MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

PLAN AND PROFILE OF

MAIN STREET (ROUTE 9) AT

SOOJIANS DRIVE

IN THE TOWN OF

LEICESTER

WORCESTER COUNTY

25% SUBMITTAL

LEICESTER
MAIN STREET (ROUTE 9)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	01	20
PROJECT FILE NO.		N/A	

TITLE SHEET & INDEX

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.

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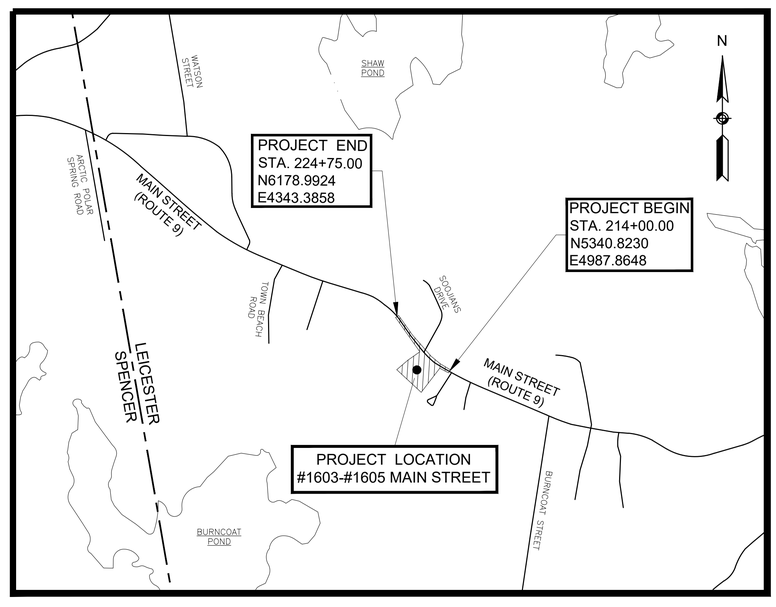

0 1000 2000 3000 4000

SCALE: 1" = 1000'

LENGTH OF PROJECT = 1075.00 FEET = 0.204 MILES

DESIGN DESIGNATION (MAIN STREET/ROUTE 9)

DESIGN SPEED	45 MPH
ADT (2021)	20,200
ADT (2028)	21,700
K	8%
D	55%
T (PEAK HOUR)	3.5%
T (AVERAGE DAY)	2.0%
DHV	1,740
DDHV	960
FUNCTIONAL CLASSIFICATION	PRINCIPAL ARTERIAL

DATE	DESCRIPTION	REV #
09/15/2021	DRAFT 25% SUBMISSION	REV 0

CHAPPELL ENGINEERING ASSOCIATES, LLC
Civil · Structural · Land Surveying
R.K. EXECUTIVE CENTRE
201 BOSTON POST ROAD WEST
SUITE 101
MARLBOROUGH, MA 01752

massDOT Massachusetts Department of Transportation Highway Division

APPROVED

CHIEF ENGINEER **DATE**

2056_HD(TITLE).DWG Plotted on 15-Sep-2021 11:36 AM

GENERAL SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
JB	JB	JERSEY BARRIER
CB	CB	CATCH BASIN
		CATCH BASIN CURB INLET
FP	FP	FLAG POLE
GP	GP	GAS PUMP
MB	MB	MAIL BOX
		POST SQUARE
		POST CIRCULAR
WELL	WELL	WELL
EHH	EHH	ELECTRIC HANDHOLE
		FENCE GATE POST
GG	GG	GAS GATE
BHL #	BHL #	BORING HOLE
MW #	MW #	MONITORING WELL
TP #	TP #	TEST PIT
		HYDRANT
		LIGHT POLE
CO.BD.		COUNTY BOUND
		GPS POINT
		CABLE MANHOLE
		DRAINAGE MANHOLE
		ELECTRIC MANHOLE
		GAS MANHOLE
		MISC MANHOLE
		SEWER MANHOLE
		TELEPHONE MANHOLE
		WATER MANHOLE
MHB	MHB	MASSACHUSETTS HIGHWAY BOUND
MON		MONUMENT
SB		STONE BOUND
TB		TOWN OR CITY BOUND
		TRAVERSE OR TRIANGULATION STATION
TPL or GUY	TPL or GUY	TROLLEY POLE OR GUY POLE
HTP		TRANSMISSION POLE
UFB	UFB	UTILITY POLE W/ FIREBOX
UPDL	UPDL	UTILITY POLE WITH DOUBLE LIGHT
ULT	ULT	UTILITY POLE W / 1 LIGHT
UPL	UPL	UTILITY POLE
		BUSH
SIZE & TYPE		TREE
		STUMP
		SWAMP / MARSH
WG	WG	WATER GATE
PM	PM	PARKING METER
		OVERHEAD CABLE/WIRE
		CURBING
100 99		CONTOURS (ON-THE-GROUND SURVEY DATA)
100 99		CONTOURS (PHOTOGRAMMETRIC DATA)
		UNDERGROUND DRAIN PIPE (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND ELECTRIC DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND GAS MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND SEWER MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND TELEPHONE DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND WATER MAIN (DOUBLE LINE 24 INCH AND OVER)
		BALANCED STONE WALL
		GUARD RAIL - STEEL POSTS
		GUARD RAIL - WOOD POSTS
		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
1	1	CONTROLLER PHASE ACTUATED
		TRAFFIC SIGNAL HEAD (SIZE AS NOTED)
		WIRE LOOP DETECTOR (6' x 6' TYP UNLESS OTHERWISE SPECIFIED)
		VIDEO DETECTION CAMERA
		MICROWAVE DETECTOR
		PEDESTRIAN PUSH BUTTON, SIGN (DIRECTIONAL ARROW AS SHOWN) AND SADDLE
	*	EMERGENCY PREEMPTION CONFIRMATION STROBE LIGHT
		VEHICULAR SIGNAL HEAD
		VEHICULAR SIGNAL HEAD, OPTICALLY PROGRAMMED
		FLASHING BEACON
		PEDESTRIAN SIGNAL HEAD, (TYPE AS NOTED OR AS SPECIFIED)
RRSG	RRSG	RAILROAD SIGNAL
OR		SIGNAL POST AND BASE (ALPHA-NUMERIC DESIGNATION NOTED)
	20'	MAST ARM, SHAFT AND BASE (ARM LENGTH AS NOTED)
		HIGH MAST POLE OR TOWER
		SIGN AND POST
		SIGN AND POST (2 POSTS)
	20'	MAST ARM WITH LUMINAIRE
		OPTICAL PRE-EMPTION DETECTOR
		CONTROL CABINET, GROUND MOUNTED
		CONTROL CABINET, POLE MOUNTED
		FLASHING BEACON CONTROL AND METER PEDESTAL
		LOAD CENTER ASSEMBLY
		PULL BOX 12"x12" (OR AS NOTED)
		ELECTRIC HANDHOLE 12"x24" (OR AS NOTED)
		TRAFFIC SIGNAL CONDUIT

PAVEMENT MARKINGS SYMBOLS

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

ABBREVIATIONS

GENERAL

AADT	ANNUAL AVERAGE DAILY TRAFFIC
ABAN	ABANDON
ADJ	ADJUST
APPROX.	APPROXIMATE
A.C.	ASPHALT CONCRETE
ACCM PIPE	ASPHALT COATED CORRUGATED METAL PIPE
BIT.	BITUMINOUS
BC	BOTTOM OF CURB
BD.	BOUND
BL	BASELINE
BLDG	BUILDING
BM	BENCHMARK
BO	BY OTHERS
BOS	BOTTOM OF SLOPE
BR.	BRIDGE
CB	CATCH BASIN
CBCI	CATCH BASIN WITH CURB INLET
CC	CEMENT CONCRETE
CCM	CEMENT CONCRETE MASONRY
CEM	CEMENT
CI	CURB INLET
CIP	CAST IRON PIPE
CLF	CHAIN LINK FENCE
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CSP	CORRUGATED STEEL PIPE
CO.	COUNTY
CONC	CONCRETE
CONT	CONTINUOUS
CONST	CONSTRUCTION
CR GR	CROWN GRADE
DHV	DESIGN HOURLY VOLUME
DI	DROP INLET
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DW	STEADY DON'T WALK - PORTLAND ORANGE
DWY	DRIVEWAY
ELEV (or EL.)	ELEVATION
EMB	EMBANKMENT
EOP	EDGE OF PAVEMENT
EXIST (or EX)	EXISTING
EXC	EXCAVATION
F&C	FRAME AND COVER
F&G	FRAME AND GRATE
FDN.	FOUNDATION
FLDSTN	FIELDSTONE
GAR	GARAGE
GD	GROUND
GG	GAS GATE
GI	GUTTER INLET
GIP	GALVANIZED IRON PIPE
GRAN	GRANITE
GRAV	GRAVEL
GRD	GUARD
HDW	HEADWALL
HMA	HOT MIX ASPHALT
HOR	HORIZONTAL
HYD	HYDRANT
INV	INVERT
JCT	JUNCTION
L	LENGTH OF CURVE
LB	LEACH BASIN
LP	LIGHT POLE
LT	LEFT
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
PVMT	PAVEMENT
PWW	PAVED WATER WAY

LEICESTER
MAIN STREET (ROUTE 9)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	02	20
PROJECT FILE NO.		NA	

LEGEND & ABBREVIATIONS

ABBREVIATIONS (cont.)

