

2024 ROAD IMPROVEMENTS PROJECT

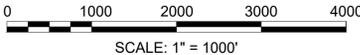
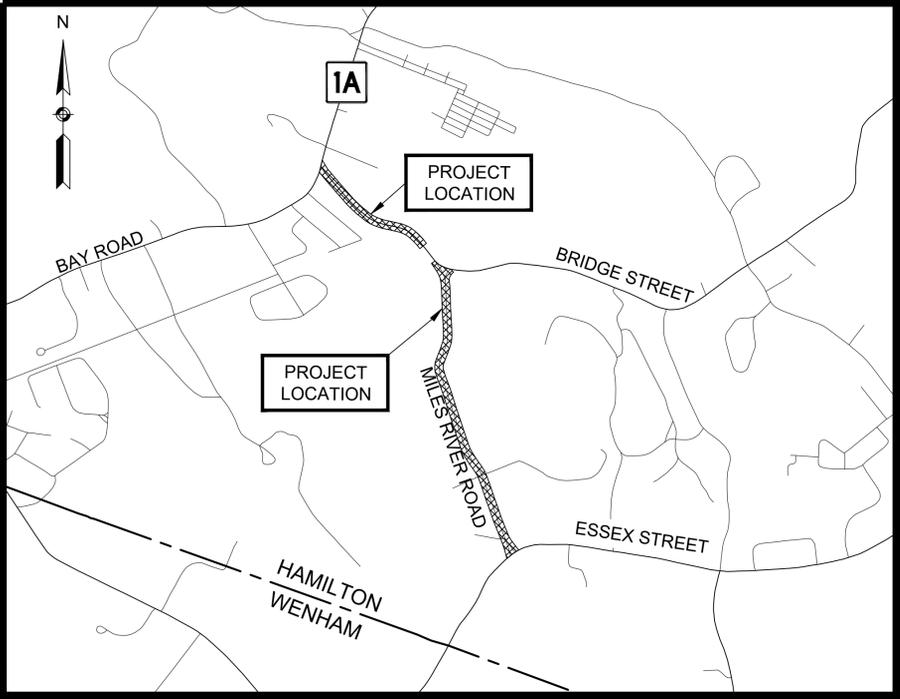
HAMILTON
BRIDGE STREET & MILES RIVER ROAD
TITLE SHEET & INDEX
SHEET 1 OF 14

PLAN OF
BRIDGE STREET & MILES RIVER ROAD

IN THE TOWN OF
HAMILTON
ESSEX COUNTY

THESE PLANS ARE SUPPLEMENTED BY THE MASSDOT OCTOBER 2017 CONSTRUCTION STANDARD DETAILS, THE MASSDOT 2015 OVERHEAD SIGNAL STRUCTURE AND FOUNDATION STANDARD DRAWINGS, THE MASSDOT TRAFFIC MANAGEMENT PLANS AND DETAIL DRAWINGS, THE MASSDOT WORKZONE SAFETY TEMPORARY TRAFFIC CONTROL, THE MASSDOT 1996 CONSTRUCTION AND TRAFFIC STANDARD DETAILS (AS RELATES TO THE PAVEMENT MARKING DETAILS ONLY), THE 2023 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AND THE STANDARD MUNICIPAL TRAFFIC CODE, THE MASSDOT 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS, THE MASSDOT 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING, AND THE LATEST EDITION OF THE AMERICAN STANDARD FOR NURSERY STOCK.

INDEX	
SHEET NO.	DESCRIPTION
1	TITLE SHEET & INDEX
2	LEGEND & ABBREVIATIONS
3	CONSTRUCTION NOTES
4	KEY PLAN
5-9	CONSTRUCTION PLANS
10-12	TEMPORARY TRAFFIC CONTROL PLANS
13-14	CONSTRUCTION DETAILS



LENGTH OF PROJECT ALONG BRIDGE STREET = 1385 FEET = 0.262 MILES
LENGTH OF PROJECT ALONG MILES RIVER ROAD = 3545 FEET = 0.671 MILES

DATE	DESCRIPTION	REV #
2/28/2025	NOI SUBMITTAL	-

TEC
The Engineering Corp

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

GENERAL SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
		JERSEY BARRIER
		CATCH BASIN
		CATCH BASIN CURB INLET
		GUTTER INLET
		FLAG POLE
		GAS PUMP
		MAIL BOX
		POST SQUARE
		POST CIRCULAR
		WELL
		ELECTRIC HANDHOLE
		FENCE GATE POST
		GAS GATE
		BORING HOLE
		MONITORING WELL
		TEST PIT
		HYDRANT
		LIGHT POLE
		COUNTY BOUND
		GPS POINT
		CABLE MANHOLE
		DRAINAGE MANHOLE
		ELECTRIC MANHOLE
		GAS MANHOLE
		MISC MANHOLE
		SEWER MANHOLE
		TELEPHONE MANHOLE
		WATER MANHOLE
		MASSACHUSETTS HIGHWAY BOUND
		MONUMENT
		STONE BOUND
		TOWN OR CITY BOUND
		TRaverse OR TRIANGULATION STATION
		TROLLEY POLE OR GUY POLE
		TRANSMISSION POLE
		UTILITY POLE W/ FIREBOX
		UTILITY POLE WITH DOUBLE LIGHT
		UTILITY POLE W / 1 LIGHT
		UTILITY POLE
		BUSH
		TREE
		SHRUB / PLANTING
		STUMP
		TREE PROTECTION
		SWAMP / MARSH
		WATER GATE
		WATER SHUTOFF/CURB STOP
		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
		CHAIN LINK OR METAL FENCE
		WOOD FENCE
		SEDIMENT CONTROL BARRIER
		TREE LINE
		EDGE OF PAVEMENT
		SAWCUT LINE
		TOP OR BOTTOM OF SLOPE
		DRAINAGE SWALE
		LIMIT OF EDGE OF MICROMILLING 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
		TRAFFIC SIGN (1 POST)
		TRAFFIC SIGN (2 POST)

PAVEMENT MARKINGS SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
		PAVEMENT ARROW - WHITE
		LEGEND "ONLY" - WHITE
		STOP LINE - 12" WIDE
		CROSSWALK - 12" WIDE
		SOLID WHITE LINE
		SOLID YELLOW LINE
		BROKEN WHITE LINE
		BROKEN YELLOW LINE
		DOTTED WHITE LINE
		DOTTED YELLOW LINE
		DOTTED WHITE LINE EXTENSION
		DOTTED YELLOW LINE EXTENSION
		DOUBLE WHITE LINE
		DOUBLE YELLOW LINE

ABBREVIATIONS

GENERAL	
AADT	ANNUAL AVERAGE DAILY TRAFFIC
ABAN	ABANDON
ADJ	ADJUST
APPROX.	APPROXIMATE
A.C.	ASBESTOS CEMENT
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
BW	BOTTOM OF WALL
CB	CATCH BASIN
CBCI	CATCH BASIN WITH CURB INLET
CC	CEMENT CONCRETE
CCB	CAPE COD BERM
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
DSCB	DEEP SUMP CATCH BASIN
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
FDP	FULL DEPTH PAVEMENT
FG	FINISHED GRADE
FES	FLARED END SECTION
FLDSTN	FIELDSTONE
GAR	GARAGE
GC	GRANITE CURB
GCC	GRANITE CURB CORNER
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
IH	IRRIGATION HEAD
INV	INVERT
JCT	JUNCTION
L	LENGTH OF CURVE
LB	LEACH BASIN
LOG	LIMIT OF GRADING
LP	LIGHT POLE OR LOW POINT
L&S	LOAM & SEED
LT	LEFT
MAX	MAXIMUM
MB	MAILBOX
MH	MANHOLE
MHB	MASSACHUSETTS HIGHWAY BOUND
MIN	MINIMUM
NIC	NOT IN CONTRACT
NO.	NUMBER
OCS	OUTLET CONTROL STRUCTURE
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
PERM	PERMANENT
P.G.L.	PROFILE GRADE LINE
PI	POINT OF INTERSECTION

**HAMILTON
BRIDGE STREET & MILES RIVER ROAD
LEGEND & ABBREVIATIONS
SHEET 2 OF 14**

ABBREVIATIONS (cont.)

GENERAL	
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
PUE	PERMANENT UTILITY EASEMENT
PVC	POINT OF VERTICAL CURVATURE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENCY
PVMT	PAVEMENT
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
S&M	STONE & MASONRY
SB	STONE BOUND
SHLD	SHOULDER
SMH	SEWER MANHOLE
ST	STREET
STA	STATION
SSD	STOPPING SIGHT DISTANCE
SHLO	STATE HIGHWAY LAYOUT LINE
SW	SIDEWALK
SWAG	SIDEWALK ANCHOR GUY
T	TANGENT DISTANCE OF CURVE/TRUCK %
TAN	TANGENT
TEMP	TEMPORARY
TC	TOP OF CURB
TOS	TOP OF SLOPE
TS	TRAFFIC SIGNAL
TW	TOP OF WALL
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

CONSTRUCTION NOTES:

- EXISTING CONDITIONS INFORMATION COMPILED FROM ON-THE-GROUND INSTRUMENT SURVEY PERFORMED BY HANCOCK ASSOCIATES IN MARCH THROUGH MAY OF 2021.
HORIZONTAL DATUM = NAD83, MAINLAND ZONE (MASSACHUSETTS STATE PLANE COORDINATES)
VERTICAL DATUM = NAVD88
SAID DATUMS WERE ESTABLISHED VIA GPS OBSERVATIONS UTILIZING REALIZATION NAD83 (2011) AND GEOID 12A
- 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.
- 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.
- ALL MUNICIPALLY OWNED UTILITY STRUCTURES (CATCH BASINS, DRAIN & SEWER MANHOLES, WATER GATES, ETC.) SHALL BE ADJUSTED BY THE CONTRACTOR TO FINISHED GRADE UNLESS DIRECTED OTHERWISE.
- ALL PRIVATELY OWNED UTILITY STRUCTURES (GAS GATES, ELECTRIC / TELEPHONE MANHOLES, ETC.) SHALL BE ADJUSTED TO FINISHED GRADE BY THE PRIVATE UTILITY COMPANY, UNLESS DIRECTED OTHERWISE. THE CONTRACTOR SHALL COORDINATE WITH PRIVATE UTILITY COMPANIES FOR THE ALTERATION AND ADJUSTMENT, AS NECESSARY.
- 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.
- THE TERM "MEET EXIST" MEANS TO MEET BOTH THE EXISTING ALIGNMENT AND ELEVATION.
- DETECTABLE WARNING PANELS ARE REQUIRED ON ALL PROPOSED PEDESTRIAN CURB RAMPS AND SHALL BE INSTALLED IN ACCORDANCE WITH MASSDOT CONSTRUCTION STANDARDS.
- 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.
- ALL DISTURBED AREAS OUTSIDE THE CURBLINE SHALL BE STABILIZED WITH 4" LOAM AND SEED, UNLESS OTHERWISE NOTED.
- AN UNOBSTRUCTED PEDESTRIAN PATH OF TRAVEL WITH A MINIMUM WIDTH OF 4'-0" (EXCLUDING THE WIDTH OF THE CURB) SHALL BE MAINTAINED PAST ALL VERTICAL OBSTRUCTIONS (UTILITY POLES, LIGHT POLES, SIGNS, MAILBOXES, ETC.)
- SEDIMENT CONTROL BARRIERS ARE TO BE USED AS DIRECTED BY THE TOWN OF HAMILTON AND THE TOWN ENGINEER ONLY.

