

# LOWELL REGIONAL WATER UTILITY LOWELL, MASSACHUSETTS REDUNDANT TRANSMISSION MAIN

CONTRACT NO. 2 DWSRF 3769  
PROJECT NO. 227251



FEBRUARY 2014



PROJECT LOCATION MAP

50 0 50 100  
scale mile



SITE LOCATION MAP

SCALE: 1:31250

SOURCE  
U.S.G.S. QUADRANGLE, LOWELL, MA,  
PHOTO REVISED 1987, 15 MINUTE SERIES



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COMMITMENT & INTEGRITY DRIVE RESULTS

IFB #14-38

GENERAL NOTES

- PROVIDE ALL MATERIALS AND LABOR AS REQUIRED TO PERFORM THE WORK INDICATED ON THE DRAWINGS AND IN THE SPECIFICATIONS. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE, AND LOCAL CODES.
- THE LOCATION, TYPE AND SIZE OF EXISTING PIPES, DUCTS, CONDUITS, UTILITIES AND UNDERGROUND STRUCTURES SHOWN ON THE DRAWINGS ARE NOT WARRANTED TO BE EXACT, NOR IS IT WARRANTED THAT ALL UNDERGROUND STRUCTURES ARE SHOWN. CONTRACTOR SHALL FIELD VERIFY ALL LOCATIONS, SIZES AND DEPTHS.
- COORDINATE CONSTRUCTION ACTIVITIES WITH THE LOWELL REGIONAL WATER UTILITY (LRWU), LOWELL REGIONAL WASTEWATER UTILITY, LOWELL DEPARTMENT OF PUBLIC WORKS, LOWELL ENGINEERING DEPARTMENT, MASSDOT, UTILITY COMPANIES AND THE ENGINEER.
- ENSURE CONSTRUCTION OPERATIONS DO NOT INTERFERE WITH THE LRWU'S ABILITY TO MEET DEMAND. COORDINATE ANY PROCESS DISTURBANCES WITH LRWU. PROVIDE A MINIMUM OF TWO WEEKS NOTICE PRIOR TO ANY REQUIRED SHUT DOWNS.
- RESTORE ALL AREAS DISTURBED BY CONTRACTOR'S OPERATIONS TO ORIGINAL CONDITION UNLESS NOTED OTHERWISE (GRAVEL, CONCRETE, PAVEMENT, GRASS, ETC.).
- ALL NEW BURIED PIPE SHALL HAVE MINIMUM 5 FEET OF COVER UNLESS NOTED OTHERWISE OR APPROVED BY THE ENGINEER. BURIED PIPE WITH LESS THAN 5 FEET OF COVER SHALL HAVE A MINIMUM OF 4" OF RIGID INSULATION WITH AN R-VALUE OF R-20 INSTALLED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
- TAKE ALL NECESSARY PRECAUTIONS TO PREVENT EQUIPMENT FLUIDS FROM REACHING ANY WATER RESOURCE AREA. FLUID DISCHARGED INADVERTENTLY SHALL BE IMMEDIATELY CLEANED FROM THE WATER RESOURCE USING WHATEVER MEANS REQUIRED, AS DETERMINED BY THE ENGINEER.
- LOCATION OF EXISTING UTILITIES, BUILDINGS, AND EQUIPMENT LAYOUTS ARE BASED ON BEST INFORMATION AVAILABLE. INFORMATION INCLUDES PLANS PROVIDED BY OWNER AND UTILITY COMPANIES AND SURVEY INFORMATION.
- CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND ELEVATIONS PRIOR TO START OF CONSTRUCTION.
- CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO STRUCTURES AND EQUIPMENT NOT SCHEDULED FOR REMOVAL.
- EXISTING FACILITIES (I.E. GUARDRAILS, TREES, POLES, SIGNS, LIGHT POLES, MAIL BOXES, ETC.) SHALL BE REMOVED AND REPLACED IN KIND, IN ACCORDANCE WITH LOCAL AND STATE REQUIREMENTS, OR PROTECTED AS REQUIRED DURING CONSTRUCTION. THE ASSOCIATED COSTS ARE CONSIDERED INCIDENTAL TO THE PROJECT.
- CONTRACTOR TO PROVIDE TRAFFIC CONTROL DEVICES IN ACCORDANCE WITH TRAFFIC MANAGEMENT PLAN, INCLUDED IN SPECIFICATIONS AND LOCAL REQUIREMENTS. THE CONTRACTOR MUST MAINTAIN CONTINUOUS TRAFFIC FLOW (MINIMUM OF ONE LANE EACH DIRECTION) DURING CONSTRUCTION.
- ALL CURB DAMAGED DURING CONSTRUCTION SHALL BE REPLACED IN KIND AND SHALL CONFORM TO MASSDOT AND CITY OF LOWELL SPECIFICATIONS. SEE SHEET C-502 FOR VERTICAL GRANITE CURB DETAIL. SLOPED EDGING CURB SHALL CONFORM TO MASSDOT CONSTRUCTION STANDARD DETAIL E 106.5.0, "METHOD OF SETTING SLOPED EDGING."
- LOOP DETECTORS DAMAGED DURING CONSTRUCTION SHALL BE REPLACED IN KIND AND SHALL CONFORM TO MASSDOT AND CITY OF LOWELL SPECIFICATIONS. THE ASSOCIATED COSTS SHALL BE CONSIDERED INCIDENTAL TO THE PROJECT.
- WHERE NEW WATER MAINS OR APPURTENANCES ARE TO BE CONNECTED TO EXISTING PIPE, CONTRACTOR SHALL CUT AND REMOVE THE EXISTING PIPE AS NECESSARY TO INSTALL THE NEW WORK. TEST PIT LOCATIONS WHERE NEW MAINS CONNECT TO EXISTING MAINS TO VERIFY PIPE AND MATERIAL TYPE.
- FINAL LOCATIONS FOR NEW WATER MAINS, HYDRANTS, VALVES AND FITTINGS SHALL BE ESTABLISHED IN THE FIELD BY THE ENGINEER.
- CONTRACTOR IS RESPONSIBLE TO NOTIFY THE LOWELL REGIONAL WATER UTILITY, LOWELL REGIONAL WASTEWATER UTILITY, LOWELL DEPARTMENT OF PUBLIC WORKS, LOWELL ENGINEERING DEPARTMENT, AND UTILITY COMPANIES PRIOR TO COMMENCING WORK TO ALLOW SUFFICIENT TIME TO LOCATE AND MARK THE LOCATION OF ALL BURIED UTILITIES. CONTRACTOR SHALL ALSO CONTACT "DIG SAFE", TELEPHONE NO. 888-344-7233, AT LEAST 72 HOURS PRIOR TO CONSTRUCTION. REPAIR OF ANY DAMAGED UTILITY WILL BE INCIDENTAL TO THE CONTRACT.
- WATER MAIN TRENCHES SHALL HAVE THE TRAVELED WAY SURFACE RECLAIMED WITHIN THE TRENCH LIMITS. TRENCH SURFACE REMOVAL OPERATIONS SHALL NOT BE DONE BY BACK HOE, GRADALL, JACKHAMMER, ROCK SAW OR OTHER RIPPING EQUIPMENT. RECLAIMED MATERIAL SHALL BE STORED AND REUSED AS A PAVEMENT BASE COURSE, AS APPROVED BY THE ENGINEER.
- BRACING OF UTILITY POLES, WHERE REQUIRED, SHALL BE INCIDENTAL TO THE INSTALLATION OF THE WATER MAIN, NO SEPARATE PAYMENT SHALL BE MADE.
- THE CONTRACTOR SHALL NOT STORE TOOLS, VEHICLES, MATERIALS, SUPPLIES, OR EQUIPMENT ON DRAINAGE STRUCTURES OR WITHIN 100 FEET OF WETLANDS OR RIVERFRONT RESOURCE AREAS.
- THE CONTRACTOR SHALL NOT OPERATE EXISTING VALVES OR HYDRANTS IN THE DISTRIBUTION SYSTEM.
- THE LRWU WILL OPERATE EXISTING VALVES AND HYDRANTS TO ISOLATE SECTIONS OF THE WORK. CONTRACTOR TO PROVIDE A MINIMUM 48-HOUR ADVANCE NOTICE TO LRWU WHEN REQUESTING OPERATION OF EXISTING VALVES AND HYDRANTS.
- CONTRACTOR MUST ADHERE TO APPROVED TRAFFIC MANAGEMENT PLAN AT ALL TIMES. REFER TO TRAFFIC MANAGEMENT PLAN IN SPECIFICATIONS.
- INITIAL TRENCH-WIDTH PAVEMENT SHALL BE INSTALLED AT THE END OF EACH DAY.
- SAWCUT ALL DRIVEWAYS, WALKWAYS, AND SIDEWALKS AT EDGE OF RIGHT OF WAY TO TRANSITION EXISTING GRADE TO FINISH GRADE.
- ALL CITY OF LOWELL ORDINANCES APPLY.
- SIDEWALK RESTORATION TO INCLUDE REPLACEMENT IN KIND OF EXISTING 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, AAB, "RULES AND REGULATIONS" WHICH APPEAR IN THE CODE OF MA REG (C) 521 LMR 1.00.

