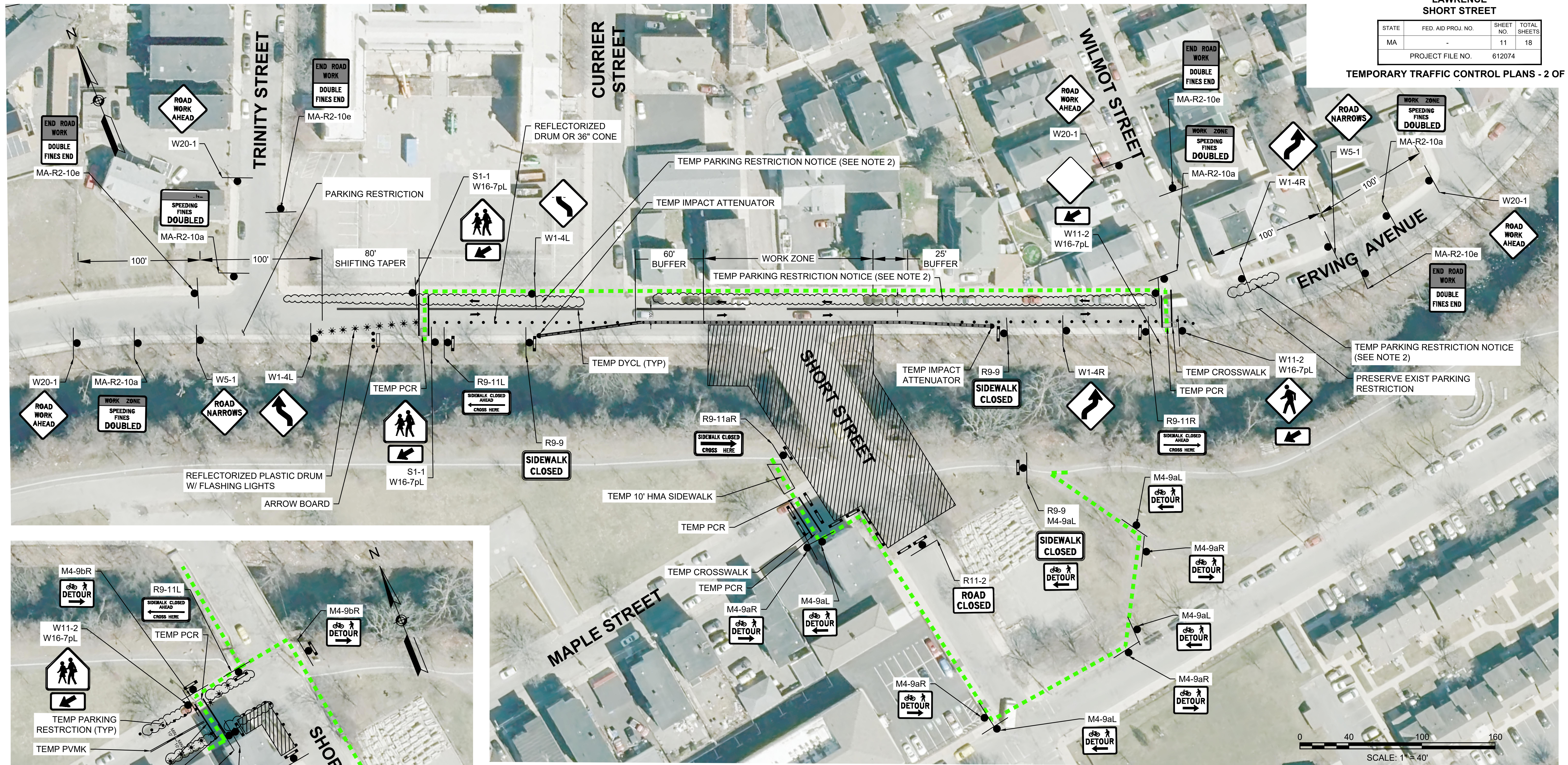
TYPICAL PEDESTRIAN DEVICE NOTES:

- PEDESTRIAN CURB RAMPS SHALL BE 48 INCH MINIMUM WIDTH WITH A FIRM, STABLE AND NON-SLIP SURFACE.
- PROTECTIVE EDGING WITH A 2 INCH MINIMUM HEIGHT SHALL BE INSTALLED WHEN THE CURB RAMP OR LANDING PLATFORM HAS A VERTICAL DROP OF 6 INCHES OR GREATER OR HAS A SIDE APRON SLOPE STEEPER THAN 1:3 (33%). PROTECTIVE EDGING SHOULD BE CONSIDERED WHEN THE CURB RAMPS OR LANDING PLATFORMS HAVE A VERTICAL DROP OF 3 INCHES OR MORE.
- PROTECTABLE EDGING WITH 6 INCH MINIMUM HEIGHT AND CONTRASTING COLOR SHALL BE INSTALLED ON ALL CURB RAMP LANDINGS WHERE THE WALKWAY CHANGES DIRECTION (TURNS).
- THE CURB RAMP WALKWAY AND LANDING AREA SURFACE SHALL BE OF A SOLID CONTINUOUS CONTRASTING COLOR ABUTTING UP TO THE EXISTING SIDEWALK.
- CURB RAMPS AND LANDINGS SHOULD HAVE A 1:50 (2%) MAX CROSS-SLOPE.
- CLEAR SPACE OF 48x48 INCH MINIMUM SHALL BE PROVIDED ABOVE AND BELOW THE CURB RAMP.
- WATER FLOW IN THE GUTTER SYSTEM SHALL HAVE MINIMAL RESTRICTION.
- LATERAL JOINTS OR GAPS BETWEEN SURFACES SHALL BE LESS THAN 0.5 INCHES WIDTH.
- CHANGES BETWEEN SURFACE HEIGHTS SHOULD NOT EXCEED 0.5 INCHES LATERAL EDGES SHOULD BE VERTICAL UP TO 0.25 IN. HIGH, AND BEVELED AT 1:2 BETWEEN 0.25 INCHES AND 0.5 INCHES HEIGHT.
- IF A TEMPORARY PEDESTRIAN RAMP LEADS TO A CROSSWALK, THEN A DETECTABLE WARNING PAD MUST BE ADHERED TO THE BASE OF THE RAMP. IF IT LEADS TO A PROTECTED PEDESTRIAN BYPASS THAT DOES NOT CONFLICT WITH VEHICULAR TRAFFIC, THEN A PAD SHALL NOT BE INSTALLED ON THE RAMP.

LAWRENCE
SHORT STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	11	18
PROJECT FILE NO.		612074	

TEMPORARY TRAFFIC CONTROL PLANS - 2 OF 5



TEMPORARY TRAFFIC CONTROL LEGEND

- WORK ZONE
- SIGN
- ARROW BOARD
- CONSTRUCTION BARRIER W/ REFLECTORS OR WARNING LIGHTS
- REFLECTORIZED PLASTIC DRUM OR 36" CONE
- REFLECTORIZED PLASTIC DRUM WITH FLASHING LIGHTS
- TEMPORARY PARKING RESTRICTION NOTICE ZONE
- TYPE III BARRICADE
- PEDESTRIAN PATH OF TRAVEL

PHASE 1A - SHORT STREET CLOSURE

SCALE: 1" = 40'

NOTE:

- ON SIDE STREETS WHERE NO DIMENSIONS ARE SHOWN, W20-1 SIGNS SHALL BE LOCATED 200' FROM THE LIMIT OF WORK, MA-R2-10a SIGNS SHALL BE LOCATED 100' FROM THE LIMIT OF WORK, AND MA-R2-10e SHALL BE LOCATED 100' FROM THE LIMIT OF WORK UNLESS OTHERWISE NOTED.
- CONTRACTOR SHALL COORDINATE WITH CITY ON TEMPORARY PARKING RESTRICTION NOTICES AND SIGNAGE.
- UP TO TWO (2) PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) ARE DENOTED IN THE PROJECT ITEMS LIST FOR THE PROJECT DURATION AND SHALL BE POSITIONED AT THE DISCRETION OF THE CONTRACTOR AND THE MASSDOT RESIDENT ENGINEER. PCMS ARE NOT CURRENTLY SHOWN ON THE TTC PLANS.

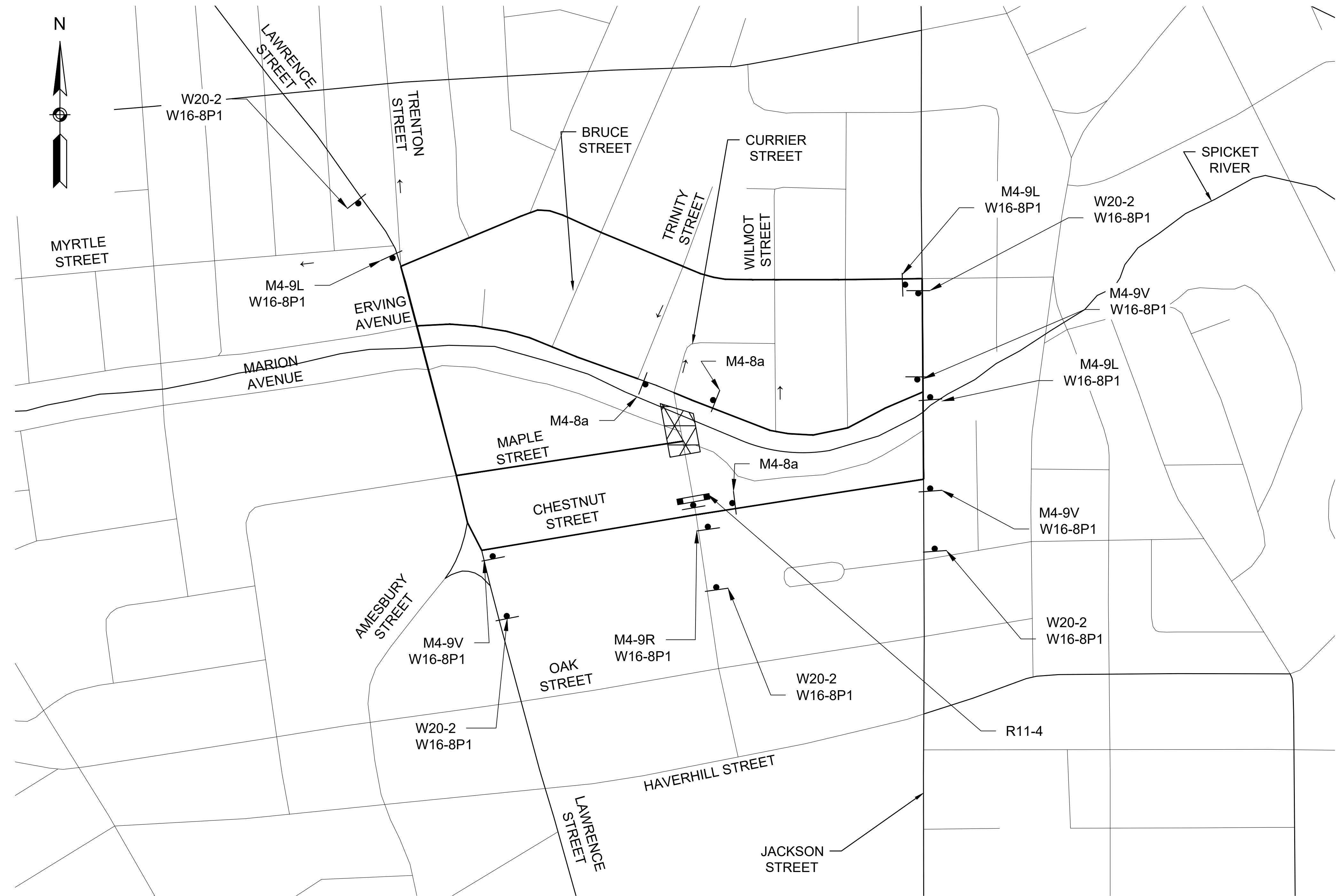
PHASE 1B - SHORT STREET SHORT-TERM PCR RECOMMENDATION

SCALE: 1" = 40'

LAWRENCE
SHORT STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	12	18
PROJECT FILE NO.		612074	