PAVEMENT NOTES

PROPOSED MILL & HOT MIX ASPHALT (HMA) OVERLAY

SURFACE: 2" SUPERPAVE SURFACE COURSE - 12.5 (SSC-12.5) OVER
ASPHALT EMULSION TACK COAT OVER
2" PAVEMENT FINE MILLING

PROPOSED FULL DEPTH PAVEMENT

SURFACE: 2" SUPERPAVE SURFACE COURSE - 12.5 (SSC-12.5) OVER
ASPHALT EMULSION TACK COAT OVER
2" SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC-12.5) OVER
ASPHALT EMULSION TACK COAT OVER

BASE: 3.5" SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC-19.0) OVER

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

PROPOSED PERMANENT PAVEMENT TRENCH PATCH

SURFACE: VARIABLE DEPTH HMA FOR PATCHING TO MATCH EXISTING PAVEMENT PER SECTION 450.53
(COMPACTED IN 2" (MAX) LIFTS TO MATCH EXIST PAVEMENT THICKNESS)

BASE: 8" GRAVEL BORROW, TYPE b OVER

SUBBASE: EXISTING MATERIAL SUITABLE FOR RE-USE (SEE VARIOUS TRENCH DETAILS)

PROPOSED TEMPORARY PAVEMENT TRENCH PATCH

SURFACE: 2½" TEMPORARY ASPHALT PATCHING

BASE: EXISTING MATERIAL SUITABLE FOR RE-USE (SEE VARIOUS TRENCH DETAILS)

PROPOSED HMA SIDEWALK

SURFACE: 1¼" SUPERPAVE SURFACE COURSE 9.5 (SSC -9.5) OVER
1¾" SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC - 12.5) OVER

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

PROPOSED DRIVEWAY APRON REPAIR

SURFACE: 1½" SUPERPAVE SURFACE COURSE 9.5 (SSC -9.5) OVER
2½" SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC - 12.5) OVER

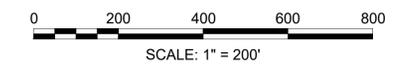
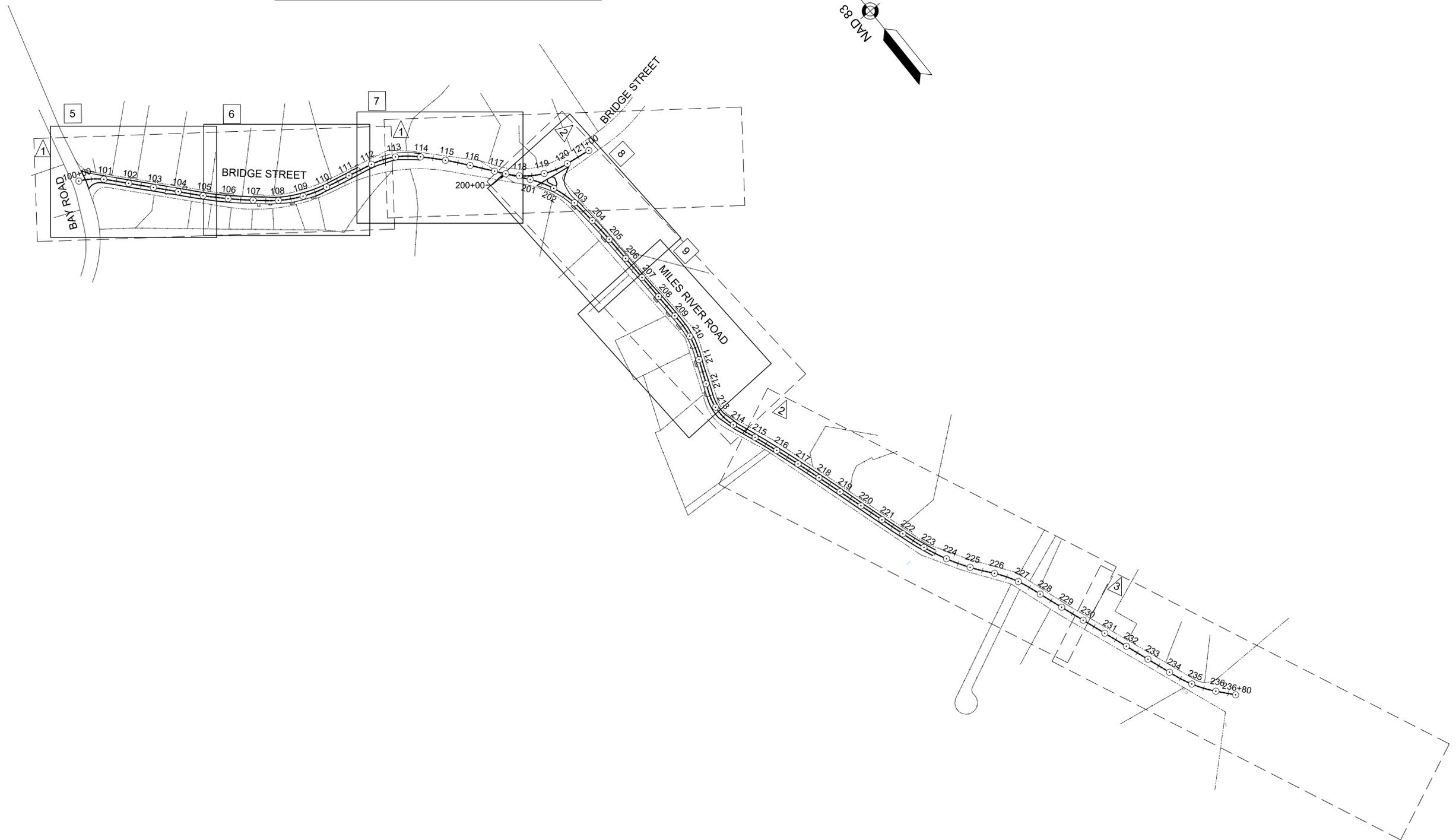
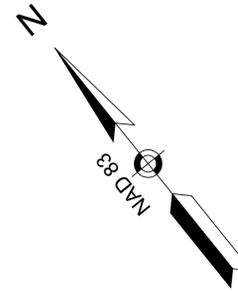
BASE: 8" SUITABLE EXISTING GRAVEL;
ADD GRAVEL BORROW, TYPE b AS REQUIRED

GENERAL PAVEMENT NOTES:

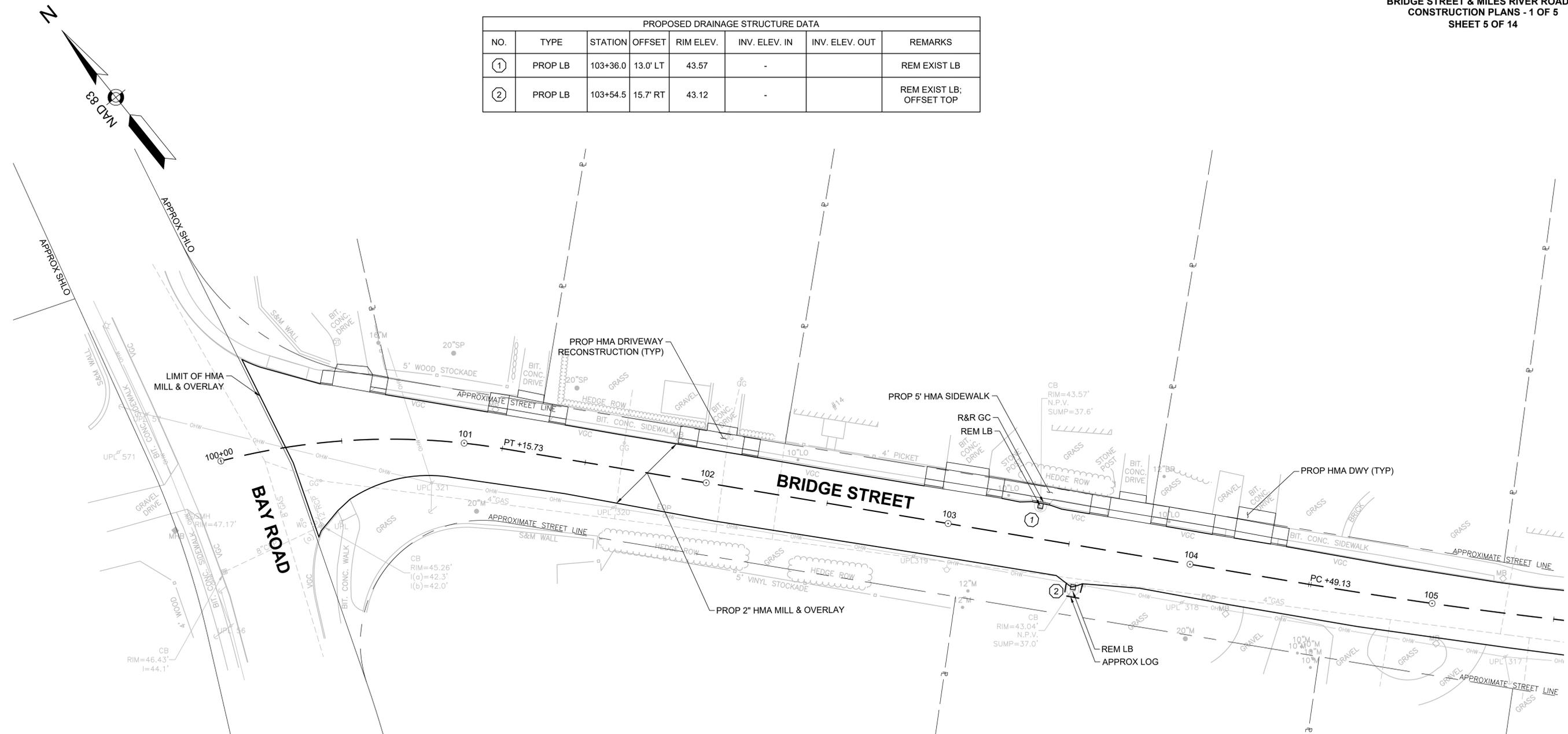
- ASPHALT EMULSION FOR TACK COAT SHALL BE APPLIED BETWEEN ALL ASPHALT SURFACES AND SAWCUT JOINTS BEFORE PAVING. HMA JOINT SEALANT SHALL BE APPLIED TO ALL COLD JOINTS (LONGITUDINAL AND TRANSVERSE) BEFORE PAVING SURFACE COURSE. ASPHALT EMULSION FOR TACK COAT SHALL BE APPLIED IN ACCORDANCE WITH SUBSECTION 450.43. ALL SURFACES SHALL BE CLEAN OF ALL ORGANICS, DEBRIS, AND SAND PRIOR TO PAVING.
- ALL HMA SHALL BE IN ACCORDANCE WITH SECTION 460.
- ASPHALT EMULSION FOR TACK COAT SHALL BE RS-1H TO RESIST TRACKING OF TACK BY HAUL VEHICLES.
- HMA FOR WALKS SHALL BE IN ACCORDANCE WITH SECTION 702.
- ALL GRAVEL BORROW MEETING SPECIFICATION SHALL BE RETAINED IN PLACE, COMPACTED, AND LEVELED AS REQUIRED.

