

# MARGINAL SEWER RELIEF PIPE AND LRTA DRAINAGE IMPROVEMENTS

CONTRACT NO. 2-241 / IFB 16-89

LOWELL CITY MANAGER

KEVIN J. MURPHY

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LRWWU ENGINEERING MANAGER

MICHAEL STUER



MARGINAL SEWER RELIEF PIPE  
PROJECT AREA

LRTA DRAINAGE IMPROVEMENTS  
PROJECT AREA

NOT TO SCALE

LOCATION PLAN

LIST OF DRAWINGS

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APRIL 2016



MANCHESTER, NEW HAMPSHIRE

**Water**

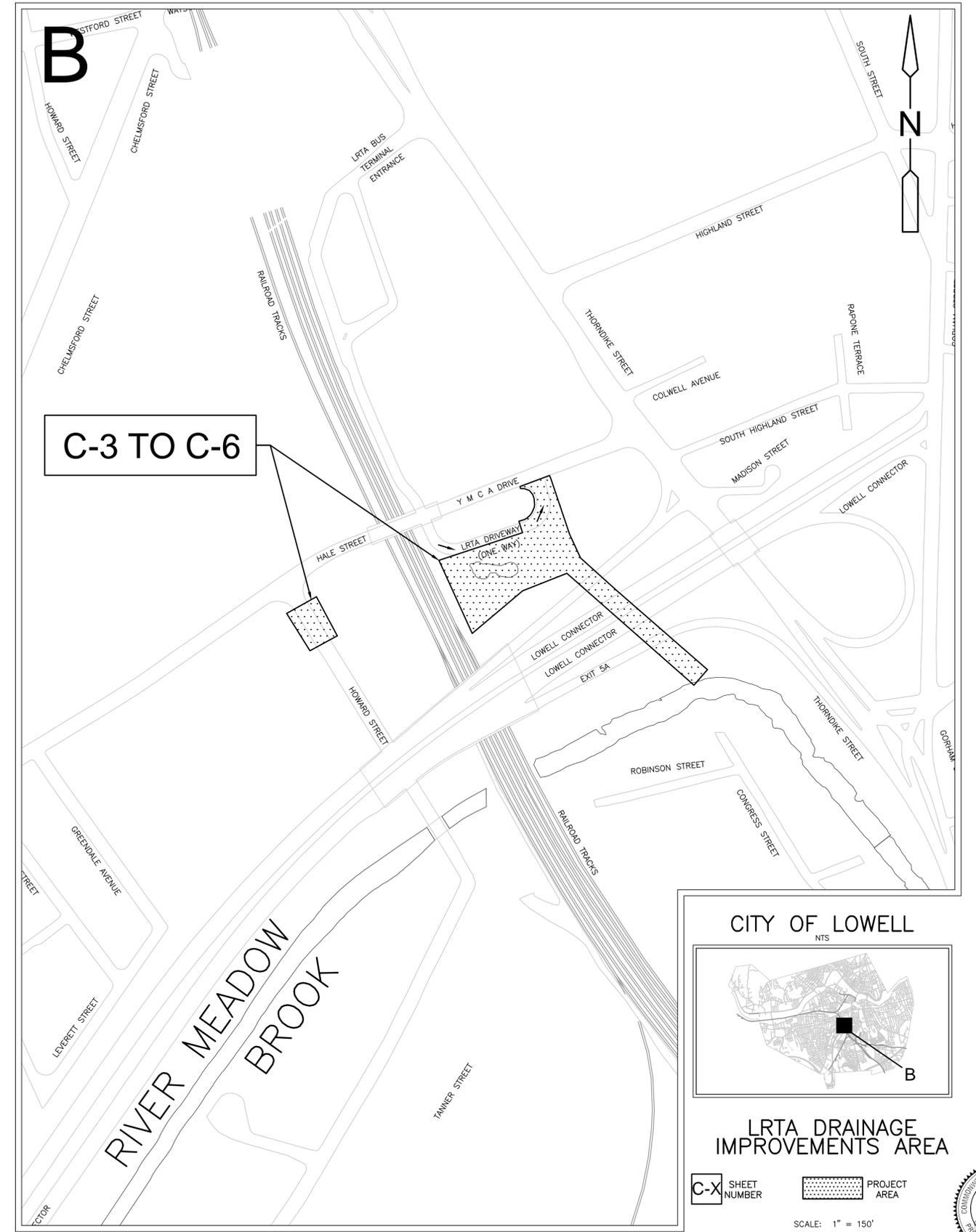
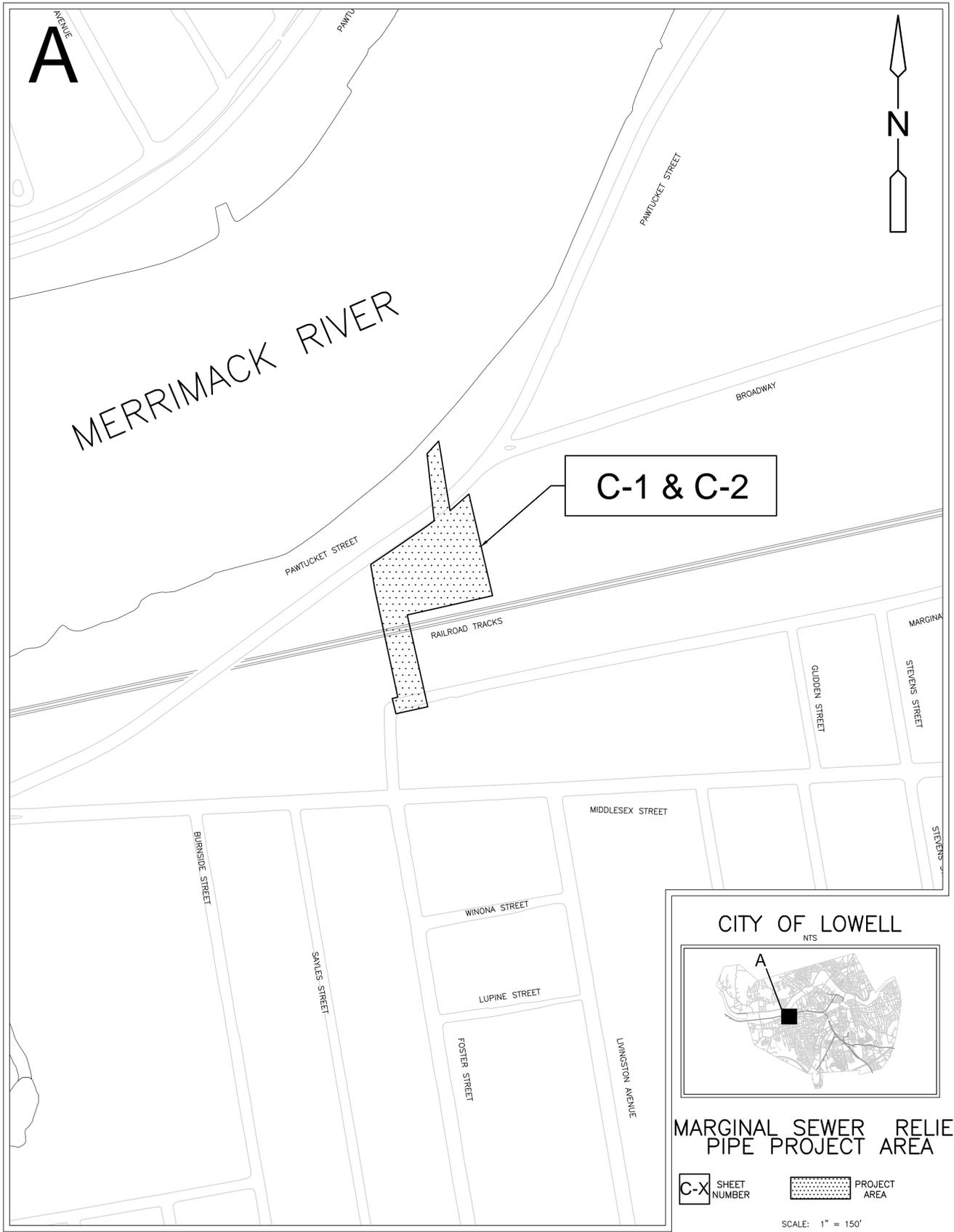
**Environment**

**Transportation**

**Energy**

**Facilities**

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REV. NO.	DATE	DRWN	CHKD	REMARKS

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 SHEET CHK'D BY: S. LAVOIE  
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 DATE: APRIL 2016

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LOWELL REGIONAL WASTEWATER UTILITY  
 LOWELL, MASSACHUSETTS  
 MARGINAL SEWER RELIEF PIPE  
 AND LRTA DRAINAGE IMPROVEMENTS

