THE TOWN OF TYNGSBOROUGH
HIGHWAY DEPARTMENT

ROADWAY AND DRAINAGE REHABILITATION OF
MASCUPPIC TRAIL
IN THE TOWN OF
TYNGSBOROUGH
MIDDLESEX COUNTY
COMMONWEALTH OF MASSACHUSETTS

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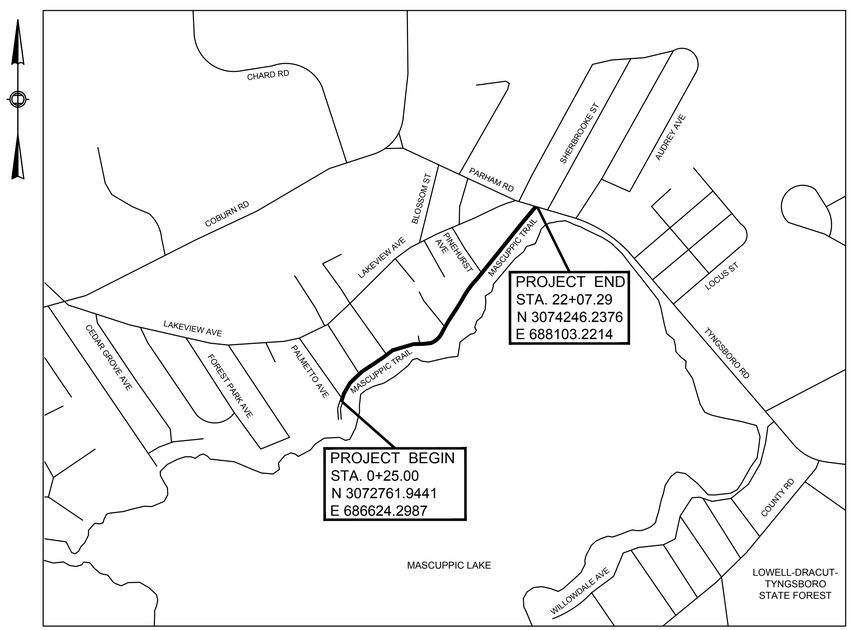

LOCATION MAP

APPROXIMATE SCALE

0 500 1000 1500 2000

(1"=500')

LENGTH OF PROJECT:
MASCUPPIC TRAIL: = 2182.29 FEET = 0.413 MILES

THE MASSACHUSETTS HIGHWAY DEPARTMENT 1988 STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, THE MASSDOT ENGLISH EDITION OF SUPPLEMENTAL SPECIFICATIONS DATED JULY 1, 2015, THE INTERIM SUPPLEMENTAL SPECIFICATIONS DATED DECEMBER 12, 2014, THE 2015 OVERHEAD SIGNAL STRUCTURE AND FOUNDATION STANDARD DRAWINGS, THE MASSDOT 2014 CONSTRUCTION STANDARD DETAILS, THE LATEST MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS WITH LATEST REVISIONS AND MASSACHUSETTS AMENDMENTS, THE 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS WITH LATEST REVISIONS, THE 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING WITH LATEST REVISIONS, AND THE 2004 EDITION OF THE AMERICAN STANDARD FOR NURSERY STOCK, WILL GOVERN.

CLIENT:

TOWN OF TYNGSBOROUGH

HIGHWAY DEPARTMENT
89 KENDALL ROAD
TYNGSBOROUGH, MA 01879
PHONE: 978-649-2310

PROJECT:

MASCUPPIC TRAIL ROADWAY AND DRAINAGE REHABILITATION

TYNGSBOROUGH, MA

PREPARED BY:

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COMMONWEALTH OF MASSACHUSETTS
THOMAS F. QUINLAN
CIVIL
No. 50899
REGISTERED PROFESSIONAL ENGINEER
4/29/16

PROFESSIONAL CIVIL ENGINEER FOR WORLDTECH ENGINEERING, LLC

NO.	DATE	REVISION

SCALE:	NONE
DATE:	APRIL 2016
PROJECT NO.	15–006.01
DESIGNED BY:	TFQ
CHECKED BY:	WPM

DRAWING TITLE:

TITLE SHEET

GENERAL SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
JB	JB	JERSEY BARRIER ON BRIDGE OR JERSEY BARRIER
CB	CB	CATCH BASIN
		CATCH BASIN CURB INLET
	CB	CATCH BASIN WITH ECCENTRIC TOP SECTION
FP	FP	FLAG POLE
GP	GP	GAS PUMP
MB	MB	MAIL BOX
		POST SQUARE
		POST CIRCULAR
SP		STEEL POLE
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	D	DRAINAGE MANHOLE
E	E	ELECTRIC MANHOLE
G	G	GAS MANHOLE
M	M	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
D		UNDERGROUND DRAIN PIPE
E		UNDERGROUND ELECTRIC DUCT
G		UNDERGROUND GAS MAIN
S		UNDERGROUND SEWER MAIN
T		UNDERGROUND TELEPHONE DUCT
W		UNDERGROUND WATER MAIN
		BALANCE STONE WALL
		GUARD RAIL - STEEL POSTS
		GUARD RAIL - WOOD POSTS
x	x	CHAIN LINK OR METAL FENCE
		WOOD FENCE
		HAY BALES/SILT FENCE
		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

TRAFFIC SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
1	1	CONTROLLER PHASE ACTUATED
		TRAFFIC SIGNAL HEAD (SIZE AS NOTED)
		WIRE LOOP DETECTOR
		VIDEO DETECTION CAMERA
		MICROWAVE DETECTOR
		PEDESTRIAN PUSH BUTTON, SIGN AND SADDLE
		EMERGENCY PREEMPTION CONFIRMATION STROBE LIGHT
		3-SECTION VEHICULAR SIGNAL HEAD
		5-SECTION VEHICULAR SIGNAL HEAD
		VEHICULAR SIGNAL HEAD, OPTICALLY PROGRAMMED
		FLASHING BEACON
		PEDESTRIAN SIGNAL HEAD, (TYPE AS NOTED OR AS SPECIFIED)
RRSG	RRSG	RAILROAD SIGNAL
OR		SIGNAL POST AND BASE (ALPHA-NUMERIC DESIGNATION NOTED)
	20'	MAST ARM, SHAFT AND BASE (ARM LENGTH AS NOTED)
		HIGH MAST POLE OR TOWER
		SIGN AND POST
		SIGN AND POST (2 POSTS)
	20'	MAST ARM WITH LUMINAIRE
		OPTICAL PRE-EMPTION DETECTOR
		CONTROLLER CABINET, GROUND MOUNTED
		CONTROL CABINET, POLE MOUNTED
		FLASHING BEACON CONTROL AND METER PEDESTAL
		LOAD CENTER ASSEMBLY
		PULL BOX 12"x12" (OR AS NOTED)
		ELECTRIC HANDHOLE 12"x24" (OR AS NOTED)
		TRAFFIC SIGNAL CONDUIT

PAVEMENT MARKINGS SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
		PAVEMENT ARROW - WHITE
ONLY	ONLY	LEGEND "ONLY" - WHITE
	SL	STOP LINE - 12"
	CW 8' O.C.	CROSSWALK - 12" LINES SPACED 8' APART
		CROSSWALK AT TRAFFIC SIGNALS
	SWL	SOLID WHITE LINE - 6"
	SWSHL	SOLID WHITE SHOULDER LINE - 6"
	SYL	SOLID YELLOW LINE - 6"
	BWL	BROKEN WHITE LINE - 6"
	BYL	BROKEN YELLOW LINE - 6"
	DWL	DOTTED WHITE LINE - 6"
	DYL	DOTTED YELLOW LINE - 6"
	DWLEx	DOTTED WHITE LINE EXTENSION - 6"
	DYLEx	DOTTED YELLOW LINE EXTENSION - 6"
	DBWL	DOUBLE WHITE LINE - 2 - 6" LINES
	DYCL	DOUBLE YELLOW CENTERLINE - 2 - 6" LINES

ABBREVIATIONS

GENERAL

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

ABBREVIATIONS (cont.)

GENERAL

MB	MAILBOX
MH	MANHOLE
MHB	MASSACHUSETTS HIGHWAY BOUND
MIN	MINIMUM
NIC	NOT IN CONTRACT
NO.	NUMBER
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
P.G.L.	PROFILE GRADE LINE
PI	POINT OF INTERSECTION
POC	POINT ON CURVE
POT	POINT ON TANGENT
PRC	POINT OF REVERSE CURVATURE
PROJ	PROJECT
PROP	PROPOSED
PSB	PLANTABLE SOIL BORROW
PT	POINT OF TANGENCY
PVC	POINT OF VERTICAL CURVATURE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENCY
PVMT	PAVEMENT
PWW	PAVED WATER WAY
R	RADIUS OF CURVATURE
R&D	REMOVE AND DISPOSE
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RDWY	ROADWAY
REM	REMOVE
RET	RETAIN
RET WALL	RETAINING WALL
ROW	RIGHT OF WAY
RR	RAILROAD
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
RT	RIGHT
SB	STONE BOUND
SHLD	SHOULDER
SMH	SEWER MANHOLE
ST	STREET
STA	STATION
SSD	STOPPING SIGHT DISTANCE
SHLO	STATE HIGHWAY LAYOUT LINE
SW	SIDEWALK
T	TANGENT DISTANCE OF CURVE/TRUCK %
TAN	TANGENT
TEMP	TEMPORARY
TC	TOP OF CURB
TOS	TOP OF SLOPE
TYP	TYPICAL
UP	UTILITY POLE
VAR	VARIES
VERT	VERTICAL
VC	VERTICAL CURVE
WCR	WHEEL CHAIR RAMP
WG	WATER GATE
WIP	WROUGHT IRON PIPE
WM	WATER METER/WATER MAIN
X-SECT	CROSS SECTION

TRAFFIC SIGNAL

CAB.	CABINET
CCVE	CLOSED CIRCUIT VIDEO EQUIPMENT
DW	STEADY DON'T WALK
FDW	FLASHING DON'T WALK
FR	FLASHING CIRCULAR RED
FRL	FLASHING RED LEFT ARROW
FRR	FLASHING RED RIGHT ARROW
FY	FLASHING CIRCULAR AMBER
FYL	FLASHING AMBER LEFT ARROW
FYR	FLASHING AMBER RIGHT ARROW
G	STEADY CIRCULAR GREEN
GL	STEADY GREEN LEFT ARROW
GR	STEADY GREEN RIGHT ARROW
GSL	STEADY GREEN SLASH LEFT ARROW
GSR	STEADY GREEN SLASH RIGHT ARROW
GV	STEADY GREEN VERTICAL ARROW
OL	OVERLAP
PED	PEDESTRIAN
PTZ	PAN, TILE, ZOOM
R	STEADY CIRCULAR RED
RL	STEADY RED LEFT ARROW
RR	STEADY RED RIGHT ARROW
TR SIG	TRAFFIC SIGNAL
TSC	TRAFFIC SIGNAL CONDUIT
W	STEADY WALK
Y	STEADY CIRCULAR AMBER
YL	STEADY AMBER LEFT ARROW

GENERAL NOTES:

1. 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 AGREES TO 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.
2. 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.
3. THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENT OF GAS, ELECTRIC, TELEPHONE AND ANY OTHER PRIVATE UTILITIES BY THE UTILITY COMPANIES.
4. AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE.
5. THE TERM "PROPOSED" (PROP.) MEANS WORK TO BE CONSTRUCTED USING NEW MATERIALS OR, WHERE APPLICABLE, REUSING EXISTING MATERIALS IDENTIFIED AS "REMOVE AND RESET" (R&R).
6. JOINTS BETWEEN NEW BITUMINOUS CONCRETE ROADWAY PAVEMENT AND SAWCUT EXISTING PAVEMENT SHALL BE SEALED IN ACCORDANCE WITH ITEM 464.5 OF THE 1988 MASSHIGHWAY STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES.
7. ALL EXISTING SIGNS WITHIN THE PROJECT LIMITS SHALL BE RETAINED UNLESS INDICATED OTHERWISE ON THE DRAWINGS.
8. ALL PROPOSED PAVEMENT MARKINGS SHALL BE PAINTED.
9. 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 CONSTRUCTABILITY 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.
10. FIELD SURVEY PROVIDED BY DAVID E. ROSS ASSOCIATES, INC. HORIZONTAL DATUM IS BASED ON MASS GRID SYSTEM NAD 1983. ELEVATIONS SHOWN ON THIS PLAN REFER TO THE NAVD OF 1988.

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PHONE: 978-649-2310

PROJECT:

MASCUPPIC TRAIL ROADWAY AND DRAINAGE REHABILITATION

TYNGSBOROUGH, MA

PREPARED BY:

WORLDTECH ENGINEERING
300 TRADECENTER, SUITE 5580
WOBURN, MA 01801
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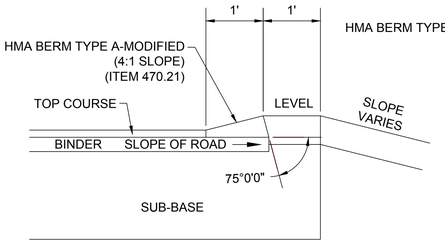
PROFESSIONAL CIVIL ENGINEER FOR WORLDTECH ENGINEERING, LLC

NO.	DATE	REVISION

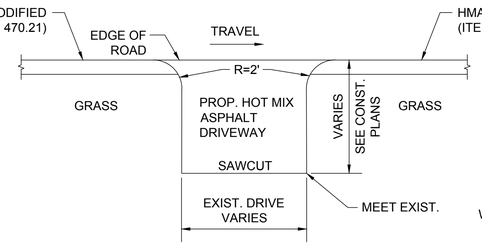
SCALE:	NONE
DATE:	APRIL 2016
PROJECT NO.	15-006.01
DESIGNED BY:	TFQ
CHECKED BY:	WPM

DRAWING TITLE:

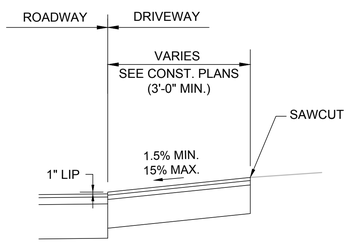
LEGEND, ABBREVIATIONS & GENERAL NOTES



HMA BERM TYPE A MODIFIED
N.T.S



TYPICAL RESIDENTIAL DRIVEWAY DETAIL
N.T.S



TYPICAL CUT DRIVEWAY
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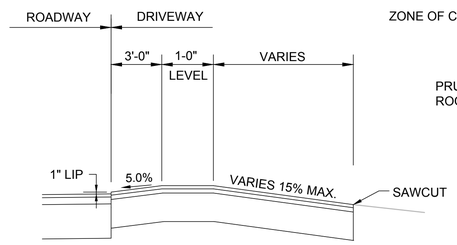

TYPICAL FILL DRIVEWAY
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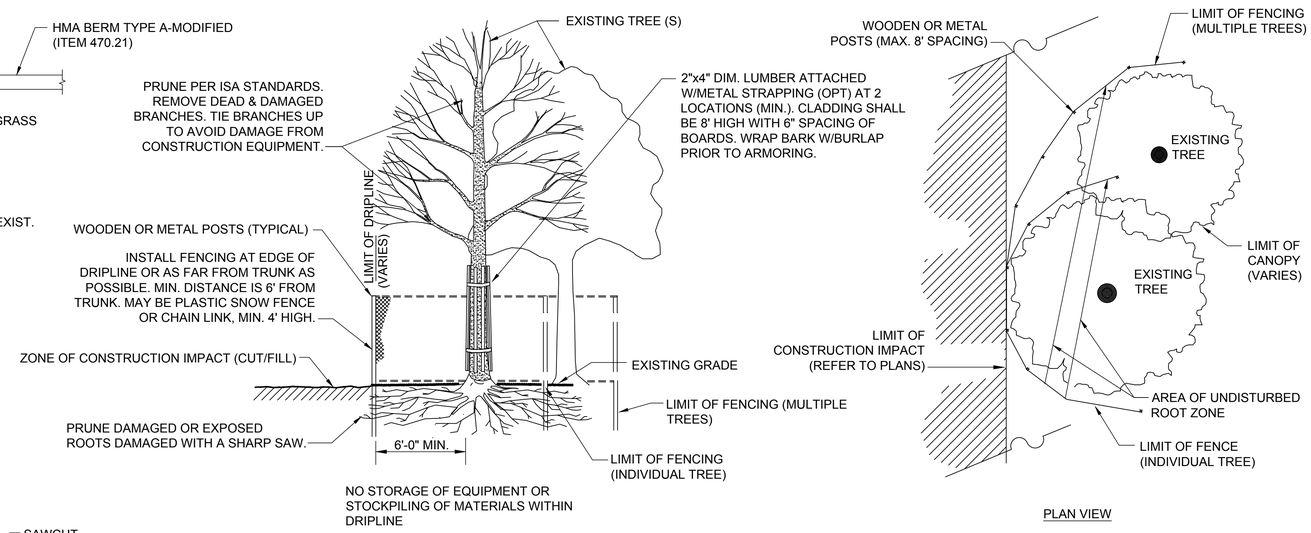


TREE PROTECTION DETAIL
N.T.S.

PAVEMENT NOTES:

PROPOSED FULL DEPTH PAVEMENT RECLAMATION:
1 1/2" HOT MIX ASPHALT TOP COURSE MATERIAL OVER
0.05 GAL/SY TACK COAT OVER
2 1/2" HOT MIX ASPHALT BINDER COURSE MATERIAL OVER
12" RECLAIMED PAVEMENT FOR SUB-BASE

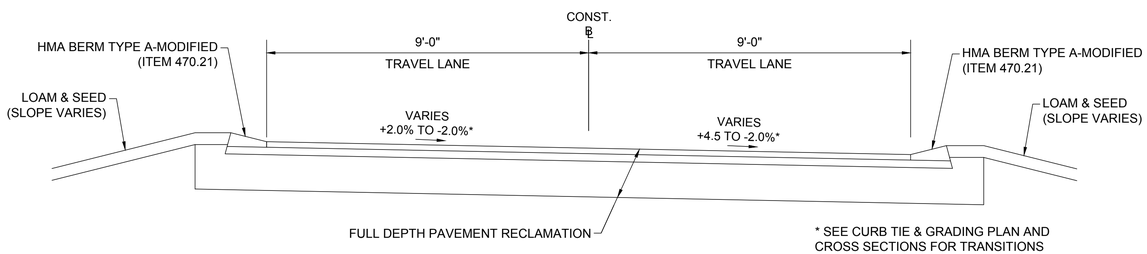
PROPOSED HMA DRIVEWAY APRON:
3 1/2" HOT MIX ASPHALT, PLACED IN TWO EQUAL LAYERS OVER
8" GRAVEL BORROW

PROPOSED HMA WALK:
3" HOT MIX ASPHALT OVER
8" GRAVEL BORROW

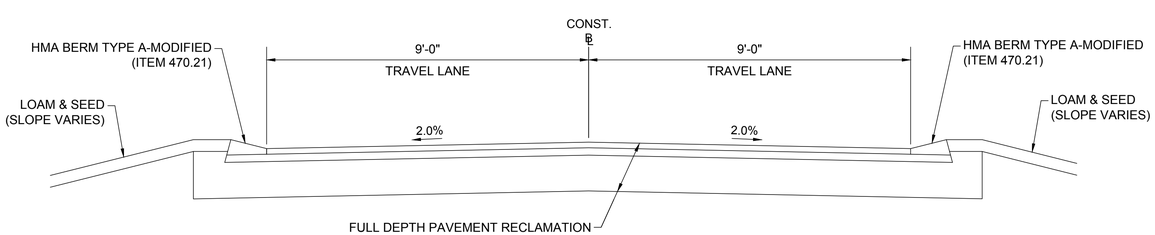
PROPOSED GRAVEL DRIVEWAYS:
4" STONE DUST OVER
GEOTEXTILE FABRIC FOR SEPARATION OVER
8" GRAVEL BORROW

PROPOSED LAWNS AND SLOPES:
4" LOAM AND SEED

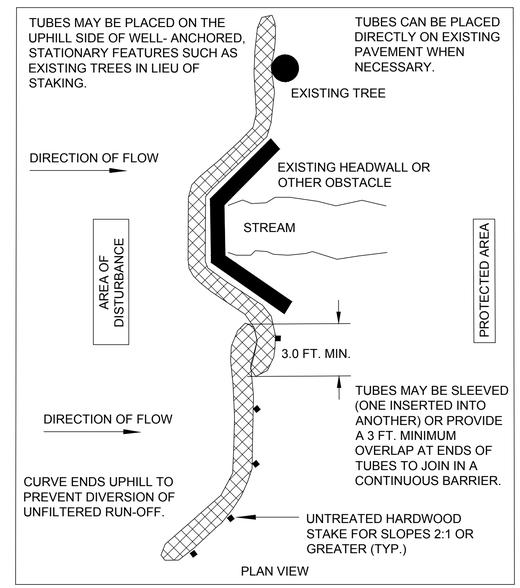
PROPOSED MULCH AREAS:
4" AGED PINE BARK



TYPICAL SECTION MASCUPPIC TRAIL SUPERELEVATED ROADWAY
N.T.S

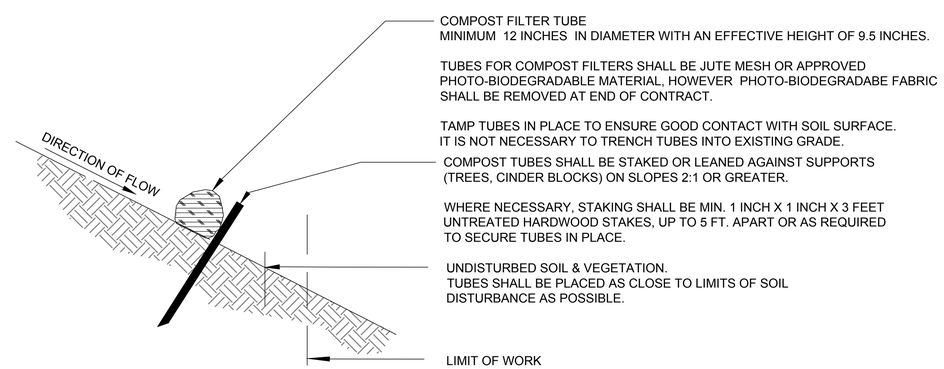


TYPICAL SECTION MASCUPPIC TRAIL CROWNED ROADWAY
N.T.S



GENERAL NOTES:

1. PROVIDE A MINIMUM TUBE DIAMETER OF 12 INCHES FOR SLOPES UP TO 50 FEET 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.



COMPOST FILTER TUBE DETAIL
N.T.S.