LEGEND

- ☒ CONSTRUCTION PLANS
- △ PAVING OVERVIEW PLANS (SEE PROJECT MANUAL)

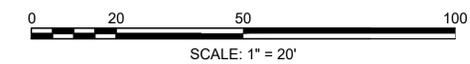


PROPOSED DRAINAGE STRUCTURE DATA							
NO.	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
①	PROP LB	103+36.0	13.0' LT	43.57	-		REM EXIST LB
②	PROP LB	103+54.5	15.7' RT	43.12	-		REM EXIST LB; OFFSET TOP



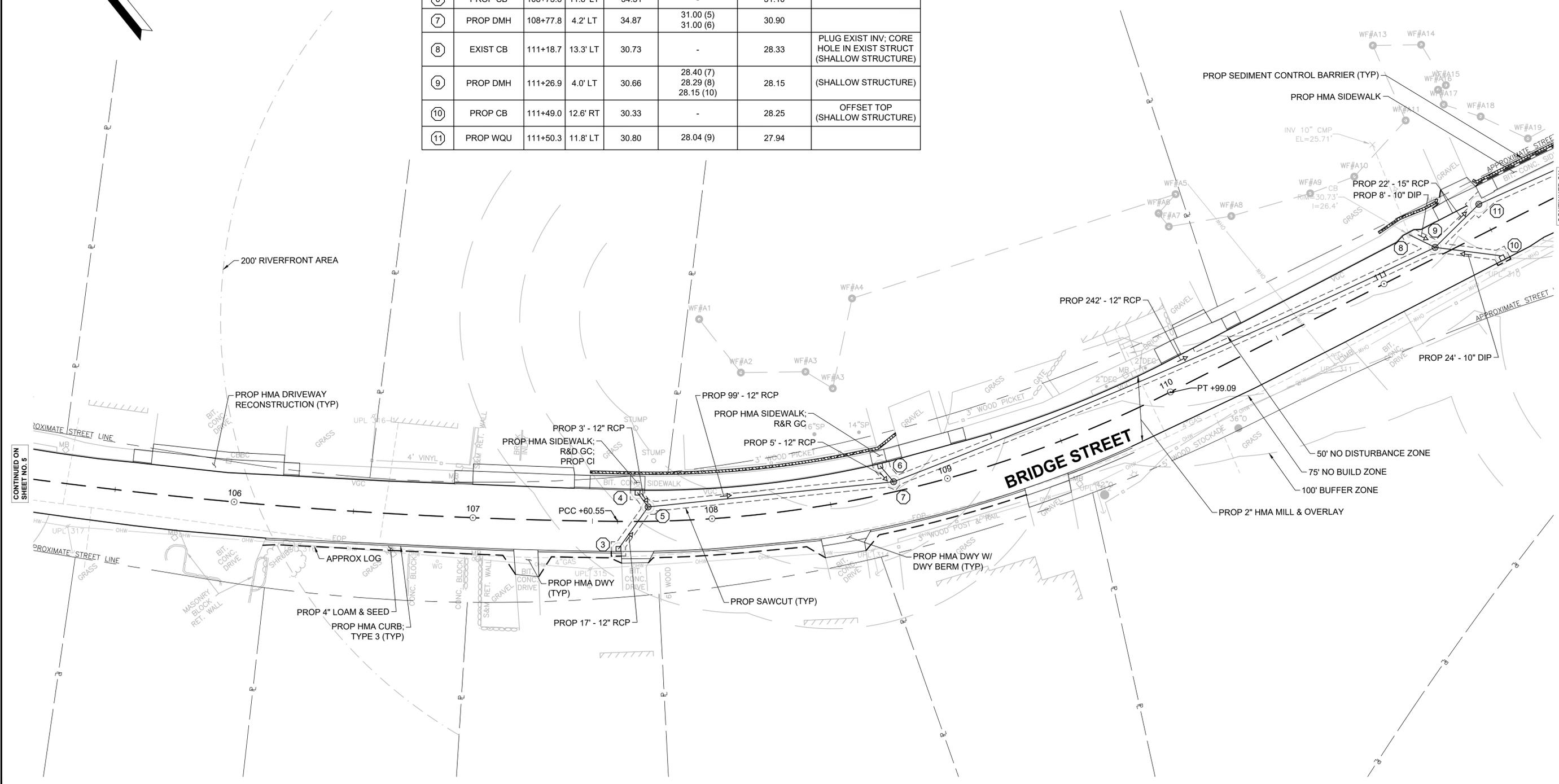
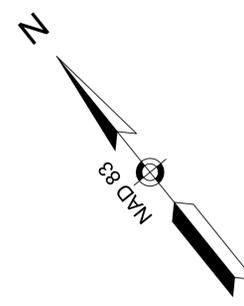
CONSTRUCTION NOTES:

- EXISTING CONDITIONS INFORMATION COMPILED FROM AN ON-THE-GROUND INSTRUMENT SURVEY PERFORMED BY HANCOCK ASSOCIATES IN APRIL & MAY OF 2021.
HORIZONTAL DATUM = NAD83 (MASSACHUSETTS STATE PLANE COORDINATES)
VERTICAL DATUM = NAVD88
- 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.
- 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.
- ALL MUNICIPALLY OWNED UTILITY STRUCTURES (CATCH BASINS, DRAIN MANHOLES, WATER GATES, ETC.) SHALL BE ADJUSTED BY THE CONTRACTOR TO FINISHED GRADE UNLESS DIRECTED OTHERWISE.
- ALL PRIVATELY OWNED UTILITY STRUCTURES (GAS GATES, ELECTRIC /TELEPHONE MANHOLES, ETC.) SHALL BE ADJUSTED TO FINISHED GRADE BY THE PRIVATE UTILITY COMPANY, UNLESS DIRECTED OTHERWISE. THE CONTRACTOR SHALL COORDINATE WITH PRIVATE UTILITY COMPANIES FOR THE ALTERATION AND ADJUSTMENT, AS NECESSARY.
- AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT THE CONTRACTORS EXPENSE.
- 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.
- THE TERM "MEET EXIST" MEANS TO MEET BOTH THE EXISTING ALIGNMENT AND ELEVATION.
- 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.
- ALL AREAS BETWEEN THE BACK OF SIDEWALK OR CURB TO THE LIMIT OF GRADING, OR AREAS DISTURBED BY THE CONTRACTORS OPERATIONS SHALL BE RESTORED WITH 4 INCHES OF LOAM AND SEED.



CONTINUED ON
SHEET NO. 6

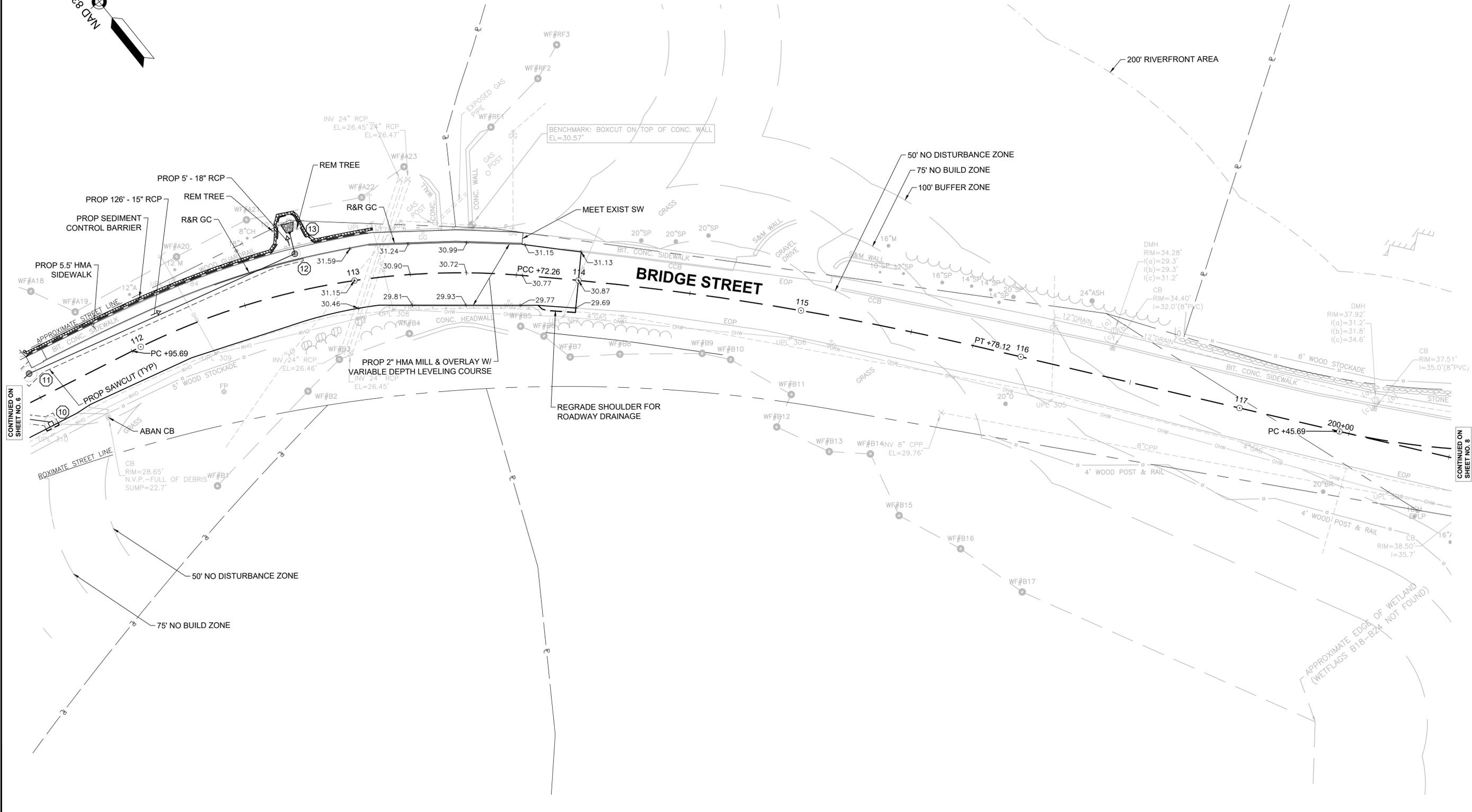
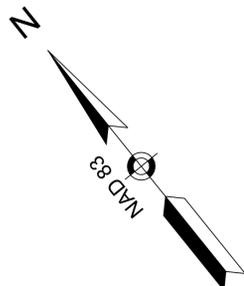
PROPOSED DRAINAGE STRUCTURE DATA							
NO.	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
3	PROP CB	107+61.0	11.4' RT	37.51	-	33.50	
4	PROP CBCI	107+68.9	12.0' LT	37.16	-	33.16	
5	PROP DMH	107+73.4	6.0' LT	37.25	33.10 (4) 33.20 (3)	33.05	
6	PROP CB	108+73.6	11.8' LT	34.51	-	31.10	
7	PROP DMH	108+77.8	4.2' LT	34.87	31.00 (5) 31.00 (6)	30.90	
8	EXIST CB	111+18.7	13.3' LT	30.73	-	28.33	PLUG EXIST INV; CORE HOLE IN EXIST STRUCT (SHALLOW STRUCTURE)
9	PROP DMH	111+26.9	4.0' LT	30.66	28.40 (7) 28.29 (8) 28.15 (10)	28.15	(SHALLOW STRUCTURE)
10	PROP CB	111+49.0	12.6' RT	30.33	-	28.25	OFFSET TOP (SHALLOW STRUCTURE)
11	PROP WQU	111+50.3	11.8' LT	30.80	28.04 (9)	27.94	