GENERAL PLAN  
 SHEET NO.  
**GP**

PROJECT NO. 0552-112344  
 FILE NAME: G001NFPL.DWG  
 SHEET NO.  
**GP**  
 0552-80898

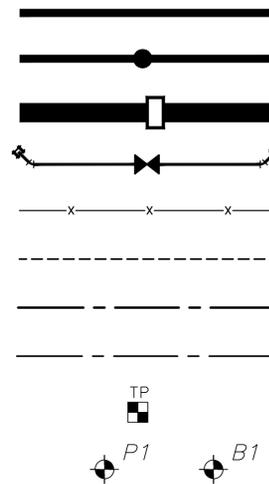


**GENERAL NOTES**

- PLAN AND TOPOGRAPHY FROM SURVEY PERFORMED BY TF MORAN OF BEDFORD, NH IN WINTER 2015 FOR MARGINAL RELIEF SEWER AND WSP GROUP OF NASHUA, NH IN FALL 2015 FOR LRTA DRAINAGE IMPROVEMENTS. TEMPORARY BENCHMARKS ARE LOCATED ON THE PLANS WITH DESCRIPTIONS AND ELEVATIONS.
- ELEVATIONS ON ALL PLAN AND PROFILE SHEETS REFER TO VERTICAL DATUM NAVD 1988 AND HORIZONTAL DATUM NAD 1983/92.
- NOTES PERTAINING TO NEW WORK SHOWN THUS: **NEW WORK**
- HAYBALES SHALL BE PLACED AROUND ALL CATCH BASINS SUBJECT TO RUNOFF FROM CONSTRUCTION AREAS.
- THE LOCATION, SIZE AND MATERIAL OF EXISTING PIPES, DUCTS, CONDUITS AND OTHER UNDERGROUND STRUCTURES AND THE LOCATION OF PROPERTY LINES SHOWN ON THESE PLANS ARE NOT WARRANTED TO BE EXACT, NOR IS IT WARRANTED THAT ALL ARE SHOWN. EXACT LOCATIONS SHALL BE DETERMINED BY THE CONTRACTOR.
- MANHOLE LOCATIONS ARE APPROXIMATE AND IN SOME CASES MAY BE ALTERED TO MINIMIZE PIPE CUTTING OR FOR OTHER APPROVED REASONS, AS DIRECTED BY OWNER AND ENGINEER.
- UNLESS OTHERWISE NOTED, PVC PIPE SHALL BE SDR 35, DI PIPE SHALL BE CLASS 52 AND RC PIPE SHALL BE CLASS IV.
- WHEN IT IS IMPOSSIBLE TO ACHIEVE HORIZONTAL (10-FT) OR VERTICAL (18-IN) SEPARATION BETWEEN PIPES, THE SEWER SHALL BE CONSTRUCTED OF MECHANICAL JOINT CEMENT-LINED DUCTILE IRON PIPE OR ANOTHER EQUIVALENT THAT IS WATERTIGHT AND STRUCTURALLY SOUND. THE NEW SEWER SHALL BE REPLACED FOR A MINIMUM OF 10-FT ON EITHER SIDE OF CROSSING UNLESS OTHERWISE DIRECTED BY THE ENGINEER. PIPES SHOULD BE TESTED ACCORDING TO THE RESPECTED SPECIFICATION SECTION (WATER MAIN 02611, SEWER 02610).
- GAS MAINS AND TELEPHONE LINES ARE ASSUMED TO HAVE THREE FEET OF COVER UNLESS SHOWN OTHERWISE. WATER MAINS ARE ASSUMED TO HAVE FIVE FEET OF COVER UNLESS SHOWN OTHERWISE. IT IS NOT WARRANTED THAT ALL UTILITIES ARE SHOWN.
- ABANDONED PIPES SHALL BE FILLED WITH CONTROLLED DENSITY FILL OR SAND AS DIRECTED BY THE ENGINEER. ABANDONED PIPE CONNECTIONS AT MANHOLES SHALL BE SEALED FROM WITHIN THE MANHOLE WITH A 12-IN. MASONRY PLUG CONSISTING OF BRICK, MORTAR AND NON-SHRINK GROUT.
- UNLESS OTHERWISE NOTED, MANHOLES FOR NEW SEWER AND DRAIN PIPES SHALL BE 4-FOOT DIAMETER MANHOLES AS SPECIFIED.
- GAS LINE RELOCATION WORK WILL BE COORDINATED WITH ENGINEER AND CONTRACTOR, AND WILL BE DONE BY NATIONAL GRID AT THEIR EXPENSE.
- INITIAL TRENCH-WIDTH PAVEMENT SHALL BE INSTALLED AT THE END OF EACH WORK WEEK, UNLESS OTHERWISE DIRECTED BY THE OWNER.
- SUBSURFACE INVESTIGATIONS (BORINGS) FOR MARGINAL SEWER RELIEF PIPE AREA WERE CONDUCTED BY NEW ENGLAND BORING CONTRACTORS OF DERRY, NH IN WINTER 2015. BORING LOGS ARE APPENDED TO THE SPECIFICATIONS.
- COORDINATE THE ADJUSTMENT OF ALL EXISTING UTILITIES WITH EACH RESPONSIBLE OWNER PRIOR TO RECONSTRUCTION AND/OR PAVING OPERATIONS. ALL STRUCTURES SHALL BE RAISED TO FINISH GRADES PRIOR TO THE END OF THE OF THE CONSTRUCTION SEASON AND PRIOR TO FINISHING PAVING, AS DIRECTED BY THE ENGINEER.
- SAW CUT ALL DRIVEWAYS, WALKWAYS AND SIDEWALKS AT EDGE OF RIGHT-OF-WAY OR AS DIRECTED BY THE ENGINEER TO TRANSITION EXISTING DRIVEWAY TO FINISH GRADE OF PROPOSED BITUMINOUS CONCRETE ROADWAY OR SIDEWALK.
- MAINTAIN THE AVAILABILITY OF SEWER SERVICE DURING THE CONSTRUCTION OF THIS PROJECT, PLUGGING AND BYPASS PUMPING OF EXISTING MANHOLES WILL BE REQUIRED. DESCRIBE METHODS OF MAINTAINING FLOWS PRIOR TO THE START OF CONSTRUCTION. SEE SPECIFICATIONS SECTIONS 01510 AND 02658.
- PROVIDE AND UPDATE A CONSTRUCTION SCHEDULE AS SPECIFIED IN ARTICLE 2.07 AND 6.04 OF THE GENERAL CONDITIONS.
- SUBMIT TO THE ENGINEER A TRAFFIC PLAN AS SPECIFIED IN SECTION 01570 OF THE SPECIFICATIONS. COORDINATE WITH TRAFFIC PLAN FOR LRTA AS NECESSARY.
- COORDINATE ACTIVITIES WITH LOWELL WATER DEPARTMENT FOR WATER MAIN REPLACEMENT, RELOCATION, LINE STOP AND VALVE INSTALLATION. LOCATIONS OF WATER MAIN WORK ARE IDENTIFIED ON THE DRAWINGS.
- NOT ALL TEST PIT LOCATIONS ARE SHOWN ON THE PLANS. EXCAVATE TEST PITS IN LOCATIONS AS DIRECTED BY THE ENGINEER. TEST PITS SHALL BE DUG TO ADJUST PIPING AS REQUIRED BY THE ENGINEER.
- COORDINATE THE PROTECTION/RELOCATION OF UTILITY POLES WITH NATIONAL GRID.
- UNDERGROUND SERVICES TO HOUSES ARE NOT SHOWN. CONTRACTOR SHALL IDENTIFY LOCATION OF UTILITIES AS NEEDED.
- LIMITS OF CLEARING AND GRUBBING ARE LIMITS OF TEMPORARY CONSTRUCTION UNLESS INDICATED OTHERWISE. MINIMIZE CLEARING AND GRUBBING AS MUCH AS POSSIBLE. ALL CROSS COUNTRY AREAS SHALL BE LOAMED AND SEEDED TO THE LIMITS DISTURBED BY CONSTRUCTION UNLESS OTHERWISE NOTED.
- SIDEWALK AND RAMP RESTORATION TO INCLUDE REPLACEMENT BACK TO EXISTING CONDITIONS PRIOR TO CONSTRUCTION WITH RESPECT TO WIDTH AND MATERIALS. ALL SIDEWALK RESTORATION SHALL BE CONSTRUCTED TO THE SPECIFICATIONS SET FORTH IN THE COMMONWEALTH OF MASSACHUSETTS, EXECUTIVE OFFICE OF PUBLIC SAFETY, ARCHITECTURAL ACCESS BOARD, "RULES AND REGULATIONS" WHICH APPEAR IN THE CODE OF MASSACHUSETTS REGULATIONS AT 521 CMR 1.00 ET SEQ.
- RECONSTRUCTION OF EXISTING INVERTS IN SEWER MANHOLES WILL BE REQUIRED DUE TO PROPOSED MODIFICATIONS. THE COST FOR THIS WORK WILL BE PAID FOR UNDER SECTION 02658 CONNECTIONS TO AND WORK ON EXISTING SYSTEMS.
- ALL PIPE SECTIONS SHOWING LENGTHS IN LINEAR FEET ARE TWO-DIMENSIONAL MEASUREMENTS TAKEN FROM CENTER TO CENTER OF EACH ADJOINING MANHOLE. INVERTS ON DRAWINGS WILL GOVERN.
- INSTALL CONTROLLED DENSITY FILL AT LOCATIONS WHERE NEW PIPES CROSS UNDER EXISTING UTILITIES AS DIRECTED BY THE ENGINEER.
- PROTECT EXISTING UTILITIES AND STRUCTURES AND REPLACE DAMAGED UTILITIES AT NO COST TO THE OWNER.
- PERFORM OVER-EXCAVATION AS DIRECTED BY THE ENGINEER IN THE FIELD. COMPENSATION WILL BE IN ACCORDANCE WITH THE OVER-EXCAVATION BID ITEM SPECIFIED IN THE BID FORM (SECTION 00300).
- THIS CONTRACT REQUIRES WORKING IN LIVE SEWER MANHOLES AND SHALL FOLLOW ALL FEDERAL, STATE AND LOCAL REQUIREMENTS FOR SAFETY WHEN IN CONFINED SPACES. ALSO REFER TO RECOMMENDATIONS IN THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH PUBLICATION NO. 80-106, "WORKING IN CONFINED SPACES".
- DIG SAFE NOTIFICATION PHONE NUMBER 888-344-7233.
- COORDINATE REQUIRED SUBMITTALS AND ALL RELATED WORK ON OR NEAR RAILROAD WITH PAN AM RAILWAYS PRIOR TO THE COMMENCEMENT OF PROJECT
- COORDINATE WITH PAN AM RAILWAYS FOR FLAGGING SUPPORT AND INSPECTION SERVICES PRIOR TO THE COMMENCEMENT OF MARGINAL SEWER RELIEF PIPE PROJECT.
- COORDINATE REQUIRED SUBMITTALS AND ALL RELATED WORK ON OR NEAR MASSDOT PROPERTY AND DRAINAGE CULVERT FOR LRTA DRAINAGE IMPROVEMENTS PROJECT AREA PRIOR TO THE COMMENCEMENT OF THE PROJECT.
- COORDINATE REQUIRED PERMITTING SUBMITTALS WITH LOWELL CONSERVATION COMMISSION FOR PIPE CLEANING. SEE SPECIFICATION SECTIONS 01010 AND 02765.
- COORDINATE WITH LRTA FOR SITE ACCESS FOR WORK IN OR ADJACENT TO LRTA PROPERTY.

**LEGEND**

**NEW**



- NEW SEWER/DRAIN PIPE
- NEW SEWER/DRAIN MANHOLE
- LARGE DIAMETER DRAIN PIPE AND PRECAST CONCRETE STRUCTURE
- NEW WATER MAIN, FITTINGS AND GATE VALVE
- FENCING
- SILT FENCE AND HAYBALES
- PERMANENT EASEMENT
- TEMPORARY CONSTRUCTION EASEMENT
- TEST PIT
- PROBE AND BORING (NUMBER)

**EXISTING**

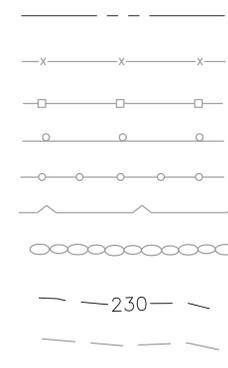


- EXISTING IRON PIPE
- EXISTING DRILL HOLE
- EXISTING STONE BOUND
- EXISTING MAIL BOX
- TRAFFIC SIGN
- CAUTION
- STOP SIGN
- STREET ID SIGN
- NO TRUCKS
- NO LEFT TURN
- BUSINESS IDENTIFICATION SIGN
- PRIVATE PROPERTY
- LEFT TURN ONLY
- SLOW CHILDREN PLAYING
- NO TRESPASSING
- DEAD END
- TENANTS ONLY
- NO PARKING
- LIMITED TIME PARKING
- HANDICAP PARKING
- BENCH MARK
- EXISTING GROUND LIGHT
- EXISTING LIGHT POLE
- EXISTING TELEPHONE POLE/OVERHEAD WIRES
- EXISTING ELECTRICAL HANDHOLE BOX
- EXISTING ELECTRICAL TRANSFORMER
- EXISTING HYDRANT
- EXISTING SANITARY MANHOLE
- EXISTING STORM WATER MANHOLE
- EXISTING TELEPHONE MANHOLE
- EXISTING ELECTRICAL MANHOLE/UNDERGROUND DUCT
- EXISTING WATER MANHOLE/UNDERGROUND DUCT
- EXISTING SERVICES (GAS, WATER, SEWER, DRAIN)
- EXISTING MISCELLANEOUS MANHOLE
- EXISTING POST
- EXISTING CATCH BASIN
- EXISTING WATER GATE VALVE
- POST INDICATOR VALVE
- IRRIGATION CONTROL VALVE
- EXISTING GAS GATE VALVE
- DECIDUOUS TREE
- CONIFEROUS TREE

**ABBREVIATIONS**

- S SANITARY SEWER
- D STORM DRAIN
- W WATER
- G GAS
- E UNDERGROUND ELECTRIC
- T UNDERGROUND TELEPHONE
- FM FORCE MAIN
- CATV UNDERGROUND CABLE TELEVISION
- OHW OVERHEAD WIRES
- AC ASBESTOS CEMENT
- AK AKRON (VITRIFIED CLAY)
- BM BENCH MARK
- CI CAST IRON
- DI DUCTILE IRON
- RCP REINFORCED CONCRETE PIPE
- PVC POLYVINYL CHLORIDE
- CL CEMENT LINED
- VCP VITRIFIED CLAY PIPE
- PL PLASTIC PIPE
- BS BARE STEEL (FOR GAS MAINS)
- CS COATED STEEL (FOR GAS MAINS)
- HP HIGH PRESSURE (FOR GAS MAINS)
- LP LOW PRESSURE (FOR GAS MAINS)
- INV. EL. INVERT ELEVATION IN/OUT
- ii INVERT ELEVATION IN
- Io INVERT ELEVATION OUT
- SMH SEWER MANHOLE
- MH MANHOLE
- DMH DRAIN MANHOLE
- GV GATE VALVE
- HDPE HIGH DENSITY POLYETHYLENE
- PE POLYETHYLENE
- MB MAIL BOX
- CB CATCH BASIN
- CMP CORRUGATED METAL PIPE
- TBM TEMPORARY BENCH MARK
- EX EXISTING
- VGC VERTICAL GRANITE CURBING
- BCC BITUMINOUS CONCRETE CURBING
- PVWK PAVED WALKWAY
- CCWK CONCRETE WALKWAY
- RTWL RETAINING WALL
- CLFC CHAIN LINK FENCE
- PVD PAVED
- CS CONCRETE STEPS
- WS WOOD STEPS
- BK BRICK
- PV PAVEMENT
- CC CONCRETE
- TGT TOP GAS TRAP
- DOM DOMESTIC WATER SERVICE
- FIRE FIRE SERVICE
- MTL METAL
- APPROX APPROXIMATE
- ø DIAMETER

**EXISTING**



- PROPERTY LINE (PER TAX MAP)
- PICKET OR METAL FENCE
- WOOD FENCE
- GUARD RAIL
- CHAIN LINK FENCE
- RETAINING WALL
- STONE WALL
- EXISTING CONTOUR (INDEX)
- EXISTING CONTOUR (INTERMEDIATE)