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SCALE:	N.T.S.
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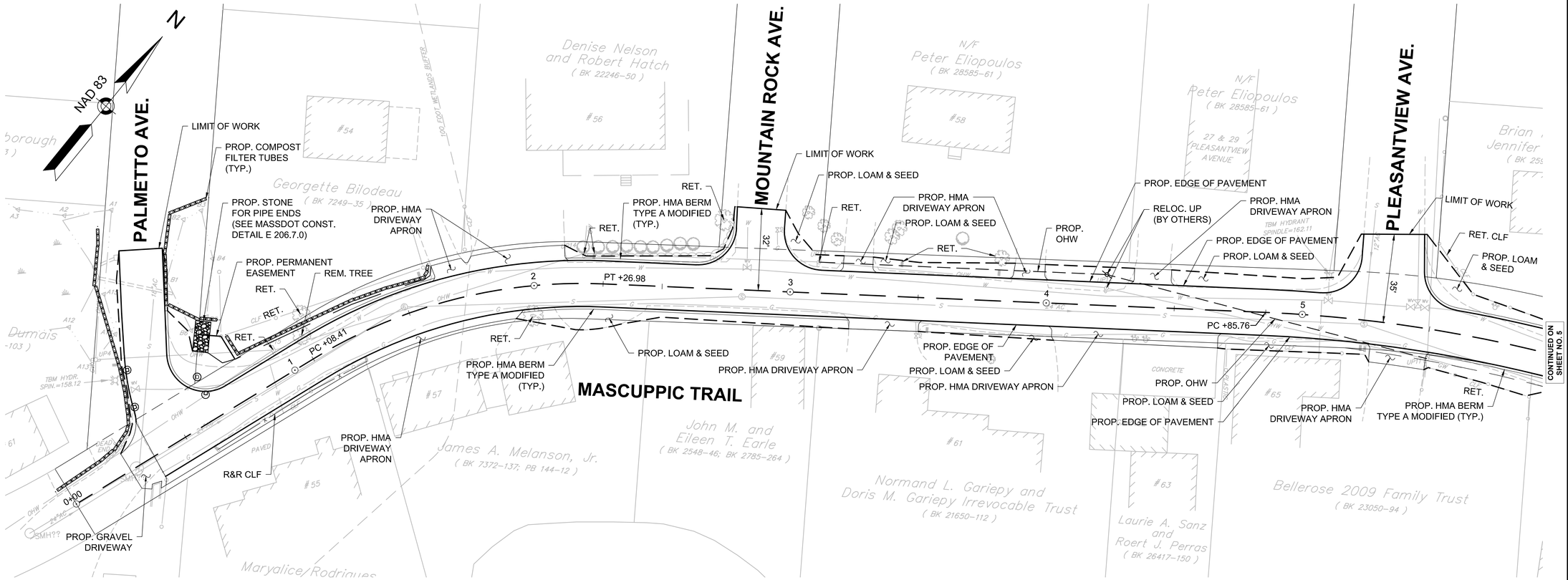
DRAWING TITLE:

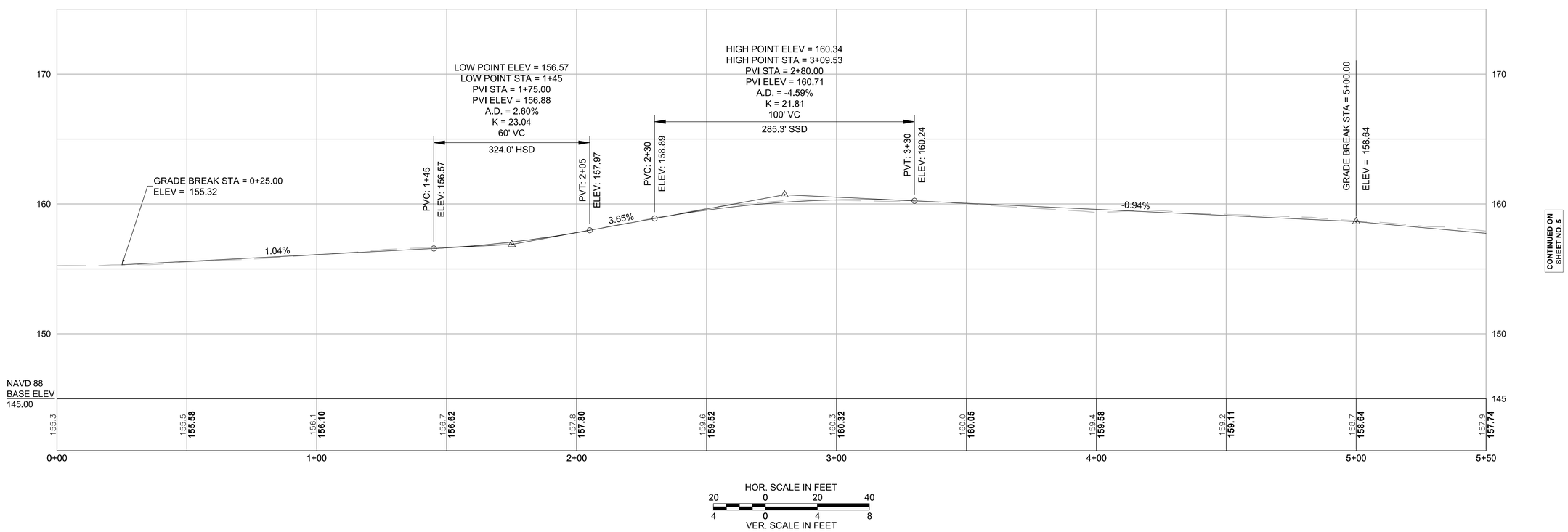
TYPICAL SECTIONS & CONSTRUCTION DETAILS



0 20 50 100

SCALE: 1" = 20'

NOTE:
FOR UTILITY INFORMATION, SEE DRAINAGE & UTILITY PLANS.



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

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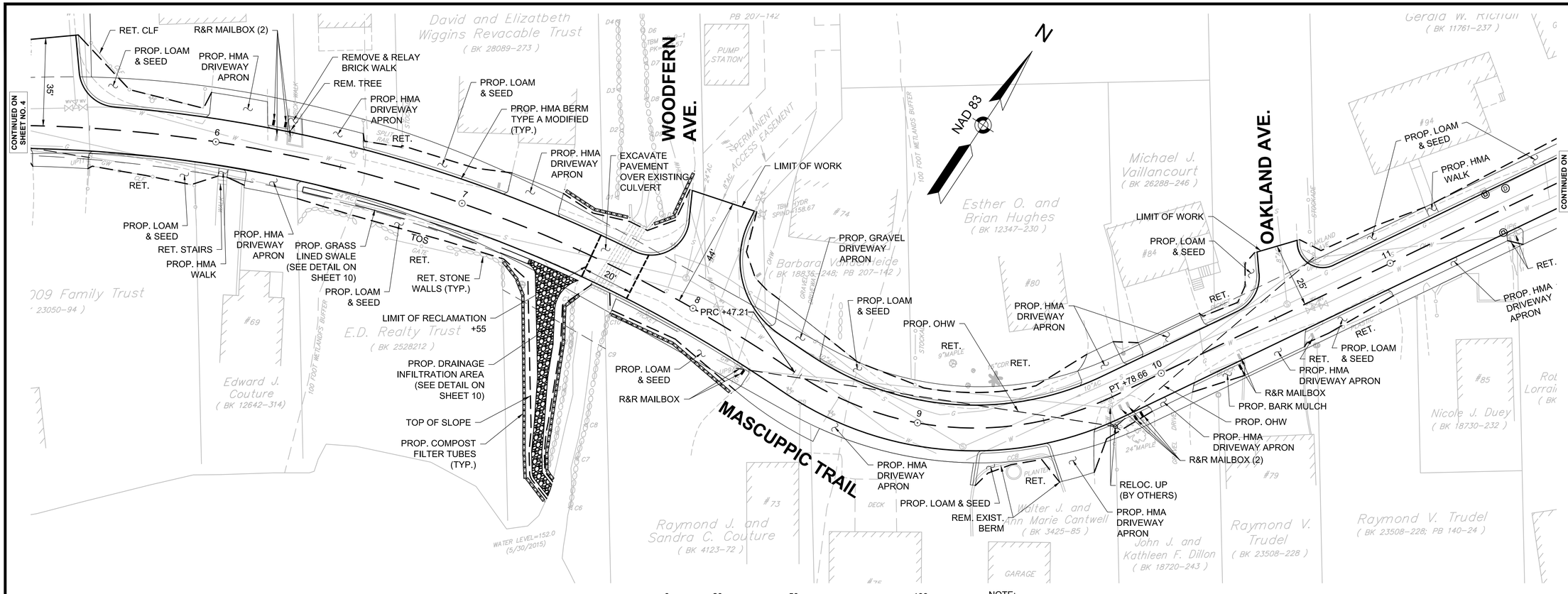
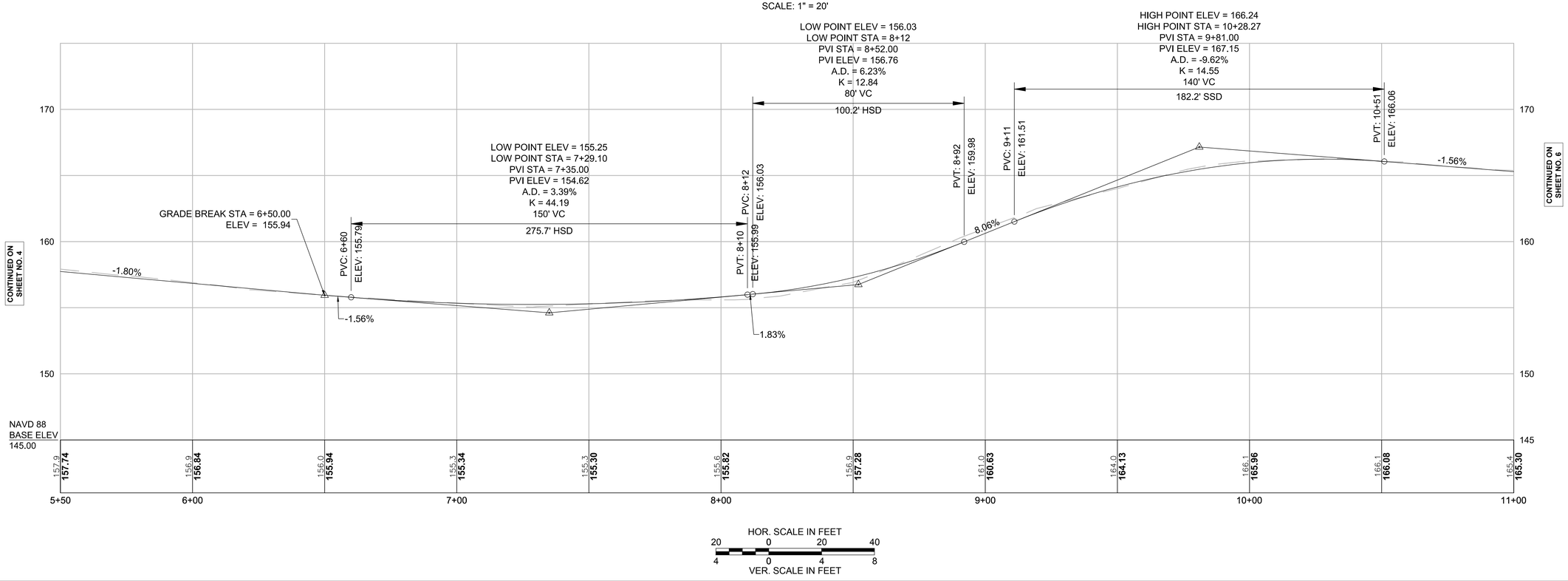
DRAWING TITLE:

CONSTRUCTION PLAN & PROFILE
SHEET 1 OF 4

SHEET NO. 4 OF 26



NOTE:
FOR UTILITY INFORMATION, SEE DRAINAGE & UTILITY PLANS.



CLIENT:

TOWN OF TYNGSBOROUGH

HIGHWAY DEPARTMENT
89 KENDALL ROAD
TYNGSBOROUGH, MA 01879
PHONE: 978-649-2310

PROJECT:

MASCUPPIC TRAIL ROADWAY AND DRAINAGE REHABILITATION

TYNGSBOROUGH, MA

PREPARED BY:

WORLDTECH ENGINEERING
300 TRADECENTER, SUITE 5580
WOBURN, MA 01801
T: 781-933-4800
F: 781-933-4801

PROFESSIONAL CIVIL ENGINEER FOR WORLDTECH ENGINEERING, LLC

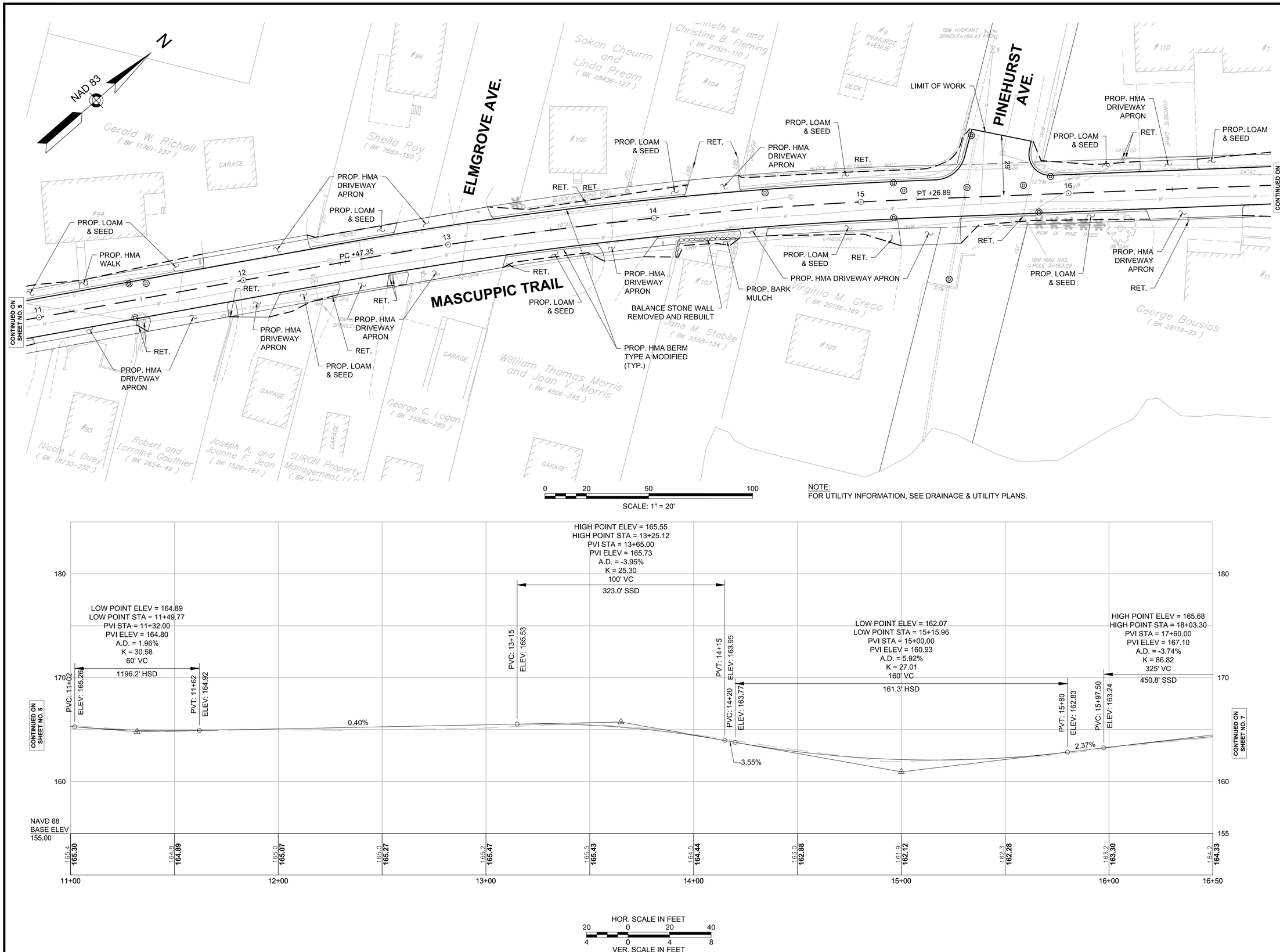
NO.	DATE	REVISION

SCALE:	1" = 20'
DATE:	APRIL 2016
PROJECT NO.	15-006.01
DESIGNED BY:	TFQ
CHECKED BY:	WPM

DRAWING TITLE:

CONSTRUCTION PLAN & PROFILE
SHEET 2 OF 4

SHEET NO. 5 OF 26



NOTE:
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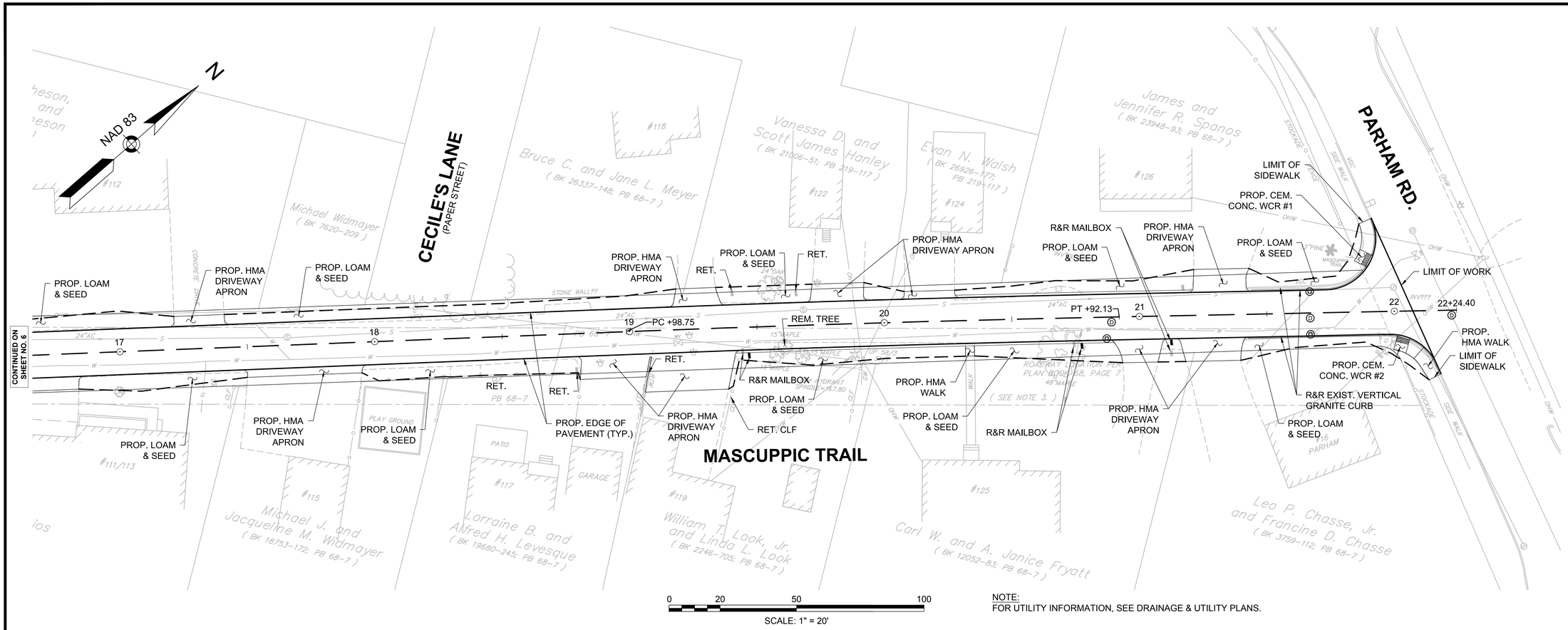
DRAWING TITLE:

CONSTRUCTION PLAN & PROFILE
SHEET 3 OF 4

SHEET NO. 6 OF 26



NOTE:
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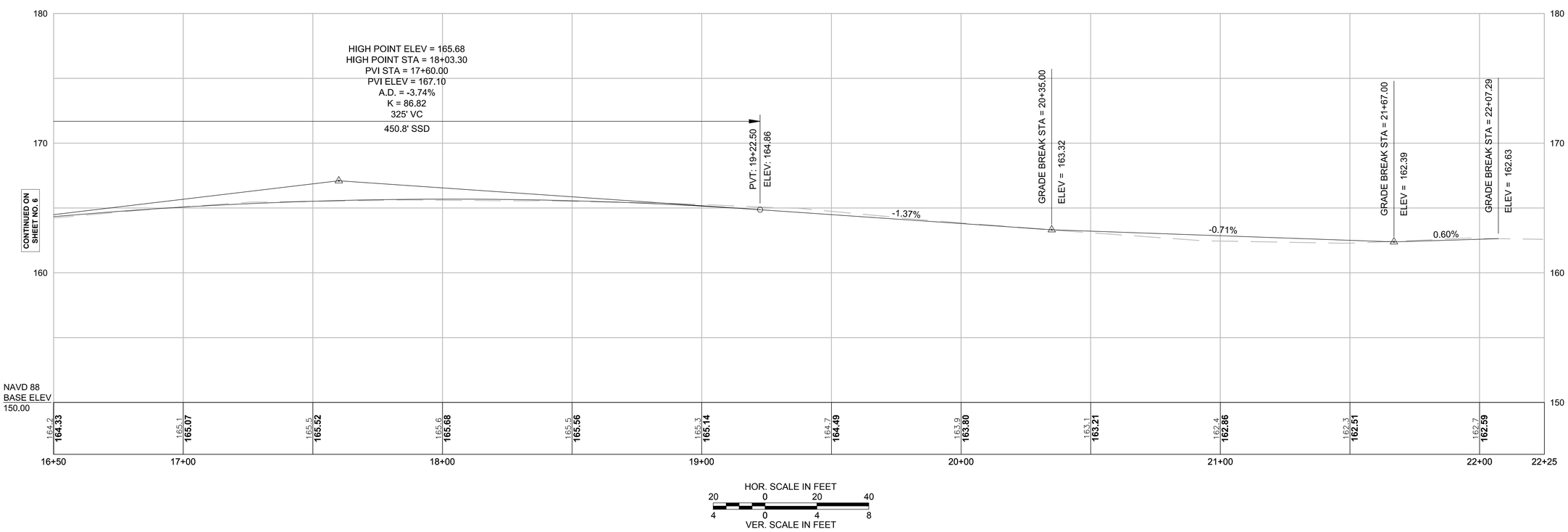

