CITY OF WORCESTER
DEPARTMENT OF TRANSPORTATION AND MOBILITY

PLAN OF

COMPLETE STREETS IMPROVEMENTS

IN THE CITY OF

WORCESTER, MA

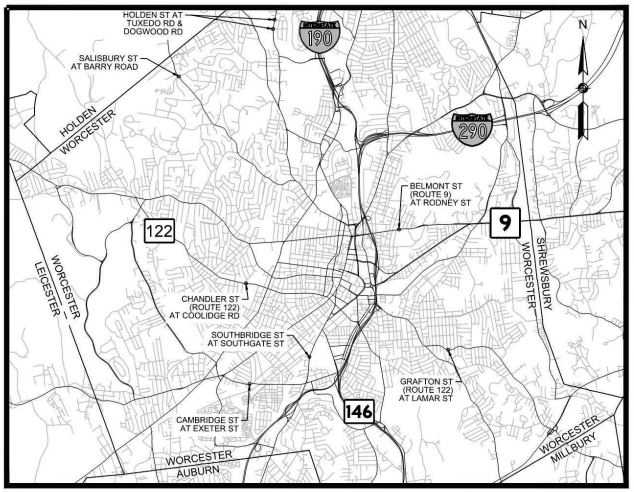
WORCESTER COUNTY

WORCESTER
COMPLETE STREETS IMPROVEMENTS
TITLE SHEET & INDEX
SHEET 1 OF 29

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.

CONSTRUCTION PLANS

INDEX



4,000 0 4,000 8,000 12,000

SCALE: 1" = 4,000'

DATE	DESCRIPTION	REV #

COMMONWEALTH OF MASSACHUSETTS
JARED M. DUVAL
CIVIL
No. 55340
REGISTERED PROFESSIONAL ENGINEER

4/19/2024

TEC, Inc.

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

www.TheEngineeringCorp.com

APPROVED BY:	DESIGNED BY:	DATE:
JMD	ZJC/JD/TS/FAS	April 1, 2024
CHECKED BY:	DRAWN BY:	TEC PROJECT NO.
PE	ZJC/JD/TS/FAS	T1414

T:\414_HD\(TITLE).DWG Plotted on 16-Apr-2024 3:39 PM

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
		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
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

GENERAL NOTES

1. THE LOCATIONS EXISTING UNDERGROUND UTILITIES ARE SHOWN AS AN APPROXIMATE REPRESENTATION ONLY. THE OWNER OR ITS REPRESENTATIVE(S) HAVE NOT INDEPENDENTLY VERIFIED THIS INFORMATION AS SHOWN ON THE PLANS. THE UTILITY INFORMATION SHOWN DOES NOT GUARANTEE THE ACTUAL EXISTENCE, SERVICEABILITY, OR OTHER DATA CONCERNING THE UTILITIES, NOR DOES IT GUARANTEE AGAINST THE POSSIBILITY THAT ADDITIONAL UTILITIES MAY BE PRESENT THAT ARE NOT SHOWN ON THE PLANS. PRIOR TO ORDERING MATERIALS AND BEGINNING CONSTRUCTION THE CONTRACTOR SHALL VERIFY AND DETERMINE THE EXACT LOCATION, SIZE, AND ELEVATION OF EXISTING UTILITIES.
2. THE CONTRACTOR MUST FIELD VERIFY THE PROPOSED INTERFACE POINTS (CROSSINGS) WITH EXISTING UNDERGROUND UTILITIES BY USING TEST PITS TO CONFIRM EXACT DEPTH, PRIOR TO COMMENCEMENT OF CONSTRUCTION.
3. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, OR EXISTING CONDITIONS DIFFER FROM THOSE SHOWN SUCH THAT THE WORK CANNOT BE COMPLETED AS INTENDED, THE LOCATION, ELEVATION, AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED IN WRITING TO THE OWNER'S REPRESENTATIVE FOR THE RESOLUTION OF THE CONFLICT. FAILURE TO PROVIDE OR PERFORM THE ABOVE PRIOR TO PERFORMING ANY WORK SHALL NOT BE GROUNDS FOR EXTRA PAYMENTS TO THE CONTRACTOR.
4. AT ALL LOCATIONS WHERE EXISTING CURBING OR PAVEMENT ABUTS NEW CONSTRUCTION, THE EDGE OF THE EXISTING CURB OR PAVEMENT SHALL BE SAW CUT TO A CLEAN, SMOOTH EDGE. BLEND NEW PAVEMENT, CURBS, AND EARTHWORK SMOOTHLY INTO EXISTING BY MATCHING LINES, GRADES, AND JOINTS.
5. THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENT OF GAS, ELECTRIC, TELEPHONE AND ANY OTHER PRIVATE UTILITIES BY THE UTILITY COMPANIES, AS REQUIRED.
6. UTILITY COVERS, GRATES, ETC. SHALL BE ADJUSTED TO BE FLUSH WITH THE PAVEMENT FINISH GRADE UNLESS OTHERWISE NOTED.
7. INSTALL ALL UTILITIES (INCLUDING CONCRETE PADS) PER UTILITY COMPANY, DPW, AND STATE STANDARDS.
8. ALL FILL, COMPACTION, AND BACKFILL MATERIALS MUST COMPLY WITH APPLICABLE REQUIREMENTS AND SPECIFICATIONS. THE PROFESSIONAL OF RECORD AND TEC ARE NOT RESPONSIBLE FOR DESIGN OF TRENCH BACKFILL OR FOR COMPACTION REQUIREMENTS.
9. DURING THE INSTALLATION OF SANITARY, STORM, AND ALL UTILITIES, THE CONTRACTOR MUST MAINTAIN A CONTEMPORANEOUS AND THOROUGH RECORD OF CONSTRUCTION TO IDENTIFY THE AS-INSTALLED LOCATIONS OF ALL UNDERGROUND INFRASTRUCTURE. THE CONTRACTOR MUST CAREFULLY NOTE ANY INSTALLATIONS THAT DEVIATE, IN ANY RESPECT, FROM THE INFORMATION CONTAINED IN THESE PLANS. THIS RECORD MUST BE KEPT ON A CLEAN COPY OF THE APPROPRIATE PLAN(S), WHICH THE CONTRACTOR MUST PROMPTLY PROVIDE TO THE OWNER IMMEDIATELY UPON THE COMPLETION OF WORK.
10. THE CONTRACTOR MUST ENSURE THAT ALL UTILITY TRENCHES LOCATED IN EXISTING PAVED ROADWAYS INCLUDING SANITARY, WATER AND STORM SYSTEMS, ARE REPAIRED IN ACCORDANCE WITH REFERENCED MUNICIPAL, COUNTY AND OR STATE DOT DETAILS AS APPLICABLE. THE CONTRACTOR MUST COORDINATE INSPECTION AND APPROVAL OF COMPLETED WORK WITH THE AUTHORIZED REPRESENTATIVE.
11. ALL WORK ASSOCIATED WITH LIGHT POLES OR APPURTENANCES SHALL BE COORDINATED BY THE GENERAL CONTRACTOR WITH THE LOCAL UTILITY COMPANIES PRIOR TO THE ORDERING OF ANY MATERIALS. THIS MAY INCLUDE BUT IS NOT LIMITED TO THE REMOVAL, INSTALLATION, RELOCATION OR PROTECTION AS IT MAY BE REQUIRED TO ACCOMMODATE THE PROJECT.
12. CONTRACTOR SHALL PROTECT ALL UNDERGROUND DRAINAGE, SEWER AND UTILITY FACILITIES FROM EXCESSIVE VEHICULAR LOADS DURING CONSTRUCTION. ANY DAMAGE TO THESE FACILITIES RESULTING FROM CONSTRUCTION LOADS WILL BE RESTORED TO ORIGINAL CONDITION (AT NO ADDITIONAL COST TO THE OWNER) BY THE CONTRACTOR.
13. STORM AND SANITARY PIPE LENGTHS INDICATED ARE NOMINAL AND ARE MEASURED FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE UNLESS INDICATED ON THE PLANS OTHERWISE.
14. EXCAVATION REQUIRED IN THE PROXIMITY OF EXISTING UTILITY LINES SHALL BE DONE BY HAND. CONTRACTOR SHALL REPAIR ANY DAMAGE TO EXISTING UTILITY LINES OR STRUCTURES INCURRED DURING CONSTRUCTION OPERATIONS AT NO COST TO THE OWNER.
15. THE CONTRACTOR SHALL SCHEDULE THEIR WORK TO ALLOW THE FINISHED SUBGRADE ELEVATIONS TO DRAIN PROPERLY WITHOUT PUDDLING. SPECIFICALLY, ALLOW WATER TO ESCAPE WHERE PROPOSED CURB MAY RETAIN RUNOFF PRIOR TO APPLICATION OF THE FINISH SUBGRADE AND/OR SURFACE PAVING.

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 (or EP)	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

WORCESTER
COMPLETE STREETS IMPROVEMENTS
LEGEND & GENERAL NOTES
SHEET 2 OF 29

ABBREVIATIONS (cont.)

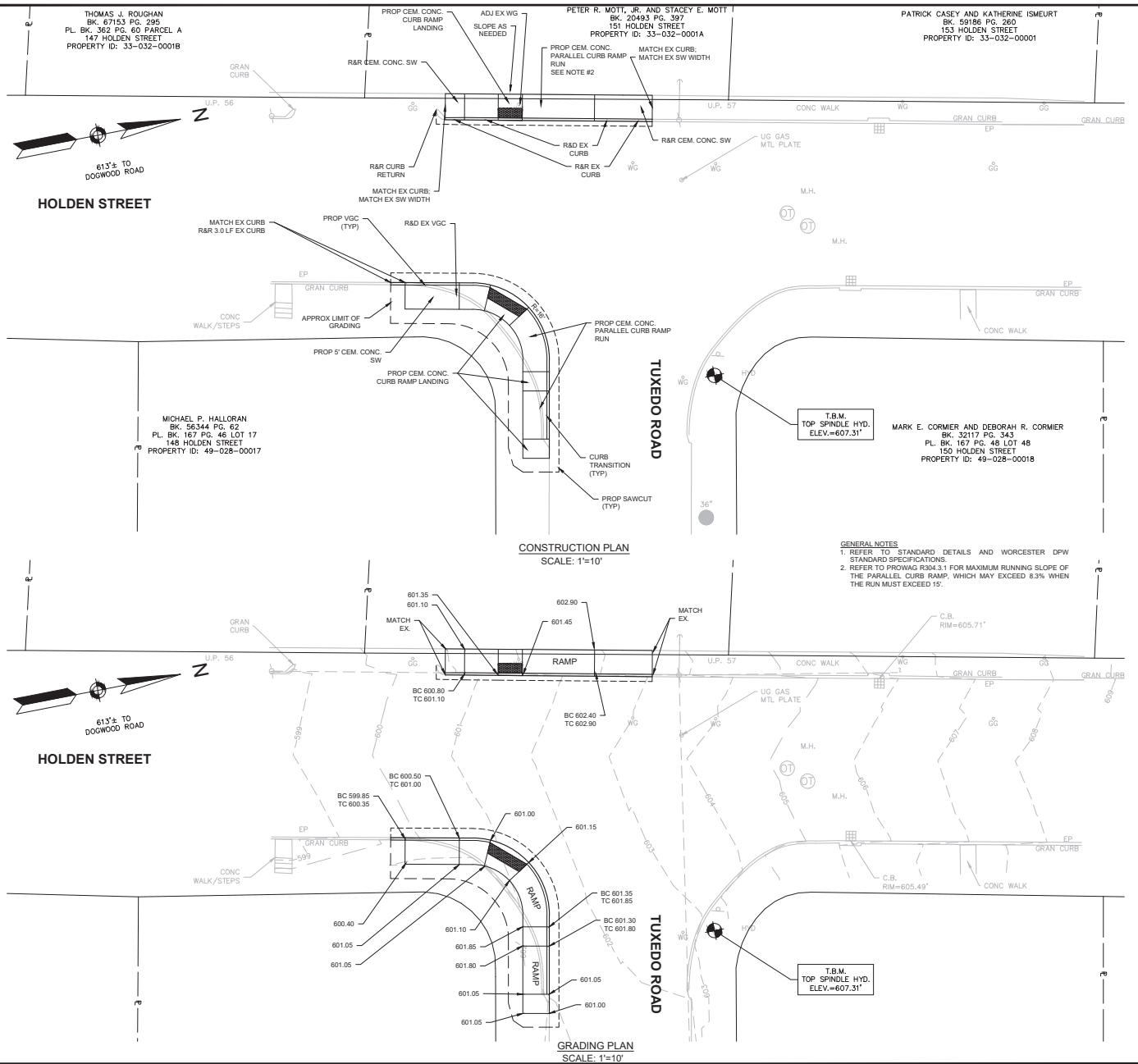
GENERAL

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

T1414_HI20LEG.DWG Plotted on 16-Apr-2024 3:43 PM



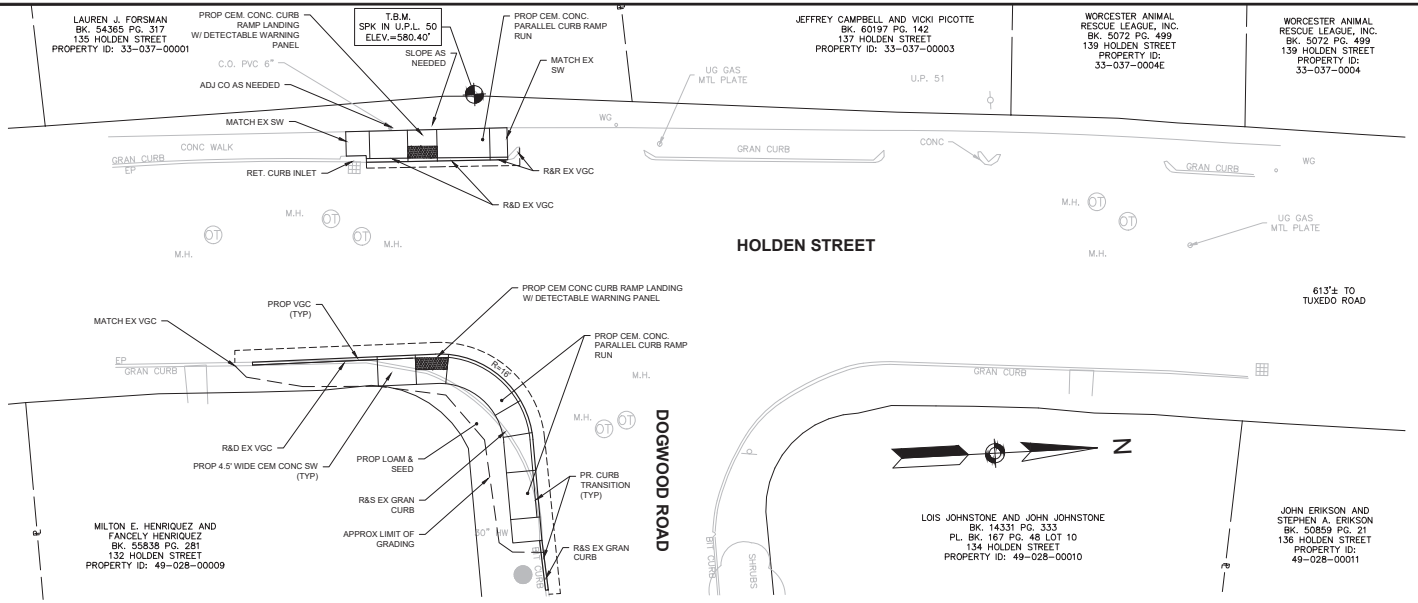
GENERAL NOTES

1. REFER TO STANDARD DETAILS AND WORCESTER DPW STANDARD SPECIFICATIONS.
2. REFER TO PROWAG R304.3.1 FOR MAXIMUM RUNNING SLOPE OF THE PARALLEL CURB RAMP, WHICH MAY EXCEED 8.3% WHEN THE RUN MUST EXCEED 15'.

