MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	1	231
PROJECT FILE NO. 608227			

TITLE & INDEX SHEET

608227HD (COV).DWG Plotted on 25-Jul-2025 8:50 AM

PLAN AND PROFILE OF

YANKEE DOODLE BIKE PATH - PHASE 1

BRIDGE NO. B-12-027(C5K)
BRIDGE NO. B-12-028(C5L)
BRIDGE NO. B-12-029(C5M)

IN THE TOWN OF

BILLERICA

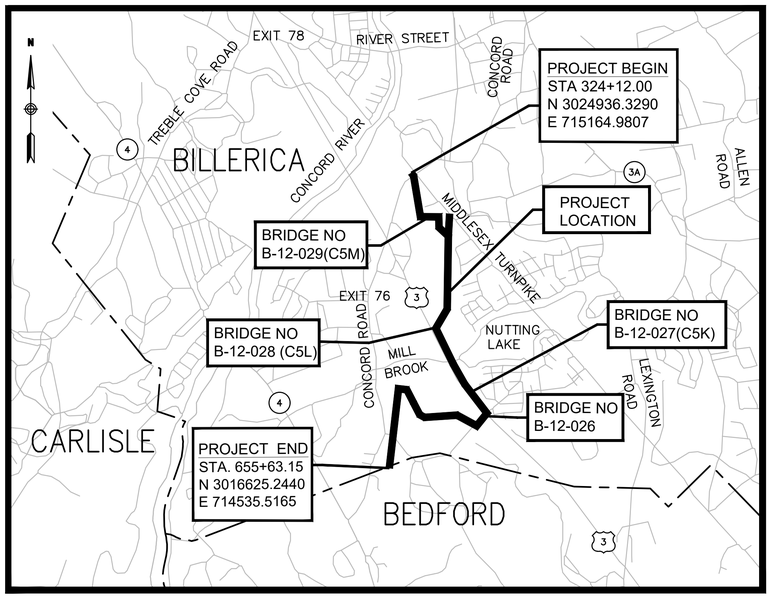
MIDDLESEX COUNTY

FEDERAL AID PROJECT NO. : CMQ-0034(028)X

THESE PLANS ARE SUPPLEMENTED BY THE LATEST EDITIONS OF THE FOLLOWING PUBLICATIONS, AS IDENTIFIED IN THE CONTRACT SPECIAL PROVISIONS: THE MASSDOT CONSTRUCTION STANDARD DETAILS, THE MASSDOT STANDARD DRAWINGS FOR SIGNS AND SUPPORTS, THE MASSDOT STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING, THE MASSDOT OVERHEAD SIGNAL STRUCTURE AND FOUNDATION STANDARD DRAWINGS, THE MASSDOT TRAFFIC MANAGEMENT PLANS AND DETAIL DRAWINGS, AND THE ANSI AMERICAN STANDARD FOR NURSERY STOCK.

INDEX

SHEET NO.	DESCRIPTION
1	TITLE & INDEX SHEET
2	LEGEND, GENERAL NOTES & ABBREVIATIONS
3 - 5	KEY PLANS & BORING LOCATIONS
6 - 7	BORING LOGS
8 - 11	TYPICAL SECTIONS
12 - 14	CONSTRUCTION BASELINE TIES
15 - 17	CONSTRUCTION BASELINE DATA
18 - 31	CONSTRUCTION PLANS
32 - 48	PROFILES
49 - 63	ALIGNMENT & GRADING PLANS
64 - 77	SIGNS & PAVEMENT MARKINGS
78 - 79	TRAFFIC SIGNAL PLANS
80 - 81	TRAFFIC SIGN SUMMARY
82 - 94	TEMPORARY TRAFFIC CONTROL PLANS
95 - 97	ROUTE 3 PAVEMENT RESTORATION PLANS
98-101	WETLAND REPLICATIONS PLANS
102 - 110	CONSTRUCTION DETAILS
111-114	PEDESTRIAN CURB RAMP & DRIVEWAY DETAILS
115-119	RETAINING WALL PLANS
120 - 161	CROSS SECTIONS
162-172	BRIDGE NO. B-12-029(C5M)
173-186	BRIDGE NO. B-12-028 (C5L)
187-231	BRIDGE NO. B-12-027(C5K)



0 2000 4000 6000 8000

SCALE: 1" = 2,000'

LENGTH OF PROJECT = 14,419.00 FEET = 2.731 MILES

DESIGN DESIGNATION (YANKEE DOODLE BIKE PATH)

DESIGN SPEED	20 MPH
FUNCTIONAL CLASSIFICATION	MULTI-USE PATH

DESIGN DESIGNATION (CONCORD ROAD)

DESIGN SPEED	25 MPH
FUNCTIONAL CLASSIFICATION	URBAN MINOR ARTERIAL

DESIGN DESIGNATION (ORCHARD ROAD)

DESIGN SPEED	25 MPH
FUNCTIONAL CLASSIFICATION	URBAN COLLECTOR

DESIGN DESIGNATION (TECHNOLOGY PARK DRIVE)

DESIGN SPEED	25 MPH
FUNCTIONAL CLASSIFICATION	LOCAL

COMMONWEALTH OF MASSACHUSETTS
JOSHUA D. TREARCHIS
CIVIL
No. 49960
REGISTERED PROFESSIONAL ENGINEER

Trearchis, Josh Date: 2025.07.25 15:10:21-04'00'

COMMONWEALTH OF MASSACHUSETTS
SHANTA B. KELLER
STRUCTURAL
No. 51381
REGISTERED PROFESSIONAL ENGINEER

Shanta B. Keller, PE 2025.07.25 15:17:45-04'00'

DATE	DESCRIPTION	REV #

PLANS PREPARED BY:

vhb
260 ARSENAL PLACE #2
WATERTOWN, MA 02471

massDOT
Massachusetts Department of Transportation
Highway Division

APPROVED

Carrie Lavallee, P.E. Carrie Lavallee, P.E. 2025.07.29 10:28:34 -04'00'

CHIEF ENGINEER **DATE**

GENERAL SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
JB	JB	JERSEY BARRIER ON BRIDGE OR JERSEY BARRIER
CB	CB	CATCH BASIN
		CATCH BASIN CURB INLET
		FLARED END SECTION (FES)
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
C	C	CABLE MANHOLE
D	DMH/LB	DRAINAGE MANHOLE OR LEACHING BASIN
E	E	ELECTRIC MANHOLE
G	G	GAS MANHOLE
GT	GT	MISC MANHOLE
S	S	SEWER MANHOLE
T	T	TELEPHONE MANHOLE
W	W	WATER MANHOLE
MHB	MHB	MASSACHUSETTS HIGHWAY BOUND
MON		MONUMENT
SB		STONE BOUND
TB		TOWN OR CITY BOUND
		TRAVERSE OR TRIANGULATION STATION
TPL or GUY	TPL or GUY	TROLLEY POLE OR GUY POLE
HTP		TRANSMISSION POLE
UFB	UFB	UTILITY POLE W/ FIREBOX
UPDL	UPDL	UTILITY POLE WITH DOUBLE LIGHT
ULT	ULT	UTILITY POLE W / 1 LIGHT
UPL	UPL	UTILITY POLE
		BUSH
SIZE & TYPE		TREE
		STUMP
		SWAMP / MARSH
WG	WG	WATER GATE
PM	PM	PARKING METER
		OVERHEAD CABLE/WIRE
		CURBING
100 99		CONTOURS
		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)
		MSE RETAINING WALL / TEMPORARY SHEETING
		BALANCE STONE WALL
		GUARD RAIL - STEEL POSTS
		GUARD RAIL - WOOD POSTS
		CHAIN LINK OR METAL FENCE
		WOOD RAILING
		SPLIT RAIL WOOD FENCE
		EROSION CONTROL BARRIER
		TREE LINE OR LIMIT OF CLEARING AND GRUBBING
		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
		FULL DEPTH PAVEMENT
		RIP RAP SLOPE PROTECTION OR MODIFIED ROCK FILL
WF#XX-XXX		WETLAND FLAG & LIMITS
		TREE LINE

TRAFFIC SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
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
		PEDESTRIAN PUSH BUTTON
		RECTANGULAR RAPID FLASHING BEACON (RRFB)

PAVEMENT MARKINGS SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
		PAVEMENT ARROW - WHITE
ONLY	ONLY	LEGEND "ONLY" - WHITE
	SL	STOP LINE (12" LINE WIDTH)
	CW	CROSSWALK (WIDTHS AS NOTED)
	SWL	SOLID WHITE LINE (4" LINE WIDTH UNLESS OTHERWISE NOTED)
	SYL	SOLID YELLOW LINE (4" LINE WIDTH)
	BWL	BROKEN WHITE LINE (4" LINE WIDTH)
	BYL	BROKEN YELLOW LINE 3' LINE, W/ 9' GAP (4" LINE WIDTH)
	DBYL	DOUBLE YELLOW LINE (4" LINE WIDTH)
		BICYCLE CROSSING

ABBREVIATIONS

GENERAL

ABAN	ABANDON
ADJ	ADJUST
APPROX.	APPROXIMATE
BIT.	BITUMINOUS
BD.	BOUND
BL	BASELINE
BLDG	BUILDING
BM	BENCHMARK
BO	BY OTHERS
BOS	BOTTOM OF SLOPE
BR.	BRIDGE
CEM	CEMENT
CLF	CHAIN LINK FENCE
CL	CENTERLINE
CONC	CONCRETE
CONT	CONTINUOUS
CONST	CONSTRUCTION
DIA	DIAMETER
DW	DRIVEWAY
ELEV (or EL.)	ELEVATION
EOP	EDGE OF PAVEMENT
EXIST	EXISTING
FDN.	FOUNDATION
GP	GATE POST
GRAN	GRANITE
GRAV	GRAVEL
GRD	GUARD
HMA	HOT MIX ASPHALT
L&S	LOAM AND SEED
LT, L	LEFT
MAX	MAXIMUM
MB	MAILBOX
MIN	MINIMUM
NTS	NOT TO SCALE
PROP	PROPOSED

ABBREVIATIONS (CONTINUED)

GENERAL

OD	OUTSIDE DIAMETER
PVM'T	PAVEMENT
REM	REMOVE
REMOD	REMODEL
RET	RETAIN
R&D	REMOVE AND DISCARD
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
RT, R	RIGHT
SGE	SLOPED GRANITE EDGING
STA	STATION
SUP	SHARED USE PATH
TEMP	TEMPORARY
TOS	TOP OF SLOPE
TYP	TYPICAL
PCR	PEDESTRIAN CURB RAMP

UTILITIES

CIP	CAST IRON PIPE
CIT	CHANGE IN TYPE
COND	CONDUIT
DB	DIRECT BURIAL
FES	FLARED END SECTION
F&C	FRAME & COVER
F&G	FRAME & GRATE
HDPE	HIGH DENSITY POLYETHYLENE PIPE
HW	HEADWALL
HYD	HYDRANT
INV	INVERT
LB	LEACHING BASIN
PVC	POLYVINYL CHLORIDE PIPE
PWW	PAVED WATER WAY
RCP	REINFORCED CONCRETE PIPE
TSV&B	TAPPING SLEEVE, VALVE, & BODY
UP	UTILITY POLE

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	2	231
PROJECT FILE NO. 608227			

LEGEND, GENERAL NOTES, & ABBREVIATIONS

GENERAL NOTES:

1. TOPOGRAPHICAL INFORMATION WAS OBTAINED VIA PHOTOGRAMMETRIC METHODS BY EASTERN TOPOGRAPHICS FROM PHOTOGRAPHS TAKEN IN APRIL OF 2014 AND BY COL-EAST, INC. FROM PHOTOGRAPHS TAKEN IN JANUARY 2016 AND SUPPLEMENTED WITH GROUND SURVEY BY HANCOCK ASSOCIATES. (HORIZONTAL DATUM: NAD83, VERTICAL DATUM: NAVD88). ADDITIONAL GROUND SURVEY WAS OBTAINED BY HANCOCK ASSOCIATES IN SUMMER 2017, WINTER 2017, APRIL 2023 AND JUNE 2023.
2. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT 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 EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES. CONTRACTOR SHALL NOTIFY "DIG-SAFE" (1-888-344-7233) AT LEAST 72 BUSINESS HOURS BEFORE EXCAVATING.
3. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED TO THE ENGINEER FOR RESOLUTION OF THE CONFLICT.
4. THE CONTRACTOR SHALL ALTER THE MASONRY OF THE TOP SECTION OF ALL EXISTING DRAINAGE STRUCTURES AS NECESSARY FOR CHANGES IN GRADE, AND RESET ALL WATER AND DRAINAGE FRAMES, GRATES AND BOXES TO THE PROPOSED FINISH SURFACE GRADE. REQUIRED NEW MASONRY SHALL BE CLAY BRICK CONFORMING TO M4.05.2.
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.
6. EXISTING UTILITY POLES WILL BE RELOCATED BY OTHERS.
7. TREES AND SHRUBS WITHIN THE LIMITS OF GRADING SHALL BE REMOVED ONLY UPON APPROVAL OF THE ENGINEER.
8. AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT NO EXPENSE TO THE OWNER. NO TREE/VEGETATION CLEARING SHALL OCCUR FOR THE PURPOSES OF CREATING TEMPORARY STAGING/STOCKPILING AREAS FOR THE PROJECT.
9. TEMPORARY STAGING OF CONSTRUCTION EQUIPMENT AND MATERIALS FOR THE PROJECT ARE PROHIBITED WITHIN 50 FEET OF WETLAND RESOURCE AREAS. EROSION & SEDIMENT CONTROLS SHALL BE PROVIDED AROUND TEMPORARY STAGING/MATERIAL LAYDOWN AREAS THAT ARE WITHIN 100 FEET OF A WETLAND RESOURCE AREA.
10. 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).
11. JOINTS BETWEEN NEW BITUMINOUS CONCRETE ROADWAY PAVEMENT AND SAWCUT EXISTING PAVEMENT SHALL BE SEALED WITH HMA JOINT SEALER, IN ACCORDANCE WITH SUPERPAVE SPECIFICATIONS.
12. ALL EXISTING SIGNS WITHIN THE PROJECT LIMITS SHALL BE RETAINED UNLESS INDICATED OTHERWISE ON THE DRAWINGS
13. ALL EXISTING UTILITY STRUCTURES WITHIN THE PROJECT LIMITS SHALL BE RETAINED UNLESS INDICATED OTHERWISE ON THE DRAWINGS
14. ALL LATERAL DRAIN PIPES SHALL BE INSTALLED WITH A PITCH OF 0.01 FOOT PER FOOT (MINIMUM) UNLESS NOTED OTHERWISE ON THE DRAWINGS.
15. ALL CATCH BASIN STRUCTURES SHALL BE DEEP SUMP CATCH BASINS AS SHOWN IN THE MASSDOT CONSTRUCTION STANDARD DETAILS, DETAIL E201.1.0, UNLESS NOTED OTHERWISE ON THE PLANS.
16. DRAIN INLET PROTECTION SHALL BE INSTALLED AT ALL EXISTING DRAIN INLETS DOWNSTREAM OF SOIL DISTURBANCE AREAS.
17. EXISTING SUITABLE GRANITE CURB & EDGING SHALL BE RE-USED IN THE PROPOSED WORK, EXCEPT CURVED PIECES OF A DIFFERENT RADIUS THAN PROPOSED CURB.
18. ALL EXISTING STATE, COUNTY, CITY, AND TOWN LOCATION LINES AND PRIVATE PROPERTY LINES HAVE BEEN ESTABLISHED FROM AVAILABLE INFORMATION AND THEIR EXACT LOCATION ARE NOT GUARANTEED.
19. DRAINAGE ELEVATIONS ARE PROVIDED FOR DESIGN PURPOSES ONLY. THE CONTRACTOR SHALL VERIFY BY TEST PIT, THE LOCATIONS OF EXISTING UTILITIES WHICH MAY CONFLICT WITH THE PROPOSED DRAINAGE DESIGN. ANY FIELD ADJUSTMENTS REQUIRED WILL BE MADE AS APPROVED OR DIRECTED BY THE ENGINEER. ONLY AFTER THE CONTRACTOR VERIFIES ELEVATIONS FOR THE CONTRACTIBILITY OF THE DRAINAGE SYSTEM SHALL ANY STRUCTURES BE ORDERED. ANY FIELD ADJUSTMENTS TO LINE & GRADE UP TO A DEPTH OF 5' SHALL BE INCLUDED IN THE COST OF THE PIPE. PIPE EXCAVATION GREATER THAN 5' WILL BE PAID UNDER CLASS B TRENCH EXCAVATION.
20. ALL EXISTING STONE OR WOOD MILE MARKERS SHALL BE REMOVED AND RESET AS DIRECTED BY THE ENGINEER. EXISTING BATTERY BOXES AND OTHER METAL AND CONCRETE RAILROAD ARTIFACTS THAT ARE IN POOR CONDITION ARE PROPOSED TO BE REMOVED. RAILROAD ARTIFACTS NOT SHOWN ON PLANS TO BE REMOVED SHALL BE MADE AWARE TO ENGINEER BEFORE REMOVAL.
21. ALL EXISTING RAILROAD BOUNDS, WITHIN THE LIMITS OF WORK, SHALL BE ADJUSTED TO FINISH GRADE. EXISTING BOUNDS WITHIN THE SHARED USE PATH PAVEMENT SHALL BE SET FLUSH WITH THE FINISH PAVEMENT SURFACE. ALL EXISTING DAMAGED BOUNDS SHALL BE REPLACED WITH NEW BOUNDS AND SET TO FINISH GRADE.
22. LOAM FOR LAWNS SHALL BE USED BETWEEN STATIONS 101+16 TO 112+ 33 (ALONG RIVER STREET), 700+19 TO 700+62 (ALONG ORCHARD ROAD), AND 600+00 TO 633+25 (ALONG TECHNOLOGY PARK DRIVE). ALL OTHER AREAS SHALL BE LOAM FOR ROADSIDES.

ABBREVIATIONS (CONTINUED)

ALIGNMENT/GRADING

BC	BOTTOM OF CURB
CC	CENTER OF CURVE
HP	HIGH POINT
LP	LOW POINT
PC	POINT OF CURVE
PI	POINT OF INTERSECTION
PNT	POINT
PCC	POINT OF COMPOUND CURVE
PRC	POINT OF REVERSE CURVE
PT	POINT OF TANGENT
TEMP	TEMPORARY
25.45	SPOT ELEVATION

PROFILES

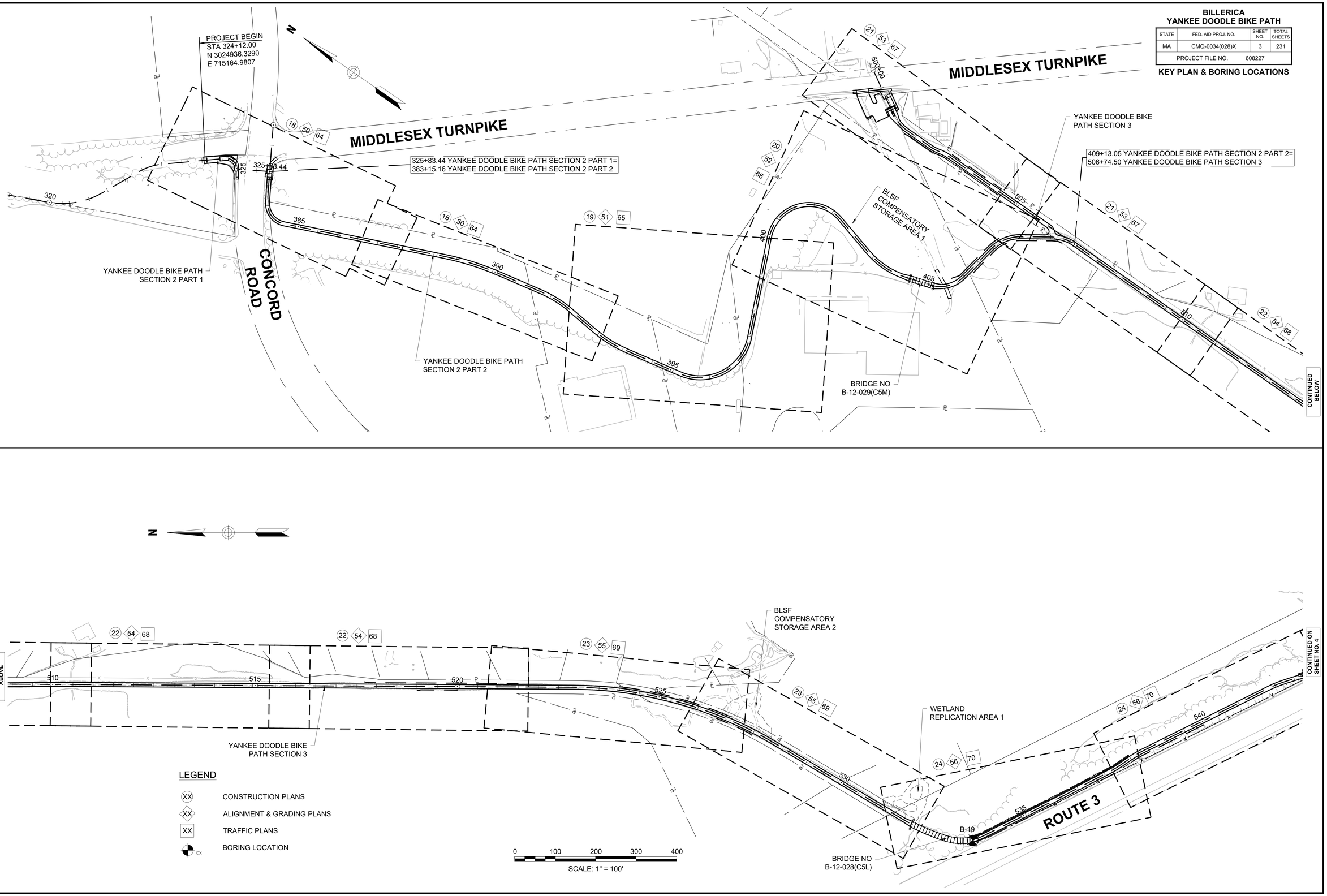
AD	ALGEBRAIC DIFFERENCE IN RATES OF GRADE
ELEV (or EL)	ELEVATION
HSD	HORIZONTAL SIGHT DISTANCE
K	RATE OF VERTICAL CURVATURE
PVI	POINT OF VERTICAL INTERSECTION
PVC	POINT OF VERTICAL CURVE
PVT	POINT OF VERTICAL TANGENT
PVRC	POINT OF VERTICAL REVERSE CURVE
PVCC	POINT OF VERTICAL COMPOUND CURVE
SSD	STOPPING SIGHT DISTANCE
VC	VERTICAL CURVE

608227HD (LEG).DWG 23-Jul-2025

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	3	231
PROJECT FILE NO.	608227		

KEY PLAN & BORING LOCATIONS



608227HD (KEYPLAN).DWG Plotted on 23-Jul-2025 12:43 PM

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	4	231
PROJECT FILE NO.	608227		

KEY PLAN & BORING LOCATIONS

608227HD (KEYPLAN).DWG Plotted on 23-Jul-2025 12:43 PM

N

CONTINUED ON SHEET NO. 3

ROUTE 3

B-9 B-10 HP-B-S-3 B-S-2 B-S-1

YANKEE DOODLE BIKE PATH SECTION 3

562+42.05 YANKEE DOODLE BIKE PATH SECTION 3=
600+06.55 YANKEE DOODLE BIKE PATH SECTION 4

562+63.62

BRIDGE NO B-12-027(C5K)

BLSF COMPENSATORY STORAGE AREA 3

YANKEE DOODLE BIKE PATH SECTION 4

ORCHARD ROAD CONST ℄

BRIDGE NO. B-12-026

ORCHARD ROAD

TECHNOLOGY PARK DRIVE

MIDDLESEX COMMUNITY COLLEGE

WALL STREET

TECHNOLOGY PARK DRIVE

YANKEE DOODLE BIKE PATH SECTION 4

TECHNOLOGY PARK DRIVE CONST ℄

CONTINUED ON SHEET NO. 5

0 100 200 300 400

SCALE: 1" = 100'

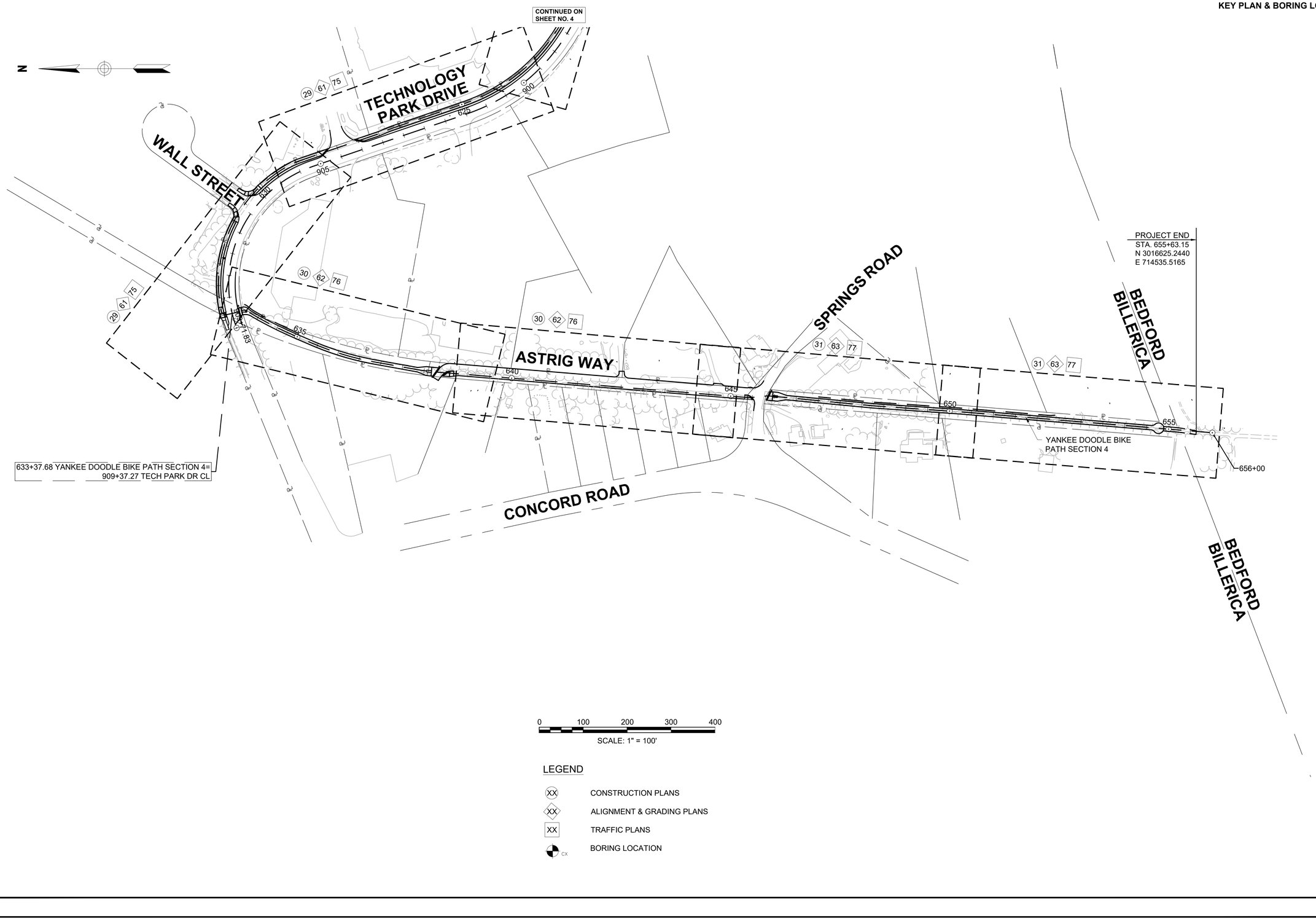
LEGEND

- XX — CONSTRUCTION PLANS
- XX — ALIGNMENT & GRADING PLANS
- XX — TRAFFIC PLANS
- CX — BORING LOCATION

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	5	231
PROJECT FILE NO.	608227		

KEY PLAN & BORING LOCATIONS



0 100 200 300 400

SCALE: 1" = 100'

LEGEND

- XX — CONSTRUCTION PLANS
- XX — ALIGNMENT & GRADING PLANS
- XX — TRAFFIC PLANS
- CX — BORING LOCATION

608227HD (KEYPLAN).DWG Plotted on 23-Jul-2025 12:44 PM

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	6	231
PROJECT FILE NO. 608227			

BORING LOGS

608227HD (BORING LOGS).DWG 1-Aug-2025

BORING B–9

STATION: 542+85
OFFSET: 3.5' LT
GROUND ELEVATION: 196'
N3019626.9320
E716232.1320

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG **Boring B-9**

Project: **Proposed Yankee Doodle Bike Path, Billerica, Massachusetts**
Client: **Vanasse Hangen Brustlin, Inc.** LGCI Project No.: 1723

Drilling Subcontractor:	Soil Exploration Corp.	Date Started:	11/20/2017
Drilling Foreman:	Don Leger	Date Completed:	11/20/2017
LGCI Engineer:	Tom Sinnott	Location:	N3019626.9320, E716232.1320
Ground Surface El:	~196 ft. (see remark 1)	Total Depth:	36 feet
Groundwater Depth:	~8.4 ft. at end of drilling	Drill Rig Type:	Geoprobe 6610DT
		Drilling Method:	Drive and wash with 3 inch casing
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	NA
Drop:	30 inches		

Depth Scale	Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-2	S1	2	4	2	1	24	8		Topsoil ~2 ft.	S1 - Silty SAND (SM), fine, ~15% fines, trace fine gravel, trace organic fines, trace roots, trace paper and plastic, dark brown, moist
	2-4	S2	1	2	2	2	24	8		Fill ~16 ft.	S2 - Silty SAND (SM), fine, 20-25% fines, ~5% fine gravel, trace organic fines, trace roots, brown, wet
5ft											
	5-7	S3	9	7	13	5	24	11			S3 - Silty SAND with Gravel (SM), fine, trace medium, 15-20% fines, ~20% fine gravel, gray, wet
	7-9	S4	6	5	13	6	24	11			S4 - Top 5": Similar to S3, ~15% fines, trace roots Bot. 6": Silty SAND with Gravel (SM), fine to medium, 20-25% fines, ~40% fine to coarse gravel, gray, wet
10ft											
	10-12	S5	9	12	5	4	24	7	2		S5 - Silty SAND with Gravel (SM), fine, trace medium, 20-25% fines, 25-30% fine gravel and concrete, gray, wet
15ft											
	15-17	S6	WOH	WOH	WOH	2	24	11		Swamp Deposits ~20 ft.	S6 - SILT (ML), slightly plastic, trace organic fines, peat fibers, thin non-fibrous peat layer, black, wet (Swamp deposits)
20ft											
	20-22	S7	1	6	7	6	24	20		Silt	S7 - Top 9": SILT (ML), moderately plastic, gray, wet
										Sand	Bot 11": Silty SAND (SM), 25-30% fines, ~5% fine gravel, gray, wet
	25-27	S8	WOH	WOH	1	3	24	15			S8 - Silty SAND with Gravel (SM), fine to medium, ~25% fines, 10-15% fine gravel, gray, wet
30 ft											
	30-32	S9	23	22	20	20	24	18	3	Sand ~36 ft.	S9 - Silty SAND (SM), fine, trace coarse, 30-35% fines, 5-10% fine gravel, gray, wet
									4		
35 ft	34-36	S10	34	24	19	17	24	18			S10 - Silty SAND (SM), fine, trace medium, 25-30% fines, ~5% fine gravel, gray, wet
40 ft											Bottom of boring at 36 feet. Backfilled borehole with soil from the surrounding area.
45 ft											
50 ft											

Remarks:
1. The ground surface elevation was interpolated to the nearest 1/2 foot using a survey plan titled: "Yankee Doodle Pike Bath, Billerica, MA, Boring Locations, page 5 of 6," provided to LGCI by VHB via email on February 9, 2018.
2. Drillers introduced water at 10 feet.
2. Drill chattere3. at 33 feet.
3. Casing refus4. at 34 feet.

EL. 190
EL. 187.6
EL. 180
EL. 170
EL. 160
EL. 150

BOTTOM PILE CAP
EL. 189.00

EST. HELICAL
PILE TIP EL. VARIES
EL. 166.0–170.0

BORING B–10

STATION: 543+20
OFFSET: 4.0' LT
GROUND ELEVATION: 197'
N3019594.3314
E716245.9828

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG **Boring B-10**

Project: **Proposed Yankee Doodle Bike Path, Billerica, Massachusetts**
Client: **Vanasse Hangen Brustlin, Inc.** LGCI Project No.: 1723

Drilling Subcontractor:	Soil Exploration Corp.	Date Started:	11/20/2017
Drilling Foreman:	Don Leger	Date Completed:	11/20/2017
LGCI Engineer:	Tom Sinnott	Location:	N3019594.3314, E716245.9828
Ground Surface El:	~197 ft. (see remark 1)	Total Depth:	31 feet
Groundwater Depth:	~10.3 ft. at end of drilling	Drill Rig Type:	Geoprobe 6610DT
		Drilling Method:	Drive and wash with 3 inch casing
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	NA
Drop:	30 inches		

Depth Scale	Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-2	S1	2	3	3	3	24	13		Topsoil ~2 ft.	S1 - Top 3": Forest Material Bot 10": Silty SAND (SM), fine, trace medium, ~20% fines, ~5% fine gravel, trace organic fines, trace roots, brown, moist
	2-4	S2	7	15	12	9	24	14		Fill ~10 ft.	S2 - Silty SAND (SM), fine, trace coarse, ~15% fines, ~5% fine gravel, trace organic fines, brown, moist
5ft											
	5-7	S3	3	10	10	11	24	19			S3 - Top 8": Silty SAND (SM), fine, trace medium, 15-20% fines, trace fine gravel, trace organic fines, brown, wet Bot 11": Silty SAND (SM), fine, trace medium, 15-20% fines, trace fine gravel, brown, wet
	7-9	S4	9	11	11	11	24	24			S4 - Similar to Bot 11" of S3
10ft											
	10-12	S5	4	2	2	2	24	15	2	Swamp Deposits ~15 ft.	S5 - Silty SAND (SM), fine, 30-35% fines, trace roots, fibrous peat, gray, wet
15ft											
	15-17	S6	1	1	WOH	WOH	24	18		Sand ~20 ft.	S6 - Well Graded SAND with Silt (SW-SM), fine to medium, 10-15% fines, gray, wet
20ft											
	20-22	S7	2	1	2	4	24	16		Silt ~25 ft.	S7 - SILT (ML), moderately plastic, 10-15% fine sand, gray, wet
									3		
	25-27	S8	1	2	11	5	24	13		Sand ~31 ft.	S8 - Silty SAND (SM), fine to medium, ~30% fines, trace fine gravel, gray, wet
30 ft											
	30-31	S9	29	75/6			12	10	4		S9 - Silty SAND (SM), fine, ~25% fines, trace fine gravel, gray, wet
35 ft											Bottom of boring at 31 feet. Backfilled borehole with soil from the surrounding area.
40 ft											
45 ft											
50 ft											

Remarks:
1. The ground surface elevation was interpolated to the nearest 1/2 foot using a survey plan titled: "Yankee Doodle Pike Bath, Billerica, MA, Boring Locations, page 5 of 6," provided to LGCI by VHB via email on February 9, 2018.
2. Drillers introduced water at 10 feet.
3. Drill chattered at 21 feet.
4. Refusal at 31 feet.

EL. 186.7

BORING B–19

STATION: 533+64
OFFSET: 0.5' RT
GROUND ELEVATION: 190'
N: 3020468.4099
E: 715825.3449

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG **Boring B-19** **Page 1 of 1**

Project: **Proposed Yankee Doodle Bike Path, Billerica, MA (Structure 4) - Bridge No. B-12-028 (CSL)**
Client: **Vanasse Hangen Brustlin, Inc.** LGCI Project No.: 1723

Drilling Subcontractor:	Soil Exploration Corp.	Date Started:	11/20/2017
Drilling Foreman:	Pat Goodale	Date Completed:	11/20/2017
LGCI Engineer:	Andrew Jefferson	Location:	N3020468.4099, E715825.3449
Ground Surface El:	~190 ft. (see remark 1)	Total Depth:	23 feet
Groundwater Depth:	~1 ft. at end of drilling	Drill Rig Type:	CME 60 Rubber Tire Rig
		Drilling Method:	HSA (4-1/4" ID)
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	NA
Drop:	30 inches	Coordinates: E: 715825.3449, N: 3020468.4099	

Depth Scale	Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-2	S1	1	1	1	1	24	3		Forest	S1 - Forest Material
	2-4	S2	WOH	WOH	WOH	WOH	24	12		Peat ~5.5 ft.	S2 - PEAT, fibrous, trace roots
5ft											
	5-7	S3	WOH	4	5	5	24	12	2		S3 - Well Graded SAND with Silt (SW-SM), fine to medium, trace coarse, 10-15% fines, gray, wet
	7-9										
10ft											
	10-12	S4	8	14	12	12	24	12		Sand with Silt and Gravel	S4 - Silty SAND (SM), fine to medium, trace coarse, ~15% fines, trace fine gravel, gray, wet
15ft											
	15-16.7	S5	15	38	47	50/2	20	20		~16.7 ft.	S5 - Silty GRAVEL with Sand (GM), fine to coarse, ~15% fines, 20-25% fine sand, fine to coarse angular stone fragments, gray, wet
20ft	18-23	C1					60	60		Bedrock ~23 ft.	C1 - min/ft.: 5, 5, 4, 5, 5 Hard, slightly weathered, slightly to moderately fractured, fine grained, gray, GRANITE REC=100%, RQD=83%
											Bottom of boring at 23 feet. Backfilled borehole with drill cuttings.

Remarks:
1. The ground surface elevation was interpolated to the nearest 1/2 foot using a survey plan titled: "Yankee Doodle Pike Bath, Billerica, MA, Boring Locations, page 4 of 6," provided to LGCI by VHB via email on February 9, 2018.
2. Noted on sample jar that the strata change occurred at 5.5 feet.

EL. 189.0

NOTES:

1. LOCATION OF BORINGS FOR PROPOSED BRIDGE SHOWN ON THE KEY PLAN THUS: ◔ B–X
2. BORINGS ARE TAKEN FOR PURPOSE OF DESIGN AND SHOW CONDITIONS AT BORING POINTS ONLY, BUT DO NOT NECESSARILY SHOW THE NATURE OF THE MATERIALS TO BE ENCOUNTERED DURING CONSTRUCTION.
3. WATER LEVELS SHOWN ON THE BORING LOGS AND INDICATED THUS: ⏚ WERE OBSERVED AT THE TIME OF TAKING BORINGS AND DO NOT NECESSARILY SHOW THE TRUE GROUND WATER LEVEL.
4. FIGURES IN COLUMNS INDICATE NUMBER OF BLOWS REQUIRED TO DRIVE A 1⅜" I.D. SPLIT SPOON SAMPLER 6" USING A 140 POUND WEIGHT FALLING 30", UNLESS OTHERWISE NOTED.
5. BORING B–9, B–10, NAD B–19 WERE MADE IN NOVEMBER 2017.
6. BORINGS WERE MADE BY SOIL EXPLORATION CORP, 148 PIONEER DRIVE, LEOMINSTER MA.
7. THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988 IS USED THROUGHOUT.
8. BORING SAMPLES ARE STORED AT A STORAGE FACILITY LOCATED ON ROUTE 129. THE CONTRACTOR MAY EXAMINE THE SOIL AND ROCK SAMPLES BY CONTACTING LAHLAF GEOTECHNICAL CONSULTING, INC. AT 100 CHELMSFORD ROAD, SUITE 2, BILLERICA, MA.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	7	231
PROJECT FILE NO. 608227			

BORING LOGS

31-Jul-2025

608227HD (BORING LOGS).DWG

BORING B–S–1

STATION: 545+70
OFFSET: 23.5' LT
GROUND ELEVATION: 191.5'
N3019364.8696
E716346.7439

LGCI Lahlaf Geotechnical Consulting, Inc. — 100 Chelmsford Road, Suite 2, Billerica, MA 01862, Telephone: (978) 330-5912, Fax: (978) 330-5056

BORING LOG **B-S-1**

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Prop. Yankee Doodle Bike Path (Structure 6)
LGCI PROJECT NUMBER: 1723
PROJECT LOCATION: Billerica, MA - Bridge No. B-12-027 (C5K)

DATE STARTED: 8/30/21 **DATE COMPLETED:** 8/30/21
BORING LOCATION: South of the bottom of rip rap near Structure 5
COORDINATES: N3019364.8696, E716346.7439
SURFACE EI.: 191.5 ft. (see note 1) **TOTAL DEPTH:** 20 ft.
WEATHER: 70's Cloudy
GROUNDWATER LEVELS:
▽ **DURING DRILLING:** 6.0 ft. / El. 185.5 ft. Based on sample moisture
▼ **AT END OF DRILLING:** 1.5 ft. / El. 190.0 ft.
▽ **OTHER:** -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Justin Raymond
DRILLING METHOD: Drive and wash with 4" and 3" casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: HO **CHECKED BY:** NP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remarks	Strata	Depth (ft.)	Material Description
0	191.5						Forest Mat	0.5 / 191.5	S1 - No recovery, drove 3" spoon: Forest Mat
2	189.5		S1	1-1-1-1 (2)	24/0			2.0 / 189.5	
4			S2	1-1-1-1 (2)	24/10		Peat		S2 - PEAT (PT), fibrous, plastic, black, moist
5	185.0		S3	1-1-1-1 (2)	24/11				S3 - PEAT (PT), fibrous, slightly plastic, black, moist
6			S4	7-8-13-23 (21)	24/16				S4 - PEAT (PT), fibrous, plastic, black, moist
8			S5	28-29-20-14 (49)	24/6			8.0 / 183.5	S5 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, 10-15% fines, 20-25% fine to coarse subrounded gravel, dark gray, wet
10	180.0		S6	16-18-15-12 (33)	24/10				S6 - Silty SAND with Gravel (SM), fine to medium, 15-20% fines, 15-20% fine to coarse subangular gravel, gray, wet
12									
14			S7	24-17-18-15 (35)	24/9		Sand and Gravel		S7 - Silty SAND (SM), fine to medium, 20-25% fines, 5-10% fine to coarse subrounded gravel, gray, wet
15	175.0								
16			S8	13-27-28-33 (55)	24/9				S8 - Silty SAND with Gravel (SM), fine to medium, ~20% fines, 20-25% fine to coarse subrounded gravel, gray, wet
18									
20	170.0							20.0 / 171.5	Bottom of borehole at 20.0 feet. Backfilled borehole with drill cuttings.
25									

GENERAL NOTES:
1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Boring Locations Yankee Doodle Bike Path, Billerica, MA," prepared by Vanasse Hangen Brustlin, Inc. (VHB), and provided to LGCI by VHB via e-mail on June 2, 2021.

EL. 190.0
EL. 190
EL. 180
EL. 170

BORING B–S–2

STATION: 545+10
OFFSET: 21.0' LT
GROUND ELEVATION: 191.5'
N3019419.4666
E716321.2647

LGCI Lahlaf Geotechnical Consulting, Inc. — 100 Chelmsford Road, Suite 2, Billerica, MA 01862, Telephone: (978) 330-5912, Fax: (978) 330-5056

BORING LOG **B-S-2**

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Prop. Yankee Doodle Bike Path (Structure 6)
LGCI PROJECT NUMBER: 1723
PROJECT LOCATION: Billerica, MA - Bridge No. B-12-027 (C5K)

DATE STARTED: 8/30/21 **DATE COMPLETED:** 8/30/21
BORING LOCATION: Middle of bottom of rip rap slope near Structure 5
COORDINATES: N3019419.4466, E716321.2647
SURFACE EI.: 191.5 ft. (see note 1) **TOTAL DEPTH:** 20 ft.
WEATHER: 70's cloudy
GROUNDWATER LEVELS:
▽ **DURING DRILLING:** 3.0 ft. / El. 188.5 ft. Based on sample moisture
▼ **AT END OF DRILLING:** 2.5 ft. / El. 189.0 ft.
▽ **OTHER:** -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Justin Raymond
DRILLING METHOD: Drive and wash with 4" and 3" casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: HO **CHECKED BY:** NP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remarks	Strata	Depth (ft.)	Material Description
0	191.5						Forest Mat	0.5 / 191.5	S1 - Silty SAND (SM), fine, 30-35% fines, organic soil, trace of roots, trace of leaves, black, moist
2	189.5		S1	0-1-1-1 (2)	24/8			2.0 / 189.5	
4			S2	0-1-1-1 (2)	24/11		Peat		S2 - PEAT (PT), fibrous, plastic, black, wet
5	185.0		S3	1-1-1-1 (2)	24/10				S3 - Similar to S2
6			S4	1-1-1-3 (2)	24/16				S4 - Similar to S2
8			S5	12-11-11-14 (22)	24/7			8.0 / 183.5	S5 - Silty SAND with Gravel (SM), fine to coarse, 25-30% fines, 15-20% fine to coarse subangular gravel, gray, wet
10	180.0		S6	14-14-19-21 (33)	24/12				S6 - Silty SAND with Gravel (SM), fine to coarse, ~15% fines, 15-20% fine to coarse subangular gravel, gray, wet
12									
14	14.3		S7	100/3"	3/0	1	Sand and Gravel		S7 - No recovery REMARK 1: Casing bent at depth of 14.3'. Pulled casing and started over in the same borehole.
15	175.0								
16			S8	10-16-17-11 (33)	24/6				S8 - Silty SAND with Gravel (SM), fine to coarse, ~15% fines, 15-20% fine to coarse subangular gravel, gray, wet
18			S9	10-13-12-11 (25)	24/12				S9 - Silty SAND with Gravel (SM), fine to coarse, ~15% fines, 15-20% fine to coarse subangular gravel, gray, wet
20	170.0							20.0 / 171.5	Bottom of borehole at 20.0 feet. Backfilled borehole with drill cuttings.
25									

GENERAL NOTES:
1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Boring Locations Yankee Doodle Bike Path, Billerica, MA," prepared by Vanasse Hangen Brustlin, Inc. (VHB), and provided to LGCI by VHB via e-mail on June 2, 2021.

EL. 189.0
EST. SHEET PILE TIP EL. 179.00±

BORING HP–B–S–3

STATION: 544+35
OFFSET: 22.0' LT
GROUND ELEVATION: 191'
N3019485.5773
E716285.8707

LGCI Lahlaf Geotechnical Consulting, Inc. — 100 Chelmsford Road, Suite 2, Billerica, MA 01862, Telephone: (978) 330-5912, Fax: (978) 330-5056

BORING LOG **HP-B-S-3**

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Prop. Yankee Doodle Bike Path (Structure 6)
LGCI PROJECT NUMBER: 1723
PROJECT LOCATION: Billerica, MA - Bridge No. B-12-027 (C5K)

DATE STARTED: 8/24/21 **DATE COMPLETED:** 8/24/21
BORING LOCATION: North of bottom of rip rap slope near Structure 5
COORDINATES: N3019485.5773, E716285.8707
SURFACE EI.: 191 ft. (see note 1) **TOTAL DEPTH:** 11.2 ft.
WEATHER: 70's Scattered showers
GROUNDWATER LEVELS:
▽ **DURING DRILLING:** -
▼ **AT END OF DRILLING:** 1.2 ft. / El. 189.8 ft. Standing water
▽ **OTHER:** -

DRILLING SUBCONTRACTOR: N/A - Completed by LGCI
DRILLING FOREMAN: N/A
DRILLING METHOD: N/A
DRILL RIG TYPE/MODEL: Hand Auger
HAMMER TYPE: N/A
HAMMER WEIGHT: N/A **HAMMER DROP:** N/A
SPLIT SPOON DIA.: N/A
CORE BARREL SIZE: N/A
LOGGED BY: TG **CHECKED BY:** NP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remarks	Strata	Depth (ft.)	Material Description
0	191.0		G1				Forest Mat	0.5 / 191.0	G1 - Forest Mat
1	190.0		G2				Fill	1.0 / 190.0	G2 - Silty SAND (SM), fine to medium, 40-45% fines, 0-5% fine gravel, gray, wet
3	188.0		G3			1		3.0 / 188.0	REMARK 1: Interbedded layers of fine sand and medium sand between depths of 3' to 11.2'.
5	185.0								G3 - Silty SAND (SM), fine to medium, 20-25% organic fines, trace of organic soil, brown, wet
9	182.0		G4			2	Swamp Deposits		REMARK 2: Hand augering effort was generally easy, except between depths of 3' to 4', where it was medium difficulty.
10	180.0		G5						G4 - Silty SAND (SM), fine to medium, ~25% fines, gray, wet
10.2									G5 - Silty SAND (SM), fine to medium, 20-25% fines, trace of roots, gray, wet
11.2	179.8							11.2 / 179.8	Bottom of borehole at 11.2 feet. Backfilled borehole with drill cuttings.
15	175.0								
20	170.0								
25									

GENERAL NOTES:
1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Boring Locations Yankee Doodle Bike Path, Billerica, MA," prepared by Vanasse Hangen Brustlin, Inc. (VHB), and provided to LGCI by VHB via e-mail on June 2, 2021.

EL. 189.8
EST. SHEET PILE TIP EL. 179.00±

NOTES:

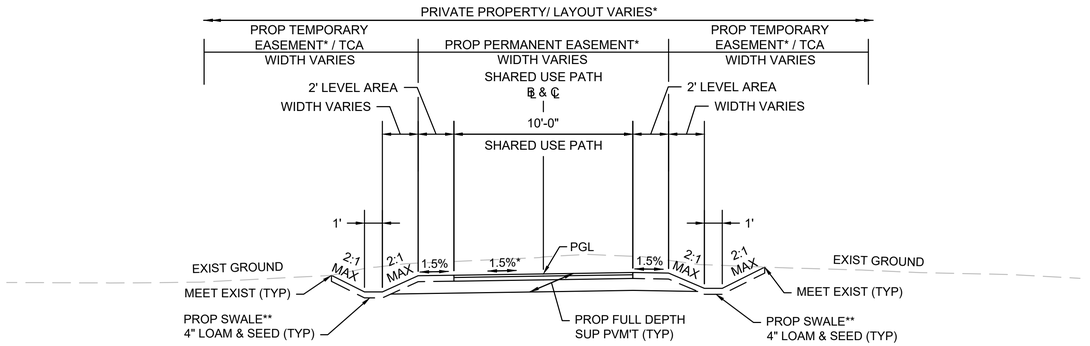
1. LOCATION OF BORINGS FOR PROPOSED BRIDGE SHOWN ON THE KEY PLAN THUS: ◔ B–X
2. BORINGS ARE TAKEN FOR PURPOSE OF DESIGN AND SHOW CONDITIONS AT BORING POINTS ONLY, BUT DO NOT NECESSARILY SHOW THE NATURE OF THE MATERIALS TO BE ENCOUNTERED DURING CONSTRUCTION.
3. WATER LEVELS SHOWN ON THE BORING LOGS AND INDICATED THUS: ▽ WERE OBSERVED AT THE TIME OF TAKING BORINGS AND DO NOT NECESSARILY SHOW THE TRUE GROUND WATER LEVEL.
4. FIGURES IN COLUMNS INDICATE NUMBER OF BLOWS REQUIRED TO DRIVE A 1⅜" I.D. SPLIT SPOON SAMPLER 6" USING A 140 POUND WEIGHT FALLING 30", UNLESS OTHERWISE NOTED.
5. BORING B–S–1, B–S–2 AND HP–B–S–3 FOR ROCKFILL SLOPE WERE MADE IN AUGUST 2021.
6. BORINGS WERE MADE BY NORTHERN DRILL SERVICE, INC, 33 TALBOT RD, NORTHBOROUGH, MA. HAND AUGURS WERE MADE BY LAHLAF GEOTECHNICAL CONSULTING, INC., 100 CHELMSFORD ROAD, SUITE 2, BILLERICA, MA.
7. THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988 IS USED THROUGHOUT.
8. BORING SAMPLES ARE STORED AT A STORAGE FACILITY LOCATED ON ROUTE 129. THE CONTRACTOR MAY EXAMINE THE SOIL AND ROCK SAMPLES BY CONTACTING LAHLAF GEOTECHNICAL CONSULTING, INC. AT 100 CHELMSFORD ROAD, SUITE 2, BILLERICA, MA.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	8	231
PROJECT FILE NO. 608227			

TYPICAL SECTIONS

608227HD (TYP).DWG Plotted on 23-Jul-2025 12:47 PM



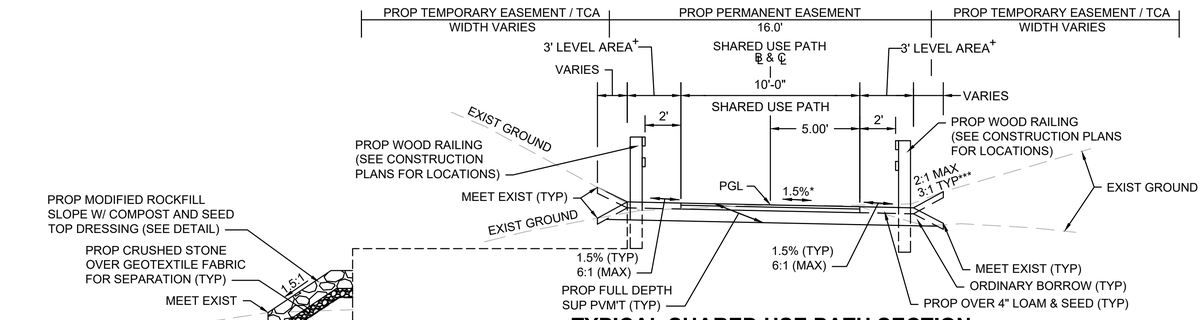
TYPICAL SHARED USE PATH SECTION - WITH SWALE

** LT SWALE - STA 405+68± TO STA 407+25±
** LT SWALE - STA 503+00± TO STA 504+50±
** LT SWALE - STA 518+20± TO STA 521+50±
** LT SWALE - STA 524+00± TO STA 526+85±
** LT SWALE - STA 550+10± TO STA 551+00±
** LT SWALE - STA 554+50± TO STA 556+20±
** LT SWALE - STA 633+65± TO STA 635+00±
** LT SWALE - STA 647+00± TO STA 652+40±

** RT SWALE - STA 406+22± TO STA 408+80±
** RT SWALE - STA 501+73± TO STA 504+50±
** RT SWALE - STA 519+00± TO STA 520+00±
** RT SWALE - STA 526+50± TO STA 527+50±
** RT SWALE - STA 538+00± TO STA 540+00±

NTS

* TEMPORARY EASEMENTS, PERMANENT EASEMENTS, AND LAYOUT VARY BY LOCATION



MODIFIED ROCKFILL SLOPE
STA 404+20± TO STA 404+56±
NTS

TYPICAL SHARED USE PATH SECTION

STA 384+00± TO STA 404+67±
STA 405+21± TO STA 409+13±
STA 501+00± TO STA 532+04±
STA 633+74± TO STA 637+89±
STA 646+10± TO STA 655+00±
NTS
**STA 500+00± TO 531+50± ONLY

* ±0.5% CONSTRUCTION TOLERANCE
*** LOAM AND SEED AREAS WITH 2:1 SLOPE REQUIRE MATTING FOR EROSION CONTROL (ITEM 767.9)
\+ 3' LEVEL AREA IN SECTIONS WITH WOOD RAILING, 2' LEVEL AREA IN SECTIONS WITHOUT WOOD RAILING

PAVEMENT NOTES

PROPOSED FULL DEPTH SHARED USE PATH (SUP) PAVEMENT

SURFACE: 1.5" SUPERPAVE SURFACE COURSE 9.5 (SSC-9.5) OVER
BASE: 2.5" SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC-12.5) OVER
SUBBASE: 8" GRAVEL BORROW, TYPE b

PROPOSED FULL DEPTH ROADWAY PAVEMENT (ASTRIG WAY)

SURFACE: 1.5" SUPERPAVE SURFACE COURSE 9.5 (SSC-9.5) OVER
BASE: 2.5" SUPERPAVE SURFACE COURSE 12.5 (SIC-12.5) OVER
SUBBASE: 4" DENSE GRADED CRUSHED STONE OVER 8" GRAVEL BORROW, TYPE b

PROPOSED MILL & OVERLAY (ELIOT STREET/ORCHARD ROAD)

SURFACE: 1.25" SUPERPAVE SURFACE COURSE 9.5 (SSC-9.5) OVER
PAVEMENT MILLING 1.25" PAVEMENT FINE MILLING

PROPOSED MILL & OVERLAY (ROUTE 3 RESTORATION)

SURFACE: 0.75" ULTRATHIN BONDED OVERLAY - TYPE 2 - POLYMER OVER
PAVEMENT MILLING 0.75" PAVEMENT FINE MILLING

PROPOSED HOT MIX ASPHALT DRIVEWAY

SURFACE: 1.5" SUPERPAVE SURFACE COURSE 9.5 (SSC-9.5) OVER 2.5" SUPERPAVE SURFACE COURSE 12.5 (SIC-12.5) OVER
SUBBASE: 8" GRAVEL BORROW, TYPE b

PROPOSED HOT MIX ASPHALT WALK

SURFACE: 1.25" SUPERPAVE SURFACE COURSE 9.5 (SSC-9.5) OVER 1.75" SUPERPAVE SURFACE COURSE 12.5 (SIC-12.5) OVER
SUBBASE: 8" GRAVEL BORROW, TYPE b

PROPOSED CEMENT CONCRETE WALK & MEDIAN

SURFACE: 4" CEMENT CONCRETE AIR ENTRAINED 4000 PSI, ¾", 610
SUBBASE: 8" GRAVEL BORROW, TYPE b

PROPOSED CEMENT CONCRETE PEDESTRIAN CURB RAMPS

SURFACE: 4" CEMENT CONCRETE AIR ENTRAINED 4000 PSI, ¾", 610 (6" IN SPLITTER ISLAND RAMPS)
SUBBASE: 8" GRAVEL BORROW, TYPE b

PROPOSED PERMEABLE PAVEMENT PARKING LOT

SURFACE: 4" OPEN GRADED FRICTION COURSE - 9.5 - POLYMER MODIFIED (OGFC-P) OVER
CHOKER COURSE: 4" CRUSHED STONE, 3/4" (M2.01.4)
FILTER COURSE: 12" GRAVEL BORROW, TYPE b
FILTER BLANKET: 3" CRUSHED STONE, 3/8" (M2.01.6)
RESERVOIR BASE: 6" CRUSHED STONE, 3/4" (M2.01.4)

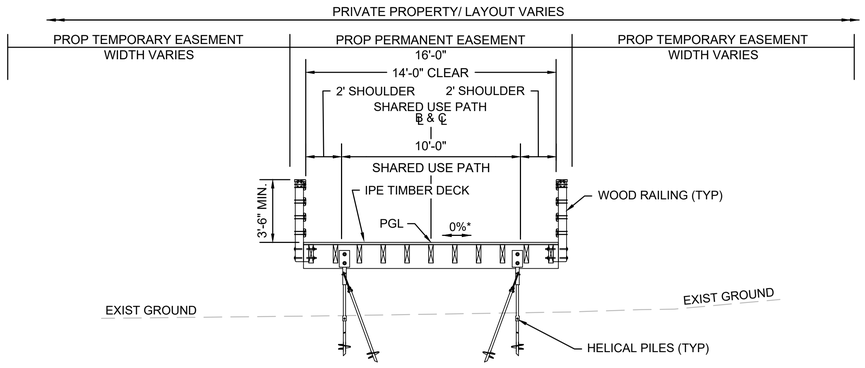
GRAVEL ACCESS DRIVE

8" GRAVEL BORROW, TYPE b

NOTES:

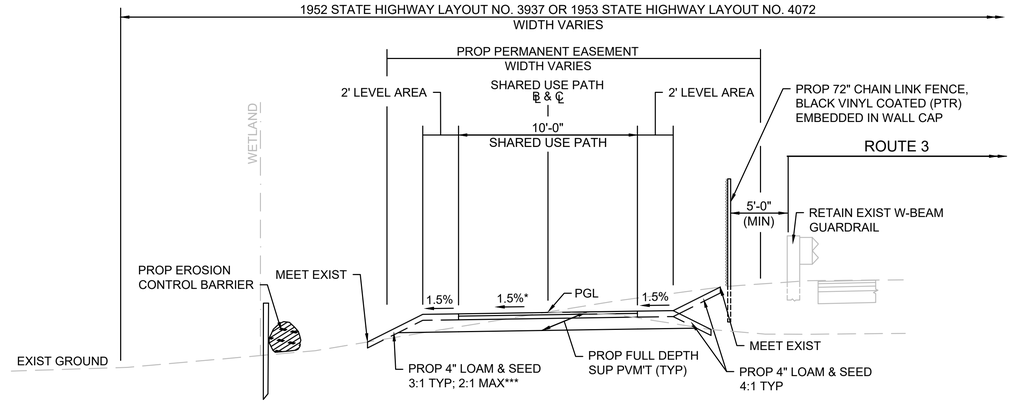
1. ALL HOT MIX ASPHALT PAVEMENTS SHALL BE CONSTRUCTED AND PRODUCED IN ACCORDANCE WITH SECTION 450 HOT MIX ASPHALT PAVEMENT AND SECTION M-3 ASPHALTIC MATERIALS.
2. ASPHALT EMULSION FOR TACK COAT (ITEM 452.) SHALL BE SPRAY APPLIED FOR DOUBLE OVERLAP COVERAGE AT 0.08 GALLONS PER SQUARE YARD OVER MILLED SURFACES AND 0.07 GALLONS PER SQUARE YARD OVER SMOOTH SURFACES.
3. HMA JOINT ADHESIVE (ITEM 453.) SHALL BE APPLIED IN SURFACE COURSE AT ALL VERTICAL COLD JOINTS PRIOR TO HMA PAVING.
4. ALL HOT MIX ASPHALT WALKS AND DRIVEWAYS SHALL BE ESTIMATED AND PAID FOR UNDER ITEM 702. OF STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES.
5. EXISTING SUBBASE MATERIAL AT SIDEWALKS AND DRIVEWAYS THAT MEETS THE REQUIREMENTS FOR GRAVEL BORROW TYPE b SHALL REMAIN IN PLACE.
6. ALL TEMPORARY HOT MIX ASPHALT PAVEMENT SHALL BE MEASURED AND PAID FOR UNDER ITEM 472. OF STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES.
7. PAVEMENT MILLING SHALL BE ADJUSTED TO PROVIDE A SMOOTH, STABLE SURFACE FOR THE RESURFACING OVERLAY TO MINIMIZE PATCHING REQUIRED.
8. PERMANENT ROADWAY PATCHING SHALL BE COMPENSATED UNDER ITEM 451., HMA FOR PATCHING.

608227HD (TYP).DWG Plotted on 23-Jul-2025 12:47 PM



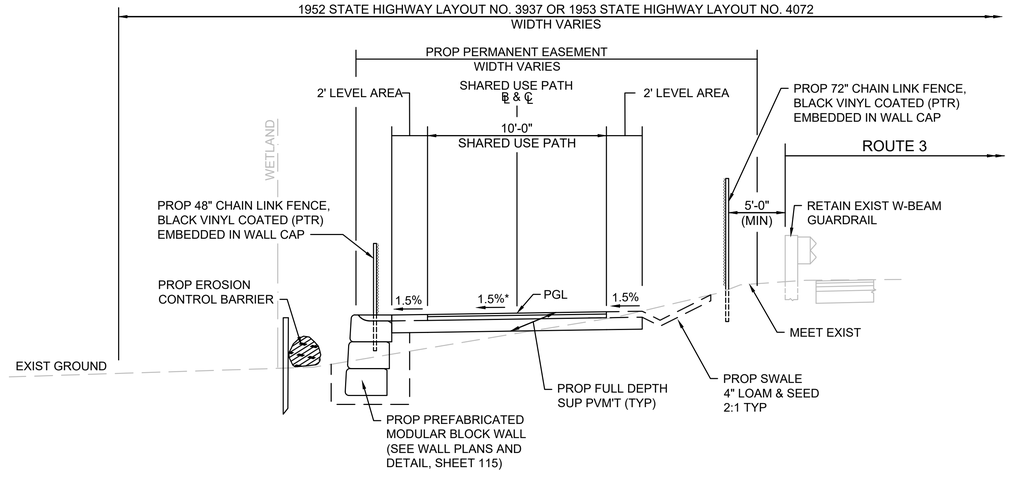
TYPICAL BOARDWALK SECTION

STA 404+56± TO STA 405+16±
STA 532+02± TO STA 533+55±
NTS
(SEE BRIDGE B-12-028(C5L) & BRIDGE B-12-029(C5M)
PLANS FOR DESIGN DETAILS)



TYPICAL SHARED USE PATH SECTION - ADJACENT TO ROUTE 3

STA 540+50± TO STA 542+50±
NTS



TYPICAL SHARED USE PATH SECTION - ADJACENT TO ROUTE 3 - WITH SWALE

STA 534+00± TO STA 538+00±
NTS

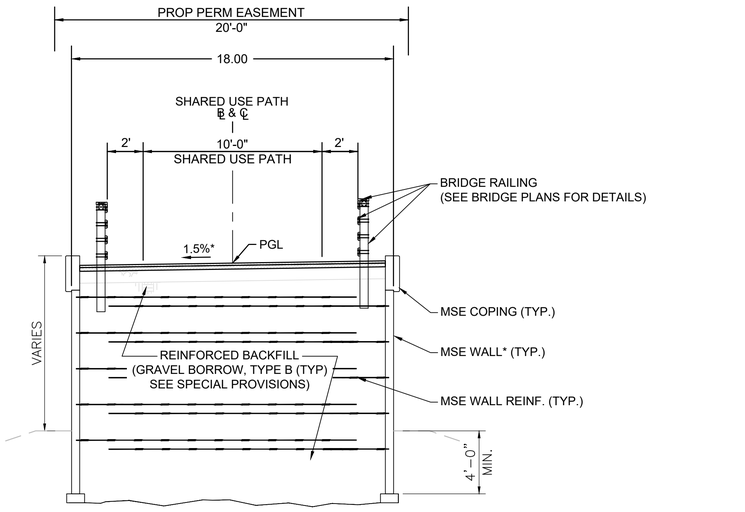
* 0.5% CONSTRUCTION TOLERANCE
*** LOAM AND SEED AREAS WITH 2:1 SLOPE REQUIRE MATTING FOR EROSION CONTROL (ITEM 767.9)
\+ 3' LEVEL AREA IN SECTIONS WITH WOOD RAILING, 2' LEVEL AREA IN SECTIONS WITHOUT WOOD RAILING

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	10	231
PROJECT FILE NO. 608227			

TYPICAL SECTIONS

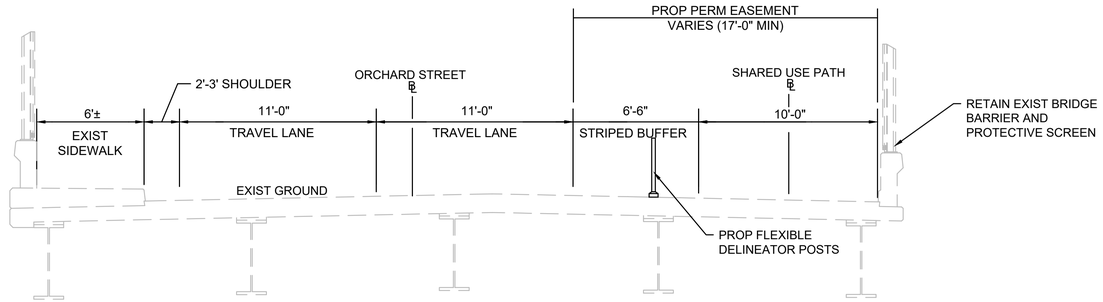
608227HD (TYP).DWG Plotted on 23-Jul-2025 12:47 PM



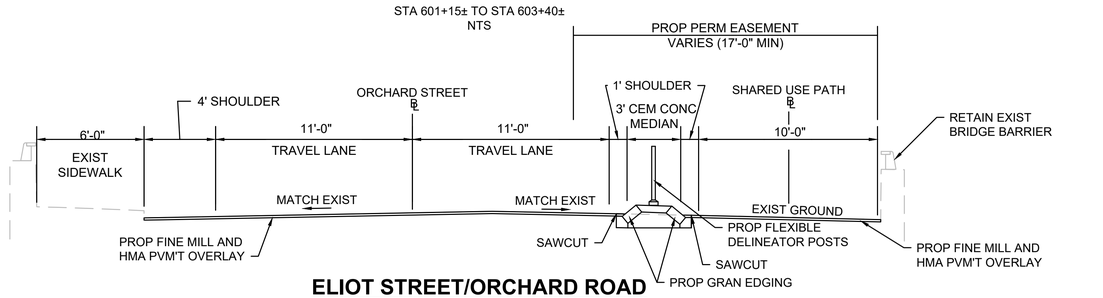
*MSE WALL ENDS ON RIGHT SIDE AT STA 561+61±

TYPICAL SHARED USE PATH SECTION - MSE WALL

STA 556+33± TO STA 556+74±
STA 561+55± TO STA 561+75±*
NTS
(SEE BRIDGE B-12-027(C5K) PLANS FOR DESIGN DETAILS)

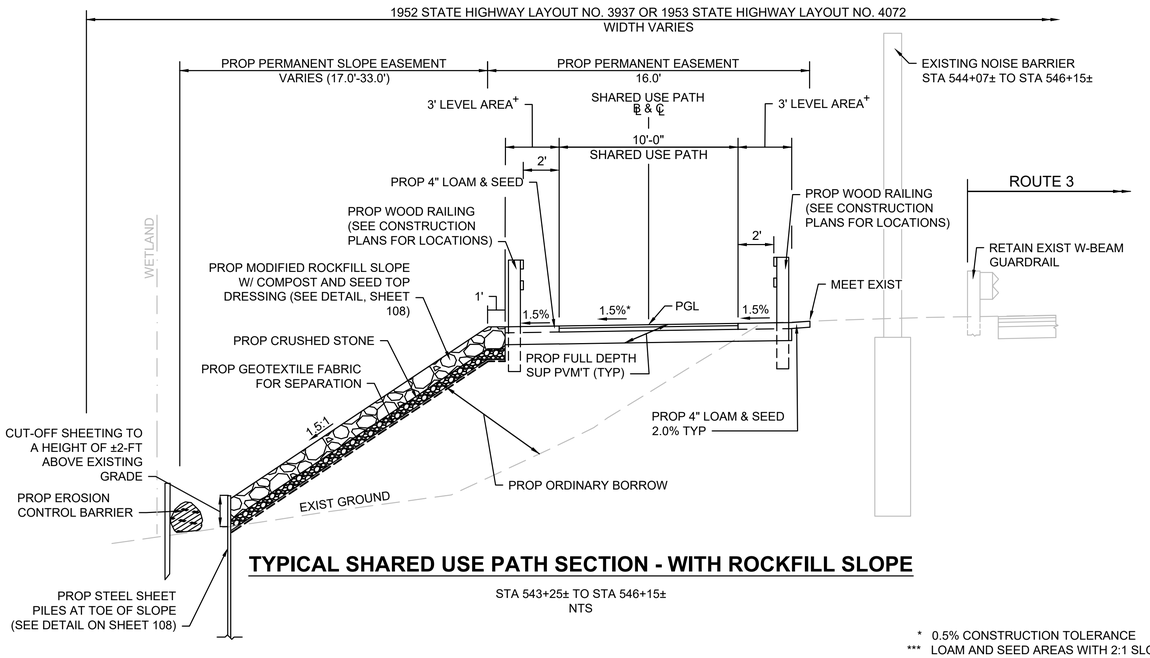


ELIOT STREET/ORCHARD ROAD BRIDGE



ELIOT STREET/ORCHARD ROAD

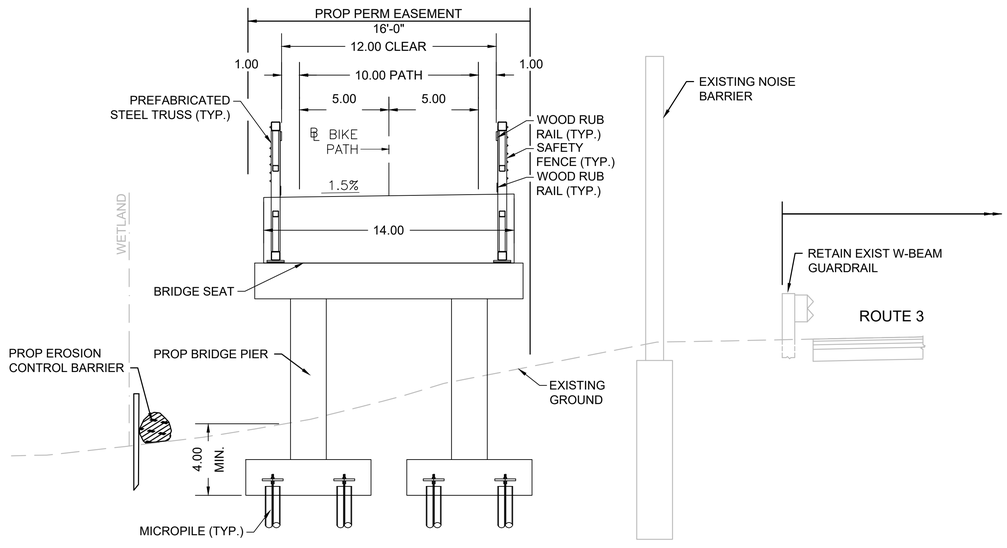
STA 600+25± TO STA 601+15±
STA 603+40± TO STA 605+75±
NTS



TYPICAL SHARED USE PATH SECTION - WITH ROCKFILL SLOPE

STA 543+25± TO STA 546+15±
NTS

* 0.5% CONSTRUCTION TOLERANCE
*** LOAM AND SEED AREAS WITH 2:1 SLOPE REQUIRE MATTING FOR EROSION CONTROL (ITEM 767.9)
\+ 3' SHOULDER IN SECTIONS WITH WOOD RAILING, 2' SHOULDER IN SECTIONS WITHOUT WOOD RAILING



TYPICAL TRUSS BRIDGE SECTION

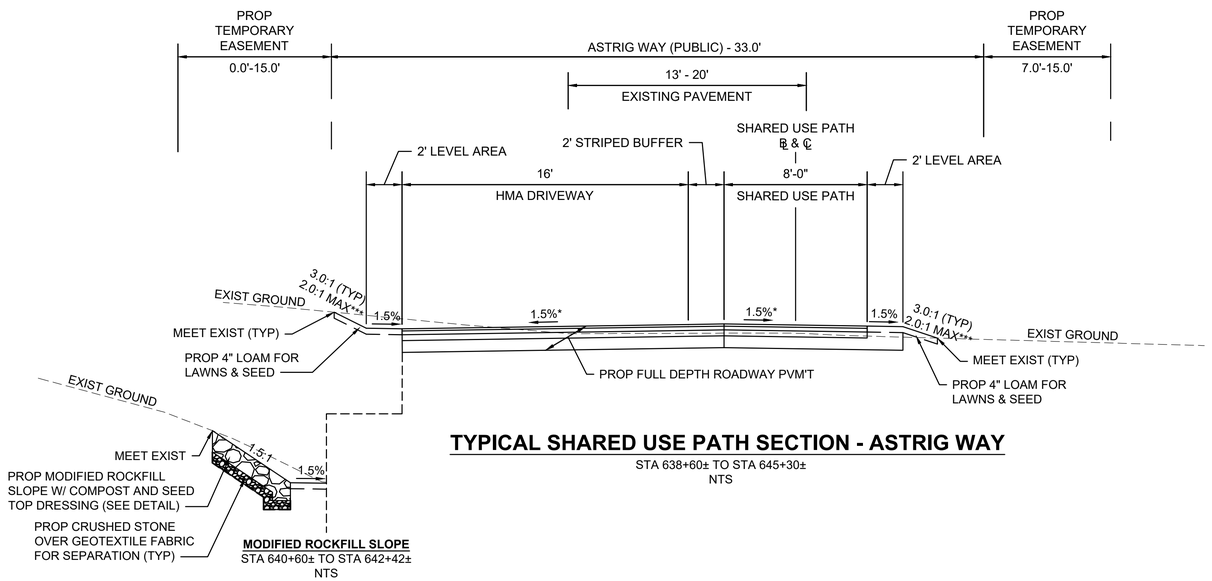
STA 556+77± TO STA 561+49±
NTS
(SEE BRIDGE B-12-027(C5K) PLANS FOR DESIGN DETAILS)

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	11	231
PROJECT FILE NO. 608227			

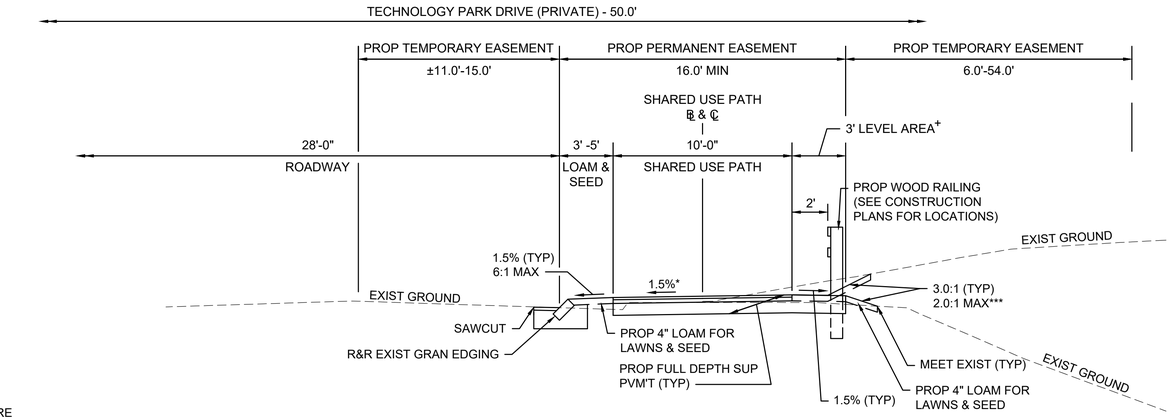
TYPICAL SECTIONS

608227HD (TYP).DWG Plotted on 23-Jul-2025 12:47 PM



TYPICAL SHARED USE PATH SECTION - ASTRIG WAY

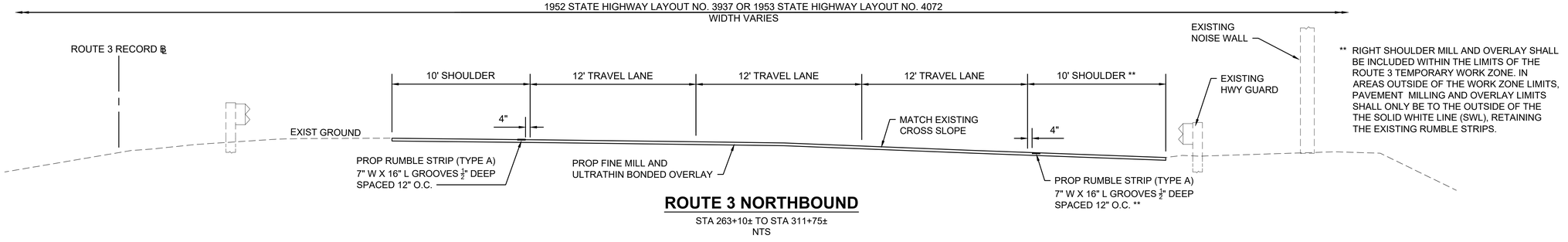
STA 638+60± TO STA 645+30±
NTS



* 0.5% CONSTRUCTION TOLERANCE
*** LOAM AND SEED AREAS WITH 2:1 SLOPE REQUIRE MATTING FOR EROSION CONTROL (ITEM 767.9)
\+ 3' SHOULDER IN SECTIONS WITH WOOD RAILING, 2' SHOULDER IN SECTIONS WITHOUT WOOD RAILING

TYPICAL SHARED USE PATH SECTION - TECHNOLOGY PARK DRIVE

STA 606+00± TO STA 633+00±
NTS



** RIGHT SHOULDER MILL AND OVERLAY SHALL BE INCLUDED WITHIN THE LIMITS OF THE ROUTE 3 TEMPORARY WORK ZONE. IN AREAS OUTSIDE OF THE WORK ZONE LIMITS, PAVEMENT MILLING AND OVERLAY LIMITS SHALL ONLY BE TO THE OUTSIDE OF THE THE SOLID WHITE LINE (SWL), RETAINING THE EXISTING RUMBLE STRIPS.

ROUTE 3 NORTHBOUND

STA 263+10± TO STA 311+75±
NTS

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	12	231
PROJECT FILE NO.	608227		

CONSTRUCTION BASELINE TIES

608227HD (BASELINE TIES).DWG Plotted on 23-Jul-2025 12:51 PM

LIMIT OF WORK
STA 324+12.00
N 3024936.3290
E 715164.9807

325+83.43 YANKEE DOODLE BIKE PATH SECTION 2 PART 1=
383+06.54 YANKEE DOODLE BIKE PATH SECTION 2 PART 2

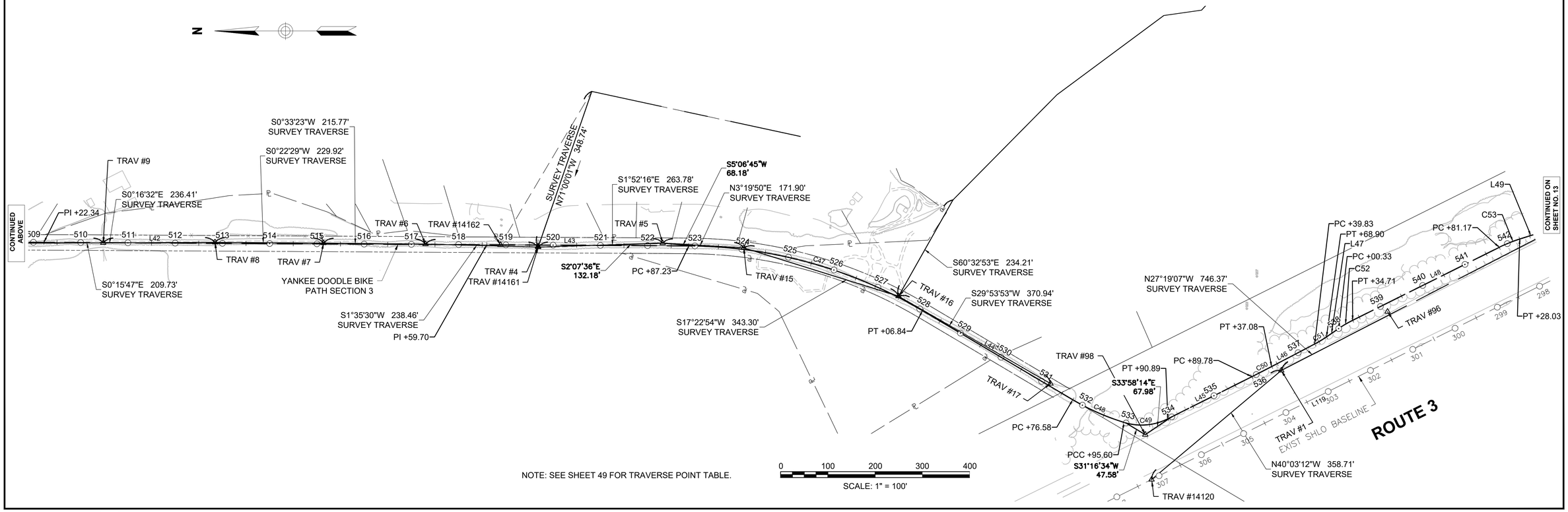
MIDDLESEX TURNPIKE

CONCORD ROAD

S19°35'04"E 116.33'
PC +96.32
PC +40.91
PT +36.97
PT +02.90
PT +01.26
PC +58.49
L29
PC +63.97
C33
PCC +94.21
PC +71.30
PT +63.96
C34
PT +05.61
PC +21.47
PT +11.65
PC +89.65
PT +79.83
PC +25.38
PT +48.23
S4°04'41"E 209.58'
SURVEY TRAVERSE
S56°10'18"E 19.80'
TRAV #89
TRAV #14190
S54°46'57"E 279.06'
SURVEY TRAVERSE
TRAV #88
N61°31'32"E 190.03'
N3°37'55"W 81.56'
PC +00.00
PT +44.87
PC +10.00
TRAV #87
PT +97.72
S88°23'44"E 187.46'
SURVEY TRAVERSE
S0°03'27"W 1,466.59'
SURVEY TRAVERSE
S31°05'50"W 199.49'
SURVEY TRAVERSE
TRAV #14
PC +19.33
PT +72.90
PC +44.12
C45
PRC +69.68
TRAV #12
S54°51'35"W 147.66'
TRAV #13
S84°17'08"E 96.84'
PT +24.61
S47°51'55"E 141.81'
SURVEY TRAVERSE
PC +32.03
S86°42'34"W 55.41'
PT +95.25
C46
S0°15'20"W 316.72'
SURVEY TRAVERSE
S1°24'09"E 102.77'
YANKEE DOODLE BIKE PATH SECTION 3
S2°07'19"W 97.33'
409+13.05 YANKEE DOODLE BIKE PATH SECTION 2 PART 2=
506+74.50 YANKEE DOODLE BIKE PATH SECTION 3
PT +76.40
S1°39'20"W 235.60'
SURVEY TRAVERSE
TRAV #1
PC +53.14
C43
S58°56'08"E 179.88'
SURVEY TRAVERSE
PC +96.30
TRAV #94
TRAV #10
PI +22.34
S0°16'32"E 236.41'
SURVEY TRAVERSE
TRAV #9
S0°15'47"E 209.73'
SURVEY TRAVERSE
CONTINUED BELOW

YANKEE DOODLE BIKE PATH SECTION 1
TRAV #700

YANKEE DOODLE BIKE PATH SECTION 2 PART 2



NOTE: SEE SHEET 49 FOR TRAVERSE POINT TABLE.

0 100 200 300 400
SCALE: 1" = 100'

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	13	231
PROJECT FILE NO.	608227		

CONSTRUCTION BASELINE TIES

608227HD (BASELINE TIES).DWG Plotted on 23-Jul-2025 12:51 PM

CONTINUED ON SHEET NO. 12

N

ROUTE 3

EXIST SHLO BASELINE

TRAV #96 · PC +69.59 · PC +81.17 · PT +28.03 · TRAV #95 · TRAV #42 · TRAV #41 · PT +94.76 · C53 · C54 · L49 · PRC +48.77 · N27°19'07"W 746.37' SURVEY TRAVERSE · S38°20'51"E 103.64' · C55 · C56 · PC +66.93 · S24°40'03"E 97.37' · S28°19'02"E 198.01' SURVEY TRAVERSE · PC +00.27 · PT +55.12 · PT +25.05 · TRAV #43 · PC +85.32 · TRAV #200 · C58 · L52 · PT +42.38 · L53 · PC +82.73 · PRC +07.04 · S41°31'07"E 273.96' SURVEY TRAVERSE · S33°56'06"E 556.21' SURVEY TRAVERSE · YANKEE DOODLE BIKE PATH SECTION 3 · TRAV #201 · PC +07.44 · PRC +14.00 · TRAV #40 · S4°04'06"E 187.02' SURVEY TRAVERSE · TRAV #39 · PT +75.43 · S47°48'46"E 96.95' · N41°07'32"W 230.83' SURVEY TRAVERSE · TRAV #38 · TRAV #37 · N26°16'58"W 218.58' SURVEY TRAVERSE · S18°58'00"E 108.58' · N50°03'30"W 136.11' SURVEY TRAVERSE · N52°24'44"W 315.48' SURVEY TRAVERSE · PI +24.16 · PI +28.76 · L59 · PT +14.59 · C63 · PC +48.16 · PI +88.46 · PI +42.43 · L61 · PC +42.84 · C64 · PC +03.09 · PC +88.85 · C65 · S23°51'58"W 57.91' · TRAV #14050 · 562+63.62 YANKEE DOODLE BIKE PATH SECTION 3= 701+70.19 ORCHARD ROAD · S59°05'20"W 46.82' · 562+42.05 YANKEE DOODLE BIKE PATH SECTION 3= 600+06.55 YANKEE DOODLE BIKE PATH SECTION 4 · 562+63.62 · 600+06.55 · PT +78.15 · PC +61.95 · 278+04.29 EXIST SHLO BASELINE= 704+04.74 ORCHARD ROAD · L64 · PC +69.26 · PT +48.72 · PT +15.66 · TRAV #36 · PC +23.15 · YANKEE DOODLE BIKE PATH SECTION 4 · PC +82.26 · N44°18'22"E 482.96' SURVEY TRAVERSE · ORCHARD ROAD CONST ℄ · PT +62.69 · PT +05.20 · L69 · PC +83.35 · TRAV #58 · C75 · PT +11.78 · L65 · TRAV #14040 · S37°22'32"E 52.65' SURVEY TRAVERSE · N82°23'03"E 32.40' · S58°54'17"W 128.88' · TRAV #35 · 174.68' · N3°45'16"E · 182.84' · S71°43'12"W · N29°39'47"E 154.14' SURVEY TRAVERSE · PC +59.27 · C76 · PRC +73.34 · C77 · PCC +18.01 · TRAV #83 · S9°17'18"W 20.80' · PT +94.15 · PC +18.19 · 882+30.83 · S35°40'13"W 13.83' · TRAV #14030 · S58°02'16"E 325.65' SURVEY TRAVERSE · PC +05.70 · C70 · PT +09.02 · PC +63.03 · C80 · PRC +83.04 · C81 · PT +03.05 · PC +33.55 · YANKEE DOODLE BIKE PATH SECTION 4 · PCC +03.16 · N21°37'49"W 187.39' SURVEY TRAVERSE · C83 · PRC +37.45 · C84 · PRC +49.12 · PC +55.65 · PC +86.17 · C89 · PCC +24.99 · PRC +87.35 · C88 · PT +07.36 · C87 · PC +67.34 · TRAV #3200 · TRAV #68 · PT +95.01 · PC +18.06 · S50°32'27"E 642.39' SURVEY TRAVERSE · S71°11'40"W 16.86' · PT +47.61 · S62°39'41"W 21.61' · TECHNOLOGY PARK DRIVE CONST ℄ · 633+37.68 YANKEE DOODLE BIKE PATH SECTION 4= 909+37.27 TECHNOLOGY PARK DRIVE · PCC +08.73 · C92 · PT +24.54 · TRAV #77 · 909+71.83 · S22°19'32"E 19.28' · L78 · PC +57.66 · C93 · PRC +80.09 · PT +95.85 · L79 · PC +37.29

TECHNOLOGY PARK DRIVE · ORCHARD ROAD · WALL STREET · MIDDLESEX COMMUNITY COLLEGE

CONTINUED ON SHEET NO. 14

0 100 200 300 400

SCALE: 1" = 100'

NOTE: SEE SHEET 49 FOR TRAVERSE POINT TABLE.

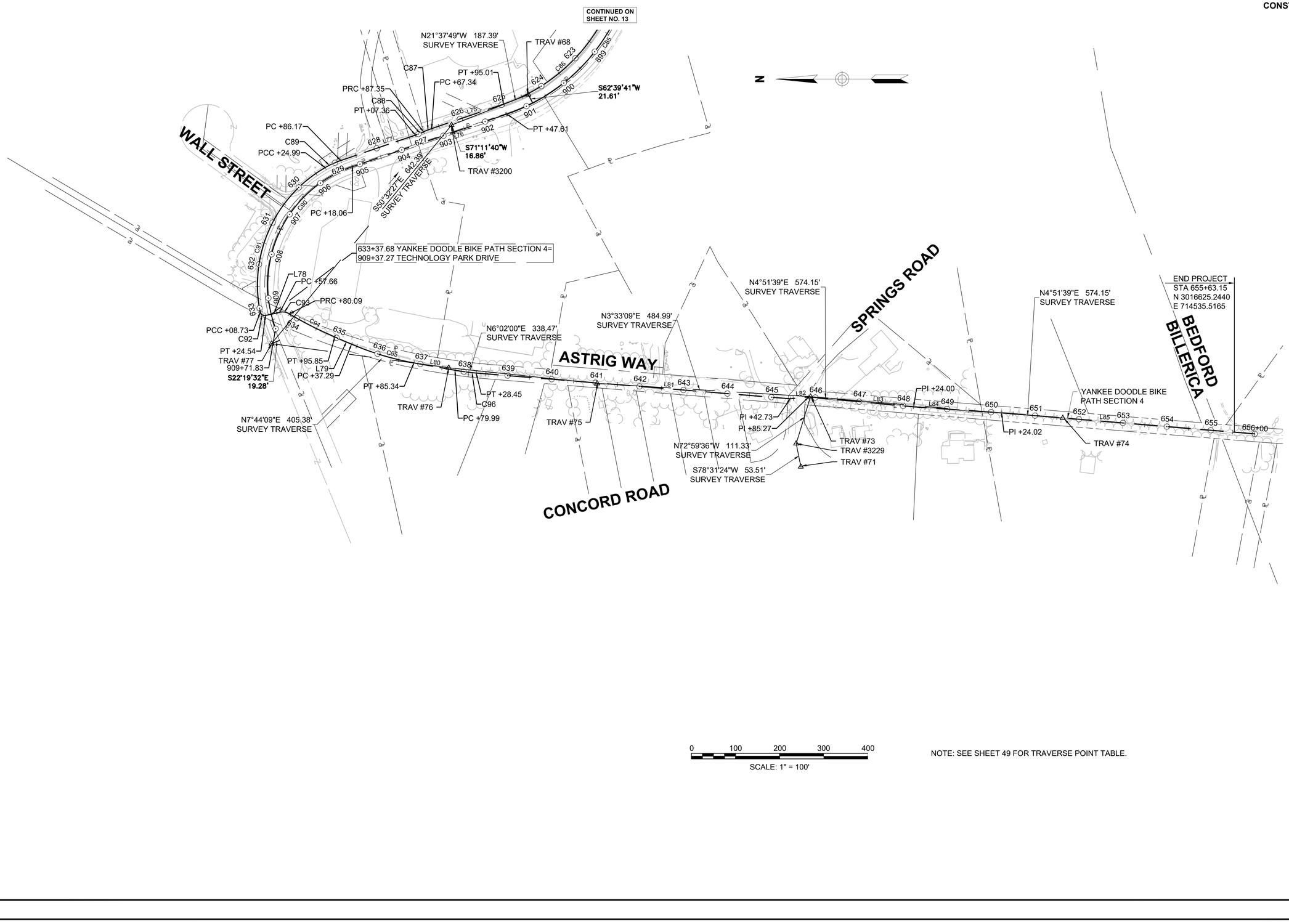
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	14	231
PROJECT FILE NO.	608227		

CONSTRUCTION BASELINE TIES

608227HD (BASELINE TIES).DWG Plotted on 23-Jul-2025 12:51 PM

CONTINUED ON SHEET NO. 13



0 100 200 300 400

SCALE: 1" = 100'

NOTE: SEE SHEET 49 FOR TRAVERSE POINT TABLE.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	15	231
PROJECT FILE NO.	608227		

CONSTRUCTION BASELINE DATA

608227HD (BASELINE TIES).DWG Plotted on 23-Jul-2025 12:51 PM

EXIST SHLO BASELINE CONSTRUCTION BASELINE DATA								
NUMBER	STARTING STATION	NORTHING	EASTING	CURVE DATA	LINE DATA	ENDING STATION	NORTHING	EASTING
L120	259+38.72	3016756.479	718628.863		N48°57'10"W 1323.23'	272+61.95	3017625.420	717630.925
C195	272+61.95	3017625.420	717630.925	R=6000.00' Δ=22°26'18" L=2349.74' T=1190.12'		296+11.69	3019471.896	716202.080
L119	296+11.69	3019471.896	716202.080		N26°30'11"W 3922.94'	335+34.63	3022982.577	714451.486

YANKEE DOODLE BIKE PATH SECTION 2 PART 2 CONSTRUCTION BASELINE DATA								
NUMBER	STARTING STATION	NORTHING	EASTING	CURVE DATA	LINE DATA	ENDING STATION	NORTHING	EASTING
L29	382+00.00	3024850.503	715329.571		S59°42'13"W 163.97'	383+63.97	3024767.785	715187.997
C33	383+63.97	3024767.785	715187.997	R=595.00' Δ=2°54'44" L=30.24' T=15.12'		383+94.21	3024751.872	715162.284
C34	383+94.21	3024751.872	715162.284	R=50.00' Δ=79°55'49" L=69.75' T=41.90'		384+63.96	3024690.390	715143.691
L30	384+63.96	3024690.390	715143.691		S23°08'19"E 407.34'	388+71.30	3024315.819	715303.758
C35	388+71.30	3024315.819	715303.758	R=650.00' Δ=11°50'20" L=134.31' T=67.39'		390+05.61	3024187.761	715343.446
L31	390+05.61	3024187.761	715343.446		S11°18'00"E 115.86'	391+21.47	3024074.144	715366.149
C36	391+21.47	3024074.144	715366.149	R=300.00' Δ=17°13'23" L=90.18' T=45.43'		392+11.65	3023984.403	715370.363
L32	392+11.65	3023984.403	715370.363		S5°55'23"W 78.00'	392+89.65	3023906.816	715362.314
C37	392+89.65	3023906.816	715362.314	R=300.00' Δ=17°13'23" L=90.18' T=45.43'		393+79.83	3023817.075	715366.528
L33	393+79.83	3023817.075	715366.528		S11°18'00"E 145.55'	395+25.38	3023674.346	715395.048
C38	395+25.38	3023674.346	715395.048	R=125.00' Δ=102°08'43" L=222.85' T=154.76'		397+48.23	3023584.159	715567.358
L34	397+48.23	3023584.159	715567.358		N66°33'18"E 251.77'	400+00.00	3023684.332	715798.345
C39	400+00.00	3023684.332	715798.345	R=100.00' Δ=128°41'23" L=224.61' T=208.20'		402+24.61	3023566.294	715934.613
L35	402+24.61	3023566.294	715934.613		S15°14'41"W 107.42'	403+32.03	3023462.651	715906.367
C40	403+32.03	3023462.651	715906.367	R=200.00' Δ=32°19'31" L=112.84' T=57.96'		404+44.87	3023351.319	715908.151
L36	404+44.87	3023351.319	715908.151		S17°04'51"E 65.13'	405+10.00	3023289.061	715927.281
C41	405+10.00	3023289.061	715927.281	R=80.00' Δ=62°49'50" L=87.73' T=48.86'		405+97.72	3023233.796	715989.739
L37	405+97.72	3023233.796	715989.739		S79°54'41"E 98.57'	406+96.30	3023216.529	716086.786
C42	406+96.30	3023216.529	716086.786	R=100.00' Δ=45°53'42" L=80.10' T=42.34'		407+76.40	3023174.018	716152.157
L38	407+76.40	3023174.018	716152.157		S34°00'59"E 76.74'	408+53.14	3023110.411	716195.086
C43	408+53.14	3023110.411	716195.086	R=100.00' Δ=34°19'41" L=59.91' T=30.89'		409+13.05	3023053.924	716212.197

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	16	231
PROJECT FILE NO.	608227		

CONSTRUCTION BASELINE DATA

YANKEE DOODLE BIKE PATH SECTION 3 CONSTRUCTION BASELINE DATA

NUMBER	STARTING STATION	NORTHING	EASTING	CURVE DATA	LINE DATA	ENDING STATION	NORTHING	EASTING
L39	500+00.00	3023708.247	716284.174		S31°00'10"W 119.33'	501+19.33	3023605.960	716222.708
C44	501+19.33	3023605.960	716222.708	R=100.00' Δ=30°41'28" L=53.57' T=27.44'		501+72.90	3023554.996	716208.423
L40	501+72.90	3023554.996	716208.423		S0°18'42"W 71.22'	502+44.12	3023483.778	716208.036
C45	502+44.12	3023483.778	716208.036	R=100.00' Δ=14°38'51" L=25.56' T=12.85'		502+69.68	3023458.474	716211.148
C46	502+69.68	3023458.474	716211.148	R=100.00' Δ=14°38'51" L=25.56' T=12.85'		502+95.25	3023433.169	716214.261
L41	502+95.25	3023433.169	716214.261		S0°18'42"W 627.09'	509+22.34	3022806.089	716210.848
L42	509+22.34	3022806.089	716210.848		S0°18'42"W 937.36'	518+59.70	3021868.740	716205.748
L43	518+59.70	3021868.740	716205.748		S0°18'42"W 427.53'	522+87.23	3021441.217	716203.422
C47	522+87.23	3021441.217	716203.422	R=980.00' Δ=30°22'45" L=519.61' T=266.07'		528+06.84	3020946.351	716066.171
L44	528+06.84	3020946.351	716066.171		S30°41'27"W 369.74'	531+76.58	3020628.399	715877.453
C48	531+76.58	3020628.399	715877.453	R=500.00' Δ=13°38'18" L=119.02' T=59.79'		532+95.60	3020519.821	715829.402
C49	532+95.60	3020519.821	715829.402	R=125.00' Δ=43°40'34" L=95.29' T=50.09'		533+90.89	3020427.148	715837.160
L45	533+90.89	3020427.148	715837.160		S26°37'25"E 198.89'	535+89.78	3020249.342	715926.290
C50	535+89.78	3020249.342	715926.290	R=2500.00' Δ=1°05'03" L=47.30' T=23.65'		536+37.08	3020207.260	715947.886
L46	536+37.08	3020207.260	715947.886		S27°42'27"E 102.74'	537+39.83	3020116.298	715995.658
C51	537+39.83	3020116.298	715995.658	R=250.00' Δ=6°39'43" L=29.07' T=14.55'		537+68.90	3020091.405	716010.637
L47	537+68.90	3020091.405	716010.637		S34°22'11"E 31.43'	538+00.33	3020065.459	716028.383
C52	538+00.33	3020065.459	716028.383	R=250.00' Δ=7°52'47" L=34.38' T=17.22'		538+34.71	3020035.837	716045.783
L48	538+34.71	3020035.837	716045.783		S26°29'24"E 346.46'	541+81.17	3019725.752	716200.318
C53	541+81.17	3019725.752	716200.318	R=300.00' Δ=8°56'58" L=46.86' T=23.48'		542+28.03	3019682.354	716217.865
L49	542+28.03	3019682.354	716217.865		S17°32'26"E 41.56'	542+69.59	3019642.726	716230.390
C54	542+69.59	3019642.726	716230.390	R=300.00' Δ=15°07'20" L=79.18' T=39.82'		543+48.77	3019571.233	716263.883
C55	543+48.77	3019571.233	716263.883	R=500.00' Δ=5°16'13" L=45.99' T=23.01'		543+94.76	3019531.428	716286.890
L50	543+94.76	3019531.428	716286.890		S27°23'33"E 172.17'	545+66.93	3019378.560	716366.103
C56	545+66.93	3019378.560	716366.103	R=400.00' Δ=8°19'30" L=58.12' T=29.11'		546+25.05	3019329.078	716396.491
L51	546+25.05	3019329.078	716396.491		S35°43'03"E 75.22'	547+00.27	3019268.007	716440.403
C57	547+00.27	3019268.007	716440.403	R=200.00' Δ=15°42'50" L=54.85' T=27.60'		547+55.12	3019219.665	716465.956
L52	547+55.12	3019219.665	716465.956		S20°00'13"E 30.20'	547+85.32	3019191.287	716476.287
C58	547+85.32	3019191.287	716476.287	R=300.00' Δ=10°53'52" L=57.06' T=28.62'		548+42.38	3019139.842	716500.773
L53	548+42.38	3019139.842	716500.773		S30°54'05"E 40.35'	548+82.73	3019105.219	716521.495
C59	548+82.73	3019105.219	716521.495	R=325.00' Δ=21°54'53" L=124.31' T=62.92'		550+07.04	3019013.199	716603.941

YANKEE DOODLE BIKE PATH SECTION 3 CONSTRUCTION BASELINE DATA

NUMBER	STARTING STATION	NORTHING	EASTING	CURVE DATA	LINE DATA	ENDING STATION	NORTHING	EASTING
C60	550+07.04	3019013.199	716603.941	R=100.00' Δ=19°50'37" L=34.63' T=17.49'		550+41.67	3018987.953	716627.397
L54	550+41.67	3018987.953	716627.397		S32°58'21"E 265.76'	553+07.44	3018764.995	716772.036
C61	553+07.44	3018764.995	716772.036	R=1500.00' Δ=11°42'36" L=306.56' T=153.82'		556+14.00	3018526.585	716963.911
C62	556+14.00	3018526.585	716963.911	R=350.00' Δ=10°03'21" L=61.43' T=30.79'		556+75.43	3018479.353	717003.061
L55	556+75.43	3018479.353	717003.061		S29°08'30"E 169.00'	558+44.43	3018331.748	717085.357
L56	558+44.43	3018331.748	717085.357		S41°28'40"E 179.73'	560+24.16	3018197.092	717204.398
L57	560+24.16	3018197.092	717204.398		S52°14'02"E 64.31'	560+88.46	3018157.709	717255.232
L58	560+88.46	3018157.709	717255.232		S83°04'45"E 59.70'	561+48.16	3018150.515	717314.497
C63	561+48.16	3018150.515	717314.497	R=70.00' Δ=54°22'12" L=66.43' T=35.95'		562+14.59	3018172.668	717374.499
L59	562+14.59	3018172.668	717374.499		N42°33'03"E 14.18'	562+28.76	3018183.112	717384.086
L60	562+28.76	3018183.112	717384.086		S47°26'57"E 34.85'	562+63.62	3018159.544	717409.760

ORCHARD ROAD CONSTRUCTION BASELINE DATA

NUMBER	STARTING STATION	NORTHING	EASTING	CURVE DATA	LINE DATA	ENDING STATION	NORTHING	EASTING
L61	700+00.00	3018293.583	717514.572		S39°11'41"W 42.84'	700+42.84	3018260.381	717487.498
C64	700+42.84	3018260.381	717487.498	R=800.00' Δ=3°17'43" L=46.01' T=23.01'		700+88.85	3018223.905	717459.461
L62	700+88.85	3018223.905	717459.461		S35°53'58"W 14.24'	701+03.09	3018212.369	717451.111
C65	701+03.09	3018212.369	717451.111	R=811.00' Δ=12°22'03" L=175.06' T=87.87'		702+78.15	3018082.699	717334.015
L64	702+78.15	3018082.699	717334.015		S48°16'01"W 245.00'	705+23.15	3017919.613	717151.184
C67	705+23.15	3017919.613	717151.184	R=3011.00' Δ=3°27'51" L=182.06' T=91.06'		707+05.20	3017802.605	717011.745
L65	707+05.20	3017802.605	717011.745		S51°43'52"W 200.49'	709+05.70	3017678.430	716854.337
C70	709+05.70	3017678.430	716854.337	R=1100.00' Δ=11°33'27" L=221.89' T=111.32'		711+27.58	3017524.424	716695.124

608227HD (BASELINE TIES).DWG Plotted on 23-Jul-2025 12:51 PM

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	17	231
PROJECT FILE NO.	608227		

CONSTRUCTION BASELINE DATA

608227HD (BASELINE TIES).DWG Plotted on 23-Jul-2025 12:52 PM

YANKEE DOODLE BIKE PATH SECTION 4 CONSTRUCTION BASELINE DATA								
NUMBER	STARTING STATION	NORTHING	EASTING	CURVE DATA	LINE DATA	ENDING STATION	NORTHING	EASTING
C72	600+06.55	3018174.126	717393.875	R=484.00' Δ=4°59'32" L=42.17' T=21.10'		600+48.72	3018143.328	717365.085
L67	600+48.72	3018143.328	717365.085		S45°33'56"W 20.54'	600+69.26	3018128.945	717350.416
C73	600+69.26	3018128.945	717350.416	R=984.00' Δ=2°42'05" L=46.39' T=23.20'		601+15.66	3018097.258	717316.536
L68	601+15.66	3018097.258	717316.536		S48°16'01"W 266.61'	603+82.26	3017919.789	717117.581
C74	603+82.26	3017919.789	717117.581	R=2984.00' Δ=3°27'51" L=180.42' T=90.24'		605+62.69	3017803.830	716979.392
L69	605+62.69	3017803.830	716979.392		S51°43'52"W 20.66'	605+83.35	3017791.033	716963.169
C75	605+83.35	3017791.033	716963.169	R=22.00' Δ=74°02'21" L=28.43' T=16.59'		606+11.78	3017790.455	716936.683
L70	606+11.78	3017790.455	716936.683		N54°13'47"W 447.49'	610+59.27	3018052.028	716573.607
C76	610+59.27	3018052.028	716573.607	R=200.00' Δ=4°01'59" L=14.08' T=7.04'		610+73.34	3018060.652	716562.484
C77	610+73.34	3018060.652	716562.484	R=200.00' Δ=12°47'42" L=44.66' T=22.42'		611+18.01	3018085.191	716525.277
C78	611+18.01	3018085.191	716525.277	R=286.50' Δ=35°13'32" L=176.14' T=90.95'		612+94.15	3018113.495	716354.223
L72	612+94.15	3018113.495	716354.223		S81°46'58"W 268.88'	615+63.03	3018075.064	716088.102
C80	615+63.03	3018075.064	716088.102	R=200.00' Δ=5°43'55" L=20.01' T=10.01'		615+83.04	3018071.219	716068.475
C81	615+83.04	3018071.219	716068.475	R=200.00' Δ=5°43'55" L=20.01' T=10.01'		616+03.05	3018067.374	716048.848
L74	616+03.05	3018067.374	716048.848		S81°46'58"W 330.51'	619+33.55	3018020.135	715721.733
C82	619+33.55	3018020.135	715721.733	R=406.50' Δ=23°54'23" L=169.61' T=86.06'		621+03.16	3018031.107	715553.708
C83	621+03.16	3018031.107	715553.708	R=200.00' Δ=9°49'23" L=34.29' T=17.19'		621+37.45	3018043.157	715521.651
C84	621+37.45	3018043.157	715521.651	R=200.00' Δ=3°20'28" L=11.66' T=5.83'		621+49.12	3018047.870	715510.985
C86	621+49.12	3018047.870	715510.985	R=404.50' Δ=48°59'42" L=345.90' T=184.32'		624+95.01	3018291.878	715280.790
L75	624+95.01	3018291.878	715280.790		N18°50'02"W 172.33'	626+67.34	3018454.982	715225.157
C87	626+67.34	3018454.982	715225.157	R=200.00' Δ=5°43'55" L=20.01' T=10.01'		626+87.35	3018473.564	715217.762
C88	626+87.35	3018473.564	715217.762	R=200.00' Δ=5°43'55" L=20.01' T=10.01'		627+07.36	3018492.147	715210.367
L77	627+07.36	3018492.147	715210.367		N18°50'02"W 178.80'	628+86.17	3018661.378	715152.644
C89	628+86.17	3018661.378	715152.644	R=200.00' Δ=11°07'17" L=38.82' T=19.47'		629+24.99	3018696.678	715136.635
C91	629+24.99	3018696.678	715136.635	R=306.50' Δ=71°44'10" L=383.75' T=221.61'		633+08.73	3018843.776	714808.969
C92	633+08.73	3018843.776	714808.969	R=10.00' Δ=90°32'36" L=15.80' T=10.10'		633+24.54	3018831.864	714801.223
L78	633+24.54	3018831.864	714801.223		S12°14'06"E 33.12'	633+57.66	3018799.496	714808.241
C93	633+57.66	3018799.496	714808.241	R=30.00' Δ=42°50'21" L=22.43' T=11.77'		633+80.09	3018777.865	714804.744
C94	633+80.09	3018777.865	714804.744	R=900.00' Δ=7°22'10" L=115.76' T=57.96'		634+95.85	3018674.719	714752.371
L79	634+95.85	3018674.719	714752.371		S23°14'05"W 41.44'	635+37.29	3018636.643	714736.024
C95	635+37.29	3018636.643	714736.024	R=650.00' Δ=13°03'01" L=148.05' T=74.35'		636+85.34	3018495.149	714693.548

YANKEE DOODLE BIKE PATH SECTION 4 CONSTRUCTION BASELINE DATA								
NUMBER	STARTING STATION	NORTHING	EASTING	CURVE DATA	LINE DATA	ENDING STATION	NORTHING	EASTING
L80	636+85.34	3018495.149	714693.548		S10°11'04"W 94.65'	637+79.99	3018401.991	714676.813
C96	637+79.99	3018401.991	714676.813	R=505.00' Δ=5°29'55" L=48.46' T=24.25'		638+28.45	3018353.952	714670.544
L81	638+28.45	3018353.952	714670.544		S4°41'08"W 714.28'	645+42.73	3017642.061	714612.195
L82	645+42.73	3017642.061	714612.195		S5°42'33"E 42.54'	645+85.27	3017599.733	714616.427
L83	645+85.27	3017599.733	714616.427		S5°26'07"W 238.73'	648+24.00	3017362.076	714593.814
L84	648+24.00	3017362.076	714593.814		S3°53'49"W 200.02'	650+24.02	3017162.516	714580.220
L85	650+24.02	3017162.516	714580.220		S4°45'23"W 575.98'	656+00.00	3016588.521	714532.461

TECHNOLOGY PARK DRIVE CONSTRUCTION BASELINE DATA								
NUMBER	STARTING STATION	NORTHING	EASTING	CURVE DATA	LINE DATA	ENDING STATION	NORTHING	EASTING
L71	882+30.83	3017765.071	716940.259		N54°19'47"W 487.36'	887+18.19	3018049.260	716544.335
C79	887+18.19	3018049.260	716544.335	R=248.50' Δ=44°00'00" L=190.83' T=100.40'		889+09.02	3018093.261	716363.430
L73	889+09.02	3018093.261	716363.430		S81°40'13"W 646.63'	895+55.65	3017999.584	715723.626
C85	895+55.65	3017999.584	715723.626	R=426.50' Δ=79°31'27" L=591.96' T=354.87'		901+47.61	3018284.099	715258.107
L76	901+47.61	3018284.099	715258.107		N18°48'20"W 370.45'	905+18.06	3018634.771	715138.691
C90	905+18.06	3018634.771	715138.691	R=283.50' Δ=91°42'31" L=453.77' T=292.08'		909+71.83	3018808.904	714770.975

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	18	231
PROJECT FILE NO.	608227		

CONSTRUCTION PLANS

HIGHWAY GUARD DETAILS

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE BELOW

YANKEE DOODLE BIKE PATH SECTION 2 PART 1 DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	RIM ELEV.	INV. IN	INV. OUT	REMARKS
11	CB	324+94.0 6.6 L	186.21		182.52	
12	EX DMH	325+12.9 9.2 L	186.94	(11) 182.46		

LEGEND:
[#] PCR NUMBER
<#> DRIVEWAY NUMBER

RET EXIST 8' TS POST
R&S EXIST PED HEAD
R&S EXIST PED PUSH BUTTON
PROP PED HEAD
PROP APS PED PUSH BUTTON

RET CEM CONC WALK

MODIFY EXIST TS CONTROLLER & CABINET TO ACCOMMODATE PROP CHANGES AS SHOWN

#161 CONCORD ROAD
BERKELEY CONCORD RD. OWNER LLC
DEED BOOK 37568, PAGE 260
PLAN BOOK 249, PLAN 124

RET SIGNS
RET CB
RET MAST ARM
REM EXIST GATE (BO)
PROP GUY POLE #64-84 & 8' GUY ANCHOR (BO - NGRID)

FUTURE PATH CONSTRUCTED BY OTHERS

DRAINAGE EASEMENT PLAN BOOK 229, PLAN 30

PROJECT BEGIN
STA 324+12.00
N 3024936.3290
E 715164.9807

PROP LOAM & SEED
BEGIN PROP GRAN CURB MEET EXIST
SAWCUT, MEET EXIST EXIST HMA SUP
LIMIT OF PHASE 1 WORK MEET PHASE 2 STA 324+12.00

ADJ PB
PROP 10' HMA SUP

PROP 8' TS POST (TYP)
RET TMH
RET WG
PROP 3" REVEAL
ADJ PB
REM CB
6 LF - 12" RCP
RET DMH
RET FO MH

PC +76.88
PT +01.88

ADJ DMH

REM GUY (BO-NGRID)
PROP LOAM & SEED
RET UP 64 & w/ RISER (Vz)
RET GUY

SAWCUT
PROP GRAN CURB
SAWCUT, MEET EXIST CURB & WALK

R&S TRAFFIC SIGNAL POST
RET HIGHWAY GUARD
PROP CEM CONC WALK
RET TRAFFIC SIGNAL POST
PROP LIMIT OF GRADING
R&S TRAFFIC SIGNAL POST

RET RET WALL
PROP CEM CONC WALK

YANKEE DOODLE BIKE PATH SECTION 2 PART 1 ℄

PT +02.90

DRAIN EASEMENT PLAN BOOK 199, PLAN 21

PLAN BOOK 229, MATCH EASEMENT PLAN

NOTE:
TEST PIT SHALL BE PROVIDED IN THE VICINITY OF UPL 64 TO DETERMINE THE LOCATION OF THE EXISTING UNDERGROUND VERIZON CONDUIT PRIOR TO INSTALLING TS POST

DRAINAGE EASEMENT PLAN BOOK 229, PLAN 30
CONCORD ROAD
BERKELEY CONCORD RD. OWNER, LLC
DEED BOOK 37031, PAGE 199
PLAN BOOK 249, PLAN 124
PLAN BOOK 89, PLAN 165

1953 TOWN LAYOUT (LAYOUT NO. 4072)

RET EXIST 8' TS POST
R&S EXIST PED HEAD
R&S EXIST PED PUSH BUTTON
PROP PED HEAD
PROP APS PED PUSH BUTTON

MIDDLESEX TURNPIKE

1933 COUNTY LAYOUT

RET EXIST TS POLE
R&S EXIST PED HEAD
R&S EXIST PED PUSH BUTTON
PROP PED HEAD
PROP APS PED PUSH BUTTON

RET VINYL FENCE
RET UPL
SAWCUT, MEET EXIST CURB & WALK
RET DMH
ADJ PB
PROP GRAN CURB

R&S CURB INLET
ADJ CB,
PROP FRAME & GRATE
325+83.44 YANKEE DOODLE BIKE PATH SECTION 2 PART 1=
383+15.16 YANKEE DOODLE BIKE PATH SECTION 2 PART 2

R&S TRAFFIC SIGNAL POST
END PROP GRAN CURB MEET EXIST
REM EXIST TREE
R&R BOUND (SET FLUSH)

1938 COUNTY LAYOUT
1953 TOWN LAYOUT (LAYOUT NO. 4072)

ADJ PB
PROP 10' SUP (TYP)
RET CBCI

PC +63.97

R&S 6' VINYL FENCE (STA 383+00 TO STA 383+83)
RET STONE WALL
REM 6' OF STONE WALL

PCC +94.21

PT +63.96

PROP SELECTIVE CLEARING & THINNING FOR SIGHT LINE

PROP CLEARING & GRUBBING (TYP)

YANKEE DOODLE BIKE PATH SECTION 2 PART 2 ℄

PROP TEMP CONSTR EASEMENT

#401 MIDDLESEX TURNPIKE
RICARDO VERISSIMO DOS REIS & DANIELA DE SOUSA TEIXEIRA
DEED BOOK 34351, PAGE 129
PLAN BOOK 95, PLAN 56B

PROP TEMP CONSTR EASEMENT

PROP PERM HWY EASEMENT
APPROX LIMIT OF GRADING (TYP)
PROP LOAM & SEED (TYP)

PROP PERM HWY EASEMENT
APPROX LIMIT OF GRADING (TYP)

CONTINUED BELOW

#2 FEDERAL STREET
REXPAR PROPERTY LLC
DEED BOOK 28863, PAGE 237

0 20 50 100
SCALE: 1" = 20'

RET STONE WALL
PROP LOAM & SEED (TYP)
PROP CLEARING & GRUBBING (TYP)
APPROX LIMIT OF GRADING (TYP)
PROP PERM HWY EASEMENT
PROP TEMP CONSTR EASEMENT

PC +71.30
PT +05.61
PC +21.47
PT +11.65
PC +89.65

7 TG
5 PS

PROP 10' SUP (TYP)
YANKEE DOODLE BIKE PATH SECTION 2 PART 2 ℄

CONTINUED ABOVE

CONTINUED ON SHEET NO. 19

#2 FEDERAL STREET
REXPAR PROPERTY LLC
DEED BOOK 28863, PAGE 237

#4 FEDERAL STREET
ONNURI MISSION ALLIANCE
DEED BOOK 38870, PAGE 208
PLAN BOOK 144, PLAN 43
PLAN BOOK 108, PLAN 33

0 20 50 100
SCALE: 1" = 20'

PLANT SCHEDULE

EVERGREEN TREES	QTY	BOTANICAL NAME	COMMON NAME	SIZE
PS	5	Pinus strobus	White Pine	5 - 6' HT.
TG	7	Thuja plicata 'Green Giant'	Arborvitae - Western Green Giant	5 - 6' HT.

FOR PROFILE, SEE SHEETS 32-33.

608227HD (GEN)-1.DWG Plotted on 23-Jul-2025 12:56 PM

HIGHWAY GUARD DETAILS

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

CONTINUED ON SHEET NO. 18

CONTINUED ON SHEET NO. 20

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	19	231
PROJECT FILE NO.	608227		

CONSTRUCTION PLANS

608227HD (GEN)-1.DWG Plotted on 23-Jul-2025 12:57 PM

DENSE TREES

EDGE OF PAVEMENT

CONC PAD WITH PROPANE TANKS

RET CHAIN LINK FENCE

RET PARKING SPACES

PROP SEDIMENT CONTROL BARRIER (TYP)

WF#20–100 GC112 GC111 WF#20–109 GC113 WF#20–108 GC114 GC115 GC110 WF#20–101 GC109 GC100 WF#20–107 GC108 WF#20–102 GC103 GC105 GC104 GC106 GC107 WF#20–103 WF#20–105 WF#20–104

WETLAND 20

399 398 397

PT +48.23

RET LP

PROP SELECTIVE CLEARING & THINNING FOR SIGHT LINE

APPROX LIMIT OF GRADING (TYP)

PROP LOAM & SEED (TYP)

PROP 10' SUP (TYP)

PROP CLEARING & GRUBBING (TYP)

PC +25.38

396

395

394

393

PT +79.83

PC +89.65

PT +11.65

PROP TEMP CONSTR EASEMENT

PROP PERM HWY EASEMENT

PROP PERM HWY EASEMENT

PROP TEMP CONSTR EASEMENT

RET PARKING SPACES

YANKEE DOODLE BIKE PATH SECTION 2 PART 2

RET LP

APPROX LIMIT OF GRADING (TYP)

PROP LOAM & SEED (TYP)

REM WALLS

RET PARKING SPACES

FEDERAL STREET
THE FIELDS REALTY TRUST
DEED BOOK 2673, PAGE 612
PLAN BOOK 108, PLAN 33

FEDERAL STREET
THE FIELDS REALTY TRUST
DEED BOOK 2673, PAGE 612
PLAN BOOK 108, PLAN 33

#4 FEDERAL STREET
ONNURI MISSION ALLIANCE
DEED BOOK 38870, PAGE 208
PLAN BOOK 144, PLAN 43
PLAN BOOK 108, PLAN 33

#8 FEDERAL STREET
RHINO 8 FEDERAL LLC
DEED BOOK 37054, PAGE 103
PLAN BOOK 141, PLAN 60

0 20 50 100

SCALE: 1" = 20'

FOR PROFILE, SEE SHEETS 33 - 34 .

HIGHWAY GUARD DETAILS

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE BELOW

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	20	231
PROJECT FILE NO.	608227		

CONSTRUCTION PLANS

608227HD (GEN)-1.DWG Plotted on 23-Jul-2025 12:57 PM

LEGEND:
- [#] WCR NUMBER
- <#> DRIVEWAY NUMBER

#8 FEDERAL STREET
RHINO 8 FEDERAL LLC
DEED BOOK 37054, PAGE 103
PLAN BOOK 141, PLAN 60

REAR MIDDLESEX TPK
THE FIELDS REALTY TRUST
DEED BOOK 2673, PAGE 612
PLAN BOOK 108, PLAN 33

30' WIDE SEWER EASEMENT
PLAN BOOK M, PLAN 665
PLAN BOOK 141, PLAN 60
GRANTOR: RHINO 8 FEDERAL, LLC
GRANTEE: TOWN OF BILLERICA

55' WIDE MASSACHUSETTS ELECTRIC COMPANY EASEMENT
PLAN BOOK 157, PLAN 101
GRANTOR: RHINO 8 FEDERAL, LLC
GRANTEE: MASSACHUSETTS ELECTRIC COMPANY

30' WIDE BROOK EASEMENT
BOOK 4592, PAGE 173
PLAN BOOK 141, PLAN 60

WETLAND 7

PROP CLEARING & GRUBBING (TYP)
PROP 10' SUP (TYP)
PROP SELECTIVE CLEARING & THINNING FOR SIGHT LINE
PROP LOAM & SEED (TYP)
APPROX LIMIT OF GRADING (TYP)
PROP BLSF COMPENSATORY STORAGE AREA #4
PROP TEMP CONSTR EASEMENT
APPROX LIMIT OF GRADING (TYP)
PROP LOAM & SEED (TYP)
PROP PERM HWY EASEMENT
PROP SEDIMENT CONTROL BARRIER (TYP)
BEGIN WOOD RAILING STA 404+00
PROP MODIFIED ROCK FILL SLOPE
END WOOD RAILING, BEGIN BRIDGE RAILING STA 404+50.83
28 LF - 12" RCP, CLASS V
PROP STONE PAD PROTECTION
END BRIDGE RAILING, BEGIN WOOD RAILING STA 405+20.81
PROP BOARDWALK STRUCTURE BRIDGE NO. B-12-029 (C5M)
RET EX SEWER
PROP WETLAND RESTORATION AREA (TYP)
BEGIN GRASS SWALE STA 405+68
PROP STONE PAD PROTECTION
RET UPL#98
RET UPL#63
YANKEE DOODLE BIKE PATH SECTION 2 PART 2 ℄
BEGIN GRASS SWALE STA 406+20
PROP STONE PAD PROTECTION
PROP SEDIMENT CONTROL BARRIER (TYP)
END WOOD RAILING STA 405+36
PROP GRAVEL ACCESS DRIVE
RET CHAIN LINK FENCE
RET PARKING SPACES
BEGIN WOOD RAILING STA 404+00
PROP TEMP CONSTR EASEMENT
PROP PERM HWY EASEMENT
END WOOD RAILING, BEGIN BRIDGE RAILING STA 404+50.83
YANKEE DOODLE BIKE PATH SECTION 2 PART 2 ℄

PC +00.00
PT +24.61
PC +32.03
PT +44.87
PC +10.00
PC +96.30
PT +76.40
PT +97.72

UTILITY EASEMENT
PLAN BOOK 141, PLAN 60

CONIC PAD WITH PROPANE TANKS

DENSE TREES

EDGE OF PAVEMENT

CONTINUED ON SHEET NO. 19

CONTINUED ON SHEET NO. 21

YANKEE DOODLE BIKE PATH SECTION 2 PART 2 DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	RIM ELEV.	INV. IN	INV. OUT	REMARKS
88	FES	405+57.3 16.4 L	189.63		184.40	
89	FES	405+21.2 17.5 L	185.87	(88) 184.20		

0 20 50 100
SCALE: 1" = 20'

FOR PROFILE, SEE SHEETS 33 - 34 .

HIGHWAY GUARD DETAILS

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE BELOW

YANKEE DOODLE BIKE PATH SECTION 3 DRAINAGE STRUCTURE DATA						
NO.	TYPE	STATION	RIM ELEV.	INV. IN	INV. OUT	REMARKS
13	LB	503+00.0 8.5 L	186.00		185.00	PROP FRAME & GRATE

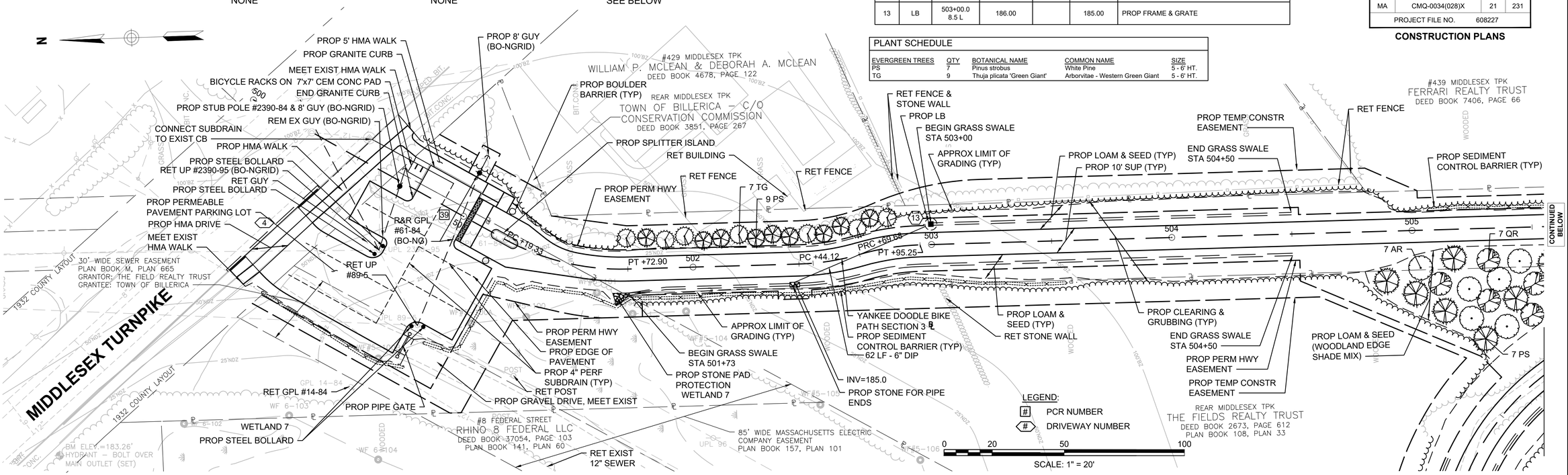
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	21	231
PROJECT FILE NO.	608227		

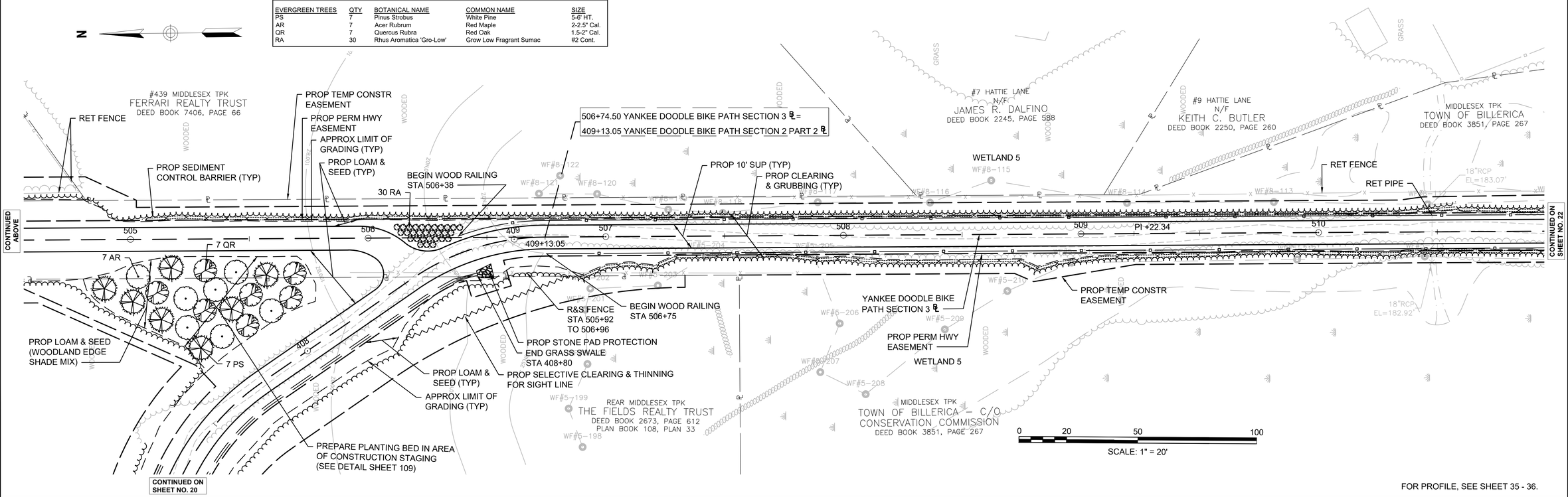
CONSTRUCTION PLANS

608227HD (GEN)-2.DWG Plotted on 23-Jul-2025 1:06 PM

PLANT SCHEDULE				
EVERGREEN TREES	QTY	BOTANICAL NAME	COMMON NAME	SIZE
PS	7	Pinus strobus	White Pine	5 - 6' HT.
TG	9	Thuja plicata 'Green Giant'	Arborvitae - Western Green Giant	5 - 6' HT.



PLANT SCHEDULE				
EVERGREEN TREES	QTY	BOTANICAL NAME	COMMON NAME	SIZE
PS	7	Pinus Strobus	White Pine	5-6' HT.
AR	7	Acer Rubrum	Red Maple	2-2.5" Cal.
QR	7	Quercus Rubra	Red Oak	1.5-2" Cal.
RA	30	Rhus Aromatica 'Gro-Low'	Grow Low Fragrant Sumac	#2 Cont.



FOR PROFILE, SEE SHEET 35 - 36.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	22	231
PROJECT FILE NO.	608227		

CONSTRUCTION PLANS

608227HD (GEN)-2.DWG Plotted on 23-Jul-2025 1:08 PM

HIGHWAY GUARD DETAILS
NONE

WATER SUPPLY ALTERATIONS
NONE

DRAINAGE DETAILS
SEE BELOW

N

MIDDLESEX TPK
TOWN OF BILLERICA – C/O CONSERVATION COMMISSION
DEED BOOK 3851, PAGE 267

#13 HATTIE LANE
N/F
JEFFREY C. ESPINOLA
DEED BOOK 22634, PAGE 132

#15 HATTIE LANE
N/F
ERNEST COVINO, III
DEED BOOK 25026, PAGE 91

MIDDLESEX TPK
TOWN OF BILLERICA
DEED BOOK 3851, PAGE 267

RET FENCE
RET PIPE
18"RCP
EL=183.07'
18"RCP
EL=182.92'
PROP WOOD RAILING
WETLAND 5
PROP GRANITE MILE POST (MILE 2.0)
RET FENCE
PROP TEMP CONSTR EASEMENT
PROP PERM HWY EASEMENT
PROP SEDIMENT CONTROL BARRIER (TYP)
APPROX LIMIT OF GRADING (TYP)
PROP LOAM & SEED (TYP)
PROP 10' SUP (TYP)
RET FENCE
YANKEE DOODLE BIKE PATH SECTION 3
PROP WOOD RAILING
PROP PERM HWY EASEMENT
PROP TEMP CONSTR EASEMENT
PROP CLEARING & GRUBBING (TYP)
PROP LOAM & SEED (TYP)
APPROX LIMIT OF GRADING (TYP)
PROP SEDIMENT CONTROL BARRIER (TYP)

CONTINUED ON SHEET NO. 21

CONTINUED BELOW

510 511 512 513 514 515 516

WF#8–110 WF#8–111 WF#8–107 WF#8–105 WF#8–106 WF#8–103 WF#8–104 WF#8–100 WF#8–101 WF#8–102 WF#5–226

WOODED

MIDDLESEX TPK
TOWN OF BILLERICA – C/O CONSERVATION COMMISSION
DEED BOOK 3851, PAGE 267

WETLAND 5

0 20 50 100
SCALE: 1" = 20'

#15 HATTIE LANE
N/F
ERNEST COVINO, III
DEED BOOK 25026, PAGE 91

#17 HATTIE LANE
N/F
JOSEPH N. SALEMI
DEED BOOK 2258, PAGE 19

#19 HATTIE LANE
N/F
HOGAN FAMILY
2011 REALTY TRUST
DEED BOOK 25436, PAGE 77

#21 HATTIE LANE
KEVIN G. CLARK
DEED BOOK 36492, PAGE 253

#25 HATTIE LANE
PHILLIP T. LASKA & CHRISTINE M. LASKA
DEED BOOK 7265, PAGE 49

#27 HATTIE LANE
SIGISMONDO ANGELO
& DEBRA A. ANGELO
DEED BOOK 7234, PAGE 276

100'BZ 50'NDZ

BEGIN GRASS SWALE STA 517+70
PROP STONE PAD PROTECTION
END WOOD RAILING STA 516+50
PROP PERM HWY EASEMENT
APPROX LIMIT OF GRADING (TYP)
PROP LOAM & SEED (TYP)
PROP TEMP CONSTR EASEMENT
PROP SEDIMENT CONTROL BARRIER (TYP)
END GRASS SWALE STA 521+50
PROP CLEARING & GRUBBING (TYP)
YANKEE DOODLE BIKE PATH SECTION 3
PROP PERM HWY EASEMENT
PROP WOOD RAILING
PROP SEDIMENT CONTROL BARRIER (TYP)
PROP TEMP CONSTR EASEMENT
BEGIN GRASS SWALE STA 519+00
PROP STONE PAD PROTECTION
PROP LOAM & SEED (TYP)
APPROX LIMIT OF GRADING (TYP)
END GRASS SWALE STA 520+00

CONTINUED ABOVE

CONTINUED ON SHEET NO. 23

516 517 518 519 520 521

WF#8–100 WF#8–101 WF#8–102 WF#5–226 WF#5–227 WF#5–228 WF#5–229 WF#5–230 WF#5–231

WOODED

MIDDLESEX TPK
TOWN OF BILLERICA – C/O CONSERVATION COMMISSION
DEED BOOK 3851, PAGE 267

WETLAND 5

0 20 50 100
SCALE: 1" = 20'

FOR PROFILE, SEE SHEETS 36 - 37.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	23	231
PROJECT FILE NO.	608227		

CONSTRUCTION PLANS

608227HD (GEN)-2.DWG Plotted on 23-Jul-2025 1:09 PM

HIGHWAY GUARD DETAILS

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE BELOW

#27 HATTIE LANE
SIGISMONDO ANGELO & DEBRA A. ANGELO
DEED BOOK 7234, PAGE 276

#29 HATTIE LANE
RAYMOND E. HINXMAN, III & MICHELLE E. HINXMAN
DEED BOOK 26181, PAGE 60

#31 HATTIE LANE
CHRISTINE MARIE KEMP
DEED BOOK 16419, PAGE 163

#33 HATTIE LANE
ROBERT A. SEARS & HEAWON SEARS
DEED BOOK 7380, PAGE 170

MIDDLESEX TPK
TOWN OF BILLERICA – C/O CONSERVATION COMMISSION
DEED BOOK 3851, PAGE 267

MIDDLESEX TPK
TOWN OF BILLERICA – C/O CONSERVATION COMMISSION
DEED BOOK 10217, PAGE 131

REAR BLACKWOOD AVE
TOWN OF BILLERICA – C/O CONSERVATION COMMISSION
DEED BOOK 2285, PAGE 656

REAR BACKWOOD AVE
TOWN OF BILLERICA – C/O SELECT BOARD
DEED BOOK 20230, PAGE 285

N/F
ROUTE 3
TOWN OF BILLERICA – C/O SELECT BOARD
DEED BOOK 19950, PAGE 275

END GRASS SWALE STA 521+50
PROP TEMP CONSTR EASEMENT
PROP 10' SUP (TYP)
PROP LOAM & SEED (TYP)
APPROX LIMIT OF GRADING (TYP)
PROP PERM HWY EASEMENT
BEGIN GRASS SWALE STA 524+00
PROP CLEARING & GRUBBING (TYP)
BEGIN WOOD RAILING STA 526+50
PC +87.23
PROP WOOD RAILING
YANKEE DOODLE BIKE PATH SECTION 3 ℄
WETLAND 5
BEGIN GRASS SWALE STA 526+50

CONTINUED ON SHEET NO. 22
CONTINUED BELOW

SCALE: 1" = 20'

END GRASS SWALE STA 526+85
PROP STONE PAD PROTECTION
PROP BLSF COMPENSATORY STORAGE AREA #4
PROP SEDIMENT CONTROL BARRIER (TYP)
PROP WETLAND REPLICATION AREA LOCATION 1
END WOOD RAILING; BEGIN BRIDGE RAILING STA 531+96.46
PT +06.84
PC +76.58
END GRASS SWALE STA 527+50
END WOOD RAILING; BEGIN BRIDGE RAILING STA 531+97.74
WETLAND 6
HIGHWAY LAYOUT (LAYOUT NO. 4072)
LOCATION LINE OF SEPTEMBER 15, 1953
NO ACCESS

CONTINUED ABOVE
CONTINUED ON SHEET NO. 24

SCALE: 1" = 20'

FOR PROFILE, SEE SHEETS 38 - 39.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	24	231
PROJECT FILE NO.	608227		

CONSTRUCTION PLANS

HIGHWAY GUARD DETAILS

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE BELOW

YANKEE DOODLE BIKE PATH SECTION 3 DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	RIM ELEV.	INV. IN	INV. OUT	REMARKS
15	LB	538+22.0 9.5 R	191.48		189.50	PROP FRAME & GRATE
16	CB	539+81.2 9.6 R	193.03		189.70	
17	FES	539+85.7 18.8 L			(16) 189.40	
17A	FES	541+48.4 20.1 L			(EX) 189.40	
18	EX CB	543+67.0 17.8 R	200.79		196.30	ASSUMED INV. OUT ELEVATION
19	DMH	543+67.0 2.7 L	200.76	(18) 193.40	193.30	
20	FES	543+29.0 21.0 L			(19) 193.00	

CONTINUED ON SHEET NO. 29

LOCATION LINE OF SEPTEMBER 15, 1953 STATE HIGHWAY LAYOUT (LAYOUT NO. 4072)

NO ACCESS

N

WETLAND 6

END WOOD RAILING; BEGIN BRIDGE RAILING STA 531+96.46

PROP BEGINNING OF BOARDWALK SECTION STA 532+02

PROP WETLAND RESTORATION AREA

PROP BOARDWALK BRIDGE NO. B-12-028(C5L)

PROP SELECTIVE CLEARING & THINNING FOR SIGHT LINE

PC +76.59

END WOOD RAILING; BEGIN BRIDGE RAILING STA 531+97.74

PCC +95.60

BEGIN V-DITCH GRASS SWALE STA 533+50

PROP END OF BOARDWALK SECTION STA 533+55

END BRIDGE RAILING; BEGIN CHAIN LINK FENCE STA 533+60

PT +90.89

END BRIDGE RAILING; BEGIN 72" CHAIN LINK FENCE STA 533+59

PROP EROSION CONTROL BARRIER (TYP)

PROP 48" CHAIN LINK FENCE, BLACK VINYL COATED (PTR) (SEE DETAIL SHEET 115)

PROP PREFABRICATED MODULAR BLOCK WALL

PROP LOAM & SEED (TYP)

APPROX LIMIT OF GRADING (TYP)

RET HIGHWAY GUARD

PROP 10' SUP (TYP)

PROP LINE OF EASEMENT

PROP CLEARING & GRUBBING (TYP)

PROP LINE OF EASEMENT

PC +89.78

PT +37.08

YANKEE DOODLE BIKE PATH SECTION 3 ℄

PC +39.83

PT +68.90

PC +00.33

END V DITCH SWALE BEGIN FLAT BOTTOM SWALE STA 538+00

CONTINUED BELOW

U.S. ROUTE 3
(NORTHBOUND)

SEPTEMBER 15, 1953 STATE HIGHWAY LAYOUT (LAYOUT NO. 4072)
THE COMMONWEALTH OF MASSACHUSETTS
DEED BOOK 1236, PAGE 297

0 20 50 100
SCALE: 1" = 20'

CONTINUED ABOVE

PROP STONE FOR PIPE ENDS INV=189.5

20 LF - 6" DIP

PROP SEDIMENT CONTROL BARRIER (TYP)

APPROX LIMIT OF GRADING (TYP)

PROP LOAM & SEED (TYP)

PT +68.90

+39.83

PC +00.33

PT +34.71

PROP LB

END V DITCH SWALE BEGIN FLAT BOTTOM SWALE STA 538+00

PROP LOAM & SEED (TYP)

APPROX LIMIT OF GRADING (TYP)

PROP 72 INCH CHAIN LINK FENCE, BLACK VINYL COATED (PTR) INSTALL 5' MIN BEHIND GUARDRAIL

WETLAND 6

PROP STONE FOR PIPE ENDS

22 LF - 12" RCP

BEGIN WOOD RAILING STA 539+80

PROP CB

PROP 10' SUP (TYP)

YANKEE DOODLE BIKE PATH SECTION 3 ℄

PROP LINE OF EASEMENT

END GRASS SWALE STA 540+00

PROP STONE FOR PIPE ENDS

27 LF - 12" RCP

PROP LINE OF EASEMENT

REM EXIST FES AND CONNECT TO 12" RCP

RET 12" PIPE

RET CB

PC +81.17

RET HIGHWAY GUARD *

* EXISTING HWY GUARD MAY BE REMOVED AFTER TRAFFIC BARRIER SETUP TO ALLOW CONTRACTOR ACCESS FROM ROUTE 3. GUARDRAIL REMOVED SHALL BE DISCARDED AND REPLACED WITH NEW TL-3 HWY GUARD

PROP CLEARING & GRUBBING (TYP)

PROP CEM CONC RETAINING WALL OVER EXIST HEADWALL (SEE SHEETS 116-119)

WETLAND 3

END WOOD RAILING; BEGIN WOOD BRIDGE RAIL STA 542+62

RET EXIST HEADWALL

PT +28.03

PC +69.59

RET EXIST 48" CULVERT

END WOOD BRIDGE RAIL; BEGIN WOOD RAILING STA 543+35

PROP MODIFIED ROCKFILL SLOPE 1.5:1 MAX

34 LF - 12" RCP

PT +94

PRC +48.77

RET 12" PIPE

RET CB

CONTINUED ON SHEET NO. 25

FOR PROFILE, SEE SHEETS 39 - 40.

608227HD (GEN)-2.DWG Plotted on 23-Jul-2025 1:11 PM

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	25	231
PROJECT FILE NO.	608227		

CONSTRUCTION PLANS

608227HD (GEN)-2.DWG Plotted on 23-Jul-2025 1:13 PM

HIGHWAY GUARD DETAILS

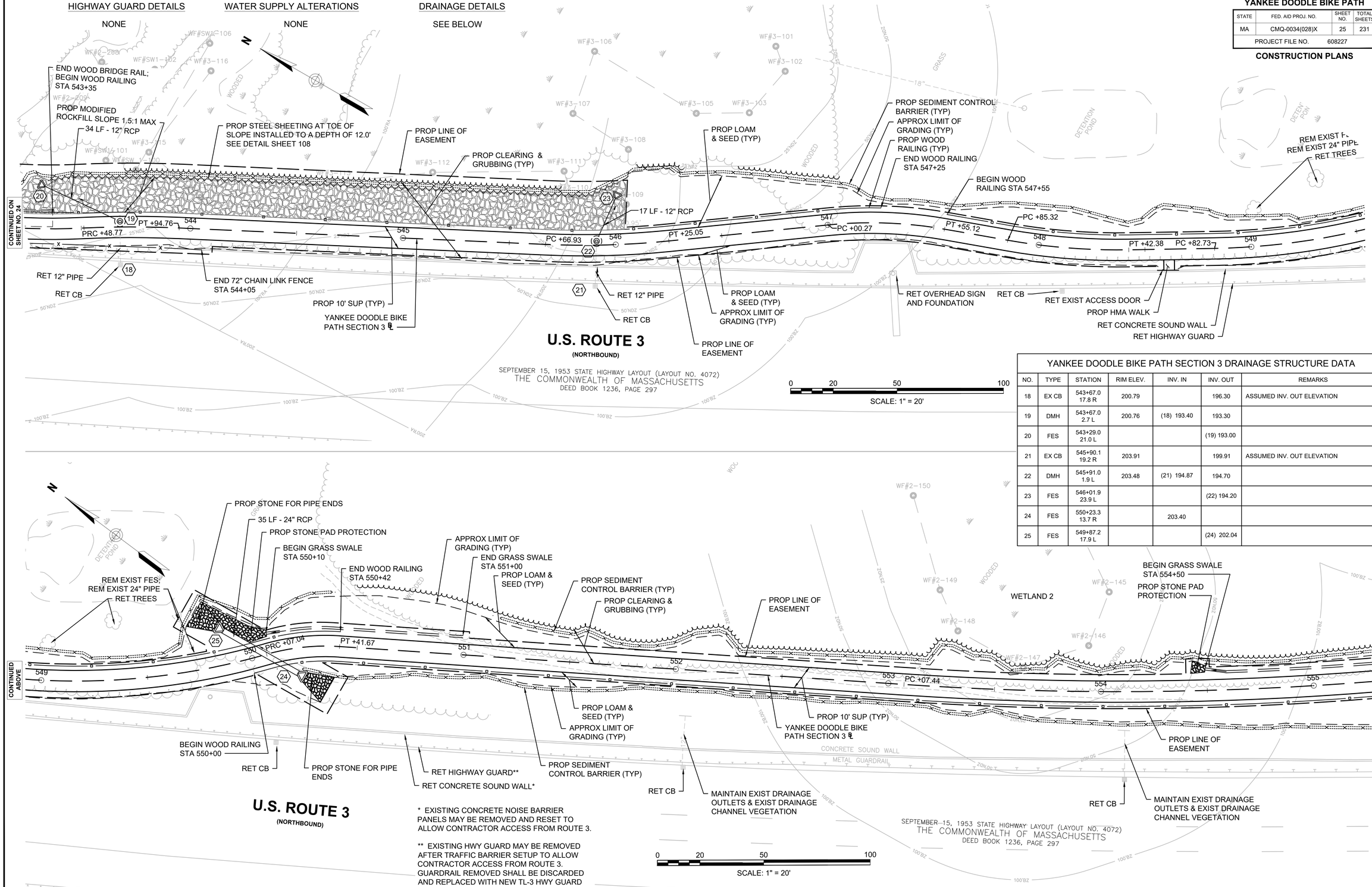
NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE BELOW



YANKEE DOODLE BIKE PATH SECTION 3 DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	RIM ELEV.	INV. IN	INV. OUT	REMARKS
18	EX CB	543+67.0 17.8 R	200.79		196.30	ASSUMED INV. OUT ELEVATION
19	DMH	543+67.0 2.7 L	200.76	(18) 193.40	193.30	
20	FES	543+29.0 21.0 L			(19) 193.00	
21	EX CB	545+90.1 19.2 R	203.91		199.91	ASSUMED INV. OUT ELEVATION
22	DMH	545+91.0 1.9 L	203.48	(21) 194.87	194.70	
23	FES	546+01.9 23.9 L			(22) 194.20	
24	FES	550+23.3 13.7 R		203.40		
25	FES	549+87.2 17.9 L			(24) 202.04	

* EXISTING CONCRETE NOISE BARRIER PANELS MAY BE REMOVED AND RESET TO ALLOW CONTRACTOR ACCESS FROM ROUTE 3.

** EXISTING HWY GUARD MAY BE REMOVED AFTER TRAFFIC BARRIER SETUP TO ALLOW CONTRACTOR ACCESS FROM ROUTE 3. GUARDRAIL REMOVED SHALL BE DISCARDED AND REPLACED WITH NEW TL-3 HWY GUARD

FOR PROFILE, SEE SHEETS 40 - 41.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	26	231
PROJECT FILE NO.	608227		

CONSTRUCTION PLANS

608227HD (GEN)-2.DWG Plotted on 23-Jul-2025 1:14 PM

HIGHWAY GUARD DETAILS

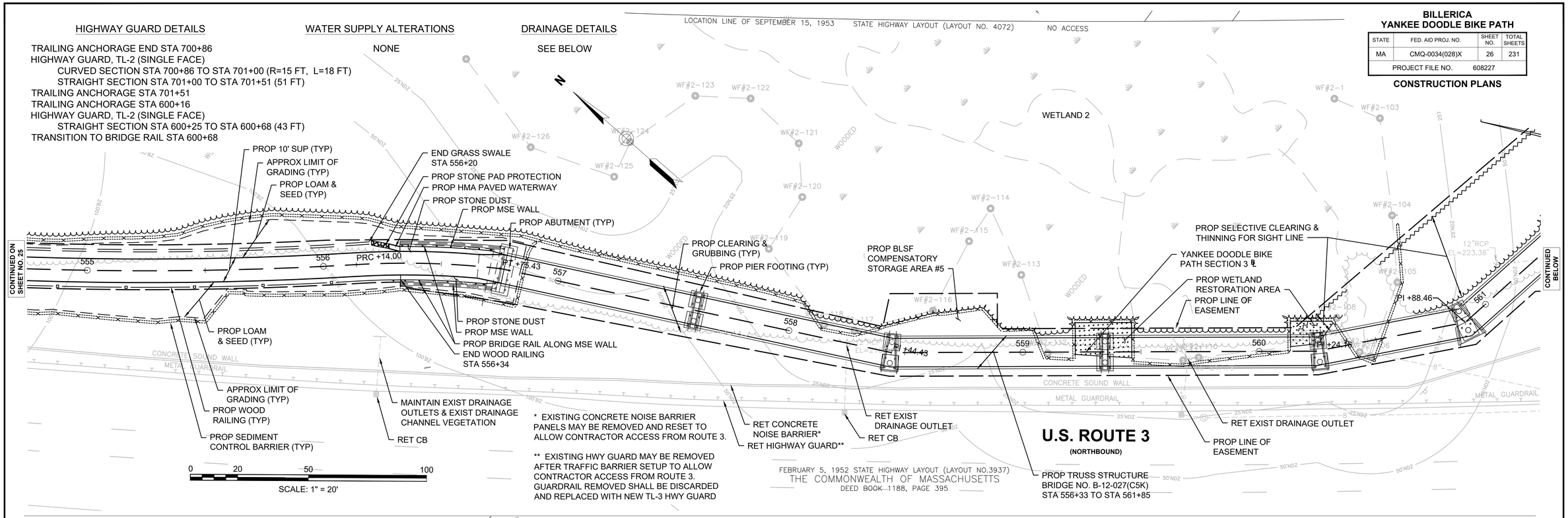
TRAILING ANCHORAGE END STA 700+86
HIGHWAY GUARD, TL-2 (SINGLE FACE)
CURVED SECTION STA 700+86 TO STA 701+00 (R=15 FT, L=18 FT)
STRAIGHT SECTION STA 701+00 TO STA 701+51 (51 FT)
TRAILING ANCHORAGE STA 701+51
TRAILING ANCHORAGE STA 600+16
HIGHWAY GUARD, TL-2 (SINGLE FACE)
STRAIGHT SECTION STA 600+25 TO STA 600+68 (43 FT)
TRANSITION TO BRIDGE RAIL STA 600+68

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE BELOW

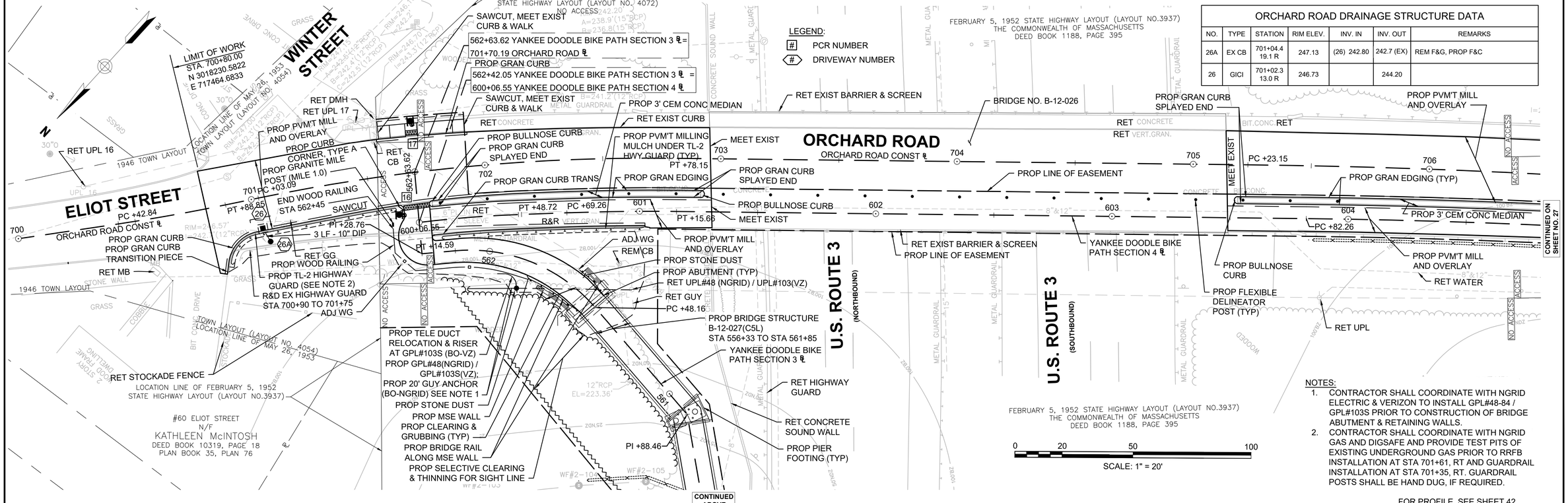


* EXISTING CONCRETE NOISE BARRIER PANELS MAY BE REMOVED AND RESET TO ALLOW CONTRACTOR ACCESS FROM ROUTE 3.

** EXISTING HWY GUARD MAY BE REMOVED AFTER TRAFFIC BARRIER SETUP TO ALLOW CONTRACTOR ACCESS FROM ROUTE 3. GUARDRAIL REMOVED SHALL BE DISCARDED AND REPLACED WITH NEW TL-3 HWY GUARD

FEBRUARY 5, 1952 STATE HIGHWAY LAYOUT (LAYOUT NO.3937)
THE COMMONWEALTH OF MASSACHUSETTS
DEED BOOK 1188, PAGE 395

U.S. ROUTE 3
(NORTHBOUND)



LEGEND:
[#] PCR NUMBER
(#) DRIVEWAY NUMBER

ORCHARD ROAD DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	RIM ELEV.	INV. IN	INV. OUT	REMARKS
26A	EX CB	701+04.4 19.1 R	247.13	(26) 242.80	242.7 (EX)	REM F&G, PROP F&C
26	GICI	701+02.3 13.0 R	246.73		244.20	

NOTES:
1. CONTRACTOR SHALL COORDINATE WITH NGRID ELECTRIC & VERIZON TO INSTALL GPL#48-84 / GPL#103S PRIOR TO CONSTRUCTION OF BRIDGE ABUTMENT & RETAINING WALLS.
2. CONTRACTOR SHALL COORDINATE WITH NGRID GAS AND DIGSAFE AND PROVIDE TEST PITS OF EXISTING UNDERGROUND GAS PRIOR TO RRFB INSTALLATION AT STA 701+61, RT AND GUARDRAIL INSTALLATION AT STA 701+35, RT. GUARDRAIL POSTS SHALL BE HAND DUG, IF REQUIRED.

FOR PROFILE, SEE SHEET 42

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	27	231
PROJECT FILE NO.	608227		

CONSTRUCTION PLANS

608227HD (GEN)-2.DWG Plotted on 23-Jul-2025 1:16 PM

HIGHWAY GUARD DETAILS
NONE

WATER SUPPLY ALTERATIONS
NONE

DRAINAGE DETAILS
SEE BELOW

LEGEND:
[#] PCR NUMBER
<#> DRIVEWAY NUMBER

ORCHARD ROAD DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	RIM ELEV.	INV. IN	INV. OUT	REMARKS
82	DMH	706+76.9 9.8 R	244.23	(83) 240.80	±240.6 (EXIST)	BUILD OVER EXIST PIPE
83	CB	706+84.8 11.2 R	244.44		240.90	
84	CIT	707+44.5 25.3 R	241.69	(85) 238.10	±237.9 (EXIST)	FIELD VERIFY EXISTING INVERT
85	CB	707+37.3 11.0 R	242.23		238.30	

LIMIT OF WORK
STA. 709+50.00
N 3017650.2972
E 716820.1148

PROP PVM'T MILL AND OVERLAY
PROP GRAN EDGING (TYP)
PROP 3' CEM CONC MEDIAN
PC +82.26
PROP PVM'T MILL AND OVERLAY
RET WATER
RET UPL
ADJ CB
RET HWY GUARD
RET DMH
PROP GRAN TRANS CURB
REM EXIST CEM CONC WALK & CURB
PROP SEDIMENT CONTROL BARRIER (TYP)
BEGIN WOOD RAILING STA 606+47
PROP SELECTIVE CLEARING & THINNING FOR SIGHT LINE
PROP 10' SUP
WETLAND 1
PROP WOOD RAILING
SAWCUT, MEET EXIST CURB AND WALK
ADJ CB
4 LF - 12" RCP
PROP GRAN CURB SPLAYED END
PT +05.20
PROP GRAN CURB
PROP RRFB (TYP) SEE TRAFFIC PLANS
PROP BULLNOSE CURB
12 LF - 12" RCP
PC +83.35
PT +62.69
PT +11.78
PROP BIKE RAMP WITH TACTILE DIRECTIONAL INDICATOR (SEE DETAIL SHEET 113)
SAWCUT, MEET EXIST CURB AND WALK
RET EXIST HWY GUARD
RET EXIST CURB
RET UPL
PROP PVM'T MILL AND OVERLAY
MEET EXIST
PC +05.70
PT +27.58
ORCHARD ROAD CONST ℄
ORCHARD ROAD
TECHNOLOGY PARK DRIVE
LOCATION LINE OF MAY 26, 1953 TOWN LAYOUT (LAYOUT NO. 4054)
LOCATION LINE OF FEBRUARY 5, 1952 STATE HIGHWAY LAYOUT (LAYOUT NO. 3837)
NO ACCESS
METAL GUARDRAIL
SLOPED GRAN. RET
RET VERT.GRAN.
RET BIT.CONC.
RET VERT.BIT.
RET 8"GAS
RET 6"GAS
RET 12"
WOODED
GRASS
BIT.CONC.
VERT.GRAN.
VERT.BIT.
CONTINUED ON SHEET NO. 26
CONTINUED BELOW

NOTES:
1. CONTRACTOR SHALL COORDINATE WITH NGRID ELECTRIC & VERIZON TO INSTALL GPL#48-84 / GPL#103S PRIOR TO CONSTRUCTION OF BRIDGE ABUTMENT & RETAINING WALLS.
2. CONTRACTOR SHALL COORDINATE WITH NGRID GAS AND DIGSAFE AND PROVIDE TEST PITS OF EXISTING UNDERGROUND GAS PRIOR TO RRFB INSTALLATION AT STA 701+61, RT AND GUARDRAIL INSTALLATION AT STA 701+35, RT. GUARDRAIL POSTS SHALL BE HAND DUG, IF REQUIRED.

#1100 TECHNOLOGY PARK DRIVE
1100 TECHNOLOGY PARK DRIVE LLC
L.C. CERT #42526
L.C. PLAN #8946J

0 20 50 100
SCALE: 1" = 20'

YANKEE DOODLE BIKE PATH SECTION 4 DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	RIM ELEV.	INV. IN	INV. OUT	REMARKS
27	CB	608+68.8 8.9 L	233.60		229.48	
28	CIT	608+76.2 5.7 L	234.03	(27) 229.23	±228.90 (EXIST)	
30	CIT	609+50.9 5.2 L			227.86	
31	CB	609+56.2 9.0 L	234.62		230.29	

LEGEND:
[#] PCR NUMBER
<#> DRIVEWAY NUMBER

#1100 TECHNOLOGY PARK DRIVE
BAC/JC TECH PARK LLC
LC CERT #45848
LC PLAN 8946-J

TECHNOLOGY PARK DRIVE
RET CB
4 LF - 12" RCP
PROP LOAM & SEED (TYP)
RET 12" WATER
PROP TEMP CONSTR EASEMENT
RET EMH
SAWCUT
PC +59.27
PC +18.19
PRC +73.34
PCC +18.01
PROP CLEARING & GRUBBING (TYP)
RET UP W/ RISER
BEGIN WOOD RAILING STA 606+47
PROP SEDIMENT CONTROL BARRIER (TYP)
PROP SELECTIVE CLEARING & THINNING FOR SIGHT LINE
PROP LOAM & SEED (TYP)
APPROX LIMIT OF GRADING (TYP)
PROP PERM HWY EASEMENT
R&R EXIST CURB
PROP CLEARING & GRUBBING (TYP)
RET EXIST DRAIN OUTLET
YANKEE DOODLE BIKE PATH SECTION 4 ℄
2 LF - 12" RCP
INV. FES
EL=228.29'
PROP GRAN EDGING (TYP)
RET EXIST DRAIN OUTLET
PROP PERM HWY EASEMENT
RET TMH
END WOOD RAILING STA 610+37
PROP 10' SUP (TYP)
DRAIN EASEMENT (BOOK 5072, PAGE 49 PLAN BOOK 139, PLAN 29)
PROP PERM DRAINAGE EASEMENT
GAS EASEMENT (DEED BOOK 5652, PAGE 179)
LOCATION LINE OF MAY 26, 1953 TOWN LAYOUT (LAYOUT NO. 4054)
SLOPED GRAN. RET
RET EMH
RET UPL
RET
CONTINUED ABOVE
CONTINUED ON SHEET NO. 28

1400 TECHNOLOGY PARK DRIVE
E INK CALIFORNIA, LLC, C/O E INK CORPORATION
DEED BOOK 37546, PAGE 108

NOTE:
CONTRACTOR SHALL COORDINATE WITH DIGSAFE AND PROVIDE TEST PITS OF EXISTING UNDERGROUND UTILITIES PRIOR TO WOOD RAILING INSTALLATION AT THIS LOCATION.

0 20 50 100
SCALE: 1" = 20'

FOR PROFILE, SEE SHEETS 43 - 44.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	28	231
PROJECT FILE NO.	608227		

CONSTRUCTION PLANS

608227HD (GEN)-2.DWG Plotted on 23-Jul-2025 1:17 PM

HIGHWAY GUARD DETAILS

NONE

WATER SUPPLY ALTERATIONS

SEE BELOW

DRAINAGE DETAILS

SEE BELOW

LEGEND:
- [#] PCR NUMBER
- <#> DRIVEWAY NUMBER

CONTINUED ON SHEET NO. 27

#1100 TECHNOLOGY PARK DRIVE
BAC/JC TECH PARK LLC
LC CERT #45848
LC PLAN 8946-J

PROP 6" WG & BOX

PROP TEMP CONSTR EASEMENT

RET CB

PROP PERM DRAINAGE EASEMENT

12 LF - 12" RCP

RET SMH

RET EMH

888

889

890

891

892

893

894

SAWCUT

612

613

614

615

616

617

PROP CLEARING & GRUBBING (TYP)

PROP GRAN EDGING (TYP)

PROP LOAM & SEED (TYP)

R&R HYD; PROP THRUST BLOCK REM WG

PT +94.15

R&R BOUND, SET FLUSH WITH RAMP

PROP CLEARING & GRUBBING

RET TREE

RET LP

RET SIGN POSTS

PROP 10' SUP (TYP)

APPROX LIMIT OF GRADING (TYP)

YANKEE DOODLE BIKE PATH SECTION 4 ℄

PROP TREE PROTECTION (TYP)

PROP PERM HWY EASEMENT

PROP TEMP CONSTR EASEMENT

PC +63.03

ADJ EMH (BO, NG)

PRC +83.04

PT +03.05

RET SIGN

RET LP

RET TREE

RET LP

END PROP GRAN EDGING MEET EXIST

R&D SIGN & FLASHING WARNING BEACON

RET LP

REM TREE

RET LANDSCAPING & WALK

RET LANDSCAPING

END PROP GRAN EDGING MEET EXIST

DRAIN EASEMENT (BOOK 5072, PAGE 49 PLAN BOOK 139, PLAN 29)

PROP PERM DRAINAGE EASEMENT

RET EXIST DRAIN OUTLET

END PROP GRAN EDGING, MEET EXIST

DRIVEWAY EASEMENT (BOOK 2610, PAGE 259 PLAN BOOK 139, PLAN 89)

#1000 TECHNOLOGY PARK DRIVE
E INK CORPORATION
DEED BOOK 37546, PAGE 88

#1000 TECHNOLOGY PARK DRIVE
E INK CORPORATION
DEED BOOK 37546, PAGE 88

#1100 TECHNOLOGY PARK DRIVE
BAC/JC TECH PARK LLC
LC CERT #45848
LC PLAN 8946-J

RET HYD

GAS EASEMENT (DEED BOOK 5652, PAGE 179)

RET

SLOPED GRAN.

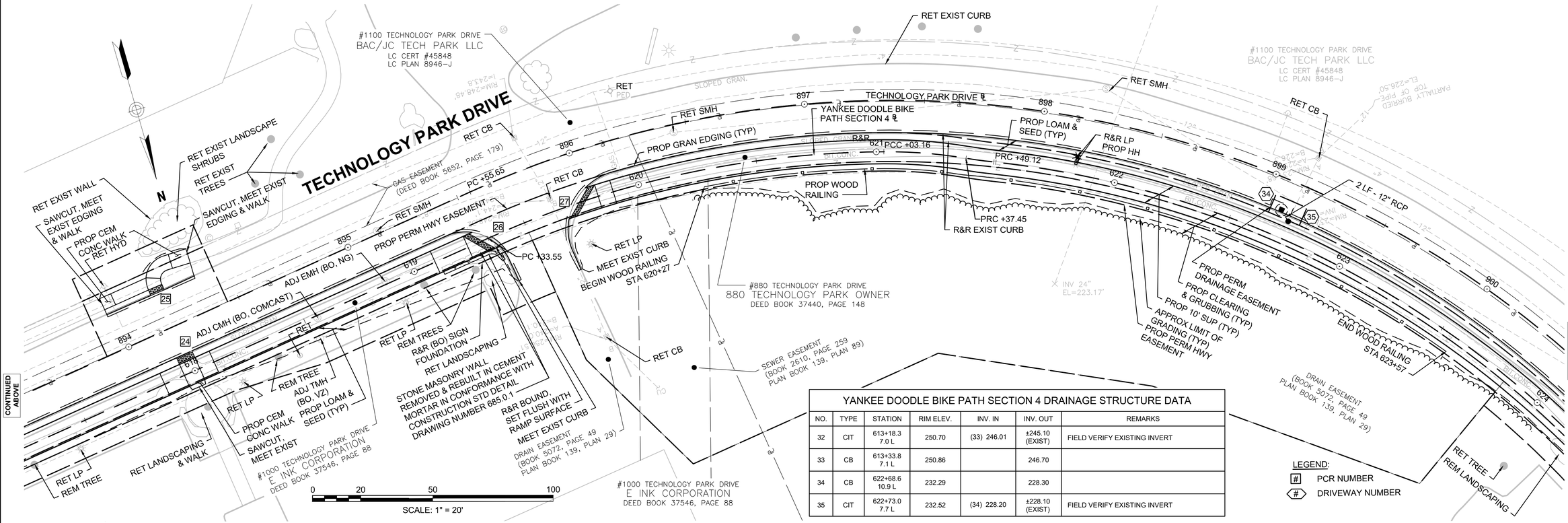
BIT.CONC.

12"

CONTINUED BELOW

NOTE:
WHERE EXISTING BOUNDS ARE REMOVED AND RESET WITHIN PROPOSED PEDESTRIAN CURB RAMPS, THE TOP OF THE BOUND SHALL BE SET TO MATCH THE PROPOSED GRADE AND SLOPE OF THE RAMP.

0 20 50 100
SCALE: 1" = 20'



CONTINUED ABOVE

CONTINUED ON SHEET NO. 29

YANKEE DOODLE BIKE PATH SECTION 4 DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	RIM ELEV.	INV. IN	INV. OUT	REMARKS
32	CIT	613+18.3 7.0 L	250.70	(33) 246.01	±245.10 (EXIST)	FIELD VERIFY EXISTING INVERT
33	CB	613+33.8 7.1 L	250.86		246.70	
34	CB	622+68.6 10.9 L	232.29		228.30	
35	CIT	622+73.0 7.7 L	232.52	(34) 228.20	±228.10 (EXIST)	FIELD VERIFY EXISTING INVERT

LEGEND:
- [#] PCR NUMBER
- <#> DRIVEWAY NUMBER

FOR PROFILE, SEE SHEETS 44 - 45.