SHEET INDEX

G-101	SHEET INDEX, GENERAL NOTES, LEGEND AND ABBREVIATIONS
C-101	PHASE 1, PHASE 3, PHASE 4 AND PHASE 6 - TRANSMISSION MAIN IMPROVEMENTS
C-102	PHASE 2 - VARNUM AVENUE, STA 0+00 TO STA 11+50
C-103	PHASE 2 - VARNUM AVE. AND DUNBAR AVE., VARNUM AVE.: STA 11+50 TO STA 14+50; DUNBAR AVE.: STA 0+00 TO STA 6+00
C-104	PHASE 2 - VARNUM AVENUE, STA 14+50 TO STA 25+00
C-105	PHASE 2 - VARNUM AVE., STA 25+00 TO STA 31+89
C-106	PHASE 2 - DUNBAR AVENUE, STA 6+00 TO STA 13+92
C-107	PHASE 5 - PAWTUCKET BLVD., STA 0+00 TO STA 5+93
C-501	WATER MAIN DETAILS 1
C-502	WATER MAIN DETAILS 2
C-503	WATER MAIN DETAILS 3

CIVIL SYMBOLS

DESCRIPTION	EXISTING	PROPOSED
SANITARY SEWER MANHOLE	○	●
SANITARY SEWER SERVICE CLEANOUT	○∞	●∞
STORM DRAIN MANHOLE	○	●
CATCH BASIN	⊞	⊞
TELECOMM MANHOLE	○	●
TELECOMM SERVICE BOX	⊞	⊞
ELECTRIC MANHOLE	○	●
TRANSFORMER	⊞	⊞
UTILITY POLE W/GUY	⊞	⊞
UTILITY POLE	⊞	⊞
LIGHTPOST	⊞	⊞
GAS METER BOX	⊞	⊞
GAS VENT	⊞	⊞
GAS GATE	⊞	⊞
REDUCER	⊞	⊞
WATER VALVE	⊞	⊞
CURB STOP	⊞	⊞
HYDRANT	⊞	⊞
CORPORATE STOP	⊞	⊞
WATER METER BOX	⊞	⊞
SIGN	⊞	⊞
MAILBOX	⊞	⊞
FLAGPOLE	⊞	⊞
WETLAND HATCHING	⊞	⊞
CONIFEROUS TREE	⊞	⊞
DEODOUOUS TREE	⊞	⊞
STONE CHECK DAM	⊞	⊞
SURVEY STATION	⊞	⊞
TEMPORARY BENCH MARK	⊞	⊞
IRON PIN	⊞	⊞
MONUMENTS	⊞	⊞
SPOT ELEVATION	⊞	⊞
TEST PIT & NUMBER	⊞	⊞
BORING WITH SAMPLING & NUMBER	⊞	⊞
BORING WITHOUT SAMPLING & NUMBER	⊞	⊞
SURFACE WATER MONITORING LOC.	⊞	⊞
MONITORING WELL	⊞	⊞
PIEZOMETER	⊞	⊞

