

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION HIGHWAY DIVISION

BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	49
PROJECT FILE NO.		608347	

TITLE SHEET & INDEX

PLAN AND PROFILE OF INTERSECTION IMPROVEMENTS AT THREE LOCATIONS

IN THE CITY OF
BEVERLY
ESSEX 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.

DESIGN DESIGNATION CABOT STREET DODGE STREET

DESIGN SPEED	30 MPH	35 MPH
ADT (2015)	13,934	24,951
ADT (2025)	14,647	26,227
K	4.7%	5.5%
D	57%	67%
T (PEAK HOUR)	1.0%	X.X%
T (AVERAGE DAY)	1.0%	X.X%
DHV	650	1,372
DDHV	372	922

FUNCTIONAL CLASSIFICATION URBAN PRINCIPAL ARTERIAL URBAN PRINCIPAL ARTERIAL

DESIGN DESIGNATION MCKAY STREET BALCH STREET

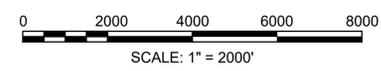
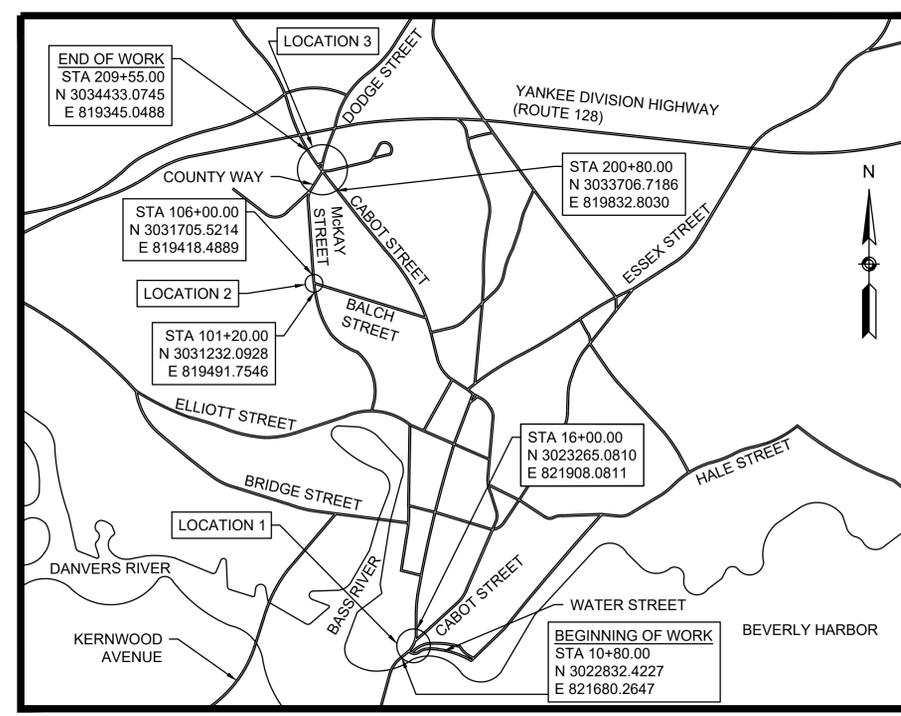
DESIGN SPEED	30 MPH	30 MPH
ADT (2015)	12,817	6,960
ADT (2025)	13,472	7,316
K	5.6%	9.6%
D	61%	79%
T (PEAK HOUR)	1.0%	1.0%
T (AVERAGE DAY)	1.0%	1.0%
DHV	712	666
DDHV	437	526

FUNCTIONAL CLASSIFICATION URBAN MINOR ARTERIAL URBAN COLLECTOR

INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET & INDEX
2	LEGEND & ABBREVIATIONS
3	KEY PLAN
4-7	TYPICAL SECTIONS
8-12	CONSTRUCTION PLANS
13-19	PROFILES
20-24	TRAFFIC SIGN & PAVEMENT MARKINGS
25-31	TRAFFIC SIGNAL PLANS
32-34	TEMPORARY TRAFFIC CONTROL PLANS
35-39	DRAINAGE AND UTILITY PLANS
40-41	CONSTRUCTION DETAILS
42-49	CRITICAL CROSS SECTIONS

25% SUBMITTAL



LOCATION 1 = 520.00 FEET = 0.098 MILES
LOCATION 2 = 480.00 FEET = 0.091 MILES
LOCATION 3 = 875.00 FEET = 0.166 MILES



300 TRADE CENTER, SUITE 5580
WOBURN, MA 01801-7433
PHONE: 781-933-4800
FAX: 781-933-4801

DATE	DESCRIPTION	REV #
06-02-2017	25% DESIGN SUBMISSION	0

**DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION**

APPROVED:

DIVISION ADMINISTRATOR DATE



RECOMMENDED FOR APPROVAL

CHIEF ENGINEER DATE

APPROVED

HIGHWAY ADMINISTRATOR DATE

GENERAL SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
		JERSEY BARRIER ON BRIDGE OR JERSEY BARRIER
		CATCH BASIN
		CATCH BASIN CURB INLET
		FLAG POLE
		GAS PUMP
		MAIL BOX
		POST SQUARE
		POST CIRCULAR
		STEEL POLE
		WELL
		ELECTRIC HANDHOLE
		FENCE GATE POST
		GAS GATE
		BORING HOLE
		MONITORING WELL
		TEST PIT
		HYDRANT
		LIGHT POLE
		COUNTY BOUND
		GPS POINT
		CABLE MANHOLE
		DRAINAGE MANHOLE
		ELECTRIC MANHOLE
		GAS MANHOLE
		MISC MANHOLE
		SEWER MANHOLE
		TELEPHONE MANHOLE
		WATER MANHOLE
		MASSACHUSETTS HIGHWAY BOUND
		MONUMENT
		STONE BOUND
		TOWN OR CITY BOUND
		TRAVERSE OR TRIANGULATION STATION
		TROLLEY POLE OR GUY POLE
		TRANSMISSION POLE
		UTILITY POLE W/ FIREBOX
		UTILITY POLE WITH DOUBLE LIGHT
		UTILITY POLE W/ 1 LIGHT
		UTILITY POLE
		BUSH
		TREE
		STUMP
		SWAMP / MARSH
		WATER GATE
		PARKING METER
		OVERHEAD CABLE/WIRE
		CURBING
		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

TRAFFIC SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
		CONTROLLER PHASE ACTUATED
		TRAFFIC SIGNAL HEAD (SIZE AS NOTED)
		WIRE LOOP DETECTOR (6' x 6' TYP UNLESS OTHERWISE SPECIFIED)
		VIDEO DETECTION CAMERA
		MICROWAVE DETECTOR
		PEDESTRIAN PUSH BUTTON, SIGN (DIRECTIONAL ARROW AS SHOWN) AND SADDLE
		EMERGENCY PREEMPTION CONFIRMATION STROBE LIGHT
		VEHICULAR SIGNAL HEAD
		VEHICULAR SIGNAL HEAD, OPTICALLY PROGRAMMED
		FLASHING BEACON
		PEDESTRIAN SIGNAL HEAD, (TYPE AS NOTED OR AS SPECIFIED)
		RAILROAD SIGNAL
		SIGNAL POST AND BASE (ALPHA-NUMERIC DESIGNATION NOTED)
		MAST ARM, SHAFT AND BASE (ARM LENGTH AS NOTED)
		HIGH MAST POLE OR TOWER
		SIGN AND POST
		SIGN AND POST (2 POSTS)
		MAST ARM WITH LUMINAIRE
		OPTICAL PRE-EMPTION DETECTOR
		CONTROL CABINET, GROUND MOUNTED
		CONTROL CABINET, POLE MOUNTED
		FLASHING BEACON CONTROL AND METER PEDESTAL
		LOAD CENTER ASSEMBLY
		PULL BOX 12"x12" (OR AS NOTED)
		ELECTRIC HANDHOLE 12"x24" (OR AS NOTED)
		TRAFFIC SIGNAL CONDUIT

PAVEMENT MARKINGS SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
		PAVEMENT ARROW - WHITE
		LEGEND "ONLY" - WHITE
		STOP LINE - 12"
		CROSSWALK - 12" LINES SPACED 8' APART
		SOLID WHITE LINE - 6"
		SOLID WHITE SHOULDER LINE - 6"
		SOLID YELLOW LINE - 6"
		BROKEN WHITE LINE - 6"
		BROKEN YELLOW LINE - 6"
		DOTTED WHITE LINE - 6"
		DOTTED YELLOW LINE - 6"
		DOTTED WHITE LINE EXTENSION - 6"
		DOTTED YELLOW LINE EXTENSION - 6"
		DOUBLE WHITE LINE - 2 - 6" LINES
		DOUBLE YELLOW CENTERLINE - 2 - 6" LINES

GENERAL NOTES:

- THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
- WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED TO THE ENGINEER FOR RESOLUTION OF THE CONFLICT.
- THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENT OF GAS, ELECTRIC, TELEPHONE AND ANY OTHER PRIVATE UTILITIES BY THE UTILITY COMPANIES.
- 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.
- THE TERM "PROPOSED" (PROP.) MEANS WORK TO BE CONSTRUCTED USING NEW MATERIALS OR, WHERE APPLICABLE, REUSING EXISTING MATERIALS IDENTIFIED AS "REMOVE AND RESET" (R&R).
- JOINTS BETWEEN NEW BITUMINOUS CONCRETE ROADWAY PAVEMENT AND SAWCUT EXISTING PAVEMENT SHALL BE SEALED IN ACCORDANCE WITH ITEM 453. OF THE SPECIAL PROVISIONS.
- ALL EXISTING SIGNS WITHIN THE PROJECT LIMITS SHALL BE RETAINED UNLESS INDICATED OTHERWISE ON THE DRAWINGS.
- ALL PROPOSED PAVEMENT MARKINGS SHALL BE THERMOPLASTIC.
- 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.
- FIELD SURVEY PROVIDED BY CHAPPELL ENGINEERING ASSOCIATES, LLC., 201 BOSTON POST ROAD WEST, SUITE 101, MARLBOROUGH, MA 01752 IN JULY 2016. HORIZONTAL DATUM IS BASED ON MASS GRID SYSTEM NAD 1983. ELEVATIONS SHOWN ON THIS PLAN REFER TO THE NAVD OF 1988.

ABBREVIATIONS

GENERAL	DESCRIPTION
AADT	ANNUAL AVERAGE DAILY TRAFFIC
ABAN	ABANDON
ADJ	ADJUST
APPROX.	APPROXIMATE
A.C.	ASPHALT CONCRETE
ACCM PIPE	ASPHALT COATED CORRUGATED METAL PIPE
BIT.	BITUMINOUS
BC	BOTTOM OF CURB
BD.	BOUND
BL	BASELINE
BLDG	BUILDING
BM	BENCHMARK
BO	BY OTHERS
BOS	BOTTOM OF SLOPE
BR.	BRIDGE
CB	CATCH BASIN
CBCI	CATCH BASIN WITH CURB INLET
CC	CEMENT CONCRETE
CCM	CEMENT CONCRETE MASONRY
CEM	CEMENT
CI	CURB INLET
CIP	CAST IRON PIPE
CLF	CHAIN LINK FENCE
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CSP	CORRUGATED STEEL PIPE
CO.	COUNTY
CONC	CONCRETE
CONT	CONTINUOUS
CONST	CONSTRUCTION
CR GR	CROWN GRADE
DHV	DESIGN HOURLY VOLUME
DI	DROP INLET
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DWY	DRIVEWAY
ELEV (or EL.)	ELEVATION
EMB	EMBANKMENT
EOP	EDGE OF PAVEMENT
EXIST (or EX)	EXISTING
EXC	EXCAVATION
F&C	FRAME AND COVER
F&G	FRAME AND GRATE
FDN.	FOUNDATION
FLDSTN	FIELDSTONE
GAR	GARAGE
GD	GROUND
GG	GAS GATE
GI	GUTTER INLET
GIP	GALVANIZED IRON PIPE
GRAN	GRANITE
GRAV	GRAVEL
GRD	GUARD
HDW	HEADWALL
HMA	HOT MIX ASPHALT
HOR	HORIZONTAL
HYD	HYDRANT
INV	INVERT
JCT	JUNCTION
L	LENGTH OF CURVE
LB	LEACH BASIN
LP	LIGHT POLE
LT	LEFT
MAX	MAXIMUM
MB	MAILBOX
MH	MANHOLE
MHB	MASSACHUSETTS HIGHWAY BOUND
MIN	MINIMUM
NIC	NOT IN CONTRACT
NO.	NUMBER
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
P.G.L.	PROFILE GRADE LINE
PI	POINT OF INTERSECTION
POC	POINT ON CURVE
POT	POINT ON TANGENT
PRC	POINT OF REVERSE CURVATURE
PROJ	PROJECT
PROP	PROPOSED
PSB	PLANTABLE SOIL BORROW
PT	POINT OF TANGENCY
PVC	POINT OF VERTICAL CURVATURE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENCY
PVMT	PAVEMENT
PWW	PAVED WATER WAY

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MA	-	2	49

PROJECT FILE NO. 608347

LEGEND, ABBREVIATIONS & GENERAL NOTES

ABBREVIATIONS (cont.)

GENERAL	DESCRIPTION
R	RADIUS OF CURVATURE
R&D	REMOVE AND DISPOSE
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RDWY	ROADWAY
REM	REMOVE
RET	RETAIN
RET WALL	RETAINING WALL
ROW	RIGHT OF WAY
RR	RAILROAD
RRFB	RECTANGULAR RAPID FLASHING BEACON
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
RT	RIGHT
SB	STONE BOUND
SHLD	SHOULDER
SMH	SEWER MANHOLE
ST	STREET
STA	STATION
SSD	STOPPING SIGHT DISTANCE
SHLO	STATE HIGHWAY LAYOUT LINE
SW	SIDEWALK
T	TANGENT DISTANCE OF CURVE/TRUCK %
TAN	TANGENT
TEMP	TEMPORARY
TC	TOP OF CURB
TOS	TOP OF SLOPE
TYP	TYPICAL
UP	UTILITY POLE
VAR	VARIES
VERT	VERTICAL
VC	VERTICAL CURVE
WCR	WHEEL CHAIR RAMP
WG	WATER GATE
WIP	WROUGHT IRON PIPE
WM	WATER METER/WATER MAIN
X-SECT	CROSS SECTION

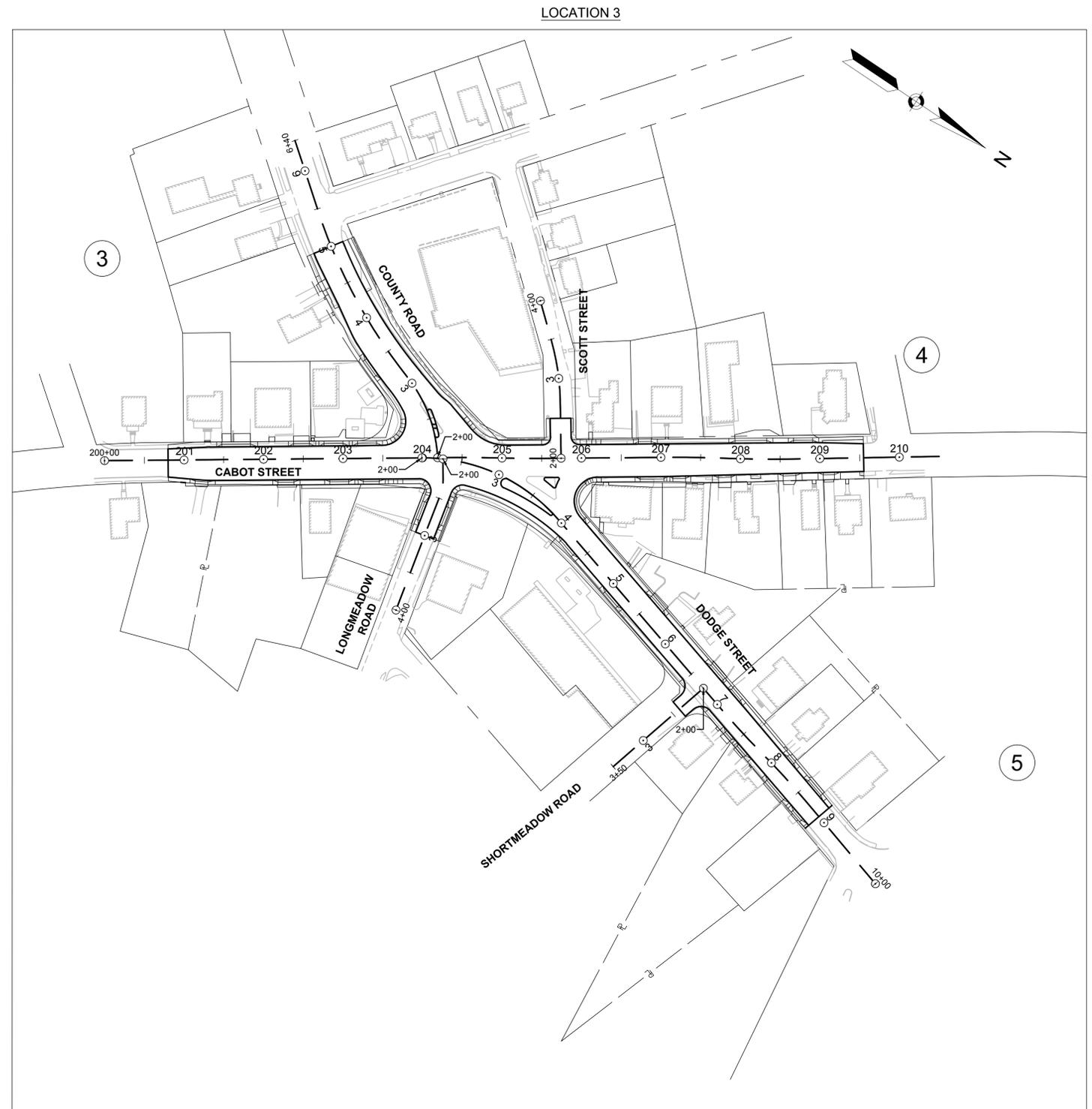
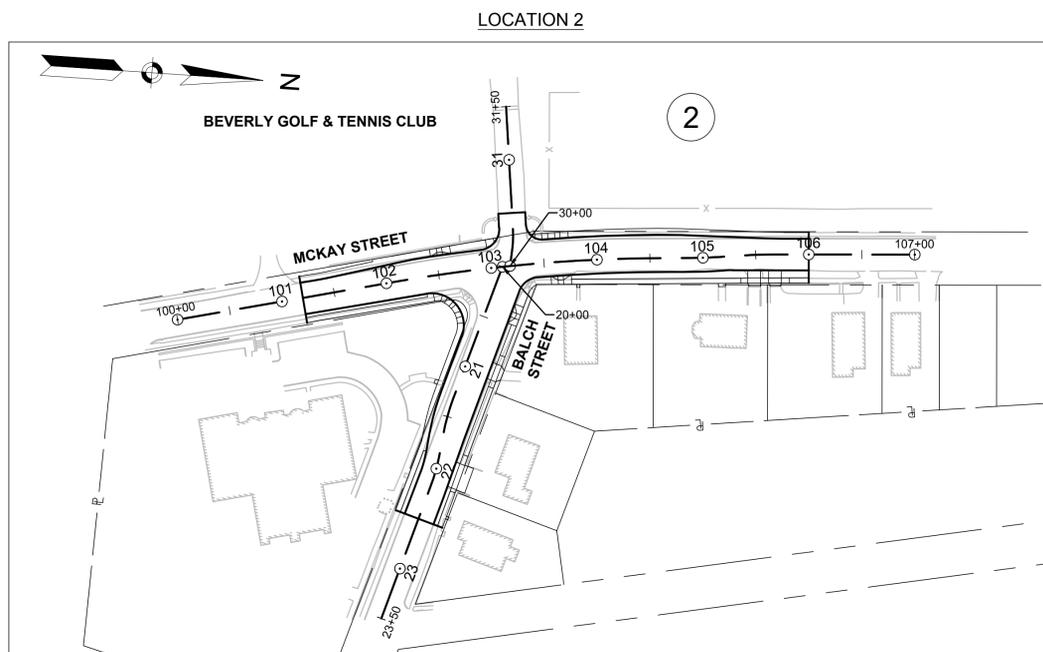
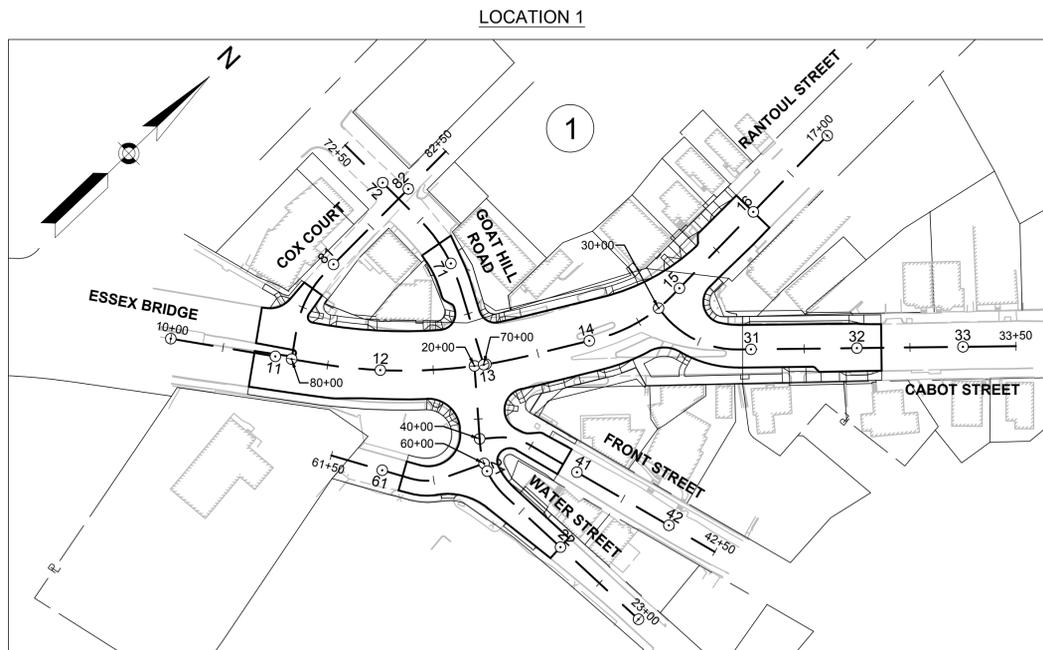
TRAFFIC SIGNAL

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

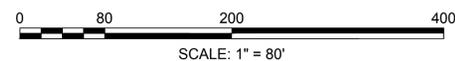
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INTERSECTION IMPROVEMENTS AT 3 LOCATIONS**

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KEY PLAN



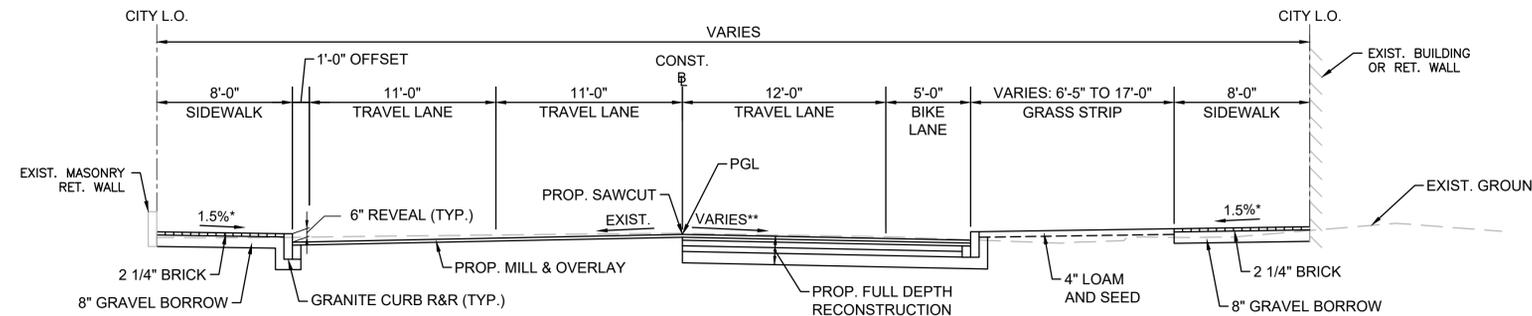
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Drawing Title:	Sheet Number:				
Construction Plans	8	9	10	11	12
Profiles	13 & 14	15 & 16	17 - 19		
Sign and Pavement Marking Plans	20	21	22	23	24
Drainage and Utility Plans	35	36	37	38	39



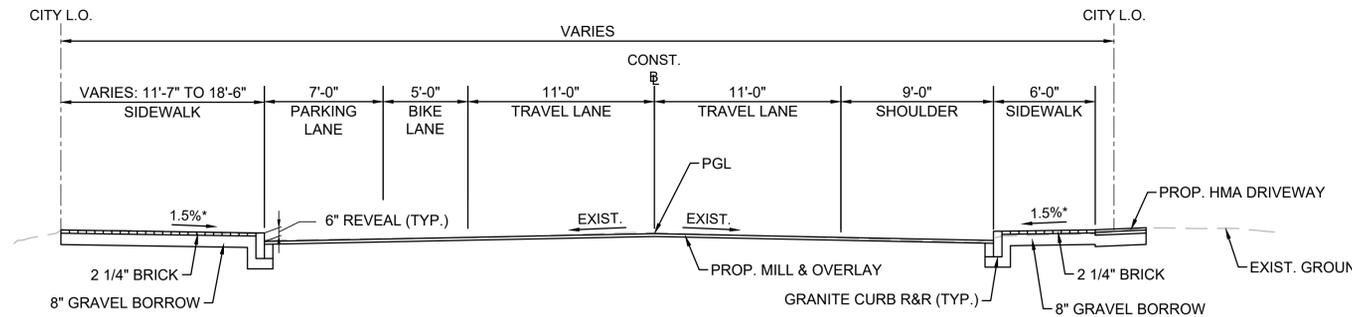
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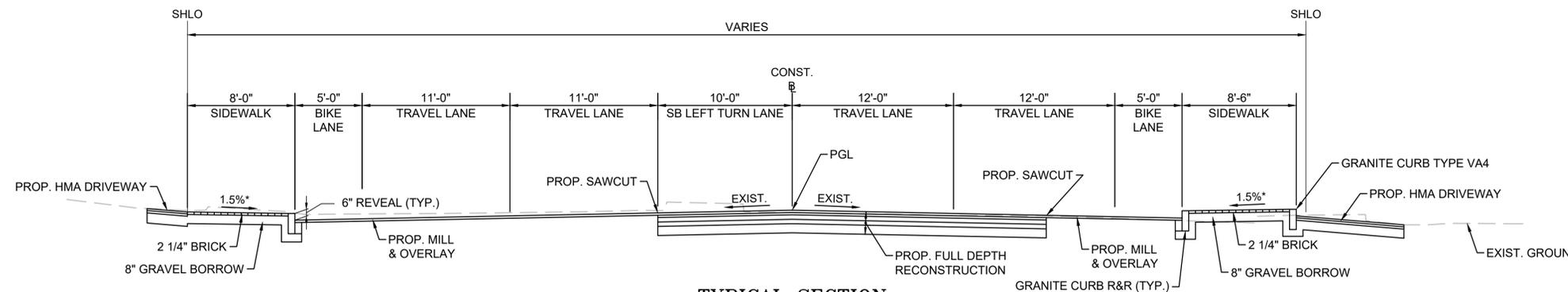
**TYPICAL SECTIONS
LOCATION 1**



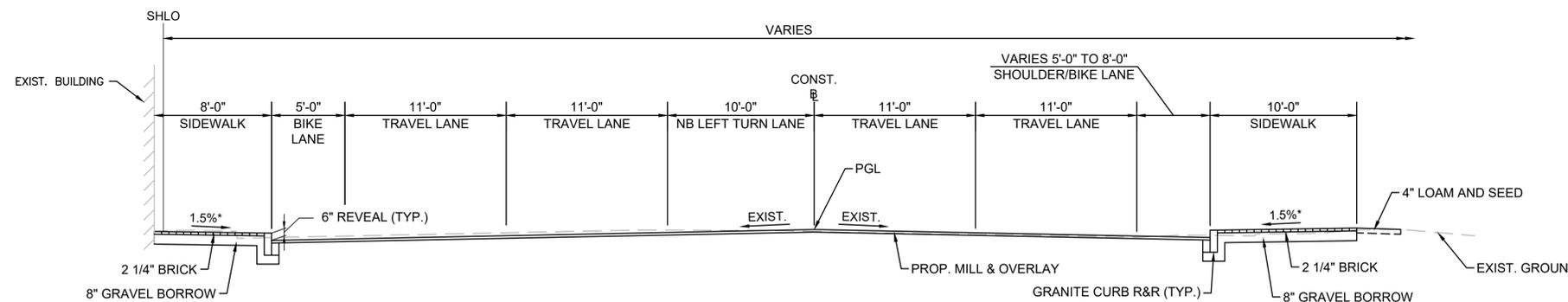
**TYPICAL SECTION
CABOT STREET
STA. 30+50± TO 31+90±
N.T.S**