WORCESTER
COMPLETE STREETS IMPROVEMENTS
HOLDEN ST AT TUXEDO RD
CONSTRUCTION & GRADING PLANS
SHEET 3 OF 29

T1414_HD(PR-HOLDEN).DWG Plotted on 17-Apr-2024 1:27 PM

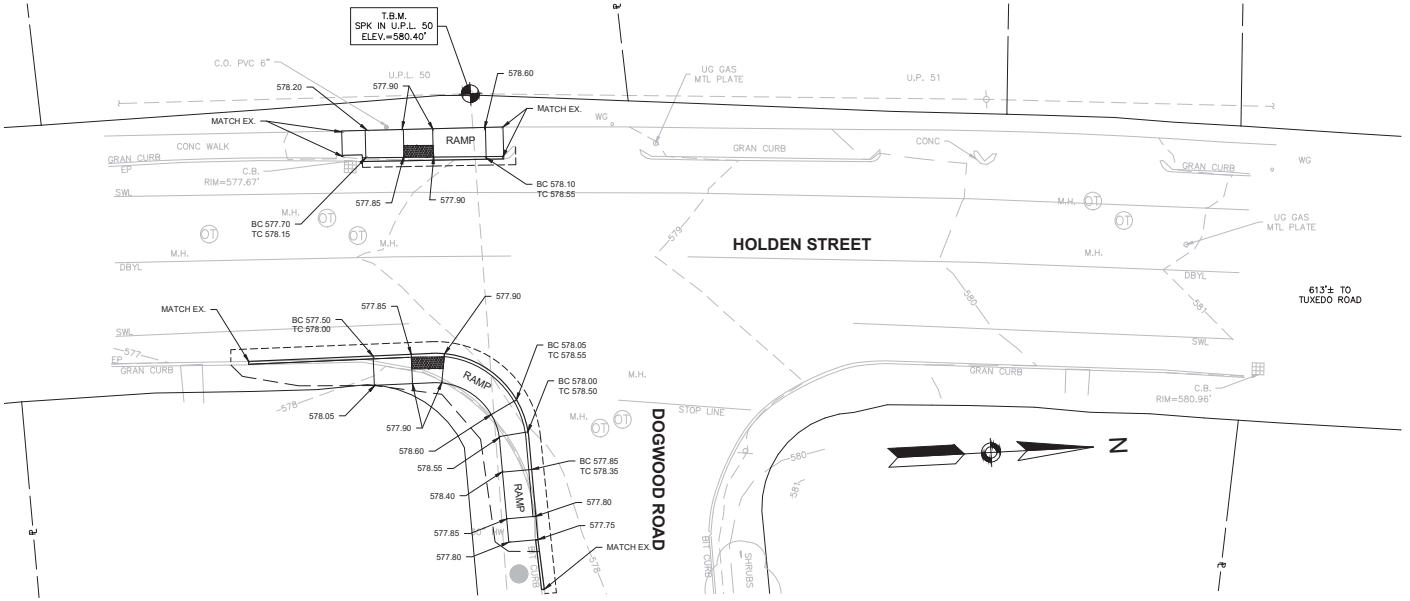
WORCESTER
COMPLETE STREETS IMPROVEMENTS
HOLDEN ST AT DOGWOOD RD
CONSTRUCTION & GRADING PLANS
SHEET 4 OF 29



CONSTRUCTION PLAN
SCALE: 1'=10'

GENERAL NOTES
1. REFER TO STANDARD DETAILS AND WORCESTER DPW STANDARD SPECIFICATIONS.

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

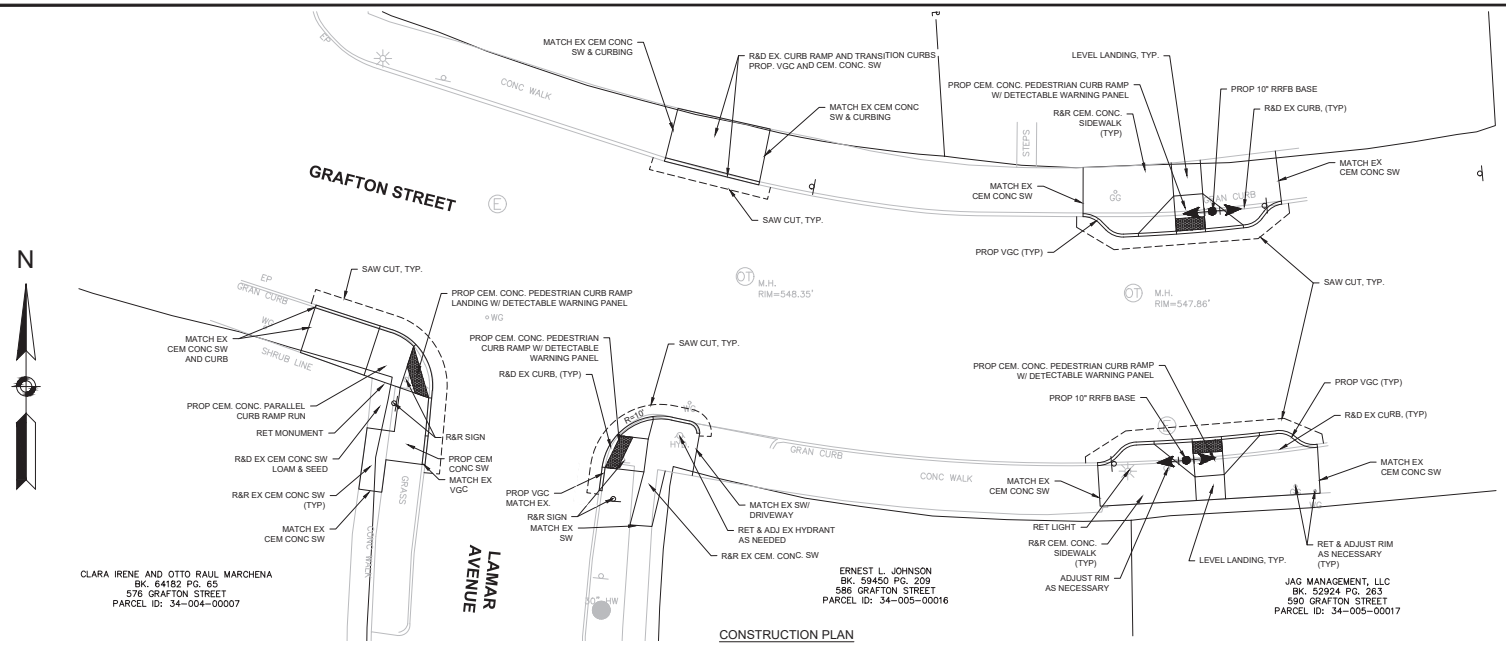


GRADING PLAN
SCALE: 1'=10'

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

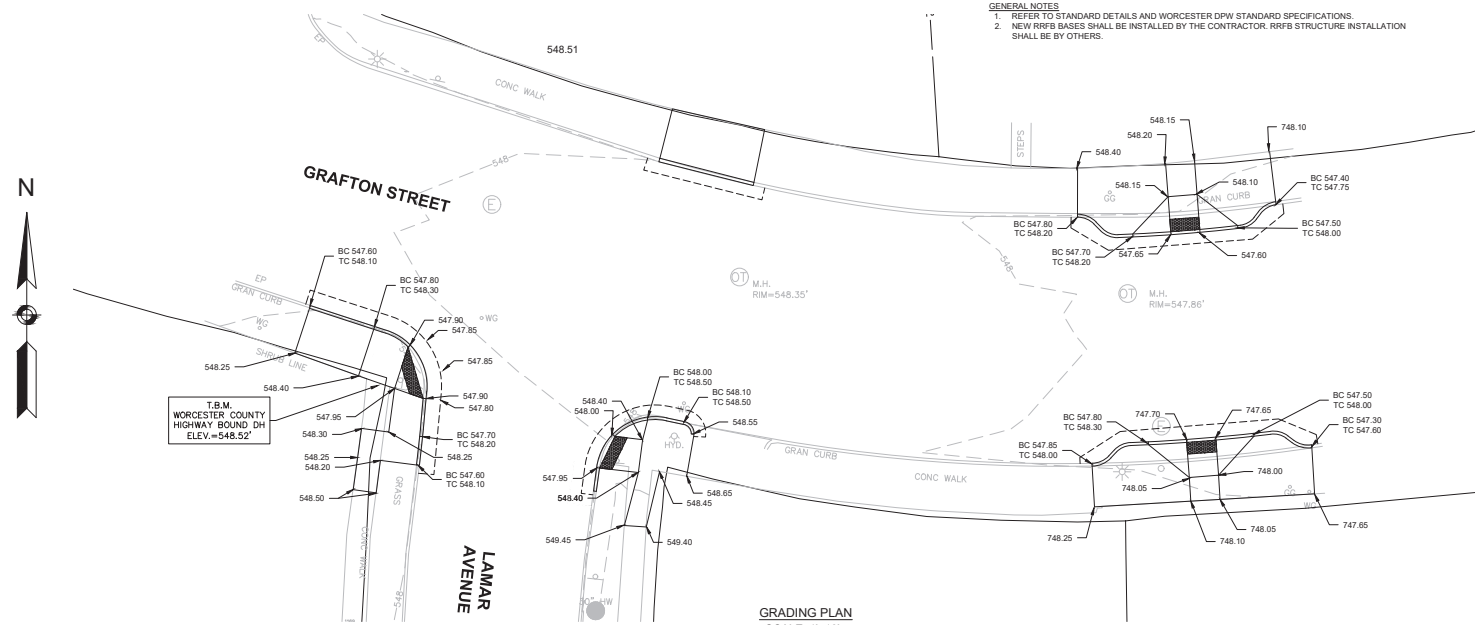
T1414_HD(PR-HOLDEN).DWG Plotted on 17-Apr-2024 1:20 PM

WORCESTER
COMPLETE STREETS IMPROVEMENTS
GRAFTON STREET AT LAMAR AVENUE
CONSTRUCTION & GRADING PLANS
SHEET 5 OF 29



CONSTRUCTION PLAN
SCALE: 1'=10'

GENERAL NOTES
1. REFER TO STANDARD DETAILS AND WORCESTER DPW STANDARD SPECIFICATIONS.
2. NEW RRFB BASES SHALL BE INSTALLED BY THE CONTRACTOR. RRFB STRUCTURE INSTALLATION SHALL BE BY OTHERS.

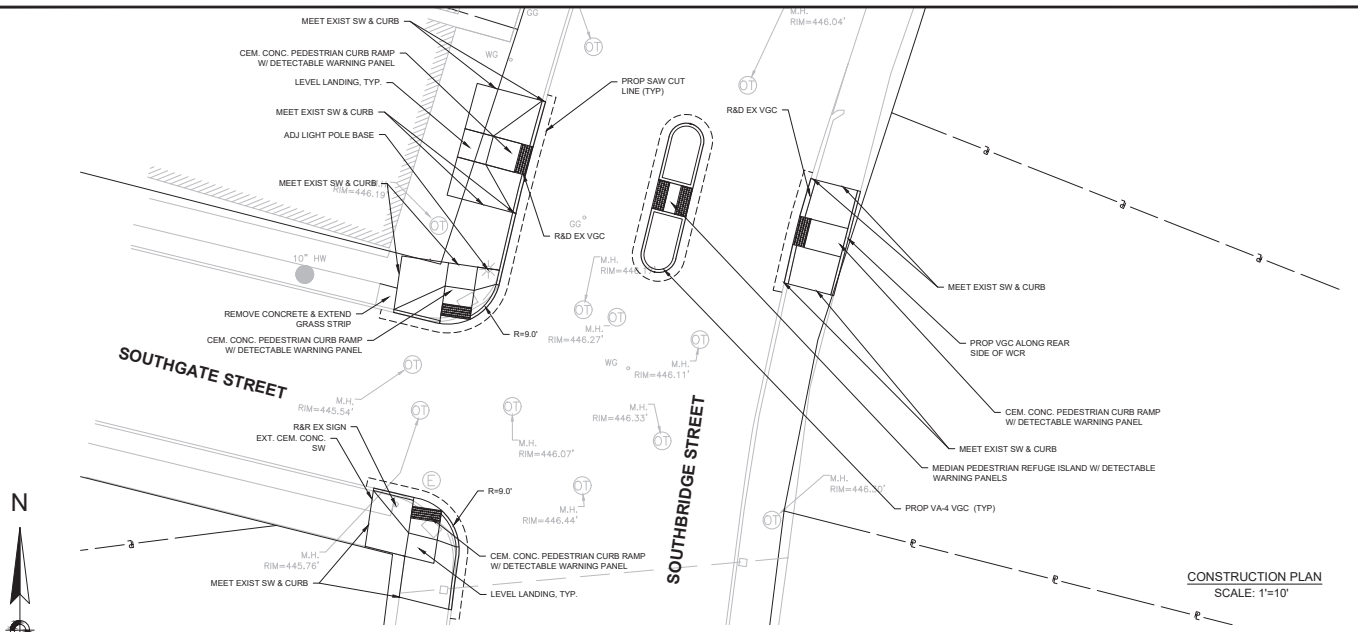


GRADING PLAN
SCALE: 1'=10'

