MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	175
PROJECT FILE NO.	607573		

HAVERHILL
BROADWAY (ROUTE 97)

TITLE SHEET & INDEX

PLAN AND PROFILE OF

BROADWAY (ROUTE 97)

IN THE CITY OF

HAVERHILL

ESSEX COUNTY

FEDERAL AID PROJECT NO.

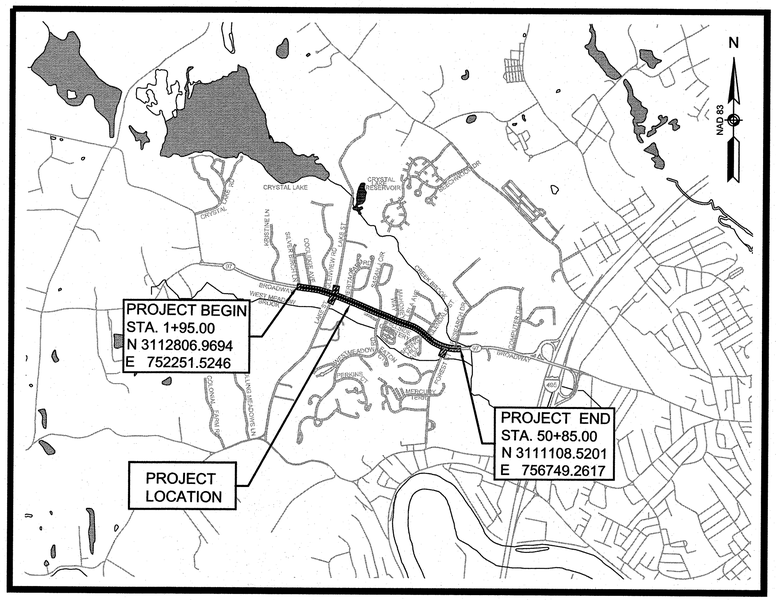
--

NOI SUBMITTAL

THE MASSACHUSETTS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES DATED 1988, AS AMENDED, THE SUPPLEMENTAL SPECIFICATIONS DATED JULY 1, 2015, THE 2014 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.

INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET & INDEX
2	LEGEND & ABBREVIATIONS
3	KEY PLAN & CORING LOCATIONS
~~4-5~~	~~CORING LOGS~~
6-9	TYPICAL SECTIONS (RESOURCE AREAS ONLY)
~~10-18~~	~~SURVEY CONTROL PLANS~~
19-27	CONSTRUCTION PLANS (RESOURCE AREAS ONLY)
~~28-36~~	~~BROADWAY (RTE 97) PROFILES~~
~~37-39~~	~~SIDE STREET PROFILES~~
~~40-48~~	~~CURB TIE & GRADING PLANS~~
49-57	DRAINAGE & UTILITY PLANS (RESOURCE AREAS ONLY)
~~58-67~~	~~LANDSCAPING PLANS & DETAILS~~
68	STORMWATER MANAGEMENT DETAILS
69	WETLAND REPLICATION AREA
~~70-78~~	~~PAVEMENT MARKING & SIGNING PLANS~~
~~79-80~~	~~TRAFFIC SIGN SUMMARY SHEET~~
~~81~~	~~TRAFFIC LEGEND, ABBREVIATIONS & NOTES~~
~~82-83~~	~~TRAFFIC SIGNAL PLANS~~
~~84~~	~~BICYCLE LOOP DETECTOR DETAILS~~
~~85-112~~	~~TEMPORARY TRAFFIC CONTROL PLANS~~
113-114	CONSTRUCTION DETAILS (RESOURCE AREAS ONLY)
~~115-116~~	~~WHEELCHAIR RAMP DETAILS~~
117-175	CROSS SECTIONS (RESOURCE AREAS ONLY)



NOVEMBER 2016

0 2000 4000 6000 8000

SCALE: 1" = 2000'

LENGTH OF PROJECT = 6,135 FEET = 1.162 MILES

DESIGN DESIGNATION

	BROADWAY(WEST OF LAKE ST.)	BROADWAY(EAST OF FOREST ST.)
DESIGN SPEED	40 MPH	40 MPH
ADT (2014)	13,000	18,500
ADT (2024)	13,600	19,500
K	9.1%	7.9%
D	58% SB	59% NB
T (PEAK HOUR)	4%	2%
T (AVERAGE DAY)	6%	4%
DHV	1,250	1,550
DDHV	725	920
FUNCTIONAL CLASSIFICATION	URBAN MINOR 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

COMMONWEALTH OF MASSACHUSETTS
CHRISTER ERICSSON CIVIL No. 36428 REGISTERED PROFESSIONAL ENGINEER

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

607573_HD (CS).DWG Plotted on 4-Nov-2016 3:24 PM

GENERAL SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
JB	JB	JERSEY BARRIER
CB	CB	CATCH BASIN
		CATCH BASIN CURB INLET
FP	FP	FLAG POLE
GP	GP	GAS PUMP
MB	MB	MAIL BOX
		POST SQUARE
		POST CIRCULAR
WELL	WELL	WELL
EHH	EHH	ELECTRIC HANDHOLE
		FENCE GATE POST
GG	GG	GAS GATE
BHL #	BHL #	BORING HOLE
MW #	MW #	MONITORING WELL
TP #	TP #	TEST PIT
		HYDRANT
		LIGHT POLE
CO.BD.		COUNTY BOUND
		GPS POINT
		CABLE MANHOLE
		DRAINAGE MANHOLE
		ELECTRIC MANHOLE
		GAS MANHOLE
		MISC MANHOLE
		SEWER MANHOLE
		TELEPHONE MANHOLE
		WATER MANHOLE
MHB	MHB	MASSACHUSETTS HIGHWAY BOUND
MON		MONUMENT
SB		STONE BOUND
TB		TOWN OR CITY BOUND
		TRAVERSE OR TRIANGULATION STATION
TPL or GUY	TPL or GUY	TROLLEY POLE OR GUY POLE
HTP		TRANSMISSION POLE
UFB	UFB	UTILITY POLE W/ FIREBOX
UPDL	UPDL	UTILITY POLE WITH DOUBLE LIGHT
ULT	ULT	UTILITY POLE W / 1 LIGHT
UPL	UPL	UTILITY POLE
		BUSH
•SIZE & TYPE		TREE
		STUMP
		SWAMP / MARSH
WG	WG	WATER GATE
PM	PM	PARKING METER
		OVERHEAD CABLE/WIRE
		CURBING
100 99		CONTOURS (ON-THE-GROUND SURVEY DATA)
100 99		CONTOURS (PHOTOGRAMMETRIC DATA)
		UNDERGROUND DRAIN PIPE (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND ELECTRIC DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND GAS MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND SEWER MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND TELEPHONE DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND WATER MAIN (DOUBLE LINE 24 INCH AND OVER)
		BALANCED STONE WALL
		GUARD RAIL - STEEL POSTS
		GUARD RAIL - WOOD POSTS
x	x	CHAIN LINK OR METAL FENCE
		WOOD FENCE
		COMPOST FILTER TUBES
		TREE LINE
		SAWCUT LINE
		TOP OR BOTTOM OF SLOPE
		LIMIT OF EDGE OF PAVEMENT OR COLD PLANE AND OVERLAY
		BANK OF RIVER OR STREAM
		BORDER OF WETLAND
		100 FT WETLAND BUFFER
		200 FT RIVERFRONT BUFFER
		STATE HIGHWAY LAYOUT
		TOWN OR CITY LAYOUT
		COUNTY LAYOUT
		RAILROAD SIDELINE
		TOWN OR CITY BOUNDARY LINE
		PROPERTY LINE OR APPROXIMATE PROPERTY LINE
		EASEMENT

PAVEMENT MARKINGS SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
		PAVEMENT ARROW - WHITE
ONLY	ONLY	LEGEND "ONLY" - WHITE
	SL	STOP LINE (12" WHITE)
	CW	CROSSWALK (12" OR 24")
	SWL	SOLID WHITE LINE (6" OR 12")
	SYL	SOLID YELLOW LINE (6" OR 12")
	BWL	* BROKEN WHITE LINE (6")
	BYL	* BROKEN YELLOW LINE (6")
	DWL	** DOTTED WHITE LINE (6")
	DYL	** DOTTED YELLOW LINE (6")
	DWLEx	** DOTTED WHITE LINE EXTENSION (6")
	DYLEx	** DOTTED YELLOW LINE EXTENSION (6")
	DBWL	* DOUBLE WHITE LINE (6")
	DBYL	* DOUBLE YELLOW LINE (6")

* BROKEN WHITE/YELLOW LINES TO BE 10' IN LENGTH WITH 30' GAP (TYP.)
** DOTTED WHITE/YELLOW LINES TO BE 2' IN LENGTH WITH 6' GAP (TYP.)

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 (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. THE LIMIT OF WORK AREA SHALL BE THE STREET RIGHT OF WAY UNLESS SHOWN OTHERWISE.
13. 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.
14. ALL CASTINGS SHALL BE SET FLUSH WITH FINISHED GRADE.
15. ALL PUBLICLY OWNED GATE BOXES, SERVICE BOXES, MANHOLE FRAMES AND COVERS SHALL BE ADJUSTED TO GRADE BY THE CONTRACTOR.
16. ALL NEW SIDEWALKS AND DRIVEWAY GRADES SHALL MATCH EXISTING GRADES AT BACK OF SIDEWALK LINE UNLESS SHOWN OTHERWISE ON THE PLANS AND CROSS-SECTIONS.
17. THE CONTRACTOR SHALL TAKE EVERY PRECAUTION TO PROTECT ALL EXISTING TREES AND ROOTS THAT ARE NOT DESIGNATED FOR REMOVAL.
18. CONTRACTOR TO CONTACT ENGINEER PRIOR TO INSTALLATION OF BOUNDS FOR FINAL LOCATIONS.
19. DRAINAGE ELEVATIONS ARE PROVIDED FOR DESIGN PURPOSES ONLY. THE CONTRACTOR SHALL VERIFY BY TEST PIT, THE LOCATIONS OF EXISTING UTILITIES WHICH MAY CONFLICT WITH THE PROPOSED DRAINAGE DESIGN. ANY FIELD ADJUSTMENTS REQUIRED WILL BE MADE AS APPROVED OR DIRECTED BY THE ENGINEER. ONLY AFTER THE CONTRACTOR VERIFIES ELEVATIONS FOR THE 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.

HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	2	175
PROJECT FILE NO.	607573		

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	HYD	HYDRANT	R&S	REMOVE AND STACK
CBCI	CATCH BASIN WITH CURB INLET	INV	INVERT	RT	RIGHT
CC	CEMENT CONCRETE	JCT	JUNCTION	SAW	SAWCUT
CCM	CEMENT CONCRETE MASONRY	L	LENGTH OF CURVE	SB	STONE BOUND
CEM	CEMENT	LB	LEACH BASIN	SHLD	SHOULDER
CI	CURB INLET	LP	LIGHT POLE	SMH	SEWER MANHOLE
CIP	CAST IRON PIPE	LT	LEFT	ST	STREET
CLF	CHAIN LINK FENCE	MAX	MAXIMUM	STA	STATION
CL	CENTERLINE	MB	MAILBOX	SSD	STOPPING SIGHT DISTANCE
CMP	CORRUGATED METAL PIPE	MH	MANHOLE	SHLO	STATE HIGHWAY LAYOUT LINE
CSP	CORRUGATED STEEL PIPE	MHB	MASSACHUSETTS HIGHWAY BOUND	SW	SIDEWALK
CO.	COUNTY	MIN	MINIMUM	T	TANGENT DISTANCE OF CURVE/TRUCK %
CONC	CONCRETE	NIC	NOT IN CONTRACT	TAN	TANGENT
CONT	CONTINUOUS	NO.	NUMBER	TEMP	TEMPORARY
CONST	CONSTRUCTION	PC	POINT OF CURVATURE	TC	TOP OF CURB
CR GR	CROWN GRADE	PCC	POINT OF COMPOUND CURVATURE	TOS	TOP OF SLOPE
DHV	DESIGN HOURLY VOLUME	P.G.L.	PROFILE GRADE LINE	TYP	TYPICAL
DI	DROP INLET	PI	POINT OF INTERSECTION	UP	UTILITY POLE
DIA	DIAMETER	POC	POINT ON CURVE	VAR	VARIES
DIP	DUCTILE IRON PIPE	POT	POINT ON TANGENT	VERT	VERTICAL
DW	STEADY DON'T WALK - PORTLAND ORANGE	PRC	POINT OF REVERSE CURVATURE	VC	VERTICAL CURVE
DWY	DRIVEWAY	PROJ	PROJECT	WCR	WHEEL CHAIR RAMP
ELEV (or EL.)	ELEVATION	PROP	PROPOSED	WG	WATER GATE
EMB	EMBANKMENT	PSB	PLANTABLE SOIL BORROW	WIP	WROUGHT IRON PIPE
EOP	EDGE OF PAVEMENT	PT	POINT OF TANGENCY	WM	WATER METER/WATER MAIN
EXIST (or EX)	EXISTING	PTH	PLANIMETER TO HERE	X-SECT	CROSS SECTION
EXC	EXCAVATION	PVC	POINT OF VERTICAL CURVATURE		

607573_HD (LE).DWG Plotted on 4-Nov-2016 3:24 PM

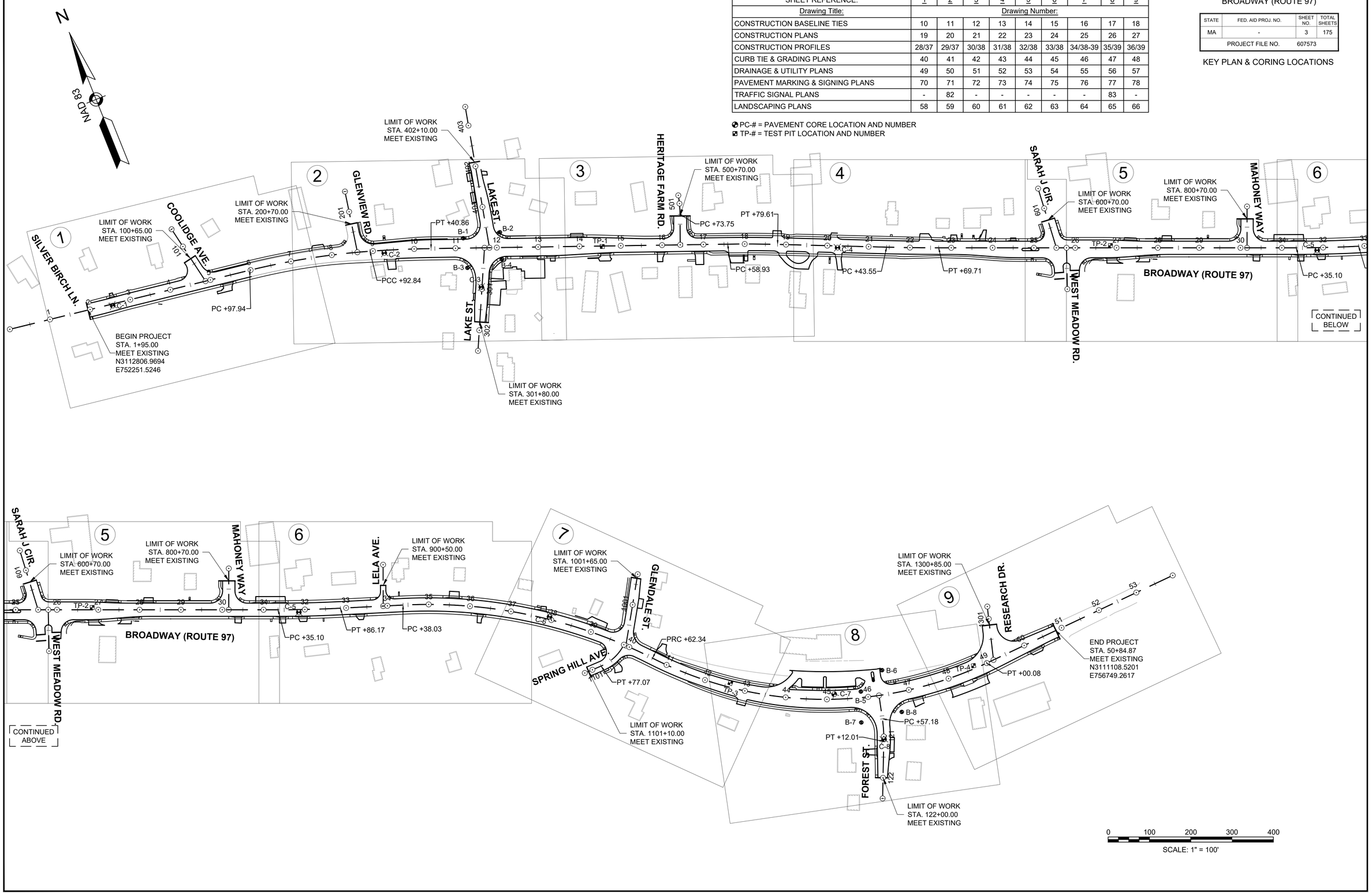
SHEET REFERENCE:	1	2	3	4	5	6	7	8	9
Drawing Title:	Drawing Number:								
CONSTRUCTION BASELINE TIES	10	11	12	13	14	15	16	17	18
CONSTRUCTION PLANS	19	20	21	22	23	24	25	26	27
CONSTRUCTION PROFILES	28/37	29/37	30/38	31/38	32/38	33/38	34/38-39	35/39	36/39
CURB TIE & GRADING PLANS	40	41	42	43	44	45	46	47	48
DRAINAGE & UTILITY PLANS	49	50	51	52	53	54	55	56	57
PAVEMENT MARKING & SIGNING PLANS	70	71	72	73	74	75	76	77	78
TRAFFIC SIGNAL PLANS	-	82	-	-	-	-	-	83	-
LANDSCAPING PLANS	58	59	60	61	62	63	64	65	66

PC-# = PAVEMENT CORE LOCATION AND NUMBER
TP-# = TEST PIT LOCATION AND NUMBER

HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	3	175
PROJECT FILE NO.	607573		

KEY PLAN & CORING LOCATIONS

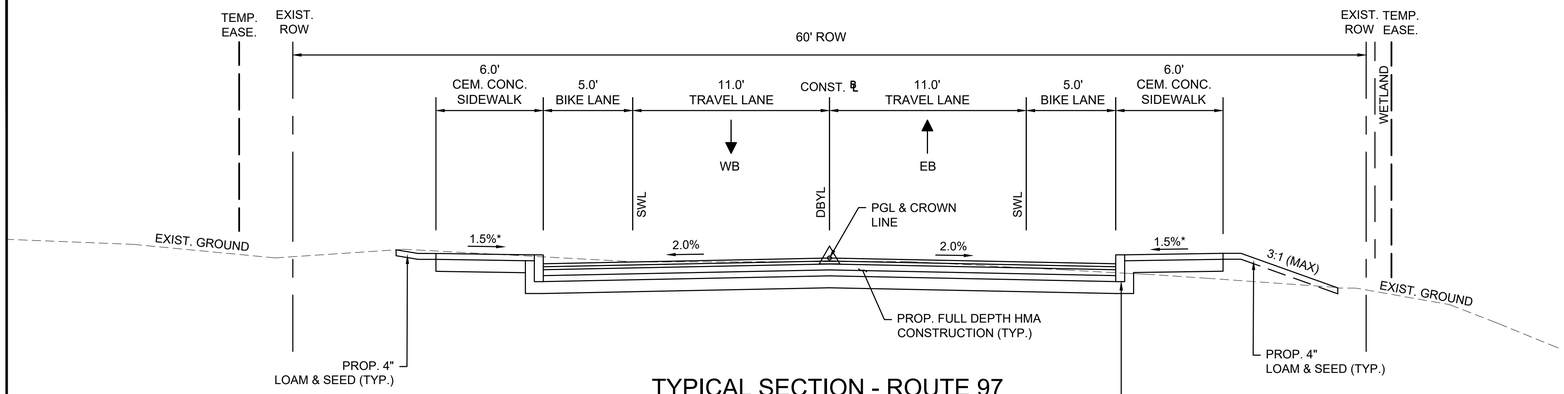


607573_HD (KEY).DWG Plotted on 4-Nov-2016 3:26 PM

HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	6	175
PROJECT FILE NO.	607573		

TYPICAL SECTIONS

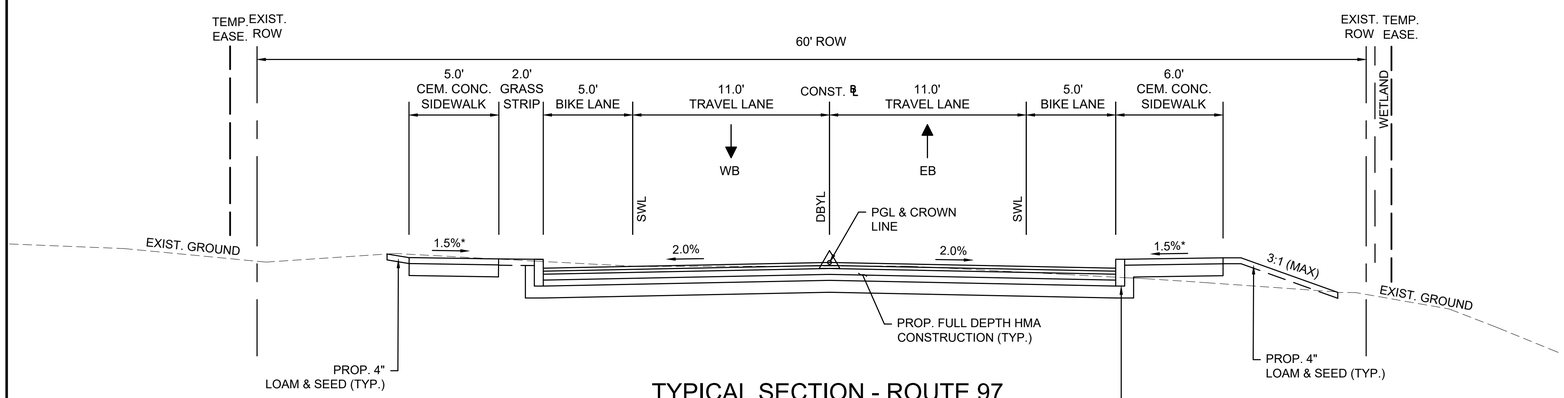


* - TOLERANCE FOR CONSTRUCTION ±0.5% (TYP.)

TYPICAL SECTION - ROUTE 97

STA. 2+30 - 5+17
STA. 15+00 - 16+90
STA. 28+00 - 41+50
STA. 48+80 - 50+45

SCALE: 1" = 4'

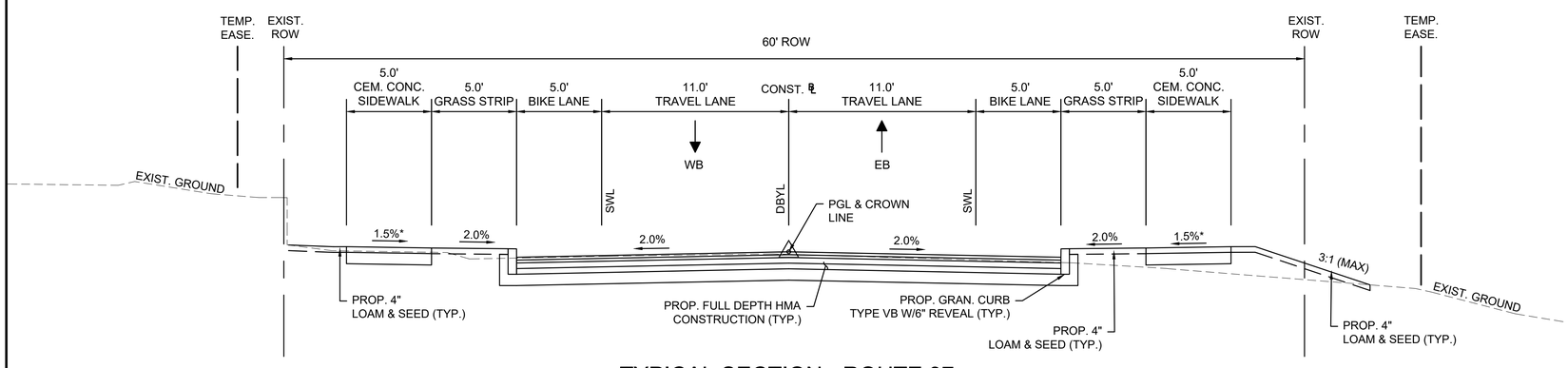


* - TOLERANCE FOR CONSTRUCTION ±0.5% (TYP.)

TYPICAL SECTION - ROUTE 97

STA. 5+17 - 8+20

SCALE: 1" = 4'



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

TYPICAL SECTION - ROUTE 97

STA. 16+90 - 23+00
STA. 41+50 - 43+50

SCALE: 1" = 4'

4 0 4 8

SCALE 1" = 4'

PAVEMENT NOTES

FULL DEPTH HMA CONSTRUCTION

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

BASE: 4" 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)

MICROMILLING & HMA OVERLAY

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

SURFACE MILLING: VARIABLE DEPTH (1-1/4" MIN.) PAVEMENT MICROMILLING (ITEM 415.)
TO BE USED ON THE EXISTING PAVEMENT SURFACE TO ACHIEVE DESIRED CROSS-SLOPE

TACK COAT: ASPHALT EMULSION FOR TACK COAT SHALL BE APPLIED AT THE RATE OF
0.07 GAL/S.Y. FOR MILLED SURFACES.

FULL DEPTH HMA CONSTRUCTION LESS THAN 4 FEET

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

BASE: 6" HIGH EARLY STRENGTH CEMENT CONCRETE BASE COURSE

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

CEMENT CONCRETE SIDEWALK, ISLANDS, WHEELCHAIR RAMPS AND WALKWAYS

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

SUBBASE: 8" GRAVEL BORROW TYPE B

CEMENT CONCRETE SIDEWALK AT DRIVEWAY APRONS

SURFACE COURSE: 6" CEMENT CONCRETE (AIR ENTRAINED 4000 PSI, 3/4", 610) OVER

SUBBASE: 8" GRAVEL BORROW TYPE B

HMA DRIVEWAYS

SURFACE COURSE: 1-1/2" 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

HMA SIDEWALK AND WALKWAYS

SURFACE COURSE: 1" SUPERPAVE SURFACE COURSE 9.5 (SSC-9.5) OVER
1-1/2" 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.