**TYPICAL SECTION
RANTOUL STREET
STA. 15+30± TO 16+00
N.T.S**



**TYPICAL SECTION
RANTOUL STREET
STA. 13+25± TO 14+50±
N.T.S**



**TYPICAL SECTION
ESSEX BRIDGE
STA. 11+40± TO 12+50±
N.T.S**

* - TOLERANCE FOR CONSTRUCTION ±0.5%

PAVEMENT NOTES:

PROPOSED PAVEMENT MILLING AND OVERLAY:
2" SUPERPAVE SURFACE COURSE - 12.5 (SSC-12.5) OVER
0.07 GAL/SY TACK COAT OVER
VARIABLE DEPTH PAVEMENT MICROMILLING

PROPOSED FULL DEPTH RECONSTRUCTION / MAJOR BOX WIDENING:
(ESSEX BRIDGE / CABOT STREET / MCKAY STREET)
2" SUPERPAVE SURFACE COURSE - 12.5 (SSC-12.5) OVER
0.05 GAL/SY TACK COAT OVER
2" SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC-19.0) OVER
0.05 GAL/SY TACK COAT OVER
4" SUPERPAVE BASE COURSE - 37.5 (SBC-37.5) OVER
4" DENSE GRADED CRUSHED STONE OVER
8" GRAVEL BORROW

PROPOSED FULL DEPTH RECONSTRUCTION:
(BALCH STREET)
1 3/4" SUPERPAVE SURFACE COURSE - 12.5 (SSC-12.5) OVER
0.05 GAL/SY TACK COAT OVER
1 3/4" SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC-19.0) OVER
0.05 GAL/SY TACK COAT OVER
4" SUPERPAVE BASE COURSE - 37.5 (SBC-37.5) OVER
4" DENSE GRADED CRUSHED STONE OVER
8" GRAVEL BORROW

PROPOSED FULL DEPTH MINOR BOX WIDENING (LESS THAN 4' WIDE):
2" SUPERPAVE SURFACE COURSE - 12.5 (SSC-12.5) OVER
0.05 GAL/SY TACK COAT OVER
2" SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC-19.0) OVER
0.05 GAL/SY TACK COAT OVER
6" H.E.S. CEMENT CONCRETE BASE OVER
8" GRAVEL BORROW

PROPOSED CEMENT CONCRETE WALKS / WHEELCHAIR RAMP:
4" CEMENT CONCRETE
AIR ENTRAINED 4000 PSI, 3/4" 610 OVER
8" GRAVEL BORROW

PROPOSED CEMENT CONCRETE SIDEWALK AT DRIVEWAY:
6" CEMENT CONCRETE
AIR ENTRAINED 4000 PSI, 3/4" 610 OVER
8" GRAVEL BORROW

PROPOSED HMA DRIVEWAYS / HMA WALK
1 1/2" SUPERPAVE SURFACE COURSE - 9.5 (SSC-9.5) OVER
0.05 GAL/SY TACK COAT OVER
2" SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC-12.5) OVER
8" GRAVEL BORROW

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

PROPOSED BRICK SIDEWALK:
2 1/4" BRICK OVER
8" GRAVEL BORROW

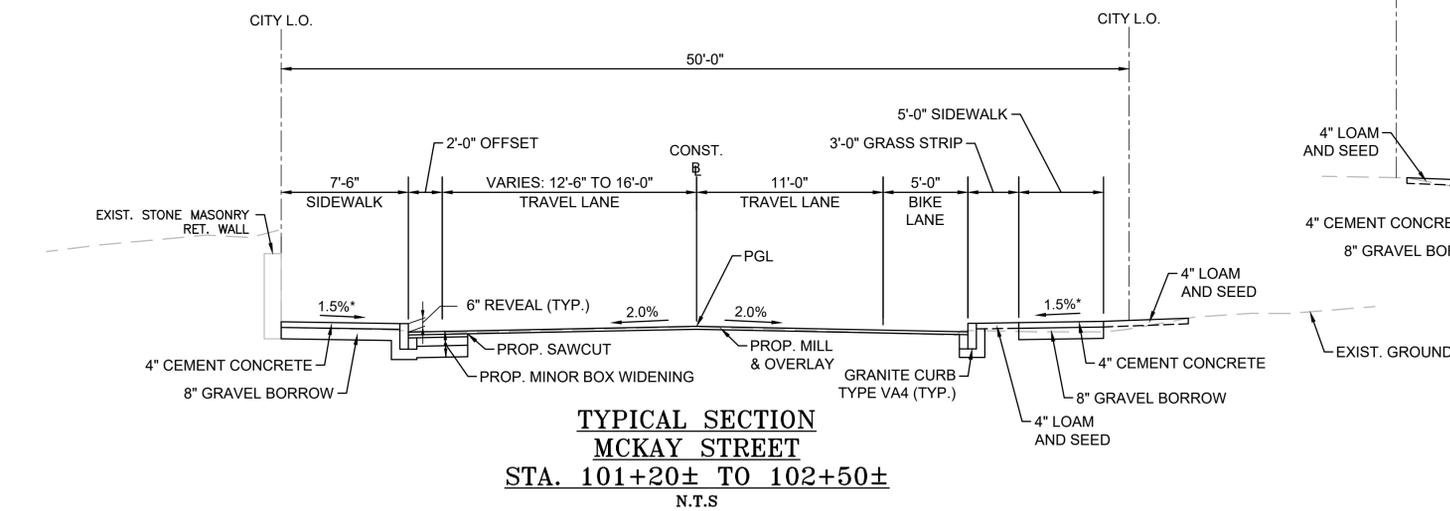
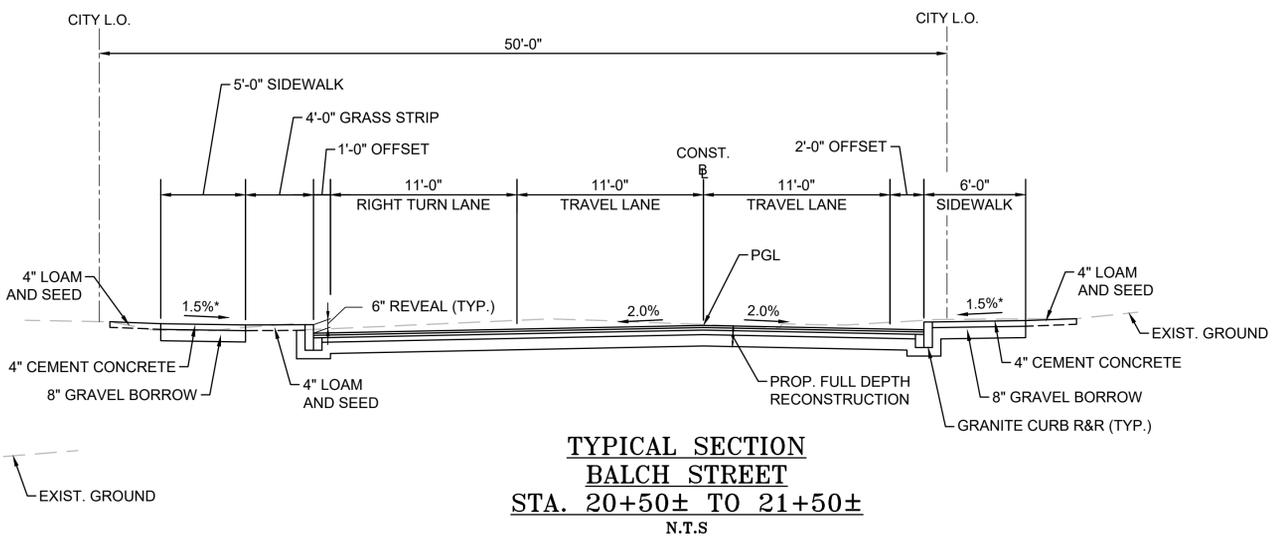
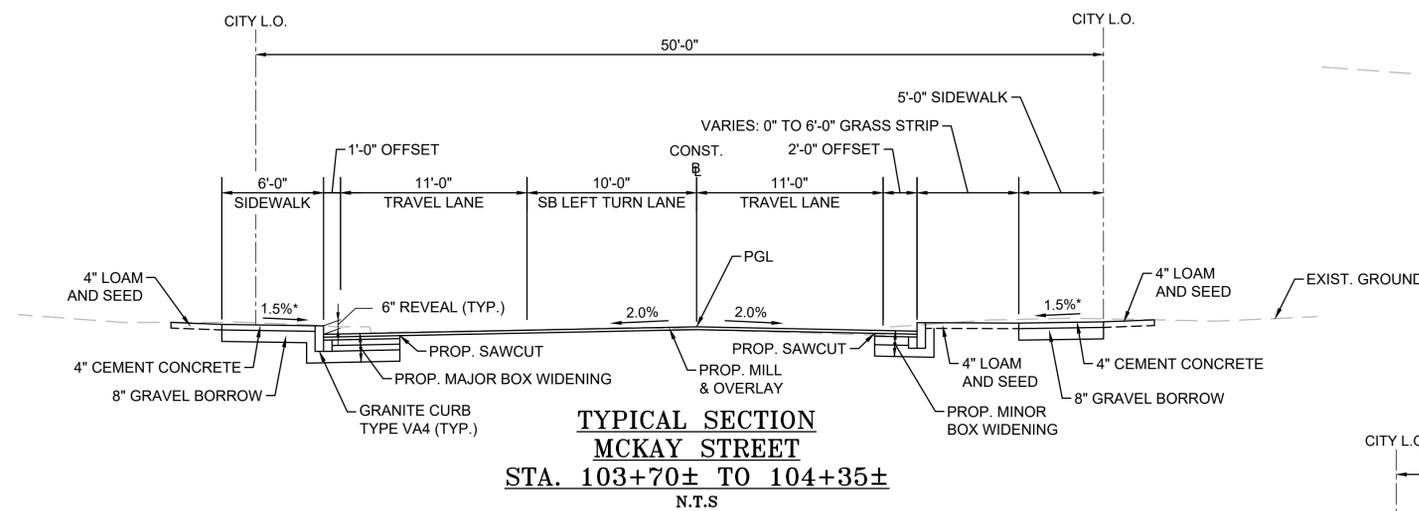
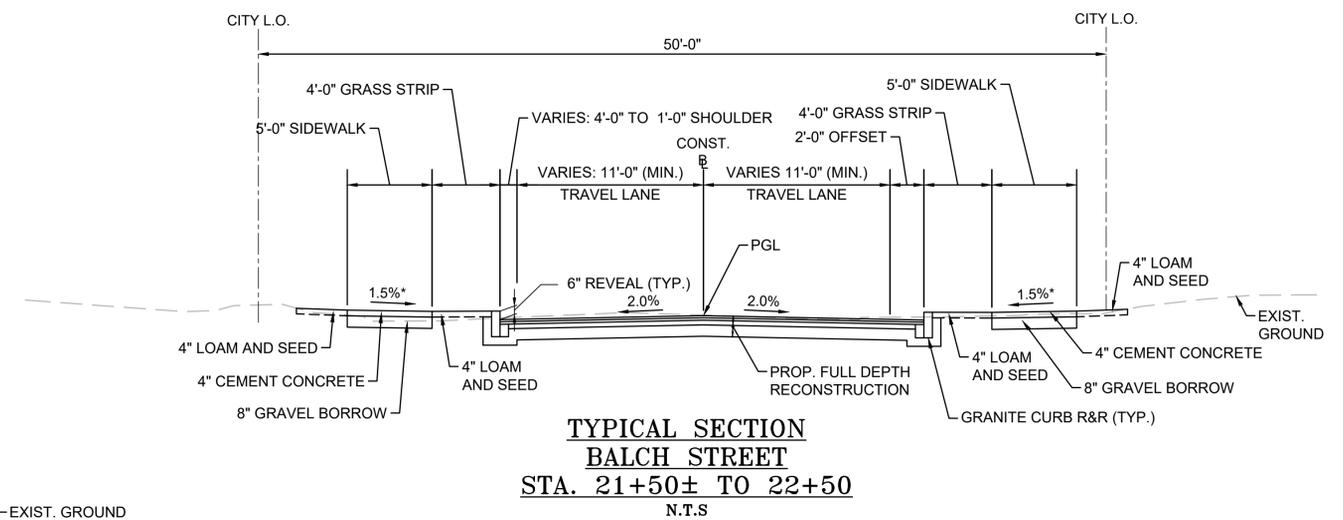
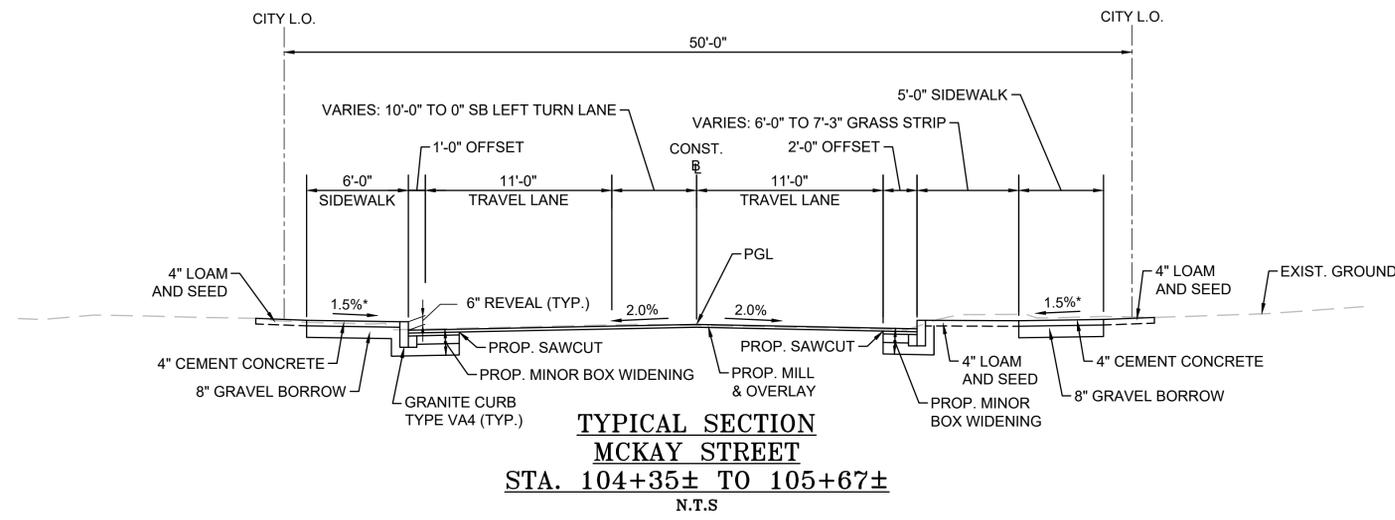
PROPOSED LAWNS, GRASS, AND SLOPES:
4" LOAM AND SEED

PROPOSED TEMPORARY PATCH (WITHIN ROADWAY LIMITS):
3" HOT MIX ASPHALT OVER
12" GRAVEL BORROW OVER
SUITABLE BACK FILL MATERIAL OR
CONTROLLED DENSITY FILL TYPE 1E EXCAVATABLE (CONDUIT ONLY)

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**TYPICAL SECTIONS
LOCATION 2**

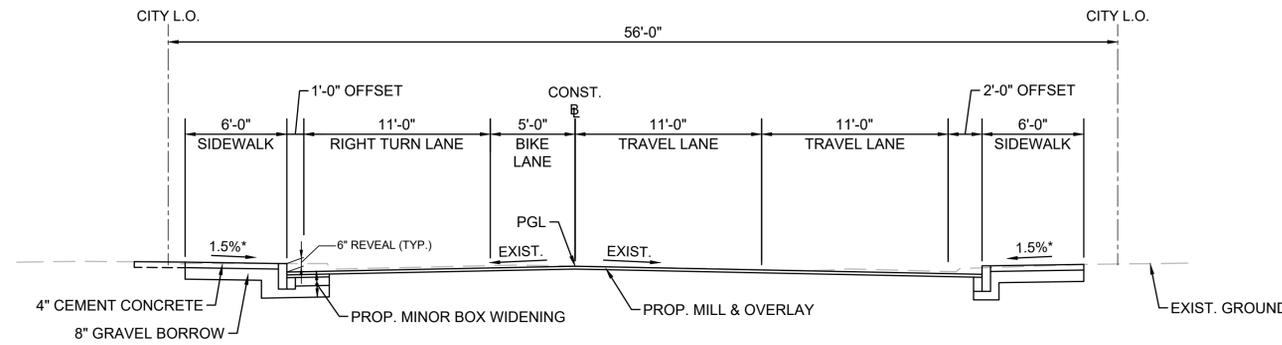


* - TOLERANCE FOR CONSTRUCTION ±0.5%

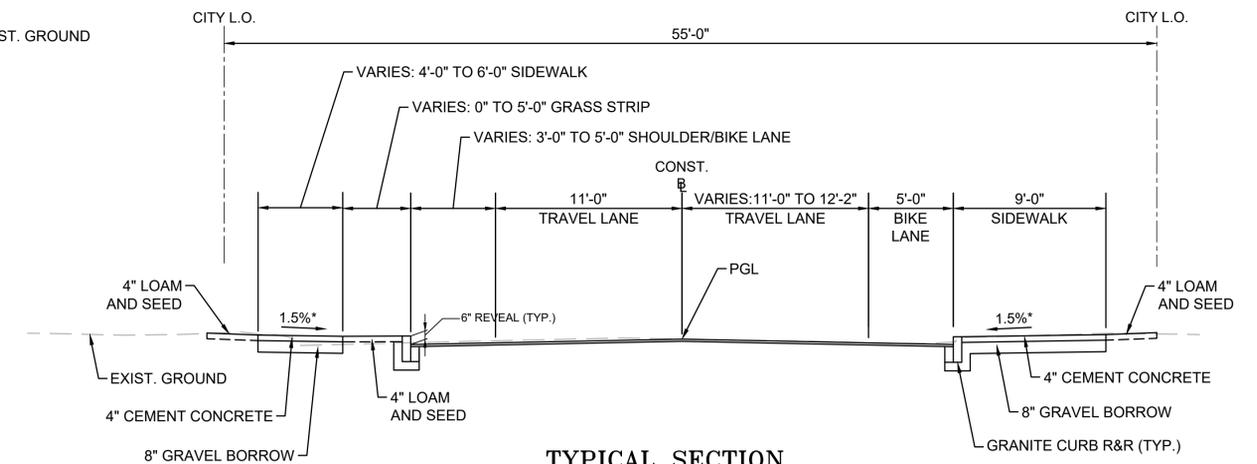
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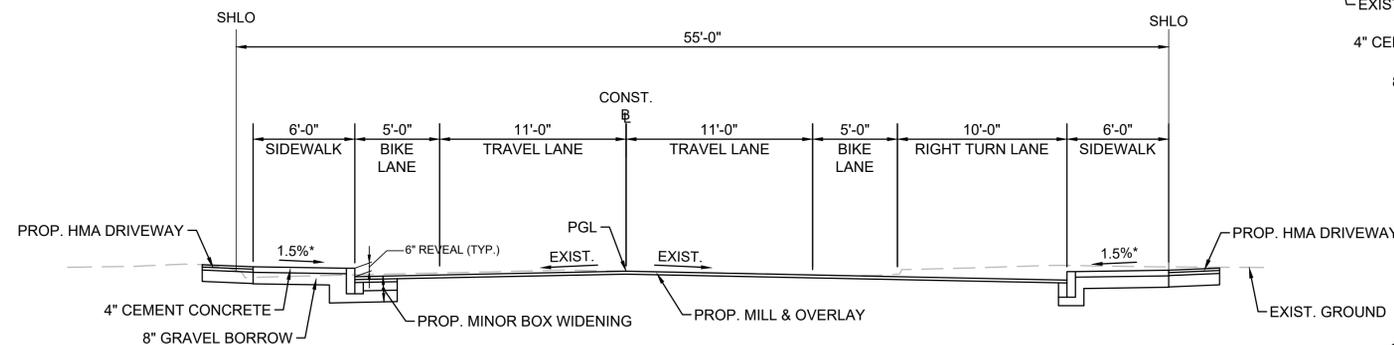
TYPICAL SECTIONS
LOCATION 3
SHEET 1 OF 2



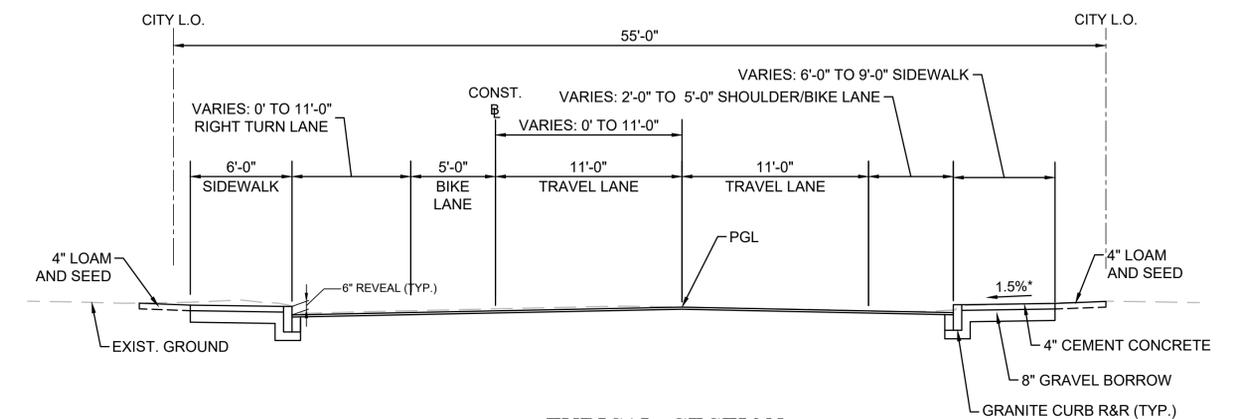
TYPICAL SECTION
CABOT STREET
STA. 206+75± TO 207+10±
N.T.S



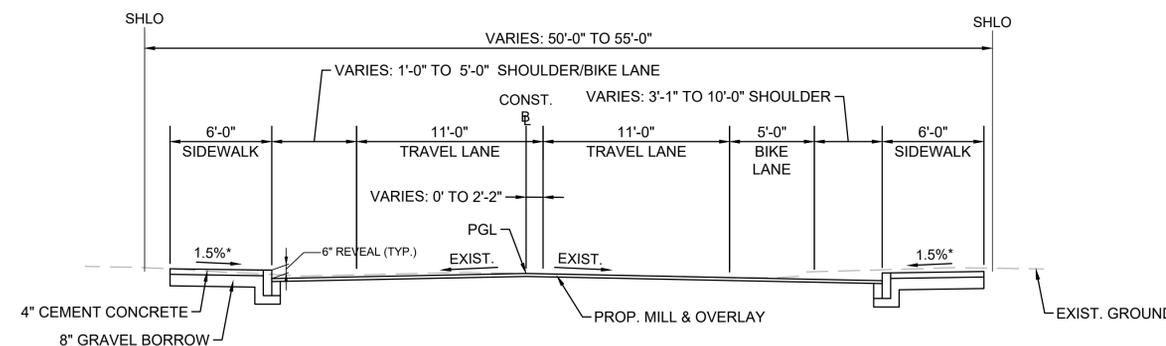
TYPICAL SECTION
CABOT STREET
STA. 208+50± TO 209+55
N.T.S



TYPICAL SECTION
CABOT STREET
STA. 201+50± TO 203+50±
N.T.S



TYPICAL SECTION
CABOT STREET
STA. 207+10± TO 208+50±
N.T.S



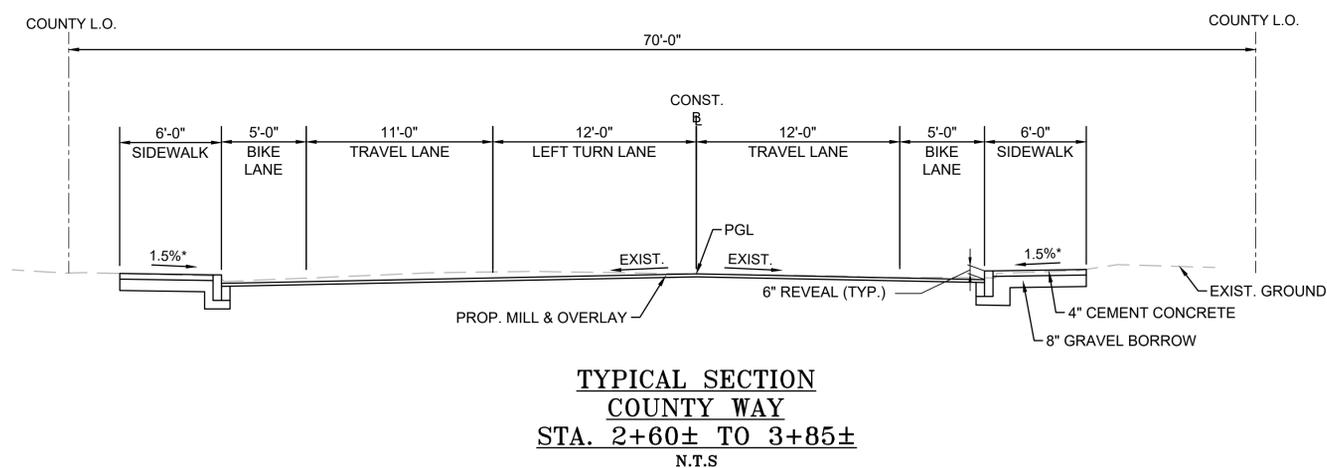
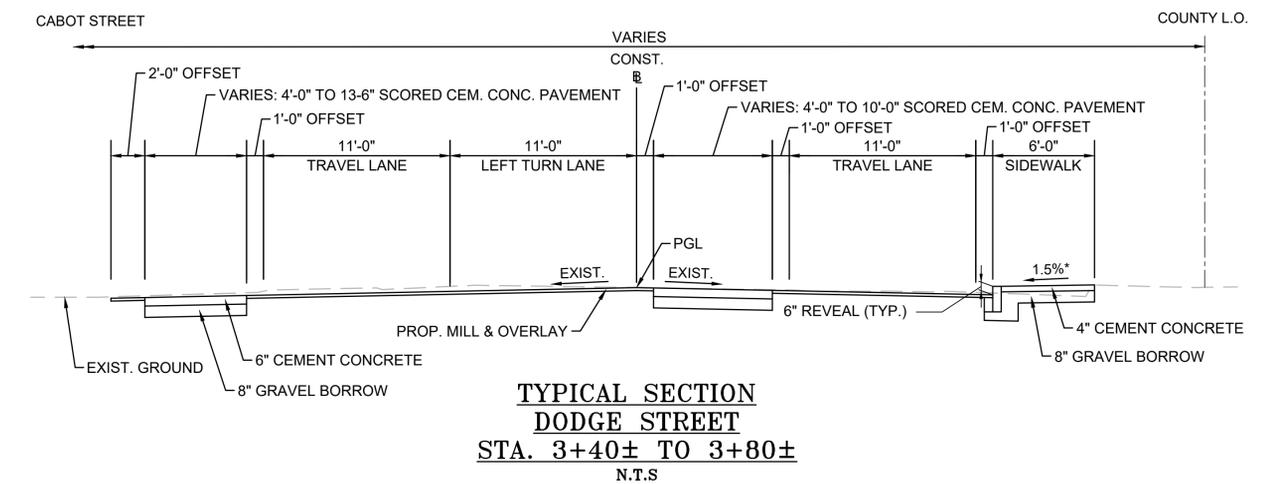
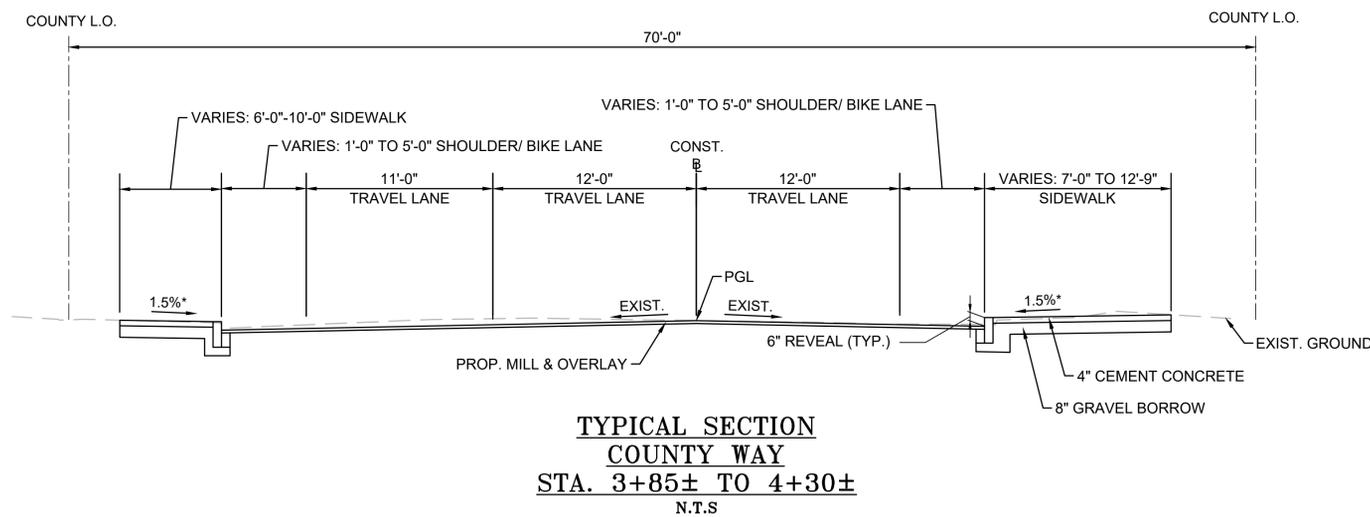
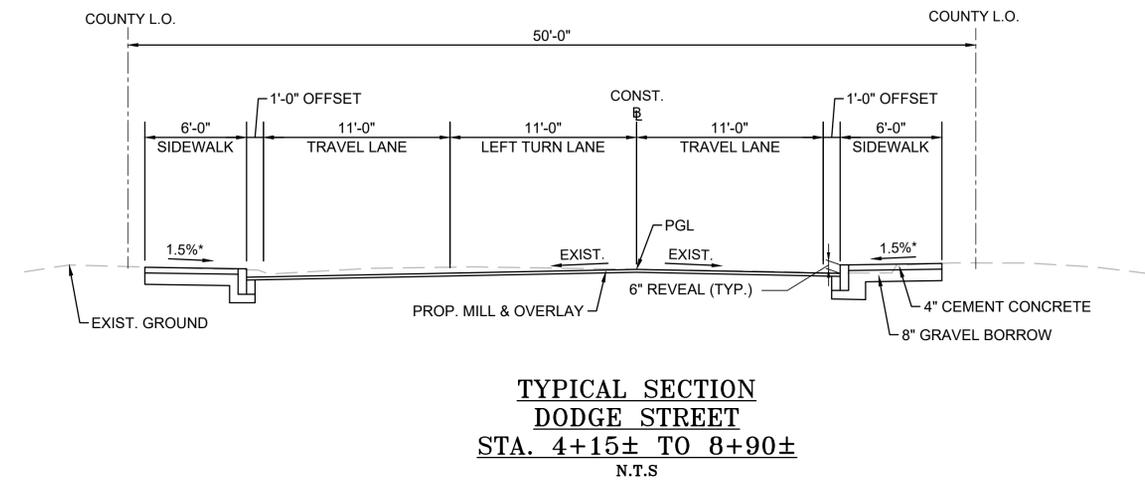
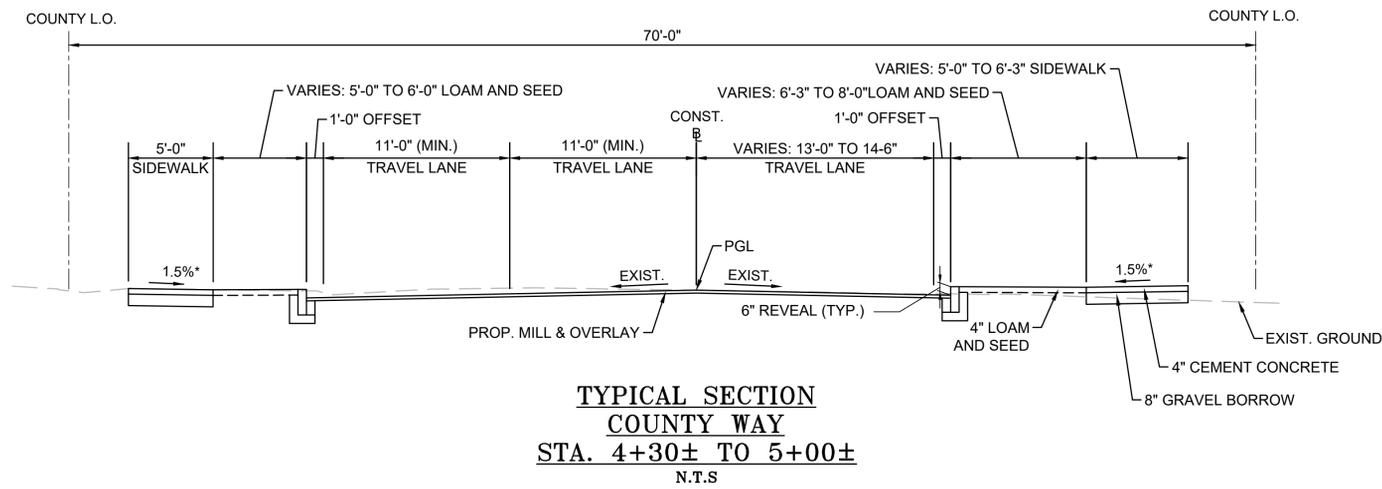
TYPICAL SECTION
CABOT STREET
STA. 200+80 TO 201+50±
N.T.S