TEMPORARY TRAFFIC CONTROL PLANS - 3 OF 5

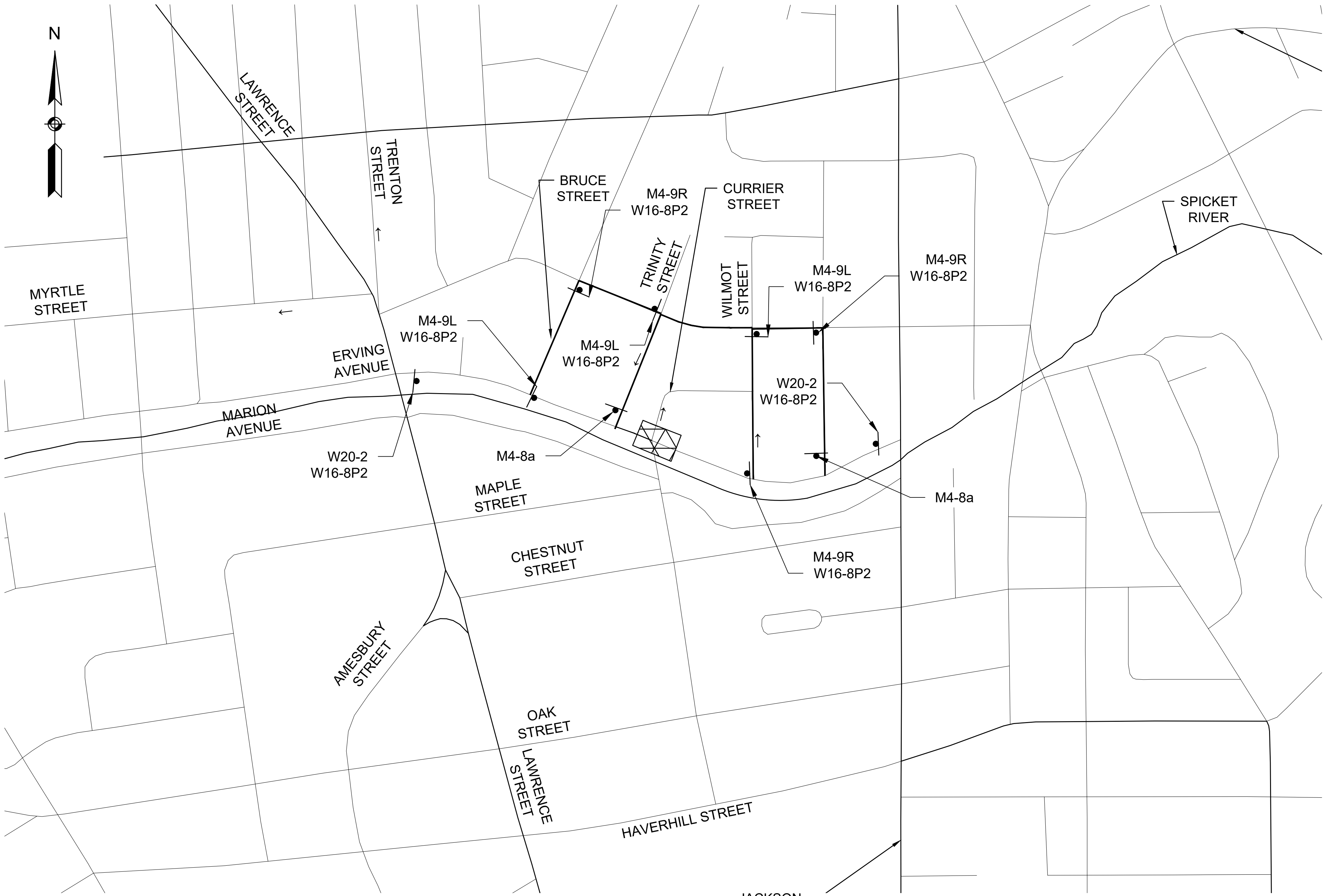


DETOUR PLAN & SIGNAGE SCHEMATIC FOR DETOUR CONDITIONS - SHORT STREET CLOSURE
SCALE: 1"=200'

LAWRENCE
SHORT STREET

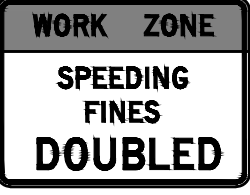
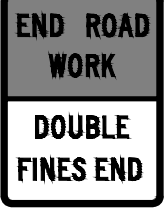
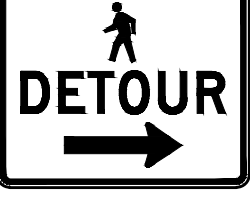
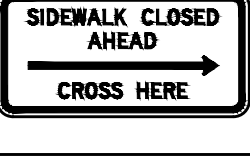
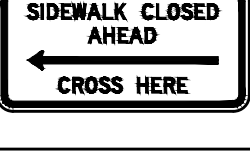
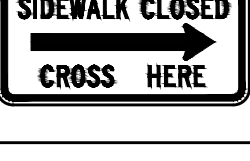
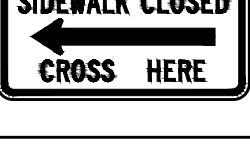
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	13	18
PROJECT FILE NO.		612074	

TEMPORARY TRAFFIC CONTROL PLANS - 4 OF 5



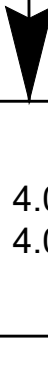
DETOUR PLAN & SIGNAGE SCHEMATIC FOR DETOUR CONDITIONS - ERVING AVENUE SHORT-TERM CLOSURE

SCALE: 1"=200'

TEMPORARY TRAFFIC SIGN SUMMARY											
IDENTIFICATION NUMBER	SIZE OF SIGN (INCHES)		LEGEND	TEXT DIMENSIONS (INCHES)			NUMBER OF SIGNS REQUIRED	COLOR			AREA IN SQUARE FEET
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING	ARROW RTE. MKR.		BACKGR OUND	LEGEND	BORDER	
MA-R2-10a	48	36					4	FL. ORANGE/ WHITE	BLACK	BLACK	48.00
MA-R2-10e	36	48					2	FL. ORANGE/ WHITE	BLACK	BLACK	24.00
M4-8a	24	18					3	FL. ORANGE	BLACK	BLACK	9.00
M4-9L	30	24					3	FL. ORANGE	BLACK	BLACK	15.00
M4-9R	30	24					4	FL. ORANGE	BLACK	BLACK	20.00
M4-9V	30	24					3	FL. ORANGE	BLACK	BLACK	15.00
M4-9aL	30	24					5	FL. ORANGE	BLACK	BLACK	25.00
M4-9aR	30	24					4	FL. ORANGE	BLACK	BLACK	20.00
M4-9bR	30	24					2	FL. ORANGE	BLACK	BLACK	10.00
R9-9	24	12					3	WHITE	BLACK	BLACK	6.00
R9-11R	24	18					2	WHITE	BLACK	BLACK	6.00
R9-11L	24	18					2	WHITE	BLACK	BLACK	6.00
R9-11aR	24	12					1	WHITE	BLACK	BLACK	2.00
R9-11aL	24	12					1	WHITE	BLACK	BLACK	2.00
R11-2	48	30					1	WHITE	BLACK	BLACK	10.00

NOTES:

1. MASSDOT STANDARD SIGN
2. CONTRACTOR TO FURNISH SIGNS CONSISTENT WITH 2009 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS. SEE MANUAL FOR TEXT AND LEGEND DIMENSIONS.
3. SIGNS MAY BERELOCATED FROM WORK ZONE SET-UP TO WORK ZONE SET-UP.

TEMPORARY TRAFFIC SIGN SUMMARY											
IDENTIFICATION NUMBER	SIZE OF SIGN (INCHES)		LEGEND	TEXT DIMENSIONS (INCHES)			NUMBER OF SIGNS REQUIRED	COLOR			AREA IN SQUARE FEET
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING	ARROW RTE. MKR.		BACKGR OUND	LEGEND	BORDER	
R11-4	60	30					1	WHITE	BLACK	BLACK	12.50
S1-1	36	36					4	FL. YELLOW-GREEN	BLACK	BLACK	36.00
W1-4L	36	36					2	FL. ORANGE	BLACK	BLACK	18.00
W1-4R	36	36					2	FL. ORANGE	BLACK	BLACK	18.00
W5-1	36	36					2	FL. ORANGE	BLACK	BLACK	18.00
W8-1	36	36					2	FL. ORANGE	BLACK	BLACK	18.00
W8-15	36	36					2	FL. ORANGE	BLACK	BLACK	18.00
W11-2	30	30					2	FL. YELLOW-GREEN	BLACK	BLACK	6.25
W16-7pL	21	15					6	FL. YELLOW-GREEN	BLACK	BLACK	13.13
W16-8P1	30	25	SEE RIGHT			6D	12	FL. ORANGE	BLACK	BLACK	62.50
W16-8P2	30	25	SEE RIGHT			6D	8	FL. ORANGE	BLACK	BLACK	41.67
W20-1	36	36					4	FL. ORANGE	BLACK	BLACK	36.00
W20-2	36	36					5	FL. ORANGE	BLACK	BLACK	45.00

LAWRENCE
SHORT STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	14	18
PROJECT FILE NO.		612074	

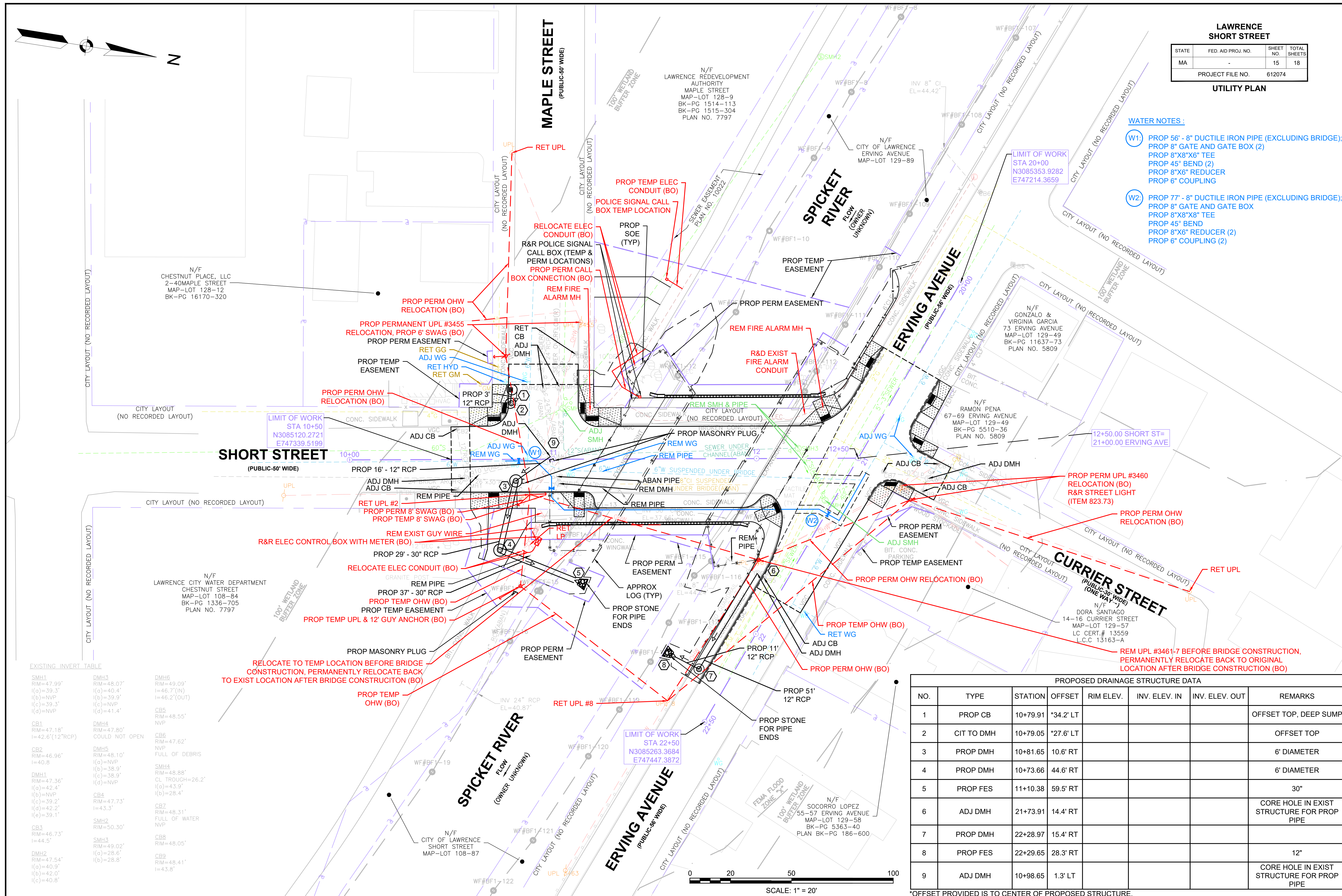
TEMPORARY TRAFFIC CONTROL PLANS - 5 OF 5