   STA. 1+95 - STA. 2+30
   STA. 7+48 - STA. 10+24
   STA. 13+34 - STA. 15+00
   STA. 23+00 - STA. 24+65
   STA. 25+12 - STA. 26+00

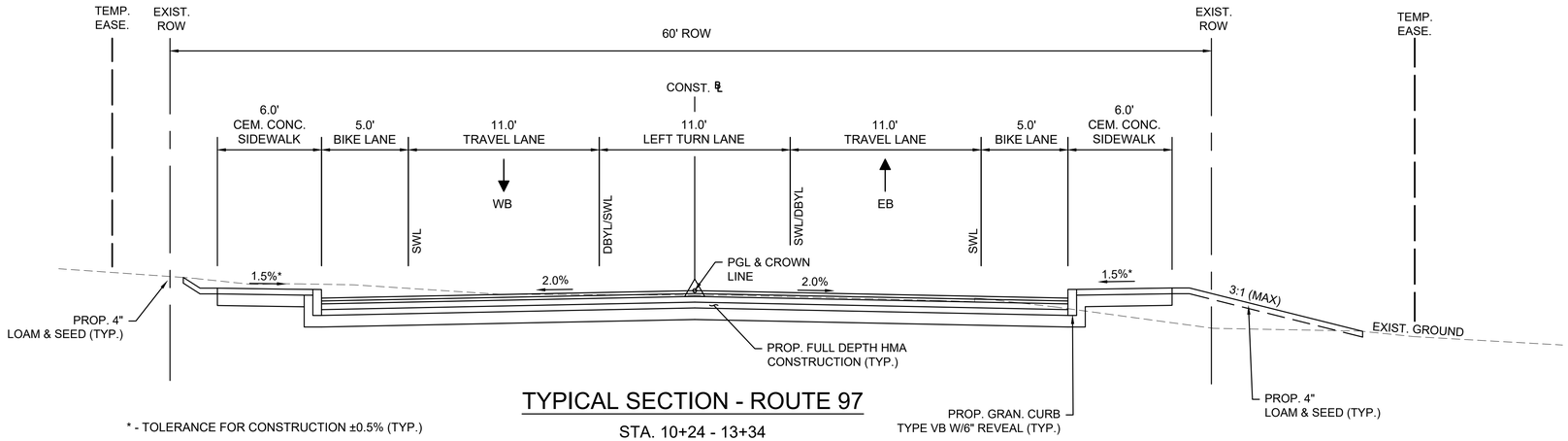
2. ASPHALT EMULSION FOR TACK COAT (RS-1) SHALL BE APPLIED AT THE RATE OF 0.07 GALLONS PER SQUARE YARD OVER MILLED SURFACES AND 0.05 GALLONS PER SQUARE YARD OVER TIGHT PAVED SURFACES PER SECTION 450.53.

607573_HD (TYP).DWG Plotted on 4-Nov-2016 3:26 PM

HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	7	175
PROJECT FILE NO.	607573		

TYPICAL SECTIONS

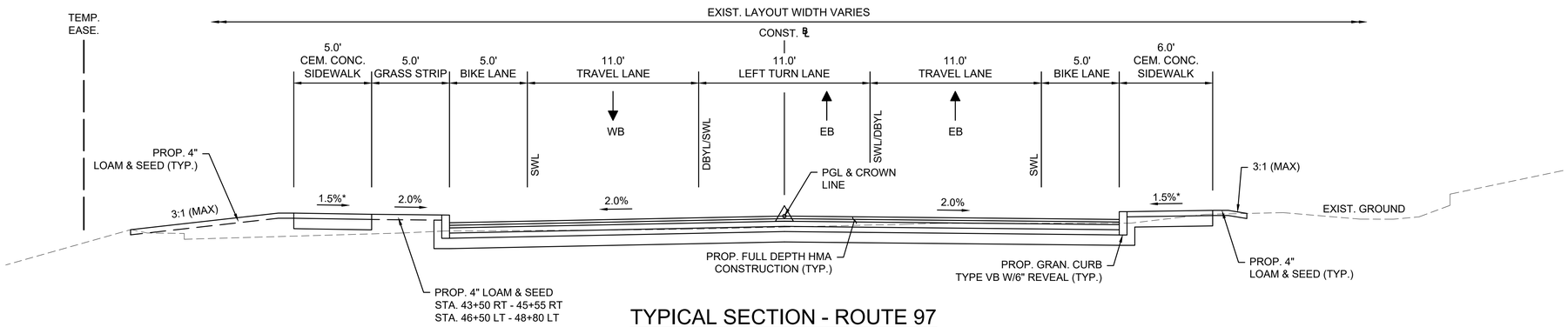


TYPICAL SECTION - ROUTE 97

STA. 10+24 - 13+34
STA. 26+00 - 27+00

SCALE: 1" = 4'

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

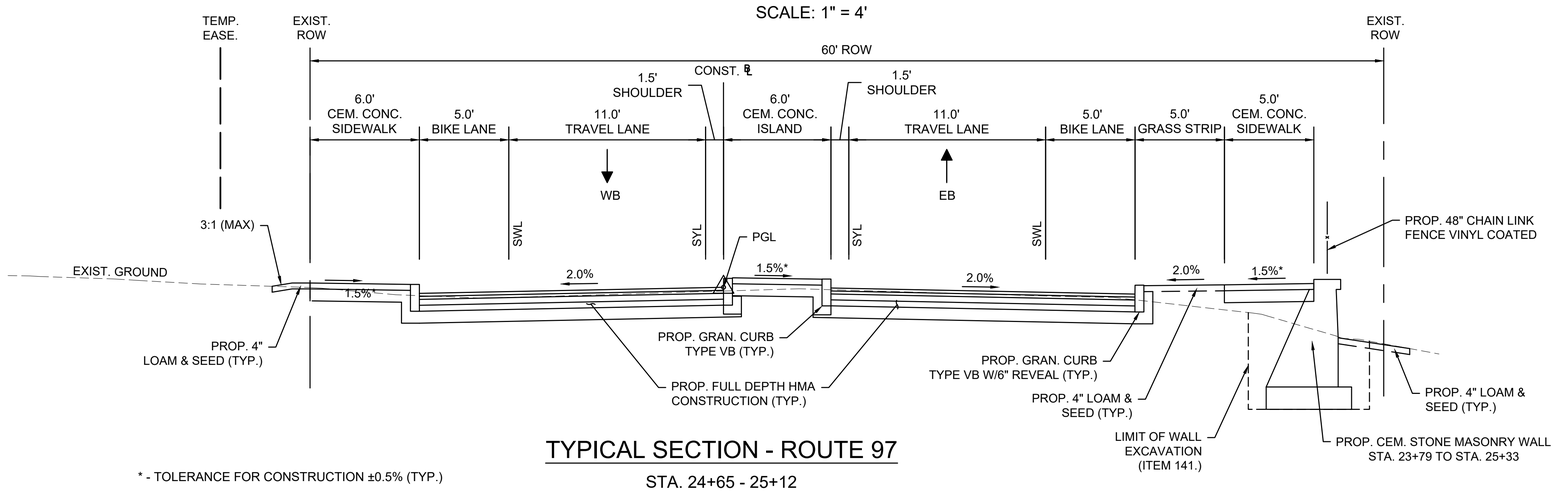


TYPICAL SECTION - ROUTE 97

STA. 43+50 - 48+80

SCALE: 1" = 4'

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



TYPICAL SECTION - ROUTE 97

STA. 24+65 - 25+12

SCALE: 1" = 4'

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

4 0 4 8

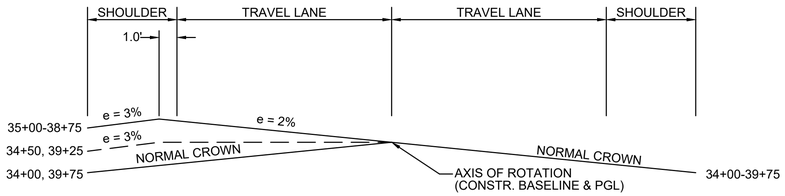
SCALE 1" = 4'

607573_HD (TYP).DWG Plotted on 4-Nov-2016 3:26 PM

HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	9	175
PROJECT FILE NO.	607573		

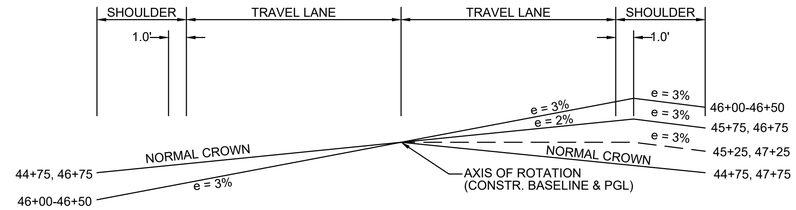
TYPICAL SECTIONS



METHOD OF BANKING

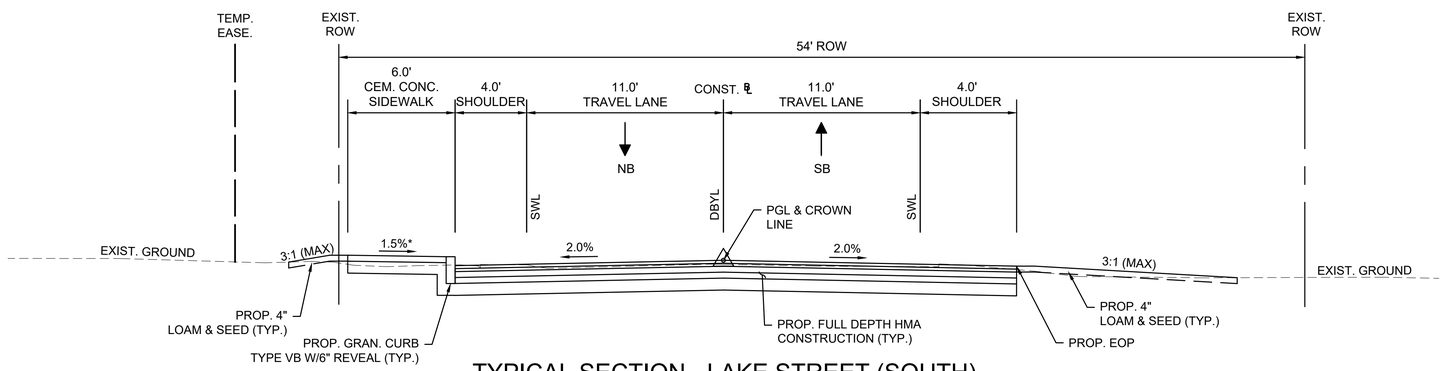
CURVE 7
PC = 34+38.16
PRC = 40+62.47
R = 1200'
BANK = 2%

CURVE 7
PC = 34+38.16
PRC = 40+62.47
R = 1200'
BANK = 2%



METHOD OF BANKING

CURVE 8
PRC = 40+62.47
PT = 49+00.20
R = 920'
BANK = 3%

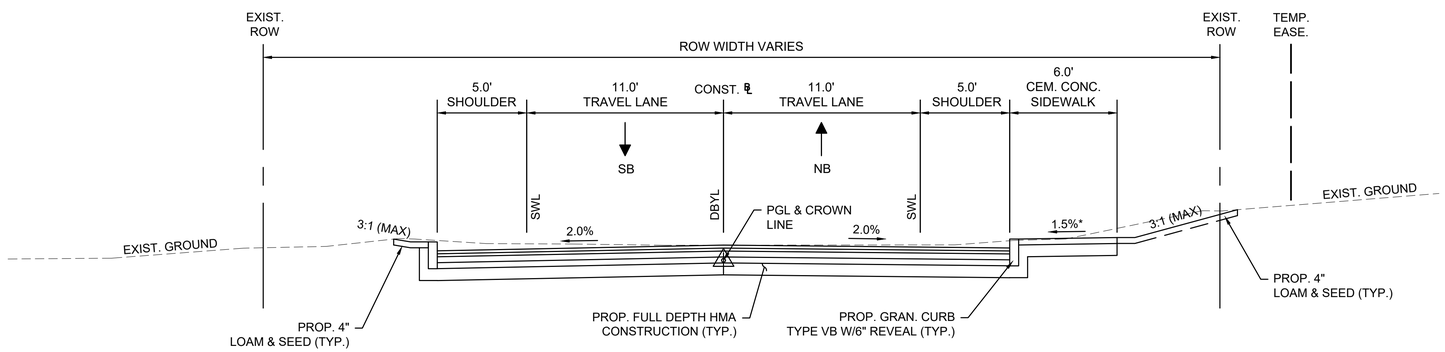


TYPICAL SECTION - LAKE STREET (SOUTH)

STA. 300+50 - 301+35

SCALE: 1" = 4'

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



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

TYPICAL SECTION - FOREST STREET

STA. 120+50 - 121+80

SCALE: 1" = 4'

4 0 4 8

SCALE 1" = 4'

607573_HD (TYP).DWG Plotted on 4-Nov-2016 3:26 PM

HAVERHILL
BROADWAY (ROUTE 97)

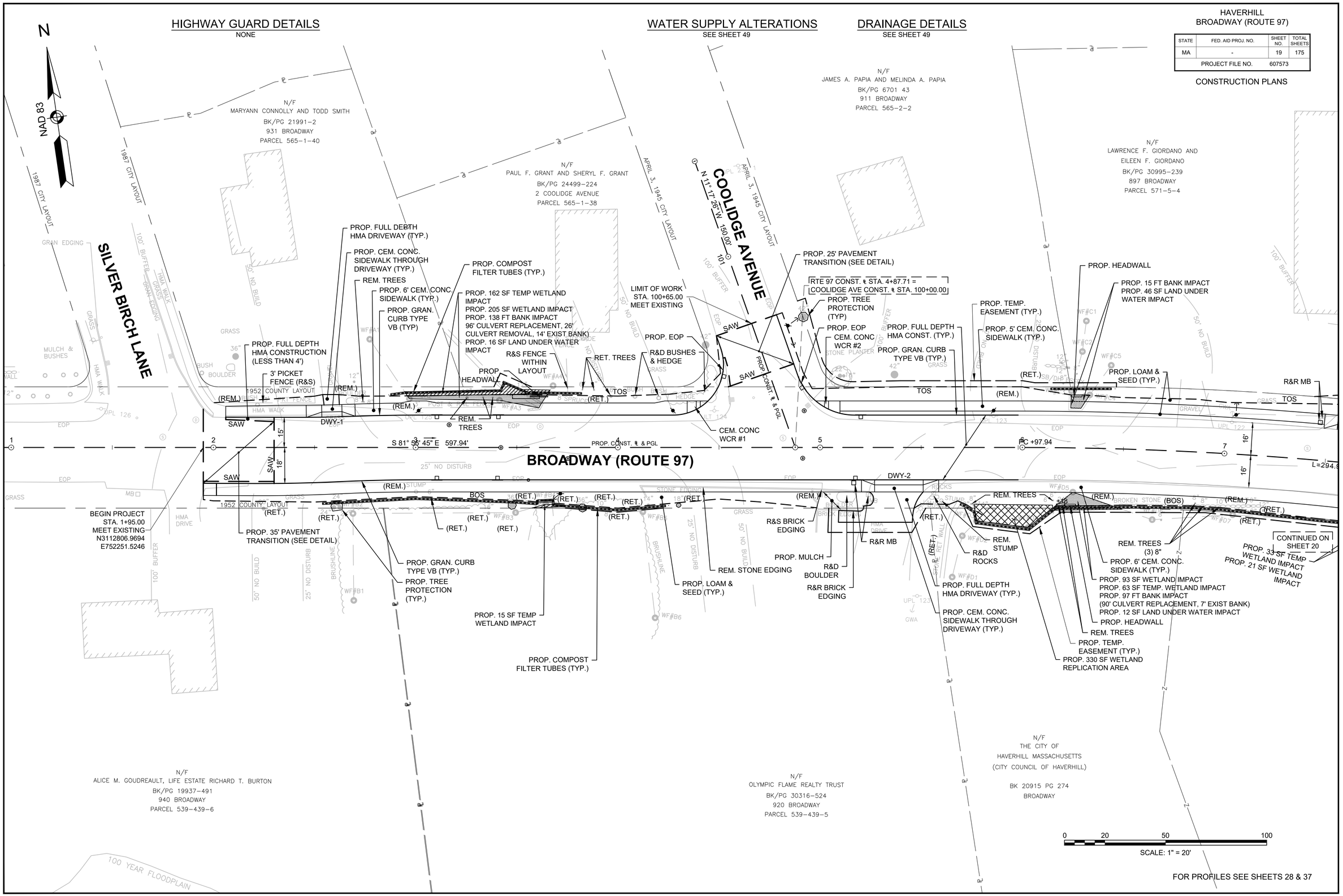
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	19	175
PROJECT FILE NO.	607573		

CONSTRUCTION PLANS

HIGHWAY GUARD DETAILS
NONE

WATER SUPPLY ALTERATIONS
SEE SHEET 49

DRAINAGE DETAILS
SEE SHEET 49



FOR PROFILES SEE SHEETS 28 & 37

607573_HD (CO).DWG Plotted on 7-Nov-2016 8:54 AM

HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
SEE SHEET 82

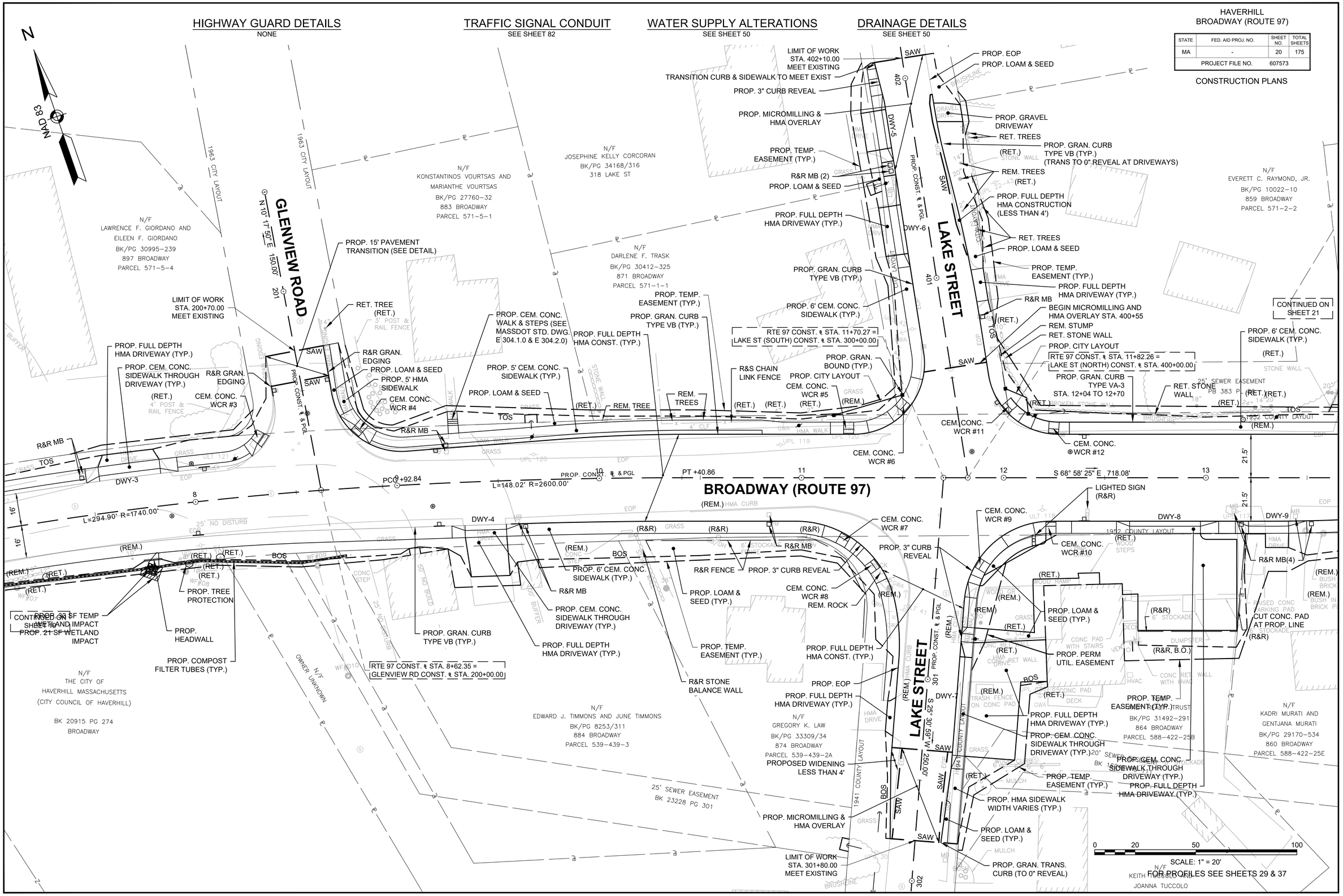
WATER SUPPLY ALTERATIONS
SEE SHEET 50

DRAINAGE DETAILS
SEE SHEET 50

HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	20	175
PROJECT FILE NO.	607573		

CONSTRUCTION PLANS



FOR PROFILES SEE SHEETS 29 & 37

607573_HD (CO).DWG Plotted on 4-Nov-2016 3:29 PM

HIGHWAY GUARD DETAILS
NONE

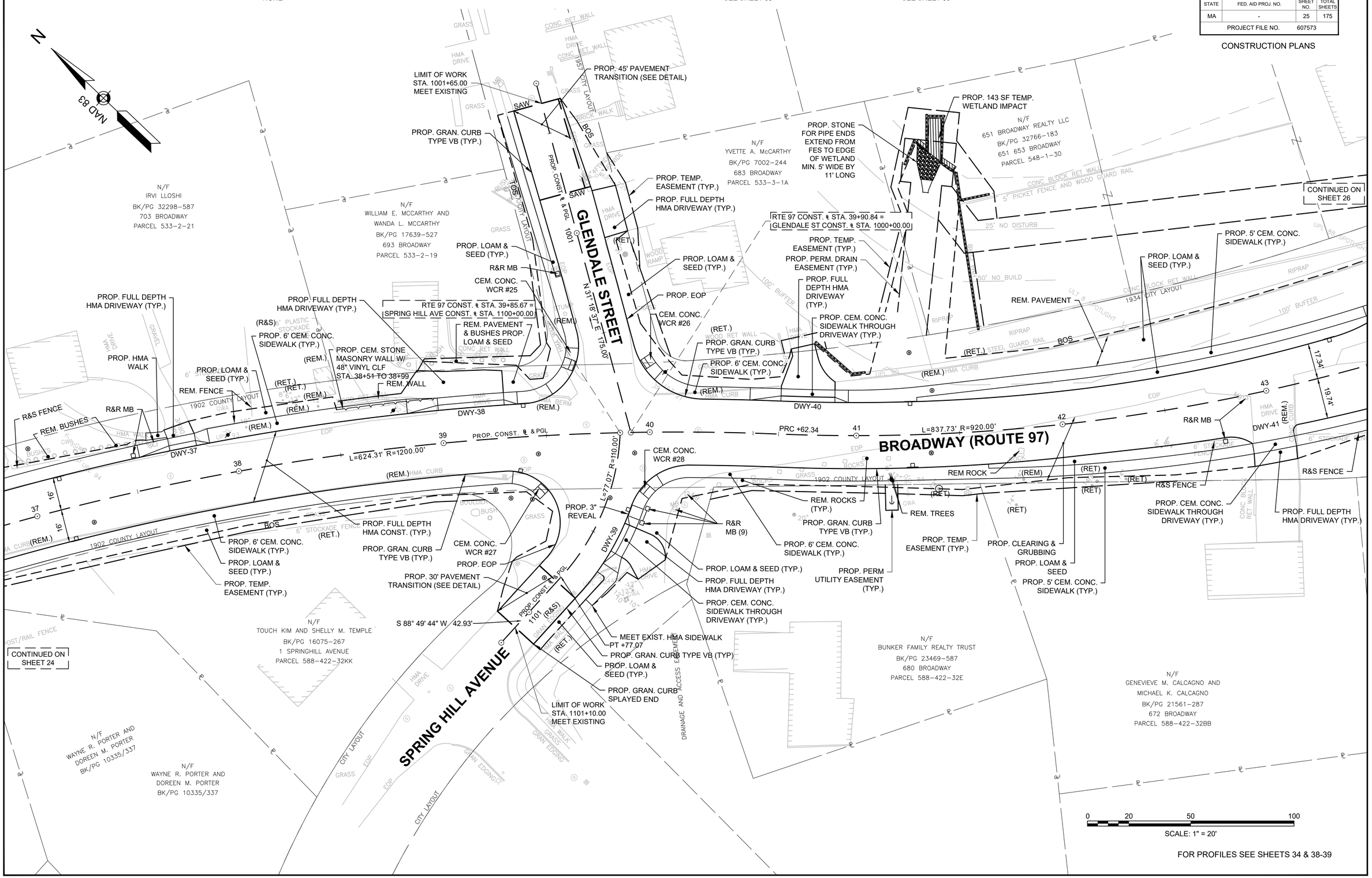
WATER SUPPLY ALTERATIONS
SEE SHEET 55

DRAINAGE DETAILS
SEE SHEET 55

HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	25	175
PROJECT FILE NO.	607573		