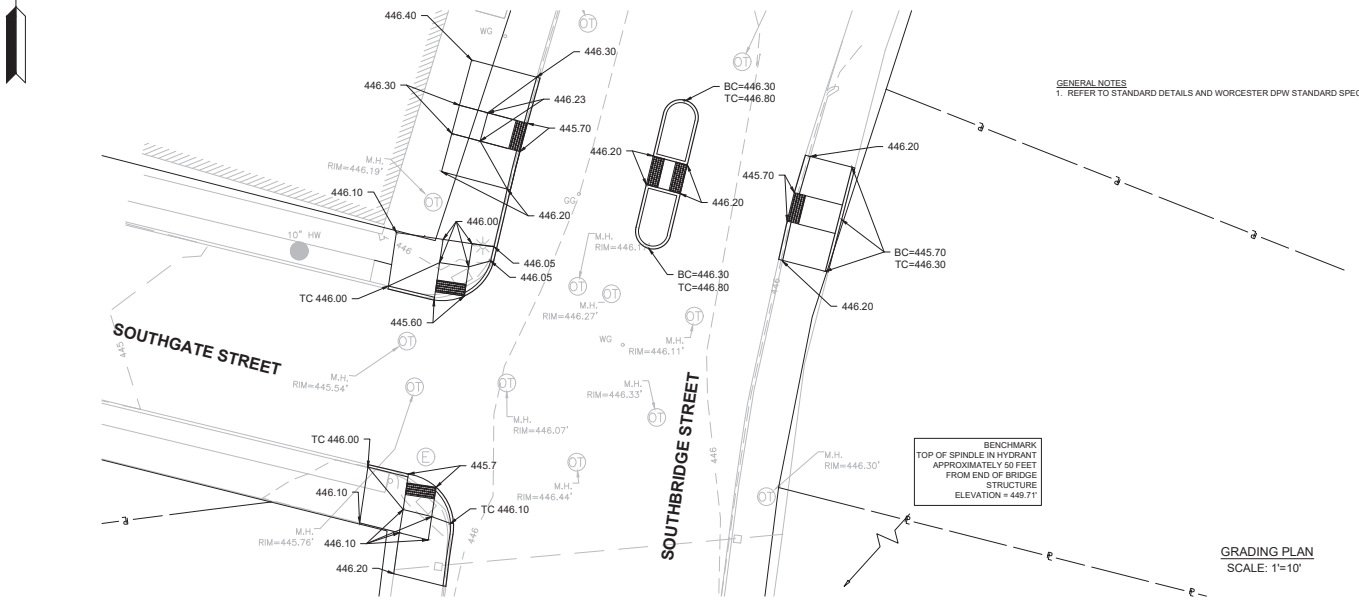
0 10 20 30 40
SCALE: 1" = 10'

T1414_sht04(CONST PLANS).DWG Plotted on 17-Apr-2024 1:32 PM

WORCESTER, MASSACHUSETTS
COMPLETE STREETS IMPROVEMENTS
SOUTHBRIDGE ST AT SOUTHGATE ST
CONSTRUCTION & GRADING PLANS
SHEET 6 OF 29



CONSTRUCTION PLAN
SCALE: 1"=10'



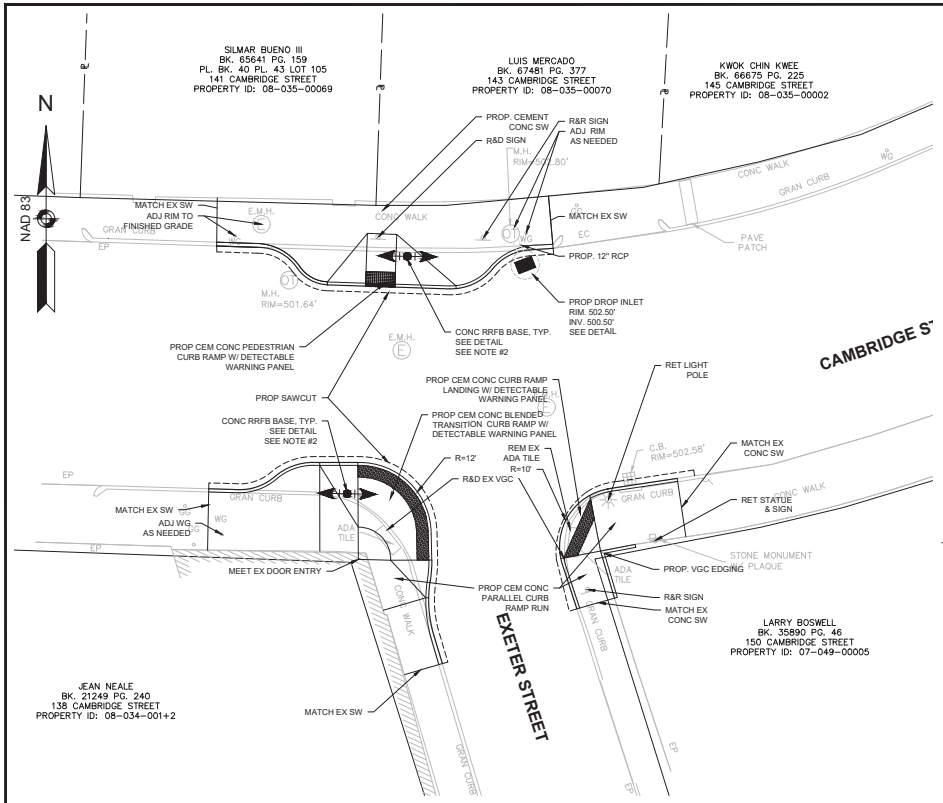
GENERAL NOTES
1. REFER TO STANDARD DETAILS AND WORCESTER DPW STANDARD SPECIFICATIONS.

BENCHMARK
TOP OF SPINDLE IN HYDRANT
APPROXIMATELY 50 FEET
FROM END OF BRIDGE
STRUCTURE
ELEVATION = 449.71'

GRADING PLAN
SCALE: 1'=10'

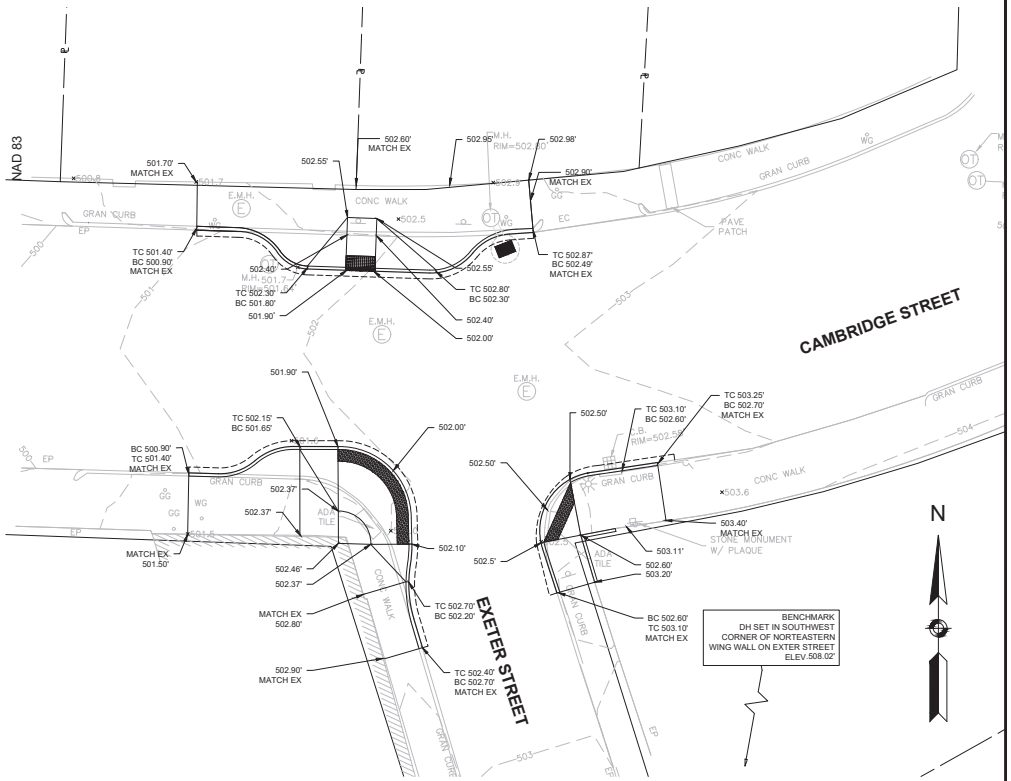
0 10 20 30 40
SCALE: 1" = 10'

WORCESTER
COMPLETE STREETS IMPROVEMENTS
CAMBRIDGE STREET AT EXETER STREET
CONSTRUCTION & GRADING PLANS
SHEET 7 OF 29



CONSTRUCTION PLAN
SCALE: 1"=10'

GENERAL NOTES
1. REFER TO STANDARD DETAILS AND WORCESTER DPW STANDARD SPECIFICATIONS.
2. NEW RRFB BASES SHALL BE INSTALLED BY THE CONTRACTOR. RRFB STRUCTURE INSTALLATION SHALL BE BY OTHERS.



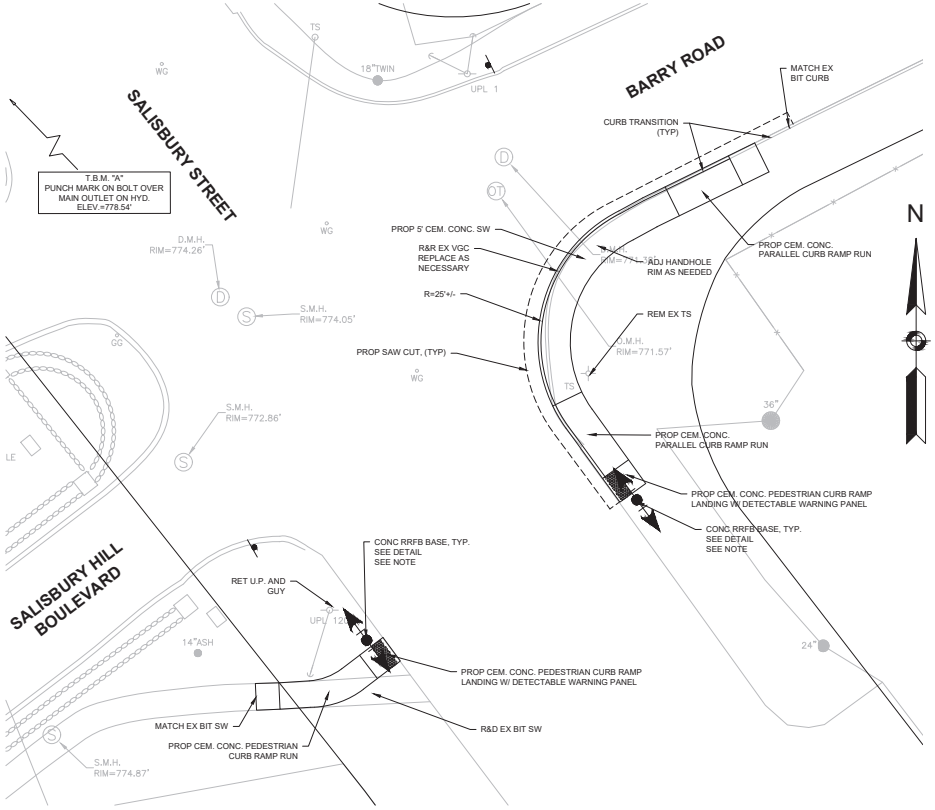
GRADING PLAN
SCALE: 1"=10'

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

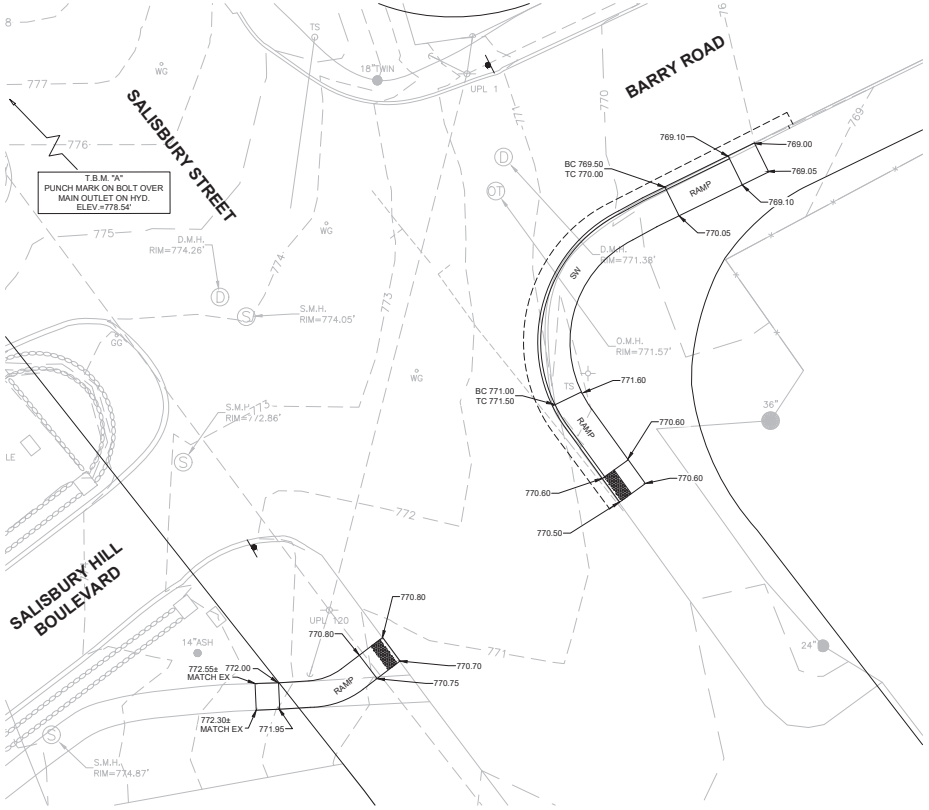
T1414_HDK(PR-CAMBRIDGE TITLE BLOCK).DWG Plotted on 17-Apr-2024 1:51 PM

WORCESTER
COMPLETE STREETS IMPROVEMENTS
SALISBURY STREET AT BARRY ROAD
CONSTRUCTION & GRADING PLANS
SHEET 8 OF 29

GENERAL NOTES:
1. NEW RRFB BASES SHALL BE INSTALLED BY THE CONTRACTOR. RRFB STRUCTURE INSTALLATION SHALL BE BY OTHERS.
2. REFER TO STANDARD DETAILS AND WORCESTER DPW STANDARD SPECIFICATIONS.