GENERAL

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

TRAFFIC SIGNAL ABBREVIATIONS

CAB	CABINET
CCVE	CLOSED CIRCUIT VIDEO EQUIPMENT
DW	STEADY UPRAISED HAND
FDW	FLASHING UPRAISED HAND
FR	FLASHING CIRCULAR RED
FRL	FLASHING RED LEFT ARROW
FRR	FLASHING RED RIGHT ARROW
FY	FLASHING CIRCULAR YELLOW
FYL	FLASHING YELLOW LEFT ARROW
FYR	FLASHING YELLOW RIGHT ARROW
G	STEADY CIRCULAR GREEN
GL	STEADY GREEN LEFT ARROW
GR	STEADY GREEN RIGHT ARROW
GSL	STEADY GREEN SLASH LEFT ARROW
GSR	STEADY GREEN SLASH RIGHT ARROW
GV	STEADY GREEN VERTICAL ARROW
OL	OVERLAP
PED	PEDESTRIAN
PTZ	PAN, TILT, ZOOM
R	STEADY CIRCULAR RED
RL	STEADY RED LEFT ARROW
RR	STEADY RED RIGHT ARROW
TR SIG	TRAFFIC SIGNAL
TSC	TRAFFIC SIGNAL CONDUIT
W	STEADY WALKING PERSON
Y	STEADY CIRCULAR YELLOW
YL	STEADY YELLOW LEFT ARROW

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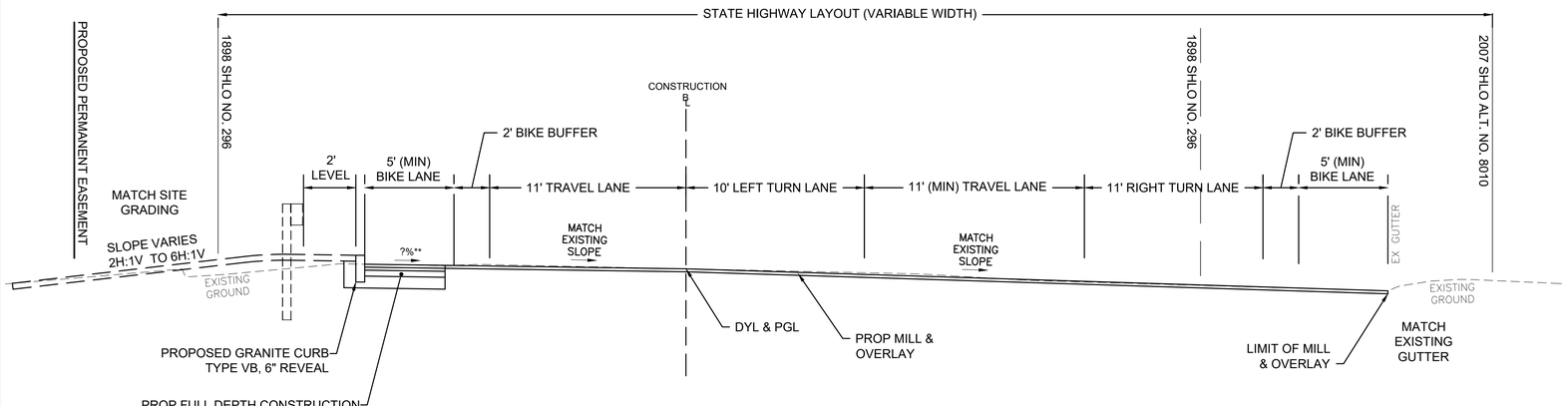
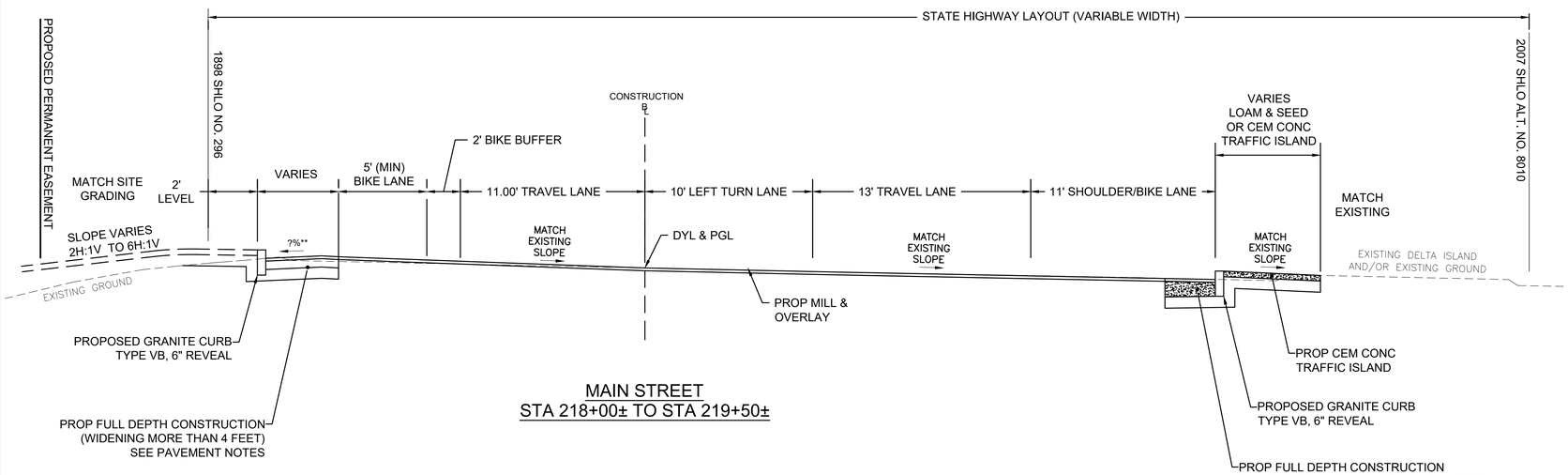
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	03	20
PROJECT FILE NO.	NA		

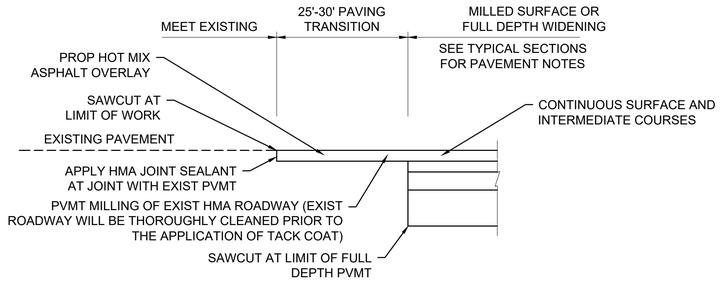
TYPICAL SECTIONS



MAIN STREET (ROUTE 9)
STA 214+00± TO 216+00± (WIDEN LESS THAN 4 FEET)
STA 216+00± TO STA 218+00± (WIDEN MORE THAN 4 FEET)



MAIN STREET
STA 218+00± TO STA 219+50±



PAVEMENT MILLING & OVERLAY TRANSITION DETAIL

SCALE: NONE

PAVEMENT NOTES

PROPOSED PAVEMENT MILLING AND PAVEMENT OVERLAY

SURFACE: 2.0" SUPERPAVE SURFACE COURSE 12.5 (SSC -12.5) OVER ASPHALT EMULSION FOR TACK COAT (RS-1h) OVER
MILLING : 2.0" PAVEMENT FINE MILLING

PROPOSED FULL DEPTH PAVEMENT LESS THAN 4 FEET WIDE

SURFACE: 2.0" SUPERPAVE SURFACE COURSE 12.5 (SSC -12.5) OVER ASPHALT EMULSION FOR TACK COAT (RS-1h) OVER
INTERMEDIATE: 1.75" SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC - 12.5) OVER ASPHALT EMULSION FOR TACK COAT (RS-1h) OVER
BASE: 6" CEMENT CONCRETE BASE COURSE OVER

SUBBASE: 8" GRAVEL BORROW, TYPE b

PROPOSED FULL DEPTH PAVEMENT - WIDENING 4 FEET OR MORE

SURFACE: 2.0" SUPERPAVE SURFACE COURSE 12.5 (SSC - 12.5) OVER ASPHALT EMULSION FOR TACK COAT (RS-1h) OVER
INTERMEDIATE: 1.75" SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC - 12.5) OVER ASPHALT EMULSION FOR TACK COAT (RS-1h) OVER
BASE: 4" SUPERPAVE BASE COURSE 37.5 (SBC - 37.5) OVER

SUBBASE: 4" DENSE GRADED CRUSHED STONE OVER 8" GRAVEL, TYPE b

PROPOSED HOT MIX ASPHALT DRIVEWAY

SURFACE: 1.5" SUPERPAVE SURFACE COURSE OVER ASPHALT EMULSION FOR TACK COAT (RS-1h) OVER 2.5" SUPERPAVE INTERMEDIATE COURSE

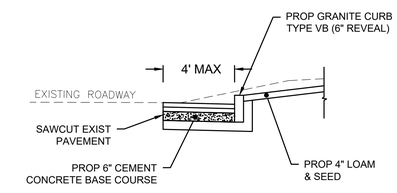
FOUNDATION: 12" GRAVEL BORROW, TYPE b

PROPOSED CEMENT CONCRETE TRAFFIC ISLAND

SURFACE: 4" CEMENT CONCRETE WALK SURFACE 4000 PSI, 3/4", 610 LB OVER
FOUNDATION: 8" GRAVEL BORROW, TYPE b

GENERAL NOTES

1. EXISTING PAVEMENT MARKINGS IN CONFLICT WITH PROPOSED LANE MARKINGS TO BE REMOVED, SEE SIGN AND PAVEMENT MARKING PLANS.