CONTINUED ON SHEET NO. 5

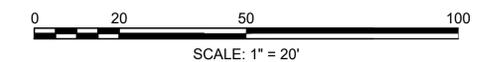
CONTINUED ON SHEET NO. 7

PROPOSED DRAINAGE STRUCTURE DATA							
NO.	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
12	PROP DMH	112+76.6	16.5' LT	32.04	27.31 (11)	27.21	
13	PROP FES	112+76.3	26.4' LT	-	-	27.2	

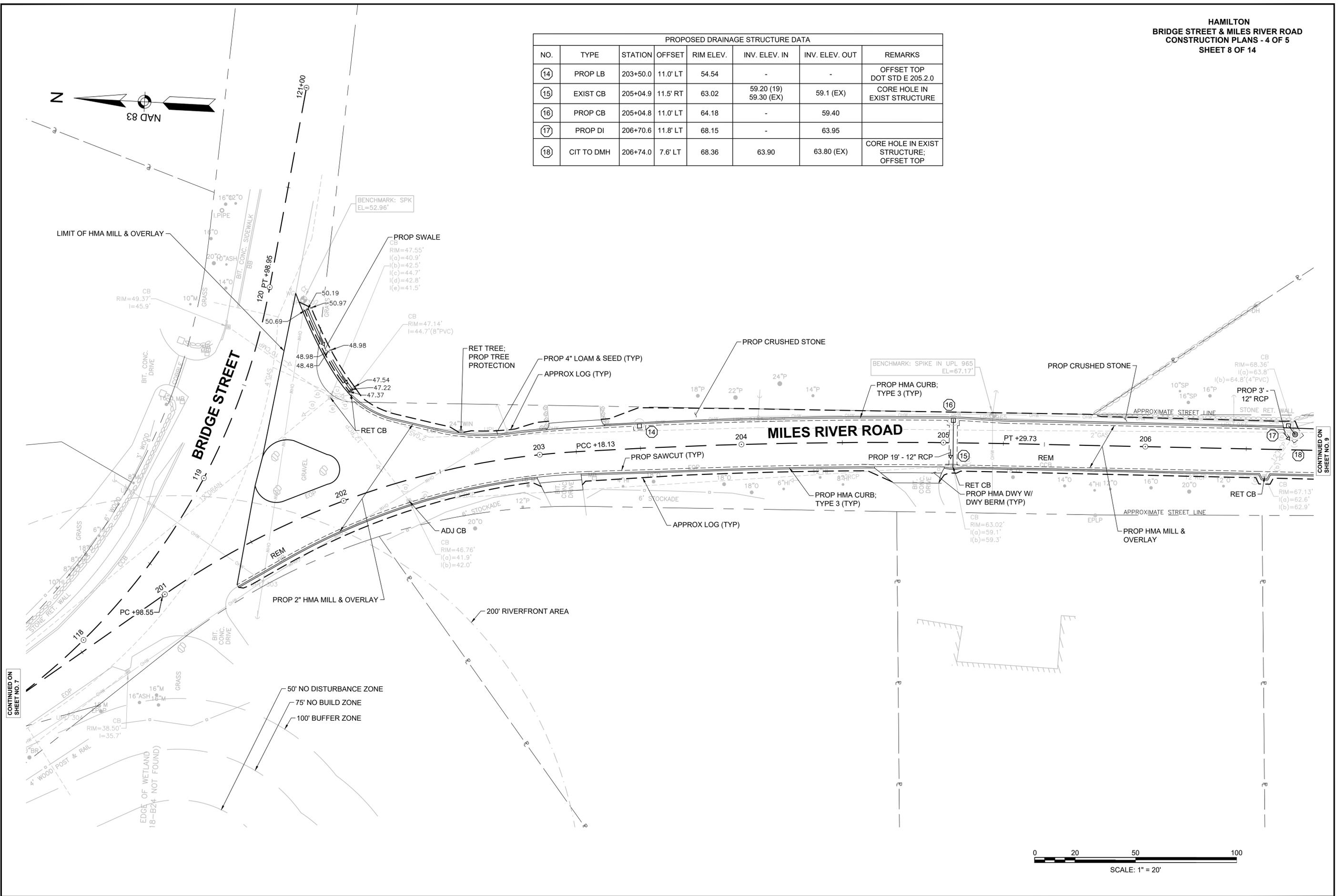


CONTINUED ON
 SHEET NO. 6

CONTINUED ON
 SHEET NO. 8



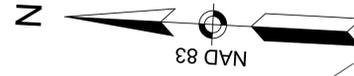
PROPOSED DRAINAGE STRUCTURE DATA							
NO.	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
14	PROP LB	203+50.0	11.0' LT	54.54	-	-	OFFSET TOP DOT STD E 205.2.0
15	EXIST CB	205+04.9	11.5' RT	63.02	59.20 (19) 59.30 (EX)	59.1 (EX)	CORE HOLE IN EXIST STRUCTURE
16	PROP CB	205+04.8	11.0' LT	64.18	-	59.40	
17	PROP DI	206+70.6	11.8' LT	68.15	-	63.95	
18	CIT TO DMH	206+74.0	7.6' LT	68.36	63.90	63.80 (EX)	CORE HOLE IN EXIST STRUCTURE; OFFSET TOP



CONTINUED ON
SHEET NO. 7

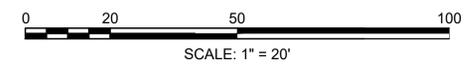
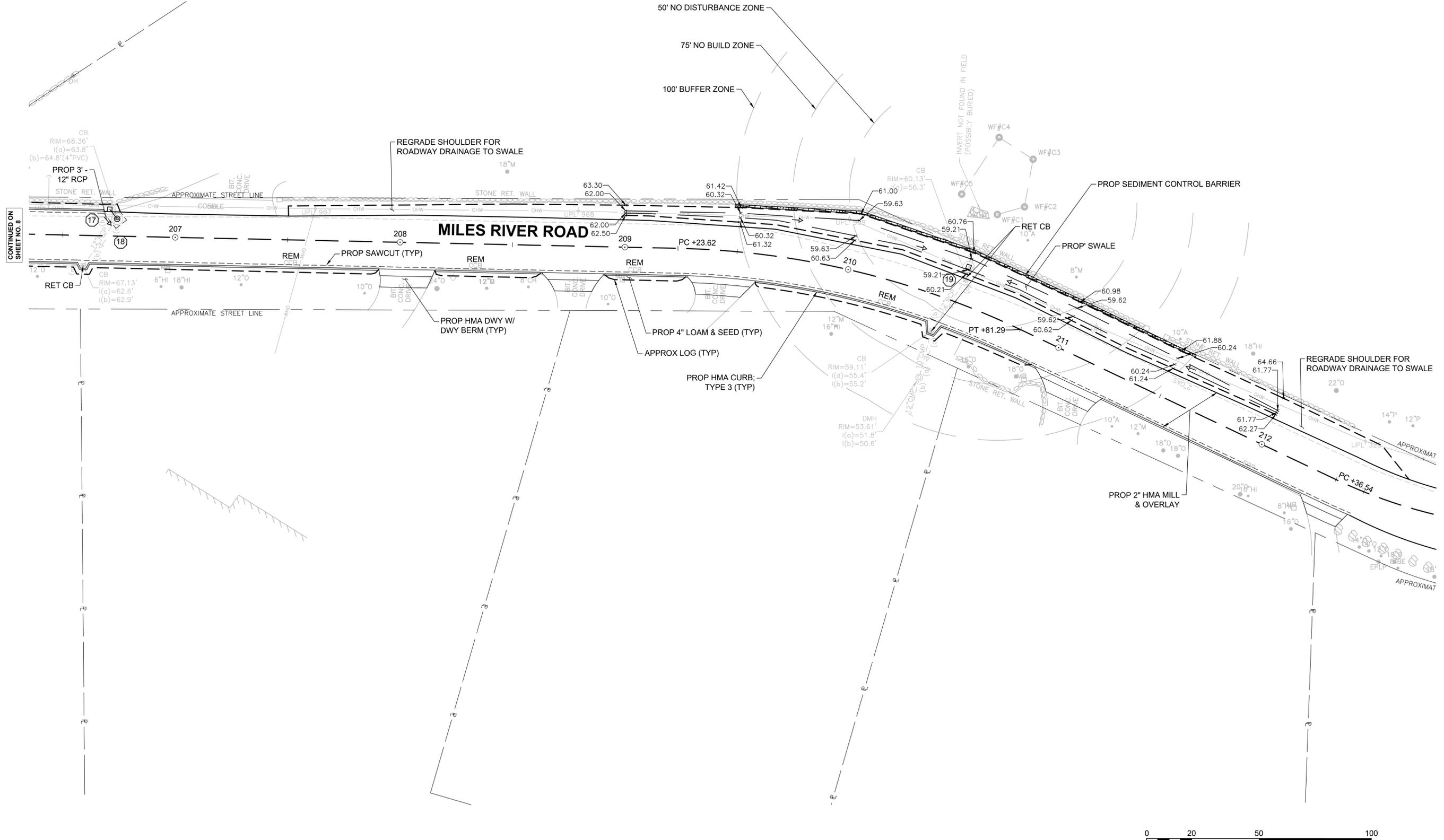
CONTINUED ON
SHEET NO. 9