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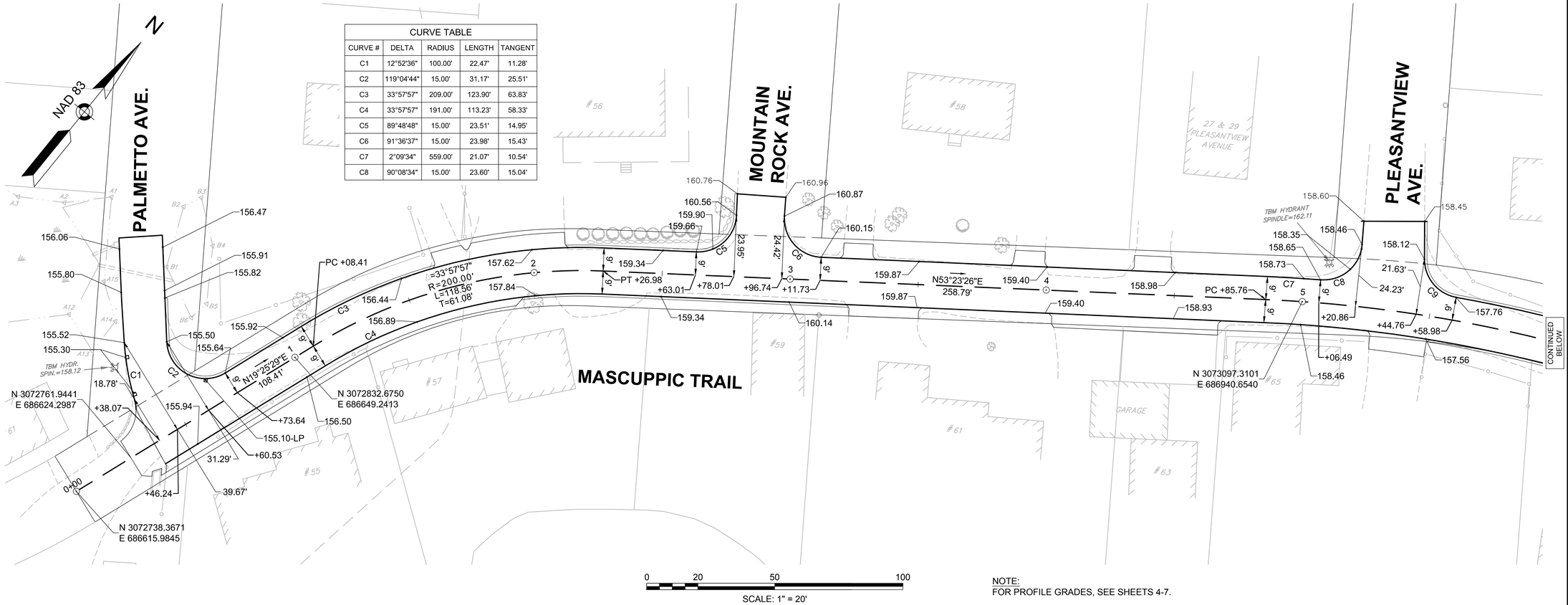
DRAWING TITLE:

CONSTRUCTION PLAN & PROFILE
SHEET 4 OF 4

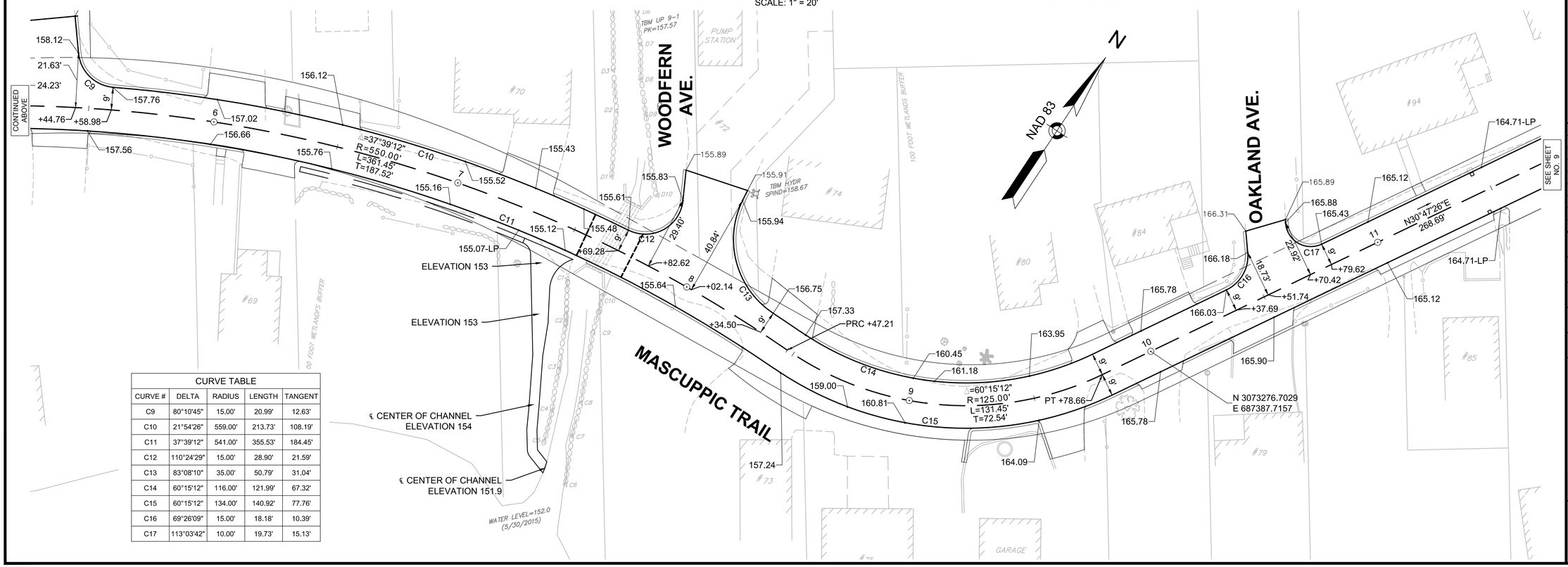
CURVE TABLE				
CURVE #	DELTA	RADIUS	LENGTH	TANGENT
C1	12°52'36"	100.00'	22.47'	11.28'
C2	119°04'44"	15.00'	31.17'	25.51'
C3	33°57'57"	209.00'	123.90'	63.83'
C4	33°57'57"	191.00'	113.23'	58.33'
C5	89°48'48"	15.00'	23.51'	14.95'
C6	91°36'37"	15.00'	23.98'	15.43'
C7	2°09'34"	559.00'	21.07'	10.54'
C8	90°08'34"	15.00'	23.60'	15.04'



0 20 50 100

SCALE: 1" = 20'

NOTE:
FOR PROFILE GRADES, SEE SHEETS 4-7.



CURVE TABLE				
CURVE #	DELTA	RADIUS	LENGTH	TANGENT
C9	80°10'45"	15.00'	20.99'	12.63'
C10	21°54'26"	559.00'	213.73'	108.19'
C11	37°39'12"	541.00'	355.53'	184.45'
C12	110°24'29"	15.00'	28.90'	21.59'
C13	83°08'10"	35.00'	50.79'	31.04'
C14	60°15'12"	116.00'	121.99'	67.32'
C15	60°15'12"	134.00'	140.92'	77.76'
C16	69°26'09"	15.00'	18.18'	10.39'
C17	113°03'42"	10.00'	19.73'	15.13'

CLIENT:

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TYNGSBOROUGH, MA

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PROFESSIONAL CIVIL ENGINEER FOR WORLDTECH ENGINEERING, LLC

NO.	DATE	REVISION

SCALE:	1" = 20'
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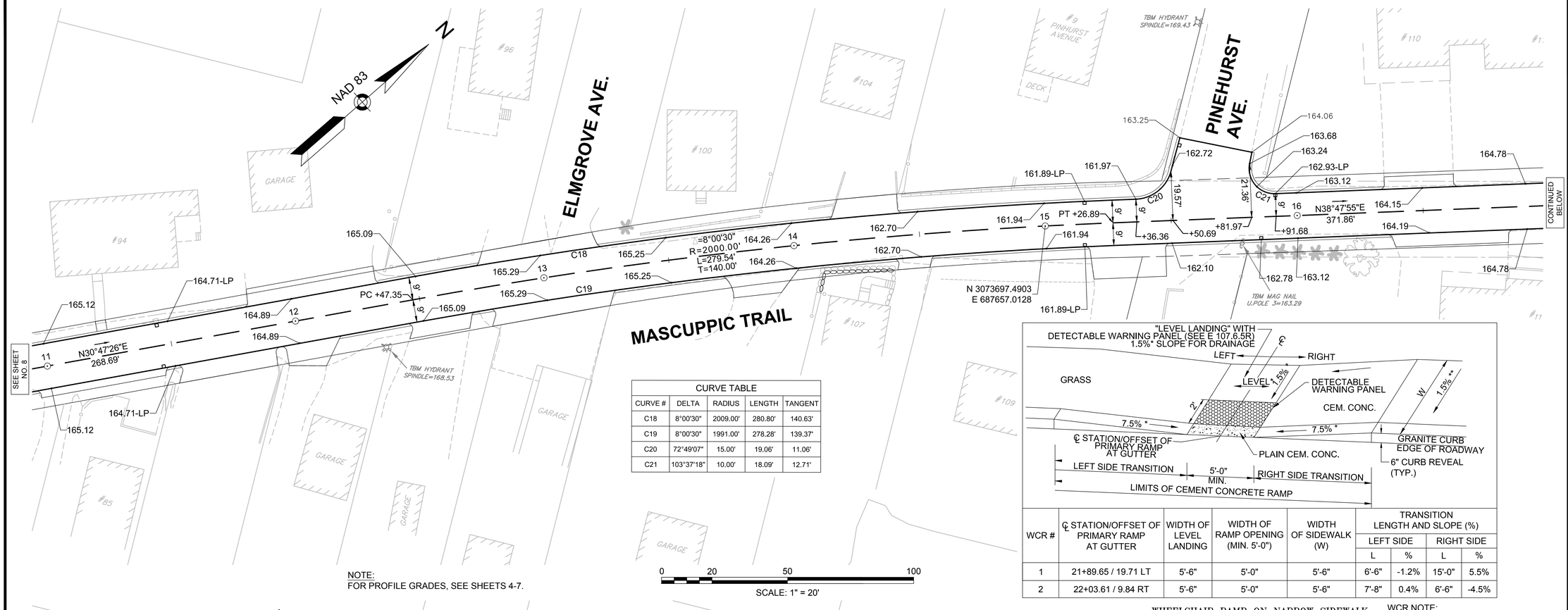
PROJECT NO.	15-006.01
DESIGNED BY:	TFQ
CHECKED BY:	WPM

DRAWING TITLE:

CURB TIE & GRADING PLANS SHEET 1 OF 2



CURVE TABLE				
CURVE #	DELTA	RADIUS	LENGTH	TANGENT
C18	8°00'30"	2009.00'	280.80'	140.63'
C19	8°00'30"	1991.00'	278.28'	139.37'
C20	72°49'07"	15.00'	19.06'	11.06'
C21	103°37'18"	10.00'	18.09'	12.71'

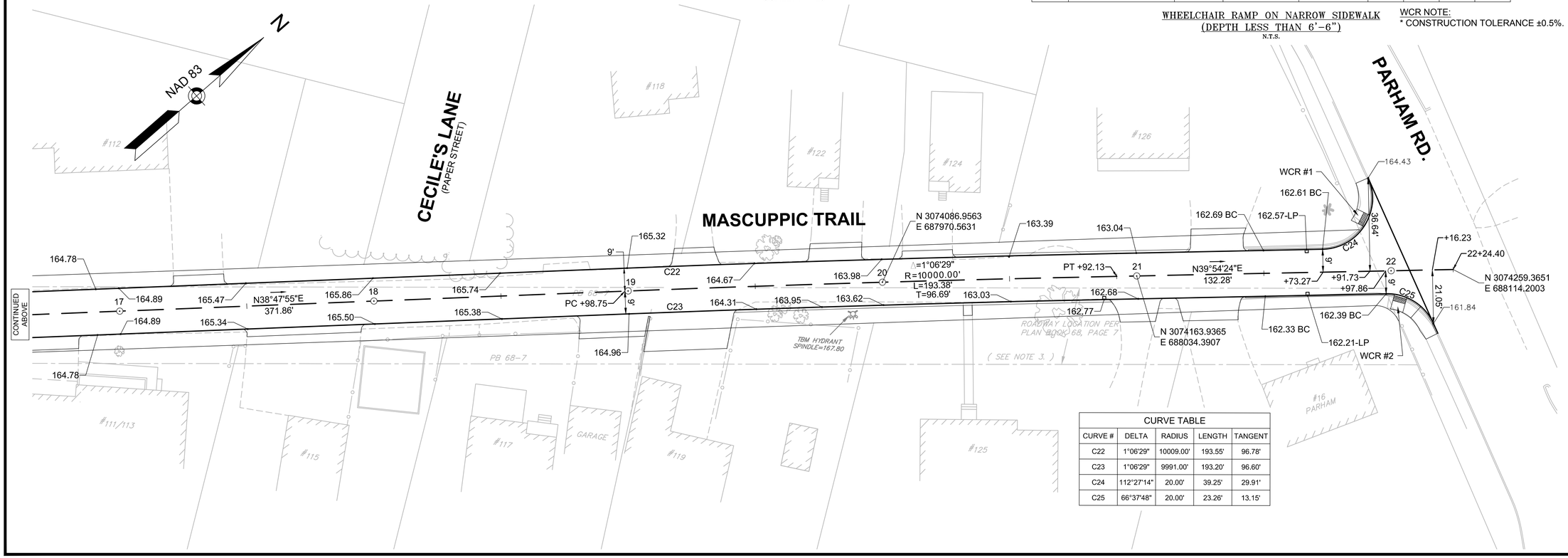
NOTE:
FOR PROFILE GRADES, SEE SHEETS 4-7.

0 20 50 100
SCALE: 1" = 20'

WCR #	℄ STATION/OFFSET OF PRIMARY RAMP AT GUTTER	WIDTH OF LEVEL LANDING	WIDTH OF RAMP OPENING (MIN. 5'-0")	WIDTH OF SIDEWALK (W)	TRANSITION LENGTH AND SLOPE (%)			
					LEFT SIDE		RIGHT SIDE	
					L	%	L	%
1	21+89.65 / 19.71 LT	5'-6"	5'-0"	5'-6"	6'-6"	-1.2%	15'-0"	5.5%
2	22+03.61 / 9.84 RT	5'-6"	5'-0"	5'-6"	7'-8"	0.4%	6'-6"	-4.5%

WHEELCHAIR RAMP ON NARROW SIDEWALK
(DEPTH LESS THAN 6'-6")
N.T.S.

WCR NOTE:
* CONSTRUCTION TOLERANCE ±0.5%.



CURVE TABLE				
CURVE #	DELTA	RADIUS	LENGTH	TANGENT
C22	1°06'29"	10009.00'	193.55'	96.78'
C23	1°06'29"	9991.00'	193.20'	96.60'
C24	112°27'14"	20.00'	39.25'	29.91'
C25	66°37'48"	20.00'	23.26'	13.15'

CLIENT:

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PROJECT:

MASCUPPIC TRAIL ROADWAY AND DRAINAGE REHABILITATION

TYNGSBOROUGH, MA

PREPARED BY:

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300 TRADECENTER, SUITE 5580
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NO.	DATE	REVISION

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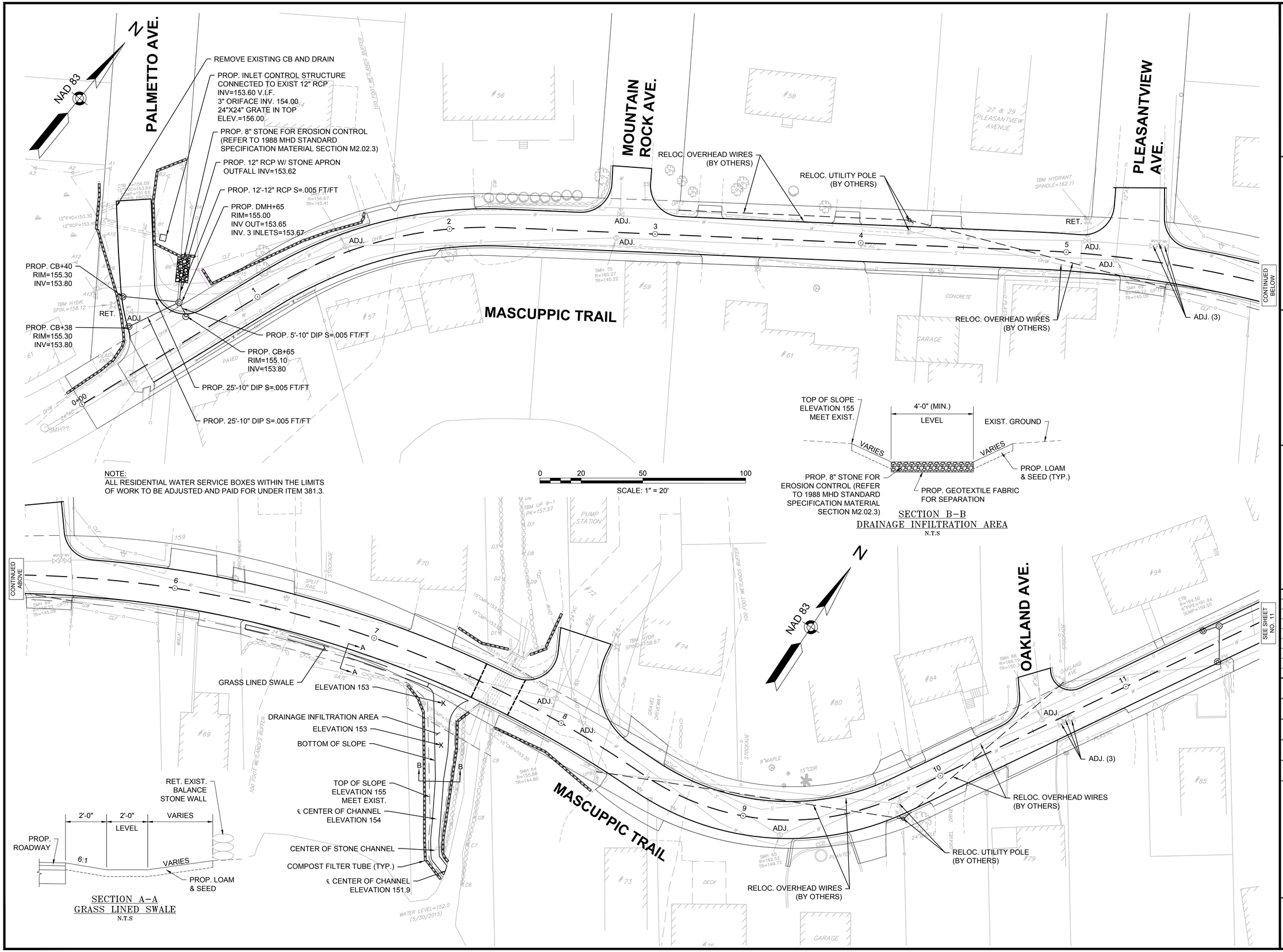
DRAWING TITLE:

CURB TIE & GRADING PLANS
SHEET 2 OF 2



NOTE:
ALL RESIDENTIAL WATER SERVICE BOXES WITHIN THE LIMITS OF WORK TO BE ADJUSTED AND PAID FOR UNDER ITEM 381.3.

CLIENT:

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PROJECT:

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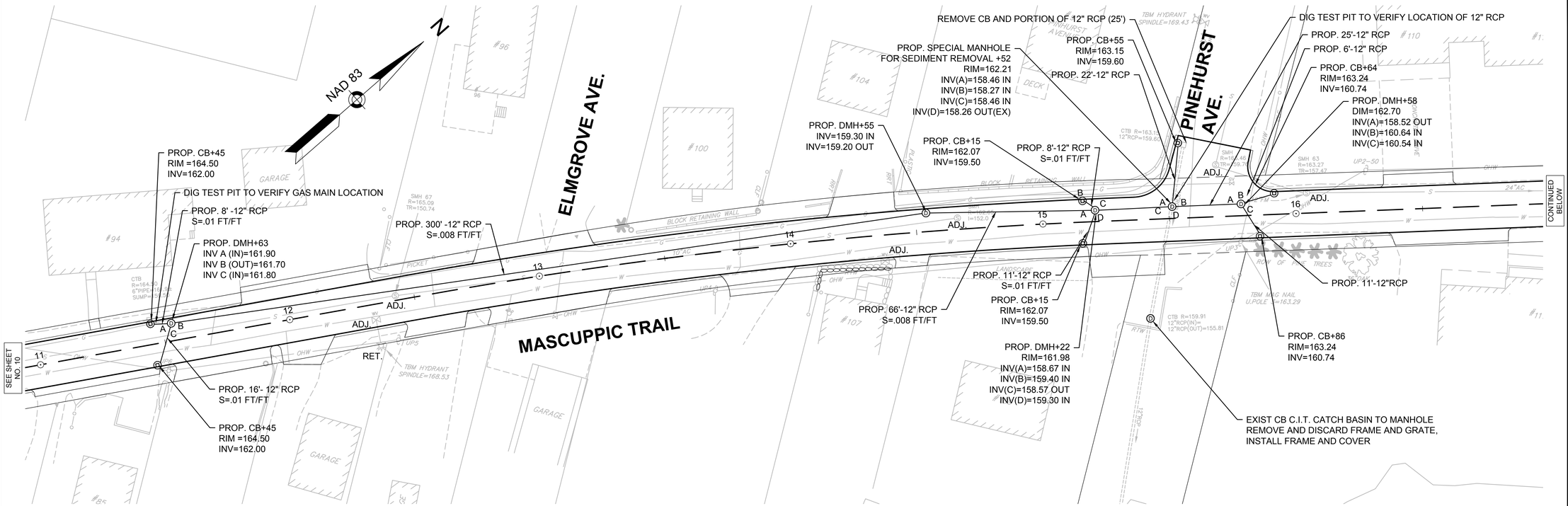
DESIGNED BY:	JG
CHECKED BY:	WPM

DRAWING TITLE:

DRAINAGE & UTILITY PLAN SHEET 1 OF 2

SHEET NO. 10 OF 26



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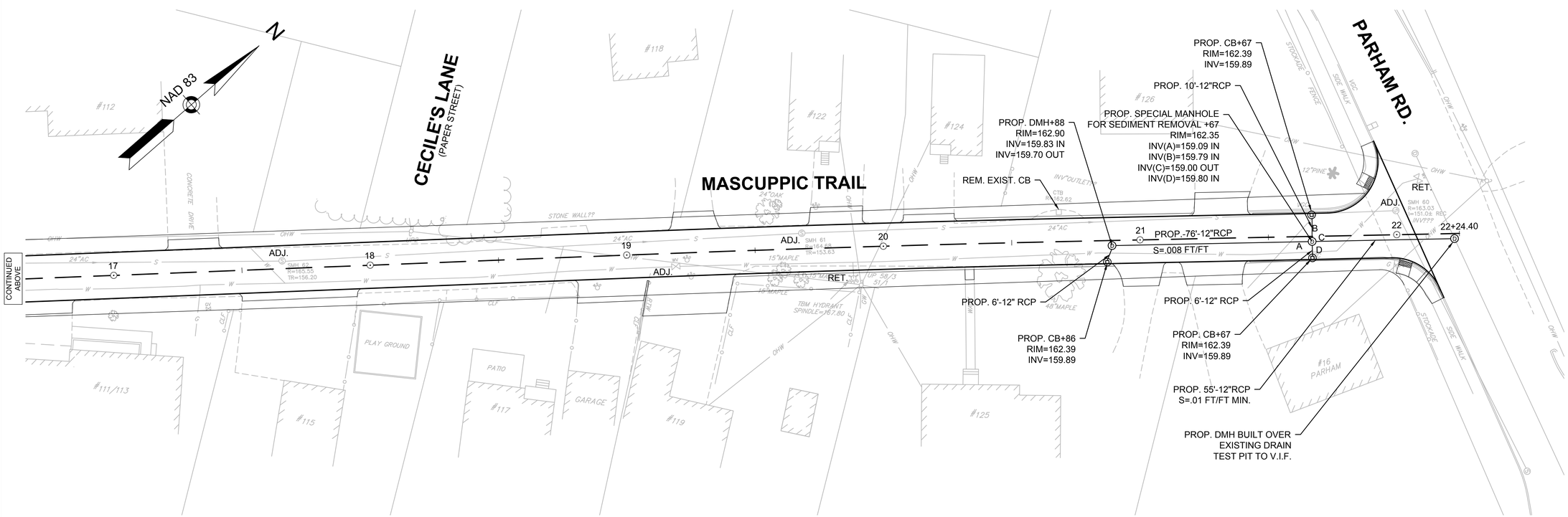
ALL RESIDENTIAL WATER SERVICE BOXES WITHIN THE LIMITS OF WORK TO BE ADJUSTED AND PAID FOR UNDER ITEM 381.3.

