MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	51
PROJECT FILE NO.	607249		

TITLE SHEET & INDEX

PLAN AND PROFILE OF

ROUTE 20 (BOSTON POST ROAD) AT LANDHAM ROAD

IN THE TOWN OF

SUDBURY

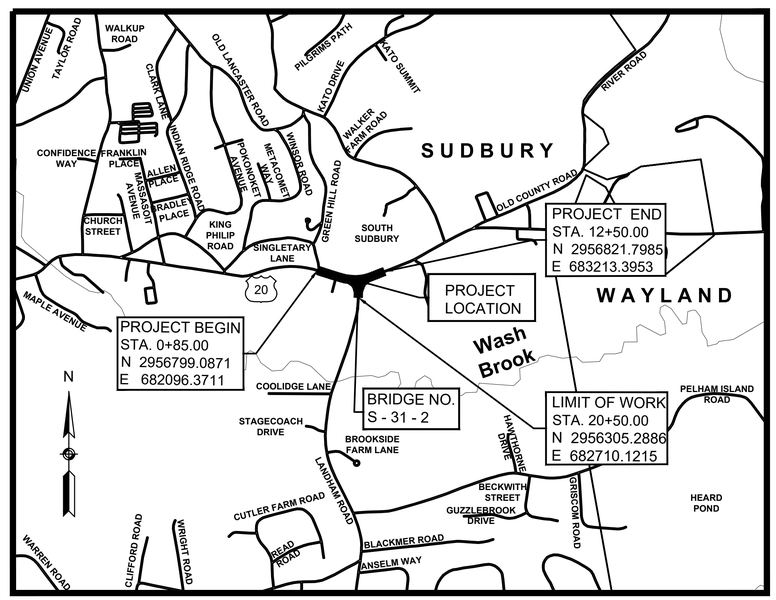
MIDDLESEX COUNTY

FEDERAL AID PROJECT NO.

THE MASSACHUSETTS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES DATED 1988, AS AMENDED, THE SUPPLEMENTAL SPECIFICATIONS DATED JULY 1, 2015, THE 2016 CONSTRUCTION STANDARD DETAILS, THE 2015 OVERHEAD SIGNAL STRUCTURE AND FOUNDATION STANDARD DRAWINGS, MASSDOT TRAFFIC MANAGEMENT PLANS AND DETAIL DRAWINGS, THE LATEST MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS WITH MASSACHUSETTS AMENDMENTS, THE 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS, THE 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING, AND THE LATEST EDITION OF THE AMERICAN STANDARD FOR NURSERY STOCK, WILL GOVERN.

75%/100% SUBMITTAL

INDEX



0 100 200 300 400

SCALE: 1" = 100'

LENGTH OF PROJECT = 1515.00 FEET = 0.287 MILES

DESIGN DESIGNATION

	RTE 20 WEST OF LANDHAM RD	RTE 20 EAST OF LANDHAM RD	LANDHAM RD SOUTH OF RTE 20
DESIGN SPEED	35 MPH	35 MPH	35 MPH
ADT (2017)	22,350	22,600	11,550
ADT (2027)	23,000	23,250	11,900
K	7.1%	7.5%	8.6%
D	66%	66%	58%
T (PEAK HOUR)	1.0%	1.0%	1.0%
T (AVERAGE DAY)	3.0%	3.0%	1.0%
DHV	1,620	1,740	1,020
DDHV	1,070	1,140	590
FUNCTIONAL CLASSIFICATION	URBAN PRINCIPAL ARTERIAL	URBAN PRINCIPAL ARTERIAL	URBAN MINOR ARTERIAL

GPI Greenman-Pedersen, Inc.
Engineers, Architects, Planners, Construction Engineers & Inspectors
181 Ballardvale Street, Suite 202, Wilmington, MA 01887
Tel: (978) 570-2999 Fax: (978) 658-3044
http://www.gpinet.com

DATE	DESCRIPTION	REV #

massDOT
Massachusetts Department of Transportation
Highway Division

RECOMMENDED FOR APPROVAL

CHIEF ENGINEER DATE

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED:

DIVISION ADMINISTRATOR DATE

APPROVED

HIGHWAY ADMINISTRATOR DATE

607249_HD (CS).DWG Plotted on 11-Oct-2017 4:33 PM

GENERAL SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
JB	JB	JERSEY BARRIER ON BRIDGE OR JERSEY BARRIER
CB	CB	CATCH BASIN
		CATCH BASIN CURB INLET
FP	FP	FLAG POLE
GP	GP	GAS PUMP
MB	MB	MAIL BOX
		POST SQUARE
		POST CIRCULAR
WELL	WELL	WELL
EHH	EHH	ELECTRIC HANDHOLE
		FENCE GATE POST
GG	GG	GAS GATE
BHL #	BHL #	BORING HOLE
MW #	MW #	MONITORING WELL
TP #	TP #	TEST PIT
		HYDRANT
		LIGHT POLE
CO.BD.		COUNTY BOUND
		GPS POINT
		CABLE MANHOLE
		DRAINAGE MANHOLE
		ELECTRIC MANHOLE
		GAS MANHOLE
		MISC MANHOLE
		SEWER MANHOLE
		TELEPHONE MANHOLE
		WATER MANHOLE
MHB	MHB	MASSACHUSETTS HIGHWAY BOUND
MON		MONUMENT
SB		STONE BOUND
TB		TOWN OR CITY BOUND
		TRAVERSE OR TRIANGULATION STATION
TPL or GUY	TPL or GUY	TROLLEY POLE OR GUY POLE
HTP		TRANSMISSION POLE
UFB	UFB	UTILITY POLE W/ FIREBOX
UPDL	UPDL	UTILITY POLE WITH DOUBLE LIGHT
ULT	ULT	UTILITY POLE W / 1 LIGHT
UPL	UPL	UTILITY POLE
		BUSH
•SIZE & TYPE		TREE
		STUMP
		SWAMP / MARSH
WG	WG	WATER GATE
PM	PM	PARKING METER
		OVERHEAD CABLE/WIRE
		CURBING
100 99		CONTOURS
		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)
		BALANCE STONE WALL
		GUARD RAIL - STEEL POSTS
		GUARD RAIL - WOOD POSTS
		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

PAVEMENT MARKINGS SYMBOLS

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

GENERAL NOTES

1. TOPOGRAPHICAL INFORMATION WAS PROVIDED IN NAVD 1988 VERTICAL DATUM AND MA MAINLAND NAD 83 HORIZONTAL DATUM. EXISTING CONDITIONS AND TOPOGRAPHICAL SURVEY PROVIDED BY GREENMAN-PEDERSEN, INC., AUGUST/SEPTEMBER 2014, (978-570-2999).
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 AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO LOCATE EXACTLY AND TO PRESERVE ANY AND ALL UNDERGROUND UTILITIES. CALL "DIG-SAFE" 1-888-DIGSAFE (344-7233) AT LEAST 72 HOURS BEFORE COMMENCING CONSTRUCTION.
3. WHERE AN EXISTING UNDERGROUND 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 MAKE ALL ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENT OF GAS, ELECTRIC, TELEPHONE AND ANY OTHER PRIVATE UTILITIES BY THE UTILITY COMPANIES.
5. 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.
6. THE TERM "PROPOSED" (PROP.) MEANS WORK TO BE CONSTRUCTED USING NEW MATERIALS, OR, WHERE APPLICABLE, RE-USING EXISTING MATERIALS IDENTIFIED AS "REMOVE & RESET" (R&R).
7. ALL EXISTING SIGNS WITHIN THE PROJECT LIMITS SHALL BE RETAINED UNLESS NOTED OTHERWISE.
8. ALL PROPOSED PAVEMENT MARKINGS SHALL BE THERMOPLASTIC.
9. ALL EXISTING STATE, COUNTY, CITY AND TOWN LOCATION LINES AND PRIVATE PROPERTY LINES HAVE BEEN ESTABLISHED FROM AVAILABLE INFORMATION AND THEIR EXACT LOCATIONS ARE NOT GUARANTEED.
10. ALL TRANSVERSE JOINTS, AND ALL LONGITUDINAL JOINTS BETWEEN NEW SURFACE PAVEMENT AND EXISTING SURFACE PAVEMENT TO REMAIN SHALL BE COATED WITH A HOT MIX ASPHALT JOINT SEALANT MEETING SPECIAL PROVISION ITEM 453.
11. ALL DISTURBED AREAS NOT DESIGNATED TO BE PAVED SHALL HAVE LOAM BORROW PLACED AND SEEDED. THE LOAM BORROW SHALL HAVE A MINIMUM DEPTH OF 4 INCHES AND SHALL BE PLACED FLUSH WITH THE TOP OF THE ADJACENT CURB, EDGING, BERM OR PAVEMENT SURFACE.
12. PRIOR TO THE START OF ANY NEW UTILITY WORK, ALL ELEVATIONS OF EXISTING UTILITIES IN THOSE AREAS ARE TO BE VERIFIED. THE ENGINEER IS TO BE NOTIFIED IMMEDIATELY SHOULD ANY DISCREPANCIES OCCUR.
13. ALL CASTINGS SHALL BE SET FLUSH WITH FINISHED GRADE. "HOOK LOCK CASCADE GRATES" SHALL BE USED ON ALL MASSDOT FACILITIES.
14. ALL PUBLICLY OWNED GATE BOXES, SERVICE BOXES, MANHOLE FRAMES AND COVERS SHALL BE ADJUSTED TO GRADE BY THE CONTRACTOR.
15. ALL NEW SIDEWALKS AND DRIVEWAY GRADES SHALL MATCH EXISTING GRADES AT BACK OF SIDEWALK LINE UNLESS SHOWN OTHERWISE ON THE PLANS AND CROSS-SECTIONS.
16. THE CONTRACTOR SHALL TAKE EVERY PRECAUTION TO PROTECT ALL EXISTING TREES AND ROOTS THAT ARE NOT DESIGNATED FOR REMOVAL.
17. 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.
18. EXISTING WATER MAIN IS ASBESTOS CONCRETE. EXTREME CARE SHALL BE TAKEN DURING UTILITY INSTALLATIONS AND COMPACTION OF SUBGRADE WITHIN THE FULL DEPTH AREAS NOT TO DISTURB THE MAIN.

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AT LANDHAM ROAD

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MA	-	2	51
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LEGEND & ABBREVIATIONS

GENERAL ABBREVIATIONS

AADT	ANNUAL AVERAGE DAILY TRAFFIC	F&C	FRAME AND COVER	PVI	POINT OF VERTICAL INTERSECTION
ABAN	ABANDON	F&G	FRAME AND GRATE	PVT	POINT OF VERTICAL TANGENCY
ADJ	ADJUST	FDN.	FOUNDATION	PVMT	PAVEMENT
APPROX.	APPROXIMATE	FLDSTN	FIELDSTONE	PWW	PAVED WATER WAY
A.C.	ASPHALT CONCRETE	GAR	GARAGE	R	RADIUS OF CURVATURE
ACCM PIPE	ASPHALT COATED CORRUGATED METAL PIPE	GD	GROUND	R&D	REMOVE AND DISPOSE
BIT.	BITUMINOUS	GG	GAS GATE	RCP	REINFORCED CONCRETE PIPE
BC	BOTTOM OF CURB	GI	GUTTER INLET	RD	ROAD
BD.	BOUND	GIP	GALVANIZED IRON PIPE	RDWY	ROADWAY
BL	BASELINE	GRAN	GRANITE	REM	REMOVE
BLDG	BUILDING	GRAV	GRAVEL	RET	RETAIN
BM	BENCHMARK	GRD	GUARD	RET WALL	RETAINING WALL
BO	BY OTHERS	HDW	HEADWALL	ROW	RIGHT OF WAY
BOS	BOTTOM OF SLOPE	HMA	HOT MIX ASPHALT	RR	RAILROAD
BR.	BRIDGE	HOR	HORIZONTAL	R&R	REMOVE AND RESET
CB	CATCH BASIN	HWY	HIGHWAY	R&S	REMOVE AND STACK
CBCI	CATCH BASIN WITH CURB INLET	HYD	HYDRANT	RT	RIGHT
CC	CEMENT CONCRETE	INV	INVERT	SB	STONE BOUND
CCM	CEMENT CONCRETE MASONRY	JCT	JUNCTION	SHLD	SHOULDER
CEM	CEMENT	L	LENGTH OF CURVE	SMH	SEWER MANHOLE
CI	CURB INLET	LB	LEACH BASIN	ST	STREET
CIP	CAST IRON PIPE	LP	LIGHT POLE	STA	STATION
CLF	CHAIN LINK FENCE	LT	LEFT	SSD	STOPPING SIGHT DISTANCE
CL	CENTERLINE	MAX	MAXIMUM	SHLO	STATE HIGHWAY LAYOUT LINE
CMP	CORRUGATED METAL PIPE	MB	MAILBOX	SW	SIDEWALK
CSP	CORRUGATED STEEL PIPE	MH	MANHOLE	T	TANGENT DISTANCE OF CURVE/TRUCK %
CO.	COUNTY	MHB	MASSACHUSETTS HIGHWAY BOUND	TAN	TANGENT
CONC	CONCRETE	MIN	MINIMUM	TEMP	TEMPORARY
CONT	CONTINUOUS	NIC	NOT IN CONTRACT	TC	TOP OF CURB
CONST	CONSTRUCTION	NO.	NUMBER	TOS	TOP OF SLOPE
CR GR	CROWN GRADE	PC	POINT OF CURVATURE	TYP	TYPICAL
DHV	DESIGN HOURLY VOLUME	PCC	POINT OF COMPOUND CURVATURE	UPL	UTILITY POLE
DI	DROP INLET	P.G.L.	PROFILE GRADE LINE	VAR	VARIES
DIA	DIAMETER	PI	POINT OF INTERSECTION	VERT	VERTICAL
DIP	DUCTILE IRON PIPE	POC	POINT ON CURVE	VC	VERTICAL CURVE
DW	STEADY DON'T WALK - PORTLAND ORANGE	POT	POINT ON TANGENT	WCR	WHEEL CHAIR RAMP
DWY	DRIVEWAY	PRC	POINT OF REVERSE CURVATURE	WG	WATER GATE
ELEV (or EL.)	ELEVATION	PROJ	PROJECT	WIP	WROUGHT IRON PIPE
EMB	EMBANKMENT	PROP	PROPOSED	WM	WATER METER/WATER MAIN
EOP	EDGE OF PAVEMENT	PSB	PLANTABLE SOIL BORROW	X-SECT	CROSS SECTION
EXIST (or EX)	EXISTING	PT	POINT OF TANGENCY		
EXC	EXCAVATION	PVC	POINT OF VERTICAL CURVATURE		

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SUDBURY
ROUTE 20 (BOSTON POST ROAD)
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MA	-	3	51
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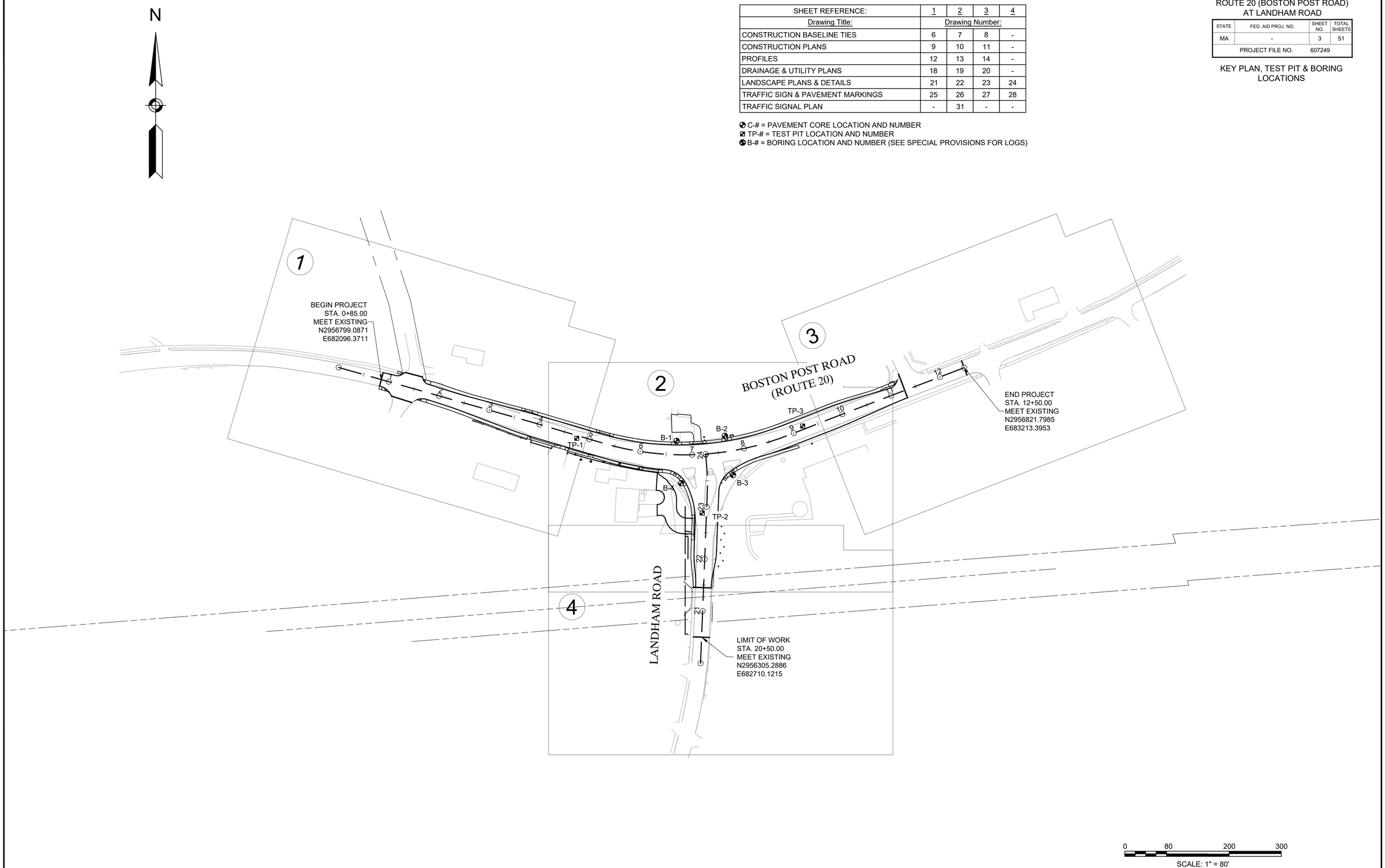
KEY PLAN, TEST PIT & BORING LOCATIONS

SHEET REFERENCE:	1	2	3	4
Drawing Title:	Drawing Number:			
CONSTRUCTION BASELINE TIES	6	7	8	-
CONSTRUCTION PLANS	9	10	11	-
PROFILES	12	13	14	-
DRAINAGE & UTILITY PLANS	18	19	20	-
LANDSCAPE PLANS & DETAILS	21	22	23	24
TRAFFIC SIGN & PAVEMENT MARKINGS	25	26	27	28
TRAFFIC SIGNAL PLAN	-	31	-	-

C-# = PAVEMENT CORE LOCATION AND NUMBER
TP-# = TEST PIT LOCATION AND NUMBER
B-# = BORING LOCATION AND NUMBER (SEE SPECIAL PROVISIONS FOR LOGS)



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SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	4	51
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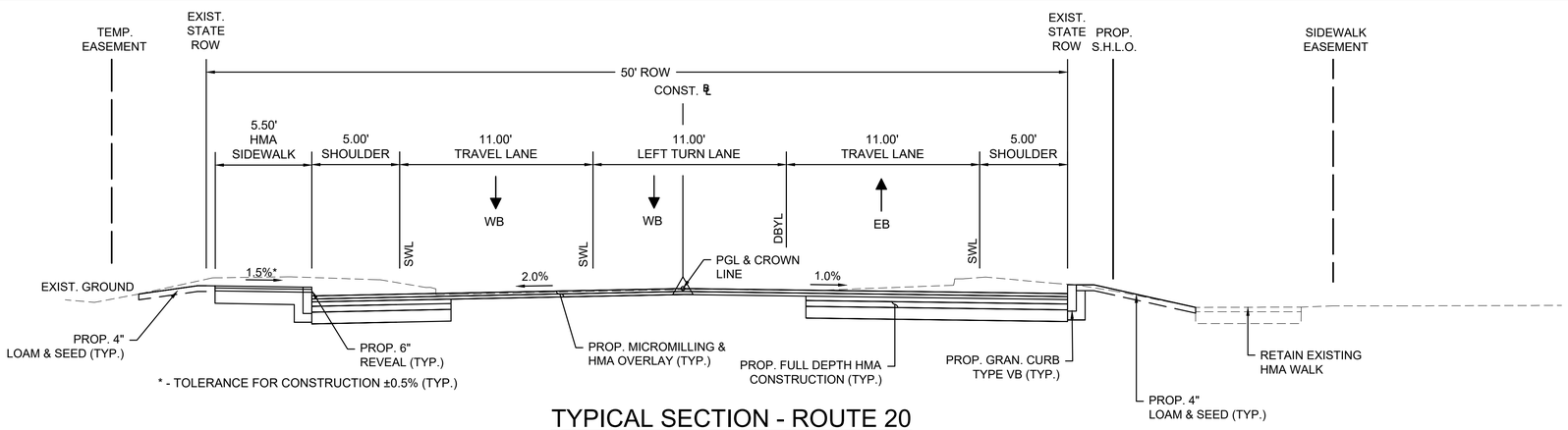
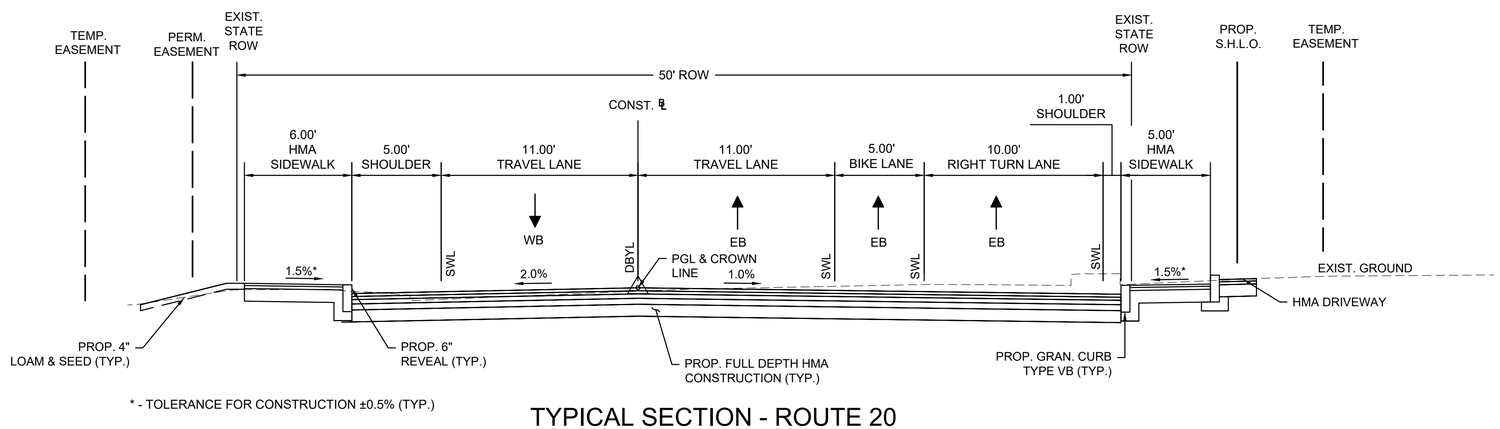
TYPICAL SECTIONS



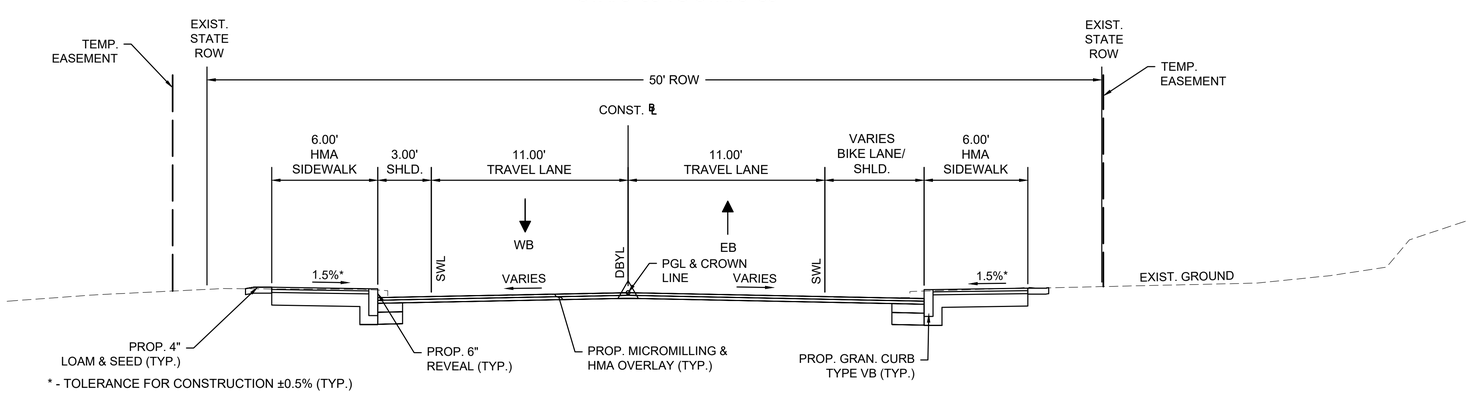
TYPICAL SECTION - ROUTE 20

STA. 9+00 TO STA. 10+50



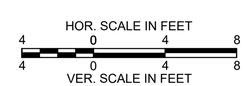
TYPICAL SECTION - ROUTE 20

STA. 3+90 TO STA. 5+30



TYPICAL SECTION - ROUTE 20

STA. 0+85 TO STA. 3+55



PAVEMENT NOTES

PROPOSED FULL DEPTH HMA CONSTRUCTION

SURFACE COURSE: 1.75" SUPERPAVE SURFACE COURSE - 12.5 (SSC-12.5) OVER
2.25" SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC-19.0) OVER

BASE: 4.5" SUPERPAVE BASE COURSE - 37.5 (SBC-37.5) OVER

SUBBASE: 4" DENSE GRADED CRUSHED STONE OVER
8" GRAVEL BORROW TYPE B (OR SUITABLE EXISTING MATERIAL)

PROPOSED MICROMILLING & HMA OVERLAY

SURFACE COURSE: 1.75" SUPERPAVE SURFACE COURSE - 12.5 (SSC-12.5) OVER
2.25" SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC-19.0) OVER

SURFACE MILLING: VARIABLE DEPTH (2.75" ± 0.75") PAVEMENT MICROMILLING (ITEM 415.)

PROPOSED FULL DEPTH HMA CONSTRUCTION LESS THAN 4 FEET

SURFACE COURSE: 1.75" SUPERPAVE SURFACE COURSE - 12.5 (SSC-12.5) OVER
2.25" SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC-19.0) OVER

BASE: 6" HIGH EARLY STRENGTH CEMENT CONCRETE BASE COURSE

SUBBASE: 8" GRAVEL BORROW TYPE B (OR SUITABLE EXISTING MATERIAL)

PROPOSED HMA SIDEWALKS

SURFACE COURSE: 1" SUPERPAVE SURFACE COURSE - 9.5 (SSC-9.5) OVER
1.5" SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC-12.5) OVER

SUBBASE: 8" GRAVEL BORROW TYPE B

PROPOSED CEMENT CONCRETE ISLANDS, WHEELCHAIR RAMPS AND WALKWAYS

SURFACE COURSE: 4" CEMENT CONCRETE (AIR ENTRAINED 4000 PSI, 3/4", 610) OVER

SUBBASE: 8" GRAVEL BORROW TYPE B

PROPOSED HMA DRIVEWAYS

SURFACE COURSE: 1.5" SUPERPAVE SURFACE COURSE - 9.5 (SSC-9.5) OVER
2" SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC-12.5) OVER

SUBBASE: 8" GRAVEL BORROW TYPE B

GENERAL NOTES

1. THE SECTIONS OF ROADWAY NOT COVERED IN THE RANGE OF STATIONS ASSOCIATED WITH THE TYPICAL SECTIONS ARE IN AREAS OF TRANSITION AND THEREFORE HAVE NOT BEEN SHOWN.
2. ASPHALT EMULSION FOR TACK COAT (RS-1) SHALL BE APPLIED AT THE RATE OF 0.07 GALLONS PER SQUARE YARD OVER MILLED SURFACES AND 0.05 GALLONS PER SQUARE YARD OVER TIGHT PAVED SURFACES PER SECTION 450.53.
3. ALL HMA SHALL BE IN ACCORDANCE WITH QUALITY ASSURANCE OF HMA AND SUPERPAVE SPECIFICATIONS. ASPHALT EMULSION FOR TACK COAT RS-1H SHALL BE APPLIED TO PAVEMENT LAYERS PRIOR TO PAVING FOR BONDED STRENGTH. HMA JOINT SEALANT SHALL BE APPLIED TO ALL COLD JOINTS IN SURFACE COURSE.
4. PAVEMENT MICROMILLING SHALL ACHIEVE THE CROSS SLOPES AS NOTED ON THE TYPICAL SECTIONS FOR NORMAL SECTION AND MAINTAIN EXISTING CROSS SLOPE FOR TRANSITIONS AND SUPERELEVATED SECTIONS AND/OR AS DIRECTED BY THE ENGINEER.
5. BASED ON SOIL SURVEY CLASSIFICATION AND GRADATION OF SUB-BASE MATERIALS, THE FULL DEPTH CONSTRUCTION IS INTENDED TO EXCAVATE THE EXISTING ASPHALT CONCRETE PAVEMENT TO ALLOW FOR THE EXISTING GRAVEL SUB-BASE TO BE TESTED BY MASSDOT. EXISTING SUB-BASE MATERIAL MEETING SPECIFICATIONS SHALL REMAIN TO BE USED ON SITE, FINE GRADED AND COMPACTED AS DIRECTED BY THE ENGINEER.
6. SUITABLE EXCAVATED MATERIAL FROM WITHIN THE RIGHT-OF-WAY SHALL BE USED ON SITE AS DIRECTED BY ENGINEER.

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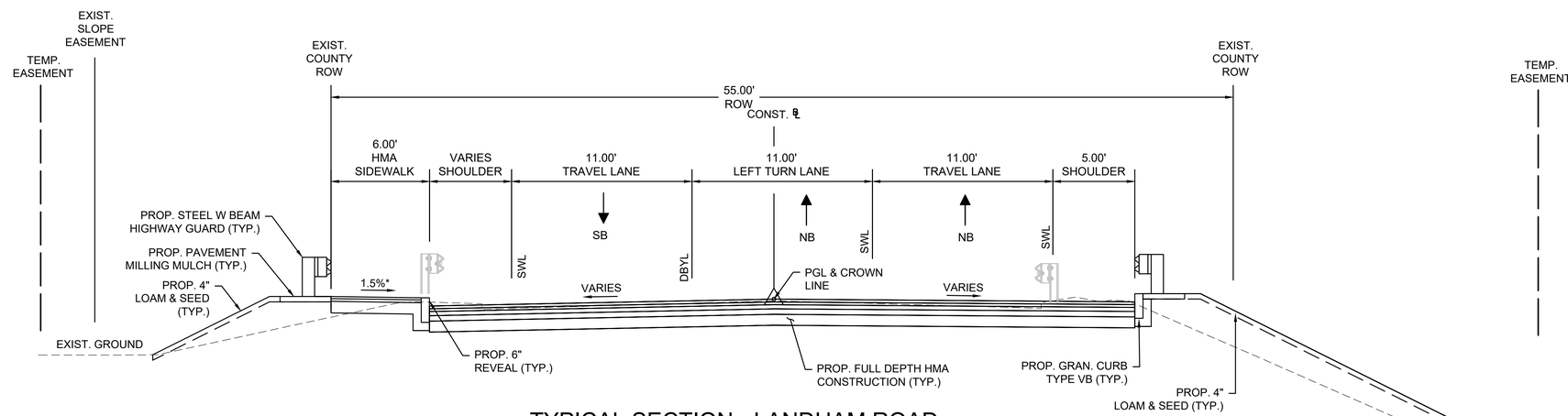
TYPICAL SECTIONS



TYPICAL SECTION - LANDHAM ROAD

* - TOLERANCE FOR CONSTRUCTION ±0.5% (TYP.)