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 CROSS CHK'D BY: D. FREEMAN  
 APPROVED BY: J. DRAKE  
 DATE: APRIL 2016

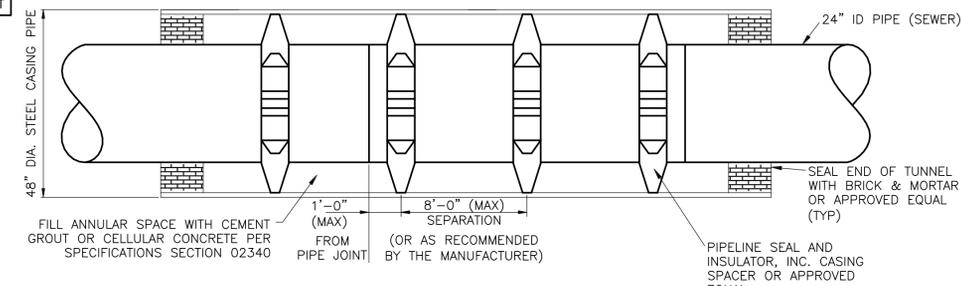
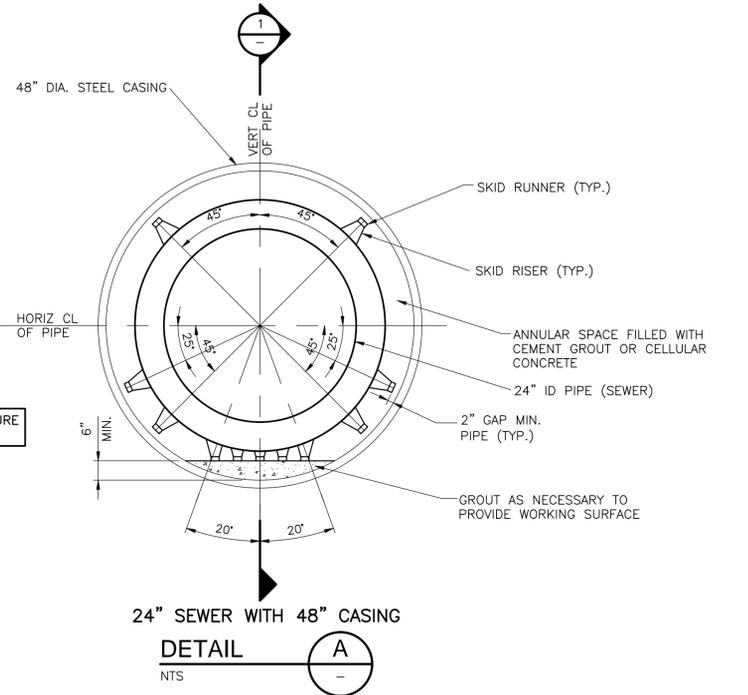
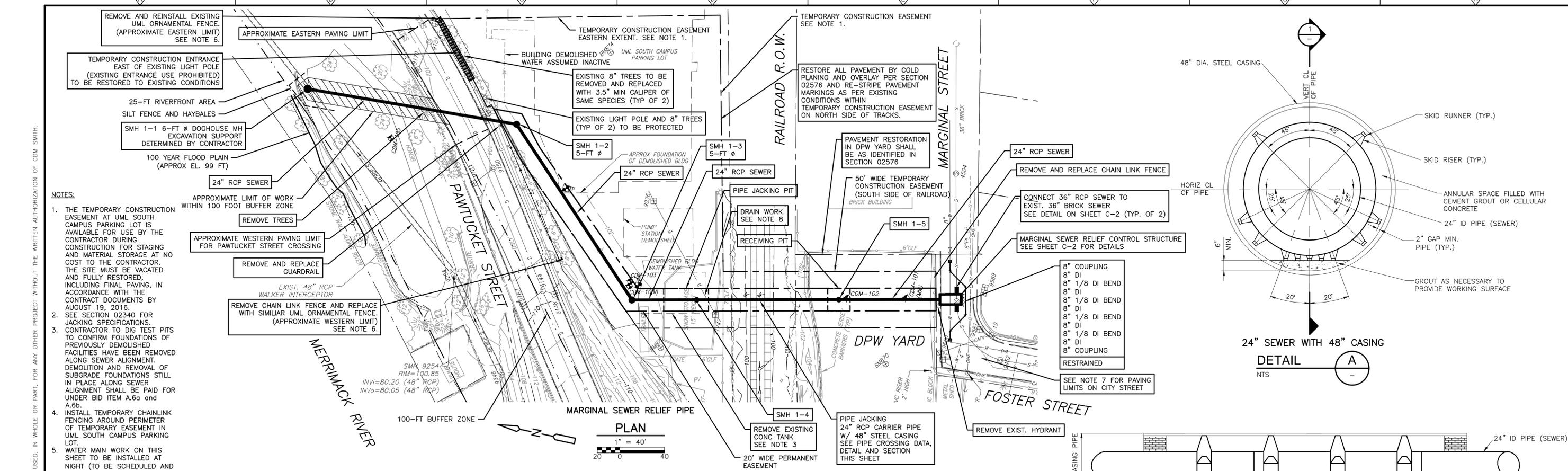


LOWELL REGIONAL WASTEWATER UTILITY  
 LOWELL, MASSACHUSETTS  
**MARGINAL SEWER RELIEF PIPE  
 AND LRTA DRAINAGE IMPROVEMENTS**

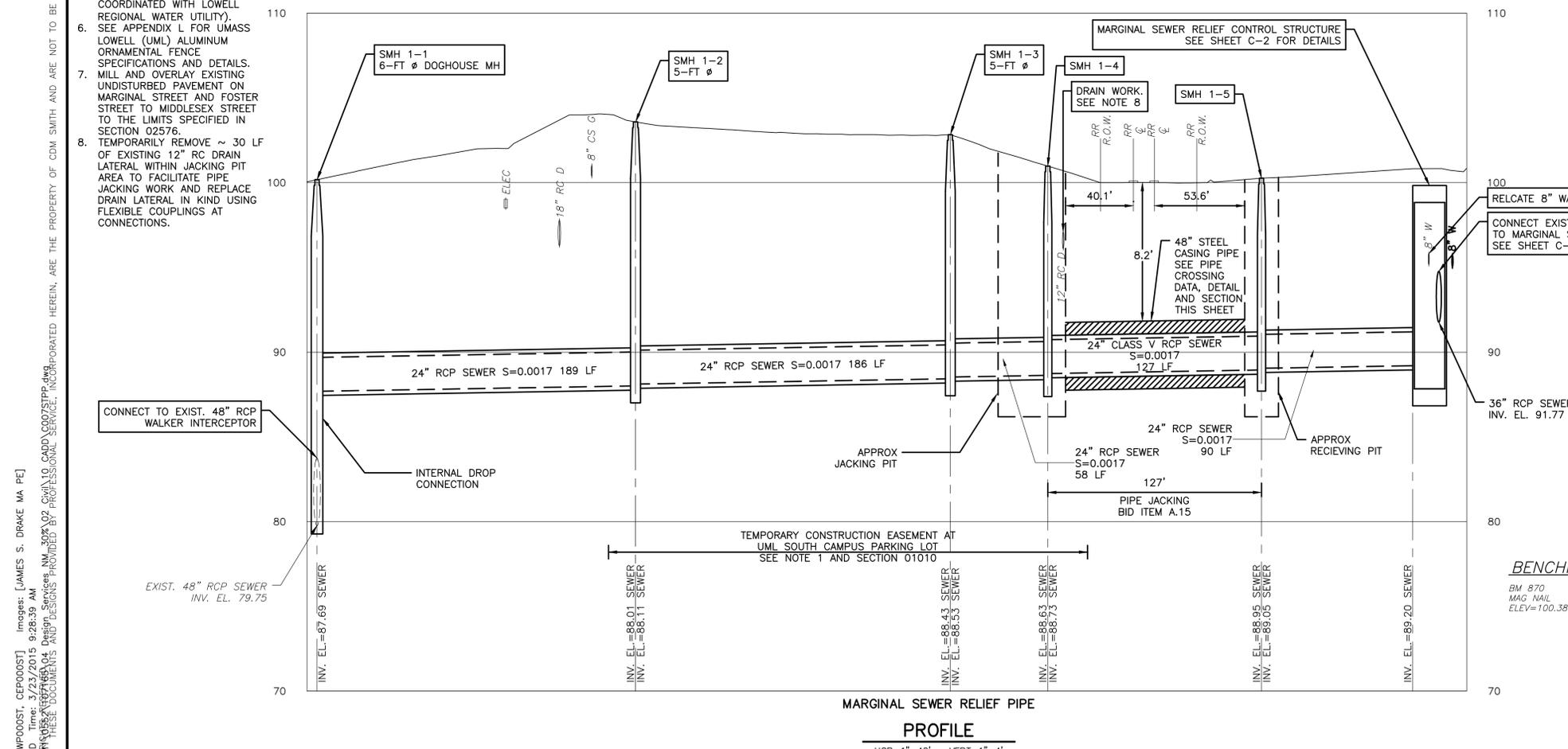
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 SHEET NO. **LGN**  
 0552-80899

PROJECT NO. 0552-112344  
 FILE NAME: G002NFLG.DWG  
 SHEET NO. **LGN**  
 0552-80899





- NOTES:**
1. THE TEMPORARY CONSTRUCTION EASEMENT AT UML SOUTH CAMPUS PARKING LOT IS AVAILABLE FOR USE BY THE CONTRACTOR DURING CONSTRUCTION FOR STAGING AND MATERIAL STORAGE AT NO COST TO THE CONTRACTOR. THE SITE MUST BE VACATED AND FULLY RESTORED, INCLUDING FINAL PAVING, IN ACCORDANCE WITH THE CONTRACT DOCUMENTS BY AUGUST 19, 2016.
  2. SEE SECTION 02340 FOR JACKING SPECIFICATIONS.
  3. CONTRACTOR TO DIG TEST PITS TO CONFIRM FOUNDATIONS OF PREVIOUSLY DEMOLISHED FACILITIES HAVE BEEN REMOVED ALONG SEWER ALIGNMENT. DEMOLITION AND REMOVAL OF SUBGRADE FOUNDATIONS STILL IN PLACE ALONG SEWER ALIGNMENT SHALL BE PAID FOR UNDER BID ITEM A.6a and A.6b.
  4. INSTALL TEMPORARY CHAINLINK FENCING AROUND PERIMETER OF TEMPORARY EASEMENT IN UML SOUTH CAMPUS PARKING LOT.
  5. WATER MAIN WORK ON THIS SHEET TO BE INSTALLED AT NIGHT (TO BE SCHEDULED AND COORDINATED WITH LOWELL REGIONAL WATER UTILITY).
  6. SEE APPENDIX L FOR UMSA LOWELL (UML) ALUMINUM ORNAMENTAL FENCE SPECIFICATIONS AND DETAILS. MILL AND OVERLAY EXISTING UNDISTURBED PAVEMENT ON MARGINAL STREET AND FOSTER STREET TO MIDDLESEX STREET TO THE LIMITS SPECIFIED IN SECTION 02576.
  7. TEMPORARILY REMOVE ~ 30 LF OF EXISTING 12" RC DRAIN LATERAL WITHIN JACKING PIT AREA TO FACILITATE PIPE JACKING WORK AND REPLACE DRAIN LATERAL IN KIND USING FLEXIBLE COUPLINGS AT CONNECTIONS.