CONSTRUCTION PLANS



FOR PROFILES SEE SHEETS 34 & 38-39

607573_HD (CO).DWG Plotted on 4-Nov-2016 3:29 PM

HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
SEE SHEET 83

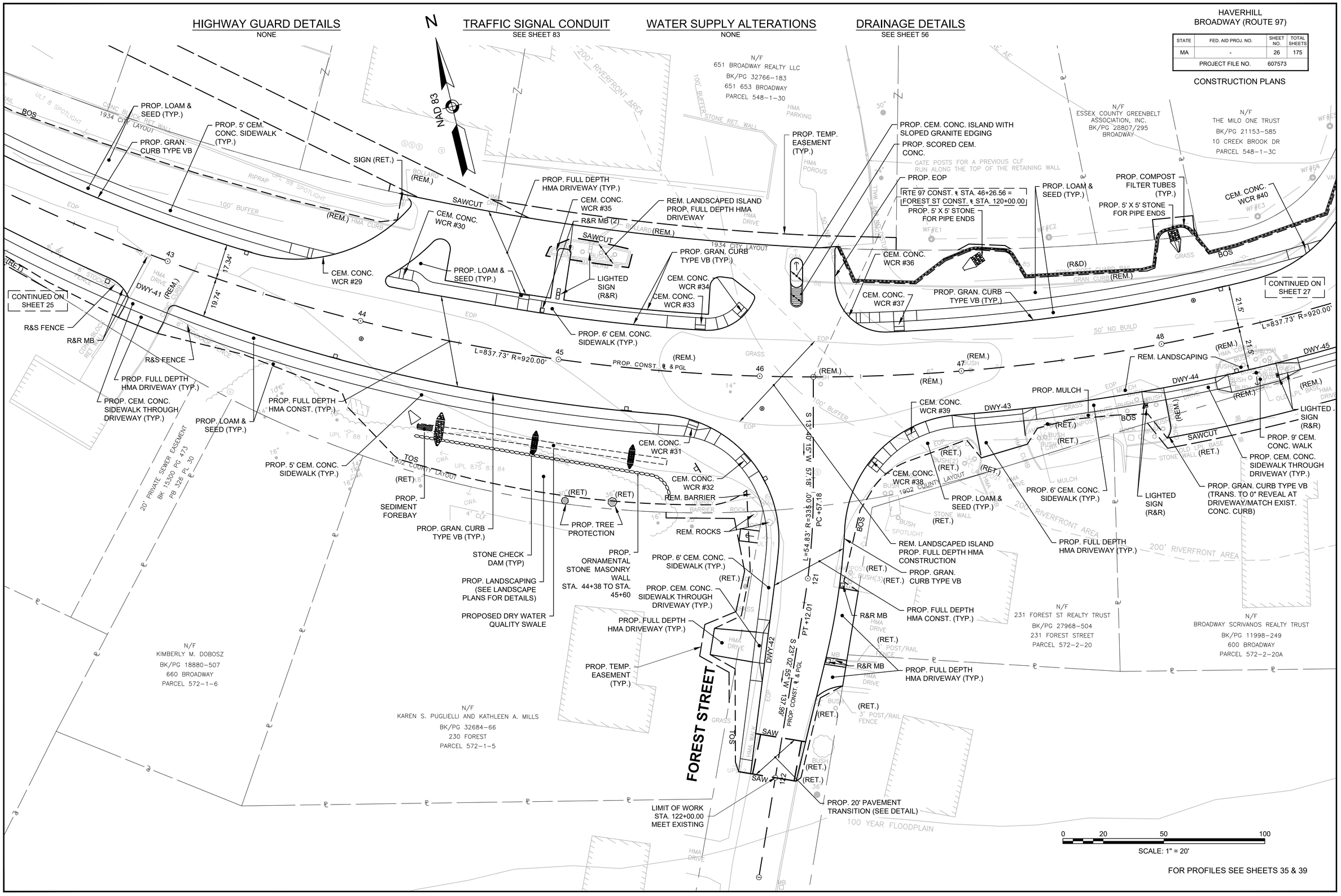
WATER SUPPLY ALTERATIONS
NONE

DRAINAGE DETAILS
SEE SHEET 56

HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	26	175
PROJECT FILE NO.	607573		

CONSTRUCTION PLANS



FOR PROFILES SEE SHEETS 35 & 39

607573_HD (CO).DWG Plotted on 4-Nov-2016 3:29 PM

HIGHWAY GUARD DETAILS
STA. 50+87, 16.5' LEFT - STEEL W BEAM TERMINAL SECTION

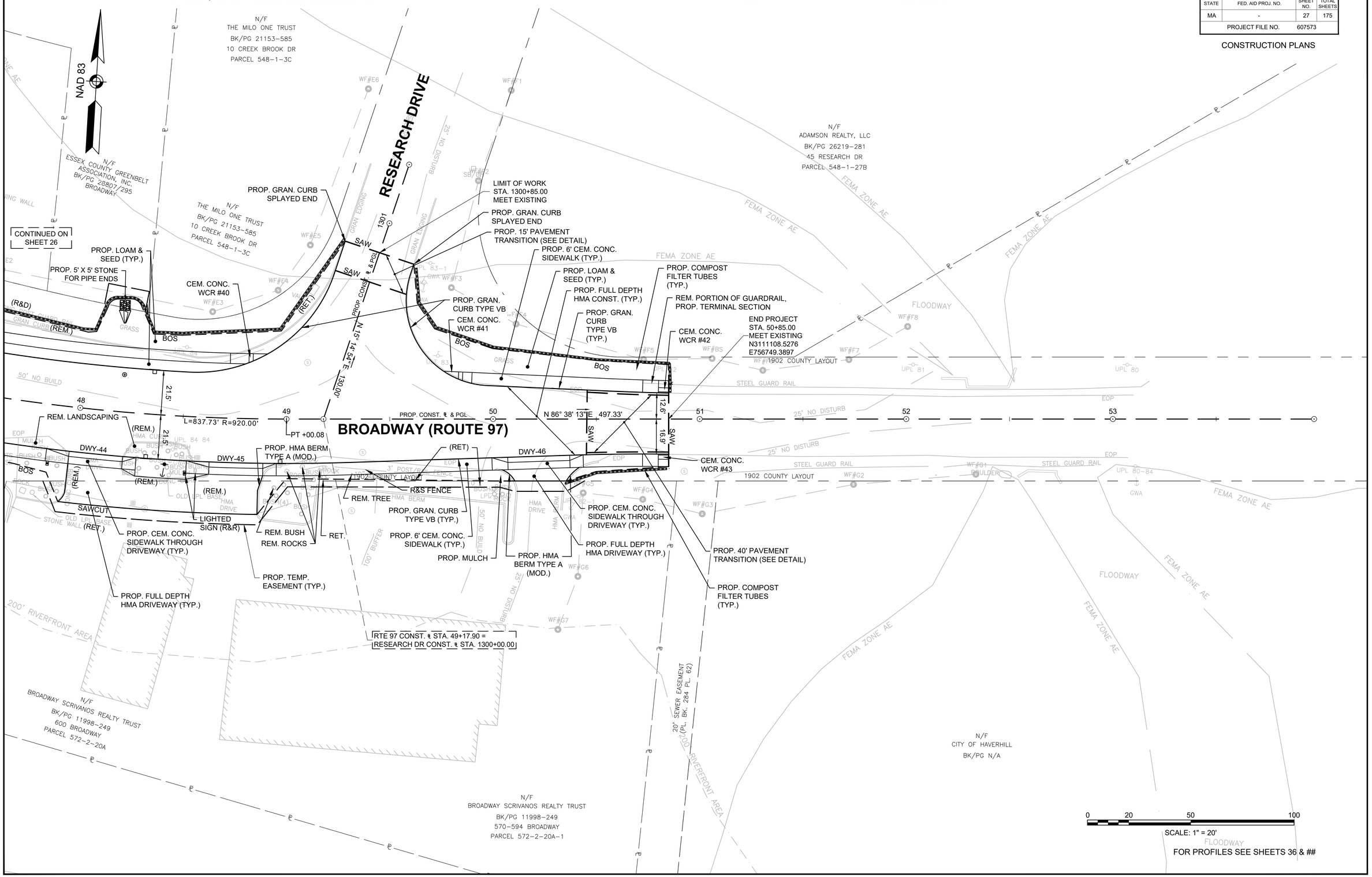
WATER SUPPLY ALTERATIONS
NONE

DRAINAGE DETAILS
SEE SHEET 57

HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	27	175
PROJECT FILE NO.	607573		

CONSTRUCTION PLANS



FOR PROFILES SEE SHEETS 36 & ##

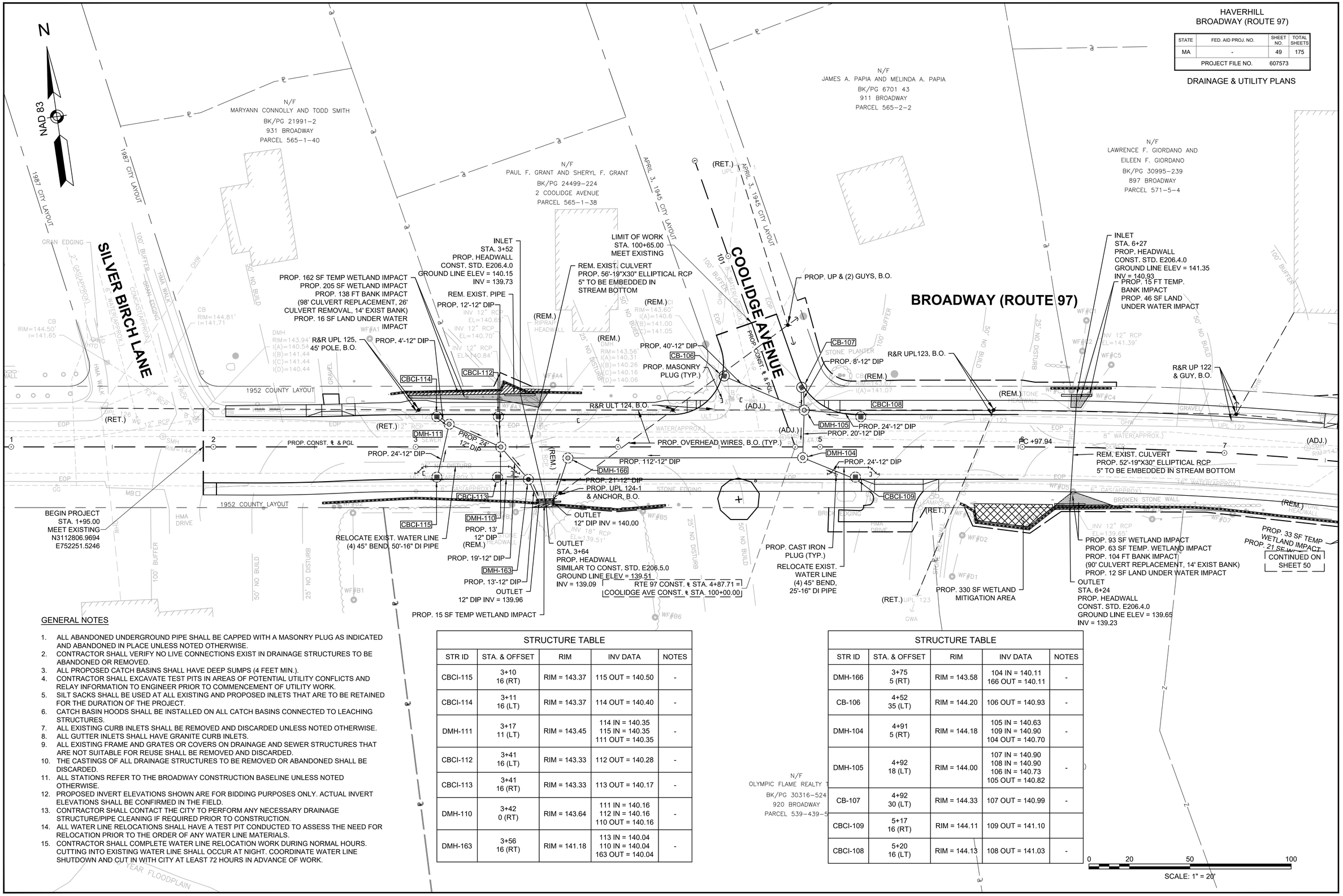
607573_HD (CO).DWG Plotted on 4-Nov-2016 3:29 PM

HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	49	175
PROJECT FILE NO.	607573		

DRAINAGE & UTILITY PLANS

607573_HD (DU).DWG Plotted on 7-Nov-2016 9:11 AM



GENERAL NOTES

1. ALL ABANDONED UNDERGROUND PIPE SHALL BE CAPPED WITH A MASONRY PLUG AS INDICATED AND ABANDONED IN PLACE UNLESS NOTED OTHERWISE.
2. CONTRACTOR SHALL VERIFY NO LIVE CONNECTIONS EXIST IN DRAINAGE STRUCTURES TO BE ABANDONED OR REMOVED.
3. ALL PROPOSED CATCH BASINS SHALL HAVE DEEP SUMPS (4 FEET MIN.).
4. CONTRACTOR SHALL EXCAVATE TEST PITS IN AREAS OF POTENTIAL UTILITY CONFLICTS AND RELAY INFORMATION TO ENGINEER PRIOR TO COMMENCEMENT OF UTILITY WORK.
5. SILT SACKS SHALL BE USED AT ALL EXISTING AND PROPOSED INLETS THAT ARE TO BE RETAINED FOR THE DURATION OF THE PROJECT.
6. CATCH BASIN HOODS SHALL BE INSTALLED ON ALL CATCH BASINS CONNECTED TO LEACHING STRUCTURES.
7. ALL EXISTING CURB INLETS SHALL BE REMOVED AND DISCARDED UNLESS NOTED OTHERWISE.
8. ALL GUTTER INLETS SHALL HAVE GRANITE CURB INLETS.
9. ALL EXISTING FRAME AND GRATES OR COVERS ON DRAINAGE AND SEWER STRUCTURES THAT ARE NOT SUITABLE FOR REUSE SHALL BE REMOVED AND DISCARDED.
10. THE CASTINGS OF ALL DRAINAGE STRUCTURES TO BE REMOVED OR ABANDONED SHALL BE DISCARDED.
11. ALL STATIONS REFER TO THE BROADWAY CONSTRUCTION BASELINE UNLESS NOTED OTHERWISE.
12. PROPOSED INVERT ELEVATIONS SHOWN ARE FOR BIDDING PURPOSES ONLY. ACTUAL INVERT ELEVATIONS SHALL BE CONFIRMED IN THE FIELD.
13. CONTRACTOR SHALL CONTACT THE CITY TO PERFORM ANY NECESSARY DRAINAGE STRUCTURE/PIPE CLEANING IF REQUIRED PRIOR TO CONSTRUCTION.
14. ALL WATER LINE RELOCATIONS SHALL HAVE A TEST PIT CONDUCTED TO ASSESS THE NEED FOR RELOCATION PRIOR TO THE ORDER OF ANY WATER LINE MATERIALS.
15. CONTRACTOR SHALL COMPLETE WATER LINE RELOCATION WORK DURING NORMAL HOURS. CUTTING INTO EXISTING WATER LINE SHALL OCCUR AT NIGHT. COORDINATE WATER LINE SHUTDOWN AND CUT IN WITH CITY AT LEAST 72 HOURS IN ADVANCE OF WORK.

STRUCTURE TABLE

STR ID	STA. & OFFSET	RIM	INV DATA	NOTES
CBCI-115	3+10 16 (RT)	RIM = 143.37	115 OUT = 140.50	-
CBCI-114	3+11 16 (LT)	RIM = 143.37	114 OUT = 140.40	-
DMH-111	3+17 11 (LT)	RIM = 143.45	114 IN = 140.35 115 IN = 140.35 111 OUT = 140.35	-
CBCI-112	3+41 16 (LT)	RIM = 143.33	112 OUT = 140.28	-
CBCI-113	3+41 16 (RT)	RIM = 143.33	113 OUT = 140.17	-
DMH-110	3+42 0 (RT)	RIM = 143.64	111 IN = 140.16 112 IN = 140.16 110 OUT = 140.16	-
DMH-163	3+56 16 (RT)	RIM = 141.18	113 IN = 140.04 110 IN = 140.04 163 OUT = 140.04	-

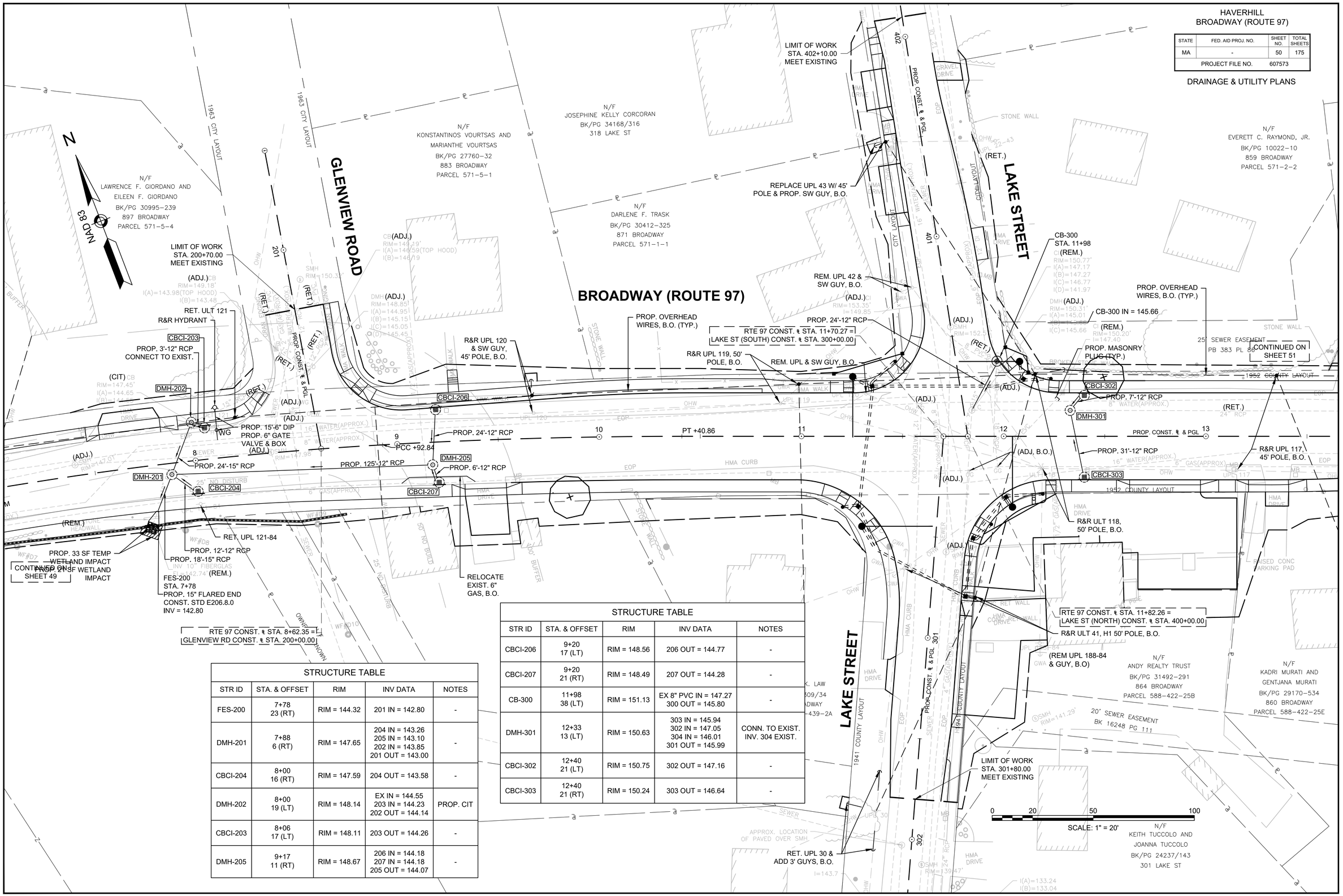
STRUCTURE TABLE

STR ID	STA. & OFFSET	RIM	INV DATA	NOTES
DMH-166	3+75 5 (RT)	RIM = 143.58	104 IN = 140.11 166 OUT = 140.11	-
CB-106	4+52 35 (LT)	RIM = 144.20	106 OUT = 140.93	-
DMH-104	4+91 5 (RT)	RIM = 144.18	105 IN = 140.63 109 IN = 140.90 104 OUT = 140.70	-
DMH-105	4+92 18 (LT)	RIM = 144.00	107 IN = 140.90 108 IN = 140.90 106 IN = 140.73 105 OUT = 140.82	-
CB-107	4+92 30 (LT)	RIM = 144.33	107 OUT = 140.99	-
CBCI-109	5+17 16 (RT)	RIM = 144.11	109 OUT = 141.10	
CBCI-108	5+20 16 (LT)	RIM = 144.13	108 OUT = 141.03	-

HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	50	175
PROJECT FILE NO.	607573		

DRAINAGE & UTILITY PLANS



STRUCTURE TABLE				
STR ID	STA. & OFFSET	RIM	INV DATA	NOTES
FES-200	7+78 23 (RT)	RIM = 144.32	201 IN = 142.80	-
DMH-201	7+88 6 (RT)	RIM = 147.65	204 IN = 143.26 205 IN = 143.10 202 IN = 143.85 201 OUT = 143.00	-
CBCI-204	8+00 16 (RT)	RIM = 147.59	204 OUT = 143.58	-
DMH-202	8+00 19 (LT)	RIM = 148.14	EX IN = 144.55 203 IN = 144.23 202 OUT = 144.14	PROP. CIT
CBCI-203	8+06 17 (LT)	RIM = 148.11	203 OUT = 144.26	-
DMH-205	9+17 11 (RT)	RIM = 148.67	206 IN = 144.18 207 IN = 144.18 205 OUT = 144.07	-

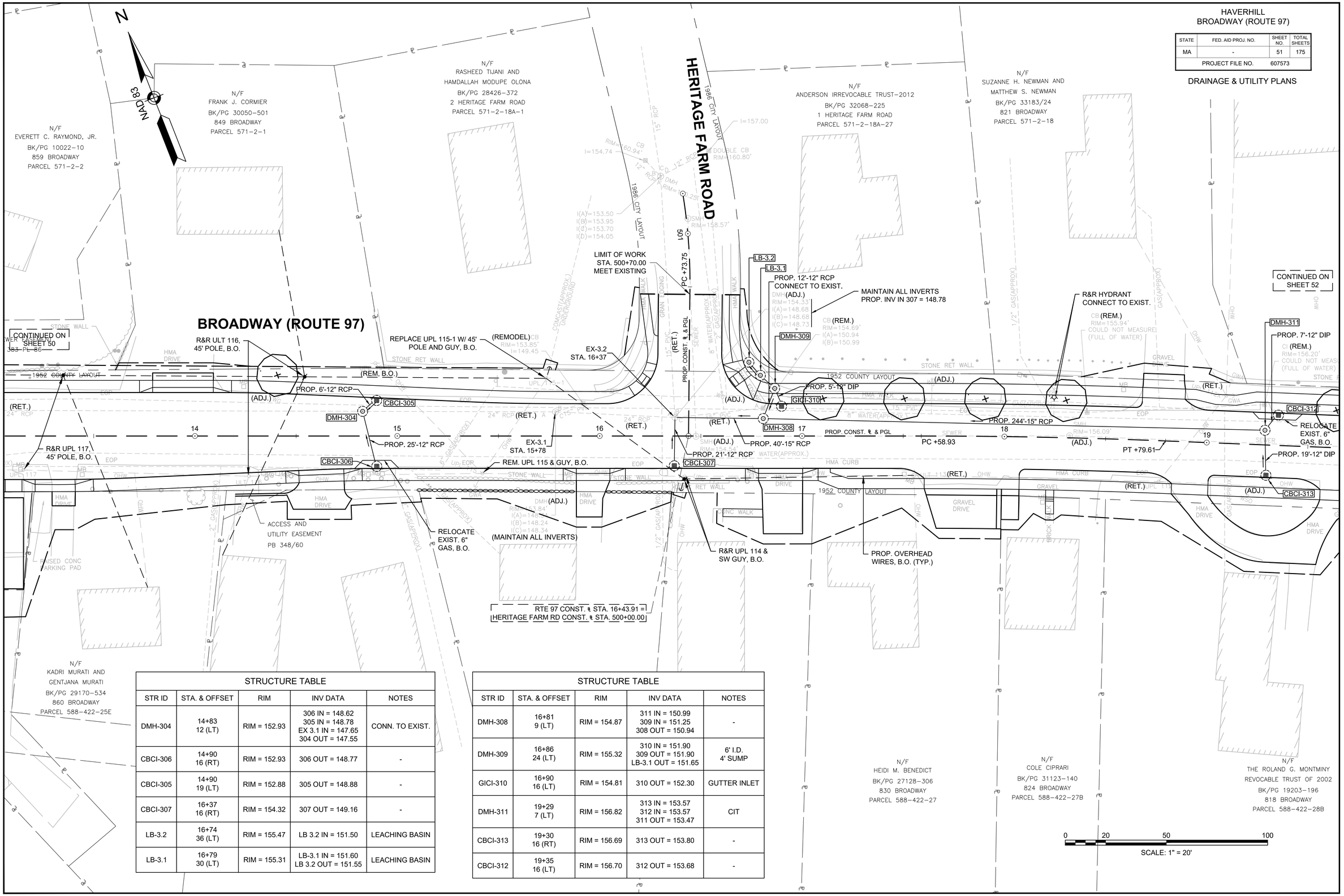
STRUCTURE TABLE				
STR ID	STA. & OFFSET	RIM	INV DATA	NOTES
CBCI-206	9+20 17 (LT)	RIM = 148.56	206 OUT = 144.77	-
CBCI-207	9+20 21 (RT)	RIM = 148.49	207 OUT = 144.28	-
CB-300	11+98 38 (LT)	RIM = 151.13	EX 8" PVC IN = 147.27 300 OUT = 145.80	-
DMH-301	12+33 13 (LT)	RIM = 150.63	303 IN = 145.94 302 IN = 147.05 304 IN = 146.01 301 OUT = 145.99	CONN. TO EXIST. INV. 304 EXIST.
CBCI-302	12+40 21 (LT)	RIM = 150.75	302 OUT = 147.16	-
CBCI-303	12+40 21 (RT)	RIM = 150.24	303 OUT = 146.64	-

607573_HD (DU).DWG Plotted on 4-Nov-2016 4:21 PM

HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	51	175
PROJECT FILE NO.	607573		