PROPOSED DRAINAGE STRUCTURE DATA							
NO.	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
(19)	PROP DI	210+49.7	17.7' LT	59.38	MATCH EXIST	MATCH EXIST	



CONTINUED ON SHEET NO. 8

REFER TO PAVING OVERVIEW PLANS FOR CONTINUATION



TEMPORARY TRAFFIC CONTROL NOTES:

- ALL TEMPORARY TRAFFIC CONTROL WORK SHALL CONFORM TO THE LATEST EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND ALL REVISIONS, UNLESS SUPERCEDED BY THESE PLANS.
- ALL SIGN LEGENDS, BORDERS, AND MOUNTING SHALL BE IN ACCORDANCE WITH THE MUTCD.
- TEMPORARY CONSTRUCTION SIGNING AND ALL OTHER TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY WORK.
- TEMPORARY CONSTRUCTION SIGNING, BARRICADES, AND ALL OTHER NECESSARY WORK ZONE TRAFFIC CONTROL DEVICES SHALL BE REMOVED FROM THE HIGHWAY OR COVERED WHEN THEY ARE NOT REQUIRED FOR CONTROL OF TRAFFIC.
- SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY, CHANNELIZING DEVICES, BARRIERS, AND CRASH ATTENUATORS MUST PASS THE CRITERIA SET FORTH IN THE "MANUAL FOR ASSESSING SAFETY HARDWARE" (MASH).
- CONTRACTORS SHALL NOTIFY EACH 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.
- THE FIRST TEN PLASTIC DRUMS OF A TAPER SHALL BE MOUNTED WITH SEQUENTIAL FLASHING LIGHTS.
- THE ADVISORY SPEED LIMIT, IF REQUIRED, SHALL BE DETERMINED BY THE ENGINEER.
- DISTANCES ARE A GUIDE AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.
- MAXIMUM SPACING OF TRAFFIC DEVICES IN A TAPER (DRUMS OR CONES) IS EQUAL IN FEET TO THE SPEED LIMIT IN MPH.
- MINIMUM LANE WIDTH IS TO BE 11 FEET UNLESS OTHERWISE SHOWN. MINIMUM LANE WIDTH TO BE MEASURED FROM THE EDGE OF DRUMS OR MEDIAN BARRIER.
- ALL SIGNS SHALL BE MOUNTED ON THEIR OWN STANDARD SIGN SUPPORTS.
- NO LANE CLOSURES SHALL BE PERMITTED DURING PEAK HOUR TRAFFIC. PEAK HOUR IS CONSIDERED TO BE FROM 7-9:00 AM AND 4-6:00 PM ON WEEKDAYS.
- 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

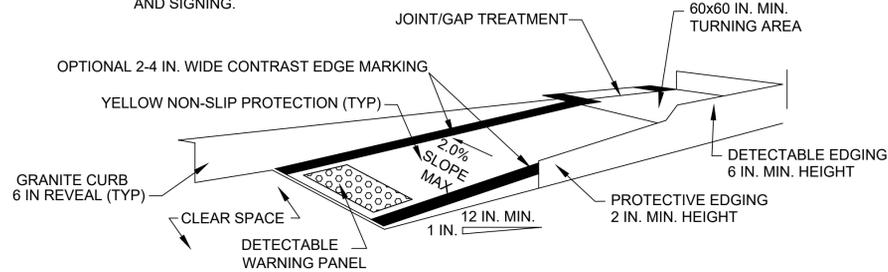
W = WIDTH OF OFFSET IN FEET

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

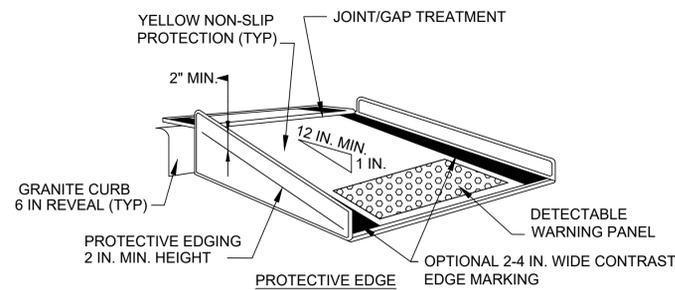
TYPICAL PEDESTRIAN DETAILS:

NOTES:

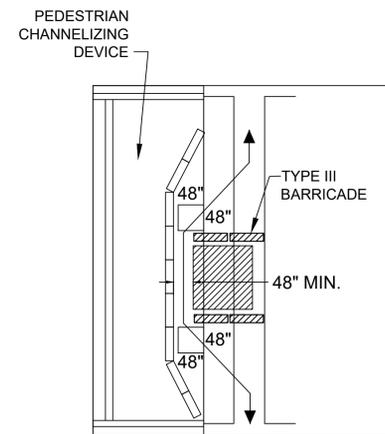
- WHEN EXISTING PEDESTRIAN FACILITIES ARE DISRUPTED, CLOSED, OR RELOCATED IN A TTC ZONE, TEMPORARY FACILITIES SHALL BE PROVIDED AND THEY SHALL BE DETECTABLE AND INCLUDE ACCESSIBILITY FEATURES CONSISTENT WITH THE FEATURES PRESENT IN THE EXISTING PEDESTRIAN FACILITY.
- A PEDESTRIAN CHANNELIZING DEVICE THAT IS DETECTABLE BY A PERSON WITH A VISUAL DISABILITY TRAVELING WITH THE AID OF A LONG CANE SHALL BE PLACED ALONG THE FULL LENGTH OF THE TEMPORARY PEDESTRIAN ROUTE.
- WHEN USED, TEMPORARY RAMPS SHALL COMPLY WITH AMERICANS WITH DISABILITIES ACT.
- THE ALTERNATE PATHWAY SHOULD HAVE A SMOOTH CONTINUOUS HARD SURFACE FOR THE ENTIRE LENGTH OF THE TEMPORARY PEDESTRIAN FACILITY.
- THE TEMPORARY SIDEWALK SHOULD BE A MINIMUM OF 4 FEET WIDE. IF THE SIDEWALK EXCEEDS 200 FEET THEN A 5 FOOT BY 5 FOOT PASSING ZONE SHALL BE PROVIDED NEAR THE MIDPOINT OF THE CLOSURE.
- THE PROTECTIVE REQUIREMENTS OF A TTC WORK ZONE MAY HAVE AN IMPACT IN DETERMINING THE NEED FOR TEMPORARY TRAFFIC BARRIERS AND THEIR USE IN PROVIDING PEDESTRIAN DELINEATION SHOULD BE BASED ON ENGINEERING JUDGEMENT.
- ON-DEMAND PEDESTRIAN ASSISTANCE PERSONNEL TO ASSIST WITH NAVIGATION AROUND THE CLOSURE/WORK AREA MAY BE CONSIDERED AS AN OPTION IN PLACE OF PROVIDING ADA/AAB DEVICES FOR WORK CLOSURES LASTING 4 HOURS OR LESS.
- CONTROLS ONLY FOR PEDESTRIAN TRAFFIC ARE SHOWN; VEHICULAR TRAFFIC SHOULD BE HANDLED AS SHOWN ELSEWHERE. THESE DETAILS ARE USED IN CONJUNCTION WITH THE PROPOSED LANE CLOSURE DETAILS AND DURING CONSTRUCTION STAGING, AS DETERMINED BY THE ENGINEER.
- ADA COMPLIANT ACCESS SHALL BE MAINTAINED AT ALL TIMES, INCLUDING PEDESTRIAN GUIDANCE SYSTEMS AT WORK ZONES. PEDESTRIAN DETOURS OR BYPASSES SHALL INCLUDE AN ADA COMPLIANT ROUTE WITH PROPER BARRICADES, RAILINGS, RAMPS, AND SIGNING.



TEMPORARY CURB RAMP PARALLEL TO CURB

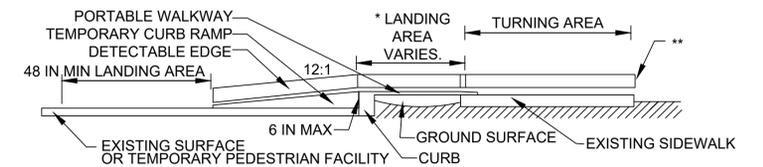
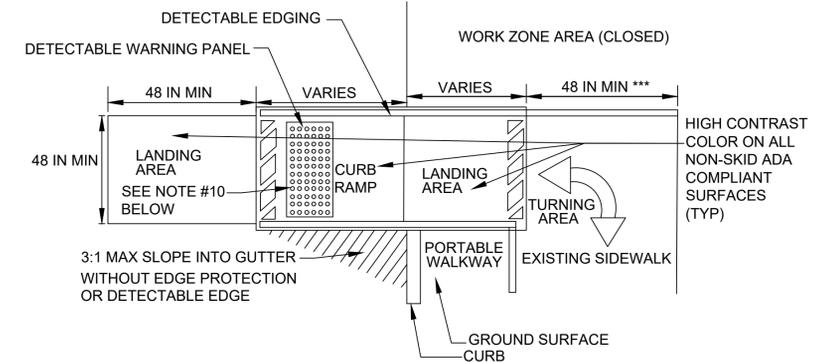


TEMPORARY CURB RAMP-PERPENDICULAR TO CURB



PEDESTRIAN BYPASS

TYPICAL PEDESTRIAN DEVICES:

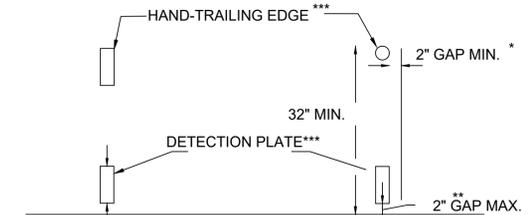


* -LANDING AREA USED TO OVERLAP NON-ADA COMPLIANT SURFACES.