SHORT
ST

W16-8P1

ERVING
AVE

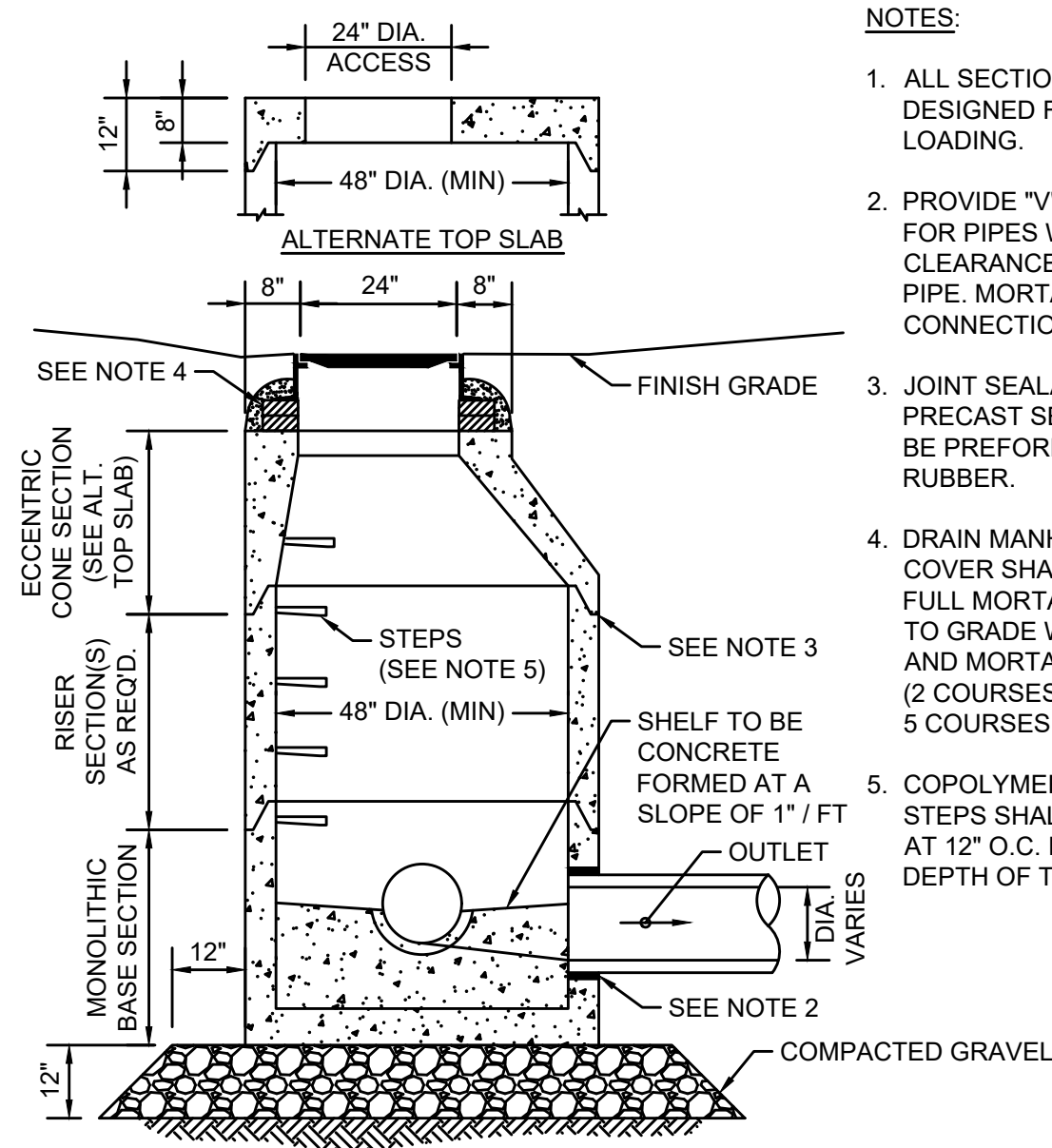
W16-8P2



LAWRENCE
SHORT STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	16	18
PROJECT FILE NO.		612074	

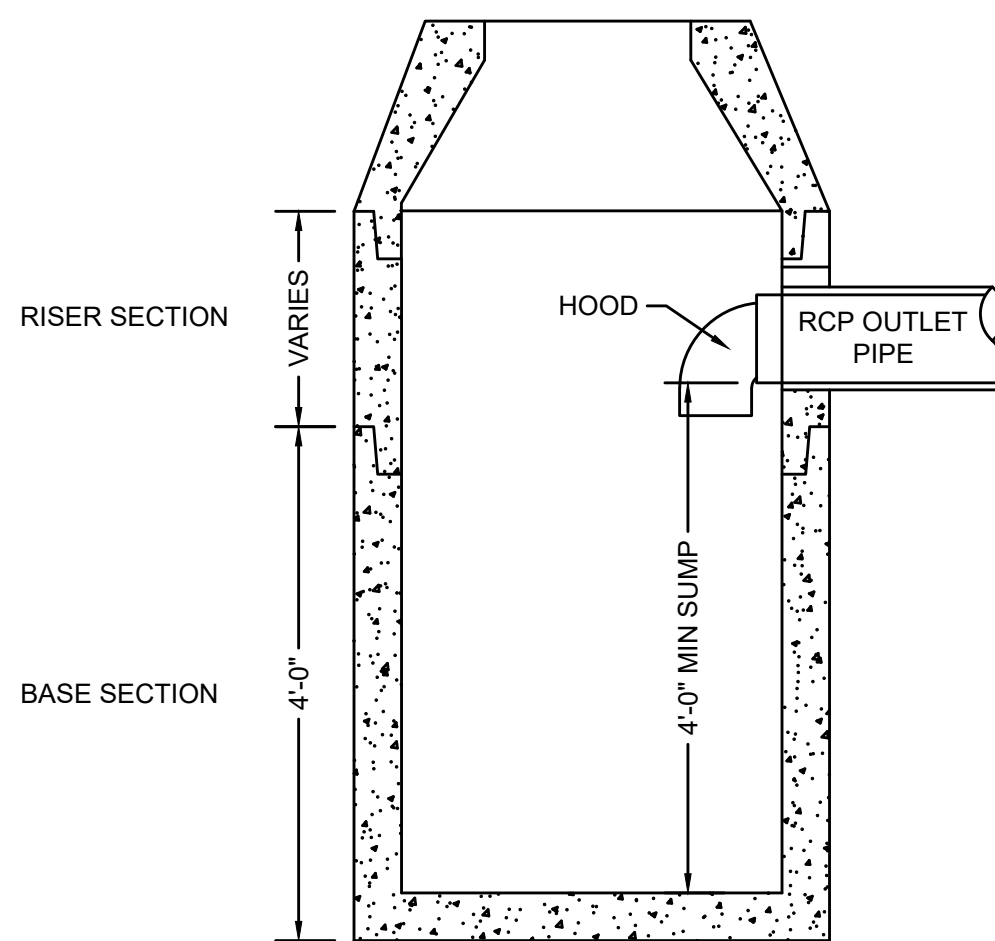
CONSTRUCTION DETAILS - 1 OF 3



NOTES:

- ALL SECTIONS SHALL BE DESIGNED FOR HL-93 LOADING.
- PROVIDE "V" KNOCKOUTS FOR PIPES WITH 2" MAX CLEARANCE TO OUTSIDE OF PIPE. MORTAR ALL PIPE CONNECTIONS.
- JOINT SEALANT BETWEEN PRECAST SECTIONS SHALL BE PREFORMED BUTYL RUBBER.
- DRAIN MANHOLE FRAME AND COVER SHALL BE SET IN FULL MORTAR BED. ADJUST TO GRADE WITH CLAY BRICK AND MORTAR. (2 COURSES TYP 5 COURSES MAX)
- COPOLYMER MANHOLE STEPS SHALL BE INSTALLED AT 12" O.C. FOR THE FULL DEPTH OF THE STRUCTURE.

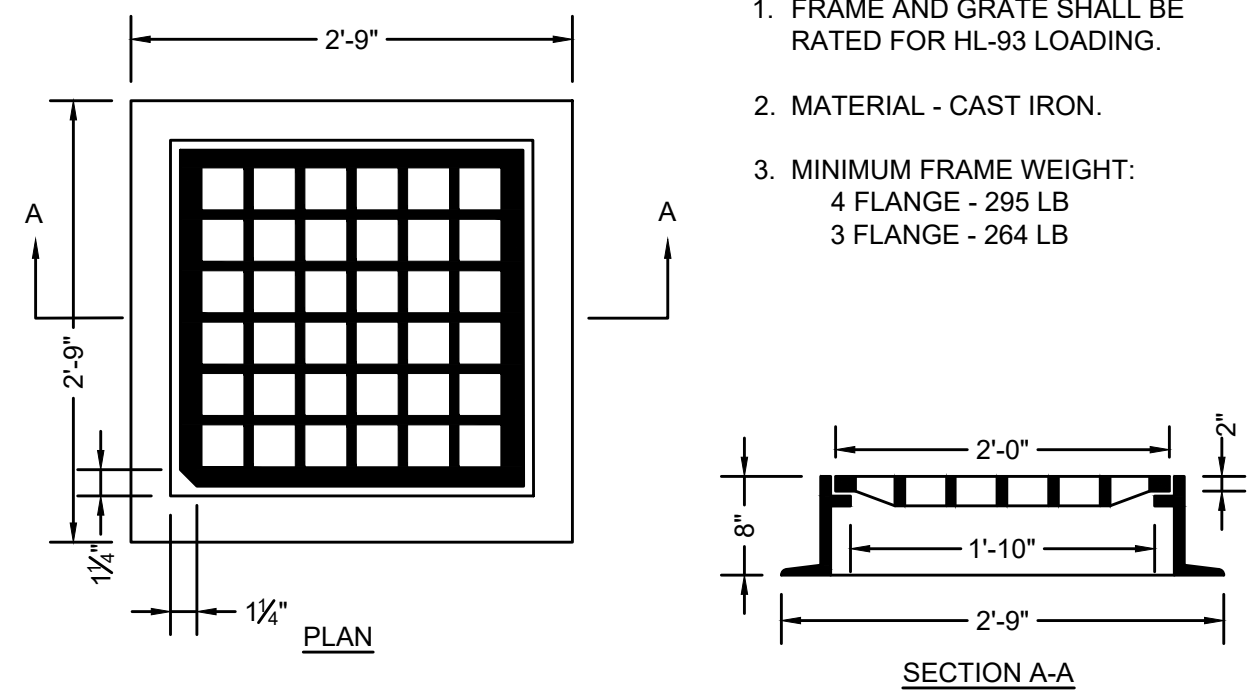
DRAIN MANHOLE
N.T.S.



NOTE:

ALL CATCH BASINS SHALL CONFORM TO MASSDOT CONSTRUCTION STANDARD E 201.4.0 EXCEPT FOR 4" SUMP DEPTH AS SHOWN

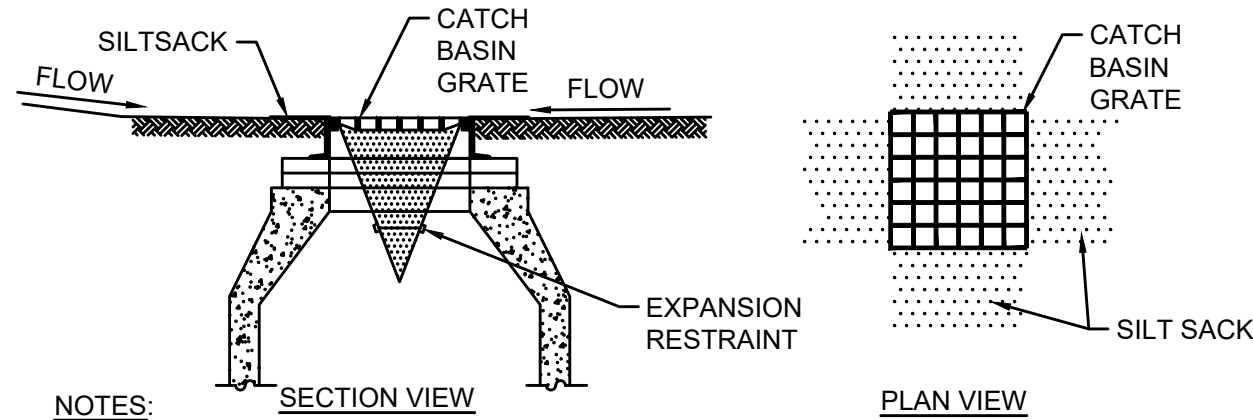
DEEP SUMP CATCH BASIN WITH HOOD
N.T.S.



NOTES:

- FRAME AND GRATE SHALL BE RATED FOR HL-93 LOADING.
- MATERIAL - CAST IRON.
- MINIMUM FRAME WEIGHT:
4 FLANGE - 295 LB
3 FLANGE - 264 LB

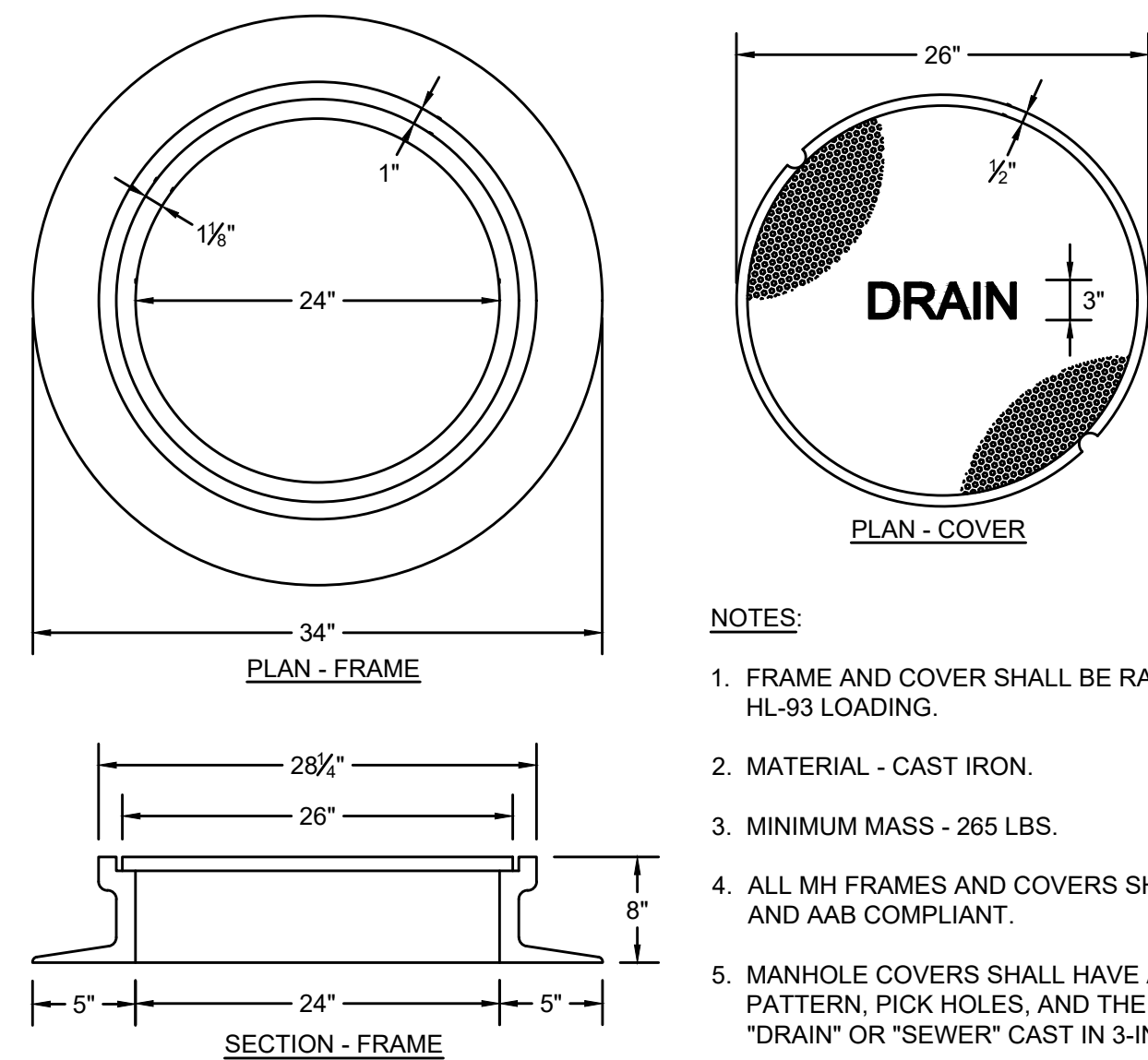
SECTION A-A



NOTES:

- 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.
- GRATE TO BE PLACED OVER SILT SACK.
- SILT SACK SHALL BE INSPECTED PERIODICALLY AND AFTER ALL STORM EVENTS AND CLEANING OR REPLACEMENT SHALL BE PERFORMED PROMPTLY AS NEEDED.

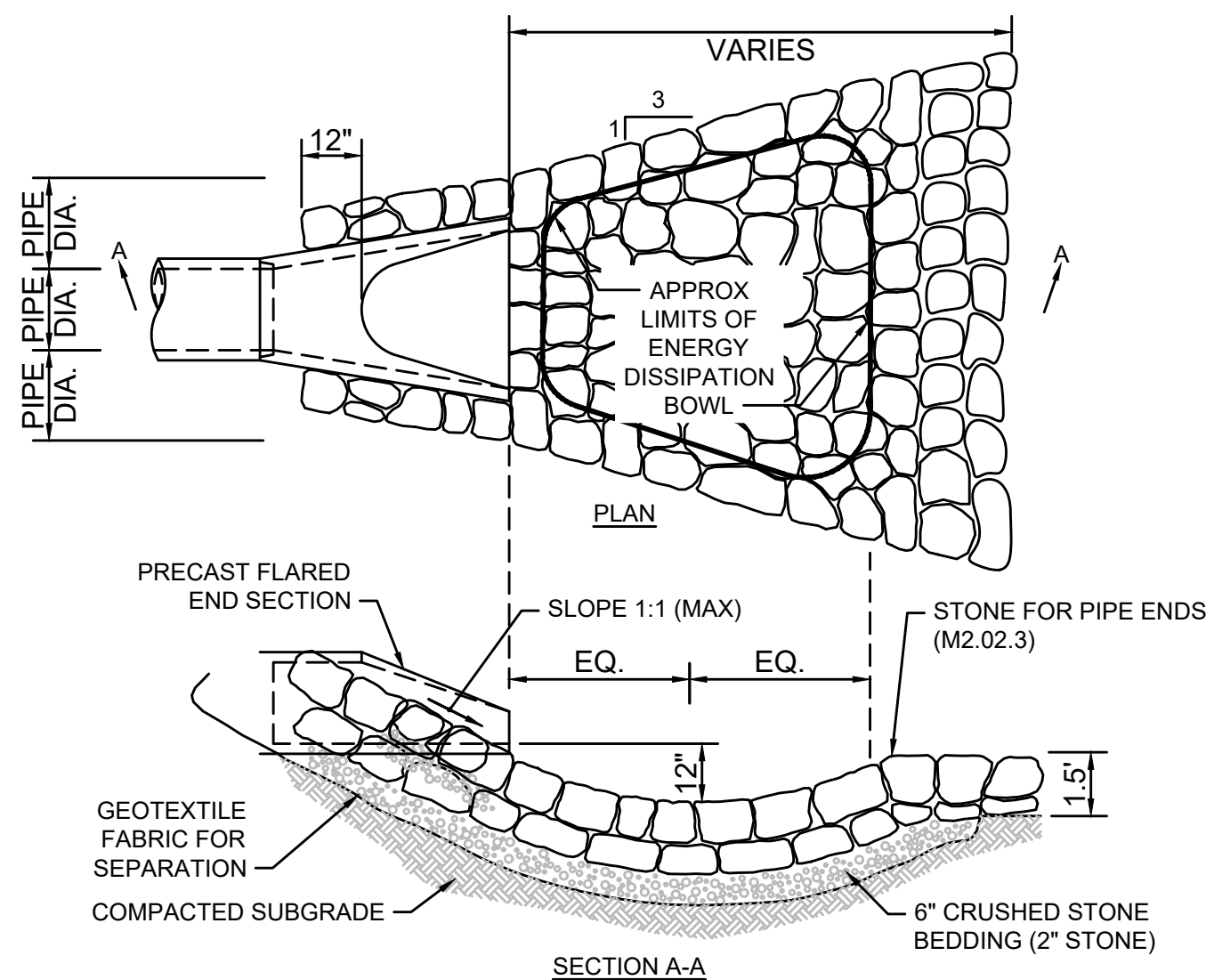
INLET PROTECTION SILT SACK IN CATCH BASIN
N.T.S.



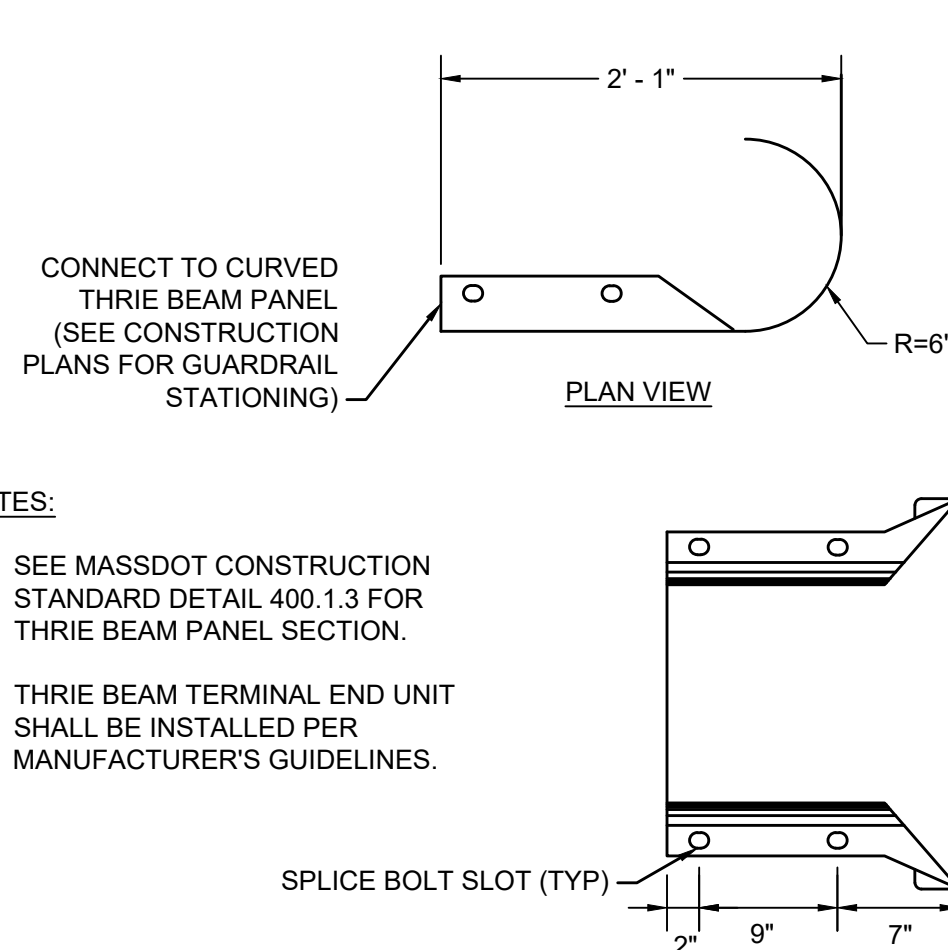
NOTES:

- FRAME AND COVER SHALL BE RATED FOR HL-93 LOADING.
- MATERIAL - CAST IRON.
- MINIMUM MASS - 265 LBS.
- ALL MH FRAMES AND COVERS SHALL BE ADA AND AAB COMPLIANT.
- MANHOLE COVERS SHALL HAVE A DIAMOND PATTERN, PICK HOLES, AND THE WORD "DRAIN" OR "SEWER" CAST IN 3-INCH LETTERS.

MANHOLE FRAME & COVER (MUNICIPAL STANDARD)
N.T.S.



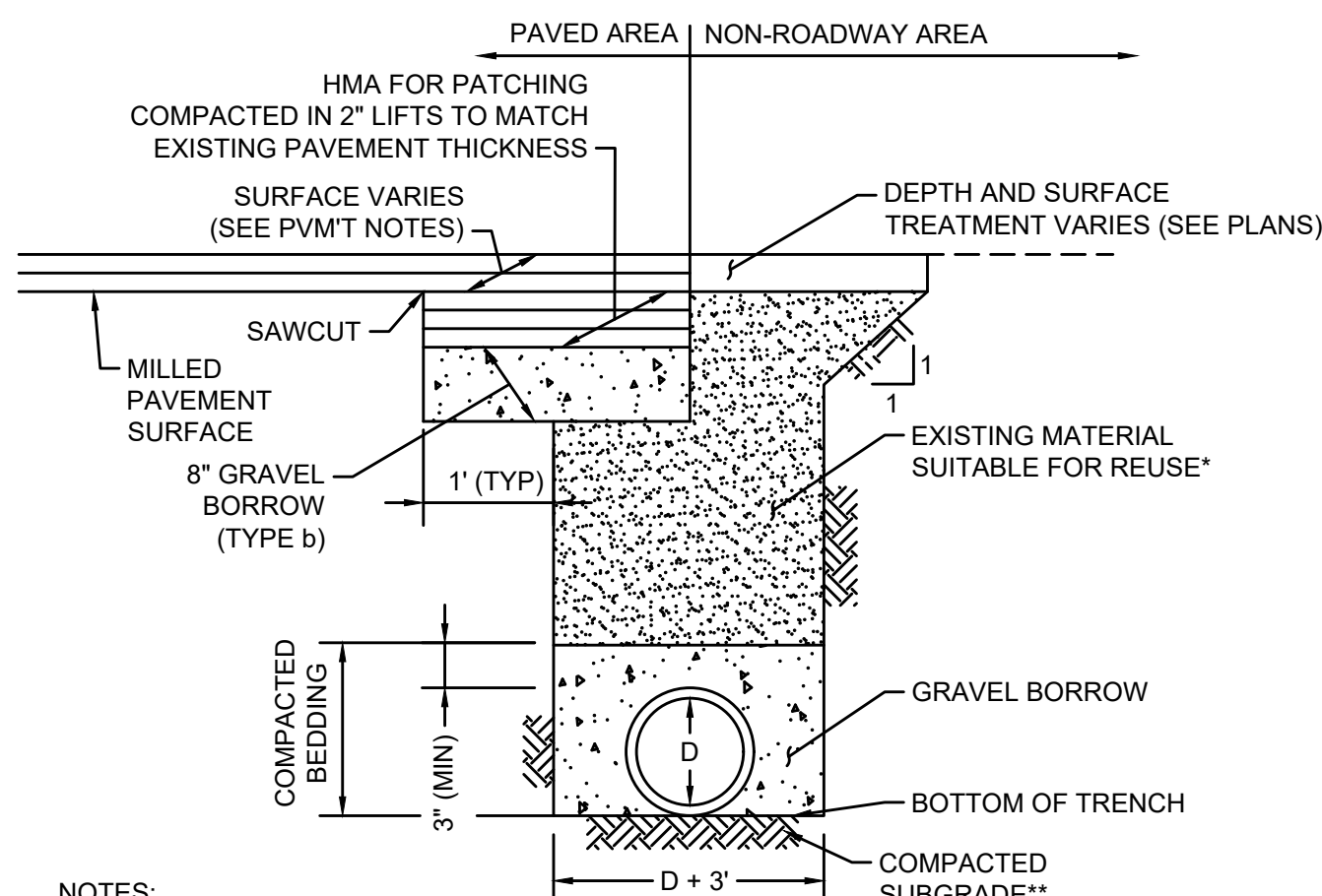
STONE AT FLARED END SECTION
N.T.S.



NOTES:

- SEE MASSDOT CONSTRUCTION STANDARD DETAIL 400.1.3 FOR THRIE BEAM PANEL SECTION.
- THRIE BEAM TERMINAL END UNIT SHALL BE INSTALLED PER MANUFACTURER'S GUIDELINES.