* - TOLERANCE FOR CONSTRUCTION ±0.5%

**BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	7	49
PROJECT FILE NO.		608347	

**TYPICAL SECTIONS
LOCATION 3
SHEET 2 OF 2**



* - TOLERANCE FOR CONSTRUCTION ±0.5%

HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
SEE SHEET 25 AND 26

DRAINAGE DETAILS
SEE SHEET 35

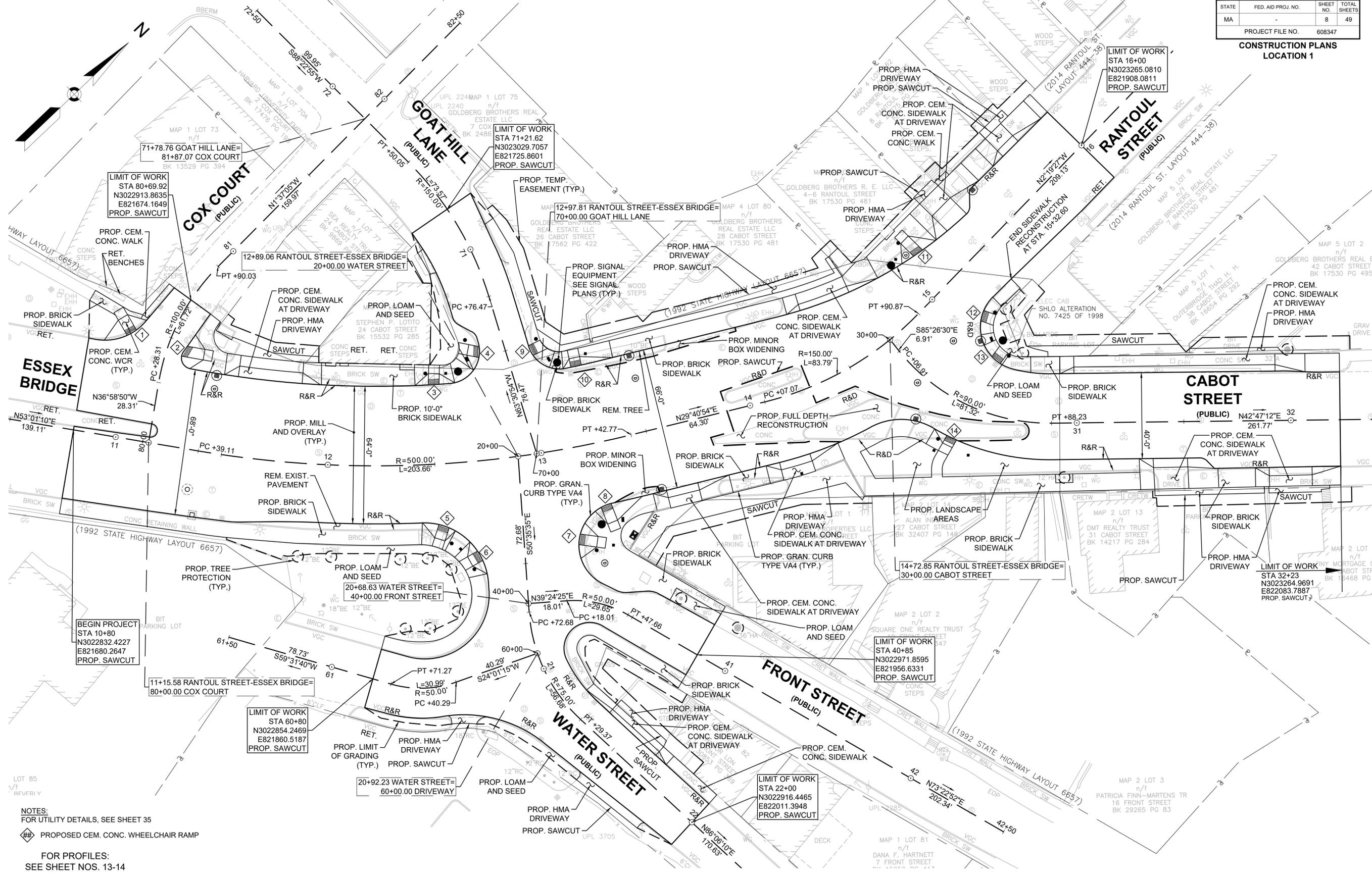
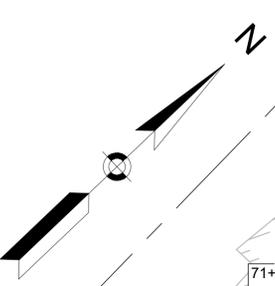
WATER SUPPLY ALTERATIONS
NONE

BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	8	49

CONSTRUCTION PLANS
LOCATION 1

PROJECT FILE NO. 608347



LIMIT OF WORK
STA 80+69.92
N3022913.8635
E821674.1649
PROP. SAWCUT

LIMIT OF WORK
STA 71+21.62
N3023029.7057
E821725.8601
PROP. SAWCUT

LIMIT OF WORK
STA 16+00
N3023265.0810
E821908.0811
PROP. SAWCUT

BEGIN PROJECT
STA 10+80
N3022832.4227
E821680.2647
PROP. SAWCUT

LIMIT OF WORK
STA 60+80
N3022854.2469
E821860.5187
PROP. SAWCUT

LIMIT OF WORK
STA 40+85
N3022971.8595
E821956.6331
PROP. SAWCUT

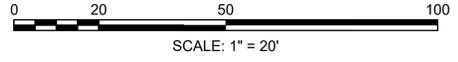
LIMIT OF WORK
STA 22+00
N3022916.4465
E822011.3948
PROP. SAWCUT

LIMIT OF WORK
STA 32+23
N3023264.9691
E822083.7887
PROP. SAWCUT

NOTES:
FOR UTILITY DETAILS, SEE SHEET 35

PROPOSED CEM. CONC. WHEELCHAIR RAMP

FOR PROFILES:
SEE SHEET NOS. 13-14



HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
SEE SHEET 30

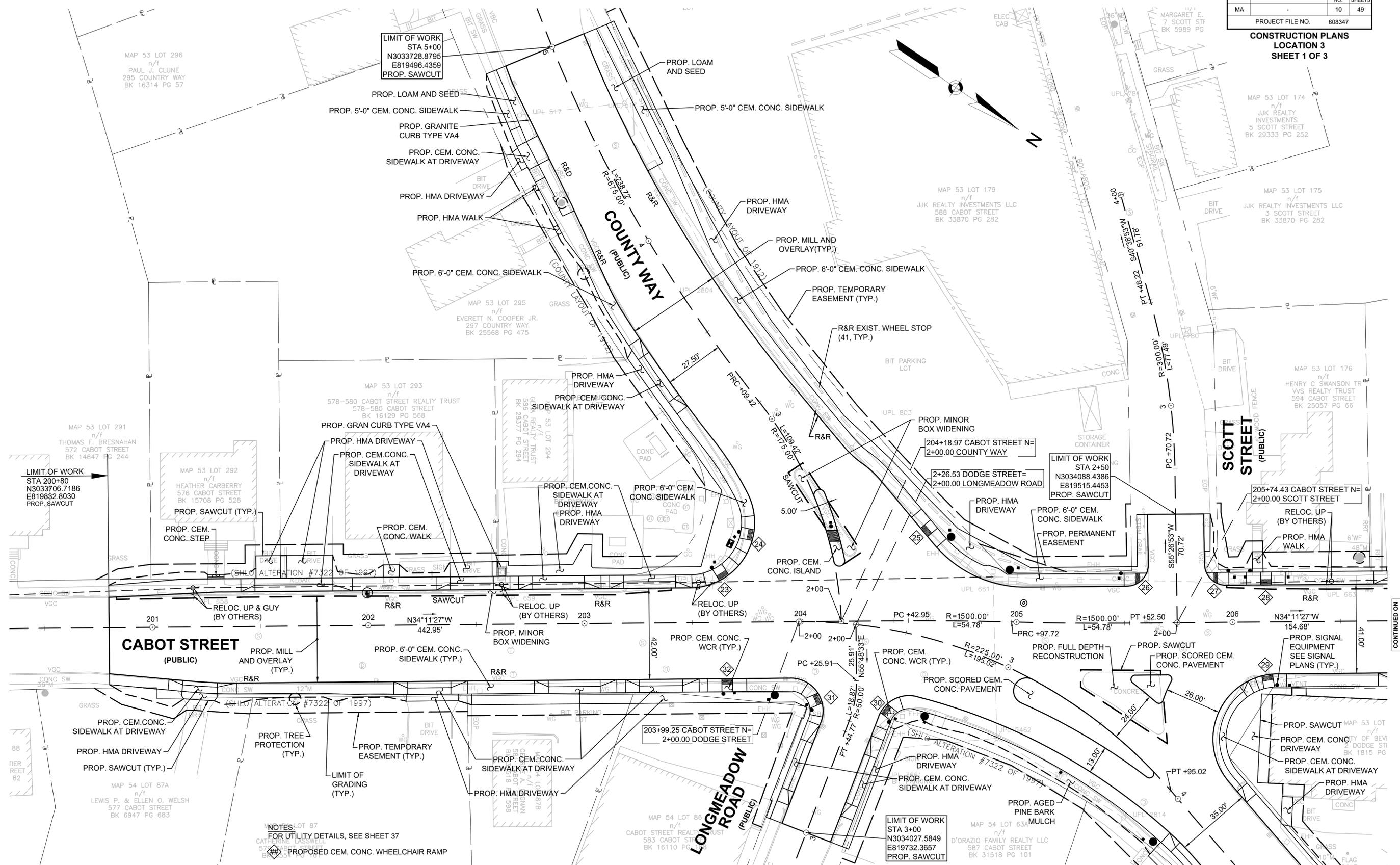
DRAINAGE DETAILS
SEE SHEET 37

WATER SUPPLY ALTERATIONS
NONE

BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	10	49
PROJECT FILE NO.		608347	

CONSTRUCTION PLANS
LOCATION 3
SHEET 1 OF 3



LIMIT OF WORK
STA 200+80
N3033706.7186
E819832.8030
PROP. SAWCUT

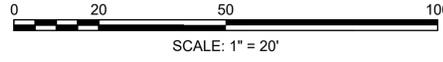
LIMIT OF WORK
STA 5+00
N3033728.8795
E819496.4359
PROP. SAWCUT

LIMIT OF WORK
STA 2+50
N3034088.4386
E819515.4453
PROP. SAWCUT

LIMIT OF WORK
STA 3+00
N3034027.5849
E819732.3657
PROP. SAWCUT

NOTES
FOR UTILITY DETAILS, SEE SHEET 37
PROPOSED CEM. CONC. WHEELCHAIR RAMP

FOR PROFILES:
SEE SHEET NOS. 17-18



CONTINUED ON
SHEET NO. 11

CONTINUED ON
SHEET NO. 11

HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
SEE SHEET 30

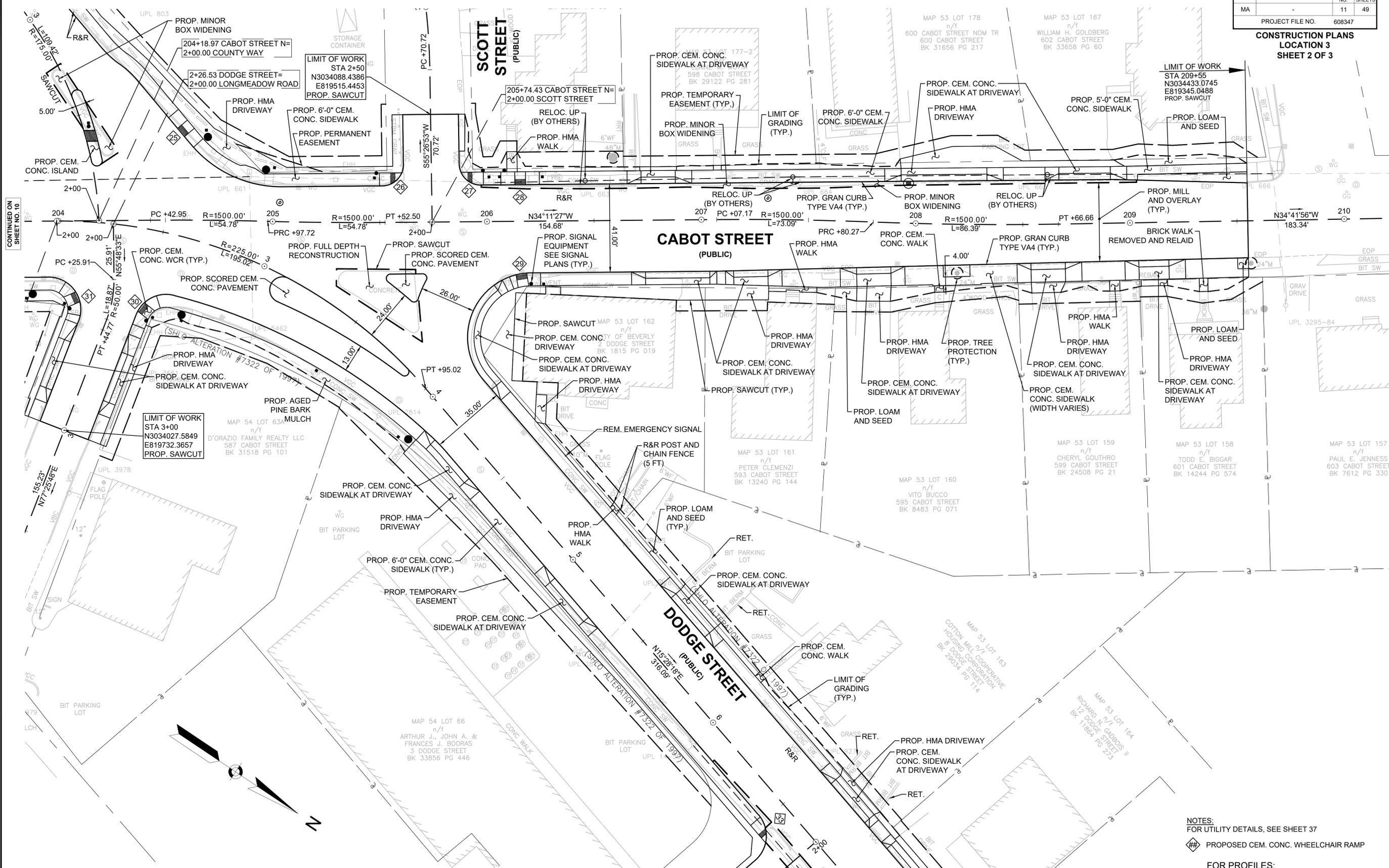
DRAINAGE DETAILS
SEE SHEET 38

WATER SUPPLY ALTERATIONS
NONE

BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	11	49
PROJECT FILE NO.		608347	

CONSTRUCTION PLANS
LOCATION 3
SHEET 2 OF 3



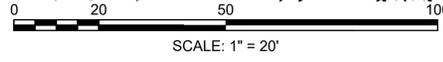
CONTINUED ON
SHEET NO. 10

LIMIT OF WORK
STA 3+00
N3034027.5849
E819732.3657
PROP. SAWCUT

LIMIT OF WORK
STA 2+50
N3034088.4386
E819515.4453
PROP. SAWCUT

LIMIT OF WORK
STA 209+55
N3034433.0745
E819345.0488
PROP. SAWCUT

LIMIT OF WORK
STA 3+00
N3034027.5849
E819732.3657
PROP. SAWCUT



CONTINUED ON
SHEET NO. 12

NOTES:
FOR UTILITY DETAILS, SEE SHEET 37

PROPOSED CEM. CONC. WHEELCHAIR RAMP

FOR PROFILES:
SEE SHEET NOS. 17-18

HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

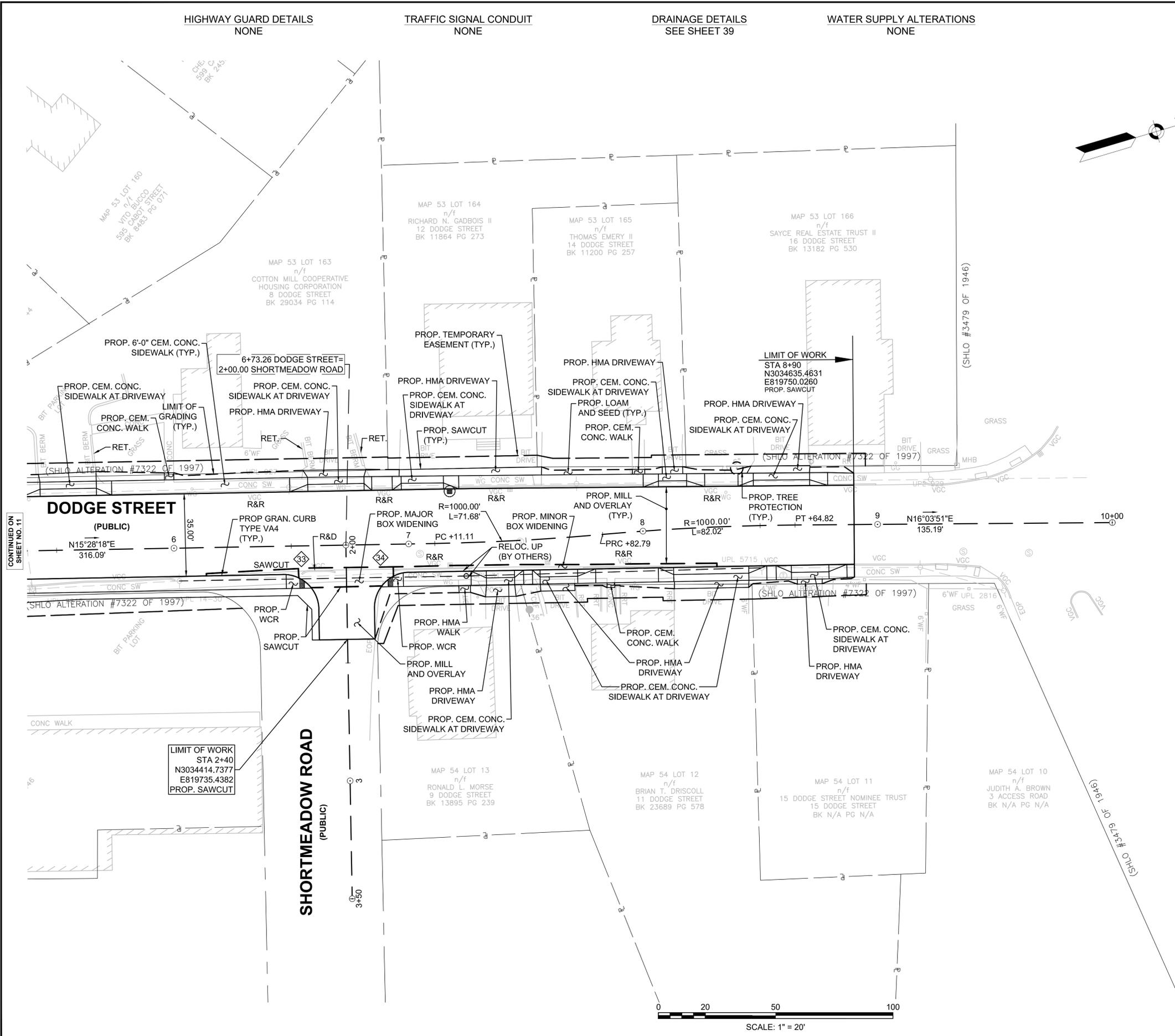
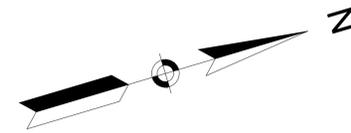
DRAINAGE DETAILS
SEE SHEET 39

WATER SUPPLY ALTERATIONS
NONE

BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS

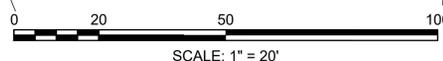
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	12	49
PROJECT FILE NO.		608347	

CONSTRUCTION PLANS
LOCATION 3
SHEET 3 OF 3



CONTINUED ON
SHEET NO. 11

LIMIT OF WORK
STA 2+40
N3034414.7377
E819735.4382
PROP. SAWCUT



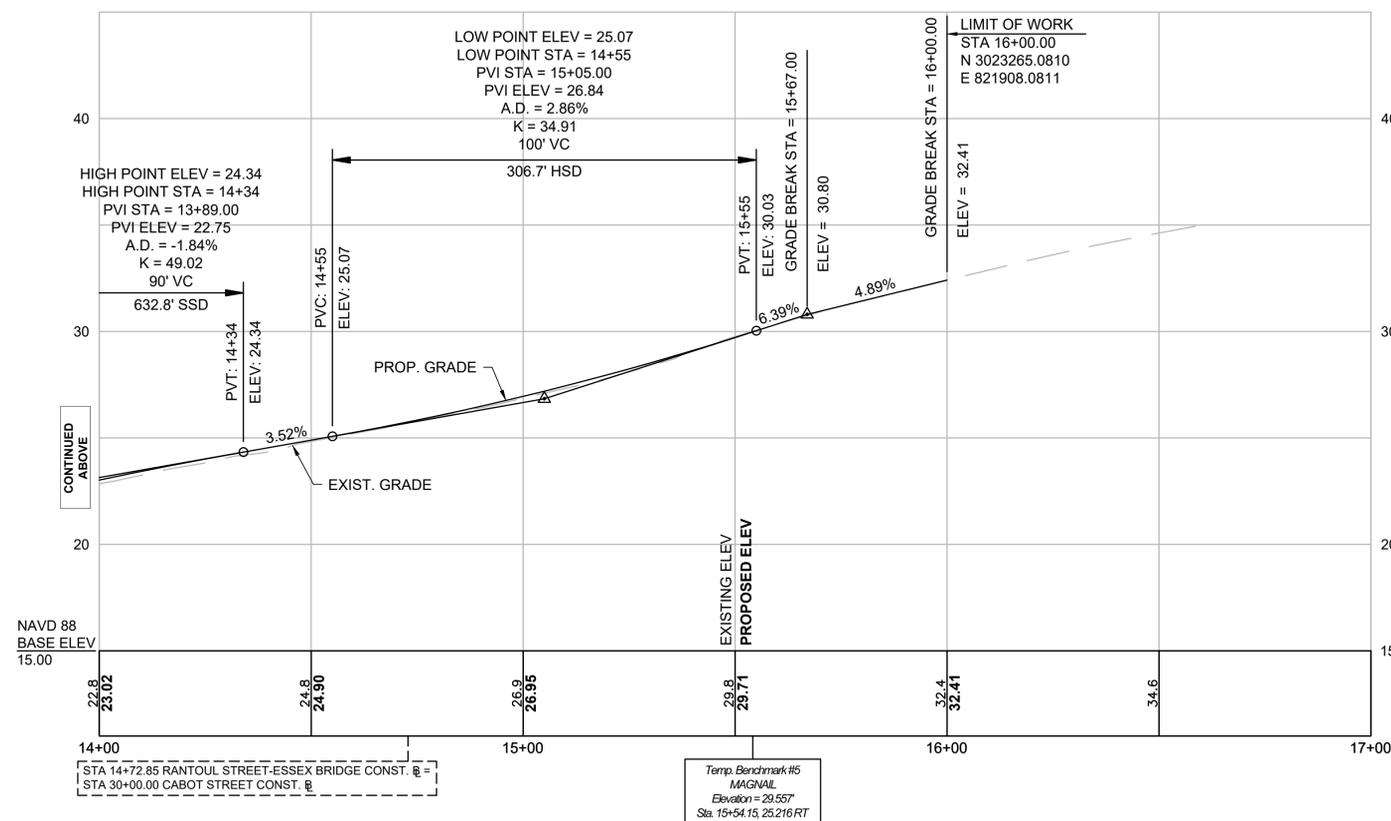
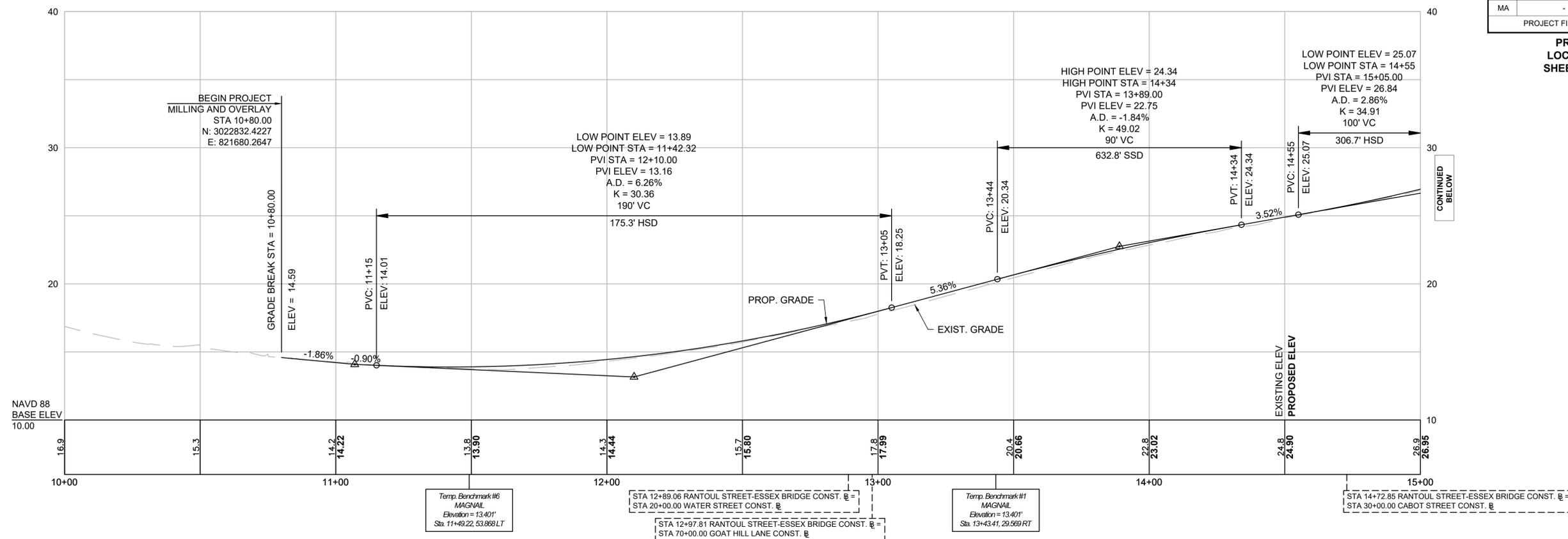
NOTES:
FOR UTILITY DETAILS, SEE SHEET 39
 PROPOSED CEM. CONC. WHEELCHAIR RAMP
 FOR PROFILES:
SEE SHEET NOS. 17-18