STA. 22+25 TO STA. 23+50

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

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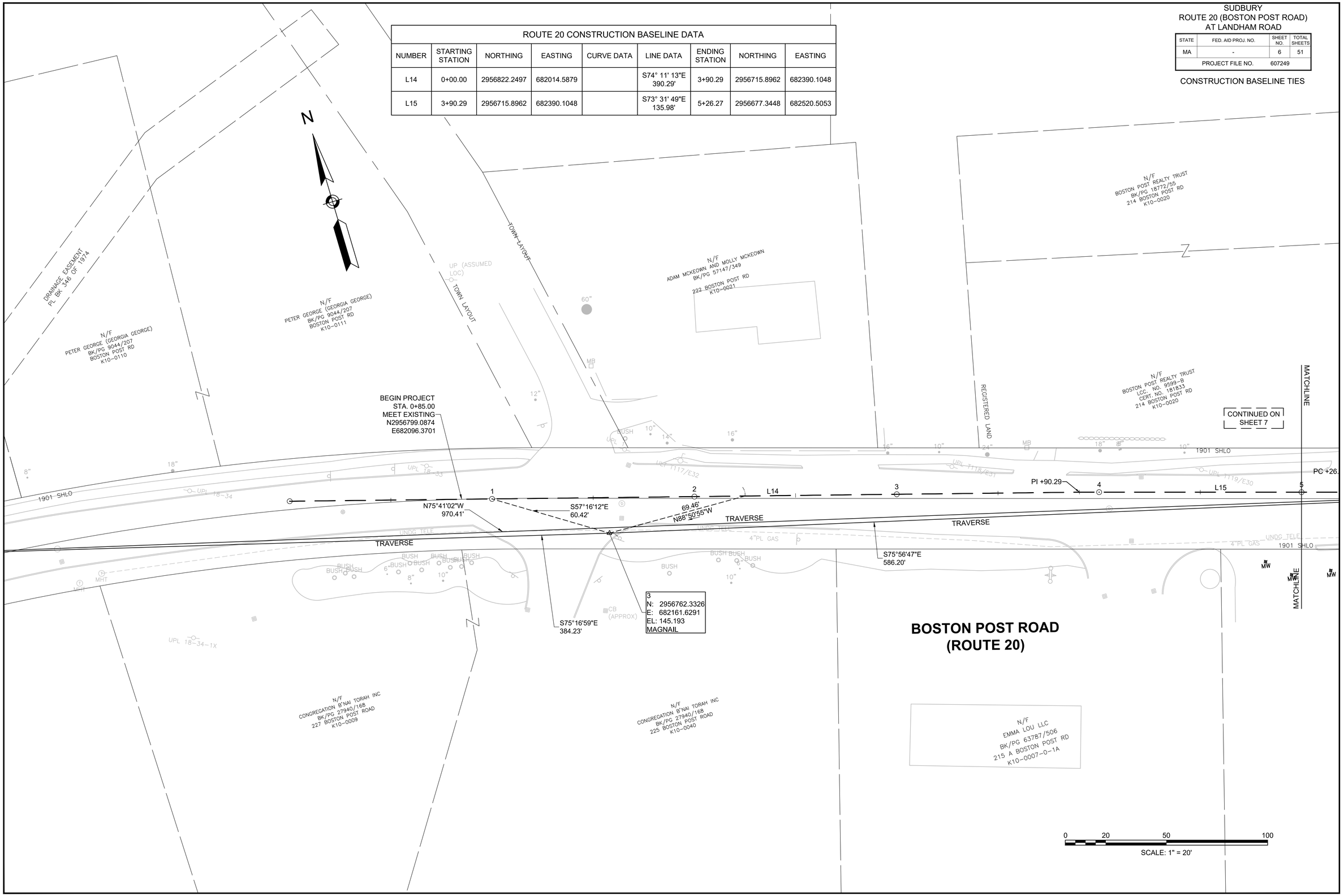
CONSTRUCTION BASELINE TIES

ROUTE 20 CONSTRUCTION BASELINE DATA								
NUMBER	STARTING STATION	NORTHING	EASTING	CURVE DATA	LINE DATA	ENDING STATION	NORTHING	EASTING
L14	0+00.00	2956822.2497	682014.5879		S74° 11' 13"E 390.29'	3+90.29	2956715.8962	682390.1048
L15	3+90.29	2956715.8962	682390.1048		S73° 31' 49"E 135.98'	5+26.27	2956677.3448	682520.5053



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SUDBURY
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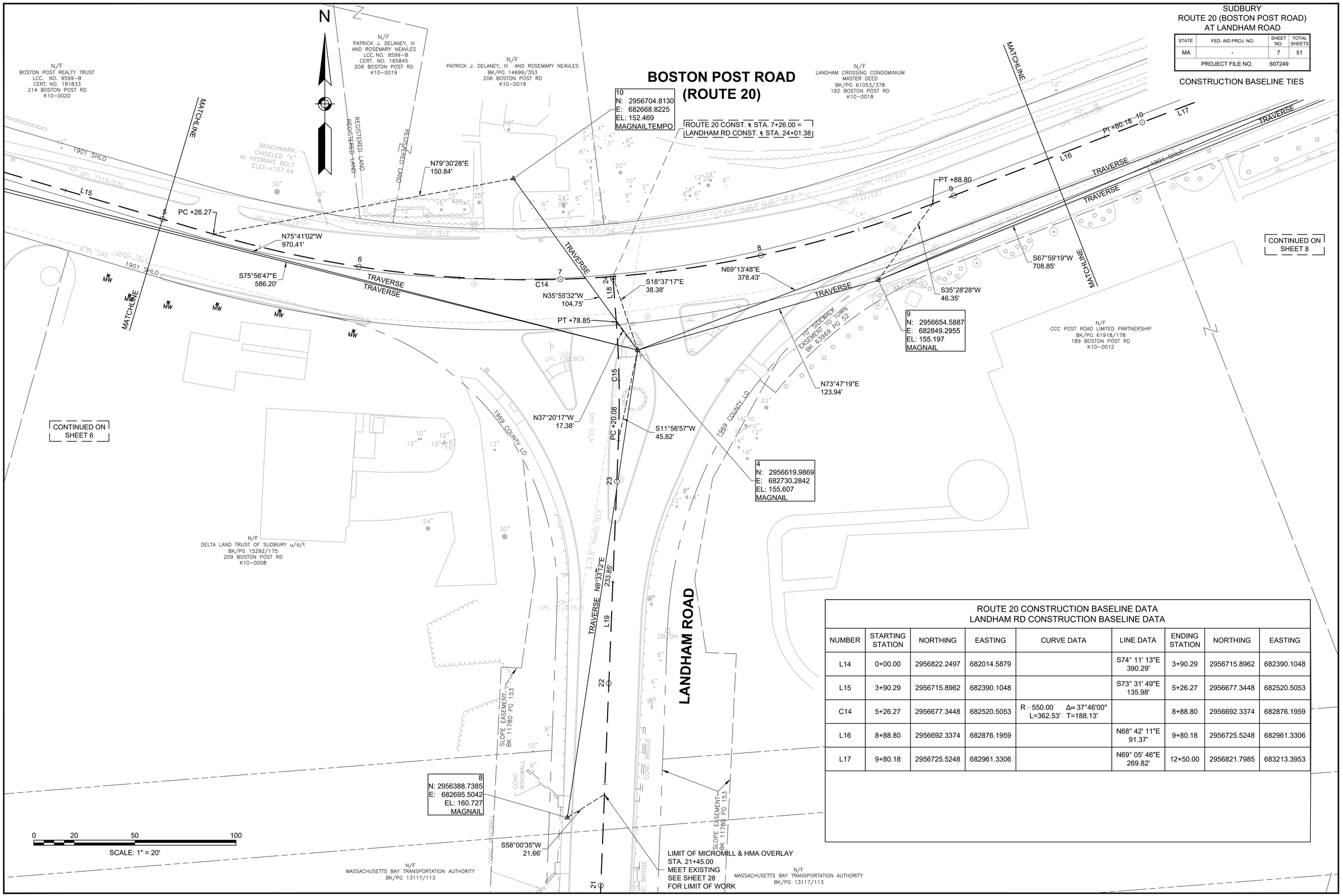
CONSTRUCTION BASELINE TIES



ROUTE 20 CONSTRUCTION BASELINE DATA
LANDHAM RD CONSTRUCTION BASELINE DATA

NUMBER	STARTING STATION	NORTHING	EASTING	CURVE DATA	LINE DATA	ENDING STATION	NORTHING	EASTING
L14	0+00.00	2956822.2497	682014.5879		S74° 11' 13"E 390.29'	3+90.29	2956715.8962	682390.1048
L15	3+90.29	2956715.8962	682390.1048		S73° 31' 49"E 135.98'	5+26.27	2956677.3448	682520.5053
C14	5+26.27	2956677.3448	682520.5053	R=550.00' Δ=37°46'00" L=362.53' T=188.13'		8+88.80	2956692.3374	682876.1959
L16	8+88.80	2956692.3374	682876.1959		N68° 42' 11"E 91.37'	9+80.18	2956725.5248	682961.3306
L17	9+80.18	2956725.5248	682961.3306		N69° 05' 46"E 269.82'	12+50.00	2956821.7985	683213.3953

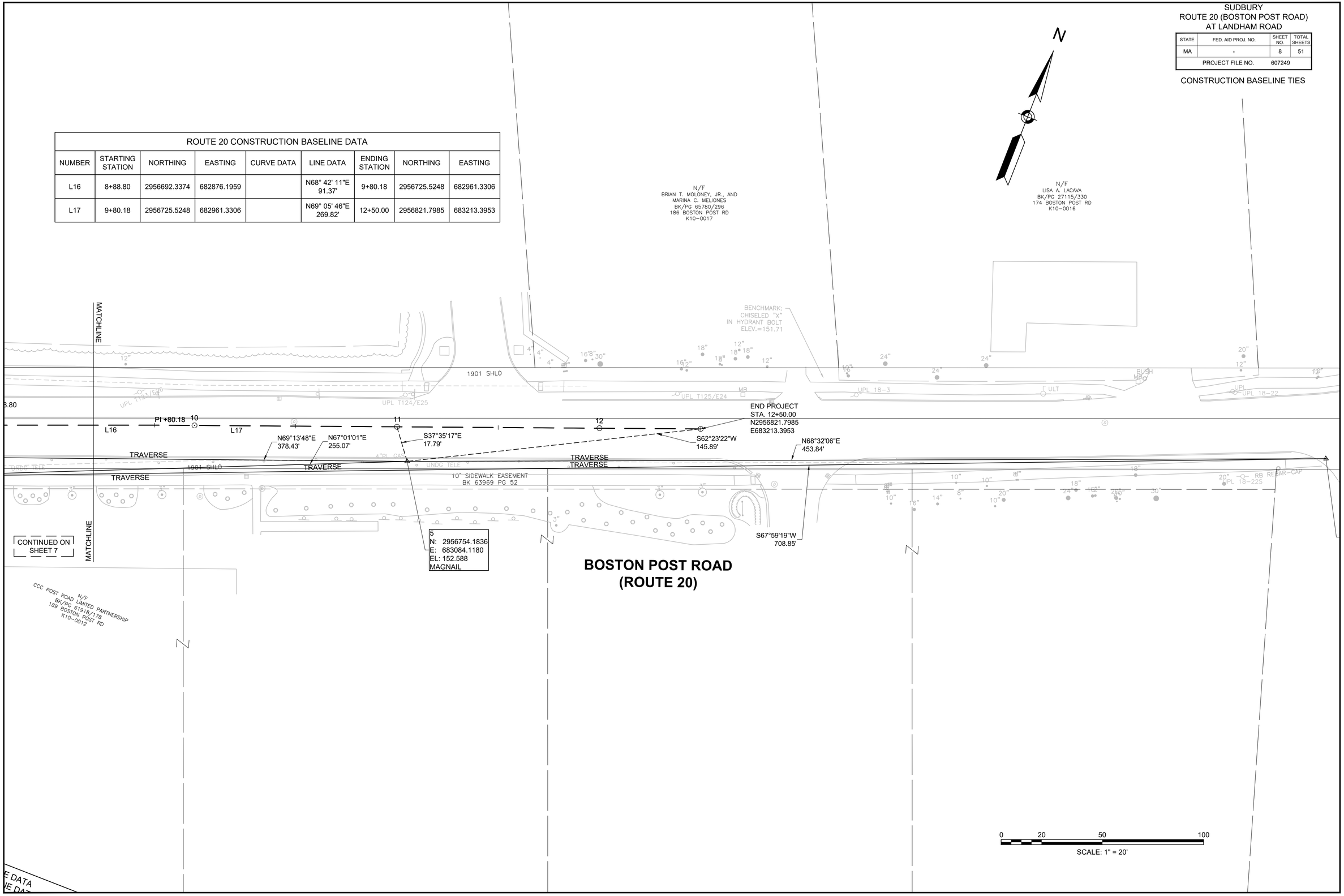
607249_HD (BLT).DWG Plotted on 11-Oct-2017 4:34 PM

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	8	51
PROJECT FILE NO.	607249		

CONSTRUCTION BASELINE TIES

ROUTE 20 CONSTRUCTION BASELINE DATA								
NUMBER	STARTING STATION	NORTHING	EASTING	CURVE DATA	LINE DATA	ENDING STATION	NORTHING	EASTING
L16	8+88.80	2956692.3374	682876.1959		N68° 42' 11"E 91.37'	9+80.18	2956725.5248	682961.3306
L17	9+80.18	2956725.5248	682961.3306		N69° 05' 46"E 269.82'	12+50.00	2956821.7985	683213.3953



607249_HD (BLT).DWG Plotted on 11-Oct-2017 4:34 PM

HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

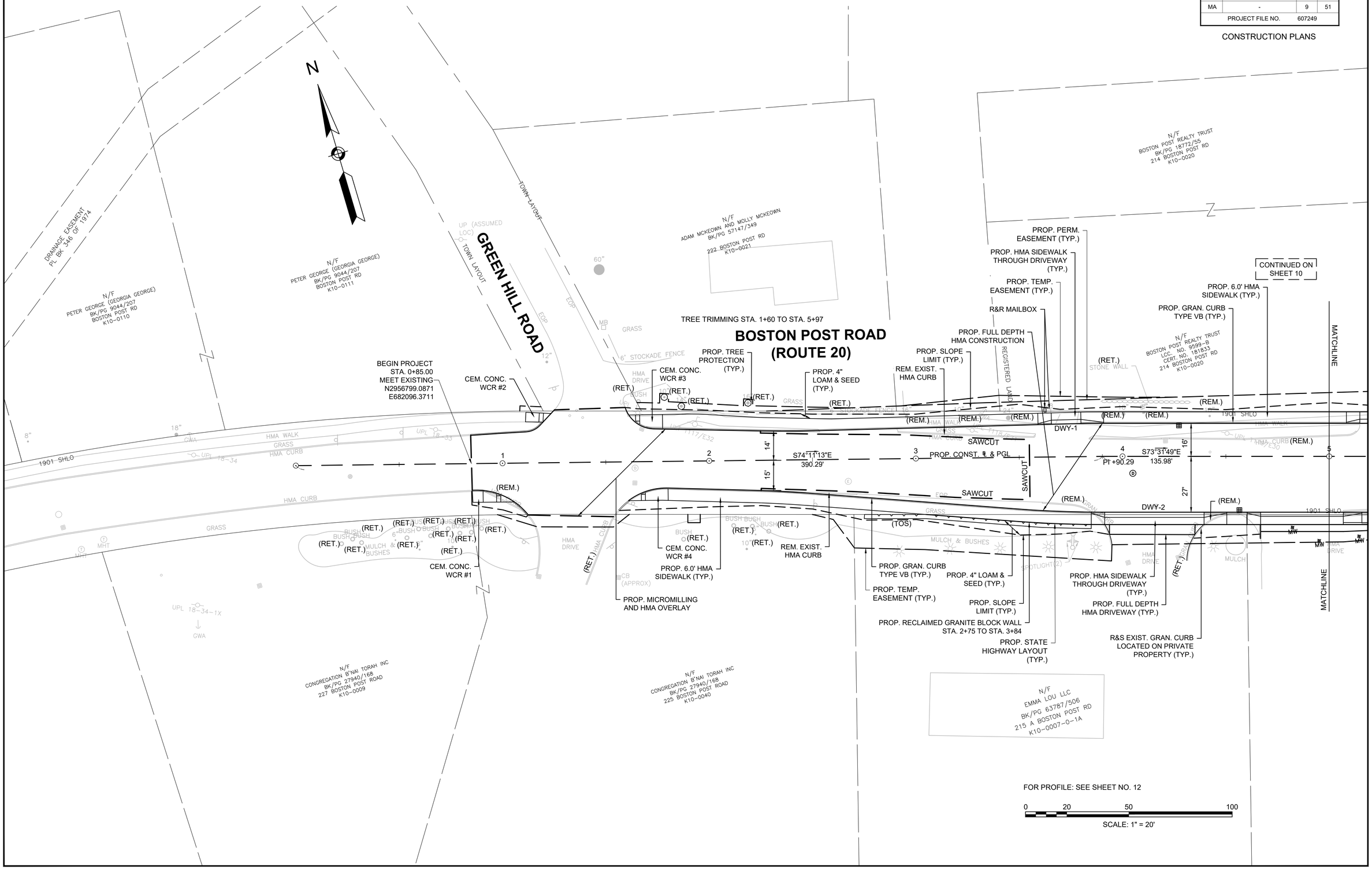
WATER SUPPLY ALTERATIONS
NONE

DRAINAGE DETAILS
SEE SHEET 18

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	9	51
PROJECT FILE NO.	607249		

CONSTRUCTION PLANS



607249_HD (CO).DWG Plotted on 11-Oct-2017 4:34 PM

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	10	51
PROJECT FILE NO.	607249		

CONSTRUCTION PLANS

HIGHWAY GUARD DETAILS

STA 21+ 55 LT TO STA 22+37 LT - ITEM 620.1
STA 22+37 LT TO STA 22+46 LT - ITEM 620.3
STA 22+46 LT - ITEM 627.1
STA 21+55 RT TO STA 23+29 RT - ITEM 620.1
STA 23+29 RT TO STA 23+45 RT - ITEM 620.3
STA 23+45 RT ITEM 627.1

TRAFFIC SIGNAL CONDUIT

SEE SHEET 31

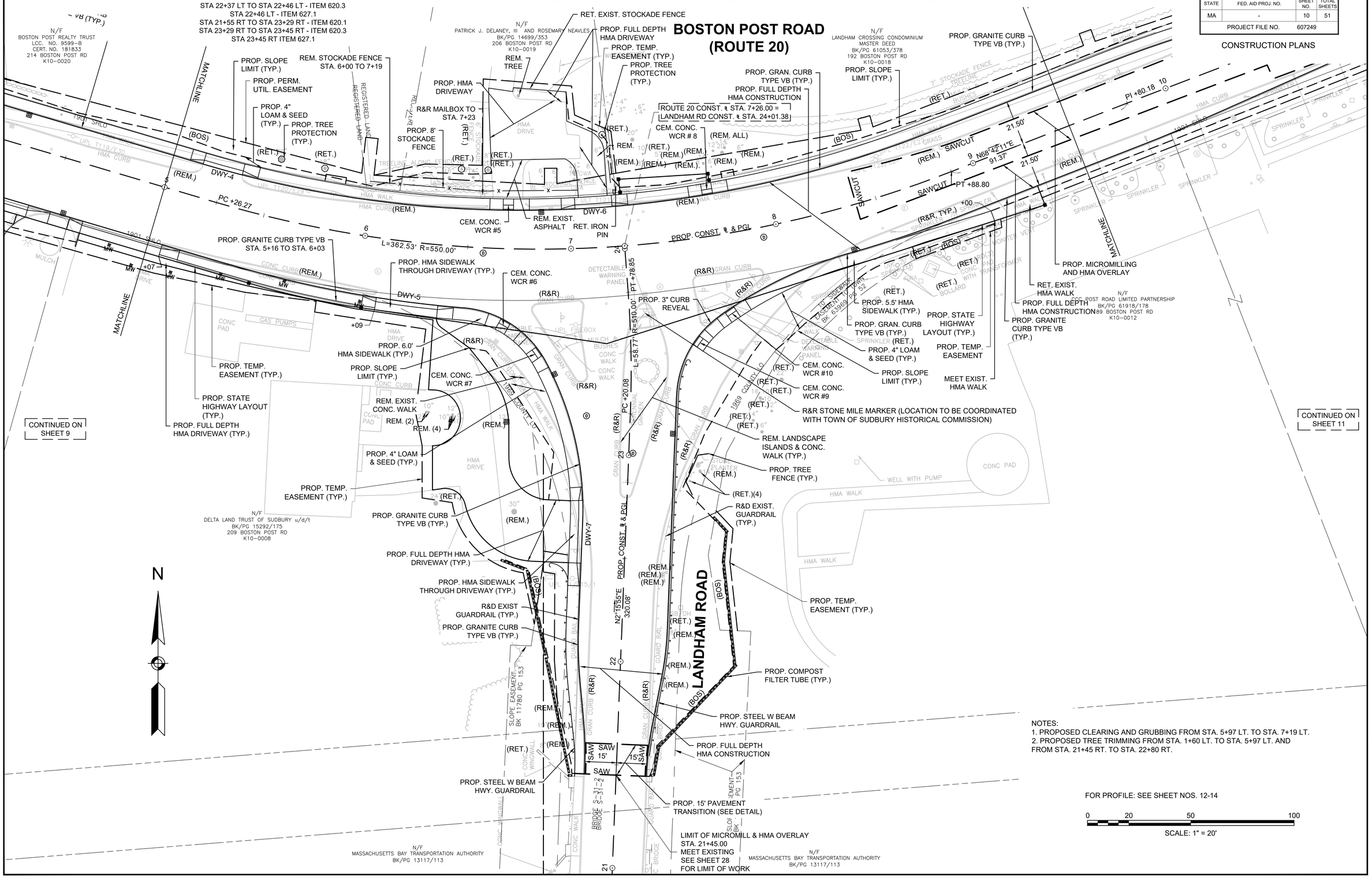
WATER SUPPLY ALTERATIONS

SEE SHEET 19

DRAINAGE DETAILS

SEE SHEET 19

BOSTON POST ROAD (ROUTE 20)



NOTES:
1. PROPOSED CLEARING AND GRUBBING FROM STA. 5+97 LT. TO STA. 7+19 LT.
2. PROPOSED TREE TRIMMING FROM STA. 1+60 LT. TO STA. 5+97 LT. AND FROM STA. 21+45 RT. TO STA. 22+80 RT.

FOR PROFILE: SEE SHEET NOS. 12-14

0 20 50 100
SCALE: 1" = 20'

607249_HD (CO).DWG Plotted on 11-Oct-2017 4:35 PM

HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

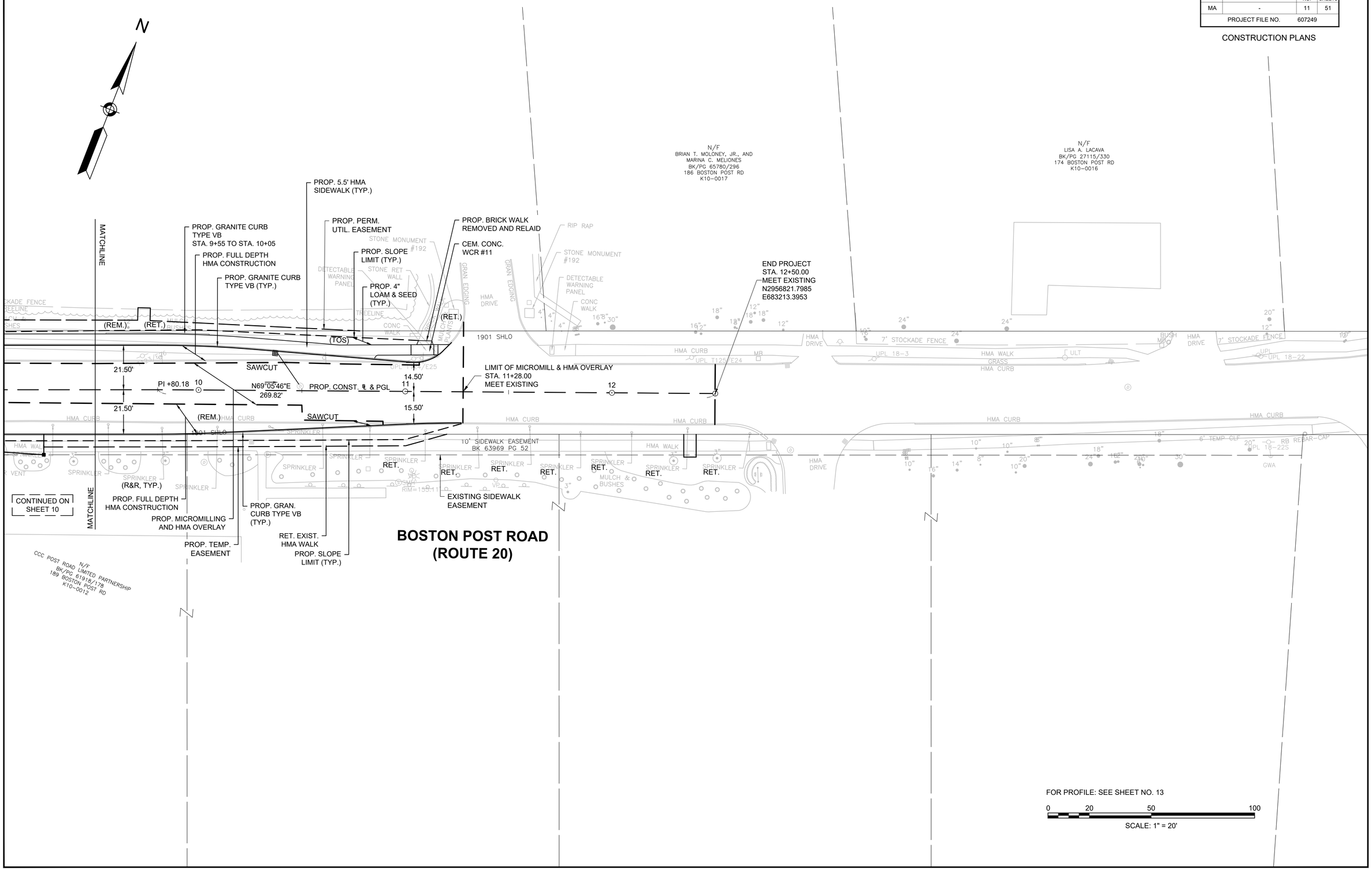
WATER SUPPLY ALTERATIONS
NONE

DRAINAGE DETAILS
SEE SHEET 20

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	11	51
PROJECT FILE NO.	607249		

CONSTRUCTION PLANS



607249_HD (CO).DWG Plotted on 11-Oct-2017 4:35 PM

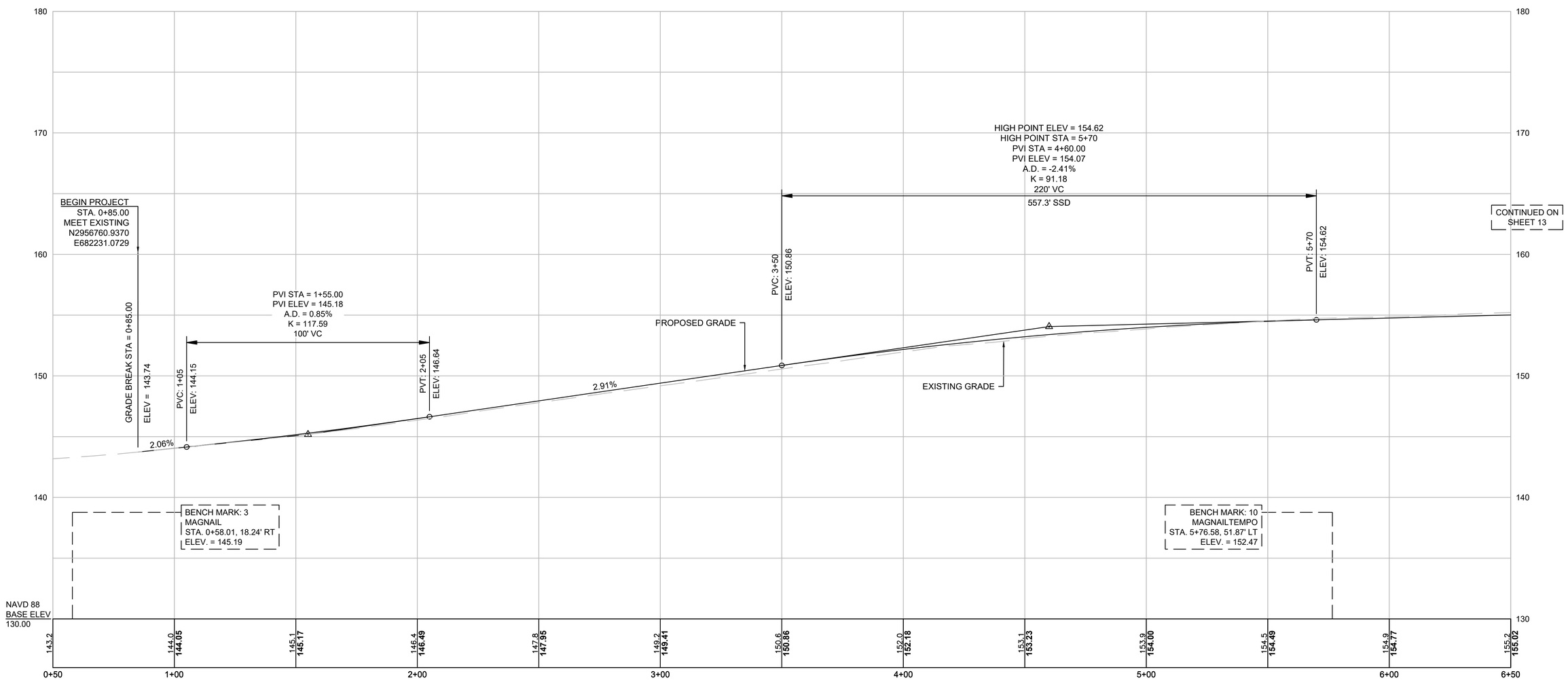
SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	12	51
PROJECT FILE NO.	607249		

PROFILES

607249_HD (PR).DWG Plotted on 11-Oct-2017 4:37 PM

ROUTE 20



FOR CONSTRUCTION PLANS: SEE SHEET NOS. 9-10

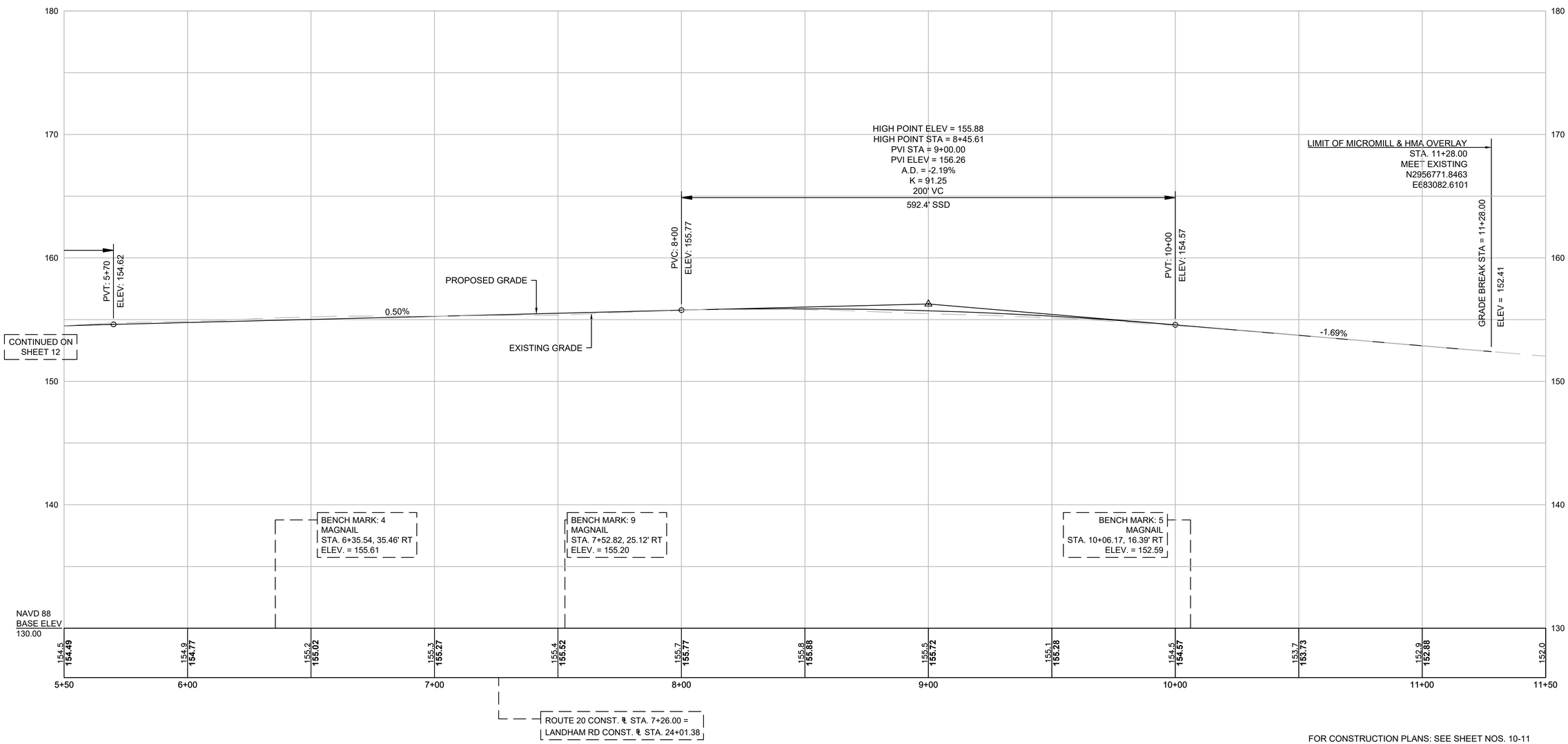
HOR. SCALE IN FEET
20 0 20 40
4 0 4 8
VER. SCALE IN FEET

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	13	51
PROJECT FILE NO.	607249		

PROFILES

ROUTE 20



FOR CONSTRUCTION PLANS: SEE SHEET NOS. 10-11

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

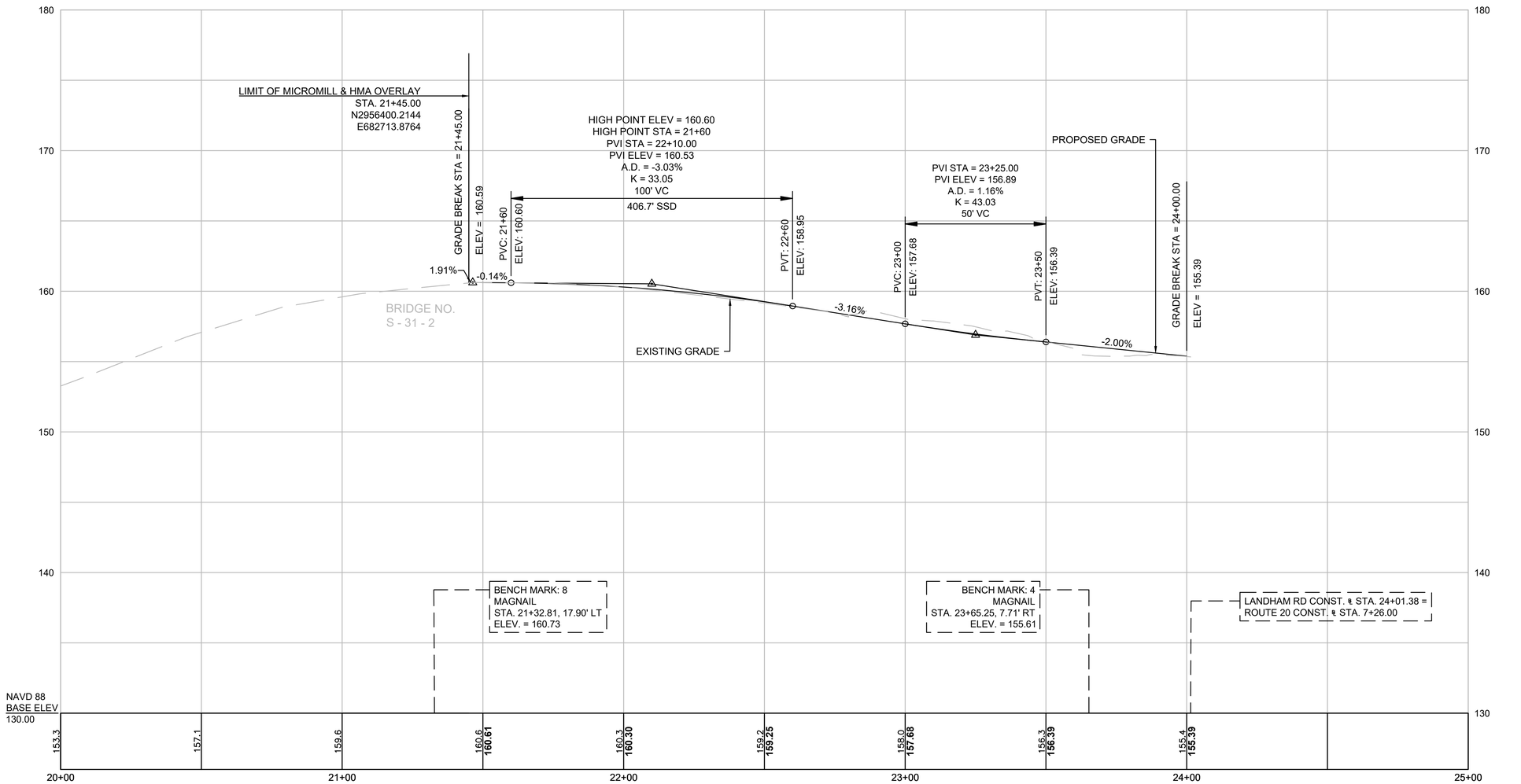
607249_HD (PR).DWG Plotted on 11-Oct-2017 4:37 PM

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	14	51
PROJECT FILE NO.	607249		

PROFILES

LANDHAM RD



FOR CONSTRUCTION PLAN: SEE SHEET NO. 10

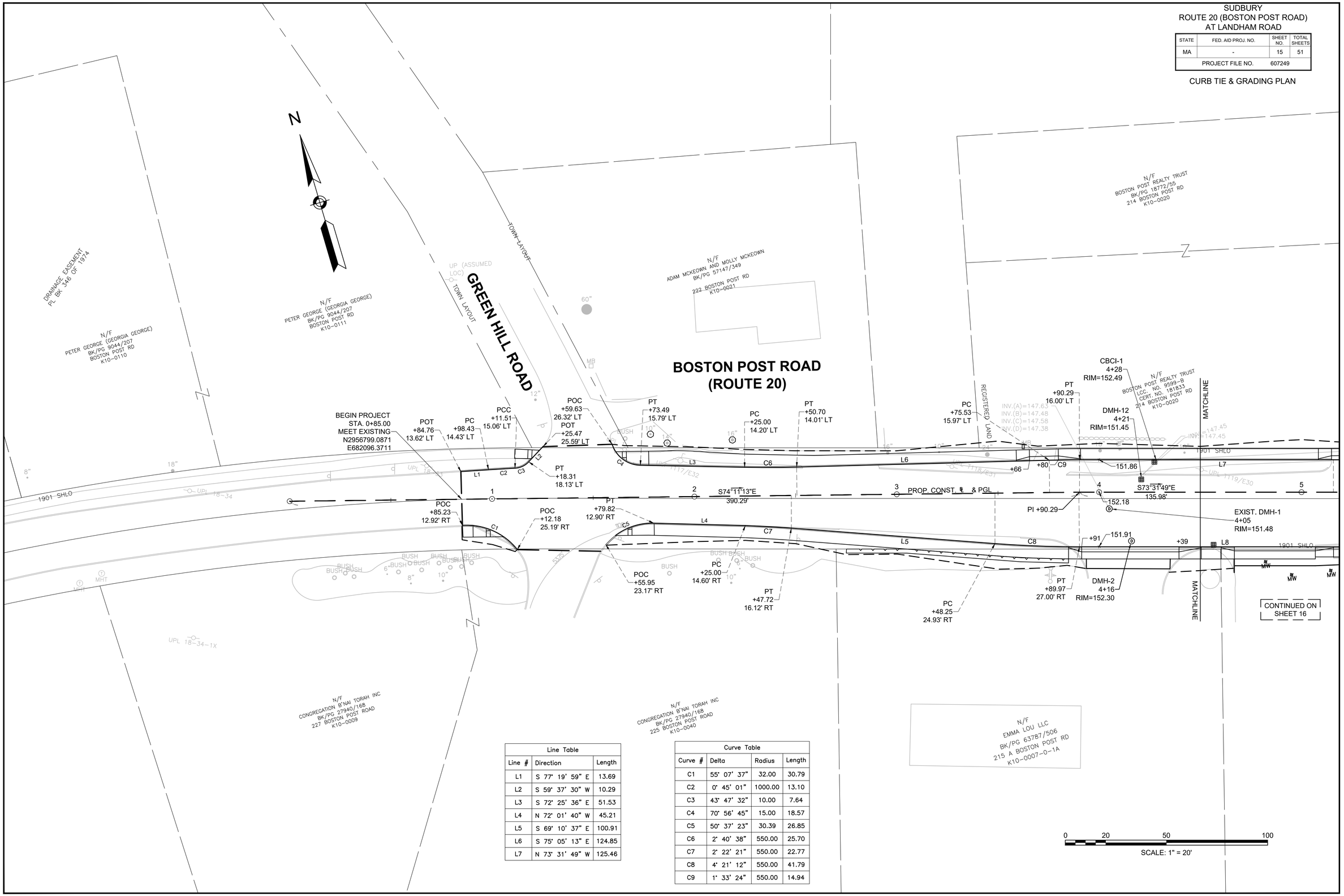
HOR. SCALE IN FEET
20 0 20 40
4 0 4 8
VER. SCALE IN FEET