THRIE BEAM TERMINAL END UNIT
N.T.S.

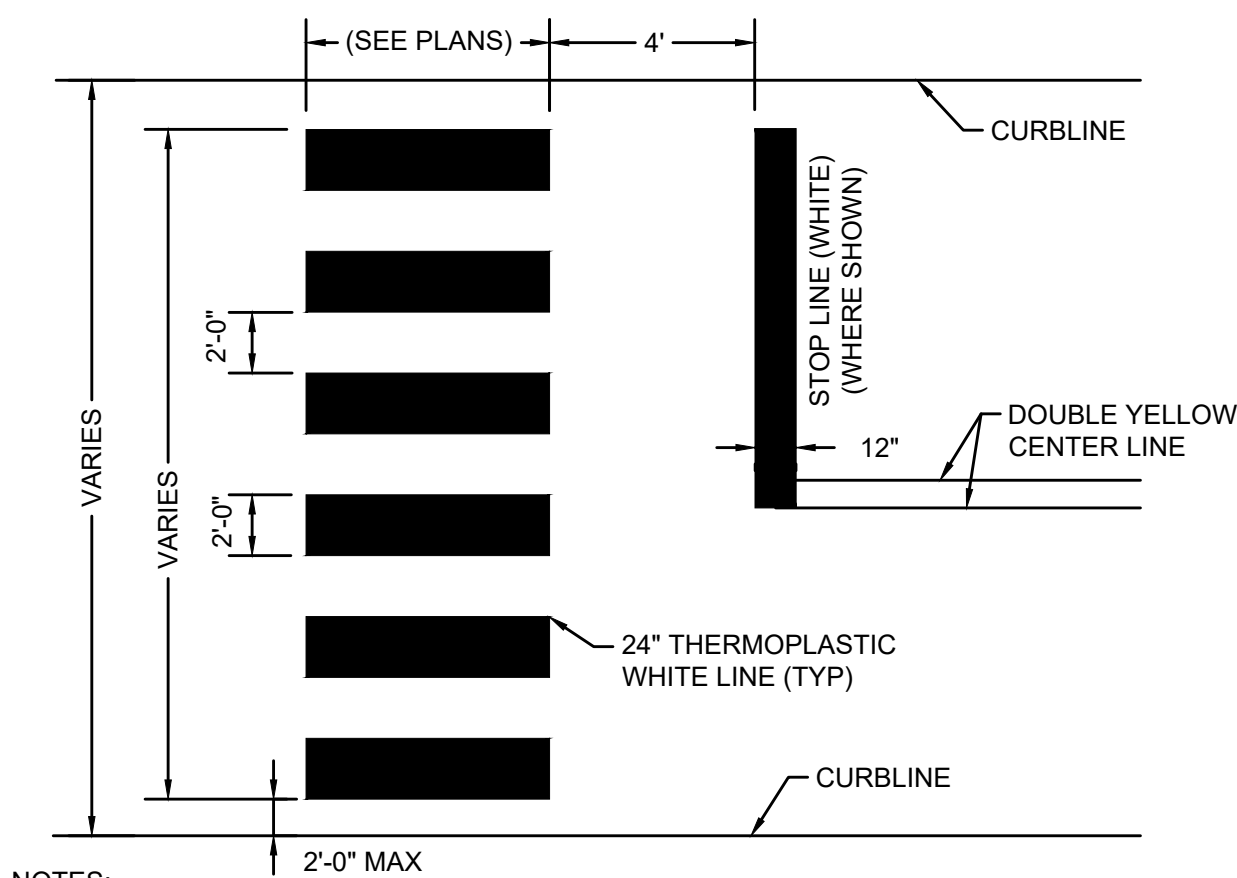


NOTES:

* 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.

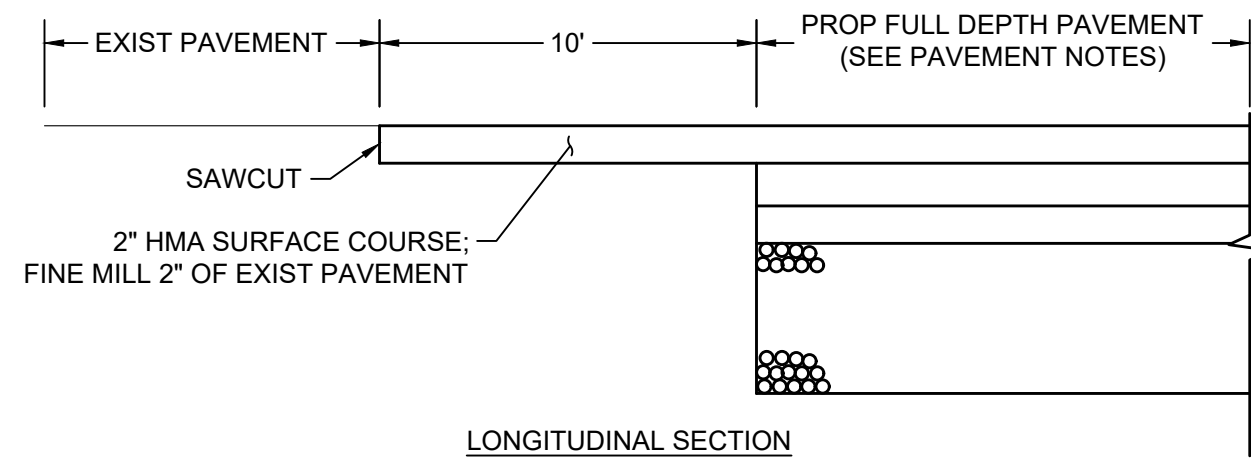
UTILITY TRENCH
N.T.S.



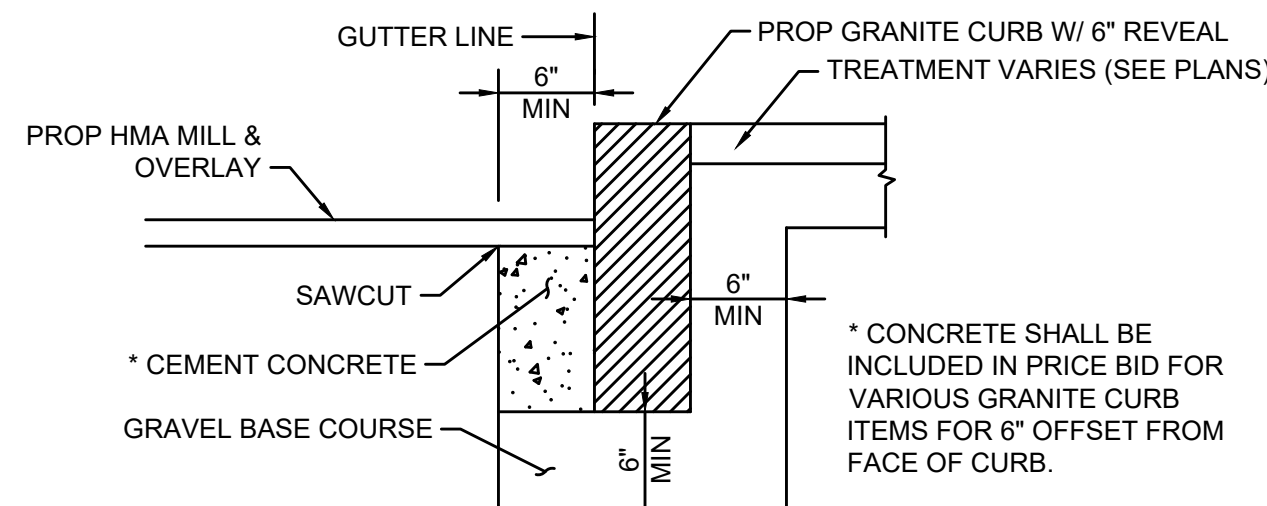
NOTES:

- 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.
- LAYOUT OF CROSSWALKS SHALL BE APPROVED BY THE ENGINEER PRIOR TO APPLICATION.
- CROSSWALK BARS SHALL BE PLACED OUTSIDE THE VEHICULAR WHEEL PATH WHEREVER POSSIBLE.
- OMIT STOP BAR WHERE NOT SHOWN ON TRAFFIC SIGN & PAVEMENT MARKING PLAN.

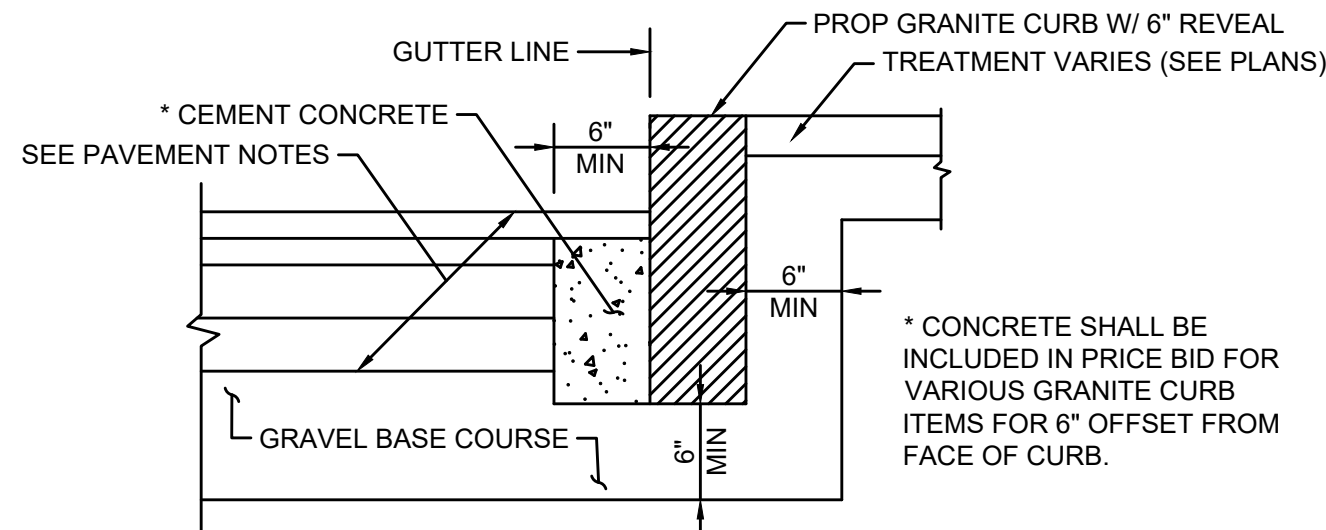
CROSSWALK PAVEMENT MARKING
N.T.S.



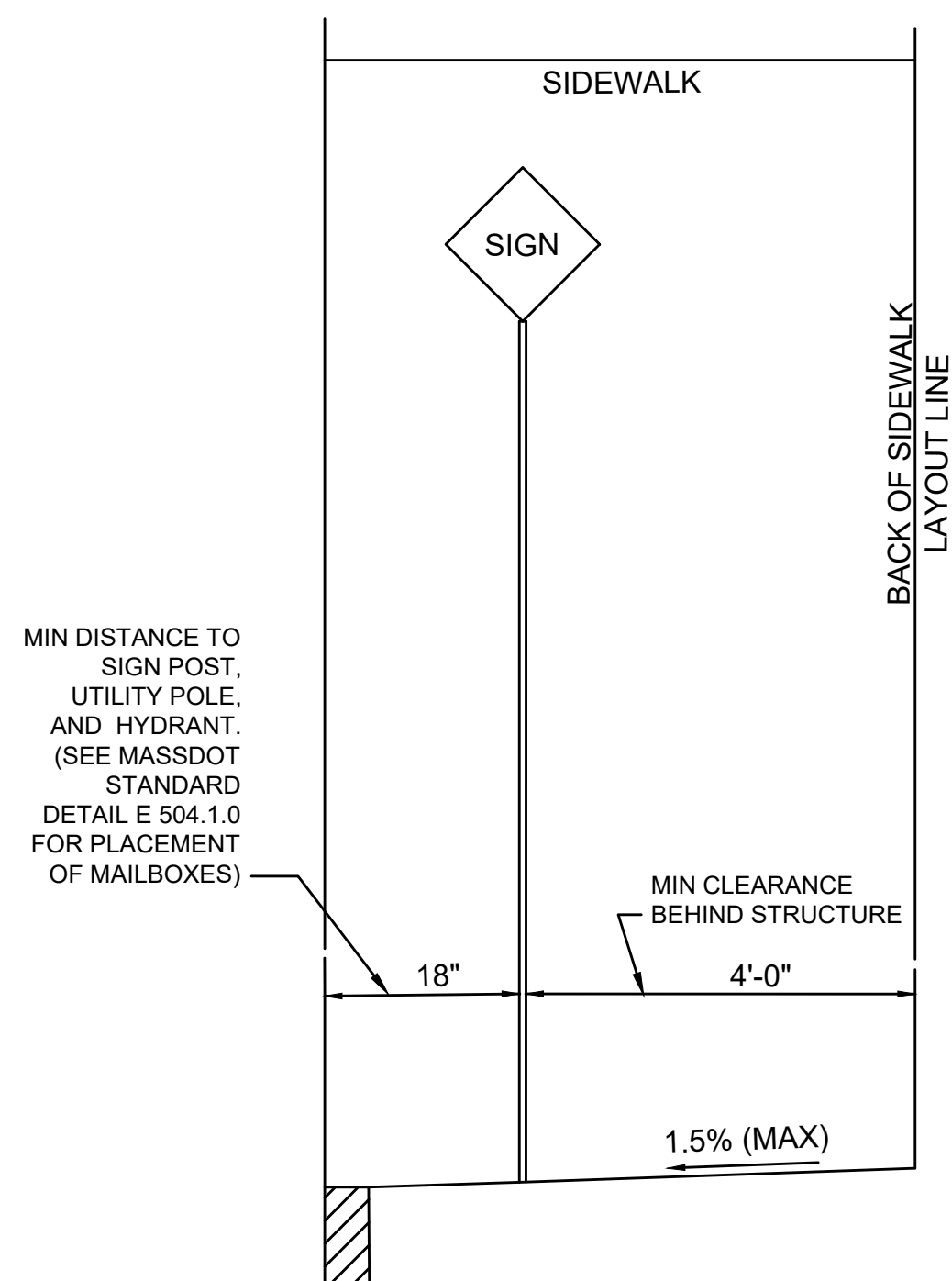
FULL DEPTH PAVEMENT TRANSITION
N.T.S.