RANTOUL STREET-ESSEX BRIDGE CONST. B

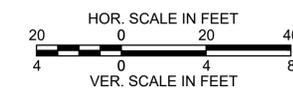
BEVERLY INTERSECTION IMPROVEMENTS AT 3 LOCATIONS

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	13	49
PROJECT FILE NO.		608347	

PROFILE LOCATION 1 SHEET 1 OF 2



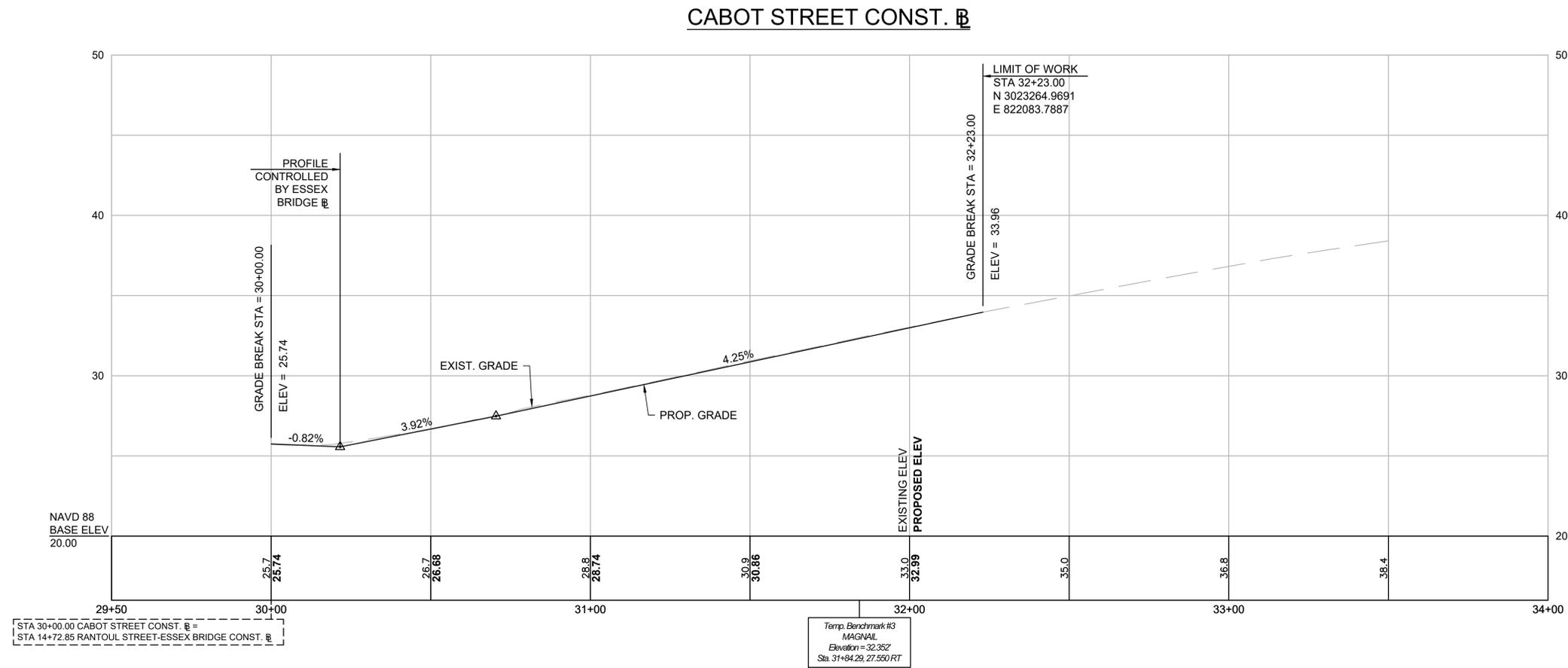
FOR CONSTRUCTION PLANS:
SEE SHEET NO. 8



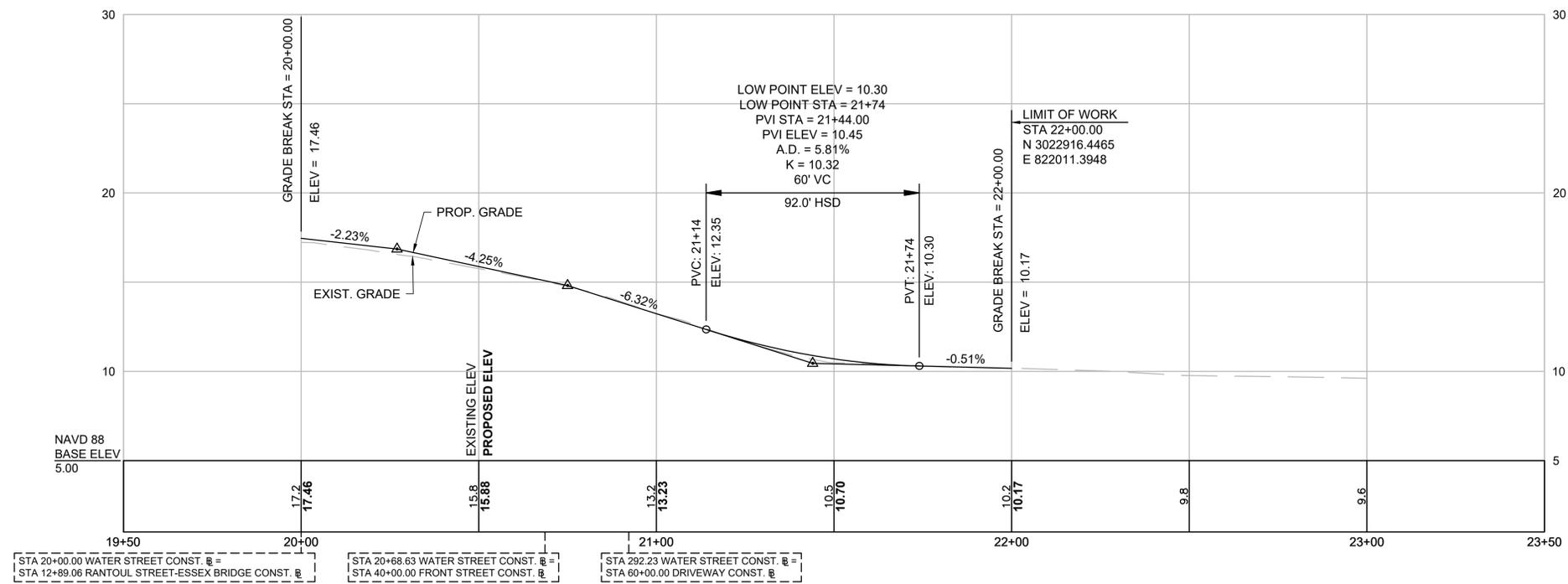
BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	14	49
PROJECT FILE NO.		608347	

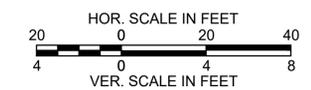
PROFILE
LOCATION 1
SHEET 2 OF 2



WATER STREET CONST. B



FOR CONSTRUCTION PLANS:
SEE SHEET NO. 8

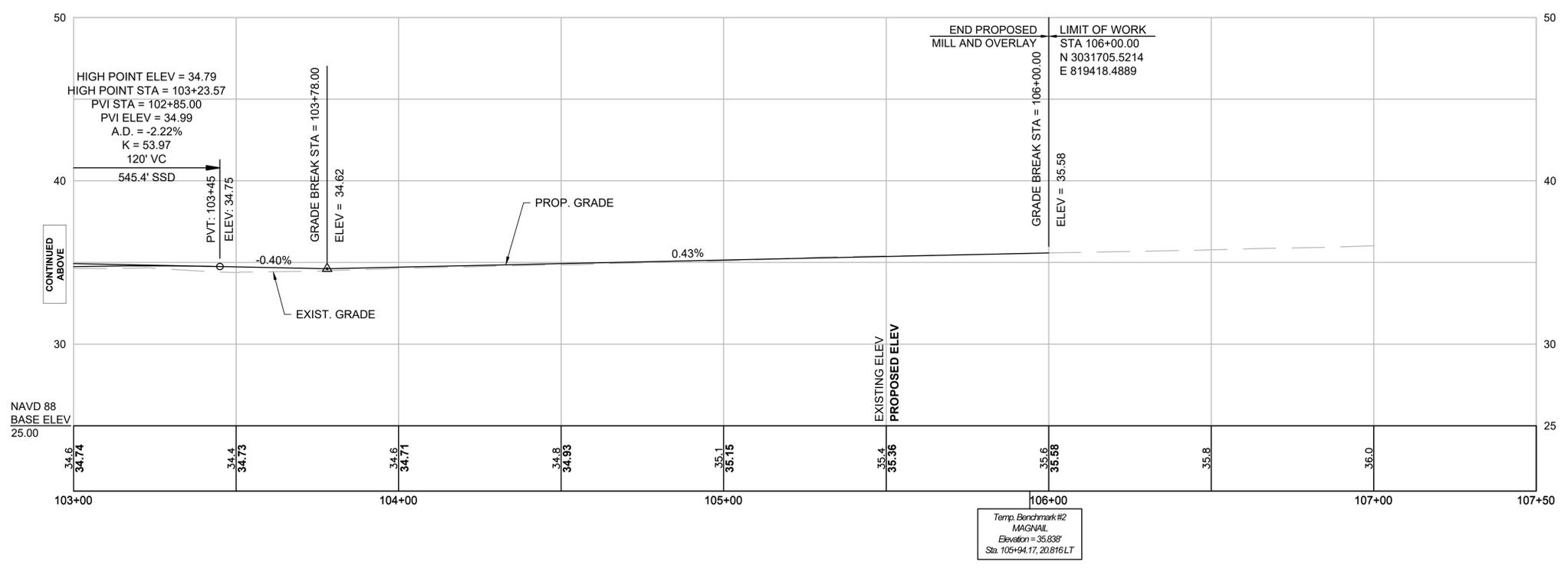
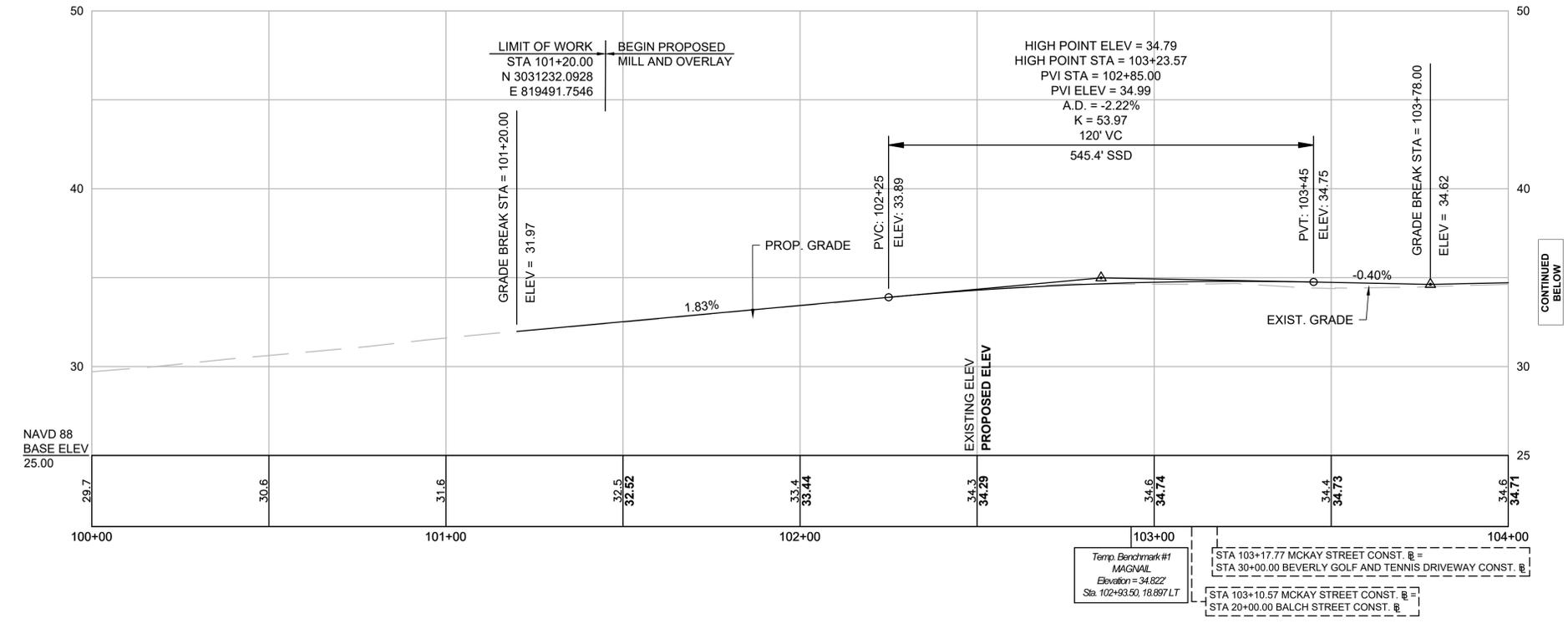


MCKAY STREET CONST. B

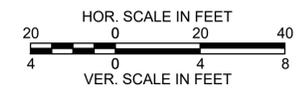
BEVERLY INTERSECTION IMPROVEMENTS AT 3 LOCATIONS

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	15	49
PROJECT FILE NO.		608347	

PROFILE LOCATION 2 SHEET 1 OF 2



FOR CONSTRUCTION PLANS:
SEE SHEET NO. 9

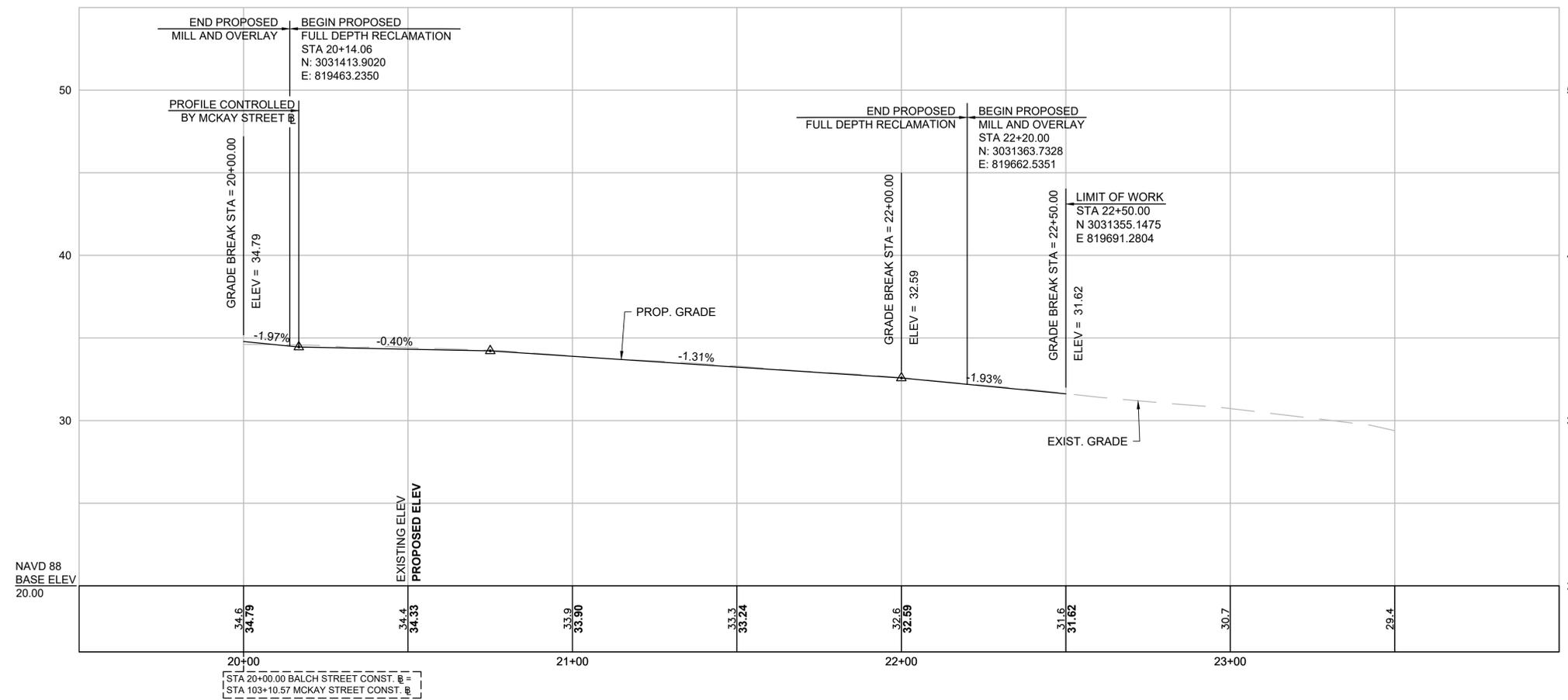


BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS

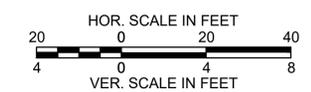
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	16	49
PROJECT FILE NO.		608347	

PROFILE
LOCATION 2
SHEET 2 OF 2

BALCH STREET CONST. B



FOR CONSTRUCTION PLANS:
SEE SHEET NO. 9

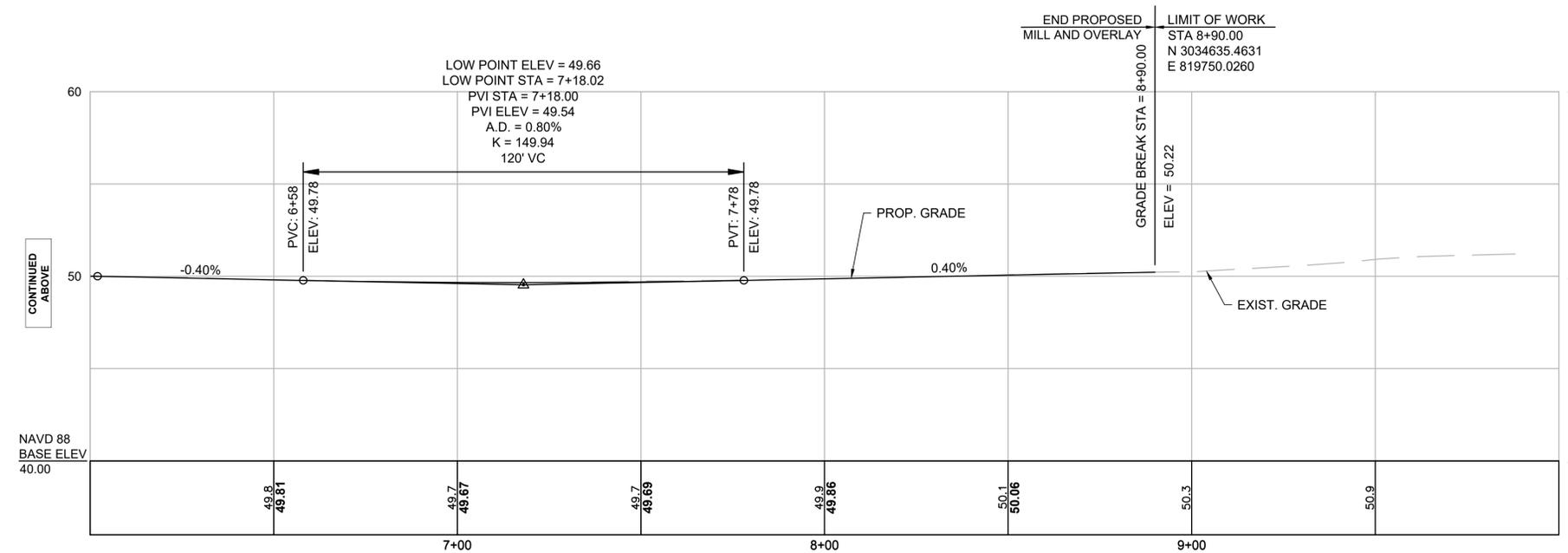
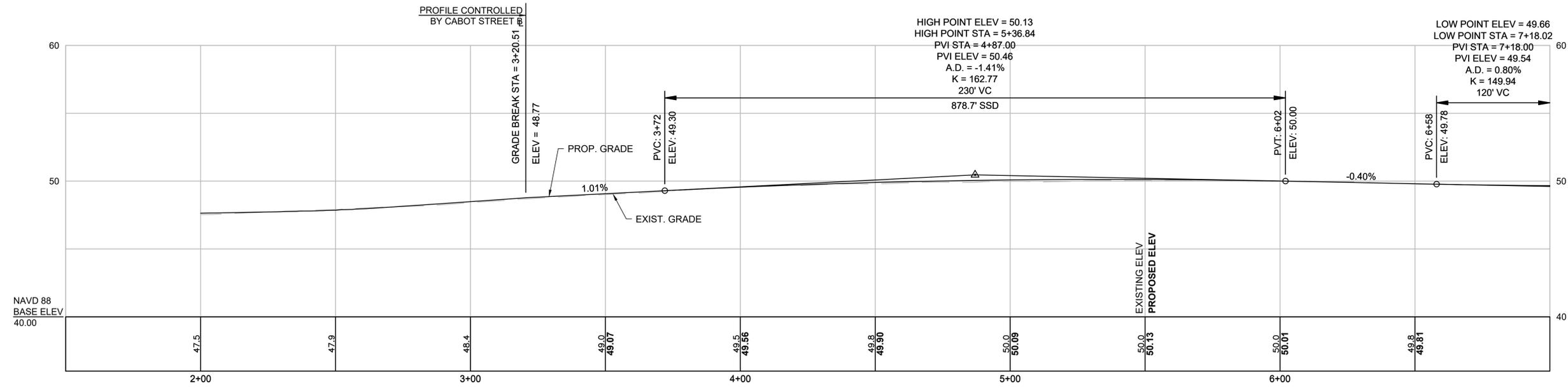


**BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS**

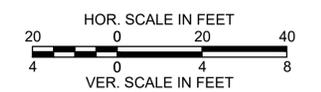
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	18	49
PROJECT FILE NO.		608347	

**PROFILE
LOCATION 3
SHEET 2 OF 3**

DODGE STREET CONST. B



FOR CONSTRUCTION PLANS:
SEE SHEET NOS. 10-12

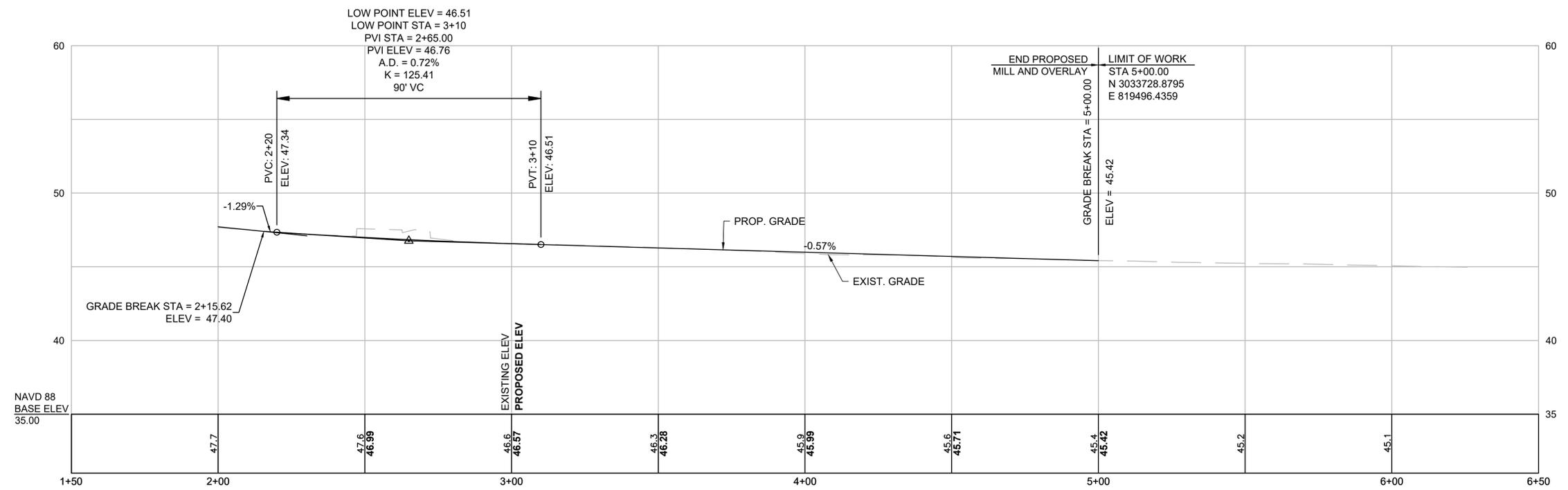


BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS

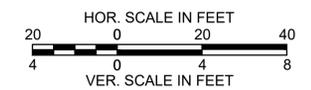
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	19	49
PROJECT FILE NO.		608347	

PROFILE
LOCATION 3
SHEET 3 OF 3

COUNTY WAY STREET CONST. B



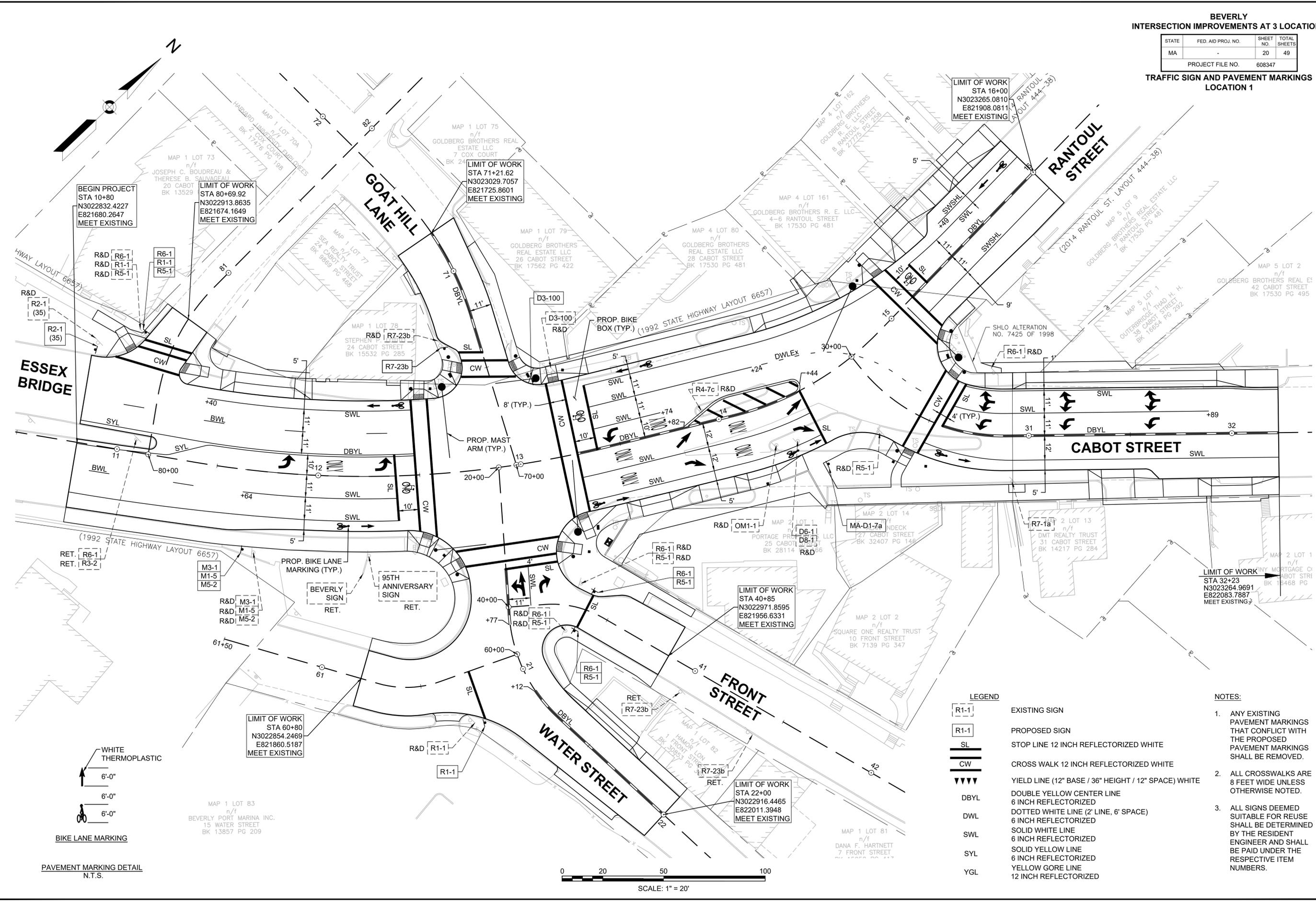
FOR CONSTRUCTION PLANS:
SEE SHEET NOS. 10-12



**BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	20	49
PROJECT FILE NO. 608347			

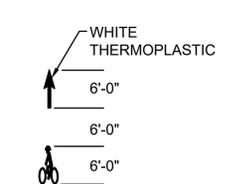
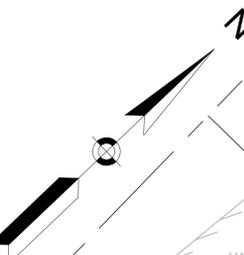
**TRAFFIC SIGN AND PAVEMENT MARKINGS
LOCATION 1**



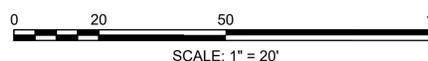
LEGEND

	EXISTING SIGN
	PROPOSED SIGN
	STOP LINE 12 INCH REFLECTORIZED WHITE
	CROSS WALK 12 INCH REFLECTORIZED WHITE
	YIELD LINE (12" BASE / 36" HEIGHT / 12" SPACE) WHITE
	DOUBLE YELLOW CENTER LINE 6 INCH REFLECTORIZED
	DOTTED WHITE LINE (2' LINE, 6" SPACE) 6 INCH REFLECTORIZED
	SOLID WHITE LINE 6 INCH REFLECTORIZED
	SOLID YELLOW LINE 6 INCH REFLECTORIZED
	YELLOW GORE LINE 12 INCH REFLECTORIZED

- NOTES:**
- ANY EXISTING PAVEMENT MARKINGS THAT CONFLICT WITH THE PROPOSED PAVEMENT MARKINGS SHALL BE REMOVED.
 - ALL CROSSWALKS ARE 8 FEET WIDE UNLESS OTHERWISE NOTED.
 - ALL SIGNS DEEMED SUITABLE FOR REUSE SHALL BE DETERMINED BY THE RESIDENT ENGINEER AND SHALL BE PAID UNDER THE RESPECTIVE ITEM NUMBERS.