PIPE CROSSING DATA		
	CARRIER PIPE	CASING PIPE
CONTENTS TO BE HANDLED	SEWERAGE	CARRIER PIPE/SEWERAGE
NORMAL OPERATING PRESSURE	NON-PRESSURE/GRAVITY	-
NORMAL SIZE OF PIPE	24"	48"
OUTSIDE DIAMETER	31.5"	48"
INSIDE DIAMETER	24"	46.621"
WALL THICKNESS	3.75"	0.688" (MIN.)
WEIGHT PER FOOT	366 LBS.	348 LBS.
MATERIAL	REINFORCED CONCRETE	STEEL
PROCESS OF MANUFACTURE	PRECAST	WELDED
SPECIFICATION	ASTM C76 AASHTO M170	ASTM A53
GRADE OR CLASS	CLASS V, WALL C	ASTM A53
TEST PRESSURE	3,750 LBS./FT.FT	35,000 PSI
TYPE OF JOINT	SINGLE-STEP	V-GROOVE/WELDED
TYPE OF COATING	NONE	NONE
DETAILS OF CATHODIC PROTECTION	NONE	NONE
DETAILS OF SEAL OR PROTECTION AT ENDS OF CASING	-	BRICK AND MORTAR
METHOD OF INSTALLATION	JACKING	JACKING
CHARACTER OF SUBSURFACE MATERIAL AT THE CROSSING LOCATION	-	SEE BORINGS
APPROXIMATE GROUND WATER LEVEL	SEE BORINGS	SEE BORINGS
SOURCE OF INFORMATION ON SUB-SURFACE CONDITIONS	BORINGS	BORINGS

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 LOWELL, MASSACHUSETTS  
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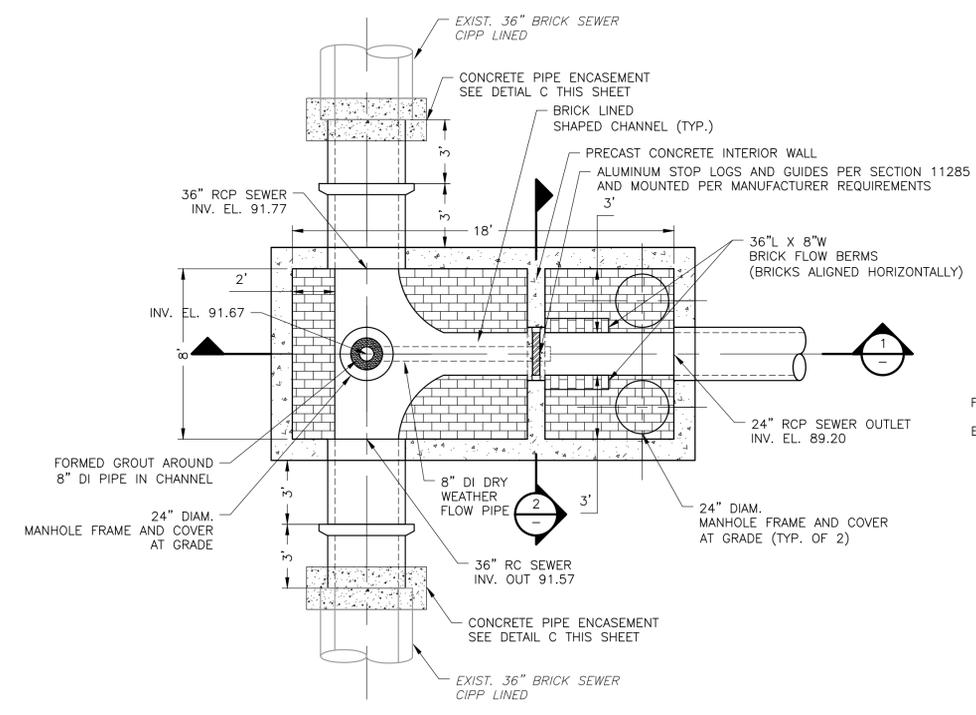
MARGINAL SEWER RELIEF PIPE AND DETAILS

PROJECT NO. 0552-112344  
 FILE NAME: C001STPP.DWG  
 SHEET NO. C-1  
 0552-80900

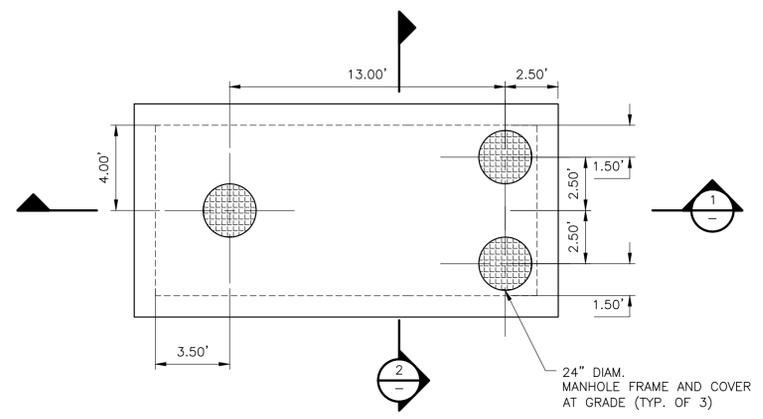
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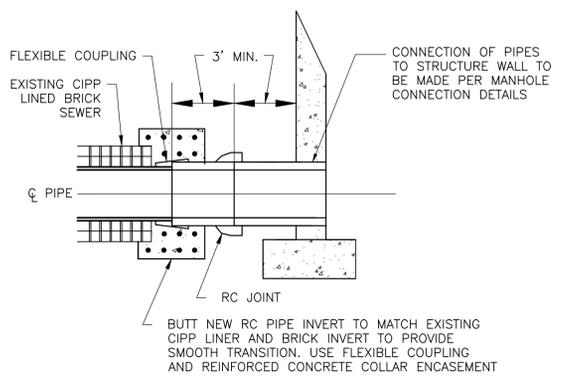
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PRECAST MARGINAL SEWER RELIEF PIPE CONTROL STRUCTURE BASE  
 DETAIL A  
 1"=4"

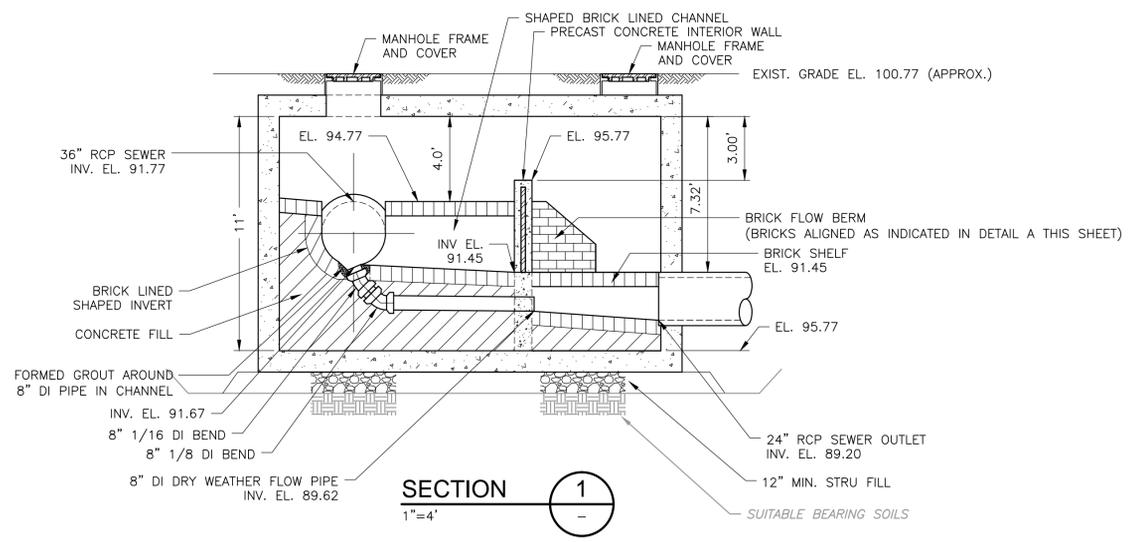


PRECAST MARGINAL SEWER RELIEF PIPE CONTROL STRUCTURE TOP SLAB  
 DETAIL B  
 1"=4"

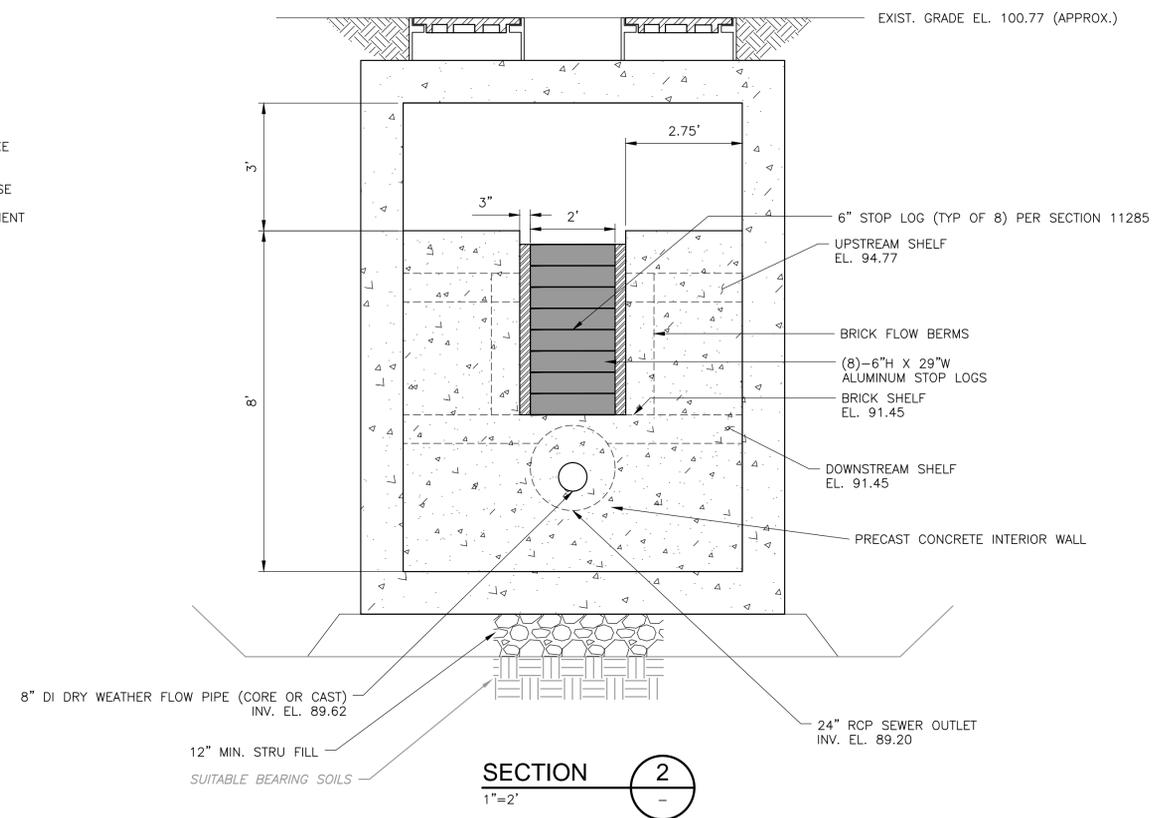


RELIEF STRUCTURE CONNECTION  
 DETAIL C  
 NTS

- NOTES:
1. REMOVE BRICK SEWER UNTIL STRUCTURALLY SOUND TO MAKE CONNECTION WITH CIPP LINER.
  2. CLEAR OBSTRUCTIONS FROM INSIDE WALL OF BRICK SEWER
  3. MATCH NEW PIPE INVERT WITH EXISTING CIPP LINER AND USE FLEXIBLE COUPLING TO JOIN TWO PIPES.
  4. ENCASE JOINT USING REINFORCED CONCRETE PIPE ENCASMENT DETAIL ON SHEET D-1.



SECTION 1  
 1"=4"



SECTION 2  
 1"=2"

- NOTE:
1. INTERIOR ELEVATIONS ARE ASSUMED FROM SURVEY AND RECORD INFORMATION. CONTRACTOR SHALL CONFIRM ACTUAL ELEVATIONS AND DIMENSIONS.
  2. BORING LOGS, BORING TEST DATA AND MONITORING WELL INFORMATION FOR THE MARGINAL SEWER RELIEF PIPE ARE INCLUDED IN APPENDICES A AND B.
  3. DIMENSIONS OF ROOF, WALL, AND FLOOR SLABS ARE APPROXIMATE. CONTRACTOR SHALL MEET THE REQUIREMENTS OF SPECIFICATION SECTION 02650 FOR THE DESIGN OF THE STRUCTURE.
  4. PRECAST INTERIOR WALL TO BE DESIGNED TO WITHSTAND WATER OVERTOPPING WALL UP TO THE ROOF SLAB HEIGHT.