PROPOSED WIDENING LESS THAN 4 FEET

SCALE: NONE

HOR. SCALE IN FEET
4 0 4 8

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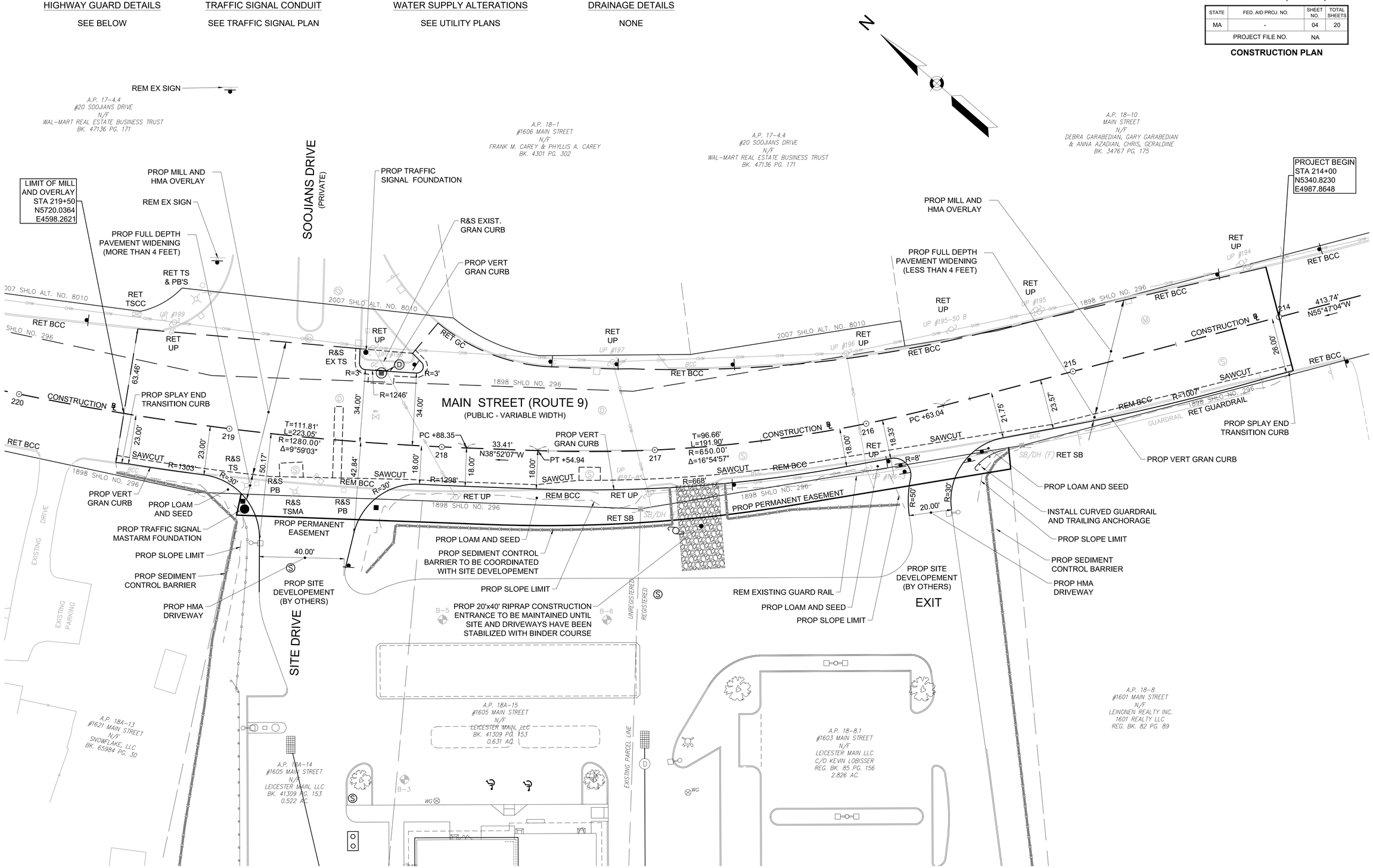
LEICESTER
MAIN STREET (ROUTE 9)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	04	20
PROJECT FILE NO.		NA	

CONSTRUCTION PLAN

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



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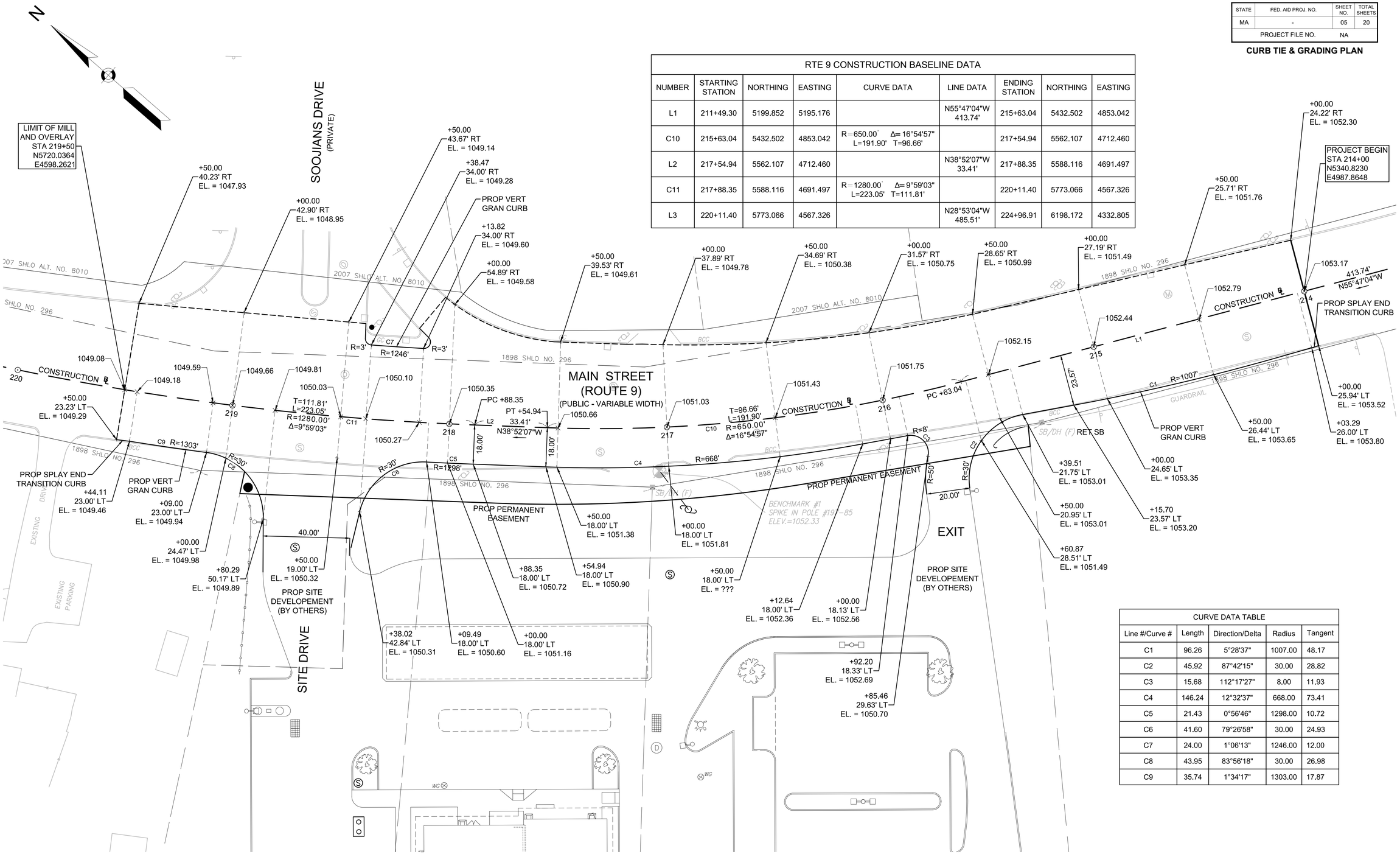
LEICESTER
MAIN STREET (ROUTE 9)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	05	20
PROJECT FILE NO.		NA	

CURB TIE & GRADING PLAN

RTE 9 CONSTRUCTION BASELINE DATA								
NUMBER	STARTING STATION	NORTHING	EASTING	CURVE DATA	LINE DATA	ENDING STATION	NORTHING	EASTING
L1	211+49.30	5199.852	5195.176		N55°47'04"W 413.74'	215+63.04	5432.502	4853.042
C10	215+63.04	5432.502	4853.042	R=650.00' Δ=16°54'57" L=191.90' T=96.66'		217+54.94	5562.107	4712.460
L2	217+54.94	5562.107	4712.460		N38°52'07"W 33.41'	217+88.35	5588.116	4691.497
C11	217+88.35	5588.116	4691.497	R=1280.00' Δ=9°59'03" L=223.05' T=111.81'		220+11.40	5773.066	4567.326
L3	220+11.40	5773.066	4567.326		N28°53'04"W 485.51'	224+96.91	6198.172	4332.805



CURVE DATA TABLE				
Line #/Curve #	Length	Direction/Delta	Radius	Tangent
C1	96.26	5°28'37"	1007.00	48.17
C2	45.92	87°42'15"	30.00	28.82
C3	15.68	112°17'27"	8.00	11.93
C4	146.24	12°32'37"	668.00	73.41
C5	21.43	0°56'46"	1298.00	10.72
C6	41.60	79°26'58"	30.00	24.93
C7	24.00	1°06'13"	1246.00	12.00
C8	43.95	83°56'18"	30.00	26.98
C9	35.74	1°34'17"	1303.00	17.87