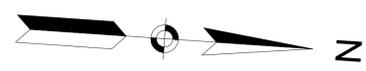
PAVEMENT MARKING DETAIL
N.T.S.



**BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	21	49
PROJECT FILE NO. 608347			

**TRAFFIC SIGN AND PAVEMENT MARKINGS
LOCATION 2**

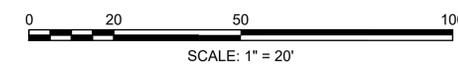
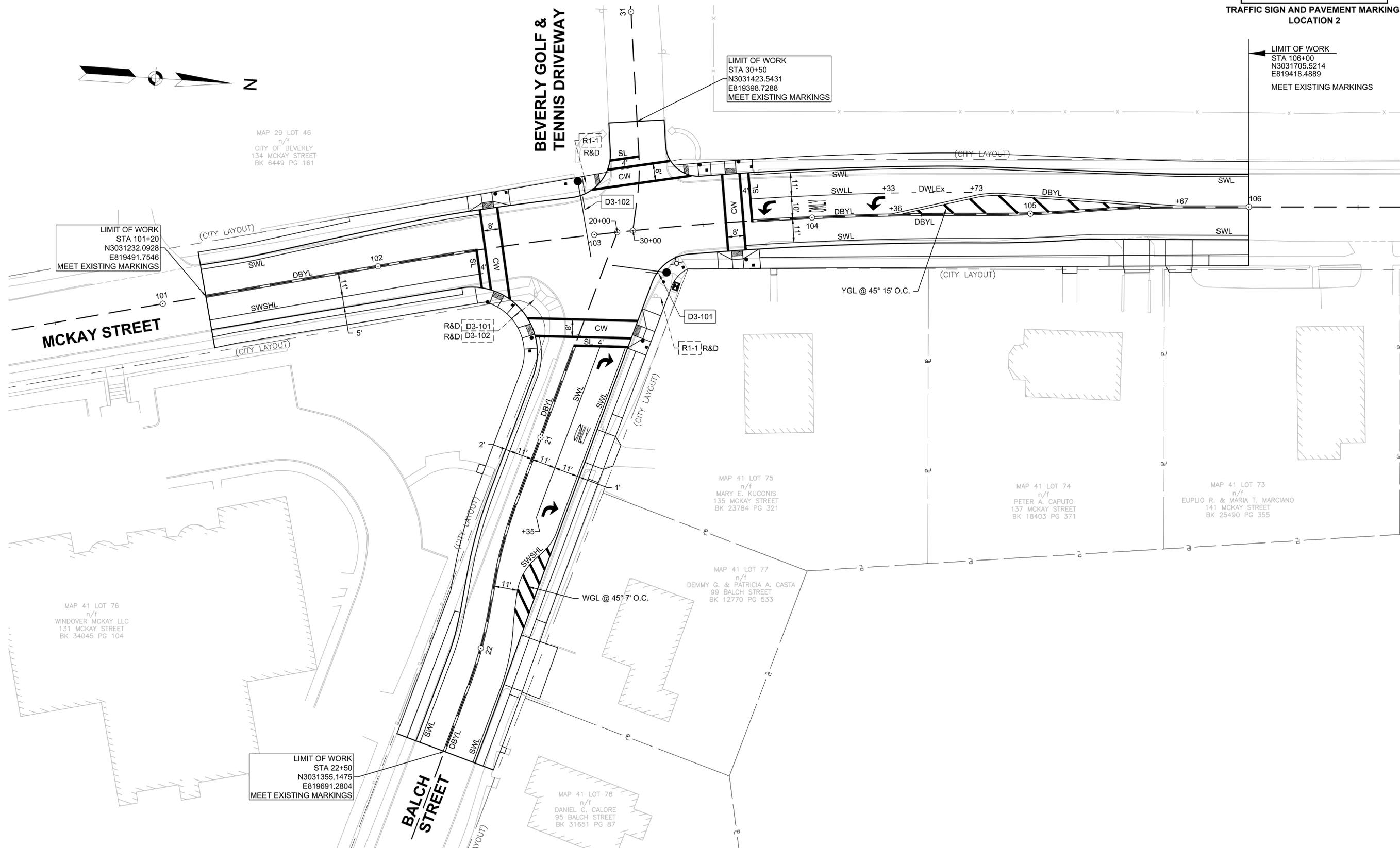


MAP 29 LOT 46
n/f
CITY OF BEVERLY
134 MCKAY STREET
BK 6449 PG 161

LIMIT OF WORK
STA 101+20
N3031232.0928
E819491.7546
MEET EXISTING MARKINGS

LIMIT OF WORK
STA 30+50
N3031423.5431
E819398.7288
MEET EXISTING MARKINGS

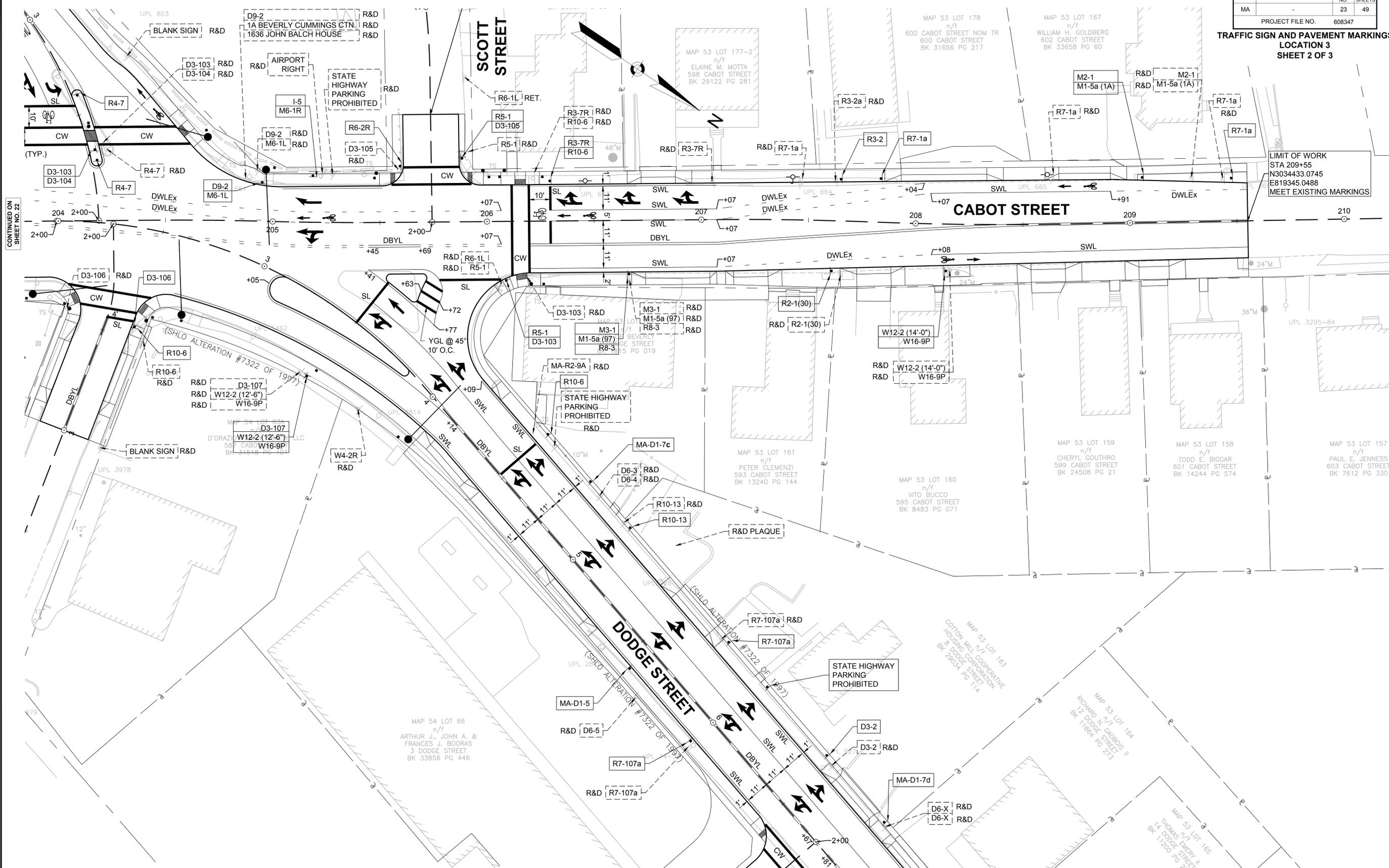
LIMIT OF WORK
STA 106+00
N3031705.5214
E819418.4889
MEET EXISTING MARKINGS



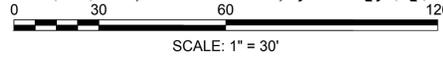
BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	23	49
PROJECT FILE NO.		608347	

TRAFFIC SIGN AND PAVEMENT MARKINGS
LOCATION 3
SHEET 2 OF 3



CONTINUED ON
SHEET NO. 22

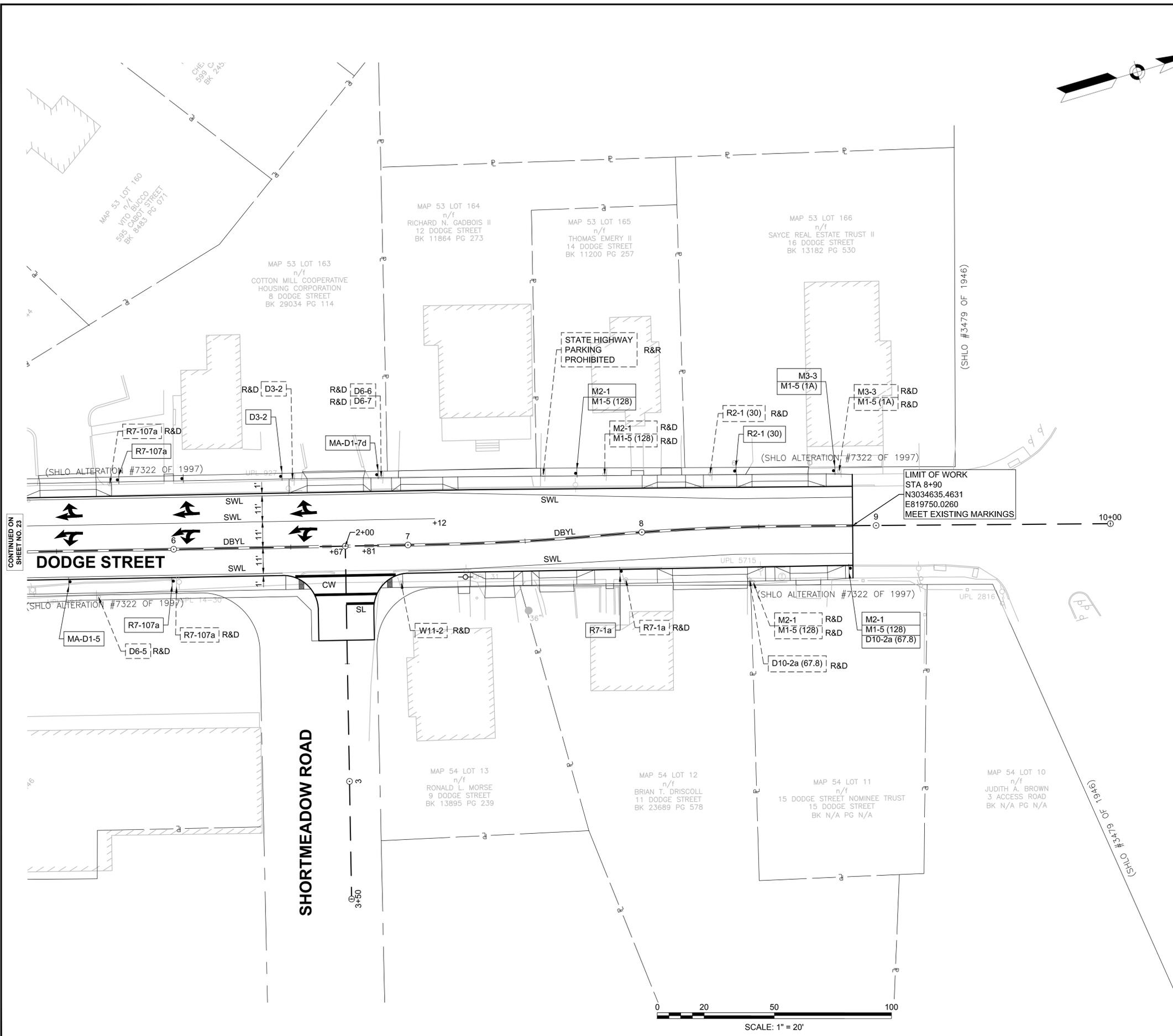
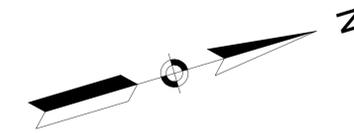


CONTINUED ON
SHEET NO. 24

BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	24	49
PROJECT FILE NO.		608347	

TRAFFIC SIGN AND PAVEMENT MARKINGS
LOCATION 3
SHEET 3 OF 3



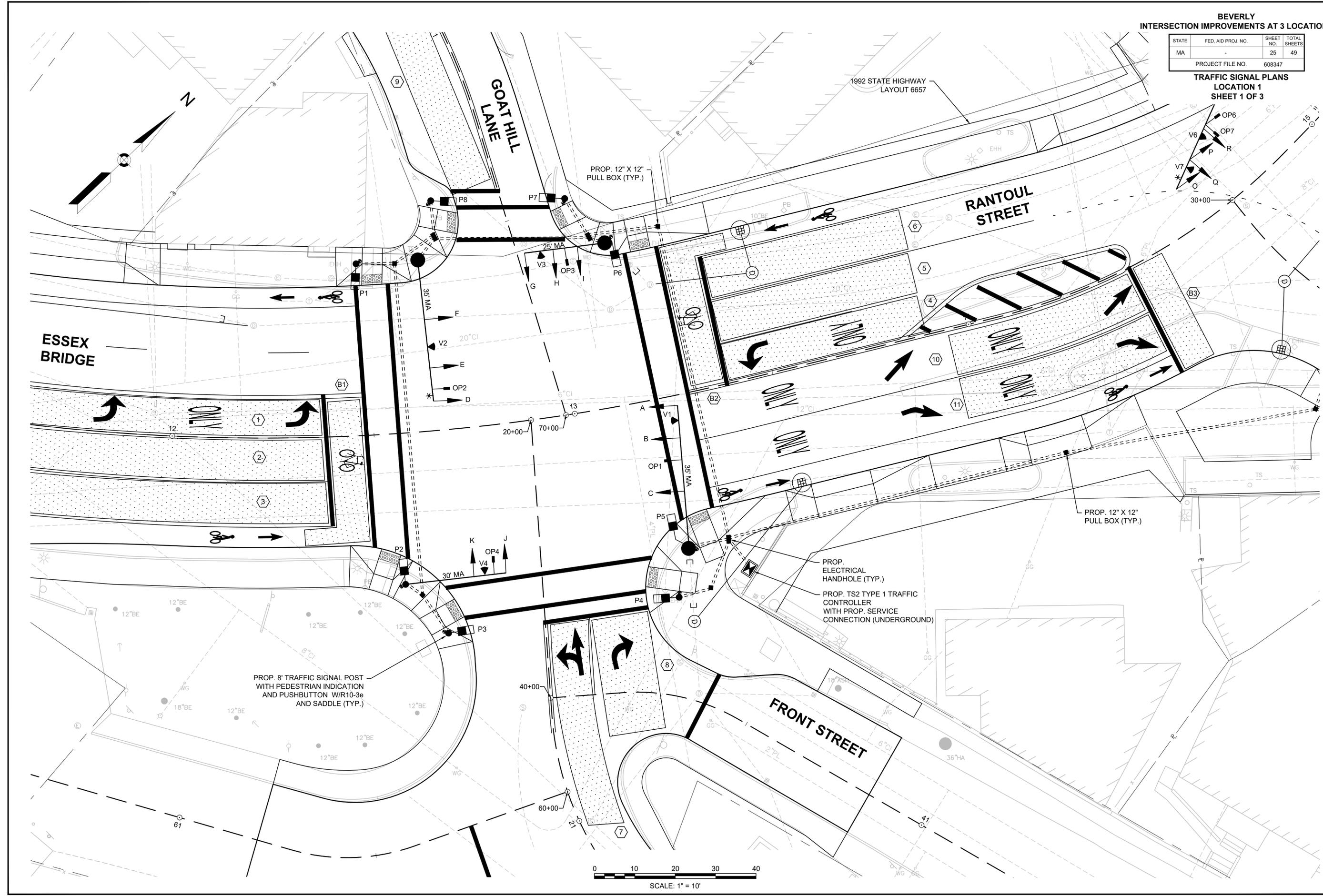
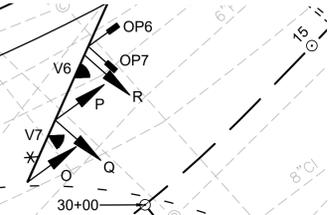
CONTINUED ON SHEET NO. 23

608347_HD13(SIGN AND PAVEMENT MARKINGS CABOT DODGE).DWG Plotted on 2-Jun-2017 8:30 AM

**BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	25	49
PROJECT FILE NO.		608347	

**TRAFFIC SIGNAL PLANS
LOCATION 1
SHEET 1 OF 3**



ESSEX BRIDGE

GOAT HILL LANE

RANTOUL STREET

FRONT STREET

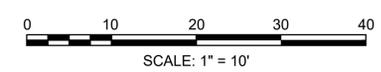
PROP. 12" X 12" PULL BOX (TYP.)

PROP. 12" X 12" PULL BOX (TYP.)

PROP. ELECTRICAL HANDHOLE (TYP.)

PROP. TS2 TYPE 1 TRAFFIC CONTROLLER WITH PROP. SERVICE CONNECTION (UNDERGROUND)

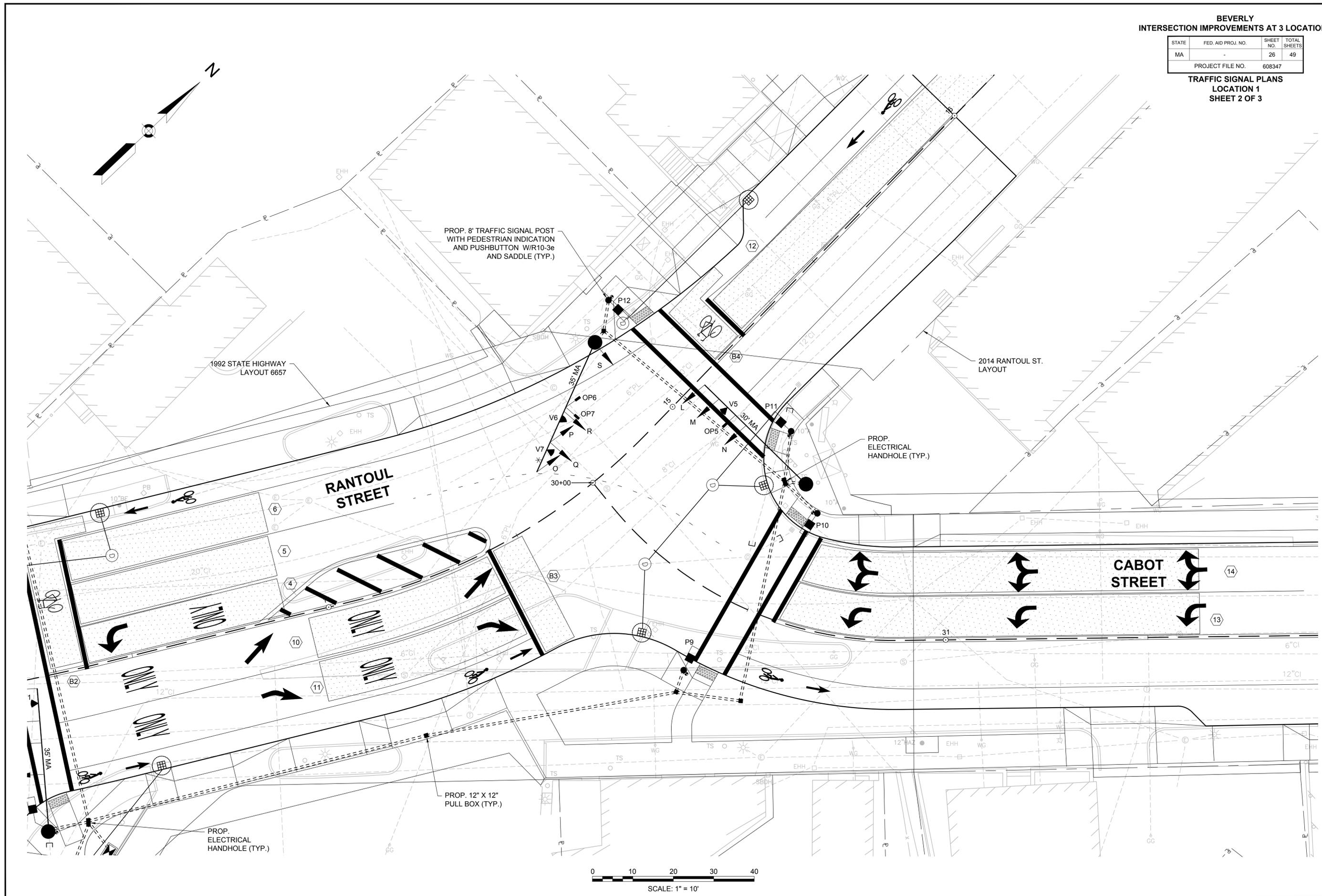
PROP. 8' TRAFFIC SIGNAL POST WITH PEDESTRIAN INDICATION AND PUSHBUTTON W/R10-3e AND SADDLE (TYP.)



BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	26	49
PROJECT FILE NO.		608347	

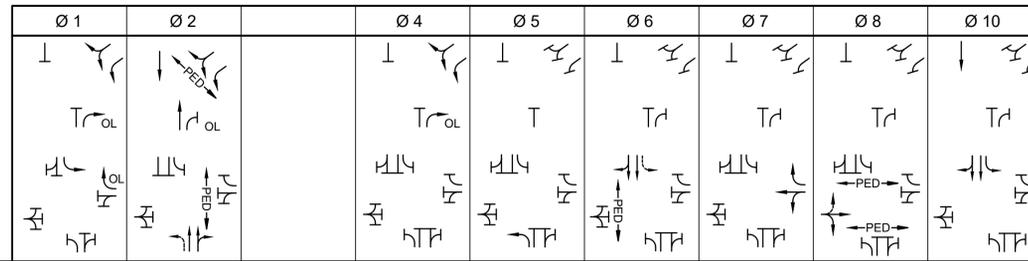
TRAFFIC SIGNAL PLANS
LOCATION 1
SHEET 2 OF 3



**BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	27	49
PROJECT FILE NO.		608347	

**TRAFFIC SIGNAL DATA
LOCATION 1
SHEET 3 OF 3**



SEQUENCE AND TIMING

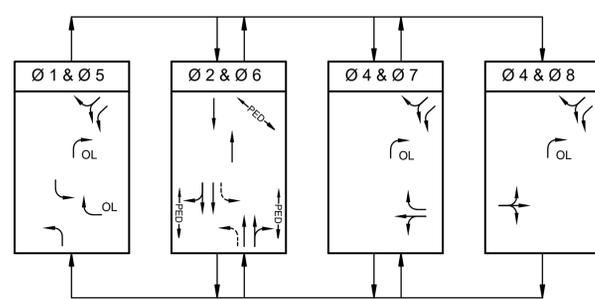
STREET	DIRECTION	HOUSINGS	SEQUENCE AND TIMING										FLASHING OPERATION																		
			1	2	3	4	5	6	7	8	9	10																			
CABOT STREET	NB	A	RLA	RLA	RLA	FYLA	YLA	RLA				RLA	RLA	RLA	GLA	YLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RYLA	
CABOT STREET	NB	B,C	R	R	R	G	Y	R				R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FY
CABOT STREET	NB	L,M	RLA	RLA	RLA	GLA	YLA	RLA				RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	FYLA	
CABOT STREET	NB	N	GRA	YRA	RRR	RRR	RRR	RRR				GRA	YRA	RRR	RRR	RRR	RRR	RRR	RRR	RRR	RRR	RRR	RRR	RRR	RRR	RRR	RRR	RRR	RRR	FYRA	
CABOT STREET	SB	D	GLA	YLA	RLA	RLA	RLA	RLA				RLA	RLA	RLA	RLA	RLA	FYLA	YLA	RLA	GLA	YLA	RLA	FYLA								
CABOT STREET	SB	E,F	R	R	R	R	R	R				R	R	R	R	R	G	Y	R	R	R	R	R	R	R	G	Y	R	FY		
CABOT STREET	SB	Q,R	GLA	YLA	RLA	GLA	YLA	RLA				GLA	YLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	RLA	FRLA		
CABOT STREET	SB	S	G	Y	R	R	R	R				G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FR	
RANTOUL STREET	SB	O,P	R	R	R	G	Y	R				R	R	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	FY		
WATER STREET	WB	G,H	R	R	R	R	R	R				R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FR	
WATER STREET	WB	I	GRA	YRA	RRR	R	R	R				RRR	RRR	RRR	RRR	RRR	RRR	RRR	RRR	RRR	RRR	RRR	RRR	RRR	RRR	RRR	RRR	RRR	RRR	FRRA	
GOAT HILL LANE	EB	J,K	R	R	R	R	R	R				R	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	FR		
PEDESTRIANS	EB-WB	P1-P2	DW	DW	DW	DW	DW	DW				DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	OFF	
PEDESTRIANS	NB-SB	P3-P4	DW	DW	DW	W	FDW	DW				DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	OFF	
PEDESTRIANS	EB-WB	P5-P6	DW	DW	DW	DW	DW	DW				DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	OFF	
PEDESTRIANS	NB-SB	P7-P8	DW	DW	DW	DW	DW	DW				DW	DW	DW	DW	DW	W	FDW	DW	OFF											
PEDESTRIANS	NB-SB	P9-P10	DW	DW	DW	W	FDW	DW				DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	OFF	
PEDESTRIANS	EB-WB	P11-P12	DW	DW	DW	DW	DW	DW				W	FDW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	OFF	

TIMING IN SECONDS										
MINIMUM GREEN (INITIAL)	4			10						10
PASSAGE TIME (VEHICLE)	3			3						3
MAXIMUM 1	5			32						35
MAXIMUM 2	9			37						36
YELLOW CLEARANCE		4			4				4	
RED CLEARANCE			2			2			2	
WALK (W)				5					5	
PEDESTRIAN CLEARANCE				11	3				8	3

RECALL	MEMORY
NONE	NON-LOCKING
SOFT	NON-LOCKING
NONE	NON-LOCKING
NONE	NON-LOCKING
SOFT	NON-LOCKING
NONE	NON-LOCKING
NONE	NON-LOCKING

- NOTES:
1. AUTOMATIC FLASHING OPERATION PER 2009 MUTCD, AS AMENDED.
 2. STOP AND GO OPERATION FOR 24 HOURS PER DAY, FLASHING OPERATION FOR EMERGENCY ONLY.
 3. DURING PEDESTRIAN INTERVAL, FDW THROUGH YELLOW OPERATION SHALL NOT BE IN EFFECT
 4. MAXIMUM 2 IN EFFECT 3:00PM TO 7:00PM WEEKDAYS, MAXIMUM 1 IN EFFECT OTHER TIMES.
 5. PHASE 10 SHALL OPERATE UPON EMERGENCY PRE-EMPTION CALL ONLY.