REV. NO.	DATE	DRWN	CHKD	REMARKS

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 DRAWN BY: JTO/SDL  
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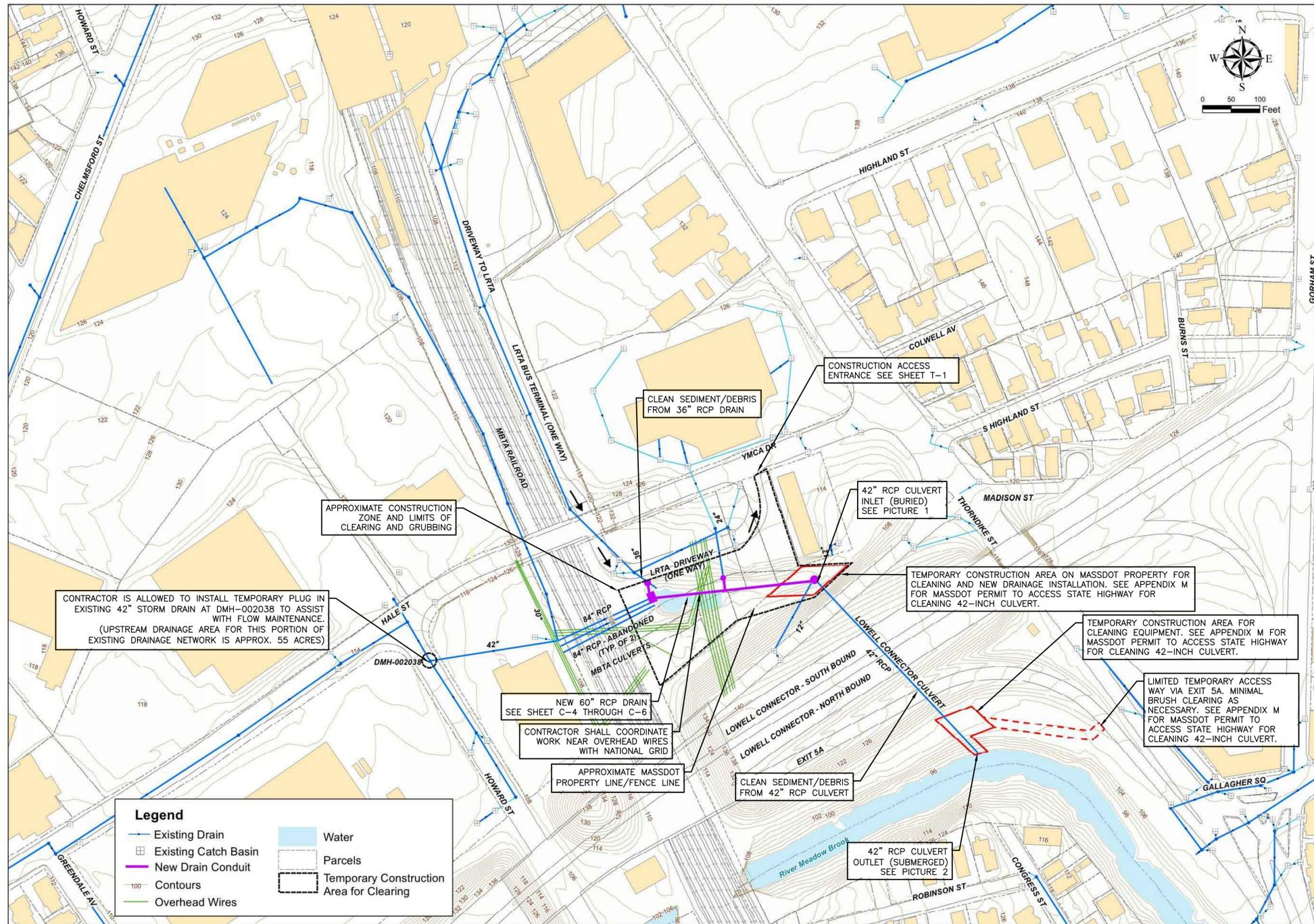


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 LOWELL, MASSACHUSETTS  
 MARGINAL SEWER RELIEF PIPE  
 AND LRTA DRAINAGE IMPROVEMENTS

MARGINAL SEWER RELIEF PIPE  
 CONTROL STRUCTURE DETAILS  
 SHEET NO. C-2

PROJECT NO. 0552-112344  
 FILE NAME: C002STDT.DWG  
 SHEET NO. C-2  
 0552-80901





LRTA DRAINAGE IMPROVEMENTS SITE OVERVIEW  
**PLAN**

- NOTES:**
1. THE INTENT OF THIS SHEET IS TO SHOW AN OVERVIEW OF THE WORK AREAS FOR THE DRAINAGE IMPROVEMENTS, CULVERT PIPE CLEANING AND GENERAL ACCESS TO THE SITE. THIS SHEET IS BASED ON CITY OF LOWELL GIS INFORMATION AND NOT ALL FEATURES ARE SHOWN. REFER TO SHEETS C-4 THROUGH C-7 FOR AVAILABLE SURVEY AND SPECIFIC DESIGN INFORMATION.
  2. THE CONSTRUCTION ZONE IS AN APPROXIMATE DEMARCATION LINE BASED ON GIS.
  3. THE CONTRACTOR SHALL OBTAIN A CONSERVATION COMMISSION PERMIT TO ADDRESS WETLAND IMPACTS OF CLEANING OPERATIONS AT THE OUTFALL END OF THE 42-INCH CULVERT INTO RIVER MEADOW BROOK. THE CONTRACTOR SHALL SUBMIT THE DRAFT OF NOTICE OF INTENT TO THE OWNER AND ENGINEER FOR REVIEW AND COMMENT. SEE THE SPECIFICATION SECTION 01250, BID ITEM B.18 FOR A COMPLETE DESCRIPTION OF THE WORK BY THE CONTRACTOR ASSOCIATED WITH THE PERMIT.
  4. THE CONTRACTOR SHALL COORDINATE THE WORK AND COMPLETE THE WORK ON MASSDOT PROPERTY IN ACCORDANCE WITH APPENDIX M - MASSDOT PERMIT TO ACCESS STATE HIGHWAY.



42" RCP CULVERT INLET  
**PICTURE 1**



42" RCP CULVERT OUTLET  
**PICTURE 1**

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REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: S. LAVOIE  
 DRAWN BY: S. CAREY  
 SHEET CHK'D BY: S. LAVOIE  
 CROSS CHK'D BY: D. FREEMAN  
 APPROVED BY: J. DRAKE  
 DATE: APRIL 2016

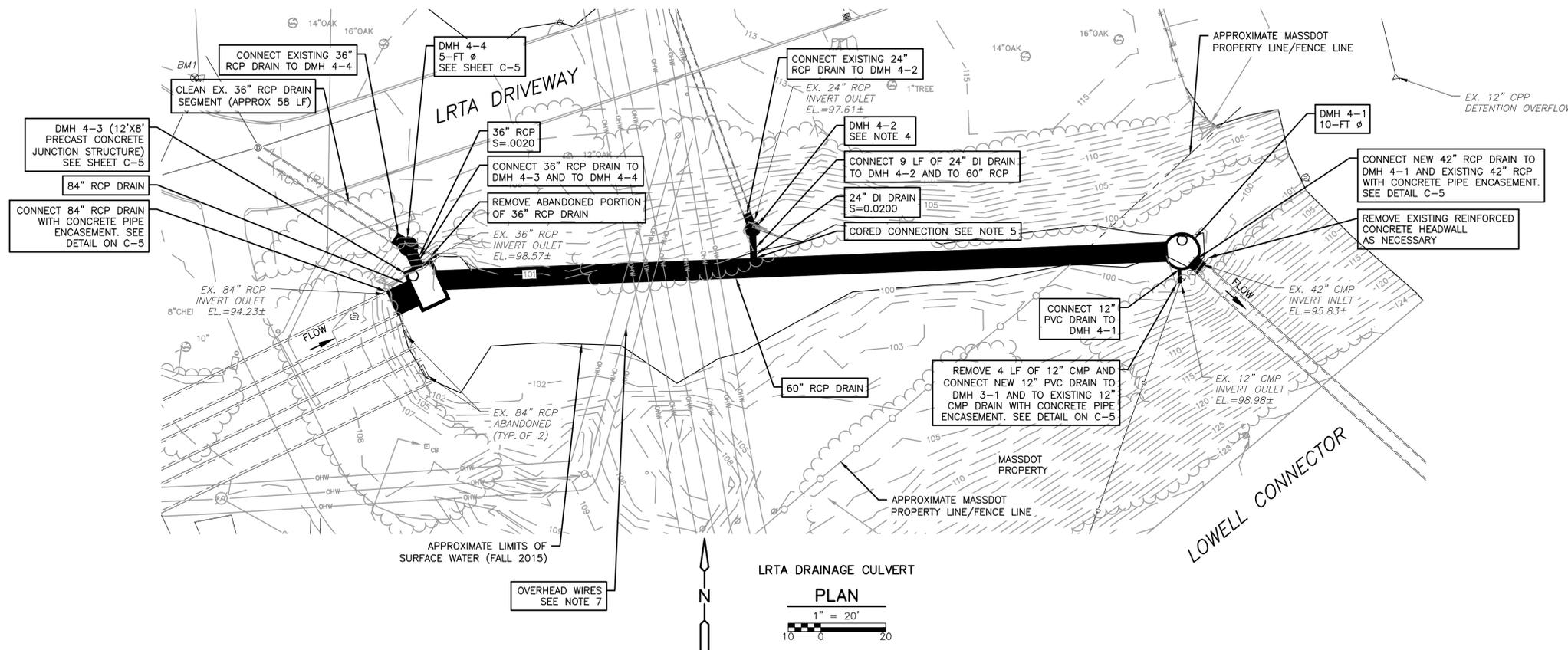
670 N. Commercial St  
 Manchester, NH 03101  
 Tel: (603) 222-8300

LOWELL REGIONAL WASTEWATER UTILITY  
 LOWELL, MASSACHUSETTS  
**MARGINAL SEWER RELIEF PIPE  
 AND LRTA DRAINAGE IMPROVEMENTS**

**LRTA DRAINAGE IMPROVEMENTS SITE  
 PLAN OVERVIEW AND PIPE CLEANING PLAN**

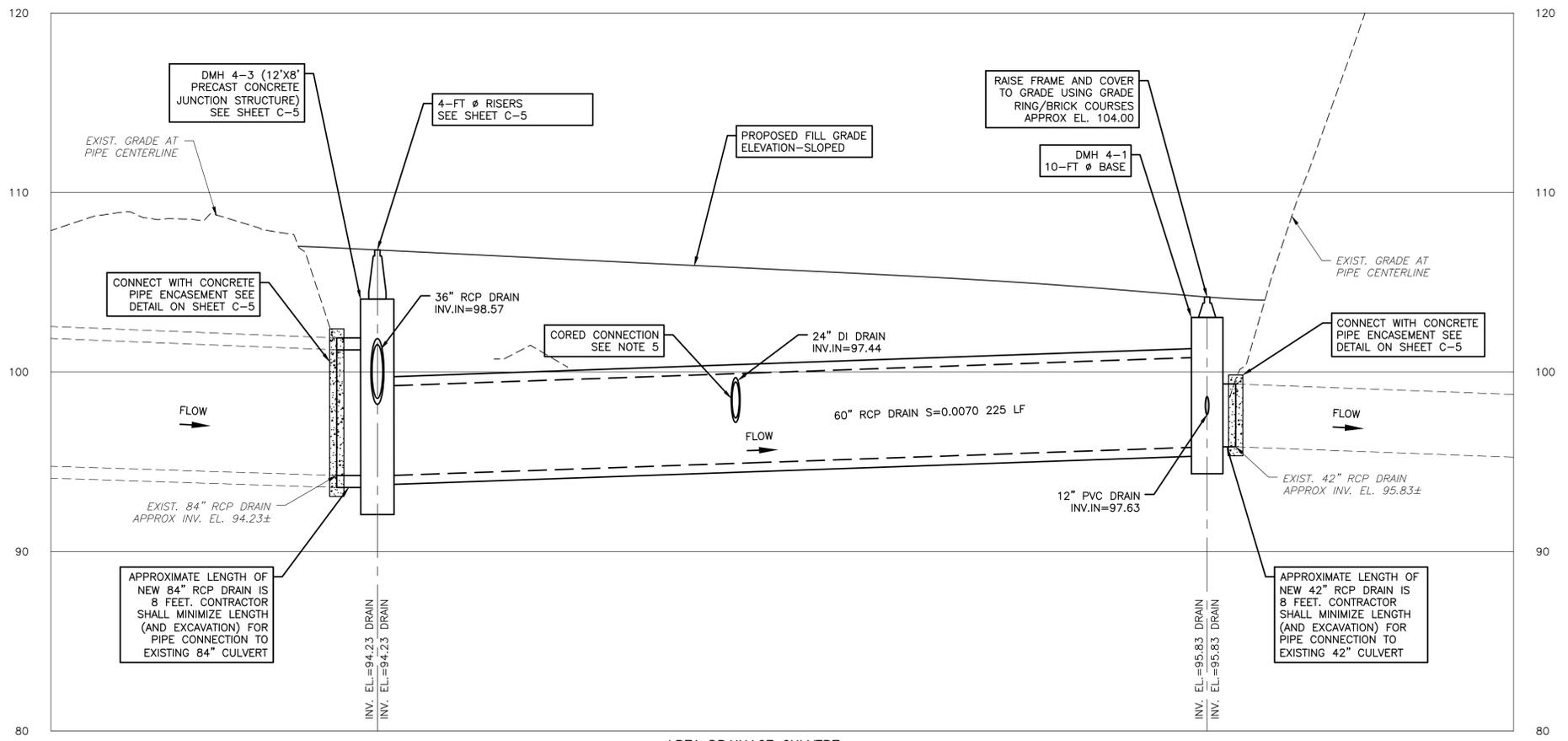
PROJECT NO. 0552-112344  
 FILE NAME: C003STPL.DWG  
 SHEET NO. **C-3**  
 0552-80902