HIGHWAY GUARD DETAILS

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE BELOW

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	29	231
PROJECT FILE NO.	608227		

CONSTRUCTION PLANS

608227HD (GEN)-2.DWG Plotted on 23-Jul-2025 1:19 PM

#900 TECHNOLOGY PARK DRIVE
FLUID MANAGEMENT SYSTEMS INC
DEED BOOK 35077 PAGE 203
PLAN BOOK 150, PLAN 1

TECHNOLOGY PARK DRIVE

#880 TECHNOLOGY PARK DRIVE
880 TECHNOLOGY PARK OWNER
DEED BOOK 37440, PAGE 148

#800 TECHNOLOGY PARK DRIVE
TECHNOLOGY PARK REALTY TRUST I
DEED BOOK 10302, PAGE 256
PLAN BOOK 168, PLAN 117

#700 TECHNOLOGY PARK DRIVE
700 TECHNOLOGY PARK FMS LLC
DEED BOOK 35963 PAGE 108
PLAN BOOK 150, PLAN 1

RET
SLOPED GRAN.
RET SMH
SAWCUT
BIT.CONC.
RET PIPE
RET CB
TECHNOLOGY PARK DRIVE ℄
PT +47.61
YANKEE DOODLE BIKE PATH SECTION 4 ℄
PT +95.01
ADJ TMH (BO, VZ)
ADJ EMH (BO, NG)
3 LF - 12" RCP
PC +67.34
PRC +87.35
PT +07.36
PROP PERM DRAINAGE EASEMENT
PROP LOAM & SEED (TYP)
RET EDGING
GAS EASEMENT (DEED BOOK 5652, PAGE 179)
PC +18.06
PC +86.17
PCC +24.99
19 LF - 12" RCP
RET
CONTINUED ON SHEET NO.28
CONTINUED BELOW
END WOOD RAILING STA 623+57
RET TREE
REM LANDSCAPING
R&R GRAN EDGING
CONTROL BOX REMNANT
RET FOUNDATION
PROP TEMP CONSTR EASEMENT
REM TREE
PROP PERM HWY EASEMENT
ELECTRIC EASEMENT (BOOK 10303, PAGE 3 PLAN BOOK 200, PLAN 141)
REM LANDSCAPING
RET LANDSCAPING
PROP 10' SUP (TYP)
APPROX LIMIT OF GRADING (TYP)
ACCESS AND UTILITY CORRIDOR (PLAN BOOK 10303, PLAN 3)
RET LPS & SIGN
RET LANDSCAPING
END PROP GRAN EDGING MEET EXIST
RET HEDGES
RET SIGN
RET LANDSCAPING (TYP)
RET TREE
END PROP GRAN EDGING MEET EXIST
RET LP
ADJ TMH (BO, VZ)
RET TREE
RET DMH
RET LP
RET TREE: PROP TREE PROTECTION
COMMUNICATION EASEMENT (BOOK 10303, PAGE 3 PLAN BOOK 200, PLAN 141)
DRIVEWAY EASEMENT (BOOK 2610, PAGE 259 PLAN BOOK 139, PLAN 89)
DRAIN EASEMENT (BOOK 5072, PAGE 49 PLAN BOOK 139, PLAN 29)

LEGEND:
[#] PCR NUMBER
<#> DRIVEWAY NUMBER

0 20 50 100
SCALE: 1" = 20'

CONTINUED ON SHEET NO. 30
CONTINUED ABOVE

#700 TECHNOLOGY PARK DRIVE
700 TECHNOLOGY PARK FMS LLC
DEED BOOK 35963 PAGE 108
PLAN BOOK 150, PLAN 1

#600 TECHNOLOGY PARK DRIVE
TPD 600 EQUITY PARTNERS
DEED BOOK 36008, PLAN 40
PLAN BOOK 139, PLAN 29

PROP PERM DRAINAGE EASEMENT
RET EDGING
RET PIPE
RET CB
RET ROCK OUTCROP
DRAIN EASEMENT (BOOK 5072, PAGE 49 PLAN BOOK 139, PLAN 29)
RET SIGN
BEGIN PROP GRAN EDGING MEET EXIST
PROP GRAN EDGING
TECHNOLOGY PARK DRIVE ℄
YANKEE DOODLE BIKE PATH SECTION 4 ℄
PROP LOAM & SEED (TYP)
R&R LP, PROP HH
ADJ TMH (BO - VERIZON)
REM RISER
PROP COMM HH
ADJ CMH (BO)
RET UTILITY BOX
PROP 10' SUP (TYP)
PROP LOAM & SEED (TYP)
PROP PERM HWY EASEMENT
APPROX LIMIT OF GRADING (TYP)
ADJ TMH (BO, VZ)
RET STONE WALL
R&R BOUND, SET FLUSH WITH PATH SURFACE
PROP TREE PROTECTION FENCE
RET MAILBOXES
SAWCUT, MEET EXIST CURB AND EDGING
PROP BOULDER BARRIER (TYP)
R&R GRAN EDGING
SAWCUT, MEET EXIST WALK AND EDGING STA 897+17
PROP TEMP CONSTR EASEMENT (TYP)
ADJ SMH
12 LF - 12" RCP
INV = EL=193.97
KS BILLERICA ROADWAYS, LLC
DEED BOOK 38118, PAGE 71
PLAN BOOK 187, PLAN 94
PLAN BOOK 194, PLAN 119
WALL STREET

0 20 50 100
SCALE: 1" = 20'

YANKEE DOODLE BIKE PATH SECTION 4 DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	RIM ELEV.	INV. IN	INV. OUT	REMARKS
36	CB	626+17.0 11.0 L	217.70		213.40	
37	CIT	626+21.9 6.9 L	218.04	(36) 213.30	±212.5 (EXIST)	FIELD VERIFY EXISTING INVERT
38	CB	628+93.8 10.2 L	211.56		206.99	
39	CIT	629+17.5 6.8 L	211.52	(38) 206.61	±205.9 (EXIST)	FIELD VERIFY EXISTING INVERT
40	CB	632+50.7 37.0 L	199.01		EXIST	REMODEL
41	CIT	632+50.4 7.1 L	199.39	(42) 195.01	±194.96 (EXIST)	FIELD VERIFY EXISTING INVERT
42	CB	632+66.8 11.0 L	198.63		195.13	

FOR PROFILE, SEE SHEETS 45 - 46.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	30	231
PROJECT FILE NO.	608227		

CONSTRUCTION PLANS

608227HD (GEN)-2.DWG Plotted on 23-Jul-2025 1:21 PM

HIGHWAY GUARD DETAILS

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE BELOW

#900 TECHNOLOGY PARK DRIVE
FLUID MANAGEMENT SYSTEMS INC
DEED BOOK 35077 PAGE 203
PLAN BOOK 150, PLAN 1

#700 TECHNOLOGY PARK DRIVE
700 TECHNOLOGY PARK FMS LLC
DEED BOOK 35963 PAGE 108
PLAN BOOK 150, PLAN 1

LEGEND:
PCR NUMBER
DRIVEWAY NUMBER

KS BILLERICA ROADWAYS, LLC
DEED BOOK 38118, PAGE 71
PLAN BOOK 187, PLAN 94
PLAN BOOK 194, PLAN 119

CONTINUED ON SHEET NO. 29

PROP STONE PAD
BEGIN GRASS SWALE STA 633+58
PROP RRFB (SHEET 76)
ADJ CMH (BO, COMCAST)
PROP LOAM & SEED (TYP)
APPROX LIMIT OF GRADING (TYP)
PROP TEMP CONSTR EASEMENT
REM CONC PAD
REM WOOD POST
END GRASS SWALE STA 635+00
PROP PERM HWY EASEMENT
PC +80.03
PT +95.85
PC +37.29
PT +85.34
PC +79.99
PT +28.45
TEXTURIZED DECORATIVE PVM'T
PROP BOULDER (TYP)
PROP FULL DEPTH PAVEMENT
2023 TOWN LAYOUT
ASTRIG WAY
CONTINUED BELOW
RET STREET LIGHT
PROP CLEARING & GRUBBING (TYP)
PROP SPLITTER ISLAND (SEE DETAIL SHEET 113)
RET WOOD POST
RET BOUND
END PROP GRAN EDGING MEET EXIST
PROP PERM HWY EASEMENT
PROP LOAM & SEED (TYP)
APPROX LIMIT OF GRADING (TYP)
PROP TEMP CONSTR EASEMENT
PROP 10' SUP (TYP)
YANKEE DOODLE BIKE PATH SECTION 4 ℄
PROP SPLITTER ISLAND (SEE DETAIL SHEET113)
RET WOOD POST
SAWCUT & MEET EXIST DWY
REM WOOD POST
PROP BOULDER (TYP)
CONCORD ROAD
TECHNOLOGY PARK REALTY TRUST 1
DEED BOOK 2517, PAGE 532
PLAN BOOK 107, PLAN 42
350 CONCORD ROAD
LARA PUPIM
DEED BOOK 34277, PAGE 189
PLAN BOOK 126, PLAN 7
#354 CONCORD ROAD
JOHN M. & PATRICE I. FICOCIELLO
DEED BOOK 4936, PAGE 275
PLAN BOOK 126, PLAN 7
0 20 50 100
SCALE: 1" = 20'

YANKEE DOODLE BIKE PATH SECTION 4 DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	RIM ELEV.	INV. IN	INV. OUT	REMARKS
86	GI	643+71.3 21.0 L	210.74		208.20	
87	EX CB	643+71.3 16.1 L	210.82	(86) 207.60	±207.4 (EXIST)	REM F&G, PROP F&C

ASTRIG WAY SEWER STRUCTURE DATA

NO.	TYPE	STATION	RIM ELEV.	INV. IN	INV. OUT	REMARKS
S1	SMH	642+12.0 9.7 L	211.71		205.35	
S2	STUB	645+62.4 10.5 L		(S1) 202.57		CAP 8" SEWER FOR FUTURE CONNECTION
S3	STUB	642+97.1 23.0 L				2% SLOPE TO MAIN
S4	STUB	642+33.9 23.0 L				2% SLOPE TO MAIN

#3 ASTRIG WAY
MICHAEL J. & LISA M. KILCOYNE
DEED BOOK 4809, PAGE 252
PLAN BOOK 165, PLAN 20

EXIST ROADWAY TURN AROUND EASEMENT
BOOK 04746, PAGE 285
PLAN BOOK 165, PLAN 20
GRANTOR: MICHAEL J. & LISA M. KILCOYNE
GRANTEE: TOWN OF BILLERICA

#1 ASTRIG WAY
DONALD E & KELLY A. NAUGLER
DEED BOOK 34647, PAGE 162
PLAN BOOK 165, PLAN 20

CONTINUED ABOVE

PROP CLEARING & GRUBBING (TYP)
PROP FULL DEPTH PAVEMENT
PROP TEMP CONSTR EASEMENT
PROP LOAM & SEED (TYP)
PROP MODIFIED ROCKFILL SLOPE
PROP CLEARING & GRUBBING (TYP)
RET WALL
APPROX LIMIT OF GRADING (TYP)
PROP SMH
YANKEE DOODLE BIKE PATH SECTION 4 ℄
PROP FULL DEPTH PAVEMENT
RET TREE; PROP TREE PROTECTION
RET HYD
RET UP
PROP 4" PVC SEWER SERVICE WYE CONNECTION (TYP) STUB AT EDGE OF PVM'T
PROP GI
RET STONE WALL
RET UP
SAWCUT & MEET EXIST DWY
PROP FULL DEPTH PAVEMENT
PROP TREE PROTECTION FENCE
R&S STONE WALL
2023 TOWN LAYOUT
ASTRIG WAY
REM TREES
3 LF - 10" DIP
346 FT - 8" PVC SEWER
R&S BASKETBALL HOOP
PROP F&C
639 640 641 642 643 644 645
PROP TEMP CONSTR EASEMENT
RET STONE RETAINING WALL MEET EXIST GRAVEL DWY
RET STONE RETAINING WALL
PROP LOAM & SEED (TYP)
APPROX LIMIT OF GRADING (TYP)
PROP GRAVEL DRIVE
SAWCUT, MEET EXIST DWY
PROP HMA DRIVE MEET EXIST DWY
PROP GRAVEL DRIVE
REM TREES AND SHRUB
PROP CLEARING & GRUBBING (TYP)
R&S STONE WALL - 7 LF
RET STONE WALL
PROP CLEARING & GRUBBING (TYP)
PROP HMA DRIVE
SAWCUT, MEET EXIST DWY
CONTINUED ON SHEET NO. 31

LEGEND:
PCR NUMBER
DRIVEWAY NUMBER

#354 CONCORD ROAD
JOHN M. & PATRICE I. FICOCIELLO
DEED BOOK 4936, PAGE 275
PLAN BOOK 126, PLAN 7
#358 CONCORD ROAD
VICKI L. STRANG
DEED BOOK 30086, PAGE 269
PLAN BOOK 82, PLAN 144
#360 CONCORD ROAD
MARY B CARSON
DEED BOOK 16261, PAGE 224
PLAN BOOK 82, PLAN 144
#362 CONCORD ROAD
JACIRA DE JESUS MATOS
DEED BOOK 35880, PAGE 28
PLAN BOOK 82, PLAN 144
#364 CONCORD ROAD
DANIEL J. & JENNIFER A. MORIARTY
DEED BOOK 28466, PAGE 72
PLAN BOOK 82, PLAN 144
#366 CONCORD ROAD
RICHARD E. & BONNIE JEAN MCLAY
DEED BOOK 4865, PAGE 219
PLAN BOOK 82, PLAN 144
#368 CONCORD ROAD
CHRISTINA J. FISHER
DEED BOOK 35668, PAGE 278
PLAN BOOK 82, PLAN 144
#370 CONCORD ROAD
WILLIAM P. & DIANA I. QUAGIOZZI
DEED BOOK 4456, PAGE 90
PLAN BOOK 82, PLAN 144
0 20 50 100
SCALE: 1" = 20'

FOR PROFILE, SEE SHEETS 46 - 47.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	31	231
PROJECT FILE NO.	608227		

CONSTRUCTION PLANS

HIGHWAY GUARD DETAILS — NONE

WATER SUPPLY ALTERATIONS — NONE

DRAINAGE DETAILS — SEE BELOW

LEGEND:
- [#] PCR NUMBER
- <#> DRIVEWAY NUMBER

#1 ASTRIG WAY
DONALD E & KELLY A. NAUGLER
DEED BOOK 34647, PAGE 162
PLAN BOOK 165, PLAN 20

#6 SPRINGS ROAD
LOCUST CONSTRUCTION GROUP, LLC
L.C. CERT #44051
L.C. PLAN #5472D

#3 SPRINGS ROAD
ALISTAIR W. WILSON
DEED BOOK 7211, PAGE 208
PLAN BOOK 105, PLAN 30

#7 SPRINGS ROAD
CARL DWORKIN FAMILY TRUST
DEED BOOK 1834, PAGE 196
PLAN BOOK 105, PLAN 30

#11 SPRINGS ROAD
FRANK J. LUCIANO, III
DEED BOOK 8574, PAGE 214

#1 SPRINGS ROAD
JOHN J. CAPORIZZO
DEED BOOK 26754, PAGE 80
PLAN BOOK 167, PLAN 61

#374 CONCORD ROAD
STEPHEN B. MOSS
DEED BOOK 10411, PAGE 10
PLAN BOOK 167, PLAN 61

#370 CONCORD ROAD
WILLIAM P. & DIANA I. QUAGIOZZI
DEED BOOK 4456, PAGE 90
PLAN BOOK 82, PLAN 144

SPRINGS ROAD

ASTRIG WAY

SAWCUT & MEET EXIST DWY
PROP FULL DEPTH PAVEMENT
PROP TREE PROTECTION FENCE
RET STONE WALL
PROP CLEARING & GRUBBING (TYP)
R&S STONE WALL
RET MB
RET UP
2023 TOWN LAYOUT
2016 TOWN LAYOUT
RET POST
8" PVC SEWER STUB FOR FUTURE CONNECTION
ADJ CB
346 FT - 8" PVC SEWER
SAWCUT
2 LF - 10" DIP
REM TREES AND SHRUB
PROP CLEARING & GRUBBING (TYP)
R&S STONE WALL - 7 LF
RET STONE WALL
PI +42.73
RET UP
TEXTURIZED DECORATIVE PVM'T
PROP HMA DRIVE
SAWCUT & MEET EXIST DWY
RET UP #992
PROP BOULDER BARRIER (TYP)
PROP SPLITTER ISLAND (SEE DETAIL SHEET 113)
REM EXIST RAILROAD TIES
REM TREE
RET TREES; PROP TREE PROTECTION
RET HEDGE
RET BOULDERS
REM HEDGE
R&R MB
PI +85.27
YANKEE DOODLE BIKE PATH SECTION 4 ℄
RET STONE WALL
RET CURB
RET TREE
PROP 10' SUP (TYP)
PROP LOAM & SEED (TYP)
APPROX LIMIT OF GRADING (TYP)
RET EXIST FENCE
BEGIN GRASS SWALE STA 647+00
RET BUILDING
REM TREES
RET TREE; PROP TREE PROTECTION
RET POST
REM TREE
PROP TEMP CONSTR EASEMENT
R&D WOOD RET WALL
PROP PERM HWY EASEMENT
R&S EXIST FENCE (STA 646+57 LT TO STA 649+23 LT)
PROP CLEARING & GRUBBING (TYP)
PROP TEMP CONSTR EASEMENT
RET BOULDER
APPROX LIMIT OF GRADING (TYP)
RET TREES
RET TREE; PROP TREE PROTECTION
PROP LOAM & SEED (TYP)
REM TREES
FORMER RAILROAD SIDELINE (VAL MAP VS13.3M03)
PI +24.00
PROP CLEARING & GRUBBING (TYP)
PI +24.02
RET WOOD FENCE
PROP PERM HWY EASEMENT
FORMER RAILROAD SIDELINE (VAL MAP VS13.3M03)

CONTINUED ON SHEET NO. 30

CONTINUED BELOW

0 20 50 100
SCALE: 1" = 20'

YANKEE DOODLE BIKE PATH SECTION 4 DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	RIM ELEV.	INV. IN	INV. OUT	REMARKS
43	GI	645+53.7 7.9 R	209.63	(44) 206.13		
44	EX CB	645+50.5 8.8 R	209.63		205.46	REM F&G, PROP F&C

#11 SPRINGS ROAD
FRANK J. LUCIANO, III
DEED BOOK 8574, PAGE 214

#13 SPRINGS ROAD
ANTHONY & ELIZABETH B. PARKES
DEED BOOK 6478, PAGE 85
PLAN BOOK 181, PLAN 93

#11 HOSMER WAY
TOWN OF BEDFORD
DEED BOOK 70984, PAGE 404
PLAN 487 OF 2017

#9 HOSMER WAY HOMEOWNERS ASSOCIATION
DEED BOOK 22452, PAGE 508
PLAN 487 OF 2017

BEDFORD
BILLERICA

#44 BUEHLER ROAD
TOWN OF BEDFORD
DEED BOOK 70984, PAGE 404
PLAN 487 OF 2017

RAIL ROAD (SPRING ST SOUTH)
TOWN OF BEFORD
DEED BOOK 10423, PAGE 220

#388 CONCORD ROAD
JODY PAUL PERONI
DEED BOOK 2502, PAGE 332
PLAN BOOK 103, PLAN 171B
PLAN BOOK 103, PLAN 121B

RAIL ROAD (SPRING ST SOUTH)
BOSTON AND MAINE CORPORATION
DEED BOOK 170, PAGE 15
DEED BOOK 173, PAGE 409

#4 FIELD STREET
LEONARD & MAUREEN CARON
DEED BOOK 36494, PAGE 288
PLAN BOOK 31, PLAN 37

#481-B NORTH ROAD
LEONARD & MAUREEN CARON
DEED BOOK 21138, PAGE 394
PLAN BOOK 31, PLAN 37

END GRASS SWALE STA 652+40
PROP STONE PAD
PROP SEDIMENT CONTROL BARRIER (TYP)
PROP TEMP CONSTR EASEMENT
PROP PERM HWY EASEMENT
PROP CLEARING & GRUBBING (TYP)
PROP 10' SUP (TYP)
BEGIN WOOD RAILING STA 652+07
PROP LOAM & SEED (TYP)
APPROX LIMIT OF GRADING (TYP)
END WOOD RAILING STA 652+87
APPROX LIMIT OF GRADING(TYP)
PROP SEDIMENT CONTROL BARRIER (TYP)
BEGIN WOOD RAILING STA 653+87
PROP LOAM & SEED (TYP)
YANKEE DOODLE BIKE PATH SECTION 4 ℄
RET BOULDER
END WOOD RAILING STA 654+60
PROP TEMP CONSTR EASEMENT
PROP GRANITE MILE POST (MILE 0.0)
RET RB
R&S EXIST GATE
PROP 10' STONE DUST PATH
656+00
MEET EXIST STONE DUST PATH
PROJECT END
STA. 655+63.15
N 3016625.2440
E 714535.5165
PROP TEMP CONSTR EASEMENT
RET WALL

0 20 50 100
SCALE: 1" = 20'

FOR PROFILE, SEE SHEETS 47 - 48.

608227HD (GEN)-2.DWG Plotted on 23-Jul-2025 1:23 PM

BILLERICA
YANKEE DOODLE BIKE PATH

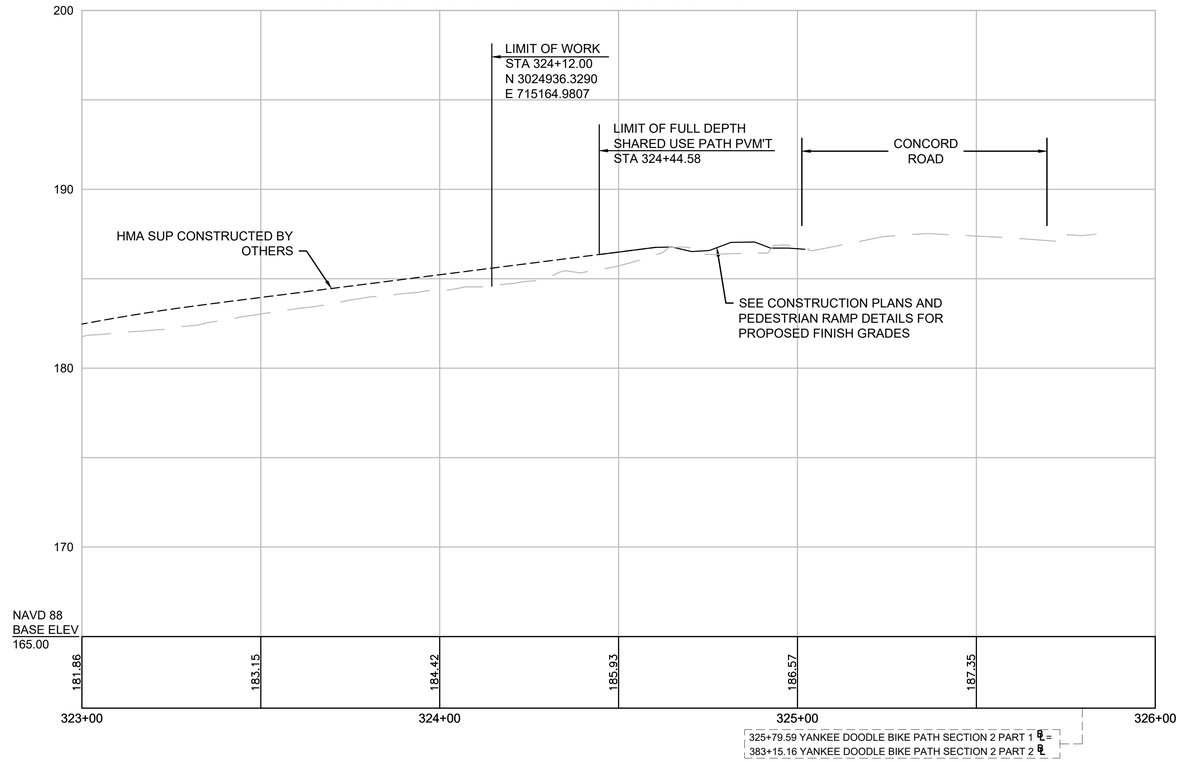
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	32	231
PROJECT FILE NO.	608227		

PROFILES

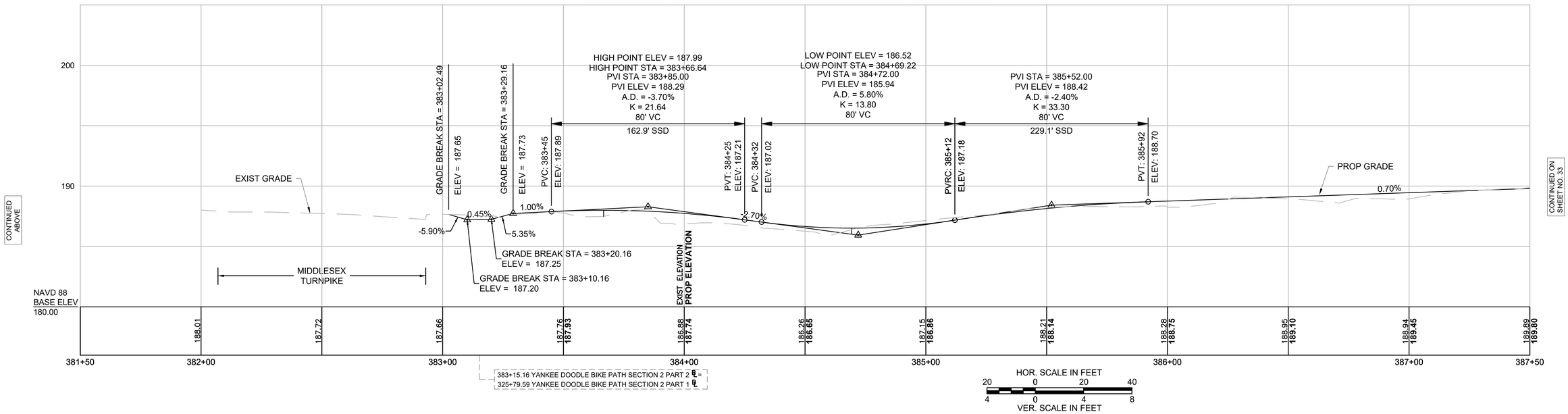
608227HD (PROF)-2.DWG Plotted on 23-Jul-2025 12:41 PM

CONTINUED BELOW

YANKEE DOODLE BIKE PATH SECTION 2 PART 1



YANKEE DOODLE BIKE PATH SECTION 2 PART 2



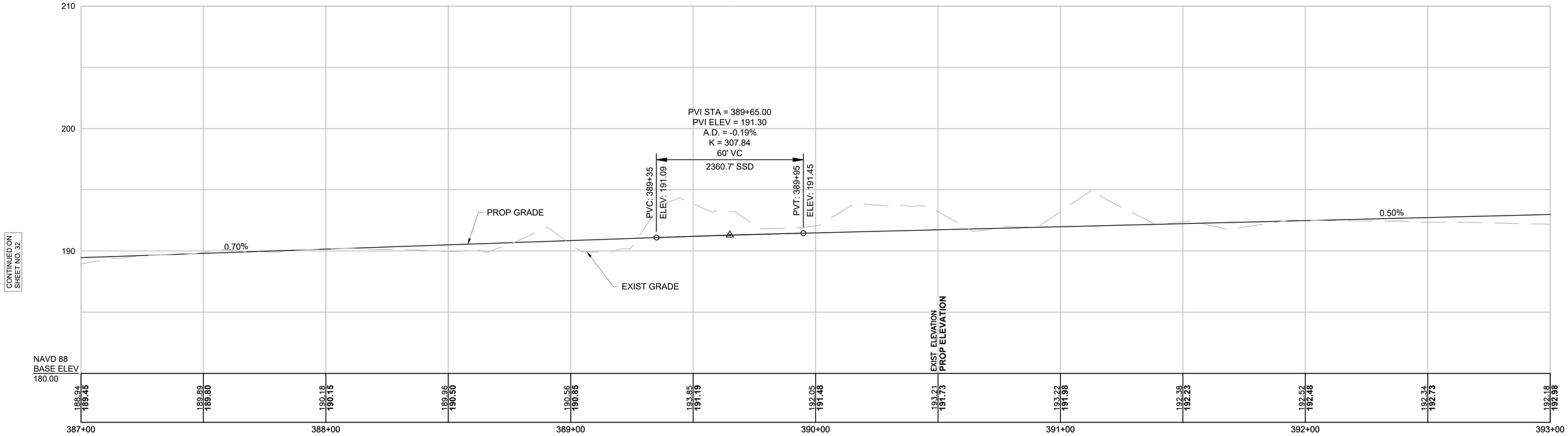
FOR CONSTRUCTION PLANS SEE SHEET NO. 18

BILLERICA
YANKEE DOODLE BIKE PATH

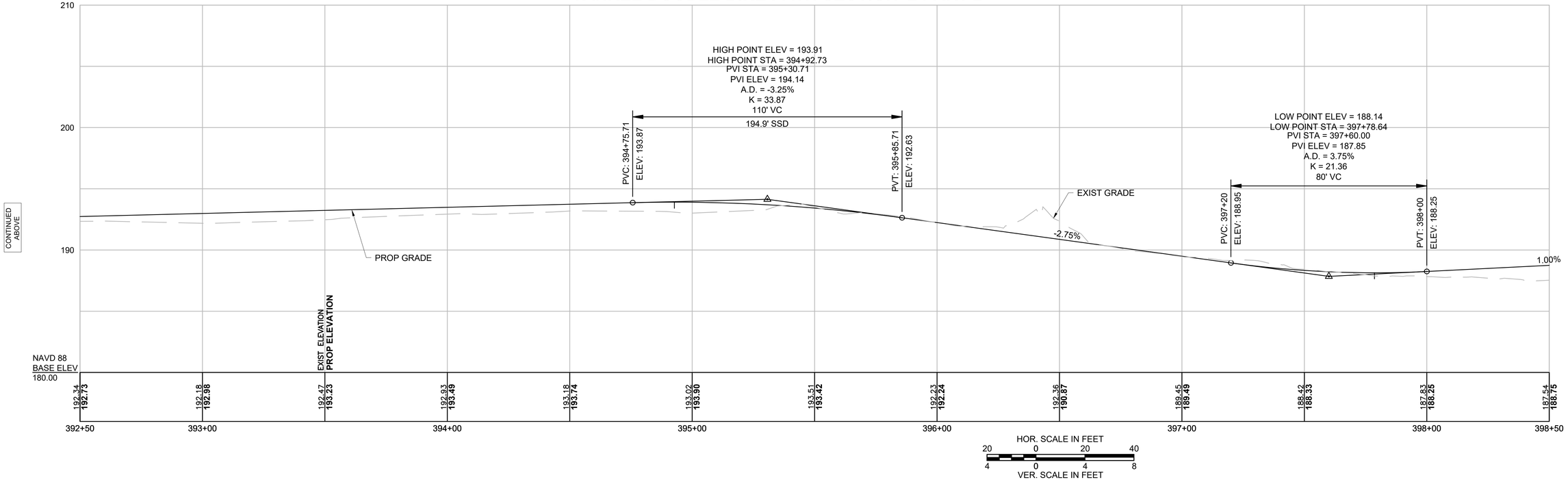
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	33	231
PROJECT FILE NO.	608227		

PROFILES

YANKEE DOODLE BIKE PATH SECTION 2 PART 2



YANKEE DOODLE BIKE PATH SECTION 2 PART 2



HOR. SCALE IN FEET
20 0 20 40
4 0 4 8
VER. SCALE IN FEET

FOR CONSTRUCTION PLANS SEE SHEET NOS. 18-19

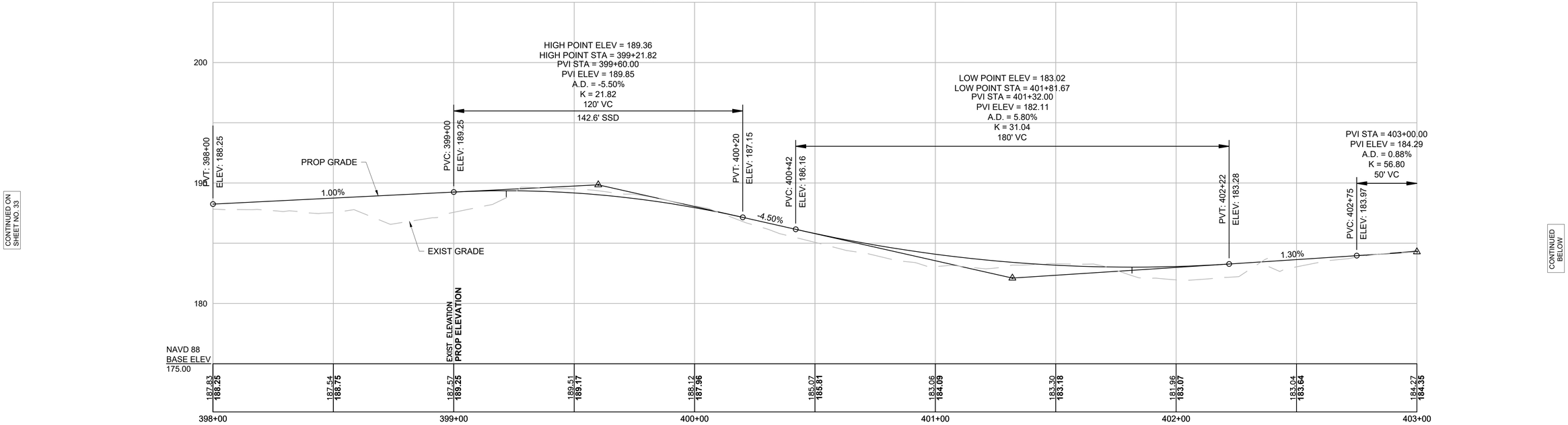
608227HD (PROF)-2.DWG Plotted on 23-Jul-2025 12:42 PM

BILLERICA
YANKEE DOODLE BIKE PATH

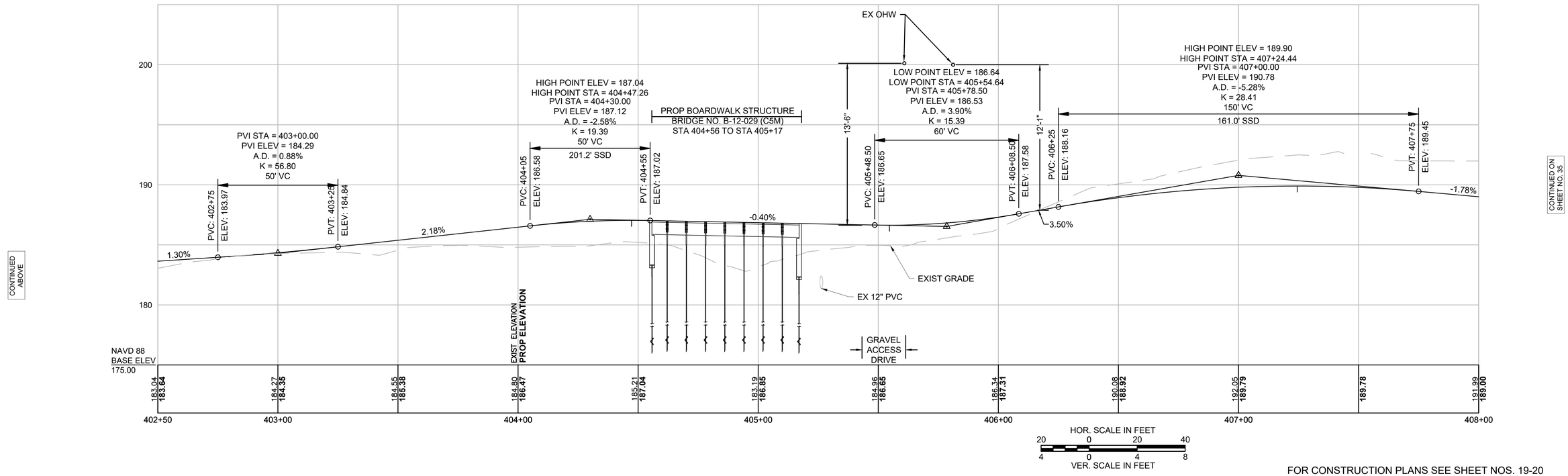
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	34	231
PROJECT FILE NO.	608227		

PROFILES

YANKEE DOODLE BIKE PATH SECTION 2 PART 2



YANKEE DOODLE BIKE PATH SECTION 2 PART 2



FOR CONSTRUCTION PLANS SEE SHEET NOS. 19-20

608227HD (PROF)-2.DWG Plotted on 23-Jul-2025 12:42 PM

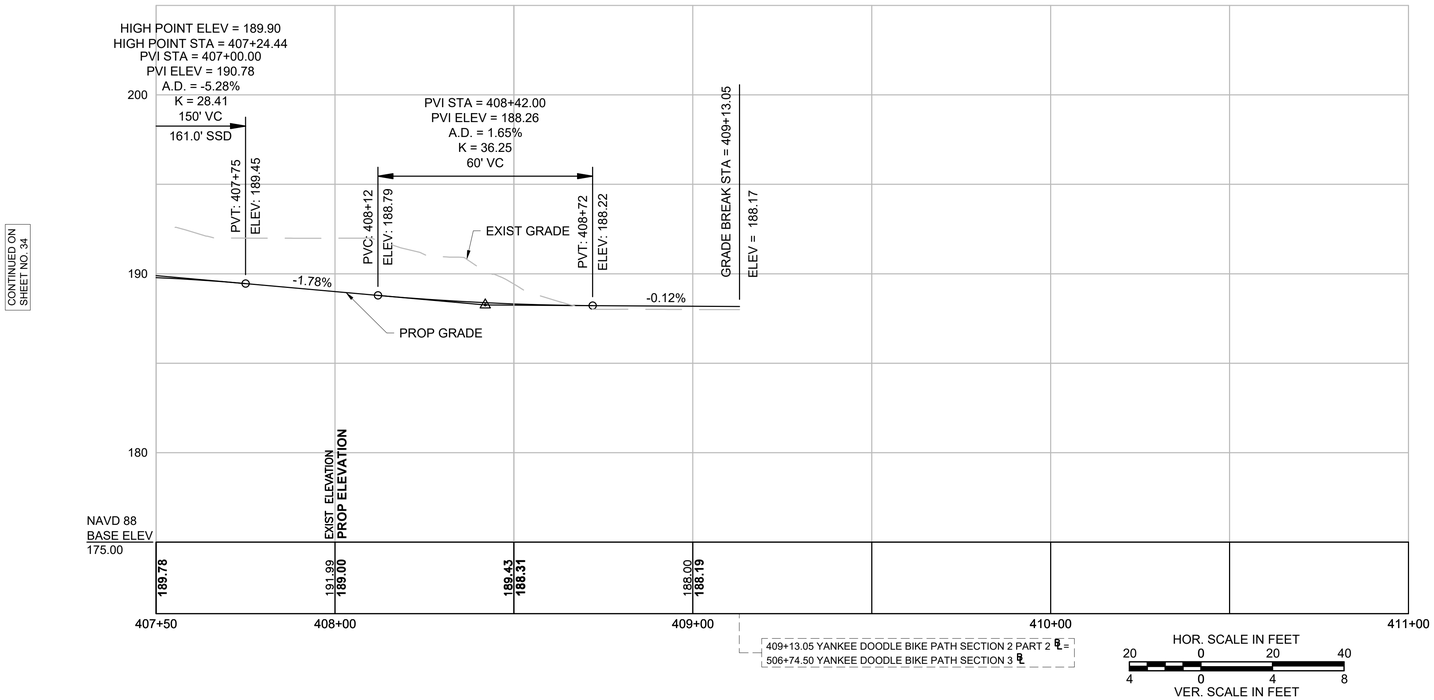
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	35	231
PROJECT FILE NO.	608227		

PROFILES

608227HD (PROF)-2.DWG Plotted on 23-Jul-2025 12:42 PM

YANKEE DOODLE BIKE PATH SECTION 2 PART 2



CONTINUED ON SHEET NO. 34

FOR CONSTRUCTION PLANS SEE SHEET NOS. 20-21

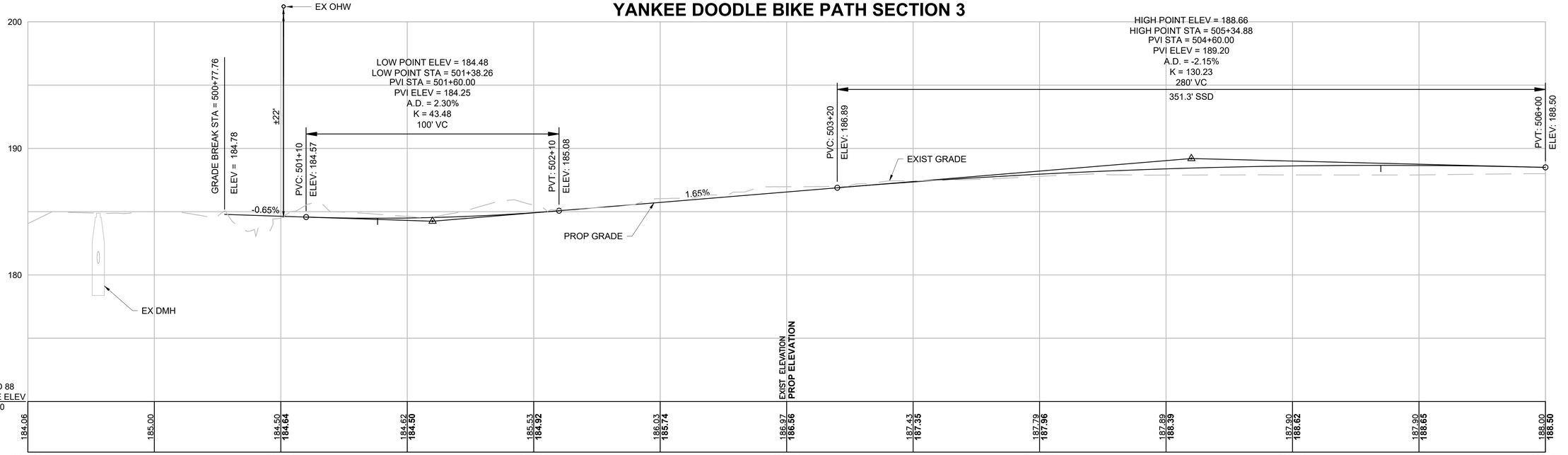
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	36	231
PROJECT FILE NO.	608227		

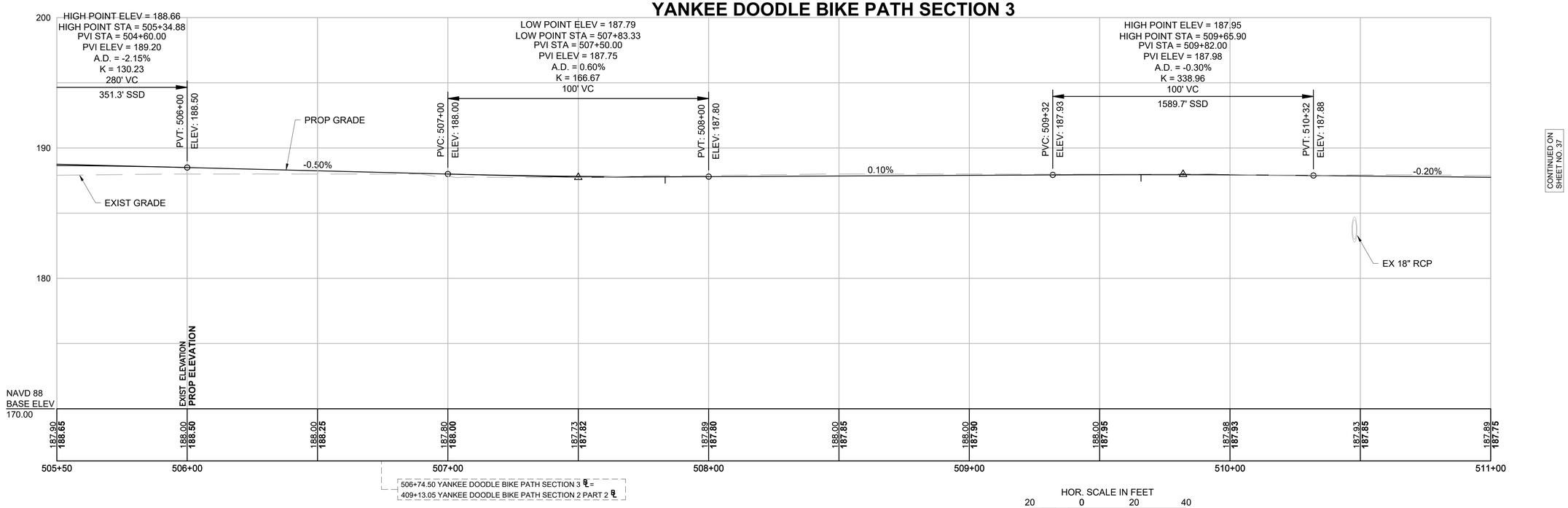
PROFILES

608227HD (PROF)-3.DWG Plotted on 23-Jul-2025 12:44 PM

YANKEE DOODLE BIKE PATH SECTION 3



YANKEE DOODLE BIKE PATH SECTION 3



506+74.50 YANKEE DOODLE BIKE PATH SECTION 3 ℄ =
409+13.05 YANKEE DOODLE BIKE PATH SECTION 2 PART 2 ℄

HOR. SCALE IN FEET
20 0 20 40
VER. SCALE IN FEET
4 0 4 8

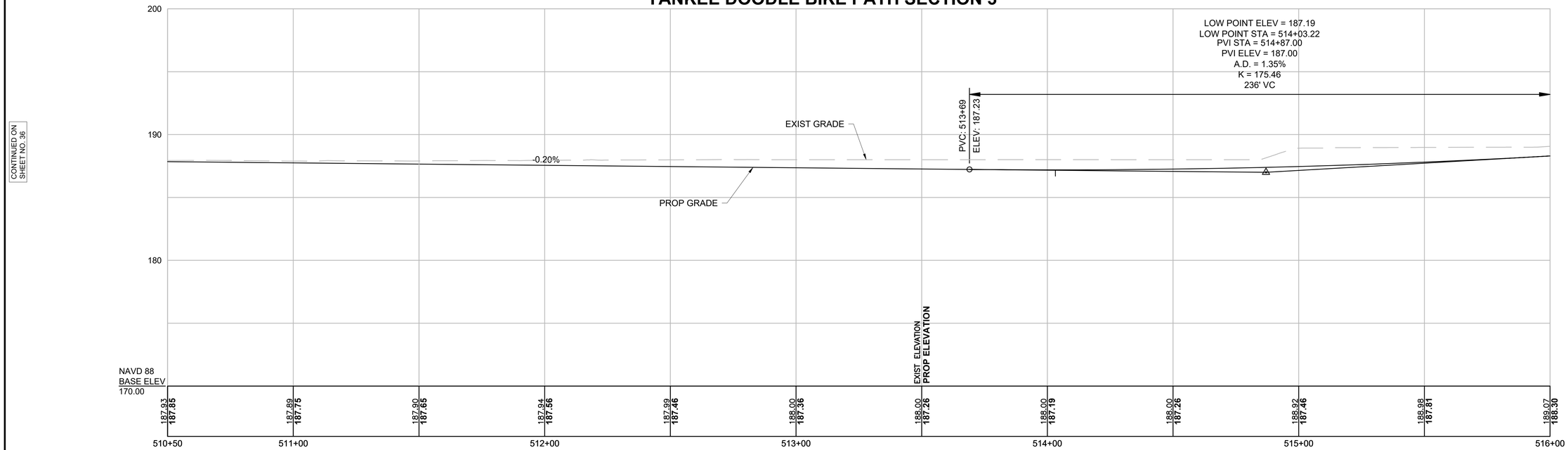
FOR CONSTRUCTION PLANS SEE SHEET NO. 21

BILLERICA
YANKEE DOODLE BIKE PATH

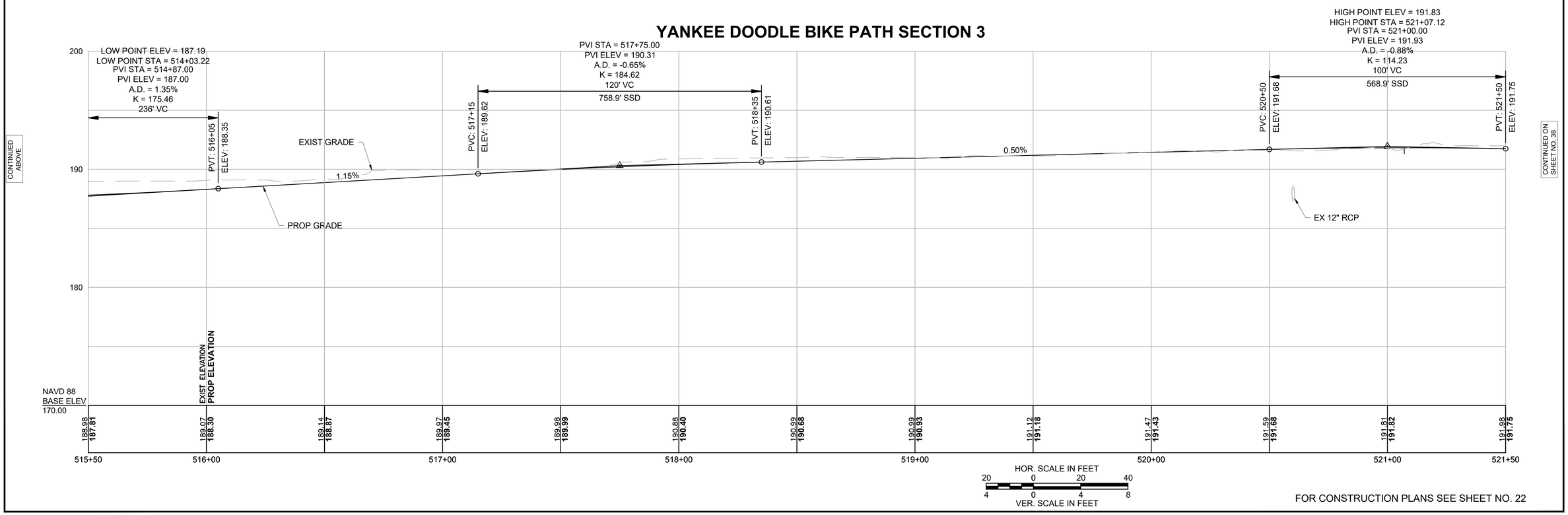
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	37	231
PROJECT FILE NO.	608227		

PROFILES

YANKEE DOODLE BIKE PATH SECTION 3



YANKEE DOODLE BIKE PATH SECTION 3



FOR CONSTRUCTION PLANS SEE SHEET NO. 22

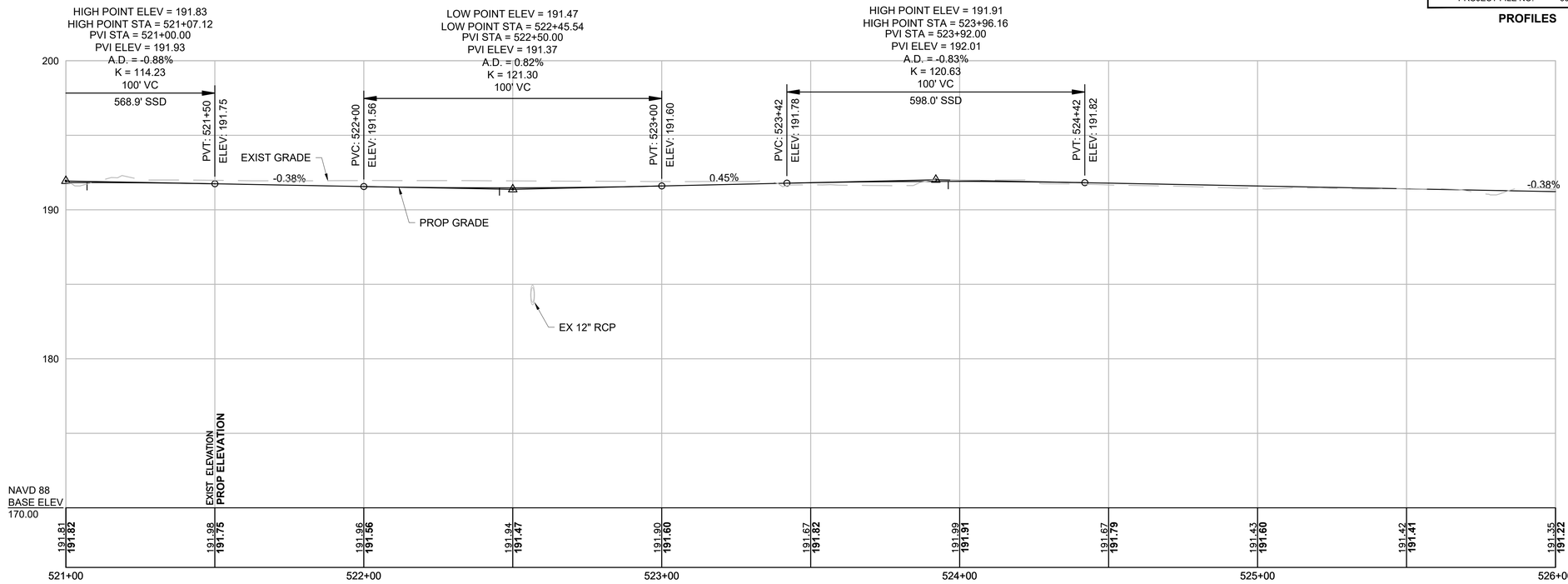
608227HD (PROF)-3.DWG Plotted on 23-Jul-2025 12:44 PM

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	38	231
PROJECT FILE NO.	608227		

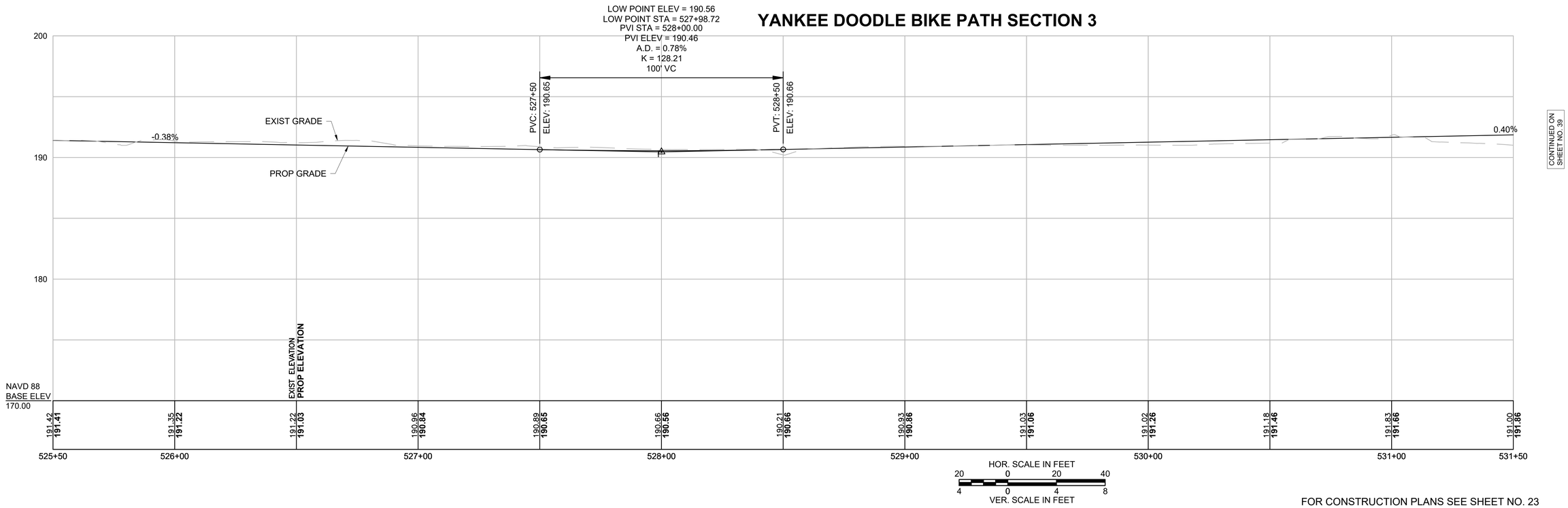
PROFILES

CONTINUED ON SHEET NO. 37



CONTINUED BELOW

CONTINUED ABOVE



YANKEE DOODLE BIKE PATH SECTION 3

CONTINUED ON SHEET NO. 39

HOR. SCALE IN FEET
20 0 20 40
VER. SCALE IN FEET
4 0 4 8

FOR CONSTRUCTION PLANS SEE SHEET NO. 23

608227HD (PROF)-3.DWG Plotted on 23-Jul-2025 12:44 PM

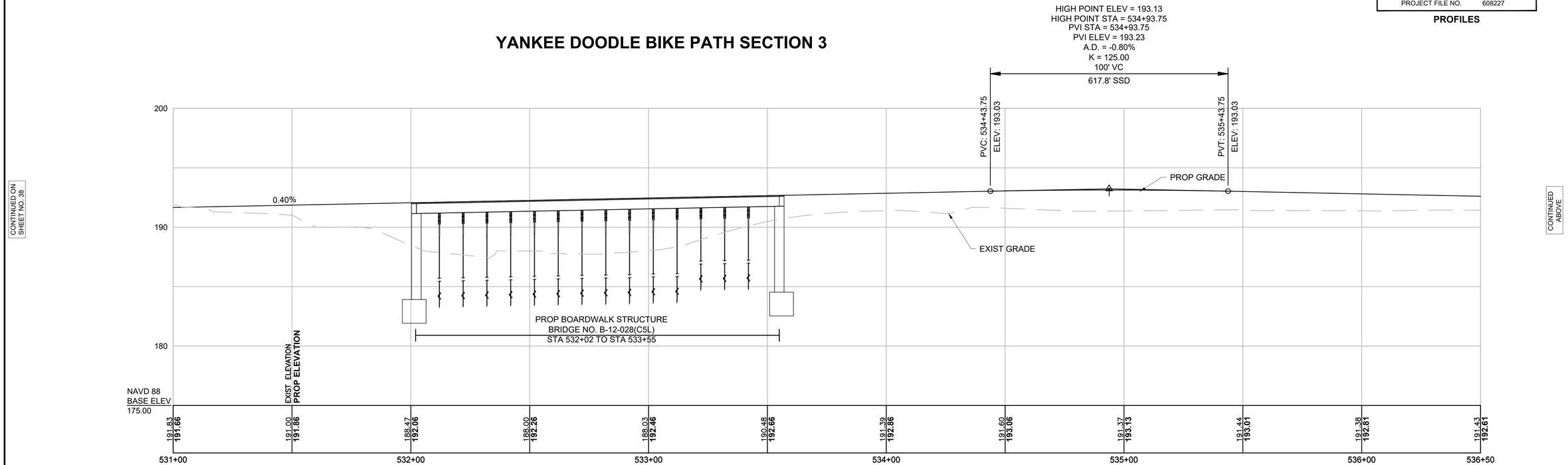
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	39	231
PROJECT FILE NO.	608227		

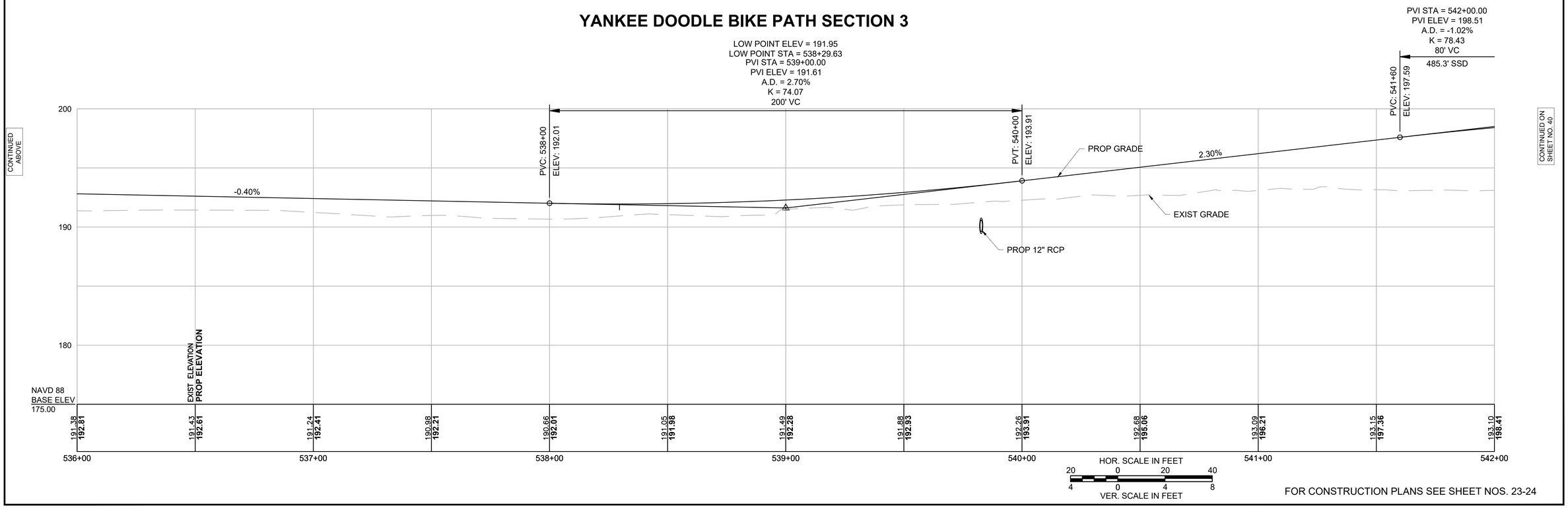
PROFILES

608227HD (PROF)-3.DWG Plotted on 23-Jul-2025 12:45 PM

YANKEE DOODLE BIKE PATH SECTION 3



YANKEE DOODLE BIKE PATH SECTION 3



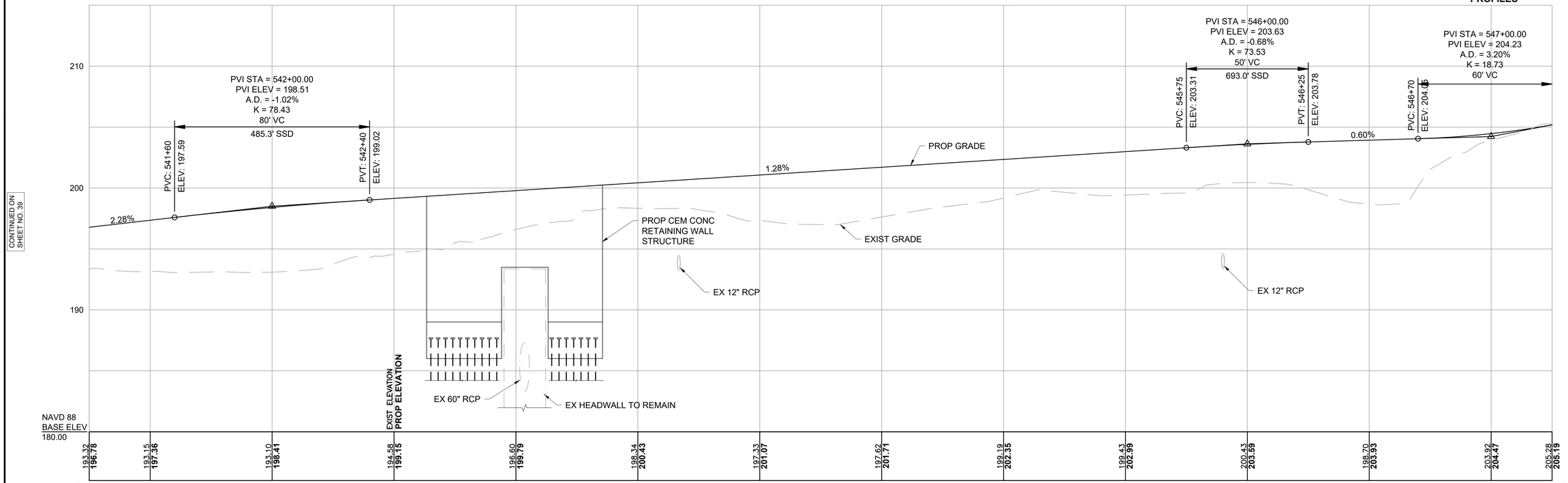
FOR CONSTRUCTION PLANS SEE SHEET NOS. 23-24

BILLERICA
YANKEE DOODLE BIKE PATH

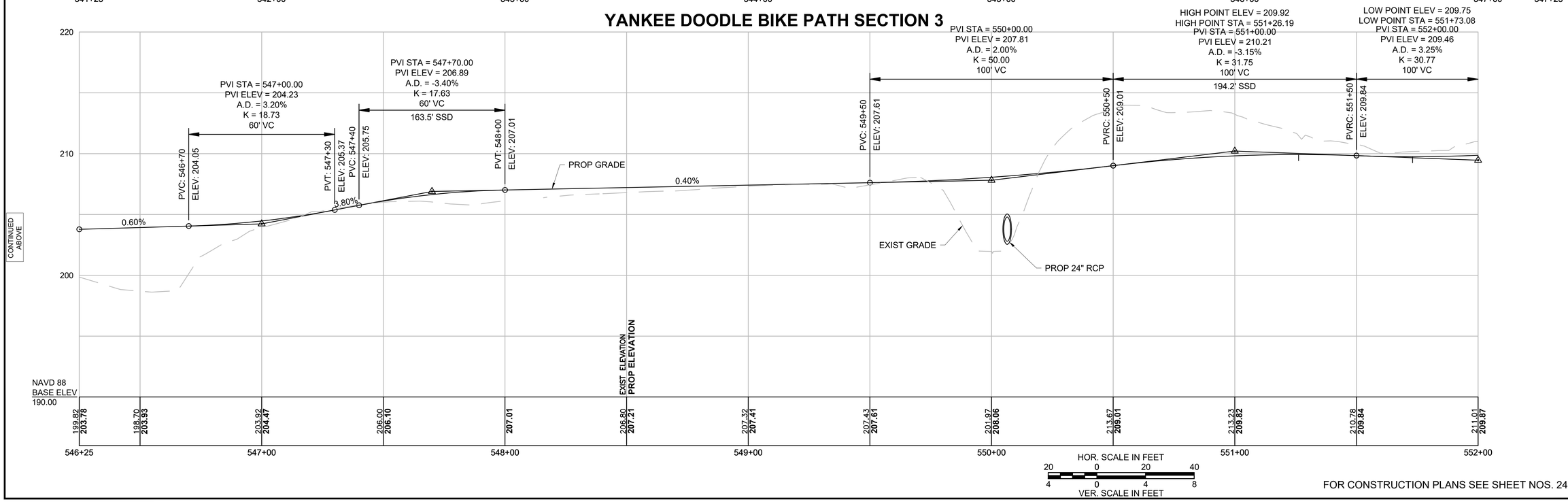
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	40	231
PROJECT FILE NO.	608227		

PROFILES

YANKEE DOODLE BIKE PATH SECTION 3



YANKEE DOODLE BIKE PATH SECTION 3



HOR. SCALE IN FEET
20 0 20 40
VER. SCALE IN FEET
4 0 4 8

FOR CONSTRUCTION PLANS SEE SHEET NOS. 24-25

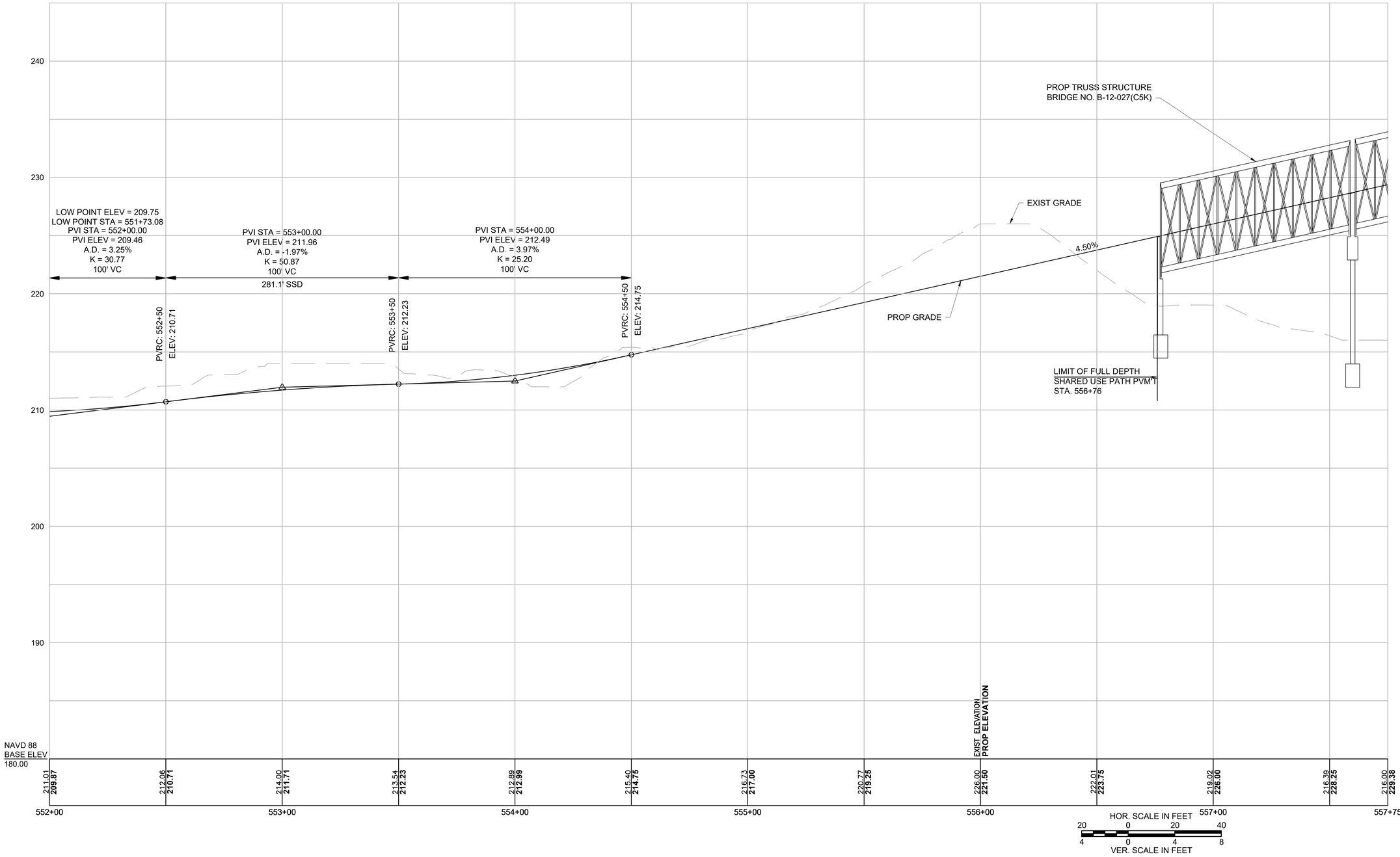
608227HD (PROF)-3.DWG Plotted on 23-Jul-2025 12:45 PM

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	41	231
PROJECT FILE NO.	608227		

PROFILES

YANKEE DOODLE BIKE PATH SECTION 3



FOR CONSTRUCTION PLANS SEE SHEET NOS. 25-26

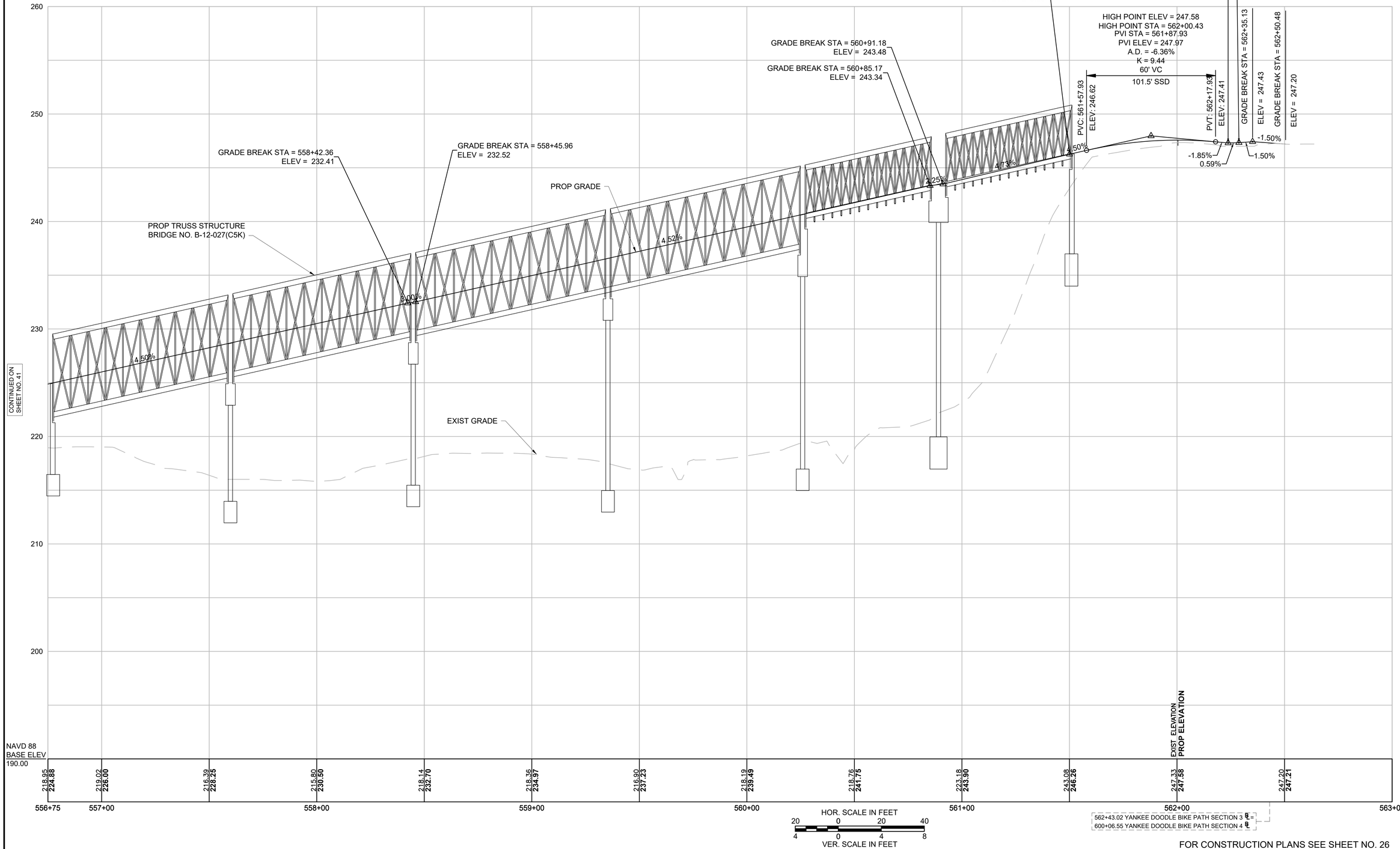
608227HD (PROF)-3.DWG Plotted on 23-Jul-2025 12:45 PM

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	42	231
PROJECT FILE NO.	608227		

PROFILES

YANKEE DOODLE BIKE PATH SECTION 3



562+43.02 YANKEE DOODLE BIKE PATH SECTION 3 ℄ =
600+06.55 YANKEE DOODLE BIKE PATH SECTION 4 ℄

FOR CONSTRUCTION PLANS SEE SHEET NO. 26

608227HD (PROF)-3.DWG Plotted on 23-Jul-2025 12:45 PM

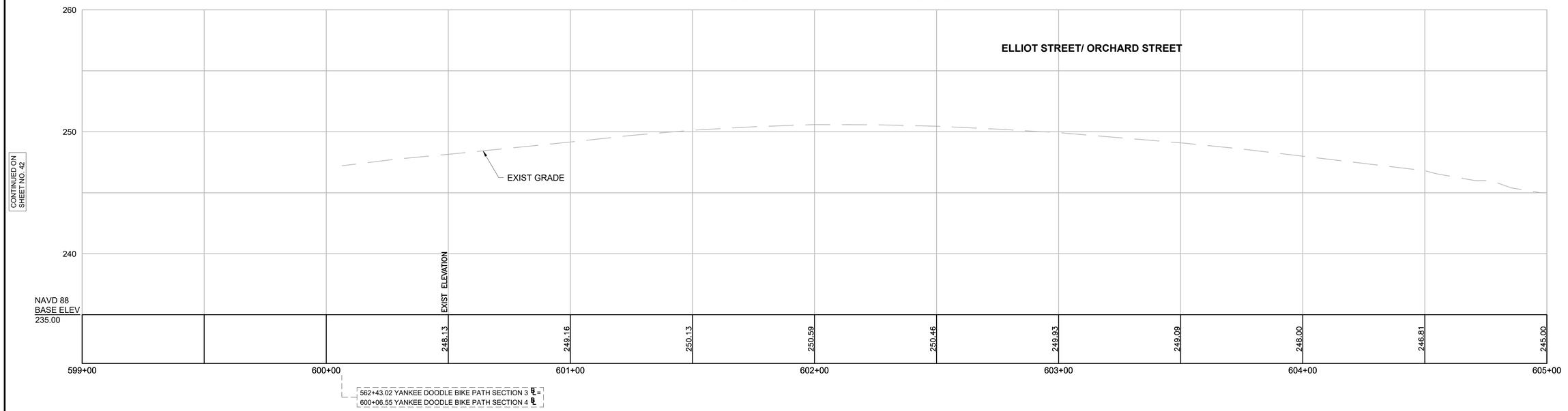
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	43	231
PROJECT FILE NO.	608227		

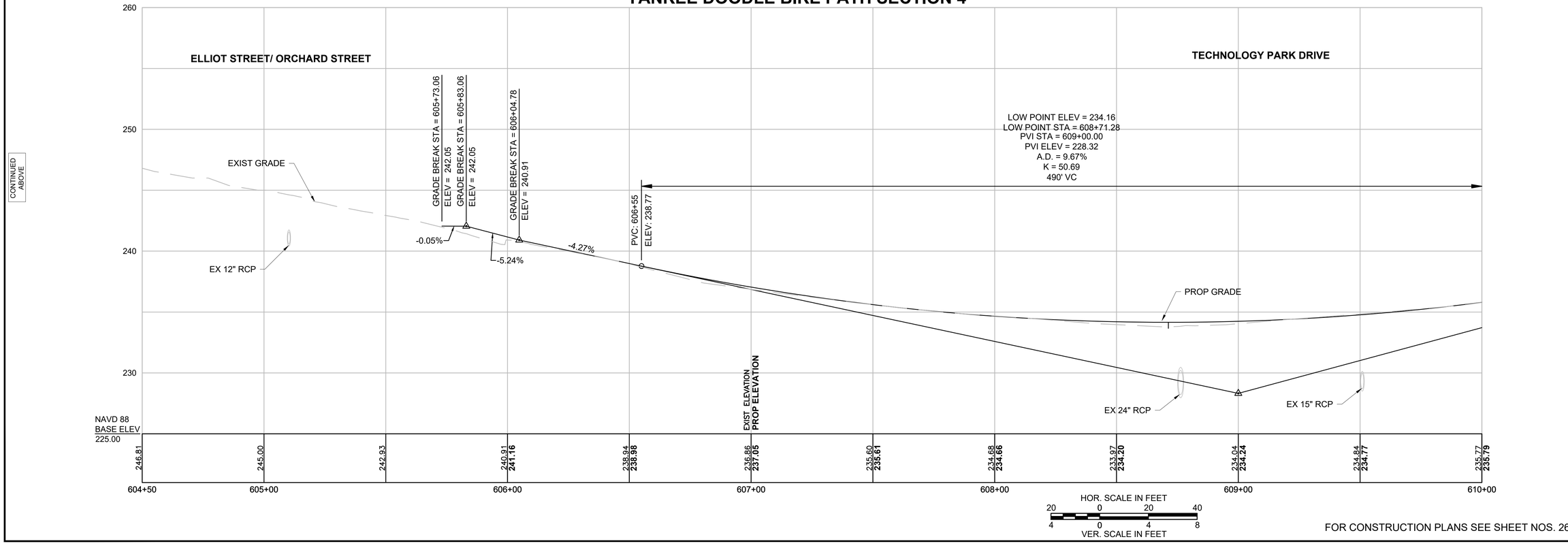
PROFILES

608227HD (PROF)-4.DWG Plotted on 23-Jul-2025 12:47 PM

YANKEE DOODLE BIKE PATH SECTION 4



YANKEE DOODLE BIKE PATH SECTION 4



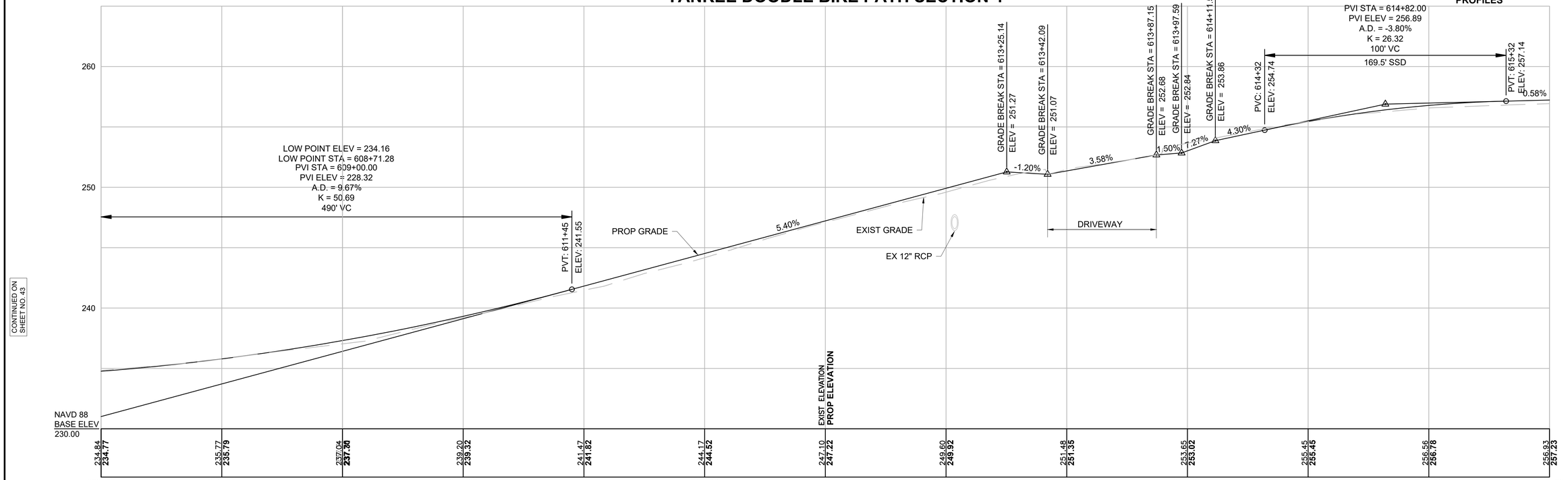
FOR CONSTRUCTION PLANS SEE SHEET NOS. 26-27

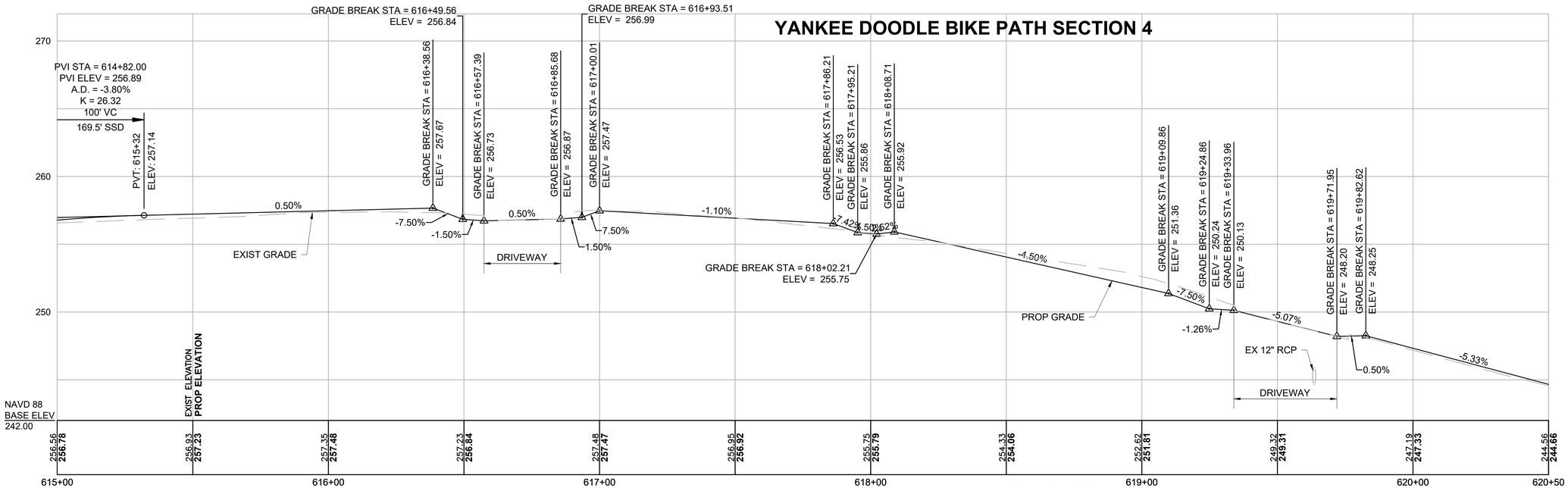
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	44	231
PROJECT FILE NO.	608227		

PROFILES

YANKEE DOODLE BIKE PATH SECTION 4





HOR. SCALE IN FEET
20 0 20 40
VER. SCALE IN FEET
4 0 4 8

FOR CONSTRUCTION PLANS SEE SHEET NOS. 27-28

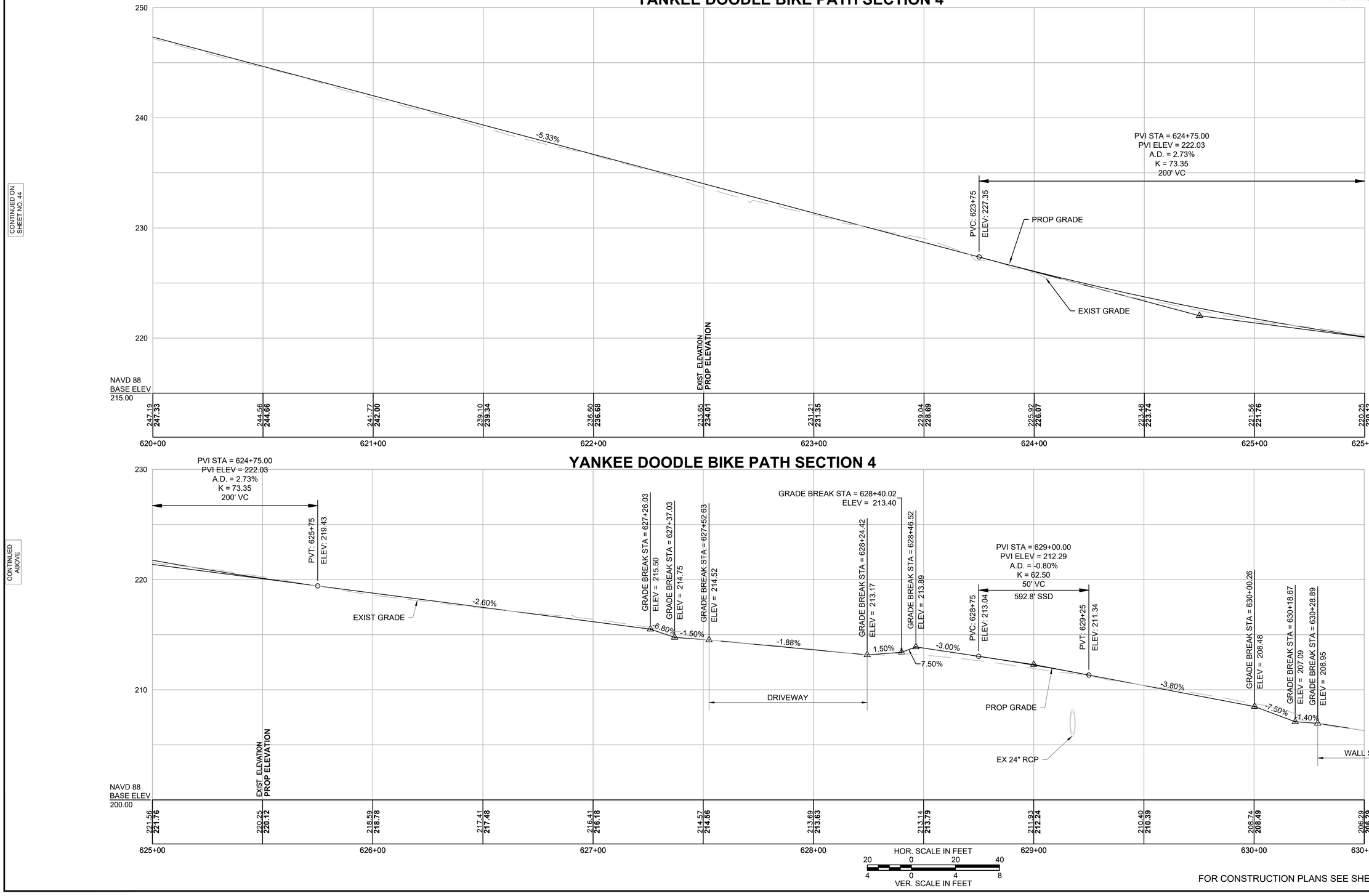
608227HD (PROF)-4.DWG Plotted on 23-Jul-2025 12:47 PM

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	45	231
PROJECT FILE NO.	608227		

PROFILES

YANKEE DOODLE BIKE PATH SECTION 4



FOR CONSTRUCTION PLANS SEE SHEET NOS. 28-29

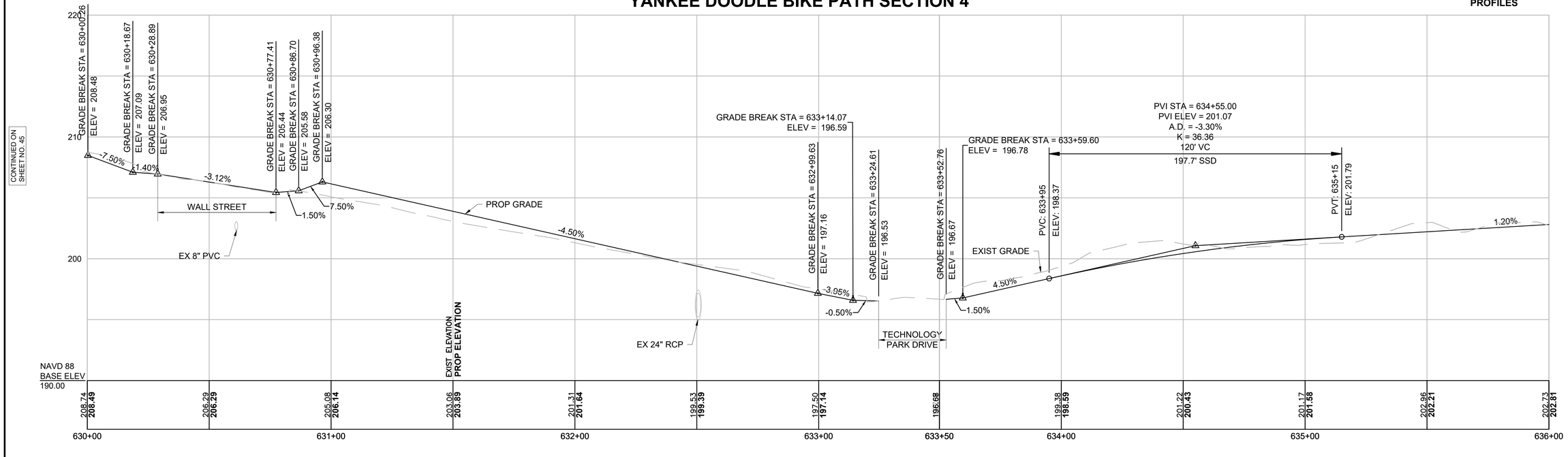
608227HD (PROF)-4.DWG Plotted on 23-Jul-2025 12:47 PM

BILLERICA
YANKEE DOODLE BIKE PATH

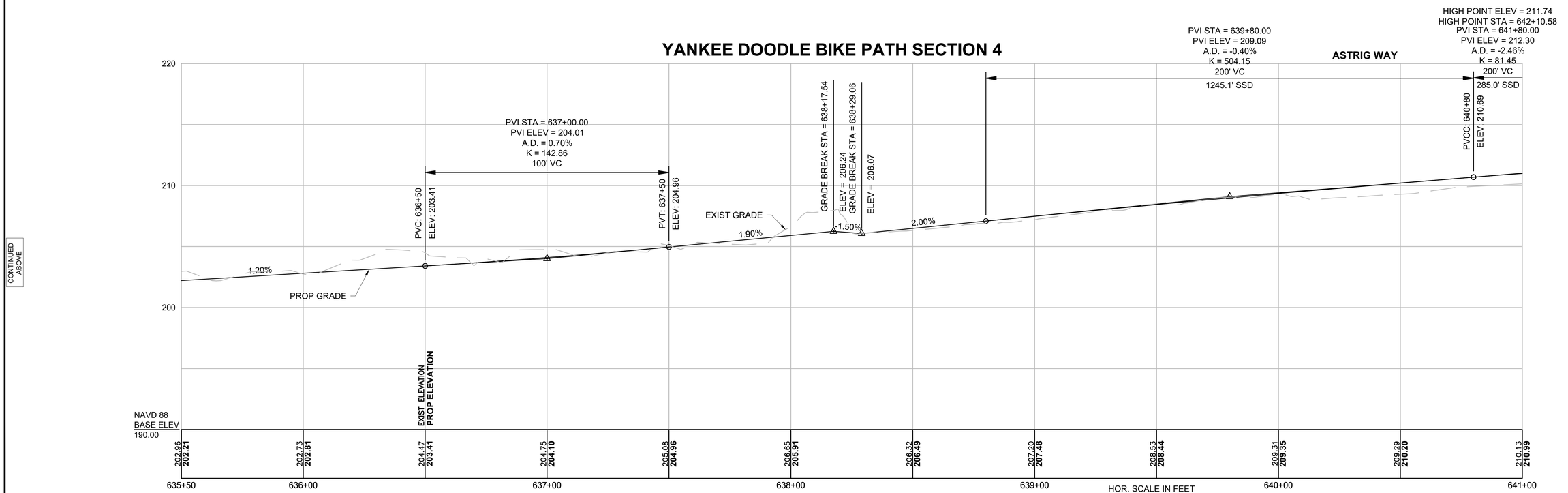
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	46	231
PROJECT FILE NO.	608227		

PROFILES

YANKEE DOODLE BIKE PATH SECTION 4



YANKEE DOODLE BIKE PATH SECTION 4



HOR. SCALE IN FEET
20 0 20 40
VER. SCALE IN FEET
4 0 4 8

FOR CONSTRUCTION PLANS SEE SHEET NOS. 29-30

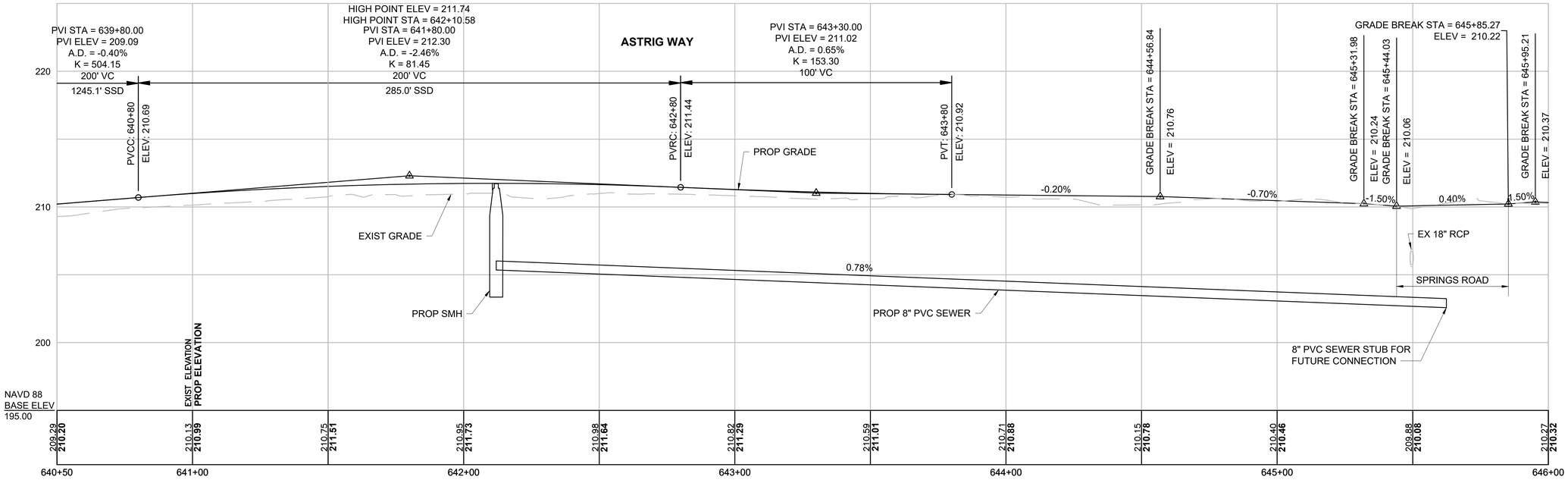
608227HD (PROF)-4.DWG Plotted on 23-Jul-2025 12:48 PM

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	47	231
PROJECT FILE NO.	608227		

PROFILES

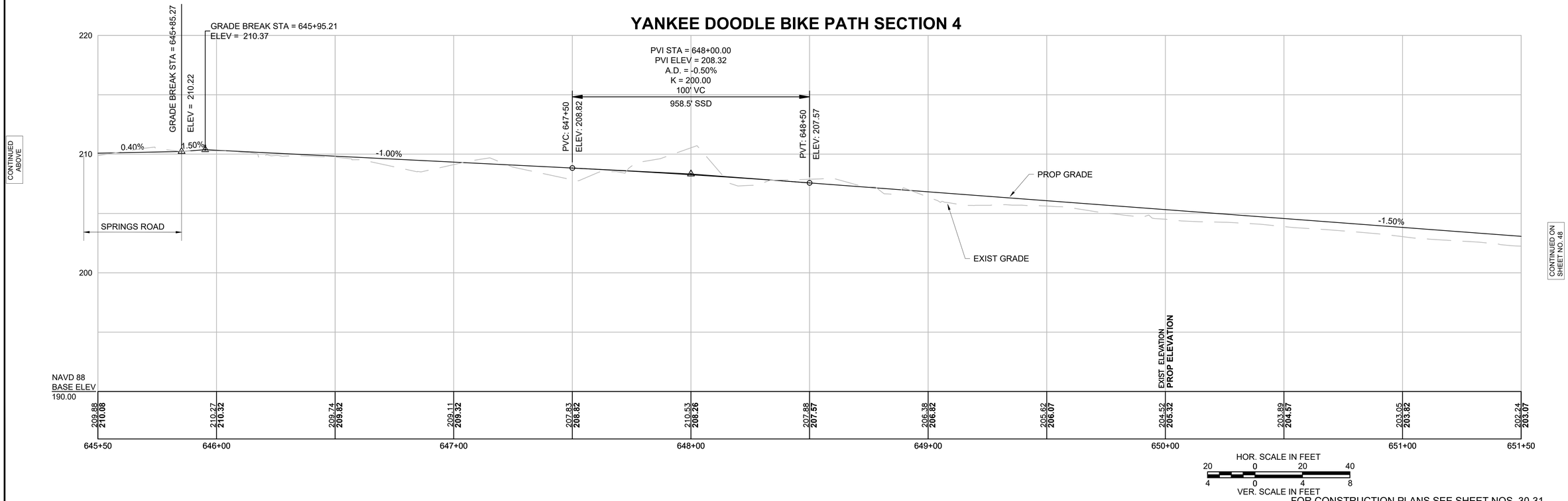
YANKEE DOODLE BIKE PATH SECTION 4



CONTINUED ON SHEET NO. 46

CONTINUED BELOW

YANKEE DOODLE BIKE PATH SECTION 4



CONTINUED ABOVE

CONTINUED ON SHEET NO. 48

HOR. SCALE IN FEET
20 0 20 40
VER. SCALE IN FEET
4 0 4 8

FOR CONSTRUCTION PLANS SEE SHEET NOS. 30-31

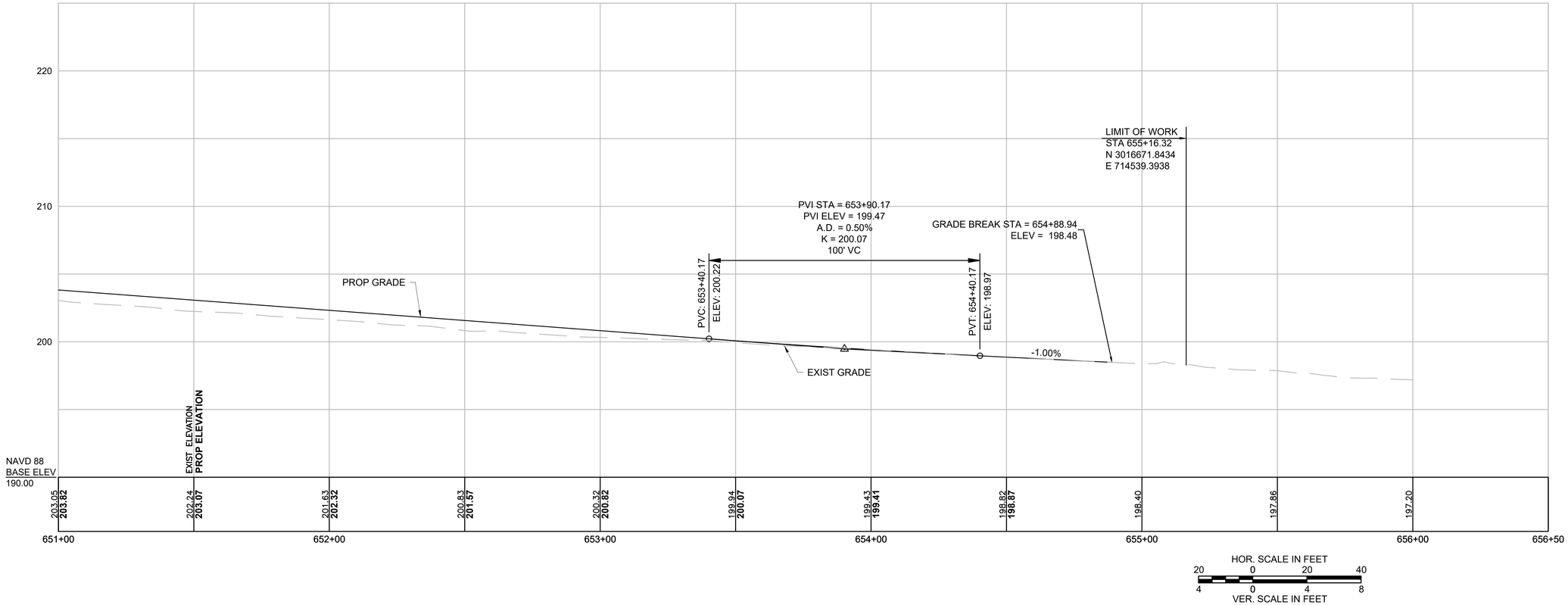
608227HD (PROF)-4.DWG Plotted on 23-Jul-2025 12:48 PM

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	48	231
PROJECT FILE NO.	608227		

PROFILES

YANKEE DOODLE BIKE PATH SECTION 4



FOR CONSTRUCTION PLANS SEE SHEET NOS. 30-31

608227HD (PROF)-4.DWG Plotted on 23-Jul-2025 12:48 PM

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	49	231
PROJECT FILE NO.	608227		

ALIGNMENT & GRADING PLANS

MONUMENT DATA			
STATION	OFFSET	NORTHING	EASTING
383+35.31	4.94 RT	3024786.5057	715210.2547
619+35.13	4.43 RT	3018024.2968	715719.5536
630+98.54	3.49 RT	3018818.3466	715014.7000

CURVE TABLE			
Curve #	Delta	Radius	Length
14	27°23'17"	30.00	14.34
15	16°13'40"	20.00	5.66
17	96°44'57"	20.00	33.77
18	96°52'14"	30.00	50.72
19	49°48'33"	62.00	53.90
20	44°47'05"	30.00	23.45
23	18°12'54"	45.00	14.31
29	90°00'00"	5.00	7.85
32	90°00'00"	2.50	3.93
34	34°30'59"	20.00	12.05
39	71°17'35"	15.00	18.66
40	9°00'28"	500.00	78.61
41	40°55'15"	4.02	2.87
42	91°10'30"	1.49	2.38
43	84°52'14"	1.00	1.48
44	179°39'14"	1.25	3.92
45	180°00'00"	1.50	4.71
46	73°57'45"	17.00	21.95
47	43°59'16"	276.50	212.28
48	88°06'47"	35.00	53.83
49	89°05'26"	35.00	54.42
50	90°32'45"	16.00	25.29
51	89°27'15"	16.00	24.98
52	95°37'37"	4.00	6.68
53	95°37'37"	10.00	16.69
54	89°03'05"	20.00	31.08
55	99°00'01"	25.00	43.20
56	71°19'53"	414.50	516.04
57	91°29'33"	50.00	79.84
58	44°43'34"	50.00	39.03
59	26°08'29"	296.50	135.28
60	79°58'57"	35.00	48.86
61	77°13'22"	24.93	33.60
62	79°02'21"	20.00	27.59
63	82°08'23"	35.00	50.18
64	38°05'05"	10.00	6.65
65	30°33'52"	10.00	5.33
68	58°34'33"	30.00	30.67
69	58°34'33"	30.00	30.67
70	94°12'55"	10.00	16.44
71	80°42'21"	10.00	14.09
72	95°42'06"	20.00	33.41
73	57°48'39"	30.00	30.27
74	44°54'02"	12.00	9.40
75	44°54'02"	12.00	9.40
76	269°48'04"	12.00	56.51
77	17°09'15"	25.00	7.48
78	86°45'59"	2.00	3.03
79	94°09'37"	2.00	3.29
80	33°40'10"	30.00	17.63
81	34°50'45"	35.00	21.29
82	127°49'02"	12.23	27.29

CURVE TABLE			
Curve #	Delta	Radius	Length
83	111°09'21"	8.00	15.52
84	40°10'29"	30.00	21.04
85	64°27'26"	15.00	16.87
99	180°00'00"	1.50	4.71
100	180°00'32"	1.50	4.71

TRAVERSE DATA				
Point #	Northing	Easting	Elevation	Raw Description
1	3020186.9488	715939.4801	193.167	
4	3027550.9997	716409.7418	198.022	
5	3021496.3612	716209.3454	191.526	
6	3021998.3735	716207.3566	189.453	
7	3022214.1378	716209.4520	187.892	
8	3022444.0544	716210.9559	187.400	
9	3022680.4618	716209.8190	186.990	
10	3022890.2040	716208.8562	187.154	
12	3023442.4147	716217.0643	186.122	
13	3023537.5402	716111.9146	182.360	
14	3023708.3660	716214.9516	183.406	
15	3021324.7524	716199.3573	191.098	
17	3020675.5674	715911.9093	191.304	
34	3028064.9118	716373.9772	194.815	
35	3018074.7669	716795.4037	225.025	
36	3018094.0128	717306.4560	249.829	
37	3018181.3964	717202.1009	224.225	
38	3019545.7506	716060.1497	199.333	
39	3018551.2577	716953.4923	225.568	
40	3018737.8018	716940.2240	220.566	
41	3019523.9230	716282.1644	200.166	
42	3019570.4171	716257.9506	0.000	
43	3024075.4745	716215.3175	177.235	
47	3021759.9985	716200.7329	190.718	
49	3026704.6439	714823.0142	121.070	
50	3020997.1368	716096.8046	190.139	
58	3017790.2380	716937.1500	240.530	
64	3018355.2750	717050.2799	220.528	
65	3019349.5070	716375.9448	202.890	
66	3023125.6868	716215.6619	187.616	
68	3018235.6395	715302.1721	224.320	
71	3017617.6624	714458.0302	198.290	
73	3017595.7480	714616.9261	210.060	
74	3017023.6630	714568.2751	202.180	
75	3018079.8061	714646.9776	210.080	
76	3018416.4013	714682.5532	204.870	
77	3018818.0920	714737.1197	194.180	
83	3018113.1530	716442.8958	244.290	
85	3028411.6838	716216.0971	188.155	
87	3023223.7544	715874.1921	188.008	
88	3023432.8065	715859.2876	186.560	
89	3023593.7337	715631.3068	188.044	
90	3026845.6118	715231.1545	142.791	
94	3023218.5056	716061.5786	191.181	
95	3019616.0840	716230.7755	199.787	
96	3019962.0845	716064.1697	193.532	
98	3020474.9286	715803.4852	192.888	
106	3026870.7258	715310.8471	145.317	
107	3027140.0651	715206.4584	133.770	
200	3019217.8503	716461.3917	206.129	
201	3019012.7277	716642.9878	213.590	
202	3029011.1508	717417.1943	228.269	
203	3028940.6511	717257.1737	223.399	
204	3028816.9408	716972.1664	215.899	
700	3025175.3505	714857.0134	171.980	
3200	3018409.8343	715233.0969	213.936	
3229	3017628.3089	714510.4685	201.119	
14030	3017940.8303	716719.1222	233.334	
14040	3017748.3973	716969.1112	240.606	
14050	3018161.8567	717429.5625	246.593	

608227HD (ALGN).DWG Plotted on 23-Jul-2025 12:52 PM

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	50	231
PROJECT FILE NO.	608227		

ALIGNMENT & GRADING PLANS

608227HD (ALGN).DWG Plotted on 23-Jul-2025 12:53 PM

N

MIDDLESEX TURNPIKE

CONCORD ROAD

1938 COUNTY LAYOUT

1933 COUNTY LAYOUT

MEET EXIST
PT +78.8, 12.6' LT

#401 MIDDLESEX TURNPIKE
RICARDO VERISSIMO DOS REIS
& DANIELA DE SOUSA
TEIXEIRA
DEED BOOK 34351, PAGE 129
PLAN BOOK 95, PLAN 56B

325+83.34 YANKEE DOODLE BIKE PATH SECTION 2 PART 1=
383+15.16 YANKEE DOODLE BIKE PATH SECTION 2 PART 2

PROJECT BEGIN
STA 324+12.00
N 3024936.3290
E 715164.9807

PC +58.7,
7.4' LT

PROP 3" REVEAL
RIM EL=186.71

PT +06.1
3.2' LT

PC +25.6,
10.5' RT

R&R BOUND (SET FLUSH
WITH PATH SURFACE)

MEET EXIST
+88.3, 139.7' RT

MEET EXIST
+07.26

MEET EXIST
+07.5, 24.8' RT

MEET EXIST
+28.7, 10.5' RT

PC +63.97

PCC +94.21

PT +63.96

YANKEE DOODLE BIKE PATH
SECTION 2 PART 1

YANKEE DOODLE BIKE PATH
SECTION 2 PART 2

323 PT +02.90

324

383

384

385

386

387

10.0'

5.0%

+90

CONTINUED BELOW

DENSE TREES

D.TREES

EDGE OF PAVEMENT

PAVEMENT PATCH

STATE HIGHWAY LAYOUT
(LAYOUT NO. 4072)

0 20 50 100
SCALE: 1" = 20'

#2 FEDERAL STREET
REXPAR PROPERTY LLC
DEED BOOK 28863, PAGE 237

LEGEND:
(#) CURVE NUMBER
(SEE TABLE SHEET 49)

CONTINUED ABOVE

YANKEE DOODLE BIKE PATH
SECTION 2 PART 2

PC +71.30

PT +05.61

PC +21.47

PT +11.65

PC +89.65

387

388

389

390

391

392

393

10.0'

#4 FEDERAL STREET
ONNURI MISSION ALLIANCE
DEED BOOK 38870, PAGE 208
PLAN BOOK 144, PLAN 43
PLAN BOOK 108, PLAN 33

CONTINUED ON SHEET NO. 51

#2 FEDERAL STREET
REXPAR PROPERTY LLC
DEED BOOK 28863, PAGE 237

0 20 50 100
SCALE: 1" = 20'

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	51	231
PROJECT FILE NO.	608227		

ALIGNMENT & GRADING PLANS

CONTINUED ON SHEET NO. 50

CONTINUED ON SHEET NO. 52

N

DENSE TREES

PT +11.65

PC +89.65

393

394

PT +79.83

395

PC +25.38

396

397

398

399

400

10.0'

1.50%

1.50%

PT +48.23

EDGE OF PAVEMENT

YANKEE DOODLE BIKE PATH
SECTION 2 PART 2

FEDERAL STREET
THE FIELDS REALTY TRUST
DEED BOOK 2673, PAGE 612
PLAN BOOK 108, PLAN 33

FEDERAL STREET
THE FIELDS REALTY TRUST
DEED BOOK 2673, PAGE 612
PLAN BOOK 144, PLAN 43
PLAN BOOK 108, PLAN 33

#4 FEDERAL STREET
ONNURI MISSION ALLIANCE
DEED BOOK 38870, PAGE 208
PLAN BOOK 144, PLAN 43
PLAN BOOK 108, PLAN 33

#8 FEDERAL STREET
RHINO 8 FEDERAL LLC
DEED BOOK 37054, PAGE 103
PLAN BOOK 141, PLAN 60

WF#20–100
WF#20–101
WF#20–102
WF#20–103
WF#20–104
WF#20–105
WF#20–106
WF#20–107
WF#20–108
WF#20–109

LEGEND:
(#) CURVE NUMBER
(SEE TABLE SHEET 49)

0 20 50 100
SCALE: 1" = 20'

608227HD (ALGN).DWG Plotted on 23-Jul-2025 12:54 PM

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	52	231
PROJECT FILE NO.	608227		

ALIGNMENT & GRADING PLANS

608227HD (ALGN).DWG Plotted on 23-Jul-2025 12:54 PM

N

#8 FEDERAL STREET
RHINO 8 FEDERAL LLC
DEED BOOK 37054, PAGE 103
PLAN BOOK 141, PLAN 60

REAR MIDDLESEX TPK
THE FIELDS REALTY TRUST
DEED BOOK 2673, PAGE 612
PLAN BOOK 108, PLAN 33

YANKEE DOODLE BIKE PATH
SECTION 2 PART 2

PC +00.00
PT +24.61
PC +32.03
PT +44.87
PC +10.00
PT +97.72
PC +96.30
PT +76.40

EL=189.11
EL=188.99
EL=188.11
EL=186.90
EL=185.67
EL=188.77
EL=188.78
EL=187.87
EL=186.38

1.50%
0.00%
1.50%
1.50%
1.50%

DENSE TREES
EDGE OF PAVEMENT

CONTINUED ON SHEET NO. 51

CONTINUED ON SHEET NO. 53

LEGEND:
(#) CURVE NUMBER (SEE TABLE SHEET 49)

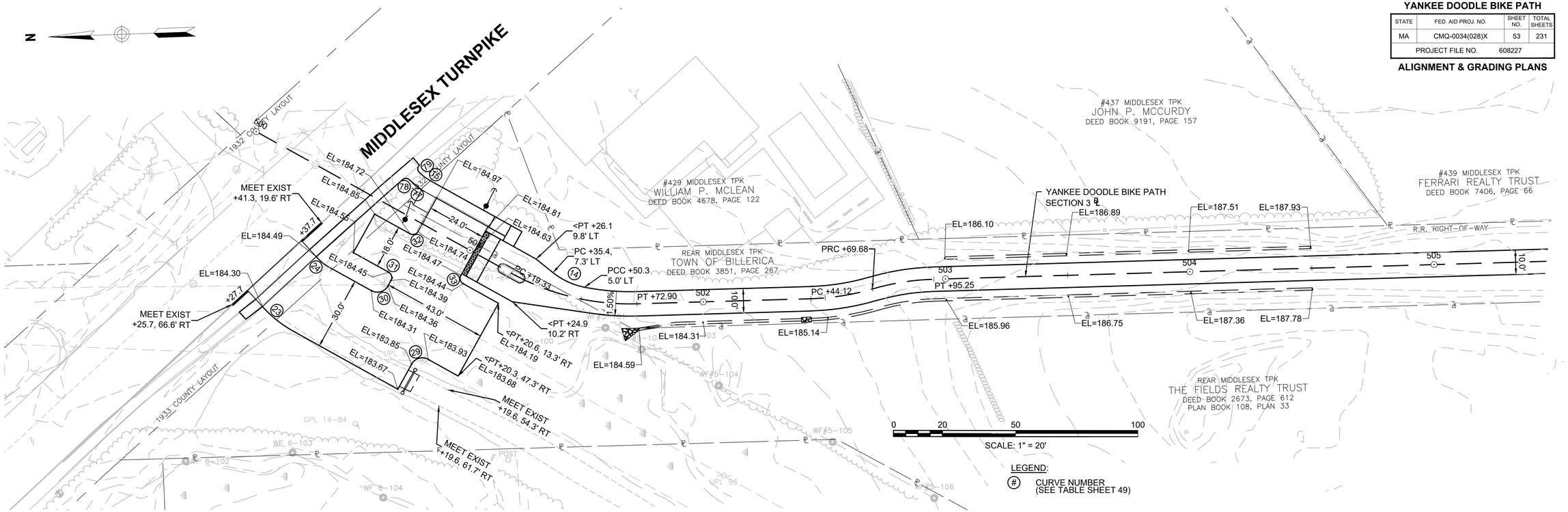
0 20 50 100
SCALE: 1" = 20'

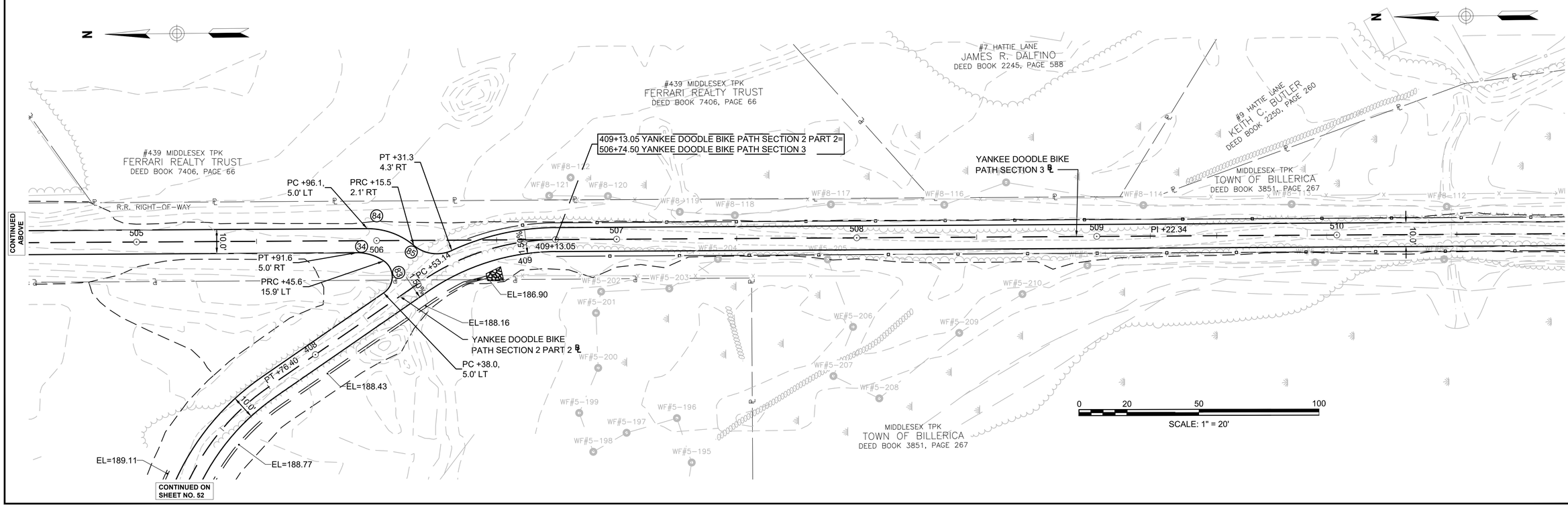
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	53	231
PROJECT FILE NO.	608227		

ALIGNMENT & GRADING PLANS

608227HD (ALGN).DWG Plotted on 23-Jul-2025 12:55 PM



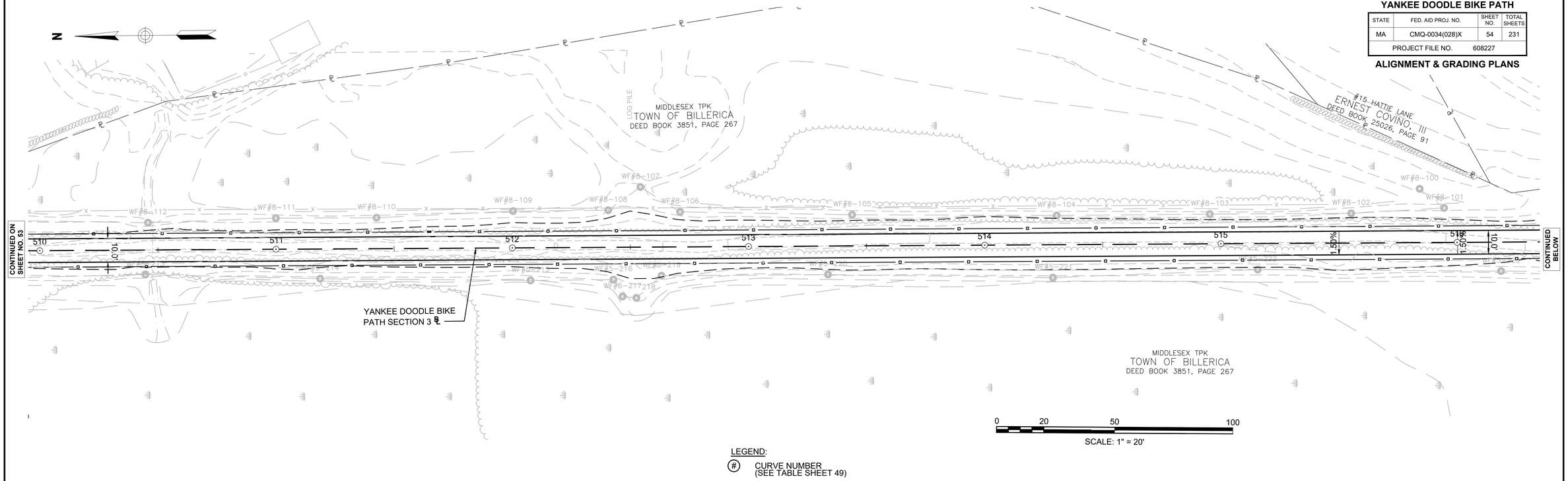


BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	54	231
PROJECT FILE NO.	608227		

ALIGNMENT & GRADING PLANS

608227HD (ALGN).DWG Plotted on 23-Jul-2025 12:55 PM



BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	55	231
PROJECT FILE NO.	608227		

ALIGNMENT & GRADING PLANS

608227HD (ALGN).DWG Plotted on 23-Jul-2025 12:56 PM

#27 HATTIE LANE
SIGISMONDO ANGELO
DEED BOOK 7234, PAGE 276

#29 HATTIE LANE
RAYMOND E. HINXMAN, III
DEED BOOK 26181, PAGE 60

#31 HATTIE LANE
CHRISTINE MARIE KEMP
DEED BOOK 16419, PAGE 163

#33 HATTIE LANE
ROBERT A. SEARS & HAEWON SEARS
DEED BOOK 7380, PAGE 170

EL=191.22
EL=191.25
EL=191.30
EL=191.18
EL=190.99
EL=190.80
EL=190.61
EL=190.57
EL=190.44
EL=190.42
EL=190.23

521
522
523
524
525
526
527

PC +87.23

YANKEE DOODLE BIKE PATH SECTION 3

1.50%
1.50%
1.50%
1.50%

10.0'
10.0'

CONTINUED ON SHEET NO. 54

CONTINUED BELOW

MIDDLESEX TPK
TOWN OF BILLERICA
DEED BOOK 3851, PAGE 267

0 20 50 100
SCALE: 1" = 20'

LEGEND:
(#) CURVE NUMBER (SEE TABLE SHEET 49)

REAR BLACKWOOD AVE
TOWN OF BILLERICA
DEED BOOK 2285, PAGE 656

EL=190.57
EL=190.44
EL=190.64
EL=190.23
EL=190.42
EL=189.18

526
527
528
529
530
531

PT +06.84

YANKEE DOODLE BIKE PATH SECTION 3

PC +76.58

LIMITED ACCESS STATE HIGHWAY LAYOUT (LAYOUT NO. 4572) LOCATION LINE OF SEPTEMBER 15, 1953

LIMITED ACCESS STATE HIGHWAY LAYOUT (LAYOUT NO. 4572) LOCATION LINE OF SEPTEMBER 15, 1953

ROUTE 3
TOWN OF BILLERICA
DEED BOOK 19950, PAGE 275

CONTINUED ABOVE

CONTINUED ON SHEET NO. 56

0 20 50 100
SCALE: 1" = 20'

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	56	231
PROJECT FILE NO.	608227		

ALIGNMENT & GRADING PLANS

608227HD (ALGN).DWG Plotted on 23-Jul-2025 12:57 PM

N

LIMITED ACCESS STATE HIGHWAY LAYOUT (LAYOUT NO. 4072)
LOCATION LINE OF SEPTEMBER 15, 1952

NO ACCESS

NO ACCESS (SEE ALTERATION NO. 35)

CONTINUED ON SHEET NO. 55

PC +76.58

+00 +40 +80 +90 +02

PCC +95.60

FOR WALL ELEVATIONS, SEE RETAINING WALL PLANS SHEET 115

PC +89.78
PT +90.89
PT +37.08
PC +39.83
PT +68.90
PC +00.33
PT +00.33

10.0% 10.0%

534 535 536 537 538

+54 +56 +76 +75

YANKEE DOODLE BIKE PATH SECTION 3 ℄

EL=191.79

CONTINUED BELOW

U.S. ROUTE 3
(NORTHBOUND)

0 20 50 100
SCALE: 1" = 20'

LEGEND:
(#) CURVE NUMBER (SEE TABLE SHEET 49)

N

TOP OF WALL EL=192.07
TOP OF WALL EL=192.03
TOP OF WALL EL=191.90

PT +68.90
PC +00.33
PT +34.71
+39.83

10.0%

538 539 540 541 542 543

EL=191.79
RIM EL= 191.48
EL=191.51
EL=191.81
EL=192.44
RIM EL= 193.03
EL=193.42

YANKEE DOODLE BIKE PATH SECTION 3 ℄

PC +81.17
PT +28.03
PC +69.59

RIM EL= 200.76
PRC +48.77

CONTINUED ABOVE

CONTINUED ON SHEET NO. 57

U.S. ROUTE 3
(NORTHBOUND)

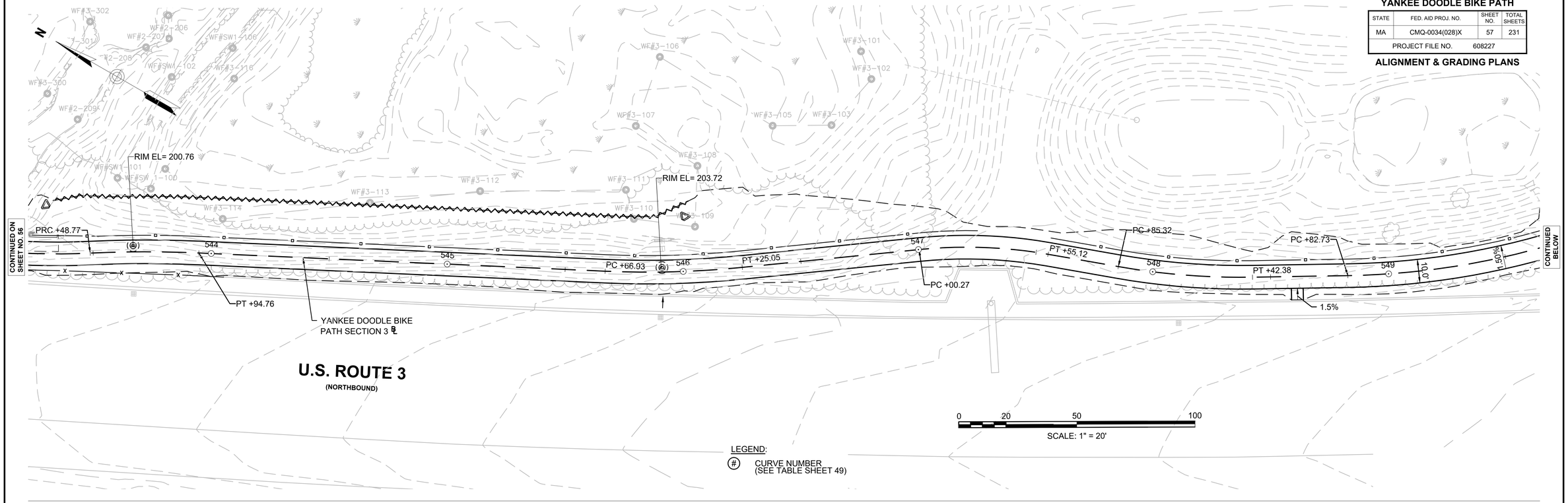
0 20 50 100
SCALE: 1" = 20'

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	57	231
PROJECT FILE NO.	608227		

ALIGNMENT & GRADING PLANS

608227HD (ALGN).DWG Plotted on 23-Jul-2025 12:57 PM

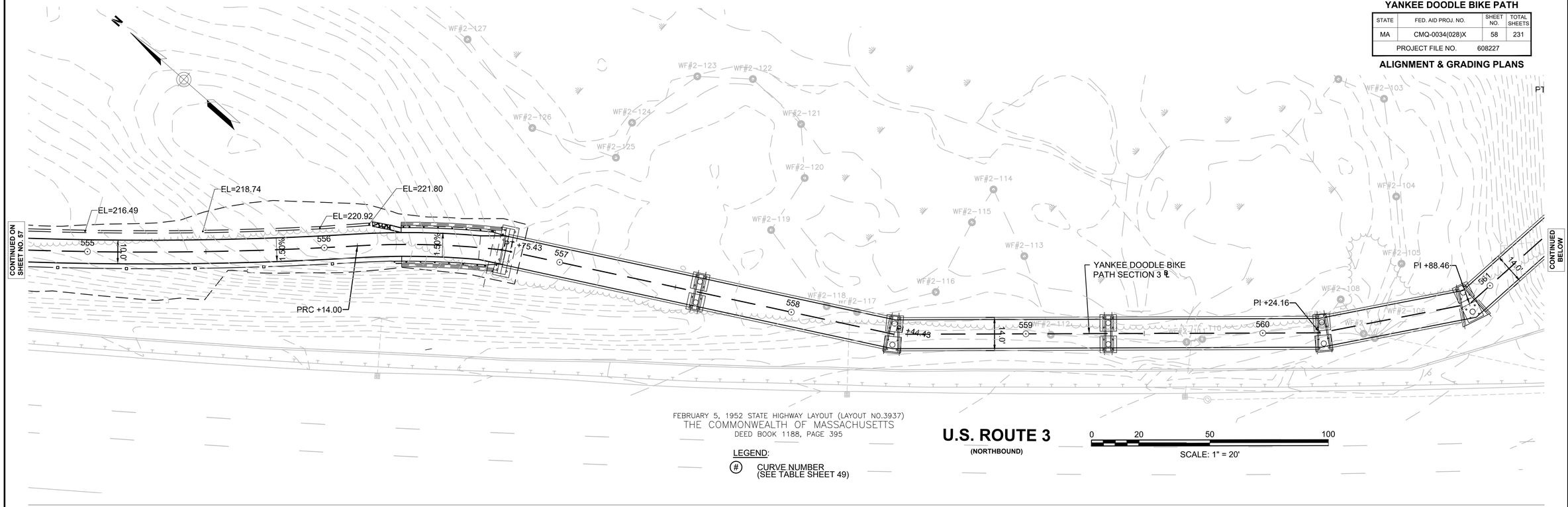


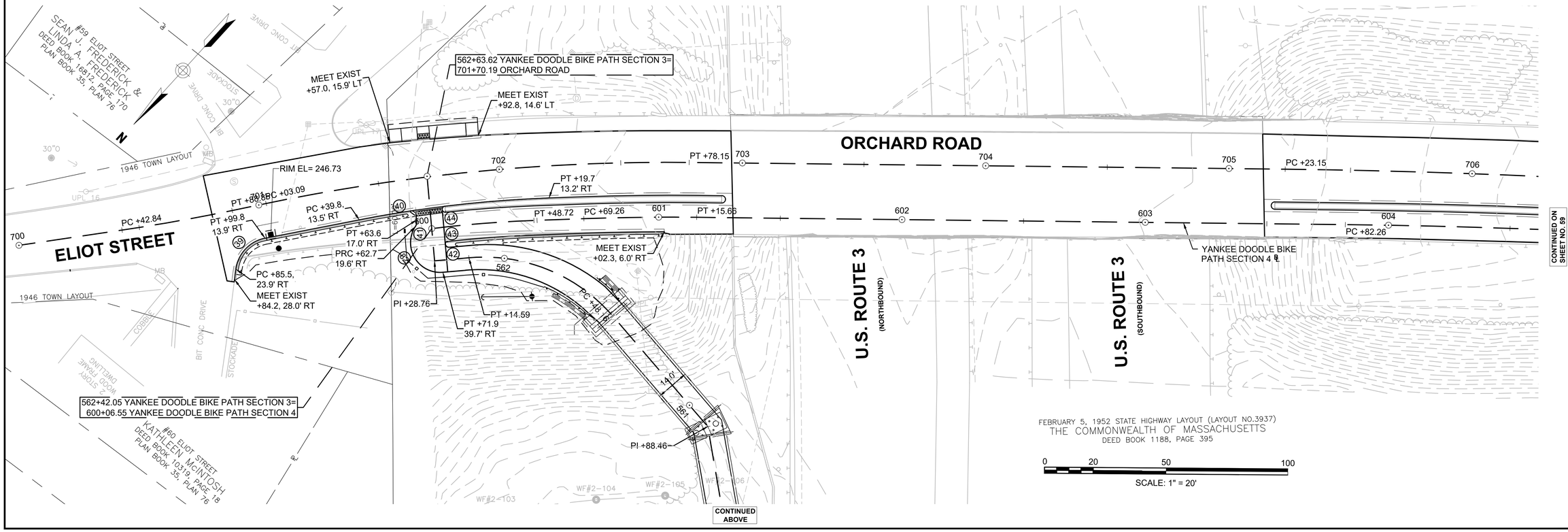
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	58	231
PROJECT FILE NO.	608227		

ALIGNMENT & GRADING PLANS

608227HD (ALGN).DWG Plotted on 23-Jul-2025 12:58 PM





BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	59	231
PROJECT FILE NO.	608227		

ALIGNMENT & GRADING PLANS

608227HD (ALGN).DWG Plotted on 23-Jul-2025 12:58 PM

N

MEET EXIST +22.9, 15.1' LT

MEET EXIST +59.6, 15.4' LT

LOCATION LINE OF MAY 26, 1953 TOWN LAYOUT (LAYOUT NO. 4054)

LOCATION LINE OF OCTOBER 9, 2002 TOWN LAYOUT

ORCHARD ROAD

RIM EL= 244.73
PT +05.20

RIM EL= 244.44

PT +83.1
9.0' LT

PT +62.69

PC +83.35

RIM EL= 242.23
YANKEE DOODLE BIKE
PATH SECTION 4 ℄

RIM EL= 241.69

MEET EXIST
+87.2, 5.0' RT

PC +82.26

PC +05.70

PT +27.58

711+73.26

PC +11.0,
8.0' LT

PT +11.78

10.0'

TECHNOLOGY PARK DRIVE

LOCATION LINE OF FEBRUARY 5, 1952 STATE HIGHWAY LAYOUT (LAYOUT NO. 3937)

LOCATION LINE OF MAY 26, 1953

LOCATION LINE OF MAY 26, 1953 TOWN LAYOUT (LAYOUT NO. 4054)

WF#1–100
WF#1–101
WF#1–102
WF#1–103

CONTINUED ON SHEET NO. 59

CONTINUED BELOW

0 20 50 100
SCALE: 1" = 20'

LEGEND:
(#) CURVE NUMBER (SEE TABLE SHEET 49)

CONTINUED ABOVE

#1100 TECHNOLOGY PARK DRIVE
1100 TECHNOLOGY PARK DRIVE LLC
L.C. CERT #42526
L.C. PLAN #8946J

TECHNOLOGY PARK DRIVE

TECHNOLOGY PARK DR ℄

PC +18.19
PT +73.6
8.5' LT

PRC +73.34

PCC +18.01

PC +59.27

3.00'

5.00'

RIM EL= 234.12

RIM EL= 233.65

RIM EL= 234.84

RIM EL= 234.62

YANKEE DOODLE BIKE
PATH SECTION 4 ℄

TECHNOLOGY PARK DRIVE
TECHNOLOGY PARK REALTY TRUST
DEED BOOK 2517, PAGE 532
PLAN BOOK 107, PLAN 42
PLAN BOOK 4, PLAN 127

DRAIN EASEMENT
(PLAN BOOK 139, PLAN 29)

CONTINUED ON SHEET NO. 60

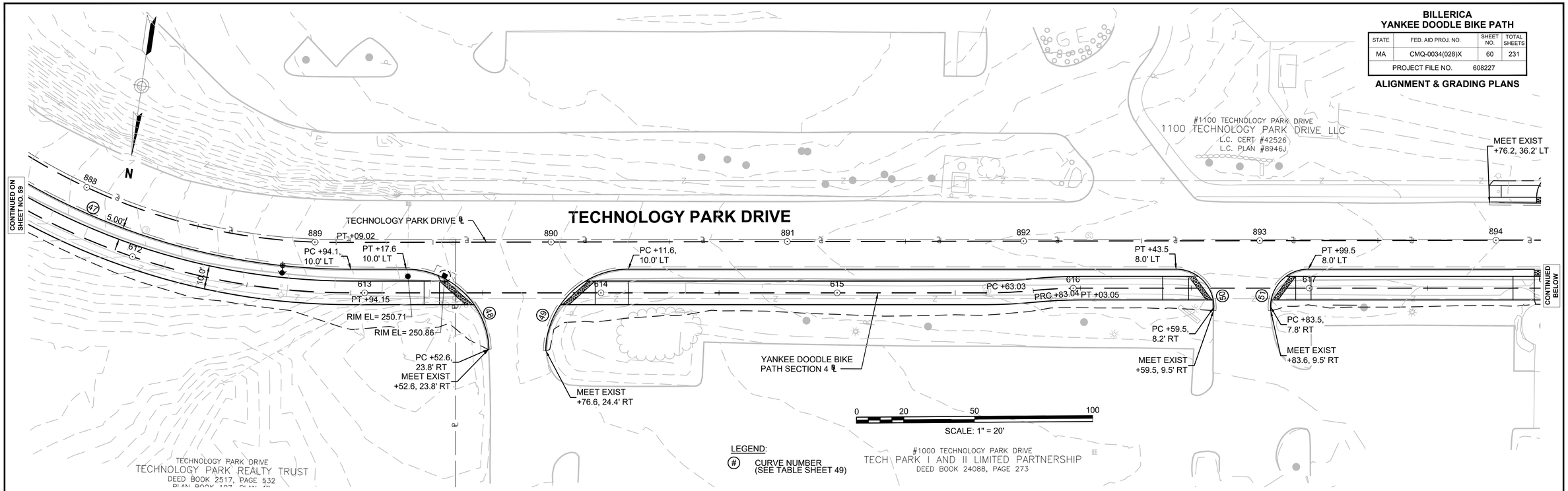
0 20 50 100
SCALE: 1" = 20'

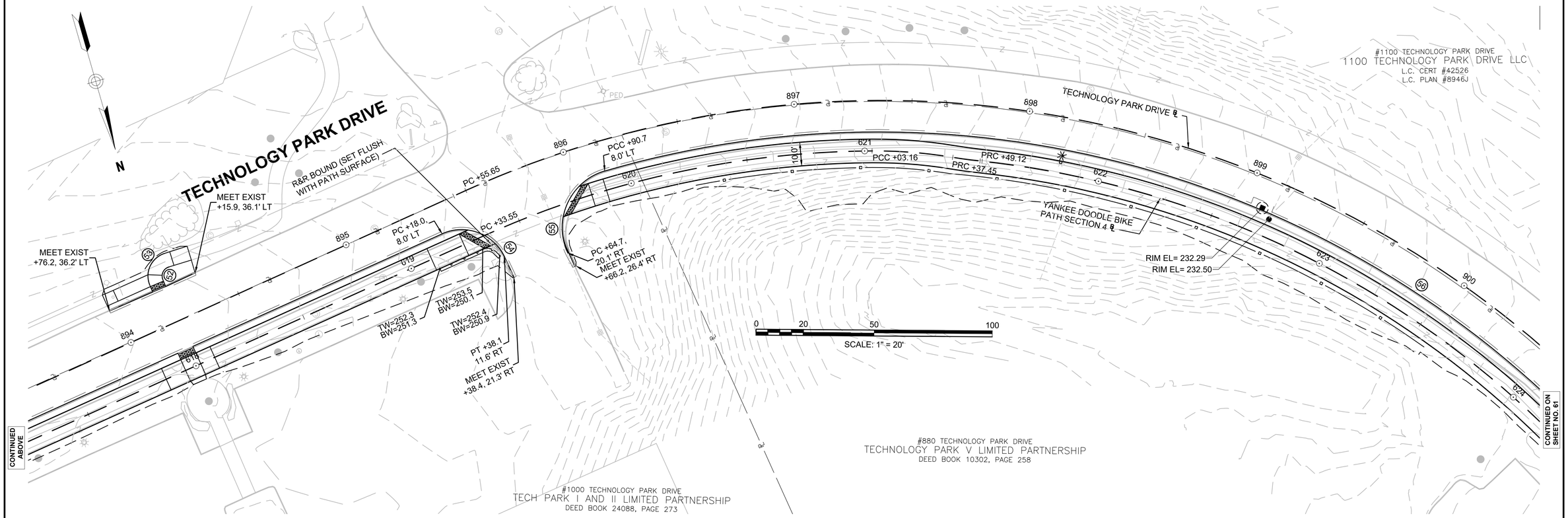
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	60	231
PROJECT FILE NO.	608227		

ALIGNMENT & GRADING PLANS

608227HD (ALGN).DWG Plotted on 23-Jul-2025 12:59 PM





BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	61	231
PROJECT FILE NO.	608227		

ALIGNMENT & GRADING PLANS

608227HD (ALGN).DWG Plotted on 23-Jul-2025 1:00 PM

TECHNOLOGY PARK DRIVE

#900 TECHNOLOGY PARK DRIVE
GCP TECH PARK LLC
DEED BOOK 27667, PAGE 58
PLAN BOOK 150, PLAN 1

TECHNOLOGY PARK DRIVE ℄

PT +47.61
PT +95.0
10.0' LT
PT +95.01
10.0

YANKEE DOODLE BIKE PATH SECTION 4 ℄

PC +25.5,
8.0' LT
PC +67.34
PRC +87.35
PT +07.36

RIM EL= 217.70
RIM EL= 218.04

CONTROL BOX REMNANT

MEET EXIST
PT +75.5, 43.3' RT

PT +51.5
8.0' LT
PC +18.06
PC +65.6,
8.0' LT
PC +86.17
PCC +24.99

PCC +16.4
6.5' RT
RIM EL= 211.56
RIM EL= 211.52

PC +06.6,
25.0' RT
MEET EXIST
+03.2, 43.4' RT

CONTINUED ON SHEET NO. 60

CONTINUED BELOW

0 20 50 100
SCALE: 1" = 20'

LEGEND:
(#) CURVE NUMBER
(SEE TABLE SHEET 49)

#800 TECHNOLOGY PARK DRIVE
TECHNOLOGY PARK X LIMITED PARTNERSHIP
DEED BOOK 10302, PAGE 253

#800 TECHNOLOGY PARK DRIVE
TECHNOLOGY PARK X LIMITED PARTNERSHIP
DEED BOOK 10302, PAGE 253

CONTINUED ON SHEET NO. 62

PC +57.66
EL=197.50
PT +24.54

#700 TECHNOLOGY PARK DRIVE
GCP TECH PARK LLC
DEED BOOK 27667, PAGE 58
PLAN BOOK 150, PLAN 1

RIM EL= 199.01
MEET EXIST
+41.1, 15.0' LT
PCC +08.73
RIM EL= 198.63
RIM EL= 199.39

CONTINUED ABOVE

PC +18.06
PC +86.17
PCC +24.99
RIM EL= 211.56
RIM EL= 211.52
PRC +05.3
10.0' LT
PRC +01.0
10.0' LT
YANKEE DOODLE BIKE PATH SECTION 4 ℄
R&R BOUND (SET FLUSH WITH PATH SURFACE)
PT +37.7
20.7' RT
MEET EXIST
+38.5, 33.2' RT
PC +68.6,
22.0' RT
MEET EXIST
+68.4, 29.5' RT

WALL STREET

0 20 50 100
SCALE: 1" = 20'

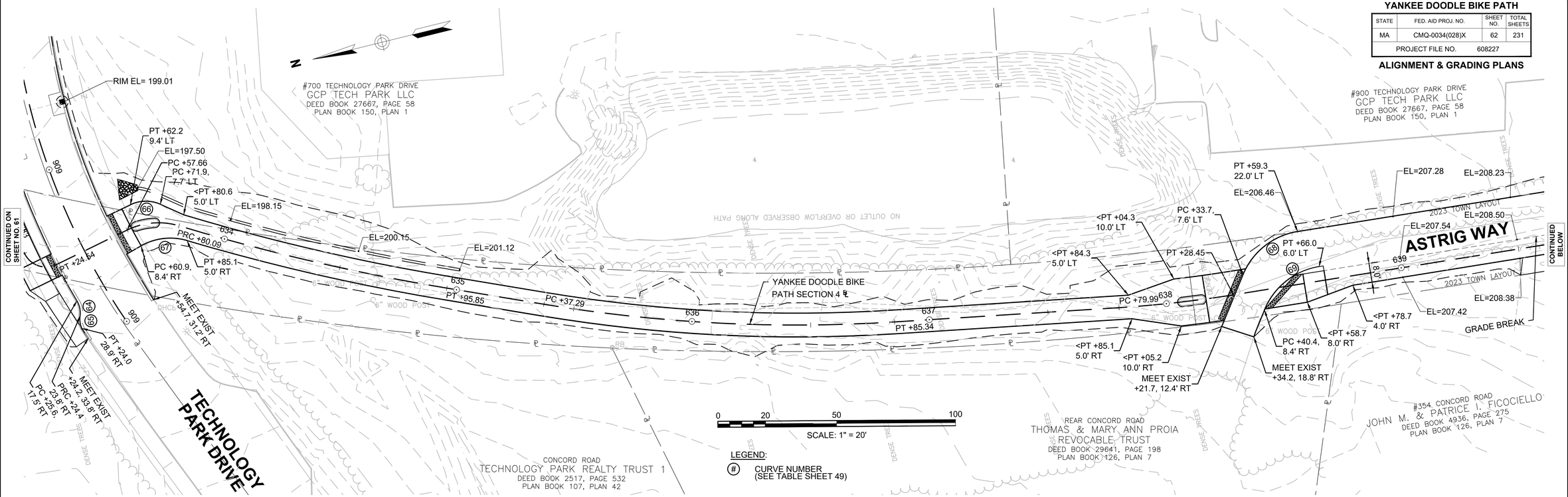
#600 TECHNOLOGY PARK DRIVE
TECHNOLOGY PARK X LIMITED PARTNERSHIP
DEED BOOK 4370, PLAN 296

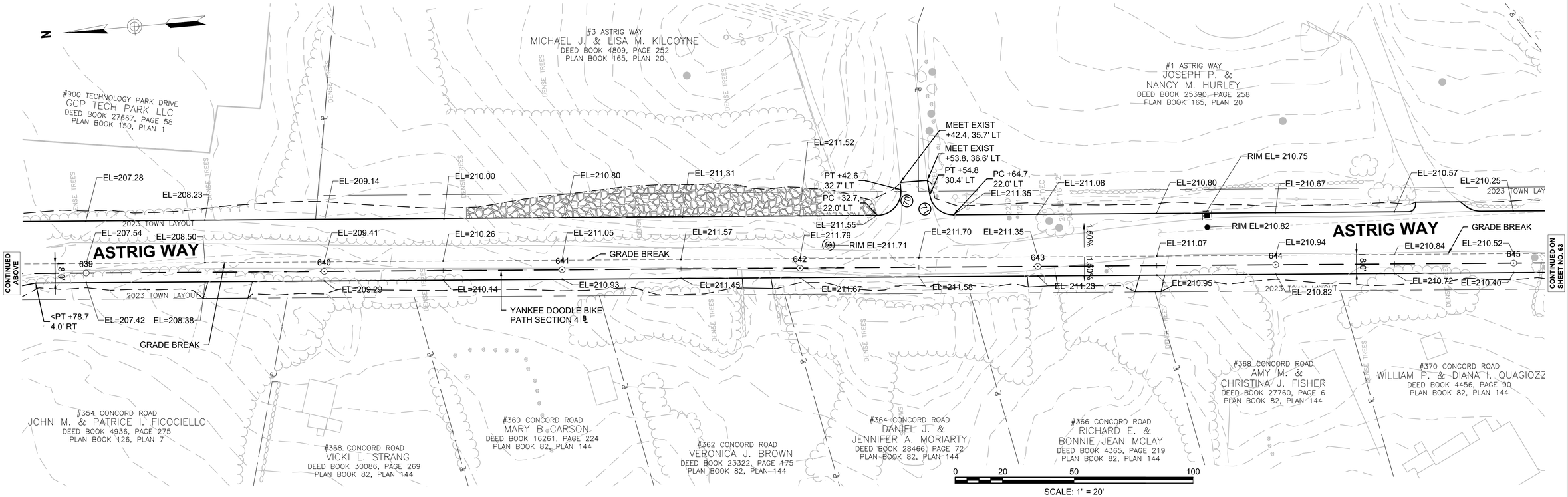
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	62	231
PROJECT FILE NO.	608227		

ALIGNMENT & GRADING PLANS

608227HD (ALGN).DWG Plotted on 23-Jul-2025 1:00 PM





BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	63	231
PROJECT FILE NO.	608227		

ALIGNMENT & GRADING PLANS

608227HD (ALGN).DWG Plotted on 23-Jul-2025 1:01 PM

N

#6 SPRINGS ROAD
DANIEL WILLIAMS
L.C. CERT #37549
L.C. PLAN #5472D

SPRINGS ROAD

#3 SPRINGS ROAD
ALISTAIR W. WILSON
DEED BOOK 7211, PAGE 208
PLAN BOOK 105, PLAN 30

#7 SPRINGS ROAD
CARL DWORKIN
DEED BOOK 1834, PAGE 196
PLAN BOOK 105, PLAN 30

#11 SPRINGS ROAD
FRANK J. LUCIANO, III
DEED BOOK 8574, PAGE 214

ASTRIG WAY

MEET EXIST
PT +78.8, 34.8' LT

PC +53.4,
20.9' LT

<PT +46.2
23.6' LT

<PT +36.5
22.0' LT

PC +35.6,
6.0' LT

<PT +48.2
23.3' LT

PI +85.27

<PT +07.7
10.0' LT

<PT +27.7
5.0' LT

<PT +07.7
10.0' RT

<PT +27.7
5.0' RT

PI +42.73

RIM EL=209.46

RIM EL=209.63

PT +52.4
18.0' RT

MEET EXIST
+49.4, 30.3' RT

EL=207.94

EL=210.57
EL=210.25
EL=210.84
EL=210.52
EL=210.72
EL=210.40
EL=211.59
EL=208.72
EL=208.15
EL=207.57
EL=206.86
EL=206.11
EL=205.37
EL=204.62
EL=203.87
EL=206.22
EL=204.66

646 647 648 649 650 645

PI +24.00
PI +24.02

1.50%
1.50%
10.0'
10.0'

YANKEE DOODLE BIKE
PATH SECTION 4 ℄

RAILROAD SIDELINE
FORMER RAILROAD SIDELINE

CONTINUED ON SHEET NO. 62

CONTINUED BELOW

#370 CONCORD ROAD
WILLIAM P. & DIANA I. QUAGIOZZI
DEED BOOK 4456, PAGE 90
PLAN BOOK 82, PLAN 144

#1 SPRINGS ROAD
JOHN J. CAPORIZZO
DEED BOOK 26754, PAGE 80
PLAN BOOK 167, PLAN 61

#374 CONCORD ROAD
STEPHEN B. MOSS
DEED BOOK 10411, PAGE 10
PLAN BOOK 167, PLAN 61

LEGEND:
(#) CURVE NUMBER
(SEE TABLE SHEET 49)

0 20 50 100
SCALE: 1" = 20'

N

#11 SPRINGS ROAD
FRANK J. LUCIANO, III
DEED BOOK 8574, PAGE 214

#13 SPRINGS ROAD
ANTHONY & ELIZABETH B. PARKES
DEED BOOK 6478, PAGE 85
PLAN BOOK 181, PLAN 93

BEDFORD
BILLERICA

EL=204.62
EL=203.87
EL=203.12
EL=202.46
EL=201.72
EL=201.12

650 PI +24.02 651 652 653 654 655 656+00

10.0'

PT +60.0
5.0' LT

PRC +68.5
8.5' LT

PC +60.0
5.0' RT

PRC +68.5
8.5' RT

YANKEE DOODLE BIKE
PATH SECTION 4 ℄

CONTINUED ABOVE

LIMIT OF WORK
STA 655+53.15
N 3016625.2440
E 714535.5165

0 20 50 100
SCALE: 1" = 20'

#388 CONCORD ROAD
JODY PAUL PERONI
DEED BOOK 2502, PAGE 332
PLAN BOOK 103, PLAN 171B
PLAN BOOK 103, PLAN 121B

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	64	231
PROJECT FILE NO.	608227		

SIGNS & PAVEMENT MARKINGS

608227HD (STRP).DWG Plotted on 23-Jul-2025 1:05 PM

MIDDLESEX TURNPIKE

1938 COUNTY LAYOUT

LIMIT OF WORK
STA 324+12.00
N 3024936.3290
E 715164.9807

FUTURE PATH CONSTRUCTED BY OTHERS

R&S MEET EXIST MARKINGS

PROP TOWN LAYOUT ALTERATION

R9-5

YD-1
M6-1(L)
YD-1
M6-1(L)

R10-22

W1-1(L)

SEE DETAIL (TYP)

YD-1
M6-3

R3-8c

SP-5
"MILE 2.6"

MEET EXIST MARKINGS

PROP TOWN LAYOUT ALTERATION

PC +63.97

PCC +94.21

PT +02.90

CONCORD ROAD

STATE HIGHWAY LAYOUT (LAYOUT NO. 4072)

DRAIN EASEMENT PLAN BOOK 229, PLAN 30

DRAIN EASEMENT PLAN BOOK 139, PLAN 21

HIGHWAY EASEMENT PLAN BOOK 217, PLAN 42

#401 MIDDLESEX TURNPIKE
RICARDO VERISSIMO DOS REIS & DANIELA DE SOUSA TEIXEIRA
DEED BOOK 34351, PAGE 129
PLAN BOOK 95, PLAN 56B

PROP 4" - 3' BYL
W/9' GAPS (TYP)
STA 386+14 TO STA 393+80

SP-5
"MILE 2.5"

CONTINUED BELOW

W1-1(R)

PT +63.96

PC +71.30

PC +21.47

PT +05.61

PT +11.65

SP-5
"MILE 2.4"

PC +89.65

#2 FEDERAL STREET
REXPAR PROPERTY LLC
DEED BOOK 28868, PAGE 237

#4 FEDERAL STREET
THE FIELDS REALTY TRUST
DEED BOOK 2673, PAGE 612
PLAN BOOK 144, PLAN 43

CONTINUED ABOVE

CONTINUED ON SHEET NO. 65

DENSE TREES

D.TREES

EDGE OF PAVEMENT

SCALE IN FEET
20 0 20 40

CONSTRUCTION NOTES:

1. ALL PAVEMENT MARKINGS ON ROADWAYS SHALL BE REFLECTIVE THERMOPLASTIC. ALL PAVEMENT MARKINGS ON THE YANKEE DOODLE BIKE PATH SHALL BE REFLECTIVE PAINT.
2. WHERE EXISTING PAVEMENT MARKINGS ARE DIFFERENT THAN PROPOSED MARKINGS SHOWN, REMOVE BY AN APPROVED METHOD.
3. RETAIN ALL EXISTING SIGNS UNLESS OTHERWISE NOTED.
4. SEE SHEET 78 FOR TRAFFIC SIGNAL PLAN AND 79 SHEET FOR TRAFFIC SIGNAL DATA.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	65	231
PROJECT FILE NO.	608227		

SIGNS & PAVEMENT MARKINGS

CONSTRUCTION NOTES:
1. ALL PAVEMENT MARKINGS ON ROADWAYS SHALL BE REFLECTIVE THERMOPLASTIC. ALL PAVEMENT MARKINGS ON THE YANKEE DOODLE BIKE PATH SHALL BE REFLECTIVE PAINT.
2. WHERE EXISTING PAVEMENT MARKINGS ARE DIFFERENT THAN PROPOSED MARKINGS SHOWN, REMOVE BY AN APPROVED METHOD.
3. RETAIN ALL EXISTING SIGNS UNLESS OTHERWISE NOTED.

CONTINUED ON SHEET NO. 64

CONTINUED ON SHEET NO. 66

PT +11.65

SP-5 "MILE 2.4"

PC +89.65

393

PROP 4" - 3' BYL W/9' GAPS (TYP) STA 386+14 TO STA 393+80

PROP 4" SYL STA 393+80 TO STA 409+13

PT +79.83

394

5'

5'

395

PC +25.38

396

W1-1(L)

W1-1(R)

398

399

PT +48.23

397

SP-5 "MILE 2.3"

W1-5(L)

DENSE TREES

BIT CONC.

EDGE OF PAVEMENT

FEDERAL STREET
THE FIELDS REALTY TRUST
DEED BOOK 2673, PAGE 612
PLAN BOOK 108, PLAN 33

#4 FEDERAL STREET
THE FIELDS REALTY TRUST
DEED BOOK 2673, PAGE 612
PLAN BOOK 144, PLAN 43
PLAN BOOK 108, PLAN 33

#8 FEDERAL STREET
RHINO 8 FEDERAL LLC
DEED BOOK 37054, PAGE 103
PLAN BOOK 141, PLAN 60

20 0 20 40
SCALE IN FEET

608227HD (STRP).DWG Plotted on 23-Jul-2025 1:06 PM

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	66	231
PROJECT FILE NO.	608227		

SIGNS & PAVEMENT MARKINGS

CONSTRUCTION NOTES:
1. ALL PAVEMENT MARKINGS ON ROADWAYS SHALL BE REFLECTIVE THERMOPLASTIC. ALL PAVEMENT MARKINGS ON THE YANKEE DOODLE BIKE PATH SHALL BE REFLECTIVE PAINT.
2. WHERE EXISTING PAVEMENT MARKINGS ARE DIFFERENT THAN PROPOSED MARKINGS SHOWN, REMOVE BY AN APPROVED METHOD.
3. RETAIN ALL EXISTING SIGNS UNLESS OTHERWISE NOTED.

N

30' WIDE BROOK EASEMENT
PLAN BOOK 141, PLAN 60

#8 FEDERAL STREET
RHINO 8 FEDERAL LLC
DEED BOOK 37054, PAGE 103
PLAN BOOK 141, PLAN 60

REAR MIDDLESEX TPK
THE FIELDS REALTY TRUST
DEED BOOK 2673, PAGE 612
PLAN BOOK 108, PLAN 33

DENSE TREES

UPL 86

UPL 92

UPL

UPL 98

UPL 90-99

BIT CONC.

EDGE OF PAVEMENT

CONC.

PROP 4" SYL
STA 393+80 TO STA 404+55

SP-5
"MILE 2.2"

W1-5(L)

W5-2
W8-10P

OM2-2V

PC +00.00

PT +24.61

PC +32.03

PT +44.87

PC +10.00

PT +76.40

PC +96.30

PT +97.72

401

402

403

404

405

406

407

5'

5'

SP-4

PROP 4" SYL
STA 405+10 TO STA 409+13

NOTE: NO PAVEMENT MARKINGS SHALL BE INSTALLED ON BOARDWALK BRIDGE STRUCTURE

20 0 20 40
SCALE IN FEET

CONTINUED ON SHEET NO. 65

CONTINUED ON SHEET NO. 67

FOR PROFILE, SEE SHEETS ##-##.

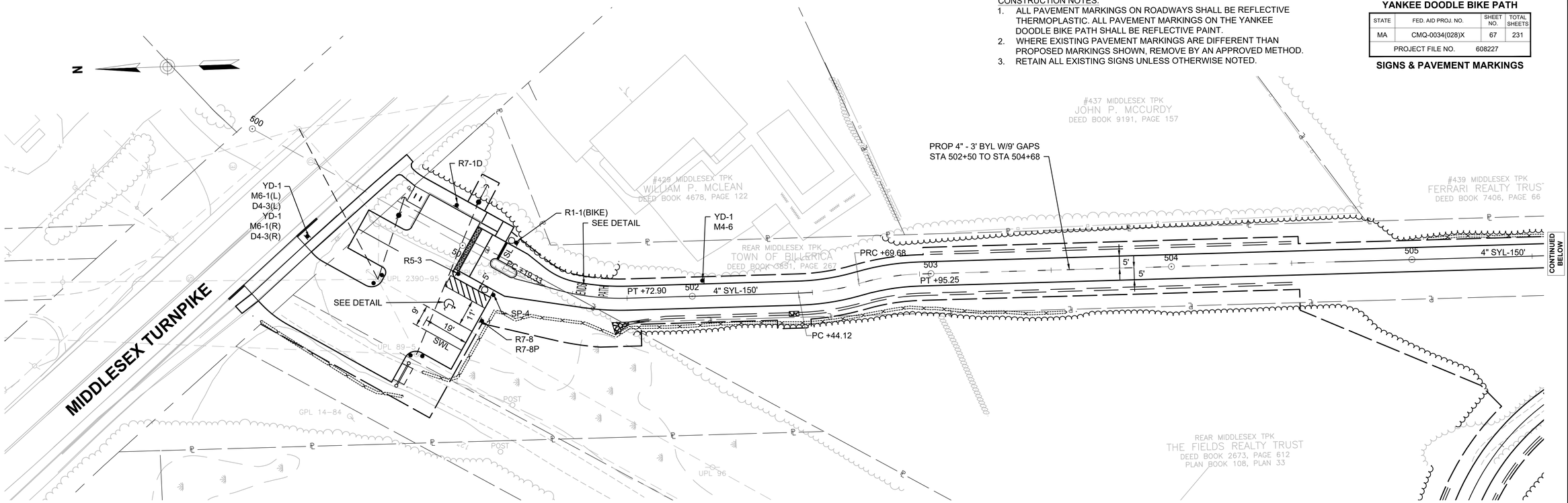
608227HD (STRP).DWG Plotted on 23-Jul-2025 1:06 PM

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	67	231
PROJECT FILE NO.	608227		

SIGNS & PAVEMENT MARKINGS

CONSTRUCTION NOTES:
1. ALL PAVEMENT MARKINGS ON ROADWAYS SHALL BE REFLECTIVE THERMOPLASTIC. ALL PAVEMENT MARKINGS ON THE YANKEE DOODLE BIKE PATH SHALL BE REFLECTIVE PAINT.
2. WHERE EXISTING PAVEMENT MARKINGS ARE DIFFERENT THAN PROPOSED MARKINGS SHOWN, REMOVE BY AN APPROVED METHOD.
3. RETAIN ALL EXISTING SIGNS UNLESS OTHERWISE NOTED.



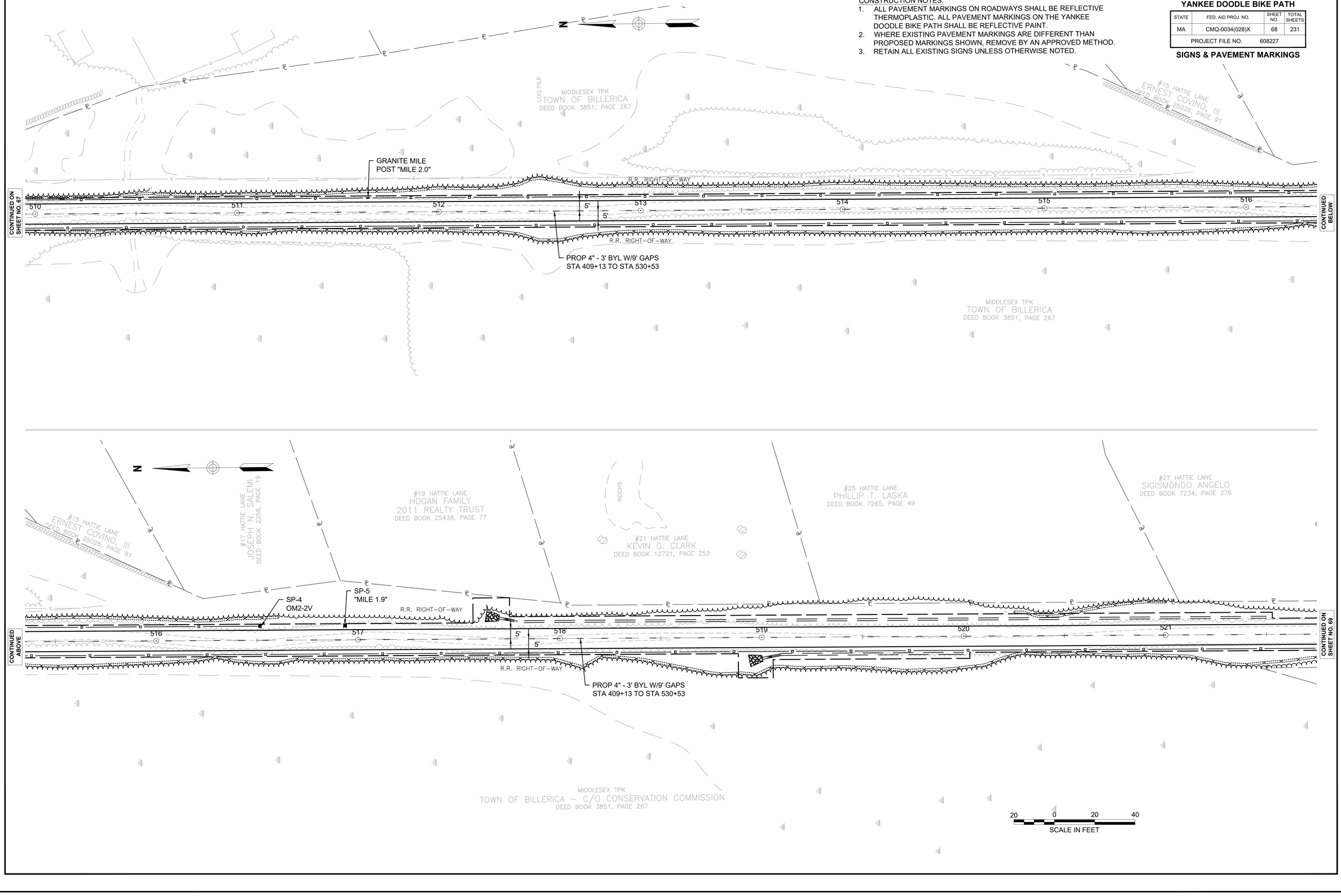
608227HD (STRP).DWG Plotted on 23-Jul-2025 1:07 PM

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	68	231
PROJECT FILE NO.	608227		

SIGNS & PAVEMENT MARKINGS

CONSTRUCTION NOTES:
1. ALL PAVEMENT MARKINGS ON ROADWAYS SHALL BE REFLECTIVE THERMOPLASTIC. ALL PAVEMENT MARKINGS ON THE YANKEE DOODLE BIKE PATH SHALL BE REFLECTIVE PAINT.
2. WHERE EXISTING PAVEMENT MARKINGS ARE DIFFERENT THAN PROPOSED MARKINGS SHOWN, REMOVE BY AN APPROVED METHOD.
3. RETAIN ALL EXISTING SIGNS UNLESS OTHERWISE NOTED.



608227HD (STRP).DWG Plotted on 23-Jul-2025 1:07 PM

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	69	231
PROJECT FILE NO.	608227		

SIGNS & PAVEMENT MARKINGS

CONSTRUCTION NOTES:
1. ALL PAVEMENT MARKINGS ON ROADWAYS SHALL BE REFLECTIVE THERMOPLASTIC. ALL PAVEMENT MARKINGS ON THE YANKEE DOODLE BIKE PATH SHALL BE REFLECTIVE PAINT.
2. WHERE EXISTING PAVEMENT MARKINGS ARE DIFFERENT THAN PROPOSED MARKINGS SHOWN, REMOVE BY AN APPROVED METHOD.
3. RETAIN ALL EXISTING SIGNS UNLESS OTHERWISE NOTED.

608227HD (STRP).DWG Plotted on 23-Jul-2025 1:08 PM

#27 HATTIE LANE
SIGISMONDO ANGELO
DEED BOOK 7234, PAGE 276

#29 HATTIE LANE
RAYMOND E. HINXMAN, III
DEED BOOK 26181, PAGE 60

#31 HATTIE LANE
CHRISTINE MARIE KEMP
DEED BOOK 16419, PAGE 163

#33 HATTIE LANE
ROBERT A. SEARS & HAEWON SEARS
DEED BOOK 7380, PAGE 170

SP-5
"MILE 1.8"

PC +87.23

R.R. RIGHT-OF-WAY

PROP 4" - 3' BYL W/9' GAPS
STA 409+13 TO STA 530+53

5'

5'

521 522 523 524 525 526 527

CONTINUED ON SHEET NO. 68

CONTINUED BELOW

MIDDLESEX TPK
TOWN OF BILLERICA
DEED BOOK 3851, PAGE 267

REAR BLACKWOOD AVE
TOWN OF BILLERICA
DEED BOOK 2285, PAGE 656

REAR DEERFIELD STREET
TOWN OF BILLERICA
DEED BOOK 10217, PAGE 131

SP-5
"MILE 1.7"
MTD TO RAILING

PT +06.84

PC +76.58

526 527 528 529 530 531 532

PROP 4" - 3' BYL W/9' GAPS
STA 409+13 TO STA 530+53

PROP 4" SYL
STA 530+53 TO STA 532+01

W5-2
W8-10P

LIMITED ACCESS STATE HIGHWAY LAYOUT (LAYOUT NO. 4072)

LOCATION LINE OF SEPTEMBER 15, 1953

ROUTE 3
TOWN OF BILLERICA
DEED BOOK 19950, PAGE 275

CONTINUED ABOVE

CONTINUED ON SHEET NO. 70

20 0 20 40
SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	70	231
PROJECT FILE NO.	608227		

SIGNS & PAVEMENT MARKINGS

CONSTRUCTION NOTES:
1. ALL PAVEMENT MARKINGS ON ROADWAYS SHALL BE REFLECTIVE THERMOPLASTIC. ALL PAVEMENT MARKINGS ON THE YANKEE DOODLE BIKE PATH SHALL BE REFLECTIVE PAINT.
2. WHERE EXISTING PAVEMENT MARKINGS ARE DIFFERENT THAN PROPOSED MARKINGS SHOWN, REMOVE BY AN APPROVED METHOD.
3. RETAIN ALL EXISTING SIGNS UNLESS OTHERWISE NOTED.

CONTINUED ON SHEET NO. 69

N

PC +76.58

536

NOTE: NO PAVEMENT MARKINGS SHALL BE INSTALLED ON BOARDWALK BRIDGE STRUCTURE

W5-2
W8-10P

PROP 4" - 3' BYL W/9' GAPS
STA 535+42 TO STA 556+26

SP-5
"MILE 1.6"
MTD TO RAILING

PCC +95.60

533

534

PT +90.89

535

PROP 4" SYL
STA 533+56 TO STA 535+42

PT +37.08

5'

5'

536

PC +89.78

537

PC +39.83

PT +68.90

SP-5
"MILE 1.5"

538

PC +00.33

CONTINUED BELOW

U.S. ROUTE 3
(NORTHBOUND)

N

SP-5
"MILE 1.5"

SP-4
OM2-2V

538

PT +34.71

539

540

5'

5'

541

542

PC +81.17

PT +28.03

PC +69.59

543

PRC +48.77

SP-5
"MILE 1.4"
MTD TO RAILING

+39.83

PT +68.90

PC +00.33

PROP 4" - 3' BYL W/9' GAPS
STA 535+42 TO STA 556+26

CONTINUED ABOVE

CONTINUED ON SHEET NO. 71

U.S. ROUTE 3
(NORTHBOUND)

LOCATION LINE OF SEPTEMBER
STATE HIGHWAY LAYOUT (LAYOUT

20 0 20 40
SCALE IN FEET

608227HD (STRP).DWG Plotted on 23-Jul-2025 1:08 PM

CONSTRUCTION NOTES:

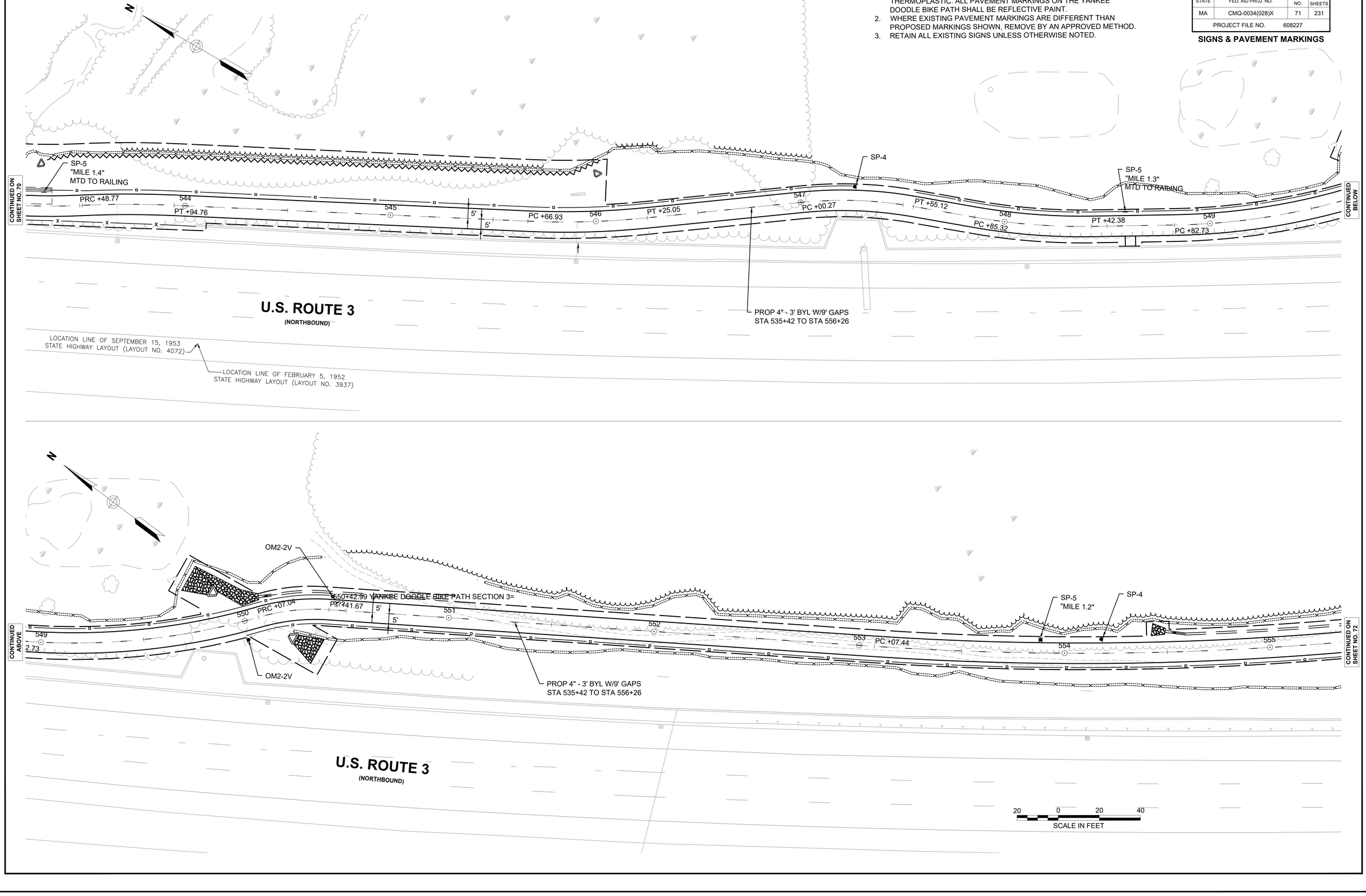
1. ALL PAVEMENT MARKINGS ON ROADWAYS SHALL BE REFLECTIVE THERMOPLASTIC. ALL PAVEMENT MARKINGS ON THE YANKEE DOODLE BIKE PATH SHALL BE REFLECTIVE PAINT.
2. WHERE EXISTING PAVEMENT MARKINGS ARE DIFFERENT THAN PROPOSED MARKINGS SHOWN, REMOVE BY AN APPROVED METHOD.
3. RETAIN ALL EXISTING SIGNS UNLESS OTHERWISE NOTED.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	71	231
PROJECT FILE NO.	608227		

SIGNS & PAVEMENT MARKINGS

608227HD (STRP).DWG Plotted on 23-Jul-2025 1:09 PM



CONSTRUCTION NOTES:
1. ALL PAVEMENT MARKINGS ON ROADWAYS SHALL BE REFLECTIVE THERMOPLASTIC. ALL PAVEMENT MARKINGS ON THE YANKEE DOODLE BIKE PATH SHALL BE REFLECTIVE PAINT.
2. WHERE EXISTING PAVEMENT MARKINGS ARE DIFFERENT THAN PROPOSED MARKINGS SHOWN, REMOVE BY AN APPROVED METHOD.
3. RETAIN ALL EXISTING SIGNS UNLESS OTHERWISE NOTED.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	72	231
PROJECT FILE NO.	608227		

SIGNS & PAVEMENT MARKINGS

608227HD (STRP).DWG Plotted on 23-Jul-2025 1:10 PM

CONTINUED ON SHEET NO. 71

PROP 4" SYL
STA 556+26 TO STA 562+23

PRC +14.00

PROP 4" - 3' BYL W/9' GAPS
STA 535+42 TO STA 556+26

W5-2

555 556 557 558 559 560 561

PRC +75.43

PRC +44.43

PRC +24.76

PRC +88.46

6' 6' 6' 6'

SWEL

U.S. ROUTE 3
(NORTHBOUND)

FEBRUARY 5, 1952 STATE HIGHWAY LAYOUT (LAYOUT NO.3937)
THE COMMONWEALTH OF MASSACHUSETTS
DEED BOOK 1188, PAGE 395

CONTINUED BELOW

PROP 15' TS POST & FOUNDATION
W/TWO RRFB (1-SIDED)
W/SOLAR POWER
W/RADIO ANTENNA
W/APS PED PUSH BUTTON (LEFT)
W/R10-25
W/W11-2(L), W11-2(R), W16-7P(L),
W16-7P(R)
STA 701+70.7, 21.5' LT

LOCATION LINE OF MAY 26, 1953
TOWN LAYOUT (LAYOUT NO. 4054)

SEE CROSSWALK DETAIL (TYP)

PROP FLEXIBLE
DELINEATOR
POST (TYP)

SEE CHANNELIZED
MARKING DETAIL

ALL MARKINGS ON BRIDGE
DECK SHALL BE
REFLECTORIZED PAINT
STA 702+96 TO STA 705+14

WINTER STREET

ELIOT STREET

ORCHARD ROAD
(FKA MANNING ROAD)

VARIES 11' 11' 7' VARIES
SWL DBYL SWL SWL SWL SWL
5' 4" SYL 5'

12" SWCHL, @45°, 10' O.C.

700 701 702 703 704 705 706
601 602 603 604

+90 +23

10' CW

R&S
MA-R7-2

W11-2(L)
W16-9p

GRANITE MILE
POST "MILE 1.0"

YD-1
M6-1(R)
YD-1
M6-1(L)

YD-1
M6-1(R)

SEE DETAILS

W7-5

W5-2
R1-1(BIKE)

562

PROP 4" SYL
STA 556+26 TO STA 562+23

6' 6' 561

PROP 15' TS POST & FOUNDATION
W/TWO RRFB (1-SIDED)
W/SOLAR POWER
W/RADIO ANTENNA
W/APS PED PUSH BUTTON (RIGHT)
W/R10-25
W/W11-2(L), W11-2(R), W16-7P(L),
W16-7P(R)
STA 701+61.3, 16.9' RT

LOCATION LINE OF FEBRUARY 5, 1952
STATE HIGHWAY LAYOUT (LAYOUT NO.3937)

TOWN LAYOUT (LAYOUT NO. 4054)
LOCATION LINE OF MAY 26, 1953

1946 TOWN LAYOUT

U.S. ROUTE 3
(NORTHBOUND)

U.S. ROUTE 3
(SOUTHBOUND)

DURATION OF FLASHING UPON RECEIPT OF VALID PEDESTRIAN PUSHBUTTON ACTUATION SHALL BE INITIALLY SET FOR 13 SECONDS.