** -DETECTABLE EDGE REMOVED IF A CONTINUOUS SIDEWALK.

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

TEMPORARY CURB RAMP-TYPE 2



CROSS SECTION VIEW

NOTES:

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

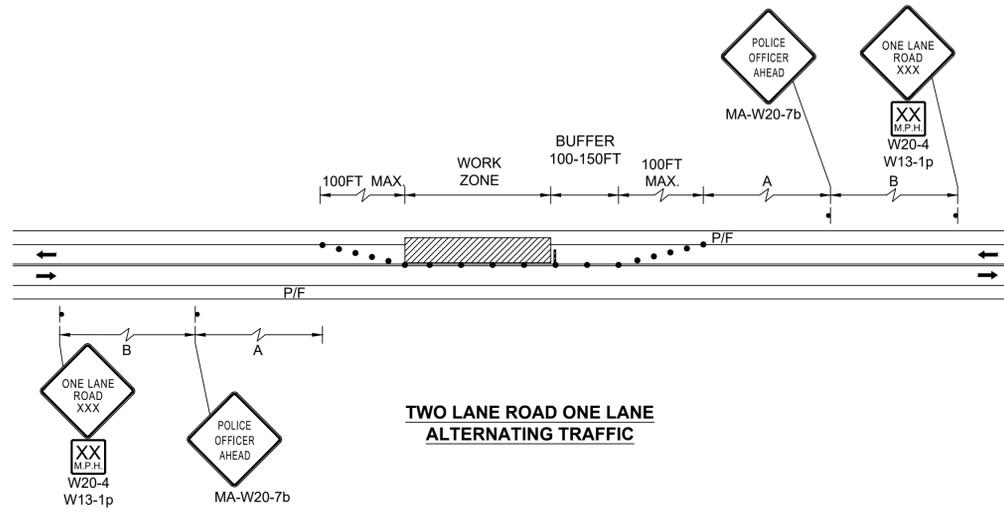
** A MAXIMUM 2 INCH GAP BETWEEN THE BOTTOM OF THE BOTTOM RAIL AND THE SURFACE MAY BE USED TO PROVIDE DRAINAGE.

*** THE HAND-TRAILING EDGE AND DETECTION PLATE SHALL BE CONTINUOUS THROUGHOUT THE LENGTH OF THE PATH SUCH THAT A PEDESTRIAN USER WITH A LONG CANE CAN FOLLOW IT.

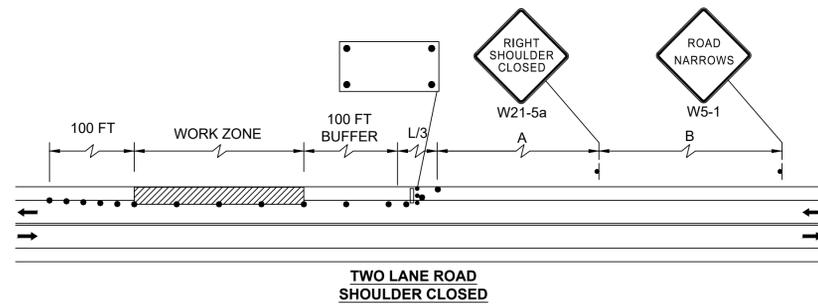
PEDESTRIAN CHANNELIZING DEVICE

TYPICAL PEDESTRIAN DEVICE NOTES:

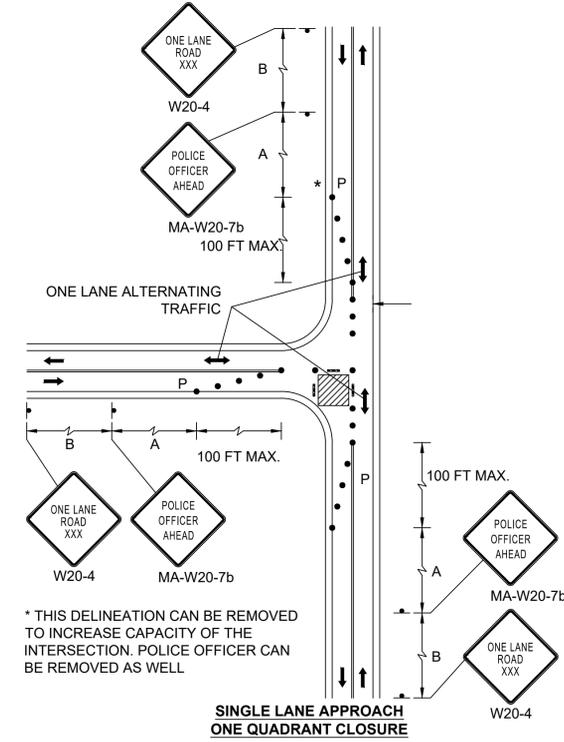
- CURB RAMPS SHALL BE 60 IN. MINIMUM WIDTH WITH A FIRM, STABLE AND NON-SLIP SURFACE.
- PROTECTIVE EDGING WITH A 2 IN. MINIMUM HEIGHT SHALL BE INSTALLED WHEN THE CURB RAMP OR LANDING PLATFORM HAS A VERTICAL DROP OF 6 IN. OR GREATER OR HAS A SIDE APRON SLOP STEEPER THAN 1:3 (33%). PROTECTIVE EDGING SHOULD BE CONSIDERED WHEN THE CURB RAMPS OR LANDING PLATFORMS HAVE A VERTICAL DROP OF 3 IN. OR MORE.
- DETECTABLE EDGING WITH 6 IN. 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 IN. 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 IN. WIDTH.
- 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.
- 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.



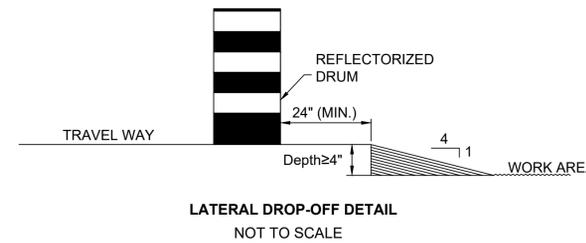
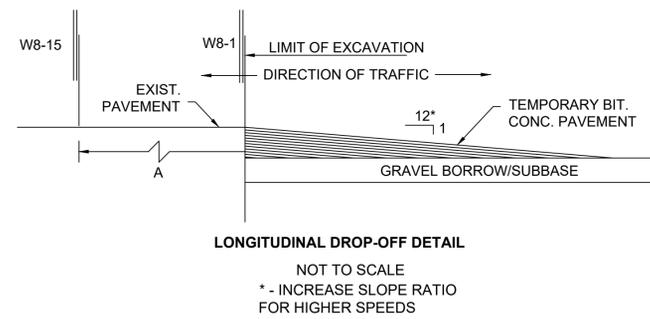
TWO LANE ROAD ONE LANE ALTERNATING TRAFFIC



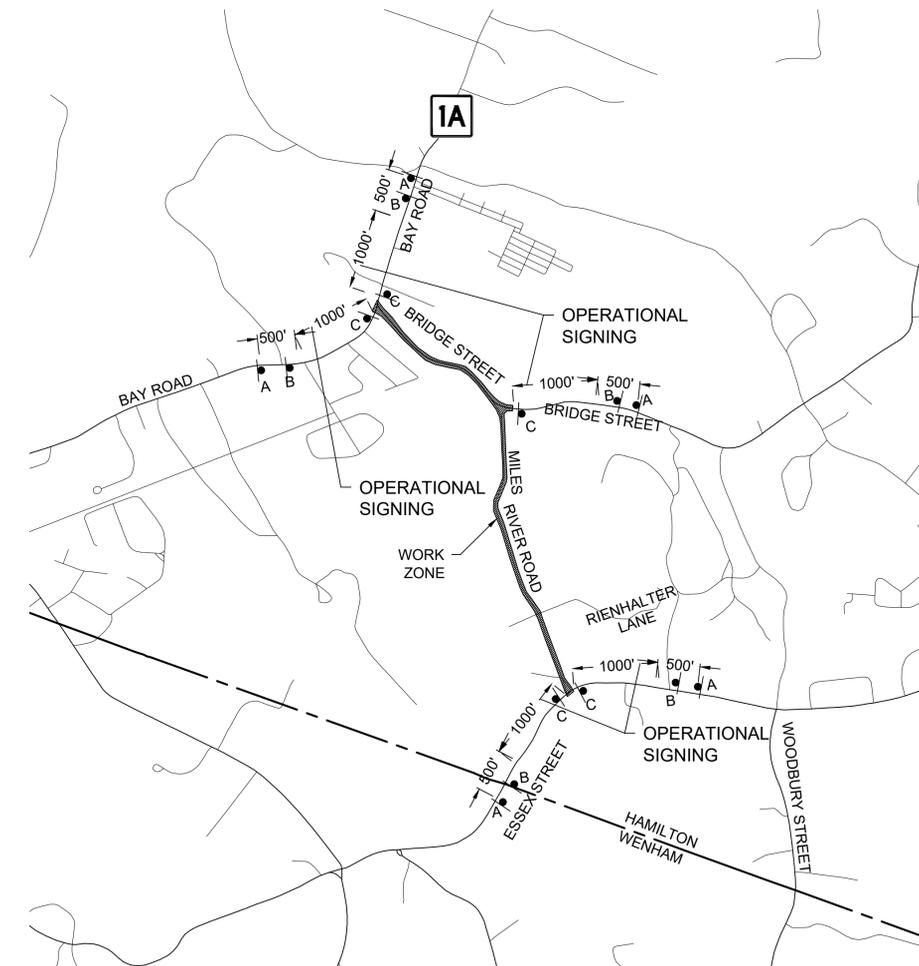
TWO LANE ROAD SHOULDER CLOSED



SINGLE LANE APPROACH ONE QUADRANT CLOSURE

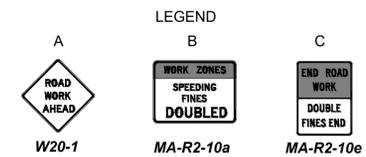


TEMPORARY TRAFFIC CONTROL SIGN SUMMARY												
IDENTIFICATION NUMBER	SIZE OF SIGN (in)		LEGEND	TEXT DIMENSIONS (in)			COLOR			NUMBER OF SIGNS REQUIRED	UNIT AREA (SF)	TOTAL AREA (SF)
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING	ARROW RTE. MKR	BACK-GROUND	LEGEND	BORDER			
MA-R2-10a	48	36		MASSDOT STANDARD SIGN			FL. ORANGE WHITE	BLACK BLACK	BLACK BLACK	5	12.00	60.00
MA-R2-10e	36	48		↓			FL. ORANGE WHITE	BLACK BLACK	BLACK BLACK	5	12.00	60.00
W5-1	36	36		SEE 2009 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS			FL. ORANGE	BLACK	BLACK	1	9.00	9.00
W8-1	36	36					FL. ORANGE	BLACK	BLACK	5	9.00	45.00
W8-15	36	36					FL. ORANGE	BLACK	BLACK	5	9.00	45.00
W13-1p	24	24					FL. ORANGE	BLACK	BLACK	2	4.00	8.00
W20-1	36	36					FL. ORANGE	BLACK	BLACK	5	9.00	45.00
W20-4	36	36		↓			FL. ORANGE	BLACK	BLACK	3	9.00	27.00
MA-W20-7b	36	36		MASSDOT STANDARD SIGN			FL. ORANGE	BLACK	BLACK	3	9.00	27.00
W21-5a	36	36		SEE 2009 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS			FL. ORANGE	BLACK	BLACK	1	9.00	9.00