0 20 50 100
SCALE: 1" = 20'



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PHONE: 978-649-2310

PROJECT:

MASCUPPIC TRAIL ROADWAY AND DRAINAGE REHABILITATION

TYNGSBOROUGH, MA

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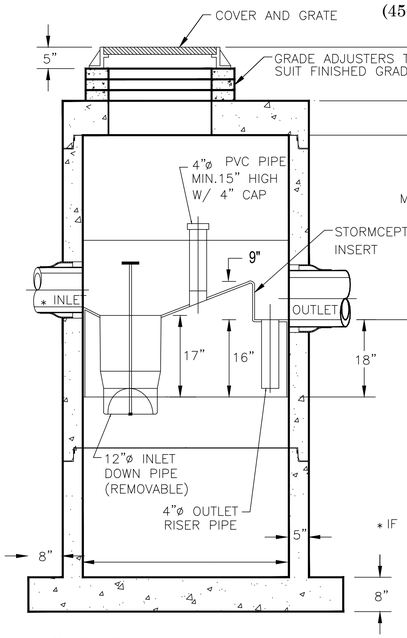
DRAWING TITLE:

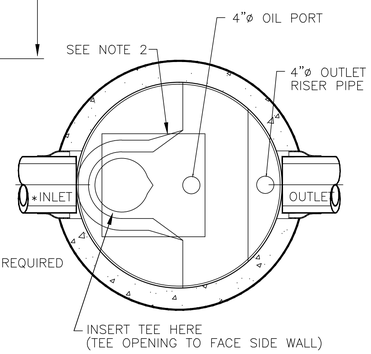
DRAINAGE & UTILITY PLAN
SHEET 2 OF 2

SHEET NO. 11 OF 26

STC 450i Precast Concrete Stormceptor ®
(450 U.S. Gallon Capacity)



SECTION THRU CHAMBER



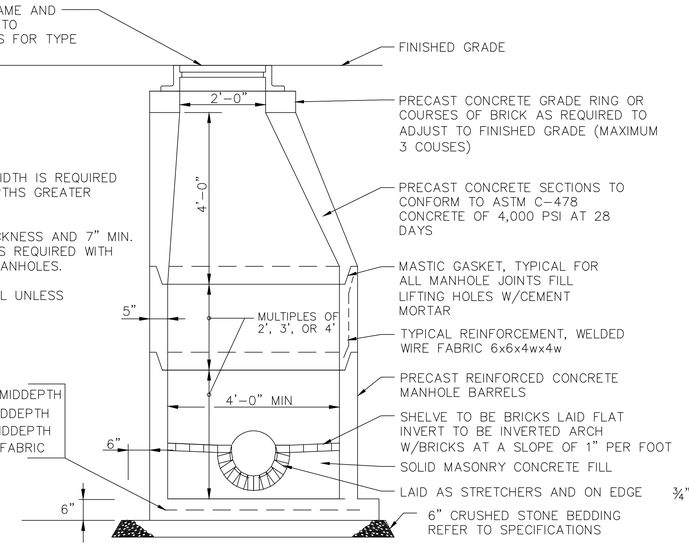
PLAN VIEW

NOTES:
1. THE USE OF FLEXIBLE CONNECTION IS RECOMMENDED AT THE INLET AND OUTLET WHERE APPLICABLE.
2. THE COVER SHOULD BE POSITIONED OVER THE INLET DROP PIPE AND THE OIL PORT.
3. THE STORMCEPTOR SYSTEM IS PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: #4985148, #5498331, #5725760, #5753115, #5849181, #6068765, #6371690.
4. CONTACT A CONCRETE PIPE DIVISION REPRESENTATIVE FOR FURTHER DETAILS NOT LISTED ON THIS DRAWING.
5. THE STORMCEPTORS USE ON THIS PROJECT SHALL BE SET UP FOR INLINE OPERATION.

SPECIAL MANHOLE FOR SEDIMENT REMOVAL DETAILS
NOT TO SCALE

NOTES:
1. 5'–0" DIAMETER WIDTH IS REQUIRED FOR MANHOLE DEPTHS GREATER THAN 20 FEET
2. 6" MIN. WALL THICKNESS AND 7" MIN. BASE THICKNESS IS REQUIRED WITH 5'–0" DIAMETER MANHOLES.
3. 6" LIP IS OPTIONAL UNLESS OTHERWISE NOTED.

H=10' OR LESS: #4 AT 18 EW MIDDEPTH
H=10' TO 20': #4 AT 12 EW MIDDEPTH
H=20' TO 30': #5 AT 12 EW MIDDEPTH
IN ADDITION TO WELDED WIRE FABRIC



TYPICAL PRECAST CONCRETE MANHOLE
NOT TO SCALE

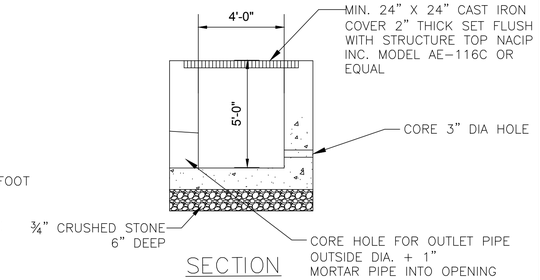
NOTES:

ALL PRECAST CONCRETE INCLUDING RISER, CONE, AND BASE SECTIONS SHALL HAVE MIN. OF 12 SQ. IN. OF STEEL REINF. PER VERTICAL FOOT, PLACED ACCORDING TO AASHTO DESIGNATION M199 DESIGNED FOR H–20 LOADING.

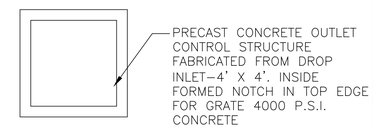
ALL BRICKS SHALL BE MINIMUM 5000 P.S.I. RED MANHOLE BRICK BY S&H OR EQUAL.

CEMENT MORTAR SHALL MEET ASTM C270–12A TYPE M ONLY.

ALL DRAIN OUTLET PIPE SHALL BE ADS N–12 SINGLE WALL. COUPLINGS AND FITTINGS FOR DRAIN PIPES SHALL BE INJECTION MOLDED WITH (WT) WATERTIGHT F477 GASKETS.

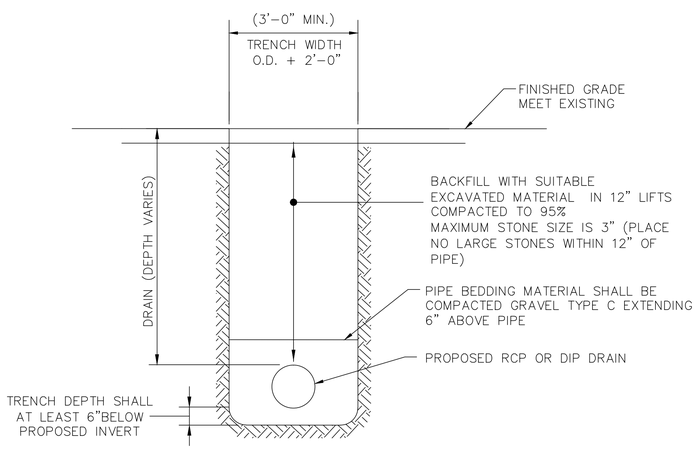


SECTION

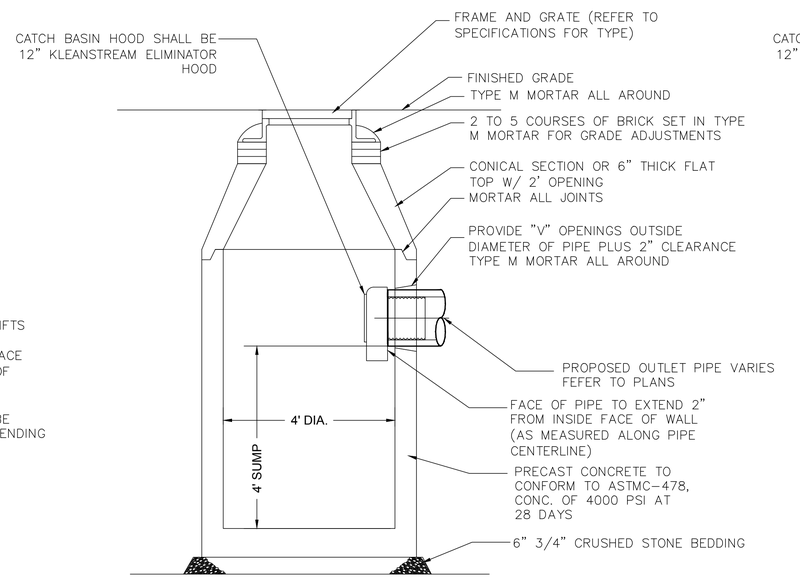


PLAN

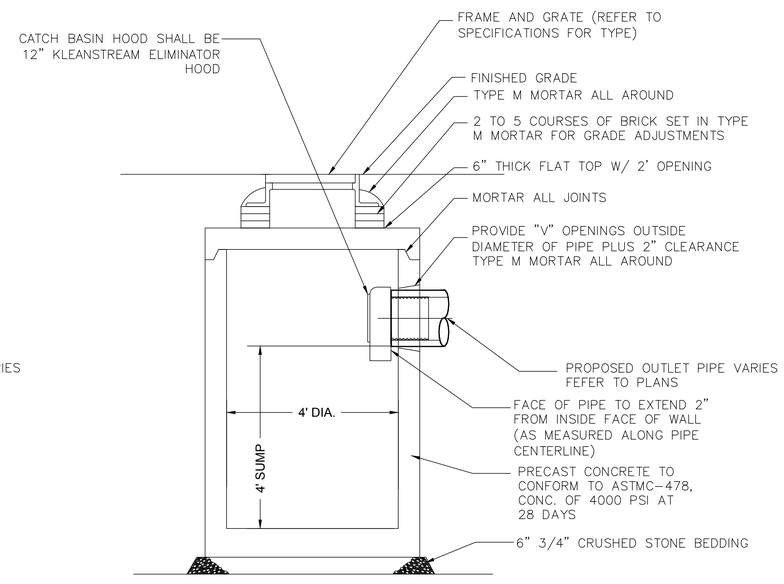
INLET STRUCTURE DETAIL
NOT TO SCALE



TYPICAL DRAIN PIPE TRENCH DETAIL
NOT TO SCALE



4 ' DIAMETER PRECAST CONCRETE CATCH BASIN W/ CONE TOP
NOT TO SCALE



4 ' DIAMETER PRECAST CONCRETE CATCH BASIN W/ FLAT TOP
NOT TO SCALE

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PROFESSIONAL CIVIL ENGINEER FOR WORLDTECH ENGINEERING, LLC

NO.	DATE	REVISION

SCALE:	N.T.S.
DATE:	APRIL 2016
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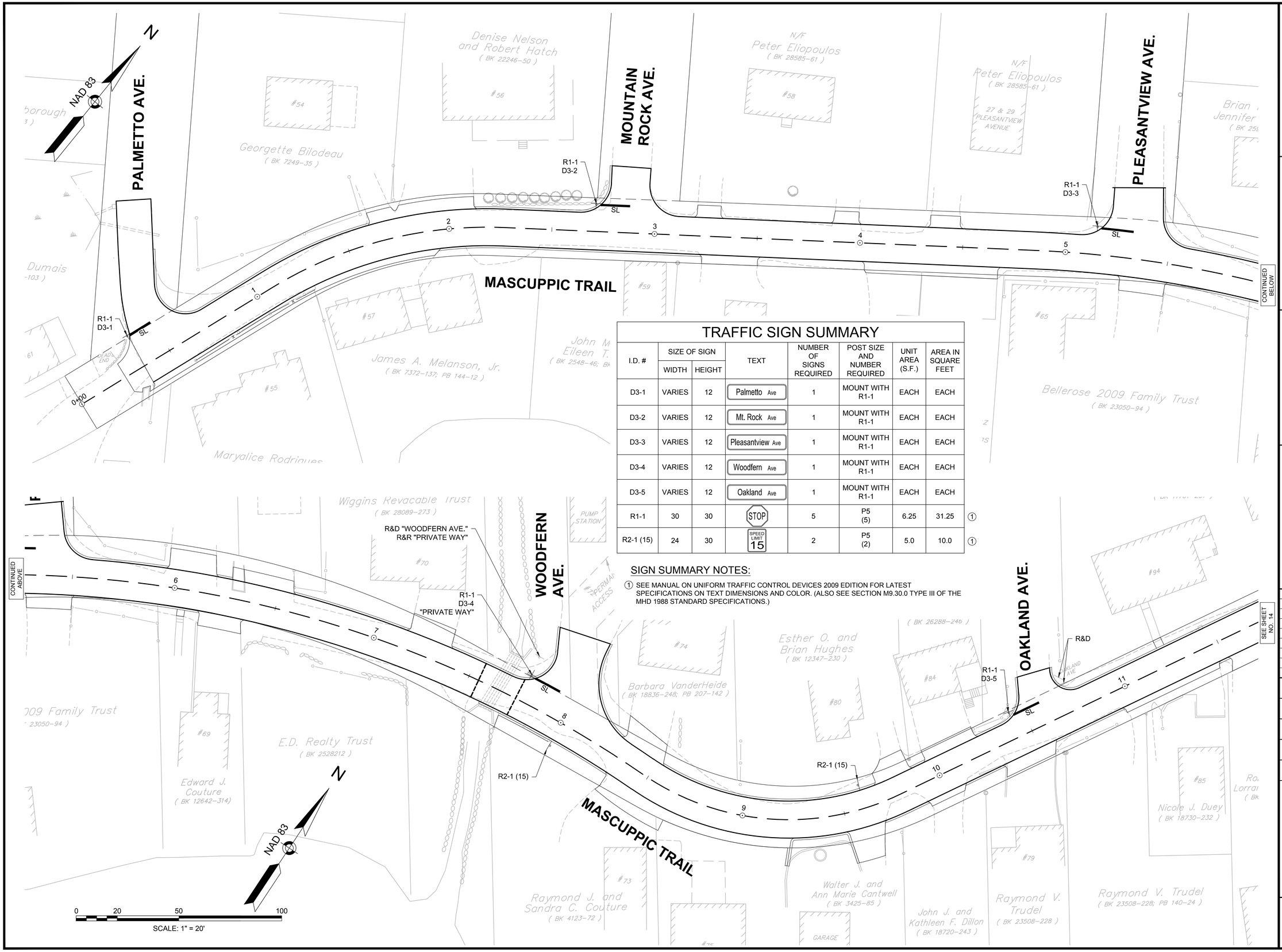
DESIGNED BY:	JG
CHECKED BY:	WPM

DRAWING TITLE:

DRAINAGE DETAILS



TRAFFIC SIGN SUMMARY

I.D. #	SIZE OF SIGN		TEXT	NUMBER OF SIGNS REQUIRED	POST SIZE AND NUMBER REQUIRED	UNIT AREA (S.F.)	AREA IN SQUARE FEET	
	WIDTH	HEIGHT						
D3-1	VARIES	12	Palmetto Ave	1	MOUNT WITH R1-1	EACH	EACH	
D3-2	VARIES	12	Mt. Rock Ave	1	MOUNT WITH R1-1	EACH	EACH	
D3-3	VARIES	12	Pleasantview Ave	1	MOUNT WITH R1-1	EACH	EACH	
D3-4	VARIES	12	Woodfern Ave	1	MOUNT WITH R1-1	EACH	EACH	
D3-5	VARIES	12	Oakland Ave	1	MOUNT WITH R1-1	EACH	EACH	
R1-1	30	30	STOP	5	P5 (5)	6.25	31.25	1
R2-1 (15)	24	30	SPEED LIMIT 15	2	P5 (2)	5.0	10.0	1

SIGN SUMMARY NOTES:

1. SEE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES 2009 EDITION FOR LATEST SPECIFICATIONS ON TEXT DIMENSIONS AND COLOR. (ALSO SEE SECTION M9.30.0 TYPE III OF THE MHD 1988 STANDARD SPECIFICATIONS.)

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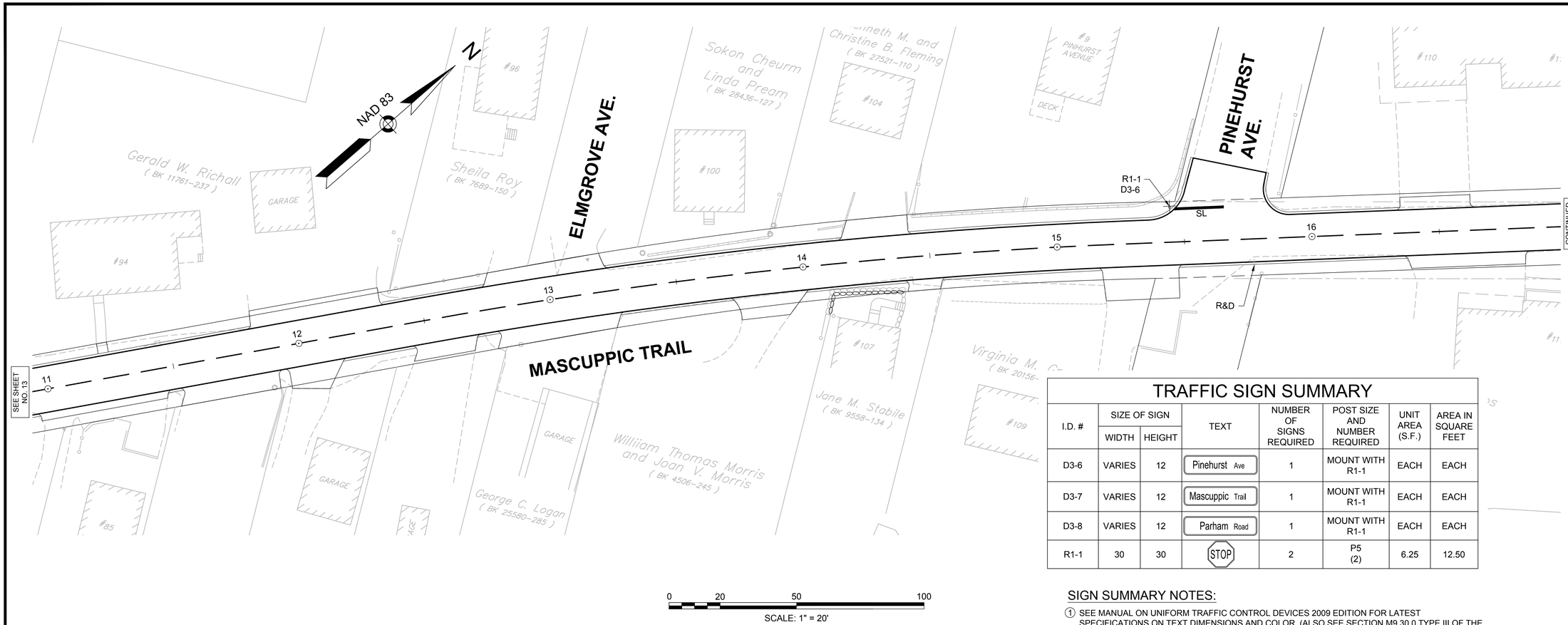
DRAWING TITLE:

SIGN & PAVEMENT MARKING PLANS
SHEET 1 OF 2



0 20 50 100

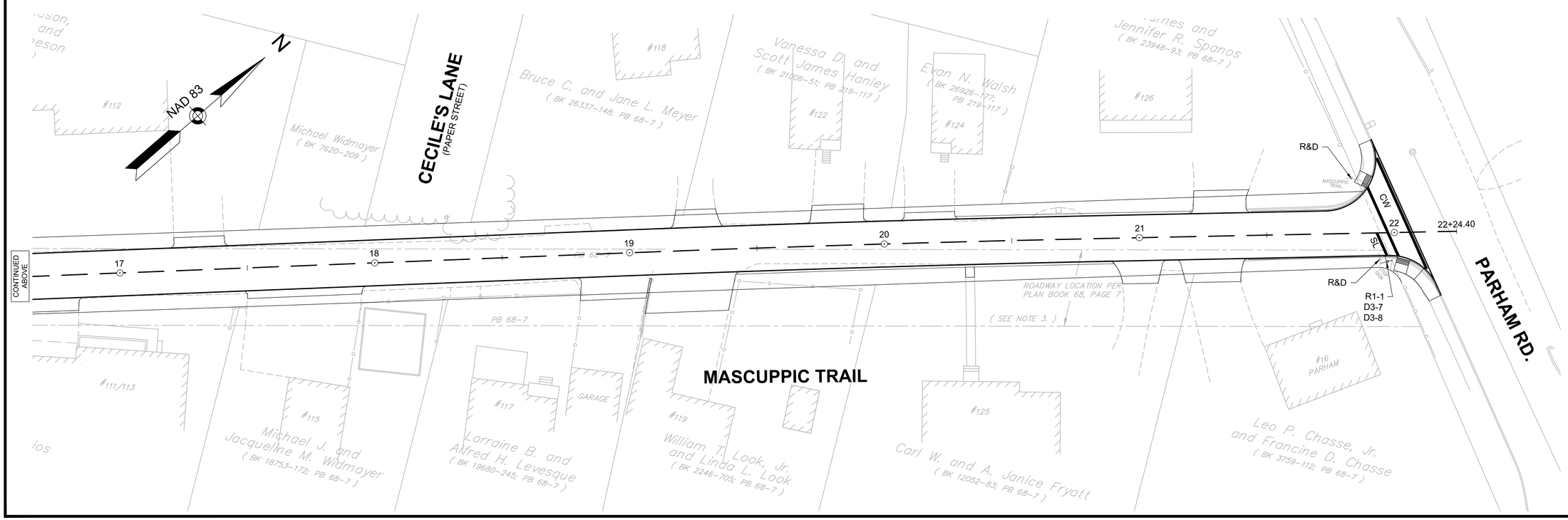
SCALE: 1" = 20'

TRAFFIC SIGN SUMMARY

I.D. #	SIZE OF SIGN		TEXT	NUMBER OF SIGNS REQUIRED	POST SIZE AND NUMBER REQUIRED	UNIT AREA (S.F.)	AREA IN SQUARE FEET
	WIDTH	HEIGHT					
D3-6	VARIES	12	Pinehurst Ave	1	MOUNT WITH R1-1	EACH	EACH
D3-7	VARIES	12	Mascuppic Trail	1	MOUNT WITH R1-1	EACH	EACH
D3-8	VARIES	12	Parham Road	1	MOUNT WITH R1-1	EACH	EACH
R1-1	30	30	STOP	2	P5 (2)	6.25	12.50

SIGN SUMMARY NOTES:

1. SEE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES 2009 EDITION FOR LATEST SPECIFICATIONS ON TEXT DIMENSIONS AND COLOR. (ALSO SEE SECTION M9.30.0 TYPE III OF THE MHD 1988 STANDARD SPECIFICATIONS.)