FEBRUARY 5, 1952 STATE HIGHWAY L
THE COMMONWEALTH OF
DEED BOOK 1188,

20 0 20 40
SCALE IN FEET

CONTINUED ABOVE

CONTINUED ON SHEET NO. 72

#59 ELIOT STREET
LINDA A. FREDERICK &
SEAN U. FREDERICK
DEED BOOK 16812, PAGE 170
PLAN BOOK 35, PLAN 76

#60 ELIOT STREET
KATHLEEN MACINTOSH
DEED BOOK 10319, PAGE
PLAN BOOK 35, PLAN

LIST OF MAJOR ITEMS REQUIRED

YANKEE DOODLE BIKE PATH AT ELLIOT STREET (LOC. 1)

PAY ITEM	QUANTITY	DESCRIPTION
825.21	2	SIDE-OF-POST MOUNTED CONTROL CABINET ASSEMBLY
	2	15' TS POST STANDARD INCL. FOUNDATION
	4	L.E.D. RECTANGULAR DUAL YELLOW BEACON (RRFB) (1-SIDED)
	2	SOLAR PANEL W/MOUNTING BRACKET
	2	RADIO ANTENNA
	1	APS PEDESTRIAN PUSH BUTTON (LEFT) W/R10-25
	1	APS PEDESTRIAN PUSH BUTTON (RIGHT) W/R10-25
	2	BATTERY SYSTEM
	2	W11-2(L) SIGN
	2	W11-2(R) SIGN
	2	W16-7p(L) SIGN
	2	W16-7p(R) SIGN

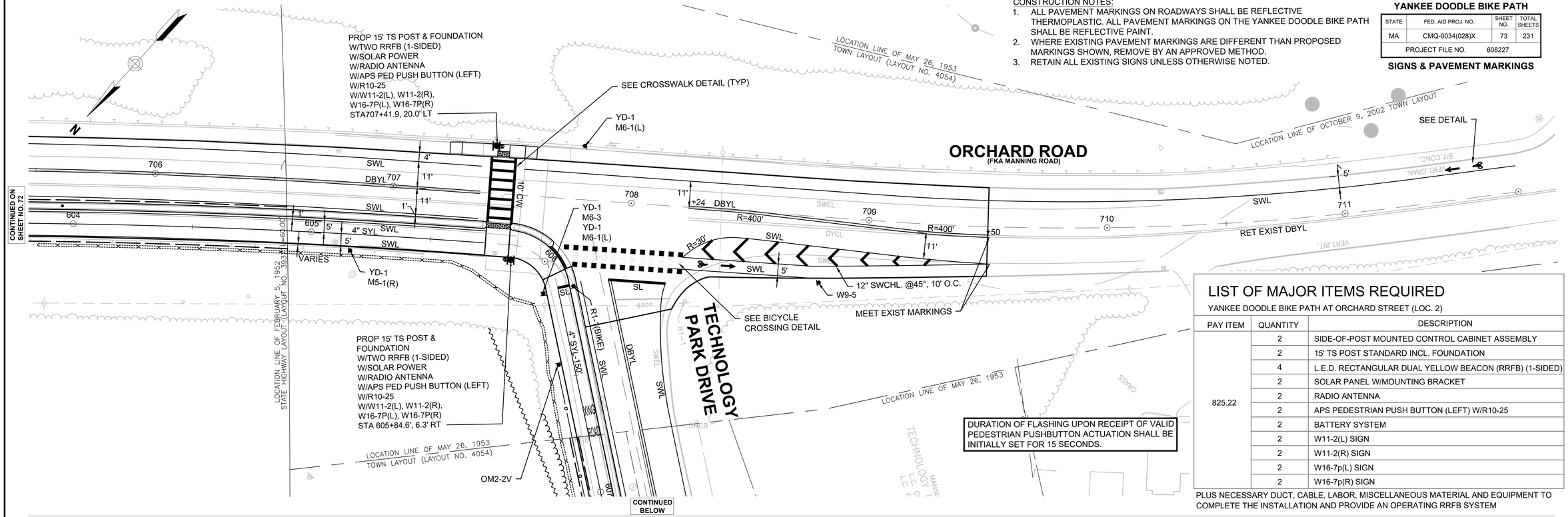
PLUS NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS MATERIAL AND EQUIPMENT TO COMPLETE THE INSTALLATION AND PROVIDE AN OPERATING RRFB SYSTEM

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	73	231
PROJECT FILE NO.	608227		

SIGNS & PAVEMENT MARKINGS

CONSTRUCTION NOTES:
1. ALL PAVEMENT MARKINGS ON ROADWAYS SHALL BE REFLECTIVE THERMOPLASTIC. ALL PAVEMENT MARKINGS ON THE YANKEE DOODLE BIKE PATH SHALL BE REFLECTIVE PAINT.
2. WHERE EXISTING PAVEMENT MARKINGS ARE DIFFERENT THAN PROPOSED MARKINGS SHOWN, REMOVE BY AN APPROVED METHOD.
3. RETAIN ALL EXISTING SIGNS UNLESS OTHERWISE NOTED.

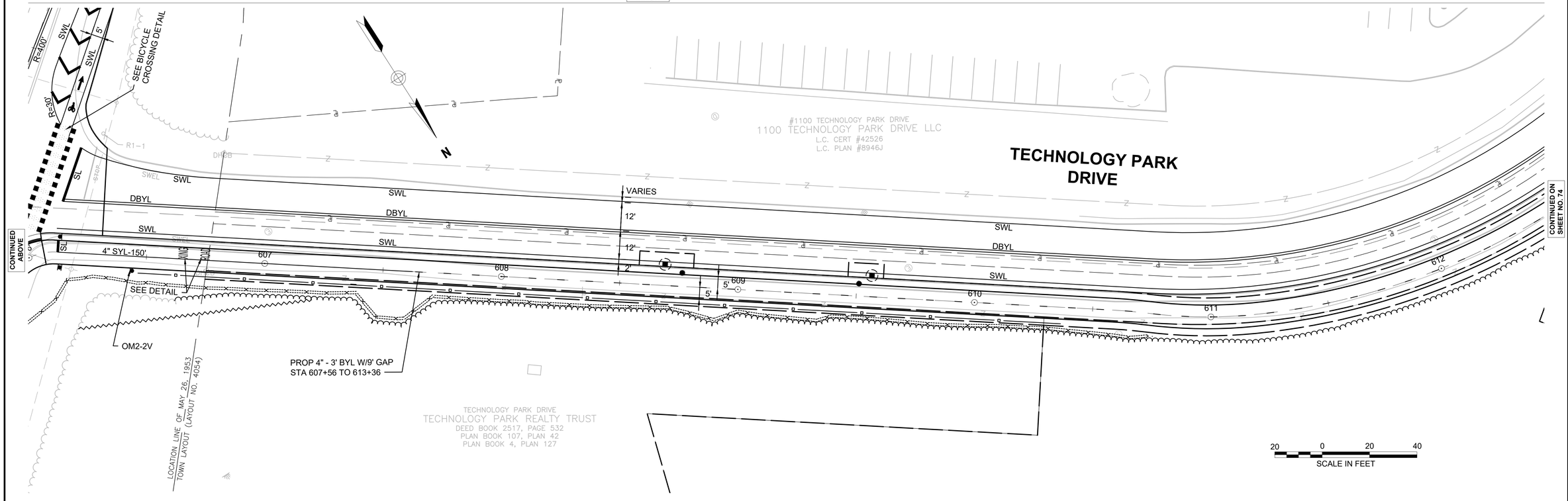


LIST OF MAJOR ITEMS REQUIRED

YANKEE DOODLE BIKE PATH AT ORCHARD STREET (LOC. 2)

PAY ITEM	QUANTITY	DESCRIPTION
825.22	2	SIDE-OF-POST MOUNTED CONTROL CABINET ASSEMBLY
	2	15' TS POST STANDARD INCL. FOUNDATION
	4	L.E.D. RECTANGULAR DUAL YELLOW BEACON (RRFB) (1-SIDED)
	2	SOLAR PANEL W/MOUNTING BRACKET
	2	RADIO ANTENNA
	2	APS PEDESTRIAN PUSH BUTTON (LEFT) W/R10-25
	2	BATTERY SYSTEM
	2	W11-2(L) SIGN
	2	W11-2(R) SIGN
	2	W16-7p(L) SIGN
	2	W16-7p(R) SIGN

PLUS NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS MATERIAL AND EQUIPMENT TO COMPLETE THE INSTALLATION AND PROVIDE AN OPERATING RRFB SYSTEM



608227HD (STRP).DWG Plotted on 23-Jul-2025 1:10 PM

CONSTRUCTION NOTES:

1. ALL PAVEMENT MARKINGS ON ROADWAYS SHALL BE REFLECTIVE THERMOPLASTIC. ALL PAVEMENT MARKINGS ON THE YANKEE DOODLE BIKE PATH SHALL BE REFLECTIVE PAINT.
2. WHERE EXISTING PAVEMENT MARKINGS ARE DIFFERENT THAN PROPOSED MARKINGS SHOWN, REMOVE BY AN APPROVED METHOD.
3. RETAIN ALL EXISTING SIGNS UNLESS OTHERWISE NOTED.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	74	231
PROJECT FILE NO.	608227		

SIGNS & PAVEMENT MARKINGS

CONTINUED ON SHEET NO. 73

N

#1100 TECHNOLOGY PARK DRIVE
1100 TECHNOLOGY PARK DRIVE LLC
L.C. CERT #42526
L.C. PLAN #8946J

GAS EASEMENT
(DEED BOOK 3652, PAGE 179)

TECHNOLOGY PARK DRIVE

VARIES
12'
SWL
DBYL
12'
SWL
2'
12' CW
5'
5'
612
613
614
615
616
617
W11-2(L)
W16-9P
SP-5
"MILE 0.8"
DRAIN EASEMENT
(PLAN BOOK 139, PLAN 29)
R&S
R1-1
R1-1
SEE DETAIL (TYP)
RET SIGN
SP-5
"MILE 0.7"
RET SIGNS
R&D
PED. BEACON
R&S
"SLOW PEDESTRIAN CROSSING"
W11-15(L)
W16-7P(L)
SEE CROSSWALK DETAIL (TYP)
PROP 4" - 3' BYL W/9' GAP
STA 613+95 TO 616+52

CONTINUED BELOW

TECHNOLOGY PARK DRIVE
TECHNOLOGY PARK REALTY TRUST
DEED BOOK 2517, PAGE 532
PLAN BOOK 107, PLAN 12

#1000 TECHNOLOGY PARK DRIVE
TECH PARK I AND II LIMITED PARTNERSHIP
DEED BOOK 24088, PAGE 273

DRIVEWAY EASEMENT
(PLAN BOOK 139, PLAN 89)

N

TECHNOLOGY PARK DRIVE

"SLOW PEDESTRIAN CROSSING"
PED. BEACON
W11-2(L)
W16-9P
R1-1
+70
+33
12' CW
620
619
618
W11-2(L)
W16-7P(L)
OM2-2V
R&R SIGN (BO)
SEE CROSSWALK DETAIL (TYP)
W11-15(L)
W16-7P(L)
OM2-2V
SEE DETAIL (TYP)
PROP 4" - 3' BYL W/9' GAP
STA 619+80 TO 627+40
PROP 4" - 3' BYL W/9' GAP
STA 616+92 TO 619+28
W11-2(L)
W16-7P(L)
SP-5
"MILE 0.7"
VARIES
SWL
DBYL
SWL
12'
12'
2'
5'
5'
621
622
623
624
SP-5
"MILE 0.6"
MTD TO RAILING

CONTINUED ABOVE

CONTINUED ON SHEET NO. 75

#1100 TECHNOLOGY PARK DRIVE
1100 TECHNOLOGY PARK DRIVE LLC
L.C. CERT #42526
L.C. PLAN #8946J

#880 TECHNOLOGY PARK DRIVE
TECHNOLOGY PARK V LIMITED PARTNERSHIP
DEED BOOK 10302, PAGE 258

#1000 TECHNOLOGY PARK DRIVE
TECH PARK I AND II LIMITED PARTNERSHIP
DEED BOOK 24088, PAGE 273

20 0 20 40
SCALE IN FEET

608227HD (STRP).DWG Plotted on 23-Jul-2025 1:11 PM

CONSTRUCTION NOTES:
1. ALL PAVEMENT MARKINGS ON ROADWAYS SHALL BE REFLECTIVE THERMOPLASTIC. ALL PAVEMENT MARKINGS ON THE YANKEE DOODLE BIKE PATH SHALL BE REFLECTIVE PAINT.
2. WHERE EXISTING PAVEMENT MARKINGS ARE DIFFERENT THAN PROPOSED MARKINGS SHOWN, REMOVE BY AN APPROVED METHOD.
3. RETAIN ALL EXISTING SIGNS UNLESS OTHERWISE NOTED.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	75	231
PROJECT FILE NO.	608227		

SIGNS & PAVEMENT MARKINGS

608227HD (STRP).DWG Plotted on 23-Jul-2025 1:11 PM

#900 TECHNOLOGY PARK DRIVE
GCP TECH PARK LLC
DEED BOOK 27667, PAGE 58
PLAN BOOK 150, PLAN 1

TECHNOLOGY PARK DRIVE

GAS EASEMENT (DEED BOOK 3552, PAGE 179)

VARIES
SWL
12'
DBYL
12'
SWL
2'
5'
6'
RET SIGN
12' CW
+63
+14
624
625
626
627
628
629
630
631
632
5'
5'
SL
SP-5
"MILE 0.5"
R1-1
R&S
ERADICATE SL
SEE CROSSWALK DETAIL (TYP)
CONTROL BOX REMNANT
PROP 4" - 3' BYL W/9' GAP
STA 619+80 TO 627+40
SEE DETAIL (TYP)
ACCESS AND UTILITY CORRIDOR (PLAN BOOK 200, PLAN 141)
ACCESS AND UTILITY CORRIDOR (PLAN BOOK 200, PLAN 141)
DRIVEWAY EASEMENT (PLAN BOOK 139, PLAN 89)
CONTINUED ON SHEET NO. 74
CONTINUED BELOW
SP-5
"MILE 0.6"
MTD TO RAILING

#800 TECHNOLOGY PARK DRIVE
TECHNOLOGY PARK X LIMITED PARTNERSHIP
DEED BOOK 10302, PAGE 253

#800 TECHNOLOGY PARK DRIVE
TECHNOLOGY PARK X LIMITED PARTNERSHIP
DEED BOOK 10302, PAGE 253

CONTINUED ON SHEET NO. 76

PC +57.66
PCC +08.73
20' CW
15'
15'
15'
R1-1(BIKE)
4' SYL-150'
633
CONTINUED ABOVE
PC+18.06
SP-5
"MILE 0.5"
5'
5'
PC +86.72
PCC +24.99
SWL
12' CW
SL
STOP
R1-1
R&S
PROP 4" - 3' BYL W/9' GAP
STA 628+35 TO 630+18
SEE CROSSWALK DETAIL (TYP)
PROP 4" - 3' BYL W/9' GAP
STA 630+88 TO 631+58
SEE DETAIL
VARIES
12'
12'
2'
SWL
DBYL
+22
+70
W11-15(L)
W16-9p
W1-3(L)
SEE DETAIL (TYP)
R2-1(25)
TECHNOLOGY PARK DRIVE
WALL STREET

#700 TECHNOLOGY PARK DRIVE
GCP TECH PARK LLC
DEED BOOK 27667, PAGE 58
PLAN BOOK 150, PLAN 1

#600 TECHNOLOGY PARK DRIVE
TECHNOLOGY PARK X LIMITED PARTNERSHIP
DEED BOOK 4370, PLAN 296

20 0 20 40
SCALE IN FEET

LIST OF MAJOR ITEMS REQUIRED

YANKEE DOODLE BIKE PATH AT TECHNOLOGY PARK DRIVE (LOC. 3)

PAY ITEM	QUANTITY	DESCRIPTION
825.23	2	SIDE-OF-POST MOUNTED CONTROL CABINET ASSEMBLY
	2	15' TS POST STANDARD INCL. FOUNDATION
	4	L.E.D. RECTANGULAR DUAL YELLOW BEACON (RRFB) (1-SIDED)
	2	SOLAR PANEL W/MOUNTING BRACKET
	2	RADIO ANTENNA
	2	APS PEDESTRIAN PUSH BUTTON (LEFT) W/R10-25
	2	BATTERY SYSTEM
	2	W11-15(L) SIGN
	2	W11-15(R) SIGN
	2	W16-7p(L) SIGN
	2	W16-7p(R) SIGN

PLUS NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS MATERIAL AND EQUIPMENT TO COMPLETE THE INSTALLATION AND PROVIDE AN OPERATING RRFB SYSTEM

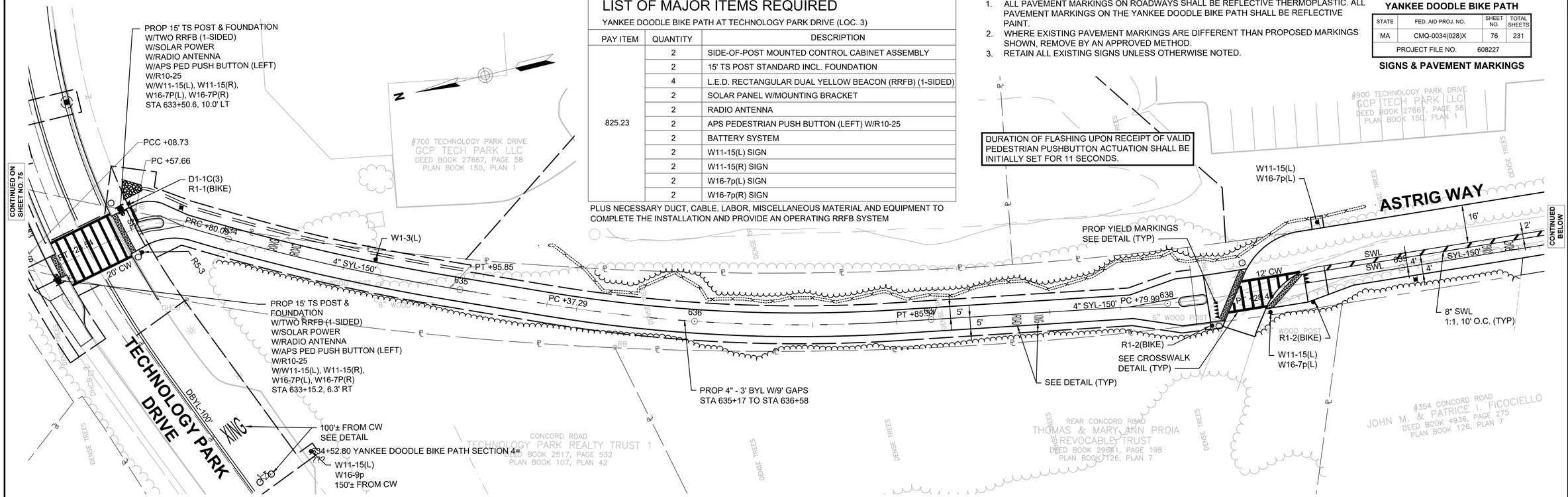
CONSTRUCTION NOTES:

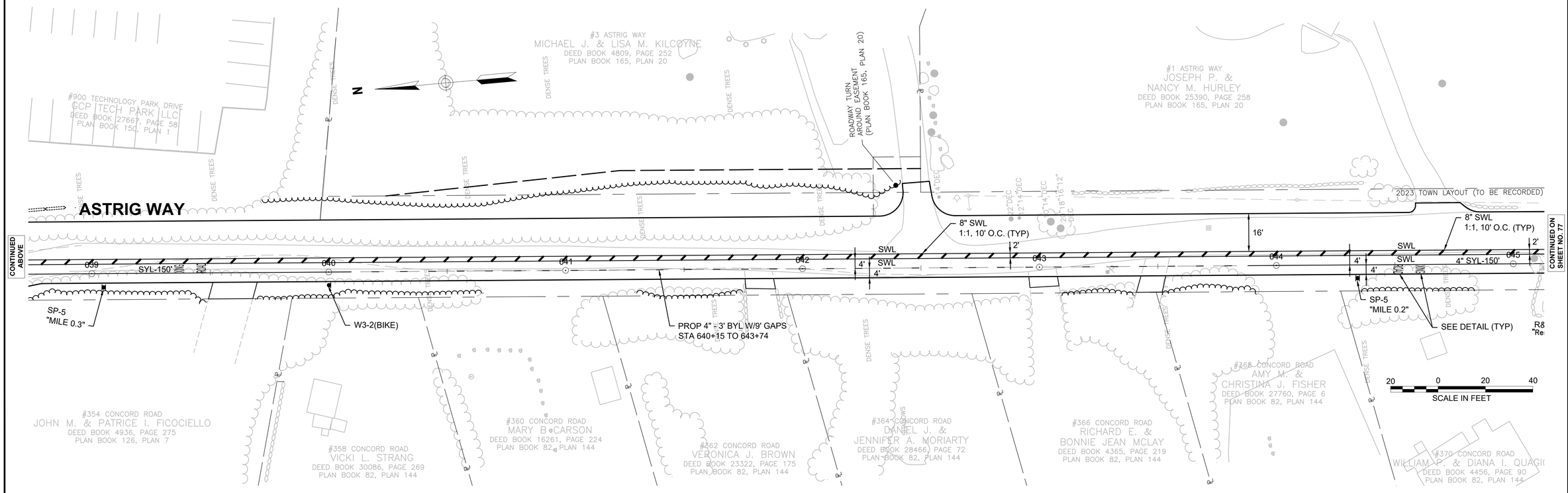
1. ALL PAVEMENT MARKINGS ON ROADWAYS SHALL BE REFLECTIVE THERMOPLASTIC. ALL PAVEMENT MARKINGS ON THE YANKEE DOODLE BIKE PATH SHALL BE REFLECTIVE PAINT.
2. WHERE EXISTING PAVEMENT MARKINGS ARE DIFFERENT THAN PROPOSED MARKINGS SHOWN, REMOVE BY AN APPROVED METHOD.
3. RETAIN ALL EXISTING SIGNS UNLESS OTHERWISE NOTED.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	76	231
PROJECT FILE NO.	608227		

SIGNS & PAVEMENT MARKINGS





608227HD (STRP).DWG Plotted on 23-Jul-2025 1:12 PM

LIST OF MAJOR ITEMS REQUIRED

YANKEE DOODLE BIKE PATH AT SPRINGS ROAD (LOC. 4)

PAY ITEM	QUANTITY	DESCRIPTION
825.24	2	SIDE-OF-POST MOUNTED CONTROL CABINET ASSEMBLY
	2	15' TS POST STANDARD INCL. FOUNDATION
	4	L.E.D. RECTANGULAR DUAL YELLOW BEACON (RRFB) (1-SIDED)
	2	SOLAR PANEL W/MOUNTING BRACKET
	2	RADIO ANTENNA
	2	APS PEDESTRIAN PUSH BUTTON (LEFT) W/R10-25
	2	BATTERY SYSTEM
	2	W11-15(L) SIGN
	2	W11-15(R) SIGN
	2	W16-7p(L) SIGN
	2	W16-7p(R) SIGN

PLUS NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS MATERIAL AND EQUIPMENT TO COMPLETE THE INSTALLATION AND PROVIDE AN OPERATING RRFB SYSTEM

CONSTRUCTION NOTES:

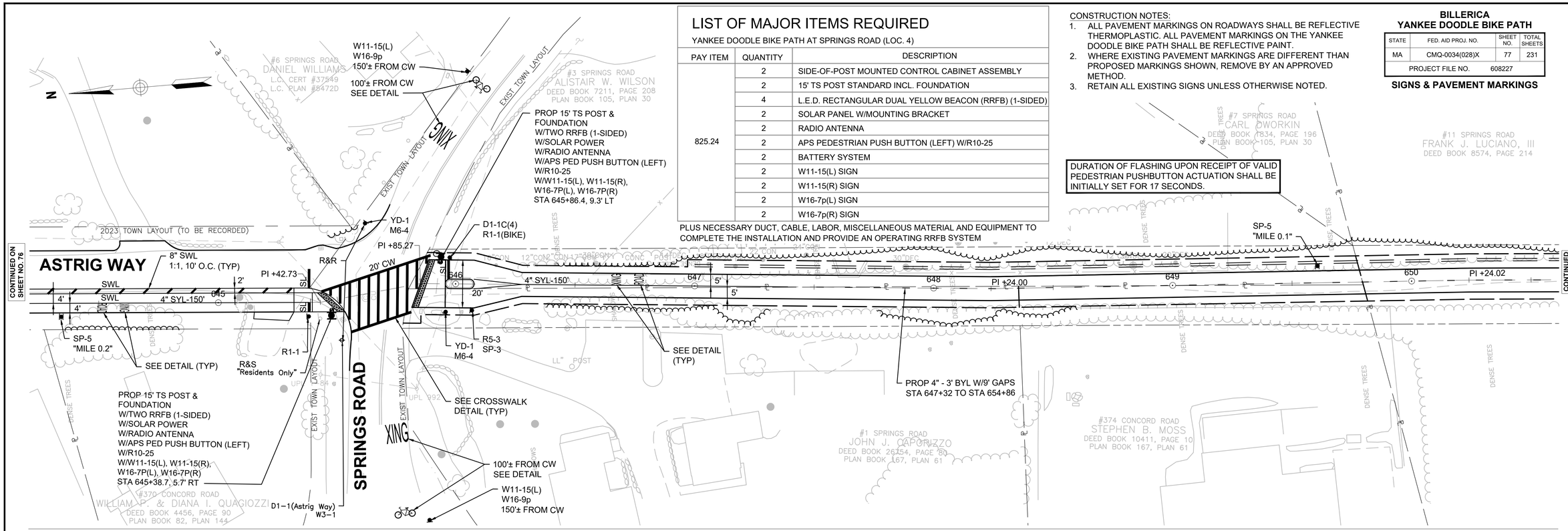
1. ALL PAVEMENT MARKINGS ON ROADWAYS SHALL BE REFLECTIVE THERMOPLASTIC. ALL PAVEMENT MARKINGS ON THE YANKEE DOODLE BIKE PATH SHALL BE REFLECTIVE PAINT.
2. WHERE EXISTING PAVEMENT MARKINGS ARE DIFFERENT THAN PROPOSED MARKINGS SHOWN, REMOVE BY AN APPROVED METHOD.
3. RETAIN ALL EXISTING SIGNS UNLESS OTHERWISE NOTED.

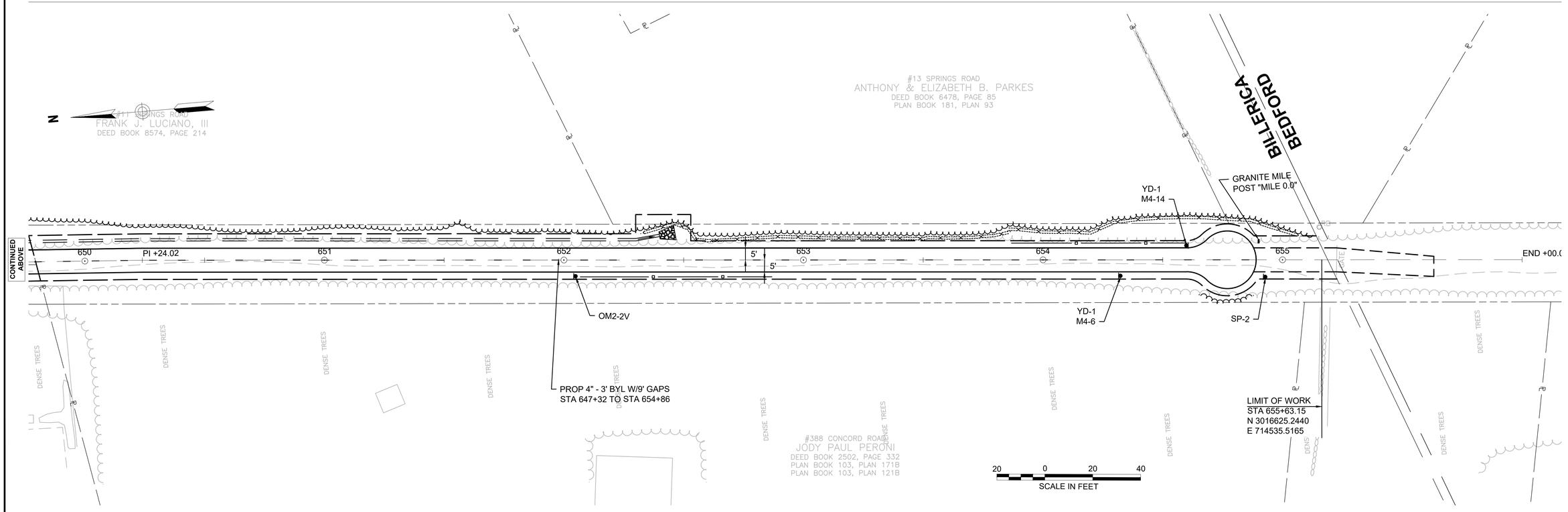
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	77	231
PROJECT FILE NO.	608227		

SIGNS & PAVEMENT MARKINGS

608227HD (STRP).DWG Plotted on 23-Jul-2025 1:12 PM



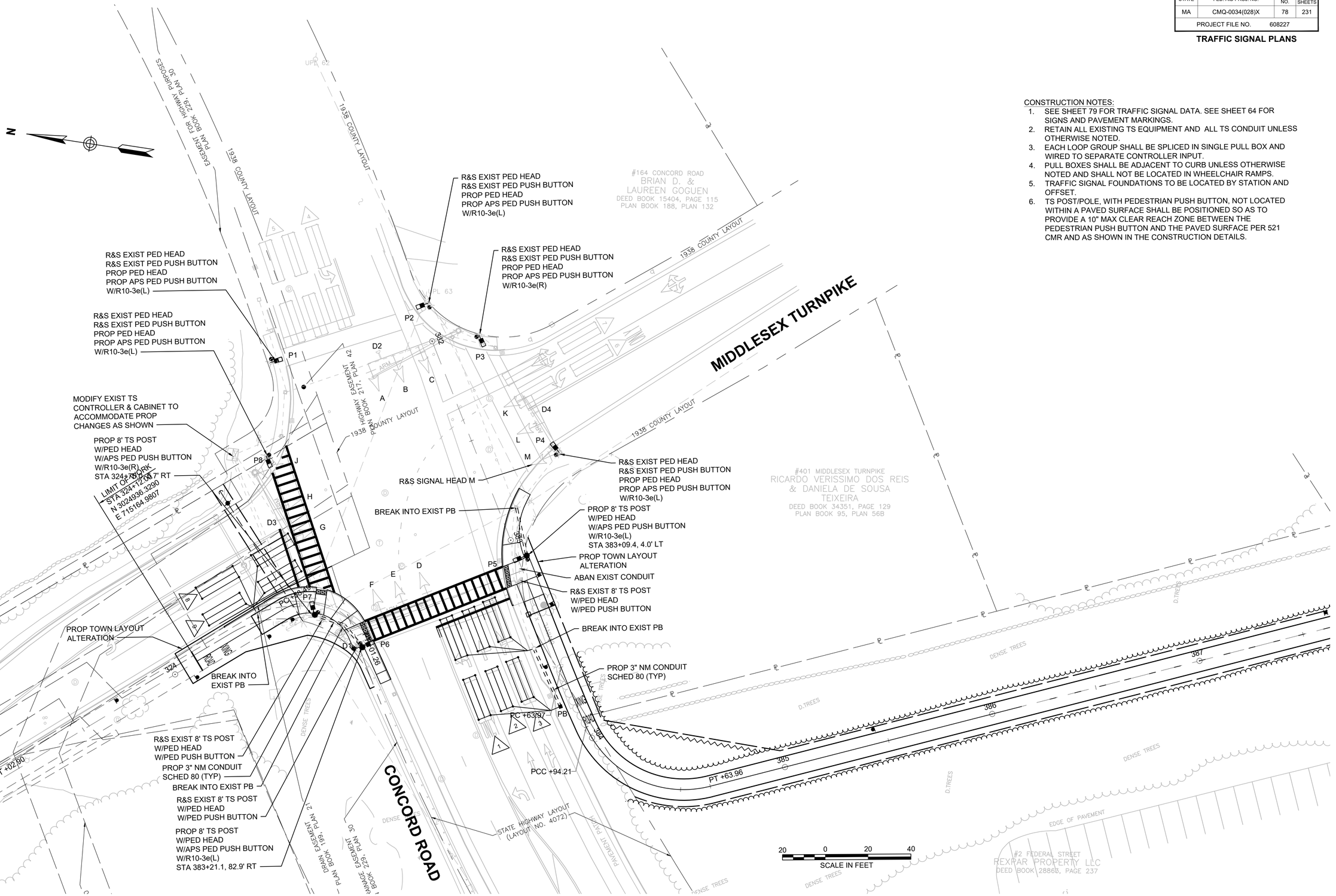


BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	78	231
PROJECT FILE NO.	608227		

TRAFFIC SIGNAL PLANS

CONSTRUCTION NOTES:
1. SEE SHEET 79 FOR TRAFFIC SIGNAL DATA. SEE SHEET 64 FOR SIGNS AND PAVEMENT MARKINGS.
2. RETAIN ALL EXISTING TS EQUIPMENT AND ALL TS CONDUIT UNLESS OTHERWISE NOTED.
3. EACH LOOP GROUP SHALL BE SPLICED IN SINGLE PULL BOX AND WIRED TO SEPARATE CONTROLLER INPUT.
4. PULL BOXES SHALL BE ADJACENT TO CURB UNLESS OTHERWISE NOTED AND SHALL NOT BE LOCATED IN WHEELCHAIR RAMPS.
5. TRAFFIC SIGNAL FOUNDATIONS TO BE LOCATED BY STATION AND OFFSET.
6. TS POST/POLE, WITH PEDESTRIAN PUSH BUTTON, NOT LOCATED WITHIN A PAVED SURFACE SHALL BE POSITIONED SO AS TO PROVIDE A 10" MAX CLEAR REACH ZONE BETWEEN THE PEDESTRIAN PUSH BUTTON AND THE PAVED SURFACE PER 521 CMR AND AS SHOWN IN THE CONSTRUCTION DETAILS.



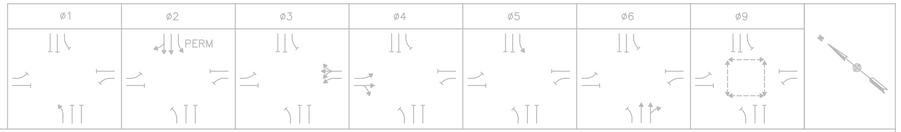
608227HD (STRP).DWG Plotted on 23-Jul-2025 1:16 PM

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	79	231
PROJECT FILE NO.	608227		

TRAFFIC SIGNAL PLANS

608227HD (STRP).DWG Plotted on 23-Jul-2025 1:17 PM



PROPOSED/EXISTING SEQUENCE AND TIMING FOR FULLY ACTUATED CONTROL (ISOLATED)

APPROACH	DIRECTION	HOUSING	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	FLASH
CONCORD ROAD	EB	A	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FR
CONCORD ROAD	EB	B,C	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	FY
CONCORD ROAD	WB	D	R	R	R	G	Y	R	R	R	R	R	R	R	G R	Y R	R	R	R	R	R	R	R	FY
CONCORD ROAD	WB	E,F	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FY
MIDDLESEX TURNPIKE	NB	G	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	FR
MIDDLESEX TURNPIKE	NB	H	R	R	R	R	R	R	G G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	FR
MIDDLESEX TURNPIKE	NB	J	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	FR
DRIVEWAY	SB	K	R	R	R	R	R	R	R	R	R	G G	Y	R	R	R	R	R	R	R	R	R	R	FR
DRIVEWAY	SB	L,M	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	FR
PEDESTRIAN X-ING	ALL	P1-P4	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	W	FDW	DW	OUT
TIMING IN SECONDS																								
MINIMUM GREEN (INITIAL)			7			7			7			7			7			7						CONFLICT FLASH OPERATION ONLY
PASSAGE TIME (VEHICLE)			2			2			2			2			2			2						
MAXIMUM 1			20			35			30			15			15			35						
MAXIMUM 2			15			45			30			15			15			45						
YELLOW CLEARANCE				4			4			4			4			4			4					
RED CLEARANCE					2			2			2			2			2			2			4	
PEDESTRIAN WALK																					7			
PEDESTRIAN CLEARANCE																						16		
DETECTOR MEMORY			NON-LOCK			NON-LOCK			NON-LOCK			NON-LOCK			NON-LOCK			NON-LOCK			LOCK			
RECALL			OFF			MIN			OFF			OFF			OFF			MIN			OFF			

NOTES:
1. AUTOMATIC FLASHING OPERATION PER 2009 M.U.T.C.D., AS AMENDED.
2. * UPON PEDESTRIAN PUSH BUTTON ACTUATION
3. PERM = PERMISSIVE
4. MAXIMUM 1 = NORMAL OPERATION
5. MAXIMUM 2 = NOT USED
6. STOP AND GO OPERATION FOR 24 HOURS PER DAY. FLASHING OPERATION FOR EMERGENCY ONLY.
7. DURING PEDESTRIAN INTERVAL, FDW THROUGH RED OPERATION SHALL NOT BE IN EFFECT.

SEQUENCE & TIMING NOTES:

1. IF THE ASSIGNED RIGHT OF WAY FOR ANY TRAFFIC MOVEMENT IS TO REMAIN IN EFFECT DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATIONS FOR THAT TRAFFIC MOVEMENT WILL NOT CHANGE DURING THE CLEARANCE INTERVAL.
2. THE RIGHT OF WAY MAY BE ASSIGNED TO ANY PHASE OR ANY COMBINATION OF NON-CONFLICTING PHASES.
3. IF CALLS EXIST ON ALL PHASES, THE ASSIGNMENT OF RIGHT OF WAY SHALL BE IN ACCORDANCE WITH THE PREFERENTIAL PHASE SEQUENCE.
4. IF THE ASSIGNED RIGHT-OF-WAY FOR ANY TRAFFIC MOVEMENT IS TO CHANGE DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATION FOR THAT MOVEMENT WILL DISPLAY THE APPROPRIATE CLEARANCE INTERVALS.

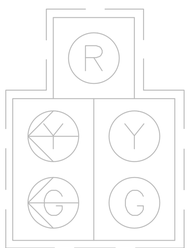
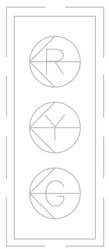
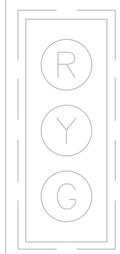
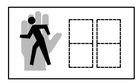
EMERGENCY VEHICLE PRE-EMPTION OPERATION

1. EMERGENCY VEHICLE PRE-EMPTION SIGNALS SHALL BE OPTICALLY TRANSMITTED BY OPTICAL EMITTERS MOUNTED IN EMERGENCY VEHICLES AND RECEIVED BY OPTICAL DETECTORS LOCATED AT EACH INTERSECTION.
2. PRE-EMPTION SIGNALS SHALL BE SERVICED ON A PRIORITY BASIS WITH DETECTORS D1, D2, D3 OR D4 ASSIGNED DESCENDING PRIORITIES AS FOLLOWS: (D1 HIGHEST AND D4 LOWEST)
3. IN RESPONSE TO A PRE-EMPTION SIGNAL RECEIVED AT AN INTERSECTION BY OPTICAL DETECTOR D1 (OR D2, D3, D4) THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY VEHICLE PRE-EMPTION PHASE #1 (OR #2, #3, #4) GREEN FOR A MINIMUM OF TEN (10) SECONDS OR UNTIL PRE-EMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME PRE-EMPTION PHASE CLEARANCES FOR THE ASSOCIATED PHASE(S) AS SHOWN IN THE SEQUENCE AND TIMING CHART AND SERVICE SUBSEQUENT EMERGENCY VEHICLE PRE-EMPTION PHASES AS NECESSARY.
4. MINIMUM GREEN, NORMAL VEHICLE CLEARANCE, AND PEDESTRIAN CLEARANCE SHALL BE PROVIDED ON PHASES THAT ARE TO BE TERMINATED BY PRE-EMPTION DEMAND.
5. PRE-EMPTION STROBE SHALL BE ILLUMINATED WHENEVER ANY EMERGENCY VEHICLE PRE-EMPTION GREEN IS ACTIVE.
6. EMERGENCY VEHICLE PRE-EMPTION SHALL OVERRIDE COORDINATION.

EXISTING PRE-EMPTION PHASING & PRIORITY

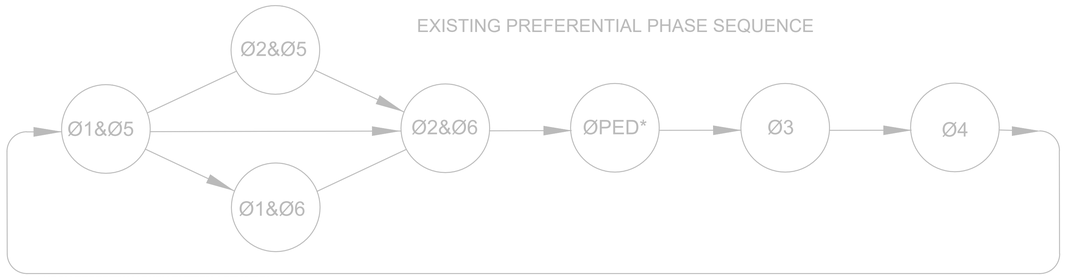
DETECTOR & PRIORITY	PRE-EMPT PHASE ASSIGNMENT	MOVEMENT	VEHICLE PHASE ASSIGNMENT
D1	1		Ø1&Ø6
D2	2		Ø2&Ø6
D3	3		Ø3
D4	4		Ø4

PROPOSED/EXISTING SIGNAL HEAD DATA

D	A,G	B,C,E,F,J,L,M	H,K	~~P1-P8~~	P1-P8
				 R&S P1-P8	 W/COUNTDOWN TIMER
ALL 12" LENS					ALL 16" DISPLAY

NOTES:
1. ALL PROPOSED SIGNAL HEADS SHALL BE EQUIPPED WITH TUNNEL VISORS.
2. ALL PROPOSED SIGNAL DISPLAYS SHALL BE EQUIPPED WITH L.E.D. MODULES.

EXISTING PREFERENTIAL PHASE SEQUENCE



* UPON PEDESTRIAN PUSH BUTTON ACTUATION
Ø1 & Ø4 ARE FOR FUTURE USE

PROPOSED/EXISTING LOOP DETECTOR DATA

DETECTOR NO.	NO. SECTION/ SIZE	NO. OF TURNS	OPERATIONS	DELAY /EXT	CALL PHASE	LOOP CONNECTION
1	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø1	SERIES
2	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø6	SERIES
3	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø6	SERIES
4	EXISTING	EXISTING	PRESENCE	0	Ø5	EXISTING
5	EXISTING	EXISTING	PRESENCE	0	Ø2	EXISTING
6	EXISTING	EXISTING	PRESENCE	0	Ø3	EXISTING
7	EXISTING	EXISTING	PRESENCE	0	Ø3	EXISTING
8	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø4	SERIES
9	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø4	SERIES

NOTE: DELAY AND EXTENSION TIMINGS SHALL BE PROGRAMMED IN THE CONTROLLER ONLY

LIST OF MAJOR ITEMS REQUIRED

CONCORD ROAD AT MIDDLESEX TURNPIKE

PAY ITEM	QUANTITY	DESCRIPTION
816.01	1	MODIFY EXIST TS CABINET & CONTROLLER TO ACCOMMODATE PROP CHANGES AS SHOWN
	3	TS POST 8' STANDARD INCL. FOUNDATION
	8	PEDESTRIAN SIGNAL HEAD W/COUNTDOWN TIMER
	6	PEDESTRIAN PUSH BUTTON W/R10-3e(L) AND SIGN SADDLE
	2	PEDESTRIAN PUSH BUTTON W/R10-3e(R) AND SIGN SADDLE
	10	WIRE LOOP DETECTOR W/LEAD IN CABLES
804.3	100'±	3" CONDUIT, SCHEDULE 80, TYPE NM
811.31	1	PULL BOX-12"x12"

PLUS NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS MATERIAL AND EQUIPMENT TO COMPLETE THE INSTALLATION AND PROVIDE AN OPERATING TRAFFIC CONTROL SIGNAL.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	80	231
PROJECT FILE NO. 608227			

TRAFFIC SIGN SUMMARY SHEET

IDENTIFICATION NUMBER	SIZE OF SIGN WIDTH	SIZE OF SIGN HEIGHT	TEXT	TEXT DIMENSIONS (INCHES) LETTER HEIGHT	TEXT DIMENSIONS (INCHES) VERTICAL SPACING	TEXT DIMENSIONS (INCHES) ARROW RTE. MKR.	NUMBER OF SIGNS REQUIRED	COLOR BACK-GROUND	COLOR LEGEND	COLOR BORDER	POST SIZE AND NUMBER REQUIRED	UNIT AREA (S.F.)	AREA IN SQUARE FEET
R1-1	30"	30"	STOP	SEE FHWA "STANDARD HIGHWAY SIGNS, 2004 EDITION"; AS AMENDED			4	RED	WHITE	WHITE	P5-4	6.25	25.00
R1-1(BIKE)	18"	18"	STOP	SEE FHWA "STANDARD HIGHWAY SIGNS, 2004 EDITION"; AS AMENDED			7	RED	WHITE	WHITE	P5-5 2 MTD W/OTHERS	1.86	13.02
R1-2(BIKE)	18"X18"X18"		YIELD				2	RED	WHITE	WHITE	P5-2	1.13	2.26
R3-8c	30"	30"	ONLY				2	WHITE	BLACK	BLACK	P5-2	6.25	12.50
R5-3	24"	24"	NO MOTOR VEHICLES				3	WHITE	BLACK	BLACK	P5-3	4.00	12.00
R7-1D	12"	18"	NO PARKING ANYTIME				1	WHITE	RED	RED	P5-1	1.50	1.50
R7-8	12"	18"	RESERVED PARKING				1	WHITE	GREEN/ BLUE	GREEN	P5-1	1.50	1.50
R7-8P	12"	6"	VAN ACCESSIBLE				1	WHITE	GREEN	GREEN	1 MTD W/OTHERS	0.50	0.50
R9-5	12"	18"	USE PED SIGNAL				2	WHITE	BLACK	BLACK	P5-2	1.50	3.00
R10-3e(L)	9"	15"	START CROSSING Watch For Vehicles / DON'T START Finish Crossing If Started / TIME REMAINING To Finish Crossing / DON'T CROSS / PUSH BUTTON TO CROSS				6	WHITE	WHITE/ BLACK/ ORANGE	BLACK	6 MTD ON TS POST/POLE	PAID UNDER ITEM 816.01	
R10-3e(R)	9"	15"	START CROSSING Watch For Vehicles / DON'T START Finish Crossing If Started / TIME REMAINING To Finish Crossing / DON'T CROSS / PUSH BUTTON TO CROSS				2	WHITE	WHITE/ BLACK ORANGE	BLACK	2 MTD ON TS POST/POLE	PAID UNDER ITEM 816.01	
R10-25	9"	12"	PUSH BUTTON TO TURN ON WARNING LIGHTS				10	WHITE	BLACK	BLACK	10 MTD ON TS POST	PAID UNDER ITEMS 825.21-825.24	
W1-1(L)	18"	18"					2	YELLOW	BLACK	BLACK	P5-2	2.25	4.50
W1-1(R)	18"	18"					2	YELLOW	BLACK	BLACK	P5-2	2.25	4.50
W1-3(L)	18"	18"					2	YELLOW	BLACK	BLACK	P5-2	2.25	4.50
W1-5(L)	18"	18"					2	YELLOW	BLACK	BLACK	P5-2	2.25	4.50
W3-2(BIKE)	18"	18"					1	YELLOW	RED/ WHITE/ BLACK	BLACK	P5-1	2.25	2.25
W5-2	18"	18"	NARROW BRIDGE				6	YELLOW	BLACK	BLACK	P5-6	2.25	13.50
W7-5	18"	18"		SEE FHWA "STANDARD HIGHWAY SIGNS, 2004 EDITION"; AS AMENDED			1	YELLOW	BLACK	BLACK	P5-1	2.25	2.25
W8-10P	12"	9"	SLIPPERY WHEN WET				4	YELLOW	BLACK	BLACK	4 MTD W/OTHERS	0.75	3.00
W9-5	30"	30"	LANE ENDS (SEE NOTE 2)				1	YELLOW	BLACK	BLACK	P5-1	6.25	6.25
W11-15(L)	30"	30"					12	FLUORESCENT YELLOW GREEN	BLACK	BLACK	P5-8	6.25	50.00
											4 MTD ON TS POST	PAID FOR UNDER ITEMS 825.21-825.24	
W11-15(R)	30"	30"					4	FLUORESCENT YELLOW GREEN	BLACK	BLACK	4 MTD ON TS POST	PAID FOR UNDER ITEMS 825.21-825.24	
W11-2(L)	30"	30"					9	FLUORESCENT YELLOW GREEN	BLACK	BLACK	P5-5	6.25	31.25
											4 MTD ON TS POST	PAID FOR UNDER ITEMS 825.21-825.24	
W11-2(R)	30"	30"					4	FLUORESCENT YELLOW GREEN	BLACK	BLACK	4 MTD ON TS POST	PAID FOR UNDER ITEMS 825.21-825.24	
W16-7p(L)	24"	12"					14	FLUORESCENT YELLOW GREEN	BLACK	BLACK	6 MTD W/OTHERS	2.00	12.00
											8 MTD ON TS POST	PAID FOR UNDER ITEMS 825.21-825.24	
W16-7p(R)	24"	12"					8	FLUORESCENT YELLOW GREEN	BLACK	BLACK	8 MTD ON TS POST	PAID FOR UNDER ITEMS 825.21-825.24	
W16-9p	24"	12"	AHEAD				7	FLUORESCENT YELLOW GREEN	BLACK	BLACK	7 MTD W/OTHERS	2.00	14.00
OM2-2V	6"	12"					11	YELLOW	N/A	N/A	P5-7 3 MTD W/OTHERS	0.50	5.50
M4-6	12"	9"	END				2	GREEN	WHITE	WHITE	2 MTD W/OTHERS	0.75	1.50
M4-14	12"	9"	BEGIN				1	GREEN	WHITE	WHITE	1 MTD W/OTHERS	0.75	0.75
M5-1(R)	12"	9"					1	GREEN	WHITE	WHITE	1 MTD W/OTHERS	0.75	0.75
M5-2(R)	12"	9"					1	GREEN	WHITE	WHITE	1 MTD W/OTHERS	0.75	0.75
M6-1(L)	12"	9"					6	GREEN	WHITE	WHITE	6 MTD W/OTHERS	0.75	4.50

NOTES:
1. HIGH INTENSITY REFLECTIVE SHEETING SHALL BE USED FOR ALL SIGNS. SEE 2009 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS, FOR VERTICAL & LATERAL CLEARANCES.
2. SEE 2023 MUTCD FOR MORE INFORMATION FOR SIGN W9-5.

608227HD (SS).DWG 23-Jul-2025

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	81	231
PROJECT FILE NO. 608227			

TRAFFIC SIGN SUMMARY SHEET

23-Jul-2025

608227HD (SS).DWG

IDENTIFI-CATION NUMBER	SIZE OF SIGN		TEXT	TEXT DIMENSIONS (INCHES)			NUMBER OF SIGNS REQUIRED	COLOR			POST SIZE AND NUMBER REQUIRED	UNIT AREA (S.F.)	AREA IN SQUARE FEET
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING	ARROW RTE. MKR.		BACK-GROUND	LEGEND	BORDER			
M6-1(R)	12"	9"		SEE FHWA "STANDARD HIGHWAY SIGNS, 2004 EDITION"; AS AMENDED			3	GREEN	WHITE	WHITE	3 MTD W/OTHERS	0.75	2.25
M6-2(L)	12"	9"					1	GREEN	WHITE	WHITE	1 MTD W/OTHERS	0.75	0.75
M6-3	12"	9"					1	GREEN	WHITE	WHITE	1 MTD W/OTHERS	0.75	0.75
M6-4	12"	9"					2	GREEN	WHITE	WHITE	2 MTD W/OTHERS	0.75	1.50
D1-1C(3)	54"	8"		4"D/3"D	1.75" 2.25"	N/A	1	GREEN	WHITE	WHITE	P5-2	PAID UNDER ITEM 874	
D1-1C(4)	30"	8"		4"D/3"D	1.75" 2.25"	N/A	1	GREEN	WHITE	WHITE	P5-1	PAID UNDER ITEM 874	
SP-2	30"	36"		4"B 4"B 4"B 4"B 4"B	2" 3" 3" 3" 3" 2"	N/A	1	YELLOW	BLACK	BLACK	P5-1	7.50	7.50
SP-3	30"	30"		4"B 4"B 4"B 4"B	2" 3" 3" 3" 3"	N/A	1	YELLOW	BLACK	BLACK	1 MTD W/OTHERS	6.25	6.25
SP-4	12"	18"	 SEE NOTE 2	AS PER TOWN OF BILLERICA CONSERVATION COMMISSION STANDARD			7	AS PER TOWN OF BILLERICA CONSERVATION COMMISSION STANDARD			P5-7	PAID UNDER ITEM 832.1	
SP-5	6"	8"	 SEE NOTE 3	1"B 0.75"B 2"B	1" 1.5" 0.75" 1"	N/A	40	GREEN / WHITE	WHITE / GREEN	WHITE / GREEN	P5-17 16 MTD W/OTHERS 7 MTD TO RAILINGS	0.33	13.33
YD-1	12"	18"		2"C 2"C 2"C 2"C	2" 2" 2" 2" 2"	N/A	18	GREEN	WHITE	WHITE	P5-15 3 MTD W/OTHERS	1.50	27.00

NOTES:
1. HIGH INTENSITY REFLECTIVE SHEETING SHALL BE USED FOR ALL SIGNS. SEE 2009 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS, FOR VERTICAL & LATERAL CLEARANCES.
2. CONTRACTOR SHALL COORDINATE WITH THE TOWN OF BILLERICA CONSERVATION COMMISSION CONCERNING THE WETLAND PROTECTION SIGN. SIGN SHOWN ON SIGN SUMMARY IS A PLACEHOLDER ONLY, SEE CONSTRUCTION DETAILS AND SPECIAL PROVISIONS FOR MORE INFORMATION.
3. SEE PLANS FOR MILE MARKER NUMBERING REQUIRED AT EACH LOCATION.

GENERAL NOTES

1. ALL CONSTRUCTION SIGNING, TEMPORARY TRAFFIC CONTROL DEVICES, AND ROADSIDE ELEMENTS SHALL CONFORM WITH THE 2009 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AS AMENDED, THE MASSDOT STANDARD DETAILS AND DRAWINGS FOR THE DEVELOPMENT OF TEMPORARY TRAFFIC CONTROL PLANS, THE LATEST REVISIONS OF THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, (AASHTO) ROADSIDE DESIGN GUIDE, AASHTO POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS, AND NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM (NCHRP) REPORT 350 OR THE AASHTO MANUAL FOR ASSESSING SAFETY HARDWARE (MASH).

2. WORK HOURS WITHIN DEDICATED RIGHT-OF-WAY AND OFF PUBLIC WAY SHALL BE 7:00AM TO 6:00PM MONDAY THRU FRIDAY UNLESS OTHERWISE APPROVED BY MASSDOT AND THE TOWN OF BILLERICA. ANY WORK IMPACTING PUBLIC WAY DURING PEAK PERIODS SHALL BE COORDINATED IN ADVANCE WITH MASSDOT AND THE TOWN. LANE CLOSURES OR SHIFTS WILL NOT BE ALLOWED ON RIVER STREET, CONCORD ROAD, MIDDLESEX TURNPIKE AND ELLIOT STREET/ ORCHARD ROAD DURING PEAK TRAFFIC PERIODS. PEAK PERIODS ARE DEFINED AS MONDAY THRU FRIDAY, 7:00AM TO 9:00AM AND 4:00PM TO 6:00PM. TEMPORARY LANE CLOSURES ON ROUTE 3 ADJACENT TO THE FIXED WORK ZONE SETUP WILL BE ALLOWED ONLY ON NIGHTLY BASIS AS APPROVED BY MASSDOT.

3. NO WORK SHALL OCCUR WITHIN THE PUBLIC WAY THE DAY BEFORE, AFTER OR ON A STATE RECOGNIZED HOLIDAY UNLESS OTHERWISE APPROVED BY THE ENGINEER.

4. ALL TEMPORARY PEDESTRIAN PATHWAYS SHALL COMPLY FULLY WITH ALL REQUIREMENTS OF THE MUTCD AND ALL APPLICABLE MASSACHUSETTS ARCHITECTURAL ACCESS BOARD (MAAB) AND AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES (ADAAG) REQUIREMENTS AND PUBLIC RIGHTS-OF WAY ACCESSIBILITY GUIDELINES (PROWAG).

5. ALL DRUMS OUTSIDE TAPERS SHALL BE SET AT 20' ON CENTER MAX. ON ROADWAYS, AND 80' O.C. MAX. ON ROUTE 3 UNLESS OTHERWISE NOTED OR ADJUSTED BY THE ENGINEER.

6. ALL DRUMS SHALL BE APPROXIMATELY PLACED AND MOVED AS NECESSARY TO MAINTAIN SAFE AND REASONABLE ABUTTER ACCESS. WORK MAY REQUIRE ADDITIONAL SIGNS, DRUMS AND OTHER TRAFFIC CONTROL DEVICES, GRADING AND TEMPORARY PAVEMENT FOR PASSAGE OF PEDESTRIAN, VEHICULAR AND EMERGENCY TRAFFIC THROUGH THE WORK AREAS, BOTH DURING AND AFTER WORKING HOURS, TO MAINTAIN SUCH ACCESS.

7. THE FIRST 10 DRUMS ON TAPERS SHALL BE REFLECTORIZED DRUMS WITH SEQUENTIAL FLASHING WARNING LIGHTS AND SHALL BE OPERATING, AT A MINIMUM, BETWEEN DUSK AND DAWN, WHEN TAPER IS DEPLOYED.

8. REFLECTORIZED CONES SHALL BE A MINIMUM OF 36 INCHES IN HEIGHT.

9. CONES MAY BE USED IN LIEU OF DRUMS OUTSIDE OF TAPER AREAS.

10. THE CONTRACTOR SHALL NOTIFY EACH ABUTTER AT LEAST 48 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE THE TEMPORARY CLOSURE OR RESTRICTION OF ACCESS.

11. FOR DROP-OFFS 3" OR LESS WITHIN THE CLEAR ZONE, CONDITION MAY BE MITIGATED WITH W8-9 (LOW SHOULDER) SIGN OR TEMPORARY CHANNELIZATION DEVICES.

12. CONTRACTOR SHALL STAGE WORK SUCH THAT A DROP-OFF OF NO MORE THAN 3" AT THE END OF EACH WORK DAY EXISTS WITHIN THE CLEAR ZONE AT ANY TIME AND ENSURE DROP-OFF IS MITIGATED WITHOUT BARRIER PER NOTE 11.

13. CONSTRUCTION CLEAR ZONE SHALL BE IN ACCORDANCE WITH MASSDOT BOSTON TRAFFIC GUIDELINES AS FOLLOWS:
    - 4' IF POSTED SPEED IS LESS THAN 35 MPH
    - 8' IF POSTED SPEED IS 35 MPH
    - 15' IF POSTED SPEED IS 40 MPH
    - 20' IF POSTED SPEED IS 45 MPH
    - 25' IF POSTED SPEED IS 55 MPH
    - 30' IF POSTED SPEED IS GREATER THAN 55 MPH

14. 11' MINIMUM LANE WIDTHS SHALL BE MAINTAINED UNLESS OTHERWISE NOTED.

15. TEMPORARY TRAFFIC CONTROL DEVICES AND SIGNS SHALL BE COVERED OR REMOVED DURING NON-WORKING HOURS WHEN NOT IN USE.

16. SIGNS INSTALLED ON PORTABLE STANDS REQUIRE 12 INCH MINIMUM MOUNTING HEIGHT FROM THE ROADWAY SURFACE TO THE BOTTOM OF THE SIGN.

17. SIGNS INSTALLED ON PORTABLE STANDS PLACED AMONG CHANNELIZATION DEVICES REQUIRE A 36 INCH MINIMUM MOUNTING HEIGHT FROM THE ROADWAY SURFACE TO THE BOTTOM OF THE SIGN.

18. SIGNS MOUNTED ON POSTS REQUIRE A MINIMUM 84 INCH MOUNTING HEIGHT FROM THE ROADWAY OR SIDEWALK SURFACE TO THE BOTTOM OF THE SIGN. CONTRACTOR SHALL MAINTAIN A MINIMUM SIDEWALK HORIZONTAL CLEAR WIDTH OF 36" AT ALL TIMES.

19. ALL SIGNS SHALL BE MOUNTED ON THEIR OWN NCHRP 350 AND/OR MASH CRASH TESTED SIGN SUPPORTS AND INSTALLED IN ACCORDANCE WITH THE MUTCD. SIGNS SHALL NOT BE MOUNTED TO OR LEANED AGAINST DRUMS OR CONES.

20. CONTRACTOR SHALL SECURE WORK AREAS BY APPROPRIATE MEANS, TO PREVENT UNAUTHORIZED ACCESS AT ALL TIMES.

21. THERE IS NO DESIGNATED BICYCLE LANE ON THE ROADWAY WITHIN THE PROJECT LIMITS. BICYCLES ARE EXPECTED TO SHARE THE ROAD WITH GENERAL VEHICULAR TRAFFIC.

22. TEMPORARY MARKINGS SHALL BE WATER-BORNE PAINT OR SURFACE-APPLIED REMOVEBLE TAPE, AS APPROVED BY THE ENGINEER.

23. ALL TEMPORARY DOUBLE YELLOW LINES (DBYL) SHALL BE 6 INCHES WIDE.

24. CONTRACTOR SHALL PROVIDE TWO (2) PORTABLE CHANGE MESSAGE SIGN (PCMS) FOR THE DURATION OF PROJECT. PCMS LOCATION AND MESSAGING SHALL BE APPROVED BY MASSDOT AND THE TOWN.

25. FOR GUARDRAIL WORK ON ELIOT ST/ ORCHARD RD (STA 701+00 TO 701+50), CONTRACTOR TO ENSURE THAT THE REMOVAL OF EXISTING GUARDRAIL DOES NOT EXPOSE UNPROTECTED DROP-OFF CONDITION TO ERRAND VEHICLES AND IS ADEQUATELY SHIELDED AT ALL TIMES. THE ROADSIDE PROTECTIVE MEASURE SUCH AS BARRIER AND IMPACT ATTENUATOR, IF NEEDED, SHALL BE APPROVED BY MASSDOT AND THE TOWN OF BILLERICA.

26. CONTRACTOR SHALL HAVE TRUCK MOUNTED ATTENUATORS (1 PER CLOSED LANE OR USABLE SHOULDER) IN ADVANCE OF WORK AREA FOR ALL DAILY TEMPORARY LANE / SHOULDER CLOSURES ON ROUTE 3 OR AS DIRECTED BY THE RESIDENT ENGINEER.

27. PROVIDE CLEAR ZONES AROUND TRUCK MOUNTED ATTENUATORS AS REQUIRED BY THE MANUFACTURER.

28. ALL TEMP BARRIERS SHALL MEET OR EXCEED MASH TL-3 REQUIREMENTS IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.

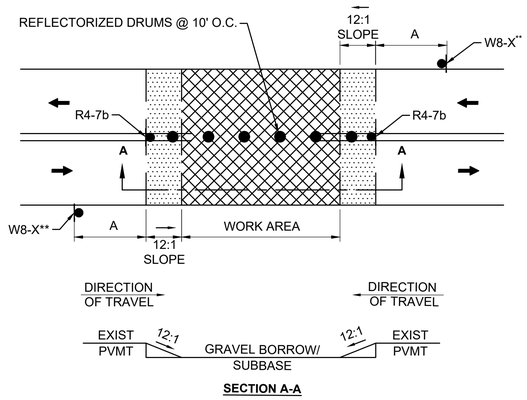
29. THE CONTRACTOR SHALL PROVIDE TEMPORARY IMPACT ATTENUATORS TO PROTECT ALL BLUNT-ENDS OF TEMPORARY BARRIER. ALL TEMPORARY IMPACT ATTENUATORS SHALL BE DESIGNED TO MEET OR EXCEED MASH TEST LEVEL 3 (TL-3).

30. NIGHTTIME WORK SHALL REQUIRE PRIOR APPROVAL FROM MASSDOT.

31. ILLUMINATION REQUIRED FOR NIGHTTIME WORK APPROVED BY THE ENGINEER SHALL BE DIFFUSED OR ANTI-GLARE LIGHTING AND IN ACCORDANCE WITH MASSDOT STANDARDS.

SUGGESTED TEMPORARY TRAFFIC CONTROL SETUP APPLICATION

ROADWAY	STATION	TEMPORARY TRAFFIC CONTROL SETUPS	SHEET NUMBER
CONCORD RD AT MIDDLESEX TURNPIKE	324+00 TO 325+62 383+00	WORK ON THE SOUTH SIDE OF INTERSECTION- CONCORD ROAD WORK ON THE NORTH SIDE OF INTERSECTION - CONCORD ROAD PEDESTRIAN BYPASS TYPE II	84 84 83
MIDDLESEX TURNPIKE	50'± NORTH OF 501+00	TYPICAL TWO-WAY STREET LANE CLOSURE ALTERNATING TRAFFIC PEDESTRIAN BYPASS TYPE I	83 83
ELLIOT ST/ ORCHARD RD	700+00 TO 708+00	TYPICAL TWO-WAY STREET LANE SHIFT ONE LANE BI-DIRECTIONAL TRAFFIC AT INTERSECTIONS - FAR SIDE ONE LANE BI-DIRECTIONAL TRAFFIC AT INTERSECTIONS - NEAR SIDE PEDESTRIAN BYPASS TYPE I	82 84 84 83
TECH PARK DR	282+00 TO 309+75	TYPICAL TWO-WAY STREET LANE CLOSURE ALTERNATING TRAFFIC ONE LANE BI-DIRECTIONAL TRAFFIC AT INTERSECTIONS - FAR SIDE ONE LANE BI-DIRECTIONAL TRAFFIC AT INTERSECTIONS - NEAR SIDE PEDESTRIAN BYPASS TYPE I	83 84 84 83
ASTRIG WAY	638+00 TO 645+00	TYPICAL TWO-WAY STREET LANE CLOSURE ALTERNATING TRAFFIC	83
SPRINGS ROAD	645+50 TO 645+80	TYPICAL TWO-WAY STREET LANE CLOSURE ALTERNATING TRAFFIC ONE LANE BI-DIRECTIONAL TRAFFIC AT INTERSECTIONS - NEAR SIDE	83 84
ROUTE 3	533+00 TO 562+00	SITE SPECIFIC - ROUTE 3	86-91
ORCHARD ROAD	700+85 TO 705+00	SITE SPECIFIC - ORCHARD RD	93

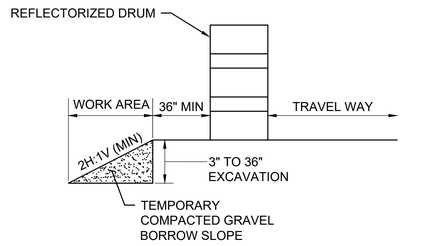


SECTION A-A

NOTES:
1. SQUARE OFF THE FULL WIDTH OF THE ROADWAY AT THE END OF WORK DAY.
2. ** CONTRACTOR SHALL INSTALL W8-1, W8-3, W8-8, OR W8-15 SIGN, AS APPROPRIATE, ON ALL ROADWAYS IN ADVANCE OF THE TRANSITION UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

TEMPORARY PAVEMENT TRANSITION

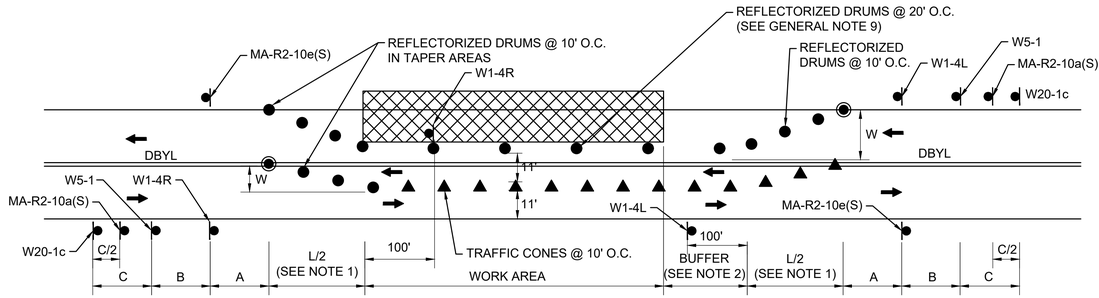
SCALE: NTS



NOTE:
1. CONTRACTOR SHALL INSTALL W8-9 SIGN ON ALL ROADWAYS 350 FT IN ADVANCE OF THE START OF DROP-OFF CONDITION.

TYPICAL ROADWAY DROP-OFF PROTECTION

SCALE: NTS



NOTES:
1. SEE TAPER LENGTH FORMULA.
2. SEE BUFFER SPACING CHART.
3. REFER TO ADVANCE SIGN SPACING TABLE.
4. AT THE END OF WORK SHIFT, CONTRACTOR TO RESTORE TRAFFIC BACK TO ORIGINAL CONDITION.

TYPICAL TWO-WAY STREET LANE SHIFT

SCALE: NTS

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	82	231
PROJECT FILE NO.	608227		

TEMPORARY TRAFFIC CONTROL PLANS
GENERAL NOTES & LEGEND

BUFFER SPACING

SPEED (MPH)	DISTANCE (FEET)
15	80
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645

LEGEND

(P)	POLICE OFFICER
(S)	TRAFFIC SIGNAL
●	REFLECTORIZED DRUM
◉	REFLECTORIZED DRUMS WITH SEQUENTIAL FLASHING WARNING LIGHTS (SEE NOTE 7)
	TEMPORARY CONSTRUCTION SIGN
▲	TRAFFIC CONE
	TYPE III BARRICADE
	ARROW BOARD (AB) (RIGHT OR LEFT)
	PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)
TMA	TRUCK MOUNTED ATTENTUATOR
	TEMPORARY BARRIER
	TEMPORARY IMPACT ATTENUATOR (TYPE NOTED)
	WORK AREA (PUBLIC ACCESS RESTRICTED)
	TRANSITION/BUFFER AREAS
	TRAFFIC FLOW
	PEDESTRIAN ROUTE
	CONSTRUCTION FENCE
	TEMPORARY PEDESTRIAN BARRICADE
NTS	NOT TO SCALE

LANE TAPER LENGTH FORMULAS

L=	TAPER LENGTH IN FEET
W=	WIDTH OF ROADWAY TO BE SHIFTED OR REDIRECTED IN FEET
S=	POSTED SPEED LIMIT IN MPH

POSTED SPEED
40 MPH OR LESS
$L=\frac{WS^2}{60}$

ADVANCE SIGN SPACING

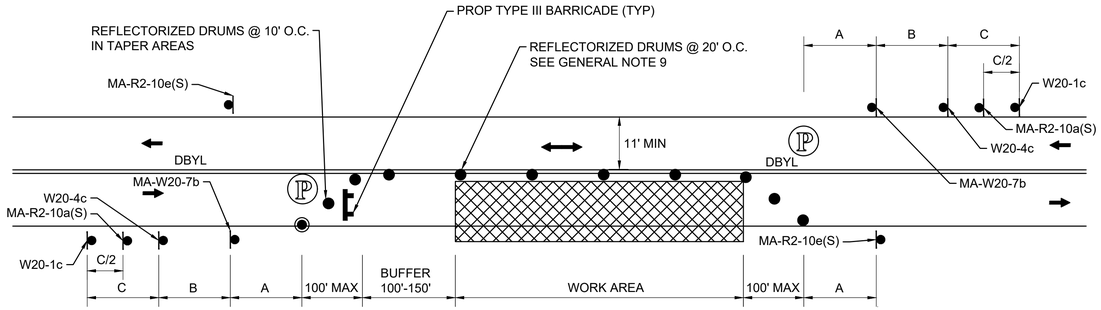
ROAD	DISTANCE BETWEEN SIGNS (FEET) A	B	C
BIKE PATH RICHARDSON ST ASTRIG WAY	100	100	100
TECHNOLOGY PARK DR SPRINGS ST ELIOT ST/ORCHARD RD RIVER ST	350	350	350
CONCORD RD	500	500	500
ROUTE 3	1,000	1,600	2,600

608227HD (TTCP).DWG Plotted on 23-Jul-2025 1:19 PM

608227HD (TTCP).DWG Plotted on 23-Jul-2025 1:19 PM

OPERATIONAL SIGNING

LANE CLOSURES SHOWN ARE FOR TEMPORARY CONSTRUCTION.
ALL DRUMS AND SIGNS ARE SHOWN AS THEY SHOULD APPEAR
DURING THE WORKING DAY, OR WHILE OPERATING IN THE WORK ZONE.

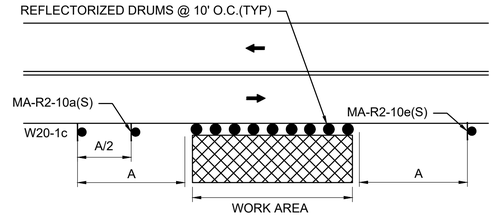


NOTES:

1. REFER TO ADVANCE SIGN SPACING TABLE ON SHEET 82.
2. SEE ADVANCE SIGN SPACING CHART ON SHEET 82.
3. AT THE END OF WORK SHIFT, CONTRACTOR TO RESTORE TRAFFIC BACK TO ORIGINAL CONDITION.

TYPICAL TWO-WAY STREET LANE CLOSURE ALTERNATING TRAFFIC

SCALE: NTS



NOTE:

1. SEE TTCP GENERAL NOTES ON SHEET 82 FOR ADDITIONAL INFORMATION.

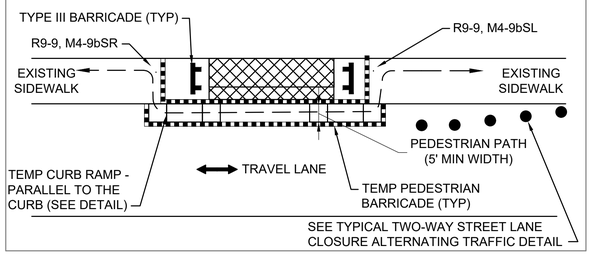
OFF ROADWAY WORK - RIGHT

SCALE: NTS

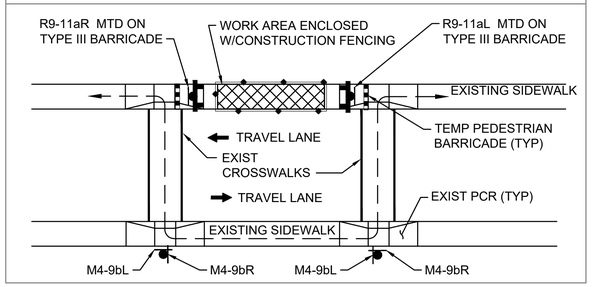
NOTES:

1. ADDITIONAL ADVANCE WARNING SIGNS MAY BE NECESSARY AS DETERMINED BY THE ENGINEER.
2. CONTROLS FOR PEDESTRIAN TRAFFIC ONLY, ARE SHOWN. VEHICULAR TRAFFIC SHALL BE MAINTAINED AS SHOWN ELSEWHERE.
3. STREET LIGHTING SHOULD BE CONSIDERED WHEN LOCATING CONTROL DEVICES.
4. ◄— — — ► INDICATES DIRECTION OF PEDESTRIAN TRAVEL.
5. IF THE WORK ZONE DOES NOT PERMIT PEDESTRIANS TO TRAVEL ADJACENT TO IT AS SHOWN IN PEDESTRIAN BYPASS TYPE I, THE APPROPRIATE SIGNS SHALL BE INSTALLED TO CROSS PEDESTRIANS TO THE OPPOSITE SIDE OF THE STREET AT EXISTING OR TEMPORARY CROSSWALKS AS SHOWN IN PEDESTRIAN BYPASS TYPE II, AND AS DIRECTED BY THE ENGINEER.
6. ALL TEMPORARY PEDESTRIAN PATHWAYS SHALL COMPLY FULLY WITH ALL REQUIREMENTS OF THE MUTCD AND ALL APPLICABLE MAAB AND ADAAG REQUIREMENTS AND INCLUDE THE USE OF A COMPLIANT TEMPORARY PEDESTRIAN MANAGEMENT GUIDANCE SYSTEM AT ALL TIMES.
7. CONTRACTOR SHALL MAINTAIN AS WIDE OF A PEDESTRIAN ACCESS AS POSSIBLE AT ALL TIMES. EXCEPT WHERE NECESSARY, THE CONTRACTOR MAY TEMPORARILY REDUCE PEDESTRIAN PATHWAYS TO 4 FEET IN WIDTH (EXCLUDING CURB) FOR NO MORE THAN 200 LINEAR FEET AT A TIME IN ACCORDANCE WITH ALL STANDARDS. A 5' x 5' PASSING AREA SHALL BE PROVIDED IN INTERVALS NOT EXCEEDING 200 FEET.
8. TEMPORARY PEDESTRIAN CURB RAMPS SHALL BE CONSTRUCTED IN ACCORDANCE WITH MASSDOT, MAAB, AND ADAAG REQUIREMENTS.
9. TEMPORARY PEDESTRIAN BARRICADE SHALL BE PAID FOR UNDER ITEM 852.11 TEMPORARY PEDESTRIAN BARRICADE.
10. TEMPORARY PEDESTRIAN CURB RAMPS SHALL BE PAID FOR UNDER ITEM 852.12 TEMPORARY PEDESTRIAN CURB RAMP.
11. AT THE END OF WORK SHIFT, CONTRACTOR TO RESTORE SIDEWALK BACK TO ORIGINAL CONDITION.

PEDESTRIAN BYPASS TYPE I

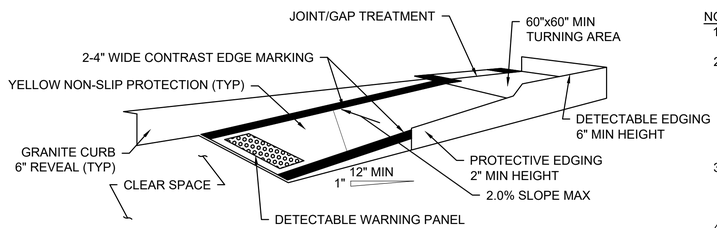


PEDESTRIAN BYPASS TYPE II

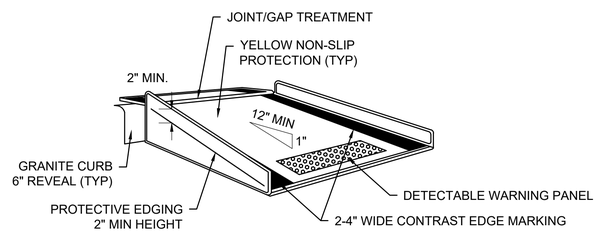


PEDESTRIAN BYPASS DETAIL

SCALE: NTS



TEMPORARY CURB RAMP-PARALLEL TO CURB



TEMPORARY CURB RAMP-PERPENDICULAR TO CURB

NOTES:

1. CURB RAMPS SHALL BE 60" MINIMUM WIDTH WITH A FIRM, STABLE AND NON-SLIP SURFACE.
2. PROTECTIVE EDGING WITH A 2" MINIMUM HEIGHT SHALL BE INSTALLED WHEN THE CURB RAMP OR LANDING PLATFORM HAS A VERTICAL DROP OF 6" OR GREATER OR HAS A SIDE APRON SLOPE STEEPER THAN 1:3 (33%). PROTECTIVE EDGING SHOULD BE CONSIDERED WHEN THE CURB RAMPS OR LANDING PLATFORMS HAVE A VERTICAL DROP OF 3" OR MORE.
3. DETECTABLE EDGING WITH 6" 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 48"x48" 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" WIDTH.
9. CHANGES BETWEEN SURFACE HEIGHTS SHOULD NOT EXCEED 0.5" LATERAL EDGES SHOULD BE VERTICAL UP TO 0.25" HIGH, AND BEVELED AT 1:2 BETWEEN 0.25" AND 0.5" 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.

TEMPORARY CURB RAMPS

SCALE: NTS

BILLERICA
YANKEE DOODLE BIKE PATH

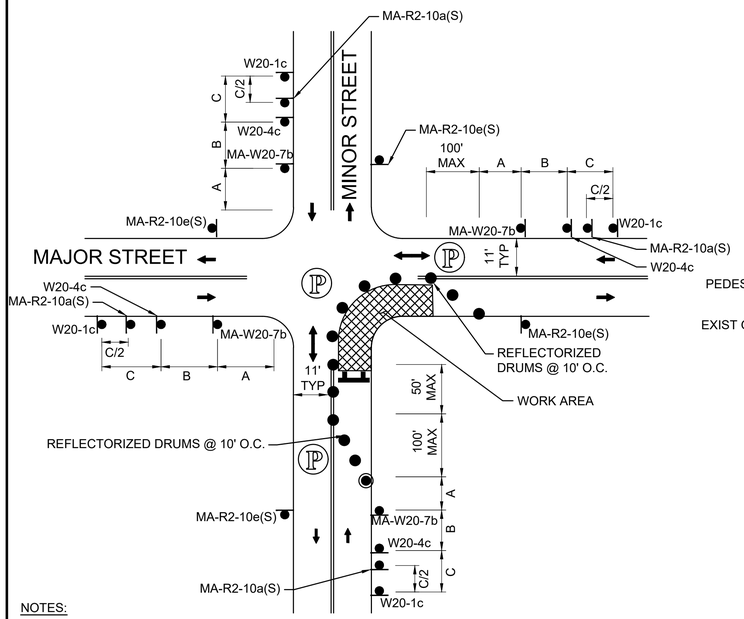
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	84	231
PROJECT FILE NO.	608227		

TEMPORARY TRAFFIC CONTROL PLANS
TYPICAL DETAILS

608227HD (TTCP).DWG Plotted on 23-Jul-2025 1:19 PM

OPERATIONAL SIGNING

LANE CLOSURES SHOWN ARE FOR TEMPORARY CONSTRUCTION.
ALL DRUMS AND SIGNS ARE SHOWN AS THEY SHOULD APPEAR
DURING THE WORKING DAY, OR WHILE OPERATING IN THE WORK ZONE.

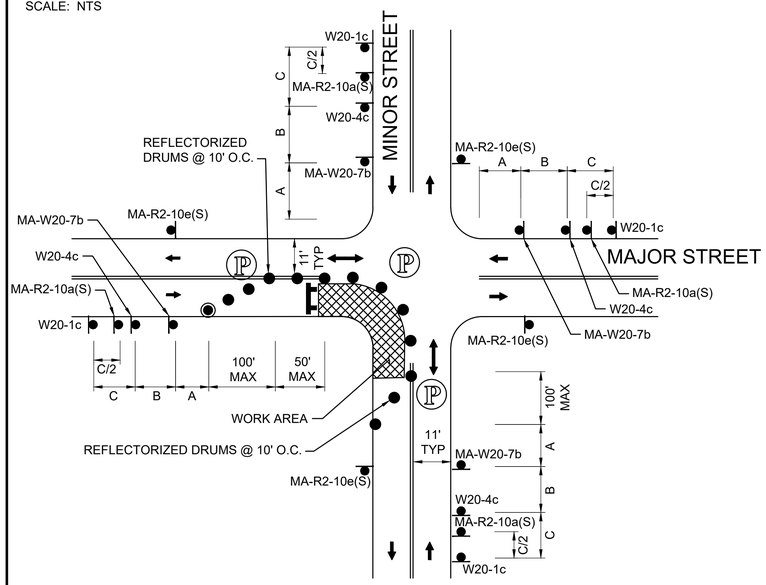


NOTES:

1. ADVANCE WARNING SIGN PLACEMENT TO BE ADJUSTED AS NECESSARY.
2. REFER TO ADVANCE SIGN SPACING TABLE ON SHEET 82.
3. AT THE END OF WORK SHIFT, CONTRACTOR TO RESTORE TRAFFIC BACK TO ORIGINAL CONDITION.

ONE LANE BI-DIRECTIONAL TRAFFIC AT INTERSECTIONS - FAR SIDE

SCALE: NTS

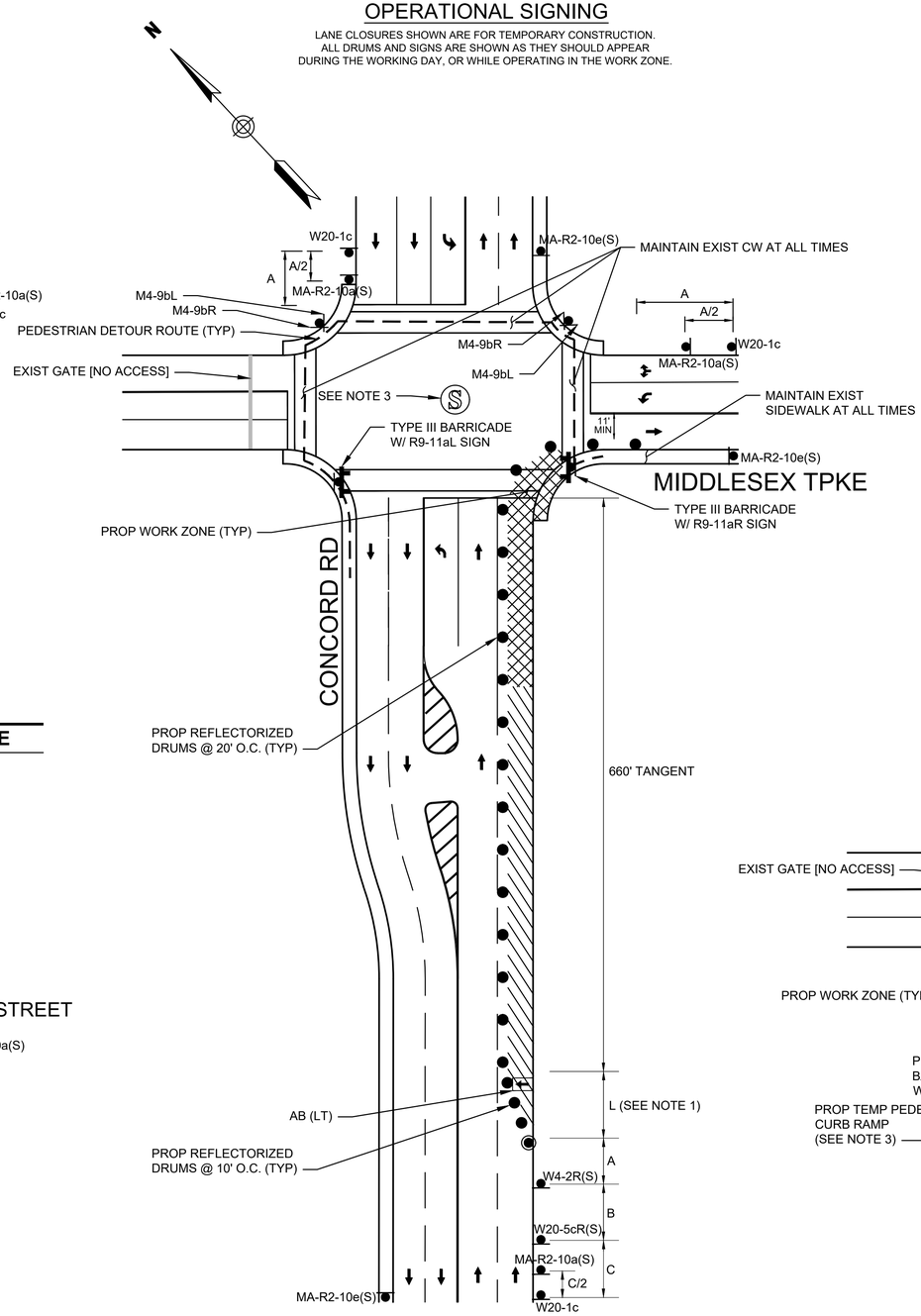


NOTES:

1. ADVANCE WARNING SIGN PLACEMENT TO BE ADJUSTED AS NECESSARY.
2. REFER TO ADVANCE SIGN SPACING TABLE ON SHEET 82.
3. AT THE END OF WORK SHIFT, CONTRACTOR TO RESTORE TRAFFIC BACK TO ORIGINAL CONDITION.

ONE LANE BI-DIRECTIONAL TRAFFIC AT-INTERSECTIONS - NEAR SIDE

SCALE: NTS

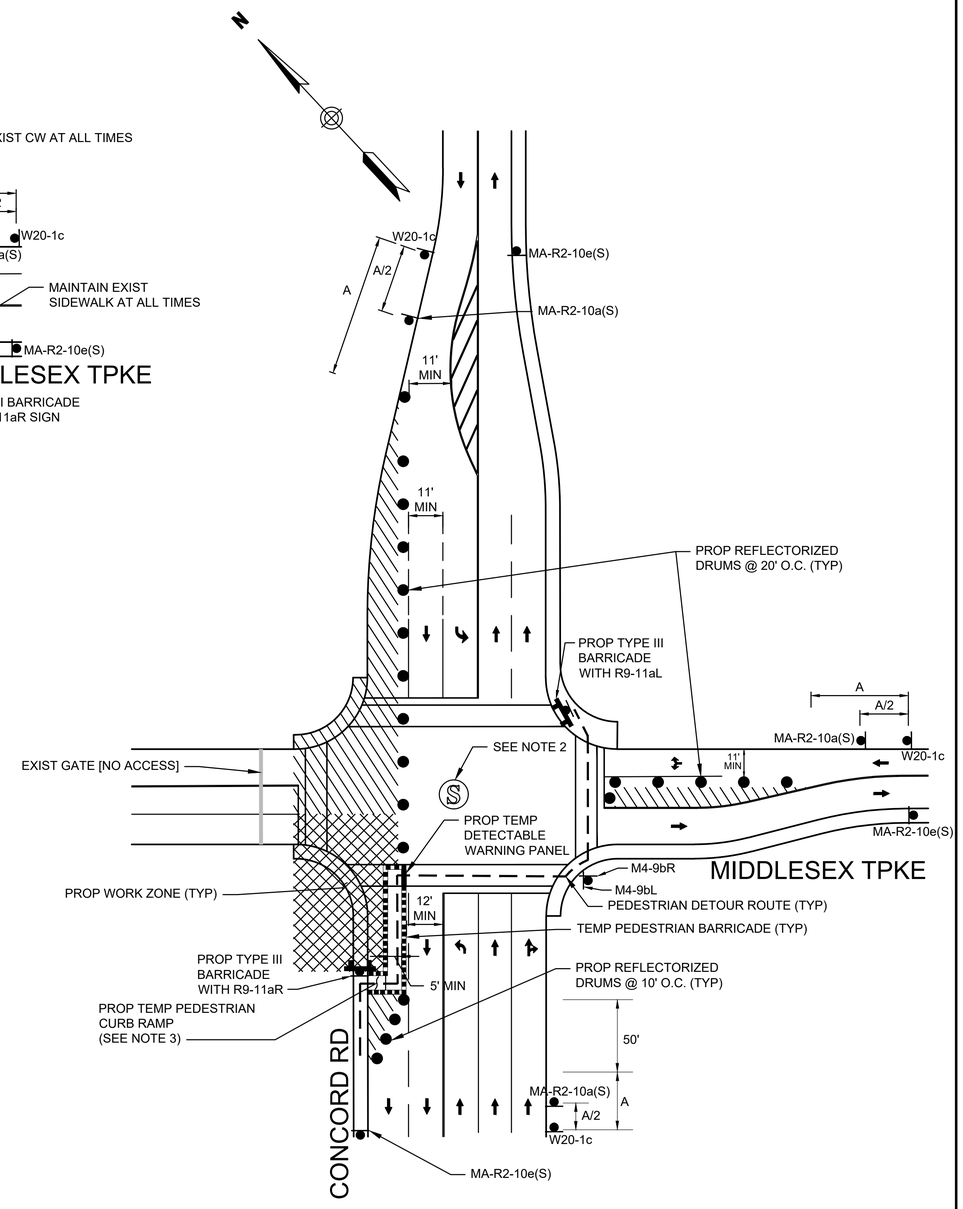


NOTES:

1. SEE TAPER LENGTH FORMULA ON SHEET 82.
2. REFER TO ADVANCED SIGN SPACING TABLE ON SHEET 82.
3. IF THE EXIST TRAFFIC SIGNAL EQUIPMENT IS IMPACTED DURING CONSTRUCTION, REPLACE IN-KIND AT NO COST TO THE PROJECT.
4. AT THE END OF WORK SHIFT, CONTRACTOR TO RESTORE TRAFFIC BACK TO ORIGINAL CONDITION.

WORK ON THE SOUTH SIDE OF INTERSECTION - CONCORD ROAD

SCALE: NTS



NOTES:

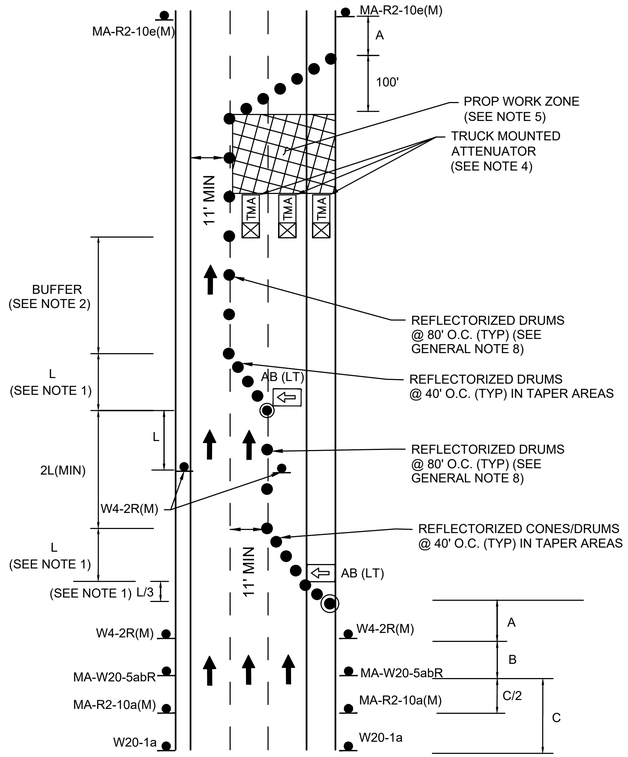
1. REFER TO ADVANCED SIGN SPACING TABLE ON SHEET 82.
2. IF THE EXIST TRAFFIC SIGNAL EQUIPMENT IS IMPACTED DURING CONSTRUCTION, REPLACE IN-KIND AT NO COST TO THE PROJECT.
3. REFER TO TEMPORARY CURB RAMPS DETAIL SHOWN ON SHEET 83.
4. AT THE END OF WORK SHIFT, CONTRACTOR TO RESTORE TRAFFIC BACK TO ORIGINAL CONDITION.

WORK ON THE NORTH SIDE OF INTERSECTION - CONCORD ROAD

SCALE: NTS

OPERATIONAL SIGNING

LANE CLOSURES SHOWN ARE FOR TEMPORARY CONSTRUCTION.
ALL DRUMS AND SIGNS ARE SHOWN AS THEY SHOULD APPEAR
DURING THE WORKING DAY, OR WHILE OPERATING IN THE WORK ZONE.

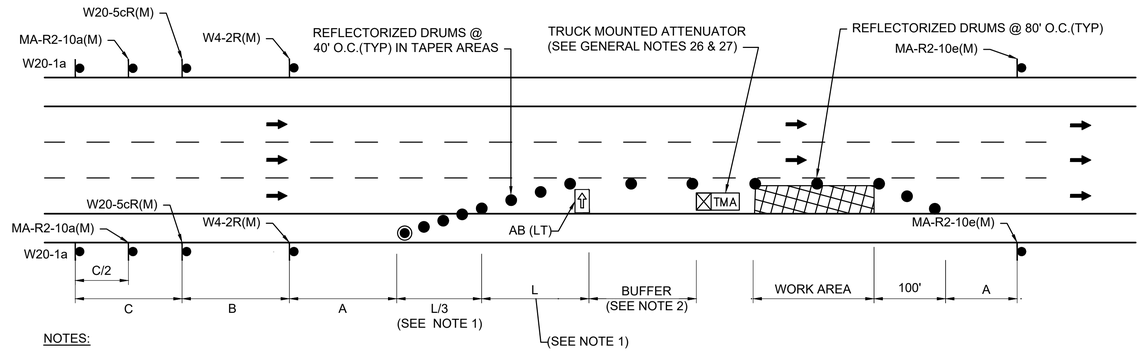


NOTES:

1. SEE TAPER LENGTH FORMULA ON SHEET 82.
2. SEE BUFFER SPACING TABLE ON SHEET 82.
3. SEE ADVANCED SIGN SPACING CHART ON SHEET 82.
4. SEE GENERAL NOTES 24 & 25 ON SHEET 82.
5. AT THE END OF WORK SHIFT, CONTRACTOR TO RESTORE TRAFFIC BACK TO ORIGINAL OR FIXED WORK-ZONE SETUP (SHEET 86-91) CONDITION.

TYPICAL TWO LANE CLOSURE - RIGHT (ROUTE 3)

SCALE: NTS

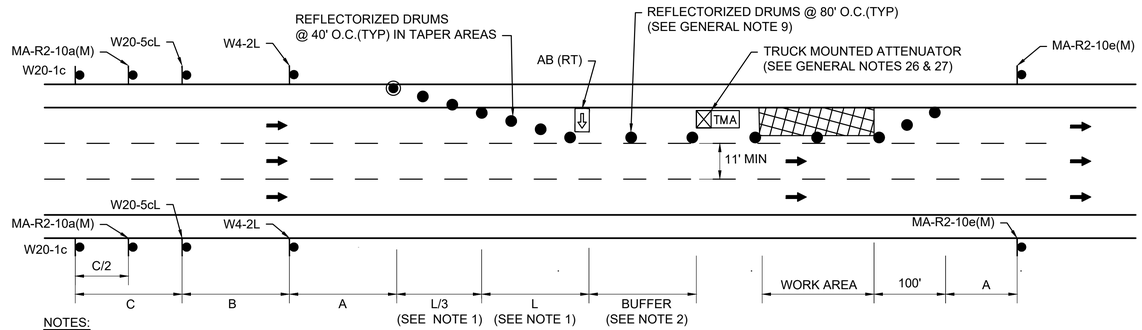


NOTES:

1. SEE TAPER LENGTH FORMULA ON SHEET 82.
2. SEE BUFFER SPACING TABLE ON SHEET 82.
3. SEE ADVANCED SIGN SPACING CHART ON SHEET 82.
4. SEE GENERAL NOTES 24 & 25 ON SHEET 82.
5. AT THE END OF WORK SHIFT, CONTRACTOR TO RESTORE TRAFFIC BACK TO ORIGINAL OR FIXED WORK-ZONE SETUP (SHEET 86-91) CONDITION.

TYPICAL ONE LANE CLOSURE - RIGHT (ROUTE 3)

SCALE: NTS

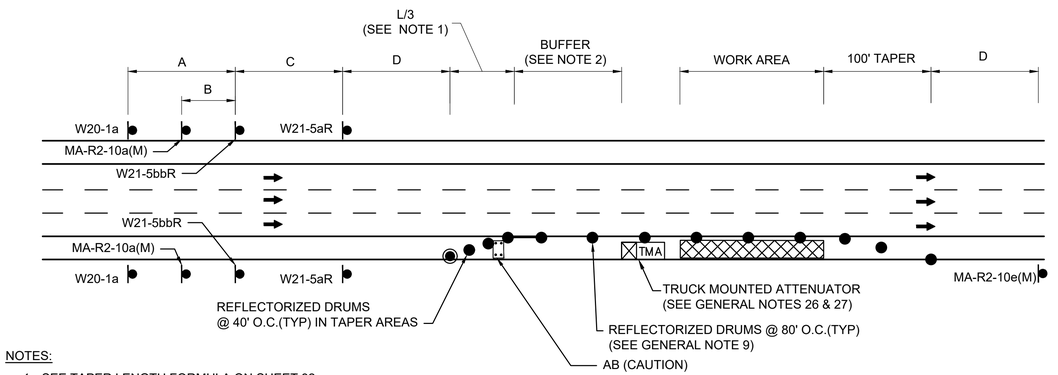


NOTES:

1. SEE TAPER LENGTH FORMULA ON SHEET 82.
2. SEE BUFFER SPACING TABLE ON SHEET 82.
3. SEE ADVANCED SIGN SPACING CHART ON SHEET 82.
4. SEE GENERAL NOTES 24 & 25 ON SHEET 82.
5. AT THE END OF WORK SHIFT, CONTRACTOR TO RESTORE TRAFFIC BACK TO ORIGINAL OR FIXED WORK-ZONE SETUP (SHEET 86-91) CONDITION.

TYPICAL ONE LANE CLOSURE - LEFT (ROUTE 3)

SCALE: NTS



NOTES:

1. SEE TAPER LENGTH FORMULA ON SHEET 82.
2. SEE BUFFER SPACING TABLE ON SHEET 82.
3. SEE ADVANCED SIGN SPACING CHART ON SHEET 82.
4. SEE GENERAL NOTES 24 & 25 ON SHEET 82.
5. AT THE END OF WORK SHIFT, CONTRACTOR TO RESTORE TRAFFIC BACK TO ORIGINAL OR FIXED WORK-ZONE SETUP (SHEET 86-91) CONDITION.

TYPICAL SHOULDER CLOSURE - RIGHT (ROUTE 3)

SCALE: NTS

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	85	231
PROJECT FILE NO.	608227		

TEMPORARY TRAFFIC CONTROL PLANS
TYPICAL DETAILS

608227HD (TTCP).DWG Plotted on 23-Jul-2025 1:20 PM

BILLERICA
YANKEE DOODLE BIKE PATH

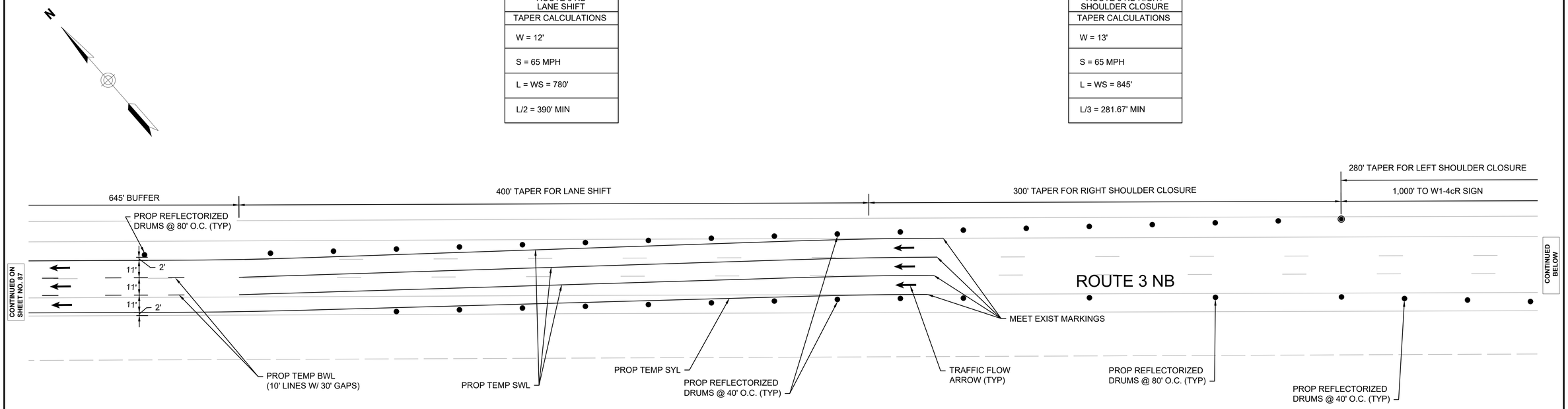
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	86	231
PROJECT FILE NO.	608227		

TEMPORARY TRAFFIC CONTROL PLANS
ROUTE 3 NB (SHEET 1 OF 6)

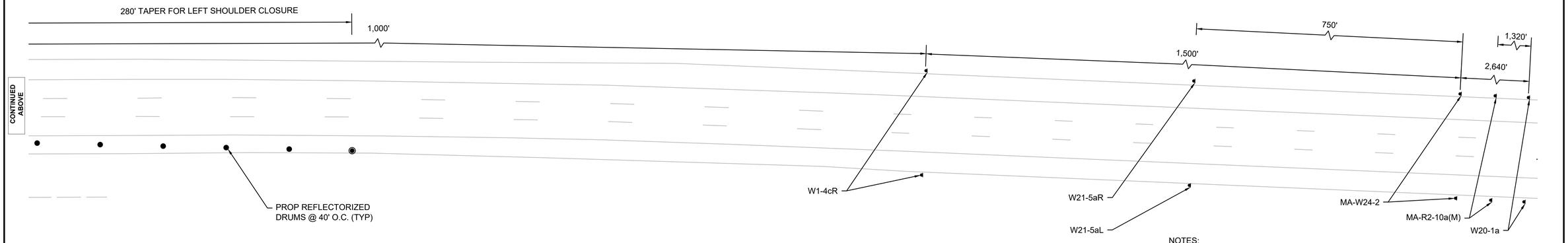
Plotted on 23-Jul-2025 1:22 PM
608227HD (TTCP)-RTE3.DWG

ROUTE 3 NB LANE SHIFT
TAPER CALCULATIONS
W = 12'
S = 65 MPH
L = WS = 780'
L/2 = 390' MIN

ROUTE 3 NB RIGHT SHOULDER CLOSURE
TAPER CALCULATIONS
W = 13'
S = 65 MPH
L = WS = 845'
L/3 = 281.67' MIN



ROUTE 3 NB LEFT SHOULDER CLOSURE
TAPER CALCULATIONS
W = 11.5'
S = 65 MPH
L = WS = 747.5'
L/3 = 250' MIN



30 0 30 60
SCALE IN FEET

NOTES:

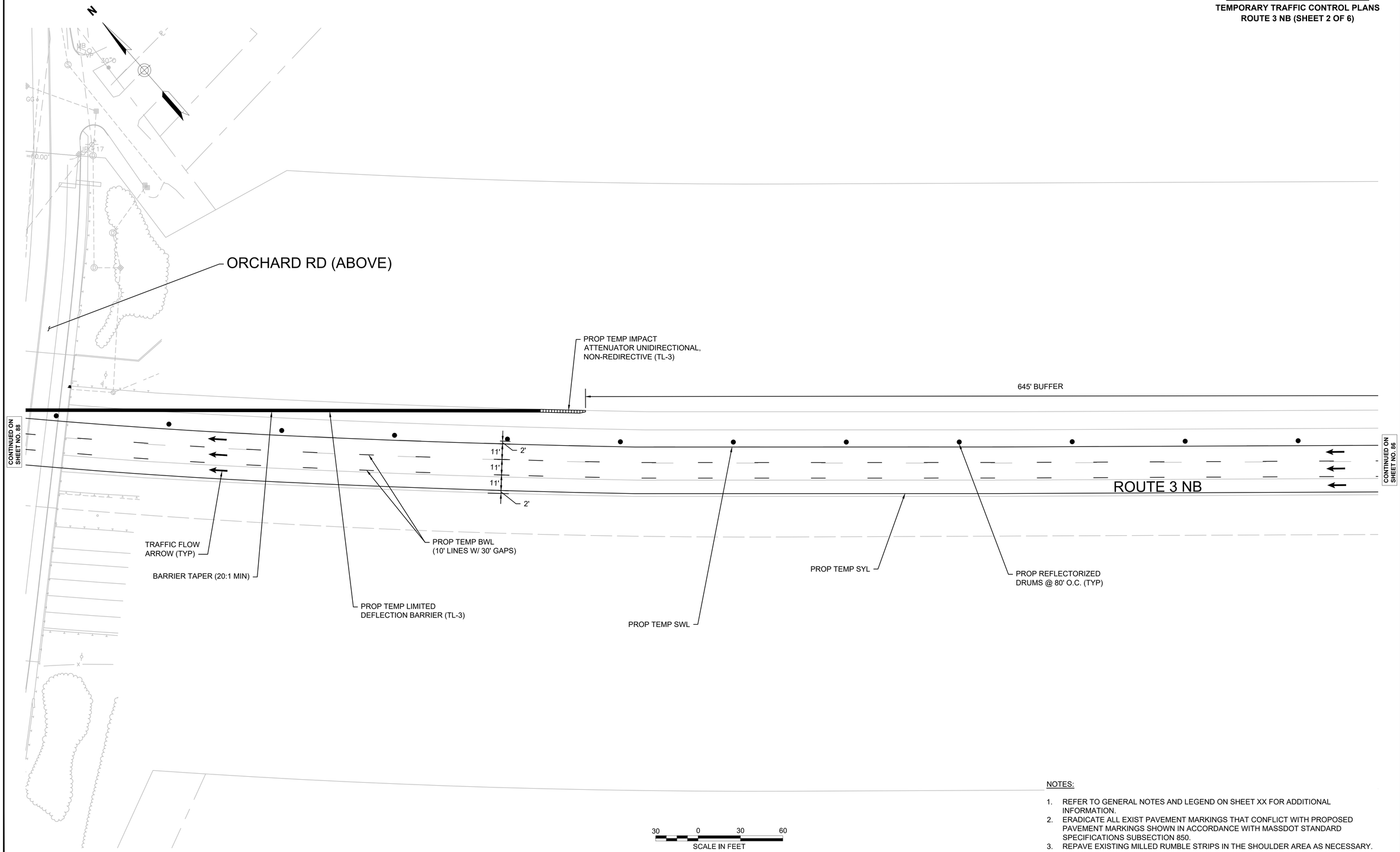
1. REFER TO GENERAL NOTES AND LEGEND ON SHEET 82 FOR ADDITIONAL INFORMATION.
2. ERADICATE ALL EXIST PAVEMENT MARKINGS THAT CONFLICT WITH PROPOSED PAVEMENT MARKINGS SHOWN IN ACCORDANCE WITH MASSDOT STANDARD SPECIFICATIONS SUBSECTION 850.
3. REPAVE EXISTING MILLED RUMBLE STRIPS IN THE SHOULDER AREA AS NECESSARY.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	87	231
PROJECT FILE NO.	608227		

TEMPORARY TRAFFIC CONTROL PLANS
ROUTE 3 NB (SHEET 2 OF 6)

608227HD (TTCP)-RTE3.DWG Plotted on 23-Jul-2025 1:22 PM



NOTES:

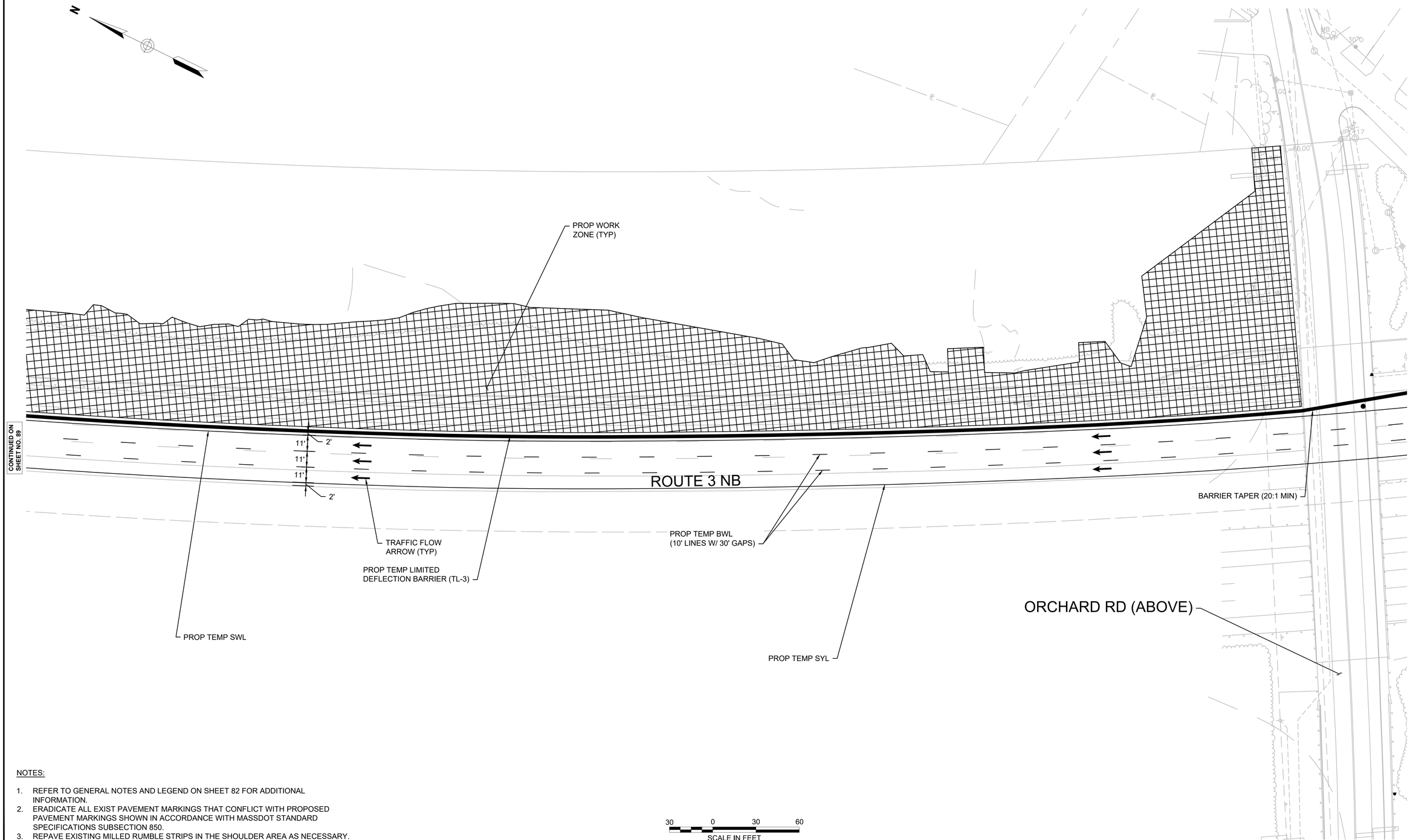
1. REFER TO GENERAL NOTES AND LEGEND ON SHEET XX FOR ADDITIONAL INFORMATION.
2. ERADICATE ALL EXIST PAVEMENT MARKINGS THAT CONFLICT WITH PROPOSED PAVEMENT MARKINGS SHOWN IN ACCORDANCE WITH MASSDOT STANDARD SPECIFICATIONS SUBSECTION 850.
3. REPAVE EXISTING MILLED RUMBLE STRIPS IN THE SHOULDER AREA AS NECESSARY.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	88	231
PROJECT FILE NO.	608227		

TEMPORARY TRAFFIC CONTROL PLANS
ROUTE 3 NB (SHEET 3 OF 6)

608227HD (TTCP)-RTE3.DWG Plotted on 23-Jul-2025 1:22 PM



NOTES:

1. REFER TO GENERAL NOTES AND LEGEND ON SHEET 82 FOR ADDITIONAL INFORMATION.
2. ERADICATE ALL EXIST PAVEMENT MARKINGS THAT CONFLICT WITH PROPOSED PAVEMENT MARKINGS SHOWN IN ACCORDANCE WITH MASSDOT STANDARD SPECIFICATIONS SUBSECTION 850.
3. REPAVE EXISTING MILLED RUMBLE STRIPS IN THE SHOULDER AREA AS NECESSARY.

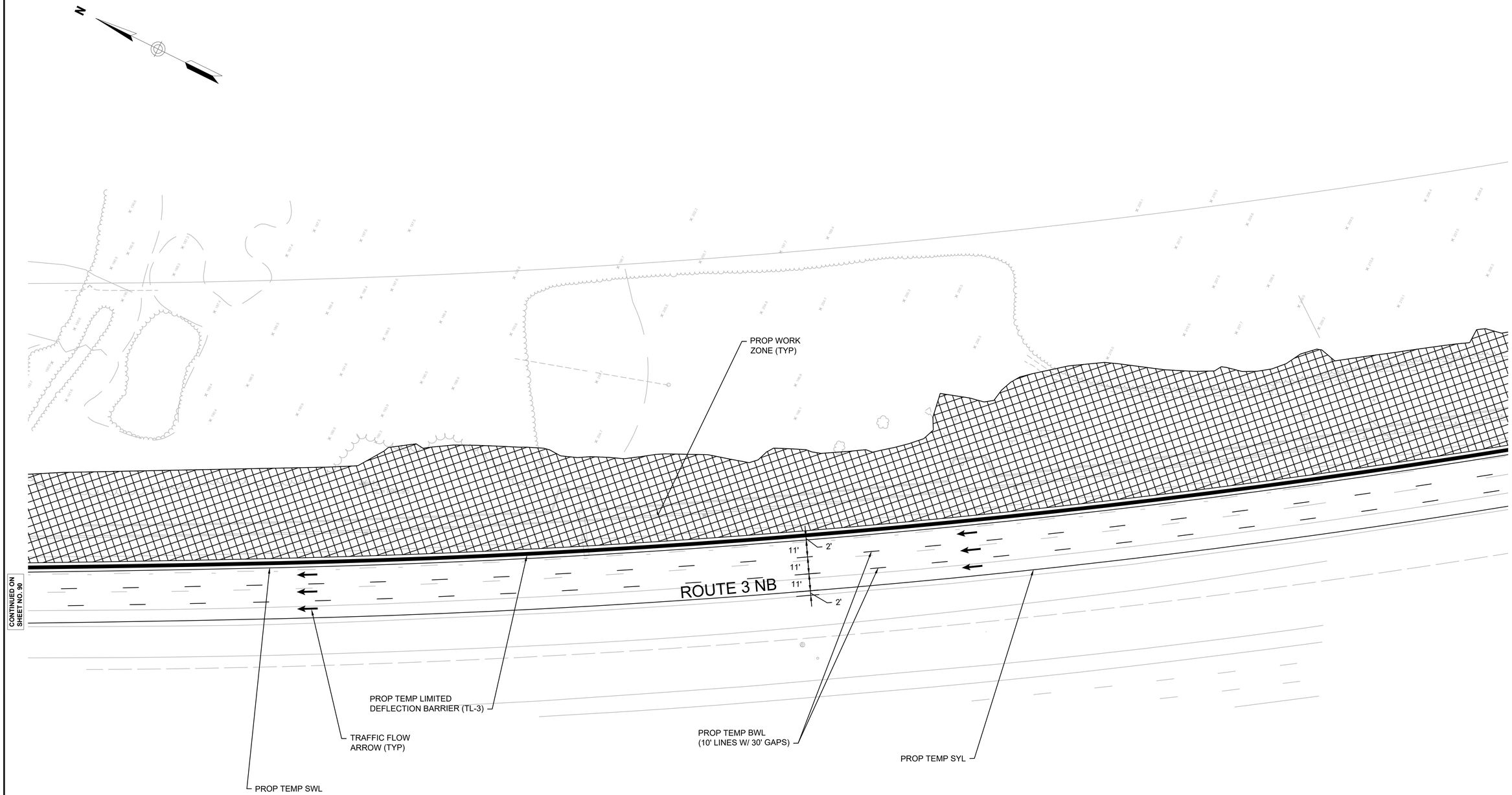
30 0 30 60
SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	89	231
PROJECT FILE NO.	608227		

TEMPORARY TRAFFIC CONTROL PLANS
ROUTE 3 NB (SHEET 4 OF 6)

608227HD (TTCP)-RTE3.DWG Plotted on 23-Jul-2025 1:23 PM



NOTES:

1. REFER TO GENERAL NOTES AND LEGEND ON SHEET 82 FOR ADDITIONAL INFORMATION.
2. ERADICATE ALL EXIST PAVEMENT MARKINGS THAT CONFLICT WITH PROPOSED PAVEMENT MARKINGS SHOWN IN ACCORDANCE WITH MASSDOT STANDARD SPECIFICATIONS SUBSECTION 850.
3. REPAVE EXISTING MILLED RUMBLE STRIPS IN THE SHOULDER AREA AS NECESSARY.

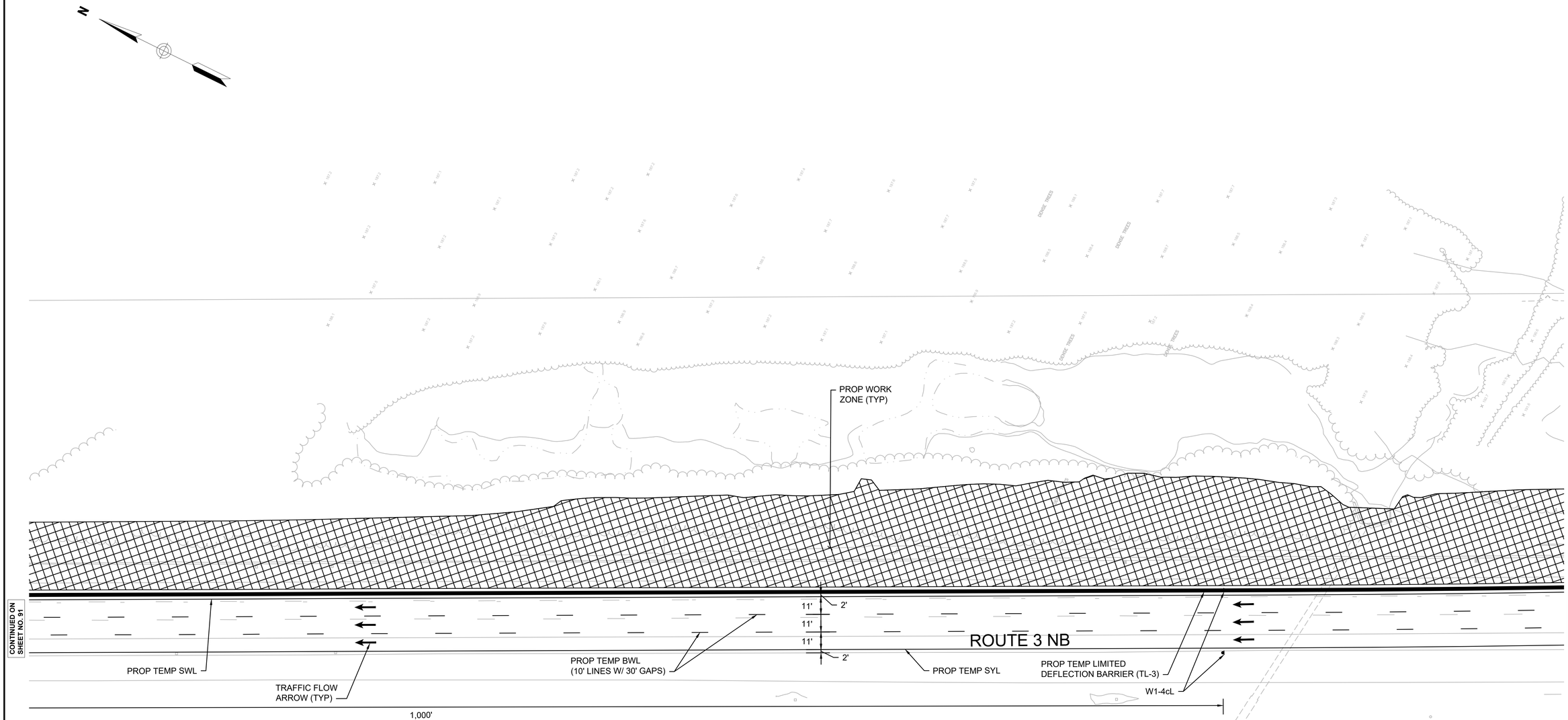
30 0 30 60
SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	90	231
PROJECT FILE NO.	608227		

TEMPORARY TRAFFIC CONTROL PLANS
ROUTE 3 NB (SHEET 5 OF 6)

608227HD (TTCP)-RTE3.DWG Plotted on 23-Jul-2025 1:23 PM



NOTES:

1. REFER TO GENERAL NOTES AND LEGEND ON SHEET 82 FOR ADDITIONAL INFORMATION.
2. ERADICATE ALL EXIST PAVEMENT MARKINGS THAT CONFLICT WITH PROPOSED PAVEMENT MARKINGS SHOWN IN ACCORDANCE WITH MASSDOT STANDARD SPECIFICATIONS SUBSECTION 850.
3. REPAVE EXISTING MILLED RUMBLE STRIPS IN THE SHOULDER AREA AS NECESSARY.

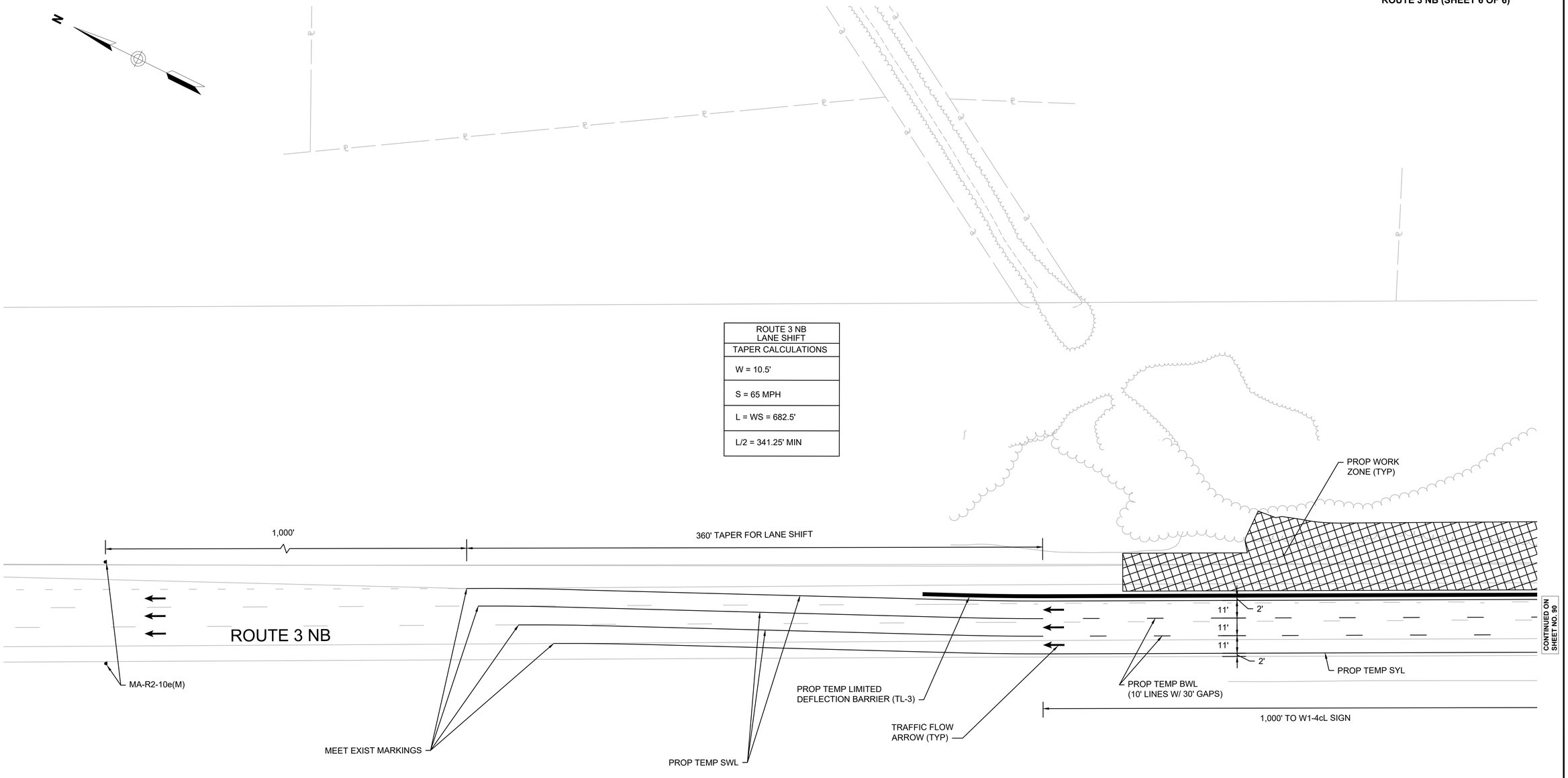
30 0 30 60
SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	91	231
PROJECT FILE NO.	608227		

TEMPORARY TRAFFIC CONTROL PLANS
ROUTE 3 NB (SHEET 6 OF 6)

608227HD (TTCP)-RTE3.DWG Plotted on 23-Jul-2025 1:23 PM



NOTES:

1. REFER TO GENERAL NOTES AND LEGEND ON SHEET 82 FOR ADDITIONAL INFORMATION.
2. ERADICATE ALL EXIST PAVEMENT MARKINGS THAT CONFLICT WITH PROPOSED PAVEMENT MARKINGS SHOWN IN ACCORDANCE WITH MASSDOT STANDARD SPECIFICATIONS SUBSECTION 850.
3. REPAVE EXISTING MILLED RUMBLE STRIPS IN THE SHOULDER AREA AS NECESSARY.

30 0 30 60
SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	92	231
PROJECT FILE NO. 608227			

TEMPORARY TRAFFIC CONTROL PLANS
WORK ZONE SPEED LIMIT PLAN

608227HD (TTCP)-RTE3_SPEED_LIMIT_SIGNS.DWG Plotted on 31-Jul-2025 12:11 PM

N

EXIT 76

3

PROP
R2-12
(INSTALL SIGNS ON BOTH SIDES
OF THE ROUTE 3 NORTHBOUND)

LIMIT OF TRAFFIC SHIFTS

NUTTING LAKE

LEXINGTON RD

MIDDLESEX TURNPIKE

MILL BROOK

CONCORD RD

BILLERICA

ORCHARD RD

4

BEDFORD

PROP
G20-5aP
R2-1(55)
NORTHBOUND
AT LIMIT OF WORK
(INSTALL SIGNS ON BOTH SIDES
OF THE ROUTE 3 NORTHBOUND)

LIMIT OF TRAFFIC SHIFTS

PROP
W3-5(55)
NORTHBOUND
500' IN ADVANCE OF LIMIT OF WORK
(INSTALL SIGNS ON BOTH SIDES OF
THE ROUTE 3 NORTHBOUND)

PCMS #1
(LOCATED APPROXIMATELY 1,150'± FROM W3-5(55)
ON THE RIGHT SIDE IN GRASSY AREA BEHIND
LEADING END OF GUARDRAIL)
(APPROX BETWEEN MILE MARKERS 75.4 AND 75.6)

PCMS #1 MESSAGE TEXT

14 DAYS PRIOR TO IMPLEMENTATION	SPEED LIMIT CHANGE	BEGINS MMM DD
14 DAYS AFTER IMPLEMENTATION	SPEED LIMIT CHANGE	55 MPH AHEAD

PCMS NOTES:

1. PCMS SHALL BE INSTALLED WITHIN THE EXISTING RIGHT-OF-WAY (ROW) OFF THE ROADWAY OUTSIDE CLEAR ZONE OR BEHIND EXIST GUARDRAIL AT APPROX. LOCATIONS SHOWN OR AS DIRECTED BY MASSDOT.
2. DATE AND TIMES ON PCMS MESSAGING SHALL BE COORDINATED WITH MASSDOT HOC AND DISTRICT 4.
3. CONTRACTOR SHALL PROVIDE PCMS 14 DAYS PRIOR TO START OF TEMPORARY SPEED LIMIT IMPLEMENTATION OR AS DIRECTED BY MASSDOT.
4. CONTRACTOR SHALL REMOVE ALL PCMS 14 DAYS AFTER TEMPORARY SPEED LIMIT IMPLEMENTATION UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

NOTE:
1. REFER TO SHEET 82 FOR GENERAL NOTES & LEGEND INFORMATION.

0 300 750 1200
SCALE: 1" = 300'

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	93	231
PROJECT FILE NO.	608227		

TEMPORARY TRAFFIC CONTROL PLANS
ORCHARD RD

608227HD (TTCP)-ORCHARD_RD.DWG Plotted on 23-Jul-2025 1:26 PM

N

ROUTE 3 NB
(BELOW)

ORCHARD RD WB LANE SHIFT
TAPER CALCULATIONS
W = 8'
S = 25 MPH
$L = \frac{WS^2}{60} = 83.3'$
L/2 = 41.7' MIN

ORCHARD RD EB LANE SHIFT
TAPER CALCULATIONS
W = 7'
S = 25 MPH
$L = \frac{WS^2}{60} = 73'$
L/2 = 36.5' MIN

WINTER ST

ELIOT ST

REARDON RD

ORCHARD RD

TECHNOLOGY PARK DR

PROP TEMP BARRIER (TL-2)

PROP TEMP SWL

MAINTAIN EXIST SIDEWALK AT ALL TIMES

TRAFFIC FLOW ARROW (TYP)

150' TAPER FOR LANE SHIFT

100' TAPER FOR LANE SHIFT

100' 100' 100' 50'

MA-R2-10e(S)

MEET EXISTING MARKINGS

W1-4L

1' 11' 11' 1'

W1-4R

W5-1

MA-R2-10a(S)

50' 100' 100' 100'

W20-1c (SEE NOTE 2)

PROP TEMP DBYL

PROP TEMP SWL

PROP TEMP IMPACT ATTENUATOR UNIDIRECTIONAL, NON-REDIRECTIVE (TL-2)

PROP REFLECTORIZED DRUMS @ 10' O.C. (TYP)

PROP WORK ZONE (TYP)

MAINTAIN ABUTTER ACCESS AT ALL TIMES

SEE NOTE 2

30 0 30 60
SCALE IN FEET

NOTES:

1. REFER TO GENERAL NOTES AND LEGEND ON SHEET 82 FOR ADDITIONAL INFORMATION.
2. CONTRACTOR TO INSTALL ADVANCE WARNING SIGNS (W20-1c W/ W16-8P) ON TECHNOLOGY PARK DR APPROACHING ORCHARD RD AT 100' SPACING.

TEMPORARY TRAFFIC CONTROL SIGN SUMMARY

IDENTIFICATION NUMBER	SIZE OF SIGN		TEXT	TEXT DIMENSIONS (INCHES)			COLOR		
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING	ARROW RTE. MKR.	BACK-GROUND	LEGEND	BORDER
R2-1(55)	48"	60"	SPEED LIMIT 55	SEE FHWA "STANDARD HIGHWAY SIGNS, 2004 EDITION"; AS AMENDED			WHITE	BLACK	BLACK
MA-R2-10a(M)	60"	48"	WORK ZONE SPEEDING FINES DOUBLED	AS PER MASSDOT STANDARD			FLUOR-ESCENT ORANGE	BLACK	BLACK
MA-R2-10a(S)	48"	36"					WHITE		
MA-R2-10e(M)	60"	48"	END ROAD WORK DOUBLE FINES END				FLUOR-ESCENT ORANGE	BLACK	BLACK
MA-R2-10e(S)	48"	36"					WHITE		
R2-12	36"	54"	END WORK ZONE SPEED LIMIT	SEE FHWA "STANDARD HIGHWAY SIGNS, 2004 EDITION"; AS AMENDED			WHITE	BLACK	BLACK
R4-7b	24"	30"	KEEP RIGHT				WHITE	BLACK	BLACK
R9-9	24"	12"	SIDEWALK CLOSED				WHITE	BLACK	BLACK
R9-11aL	24"	12"	SIDEWALK CLOSED ← CROSS HERE				WHITE	BLACK	BLACK
R9-11aR	24"	12"	SIDEWALK CLOSED → CROSS HERE				WHITE	BLACK	BLACK
W1-4cL	48"	48"					FLUOR-ESCENT ORANGE	BLACK	BLACK
W1-4cR	48"	48"					FLUOR-ESCENT ORANGE	BLACK	BLACK
W1-4L	36"	36"					FLUOR-ESCENT ORANGE	BLACK	BLACK
W1-4R	36"	36"					FLUOR-ESCENT ORANGE	BLACK	BLACK
W3-5(55)	48"	48"	SPEED LIMIT 55				FLUOR-ESCENT ORANGE	BLACK/ WHITE	BLACK
W4-2L	48"	48"					FLUOR-ESCENT ORANGE	BLACK	BLACK
W4-2R(M)	48"	48"					FLUOR-ESCENT ORANGE	BLACK	BLACK
W4-2R(S)	36"	36"							
W5-1	36"	36"	ROAD NARROWS				FLUOR-ESCENT ORANGE	BLACK	BLACK
W8-1	36"	36"	BUMP				FLUOR-ESCENT ORANGE	BLACK	BLACK
W8-3	36"	36"	PAVEMENT ENDS				FLUOR-ESCENT ORANGE	BLACK	BLACK
W8-8	36"	36"	ROUGH ROAD				FLUOR-ESCENT ORANGE	BLACK	BLACK

TEMPORARY TRAFFIC CONTROL SIGN SUMMARY (CONTINUED)

IDENTIFICATION NUMBER	SIZE OF SIGN		TEXT	TEXT DIMENSIONS (INCHES)			COLOR		
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING	ARROW RTE. MKR.	BACK-GROUND	LEGEND	BORDER
W8-9	36"	36"	LOW SHOULDER	SEE FHWA "STANDARD HIGHWAY SIGNS, 2004 EDITION"; AS AMENDED			FLUOR-ESCENT ORANGE	BLACK	BLACK
W8-15	36"	36"	GROOVED PAVEMENT				FLUOR-ESCENT ORANGE	BLACK	BLACK
W20-1a	48"	48"	ROAD WORK 1 MILE				FLUOR-ESCENT ORANGE	BLACK	BLACK
W20-1c	36"	36"	ROAD WORK AHEAD				FLUOR-ESCENT ORANGE	BLACK	BLACK
W20-4c	36"	36"	ONE LANE ROAD AHEAD				FLUOR-ESCENT ORANGE	BLACK	BLACK
MA-W20-5abR	48"	48"	RIGHT TWO LANES CLOSED 1/2 MILE	AS PER MASSDOT STANDARD			FLUOR-ESCENT ORANGE	BLACK	BLACK
W20-5cL	48"	48"	LEFT LANE CLOSED AHEAD	SEE FHWA "STANDARD HIGHWAY SIGNS, 2004 EDITION"; AS AMENDED			ESCENT ORANGE	BLACK	BLACK
W20-5cR(M)	48"	48"	RIGHT LANE CLOSED AHEAD				FLUOR-ESCENT ORANGE	BLACK	BLACK
W20-5cR(S)	36"	36"							
MA-W20-7b	36"	36"	POLICE OFFICER AHEAD	AS PER MASSDOT STANDARD			FLUOR-ESCENT ORANGE	BLACK	BLACK
W21-5aL	48"	48"	LEFT SHOULDER CLOSED	SEE FHWA "STANDARD HIGHWAY SIGNS, 2004 EDITION"; AS AMENDED			FLUOR-ESCENT ORANGE	BLACK	BLACK
W21-5aR	48"	48"	RIGHT SHOULDER CLOSED				FLUOR-ESCENT ORANGE	BLACK	BLACK
W21-5bbR	48"	48"	RIGHT SHOULDER CLOSED 1/3 MILE				FLUOR-ESCENT ORANGE	BLACK	BLACK
MA-W24-2	48"	48"	LANE SHIFT AHEAD	AS PER MASSDOT STANDARD			FLUOR-ESCENT ORANGE	BLACK	BLACK
M4-9bL	30"	24"	DETOUR ←	SEE FHWA "STANDARD HIGHWAY SIGNS, 2004 EDITION"; AS AMENDED			FLUOR-ESCENT ORANGE	BLACK	BLACK
M4-9bR	30"	24"	DETOUR →				FLUOR-ESCENT ORANGE	BLACK	BLACK
M4-9bSL	30"	24"	DETOUR ↖				FLUOR-ESCENT ORANGE	BLACK	BLACK
M4-9bSR	30"	24"	DETOUR ↗				FLUOR-ESCENT ORANGE	BLACK	BLACK
G20-5aP	48"	36"	WORK ZONE				FLUOR-ESCENT ORANGE	BLACK	BLACK

NOTES:
1. HIGH INTENSITY REFLECTIVE SHEETING SHALL BE USED FOR ALL SIGNS. SEE FHWA "STANDARD HIGHWAY SIGNS, 2004 EDITION" FOR TEXT DIMENSIONS, AS AMENDED; THE 1977 MASSHIGHWAY DEPARTMENT CONSTRUCTION AND TRAFFIC STANDARD DETAILS, AS AMENDED, FOR SIGNS AND SUPPORTS; THE MASSHIGHWAY DEPARTMENT SIGN LISTINGS 1993 EDITION, AS AMENDED; THE 2009 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR MOUNTING REQUIREMENTS; AND THE 2017 MassDOT STANDARD SIGNS BOOK, AS AMENDED.
2. ALL SIGNS SHOWN GRAPHICALLY FOR INFORMATION ONLY. SIGN VENDOR SHALL FABRICATE ALL SIGNS IN ACCORDANCE WITH THE APPLICABLE STANDARDS.
3. CERTAIN SIGNS WITH MULTIPLE DIMENSIONS SIZES WILL HAVE SIGN CODES FOLLOWED BY (M) OR (S) INDICATING WHERE THE SIGNS ARE TO BE INSTALLED. (M) INDICATES MAINLINE ROADWAYS AND (S) INDICATES SECONDARY ROADWAYS. THIS FORMAT IS ALSO NOTED ON THE PLAN SHEETS.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	94	231
PROJECT FILE NO.	608227		

TEMPORARY TRAFFIC CONTROL PLANS
SIGN SUMMARY

608227HD (TTCP).DWG Plotted on 23-Jul-2025 1:27 PM

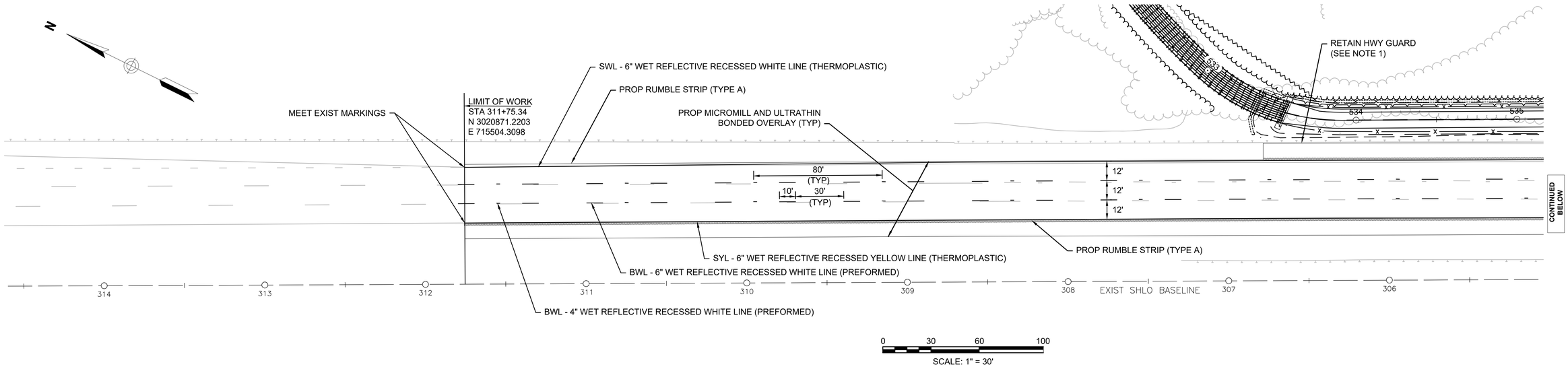
BILLERICA
YANKEE DOODLE BIKE PATH

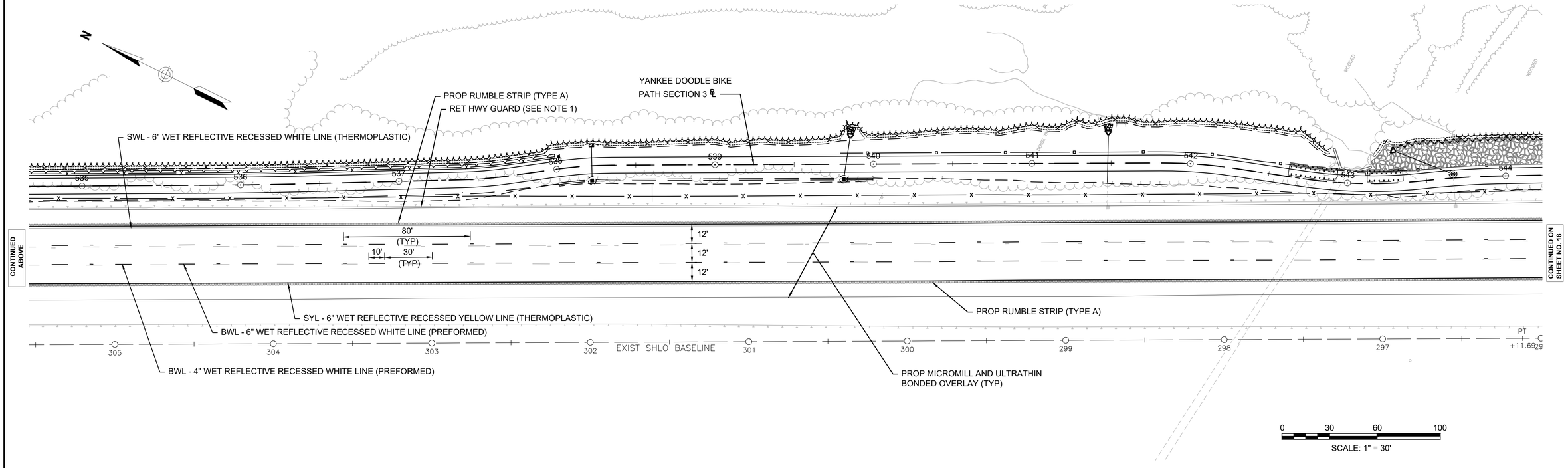
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	95	231
PROJECT FILE NO.	608227		

ROUTE 3 PAVEMENT RESTORATION PLANS

NOTES:

1. EXISTING HWY GUARD THAT WAS REMOVED AFTER TRAFFIC BARRIER SETUP TO ALLOW CONTRACTOR ACCESS FROM ROUTE 3, SHALL REPLACED WITH NEW TL-2 HWY GUARD.





608227HD (ROUTE 3 RESTORATION PLANS).DWG Plotted on 23-Jul-2025 1:30 PM

NOTES:

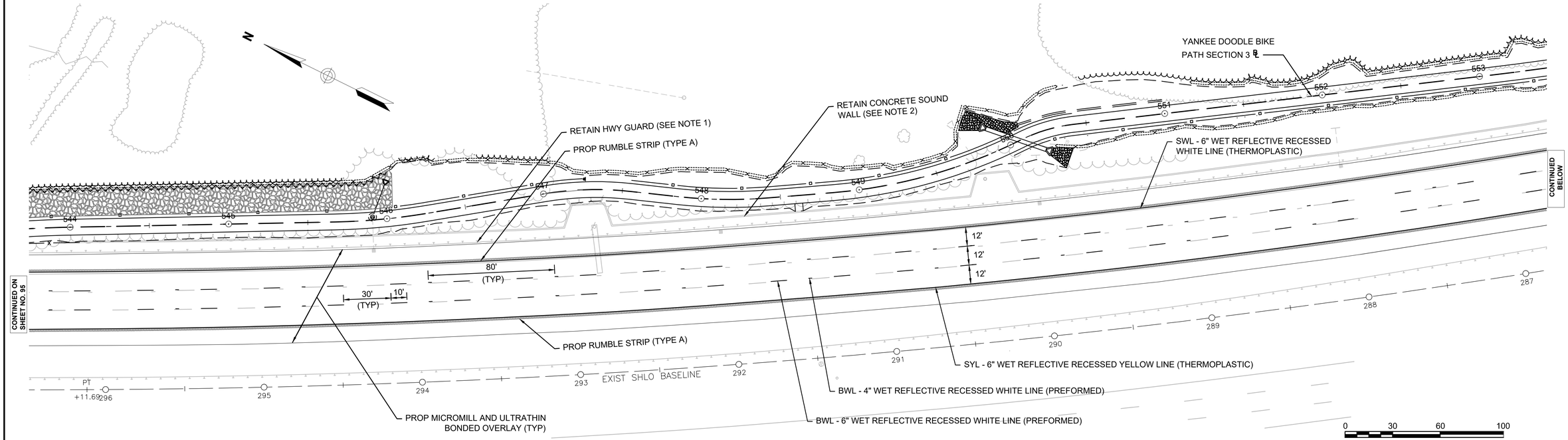
1. EXISTING HWY GUARD THAT WAS REMOVED AFTER TRAFFIC BARRIER SETUP TO ALLOW CONTRACTOR ACCESS FROM ROUTE 3, SHALL REPLACED WITH NEW TL-2 HWY GUARD.

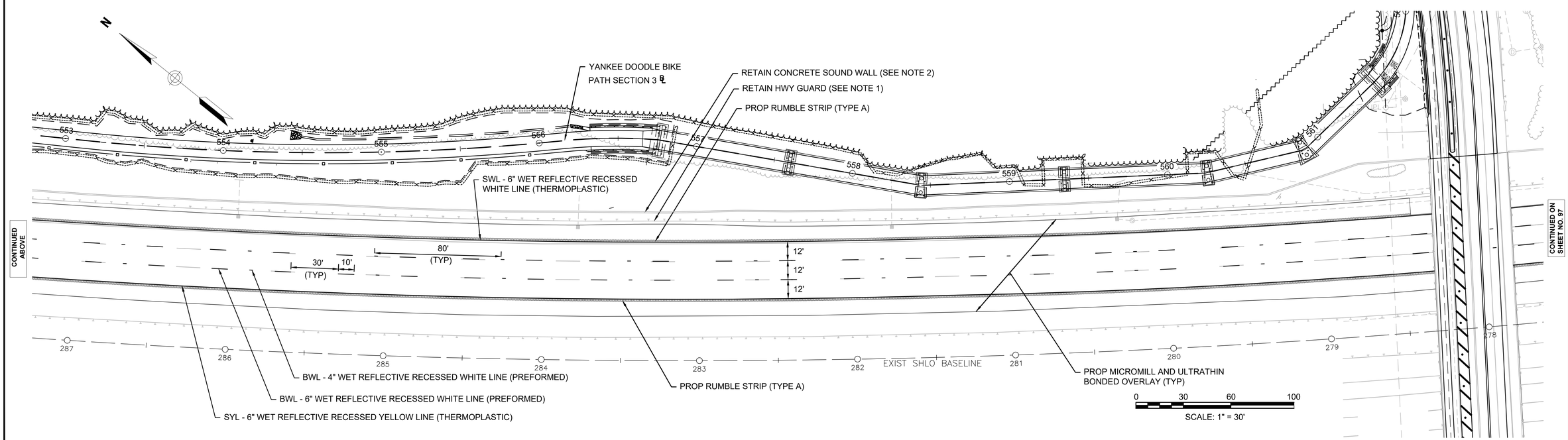
2. EXISTING CONCRETE SOUND WALL THAT WAS REMOVED AFTER TRAFFIC BARRIER SETUP TO ALLOW CONTRACTOR ACCESS FROM ROUTE 3, SHALL BE RESET BEFORE TRAFFIC BARRIER SETUP IS DISMANTLED.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	96	231
PROJECT FILE NO.	608227		

ROUTE 3 PAVEMENT RESTORATION PLANS





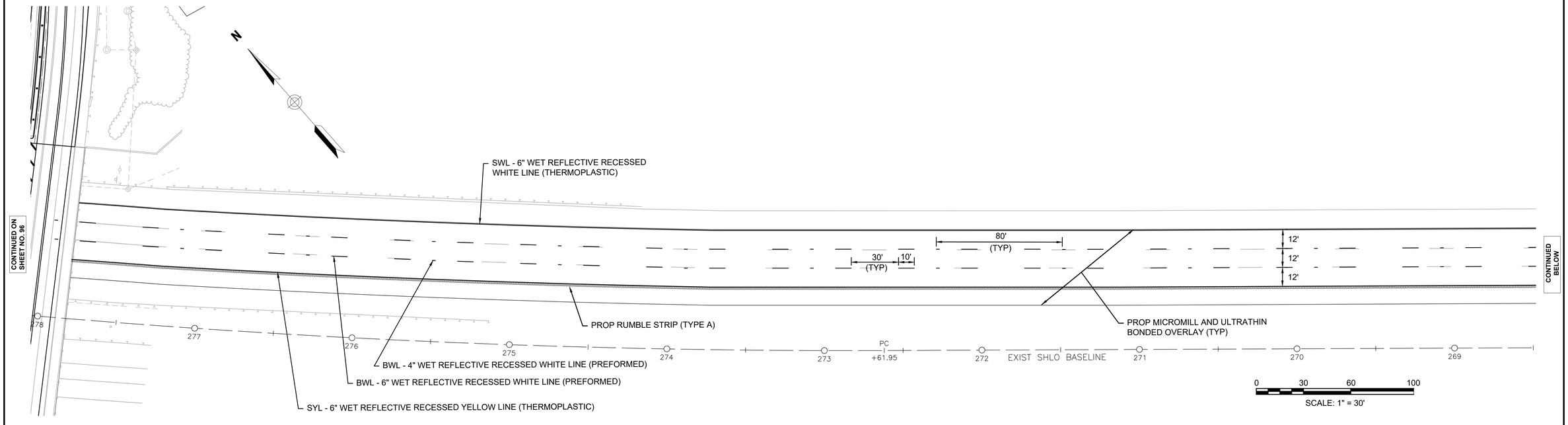
608227HD (ROUTE 3 RESTORATION PLANS).DWG Plotted on 23-Jul-2025 1:31 PM

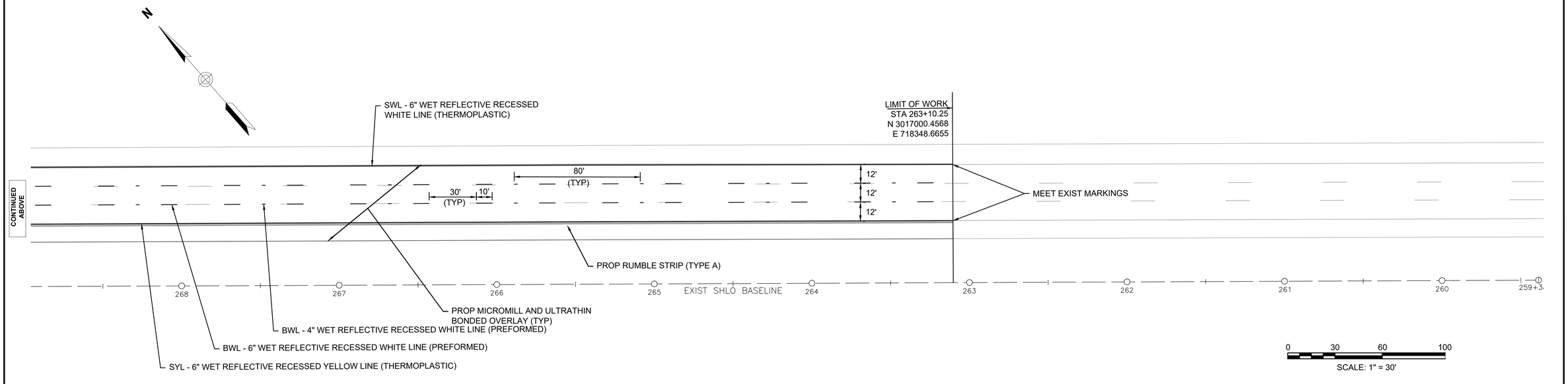
BILLERICA
YANKEE DOODLE BIKE PATH

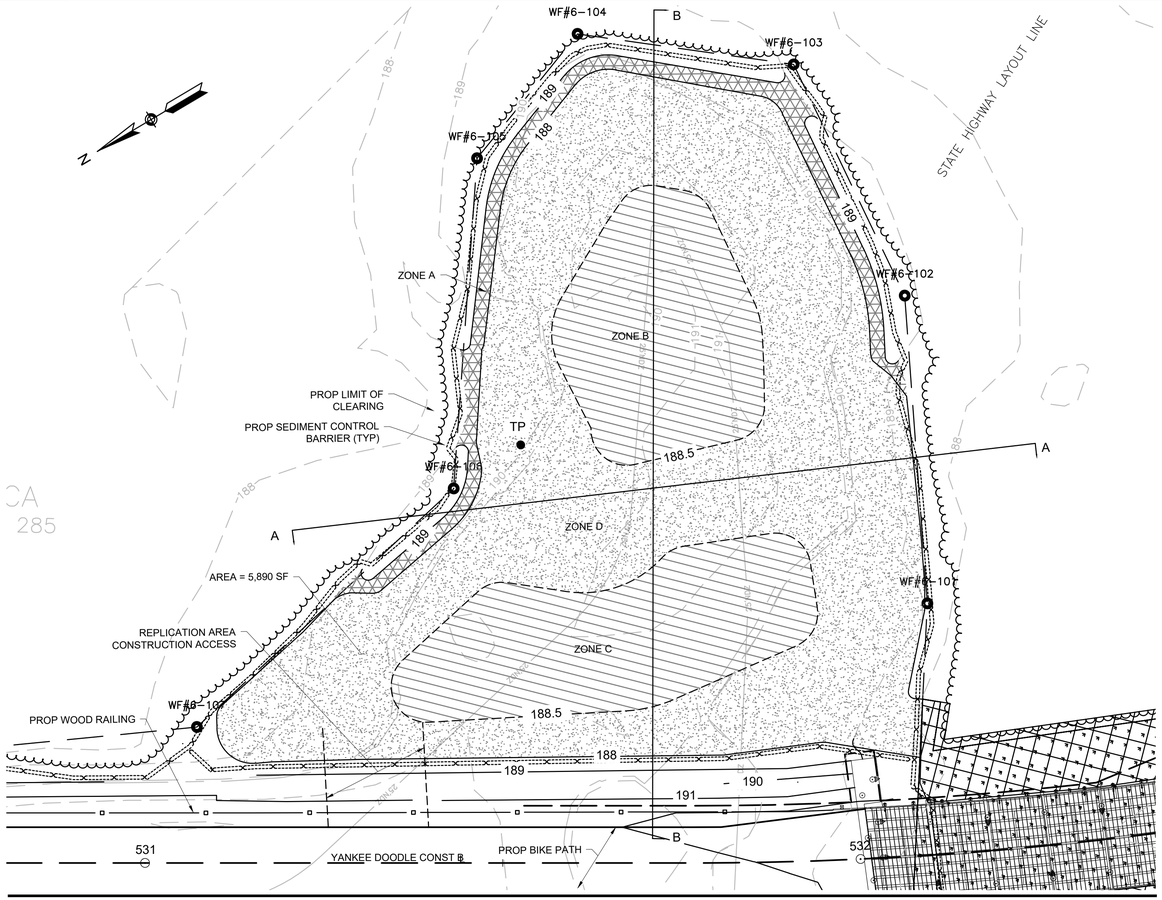
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	97	231
PROJECT FILE NO.	608227		

TEMPORARY TRAFFIC CONTROL PLANS

608227HD (ROUTE 3 RESTORATION PLANS).DWG Plotted on 23-Jul-2025 1:31 PM

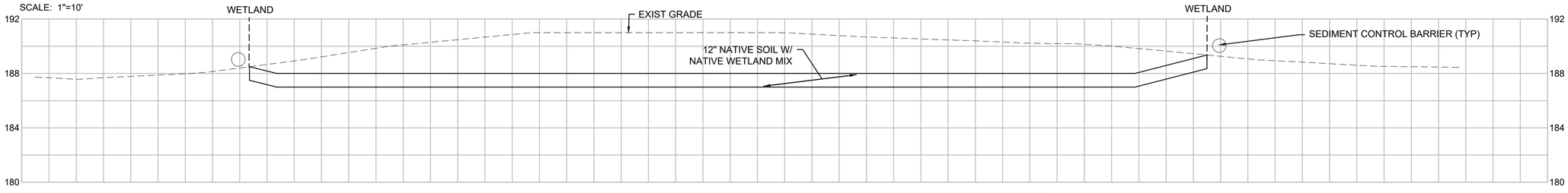






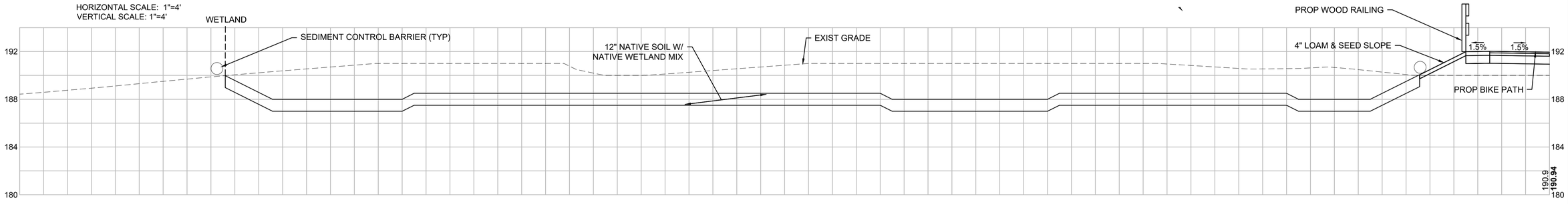
WETLAND REPLICATION AREA PLAN LOCATION 1

SCALE: 1"=10'



WETLAND REPLICATION CROSS SECTION A-A

HORIZONTAL SCALE: 1"=4'
VERTICAL SCALE: 1"=4'



WETLAND REPLICATION CROSS SECTION B-B

HORIZONTAL SCALE: 1"=4'
VERTICAL SCALE: 1"=4'

SEE SHEET 101 FOR WETLAND 6 PLANT SCHEDULE

NOTES:

1. SEE SPECIAL PROVISIONS UNDER ITEM 755.35 INLAND WETLAND REPLICATION AREA.
2. THE REPLACEMENT AREA SHALL BE EXCAVATED TO THE FINISHED GRADE SHOWN ON THE PLAN. A BARRIER OF COMPOST FILTER TUBES AS SHOWN ON THE DRAWINGS SHALL SEPARATE ANY WETLAND RESOURCE AREA ADJACENT TO THE REPLACEMENT AREA FROM THE REPLACEMENT AREA.
3. ALL SOIL WITHIN THE TOP 12 INCHES OF THE PROPOSED REPLACEMENT AREA SURFACE SHALL BE INSPECTED FOR RUBBLE; IF RUBBLE IS FOUND, IT SHALL BE REMOVED FROM THE TOPSOIL. IF THE SOIL IS BEYOND USABLE QUALITY AS DETERMINED BY THE WETLAND SCIENTIST, IT SHALL BE DISPOSED OF.
4. ORGANIC COMPOST SOIL SHALL BE INCORPORATED INTO THE TOP 12 INCHES OF EXISTING SUBSOIL AT A RATE OF 1 PART COMPOST TO 3 PARTS EXISTING SOIL. THE REPLICATION AREA SHALL BE GRADED TO BE AT A GRADE COMPATIBLE WITH THE ADJACENT WETLAND. ANY EXCAVATED HYDRIC SOILS FROM THE WETLAND REPLACEMENT AREA SHALL BE ASSUMED TO CONTAIN SEED OR RHIZOMES OF INVASIVE PLANT SPECIES AND WILL BE REMOVED FROM THE SITE AND NOT USED IN THE WETLAND REPLACEMENT AREA.
5. THE GRADING AND OPERATION REQUIRED TO INCORPORATE THE COMPOST SOIL TO CREATE A WETLAND SOIL MIXTURE SHALL BE PERFORMED IN A MANNER TO MINIMIZE TRAVEL AND SUBSEQUENT COMPACTION OF THE PREPARED SOIL.
6. ALL PLANTING WILL BE PERFORMED IN THE SPRING (4-15 TO 6-15) OR FALL (9-1 TO 10-15).
7. ALL PLANT MATERIAL SHALL BE HEALTHY, FREE OF DISEASE AND PESTS AND CONTAIN A WELL DEVELOPED ROOT SYSTEM.
8. ONCE ALL TREES AND SHRUBS HAVE BEEN PLANTED, THE WETLAND AREA WILL BE SEEDED WITH A HERBACEOUS NATIVE NEW ENGLAND WETLAND SEED MIX. SEE SPECIFICATIONS FOR SEED RATES. HYDROSEEDING MAY BE USED.
9. A HERBACEOUS EROSION CONTROL / RESTORATION SEED MIXTURE FOR WET SITES SHALL BE APPLIED TO THE SIDE SLOPES AS SPECIFIED IN THE SPECIAL PROVISIONS. PROPER APPLICATION WILL PERMIT THE GROUNDCOVER TO GERMINATE AND GROW IN AND BENEATH THE LAYER. EROSION AND SEDIMENTATION CONTROLS SHALL REMAIN IN PLACE UNTIL ALL AREAS ARE STABILIZED.
10. UPON COMPLETION OF THE REPLACEMENT AREA, A COMPOST FILTER TUBE BARRIER SHALL BE PLACED AROUND THE ENTIRE PERIMETER TO PROTECT IT DURING THE REST OF THE CONSTRUCTION.
11. THE FINAL GRADING OF THE WETLAND SOILS SHALL RESULT IN NO BREAKS IN ELEVATION UPON REMOVAL OF SEDIMENTATION BARRIERS.
12. THE SEDIMENTATION BARRIERS SHALL BE REMOVED AT THE COMPLETION OF ALL CONSTRUCTION FOR THE PROJECT. THE GROUND UNDER THE SEDIMENTATION BARRIERS SHALL BE RESEEDED WHEN THE BARRIERS ARE REMOVED.
13. ELEVATION AT THE TEST PIT LOCATION IS ±190.0 FT. REDEXIMORPHIC FEATURES WERE OBSERVED 12" BELOW THE GROUND. MITIGATION AREA IS SET AT ELEVATION 188.0-189.0 FT WITH CONNECTION TO EXISTING 188.0 FT CONTOUR ON WEST CORNER. ADJACENT WETLAND ELEVATION IS ±188-189 FT.
14. THE WETLAND SCIENTIST SHALL OBSERVE THE ROUGH GRADED SURFACE BEFORE PLACING THE 12 INCHES OF WETLAND SOIL AND SHALL DETERMINE IF THE FINAL GRADE ELEVATION IS APPROPRIATE FOR THE WETLAND REPLACEMENT AREA AT OR BELOW THE SEASONAL HIGH GROUNDWATER LEVEL BASED ON REDOXIMORPHIC FEATURES OR PRESENCE OF STANDING WATER.
15. THE REPLACEMENT AREA SURFACE SHALL BE LEFT WITH AN IRREGULAR SURFACE OF MICROTOPOGRAPHY OF UP TO 6 INCHES BETWEEN HIGH POINTS AND LOW POINTS.
16. WOODY DEBRIS CONSISTING OF BRANCHES, LOGS AND STUMPS OF VARYING DEGREES OF DECOMPOSITION SHALL OCCUPY AT LEAST 4 PERCENT OF THE SURFACE AREA. WOODY DEBRIS SHALL BE PLACED PRIOR TO PLANTING AND SEEDING.
17. BILLERICA IS KNOWN FOR INTENSE DEER ACTIVITY AND BROWSING. A TEMPORARY DEER FENCE A MINIMUM OF 7 FEET HIGH SHALL BE INSTALLED AROUND THE REPLACEMENT AREA TO EXCLUDE DEER AND PROTECT THE PLANTED TREES AND SHRUBS FROM BROWSING.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	98	231
PROJECT FILE NO.	608227		

ENVIRONMENTAL MITIGATION PLANS
WETLAND REPLICATION PLAN

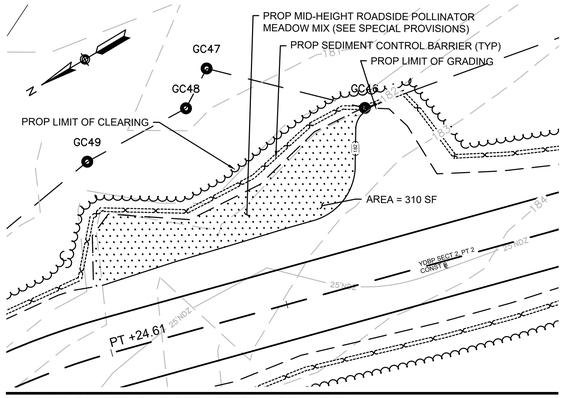
608227HD (WETLAND)-1.DWG Plotted on 23-Jul-2025 1:38 PM

BILLERICA
YANKEE DOODLE BIKE PATH

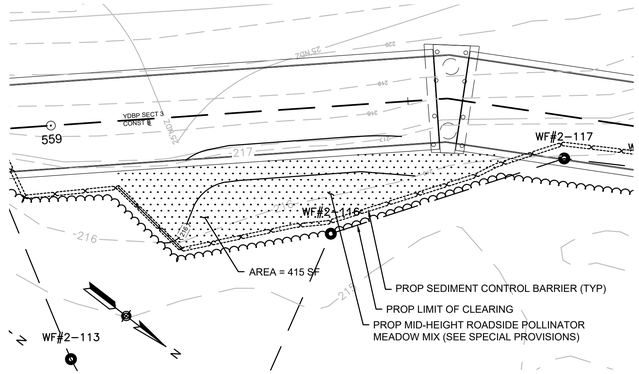
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	99	231
PROJECT FILE NO.	608227		

ENVIRONMENTAL MITIGATION PLANS
BLSF COMPENSATORY STORAGE PLAN

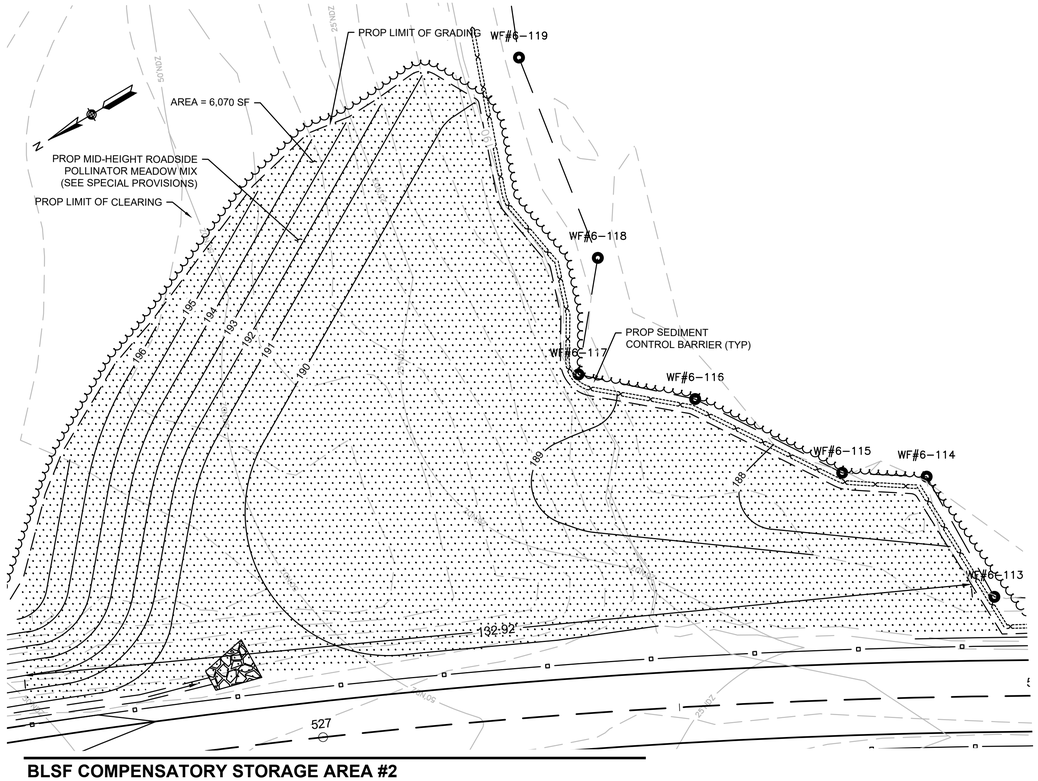
608227HD (WETLAND)-1.DWG Plotted on 23-Jul-2025 1:39 PM



BLSF COMPENSATORY STORAGE AREA #1
SCALE: 1"=10'



BLSF COMPENSATORY STORAGE AREA #3
SCALE: 1"=10'



BLSF COMPENSATORY STORAGE AREA #2
SCALE: 1"=10'

LEGEND:

LIMIT OF COMPENSATORY STORAGE AREA PLANTINGS AND SEED MIXTURE

SEE SHEET 101 FOR FLOODPLAIN STORAGE AREA PLANT SCHEDULE

NOTES:

1. THE COMPENSATORY FLOODPLAIN STORAGE AREAS SHALL BE EXCAVATED TO THE FINISHED GRADE SHOWN ON THE PLAN. A BARRIER OF COMPOST FILTER TUBES, AS SHOWN ON THE DRAWINGS, SHALL SEPARATE ANY WETLAND RESOURCE AREA ADJACENT TO THE COMPENSATORY STORAGE AREAS.
2. ALL PLANTING WILL BE PERFORMED IN THE SPRING (4-15 TO 6-15) OR FALL (9-1 TO 10-15).
3. ALL PLANT MATERIAL SHALL BE HEALTHY, FREE OF DISEASE AND PESTS AND CONTAIN A WELL-DEVELOPED ROOT SYSTEM.
4. ONCE ALL TREES AND SHRUBS HAVE BEEN PLANTED, THE COMPENSATORY STORAGE AREA WILL BE SEEDED WITH A MID-HEIGHT POLLINATOR UPLAND SEED MIX.
5. THE SEDIMENTATION BARRIERS SHALL BE REMOVED AT THE COMPLETION OF ALL CONSTRUCTION FOR THE PROJECT. THE GROUND UNDER THE SEDIMENTATION BARRIERS SHALL BE RESEEDED WHEN THE BARRIERS ARE REMOVED.
6. BILLERICA IS KNOWN FOR INTENSE DEER ACTIVITY AND BROWSING. A TEMPORARY DEER FENCE A MINIMUM OF 7 FEET HIGH SHALL BE INSTALLED AROUND THE REPLACEMENT AREA TO EXCLUDE DEER AND PROTECT THE PLANTED TREES AND SHRUBS FROM BROWSING.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	100	231
PROJECT FILE NO.	608227		

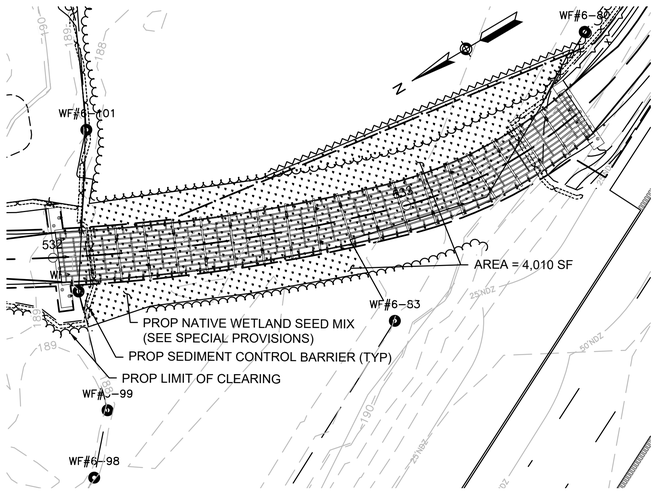
ENVIRONMENTAL MITIGATION PLANS
BLSF COMPENSATORY STORAGE PLAN

608227HD (WETLAND)-1.DWG Plotted on 23-Jul-2025 1:40 PM

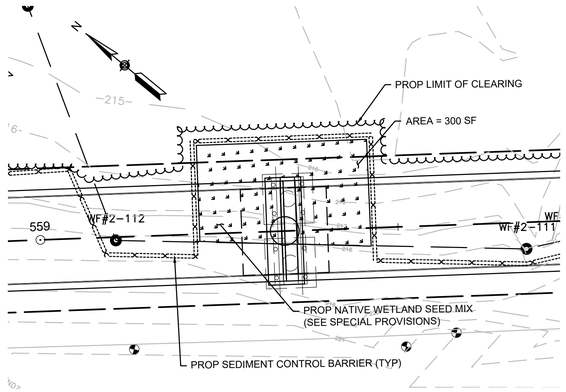
LEGEND:

WETLAND RESTORATION AREA
PLANTINGS AND SEED MIXTURE

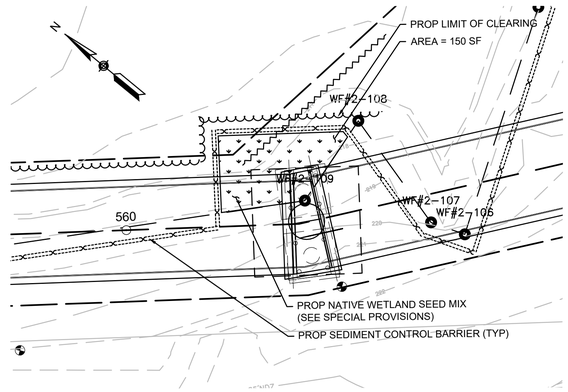
SEE SHEET 101 FOR WETLAND REPLICATION AREA PLANT SCHEDULE



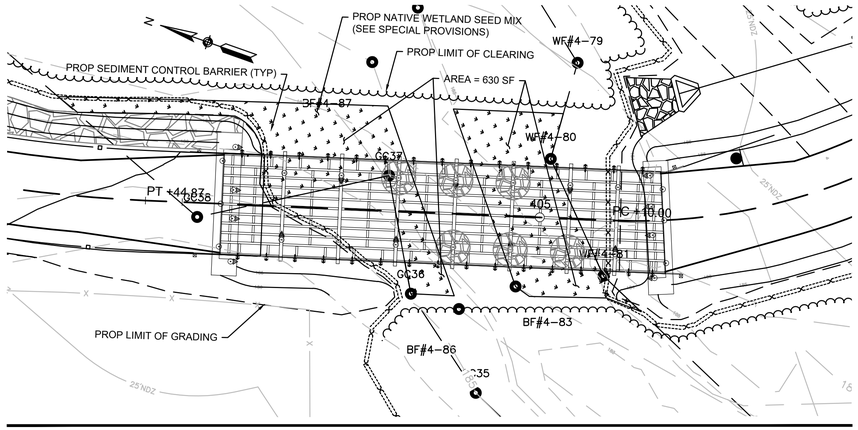
TEMPORARY WETLAND RESTORATION - STA 532+05 TO STA 533+70
SCALE: 1"=20'



TEMPORARY WETLAND RESTORATION - STA 559+35
SCALE: 1"=10'



TEMPORARY WETLAND RESTORATION - STA 560+20
SCALE: 1"=10'



TEMPORARY WETLAND RESTORATION - STA 404+30 TO 405+10
SCALE: 1"=10'

NOTES:

1.SEE SPECIAL PROVISIONS UNDER ITEM 755.45 WETLAND RESTORATION.