DRAINAGE & UTILITY PLANS



STRUCTURE TABLE

STR ID	STA. & OFFSET	RIM	INV DATA	NOTES
DMH-304	14+83 12 (LT)	RIM = 152.93	306 IN = 148.62 305 IN = 148.78 EX 3.1 IN = 147.65 304 OUT = 147.55	CONN. TO EXIST.
CBCI-306	14+90 16 (RT)	RIM = 152.93	306 OUT = 148.77	-
CBCI-305	14+90 19 (LT)	RIM = 152.88	305 OUT = 148.88	-
CBCI-307	16+37 16 (RT)	RIM = 154.32	307 OUT = 149.16	-
LB-3.2	16+74 36 (LT)	RIM = 155.47	LB 3.2 IN = 151.50	LEACHING BASIN
LB-3.1	16+79 30 (LT)	RIM = 155.31	LB-3.1 IN = 151.60 LB 3.2 OUT = 151.55	LEACHING BASIN

STRUCTURE TABLE

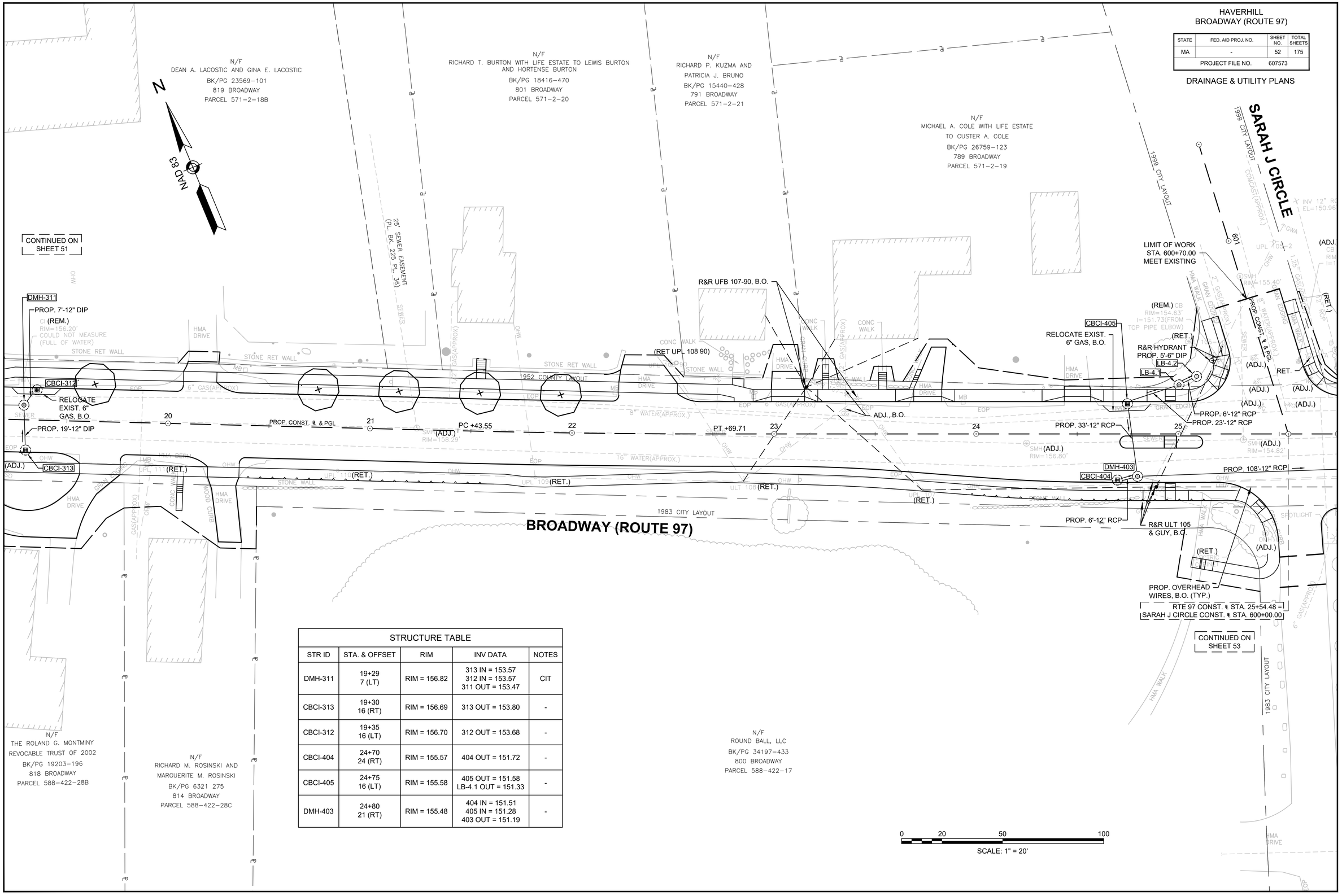
STR ID	STA. & OFFSET	RIM	INV DATA	NOTES
DMH-308	16+81 9 (LT)	RIM = 154.87	311 IN = 150.99 309 IN = 151.25 308 OUT = 150.94	-
DMH-309	16+86 24 (LT)	RIM = 155.32	310 IN = 151.90 309 OUT = 151.90 LB-3.1 OUT = 151.65	6' I.D. 4' SUMP
GICI-310	16+90 16 (LT)	RIM = 154.81	310 OUT = 152.30	GUTTER INLET
DMH-311	19+29 7 (LT)	RIM = 156.82	313 IN = 153.57 312 IN = 153.57 311 OUT = 153.47	CIT
CBCI-313	19+30 16 (RT)	RIM = 156.69	313 OUT = 153.80	-
CBCI-312	19+35 16 (LT)	RIM = 156.70	312 OUT = 153.68	-

607573_HD (DU).DWG Plotted on 4-Nov-2016 4:21 PM

HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	52	175
PROJECT FILE NO.	607573		

DRAINAGE & UTILITY PLANS



STRUCTURE TABLE

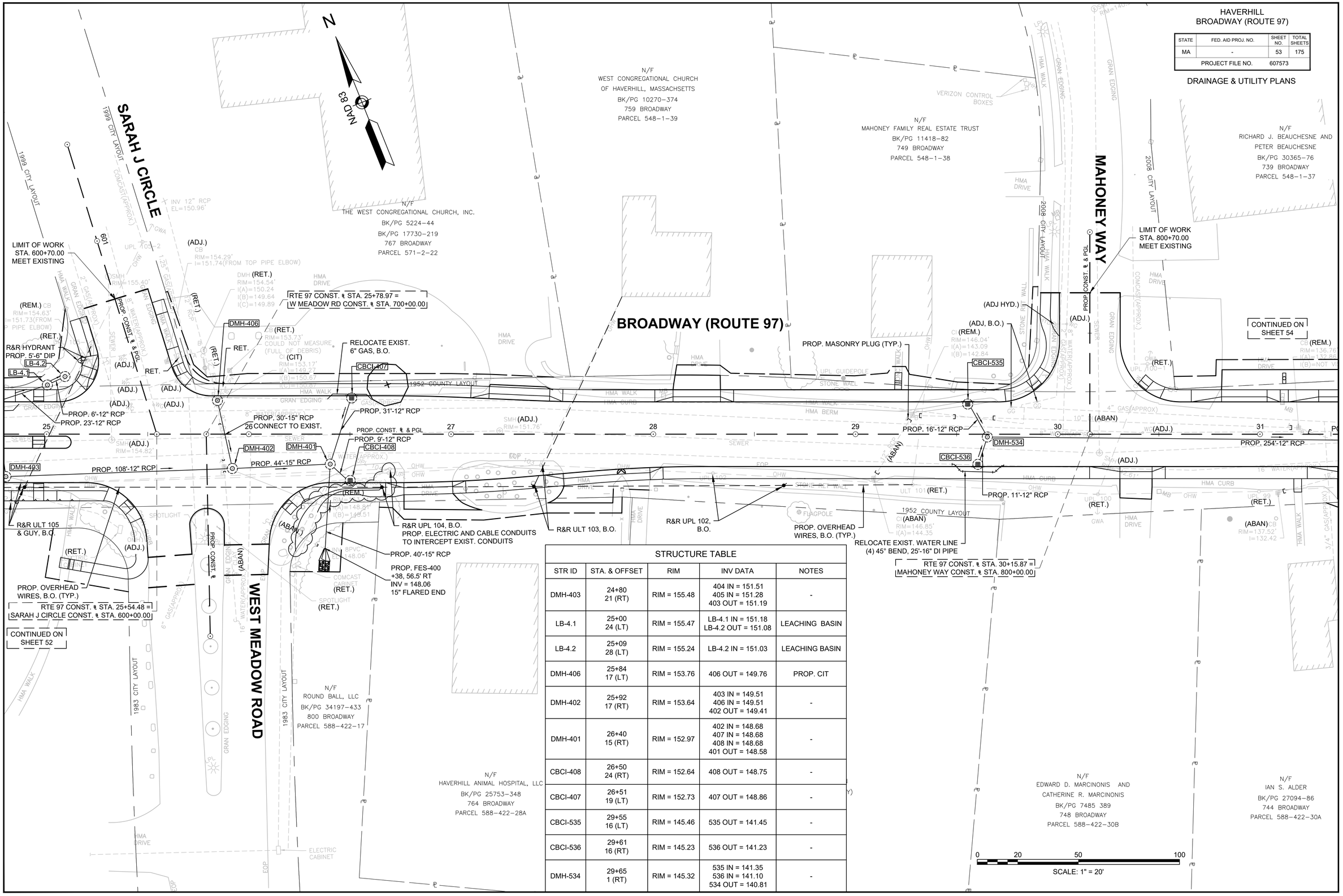
STR ID	STA. & OFFSET	RIM	INV DATA	NOTES
DMH-311	19+29 7 (LT)	RIM = 156.82	313 IN = 153.57 312 IN = 153.57 311 OUT = 153.47	CIT
CBCI-313	19+30 16 (RT)	RIM = 156.69	313 OUT = 153.80	-
CBCI-312	19+35 16 (LT)	RIM = 156.70	312 OUT = 153.68	-
CBCI-404	24+70 24 (RT)	RIM = 155.57	404 OUT = 151.72	-
CBCI-405	24+75 16 (LT)	RIM = 155.58	405 OUT = 151.58 LB-4.1 OUT = 151.33	-
DMH-403	24+80 21 (RT)	RIM = 155.48	404 IN = 151.51 405 IN = 151.28 403 OUT = 151.19	-

607573_HD (DU).DWG Plotted on 4-Nov-2016 4:21 PM

HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	53	175
PROJECT FILE NO.	607573		

DRAINAGE & UTILITY PLANS



STRUCTURE TABLE

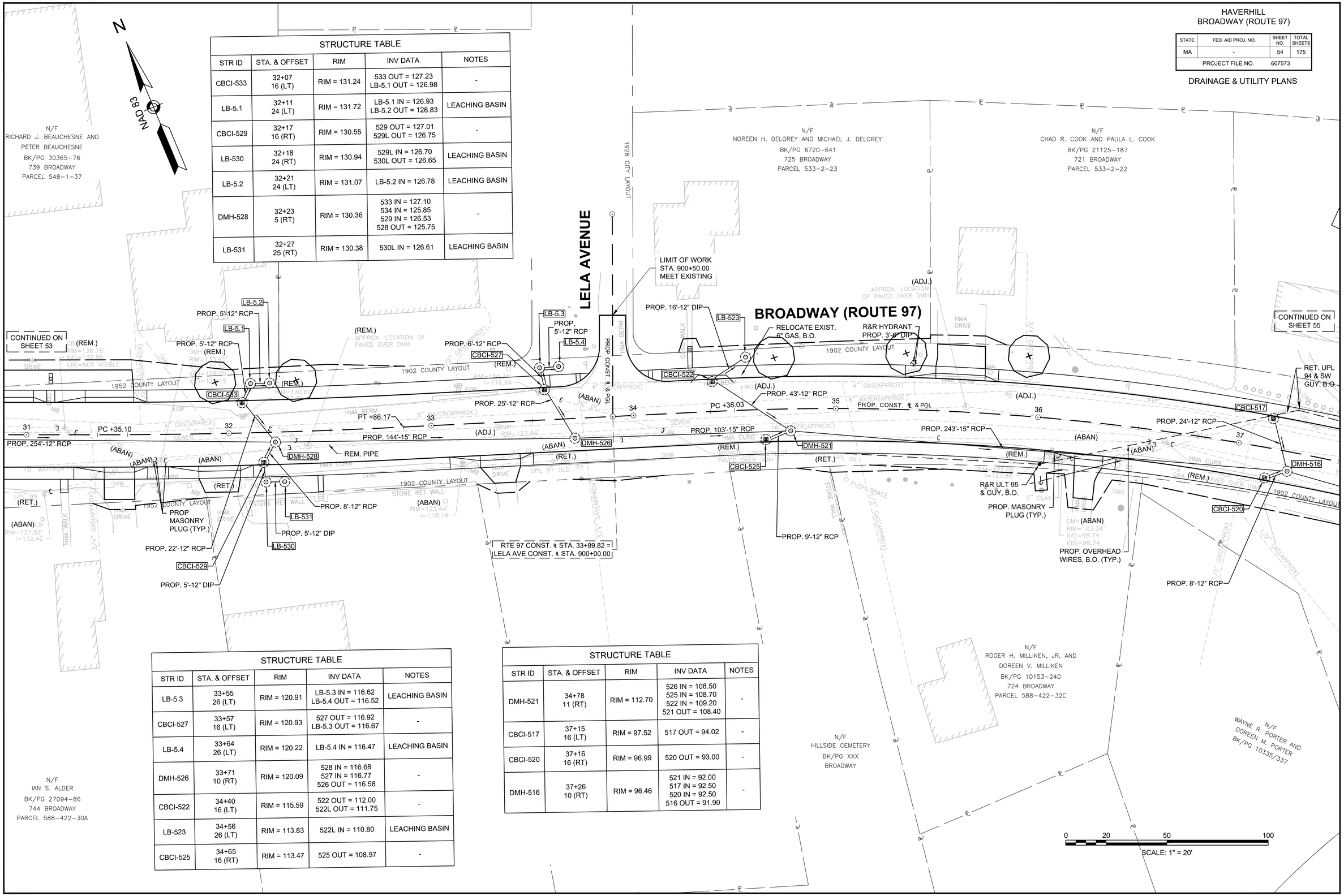
STR ID	STA. & OFFSET	RIM	INV DATA	NOTES
DMH-403	24+80 21 (RT)	RIM = 155.48	404 IN = 151.51 405 IN = 151.28 403 OUT = 151.19	-
LB-4.1	25+00 24 (LT)	RIM = 155.47	LB-4.1 IN = 151.18 LB-4.2 OUT = 151.08	LEACHING BASIN
LB-4.2	25+09 28 (LT)	RIM = 155.24	LB-4.2 IN = 151.03	LEACHING BASIN
DMH-406	25+84 17 (LT)	RIM = 153.76	406 OUT = 149.76	PROP. CIT
DMH-402	25+92 17 (RT)	RIM = 153.64	403 IN = 149.51 406 IN = 149.51 402 OUT = 149.41	-
DMH-401	26+40 15 (RT)	RIM = 152.97	402 IN = 148.68 407 IN = 148.68 408 IN = 148.68 401 OUT = 148.58	-
CBCI-408	26+50 24 (RT)	RIM = 152.64	408 OUT = 148.75	-
CBCI-407	26+51 19 (LT)	RIM = 152.73	407 OUT = 148.86	-
CBCI-535	29+55 16 (LT)	RIM = 145.46	535 OUT = 141.45	-
CBCI-536	29+61 16 (RT)	RIM = 145.23	536 OUT = 141.23	-
DMH-534	29+65 1 (RT)	RIM = 145.32	535 IN = 141.35 536 IN = 141.10 534 OUT = 140.81	-

607573_HD (DU).DWG Plotted on 4-Nov-2016 4:22 PM

HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	54	175
PROJECT FILE NO.	607573		

DRAINAGE & UTILITY PLANS



STRUCTURE TABLE				
STR ID	STA. & OFFSET	RIM	INV DATA	NOTES
CBCI-533	32+07 16 (LT)	RIM = 131.24	533 OUT = 127.23 LB-5.1 OUT = 126.98	-
LB-5.1	32+11 24 (LT)	RIM = 131.72	LB-5.1 IN = 126.93 LB-5.2 OUT = 126.83	LEACHING BASIN
CBCI-529	32+17 16 (RT)	RIM = 130.55	529 OUT = 127.01 529L OUT = 126.75	-
LB-530	32+18 24 (RT)	RIM = 130.94	529L IN = 126.70 530L OUT = 126.65	LEACHING BASIN
LB-5.2	32+21 24 (LT)	RIM = 131.07	LB-5.2 IN = 126.78	LEACHING BASIN
DMH-528	32+23 5 (RT)	RIM = 130.36	533 IN = 127.10 534 IN = 125.85 529 IN = 126.53 528 OUT = 125.75	-
LB-531	32+27 25 (RT)	RIM = 130.38	530L IN = 126.61	LEACHING BASIN

STRUCTURE TABLE				
STR ID	STA. & OFFSET	RIM	INV DATA	NOTES
LB-5.3	33+55 26 (LT)	RIM = 120.91	LB-5.3 IN = 116.62 LB-5.4 OUT = 116.52	LEACHING BASIN
CBCI-527	33+57 16 (LT)	RIM = 120.93	527 OUT = 116.92 LB-5.3 OUT = 116.67	-
LB-5.4	33+64 26 (LT)	RIM = 120.22	LB-5.4 IN = 116.47	LEACHING BASIN
DMH-526	33+71 10 (RT)	RIM = 120.09	528 IN = 116.68 527 IN = 116.77 526 OUT = 116.58	-
CBCI-522	34+40 16 (LT)	RIM = 115.59	522 OUT = 112.00 522L OUT = 111.75	-
LB-523	34+56 26 (LT)	RIM = 113.83	522L IN = 110.80	LEACHING BASIN
CBCI-525	34+65 16 (RT)	RIM = 113.47	525 OUT = 108.97	-

STRUCTURE TABLE				
STR ID	STA. & OFFSET	RIM	INV DATA	NOTES
DMH-521	34+78 11 (RT)	RIM = 112.70	526 IN = 108.50 525 IN = 108.70 522 IN = 109.20 521 OUT = 108.40	-
CBCI-517	37+15 16 (LT)	RIM = 97.52	517 OUT = 94.02	-
CBCI-520	37+16 16 (RT)	RIM = 96.99	520 OUT = 93.00	-
DMH-516	37+26 10 (RT)	RIM = 96.46	521 IN = 92.00 517 IN = 92.50 520 IN = 92.50 516 OUT = 91.90	-

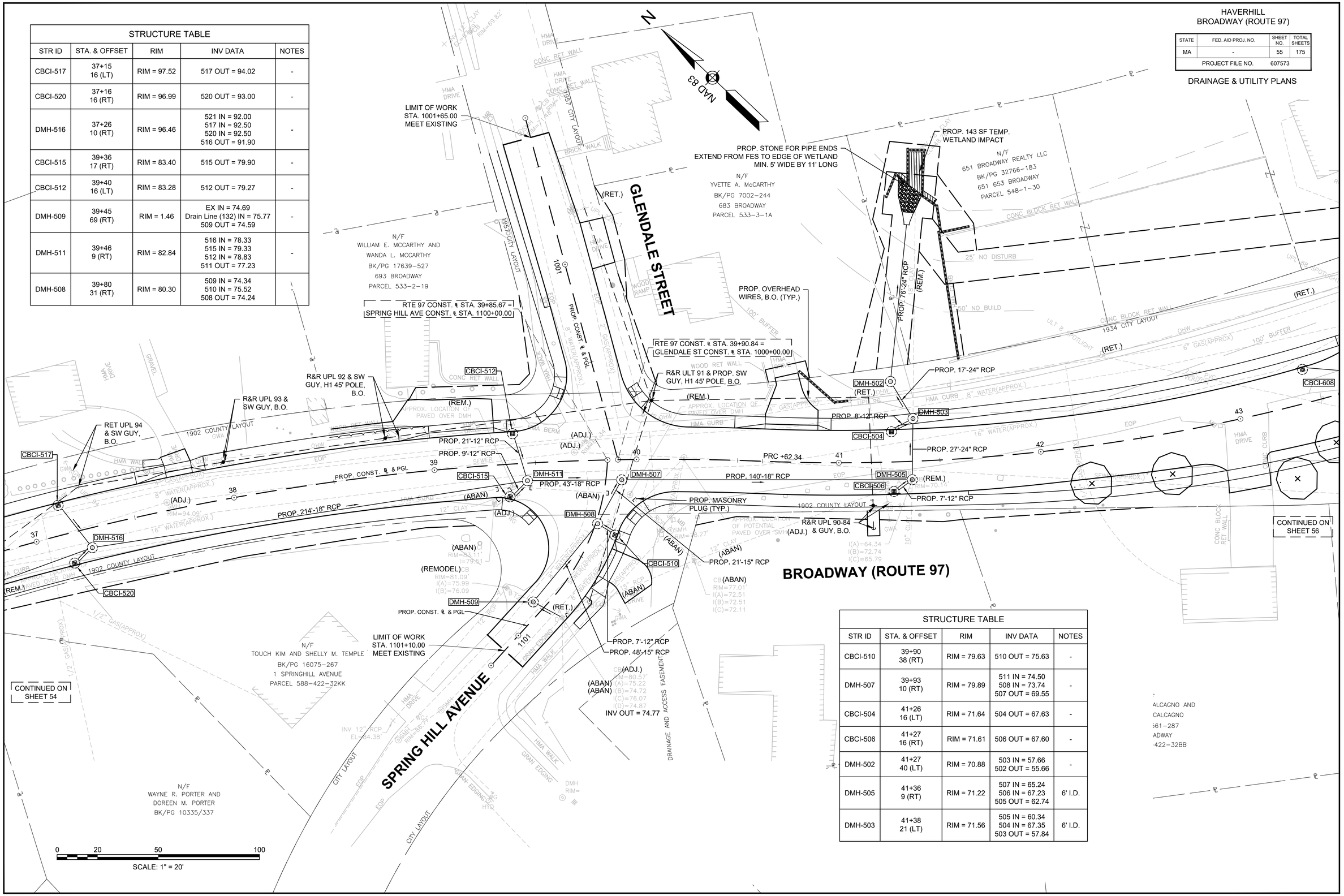
607573_HD (DU).DWG Plotted on 4-Nov-2016 4:22 PM

HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	55	175
PROJECT FILE NO.	607573		

DRAINAGE & UTILITY PLANS

607573_HD (DU).DWG Plotted on 4-Nov-2016 4:22 PM



STRUCTURE TABLE

STR ID	STA. & OFFSET	RIM	INV DATA	NOTES
CBCI-517	37+15 16 (LT)	RIM = 97.52	517 OUT = 94.02	-
CBCI-520	37+16 16 (RT)	RIM = 96.99	520 OUT = 93.00	-
DMH-516	37+26 10 (RT)	RIM = 96.46	521 IN = 92.00 517 IN = 92.50 520 IN = 92.50 516 OUT = 91.90	-
CBCI-515	39+36 17 (RT)	RIM = 83.40	515 OUT = 79.90	-
CBCI-512	39+40 16 (LT)	RIM = 83.28	512 OUT = 79.27	-
DMH-509	39+45 69 (RT)	RIM = 1.46	EX IN = 74.69 Drain Line (132) IN = 75.77 509 OUT = 74.59	-
DMH-511	39+46 9 (RT)	RIM = 82.84	516 IN = 78.33 515 IN = 79.33 512 IN = 78.83 511 OUT = 77.23	-
DMH-508	39+80 31 (RT)	RIM = 80.30	509 IN = 74.34 510 IN = 75.52 508 OUT = 74.24	-

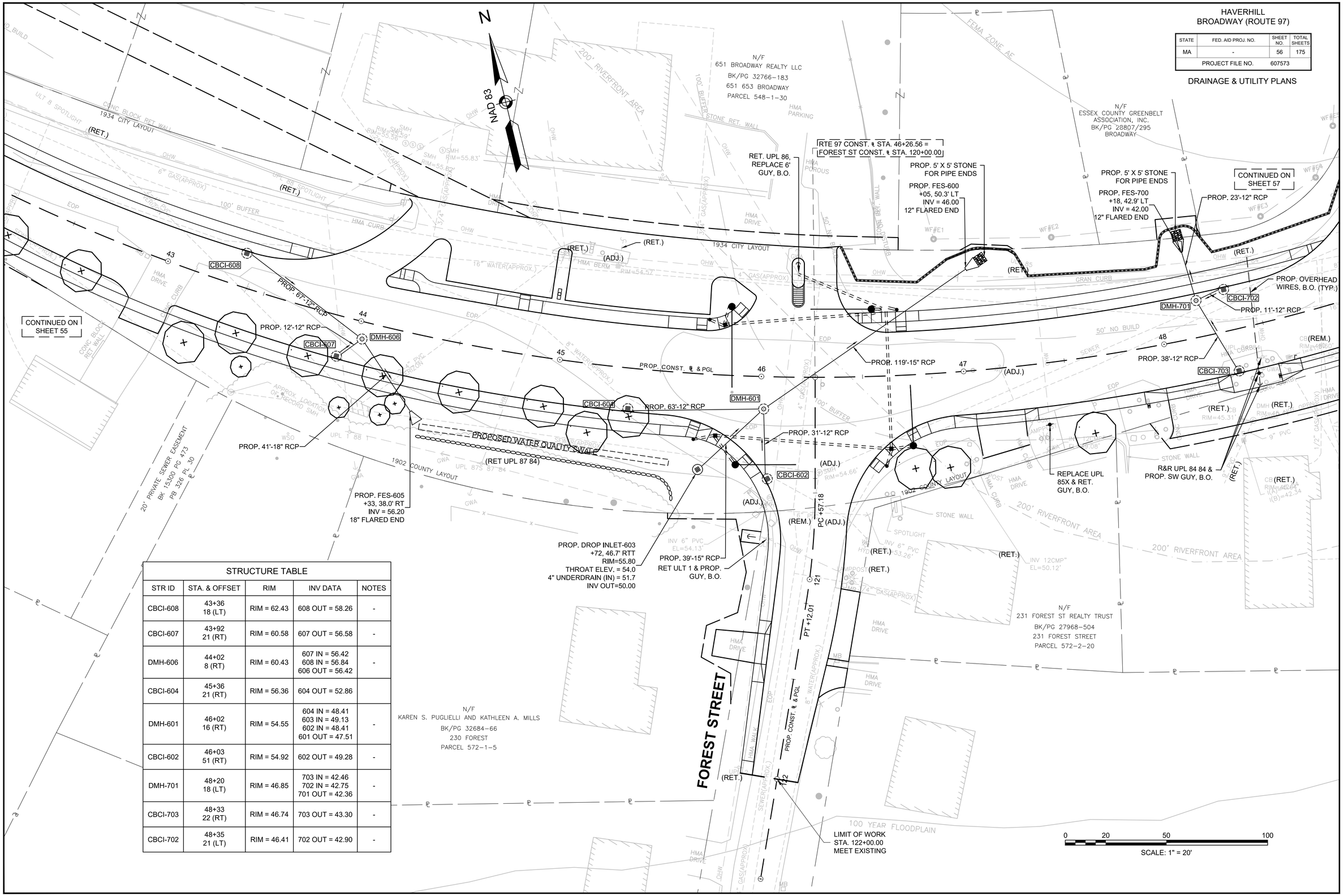
STRUCTURE TABLE

STR ID	STA. & OFFSET	RIM	INV DATA	NOTES
CBCI-510	39+90 38 (RT)	RIM = 79.63	510 OUT = 75.63	-
DMH-507	39+93 10 (RT)	RIM = 79.89	511 IN = 74.50 508 IN = 73.74 507 OUT = 69.55	-
CBCI-504	41+26 16 (LT)	RIM = 71.64	504 OUT = 67.63	-
CBCI-506	41+27 16 (RT)	RIM = 71.61	506 OUT = 67.60	-
DMH-502	41+27 40 (LT)	RIM = 70.88	503 IN = 57.66 502 OUT = 55.66	-
DMH-505	41+36 9 (RT)	RIM = 71.22	507 IN = 65.24 506 IN = 67.23 505 OUT = 62.74	6' I.D.
DMH-503	41+38 21 (LT)	RIM = 71.56	505 IN = 60.34 504 IN = 67.35 503 OUT = 57.84	6' I.D.

HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	56	175
PROJECT FILE NO.	607573		

DRAINAGE & UTILITY PLANS



STRUCTURE TABLE

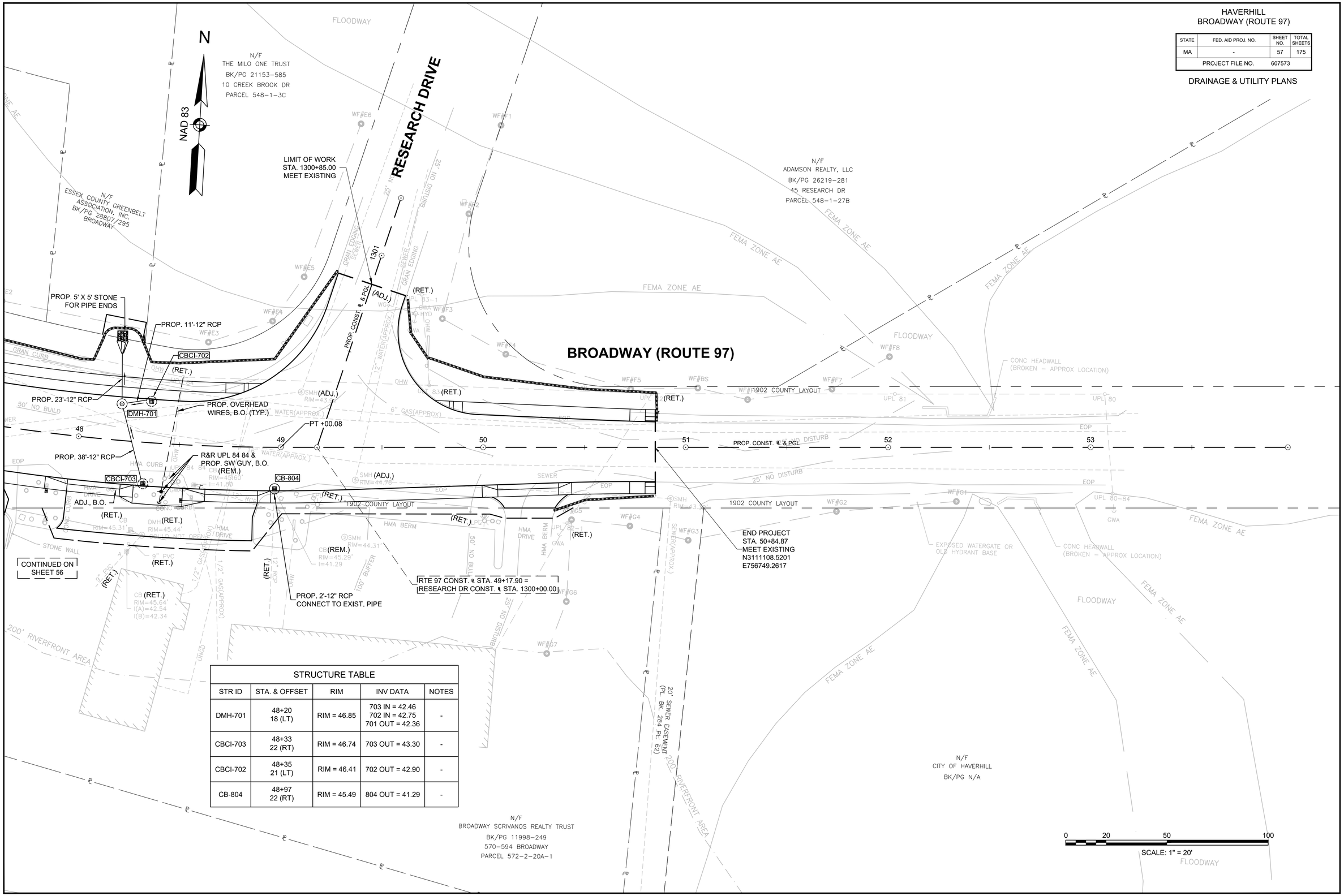
STR ID	STA. & OFFSET	RIM	INV DATA	NOTES
CBCI-608	43+36 18 (LT)	RIM = 62.43	608 OUT = 58.26	-
CBCI-607	43+92 21 (RT)	RIM = 60.58	607 OUT = 56.58	-
DMH-606	44+02 8 (RT)	RIM = 60.43	607 IN = 56.42 608 IN = 56.84 606 OUT = 56.42	-
CBCI-604	45+36 21 (RT)	RIM = 56.36	604 OUT = 52.86	
DMH-601	46+02 16 (RT)	RIM = 54.55	604 IN = 48.41 603 IN = 49.13 602 IN = 48.41 601 OUT = 47.51	-
CBCI-602	46+03 51 (RT)	RIM = 54.92	602 OUT = 49.28	-
DMH-701	48+20 18 (LT)	RIM = 46.85	703 IN = 42.46 702 IN = 42.75 701 OUT = 42.36	-
CBCI-703	48+33 22 (RT)	RIM = 46.74	703 OUT = 43.30	-
CBCI-702	48+35 21 (LT)	RIM = 46.41	702 OUT = 42.90	-

Plotted on 4-Nov-2016 4:22 PM
607573_HD (DU).DWG

HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	57	175
PROJECT FILE NO.	607573		

DRAINAGE & UTILITY PLANS



STRUCTURE TABLE

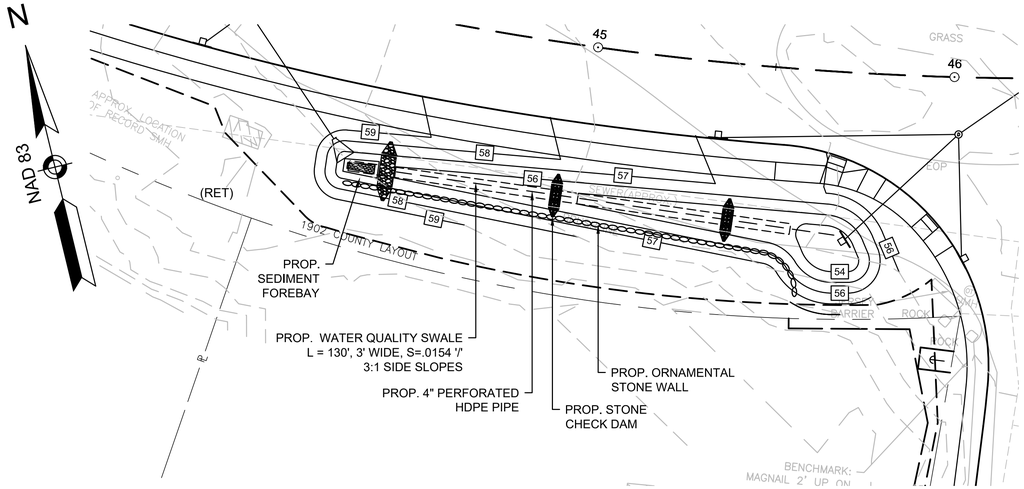
STR ID	STA. & OFFSET	RIM	INV DATA	NOTES
DMH-701	48+20 18 (LT)	RIM = 46.85	703 IN = 42.46 702 IN = 42.75 701 OUT = 42.36	-
CBCI-703	48+33 22 (RT)	RIM = 46.74	703 OUT = 43.30	-
CBCI-702	48+35 21 (LT)	RIM = 46.41	702 OUT = 42.90	-
CB-804	48+97 22 (RT)	RIM = 45.49	804 OUT = 41.29	-

607573_HD (DU).DWG Plotted on 4-Nov-2016 4:22 PM

HAVERHILL
BROADWAY (ROUTE 97)

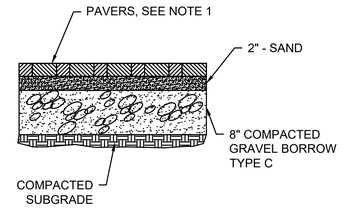
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	68	175
PROJECT FILE NO.	607573		

STORMWATER DETAILS



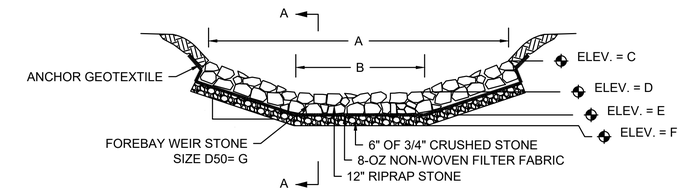
WATER QUALITY SWALE PLAN VIEW

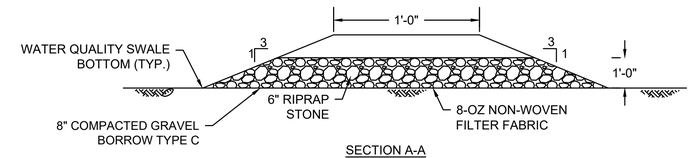
1" = 20'



BOTTOM OF SEDIMENT FOREBAY

NOTES:
1. PAVERS SHALL MEET ALL REQUIREMENTS SET FORTH IN THE SPECIAL PROVISIONS. INSTALLATION OF PAVERS IN SEDIMENT FOREBAY IS NOT INTENDED TO BE PERVIOUS. SPACING BETWEEN PAVERS NOT REQUIRED.



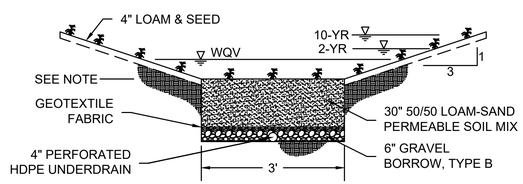


SECTION A-A

FOREBAY WEIR DESIGN TABLE							
	A	B	C	D	E	F	G
IB-1	16'	8.5'	58.0	57.0	56.00	55.50	6"

FOREBAY RIPRAP WEIR (TYP.)

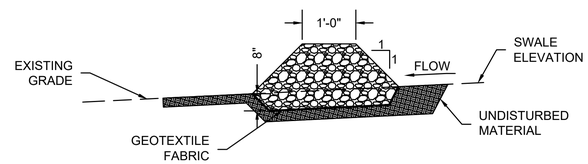
NTS



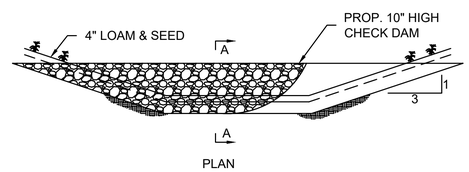
WATER QUALITY SWALE DETAIL - DRY

N.T.S.

BMP STA.	WQV. DEPTH	2-YR. DEPTH	10-YR. DEPTH
46+00	**0.08**	**0.24**	**0.30**



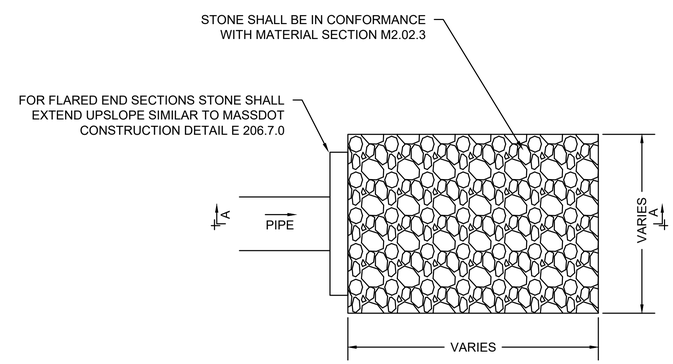
SECTION A-A



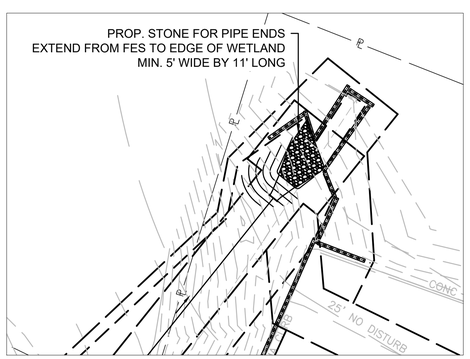
PLAN

STONE CHECK DAM

N.T.S.

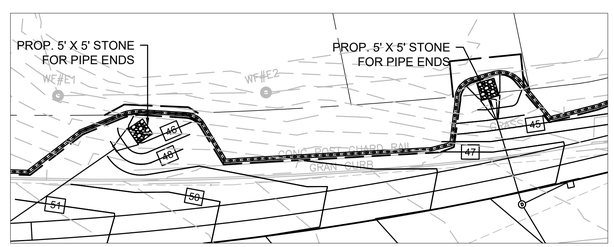


PLAN VIEW



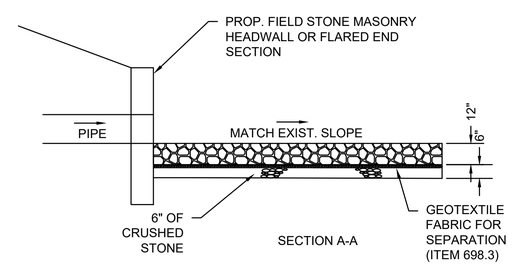
PLAN VIEW
PROP. OUTFALL 41+38 LEFT

1" = 20'



PLAN VIEW
PROP. OUTFALLS 47+10 & STA. 48+18 LEFT

1" = 20'



SECTION A-A

STONE FOR PIPE ENDS

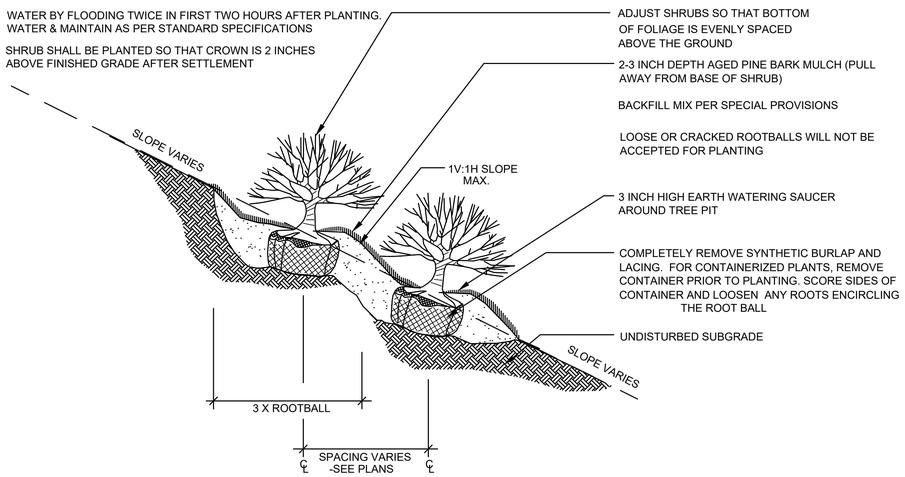
N.T.S.

607573_HD (SW).DWG Plotted on 4-Nov-2016 3:33 PM

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	69	175
PROJECT FILE NO.	607573		

WETLAND REPLICATION PLAN & DETAILS

607573_HD (EV).DWG Plotted on 4-Nov-2016 3:35 PM



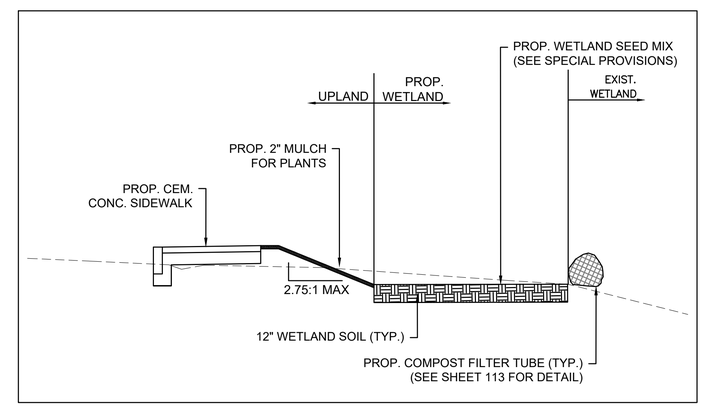
CONTAINERIZED SHRUB PLANTING (SLOPE) DETAIL

NOT TO SCALE

PLANT LIST - SHEET

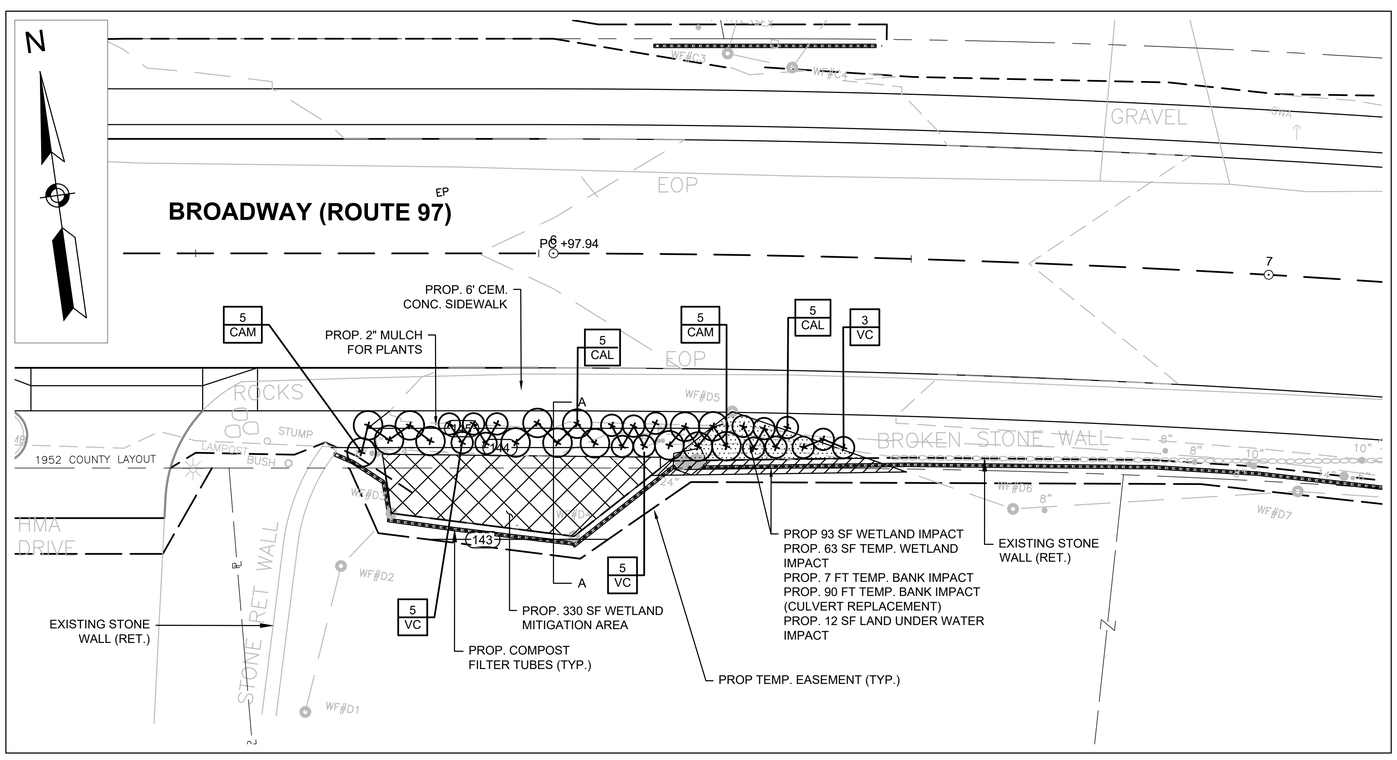
SHRUBS	QTY	BOTANICAL NAME	COMMON NAME	SIZE	REMARKS
VC	13	VACCINIUM CORYMBOSUM	HIGHBUSH BLUEBERRY	18" - 24"	TO BE LOCATED BY WETLAND SCIENTIST
CAM	10	CORNUS AMOMUM	SILKY DOGWOOD	18" - 24"	TO BE LOCATED BY WETLAND SCIENTIST
CAL	10	CLETHRA ALNIFOLIA	SUMMERSWEET	18" - 24"	TO BE LOCATED BY WETLAND SCIENTIST

6+00



SECTION A-A THROUGH WETLAND REPLICATION

NOT TO SCALE



WETLAND REPLICATION AREA PLAN

0 10 20 30 40

SCALE: 1" = 10'

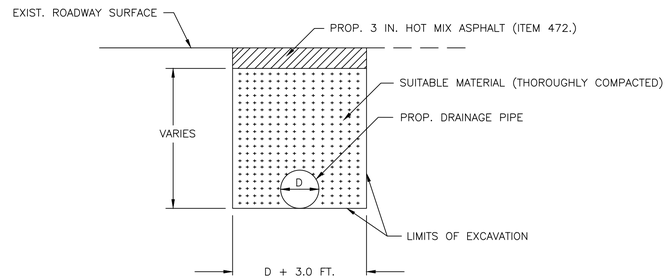
NOTES: WETLAND AND ACCESS ROUTE

1. PRIOR TO ENGAGING IN CONSTRUCTION ACTIVITIES RELATED TO THE REPLACEMENT WETLAND, THE CONTRACTOR SHALL BE REQUIRED TO MEET WITH THE WETLAND SPECIALIST TO REVIEW ANY SPECIAL CONSTRUCTION AND EROSION CONTROL REQUIREMENTS. CONSTRUCTION ACTIVITIES SHALL BE SCHEDULED SUCH THAT EXCAVATED WETLAND SOIL SHALL BE RELOCATED AS QUICKLY AS POSSIBLE.
2. TO MINIMIZE THE DISTURBANCE OF VEGETATION, THE CONTRACTOR SHALL USE SMALL CONSTRUCTION EQUIPMENT (LESS THAN 9000 LBS OPERATING WEIGHT) AND HAND METHODS AS APPROVED BY THE WETLAND SPECIALIST AND AS DIRECTED BY THE ENGINEER.
3. ALL TREES CUT FOR WETLAND REPLICATION SHALL BE RE-USED ON SITE FOR RESTORATION PURPOSES. CUT TREES SHALL BE RE-LAID WITHIN THE WETLAND / DISTURBED AREA PER THE DIRECTION OF THE WETLAND SPECIALIST.
4. WETLAND SPECIALIST SHALL LOCATE PLANTS IN WETLAND REPLICATION AREA, RESTORATION AREA AS APPROPRIATE TO BEST PROTECT AND RESTORE DISTURBED AREA. COMPOST TOPSOIL SHALL BE USED IN LIEU OF MULCH.
5. APPLY WETLAND SEED MIX TO WETLAND REPLICATION AREA AS WELL AS WETLAND RESTORATION AREAS.
6. COMPOST FILTER TUBES SHALL BE 100% BIODEGRADABLE AND LEFT IN PLACE AT THE CONCLUSION OF WETLAND REPLICATION CONSTRUCTION. ANY NON-BIODEGRADABLE MATERIAL, IF USED, SHALL BE REMOVED AND DISPOSED OF OFF SITE AT CONTRACTOR'S EXPENSE.

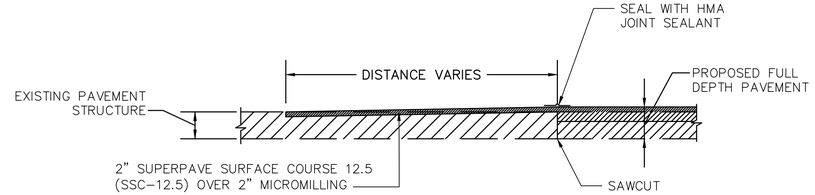
HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	113	175
PROJECT FILE NO.	607573		

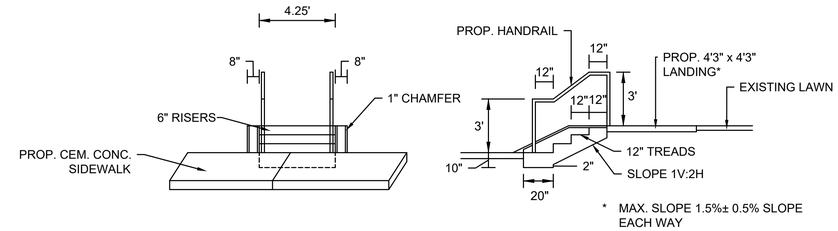
CONSTRUCTION DETAILS



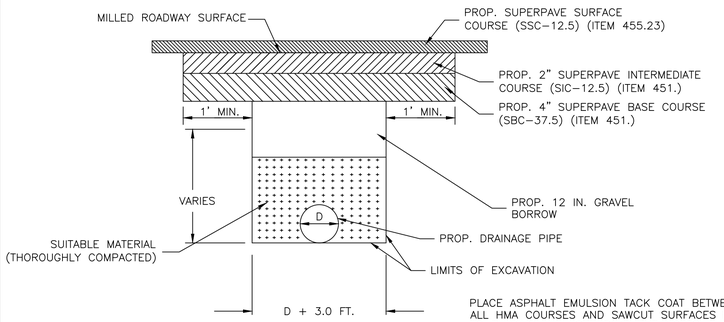
TEMPORARY PATCH
(IN AREAS OF FULL DEPTH HMA CONSTRUCTION)



PAVEMENT TRANSITION DETAIL
N.T.S.