EXISTING LINETYPES

CONTOUR (1' OR 2' INTERVAL)	122
SANITARY SEWER	S
FORCE MAIN	FM
STORM DRAIN	SD
DRAIN	D
WATER MAIN (LESS THAN 20")	W
UNDERGROUND ELECTRIC	E
UNDERGROUND TELEPHONE	T
UNDERGROUND TELEVISION	TV
GAS LINE	G
OVERHEAD ELECTRIC	OE
CULVERT	INV. IN. EL. XXX.XX
PROPERTY LINE	R/W
RIGHT OF WAY	R/W
EASEMENT	E
EDGE OF VEGETATION	E
FENCE	F
CENTERLINE	C
RETAINING WALL	R
STONEWALL	S
CURB	C
EDGE OF PAVEMENT	E
EDGE OF GRAVEL	E
RAILROAD TRACKS	R
DRAINAGE DITCH / SWALE	D
EXTENT OF WETLANDS	W
RIVERFRONT 25FT BUFFER	R
TOP OF BANK	T
WETLAND 100FT BUFFER	W
LIMITS OF FLOOD ZONE	F

PROPOSED LINETYPES

CONTOUR (1' OR 2' INTERVAL)	122
CONTOUR (INDEX)	120
SANITARY SEWER	S
FORCE MAIN	FM
STORM DRAIN	SD
DRAIN	D
WATER MAIN (LESS THAN 20")	W
TEMPORARY WATER MAIN	W
UNDERGROUND ELECTRIC	E
UNDERGROUND TELEPHONE	T
UNDERGROUND TELEVISION	TV
GAS LINE	G
OVERHEAD ELECTRIC	OE
CULVERT	INV. IN. EL. XXX.XX
HOUSE SERVICE / LATERAL	H
PROPERTY LINE	R/W
RIGHT OF WAY	R/W
EASEMENT	E
EDGE OF VEGETATION	E
FENCE	F
CENTERLINE	C
RETAINING WALL	R
STONEWALL	S
CURB	C
EDGE OF PAVEMENT	E
EDGE OF GRAVEL	E
RAILROAD TRACKS	R
DRAINAGE DITCH / SWALE	D
SILT FENCE	S

ABBREVIATIONS

ADJ.	ADJUSTABLE	G	GAS	S	SEWER
ALUM.	ALUMINUM	GALV.	GALVANIZED	S.S.	SLOPE
APPLY.	AMERICAN PLYWOOD ASSOCIATION	GV	GATE VALVE	SCH.	SCHEDULE
APPROX.	APPROXIMATE	H	HATCH	SECT	SECTION
ASSY	ASSEMBLY	HOR.	HORIZONTAL	SHLDR.	SHOULDER
ASTM	AMERICAN SOCIETY OF TESTING MATERIALS	HORIZ.	HORIZONTAL	SHT.	SHEET
B	BEAM	HORIZ.	HORIZONTAL	SP. AL.	SPECIAL ALUMINUM
BLDG.	BUILDING	HP	HIGH POINT	SQ.	SQUARE
BOT	BOTTOM	HVAC	HEATING, VENTILATING AND AIR CONDITIONING	SUP.	SUPPORT
BV	BUTTERFLY VALVE	IMFO	INTEGRALLY MOLDED FLANGED OPENING	TEMP.	TEMPERATURE
C	COLUMN	INV.	INVERT	THD.	THREADED
C.E.	CONTINUOUS END	L	LENGTH	TMB	TEMPORARY BENCH MARK
CB	CATCH BASIN	L.L.V.	LONG LEG VERTICAL	TOC	TOP OF CONCRETE
CJ	CONTROL JOINT	LB	POUND	TP	TEST PIT
CHKD	CHECKED	LG.	LONG	TYP.	TYPICAL
CLR.	CLEAR	LP	LOW POINT	U.N.O.	UNLESS NOTED OTHERWISE
CLF	CHAIN LINK FENCE	M.O.	MASONRY OPENING	UGE	UNDERGROUND ELECTRIC
CMP	CORRUGATED METAL PIPE	MAX.	MAXIMUM	UGT	UNDERGROUND TELEPHONE
CMU	CONCRETE MASONRY UNIT	MECH.	MECHANICAL	UV	ULTRAVIOLET
COL	COLUMN	MH	MANHOLE	V	VELOCITY
CONC.	CONCRETE	MIN.	MINIMUM	VERT.	VERTICAL
CONT.	CONTINUOUS	MPH	MILES PER HOUR	W	WATER
COR	CORNER	MR	MONORAIL	W	WIDE
CORR.	CORRUGATED	MW	MONITORING WELL	W/	WITH
CPE	CORRUGATED POLYETHYLENE	N	NORTHING	YR.	YEAR
CU	COPPER	NIC	NOT IN CONTRACT		
D	DIAMETER	N.T.S.	NOT TO SCALE		
D.E.	DUCTILE IRON	#	NUMBER		
D.I.	DESIGNED	NO.	NOMINAL		
DES.	DIAMETER	NOM.	NOMINAL		
DIA.	DIAGONALLY	O.C.	ON CENTER		
DIAG.	DISCONTINUOUS	O.C.E.F.	ON CENTER EACH FACE		
DISCONT.	DRAWN	O.C.E.W.	ON CENTER EACH WAY		
DR.	DRAWN	O.D.	OUTSIDE DIAMETER		
DRI	DOUBLE RING INFILTRATOR	O.I.T.	OPERATOR INTERFACE TERMINAL		
DRWS.	DRAWINGS	OZ.	OUNCE		
E	EASTING	P	PLATE		
EA.	EACH	P	PROPERTY LINE		
EFFL.	EFFLUENT	PC	POINT OF CURVATURE		
EL.	ELEVATION	PCC	POINT OF COMPOUND CURVE		
ELECT.	ELECTRICAL	PCF	PER CUBIC FOOT		
ELEV.	ELEVATION	PE	POLYETHYLENE		
EMBED.	EMBEDMENT	PIC	POST INDICATOR VALVE		
EQ.	EQUALIZATION	PRC	POINT OF REVERSE CURVE		
EXP.	EXPANSION	PSI	PER SQUARE INCH		
F	FOOTING	PT	POINT OF TANGENCY		
FD	FLOOR DRAIN	PVC	POLYVINYL CHLORIDE		
FF	FINISH FLOOR	PZ	PIEZOMETER		
FIN	FINISH	RCP	REINFORCED CONCRETE PIPE		
FIN. FLR.	FINISH FLOOR	REINF.	REINFORCEMENT		
FL.	FLANGE	RIBS	RAPID INFILTRATION BASINS		
FM	FORCE MAIN				
FRP	FIBERGLASS REINFORCED PLASTIC				
FT.	FOOT				
FTG.	FOOTING				
FTG.	FITTING				