2.FILL AND TEMPORARY SEPARATION FABRIC OR MATS SHALL BE REMOVED AND DISPOSED OF AS SPECIFIED UNDER THE RESPECTIVE ITEMS.

3.A BARRIER OF COMPOST FILTER TUBES AS SHOWN ON THE DRAWINGS SHALL SEPARATE ANY WETLAND RESOURCE AREA ADJACENT TO THE RESTORATION AREA.

4. GRADES SHALL BE RESTORED TO PRE-CONSTRUCTION ELEVATIONS AS SHOWN IN THE BASELINE SURVEY OR AS REQUIRED BY THE ENGINEER AND WETLAND SPECIALIST TO RESTORE HYDROLOGIC FUNCTIONS. FINAL ELEVATIONS SHALL BE APPROVED BY THE ENGINEER PRIOR TO SOIL PREPARATION AND SEEDING.

5. FOLLOWING APPROVAL OF GRADING TO ELEVATIONS REQUIRED, SOIL SHALL BE PREPARED AND SEEDED. COMPACTED SOIL SHALL BE SCARIFIED WITH EQUIPMENT APPROVED BY THE ENGINEER AND SEEDING SHALL IMMEDIATELY FOLLOW SOIL PREPARATION.

6. SEEDING SHALL BE HAND BROADCAST WITH STRAW MULCH APPLIED PER THE STANDARD SPECIFICATIONS AND PER THE MANUFACTURER'S DIRECTIONS. HYDROMULCH SHALL BE STRAW OR WOOD FIBER ONLY AND SHALL BE PER THE MANUFACTURER'S RECOMMENDATIONS.

7. PLANTINGS SHALL BE INCLUDED WITHIN THE RESTORATION AREAS AS INDICATED IN THE PLANTING SCHEDULE ON SHEET 101. REPLICATION AREAS DIRECTLY UNDER BRIDGES ARE ONLY INTENDED TO BE SEEDED AS NOTED ABOVE.

8, PLANTING WITHIN THE RESTORATION AREAS SHALL BE PERFORMED IN THE SPRING (4-15 TO 6-15) OR FALL (9-1 TO 10-15). ALL PLANT MATERIAL SHALL BE HEALTHY, FREE OF DISEASE AND PESTS AND CONTAIN A WELL DEVELOPED ROOT SYSTEM.

9. UPON COMPLETION OF THE RESTORATION AREA, A COMPOST FILTER TUBE BARRIER SHALL BE PLACED AROUND THE ENTIRE PERIMETER TO PROTECT IT DURING THE REST OF THE CONSTRUCTION.

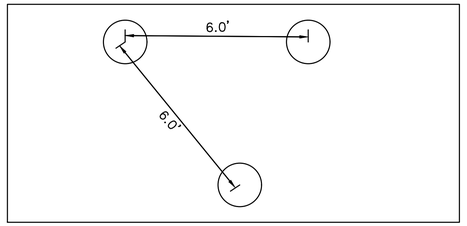
10. THE SEDIMENTATION BARRIERS SHALL BE REMOVED AT THE COMPLETION OF ALL CONSTRUCTION FOR THE PROJECT. THE GROUND UNDER THE SEDIMENTATION BARRIERS SHALL BE RESEEDED WHEN THE BARRIERS ARE REMOVED.

608227HD (WETLAND)-1.DWG Plotted on 23-Jul-2025 1:40 PM

PLANT SCHEDULE FOR WETLAND MITIGATION AREA (5,890 SQUARE FEET)

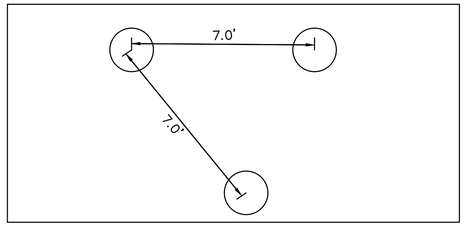
COMMON NAME	SCIENTIFIC NAME	PLANTING ZONE				NUMBER	SIZE
		A	B	C	D		
RED MAPLE	*ACER RUBRUM*	2	3	3	2	10	18" TO 24"
RED MAPLE	*ACER RUBRUM*	2	3	3	2	10	3' TO 4'
SILVER MAPLE	*ACER SACCHARINUM*	5	2	3		10	18" TO 24"
SILVER MAPLE	*ACER SACCHARINUM*	5	2	3		10	3' TO 4'
BLACK GUM	*NYSSA SYLVATICA*		3	5	2	10	18" TO 24"
BLACK GUM	*NYSSA SYLVATICA*		3	5	2	10	3' TO 4'
SWAMP WHITE OAK	*QURCUS BICOLOR*		3	3	4	10	18" TO 24"
SWAMP WHITE OAK	*QURCUS BICOLOR*		3	3	4	10	3' TO 4'
SPECKLED ALDER	*ALNUS INCANA*				7	7	18" TO 24"
SPECKLED ALDER	*ALNUS INCANA*				7	7	3' TO 4'
BUTTONBUSH	*CEPHALANTHUS OCCIDENTALIS*				9	9	18" TO 24"
BUTTONBUSH	*CEPHALANTHUS OCCIDENTALIS*				9	9	3' TO 4'
SWEET PEPPERBUSH	*CLETHRA ALNIFOLIA*	3	2	2		7	18" TO 24"
SWEET PEPPERBUSH	*CLETHRA ALNIFOLIA*	3	2	2		7	3' TO 4'
SILKY DOGWOOD	*SWIDA AMOMUM*	2			7	9	18" TO 24"
SILKY DOGWOOD	*SWIDA AMOMUM*	2			7	9	3' TO 4'
WINTERBERRY	*AMELANCHIER CANADENSIS*				7	7	18" TO 24"
WINTERBERRY	*AMELANCHIER CANADENSIS*				7	7	3' TO 4'
HIGHBUSH BLUEBERRY	*VACCINIUM CORYMBOSUM*				9	9	18" TO 24"
HIGHBUSH BLUEBERRY	*VACCINIUM CORYMBOSUM*				9	9	3' TO 4'
NORTHERN ARROW-WOOD	*VIBURNUM DENTATUM*				9	9	18" TO 24"
NORTHERN ARROW-WOOD	*VIBURNUM DENTATUM*				9	9	3' TO 4'
TOTAL PLANTS		24	26	32	112	194	
WETLAND SEED MIX						3	LB

NOTES:
1. PLANTED AT A RATE OF 1,340 PLANTS PER ACRE
2. INSTALL PLANTS 6 FEET APART IN STAGGERED ROWS
3. SEED ENTIRE AREA WITH NEW ENGLAND WETMIX, OR APPROVED EQUIVALENT (SEE SPECIAL PROVISIONS FOR SEED MIX AND SEEDING RATE)



WETLAND REPLICATION AREA AND WETLAND RESTORATION AREA STAGGERED PLANTING

SCALE: N.T.S.



FLOODPLAIN COMPENSATORY STORAGE AREAS STAGGERED PLANTING

SCALE: N.T.S.

PLANT SCHEDULE FOR FLOODPLAIN COMPENSATORY STORAGE AREAS (6,795 SQUARE FEET)

COMMON NAME	SCIENTIFIC NAME	NUMBER	SIZE
SWEET PEPPERBUSH	*CLETHRA ALNIFOLIA*	27	2' TO 3'
ALTERNATE LEAVED DOGWOOD	*CORNUS ALTERNIFOLIA*	27	2' TO 3'
GRAY DOGWOOD	*CORNUS RACEMOSE*	27	2' TO 3'
AMERICAN HAZELNUT	*CORYLUS AMERICANA*	27	2' TO 3'
STAGHORN SUMAC	*RHUS TYPHINA*	27	2' TO 3'
NANNYBERRY	*VIBURNUM LENTAGO*	27	2' TO 3'
TOTAL PLANTS		162	
MID-HEIGHT POLLINATOR MIX		3	LB.

NOTES:
1. PLANTED AT A RATE OF 1,034 PLANTS PER ACRE
2. INSTALL PLANTS 7 FEET APART IN STAGGERED ROWS
3. SEED ENTIRE AREA WITH MID-HEIGHT POLLINATOR MIX OR APPROVED EQUIVALENT (SEE SPECIAL PROVISIONS FOR SEED MIX AND SEEDING RATE)

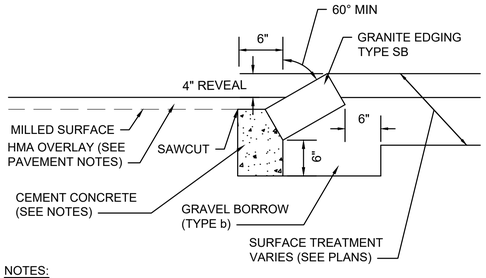
PLANT SCHEDULE FOR TEMPORARY IMPACT WETLAND RESTORATION AREAS (5,090 SQUARE FEET[1])

COMMON NAME	SCIENTIFIC NAME	NUMBER	SIZE
SPICEBUSH	*LINDERA BENZOIN*	15	18" TO 24"
SPICEBUSH	*LINDERA BENZOIN*	16	3' TO 4'
SILKY DOGWOOD	*SWIDA AMOMUM*	15	18" TO 24"
SILKY DOGWOOD	*SWIDA AMOMUM*	16	3' TO 4'
WINTERBERRY	*AMELANCHIER CANADENSIS*	15	18" TO 24"
WINTERBERRY	*AMELANCHIER CANADENSIS*	16	3' TO 4'
HIGHBUSH BLUEBERRY	*VACCINIUM CORYMBOSUM*	15	18" TO 24"
HIGHBUSH BLUEBERRY	*VACCINIUM CORYMBOSUM*	16	3' TO 4'
NORTHERN ARROW-WOOD	*VIBURNUM DENTATUM*	15	18" TO 24"
NORTHERN ARROW-WOOD	*VIBURNUM DENTATUM*	16	3' TO 4'
TOTAL PLANTS		155	
WETLAND SEED MIX		2.5	LB.

[1] APPLIES TO LARGER WETLAND RESTORATION AREAS, AS SHOWN ON SHEET 100

NOTES:
1. PLANTED AT A RATE OF 1,340 PLANTS PER ACRE
2. INSTALL PLANTS 6 FEET APART IN STAGGERED ROWS
3. SEED ENTIRE AREA WITH NEW ENGLAND WETMIX MIX, OR APPROVED EQUIVALENT (SEE SPECIAL PROVISIONS FOR SEED MIX AND SEEDING RATE)

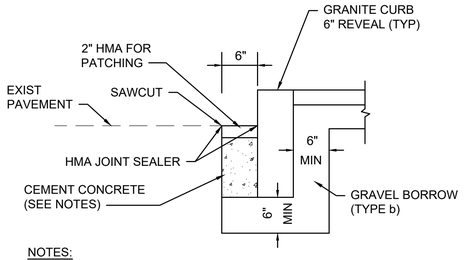
608227HD (DET).DWG Plotted on 23-Jul-2025 1:42 PM



NOTES:
1. CONCRETE SHALL BE IN PRICE BID FOR GRANITE EDGING
2. SAWCUT 6" FROM CURB LINE AND REMOVE EXISTING PAVEMENT AND GRAVEL. REPLACE WITH CEMENT CONCRETE.
3. ANY DESIGNATED CEMENT CONCRETE THAT IS ACCEPTABLE UNDER SECTION M4 OF THE STANDARD SPECIFICATIONS MAY BE USED. ALL TEST REQUIREMENTS ARE WAIVED. HOT MIX ASPHALT SHALL NOT BE USED AS A SUBSTITUTE.
3. THE REVEAL IS TO BE A MAXIMUM OF 4" UNDER ALL CONDITIONS, THE ANGLE IS TO BE A MINIMUM OF 60° FROM VERTICAL UNDER ALL CONDITIONS.
4. SEE STANDARD DETAIL 510.0.1 FOR ADDITIONAL INFORMATION.

GRANITE EDGING IN EXISTING PAVEMENT - WITH OVERLAY

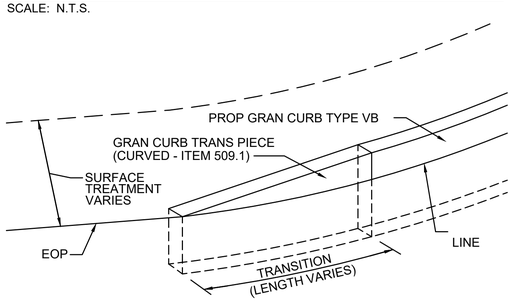
SCALE: N.T.S.

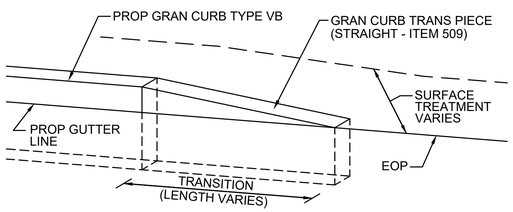


NOTES:
1. CONCRETE SHALL BE INCLUDED IN PRICE BID FOR GRANITE CURB.
2. SAWCUT 6" FROM CURB LINE AND REMOVE EXISTING PAVEMENT AND GRAVEL. REPLACE WITH CEMENT CONCRETE.
3. ANY DESIGNATED CEMENT CONCRETE THAT IS ACCEPTABLE UNDER SECTION M4 OF THE STANDARD SPECIFICATIONS MAY BE USED. ALL TEST REQUIREMENTS ARE WAIVED. HOT MIX ASPHALT SHALL NOT BE USED AS A SUBSTITUTE.

GRANITE CURB IN EXISTING PAVEMENT

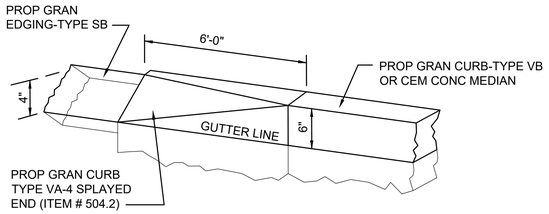
SCALE: N.T.S.





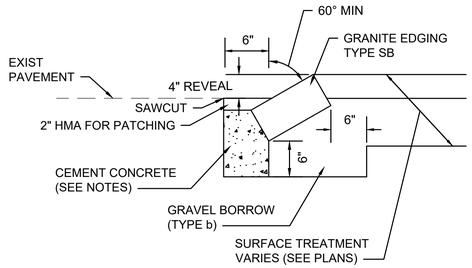
GRANITE CURB TRANSITION PIECE

SCALE: NTS



SPLAYED END (TRANSITION FROM CURB TO EDGING)

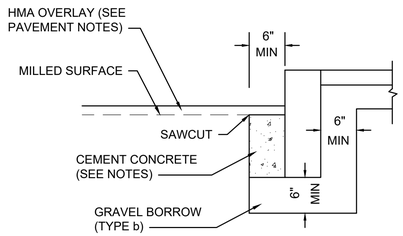
SCALE: NTS



NOTES:
1. CONCRETE SHALL BE IN PRICE BID FOR GRANITE EDGING
2. SAWCUT 6" FROM CURB LINE AND REMOVE EXISTING PAVEMENT AND GRAVEL. REPLACE WITH CEMENT CONCRETE.
3. ANY DESIGNATED CEMENT CONCRETE THAT IS ACCEPTABLE UNDER SECTION M4 OF THE STANDARD SPECIFICATIONS MAY BE USED. ALL TEST REQUIREMENTS ARE WAIVED. HOT MIX ASPHALT SHALL NOT BE USED AS A SUBSTITUTE.
3. THE REVEAL IS TO BE A MAXIMUM OF 4" UNDER ALL CONDITIONS, THE ANGLE IS TO BE A MINIMUM OF 60° FROM VERTICAL UNDER ALL CONDITIONS.
4. SEE STANDARD DETAIL 510.0.1 FOR ADDITIONAL INFORMATION.

GRANITE EDGING IN EXISTING PAVEMENT

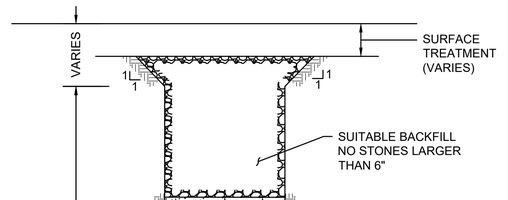
SCALE: N.T.S.



NOTES:
1. CONCRETE SHALL BE INCLUDED IN PRICE BID FOR GRANITE CURB.
2. ANY DESIGNATED CEMENT CONCRETE THAT IS ACCEPTABLE UNDER SECTION M4 OF THE STANDARD SPECIFICATIONS MAY BE USED. ALL TEST REQUIREMENTS ARE WAIVED. HOT MIX ASPHALT SHALL NOT BE USED AS A SUBSTITUTE.

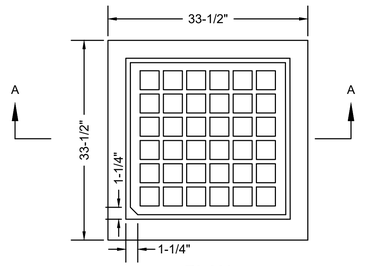
GRANITE CURB IN EXISTING PAVEMENT - WITH OVERLAY

SCALE: N.T.S.

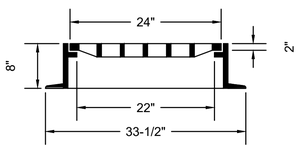


TRENCH DETAIL

SCALE: N.T.S.



PLAN

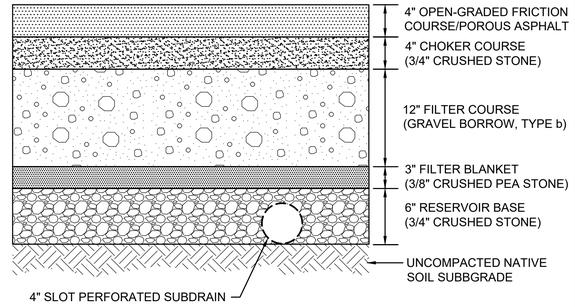


SECTION

NOTES:
1. FRAME AND GRATE SHALL BE RATED FOR HS-20 LOADING.
2. MIN FRAME WEIGHT:
   4 FLANGE 295 LBS.
   3 FLANGE 265 LBS.
3. USE 3 FLANGE FRAMES AT CURB INLETS.

MUNICIPAL STANDARD CATCH BASIN FRAME & GRATE

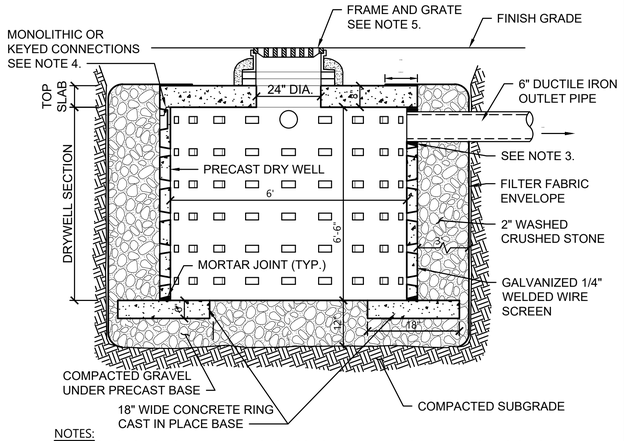
SCALE: N.T.S.



NOTES:
1. SEE PAVEMENT NOTES ON SHEET 8 FOR ADDITIONAL PAVEMENT MATERIAL INFORMATION.
2. SEE PLANS FOR SUBDRAIN LOCATIONS AND SPACING.

PERMEABLE PAVEMENT

SCALE: N.T.S.

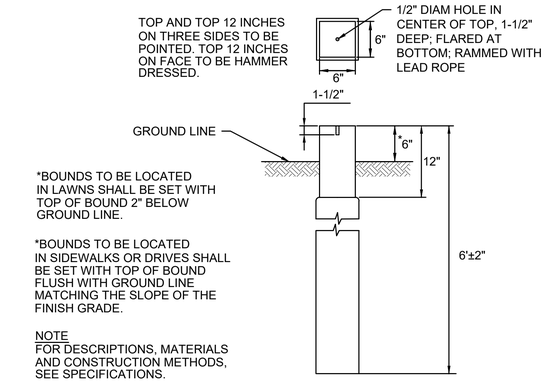


NOTES:
1. BASE SECTION SHALL BE PRECAST CONCRETE WITH MORTARED JOINTS OR C.I.P.
2. ALL COMPONENTS SHALL BE DESIGNED FOR HS-20 LOADING.
3. PROVIDE PRECAST OPENINGS FOR PIPES WITH 2" MAX. CLEARANCE TO OUTSIDE OF PIPE. MORTAR ALL PIPE CONNECTIONS.
4. JOINT SEALANT BETWEEN PRECAST SECTIONS SHALL BE PREFORMED BUTYL RUBBER.
5. FRAME AND GRATE SHALL BE SET IN FULL MORTAR BED. ADJUST TO GRADE WITH CLAY BRICK AND MORTAR (5 BRICK COURSE MAXIMUM)
6. PERIMETER OF STRUCTURE TO BE WRAPPED WITH GALVANIZED $\frac{1}{4}$" WELDED WIRE SCREEN TO PREVENT OPENINGS FROM BEING PLUGGED.
7. GEOTEXTILE FILTER FABRIC SHALL BE USED TO ENCLOSE THE CRUSHED STONE AND PROVIDE SEPARATION. FILTER FABRIC SHALL NOT BE INSTALLED ALONG THE BASE OF THE STRUCTURE.

LEACHING BASIN

SCALE: N.T.S.

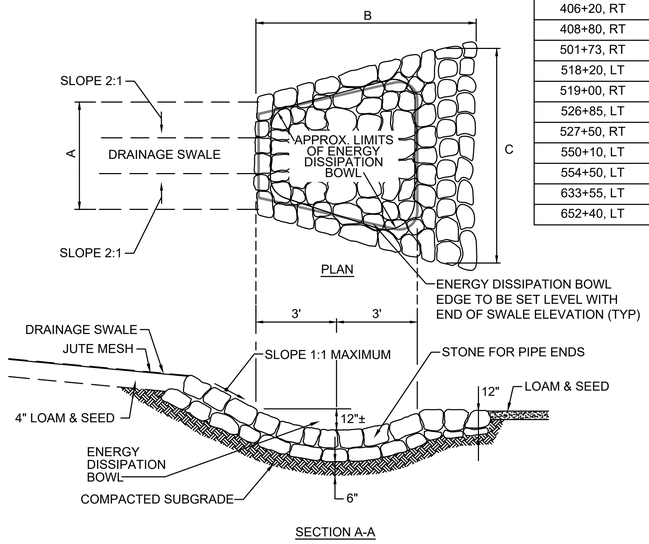
608227HD (DET).DWG Plotted on 23-Jul-2025 1:42 PM



GRANITE BOUND

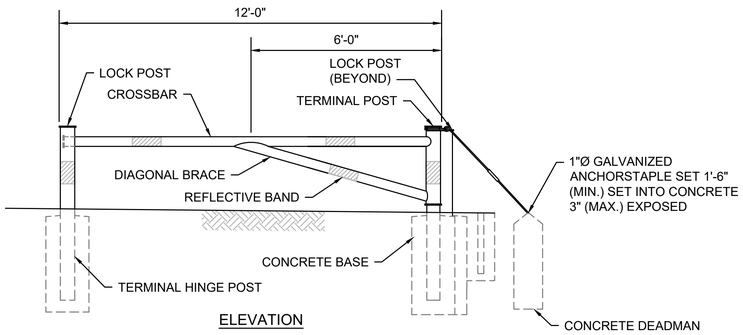
SCALE: NTS

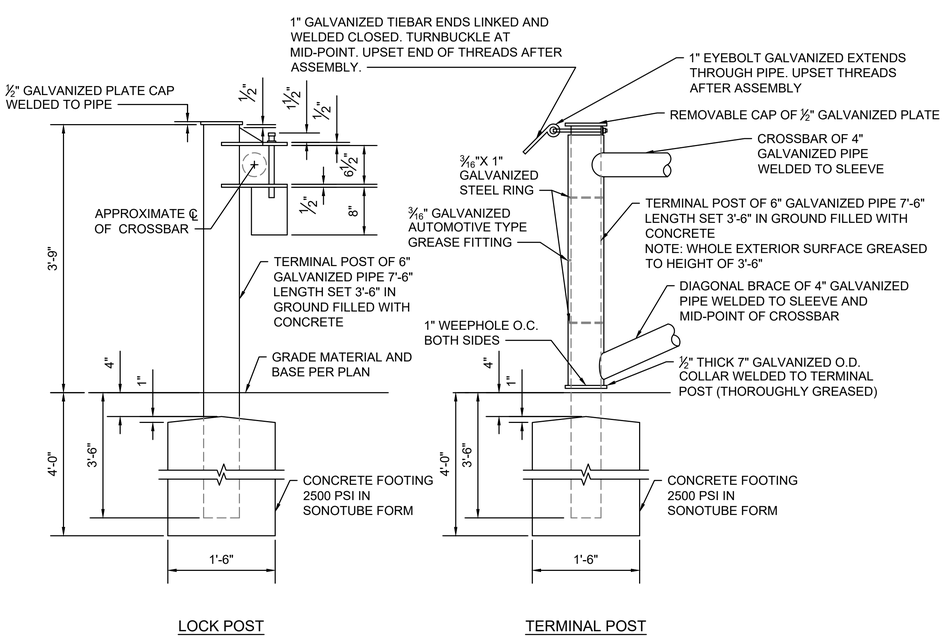
STONE PROTECTION AT SWALE END SIZING CHART			
STATION	A	B	C
405+70, LT	3'-0"	7'-0"	6'-6"
406+20, RT	3'-0"	9'-0"	10'-0"
408+80, RT	3'-0"	7'-0"	6'-0"
501+73, RT	3'-0"	6'-0"	7'-0"
518+20, LT	3'-0"	6'-6"	6'-0"
519+00, RT	3'-0"	6'-6"	6'-0"
526+85, LT	3'-0"	6'-6"	6'-0"
527+50, RT	3'-0"	6'-6"	6'-0"
550+10, LT	3'-0"	8'-0"	9'-0"
554+50, LT	3'-0"	6'-6"	6'-0"
633+55, LT	3'-0"	8'-0"	8'-10"
652+40, LT	3'-0"	6'-6"	6'-0"



STONE PROTECTION AT SWALE END DETAIL

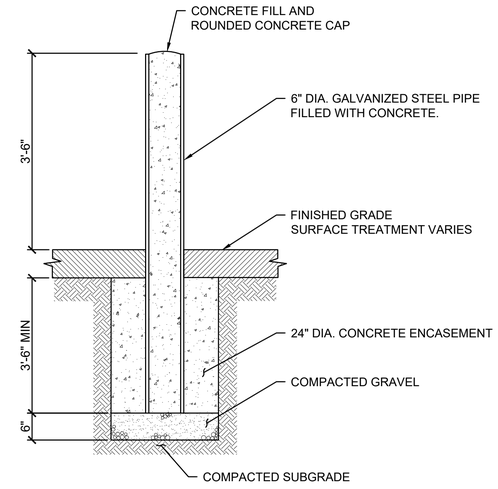
SCALE: NTS





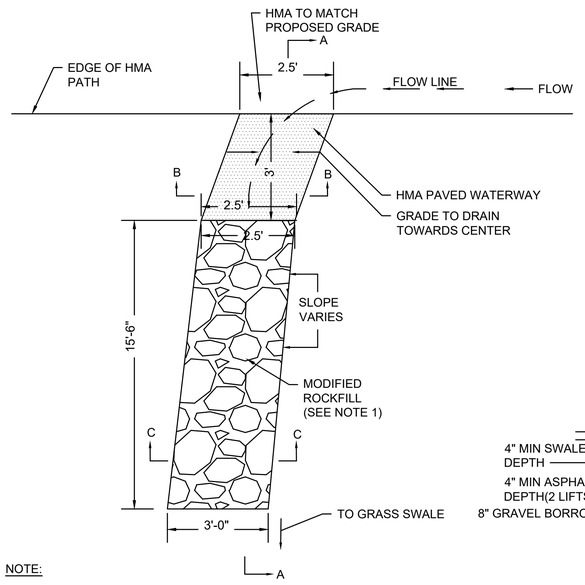
PROP PIPE GATE AND POST DETAILS

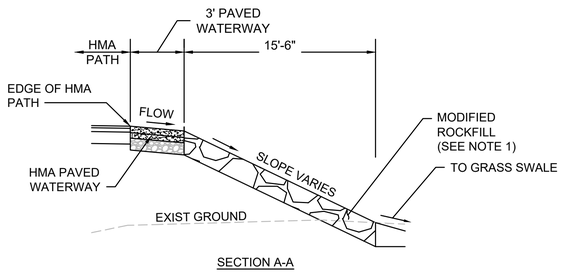
SCALE: N.T.S.

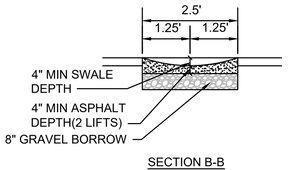


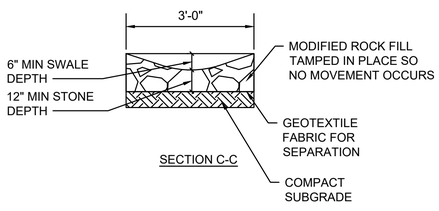
STEEL BOLLARD

SCALE: N.T.S.









NOTE:

1. EACH LARGE STONE SHALL BE CAREFULLY PLACED BY HAND, NORMAL TO THE SLOPE AND FIRMLY BEDDED THEREON. THE SMALLER STONES SHALL BE SO GRADED THAT WHEN PLACED WITH THE LARGER STONES, THE ENTIRE MASS WILL BE COMPACT WITH A MINIMUM PERCENTAGE OF VOIDS AND MINIMUM THICKNESS OF 12".
2. HMA PAVED WATERWAYSHALL BE 3/8 INCHES MAX NOMINAL AGGREGATE SIZE (SUPERPAVE 9.5 STONE SIZE)

HOT MIX ASPHALT PAVED WATERWAY WITH STONE SLOPE SWALE - STA 556+13 RT

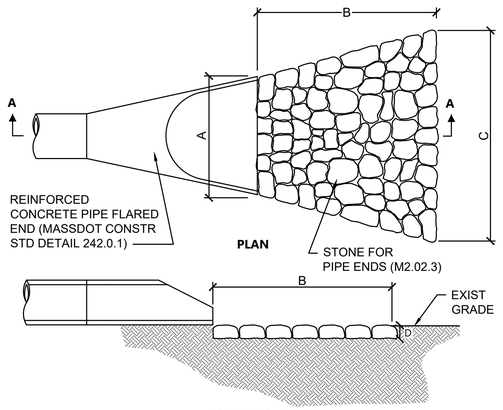
SCALE: N.T.S.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	104	231
PROJECT FILE NO.	608227		

CONSTRUCTION DETAILS

608227HD (DET).DWG Plotted on 23-Jul-2025 1:42 PM



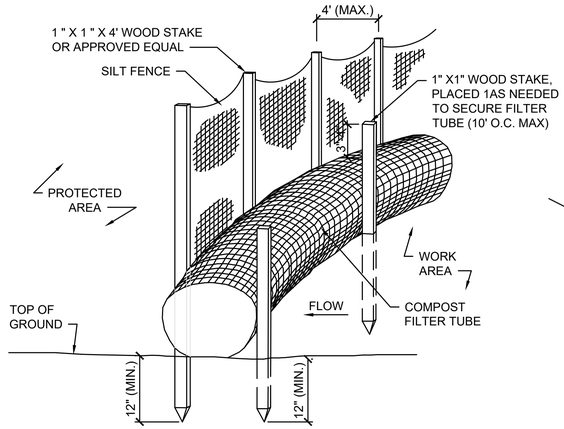
SECTION A-A

STRUCTURE NO.	STATION	A	B	C	D
89	405+20.0, 17.5' LT	4'-7"	6'-0"	8'-6"	1'-6"
17	539+85.6, 18.0 RT	3'-10"	4'-0"	5'-8"	0'-6"
25	549+87.2, 17.9 LT	5'-0"	12'-0"	13'-6"	1'-6"
24	550+23.3, 14.0 RT	5'-0"	12'-0"	13'-6"	1'-6"
29	608+76.7, 19.9 RT	5'-2"	10'-0"	12'-2"	1'-0"

NOTE:
1. SEE MASSDOT CONSTR STD DETAIL 258.0.1 FOR ADDITIONAL INFORMATION.

STONE FOR EROSION CONTROL AT PIPE INLETS AND OUTLETS

SCALE: N.T.S.

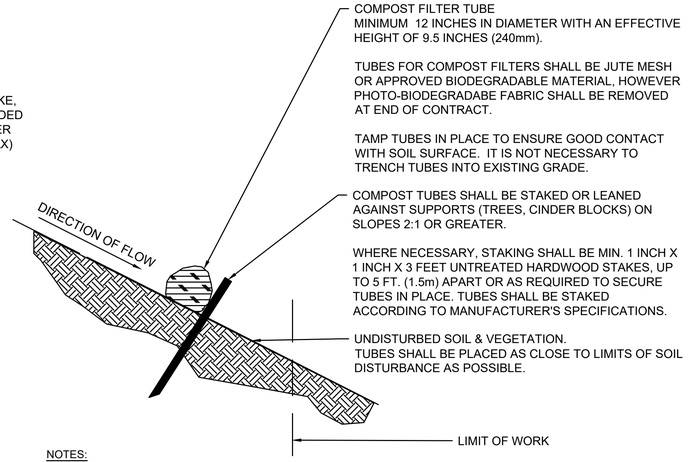


NOTES

1. EROSION CONTROL BARRIER CONSISTING OF COMPOST FILTER TUBES AND SILT FENCE SHALL BE USED IN COMBINATION WHERE PROPOSED WORK IS WITHIN 25' OR LESS OF WETLAND RESOURCE AREA.
2. SEE DETAIL FOR COMPOST FILTER TUBE EROSION CONTROL BARRIER FOR ADDITIONAL INFORMATION

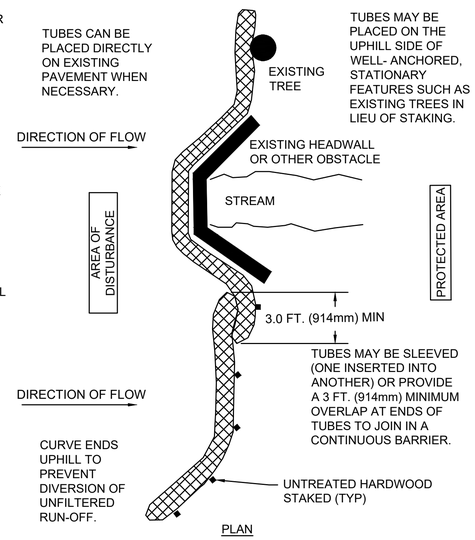
EROSION CONTROL BARRIER - COMPOST FILTER TUBE & SILT FENCE COMBINATION

SCALE: N.T.S.



NOTES:

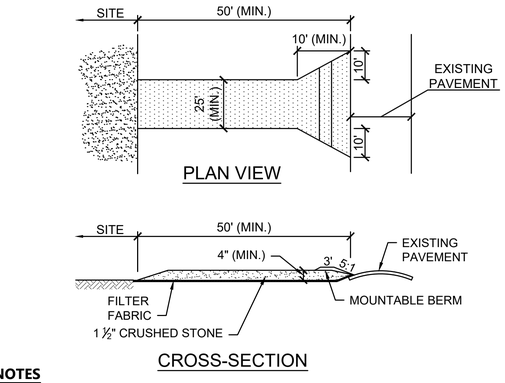
1. PROVIDE A MINIMUM TUBE DIAMETER OF 12 INCHES (300mm) FOR SLOPES UP TO 50 FEET (15.24m) IN LENGTH WITH A SLOPE RATIO OF 3H:1V OR STEEPER. LONGER SLOPES OF 3H:1V MAY REQUIRE LARGER TUBE DIAMETER OR ADDITIONAL COURSING OF FILTER TUBES TO CREATE A FILTER BERM. REFER TO MANUFACTURER'S RECOMMENDATIONS FOR SITUATIONS WITH LONGER OR STEEPER SLOPES.
2. INSTALL TUBES ALONG CONTOURS AND PERPENDICULAR TO SHEET OR CONCENTRATED FLOW.
3. TUBE LOCATION MAY BE SHIFTED TO ADJUST TO LANDSCAPE FEATURES, BUT SHALL PROTECT UNDISTURBED AREA AND VEGETATION TO MAXIMUM EXTENT POSSIBLE.
4. DO NOT INSTALL IN PERENNIAL, EPHEMERAL OR INTERMITTENT STREAMS.
5. ADDITIONAL TUBES SHALL BE USED AT THE DIRECTION OF THE ENGINEER.
6. ADDITIONAL STAKING SHALL BE USED AT THE DIRECTION OF THE ENGINEER.



PLAN

EROSION CONTROL BARRIER - COMPOST FILTER TUBE

SCALE: N.T.S.

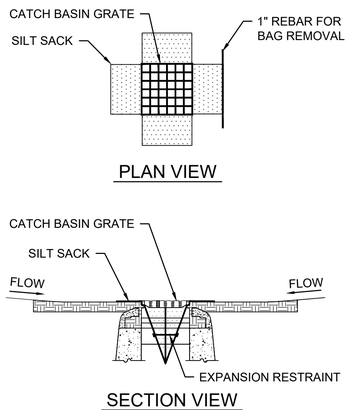


NOTES

1. STABILIZED CONSTRUCTION EXISTS SHALL BE INSTALLED AT CONSTRUCTION SITE ENTRANCE/EXIST ACCESS POINTS.
2. EXIT WIDTH SHALL BE A TWENTY-FIVE (25) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
3. THE EXIT SHALL BE MAINTAINED IN A CONDITION WHICH SHALL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY. BERM SHALL BE PERMITTED. PERIODIC INSPECTION AND MAINTENANCE SHALL BE PROVIDED AS NEEDED.
4. STABILIZED CONSTRUCTION EXIT SHALL BE REMOVED PRIOR TO FINAL FINISH MATERIALS BEING INSTALLED.

STABILIZED CONSTRUCTION EXIT

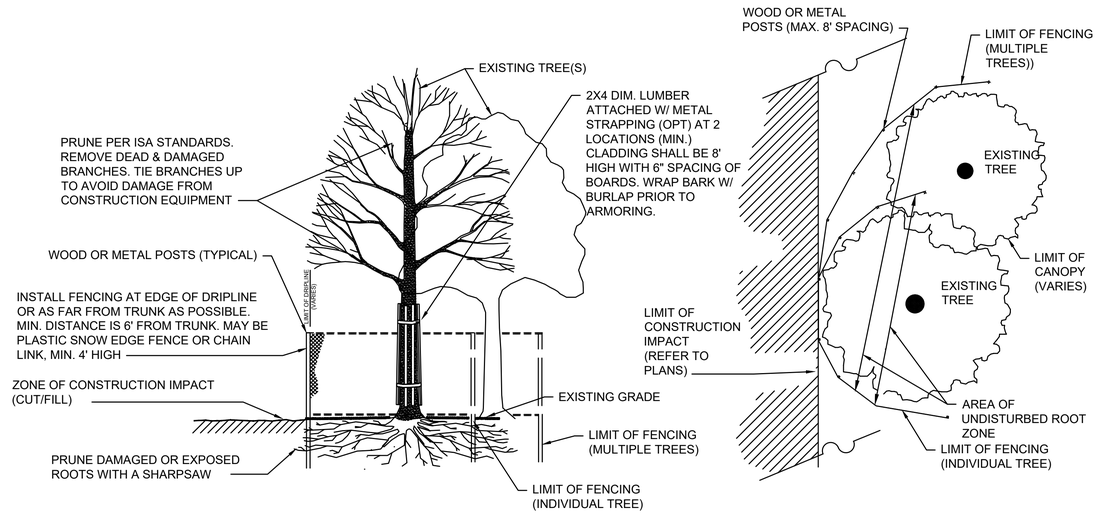
SCALE: N.T.S.



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

INLET PROTECTION - SILT SACK IN CATCH BASIN

SCALE: N.T.S.



PLAN VIEW

TREE PROTECTION OF EXISTING TREE(S)

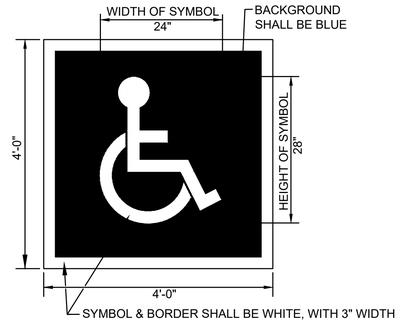
SCALE: N.T.S.

BILLERICA
YANKEE DOODLE BIKE PATH

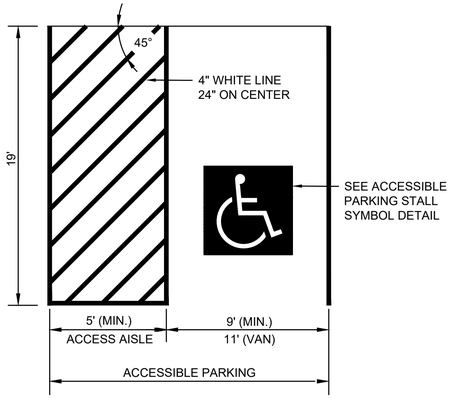
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	105	231
PROJECT FILE NO.	608227		

CONSTRUCTION DETAILS

608227HD (DET).DWG Plotted on 23-Jul-2025 1:42 PM



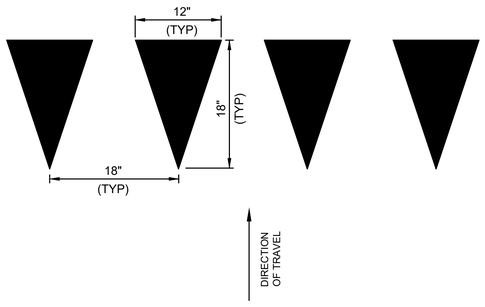
ACCESSIBLE PARKING STALL SYMBOL



NOTES:
1. ALL DIMENSIONS TO EDGES OF 4" PAVEMENT STRIPING.
2. STALL MARKINGS SHALL BE REFLECTORIZED WHITE PAINT.
3. ACCESSIBLE PARKING STALL SYMBOL SHALL BE CENTERED IN THE PARKING STALL AND SHALL BE REFLECTORIZED PREFORMED THERMOPLASTIC.
4. SEE 2004 MUTCD STANDARD HIGHWAY SIGNS MANUAL (APPENDIX, PAGE 10-22) FOR MORE DETAILS.

ACCESSIBLE PARKING STALL PAVEMENT MARKINGS

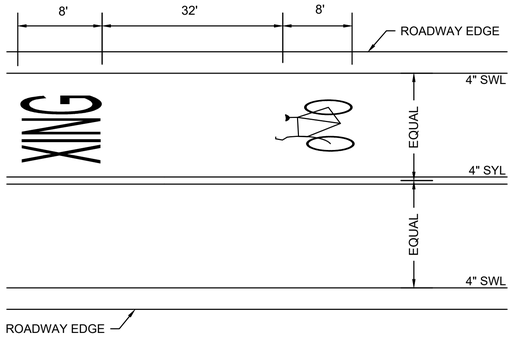
SCALE: N.T.S.



NOTES:
1. YIELD LINES SHALL CONSIST OF A ROW OF SOLID WHITE TRIANGLES.
2. IF APPLICABLE, YIELD LINES SHALL BE PLACED 4-FEET IN ADVANCE OF THE NEAREST CROSSWALK LINE.
3. MARKINGS SHALL BE REFLECTORIZED PREFORMED THERMOPLASTIC.

YIELD LINE TRIANGLES FOR BIKE LANES

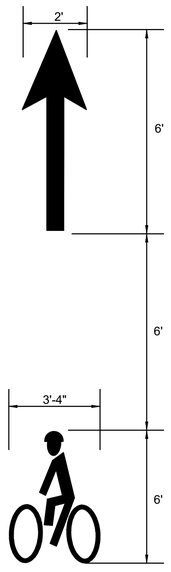
SCALE: NTS



NOTES:
1. PAVEMENT MARKINGS AS PER MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
2. PAVEMENT MARKINGS SHALL BE REFLECTORIZED THERMOPLASTIC.

ROADWAY MARKINGS

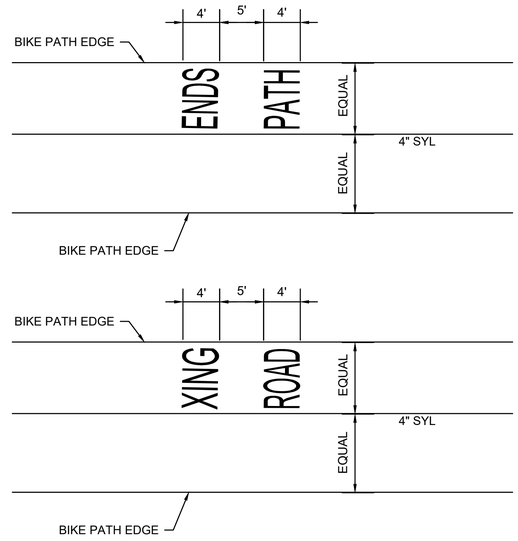
SCALE: N.T.S.



NOTES:
1. SEE MUTCD FIGURE 9C-6 FOR MORE INFORMATION.
2. BIKE LANE MARKINGS SHALL BE REFLECTORIZED PREFORMED THERMOPLASTIC.

BIKE LANE PAVEMENT MARKINGS

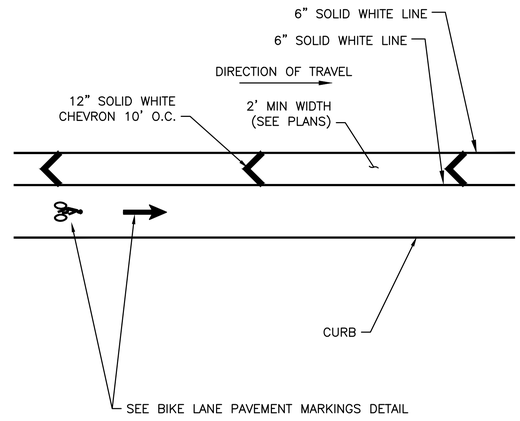
SCALE: N.T.S.



NOTES:
1. PAVEMENT MARKINGS AS PER MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
2. PAVEMENT MARKINGS SHALL BE REFLECTIVE PAINT.

BIKE PATH MARKINGS

SCALE: N.T.S.



SEPARATED BIKE LANE MARKINGS

SCALE: N.T.S.

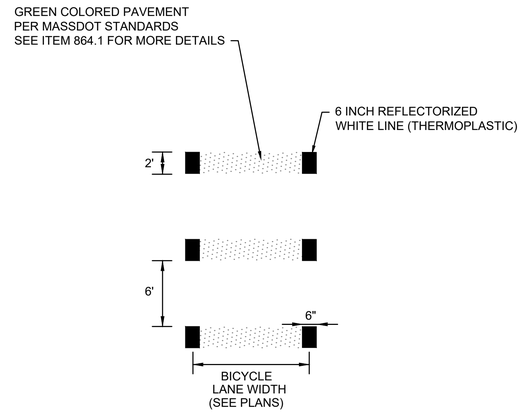


NOTES

1. WETLAND PROTECTION SIGN SHALL BE LOCATED IN ADVANCE OF WETLAND RESOURCE AREAS THAT ARE WITHIN 25' FROM THE PATH. SEE PLANS FOR SPECIFIC LOCATIONS.
2. SEE ADDITIONAL INFORMATION ON THE SIGN SUMMARY SHEET AND THE SPECIAL PROVISIONS.

WETLAND PROTECTION SIGN

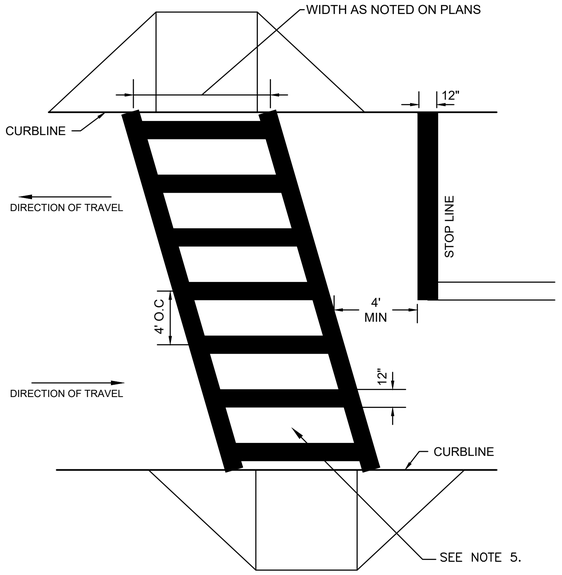
SCALE: NTS



BICYCLE CROSSING

SCALE: N.T.S.

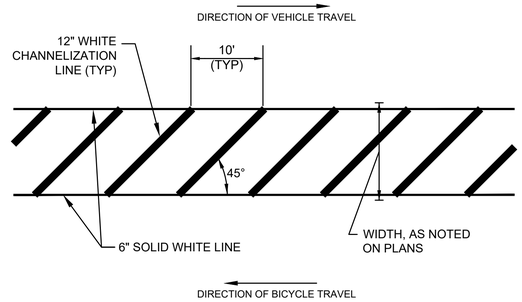
608227HD (DET).DWG Plotted on 23-Jul-2025 1:42 PM



LADDER STYLE CROSSWALK

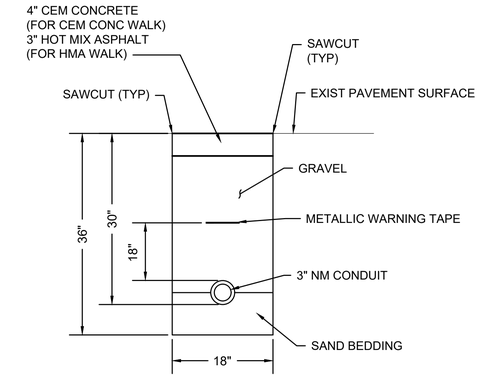
NOTES:
1. ALL EXISTING CROSSWALK MARKINGS SHALL BE FULLY ERADICATED BY APPROVED METHOD PRIOR TO THE APPLICATION OF PROPOSED MARKINGS.
2. ALL 12" THERMOPLASTIC LINES SHALL BE APPLIED IN ONE APPLICATION, NO COMBINATION OF LINES (TWO - 6" LINES) WILL BE ACCEPTED.
3. LAYOUT OF CROSSWALKS SHALL BE ORIENTATED IN THE DIRECTION OF TRAVEL AND LOCATED OUTSIDE OF THE WHEEL PATH OF VEHICLES. LAYOUT SHALL BE APPROVED BY MASSDOT PRIOR TO APPLICATION OF THERMOPLASTIC.
4. ALL CROSSWALKS INSTALLED SHALL CONFORM TO THE RELEVANT PROVISIONS OF THE MASSACHUSETTS HIGHWAY DEPARTMENT "STANDARD SPECIFICATION FOR HIGHWAY AND BRIDGES" DATED 2024, SECTION 860 FOR REFLECTORIZED LINE (THERMO-PLASTIC) & MATERIAL M7.01.03, LATEST REVISIONS.
5. THE CROSSWALK SHALL BE LOCATED SUCH THAT THERE IS A 4' DIAMETER LOWER LANDING AREA IN THE ROADWAY ADJACENT TO THE RAMP OPENING THAT FITS ENTIRELY WITHIN THE LONGITUDINAL LINES OF THE CROSSWALK.
6. ALL PAVEMENT MARKINGS SHALL BE 4' AWAY FROM CROSSWALKS, MEASURED FROM THE OUTER EDGE OF THE MARKING LINES.

CROSSWALKS
SCALE: N.T.S.

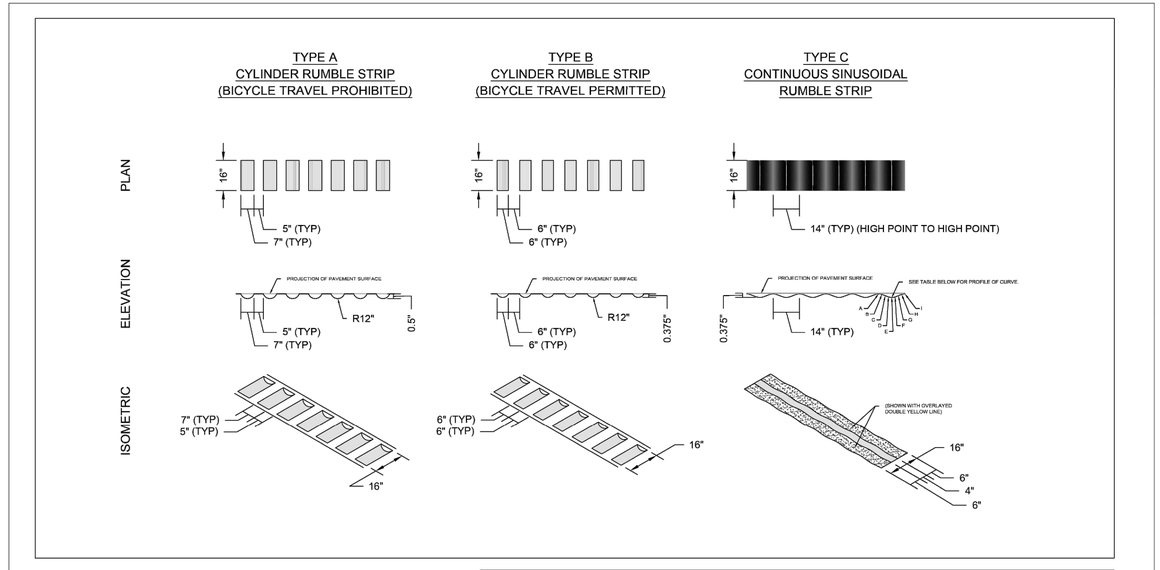


NOTES:
1. ALL 12" LINES SHALL BE APPLIED IN ONE APPLICATION, NO COMBINATION OF LINES (e.g. TWO - 6" LINES) WILL BE ACCEPTED.

CHANNELIZED MARKINGS
SCALE: NTS



CONDUIT IN SIDEWALK
SCALE: N.T.S.

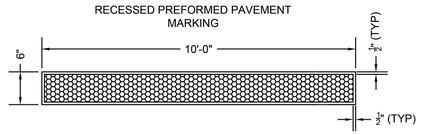


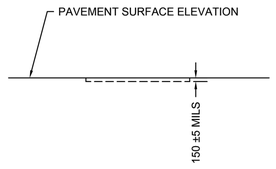
NOTES:
1. NOT TO SCALE. SOME LINE WORK EXAGGERATED FOR CLARITY.
2. SEE PLANS FOR LOCATION(S) AND START AND END STATIONS FOR ALL RUMBLE STRIP INSTALLATIONS.
3. HIGH POINT OF SINUSOIDAL RUMBLE STRIP LOCATED $\frac{1}{16}$" BELOW PAVEMENT SURFACE.

DESIGN OF CURVE PROFILE FOR SINUSOIDAL RUMBLE STRIP									
POINT	A	B	C	D	E	F	G	H	I
DEPTH FROM PAVEMENT SURFACE (IN.)	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{7}{32}$	$\frac{11}{32}$	$\frac{3}{8}$	$\frac{11}{32}$	$\frac{7}{32}$	$\frac{1}{8}$	$\frac{1}{16}$
DISTANCE FROM HIGH POINT "A" (IN.)	0	1.75	3.5	5.25	7	8.75	10.5	12.25	14

massDOT Massachusetts Department of Transportation Highway Division | TRAFFIC & SAFETY STANDARDS SECTION 860 | **RUMBLE STRIP DETAILS** | DATE OF ISSUE 2020 | DRAWING NUMBER XXX.X.XX

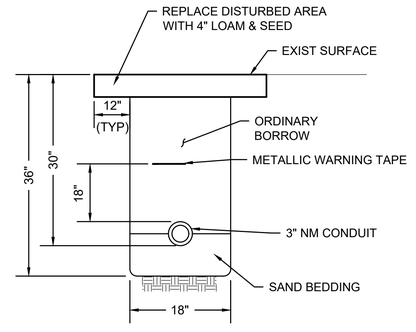
RUMBLE STRIP DETAILS
SCALE: N.T.S.





NOTES:
1. NOT TO SCALE. SOME LINE WORK EXAGGERATED FOR CLARITY.
2. THERE SHALL BE 0.125" OF CLEARANCE BETWEEN THE TOP OF A PAVEMENT MARKER AND THE PAVEMENT SURFACE.
3. GROOVE FOR RECESSED PREFORMED PAVEMENT MARKING SHALL BE 1" $\pm\frac{1}{4}$" LONGER AND 1" $\pm\frac{1}{4}$" THAN THE MARKING.

RECESSED PREFORMED PAVEMENT MARKINGS
SCALE: N.T.S.



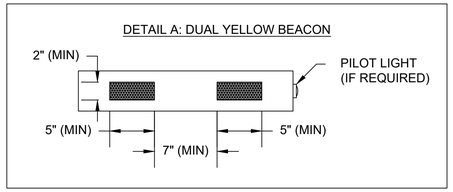
CONDUIT IN GRASS
SCALE: N.T.S.

BILLERICA
YANKEE DOODLE BIKE PATH

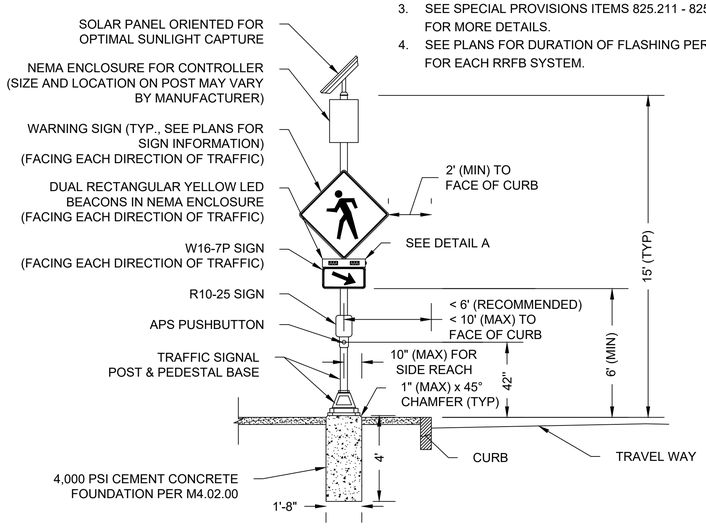
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	107	231
PROJECT FILE NO.	608227		

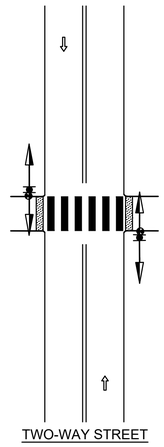
CONSTRUCTION DETAILS

608227HD (DET).DWG Plotted on 23-Jul-2025 1:43 PM



NOTES:
1. CROSSWALK AND ADA/AAB-COMPLIANT RAMPS NOT SHOWN. SEE PLANS FOR LOCATIONS.
2. APS PUSHBUTTONS SHALL BE POSITIONED TO MEET ALL ADA/AAB REQUIREMENTS.
3. SEE SPECIAL PROVISIONS ITEMS 825.211 - 825.214 FOR MORE DETAILS.
4. SEE PLANS FOR DURATION OF FLASHING PERIOD FOR EACH RRFB SYSTEM.





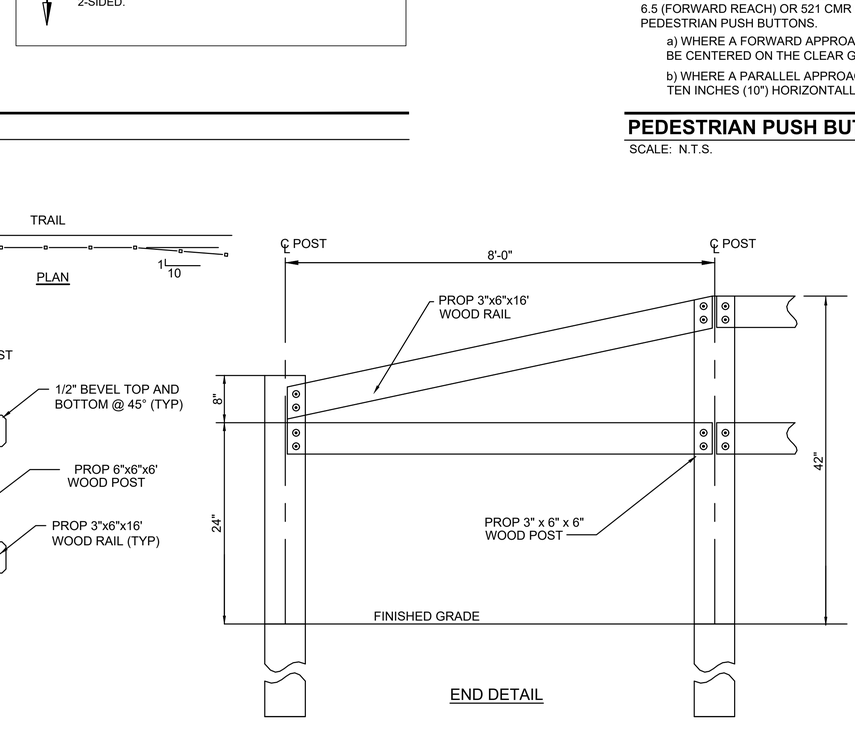
LEGEND

BEACON INSTALLATION FOR TWO DIRECTIONS OF TRAFFIC. BEACON SHALL BE 2-SIDED.

DIRECTION OF TRAFFIC

RECTANGULAR RAPID FLASHING BEACON (SOLAR)

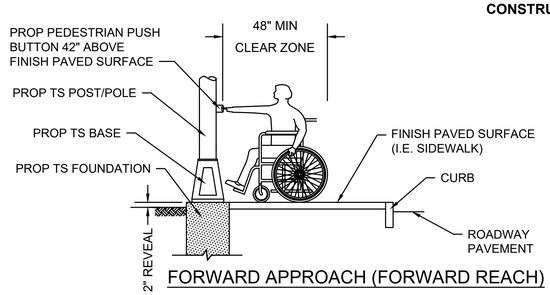
SCALE: NTS



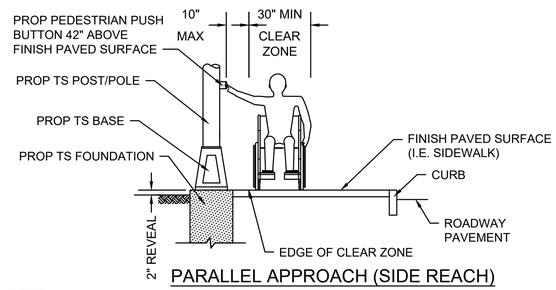
NOTES:
1. POSTS SHALL BE PLACED 8'-0" ON CENTER.
2. THE FACE OF RAIL SHALL BE SET OFF THE EDGE OF SHARED USE PATH PAVEMENT, AS SHOWN ON THE PLANS, AND AS DIRECTED BY THE ENGINEER.
3. ALL HARDWARE SHALL BE GALVANIZED.
4. ALTERNATE JOINTS IN RAILING BETWEEN POSTS
5. WHERE POSTS ARE UNABLE TO BE SET AT REQUIRED DEPTH, POSTS SHALL BE SET IN 4,000 PSI, 1-1/2IN, 565 CEMENT CONCRETE
6. BOLTS SHALL BE SIZED AND INSTALLED SO THAT THEY EXTEND NO MORE THAN ONE ADDITIONAL NUT LENGTH BEYOND THE SECURED SURFACE.
7. SEE BRIDGE PLANS FOR TRANSITIONS AT BRIDGES.

WOOD RAILING DETAIL

SCALE: NTS



FORWARD APPROACH (FORWARD REACH)



PARALLEL APPROACH (SIDE REACH)

NOTE:
A CLEAR GROUND SPACE SHALL CONSIST OF A STABLE AND FIRM AREA, COMPLYING WITH 521 CMR 6.5 (FORWARD REACH) OR 521 CMR 6.6 (SIDE REACH) AND SHALL BE PROVIDED AT EACH OF THE PEDESTRIAN PUSH BUTTONS.

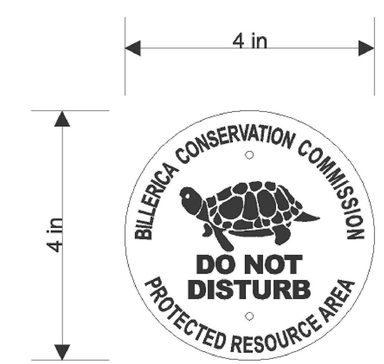
a) WHERE A FORWARD APPROACH IS PROVIDED, PEDESTRIAN PUSH BUTTONS SHALL ABUT AND BE CENTERED ON THE CLEAR GROUND SPACE.

b) WHERE A PARALLEL APPROACH IS PROVIDED, PEDESTRIAN PUSH BUTTONS SHALL BE WITHIN TEN INCHES (10") HORIZONTALLY OF AND CENTERED ON THE CLEAR GROUND SPACE.

PEDESTRIAN PUSH BUTTON CLEAR ZONE

SCALE: N.T.S.

END DETAIL



WOOD RAIL PLACARD

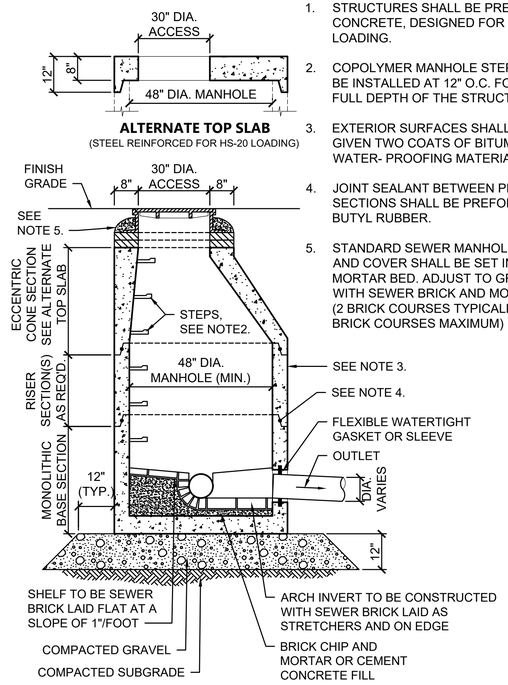
PLACARD NOTES:
1. PLACARDS SHALL BE PLACED ON WOOD RAILINGS WHERE WETLANDS ARE LOCATED WITHIN 25' OF EDGE OF PATH.
2. PLACARD SHALL BE PLACED IN THE CENTER ON TOP RAIL OF WOOD RAILING, SPACED EVERY 100'. SEE SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	108	231
PROJECT FILE NO.	608227		

CONSTRUCTION DETAILS

608227HD (DET).DWG Plotted on 23-Jul-2025 1:43 PM

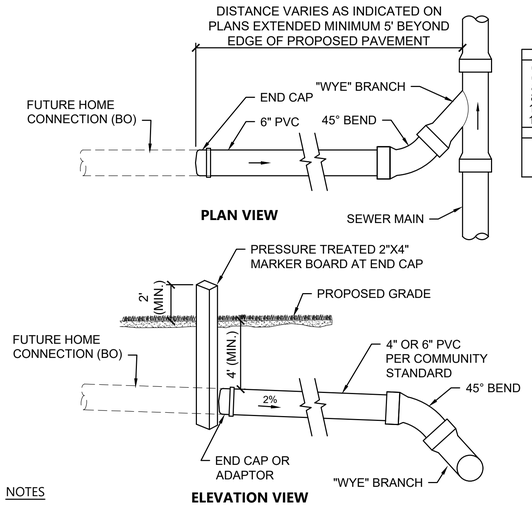


NOTES

1. STRUCTURES SHALL BE PRECAST CONCRETE, DESIGNED FOR HS-20 LOADING.
2. COPOLYMER MANHOLE STEPS SHALL BE INSTALLED AT 12" O.C. FOR THE FULL DEPTH OF THE STRUCTURE.
3. EXTERIOR SURFACES SHALL BE GIVEN TWO COATS OF BITUMINOUS WATER- PROOFING MATERIAL.
4. JOINT SEALANT BETWEEN PRECAST SECTIONS SHALL BE PREFORMED BUTYL RUBBER.
5. STANDARD SEWER MANHOLE FRAME AND COVER SHALL BE SET IN FULL MORTAR BED. ADJUST TO GRADE WITH SEWER BRICK AND MORTAR (2 BRICK COURSES TYPICALLY, 5 BRICK COURSES MAXIMUM)

SANITARY SEWER MANHOLE

SCALE: NTS



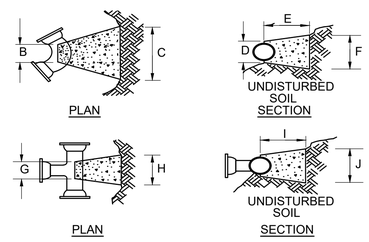
NOTES

1. PIPE AND FITTING MATERIALS TO BE PVC SDR35, MEETING ASTM 3034 FOR USE WITH SANITARY SEWER SYSTEMS.
2. ADAPTOR TO BE PREMANUFACTURED UNIT FOR CONNECTION OF PIPE TYPES.
3. AS-BUILTS WITH TIES TO ALL PIPE ENDS, BENDS, TEES, ETC TO BE PROVIDED TO THE TOWN, INCLUDING GIS DATA PRIOR TO PAYMENT.

TYPICAL WYE CONNECTION DETAIL

SCALE: NTS

BENDS	B	C	D	E	F	BENDS	B	C	D	E	F
6" 11-1/4°	8"	15"	12"	24"	12"	6" 45°	8"	30"	12"	24"	14"
6" 22-1/2°	"	18"	"	"	13"	6" 90°	"	30"	"	"	27"
8" 11-1/4°	"	20"	"	"	12"	8" 45°	"	30"	"	"	24"
8" 22-1/2°	"	22"	"	"	17"	8" 90°	"	38"	"	"	36"
12" 11-1/4°	"	30"	"	"	15"	12" 45°	"	40"	"	"	40"
12" 22-1/2°	"	35"	"	"	25"	12" 90°	"	60"	"	"	52"
TEES	G	H	I	J		TEES	G	H	I	J	
6"x 6"x 6"	12"	24"	24"	18"		12"x12"x6"	12"	24"	24"	12"	
8"x 8"x 6"	"	"	"	"		12"x12"x8"	"	"	"	24"	
8"x 8"x 8"	"	"	"	24"		12"x12"x12"	"	36"	"	36"	

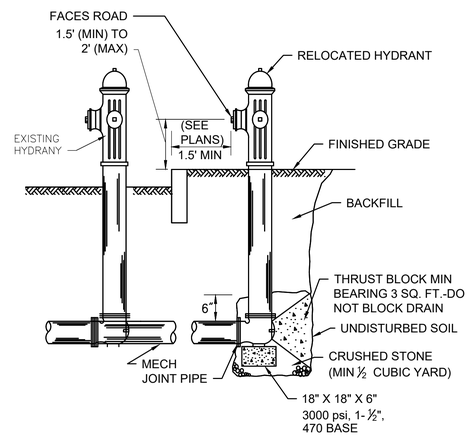


NOTES:

1. PROVIDE BLOCKS FOR TAPPING SLEEVES, DEAD ENDS, GATE VALVES AND VERTICAL BENDS, SAME SIZE AS REQUIRED FOR TEES.
2. PROVIDE ANCHOR RODS AT VERTICAL BENDS AND GATE VALVES
3. CONCRETE SHALL NOT BE PLACED AGAINST PIPE BEYOND FITTING.

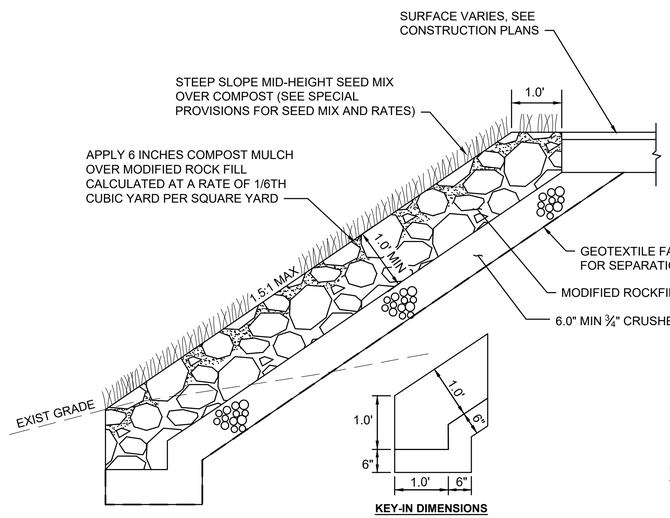
CONCRETE THRUST BLOCK

SCALE: N.T.S.

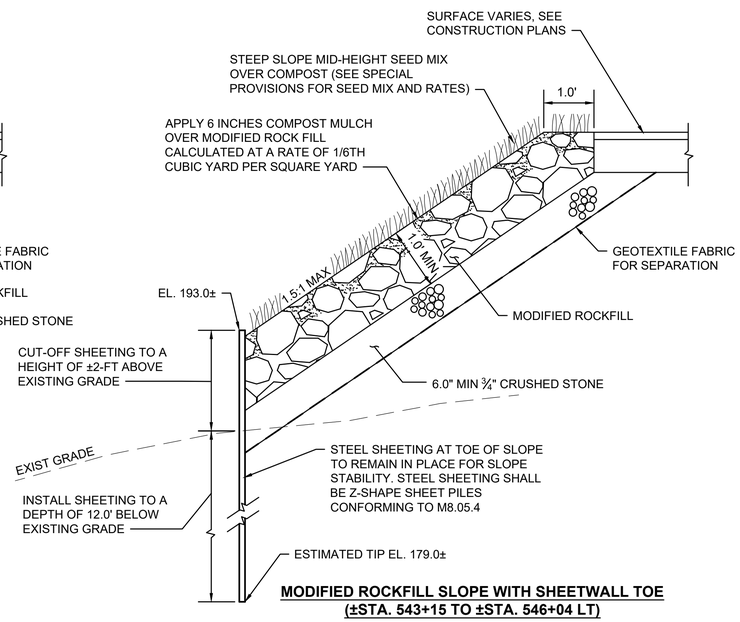


HYDRANT RELOCATION

SCALE: N.T.S.



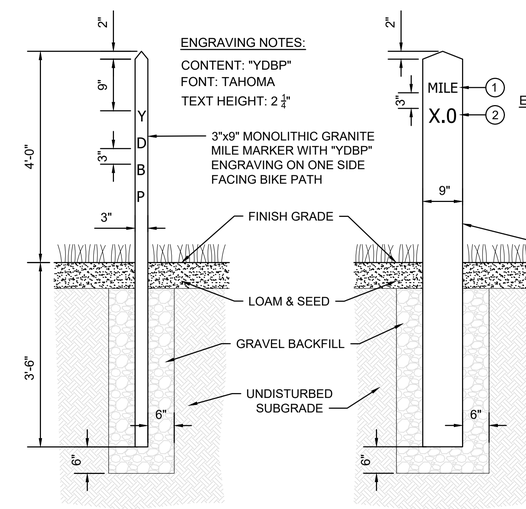
MODIFIED ROCKFILL SLOPE WITH KEY-IN TOE (TYPICAL)



MODIFIED ROCKFILL SLOPE WITH SHEETWALL TOE (±STA. 543+15 TO ±STA. 546+04 LT)

MODIFIED ROCKFILL SLOPE

SCALE: NTS



ENGRAVING NOTES:

CONTENT: "YDBP"
FONT: TAHOMA
TEXT HEIGHT: 2 ¼"

MILE MARKER SCHEDULE		
TEXT	STATION	OFFSET
MILE 0.0	654+90	LT
MILE 1.0	600+30	RT
MILE 2.0	511+65	RT

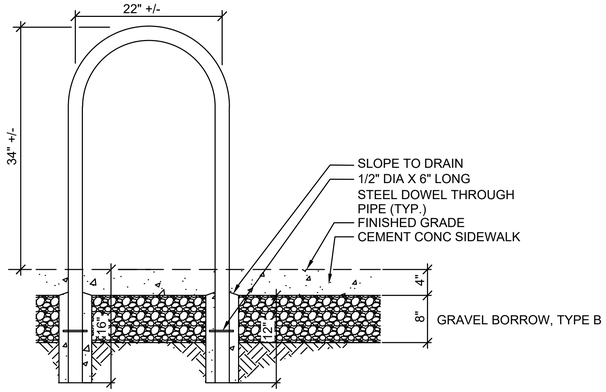
ENGRAVING NOTES:

1. CONTENT: "MILE"
   FONT: TAHOMA
   TEXT HEIGHT: 2 ¼"
2. CONTENT: SEE MILE MARKER SCHEDULE
   FONT: TAHOMA
   TEXT HEIGHT: 3 ½"

GRANITE MILE MARKER

SCALE: N.T.S.

608227HD (DET).DWG Plotted on 23-Jul-2025 1:43 PM



NOTES:

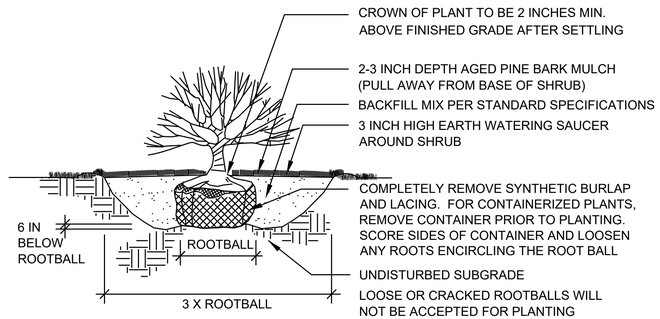
1. BICYCLE RACK UNITS SHALL CONSIST OF INVERTED "U" PIPES
2. 2IN NOM SCHED 40, ASTMA 500 WELDED SEAMLESS STEEL PIPE CONSTRUCTION SHALL BE POWDER COATED OVER ZINC - METALIZED STEEL
3. INVERTED "U" PIPES SHALL BE PLACED PARALLEL TO EACH OTHER 36-INCHES
4. CONCRETE SHALL BE 4000 PSI, 3/4IN, 565 CEMENT CONCRETE

BICYCLE RACK

NOT TO SCALE

NOTES:

1. EXCAVATE TO REQUIRED DEPTH AND BACKFILL WITH PLANTING MIX.
2. SHRUBS SHALL BE SET PLUMB

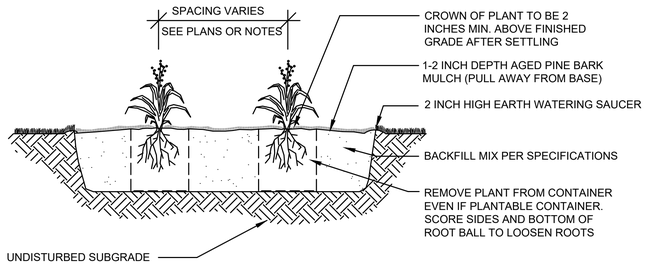


SHRUB PLANTING

NOT TO SCALE

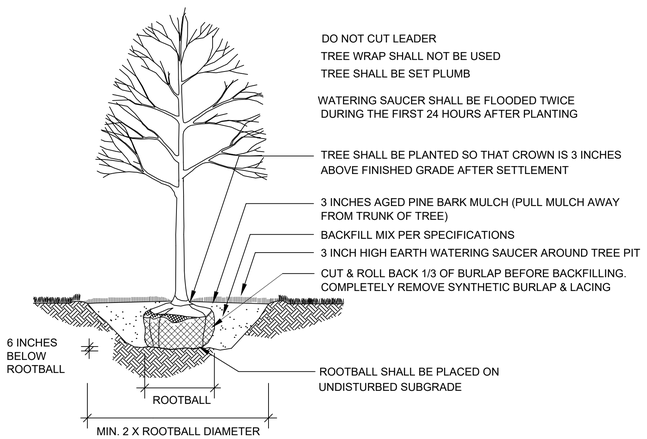
NOTES:

1. EXCAVATE TO REQUIRED DEPTH AND BACKFILL WITH PLANTING MIX.
2. RAISE AND REPLANT PLANTS THAT SETTLE MORE THAN 3 INCHES AFTER PLANTING AND WATERING IN.
3. WATER BY FLOODING TWICE IN FIRST TWO HOURS AFTER PLANTING. WATER & MAINTAIN AS PER STANDARD SPECIFICATIONS.



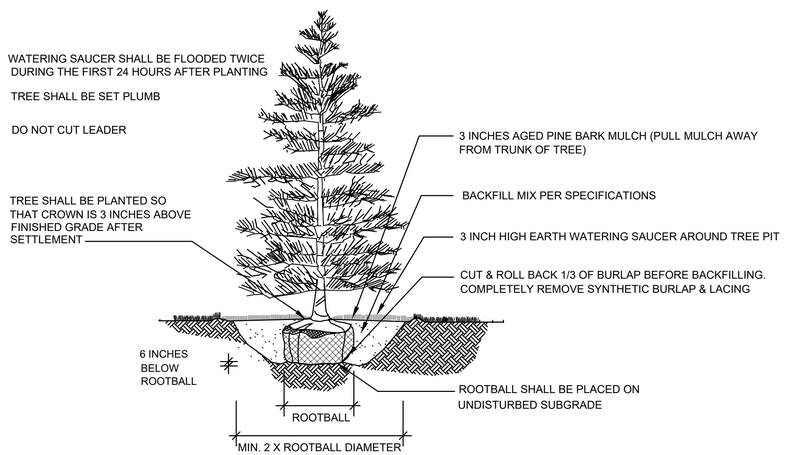
PERENNIAL PLANTING

NOT TO SCALE



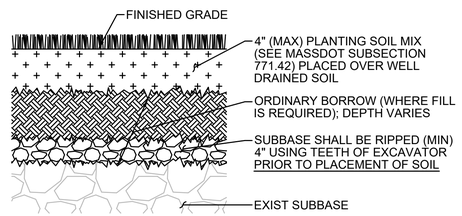
DECIDUOUS TREE PLANTING

NOT TO SCALE



EVERGREEN TREE PLANTING

NOT TO SCALE



PLANTING BED IN FORMER COMPACTED CONSTRUCTION STAGING AREAS

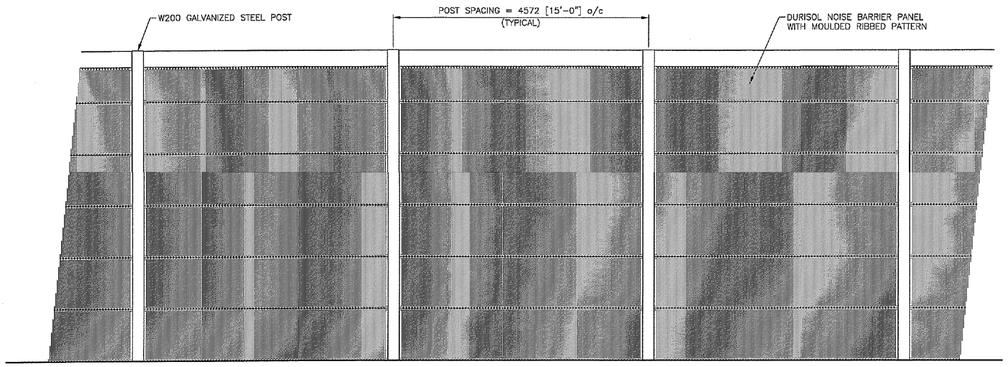
NOT TO SCALE

BILLERICA
YANKEE DOODLE BIKE PATH

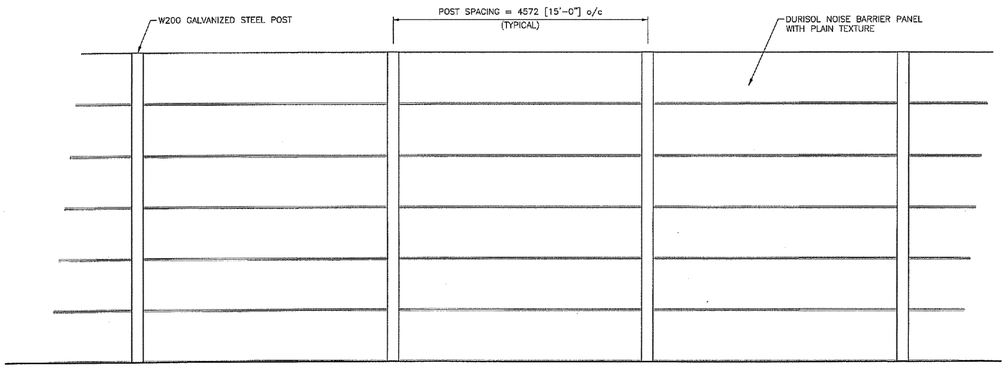
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	110	231
	PROJECT FILE NO. 608227		

CONSTRUCTION DETAILS
NOISE BARRIER RECORD PLAN DETAILS

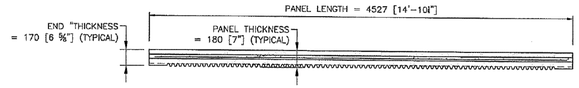
608227HD (DET).DWG Plotted on 23-Jul-2025 1:43 PM



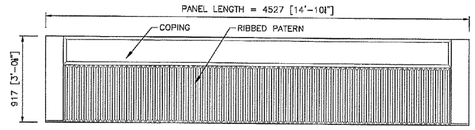
TYPICAL HIGHWAY ELEVATION
1 : 50



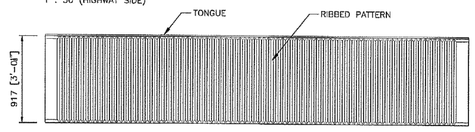
TYPICAL RESIDENTIAL ELEVATION
1 : 50



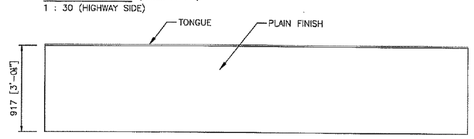
HORZ. SECTION
1 : 30



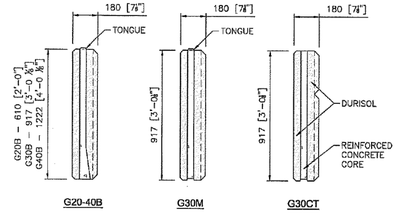
ELEVATION (G30CT PANEL)
1 : 30 (HIGHWAY SIDE)



ELEVATION (G30M PANEL)
1 : 30 (HIGHWAY SIDE)

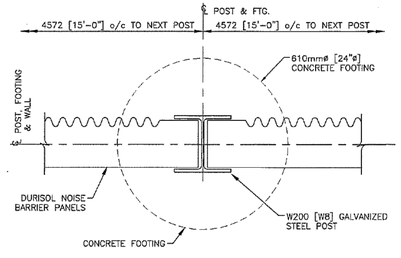


ELEVATION
1 : 30 (RESIDENTIAL SIDE)

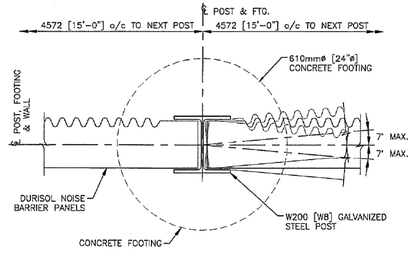


NOISE WALL PANEL SECTIONS
1 : 20

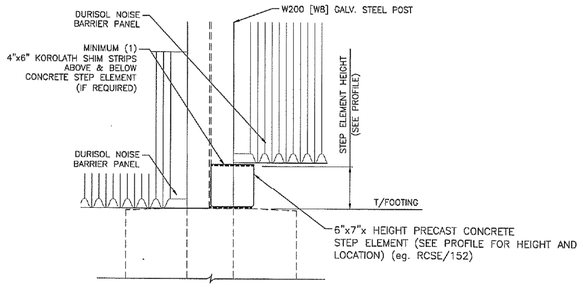
THE EXISTING NOISE WALL IS MANUFACTURED BY DURISOL INC. BASED ON RECORD INFORMATION, THE HEAVIEST NOISE BARRIER PANEL WEIGHTS UP TO 1218 kg (APPROX. 2,700 lb) AND EACH PANEL HAS TWO (2) 1 TON LIFTING ANCHORS CAST INTO THE PANEL.



TYPICAL POST DETAIL
1 : 10



TYPICAL ROTATION DETAIL
1 : 10



STEP ELEMENT ELEVATION
SCALE 1 : 10

PLEASE NOTE: THIS PLAN WAS NOT DESIGNED BY VANASSE HANGEN BRUSTLIN, INC. THIS IS A RECORD PLAN OF THE EXISTING NOISE WALL INSTALLED ON ROUTE 3 NB WITHIN THE PROJECT LIMITS, PROVIDED BY MASSDOT FOR REFERENCE. THE INFORMATION CONTAINED HEREIN IS ASSUMED TO BE CORRECT.

BILLERICA
YANKEE DOODLE BIKE PATH

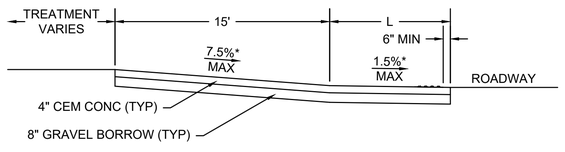
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	CMQ-0034(028)X	111	231
PROJECT FILE NO. 608227			

PEDESTRIAN CURB RAMP & DRIVEWAY DETAILS

608227HD (DET-WCR).DWG Plotted on 23-Jul-2025 1:44 PM

PEDESTRIAN CURB RAMP - ONE DIRECTIONAL							
NO.	LOCATION	RAMP LENGTH (L)	ROADWAY GUTTER	RAMP TRANSITION LENGTH	OPENING ELEVATION	LEFT SIDE TRANSITION CURB LENGTH	RIGHT SIDE TRANSITION CURB LENGTH
20	STA 613+42.1 ALGN - YANKEE DOODLE BIKE PATH SECTION 4	14'-8"	-3.30%	6'-6"	251.11	14'-0"	11'-4"
21	STA 613+87.2 ALGN - YANKEE DOODLE BIKE PATH SECTION 4	14'-8"	3.20%	14'-0"	252.68	18'-11"	6'-6"
22	STA 616+57.4 ALGN - YANKEE DOODLE BIKE PATH SECTION 4	9'-8"	2.38%	11'-0"	256.73	6'-6"	14'-11"
23	STA 616+85.7 ALGN - YANKEE DOODLE BIKE PATH SECTION 4	9'-8"	-1.12%	6'-6"	256.87	9'-0"	10'-5"
26	STA 619+34.0 ALGN - YANKEE DOODLE BIKE PATH SECTION 4	11'-10"	6.81%	15'-0"	250.07	6'-6"	19'-2"
27	STA 619+72.0 ALGN - YANKEE DOODLE BIKE PATH SECTION 4	14'-4"	-4.63%	6'-6"	248.20	11'-0"	6'-6"
28	STA 627+52.6 ALGN - YANKEE DOODLE BIKE PATH SECTION 4	22'-1"	2.54%	15'-0"	214.52	6'-6"	16'-11"
29	STA 628+24.4 ALGN - YANKEE DOODLE BIKE PATH SECTION 4	22'-1"	-1.91%	6'-6"	213.17	12'-4"	9'-0"
35	STA 638+48.0 ALGN - YANKEE DOODLE BIKE PATH SECTION 4	15'-1"	1.48%	9'-0"	206.37	-	-
36	STA 645+48.8 ALGN - YANKEE DOODLE BIKE PATH SECTION 4	13'-7"	0.12%	7'-8"	209.89	-	-

NOTE: GUTTER SLOPE IS IN THE DIRECTION OF THE BASELINE

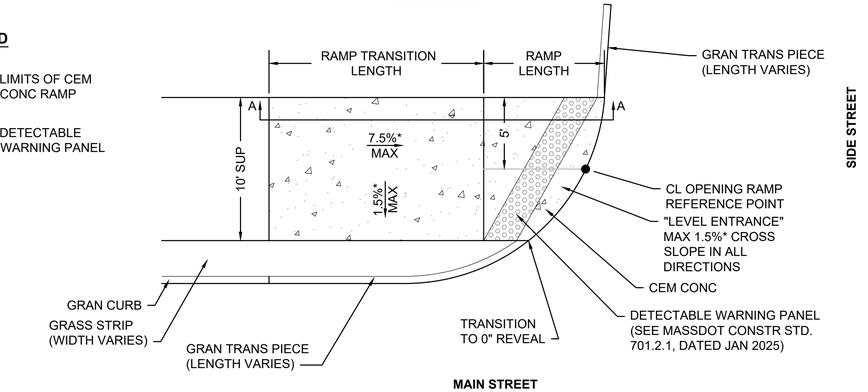


SECTION A-A

LEGEND

LIMITS OF CEM CONC RAMP

DETECTABLE WARNING PANEL



*TOLERANCE FOR CONSTRUCTION ±0.5%

PEDESTRIAN CURB RAMP - ONE DIRECTIONAL

SCALE: NTS

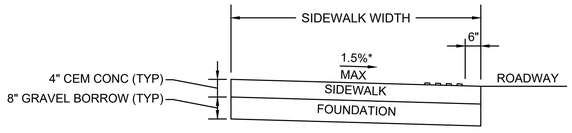
PEDESTRIAN CURB RAMP - NARROW								
NO.	LOCATION	SIDEWALK WIDTH	RAMP WIDTH	OPENING ELEVATION	LEFT SIDE		RIGHT SIDE	
					GUTTER	TRANSITION	GUTTER	TRANSITION
13	STA 324+72.6, 7.0' LT ALGN - YANKEE DOODLE BIKE PATH SECTION 2 PART 1	12'	5'-0"	186.57	0.39%	3'-9" **	-0.14%	6'-6"
14	STA 325+02.4, 0.0' LT/RT ALGN - YANKEE DOODLE BIKE PATH SECTION 2 PART 1	5'-3"	10'-0"	186.65	4.06%	15'-0"	-0.26%	3'-9" **
15	STA 325+55.4, 0.3 LT ALGN - YANKEE DOODLE BIKE PATH SECTION 2 PART 1	10'-0"	10'-0"	187.09	0.72%	7'-8"	1.20%	9'-0"
17	STA 701+70.5', 15.1' LT ALGN ORCHARD ROAD	5'-6"	5'-0"	247.00	1.72%	6'-6"	5.60%	15'-0"
18	STA 707+57.5, 15.7' LT ALGN ORCHARD ROAD	5'-6"	5'-0"	240.68	-5.84%	15'-0"	-3.56%	6'-6"
31	STA 630+77.4, 0.0' LT/RT ALGN - YANKEE DOODLE BIKE PATH SECTION 4	10'-0"	13'-10"	205.44	2.85%	13'-5"	0.71%	10'-0"

NOTE: GUTTER SLOPE IS IN THE DIRECTION OF THE BASELINE
** 3" CURB REVEAL AT TRANSITION LOCATION

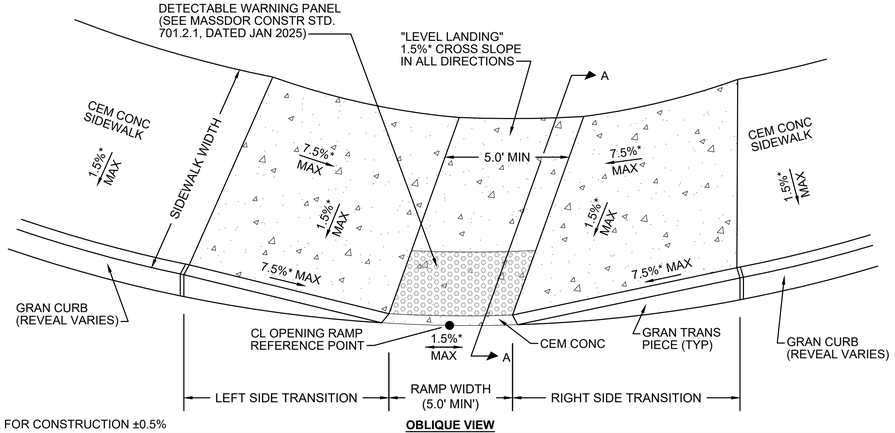
LEGEND

LIMITS OF CEM CONC RAMP

DETECTABLE WARNING PANEL



SECTION A-A



*TOLERANCE FOR CONSTRUCTION ±0.5%

OBLIQUE VIEW

PEDESTRIAN CURB RAMP - NARROW

SCALE: NTS

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	CMQ-0034(028)X	112	231
PROJECT FILE NO. 608227			

608227HD (DET-WOR).DWG Plotted on 23-Jul-2025 1:44 PM

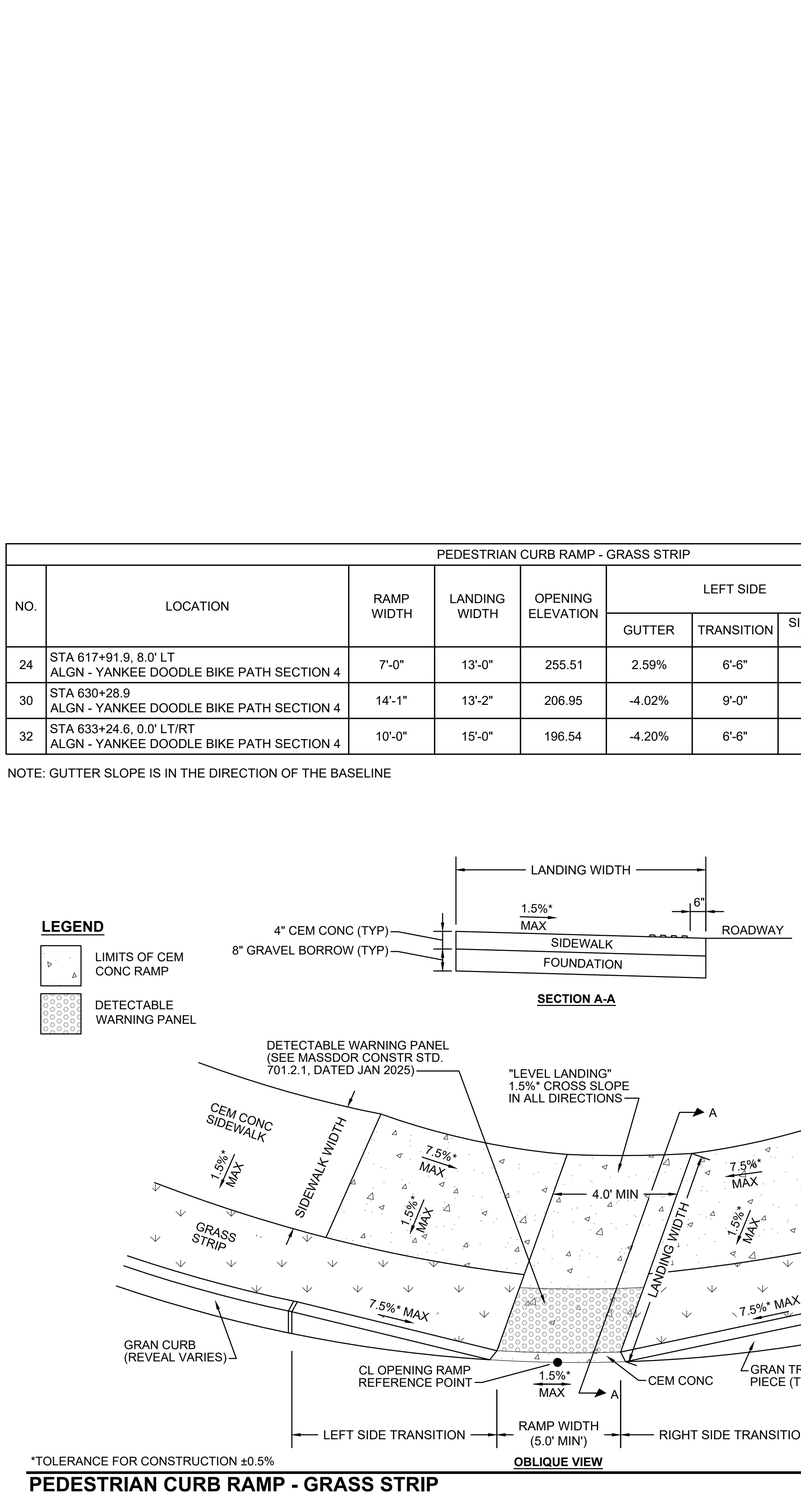
PEDESTRIAN CURB RAMP - GRASS STRIP										
NO.	LOCATION	RAMP WIDTH	LANDING WIDTH	OPENING ELEVATION	LEFT SIDE			RIGHT SIDE		
					GUTTER	TRANSITION	SIDEWALK WIDTH	GUTTER	TRANSITION	SIDEWALK WIDTH
24	STA 617+91.9, 8.0' LT ALGN - YANKEE DOODLE BIKE PATH SECTION 4	7'-0"	13'-0"	255.51	2.59%	6'-6"	10'-0"	1.36%	9'-0"	10'-0"
30	STA 630+28.9 ALGN - YANKEE DOODLE BIKE PATH SECTION 4	14'-1"	13'-2"	206.95	-4.02%	9'-0"	9'-11"	4.09%	15'-0"	10'-0"
32	STA 633+24.6, 0.0' LT/RT ALGN - YANKEE DOODLE BIKE PATH SECTION 4	10'-0"	15'-0"	196.54	-4.20%	6'-6"	10'-0"	3.75%	14'-0"	10'-0"

NOTE: GUTTER SLOPE IS IN THE DIRECTION OF THE BASELINE

LEGEND

LIMITS OF CEM CONC RAMP

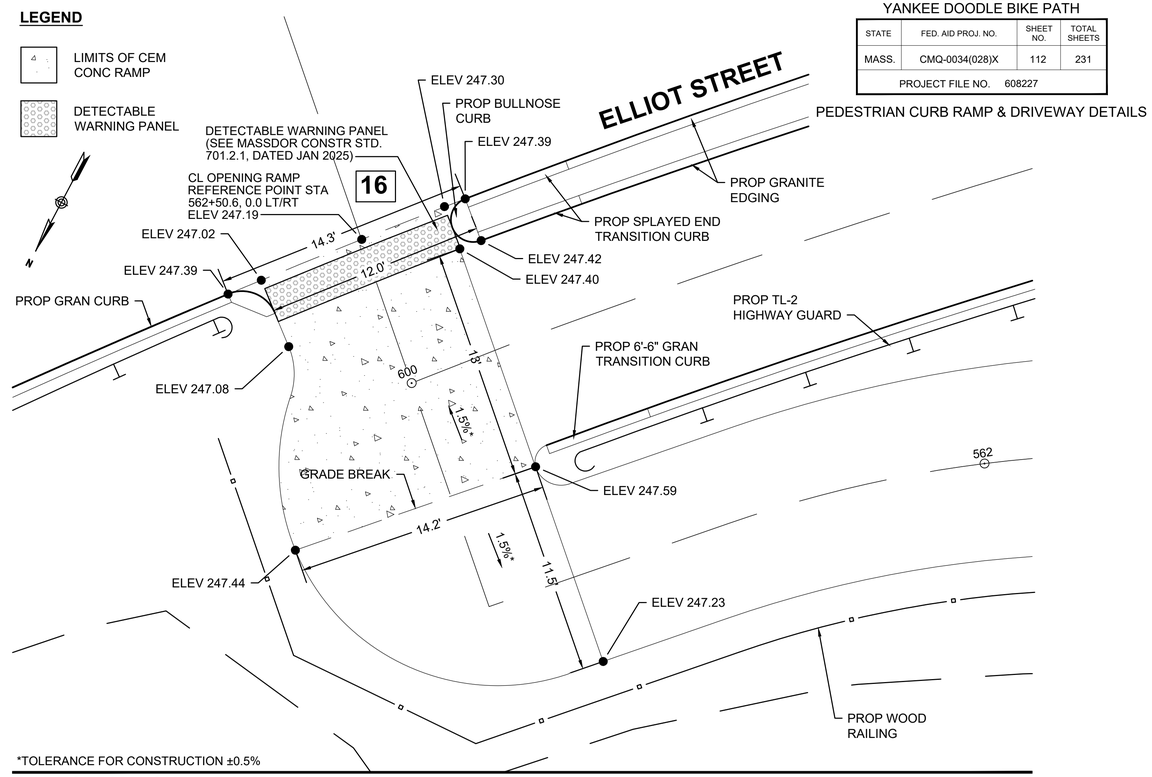
DETECTABLE WARNING PANEL



*TOLERANCE FOR CONSTRUCTION ±0.5%

PEDESTRIAN CURB RAMP - GRASS STRIP

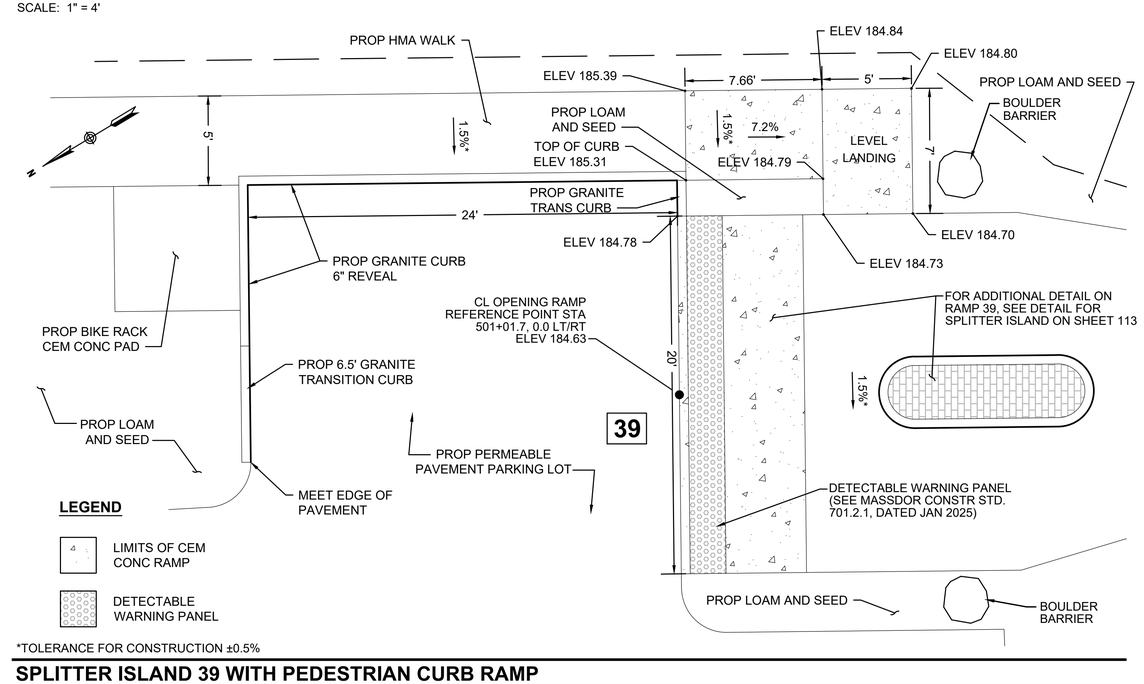
SCALE: NTS



*TOLERANCE FOR CONSTRUCTION ±0.5%

PEDESTRIAN CURB RAMP - 16

SCALE: 1" = 4'



*TOLERANCE FOR CONSTRUCTION ±0.5%

SPLITTER ISLAND 39 WITH PEDESTRIAN CURB RAMP

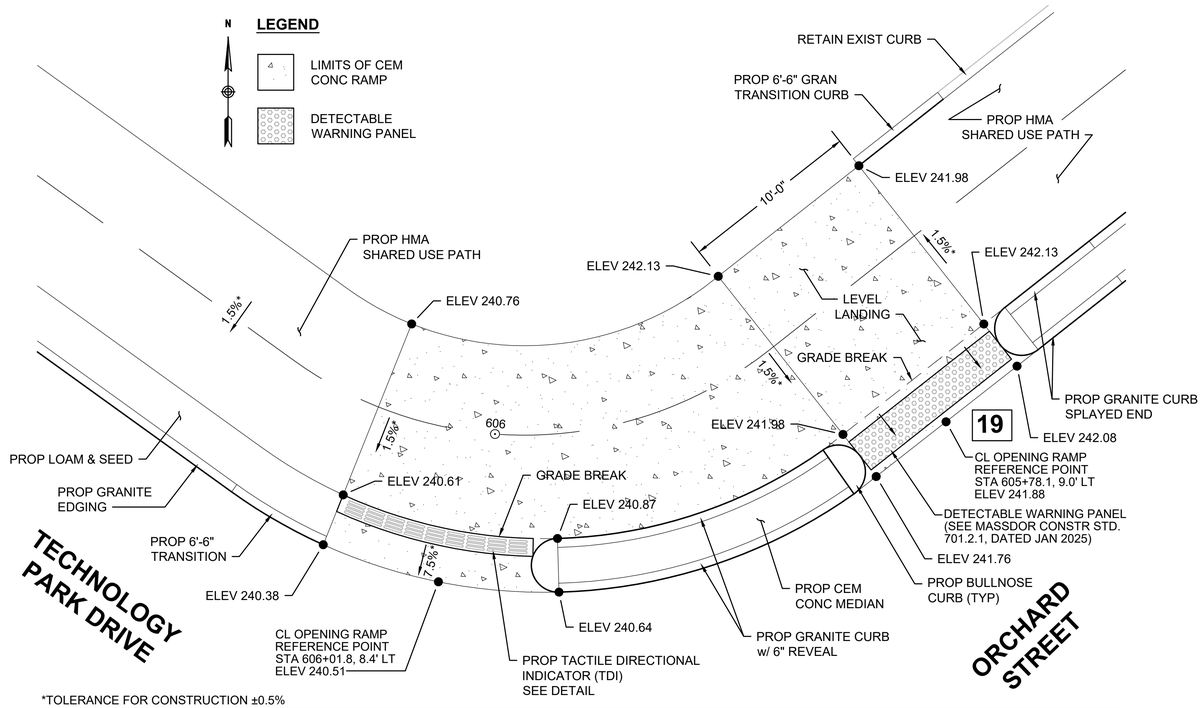
SCALE: 1" = 4'

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	CMQ-0034(028)X	113	231
PROJECT FILE NO. 608227			

PEDESTRIAN CURB RAMP & DRIVEWAY DETAILS

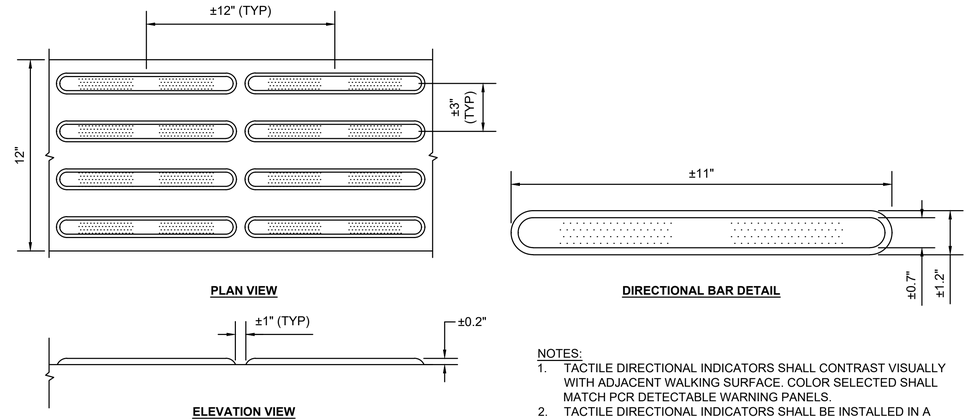
608227HD (DET-WCR).DWG Plotted on 23-Jul-2025 1:44 PM



*TOLERANCE FOR CONSTRUCTION ±0.5%

PEDESTRIAN CURB RAMP - 19 AND BIKE RAMP

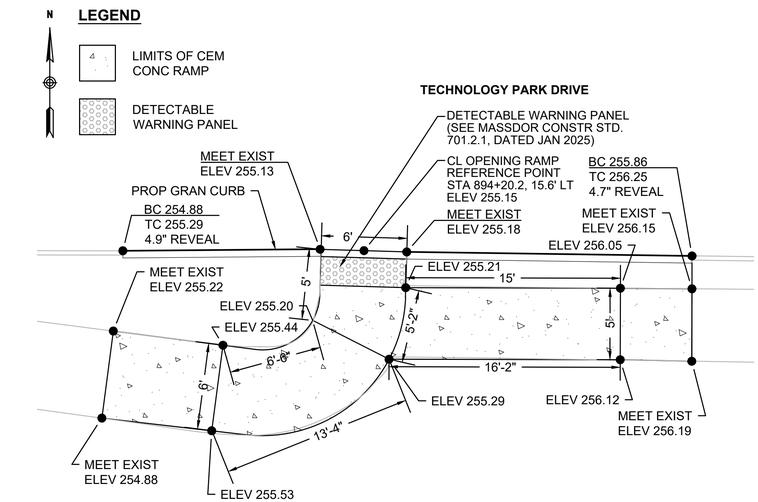
SCALE: 1" = 4'



NOTES:
1. TACTILE DIRECTIONAL INDICATORS SHALL CONTRAST VISUALLY WITH ADJACENT WALKING SURFACE. COLOR SELECTED SHALL MATCH PCR DETECTABLE WARNING PANELS.
2. TACTILE DIRECTIONAL INDICATORS SHALL BE INSTALLED IN A SIMILAR MANNER TO PCR DETECTABLE WARNING PANELS, BASED ON MANUFACTURER RECOMMENDATIONS.

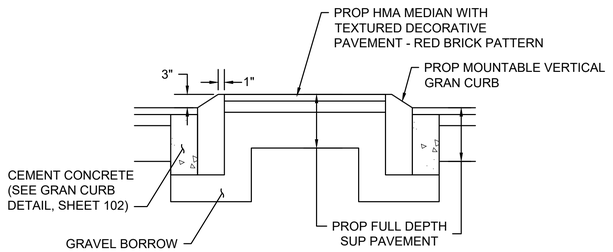
TACTILE DIRECTIONAL INDICATOR (TDI)

SCALE: 1" = 4'



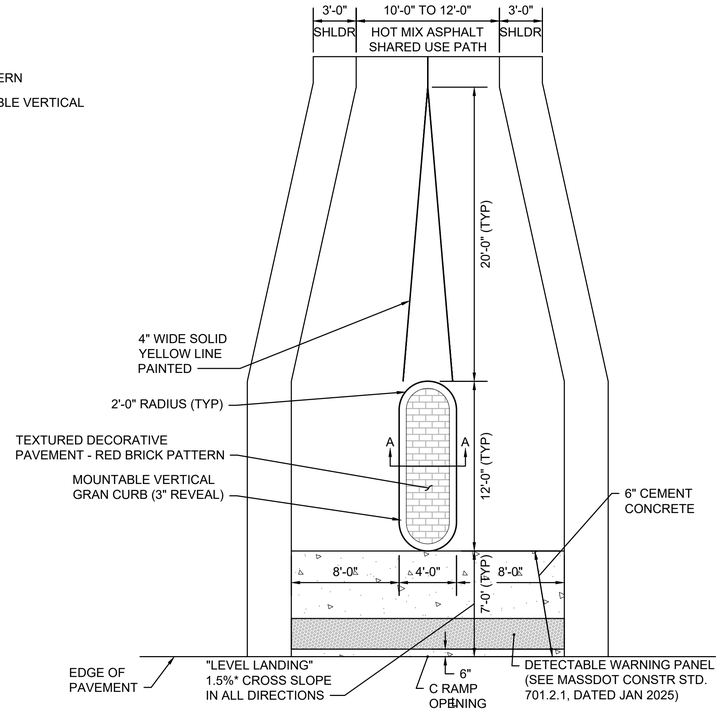
PEDESTRIAN CURB RAMP - 25

SCALE: 1" = 5'



SECTION A-A

SPLITTER ISLAND DATA		
NO.	LOCATION	OPENING ELEV
39	STA 500+97.7 ALIGN - YANKEE DOODLE BIKE PATH SECTION 3	184.63
33	STA 633+52.6 ALGN - YANKEE DOODLE BIKE PATH SECTION 4	197.10
34	STA 638+29.06 ALGN - YANKEE DOODLE BIKE PATH SECTION 4	206.07
37	STA 645+85.3 ALGN - YANKEE DOODLE BIKE PATH SECTION 4	210.22



*TOLERANCE FOR CONSTRUCTION ±0.5%

SPLITTER ISLAND

SCALE: N.T.S.

BILLERICA
YANKEE DOODLE BIKE PATH

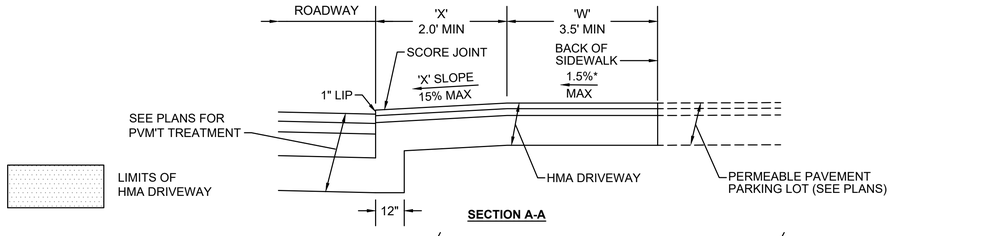
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	CMQ-0034(028)X	114	231
PROJECT FILE NO. 608227			

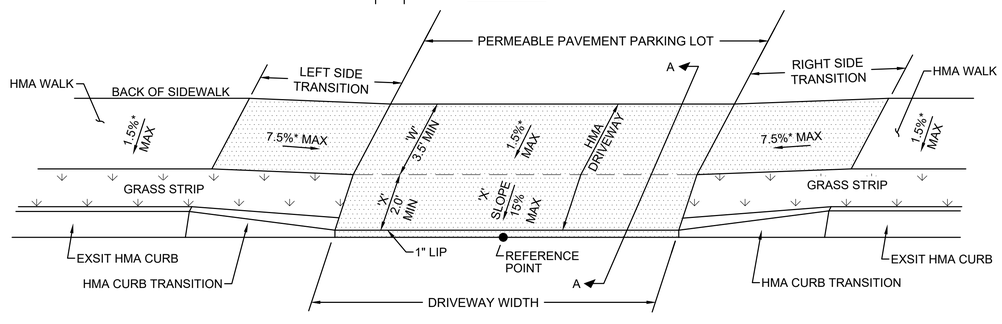
PEDESTRIAN CURB RAMP & DRIVEWAY DETAILS

608227HD (DET-WCR).DWG Plotted on 23-Jul-2025 1:44 PM

HMA DRIVEWAY										
NO.	LOCATION	RAMP WIDTH	'X'	'X' SLOPE	'W"	OPENING ELEVATION	LEFT SIDE		RIGHT SIDE		NOTES
							GUTTER	TRANSITION	GUTTER	TRANSITION	
4	STA 500+33.8, 41.9' RT ALGN - YANKEE DOODLE BIKE PATH SECTION 3	30'-0"	5'-0"	15.00%	4'-0"	183.58	2.66%	11'-0"	-1.83%	6'-6"	PROP HMA CURB

NOTE: GUTTER SLOPE IS IN THE DIRECTION OF THE BASELINE





* TOLERANCE FOR CONSTRUCTION ±0.5%

HMA DRIVEWAY WITH GRASS STRIP

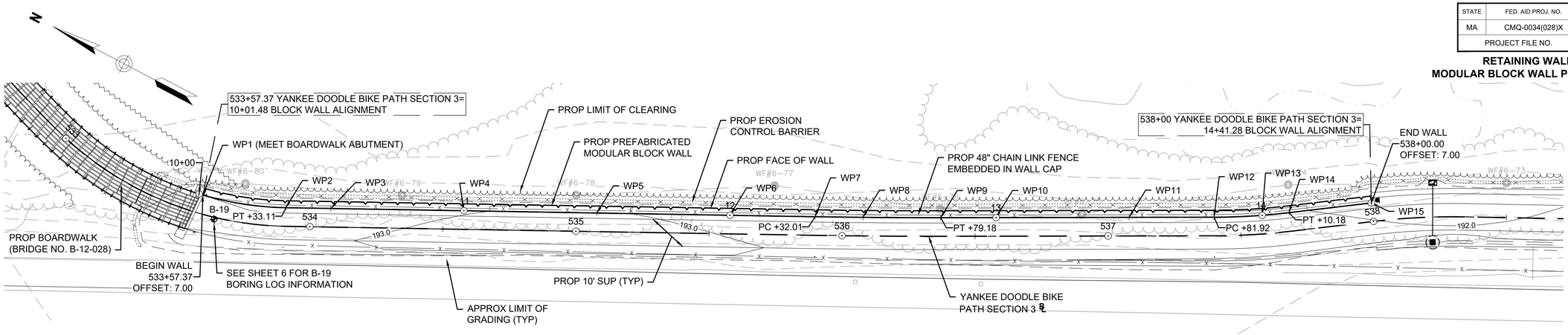
SCALE: NTS

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	115	231
PROJECT FILE NO.	608227		

RETAINING WALL PLANS
MODULAR BLOCK WALL PLAN AND DETAILS

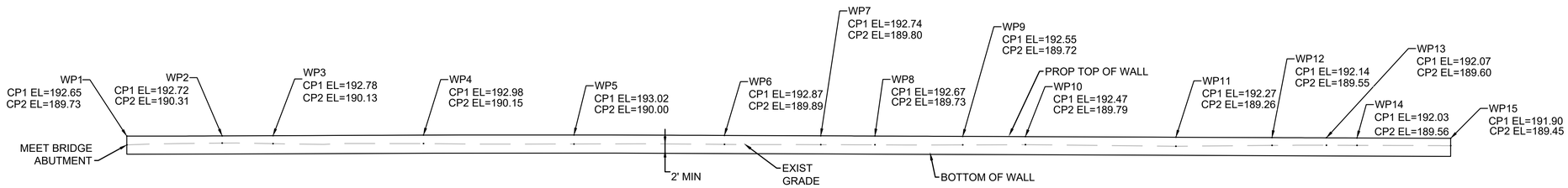
608227HD (WALL).DWG Plotted on 23-Jul-2025 1:50 PM



PREFABRICATED MODULAR BLOCK GRAVITY WALL - PLAN

SCALE: 1" = 20'

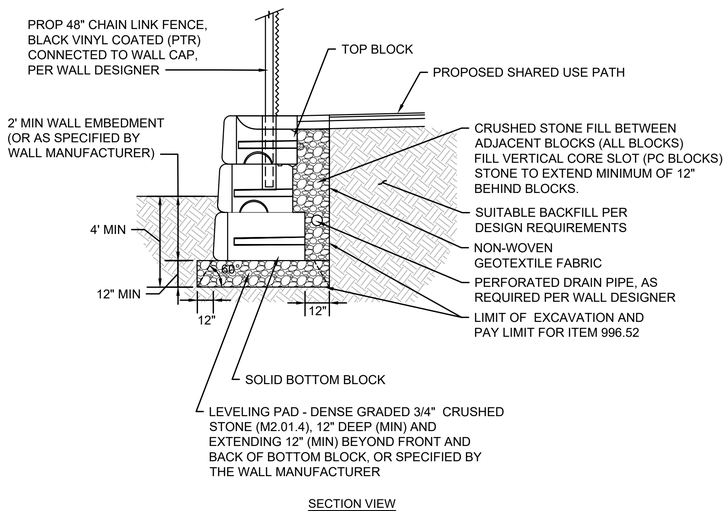
20 0 20 40
SCALE IN FEET



PREFABRICATED MODULAR BLOCK GRAVITY WALL - PROFILE

SCALE: 1" = 20'

PREFABRICATED MODULAR BLOCK WALL - WORKING POINT TABLE						
WP #	NORTHING	EASTING	YDBP STA / OFFSET	WALL ℄ STA	CP1 ELEV	CP2 ELEV
WP1	3020460.2003	715833.1624	533+57.37, 7.00' LT	10+01.48	192.65	189.73
WP2	3020430.2853	715843.4179	533+90.89, 7.00' LT	10+33.11	192.72	190.31
WP3	3020415.1900	715850.9849	534+07.77, 7.00' LT	10+50.00	192.78	190.15
WP4	3020370.4915	715873.3912	534+57.77 7.00' LT	11+00.00	192.98	190.15
WP5	3020325.7930	715895.7975	535+07.77 7.00' LT	11+50.00	193.02	190.00
WP6	3020288.0428	715914.7208	535+57.77, 7.00' LT	12+00.00	192.87	189.89
WP7	3020252.4794	715932.5480	535+89.78, 7.00' LT	12+32.01	192.74	189.80
WP8	3020236.4252	715940.6682	536+07.82, 7.00' LT	12+50.00	192.67	189.73
WP9	3020210.5151	715954.0828	536+37.08, 7.00' LT	12+79.18	192.55	189.72
WP10	3020192.0798	715963.7647	536+57.90, 7.00' LT	13+00.00	192.47	189.79
WP11	3020147.8132	715987.0127	537+07.90, 7.00' LT	13+50.00	192.27	189.26
WP12	3020119.5522	716001.8548	537+39.83, 7.00' LT	13+81.92	192.14	189.55
WP13	3020103.8739	716010.8480	537+58.43, 7.00' LT	14+00.00	192.07	189.60
WP14	3020095.3565	716016.4153	537+68.90, 7.00' LT	14+10.18	192.03	189.56
WP15	3020069.6821	716033.9750	538+00.00, 7.00' LT	14+41.28	191.90	189.45



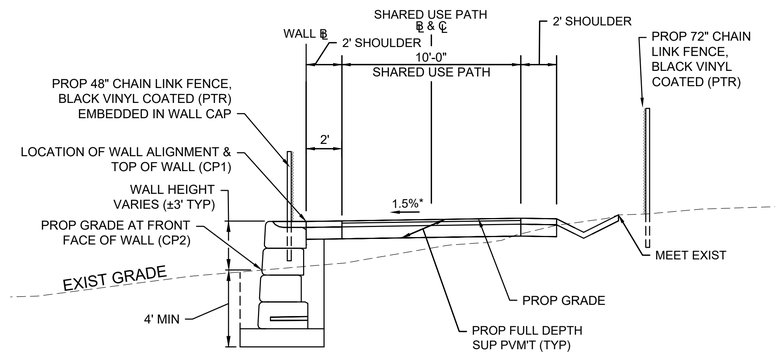
SECTION VIEW

PREFABRICATED MODULAR BLOCK WALL DETAIL

SCALE: N.T.S.

NOTES:

1. PREFABRICATED MODULAR BLOCK GRAVITY WALL SHALL BE DESIGNED BY THE CONTRACTOR AND SUBMITTED TO THE ENGINEER FOR APPROVAL.
2. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ANY UTILITIES PRIOR TO CONSTRUCTION.
3. TOP OF WALL GENERALLY FOLLOWS SHARED USE PATH FINISHED GRADE AND IS TAKEN AT CP1 AS SHOWN ON THE WALL TYPICAL SECTION BELOW.
4. PRIOR TO THE DESIGN AND FABRICATION OF THE PREFABRICATED MODULAR BLOCK GRAVITY WALL SYSTEM, THE CONTRACTOR SHALL:
   - 4.1. PERFORM A MINIMUM OF FOUR (4) ADDITIONAL GEOTECHNICAL BORING EXPLORATIONS. THE DEPTH OF THE BORINGS PROVIDED UNDER THIS ITEM SHALL MEET THE REQUIREMENTS OF THE MASSDOT STANDARD SPECIFICATIONS, THE MASSDOT LRFD BRIDGE MANUAL, AND THE AASHTO MANUAL ON SUBSURFACE INVESTIGATIONS, 2ND EDITION. THE MORE STRINGENT CRITERIA SHALL GOVERN. THE BORINGS SHALL NOT TERMINATE IN SOILS WITH 50 PERCENT OR MORE CLAY OR SILT, OR IN PEAT OR ORGANIC SOILS, IF THESE SOILS ARE ENCOUNTERED AT THE HIGHEST BOTTOM ELEVATION OF THE BORING, THE BORING SHALL BE CONTINUED TO 10 FEET BELOW THESE SOILS.
   - 4.2. ENGAGE THE SERVICES OF A GEOTECHNICAL ENGINEER TO OVERSEE THE BORINGS AND PROVIDE DESIGN CALCULATIONS TO CONFIRM THE UNDERLYING SUBSURFACE MATERIALS AND WALL STABILITY. SEE SPECIAL PROVISION UNDER ITEM 948.711 - GEOTECHNICAL ENGINEERING SERVICES FOR ADDITIONAL INFORMATION.



TYPICAL SECTION

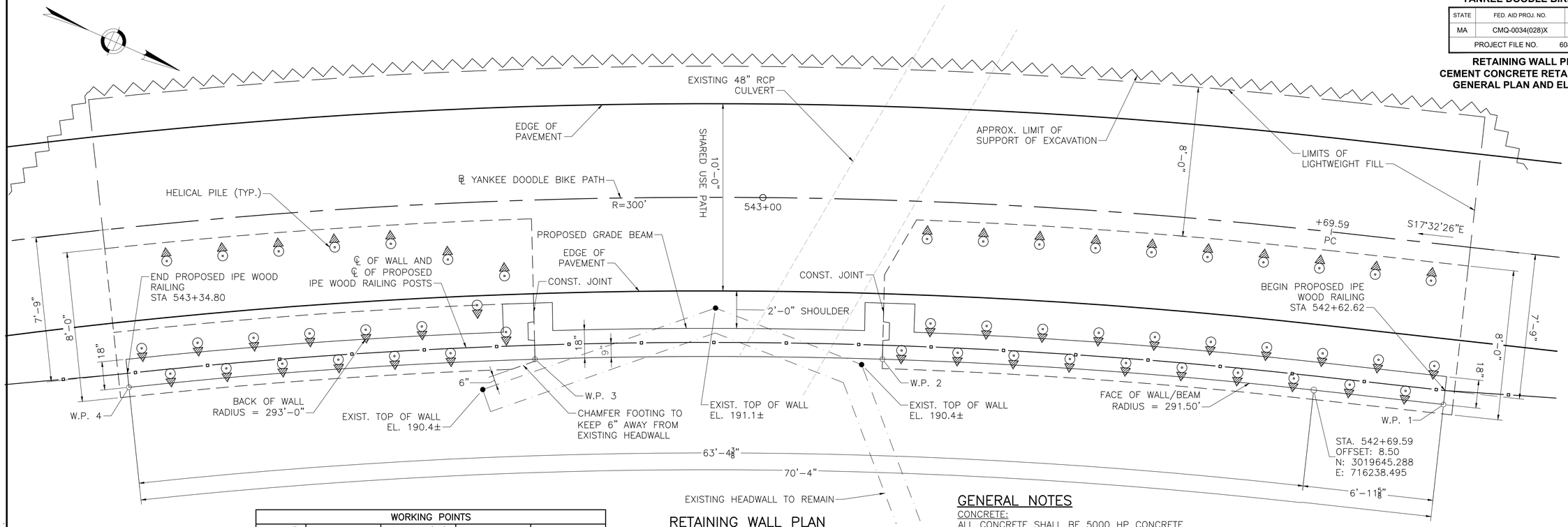
STA 533+57.4± TO STA 538+00.00±
NTS

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	116	231
PROJECT FILE NO.	608227		

RETAINING WALL PLANS
CEMENT CONCRETE RETAINING WALL
GENERAL PLAN AND ELEVATION

608227_BR(STRS-PLAN_EL).DWG Plotted on 31-Jul-2025 12:13 PM



WORKING POINTS				
W.P. #	STATION	OFFSET (FT)	NORTHING	EASTING
1	542+62.62	8.50 LT.	3019651.94	716236.40
2	542+93.35	8.50 LT.	3019623.57	716246.32
3	543+12.44	8.50 LT.	3019606.62	716253.83
4	543+34.80	8.50 LT.	3019587.41	716263.98

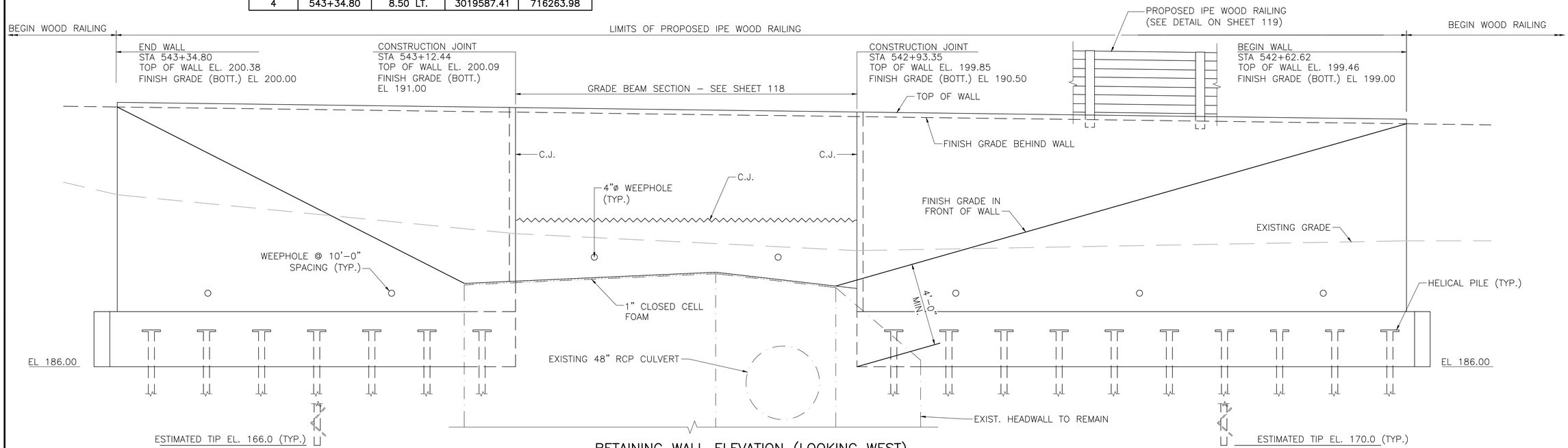
RETAINING WALL PLAN

SCALE: 3/8" = 1'-0"

GENERAL NOTES

CONCRETE:
ALL CONCRETE SHALL BE 5000 HP CONCRETE.

CONSTRUCTION JOINTS:
CONSTRUCTION JOINTS, OTHER THAN THOSE SHOWN ON THE PLANS, WILL NOT BE PERMITTED WITHOUT THE APPROVAL OF THE ENGINEER.



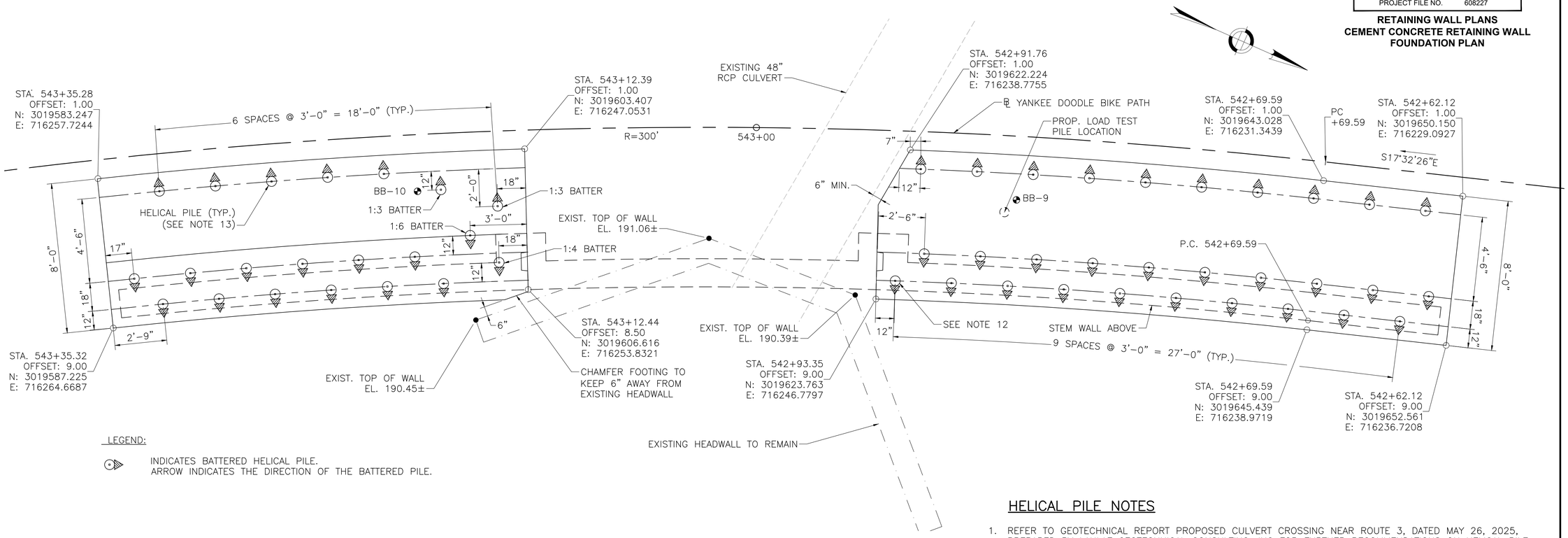
RETAINING WALL ELEVATION (LOOKING WEST)

SCALE: 3/8" = 1'-0"

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	117	231
PROJECT FILE NO.	608227		

RETAINING WALL PLANS
CEMENT CONCRETE RETAINING WALL
FOUNDATION PLAN



LEGEND:

INDICATES BATTERED HELICAL PILE.
ARROW INDICATES THE DIRECTION OF THE BATTERED PILE.

FOUNDATION PLAN
SCALE: $\frac{3}{8}$" = 1'–0"

GENERAL NOTES

LOCATION OF BORINGS AND PROBES SHOWN ON THE PLAN THUS: ◔

UNSUITABLE MATERIAL:

ALL UNSUITABLE MATERIAL SHALL BE REMOVED WITHIN THE LIMITS OF THE FOUNDATIONS OF THE STRUCTURE, AS DIRECTED BY THE ENGINEER.

GEOTECHNICAL REPORT:

REFER TO GEOTECHNICAL REPORT PROPOSED CULVERT CROSSING NEAR ROUTE 3, DATED MAY 26, 2025, PREPARED BY LAHLAF GEOTECHNICAL CONSULTING, INC.

CONCRETE:

ALL CONCRETE SHALL BE 5000 HP CONCRETE

HELICAL PILE VERIFICATION TEST:

THE VERIFICATION TEST HELICAL PILES SHALL BE A SACRIFICIAL HELICAL PILE. THE VERIFICATION TEST SHALL BE PERFORMED PRIOR TO CONSTRUCTION OF PRODUCTION HELICAL PILES. THE VERIFICATION TEST LOCATION(S) IS (ARE) APPROXIMATE AS SHOWN. CONTRACTOR TO SELECT THE EXACT LOCATION OF THE VERIFICATION TEST HELICAL PILE(S) WITH APPROVAL BY THE ENGINEER.

SUPPORT OF EXCAVATION:

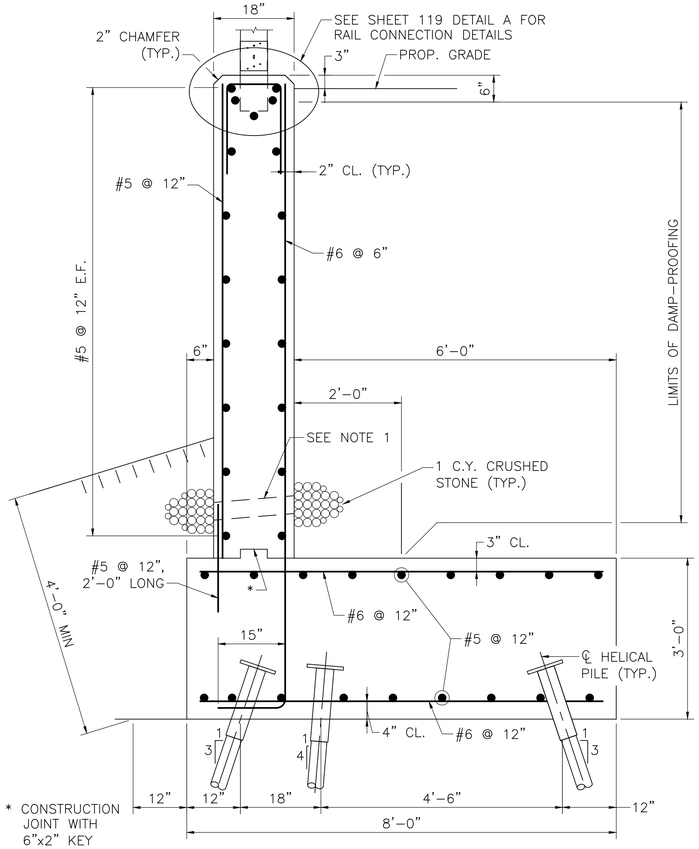
THE CONTRACTOR SHALL DESIGN, FURNISH, INSTALL, MONITOR, MAINTAIN, AND REMOVE TEMPORARY SUPPORT OF EXCAVATION CAPABLE OF SUPPORTING EXCAVATION, RESISTING SOIL AND HYDROSTATIC PRESSURE, ALLOWING FOR DEWATERING (IF REQUIRED) FOR THE CONSTRUCTION OF THE WALL AND INSTALLATION OF LIGHTWEIGHT FILL. SUPPORT OF EXCAVATION SHALL BE CAPABLE OF RESISTING SUPERIMPOSED VEHICULAR AND CONSTRUCTION LOADS. FOR LOCATIION SEE RETAINING WALL PLAN ON SHEET 116 OF 231.

HELICAL PILE NOTES

1. REFER TO GEOTECHNICAL REPORT PROPOSED CULVERT CROSSING NEAR ROUTE 3, DATED MAY 26, 2025, PREPARED BY LAHLAF GEOTECHNICAL CONSULTING, INC FOR FURTHER RECOMMENDATIONS ON HELICAL PILE DESIGN.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF THE HELICAL PILES, INCLUDING THE CONNECTIONS BETWEEN THE HELICAL PILES AND THE CONCRETE PILE CAP.
3. THE CONTRACTOR SHALL SUBMIT A PILE SCHEDULE, PILE INSTALLATION, AND TESTING PLAN FOR REVIEW AND APPROVAL OF THE ENGINEER. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND DESIGN CALCULATIONS FOR THE PROPOSED HELICAL PILES SIGNED AND STAMPED BY A PROFESSIONAL ENGINEER LICENSED IN THE COMMONWEALTH OF MASSACHUSETTS.
4. HELICAL PILE AND CONNECTION DESIGN SHALL BE IN ACCORDANCE WITH THE MASSDOT BRIDGE DESIGN MANUAL AND THE 2020 AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS LRFD BRIDGE DESIGN SPECIFICATIONS 9TH EDITION.
5. THE FACTORED AXIAL DESIGN LOAD PER PILE IS 46 KIPS AS PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS STRENGTH I LOAD COMBINATION. THE FACTORED GEOTECHNICAL PILE RESISTANCE IS 49 KIPS. THE FACTORED GEOTECHNICAL PILE RESISTANCE IS THE PRODUCT OF THE NOMINAL RESISTANCE OF 110 KIPS AND RESISTANCE FACTOR OF 0.45
6. PILE TIP ELEVATIONS TO BE DETERMINED BY THE HELICAL PILE DESIGNER. HELICAL PILES TO BE INSTALLED TO AN ESTIMATED TIP ELEVATION OF 170.0 ON THE NORTH SIDE OF THE WALL AND INSTALLED TO AN ESTIMATED TIP ELEVATION OF 166.0 ON THE SOUTH SIDE OF THE WALL.
7. FOR ADDITIONAL HELICAL PILE REQUIREMENTS, SEE SPECIAL PROVISION ITEM NO. 943.203.
8. ONE PRE–PRODUCTION VERIFICATION LOAD TEST FOR ONE SACRIFICIAL PILE IS REQUIRED TO CONFIRM THE HELICAL PILE NOMINAL RESISTANCE. LOAD TESTING SHALL BE PERFORMED IN ACCORDANCE WITH THE SPECIAL PROVISION REQUIREMENTS, THE GEOTECHNICAL REPORT RECOMMENDATIONS, AND THE SACRIFICIAL PILE LOCATION SHALL BE AGREED UPON BY THE CONTRACTOR AND ENGINEER. A RESISTANCE FACTOR OF 0.70 MAY BE UTILIZED UPON SUCCESSFUL COMPLETION OF STATIC LOAD TESTING.
9. THE WORK OF THE SPECIALTY CONTRACTOR INSTALLING THE HELICAL PILES SHOULD COORDINATED WITH THAT OF THE SITE CONTRACTOR TO MAKE SURE THAT A LEVEL STABLE PAD IS PREPARED FOR THE HELICAL PILE INSTALLATION EQUIPMENT.
10. SURFICIAL OBSTRUCTIONS SHOULD BE REMOVED BEFORE THE START OF HELICAL PILE INSTALLATION.
11. CONTRACTOR'S PROCEDURES SHALL INCLUDE MITIGATING MEASURES IF THE HELICAL PILE IS REFUSED OR DEFLECTED BY A SUBSURFACE OBSTRUCTION, INCLUDING PRE–AUGERING OR OTHERWISE. SEE SPECIFICATION FOR ADDITIONAL REQUIREMENTS.
12. ADJUST HELICAL PILE BATTER IF NEEDED TO AVOID EXISTING WINGWALL.
13. HELICAL PILE SPACING AND BATTER SHALL BE AS SHOWN ON THE TYPICAL RETAINING WALL SECTION ON SHEET 118 OF 231 UNLESS OTHERWISE NOTED ON THE FOUNDATION PLAN.

608227_BR(STR5-FDN).DWG Plotted on 28-Jul-2025 1:51 PM

608227_BR(STRS-WALL_DET).DWG Plotted on 31-Jul-2025 12:14 PM

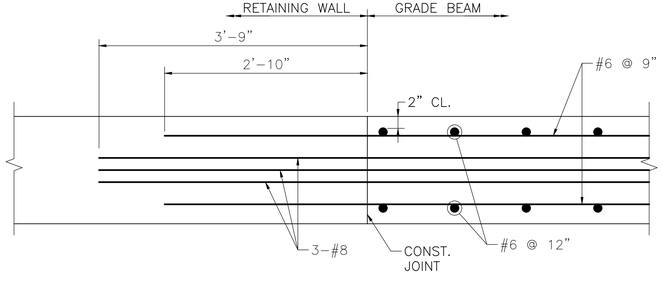


TYPICAL RETAINING WALL SECTION

SCALE: $\frac{3}{4}$" = 1'-0"

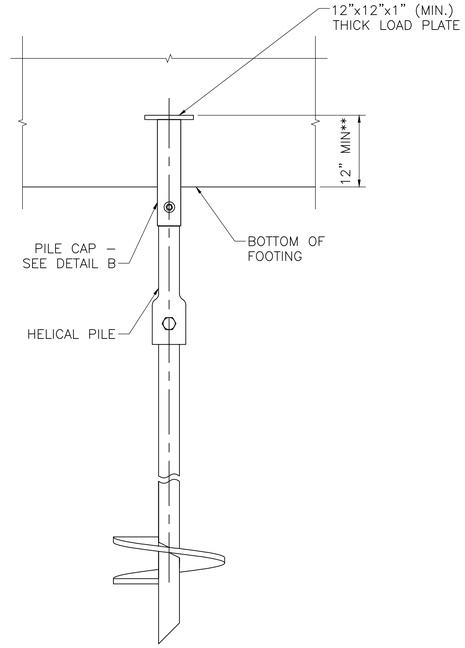
NOTES:

1. 4" ø WEEP HOLES 10'-0" O.C. LOCATED 12" ABOVE THE HEEL OF THE FOOTING SLOPING 1" PER FOOT TOWARDS THE FRONT FACE. PROVIDE 1 CUBIC YARD OF CRUSHED STONE AT EACH END OF WEEP HOLE.
2. ALL CONCRETE SHALL BE 5000 PSI HP CONCRETE.
3. REINFORCING STEEL SHALL BE EPOXY COATED UNLESS OTHERWISE NOTED IN THE CONSTRUCTION DRAWINGS AND SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M31 GRADE 60.
4. TIMBER POST NOT SHOWN FOR CLARITY. SEE DETAIL A ON SHEET 118 FOR RAILING POST TO WALL CONNECTION.
5. HELICAL PILES NOT SHOWN FOR CLARITY.
6. HELICAL PILE SPACING AND BATTER SHALL BE AS SHOWN HERE UNLESS OTHERWISE NOTED ON THE FOUNDATION PLAN ON SHEET 117 OF 231.



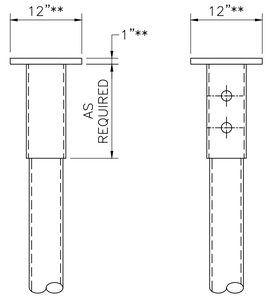
RETAINING WALL/GRADE BEAM INTERFACE DETAIL

SCALE: 1" = 1'-0"



HELICAL PILE DETAIL

SCALE: 1" = 1'-0"



DETAIL B – PILE CAP

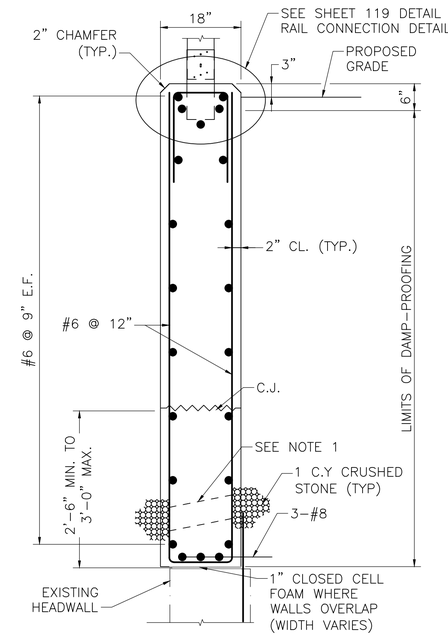
SCALE: 1" = 1'-0"

** THE PILE HEAD EMBEDMENT AND LOAD PLATE DIMENSIONS SHOWN ARE REQUIRED MINIMUMS. THE ACTUAL EMBEDMENT DEPTH AND BEARING PLATE DIMENSIONS MAY BE GREATER THAN SHOWN AND ARE DEPENDENT ON FINAL CONTRACTOR HELICAL PILE DESIGNS.

NOTE:

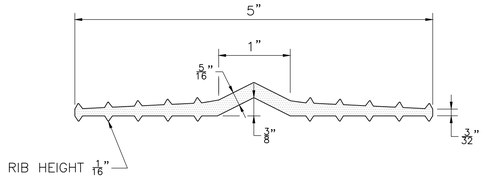
EXTEND GRADE BEAM REINFORCEMENT INTO STEM AND FOOTING.

RETAINING WALL STEM BARS OMITTED FOR CLARITY.



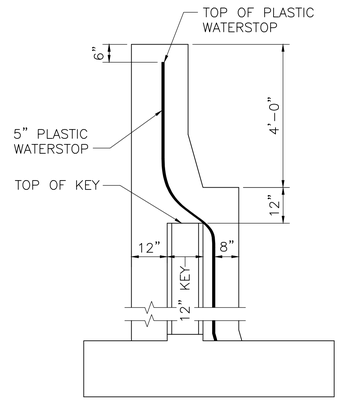
TYPICAL GRADE BEAM SECTION

SCALE: $\frac{3}{4}$" = 1'-0"



5" WATERSTOP

NOT TO SCALE

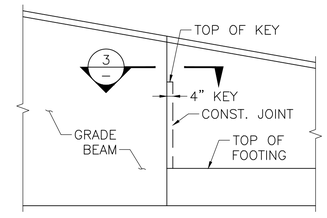


NOTE:

REINFORCEMENT SHALL BE CONTINUOUS THROUGH CONSTRUCTION JOINTS.

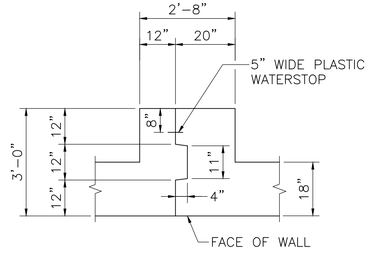
VERTICAL SECTION THROUGH CONSTRUCTION JOINT

SCALE: $\frac{1}{2}$" = 1'-0"



CONSTRUCTION JOINT ELEVATION

SCALE: $\frac{1}{2}$" = 1'-0"



SECTION 3

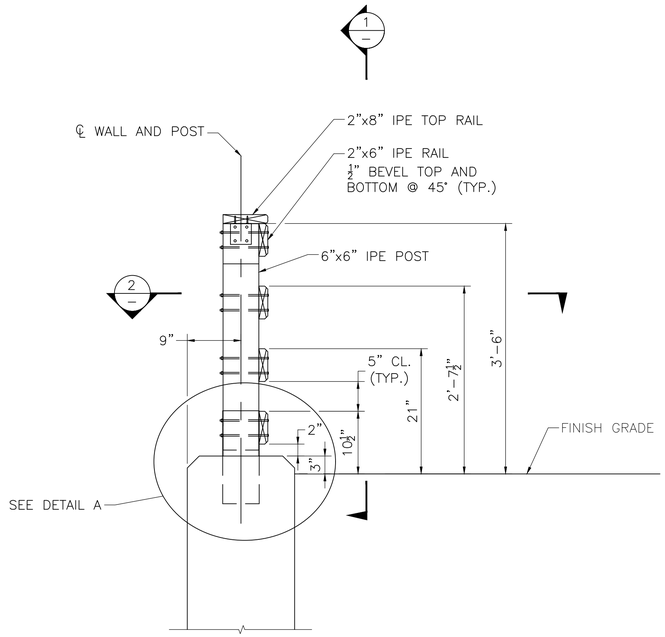
SCALE: $\frac{1}{2}$" = 1'-0"

BILLERICA
YANKEE DOODLE BIKE PATH

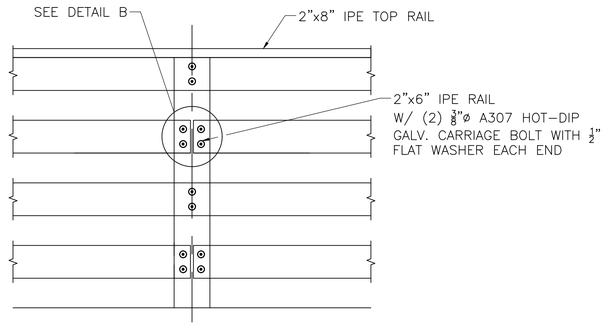
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	119	231
PROJECT FILE NO.	608227		

RETAINING WALL PLANS
CEMENT CONCRETE RETAINING WALL
DETAILS 2 OF 2

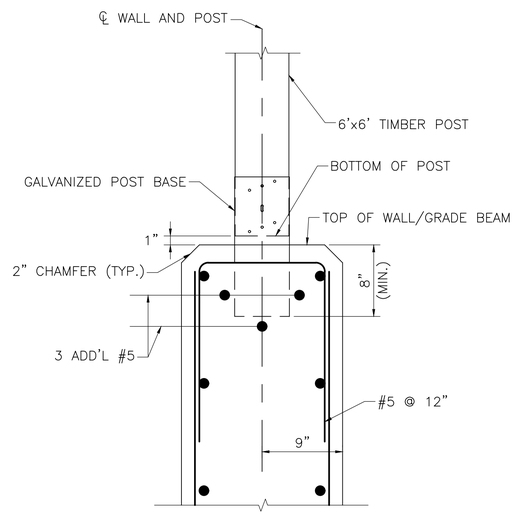
608227_BR(STRS-WALL_DET).DWG Plotted on 31-Jul-2025 12:14 PM



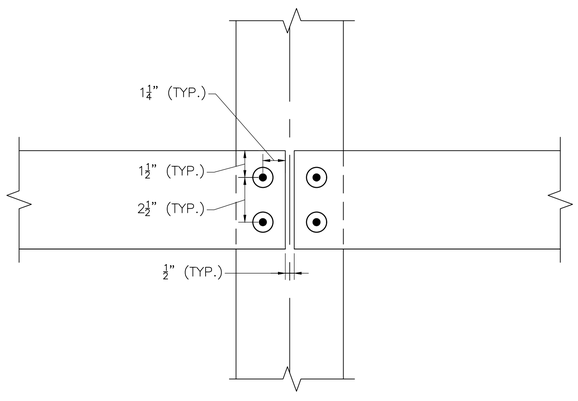
PROPOSED IPE WOOD RAILING
SCALE: 1" = 1'-0"



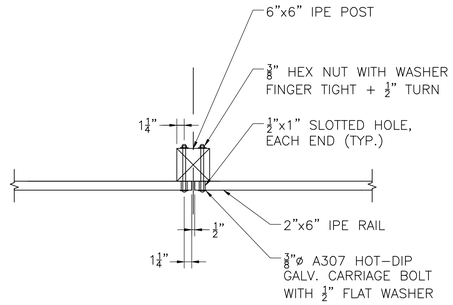
SECTION 01
SCALE: 1" = 1'-0"



DETAIL A
SCALE: 3" = 1'-0"



DETAIL B
SCALE: 1½" = 1'-0"

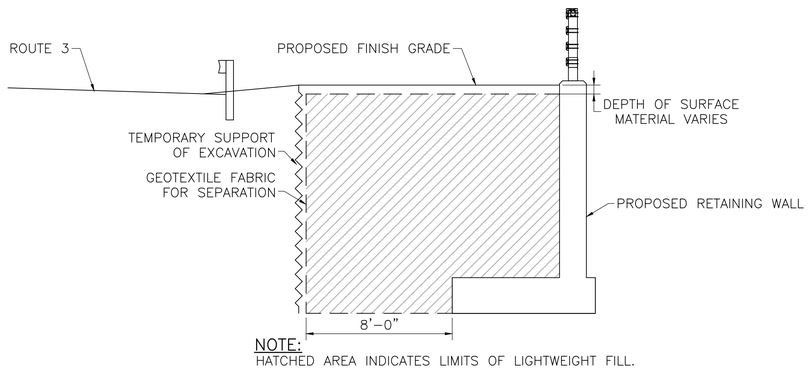


SECTION 02
SCALE: 3" = 1'-0"

NOTES:

1. POSTS SHALL BE SPACED AS SHOWN ON THE PLANS AND SHALL BE 8'-0" O.C. MAXIMUM UNLESS OTHERWISE NOTED.
2. THE FACE OF RAIL SHALL BE SET OFF THE EDGE OF SHARED USE PATH PAVEMENT, AS SHOWN ON THE PLANS, AND AS DIRECTED BY THE ENGINEER.
3. ALL BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A307, GRADE A, AND SHALL BE HOT-DIP GALV. IN ACCORDANCE WITH ASTM A153. WASHER UNDER THE HEAD OF THE CARRIAGE BOLTS SHALL BE SQUARE HOLED FOR MATING WITH THE SQUARE SHOULDERS OF THE CARRIAGE BOLT.
4. END BUTT JOINTS IN RAILS SHALL BE CENTERED ON POSTS AND STAGGERED FROM JOINTS IN ADJACENT RAILS TO EVERY OTHER POST.
5. BOLTS SHALL BE SIZED AND INSTALLED TO PROVIDE ¼" MIN. AND ½" MAX. STICKOUT PROJECTION AT FINAL TIGHTENED CONDITION UNLESS OTHERWISE NOTED.
6. POST BASE SHALL BE DESIGNED BY THE CONTRACTOR, COORDINATED WITH THE RAILING CONNECTIONS, AND SUFFICIENT TO RESIST THE FOLLOWING LFRD FACTORED LOADS:

   BENDING MOMENT, Mu = 1740 LB-FT
   VERTICAL FORCE, Pu = 730 LB
   HORIZONTAL FORCE, Vu = 580 LB



NOTE:
HATCHED AREA INDICATES LIMITS OF LIGHTWEIGHT FILL.