LRTA DRAINAGE CULVERT  
PLAN  
1" = 20'  
10 0 20

- BENCHMARKS**  
BM 1  
X-CUT IN BOLT AT LP BASE  
ELEV=109.49
- NOTES:**
- EXISTING DRAINAGE OUTFALL/INLET INVERTS WERE SUBMERGED OR BURIED AT TIME OF SURVEY. ELEVATIONS AND RELATED PIPE INFORMATION IS APPROXIMATE. CONTRACTOR SHALL VERIFY ACTUAL INVERTS AND CONDITIONS TO COMPLETE WORK.
  - FOR LRTA DRAINAGE IMPROVEMENTS, MANHOLE FRAME AND COVERS SHALL BE BOLTED.
  - BACKFILL PIPES AND STRUCTURE BASES AS SHOWN IN GRADING PLAN. SEE SHEET C-5
  - VERTICAL FOOTAGE OF STRUCTURES ARE AS FOLLOWS:  
4.1 DMH 4-1 SHOWN IN PROFILE ON THIS SHEET.  
4.2 DMH 4-2 SHALL BE APPROXIMATELY 14 VF WITH A FINAL GRADE ELEVATION OF 107 FEET.  
4.3 DMH 4-3 AND DMH 4-4 SEE SHEET C-5
  - CORED CONNECTION OPENING FOR 24" DI PIPE INTO 60" RCP PIPE SHALL BE AT LEAST 2 FEET FROM 60" RCP JOINTS.
  - EXCESS FILL MATERIAL AND UNSUITABLE SOILS TO BE STOCKPILED ON SITE AS DIRECTED BY OWNER.
  - CONTRACTOR TO NOTE LOWER SET OF WIRES ON SITE AND COORDINATE WITH NATIONAL GRID AS NECESSARY. LOWEST LINE APPROXIMATELY 30 FEET ABOVE GROUND SURFACE OF DRIVEWAY.
  - CONTRACTOR SHALL CONDUCT TEST PITS TO LOCATE AND VERIFY THE EXISTING PIPE CONNECTIONS.



LRTA DRAINAGE CULVERT  
PROFILE  
HOR. 1"=20' - VERT. 1"=4'

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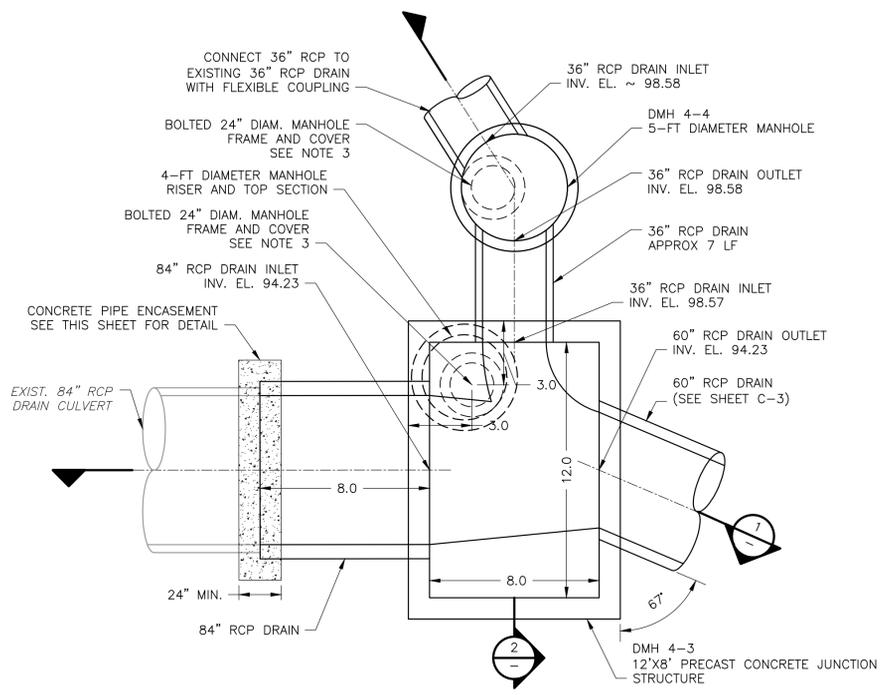
DESIGNED BY: S. LAVOIE  
 DRAWN BY: SLC/SDL  
 SHEET CHK'D BY: S. LAVOIE  
 CROSS CHK'D BY: D. FREEMAN  
 APPROVED BY: J. DRAKE  
 DATE: APRIL 2016



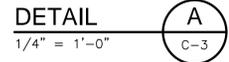
LOWELL REGIONAL WASTEWATER UTILITY  
 LOWELL, MASSACHUSETTS  
 MARGINAL SEWER RELIEF PIPE  
 AND LRTA DRAINAGE IMPROVEMENTS

PROJECT NO. 0552-112344  
 FILE NAME: C004STPP.DWG  
 SHEET NO. C-4  
 0552-80903

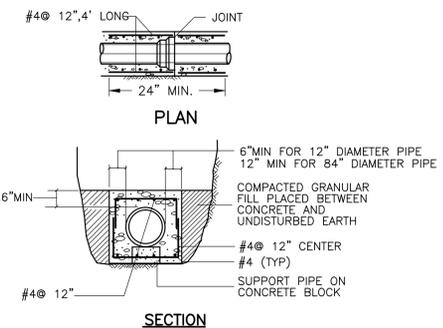




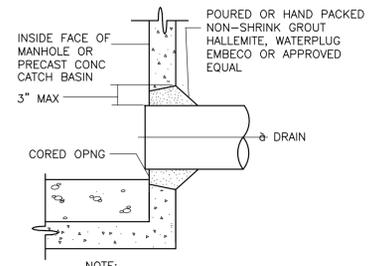
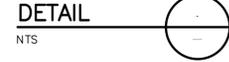
DMH 4-3 (PRECAST CONCRETE JUNCTION STRUCTURE) AND DMH 4-4



- NOTE:
- THICKNESS DIMENSIONS OF CONCRETE ROOF, WALL, AND FLOOR SLABS ARE APPROXIMATE. INTERIOR DIMENSIONS OF THE PRECAST CONCRETE STRUCTURE ARE APPROXIMATE BASED ON ASSUMPTIONS FOR ADEQUATE SPACING FROM PIPE PENETRATIONS. CONTRACTOR SHALL MEET THE REQUIREMENTS OF SPECIFICATION SECTION 02650 FOR THE DESIGN OF THE STRUCTURE AND CONNECTION DETAILS.
  - SEE "MH PIPE CONNECTIONS FOR SEWER AND DRAIN MH" DETAIL SHOWN ON SHEET D-2.
  - SEE SHEET C-4 AND C-6 FOR BACKFILL ELEVATIONS AND GRADING PLAN. APPROXIMATE RIM ELEVATIONS SHOWN IN SECTIONS 1 AND 2 ON THIS SHEET.
  - THE WORK IN THIS DETAIL, EXCLUDING THE 60-INCH DRAIN PIPE INSTALLATION AT THE EXTERIOR WALL, IS INCLUDED IN BID ITEM B.21.

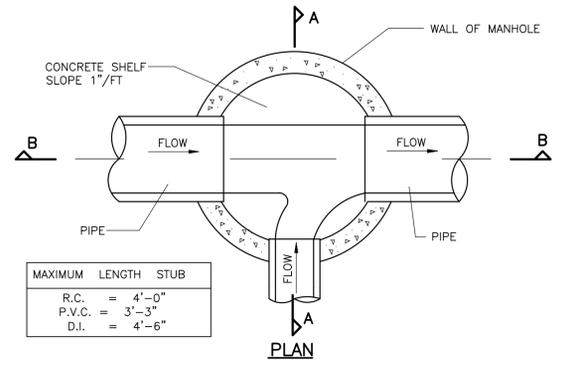


CONCRETE PIPE ENCASEMENT

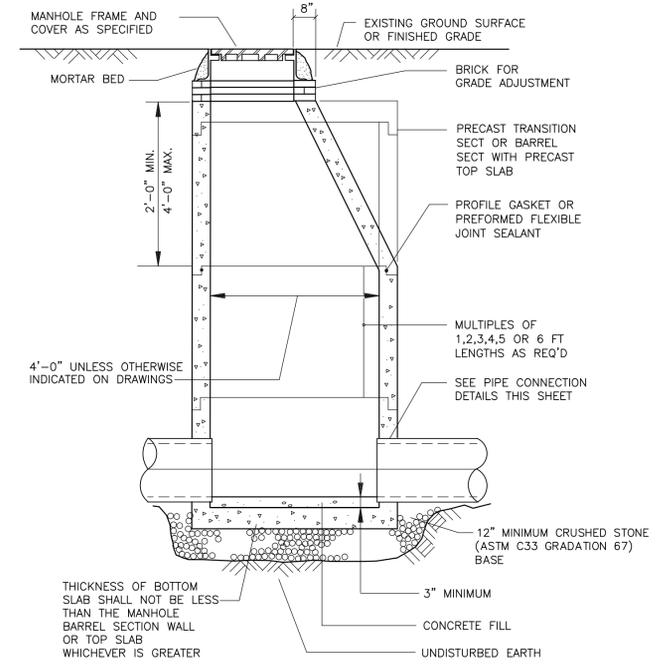


NOTE:  
THE CONTRACTOR MAY USE RES-SEAL OR KOR-N-SEAL AT HIS OPTION

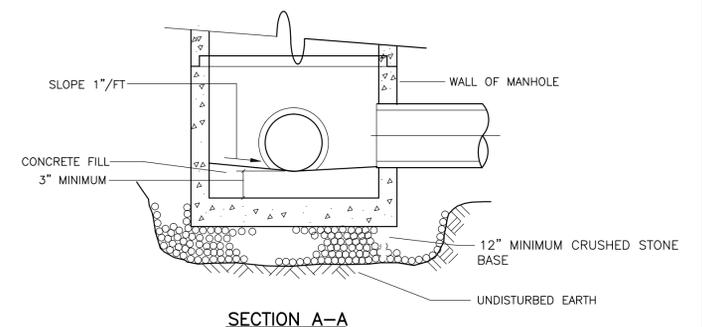
**MH PIPE CONNECTION FOR EXISTING DRAIN MH AND CATCH BASIN**



MAXIMUM LENGTH STUB	
R.C. =	4'-0"
P.V.C. =	3'-3"
D.I. =	4'-6"