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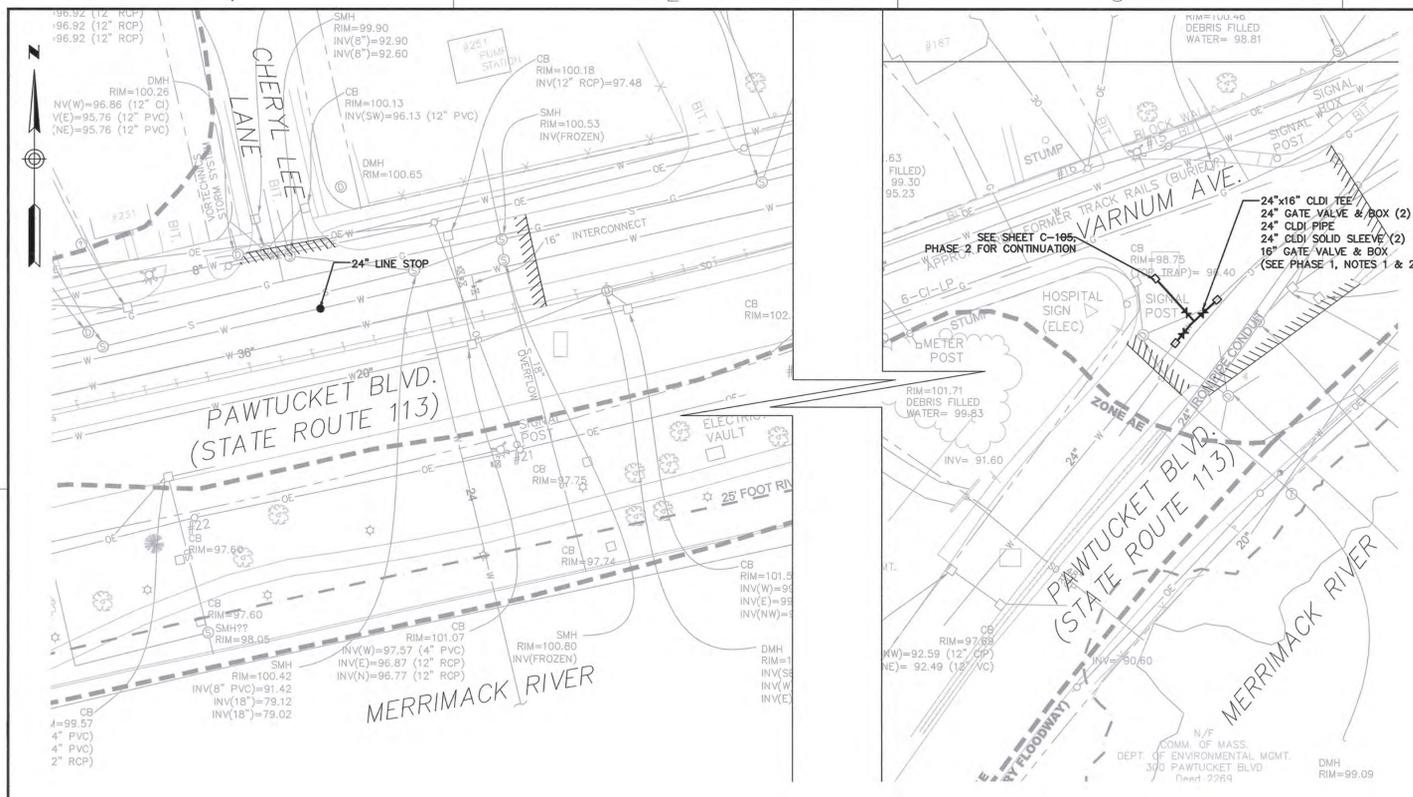
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LOWELL REGIONAL WATER UTILITY  
LOWELL, MASSACHUSETTS

REDUNDANT TRANSMISSION MAIN

JOB NO.: 227251  
DATE: FEBRUARY 2014  
SCALE: N.T.S.  
SHEET: 1 OF 11

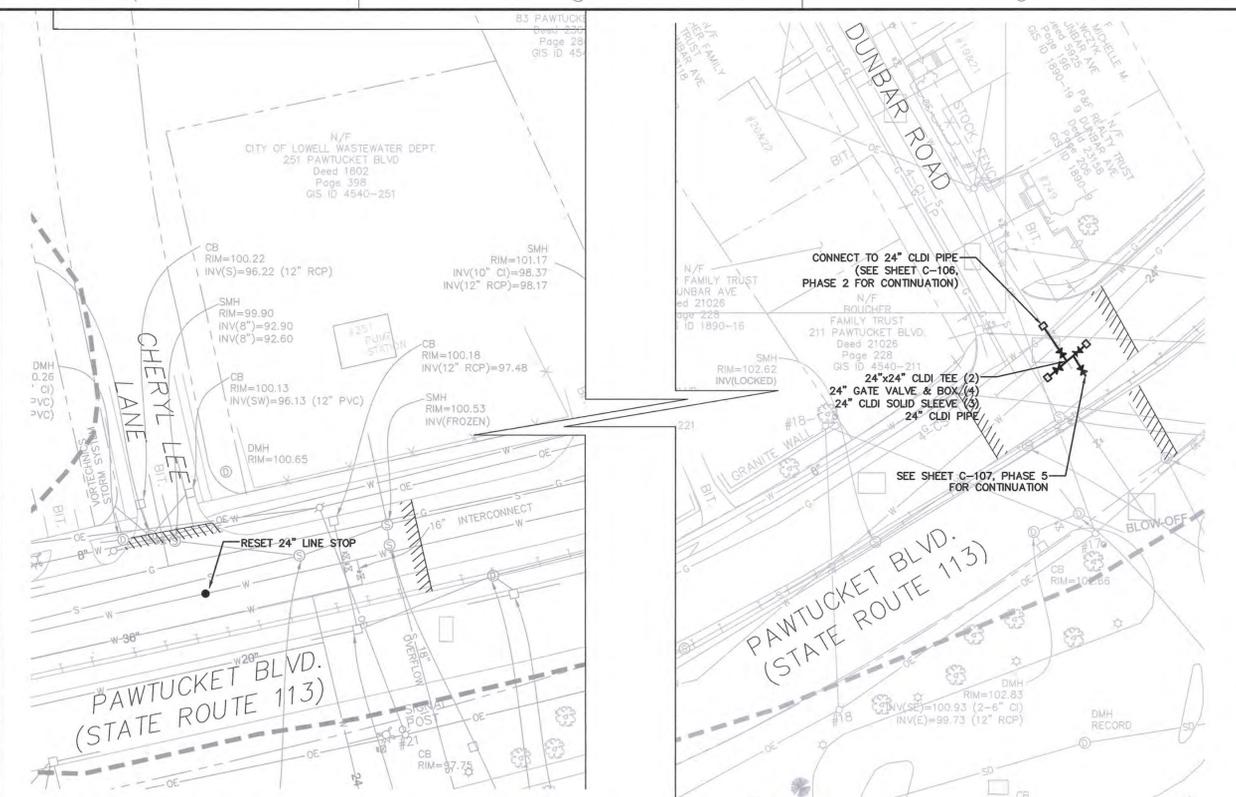
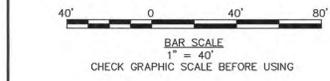
G-101