PREFERENTIAL PHASING SEQUENCE



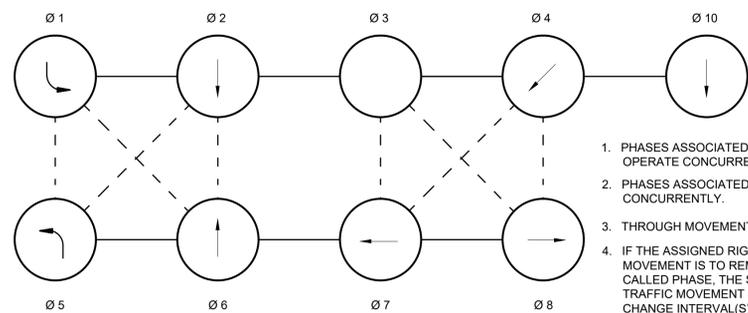
APPROACH	PREEMPTION PHASE	DETECTOR
NORTHBOUND	2 & 5	OP1, OP5
SOUTHBOUND	10	OP2, OP6
EASTBOUND	8	OP4
WESTBOUND	7	OP3
WESTBOUND	4	OP7

EMERGENCY PRE-EMPTION DATA

EMERGENCY VEHICLE PREEMPTION OPERATION:

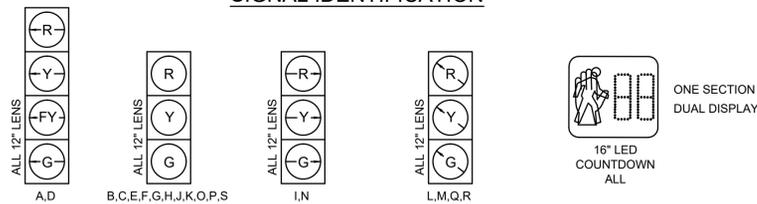
1. EMERGENCY VEHICLE PREEMPTION SHALL BE ACTUATED BY AN OPTICAL SIGNAL FROM AN OPTICAL EMITTER MOUNTED ON AN EMERGENCY VEHICLE AND RECEIVED BY AN OPTICAL DETECTOR LOCATED AT INTERSECTION. A SEPARATE RECEIVING DETECTOR IS REQUIRED FOR EACH DETECTED APPROACH.
2. PREEMPTION SIGNALS FROM MULTIPLE APPROACHES SHALL BE SERVICED ON A FIRST DETECTED FIRST SERVED BASIS.
3. IN RESPONSE TO A PREEMPTION SIGNAL RECEIVED AT AN INTERSECTION BY AN OPTICAL DETECTOR, THE CONTROLLER SHALL TIME THE CLEARANCE INTERVALS OF THE ACTIVE PHASE (IF DIFFERENT THAT TO BE SERVICED) AND ADVANCE TO AND/OR HOLD IN EMERGENCY VEHICLE PREEMPTION PHASE UNTIL PREEMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME CLEARANCES AND SIMILARLY SERVICE OTHER EMERGENCY VEHICLE PREEMPTION SEQUENCES IN THE ORDER RECEIVED (IF RECEIVED) OTHERWISE, RESUME NORMAL PREFERENTIAL PHASE SEQUENCE.
4. PREEMPTION MINIMUM GREENS SHALL BE TEN SECONDS.
5. NORMAL CLEARANCES SHALL BE PROVIDED ON PHASES THAT ARE TERMINATED BY PREEMPTION DEMAND.
6. ACTUAL TIMING FOR PREEMPTION SHALL BE DETERMINED IN THE FIELD IN COORDINATION WITH THE FIRE DEPARTMENT AND SHALL BE APPROVED BY CITY PRIOR TO OPERATION.

NEMA DUAL RING PHASING NOTES:



1. PHASES ASSOCIATED BY A SOLID LINE SHALL NOT OPERATE CONCURRENTLY.
2. PHASES ASSOCIATED BY A DASHED LINE MAY OPERATE CONCURRENTLY.
3. THROUGH MOVEMENTS MAY INCLUDE RIGHT TURNS.
4. 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) UNLESS OTHERWISE NOTED.

SIGNAL IDENTIFICATION



NOTES:

1. ALL SIGNALS SHALL HAVE CUT AWAY VISORS.
2. ALL SIGNALS SHALL HAVE 12" LED WITH 5" LOUVERED BACK PLATES W/ 2" REFLECTIVE BORDER

MAJOR ITEMS REQUIRED

PAY ITEM	QUANTITY	ITEM
	1	CONTROLLER NEMA TS-2 TYPE 1, CAB. & FDN.
	8	8 FT TRAFFIC SIGNAL, POST & FDN.
	1	25 FT MAST ARM ASSEMBLY, BASE & FDN.
	2	30 FT MAST ARM ASSEMBLY, BASE & FDN.
	3	35 FT MAST ARM ASSEMBLY, BASE & FDN.
	15	1 WAY, 3 SECTION, SIGNAL HOUSING (12" L.E.D.)
	1	2 WAY, 3 SECTION, SIGNAL HOUSING (12" L.E.D.)
	2	1 WAY, 4 SECTION, SIGNAL HOUSING (12" L.E.D.)
	12	PEDESTRIAN HOUSING (16" L.E.D. W/ COUNTDOWN)
	12	APS PEDESTRIAN PUSH BUTTON, SIGN & SADDLE
816.01	8	VIDEO DETECTOR CAMERA (1 SPARE)
	1	9" VIDEO MONITOR
	4	4 CHANNEL VIDEO INPUT PROCESSOR (1 SPARE)
	5	PRE-EMPTION RECEIVER-SINGLE CHANNEL
	1	PRE-EMPTION RECEIVER-DUAL CHANNEL
	3	PRE-EMPTION PHASE SELECTOR MODULE-DUAL CHANNEL
	1	BUS INTERFACE UNIT
	1	DETECTOR CARD RACK
	2	PRE-EMPTION CONFIRMATION STROBE (WHITE)
804.3	1300'	3 IN. ELECTRICAL CONDUIT TYPE NM - PLASTIC -(UL)
811.22	4	ELECTRIC HANDHOLE - SD2.022
811.31	8	12" X 12" PULL BOX - SD.031
813.81	1	SERVICE CONNECTION, TYPE UNDERGROUND
816.80	1	TRAFFIC CONTROL SIGNAL REMOVED AND STACKED
		PLUS ALL NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS MATERIAL AND EQUIPMENT TO COMPLETE THE INSTALLATION.

VIDEO DETECTOR DATA

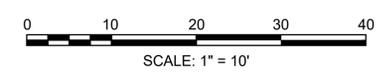
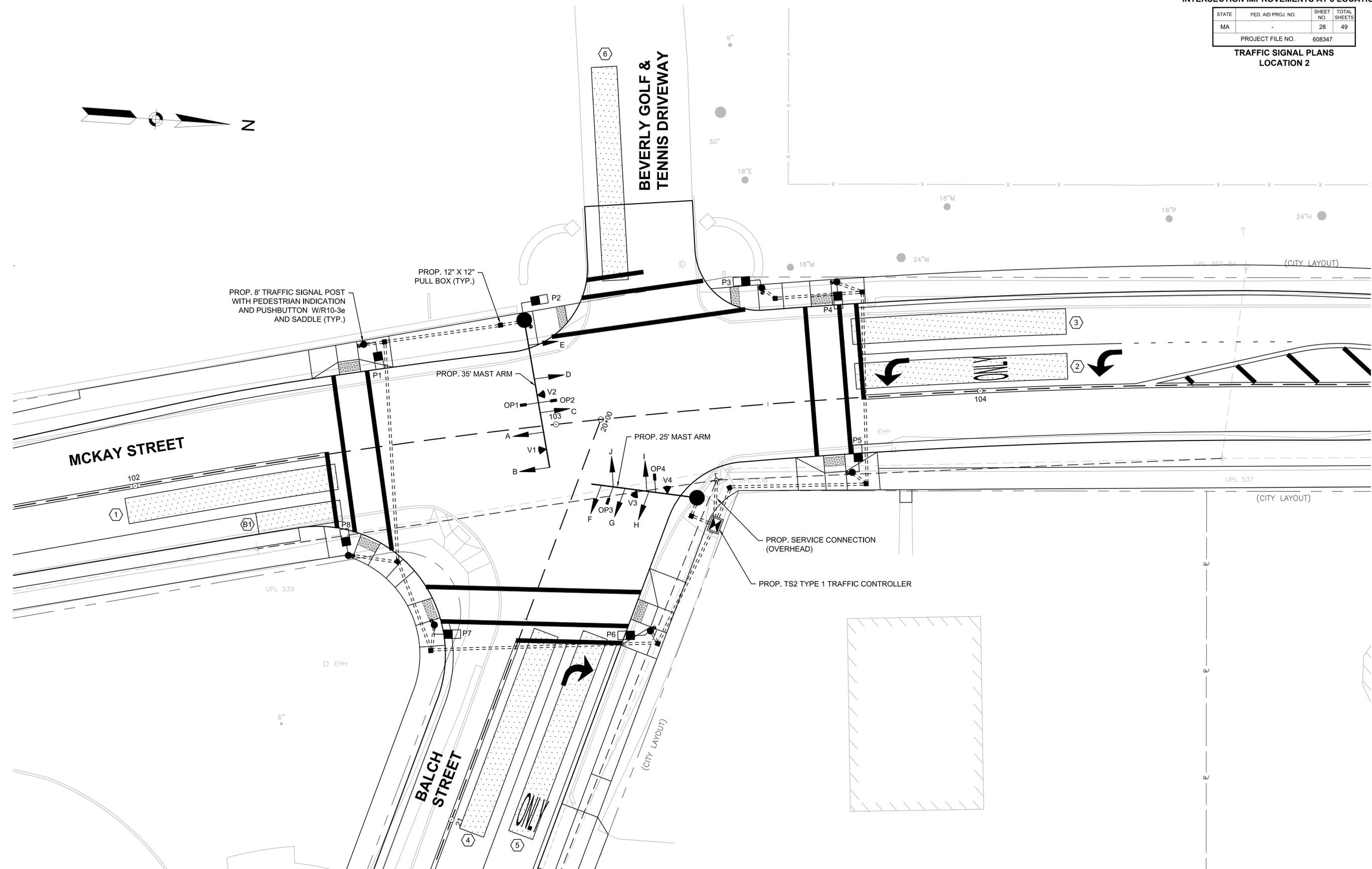
DELAY TIME EFFECTIVE ONLY DURING CALLED & RED. TIME IN SEC.

DETECTOR NUMBER	CAMERA NUMBER	CHANNEL NUMBER	DETECTION ZONE	Ø CALLED	Ø EXT.	MODE A=PULSE B=PRES.	DELAY TIME	EXT. TIME
Ø1	V1	1	1 @ 10' x 100'	5	5	B	-	-
Ø2	V1	2	1 @ 10' x 100'	2	2	B	-	-
Ø3	V1	2	1 @ 10' x 100'	2	2	B	-	-
Ø4	V2	3	1 @ 10' x 50'	1	1	B	-	-
Ø5	V2	4	1 @ 10' x 50'	6	6	B	-	-
Ø6	V2	4	1 @ 10' x 50'	6	6	B	-	-
Ø7	V3	5	1 @ 10' x 50'	7	7	B	-	-
Ø8	V3	5	1 @ 15' x 35'	7	7	B	-	-
Ø9	V4	6	1 @ 10' x 50'	8	8	B	-	-
Ø10	V5	7	1 @ 10' x 50'	2	2	B	-	-
Ø11	V5	8	1 @ 10' x 50'	4	4	B	-	-
Ø12	V6	9	1 @ 10' x 100'	2	2	B	-	-
Ø13	V7	10	1 @ 10' x 100'	4	4	B	-	-
Ø14	V7	10	1 @ 10' x 100'	4	4	B	-	-
ØB1	V1	2	1 @ 35' x 8'	2	2	B	-	-
ØB2	V2	4	1 @ 35' x 8'	6	6	B	-	-
ØB3	V5	7	1 @ 28' x 8'	2	2	B	-	-
ØB4	V6	9	1 @ 20' x 8'	2	2	B	-	-

**BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	28	49
PROJECT FILE NO.		608347	

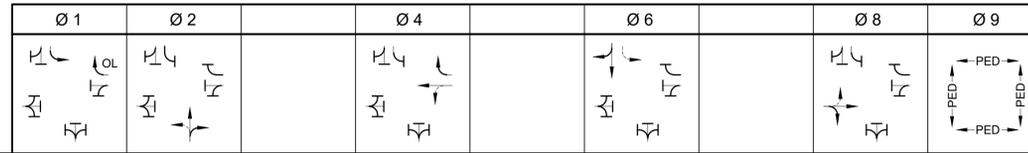
**TRAFFIC SIGNAL PLANS
LOCATION 2**



**BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	29	49
PROJECT FILE NO.		608347	

**TRAFFIC SIGNAL DATA
LOCATION 2**

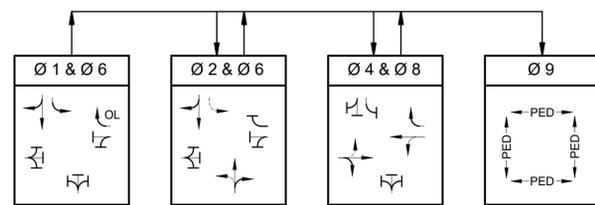


SEQUENCE AND TIMING																														
STREET	DIRECTION	HOUSINGS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	FLASHING OPERATION
MCKAY STREET	NB	A,B	R	R	R	G	Y	R				R	R	R				R	R	R				R	R	R	R	R	R	FY
MCKAY STREET	SB	C	GLA	YLA	RLA	RLA	RLA	RLA				RLA	RLA	RLA				FYLA	YLA	RLA				RLA	RLA	RLA	RLA	RLA	RLA	FYLA
MCKAY STREET	SB	D,E	R	R	R	R	R	R				R	R	R				G	Y	R				R	R	R	R	R	R	FY
BALCH STREET	WB	F,G	R	R	R	R	R	R				G	Y	R				R	R	R				R	R	R	R	R	R	FR
BALCH STREET	WB	H	R/GLA	R/YLA	R	R	R	R				G	Y	R				R	R	R				R	R	R	R	R	R	FR
GOLF AND TENNIS DRIVEWAY	EB	I,J	R	R	R	R	R	R				R	R	R				R	R	R				G	Y	R	R	R	R	FR
PEDESTRIANS	ALL	P1-P8	DW	DW	DW	DW	DW	DW				DW	DW	DW				DW	DW	DW				DW	DW	DW	W	FDW	DW	
TIMING IN SECONDS																														
MINIMUM GREEN (INITIAL)			4			10						8						10						8						
PASSAGE TIME (VEHICLE)			3			3						3						3						3						
MAXIMUM 1			9			45						15						45						15						
MAXIMUM 2			5			30						14						30						14						
YELLOW CLEARANCE				3			3						3						3						3					
RED CLEARANCE					2			2						2						2						2				
WALK (W)																												5		
PEDESTRIAN CLEARANCE																												8	3	
RECALL			NONE			SOFT						NONE						SOFT						NONE			NONE			
MEMORY			NON-LOCKING			NON-LOCKING						NON-LOCKING						NON-LOCKING						NON-LOCKING			LOCKING			

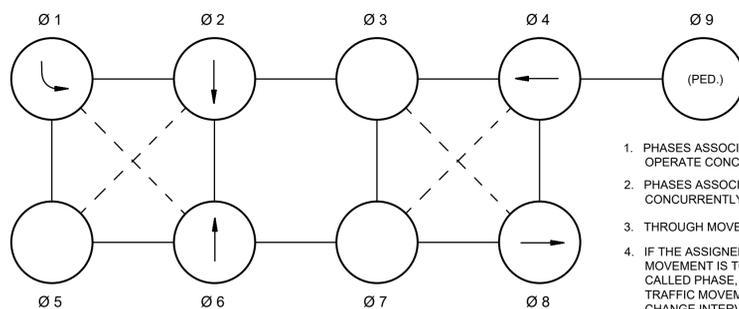
- NOTES: 1. AUTOMATIC FLASHING OPERATION PER 2009 MUTCD, AS AMENDED.
2. STOP AND GO OPERATION FOR 24 HOURS PER DAY, FLASHING OPERATION FOR EMERGENCY ONLY.
3. DURING PEDESTRIAN INTERVAL, FDW THROUGH YELLOW OPERATION SHALL NOT BE IN EFFECT

MAJOR ITEMS REQUIRED		
PAY ITEM	QUANTITY	ITEM
	1	CONTROLLER NEMA 8 PHASE TS2-TYPE 1, CAB. & FDN.
	1	SERVICE CONNECTION, TYPE OVERHEAD
	7	8' T.S. POST, BASE, & FDN.
	1	25 FT MAST ARM ASSEMBLY, BASE & FDN.
	1	35 FT MAST ARM ASSEMBLY, BASE & FDN.
	8	1 WAY, 3 SECTION, SIGNAL HOUSING (12" L.E.D.)
	1	1 WAY, 4 SECTION, SIGNAL HOUSING (12" L.E.D.)
	1	1 WAY, 5 SECTION, SIGNAL HOUSING (12" L.E.D.)
	8	PEDESTRIAN HOUSING (16" COUNTDOWN L.E.D.)
	8	APS PEDESTRIAN PUSH BUTTON, SIGN & SADDLES
	5	VIDEO DETECTOR CAMERA (1 SPARE)
	2	4 CHANNEL VIDEO INPUT PROCESSOR (1 SPARE)
	1	9" VIDEO MONITOR
	2	PRE-EMPTION RECEIVER-DUAL CHANNEL
	2	PRE-EMPTION PHASE SELECTOR MODULE-DUAL CHANNEL
	1	BUS INTERFACE UNIT
	1	PRE-EMPTION CONFIRMATION STROBE (WHITE)
804.3	300'	3 IN. ELECTRICAL CONDUIT TYPE NM - PLASTIC (-UL)
811.31	10	12" X 12" PULL BOX - SD.031
PLUS ALL NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS MATERIAL AND EQUIPMENT TO COMPLETE THE INSTALLATION.		

PREFERENTIAL PHASING SEQUENCE



NEMA DUAL RING PHASING NOTES:



- PHASES ASSOCIATED BY A SOLID LINE SHALL NOT OPERATE CONCURRENTLY.
- PHASES ASSOCIATED BY A DASHED LINE MAY OPERATE CONCURRENTLY.
- THROUGH MOVEMENTS MAY INCLUDE RIGHT TURNS.
- 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) UNLESS OTHERWISE NOTED.

EMERGENCY PRE-EMPTION DATA

APPROACH	PREEMPTION PHASE	DETECTOR
MCKAY STREET NORTHBOUND	2	OP1
MCKAY STREET SOUTHBOUND	6	OP2
BALCH STREET WESTBOUND	4	OP3
GOLF AND TENNIS EASTBOUND	8	OP4

EMERGENCY VEHICLE PREEMPTION OPERATION:

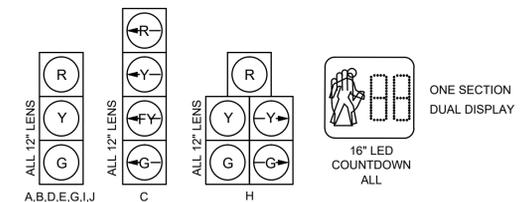
- EMERGENCY VEHICLE PREEMPTION SHALL BE ACTUATED BY AN OPTICAL SIGNAL FROM AN OPTICAL EMITTER MOUNTED ON AN EMERGENCY VEHICLE AND RECEIVED BY AN OPTICAL DETECTOR LOCATED AT INTERSECTION. A SEPARATE RECEIVING DETECTOR IS REQUIRED FOR EACH DETECTED APPROACH.
- PREEMPTION SIGNALS FROM MULTIPLE APPROACHES SHALL BE SERVICED ON A FIRST DETECTED FIRST SERVED BASIS.
- IN RESPONSE TO A PREEMPTION SIGNAL RECEIVED AT AN INTERSECTION BY AN OPTICAL DETECTOR, THE CONTROLLER SHALL TIME THE CLEARANCE INTERVALS OF THE ACTIVE PHASE (IF DIFFERENT THAT TO BE SERVICED) AND ADVANCE TO AND/OR HOLD IN EMERGENCY VEHICLE PREEMPTION PHASE UNTIL PREEMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME CLEARANCES AND SIMILARLY SERVICE OTHER EMERGENCY VEHICLE PREEMPTION SEQUENCES IN THE ORDER RECEIVED (IF RECEIVED) OTHERWISE, RESUME NORMAL PREFERENTIAL PHASE SEQUENCE.
- PREEMPTION MINIMUM GREENS SHALL BE TEN SECONDS.
- NORMAL CLEARANCES SHALL BE PROVIDED ON PHASES THAT ARE TERMINATED BY PREEMPTION DEMAND.
- ACTUAL TIMING FOR PREEMPTION SHALL BE DETERMINED IN THE FIELD IN COORDINATION WITH THE FIRE DEPARTMENT AND SHALL BE APPROVED BY CITY PRIOR TO OPERATION.

VIDEO DETECTOR DATA

DELAY TIME EFFECTIVE ONLY DURING CALLED Ø RED. TIME IN SEC.

DETECTOR NUMBER	CAMERA NUMBER	CHANNEL NUMBER	DETECTION ZONE	Ø CALLED	Ø EXT.	MODE A=PULSE B=PRES.	DELAY TIME	EXT. TIME
①	V1	1	1 @ 6'x50'	2	2	B	-	-
②	V2	2	1 @ 6'x50'	1	1	B	-	-
③	V2	3	1 @ 6'x50'	6	6	B	-	-
④	V3	4	1 @ 6'x50'	4	4	B	-	-
⑤	V3	5	1 @ 6'x50'	4	4	B	-	-
⑥	V4	6	1 @ 6'x50'	8	8	B	-	-
⑥1	V1	1	1 @ 5'x20'	2	2	B	-	-

SIGNAL IDENTIFICATION



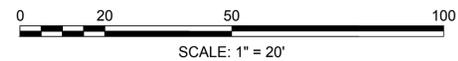
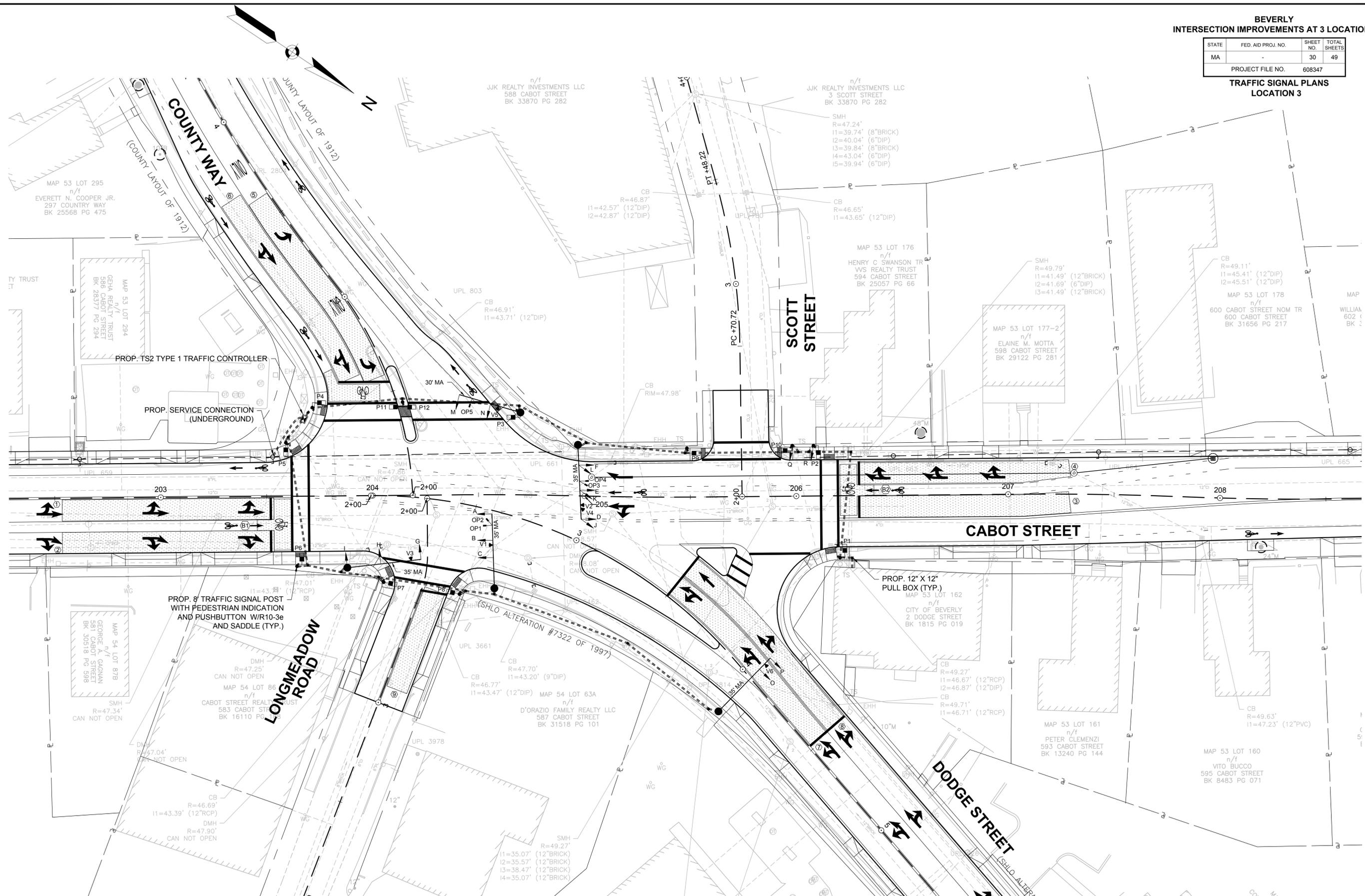
NOTES:

- ALL SIGNALS SHALL HAVE CUT AWAY VISORS.
- ALL SIGNALS SHALL HAVE 12" LED WITH 5" LOUVERED BACK PLATES W/ 2" REFLECTIVE BORDER

**BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	30	49
PROJECT FILE NO.		608347	

**TRAFFIC SIGNAL PLANS
LOCATION 3**



STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	32	49
PROJECT FILE NO.		608347	

**TEMPORARY TRAFFIC CONTROL PLANS
SHEET 1 OF 3**

NOTES:

- ALL TEMPORARY TRAFFIC CONTROL WORK SHALL CONFORM TO THE LATEST EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND ALL REVISIONS, UNLESS SUPERCEDED BY THESE PLANS.
- ALL SIGN LEGENDS, BORDERS, AND MOUNTING SHALL BE IN ACCORDANCE WITH THE MUTCD.
- TEMPORARY CONSTRUCTION SIGNING AND ALL OTHER TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY WORK.
- TEMPORARY CONSTRUCTION SIGNING, BARRICADES, AND ALL OTHER NECESSARY WORK ZONE TRAFFIC CONTROL DEVICES SHALL BE REMOVED FROM THE HIGHWAY OR COVERED WHEN THEY ARE NOT REQUIRED FOR CONTROL OF TRAFFIC.
- SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY, CHANNELIZING DEVICES, BARRIERS, AND CRASH ATTENUATORS MUST PASS THE CRITERIA SET FORTH IN NCHRP REPORT 350, "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES" AND/OR "MANUAL FOR ASSESSING SAFETY HARDWARE" (MASH).
- CONTRACTORS SHALL NOTIFY EACH ABUTTER AT LEAST 24 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE THE TEMPORARY CLOSURE OF ACCESS, SUCH AS CONDUIT INSTALLATION, EXISTING PAVEMENT EXCAVATION, TEMPORARY DRIVEWAY PAVEMENT PLACEMENT, AND SIMILAR OPERATIONS.
- THE FIRST FIVE PLASTIC DRUMS OF A TAPER SHALL BE MOUNTED WITH TYPE A LIGHTS.
- THE ADVISORY SPEED LIMIT, IF REQUIRED, SHALL BE DETERMINED BY THE ENGINEER.
- DISTANCES ARE A GUIDE AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.
- MAXIMUM SPACING OF TRAFFIC DEVICES IN A TAPER (DRUMS OR CONES) IS EQUAL IN FEET TO THE SPEED LIMIT IN MPH.
- MINIMUM LANE WIDTH IS TO BE 11 FEET (3.3m) UNLESS OTHERWISE SHOWN. MINIMUM LANE WIDTH TO BE MEASURED FROM THE EDGE OF DRUMS OR MEDIAN BARRIER.
- ALL SIGNS SHALL BE MOUNTED ON THEIR OWN STANDARD SIGN SUPPORTS.