GRANITE CURB IN HMA MILL & OVERLAY
N.T.S.



GRANITE CURB IN FULL DEPTH PAVEMENT
N.T.S.

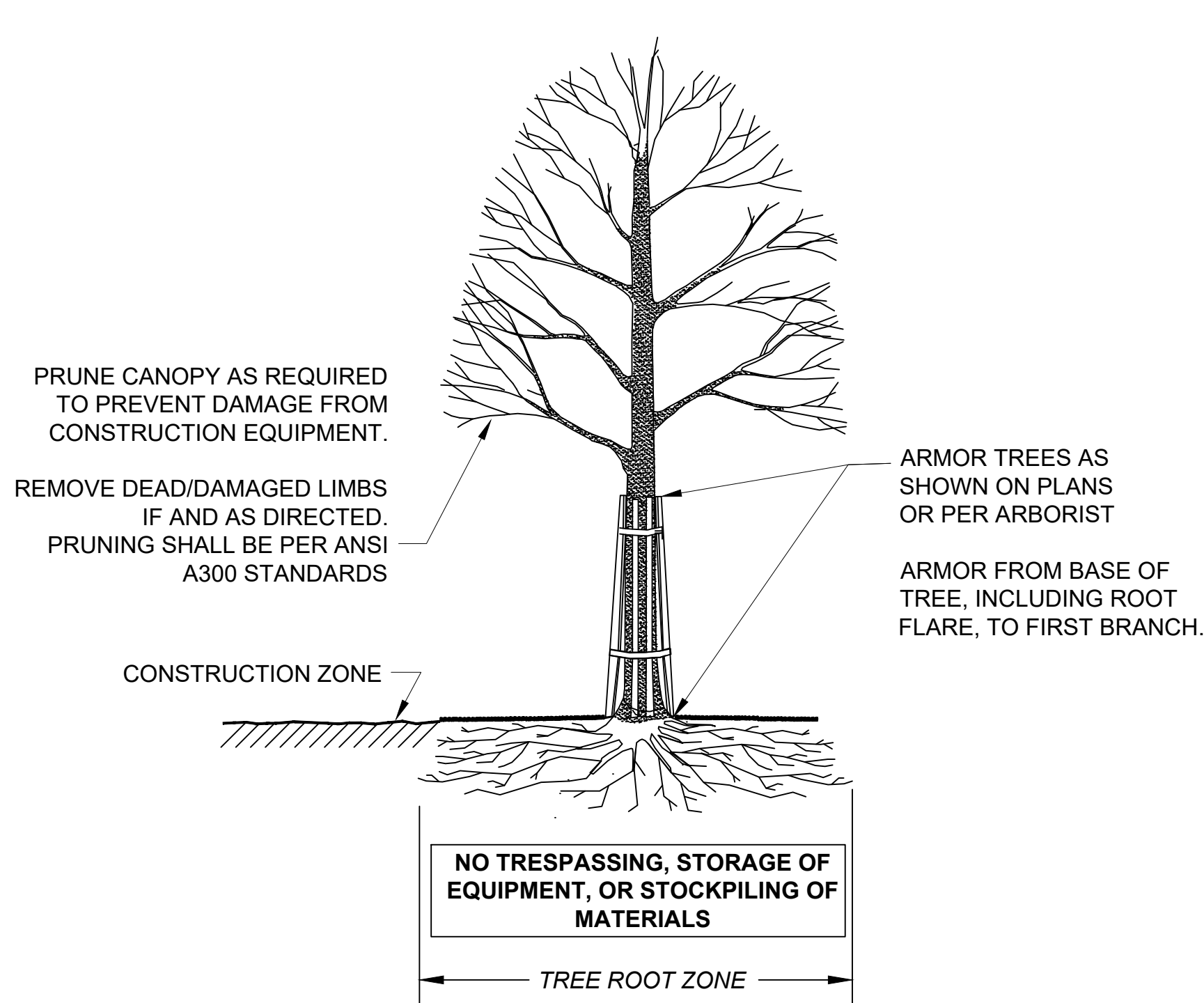


R&R VERTICAL OBSTRUCTION WITHIN SIDEWALK
N.T.S.

LAWRENCE
SHORT STREET

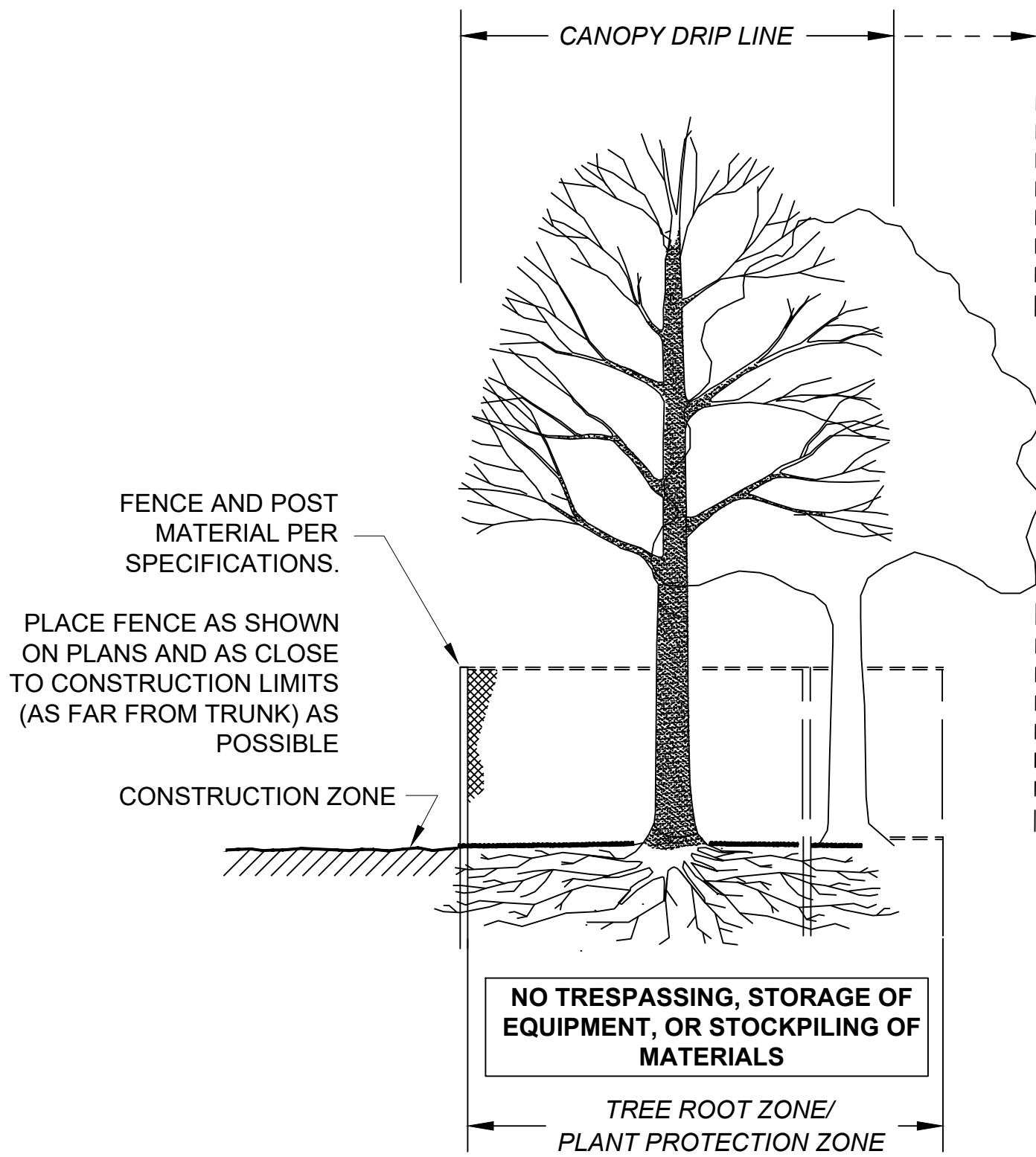
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	17	18
PROJECT FILE NO.		612074	