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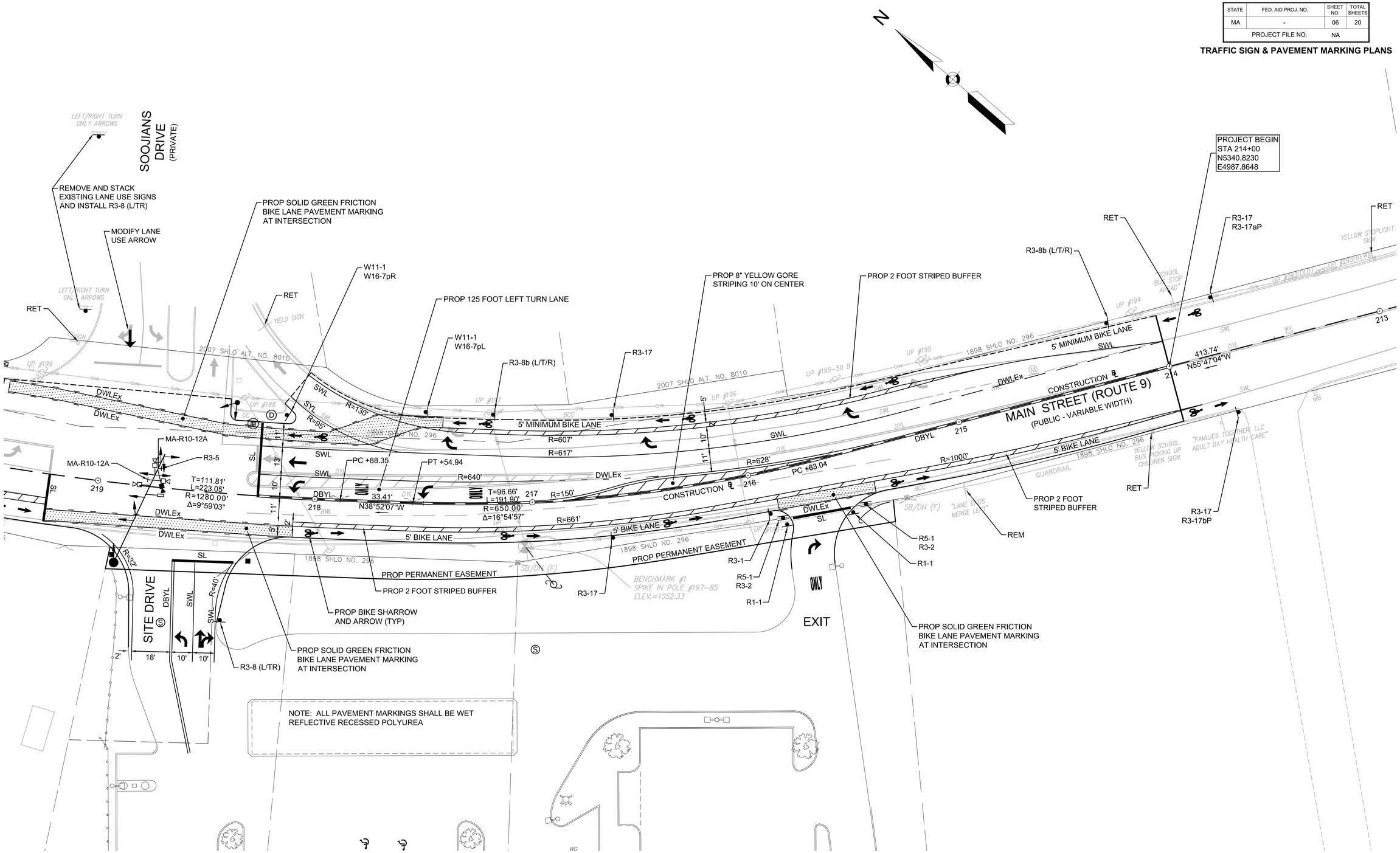
LEICESTER
MAIN STREET (ROUTE 9)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	06	20
PROJECT FILE NO.		NA	

TRAFFIC SIGN & PAVEMENT MARKING PLANS



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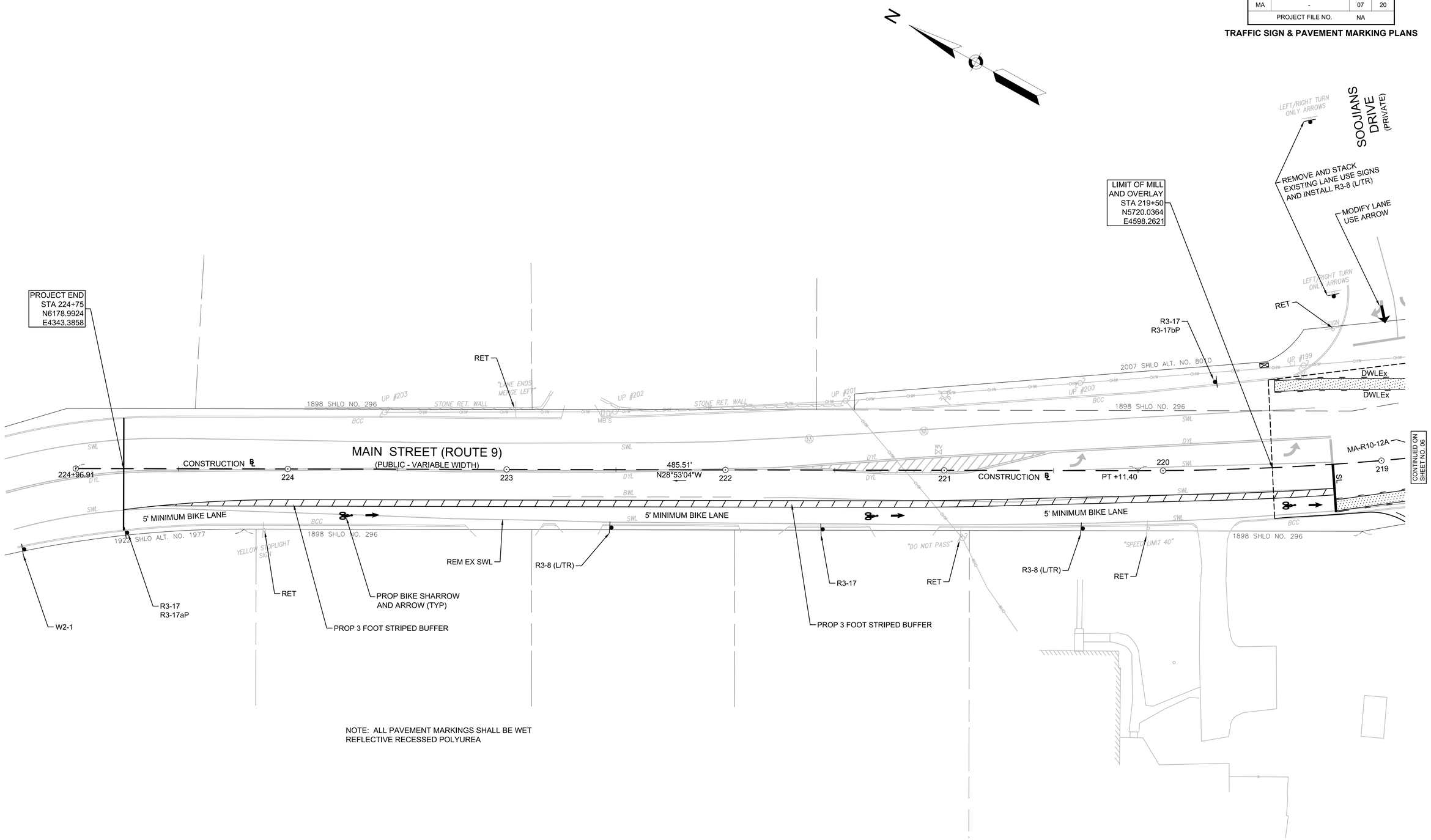
LEICESTER
MAIN STREET (ROUTE 9)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	07	20
PROJECT FILE NO.		NA	

TRAFFIC SIGN & PAVEMENT MARKING PLANS



NOTE: ALL PAVEMENT MARKINGS SHALL BE WET REFLECTIVE RECESSED POLYUREA

2056_HD(SIGN & PM PLANS).DWG Plotted on 15-Sep-2021 11:38 AM

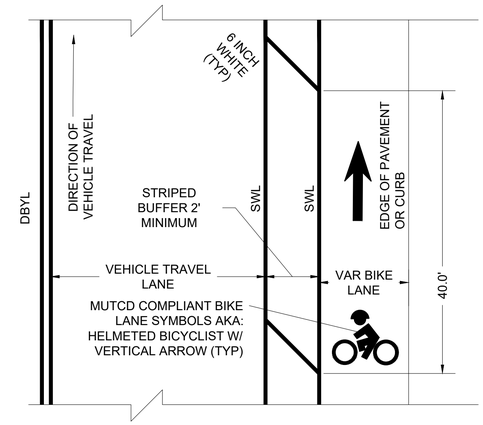
2056_HD(SIGN & PM PLANS).DWG Plotted on 15-Sep-2021 11:38 AM