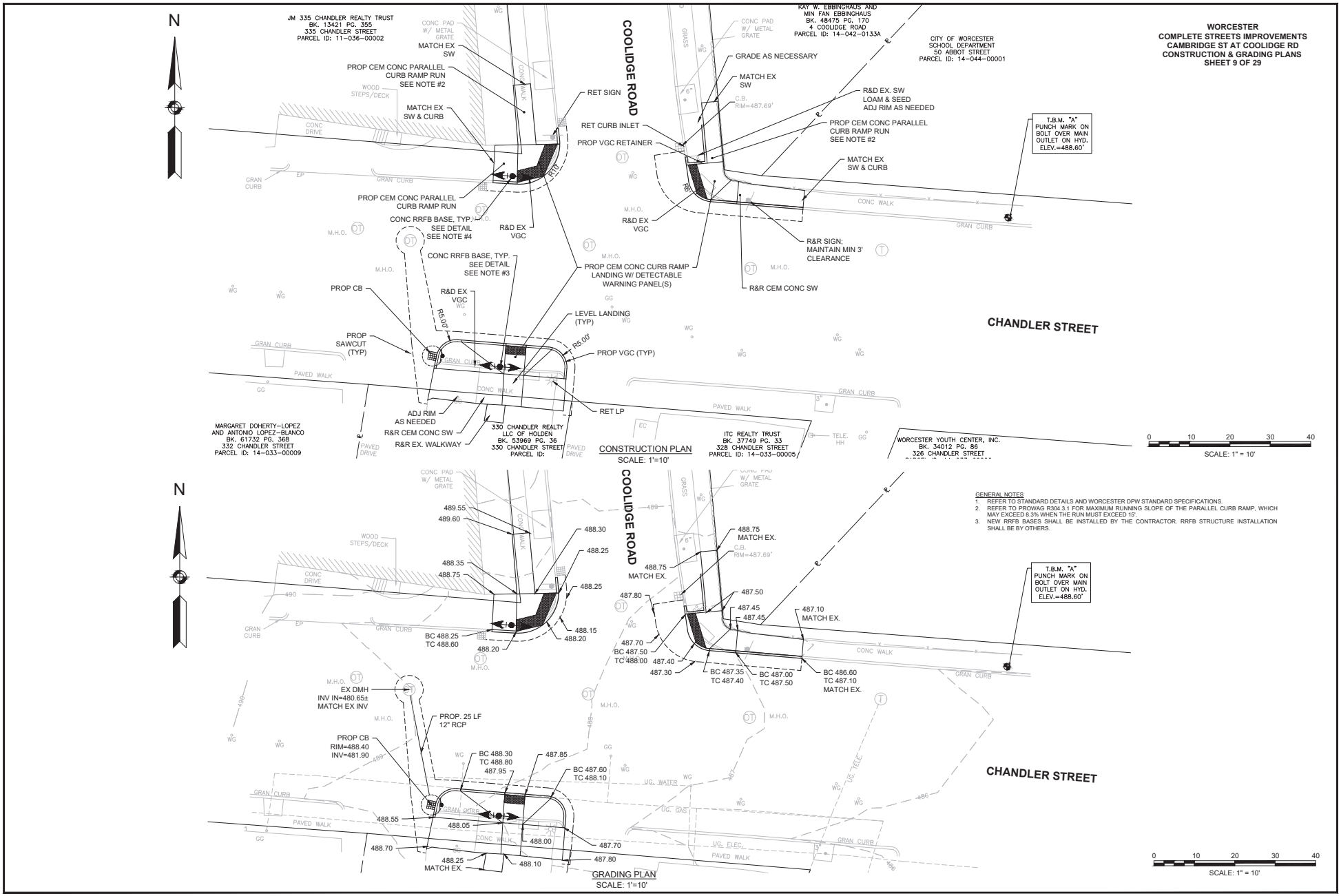
CONSTRUCTION PLAN
SCALE: 1"=10'



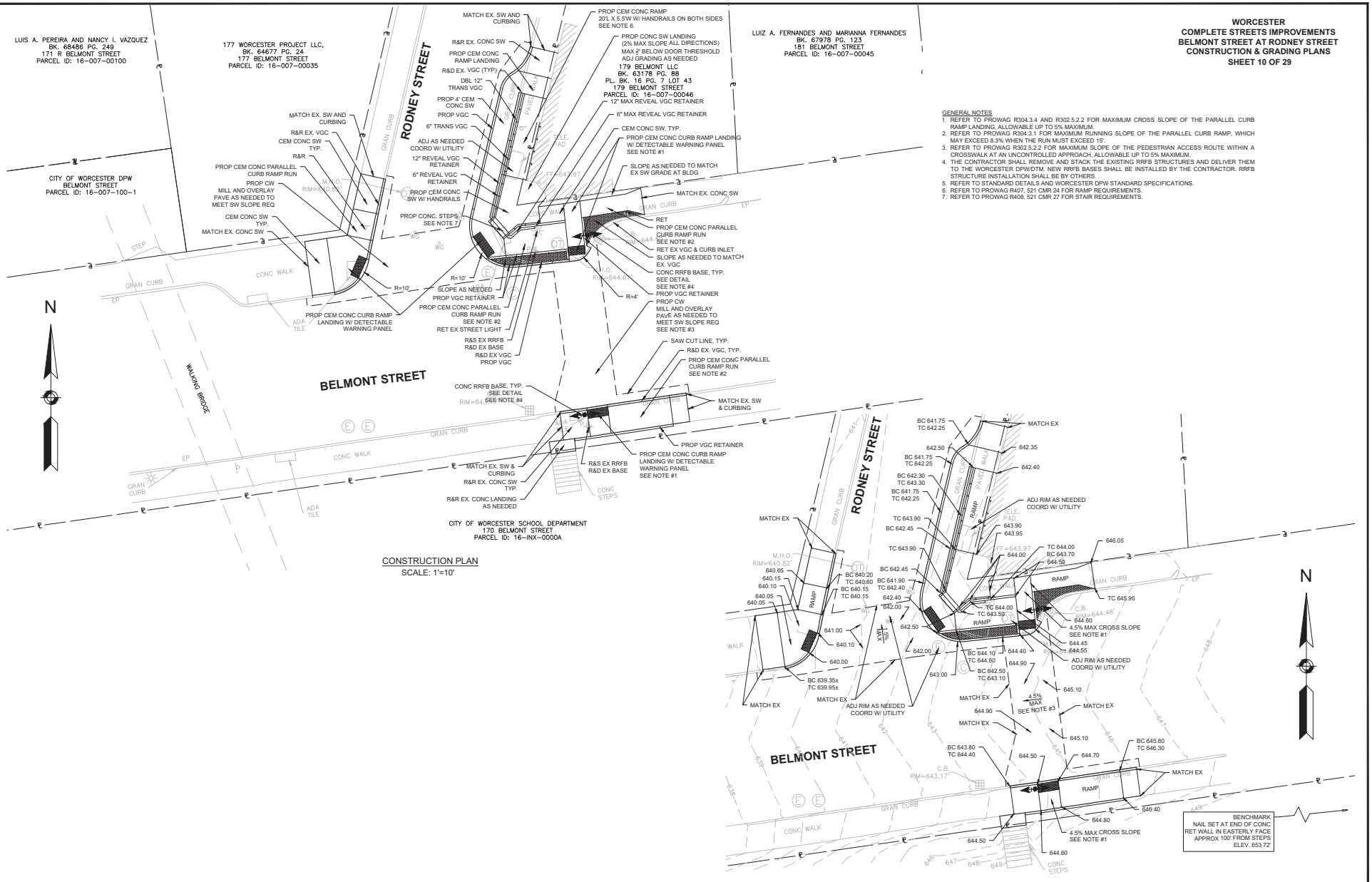
GRADING PLAN
SCALE: 1"=10'

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

T1414_HD4\CONST PLANS\.DWG Plotted on 18-Apr-2024 9:32 AM


WORCESTER
COMPLETE STREETS IMPROVEMENTS
CAMBRIDGE ST AT COOLIDGE RD
CONSTRUCTION & GRADING PLANS
SHEET 9 OF 29
COOLIDGE ROAD
CHANDLER STREET
JM 335 CHANDLER REALTY TRUST
BK. 13421 PG. 355
335 CHANDLER STREET
PARCEL ID: 11-036-00002
KAY W. EBBINGHAUS AND
MIN FAN EBBINGHAUS
BK. 48475 PG. 170
4 COOLIDGE ROAD
PARCEL ID: 14-042-0133A
CITY OF WORCESTER
SCHOOL DEPARTMENT
50 ABBOT STREET
PARCEL ID: 14-044-00001
MARGARET DOHERTY-LOPEZ
AND ANTONIO LOPEZ-BLANCO
BK. 61732 PG. 368
332 CHANDLER STREET
PARCEL ID: 14-033-00009
330 CHANDLER REALTY
LLC OF HOLDEN
BK. 53969 PG. 36
330 CHANDLER STREET
PARCEL ID:
ITC REALTY TRUST
BK. 37749 PG. 33
328 CHANDLER STREET
PARCEL ID: 14-033-00005
WORCESTER YOUTH CENTER, INC.
BK. 34012 PG. 86
326 CHANDLER STREET
MATCH EX SW
PROP CEM CONC PARALLEL CURB RAMP RUN SEE NOTE #2
MATCH EX SW & CURB
RET SIGN
RET CURB INLET
PROP VGC RETAINER
GRADE AS NECESSARY
R&D EX. SW LOAM & SEED ADJ RIM AS NEEDED
T.B.M. "A" PUNCH MARK ON BOLT OVER MAIN OUTLET ON HYD. ELEV.=488.60'
PROP CEM CONC CURB RAMP LANDING W/ DETECTABLE WARNING PANEL(S)
R&R SIGN; MAINTAIN MIN 3' CLEARANCE
R&R CEM CONC SW
PROP CEM CONC PARALLEL CURB RAMP RUN
CONC RRFB BASE, TYP. SEE DETAIL SEE NOTE #4
R&D EX VGC
CONC RRFB BASE, TYP. SEE DETAIL SEE NOTE #3
PROP CB
LEVEL LANDING (TYP)
PROP SAWCUT (TYP)
PROP VGC (TYP)
ADJ RIM AS NEEDED
R&R CEM CONC SW
R&R EX. WALKWAY
RET LP
R5.00'
CONSTRUCTION PLAN
SCALE: 1'=10'
SCALE: 1" = 10'
GENERAL NOTES
1. REFER TO STANDARD DETAILS AND WORCESTER DPW STANDARD SPECIFICATIONS.
2. REFER TO PROWAG R304.3.1 FOR MAXIMUM RUNNING SLOPE OF THE PARALLEL CURB RAMP, WHICH MAY EXCEED 8.3% WHEN THE RUN MUST EXCEED 15'.
3. NEW RRFB BASES SHALL BE INSTALLED BY THE CONTRACTOR. RRFB STRUCTURE INSTALLATION SHALL BE BY OTHERS.
489.55
489.60
488.35
488.75
488.30
488.25
488.15
488.20
BC 488.25
TC 488.60
488.75
MATCH EX.
488.75 MATCH EX.
C.B. RIM=487.69'
487.80
487.50
487.45
487.10
MATCH EX.
487.70
BC 487.50
TC 488.00
487.40
487.30
BC 487.35
TC 487.40
BC 487.00
TC 487.50
BC 486.60
TC 487.10
MATCH EX.
EX DMH
INV IN=480.65±
MATCH EX INV
PROP. 25 LF
12" RCP
PROP CB
RIM=488.40
INV=481.90
BC 488.30
TC 488.80
487.95
487.85
BC 487.60
TC 488.10
488.55
488.05
488.00
487.70
488.70
488.25
MATCH EX.
488.10
487.80
GRADING PLAN
SCALE: 1'=10'
SCALE: 1" = 10'
T1414_HDPR-CHANDLER1.DWG
Plotted on 18-Apr-2024 10:13 AM

WORCESTER
COMPLETE STREETS IMPROVEMENTS
BELMONT STREET AT RODNEY STREET
CONSTRUCTION & GRADING PLANS
SHEET 10 OF 29



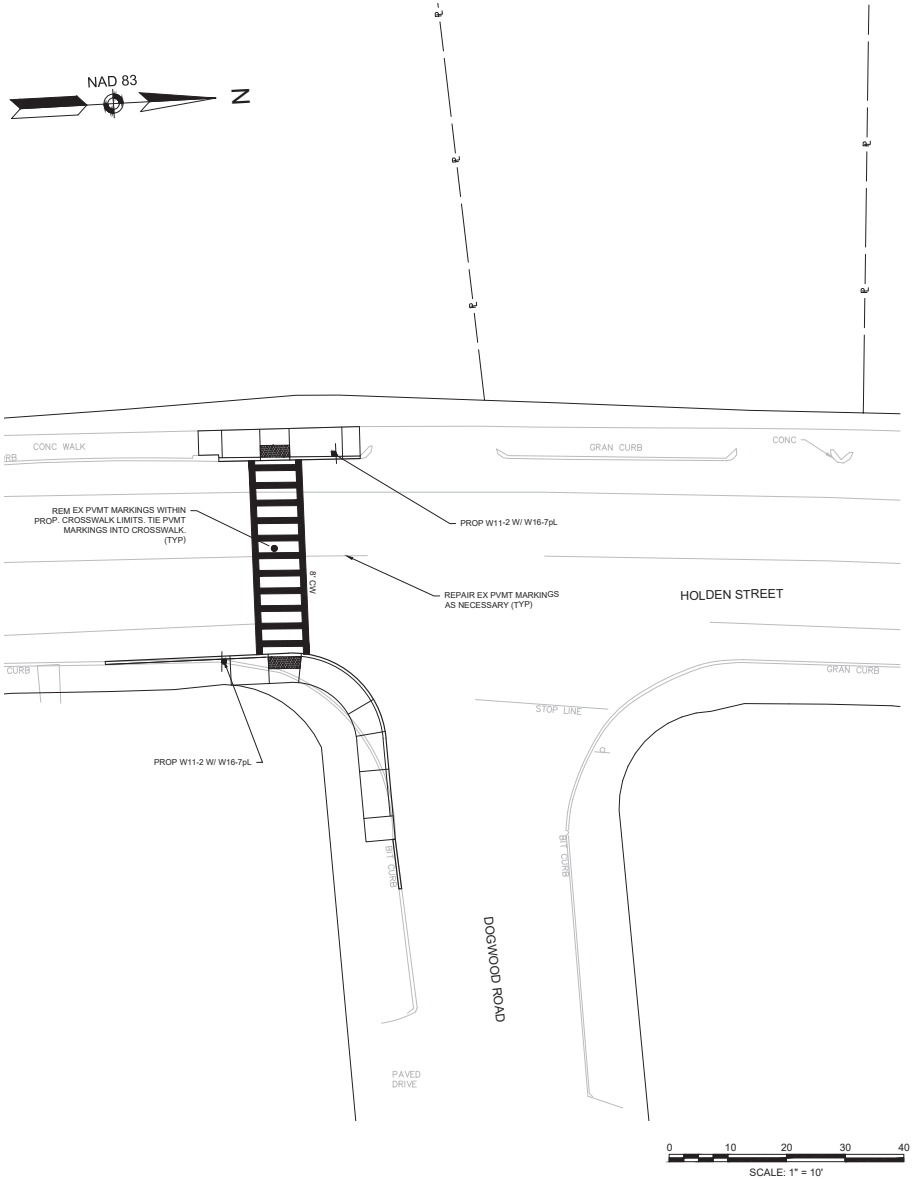
CONSTRUCTION PLAN
SCALE: 1'=10'