607249_HD (PR).DWG Plotted on 11-Oct-2017 4:37 PM

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	15	51
PROJECT FILE NO.	607249		

CURB TIE & GRADING PLAN



Line Table		
Line #	Direction	Length
L1	S 77° 19' 59" E	13.69
L2	S 59° 37' 30" W	10.29
L3	S 72° 25' 36" E	51.53
L4	N 72° 01' 40" W	45.21
L5	S 69° 10' 37" E	100.91
L6	S 75° 05' 13" E	124.85
L7	N 73° 31' 49" W	125.46

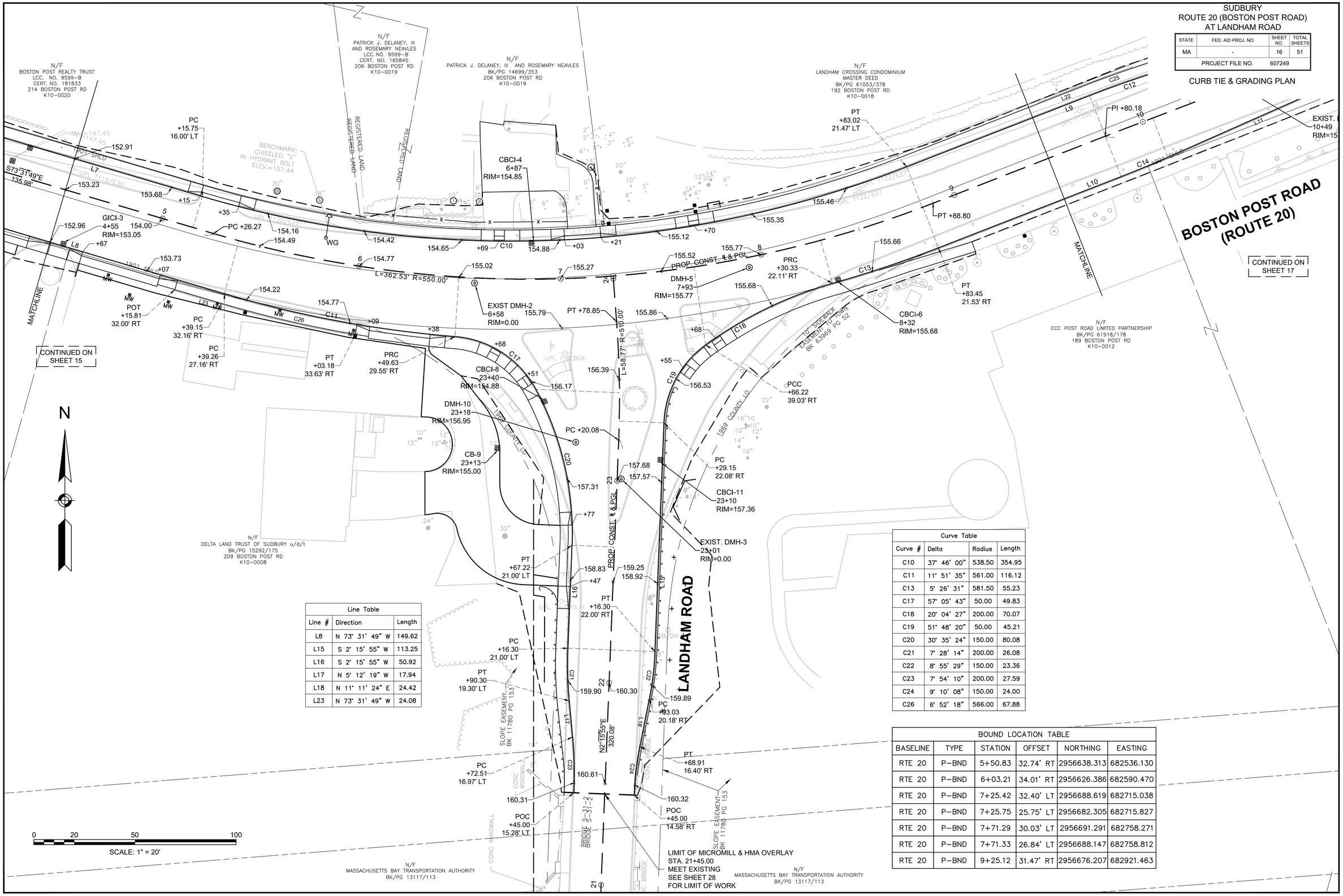
Curve Table			
Curve #	Delta	Radius	Length
C1	55° 07' 37"	32.00	30.79
C2	0° 45' 01"	1000.00	13.10
C3	43° 47' 32"	10.00	7.64
C4	70° 56' 45"	15.00	18.57
C5	50° 37' 23"	30.39	26.85
C6	2° 40' 38"	550.00	25.70
C7	2° 22' 21"	550.00	22.77
C8	4° 21' 12"	550.00	41.79
C9	1° 33' 24"	550.00	14.94

607249_HD (CT).DWG Plotted on 11-Oct-2017 4:37 PM

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	16	51
PROJECT FILE NO.	607249		

CURB TIE & GRADING PLAN



Curve Table			
Curve #	Delta	Radius	Length
C10	37° 46' 00"	538.50	354.95
C11	11° 51' 35"	561.00	116.12
C13	5° 26' 31"	581.50	55.23
C17	57° 05' 43"	50.00	49.83
C18	20° 04' 27"	200.00	70.07
C19	51° 48' 20"	50.00	45.21
C20	30° 35' 24"	150.00	80.08
C21	7° 28' 14"	200.00	26.08
C22	8° 55' 29"	150.00	23.36
C23	7° 54' 10"	200.00	27.59
C24	9° 10' 08"	150.00	24.00
C26	6° 52' 18"	566.00	67.88

Line Table		
Line #	Direction	Length
L8	N 73° 31' 49" W	149.62
L15	S 2° 15' 55" W	113.25
L16	S 2° 15' 55" W	50.92
L17	N 5° 12' 19" W	17.94
L18	N 11° 11' 24" E	24.42
L23	N 73° 31' 49" W	24.08

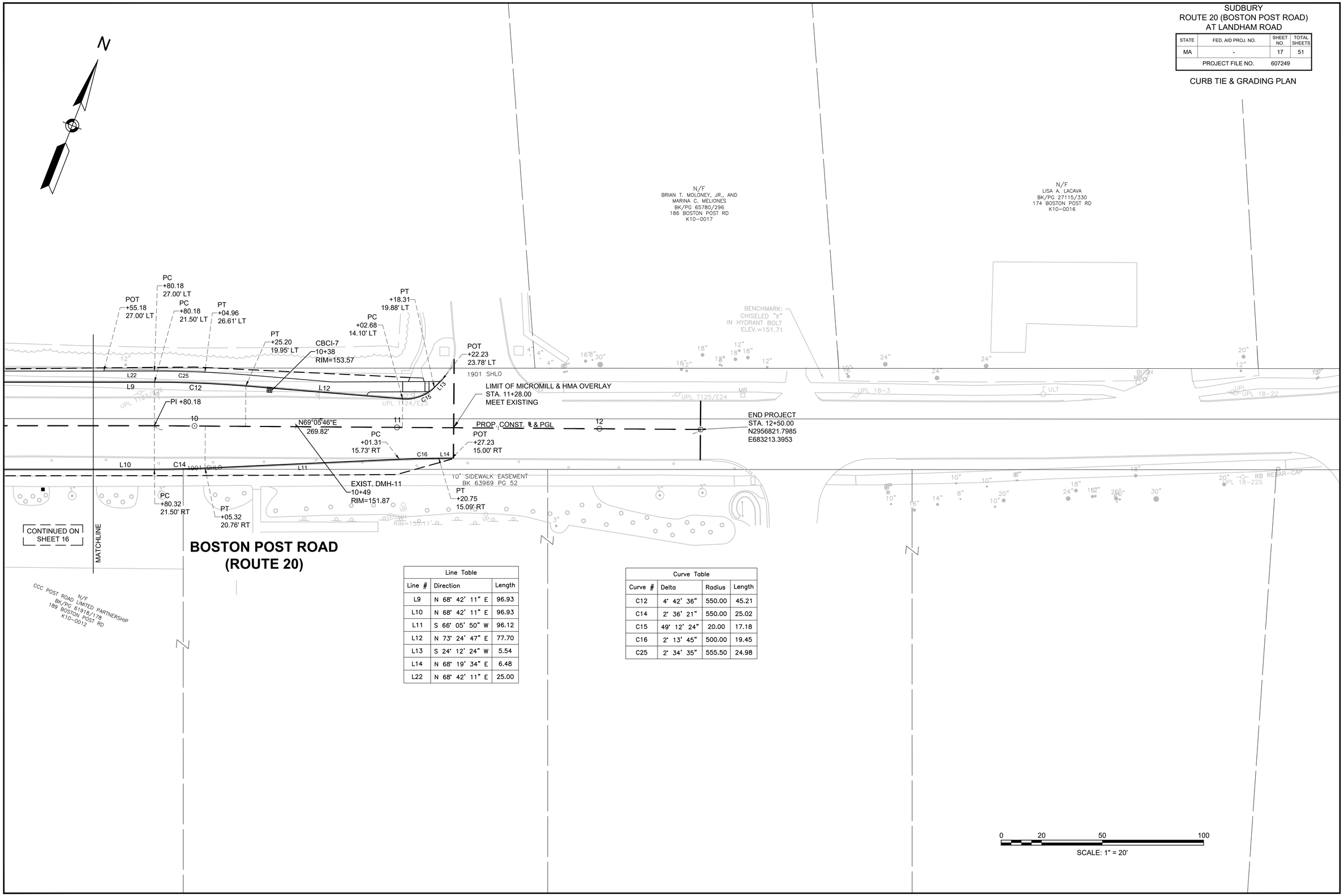
BOUND LOCATION TABLE					
BASELINE	TYPE	STATION	OFFSET	NORTHING	EASTING
RTE 20	P-BND	5+50.83	32.74' RT	2956638.313	682536.130
RTE 20	P-BND	6+03.21	34.01' RT	2956626.386	682590.470
RTE 20	P-BND	7+25.42	32.40' LT	2956688.619	682715.038
RTE 20	P-BND	7+25.75	25.75' LT	2956682.305	682715.827
RTE 20	P-BND	7+71.29	30.03' LT	2956691.291	682758.271
RTE 20	P-BND	7+71.33	26.84' LT	2956688.147	682758.812
RTE 20	P-BND	9+25.12	31.47' RT	2956676.207	682921.463

607249_HD (CT).DWG Plotted on 11-Oct-2017 4:37 PM

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	17	51
PROJECT FILE NO.	607249		

CURB TIE & GRADING PLAN



Line Table		
Line #	Direction	Length
L9	N 68° 42' 11" E	96.93
L10	N 68° 42' 11" E	96.93
L11	S 66° 05' 50" W	96.12
L12	N 73° 24' 47" E	77.70
L13	S 24° 12' 24" W	5.54
L14	N 68° 19' 34" E	6.48
L22	N 68° 42' 11" E	25.00

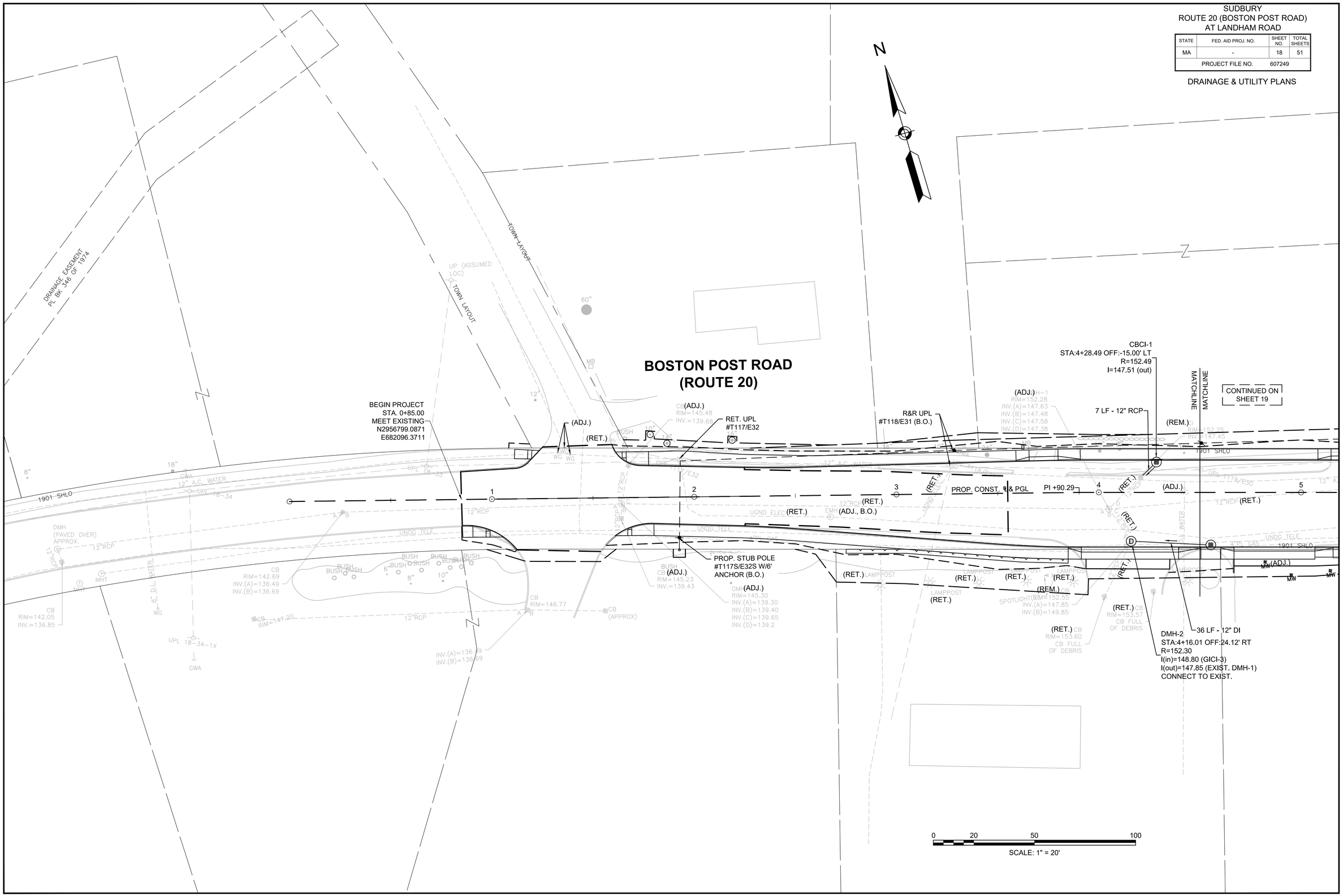
Curve Table			
Curve #	Delta	Radius	Length
C12	4° 42' 36"	550.00	45.21
C14	2° 36' 21"	550.00	25.02
C15	49° 12' 24"	20.00	17.18
C16	2° 13' 45"	500.00	19.45
C25	2° 34' 35"	555.50	24.98

607249_HD (CT).DWG Plotted on 11-Oct-2017 4:37 PM

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	18	51
PROJECT FILE NO.	607249		

DRAINAGE & UTILITY PLANS



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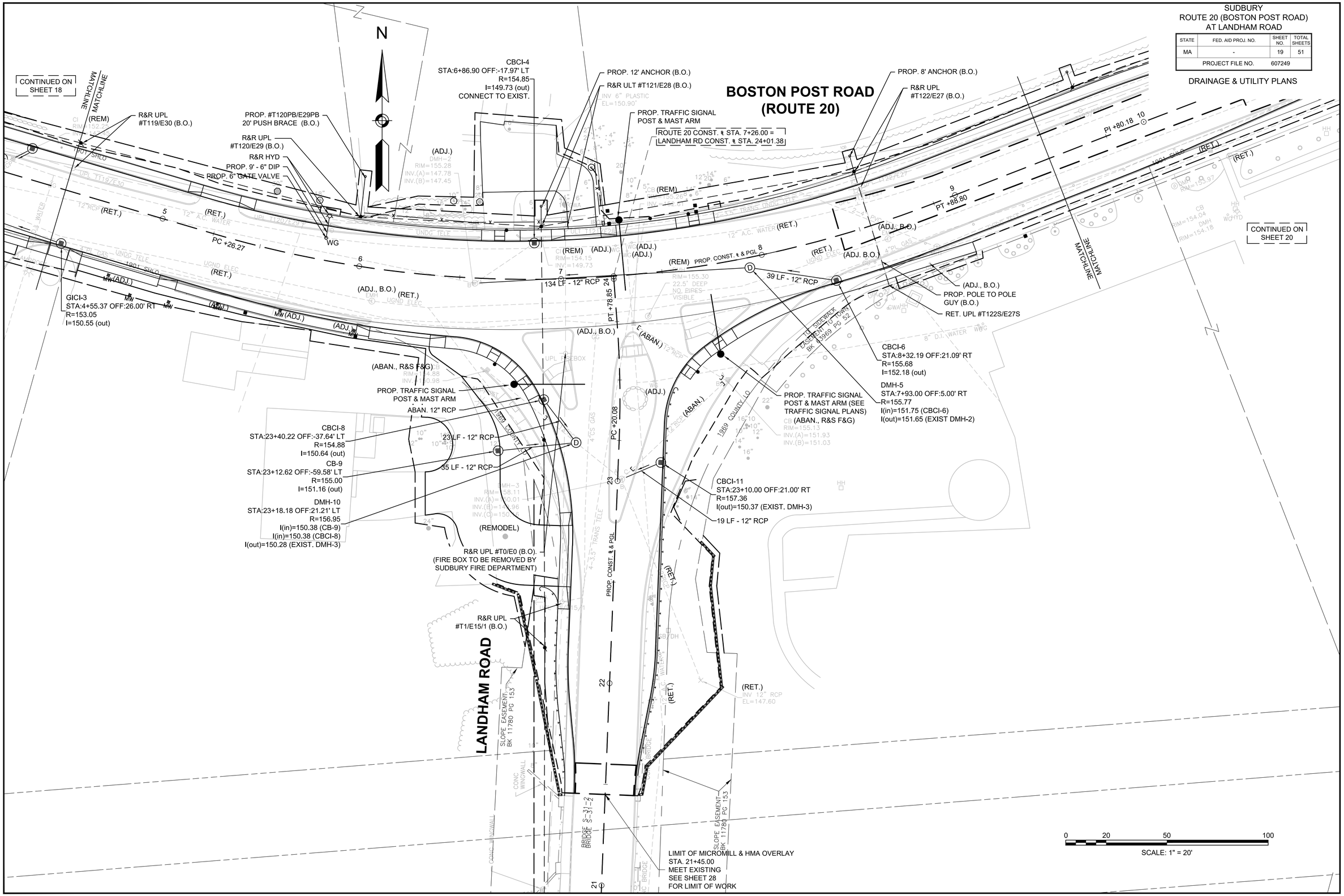
SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	19	51
PROJECT FILE NO.	607249		

DRAINAGE & UTILITY PLANS

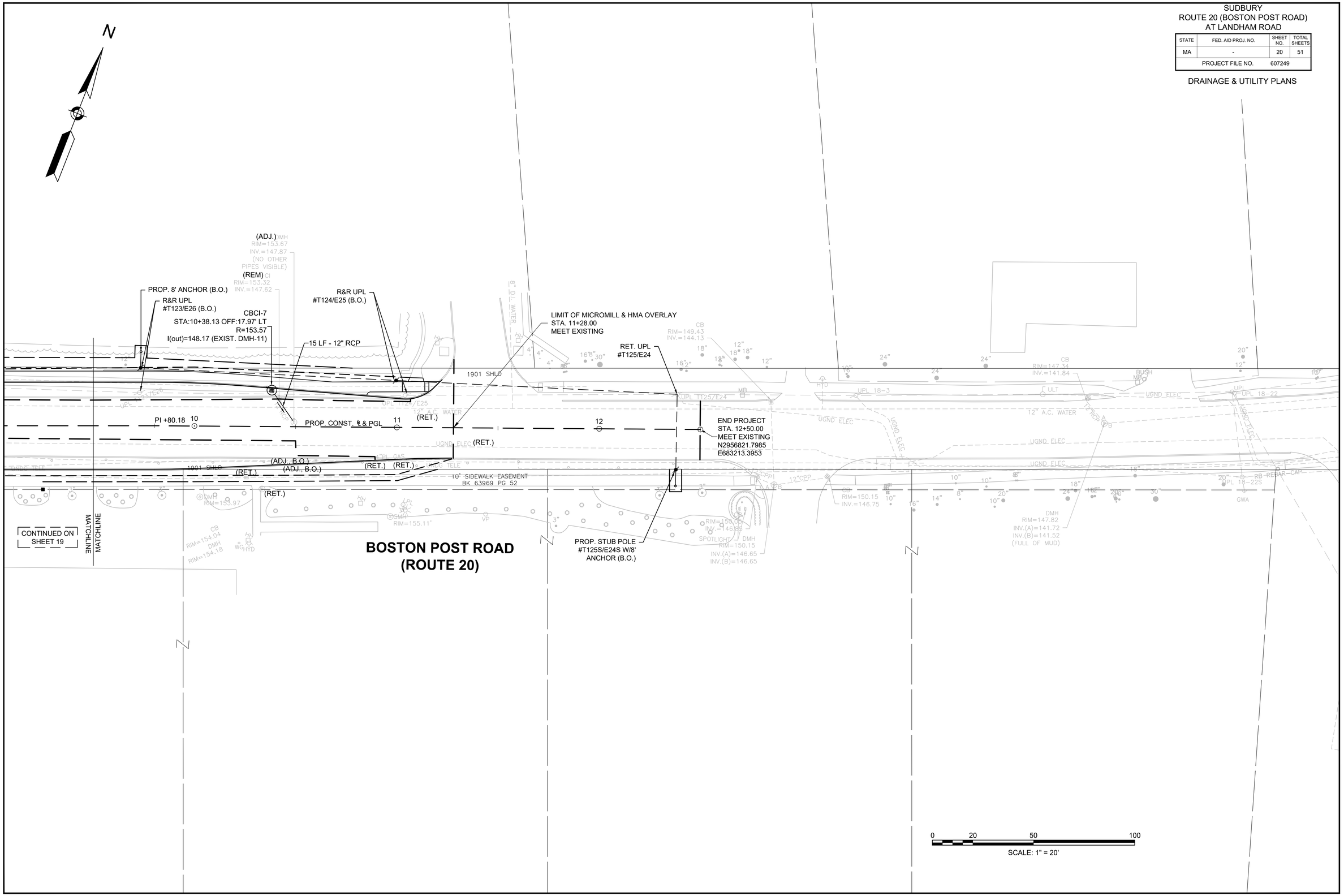


607249_HD (DU).DWG Plotted on 11-Oct-2017 4:38 PM

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	20	51
PROJECT FILE NO.	607249		

DRAINAGE & UTILITY PLANS



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SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	21	51
PROJECT FILE NO.	607249		

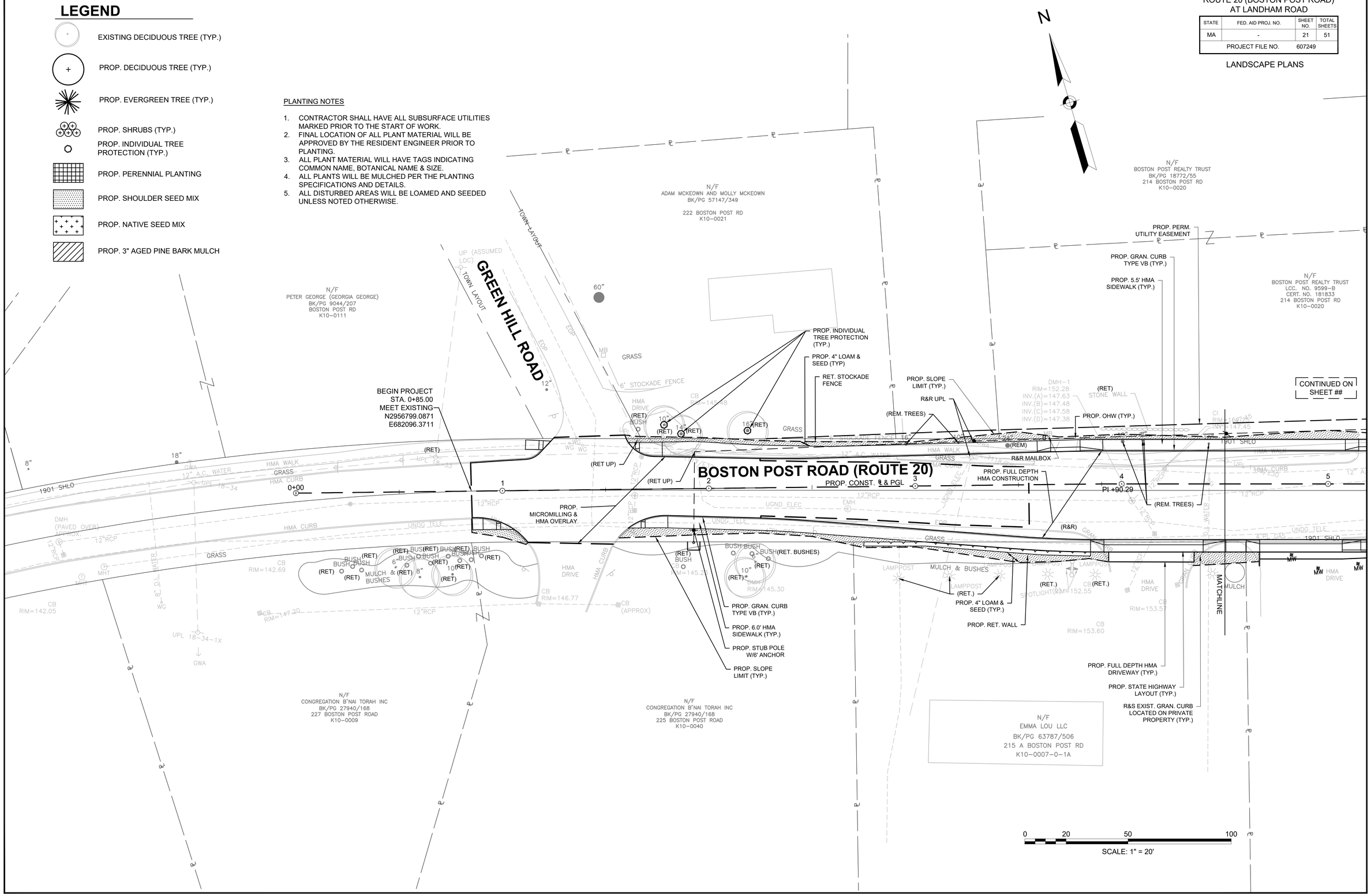
LANDSCAPE PLANS

LEGEND

- EXISTING DECIDUOUS TREE (TYP.)
- PROP. DECIDUOUS TREE (TYP.)
- PROP. EVERGREEN TREE (TYP.)
- PROP. SHRUBS (TYP.)
- PROP. INDIVIDUAL TREE PROTECTION (TYP.)
- PROP. PERENNIAL PLANTING
- PROP. SHOULDER SEED MIX
- PROP. NATIVE SEED MIX
- PROP. 3" AGED PINE BARK MULCH

PLANTING NOTES

1. CONTRACTOR SHALL HAVE ALL SUBSURFACE UTILITIES MARKED PRIOR TO THE START OF WORK.
2. FINAL LOCATION OF ALL PLANT MATERIAL WILL BE APPROVED BY THE RESIDENT ENGINEER PRIOR TO PLANTING.
3. ALL PLANT MATERIAL WILL HAVE TAGS INDICATING COMMON NAME, BOTANICAL NAME & SIZE.
4. ALL PLANTS WILL BE MULCHED PER THE PLANTING SPECIFICATIONS AND DETAILS.
5. ALL DISTURBED AREAS WILL BE LOAMED AND SEEDED UNLESS NOTED OTHERWISE.

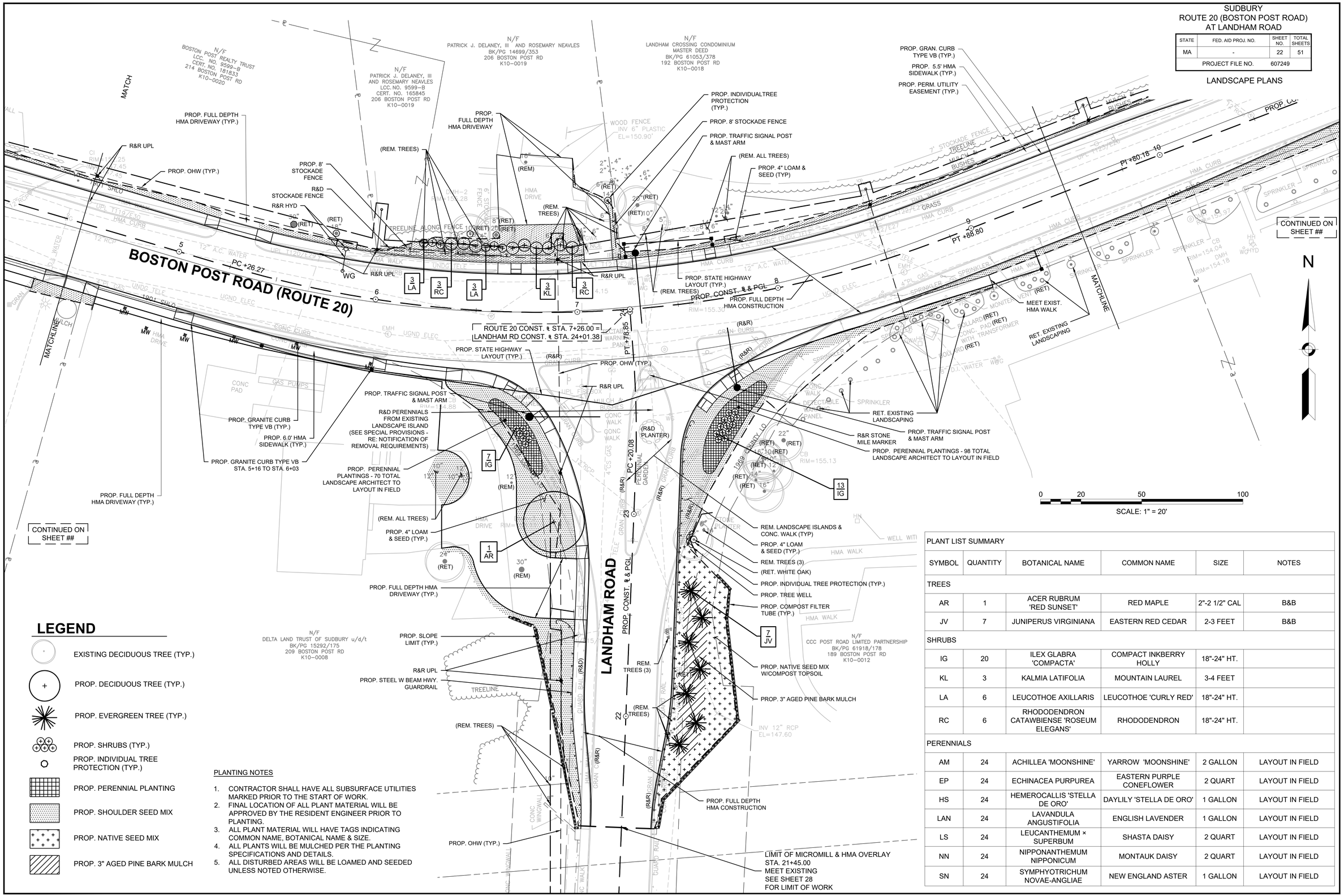


607249_HD (LD).DWG Plotted on 11-Oct-2017 4:39 PM

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	22	51
PROJECT FILE NO.	607249		

LANDSCAPE PLANS



LEGEND

- EXISTING DECIDUOUS TREE (TYP.)
- PROP. DECIDUOUS TREE (TYP.)
- PROP. EVERGREEN TREE (TYP.)
- PROP. SHRUBS (TYP.)
- PROP. INDIVIDUAL TREE PROTECTION (TYP.)
- PROP. PERENNIAL PLANTING
- PROP. SHOULDER SEED MIX
- PROP. NATIVE SEED MIX
- PROP. 3" AGED PINE BARK MULCH

PLANTING NOTES

1. CONTRACTOR SHALL HAVE ALL SUBSURFACE UTILITIES MARKED PRIOR TO THE START OF WORK.
2. FINAL LOCATION OF ALL PLANT MATERIAL WILL BE APPROVED BY THE RESIDENT ENGINEER PRIOR TO PLANTING.
3. ALL PLANT MATERIAL WILL HAVE TAGS INDICATING COMMON NAME, BOTANICAL NAME & SIZE.
4. ALL PLANTS WILL BE MULCHED PER THE PLANTING SPECIFICATIONS AND DETAILS.
5. ALL DISTURBED AREAS WILL BE LOAMED AND SEEDED UNLESS NOTED OTHERWISE.