TRAFFIC SIGN SUMMARY

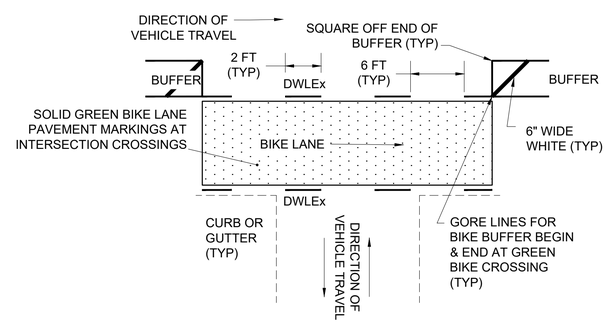
SIGN SUMMARY

IDENTIFI-CATION NUMBER	SIZE OF SIGN		TEXT	TEXT DIMENSIONS (INCHES)			COLOR			NO. OF SIGNS REQ.	POST SIZE AND NO. REQ.	UNIT AREA (S.F.)	AREA IN S.F.
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING	ARROW RTE. MKR.	BACK-GROUND	LEGEND	BORDER				
W11-1	30"	30"		SEE FHWA "STANDARD HIGHWAY SIGNS, 2004 EDITION", AS AMENDED			YELLOW	BLACK	BLACK	2	P5-4	6.25	12.50
W16-7pR	24"	12"					YELLOW	BLACK	BLACK	1	1 - MTD W/ OTHERS	2.00	2.00
W16-7pL	24"	12"					YELLOW	BLACK	BLACK	1	1 - MTD W/ OTHERS	2.00	2.00
R1-1	30"	30"	STOP				RED	WHITE	WHITE	2	P5-2	5.18	10.36
R3-1	24"	24"					WHITE	RED/ BLACK	BLACK	1	P5-1	4.00	4.00
R3-2	24"	24"					WHITE	RED/ BLACK	BLACK	2	MOUNT W/ R5-1	4.00	8.00
R3-5	30"	36"	ONLY				WHITE	BLACK	BLACK	1	MOUNTED ON TS MASTARM	7.50	7.50
R3-8b (L/T/R)	48"	30"	ONLY THRU ONLY				WHITE	BLACK	BLACK	2	P5(2)-4	10.00	20.00
R3-8 (L/TR)	30"	30"	ONLY				WHITE	BLACK	BLACK	5	P5-5	6.25	31.25
R3-17bP	24"	8"	ENDS				WHITE	BLACK	BLACK	2	2-MTD W/ OTHERS	1.33	2.66
R3-17aP	24"	8"	AHEAD				WHITE	BLACK	BLACK	2	2 - MTD W/ OTHERS	1.33	2.66
R3-17	24"	18"	BIKE LANE				WHITE	BLACK	BLACK	7	P5-7	3.00	21.00
R5-1	30"	30"	DO NOT ENTER				WHITE	RED/ WHITE	BLACK	2	P5-2	6.25	12.50
MA-R10-12a	30"	36"	LEFT TURN YIELD ON FLASHING	PER MASSDOT STANDARDS			WHITE	BLACK YELLOW	BLACK	2	MOUNTED ON T.S. MASTARM	7.50	15.00

TOTAL = 151.53 S.F.



BIKE LANE MARKINGS ADJACENT TO TRAVEL WAY



BIKE LANE MARKINGS THRU INTERSECTION

BIKE LANE PAVEMENT MARKINGS NOTES:

1. SEE TYPICAL SECTIONS AND SIGN AND PAVEMENT MARKINGS PLANS FOR TRAVEL LANE, STRIPED BUFFER AND BIKE LANE WIDTHS.
2. MARK LEFT SIDE OF THE BIKE LANE THROUGH INTERSECTIONS WITH DOTTED WHITE LANE LINE EXTENSION PAVEMENT MARKINGS, 2 FT DASH, 6 FT GAP.
3. INSTALL BIKE LANE SYMBOL AND ARROW AT INTERSECTION APPROACHES, AT THE BEGINNING OF THE BIKE LANE, AND AT 1000 FT INTERVALS (MAX).

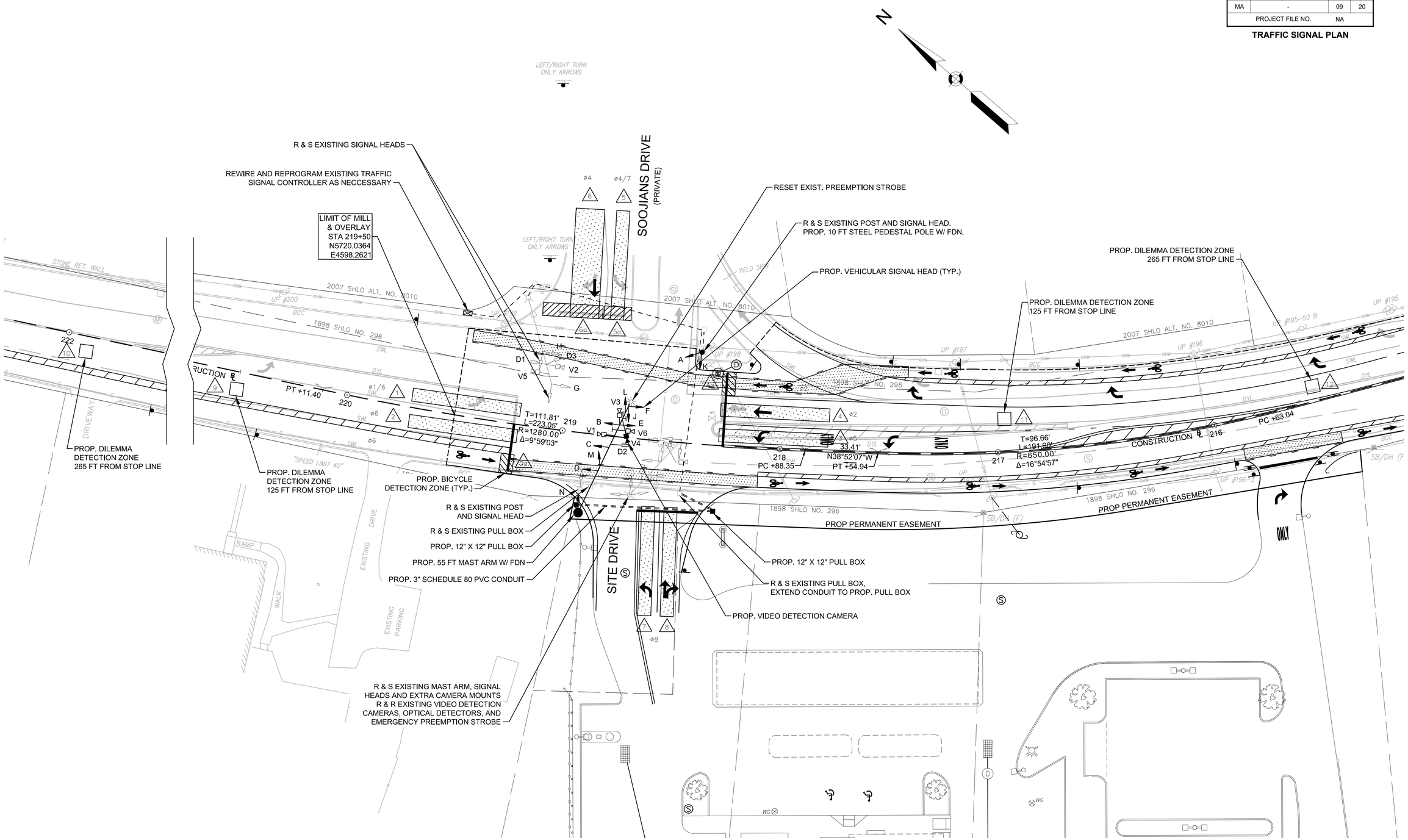
BIKE LANE PAVEMENT MARKINGS

SCALE: NONE

LEICESTER
MAIN STREET (ROUTE 9)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	09	20
PROJECT FILE NO.		NA	

TRAFFIC SIGNAL PLAN



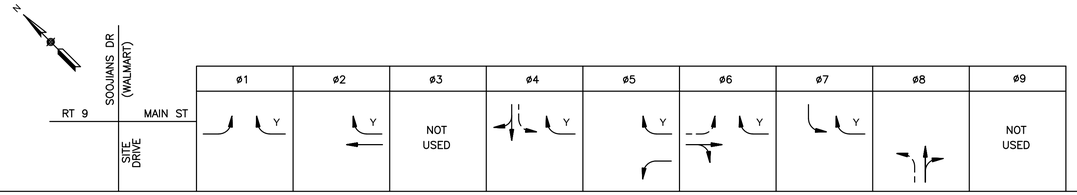
Plotted on 15-Sep-2021 11:38 AM

2056_HD(TRAFFIC SIGNAL PLAN).DWG

LEICESTER
MAIN STREET (ROUTE 9)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	X	XX
PROJECT FILE NO.		NA	

TRAFFIC SIGNAL DATA



SEQUENCE AND TIMING FOR FULL ACTUATED CONTROL (ISOLATED)

STREET	DIRECTION	HOUSINGS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	FLASH OPER.
ROUTE 9 (MAIN ST)	EBL	A,B	GL	YL	*	RL	RL	RL				RL	RL	RL	RL	RL	RL	FYL	YL	RL	RL	RL	RL	RL	RL	RL				FRL
ROUTE 9 (MAIN ST)	EB	C,D	R	R	R	R	R	R				R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R				FY
ROUTE 9 (MAIN ST)	WBL	E	RL	RL	RL	RL	RL	RL				RL	RL	RL	GL	YL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL				FRL
ROUTE 9 (MAIN ST)	WB	F,G,H	R	R	R	G	Y	R				R	R	R	R	R	R	R	R	R	R	R	R	R	R	R				FY
SITE DRIVEWAY	NB	J,K	R	R	R	R	R	R				R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R				FR
SOOJIANS DRIVE	SBL	L	RL	RL	RL	RL	RL	RL				FYL	YL	RL	RL	RL	RL	RL	RL	RL	GL	YL	**	RL	RL	RL				FRL
SOOJIANS DRIVE	SB	M,N	R	R	R	R	R	R				G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R				FR
TIMING IN SECONDS																														
MINIMUM GREEN (INITIAL)			8			10						6			6			10			6			6						EMERGENCY ONLY
PASSAGE TIME (VEHICLE)			3			3						3			3			3			3			3						
MAXIMUM 1 (ALL OTHER TIMES)			20			35						14			13			43			–			14						
MAXIMUM 2 (12PM–8PM – ALL DAYS)			22			40						37			17			46			16			15						
YELLOW CLEARANCE				3.5			5						3.5			4			4.5			3			3.5					
RED CLEARANCE					2.5			2						2.5			1.5			2.5			2.5			2.5				
WALK (W)																														
PEDESTRIAN CLEARANCE																														
RECALL			OFF			SOFT						OFF			OFF			SOFT			OFF			OFF						
MEMORY			NON–LOCK			NON–LOCK						NON–LOCK			NON–LOCK			NON–LOCK			NON–LOCK			NON–LOCK						

Y = YIELD OPERATION.
* FLASHING YELLOW LEFT (FYL) IF PHASE 2 FOLLOWS, OTHERWISE RED LEFT (RL) ALL OTHER PHASES.
** FLASHING YELLOW LEFT (FYL) IF PHASE 4+8 FOLLOWS, OTHERWISE RED LEFT (RL) ALL OTHER PHASES.
NOTES: 1. FLASHING OPERATION PER MUTCD.