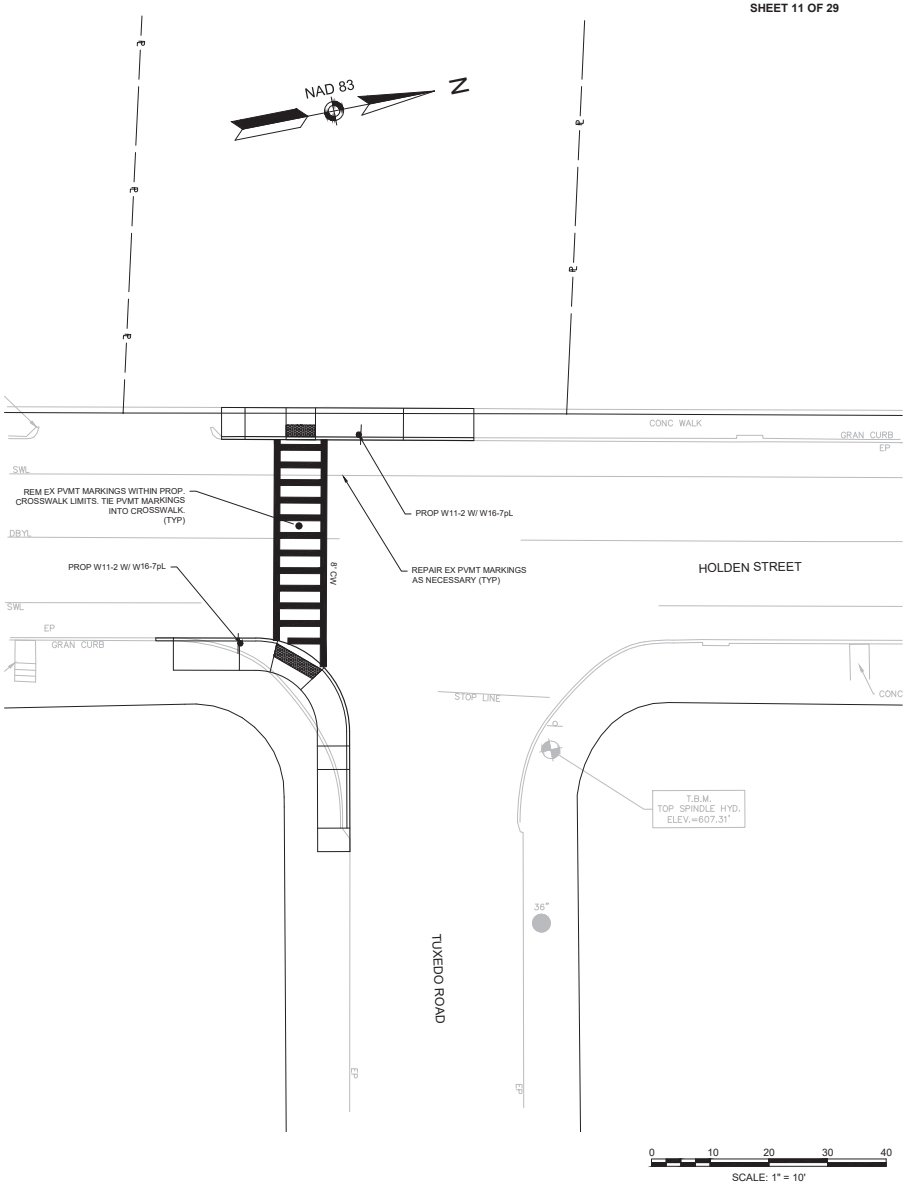
GRADING PLAN
SCALE: 1"=10'

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

GENERAL NOTES
1. REFER TO PROWAG R304.3.4 AND R302.5.2.2 FOR MAXIMUM CROSS SLOPE OF THE PARALLEL CURB RAMP LANDING, ALLOWABLE UP TO 5% MAXIMUM.
2. REFER TO PROWAG R304.3.1 FOR MAXIMUM RUNNING SLOPE OF THE PARALLEL CURB RAMP, WHICH MAY EXCEED 8.3% WHEN THE RUN MUST EXCEED 15'.
3. REFER TO PROWAG R302.5.2.2 FOR MAXIMUM SLOPE OF THE PEDESTRIAN ACCESS ROUTE WITHIN A CROSSWALK AT AN UNCONTROLLED APPROACH, ALLOWABLE UP TO 5% MAXIMUM.
4. THE CONTRACTOR SHALL REMOVE AND STACK THE EXISTING RRFB STRUCTURES AND DELIVER THEM TO THE WORCESTER DPW/DTM. NEW RRFB BASES SHALL BE INSTALLED BY THE CONTRACTOR. RRFB STRUCTURE INSTALLATION SHALL BE BY OTHERS.
5. REFER TO STANDARD DETAILS AND WORCESTER DPW STANDARD SPECIFICATIONS.
6. REFER TO PROWAG R407, 521 CMR 24 FOR RAMP REQUIREMENTS.
7. REFER TO PROWAG R408, 521 CMR 27 FOR STAIR REQUIREMENTS.

WORCESTER
COMPLETE STREETS IMPROVEMENTS
HOLDEN STREET AT DOGWOOD & TUXEDO ROAD
SIGNAGE & PAVEMENT MARKING PLANS
SHEET 11 OF 29

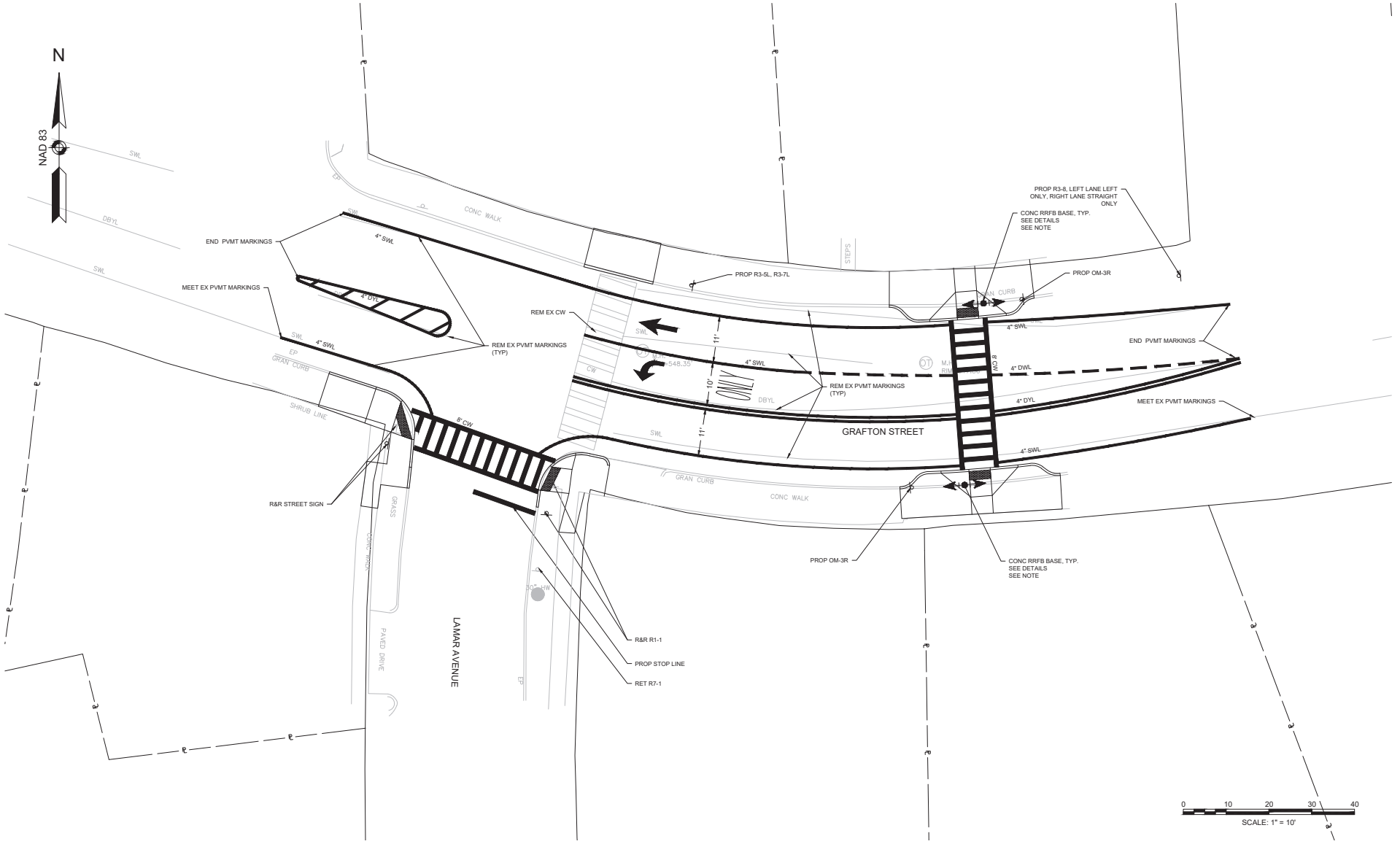


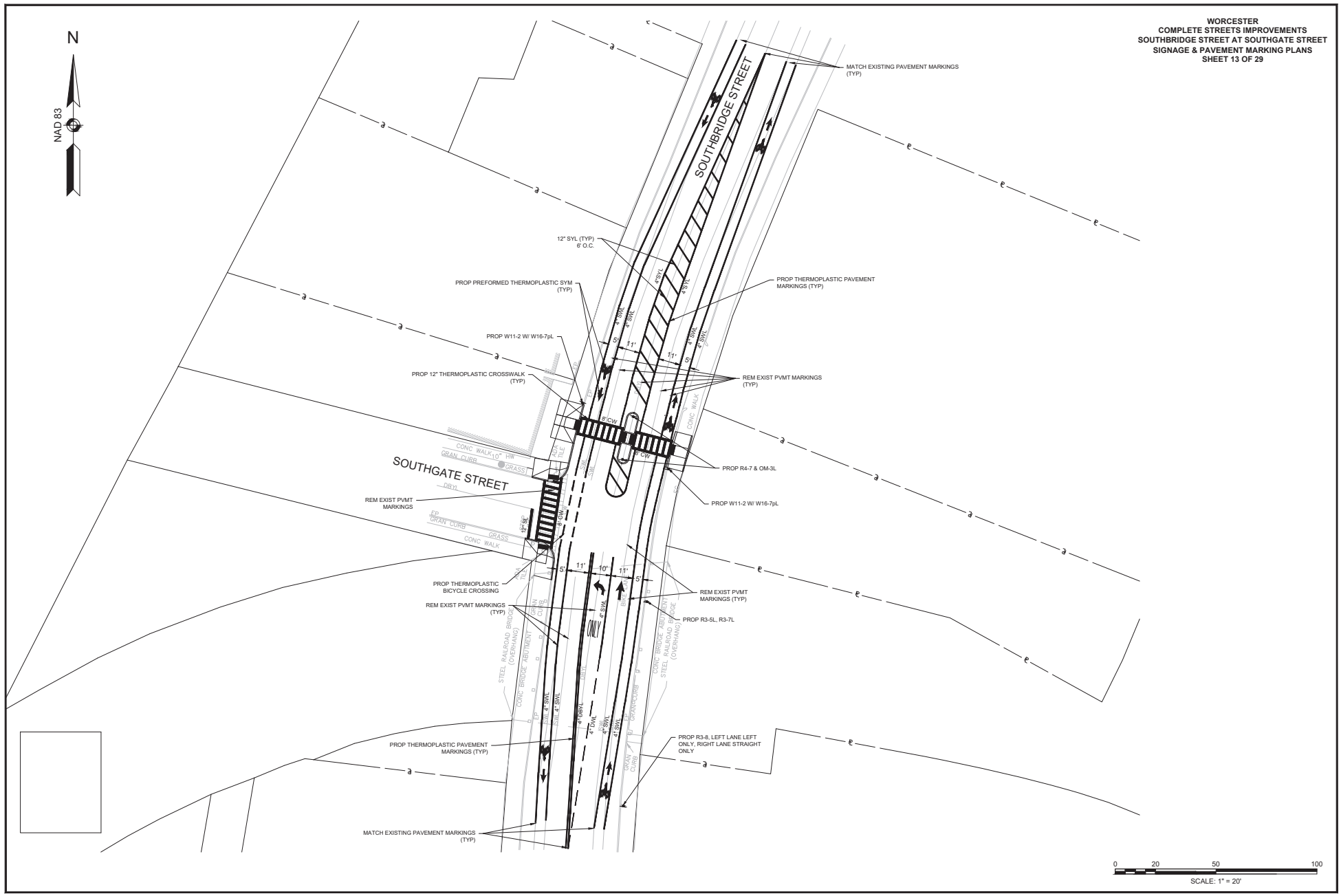


NOTES:
1. NEW RRFB BASES SHALL BE INSTALLED BY THE CONTRACTOR. RRFB STRUCTURE INSTALLATION SHALL BE BY OTHERS. INTERIM PEDESTRIAN SIGNAGE (W11-2 W/ W16-7pL) SHALL BE INSTALLED WITH THE RRFB BASE UNTIL RRFB STRUCTURE IS INSTALLED.
2. CONTRACTOR TO ENSURE MIN 36" CLEARANCE AROUND ALL SIGNS.

WORCESTER
COMPLETE STREETS IMPROVEMENTS
GRAFTON STREET AT LAMAR AVENUE
SIGNAGE & PAVEMENT MARKING PLANS
SHEET 12 OF 29

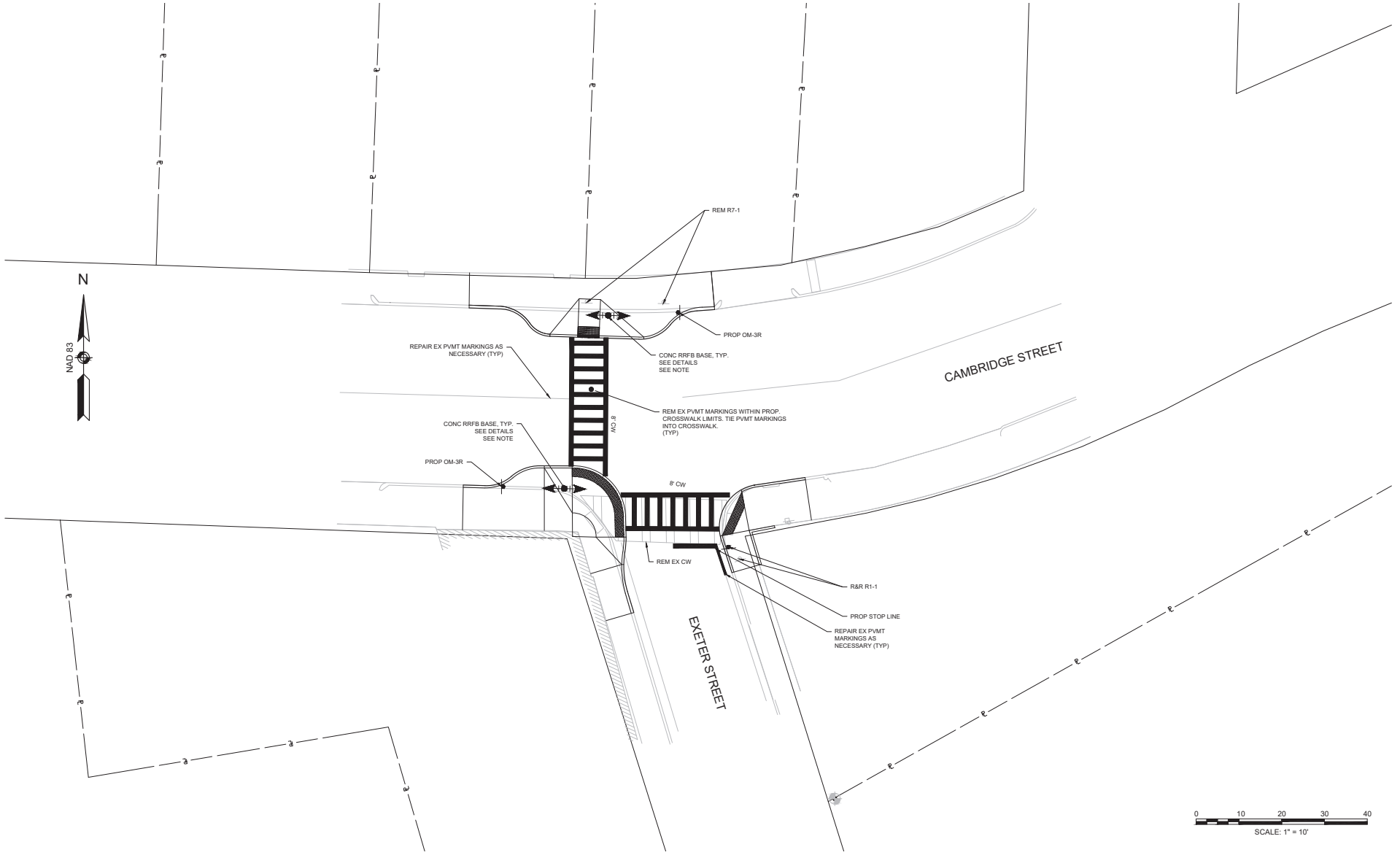
T1414_HD5(TSPM).DWG Plotted on 17-Apr-2024 1:31 PM