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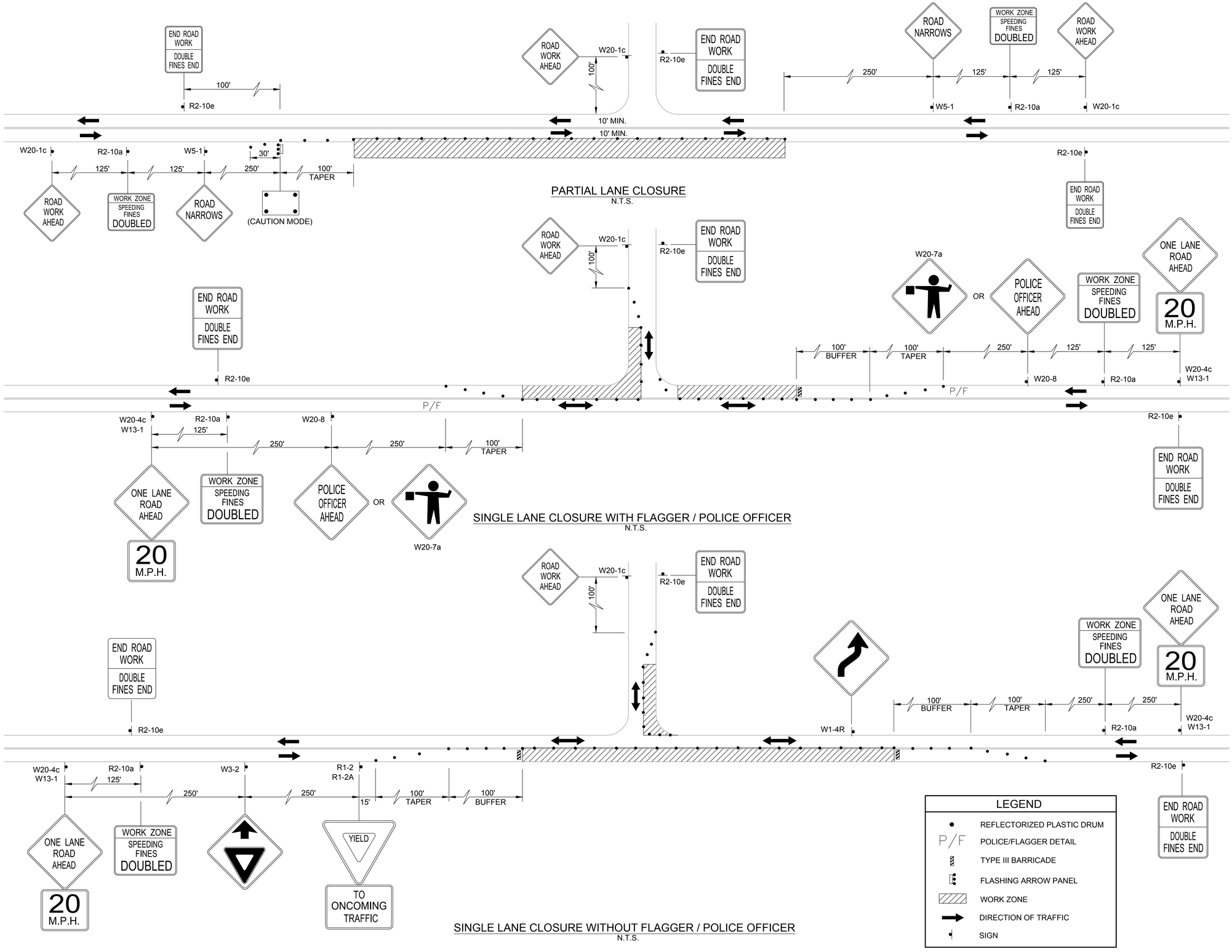
DRAWING TITLE:

SIGN & PAVEMENT MARKING PLANS SHEET 2 OF 2

SHEET NO. 14 OF 26



CLIENT:

TOWN OF TYNGSBOROUGH

HIGHWAY DEPARTMENT

89 KENDALL ROAD
TYNGSBOROUGH, MA 01879
PHONE: 978-649-2310

PROJECT:

MASCUPPIC TRAIL ROADWAY AND DRAINAGE REHABILITATION

TYNGSBOROUGH, MA

PREPARED BY:

WORLDTECH ENGINEERING
300 TRADECENTER, SUITE 5580
WOBURN, MA 01801
T: 781-933-4800
F: 781-933-4801

PROFESSIONAL CIVIL ENGINEER FOR WORLDTECH ENGINEERING, LLC

NO.	DATE	REVISION

SCALE:	N.T.S.
DATE:	APRIL 2016
PROJECT NO.	15-006.01
DESIGNED BY:	BS
CHECKED BY:	WPM

DRAWING TITLE:

TRAFFIC MANAGEMENT DETAILS

SHEET NO. 15 OF 26

TEMPORARY TRAFFIC CONTROL GENERAL NOTES:

1. ALL TEMPORARY TRAFFIC CONTROL WORK SHALL CONFORM TO THE LATEST EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND ALL REVISIONS.
2. ALL SIGN LEGENDS, BORDERS AND MOUNTING SHALL BE IN ACCORDANCE WITH THE MUTCD AND MASSDOT SIGN STANDARDS.
3. TEMPORARY CONSTRUCTION SIGNING AND ALL OTHER TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY WORK.
4. TEMPORARY CONSTRUCTION SIGNING, BARRICADES AND ALL OTHER NECESSARY WORK ZONE TRAFFIC CONTROL DEVICES SHALL BE REMOVED FROM THE ROAD OR COVERED WHEN THEY ARE NOT REQUIRED FOR CONTROL OF TRAFFIC.
5. SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY, AND REFLECTORIZED PLASTIC DRUMS WITH LIGHTING DEVICES MOUNTED ON THEM, MUST PASS THE CRITERIA SET FORTH IN NCHRP REPORT 350., "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES."
6. CONTRACTORS SHALL NOTIFY EACH ABUTTER AT LEAST 24 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE TEMPORARY CLOSURE OF ACCESS, SUCH AS CONDUIT INSTALLATION, EXISTING PAVEMENT EXCAVATION, TEMPORARY DRIVEWAY PAVEMENT PLACEMENT AND SIMILAR OPERATIONS.
7. CONSTRUCTION / SURVEY VEHICLE ACCESS TO BE COORDINATED WITH POLICE DETAIL AS REQUIRED.
8. THE FIRST FIVE PLASTIC DRUMS OF A TAPER MAY BE MOUNTED WITH TYPE A LIGHTS.
9. DISTANCES ARE A GUIDE AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.
10. MAXIMUM SPACING OF TRAFFIC DEVICES IN A TAPER (DRUMS OF CONES) IS EQUAL IN FEET TO THE SPEED LIMIT IN M.P.H.
11. MINIMUM LANE WIDTH IS TO BE 10 FEET UNLESS OTHERWISE SHOWN. MINIMUM LANE WIDTH TO BE MEASURED FROM THE EDGE OF THE DRUMS OR MEDIAN BARRIER.

WORK ZONE TAPER NOTES

1. THE FINAL LOCATION OF PROPOSED SIGNS SHALL BE DETERMINED IN THE FIELD AS DEEMED APPROPRIATE.
2. TYPE III BARRICADES SHALL BE USED AS REQUIRED.

SIGNING NOTES

1. ALL SIGNS SHALL BE MOUNTED ON THEIR OWN STANDARD SIGN SUPPORTS.
2. ALL EXISTING SIGNS NOT APPLICABLE TO VARIOUS STAGES OF CONSTRUCTION SHALL BE REMOVED OR COVERED.
3. SIGNS SHALL NOT MOUNTED ON CHANNELIZATION DRUMS OR CONES.

CONSTRUCTION SIGN SUMMARY

IDENTIFI-CATION NUMBER	SIZE		TEXT	DIMENSIONS (IN)			NUMBER OF SIGNS REQUIRED	COLOR			UNIT AREA (S.F.)	TOTAL AREA (S.F.)
	WIDTH (IN)	HEIGHT (IN)		LETTER HEIGHT	VERTICAL SPACING	ARROW RTE. MKR.		BACK-GROUND	LEGEND	BORDER		
R1-2	36"X36"X36"		YIELD	1	1	1	1	WHITE	RED	RED	3.90	3.90
R1-2a	36"	30"	TO ONCOMING TRAFFIC	↓	↓	↓	1	WHITE	BLACK	BLACK	7.50	7.50
R2-10a	48"	36"	WORK ZONE SPEEDING FINES DOUBLED	2	2	2	2	ORANGE/ WHITE	BLACK	BLACK	12.00	24.00
R2-10e	36"	48"	END ROAD WORK / DOUBLE FINES END	↓	↓	↓	4	ORANGE/ WHITE	BLACK	BLACK	12.00	48.00
W3-2	48"	48"		1	1	1	1	YELLOW	RED/ BLACK WHITE	BLACK	16.00	16.00
W5-1	36"	36"	ROAD NARROWS				2	ORANGE	BLACK	BLACK	9.00	18.00
W13-1 (20)	24"	24"	20 M.P.H.				2	ORANGE	BLACK	BLACK	4.00	8.00
W20-1C	36"	36"	ROAD WORK AHEAD	↓	↓	↓	4	ORANGE	BLACK	BLACK	9.00	36.00
W20-4c	36"	36"	ONE LANE ROAD AHEAD	1	1	1	2	ORANGE	BLACK	BLACK	9.00	18.00
W20-7a	36"	36"					2	ORANGE	BLACK	BLACK	9.00	18.00
W20-7b	36"	36"	POLICE OFFICER AHEAD	↓	↓	↓	2	ORANGE	BLACK	BLACK	9.00	18.00

SIGN SUMMARY NOTES:

1. HIGH INTENSITY ENCAPSULATED LENS REFLECTIVE SHEETING SHALL BE USED FOR ALL SIGNS. THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" 2009 EDITION, THE 1996 MASSDOT CONSTRUCTION AND TRAFFIC STANDARD DETAILS", AND ALL AMENDMENTS WILL GOVERN.
2. (1) SEE MUTCD 2009 EDITION, 1979 STD. HWY. SIGNS AND SECTION M9.30.0 TYPE III OF THE MASSDOT STANDARD SPECIFICATION FOR TEXT DIMENSIONS AND COLOR.
   (2) SEE MASSDOT SIGN STANDARDS.

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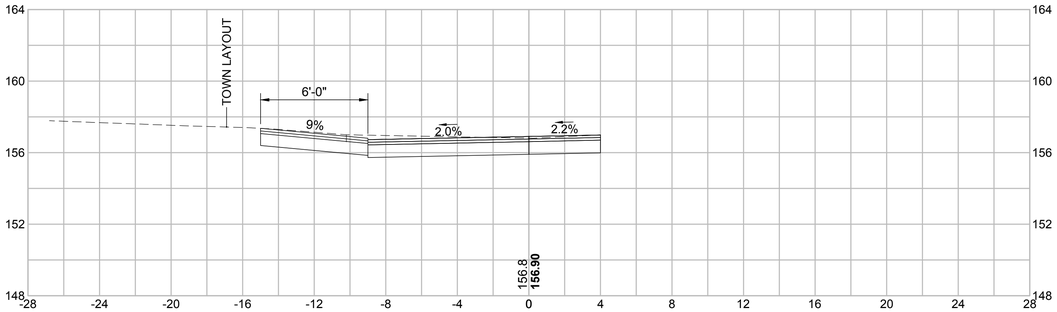
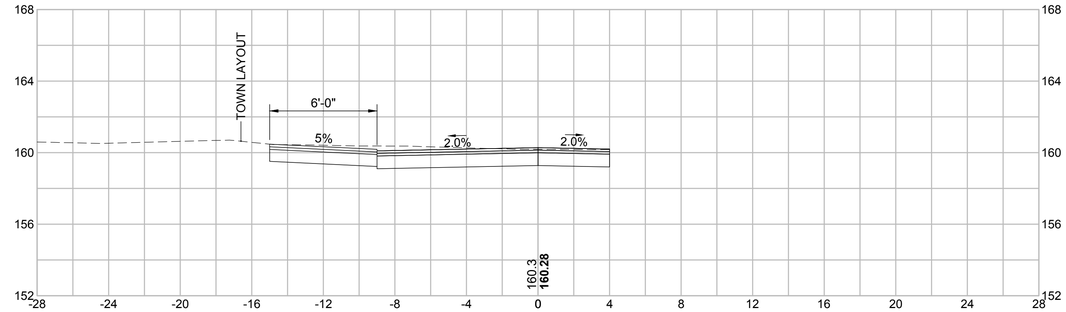
TRAFFIC MANAGEMENT DETAILS

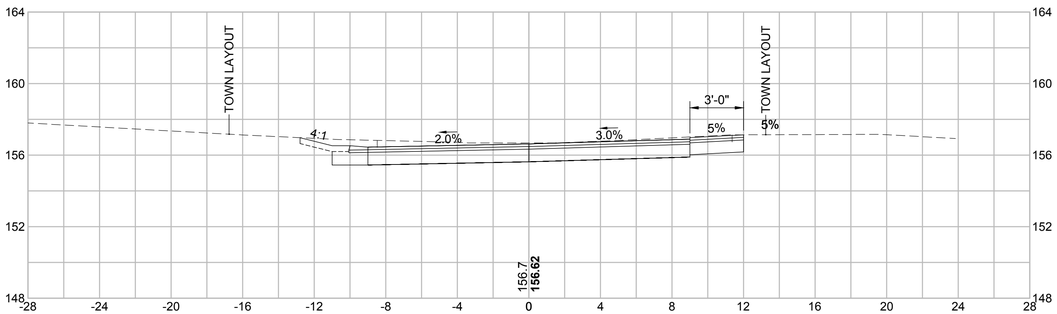
1+67 - DRIVEWAY LT



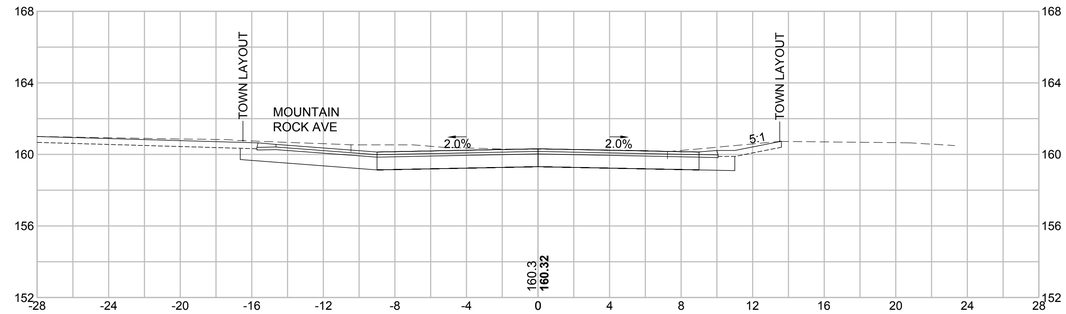
3+25 - DRIVEWAY LT



1+50 - DRIVEWAY RT

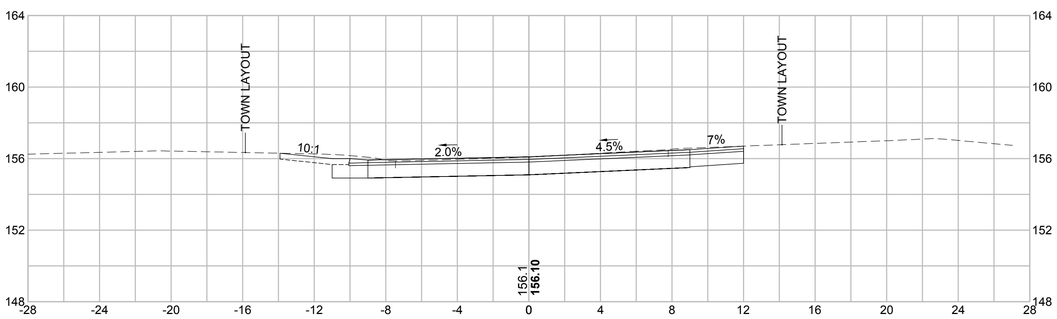


3+00

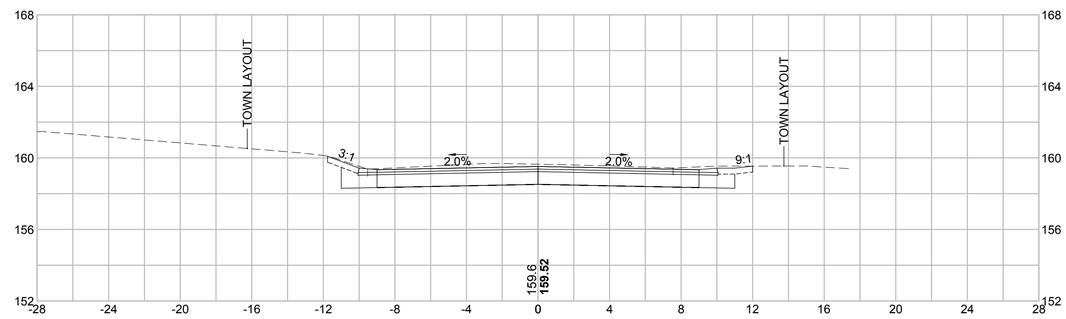


AT STA 1+20 BEGIN TRANSITION FROM +4.5% TO -2.0% AT STA 2+50 RT

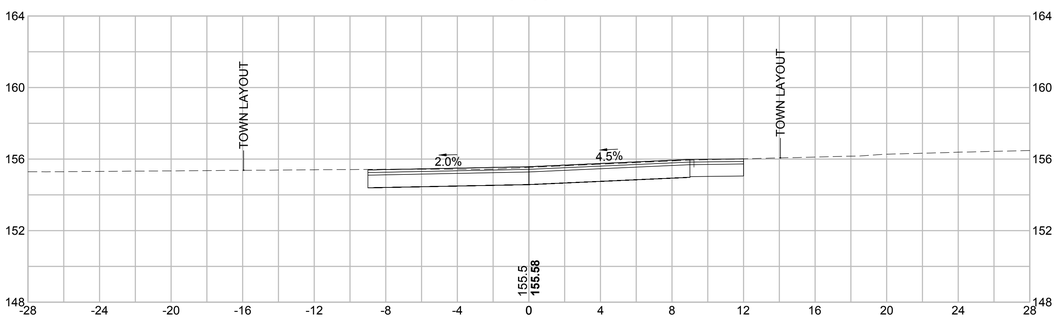
1+00



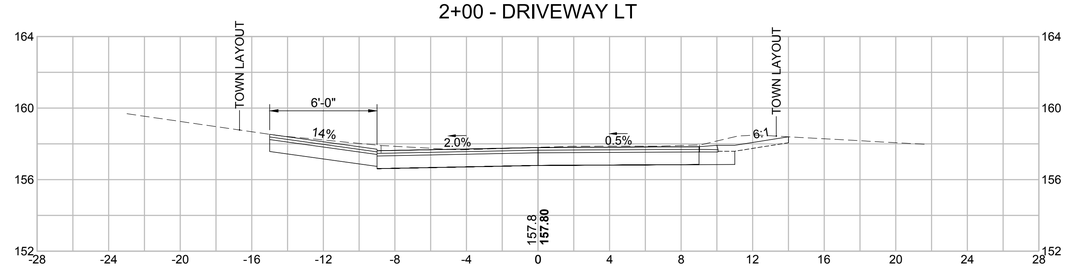
2+50



0+50



2+00 - DRIVEWAY LT



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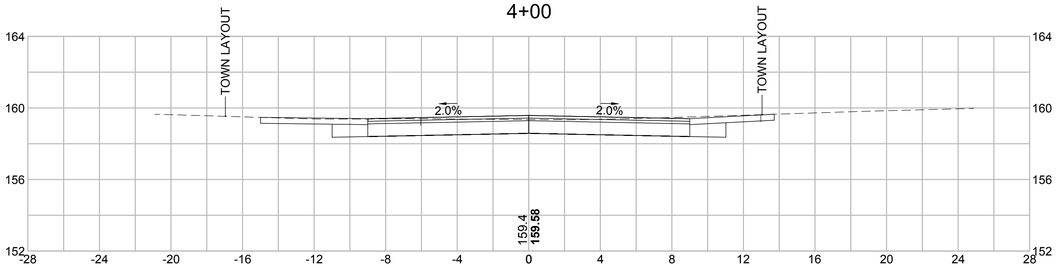
CHECKED BY:	WPM

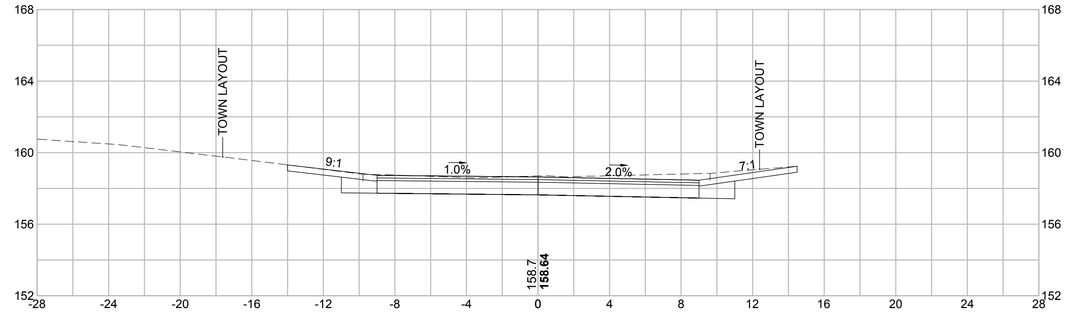
DRAWING TITLE:

CROSS SECTIONS
SHEET 1 OF 10

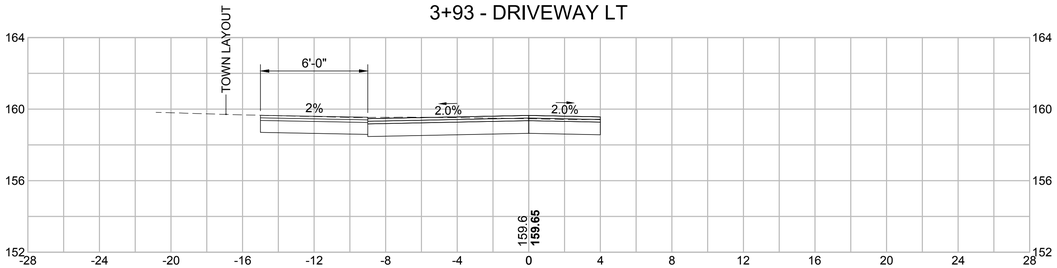
4+00



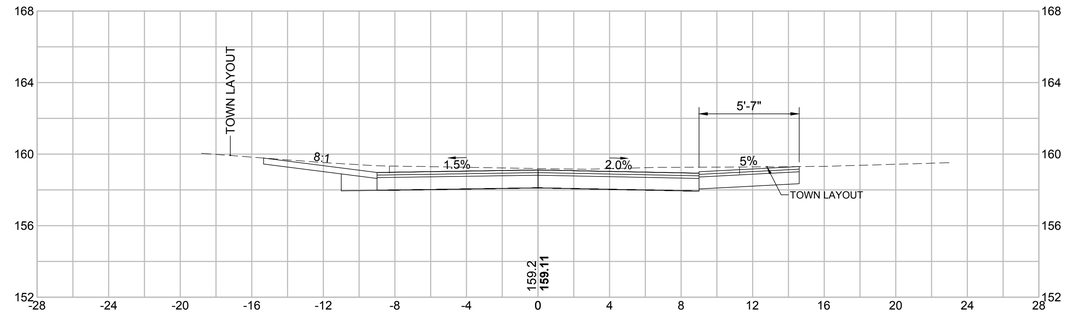
5+00



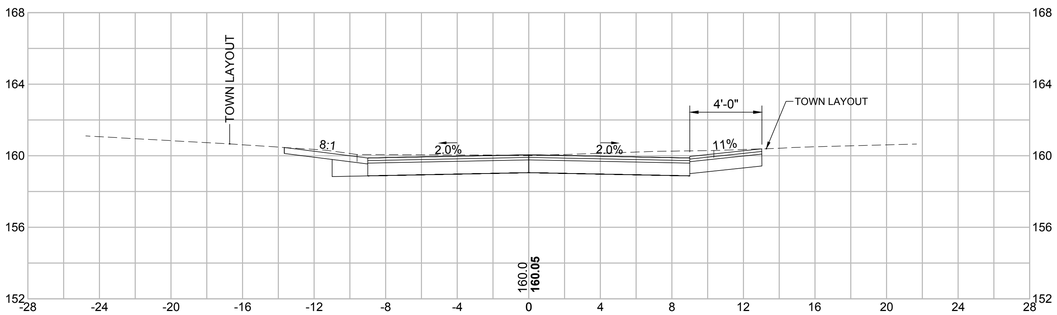
3+93 - DRIVEWAY LT



4+50 - DRIVEWAY RT

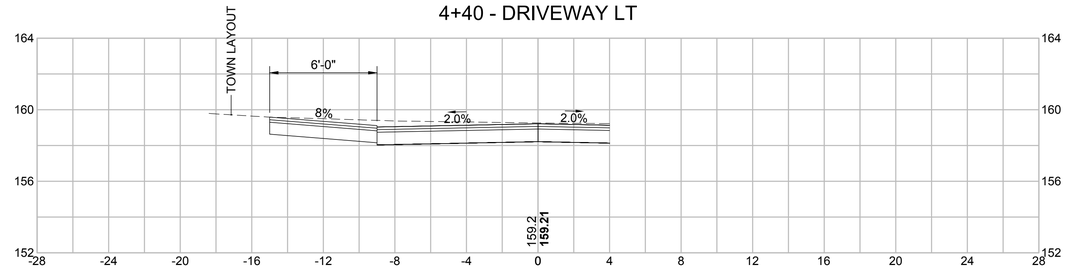


3+50 - DRIVEWAY RT

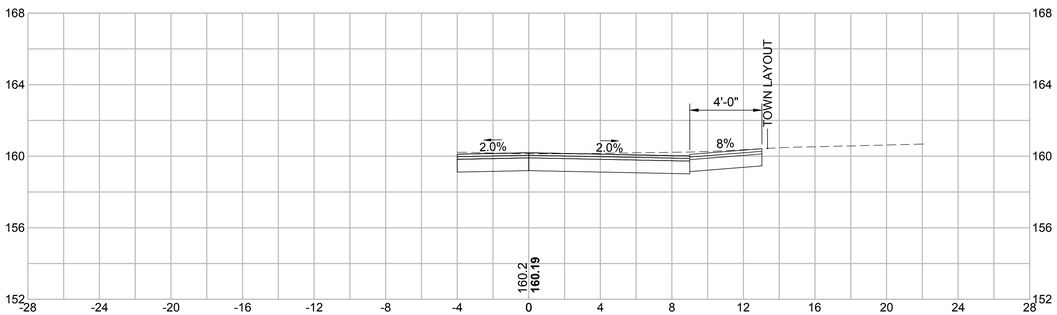


AT STA 4+40 BEGIN TRANSITION FROM -2.0% TO +2.0% AT STA 5+20 LT

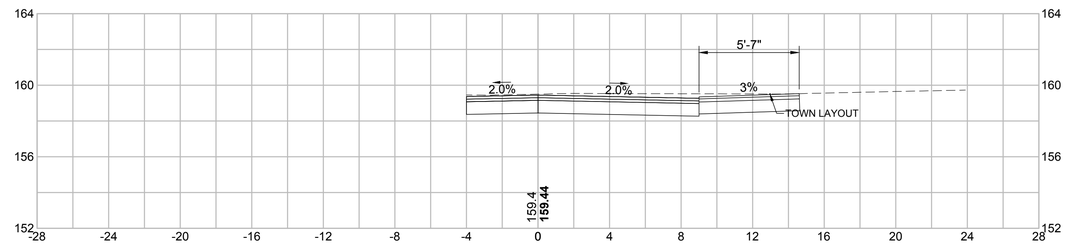
4+40 - DRIVEWAY LT



3+35 - DRIVEWAY RT



4+15 - DRIVEWAY RT



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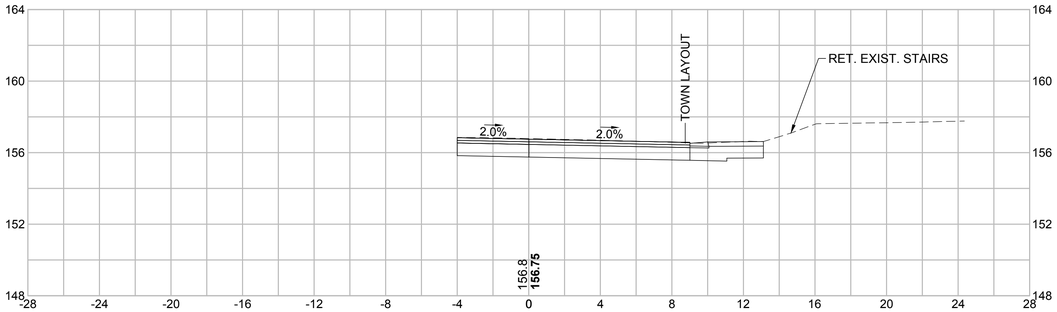
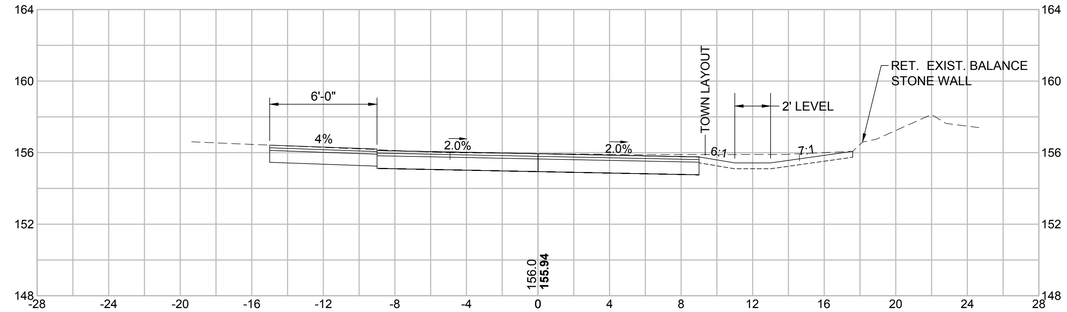
CROSS SECTIONS
SHEET 2 OF 10

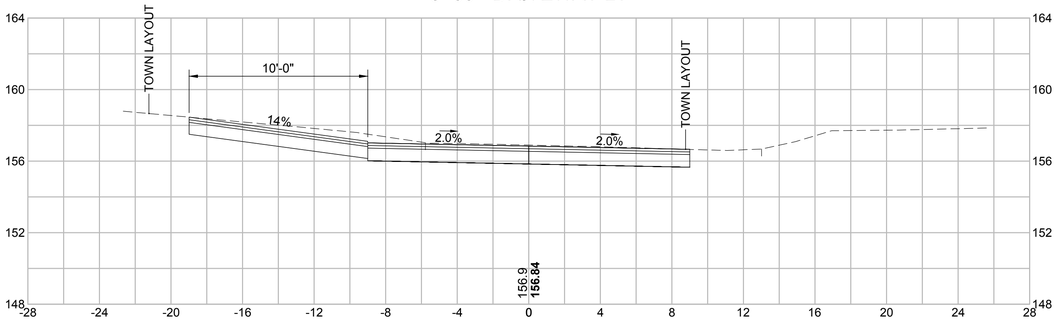
6+05 - STAIRS RT



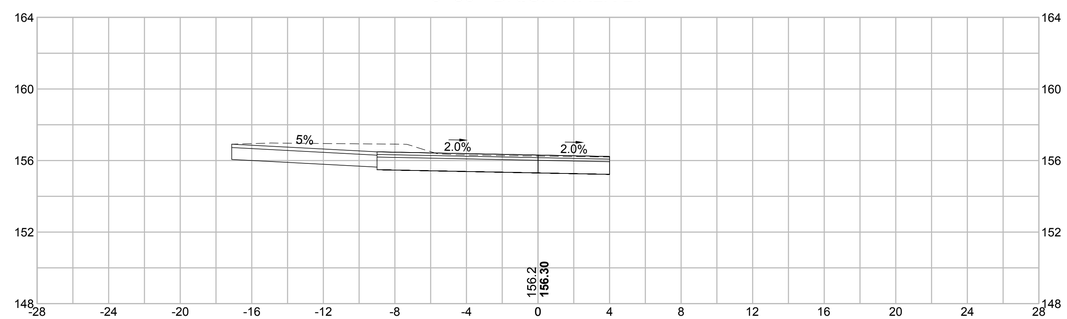
6+50 - DRIVEWAY LT



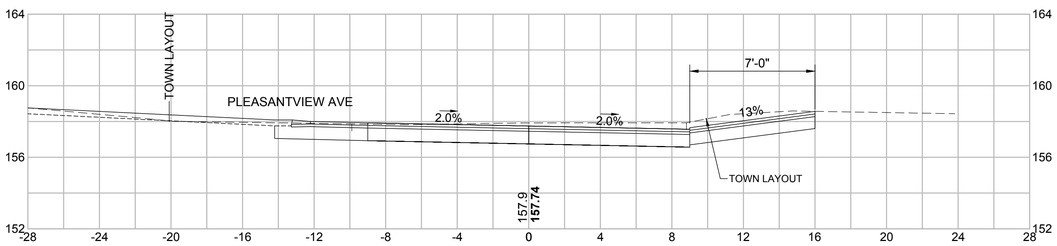
6+00 - DRIVEWAY LT



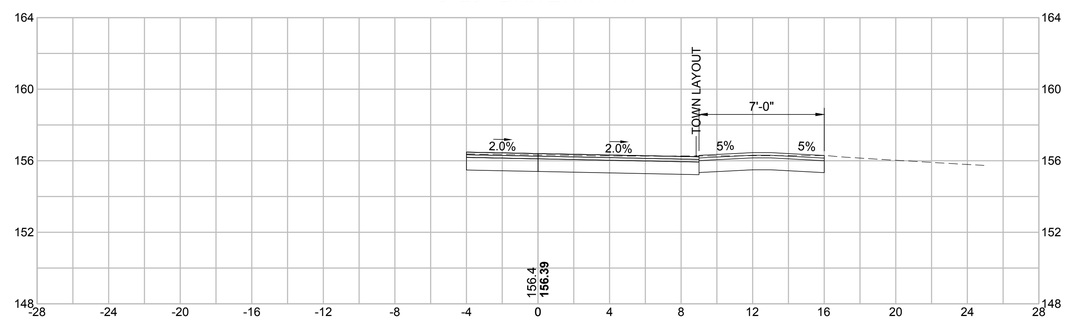
6+30 - BRICK WALK LT



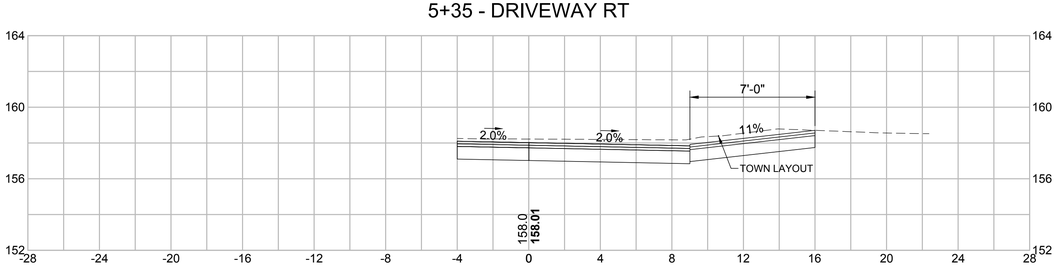
5+50 - DRIVEWAY RT



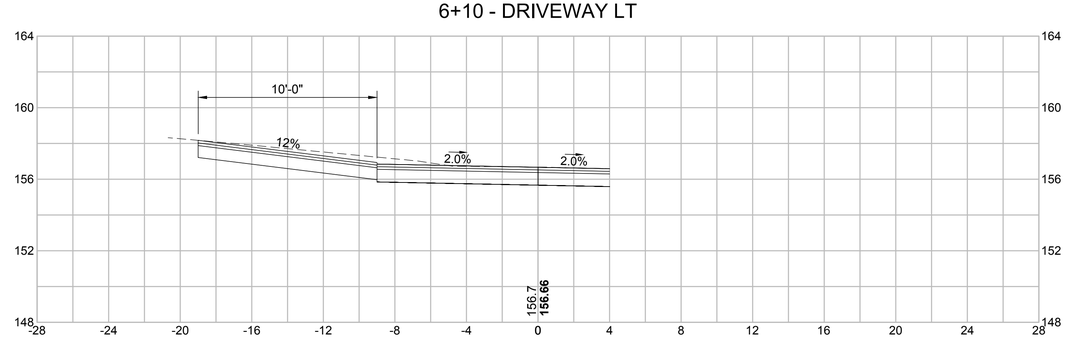
6+25 - DRIVEWAY RT



5+35 - DRIVEWAY RT



6+10 - DRIVEWAY LT



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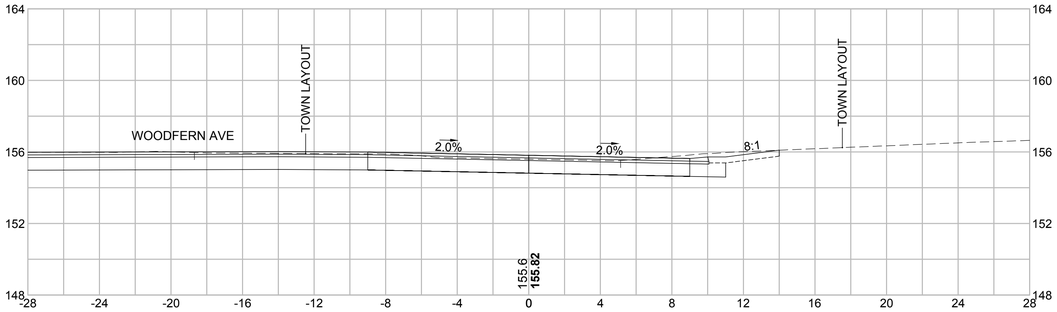
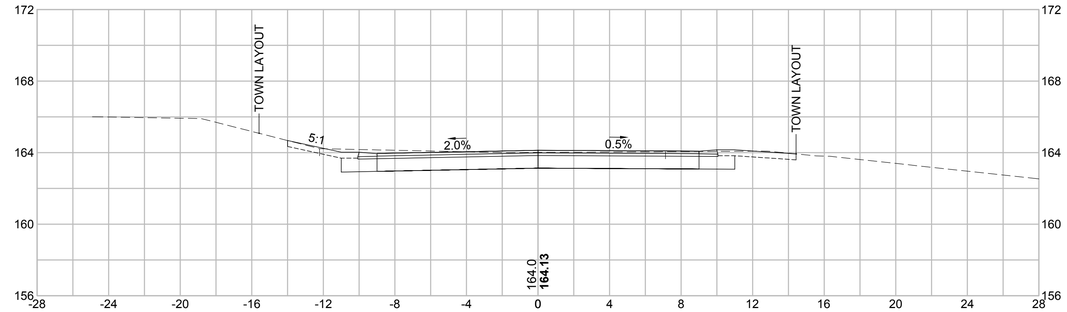
CROSS SECTIONS
SHEET 3 OF 10

AT STA 8+20 BEGIN TRANSITION FROM +2.0% TO -2.0% AT LT
AT STA 8+20 BEGIN TRANSITION FROM -2.0% TO +2.0% AT RT

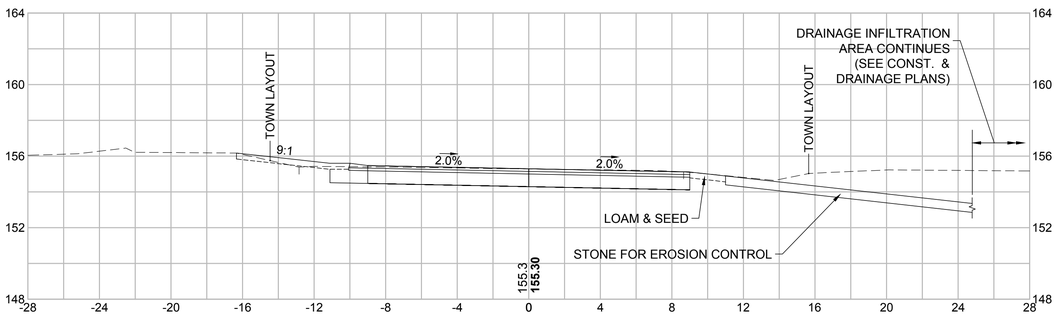
8+00



9+50

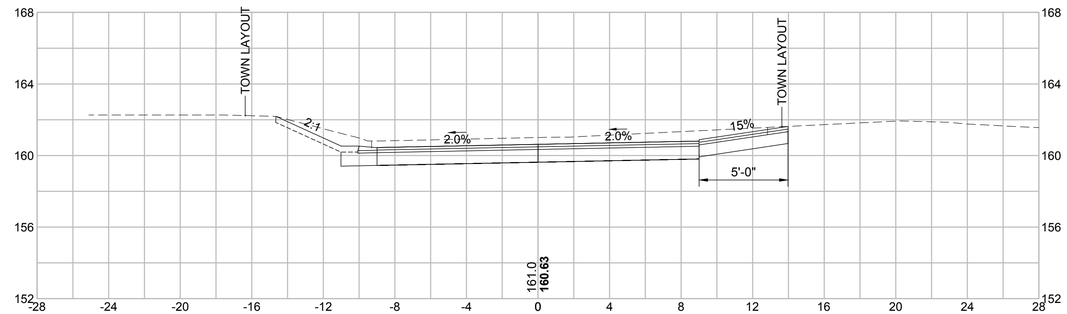


7+50



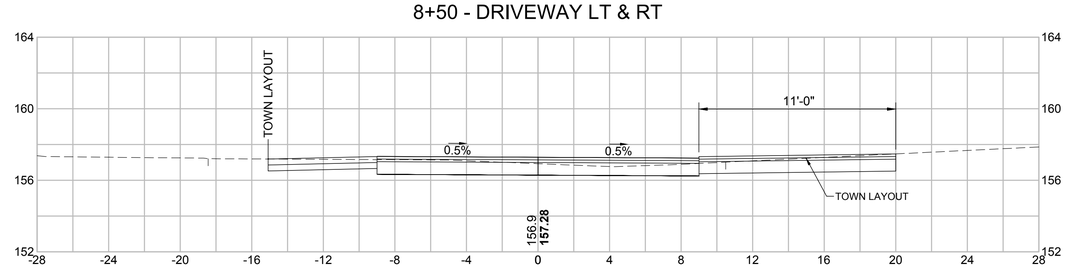
AT STA 9+00 BEGIN TRANSITION FROM +2.0% TO -2.0% AT STA 9+80 RT

9+00 - DRIVEWAY RT

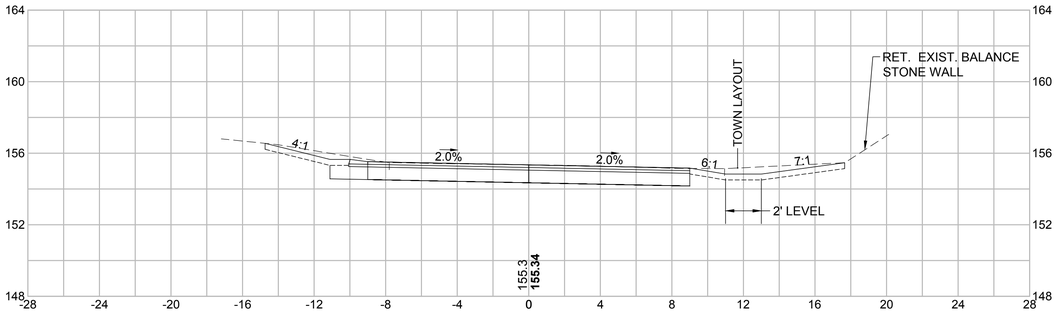


7+25 - DRIVEWAY LT

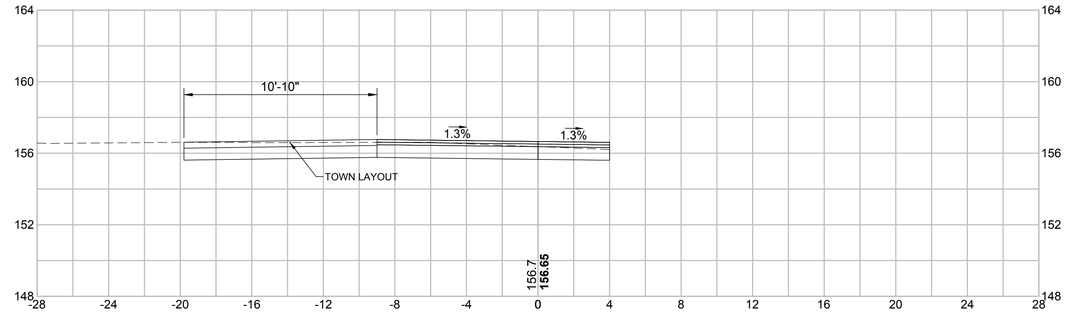
8+50 - DRIVEWAY LT & RT



7+00



8+35 - DRIVEWAY LT



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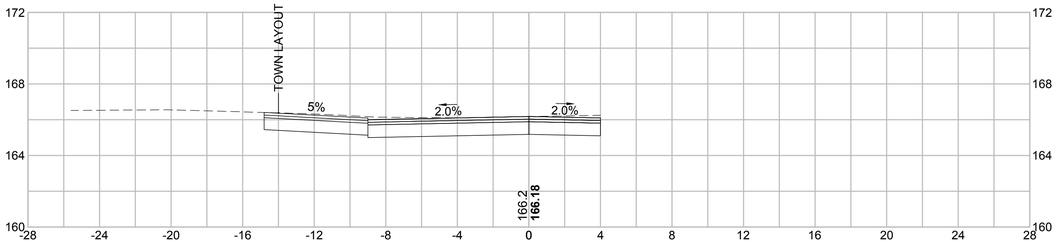
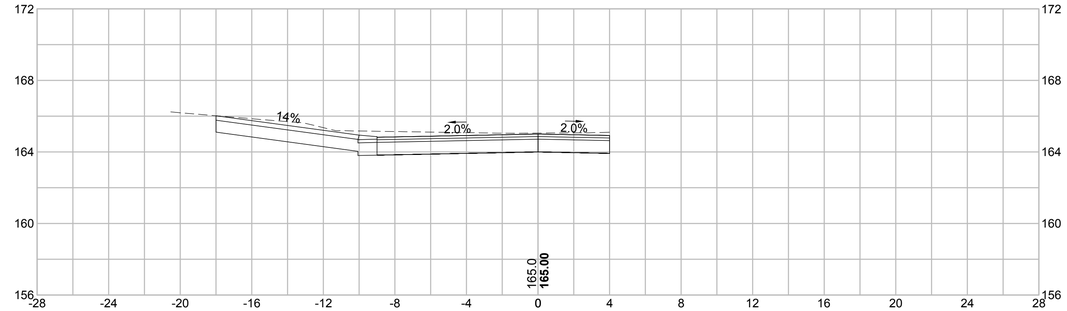
SHEET 4 OF 10