**PHASE 1 (NIGHT WORK)**

1. INSTALL 24" LINE STOP SLEEVE (NIGHT WORK NOT REQUIRED FOR SLEEVE INSTALLATION).
2. INSERT 24" LINE STOP (NIGHT WORK REQUIRED).
3. INSTALL 24"x16" TEE AND VALVE ASSEMBLY (NIGHT WORK REQUIRED).
4. REMOVE 24" LINE STOP HEAD.

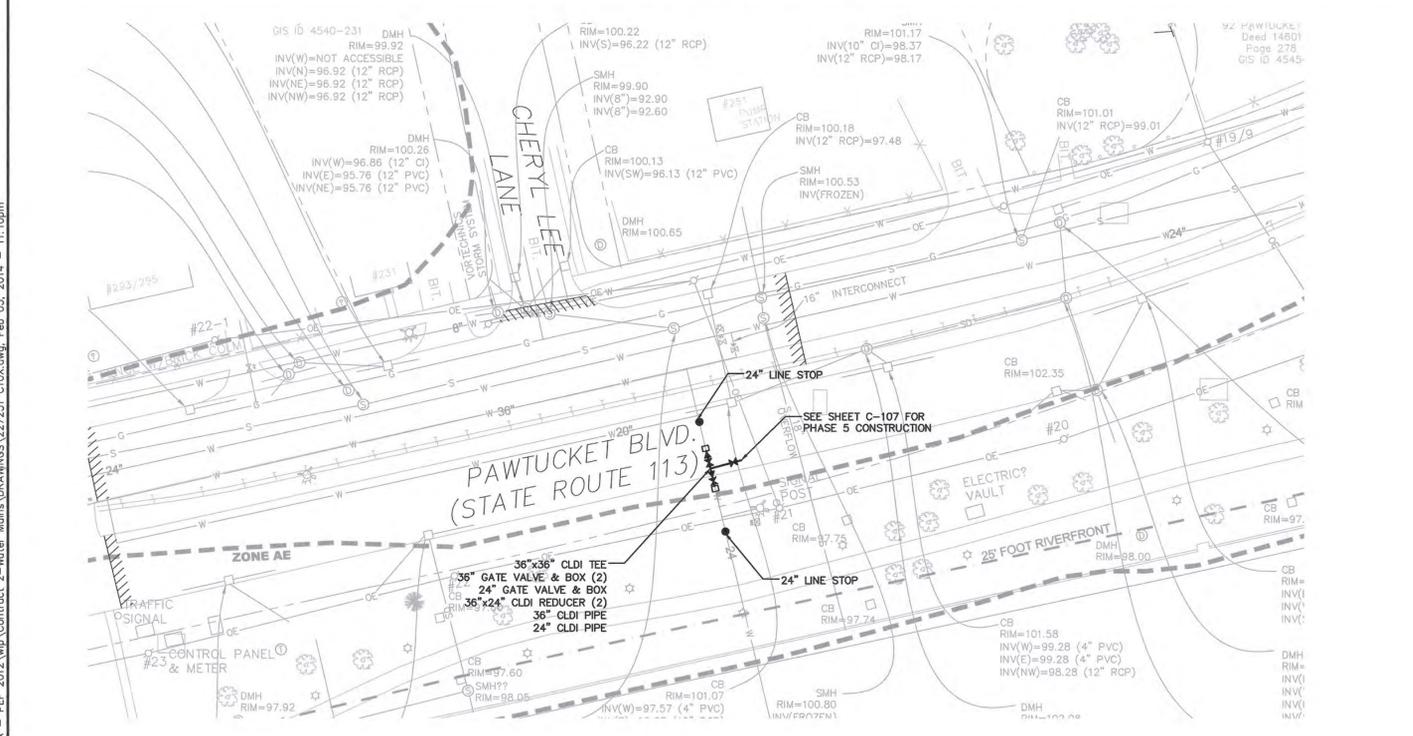
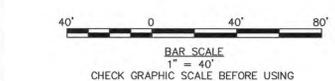
- NOTES:**
1. NIGHT WORK SHALL BEGIN AFTER 10PM
  2. REFER TO SPECIFICATIONS FOR TRAFFIC MANAGEMENT.
  3. SEE SHEETS C-102 THROUGH C-106 FOR PHASE 2 WORK