CONSTRUCTION DETAILS - 2 OF 3

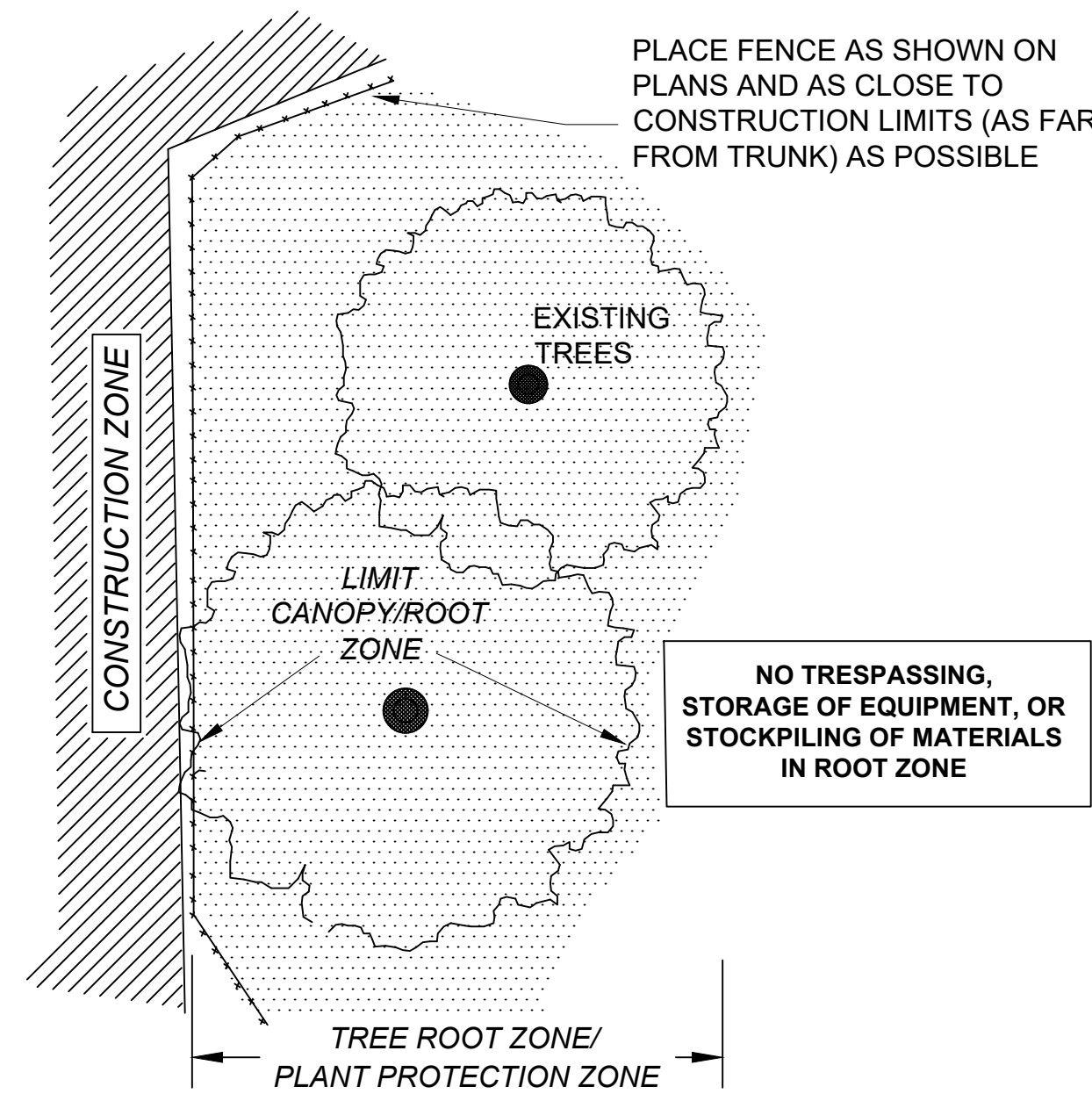


SECTION - TRUNK ARMORING & PRUNING

TREE PROTECTION - TRUNK



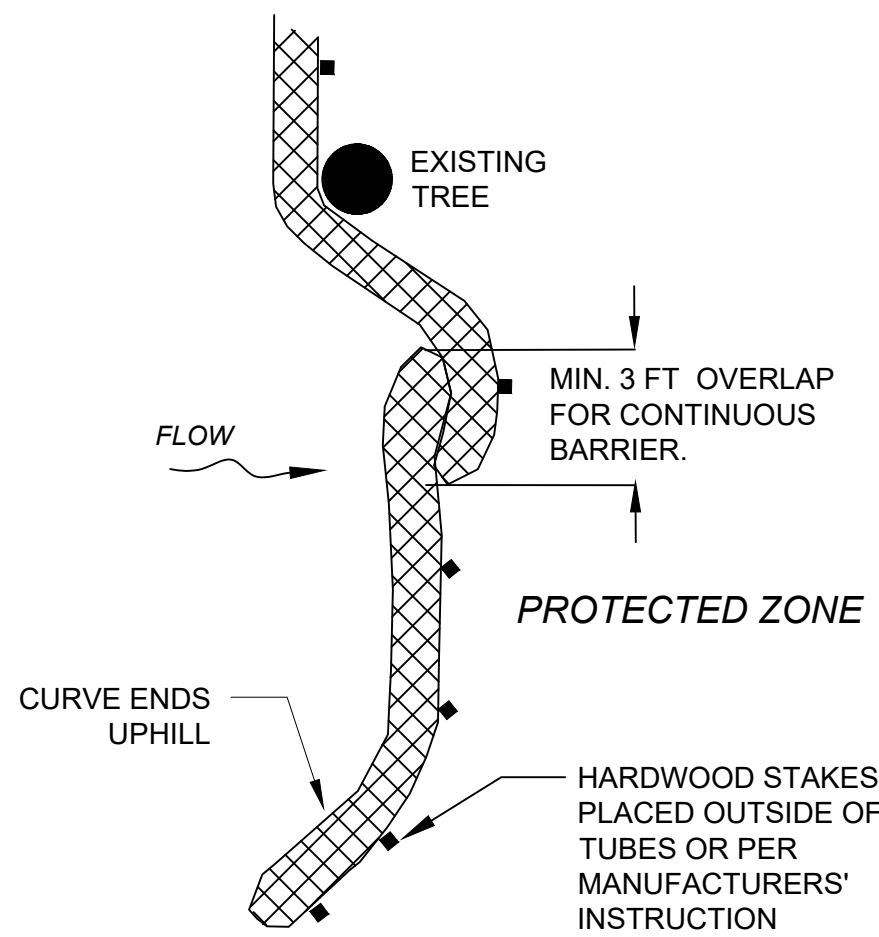
SECTION - FENCE PROTECTION OF ROOT ZONE



PLAN VIEW - FENCE PROTECTION OF ROOT ZONE

TREE PROTECTION - ROOT ZONE

NOT TO SCALE



PLACE TUBE ALONG CONTOURS AND PERPENDICULAR TO FLOW.

PLACE AS CLOSE TO LIMIT OF SOIL DISTURBANCE AS POSSIBLE

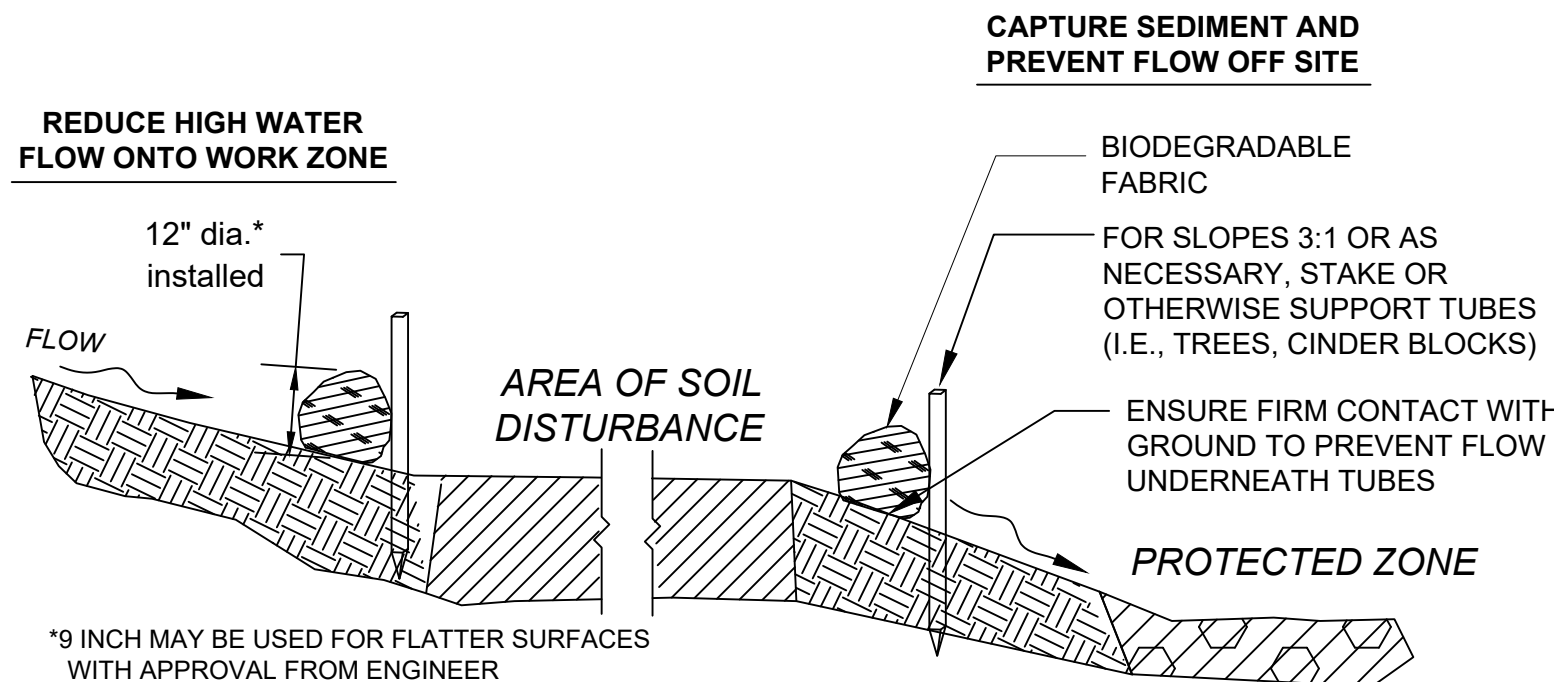
ADJUST LOCATION AS REQUIRED FOR OPTIMUM EFFECTIVENESS. DO NOT INSTALL IN WATERWAYS.

PLACE STAKES AS NEEDED TO SECURE TUBES IN PLACE.

PLAN VIEW

COMPOST FILTER TUBE

NOT TO SCALE



SECTION

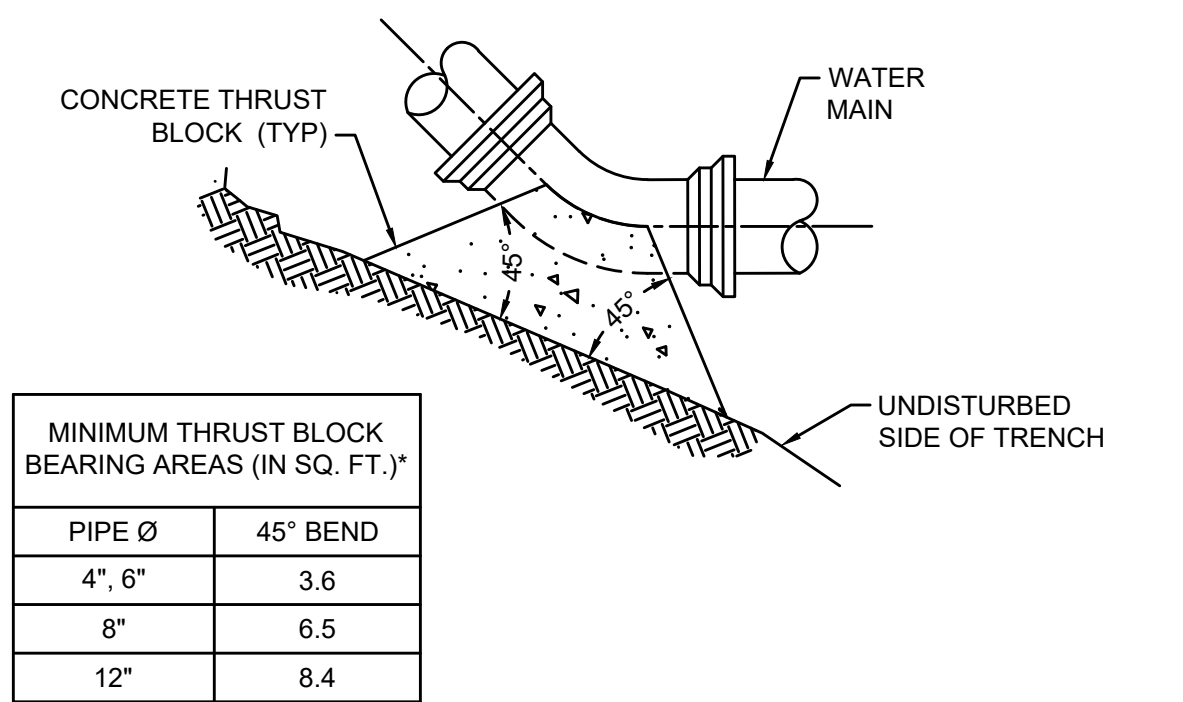
SEDIMENT BARRIER - COMPOST FILTER TUBES

NOT TO SCALE

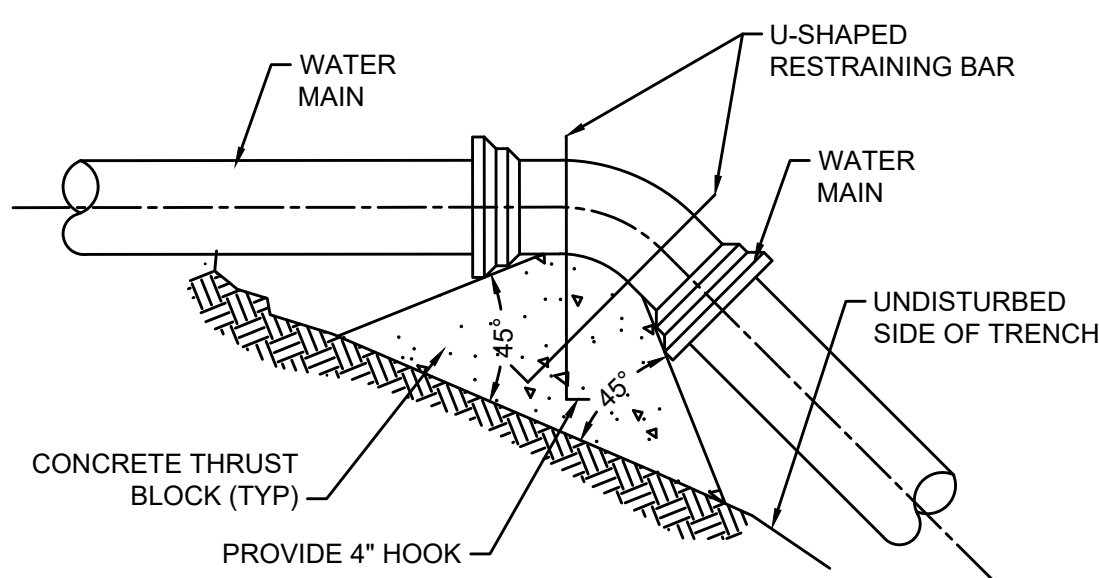
LAWRENCE
SHORT STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	18	18
PROJECT FILE NO.		612074	

CONSTRUCTION DETAILS - 3 OF 3



PLAN AT UPWARD VERTICAL BEND



MINIMUM THRUST BLOCK BEARING AREAS (IN SQ. FT.)*		RESTRAINING BAR DIMENSIONS		
PIPE Ø	45° BEND	PIPE Ø	BAR SIZE	EMBEDMENT LENGTH
4", 6"	.9	4", 6"	#4	15"
8"	1.6	8"	#4	15"
12"	3.3	12"	#6	2'-0"