	MAJOR ITEMS REQUIRED	
PAY ITEM	QUANTITY	ITEM
816.01	1	REWIRE/REPROGRAM EXISTING TRAFFIC SIGNAL CONTROLLER
	1	55FT TYPE II GALV. STEEL MAST ARM W/FDN
	1	10FT PEDESTAL POLE, STEEL, W/FDN
	8	SIGNAL HEAD 3–SECTION 12"LED W/5" FLAT BACK PLATE AND 3" YELLOW RETROFLECTIVE BORDER
	3	SIGNAL HEAD 4–SECTION 12"LED W/5" FLAT BACK PLATE AND 3" YELLOW RETROFLECTIVE BORDER
	2	5" FLAT BACK PLATE WITH 3" YELLOW RETROFLECTIVE BORDER
	1	VIDEO DETECTION CAMERA W/ MOUNTING HARDWARE
	1	2–CHANNEL VIDEO DETECTION PROCESSOR
804.3	80 FT	3" SCHEDULE 80 PVC CONDUIT
811.31	2	PULLBOX 12" X 12"
		PLUS ALL NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS
		MATERIAL AND EQUIPMENT INCLUDING LOAD SWITCHES TO COMPLETE THE INSTALLATION.

NOTES:

1. THE CONTRACTOR SHALL REMOVE AND STACK THE EXISTING 1-CHANNEL VIDEO PROCESSOR.
2. THE CONTRACTOR SHALL UTILIZE THE EXISTING SPARE 2-CHANNEL VIDEO PROCESSOR IN THE CABINET.

VIDEO DETECTOR DATA

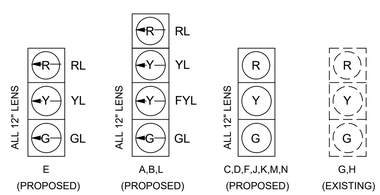
ZONE	ZONE SIZE	CAMERA	DELAY/ EXTEND	ø CALL	ø EXTENDED
1	6' X 50'	V1	0/0	ø1	ø1/6
2	6' X 50'	V1	0/0	ø6	ø6
3	6' X 50'	V2	0/0	ø5	ø5
4	6' X 50'	V2	0/0	ø2	ø2
5	6' X 50'	V3	0/0	ø4/7	ø4/7
6	14' X 50'	V3	0/0	ø4	ø4
7	6' X 50'	V4	0/0	ø8	ø8
8	6' X 50'	V4	0/0	ø8	ø8
9a *	7' X 6'	V1	0/0	ø6	ø6
9b *	10' X 6'	V2	0/0	ø2	ø2
9c *	13' X 6'	V3	0/0	ø4/7	ø4/7
9d *	30' X 6'	V3	0/0	ø4	ø4
9	6' X 6'	V5	0/2	ø6	ø6
10	6' X 6'	V5	0/2.2	ø6	ø6
11	6' X 6'	V6	0/2	ø2	ø2
12	6' X 6'	V6	0/2.2	ø2	ø2

* CAPABLE OF BICYCLE DETECTION.

NOTE:

1. ALL VIDEO DETECTION CAMERAS AND VIDEO DETECTION ZONES TO BE FIELD ADJUSTED BY THE CONTRACTOR AS NECESSARY.

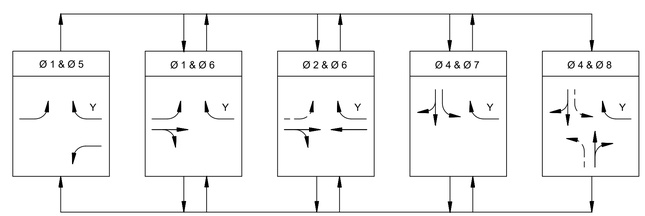
SIGNAL IDENTIFICATION



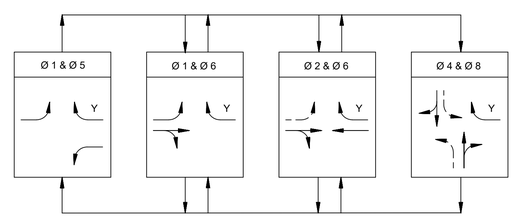
NOTES:

1. ALL SIGNALS SHALL HAVE 12" LED WITH 5" FLAT BACK PLATES AND 3" YELLOW RETROFLECTIVE BORDERS.
2. ALL PROPOSED SIGNALS SHALL HAVE CUT AWAY TUNNEL VISORS.

PREFERENTIAL PHASING SEQUENCE - 12PM-8PM (ALL DAYS)



PREFERENTIAL PHASING SEQUENCE - ALL OTHER TIMES



NOTES: 1. ANY PHASE OR PHASE COMBINATION NOT CALLED SHALL BE SKIPPED.

FIRE PREEMPTION SCHEDULE

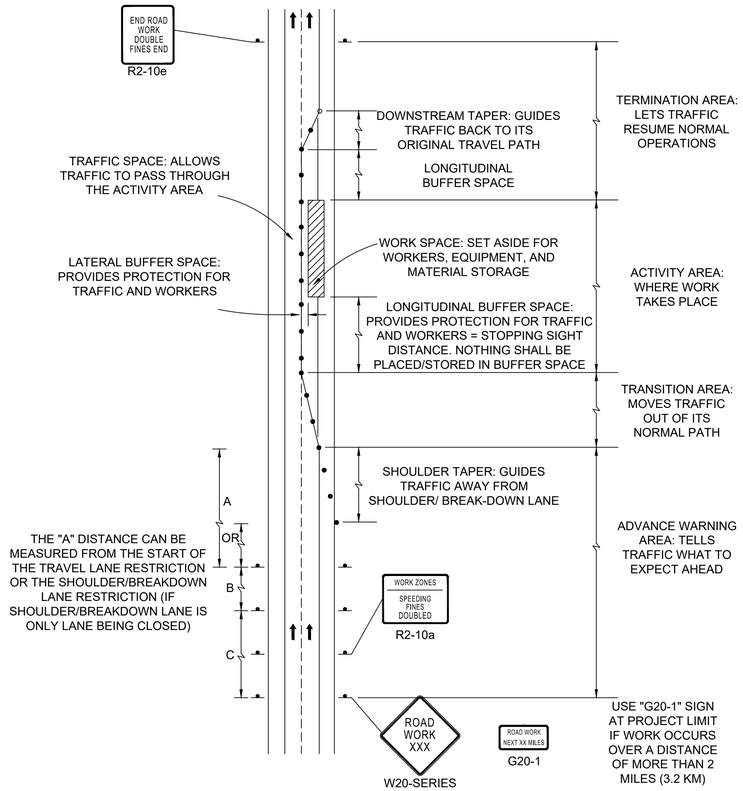
DETECTOR NO.	APPROACH	PREEMPTION PHASE	NEXT PHASE CALLED
D1	EASTBOUND	1+6	2+6
D2	WESTBOUND	2+5	2+6
D3	SOUTHBOUND	4+7	2+6

EMERGENCY VEHICLE PREEMPTION OPERATION:

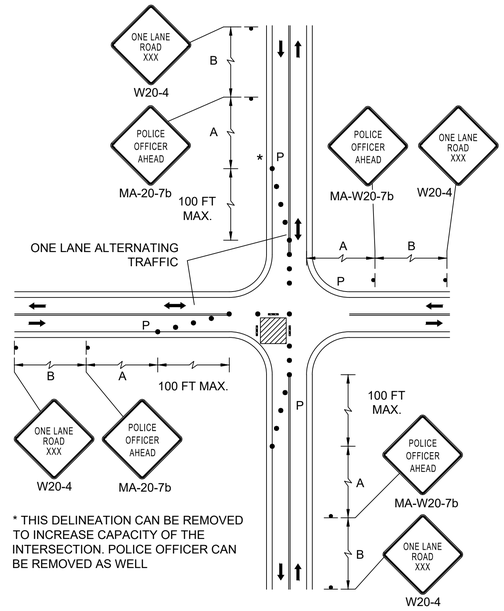
1. EMERGENCY VEHICLE PREEMPTION SHALL BE ACTUATED BY AN OPTICAL SIGNAL FROM AN OPTICAL EMITTER MOUNTED ON AN EMERGENCY VEHICLE AND RECEIVED BY AN OPTICAL DETECTOR LOCATED AT INTERSECTION. A SEPARATE RECEIVING DETECTOR IS REQUIRED FOR EACH DETECTED APPROACH.
2. PREEMPTION SIGNALS FROM MULTIPLE APPROACHES SHALL BE SERVICED ON A FIRST DETECTED FIRST SERVED BASIS.
3. IN RESPONSE TO A PREEMPTION SIGNAL RECEIVED AT AN INTERSECTION BY AN OPTICAL DETECTOR, THE CONTROLLER SHALL TIME THE CLEARANCE INTERVALS OF THE ACTIVE PHASE (IF DIFFERENT THAT TO BE SERVICED) AND ADVANCE TO AND/OR HOLD IN EMERGENCY VEHICLE PREEMPTION PHASE UNTIL PREEMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME CLEARANCES AND SIMILARLY SERVICE OTHER EMERGENCY VEHICLE PREEMPTION SEQUENCES IN THE ORDER RECEIVED (IF RECEIVED) OTHERWISE, RESUME NORMAL PREFERENTIAL PHASE SEQUENCE.
4. PREEMPTION MINIMUM GREENS SHALL BE TEN SECONDS.
5. NORMAL CLEARANCES SHALL BE PROVIDED ON PHASES THAT ARE TERMINATED BY PREEMPTION DEMAND.
6. ACTUAL TIMMING FOR PREEMPTION SHALL BE DETERMINED IN THE FIELD IN COORDINATION WITH THE FIRE DEPARTMENT AND SHALL BE APPROVED BY MASSDOT PRIOR TO OPERATION.