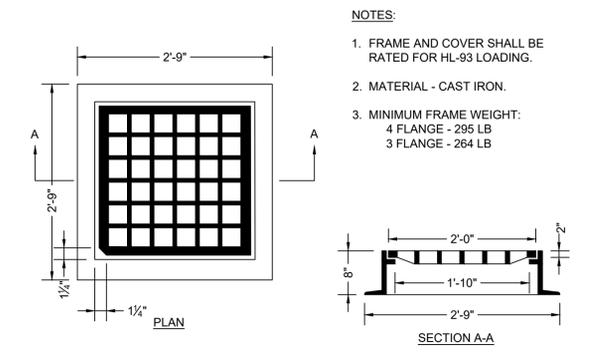
ADVANCE SIGNING SCHEMATIC

N.T.S.



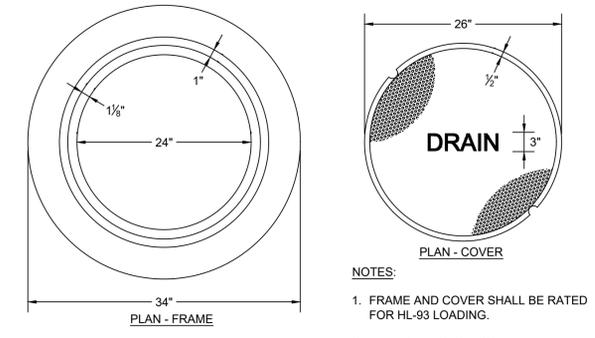
NOTE:

1. THE DISTANCE BETWEEN "A" AND "B" SIGN SHALL BE APPROXIMATELY 250' ON BAY ROAD, BRIDGE STREET, AND ESSEX STREET. 175' ON ALL OTHER (LOCAL) ROADWAYS.
2. "C" SIGNS SHALL BE PLACED APPROXIMATELY 100' BEYOND THE LIMIT OF WORK.



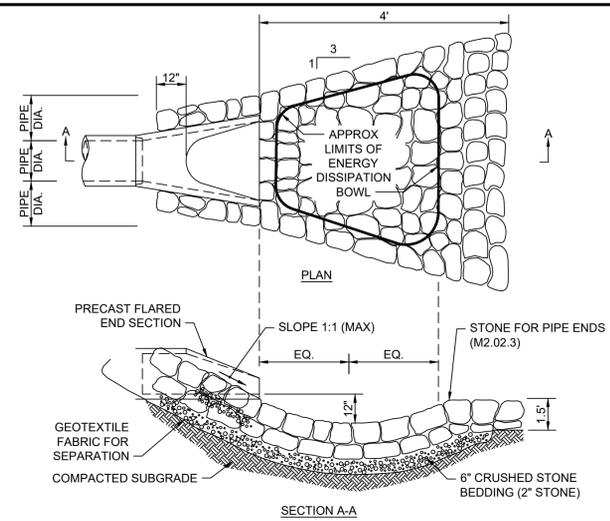
- NOTES:
1. FRAME AND COVER SHALL BE RATED FOR HL-93 LOADING.
 2. MATERIAL - CAST IRON.
 3. MINIMUM FRAME WEIGHT:
4 FLANGE - 295 LB
3 FLANGE - 264 LB

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

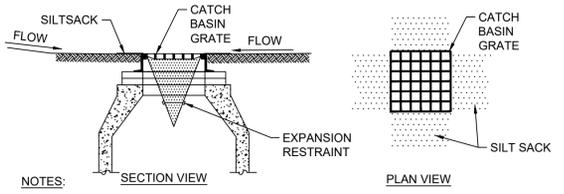


- NOTES:
1. FRAME AND COVER SHALL BE RATED FOR HL-93 LOADING.
 2. MATERIAL - CAST IRON.
 3. MINIMUM MASS - 265 LBS.
 4. ALL MH FRAMES AND COVERS SHALL BE ADA AND AAB COMPLIANT.
 5. MANHOLE COVERS SHALL HAVE A DIAMOND PATTERN, PICK HOLES, AND THE WORD "DRAIN" OR "SEWER" CAST IN 3-INCH LETTERS.

MANHOLE FRAME & COVER
N.T.S.

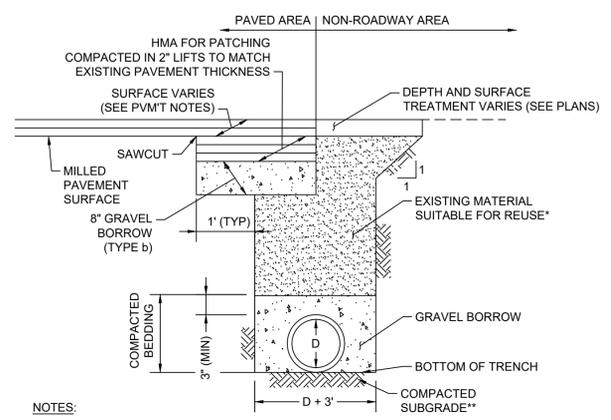


STONE AT FLARED END SECTION
N.T.S.



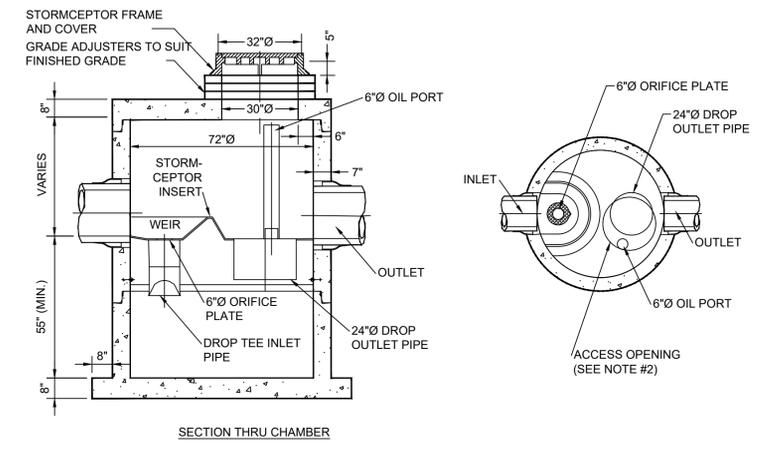
- NOTES:
1. INSTALL SILT SACK IN EXISTING CATCH BASINS BEFORE COMMENCING WORK, AND IN NEW CATCH BASINS IMMEDIATELY AFTER INSTALLATION OF STRUCTURE MAINTAIN UNTIL BINDER COURSE PAVING IS COMPLETE OR A PERMANENT STAND OF GRASS HAS BEEN ESTABLISHED.
 2. GRATE TO BE PLACED OVER SILT SACK.
 3. SILT SACK SHALL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

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



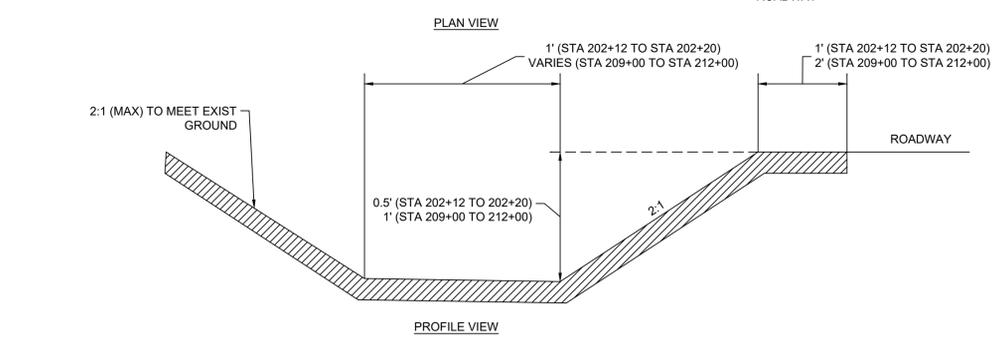
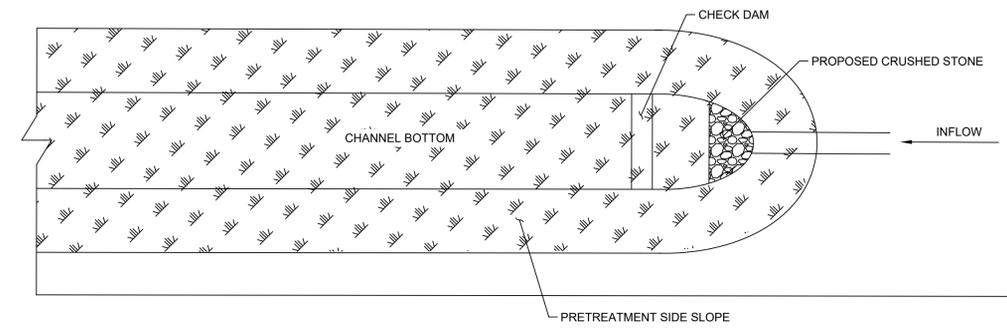
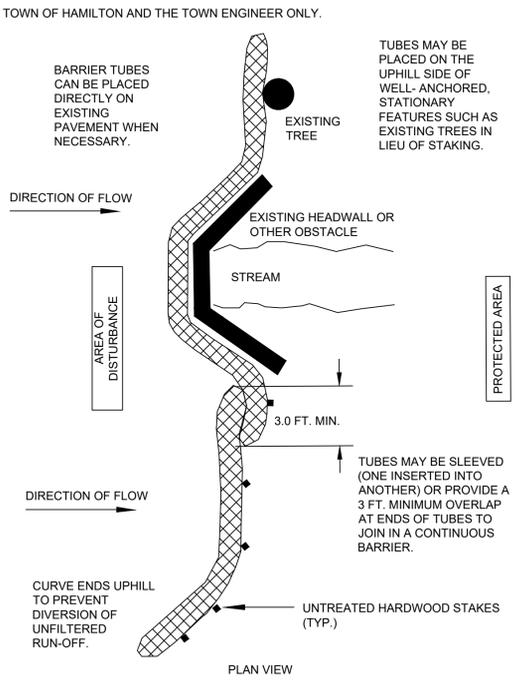
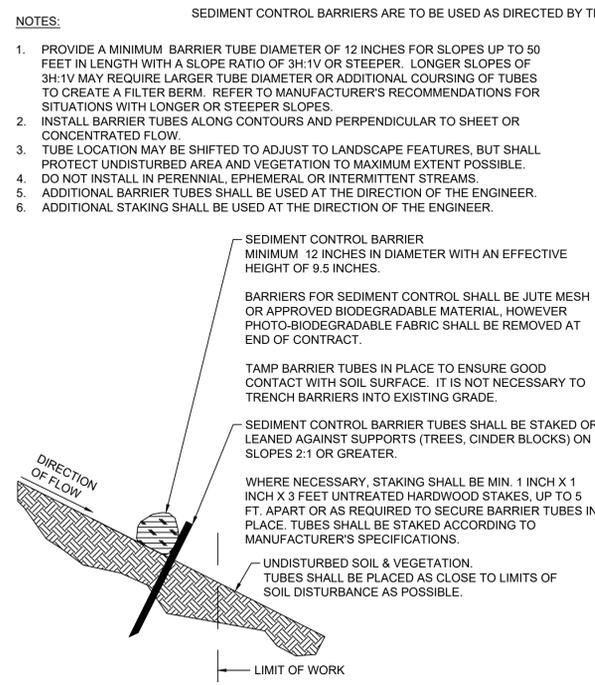
- NOTES:
- * EXISTING MATERIAL OBTAINED FROM EXCAVATION THAT IS DETERMINED TO BE SUITABLE, AND APPROVED BY THE ENGINEER SHALL BE USED. BACKFILL SHALL BE PLACED IN LAYERS NO MORE THAN 6" IN DEPTH AND THOROUGHLY COMPACTED. BACKFILLING TO A POINT 2' OVER THE PIPE SHALL CONTAIN NO STONES LARGER THAN 3".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