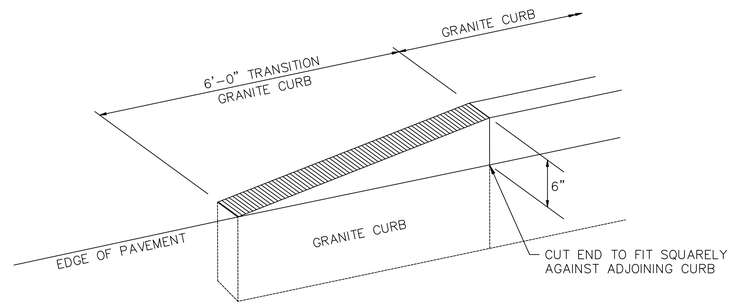
STAIRWAY AND HANDRAIL DETAIL
N.T.S.



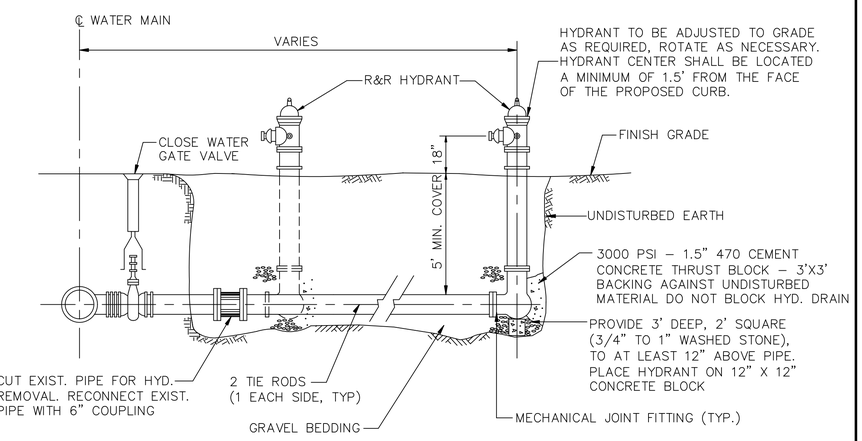
PERMANENT PATCH
(IN AREAS OF MILLING AND HMA OVERLAY)

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

AN ALTERNATIVE TO A MULTI–LAYER HMA REPAIR CONSISTING OF A COMPACTED DEPTH OF SSC–12.5 OVER SIC–12.5 OVER SBC–37.5, IS TO CONSTRUCT A 3 LAYERS COMPACTED LIFTS OF SIC–12.5.

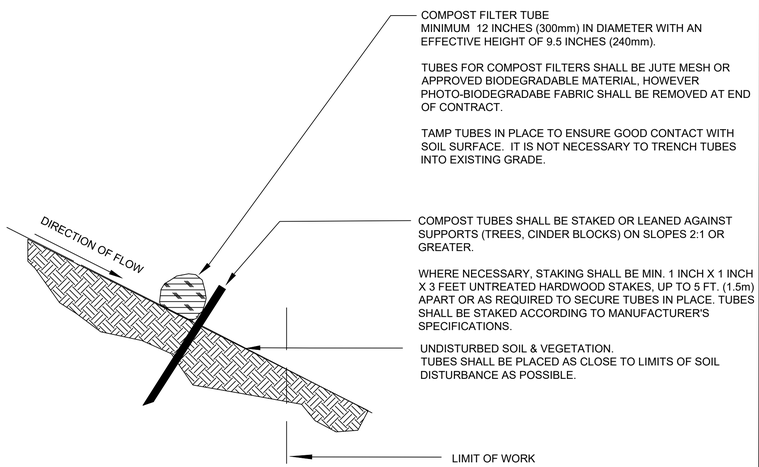


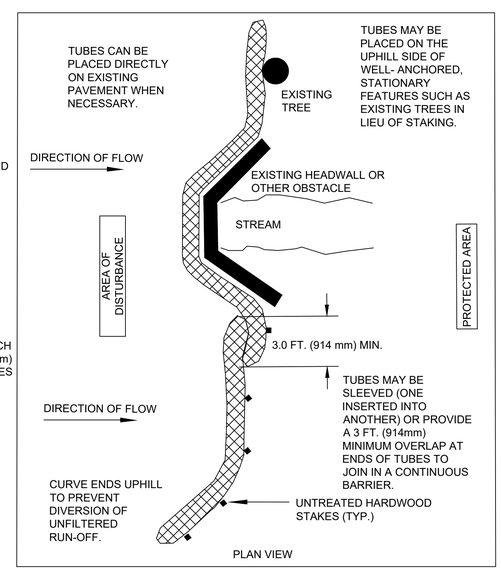
TRANSITION CURB DETAIL
(ITEM 509.)
TO BE USED AT ALL LOCATIONS WHERE
VERTICAL GRANITE CURB ENDS



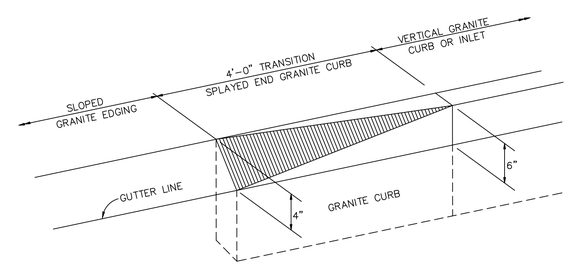
TYPICAL HYDRANT RELOCATION
NOT TO SCALE

DRAINAGE TRENCH DETAIL
NOT TO SCALE





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



CURB TRANSITION DETAIL TO SLOPED GRANITE EDGING
NOT TO SCALE

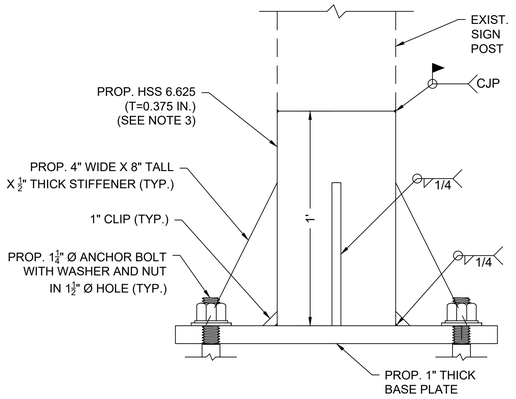
COMPOST FILTER TUBE DETAIL
NOT TO SCALE

20150226_MassDOT_rev7

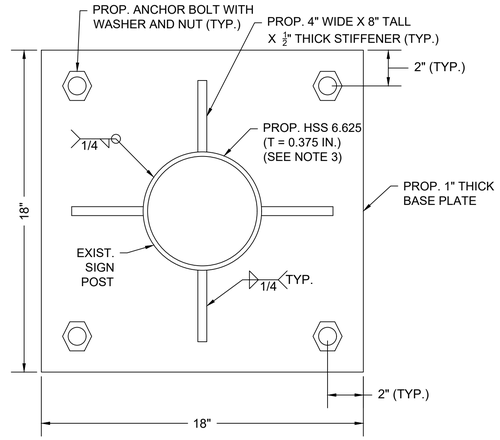
607573_HD (CD).DWG Plotted on 4-Nov-2016 3:36 PM

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	114	175
PROJECT FILE NO.	607573		

CONSTRUCTION DETAILS



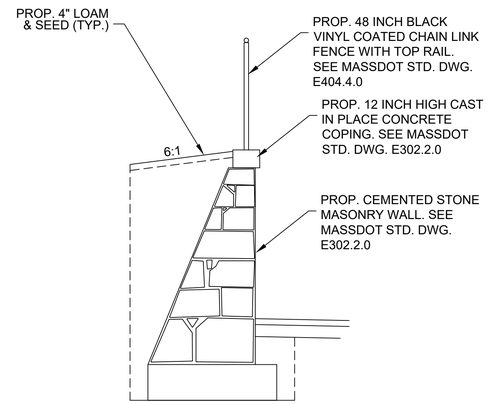
SIGN AT STA. 44+96 PROP.
BASE PLATE ELEVATION
NOT TO SCALE



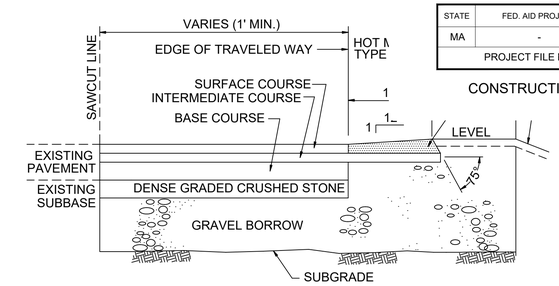
SIGN AT STA. 44+96 PROP.
BASE PLATE PLAN
NOT TO SCALE

NOTES:

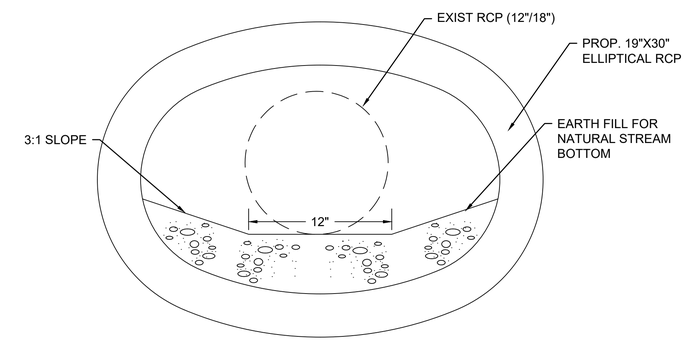
1. CONTRACTOR TO DISCONNECT EXISTING ELECTRICAL CONNECTION (SEE SPECIAL PROVISIONS).
2. CONTRACTOR TO CUT EXISTING SIGN POLE 6" ABOVE EXISTING FOUNDATION. EXISTING SIGNS AND POLE TO BE RETAINED AND REUSED.
3. CONTRACTOR SHALL CONFIRM PROPOSED HSS6.625 (T=0.375 IN.) WILL MATCH EXISTING SIGN POST PRIOR TO FABRICATION.
4. STEEL PLATES SHALL CONFORM TO AASHTO M270 (ASTM A709) GRADE 50. STEEL PIPE SHALL CONFORM TO ASTM A500 GRADE B OR C.



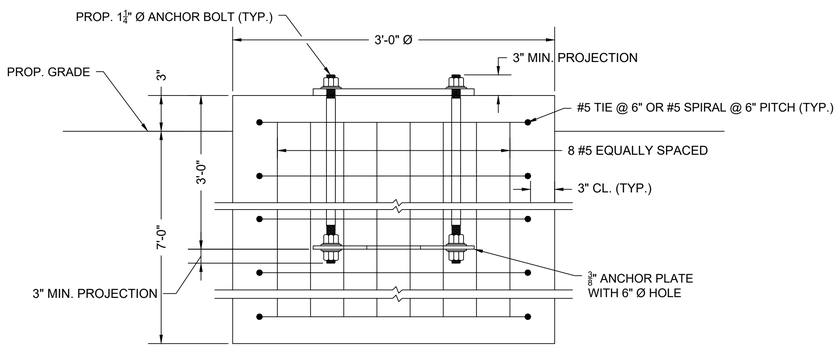
CHAIN LINK FENCE ATTACHMENT TO
RETAINING WALL
N.T.S.
SEE PLANS FOR LOCATIONS



HOT MIX ASPHALT BERM, TYPE "A" MODIFIED
N.T.S.



CROSS CULVERT REPLACEMENT 19"X30" PIPE
N.T.S.



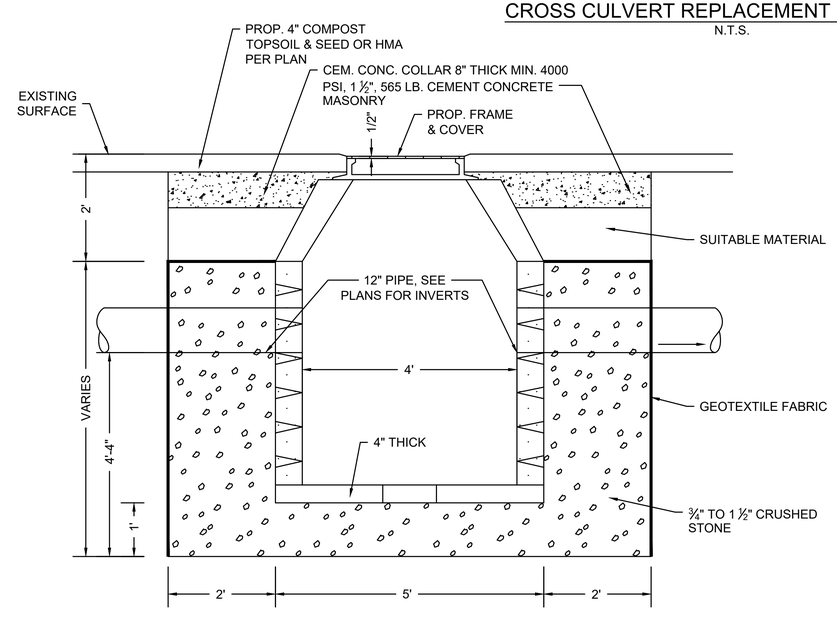
SIGN FOUNDATION STA. 12+15
AND STA. 44+96
NOT TO SCALE

NOTES (STA. 12+15 & STA 44+96):

1. FOUNDATIONS SHALL BE 4000 PSI, 565 MASSDOT APPROVED MIXED DESIGN.
2. FOUNDATIONS SHALL BE INSTALLED IN ACCORDANCE WITH MASSDOT STANDARD SPECIFICATIONS ITEM 945 - DRILLED SHAFTS
3. REINFORCEMENT SHALL BE ASTM A615 GRADE 60.
4. ANCHOR BOLTS SHALL BE SET BY TEMPLATE.
5. EXCAVATION SHALL BE BY THE AUGER METHOD TO THE NEAT LINES OF THE OUTSIDE DIMENSION OF THE FOUNDATIONS WITHOUT DISTURBING THE SOIL AROUND AND BELOW THE PROPOSED FOUNDATION BOTTOM. ALTERNATE METHODS OF EXCAVATION MAY BE SUBMITTED TO MASSDOT FOR APPROVAL IF THEY MEET THE REQUIREMENTS LISTED IN NOTES 5, 6 AND 7.
6. THE EARTH WALLS OF THE FOUNDATION SHALL BE ADEQUATELY AND SECURELY PROTECTED AT ALL TIMES AGAINST CAVE-INS, DISPLACEMENT OF THE SURROUNDING EARTH AND FOR THE EXCLUSION OF GROUND WATER. THIS MAY BE DONE BY THE USE OF STEEL CYLINDER LINERS OR CASINGS THAT ARE APPROVED BY MASSDOT. IF LINERS ARE USED THEY MAY BE RECLAIMED PROVIDED THAT THEY ARE WITHDRAWN AS THE CONCRETE IS BEING PLACED, MAINTAINING A SUFFICIENT HEAD OF CONCRETE WITHIN THE LINER TO PREVENT REDUCTION IN THE FOUNDATION DIAMETER AND TO PREVENT EXTRANEOUS MATERIAL FROM FALLING IN FROM THE SIDES AND MIXING WITH THE CONCRETE.
7. IF THE SOIL IS DISTURBED OR REMOVED BEYOND THE NEAT LINES OF THE OUTSIDE DIMENSION OF THE FOUNDATION, IT SHALL BE REPLACED WITH CONCRETE. ANY ADDITIONAL COST FOR THE CONCRETE SHALL BE PAID FOR BY THE CONTRACTOR.
8. SPECIAL CARE SHOULD BE GIVEN TO AREAS WHERE WET SOIL IS ENCOUNTERED, TO INSURE THAT THE PREAUGERED HOLE DOES NOT COLLAPSE. THIS MAY REQUIRE THE USE OF STEEL CYLINDER LINERS OR CASINGS TO HOLD THE SOIL IN PLACE UNTIL READY FOR CONCRETE PLACEMENT, UPON APPROVAL FROM THE MASSDOT. THE STEEL CYLINDERS OR CASINGS SHALL BE WITHDRAWN AS THE FOUNDATION CONCRETE IS PLACED.

NOTES (STA. 12+15 ONLY):

1. CONTRACTOR TO DISCONNECT EXISTING ELECTRICAL CONNECTION (SEE SPECIAL PROVISIONS).
2. CONTRACTOR TO UNBOLT EXISTING SIGN AND POLE TO BE RETAINED AND REUSED.



LEACHING BASIN
N.T.S.

NOTES:
1. CEMENT CONCRETE FOR LEACHING BASIN SHALL BE 4000 PSI, 1 1/2", 565 LB.
2. IF CONCRETE BLOCK, WALL THICKNESS = 6"
3. IF REINFORCED/PRECAST, WALL THICKNESS = 5" MIN.

607573_HD (CD).DWG Plotted on 4-Nov-2016 3:36 PM

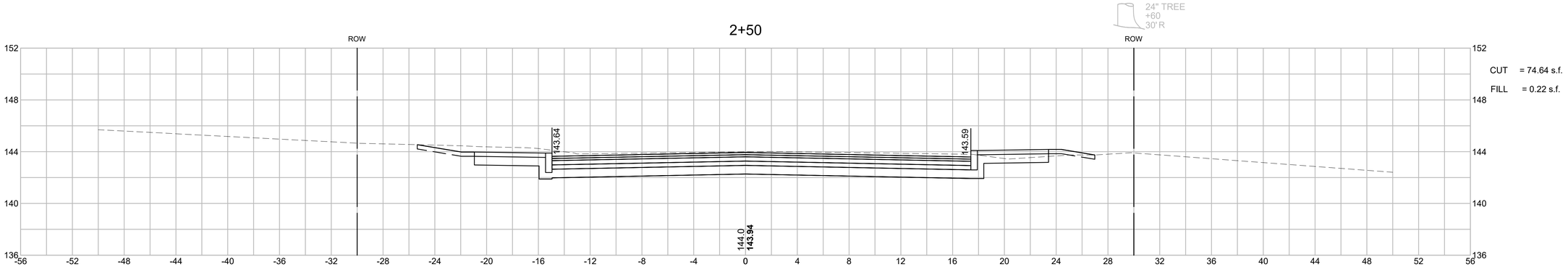
HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	117	175
PROJECT FILE NO.	607573		

CROSS SECTIONS
ROUTE 97

607573_HD (CORR).DWG Plotted on 4-Nov-2016 3:40 PM

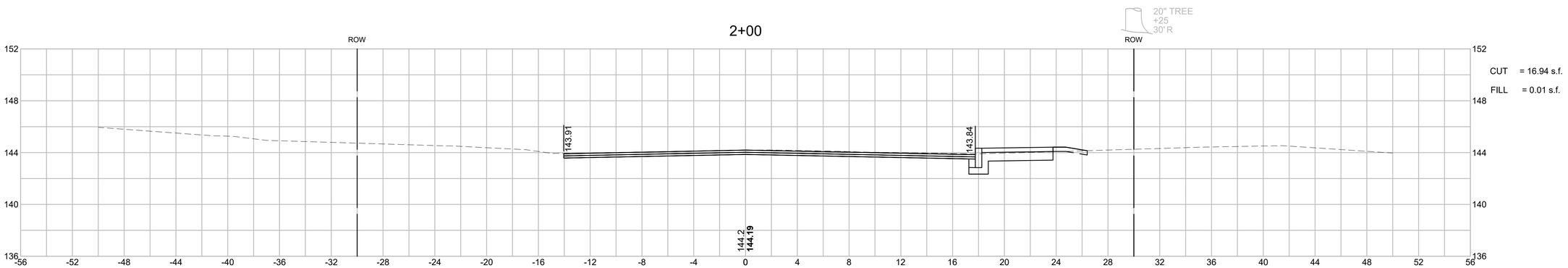
2+50



CUT = 74.64 s.f.

FILL = 0.22 s.f.

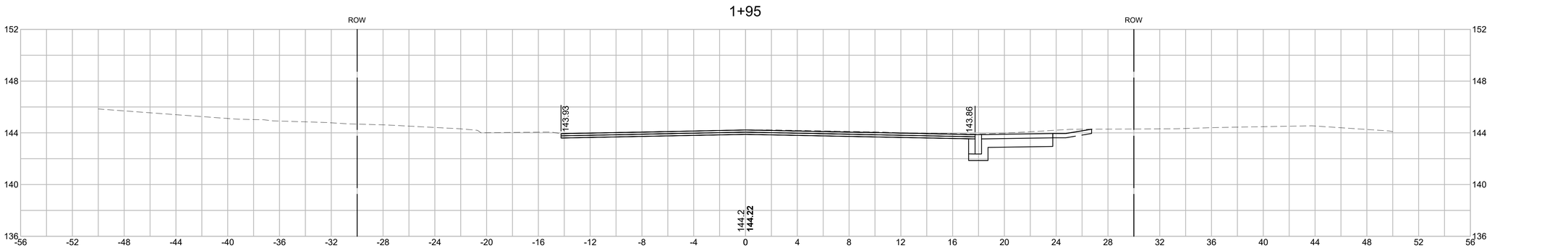
2+00



CUT = 16.94 s.f.

FILL = 0.01 s.f.

1+95



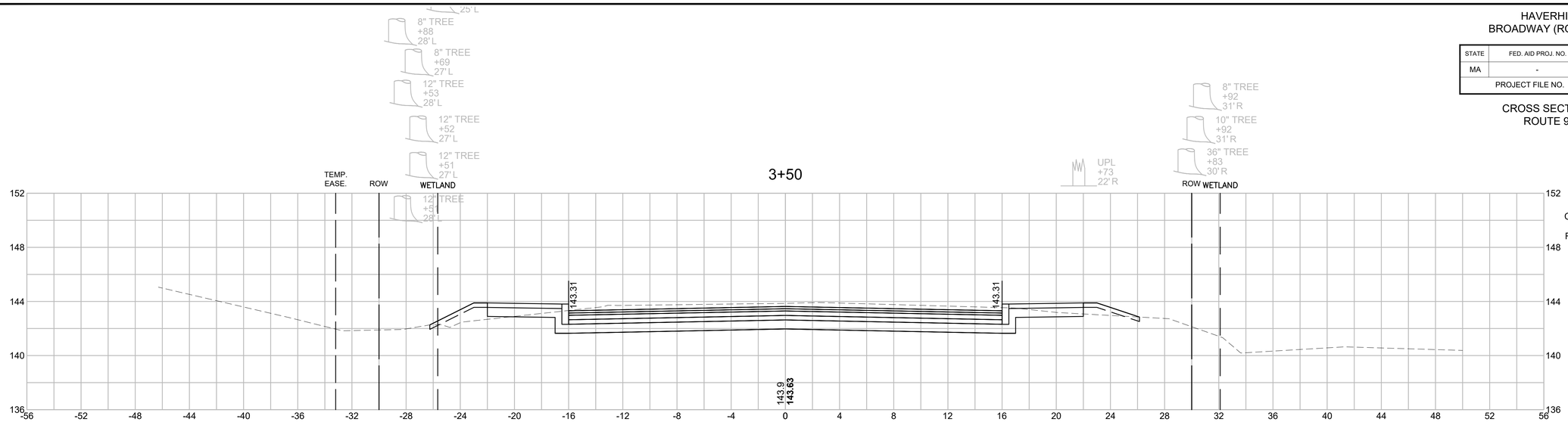
HOR. SCALE IN FEET
4 0 4 8

4 0 4 8
VER. SCALE IN FEET

HAVERHILL
BROADWAY (ROUTE 97)

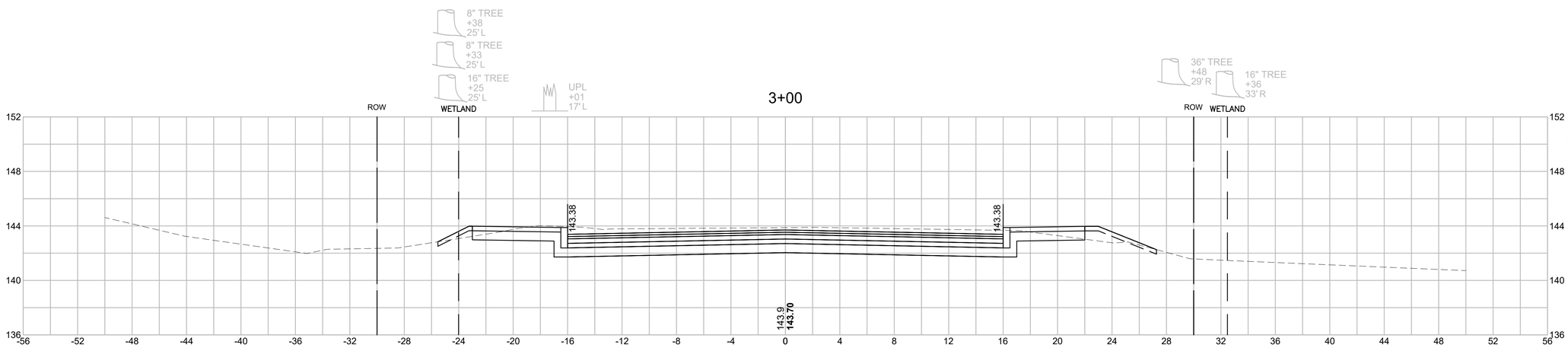
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	118	175
PROJECT FILE NO.	607573		

CROSS SECTIONS
ROUTE 97



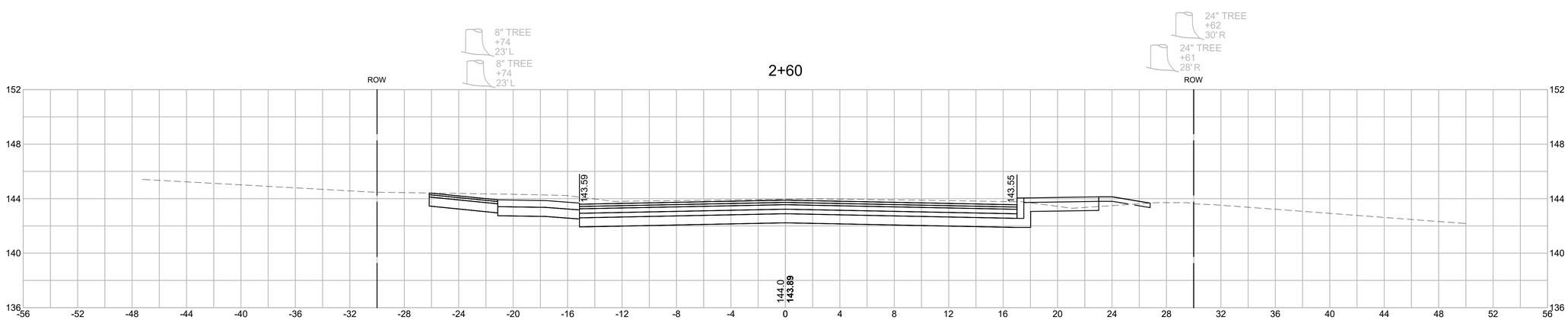
CUT = 68.48 s.f.