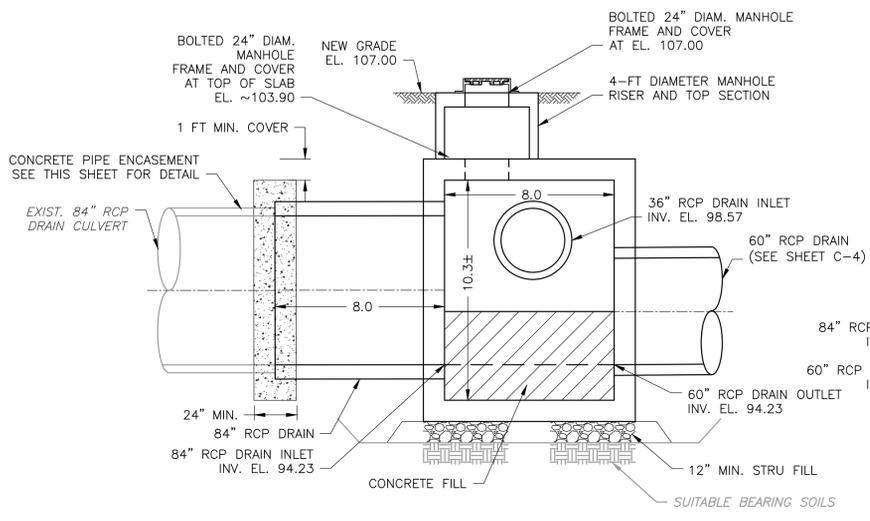
SECTION B-B



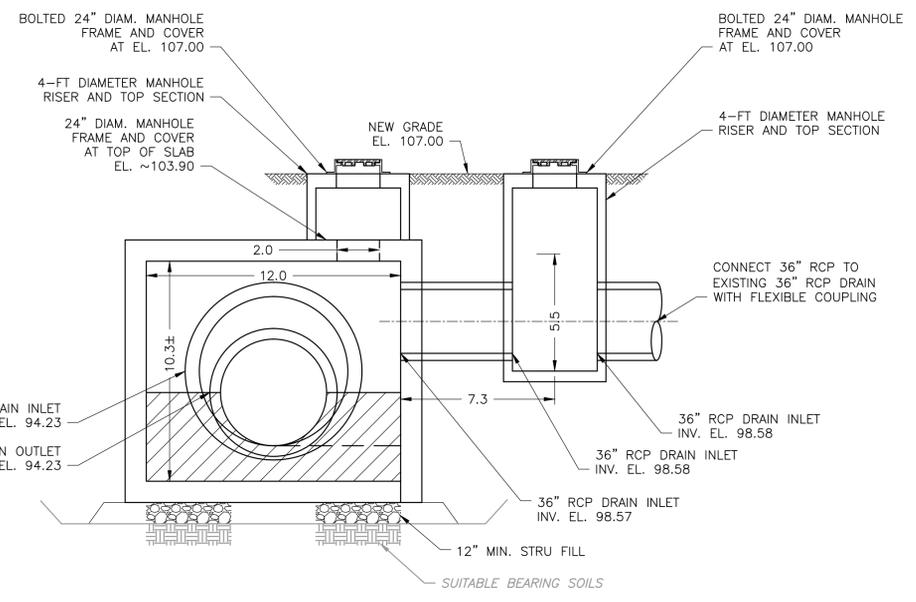
SECTION A-A

**PRECAST DRAIN MANHOLE DETAIL**

NTS



SECTION 1  
1"=4'



SECTION 2  
1"=4'

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DESIGNED BY: S. LAVOIE  
 DRAWN BY: SDL/SLC  
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 CROSS CHK'D BY: D. FREEMAN  
 APPROVED BY: J. DRAKE  
 DATE: APRIL 2016

**CDM Smith**  
 670 N. Commercial St  
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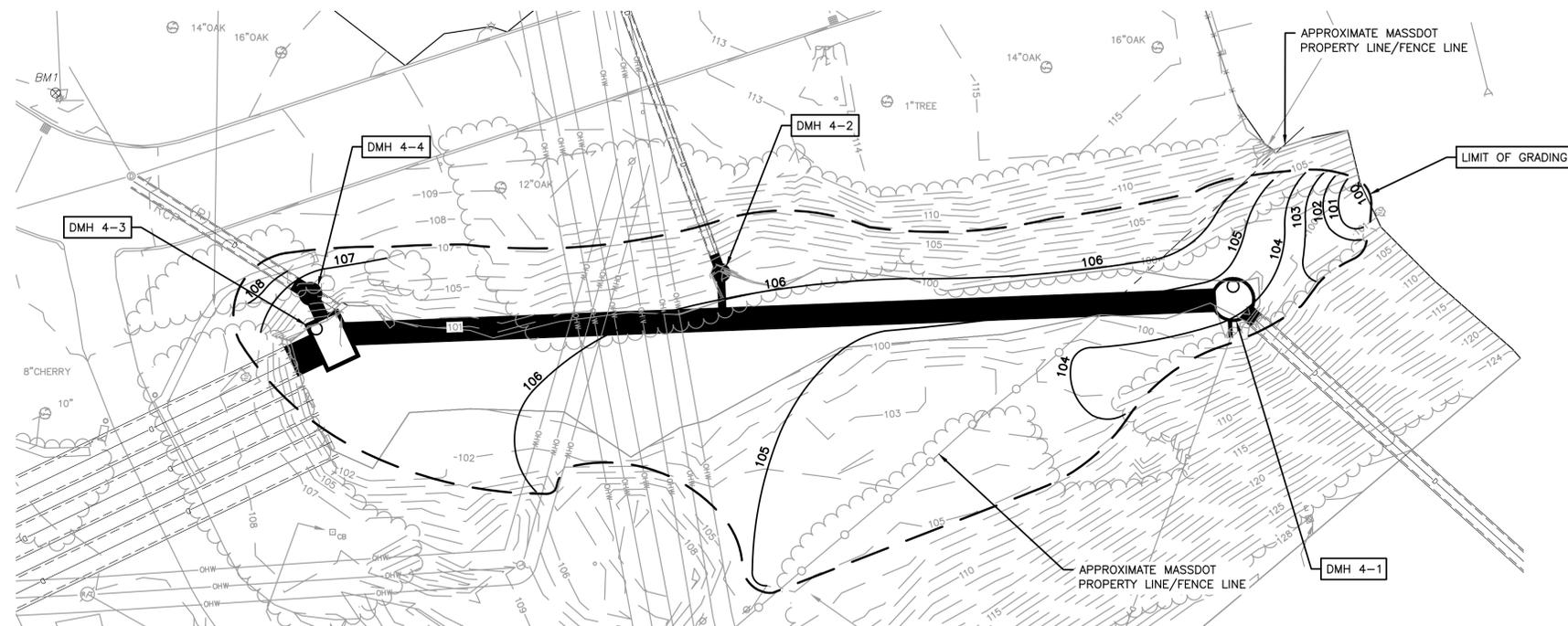
LOWELL REGIONAL WASTEWATER UTILITY  
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 MARGINAL SEWER RELIEF PIPE  
 AND LRTA DRAINAGE IMPROVEMENTS

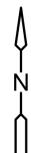
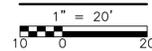
LRTA JUNCTION STRUCTURE  
 AND DRAIN MANHOLE DETAILS

PROJECT NO.	0552-112344
FILE NAME:	C005STD1.DWG
SHEET NO.	C-5
	0552-80904



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**LRTA DRAINAGE SITE GRADING PLAN**  
**PLAN**  
 1" = 20'  


REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: S. LAVOIE  
 DRAWN BY: S. CAREY  
 SHEET CHK'D BY: S. LAVOIE  
 CROSS CHK'D BY: D. FREEMAN  
 APPROVED BY: J. DRAKE  
 DATE: APRIL 2016

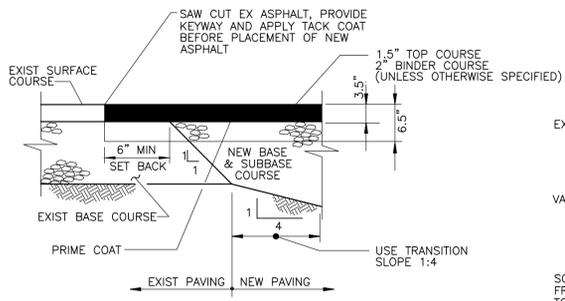


LOWELL REGIONAL WASTEWATER UTILITY  
 LOWELL, MASSACHUSETTS  
**MARGINAL SEWER RELIEF PIPE  
 AND LRTA DRAINAGE IMPROVEMENTS**

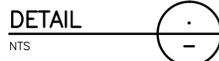
**LRTA DRAINAGE SITE  
 GRADING PLAN**  
 SHEET NO.  
**C-6**  
 0552-80905



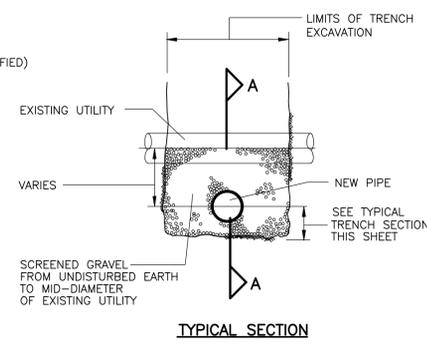
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**C-6**  
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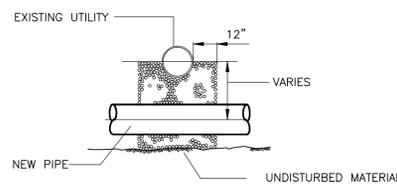
**PAVEMENT TRANSITION BETWEEN NEW AND EXISTING ASPHALT PAVEMENTS**



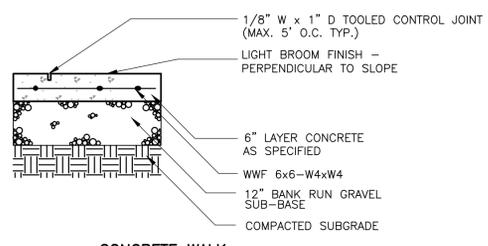
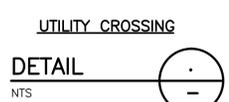
NOTE:  
1. PAVEMENT THICKNESS SHALL MATCH EXISTING DEPTHS BUT SHALL BE NO LESS THAN 3.5 INCHES THICK (6 INCHES THICK ON STREETS WITH CONCRETE OR COBBLE SUBBASES).



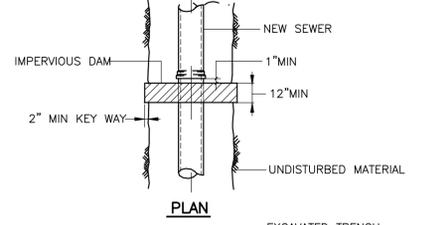
**TYPICAL SECTION**



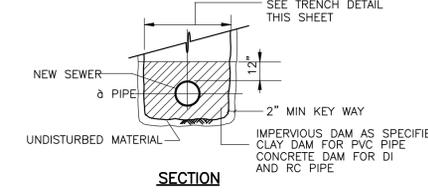
**UTILITY CROSSING**



**CONCRETE WALK**

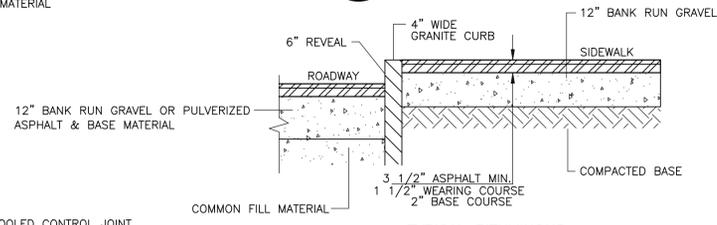
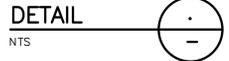


**PLAN**

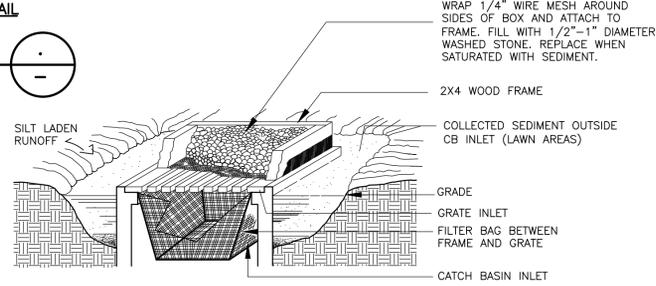
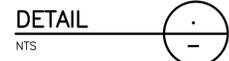


**SECTION**

**PIPE TRENCH DAM**



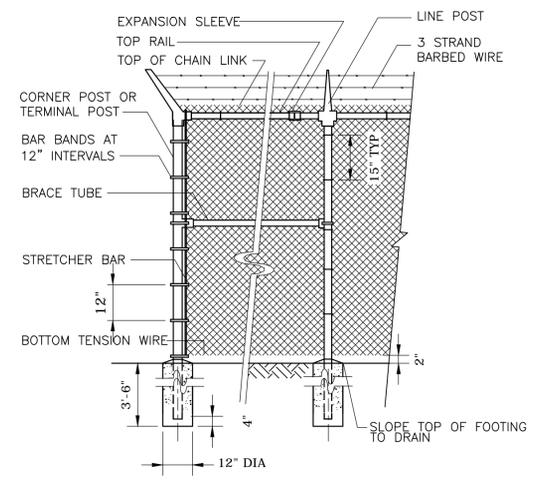
**TYPICAL BITUMINOUS SIDEWALK DETAIL**



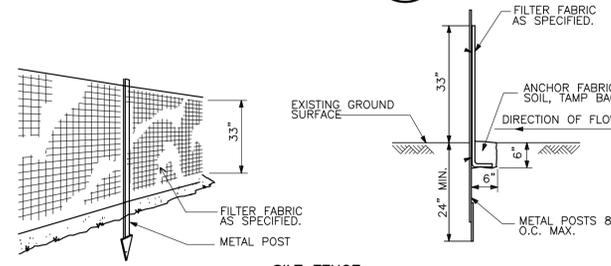
**CATCH BASIN FILTER**



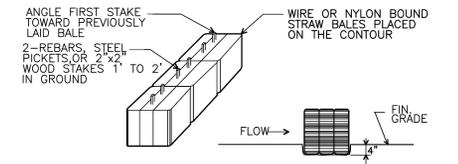
NOTE:  
1) IN LAWN AREAS, USE MESH, WOOD FRAME BOX, AND STONE FOR INLET PROTECTION (NO BAG REQUIRED)  
2) IN PAVED AREAS, USE FILTER BAG FOR INLET PROTECTION (NO MESH, BOX STONE REQUIRED)