2056_HD(TRAFFIC DATA).DWG Plotted on 15-Sep-2021 11:38 AM

2068_HD(TTCP).DWG Plotted on 15-Sep-2021 11:38 AM

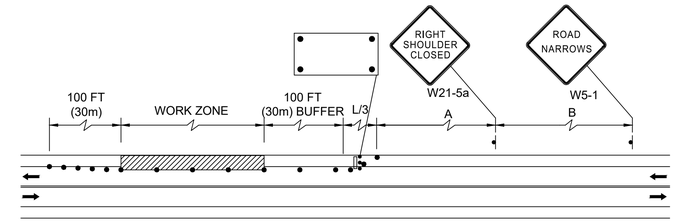


COMPONENT PARTS OF A TEMPORARY TRAFFIC CONTROL (TTC) ZONE

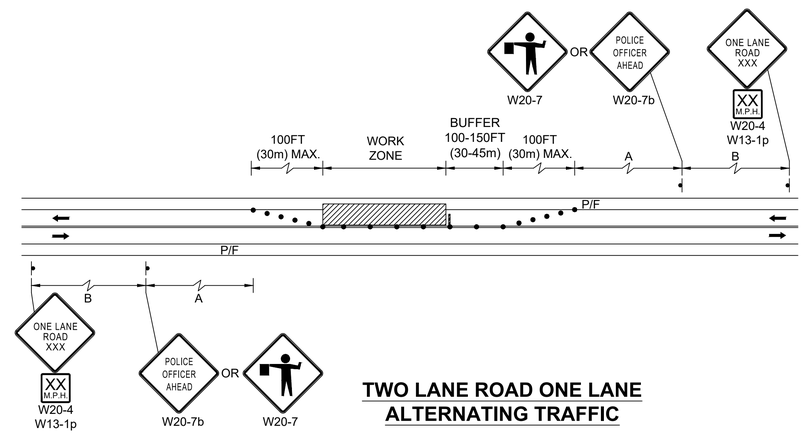


* THIS DELINEATION CAN BE REMOVED TO INCREASE CAPACITY OF THE INTERSECTION. POLICE OFFICER CAN BE REMOVED AS WELL

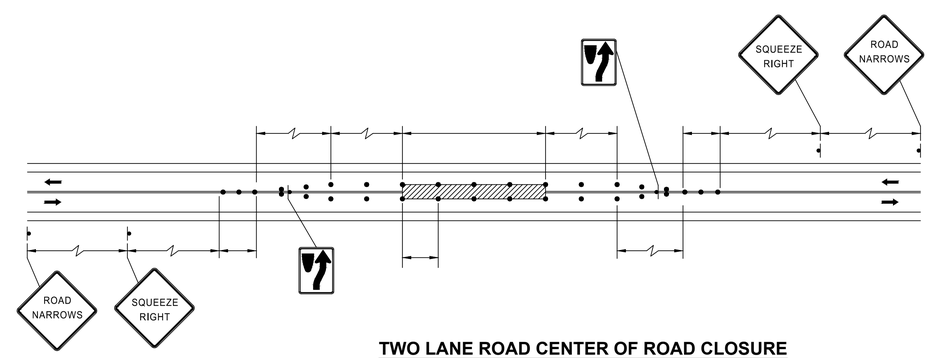
SINGLE LANE APPROACH ONE QUADRANT CLOSURE (POLICE DETAIL AT INTERSECTION)



TWO LANE ROAD SHOULDER CLOSED



TWO LANE ROAD ONE LANE ALTERNATING TRAFFIC



TWO LANE ROAD CENTER OF ROAD CLOSURE

SUGGESTED WORK ZONE WARNING SIGN SPACING

ROAD TYPE	DISTANCE BETWEEN SIGNS **		
	A	B	C
LOCAL OR LOW VOLUME ROADWAYS	350 (100)	350 (100)	350 (100)
MOST OTHER ROADWAYS	500 (150)	500 (150)	500 (150)
FREEWAYS AND EXPRESSWAYS	1,000 (300)	1,500 (450)	2,640 (800)

DISTANCES ARE SHOWN IN FEET (METERS). 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.

LEGEND:

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

2066_HD(TTCP).DWG Plotted on 15-Sep-2021 11:39 AM

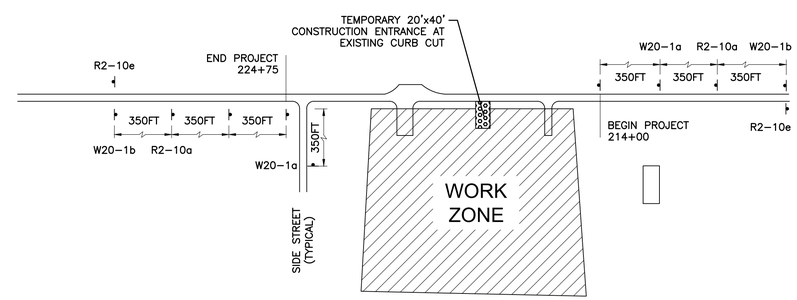
TEMPORARY TRAFFIC CONTROL SIGN SUMMARY

IDENTIFI-CATION NUMBER	SIZE OF SIGN (INCHES)		TEXT	TEXT DIMENSIONS (INCHES)			NUMBER OF SIGNS REQUIRED	COLOR			UNIT AREA (S.F.)	TOTAL AREA (S.F.)
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING	ARROW RTE. MKR.		BACK-GROUND	LEGEND	BORDER		
R2-10a	48	36	WORK ZONE SPEEDING FINES DOUBLED	SEE MASSDOT STANDARDS			2	SEE MASSDOT STDS			12	48
R2-10e	36	48	END ROAD WORK / DOUBLE FINES END	SEE MASSDOT STANDARDS			2	SEE MASSDOT STDS			12	48
R4-7	24	30		SEE MUTCD STANDARDS			2	SEE MUTCD STANDARDS			5	10
W5-1	36	36	ROAD NARROWS				2				9	18
W20-1a	36	36	ROAD WORK AHEAD				2				9	18
W20-1b	36	36	ROAD WORK 1000 FT				2				9	18
W13-1p	24	30	XX MPH				2				5	15
W20-4	36	36	ONE LANE ROAD AHEAD				2				9	27
W20-7b	36	36	POLICE OFFICER AHEAD	SEE MASSDOT STANDARDS			2	SEE MASSDOT STDS			9	27
W20-7	36	36		SEE MASSDOT STANDARDS			2	SEE MASSDOT STDS			9	18
W21-5a	36	36	RIGHT SHOULDER CLOSED	SEE MUTCD STANDARDS			1	SEE MUTCD STANDARDS			9	9
W30-8R	36	36	SQUEEZE RIGHT	SEE MASSDOT STANDARDS			2	SEE MASSDOT STDS			9	18

NOTES:

1. 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.
2. ALL SIGN LEGENDS, BORDERS, AND MOUNTING SHALL BE IN ACCORDANCE WITH THE MUTCD.
3. TEMPORARY CONSTRUCTION SIGNING AND ALL OTHER TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY WORK.
4. 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.
5. SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY, CHANNELIZING DEVICES, BARRIERS, AND CRASH ATTENUATORS MUST PASS THE CRITERIA SET FORTH IN NCHRP REPORT 350, "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES" AND/OR "MANUAL FOR ASSESSING SAFETY HARDWARE" (MASH).
6. CONTRACTORS SHALL NOTIFY EACH ABUTTER 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.
7. THE FIRST FIVE PLASTIC DRUMS OF A TAPER SHALL BE MOUNTED WITH TYPE A LIGHTS.
8. THE ADVISORY SPEED LIMIT, IF REQUIRED, SHALL BE DETERMINED BY THE ENGINEER.
9. DISTANCES ARE A GUIDE AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.
10. MAXIMUM SPACING OF TRAFFIC DEVICES IN A TAPER (DRUMS OR CONES) IS EQUAL IN FEET TO THE SPEED LIMIT IN MPH.
11. MINIMUM LANE WIDTH IS TO BE 11 FEET (3.3m) UNLESS OTHERWISE SHOWN. MINIMUM LANE WIDTH TO BE MEASURED FROM THE EDGE OF DRUMS OR MEDIAN BARRIER.
12. ALL SIGNS SHALL BE MOUNTED ON THEIR OWN STANDARD SIGN SUPPORTS.
13. PRIOR TO THE START OF CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE MASSDOT PERMITS ENGINEER WITH A SCHEDULE OF PROPOSED CONSTRUCTION ACTIVITY AND ALL REQUIRED LANE CLOSURES AND/OR TRAFFIC CONTROL TO BE IMPLEMENTED FOR APPROVAL BY MASSDOT BEFORE ANY CONSTRUCTION ACTIVITY CAN TAKE PLACE.
14. NO LANE CLOSURES WILL BE PERMITTED BETWEEN THE HOURS OF 6-9AM AND 2-6PM WEEKDAYS.
15. TRAFFIC FLOW ENTERING AND EXITING SITE DURING CONSTRUCTION SHALL REMAIN AS A RIGHT TURN ENTRANCE AND RIGHT TURN EXIT ONLY UNTIL TRAFFIC SIGNAL WORK COMPLETED.