LEGEND:

● REFLECTORIZED PLASTIC DRUM OR 36" CONE	▨ WORK ZONE	🚚 WORK VEHICLE
P/F POLICE/FLAGGER DETAIL	➔ DIRECTION OF TRAFFIC	⊠ TRUCK MOUNTED ATTENUATOR
▨ TYPE III BARRICADE	🚧 IMPACT ATTENUATOR	⬇️ TRAFFIC OR PEDESTRIAN SIGNAL
◻ CHANGEABLE MESSAGE SIGN	▭ MEDIAN BARRIER	● SIGN
⬇️ ARROW BOARD	▭ MEDIAN BARRIER WITH WARNING LIGHTS	

THE IDEAL CAPACITY OF A MAJOR HIGHWAY IS GENERALLY CONSIDERED TO BE 1900 PASSENGER CARS PER HOUR PER LANE (PCPHPL). IN WORK ZONES ON A MULTI-LANE DIVIDED HIGHWAY, THE FOLLOWING VOLUME GUIDELINES HAVE BEEN SUGGESTED:

MEASURED AVERAGE WORK ZONE CAPACITIES

NUMBER OF LANES		NUMBER OF STUDIES	AVERAGE CAPACITY	
NORMAL (EXISTING)	OPEN (TO TRAFFIC)		VPH	VPHPL
3	1	7	1,170	1,170
2	1	8	1,340	1,340
5	2	8	2,740	1,370
4	2	4	2,960	1,480
3	2	9	2,980	1,490
4	3	4	4,560	1,520

Source: Dudek, C., *Notes on Work Zone Capacity and Level of Service*. Texas Transportation Institute, Texas A&M University, College Station, Texas (1984)

BY OBTAINING HOURLY TRAFFIC COUNTS FOR A PARTICULAR ROADWAY (WITH A MINIMUM OF A 48-HOUR AUTOMATIC TRAFFIC RECORDER (ATR) COUNT), THIS WILL HELP TO DETERMINE AT WHAT TIMES OF THE DAY OR NIGHT A CERTAIN NUMBER OF LANES MAY BE CLOSED.

NOTES FOR INSTALLATION:

- ALL TRAFFIC CONTROL SCENARIOS SHALL CONFORM WITH THE MASSDOT STANDARD DETAILS AND DRAWINGS FOR THE DEVELOPMENT OF TEMPORARY TRAFFIC CONTROL PLANS.
- ALL CONSTRUCTION SIGNING, DRUMS, BARRICADES AND OTHER DEVICES SHALL CONFORM WITH THE 2009 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (M.U.T.C.D.) AS AMENDED.
- ALL DRUMS SHALL BE SET AT 20' ON CENTER MAX. UNLESS OTHERWISE NOTED OR ADJUSTED BY THE ENGINEER.
- ALL DRUMS SHALL BE APPROXIMATELY PLACED AND MOVED AS NECESSARY TO MAINTAIN ADEQUATE ABUTTER ACCESS AT ALL TIMES.
- CONTRACTOR SHALL NOTIFY EACH ABUTTER AT LEAST 48 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE THE TEMPORARY CLOSURE OF ACCESS, SUCH AS CONDUIT INSTALLATION EXISTING PAVEMENT EXCAVATION, TEMPORARY DRIVEWAY PAVEMENT PLACEMENT AND SIMILAR OPERATIONS.
- A MINIMUM OF ONE LANE OF TRAFFIC IN EACH DIRECTION ON TWO WAY STREETS SHALL BE MAINTAINED AT ALL TIMES, EXCEPT DURING WORKING HOURS, TRAFFIC MAY BE REDUCED TO ONE LANE UNDER POLICE OR FLAGGER CONTROL FOR SHORT TIME PERIODS WHEN REQUIRED FOR THE WORK, AS SHOWN.
- GRADE SEPARATIONS IN EXCESS OF 2" DURING NON-WORKING HOURS WILL REQUIRE DELINEATION BY USE OF DRUMS.
- EXCAVATION EDGES IN EXCESS OF 4" DEEP SHALL BE PROTECTED DURING NON-WORKING HOURS BY BACKFILLING WITH A WEDGE OF GRAVEL OR SOIL TO COMPACTED 1:4 SLOPE.
- 10' MINIMUM LANE WIDTHS SHALL BE MAINTAINED.
- NON-ESSENTIAL TRAFFIC CONTROL DEVICES SHALL BE COVERED OR REMOVED DURING NON-WORKING HOURS.
- ADVISORY SPEED PLATES (W13-1) SHALL BE USED IF APPROPRIATE AND AS DIRECTED BY THE ENGINEER.
- CONSTRUCTION SIGNS ASSOCIATED WITH THE DAILY LANE CLOSURES AND SHOULDER WORK AREAS WILL NOT BE MEASURED FOR PAYMENT MORE THAN ONCE REGARDLESS OF THE NUMBER OF TIMES THE SIGNS ARE REUSED.
- TEMPORARY CONSTRUCTION SIGNING AND ALL OTHER TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY WORK.

SUGGESTED WORK ZONE WARNING SIGN SPACING

ROAD TYPE	DISTANCE BETWEEN SIGNS **		
	A	B	C
LOCAL OR LOW VOLUME ROADWAYS*	350 (100)	350 (100)	350 (100)
MOST OTHER ROADWAYS*	500 (150)	500 (150)	500 (150)
FREEWAYS AND EXPRESSWAYS*	1,000 (300)	1,500 (450)	2,640 (800)

* ROAD TYPE TO BE DETERMINED BY MASSDOT OFFICE OF TRANSPORTATION PLANNING.

** DISTANCES ARE SHOWN IN FEET (METERS). THE COLUMN HEADINGS A, B, AND C ARE THE DIMENSIONS SHOWN IN THE DETAIL/ TYPICAL SETUP FIGURES. THE A DIMENSION IS THE DISTANCE FROM THE TRANSITION OR POINT OF RESTRICTION TO THE FIRST SIGN. THE B DIMENSION IS THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS. THE C DIMENSION IS THE DISTANCE BETWEEN THE SECOND AND THIRD SIGNS. (THE "THIRD" SIGN IS THE FIRST ONE TYPICALLY ENCOUNTERED BY A DRIVER APPROACHING A TEMPORARY TRAFFIC CONTROL (TTC) ZONE.)

THE "THIRD" SIGN ABOVE IS TYPICALLY REFERRED TO AS AN "ADVANCE WARNING" SIGN ON THE TTC SETUPS. THESE ADVANCE WARNING SIGNS ARE LOCATED PRIOR TO THE PROJECT LIMITS ON ALL APPROACHES (i.e. THE W20-1 SERIES (ROAD WORK XX FT) SIGNS), AND USUALLY REMAIN FOR THE DURATION OF THE PROJECT. ADDITIONAL SIGNS (i.e. "RIGHT LANE CLOSED 1 MILE" AND "LEFT LANE CLOSED 1 MILE") HAVE BEEN SHOWN IN SOME FIGURES AS EXAMPLES OF REINFORCEMENT SIGN PLACEMENT BUT ARE USED IN RARE OCCASIONS.

THE FIRST AND SECOND WARNING SIGNS ABOVE ARE REFERRED TO AS THE OPERATIONAL (DAY-TO-DAY) WORK ZONE SIGNS AND MAY BE MOVED DEPENDING ON WHERE THE SPECIFIC ROADWAY WORK FOR THAT DAY IS LOCATED.

R2-10a SIGNS SHALL BE PLACED BETWEEN THE SECOND AND THIRD SIGNS AS DESCRIBED ABOVE.

R2-10a, R2-10e, AND W20-1 SERIES SIGNS ARE TO BE INCLUDED ON ALL DETAILS/TYPICAL SETUPS.

Based on: Table 6C-1 MUTCD LATEST EDITION

STOPPING SIGHT DISTANCE AS A FUNCTION OF SPEED

SPEED* (km/h)	DISTANCE (m)	SPEED* (mph)	DISTANCE (ft)
30	35	20	115
40	50	25	155
50	65	30	200
60	85	35	250
70	105	40	305
80	130	45	360
90	160	50	425
100	185	55	495
110	220	60	570
120	250	65	645
		70	730
		75	820

*POSTED SPEED, OFF-PEAK 85TH-PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED

THESE VALUES MAY BE USED TO DETERMINE THE LENGTH OF LONGITUDINAL BUFFER SPACES.

THE DISTANCES IN THE ABOVE CHART REPRESENT THE MINIMAL VALUES FOR BUFFER SPACING.

Source: Table 6C-2 MUTCD LATEST EDITION

CONVENTIONAL ROADWAY— A STREET OR HIGHWAY OTHER THAN A LOW-VOLUME ROAD, EXPRESSWAY, OR FREEWAY.

EXPRESSWAY— A DIVIDED HIGHWAY WITH PARTIAL CONTROL OF ACCESS.

FREEWAY— A DIVIDED HIGHWAY WITH FULL CONTROL OF ACCESS.

LOW-VOLUME ROAD— A FACILITY LYING OUTSIDE OF BUILT-UP AREAS OF CITIES, TOWNS, AND COMMUNITIES, AND IT SHALL HAVE A TRAFFIC VOLUME OF LESS THAN 400 AADT. IT SHALL NOT BE A FREEWAY, EXPRESSWAY, INTERCHANGE RAMP, FREEWAY SERVICE ROAD OR A ROAD ON A DESIGNATED STATE HIGHWAY SYSTEM.

Source: MUTCD LATEST EDITION

TAPER LENGTH CRITERIA FOR TEMPORARY TRAFFIC CONTROL ZONES

TYPE OF TAPER	TAPER LENGTH (L)*
MERGING TAPER	AT LEAST L
SHIFTING TAPER	AT LEAST 0.5L
SHOULDER TAPER	AT LEAST 0.33L
ONE-LANE, TWO-WAY TRAFFIC TAPER	50 FT MIN.(15 m) 100 FT(30 m) MAX.
DOWNSTREAM TAPER	50 FT MIN.(15 m) 100 FT MAX.(30 m) PER LANE

Source: Table 6C-3 MUTCD LATEST EDITION

FORMULAS FOR DETERMINING TAPER LENGTHS

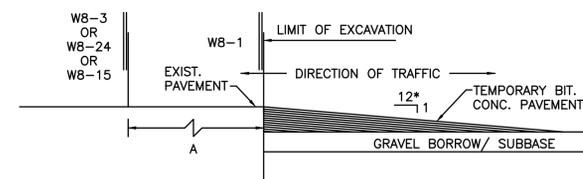
SPEED LIMIT (S)	TAPER LENGTH (L) FEET	SPEED LIMIT (S)	TAPER LENGTH (L) Meters
40 MPH OR LESS	$L = \frac{WS^2}{60}$	60 KM/H OR LESS	$L = \frac{WS^2}{155}$
45 MPH OR MORE	$L = WS$	70 KM/H OR MORE	$L = \frac{WS}{1.6}$

WHERE: L = TAPER LENGTH IN FEET (METERS)

W = WIDTH OF OFFSET IN FEET (METERS)

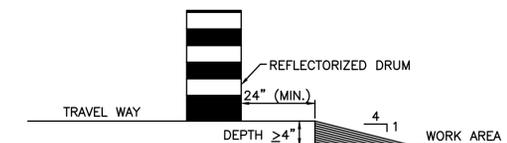
S = POSTED SPEED LIMIT, OR OFF-PEAK 85TH-PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH (KM/H)

Source: Table 6C-4 MUTCD LATEST EDITION



LONGITUDINAL DROP-OFF DETAIL

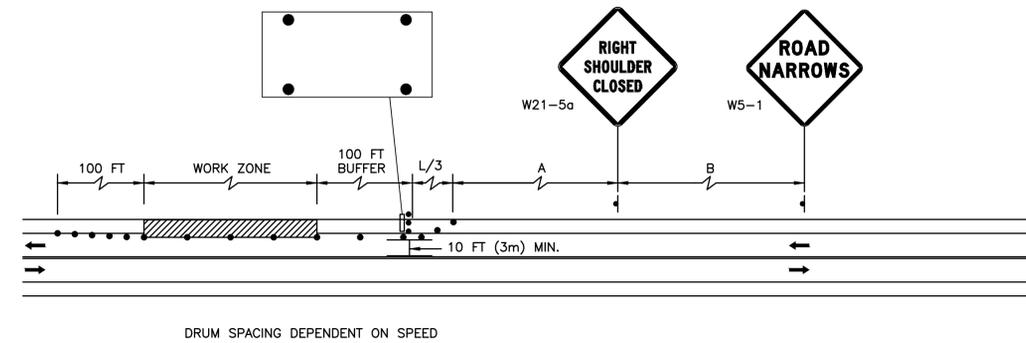
NOT TO SCALE



LATERAL DROP-OFF DETAIL

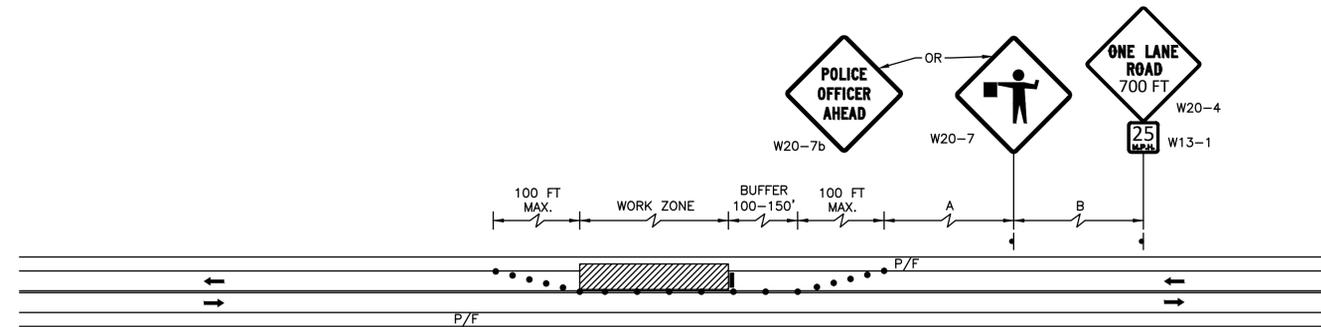
NOT TO SCALE

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	33	49
PROJECT FILE NO.		608347	



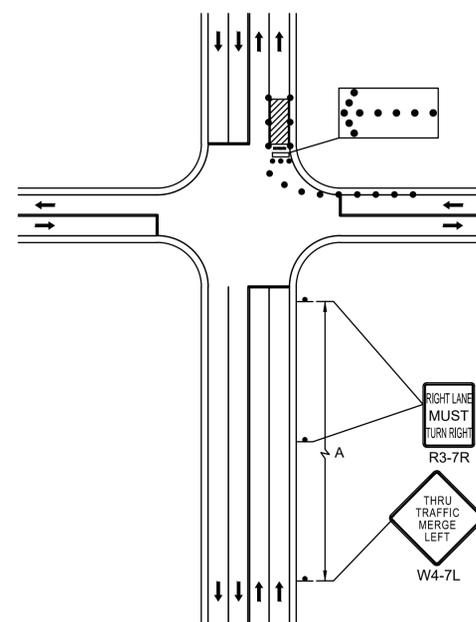
TYPICAL SHOULDER CLOSURE

NOT TO SCALE



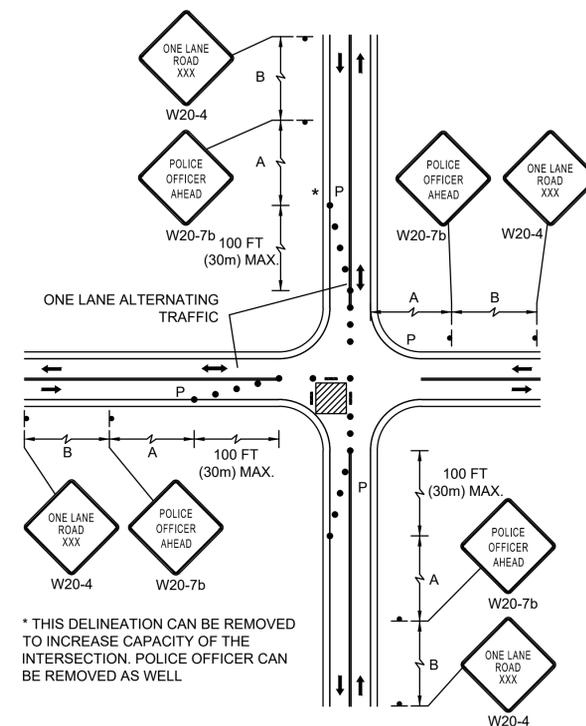
TWO LANE ROAD
ONE LANE ALTERNATING TRAFFIC
WITH POLICE OR FLAGGER DETAIL

NOT TO SCALE



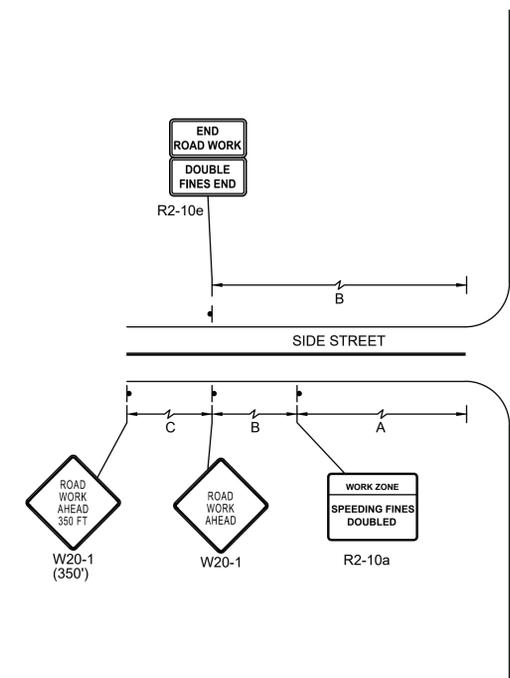
DOUBLE LANE APPROACH FAR
SIDE CLOSURE RIGHT LANE

NOT TO SCALE



SINGLE LANE APPROACH
ONE QUADRANT CLOSURE

NOT TO SCALE



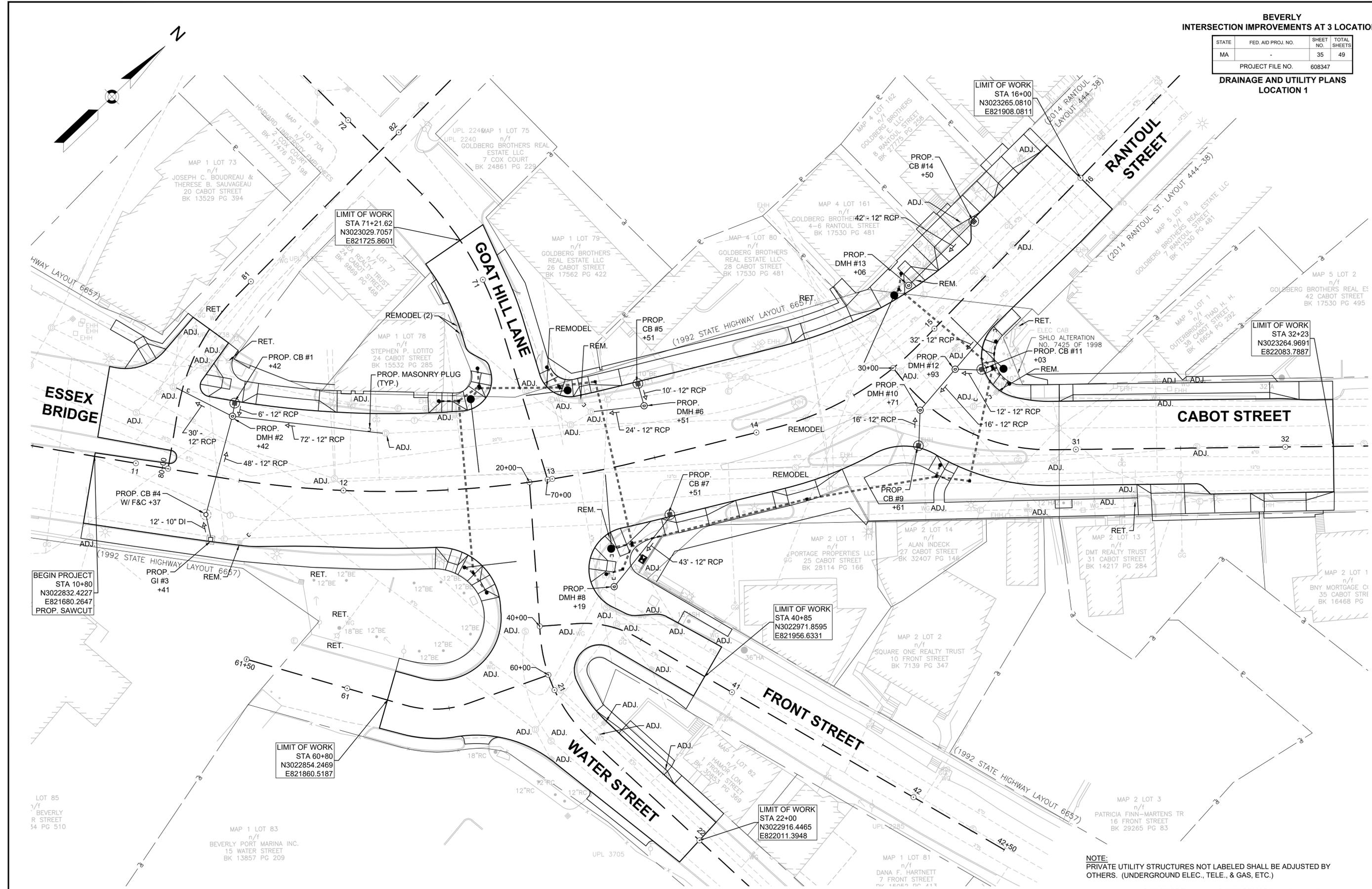
TYPICAL SIDE STREET ADVANCED
WARNING SIGN DETAIL

NOT TO SCALE

**BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	35	49
PROJECT FILE NO.		608347	

**DRAINAGE AND UTILITY PLANS
LOCATION 1**



BEGIN PROJECT
STA 10+80
N3022832.4227
E821680.2647
PROP. SAWCUT

LIMIT OF WORK
STA 71+21.62
N3023029.7057
E821725.8601

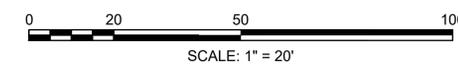
LIMIT OF WORK
STA 16+00
N3023265.0810
E821908.0811

LIMIT OF WORK
STA 32+23
N3023264.9691
E822083.7887

LIMIT OF WORK
STA 40+85
N3022971.8595
E821956.6331

LIMIT OF WORK
STA 60+80
N3022854.2469
E821860.5187

LIMIT OF WORK
STA 22+00
N3022916.4465
E822011.3948



NOTE:
PRIVATE UTILITY STRUCTURES NOT LABELED SHALL BE ADJUSTED BY OTHERS. (UNDERGROUND ELEC., TELE., & GAS, ETC.)

- CB, DMH, SMH ADJ./REMODEL = • ADJUST/REMODEL STRUCTURE
- R&D EXIST. F&G OR COVER = • R&D EXIST. F&G OR COVER
- PROVIDE NEW F&G OR COVER

**BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	36	49
PROJECT FILE NO. 608347			

**DRAINAGE AND UTILITY PLANS
LOCATION 2**

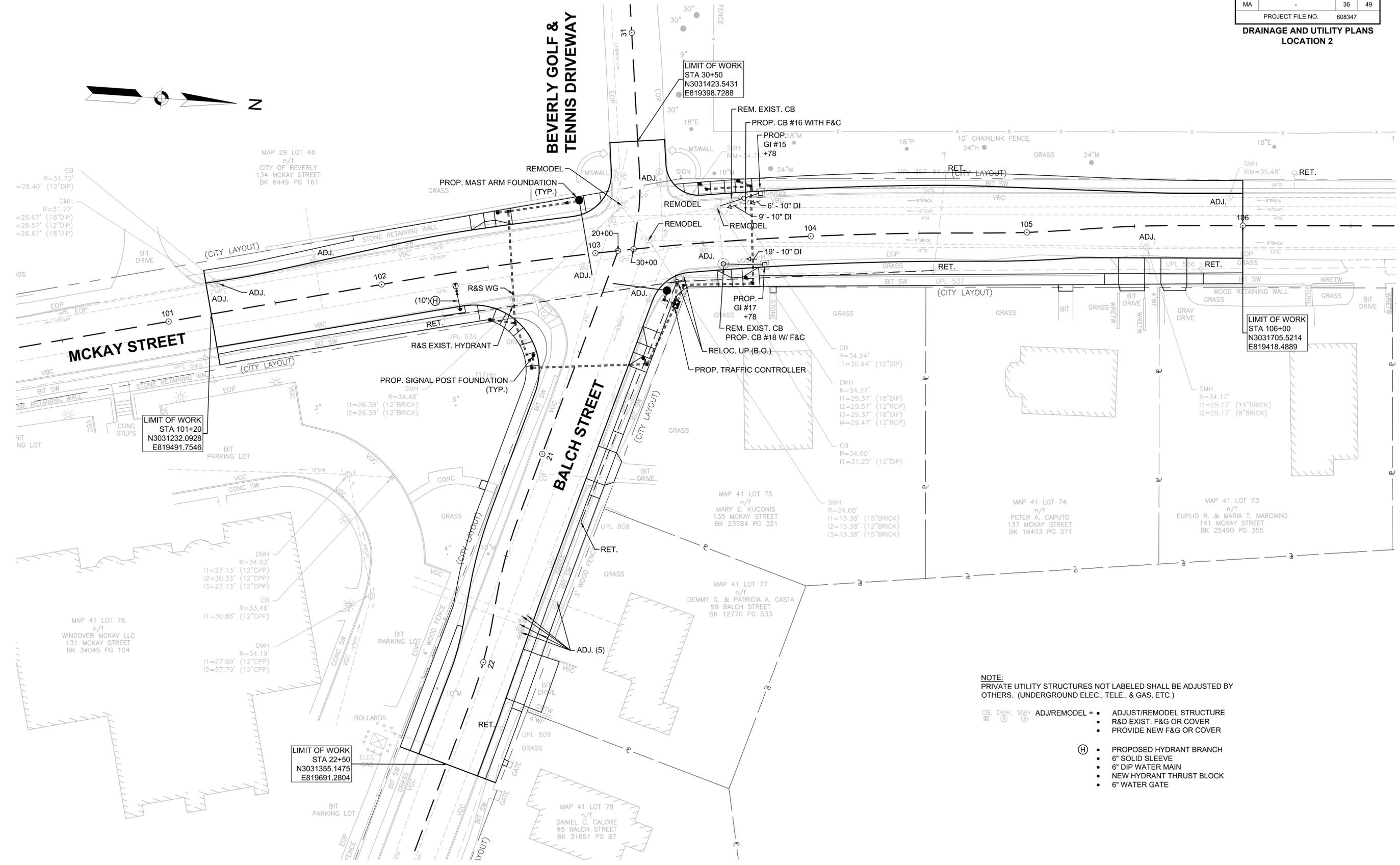


MAP 29 LOT 46
n/f
CITY OF BEVERLY
134 MCKAY STREET
BK 6449 PG 161

**BEVERLY GOLF &
TENNIS DRIVEWAY**

MCKAY STREET

BALCH STREET



LIMIT OF WORK
STA 101+20
N3031232.0928
E819491.7546

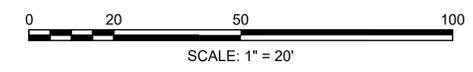
LIMIT OF WORK
STA 30+50
N3031423.5431
E819398.7288

LIMIT OF WORK
STA 106+00
N3031705.5214
E819418.4889

LIMIT OF WORK
STA 22+50
N3031355.1475
E819691.2804

NOTE:
PRIVATE UTILITY STRUCTURES NOT LABELED SHALL BE ADJUSTED BY OTHERS. (UNDERGROUND ELEC., TELE., & GAS, ETC.)