PLANT LIST SUMMARY

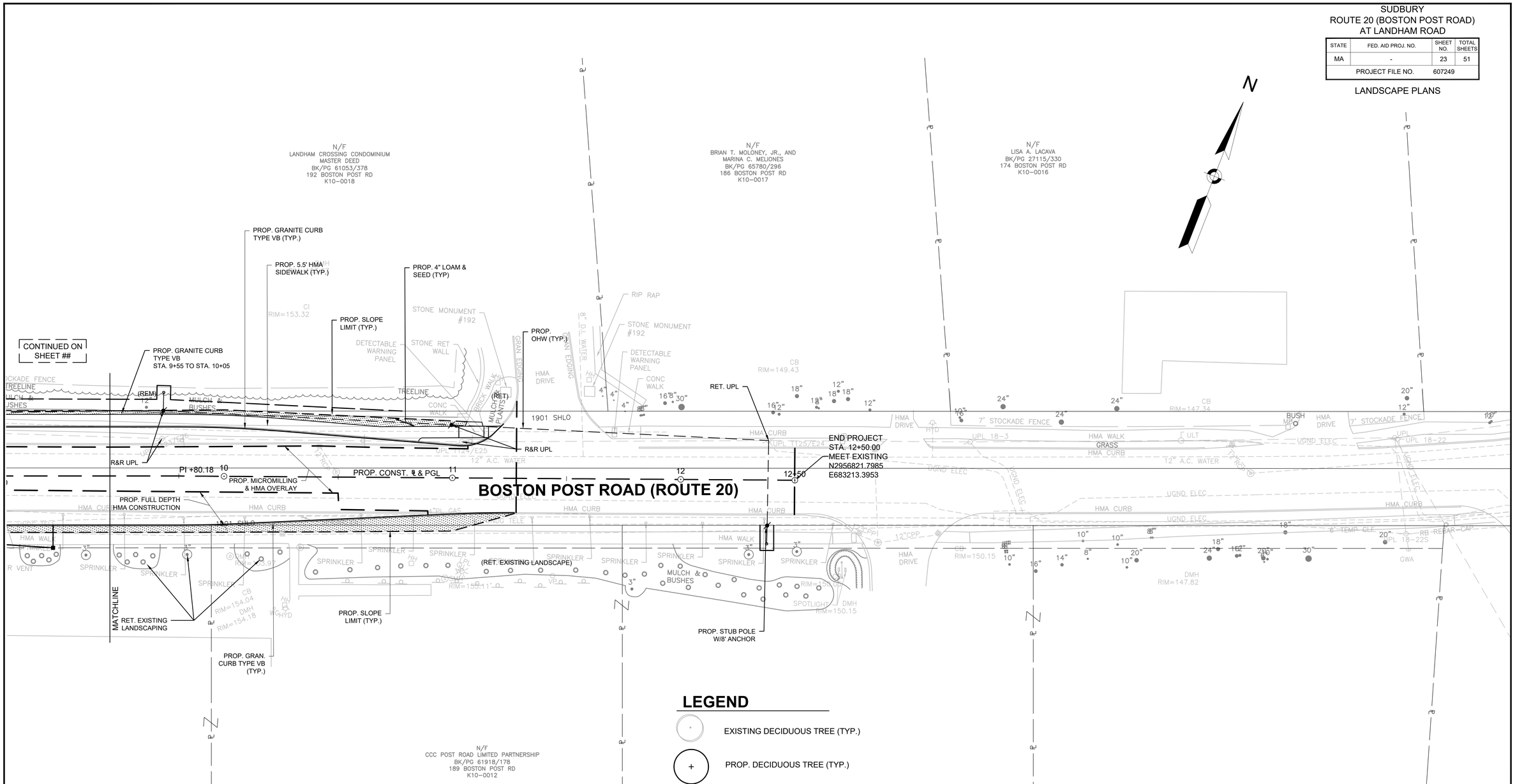
SYMBOL	QUANTITY	BOTANICAL NAME	COMMON NAME	SIZE	NOTES
TREES					
AR	1	ACER RUBRUM 'RED SUNSET'	RED MAPLE	2"-2 1/2" CAL	B&B
JV	7	JUNIPERUS VIRGINIANA	EASTERN RED CEDAR	2-3 FEET	B&B
SHRUBS					
IG	20	ILEX GLABRA 'COMPACTA'	COMPACT INKBERRY HOLLY	18"-24" HT.	
KL	3	KALMIA LATIFOLIA	MOUNTAIN LAUREL	3-4 FEET	
LA	6	LEUCOTHOE AXILLARIS	LEUCOTHOE 'CURLY RED'	18"-24" HT.	
RC	6	RHODODENDRON CATAWBIENSE 'ROSEUM ELEGANS'	RHODODENDRON	18"-24" HT.	
PERENNIALS					
AM	24	ACHILLEA 'MOONSHINE'	YARROW 'MOONSHINE'	2 GALLON	LAYOUT IN FIELD
EP	24	ECHINACEA PURPUREA	EASTERN PURPLE CONEFLOWER	2 QUART	LAYOUT IN FIELD
HS	24	HEMEROCALLIS 'STELLA DE ORO'	DAYLILY 'STELLA DE ORO'	1 GALLON	LAYOUT IN FIELD
LAN	24	LAVANDULA ANGUSTIFOLIA	ENGLISH LAVENDER	1 GALLON	LAYOUT IN FIELD
LS	24	LEUCANTHEMUM × SUPERBUM	SHASTA DAISY	2 QUART	LAYOUT IN FIELD
NN	24	NIPPONANTHEMUM NIPPONICUM	MONTAUK DAISY	2 QUART	LAYOUT IN FIELD
SN	24	SYMPHYOTRICHUM NOVAE-ANGLIAE	NEW ENGLAND ASTER	1 GALLON	LAYOUT IN FIELD

607249_HD (LD).DWG Plotted on 11-Oct-2017 4:39 PM

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	23	51
PROJECT FILE NO.	607249		

LANDSCAPE PLANS



LEGEND

- EXISTING DECIDUOUS TREE (TYP.)
- PROP. DECIDUOUS TREE (TYP.)
- PROP. EVERGREEN TREE (TYP.)
- PROP. SHRUBS (TYP.)
- PROP. INDIVIDUAL TREE PROTECTION (TYP.)
- PROP. PERENNIAL PLANTING
- PROP. SHOULDER SEED MIX
- PROP. NATIVE SEED MIX
- PROP. 3" AGED PINE BARK MULCH

PLANTING NOTES

1. CONTRACTOR SHALL HAVE ALL SUBSURFACE UTILITIES MARKED PRIOR TO THE START OF WORK.
2. FINAL LOCATION OF ALL PLANT MATERIAL WILL BE APPROVED BY THE RESIDENT ENGINEER PRIOR TO PLANTING.
3. ALL PLANT MATERIAL WILL HAVE TAGS INDICATING COMMON NAME, BOTANICAL NAME & SIZE.
4. ALL PLANTS WILL BE MULCHED PER THE PLANTING SPECIFICATIONS AND DETAILS.
5. ALL DISTURBED AREAS WILL BE LOAMED AND SEEDED UNLESS NOTED OTHERWISE.

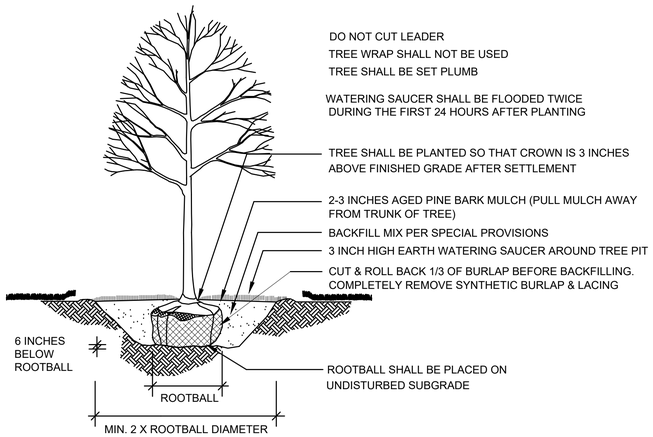
0 20 50 100
SCALE: 1" = 20'

607249_HD (LD).DWG Plotted on 11-Oct-2017 4:39 PM

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

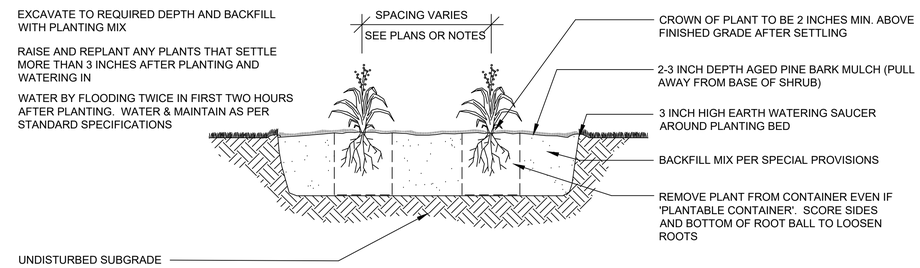
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	24	51
PROJECT FILE NO.	607249		

LANDSCAPE DETAILS



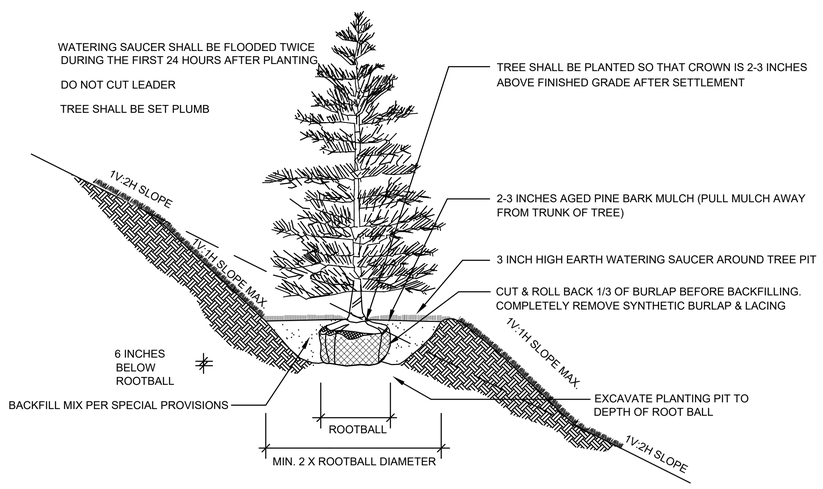
1 DECIDUOUS TREE PLANTING

NOT TO SCALE



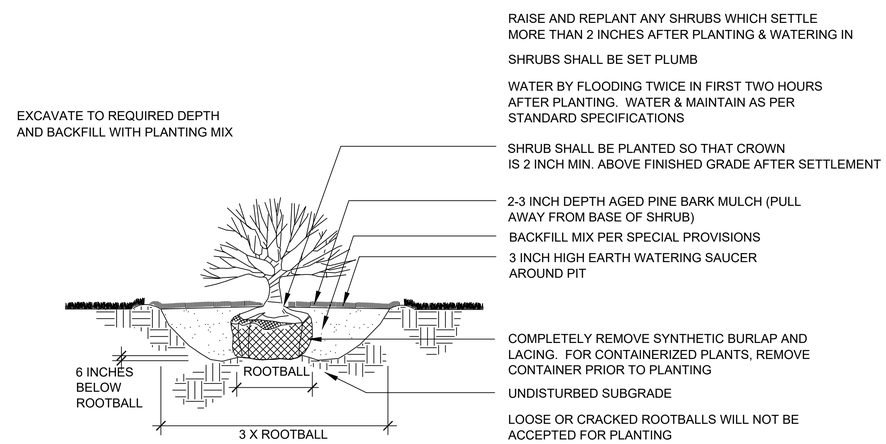
3 PERENNIAL PLANTING

NOT TO SCALE



2 EVERGREEN TREE PLANTING (SLOPE)

NOT TO SCALE



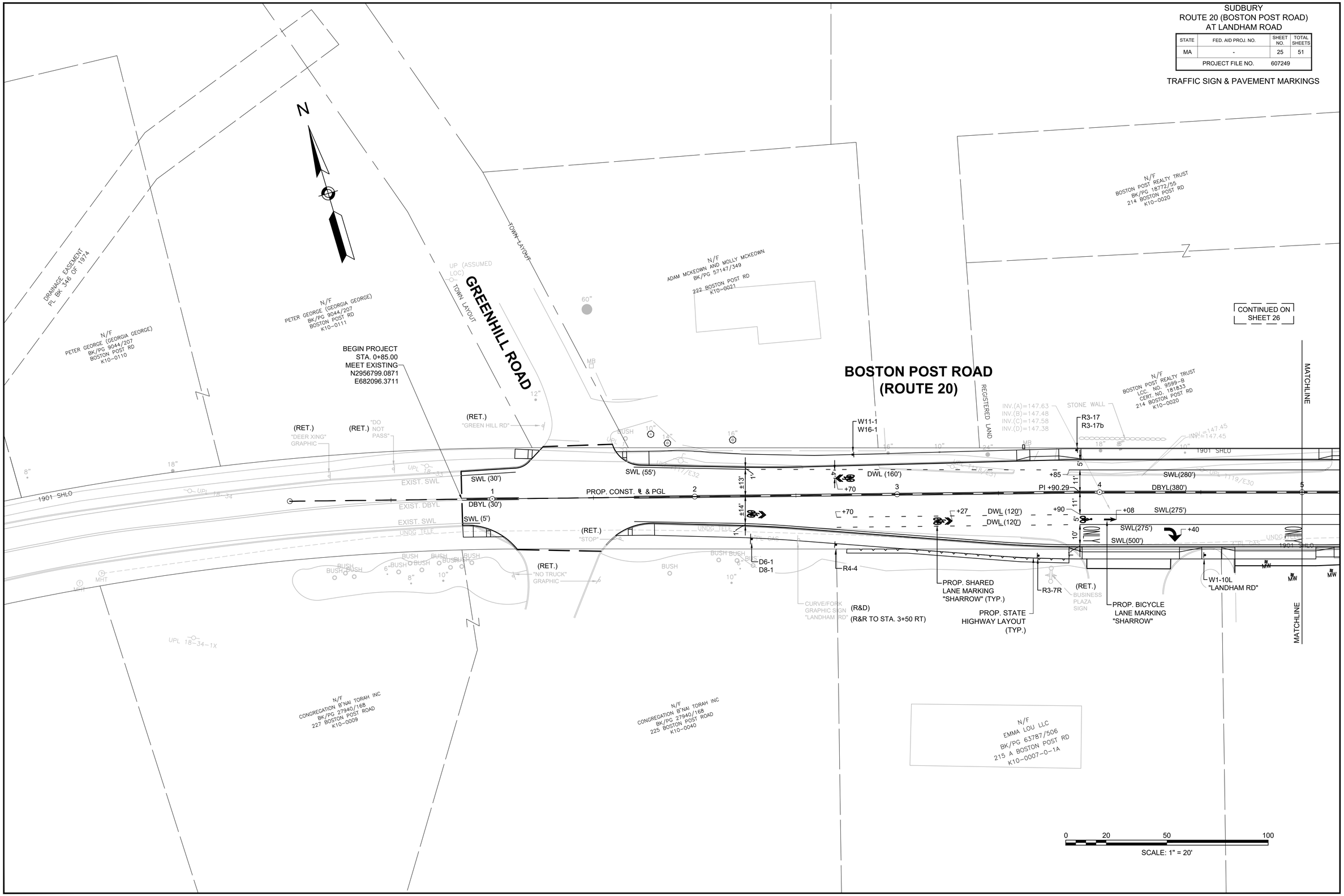
4 SHRUB PLANTING

SCALE: 1" = 1.0

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	25	51
PROJECT FILE NO.	607249		

TRAFFIC SIGN & PAVEMENT MARKINGS

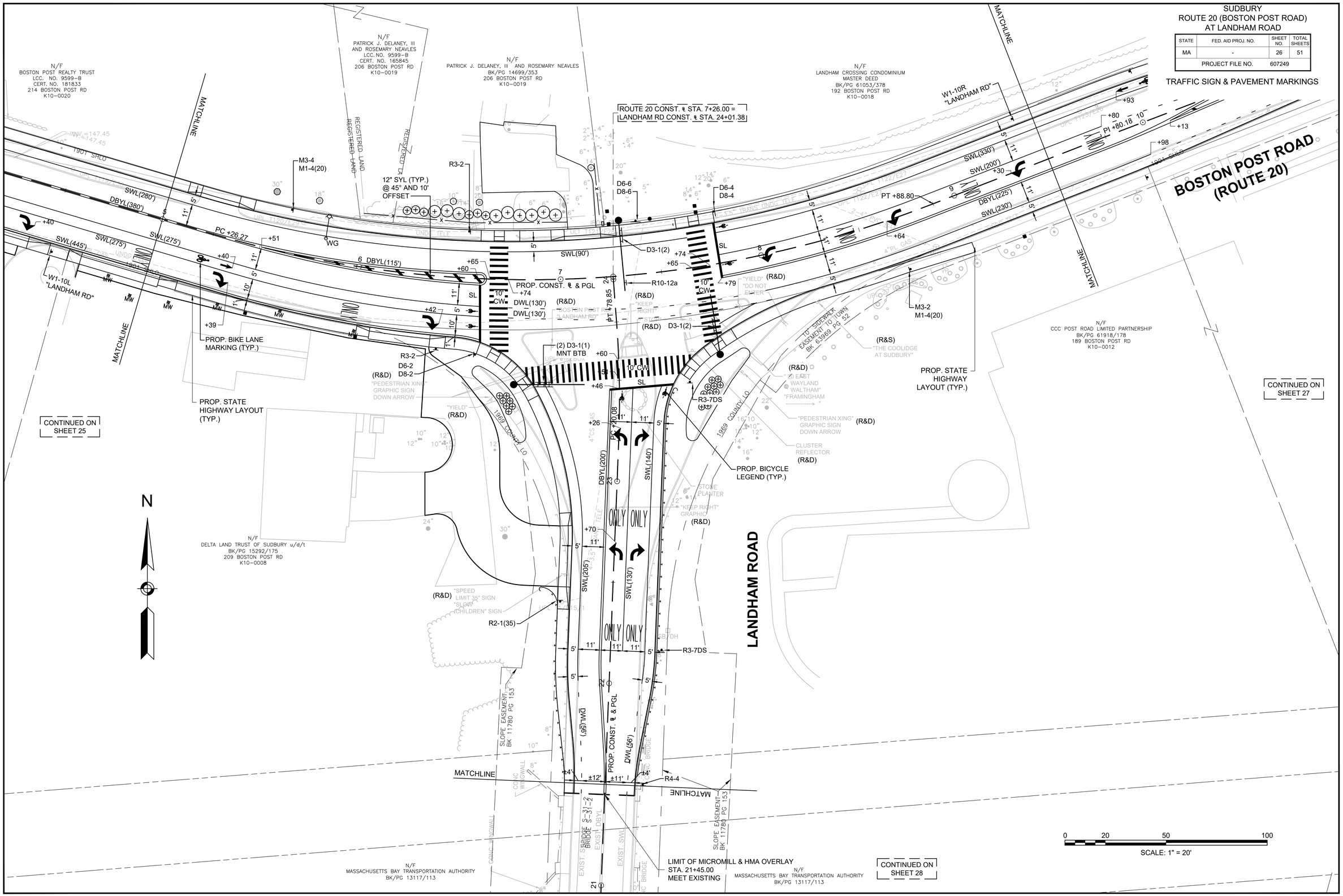


607249_HD (TSPM).DWG Plotted on 11-Oct-2017 4:40 PM

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	26	51
PROJECT FILE NO.	607249		

TRAFFIC SIGN & PAVEMENT MARKINGS

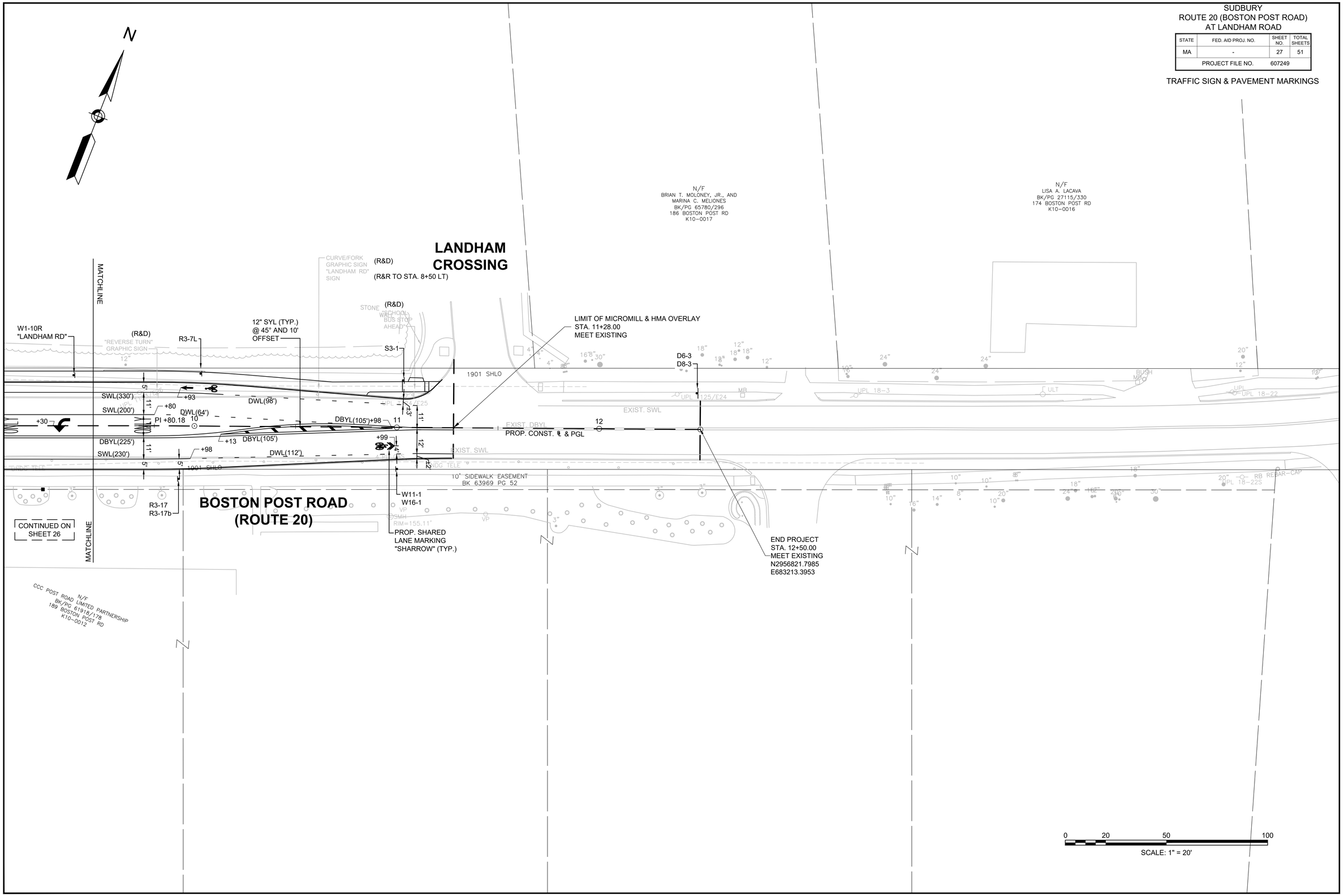


607249_HD (TSPM).DWG Plotted on 11-Oct-2017 4:40 PM

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	27	51
PROJECT FILE NO.	607249		

TRAFFIC SIGN & PAVEMENT MARKINGS

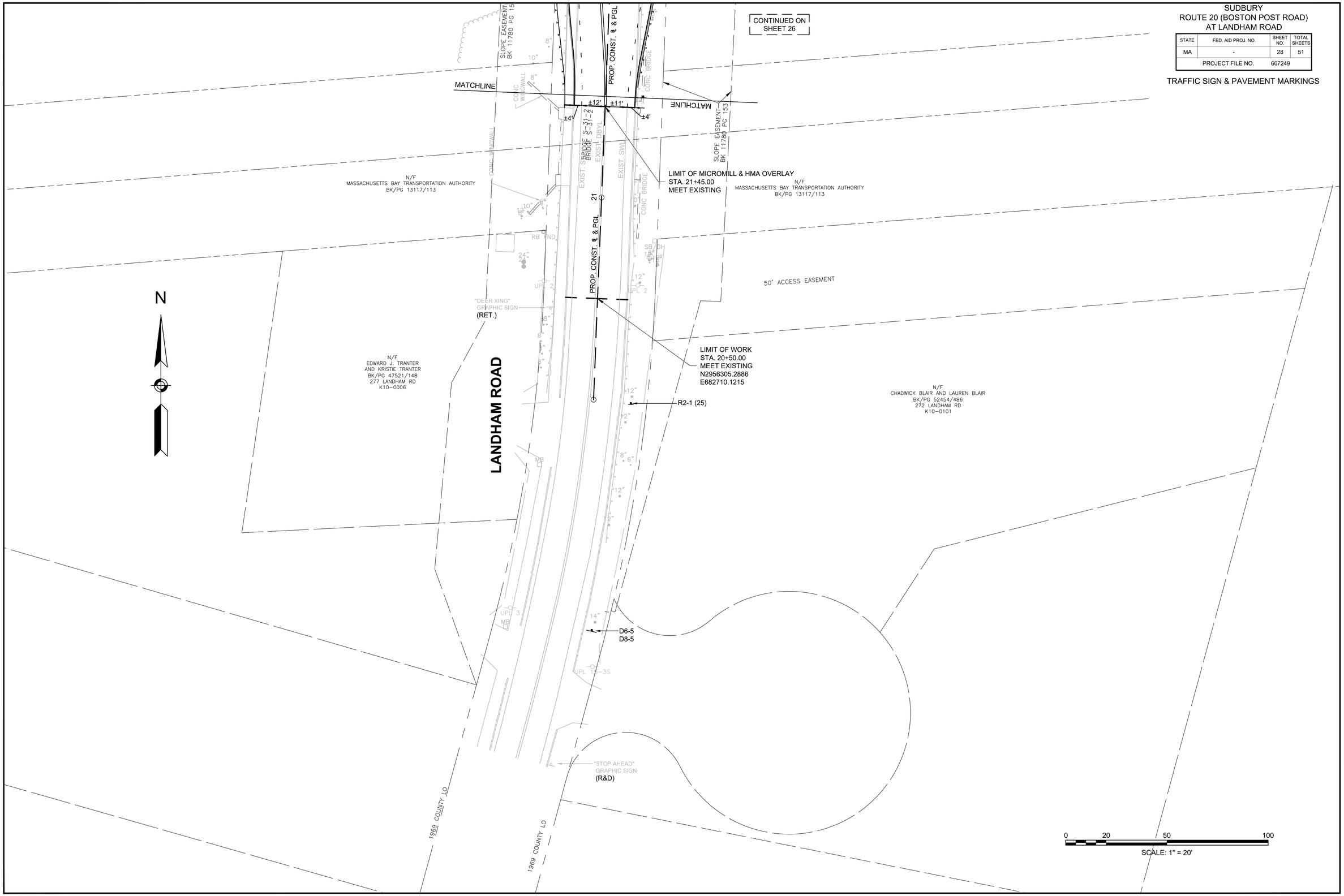


607249_HD (TSPM).DWG Plotted on 11-Oct-2017 4:40 PM

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	28	51
PROJECT FILE NO.	607249		

TRAFFIC SIGN & PAVEMENT MARKINGS



607249_HD (TSPM).DWG Plotted on 11-Oct-2017 4:40 PM

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	29	51
PROJECT FILE NO.	607249		

TRAFFIC SIGN SUMMARY

NOTES:
1. ALL WARNING, REGULATORY AND ROUTE MARKERS SHALL BE FABRICATED WITH HIGH INTENSITY ENCAPSULATED LENS REFLECTIVE SHEETING (SEE SECTION M9.30.0) TYPE III OR IV.
2. ALL SIGNS NOTED AS "(R&R)" SHALL BE MOUNTED ON NEW P5 POSTS OR AS OTHERWISE INDICATED.
3. ALL P5 POSTS SHALL BE TELESCOPIC RECTANGULAR TYPE POSTS.
4. QUANTITIES OF SIGNS AND POSTS SHOWN ON THIS SHEET MAY DIFFER FROM THE PAVEMENT MARKING AND SIGNING PLANS. WHERE DIFFERENCES OCCUR, THE PAVEMENT MARKINGS AND SIGNING PLANS SHALL PREVAIL.

IDENTIFICATION NUMBER	SIZE OF SIGN		TEXT	TEXT DIMENSIONS (INCHES)		NUMBER OF SIGNS REQUIRED	COLOR			POST SIZE AND NUMBER REQUIRED	UNIT AREA IN SQUARE FEET	AREA IN SQUARE FEET
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING		BACK-GROUND	LEGEND	BORDER			
R2-1(25)	24"	30"	SPEED LIMIT 25	MUTCD STANDARD		1	WHITE	BLACK	BLACK	P5 (1 REQ'D)	5.00	5.00
R2-1(35)	24"	30"	SPEED LIMIT 35	MUTCD STANDARD		1	WHITE	BLACK	BLACK	P5 (1 REQ'D)	5.00	5.00
R3-2	24"	24"		MUTCD STANDARD		2	WHITE	BLACK	BLACK	P5 (2 REQ'D)	4.00	8.00
R3-7DS	30"	30"	ONLY ONLY	MASSDOT STANDARD		2	WHITE	BLACK	BLACK	P5 (2 REQ'D)	6.25	12.50
R3-7L	30"	30"	LEFT LANE MUST TURN LEFT	MUTCD STANDARD		1	WHITE	BLACK	BLACK	P5 (1 REQ'D)	6.25	6.25
R3-7R	30"	30"	RIGHT LANE MUST TURN RIGHT	MUTCD STANDARD		1	WHITE	BLACK	BLACK	P5 (1 REQ'D)	6.25	6.25
R3-17	30"	24"	BIKE LANE	MUTCD STANDARD		2	WHITE	BLACK	-	P5 (2 REQ'D)	5.00	10.00
R3-17b	30"	12"	ENDS	MUTCD STANDARD		2	WHITE	BLACK	BLACK	MNT w/R3-17	2.50	5.00
R4-4	36"	30"	BEGIN RIGHT TURN LANE YIELD TO BIKES	MUTCD STANDARD		2	WHITE	BLACK	BLACK	P5 (2 REQ'D)	7.50	15.00
R10-12a	30"	36"	LEFT TURN YIELD ON FLASHING	MASSDOT STANDARD		1	WHITE	BLACK LEGEND & CIRCLE; YELLOW ARROW	BLACK	MNT ON 35' MAST ARM	7.50	7.50
W1-10L	36"	36"		MUTCD STANDARD		1	YELLOW	BLACK SYMBOL	BLACK	P5 (1 REQ'D)	9.00	9.00
W1-10R	36"	36"		MUTCD STANDARD		1	YELLOW	BLACK SYMBOL	BLACK	P5 (1 REQ'D)	9.00	9.00
W11-1	24"	24"		MUTCD STANDARD		2	YELLOW	BLACK SYMBOL	BLACK	P5 (2 REQ'D)	4.00	8.00
W16-1	18"	24"	SHARE THE ROAD	MUTCD STANDARD		2	YELLOW	BLACK SYMBOL	BLACK	MNT w/W11-1	3.00	6.00
M1-4(20)	24"	24"	20	MUTCD STANDARD		2	BLACK	BLACK SHIELD & LEGEND	-	P5 (2 REQ'D)	4.00	8.00
M3-2	24"	12"	EAST	MUTCD STANDARD		1	WHITE	BLACK	BLACK	MNT w/M1-4(20)	2.00	2.00
M3-4	24"	12"	WEST	MUTCD STANDARD		1	WHITE	BLACK	BLACK	MNT w/M1-4(20)	2.00	2.00
S3-1	36"	36"		MUTCD STANDARD		1	FLOUR-ESCENT YELLOW/ GREEN	BLACK & RED	BLACK	P5 (1 REQ'D)	9.00	9.00
D3-1(1) (POS)	102"	18"	Boston Post Rd INCLUDE TOWN EMBLEM	12"C/9"C 9"C	3" 3"	2	GREEN H/I	SILVER/ WHITE H/I	SILVER/ WHITE H/I	MNT ON MAST ARM	PAY UNDER ITEM 874.	
D3-1(2) (POS)	90"	18"	Landham Rd INCLUDE TOWN EMBLEM	12"C/9"C 9"C	3" 3"	2	GREEN H/I	SILVER/ WHITE H/I	SILVER/ WHITE H/I	MNT ON MAST ARM	PAY UNDER ITEM 874.	

IDENTIFICATION NUMBER	SIZE OF SIGN		TEXT	TEXT DIMENSIONS (INCHES)		NUMBER OF SIGNS REQUIRED	COLOR			POST SIZE AND NUMBER REQUIRED	UNIT AREA IN SQUARE FEET	AREA IN SQUARE FEET
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING		BACK-GROUND	LEGEND	BORDER			
D6-1	60"	60"	20 EAST Wayland Waltham	18"x18"/9"D/7"C/6"C 8"x18" ARROW 8"C 8"C	5" 5" 8" 8"	1	GREEN H/I	SILVER/ WHITE H/I	WHITE H/I	PAY UNDER ITEM 841.1	25.00	25.00
D8-1	60"	36"	Landham Rd Framingham NEXT RIGHT	8"C (75% SPACING) 8"C 6"C	2.5" 4.5" 4.5" 2.5"	1	GREEN H/I	SILVER/ WHITE H/I	WHITE H/I	MNT w/D6-1	15.00	15.00
D6-2	60"	60"	20 EAST Wayland Waltham	18"x18"/9"D/7"C/6"C 8"x18" ARROW 8"C 8"C	5" 5" 8" 8"	1	GREEN H/I	SILVER/ WHITE H/I	WHITE H/I	PAY UNDER ITEM 841.1	25.00	25.00
D8-2	60"	36"	Landham Rd Framingham →	8"C (75% SPACING) 8"C 8"x18" ARROW	2" 4" 4" 2"	1	GREEN H/I	SILVER/ WHITE H/I	WHITE H/I	MNT w/D6-2	15.00	15.00
D6-3	60"	60"	20 WEST Marlboro Worcester	18"x18"/9"D/7"C/6"C 8"x18" ARROW 8"C 8"C	5" 5" 8" 8"	1	GREEN H/I	SILVER/ WHITE H/I	WHITE H/I	PAY UNDER ITEM 841.1	25.00	25.00
D8-3	60"	36"	Landham Rd Framingham NEXT LEFT	8"C (75% SPACING) 8"C 6"C	2.5" 4.5" 4.5" 2.5"	1	GREEN H/I	SILVER/ WHITE H/I	WHITE H/I	MNT w/D6-3	15.00	15.00
D6-4	60"	60"	20 WEST Marlboro Worcester	18"x18"/9"D/7"C/6"C 8"x18" ARROW 8"C 8"C	5" 5" 8" 8"	1	GREEN H/I	SILVER/ WHITE H/I	WHITE H/I	PAY UNDER ITEM 841.1	25.00	25.00
D8-4	60"	36"	Landham Rd Framingham ←	8"C (75% SPACING) 8"C 8"x18" ARROW	2" 4" 4" 2"	1	GREEN H/I	SILVER/ WHITE H/I	WHITE H/I	MNT w/D6-4	15.00	15.00
D6-5	60"	66"	20 EAST Wayland Waltham NEXT RIGHT	18"x18"/9"D/7"C/6"C 8"C 8"C 6"C	4" 4" 6" 6" 6"	1	GREEN H/I	SILVER/ WHITE H/I	WHITE H/I	PAY UNDER ITEM 841.1	27.50	27.50
D8-5	48"	42"	20 WEST Worcester NEXT LEFT	18"x18"/9"D/7"C/6"C 8"C 6"C	2" 2" 4" 2"	1	GREEN H/I	SILVER/ WHITE H/I	WHITE H/I	MNT w/D6-5	14.00	14.00
D6-6	60"	66"	20 EAST Wayland Waltham →	18"x18"/9"D/7"C/6"C 8"C 8"C 8"x18" ARROW	4" 4" 6" 4" 6"	1	GREEN H/I	SILVER/ WHITE H/I	WHITE H/I	PAY UNDER ITEM 841.1	27.50	27.50
D8-6	48"	42"	20 WEST Worcester ←	18"x18"/9"D/7"C/6"C 8"C 8"x18" ARROW	2" 2" 2" 2"	1	GREEN H/I	SILVER/ WHITE H/I	WHITE H/I	MNT w/D6-6	14.00	14.00

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EXISTING	PROPOSED	
		CONTROL CABINET GROUND MOUNTED (WITH & WITHOUT CONC. PAD)
		CONTROL CABINET POLE MOUNTED
CB		FLASHING BEACON CONTROL & METER PEDESTAL
PB		PULL BOX (12" x 12" OR AS NOTED)
		MAST ARM, SHAFT & BASE (ARM LENGTH AS NOTED)
TS		SIGNAL POST & BASE (ALPHA-NUMERIC DESIGNATION NOTED)
		VEHICULAR SIGNAL HEAD (ALPHA-NUMERIC DESIGNATION NOTED)
		VEHICULAR SIGNAL HEAD, OPTICALLY PROGRAMMED (ALPHA-NUMERIC DESIGNATION NOTED)
		FLASHING BEACON (ALPHA-NUMERIC DESIGNATION NOTED)
		PEDESTRIAN SIGNAL HEAD (ALPHA-NUMERIC DESIGNATION NOTED)
		EMERGENCY PREEMPTION DETECTOR
		PEDESTRIAN PUSH BUTTON, SIGN & SADDLE
		WIRE LOOP DETECTOR (6' x 6' OR AS NOTED)
		HIGH MAST POLE OR TOWER
		MAGNETOMETER
RD		RADAR DETECTOR
		SIGNAL & LIGHTING MAST ARM
		TRAFFIC SIGN & POST
ø1	ø1	CONTROLLER PHASE ACTUATED
		ZONE OF DETECTION FOR SPECIAL DETECTORS
		ZONE OF VISIBILITY FOR PROGRAMMED SIGNAL
		TRAFFIC SIGNAL HEAD (12" LENSES OR AS NOTED)
OHW	OHW	OVERHEAD WIRE(S)
		DIRECT BURIAL CABLE
E		TRAFFIC SIGNAL CONDUIT
		CONDUIT CROSSING ROADWAY WITH CONTROLLED DENSITY FILL

TRAFFIC SIGNAL LEGEND

GENERAL ABBREVIATIONS

MAX	MAXIMUM
MIN	MINIMUM
BO	BY OTHERS
PROP	PROPOSED
R & D	REMOVE AND DISPOSE
R & R	REMOVE AND RESET
R & S	REMOVE AND STACK
REM	REMOVE
RET	RETAIN

TRAFFIC SIGNAL ABBREVIATIONS

R	STEADY CIRCULAR RED
Y	STEADY CIRCULAR AMBER
G	STEADY CIRCULAR GREEN
RL	STEADY RED LEFT ARROW
YL	STEADY AMBER LEFT ARROW
GL	STEADY GREEN LEFT ARROW
GV	STEADY GREEN VERTICAL ARROW
RR	STEADY RED RIGHT ARROW
YR	STEADY AMBER RIGHT ARROW
GR	STEADY GREEN RIGHT ARROW
FR	FLASHING CIRCULAR RED
FY	FLASHING CIRCULAR AMBER
FRL	FLASHING RED LEFT ARROW
FRR	FLASHING RED RIGHT ARROW
W	WALK - LUNAR WHITE
DW	DON'T WALK - PORTLAND ORANGE
FDW	FLASHING DON'T WALK - PORTLAND ORANGE
L	DETECTOR - LOCK
NL	DETECTOR - NON-LOCK
	VEHICLE MOVEMENT (ONLY SHOWN ON PHASING DIAGRAMS)
	PEDESTRIAN MOVEMENT (ONLY SHOWN ON PHASING DIAGRAMS)
	PERMISSIVE VEHICULAR MOVEMENT (ONLY SHOWN ON PHASING DIAGRAMS)
	DETECTOR CONTROLLING PHASE (ONLY SHOWN ON PHASING DIAGRAMS)
X X	DON'T WALK / WALK / COUNTDOWN TIMER

GENERAL NOTES

1. ALL EXISTING SIGNS WITHIN THE PROJECT LIMITS SHALL BE RETAINED UNLESS NOTED OTHERWISE.
2. IF EXISTING SIGNS (AS NOTED ON PLANS) ARE MISSING IN THE FIELD, THEY SHOULD BE REPLACED BY THE CONTRACTOR
3. ALL PROPOSED PAVEMENT MARKINGS SHALL BE THERMOPLASTIC.