**PHASE 3**

1. SEE SHEETS C-102 THROUGH C-106 FOR PHASE 2 WORK
2. RESET 24" LINE STOP.
3. INSTALL 24"x24" TEES AND 24" GATE VALVES.

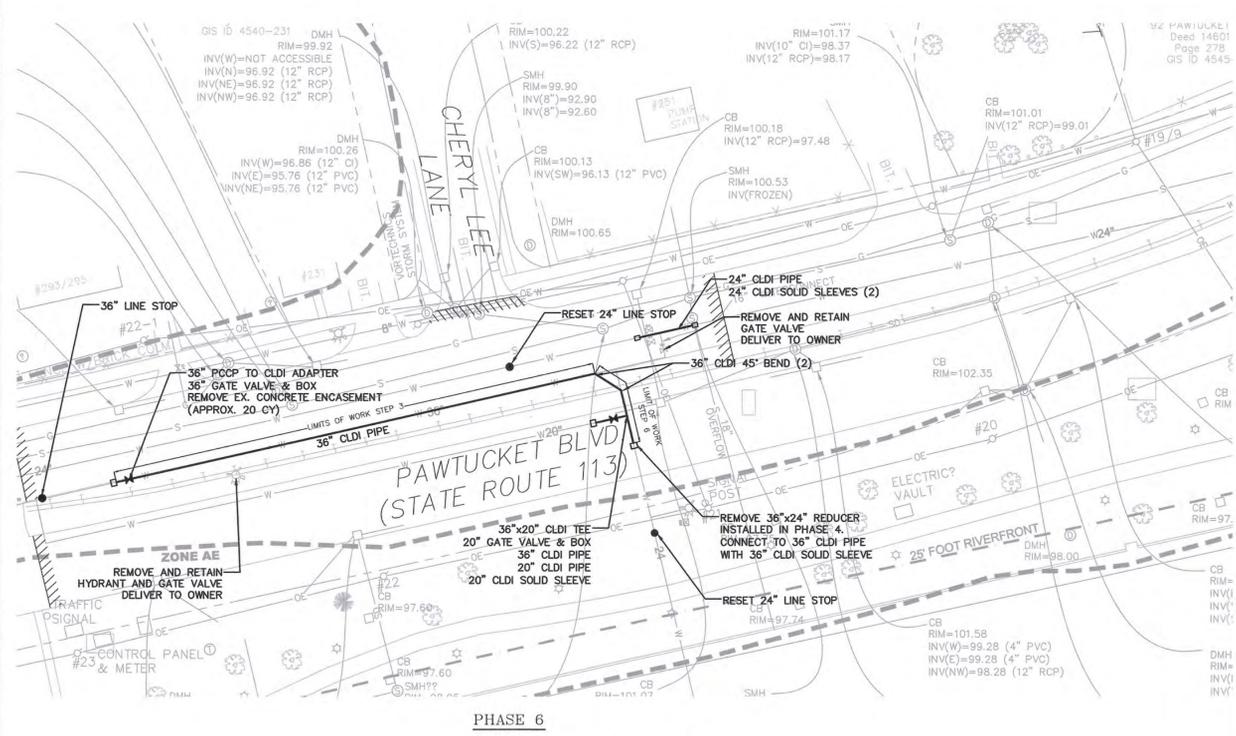
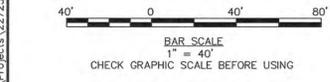
- NOTES:**
1. REFER TO SPECIFICATIONS FOR TRAFFIC MANAGEMENT PLANS.



**PHASE 4 (NIGHT WORK)**

1. INSTALL 24" LINE STOP SLEEVES (NIGHT WORK NOT REQUIRED FOR SLEEVE INSTALLATION).
2. EXCAVATE, CLEAN AND PREPARE 24" PIPE FOR CUT-IN WORK (NIGHT WORK NOT REQUIRED).
3. INSERT LINE STOPS (NIGHT WORK REQUIRED).
4. CUT-IN TEE AND VALVE ASSEMBLIES (NIGHT WORK REQUIRED).

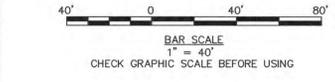
- NOTES:**
1. NIGHT WORK FOR PHASE 4 SHALL BE SCHEDULED FOR A SATURDAY NIGHT BEGINNING AT 11PM. COORDINATE SCHEDULE WITH OWNER A MINIMUM 14 CALENDAR DAYS PRIOR TO BEGINNING.
  2. SEE SHEET C-107 FOR PHASE 5 WORK.
  3. REFER TO SPECIFICATIONS FOR TRAFFIC MANAGEMENT.



**PHASE 6**

1. SEE SHEET C-101 FOR PHASE 5 WORK.
2. INSTALL 36" LINE STOP.
3. INSTALL WORK SHOWN ON 36" TRANSMISSION MAIN FROM 36" PCOP ADAPTER TO 45" BEND.
4. RESET 24" LINE STOP.
5. CUT-IN 24" CLDI PIPE.

- (NIGHT WORK)**
6. RESET 24" LINE STOP
  7. COMPLETE INSTALLATION OF 36" CLDI PIPE.
- NOTES:**
1. REFER TO SPECIFICATIONS FOR TRAFFIC MANAGEMENT PLANS.



\LANDOVER\Projects\227251 Lowell MA - PEF 2012\Map\Contract 2 - Water Main\Drawings\227251\_C101.dwg, Feb. 03, 2014 - 11:10am  
 DESIGNED BY: TRP  
 CHECKED BY: ADL  
 DRAWN BY: RCP  
 DATE: 2/27/14  
 DESCRIPTION: PHASE 1, PHASE 3, PHASE 4, AND PHASE 6 TRANSMISSION MAIN IMPROVEMENTS  
 LOWELL REGIONAL WATER UTILITY, LOWELL, MASSACHUSETTS  
 REDUNDANT TRANSMISSION MAIN  
 JOB NO.: 227251  
 DATE: FEBRUARY 2014  
 SCALE: AS NOTED  
 SHEET: 2 OF 11