UTILITY TRENCH
N.T.S.

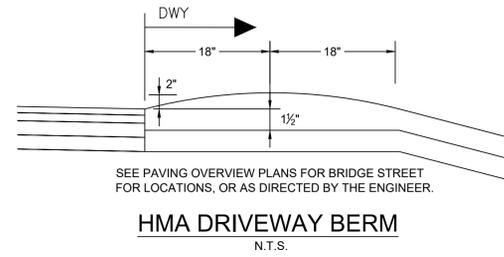


- NOTES:
1. THE USE OF FLEXIBLE CONNECTION IS RECOMMENDED AT THE INLET AND OUTLET WHERE APPLICABLE.
 2. THE COVER SHOULD BE POSITIONED OVER THE OUTLET DROP PIPE AND THE OIL PORT.
 3. THE STORMCEPTOR SYSTEM IS PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: # 4985148, #5498331, #5725760, #5753115, #5849181, #6068765, #6371690.
 4. CONTACT A CONCRETE PIPE DIVISION REPRESENTATIVE FOR FURTHER DETAILS NOT LISTED ON THIS DRAWING.
 5. A COMPARABLE PRODUCT MAY BE PROPOSED BY THE CONTRACTOR, BUT ITS USE REQUIRES APPROVAL BY THE ENGINEER OF RECORD.

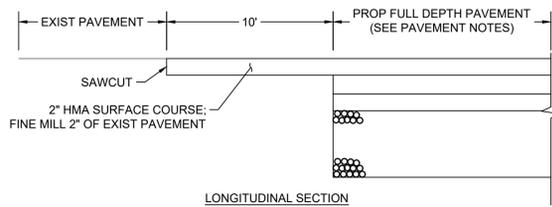
SOURCE:
WWW.STORMCEPTOR.COM



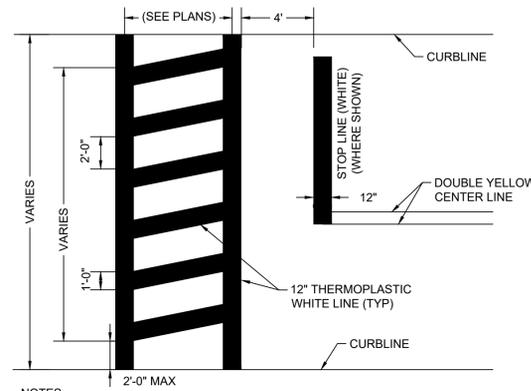
DRAINAGE SWALE
N.T.S.



HMA DRIVEWAY BERM
N.T.S.



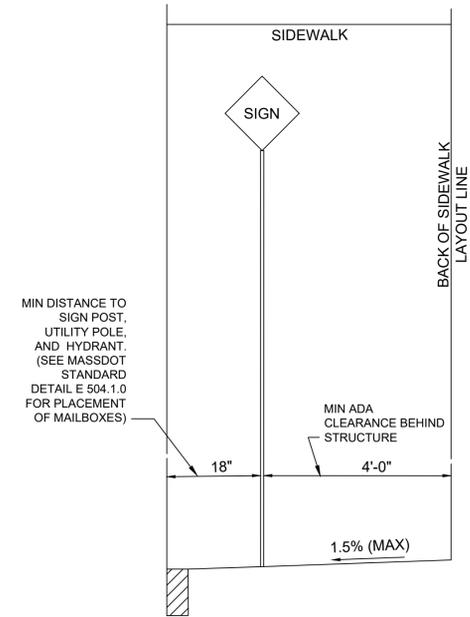
FULL DEPTH PAVEMENT TRANSITION
N.T.S.



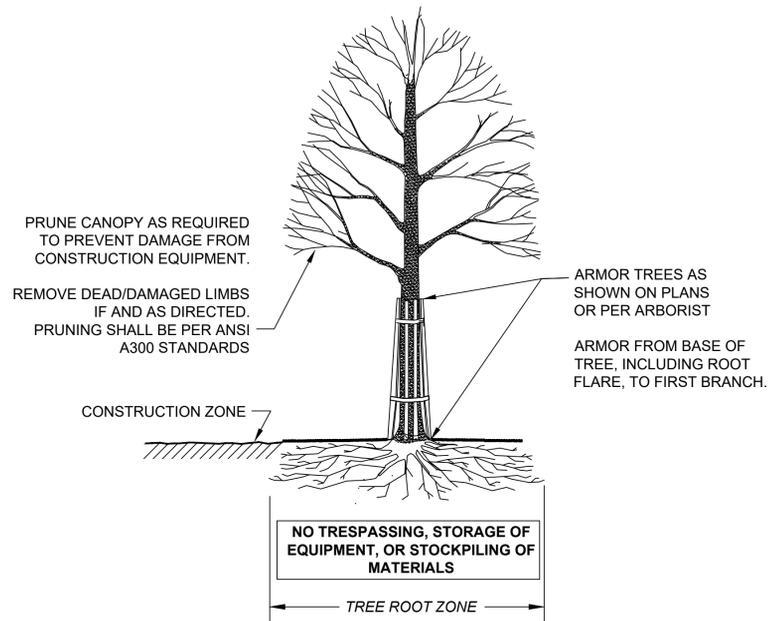
NOTES:

1. ALL 12" LINES SHALL BE APPLIED IN ONE APPLICATION, NO COMBINATION OF LINES (TWO - 6" LINES) WILL BE ACCEPTED.
2. LAYOUT OF CROSSWALKS SHALL BE APPROVED BY THE ENGINEER PRIOR TO APPLICATION.
3. CROSSWALK BARS SHALL BE PLACED OUTSIDE THE VEHICULAR WHEEL PATH WHEREVER POSSIBLE.
4. OMIT STOP BAR WHERE NOT SHOWN ON TRAFFIC SIGN & PAVEMENT MARKING PLANS.

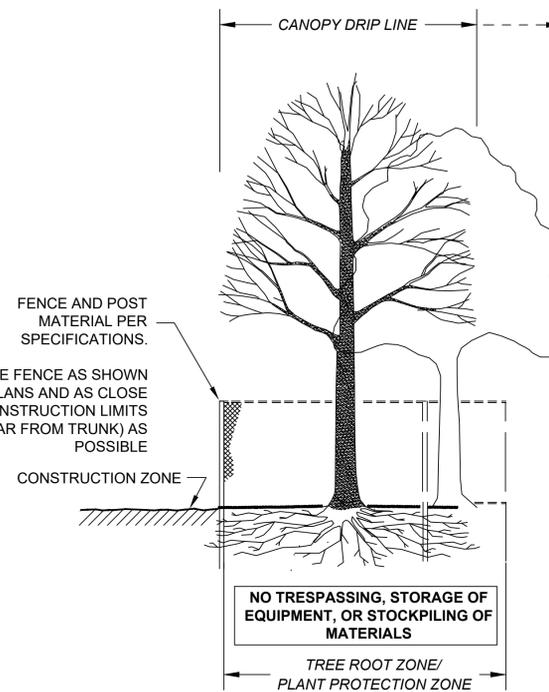
CROSSWALK PAVEMENT MARKING (LADDER)
N.T.S.



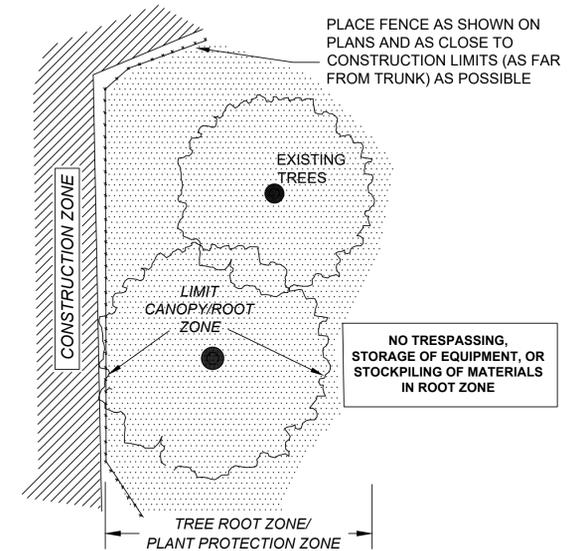
R&R VERTICAL OBSTRUCTION WITHIN SIDEWALK
N.T.S.



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