TRAFFIC SIGNAL NOTES

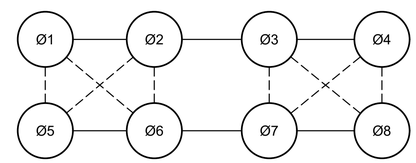
1. SEE CONSTRUCTION AND TRAFFIC PLANS FOR ADDITIONAL DETAILS.
2. PROPOSED CONTROLLERS SHALL BE A NEMA TS2, KEYBOARD ENTRY, MENU-DRIVEN TYPEWHERE AN EXISTING UNDERGROUND UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED TO THE ENGINEER FOR RESOLUTION OF THE CONFLICT.
3. POLE-MOUNTED SIGNALS SHALL BE MOUNTED TO PROVIDE A 2-FOOT MINIMUM CLEARANCE BETWEEN VERTICAL PROJECTION OF THE CURBLINE AND THE SIGNAL VISOR. WHEN FEASIBLE, INSTALL AT BACK OF SIDEWALK UNLESS OTHERWISE NOTED. PROVIDE SPECIAL MOUNTING HARDWARE AS REQUIRE.
4. CONSTRUCTION OF THE TRAFFIC CONTROL SIGNAL SYSTEMS SHOWN ON THE FOLLOWING DRAWINGS SHALL CONFORM TO THE MASSACHUSETTS HIGHWAY DEPARTMENT'S "STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES", 1988 ED. AS AMENDED, AND THE FEDERAL HIGHWAY ADMINISTRATION'S "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", 2009 EDITION AS AMENDED.
5. ALL TRAFFIC CONTROL SIGNAL EQUIPMENT SHALL BE LISTED ON THE CURRENT MASSDOT'S "APPROVED LIST" AND IS SUBJECT TO THE APPROVAL OF THE DESIGN ENGINEER AND/OR THE MASSDOT.
6. ALL OVERHEAD CONDUCTORS FOR SIGNAL HOUSINGS SHALL BE STRANDED WIRE.
7. ALL PROPOSED WIRE LOOP DETECTORS SHALL BE CENTERED WITHIN RESPECTIVE LANES UNLESS OTHERWISE NOTE.
8. ALL PROPOSED LENSES SHALL HAVE TUNNEL VISORS.
9. ALL MAST ARM MOUNTED SIGNALS SHALL BE RIGIDLY MOUNTED.
10. FLASHING OPERATION PER 2009 M.U.T.C.D., SECTION 4D.28 - 4D.31.
11. 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 SHALL NOT CHANGE DURING THE CHANGE INTERVAL(S).
12. ALL NEW TRAFFIC CONTROLLER CABINETS SHALL BE EQUIPPED WITH A LEVER-TYPE METER BY-PASS. SPECIFICATIONS FOR THE BY-PASS MUST BE APPROVED BY THE APPROPRIATE UTILITY COMPANY.
13. WHERE CALLED FOR ON THE PLANS, THE PROPOSED LOCATIONS OF THE OPTICOM DETECTOR UNITS AND CONFIRMATION BEACON ARE PERCEIVED BEST BUT NOT FINAL. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ENSURE OPTIMUM PLACEMENT IN COOPERATION WITH THE LOCAL MUNICIPALITY'S FIRE FIGHTING DEPARTMENT. THE OPTICAL DETECTOR UNITS SHALL HAVE AN UNOBSTRUCTED LINE-OF-SIGHT VIEW ALONG THE ROUTE OF APPROACHING PRIORITY VEHICLE.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING AND VERIFYING THAT THERE IS SUFFICIENT CLEARANCE BETWEEN ALL PROPOSED TRAFFIC SIGNAL POLES AND EXISTING AND RELOCATED OVERHEAD UTILITY LINES. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR COORDINATING WITH THE AFFECTED UTILITY COMPANIES RELATIVE TO THE SCOPE OF ANY REQUIRED RELOCATIONS. THIS SHALL BE PERFORMED WITHIN TEN DAYS AFTER AWARD OF THE CONTRACT.
15. THE CONTRACTOR SHALL REMOVE AND DELIVER ALL EXISTING TRAFFIC SIGNAL EQUIPMENT WITHIN THE PROJECT LIMITS TO THE APPROPRIATE OWNER'S MAINTENANCE DEPOT EXCEPT FOR LOCATIONS NOTED ON THE PLANS.

LOOP DETECTOR NOTES

1. SEE LOOP DETECTOR DETAIL SHEET FOR SPLICE PATTERN AND OTHER INFORMATION.
2. DELAY AND EXTENSION TIMES ARE IN SECONDS.
3. DELAY TIME SHALL BE EFFECTIVE ONY DURING THE RED PORTION OF THE PHASE THAT IS CALLED BY A DETECTOR.

NEMA DUAL RING PHASING NOTES

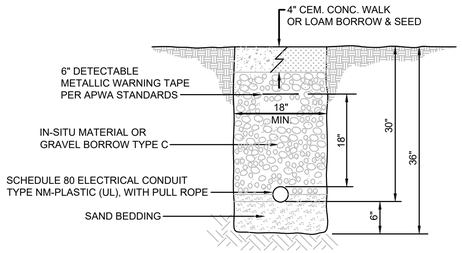
1. PHASES ASSOCIATED BY A SOLID LINE SHALL NOT OPERATE CONCURRENTLY.
2. PHASES ASSOCIATED BY A DASHED LINE MY OPERATE CONCURRENTLY.



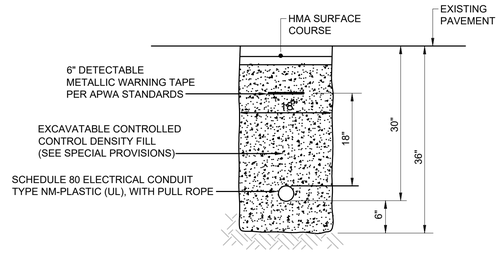
SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	30	51
PROJECT FILE NO.	607249		

TRAFFIC LEGEND ABBREVIATIONS & NOTES

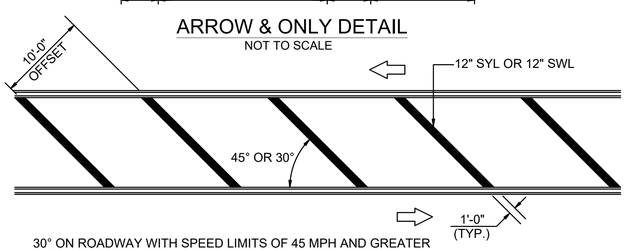


TRAFFIC SIGNAL CONDUIT TRENCH DETAIL
(IN SIDEWALK OR LANDSCAPE AREA)
NOT TO SCALE



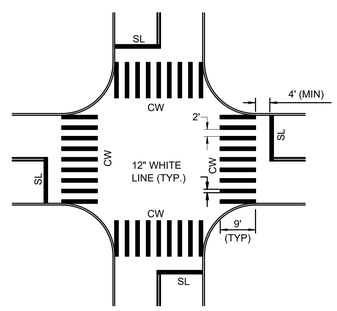
TRAFFIC SIGNAL CONDUIT TRENCH DETAIL
CROSSING ROADWAY-OUTSIDE FULL DEPTH AREA
NOT TO SCALE

ARROW & ONLY DETAIL
NOT TO SCALE

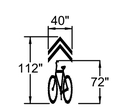


30° ON ROADWAY WITH SPEED LIMITS OF 45 MPH AND GREATER
45° ON ROADWAY WITH SPEED LIMITS OF 40 MPH OR LESS

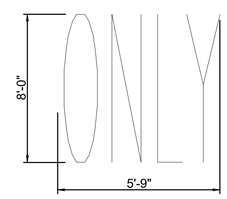
GORE AREA DETAIL
NOT TO SCALE

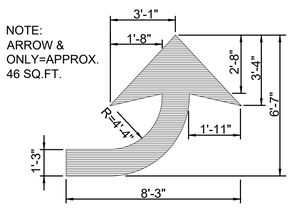


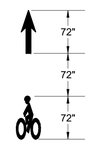
TYPICAL CROSSWALK MARKINGS
NOT TO SCALE



SHARED LANE "SHARROW"
MARKING DETAIL
NOT TO SCALE







HELMETED BIKE LANE
MARKING DETAIL
NOT TO SCALE

607249_HD (TL).DWG Plotted on 11-Oct-2017 4:41 PM

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

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MA	-	31	51
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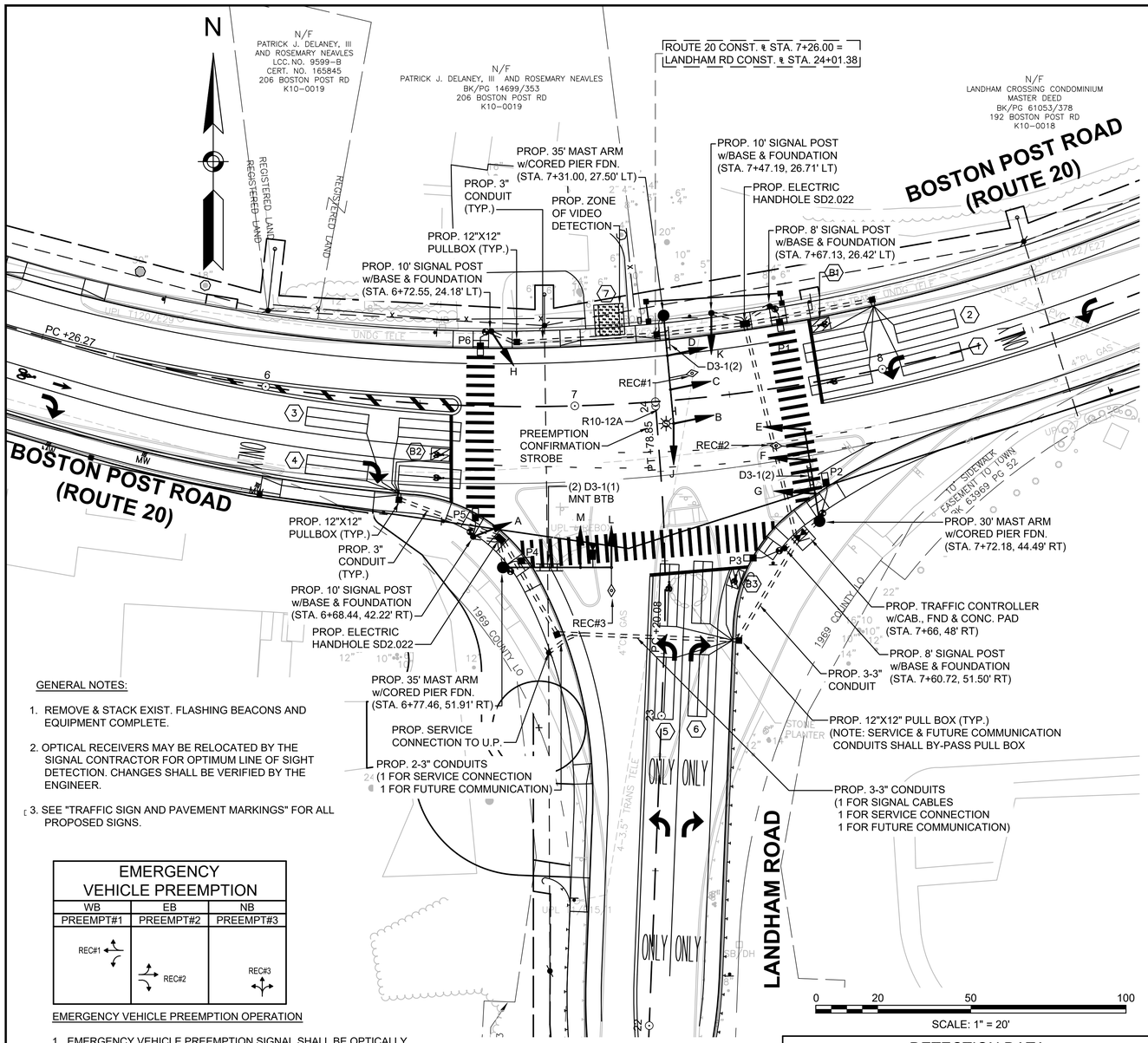
TRAFFIC SIGNAL PLAN



GENERAL NOTES:

1. REMOVE & STACK EXIST. FLASHING BEACONS AND EQUIPMENT COMPLETE.
2. OPTICAL RECEIVERS MAY BE RELOCATED BY THE SIGNAL CONTRACTOR FOR OPTIMUM LINE OF SIGHT DETECTION. CHANGES SHALL BE VERIFIED BY THE ENGINEER.
3. SEE "TRAFFIC SIGN AND PAVEMENT MARKINGS" FOR ALL PROPOSED SIGNS.

EMERGENCY VEHICLE PREEMPTION

WB	EB	NB
PREEMPT#1	PREEMPT#2	PREEMPT#3
REC#1	REC#2	REC#3

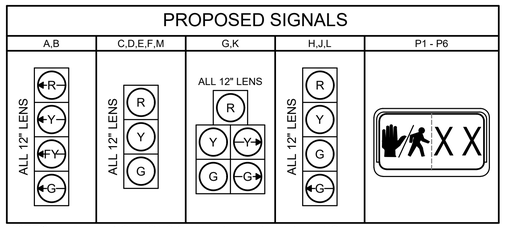
EMERGENCY VEHICLE PREEMPTION OPERATION

1. EMERGENCY VEHICLE PREEMPTION SIGNAL SHALL BE OPTICALLY TRANSMITTED BY OPTICAL EMITTERS MOUNTED IN EMERGENCY VEHICLES AND RECEIVED BY OPTICAL DETECTORS (RECEIVERS) LOCATED AT THE INTERSECTION.
2. PREEMPTION SIGNALS SHALL BE SERVICED ON A FIRST COME FIRST SERVED BASIS. IN CASE WHERE TWO OR MORE CALLS ARE COMING IN AT THE SAME TIME, PREEMPTION SHALL BE PRIORITIZED WITH PREEMPT #1 (ROUTE 20 WESTBOUND) FIRST, THEN FOLLOW BY PREEMPT #2 (ROUTE 20 EASTBOUND), THEN PREEMPT #3 (LANDHAM ROAD).
3. IN RESPONSE TO A PREEMPTION SIGNAL RECEIVED BY OPTICAL DETECTOR REC#1 (OR REC#2, REC#3), THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY VEHICLE PREEMPTION SIGNAL #1 (OR #2, #3) GREEN FOR A MINIMUM OF TEN (10) SECONDS OR UNTIL PREEMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME THE RELEVANT CLEARANCE INTERVALS AND SERVICE THE SUBSEQUENT EMERGENCY VEHICLE PREEMPTION SIGNAL IF NECESSARY. NORMAL SIGNAL OPERATION SHALL RESUME PROVIDED THAT ALL PREEMPTION SIGNALS HAVE CEASED.
4. NORMAL VEHICLE CLEARANCES SHALL BE PROVIDED ON PHASES THAT ARE TO BE TERMINATED BY PREEMPTION DEMAND.
5. PREEMPTION STROBE SHALL BE ILLUMINATED ONLY WHEN THE PREEMPTION PHASE IS ON GREEN.

DETECTION DATA

DETECTOR NO.	NUMBER AND SIZE	SPLICE PATTERN	NO. OF TURNS	Ø CALLED	Ø EXT.	MODE A=PULSE B=PRES.	DELAY TIME	EXT. TIME
1	2-6'x20'	PARALLEL	QUAD. TYPE	1	1 & 6	B	-	-
2	2-6'x20'	PARALLEL	QUAD. TYPE	6	6	B	-	-
3	2-6'x20'	PARALLEL	QUAD. TYPE	2	2	B	-	-
4	2-6'x20'	PARALLEL	QUAD. TYPE	2	2	B	-	-
5	2-6'x20'	PARALLEL	QUAD. TYPE	4	4	B	-	-
6	2-6'x20'	PARALLEL	QUAD. TYPE	4	1 & 4	B	-	-
7	VIDEO DETECTION ZONE			3	3	B	-	-
B1	4'x6'	BICYCLE TYPE D-2		6	6	B	-	-
B2	4'x6'	BICYCLE TYPE D-2		2	2	B	-	-
B3	4'x6'	BICYCLE TYPE D-2		4	4	B	-	-

PROPOSED SIGNALS



NOTES:
1. ALL INDICATIONS SHALL BE "LED" TYPE LENS IN ACCORDANCE WITH THE SPECIAL PROVISIONS.
2. ALL OVERHEAD SIGNALS SHALL BE RIGIDLY MOUNTED. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH CUT TUNNEL VISORS AND 5" LOUVERED BACKPLATES.
3. ALL VEHICLE SIGNAL HEAD BACKPLATES SHAL INCLUDE 2" RETRO-REFLECTIVE BORDER IN ACCORDANCE WITH THE SPECIAL PROVISIONS.
4. ALL PEDESTRIAN DISPLAY SHALL BE "FULL" DISPLAYS. NO OUTLINE SYMBOL SHALL BE PERMITTED.

TRAFFIC CONTROLLER DATA

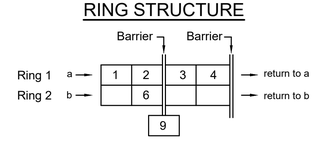
PARAMETER	SELECTION
PHASE ASSIGNMENTS	STD. NEMA
OVERLAPS	STD. NEMA
RINGS	DUAL
DUAL ENTRY	ON (Ø2 & Ø6)
SIMULTANEOUS GAP OUT DISABLED	YES (Ø2 & Ø6)
MINIMUM YELLOW IN SECONDS	3
MAX II BY INTERNAL CLOCK	YES
NIGHT TIME FLASH BY INTERNAL CLOCK	NOT USED

MAJOR ITEMS REQUIRED

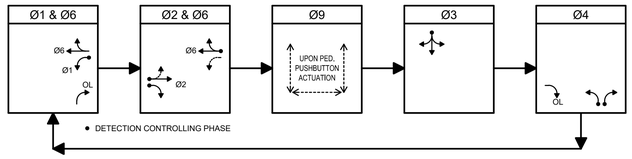
QUANTITY	DESCRIPTION
1	ADVANCE TRAFFIC CONTROLLER (ATC) AND NEMA TS2 CABINET WITH FOUNDATION AND CONC. PAD
1	SERVICE CONNECTION (OVERHEAD FROM RELOC. UTILITY POLE#18-28-121)
2	35' MAST ARM ASSEMBLY, BASE & FDN.
1	30' MAST ARM ASSEMBLY, BASE & FDN.
2	8' SIGNAL POST, BASE & FDN.
3	10' SIGNAL POST, BASE & FDN.
5	SIGNAL HEAD, 3 SECTION
5	SIGNAL HEAD, 4 SECTION
2	SIGNAL HEAD, 5 SECTION (DOGHOUSE)
6	PEDESTRIAN HOUSING GRAPHIC LED WITH COUNTDOWN TIMER
6	AUDIBLE & VIBRO-TACTILE PEDESTRIAN PUSH BUTTON (APS TYPE) INTEGRATED R10-3e SIGN & SADDLE w/LED CONFIRMATION LIGHT
12	ROADWAY VEHICLE LOOP DETECTOR (QUADRUPOLE TYPE)
3	ROADWAY BICYCLE LOOP DETECTOR TYPE D-2
1	ONE (1) INFRARED CAMERA VIDEO DETECTION SYSTEM WITH PROCESSOR
7	DUAL CHANNEL LOOP DETECTOR AMPLIFIER INCL. 2 SPARES
6	PULL BOX 12"x12" - SD2.031 (PAY SEPARATELY UNDER ITEM 811.31)
2	ELECTRIC HANDHOLE - SD2.022 (PAY SEPARATELY UNDER ITEM 811.22)
3	UNIDIRECTIONAL SINGLE CHANNEL OPTICAL DETECTOR (RECEIVER)
2	PREEMPTION 2-CHANNEL PHASE SELECTOR
1	PREEMPTION CONFIRMATION STROBE (CLEAR)

PLUS ALL MISCELLANEOUS EQUIPMENT AND MATERIAL NECESSARY TO PROVIDE A COMPLETE OPERATING TRAFFIC CONTROL SIGNAL.

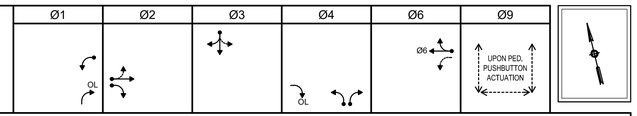
RING STRUCTURE



PREFERENTIAL PHASE SEQUENCE



FULLY-ACTUATED	☑	ISOLATED	☑
SEMI-ACTUATED	☐	COORDINATED	☐
PRE-TIMED	☐	WIRE ☐ TBCU	☐



SEQUENCE AND TIMING

STREET	DIRECTION	HOUSINGS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	FLASH OPER.
BOSTON POST ROAD (ROUTE 20)	WB	A,B	GL	YL	RL	RL	RL	RL	RL	RL	RL	RL	RL	RL	FYL	YL	RL	RL	RL	RL	FYL
BOSTON POST ROAD (ROUTE 20)	WB	C,D	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	FY
BOSTON POST ROAD (ROUTE 20)	EB	E,F	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	FY
BOSTON POST ROAD (ROUTE 20)	EB	G	R	R	R	G	Y	R	R	R	R	R/GR	R/YR	R	R	R	R	R	R	R	FY
LANDHAM ROAD	NB	H,J	R	R	R	R	R	R	R	R	R	G/GL	Y	R	R	R	R	R	R	R	FR
LANDHAM ROAD	NB	K	R/GR	R/YR	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	FR
DRIVEWAY	SB	L	R	R	R	R	R	R	G/GL	Y	R	R	R	R	R	R	R	R	R	R	FR
DRIVEWAY	SB	M	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	FR
PEDESTRIAN	ALL	P1-P6	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	W	FDW	DW	OUT

TIMING IN SECONDS

MINIMUM INITIAL			6			10			6			6			10						EMERGENCY
PASSAGE			2			2			2			2			2						
MAXIMUM 1	(MON-FRI: 6am-9am)		18			65			10			17			83						
MAXIMUM 2	ALL OTHER TIMES		20			35			10			20			55						
CHANGE				4.0	1.5		4.0	1.5		3.0	1.5		3.0	1.5		4.0	1.5				
PEDESTRIAN																		7	24	4	
RECALL			OFF			MIN.			OFF			OFF			MIN.			OFF			
MEMORY			NON-LOCKING			NON-LOCKING			NON-LOCKING			NON-LOCKING			NON-LOCKING			LOCKING			

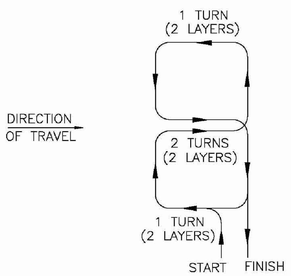
607249_HD (TS).DWG Plotted on 11-Oct-2017 4:42 PM

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

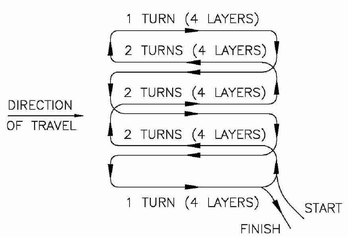
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	32	51
PROJECT FILE NO.	607249		

BICYCLE LOOP DETECTOR DETAILS

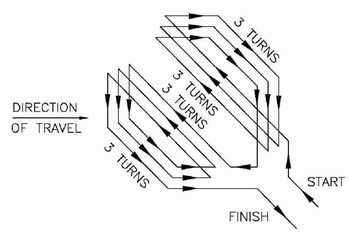
WINDING DETAILS



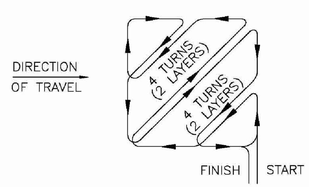
TYPE Q DETECTOR



TYPE D–Q DETECTOR

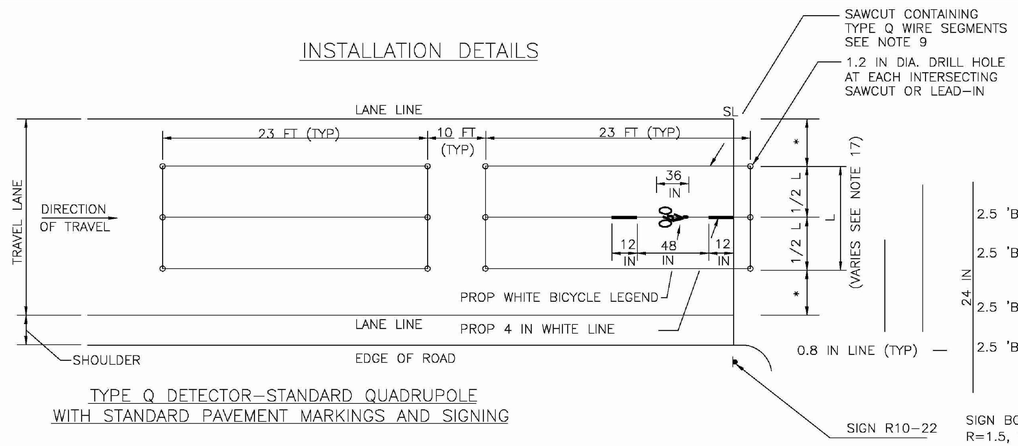


TYPE D–1 DETECTOR



TYPE D–2 DETECTOR

INSTALLATION DETAILS



TYPE Q DETECTOR–STANDARD QUADRUPOLE
WITH STANDARD PAVEMENT MARKINGS AND SIGNING

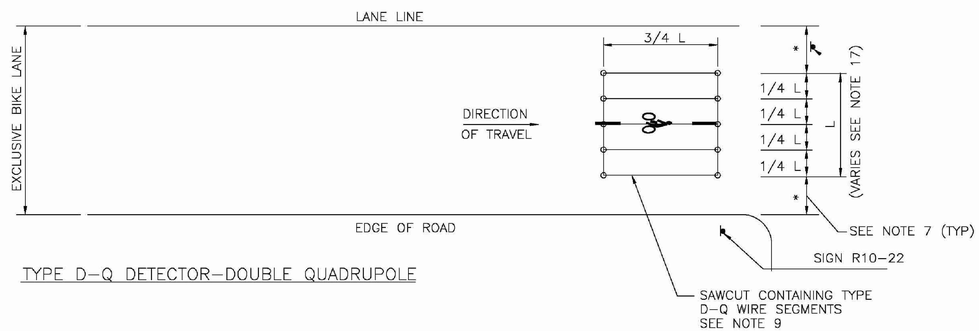
SIGN R10–22

SIGN BORDER:
R=1.5, TH=0.5, INS=.38

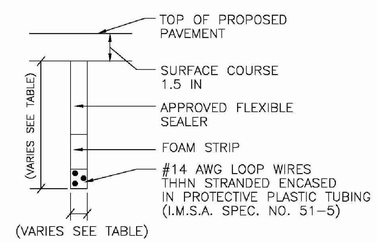
WHITE BACKGROUND
BLACK LEGEND AND LINES

NOTE: ALL SIGN DIMENSIONS IN INCHES

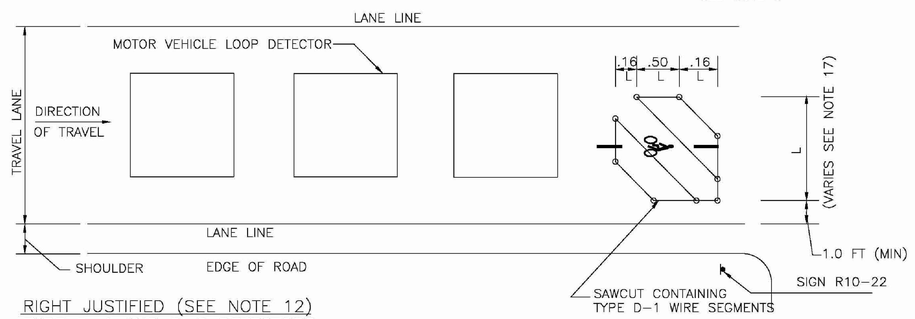
NOTE: SIGN PANEL NOT SHOWN TO SCALE



TYPE D–Q DETECTOR–DOUBLE QUADRUPOLE

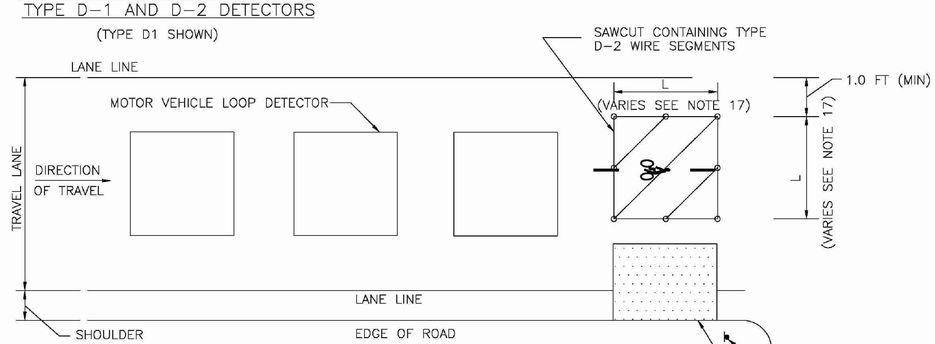


SECTION THRU LOOP DETECTOR



RIGHT JUSTIFIED (SEE NOTE 12)
TYPE D–1 AND D–2 DETECTORS

(TYPE D1 SHOWN)



LEFT JUSTIFIED (SEE NOTE 13)
TYPE D–1 AND D–2 DETECTORS

(TYPE D2 SHOWN)

PROPOSED AREA OF DETECTION

A LARGER AREA OF DETECTION MAY BE REQUIRED BASED ON FIELD CONDITIONS AND SHALL BE DETERMINED BY THE DESIGNER.

SIGN R10–22

SAWCUT SLOT DEPTH GUIDE		
TURNS OF WIRE	SLOT SIZE	
	DEPTH (IN)	WIDTH (IN)
1	1.5	0.5
2	1.5	0.5
3	1.5	0.5
4	2.0	0.5
5	2.0	0.5
6	2.0	0.5
7	2.0	0.5
8	2.0	0.5

NOTES:

1. REFER TO VEHICLE LOOP DETECTOR DETAIL SHEET FOR ADDITIONAL NOTES AND CONSTRUCTION DETAILS.
2. ALL DETAILS ARE GRAPHICAL WITH NO SCALE.
3. THE NUMBER, SIZE, LOCATION AND LENGTH OF DETECTION AREA VARIES AND SHALL BE DETERMINED BY THE DESIGNER REFER TO TRAFFIC SIGNAL PLAN.
4. BICYCLE LOOPS SHALL BE CONNECTED TO SEPARATE LOOP DETECTOR AMPLIFIERS CAPABLE OF HIGHER LEVELS OF SENSITIVITY.
5. BICYCLE LOOPS SHALL BE INSTALLED IN THE BASE COURSE OF EXISTING PAVEMENT. THE EXISTING PAVEMENT SHALL BE COLD PLANED TO THE BASE COURSE AND SAWCUT FOR LOOP INSTALLATION.
6. SIGNS AND PAVEMENT MARKINGS SHALL BE INSTALLED FOR ALL BICYCLE DETECTORS TO INFORM CYCLISTS OF THE DETECTION AREA.
7. * OFFSETS FROM LANE LINE EQUAL UNLESS OTHERWISE NOTED. SEE PLANS.
8. TYPE Q DETECTORS SHALL BE WIRED IN A FIGURE EIGHT PATTERN WITH A DOUBLE LAYER DESIGN ("2–4–2") WITH 2 TURNS IN THE PERIMETER SLOTS AND 4 TURNS IN THE CENTER SLOT AS SHOWN IN THE WINDING DETAIL.
9. BICYCLES WILL BE DETECTED WITHIN 4 IN. OF THE INTERIOR LONGITUDINAL LOOP WIRES FOR TYPE Q AND D–Q DETECTORS.
10. PROVIDE 3 TURNS FOR TYPE D–1 DETECTORS.
11. INSTALL 2 LAYERS OF WIRE WOUND IN THE SAME DIRECTION IN BOTH LAYERS FOR TYPE D–2 DETECTORS. THE RESULT IS 4 TURNS IN EACH DIAGONAL.
12. RIGHT JUSTIFIED LOOP DETECTORS SHALL BE CONSIDERED FOR THE FOLLOWING CONDITIONS:
    a) BICYCLE STOPPING ON THE RIGHT SIDE OF A THRU TRAVEL LANE.
    b) BICYCLE STOPPING ON THE RIGHT SIDE OF AN EXCLUSIVE LEFT TURN LANE.
13. LEFT JUSTIFIED LOOP DETECTORS SHALL BE CONSIDERED FOR THE FOLLOWING CONDITIONS:
    a) BICYCLE STOPPING ON THE LEFT SIDE OF A SHARED LEFT/THRU LANE.
    b) BICYCLE STOPPING JUST TO THE RIGHT OF THE CENTERLINE WHEN TURNING LEFT ON A TWO–LANE ROADWAY.
14. RECTANGULAR LOOP DETECTORS SHALL BE CONSIDERED FOR BICYCLES STOPPING ON EITHER THE LEFT OR RIGHT SIDE OF A TWO–LANE ROADWAY. THE MINIMUM OFFSET FROM LANE LINE OR CURB LINE SHALL BE 1.0 FT.
15. PAVEMENT CORES OR TEST PITS MAY BE REQUIRED TO DETERMINE THE DEPTH OF EXISTING PAVEMENT AND CONFIRM THAT THE DETECTION OPTION CHOSEN AND CORRESPONDING WINDING PATTERN CAN BE ACCOMMODATED.
16. THESE DETAILS APPLY TO BICYCLE LOOPS INSTALLED IN ROADWAYS. PUSH BUTTON ACTUATION SHALL BE CONSIDERED FOR RECREATIONAL BIKE PATHS.
17. THE MINIMUM DIMENSION FOR L SHALL BE 6 FT MIN. FOR DETECTORS TYPE D–Q, D–1 & D–2. FINAL DIMENSIONS SHALL BE DETERMINED BY THE DESIGN ENGINEER.