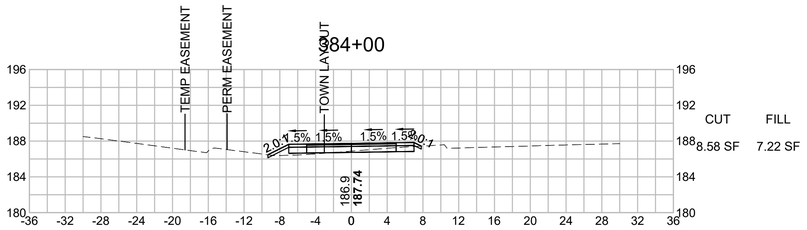
LIMITS OF LIGHTWEIGHT FILL
SCALE: N.T.S

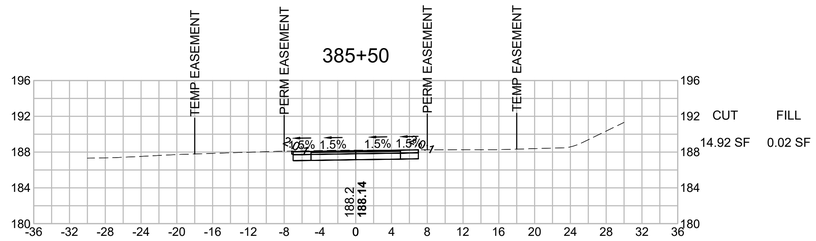
BILLERICA
YANKEE DOODLE BIKE PATH

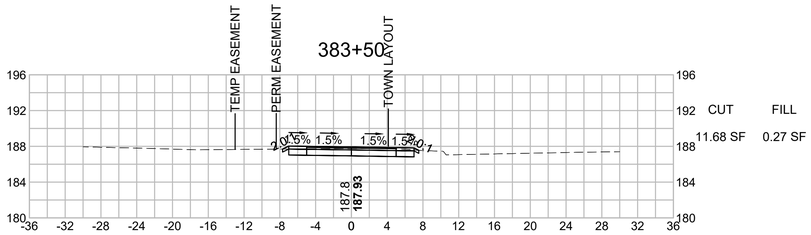
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	120	231
PROJECT FILE NO. 608227			

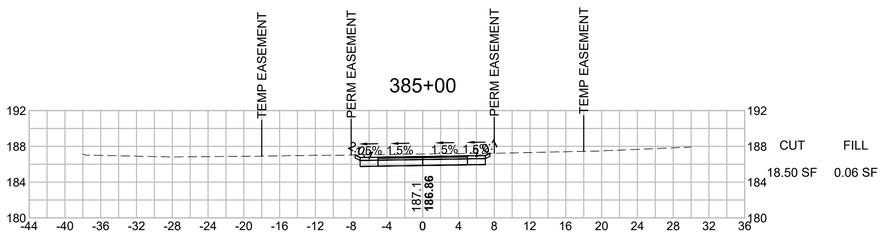
CROSS SECTIONS

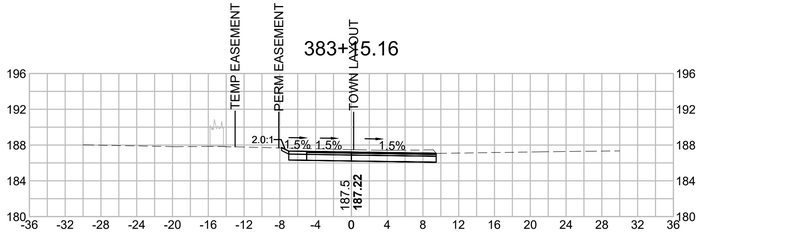
608227HD (XSEC)-2.DWG Plotted on 23-Jul-2025 1:41 PM

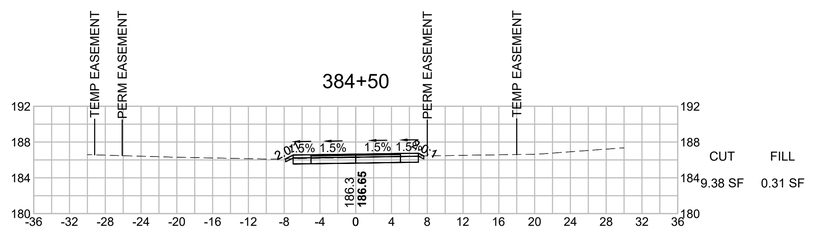


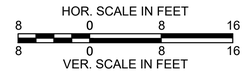










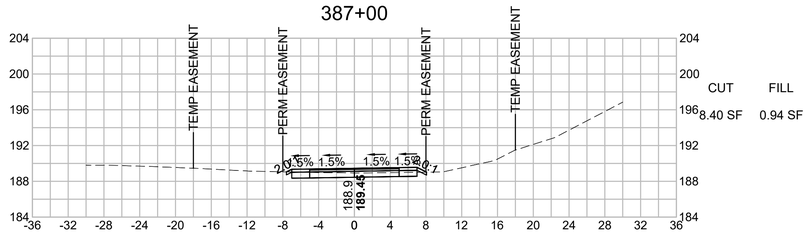


BILLERICA
YANKEE DOODLE BIKE PATH

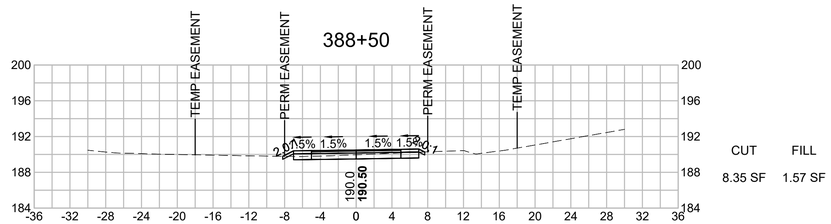
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	121	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

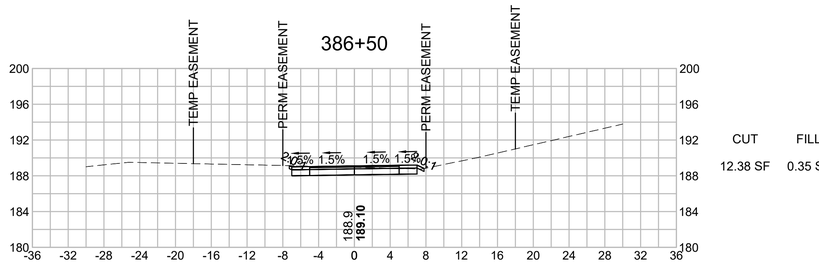
608227HD (XSEC)-2.DWG Plotted on 23-Jul-2025 1:41 PM



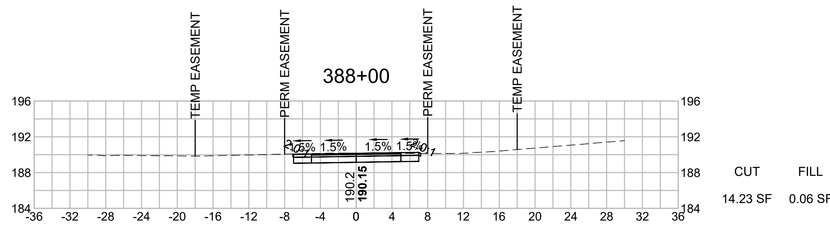
CUT 8.40 SF FILL 0.94 SF



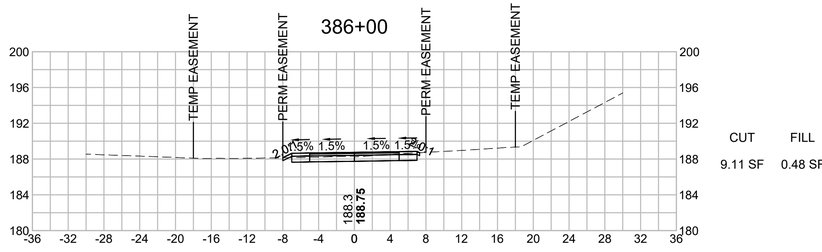
CUT 8.35 SF FILL 1.57 SF



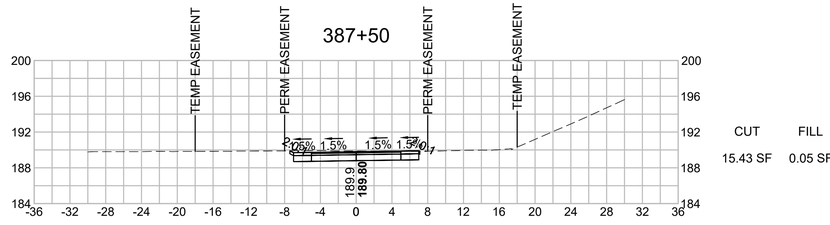
CUT 12.38 SF FILL 0.35 SF



CUT 14.23 SF FILL 0.06 SF



CUT 9.11 SF FILL 0.48 SF



CUT 15.43 SF FILL 0.05 SF

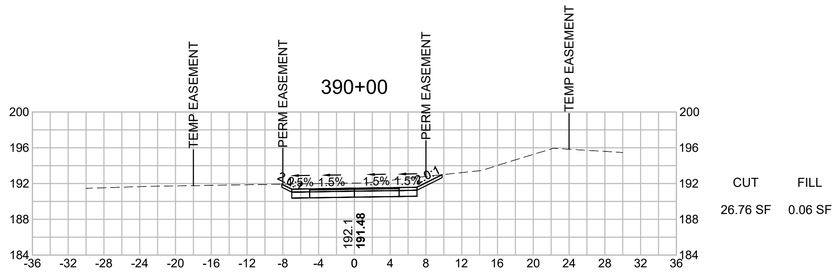
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

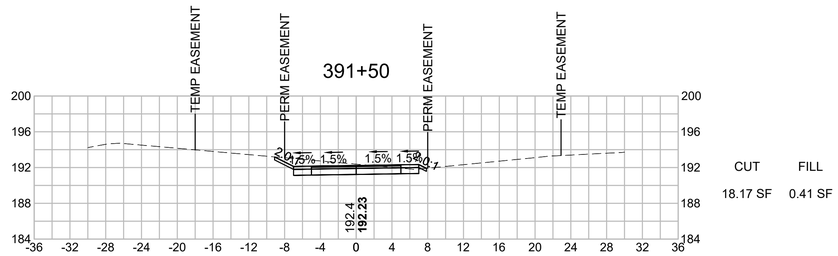
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	122	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

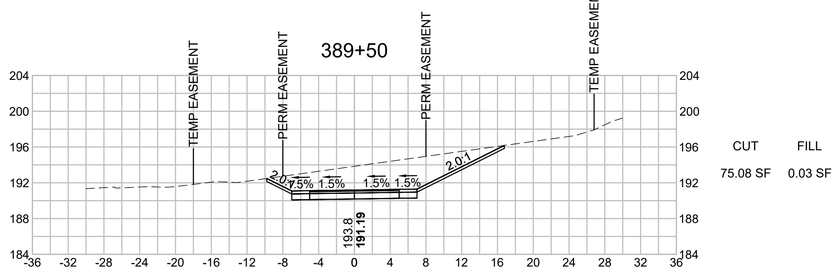
608227HD (XSEC)-2.DWG Plotted on 23-Jul-2025 1:41 PM



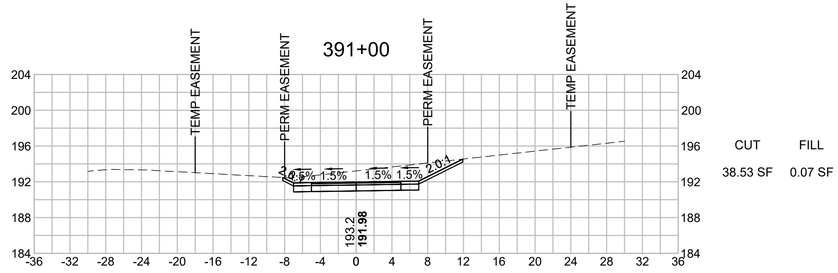
CUT	FILL
26.76 SF	0.06 SF



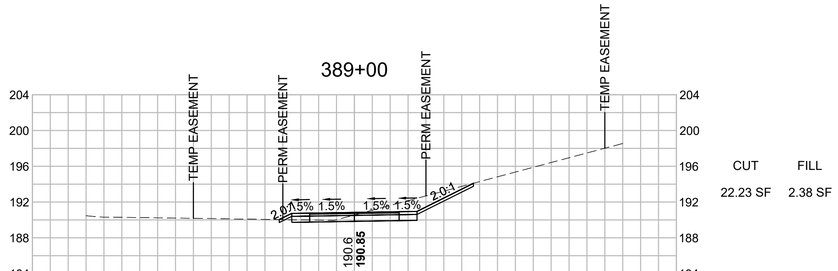
CUT	FILL
18.17 SF	0.41 SF



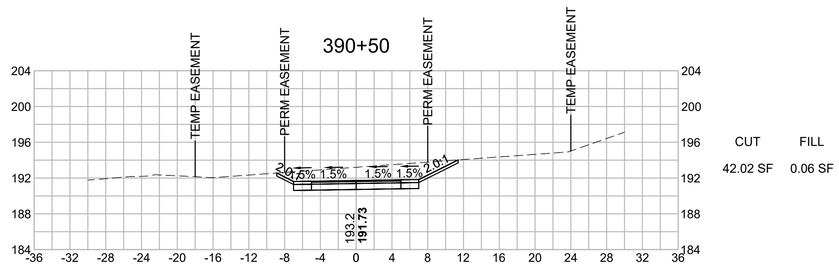
CUT	FILL
75.08 SF	0.03 SF



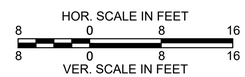
CUT	FILL
38.53 SF	0.07 SF



CUT	FILL
22.23 SF	2.38 SF



CUT	FILL
42.02 SF	0.06 SF

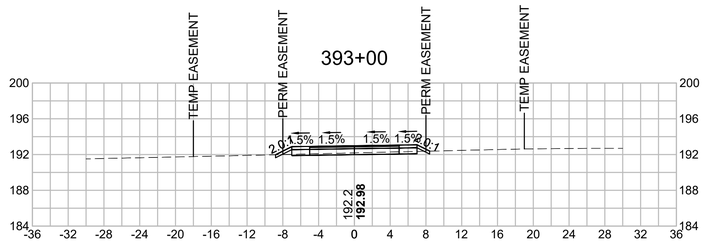


BILLERICA
YANKEE DOODLE BIKE PATH

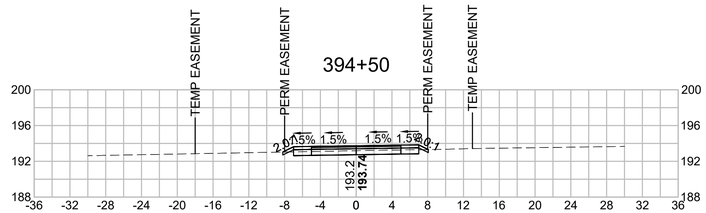
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	123	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

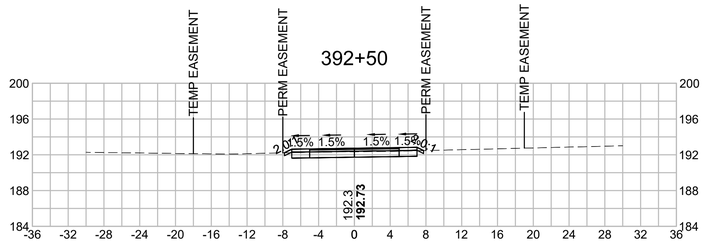
608227HD (XSEC)-2.DWG Plotted on 23-Jul-2025 1:42 PM



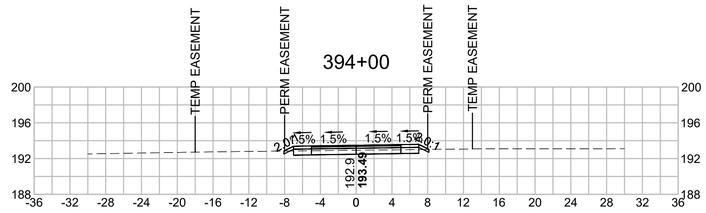
CUT 8.61 SF FILL 6.05 SF



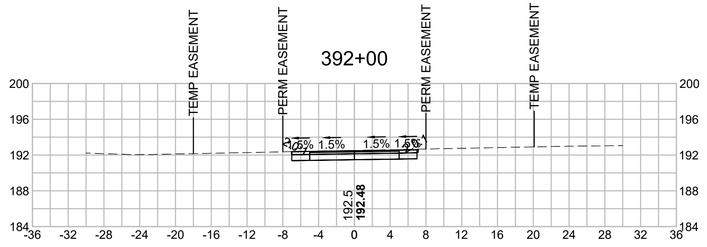
CUT 8.13 SF FILL 1.79 SF



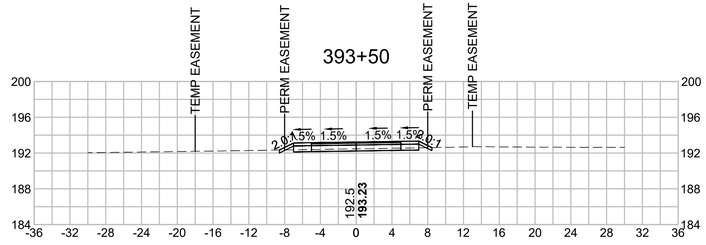
CUT 9.30 SF FILL 0.55 SF



CUT 8.11 SF FILL 1.73 SF



CUT 14.61 SF FILL 0.02 SF



CUT 8.52 SF FILL 5.35 SF

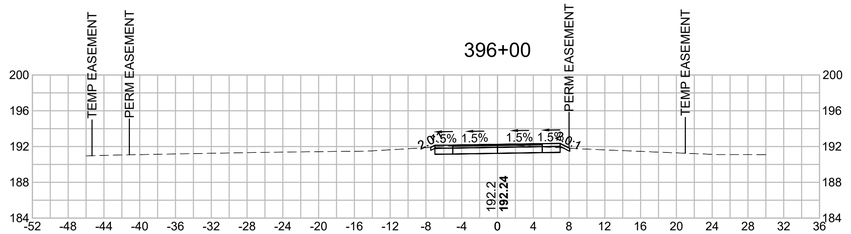
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

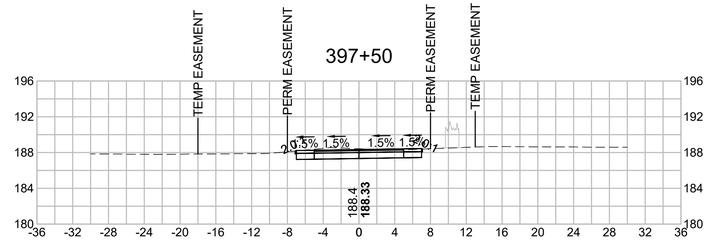
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	124	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

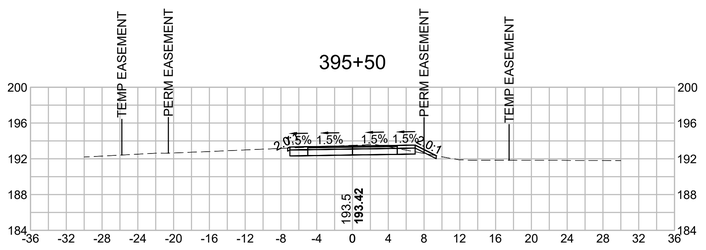
608227HD (XSEC)-2.DWG Plotted on 23-Jul-2025 1:42 PM



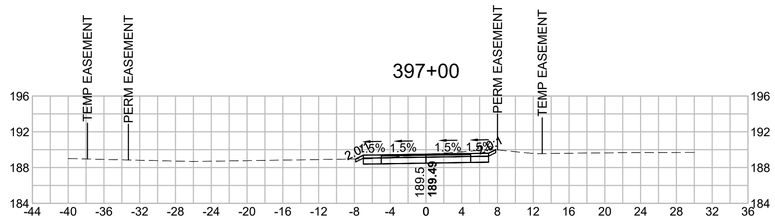
CUT	FILL
12.63 SF	0.57 SF



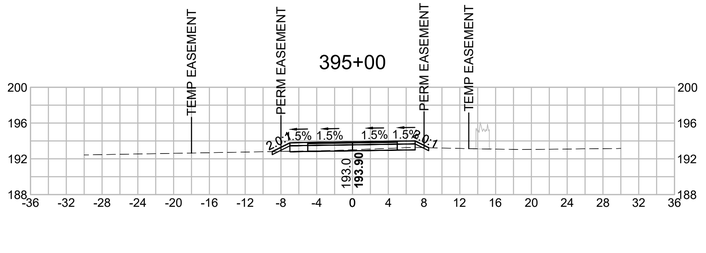
CUT	FILL
14.70 SF	0.04 SF



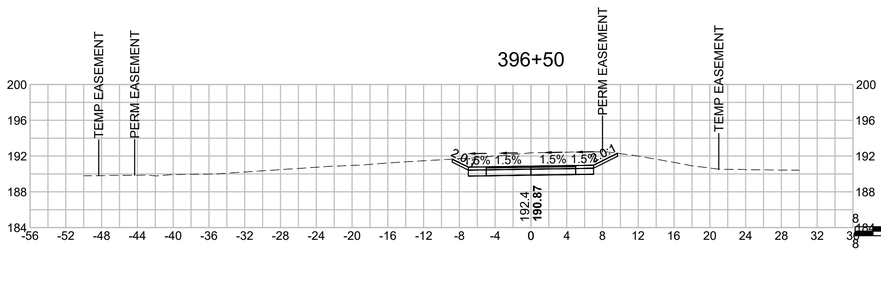
CUT	FILL
14.22 SF	1.38 SF



CUT	FILL
14.37 SF	0.35 SF



CUT	FILL
8.74 SF	7.22 SF



CUT	FILL
37.74 SF	0.05 SF

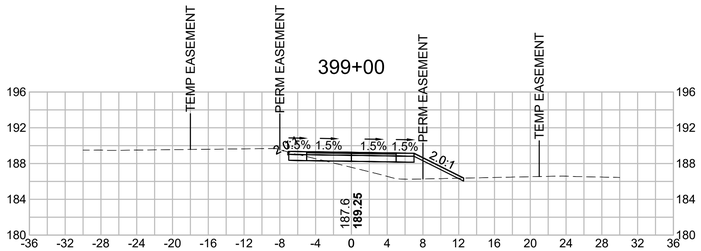
HOR. SCALE IN FEET
8 0 8 16
VER. SCALE IN FEET
8 0 8 16

BILLERICA
YANKEE DOODLE BIKE PATH

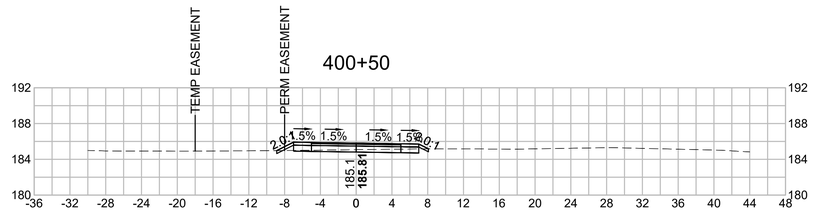
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	125	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

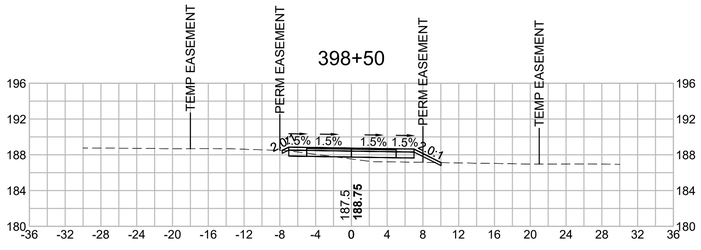
608227HD (XSEC)-2.DWG Plotted on 23-Jul-2025 1:42 PM



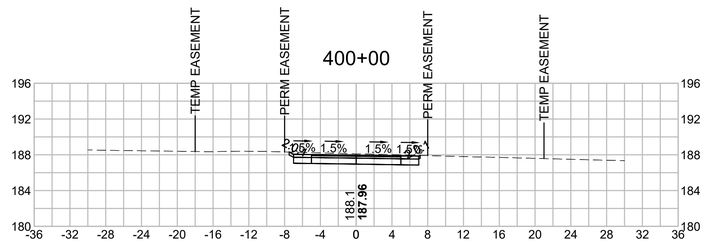
CUT	FILL
10.19 SF	25.61 SF



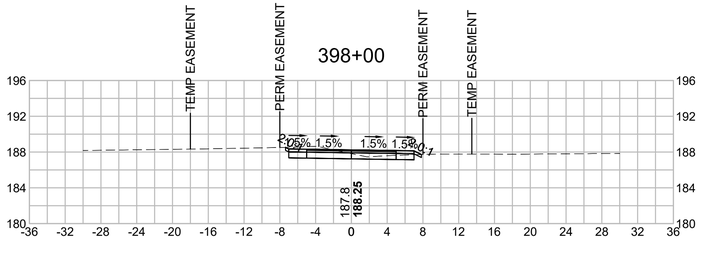
CUT	FILL
8.36 SF	4.82 SF



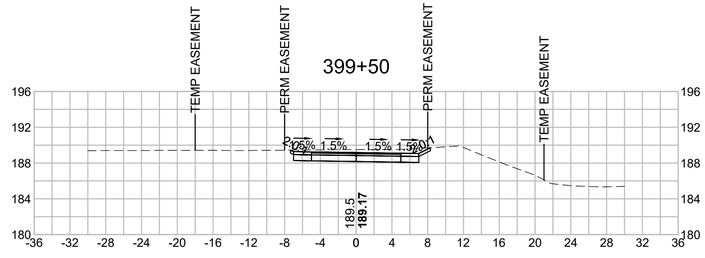
CUT	FILL
8.91 SF	11.72 SF



CUT	FILL
16.56 SF	0.05 SF



CUT	FILL
11.81 SF	0.99 SF



CUT	FILL
19.70 SF	0.06 SF

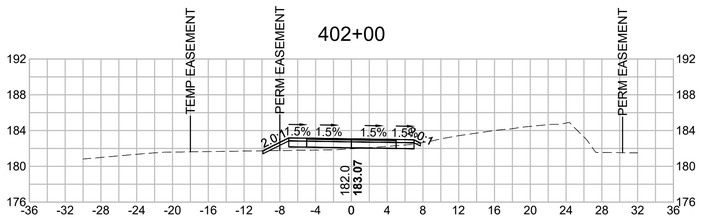
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

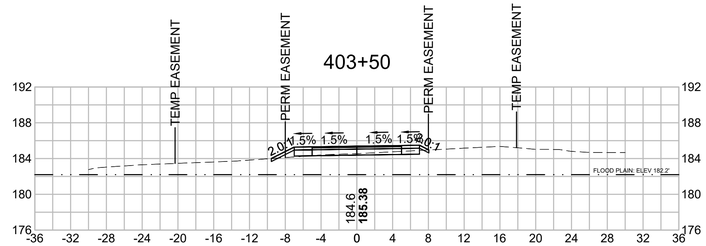
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	126	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

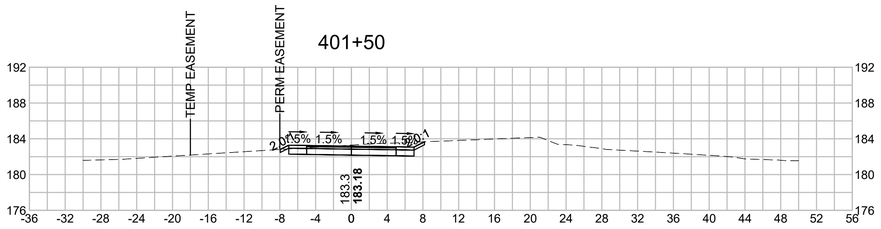
608227HD (XSEC)-2.DWG Plotted on 23-Jul-2025 1:42 PM



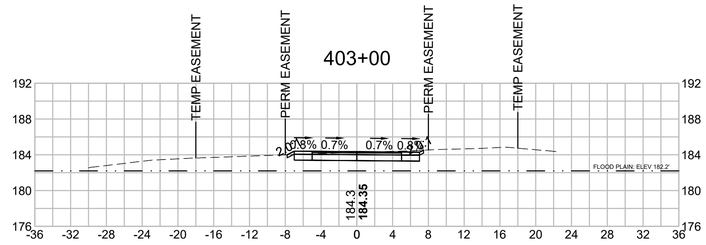
CUT 8.63 SF FILL 10.41 SF



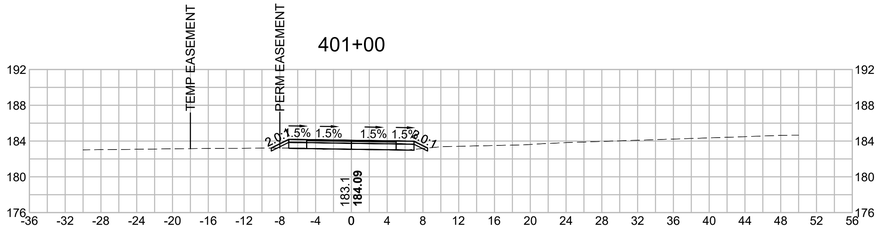
CUT 8.79 SF FILL 6.78 SF



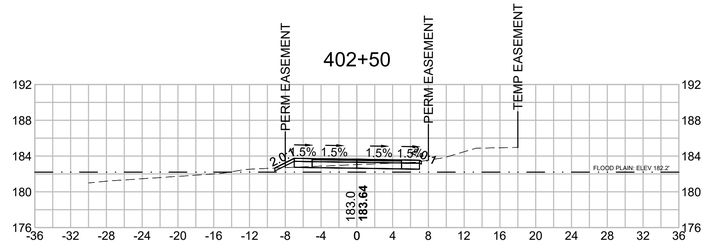
CUT 16.44 SF FILL 0.20 SF



CUT 13.37 SF FILL 0.23 SF



CUT 8.62 SF FILL 9.30 SF



CUT 9.01 SF FILL 3.65 SF

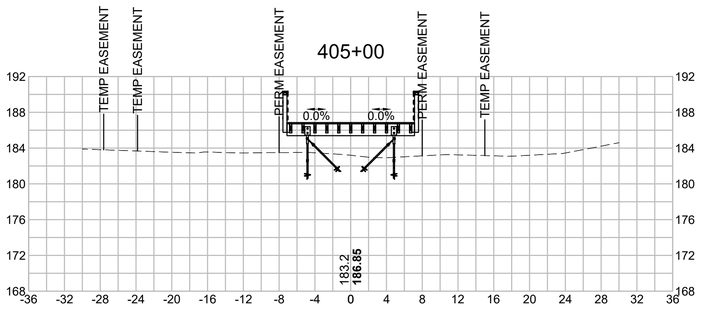
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

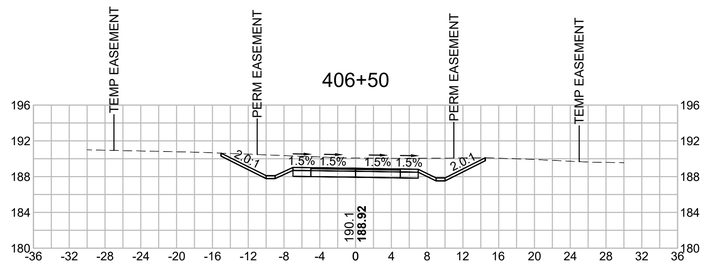
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	127	231
PROJECT FILE NO. 608227			

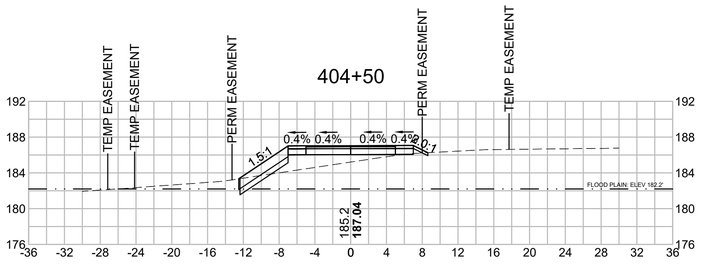
CROSS SECTIONS

608227HD (XSEC)-2.DWG Plotted on 23-Jul-2025 1:43 PM

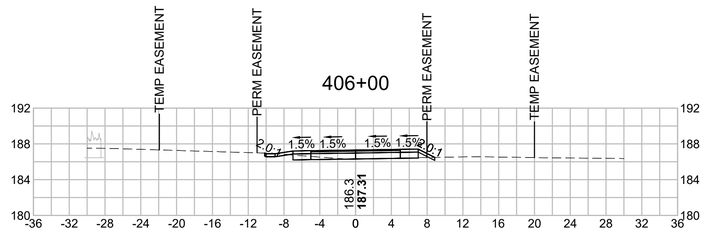




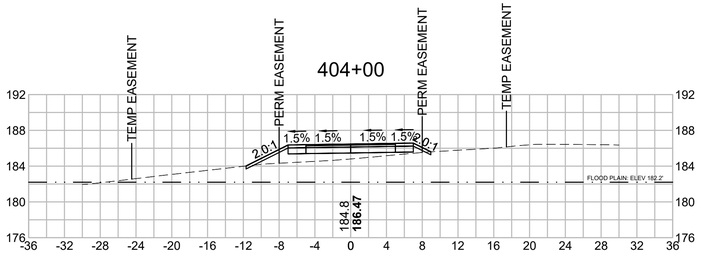
CUT	FILL
58.17 SF	0.06 SF



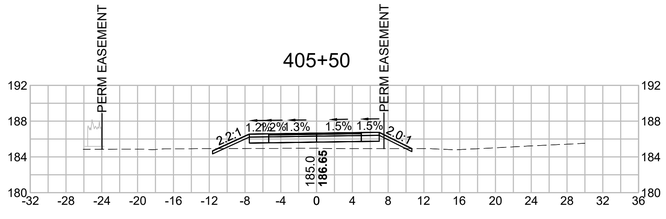
CUT	FILL
8.96 SF	21.43 SF



CUT	FILL
9.40 SF	7.13 SF



CUT	FILL
10.30 SF	22.54 SF



CUT	FILL
11.15 SF	24.95 SF

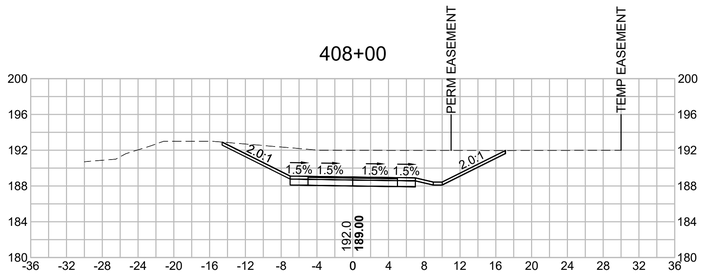
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

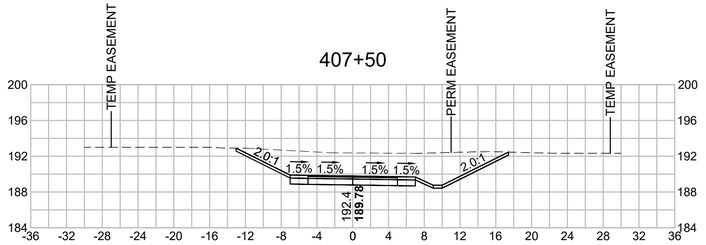
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	128	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

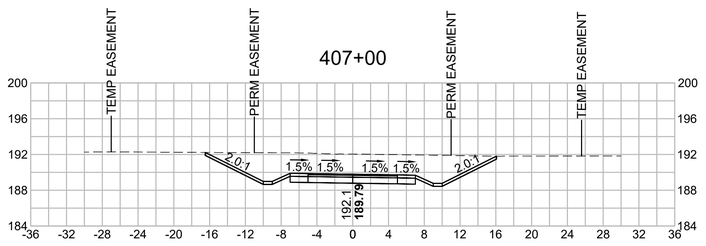
608227HD (XSEC)-2.DWG Plotted on 23-Jul-2025 1:43 PM



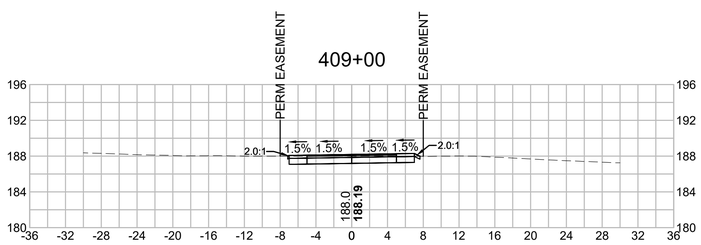
CUT 96.81 SF FILL 0.06 SF

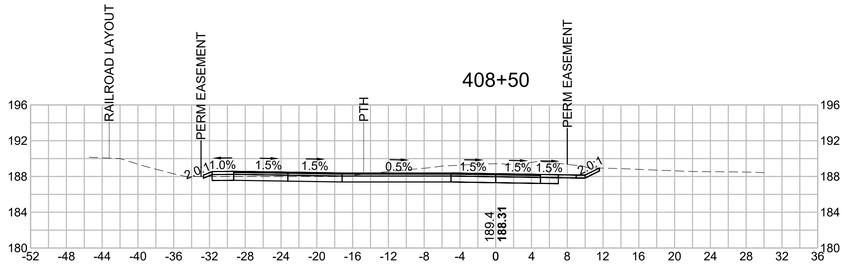


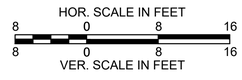
CUT 88.18 SF FILL 0.05 SF



CUT 89.16 SF FILL 0.06 SF





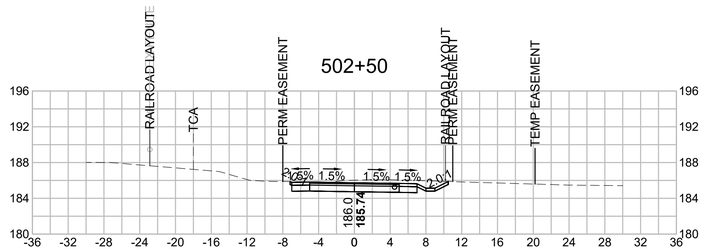


BILLERICA
YANKEE DOODLE BIKE PATH

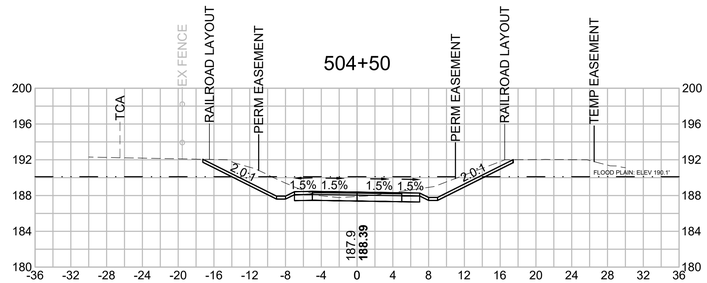
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	129	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

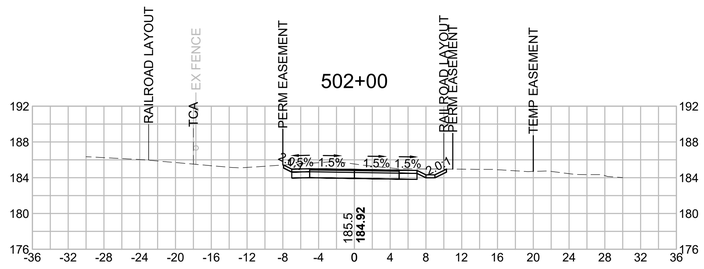
608227HD (XSEC)-3.DWG Plotted on 23-Jul-2025 1:43 PM



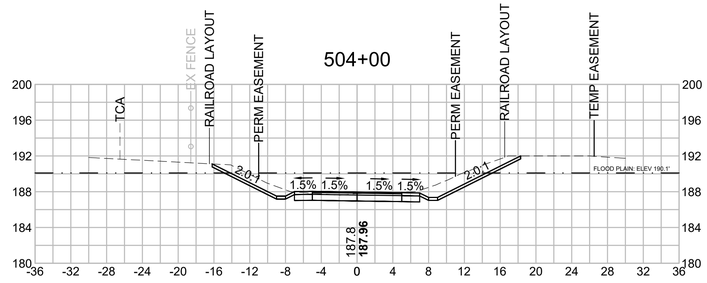
CUT 20.46 SF FILL 0.02 SF



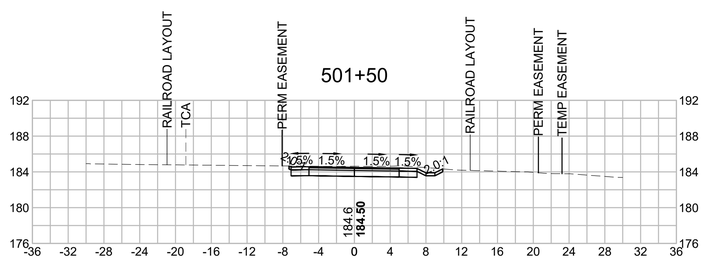
CUT 41.25 SF FILL 0.27 SF



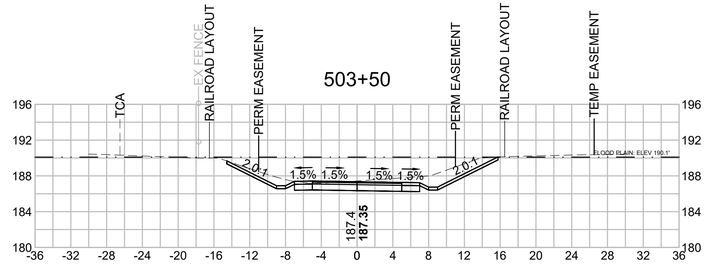
CUT 24.12 SF FILL 0.02 SF



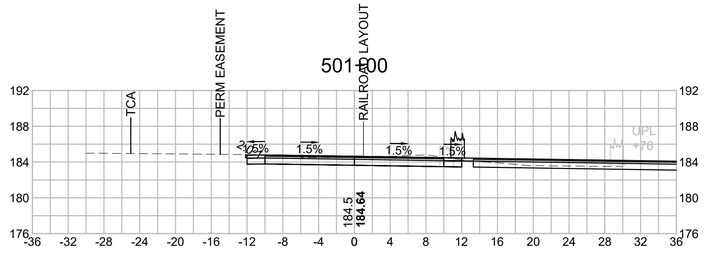
CUT 37.70 SF FILL 0.07 SF



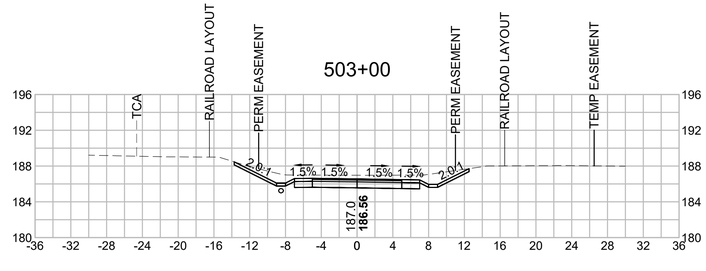
CUT 18.16 SF FILL 0.03 SF



CUT 34.02 SF FILL 0.11 SF



CUT 22.13 SF FILL 0.02 SF



CUT 32.48 SF FILL 0.08 SF

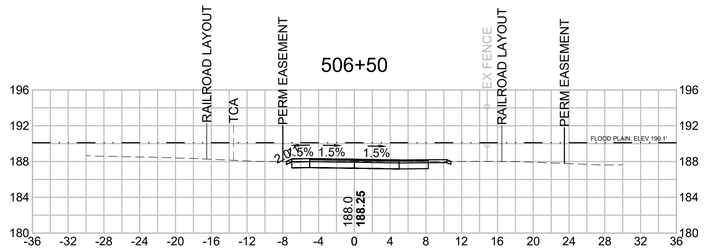
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

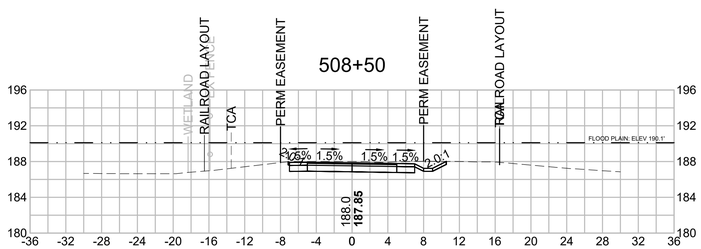
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	130	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

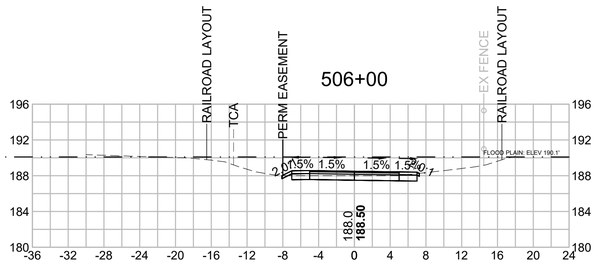
608227HD (XSEC)-3.DWG Plotted on 23-Jul-2025 1:43 PM



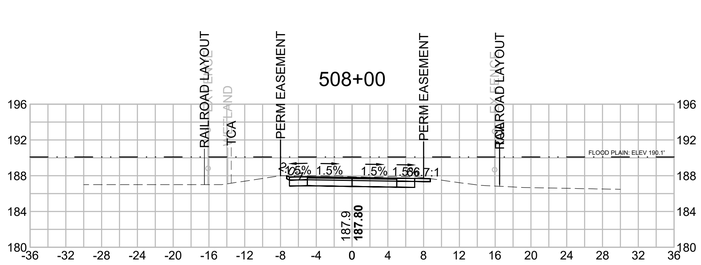
CUT 9.22 SF FILL 0.19 SF



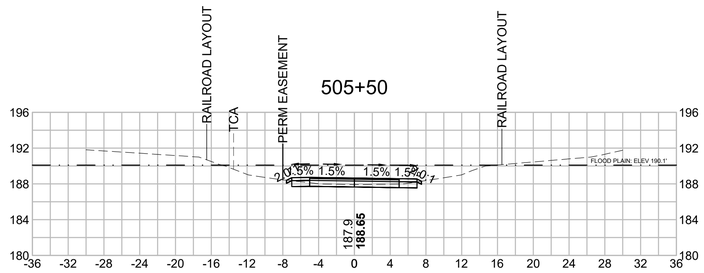
CUT 19.12 SF FILL 0.05 SF



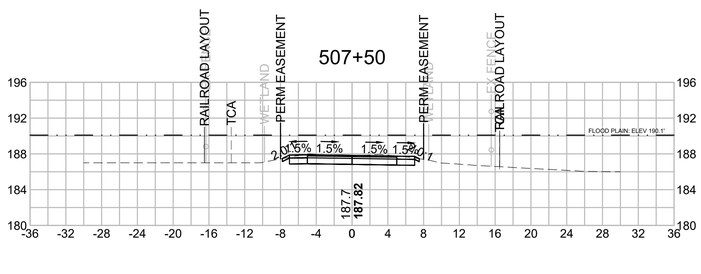
CUT 8.29 SF FILL 0.85 SF



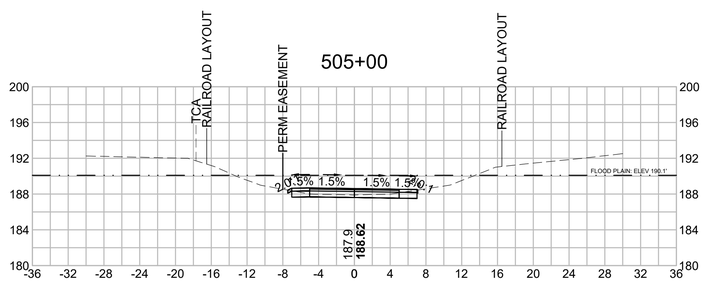
CUT 16.98 SF FILL 0.14 SF



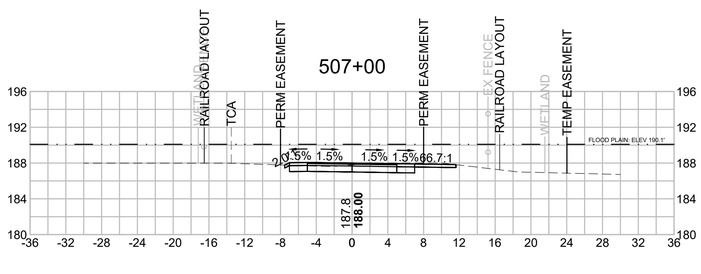
CUT 7.64 SF FILL 2.27 SF



CUT 14.57 SF FILL 0.26 SF



CUT 7.94 SF FILL 1.82 SF



CUT 14.27 SF FILL 0.41 SF

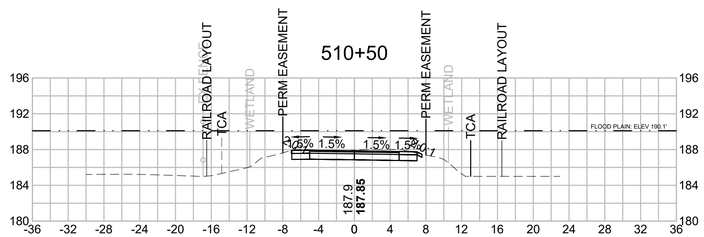
HOR. SCALE IN FEET
8 0 8 16
VER. SCALE IN FEET
8 0 8 16

BILLERICA
YANKEE DOODLE BIKE PATH

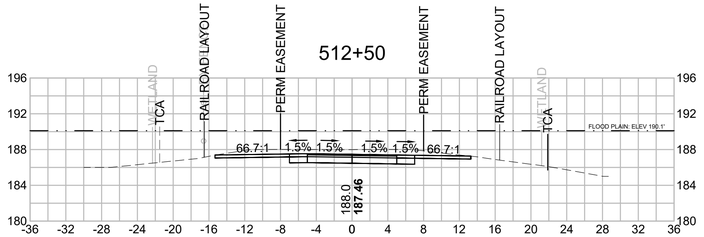
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	131	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

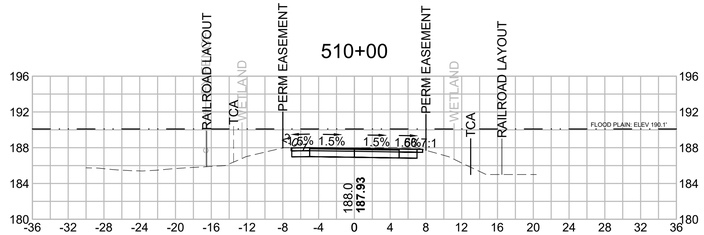
608227HD (XSEC)-3.DWG Plotted on 23-Jul-2025 1:44 PM



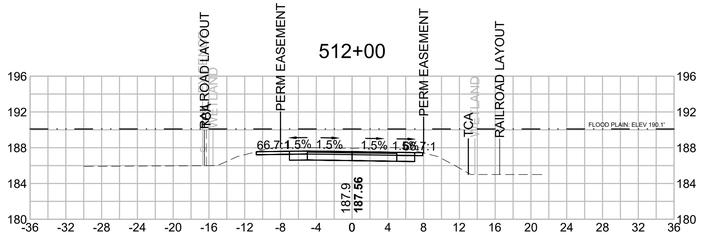
CUT	FILL
15.44 SF	0.08 SF



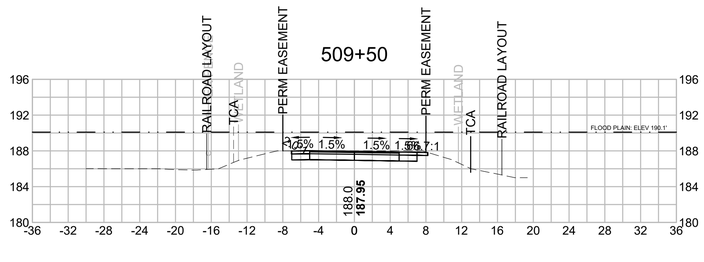
CUT	FILL
32.02 SF	0.27 SF



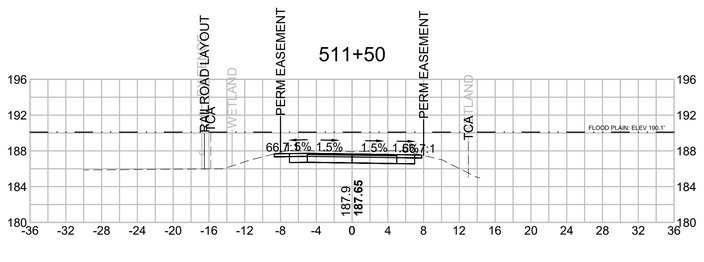
CUT	FILL
15.39 SF	0.05 SF



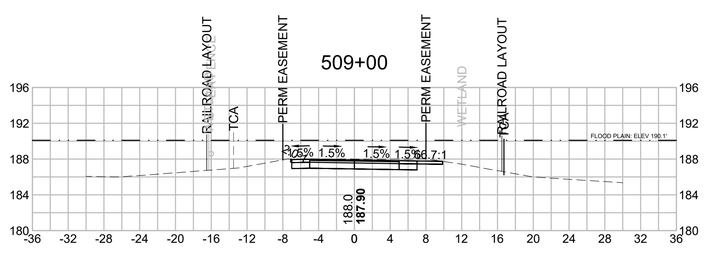
CUT	FILL
22.81 SF	0.12 SF



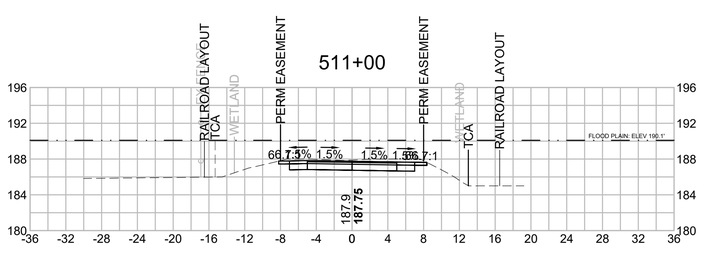
CUT	FILL
15.54 SF	0.05 SF



CUT	FILL
19.73 SF	0.12 SF



CUT	FILL
17.06 SF	0.12 SF



CUT	FILL
18.48 SF	0.09 SF

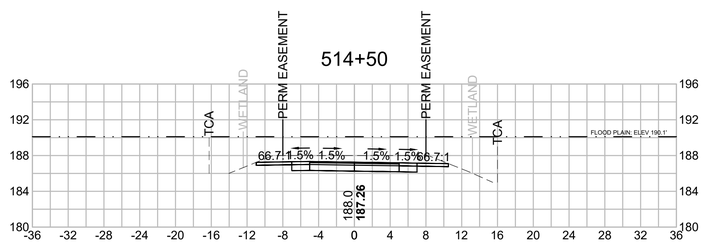
HOR. SCALE IN FEET
8 0 8 16
VER. SCALE IN FEET
8 0 8 16

BILLERICA
YANKEE DOODLE BIKE PATH

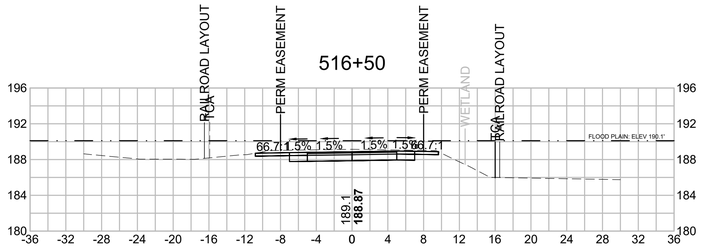
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	132	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

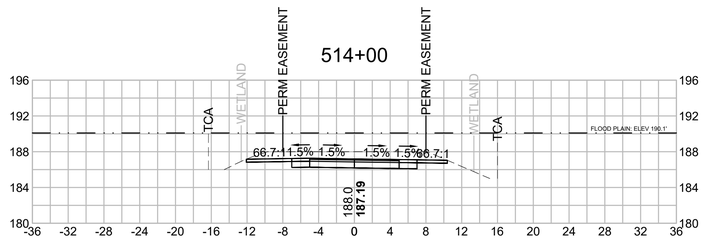
608227HD (XSEC)-3.DWG Plotted on 23-Jul-2025 1:44 PM



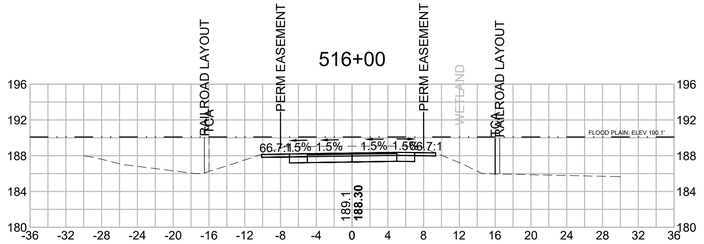
CUT	FILL
31.29 SF	0.07 SF



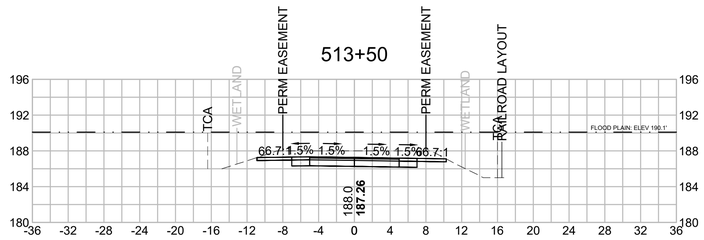
CUT	FILL
20.53 SF	0.14 SF



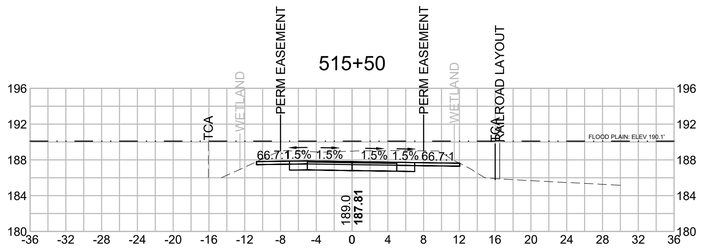
CUT	FILL
33.50 SF	0.07 SF



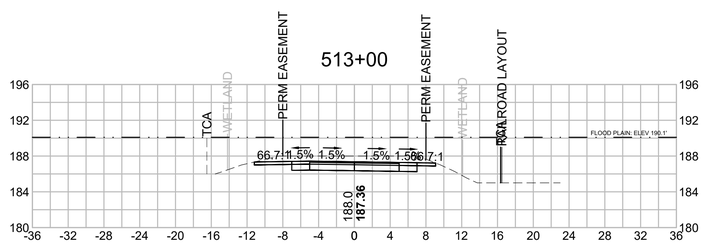
CUT	FILL
29.03 SF	0.04 SF



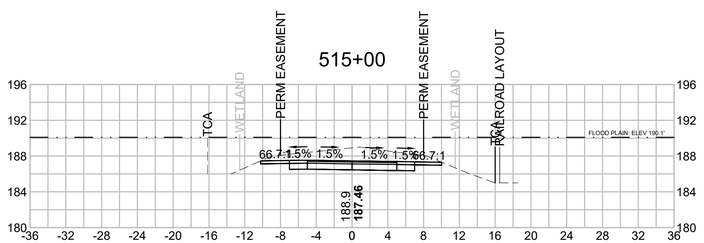
CUT	FILL
30.88 SF	0.07 SF



CUT	FILL
41.23 SF	0.06 SF



CUT	FILL
27.76 SF	0.10 SF



CUT	FILL
35.18 SF	0.07 SF

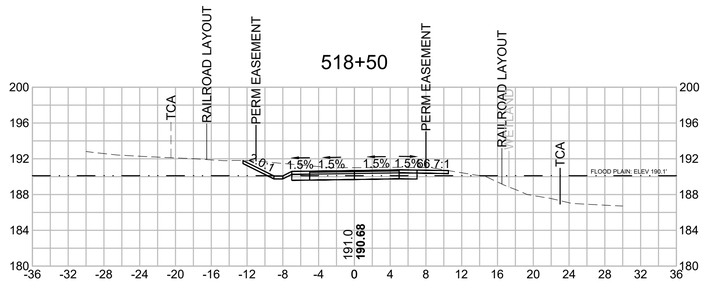
HOR. SCALE IN FEET
8 0 8 16
VER. SCALE IN FEET
8 0 8 16

BILLERICA
YANKEE DOODLE BIKE PATH

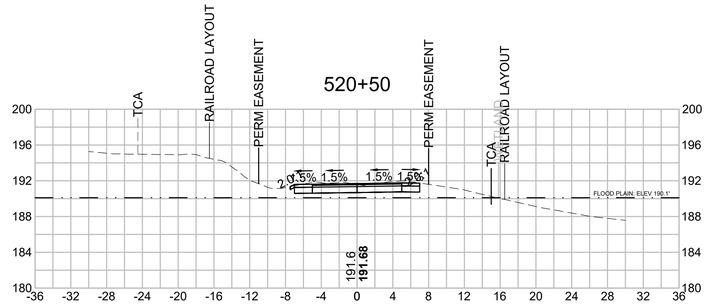
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	133	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

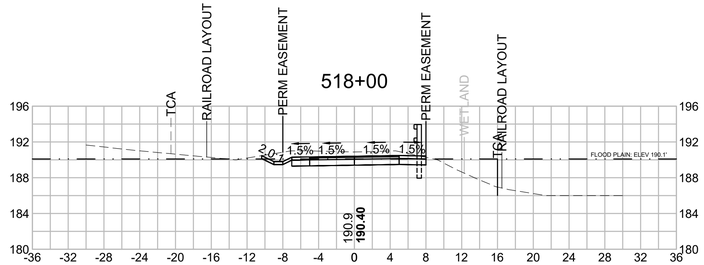
608227HD (XSEC)-3.DWG Plotted on 23-Jul-2025 1:44 PM



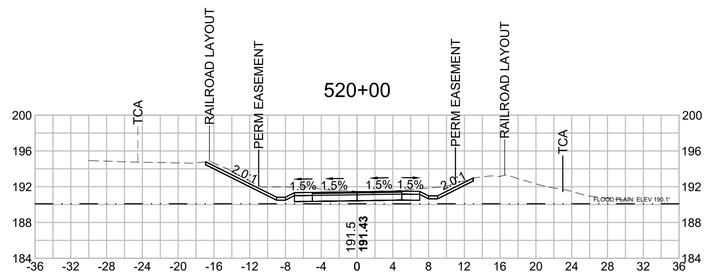
CUT 28.47 SF FILL 0.09 SF



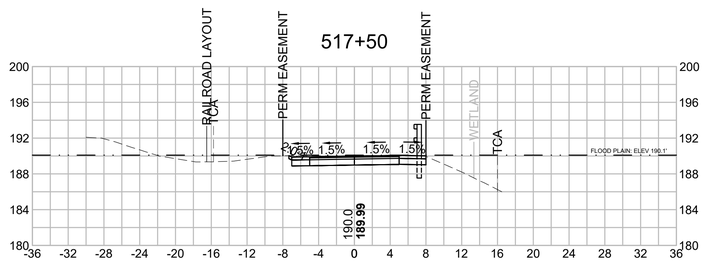
CUT 15.15 SF FILL 0.11 SF



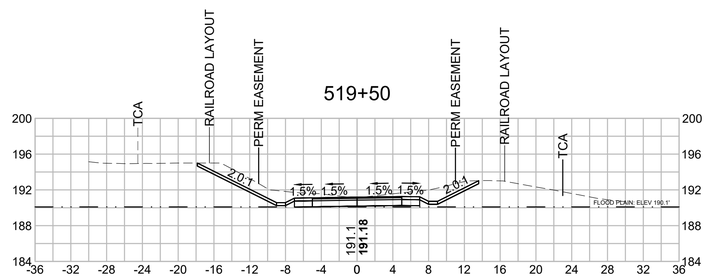
CUT 25.82 SF FILL 0.02 SF



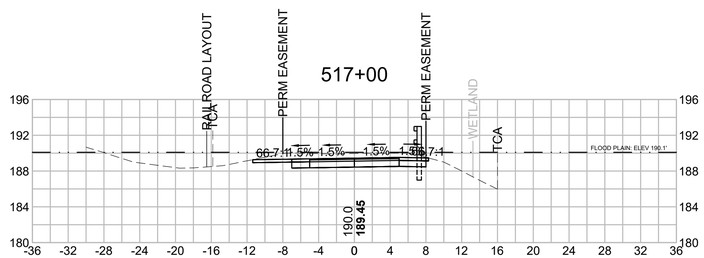
CUT 30.26 SF FILL 0.07 SF



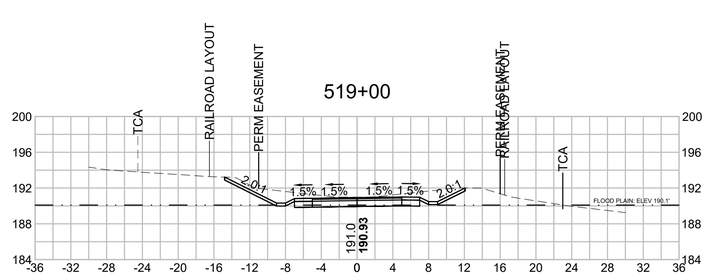
CUT 15.40 SF FILL 0.00 SF



CUT 41.60 SF FILL 0.03 SF



CUT 26.02 SF FILL 0.04 SF



CUT 32.23 SF FILL 0.03 SF

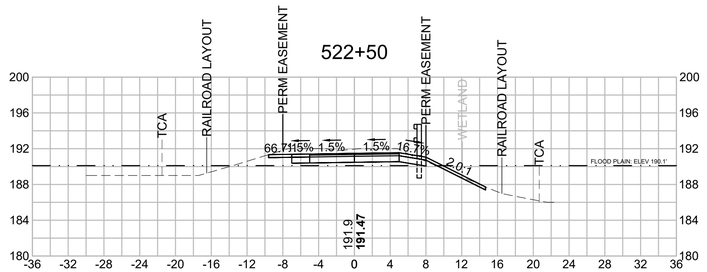
HOR. SCALE IN FEET
8 0 8 16
VER. SCALE IN FEET
8 0 8 16

BILLERICA
YANKEE DOODLE BIKE PATH

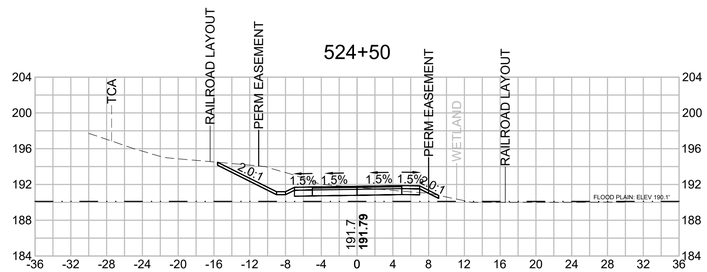
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	134	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

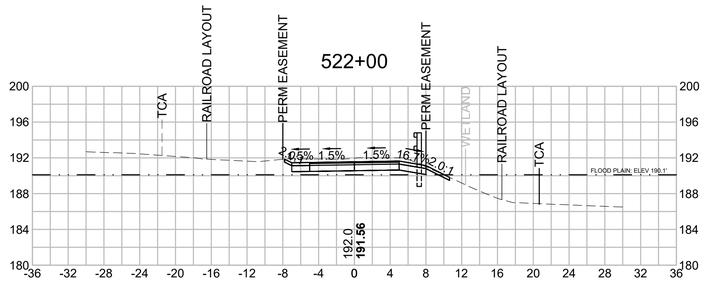
608227HD (XSEC)-3.DWG Plotted on 23-Jul-2025 1:45 PM



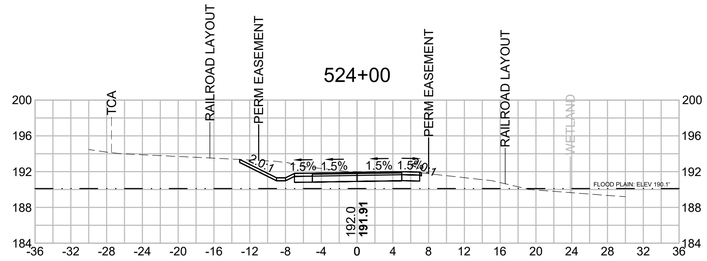
CUT	FILL
25.60 SF	2.41 SF



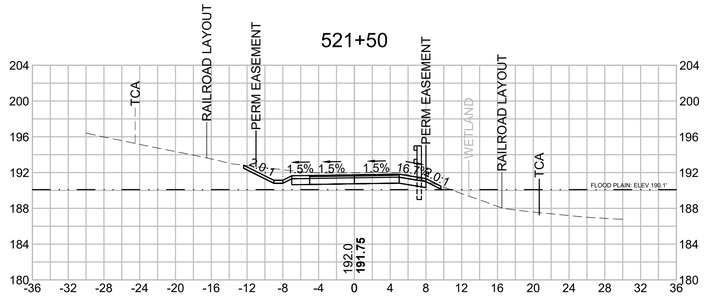
CUT	FILL
30.57 SF	1.37 SF



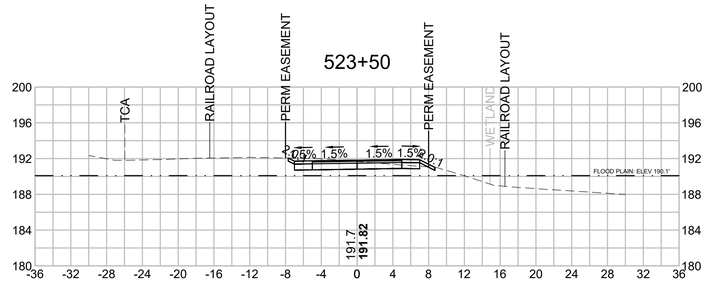
CUT	FILL
21.47 SF	0.02 SF



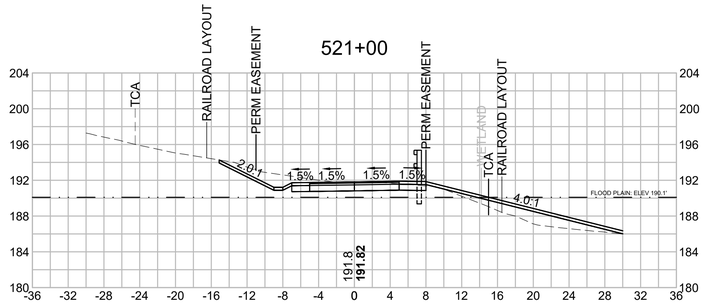
CUT	FILL
26.54 SF	0.03 SF



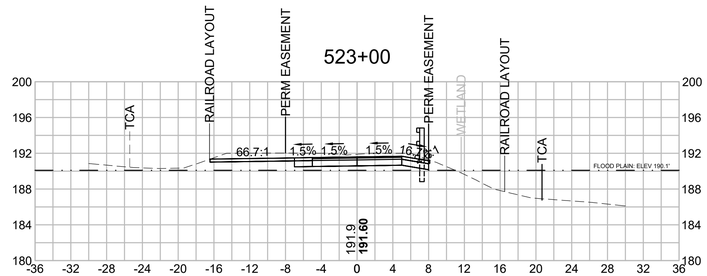
CUT	FILL
25.13 SF	0.51 SF



CUT	FILL
13.30 SF	1.21 SF



CUT	FILL
25.42 SF	0.71 SF



CUT	FILL
28.89 SF	0.01 SF

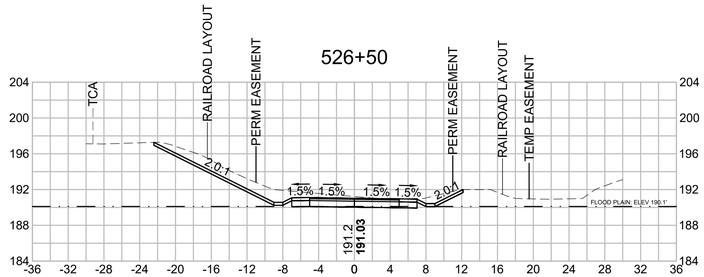
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

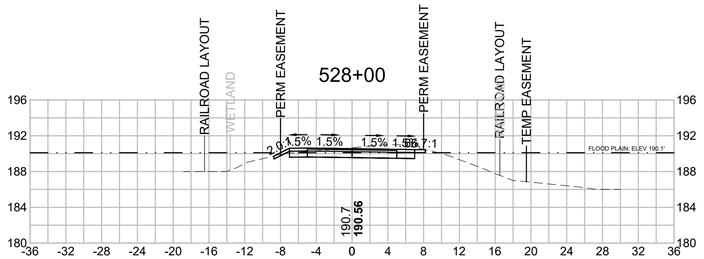
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	135	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

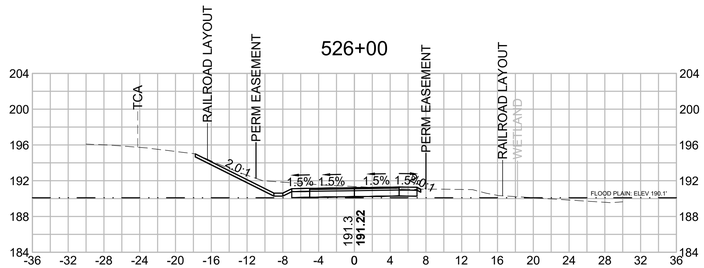
608227HD (XSEC)-3.DWG Plotted on 23-Jul-2025 1:45 PM



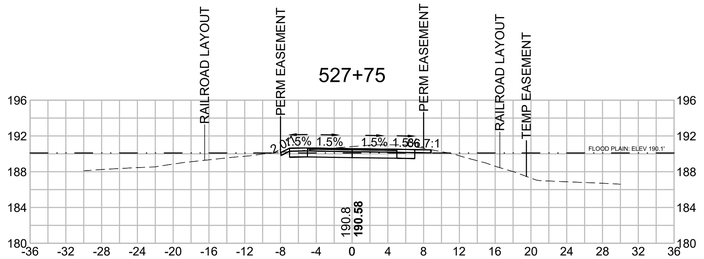
CUT	FILL
43.04 SF	0.06 SF



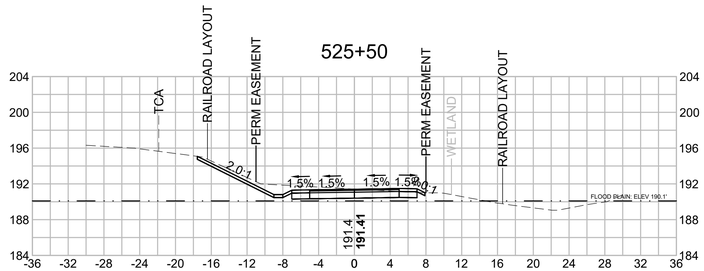
CUT	FILL
16.41 SF	0.80 SF



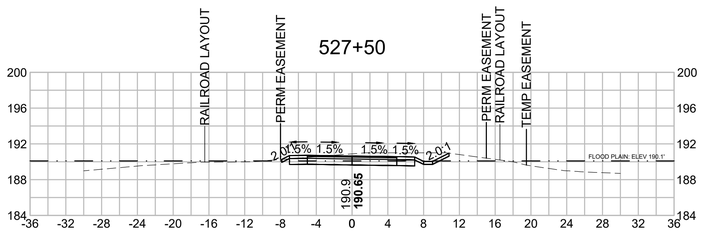
CUT	FILL
25.57 SF	0.05 SF



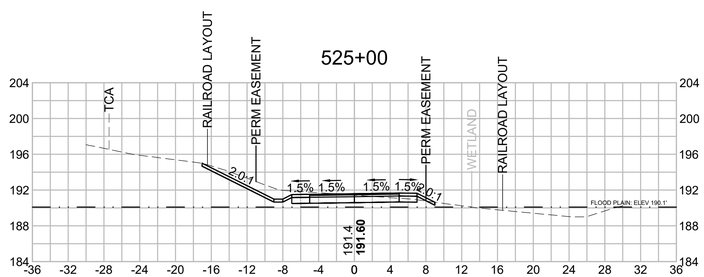
CUT	FILL
17.79 SF	0.59 SF



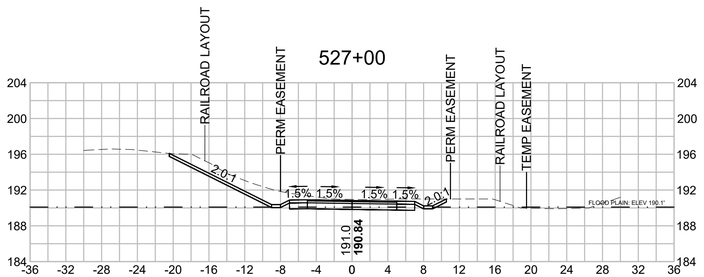
CUT	FILL
23.51 SF	0.26 SF



CUT	FILL
20.49 SF	0.32 SF



CUT	FILL
23.44 SF	1.29 SF



CUT	FILL
40.12 SF	0.06 SF

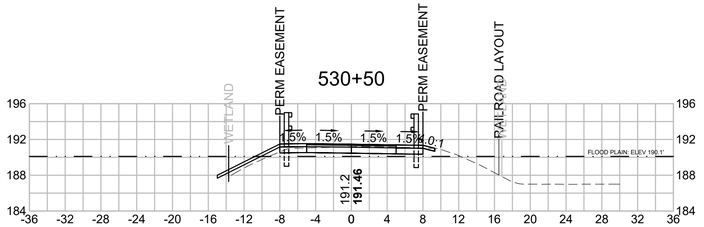
HOR. SCALE IN FEET
8 0 8 16
VER. SCALE IN FEET
8 0 8 16

BILLERICA
YANKEE DOODLE BIKE PATH

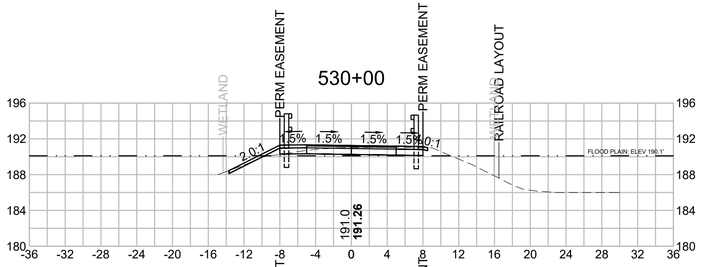
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	136	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

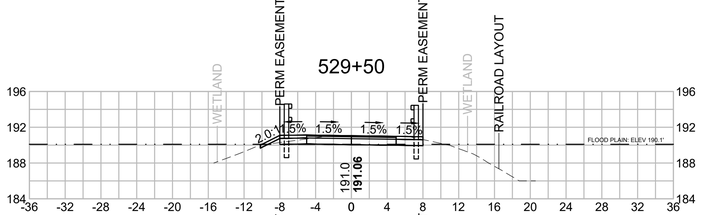
608227HD (XSEC)-3.DWG Plotted on 23-Jul-2025 1:45 PM



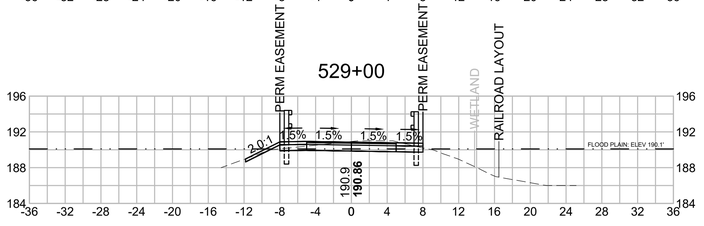
CUT 11.19 SF FILL 0.55 SF



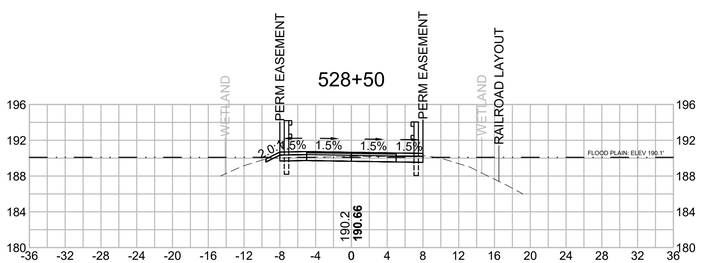
CUT 14.36 SF FILL 4.10 SF



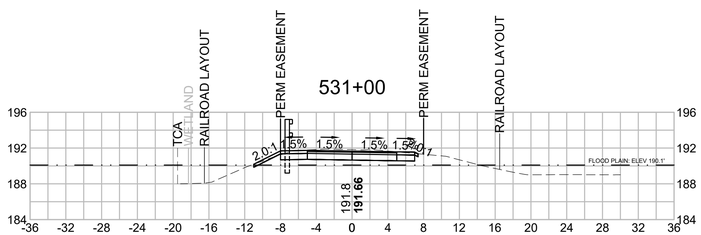
CUT 14.66 SF FILL 1.58 SF



CUT 15.56 SF FILL 2.22 SF



CUT 9.76 SF FILL 1.43 SF



CUT 17.69 SF FILL 1.20 SF

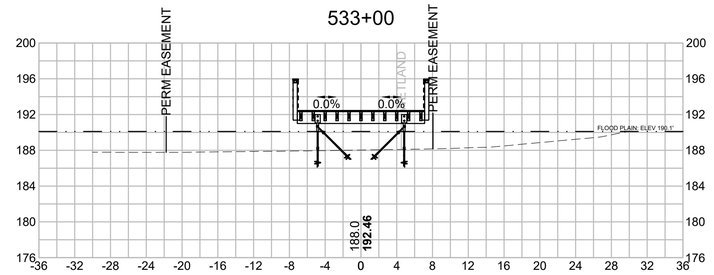
HOR. SCALE IN FEET
8 0 8 16
VER. SCALE IN FEET
8 0 8 16

BILLERICA
YANKEE DOODLE BIKE PATH

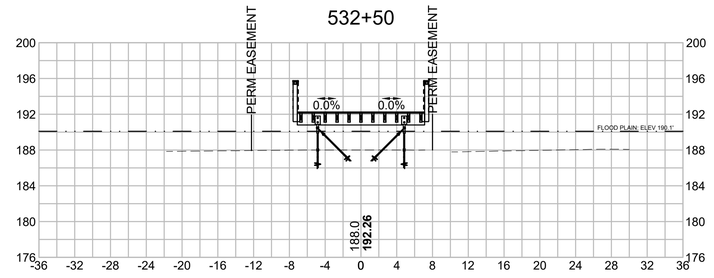
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	137	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

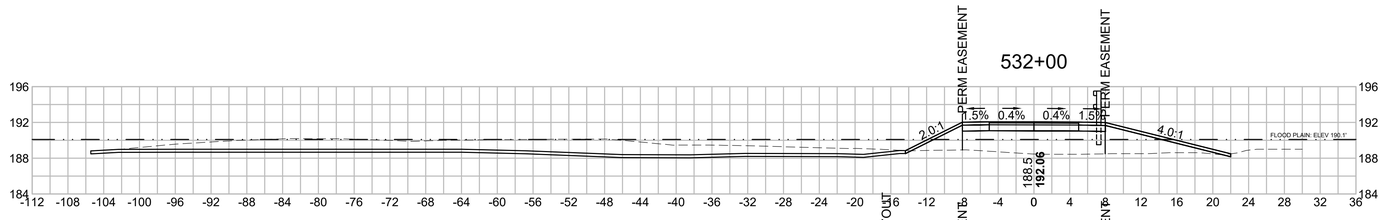
608227HD (XSEC)-3.DWG Plotted on 23-Jul-2025 1:46 PM



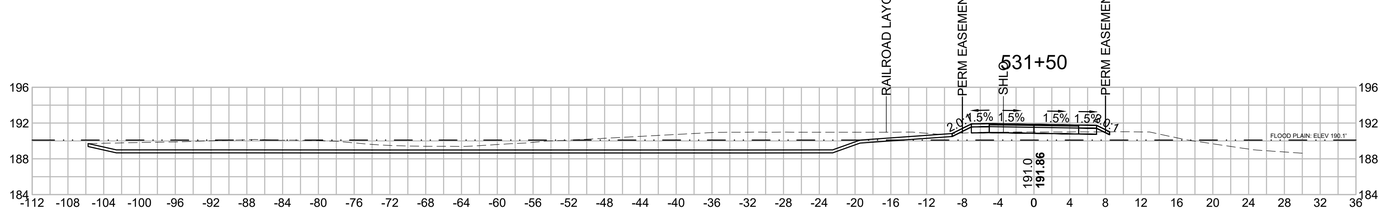
CUT 0.00 SF FILL 0.00 SF



CUT 0.00 SF FILL 0.00 SF



CUT 16.01 SF FILL 81.31 SF



CUT 8.80 SF FILL 7.20 SF

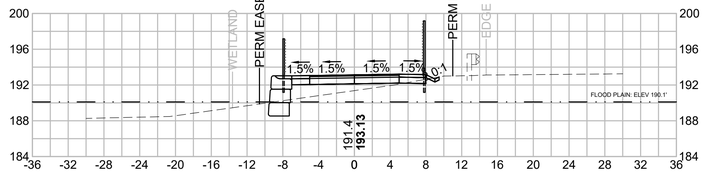
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

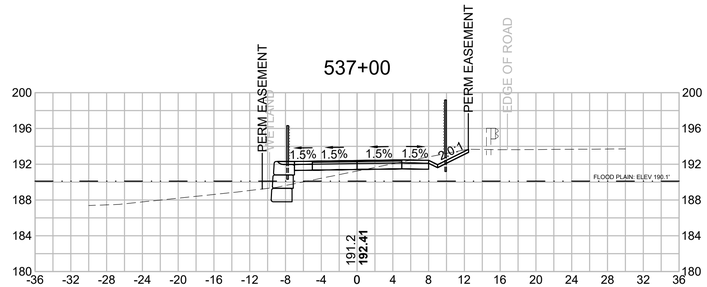
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	138	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

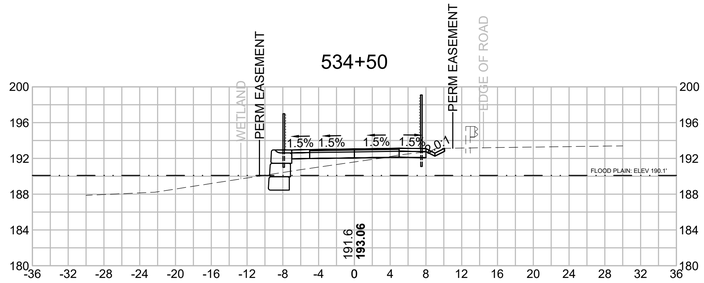
608227HD (XSEC)-3.DWG Plotted on 23-Jul-2025 1:46 PM



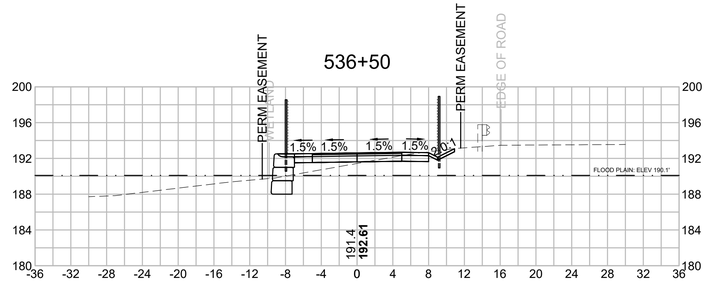
CUT	FILL
9.54 SF	24.10 SF



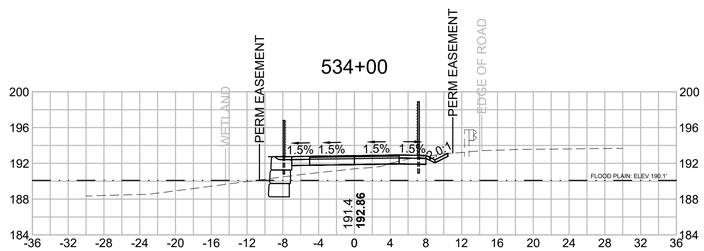
CUT	FILL
14.86 SF	15.78 SF



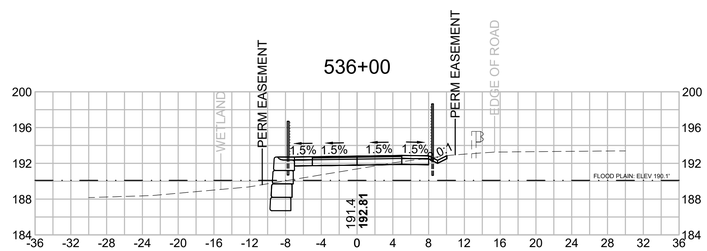
CUT	FILL
10.08 SF	18.76 SF



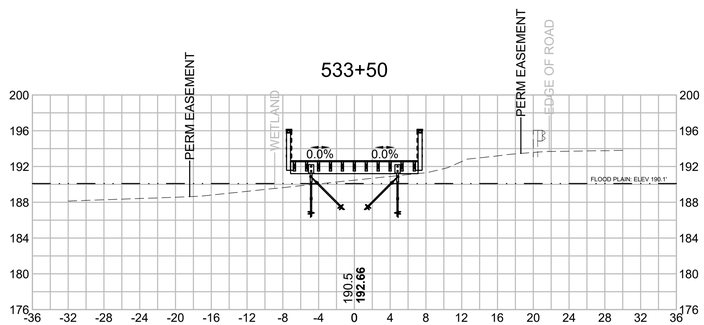
CUT	FILL
12.06 SF	15.45 SF



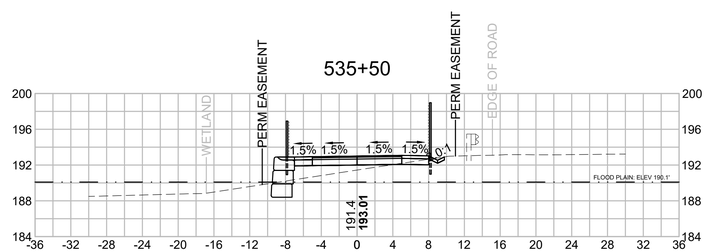
CUT	FILL
10.83 SF	17.35 SF



CUT	FILL
10.12 SF	19.04 SF



CUT	FILL
7.79 SF	11.53 SF



CUT	FILL
9.74 SF	21.03 SF

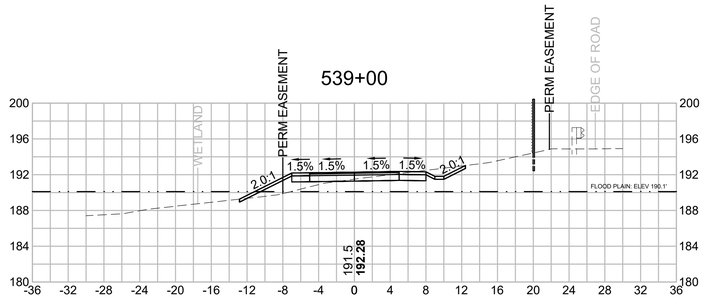
HOR. SCALE IN FEET
8 0 8 16
VER. SCALE IN FEET
8 0 8 16

BILLERICA
YANKEE DOODLE BIKE PATH

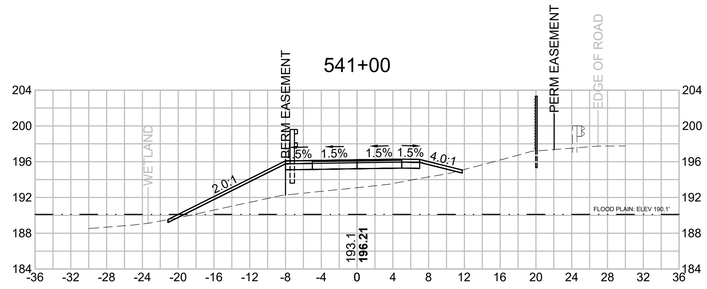
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	139	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

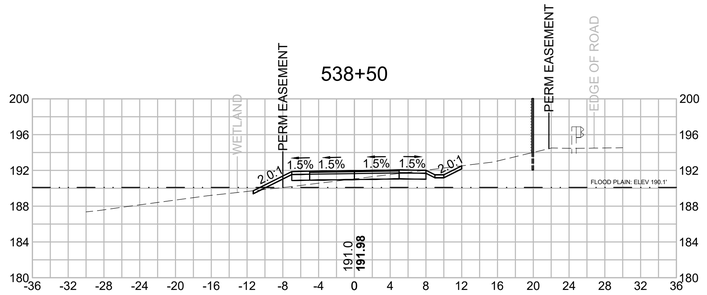
608227HD (XSEC)-3.DWG Plotted on 23-Jul-2025 1:46 PM



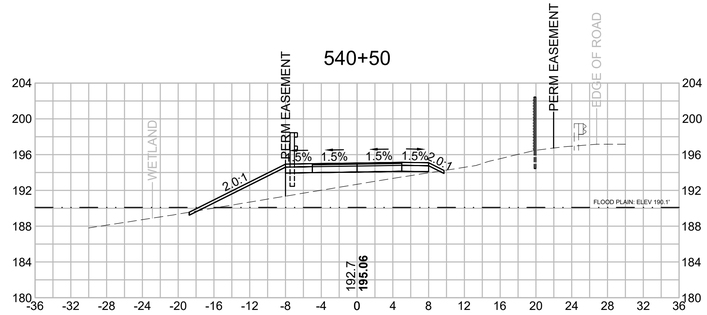
CUT 16.05 SF FILL 13.51 SF



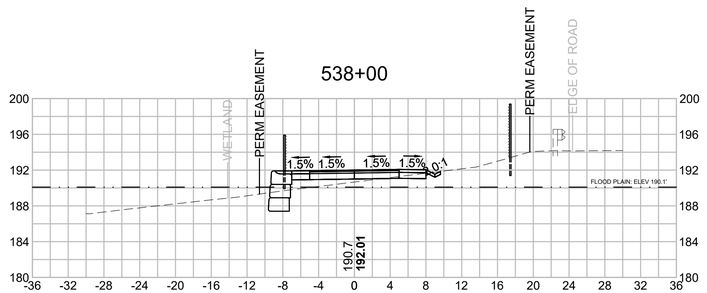
CUT 15.23 SF FILL 71.63 SF



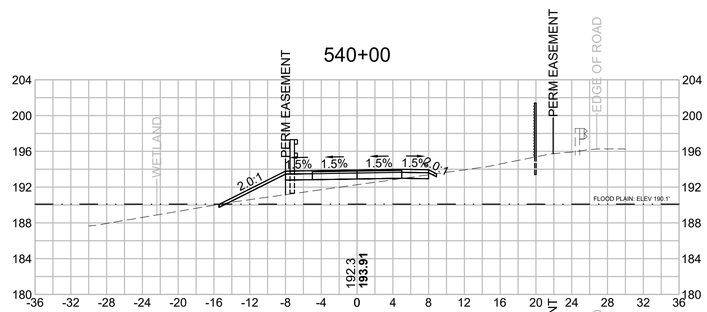
CUT 13.81 SF FILL 10.86 SF



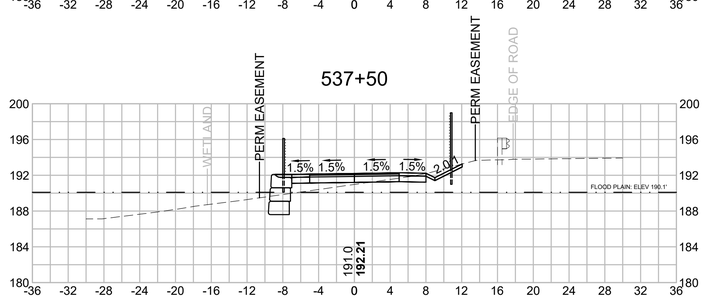
CUT 14.18 SF FILL 52.21 SF



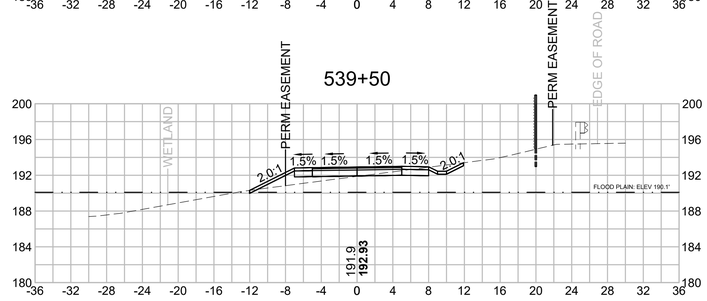
CUT 11.97 SF FILL 19.08 SF



CUT 12.16 SF FILL 29.45 SF



CUT 12.19 SF FILL 14.43 SF



CUT 13.63 SF FILL 13.50 SF

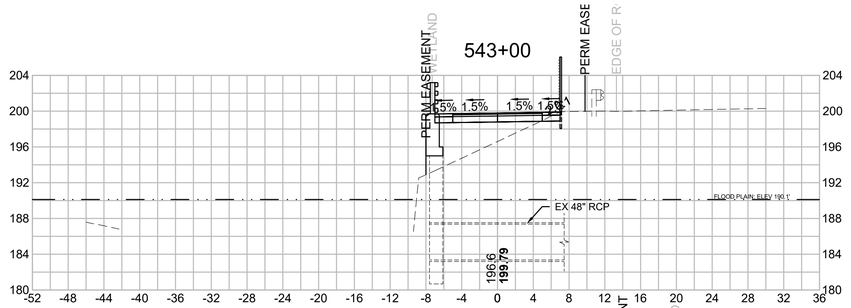
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	140	231
PROJECT FILE NO. 608227			

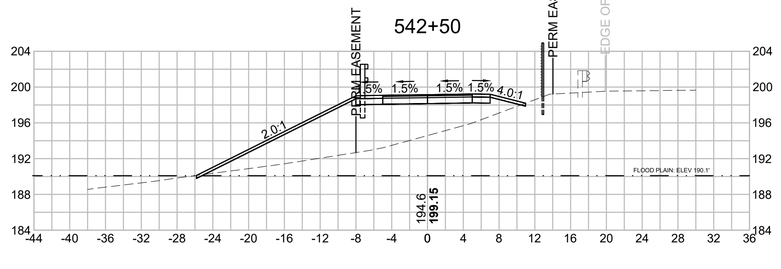
CROSS SECTIONS

608227HD (XSEC)-3.DWG Plotted on 23-Jul-2025 1:47 PM

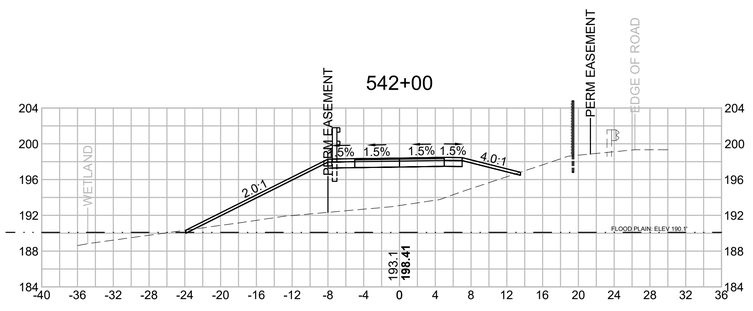


CUT 1.13 SF

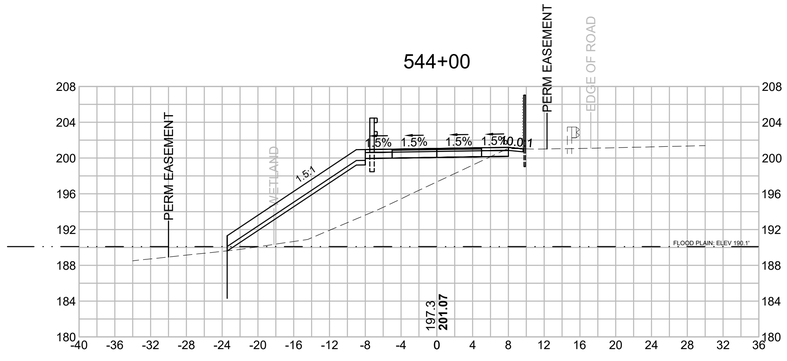
FILL 37.88 SF



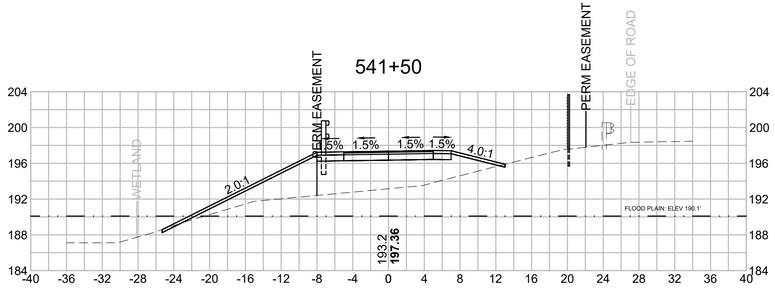
CUT	FILL
18.19 SF	128.20 SF



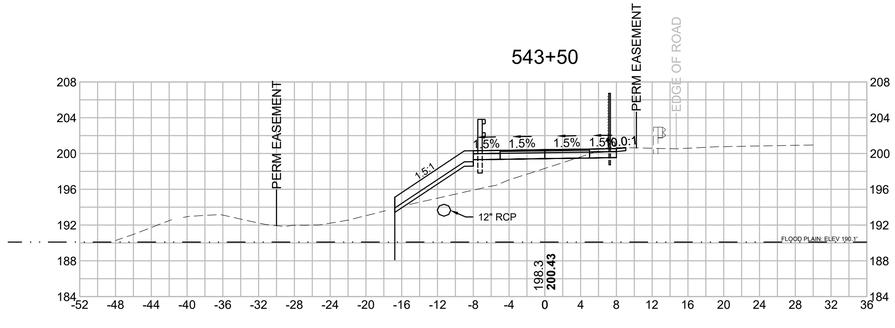
CUT	FILL
17.64 SF	131.75 SF



CUT	FILL
18.21 SF	119.68 SF



CUT	FILL
16.69 SF	98.84 SF



CUT	FILL
15.70 SF	43.61 SF

HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

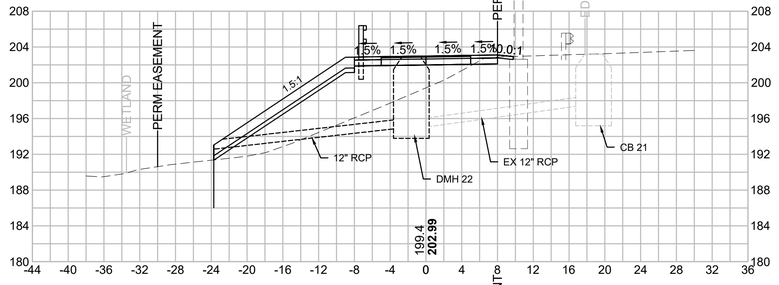
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	141	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

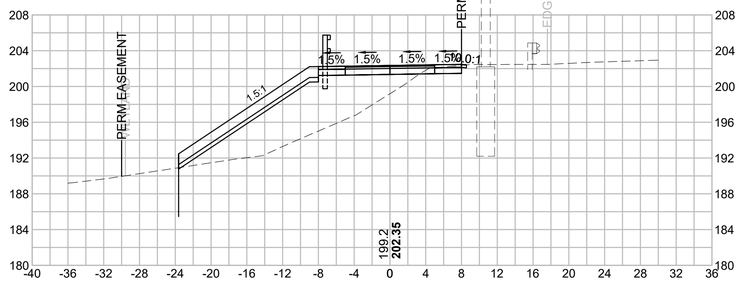
608227HD (XSEC)-3.DWG Plotted on 23-Jul-2025 1:47 PM

545+50



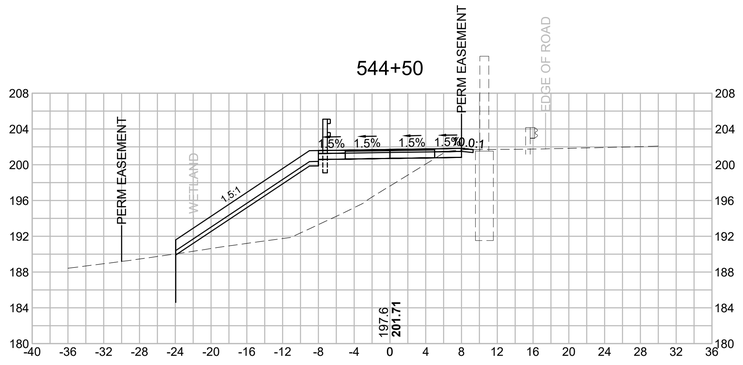
CUT	FILL
18.54 SF	111.30 SF

545+00



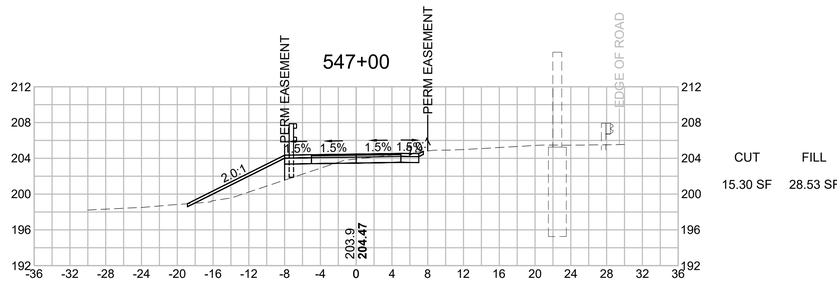
CUT	FILL
18.55 SF	109.91 SF

544+50



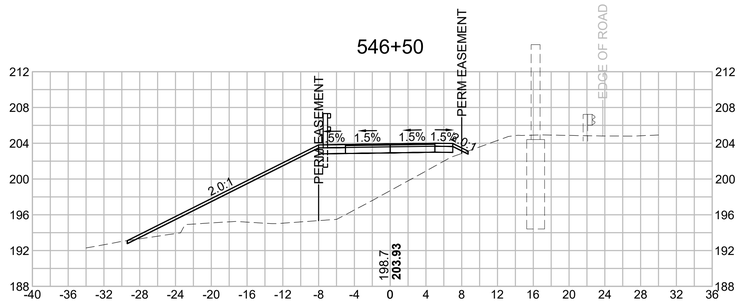
CUT	FILL
18.59 SF	130.58 SF

547+00



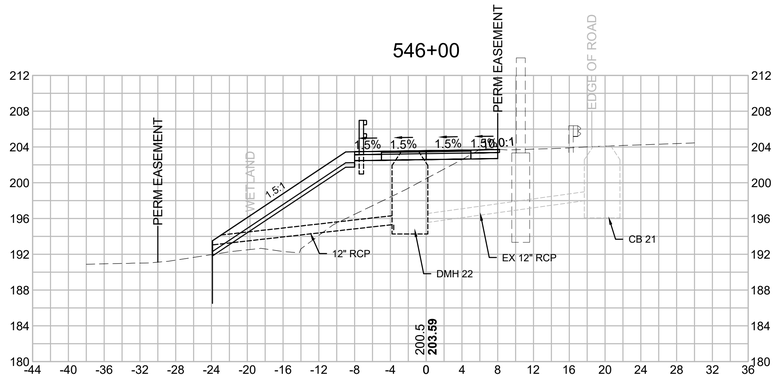
CUT	FILL
15.30 SF	28.53 SF

546+50



CUT	FILL
19.05 SF	159.80 SF

546+00



CUT	FILL
18.97 SF	114.69 SF

HOR. SCALE IN FEET
8 0 8 16
VER. SCALE IN FEET
8 0 8 16

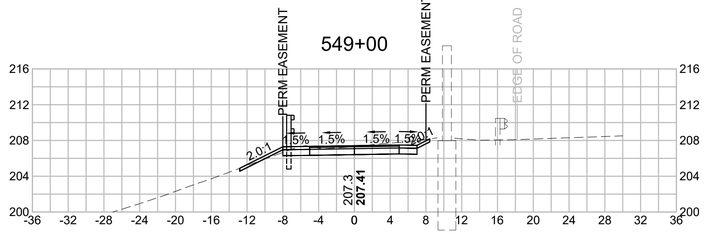
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	142	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

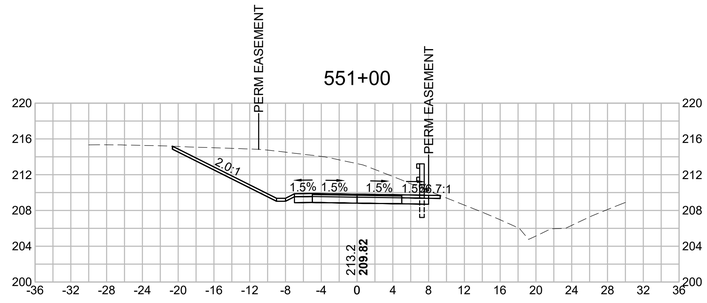
608227HD (XSEC)-3.DWG Plotted on 23-Jul-2025 1:47 PM

549+00



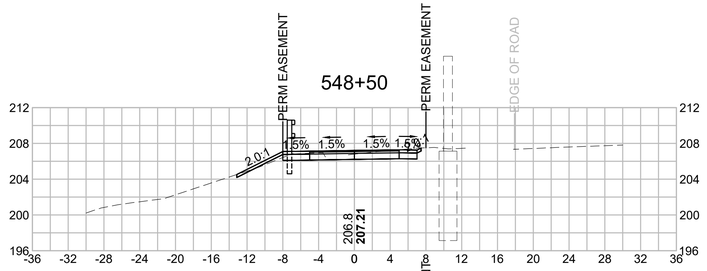
CUT	FILL
18.17 SF	2.38 SF

551+00



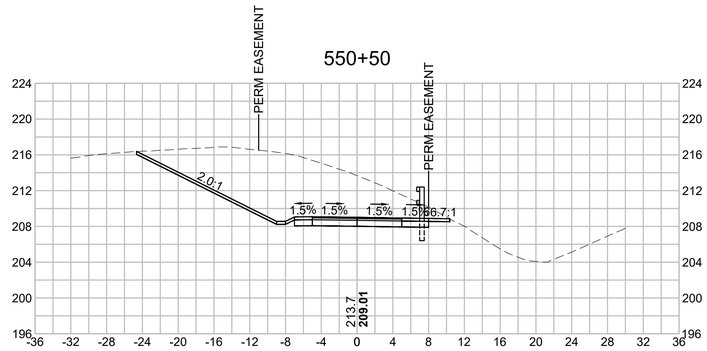
CUT	FILL
106.09 SF	0.06 SF

548+50



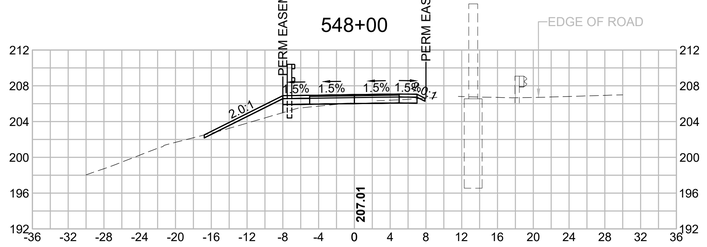
CUT	FILL
13.04 SF	3.10 SF

550+50



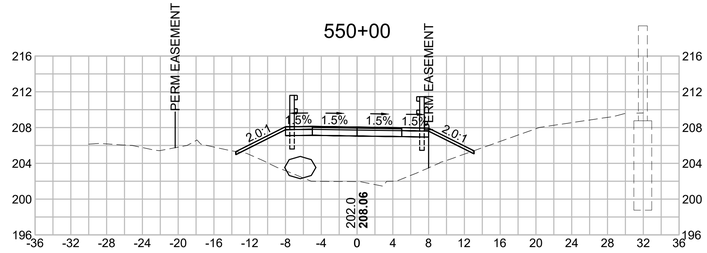
CUT	FILL
168.14 SF	0.03 SF

548+00



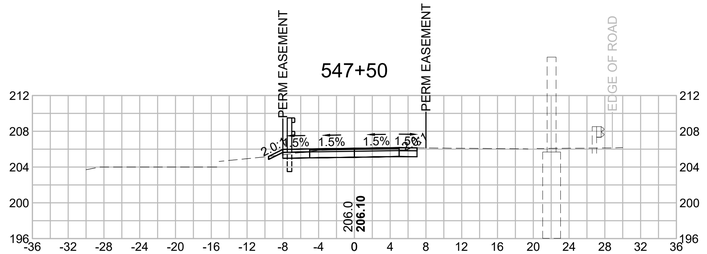
CUT	FILL
11.81 SF	17.84 SF

550+00



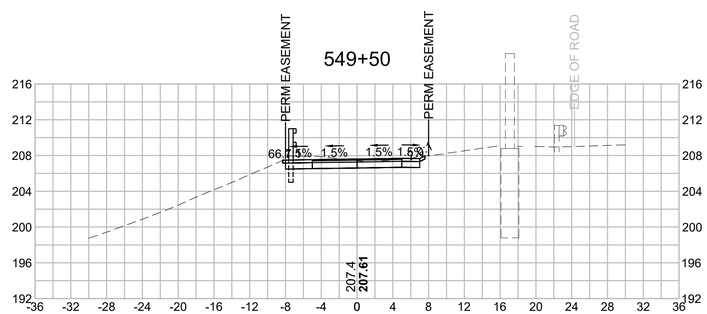
CUT	FILL
13.30 SF	111.20 SF

547+50



CUT	FILL
13.46 SF	0.79 SF

549+50



CUT	FILL
16.19 SF	0.06 SF

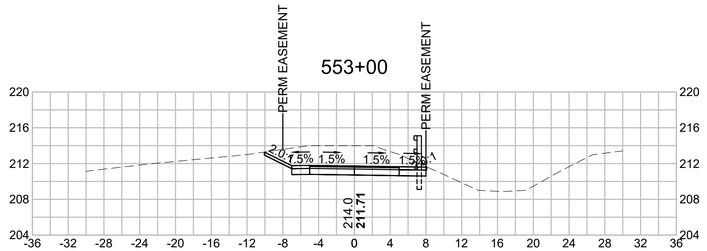
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

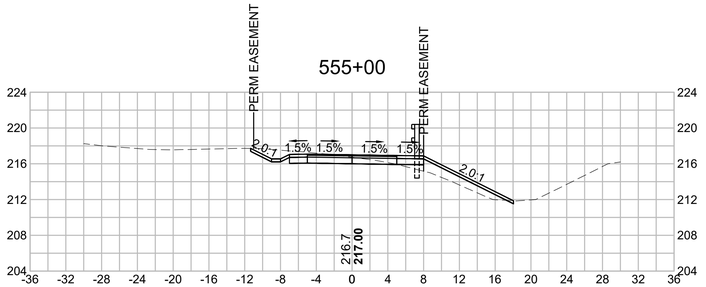
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	143	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

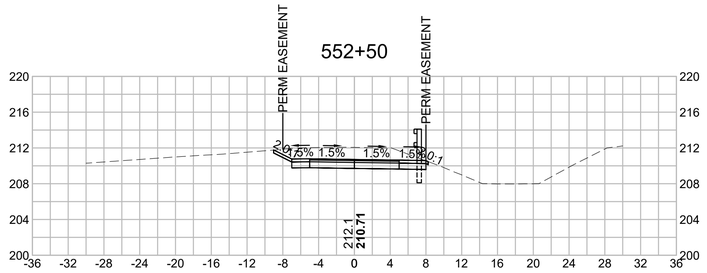
608227HD (XSEC)-3.DWG Plotted on 23-Jul-2025 1:47 PM



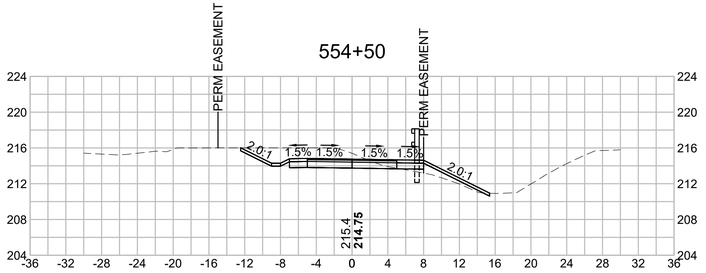
CUT 46.84 SF FILL 0.03 SF



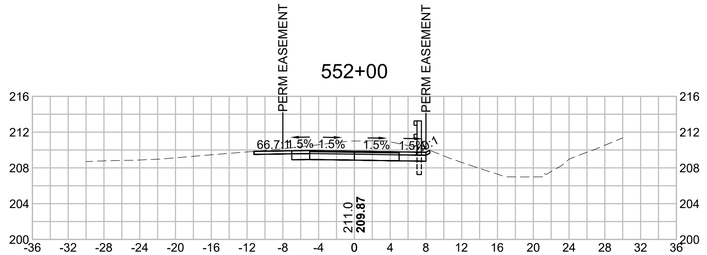
CUT 21.31 SF FILL 16.05 SF



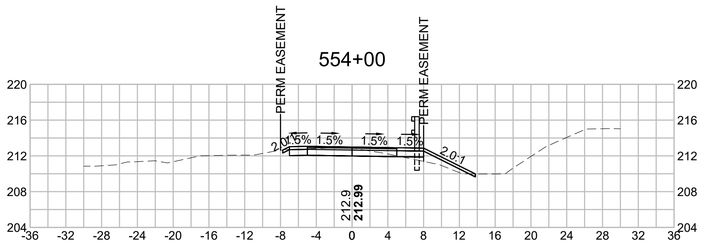
CUT 34.16 SF FILL 0.06 SF



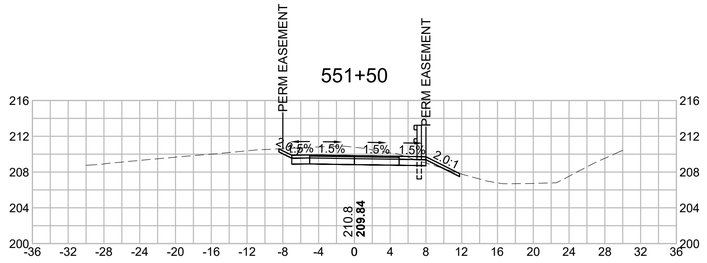
CUT 32.35 SF FILL 9.36 SF



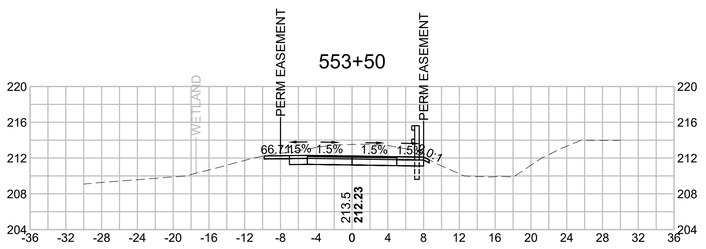
CUT 30.29 SF FILL 0.17 SF



CUT 13.35 SF FILL 8.53 SF



CUT 26.72 SF FILL 2.04 SF



CUT 31.78 SF FILL 0.20 SF

HOR. SCALE IN FEET
8 0 8 16
VER. SCALE IN FEET
8 0 8 16

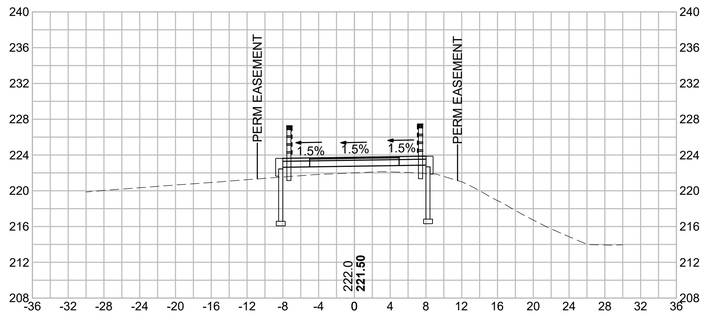
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	144	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

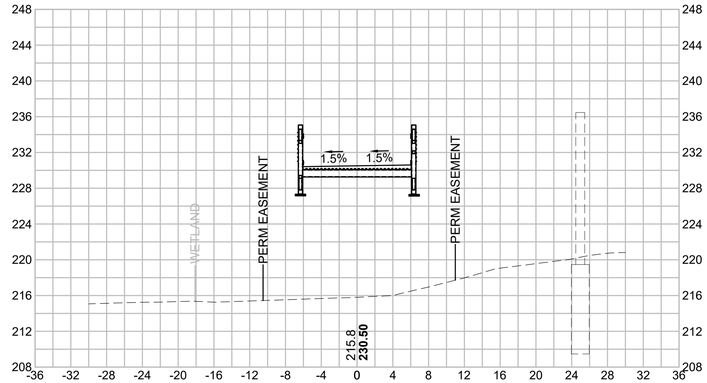
608227HD (XSEC)-3.DWG Plotted on 23-Jul-2025 1:48 PM

556+50



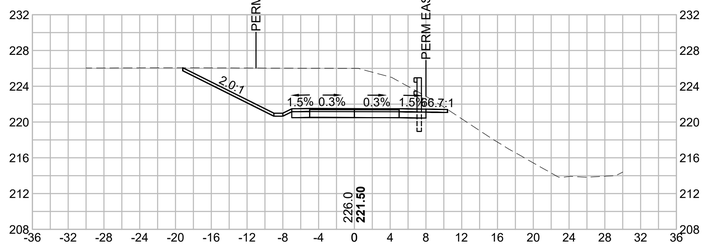
CUT	FILL
0.45 SF	1.51 SF

558+00



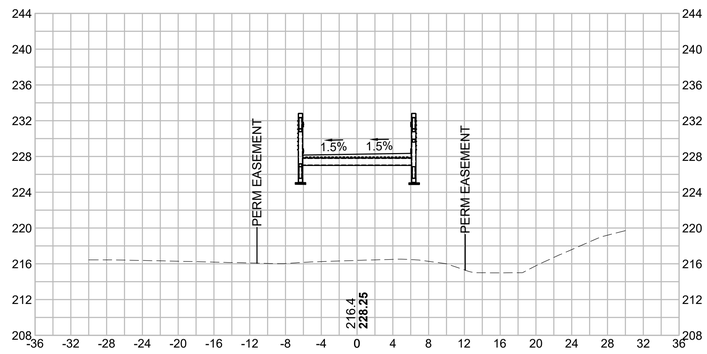
CUT	FILL
0.00 SF	0.00 SF

556+00



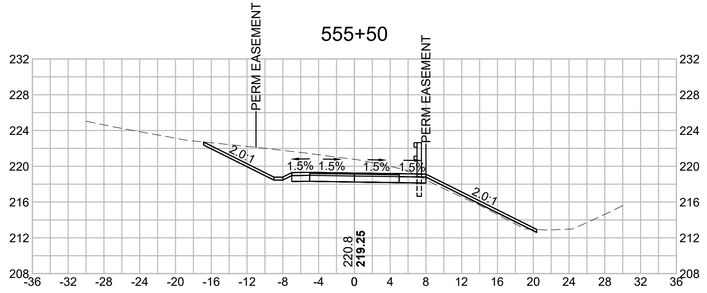
CUT	FILL
115.11 SF	0.05 SF

557+50



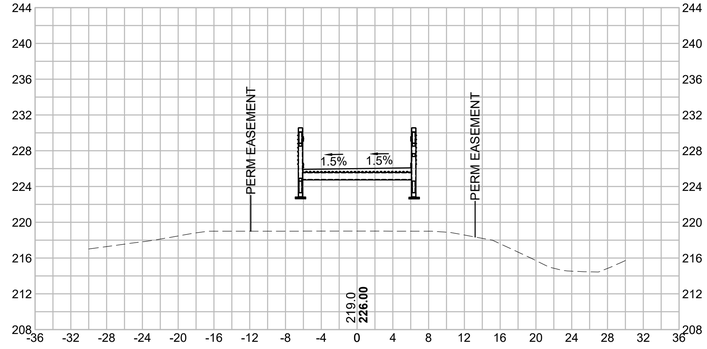
CUT	FILL
0.00 SF	0.00 SF

555+50



CUT	FILL
61.17 SF	8.26 SF

557+00



CUT	FILL
0.00 SF	0.00 SF

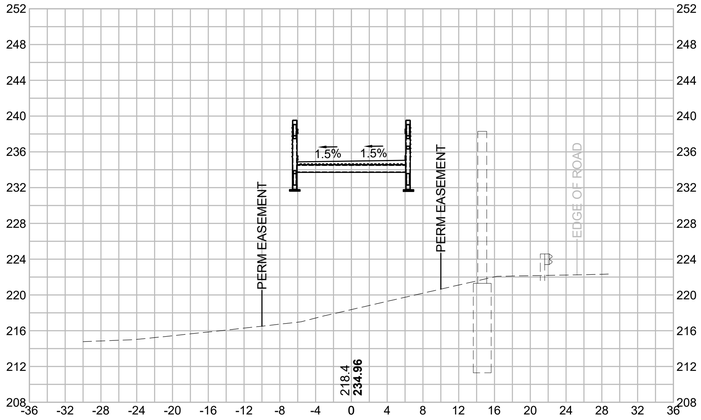
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	145	231
PROJECT FILE NO. 608227			

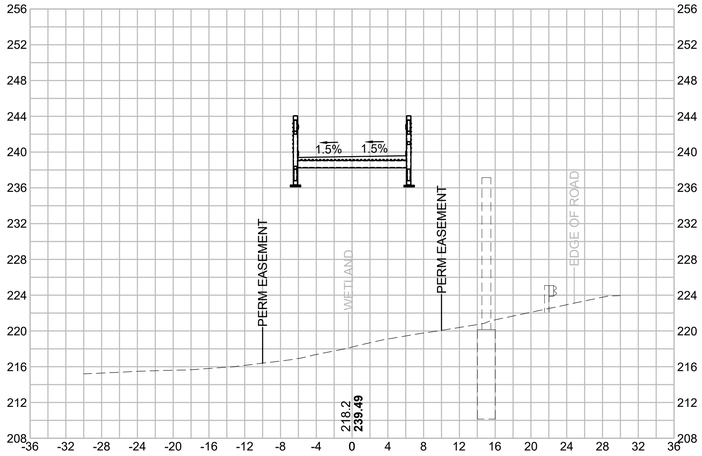
CROSS SECTIONS

559+00



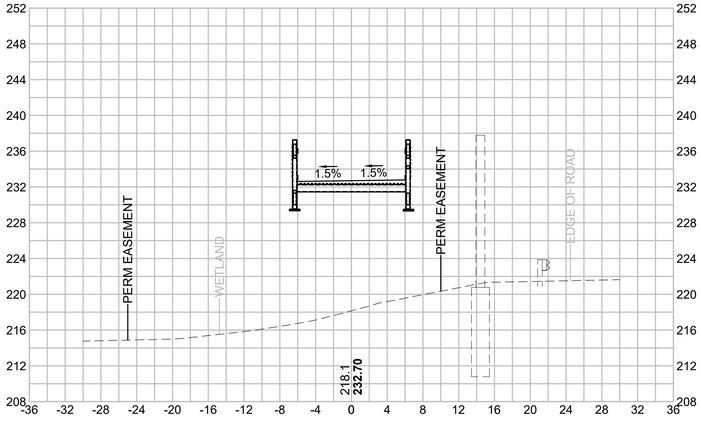
CUT	FILL
0.00 SF	0.00 SF

560+00



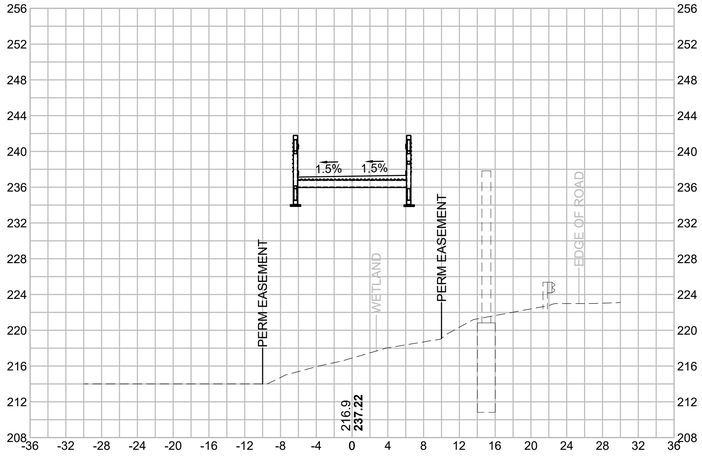
CUT	FILL
0.00 SF	0.00 SF

558+50



CUT	FILL
0.00 SF	0.00 SF

559+50



CUT	FILL
0.00 SF	0.00 SF

HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

608227HD (XSEC)-3.DWG Plotted on 23-Jul-2025 1:48 PM

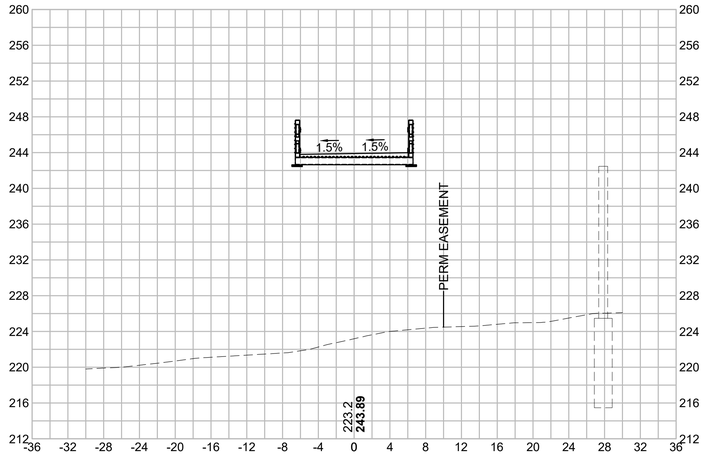
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	146	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

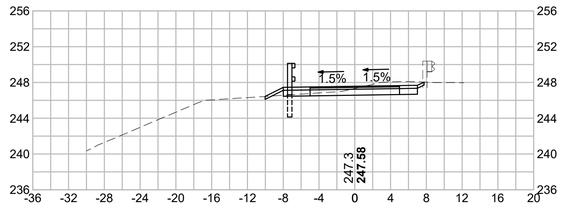
608227HD (XSEC)-3.DWG Plotted on 23-Jul-2025 1:48 PM

561+00



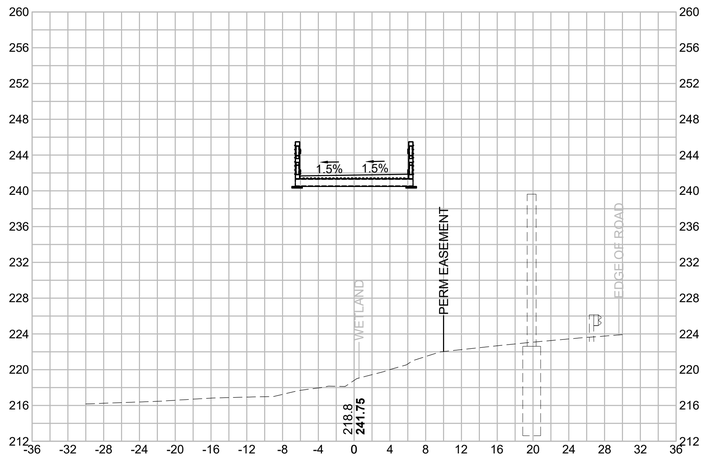
CUT	FILL
0.00 SF	0.00 SF

562+00



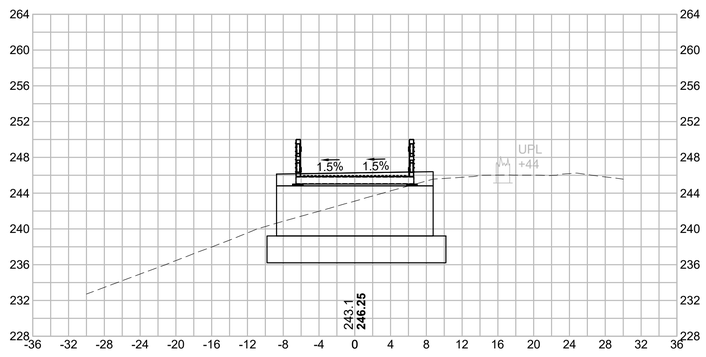
CUT	FILL
12.34 SF	0.00 SF

560+50



CUT	FILL
0.00 SF	0.00 SF

561+50



CUT	FILL
0.00 SF	0.00 SF

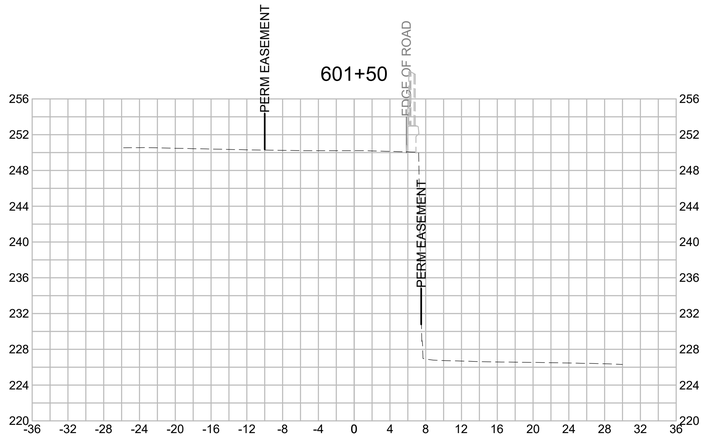
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	147	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

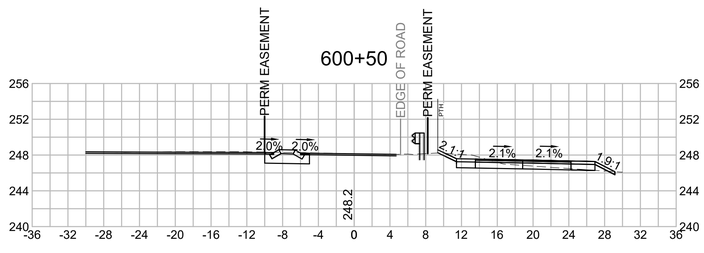
608227HD (XSEC)-4.DWG Plotted on 23-Jul-2025 2:03 PM



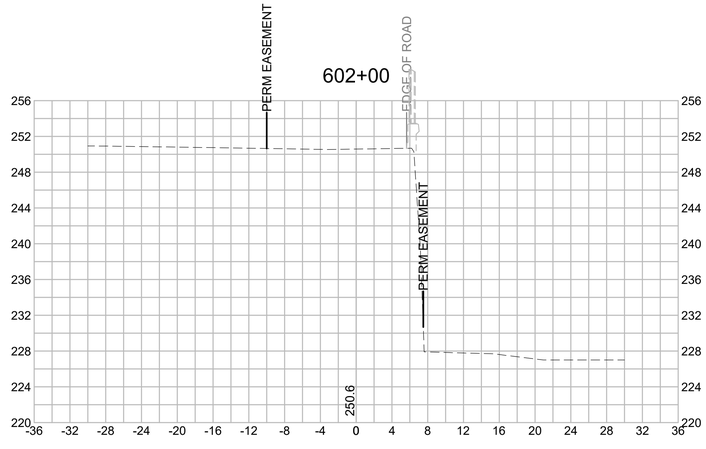
CUT	FILL
0.00 SF	0.00 SF



CUT	FILL
8.18 SF	0.73 SF



CUT	FILL
6.20 SF	0.00 SF



CUT	FILL
0.00 SF	0.00 SF

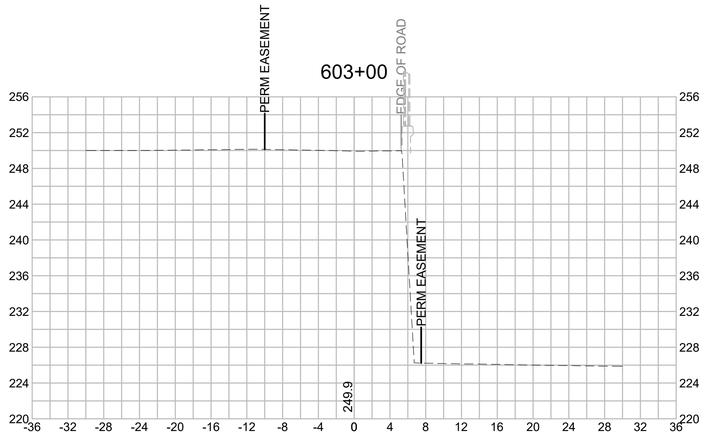
HOR. SCALE IN FEET
8 0 8 16
VER. SCALE IN FEET
8 0 8 16

BILLERICA
YANKEE DOODLE BIKE PATH

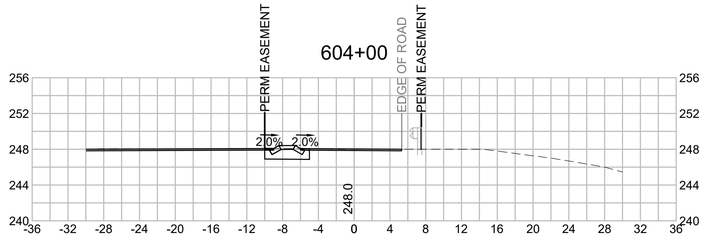
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	148	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

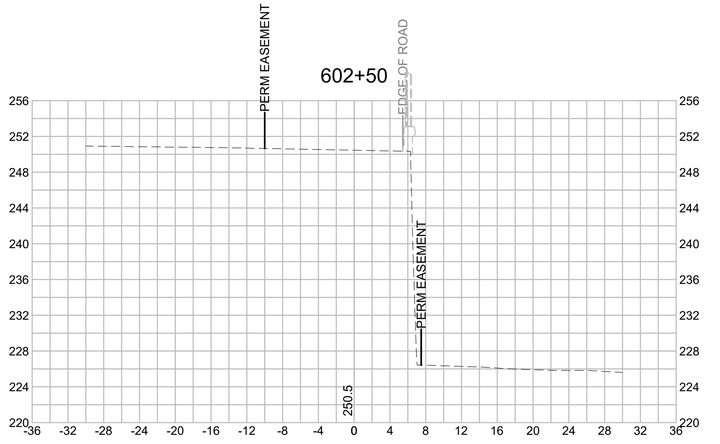
608227HD (XSEC)-4.DWG Plotted on 23-Jul-2025 2:04 PM



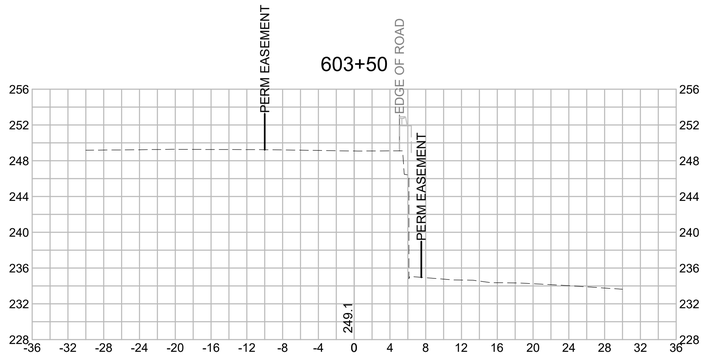
CUT 0.00 SF FILL 0.00 SF



CUT 5.98 SF FILL 0.00 SF



CUT 0.00 SF FILL 0.00 SF



CUT 0.00 SF FILL 0.00 SF

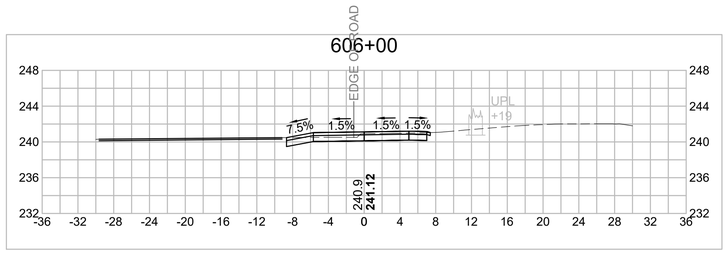
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

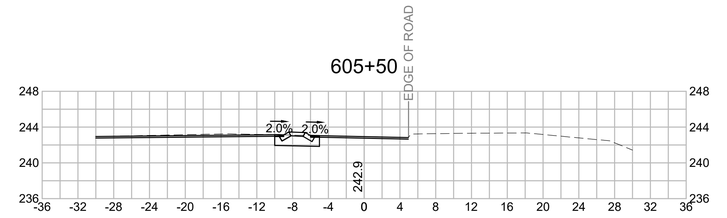
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	149	231
PROJECT FILE NO. 608227			

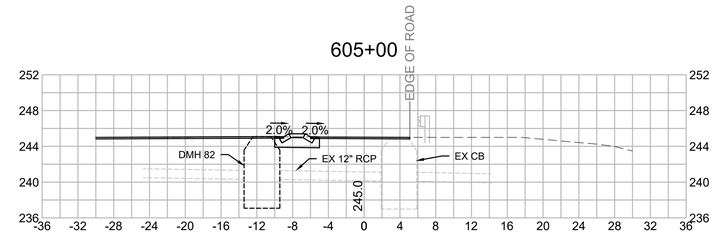
CROSS SECTIONS

608227HD (XSEC)-4.DWG Plotted on 23-Jul-2025 2:04 PM

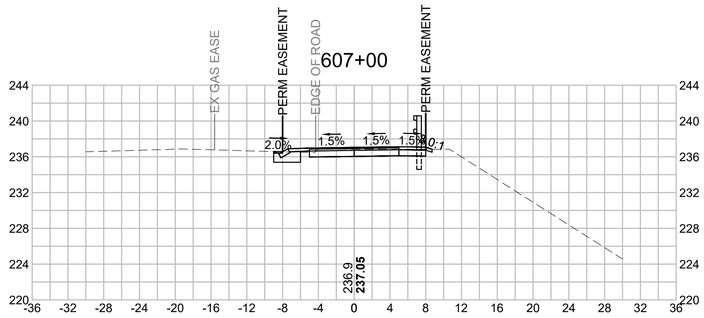




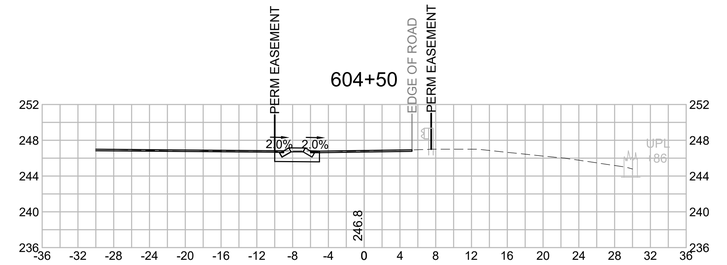
CUT	FILL
5.98 SF	0.00 SF



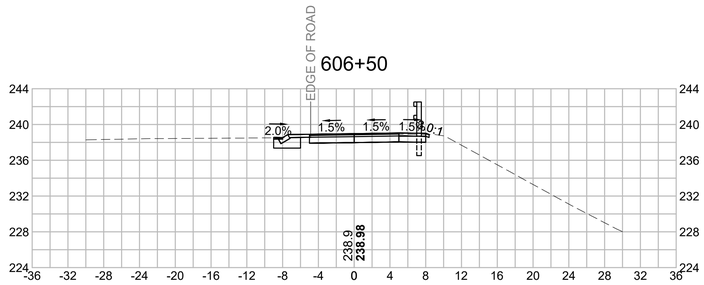
CUT	FILL
5.98 SF	0.00 SF



CUT	FILL
13.80 SF	0.14 SF



CUT	FILL
5.98 SF	0.00 SF



CUT	FILL
15.70 SF	0.04 SF

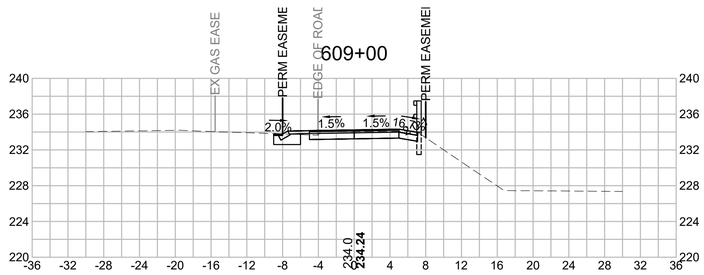
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

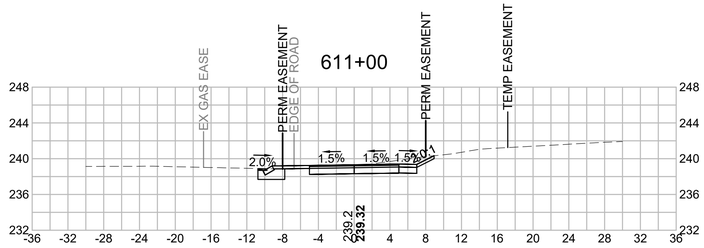
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	150	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

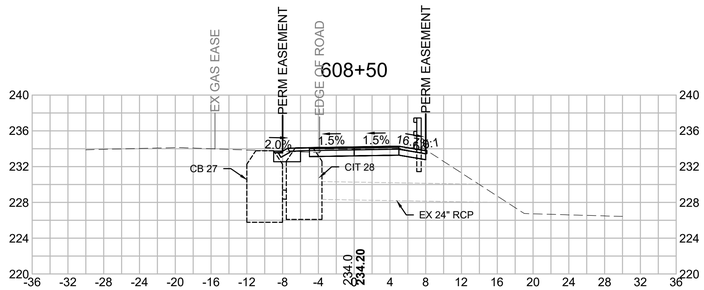
608227HD (XSEC)-4.DWG Plotted on 23-Jul-2025 2:05 PM



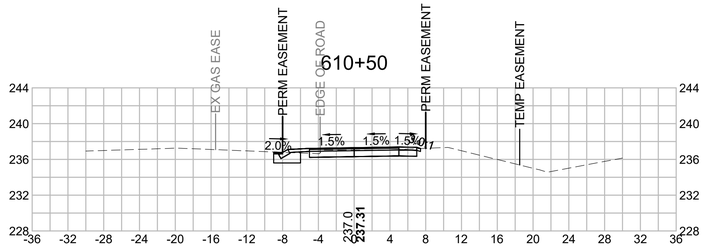
CUT	FILL
13.22 SF	0.00 SF



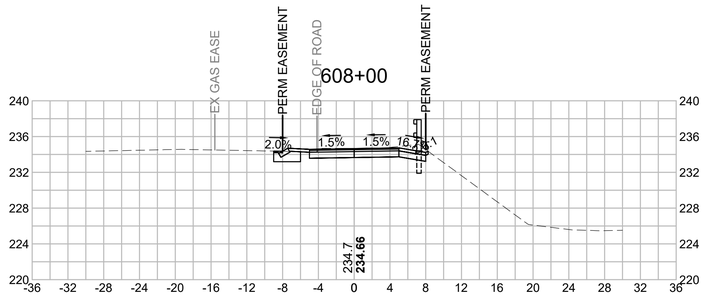
CUT	FILL
18.90 SF	0.02 SF



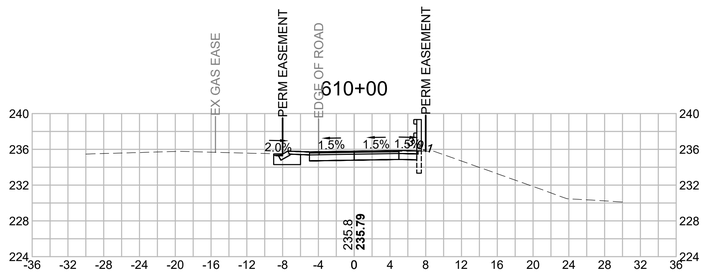
CUT	FILL
14.01 SF	0.00 SF



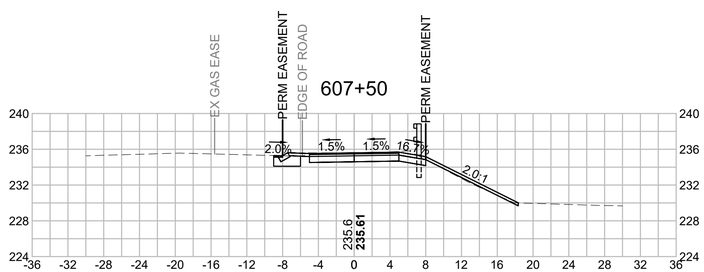
CUT	FILL
12.19 SF	0.10 SF



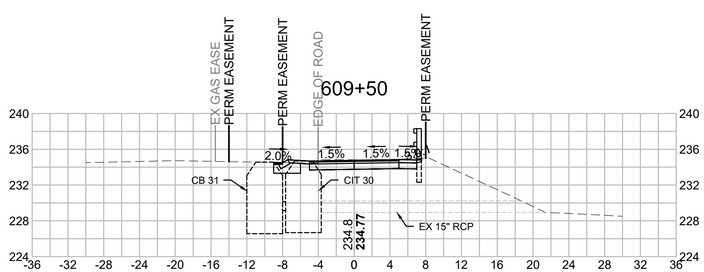
CUT	FILL
18.29 SF	0.03 SF



CUT	FILL
14.85 SF	0.03 SF



CUT	FILL
17.05 SF	0.00 SF



CUT	FILL
16.38 SF	0.00 SF

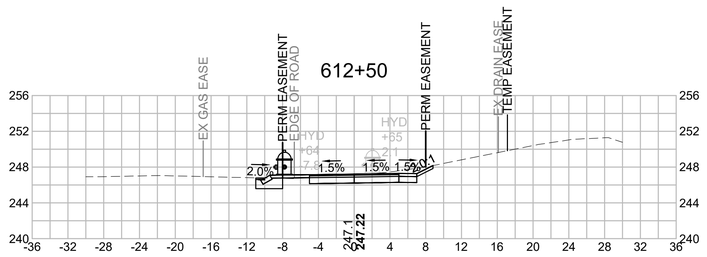
HOR. SCALE IN FEET
8 0 8 16
VER. SCALE IN FEET
8 0 8 16

BILLERICA
YANKEE DOODLE BIKE PATH

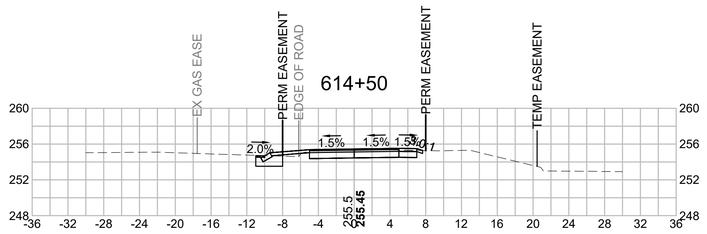
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	151	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

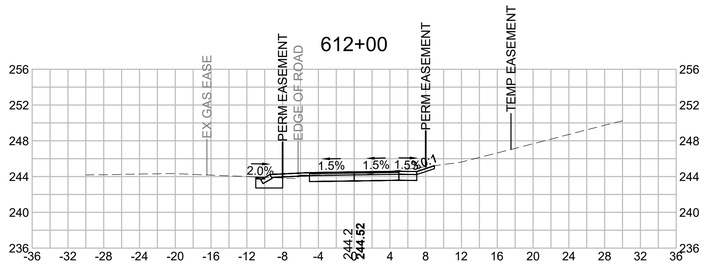
608227HD (XSEC)-4.DWG Plotted on 23-Jul-2025 2:05 PM



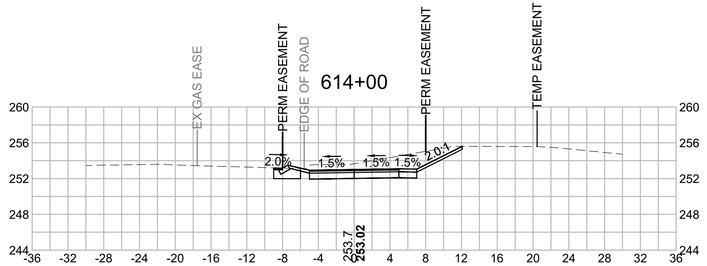
CUT	FILL
17.99 SF	0.01 SF



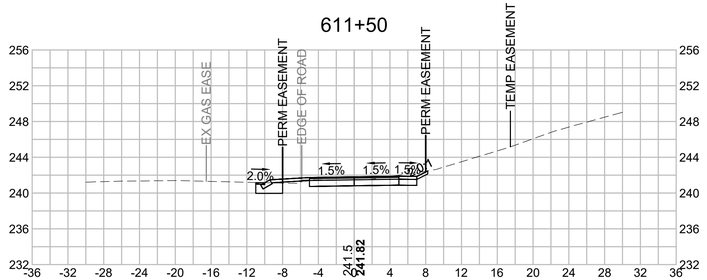
CUT	FILL
15.18 SF	0.16 SF



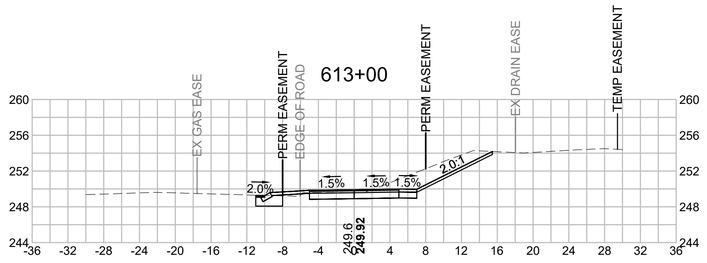
CUT	FILL
14.98 SF	0.06 SF



CUT	FILL
34.09 SF	0.03 SF



CUT	FILL
14.39 SF	0.04 SF



CUT	FILL
32.28 SF	0.00 SF

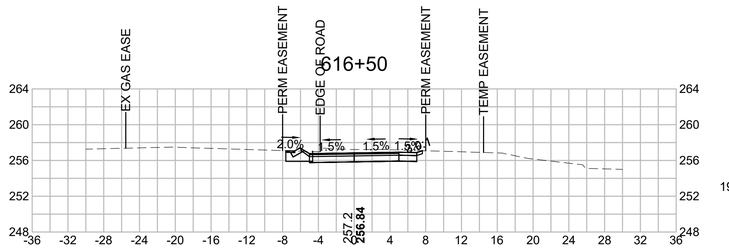
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

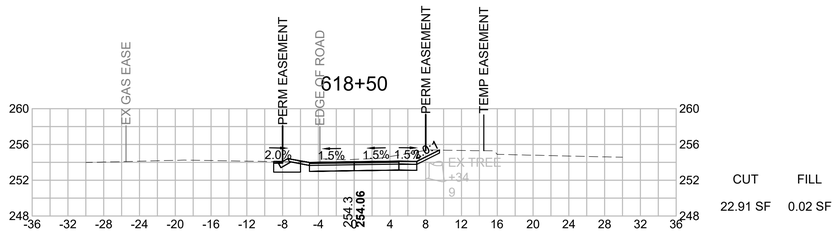
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	152	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

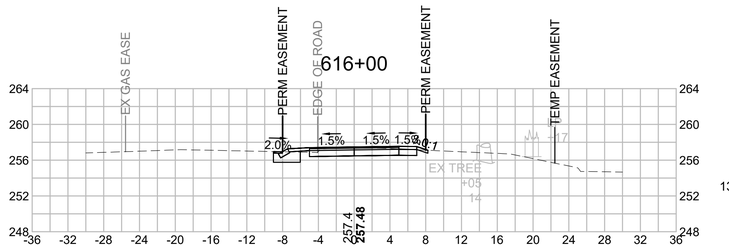
608227HD (XSEC)-4.DWG Plotted on 23-Jul-2025 2:05 PM



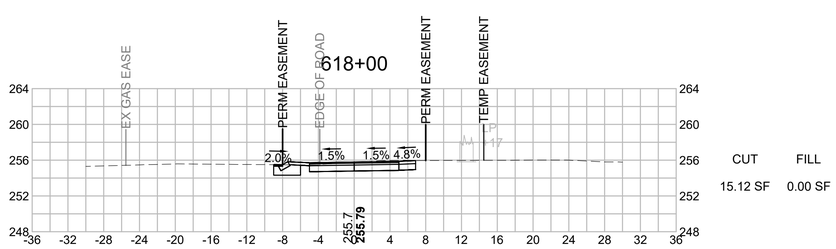
CUT 19.59 SF FILL 0.04 SF



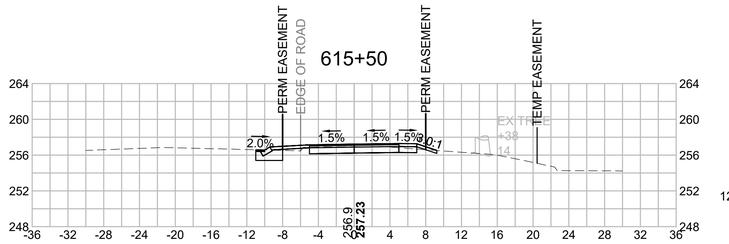
CUT 22.91 SF FILL 0.02 SF



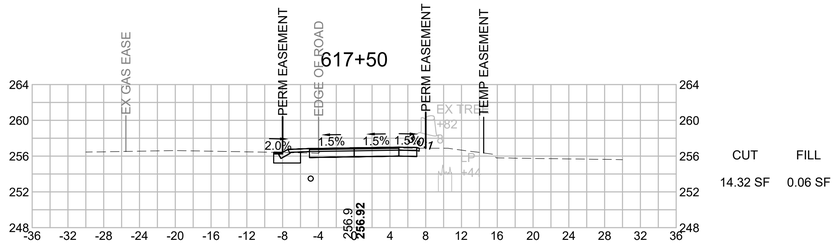
CUT 13.48 SF FILL 0.43 SF



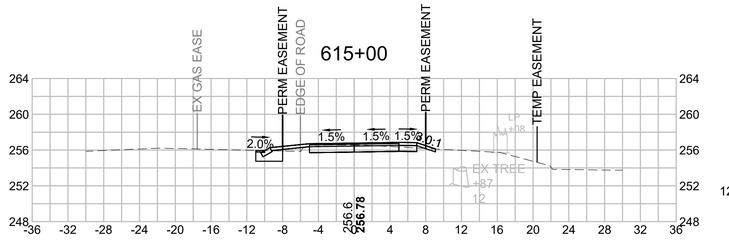
CUT 15.12 SF FILL 0.00 SF



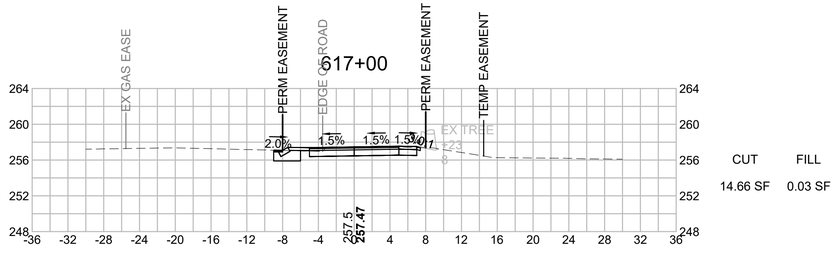
CUT 12.65 SF FILL 1.10 SF



CUT 14.32 SF FILL 0.06 SF



CUT 12.74 SF FILL 1.06 SF



CUT 14.66 SF FILL 0.03 SF

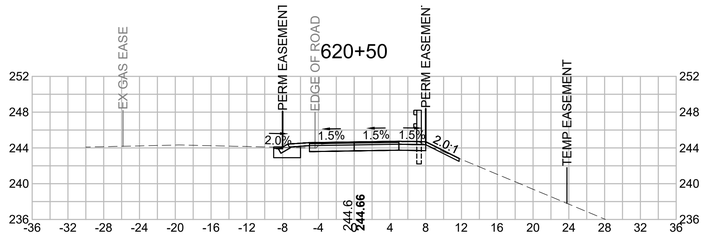
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

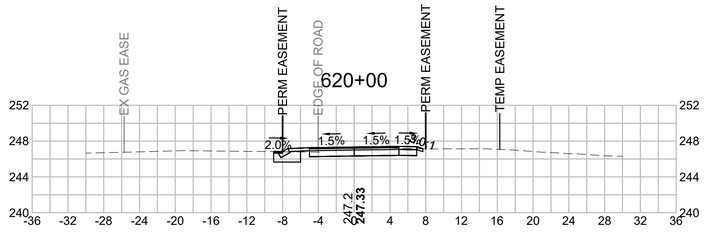
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	153	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

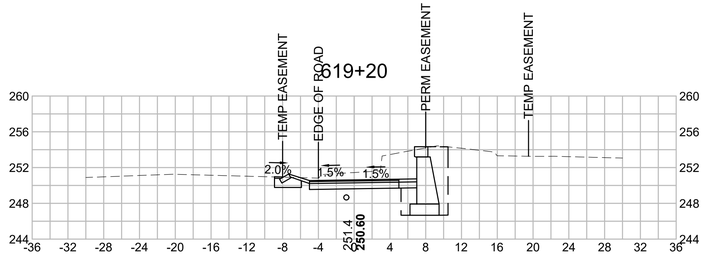
608227HD (XSEC)-4.DWG Plotted on 23-Jul-2025 2:06 PM



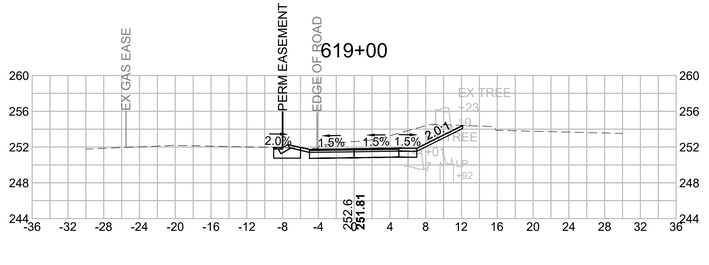
CUT 16.39 SF FILL 1.21 SF



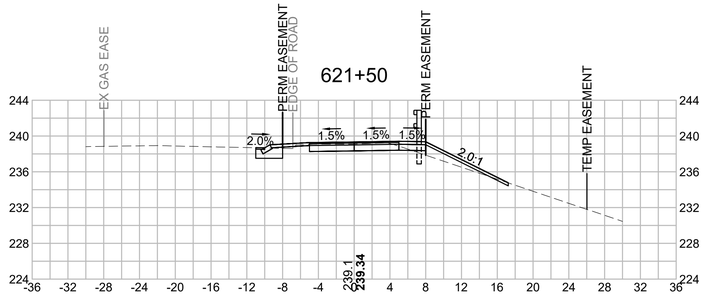
CUT 13.53 SF FILL 0.19 SF



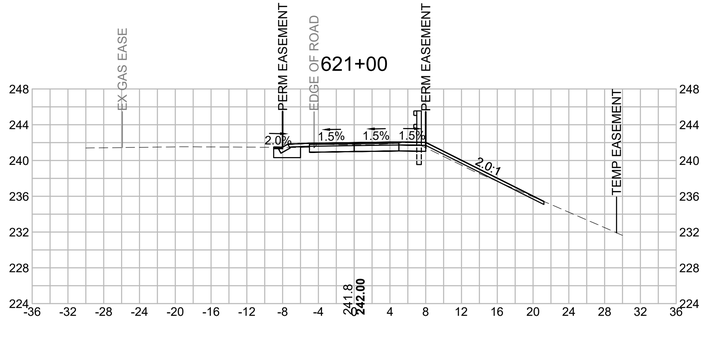
CUT 48.62 SF FILL 0.01 SF



CUT 36.47 SF FILL 0.02 SF



CUT 17.59 SF FILL 10.07 SF



CUT 13.77 SF FILL 0.01 SF

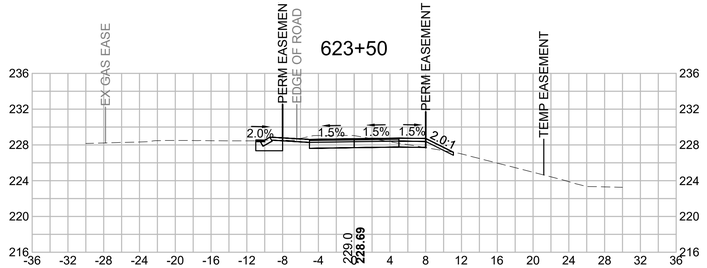
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

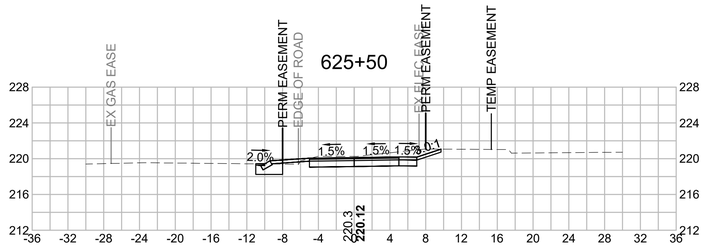
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	154	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

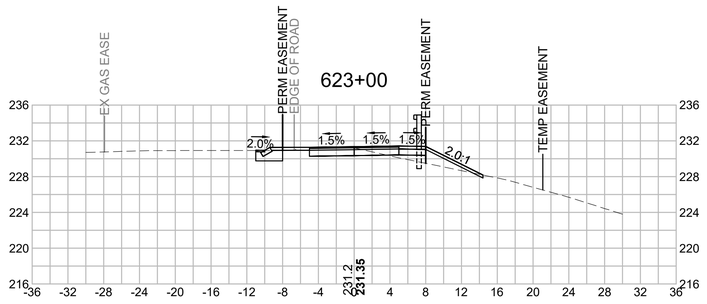
608227HD (XSEC)-4.DWG Plotted on 23-Jul-2025 2:06 PM



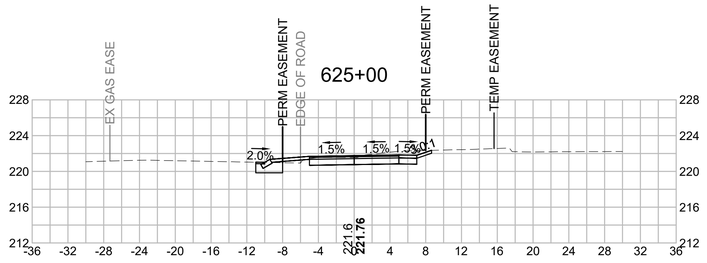
CUT 18.56 SF FILL 2.83 SF



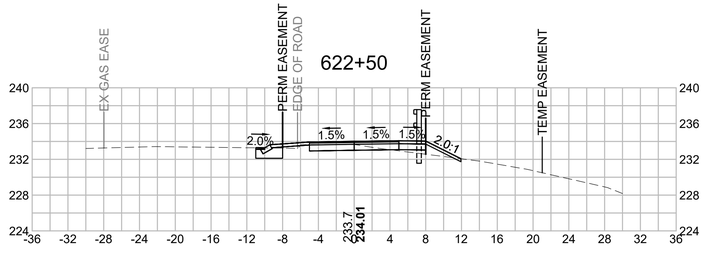
CUT 21.60 SF FILL 0.04 SF



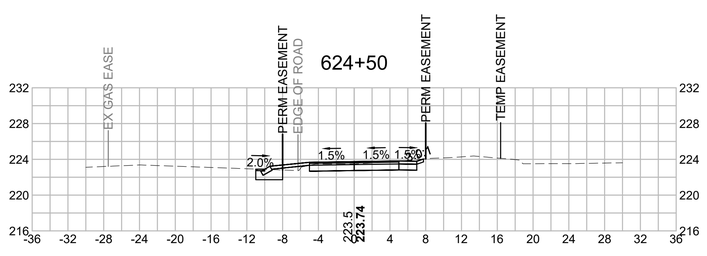
CUT 14.36 SF FILL 9.59 SF



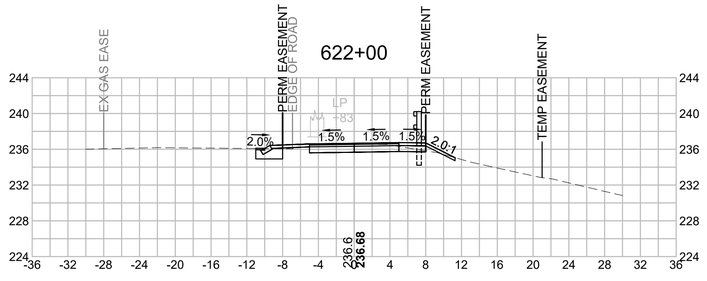
CUT 17.33 SF FILL 0.04 SF



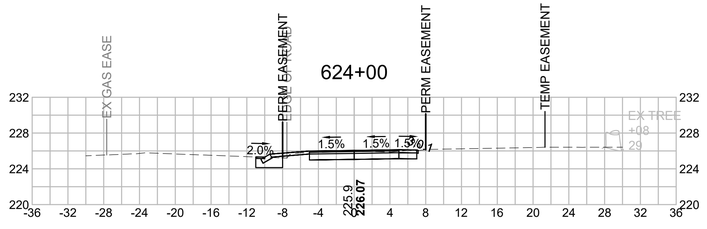
CUT 11.30 SF FILL 5.47 SF



CUT 14.06 SF FILL 0.06 SF



CUT 15.95 SF FILL 2.31 SF



CUT 14.03 SF FILL 0.03 SF

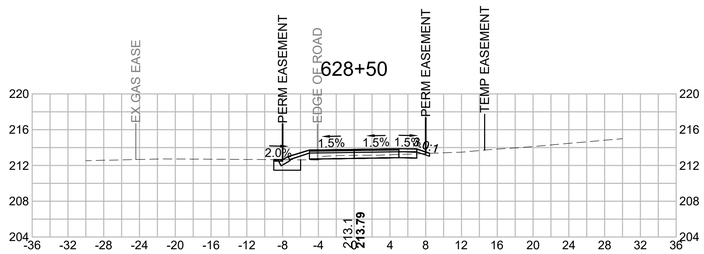
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

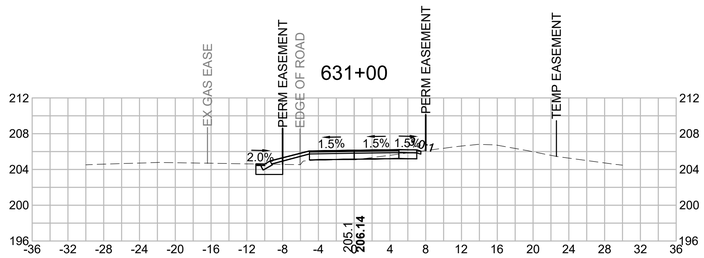
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	155	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

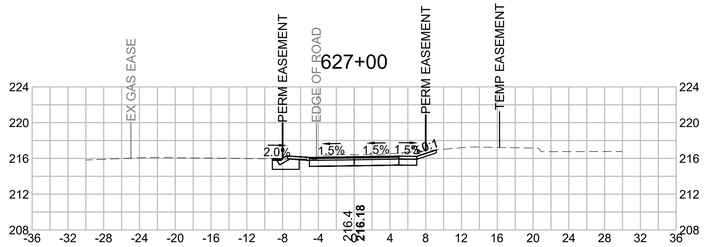
608227HD (XSEC)-4.DWG Plotted on 23-Jul-2025 2:06 PM



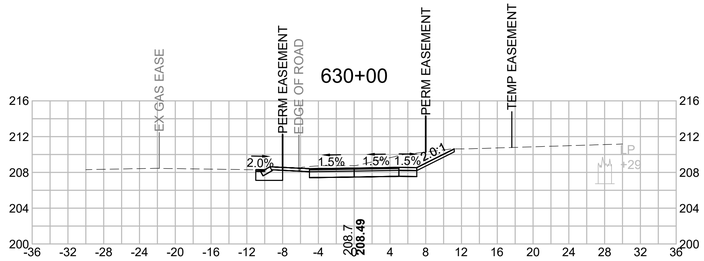
CUT	FILL
7.81 SF	0.47 SF



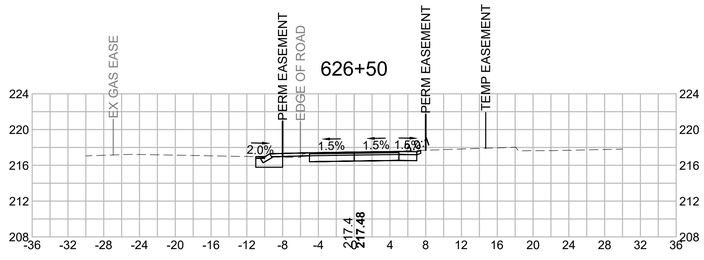
CUT	FILL
6.08 SF	0.14 SF



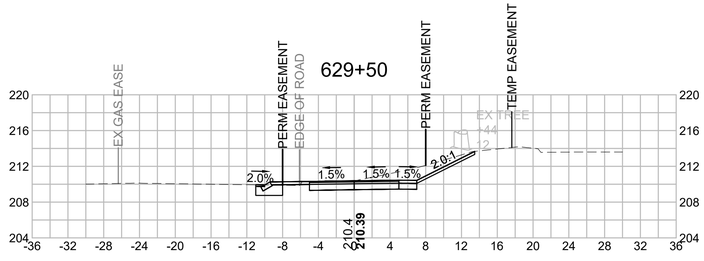
CUT	FILL
19.75 SF	0.06 SF



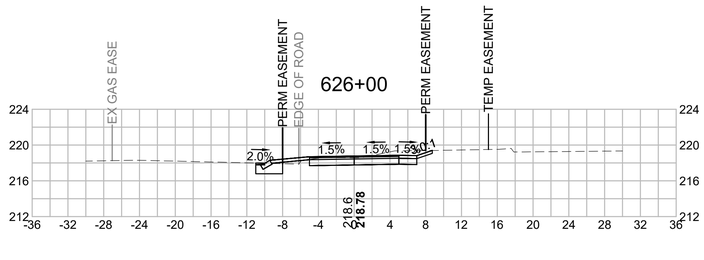
CUT	FILL
29.17 SF	0.02 SF



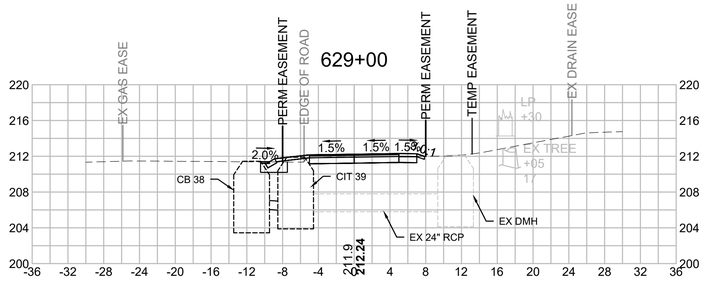
CUT	FILL
15.68 SF	0.05 SF



CUT	FILL
27.34 SF	0.00 SF



CUT	FILL
17.40 SF	0.04 SF



CUT	FILL
12.07 SF	0.24 SF

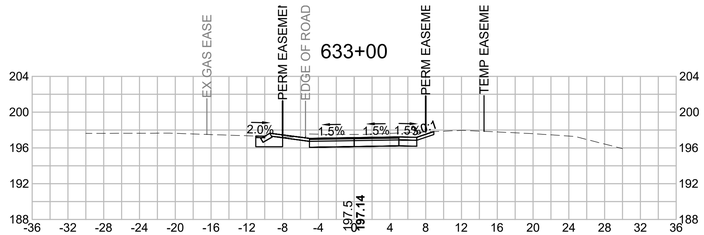
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

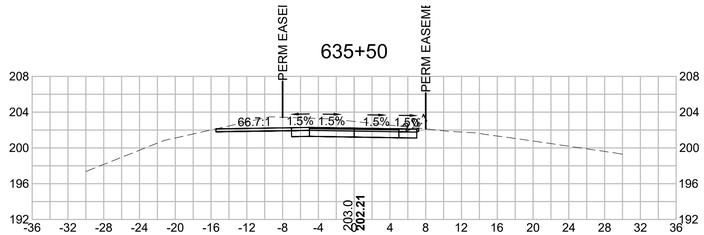
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	156	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

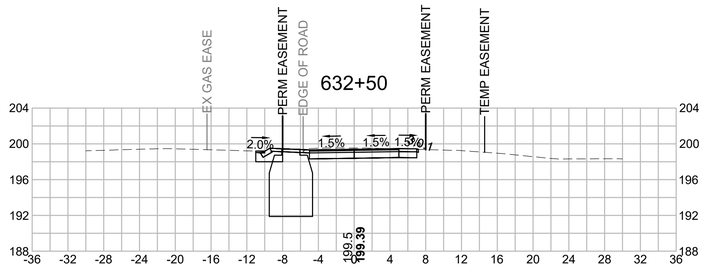
608227HD (XSEC)-4.DWG Plotted on 23-Jul-2025 2:07 PM



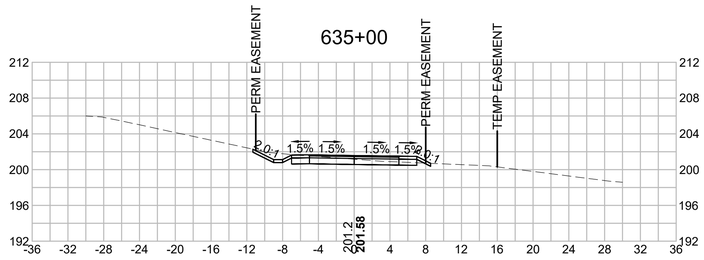
CUT 22.49 SF FILL 0.00 SF



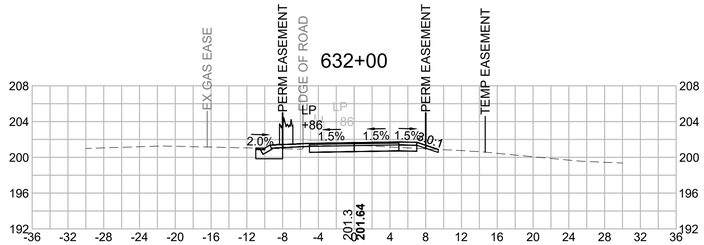
CUT 33.64 SF FILL 0.09 SF



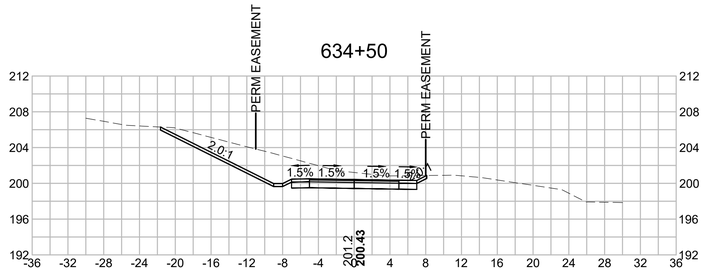
CUT 16.89 SF FILL 0.04 SF



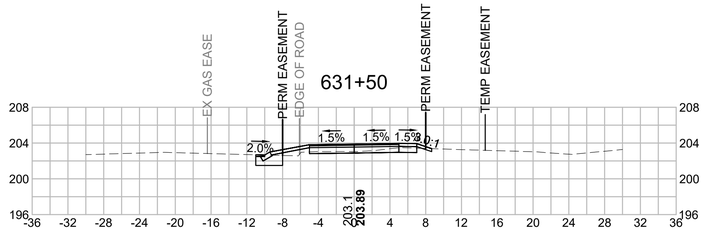
CUT 13.28 SF FILL 1.54 SF



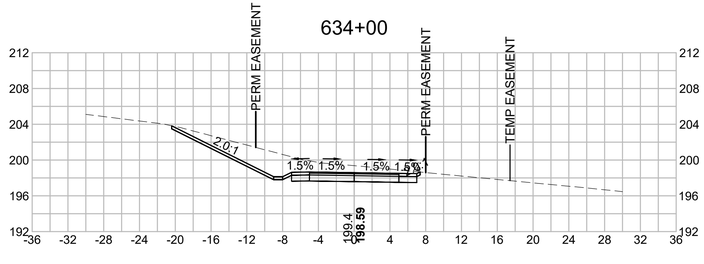
CUT 12.02 SF FILL 1.54 SF



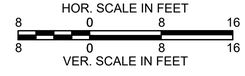
CUT 62.25 SF FILL 0.06 SF



CUT 7.62 SF FILL 0.53 SF



CUT 50.75 SF FILL 0.07 SF

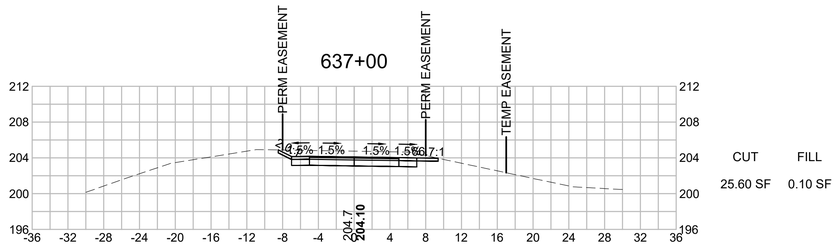


BILLERICA
YANKEE DOODLE BIKE PATH

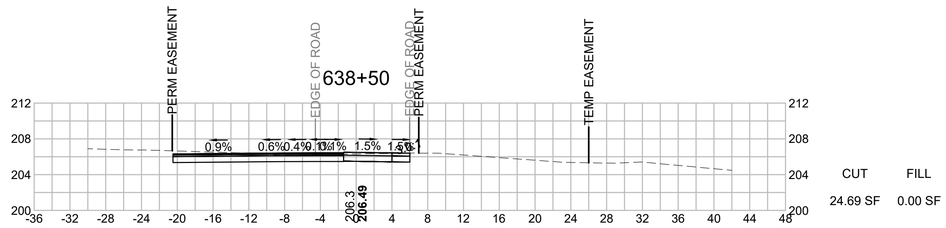
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	157	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

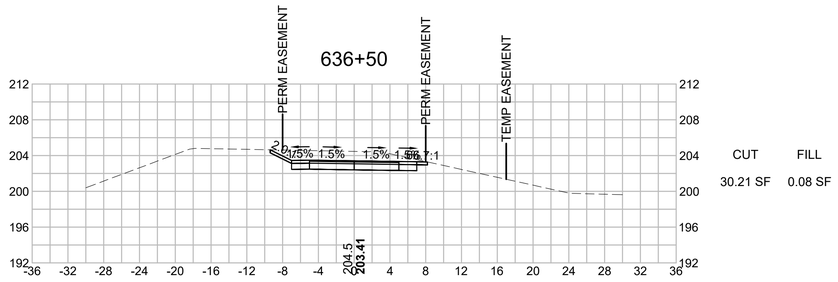
608227HD (XSEC)-4.DWG Plotted on 23-Jul-2025 2:07 PM



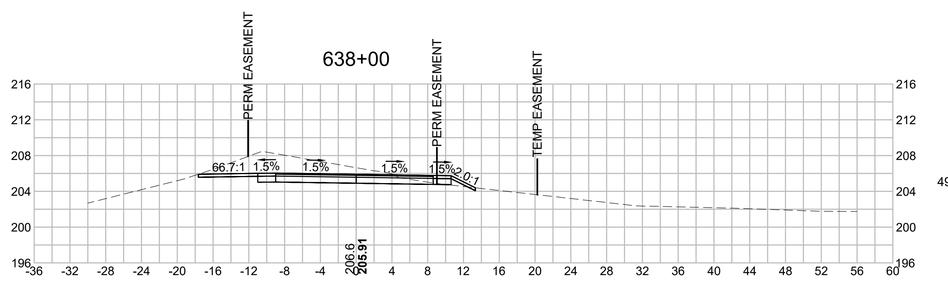
CUT 25.60 SF FILL 0.10 SF



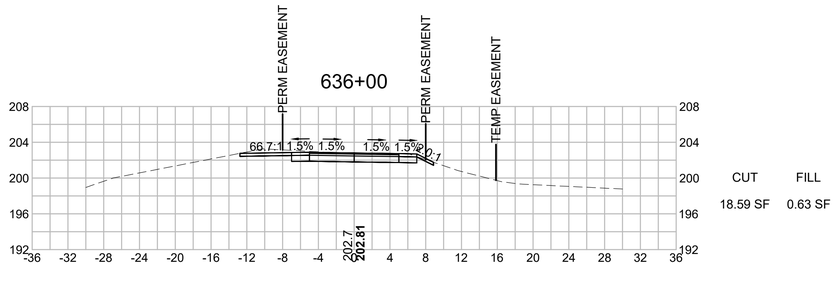
CUT 24.69 SF FILL 0.00 SF



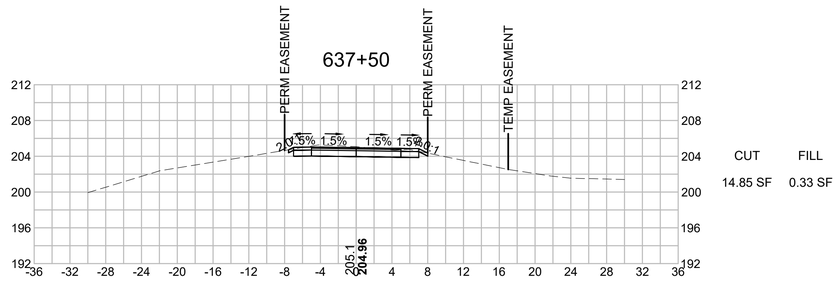
CUT 30.21 SF FILL 0.08 SF



CUT 49.20 SF FILL 3.16 SF



CUT 18.59 SF FILL 0.63 SF



CUT 14.85 SF FILL 0.33 SF

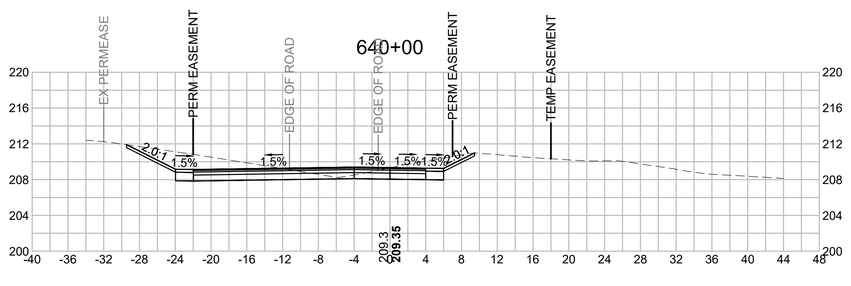
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

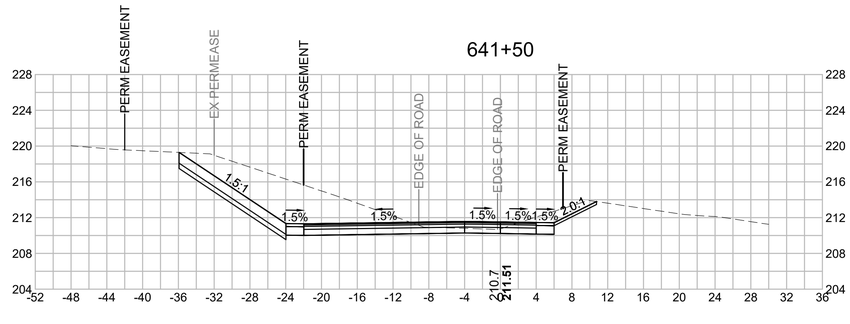
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	158	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

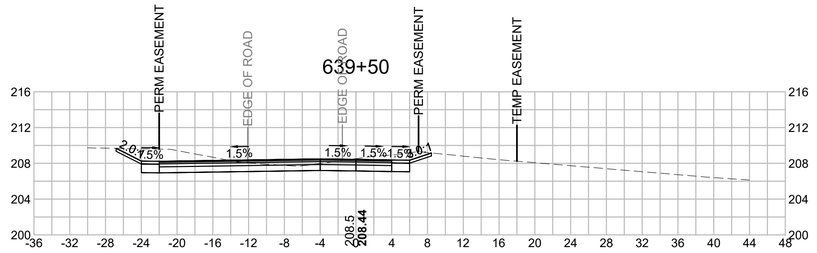
608227HD (XSEC)-4.DWG Plotted on 23-Jul-2025 2:07 PM



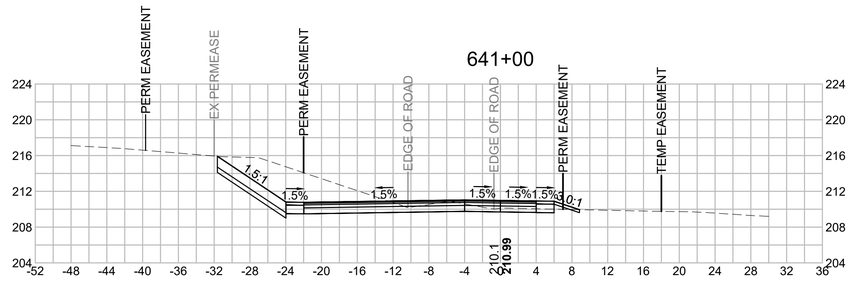
CUT	FILL
57.81 SF	0.85 SF



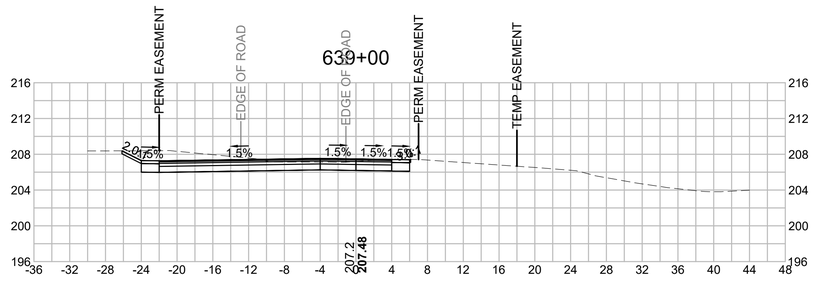
CUT	FILL
130.03 SF	0.09 SF



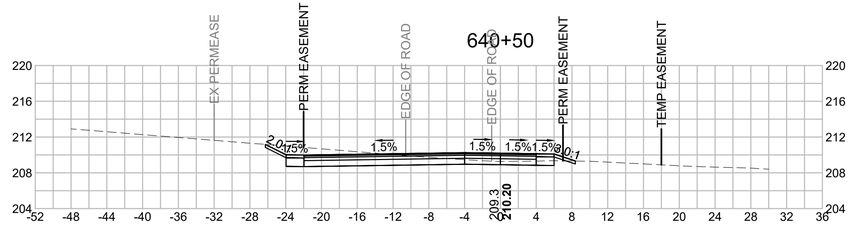
CUT	FILL
49.01 SF	0.06 SF



CUT	FILL
82.87 SF	2.38 SF



CUT	FILL
45.91 SF	0.04 SF



CUT	FILL
35.81 SF	1.94 SF

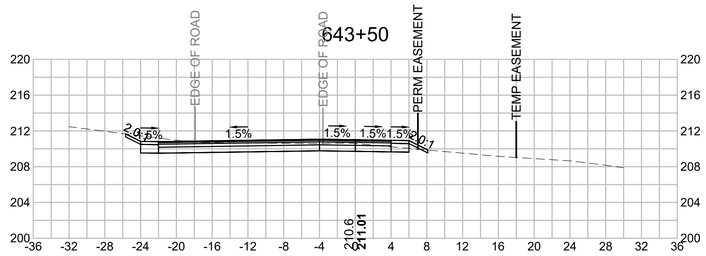
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

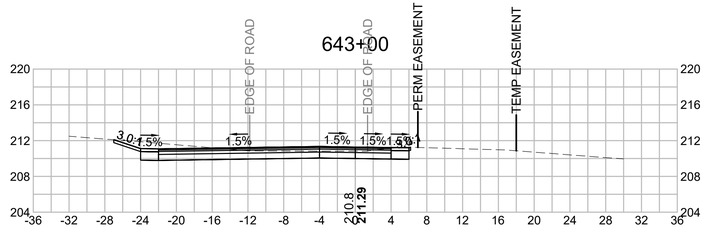
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	159	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

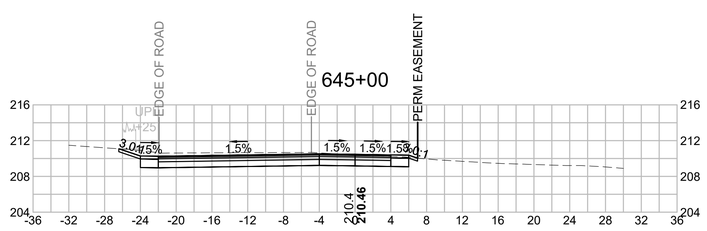
608227HD (XSEC)-4.DWG Plotted on 23-Jul-2025 2:08 PM



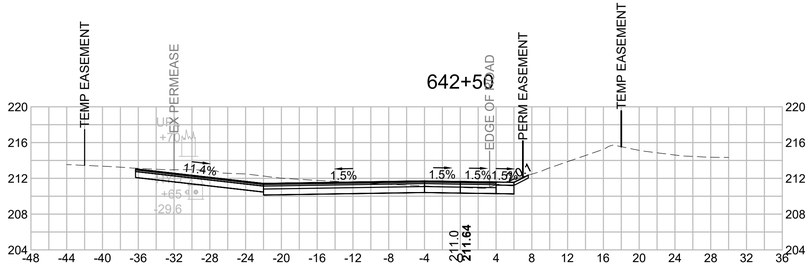
CUT	FILL
32.41 SF	1.34 SF



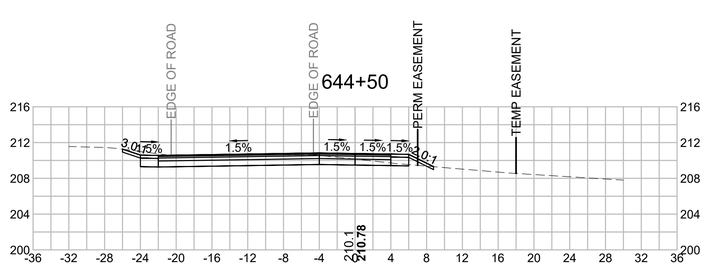
CUT	FILL
36.98 SF	0.03 SF



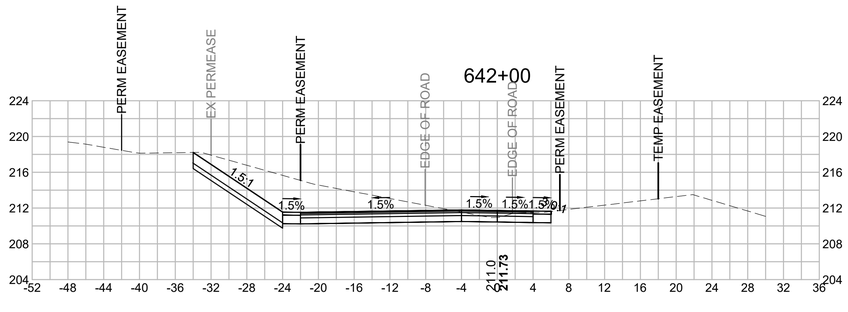
CUT	FILL
45.78 SF	0.31 SF



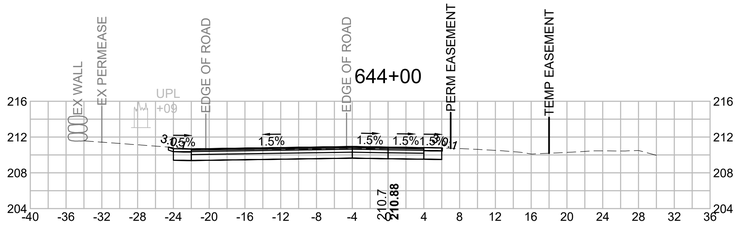
CUT	FILL
54.68 SF	0.07 SF



CUT	FILL
33.65 SF	2.89 SF



CUT	FILL
111.10 SF	0.01 SF



CUT	FILL
35.01 SF	0.06 SF

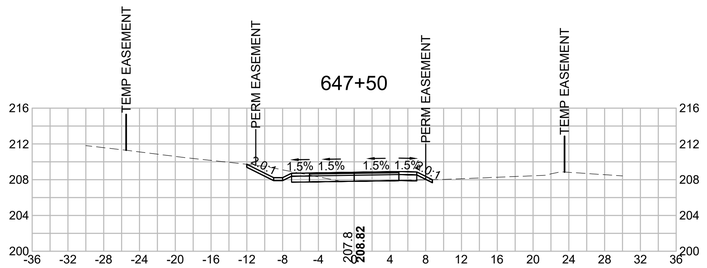
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

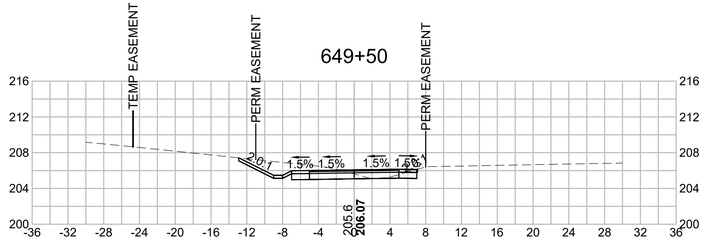
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	160	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

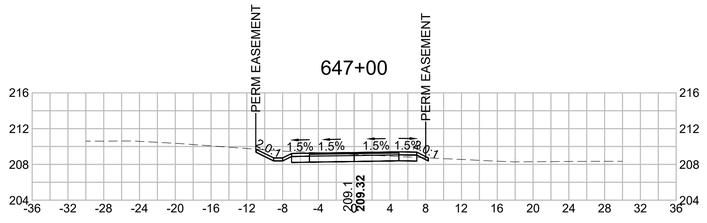
608227HD (XSEC)-4.DWG Plotted on 23-Jul-2025 2:08 PM



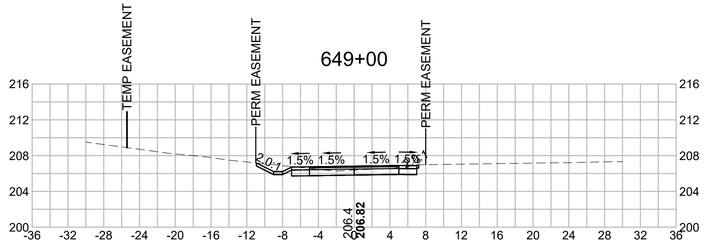
CUT 13.91 SF FILL 5.67 SF



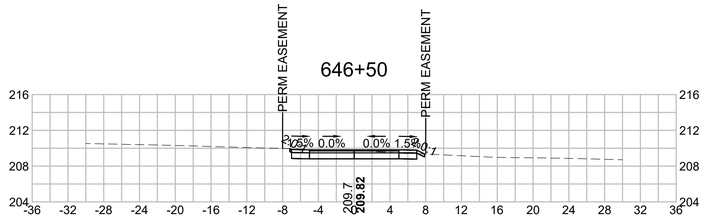
CUT 20.85 SF FILL 1.66 SF



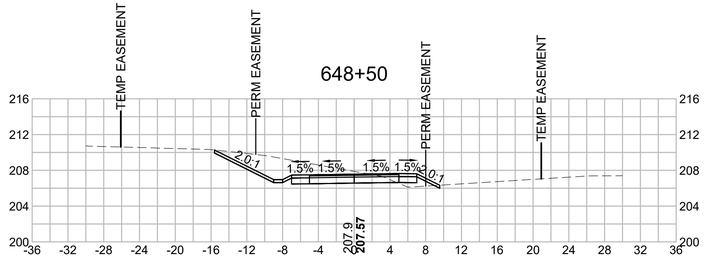
CUT 15.29 SF FILL 0.65 SF



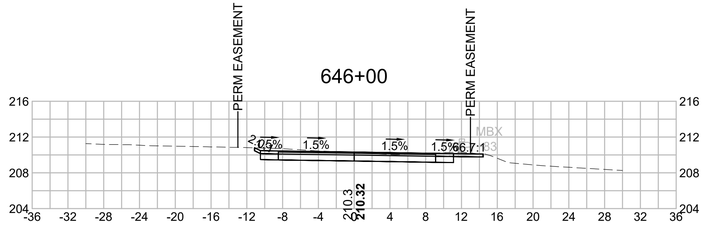
CUT 13.38 SF FILL 0.08 SF



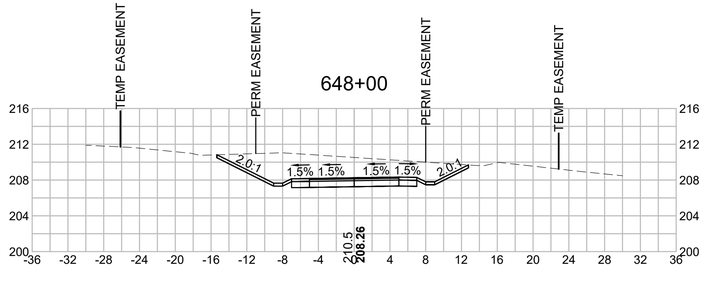
CUT 12.81 SF FILL 0.30 SF



CUT 36.20 SF FILL 4.51 SF



CUT 24.09 SF FILL 0.24 SF



CUT 75.97 SF FILL 0.05 SF

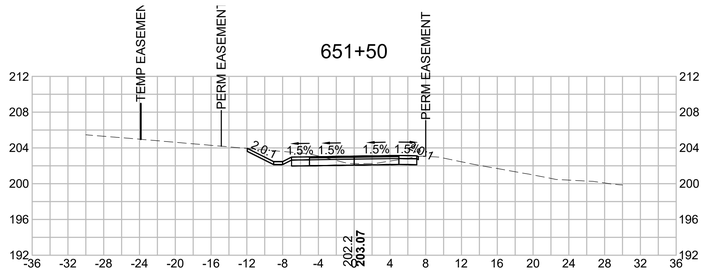
HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET

BILLERICA
YANKEE DOODLE BIKE PATH

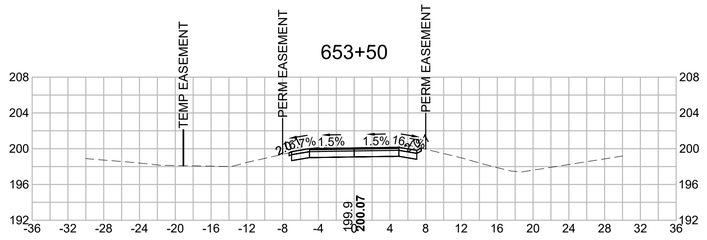
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	161	231
PROJECT FILE NO. 608227			

CROSS SECTIONS

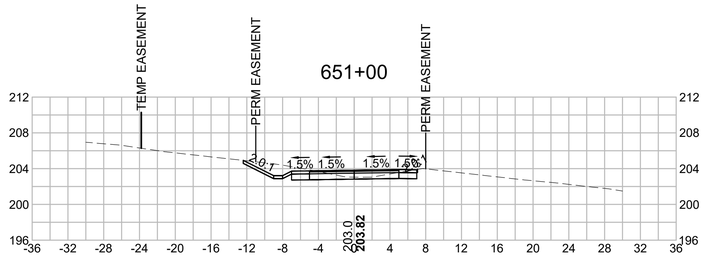
608227HD (XSEC)-4.DWG Plotted on 23-Jul-2025 2:08 PM



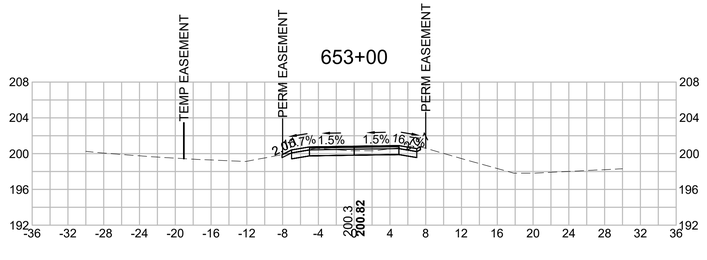
CUT	FILL
16.21 SF	1.70 SF



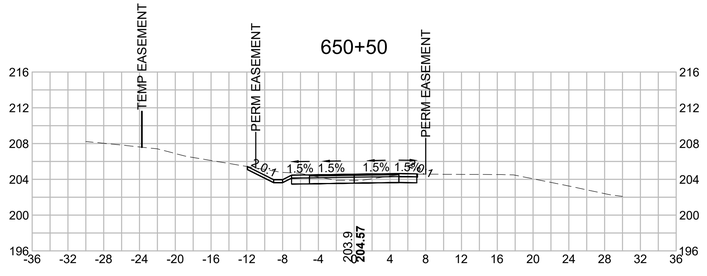
CUT	FILL
14.56 SF	0.07 SF



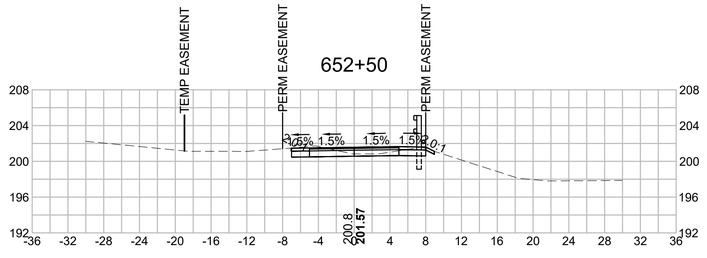
CUT	FILL
16.53 SF	1.32 SF



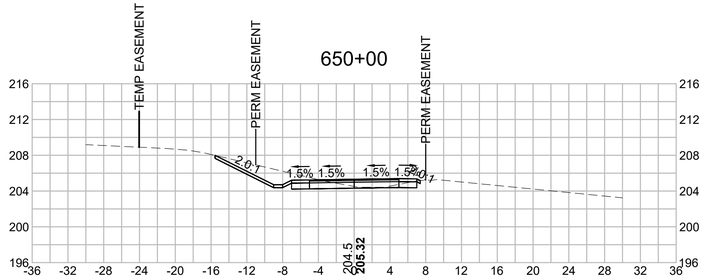
CUT	FILL
10.41 SF	0.42 SF



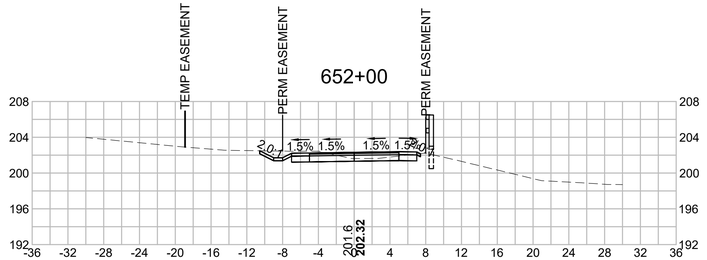
CUT	FILL
14.79 SF	0.74 SF



CUT	FILL
11.65 SF	1.44 SF

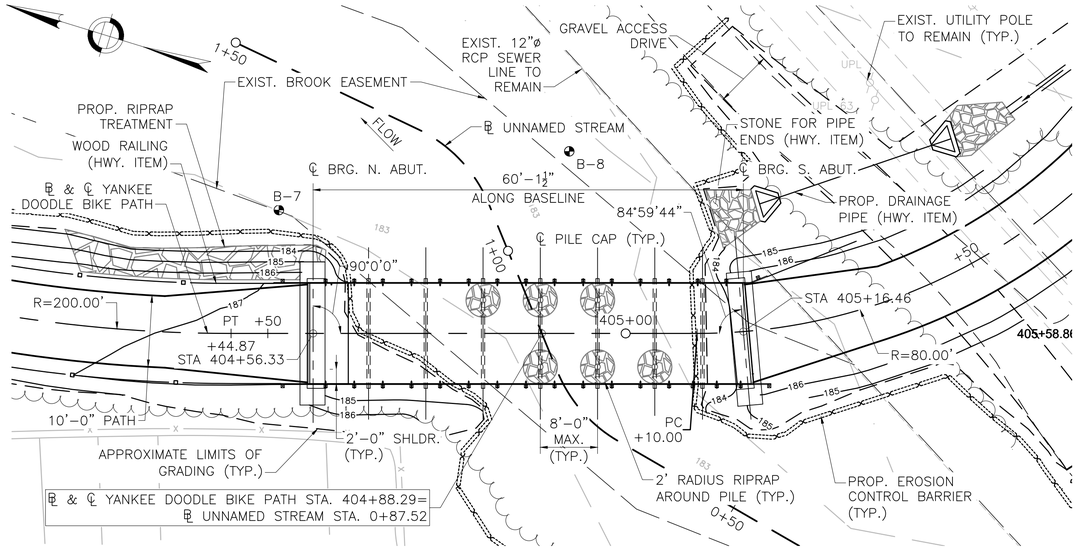


CUT	FILL
22.01 SF	2.32 SF

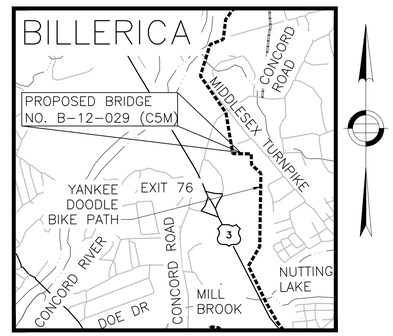


CUT	FILL
13.56 SF	1.06 SF

HOR. SCALE IN FEET
8 0 8 16
8 0 8 16
VER. SCALE IN FEET



KEY PLAN
SCALE: 1" = 10'



LOCUS
SCALE: 1" = 2000'

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	162	231
	PROJECT FILE NO. 608227		

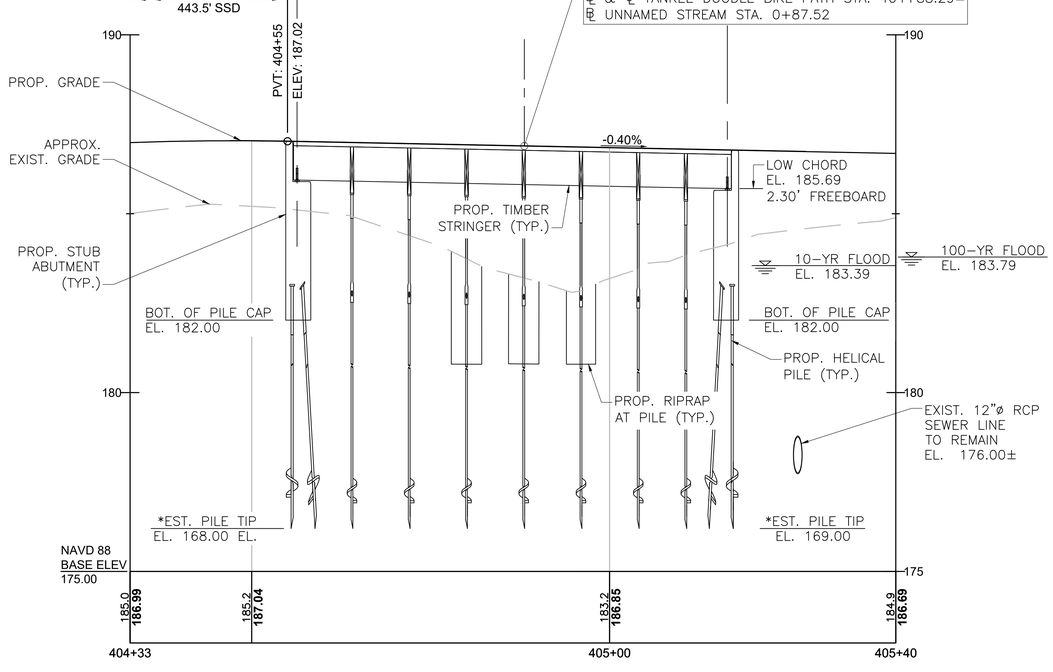
KEY PLAN, PROFILE, & INDEX

ESTIMATED QUANTITIES
(NOT GUARANTEED)

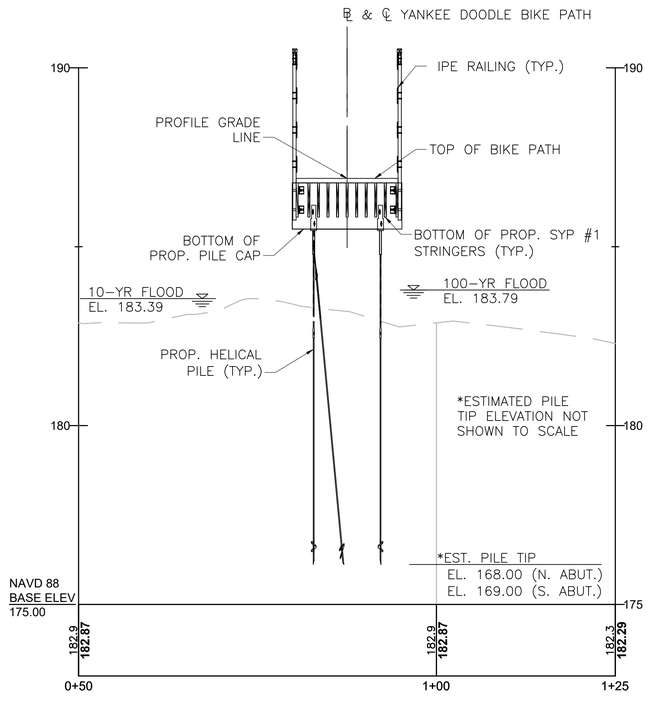
ITEM NO.	ITEM	QUANTITY	UNIT
140.	BRIDGE EXCAVATION	60	CY
144.	CLASS B ROCK EXCVATION	3	CY
151.1	GRAVEL BORROW FOR BRIDGE FOUNDATION	10	CY
151.2	GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES	20	CY
943.202	HELICAL PILE AND BRACKET ASSEMBLY BRIDGE NO. B-12-029 (C5M)	656	FT
948.70	HELICAL PILE VERIFICATION LOAD TEST	1	EA
983.1	RIPRAP	20	TON
991.1	CONTROL OF WATER - STRUCTURE NO. B-12-029 (C5M)	1	LS
995.03	BRIDGE STRUCTURE-BRIDGE NO. B-12-029 (C5M)	1	LS

INDEX OF SHEETS

1 KEY PLAN, PROFILE, & INDEX
2 GENERAL NOTES
3 BORING LOGS
4 GENERAL PLAN AND ELEVATION
5 FOUNDATION PLAN
6 NORTH ABUTMENT PLANS, ELEVATIONS & SECTIONS
7 SOUTH ABUTMENT PLANS, ELEVATIONS
8 FRAMING PLAN
9 TIMBER CONNECTION DETAILS
10 DECK DETAILS
11 TIMBER RAIL DETAILS



PROFILE ALONG YANKEE DOODLE BIKE PATH
HORIZONTAL SCALE: 1" = 10'-0"
VERTICAL SCALE: 1" = 2'-0"



PROFILE OF UNNAMED STREAM
HORIZONTAL SCALE: 1" = 10'-0"
VERTICAL SCALE: 1" = 2'-0"

COMMONWEALTH OF MASSACHUSETTS
SHANTA B. KELLER STRUCTURAL No. 51381 REGISTERED PROFESSIONAL ENGINEER
Shanta B. Keller, PE
2025.07.25 15:15:36-04'00'

vhb
260 Arsenal PL #2, P.O. Box 9151
Watertown, MA 02472
617.924.1770

August 9, 2025 — ISSUED FOR CONSTRUCTION

massDOT Highway Division

PROPOSED BRIDGE
BILLERICA
YANKEE DOODLE BIKE PATH
OVER UNNAMED STREAM

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
10 PARK PLAZA BOSTON, MASS

Alexander K. Bardow, P.E. — Digitally signed by Alexander K. Bardow, P.E. Date: 2025.07.28 15:27:34 -04'00'
STATE BRIDGE ENGINEER

Carrie Lavallee, P.E. — Carrie Lavallee, P.E. 2025.07.29 10:37:49 -04'00'
CHIEF ENGINEER

608227_BR(STR)-KEY).DWG Plotted on 23-Jul-2025 1:12 PM
Final Structural Submittal (SF) August-09-2025

GENERAL NOTES

DESIGN:

IN ACCORDANCE WITH:

THE 2020 AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS LRFD BRIDGE DESIGN SPECIFICATIONS 9TH EDITION.