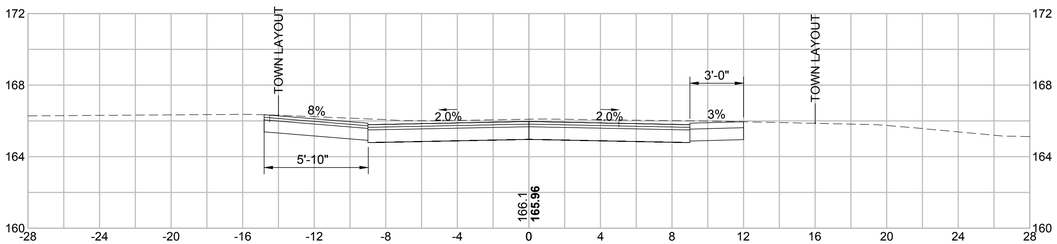
10+15 - DRIVEWAY LT



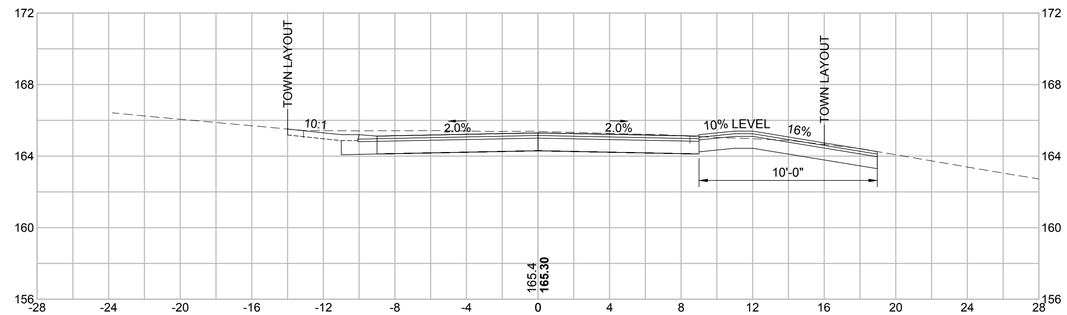
11+24 - HMA WALK LT



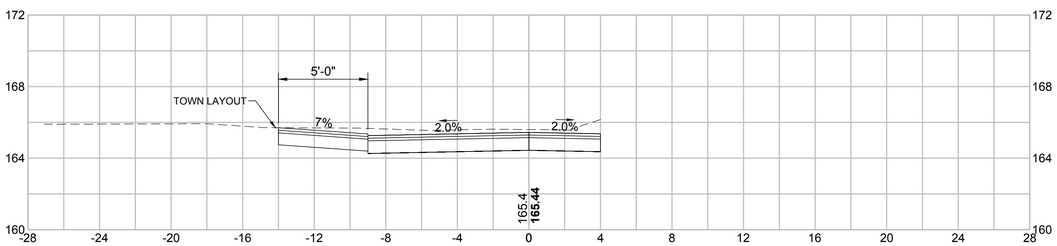
10+00 - DRIVEWAY LT



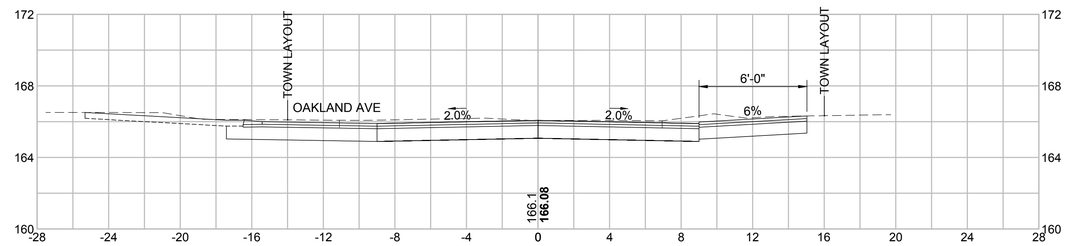
11+00 - DRIVEWAY RT



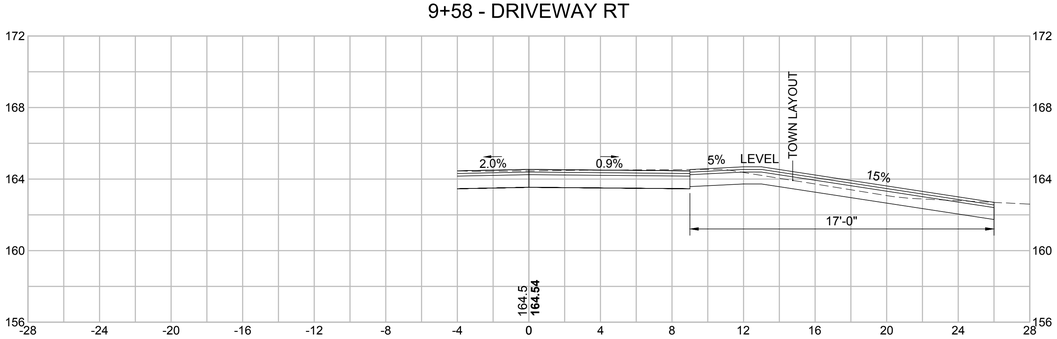
9+80 - DRIVEWAY LT



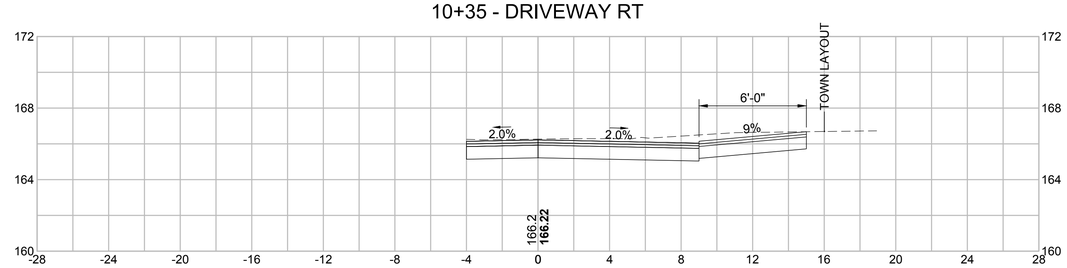
10+50 - DRIVEWAY RT



9+58 - DRIVEWAY RT



10+35 - DRIVEWAY RT



CLIENT:

TOWN OF TYNGSBOROUGH

HIGHWAY DEPARTMENT
89 KENDALL ROAD
TYNGSBOROUGH, MA 01879
PHONE: 978-649-2310

PROJECT:

MASCUPPIC TRAIL ROADWAY AND DRAINAGE REHABILITATION

TYNGSBOROUGH, MA

PREPARED BY:

WORLDTECH ENGINEERING
300 TRADECENTER, SUITE 5580
WOBURN, MA 01801
T: 781-933-4800
F: 781-933-4801

PROFESSIONAL CIVIL ENGINEER FOR WORLDTECH ENGINEERING, LLC

NO.	DATE	REVISION

SCALE:	1" = 4'
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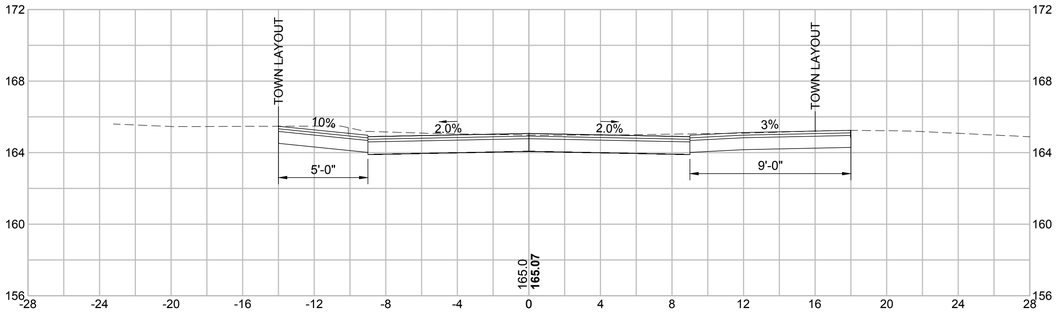
DESIGNED BY:	TFQ
CHECKED BY:	WPM

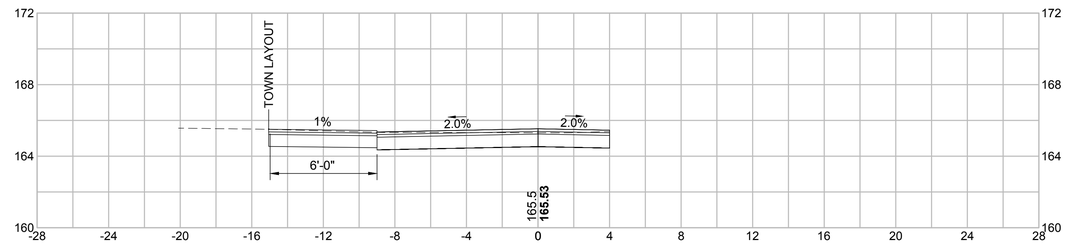
DRAWING TITLE:

CROSS SECTIONS
SHEET 5 OF 10

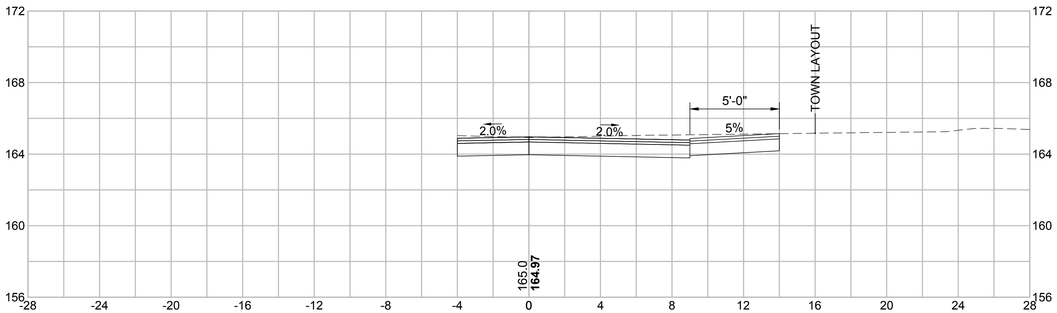
12+00 - DRIVEWAY LT & RT



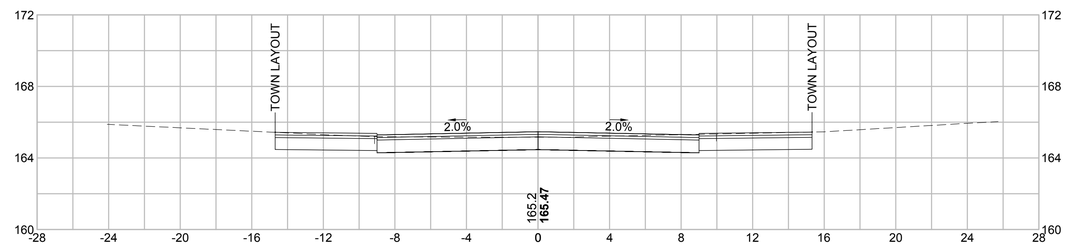
13+15 - DRIVEWAY LT



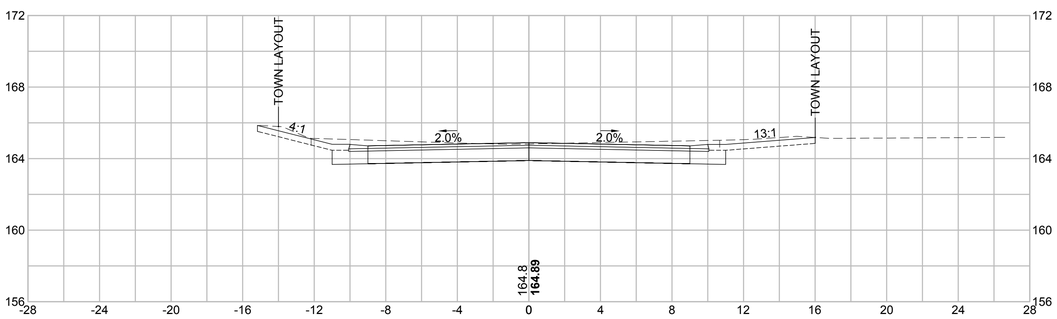
11+75 - DRIVEWAY RT



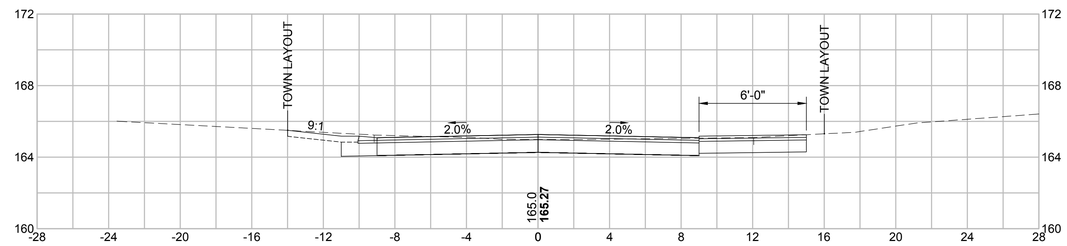
13+00



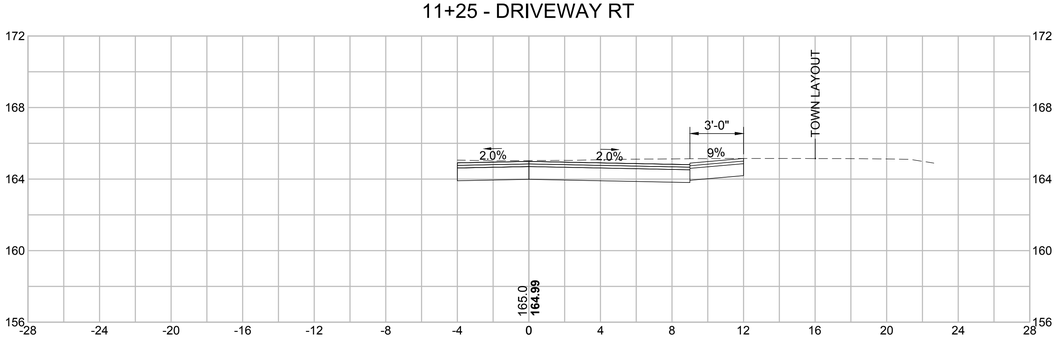
11+50



12+50 - DRIVEWAY RT



11+25 - DRIVEWAY RT



12+20 - DRIVEWAY LT

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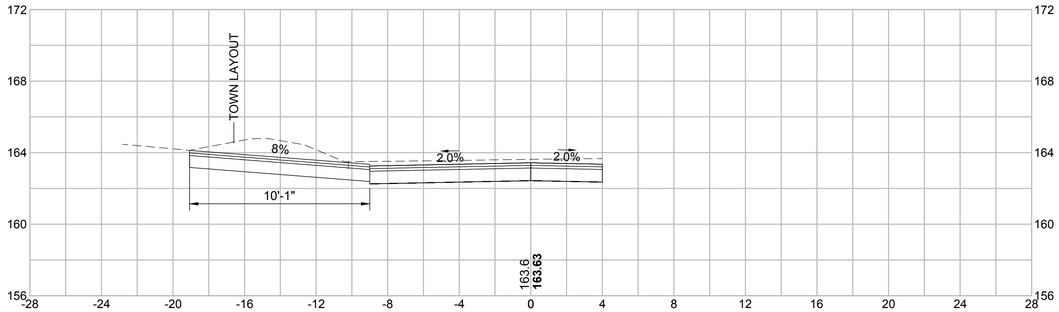
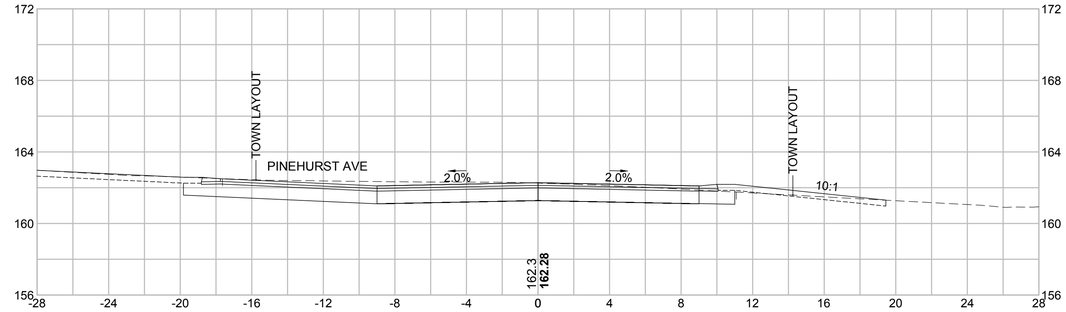
SHEET 6 OF 10

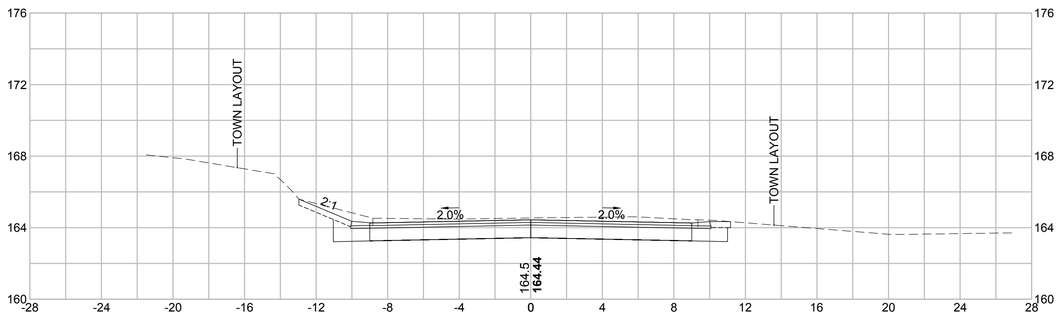
14+30 - DRIVEWAY LT



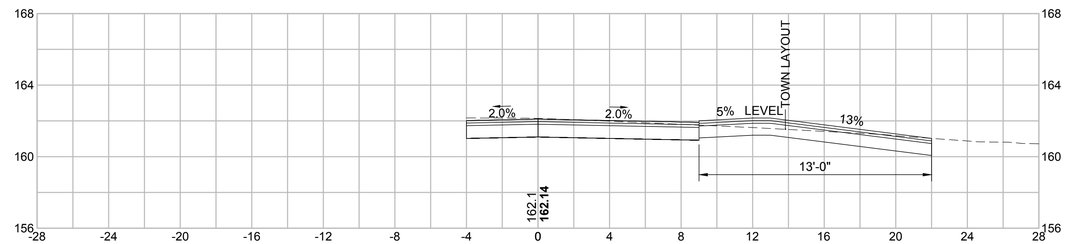
15+50



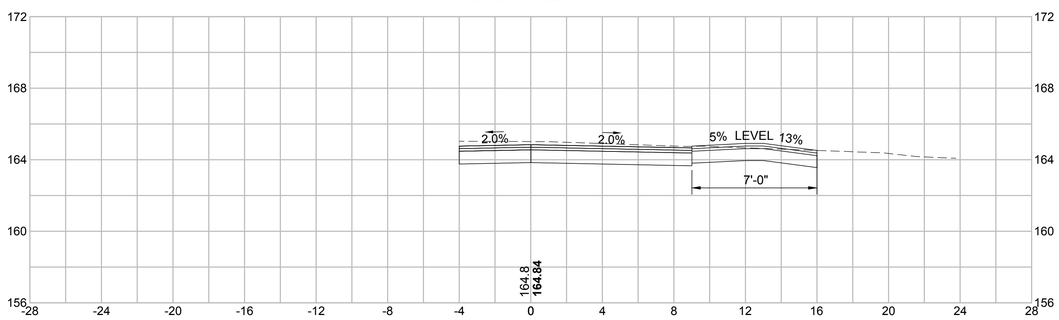
14+00



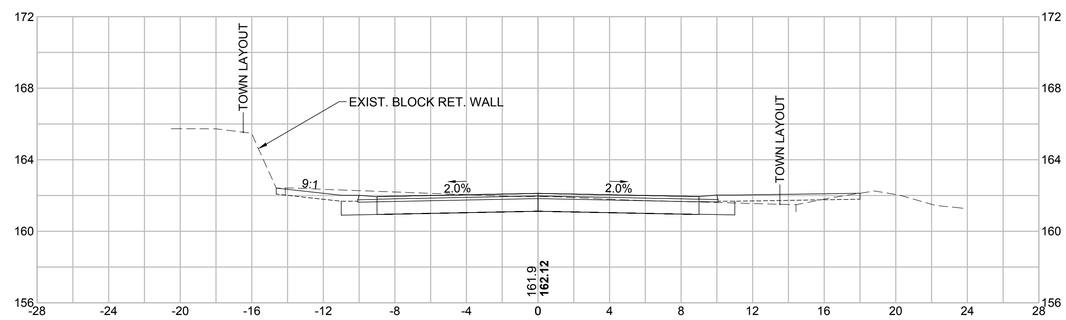
15+30 - DRIVEWAY RT



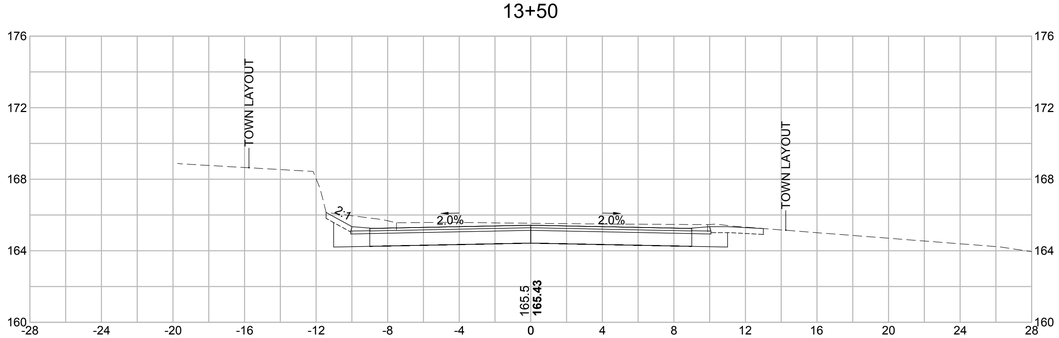
13+85 - DRIVEWAY RT



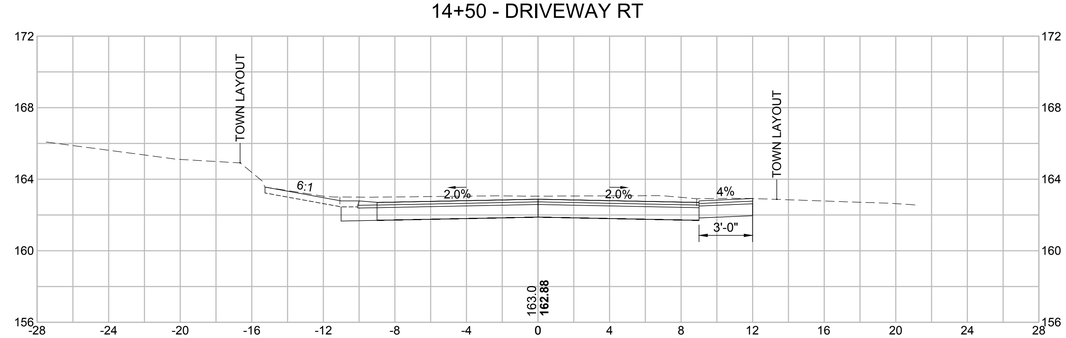
15+00



13+50



14+50 - DRIVEWAY RT



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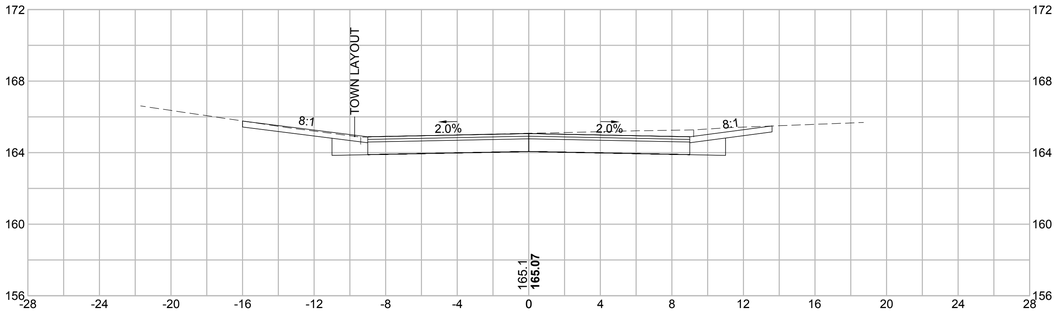
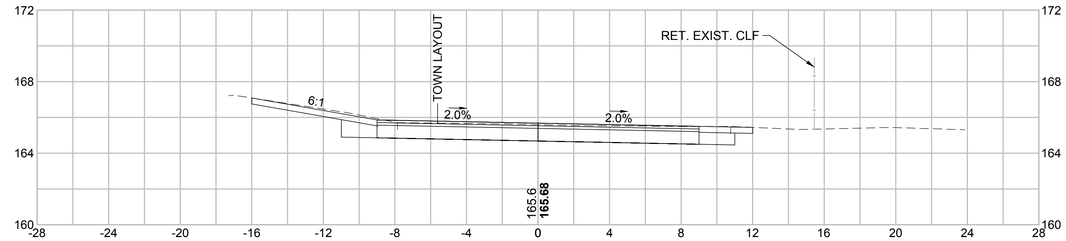
CROSS SECTIONS
SHEET 7 OF 10