NOTE: REVISED FEBRUARY 22, 2006

MASS HIGHWAY

MASSACHUSETTS HIGHWAY DEPARTMENT
TRAFFIC ENGINEERING
REVISED FEBRUARY 22, 2006

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	33	51
PROJECT FILE NO.	607249		

TEMPORARY TRAFFIC CONTROL PLANS

TRAFFIC CONTROL NOTES

GENERAL

1. ALL TEMPORARY TRAFFIC CONTROL AND WORK ZONE TRAFFIC CONTROL MEASURES SHALL CONFORM TO THE CURRENT MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (M.U.T.C.D.), MASSDOT'S "STANDARD DETAILS AND DRAWINGS FOR THE DEVELOPMENT OF TRAFFIC MANAGEMENT PLANS", THE STANDARD SPECIFICATIONS, AND THE FOLLOWING NOTES.
2. THE TEMPORARY TRAFFIC CONTROL PLANS CONTAINED HEREIN ARE GIVEN AS A GUIDE FOR TYPICAL WORK ZONE TRAFFIC CONTROL APPLICATIONS FOR THE TYPES OF WORK ANTICIPATED FOR THIS PROJECT. THEY ARE NOT INTENDED TO COVER ALL POSSIBLE CONSTRUCTION OPERATIONS WHICH THE CONTRACTOR MAY CHOOSE TO EMPLOY. WORK ZONE TRAFFIC CONTROL FOR OTHER CONSTRUCTION OPERATIONS OR OTHER TRAFFIC SITUATIONS IF APPLICABLE SHALL BE IN ACCORDANCE WITH THE REFERENCES LISTED IN NOTE NO. 1 AND AS APPROVED OR DIRECTED BY THE ENGINEER.
3. LANE RESTRICTIONS MAY NOT REMAIN OVERNIGHT OR DURING NON-WORKING HOURS UNLESS UNDER TEMPORARY SIGNAL CONTROL. AFTER EACH WORKING DAY, TRAFFIC CONTROL DEVICES THAT ARE NOT REQUIRED SHALL BE MOVED OFF THE ROADWAY OR FULL DEPTH CONSTRUCTION AREA AND PLACED SO AS NOT TO IMPEDE PEDESTRIAN AREAS, ABUTTER ACCESS OR CAUSE CONFUSION TO MOTORISTS. IN CERTAIN CIRCUMSTANCES, AND ONLY WITH THE APPROVAL OF MASSDOT AND THE ENGINEER, CAN LANE RESTRICTIONS REMAIN OVERNIGHT.
4. CONTRACTOR SHALL NOTIFY EACH ABUTTER AT LEAST 24 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE THE TEMPORARY CLOSURE OF ACCESS, SUCH AS EXISTING PAVEMENT EXCAVATION, TEMPORARY DRIVEWAY PAVEMENT PLACEMENT AND SIMILAR OPERATIONS.
5. PLACE ALL CONSTRUCTION SIGNING, TRAFFIC CONTROL DEVICES AND TEMPORARY PAVEMENT MARKINGS FOR EACH PHASE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
6. ONE (1) THRU TRAVEL LANE HAVING A MINIMUM WIDTH OF 11'-0" SHALL BE PROVIDED FOR BOTH DIRECTIONS (LANE MAY BE SHARED AND DIRECTION OF TRAVEL TO ALTERNATE UNDER POLICE OFFICER CONTROL) DURING ALL PHASES OF CONSTRUCTION AS SHOWN ON THE TEMPORARY TRAFFIC CONTROL PLANS, UNLESS OTHERWISE DIRECTED BY THE ENGINEER. MINIMUM LANE WIDTH IS MEASURED FROM THE EDGE OF DRUMS OR TEMPORARY BARRIER.
7. WHEN WORK INFRINGES UPON THE TRAVELED WAY, WORK SHALL BE RESTRICTED TO OFF-PEAK HOURS ONLY (NORMALLY 9:00am TO 4:00pm, MONDAY TO FRIDAY). THE CONTRACTOR SHALL NOTIFY EACH ABUTTER AT LEAST 24 HOURS IN ADVANCE OF ROAD CLOSURE.
8. TAPER LENGTH FORMULAE FOR CHANNELIZATION DEVICES:
   ENGLISH UNITS:
   L = WxS FOR SPEED EQUAL TO OR GREATER THAN 45 M.P.H.
   L = WS²/60 FOR SPEED EQUAL TO OR LESS THAN 40 M.P.H.
   WHERE: L = MIN. LENGTH OF TAPER, S = POSTED SPEED, W = OFFSET WIDTH.
9. ADVISORY SPEED LIMIT, IF USED, SHALL BE SET IN THE FIELD BY THE ENGINEER. W13-1 PLATES SHALL BE USED WHERE APPROPRIATE.
10. DISTANCES SHOWN ON THE TEMPORARY TRAFFIC CONTROL PLANS ARE A GUIDE ONLY, AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.

GRADE DIFFERENCES

11. WHERE THERE IS A LONGITUDINAL DIFFERENCE IN ELEVATION BETWEEN EXISTING PAVEMENT AND ADJACENT TRAVEL SURFACE (UNDER REPAIR OR RECONSTRUCTION), THE CONTRACTOR SHALL PATCH A TEMPORARY HMA WEDGE WITH A 12:1 (OR FLATTER) SLOPE FOR SMOOTH TRANSITION. SEE DETAIL, THIS SHEET.
12. CROSS-SECTIONAL GRADE DIFFERENCES IN EXCESS OF 2" DURING NON-WORKING HOURS WILL REQUIRE DELINEATION BY USE OF REFLECTORIZED DRUMS.
13. CROSS-SECTIONAL GRADE DIFFERENCES IN EXCESS OF 4" DURING NON-WORKING HOURS SHALL BE PROTECTED BY BACKFILLING WITH A WEDGE OF EARTHWORK TO BE COMPACTED AT 4:1 SLOPE AND WILL ALSO REQUIRE DELINEATION BY USE OF DRUMS.
14. A MINIMUM SLOPE OF 4:1 MUST BE MAINTAINED AFTER WORKING HOURS DURING SUBBASE AND BASE COURSE INSTALLATION ALONG EDGE OF THE TRAVELWAY (SEE DETAIL, THIS SHEET). A MAXIMUM SLOPE OF 8:1 MUST BE MAINTAINED ON ALL ABUTTER ACCESS DRIVES AND A MAXIMUM SLOPE OF 12:1 MUST BE MAINTAINED ON ALL SIDEWALKS.

CONSTRUCTION SIGNING

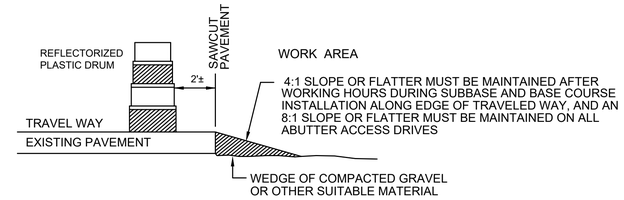
15. ALL CONSTRUCTION SIGNING ON EACH APPROACH TO THE PROJECT SHALL BE FLOURESCENT ORANGE, HIGH PERFORMANCE (OR HIGH INTENSITY) SHEETING.
16. ALL CONSTRUCTION SIGNS SHALL BE BLACK LEGEND ON A REFLECTORIZED ORANGE BACKGROUND UNLESS OTHERWISE NOTED.
17. CONSTRUCTION SIGNING SHOWN ON THE ADVANCE SIGNING PLAN SHALL REMAIN IN PLACE FOR THE ENTIRE PROJECT DURATION, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
18. STANDARD ORANGE OR FLUORESCENT RED-ORANGE FLAGS (16"x16" MIN.) MAY BE ATTACHED TWO (2) EACH ON ALL ADVANCE WARNING SIGNS. FLAGS SHALL NOT INTERFERE WITH A CLEAR VIEW OF THE SIGN FACE.
19. EXISTING GUIDE SIGNS SHALL BE TEMPORARILY RESET AS DIRECTED BY THE ENGINEER.
20. ALL SIGNS, INCLUDING EXISTING, THAT ARE NOT REPRESENTATIVE OF ACTUAL WORK CONDITIONS SHALL BE EITHER COVERED OR REMOVED WHEN NOT APPLICABLE.
21. IF USED, ALL W20-4 AND W20-5 SIGNS SHALL BE TAKEN DOWN OR COVERED AT THE CLOSE OF EACH DAY UNLESS LANE RESTRICTIONS ARE PERMITTED TO REMAIN OVERNIGHT IN ACCORDANCE WITH NOTE NO. 3 ABOVE.
22. USE W20-7a AND W20-7b SIGNS ONLY WHILE POLICE OR FLAGGERS ARE DIRECTING TRAFFIC. THEY SHALL BE TAKEN DOWN OR COVERED AT THE CLOSE OF EACH DAY OR WHEN NOT IN USE.

PAVEMENT MARKINGS

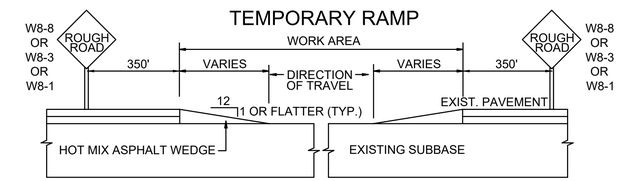
23. PAVEMENT MARKINGS WHICH ARE NO LONGER APPLICABLE SHALL BE REMOVED. APPLY TEMPORARY MARKINGS WHERE SHOWN ON THE TEMPORARY TRAFFIC CONTROL PLANS.
24. ON PROJECTS WHERE PAVEMENT OVERLAY IS NOT DESIGNATED, EXISTING PAVEMENT MARKINGS WHICH ARE IN CONFLICT WITH TEMPORARY TRAFFIC CONTROLS SHOULD BE COVERED TEMPORARILY WITH BLACKOUT TAPE, AS DIRECTED BY THE ENGINEER, FOR THE FULL DURATION OF THE PHASE IN PROGRESS. TEMPORARY PAINTED OR REMOVABLE TAPE MARKINGS SHALL BE USED AS NECESSARY FOR ALL PHASES OF CONSTRUCTION.

CHANNELIZATION

25. THE MAXIMUM SPACING BETWEEN CHANNELIZATION DEVICES (DRUMS OR CONES) SHALL BE APPROXIMATELY EQUAL IN FEET TO THE POSTED SPEED LIMIT. THE MINIMUM SPACING SHALL BE 20' O.C.
26. REFLECTORIZED CONES SHALL BE 36" HIGH.
27. FLASHING OR STEADY BURN WARNING LIGHTS SHALL ALSO BE USED ON BARRICADES, JERSEY BARRIERS OR WHERE DIRECTED BY THE ENGINEER. IF USED THEY SHALL MEET THE CRITERIA SET FORTH IN THE *MANUAL FOR ASSESSING SAFETY HARDWARE ("MASH")*, IF THEY DO NOT MEET THESE CRITERIA, THEY MUST BE REMOVED FROM THE PROJECT.
28. PLASTIC DRUMS WITH SOME FORM OF LIGHTING DEVICE MOUNTED ON THEM MUST PASS THE CRITERIA IN THE *MANUAL FOR ASSESSING SAFETY HARDWARE ("MASH")*, IF THEY DO NOT MEET THESE CRITERIA, THEY MUST BE REMOVED FROM THE PROJECT.
29. SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY MUST PASS THE CRITERIA SET FORTH IN THE *MANUAL FOR ASSESSING SAFETY HARDWARE ("MASH")*, IF THEY DO NOT MEET THESE CRITERIA, THEY MUST BE REMOVED FROM THE PROJECT.
30. TEMPORARY IMPACT ATTENUATORS MUST MEET THE PERFORMANCE STANDARDS OF MASH.



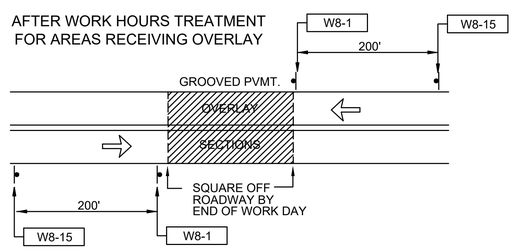
AFTER WORK HOURS TREATMENT
FOR LATERAL SLOPING



TRAFFIC MANAGEMENT LEGEND

- WORK AREA
- DIRECTION OF TRAVEL
- REFLECTORIZED DRUM (OR CONE)
- P/ POLICE OFFICER OR FLAGGER CONTROL
- PORTABLE TYPE III BARRICADE (4' WIDE, MIN.)

AFTER WORK HOURS TREATMENT
FOR AREAS RECEIVING OVERLAY

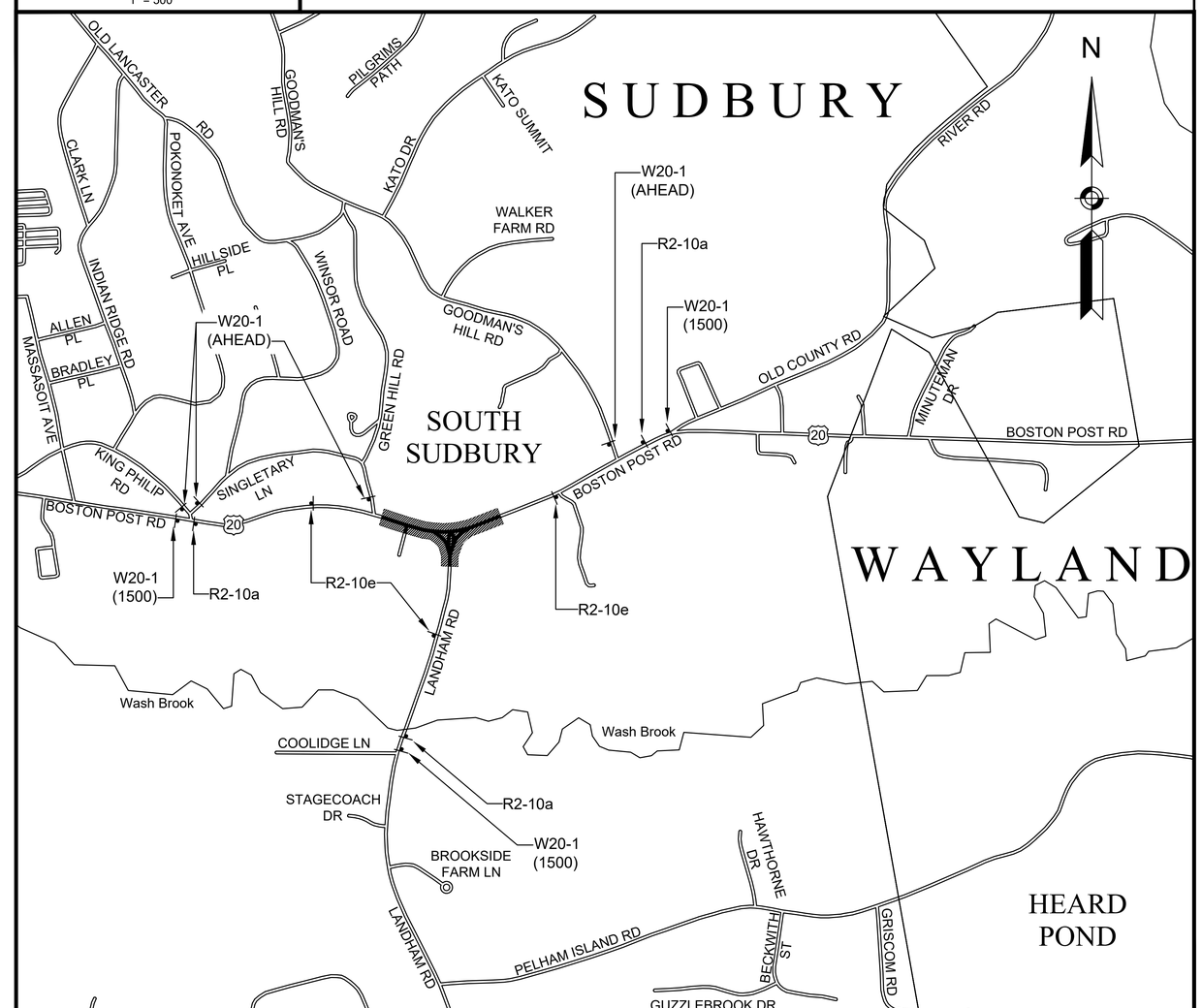


ALL TEMPORARY TRAFFIC CONTROL AND WORK ZONE TRAFFIC CONTROL MEASURES SHALL CONFORM TO MASSDOT'S "2014 STANDARD DETAILS AND DRAWINGS FOR THE DEVELOPMENT OF TEMPORARY TRAFFIC CONTROL PLANS" INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING DETAILS:

- FIGURES GEN-1 THRU GEN-6
- FIGURED PED-1 THRU PED-7
- FIGURE INT-2
- FIGURES TLR-1 THRU TLR-3

ADVANCE WARNING SIGNS

1" = 500'



607249_HD (TTCP).DWG Plotted on 11-Oct-2017 4:43 PM

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

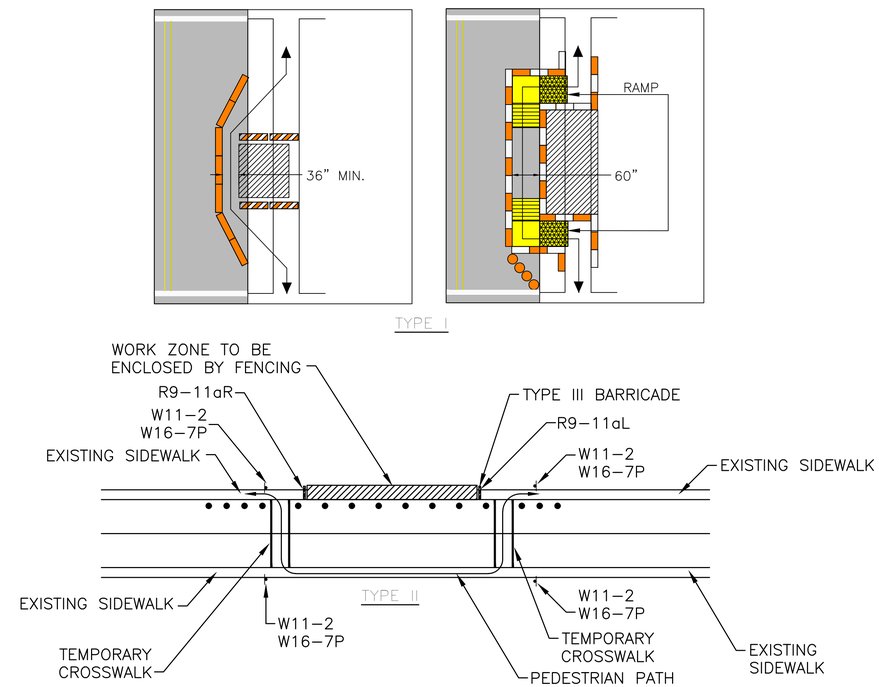
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	34	51
PROJECT FILE NO.	607249		

TEMPORARY TRAFFIC CONTROL PLANS

CONSTRUCTION SIGN SUMMARY

IDENTIFICATION NUMBER	SIZE OF SIGN WIDTH	SIZE OF SIGN HEIGHT	TEXT	TEXT DIMENSIONS (INCHES) LETTER HEIGHT	TEXT DIMENSIONS (INCHES) VERTICAL SPACING	NUMBER OF SIGNS REQUIRED	COLOR BACK-GROUND	COLOR LEGEND	COLOR BORDER	UNIT AREA IN SQUARE FEET	AREA IN SQUARE FEET
R2-10a	48"	36"	WORK ZONE SPEEDING FINES DOUBLED	MASSDOT STANDARD		3	ORANGE	BLACK	BLACK	12.00	36.00
							WHITE	BLACK	BLACK		
R2-10e	36"	48"	END ROAD WORK / DOUBLE FINES END			3	ORANGE	BLACK	BLACK	12.00	36.00
							WHITE	BLACK	BLACK		
R4-7	24"	30"		MUTCD STANDARD		3	WHITE	BLACK	BLACK	5.00	15.00
R9-9	24"	12"	SIDEWALK CLOSED			2	WHITE	BLACK	BLACK	2.00	4.00
R9-11aL	24"	12"	SIDEWALK CLOSED ← CROSS HERE			1	WHITE	BLACK	BLACK	2.00	2.00
R9-11aR	24"	12"	SIDEWALK CLOSED → CROSS HERE			1	WHITE	BLACK	BLACK	2.00	2.00
W1-4L	30"	30"				2	ORANGE	BLACK	BLACK	6.25	12.50
W1-4R	30"	30"				2	ORANGE	BLACK	BLACK	6.25	12.50
W5-1	36"	36"	ROAD NARROWS			3	ORANGE	BLACK	BLACK	9.00	27.00
W8-1	30"	30"	BUMP			3	ORANGE	BLACK	BLACK	6.25	18.75
W8-3	30"	30"	PAVEMENT ENDS			3	ORANGE	BLACK	BLACK	6.25	18.75
W8-8	30"	30"	ROUGH ROAD			3	ORANGE	BLACK	BLACK	6.25	18.75
W8-15	30"	30"	GROOVED PAVEMENT			3	ORANGE	BLACK	BLACK	6.25	18.75
W11-2	30"	30"				4	YELLOW	BLACK	BLACK	6.25	25.00
W13-1P	24"	24"	XX M.P.H			2	ORANGE	BLACK	BLACK	4.00	8.00
W16-7p	24"	12"				4	YELLOW	BLACK	BLACK	2.00	8.00
W20-1 (AHEAD)	36"	36"	ROAD WORK AHEAD			4	ORANGE	BLACK	BLACK	9.00	36.00
W20-1 (1500')	36"	36"	ROAD WORK 1500'			3	ORANGE	BLACK	BLACK	9.00	27.00
W20-4	36"	36"	ONE LANE ROAD AHEAD			3	ORANGE	BLACK	BLACK	9.00	27.00
W20-7a	36"	36"				3	ORANGE	BLACK	BLACK	9.00	27.00
W20-7b	36"	36"	POLICE OFFICER AHEAD	MUTCD STANDARD		3	ORANGE	BLACK	BLACK	9.00	27.00
W21-5a	36"	36"	RIGHT SHOULDER CLOSED			1	ORANGE	BLACK	BLACK	9.00	9.00
W30-8R	36"	36"	SQUEEZE RIGHT			2	ORANGE	BLACK	BLACK	9.00	18.00
										TOTAL	434.00

FIGURE PED-7
PEDESTRIAN BY PASS
NOT TO SCALE



NOTES:

1. ADDITIONAL ADVANCE WARNING MAY BE NECESSARY.
2. CONTROLS ONLY FOR PEDESTRIAN TRAFFIC ARE SHOWN. VEHICULAR TRAFFIC SHOULD BE HANDLED AS SHOWN ELSEWHERE.
3. STREET LIGHTING SHOULD BE CONSIDERED WHEN LOCATING CONTROL DEVICES.
4. IF THE WORK ZONE DOES NOT PERMIT PEDESTRIANS TO TRAVEL ADJACENT TO IT AS SHOWN IN PEDESTRIAN BY-PASS TYPE I, TEMPORARY CROSSWALKS WITH APPROPRIATE SIGNS SHOULD BE INSTALLED TO CROSS PEDESTRIANS TO THE OPPOSITE SIDE OF THE STREET AS SHOWN IN PEDESTRIAN BY-PASS TYPE II, AND AS DIRECTED BY THE ENGINEER.
5. BY PASS IS TO BE USED IN CONJUNCTION WITH THE PROPOSED LANE CLOSURE DETAILS AND DURING CONSTRUCTION STAGING, AS DIRECTED BY THE ENGINEER.

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	35	51
PROJECT FILE NO.	607249		

TEMPORARY TRAFFIC CONTROL PLANS

FIGURE INT-2
SINGLE LANE APPROACH
ONE QUADRANT CLOSURE
(WITH POLICE DETAIL)
NOT TO SCALE

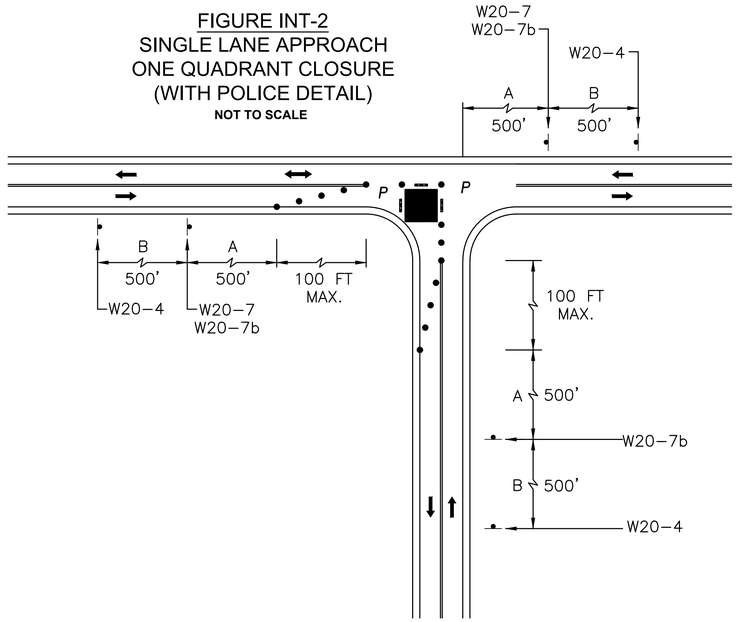


FIGURE INT-1
SINGLE LANE APPROACH
CENTER CLOSURE
NOT TO SCALE

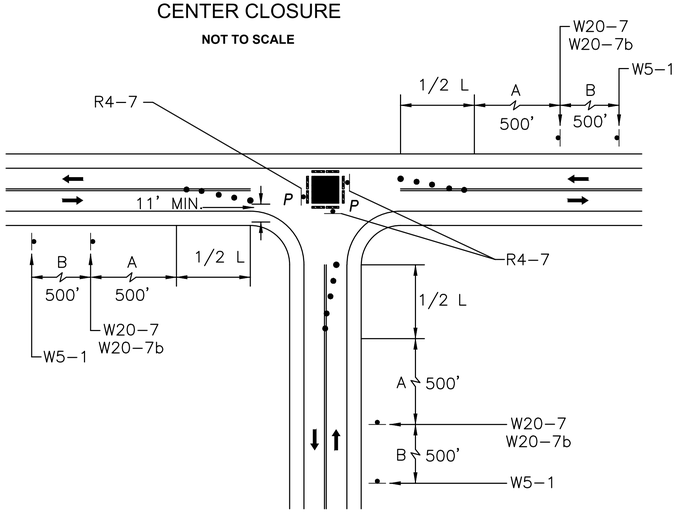


FIGURE TLR-1
TWO LANE ROAD
SHOULDER CLOSED
NOT TO SCALE

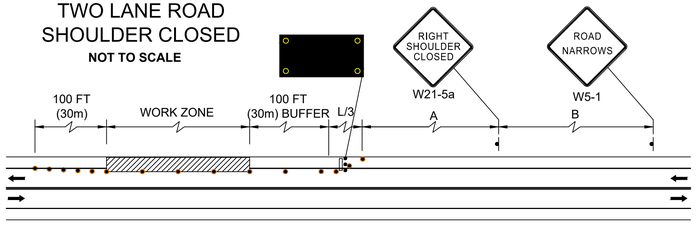


FIGURE TLR-2
TWO LANE ROAD
SHOULDER AND TRAVEL LANE CLOSED
NOT TO SCALE

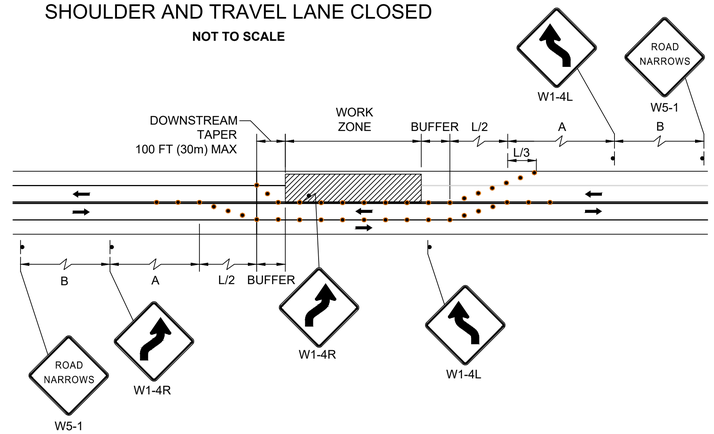


FIGURE TLR-3
TWO LANE ROAD
CENTER OF ROAD CLOSURE
NOT TO SCALE

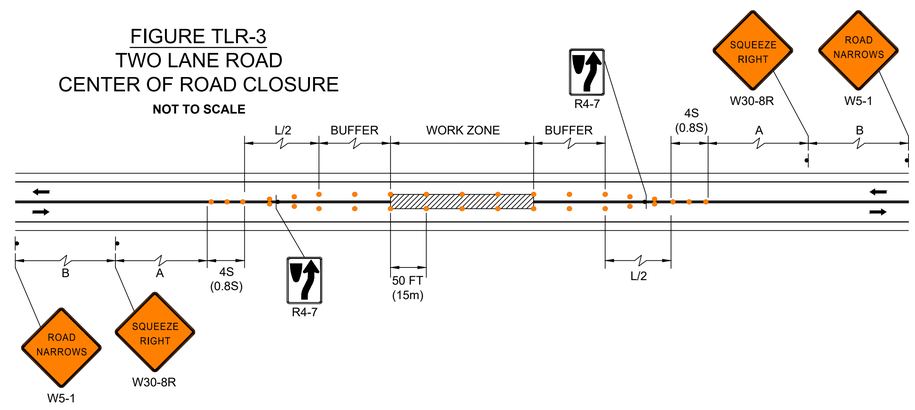
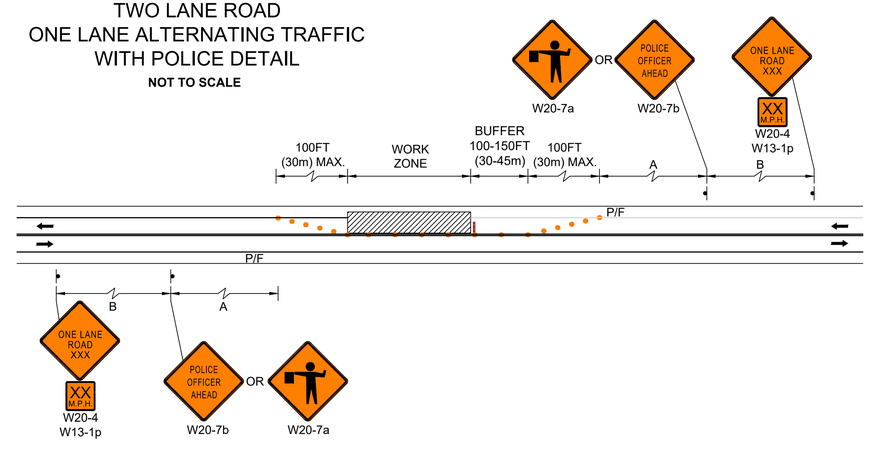


FIGURE TLR-5
TWO LANE ROAD
ONE LANE ALTERNATING TRAFFIC
WITH POLICE DETAIL
NOT TO SCALE



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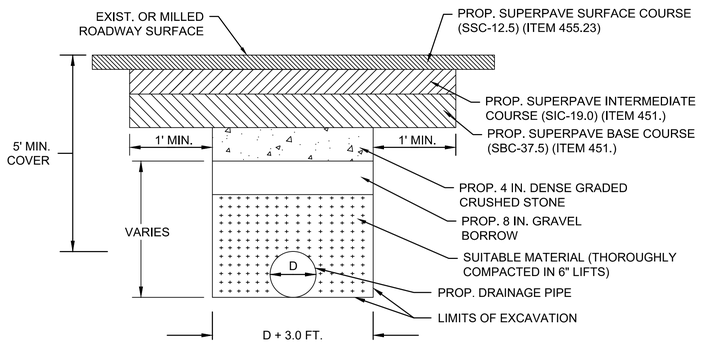
SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	36	51
PROJECT FILE NO.	607249		

CONSTRUCTION DETAILS

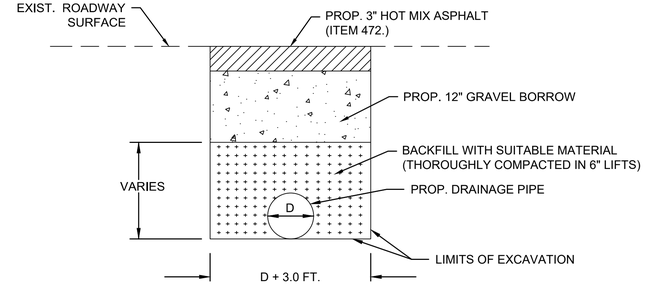


PERMANENT PATCH

(IN AREAS OF MILLING AND PAVEMENT OVERLAY)

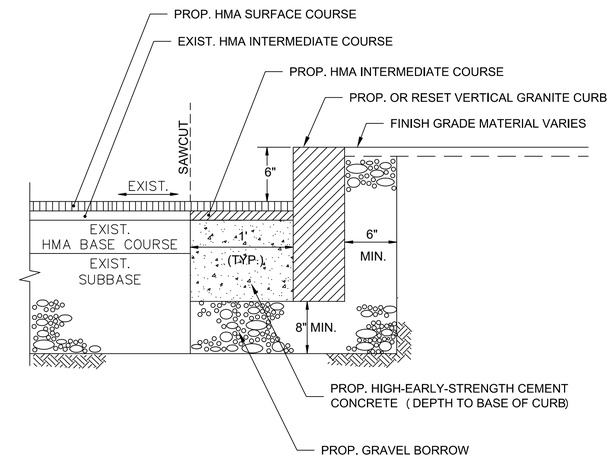
1. PLACE TACK COAT BETWEEN ALL HMA COURSES AND SAWCUT SURFACES PRIOR TO PLACING HMA. SEE PAVEMENT NOTES-FULL DEPTH HMA CONSTRUCTION FOR DEPTH OF HMA.

2. IF UNSUITABLE MATERIAL IS ENCOUNTERED AS DETERMINED BY THE ENGINEER, ADDITIONAL BEDDING SHALL BE PAID FOR UNDER ITEMS 151.2 AND 156.



TEMPORARY PATCH

(IN AREAS OF FULL DEPTH PAVEMENT RECONSTRUCTION)

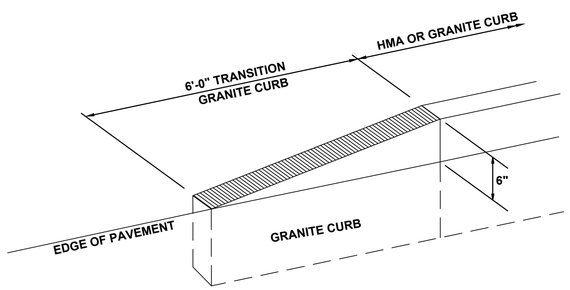


VERTICAL GRANITE CURB

NOT TO SCALE

DRAINAGE TRENCH DETAIL

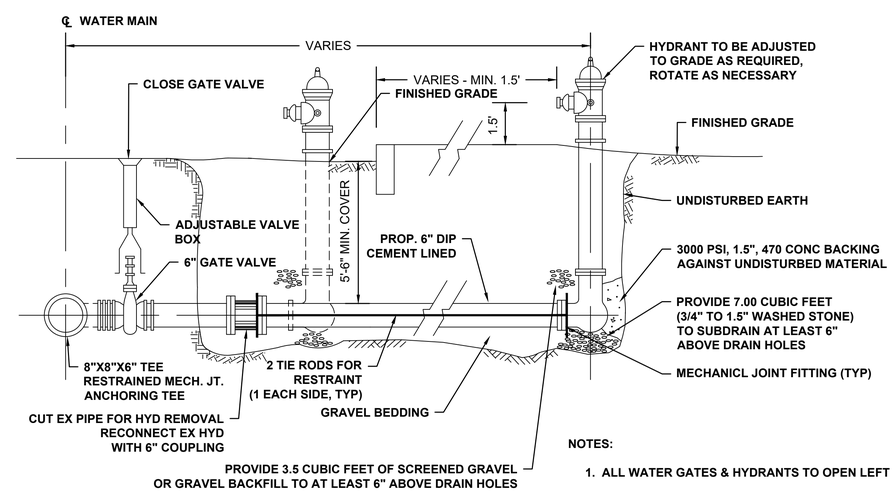
NOT TO SCALE



CURB TRANSITION DETAIL

NOT TO SCALE

TO BE USED FOR TRANSITION FROM HMA CURB OR GRANITE CURB TO EDGE OF PAVEMENT



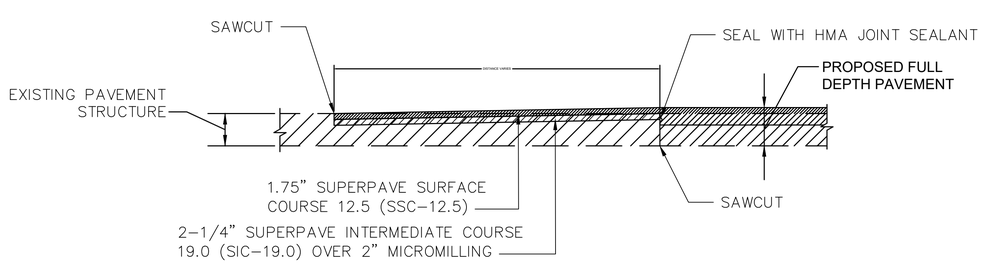
NOTES:

1. ALL WATER GATES & HYDRANTS TO OPEN LEFT

2. ALL MECHANICAL RESTRAINT DEVICES, STONE, GRAVEL, ETC. NECESSARY TO INSTALL OR REMOVE AND RESET HYDRANTS ARE INCIDENTAL TO ITEMS 376., 376.1 AND 376.2.