THE 2009 AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS GUIDE SPECIFICATIONS FOR THE DESIGN OF PEDESTRIAN BRIDGES WITH 2015 INTERIM REVISIONS FOR H10 LOADING OR 90 PSF PEDESTRIAN LOADING, WHICHEVER CONTROLS.

MASSDOT BRIDGE MANUAL HUNDREDTH ANNIVERSARY EDITION.

THE 2011 AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS GUIDE SPECIFICATIONS FOR LRFD SEISMIC BRIDGE DESIGN WITH 2022 INTERIM REVISIONS.

BENCH MARKS:

HYDRANT BOLT N3023798.5759, E716143.2143, EL. 183.26

ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988.

SURVEY NOTEBOOK:

SURVEY PERFORMED BY HANCOCK ASSOCIATES 185 CENTRE STREET, DANVERS, MA 01923.

SCALES:

SCALES NOTED ON THE PLANS ARE NOT APPLICABLE TO REDUCED SIZE PRINTS. DIVIDE SCALES BY 2 FOR HALF-SIZE PRINTS (A3).

GEOTECHNICAL REPORT:

REFER TO GEOTECHNICAL REPORT: PROPOSED YANKEE DOODLE BIKE PATH – PROPOSED BOARDWALK NEAR FEDERAL STREET (STRUCTURE No. 3) – BRDGE No. B-12-029 (C5M), BILLERICA, MASSACHUSETTS, DATED MAY 9, 2025, PREPARED BY LAHLAF GEOTECHNICAL CONSULTING, INC.

FOUNDATIONS:

FOUNDATIONS MAY BE ALTERED, IF NECESSARY, TO SUIT CONDITIONS ENCOUNTERED DURING CONSTRUCTION, WITH THE APPROVAL OF THE ENGINEER.

UNSUITABLE MATERIAL:

ALL UNSUITABLE MATERIAL SHALL BE REMOVED WITHIN THE LIMITS OF THE FOUNDATIONS OF THE STRUCTURE, AS DIRECTED BY THE ENGINEER.

CONCRETE:

CONCRETE SHALL BE 5000 HP CONCRETE, UNLESS NOTED OTHERWISE.

REINFORCEMENT:

REINFORCING STEEL SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M31 GRADE 60. UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWINGS, ALL BARS SHALL BE LAPPED AS FOLLOWS:

MODIFICATION CONDITION	#4 BARS	#5 BARS	#6 BARS
1. NONE	16"	17"	21"
2. 12" OF CONCRETE BELOW BAR	18"	22"	27"
3. EPOXY COATED BARS, COVER <3d_b, OR CLEAR SPACING <6d_b	21"	26"	31"
4. COATED BARS, ALL OTHER CASES	17"	21"	25"
5. CONDITION 2, AND 3	23"	29"	35"
6. CONDITION 2, AND 4	21"	27"	32"

ALL OTHER BARS SHALL BE LAPPED AS SHOWN ON THE CONSTRUCTION DRAWINGS.

REINFORCING STEEL SHALL BE EPOXY COATED.

CONSTRUCTION REQUIREMENTS AND PROCEDURES:

THE CONTRACTOR SHALL TAKE THE PROPER PRECAUTIONS TO ENSURE THE STABILITY AND SAFE PERFORMANCE OF ALL STRUCTURAL ELEMENTS DURING CONSTRUCTION. REFER TO APPROVED ERECTION PLANS.

EXISTING CONDITIONS:

THE CONTRACTOR SHALL DETERMINE AND ESTABLISH ALL DIMENSIONS AND DETAILS NECESSARY FOR COMPLETION OF ALL WORK BY FIELD MEASUREMENTS AND SURVEY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ADEQUACY AND ACCURACY THEREOF, AND SHALL NOT ORDER ANY MATERIAL OR COMMENCE ANY FABRICATION UNTIL HE HAS MADE THE REQUIRED MEASUREMENTS AND THE EXTENT OF THE PROPOSED WORK HAS BEEN APPROVED BY THE ENGINEER.

UTILITIES:

THE CONTRACTOR SHALL LOCATE AND PROTECT FROM DAMAGE ALL EXISTING UTILITIES.

CONSTRUCTION JOINTS:

CONSTRUCTION JOINTS, OTHER THAN THOSE SHOWN ON THE PLANS, WILL NOT BE PERMITTED WITHOUT THE APPROVAL OF THE ENGINEER.

TIMBER:

ALL SOLID TIMBER FOR FRAMING SHALL BE SOUTHERN YELLOW PINE (SYP) #1 PER NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION.

ALL TIMBER SHALL BE KILN DRIED TO A MOISTURE CONTENT OF NO MORE THAN 19% AFTER TREATMENT.

ALL SOLID TIMBER DIMENSIONS ARE NOMINAL, UNLESS NOTED OTHERWISE.

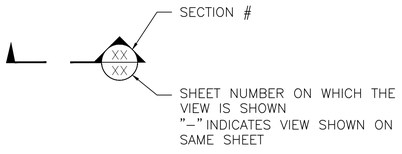
SEE SPECIAL PROVISIONS AND NOTES ON SHEET 8 OF 11 FOR ADDITIONAL REQUIREMENTS.

IPE:

IPE LUMBER SHALL BE USED FOR ALL BRIDGE DECKING, POSTS, AND RAILINGS.

SEE SPECIAL PROVISIONS AND NOTES ON SHEETS 10 OF 11 FOR ADDITIONAL REQUIREMENTS

SECTION MARK:



BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	163	231
	PROJECT FILE NO. 608227		

GENERAL NOTES

TRAFFIC DATA	ROADWAY OVER	ROADWAY UNDER
DESIGN YEAR	N/A	
AVERAGE DAILY TRAFFIC – PRESENT	N/A	
AVERAGE DAILY TRAFFIC – DESIGN YEAR	N/A	
DESIGN HOURLY VOLUME	N/A	
DIRECTIONAL DISTRIBUTION	N/A	
TRUCK PERCENTAGE – AVERAGE DAY	N/A	
TRUCK PERCENTAGE – PEAK HOUR	N/A	
DESIGN SPEED	N/A	
DIRECTIONAL DESIGN HOURLY VOLUME	N/A	

SEISMIC DESIGN CRITERIA	
DESIGN RETURN PERIOD:	1000-YR
DESIGN SPECTRA	
As	0.128g
SDs	0.257g
SD1	0.098g
SITE CLASS	D
SEISMIC DESIGN CATEGORY (SDC)	A

HYDRAULIC DESIGN FLOOD (HDF) DATA	
DRAINAGE AREA (SQ. MILES)	0.16
HDF DISCHARGE (C.F.S.)	15.4
HDF FREQUENCY (YEARS)	10
HDF VELOCITY (F.P.S.)	1.37
HDF ELEVATION (FEET, NAVD, UPSTREAM)	183.39
BASE (100-YEAR) FLOOD DATA	
BASE FLOOD DISCHARGE (C.F.S.)	27.98
BASE FLOOD ELEVATION (FEET, NAVD, UPSTREAM)	183.79
SCOUR DESIGN FLOOD (SDF) EVENT DATA	
SDF EVENT FREQUENCY (YEARS)	25
SDF ELEVATION (FEET, NAVD, UNDER BRIDGE)	N/A
SDF TOTAL SCOUR DEPTH AT ABUTMENT (FEET)	0.0
SDF TOTAL SCOUR DEPTH AT PIER (FEET)	1.2
SCOUR CHECK FLOOD (SCF) EVENT DATA	
SCF EVENT FREQUENCY (YEARS)	50
SCF ELEVATION (FEET, NAVD, UNDER BRIDGE)	N/A
SCF TOTAL SCOUR DEPTH AT ABUTMENT (FEET)	0.0
SCF TOTAL SCOUR DEPTH AT PIER (FEET)	1.2
FLOOD OF RECORD	
DISCHARGE (C.F.S.)	N/A
FREQUENCY (IF KNOWN, YEARS)	N/A
MAXIMUM ELEVATION (FEET, NAVD)	N/A
DATE (MM/YYYY)	N/A
HISTORY OF ICE FLOES	N/A
EVIDENCE OF SCOUR AND EROSION	N/A

TEMPORARY WATER CONTROL DESIGN DATA	
DESIGN FLOOD DISCHARGE (C.F.S.)	N/A
DESIGN FLOOD FREQUENCY (YEARS)	N/A
DESIGN FLOOD VELOCITY (F.P.S.)	N/A
DESIGN FLOOD ELEVATION (FEET, NAVD)	N/A

NOTE:

STREAM IS INTERMITTENT WITH NO OBSERVED WATER ELEVATION OR FLOOD OF RECORD.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER

USE ONLY PRINTS OF LATEST DATE

608227_BR(STR3-GEN_NOTES).DWG Plotted on 23-Jul-2025 1:12 PM
August-09-2025 Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	164	231
	PROJECT FILE NO. 608227		

BORING LOGS

BORING B–7

STATION: 404+51.54
OFFSET: –17.24'
GROUND ELEVATION: 183'
N: 3023350.0115
E: 715928.4014

BORING B–8

STATION: 404+92.13
OFFSET: –25.45'
GROUND ELEVATION: 183'
N: 3023327.5085
E: 715952.4184

NAVD88 (FT)

EL. 190.0
EL. 180.0
EL. 170.0
EL. 160.0
EL. 150.0

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG — **Boring B-7** — **Page 1 of 1**

Project:	**Proposed Yankee Doodle Bike Path, Billerica, MA (Structure 3) - Bridge No. B-12-029 (C5M)**		
Client:	**Vanasse Hangen Brustlin, Inc.**	LGCI Project No.:	1723
Drilling Subcontractor:	Northern Drill Services, Inc.	Date Started:	11/27/2017
Drilling Foreman:	Tim Tucker	Date Completed:	11/27/2017
LGCI Engineer:	Tom Sinnott	Location:	Proposed boardwalk near 8 Federal Street
Ground Surface El:	~183 ft. (see remark 1)	Total Depth:	23.9 feet
Groundwater Depth:	~3 ft. at the end of drilling	Drill Rig Type:	Mobile Drill B-48 ATV Rig
		Drilling Method:	Drive and wash with 4 inch casing
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	NA
Drop:	30 inches	Coordinates: E: 715928.4014, N: 3023350.0115	

Depth Scale	Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-2	S1	1	1	1	1	24	14		Topsoil ~2 ft.	S1 - Silty SAND (SM), fine, ~35% fines, trace organics, trace roots, black, moist
	2-4	S2	2	15	8	4	24	14		Swamp Deposits ~6.7 ft.	S2 - Top 8": SILT (ML), slightly plastic, trace fine gravel, trace organics, trace roots, dark brown, trace wood, wet Bot. 6": Silty GRAVEL (GM), fine angular, ~15% fines, 10-15% fine sand, gray, wet
5ft	4-6	S3	10	13	30	12	24	10			S3 - Silty SAND (SM), fine, trace medium, 30-35% fines, 5-10% fine gravel, trace organic fines, trace roots, dark brown, wet Bot. 4": Silty GRAVEL with Sand (GM), fine to coarse angular, ~15% fines, ~25% fine sand, brown, wet
	6-8	S4	35	76	15	17	24	14			S4 - Top 7": Silty SAND (SM), fine, trace medium, 15-20% fines, trace organic fines, trace roots, dark brown, wet
	8-10	S5	17	25	26	24	24	12	2		Bot. 7": Silty SAND (SM), fine, 20-25% fines, trace fine gravel, gray to light brown, wet S5 - Silty SAND (SM), fine, trace medium, ~25% fines, ~10% fine gravel, gray, wet
10ft											
	13-15	S6	27	52	59	59	24	18		Sand	S6 - Similar to S5
15ft											
	18-20	S7	20	31	49	34	24	18			S7 - Similar to S5, 0-5% fine gravel
20ft											
	23-23.9	S8	11	60/5			11	10	3	~23.9 ft.	S8 - Silty SAND (SM), fine, ~20% fines, gray, wet (Well Graded Sand in Mid 3 ")
											Bottom of boring at 23.9 feet. Backfilled with drill cuttings.

Remarks:
1. The ground surface elevation was interpolated to the nearest 1/2 foot using a survey plan titled: "Yankee Doodle Pike Bath, Billerica, MA, Boring Locations, page 3 of 6," provided to LGCI by VHB via email on February 9, 2018.
2. Drill chattered.
3. Refusal at 23.9 feet.

BOT. OF N. ABUT. EL. 182.00

WATER LEVEL EL. 180.0 OBS. 11/27/2017

EST. PILE TIP EL. 169.00 (S. ABUT.)

EST. PILE TIP EL. 168.00 (N. ABUT.)

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG — **Boring B-8** — **Page 1 of 1**

Project:	**Proposed Yankee Doodle Bike Path, Billerica, MA (Structure 3) - Bridge No. B-12-029 (C5M)**		
Client:	**Vanasse Hangen Brustlin, Inc.**	LGCI Project No.:	1723
Drilling Subcontractor:	Northern Drill Services, Inc.	Date Started:	11/27/2017
Drilling Foreman:	Tim Tucker	Date Completed:	11/27/2017
LGCI Engineer:	Tom Sinnott	Location:	Proposed boardwalk near 8 Federal Street
Ground Surface El:	~183 (see remark 1)	Total Depth:	23 feet
Groundwater Depth:	~10 ft. at the end of drilling	Drill Rig Type:	Mobile Drill B-48 ATV Rig
		Drilling Method:	Drive and wash with 4 inch casing
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	NX
Drop:	30 inches	Coordinates: E: 715952.4184, N: 3023327.5085	

Depth Scale	Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-2	S1	1	1	4	2	24	13		Topsoil ~2 ft.	S1 - Silty SAND (SM), fine, ~35% fines, trace organic fines, trace roots, black, moist
	2-4	S2	4	10	13	10	24	12	2	Swamp Deposits ~4 ft.	S2 - Top 6": Sandy SILT (ML), slightly plastic, ~20% fine sand, trace organic fines, trace roots, peat fibers, black, wet Bot. 6": Silty SAND (SM), fine, trace medium, ~25% fines, trace fine gravel, trace organics, gray, wet
5ft	4-6	S3	14	15	57	27	24	11			S3 - Top 4": Well Graded SAND with Silt & Gravel (SW-SM), fine to coarse, 5-10% fines, ~20% fine to coarse angular gravel, brown, wet Bot. 7": Silty SAND with Gravel (SM), fine to medium, trace coarse, 20-25% fines, 20% fine to coarse gravel, gray, wet
	6-8	S4	16	15	10	9	24	15			S4 - Top 6": Well Graded SAND with Silt & Gravel (SW-SM), fine to coarse, 5-10% fines, ~15% fine gravel, brown, wet Bot. 9": Silty SAND (SM), fine, ~25% fines, ~10% fine gravel, brown, wet
	8-10	S5	15	20	13	14	24	13		Sand ~13.5 ft.	S5 - Silty SAND (SM), fine, ~30% fines, trace fine gravel, wet S6 - Similar to S5, coarse angular gravel
10ft											
	13-13.4	S6	60/3				3	3	3		
15ft										Possible Weathered Bedrock	
									4		
									5	~18 ft.	
	18-23	C1					60	60		Bedrock ~23 ft.	C1 - min/ft.: 4.8, 2.4, 2.2, 2, 2.3 Hard, slightly fractured, slightly weathered, fine grained, gray, GRANITE REC=100% RQD=97.5%
20ft											
											Bottom of boring at 23 feet. Backfilled borehole with drill cuttings.

Remarks:
1. The ground surface elevation was interpolated to the nearest 1/2 foot using a survey plan titled: "Yankee Doodle Pike Bath, Billerica, MA, Boring Locations, page 3 of 6," provided to LGCI by VHB via email on February 9, 2018.
2. Drill chattering.
3. Open hole drive and wash techniques starting at 13.5 feet. Possible weathered bedrock observed in drill cuttings.
4. Heavy drill chattering.

BOT. OF S. ABUT. EL. 182.00

WATER LEVEL EL. 173.0 OBS. 11/27/2017

EST. PILE TIP EL. 169.00 (S. ABUT.)

EST. PILE TIP EL. 168.00 (N. ABUT.)

BORING NOTES:

1. LOCATION OF BORINGS SHOW ON THE KEY PLAN THUS: ⊕ B–#
2. BORINGS ARE TAKEN FOR THE PURPOSE OF DESIGN AND SHOW CONDITIONS AT BORING POINTS ONLY, BUT DO NOT NECESSARILY SHOW THE NATURE OF THE MATERIALS TO BE ENCOUNTERED DURING CONSTRUCTION.
3. WATER LEVELS SHOWN ON THE BORING LOGS WERE OBSERVED AT THE TIME OF TAKING BORINGS AND DO NOT NECESSARILY SHOW THE TRUE GROUND WATER LEVEL.
4. FIGURES IN COLUMNS INDICATE NUMBER OF BLOWS REQUIRED TO DRIVE A 1⅜" I.D. SPLIT SPOON SAMPLER 6" USING A 140 POUND WEIGHT FALLING 30".
5. BORING SAMPLES ARE STORED AT A STORAGE FACILITY LOCATED ON ROUTE 114 (219 WINTHROP AVE.) IN LAWRENCE, MA. THE CONTRACTOR MAY EXAMINE THE SOIL AND ROCK SAMPLES BY CONTACTING THE MASSDOT GEOTECHNICAL SECTION AT 10 PARK PLAZA, BOSTON, MA.
6. ALL BORINGS WERE MADE IN NOVEMBER, 2017.
7. BORINGS WERE MADE BY NORTHERN DRILL SERVICES, INC., 130 EAST MAIN ST, BLDG A, NORTHBOROUGH MA.
8. THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988 IS USED THROUGHOUT.
9. BORING LOGS ARE NOT DRAWN TO A STANDARD SCALE. BAR SCALE ON SHEET IS USED TO CONVEY ELEVATIONS.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

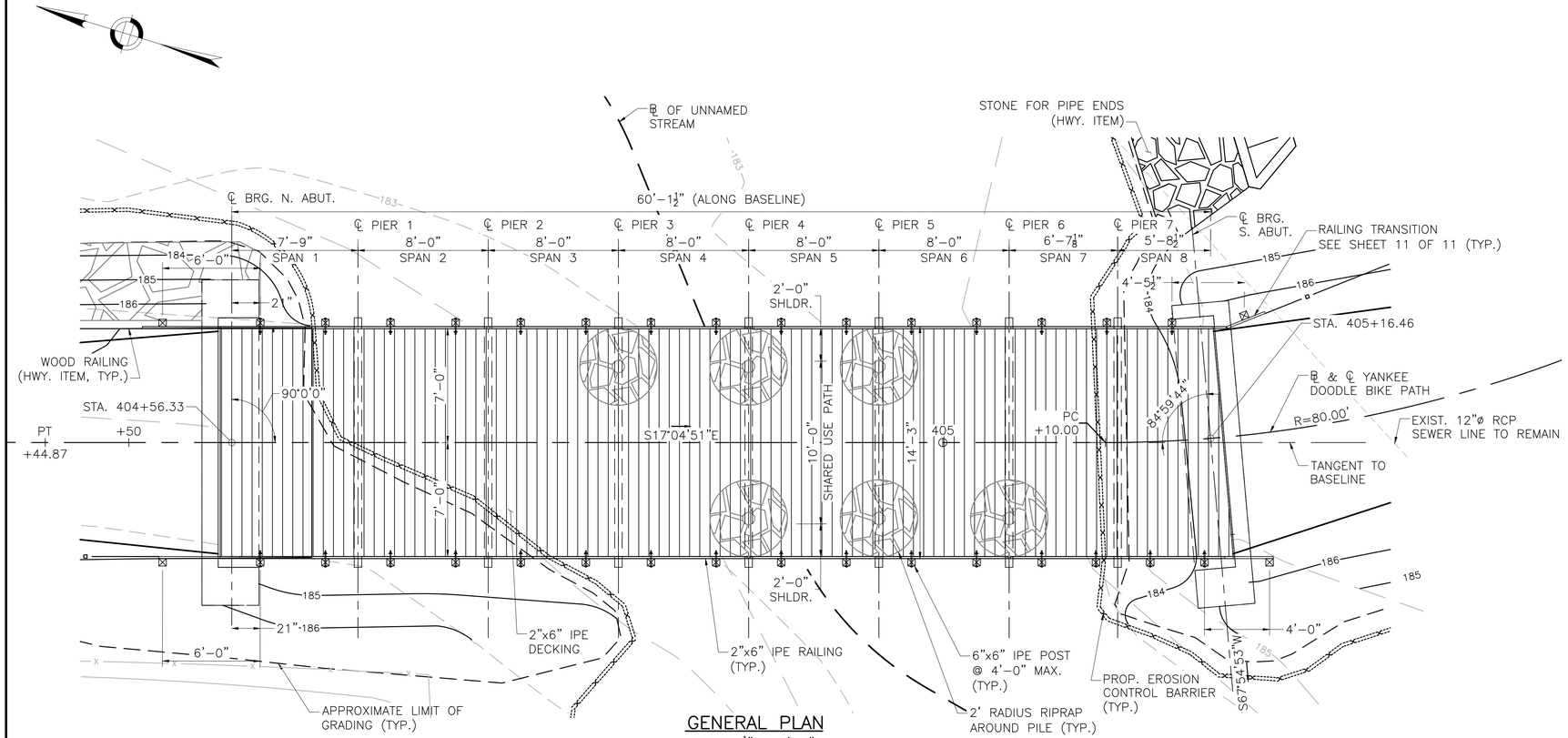
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BRISTR3-BORINGS).DWG Plotted on 31-Jul-2025 12:27 PM
August-09-2025 Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	165	231
PROJECT FILE NO.	608227		

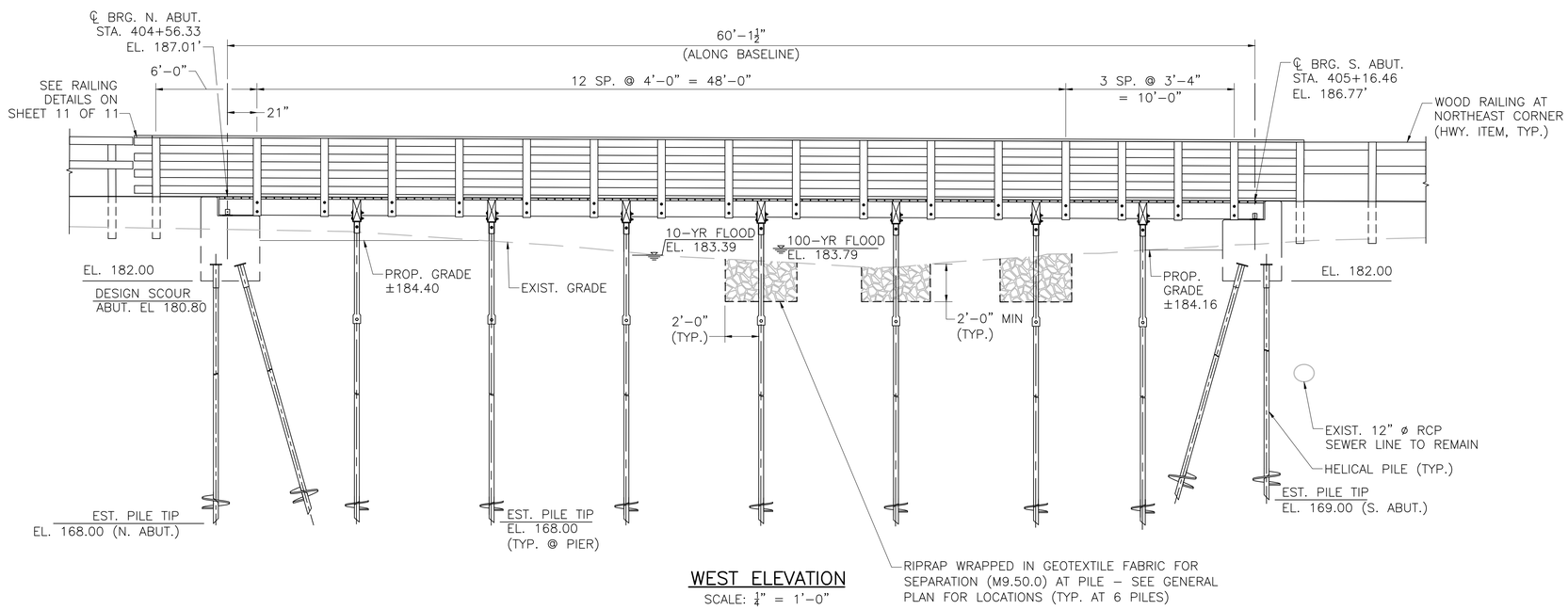
GENERAL PLAN AND ELEVATION



GENERAL PLAN
SCALE: ¼" = 1'–0"

NOTES:

1. FOR FOUNDATION PLAN SEE SHEET 5 OF 11.
2. FOR FRAMING PLAN SEE SHEET 8 OF 11.



WEST ELEVATION
SCALE: ¼" = 1'–0"

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

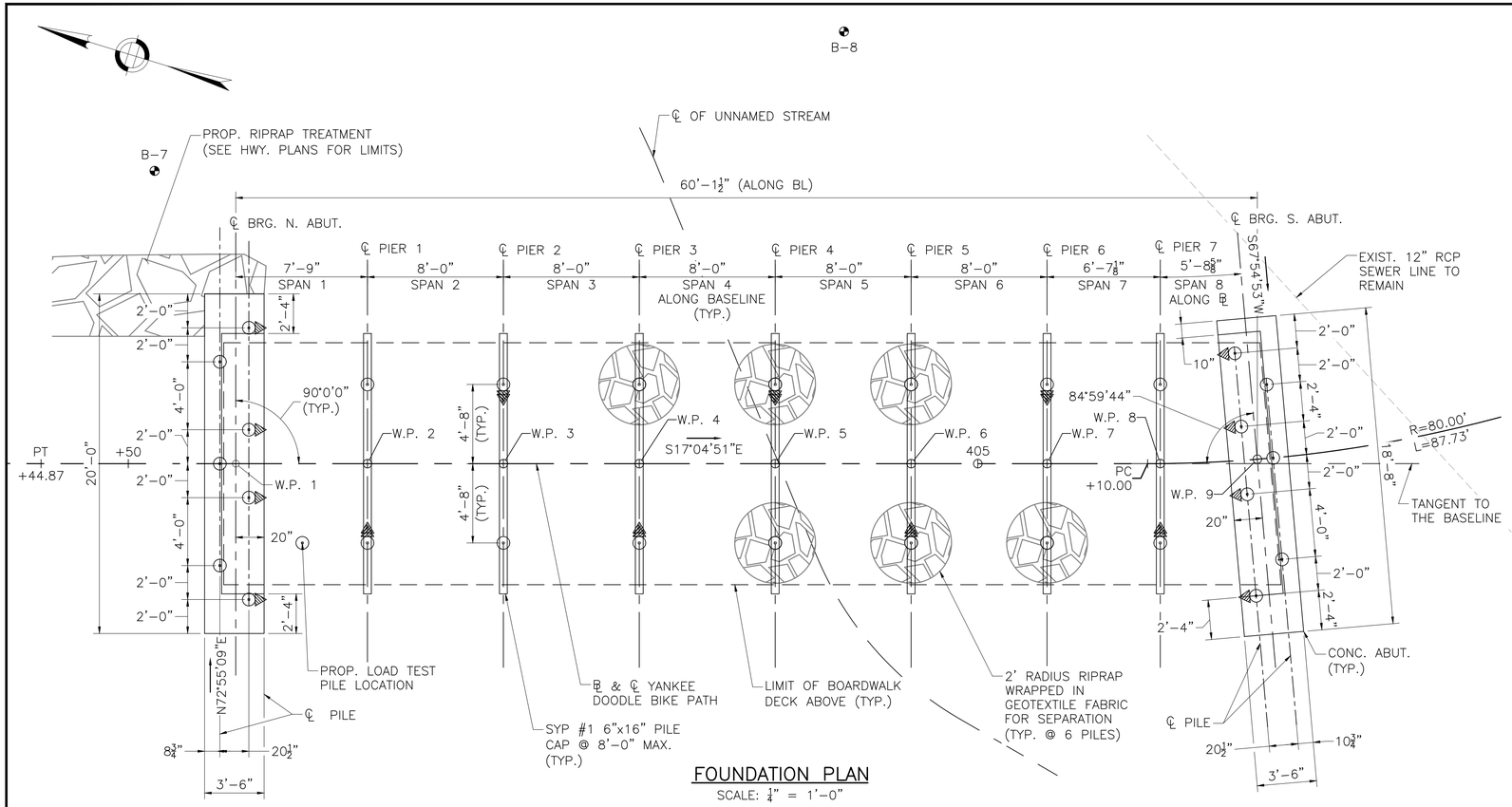
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR)-GEN_PLAN_EL).DWG Plotted on 23-Jul-2025 1:15 PM
August-09-2025 Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	166	231
	PROJECT FILE NO. 608227		

FOUNDATION PLAN



FOUNDATION PLAN
SCALE: ¼" = 1'–0"

LEGEND:

⊙ INDICATES VERTICAL HELICAL PILE.

INDICATES COMBINED BATTERED PILE AND VERTICAL HELICAL PILE. ARROW INDICATES THE DIRECTION OF THE BATTERED PILE.

INDICATES BATTERED HELICAL PILE. ARROW INDICATES THE DIRECTION OF THE BATTERED PILE.

TABLE 1 – WORKING POINTS ALONG THE BASELINE				
W.P. #	STATION	NORTHING	EASTING	TOP OF BEAM SEAT ELEVATION*
1	404+56.33	3023340.36	715911.52	185.91
2	404+64.08	3023332.96	715913.79	185.57
3	404+72.08	3023325.31	715916.14	185.54
4	404+80.08	3023317.66	715918.49	185.50
5	404+88.08	3023310.01	715920.84	185.47
6	404+96.08	3023302.37	715923.19	185.44
7	405+04.08	3023294.72	715925.54	185.41
8	405+10.74	3023288.35	715927.50	185.38
9	405+16.46	3023282.97	715929.43	185.67

* LOCATION OF PIER BEAM SEAT ELEVATIONS ARE INDICATED ON SECTION 4 ON SHEET 9 OF 11. LOCATION OF ABUTMENT BEAM SEAT ELEVATIONS ARE INDICATED ON SECTION 3 ON SHEET 9 OF 11. ABUTMENT ELEVATIONS ARE SHOWN ON SHEETS 6 & 7 OF 11.

LOADS ON HELICAL PILES					
PILE LOCATION	PILE TYPE	PILE SYMBOL	PILE COMPONENTS	STRENGTH I COMPRESSION (KIP)	BATTERED ANGLE TO VERTICAL
AT ABUTMENTS	VERTICAL	⊙		35.7	
	BATTERED			35.7	15 DEG
AT PIERS	VERTICAL	⊙		29.8	
	COMBINED VERTICAL & BATTERED PERPENDICULAR TO BOARDWALK		VERTICAL	38.4	
			BATTERED	10.0	15 DEG

LOADS ON PILES:

THE FACTORED AXIAL DESIGN LOAD PER PILE IS AS NOTED PER TABLE FOR EACH PILE TYPE, AS PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS STRENGTH I LOAD COMBINATION.

THE FACTORED GEOTECHNICAL PILE RESISTANCE IS 38.7 KIPS. THE FACTORED GEOTECHNICAL PILE RESISTANCE IS THE PRODUCT OF THE NOMINAL RESISTANCE OF 86.0 KIPS AND A RESISTANCE FACTOR OF 0.45.

FOUNDATION NOTES:

1. FOUNDATIONS SHALL BE CONSTRUCTED PER RECOMMENDATIONS ESTABLISHED BY LAHLAF GEOTECHNICAL CONSULTING, INC. IN THEIR GEOTECHNICAL REPORT: "GEOTECHNICAL REPORT PROPOSED YANKEE DOODLE BIKE PATH – PROPOSED BOARDWALK NEAR FEDERAL STREET (STRUCTURE NO. 3) – BRIDGE B–12–029 (C5M), BILLERICA, MASSACHUSETTS", DATED MAY 9, 2025.
2. HELICAL PILES SHALL BE DESIGNED AND MANUFACTURED IN ACCORDANCE WITH THE 2020 AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION W/ 2021 ERRATA.
3. HELICAL PILES SHALL BE DESIGNED BY THE MANUFACTURER'S/ INSTALLER'S PROFESSIONAL ENGINEER REGISTERED IN THE COMMONWEALTH OF MASSACHUSETTS, AND ENGAGED BY THE CONTRACTOR. THE HELICAL PILE MANUFACTURER SHOULD ESTIMATE THE MAXIMUM DESIGN RESISTANCE THAT COULD BE ACHIEVED BASED ON THE AVAILABLE SUBSURFACE DATA INCLUDING LOAD TEST DATA. THE DESIGN SHOULD INCLUDE THE SIZE AND DEPTH OF THE HELICAL PILES, AND NUMBER, SIZE, SPACING AND THICKNESS OF THE HELICAL BEARING PLATES TO SUPPORT THE SPECIFIED DESIGN LOADS, INCLUDING BRACKETS AND CAP PLATES.
4. STEEL SHAFTS SHALL HAVE MINIMUM YIELD STRENGTH OF 50 KSI AND A MINIMUM TORQUE STRENGTH RATING OF 5,286 FT–LB.
5. STRUCTURAL STEEL PIPE SHALL BE SEAMLESS OR STRAIGHT–SEAM WELDED, PER ASTM A500 OR A513, 3.5 INCH O.D. MINIMUM. WALL THICKNESS SHALL BE 0.300 INCH (SCHEDULE 80) MINIMUM. MINIMUM MOMENT INERTIA I = 3.69 IN^4, AND MINIMUM SECTION MODULUS S = 2.11 IN^3.
6. BEARING PLATE MATERIAL SHALL MEET OR EXCEED THE PROPERTIES OF ASTM A572, ASTM A1018, OR ASTM A656 AS APPLICABLE, WITH MINIMUM YIELD STRENGTH OF 50 KSI. PLATE THICKNESS SHALL BE MINIMUM ⅜" INCH.
7. THE CONTRACTOR SHALL SUBMIT A PILE SCHEDULE, PILE INSTALLATION, AND TESTING PLAN FOR REVIEW AND APPROVAL OF THE ENGINEER. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND DESIGN CALCULATIONS FOR THE PROPOSED HELICAL PILES SIGNED AND STAMPED BY A PROFESSIONAL ENGINEER LICENSED IN THE COMMONWEALTH OF MASSACHUSETTS.
8. HELICAL PILES SHALL EXTEND BEYOND THE BOTTOM OF THE SWAMP DEPOSITS AT LEAST 2 FT INTO THE SAND LAYER SO AS TO HAVE THE TOP HELIX AT OR LOWER THEN EL 174.00'. ESTIMATED HELICAL PILE TIP ELEVATION SHALL BE EL. 168.00' AT THE NORTH ABUTMENT AND EL. 169.00' AT THE SOUTH ABUTMENT.
9. A MINIMUM OF ONE VERIFICATION LOAD TEST SHOULD BE PERFORMED ON A NON–PRODUCTION HELICAL PILE BEFORE THE START OF CONSTRUCTION. EXISTING CONDITIONS AND UNDERGROUND OBSTRUCTIONS SHALL BE CONFIRMED BY THE CONTRACTOR. ANY UNFORESEEN OBSTRUCTIONS SHALL BE REPORTED TO THE ENGINEER. UPON SUCCESSFUL COMPLETION OF A STATIC LOAD TEST, A RESISTANCE FACTOR OF 0.7 MAY BE UTILIZED. SEE SPECIAL PROVISION 943.202.
10. IN ADDITION TO GALVANIZING, THE HELICAL PILES SHALL BE DESIGNED WITH A MINIMUM OF $\frac{1}{16}$" THICKNESS OF SACRIFICIAL STEEL FOR ADDITIONAL CORROSION PROTECTION.
11. MINIMUM AND MAXIMUM INSTALLATION TORQUES SHALL BE SPECIFIED BY THE CONTRACTOR'S DESIGN AND THE HELICAL PILE MANUFACTURER. THE MINIMUM INSTALLATION TORQUE SHALL BE HIGH ENOUGH TO ACHIEVE THE REQUIRED BEARING RESISTANCE. SEE THE PILE RESISTANCE SCHEDULE FOR REQUIRED BEARING RESISTANCE. THE MAXIMUM INSTALLATION TORQUE SHALL NOT EXCEED THE ALLOWABLE TORSIONAL RESISTANCE OF THE PILE SHAFTS. AS HELICAL PILES ARE SPUN, THE TORQUE SHOULD BE MONITORED TO STOP ADVANCING THE HELICAL PILES AS SOON AS THE TORQUE IS REACHED.
12. BRACING OF PILES IS NOT REQUIRED BASED ON THE FACT THAT THERE ARE HELICAL DIAMETER SIZES THAT WORK FOR A CONSERVATIVE DETERMINED UNSUPPORTED LENGTH. IF NEEDED, SPECIALTY DESIGNER CAN USE GROUTED HELICAL PILES, TO INCREASE THE DIAMETER, FOR UNSUPPORTED LENGTH.
13. THE HELICAL PILES SHALL BE INSTALLED AT A SPACING LARGER THAN 3 PILE DIAMETERS ON CENTER. BATTERED PILES SHALL MAINTAIN THE MINIMUM DISTANCE BETWEEN PILES.
14. LOCATIONS OF PILES SHALL NOT BE CHANGED WITHOUT PRIOR APPROVAL FROM THE ENGINEER.
15. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING PILE INSTALLATION TO ACCOMMODATE FLUCTUATIONS IN WATER LEVELS.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER

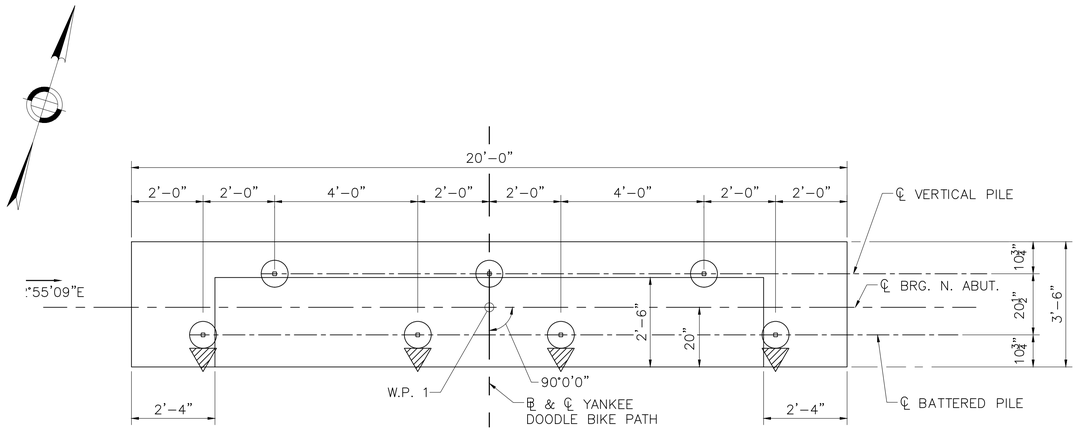
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR)-FNDN).DWG Plotted on 23-Jul-2025 1:16 PM
August-09-2025
Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	167	231
	PROJECT FILE NO. 608227		

NORTH ABUTMENT PLANS, ELEVATIONS & SECTIONS



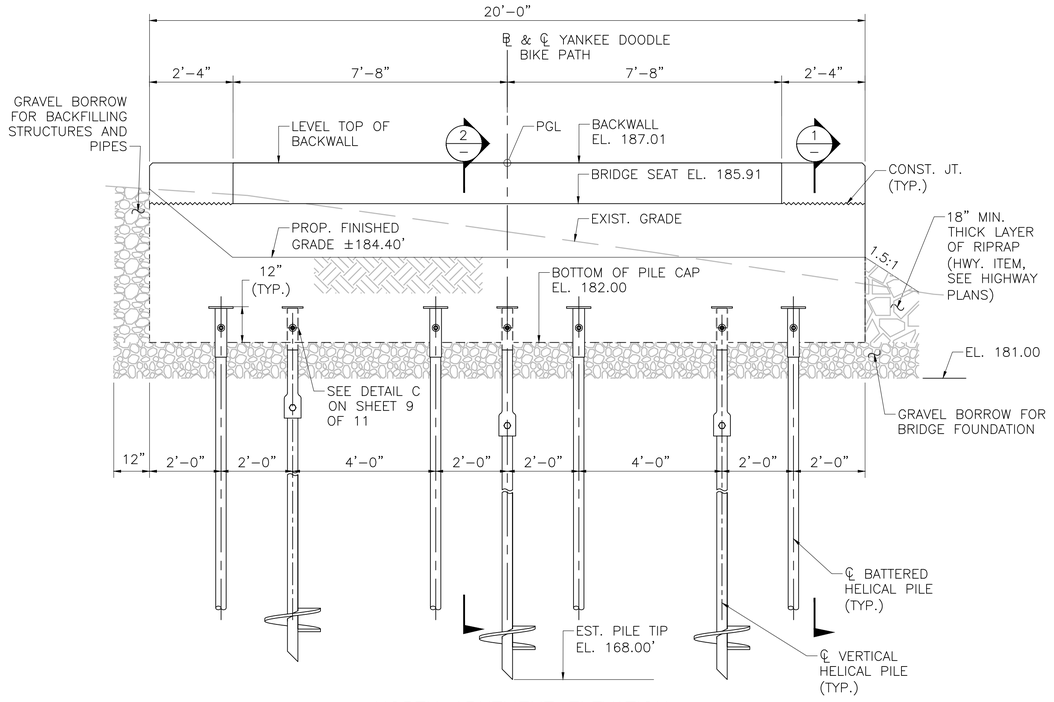
NORTH ABUTMENT PLAN

SCALE: ½" = 1'–0"

LEGEND:

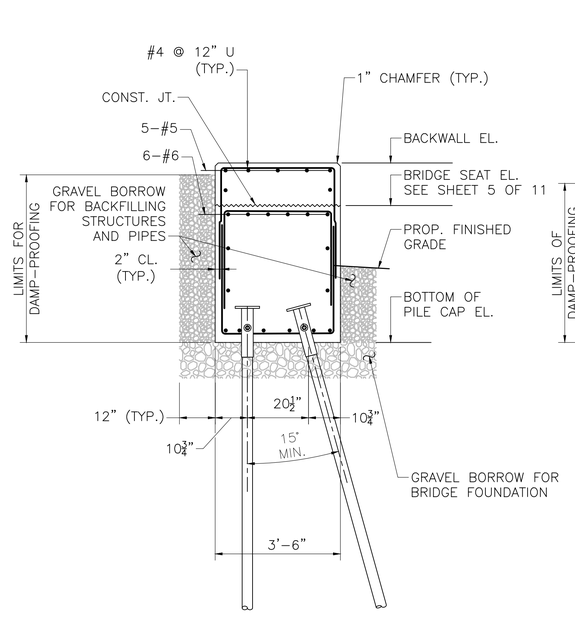
INDICATES VERTICAL HELICAL PILE.

INDICATES BATTERED HELICAL PILE.
ARROW INDICATES THE DIRECTION OF THE BATTERED PILE.



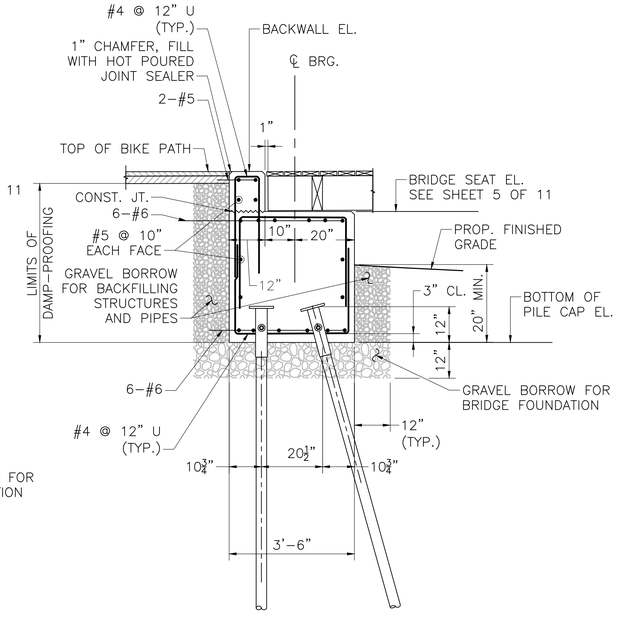
NORTH ABUTMENT ELEVATION

SCALE: ½" = 1'–0"



SECTION 6

SCALE: ½" = 1'–0"



SECTION 7

SCALE: ½" = 1'–0"

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER

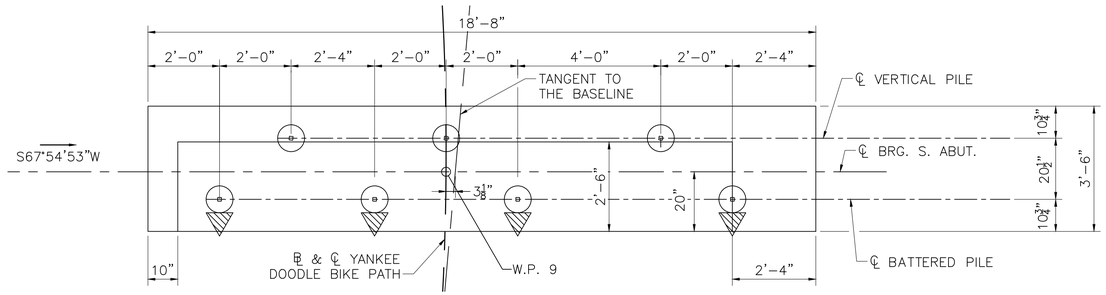
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR)-FNDN).DWG Plotted on 23-Jul-2025 1:17 PM
August-09-2025
Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	168	231
PROJECT FILE NO.	608227		

SOUTH ABUTMENT PLANS, ELEVATIONS



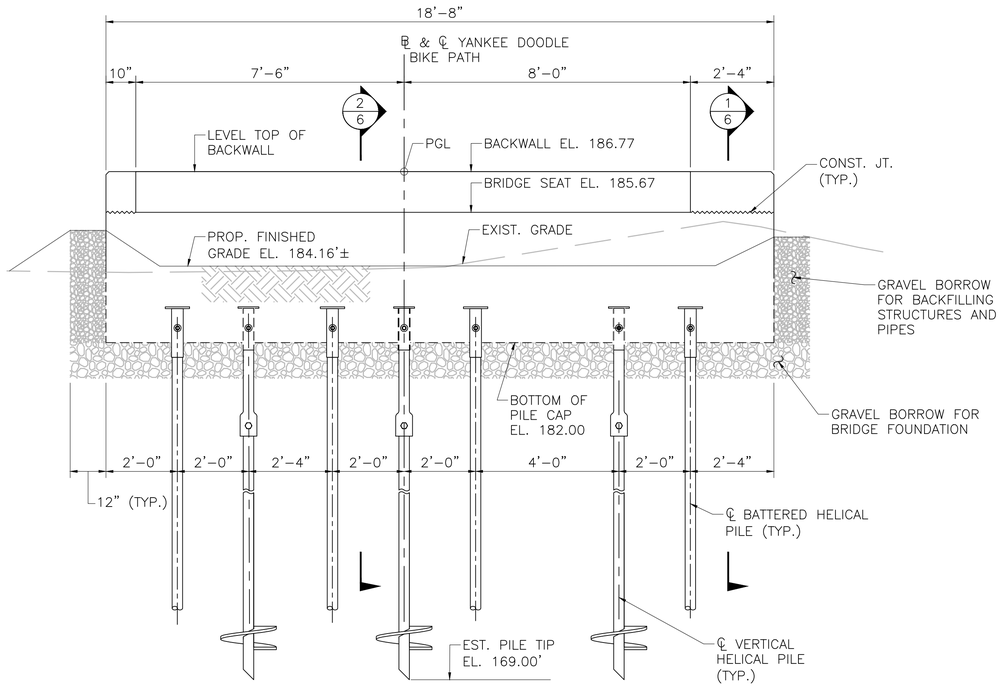
SOUTH ABUTMENT PLAN

SCALE: ½" = 1'-0"

LEGEND:

INDICATES VERTICAL HELICAL PILE.

INDICATES BATTERED HELICAL PILE.
ARROW INDICATES THE DIRECTION OF THE BATTERED PILE.



SOUTH ABUTMENT ELEVATION

SCALE: ½" = 1'-0"

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: _____ STATE BRIDGE ENGINEER

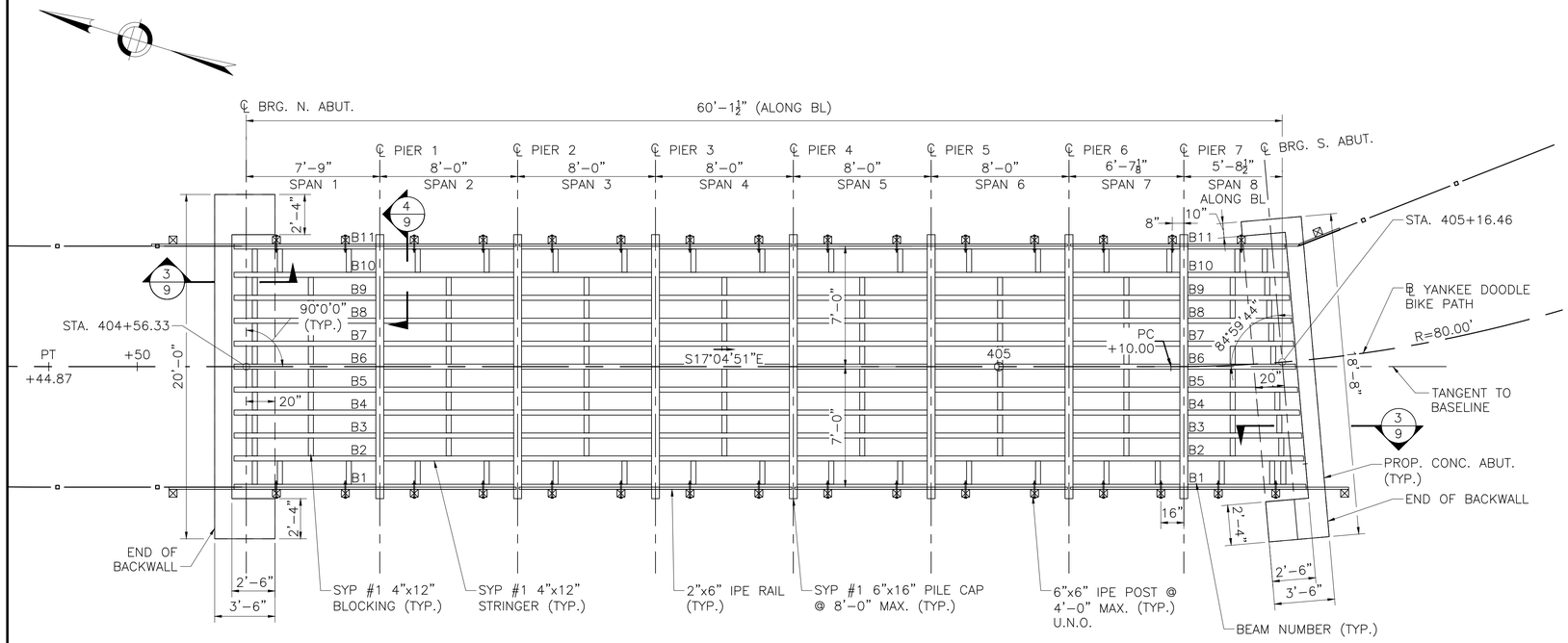
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR)-FNDN).DWG Plotted on 23-Jul-2025 1:17 PM
August-09-2025
Final Structural Submittal (SF)

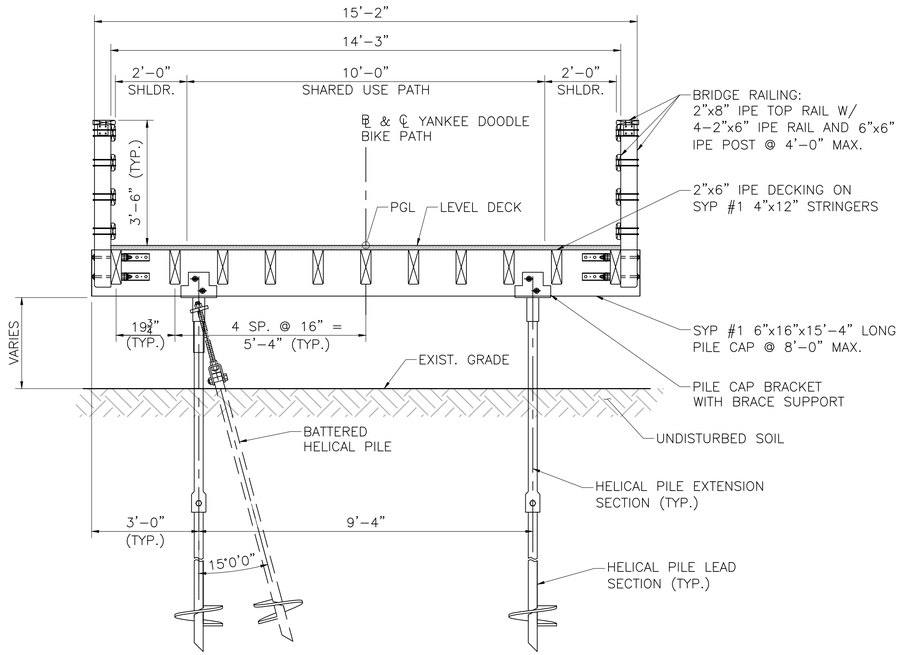
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	169	231
PROJECT FILE NO.	608227		

FRAMING PLAN



FRAMING PLAN
SCALE: ¼" = 1'–0"



TYPICAL CROSS SECTION
SCALE: ½" = 1'–0"

TIMBER NOTES:

1. ALL TIMBER CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE AMERICAN WOOD COUNCIL NATIONAL DESIGN SPECIFICATION (ANSI/AWS/NDS).
2. ALL RAILING, POSTS AND DECKING ON THE BRIDGE SHALL BE IPE FOR EXTERIOR USE. IPE MATERIAL SHALL BE CERTIFIED BY THE FOREST STEWARDSHIP COUNCIL. SEE SHEET 10 OF 11 FOR IPE NOTES AND DETAILS.
3. ALL RAILING AND POSTS OFF THE BRIDGE SHALL BE SAWN LUMBER SOUTHERN YELLOW PINE AND GRADED UNDER THE SOUTHERN PINE INSPECTION BUREAU (SPIB) RULES, UNLESS NOTED OTHERWISE.
4. ALL STRINGERS, PIER CAPS AND BLOCKING SHALL BE #1 OR BETTER SOUTHERN YELLOW PINE OR APPROVED EQUAL. ALL SAWN LUMBER SHALL BE GRADE NO. 1, S4S (SURFACED FOUR SIDES).
5. ALL SAWN LUMBER SHALL BE PRESSURE TREATED (P.T.) IN ACCORDANCE WITH AWPA U1 – COMMODITY SPECIFICATION A, USE CATEGORY 4A. PRESERVATIVE TREATED LUMBER SHALL BE SUBJECT TO A QUALITY CONTROL PROGRAM ADMINISTERED BY AN APPROVED AGENCY. ELEMENT CUTOFFS SHALL BE TREATED WITH AWPA M4. SEE SHEET 10 OF 11 FOR IPE NOTES AND DETAILS.
6. ALL METAL HARDWARE, INCLUDING SCREWS, NAILS, ANGLES, STRAPS, STEEL PLATES AND JOIST HANGERS SHALL BE STAINLESS STEEL. NOTE THAT SIMPSON PRODUCTS ARE SHOWN THROUGHOUT. CONTRACTOR MAY SUBMIT ALTERNATE HARDWARE DEMONSTRATING EQUAL CAPACITY.
7. ALL BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A307, GRADE A, AND SHALL BE HOT DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A153. WASHERS UNDER THE HEAD OF THE CARRIAGE BOLTS SHALL BE SQUARE HOLED FOR MATING WITH THE SQUARE SHOULDERS OF THE CARRIAGE BOLT. CONNECTIONS TO HAVE LOCK WASHERS.
8. POST SHALL BE SPACED AS SHOWN ON THE PLANS AND SHALL BE 4'–0" O.C. MAX U.N.O.
9. RAILS TO SPAN A MINIMUM OF 3 POSTS. END BUTT JOINTS IN RAILS SHALL BE CENTERED ON POSTS AND STAGGERED FROM JOINTS IN ADJACENT RAILS TO EVERY OTHER POST.
10. PILOT HOLES SHALL BE DRILLED PRIOR TO DRIVING OF SCREWS.
11. BOLT HOLES SHALL BE PRE DRILLED TO A DIAMETER 1/16" LARGER THAN BOLT DIAMETER.
12. ALL HOLES SHALL BE TREATED THOROUGHLY PRIOR TO INSTALLING SCREWS OR BOLTS. SEE SHEET 10 OF 11 FOR IPE REQUIREMENTS.
13. SEE HIGHWAY PLANS FOR WOOD RAILING OFF BRIDGE.

DATE	DESCRIPTION
August 9, 2025	ISSUED FOR CONSTRUCTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

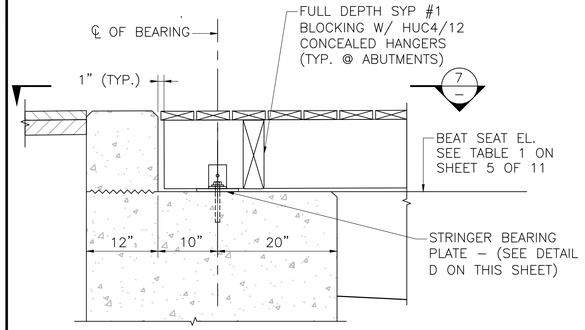
608227_BR(STR)-FRAMING).DWG Plotted on 23-Jul-2025 1:18 PM

August-09-2025 Final Structural Submittal (SF)

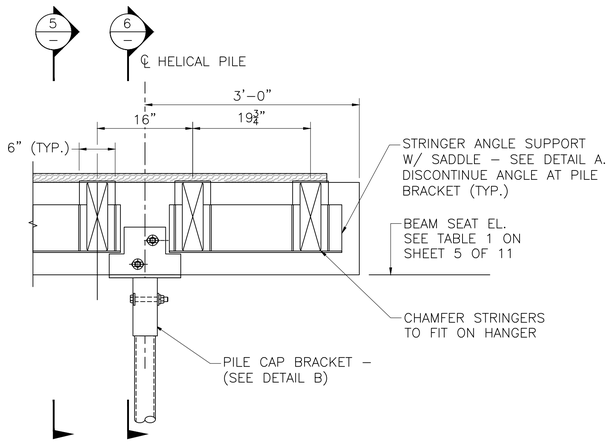
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	170	231
	PROJECT FILE NO. 608227		

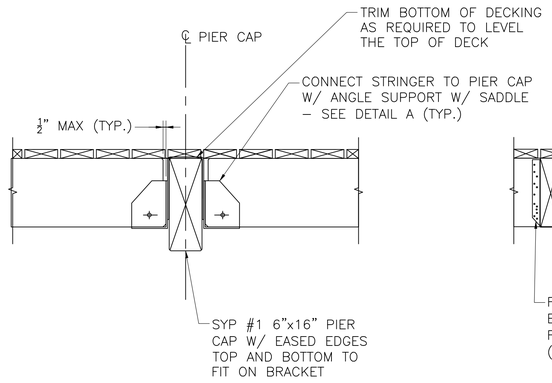
TIMBER CONNECTION DETAILS



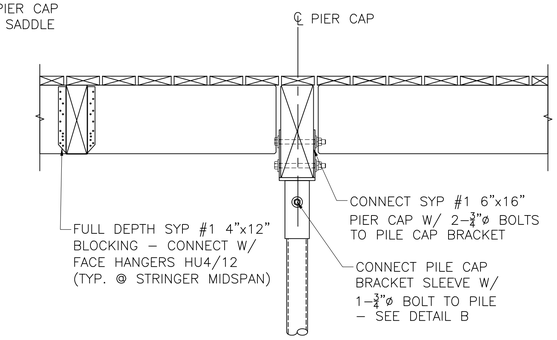
SECTION 3 / SCALE: 1" = 1'–0" (8)



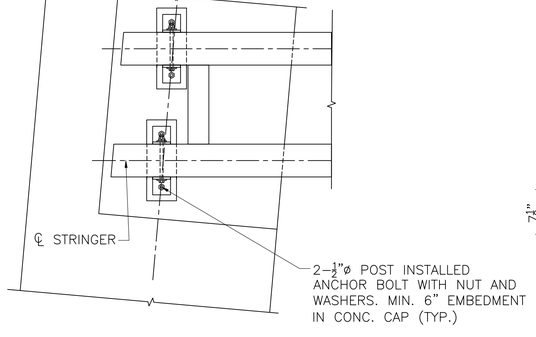
SECTION 4 / SCALE: 1" = 1'–0" (8)



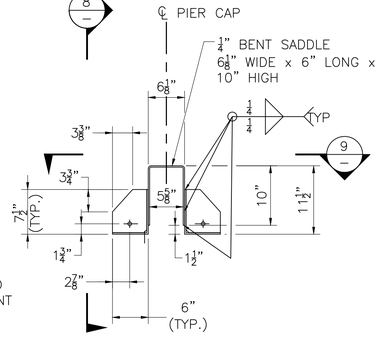
SECTION 5 / SCALE: 1" = 1'–0" (–)



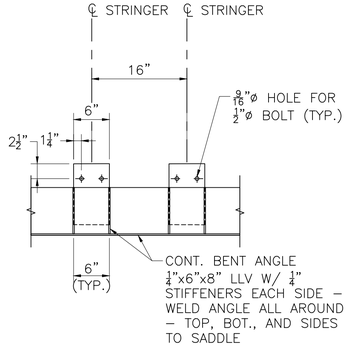
SECTION 6 / SCALE: 1" = 1'–0" (–)



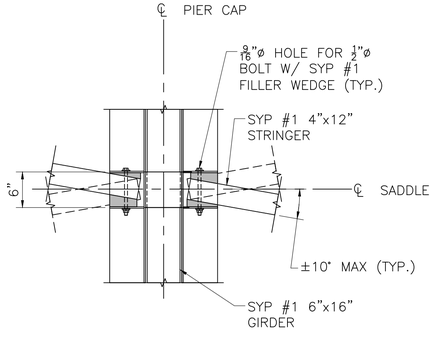
SECTION 7 / SCALE: 1" = 1'–0" (–)



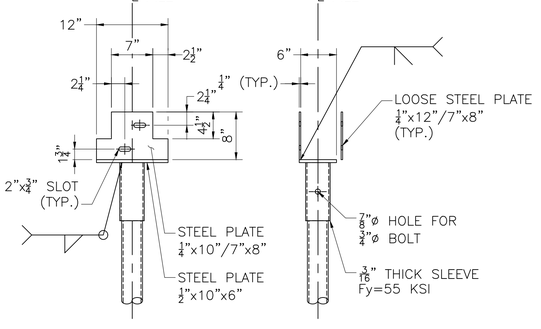
DETAIL A – STRINGER SUPPORT / SCALE: 1" = 1'–0"



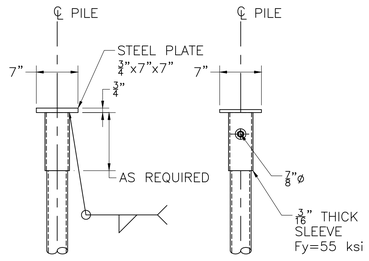
SECTION 8 / SCALE: 1" = 1'–0" (–)



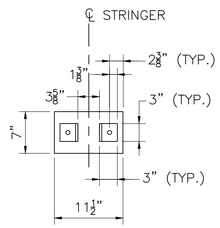
SECTION 9 / SCALE: 1" = 1'–0" (–)



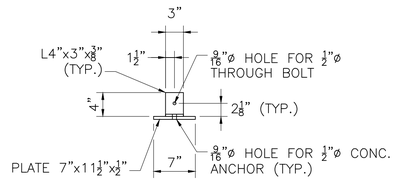
DETAIL B – PILE CAP BRACKET / SCALE: 1" = 1'–0"



DETAIL C – PILE END PLATE / SCALE: 1" = 1'–0"



PLAN



ELEVATION

DETAIL D – STRINGER BEARING PLATE / SCALE: 1" = 1'–0"

NOTES:

1. ALL STEEL INCLUDING BENT PLATES SHALL BE GALVANIZED STEEL, ASTM A572 Fy=50 KSI.
2. DISCONTINUE ANGLE SUPPORT AT PILE BRACKET.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER

USE ONLY PRINTS OF LATEST DATE

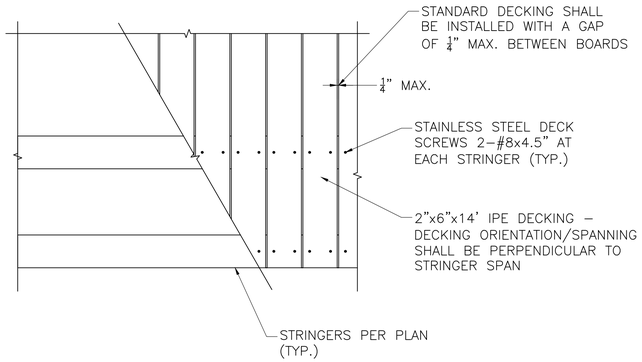
608227_BR(STR)-DETAILS).DWG Plotted on 23-Jul-2025 1:19 PM

August-09-2025 Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	171	231
PROJECT FILE NO.	608227		

DECK DETAILS



PARTIAL DECKING PLAN
SCALE: 1" = 1'–0"

IPE NOTES:

1. IPE MATERIAL SHALL BE CERTIFIED BY THE FOREST STEWARDSHIP COUNCIL.
2. DECKING SHALL BE IPE DECKING FOR EXTERIOR USE.
3. LUMBER DIMENSIONS SHOWN ON THE PLANS ARE NOMINAL. LUMBER FOR DECKING SHALL BE DRESSED (S4SE4E) WITH THE EDGES EASED TO A RADIUS OF ⅛"
4. APPEARANCE OF THE MEMBERS SHALL BE AITC ARCHITECTURAL GRADE.
5. IPE DECKING SHOULD BE ALLOWED TO SIT WHERE IT WILL BE INSTALLED FOR AT LEAST 7 DAYS PRIOR TO INSTALLATION. THIS LETS THE TIMBER ACCLIMATE TO THE LOCAL TEMPERATURE AND HUMIDITY LEVELS: ELEVATE DECKING AT LEAST 12" OFF THE GROUND USING BLOCKS OF TIMBER; SEPARATE LAYERS OF STACKED DECKING WITH TIMBER SHIMS; COVER DECKING WITH A SHEET OF PLYWOOD TO SHED WATER; ENSURE EVERY FACE OF EVERY BOARD RECEIVES ADEQUATE AIR FLOW.
6. FOR CUTTING, USE PREMIUM CARBIDE–TIPPED SAW BLADES. FOR DRILLING, USE BRAD–POINT DRILL BITS OR FOSTNER BITS TO PREDRILL SCREW HOLES.
7. ALL CUTS SHOULD BE SEALED IMMEDIATELY WITH A CLEAR WAX TO PREVENT END CHECKS AND ADVERSE MOVEMENT. APPLY THE SEALANT WITH A PAINT BRUSH. DO NOT APPLY END SEAL TO THE SURFACE OF THE DECKING. ANY SEALANT THAT GETS ON THE SURFACE SHOULD BE WIPED UP IMMEDIATELY.
8. FASTENING: USE ONLY STAINLESS STEEL SCREWS TO FASTEN IPE DECKING. ANYTHING OTHER THAN 305–GRADE OR HIGHER STAINLESS STEEL WILL CAUSE STAINING IN THE TIMBER. IN THE WORST CASES, THE SCREW WILL CORRODE AND FAIL PREMATURELY.
9. PREDRILLING IS REQUIRED FOR EVERY SCREW.
10. IPE DECKING SHALL BE STANDARD DECKING.
11. STANDARD DECKING – FACE SCREW METHOD: SECURE STANDARD IPE DECKING DIRECTLY TO THE JOIST BY SCREWING STRAIGHT DOWN THROUGH THE FACE OF THE BOARD IN PREDRILLED HOLES.
12. PROVIDE A GAP BETWEEN DECK BOARDS, AS SHOWN ON SECTION 9 ON THIS SHEET, TO ALLOW FOR EXPANSION/ SHRINKAGE, AIR FLOW AND WATER DRAINAGE.
13. AFTER INSTALLATION, IPE DECKING SHALL BE COATED WITH A COAT OF UV PROTECTANT OIL FINISH SUCH AS PENOFIN OR EQUAL.
14. FOR SPANS WITH SKEWED PIERS AND UNEQUAL STRINGER SPAN LENGTHS, THE DECKING SHALL BE ADJUSTED BY UNIFORMLY DOUBLE TAPERING DECK BOARDS OR VARYING THE WIDTHS OF DECKING GAPS SUCH THAT THE DECK BOARDS REMAIN PARALLEL WITH THE PIERS AT EACH END OF THE SPAN. TAPERS SHALL BE APPLIED TO UNIFORMLY DISTRIBUTE THE DIMENSIONAL DIFFERENCE OVER A MINIMUM OF 4 DECK BOARDS TO PROVIDE A UNIFORM TRANSITION ACROSS THE SPAN.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

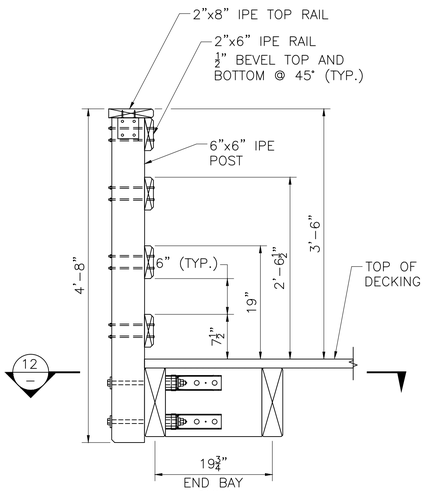
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR)-DETAILS).DWG Plotted on 23-Jul-2025 1:19 PM
August-09-2025
Final Structural Submittal (SF)

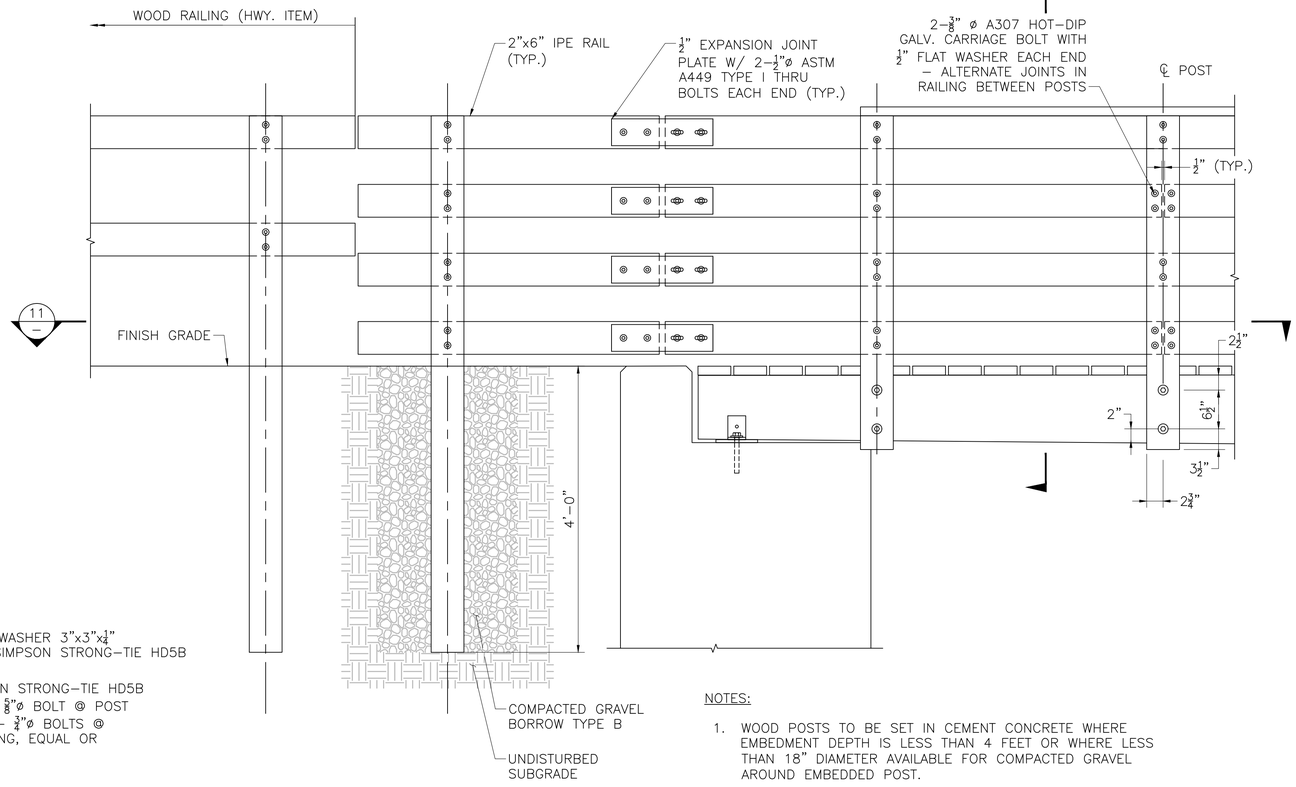
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	172	231
	PROJECT FILE NO. 608227		

TIMBER RAIL DETAILS



SECTION 10 / SCALE: 1" = 1'-0"



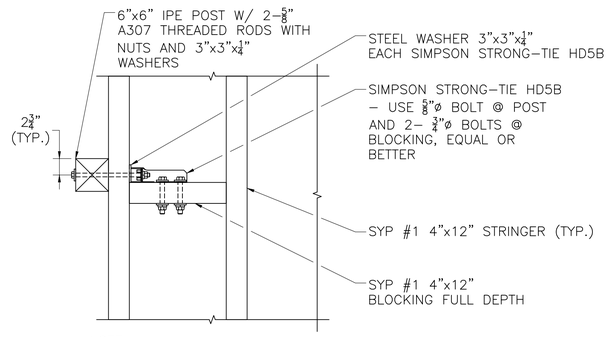
RAILING END ELEVATION
SCALE: 1" = 1'-0"

NOTE:

FOR TIMBER NOTES SEE SHEET 8 OF 11.

NOTES:

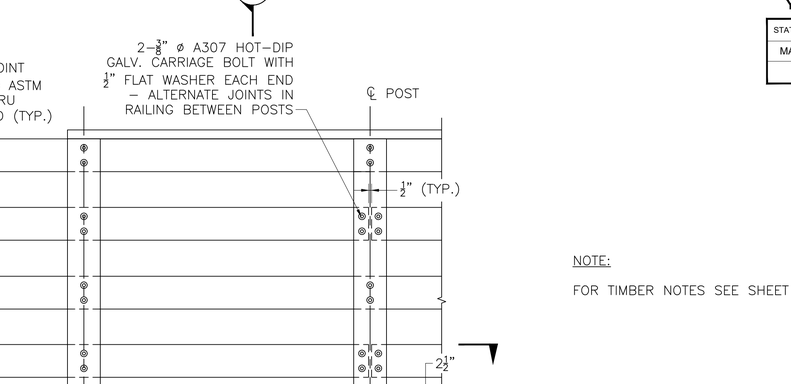
1. WOOD POSTS TO BE SET IN CEMENT CONCRETE WHERE EMBEDMENT DEPTH IS LESS THAN 4 FEET OR WHERE LESS THAN 18" DIAMETER AVAILABLE FOR COMPACTED GRAVEL AROUND EMBEDDED POST.
2. NORTHWEST CORNER SHOWN. OTHER CORNERS SIMILAR.



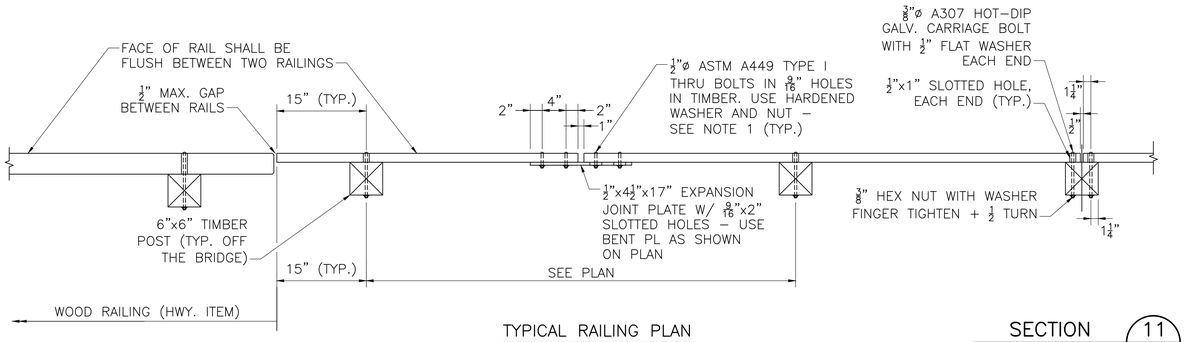
NOTE:

SIMPSON STRONG–TIE HD5B, EQUAL OR BETTER SHALL BE INSTALLED PER MANUFACTURERS RECOMMENDATIONS.

SECTION 12 / SCALE: 1" = 1'-0"



RAILING PLAN AT SOUTHEAST CORNER



TYPICAL RAILING PLAN

NOTES:

1. BOLTS IN SLOTTED HOLES SHALL UTILIZE LOCK NUTS AND BE FINGER TIGHT TO ALLOW MOVEMENT BETWEEN STEEL PLATE AND TIMBER RAIL
2. A RAILING JOINT SHALL BE USED BETWEEN ANY POST THAT IS CONNECTED TO A BRIDGE BEAM AND A POST THAT IS MOUNTED IN THE GROUND TO ALLOW FOR EXPANSION.

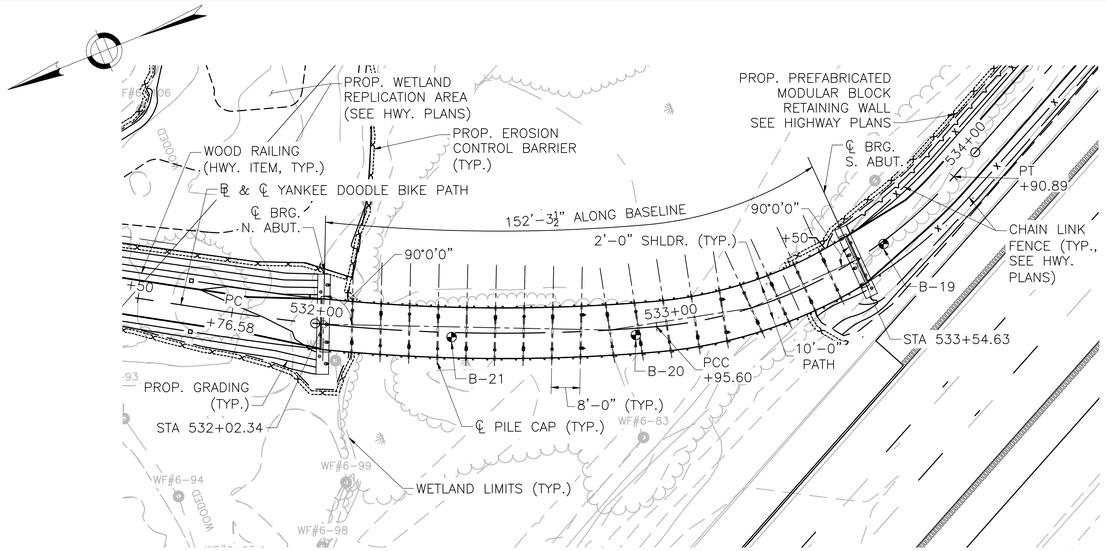
SECTION 11 / SCALE: 1" = 1'-0"

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

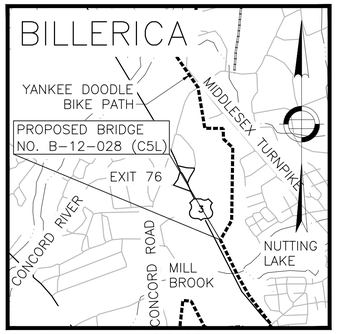
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR)-DETAILS).DWG Plotted on 23-Jul-2025 1:19 PM

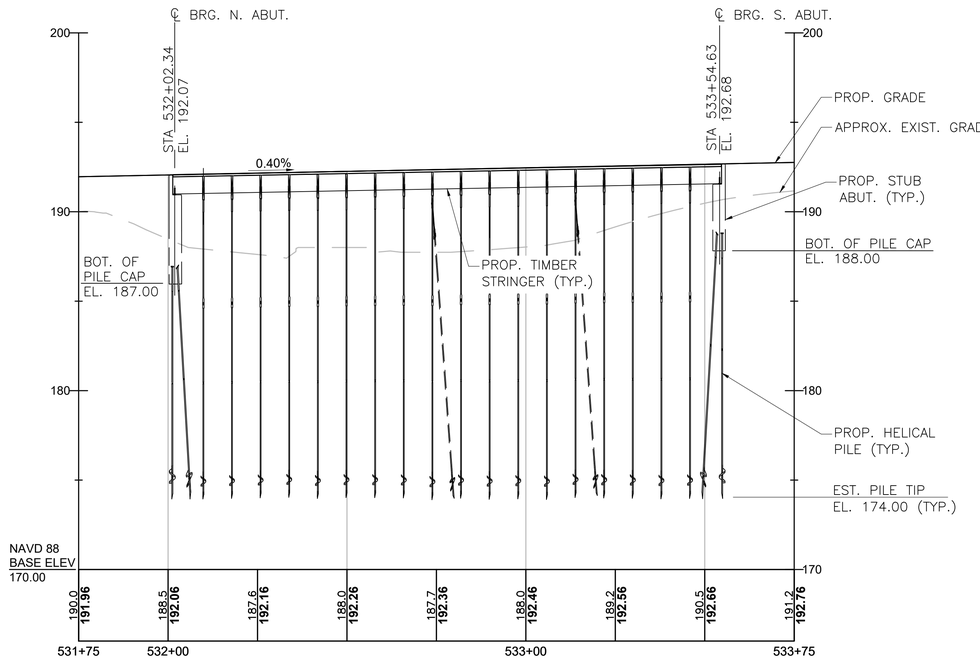
August-09-2025 Final Structural Submittal (SF)



KEY PLAN
SCALE: 1" = 20'



LOCUS
SCALE: 1" = 2000'



PROFILE ALONG YANKEE DOODLE BIKE PATH
HORIZONTAL SCALE: 1" = 20'-0"
VERTICAL SCALE: 1" = 5'-0"

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	173	231
PROJECT FILE NO.	608227		

KEY PLAN, PROFILE, & INDEX

INDEX OF SHEETS

1 KEY PLAN, PROFILE, & INDEX
2 GENERAL NOTES
3 BORING LOGS
4 GENERAL PLAN AND ELEVATION (1 OF 2)
5 GENERAL PLAN AND ELEVATION (2 OF 2)
6 FOUNDATION PLAN (1 OF 2)
7 FOUNDATION PLAN (2 OF 2)
8 NORTH ABUTMENT PLAN, ELEVATION, & SECTIONS
9 SOUTH ABUTMENT PLAN & ELEVATION
10 FRAMING PLAN (1 OF 2)
11 FRAMING PLAN (2 OF 2)
12 TIMBER CONNECTION DETAILS
13 DECK DETAILS
14 TIMBER RAIL DETAILS

ESTIMATED QUANTITIES
(NOT GUARANTEED)

ITEM NO.	ITEM	QUANTITY	UNIT
140.	BRIDGE EXCAVATION	60	CY
144.	CLASS B ROCK EXCAVATION	3	CY
151.1	GRAVEL BORROW FOR BRIDGE FOUNDATION	15	CY
151.2	GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES	20	CY
943.201	HELICAL PILE AND BRACKET ASSEMBLY BRIDGE NO. B-12-028 (C5L)	1300	FT
948.70	HELICAL PILE VERIFICATION LOAD TEST	1	EA
991.2	CONTROL OF WATER – STRUCTURE NO. B-12-028 (C5L)	1	LS
995.02	BRIDGE STRUCTURE–BRIDGE NO. B-12-028 (C5L)	1	LS

COMMONWEALTH OF MASSACHUSETTS
SHANTA B. KELLER
STRUCTURAL
No. 51381
REGISTERED PROFESSIONAL ENGINEER

Shanta B. Keller, PE
2025.07.25 15:13:37-04'00'

vhb
260 Arsenal PL #2, P.O. Box 9151
Watertown, MA 02472
617.924.1770 FAX 617.924.2286

August 9, 2025	ISSUED FOR CONSTRUCTION

MassDOT Massachusetts Department of Transportation Highway Division

PROPOSED BRIDGE
BILLERICA
YANKEE DOODLE BIKE PATH
OVER UNNAMED STREAM

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
10 PARK PLAZA BOSTON, MASS

Alexander K. Bardow, P.E. — Digitally signed by Alexander K. Bardow, P.E. Date: 2025.07.28 15:26:17 -04'00'
STATE BRIDGE ENGINEER

Carrie Lavallee, P.E. — Carrie Lavallee, P.E. 2025.07.29 10:36:31 -04'00'
CHIEF ENGINEER

608227_BR(STR4-KEY).DWG Plotted on 23-Jul-2025 1:29 PM
August-09-2025 Final Structural Submittal (SF)

GENERAL NOTES

DESIGN:

IN ACCORDANCE WITH:

THE 2020 AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS LRFD BRIDGE DESIGN SPECIFICATIONS 9TH EDITION.

THE 2009 AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS GUIDE SPECIFICATIONS FOR THE DESIGN OF PEDESTRIAN BRIDGES WITH 2015 INTERIM REVISIONS FOR H10 LOADING OR 90 PSF PEDESTRIAN LOADING, WHICHEVER CONTROLS.

MASSDOT BRIDGE MANUAL HUNDREDTH ANNIVERSARY EDITION.

THE 2011 AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS GUIDE SPECIFICATIONS FOR LRFD SEISMIC BRIDGE DESIGN WITH 2022 INTERIM REVISIONS.

BENCH MARKS:

1. SPIKE IN U.P. #20 N3028333.932, E716126.811, EL. 184.81
2. SPIKE IN U.P. #26 N3028312.181, E715531.308, EL. 135.28

ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988.

SURVEY NOTEBOOK:

SURVEY PERFORMED BY HANCOCK ASSOCIATES 185 CENTRE STREET, DANVERS, MA 01923.

SCALES:

SCALES NOTED ON THE PLANS ARE NOT APPLICABLE TO REDUCED SIZE PRINTS. DIVIDE SCALES BY 2 FOR HALF-SIZE PRINTS (A3).

UNSUITABLE MATERIAL:

ALL UNSUITABLE MATERIAL SHALL BE REMOVED WITHIN THE LIMITS OF THE FOUNDATIONS OF THE STRUCTURE, AS DIRECTED BY THE ENGINEER.

GEOTECHNICAL REPORT:

REFER TO GEOTECHNICAL REPORT: PROPOSED YANKEE DOODLE BIKE PATH – PROPOSED BOARDWALK NEAR ROUTE 3 (STRUCTURE No. 4) – BRIDGE No. B-12-028 (C5L), BILLERICA, MASSACHUSETTS, DATED MAY 9, 2025, PREPARED BY LAHLAF GEOTECHNICAL CONSULTING, INC.

FOUNDATIONS:

FOUNDATIONS MAY BE ALTERED, IF NECESSARY, TO SUIT CONDITIONS ENCOUNTERED DURING CONSTRUCTION, WITH THE APPROVAL OF THE ENGINEER.

CONCRETE:

CONCRETE SHALL BE 5000 HP CONCRETE, UNLESS NOTED OTHERWISE.

REINFORCEMENT:

REINFORCING STEEL SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M31 GRADE 60. UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWINGS, ALL BARS SHALL BE LAPPED AS FOLLOWS:

MODIFICATION CONDITION	#4 BARS	#5 BARS	#6 BARS
1. NONE	16"	17"	21"
2. 12" OF CONCRETE BELOW BAR	18"	22"	27"
3. EPOXY COATED BARS, COVER <3d_b, OR CLEAR SPACING <6d_b	21"	26"	31"
4. COATED BARS, ALL OTHER CASES	17"	21"	25"
5. CONDITION 2, AND 3	23"	29"	35"
6. CONDITION 2, AND 4	21"	27"	32"

ALL OTHER BARS SHALL BE LAPPED AS SHOWN ON THE CONSTRUCTION DRAWINGS.

REINFORCING STEEL SHALL BE EPOXY COATED.

CONSTRUCTION REQUIREMENTS AND PROCEDURES:

THE CONTRACTOR SHALL TAKE THE PROPER PRECAUTIONS TO ENSURE THE STABILITY AND SAFE PERFORMANCE OF ALL STRUCTURAL ELEMENTS DURING CONSTRUCTION. REFER TO APPROVED DEMOLITION PLANS.

EXISTING CONDITIONS:

THE CONTRACTOR SHALL DETERMINE AND ESTABLISH ALL DIMENSIONS AND DETAILS NECESSARY FOR COMPLETION OF ALL WORK BY FIELD MEASUREMENTS AND SURVEY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ADEQUACY AND ACCURACY THEREOF, AND SHALL NOT ORDER ANY MATERIAL OR COMMENCE ANY FABRICATION UNTIL HE HAS MADE THE REQUIRED MEASUREMENTS AND THE EXTENT OF THE PROPOSED WORK HAS BEEN APPROVED BY THE ENGINEER.

UTILITIES:

THE CONTRACTOR SHALL LOCATE AND PROTECT FROM DAMAGE ALL EXISTING UTILITIES.

CONSTRUCTION JOINTS:

CONSTRUCTION JOINTS, OTHER THAN THOSE SHOWN ON THE PLANS, WILL NOT BE PERMITTED WITHOUT THE APPROVAL OF THE ENGINEER.

TIMBER:

ALL SOLID TIMBER FOR FRAMING SHALL BE SOUTHERN YELLOW PINE (SYP) #1 PER NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION. ALL SOLID TIMBER FOR DECKING, POSTS AND RAILS SHALL BE IPE.

ALL TIMBER SHALL BE KILN DRIED TO A MOISTURE CONTENT OF NO MORE THAN 19% AFTER TREATMENT.

ALL SOLID TIMBER DIMENSIONS ARE NOMINAL, UNLESS NOTED OTHERWISE.

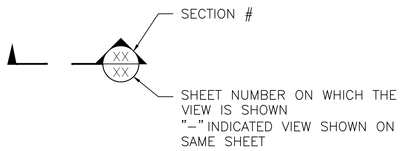
SEE SPECIAL PROVISIONS AND NOTES ON SHEET 10 OF 14 FOR ADDITIONAL REQUIREMENTS.

IPE:

IPE LUMBER SHALL BE USED FOR BRIDGE DECKING AND RAILINGS AND RAIL POSTS.

SEE SPECIAL PROVISIONS AND NOTES ON SHEET 13 OF 14 FOR ADDITIONAL REQUIREMENTS.

SECTION MARK:



BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	174	231
PROJECT FILE NO.	608227		

GENERAL NOTES

SEISMIC DESIGN CRITERIA	
DESIGN RETURN PERIOD:	1000-YR
DESIGN SPECTRA	
As	0.128g
SDs	0.257g
SD1	0.098g
SITE CLASS	D
SEISMIC DESIGN CATEGORY (SDC)	A

HYDRAULIC DESIGN FLOOD (HDF) DATA
N/A

TEMPORARY WATER CONTROL DESIGN DATA
N/A

NOTE:

STREAM IS INTERMITTENT WITH NO OBSERVED WATER ELEVATION OR FLOOD OF RECORD.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER

USE ONLY PRINTS OF LATEST DATE

608227_BRISTR4-GEN_NOTES).DWG Plotted on 23-Jul-2025 1:30 PM

August-09-2025

Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	175	231
	PROJECT FILE NO. 608227		

BORING LOGS

BORING B–19

STATION: 533+64.00
OFFSET: –0.47'
GROUND ELEVATION: 190
N: 3020468.4099
E: 715825.3449

BORING B–20

STATION: 532+89.58
OFFSET: +1.88'
GROUND ELEVATION: 188
N: 3020526.1654
E: 715830.1692

BORING B–21

STATION: 532+38.25
OFFSET: +1.28'
GROUND ELEVATION: 187.5
N: 3020567.3602
E: 715845.8245

NAV88 (FT)

EL. 190.0
EL. 180.0
EL. 170.0
EL. 160.0
EL. 150.0

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG — **Boring B-19** — **Page 1 of 1**

Project:	**Proposed Yankee Doodle Bike Path, Billerica, MA (Structure 4) - Bridge No. B-12-028 (C5L)**		
Client:	**Vanasse Hangen Brustlin, Inc.**		LGCI Project No.: 1723
Drilling Subcontractor:	Soil Exploration Corp.	Date Started:	11/20/2017
Drilling Foreman:	Pat Goodale	Date Completed:	11/20/2017
LGCI Engineer:	Andrew Jefferson	Location:	Near southern edge of prop. boardwalk
Ground Surface El:	~190 ft. (see remark 1)	Total Depth:	23 feet
Groundwater Depth:	~1 ft. at end of drilling	Drill Rig Type:	CME 60 Rubber Tire Rig
		Drilling Method:	HSA (4-1/4" ID)
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	NA
Drop:	30 inches	Coordinates: E: 715825.3449, N: 3020468.4099	

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-2	S1	1	1	1	1	24	3		Forest	S1 - Forest Material
	2-4	S2	WOH	WOH	WOH	WOH	24	12		Peat ~5.5 ft.	S2 - PEAT, fibrous, trace roots
5ft	5-7	S3	WOH	4	5	5	24	12	2		S3 - Well Graded SAND with Silt (SW-SM), fine to medium, trace coarse, 10-15% fines, gray, wet
10ft	10-12	S4	8	14	12	12	24	12		Sand with Silt and Gravel	S4 - Silty SAND (SM), fine to medium, trace coarse, ~15% fines, trace fine gravel, gray, wet
15ft	15-16.7	S5	15	38	47	50/2	20	20		~16.7 ft.	S5 - Silty GRAVEL with Sand (GM), fine to coarse, ~15% fines, 20-25% fine sand, fine to coarse angular stone fragments, gray, wet
	18-23	C1					60	60		Bedrock	C1 - min/ft.: 5, 5, 4, 5, 5 Hard, slightly weathered, slightly to moderately fractured, fine grained, gray, GRANITE REC=100%, RQD=83%
20ft										~23 ft.	Bottom of boring at 23 feet. Backfilled borehole with drill cuttings.

Remarks:
1. The ground surface elevation was interpolated to the nearest 1/2 foot using a survey plan titled: "Yankee Doodle Pike Bath, Billerica, MA, Boring Locations, page 4 of 6," provided to LGCI by VHB via email on February 9, 2018.
2. Noted on sample jar that the strata change occurred at 5.5 feet.

WATER LEVEL
EL. 189.0±
OBS. 11/20/2017

BOT. OF S. ABUT.
EL. 188.00

EST. PILE TIP
EL. 174.00

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG — **Boring B-20** — **Page 1 of 1**

Project:	**Proposed Yankee Doodle Bike Path, Billerica, MA (Structure 4) - Bridge No. B-12-028 (C5L)**		
Client:	**Vanasse Hangen Brustlin, Inc.**		LGCI Project No.: 1723
Drilling Subcontractor:	Soil Exploration Corp.	Date Started:	11/20/2017
Drilling Foreman:	Pat Goodale	Date Completed:	11/20/2017
LGCI Engineer:	Andrew Jefferson	Location:	Near middle of prop. boardwalk
Ground Surface El:	~188 ft. (see remark 1)	Total Depth:	16.5 feet
Groundwater Depth:	~1 ft. at end of drilling	Drill Rig Type:	CME 60 Rubber Tire Rig
		Drilling Method:	HSA (4-1/4" ID)
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	NA
Drop:	30 inches	Coordinates: E: 715830.1692, N: 3020526.1654	

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
										Swamp Deposits ~5 ft.	Drilled continuously without sampling to refusal. Strata change based on drilling actions and drill cuttings.
5ft										Sand ~16.5 ft.	Drill rig started to chatter at 5 feet. Drill cuttings showed a strata change.
10ft									2		Bottom of boring at 16.5 feet. Backfilled borehole with drill cuttings.
15ft											
20ft											

Remarks:
1. The ground surface elevation was interpolated to the nearest 1/2 foot using a survey plan titled: "Yankee Doodle Pike Bath, Billerica, MA, Boring Locations, page 4 of 6," provided to LGCI by VHB via email on February 9, 2018.
2. Refusal at 16.5 feet.

WATER LEVEL
EL. 187.0±
OBS. 11/20/2017

EST. PILE TIP
EL. 174.00

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG — **Boring B-21** — **Page 1 of 1**

Project:	**Proposed Yankee Doodle Bike Path, Billerica, MA (Structure 4) - Bridge No. B-12-028 (C5L)**		
Client:	**Vanasse Hangen Brustlin, Inc.**		LGCI Project No.: 1723
Drilling Subcontractor:	Soil Exploration Corp.	Date Started:	11/20/2017
Drilling Foreman:	Pat Goodale	Date Completed:	11/20/2017
LGCI Engineer:	Andrew Jefferson	Location:	Near northern edge of prop. boardwalk
Ground Surface El:	~187.5 ft. (see remark 1)	Total Depth:	16.2 feet
Groundwater Depth:	~1 ft. at end of drilling	Drill Rig Type:	CME 60 Rubber Tire Rig
		Drilling Method:	HSA (4-1/4" ID)
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	NA
Drop:	30 inches	Coordinates: E: 715845.8245, N: 3020567.3602	

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-2	S1	1	1	1	1	24	8		Swamp Deposits ~5 ft.	S1 - Silty SAND (SM), fine, 25-30% fines, 5-10% fine gravel, trace organic fines, trace roots, trace wood, dark brown, wet
	2-4	S2	1	1	3	5	24	10			S2 - Silty SAND (SM), fine, trace medium, 20-25% fines, trace organic fines, trace roots, dark brown, wet
5ft	5-7	S3	11	11	10	12	24	14		Silty Sand ~16.2 ft.	S3 - Poorly Graded SAND (SP), fine to medium, trace coarse, 10-15% fines, 10-15% fine gravel, gray, wet
10ft	10-12	S4	15	14	24	31	24	20			S4 - Similar to S3
15ft	15-16.2	S5	16	24	50/2		14	14			S5 - Silty SAND with Gravel (SM), fine, trace medium, ~15% fines, ~35% fine to coarse, angular coarse gravel, angular stone fragments, brown, wet
20ft											Bottom of boring at 16.2 feet. Backfilled borehole with drill cuttings.

Remarks:
1. The ground surface elevation was interpolated to the nearest 1/2 foot using a survey plan titled: "Yankee Doodle Pike Bath, Billerica, MA, Boring Locations, page 4 of 6," provided to LGCI by VHB via email on February 9, 2018.

BOT. OF N. ABUT.
EL. 187.00

WATER LEVEL
EL. 186.5±
OBS. 11/20/2017

EST. PILE TIP
EL. 174.00

BORING NOTES:

1. LOCATION OF BORINGS SHOW ON THE KEY PLAN THUS: ⊕ B–#
2. BORINGS ARE TAKEN FOR THE PURPOSE OF DESIGN AND SHOW CONDITIONS AT BORING POINTS ONLY, BUT DO NOT NECESSARILY SHOW THE NATURE OF THE MATERIALS TO BE ENCOUNTERED DURING CONSTRUCTION.
3. WATER LEVELS SHOWN ON THE BORING LOGS WERE OBSERVED AT THE TIME OF TAKING BORINGS AND DO NOT NECESSARILY SHOW THE TRUE GROUND WATER LEVEL.
4. FIGURES IN COLUMNS INDICATE NUMBER OF BLOWS REQUIRED TO DRIVE A $1\frac{3}{8}$" I.D. SPLIT SPOON SAMPLER 6" USING A 140 POUND WEIGHT FALLING 30".
5. BORING SAMPLES ARE STORED AT A STORAGE FACILITY LOCATED ON ROUTE 114 (219 WINTHROP AVE.) IN LAWRENCE, MA. THE CONTRACTOR MAY EXAMINE THE SOIL AND ROCK SAMPLES BY CONTACTING THE MASSDOT GEOTECHNICAL SECTION AT 10 PARK PLAZA, BOSTON, MA.
6. ALL BORINGS WERE MADE IN NOVEMBER 2017.
7. BORINGS WERE MADE BY SOIL EXPLORATION CORP, 148 PIONEER DRIVE, LEOMINSTER MA.
8. THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988 IS USED THROUGHOUT.
9. BORING LOGS ARE NOT DRAWN TO A STANDARD SCALE. BAR SCALE ON SHEET IS USED TO CONVEY ELEVATIONS.

DATE	DESCRIPTION
August 9, 2025	ISSUED FOR CONSTRUCTION

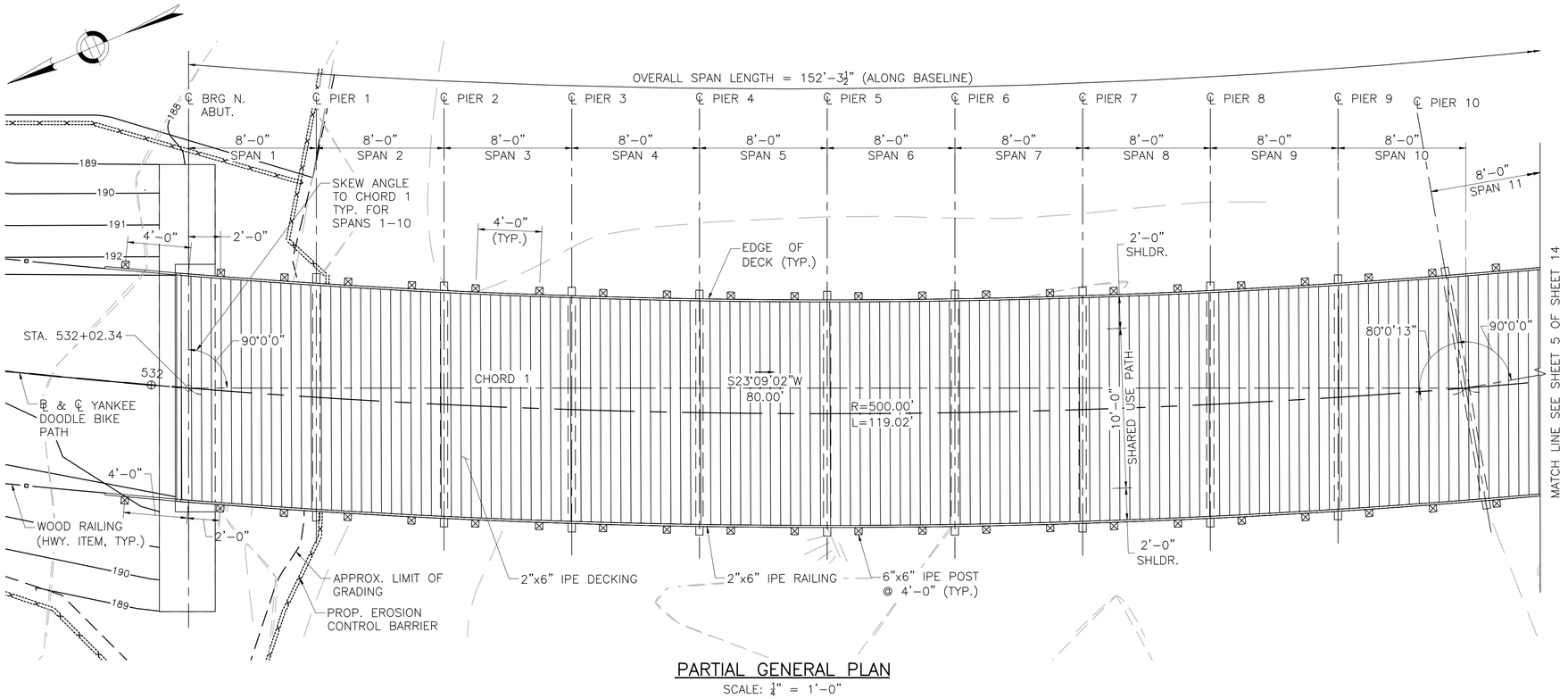
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BRSTR4-BORINGS).DWG Plotted on 31-Jul-2025 12:44 PM
August-09-2025 Final Structural Submittal (SF)

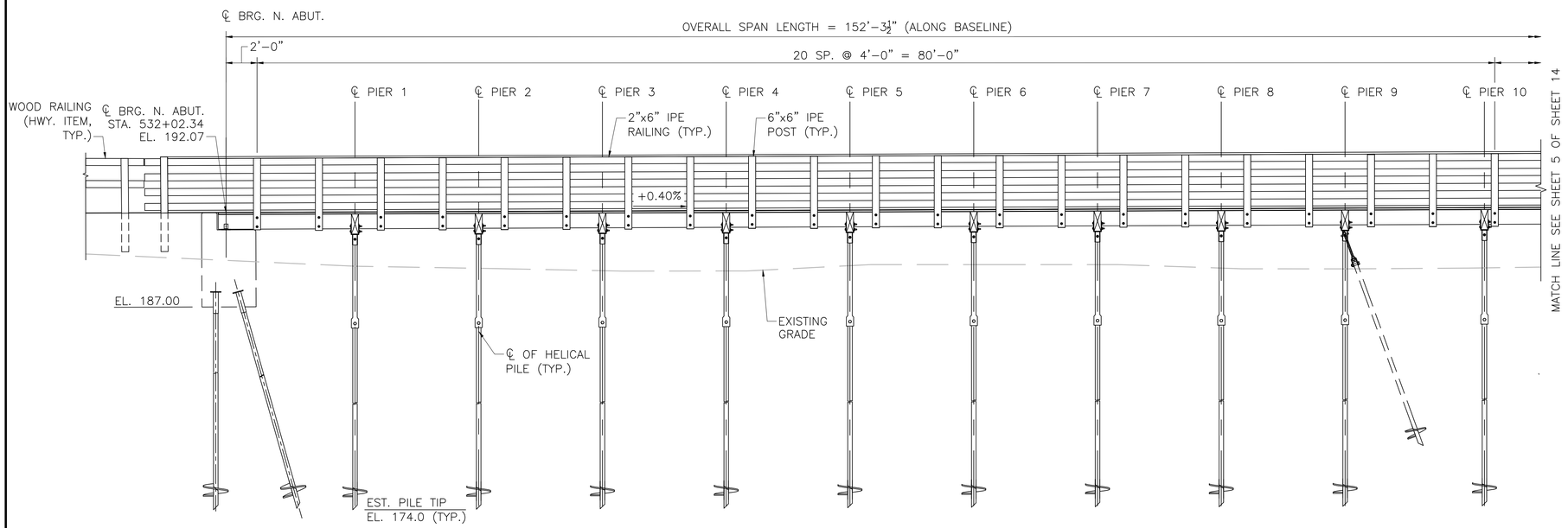
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	176	231
	PROJECT FILE NO. 608227		

GENERAL PLAN AND ELEVATION (1 OF 2)



PARTIAL GENERAL PLAN
SCALE: ¼" = 1'-0"



PARTIAL WEST ELEVATION
SCALE: ¼" = 1'-0"

NOTES:

1. FOR FOUNDATION PLAN SEE SHEETS 6 & 7 OF 14.
2. FOR FRAMING PLAN SEE SHEETS 10 & 11 OF 14.
3. SPAN LENGTHS ARE ALONG CHORD.
4. RAIL SPACING IS ALONG FACE OF RAIL.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

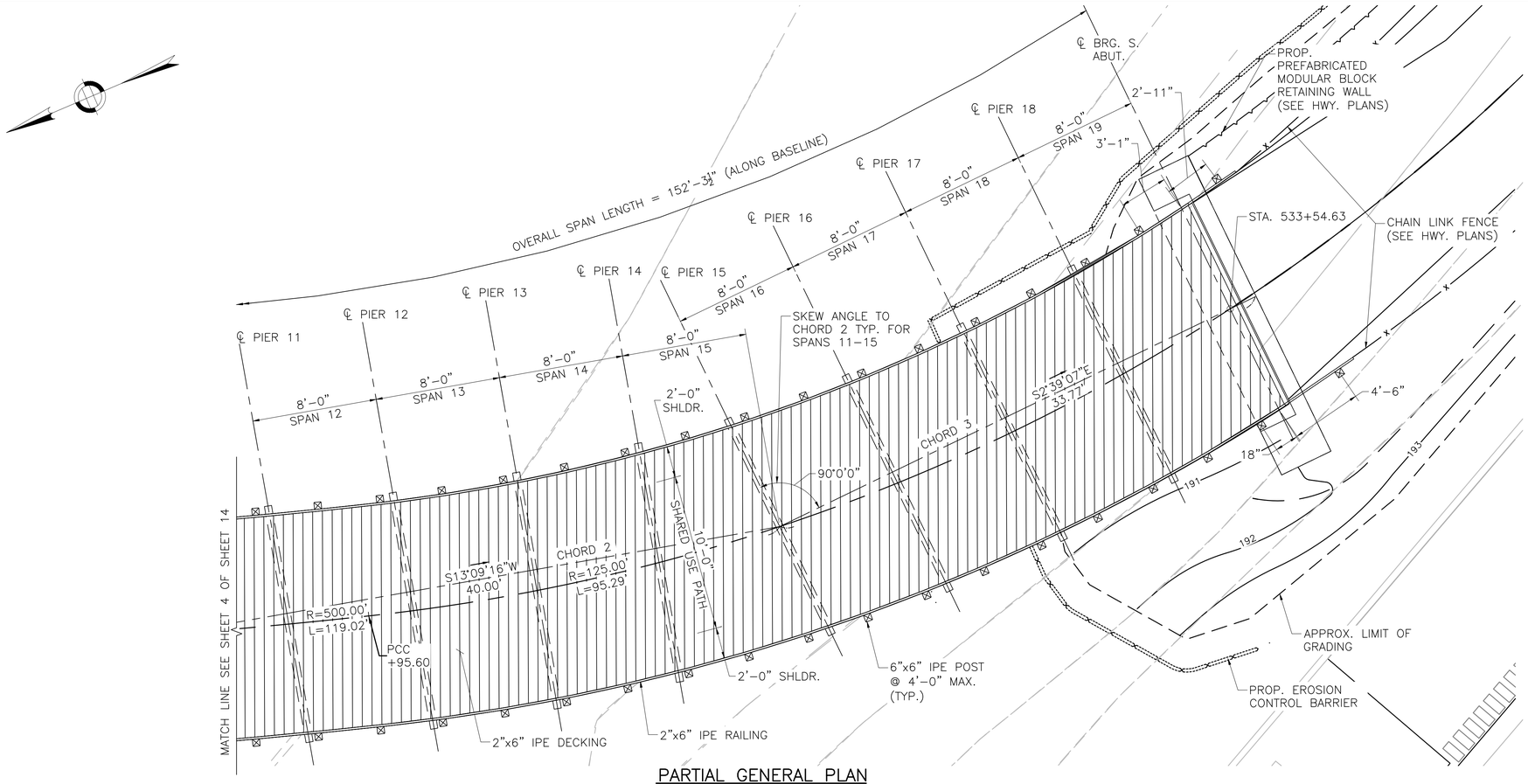
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR4-GEN_PLAN).DWG Plotted on 23-Jul-2025 1:32 PM
Final Structural Submittal (SF) August-09-2025

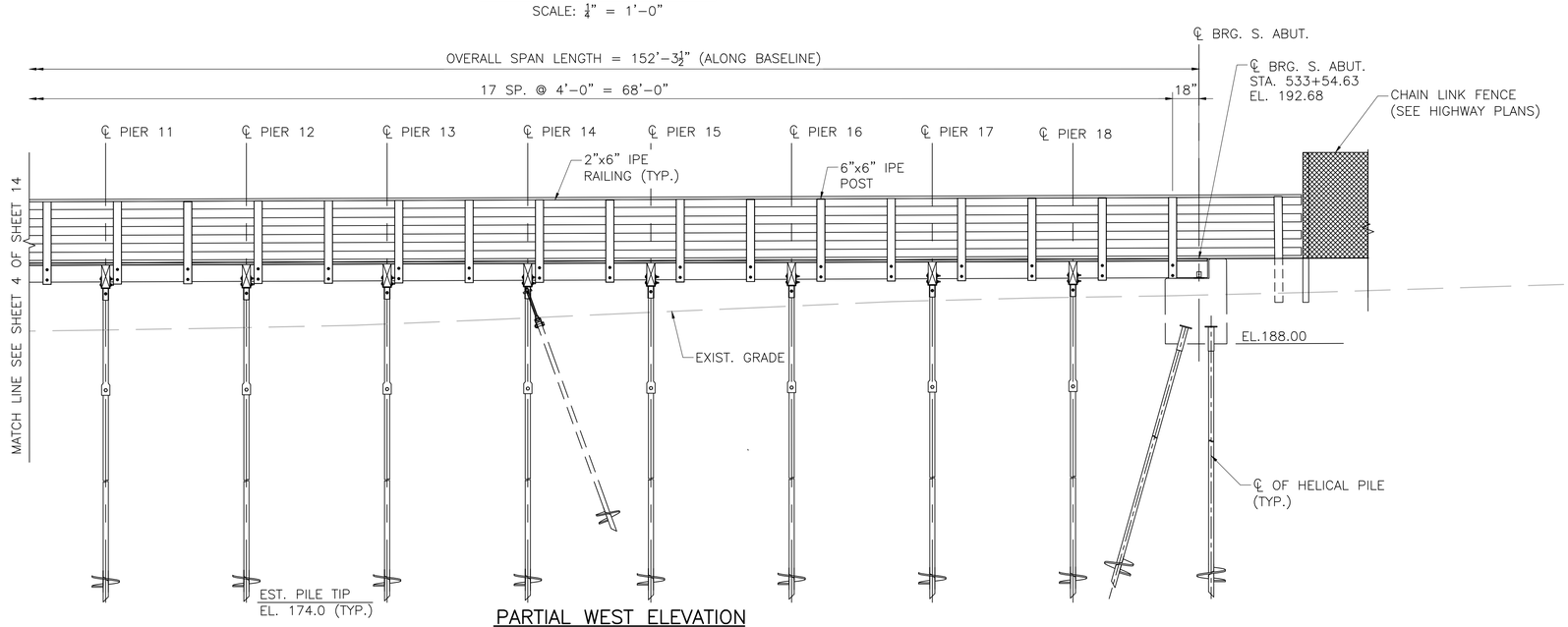
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	177	231
PROJECT FILE NO.	608227		

GENERAL PLAN AND ELEVATION (2 OF 2)



PARTIAL GENERAL PLAN
SCALE: ¼" = 1'-0"



PARTIAL WEST ELEVATION
SCALE: ¼" = 1'-0"

NOTES:

1. FOR FOUNDATION PLAN SEE SHEET 6&7 OF 14.
2. FOR FRAMING PLAN SEE SHEET 10&11 OF 14.
3. SPAN LENGTHS ARE ALONG CHORD.
4. RAIL SPACING IS ALONG FACE OF RAIL.

DATE	DESCRIPTION
August 9, 2025	ISSUED FOR CONSTRUCTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

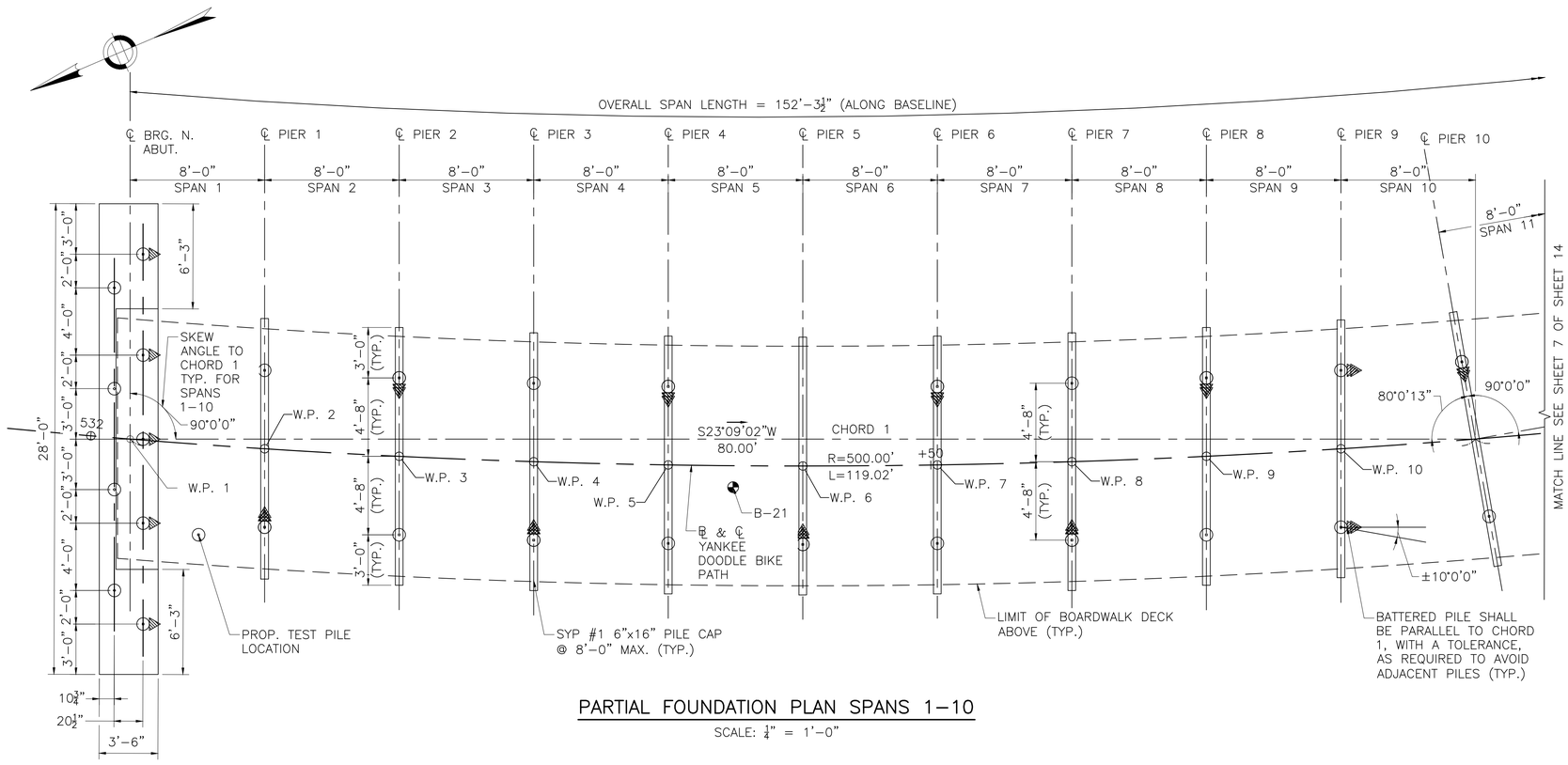
608227_BR(STR4-GEN_PLAN).DWG Plotted on 23-Jul-2025 1:32 PM

Final Structural Submittal (SF) August-09-2025

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	178	231
PROJECT FILE NO.	608227		

FOUNDATION PLAN (1 OF 2)



PARTIAL FOUNDATION PLAN SPANS 1–10

SCALE: ¼" = 1'-0"

TABLE 1 – WORKING POINTS ALONG THE BASELINE				
W.P. #	STATION	NORTHING	EASTING	BEAM SEAT ELEVATION*
1	532+02.34	3020605.9190	715864.8820	190.97
2	532+10.36	3020598.7903	715861.2058	190.68
3	532+18.38	3020591.6109	715857.6480	190.72
4	532+26.38	3020584.3810	715854.2083	190.75
5	532+34.38	3020577.1007	715850.8865	190.78
6	532+42.39	3020569.7701	715847.6825	190.81
7	532+50.39	3020562.3702	715844.5961	190.84
8	532+58.39	3020554.9578	715841.6275	190.88
9	532+66.39	3020547.4761	715838.7768	190.91
10	532+74.41	3020539.9439	715836.0442	190.94
11	532+82.43	3020532.3612	715833.4299	190.97
12	532+90.46	3020524.7287	715830.9351	191.01
13	532+98.48	3020517.0611	715828.5901	191.04
14	533+06.48	3020509.2948	715826.6681	191.07
15	533+14.49	3020501.4117	715825.2454	191.10
16	533+22.55	3020493.4106	715824.3270	191.13
17	533+30.58	3020485.3841	715823.9261	191.17
18	533+38.59	3020477.3808	715824.0402	191.20
19	533+46.59	3020469.4012	715824.6664	191.23
20	533+54.63	3020461.4444	715825.8077	191.57

* LOCATION OF PIER BEAM SEAT ELEVATIONS ARE INDICATED ON SECTION 4 ON SHEET 12 OF 14. LOCATION OF ABUTMENT ELEVATIONS ARE INDICATED ON SECTIONS 1 AND 2 ON SHEETS 8 & 9 OF 14.

LEGEND:

- ⊙ INDICATES VERTICAL HELICAL PILE.
- ⊙ INDICATES COMBINED BATTERED PILE AND VERTICAL HELICAL PILE. ARROW INDICATES THE DIRECTION OF THE BATTERED PILE.
- ⊙ INDICATES BATTERED HELICAL PILE. ARROW INDICATES THE DIRECTION OF THE BATTERED PILE.

FOUNDATION NOTES:

1. FOUNDATIONS SHALL BE CONSTRUCTED PER RECOMMENDATIONS ESTABLISHED BY LAHLAF GEOTECHNICAL CONSULTING, INC. IN THEIR GEOTECHNICAL REPORT: "GEOTECHNICAL REPORT PROPOSED YANKEE DOODLE BIKE PATH – PROPOSED BOARDWALK NEAR ROUTE 3 (STRUCTURE NO. 4) – BRIDGE NO. B-12-028 (C5L), BILLERICA, MASSACHUSETTS", DATED MAY 9, 2025.
2. HELICAL PILES SHALL BE DESIGNED AND MANUFACTURED IN ACCORDANCE WITH THE 2020 AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION W/ 2022 ERRATA.
3. HELICAL PILES SHALL BE DESIGNED BY THE MANUFACTURER'S/ INSTALLER'S PROFESSIONAL ENGINEER REGISTERED IN THE COMMONWEALTH OF MASSACHUSETTS. AND ENGAGED BY THE CONTRACTOR. THE HELICAL PILE MANUFACTURER SHOULD ESTIMATE THE MAXIMUM DESIGN RESISTANCE THAT COULD BE ACHIEVED BASED ON THE AVAILABLE SUBSURFACE DATA INCLUDING LOAD TEST DATA. THE DESIGN SHOULD INCLUDE THE SIZE AND DEPTH OF THE HELICAL PILES, AND NUMBER, SIZE, SPACING AND THICKNESS OF THE HELICAL BEARING PLATES TO SUPPORT THE SPECIFIED DESIGN LOADS, INCLUDING BRACKETS AND CAP PLATES.
4. STEEL SHAFTS SHALL HAVE MINIMUM YIELD STRENGTH OF 50 KSI AND A MINIMUM TORQUE STRENGTH RATING OF 5,500 FT-LB.
5. STRUCTURAL STEEL PIPE SHALL BE SEAMLESS OR STRAIGHT-SEAM WELDED, PER ASTM A500 OR A513, 3.5 INCH O.D. MINIMUM. WALL THICKNESS SHALL BE 0.300 INCH (SCHEDULE 80) MINIMUM. MINIMUM MOMENT INERTIA I = 3.69 IN^4, AND MINIMUM SECTION MODULUS S = 2.11 IN^3.
6. BEARING PLATE MATERIAL SHALL MEET OR EXCEED THE PROPERTIES OF ASTM A572, ASTM A1018, OR ASTM A656 AS APPLICABLE, WITH MINIMUM YIELD STRENGTH OF 50 KSI. PLATE THICKNESS SHALL BE MINIMUM ⅜" INCH.
7. THE CONTRACTOR SHALL SUBMIT A PILE SCHEDULE, PILE INSTALLATION, AND TESTING PLAN FOR REVIEW AND APPROVAL OF THE ENGINEER. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND DESIGN CALCULATIONS FOR THE PROPOSED HELICAL PILES SIGNED AND STAMPED BY A PROFESSIONAL ENGINEER LICENSED IN THE COMMONWEALTH OF MASSACHUSETTS.
8. HELICAL PILES SHALL EXTEND BEYOND THE BOTTOM OF THE SWAMP DEPOSITS AT LEAST 2 FT INTO THE SAND LAYER SO AS TO HAVE THE TOP HELIX AT OR LOWER THEN EL 180.50'. ESTIMATED HELICAL PILE TIP ELEVATION SHALL BE EL. 174.00'.
9. A MINIMUM OF ONE VERIFICATION LOAD TEST SHOULD BE PERFORMED ON A NON-PRODUCTION HELICAL PILE BEFORE THE START OF CONSTRUCTION. EXISTING CONDITIONS AND UNDERGROUND OBSTRUCTIONS SHALL BE CONFIRMED BY THE CONTRACTOR. ANY UNFORESEEN OBSTRUCTIONS SHALL BE REPORTED TO THE ENGINEER. UPON SUCCESSFUL COMPLETION OF A STATIC LOAD TEST, A RESISTANCE FACTOR OF 0.7 MAY BE UTILIZED. SEE SPECIAL PROVISION 943.201.
10. IN ADDITION TO GALVANIZING, THE HELICAL PILES SHALL BE DESIGNED WITH A MINIMUM OF 1/16" THICKNESS OF SACRIFICIAL STEEL FOR ADDITIONAL CORROSION PROTECTION.
11. MINIMUM AND MAXIMUM INSTALLATION TORQUES SHALL BE SPECIFIED BY THE CONTRACTOR'S DESIGN AND THE HELICAL PILE MANUFACTURER. THE MINIMUM INSTALLATION TORQUE SHALL BE HIGH ENOUGH TO ACHIEVE THE REQUIRED BEARING RESISTANCE. SEE THE PILE RESISTANCE SCHEDULE FOR REQUIRED BEARING RESISTANCE. THE MAXIMUM INSTALLATION TORQUE SHALL NOT EXCEED THE ALLOWABLE TORSIONAL RESISTANCE OF THE PILE SHAFTS. AS HELICAL PILES ARE SPUN, THE TORQUE SHOULD BE MONITORED TO STOP ADVANCING THE HELICAL PILES AS SOON AS THE TORQUE IS REACHED.
12. BRACING OF PILES IS NOT REQUIRED BASED ON THE FACT THAT THERE ARE HELICAL DIAMETER SIZES THAT WORK FOR A CONSERVATIVE DETERMINED UNSUPPORTED LENGTH. IF NEEDED, SPECIALTY DESIGNER CAN USE GROUTED HELICAL PILES, TO INCREASE THE DIAMETER, FOR UNSUPPORTED LENGTH.
13. THE HELICAL PILES SHALL BE INSTALLED AT A SPACING LARGER THAN 3 PILE DIAMETERS ON CENTER. BATTERED PILES SHALL MAINTAIN THE MINIMUM DISTANCE BETWEEN PILES.
14. LOCATIONS OF PILES SHALL NOT BE CHANGED WITHOUT PRIOR APPROVAL FROM THE STRUCTURAL ENGINEER.
15. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING PILE INSTALLATION TO ACCOMMODATE FLUCTUATIONS IN WATER LEVELS.

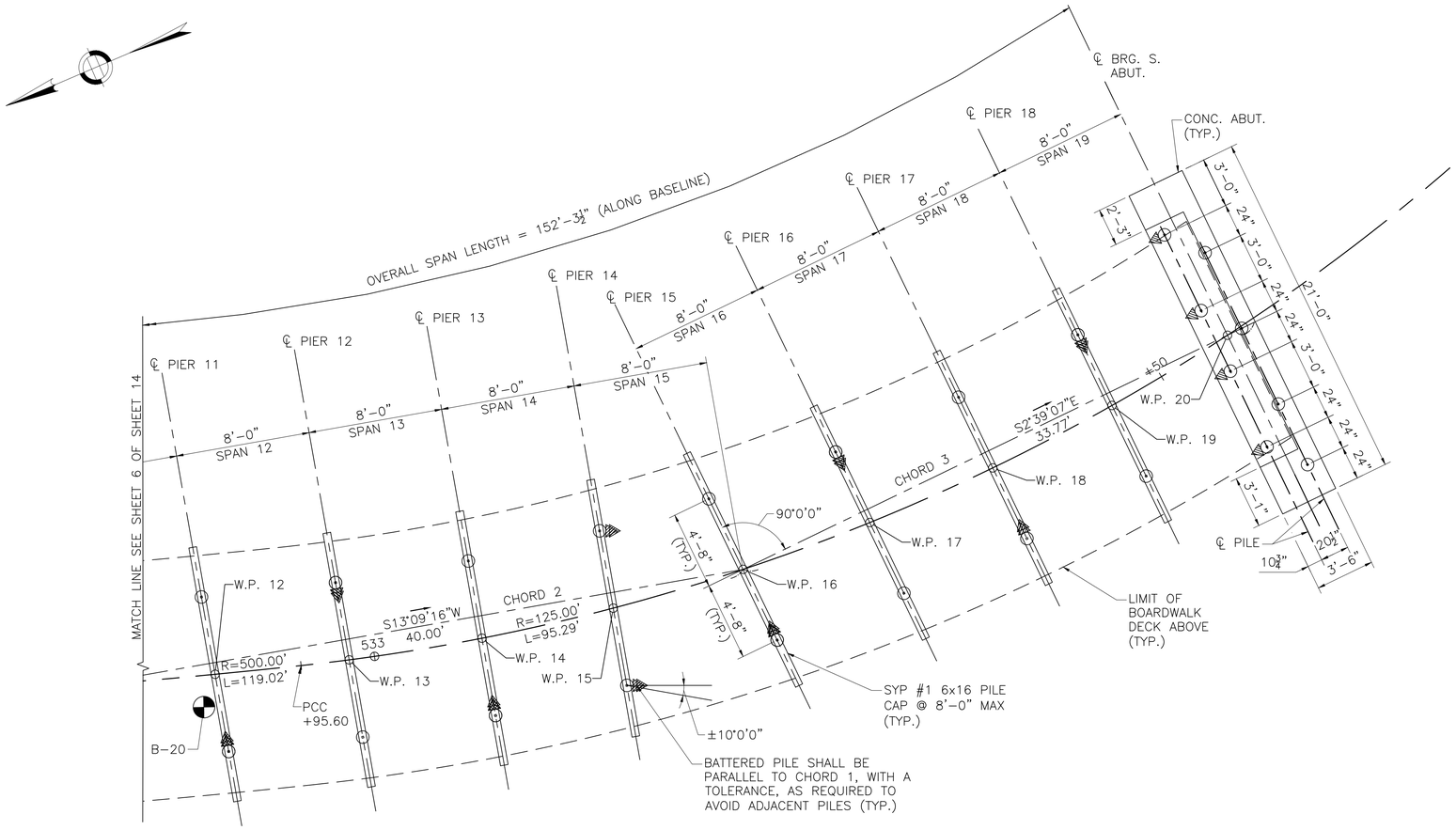
August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT AUTHORIZED SIGNATORY:	STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE	

608227_BR(STR4-FNDN).DWG Plotted on 23-Jul-2025 1:33 PM
Final Structural Submittal (SF) August-09-2025

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	179	231
	PROJECT FILE NO. 608227		

FOUNDATION PLAN (2 OF 2)



PARTIAL FOUNDATION PLAN SPANS 11–19

SCALE: ¼" = 1'–0"

LEGEND:

- ⊙ INDICATES VERTICAL HELICAL PILE.
- INDICATES COMBINED BATTERED PILE AND VERTICAL HELICAL PILE. ARROW INDICATES THE DIRECTION OF THE BATTERED PILE.
- INDICATES BATTERED HELICAL PILE. ARROW INDICATES THE DIRECTION OF THE BATTERED PILE.

LOADS ON HELICAL PILES					
PILE LOCATION	PILE TYPE	PILE SYMBOL	PILE COMPONENTS	STRENGTH I COMPRESSION (KIP)	BATTERED ANGLE TO VERTICAL
AT ABUTMENTS	VERTICAL	⊙		34.9	
	BATTERED			34.9	15 DEG
AT PIERS	VERTICAL	⊙		27.8	
	COMBINED VERTICAL & BATTERED PERPENDICULAR TO BOARDWALK		VERTICAL	36.4	
			BATTERED	10.0	15 DEG
	COMBINED VERTICAL & BATTERED PARALLEL TO BOARDWALK		VERTICAL	37.4	
			BATTERED	15.0	20 DEG

LOADS ON PILES:

THE FACTORED AXIAL DESIGN LOAD PER PILE IS AS NOTED PER TABLE FOR EACH PILE TYPE, AS PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS STRENGTH I LOAD COMBINATION.

THE FACTORED GEOTECHNICAL PILE RESISTANCE IS 37.5 KIPS. THE FACTORED GEOTECHNICAL PILE RESISTANCE IS THE PRODUCT OF THE NOMINAL RESISTANCE OF 83.3 KIPS AND A RESISTANCE FACTOR OF 0.45.

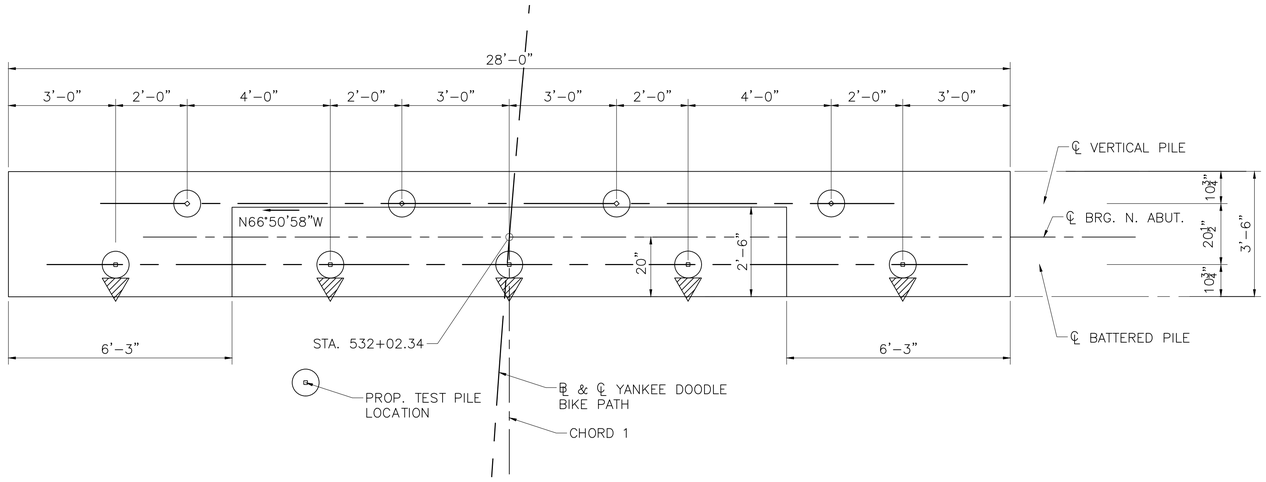
August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT AUTHORIZED SIGNATORY:	STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE	

608227_BR(STR4-FNDN).DWG Plotted on 23-Jul-2025 1:33 PM
August-09-2025
Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

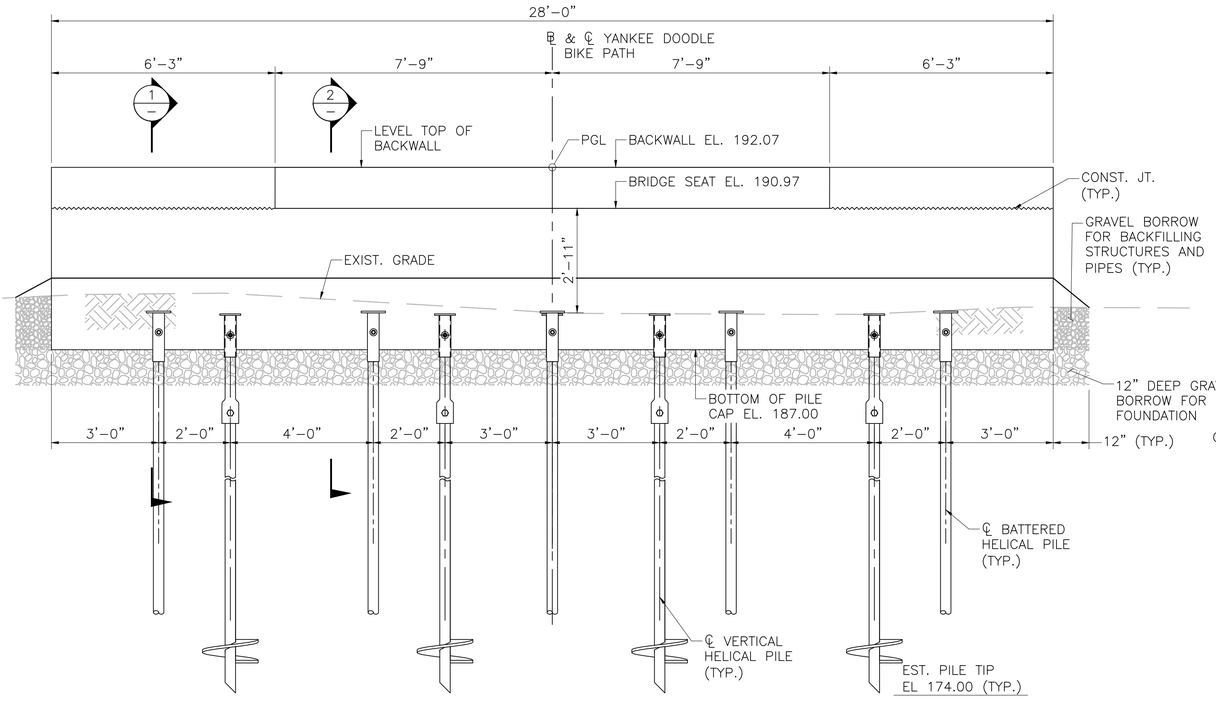
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	180	231
	PROJECT FILE NO. 608227		

NORTH ABUTMENT PLAN, ELEVATION, & SECTIONS



NORTH ABUTMENT PLAN

SCALE: ½" = 1'-0"



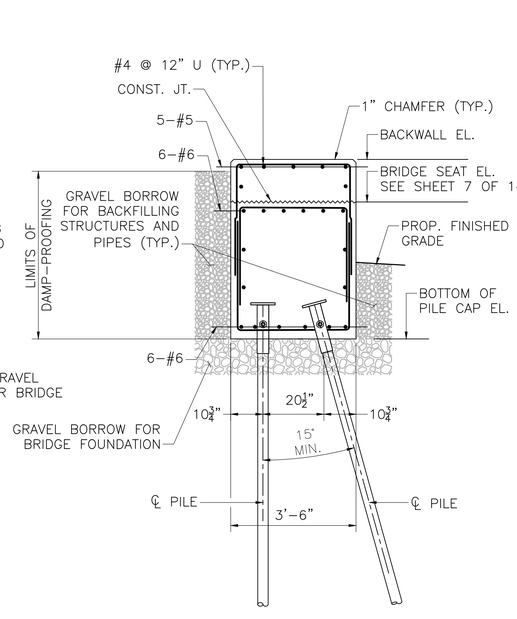
NORTH ABUTMENT ELEVATION

SCALE: ½" = 1'-0"

LEGEND:

⊙ INDICATES VERTICAL HELICAL PILE.

INDICATES BATTERED HELICAL PILE.
ARROW INDICATES THE DIRECTION OF THE BATTERED PILE.

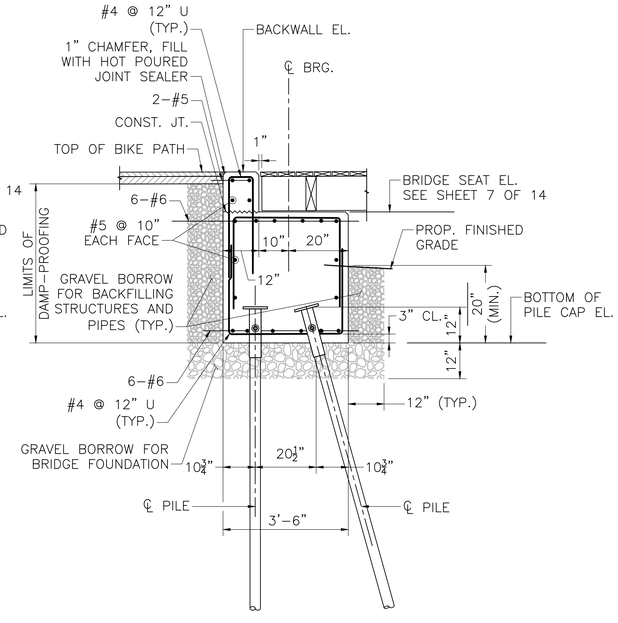


SECTION 1

SCALE: ½" = 1'-0"

8&9

NOTE:
FOR MORE INFO SEE SECTION 2



SECTION 2

SCALE: ½" = 1'-0"

8&9

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER

USE ONLY PRINTS OF LATEST DATE

608227_BR(STR4-FNDN).DWG Plotted on 23-Jul-2025 1:33 PM

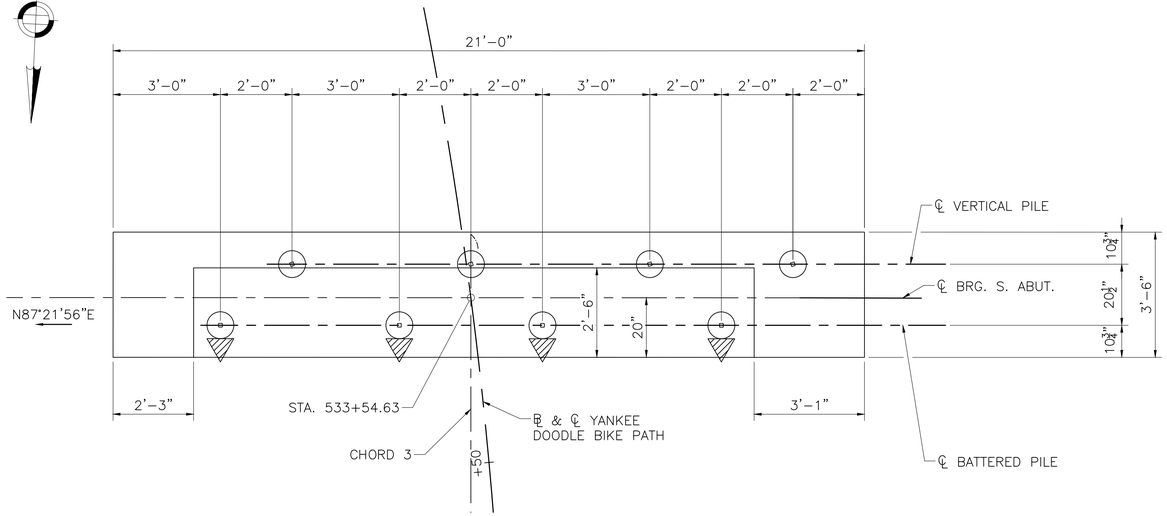
August-09-2025

Final Structural Submittal (SF)

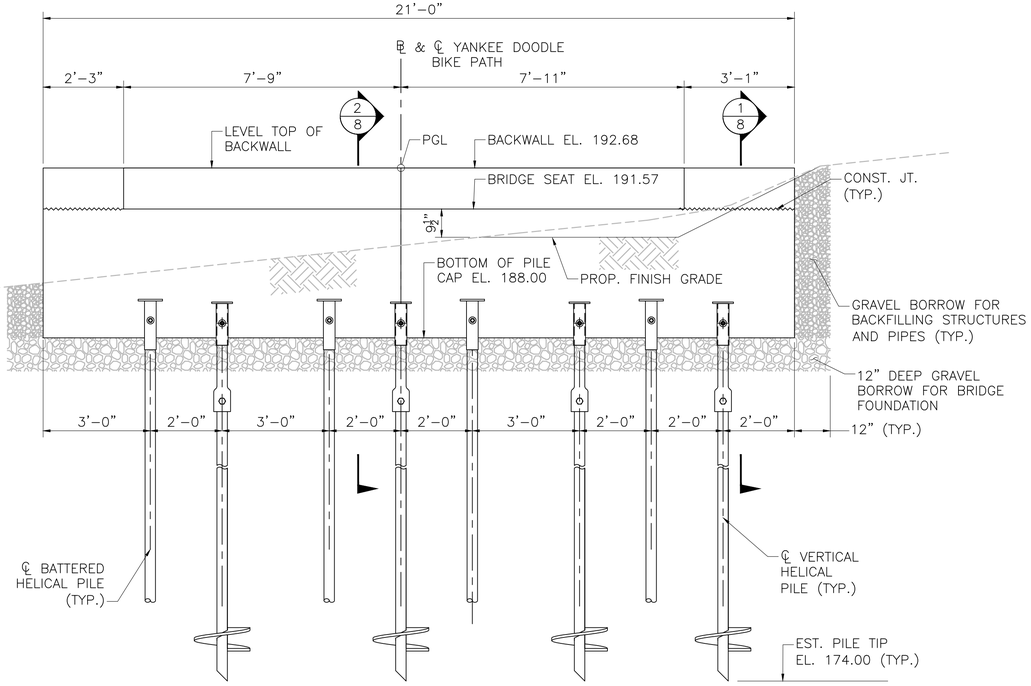
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	181	231
PROJECT FILE NO.	608227		

SOUTH ABUTMENT PLAN & ELEVATION



SOUTH ABUTMENT PLAN
SCALE: ½" = 1'-0"



SOUTH ABUTMENT ELEVATION
SCALE: ½" = 1'-0"

LEGEND:

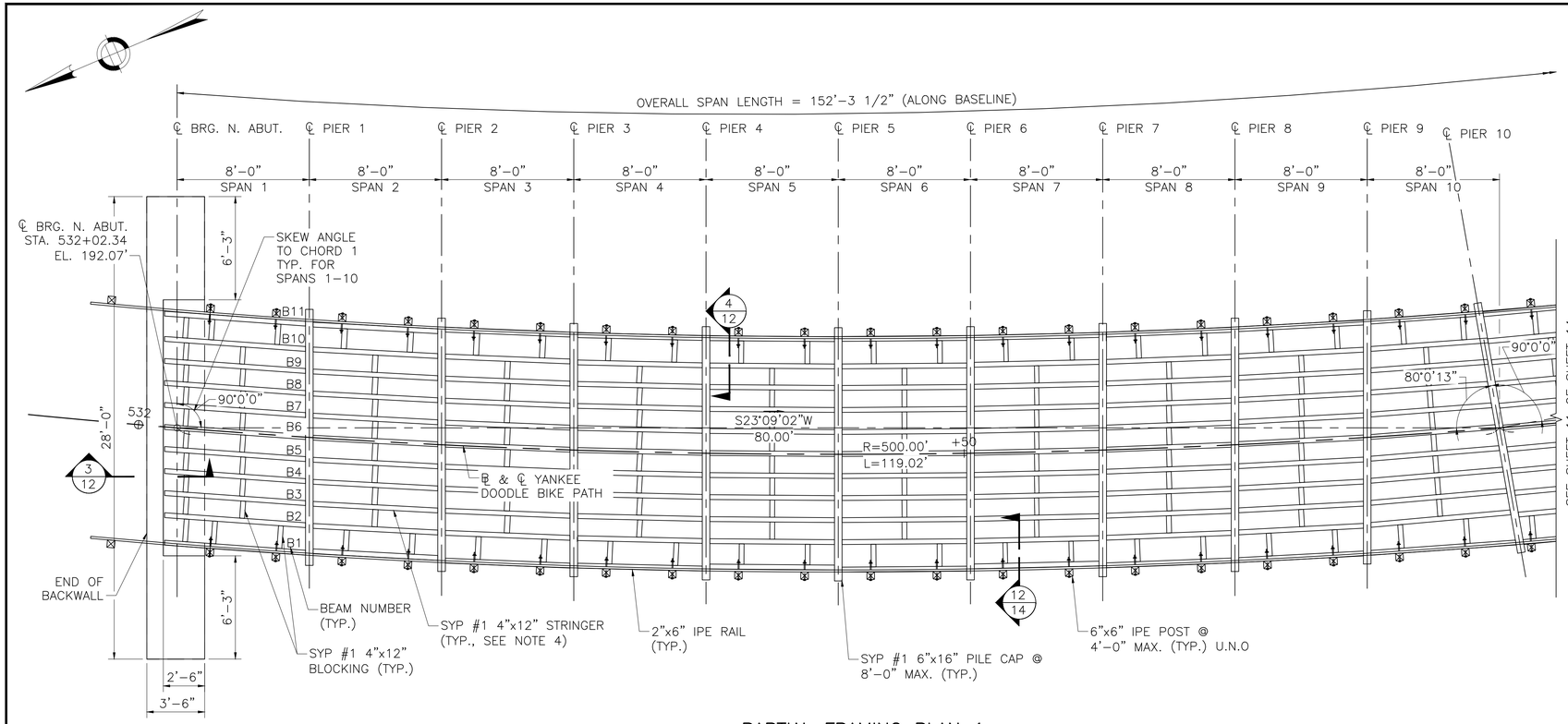
⊙ INDICATES VERTICAL HELICAL PILE.