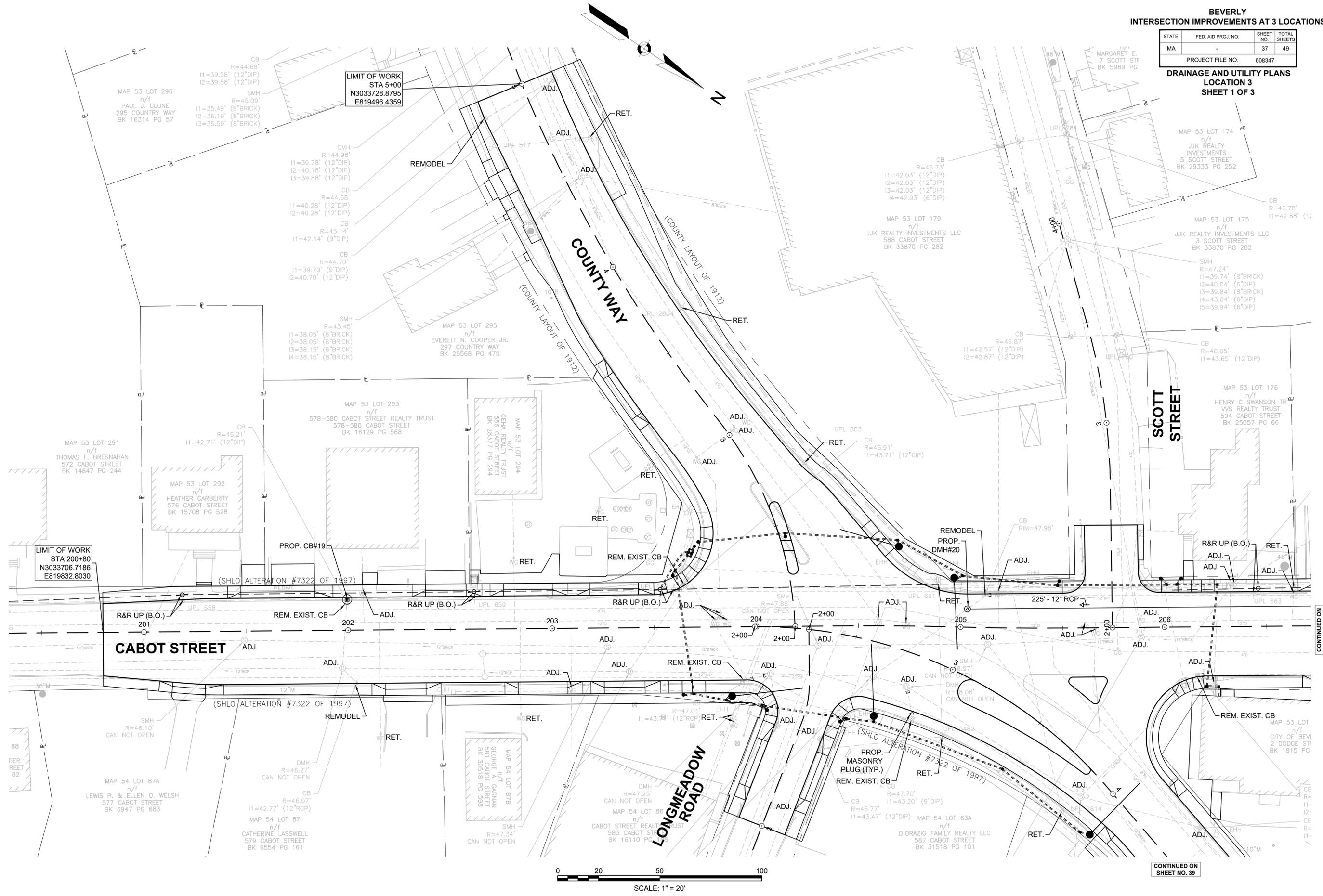
- CB, DMH, SMH ADJ/REMODEL = • ADJUST/REMODEL STRUCTURE
- R&D EXIST. F&G OR COVER
- PROVIDE NEW F&G OR COVER
- ⊕ PROPOSED HYDRANT BRANCH
- 6" SOLID SLEEVE
- 6" DIP WATER MAIN
- NEW HYDRANT THRUST BLOCK
- 6" WATER GATE



BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	37	49
PROJECT FILE NO.		608347	

DRAINAGE AND UTILITY PLANS
LOCATION 3
SHEET 1 OF 3



LIMIT OF WORK
 STA 200+80
 N3033706.7186
 E819832.8030

LIMIT OF WORK
 STA 5+00
 N3033728.8795
 E819496.4359

CONTINUED ON
 SHEET NO. 39

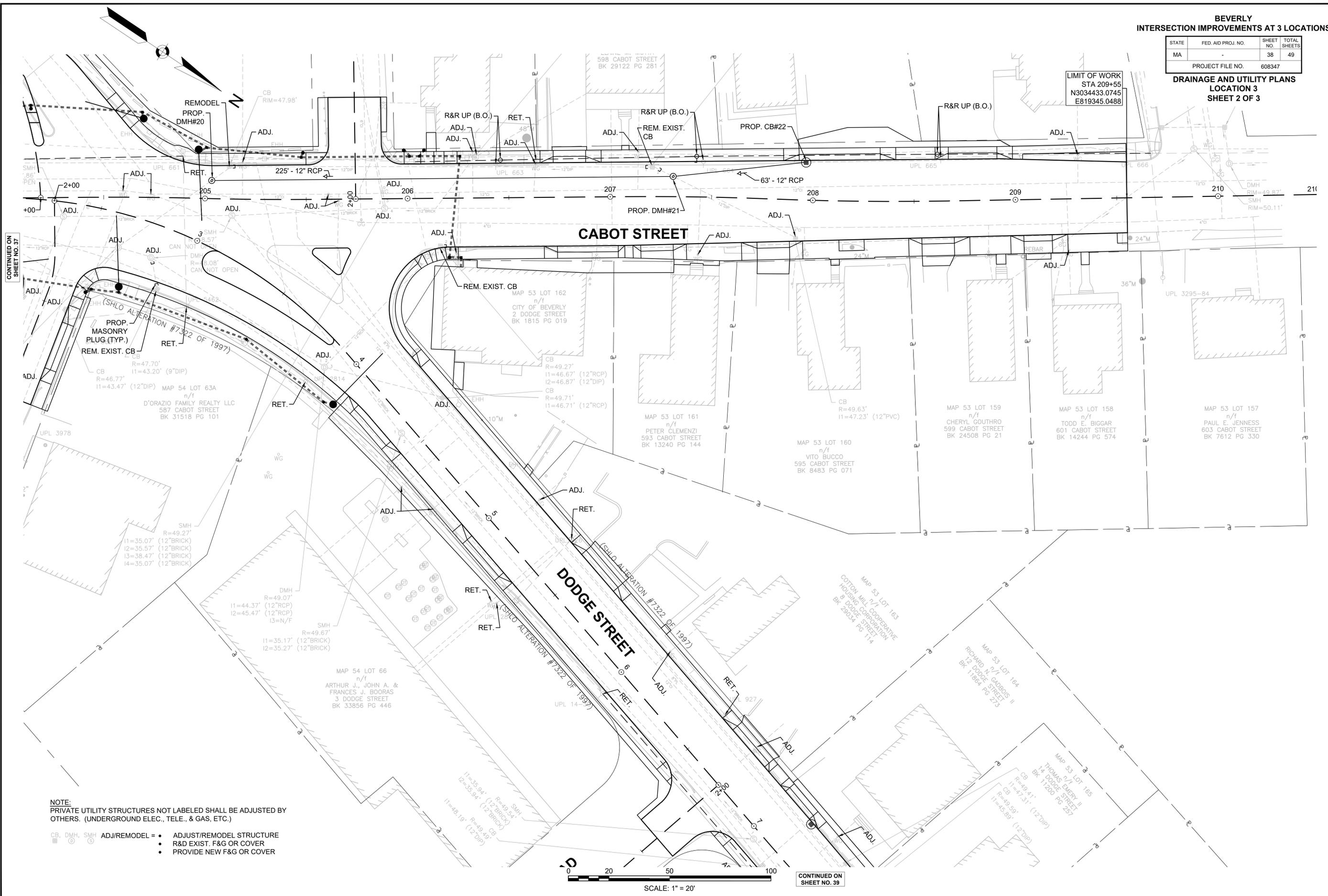
CONTINUED ON
 SHEET NO. 38

BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	38	49
PROJECT FILE NO. 608347			

DRAINAGE AND UTILITY PLANS
LOCATION 3
SHEET 2 OF 3

LIMIT OF WORK
STA 209+55
N3034433.0745
E819345.0488

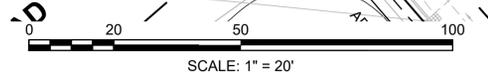


CONTINUED ON
SHEET NO. 37

CONTINUED ON
SHEET NO. 39

NOTE:
PRIVATE UTILITY STRUCTURES NOT LABELED SHALL BE ADJUSTED BY
OTHERS. (UNDERGROUND ELEC., TELE., & GAS, ETC.)

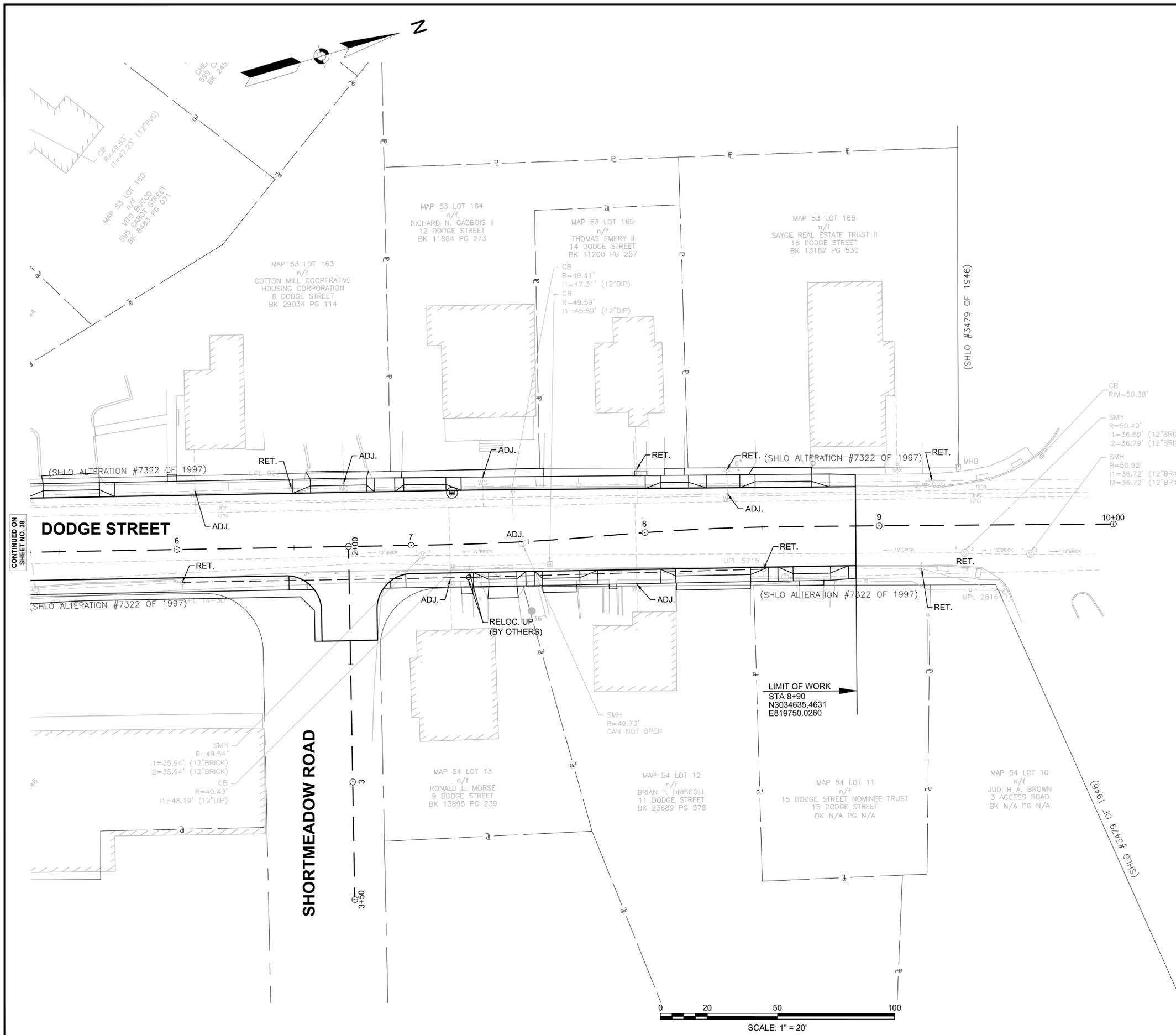
- CB, DMH, SMH ADJ./REMODEL = • ADJUST/REMODEL STRUCTURE
- ◻ R&D EXIST. F&G OR COVER
- ◻ PROVIDE NEW F&G OR COVER



**BEVERLY
INTERSECTION IMPROVEMENTS AT 3 LOCATIONS**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	39	49
PROJECT FILE NO.		608347	

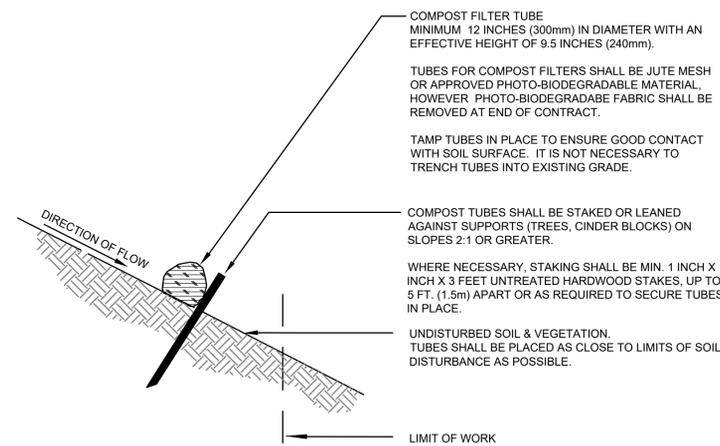
**DRAINAGE AND UTILITY PLANS
LOCATION 3
SHEET 3 OF 3**



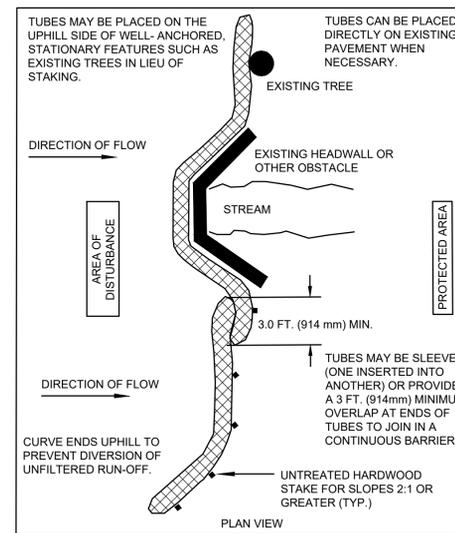
CONTINUED ON
SHEET NO. 38

608347_H10(DRAINAGE CABOT-DODGE).DWG Picked on 1-Jun-2017 4:07 PM

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	40	49
PROJECT FILE NO.		608347	

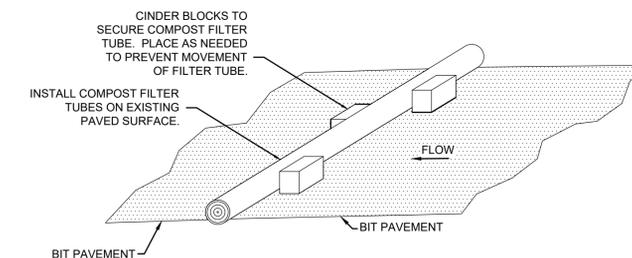


COMPOST FILTER TUBE DETAIL
N.T.S.

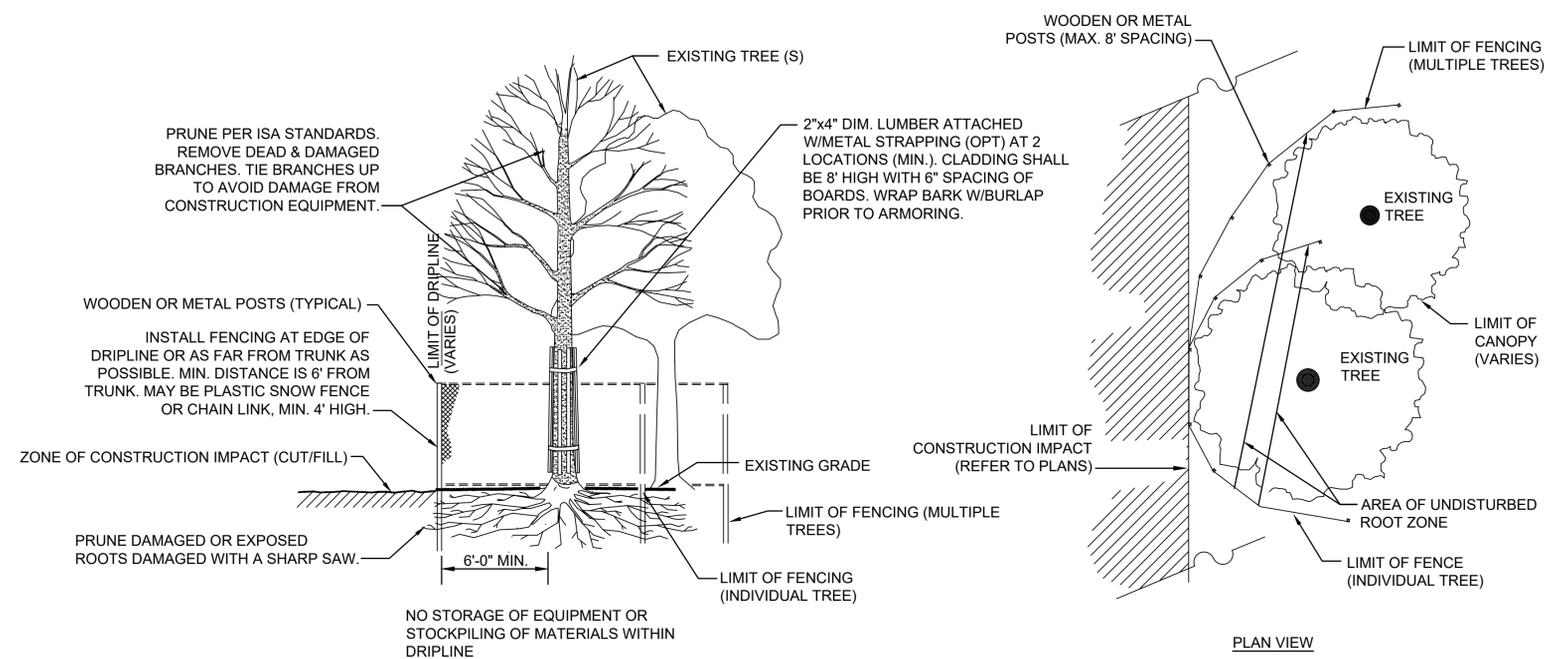


GENERAL NOTES:

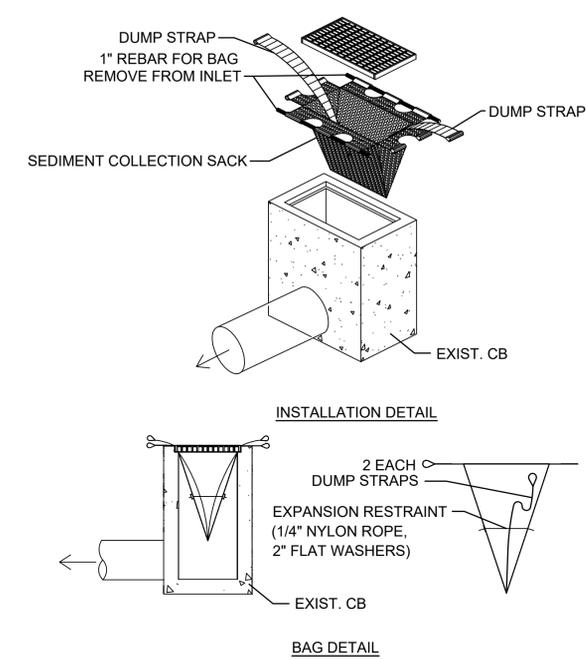
1. PROVIDE A MINIMUM TUBE DIAMETER OF 12 INCHES (300mm) FOR SLOPES UP TO 50 FEET (15.24m) IN LENGTH WITH A SLOPE RATIO OF 3H:1V OR STEEPER. LONGER SLOPES OF 3H:1V MAY REQUIRE LARGER TUBE DIAMETER OR ADDITIONAL COURSING OF FILTER TUBES TO CREATE A FILTER BERM. REFER TO MANUFACTURER'S RECOMMENDATIONS FOR 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.



COMPOST FILTER TUBE ON PAVED SURFACES
N.T.S.

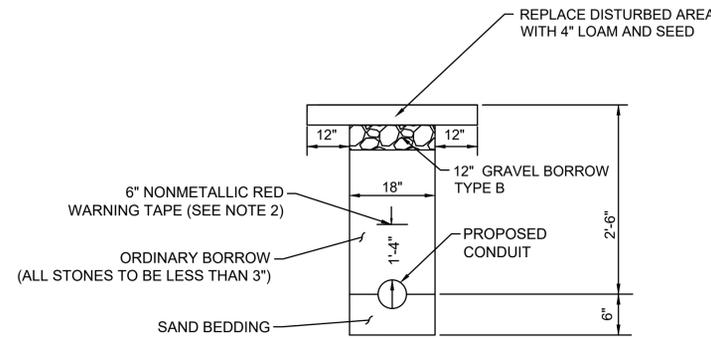


TREE PROTECTION DETAIL
N.T.S.



SILT SACK DETAIL (ITEM 697.1)
N.T.S.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	41	49
PROJECT FILE NO.		608347	

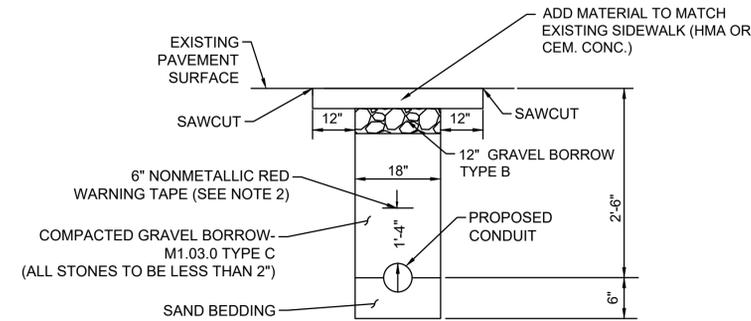


NOTES:

- SCHEDULE 80 ELECTRICAL CONDUIT TYPE NM-PLASTIC (UL), WITH PULL ROPE.
- WARNING TAPE SHALL BE PER CURRENT APWA STANDARDS.

CONDUIT UNDER GRASS AREAS

N.T.S.

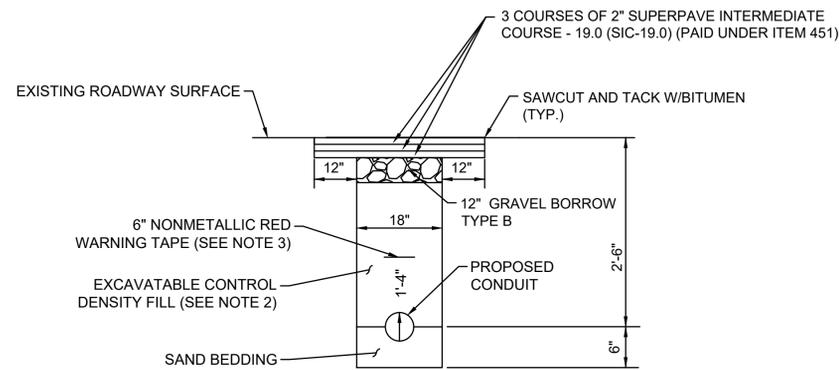


NOTES:

- SCHEDULE 80 ELECTRICAL CONDUIT TYPE NM-PLASTIC (UL), WITH PULL ROPE.
- WARNING TAPE SHALL BE PER CURRENT APWA STANDARDS.

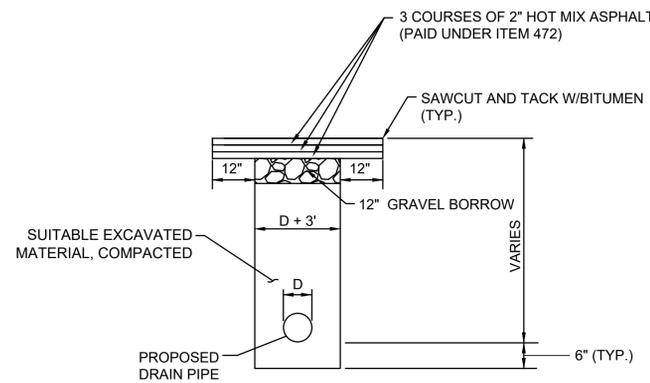
CONDUIT UNDER SIDEWALK AREAS

N.T.S.



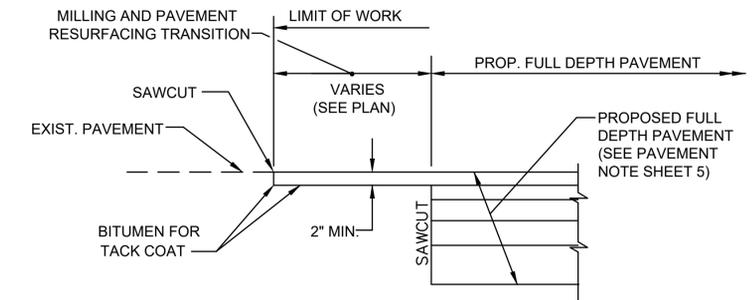
NOTES:

- SCHEDULE 80 ELECTRICAL CONDUIT TYPE NM-PLASTIC (UL), WITH PULL ROPE, UNLESS OTHERWISE APPROVED BY MASSDOT.
- CONTROL DENSITY FILL SHALL MEET THE REQUIREMENTS OF SUBSECTION M4.08.0.
- WARNING TAPE SHALL BE PER CURRENT APWA STANDARDS.



PERMANENT TRENCH PATCH FOR
DRAINAGE PIPE (WITHIN ROADWAY) DETAIL

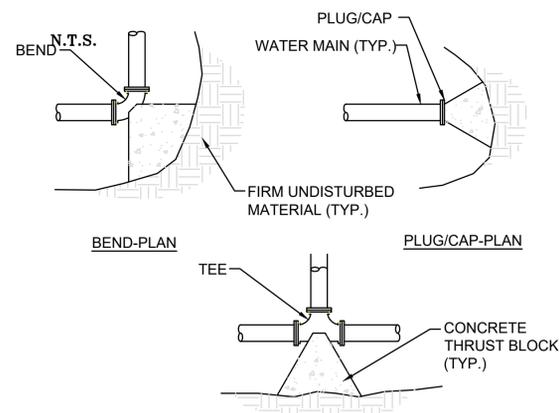
N.T.S.



JOINT DETAILS AT PAVING LIMITS

N.T.S.

CONDUIT CROSSING ROADWAY



THRUST BLOCK DETAILS

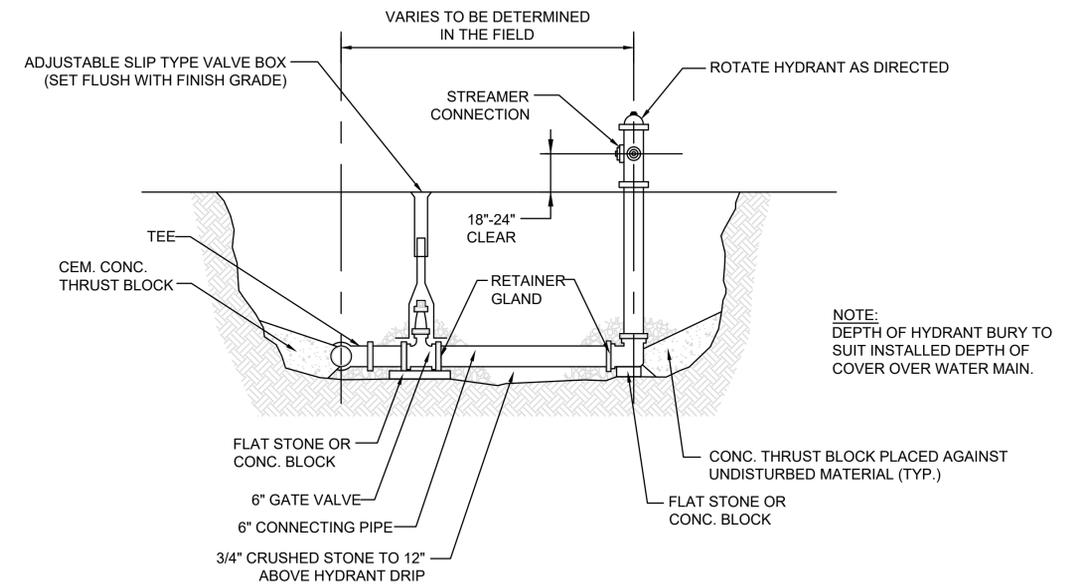
N.T.S.

TEE-PLAN

SIZE OF MAIN	TABLE OF BEARING AREAS (S.F.)		
	BENDS (90°)	BENDS (45° & UNDER)	TEES, CAPS OR PLUGS
15"	22	12	16
12"	12	6	9
<8"	6	3	4

NOTES:

- CONCRETE FOR THRUST BLOCKS SHALL HAVE MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI AT 28 DAYS, UNLESS REQUIRED OTHERWISE BY THE ENGINEER OR OWNER.
- THRUST BLOCK BEARING AREAS SHALL BE IN ACCORDANCE WITH TABLE, UNLESS REQUIRED OTHERWISE BY THE ENGINEER OR OWNER.
- THRUST BLOCK SIDES SHALL BE FORMED WITH PLYWOOD.



HYDRANT ASSEMBLY DETAIL

N.T.S.