FILL = 3.66 s.f.



CUT = 73.10 s.f.

FILL = 1.83 s.f.



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

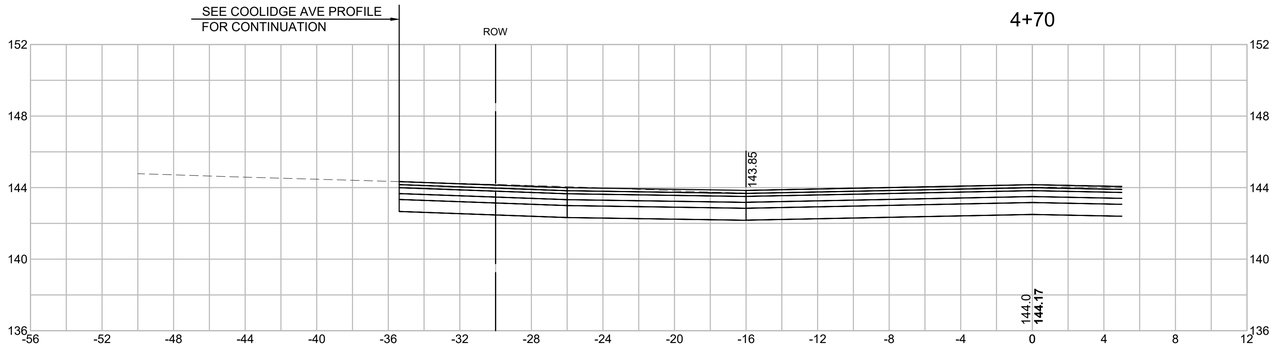
607573_HD (CORR).DWG Plotted on 4-Nov-2016 3:40 PM

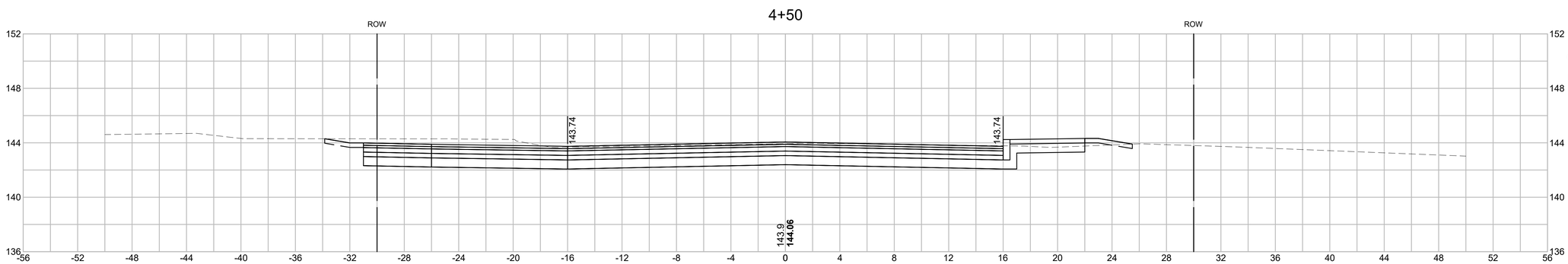
HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	119	175
PROJECT FILE NO.	607573		

CROSS SECTIONS
ROUTE 97

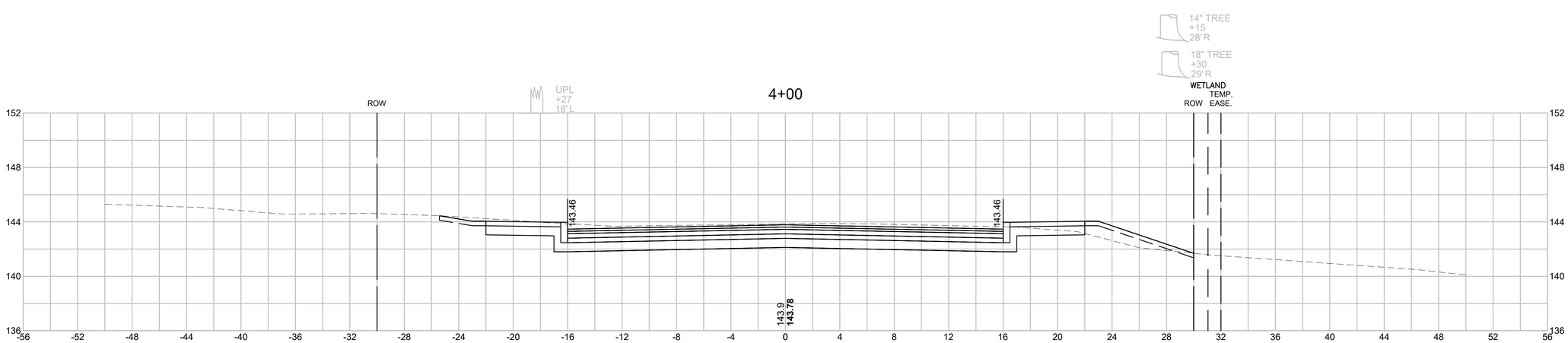
RTE 97 CONST. ℄ STA. 4+87.71 =
COOLIDGE AVE CONST. ℄ STA. 100+00.00





CUT = 86.88 s.f.

FILL = 0.29 s.f.



CUT = 71.34 s.f.

FILL = 3.67 s.f.

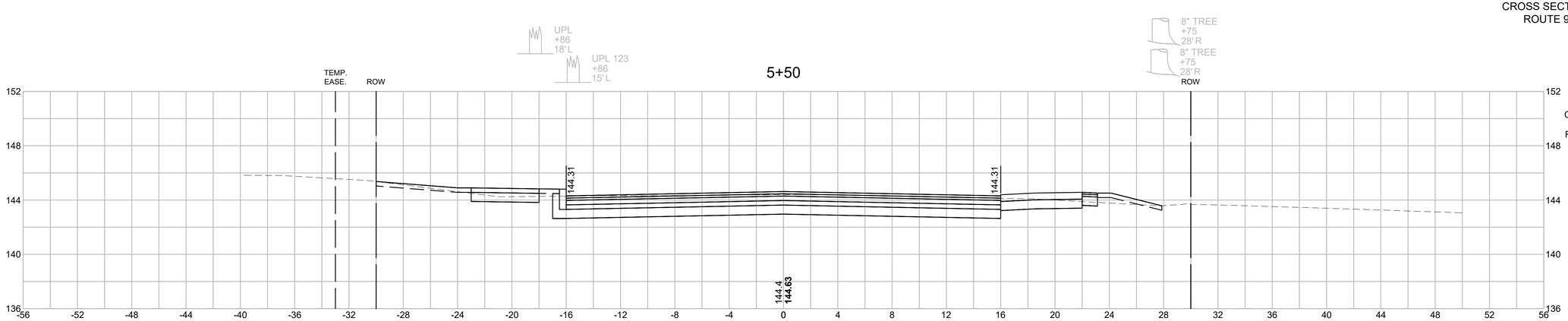
HOR. SCALE IN FEET
4 0 4 8
4 0 4 8
VER. SCALE IN FEET

607573_HD (CORR).DWG Plotted on 4-Nov-2016 3:40 PM

HAVERHILL
BROADWAY (ROUTE 97)

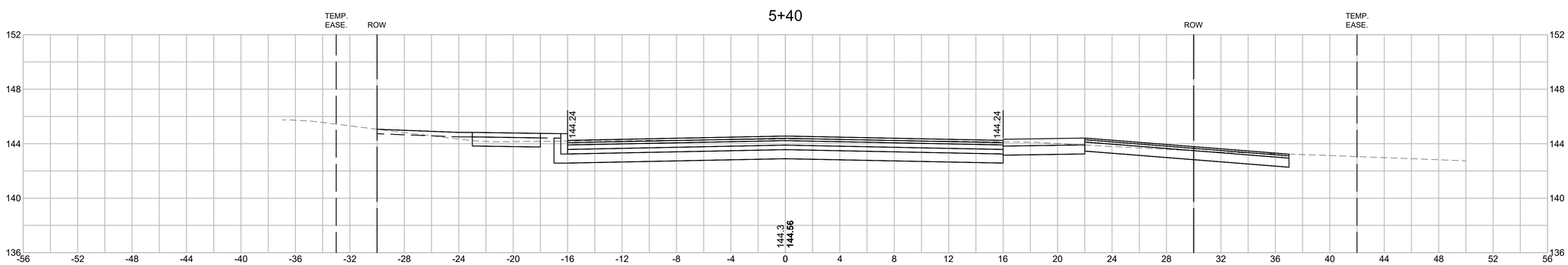
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	120	175
PROJECT FILE NO.	607573		

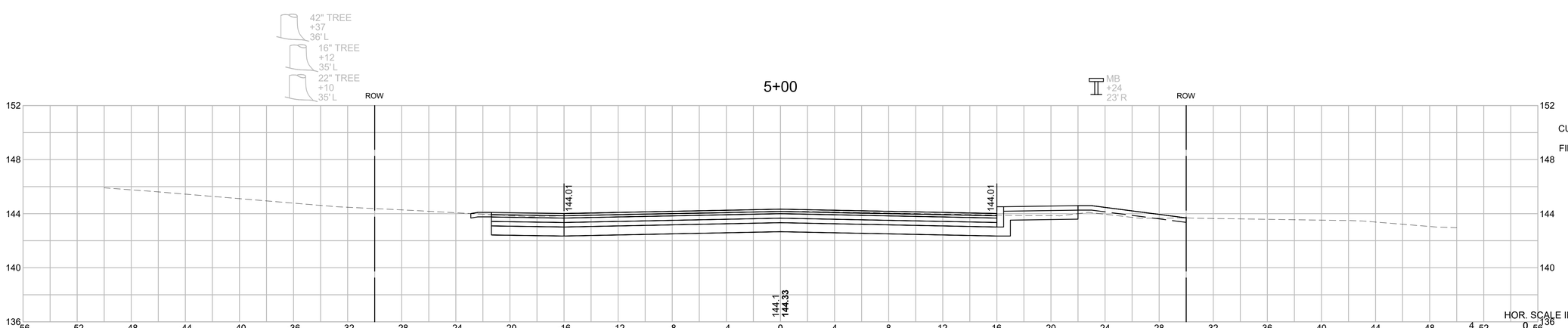
CROSS SECTIONS
ROUTE 97



CUT = 58.05 s.f.

FILL = 1.05 s.f.





CUT = 60.12 s.f.

FILL = 0.88 s.f.

HOR. SCALE IN FEET
4 0 4 8

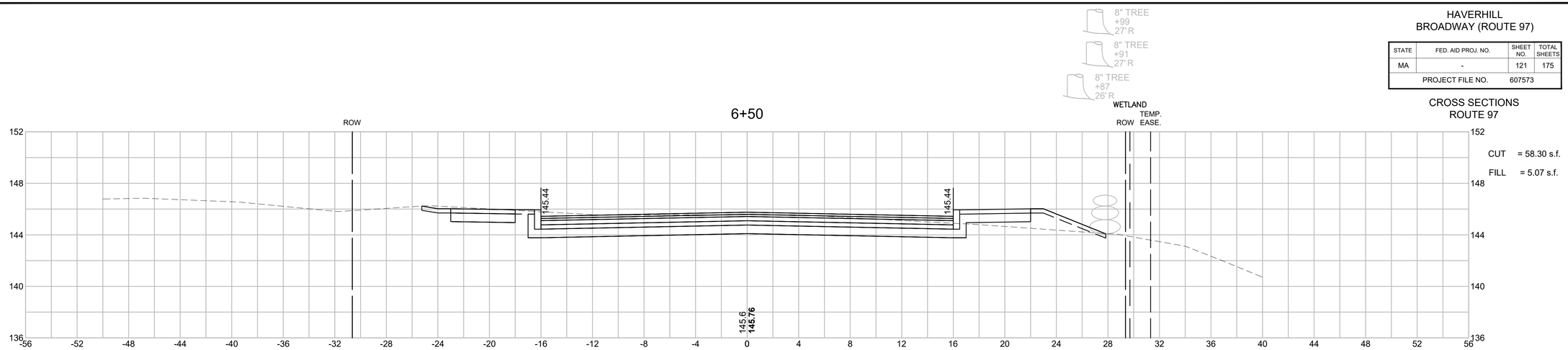
VER. SCALE IN FEET
4 0 4 8

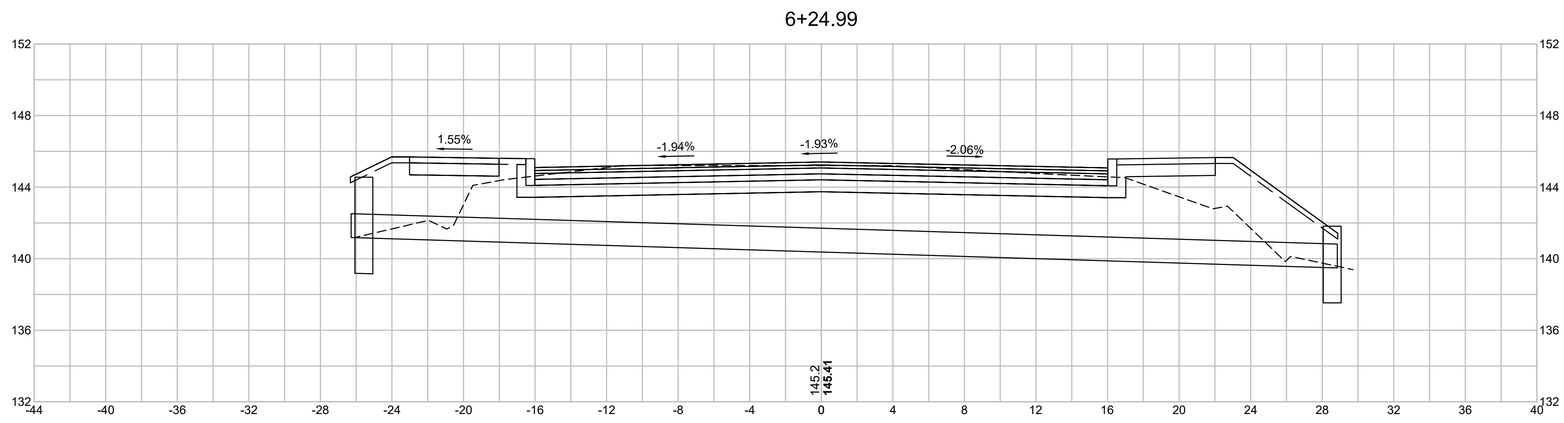
607573_HD (CORR).DWG Plotted on 4-Nov-2016 3:40 PM

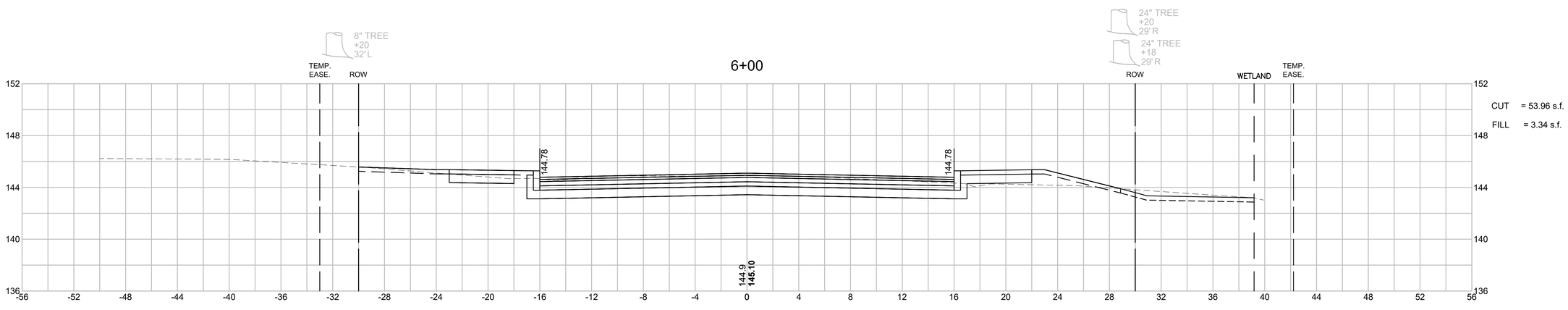
HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	121	175
PROJECT FILE NO.	607573		

CROSS SECTIONS
ROUTE 97







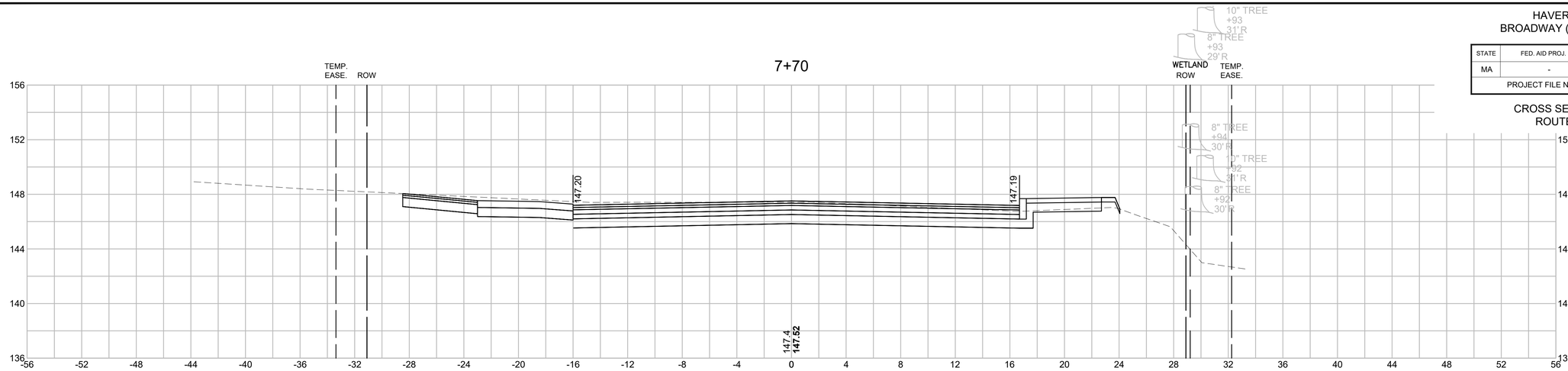
HOR. SCALE IN FEET
4 0 4 8
4 0 4 8
VER. SCALE IN FEET

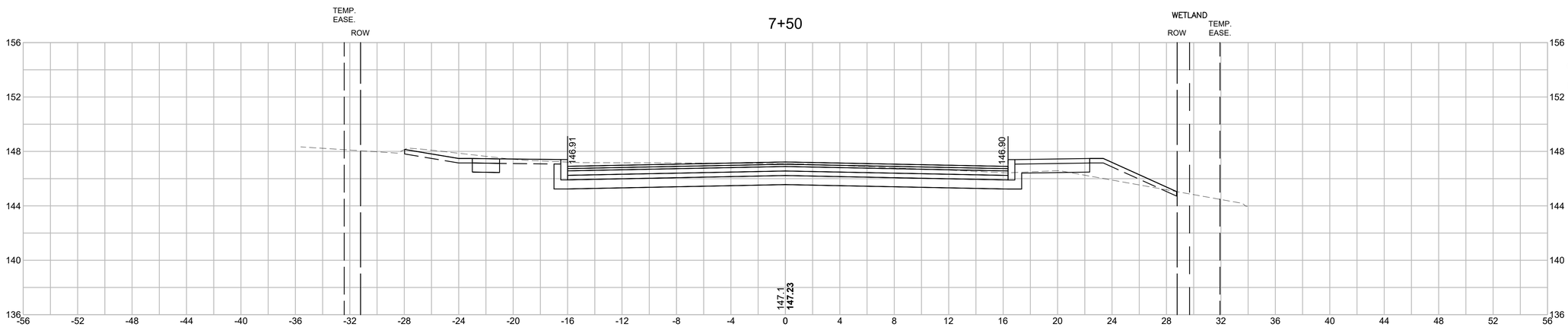
607573_HD (CORR).DWG Plotted on 4-Nov-2016 3:40 PM

HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	122	175
PROJECT FILE NO.	607573		

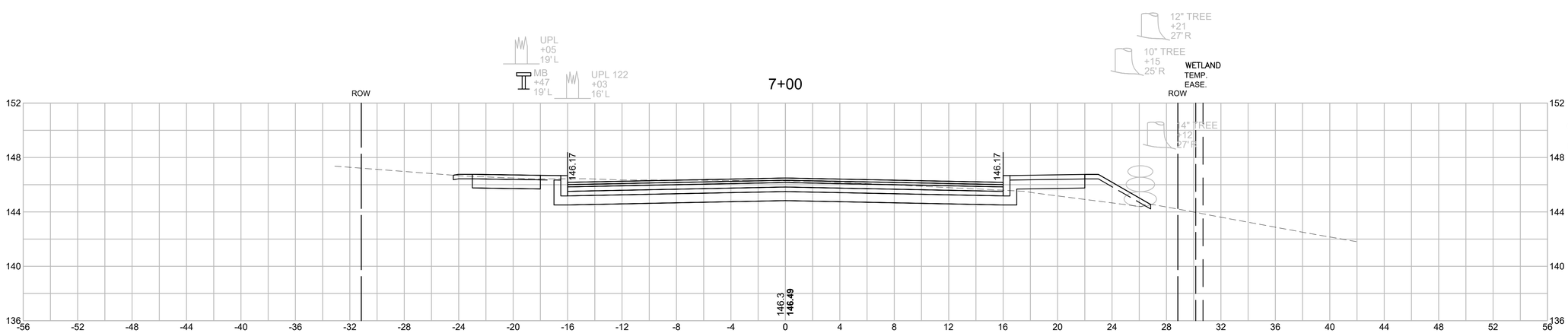
CROSS SECTIONS
ROUTE 97





CUT = 60.91 s.f.

FILL = 3.66 s.f.



CUT = 55.19 s.f.

FILL = 6.91 s.f.