HYDRANT INSTALLATION
HYDRANT REMOVED AND RESET

NOT TO SCALE



PAVEMENT TRANSITION DETAIL

N.T.S.

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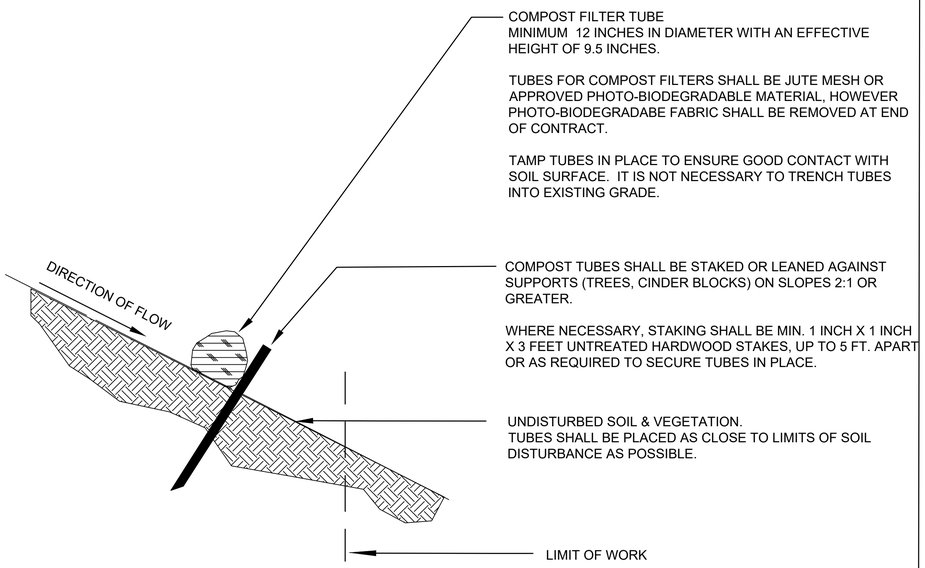
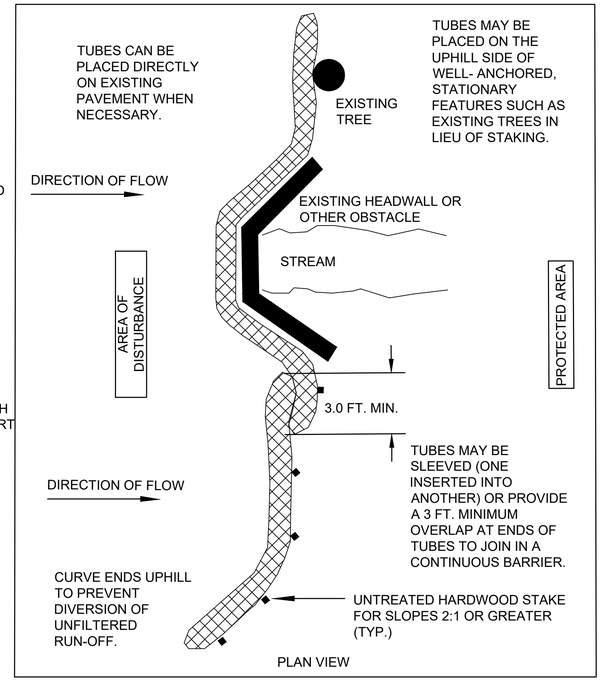
SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	37	51
PROJECT FILE NO.	607249		

CONSTRUCTION DETAILS



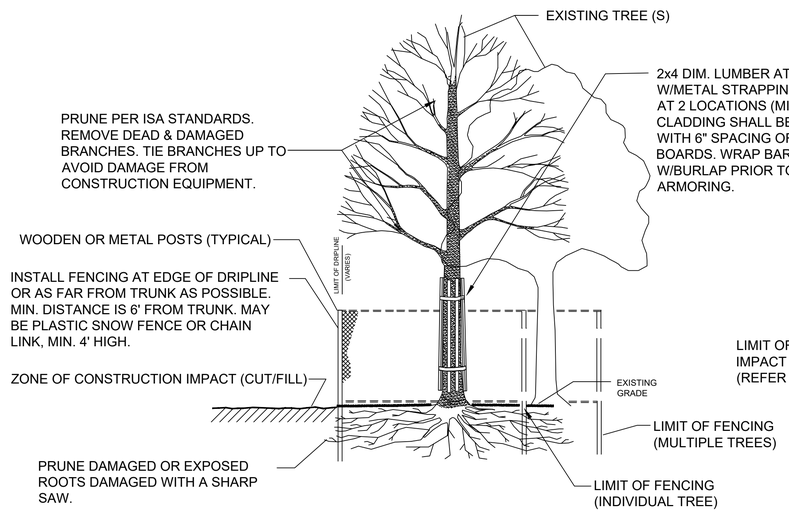


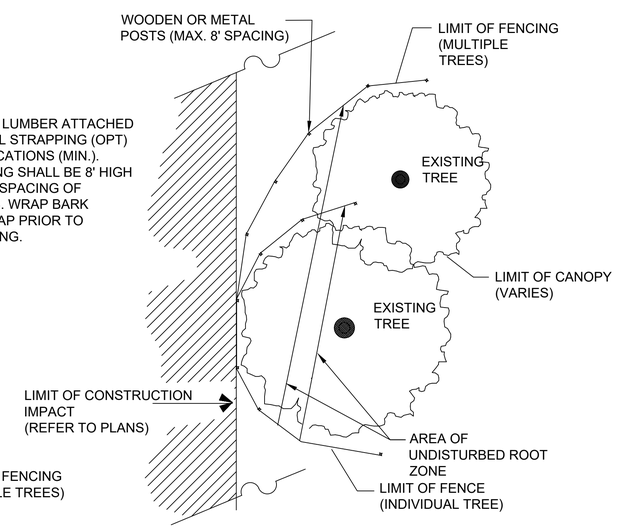
GENERAL NOTES:

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.

SINGLE COMPOST FILTER TUBE DETAIL

NOT TO SCALE





PLAN VIEW

TREE PROTECTION - EXISTING TREES

NOT TO SCALE

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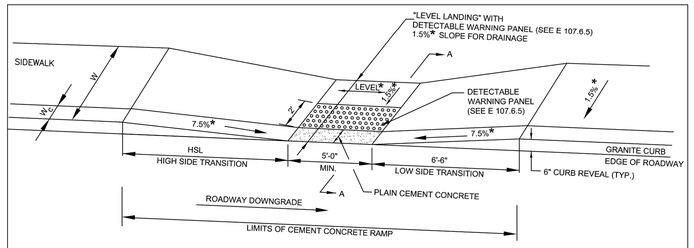
SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	38	51
PROJECT FILE NO.	607249		

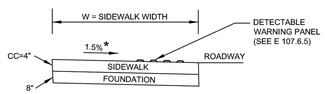
WHEELCHAIR RAMP & DRIVEWAY DETAILS



LEGEND

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

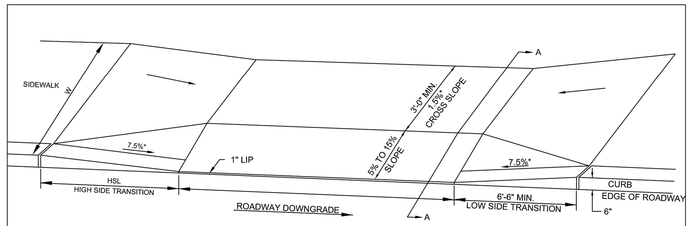
NOTE:
ROADWAY, GUTTER, AND FIRST 6" OF SIDEWALK TO BE ADJUSTED FOR FIELD CONDITIONS

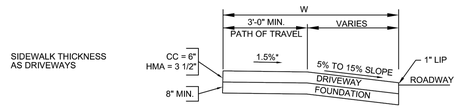


SECTION A-A

WCR #	RAMP REFERENCE POINT			WIDTH OF SIDEWALK	WIDTH OF RAMP MIN. 5'-0"	ROADWAY GUTTER SLOPE	TRANSITION LENGTH		
	BASELINE	STATION	OFFSET				LEFT SIDE	RIGHT SIDE	
5	ROUTE 20	6+69	21.1 LT	5'-6"	5'-0"	0.50%	6'-6"	7'-8"	
6	ROUTE 20	6+68	37.2 RT	6'-0"	5'-0"	2.00%	6'-6"	6'-6"	
7	ROUTE 20	6+83	50.8 RT	6'-0"	5'-0"	2.00%	6'-6"	6'-6"	
8	ROUTE 20	7+69	22.6 LT	5'-6"	5'-0"	0.50%	6'-6"	7'-8"	
9	ROUTE 20	7+56	50.4 RT	6'-0"	5'-0"	1.40%	3'-3"*	-	* 3" REVEAL
10	ROUTE 20	7+72	38.7 RT	6'-0"	5'-0"	1.40%	6'-6"	4'-6"*	* 3" REVEAL

WHEELCHAIR RAMP ON NARROW SIDEWALK WITH DETECTABLE WARNING PANEL





SECTION A-A

LEGEND

HSL = HIGH SIDE TRANSITION LENGTH. SEE E 107.9.0
W = SIDEWALK WIDTH
* = TOLERANCE FOR CONSTRUCTION ±0.5%
CC = CEMENT CONCRETE
HMA = HOT MIX ASPHALT

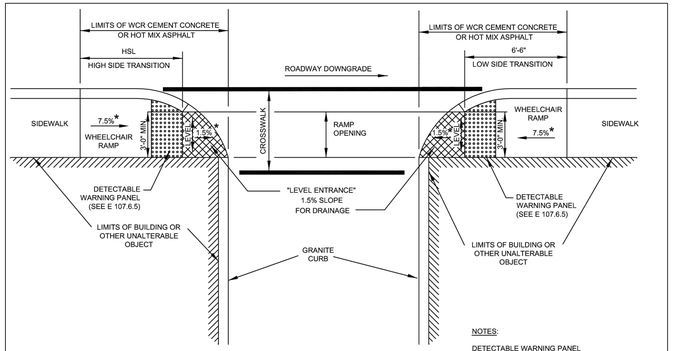
DWY #	RAMP REFERENCE POINT			LENGTH OF PRIMARY RAMP (W1)	WIDTH OF SIDEWALK (W)	WIDTH OF DRIVEWAY (L)	DEPTH OF TRAVEL PATH MIN. 3'-0"	ROADWAY GUTTER SLOPE	TRANSITION LENGTH	
	BASELINE	STATION	OFFSET						LEFT SIDE	RIGHT SIDE
1	ROUTE 20	3+73	15.9 LT	2'-0"	5'-6"	14'-0"	3'-6"	2.70%	6'-6"	11'-0"
2	ROUTE 20	4+15	27.0 RT	2'-6"	6'-0"	48'-0"	3'-6"	2.30%	11'-0"	6'-6"
3	ROUTE 20	4+87	27.0 RT	2'-0"	6'-0"	40'-0"	4'-0"	1.40%	9'-0"	6'-6"
4	ROUTE 20	5+25	16.0 LT	2'-0"	5'-6"	19'-6"	3'-6"	1.00%	6'-6"	7'-8"
5	ROUTE 20	6+24	28.0 RT	2'-0"	6'-0"	30'-0"	4'-0"	0.50%	7'-8"	6'-6"
6	ROUTE 20	7+12	19.8 LT	2'-0"	5'-6"	18'-0"	3'-6"	0.50%	6'-6"	7'-8"
7	LANDHAM ROAD	22+65	21.0 LT	2'-0"	6'-0"	30'-0"	4'-0"	-3.00%	11'-0"	6'-6"

SIDEWALK THROUGH DRIVEWAYS WITHOUT CURB RETURNS

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

NOTE:

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



LEGEND

HSL = HIGH SIDE TRANSITION LENGTH (SEE E 107.9.0)
* = TOLERANCE FOR CONSTRUCTION ±0.5%

NOTES:

DETECTABLE WARNING PANEL LOCATED NOT LESS THAN 6" OR MORE THAN 24" FROM ROADWAY EDGE (GUTTER LINE). TRUNCATED DOMES TO BE ALIGNED WITH DIRECTION OF TRAVEL.

FOR DETAILS OF TRUNCATED DOMES SEE DRAWING E 107.6.5.

ROADWAY, GUTTER, AND FIRST 6" OF SIDEWALK TO BE ADJUSTED FOR FIELD CONDITIONS.

WCR #	RAMP REFERENCE POINT			WIDTH OF SIDEWALK	WIDTH OF OPENING	ROADWAY GUTTER SLOPE	TRANSITION LENGTH
	BASELINE	STATION	OFFSET				
1	ROUTE 20	0+91	16.1 RT	5'-10"	3'-0"	2.00%	6'-6"
2	ROUTE 20	1+18	22.0 LT	4'-8"	4'-4"	2.00%	6'-6"
3	ROUTE 20	1+67	21.2 LT	7'-0"	3'-0"	2.40%	11'-0"
4	ROUTE 20	1+69	16.9 RT	6'-0"	3'-0"	2.40%	11'-0"
11	ROUTE 20	11+14	20.3 LT	5'-0"	5'-0"	1.70%	9'-0"

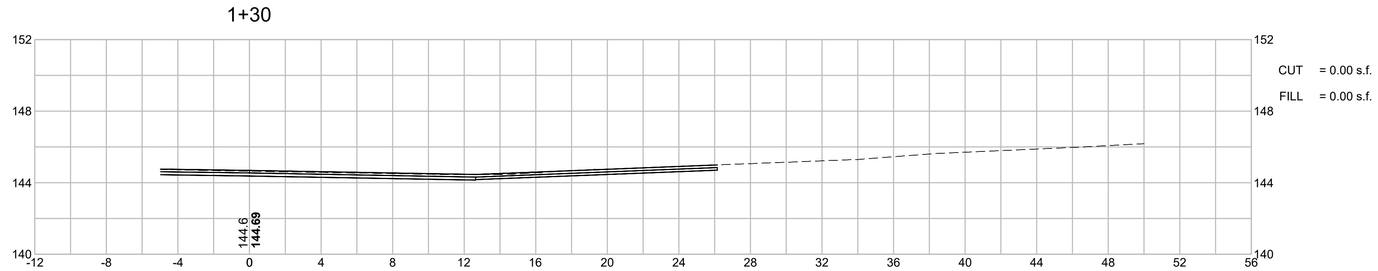
WHEELCHAIR RAMP FOR ONE CONTINUOUS DIRECTION OF PEDESTRIAN TRAVEL

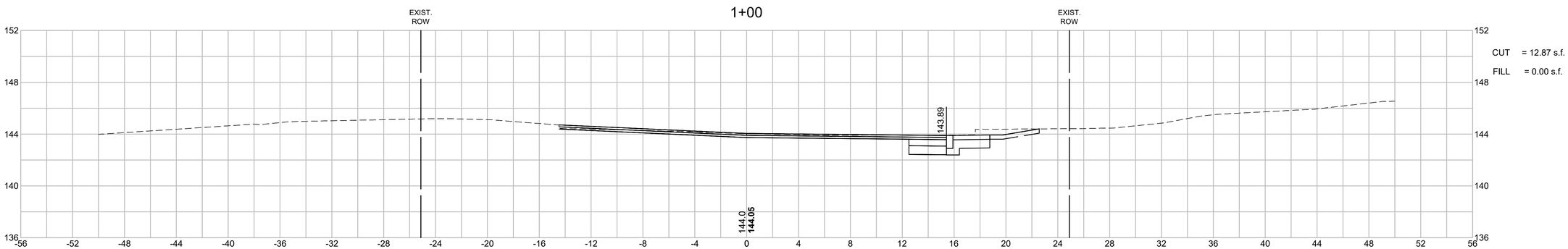
SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

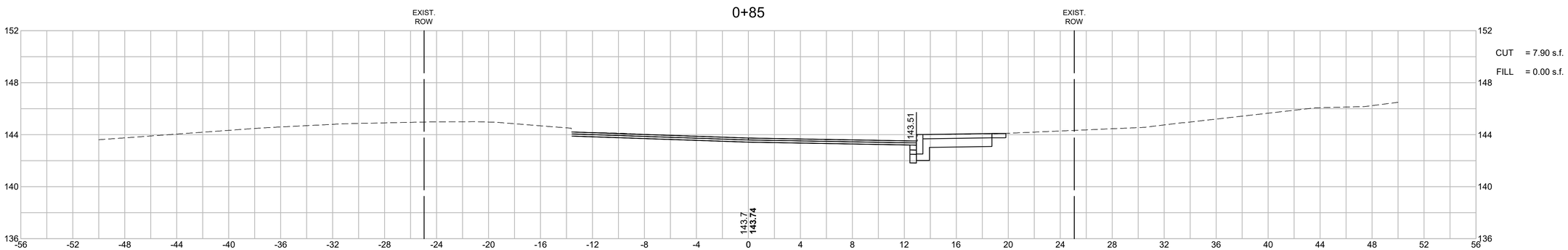
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	39	51
PROJECT FILE NO.	607249		

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

CROSS SECTIONS
ROUTE 20 (BOSTON POST ROAD)







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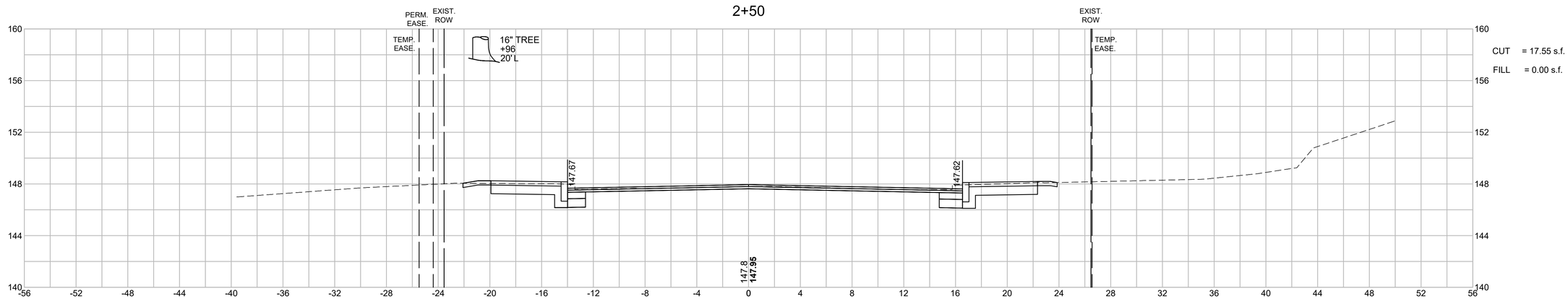
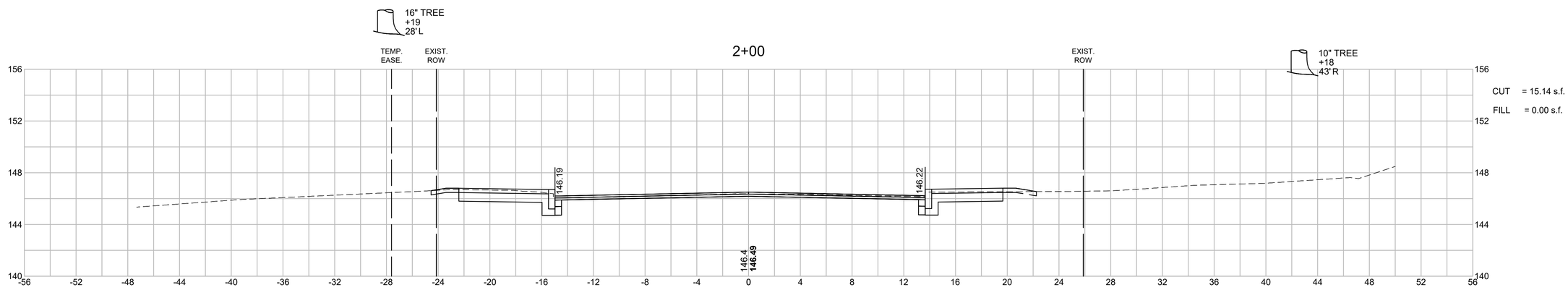
SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

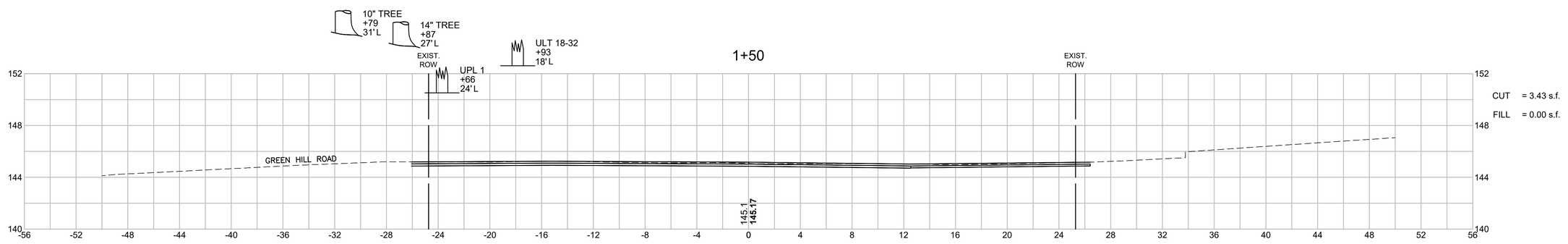
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	40	51
PROJECT FILE NO.	607249		

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

CROSS SECTIONS
ROUTE 20 (BOSTON POST ROAD)







607249_HD (XS).DWG Plotted on 11-Oct-2017 4:45 PM

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

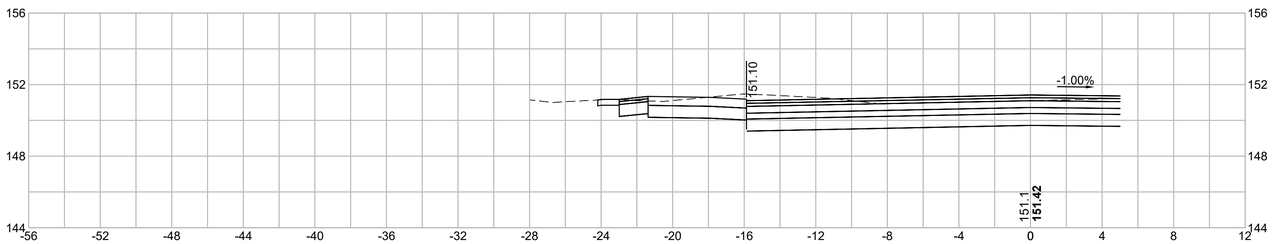
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	41	51
PROJECT FILE NO.	607249		

CROSS SECTIONS
ROUTE 20 (BOSTON POST ROAD)

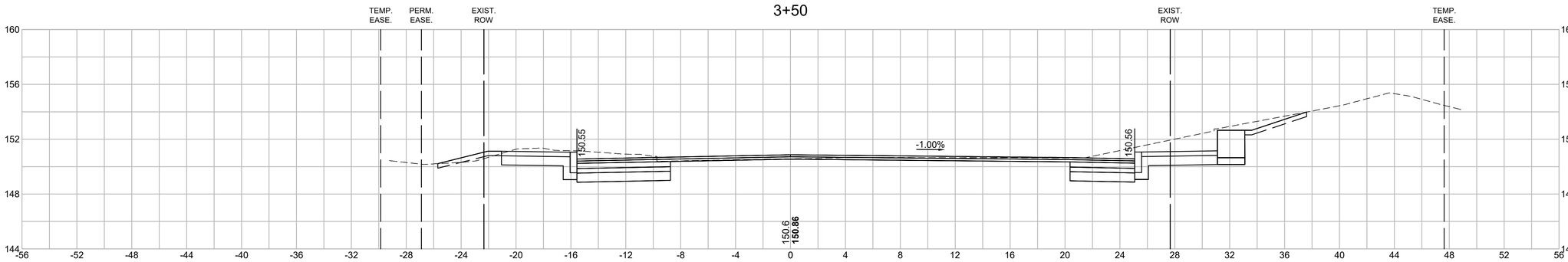
607249_HD (XS).DWG Plotted on 11-Oct-2017 4:45 PM

3+70

CUT = 38.45 s.f.
FILL = 0.00 s.f.

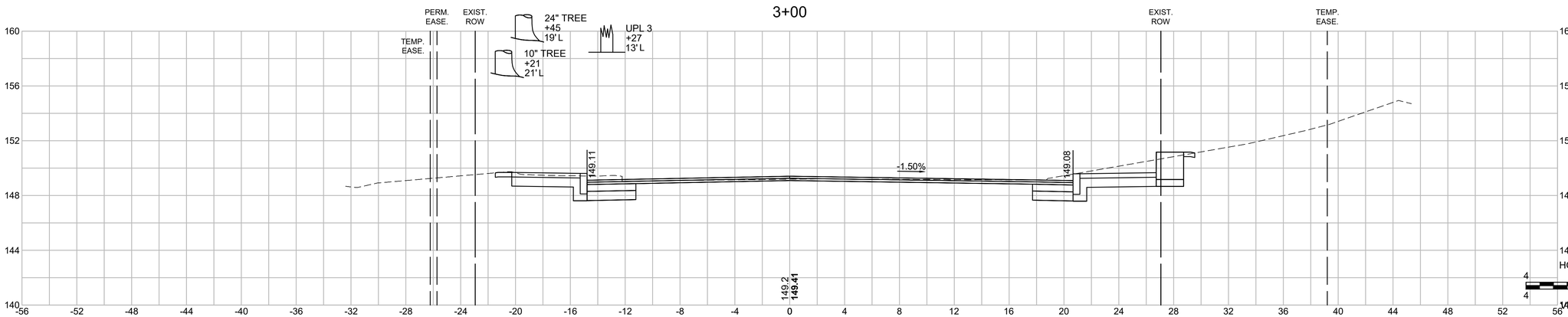


3+50



CUT = 51.54 s.f.
FILL = 0.25 s.f.

3+00



CUT = 31.20 s.f.
FILL = 0.00 s.f.

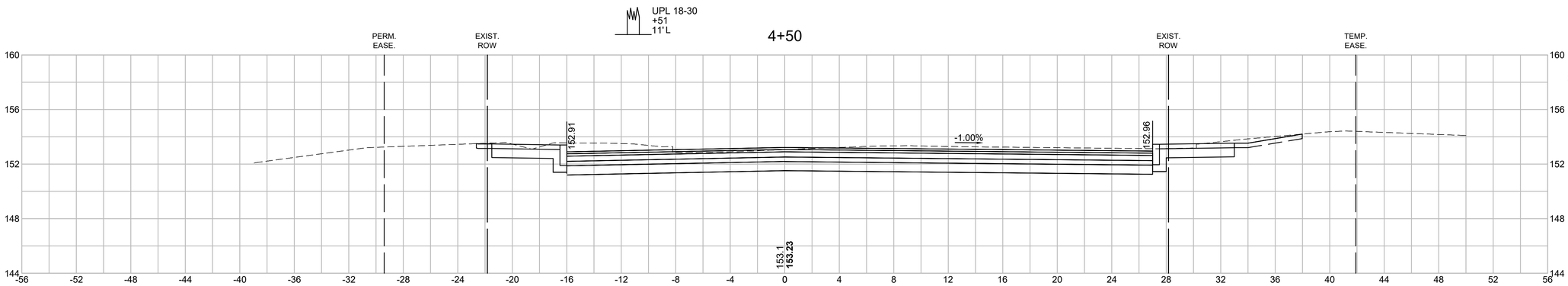
HOR. SCALE IN FEET
4 0 4 8

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

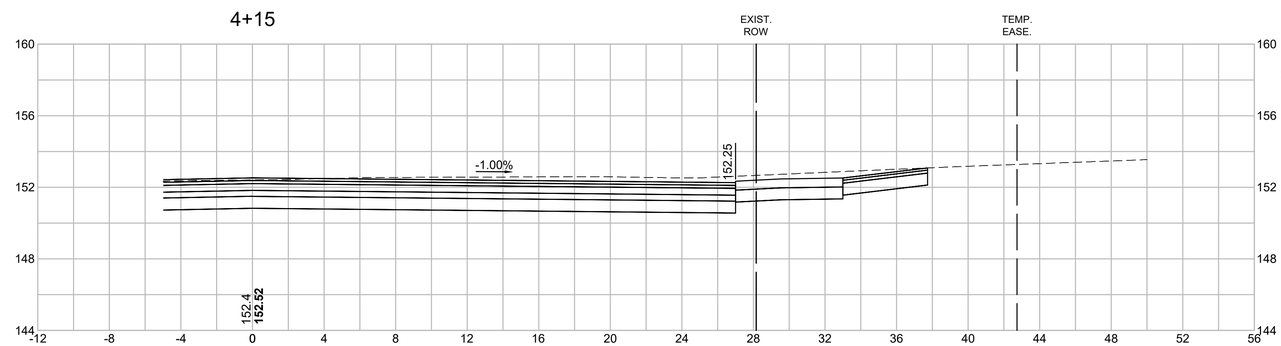
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	42	51
PROJECT FILE NO.	607249		

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

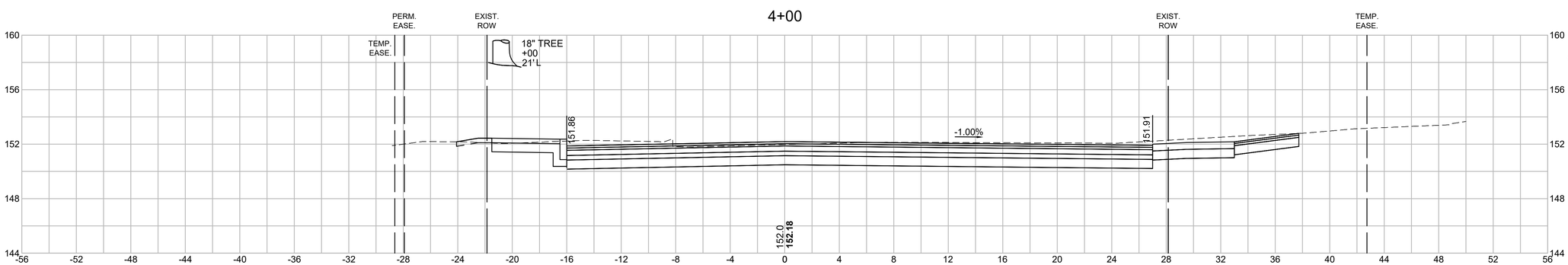
CROSS SECTIONS
ROUTE 20 (BOSTON POST ROAD)



CUT = 94.36 s.f.
FILL = 0.00 s.f.



CUT = 66.81 s.f.
FILL = 0.00 s.f.



CUT = 94.35 s.f.
FILL = 0.01 s.f.

607249_HD (XS).DWG Plotted on 11-Oct-2017 4:45 PM

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

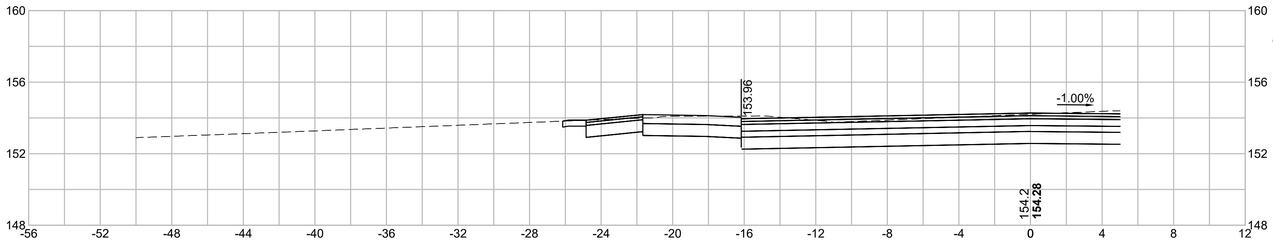
SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	43	51
PROJECT FILE NO.	607249		

CROSS SECTIONS
ROUTE 20 (BOSTON POST ROAD)

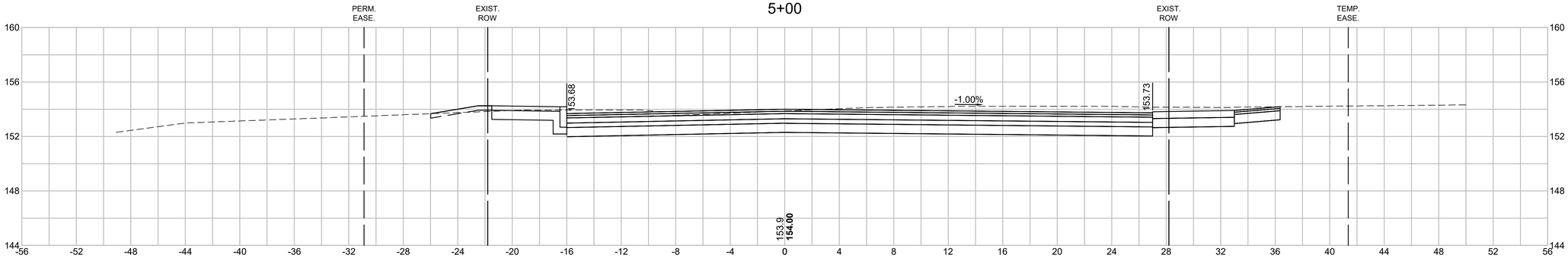
607249_HD (XS).DWG Plotted on 11-Oct-2017 4:45 PM

5+25



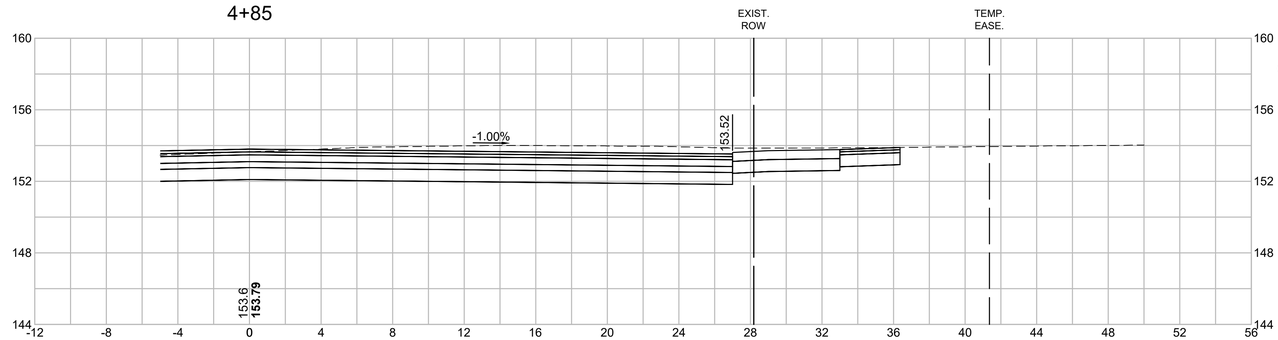
CUT = 40.26 s.f.
FILL = 0.00 s.f.

5+00



CUT = 97.44 s.f.
FILL = 0.15 s.f.

4+85



CUT = 71.50 s.f.
FILL = 0.00 s.f.