INDICATES BATTERED HELICAL PILE.
ARROW INDICATES THE DIRECTION OF THE BATTERED PILE.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

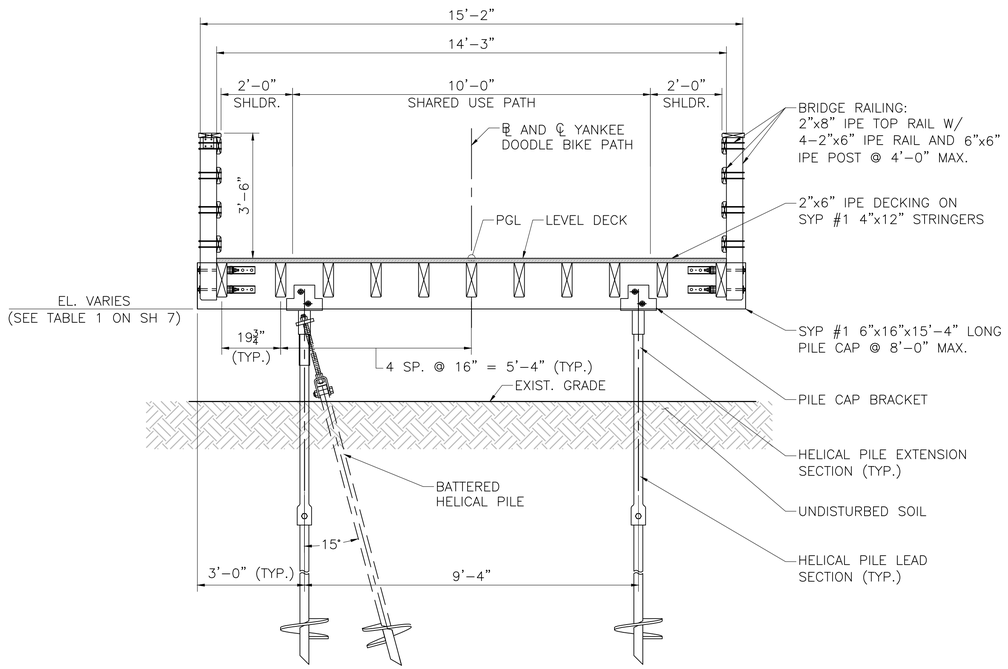
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR4-FNDN).DWG Plotted on 23-Jul-2025 1:33 PM
August-09-2025 Final Structural Submittal (SF)



PARTIAL FRAMING PLAN 1

SCALE: $\frac{1}{4}$" = 1'-0"



TYPICAL CROSS SECTION

SCALE: $\frac{1}{2}$" = 1'-0"

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	182	231
	PROJECT FILE NO. 608227		

FRAMING PLAN (1 OF 2)

TIMBER NOTES:

1. ALL TIMBER CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE AMERICAN WOOD COUNCIL NATIONAL DESIGN SPECIFICATION (ANSI/AWS/NDS)
2. ALL RAILING, POSTS AND DECKING ON THE BRIDGE SHALL BE IPE FOR EXTERIOR USE. IPE MATERIAL SHALL BE CERTIFIED BY THE FOREST STEWARDSHIP COUNCIL. SEE SHEET 13 OF 14 FOR IPE NOTES AND DETAILS.
3. ALL RAILING AND POSTS OFF THE BRIDGE SHALL BE SAWN LUMBER SOUTHERN YELLOW PINE AND GRADED UNDER THE SOUTHERN PINE INSPECTION BUREAU (SPIB) RULES, UNLESS NOTED OTHERWISE.
4. ALL STRINGERS, PIER CAPS AND BLOCKING SHALL BE #1 OR BETTER SOUTHERN YELLOW PINE OR APPROVED EQUAL. ALL SAWN LUMBER SHALL BE GRADE NO. 1, S4S (SURFACED FOUR SIDES).
5. PRIOR TO STRINGER INSTALLATION, CONTRACTOR SHALL PROVIDE ERECTION PLANS TO INCLUDE THE STRINGER LAYOUT AS FOLLOWS:
   - 5.1. INTERIOR STRINGERS EACH BAY SHALL BE PARALLEL AND TANGENT ON THE BASELINE CURVE.
   - 5.2. EXTERIOR STRINGERS SHALL BE TANGENT ON THE OUTER AND INNER CURVE RESPECTIVELY, TO SUPPORT THE RAILING POSTS.
   - 5.3. PLANS SHALL BE BASED ON AS BUILT PIER CAP LAYOUT.
   - 5.4. MAXIMUM ALLOWABLE SPAN LENGTH FOR INTERIOR AND EXTERIOR STRINGER ARE 8'- 9" AND 9'-7", RESPECTIVELY. IF SPAN LENGTH IS GREATER THAN MAXIMUM ALLOWED, THE STRINGER AND PIER CAP DESIGNS SHALL BE CHECKED AND STAMPED BY A PROFESSIONAL ENGINEER REGISTERED IN THE COMMONWEALTH OF MASSACHUSETTS.
6. ALL SAWN LUMBER SHALL BE PRESSURE TREATED (P.T.) IN ACCORDANCE WITH AWPA U1 – COMMODITY SPECIFICATION A, USE CATEGORY 4A. PRESERVATIVE TREATED LUMBER SHALL BE SUBJECT TO A QUALITY CONTROL PROGRAM ADMINISTERED BY AN APPROVED AGENCY. ELEMENT CUTOFFS SHALL BE TREATED WITH AWPA M4. SEE SHEET 13 OF 14 FOR IPE REQUIREMENTS.
7. ALL METAL HARDWARE, INCLUDING SCREWS, NAILS, ANGLES, STRAPS, STEEL PLATES AND JOIST HANGERS SHALL BE STAINLESS STEEL. NOTE THAT SIMPSON PRODUCTS ARE SHOWN THROUGHOUT. CONTRACTOR MAY SUBMIT ALTERNATE HARDWARE DEMONSTRATING EQUAL CAPACITY.
8. ALL BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A307, GRADE A, AND SHALL BE HOT DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A153. WASHERS UNDER THE HEAD OF THE CARRIAGE BOLTS SHALL BE SQUARE HOLED FOR MATING WITH THE SQUARE SHOULDERS OF THE CARRIAGE BOLT. CONNECTIONS TO HAVE LOCK WASHERS.
9. POST SHALL BE SPACED AS SHOWN ON THE PLANS AND SHALL BE 4'-0" O.C. MAX U.N.O.
10. RAILS TO SPAN A MINIMUM OF 3 POSTS. END BUTT JOINTS IN RAILS SHALL BE CENTERED ON POSTS AND STAGGERED FROM JOINTS IN ADJACENT RAILS TO EVERY OTHER POST.
11. PILOT HOLES SHALL BE DRILLED PRIOR TO DRIVING OF SCREWS.
12. BOLT HOLES SHALL BE PRE DRILLED TO A DIAMETER $\frac{1}{16}$" LARGER THAN BOLT DIAMETER.
13. ALL HOLES SHALL BE TREATED THOROUGHLY PRIOR TO INSTALLING SCREWS OR BOLTS. SEE SHEET 13 OF 14 FOR IPE NOTES AND DETAILS.
14. SEE HIGHWAY PLANS FOR TIMBER RAILING OFF BRIDGE.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

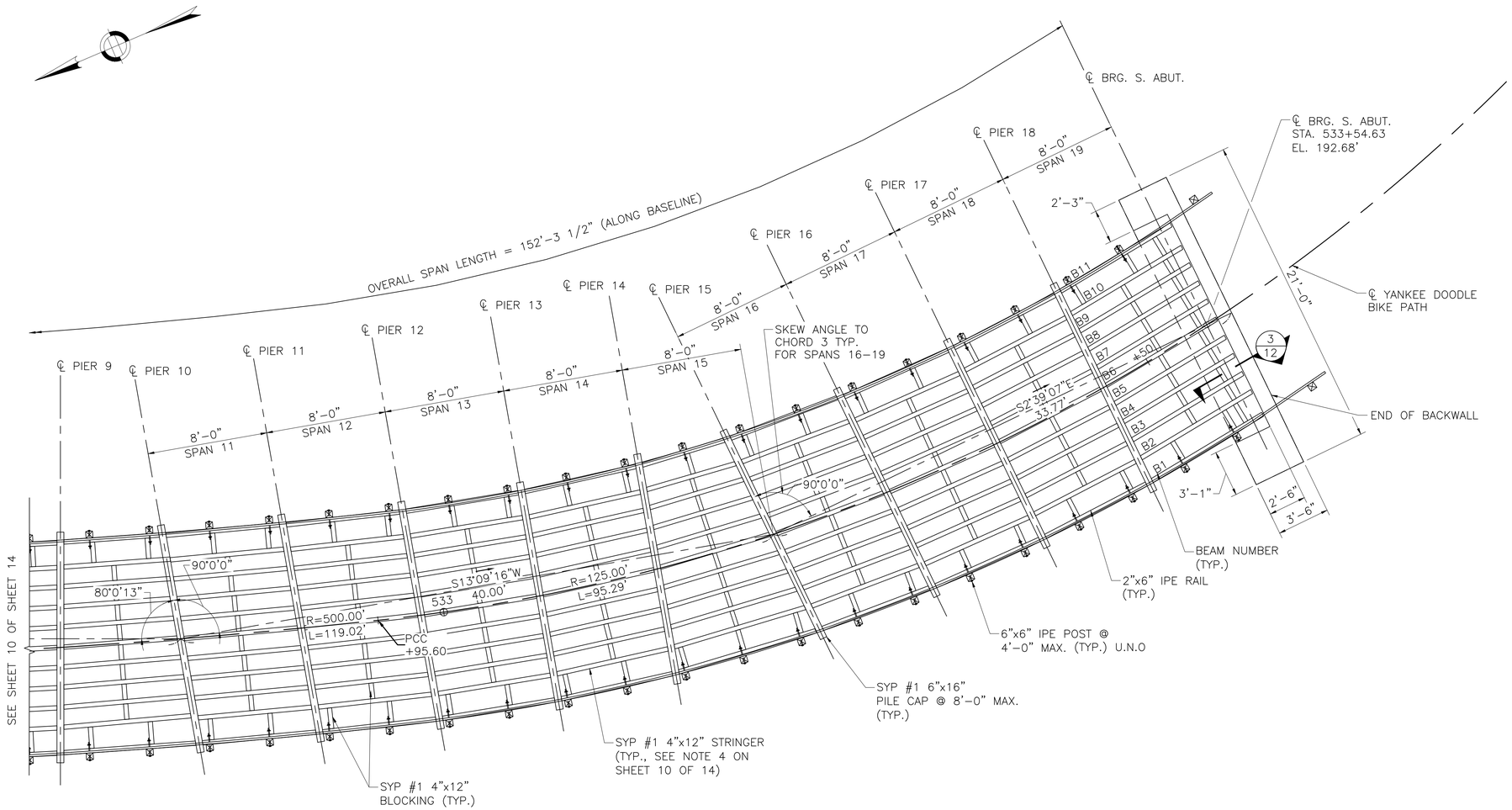
608227_BR(STR4-FRAMING).DWG Plotted on 23-Jul-2025 1:35 PM

August-09-2025 Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	183	231
PROJECT FILE NO.	608227		

FRAMING PLAN (2 OF 2)



PARTIAL FRAMING PLAN 2
SCALE: $\frac{1}{4}$" = 1'-0"

TIMBER NOTES:

SEE NOTES ON SHEET 10 OF 14.

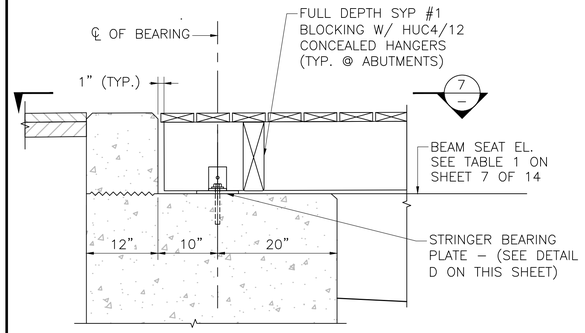
August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT AUTHORIZED SIGNATORY:	STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE	

608227_BR\STR4-FRAMING).DWG Plotted on 23-Jul-2025 1:35 PM
Final Structural Submittal (SF) August-09-2025

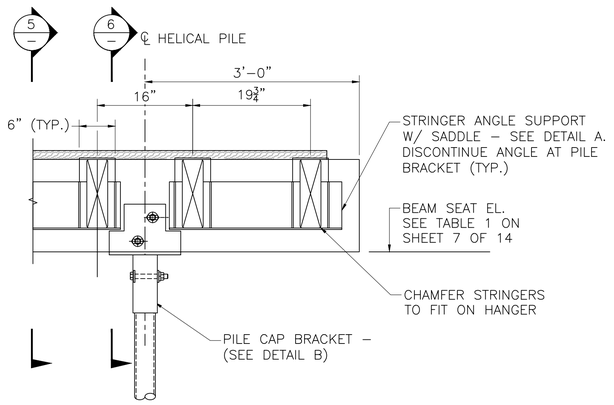
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	184	231
	PROJECT FILE NO. 608227		

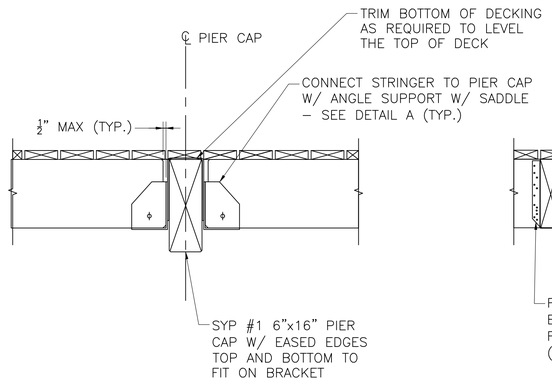
TIMBER CONNECTION DETAILS



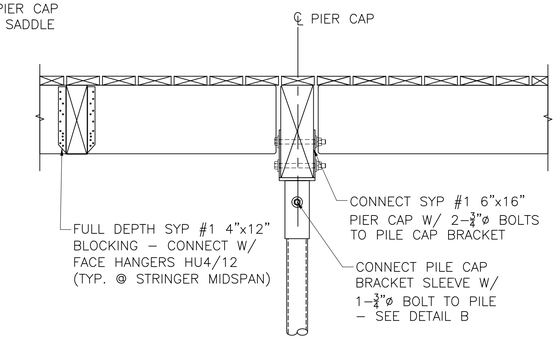
SECTION 3 (10,11)
SCALE: 1" = 1'–0"



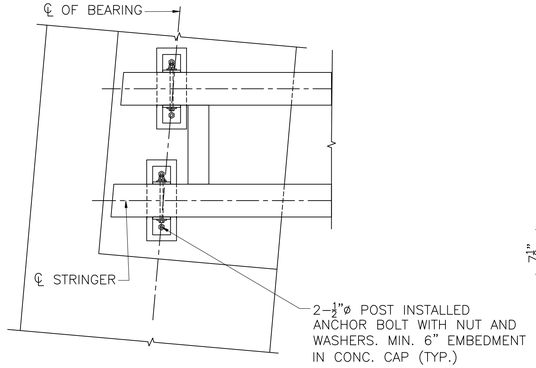
SECTION 4 (10)
SCALE: 1" = 1'–0"



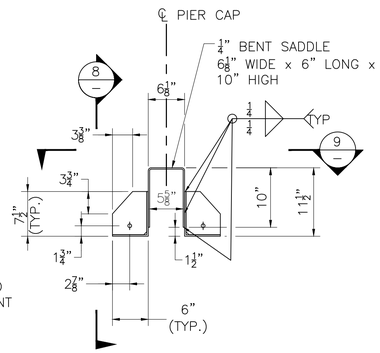
SECTION 5
SCALE: 1" = 1'–0"



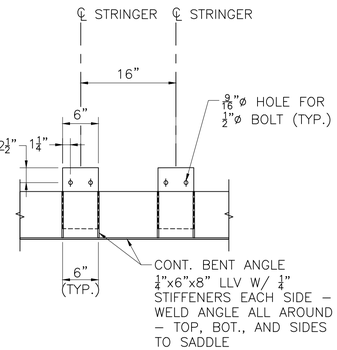
SECTION 6
SCALE: 1" = 1'–0"



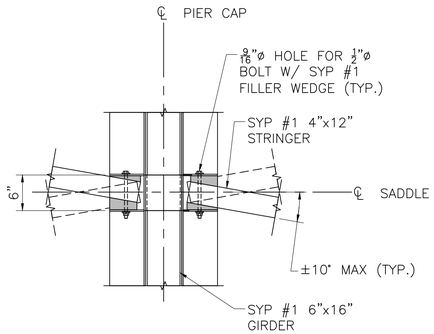
SECTION 7
SCALE: 1" = 1'–0"



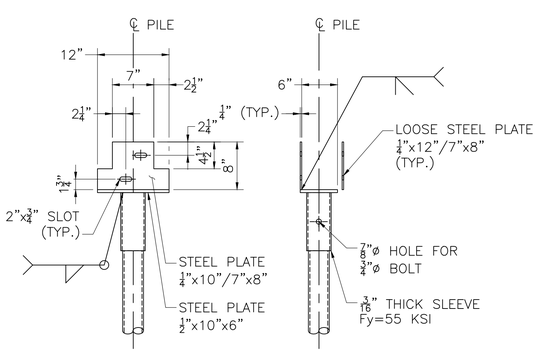
DETAIL A – STRINGER SUPPORT
SCALE: 1" = 1'–0"



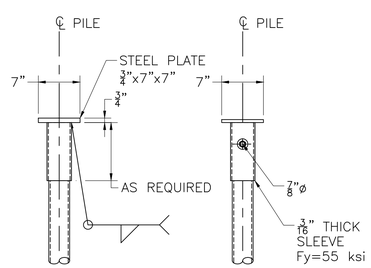
SECTION 8
SCALE: 1" = 1'–0"



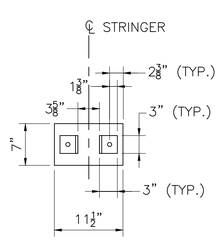
SECTION 9
SCALE: 1" = 1'–0"



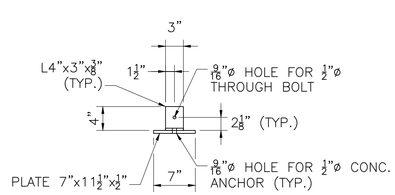
DETAIL B – PILE CAP BRACKET
SCALE: 1" = 1'–0"



DETAIL C – PILE END PLATE
SCALE: 1" = 1'–0"



PLAN



ELEVATION

DETAIL D – STRINGER BEARING PLATE
SCALE: 1" = 1'–0"

NOTES:

1. ALL STEEL INCLUDING BENT PLATES SHALL BE GALVANIZED STEEL, ASTM A572 Fy=50 KSI.
2. DISCONTINUE ANGLE SUPPORT AT PILE BRACKET.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

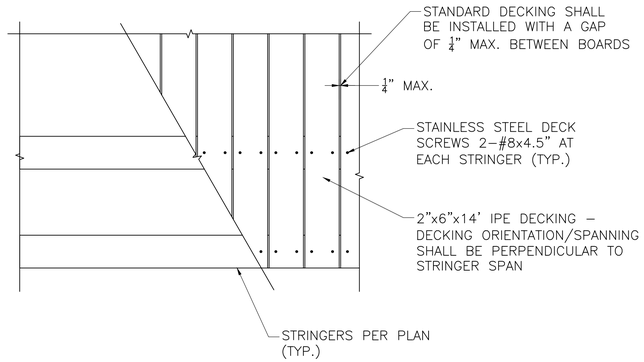
608227_BR(STR4-DETAILS).DWG Plotted on 23-Jul-2025 1:36 PM

August-09-2025 Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	185	231
PROJECT FILE NO.	608227		

DECK DETAILS



PARTIAL DECKING PLAN
SCALE: 1" = 1'–0"

IPE NOTES:

1. IPE MATERIAL SHALL BE CERTIFIED BY THE FOREST STEWARDSHIP COUNCIL.
2. DECKING SHALL BE IPE DECKING FOR EXTERIOR USE.
3. LUMBER DIMENSIONS SHOWN ON THE PLANS ARE NOMINAL. LUMBER FOR DECKING SHALL BE DRESSED (S4SE4E) WITH THE EDGES EASED TO A RADIUS OF ⅛"
4. APPEARANCE OF THE MEMBERS SHALL BE AITC ARCHITECTURAL GRADE.
5. IPE DECKING SHOULD BE ALLOWED TO SIT WHERE IT WILL BE INSTALLED FOR AT LEAST 7 DAYS PRIOR TO INSTALLATION. THIS LETS THE TIMBER ACCLIMATE TO THE LOCAL TEMPERATURE AND HUMIDITY LEVELS: ELEVATE DECKING AT LEAST 12" OFF THE GROUND USING BLOCKS OF TIMBER; SEPARATE LAYERS OF STACKED DECKING WITH TIMBER SHIMS; COVER DECKING WITH A SHEET OF PLYWOOD TO SHED WATER; ENSURE EVERY FACE OF EVERY BOARD RECEIVES ADEQUATE AIR FLOW.
6. FOR CUTTING, USE PREMIUM CARBIDE–TIPPED SAW BLADES. FOR DRILLING, USE BRAD–POINT DRILL BITS OR FOSTNER BITS TO PREDRILL SCREW HOLES.
7. ALL CUTS SHOULD BE SEALED IMMEDIATELY WITH A CLEAR WAX TO PREVENT END CHECKS AND ADVERSE MOVEMENT. APPLY THE SEALANT WITH A PAINT BRUSH. DO NOT APPLY END SEAL TO THE SURFACE OF THE DECKING. ANY SEALANT THAT GETS ON THE SURFACE SHOULD BE WIPED UP IMMEDIATELY.
8. FASTENING: USE ONLY STAINLESS STEEL SCREWS TO FASTEN IPE DECKING. ANYTHING OTHER THAN 305–GRADE OR HIGHER STAINLESS STEEL WILL CAUSE STAINING IN THE TIMBER. IN THE WORST CASES, THE SCREW WILL CORRODE AND FAIL PREMATURELY.
9. PREDRILLING IS REQUIRED FOR EVERY SCREW.
10. IPE DECKING SHALL BE STANDARD DECKING.
11. STANDARD DECKING – FACE SCREW METHOD: SECURE STANDARD IPE DECKING DIRECTLY TO THE JOIST BY SCREWING STRAIGHT DOWN THROUGH THE FACE OF THE BOARD IN PREDRILLED HOLES.
12. PROVIDE A GAP BETWEEN DECK BOARDS, AS SHOWN ON SECTION 9 ON THIS SHEET, TO ALLOW FOR EXPANSION/ SHRINKAGE, AIR FLOW AND WATER DRAINAGE.
13. AFTER INSTALLATION, IPE DECKING SHALL BE COATED WITH A COAT OF UV PROTECTANT OIL FINISH SUCH AS PENOFIN OR EQUAL.
14. FOR SPANS WITH SKEWED PIERS AND UNEQUAL STRINGER SPAN LENGTHS, THE DECKING SHALL BE ADJUSTED BY UNIFORMLY DOUBLE TAPERING DECK BOARDS OR VARYING THE WIDTHS OF DECKING GAPS SUCH THAT THE DECK BOARDS REMAIN PARALLEL WITH THE PIERS AT EACH END OF THE SPAN. TAPERS SHALL BE APPLIED TO UNIFORMLY DISTRIBUTE THE DIMENSIONAL DIFFERENCE OVER A MINIMUM OF 4 DECK BOARDS TO PROVIDE A UNIFORM TRANSITION ACROSS THE SPAN.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

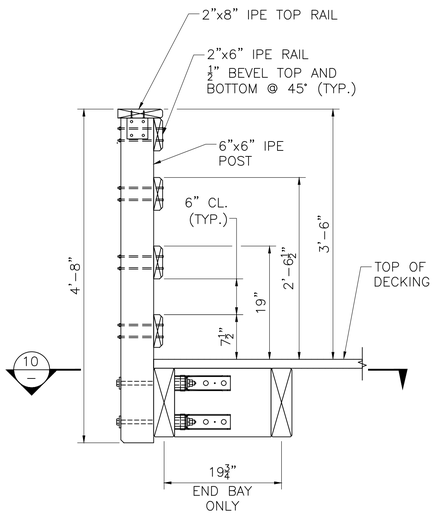
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR4-DETAILS).DWG Plotted on 23-Jul-2025 1:36 PM
August-09-2025
Final Structural Submittal (SF)

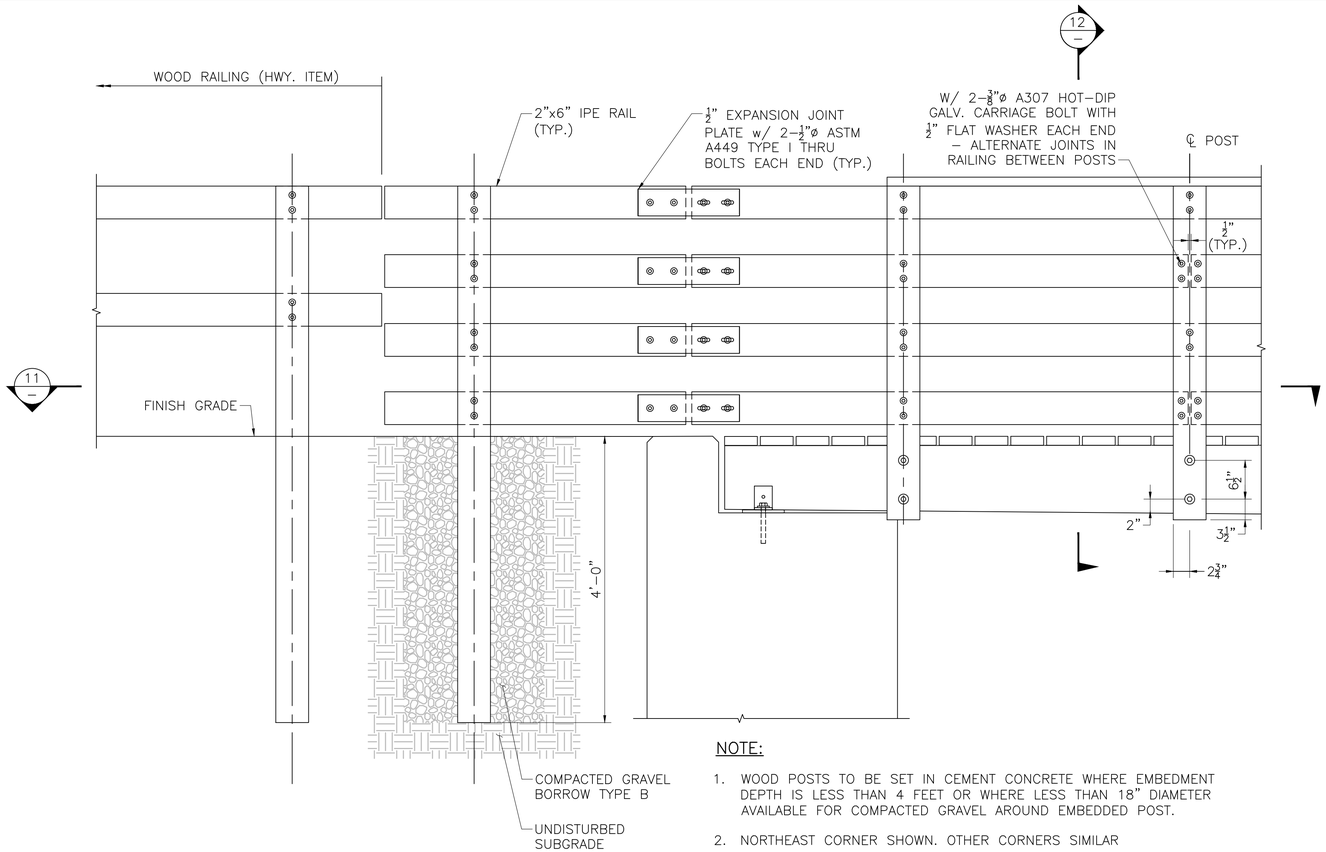
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	186	231
	PROJECT FILE NO. 608227		

TIMBER RAIL DETAILS



SECTION 12
SCALE: 1" = 1'-0"

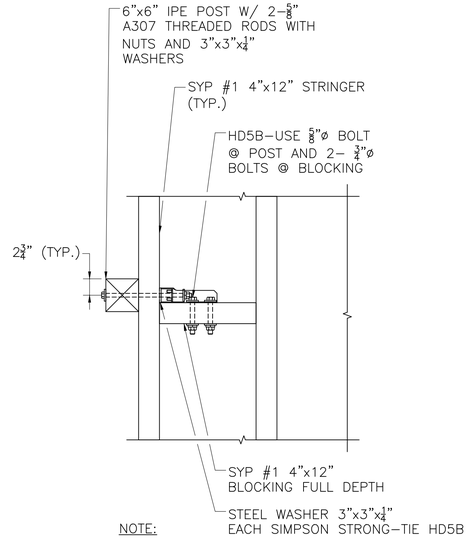


NOTE:
FOR TIMBER NOTES SEE SHEET 10 OF 14.

NOTE:

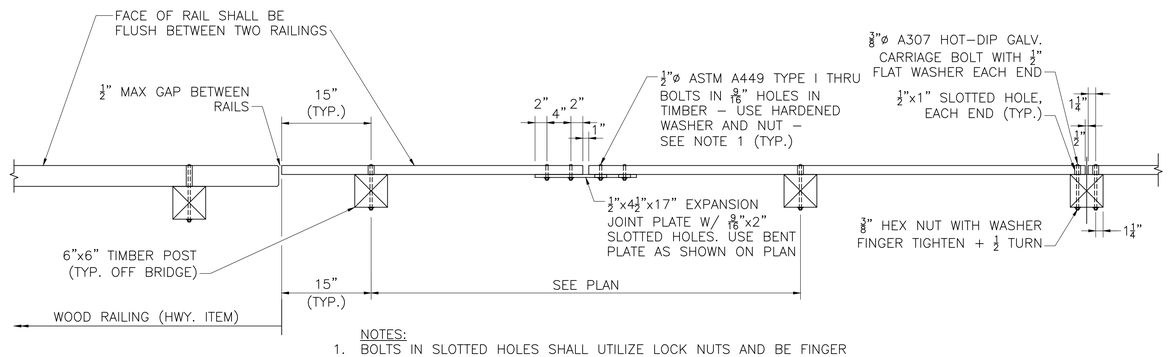
1. WOOD POSTS TO BE SET IN CEMENT CONCRETE WHERE EMBEDMENT DEPTH IS LESS THAN 4 FEET OR WHERE LESS THAN 18" DIAMETER AVAILABLE FOR COMPACTED GRAVEL AROUND EMBEDDED POST.
2. NORTHEAST CORNER SHOWN. OTHER CORNERS SIMILAR
3. SOUTH RAILINGS TRANSITION TO CHAIN LINK FENCE (HIGHWAY ITEM)

RAILING END ELEVATION
SCALE: 1" = 1'-0"



NOTE:
SIMPSON STRONG-TIE HD5B, EQUAL OR BETTER SHALL BE INSTALLED PER MANUFACTURERS RECOMMENDATIONS.

SECTION 10
SCALE: 1" = 1'-0"



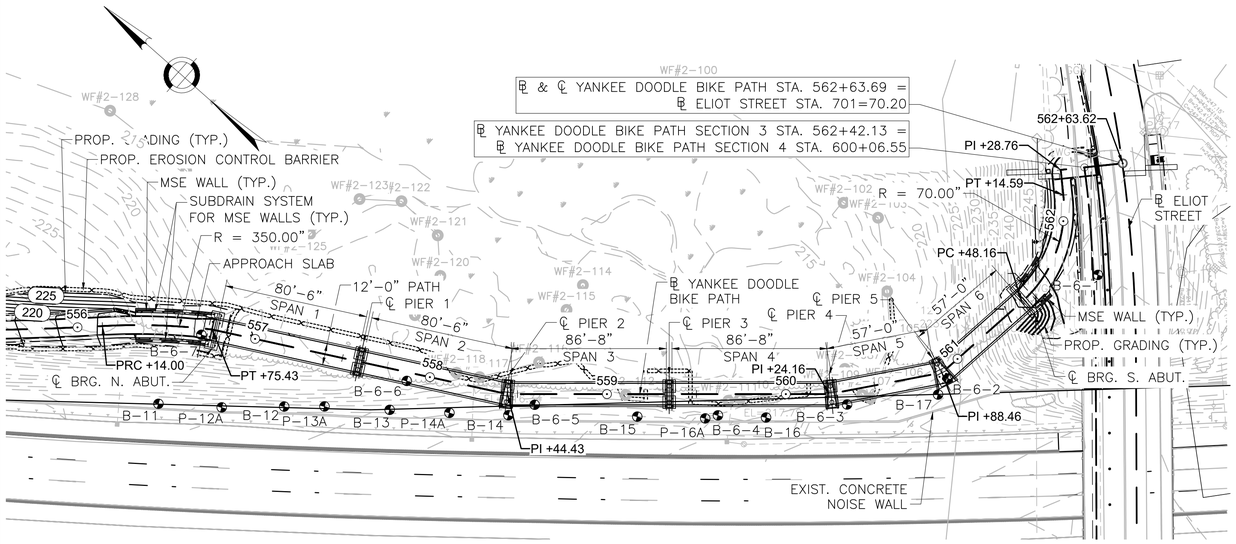
NOTES:

1. BOLTS IN SLOTTED HOLES SHALL UTILIZE LOCK NUTS AND BE FINGER TIGHT TO ALLOW MOVEMENT BETWEEN STEEL PLATE AND TIMBER RAIL
2. A RAILING JOINT SHALL BE USED BETWEEN ANY POST THAT IS CONNECTED TO A BRIDGE BEAM AND A POST THAT IS MOUNTED IN THE GROUND TO ALLOW FOR EXPANSION.

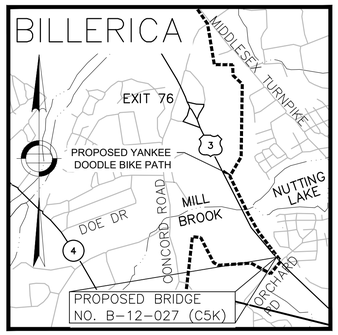
SECTION 11
SCALE: 1" = 1'-0"

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT AUTHORIZED SIGNATORY:	STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE	

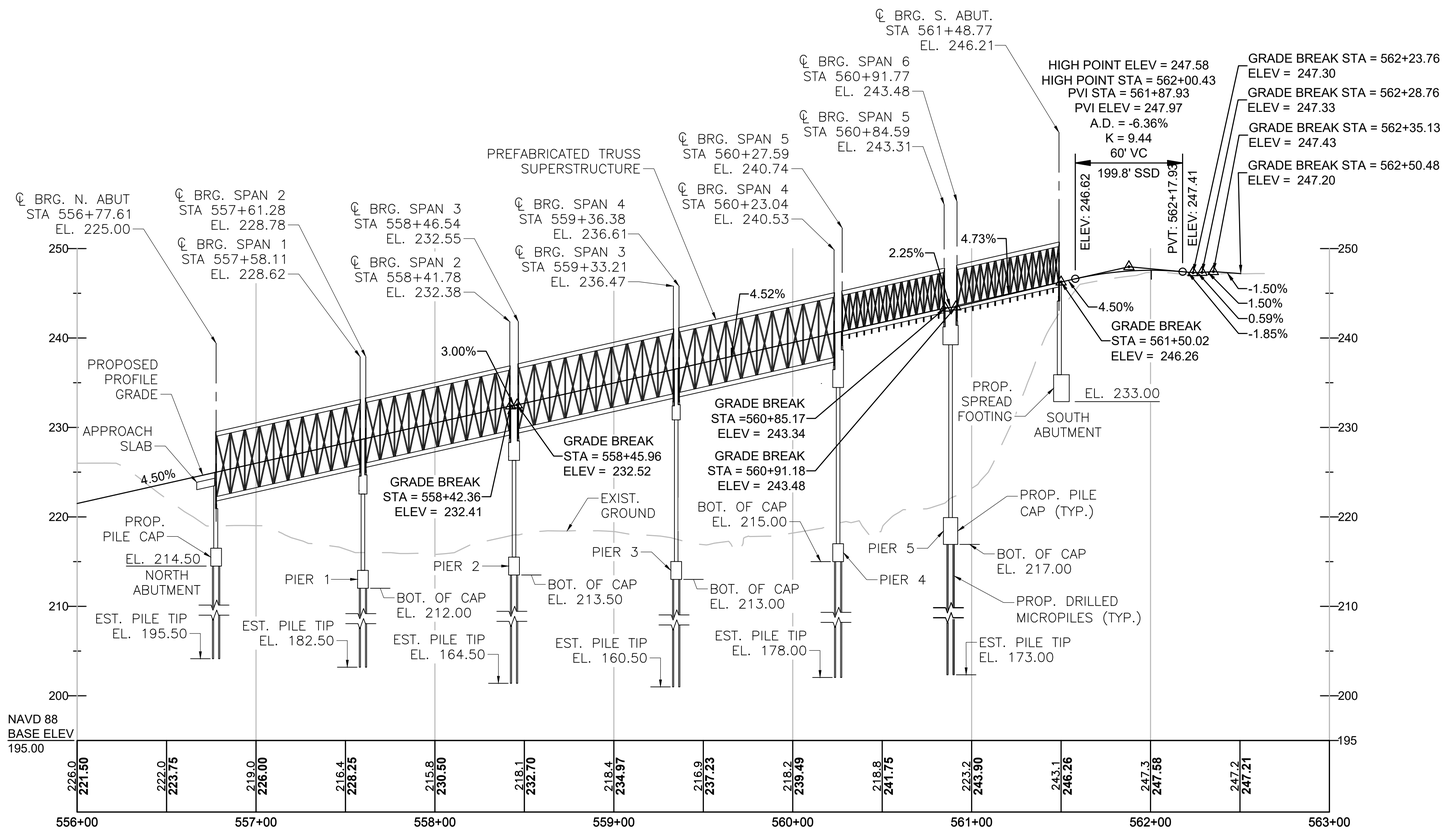
608227_BR(STR4-DETAILS).DWG Plotted on 23-Jul-2025 1:36 PM
August-09-2025
Final Structural Submittal (SF)



KEY PLAN
SCALE: 1"=40'



LOCUS
SCALE: 1"=2000'



PROFILE ALONG ℄ YANKEE DOODLE BIKE PATH
HORIZONTAL SCALE: 1"=40'
VERTICAL SCALE: 1/8"=1'-0"

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	187	231
PROJECT FILE NO.	608227		

KEY PLAN, PROFILE & INDEX

INDEX OF SHEETS

1	KEY PLAN, PROFILE & INDEX
2	GENERAL NOTES
3	BORING LOGS (1 OF 12)
4	BORING LOGS (2 OF 12)
5	BORING LOGS (3 OF 12)
6	BORING LOGS (4 OF 12)
7	BORING LOGS (5 OF 12)
8	BORING LOGS (6 OF 12)
9	BORING LOGS (7 OF 12)
10	BORING LOGS (8 OF 12)
11	BORING LOGS (9 OF 12)
12	BORING LOGS (10 OF 12)
13	BORING LOGS (11 OF 12)
14	BORING LOGS (12 OF 12)
15	GENERAL PLAN & ELEVATION (1 OF 3)
16	GENERAL PLAN & ELEVATION (2 OF 3)
17	GENERAL PLAN & ELEVATION (3 OF 3)
18	FOUNDATION LAYOUT PLAN
19	MICROPILE DETAILS
20	ABUTMENT PLAN AND ELEVATION
21	ABUTMENT SECTIONS AND DETAILS (1 OF 2)
22	ABUTMENT SECTIONS AND DETAILS (2 OF 2)
23	PIER PLAN & ELEVATION – PIER 1
24	PIER PLAN & ELEVATION – PIER 2
25	PIER PLAN & ELEVATION – PIER 3
26	PIER PLAN & ELEVATION – PIER 4
27	PIER PLAN & ELEVATIONS – PIER 5 (1 OF 2)
28	PIER PLAN & ELEVATIONS – PIER 5 (2 OF 2)
29	PIER DETAILS – PIERS 1 & 3
30	PIER DETAILS – PIER 2
31	PIER DETAILS – PIER 4
32	PIER DETAILS – PIER 5
33	COLUMN DETAILS
34	TRANSVERSE SECTIONS
35	JOINT DETAILS (1 of 3)
36	JOINT DETAILS (2 of 3)
37	JOINT DETAILS (3 of 3)
38	NORTH MSE WALL PLAN & ELEVATION (1 OF 2)
39	NORTH MSE WALL PLAN & ELEVATION (2 OF 2)
40	SOUTH MSE WALL PLAN & ELEVATION (1 OF 2)
41	SOUTH MSE WALL PLAN & ELEVATION (2 OF 2)
42	MSE WALL DETAILS
43	RAILING DETAILS (1 of 3)
44	RAILING DETAILS (2 of 3)
45	RAILING DETAILS (3 of 3)

COMMONWEALTH OF MASSACHUSETTS
SHANTA B. KELLER
STRUCTURAL
No. 51381
REGISTERED PROFESSIONAL ENGINEER

Shanta B. Keller, PE
2025.07.25 15:12:29-04'00'

August 9, 2025 | ISSUED FOR CONSTRUCTION

MassDOT Massachusetts Department of Transportation Highway Division

PROPOSED BRIDGE
BILLERICA
YANKEE DOODLE BIKE PATH
OVER LAND

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
10 PARK PLAZA BOSTON, MASS

vhb
260 Arsenal Pl #2, P.O. Box 9151
Watertown, MA 02472
617.924.1770 FAX 617.924.2286

Alexander K. Bardow, P.E. — Digitally signed by Alexander K. Bardow, P.E. Date: 2025.07.28 15:24:49 -04'00' — STATE BRIDGE ENGINEER

Carrie Lavallee, P.E. — 2025.07.29 10:35:05 -04'00' — CHIEF ENGINEER

SHEET 1 OF 45 SHEETS BRIDGE NO. B-12-027 (C5K)

608227_BR(STR&KEY).DWG Plotted on 23-Jul-2025 12:41 PM

August-09-2025 Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	188	231
	PROJECT FILE NO. 608227		

GENERAL NOTES

GENERAL NOTES

DESIGN:

IN ACCORDANCE WITH:

THE 2020 AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS LRFD BRIDGE DESIGN SPECIFICATIONS 9TH EDITION.

THE 2009 AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS GUIDE SPECIFICATIONS FOR THE DESIGN OF PEDESTRIAN BRIDGES FOR H10 LOADING OR 90 PSF PEDESTRIAN LOADING, WHICHEVER CONTROLS.

THE 2024 MASSACHUSETTS DEPARTMENT OF TRANSPORTATION HUNDREDTH ANNIVERSARY LRFD BRIDGE MANUAL.

THE 2011 AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS GUIDE SPECIFICATIONS FOR LRFD SEISMIC BRIDGE DESIGN WITH 2022 INTERIM REVISIONS.

BENCH MARKS:

1. SPIKE IN U.P. #20 N3028333.932, E716126.811, EL. 184.81
2. SPIKE IN U.P. #26 N3028312.181, E715531.308, EL. 135.28

ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM (NAVD88) OF 1988.

SURVEY NOTEBOOK:

SURVEY PERFORMED BY HANCOCK ASSOCIATES 185 CENTRE STREET, DANVERS, MA.

UNSUITABLE MATERIAL:

ALL UNSUITABLE MATERIAL SHALL BE REMOVED WITHIN THE LIMITS OF THE FOUNDATIONS OF THE STRUCTURE, AS DIRECTED BY THE ENGINEER.

GEOTECHNICAL REPORT:

REFER TO GEOTECHNICAL REPORT: PROPOSED YANKEE DOODLE BIKE PATH – PROPOSED RAMP ALONG ROUTE 3, DATED MAY 12, 2025, PREPARED BY LAHLAF GEOTECHNICAL CONSULTING, INC.

REINFORCEMENT:

REINFORCING STEEL SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M 31 GRADE 60. UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWINGS, ALL BARS SHALL BE LAPPED AS FOLLOWS:

MODIFICATION CONDITION	#4 BARS	#5 BARS	#6 BARS
1. NONE	16"	17"	21"
2. 12" OF CONCRETE BELOW BAR	18"	22"	27"
3. EPOXY COATED BARS, COVER <3d_b, OR CLEAR SPACING <6d_b	21"	26"	31"
4. COATED BARS, ALL OTHER CASES	17"	21"	25"
5. CONDITION 2, AND 3	23"	29"	35"
6. CONDITION 2, AND 4	21"	27"	32"

ALL OTHER BARS SHALL BE LAPPED AS SHOWN ON THE CONSTRUCTION DRAWINGS.

ALL REINFORCING STEEL SHALL BE EPOXY COATED.

ANCHOR BOLTS:

ANCHOR BOLTS SHALL BE DESIGNED BY THE MANUFACTURER. ALL ANCHOR BOLTS SHALL BE SET BY TEMPLATE BEFORE THE CONCRETE IS PLACED.

CONSTRUCTION REQUIREMENTS AND PROCEDURES:

THE CONTRACTOR SHALL TAKE THE PROPER PRECAUTIONS TO ENSURE THE STABILITY AND SAFE PERFORMANCE OF ALL STRUCTURAL ELEMENTS DURING CONSTRUCTION. CONTRACTOR SHALL SUBMIT FOR REVIEW ERECTION PLANS AND CALCULATIONS STAMPED BY A PE REGISTERED IN THE COMMONWEALTH OF MASSACHUSETTS.

EXISTING CONDITIONS:

THE CONTRACTOR SHALL DETERMINE AND ESTABLISH ALL DIMENSIONS AND DETAILS NECESSARY FOR COMPLETION OF ALL WORK BY FIELD MEASUREMENTS AND SURVEY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ADEQUACY AND ACCURACY THEREOF, AND SHALL NOT ORDER ANY MATERIAL OR COMMENCE ANY FABRICATION UNTIL HE HAS MADE THE REQUIRED MEASUREMENTS AND THE EXTENT OF THE PROPOSED WORK HAS BEEN APPROVED BY THE ENGINEER.

ESTIMATED QUANTITIES

(NOT GUARANTEED)

ITEM NO.	ITEM	QUANTITY	UNIT
140.	BRIDGE EXCAVATION	320	CY
144.	CLASS B ROCK EXCAVATION	20	CY
151.2	GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES	65	CY
156.1	CRUSHED STONE FOR BRIDGE FOUNDATION	20	TON
698.3	GEOTEXTILE FABRIC FOR SEPARATION	60	SY
945.10	DRILLED MICROPILES	2000	FT
948.60	MICROPILE VERIFICATION LOAD TEST	2	EA
948.61	MICROPILE PROOF LOAD TEST	6	EA
953.1	TEMPORARY SUPPORT OF EXCAVATION	1	LS
991.1	CONTROL OF WATER – STRUCTURE NO. B–12–027 (C5K)	1	LS
995.01	BRIDGE STRUCTURE, BRIDGE NO. B–12–027 (C5K)	1	LS
996.31	MECHANICALLY STABILIZED EARTH (MSE) WALLS	120	SY

UTILITIES:

THE CONTRACTOR SHALL LOCATE AND PROTECT FROM DAMAGE ALL EXISTING UTILITIES.

CONSTRUCTION JOINTS:

CONSTRUCTION JOINTS, OTHER THAN THOSE SHOWN ON THE PLANS, WILL NOT BE PERMITTED WITHOUT THE APPROVAL OF THE ENGINEER.

SCALES:

SCALES NOTED ON THE PLANS ARE NOT APPLICABLE TO REDUCED SIZE PRINTS. DIVIDE SCALES BY 2 FOR HALF–SIZE PRINTS.

CONCRETE:

UNLESS OTHERWISE SPECIFIED, ALL CONCRETE SHALL BE 5000 HP CONCRETE.

ALL CIP AND PRECAST CONCRETE POURS SHOWN ON THESE CONSTRUCTION DRAWINGS WHERE ALL VOLUMETRIC DIMENSIONS ARE 4 FEET OR GREATER SHALL BE CONSIDERED TO BE MASS CONCRETE PLACEMENTS AND SHALL REQUIRE A HEAT OF HYRDATION ANALYSIS AND THERMAL CONTROL PLAN, AS SPECIFIED IN THE MASSDOT STANDARD SPECIFICATIONS.

STRUCTURAL STEEL:

ALL STRUCTURAL STEEL OTHER THAN STRUCTURAL TUBING SHALL BE AASHTO M270 GRADE 50. STRUCTURAL TUBING SHALL BE HEAT TREATED, AND SHALL CONFORM TO ASTM A1085 GRADE A, WITH THE SUPPLEMENTAL REQUIREMENTS S1. MINIMUM STRUCTURAL TUBULAR MEMBER THICKNESS SHALL BE ¼".
STEEL TRUSS AND TRUSS CONNECTIONS SHALL BE DESIGNED BY THE CONTRACTOR IN ACCORDANCE WITH:

- THE 2020 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
- THE 2009 AASHTO LRFD GUIDE SPECIFICATIONS FOR THE DESIGN OF PEDESTRIAN BRIDGES WITH 2015 INTERIM REVISIONS.
- THE 2024 MASSDOT LRFD HUNDREDTH ANNIVERSARY EDITION BRIDGE MANUAL.
- THE PROJECT SPECIAL PROVISIONS.

THE CONTRACTOR IS TO BE AWARE THAT THERE MAY BE LIMITS TO THE LENGTH OF HEAT TREATED HSS A1085 TUBULAR STEEL THAT SUPPLIERS CAN PROVIDE WHICH MEET THE REQUIRED BUY AMERICA PROVISIONS. SPLICES ARE POSSIBLE TO BE REQUIRED GIVEN THE MAXIMUM 86'–6" BRIDGE SPAN.
ALL EXPOSED STEEL SURFACES SHALL BE FINISHED AND FREE OF COARSE OR RUGGED EDGES.
WELDED TUBULAR CONNECTIONS SHALL BE FABRICATED IN ACCORDANCE WITH THE STRUCTURAL WELDING CODE – STEEL ANSI/AWS/D1.1. SEE SPECIAL PROVISIONS FOR ADDITIONAL REQUIREMENTS.
ALL NON TUBULAR WELDED CONNECTIONS SHALL BE FABRICATED IN ACCORDANCE WITH THE STRUCTURAL WELDING CODE – STEEL ANSI/AWS/D1.5. SEE SPECIAL PROVISIONS FOR ADDITIONAL REQUIREMENTS.
ALL STRUCTURAL STEEL AND STRUCTURAL TUBING SHALL BE GALVANIZED AND PAINTED, IN ACCORDANCE WITH THE SPECIAL PROVISIONS. THE FINISH COAT COLOR SHALL BE GREEN AND MATCH COLOR CHIP NO. 24272 OF FEDERAL STANDARD 595B.

WOOD BRIDGE RAILS

WOOD BRIDGE RAILS MOUNTED TO THE TRUSS SHALL BE SUPPLIED BY THE BRIDGE MANUFACTURER. RUB RAIL MATERIAL SHALL BE IPE.

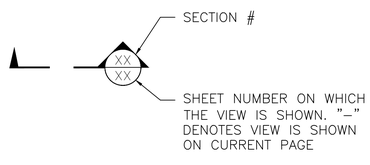
SUPERSTRUCTURE DEAD LOAD:

FOUNDATIONS ARE DESIGNED BASED ON A PRELIMINARY LOAD ESTIMATE. THE SUPERSTRUCTURE SERVICE DEAD LOADS CONSIDERED AT EACH BEARING FOR FOR THE VARIOUS SPAN LENGTHS ARE AS FOLLOWS:

SPAN 1 AND SPAN 2, 80'–6" = 26 KIPS
SPAN 3 AND SPAN 4, 86'–8" = 28 KIPS
SPAN 5 AND SPAN 6, 57'–0" = 18.1 KIPS

SUPERSTRUCTURE DEAD LOAD INCLUDES STEEL TRUSS, CONCRETE DECK FENCE, AND RAILINGS. IF WEIGHTS ARE GREATER THAN THOSE SHOWN, THE ABUTMENT AND PIER DESIGNS (FOUNDATIONS AND REINFORCING) SHALL BE CHECKED AND STAMPED BY A PROFESSIONAL ENGINEER REGISTERED IN THE COMMONWEALTH OF MASSACHUSETTS. THE CALCULATIONS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO SUBMITTAL OF REINFORCING SHOP DRAWINGS AND PILE SHOP DRAWINGS, AND PRIOR TO INSTALLATION OR FABRICATION.

SECTION MARK:



SEISMIC DESIGN CRITERIA	
DESIGN RETURN PERIOD:	1000–YR
DESIGN SPECTRA	
As	0.128g
SDs	0.257g
SD1	0.098g
SITE CLASS	D
SEISMIC DESIGN CATEGORY (SDC)	A

TEMPORARY WATER CONTROL DESIGN DATA	
DESIGN FLOOD DISCHARGE (C.F.S.)	N/A
DESIGN FLOOD FREQUENCY (YEARS)	N/A
DESIGN FLOOD VELOCITY (F.P.S.)	N/A
DESIGN FLOOD ELEVATION (FEET, NAVD)	N/A

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT AUTHORIZED SIGNATORY:	STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE	

608227_BR(STR)-GEN_NOTES).DWG Plotted on 23-Jul-2025 12:41 PM
August-09-2025
Final Structural Submittal (SF)

BORING B–11

STATION: 556+47
OFFSET: +43.8'
GROUND ELEVATION: 218.5'
N: 3018474.8179

PROBE P–12A

STATION: 556+90
OFFSET: +41.4'
GROUND ELEVATION: 219.0'
N: 3018447.9193

BORING B–12

STATION: 557+24
OFFSET: +33.5'
GROUND ELEVATION: 219.0'
N: 3018421.9557
E: 716995.3518

NAVD88 (FT)

EL. 230.0
EL. 220.0
EL. 210.0
EL. 200.0
EL. 190.0
EL. 180.0

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG — **Boring B-11** — **Page 1 of 1**

Project:	**Proposed Yankee Doodle Bike Path, Billerica, MA (Structure 6) - Bridge No. B-12-027 (C5K)**		
Client:	**Vanasse Hangen Brustlin, Inc.**		LGCI Project No.: 1723
Drilling Subcontractor:	Soil Exploration Corp.	Date Started:	11/17/2017
Drilling Foreman:	Don Leger	Date Completed:	11/17/2017
LGCI Engineer:	Tom Sinnott	Location:	~520 ft. north of Orchard Rd.
Ground Surface El:	~218.5 ft. (see remark 1)	Total Depth:	9 feet
Groundwater Depth:	~5 ft. based on sample moisture	Drill Rig Type:	Geoprobe 6610DT
		Drilling Method:	3.5" casing driven w/ percussion hammer
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	NA
Drop:	30 inches	Coordinates: E: 716951.6772, N: 3018474.8179	

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
5ft	0-2	S1	1	2	2	1	24	3		Topsoil ~2.5 ft.	S1 - Silty SAND with Gravel (SM), fine, 20-25% fines, 15-20% fine gravel, trace organic fines, dark brown, moist
	2-4	S2	9	70	17	19	24	9		Fill ~3 ft.	S2 - Top 6": Silty SAND with Gravel (SM), fine, 20-25% fines, ~20% fine gravel, trace organic fines, roots, dark brown, moist Bot. 3": Fine to coarse angular stone fragments
	5-7	S3	7	4	8	28	24	10		Swamp Deposits ~7 ft.	S3 - Top 6": Silty SAND with Gravel (SM), fine, 20-25% fines, ~20% fine gravel, trace organic fines, roots, dark brown, wet, Bot. 4": Silty SAND (SM), fine, trace medium, ~15% fines, ~5% fine gravel, dark brown, wet
10ft	7-8.4	S4	42	95	50/4		16	13	2	Sand ~9 ft.	S4 - Silty SAND (SM), fine, ~20 fines, ~5% fine gravel, fine to coarse angular stone fragments, light brown, wet
15ft											Bottom of boring at 9 feet. Backfilled borehole with soil from surrounding area.
20ft											

Remarks:
1. The ground surface elevation was interpolated to the nearest 1/2 foot using a survey plan titled: "Yankee Doodle Pike Bath, Billerica, MA, Boring Locations, page 6 of 6," provided to LGCI by VHB via email on February 9, 2018.
2. Refusal at 9 feet with macro-core sampler advanced with percussion hammer.

TER LEVEL
213.5
S. 11/17/

LGCI Lahlaf Geotechnical Consulting, Inc.

PROBE LOG — **Probe P-12 A** — **Page 1 of 1**

Project:	**Proposed Yankee Doodle Bike Path, Billerica, MA (Structure 6) - Bridge No. B-12-027 (C5K)**		
Client:	**Vanasse Hangen Brustlin, Inc.**		LGCI Project No.: 1723
Drilling Subcontractor:	Soil Exploration Corp.	Date Started:	11/17/2017
Drilling Foreman:	Don Leger	Date Completed:	11/17/2017
LGCI Engineer:	Tom Sinnott	Location:	~485 ft. north of Orchard Rd.
Ground Surface El:	~219 ft. (see remark 1)	Total Depth:	8 feet
Groundwater Depth:	~5 ft. based on sample moisture	Drill Rig Type:	Geoprobe 6610DT
		Drilling Method:	Direct Push Probe
Hammer Weight:	140 lbs	Split Spoon Diameter:	NA
Hammer Type:	Percussion	Rock Core Barrel Size:	NA
Drop:	30 inches	Coordinates: E: 716972.8692, N: 3018447.9193	

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
5ft	0-5	MC1					60	8		Topsoil ~1 ft.	MC1 - Silty SAND (SM), fine, 20-25% fines, 5-10% fine gravel, trace organic fines, trace roots, leaves, dark brown, moist
										Fill ~6 ft.	
	5-8	MC2					36	14		Sand ~8 ft.	MC2 - Silty SAND (SM), fine, trace medium, 30-35% fines, tan to light brown, wet
10ft									2		Bottom of probe at 8 feet. Backfilled borehole with soil from the surrounding area.
15ft											
20ft											

Remarks:
1. The ground surface elevation was interpolated to the nearest 1/2 foot using a survey plan titled: "Yankee Doodle Pike Bath, Billerica, MA, Boring Locations, page 6 of 6," provided to LGCI by VHB via email on February 9, 2018.
2. Refusal at 8 feet with macro-core sampler advanced with percussion hammer on possible cobbles / boulder.

BOT. OF PILE CAP
N. ABUT.
EL. 214.50

WATER LEVEL
EL. 214.0
OBS. 11/17/2017

EST. PILE TIP
EL. 195.50

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG — **Boring B-12** — **Page 1 of 1**

Project:	**Proposed Yankee Doodle Bike Path, Billerica, MA (Structure 6) - Bridge No. B-12-027 (C5K)**		
Client:	**Vanasse Hangen Brustlin, Inc.**		LGCI Project No.: 1723
Drilling Subcontractor:	Soil Exploration Corp.	Date Started:	11/17/2017
Drilling Foreman:	Don Leger	Date Completed:	11/17/2017
LGCI Engineer:	Tom Sinnott	Location:	~450 ft. north of Orchard Rd.
Ground Surface El:	~219 ft. (see remark 1)	Total Depth:	14.5 feet
Groundwater Depth:	~7 ft. based on sample moisture	Drill Rig Type:	Geoprobe 6610DT
		Drilling Method:	3.5" casing driven w/ percussion hammer
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	NA
Drop:	30 inches	Coordinates: E: 716995.3518, N: 3018421.9557	

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
5ft	0-2	S1	1	1	4	6	24	5		Topsoil ~1 ft.	S1 - Silty SAND with Gravel (SM), fine, trace medium, ~20% fines, ~20% fine gravel, trace organic fines, trace roots, dark brown to brown, moist
	2-4	S2	7	8	13	8	24	15		Fill ~1 ft.	S2 - Top 7": Poorly Graded SAND with Silt (SP-SM), fine, ~10% fines, ~10% fine gravel, trace roots, brown, moist Bot. 8": Silty SAND (SM), fine, 25-30% fines, ~5% fine gravel, trace organic fines, dark brown, moist (buried topsoil)
	5-7	S3	3	2	5	6	24	14		Buried Topsoil ~5.5 ft.	S3 - Top 7": Silty SAND (SM), fine, ~20% fines, trace fibrous peat, dark brown to gray, moist Bot. 7": Silty SAND (SM), fine, trace medium, 15-20% fines, trace fine gravel, gray, moist
10ft	7-9	S4	18	5	5	14	24	19		Fill ~7 ft.	S4 - Top 5 ": Silty SAND (SM), fine, ~20% fines, trace organic fines, trace roots, dark brown, wet Bot. 14": Silty SAND (SM), fine, ~20% fines, trace organic fines, gray, wet
	10-12	S5	12	20	26	46	24	18		Swamp Deposits ~10 ft.	
15ft									2	Sand ~14.5 ft.	S5 - Silty SAND (SM), fine, trace medium, ~20% fines, ~5% fine gravel, fine angular stone fragments, gray, wet
20ft											Bottom of boring at 14.5 feet. Backfilled borehole with soil from the surrounding area.

Remarks:
1. The ground surface elevation was interpolated to the nearest 1/2 foot using a survey plan titled: "Yankee Doodle Pike Bath, Billerica, MA, Boring Locations, page 6 of 6," provided to LGCI by VHB via email on February 9, 2018.
2. Refusal at 14.5 feet with macro-core sampler advanced with percussion hammer.

WATER LEVEL
EL. 212.0
OBS. 11/17/2017

BORING NOTES:

1. LOCATION OF BORINGS AND PROBES SHOWN ON THE KEY PLAN THUS: ◔
2. BORINGS ARE TAKEN FOR PURPOSE OF DESIGN AND SHOW CONDITIONS AT BORING POINTS ONLY, BUT DO NOT NECESSARILY SHOW THE NATURE OF THE MATERIALS TO BE ENCOUNTERED DURING CONSTRUCTION.
3. WATER LEVELS SHOWN ON THE BORING LOGS WERE OBSERVED AT THE TIME OF TAKING BORINGS AND DO NOT NECESSARILY SHOW THE TRUE GROUND WATER LEVEL.
4. FIGURES IN COLUMNS INDICATE NUMBER OF BLOWS REQUIRED TO DRIVE A 1⅜" I.D. SPLIT SPOON SAMPLER 6" USING A 140 POUND WEIGHT FALLING 30".
5. BORING SAMPLES ARE STORED AT A STORAGE FACILITY LOCATED ON ROUTE 114 (219 WINTHROP AVE.) IN LAWRENCE, MA. THE CONTRACTOR MAY EXAMINE THE SOIL AND ROCK SAMPLES BY CONTACTING THE MASSDOT GEOTECHNICAL SECTION AT 10 PARK PLAZA, BOSTON, MA.
6. BORINGS WERE MADE IN NOVEMBER 2017, AUGUST 2021, AND SEPTEMBER 2021.
7. BORINGS WERE MADE BY SOIL EXPLORATION CORP, 148 PIONEER DRIVE, LEOMINSTER, MA AND NORTHERN DRILL SERVICE, 33 TALBOT ROAD, NORTHBOROUGH, MA.
8. THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988 IS USED THROUGHOUT.
9. BORING LOGS ARE NOT DRAWN TO A STANDARD SCALE. BAR SCALE ON SHEET IS USED TO CONVEY ELEVATIONS.

DATE	DESCRIPTION
August 9, 2025	ISSUED FOR CONSTRUCTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER

USE ONLY PRINTS OF LATEST DATE

608227_BR(STR6-BORING).DWG Plotted on 1-Aug-2025 8:13 AM
August-09-2025
Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	190	231
	PROJECT FILE NO. 608227		

BORING LOGS (2 OF 12)

NAVD88 (FT)

EL. 230.0
EL. 220.0
EL. 210.0
EL. 200.0
EL. 190.0
EL. 180.0
EL. 170.0
EL. 160.0

BORING B–6–7

STATION: 556+69.82
OFFSET: 3.61'
GROUND ELEVATION: 218.5'
N: 3018482.5694
E: 716996.3824

LGCI Lahlaf Geotechnical Consulting, Inc. — 100 Chelmsford Road, Suite 2, Billerica, MA 01862, Telephone: (978) 330-5912, Fax: (978) 330-5056

BORING LOG — **B-6-7** PAGE 1 OF 1

CLIENT: Vanasse Hangen Brustlin, Inc.
LGCI PROJECT NUMBER: 1723
PROJECT NAME: Prop. Yankee Doodle Bike Path (Structure 6)
PROJECT LOCATION: Billerica, MA - Bridge No. B-12-027 (C5K)

DATE STARTED: 8/31/21 **DATE COMPLETED:** 9/1/21
BORING LOCATION: Near northern side of Structure 6
COORDINATES: N 3018482.5694 E 716996.3824
SURFACE EL: 218.5 ft. (see note 1) **TOTAL DEPTH:** 22 ft.
WEATHER: 70's Cloudy
GROUNDWATER LEVELS:
▽ **DURING DRILLING:** 9.0 ft. / El. 209.5 ft. Based on sample moisture
▼ **AT END OF DRILLING:** -
▽ **OTHER:** 7.7 ft. / El. 210.8 ft. At the start of 9/1/2021

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Justin Raymond
DRILLING METHOD: Drive and wash with 4" and 3" casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NX
LOGGED BY: HO **CHECKED BY:** NP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth (ft.)	Material Description
0	215.0		S1	1-2-2-2 (4)	24/12		Topsoil	0.5 / 218.0	S1 - Silty SAND (SM), fine to coarse, 20-25% fines, 5-10% fine gravel, trace of organic soil, trace of roots, dark brown to yellow, moist
2			S2	6-10-28-27 (38)	24/17		Fill	2.0 / 216.5	S2 - Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 15-20% fine to coarse subangular gravel, trace of organic soil, gray to yellow, moist
4			S3	16-16-24-42 (40)	24/13				S3 - Silty SAND with Gravel (SM), fine to coarse, 25-30% fines, 15-20% fine subangular gravel, brown, moist
6			S4	29-30-71/5" (101/11")	17/17			6.0 / 212.5	S4 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, 10-15% fines, 20-25% fine to coarse subangular gravel, brown, moist
7.4	210.0						Sand and Gravel		
8			S5	35-33-25-22 (58)	24/13				S5 - Silty SAND (SM), fine to medium, 25-30% fines, brown, wet (possible weathered rock)
10						1		11.0 / 207.5	REMARK 1: Roller bit chattering at depth of 11' on possible cobbles or a boulder. Switched to 3" casing.
12	205.0		C1		60/58		Rock		C1 - min./ft.: 4.3, 6.1, 6.3, 8.1, 21.3 Rec./Pen.= 58"/60"=96.7%, RQD=52"/60"=86.7% Hard to very hard, slighty weathered to fresh, moderately fractured to sound, gray, fine to medium grained, ANDOVER GRANITE
15									
17									
20	200.0		C2		60/58				C2 - min./ft.: 39.6, 17.3, 9.7, 21.5, 18 Rec/Penn= 58"/60"=96.7%, RQD=48"/60"=80% Hard to very hard, slighty weathered to fresh, moderately fractured to sound, gray, fine to medium grained, ANDOVER GRANITE
22	196.5							22.0 / 196.5	Bottom of borehole at 22.0 feet. Backfilled borehole with drill cuttings.
25	195.0								

GENERAL NOTES:
1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Boring Locations Yankee Doodle Bike Path, Billerica, MA," prepared by Vanasse Hangen Brustlin, Inc. (VHB), and provided to LGCI by VHB via e-mail on June 2, 2021.

BOT. OF PILE CAP
N. ABUT.
EL. 214.50

WATER LEVEL
EL. 209.5
OBS. 9/1/2021

EST. PILE TIP
EL. 195.50

BORING B–6–6

STATION: 557+87.90
OFFSET: 4.85'
GROUND ELEVATION: 215.5'
N: 3018378.7781
E: 717051.9687

LGCI Lahlaf Geotechnical Consulting, Inc. — 100 Chelmsford Road, Suite 2, Billerica, MA 01862, Telephone: (978) 330-5912, Fax: (978) 330-5056

BORING LOG — **B-6-6** PAGE 1 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
LGCI PROJECT NUMBER: 1723
PROJECT NAME: Prop. Yankee Doodle Bike Path (Structure 6)
PROJECT LOCATION: Billerica, MA - Bridge No. B-12-027 (C5K)

DATE STARTED: 9/8/21 **DATE COMPLETED:** 9/9/21
BORING LOCATION: Northern side of Structure 6 along noise barrier
COORDINATES: N 3018378.7781 E 717051.9687
SURFACE EL: 215.5 ft. (see note 1) **TOTAL DEPTH:** 37 ft.
WEATHER: 70's Sunny
GROUNDWATER LEVELS:
▽ **DURING DRILLING:** 11.0 ft. / El. 204.5 ft. Based on sample moisture
▼ **AT END OF DRILLING:** -
▽ **OTHER:** 1.5 ft. / El. 214.0 ft. At the start of 9/10/2021

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Justin Raymond
DRILLING METHOD: Drive and wash with 4" and 3" casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NX
LOGGED BY: HO **CHECKED BY:** TG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth (ft.)	Material Description
0	215.0		S1	1-1-3-2 (4)	24/7		Topsoil	0.5 / 215.0	S1 - Silty SAND (SM), fine to medium, 30-35% fines, trace of organic soil, trace of roots, trace of brick, brown, moist
2			S2	1-2-10-60/3" (12)	21/0	1	Peat	1.5 / 213.5	S2 - No recovery, drove 3" spoon: PEAT(PT), non fibrous, plastic, trace of roots, black, moist REMARK 1: Switched to 4" casing at depth of 3' due to possible cobbles or boulder, shifted the boring 2 feet south.
3.3			S3	14-1-1-1 (2)	24/10				S3 - Similar to S2
5									
6			S4	4-6-7-9 (13)	24/22				S4 - Similar to S2
8	210.0		S5	100/3"	3/0	2		8.0 / 207.5	REMARK 2: Encountered obstruction at depth of 8' due to possible cobbles or boulder, inserted 3" casing.
8.3									S5 - No recovery, drove 3" spoon, no recovery with 3" spoon
10			S6	12-11-13-18 (24)	24/4		Sand and Gravel		S6 - Well Graded SAND with Silt (SW-SM), fine to coarse, 5-10% fines, 10-15% fine to coarse subangular gravel, gray, wet
12			S7	14-9-8-8 (17)	24/13				S7 - Silty SAND (SM), fine, 20-25% fines, 0-5% fine to coarse rounded gravel, gray, wet
14									
15	200.0		S8	16-13-12-15 (25)	24/13				S8 - Silty SAND (SM), fine, 30-35% fines, 0-5% fine to coarse rounded gravel, gray, wet
16									
19			S9	19-19-54-46/3" (73)	21/7				S9 - Silty SAND (SM), fine, 20-25% fines, 5-10% fine rounded gravel, gray, wet
20	195.0								
20.8								21.5 / 194.0	
22							Rock		C1 - min./ft.: 4.5,5.5, 6.8, 7.5, 8.2 Rec./Pen.= 57.5"/60"=95.83%, RQD=55.5"/60"=92.5% Hard to very hard, slighty weathered to fresh, moderately fractured to sound, gray, fine to medium grained, ANDOVER GRANITE
25			C1		60/57.5				

GENERAL NOTES:
1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Boring Locations Yankee Doodle Bike Path, Billerica, MA," prepared by Vanasse Hangen Brustlin, Inc. (VHB), and provided to LGCI by VHB via e-mail on June 2, 2021.

BOT. OF PILE CAP
PIER 1
EL. 212.00

WATER LEVEL
EL. 204.5
OBS. 9/9/2021

BORING B–6–6

STATION: 557+87.90
OFFSET: 4.85'
GROUND ELEVATION: 215.5'
N: 3018378.7781
E: 717051.9687

LGCI Lahlaf Geotechnical Consulting, Inc. — 100 Chelmsford Road, Suite 2, Billerica, MA 01862, Telephone: (978) 330-5912, Fax: (978) 330-5056

BORING LOG — **B-6-6** PAGE 2 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
LGCI PROJECT NUMBER: 1723
PROJECT NAME: Prop. Yankee Doodle Bike Path (Structure 6)
PROJECT LOCATION: Billerica, MA - Bridge No. B-12-027 (C5K)

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth (ft.)	Material Description
22	190.0						Rock		C2 - min./ft.: 9.5, 12, 11.3, 9.6, 8.4 Rec./Pen.= 60"/60"=100%, RQD=50"/60"=83.33% Hard to very hard, slighty weathered to fresh, moderately fractured to sound, gray, fine to medium grained, ANDOVER GRANITE
27			C2		60/60				
30	185.0								
32			C3		60/57	3			C3 - min./ft.: 7.3, 13.6,10.2, 8, 4.5 Rec./Pen.= 57"/60"=95%, RQD=36"/60"=60% Hard to very hard, moderately weathered to fresh, extremely fractured to sound, gray, fine to medium grained, ANDOVER GRANITE REMARK 3: Rock core barrel jammed at depth of 34.2'.
35	180.0								
37								37.0 / 178.5	Bottom of borehole at 37.0 feet. Backfilled borehole with drill cuttings.
40	175.0								
45	170.0								

EST. PILE TIP
EL. 182.50

BORING NOTES:

FOR BORING NOTES SEE SHEET 3 OF 45

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STRB-BORING).DWG Plotted on 31-Jul-2025 12:36 PM
August-09-2025
Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	191	231
	PROJECT FILE NO.	608227	

BORING LOGS (3 OF 12)

PROBE P–13A
STATION: 557+46
OFFSET: +28.6'
GROUND ELEVATION: 219.0'
N: 3018404.3190

BORING B–13
STATION: 557+82
OFFSET: +22.7'
GROUND ELEVATION: 220.0'

PROBE P–14A
STATION: 558+15
OFFSET: +17.2'
GROUND ELEVATION: 220.0'

NAVD88 (FT)

EL. 230.0
EL. 220.0
EL. 210.0
EL. 200.0
EL. 190.0
EL. 180.0

LGCI Lahlaf Geotechnical Consulting, Inc.

PROBE LOG — **Probe P-13 A** — **Page 1 of 1**

Project:	**Proposed Yankee Doodle Bike Path, Billerica, MA (Structure 6) - Bridge No. B-12-027 (C5K)**		
Client:	**Vanasse Hangen Brustlin, Inc.**	LGCI Project No.:	1723
Drilling Subcontractor:	Soil Exploration Corp.	Date Started:	11/17/2017
Drilling Foreman:	Don Leger	Date Completed:	11/17/2017
LGCI Engineer:	Tom Sinnott	Location:	~430 ft. north of Orchard Rd.
Ground Surface El:	~219 ft. (see remark 1)	Total Depth:	7 feet
Groundwater Depth:	Not Encountered	Drill Rig Type:	Geoprobe 6610DT
		Drilling Method:	Direct Push Probe
Hammer Weight:	140 lbs	Split Spoon Diameter:	NA
Hammer Type:	Percussion	Rock Core Barrel Size:	NA
Drop:	30 inches	Coordinates: E: 717010.1535, N: 3018404.3190	

Depth Scale	Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-5	MC1					60	12		Topsoil	MC1 - Top 6": Silty SAND (SM), fine, ~25% fine, 5-10% fine gravel, trace organic fines, trace roots, dark brown, moist
5ft										Fill ~7 ft.	Bot 6": Poorly Graded SAND with Silt (SP-SM), fine, 10-15% fines, brown, moist
	5-7	MC2					24	3	2		MC2 - Fine angular stone fragments
											Bottom of probe at 7 feet. Backfilled borehole with soil from the surrounding area.
10ft											
15ft											
20ft											

Remarks:
1. The ground surface elevation was interpolated to the nearest 1/2 foot using a survey plan titled: "Yankee Doodle Pike Bath, Billerica, MA, Boring Locations, page 6 of 6," provided to LGCI by VHB via email on February 9, 2018.
2. Refusal at 7 feet with macro-core sampler advanced with percussion hammer on possible cobbles / boulder.

OT. OF PILE CA
IER 1
L. 212.00

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG — **Boring B-13** — **Page 1 of 1**

Project:	**Proposed Yankee Doodle Bike Path, Billerica, MA (Structure 6) - Bridge No. B-12-027 (C5K)**		
Client:	**Vanasse Hangen Brustlin, Inc.**	LGCI Project No.:	1723
Drilling Subcontractor:	Soil Exploration Corp.	Date Started:	11/17/2017
Drilling Foreman:	Don Leger	Date Completed:	11/17/2017
LGCI Engineer:	Tom Sinnott	Location:	~390 ft. north of Orchard Rd.
Ground Surface El:	~220 ft. (see remark 1)	Total Depth:	24.5 feet
Groundwater Depth:	~15 ft. at the end of drilling	Drill Rig Type:	Geoprobe 6610DT
		Drilling Method:	3.5" casing driven w/ percussion hammer
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	NA
Drop:	30 inches	Coordinates: E: 717033.4595, N: 3018375.0511	

Depth Scale	Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-2	S1	1	1	3	5	24	8		Topsoil ~2 ft.	S1 - Silty SAND (SM), fine, 15-20% fines, ~10% fine gravel, trace organic fines, trace roots, dark brown, moist
	2-4	S2	3	4	11	6	24	14		Fill ~9 ft.	S2 - Top 7": Similar to S1, ~25% fines Bot 7": Silty SAND (SM), fine, ~15% fines, ~5% fine gravel, brown, moist
5ft	5-7	S3	54	12	20	24	24	5		Peat ~10.8 ft.	S3 - PEAT, fibrous, fine angular stone fragments S4 - Similar to S3, fine angular stone fragments in tip, possible cobble / boulder
	7-8.7	S4	7	9	13	50/4	20	12			
10ft	10-12	S5	9	12	13	13	24	20		Silt ~12 ft.	S5 - Top 9": PEAT, fibrous, trace roots Bot 11": Sandy SILT (ML), non-plastic, 35-40% fine sand, fine to coarse angular stone fragments, gray, wet
	12-14	S6	2	10	10	10	24	21		Sand ~20 ft.	S6 - Silty SAND (SM), fine to medium, ~35% fines, trace fine gravel, gray, wet
15ft	15-17	S7	11	10	12	15	24	24			S7 - Top 19": Silty SAND (SW-SM), fine to medium, ~15% fines, gray, wet Bot 5": Silty SAND (SM), fine, ~25% fines, trace fine gravel, gray, wet
20ft	20-22	S8	27	28	31	28	24	19		Silt ~24.5 ft.	S8 - Sandy SILT (ML), non-plastic, 30-35% fine sand, gray, wet
									2		Bottom of boring at 24.5 feet. Backfilled borehole with soil from the surrounding area.

Remarks:
1. The ground surface elevation was interpolated to the nearest 1/2 foot using a survey plan titled: "Yankee Doodle Pike Bath, Billerica, MA, Boring Locations, page 6 of 6," provided to LGCI by VHB via email on February 9, 2018.
2. Refusal at 24.5 feet with macro-core sampler advanced with percussion hammer.

IT. OF PILE CA
ER 1
. 212.00

WATER LEVEL
EL. 205.0
OBS. 11/17/2017

EST. PILE TIP
PIER 1
EL. 182.50

LGCI Lahlaf Geotechnical Consulting, Inc.

PROBE LOG — **Probe P-14 A** — **Page 1 of 1**

Project:	**Proposed Yankee Doodle Bike Path, Billerica, MA (Structure 6) - Bridge No. B-12-027 (C5K)**		
Client:	**Vanasse Hangen Brustlin, Inc.**	LGCI Project No.:	1723
Drilling Subcontractor:	Soil Exploration Corp.	Date Started:	11/17/2017
Drilling Foreman:	Don Leger	Date Completed:	11/17/2017
LGCI Engineer:	Tom Sinnott	Location:	~360 ft. north of Orchard Rd.
Ground Surface El:	~220 ft. (see remark 1)	Total Depth:	19 feet
Groundwater Depth:	~5 ft. based on sample moisture	Drill Rig Type:	Geoprobe 6610DT
		Drilling Method:	Direct Push Probe
Hammer Weight:	140 lbs	Split Spoon Diameter:	NA
Hammer Type:	Percussion	Rock Core Barrel Size:	NA
Drop:	30 inches	Coordinates: E: 717055.2645, N: 3018348.9334	

Depth Scale	Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Strata	Sample Description
	0-5	MC1					60	22	Topsoil ~1.1 ft.	MC1 - Top 13": Silty SAND with Gravel (SM), fine, trace medium, ~15% fines, ~15% fine gravel, trace organic fines, dark brown, moist
5ft									Fill ~5 ft.	Bot 9": Silty SAND with Gravel (SM), fine, ~20% fines, 25-30% fine to coarse angular gravel, tan, moist
	5-10	MC2					60	11	Peat ~12.8 ft.	MC2 - PEAT, fibrous, trace roots
10ft	10-15	MC3					60	44	Silt ~15 ft.	MC3 - Top 32": Similar to S2 Bot 12": Sandy SILT (ML), non-plastic, 30-35% fine sand, gray, wet
15ft	15-19	MC4					48	22	Peat ~19 ft.	MC4 - Similar to S2
20ft										Bottom of probe at 19 feet. Backfilled borehole with soil from the surrounding area.

Remarks:
1. The ground surface elevation was interpolated to the nearest 1/2 foot using a survey plan titled: "Yankee Doodle Pike Bath, Billerica, MA, Boring Locations, page 6 of 6," provided to LGCI by VHB via email on February 9, 2018.
2. Refusal at 19 feet with macro-core sampler advanced with percussion hammer on possible cobbles / boulder.

WATER LEVEL
EL. 215.0
OBS. 11/17/2017

BORING NOTES:

FOR BORING NOTES SEE SHEET 3 OF 45

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR6-BORING).DWG Plotted on 31-Jul-2025 12:36 PM
August-09-2025 Final Structural Submittal (SF)

608227_BR(STR6-BORING).DWG Plotted on 31-Jul-2025 12:36 PM

BORING B–6–5

STATION: 558+59.68
OFFSET: 5.97'
GROUND ELEVATION: 216.5'
N: 3018317.1225
E: 717090.3763

NAVD88 (FT)

EL. 220.0
EL. 210.0
EL. 200.0
EL. 190.0
EL. 180.0
EL. 170.0
EL. 160.0

LGCI Lahlaf Geotechnical Consulting, Inc. — 100 Chelmsford Road, Suite 2, Billerica, MA 01862, Telephone: (978) 330-5912, Fax: (978) 330-5056

BORING LOG — **B-6-5** PAGE 1 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Prop. Yankee Doodle Bike Path (Structure 6)
LGCI PROJECT NUMBER: 1723
PROJECT LOCATION: Billerica, MA - Bridge No. B-12-027 (C5K)

DATE STARTED: 9/1/21 **DATE COMPLETED:** 9/2/21
BORING LOCATION: Near the middle of site along noise barrier
COORDINATES: N 3018317.1225 E 717090.3763
SURFACE EL.: 216.5 ft. (see note 1) **TOTAL DEPTH:** 51 ft.
WEATHER: 60's Rain
GROUNDWATER LEVELS:
▽ **DURING DRILLING:** 18.0 ft. / El. 198.5 ft. Based on sample moisture
▼ **AT END OF DRILLING:** 20.0 ft. / El. 196.5 ft.
▽ **OTHER:** -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Justin Raymond
DRILLING METHOD: Drive and wash with 4" and 3" casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: HO **CHECKED BY:** NP

Depth (ft)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth (ft)	Material Description
		0	S1	3-8-11-11 (19)	24/11		Fill		S1 - Silty SAND with Gravel (SM), fine to medium, 20-25% fines, 15-20% fine to coarse subangular gravel, trace of organic soil, trace of roots, brown, moist
	215.0	2	S2	10-7-5-4 (12)	24/0				S2 - No recovery, drove 3" spoon: Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 25-30% fine to coarse subangular gravel, brown, moist
5		4	S3	7-8-17-13 (25)	24/10				S3 - Silty SAND (SM), fine to medium, trace coarse, 20-25% fines, 10-15% fine subangular gravel, brown, moist
	210.0	6	S4	7-20-26-11 (46)	24/0				S4 - No recovery, drove 3" spoon: Silty SAND with Gravel (SM), fine to coarse, 20-25% fines, 30-35% fine to coarse subangular gravel, brown, moist
		8	S5	10-11-7-2 (18)	24/6				S5 - Similar to S4, ~35% fine to coarse subangular gravel
10		10	S6	5-3-1-0 (4)	24/3				S6 - Poorly Graded GRAVEL with Sand (GP), mostly fine, subangular, 0-5% fines, 20-25% fine to coarse sand, gray, moist
	205.0	12	S7	1-2-0-0 (2)	24/12		Peat	13.0 203.5	S7 - PEAT (PT), fibrous, plastic, 0-5% fine sand, black, moist
15		14	S8	9-13-19-11 (32)	24/10		Swamp Deposits	16.0 200.5	S8 - SILT with Sand (ML), slightly plastic, 15-20% fine sand, gray, moist
	200.0	16	S9	5-6-4-3 (10)	24/7				S9 - SILT with Sand (ML), slightly plastic, 20-25% fine sand, trace fine gravel, trace of organic soil, gray, wet (swamp deposit)
20		18							▽
	195.0	20	S10	16-14-12-11 (26)	24/12				▼ S10 - Sandy SILT (ML), slightly plastic, 30-35% fine sand, gray,wet
		22							
25		24		30-24-15-15			Sand and Gravel	24.0 192.5	S11 - Silty SAND with Gravel (SM), fine to medium, 20-25% fines, 20-25% fine to coarse subangular gravel, gray, wet

GENERAL NOTES:
1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Boring Locations Yankee Doodle Bike Path, Billerica, MA," prepared by Vanasse Hangen Brustlin, Inc. (VHB), and provided to LGCI by VHB via e-mail on June 2, 2021.

BOT. OF PILE CAP PIER 2 EL. 213.50

WATER LEVEL EL. 198.5 OBS. 9/2/2021

BORING B–6–5

STATION: 558+59.68
OFFSET: 5.97'
GROUND ELEVATION: 216.5'
N: 3018317.1225
E: 717090.3763

LGCI Lahlaf Geotechnical Consulting, Inc. — 100 Chelmsford Road, Suite 2, Billerica, MA 01862, Telephone: (978) 330-5912, Fax: (978) 330-5056

BORING LOG — **B-6-5** PAGE 2 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Prop. Yankee Doodle Bike Path (Structure 6)
LGCI PROJECT NUMBER: 1723
PROJECT LOCATION: Billerica, MA - Bridge No. B-12-027 (C5K)

Depth (ft)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth (ft)	Material Description
25	190.0	24	S11	(39)	24/9				
30	185.0	29	S12	26-29-22-21 (51)	24/10				S12 - Silty SAND with Gravel (SM), fine to medium, 20-25% fines, 15-20% fine to coarse subangular gravel, gray, wet
35	180.0	34	S13	23-29-47-55/3" (76)	21/14	1	Sand and Gravel		REMARK 1: Encountered boulder at depth of 31.8'. Inserted 3" casing.
40	175.0	39	S14	100	6/6				S13 - Silty SAND (SM), fine to coarse, ~20% fines, 10-15% fine subangular gravel, gray, wet
45	170.0	41	C1		60/59		Rock	39.5 177.0	S14 - Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 30-35% fine subrounded gravel, gray, wet
50	165.0	46	C2		60/57				C1 - min./ft.: 31, 12.3, 3.7, 4.5, 6.3 Rec./Pen.= 59"/60"=98.6%, RQD=51"/60"=85% Hard to very hard, slighty weathered to fresh, moderately fractured to sound, gray, fine to medium grained, ANDOVER GRANITE
55	160.0	51							C2 - min./ft.: 5, 6.3, 5.7, 5.3, 11.3 Rec./Pen.= 57"/60"=95%, RQD=51"/60"=85% Hard to very hard, slighty weathered to fresh, moderately fractured to sound, gray, fine to medium grained, ANDOVER GRANITE
60								51.0 165.5	Bottom of borehole at 51.0 feet. Backfilled borehole with drill cuttings.

EST. PILE TIP EL. 164.50

BORING NOTES:

FOR BORING NOTES SEE SHEET 3 OF 45

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

August-09-2025 Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	193	231
	PROJECT FILE NO. 608227		

BORING LOGS (5 OF 12)

BORING B–14

STATION: 558+45
OFFSET: +11.8'
GROUND ELEVATION: 220.5'
N: 3018324.9140
E: 717075.7087

NAVD88 (FT)

EL. 230.0
EL. 220.0
EL. 210.0
EL. 200.0
EL. 190.0
EL. 180.0
EL. 170.0
EL. 160.0

LGCI
Lahlaf Geotechnical Consulting, Inc.

BORING LOG — **Boring B-14** **Page 1 of 2**

Project:	**Proposed Yankee Doodle Bike Path, Billerica, MA (Structure 6) - Bridge No. B-12-027 (C5K)**		
Client:	**Vanasse Hangen Brustlin, Inc.**	LGCI Project No.:	1723
Drilling Subcontractor:	Soil Exploration Corp.	Date Started:	11/16/2017
Drilling Foreman:	Don Leger	Date Completed:	11/17/2017
LGCI Engineer:	Tom Sinnott	Location:	~325 ft. north of Orchard Rd.
Ground Surface El:	~220.5 ft. (see remark 1)	Total Depth:	29 feet
Groundwater Depth:	~17.6 ft. at the end of drilling	Drill Rig Type:	Geoprobe 6610DT
		Drilling Method:	3.5" casing driven w/ percussion hammer
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	NA
Drop:	30 inches	Coordinates: E: 717075.7087, N: 3018324.9140	

Depth Scale	Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-2	S1	2	4	7	8	24	9	1	Topsoil ~2 ft.	S1 - Silty SAND (SM), fine, ~20% fines, 5-10% fine gravel, trace organic fines, trace roots, dark brown, moist
	2-4	S2	7	5	5	4	24	8		Fill ~5 ft.	S2 - Silty SAND with Gravel, (SM), fine, trace medium, ~15% fines, 15-20% fine angular gravel, trace organic fines, brown, moist
5ft	5-7	S3	5	8	11	9	24	9		Buried Subsoil ~7 ft.	S3 - Silty SAND (SM), fine, ~25% fines, ~5% fine gravel, trace organic fines, trace roots, tan, moist
	7-8	S4	15	70/6			12	6	2		S4 - Silty SAND with Gravel (SM), fine to medium, ~30% fines, 20-25% fine to coarse angular gravel, possible cobble / boulder, trace organic fines, trace roots, black, wet
10ft	10-12	S5	7	4	8	12	24	8		Swamp Deposits	S5 - Well Graded SAND with Silt & Gravel (SW-SM), fine to medium, ~10% fines, ~15% fine gravel, gray, wet
15ft	15-17	S6	5	5	7	9	24	18		~17 ft.	S6 - Top 9": Silty SAND with Gravel (SM), fine to medium, ~15% fines, 15-20% fine gravel, trace fibrous peat, gray, wet Bot. 9": Silty SAND (SM), fine, 40-45% fines, gray, wet
20ft	20-22	S7	18	14	15	14	24	15		Sand	S7 - Silty SAND (SM), fine, 25-30% fines, trace fine gravel, gray, wet

Remarks:
1. The ground surface elevation was interpolated to the nearest 1/2 foot using a survey plan titled: "Yankee Doodle Pike Bath, Billerica, MA, Boring Locations, page 6 of 6," provided to LGCI by VHB via email on February 9, 2018.
2. Refusal at 8 feet with macro-core sampler advanced with percussion hammer on possible cobbles / boulder. Offset borehole 2 feet to the north of B-14.

WATER LEVEL
EL. 202.9
OBS. 11/17/2017

)T. OF
LE CAP
ER 2
. 213.50

BORING B–14

STATION: 558+45
OFFSET: +11.8'
GROUND ELEVATION: 220.5'
N: 3018324.9140
E: 717075.7087

LGCI
Lahlaf Geotechnical Consulting, Inc.

BORING LOG — **Boring B-14** **Page 2 of 2**

Project:	**Proposed Yankee Doodle Bike Path, Billerica, MA (Structure 6) - Bridge No. B-12-027 (C5K)**		
Client:	**Vanasse Hangen Brustlin, Inc.**	LGCI Project No.:	1723

Depth Scale	Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	25-27	S8	13	13	17	25	24	17	3	Sand ~29 ft.	S8 - Silty SAND (SM), fine, trace coarse, ~25% fines, gray, wet
30 ft											Bottom of boring at 29 feet. Backfilled borehole with soil from the surrounding area.
35 ft											
40 ft											
45 ft											
50 ft											

Remarks:
3. Refusal at 29 feet with macro-core sampler advanced with percussion hammer.

EST. PILE TIP
PIER 2
EL. 164.50

BORING NOTES:

FOR BORING NOTES SEE SHEET 3 OF 45

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR6-BORING).DWG Plotted on 1-Aug-2025 8:13 AM
Final Structural Submittal (SF) August-09-2025

BORING B–15

STATION: 559+17
OFFSET: +12.6'
GROUND ELEVATION: 221.0'
N: 3018269.7644
E: 717123.3598

NAVD88 (FT)

EL. 230.0
EL. 220.0
EL. 210.0
EL. 200.0
EL. 190.0
EL. 180.0
EL. 170.0
EL. 160.0

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG — **Boring B-15 Page 1 of 2**

Project:	**Proposed Yankee Doodle Bike Path, Billerica, MA (Structure 6) - Bridge No. B-12-027 (C5K)**		
Client:	**Vanasse Hangen Brustlin, Inc.**	LGCI Project No.:	1723
Drilling Subcontractor:	Soil Exploration Corp.	Date Started:	11/16/2017
Drilling Foreman:	Don Leger	Date Completed:	11/16/2017
LGCI Engineer:	Tom Sinnott	Location:	~250 ft. north of Orchard Rd.
Ground Surface El:	~221 ft. (see remark 1)	Total Depth:	34 feet
Groundwater Depth:	~13.6 at end of drilling	Drill Rig Type:	Geoprobe 6610DT
		Drilling Method:	3.5" casing driven w/ percussion hammer
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	NA
Drop:	30 inches	Coordinates: E: 717123.3598, N: 3018269.7644	

Depth Scale	Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-2	S1	1	2	4	7	24	6		Topsoil ~2 ft.	S1 - Silty SAND with Gravel (SM), fine, ~15% fines, 25-30% fine to coarse angular gravel, trace organic fines, trace roots, dark brown to gray, moist
	2-4	S2	11	9	7	7	24	8		2 Fill	S2 - Silty SAND with Gravel (SM), fine, trace coarse, ~20% fines,~20% fine gravel, brown, moist
5ft											
	5-7	S3	12	24	37	37	24	8			S3 - Poorly Graded Gravel with Silt and Sand (GP-GM), fine to coarse, angular, ~10% fines, ~45% fine to coarse sand, brown, moist
	7-9	S4	22	7	18	11	24	5			S4 - Silty SAND with Gravel (SM), fine, 15-20% fines, ~15% fine to coarse angular gravel, angular stone fragments, brown, moist
10ft											
	10-10.3	S5	100/3				3	2		3 ~13.5 ft.	S5 - Silty SAND (SM), fine, 25-30% fines, gray, wet
	10-15	MC1					60	24			MC1 - Top 11": Poorly Graded SAND with Gravel (SP), fine, trace medium, ~5% fines, 25-30% fine gravel, light brown, moist Mid 7": Silty SAND (SM), fine, ~25% fines, ~5% fine gravel, brown, wet Bot 6": PEAT, fibrous, ~15% fine sand, trace fine gravel
15ft											
	15-17	S6	2	4	4	4	24	8		Peat	S6 - Top 6": PEAT, non-fibrous, trace roots Bot 2": Silty Gravel (GM), fine, ~15% fines, ~30% fine to medium sand, brown, wet
20ft											
	20-22	S7	15	6	WOH	WOH	24	24		~25 ft.	S7 - PEAT, non-fibrous, trace roots

Remarks:
1. The ground surface elevation was interpolated to the nearest 1/2 foot using a survey plan titled: "Yankee Doodle Pike Bath, Billerica, MA, Boring Locations, page 6 of 6," provided to LGCI by VHB via email on February 9, 2018.
2. Refusal at 4 feet with macro-core sampler advanced with percussion hammer on possible cobbles / boulder. Offset borehole 2 feet to the north of B-15.
3. Drill chattered at 11 feet.

DT. OF
LE CAP
ER 3
.. 213.00

WATER LEVEL
EL. 207.4
OBS. 11/16/2017

BORING B–15

STATION: 559+17
OFFSET: +12.6'
GROUND ELEVATION: 221.0'
N: 3018269.7644
E: 717123.3598

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG — **Boring B-15 Page 2 of 2**

Project:	**Proposed Yankee Doodle Bike Path, Billerica, MA (Structure 6) - Bridge No. B-12-027 (C5K)**		
Client:	**Vanasse Hangen Brustlin, Inc.**	LGCI Project No.:	1723

Depth Scale	Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	25-27	S8	5	8	5	7	24	20		Sand	S8 - Silty SAND (SM), fine, trace medium, ~35% fines, trace fine gravel, gray, wet
30 ft											
	30-32	S9	WOH	WOH	10	26	24	15			S9 - Top 11": Well Graded SAND (SW), fine to coarse, ~5% fines, gray, wet Bot 4": Silty SAND (SM), fine, trace medium, ~25% fine, ~10% fine gravel, gray, wet
35 ft									4	~34 ft.	
											Bottom of boring at 34 feet. Backfilled borehole with soil from the surrounding area.
40 ft											
45 ft											
50 ft											

Remarks:
4. Refusal at 34 feet with macro-core sampler advanced with percussion hammer.

EST. PILE TIP
EL. 160.50

BORING NOTES:

FOR BORING NOTES SEE SHEET 3 OF 45

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR6-BORING).DWG Plotted on 31-Jul-2025 12:36 PM
August-09-2025
Final Structural Submittal (SF)

BORING B-6-4

STATION: 559+62.09
OFFSET: 11.91'
GROUND ELEVATION: 216.5'
N: 3018236.478

NAVD88 (FT)

EL. 220.0
EL. 210.0
EL. 200.0
EL. 190.0
EL. 180.0
EL. 170.0
EL. 160.0

LGCI Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Road, Suite 2
Billerica, MA 01862
Telephone: (978) 330-5912
Fax: (978) 330-5056

BORING LOG **B-6-4** PAGE 1 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Prop. Yankee Doodle Bike Path (Structure 6)
LGCI PROJECT NUMBER: 1723
PROJECT LOCATION: Billerica, MA - Bridge No. B-12-027 (C5K)

DATE STARTED: 8/25/21 **DATE COMPLETED:** 8/27/21
BORING LOCATION: Near the middle of site along noise barrier
COORDINATES: N 3018236.478 E 717153.7982
SURFACE EI.: 216.5 ft. (see note 1) **TOTAL DEPTH:** 55 ft.
WEATHER: 70's Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 11.5 ft. / El. 205.0 ft. Based on sample moisture
AT END OF DRILLING: -
OTHER: 7.0 ft. / El. 209.5 ft. After three days of drilling

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Justin Raymond
DRILLING METHOD: Drive and wash with 4" and 3" casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NX
LOGGED BY: HO **CHECKED BY:** NP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth (ft.)	Material Description
0		0							
	215.0	2	S1	3-10-9-10 (19)	24/10				S1 - Silty SAND (SM), fine to coarse, ~20% fines, 10-15% fine to coarse subangular gravel, trace of organic soil, trace of asphalt, brown, moist
			S2	9-9-5-7 (14)	24/16				S2 - Poorly Graded SAND with Silt (SP-SM), fine to medium, 10-15% fines, light brown, moist
5		4 5	S3	11-89	12/4				S3 - Silty SAND (SM), fine to coarse, 15-20% fines, 0-5% fine subangular gravel, brown, moist
	210.0	6 8	S4	70-28-32-1 (60)	24/4	1	Fill		S4 - Silty SAND (SM), fine to coarse, 15-20% fines, 0-5% fine subangular gravel, brown, moist REMARK 1: The casing dropped from depth of 7' to 9.5'.
10		9.5	S5	21-35-32-34 (67)	24/8				S5 - Silty SAND (SM), fine to coarse, 15-20% fines, 0-5% fine subangular gravel, brown, moist
	205.0	11.5 13.5	S6	22-16-7-13 (23)	24/8				S6 - Well Graded SAND with Silt (SW-SM), fine to coarse, 10-15% fines, 0-5% fine subangular gravel, brown, wet
15		14	S7	12-13-6-7 (19)	24/3			14.0 202.5	S7 - Silty SAND with Gravel (SM), fine to coarse, 30-35% organic fines, 35-40% fine to coarse angular gravel, black, wet (buried organic soil)
	200.0	16	S8	6-11-9-9 (20)	24/7				S8 - Silty SAND with Gravel (SM), fine to coarse, 30-35% organic fines, 35-40% fine to coarse angular gravel, trace of slightly fibrous PEAT, black, wet
		18	S9	18-3-2-2 (5)	24/6	2	Swamp Deposits		REMARK 2: Encountered an obstruction at depth of 17.3' on possible cobbles or boulder. Casing out of alignment. Offset the borehole 7' north. S9 - Silty SAND with Gravel (SM), fine to medium, ~30% fines, ~20% fine gravel, trace peat, black, wet
20		20	S10	38-27-8-9 (35)	24/6				S10 - SILT (ML), slightly plastic, ~10% fine sand, trace fine gravel, trace of organic soil, black, wet
	195.0	22	S11	14-12-12-10 (24)	24/22			21.0 195.5	S11 - Silty SAND (SM), fine to medium, 15-20% fines, 0-5% fine to coarse subangular gravel, gray, wet
25		24		13-9-9-6			Sand and Gravel		S12 - No recovery, drove 3" spoon: Silty SAND (SM), fine to medium, 20-25% fines, 10-15% fine to coarse

GENERAL NOTES:
1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Boring Locations Yankee Doodle Bike Path, Billerica, MA," prepared by Vanasse Hangen Brustlin, Inc. (VHB), and provided to LGCI by VHB via e-mail on June 2, 2021.

BOT. OF PILE CAP PIER 3 EL. 213.00

WATER LEVEL EL. 205.0 OBS. 8/27/2021

BORING B-6-4

STATION: 559+62.09
OFFSET: 11.91'
GROUND ELEVATION: 216.5'
N: 3018236.478
E: 717153.7982

LGCI Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Road, Suite 2
Billerica, MA 01862
Telephone: (978) 330-5912
Fax: (978) 330-5056

BORING LOG **B-6-4** PAGE 2 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Prop. Yankee Doodle Bike Path (Structure 6)
LGCI PROJECT NUMBER: 1723
PROJECT LOCATION: Billerica, MA - Bridge No. B-12-027 (C5K)

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth (ft.)	Material Description
		24	S12	(18)	24/0				subangular gravel, gray, wet
	190.0	26							
30		29	S13	26-53-55-61 (108)	24/17				S13 - Silty SAND (SM), fine to medium, ~20% fines, 5-10% fine subrounded gravel, gray, wet
	185.0	31							
35		34	S14	12-63-42/3" (105/9")	15/10				S14 - Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 35-40% fine to coarse subangular gravel, gray, moist
		35.3				3	Sand and Gravel		REMARK 3: Switched to 3" casing at depth of 35.3' due to obstruction.
	180.0								
40		39	S15	22-42-70/3" (112/9")	15/11				S15 - SILT (ML), non plastic, ~10% fine sand, gray, wet
	175.0	40.3							
45		44	S16	70/3"	3/2	4		46.1 170.4	S16 - Silty SAND (SM), fine to coarse, 15-20% fines, 10-15% fine to coarse subangular gravel, gray, moist REMARK 4: Split spoon bouncing at depth of 44.2'.
	170.0	44.3 45	C1		60/57				C1 - min./ft.: 3.8, 3.2, 3.8, 5.4, 5.8 Rec./Pen.= 57"/60"=95%, RQD=50"/60"=83.3% Hard to very hard, slightly weathered to fresh, moderately fractured to sound, gray, fine to medium grained, ANDOVER GRANITE
50		50					Rock		C2 - min./ft.: 3.8, 2.7, 2.4, 2.1, 4.4 Rec./Pen.= 50"/60"=83.3%, RQD=17.5"/60"=29.2% Soft to hard, slightly to moderately weathered locally, severely weathered near middle of core, extremely fractured to slightly fractured, gray fo dark gray, fine to medium grained, ANDOVER GRANITE
	165.0		C2		60/56				
55		55						55.0 161.5	Bottom of borehole at 55.0 feet. Backfilled borehole with drill cuttings.
	160.0								
60									

EST. PILE TIP EL. 160.50

BORING NOTES:

FOR BORING NOTES SEE SHEET 3 OF 45

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	195	231
	PROJECT FILE NO. 608227		

BORING LOGS (7 OF 12)

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR6-BORING).DWG Plotted on 31-Jul-2025 12:36 PM
August-09-2025 Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	196	231
	PROJECT FILE NO. 608227		

BORING LOGS (8 OF 12)

NAVD88 (FT)

EL. 230.0
EL. 220.0
EL. 210.0
EL. 200.0
EL. 190.0
EL. 180.0
EL. 170.0
EL. 160.0

PROBE P-16A

STATION: 559+55
OFFSET: +13.6'
GROUND ELEVATION: 221.0'

LGCI Lahlaf Geotechnical Consulting, Inc.

PROBE LOG — **Probe P-16 A** — **Page 1 of 1**

Project:	**Proposed Yankee Doodle Bike Path, Billerica, MA (Structure 6) - Bridge No. B-12-027 (C5K)**		
Client:	**Vanasse Hangen Brustlin, Inc.**		LGCI Project No.: 1723
Drilling Subcontractor:	Soil Exploration Corp.	Date Started:	11/16/2017
Drilling Foreman:	Don Leger	Date Completed:	11/16/2017
LGCI Engineer:	Tom Sinnott	Location:	~210 feet north of Orchard Rd.
Ground Surface El:	~221 ft. (see remark 1)	Total Depth:	15 feet
Groundwater Depth:	~5.7 ft. based on sample moisture	Drill Rig Type:	Geoprobe 6610DT
		Drilling Method:	Direct Push Probe
Hammer Weight:	140 lbs	Split Spoon Diameter:	NA
Hammer Type:	Percussion	Rock Core Barrel Size:	NA
Drop:	30 inches	Coordinates: E: 717148.1679, N: 3018152.0026	

Depth Scale	Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-5	MC1					60	0			MC1 - No Recovery
5ft											
	5-10	MC2					60	13		Fill	MC2 - Top 8": Well Graded SAND with Silt (SW-SM), fine to medium, 5-10% fines, 5-10% fine gravel, brown, moist Bot 5": Silty SAND (SM), fine, trace medium, 30-35% fines, trace organic fines, peat fibers, dark gray to black, wet
10ft											
	10-14	MC3					48	24		~13.5 ft.	MC3 - Top 6": Silty SAND (SM), fine, 15-20% fines, trace fine gravel, gray, wet Mid 12": Fine angular stone fragments
										Peat	Bot 6": PEAT, fibrous, 5-10% fine to medium sand, trace roots
15ft									2	~15 ft.	
											Bottom of probe at 15 feet. Backfilled borehole with soil from the surrounding area.
20ft											

Remarks:
1. The ground surface elevation was interpolated to the nearest 1/2 foot using a survey plan titled: "Yankee Doodle Pike Bath, Billerica, MA, Boring Locations, page 6 of 6," provided to LGCI by VHB via email on February 9, 2018.
2. Refusal on possible cobbles / boulder at 15 feet with macro-core sampler advanced with percussion hammer.

WATER LEVEL
EL. 215.3
OBS. 11/16/2017

BOT. OF
PILE CAP
PIER 3
EL. 213.00

EST. PILE TIP
EL. 160.50

BORING B-16

STATION: 559+89
OFFSET: +13.1'
GROUND ELEVATION: 220.0'

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG — **Boring B-16** — **Page 1 of 1**

Project:	**Proposed Yankee Doodle Bike Path, Billerica, MA (Structure 6) - Bridge No. B-12-027 (C5K)**		
Client:	**Vanasse Hangen Brustlin, Inc.**		LGCI Project No.: 1723
Drilling Subcontractor:	Soil Exploration Corp.	Date Started:	11/16/2017
Drilling Foreman:	Don Leger	Date Completed:	11/16/2017
LGCI Engineer:	Tom Sinnott	Location:	~180 ft. north of Orchard Rd.
Ground Surface El:	~220 ft. (see remark 1)	Total Depth:	18 feet
Groundwater Depth:	~13 ft. at end of drilling	Drill Rig Type:	Geoprobe 6610DT
		Drilling Method:	3.5" casing driven w/ percussion hammer
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	NA
Drop:	30 inches	Coordinates: E: 717170.9524, N: 3018215.3711	

Depth Scale	Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-2	S1	1	5	6	10	24	6		Topsoil ~2 ft.	S1 - Silty SAND (SM), fine, trace medium, ~15% fines, ~10% fine gravel, trace organic fines, trace roots, dark brown, moist
	2-4	S2	7	7	6	4	24	0			S2 - No Recovery
5ft											
	5-7	S3	6	8	6	5	24	9		Fill ~10 ft.	S3 - Silty SAND with Gravel (SM), fine, ~20% fines, ~10% fine gravel, trace roots, brown, moist
	7-9	S4	4	5	3	4	24	15			S4 - Similar to S3, trace asphalt
10ft											
	10-12	S5	9	8	60	53	24	6		Swamp Deposits ~15.3 ft.	S5 - Top 4": Silty SAND (SM), fine, trace medium, 30-35% organic fines, 15-20% fine to coarse angular gravel, thin layer (1/4") of plastic organic silt, dark brown, wet Bot. 2": Silty GRAVEL (GM), fine, ~15% fines, light brown, wet
15ft											
	15-17	S6	17	16	23	30	24	12	2	Silty Sand ~18 ft.	S6 - Top 4": Silty SAND (SM), fine, 30-35% fines, 5-10% fine to coarse angular gravel, trace fibrous peat, gray, wet Bot. 8": Silty SAND (SM), fine, ~15% fines, light brown to tan, wet
20ft											Bottom of boring at 18 feet. Backfilled borehole with soil from the surrounding area.

Remarks:
1. The ground surface elevation was interpolated to the nearest 1/2 foot using a survey plan titled: "Yankee Doodle Pike Bath, Billerica, MA, Boring Locations, page 6 of 6," provided to LGCI by VHB via email on February 9, 2018.
2. Refusal at 18 feet with macro-core sampler advanced with percussion hammer. Offset borehole 2 feet to the north of B-16 then drove probe rod without sampling to refusal at 14 feet on possible cobbles / boulder.

BOT. OF
PILE CAP
PIER 4
EL. 215.00

WATER LEVEL
EL. 207.0
OBS. 11/16/2017

EST. PILE TIP
EL. 178.00

BORING NOTES:

FOR BORING NOTES SEE SHEET 3 OF 45

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR6-BORING).DWG Plotted on 1-Aug-2025 8:13 AM
August-09-2025 Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	197	231
	PROJECT FILE NO. 608227		

BORING LOGS (9 OF 12)

BORING B–6–3

STATION: 560+33.01
OFFSET: 7.61'
GROUND ELEVATION: 217.0'
N: 3018186.2788

NAVD88 (FT)

EL. 230.0
EL. 220.0
EL. 210.0
EL. 200.0
EL. 190.0
EL. 180.0
EL. 170.0
EL. 160.0

LGCI Lahlaf Geotechnical Consulting, Inc. — 100 Chelmsford Road, Suite 2, Billerica, MA 01862, Telephone: (978) 330-5912, Fax: (978) 330-5056

BORING LOG B-6-3 PAGE 1 OF 3

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Prop. Yankee Doodle Bike Path (Structure 6)
LGCI PROJECT NUMBER: 1723
PROJECT LOCATION: Billerica, MA - Bridge No. B-12-027 (C5K)

DATE STARTED: 9/2/21 **DATE COMPLETED:** 9/8/21
BORING LOCATION: Near southern side of site along noise barrier
COORDINATES: N 3018186.2788 E 717206.0541
SURFACE EL.: 217 ft. (see note 1) **TOTAL DEPTH:** 94.1 ft.
WEATHER: 60's Partly Cloudy
GROUNDWATER LEVELS:
▽ **DURING DRILLING:** 7.0 ft. / El. 210.0 ft. Based on sample moisture
▼ **AT END OF DRILLING:** 3.5 ft. / El. 213.5 ft.
▼ **OTHER:** 8.5 ft. / El. 208.5 ft. After one day of drilling

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Justin Raymond
DRILLING METHOD: Drive and wash with 4" and 3" casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: HO **CHECKED BY:** NP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth (ft.)	Material Description
	215.0	0	S1	2-2-6-6 (8)	24/12		Fill		S1 - Silty SAND with Gravel (SM), fine to coarse, 20-25% fines, 20-25% fine to coarse subangular gravel, trace of organic soil, trace of roots, brown, moist
		2	S2	8-7-6-4 (13)	24/9				S2 - Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 20-25% fine to coarse subrounded to subangular gravel, trace of asphalt, brown to black, moist
5		4	S3	5-3-5-6 (8)	24/11				S3 - Silty SAND (SM), fine to medium, 15-20% fines, trace of organic soil, trace of roots, brown, moist
	210.0	6	S4	11-8-4-5 (12)	24/15				S4 - No recovery, drove 3" spoon: Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 30-35% fine to coarse subangular gravel, brown, wet
		8	S5	10-8-8-10 (16)	24/12	1			S5 - Silty SAND (SM), fine to coarse, ~15% fines, 5-10% fine subrounded gravel, gray, wet REMARK 1: Casing out of alignment at 9'. Moved the boring 1 foot north and started over.
10		10	S6	10-10-8-6 (18)	24/6		Swamp Deposits	10.0 207.0	S6 - Silty SAND with Gravel (SM), fine to medium, ~20% fines, 15-20% fine to coarse subangular gravel, brown, wet (swamp deposit)
	205.0	12	S7	6-5-4-5 (9)	24/7				S7 - Silty SAND with Gravel (SM), fine to medium, 20-25% fines, 20-25% fine to coarse subangular gravel, brown, wet (swamp deposit)
15		14	S8	15-16-18-18 (34)	24/15		Sand and Gravel	14.0 203.0	S8 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, 10-15% fines,~15% fine to coarse subangular gravel, gray, wet
	200.0	16	S9	17-29-39-46 (68)	24/20				S9 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, 10-15% fines, 15-20% fine to coarse subangular gravel, gray, wet
		18							
20		19	S10	14-16-15-14 (31)	24/13				S10 - Similar to S9
	195.0	21							
25		24		17-11-12-10					S11 - Silty SAND (SM), fine to coarse, ~15% fines, 10-15% fine to coarse subangular gravel, gray, wet

GENERAL NOTES:
1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Boring Locations Yankee Doodle Bike Path, Billerica, MA," prepared by Vanasse Hangen Brustlin, Inc. (VHB), and provided to LGCI by VHB via e-mail on June 2, 2021.

BOT. OF PILE CAP PIER 4 EL. 215.00

WATER LEVEL EL. 210.0 OBS. 9/8/2021

BORING B–6–3

STATION: 560+33.01
OFFSET: 7.61'
GROUND ELEVATION: 217.0'
N: 3018186.2788
E: 717206.0541

LGCI Lahlaf Geotechnical Consulting, Inc. — 100 Chelmsford Road, Suite 2, Billerica, MA 01862, Telephone: (978) 330-5912, Fax: (978) 330-5056

BORING LOG B-6-3 PAGE 2 OF 3

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Prop. Yankee Doodle Bike Path (Structure 6)
LGCI PROJECT NUMBER: 1723
PROJECT LOCATION: Billerica, MA - Bridge No. B-12-027 (C5K)

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth (ft.)	Material Description
25		24	S11	(23)	24/8		Sand and Gravel		S11 - Silty SAND (SM), fine to coarse, ~15% fines, 10-15% fine to coarse subangular gravel, gray, wet
	190.0	26							
30		29	S12	22-23-31-59/3" (54)	21/18				S12 - Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 20-25% fine to coarse subangular gravel, gray, wet
	185.0	30.8							
35		34	S13	10-11-20-16 (31)	24/13				S13 - Silty SAND (SM), fine to medium, 15-20% fines, gray, wet
	180.0	36				2			REMARK 2: Switched to 3" casing at depth of 37' due to cobbles or boulder.
40		39	S14	31-29-27-29 (56)	24/14				S14 - Silty SAND (SM), fine to medium, 20-25% fines, gray, wet
	175.0	41							
45		44	S15	20-20-80 (100)	18/12				S15 - Silty SAND (SM), fine to coarse, 15-20% fines, 0-5% fine subrounded gravel, gray, wet
	170.0	45.5						45.5 171.5	
50		49	S16	5-10-13-23 (23)	24/9		Weathered Rock		S16 - Very soft, severely weathered rock, (breaks into a bright gray SILT with Sand matrix (ML), slightly plastic, 20-25% fine sand, wet
	165.0	51							
55		54	S17	44-60/3" (60/3")	9/8				S17 - Similar to S16
	160.0	54.8							
60		59	S18	18-30-42-60 (72)	24/18				S18 - Similar to S16

EST. PILE TIP EL. 178.00

NAVD88 (FT)

EL. 160.0
EL. 150.0
EL. 140.0
EL. 130.0
EL. 120.0

BORING B–6–3

STATION: 560+33.01
OFFSET: 7.61'
GROUND ELEVATION: 217.0'
N: 3018186.2788
E: 717206.0541

LGCI Lahlaf Geotechnical Consulting, Inc. — 100 Chelmsford Road, Suite 2, Billerica, MA 01862, Telephone: (978) 330-5912, Fax: (978) 330-5056

BORING LOG B-6-3 PAGE 3 OF 3

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Prop. Yankee Doodle Bike Path (Structure 6)
LGCI PROJECT NUMBER: 1723
PROJECT LOCATION: Billerica, MA - Bridge No. B-12-027 (C5K)

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth (ft.)	Material Description
	155.0	64	S19	15-22-78/3" (100/9")	15/9		Weathered Rock		S19 - Similar to S16
65		65.3							
	150.0	69	S20	29-42-52-48 (94)	24/13	3			REMARK 3: Started drilling open hole at 69'. S20 - Similar to S16
70		71							
	145.0	74	S21	20-38-100/5" (138/11")	17/17	4			S21 - Very soft, severely weathered rock, (breaks into a bright gray SILT with Sand matrix (ML), slightly plastic, 25-30% fine sand, wet REMARK 4: Used 140 lb to pull sample.
75		75.4							
	140.0	79	S22	39-70-30/3" (100/9")	15/15	5			S22 - Similar to S21 REMARK 5: Used 140 lb to pull sample.
80		80.3							
	135.0	84	S23	41-60/4" (60/4")	10/10				S23 - Similar to S21
85		84.8							
	130.0	89	S24	100/1"	1/1				S24 - Similar to S21
90		89.1							
	125.0	94	S25	100/1"	1/1			94.1 122.9	S25 - Similar to S21 Bottom of borehole at 94.1 feet. Backfilled borehole with drill cuttings.
95									

BORING NOTES:

FOR BORING NOTES SEE SHEET 3 OF 45

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

BORING B–17

STATION: 560+84
OFFSET: +11.6'

NAVD88 (FT)

EL. 230.0
EL. 220.0
EL. 210.0
EL. 200.0
EL. 190.0
EL. 180.0
EL. 170.0

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG — **Boring B-17** **Page 1 of 2**

Project:	**Proposed Yankee Doodle Bike Path, Billerica, MA (Structure 6) - Bridge No. B-12-027 (C5K)**		
Client:	**Vanasse Hangen Brustlin, Inc.**		LGCI Project No.: 1723
Drilling Subcontractor:	Soil Exploration Corp.	Date Started:	11/15/2017
Drilling Foreman:	Don Leger	Date Completed:	11/16/2017
LGCI Engineer:	Tom Sinnott	Location:	~85 ft. north of Orchard Rd.
Ground Surface El:	~223.5 ft. (see remark 1)	Total Depth:	28 feet
Groundwater Depth:	~11.6 ft. at end of drilling	Drill Rig Type:	Geoprobe 6610DT
		Drilling Method:	3.5" casing driven w/ percussion hammer
Hammer Weight:	140 lbs	Split Spoon Diameter:	ID - 1.375", OD - 2"
Hammer Type:	Automatic	Rock Core Barrel Size:	NA
Drop:	30 inches	Coordinates: E: 717243.6028, N: 3018152.0026	

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
	0-2	S1	3	5	4	3	24	8		Topsoil ~2.6 ft.	S1 - Silty SAND (SM), fine, ~20% fines, trace fine gravel, trace organic fines, trace roots, leaves, dark brown, moist
	2-4	S2	3	11	51	24	24	15			S2 - Top 7": Similar to S1
5ft	5-7	S3	5	2	3	2	24	14		Fill ~9.9 ft.	Mid 5": Silty SAND (SM), fine, ~15% fines, trace fine gravel, trace organic fines, brown, moist Bot 3": Fine to coarse angular stone fragments S3 - Top 9": Silty SAND (SM), fine, ~15% fines, trace organic fines, brown to gray, moist
	7-9	S4	1	3	5	7	24	14		Peat ~2 ft.	Bot 5": PEAT, fibrous
10ft	9.5-11.5	S5	48	51	37	52	24	17		Swamp	S4 - Top 6": SILT (ML), moderately plastic, ~5% fine sand, trace roots, trace fibrous peat, dark brown, wet Mid 2": Silty SAND (SM), fine, 20-25% fines, trace fine gravel, trace organic fines, trace roots, dark brown to orange, wet Bot 6": Silty SAND (SM), fine, 35-40% fines, trace roots, gray, wet S5 - Silty SAND (SM), fine, trace medium, ~15% fines, light brown, wet
15ft	15-17	S6	16	19	20	25	24	24		Silty Sand	S6 - Top 9": Well Graded SAND with Silt (SW-SM), fine to medium, trace coarse, 10-15% fines, trace fine gravel, brown, wet Bot. 15": Silty SAND (SM), fine, 15-20% fines, ~5% fine gravel, gray to brown, wet
20ft	20-22	S7	15	15	34	35	24	23			S7 - Silty SAND (SM), fine to medium, ~20% fines, ~5% fine gravel, gray with brown to orange bands, wet

Remarks:
1. The ground surface elevation was interpolated to the nearest 1/2 foot using a survey plan titled: "Yankee Doodle Pike Bath, Billerica, MA, Boring Locations, page 6 of 6," provided to LGCI by VHB via email on February 9, 2018.

BOT. OF PILE CAP PIER 5 EL. 217.00

WATER LEVEL EL. 211.9 OBS. 11/16/2017

BORING B–17

STATION: 560+84
OFFSET: +11.6'
GROUND ELEVATION: 223.5'
N: 3018152.0026
E: 717243.6028

LGCI Lahlaf Geotechnical Consulting, Inc.

BORING LOG — **Boring B-17** **Page 2 of 2**

Project:	**Proposed Yankee Doodle Bike Path, Billerica, MA (Structure 6) - Bridge No. B-12-027 (C5K)**		
Client:	**Vanasse Hangen Brustlin, Inc.**		LGCI Project No.: 1723

Depth Scale	Sample Depth (ft)	Sample No	Blows per 6 inches 0-6	6-12	12-18	18-24	Pen (in)	Rec (in)	Remarks	Strata	Sample Description
30 ft	25-25.5	S8	75/6				6	6	2 3	Sand ~28 ft.	S8 - Well Graded SAND with Silt (SW-SM), fine to coarse, ~10% fines, trace fine gravel, tan, wet Bottom of boring at 28 feet. Backfilled borehole with soil from the surrounding area.
35 ft											
40 ft											
45 ft											
50 ft											

Remarks:
2. Heavy drill chatter at 26.5 feet.
3. Refusal at 28 feet with macro-core sampler advanced with percussion hammer.

EST. PILE TIP EL. 173.00

BORING NOTES:

FOR BORING NOTES SEE SHEET 3 OF 45

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR6-BORING).DWG Plotted on 1-Aug-2025 8:13 AM
August-09-2025
Final Structural Submittal (SF)

BORING B–6–2

STATION: 560+88.76
OFFSET: 4.60'
GROUND ELEVATION: 220.0'

NAVD88 (FT)

EL. 230.0
EL. 220.0
EL. 210.0
EL. 200.0
EL. 190.0
EL. 180.0
EL. 170.0

LGCI Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Road, Suite 2
Billerica, MA 01862
Telephone: (978) 330-5912
Fax: (978) 330-5056

BORING LOG **B-6-2** PAGE 1 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Prop. Yankee Doodle Bike Path (Structure 6)
LGCI PROJECT NUMBER: 1723
PROJECT LOCATION: Billerica, MA - Bridge No. B-12-027 (C5K)

DATE STARTED: 8/24/21 **DATE COMPLETED:** 8/25/21
BORING LOCATION: Near southern side of site along noise barrier
COORDINATES: N 3018154.447 E 717251.9241
SURFACE El.: 220 ft. (see note 1) **TOTAL DEPTH:** 46 ft.
WEATHER: 70's Scattered showers
GROUNDWATER LEVELS:
DURING DRILLING: 10.0 ft. / El. 210.0 ft. Based on sample moisture
AT END OF DRILLING: 7.5 ft. / El. 212.5 ft.
OTHER: 9.5 ft. / El. 210.5 ft. At the start of 8/25/21

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Justin Raymond
DRILLING METHOD: Drive and wash with 4" and 3" casing
DRILL RIG TYPE/MODEL: Diedrich D-25 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NX
LOGGED BY: HO **CHECKED BY:** NP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth (ft.)	Material Description
0		0	S1	4-7-12-9 (19)	24/15		Fill		S1 - Silty SAND (SM), fine to medium, 15-20% fines, 5-10% coarse angular gravel, trace of organic soil, brown, moist
		2	S2	15-8-20-25 (28)	24/5				S2 - Silty SAND (SM), fine to coarse, 25-30% fines, 0-5% fine subrounded gravel, trace of organic soil, dark brown, moist
5	215.0	4	S3	12-8-6-4 (14)	24/0				S3 - No recovery, drove 3" spoon: Silty SAND with Gravel (SM), fine to medium, trace coarse, 20-25% fines, 30-35% fine to coarse subangular gravel, brown, moist
		6	S4	3-1-4-13 (5)	24/8		Swamp Deposits	6.0 214.0	S4 - Silty SAND (SM), fine to medium, trace coarse, 25-30% fines, 0-5% fine subrounded gravel, trace of organic soil, brown, moist (swamp deposit)
10	210.0	8						10.0 ▼ 210.0	
		10	S5	3-2-17-30/2" (19)	20/14		Sand and Gravel		S5 - Silty SAND (SM), fine to medium, trace coarse, 20-25% fines, 5-10% fine subrounded gravel, brown, wet
		11.7				1			REMARK 1: Split spoon bouncing at depth of 11.7' on possible cobbles.
15	205.0	14	S6	19-16-15-13 (31)	24/11				S6 - Silty SAND (SM), fine to medium, trace coarse, 20-25% fines, 5-10% fine to coarse subrounded gravel, light brown, wet
		16							
		19	S7	21-22-24-14 (46)	24/9				S7 - Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 15-20% fine to coarse subrounded gravel, brown, wet
20	200.0	21							
		24	S8	35-95	12/9	2			REMARK 2: Switched from 4" to 3" casing at depth of 23' due to obstruction.
25	195.0								S8 - Silty SAND (SM), fine to medium, ~15% fines, 5-10% fine gravel, gray, wet

GENERAL NOTES:
1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Boring Locations Yankee Doodle Bike Path, Billerica, MA," prepared by Vanasse Hangen Brustlin, Inc. (VHB), and provided to LGCI by VHB via e-mail on June 2, 2021.

BOT. OF PILE CAP PIER 5 EL. 217.00

WATER LEVEL EL. 210.0 OBS. 8/25/2021

BORING B–6–2

STATION: 560+88.76
OFFSET: 4.60'
GROUND ELEVATION: 220.0'
N: 3018154.447
E: 717251.9241

LGCI Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Road, Suite 2
Billerica, MA 01862
Telephone: (978) 330-5912
Fax: (978) 330-5056

BORING LOG **B-6-2** PAGE 2 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Prop. Yankee Doodle Bike Path (Structure 6)
LGCI PROJECT NUMBER: 1723
PROJECT LOCATION: Billerica, MA - Bridge No. B-12-027 (C5K)

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth (ft.)	Material Description
25		25							
		29.4	S9	100/5"	5/5		Sand and Gravel		S9 - Silty SAND with Gravel (SM), fine to medium, ~15% fines, 15-20% fine to coarse subrounded gravel, gray, wet
30	190.0								
		34.4	S10	100/5"	5/5			34.6 185.6	S10 - Silty SAND (SM), fine to medium, ~15% fines, trace coarse gravel, gray, wet
35	185.0	36	C1		60/56	3	Rock		C1 - min./ft.: 3, 5, 5.5, 5, 4.5 Rec./Pen.= 56"/60"=93.3%, RQD=51.5"/60"=85.8% Hard to very hard, moderately weathered to fresh, moderately fractured to sound, gray, fine to medium grained, ANDOVER GRANITE
40	180.0	41							REMARK 3: Rock core barrel jammed at depth of 39.5'
45	175.0	46	C2		60/56				C2 - min./ft.: 5.5, 5.9, 10.4, 10.1, 18.5 Rec./Pen.= 56"/60"=93.3%, RQD=53.5"/60"=89.2% Hard to very hard, slighty weathered to fresh, moderately fractured to sound, gray, fine to medium grained, ANDOVER GRANITE
50	170.0							50.0 170.0	Bottom of borehole at 46.0 feet. Backfilled borehole with drill cuttings.
55	165.0								
60	160.0								

EST. PILE TIP EL. 173.00

BORING NOTES:

FOR BORING NOTES SEE SHEET 3 OF 45

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STRB-BORING).DWG Plotted on 31-Jul-2025 12:36 PM
Final Structural Submittal (SF) August-09-2025

BORING B–6–1

STATION: 561+79.52
OFFSET: 26.49'
GROUND ELEVATION: 250.0'
N: 3018132.1535

NAVD88 (FT)

EL. 260.0
EL. 250.0
EL. 240.0
EL. 230.0
EL. 220.0
EL. 210.0
EL. 200.0
EL. 190.0

LGCI Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Road, Suite 2
Billerica, MA 01862
Telephone: (978) 330-5912
Fax: (978) 330-5056

BORING LOG **B-6-1** PAGE 1 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Prop. Yankee Doodle Bike Path (Structure 6)
LGCI PROJECT NUMBER: 1723
PROJECT LOCATION: Billerica, MA - Bridge No. B-12-027 (C5K)

DATE STARTED: 9/13/21 **DATE COMPLETED:** 9/14/21
BORING LOCATION: Southern side of site near Orchard Rd.
COORDINATES: N 3018132.1535, E 717353.0983
SURFACE EL: 250 ft. (see note 1) **TOTAL DEPTH:** 37 ft.
WEATHER: 70's Scattered showers
GROUNDWATER LEVELS:
DURING DRILLING: 10.0 ft. / El. 240.0 ft.
AT END OF DRILLING: 16.5 ft. / El. 233.5 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Justin Raymond
DRILLING METHOD: Drive and wash with 4" and 3" casing
DRILL RIG TYPE/MODEL: Mobile B-53 ATV Rig
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: HO **CHECKED BY:** TG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth (ft.)	Material Description
							Asphalt	0.5	Asphalt
0.5			S1	5-17-30 (47)	18/8	1	Fill		S1 - Silty SAND with Gravel (SM), fine to coarse, ~15% fines, ~15% coarse subangular gravel, trace of asphalt, brown, moist REMARK 1: The drill operator used the auger bit for the first 6". S2 - Poorly Graded SAND with Silt (SP-SM), fine to medium, 10-15% fines, 10-15% fine to coarse subrounded gravel, brown, moist
2			S2	23-22-22-32 (44)	24/14				
4			S3	33-40-30-19 (70)	24/12				S3 - Poorly Graded SAND with Silt (SP-SM), fine to medium, 5-10% fines, ~10% fine subrounded gravel, brown, moist
5	245.0		S4	12-22-29-44 (51)	24/20				S4 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, 5-10% fines, 35-40% fine to coarse subangular gravel, brown, moist
6									
8						2			REMARK 2: Encountered cobbles or boulder between depths of 8' and 9'.
9									
10	240.0		S5	100-26-22-9 (48)	24/7				S5 - Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, 5-10% fines, 35-40% fine to coarse sand, brown, wet
11			S6	17-18-9-6 (27)	24/0	3			REMARK 3: Split spoon bent at depth of 11'. S6 - No recovery
13			S7	7-8-6-9 (14)	24/7				S7 - Top 3": Silty SAND (SM), fine to medium, 25-30% fines, 5-10% fine to coarse subrounded gravel, trace of organic soil, brown, wet Bottom 4" Silty SAND with Gravel (SM), fine to medium, 20-25% fines, 15-20% fine subangular gravel, trace of organic soil, brown, wet
15	235.0		S8	18-7-4-6 (11)	24/8	4			REMARK 4: Casing out of alignment at depth of about 15'. Drillers pulled one section of casing and redrove it to straighten the casing. S8 - Sandy SILT (ML), 45-50% fine sand, trace of organic soil, orange to brown, moist
17			S9	17-22-25-25 (47)	24/12		Sand and Gravel	17.0 233.0	S9 - Poorly Graded SAND with Silt (SP-SM), fine to medium, 10-15% fines, 5-10% fine subangular gravel, light gray, wet
19			S10	22-22-16-15 (38)	24/14				S10 - Silty SAND (SM), fine to medium, 15-20% fines, 0-5% fine subrounded gravel, light gray, wet
20	230.0								
21						5			
24			S11	29-29-21/2" (50/8")	14/5				S11 - Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 30-35% fine to coarse subangular to subrounded gravel, olive gray, wet
25	225.0								

GENERAL NOTES:
1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Boring Locations Yankee Doodle Bike Path, Billerica, MA," prepared by Vanasse Hangen Brustlin, Inc. (VHB), and provided to LGCI by VHB via e-mail on June 2, 2021.

WATER LEVEL
EL. 240.0
OBS. 9/14/2021

BOT. OF FOOTING
S. ABUT.
EL. 233.00

BORING B–6–1

STATION: 561+79.52
OFFSET: 26.49'
GROUND ELEVATION: 250.0'
N: 3018132.1535
E: 717353.0983

LGCI Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Road, Suite 2
Billerica, MA 01862
Telephone: (978) 330-5912
Fax: (978) 330-5056

BORING LOG **B-6-1** PAGE 2 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Prop. Yankee Doodle Bike Path (Structure 6)
LGCI PROJECT NUMBER: 1723
PROJECT LOCATION: Billerica, MA - Bridge No. B-12-027 (C5K)

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth (ft.)	Material Description
	225.2								
25						5	Sand and Gravel		
							Boulder	26.4 223.6	REMARK 5: Encountered boulder between depths of 26' and 27', switched to 3" casing.
27								27.0 223.0	
29	29.7		S12	11-100/2" (100/2")	8/2		Sand and Gravel		S12 - Silty SAND (SM), fine to medium, 15-20% fines, 10-15% fine subangular gravel, trace of weathered rock, orange to yellow, wet
30	220.0								
34	34.4		S13	100/5"	5/3				S13 - Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, subangular, 5-10% fines, 25-30% fine to coarse sand, brown, wet
35	215.0								
37						6		37.0 213.0	REMARK 6: Started rock coring at depth of 37', rock coring stopped due to jam in rock core barrel. Advanced roller bit to depth of 37' to seal casing before moving. Bottom of borehole at 37.0 feet. Backfilled borehole with drill cuttings, all purpose gravel and cold asphalt.
40	210.0								
45	205.0								
50	200.0								
55	195.0								
60	190.0								

BORING NOTES:

FOR BORING NOTES SEE SHEET 3 OF 45

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER

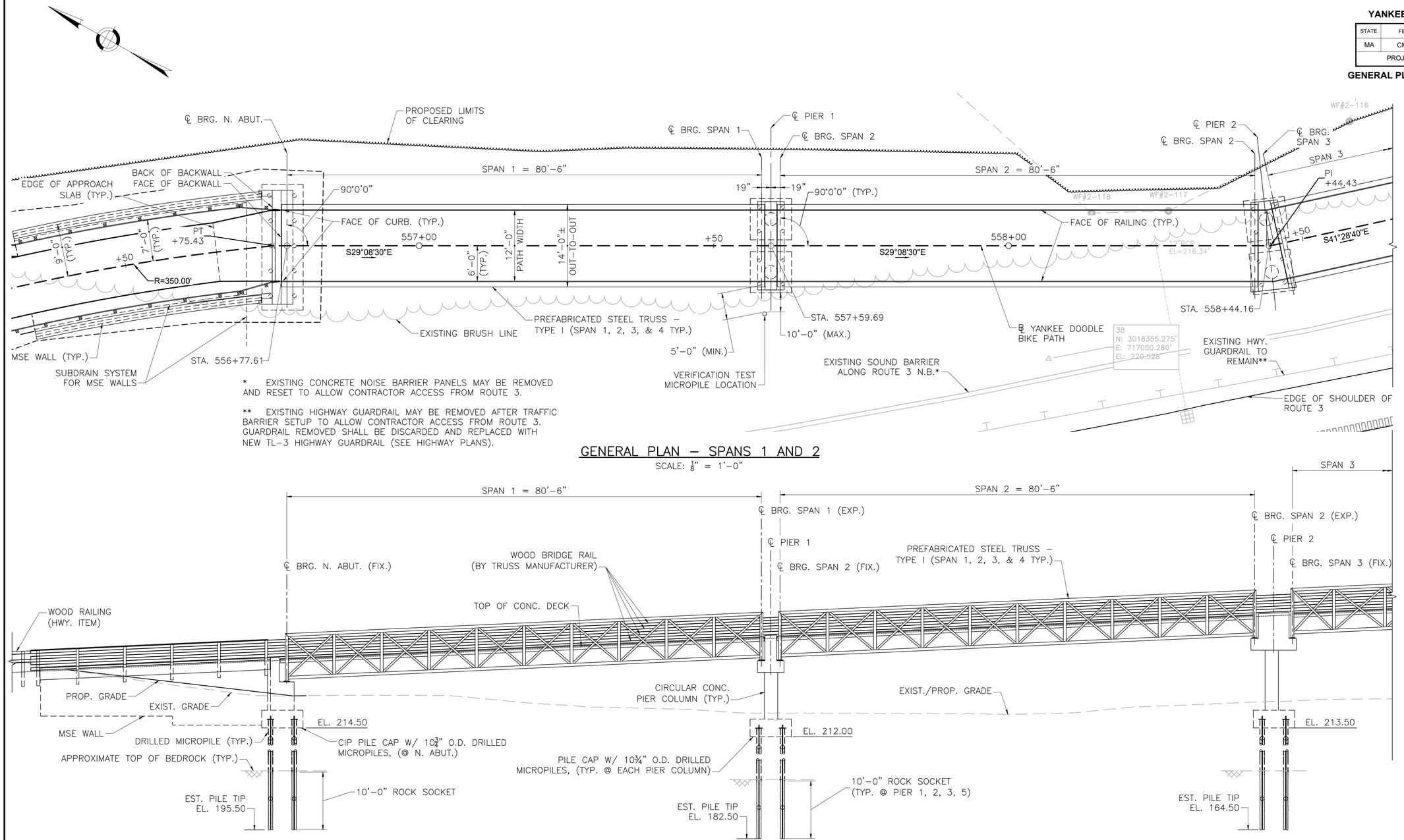
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR6-BORING).DWG Plotted on 31-Jul-2025 12:37 PM
Final Structural Submittal (SF) August-09-2025

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	201	231
	PROJECT FILE NO. 608227		

GENERAL PLAN & ELEVATION (1 OF 3)



* EXISTING CONCRETE NOISE BARRIER PANELS MAY BE REMOVED AND RESET TO ALLOW CONTRACTOR ACCESS FROM ROUTE 3.

** EXISTING HIGHWAY GUARDRAIL MAY BE REMOVED AFTER TRAFFIC BARRIER SETUP TO ALLOW CONTRACTOR ACCESS FROM ROUTE 3. GUARDRAIL REMOVED SHALL BE DISCARDED AND REPLACED WITH NEW TL–3 HIGHWAY GUARDRAIL (SEE HIGHWAY PLANS).

GENERAL PLAN – SPANS 1 AND 2

SCALE: $\frac{1}{8}$" = 1'–0"

ELEVATION – SPANS 1 AND 2

SCALE: $\frac{1}{8}$" = 1'–0"

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

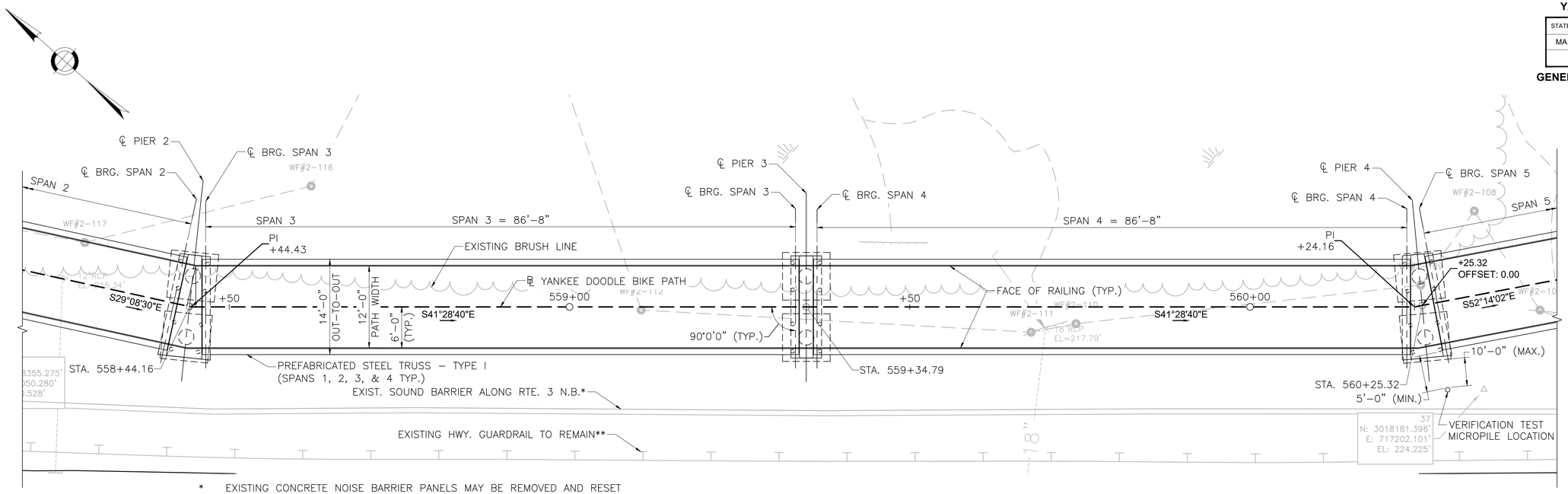
608227_BR(STR6-GEN_PLAN).DWG Plotted on 23-Jul-2025 12:45 PM

August-09-2025 Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	202	231
	PROJECT FILE NO. 608227		

GENERAL PLAN & ELEVATION (2 OF 3)

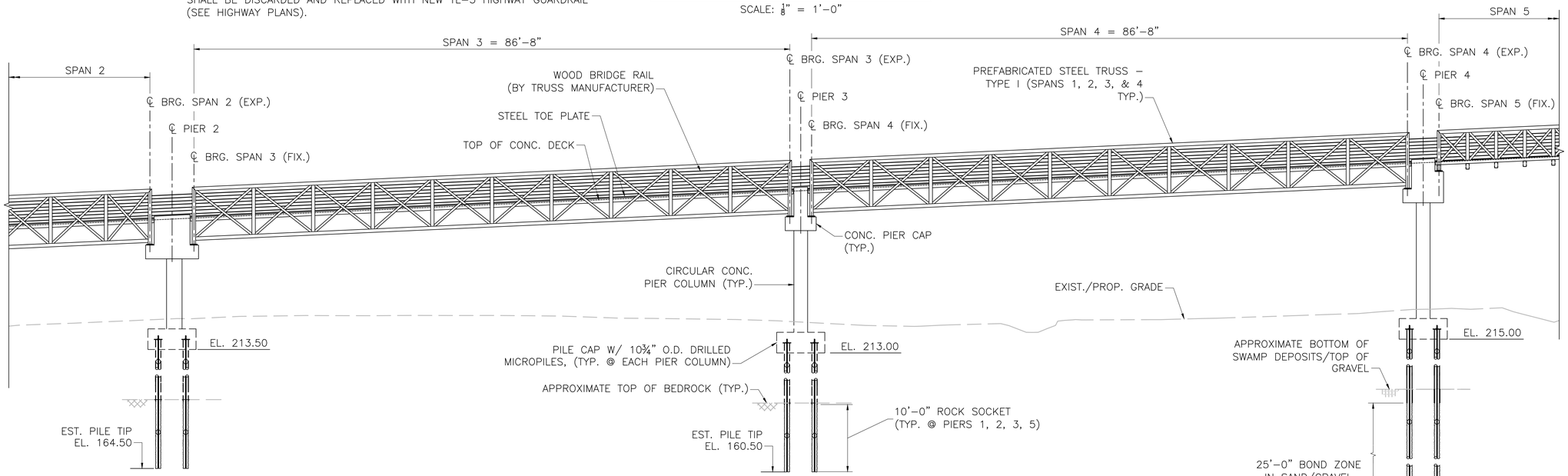


* EXISTING CONCRETE NOISE BARRIER PANELS MAY BE REMOVED AND RESET TO ALLOW CONTRACTOR ACCESS FROM ROUTE 3.

** EXISTING HIGHWAY GUARDRAIL MAY BE REMOVED AFTER TRAFFIC BARRIER SETUP TO ALLOW CONTRACTOR ACCESS FROM ROUTE 3. GUARDRAIL REMOVED SHALL BE DISCARDED AND REPLACED WITH NEW TL-3 HIGHWAY GUARDRAIL (SEE HIGHWAY PLANS).

GENERAL PLAN – SPANS 3 AND 4

SCALE: $\frac{1}{8}$" = 1'-0"



ELEVATION – SPANS 3 AND 4

SCALE: $\frac{1}{8}$" = 1'-0"

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER

USE ONLY PRINTS OF LATEST DATE

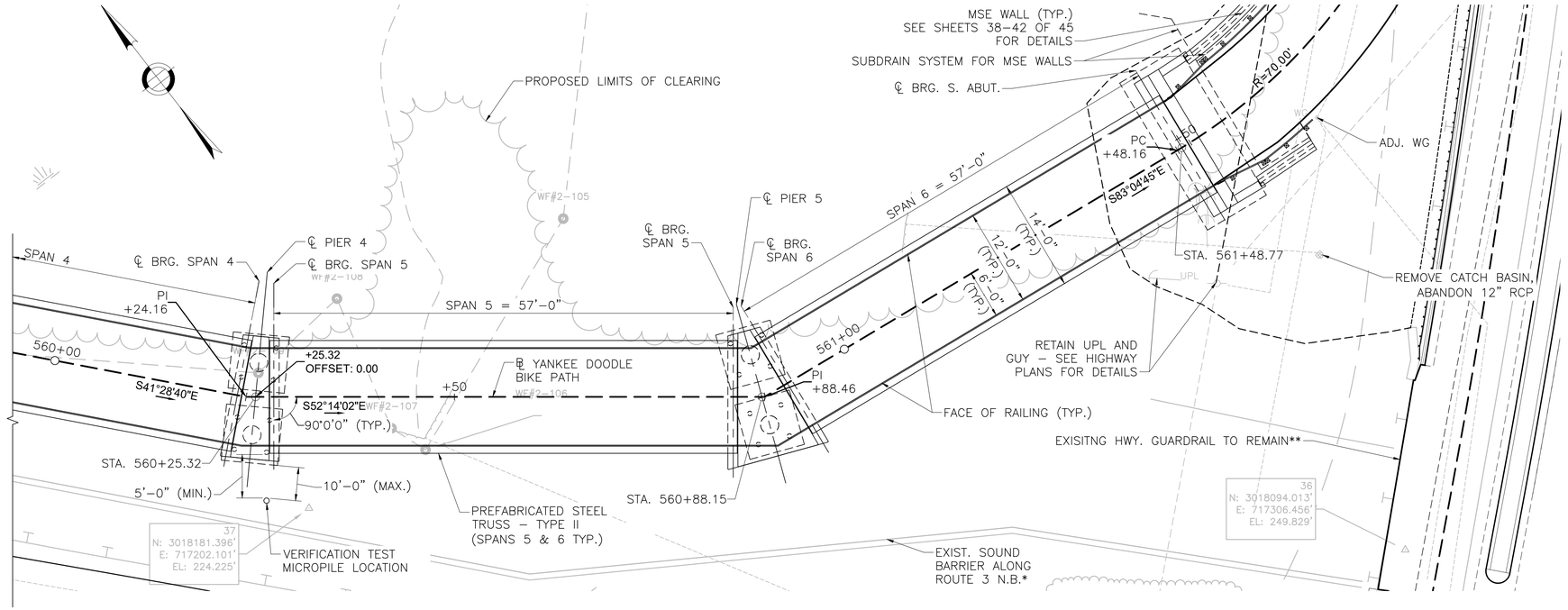
608227_BR(STR6-GEN_PLAN).DWG Plotted on 23-Jul-2025 12:46 PM

August-09-2025 Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	203	231
	PROJECT FILE NO. 608227		

GENERAL PLAN & ELEVATION (3 OF 3)

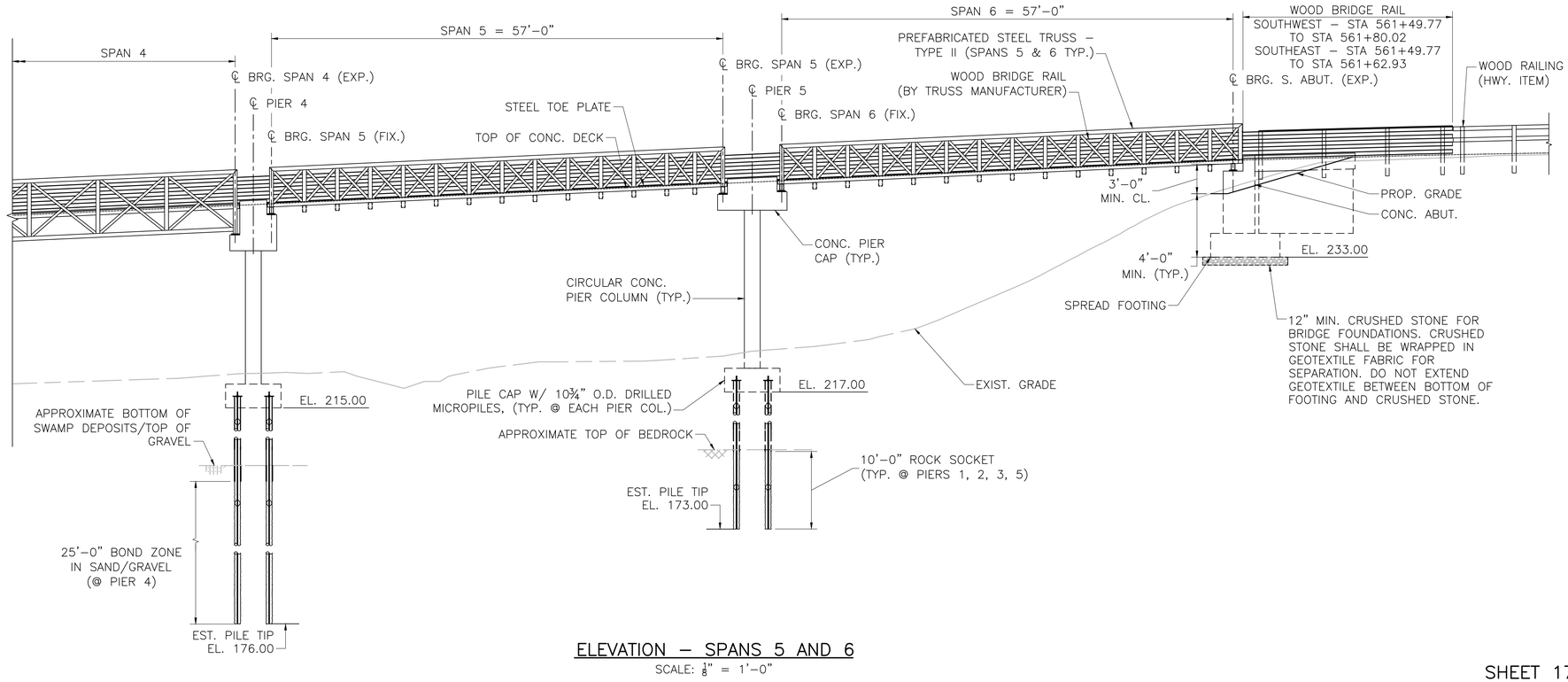


GENERAL PLAN – SPANS 5 AND 6

SCALE: ⅛" = 1'–0"

* EXISTING CONCRETE NOISE BARRIER PANELS MAY BE REMOVED AND RESET TO ALLOW CONTRACTOR ACCESS FROM ROUTE 3.

** EXISTING HIGHWAY GUARDRAIL MAY BE REMOVED AFTER TRAFFIC BARRIER SETUP TO ALLOW CONTRACTOR ACCESS FROM ROUTE. GUARDRAIL REMOVED SHALL BE DISCARDED AND REPLACED WITH NEW TL–3 HIGHWAY GUARDRAIL (SEE HIGHWAY PLANS).



ELEVATION – SPANS 5 AND 6

SCALE: ⅛" = 1'–0"

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

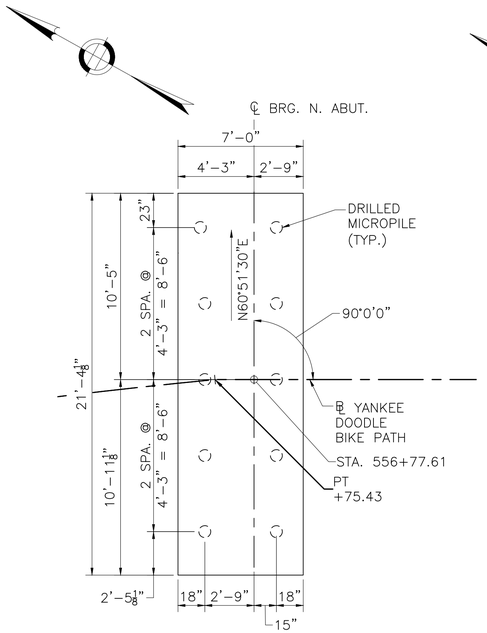
608227_BR(STR6-GEN_PLAN).DWG Plotted on 23-Jul-2025 12:46 PM

August-09-2025 Final Structural Submittal (SF)

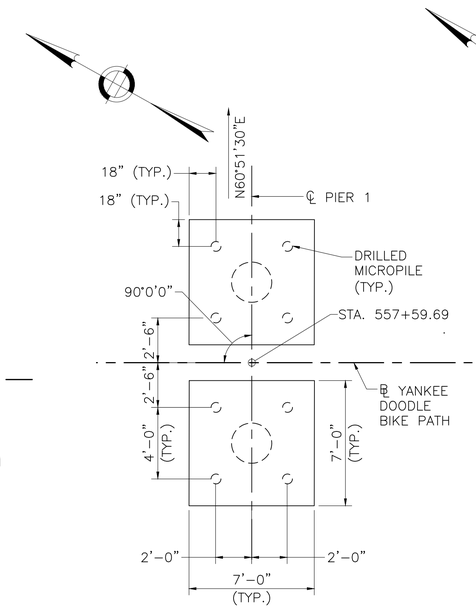
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	204	231
	PROJECT FILE NO. 608227		

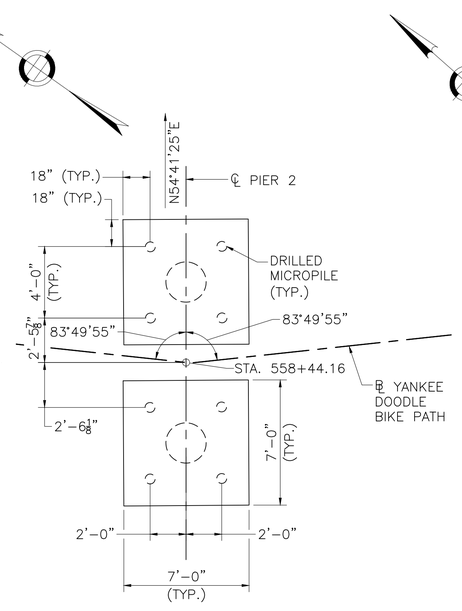
FOUNDATION LAYOUT PLAN



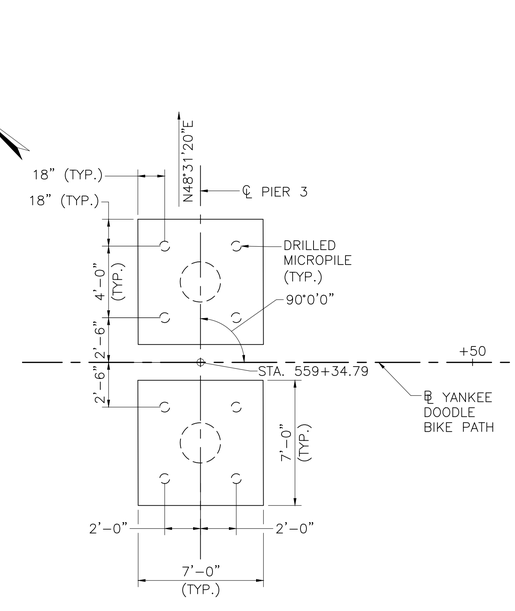
NORTH ABUTMENT
SCALE: ¼" = 1'-0"



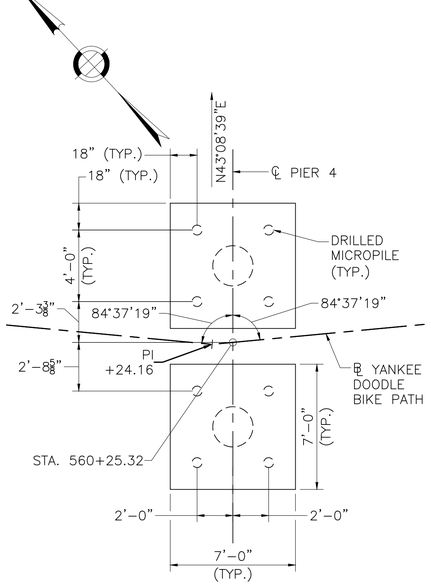
PIER 1
SCALE: ¼" = 1'-0"



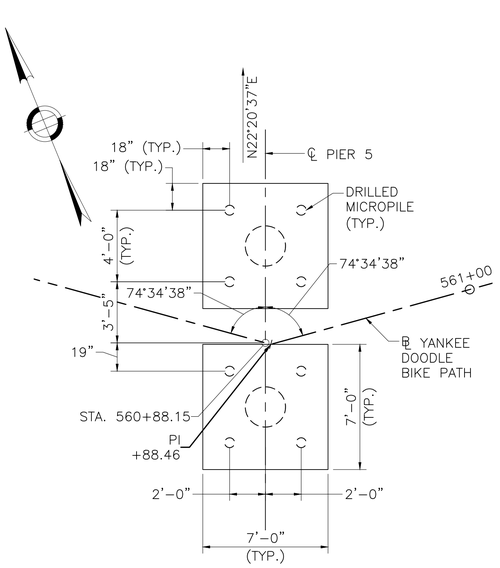
PIER 2
SCALE: ¼" = 1'-0"



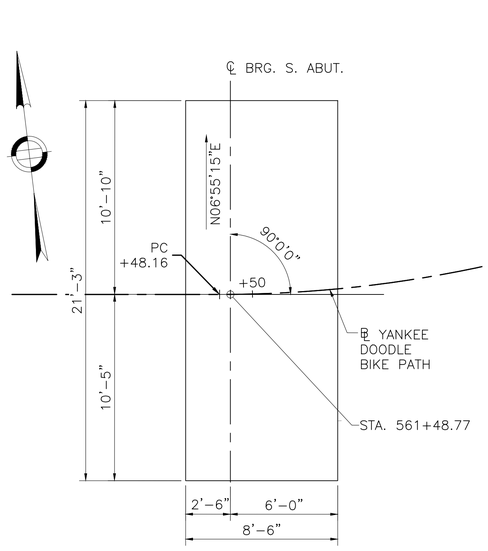
PIER 3
SCALE: ¼" = 1'-0"



PIER 4
SCALE: ¼" = 1'-0"



PIER 5
SCALE: ¼" = 1'-0"



SOUTH ABUTMENT
SCALE: ¼" = 1'-0"

FOUNDATION NOTES:

1. FOR MICROPILE DETAILS AND NOTES, SEE SHEET 19 OF 45.
2. FOR SPREAD FOOTING DETAILS SEE SHEET 21 OF 45.
3. THE SOUTH ABUTMENT FACTORED BEARING PRESSURE = 4.8 KSF AS PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS STRENGTH I LOAD.
4. THE SOUTH ABUTMENT FACTORED BEARING RESISTANCE = 5.2 KSF. FACTORED BEARING RESISTANCE IS THE PRODUCT OF THE NOMINAL BEARING RESISTANCE AND A RESISTANCE FACTOR OF 0.45.

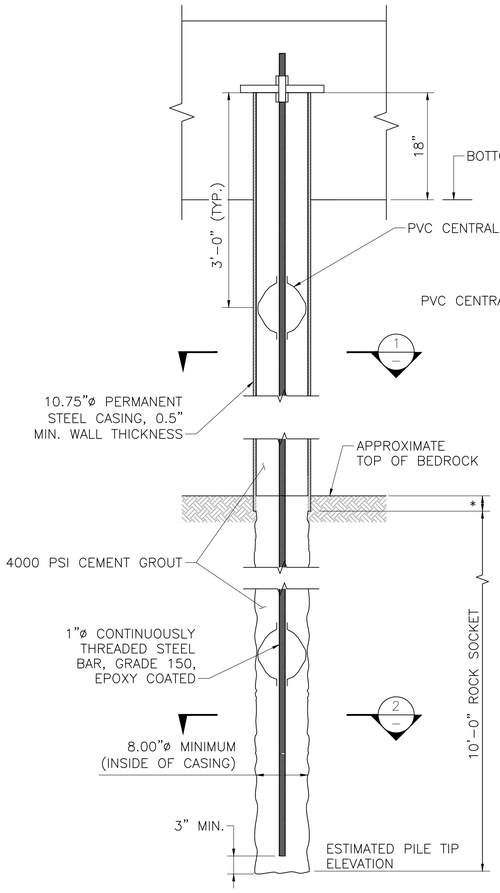
August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER

USE ONLY PRINTS OF LATEST DATE

608227_BR(STR&FOUND).DWG Plotted on 23-Jul-2025 12:47 PM

Final Structural Submittal (SF) August-09-2025

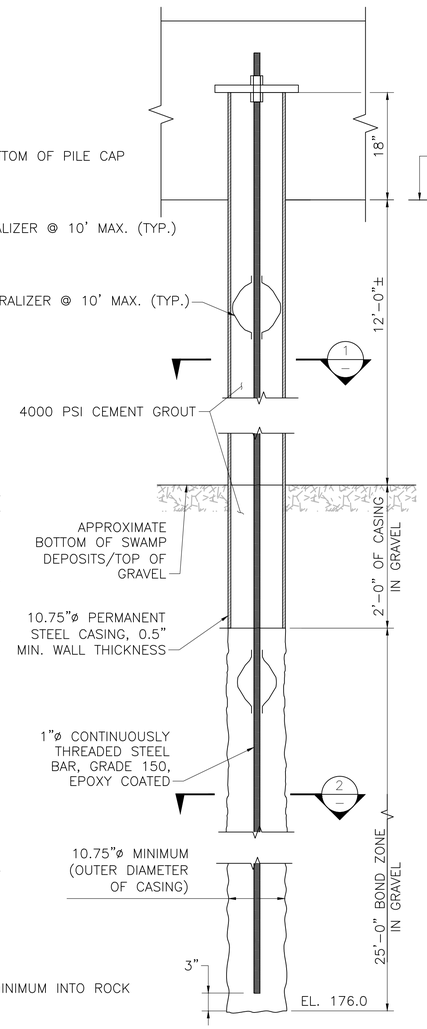


TYPICAL MICROPILE DETAIL IN ROCK

SCALE: 1" = 1'-0"

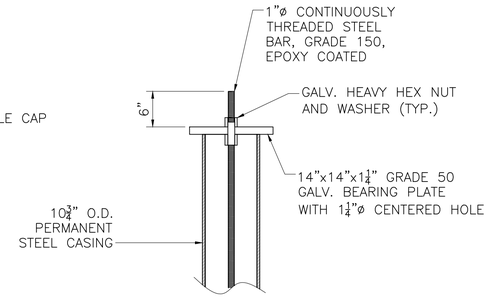
* SEAT CASING 12" MINIMUM INTO ROCK

ESTIMATED PILE TIP ELEVATIONS	
NORTH ABUTMENT	195.5
PIER 1	182.5
PIER 2	164.5
PIER 3	160.5
PIER 4	176.0
PIER 5	173.0



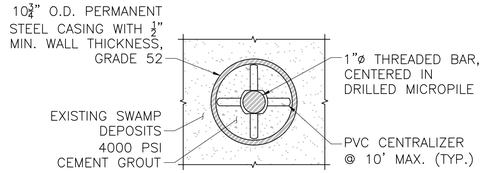
MICROPILE DETAIL IN GRAVEL AT PIER 4

SCALE: 1" = 1'-0"



MICROPILE CONNECTION DETAIL

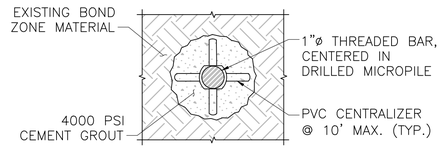
SCALE: 1" = 1'-0"



(CASED ZONE)

SECTION 1

SCALE: 1½" = 1'-0"



(BONDED ZONE)

SECTION 2

SCALE: 1½" = 1'-0"

DRILLED MICROPILE DESIGN												
LOCATION	LOAD COMBINATION	FACTORED AXIAL COMPRESSION DESIGN LOAD (KIP)	FACTORED AXIAL TENSION DESIGN LOAD (KIP)	NOMINAL GEOTECHNICAL RESISTANCE (KIP)	RESISTANCE FACTOR	FACTORED GEOTECHNICAL RESISTANCE (KIP)	NOMINAL STRUCTURAL RESISTANCE (COMPRESSION) (KIP)	RESISTANCE FACTOR (COMPRESSION)	FACTORED STRUCTURAL RESISTANCE (COMPRESSION) (KIP)	NOMINAL STRUCTURAL RESISTANCE (TENSION) (KIP)	RESISTANCE FACTOR (TENSION)	FACTORED STRUCTURAL RESISTANCE (TENSION) (KIP)
NORTH ABUTMENT	STRENGTH I	82	21	628	0.55	345	200	0.75	150	117	0.80	94
	STRENGTH V	82	26	628	0.55	345	200	0.75	150	117	0.80	94
PIER 1	STRENGTH I	60	N/A	628	0.55	345	200	0.75	150	117	0.80	94
	STRENGTH III	97	54	628	0.55	345	200	0.75	150	117	0.80	94
PIER 2	STRENGTH I	80	N/A	628	0.55	345	200	0.75	150	117	0.80	94
	STRENGTH III	107	48	628	0.55	345	200	0.75	150	117	0.80	94
PIER 3	STRENGTH I	56	N/A	628	0.55	345	200	0.75	150	117	0.80	94
	STRENGTH III	102	54	628	0.55	345	200	0.75	150	117	0.80	94
PIER 4	STRENGTH I	75	N/A	246	0.55	135	317	0.75	238	117	0.80	94
	STRENGTH III	113	50	246	0.55	135	317	0.75	238	117	0.80	94
PIER 5	STRENGTH I	71	N/A	628	0.55	345	200	0.75	150	117	0.80	94
	STRENGTH III	101	60	628	0.55	345	200	0.75	150	117	0.80	94

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	205	231
	PROJECT FILE NO. 608227		

MICROPILE DETAILS

DRILLED MICROPILE NOTES:

1. PLEASE SEE DRILLED MICROPILE DESIGN TABLE BELOW FOR THE FACTORED AXIAL DESIGN LOAD, STRUCTURAL PILE RESISTANCE, AND GEOTECHNICAL PILE RESISTANCE AT EACH APPLICABLE LIMIT STATE PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
2. PLEASE SEE ESTIMATED PILE TIP ELEVATIONS TABLE FOR THE ESTIMATED TIP ELEVATIONS.
3. STEEL CASING SHALL BE PRIME STEEL AND MEET THE REQUIREMENTS OF API 5L PSL1 GRADE 52 WITH SR 15 SUPPLEMENTAL REQUIREMENTS.
4. THREADED STEEL BAR SHALL BE CONTINUOUSLY THREADED FOR THE ENTIRE BAR LENGTH CONFORMING TO AASHTO M275, HAVING A MINIMUM YIELD STRENGTH OF 150 KSI (GRADE 150).
5. THREADED CASING JOINTS ARE NOT ALLOWED WITHIN 3'-0" OF THE PILE CAP.
6. NUT AND BAR COUPLING SHALL BE PROVIDED FROM THE SAME MANUFACTURER AS THE THREADED STEEL BAR.
7. BAR COUPLING SHALL BE FULLY ENGAGED ON THE THREADED STEEL BAR AND SHALL NOT BE LOCATED IN THE TOP THIRD OF THE MICROPILE LENGTH.
8. ANCHOR PLATE SHALL MEET THE REQUIREMENTS OF AASHTO M270 GRADE 50.
9. GROUT SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4000 PSI AND CEMENT SHALL CONFORM TO AASHTO M85 TYPE I OR II.
10. GROUT SHALL BE PLACED USING TREMIE METHODS.
11. THE CONTRACTOR SHALL SUBMIT A MICROPILE SCHEDULE, MICROPILE INSTALLATION, AND MICROPILE TESTING PLAN FOR REVIEW AND APPROVAL BY THE ENGINEER.
12. SEE SPECIAL PROVISION ITEM 945.10 DRILLED MICROPILES, ITEM 948.60 MICROPILE VERIFICATION LOAD TEST, AND ITEM 948.61 MICROPILE PROOF LOAD TEST FOR ADDITIONAL MICROPILE SPECIFICATIONS.
14. TWO VERIFICATION LOAD TESTS OF THE DRILLED MICROPILE RESISTANCE SHALL BE MADE.

    ONE ON A SACRIFICIAL PILE NEAR ONE OF THE SUBSTRUCTURE UNITS WITH A BOND ZONE IN BEDROCK. THE VERIFICATION LOAD TEST SHALL BE COMPLETED USING A STATIC LOAD TEST IN ACCORDANCE WITH ASTM D1143 (COMPRESSION) OR ASTM D3689 (TENSION) TO A NOMINAL GEOTECHNICAL RESISTANCE OF 160 KIPS.

    ONE ON A SACRIFICIAL PILE NEAR THE SUBSTRUCTURE UNIT WITH BOND ZONE IN SAND AND GRAVEL. THE VERIFICATION LOAD TEST SHALL BE COMPLETED USING A STATIC LOAD TEST IN ACCORDANCE WITH ASTM D1143 (COMPRESSION) OR ASTM D3689 (TENSION) TO A NOMINAL GEOTECHNICAL RESISTANCE OF 170 KIPS.
15. A PROOF LOAD TEST OF THE DRILLED MICROPILE RESISTANCE SHALL BE MADE ON ONE PRODUCTION PILE AT EACH SUBSTRUCTURE UNIT USING A STATIC LOAD TEST IN ACCORDANCE WITH ASTM D1143 (COMPRESSION) OR ASTM D3689 (TENSION) TO A NOMINAL GEOTECHNICAL RESISTANCE OF 113 KIPS.
16. ALL PILES SHALL BE 10¾" O.D. DRILLED MICROPILES.
17. THE THREADED STEEL BAR SHALL BE SUPPORTED BY A NON-METALLIC CENTERING DEVICE.
18. THE NON-METALLIC CENTERING DEVICE SHALL BE CONSTRUCTED OF AN APPROVED NON-METALLIC DURABLE MATERIAL.
19. THE NON-METALLIC CENTERING DEVICES SHALL BE OF ADEQUATE SIZE TO ENSURE A MINIMUM 3½" ANNULAR SPACE BETWEEN THE THREADED STEEL BAR AND THE SIDES OF THE DRILLED HOLE OR INSIDE OF STEEL CASING.
20. THE NON-METALLIC CENTERING DEVICES SHALL BE PLACED AT A MINIMUM SPACING OF 10'-0" ALONG THE LENGTH OF THE PILE.
21. LAP SPLICING OR WELDING OF THREADED STEEL BAR SHALL NOT BE PERMITTED.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER

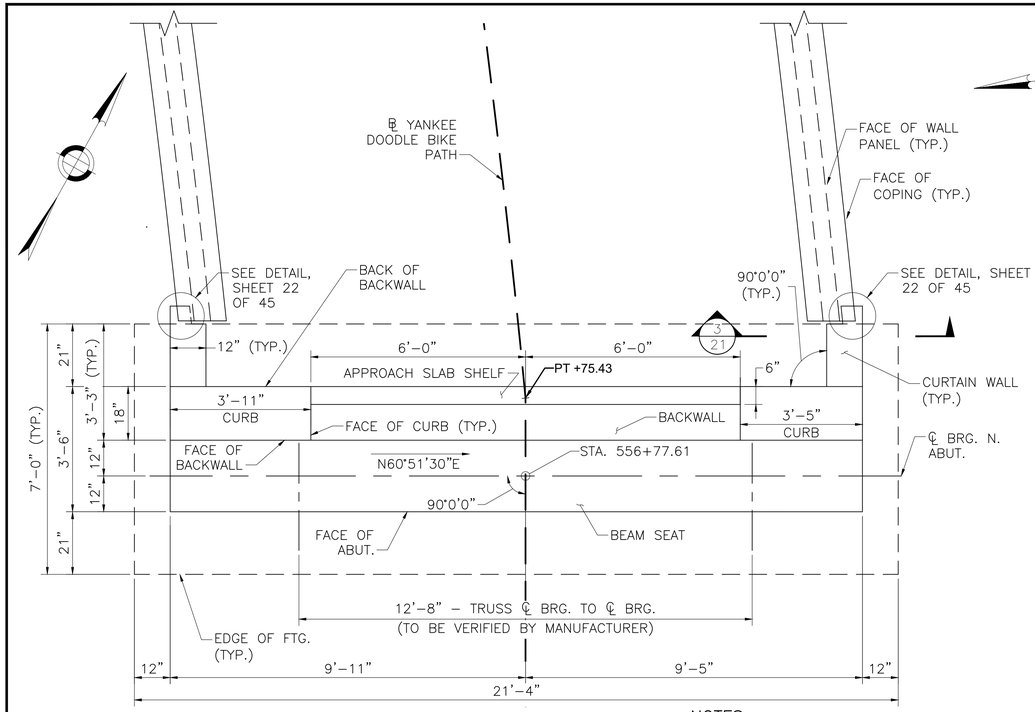
USE ONLY PRINTS OF LATEST DATE

608227_BR(STRC-TOLERANCES).DWG Plotted on 23-Jul-2025 12:48 PM
August-09-2025 Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

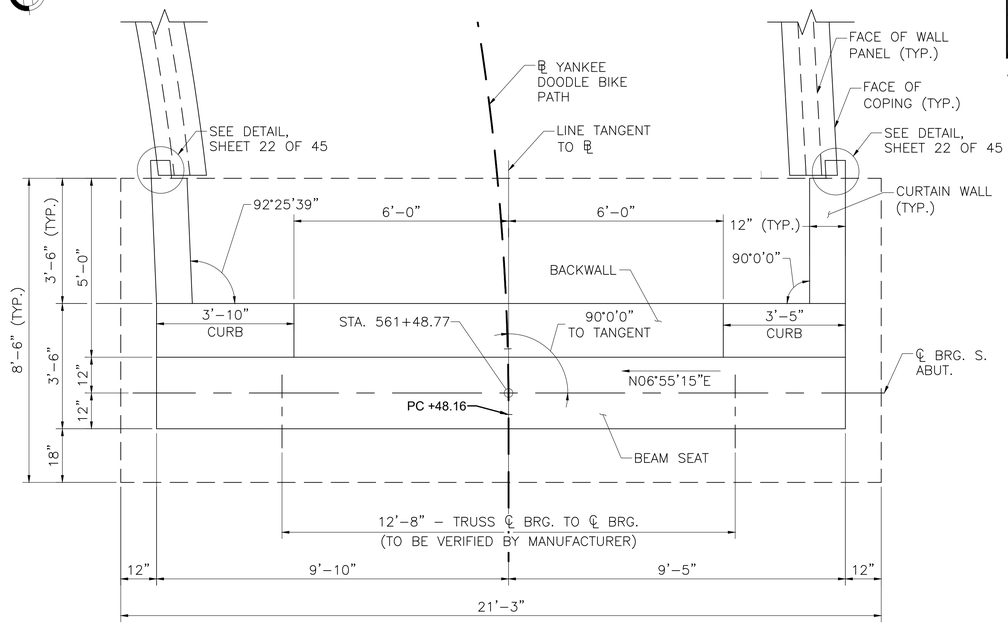
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	206	231
	PROJECT FILE NO. 608227		

ABUTMENT PLAN AND ELEVATION



NORTH ABUTMENT PLAN

SCALE: ½" = 1'-0"

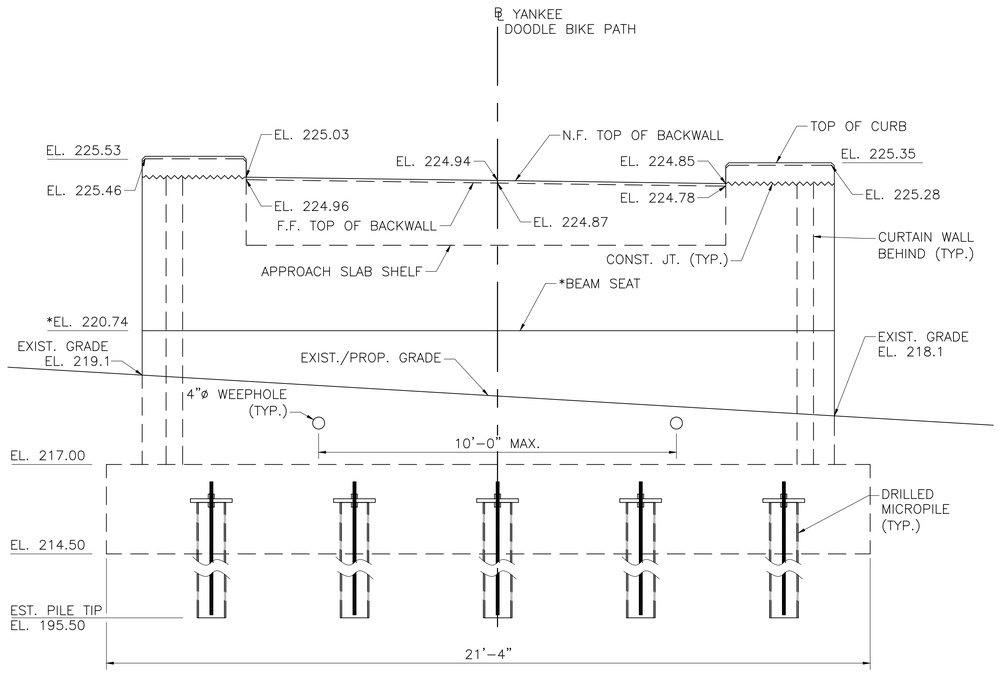


SOUTH ABUTMENT PLAN

SCALE: ½" = 1'-0"

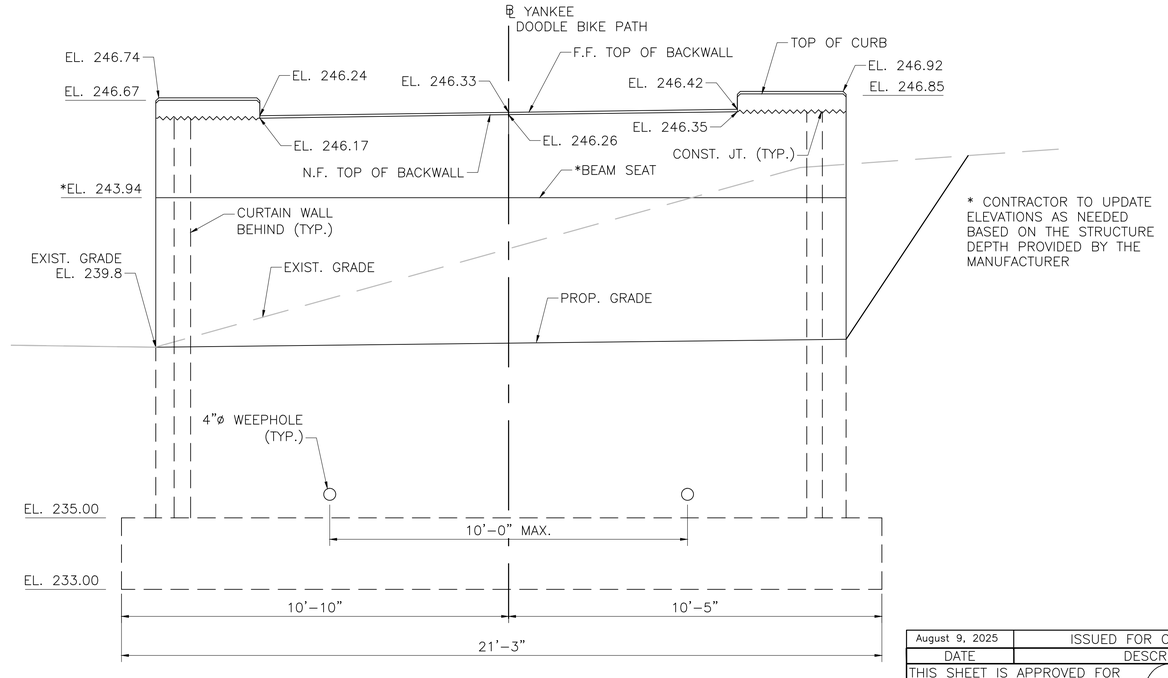
NOTES:

1. MICROPILES NOT SHOWN FOR CLARITY, SEE FOUNDATION LAYOUT PLAN, SHEET 18 OF 45.
2. APPROACH SLAB NOT SHOWN FOR CLARITY, SEE APPROACH SLAB DETAILS, SHEET 22 OF 45.