N
NAD 83
WORCESTER
COMPLETE STREETS IMPROVEMENTS
SOUTHBRIDGE STREET AT SOUTHGATE STREET
SIGNAGE & PAVEMENT MARKING PLANS
SHEET 13 OF 29
T1414_HDS(TSPM).DWG Plotted on 17-Apr-2024 1:34 PM
SOUTHBRIDGE STREET
SOUTHGATE STREET
MATCH EXISTING PAVEMENT MARKINGS (TYP)
12" SYL (TYP) 6' O.C.
PROP PREFORMED THERMOPLASTIC SYM (TYP)
PROP THERMOPLASTIC PAVEMENT MARKINGS (TYP)
PROP W11-2 W/ W16-7pL
PROP 12" THERMOPLASTIC CROSSWALK (TYP)
REM EXIST PVMT MARKINGS (TYP)
PROP R4-7 & OM-3L
PROP W11-2 W/ W16-7pL
REM EXIST PVMT MARKINGS
PROP THERMOPLASTIC BICYCLE CROSSING
REM EXIST PVMT MARKINGS (TYP)
PROP R3-5L, R3-7L
PROP THERMOPLASTIC PAVEMENT MARKINGS (TYP)
PROP R3-8, LEFT LANE LEFT ONLY, RIGHT LANE STRAIGHT ONLY
MATCH EXISTING PAVEMENT MARKINGS (TYP)
0 20 50 100
SCALE: 1" = 20'

NOTES:
1: NEW RRFB BASES SHALL BE INSTALLED BY THE CONTRACTOR. RRFB STRUCTURE INSTALLATION SHALL BE BY OTHERS. INTERIM PEDESTRIAN SIGNAGE (W11-2 W/ W16-7pL) SHALL BE INSTALLED WITH THE RRFB BASE UNTIL RRFB STRUCTURE IS INSTALLED.
2. CONTRACTOR TO ENSURE MIN 36" CLEARANCE AROUND ALL SIGNS.

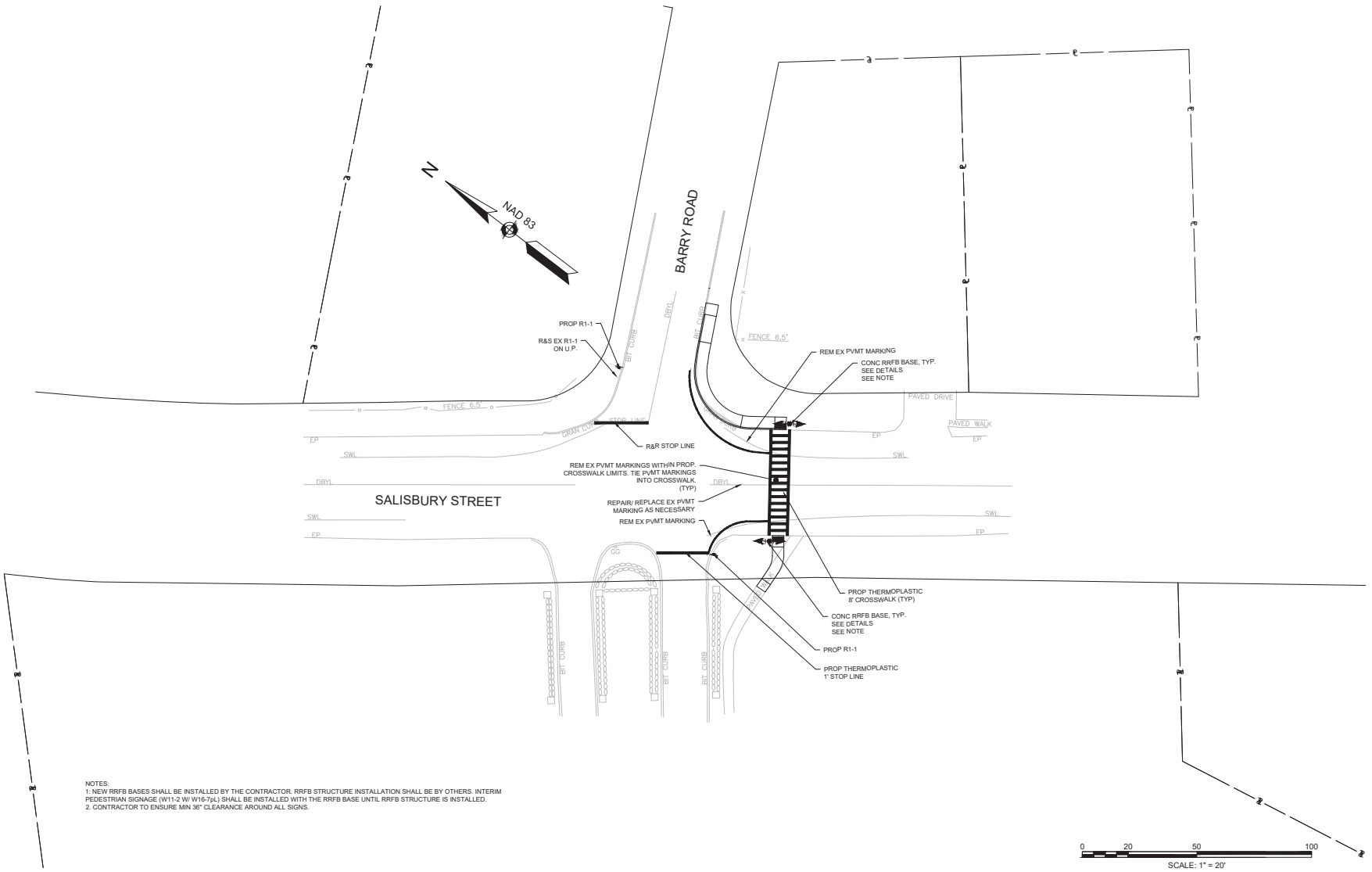
WORCESTER
COMPLETE STREETS IMPROVEMENTS
CAMBRIDGE STREET AT EXETER STREET
SIGNAGE & PAVEMENT MARKING PLANS
SHEET 14 OF 29



T1414_HDS(TSPM).DWG Plotted on 17-Apr-2024 1:53 PM

WORCESTER
COMPLETE STREETS IMPROVEMENTS
SALISBURY STREET AT BARRY ROAD
SIGNAGE & PAVEMENT MARKING PLANS
SHEET 15 OF 29

T1414_HD5(TSPM).DWG Plotted on 18-Apr-2024 9:36 AM

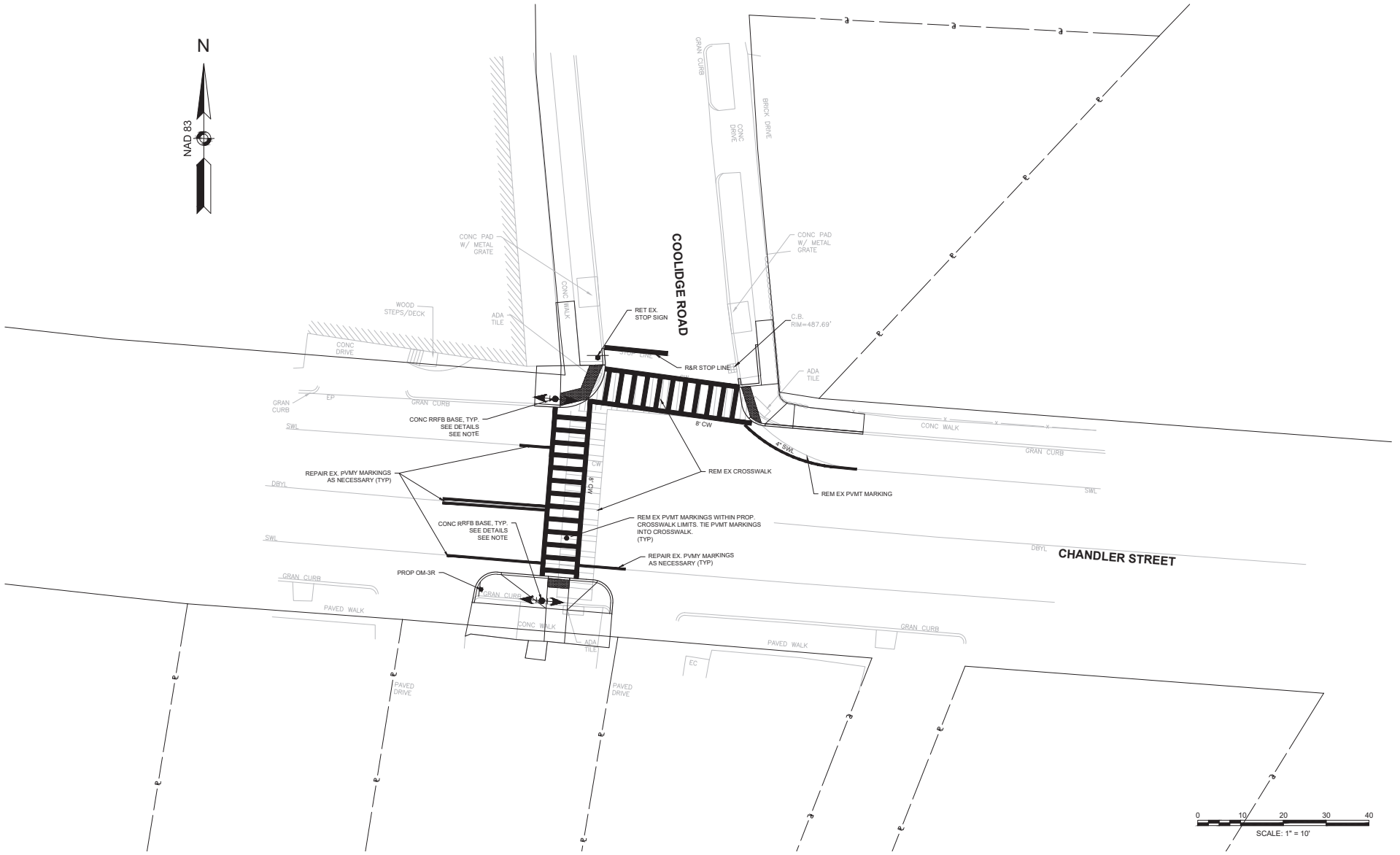


NOTES:
1: NEW RRFB BASES SHALL BE INSTALLED BY THE CONTRACTOR. RRFB STRUCTURE INSTALLATION SHALL BE BY OTHERS. INTERIM PEDESTRIAN SIGNAGE (W11-2 W/ W16-7pL) SHALL BE INSTALLED WITH THE RRFB BASE UNTIL RRFB STRUCTURE IS INSTALLED.
2. CONTRACTOR TO ENSURE MIN 36" CLEARANCE AROUND ALL SIGNS.

NOTES:
1: NEW RRFB BASES SHALL BE INSTALLED BY THE CONTRACTOR. RRFB STRUCTURE INSTALLATION SHALL BE BY OTHERS. INTERIM PEDESTRIAN SIGNAGE (W11-2 W/ W16-7pL) SHALL BE INSTALLED WITH THE RRFB BASE UNTIL RRFB STRUCTURE IS INSTALLED.
2. CONTRACTOR TO ENSURE MIN 36" CLEARANCE AROUND ALL SIGNS.

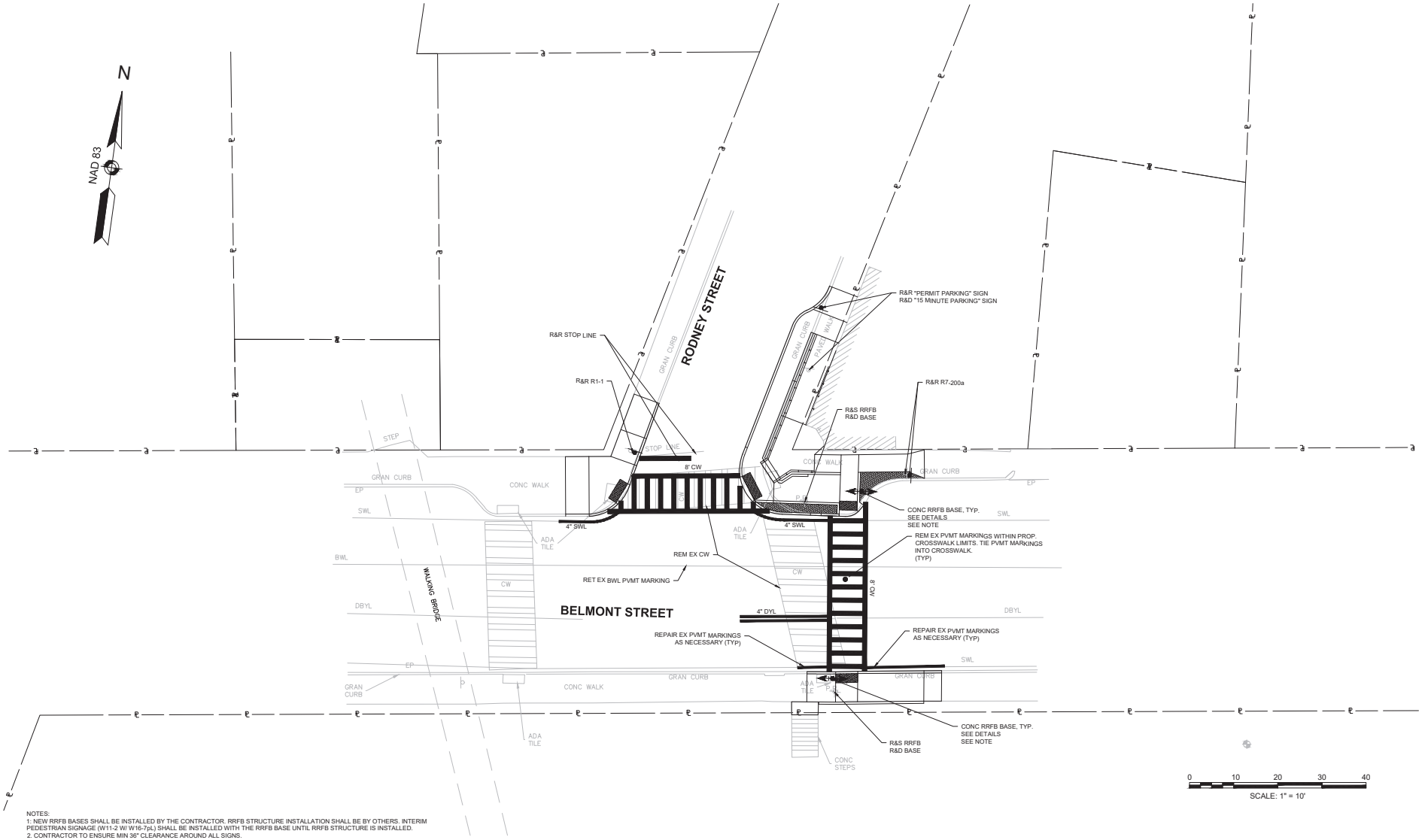
WORCESTER
COMPLETE STREETS IMPROVEMENTS
CHANDLER STREET AT COOLIDGE ROAD
SIGNAGE & PAVEMENT MARKING PLANS
SHEET 16 OF 29

T1414_HDS(TSPM).DWG Plotted on 18-Apr-2024 10:18 AM



WORCESTER
COMPLETE STREETS IMPROVEMENTS
BELMONT STREET AT RODNEY STREET
SIGNAGE & PAVEMENT MARKING PLANS
SHEET 17 OF 29

T1414_HD5(TSPM).DWG Plotted on 18-Apr-2024 5:26 PM



NOTES:
1. NEW RRFB BASES SHALL BE INSTALLED BY THE CONTRACTOR. RRFB STRUCTURE INSTALLATION SHALL BE BY OTHERS. INTERIM PEDESTRIAN SIGNAGE (W11-2 W/ W16-7pL) SHALL BE INSTALLED WITH THE RRFB BASE UNTIL RRFB STRUCTURE IS INSTALLED.
2. CONTRACTOR TO ENSURE MIN 36" CLEARANCE AROUND ALL SIGNS.