**CHAIN LINK FENCE**



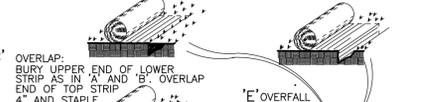
**SILT FENCE**



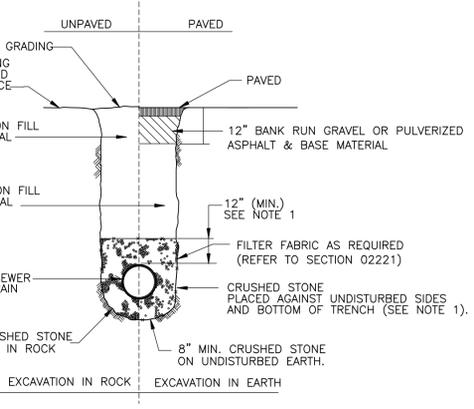
**STAKED HAYBALE**



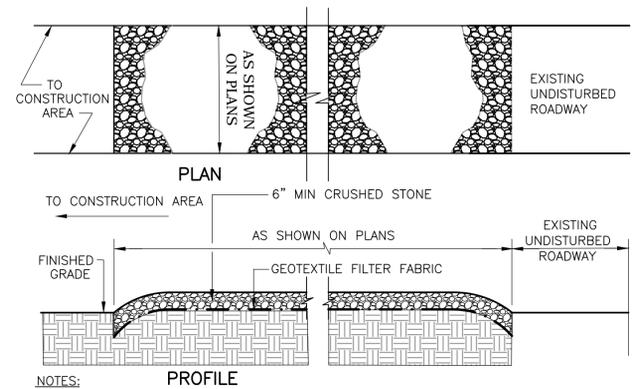
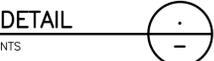
'B' TAMP THE TRENCH FULL OF SOIL. SECURE WITH ROW OF STAPLES, 10\"/>



**EROSION CONTROL BLANKET**



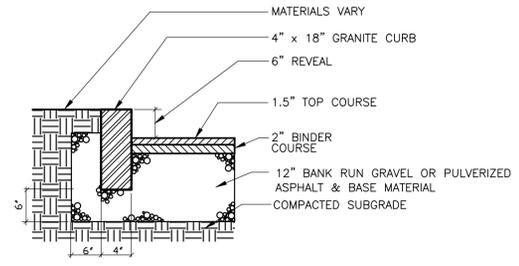
**TYPICAL TRENCH**



**STABILIZED CONSTRUCTION ENTRANCE**



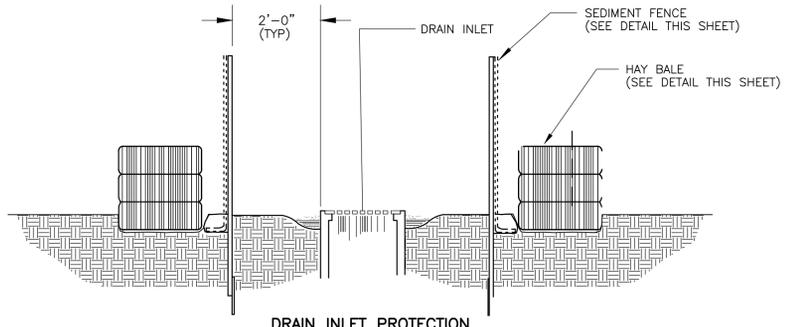
NOTES:  
1. PROVIDE APPROPRIATE TRANSITION BETWEEN STABILIZED CONSTRUCTION ENTRANCE AND UNDISTURBED ROADWAY.  
2. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO UNDISTURBED ROADWAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR ADDING STONE TO THE LENGTH OF THE ENTRANCE.  
3. REPAIR AND CLEANOUT MEASURES USED TO TRAP SEDIMENT.  
4. ALL SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO UNDISTURBED ROADWAY SHALL BE REMOVED AS DIRECTED BY THE ENGINEER.



**VERTICAL GRANITE CURB**



SIDEWALK NOTES:  
1. SIDEWALK CROSS SLOPES, WILL BE 2% MAXIMUM.  
2. AN UNOBSTRUCTED PATH OF TRAVEL WITH A MINIMUM WIDTH OF 3 FT SHALL BE MAINTAINED. THE DESIREABLE WIDTH IS 3.25 FT.  
3. WHERE THE ROAD PROFILE EXCEEDS 5% THE HIGH SIDE CURB TRANSITION (Lft) SHALL BE 13 FT.  
4. TESTING SURFACE: WHEN TESTING WITH A STRAIGHT EDGE PLACED PARALLEL TO THE LINE OF SLOPE, THERE SHALL BE NO DEVIATION FROM A TRUE SURFACE IN EXCESS OF 1/4 IN.



**DRAIN INLET PROTECTION**



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REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY:	S. CAREY
DRAWN BY:	S. CAREY
SHEET CHK'D BY:	S. LAVOIE
CROSS CHK'D BY:	D. FREEMAN
APPROVED BY:	J. DRAKE
DATE:	APRIL 2016



LOWELL REGIONAL WASTEWATER UTILITY  
 LOWELL, MASSACHUSETTS  
 MARGINAL SEWER RELIEF PIPE  
 AND LRTA DRAINAGE IMPROVEMENTS

MISCELLANEOUS DETAILS I

PROJECT NO.	0552-112344
FILE NAME:	C001STD.DWG
SHEET NO.	D-1
	0552-80906



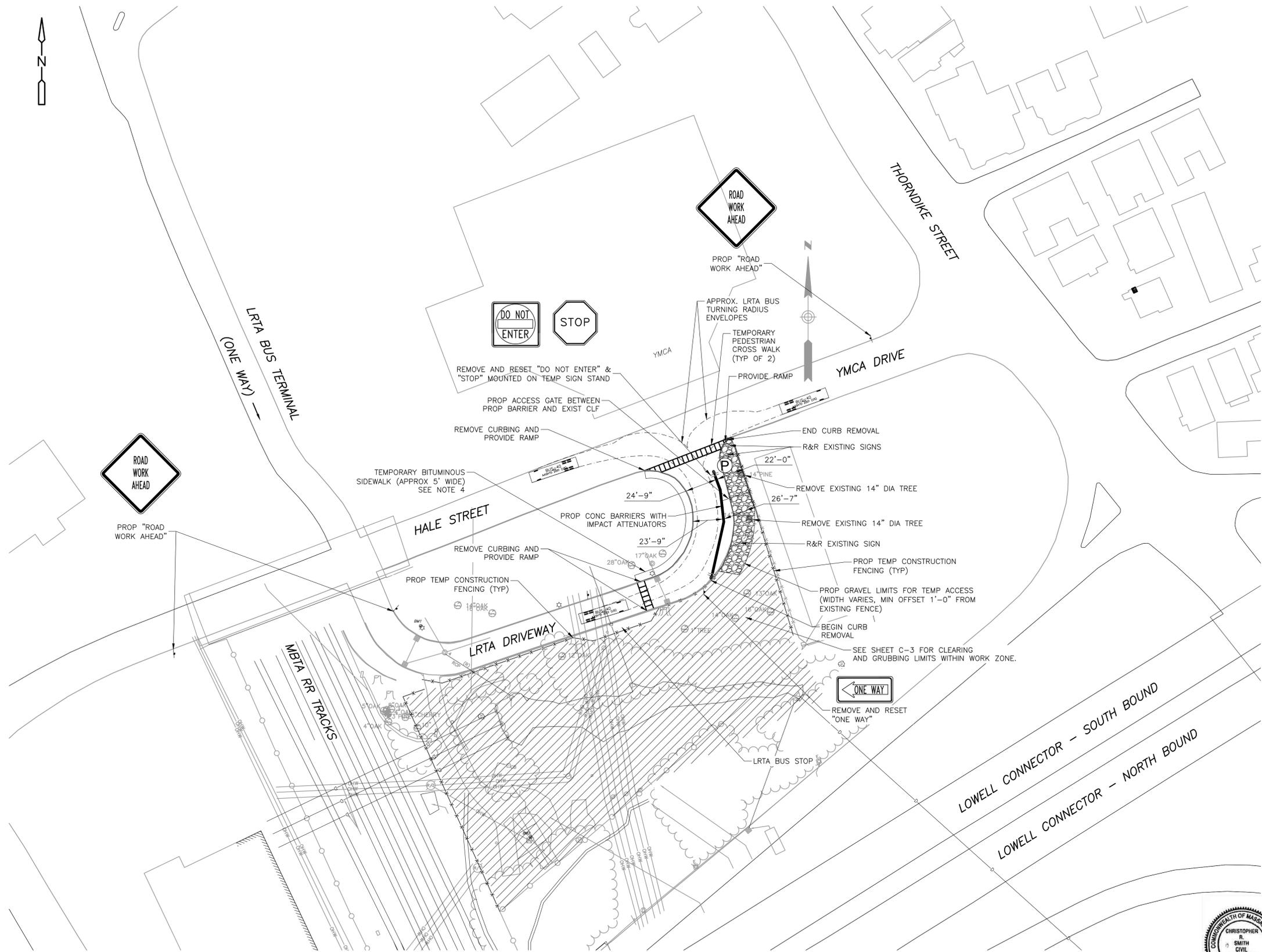


LEGEND:

-  POLICE DETAIL
-  SIGN
-  GATE OR TEMP FENCING
-  CONCRETE BARRIER
-  IMPACT ATTENUATOR
-  WORKZONE
-  CONSTRUCTION SIGN

NOTES:

1. EASTERN PORTION OF LRTA DRIVEWAY EGRESS SHALL BE USED FOR CONSTRUCTION ACCESS. CONCRETE BARRIER AND IMPACT ATTENUATOR SHALL BE PLACED AS SHOWN ON THIS SHEET. TEMP CONSTRUCTION FENCING WILL BE PLACED AS SHOWN ON THIS SHEET.
2. POLICE DETAIL LOCATION SHOWN ON THIS SHEET IS APPROXIMATE. POLICE DETAIL SHALL FACILITATE CONSTRUCTION VEHICLE ACCESS AND EGRESS AS REQUIRED ONLY DURING CONSTRUCTION HOURS.
3. EXISTING CURB WITHIN THE CONSTRUCTION ACCESS WAY WILL BE REMOVED AND STACKED TO A LOCATION WITHIN THE WORKZONE. CURBING WILL BE REPLACED AFTER CONSTRUCTION.
4. INSTALL TEMPORARY CROSSWALK AND TEMPORARY BITUMINOUS SIDEWALKS FOR PEDESTRIAN ACCESS TO LRTA BUS STOP. REMOVE CURBING AND PROVIDE RAMPS AT CROSSINGS.
5. GRAVEL SHALL BE PLACED AT THE APPROX. LIMITS SHOWN ON THIS SHEET. GRAVEL SHALL BE PLACED UP TO 1'-0" AWAY FROM EXISTING FENCE ON THE EAST SIDE OF THE PROPERTY.
6. REMOVE AND RESET ALL EXISTING SIGNS TO THE APPROX. LOCATIONS CALLED OUT ON THIS SHEET.



SITE PLAN  
1" = 40'

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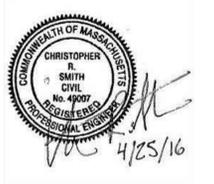
REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: Z. HELLYAR  
 DRAWN BY: Z. HELLYAR  
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 DATE: APRIL 2016



LOWELL REGIONAL WASTEWATER UTILITY  
 LOWELL, MASSACHUSETTS  
 MARGINAL SEWER RELIEF PIPE  
 AND LRTA DRAINAGE IMPROVEMENTS

LRTA SITE ACCESS MANAGEMENT PLAN



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