NORTH ABUTMENT ELEVATION

SCALE: ½" = 1'-0"



* CONTRACTOR TO UPDATE ELEVATIONS AS NEEDED BASED ON THE STRUCTURE DEPTH PROVIDED BY THE MANUFACTURER

SOUTH ABUTMENT ELEVATION

SCALE: ½" = 1'-0"

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

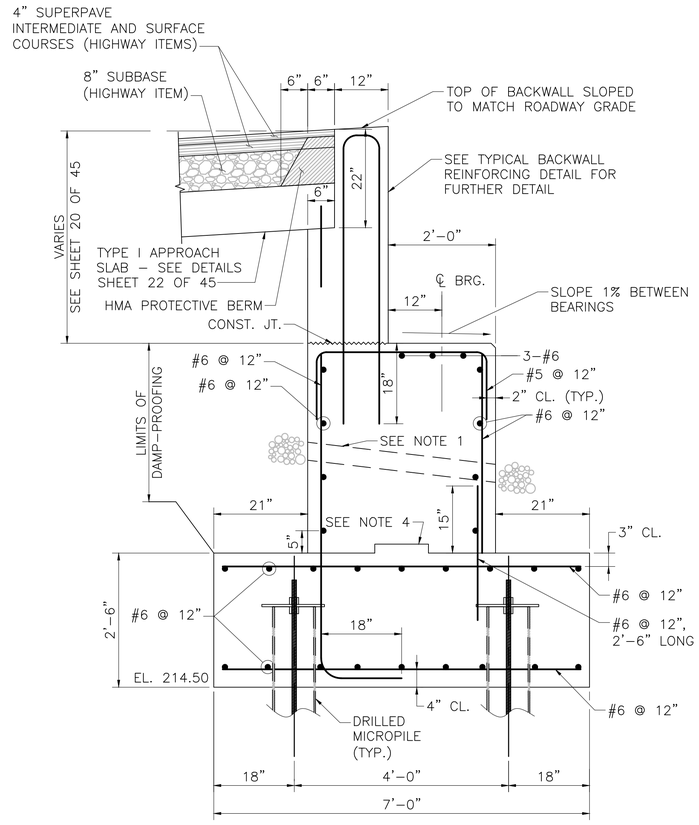
608227_BR(STR6-ABUTMENT).DWG Plotted on 23-Jul-2025 12:49 PM

August-09-2025 Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

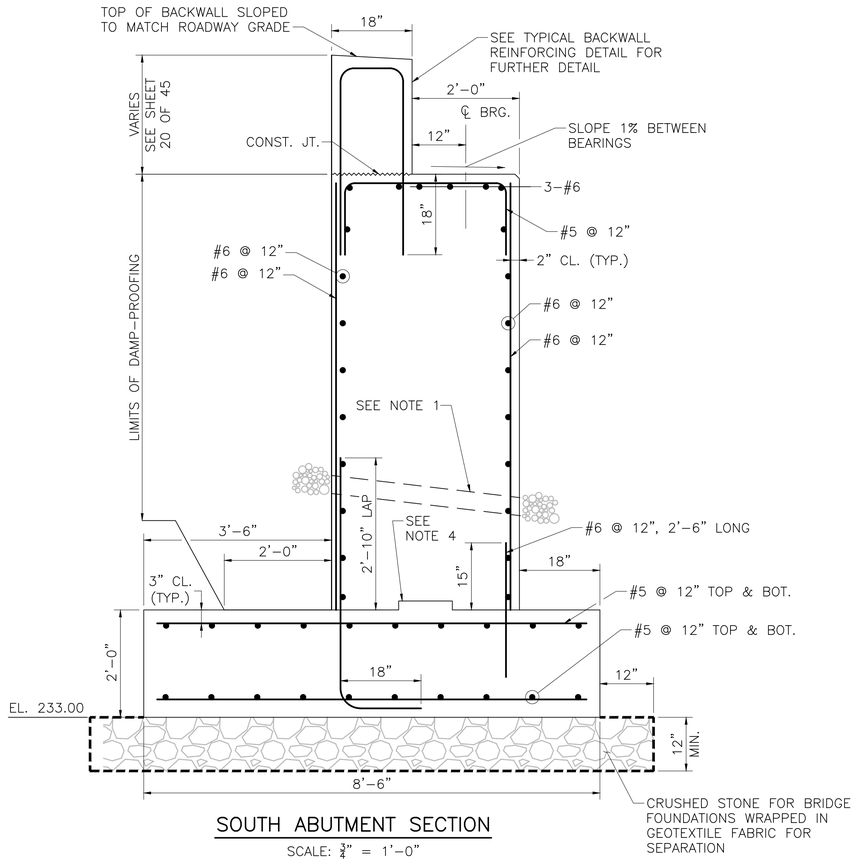
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	207	231
	PROJECT FILE NO. 608227		

ABUTMENT SECTIONS AND DETAILS (1 OF 2)



NORTH ABUTMENT SECTION

SCALE: ¾" = 1'–0"



SOUTH ABUTMENT SECTION

SCALE: ¾" = 1'–0"

NOTE: CURTAIN WALL AT SOUTHEAST ABUTMENT CORNER SHOWN. OTHER CURTAIN WALLS SIMILAR.

* FOOTING THICKNESS TO MATCH CORRESPONDING ABUTMENT THICKNESS

SECTION 3/20

SCALE: ¾" = 1'–0"

TYPICAL BACKWALL REINFORCING DETAIL

SCALE: 1" = 1'–0"

NOTES:

FINAL DIMENSIONS TO BE DETERMINED BY TRUSS MANUFACTURER.
SOUTH ABUTMENT SHOWN. NORTH ABUTMENT SIMILAR. APPROACH SLAB NOT SHOWN FOR CLARITY, FOR APPROACH SLAB DETAILS SEE SHEET 22 OF 45.

NOTES:

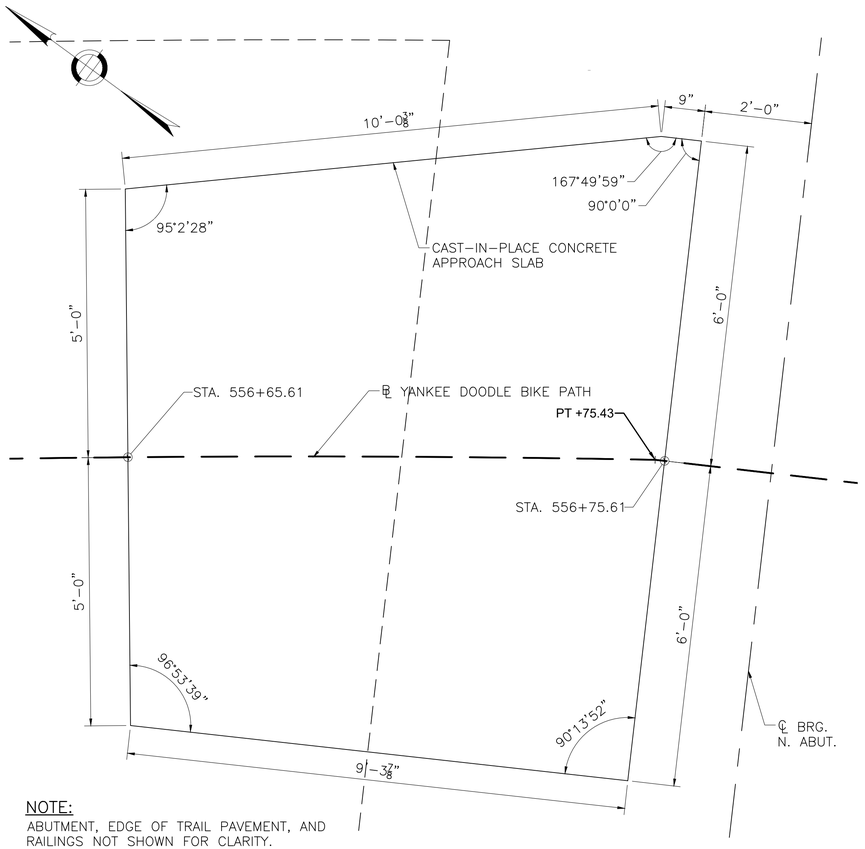
1. 4" ø WEEP HOLES 10'–0" ON CENTER PROVIDE 1 CUBIC YARD OF CRUSHED STONE AT EACH END OF WEEP HOLE.
2. ALL CONCRETE SHALL BE 5000 HP.
3. FOR DRILLED MICROPILE DETAILS AND NOTES, SEE SHEET 19 OF 45.
4. CONSTRUCTION JOINT WITH 12"x12"x2" SHEAR KEYS @ 3'–0" ON CENTER.
5. THERE SHALL BE A 1" GAP BETWEEN FACE OF BACKWALL AND END OF TRUSS AT AMBIENT TEMPERATURE 70 DEGREES FAHRENHEIT OR AS RECOMMENDED BY TRUSS MANUFACTURER.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER

USE ONLY PRINTS OF LATEST DATE

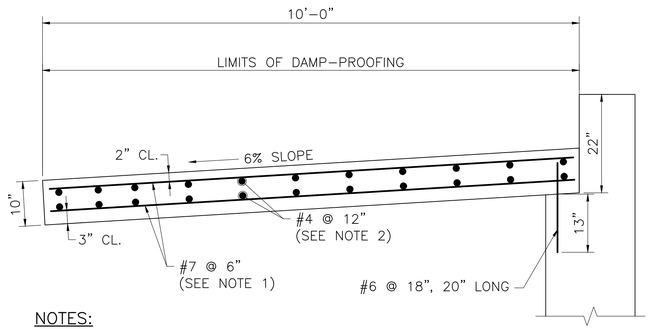
608227_BR(STR6-ABUTMENT).DWG Plotted on 23-Jul-2025 12:49 PM
August-09-2025
Final Structural Submittal (SF)



NOTE:
ABUTMENT, EDGE OF TRAIL PAVEMENT, AND RAILINGS NOT SHOWN FOR CLARITY.

NORTH ABUTMENT CIP APPROACH SLAB PLAN

SCALE: 1" = 1'–0"

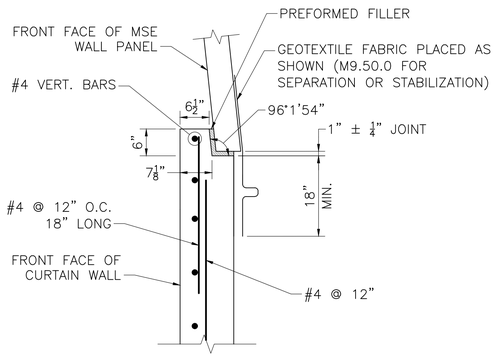


NOTES:

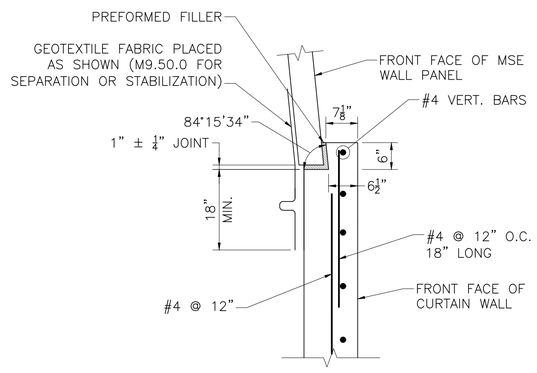
1. PLACE LONGITUDINAL REINFORCEMENT APPROXIMATELY PARALLEL TO BASELINE; SPLAY BARS OR ADJUST BAR LENGTHS TO ACCOMMODATE SKEWS, WITHOUT EXCEEDING BAR SPACING.
2. PLACE TRANSVERSE REINFORCEMENT APPROXIMATELY PARALLEL TO ABUTMENT; SPLAY BARS OR ADJUST BAR LENGTHS TO ACCOMMODATE SKEWS, WITHOUT EXCEEDING BAR SPACING.
3. ALL REINFORCEMENT SHALL NOT BE COATED.
4. SECTION IS ALONG BASELINE.

NORTH ABUTMENT CIP APPROACH SLAB DETAIL

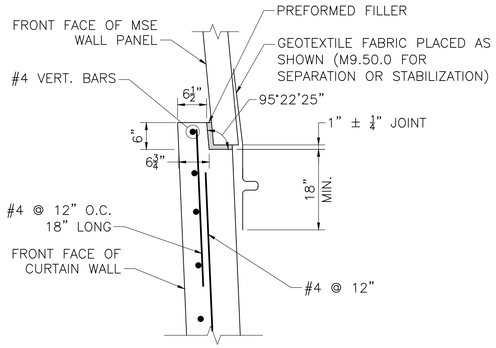
SCALE: 1" = 1'–0"



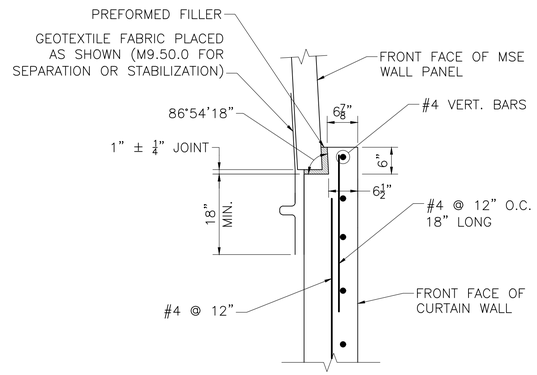
NORTHWEST CORNER



NORTHEAST CORNER



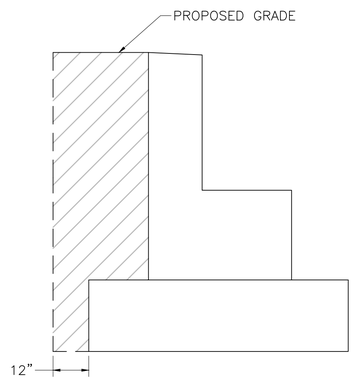
SOUTHEAST CORNER



SOUTHWEST CORNER

ABUTMENT TO MSE WALL VERTICAL RELIEF JOINT DETAIL

SCALE: 3/4" = 1'–0"



ABUTMENT

NOTES:

1. HATCHED AREA INDICATES LIMITS OF GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES.
2. AT NORTH ABUTMENT, GRAVEL BORROW LIMITS SHALL EXTEND TO THE BOTTOM OF THE APPROACH SLAB.

LIMITS OF GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES

SCALE: 1/2" = 1'–0"

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	208	231
	PROJECT FILE NO. 608227		

ABUTMENT SECTIONS AND DETAILS (2 OF 2)

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

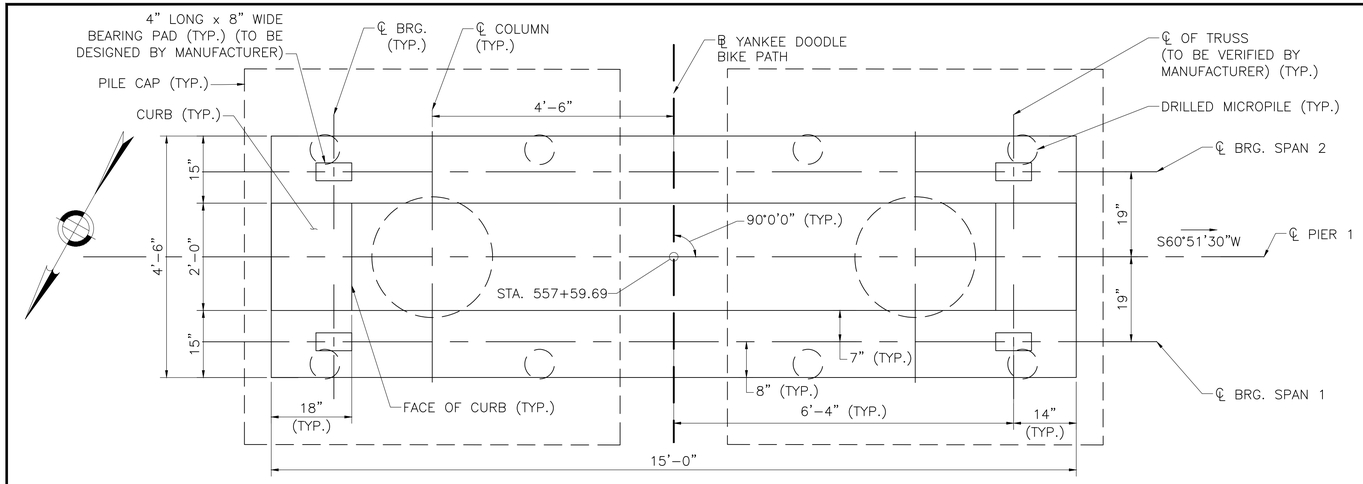
608227_BR(STR6-ABUTMENT).DWG Plotted on 23-Jul-2025 12:49 PM

Final Structural Submittal (SF) August-09-2025

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	209	231
	PROJECT FILE NO. 608227		

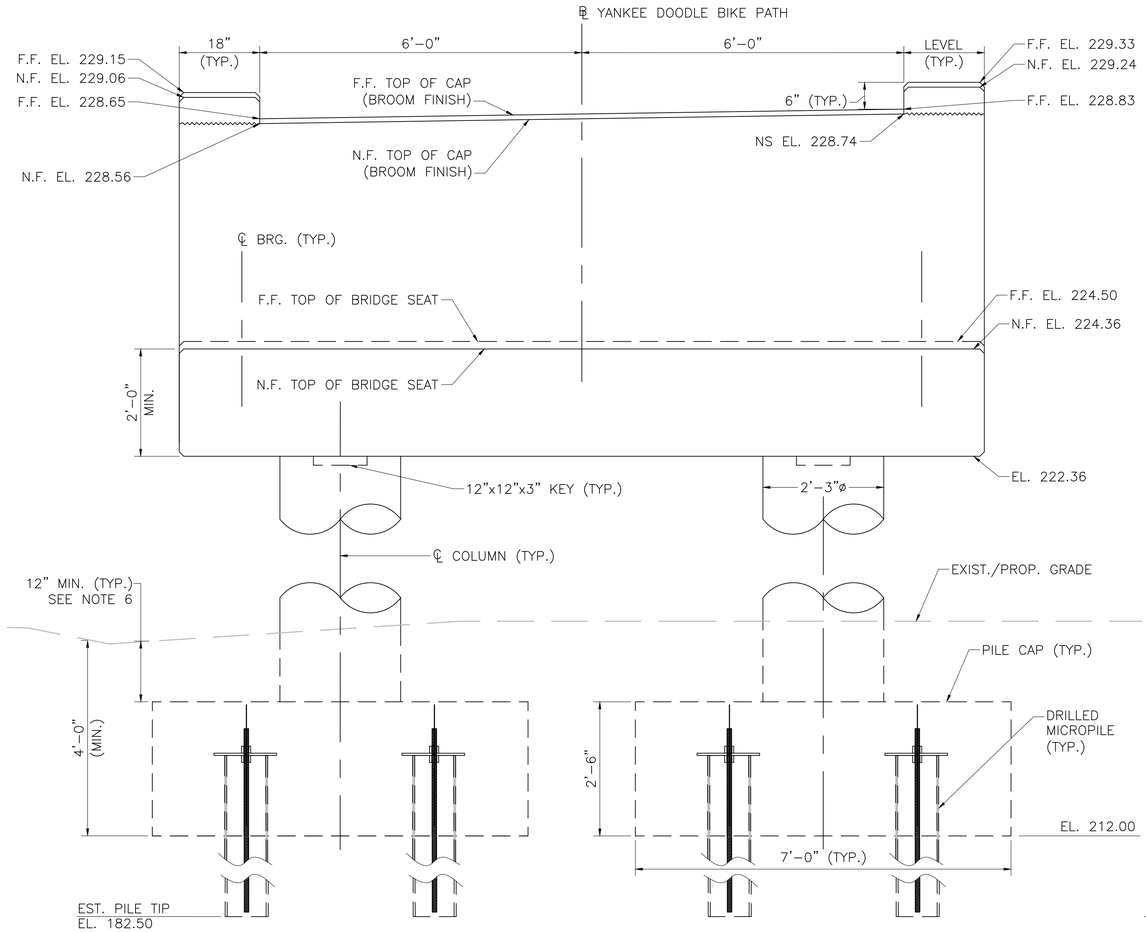
PIER PLAN & ELEVATION - PIER 1



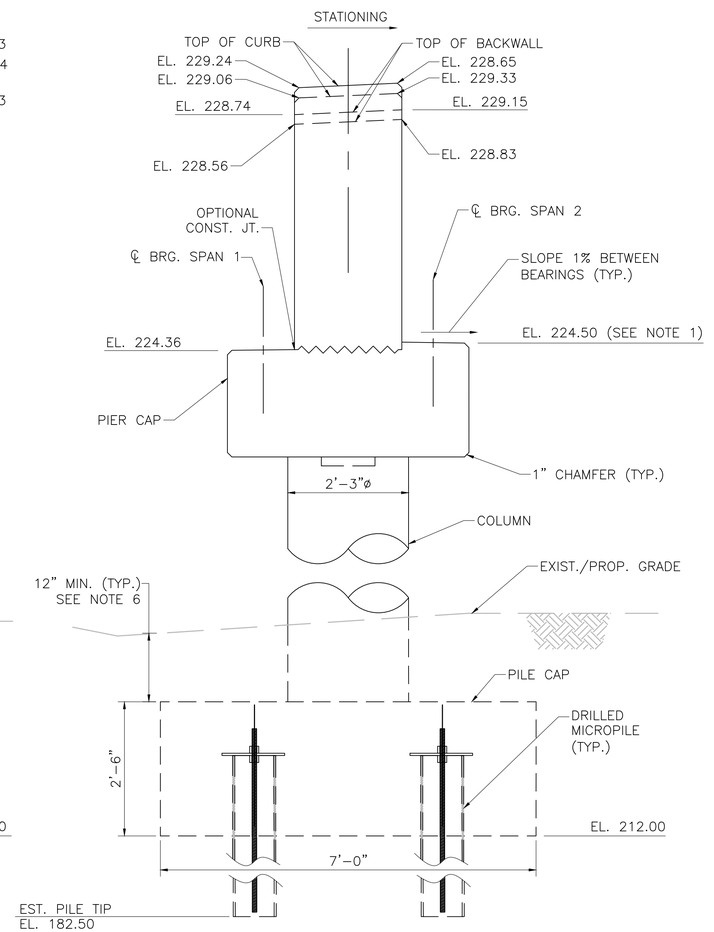
PIER 1 PLAN
SCALE: ¾" = 1'-0"

NOTES:

1. CONTRACTOR TO UPDATE BRIDGE SEAT ELEVATIONS AS NEEDED BASED ON THE STRUCTURE DEPTH PROVIDED BY THE SUPERSTRUCTURE MANUFACTURER.
2. ALL CONCRETE SHALL BE 5000 PSI HP CEMENT CONCRETE.
3. SIDES AND TOP OF CURBS SHALL BE SMOOTH FACED.
4. SEE SHEET 19 OF 45 FOR DRILLED MICROPILE LOADS.
5. SEE SHEET 2 OF 45 FOR ANCHOR BOLT NOTES.
6. PRIOR TO INSTALLATION OF MICROPILES OR FABRICATION OF PIER REINFORCING STEEL, CONTRACTOR TO FIELD VERIFY EXISTING GRADES TO CONFIRM THAT 12" MIN. COVER CAN BE PROVIDED OVER PILE CAPS. IF LESS THAN 12" COVER IS ANTICIPATED, REVIEW WITH ENGINEER.



PIER 1 NORTH ELEVATION
SCALE: ¾" = 1'-0"
(LOOKING UPSTATION)



PIER 1 WEST ELEVATION
SCALE: ¾" = 1'-0"

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

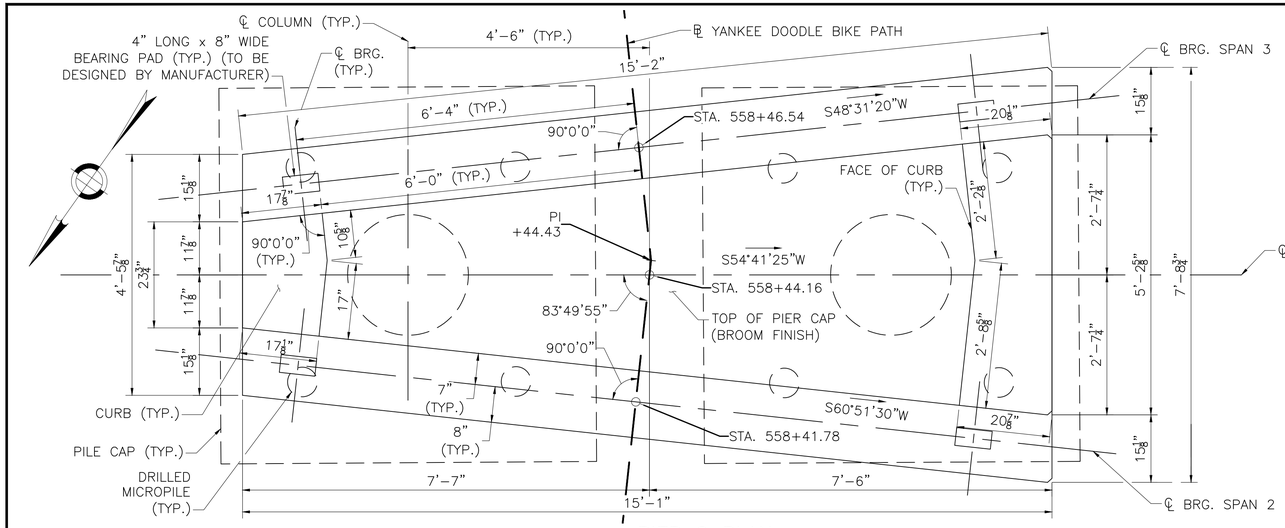
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR6 PIER 1 & 3).DWG Plotted on 23-Jul-2025 12:50 PM
Final Structural Submittal (SF) August-09-2025

BILLERICA
YANKEE DOODLE BIKE PATH

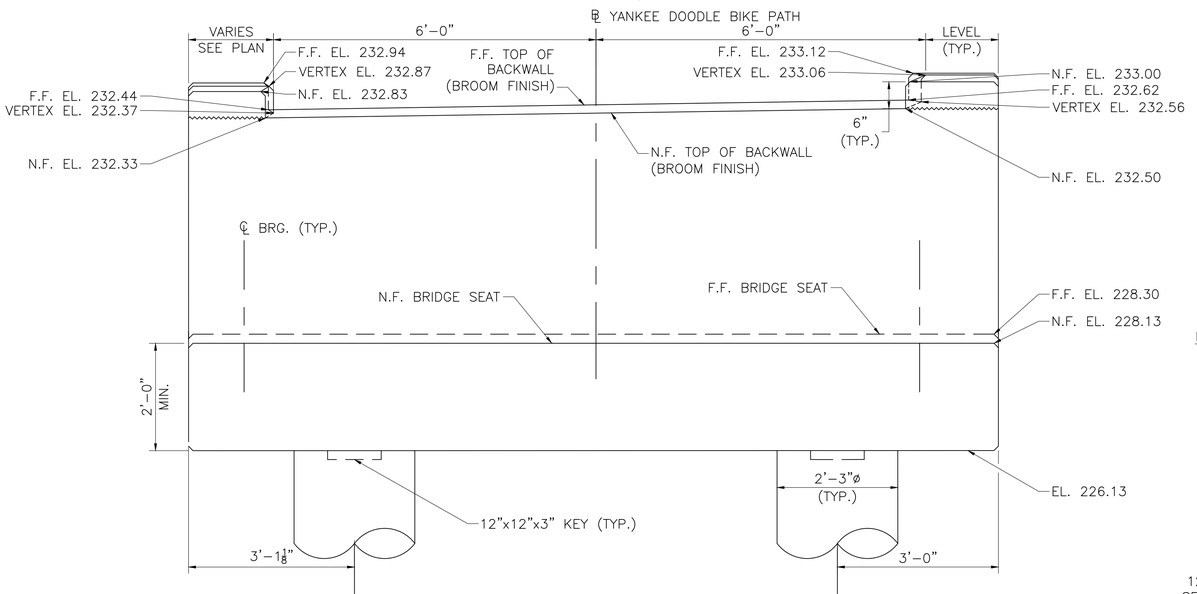
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	210	231
	PROJECT FILE NO. 608227		

PIER PLAN & ELEVATION - PIER 2



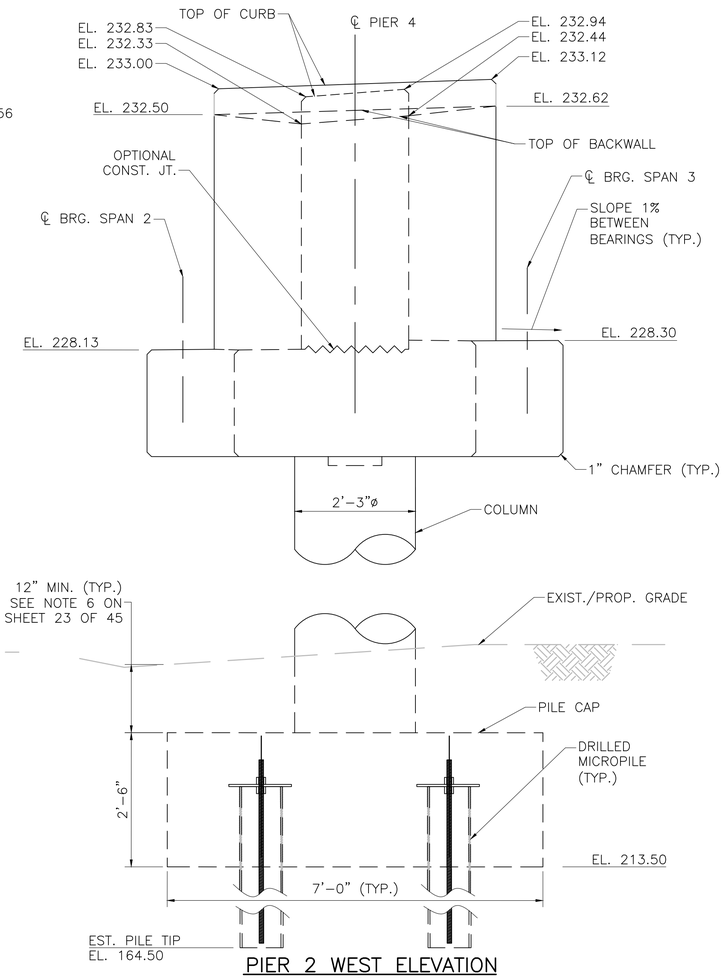
PIER 2 PLAN

SCALE: ¾" = 1'-0"



PIER 2 NORTH ELEVATION

SCALE: ¾" = 1'-0"
(LOOKING UPSTATION)



PIER 2 WEST ELEVATION

SCALE: ¾" = 1'-0"

NOTES:

1. SEE SHEET 23 OF 45 FOR TYPICAL PIER NOTES.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT AUTHORIZED SIGNATORY:	STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE	

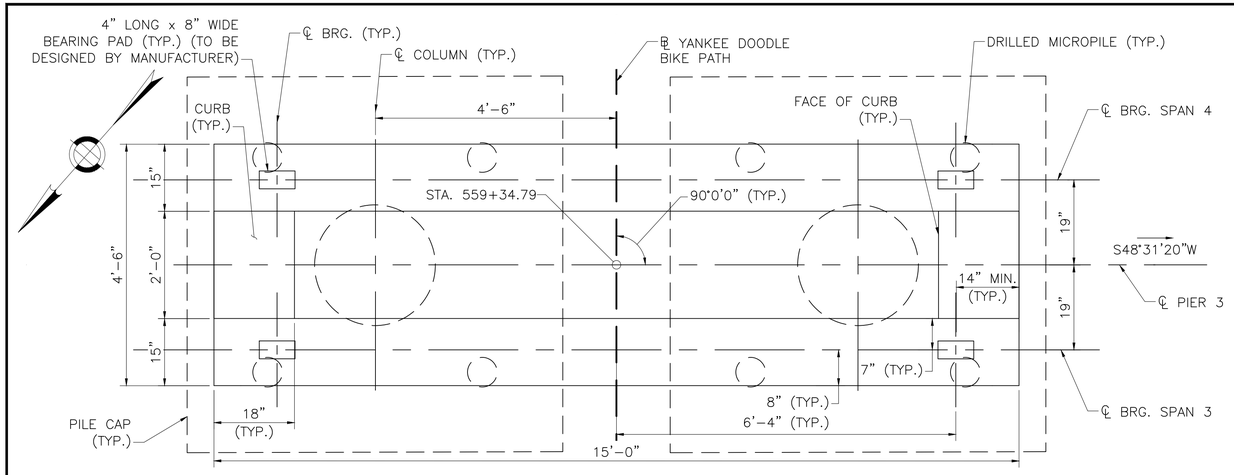
608227_BR(STR_6 PIER 2).DWG Plotted on 23-Jul-2025 12:51 PM

Final Structural Submittal (SF) August-09-2025

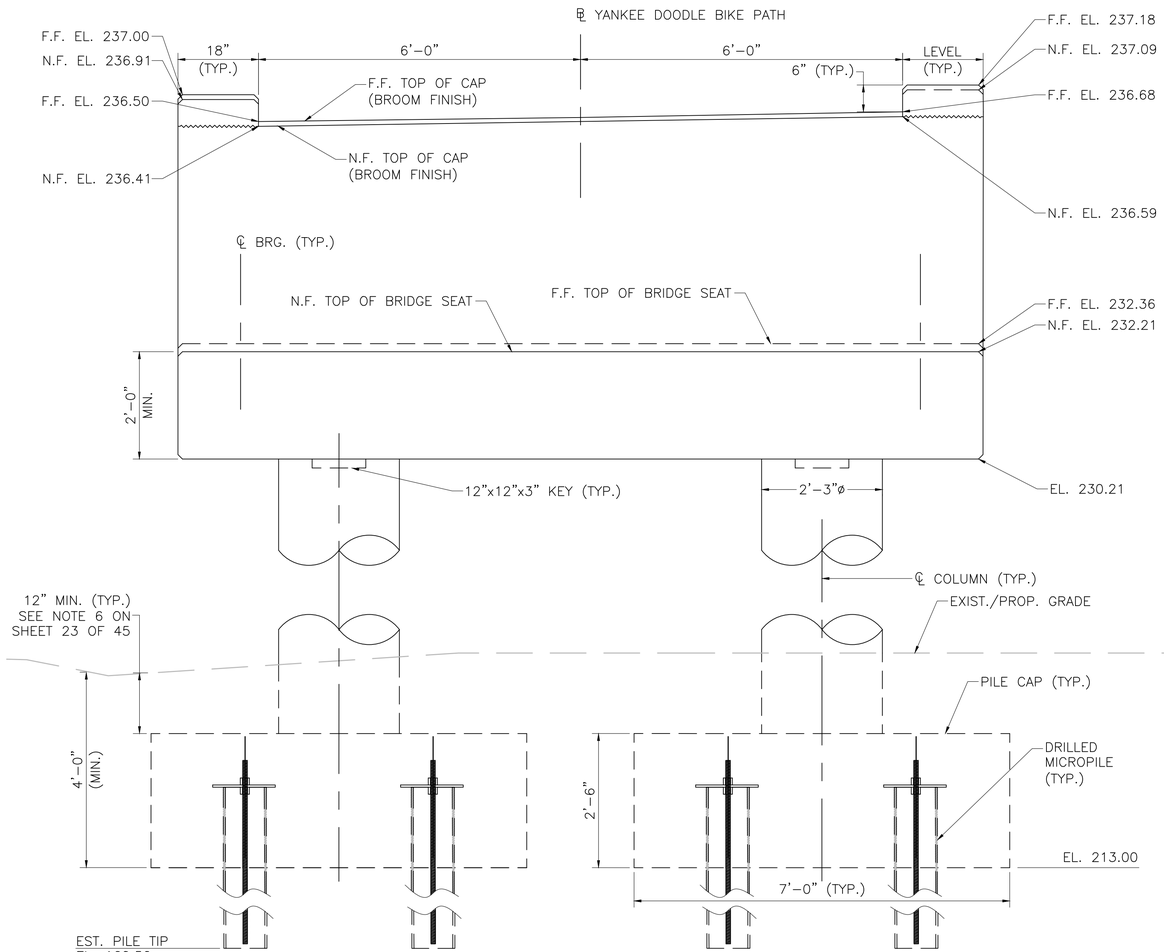
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	211	231
	PROJECT FILE NO. 608227		

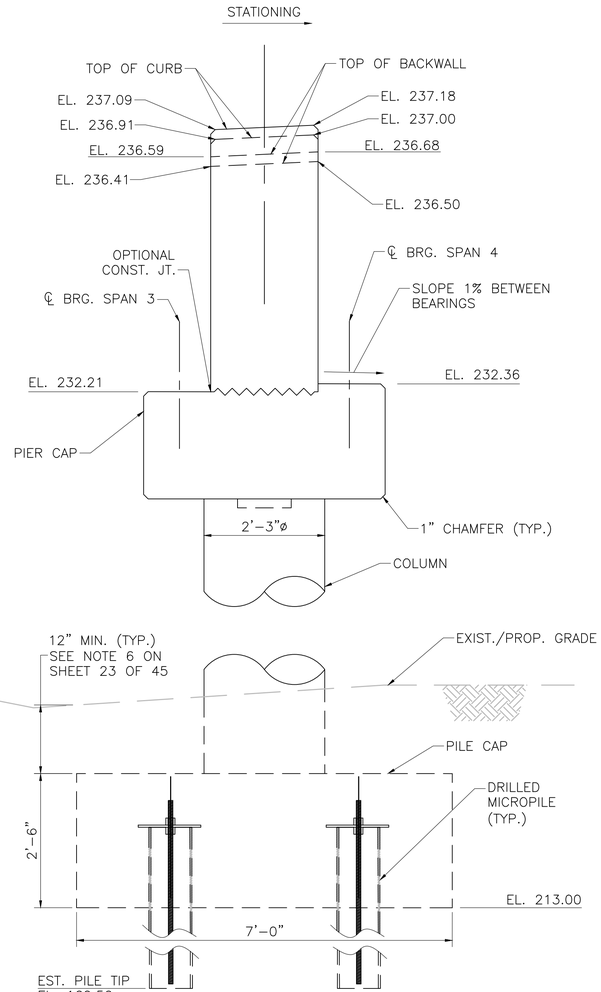
PIER PLAN & ELEVATION - PIER 3



PIER 3 PLAN
SCALE: ¾" = 1'-0"



PIER 3 NORTH ELEVATION
SCALE: ¾" = 1'-0"
(LOOKING UPSTATION)



PIER 3 WEST ELEVATION
SCALE: ¾" = 1'-0"

NOTES:

1. SEE SHEET 23 OF 45 FOR TYPICAL PIER NOTES.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

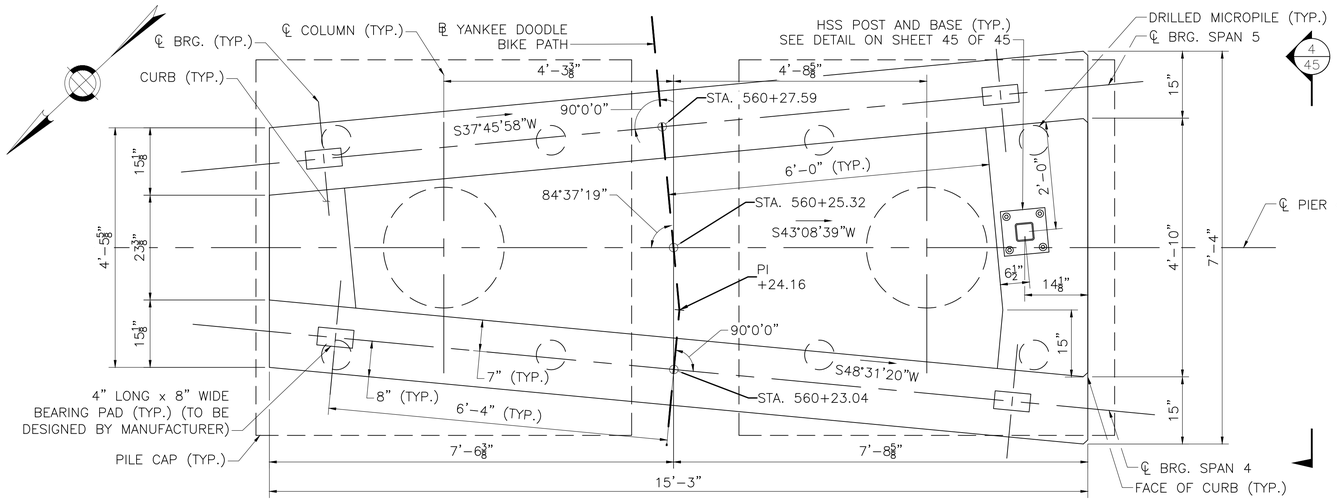
608227_BR(STR6 PIER 1 & 3).DWG Plotted on 23-Jul-2025 12:52 PM

Final Structural Submittal (SF) August-09-2025

BILLERICA
YANKEE DOODLE BIKE PATH

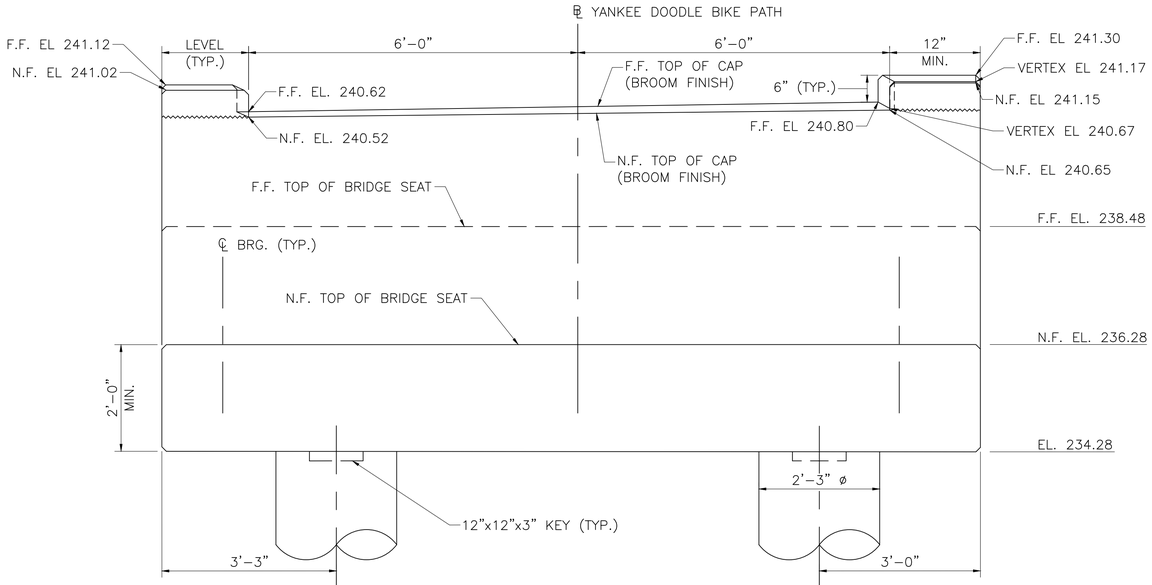
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	212	231
	PROJECT FILE NO. 608227		

PIER PLAN & ELEVATION - PIER 4



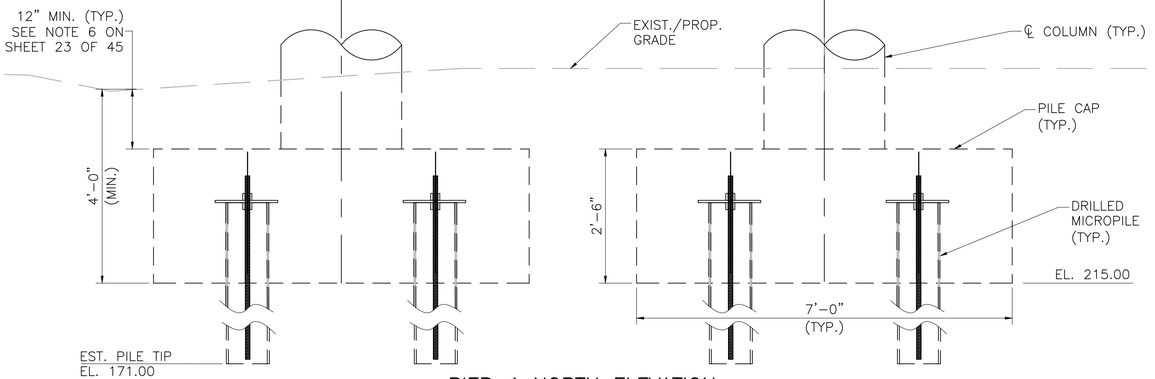
PIER 4 PLAN

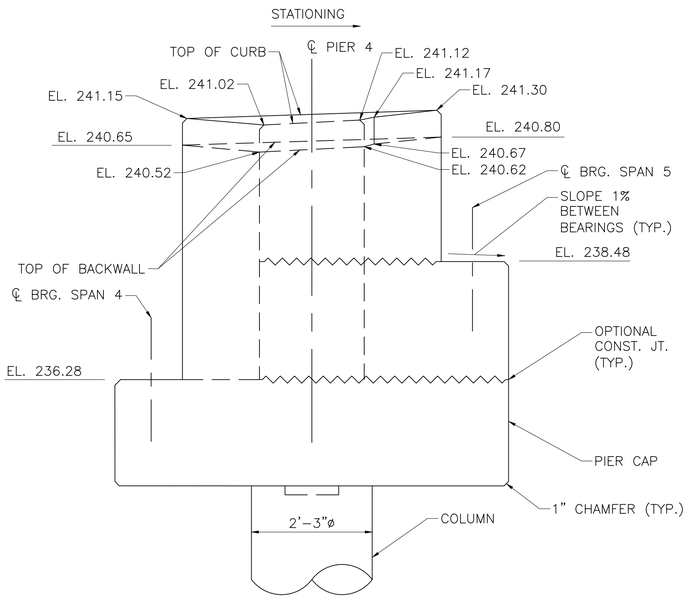
SCALE: 3/4" = 1'-0"

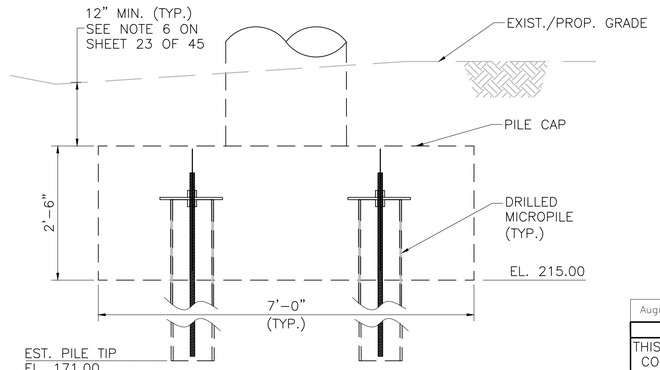


PIER 4 NORTH ELEVATION

SCALE: 3/4" = 1'-0"
(LOOKING UPSTATION)







PIER 4 WEST ELEVATION

SCALE: 3/4" = 1'-0"

NOTES:

1. SEE SHEET 23 OF 45 FOR TYPICAL PIER NOTES AND TYPICAL PIER SECTIONS.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR_6 PIER 4).DWG Plotted on 23-Jul-2025 12:53 PM
August-09-2025 Final Structural Submittal (SF)

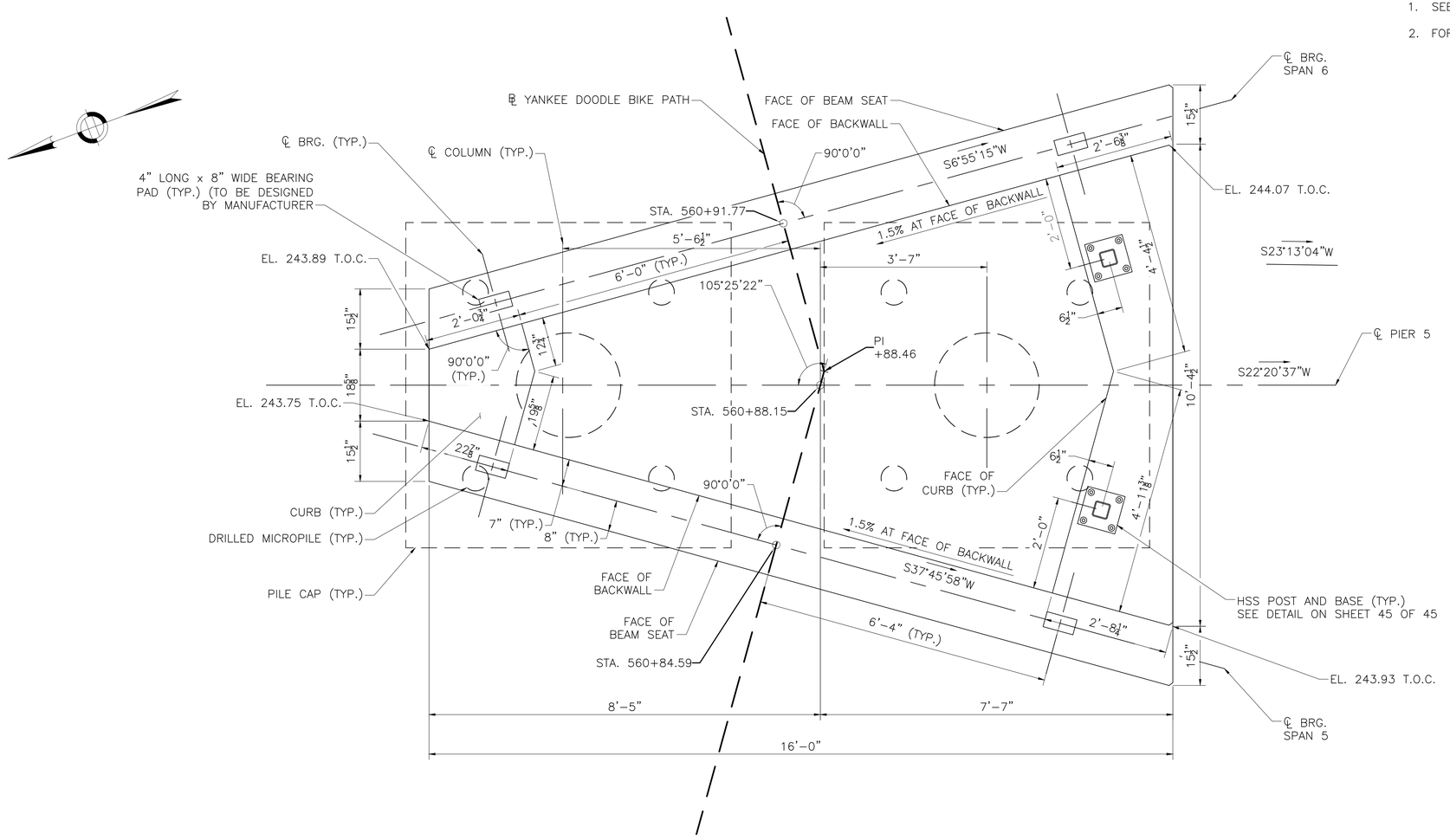
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	213	231
	PROJECT FILE NO. 608227		

PIER PLAN & ELEVATIONS - PIER 5 (1 OF 2)

NOTES:

1. SEE SHEET 23 OF 45 FOR TYPICAL PIER NOTES AND TYPICAL PIER SECTIONS.
2. FOR PIER 5 PLAN, "TOP OF CURB" IS ABBREVIATED TO "T.O.C.".



PIER 5 PLAN
SCALE: ¾" = 1'-0"

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR_6 PIER 5).DWG Plotted on 23-Jul-2025 12:54 PM
Final Structural Submittal (SF) August-09-2025

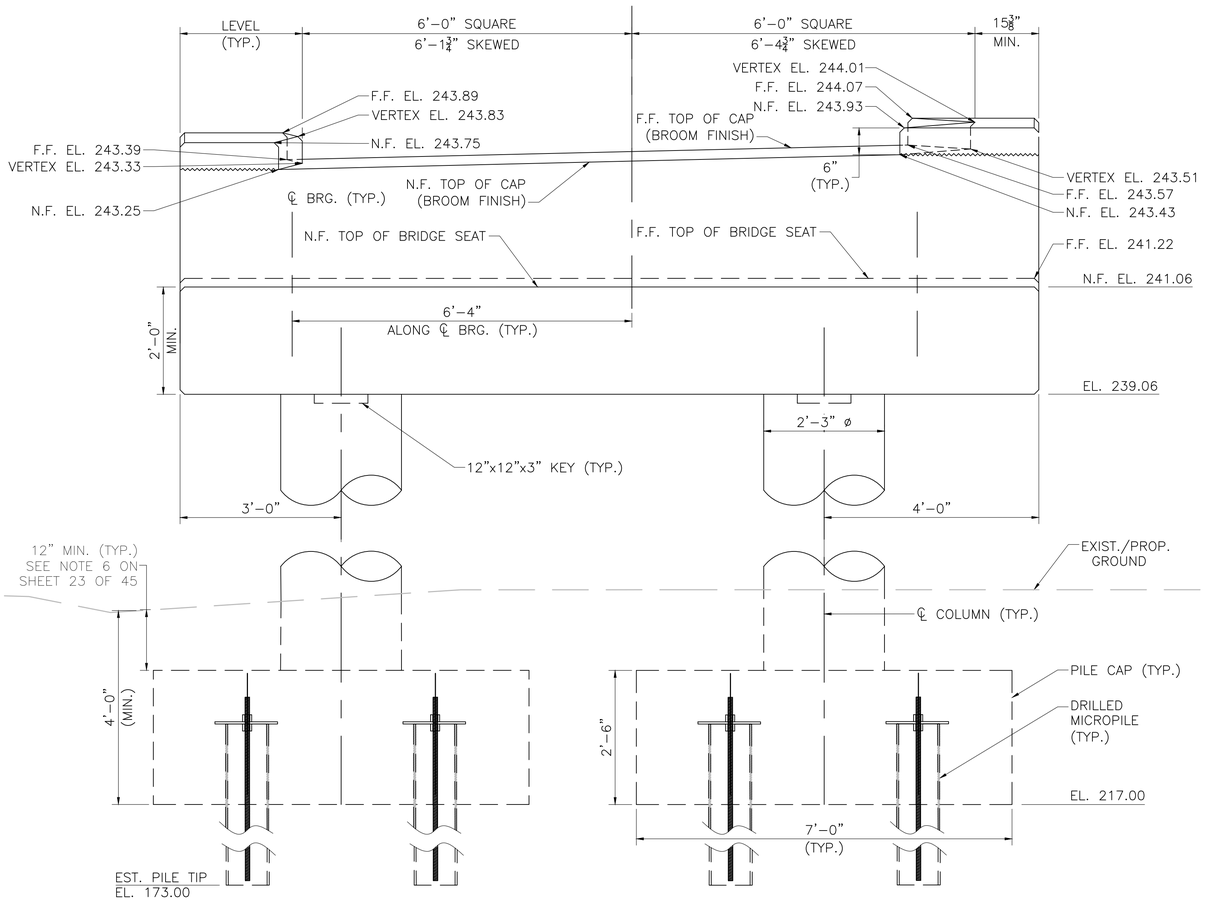
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	214	231
	PROJECT FILE NO. 608227		

PIER PLAN & ELEVATIONS - PIER 5 (2 OF 2)

NOTES:

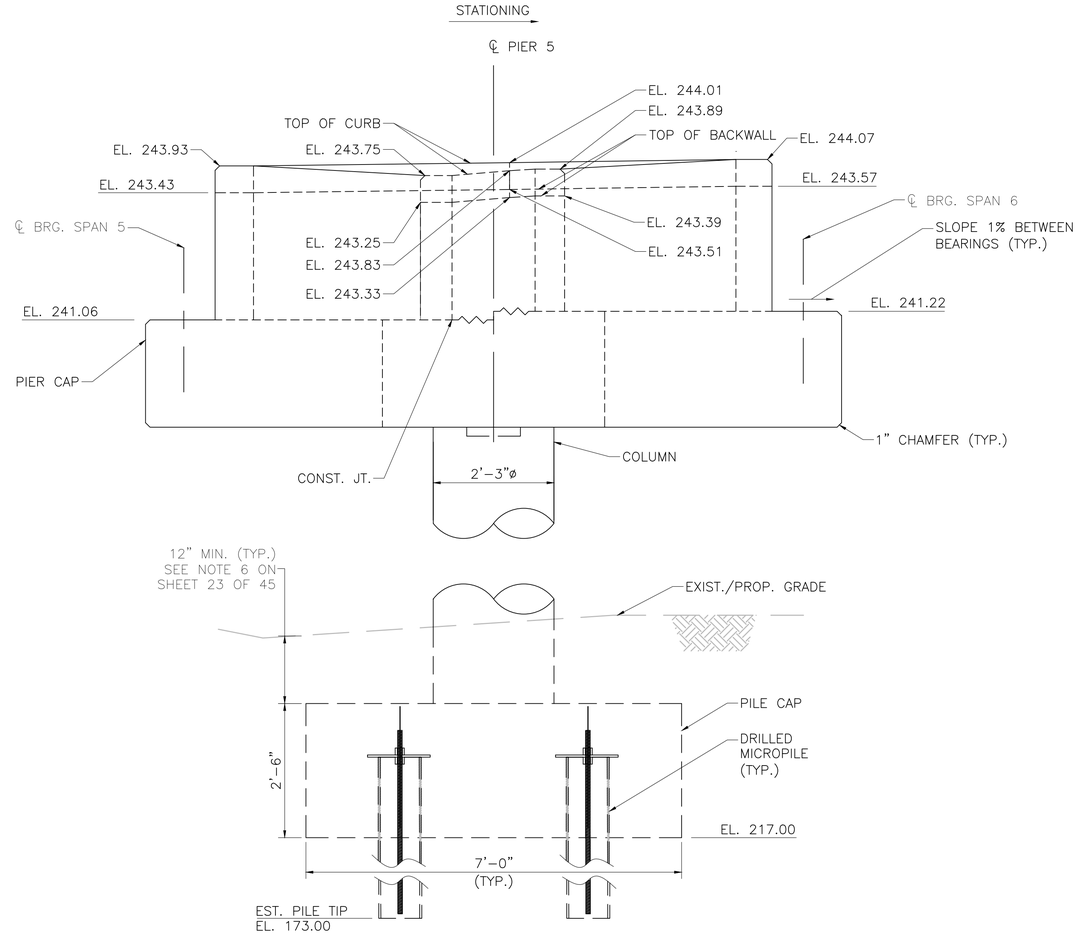
1. SEE SHEET 23 OF 45 FOR TYPICAL PIER NOTES AND TYPICAL PIER SECTIONS.



NOTE: ELEVATION VIEW SHOWN NORMAL TO CENTERLINE OF PIER

PIER 5 NORTH ELEVATION

SCALE: ¾" = 1'–0"



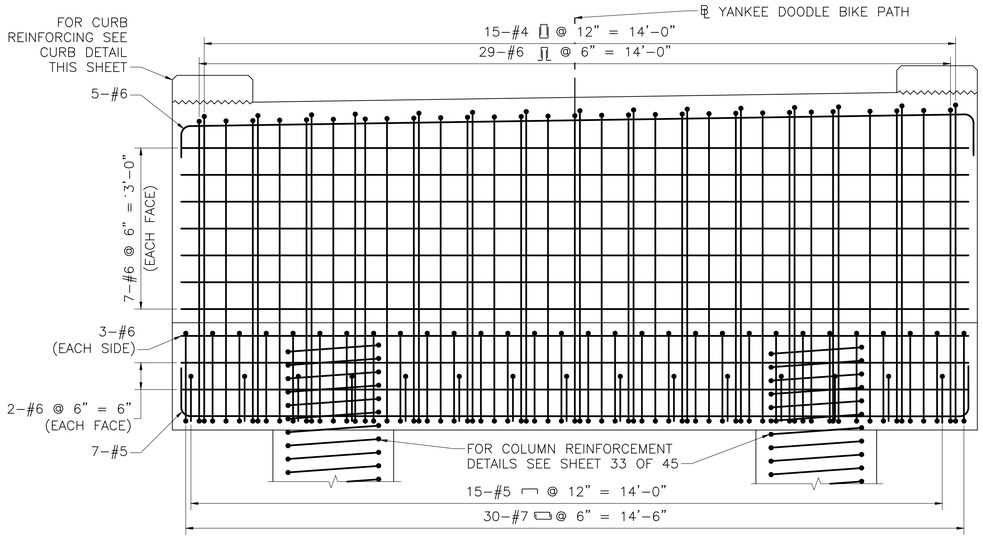
PIER 5 WEST ELEVATION

SCALE: ¾" = 1'–0"

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

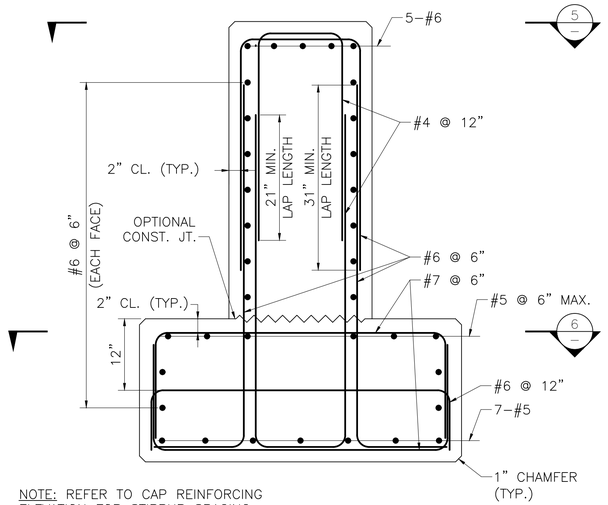
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR_6 PIER 5).DWG Plotted on 23-Jul-2025 12:55 PM
August-09-2025
Final Structural Submittal (SF)



CAP REINFORCING ELEVATION – PIERS 1 & 3

SCALE: $\frac{3}{4}$" = 1'–0"



NOTE: REFER TO CAP REINFORCING ELEVATION FOR STIRRUP SPACING.

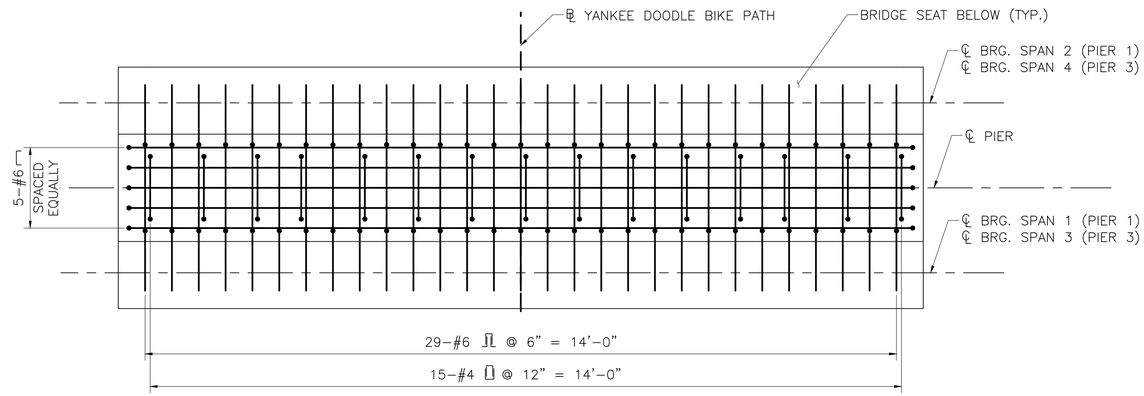
CAP REINFORCEMENT – PIERS 1 & 3

SCALE: 1" = 1'–0"

BILLERICA
YANKEE DOODLE BIKE PATH

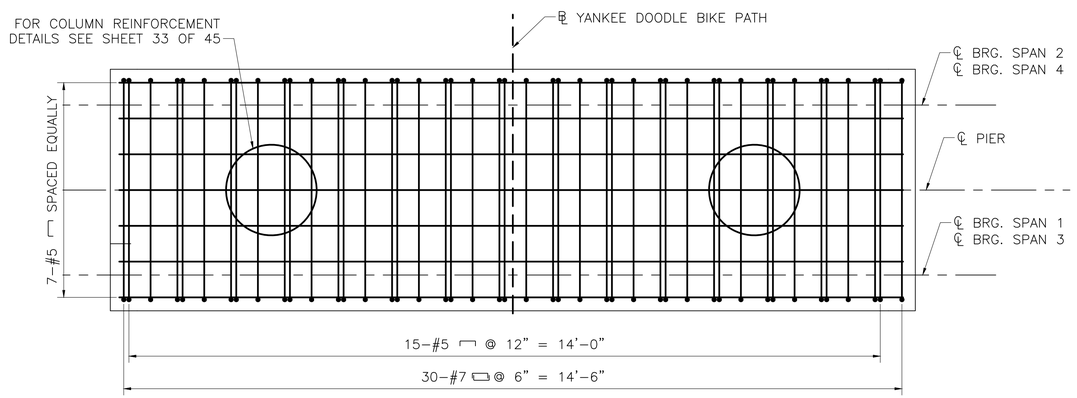
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	215	231
	PROJECT FILE NO. 608227		

PIER DETAILS - PIERS 1 & 3



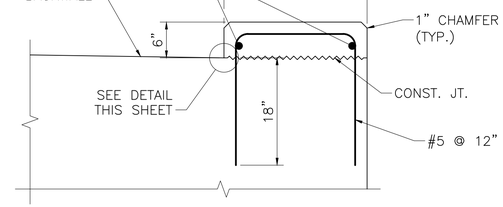
SECTION 5

SCALE: $\frac{3}{4}$" = 1'–0"



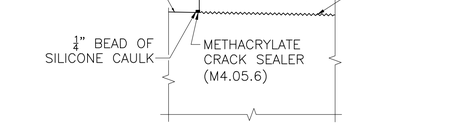
SECTION 6

SCALE: $\frac{3}{4}$" = 1'–0"



CURB DETAIL

SCALE: 1" = 1'–0"

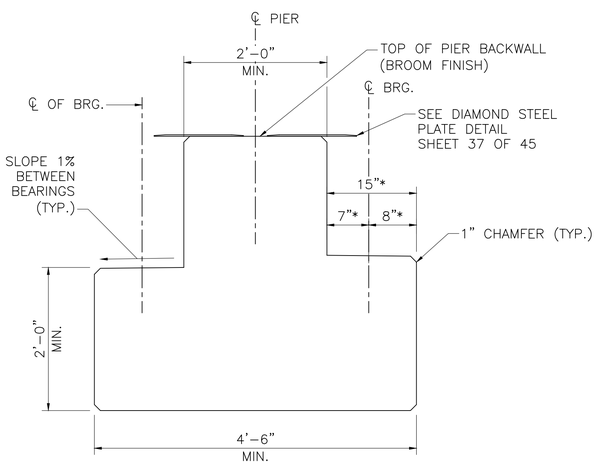


NOTES:

1. METHACRYLATE CRACK SEALER SHALL BE APPLIED AFTER CURB CURING PERIOD IS COMPLETE AND IN ACCORDANCE WITH REQUIREMENTS OF MANUFACTURER AND THE STANDARD SPECIFICATIONS.
2. BEFORE SEALING, THE CONCRETE AT THE INTERFACE OF THE BACKWALL AND CURB SHALL BE SWEPT CLEAN AND BLOWN OFF USING OIL FREE COMPRESSED AIR IMMEDIATELY PRIOR TO APPLYING THE SEALER.
3. APPLY ¼" HIGH BEAD OF SILICONE CAULKING COMPOUND ABOUT ¼" FROM THE FACE OF CURB.
4. METHACRYLATE SHALL THEN BE POURED INTO THE ¼" WIDE GAP BETWEEN THE FACE OF CURB AND THE BEAD OF CAULK.

FACE OF CURB DETAILS

SCALE: 1½" = 1'–0"



*NOTE: FINAL DIMENSIONS TO BE DETERMINED BY TRUSS MANUFACTURER

TYPICAL CAP SECTION

SCALE: 1" = 1'–0"

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

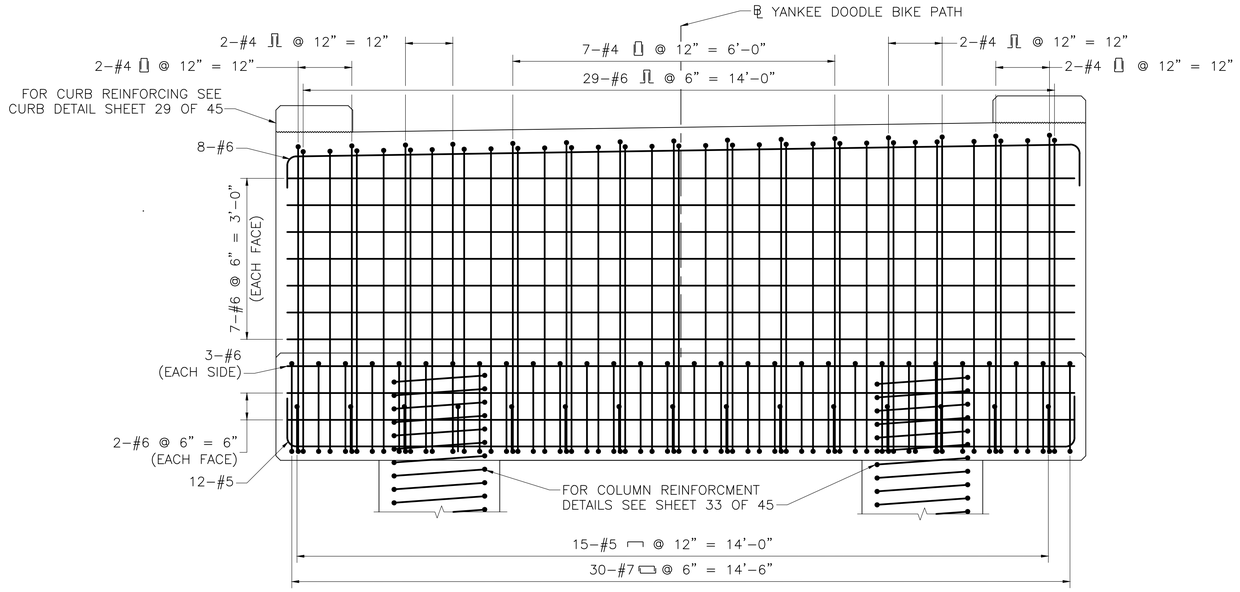
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR6 PIER DETAILS).DWG Plotted on 23-Jul-2025 12:56 PM
Final Structural Submittal (SF) August-09-2025

BILLERICA
YANKEE DOODLE BIKE PATH

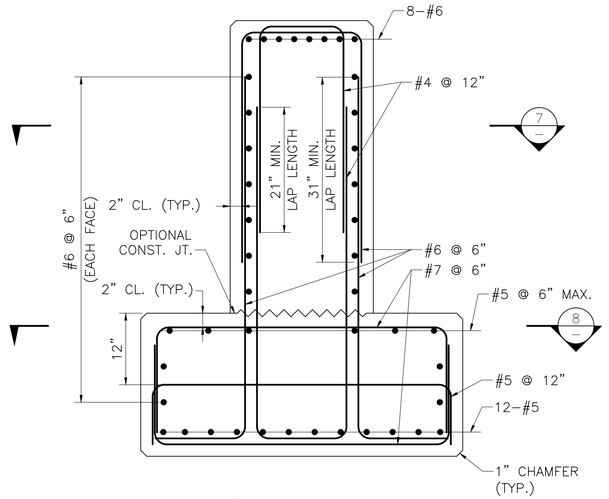
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	216	231
	PROJECT FILE NO. 608227		

PIER DETAILS - PIER 2



CAP REINFORCING ELEVATION – PIER 2

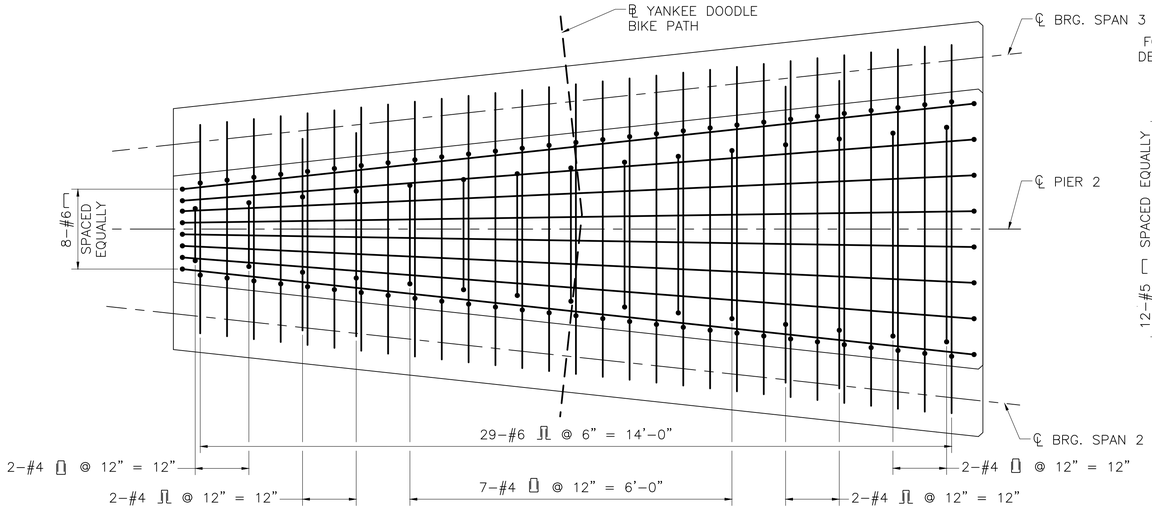
SCALE: $\frac{3}{4}$" = 1'–0"



NOTE: REFER TO CAP REINFORCING ELEVATION FOR STIRRUP SPACING.

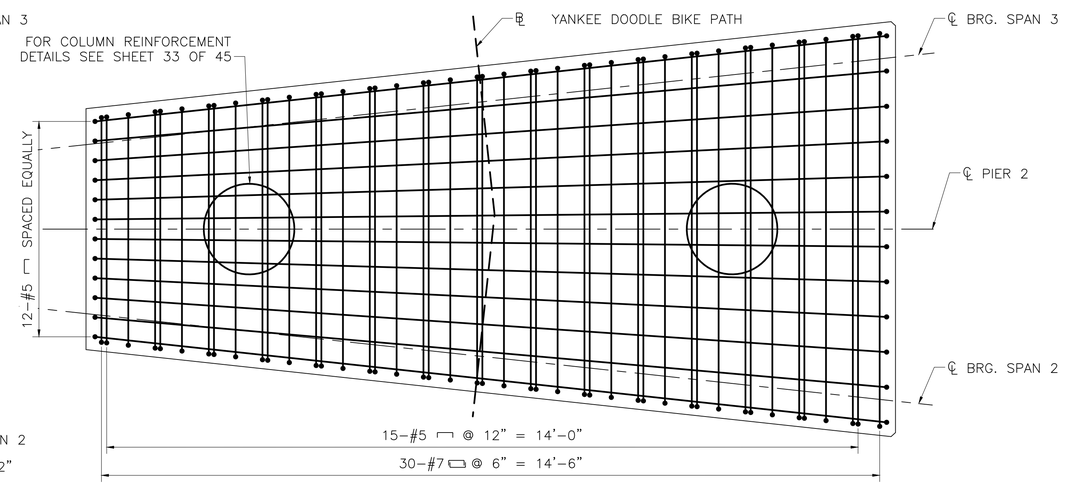
CAP REINFORCEMENT – PIER 2

SCALE: 1" = 1'–0"



SECTION 7

SCALE: $\frac{3}{4}$" = 1'–0"



SECTION 8

SCALE: $\frac{3}{4}$" = 1'–0"

NOTE:

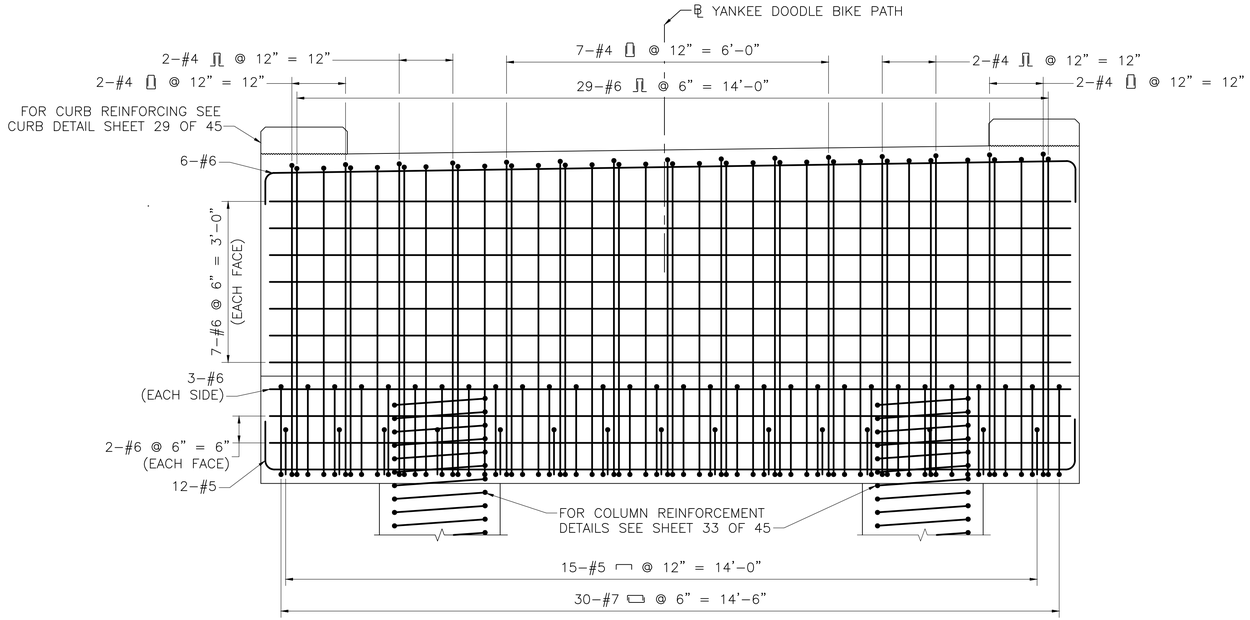
REFER TO SHEET 29 OF 45 FOR TYPICAL PIER DETAILS.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER

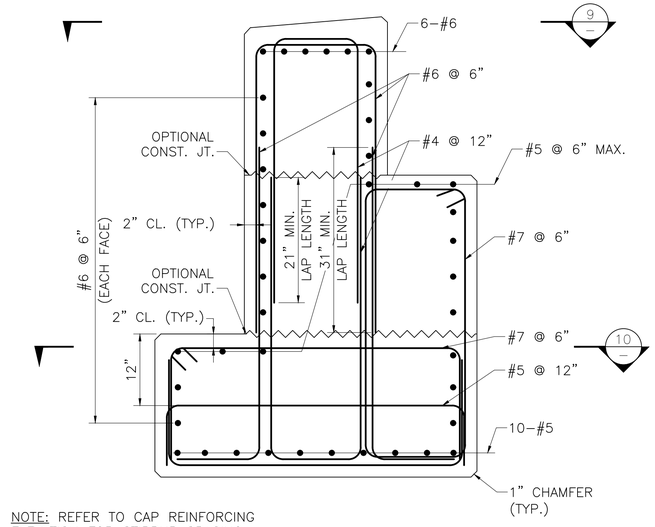
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR6 PIER DETAILS).DWG Plotted on 23-Jul-2025 12:56 PM
August-09-2025
Final Structural Submittal (SF)



CAP REINFORCING ELEVATION – PIER 4

SCALE: ¾" = 1'–0"



NOTE: REFER TO CAP REINFORCING ELEVATION FOR STIRRUP SPACING.

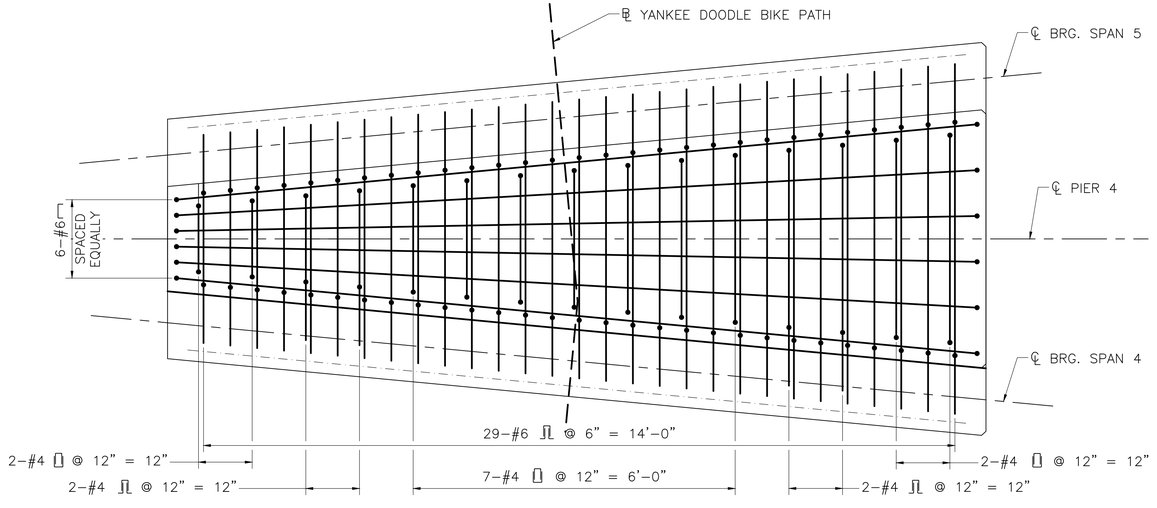
PIER 4 CAP REINFORCEMENT

SCALE: 1" = 1'–0"

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	217	231
	PROJECT FILE NO. 608227		

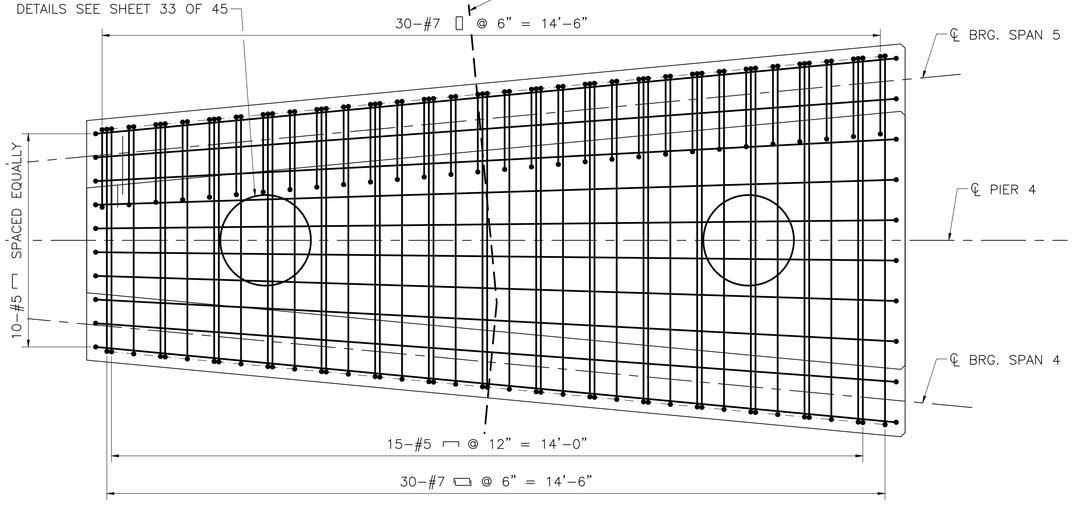
PIER DETAILS - PIER 4



NOTE: REFER TO CAP REINFORCING ELEVATION THIS SHEET FOR STIRRUP SPACING.

SECTION 9

SCALE: ¾" = 1'–0"



SECTION 10

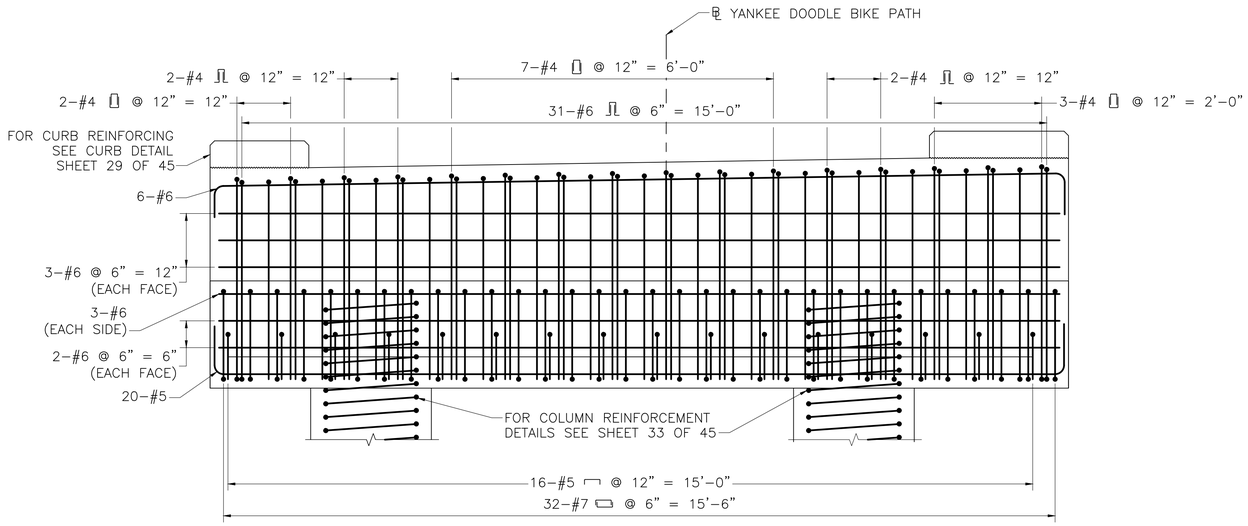
SCALE: ¾" = 1'–0"

NOTE:

REFER TO SHEET 29 OF 45 FOR TYPICAL PIER DETAILS.

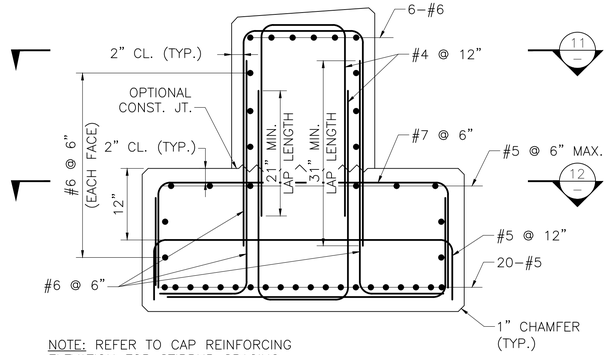
August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT AUTHORIZED SIGNATORY:	STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE	

608227_BR(STR6 PIER DETAILS).DWG Plotted on 23-Jul-2025 12:56 PM
August-09-2025
Final Structural Submittal (SF)



CAP REINFORCING ELEVATION – PIER 5

SCALE: ¾" = 1'–0"



NOTE: REFER TO CAP REINFORCING ELEVATION FOR STIRRUP SPACING.

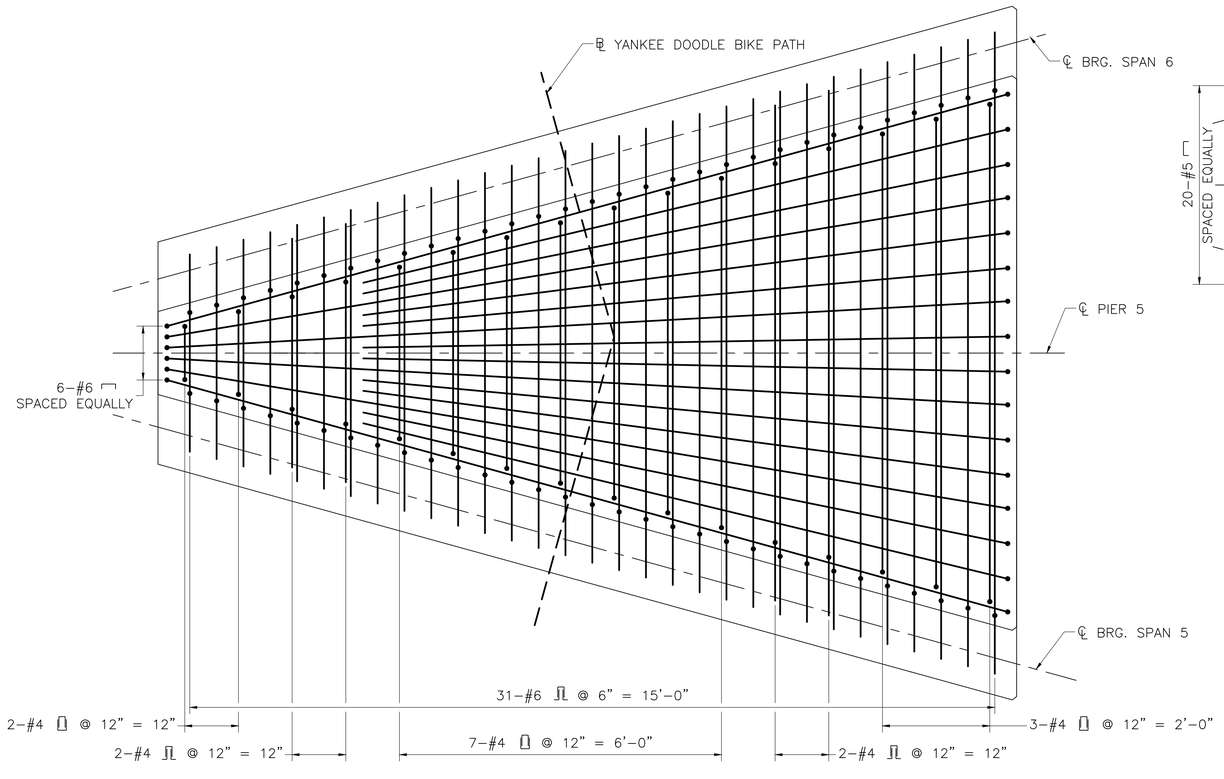
PIER 5 CAP REINFORCEMENT

SCALE: 1" = 1'–0"

BILLERICA
YANKEE DOODLE BIKE PATH

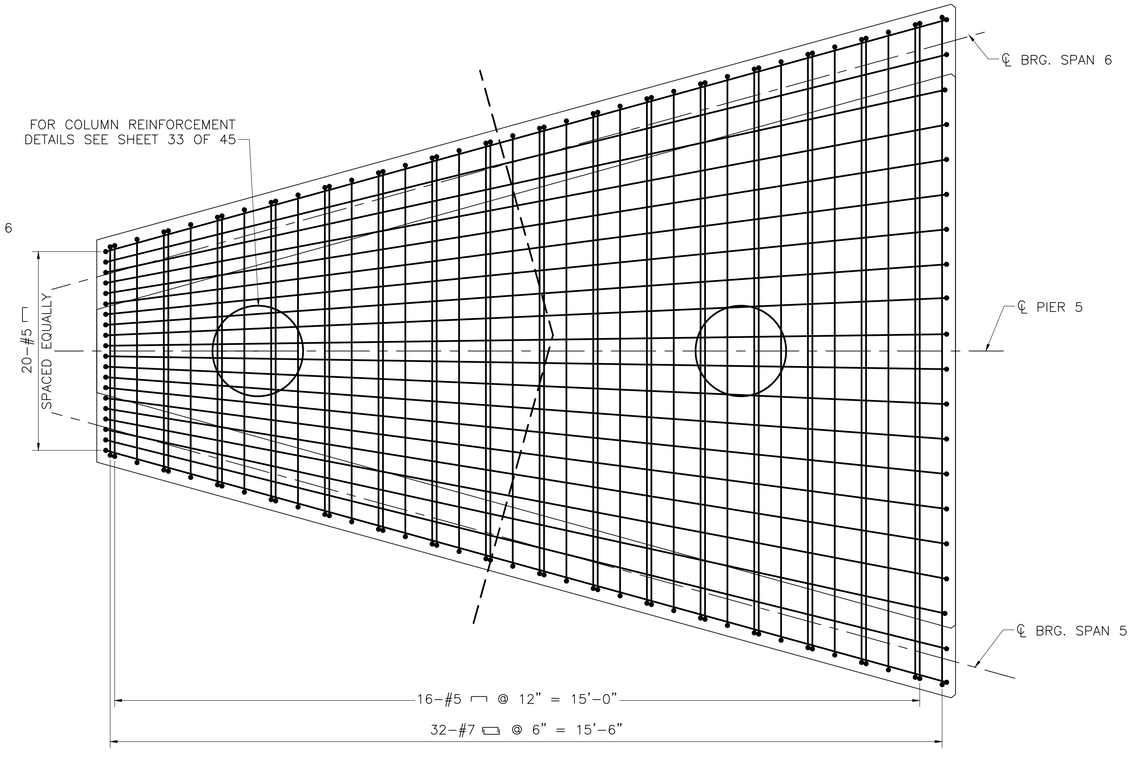
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	218	231
PROJECT FILE NO.	608227		

PIER DETAILS - PIER 5



SECTION 11

SCALE: ¾" = 1'–0"



SECTION 12

SCALE: ¾" = 1'–0"

NOTE:

REFER TO SHEET 29 OF 45 FOR TYPICAL PIER DETAILS.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER

USE ONLY PRINTS OF LATEST DATE

608227_BR(STR6 PIER DETAILS).DWG Plotted on 23-Jul-2025 12:56 PM

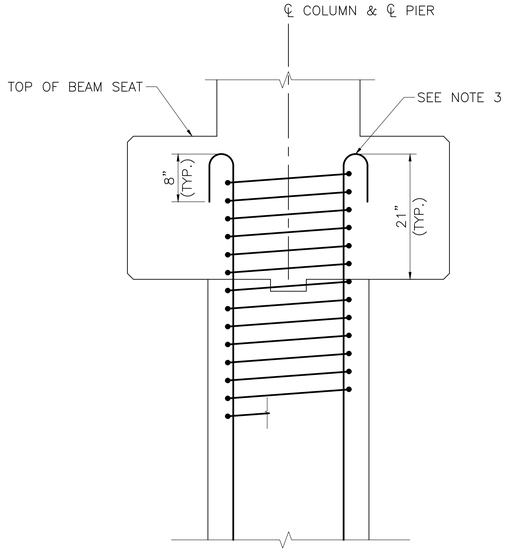
August-09-2025

Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

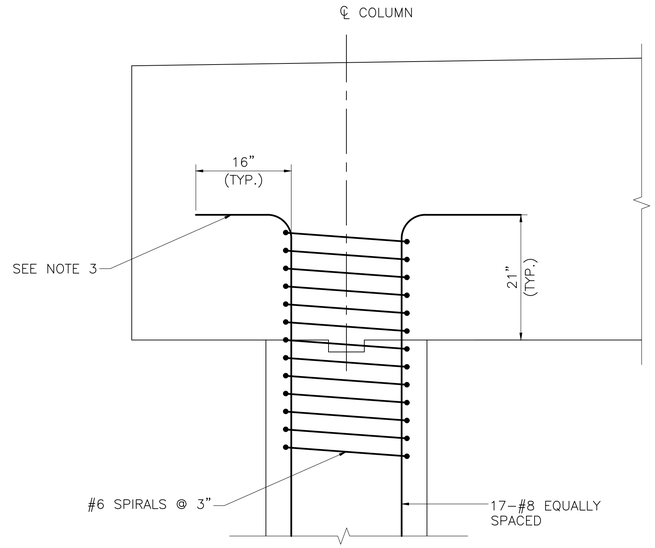
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	219	231
PROJECT FILE NO.	608227		

COLUMN DETAILS



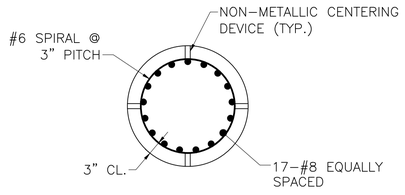
TYPICAL PIER SECTION

SCALE: 1" = 1'–0"



PARTIAL PIER ELEVATION DETAILS

SCALE: 1" = 1'–0"



NOTE:

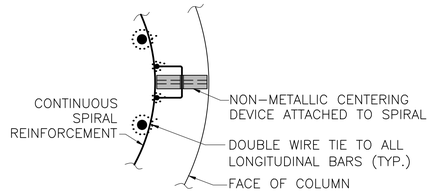
NON–METALLIC CENTERING DEVICES TO BE PLACED AT 1/4 POINTS IN COLUMN. DETAILS OF ALTERNATIVE CENTERING DEVICES MUST BE SUBMITTED TO AND APPROVED BY THE STATE BRIDGE ENGINEER.

TYPICAL PIER COLUMN SECTION

SCALE: $\frac{3}{4}$" = 1'–0"

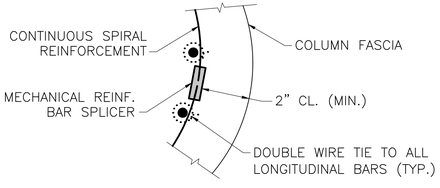
NOTES:

1. PIER CAP REINFORCEMENT OMITTED FOR CLARITY.
2. OPTIONAL STAGGERED MECHANICAL SPLICERS CONFORMING TO MASSDOT SPECIFICATIONS ALLOWED WITHIN CENTER HALF OF THE COLUMN.
3. WHERE LEDGE DISTANCE ALLOWS, CONTRACTOR SHALL USE 90 DEGREE BENDS, OTHERWISE 180 DEGREE BEND MAY BE USED.



CENTERING DEVICE DETAIL

NOT TO SCALE



SPIRAL REINFORCEMENT SPLICE DETAIL

NOT TO SCALE

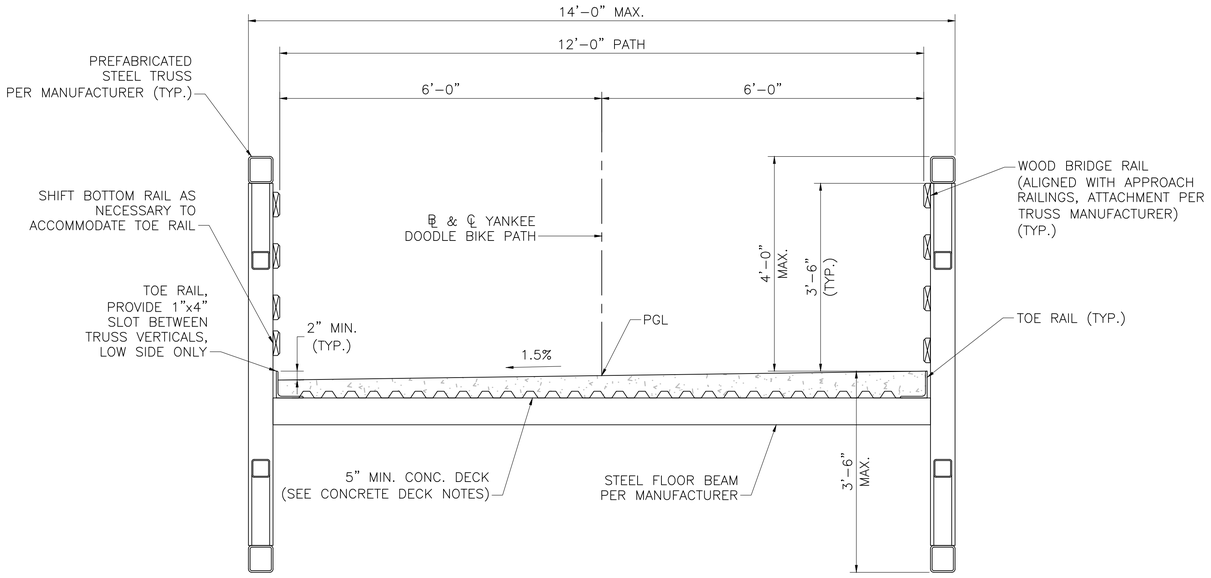
August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT AUTHORIZED SIGNATORY:	STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE	

608227_BR(STR6 PIER DETAILS).DWG Plotted on 23-Jul-2025 12:56 PM
August-09-2025 Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

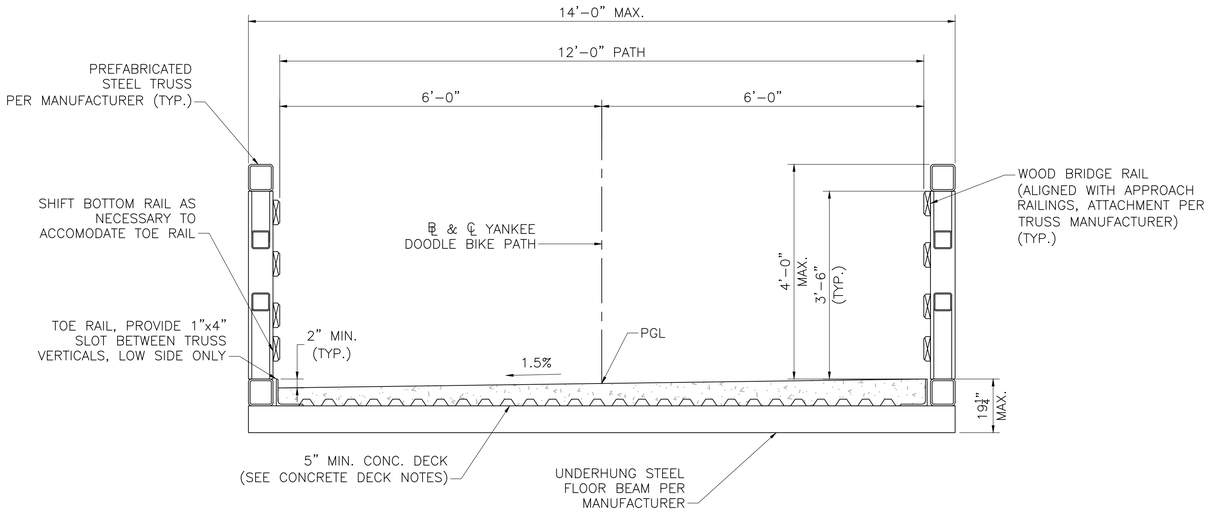
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	220	231
PROJECT FILE NO.	608227		

TRANSVERSE SECTIONS



TYPICAL SECTION – TRUSS TYPE 1 – SPANS 1, 2, 3, AND 4

SCALE: ¾" = 1'–0"



TYPICAL SECTION – TRUSS TYPE 2 – SPANS 5 AND 6

SCALE: ¾" = 1'–0"

CONCRETE DECK NOTES:

1. 5" MINIMUM CONCRETE DECK THICKNESS SHALL BE MEASURED FROM CENTROID OF STAY–IN–PLACE FORM TO TOP SURFACE OF CONCRETE.
2. DECK CONCRETE SHALL BE 5000 PSI HP CEMENT CONCRETE.
3. REINFORCING SHALL BE EPOXY COATED.
4. DESIGN OF DECK SHALL BE BY TRUSS MANUFACTURER.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: _____ STATE BRIDGE ENGINEER

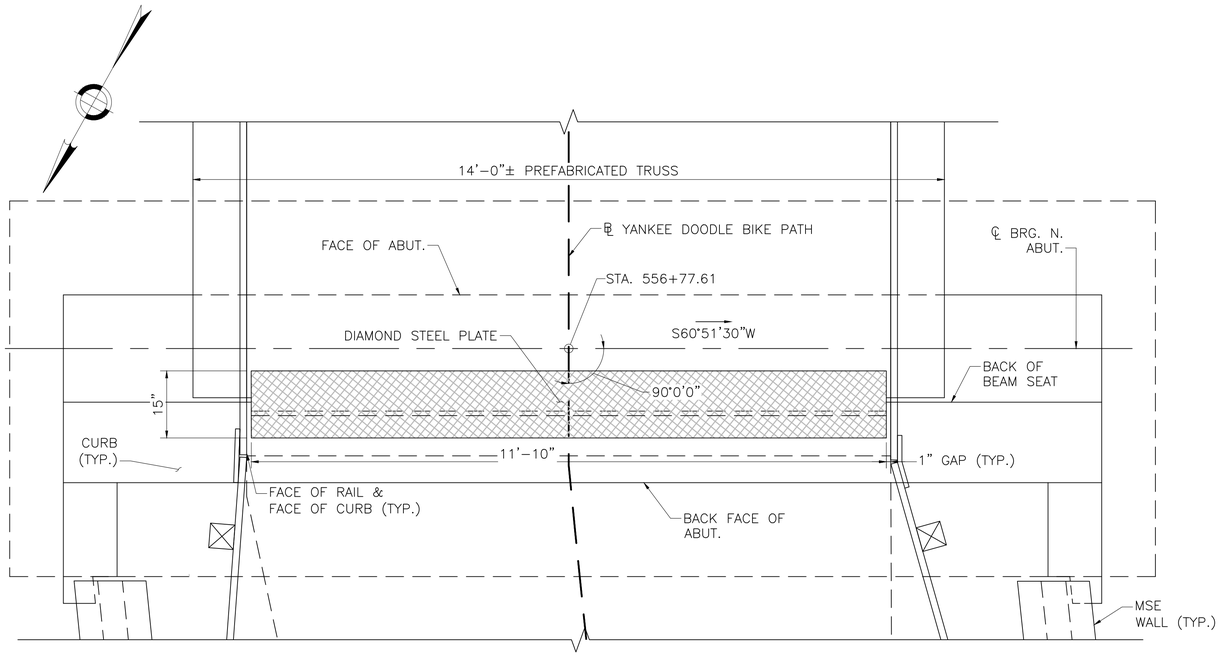
USE ONLY PRINTS OF LATEST DATE

608227_BR(STRC-TOLERANCES).DWG Plotted on 23-Jul-2025 12:57 PM
August-09-2025
Final Structural Submittal (SF)

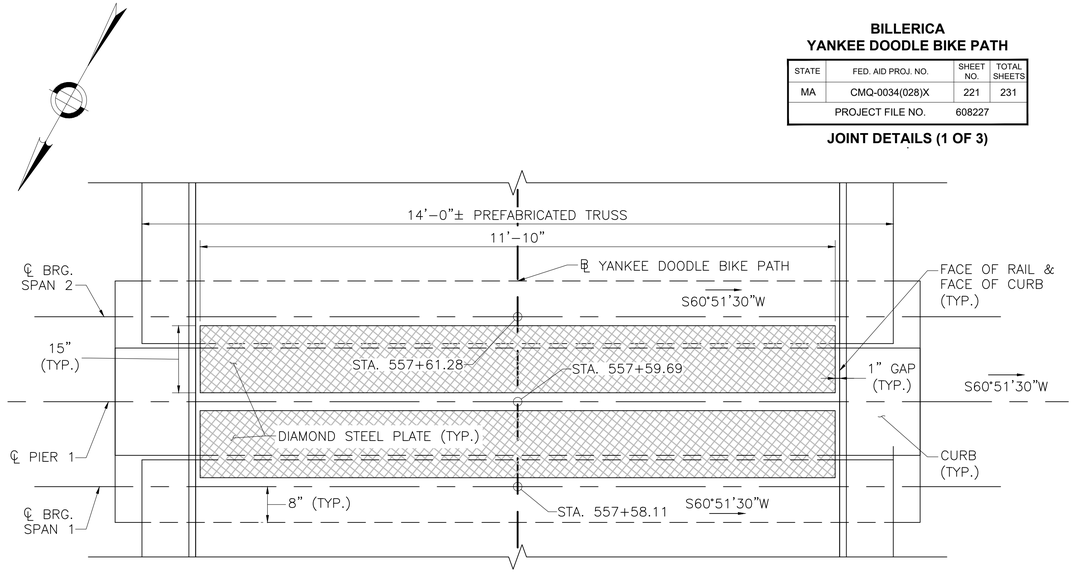
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	221	231
	PROJECT FILE NO. 608227		

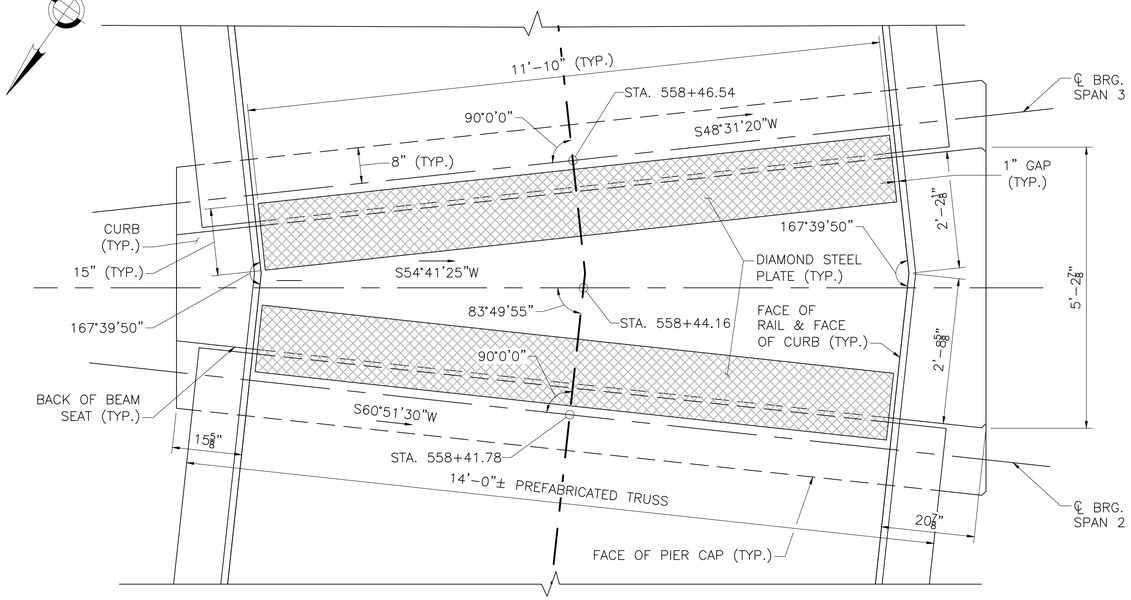
JOINT DETAILS (1 OF 3)



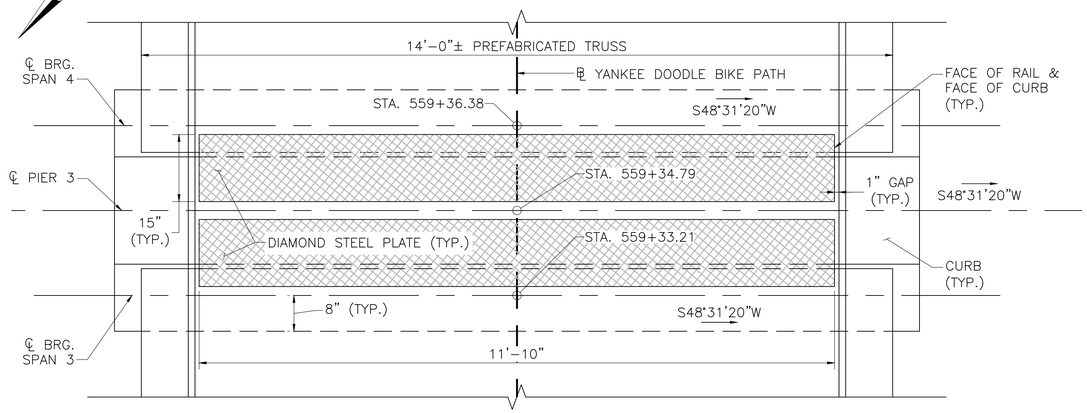
NORTH ABUTMENT JOINT PLAN
SCALE: $\frac{3}{4}$" = 1'–0"



PIER 1 JOINT PLAN
SCALE: $\frac{3}{4}$" = 1'–0"



PIER 2 JOINT PLAN
SCALE: $\frac{3}{4}$"" = 1'–0"



PIER 3 JOINT PLAN
SCALE: $\frac{3}{4}$" = 1'–0"

NOTES:

1. SEE SHEET 23 OF 45 FOR TYPICAL PIER NOTES.
2. SEE SHEET 37 OF 45 FOR DIAMOND STEEL PLATE DETAILS.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

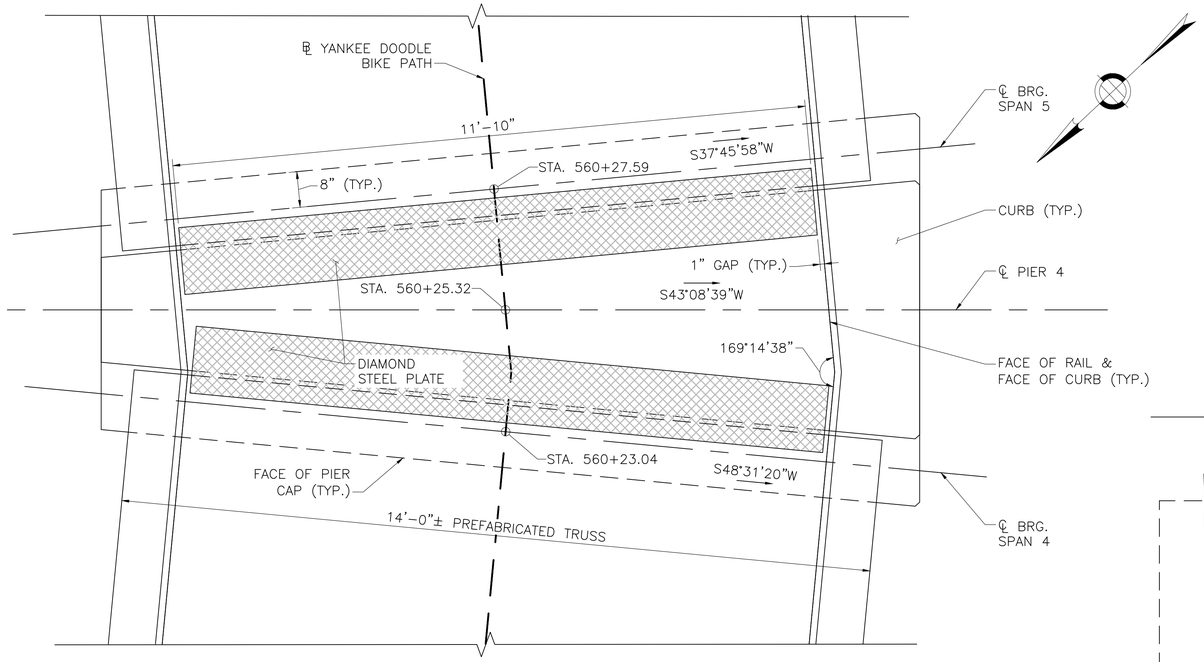
608227_BR(STR_6 JT PLAN).DWG Plotted on 23-Jul-2025 12:58 PM

August-09-2025 Final Structural Submittal (SF)

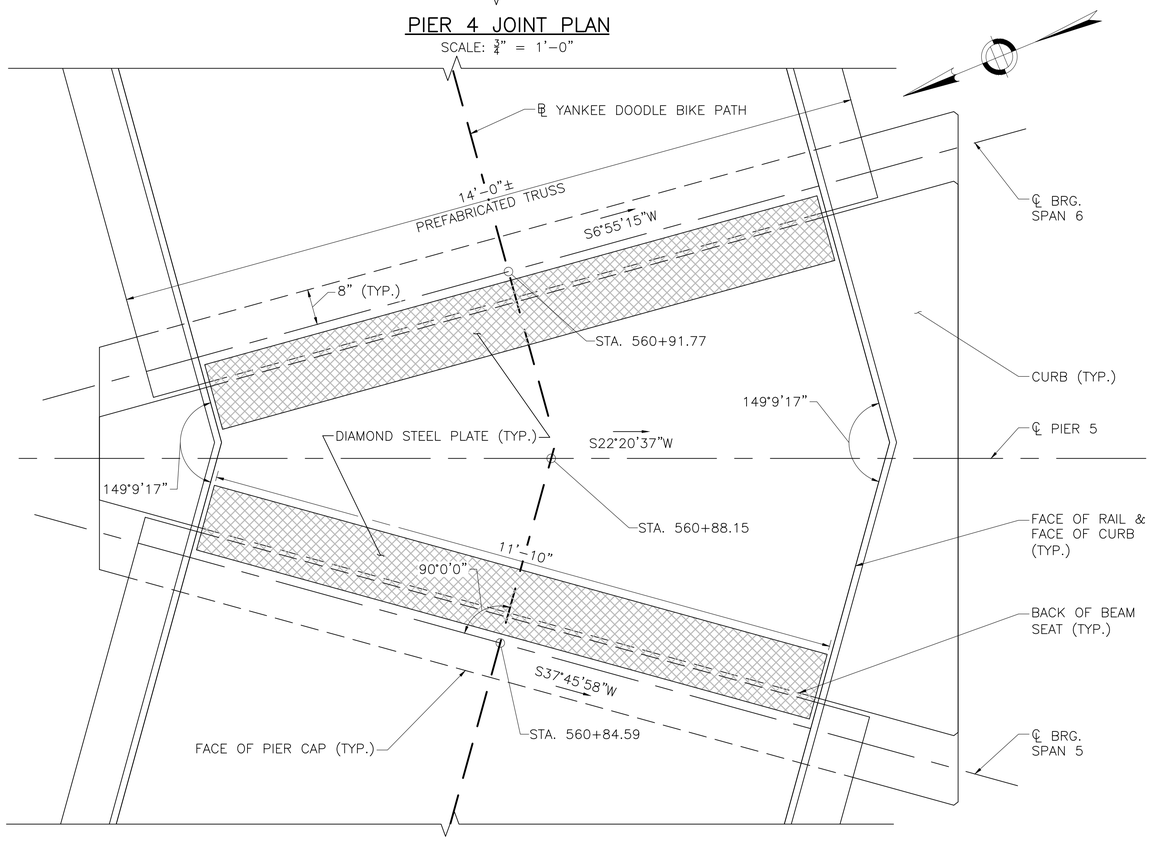
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	222	231
	PROJECT FILE NO. 608227		

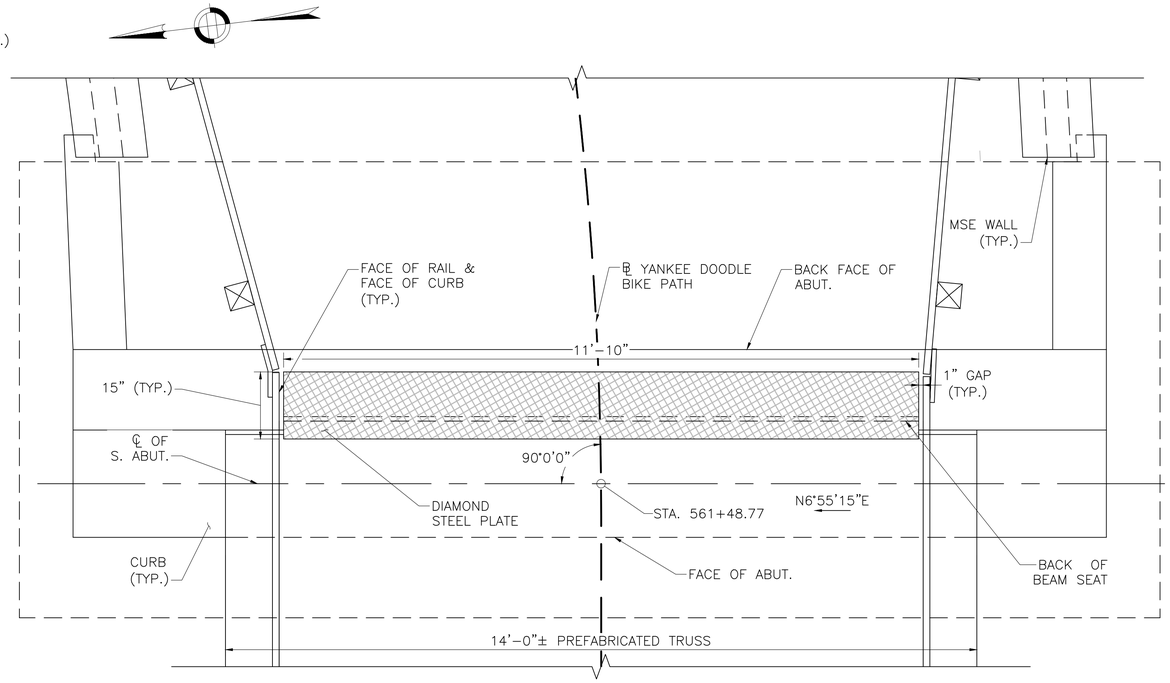
JOINT DETAILS (2 OF 3)



PIER 4 JOINT PLAN
SCALE: ¾" = 1'-0"



PIER 5 JOINT PLAN
SCALE: ¾" = 1'-0"



SOUTH ABUTMENT JOINT PLAN
SCALE: ¾" = 1'-0"

NOTES:

1. SEE SHEET 23 OF 45 FOR TYPICAL PIER NOTES.
2. SEE SHEET 37 OF 45 FOR DIAMOND STEEL PLATE DETAILS.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

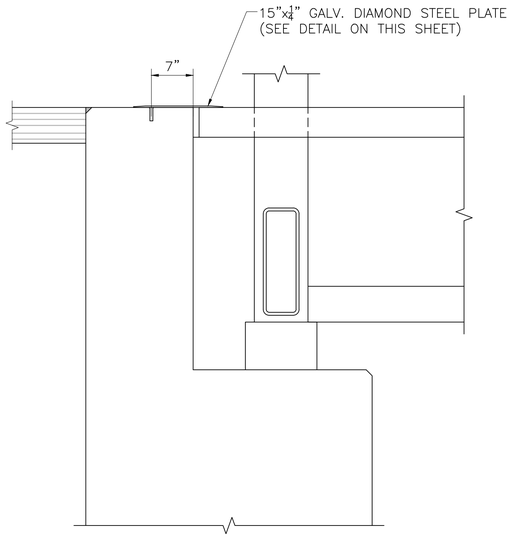
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR_6 JT PLAN).DWG Plotted on 23-Jul-2025 12:58 PM
August-09-2025
Final Structural Submittal (SF)

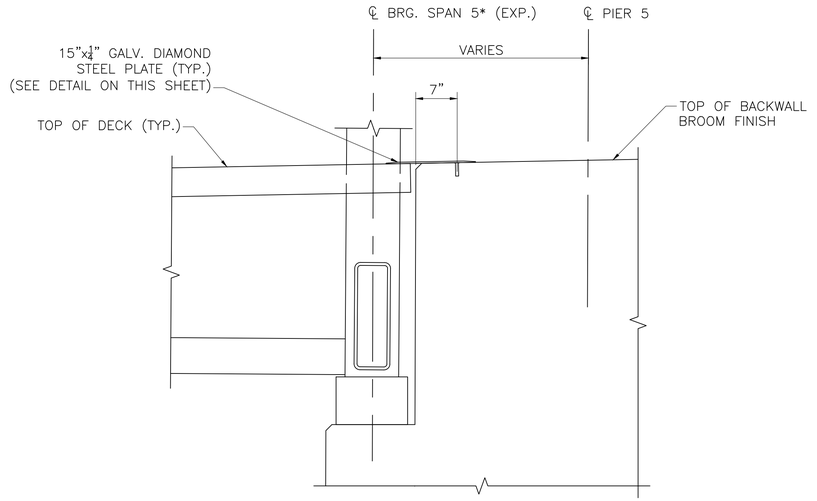
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	223	231
	PROJECT FILE NO. 608227		

JOINT DETAILS (3 OF 3)

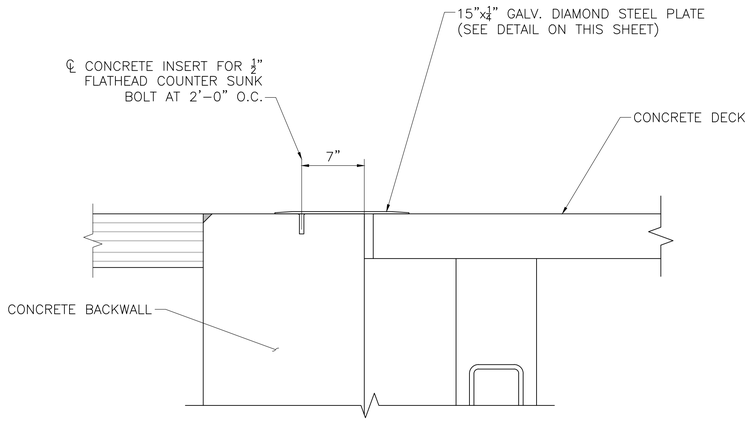


TYPICAL DECK JOINT DETAIL @ ABUTMENT
SCALE: 1" = 1'-0"



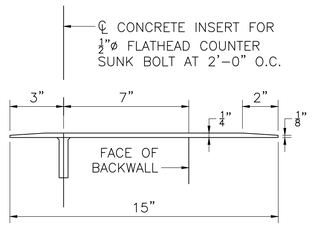
*NOTE: PIER 5 SHOWN. PIERS 1, 2, 3, AND 4 SIMILAR.
SEE SHEETS 23 THROUGH 32 OF 45 FOR PIER DETAILS.

TYPICAL DECK JOINT DETAIL @ PIER CAP
SCALE: 1" = 1'-0"



NOTE: ABUTMENT SHOWN, PIER SIMILAR

TYPICAL DECK JOINT DETAIL
SCALE: 1½" = 1'-0"



DIAMOND PLATE DETAIL
SCALE: 3" = 1'-0"

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

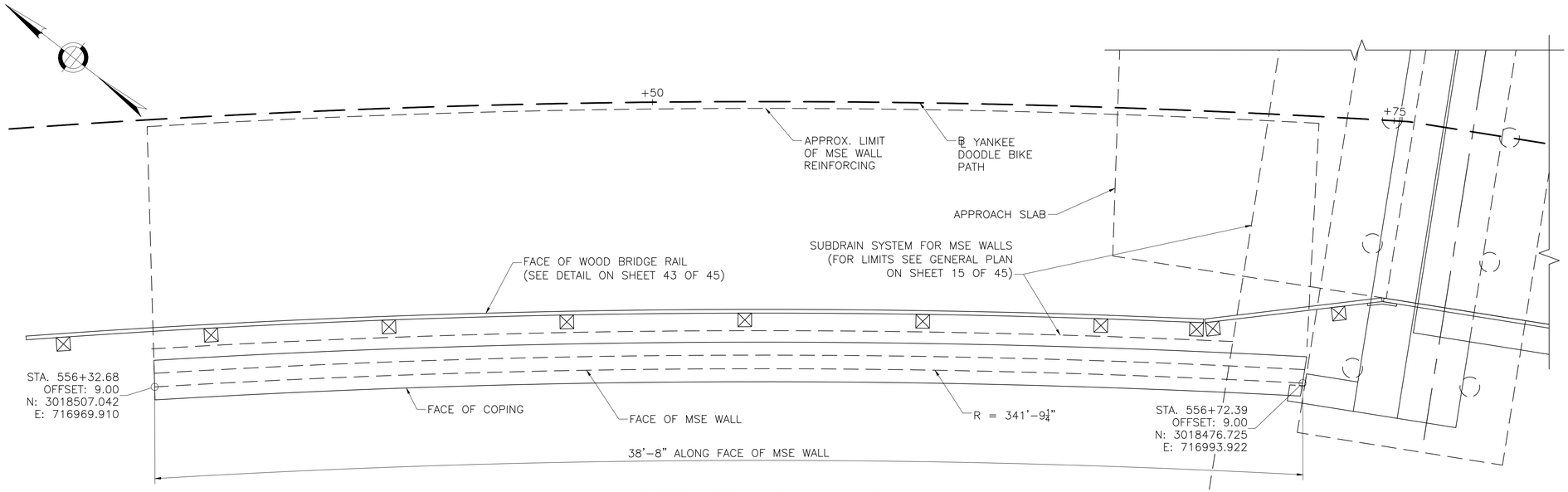
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR_6 JT PLAN).DWG Plotted on 23-Jul-2025 12:58 PM
August-09-2025
Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

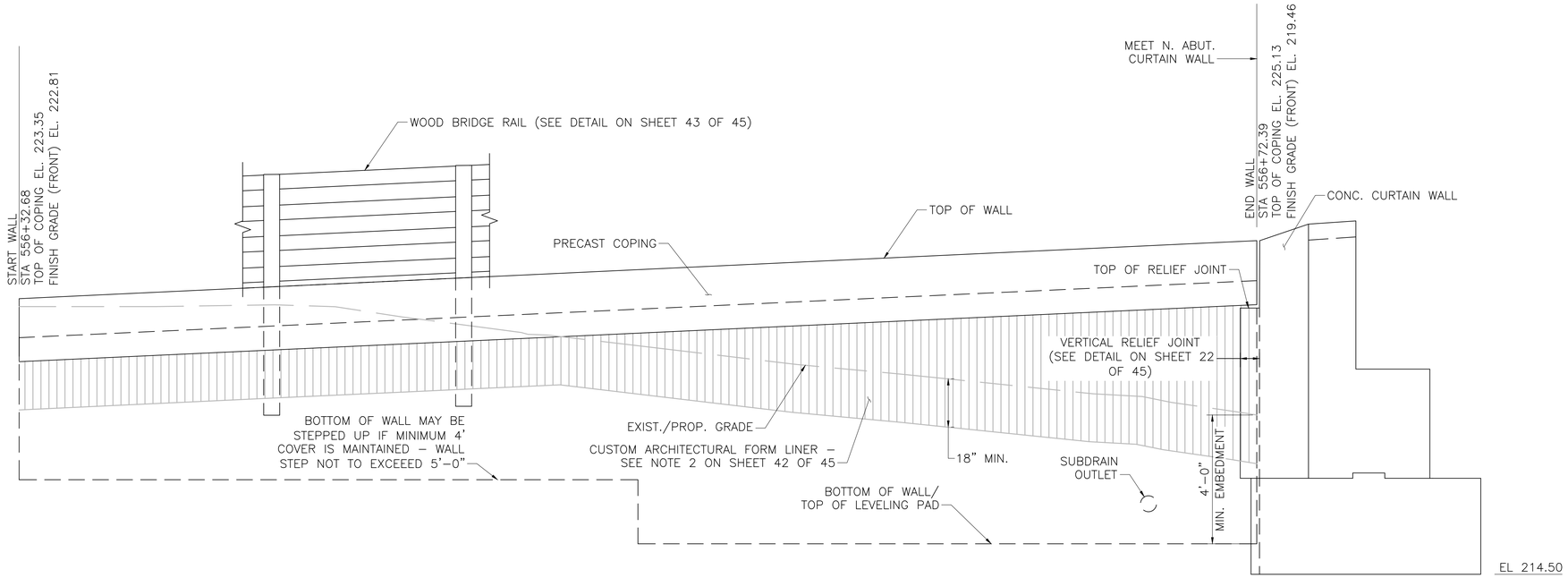
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	224	231
	PROJECT FILE NO. 608227		

NORTH MSE WALL PLAN & ELEVATION (1 OF 2)



NORTHWEST MSE WALL – PLAN

SCALE: ½" = 1'-0"



NORTHWEST MSE WALL – PROJECTED ELEVATION

SCALE: ½" = 1'-0"

NOTES:

1. SEE SHEET 42 OF 45 FOR MSE WALL NOTES.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER

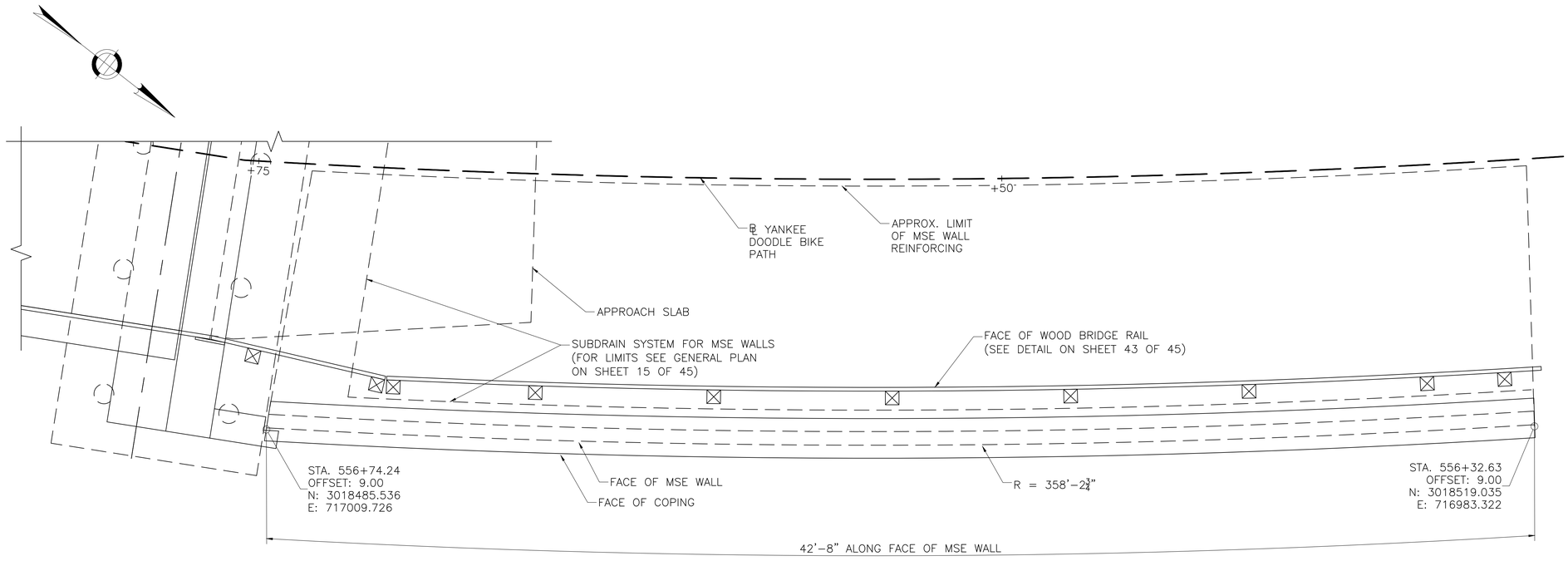
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR)-MSE_WALLS) RECOVER.DWG Plotted on 23-Jul-2025 12:59 PM
August-09-2025
Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

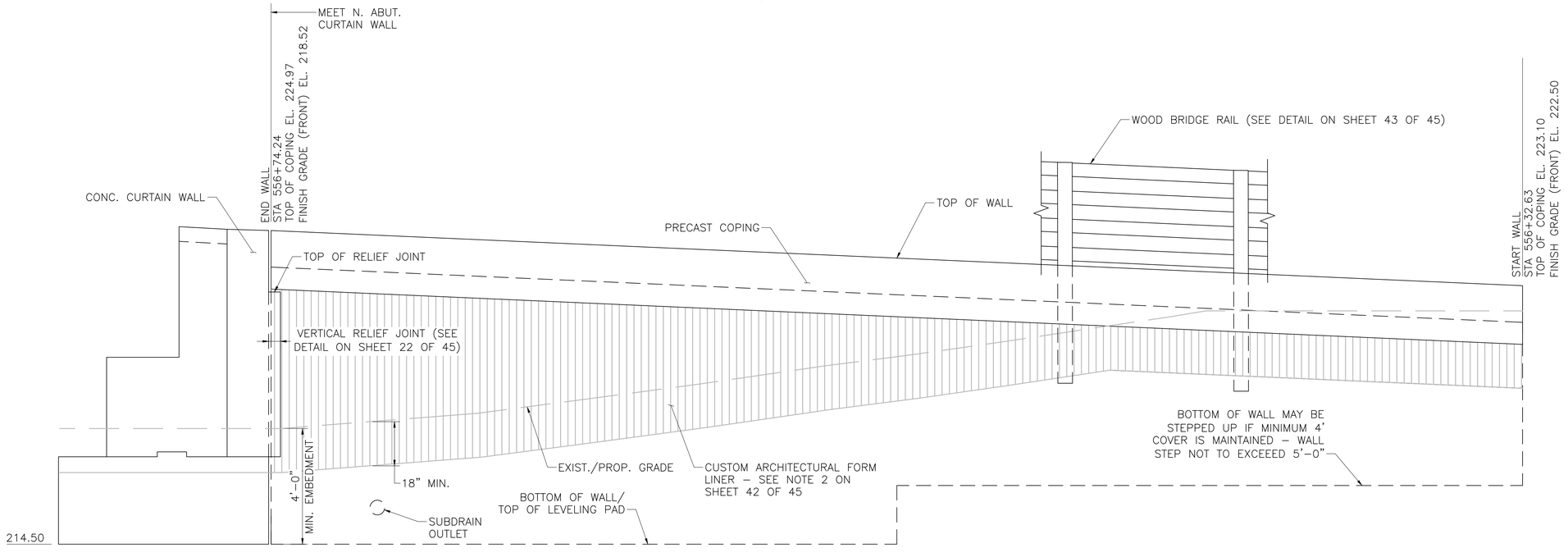
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	225	231
PROJECT FILE NO.	608227		

NORTH MSE WALL PLAN & ELEVATION (2 OF 2)



NORTHEAST MSE WALL – PLAN

SCALE: ½" = 1'-0"



NORTHEAST MSE WALL – PROJECTED ELEVATION

SCALE: ½" = 1'-0"

NOTES:

1. SEE SHEET 42 OF 45 FOR MSE WALL NOTES.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER

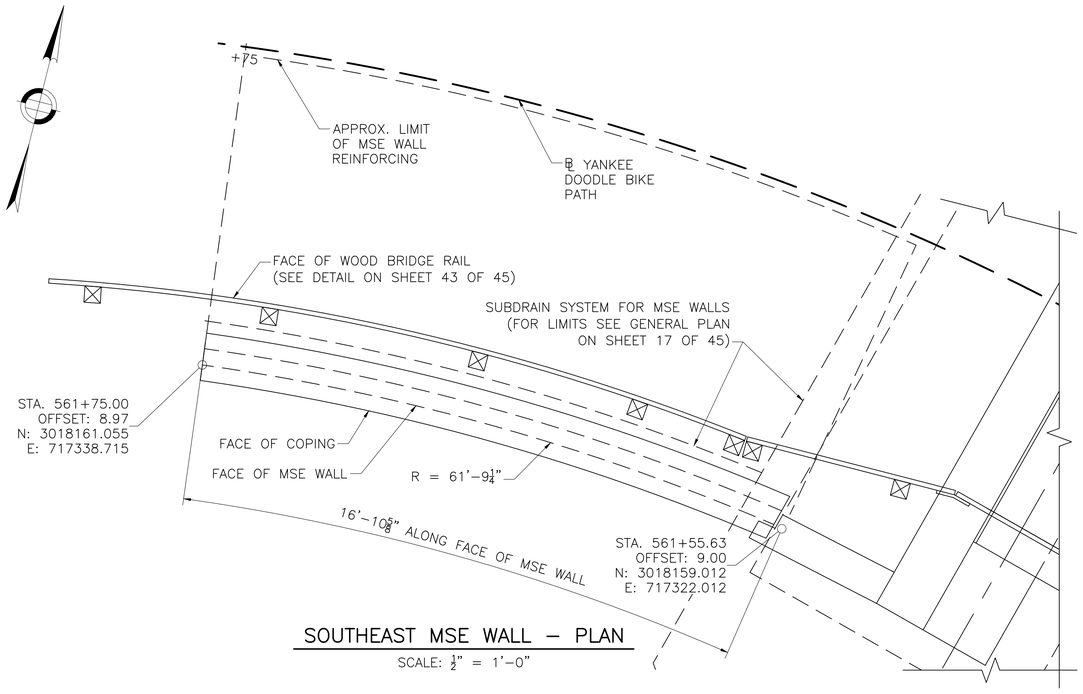
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR)-MSE_WALLS) RECOVER.DWG Plotted on 23-Jul-2025 12:59 PM
August-09-2025
Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

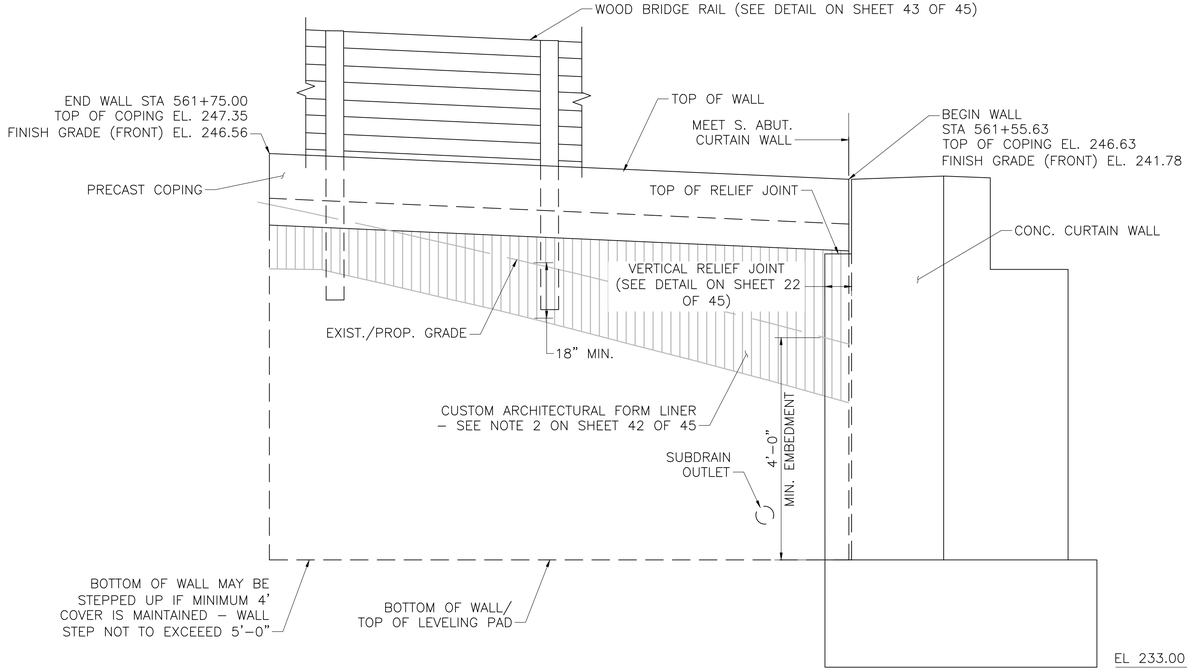
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	226	231
	PROJECT FILE NO. 608227		

SOUTH MSE WALL PLAN & ELEVATION (1 OF 2)



SOUTHEAST MSE WALL – PLAN

SCALE: ½" = 1'-0"



SOUTHEAST MSE WALL – PROJECTED ELEVATION

SCALE: ½" = 1'-0"

NOTES:

1. SEE SHEET 42 OF 45 FOR MSE WALL NOTES.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

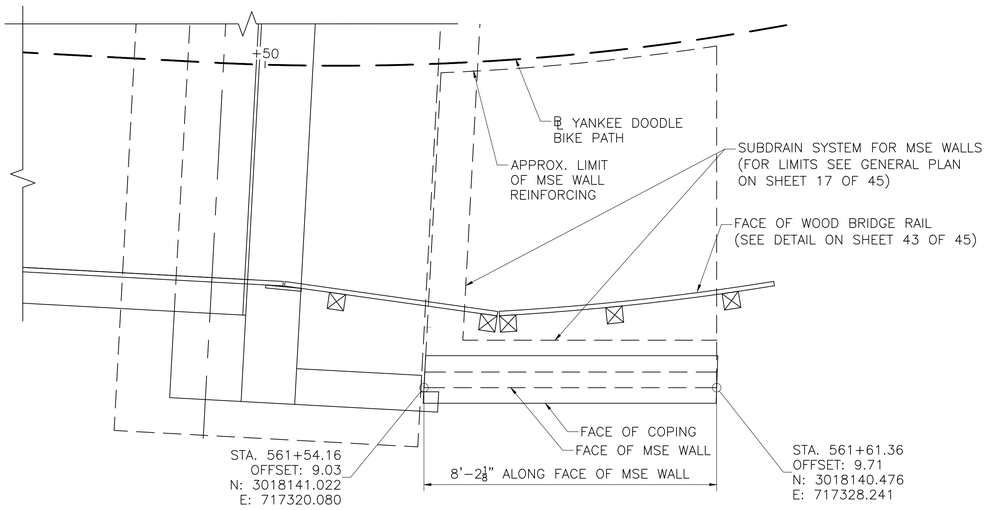
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR6-MSE_WALLS) RECOVER.DWG Plotted on 23-Jul-2025 12:59 PM
August-09-2025 Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

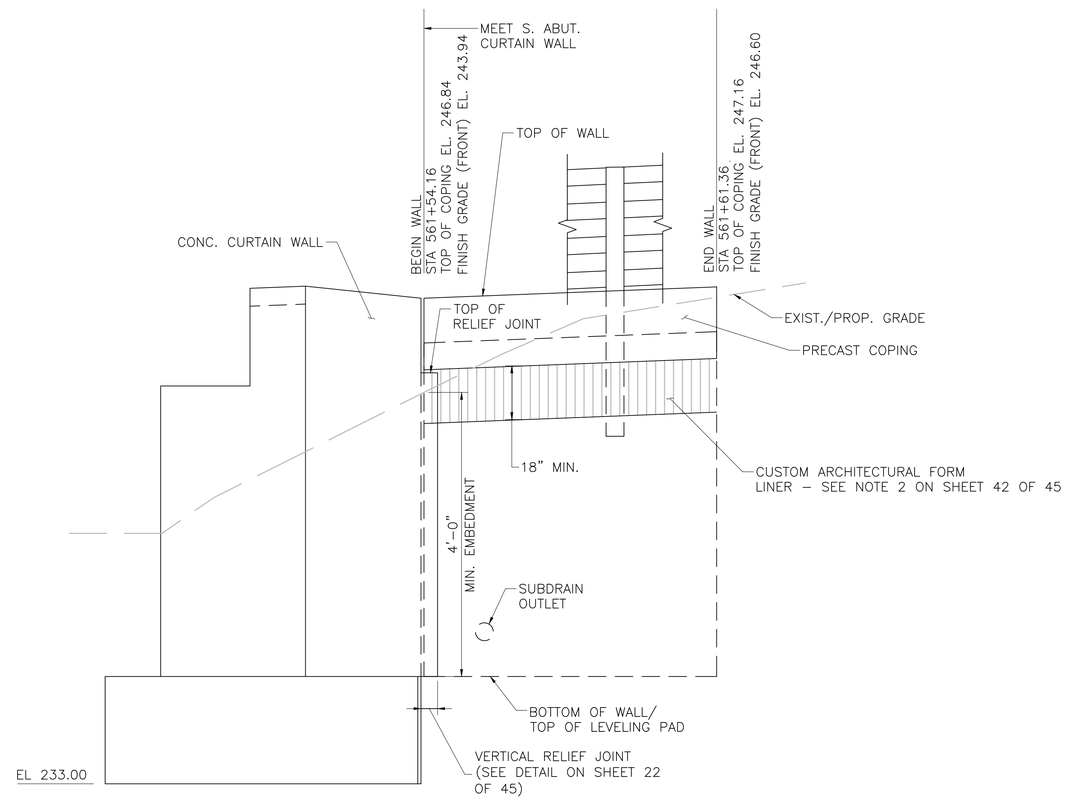
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	227	231
	PROJECT FILE NO. 608227		

SOUTH MSE WALL PLAN & ELEVATION (2 OF 2)



SOUTHWEST MSE WALL – PLAN

SCALE: ½" = 1'–0"



SOUTHWEST MSE WALL – PROJECTED ELEVATION

SCALE: ½" = 1'–0"

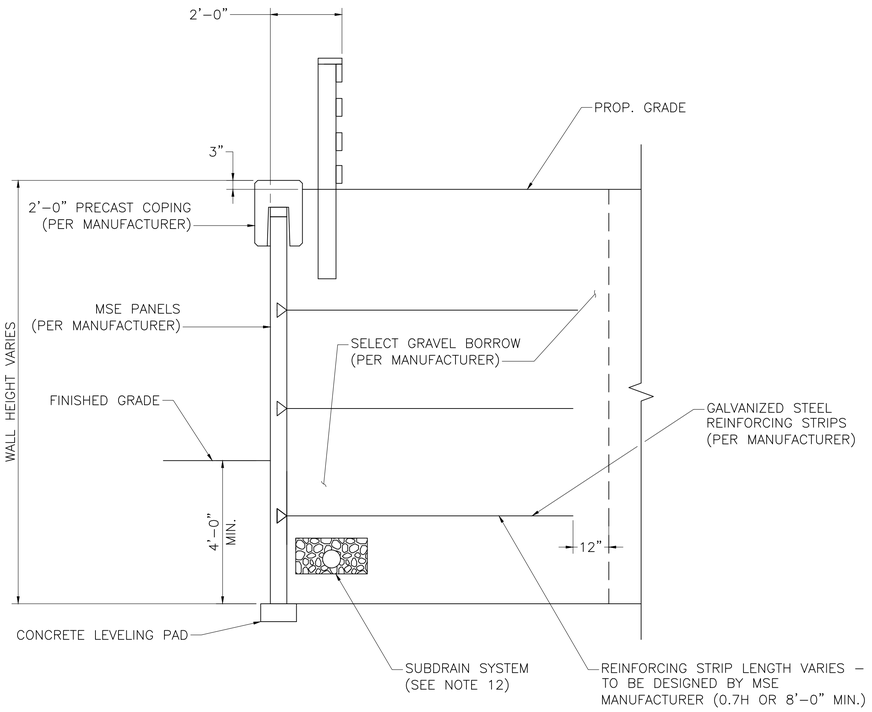
NOTES:

1. SEE SHEET 42 OF 45 FOR MSE WALL NOTES.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

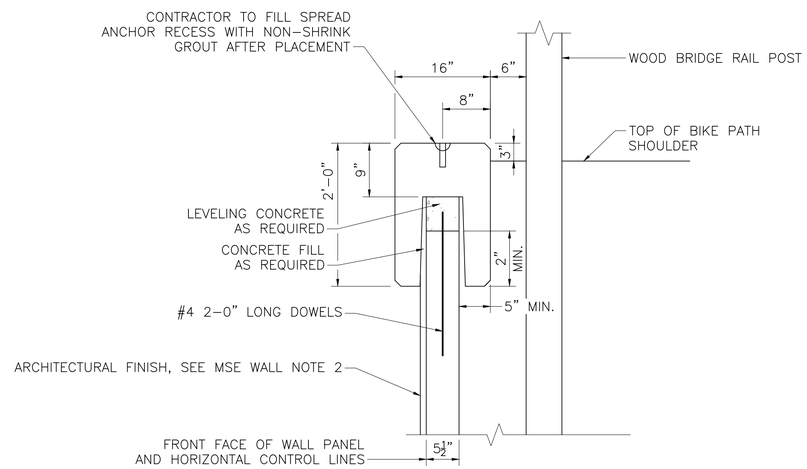
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR6-MSE_WALLS) RECOVER.DWG Plotted on 23-Jul-2025 1:00 PM
Final Structural Submittal (SF) August-09-2025



TYPICAL MSE WALL SECTION

SCALE: $\frac{1}{2}$" = 1'-0"



NOTES:

1. STANDARD COPING UNIT IS 10 FEET LONG WITH SQUARE ENDS.
2. SEE SHEET 43 OF 45 FOR WOOD BRIDGE RAIL POST DETAILS.

PRECAST COPING SECTION

SCALE: $\frac{1}{4}$" = 1'-0"

MSE WALL NOTES:

1. STEEL STRIP LENGTHS SHALL NOT BE LESS THAN 0.7H OR 8 FEET, WHICHEVER IS GREATER, WHERE H IS WALL HEIGHT. ACTUAL LENGTH OF STEEL STRIP REINFORCING DEPENDS ON WALL SUPPLIER'S DESIGN. SEE TYPICAL SECTION.
2. MSE WALL PANELS SHALL BE CAST USING CUSTOM ARCHITECTURAL FORM LINERS. THE PANEL RUSTICATIONS SHALL BE ASHLAR STONE SURFACE FINSH. FORMLINER TO BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL. ALL EXPOSED MSE WALL SURFACES SHALL RECEIVE AN ANTI-GRAFFITI COATING.
3. EXCAVATION AND BACKFILLING REQUIREMENTS SHALL BE IN ACCORDANCE WITH GEOTECHNICAL REPORT: PROPOSED YANKEE DOODLE BIKE PATH – PROPOSED RAMP ALONG ROUTE 3, DATED MAY 12, 2025, PREPARED BY LAHLAF GEOTECHNICAL CONSULTING, INC., MANUFACTURER'S RECOMMENDATIONS AND THE PROJECT SPECIAL PROVISIONS.
4. THE MSE WALL COMPANY SHALL BE RESPONSIBLE FOR THE DESIGN OF THE INTERNAL AND EXTERNAL STABILITY OF THE SELECTED MSE RETAINING WALL SYSTEM. THE CONTRACTOR SHALL SUBMIT MSE RETAINING WALL PLANS AND CALCULATIONS TO THE ENGINEER FOR APPROVAL IN ACCORDANCE WITH ITEM 996.31. ALL PLANS AND CALCULATIONS SHALL BE PREPARED BY A MASSACHUSETTS LICENSED PROFESSIONAL ENGINEER AND BEAR THE ENGINEER'S SEAL.
5. THE MAXIMUM FACTORED BEARING PRESSURE = 3.0 KSF AS PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS STRENGTH I LOAD.
6. THE FACTORED BEARING RESISTANCE = 5.3 KSF BASED ON AN EFFECTIVE WIDTH OF 5.8'. FACTORED BEARING RESISTANCE IS THE PRODUCT OF THE NOMINAL BEARING RESISTANCE AND A RESISTANCE FACTOR OF 0.65.
7. DESIGN, FABRICATION, AND CONSTRUCTION OF THE MSE RETAINING WALL, INCLUDING LEVELING PAD, PANEL COPINGS, AND GEOTEXTILE, SHALL BE IN ACCORDANCE WITH ITEM 996.31, UNLESS NOTED OTHERWISE.
8. THE CONTRACTOR SHALL LAY OUT THE MSE SOIL REINFORCING STRIPS TO PREVENT CONFLICTS WITH PEDESTRIAN POSTS, CATCH BASINS, AND ELECTRICAL HANDHOLES.
9. REINFORCEMENT IN THE MSE WALL PANELS SHALL BE EPOXY COATED AND SHALL HAVE 2" MINIMUM CLEAR COVER FOR CAST-IN-PLACE ELEMENTS AND 1½" MINIMUM CLEAR COVER FOR PRECAST ELEMENTS.
10. THE CONTRACTOR SHALL FILL ALL LIFTING DEVICE RECESSES IN THE PRECAST COPINGS WITH NON-SHRINK GROUT AFTER INSTALLATION USING A COLOR THAT MATCHES THE COPING CONCRETE.
11. THE BASE LENGTH PROVIDED IN THE TABLE REPRESENTS THE MINIMUM LENGTH NEEDED FOR EXTERNAL STABILITY AT THE DESIGNATED HEIGHT WHICH SHALL NOT BE CONSIDERED ALL INCLUSIVE. THE CONTRACTOR SHALL VERIFY EXTERNAL STABILITY OF THEIR WALL SYSTEM INCLUDING OVERALL STABILITY
12. THE MSE WALL COMPANY SHALL BE RESPONSIBILE FOR THE DESIGN OF THE SUBRAIN SYSTEM AND FOR ACCOMODATING SUBDRAIN PENETRATIONS THROUGH THE WALL TO DAYLIGHT THE DRAINS.

MSE WALL DESIGN TABLE			
WALL EXTERNAL & OVERALL STABILITY EVALUATION			
DIMENSIONS			
WALL HEIGHT (FT.)	10.69		
BASE WIDTH (FT.)	8.02		
BORING USED	B-6-7		
CAPACITY TO DEMAND RATIOS (CDR)			
ECCENTRICITY (CDR>1)	1.5		
SLIDING RESISTANCE (CDR>1)	1.3		
BEARING RESISTANCE (CDR>1)	2.7		
NOMINAL BEARING RESISTANCE (KSF)	8.2		
RESISTANCE FACTOR	0.65		
OVERALL STABILITY	SEE NOTE 11		
SOIL PARAMETERS			
SOIL DESCRIPTION	TOTAL UNIT WEIGHT (KSF)	FRICTION ANGLE (BEARING/SLIDING) (DEG)	COHESION (KSF)
GRAVEL BORROW	0.125	(34/30)	0
RETAINED SOIL	0.120	(30/30)	0

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

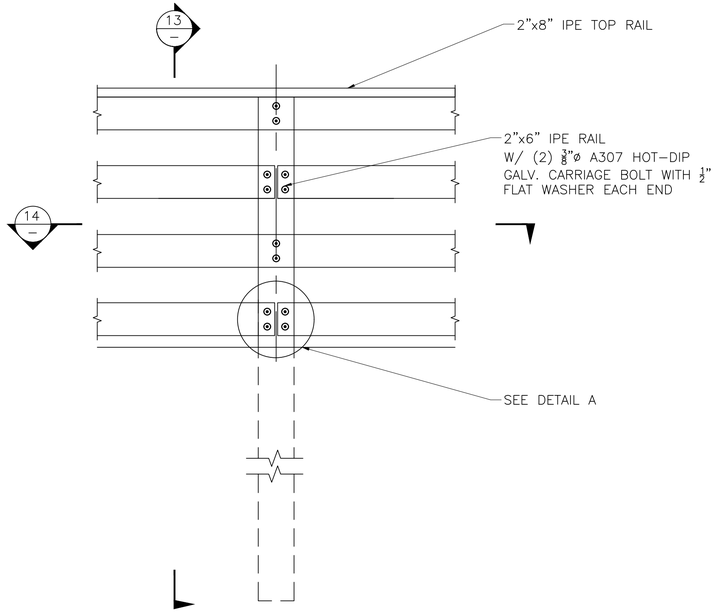
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BR(STR)-MSE_WALLS) RECOVER.DWG Plotted on 23-Jul-2025 1:00 PM
August-09-2025
Final Structural Submittal (SF)

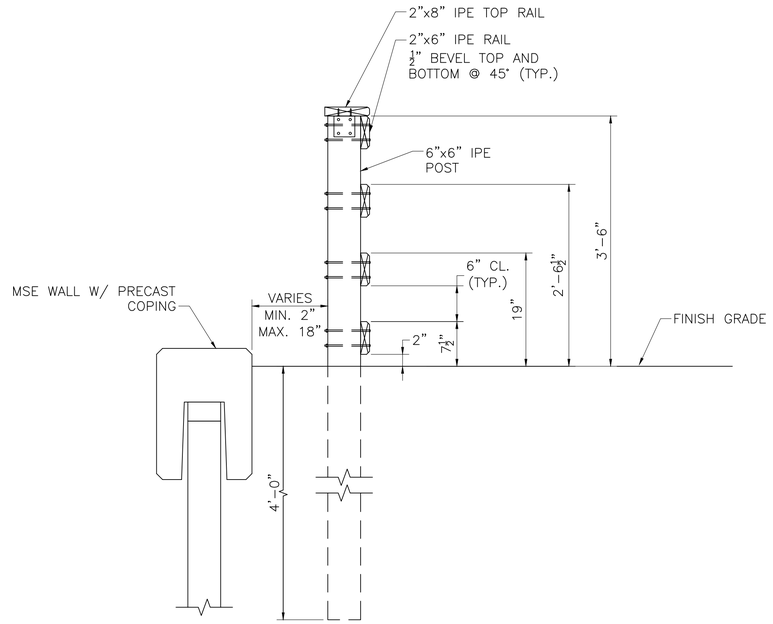
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	229	231
	PROJECT FILE NO. 608227		

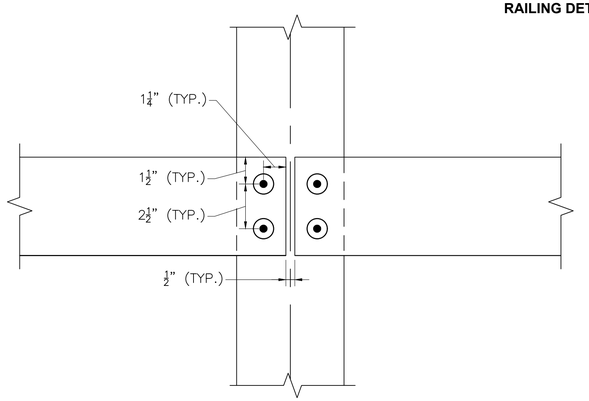
RAILING DETAILS (1 OF 3)



ELEVATION
SCALE: 1" = 1'-0"

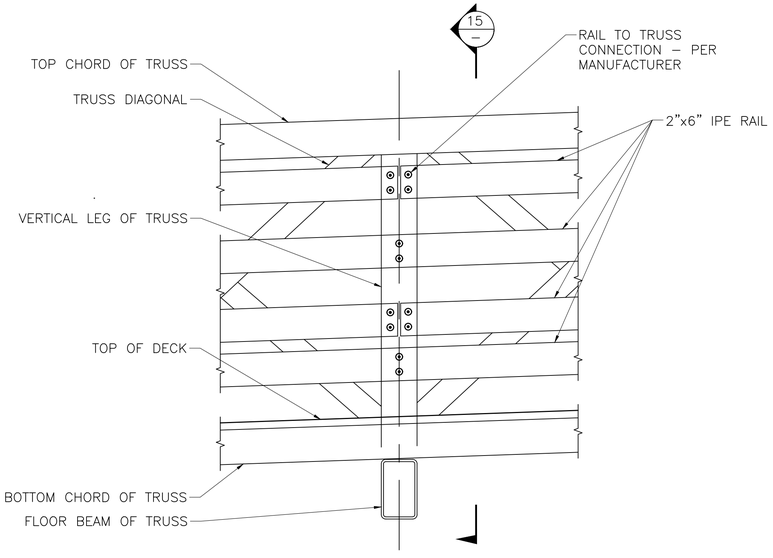


SECTION 13
SCALE: 1" = 1'-0"

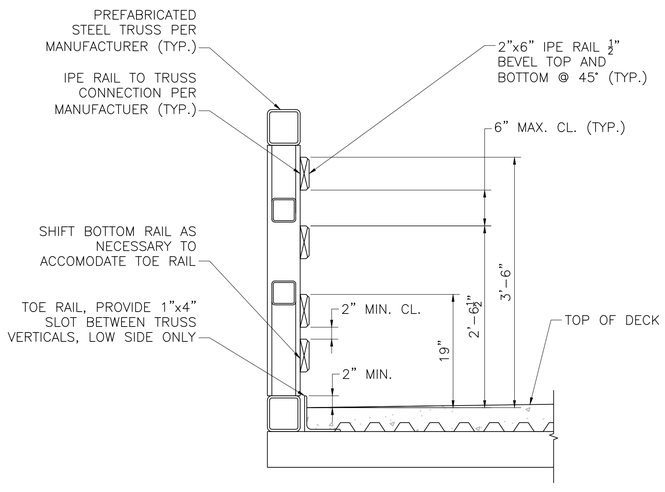


DETAIL A
SCALE: 3" = 1'-0"

PROPOSED WOOD BRIDGE RAIL IN FRONT OF MSE WALL
SCALE: 1" = 1'-0"

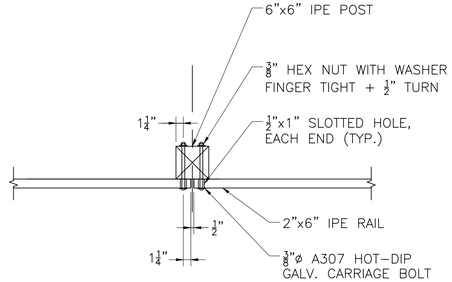


ELEVATION
SCALE: 1" = 1'-0"



SECTION 15
SCALE: 1" = 1'-0"

PROPOSED WOOD BRIDGE RAIL ON PREFABRICATED TRUSS
SCALE: 1" = 1'-0"



SECTION 14
SCALE: 3" = 1'-0"

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

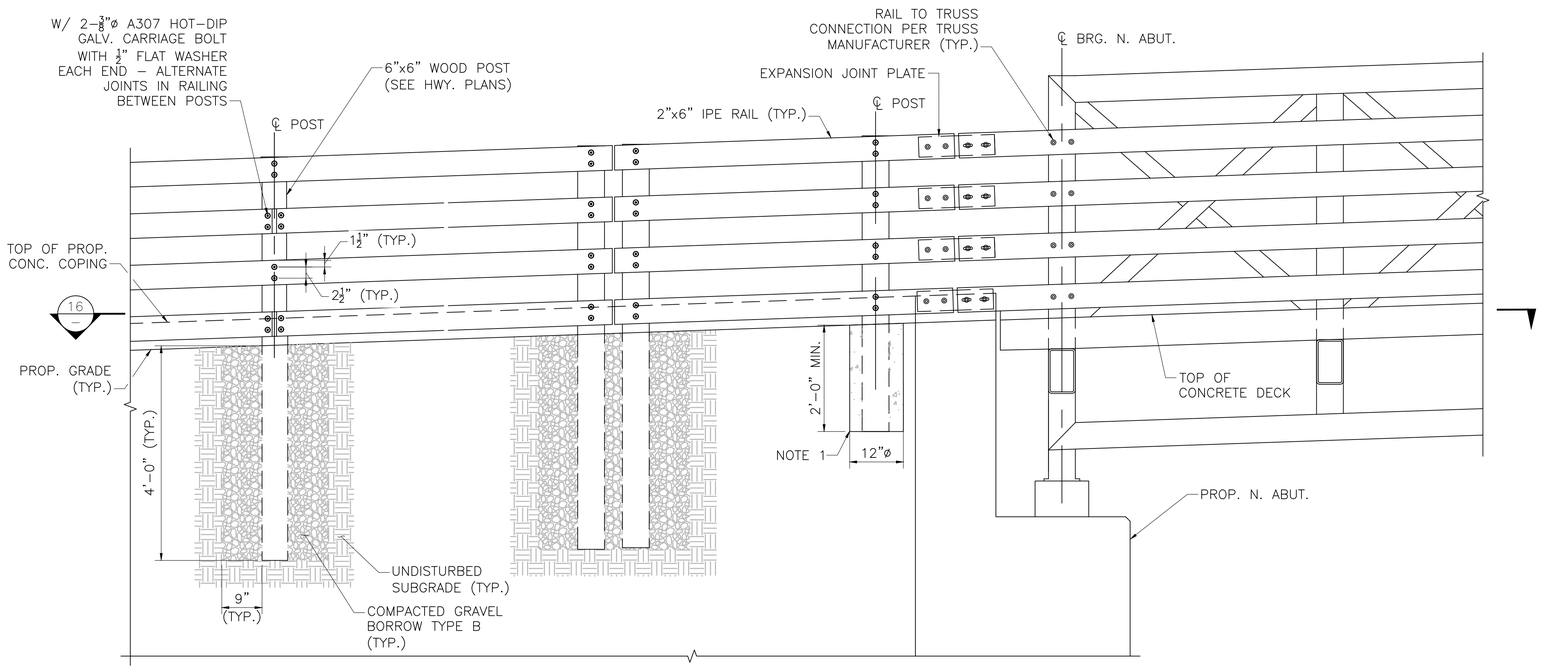
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BRST6-RAILING).DWG Plotted on 23-Jul-2025 1:00 PM
August-09-2025
Final Structural Submittal (SF)

BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	230	231
PROJECT FILE NO.	608227		

RAILING DETAILS (2 OF 3)

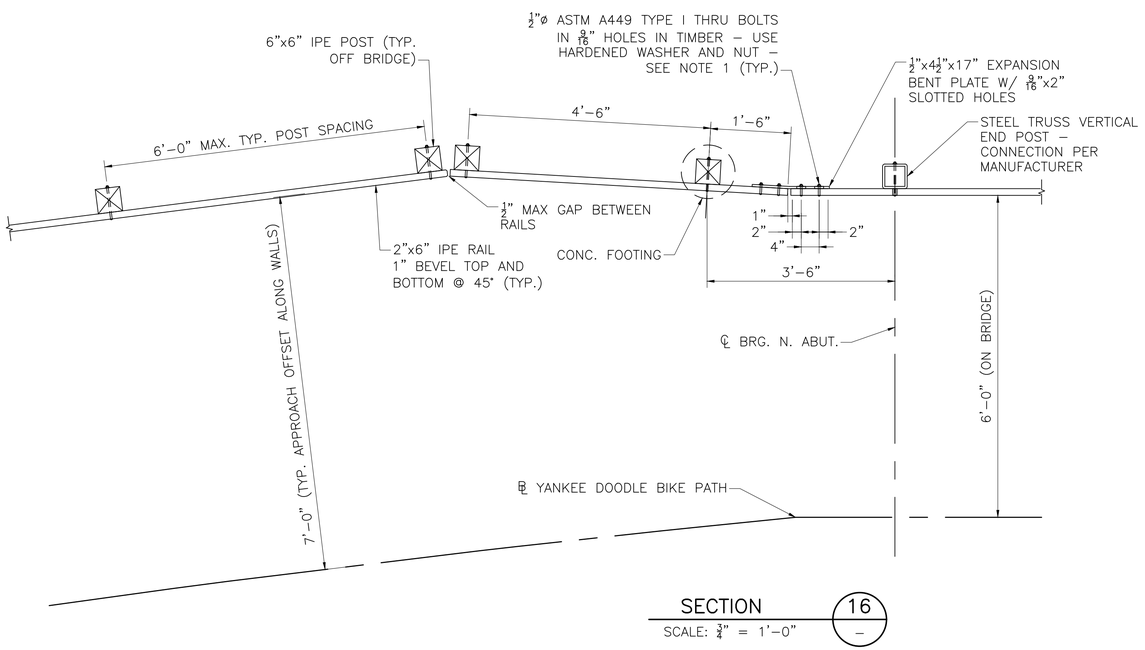


NOTES:

1. WOOD POSTS TO BE SET IN CEMENT CONCRETE WHERE EMBEDMENT DEPTH IS LESS THAN 4 FEET OR WHERE LESS THAN 18" DIAMETER AVAILABLE FOR COMPACTED GRAVEL AROUND EMBEDDED POST.
2. NORTHEAST CORNER SHOWN. OTHER CORNERS SIMILAR.

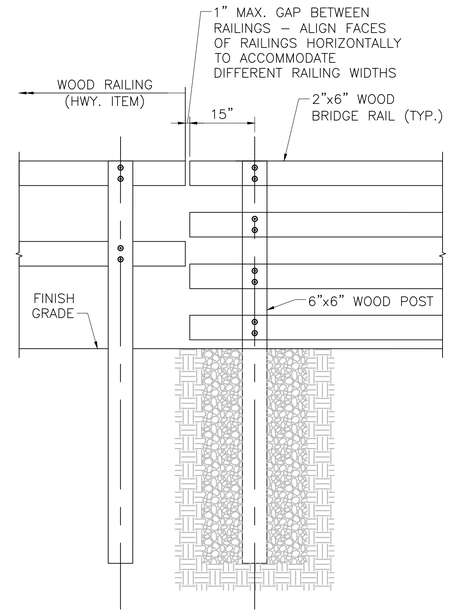
PROPOSED WOOD BRIDGE RAIL TRANSITION ELEVATION

SCALE: ¾" = 1'-0"



SECTION 16 –

SCALE: ¾" = 1'-0"



TRANSITION FROM WOOD BRIDGE RAIL TO WOOD HIGHWAY RAIL

SCALE: ¾" = 1'-0"

NOTES:

1. BOLTS IN SLOTTED HOLES SHALL UTILIZE LOCK NUTS AND BE FINGER TIGHT TO ALLOW MOVEMENT BETWEEN STEEL PLATE AND TIMBER RAIL.
2. A RAILING JOINT SHALL BE USED BETWEEN ANY POST THAT IS CONNECTED TO A BRIDGE BEAM AND A POST THAT IS MOUNTED IN THE GROUND TO ALLOW FOR EXPANSION.
3. NORTHEAST CORNER SHOWN. OTHER CORNERS SIMILAR. ANGLES IN BENT PLATE AND RAILING ANGLE POINT WILL VARY TO MEET OFFSET REQUIREMENTS.
4. ABUTMENT, BRIDGE DECK, AND EDGE OF PAVEMENT LINES NOT SHOWN FOR CLARITY.

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER

USE ONLY PRINTS OF LATEST DATE

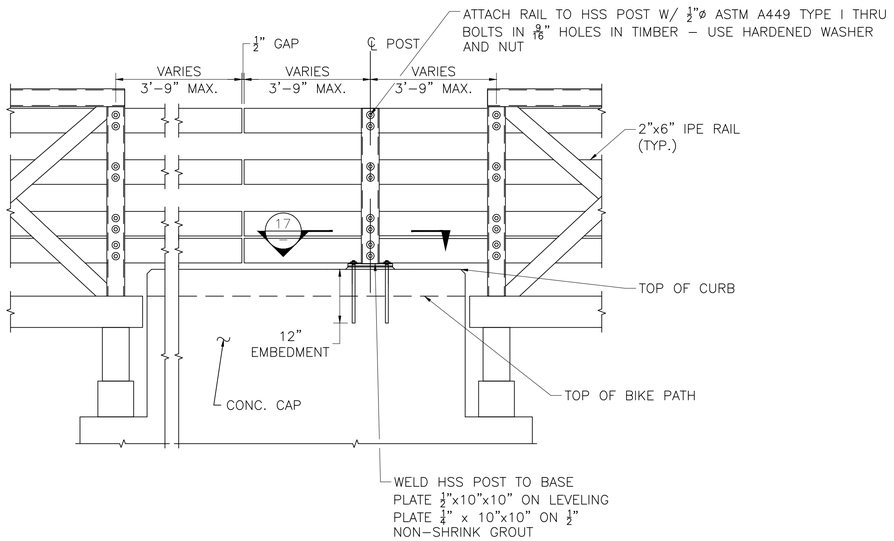
608227_BRST6-RAILING).DWG Plotted on 23-Jul-2025 1:00 PM

Final Structural Submittal (SF) August-09-2025

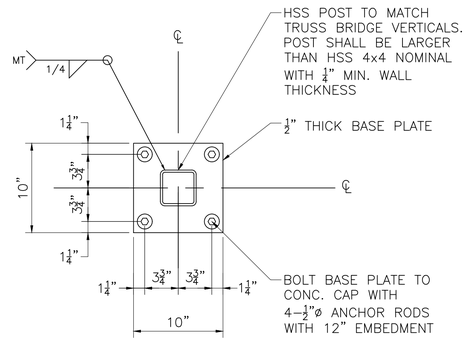
BILLERICA
YANKEE DOODLE BIKE PATH

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ-0034(028)X	231	231
	PROJECT FILE NO. 608227		

RAILING DETAILS (3 OF 3)



SECTION 4
SCALE: 3/4" = 1'–0" 26



SECTION 17
SCALE: 1 1/2" = 1'–0" –

August 9, 2025	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION

THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT
AUTHORIZED SIGNATORY: STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE

608227_BRIST6-RAILING).DWG Plotted on 23-Jul-2025 1:00 PM
August-09-2025
Final Structural Submittal (SF)