TRAFFIC SIGN SUMMARY

IDENTIFICATION NUMBER	SIZE OF SIGN (in)			TEXT DIMENSIONS (in)			NUMBER OF SIGNS REQUIRED	COLOR			NUMBER OF P5 POSTS REQUIRED	UNIT AREA (SF)	TOTAL AREA (SF)
	WIDTH	HEIGHT	LEGEND	LETTER HEIGHT	VERTICAL SPACING	ARROW RTE. MKR		BACK-GROUND	LEGEND	BORDER			
R1-1	36	36		SEE NOTE 1			2	RED	WHITE	WHITE	2	9.00	18.00
R3-5L	30	36					2	WHITE	BLACK	BLACK	1	7.50	15.00
R3-7L	30	30					2	WHITE	BLACK	BLACK	MOUNT W/ R3-5L	6.25	12.50
R3-8	30	30					2	WHITE	BLACK	BLACK	1	6.25	12.50
R4-7	24	30					2	WHITE	BLACK	BLACK	2	5.00	10.00
OM-3R	12	36					5	FLUORESCENT YELLOW/ GREEN	BLACK	N/A	4	3.00	15.00
OM-3L	12	36					2	FLUORESCENT YELLOW/ GREEN	BLACK	N/A	MOUNT W/ R4-7	3.00	6.00
W11-2	36	36					16	YELLOW	BLACK	BLACK	16	9.00	144.00
W13-1P	18	18					48	FLUORESCENT YELLOW/ GREEN	BLACK	BLACK	MOUNT W/ W17-1	2.25	108.00
W16-7pL	24	12					16	FLUORESCENT YELLOW/ GREEN	BLACK	BLACK	MOUNT W/ W11-2	2.00	32.00
W17-1	30	30					13	YELLOW	BLACK	BLACK	13	6.25	81.25

NOTES:

- SEE 2009 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS FOR TEXT AND LEGEND DIMENSIONS.
- 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.
- A MINIMUM OF 3'-0" PATH OF TRAVEL CLEARANCE, EXCLUDING CURB, IS REQUIRED WHEN PLACING SIGNS.
- ALL EXISTING SIGNS WITHIN THE LIMITS OF WORK SHOULD BE RETAINED UNLESS OTHERWISE SPECIFIED.

WORCESTER
COMPLETE STREETS IMPROVEMENTS
CONSTRUCTION DETAILS
SHEET 26 OF 29

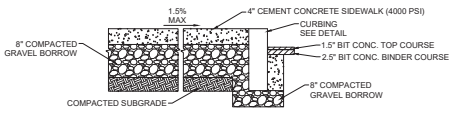
T1414_HDR\CONST_DETAILS.DWG Plotted on 18-Apr-2024 10:58 AM

ACCESSIBLE CURB RAMP NOTES:

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 (HYDRANTS, UTILITY POLES, TREES, SIGNS, ETC.).
3. CURB TREATMENT VARIES, SEE PLANS FOR CURB TYPE.
4. RAMP, CURB AND ADJACENT PAVEMENTS SHALL BE GRADED TO PREVENT PONDING.
5. DETECTABLE WARNING PANELS ARE REQUIRED ON ALL OF THE PROPOSED WHEELCHAIR RAMPS AND ARE TO BE INSTALLED IN ACCORDANCE WITH CONSTRUCTION STANDARD E 107.6.5 (JUNE 2014). CONTRACTOR SHALL PROVIDE 6" BETWEEN DETECTABLE WARNING PANEL AND EDGE OF CONCRETE WHERE IT ABUTS LOAM & SEED.
6. RAMP SLOPES AND CROSS SLOPES SHALL HAVE A CONSTRUCTION TOLERANCE OF ±0.5%.
7. DETECTABLE WARNING PANELS SHALL BE BRICK RED OR YELLOW IN COLOR AS APPROVED BY THE LOCAL DPW.
8. REFER TO PROWAG ADA AND ABA ACCESSIBILITY GUIDELINES.

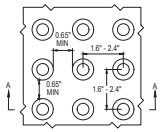
ADA CURB RAMP NOTES

N.T.S.

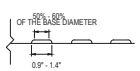


CEMENT CONCRETE SIDEWALK

N.T.S.



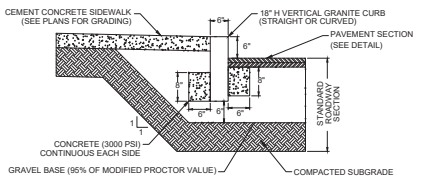
NOTES:
1. PANELS MAY BE CONCRETE PRECAST OR CAST IN PLACE OR OTHER SUITABLE MATERIAL PERMANENTLY APPLIED TO THE RAMP.
2. DETECTABLE WARNING SURFACES SHALL CONTRAST VISUALLY WITH ADJACENT WALKING SURFACES EITHER LIGHT ON DARK, OR DARK ON LIGHT.
3. REFER TO PROWAG FOR WARNING PANEL PLACEMENT REQUIREMENTS.
4. PANELS SHALL EXTEND 24" MINIMUM IN THE DIRECTION OF TRAVEL.



SECTION A-A

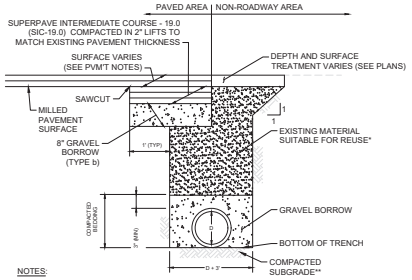
DETECTABLE WARNING PANEL

N.T.S.



VERTICAL GRANITE CURBING (VGC)

N.T.S.



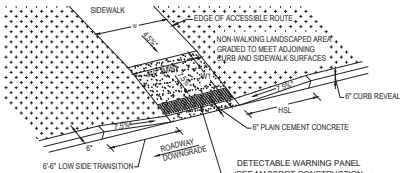
NOTES:

* 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.



LEGEND:

HSL = HIGH SIDE TRANSITION LENGTH (SEE MASSDOT CONSTRUCTION STANDARD "E 107.9.0")
W = SIDEWALK WIDTH
W1 = PERPENDICULAR RAMP LENGTH
CC = CEMENT CONCRETE
* = TOLERANCE FOR CONSTRUCTION ±0.5%

NOTES:

1. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0"
2. ROADWAY GUTTER SLOPE MEASURED IN UPSTATION DIRECTION
3. SEE MASSDOT CONSTRUCTION STANDARD "E 107.6.5" FOR DETECTABLE WARNING PANEL DETAILS

CURB RAMP TYPE A

N.T.S.

LEGEND:

HSL = HIGH SIDE TRANSITION LENGTH (SEE MASSDOT CONSTRUCTION STANDARD E 107.9.0)
W = SIDEWALK WIDTH
W1 = PERPENDICULAR RAMP LENGTH
CC = CEMENT CONCRETE
* = TOLERANCE FOR CONSTRUCTION ±0.5%

NOTES:

1. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0".
2. ROADWAY GUTTER SLOPE MEASURED IN UPSTATION DIRECTION.
3. SEE MASSDOT CONSTRUCTION STANDARD E 107.6.5 FOR DETECTABLE WARNING PANEL DETAILS.

CURB RAMP TYPE B

N.T.S.

LEGEND:

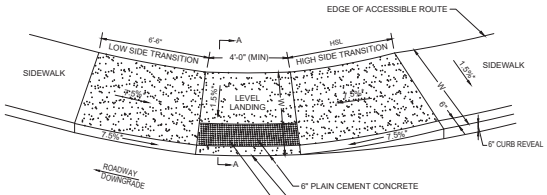
W = SIDEWALK WIDTH
W1 = PERPENDICULAR RAMP LENGTH
CC = CEMENT CONCRETE
* = TOLERANCE FOR CONSTRUCTION ±0.5%

NOTES:

1. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0"
2. ROADWAY GUTTER SLOPE MEASURED IN UPSTATION DIRECTION
3. SEE MASSDOT CONSTRUCTION STANDARD E 107.6.5 FOR DETECTABLE WARNING PANEL DETAILS

CURB RAMP TYPE C

N.T.S.

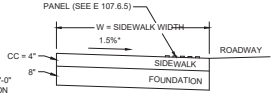


LEGEND:

HSL = HIGH SIDE TRANSITION LENGTH (SEE E 107.9.0)
W = SIDEWALK WIDTH
CC = CEMENT CONCRETE
* = TOLERANCE FOR CONSTRUCTION ±0.5%

NOTES:

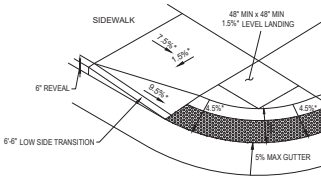
1. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0"
2. ROADWAY GUTTER SLOPE MEASURED IN UPSTATION DIRECTION
3. SEE E 107.6.5 FOR DETECTABLE WARNING PANEL DETAILS
4. SEE E 107.2.1 FOR ALL OTHER DETAILS



SECTION A-A

CURB RAMP TYPE D

N.T.S.

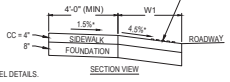


LEGEND:

HSL = HIGH SIDE TRANSITION LENGTH (SEE MASSDOT CONSTRUCTION STANDARD E 107.9.0)
W = SIDEWALK WIDTH
W1 = PERPENDICULAR RAMP LENGTH
CC = CEMENT CONCRETE
* = TOLERANCE FOR CONSTRUCTION ±0.5%

NOTES:

1. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0".
2. ROADWAY GUTTER SLOPE MEASURED IN UPSTATION DIRECTION.
3. SEE MASSDOT CONSTRUCTION STANDARD E 107.6.5 FOR DETECTABLE WARNING PANEL DETAILS.



CURB RAMP TYPE E

N.T.S.

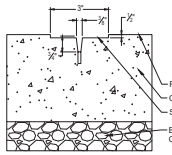
ROADWAY PROFILE GRADE	* HIGH SIDE TRANSITION LENGTH
%	ENGLISH UNITS
=0%	6'-6"
>0% TO 1%	7'-8"
>1% TO 2%	9'-0"
>2% TO 3%	11'-0"
>3% TO 4%	14'-0"
>4% TO 5%	15'-0" Max

NOTE:

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

CURB TRANSITION LENGTH TABLE

N.T.S.



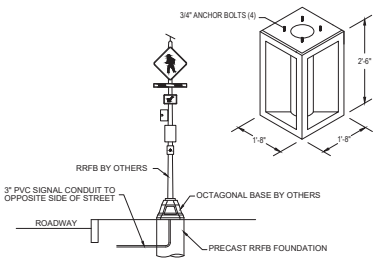
NOTES

1. TOOLED PAVEMENT EDGES AND JOINTS, ALL PANELS.
2. TOOL CONTROL JOINT TO DIMENSION SHOWN WITH 1" EDGER, USE EDGE TO CREATE HALF INCH SLOT BELOW TOOLED JOINT.

CONTROL JOINT

N.T.S.

NOTE: INTERIM PEDESTRIAN SIGNAGE (W11-2 W/ W16-7pL) SHALL BE INSTALLED WITH THE RRFB BASE UNTIL RRFB STRUCTURE IS INSTALLED.



RRFB FOUNDATION

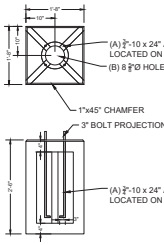
N.T.S.

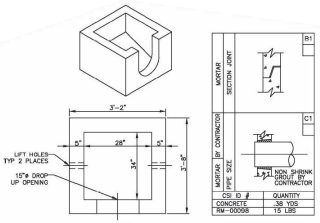
NOTES

1. CONC. 28 DAY COMPRESSIVE STRENGTH f'c=5,000 PSI TYPE III
2. REBAR GRADE 60 PER ASTM A615 (EPOXY)

DATA CHART

LTR	QTY	DESC
(A)	4	3/4"-10 UNC x 24" ANCHOR BOLT (GALV.)
(B)	1	8 5/8" Ø HOLE THRU BASE





'DROP INELT' CATCH BASIN

N.T.S.

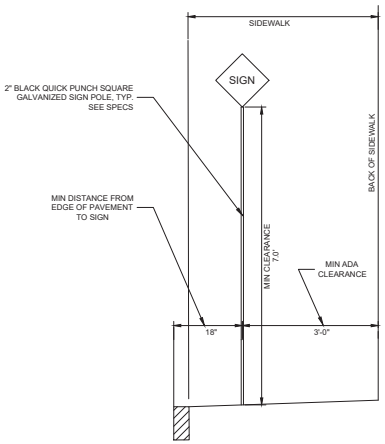
EXPANSION JOINT

N.T.S.

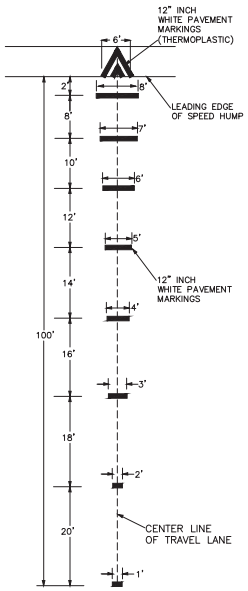
NOTES

1. DOWEL IS TYPICAL AT ALL EXPANSION JOINTS EXCEPT AGAINST VERTICAL JOINTS WITH WALLS, CURBS, OR SITE IMPROVEMENTS.
2. 1/2"X 12" DIAMOND DOWEL PLATE, 12" O.C. TYPICAL AT ALL EXPANSION JOINTS.
3. 1/2" WIDE FULL DEPTH EXPANSION JOINT, BACKER ROD AND WATERPROOF SEALANT.