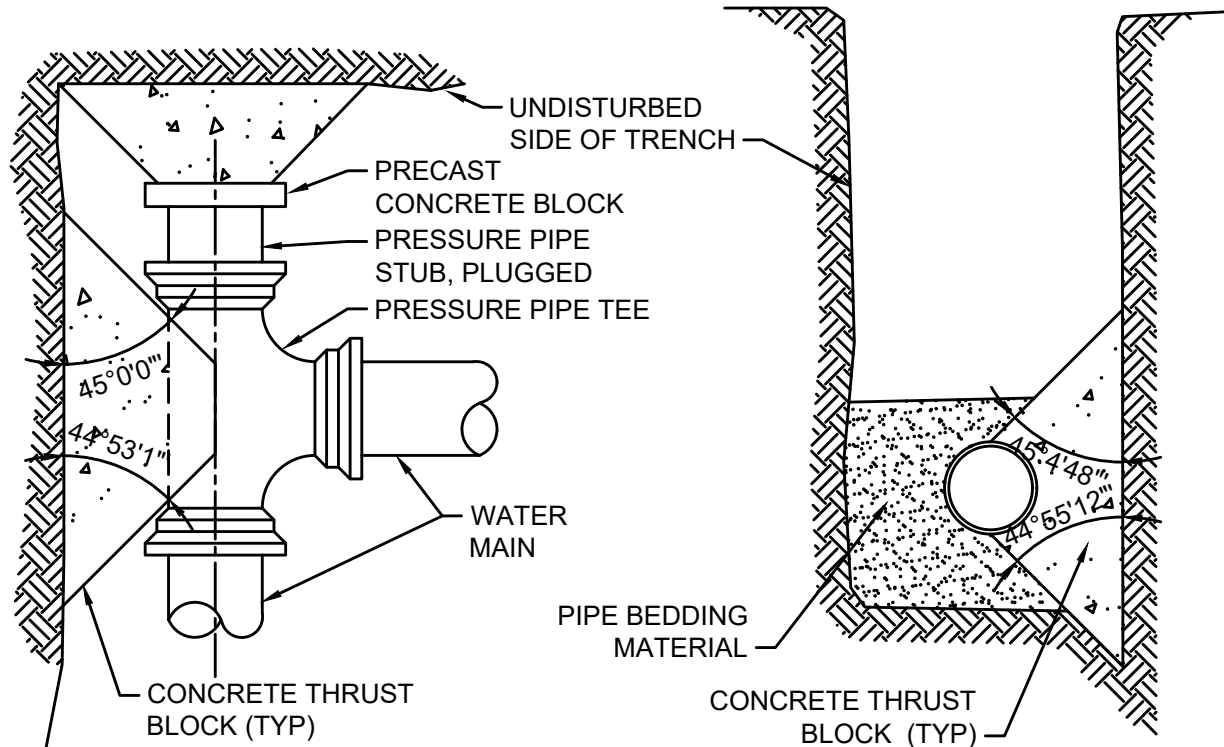
PLAN AT DOWNWARD VERTICAL BEND

NOTES:

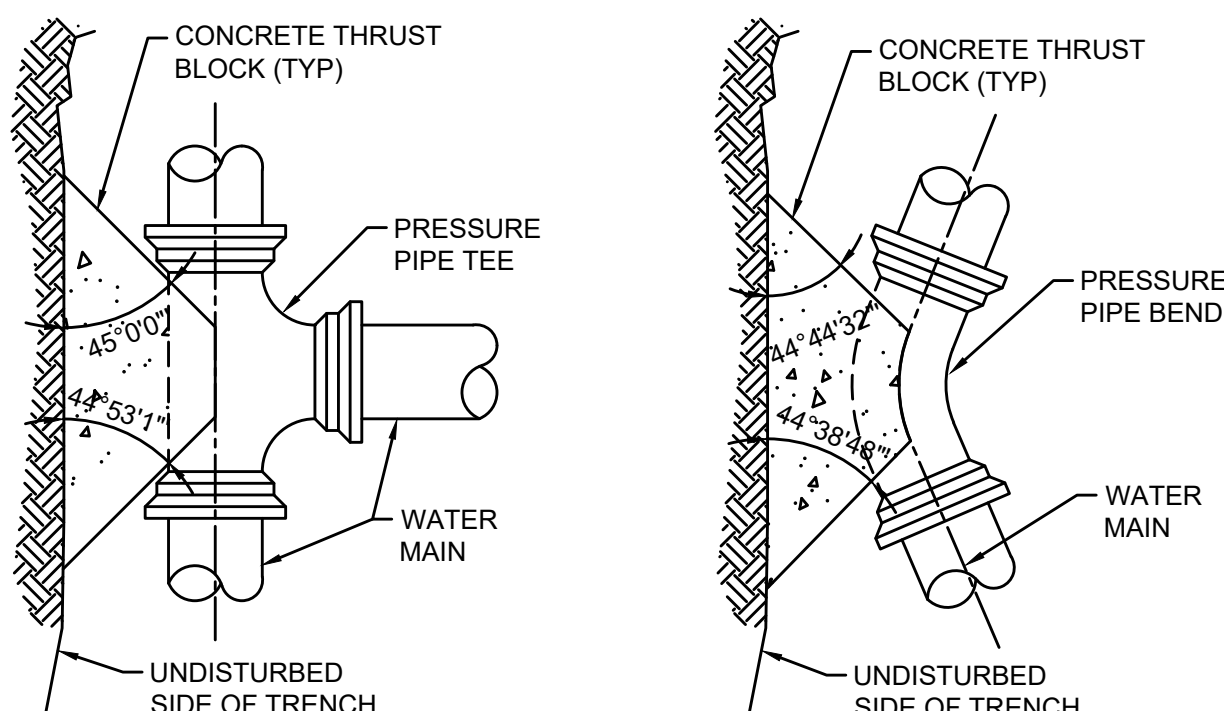
1. ALL WATER MAIN BENDS SHALL BE RESTRAINED W/ THRUST BLOCKS EXCEPT WHERE NOTED.
2. ALL THRUST BLOCKS & COLLARS SHALL BE INSTALLED SO THAT THEY BEAR AGAINST UNDISTURBED EARTH.
3. MINIMUM COMPRESSIVE STRENGTH OF THRUST BLOCK CONCRETE SHALL BE 3,000 P.S.I.
4. KEEP CONCRETE CLEAR OF MECHANICAL JOINTS.
5. MINIMUM BEARING AREAS ARE BASED ON 250 P.S.I INTERNAL PIPE PRESSURE & 1.5 TON/S.F. ALLOWABLE SOIL BEARING CAPACITY.

THRUST BLOCK DETAILS - VERTICAL BENDS

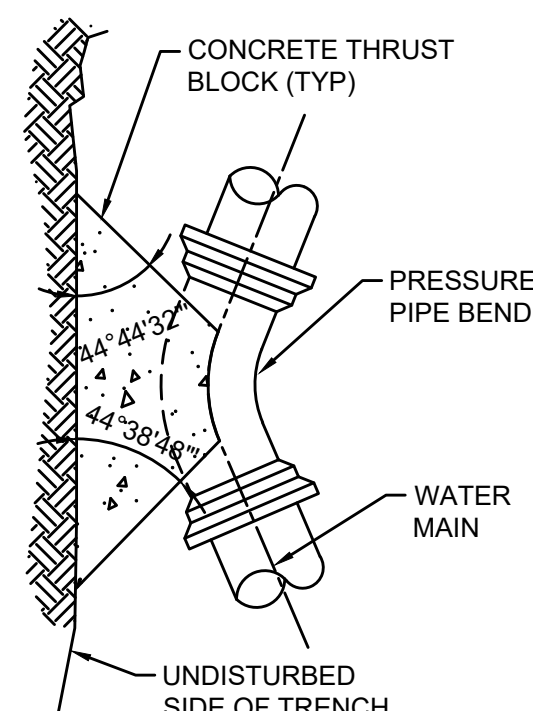
N.T.S.



PLAN AT TEE W/ STUB FOR FUTURE USE



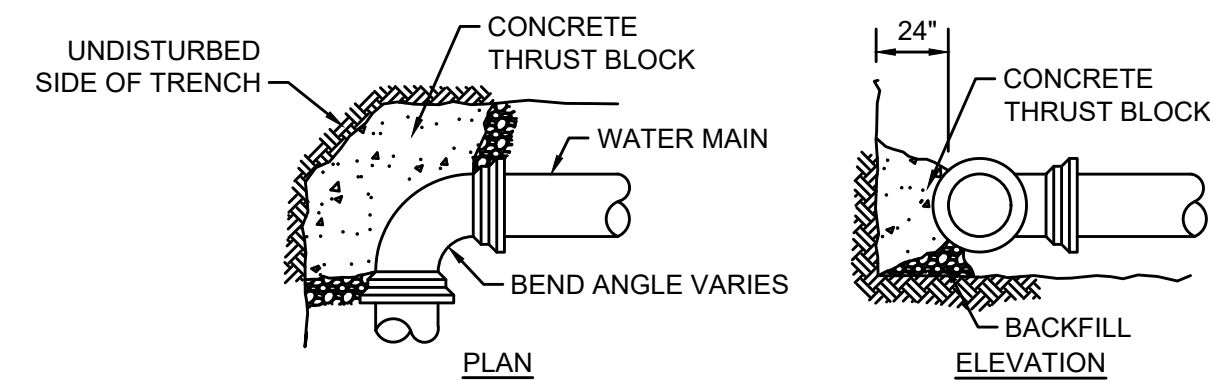
PLAN AT TEE



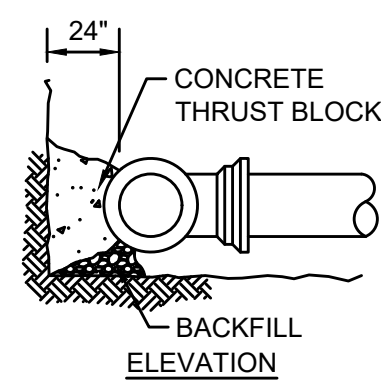
PLAN AT BEND

NOTES:

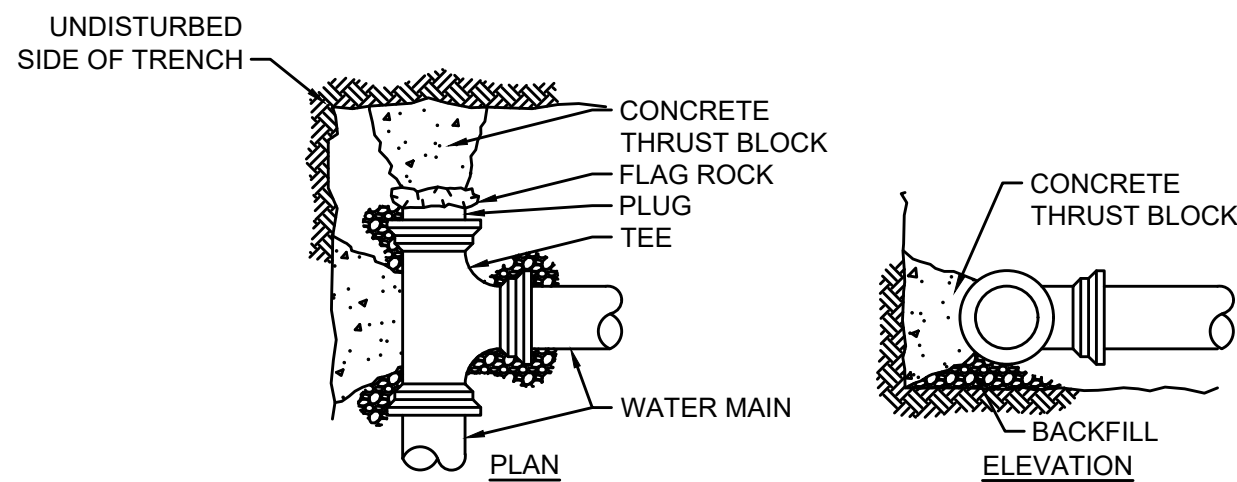
1. ALL WATER MAIN FITTINGS, BENDS, TEES, PLUGS ETC. SHALL BE RESTRAINED W/ THRUST BLOCKS EXCEPT WHERE NOTED.
2. ALL THRUST BLOCKS & COLLARS SHALL BE INSTALLED SO THAT THEY BEAR AGAINST UNDISTURBED EARTH.
3. MINIMUM COMPRESSIVE STRENGTH OF THRUST BLOCK CONCRETE SHALL BE 3,000 P.S.I.
4. KEEP CONCRETE CLEAR OF MECHANICAL JOINTS.
5. MINIMUM BEARING AREAS ARE BASED ON 250 P.S.I INTERNAL PIPE PRESSURE & 1.5 TON/S.F. ALLOWABLE SOIL BEARING CAPACITY.
6. MINIMUM PIPE RESTRAINT LENGTH IS BASED ON DUCTILE IRON PIPE WITH A 150 P.S.I INTERNAL PIPE PRESSURE WITH 5.0' OF BURY IN UNIFIED SOIL CLASSIFICATION SM.



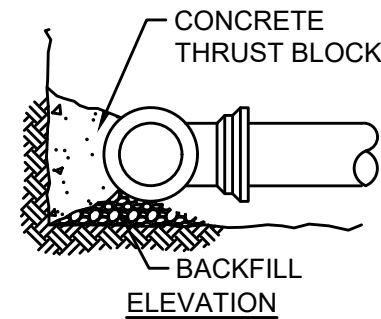
PLAN



ELEVATION



PLAN



ELEVATION

MINIMUM THRUST BLOCK BEARING AREAS (IN SQ. FT.)*				
PIPE Ø	90° BEND	45° BEND	22.5° BEND	TEES, PLUGS, CAPS & HYDRANTS
4", 6", 8"	6.0	2.9	2.3	4.5
10"	9.6	5.2	2.3	6.7
12"	13.3	6.7	3.7	9.6
* BASED ON 250 P.S.I. & 1.5 TON/S.F. ALLOWABLE SOIL BEARING CAPACITY				

MINIMUM PIPE RESTRAINT LENGTH (IN FEET)*					
PIPE Ø	90° BEND	45° BEND	22.5° BEND	TEES	PLUG/CAP
8"	21.0	9.0	4.0	29.0	38.0
10"	26.0	11.0	5.0	38.0	46.0
12"	33.0	14.0	6.0	48.0	69.0
* BASED ON DUCTILE IRON PIPE WITH A 150 P.S.I. TEST PRESSURE WITH 5.0 FEET OF BURY IN UNIFIED SOIL CLASSIFICATION SM.					
**NOTE: LONGER LENGTHS REQUIRED FOR PIPES WITH PLASTIC SLEEVES					

THRUST BLOCK - HORIZONTAL BENDS & PIPE RESTRAINT DETAILS

N.T.S.