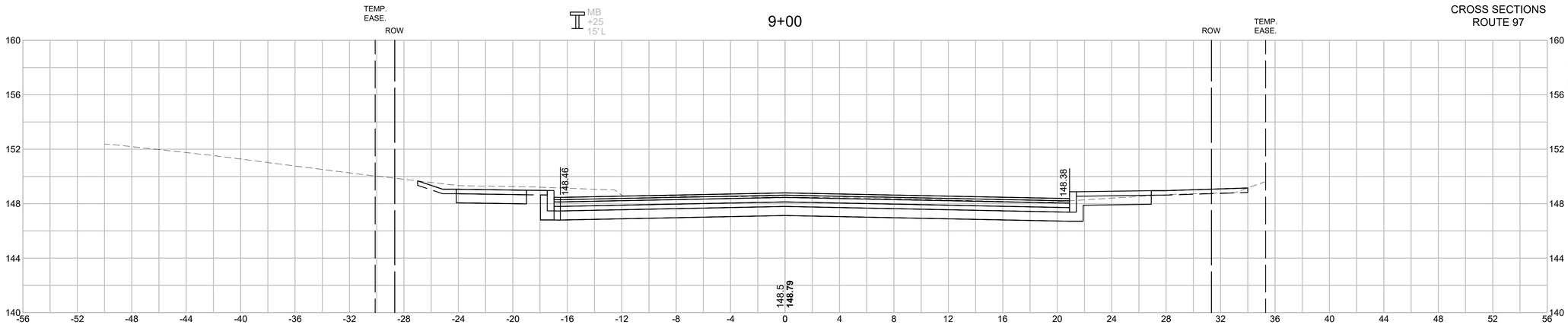
HOR. SCALE IN FEET
4 0 4 8
4 0 4 8
VER. SCALE IN FEET

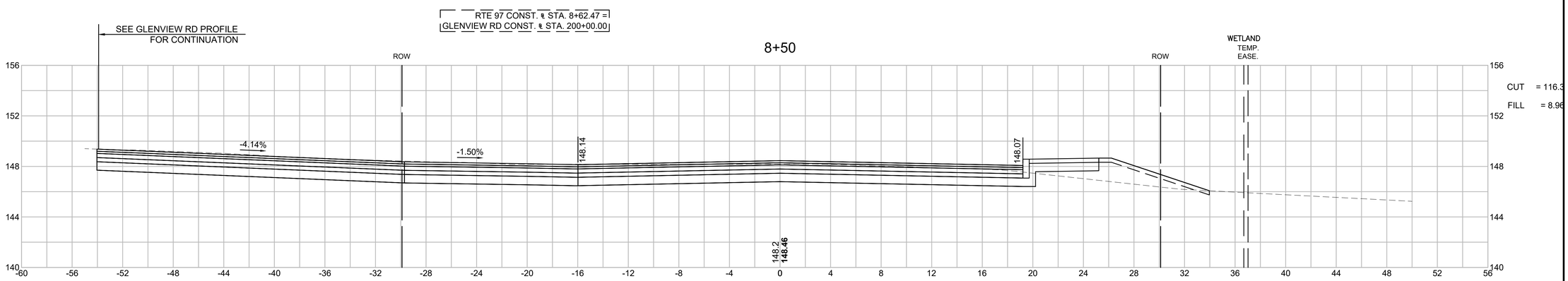
607573_HD (CORR).DWG Plotted on 4-Nov-2016 3:40 PM

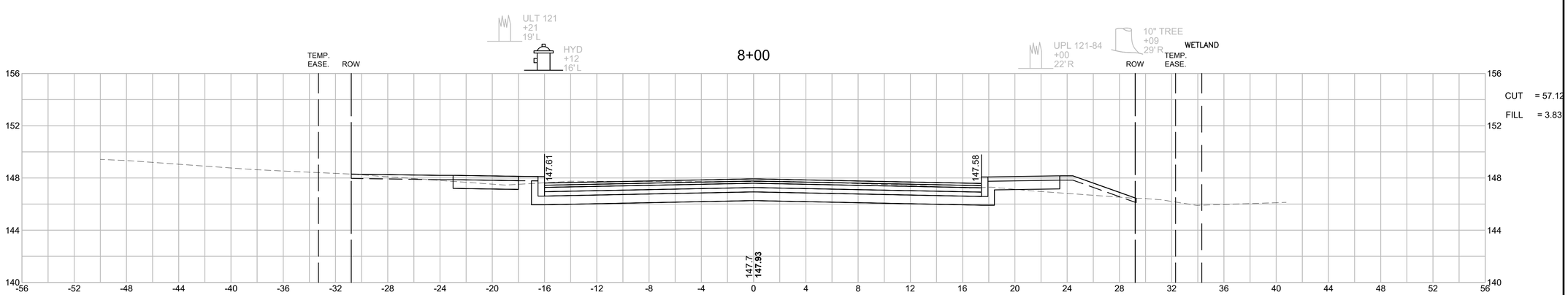
HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	123	175
PROJECT FILE NO.	607573		

CROSS SECTIONS
ROUTE 97







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

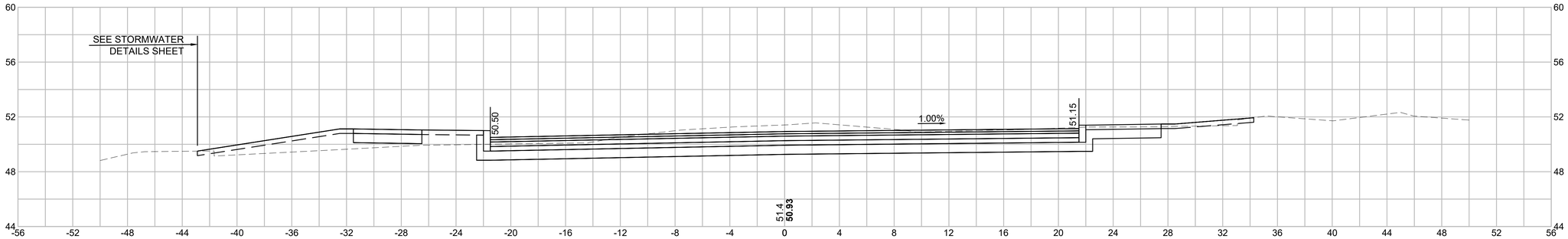
607573_HD (CORR).DWG Plotted on 4-Nov-2016 3:41 PM

HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	162	175
PROJECT FILE NO.	607573		

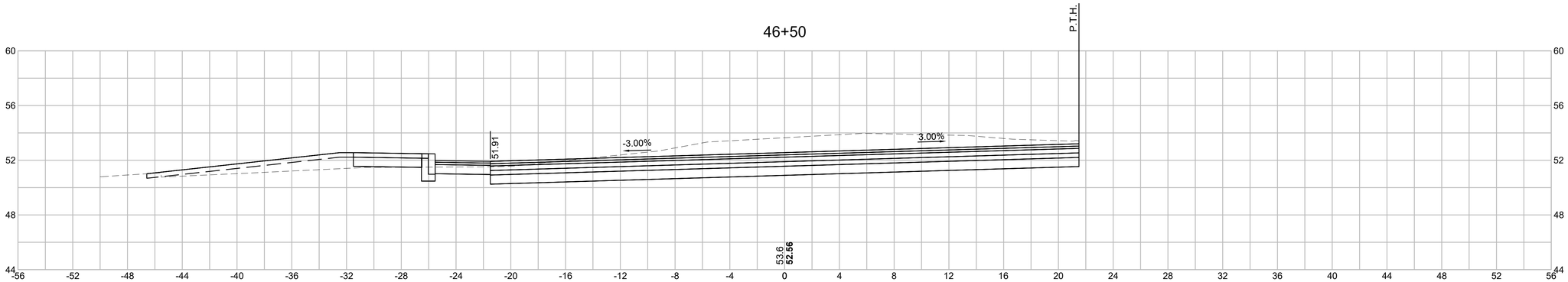
CROSS SECTIONS
ROUTE 97

47+00



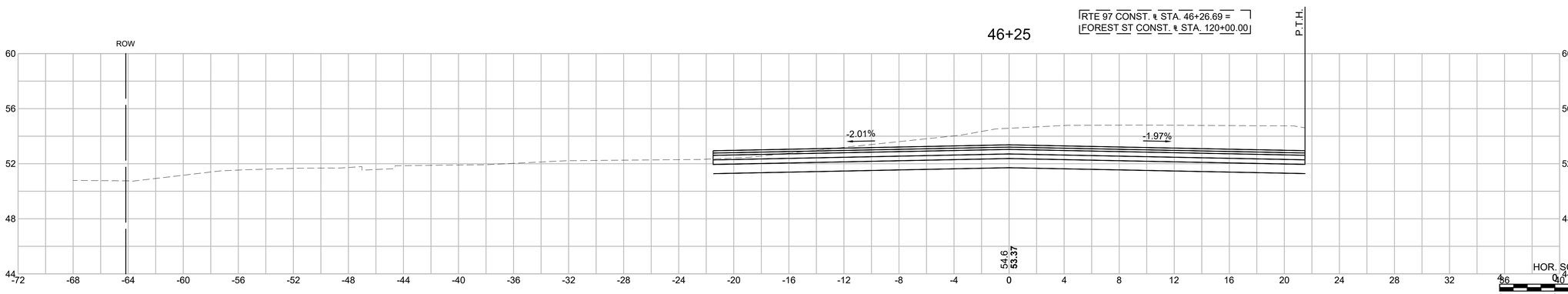
CUT = 80.84 s.f.
FILL = 12.08 s.f.

46+50



CUT = 100.90 s.f.
FILL = 6.76 s.f.

46+25



HOR. SCALE IN FEET
VER. SCALE IN FEET

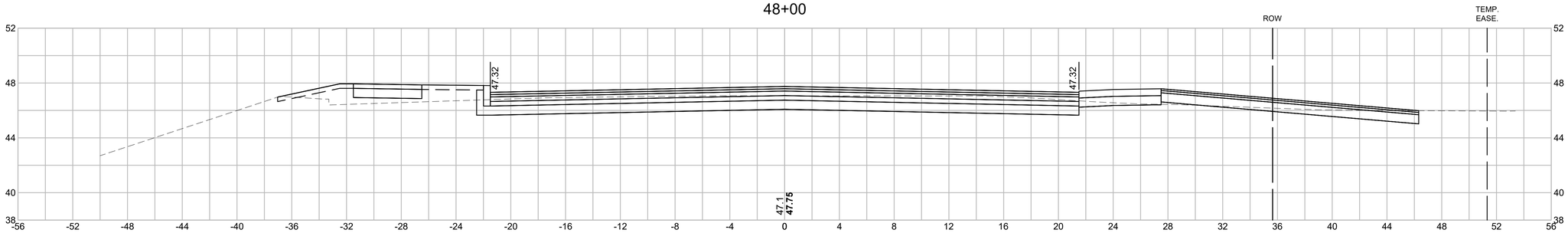
607573_HD (CORR).DWG Plotted on 4-Nov-2016 3:46 PM

HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	163	175
PROJECT FILE NO.	607573		

CROSS SECTIONS
ROUTE 97

48+00

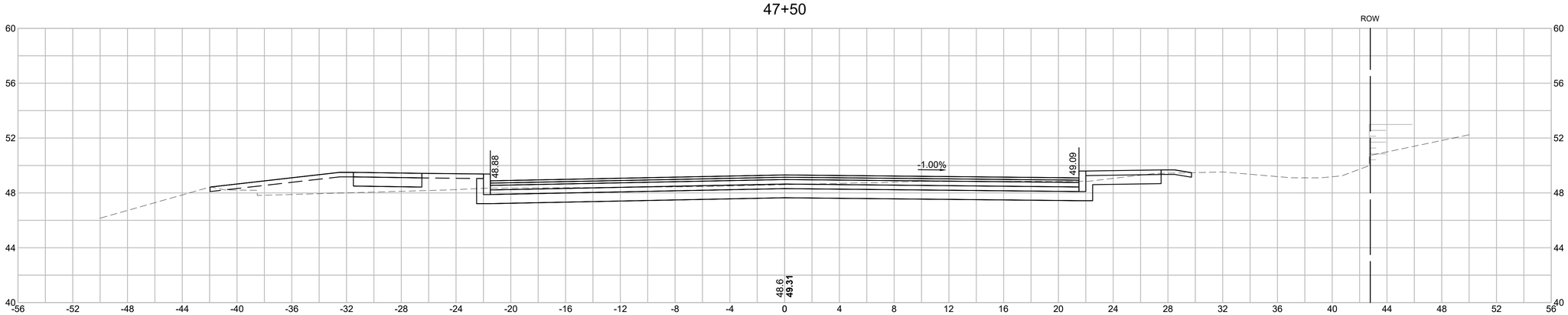


CUT = 57.60 s.f.

FILL = 8.12 s.f.

CUR
PRC = 4
PT = 49
R =
BANK

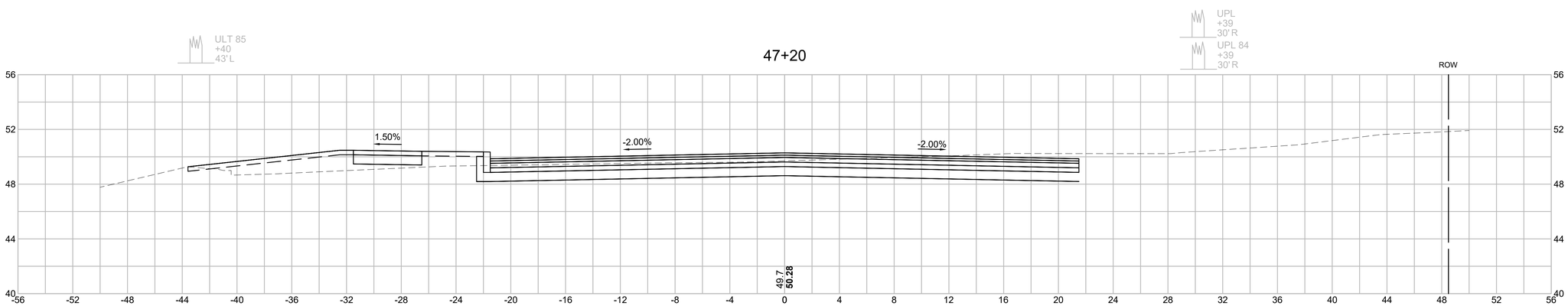
47+50



CUT = 54.02 s.f.

FILL = 12.36 s.f.

47+20



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

607573_HD (CORR).DWG Plotted on 4-Nov-2016 3:46 PM

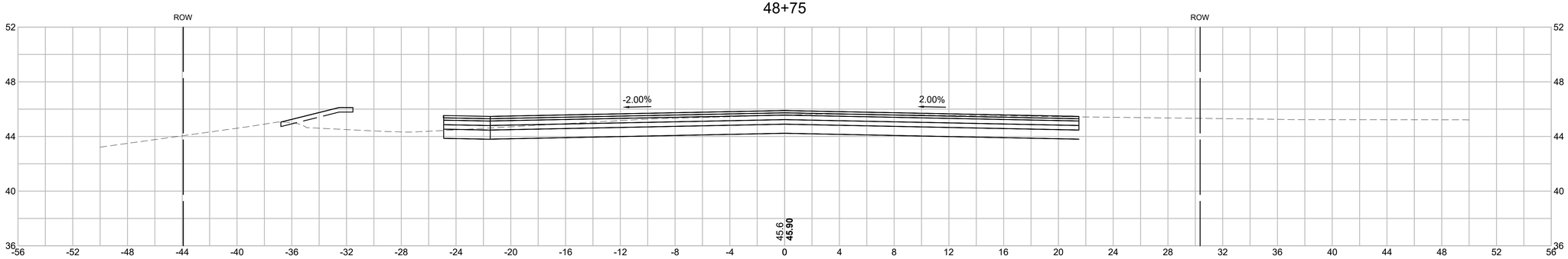
HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	164	175
PROJECT FILE NO.	607573		

CROSS SECTIONS
ROUTE 97

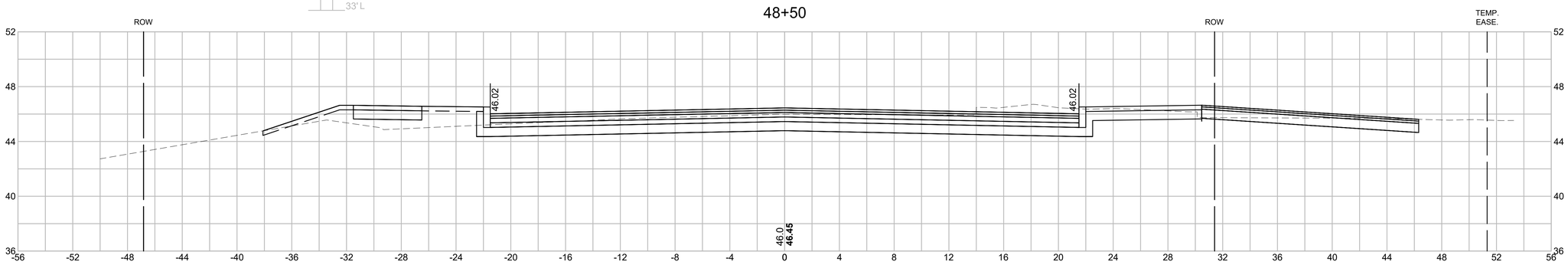
607573_HD (CORR).DWG Plotted on 4-Nov-2016 3:46 PM

48+75



CUR
PRC = 4
PT = 49
R =
BANK

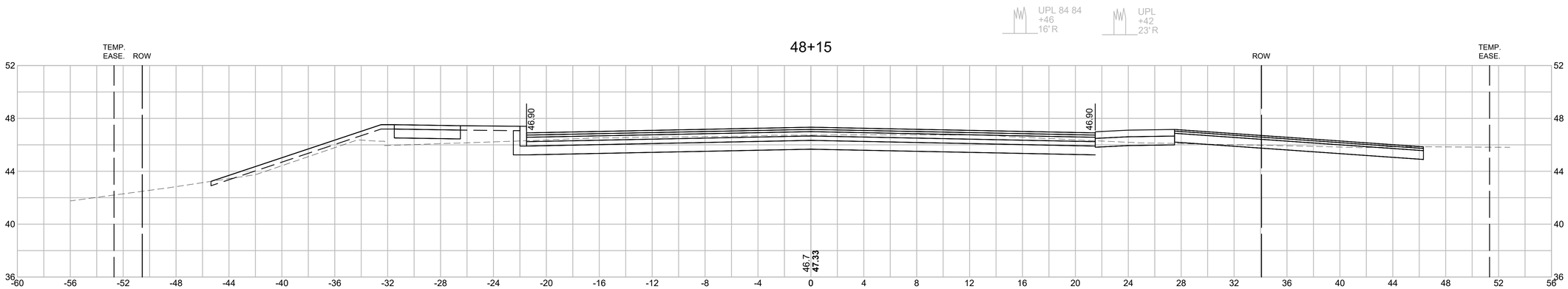
48+50



CUT = 65.85 s.f.

FILL = 9.60 s.f.

48+15



HOR. SCALE IN FEET
4 0 4 8

VER. SCALE IN FEET
4 0 4 8

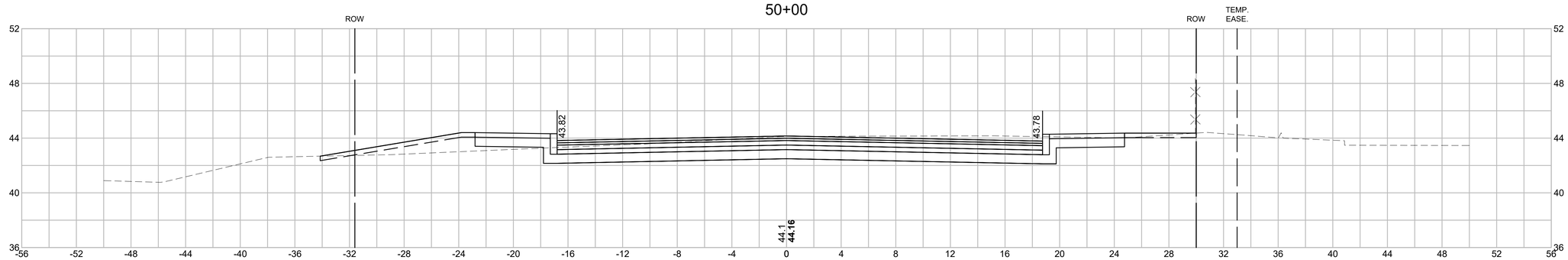
HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	165	175
PROJECT FILE NO.	607573		

CROSS SECTIONS
ROUTE 97

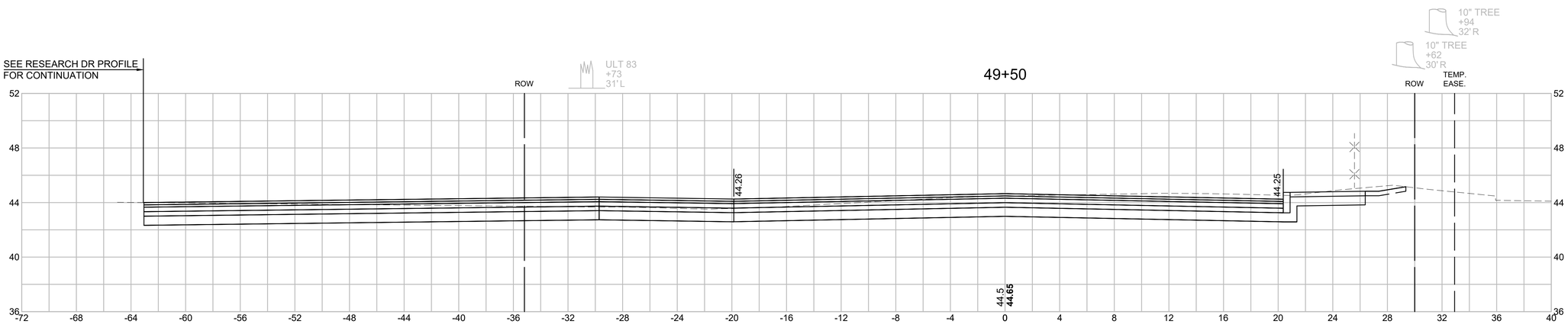
607573_HD (CORR).DWG Plotted on 4-Nov-2016 3:46 PM

50+00



CUT = 65.36 s.f.
FILL = 6.51 s.f.

49+50

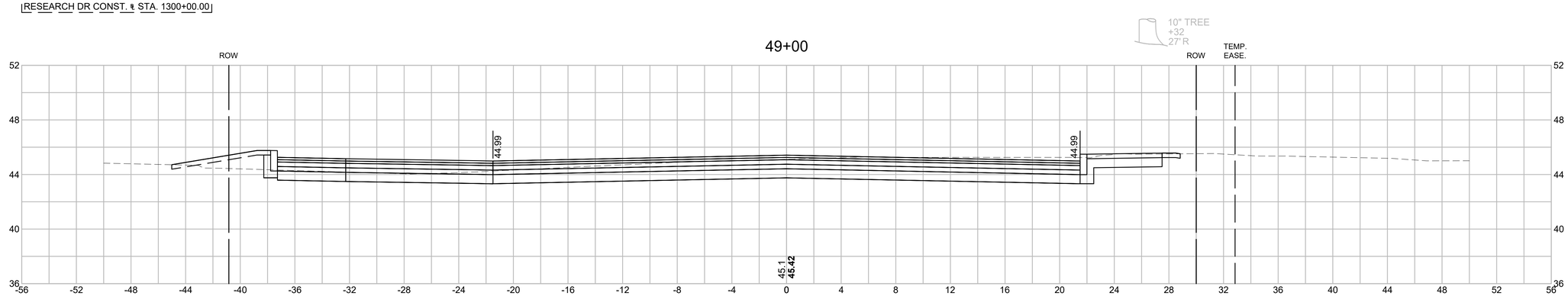


CUT = 123.12 s.f.
FILL = 0.00 s.f.

RTE 97 CONST. ℄ STA. 49+18.03 =
RESEARCH DR CONST. ℄ STA. 1300+00.00

CUR
PRC = 4
PT = 49
R =
BANK

49+00



CUT = 79.66 s.f.
FILL = 3.21 s.f.

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

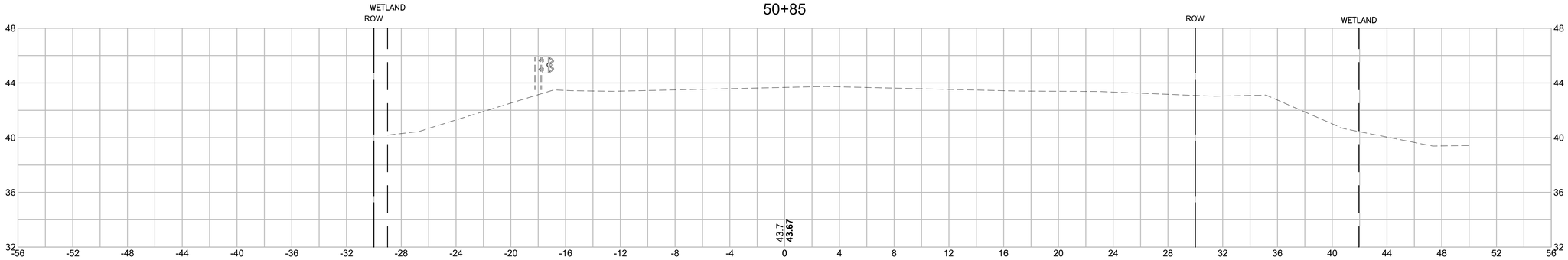
HAVERHILL
BROADWAY (ROUTE 97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	166	175
PROJECT FILE NO.	607573		

CROSS SECTIONS
ROUTE 97

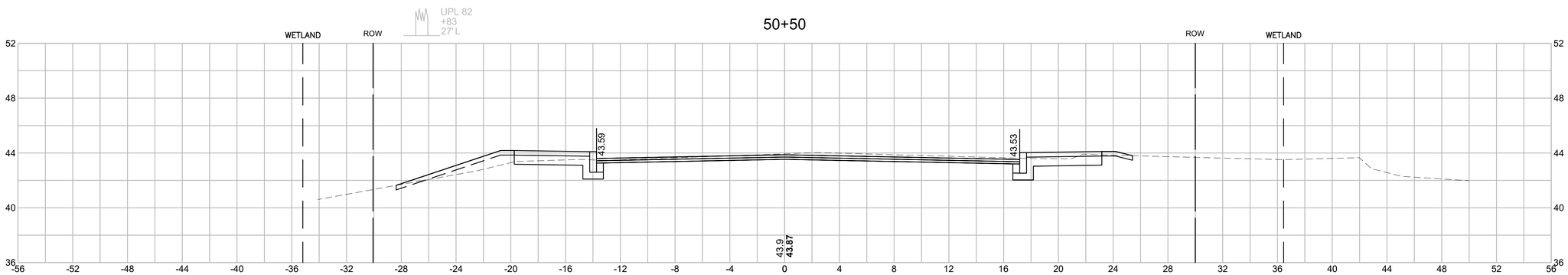
607573_HD (CORR).DWG Plotted on 4-Nov-2016 3:46 PM

50+85



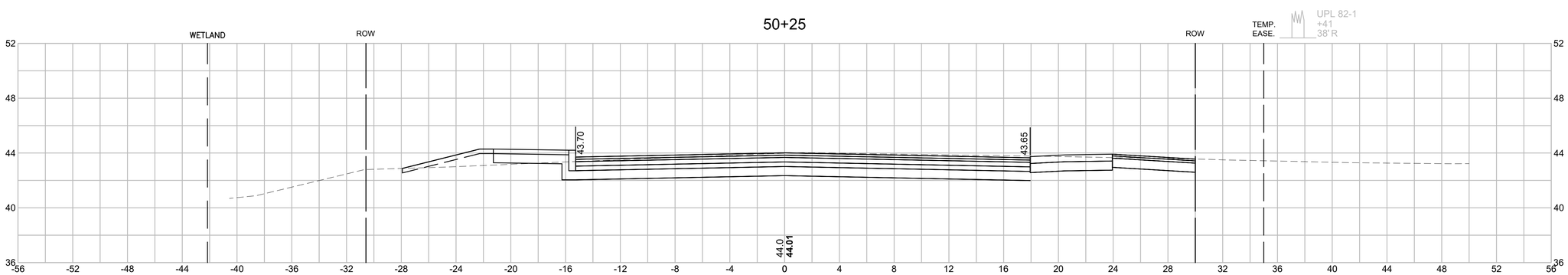
CUT = 0.00 s.f.
FILL = 0.00 s.f.

50+50



CUT = 21.74 s.f.
FILL = 2.82 s.f.

50+25



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