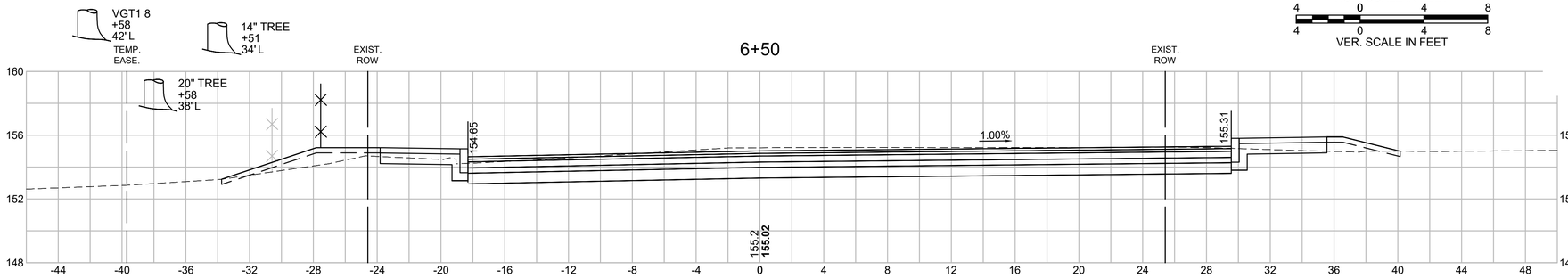
SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	44	51
PROJECT FILE NO.	607249		

CROSS SECTIONS
ROUTE 20 (BOSTON POST ROAD)

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

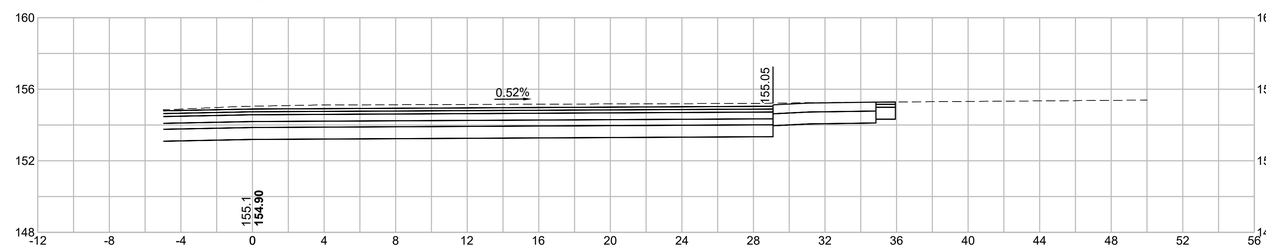
6+50



CUT = 87.73 s.f.

FILL = 4.68 s.f.

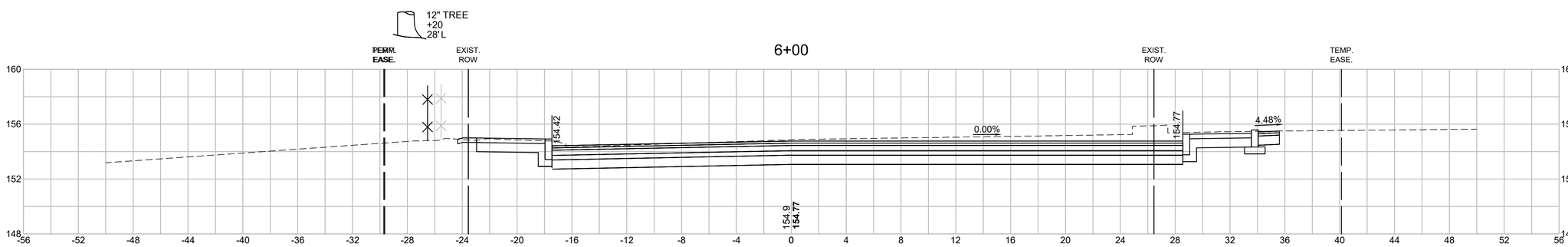
6+26



CUT = 72.20 s.f.

FILL = 0.00 s.f.

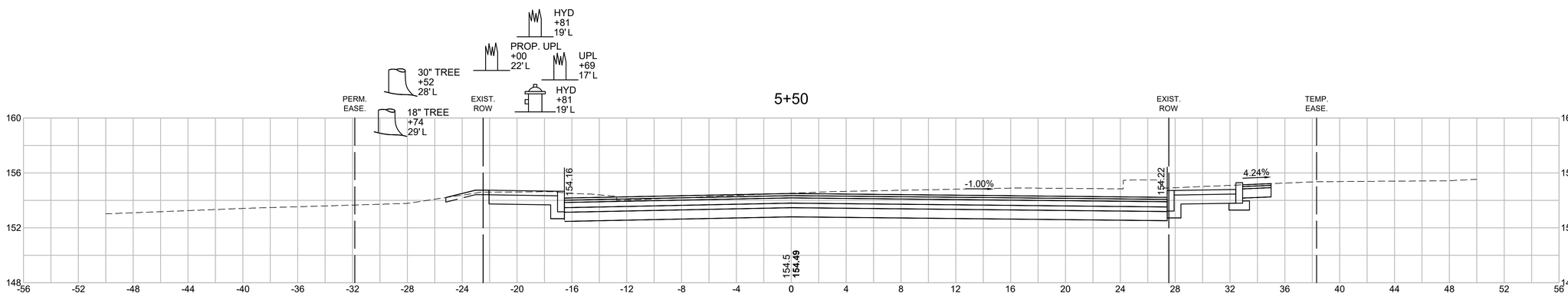
6+00



CUT = 117.29 s.f.

FILL = 0.00 s.f.

5+50



CUT = 105.21 s.f.

FILL = 0.00 s.f.

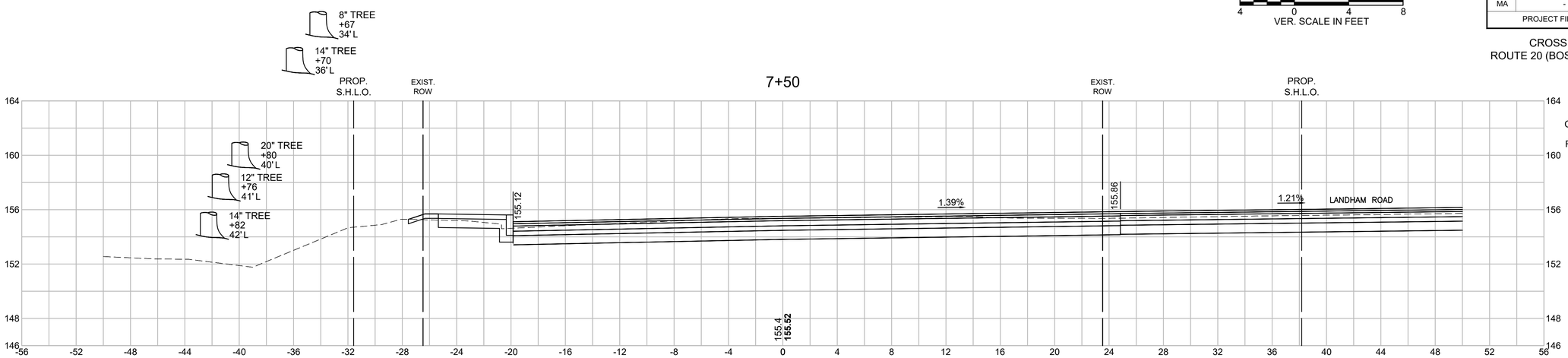
607249_HD (XS).DWG Plotted on 11-Oct-2017 4:45 PM

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	45	51
PROJECT FILE NO.	607249		

CROSS SECTIONS
ROUTE 20 (BOSTON POST ROAD)

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

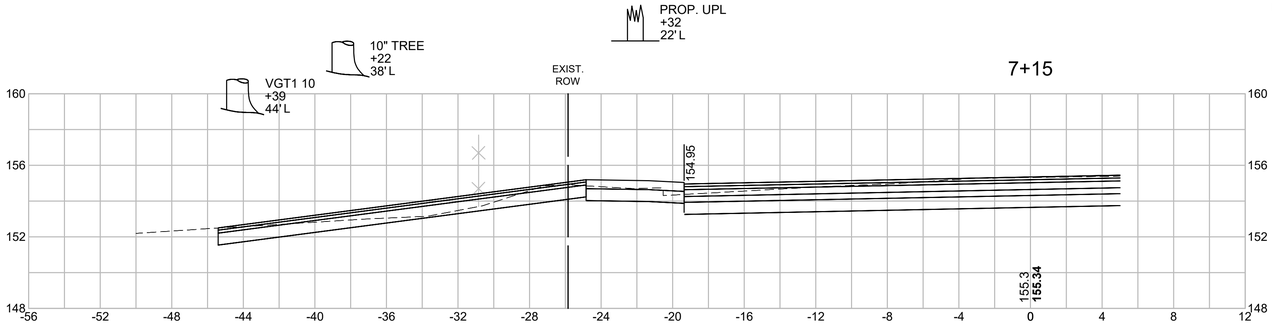


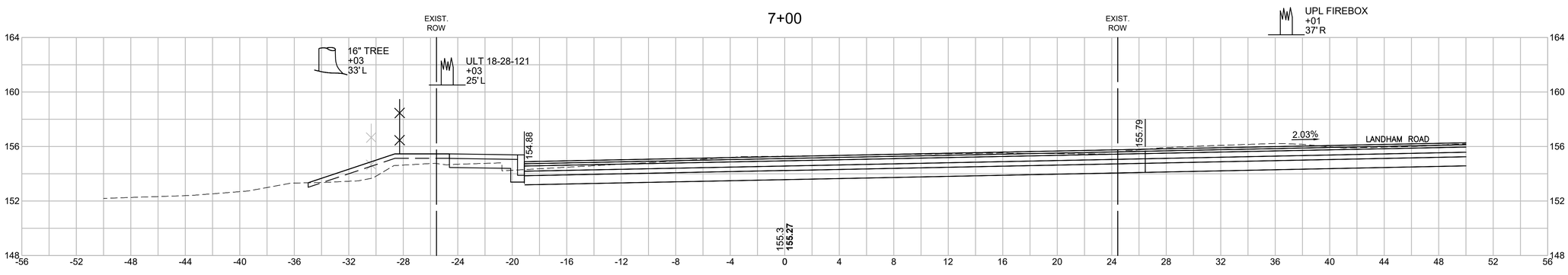
CUT = 100.04 s.f.

FILL = 7.90 s.f.

CUT = 39.94 s.f.

FILL = 0.00 s.f.





CUT = 113.11 s.f.

FILL = 4.89 s.f.

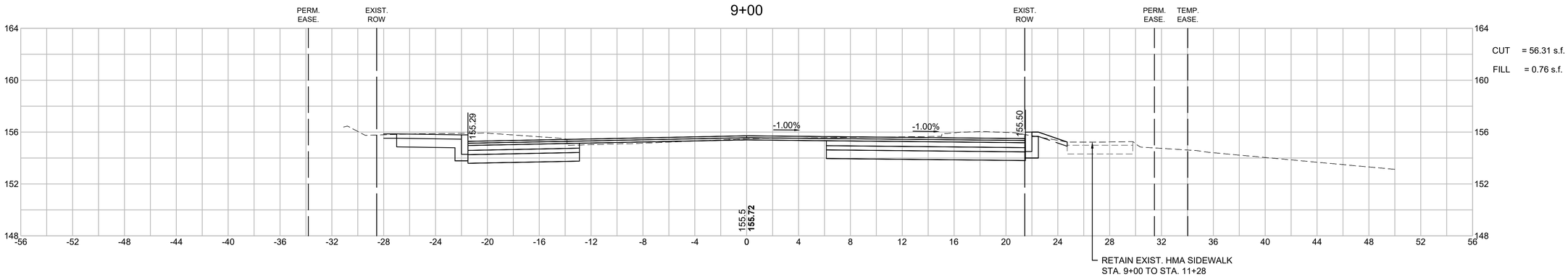
607249_HD (XS).DWG Plotted on 11-Oct-2017 4:46 PM

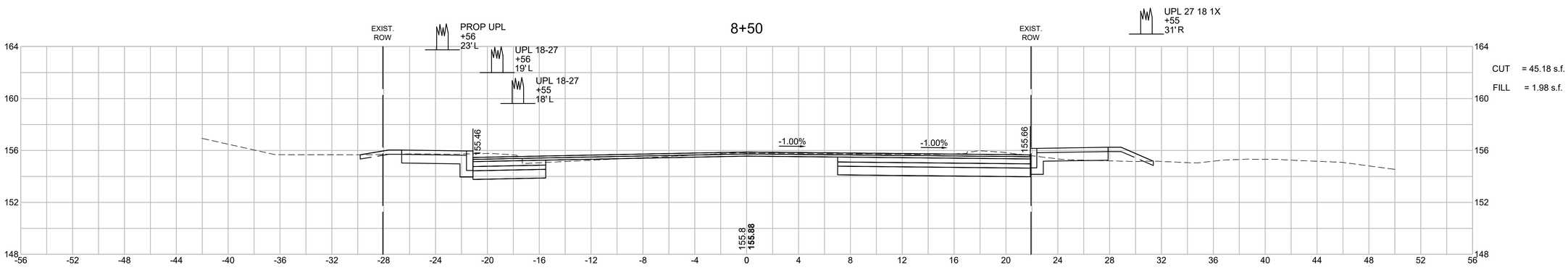
SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

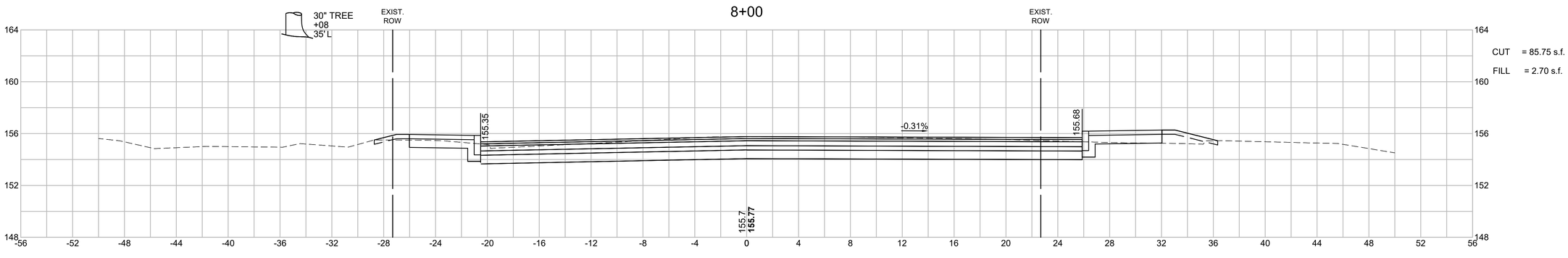
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	46	51
PROJECT FILE NO.	607249		

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

CROSS SECTIONS
ROUTE 20 (BOSTON POST ROAD)







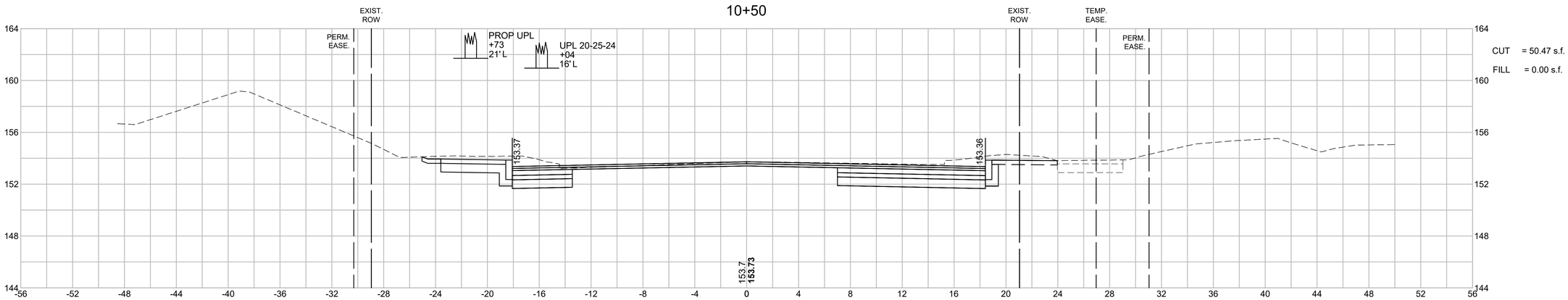
607249_HD (XS).DWG Plotted on 11-Oct-2017 4:46 PM

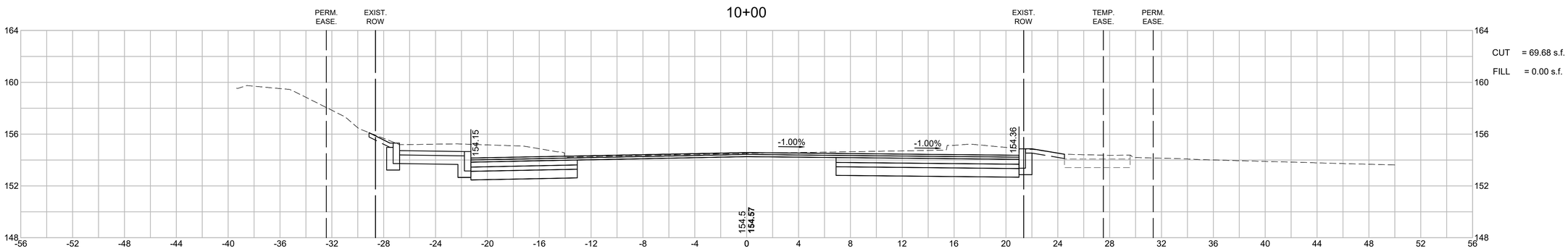
SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

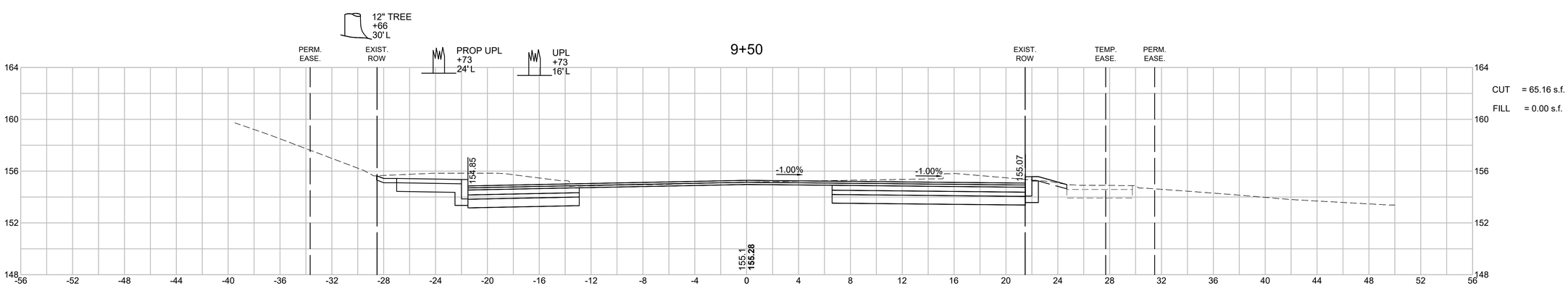
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	47	51
PROJECT FILE NO.	607249		

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

CROSS SECTIONS
ROUTE 20 (BOSTON POST ROAD)







607249_HD (XS).DWG Plotted on 11-Oct-2017 4:46 PM

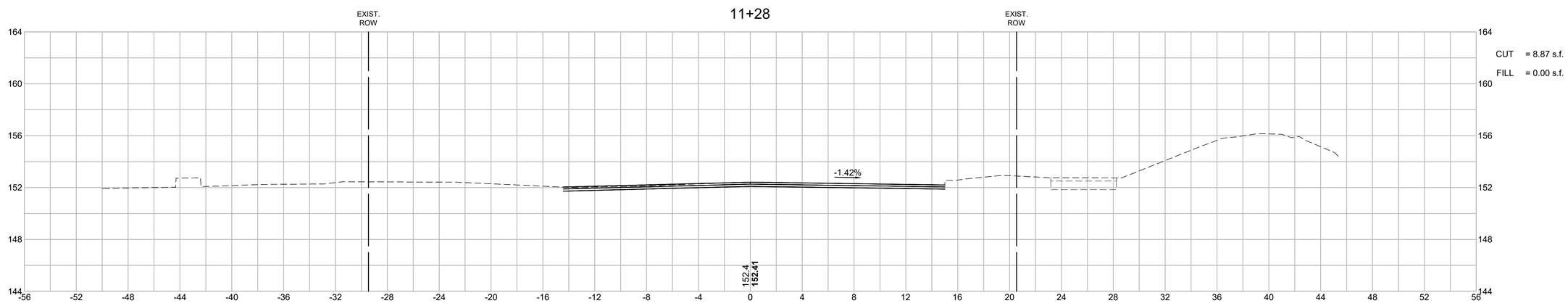
SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

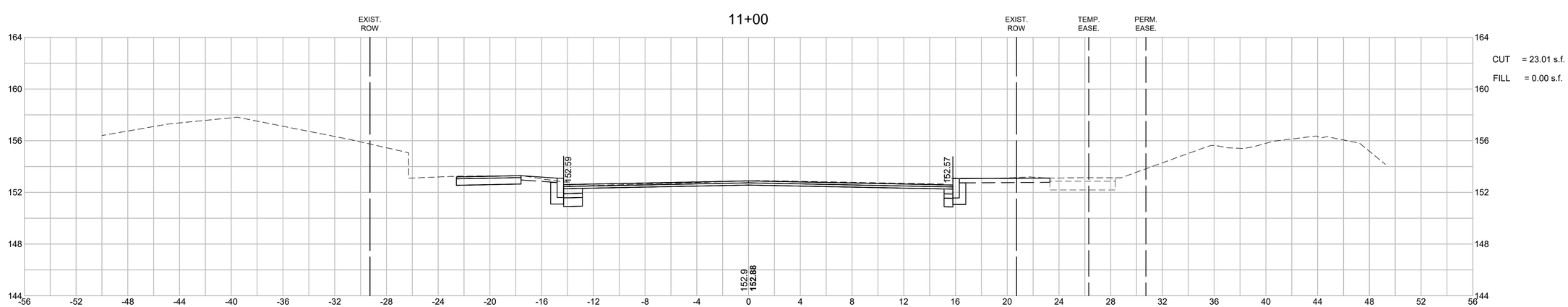
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	48	51
PROJECT FILE NO.	607249		

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

CROSS SECTIONS
ROUTE 20 (BOSTON POST ROAD)

607249_HD (XS).DWG Plotted on 11-Oct-2017 4:46 PM





SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

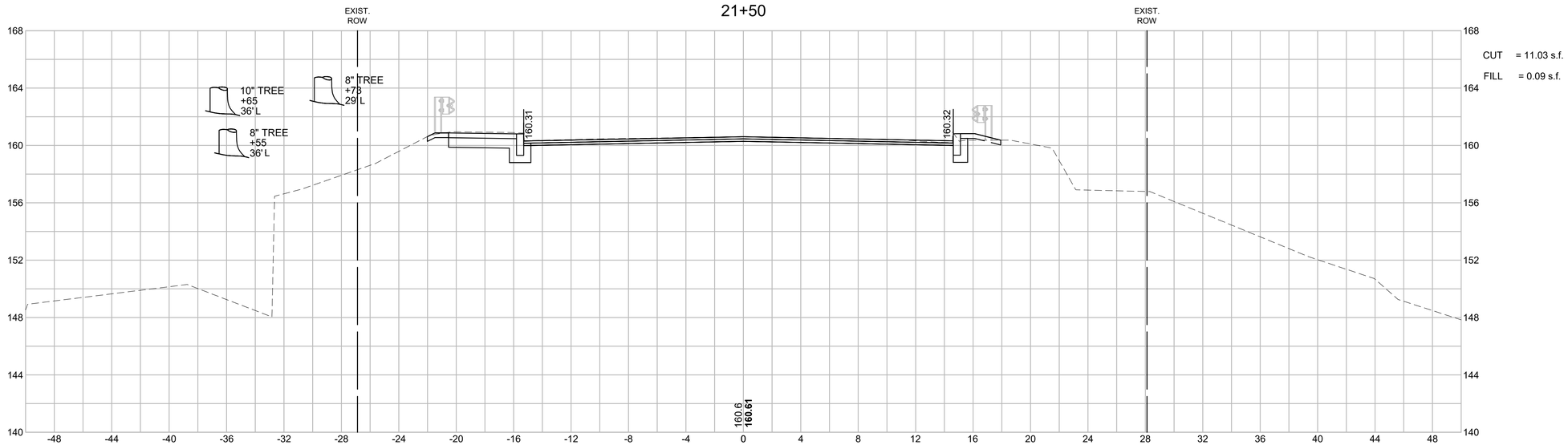
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	49	51
PROJECT FILE NO.	607249		

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

CROSS SECTIONS
LANDHAM ROAD

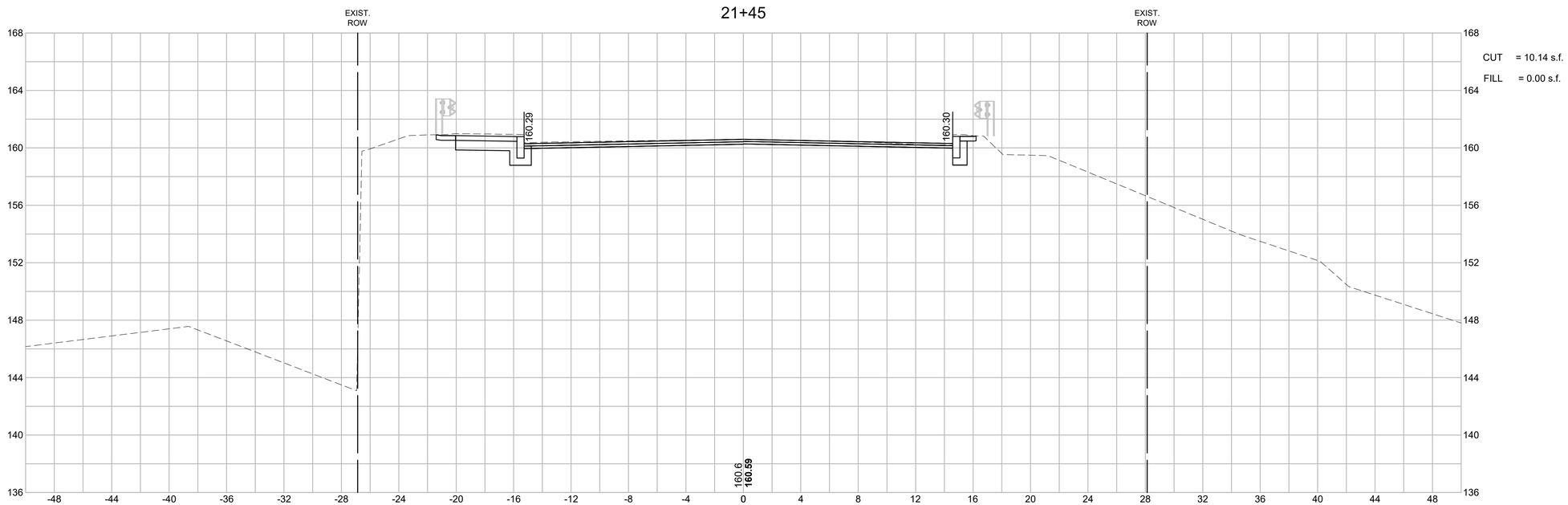
607249_HD (XS).DWG Plotted on 11-Oct-2017 4:46 PM

21+50



CUT = 11.03 s.f.
FILL = 0.09 s.f.

21+45



CUT = 10.14 s.f.
FILL = 0.00 s.f.

SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	50	51
PROJECT FILE NO.	607249		

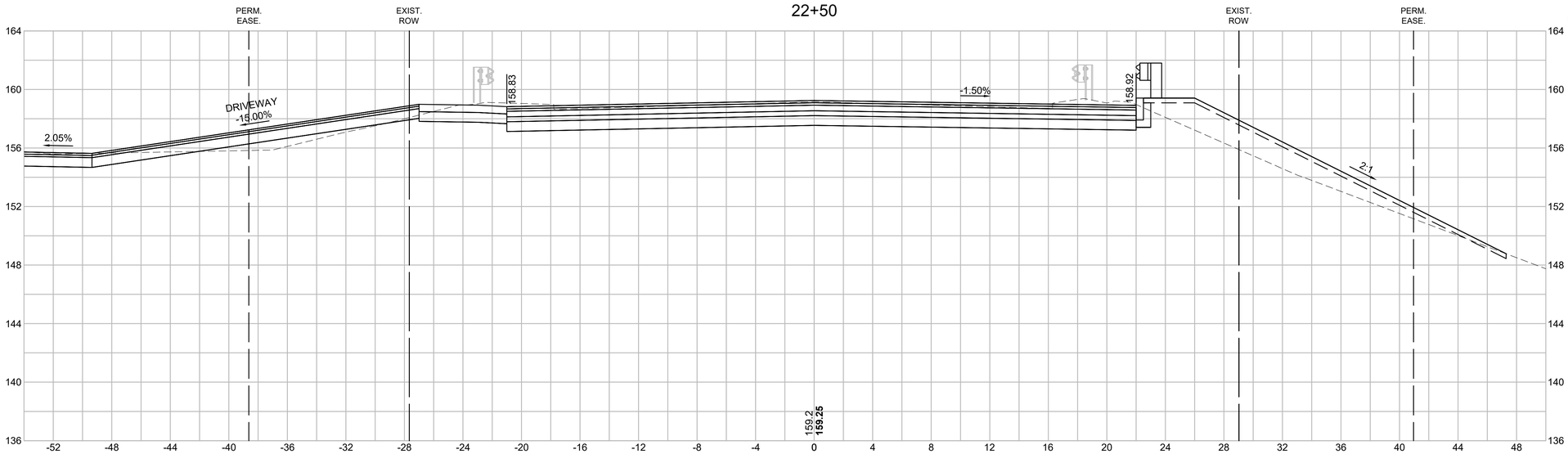
CROSS SECTIONS
LANDHAM ROAD

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

607249_HD (XS).DWG Plotted on 11-Oct-2017 4:46 PM

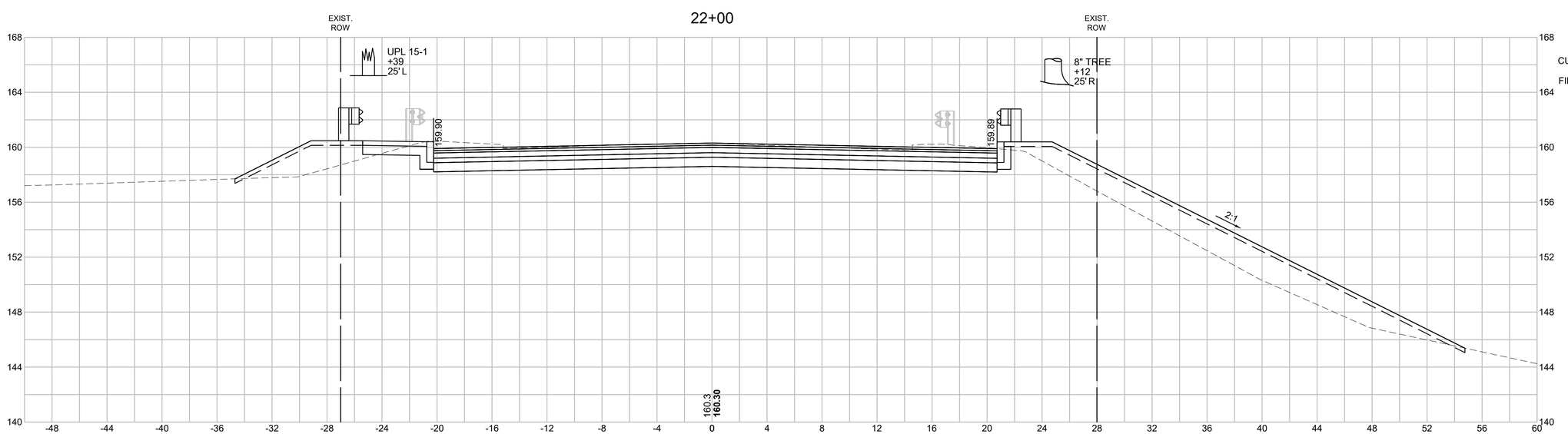
22+50

CUT = 76.86 s.f.
FILL = 23.38 s.f.



22+00

CUT = 75.31 s.f.
FILL = 60.23 s.f.

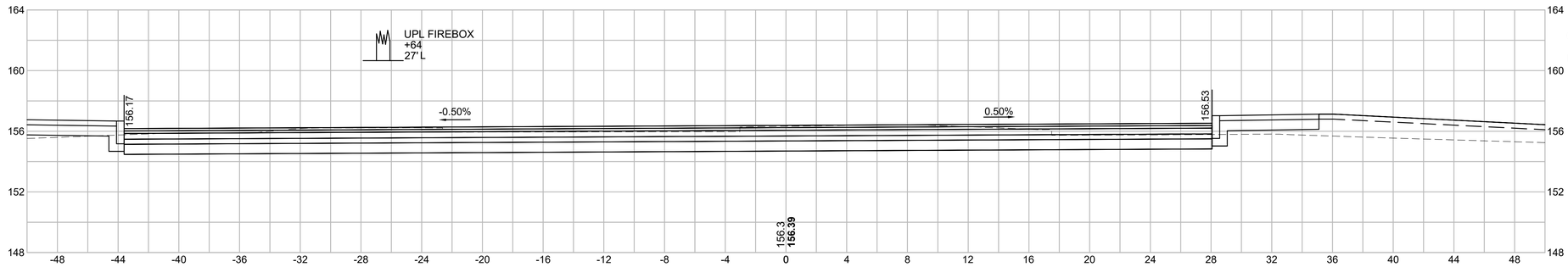


SUDBURY
ROUTE 20 (BOSTON POST ROAD)
AT LANDHAM ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	51	51
PROJECT FILE NO.	607249		

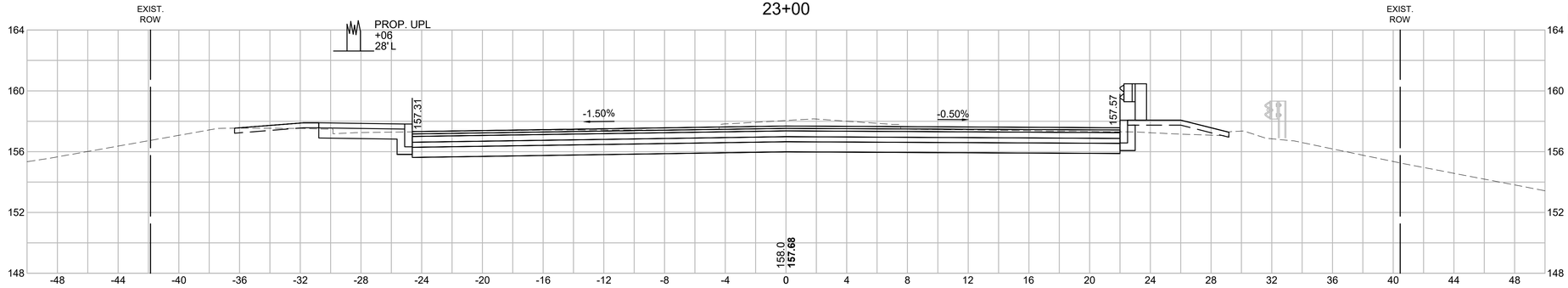
CROSS SECTIONS
LANDHAM ROAD

23+50



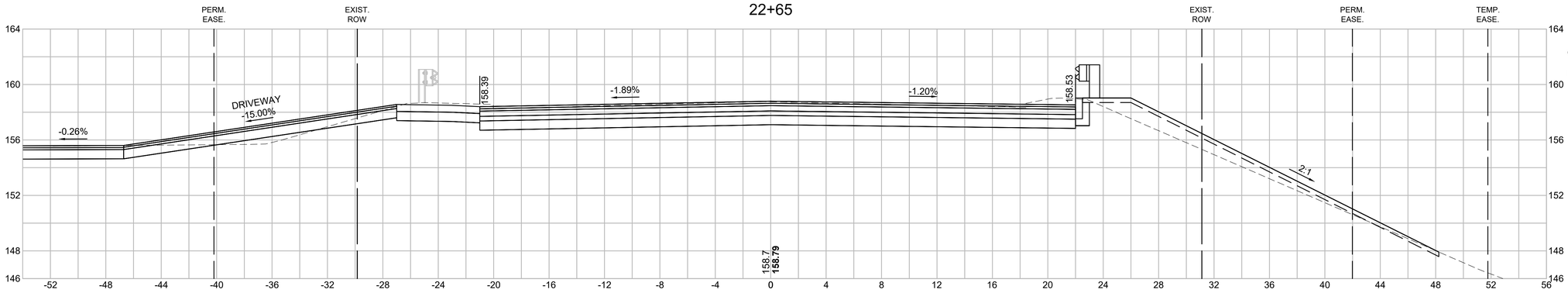
CUT = 103.20 s.f.
FILL = 25.08 s.f.

23+00



CUT = 103.32 s.f.
FILL = 2.45 s.f.

22+65



CUT = 80.75 s.f.
FILL = 11.64 s.f.

HOR. SCALE IN FEET
VER. SCALE IN FEET

607249_HD (XS).DWG Plotted on 11-Oct-2017 4:47 PM