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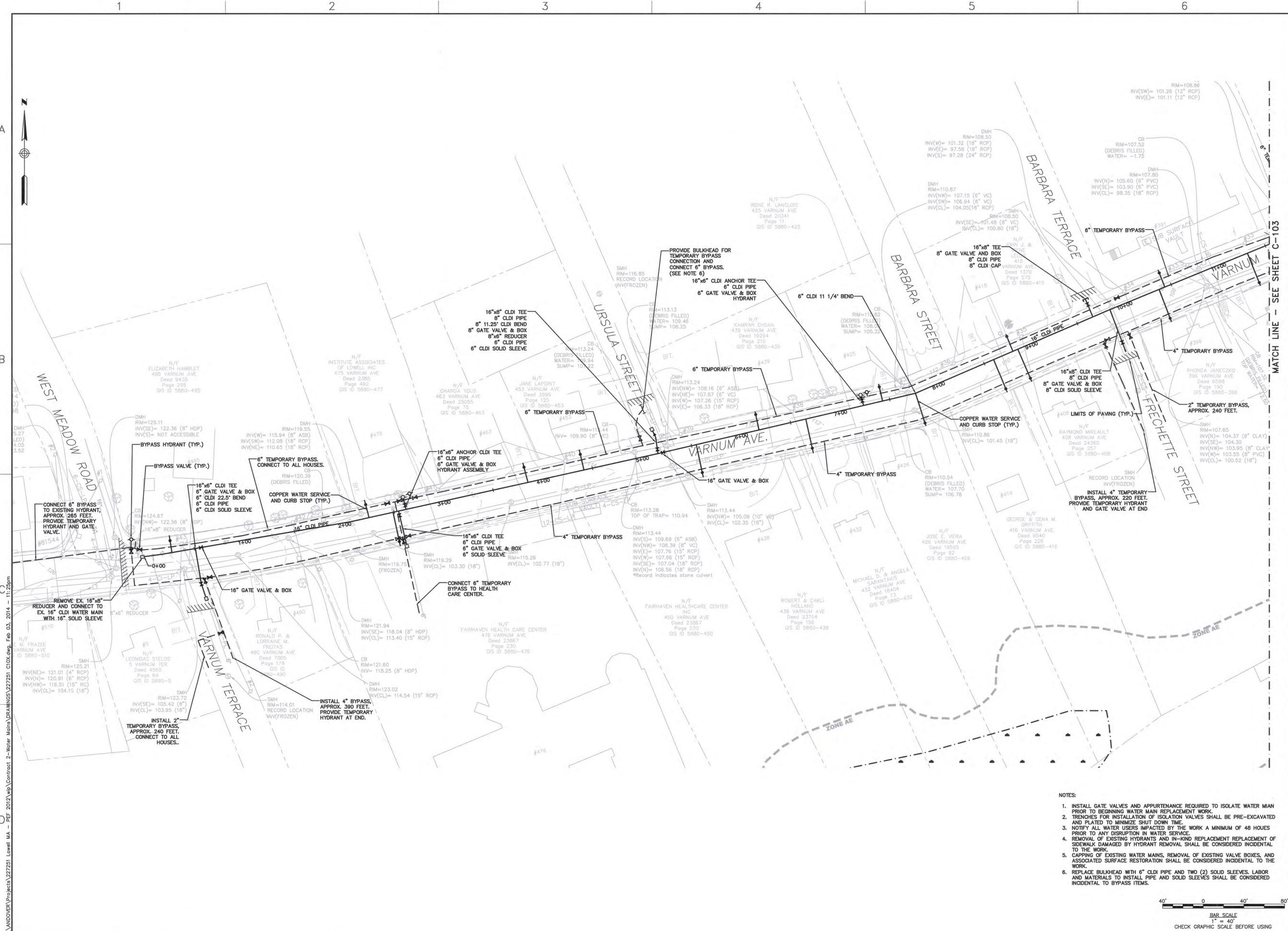
PHASE 1, PHASE 3, PHASE 4, AND PHASE 6 TRANSMISSION MAIN IMPROVEMENTS

LOWELL REGIONAL WATER UTILITY, LOWELL, MASSACHUSETTS

REDUNDANT TRANSMISSION MAIN

JOB NO.: 227251  
 DATE: FEBRUARY 2014  
 SCALE: AS NOTED  
 SHEET: 2 OF 11

**C-101**



A  
B  
C  
D  
 1  
2  
3  
4  
5  
6

MATCH LINE - SEE SHEET C-103

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**PHASE 2 - VARNUM AVE  
STA 0+00 TO 11+55**

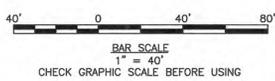
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LOWELL, MASSACHUSETTS

REDUNDANT TRANSMISSION MAIN

JOB NO.: 227251  
DATE: FEBRUARY 2014  
SCALE: AS NOTED  
SHEET: 3 OF 11

**C-102**

- NOTES:
- INSTALL GATE VALVES AND APPURTENANCE REQUIRED TO ISOLATE WATER MAIN PRIOR TO BEGINNING WATER MAIN REPLACEMENT WORK.
  - TRENCHES FOR INSTALLATION OF ISOLATION VALVES SHALL BE PRE-EXCAVATED AND PLATED TO MINIMIZE SHUT DOWN TIME.
  - NOTIFY ALL WATER USERS IMPACTED BY THE WORK A MINIMUM OF 48 HOURS PRIOR TO ANY DISRUPTION IN WATER SERVICE.
  - REMOVAL OF EXISTING HYDRANTS AND IN-KIND REPLACEMENT REPLACEMENT OF SIDEWALK DAMAGED BY HYDRANT REMOVAL SHALL BE CONSIDERED INCIDENTAL TO THE WORK.
  - CAPPING OF EXISTING WATER MAINS, REMOVAL OF EXISTING VALVE BOXES, AND ASSOCIATED SURFACE RESTORATION SHALL BE CONSIDERED INCIDENTAL TO THE WORK.
  - REPLACE BULKHEAD WITH 6" CLDI PIPE AND TWO (2) SOLID SLEEVES. LABOR AND MATERIALS TO INSTALL PIPE AND SOLID SLEEVES SHALL BE CONSIDERED INCIDENTAL TO BYPASS ITEMS.



\VANDOVER\Projects\227251 - Water Mains\Drawings\227251\_C102.dwg, Feb. 03, 2014, 11:25am  
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**PHASE 2 - VARNUM AVE**  
**STA 13+62 TO 25+02**

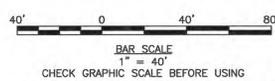
LOWELL REGIONAL WATER UTILITY  
 LOWELL, MASSACHUSETTS