AT STA 17+20 BEGIN TRANSITION FROM -2.0% TO +2.0% AT STA 18+00 LT

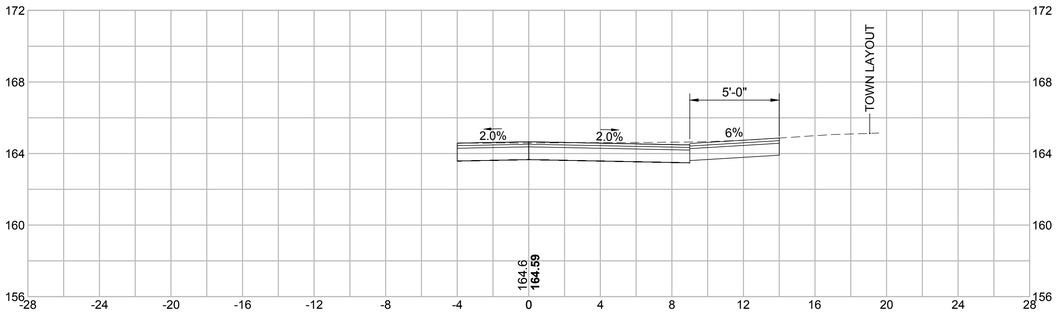
17+00



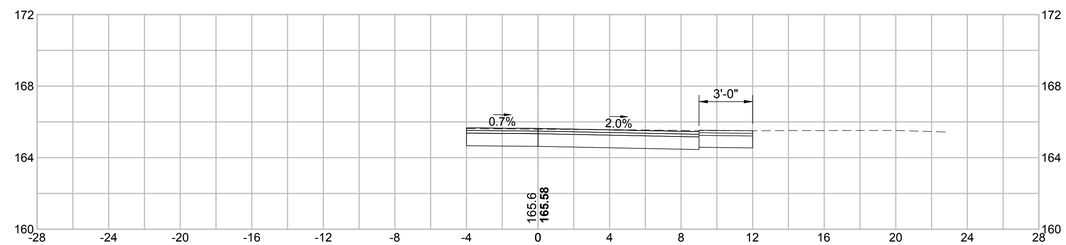
18+00



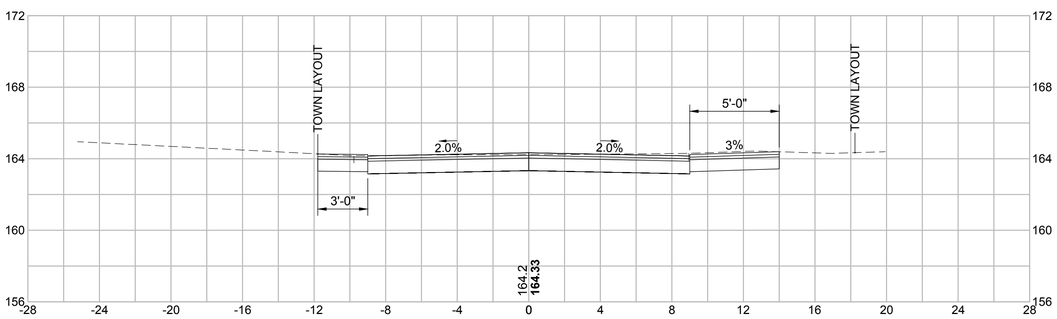
16+70 - DRIVEWAY RT



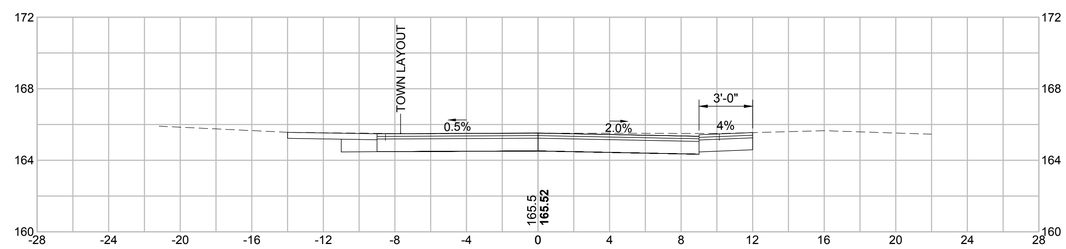
17+75 - DRIVEWAY RT



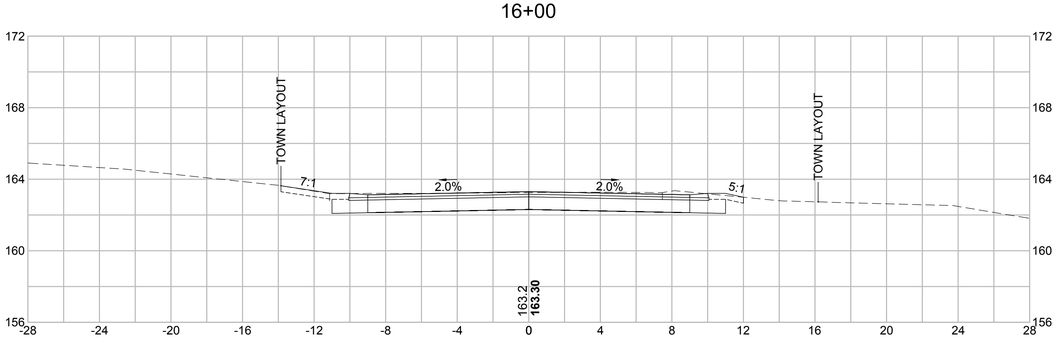
16+50 - DRIVEWAY LT & RT



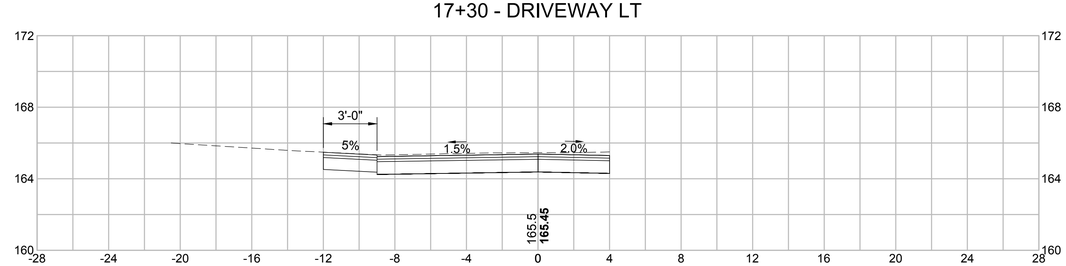
17+50 - DRIVEWAY RT



16+00



17+30 - DRIVEWAY LT



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TYNGSBOROUGH, MA

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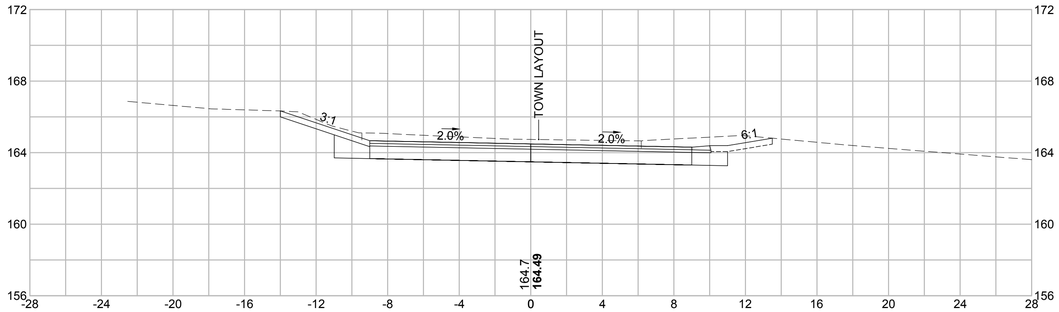
DESIGNED BY:	TFQ
CHECKED BY:	WPM

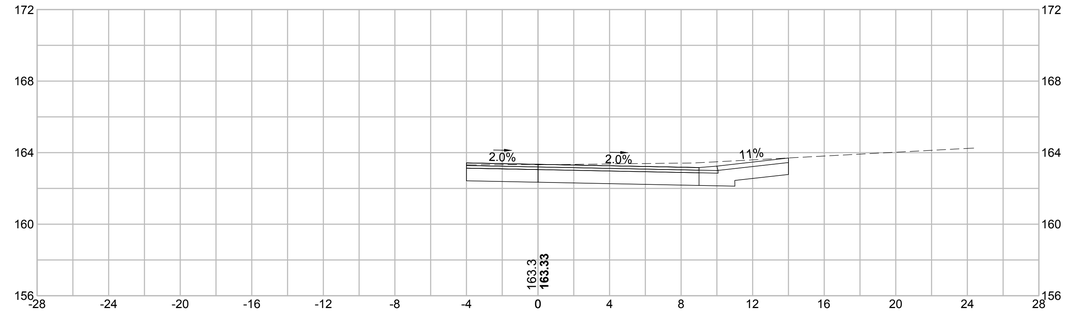
DRAWING TITLE:

CROSS SECTIONS
SHEET 8 OF 10

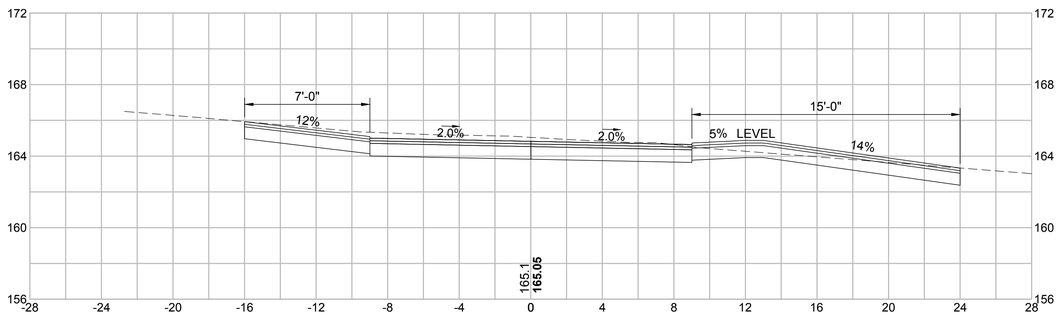
19+50



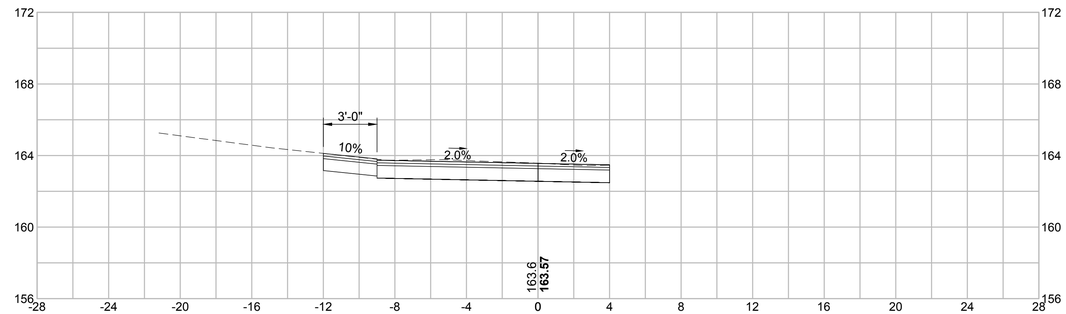
20+33 - HMA WALK RT



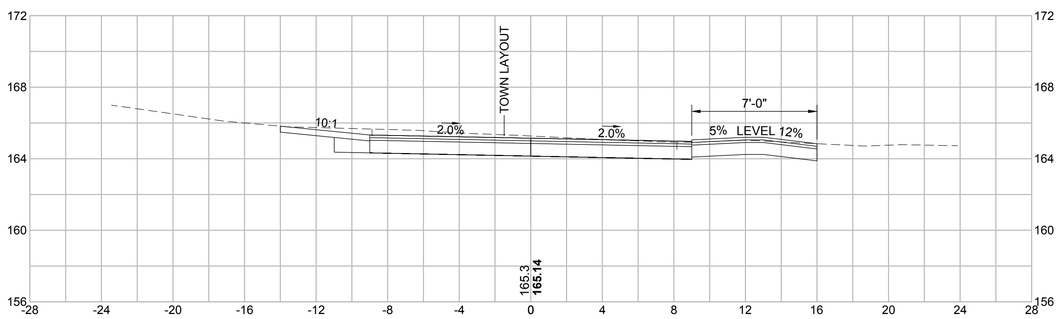
19+25 - DRIVEWAY LT & RT



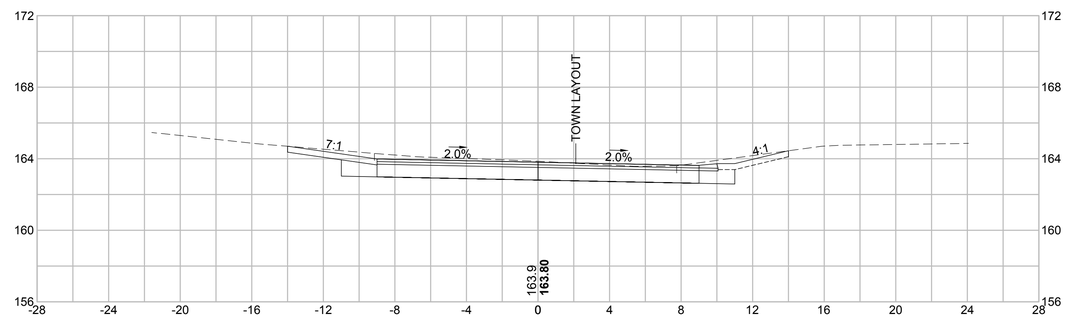
20+18 - DRIVEWAY LT



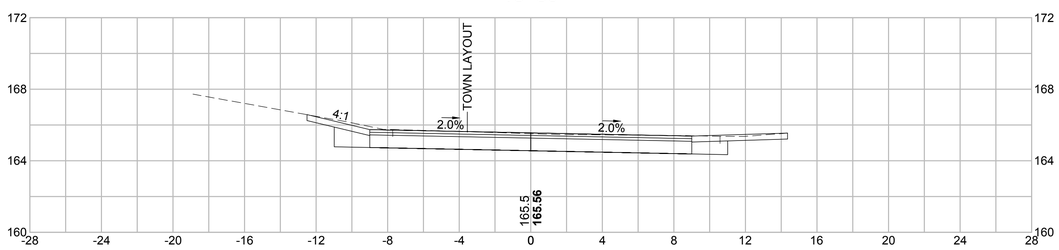
19+00 - DRIVEWAY RT



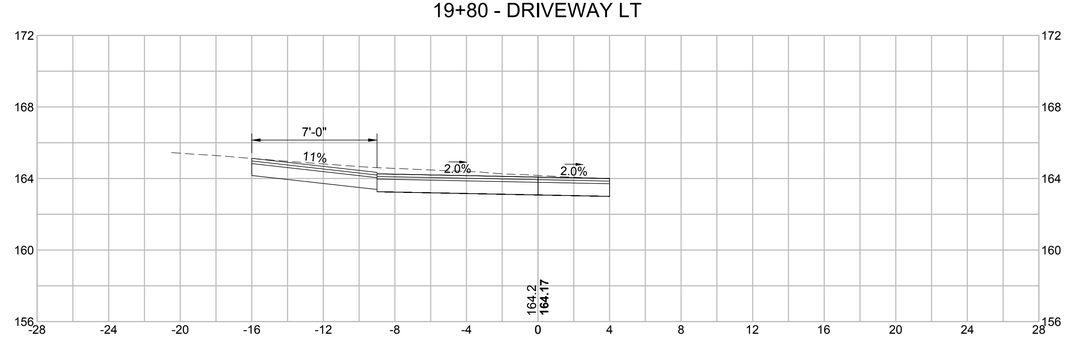
20+00



18+50



19+80 - DRIVEWAY LT



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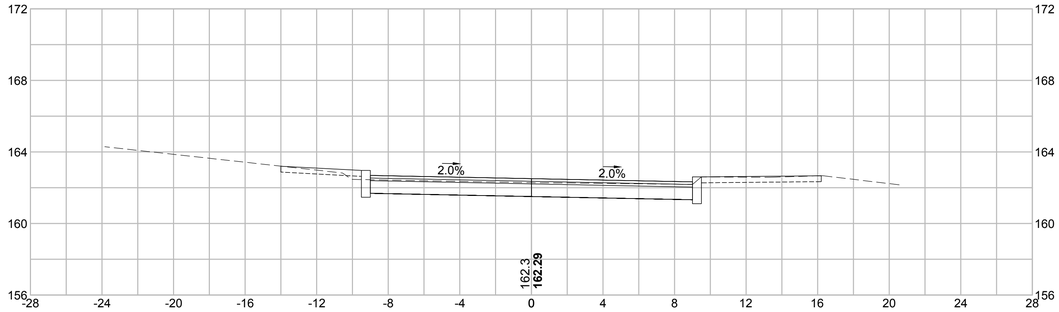
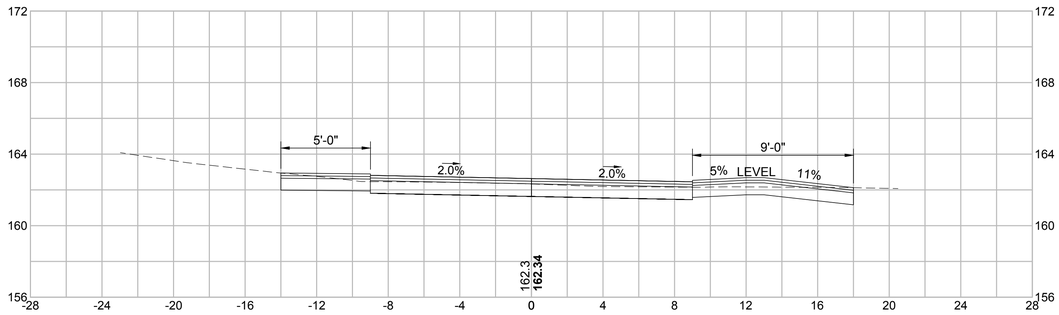
CROSS SECTIONS
SHEET 9 OF 10

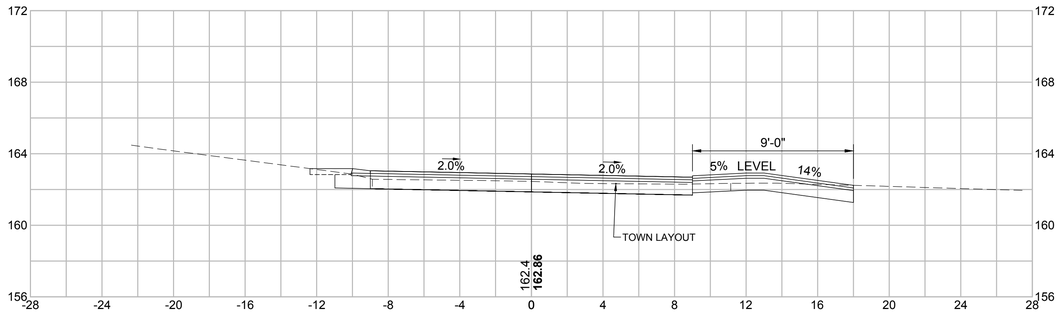
21+50



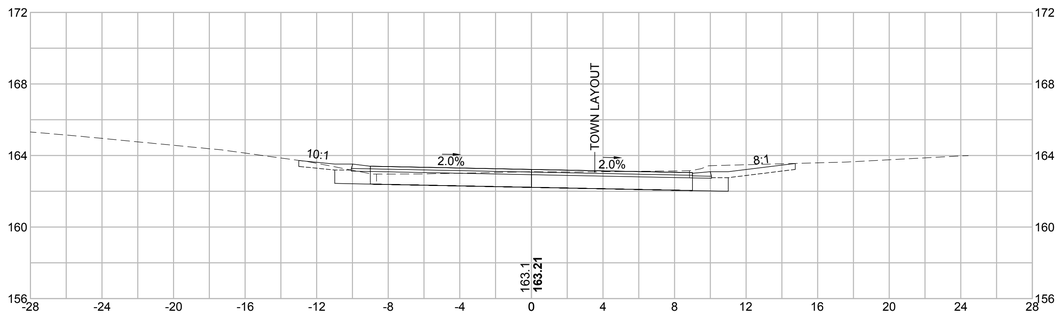
21+32 - DRIVEWAY LT & RT



21+00 - DRIVEWAY RT



20+50



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SHEET 10 OF 10