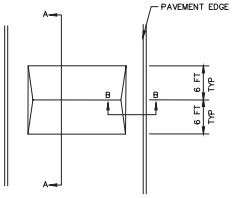
WORCESTER
COMPLETE STREETS IMPROVEMENTS
CONSTRUCTION DETAILS
SHEET 27 OF 29

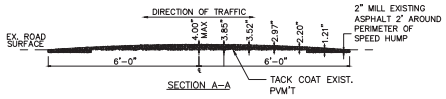


TYPICAL SIGN DETAIL
NOT TO SCALE

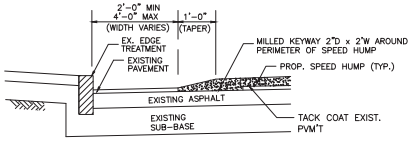


ADVANCE WARNING MARKINGS FOR RAISED ELEMENTS
NOT TO SCALE



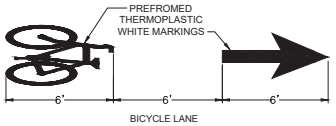


SECTION A–A

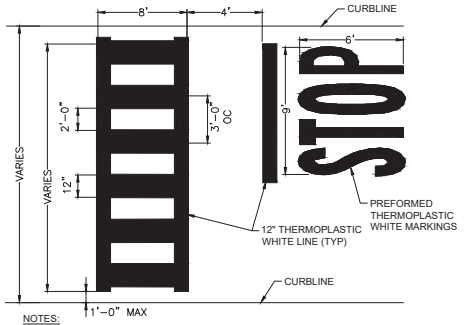


SECTION B–B

PARABOLIC CROWN SPEED HUMP
NOT TO SCALE

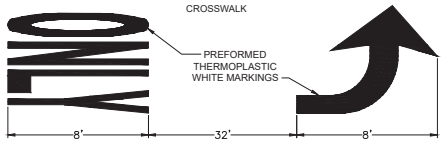


BICYCLE LANE



NOTES:

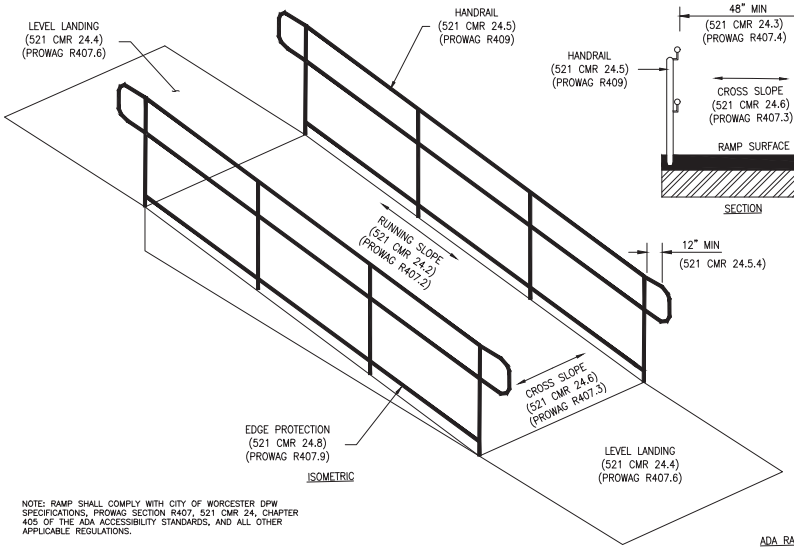
1. ALL 12" LINES SHALL BE APPLIED IN ONE APPLICATION, NO COMBINATION OF LINES (TWO - 6" LINES) WILL BE ACCEPTED.



NOTE: SPACING SHALL BE SAME FOR RIGHT TURN LANE AND THRU ONLY PAVEMENT MARKING (REFER TO MASSDOT STANDARD DRAWING TR.6.1)

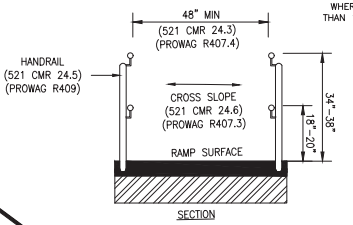
TURNING LANE

PAVEMENT MARKING DETAILS
NOT TO SCALE

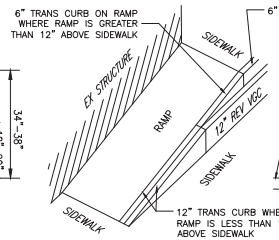


ISOMETRIC

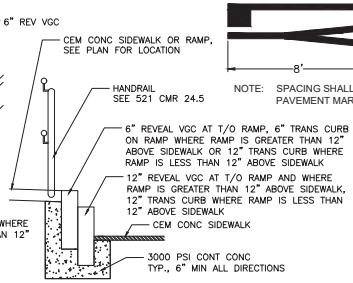
NOTE: RAMP SHALL COMPLY WITH CITY OF WORCESTER DPW SPECIFICATIONS, PROWAG SECTION R407, 521 CMR 24, CHAPTER 405 OF THE ADA ACCESSIBILITY STANDARDS, AND ALL OTHER APPLICABLE REGULATIONS.



SECTION

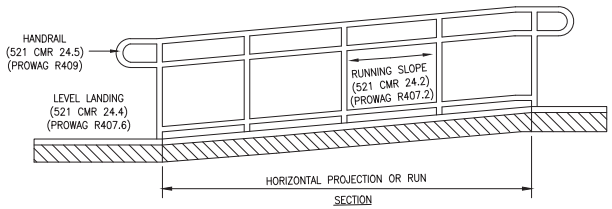


ISOMETRIC



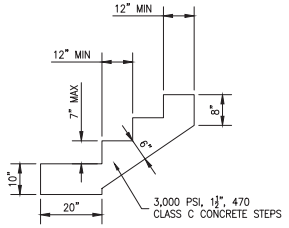
SECTION

DOUBLE VGC RETAINER DETAIL – BELMONT STREET
NOT TO SCALE



SECTION

ADA RAMP DETAILS
NOT TO SCALE



NOTES:

1. STEPS SHALL COMPLY WITH CITY OF WORCESTER DPW SPECIFICATIONS, PROWAG SECTION R408, 521 CMR 27, CHAPTER 504 OF THE ADA ACCESSIBILITY STANDARDS, AND ALL OTHER APPLICABLE REGULATIONS.
2. STEPS SHALL BE CONSTRUCTED WITH HANDRAILS PER 521 CMR 27.4.

CONCRETE STEPS DETAIL
NOT TO SCALE

TEMPORARY TRAFFIC CONTROL 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 THE "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 TEN PLASTIC DRUMS OF A TAPER SHALL BE MOUNTED WITH SEQUENTIAL WARNING 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 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. THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER A CONSTRUCTION PHASING DIAGRAM FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.

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

SUGGESTED WORK ZONE WARNING SIGN SPACING

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

* 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

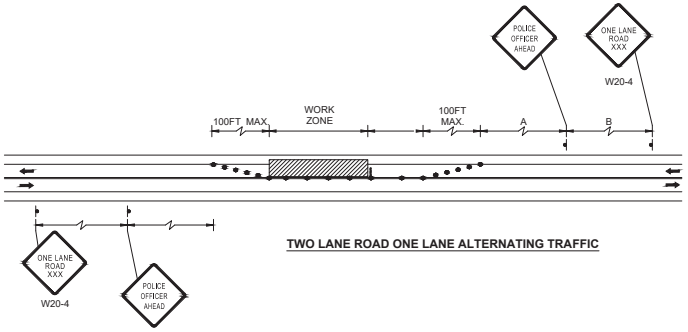
FORMULAS FOR DETERMINING TAPER LENGTHS

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

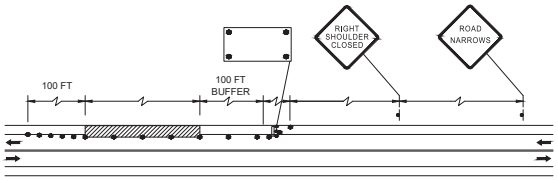
WHERE: L = TAPER LENGTH IN FEET

W = WIDTH OF OFFSET IN FEET

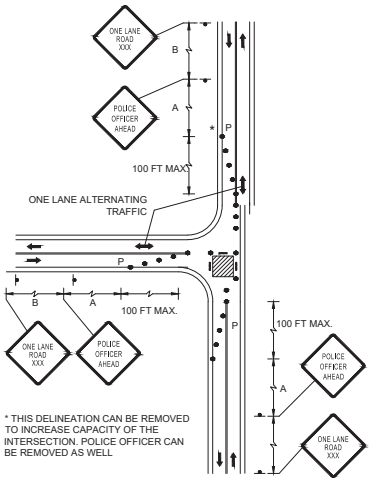
S = POSTED SPEED LIMIT, OR OFF-PEAK 85TH-PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH



TWO LANE ROAD ONE LANE ALTERNATING TRAFFIC



TWO LANE ROAD SHOULDER CLOSED



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

SINGLE LANE APPROACH CORNER CLOSURE

TEMPORARY TRAFFIC CONTROL 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 THE "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 TEN PLASTIC DRUMS OF A TAPER SHALL BE MOUNTED WITH TYPE A SEQUENTIAL WARNING 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 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. NO LANE CLOSURES SHALL BE PERMITTED DURING PEAK HOUR TRAFFIC. PEAK HOUR IS CONSIDERED TO BE FROM 7-9:00 AM AND 3-6:00 PM ON WEEKDAYS.
14. THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER A CONSTRUCTION PHASING DIAGRAM FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.

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

SUGGESTED WORK ZONE WARNING SIGN SPACING

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

* 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

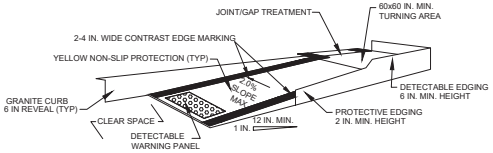
TYPICAL PEDESTRIAN DETAILS:

NOTES:

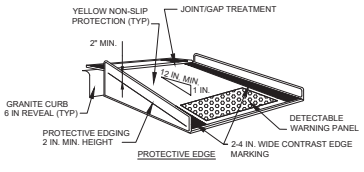
- WHEN EXISTING PEDESTRIAN FACILITIES ARE DISRUPTED, CLOSED, OR RELOCATED IN A TTC ZONE, TEMPORARY FACILITIES SHALL BE PROVIDED AND THEY SHALL BE DETECTABLE AND INCLUDE ACCESSIBILITY FEATURES CONSISTENT WITH THE FEATURES PRESENT IN THE EXISTING PEDESTRIAN FACILITY.
- A PEDESTRIAN CHANNELIZING DEVICE 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 JUDGMENT.
- 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.

AUDIBLE DEVICES

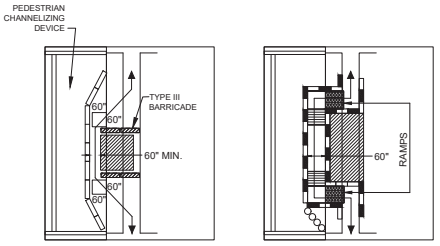
FOR LONG TERM SIDEWALK CLOSURES (AT A MINIMUM OVERNIGHT) A FORM OF SPEECH MESSAGING FOR PEDESTRIANS WITH VISUAL DISABILITIES SHALL BE PROVIDED. AUDIBLE INFORMATION DEVICES SUCH AS DETECTABLE BARRIERS OR BARRICADES AND OTHER PASSIVE PEDESTRIAN ACTIVATION (MOTION ACTIVATED) DEVICES SHOULD BE CONSIDERED FOR THESE CASES. THESE AUDIBLE DEVICES CAN BE MOUNTABLE OR STAND ALONE.



TEMPORARY CURB RAMP PARALLEL TO CURB

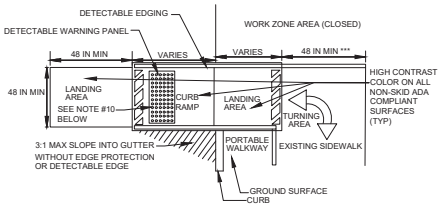


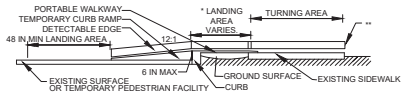
TEMPORARY CURB RAMP-PERPENDICULAR TO CURB



PEDESTRIAN BYPASS

TYPICAL PEDESTRIAN DEVICES:



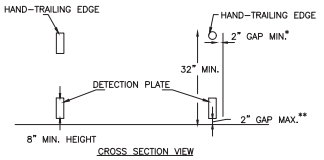


* -LANDING AREA USED TO OVERLAP NON-ADA COMPLIANT SURFACES.

** -DETECTABLE EDGE REMOVED IF A CONTINUOUS SIDEWALK.

*** -60 IN. IF AN OBSTRUCTION IS AT BACK OF SIDEWALK

TEMPORARY CURB RAMP-TYPE 2



PEDESTRIAN CHANNELIZING DEVICE

NOTES:

* THERE SHALL BE A 2 INCH GAP BETWEEN THE HAND–TRAILING EDGE AND ITS SUPPORT.

** A MAXIMUM 2 INCH GAP BETWEEN THE BOTTOM OF THE BOTTOM RAIL AND THE SURFACE MAY BE USED TO PROVIDE DRAINAGE.

TYPICAL PEDESTRIAN DEVICE NOTES: **PEDESTRIAN DETAILS**

1. CURB RAMPS SHALL BE 60 IN. MINIMUM WIDTH WITH A FIRM, STABLE AND NON-SLIP SURFACE.
2. PROTECTIVE EDGING WITH A 2 IN. MINIMUM HEIGHT SHALL BE INSTALLED WHEN THE CURB RAMP OR LANDING PLATFORM HAS A VERTICAL DROP OF 6 IN. OR GREATER OR HAS A SIDE APRON SLOP STEEPER THAN 1:3 (33%). PROTECTIVE EDGING SHOULD BE CONSIDERED WHEN THE CURB RAMPS OR LANDING PLATFORMS HAVE A VERTICAL DROP OF 3 IN. OR MORE.
3. PROTECTIVE EDGING WITH 6 IN. MINIMUM HEIGHT AND CONTRASTING COLOR SHALL BE INSTALLED ON ALL CURB RAMP LANDINGS WHERE THE WALKWAY CHANGES DIRECTION (TURNS).
4. THE CURB RAMP WALKWAY AND LANDING AREA SURFACE SHALL BE OF A SOLID CONTINUOUS CONTRASTING COLOR ABUTTING UP TO THE EXISTING SIDEWALK.
5. CURB RAMPS AND LANDINGS SHOULD HAVE A 1:50 (2%) MAX CROSS-SLOPE.
6. CLEAR SPACE OF 48x48 IN. MINIMUM SHALL BE PROVIDED ABOVE AND BELOW THE CURB RAMP.
7. WATER FLOW IN THE GUTTER SYSTEM SHALL HAVE MINIMAL RESTRICTION.
8. LATERAL JOINTS OR GAPS BETWEEN SURFACES SHALL BE LESS THAN 0.5 IN. WIDTH.
9. CHANGES BETWEEN SURFACE HEIGHTS SHOULD NOT EXCEED 0.5 IN. LATERAL EDGES SHOULD BE VERTICAL UP TO 0.25 IN. HIGH, AND BEVELED AT 1:2 BETWEEN 0.25 IN. AND 0.5 IN. HEIGHT.
10. 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.