MAIN STREET (ROUTE 9)



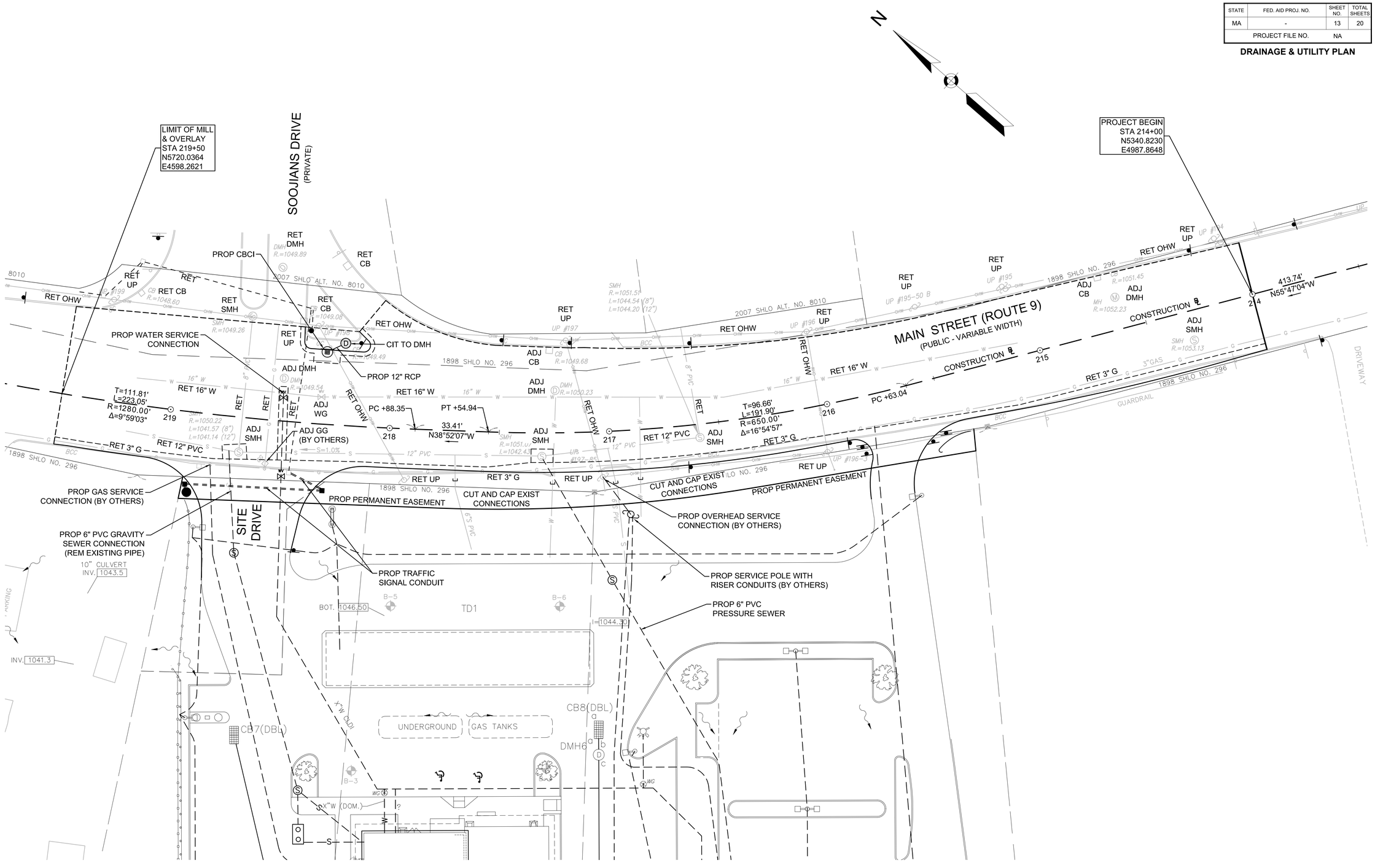
PERMANENT PROJECT CONSTRUCTION SIGNING

NOT TO SCALE

LEICESTER
MAIN STREET (ROUTE 9)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	13	20
PROJECT FILE NO.		NA	

DRAINAGE & UTILITY PLAN



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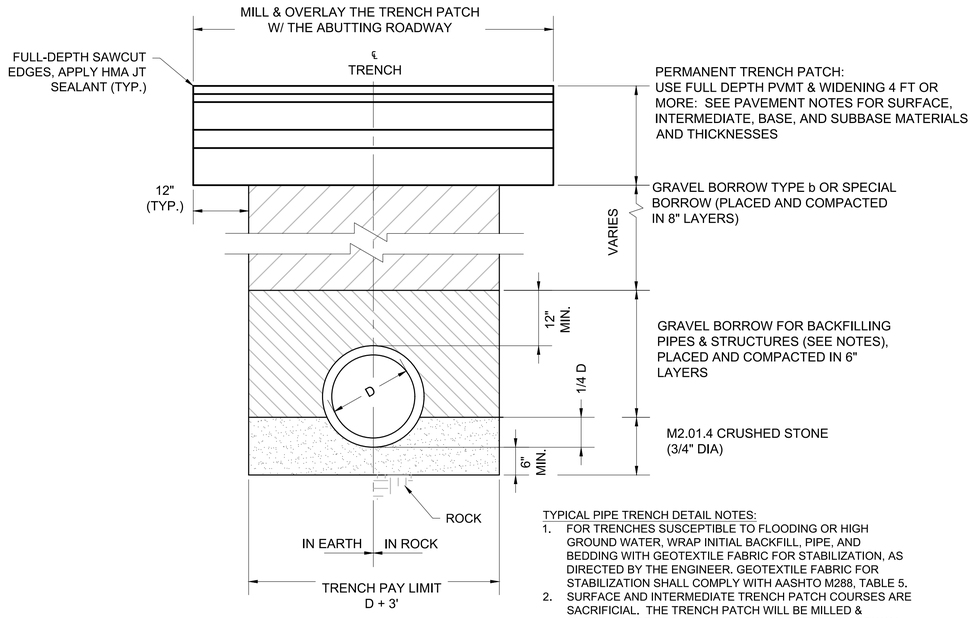
2056_HD(UTILITY PLAN).DWG

2056_HD(CONSTR DETAILS).DWG 15-Sep-2021

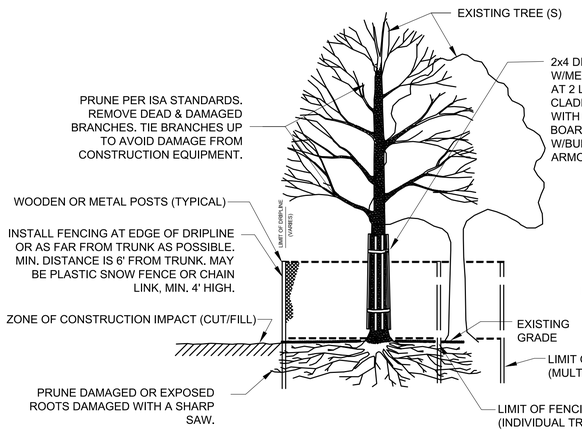


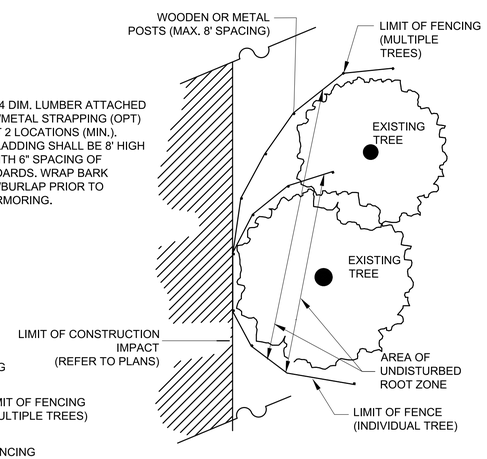
TYPICAL PIPE TRENCH DETAIL NOTES:

1. FOR TRENCHES SUSCEPTIBLE TO FLOODING OR HIGH GROUND WATER, WRAP INITIAL BACKFILL, PIPE, AND BEDDING WITH GEOTEXTILE FABRIC FOR STABILIZATION, AS DIRECTED BY THE ENGINEER. GEOTEXTILE FABRIC FOR STABILIZATION SHALL COMPLY WITH AASHTO M288, TABLE 5.
2. SURFACE AND INTERMEDIATE TRENCH PATCH COURSES ARE SACRIFICIAL. THE TRENCH PATCH WILL BE MILLED & OVERLAID AT THE SAME TIME AS THE ABUTTING ROADWAY.

TYPICAL PIPE TRENCH DETAIL

SCALE: NONE

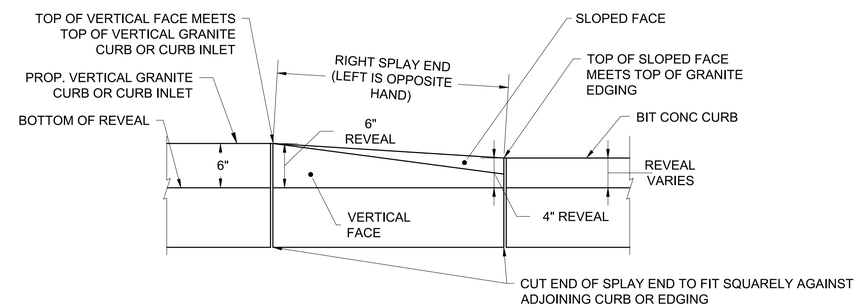




PLAN VIEW

TREE PROTECTION-EXISTING TREE(S)

SCALE: NONE



NOTES:

1. SPLAY END INSTALLED TO THE RIGHT OF THE VERTICAL CURB IS SHOWN (LOOKING AT THE FACE). SPLAY END INSTALLED TO THE LEFT OF THE VERTICAL CURB IS OPPOSITE HAND.
2. SPLAY ENDS TO BE USED AT ALL LOCATIONS BETWEEN GRANITE EDGING AND VERTICAL GRANITE CURB OR CURB INLET.
3. LENGTH OF SECTION OF SP;AY END SHALL COMPLY WITH THE LENGTH SPECIFIED FOR GRANITE CURB TYPE VA4.
4. THERE SHALL BE NO CUTTING OF STONE IN THE FIELD.

GRANITE CURB SPLAY END

SCALE: NONE