REDUNDANT TRANSMISSION MAIN

JOB NO.: 227251  
 DATE: FEBRUARY 2014  
 SCALE: AS NOTED  
 SHEET: 5 OF 11

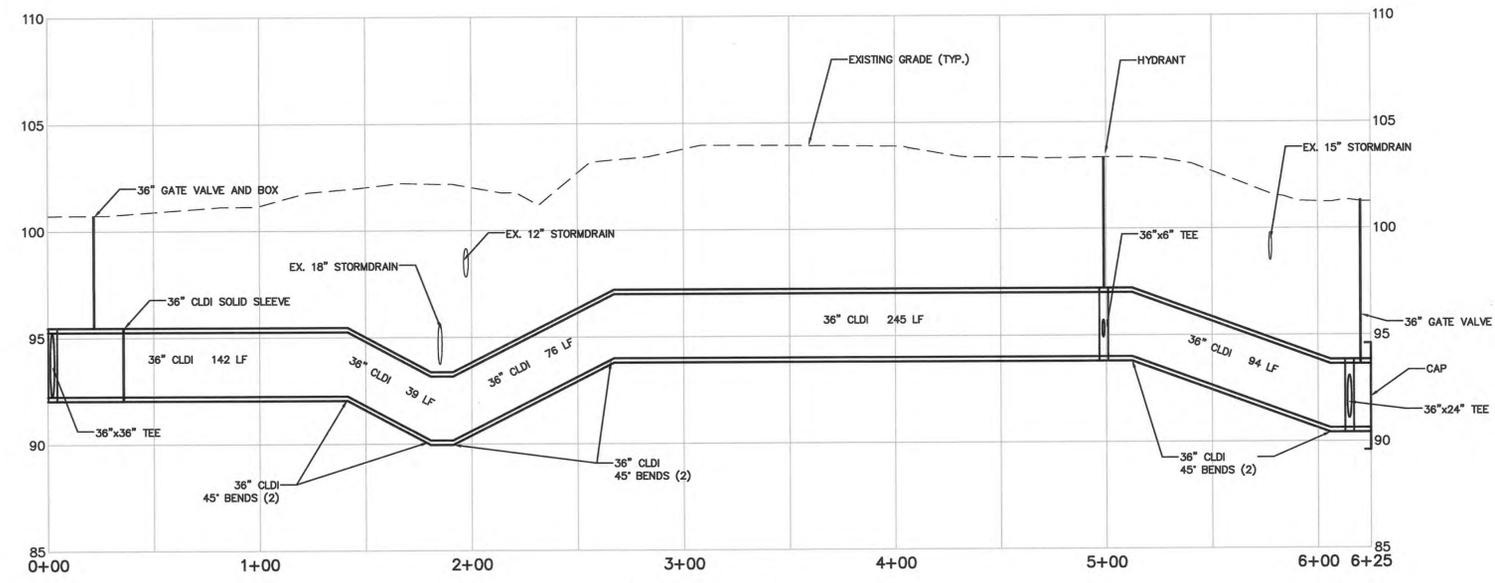
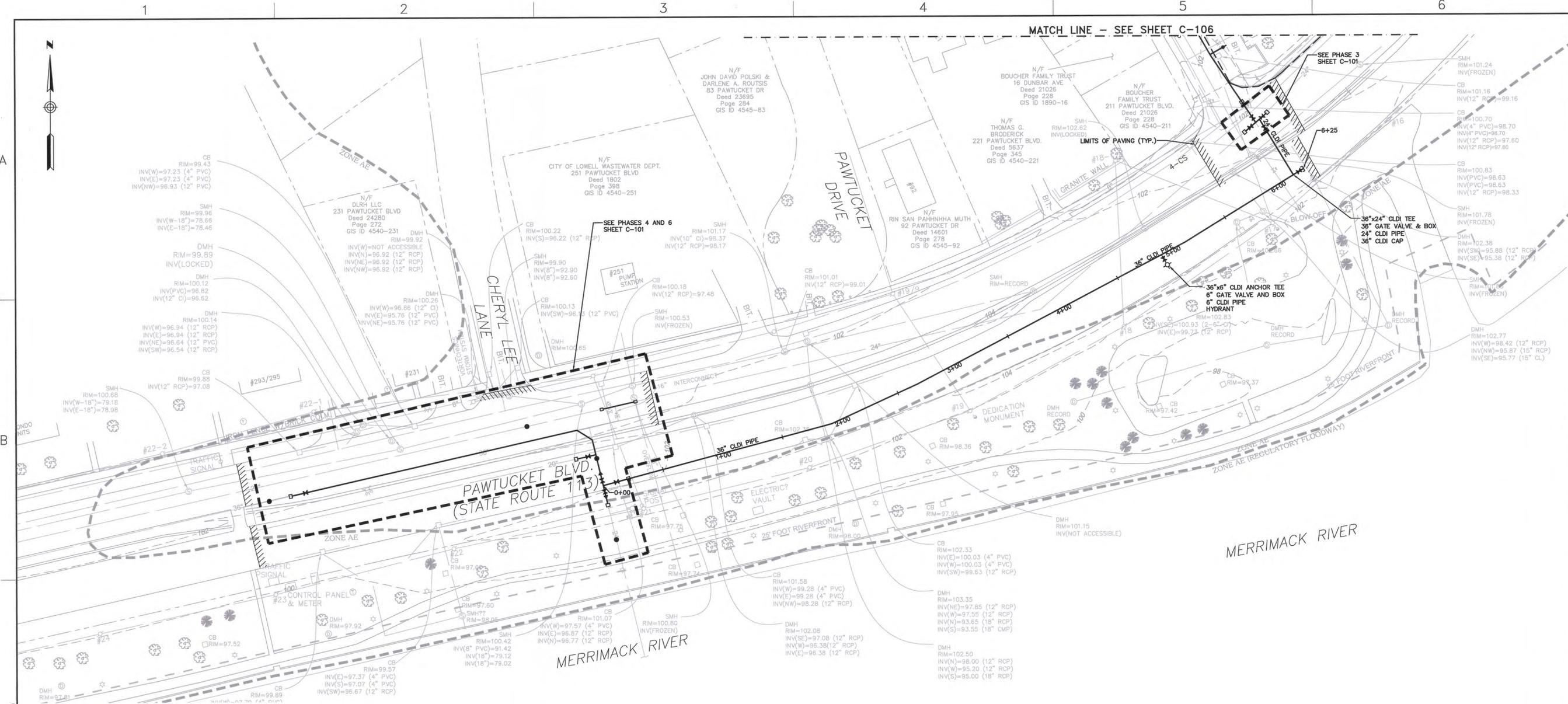
**C-104**

- NOTES:
1. WORK SHOWN CONNECTS TO LOWELL GENERAL HOSPITAL (LGH) WATER SERVICE. COORDINATE WORK WITH OWNER TO MAINTAIN UNINTERRUPTED SERVICE TO LGH DURING CONSTRUCTION. TEMPORARY SERVICE CONNECTION AND NEW SERVICE CONNECTION MAY REQUIRE NIGHT WORK.
  2. INSTALL GATE VALVES AND APPURTENANCE REQUIRED TO ISOLATE WATER MAIN PRIOR TO BEGINNING WATER MAIN REPLACEMENT WORK.
  3. TRENCHES FOR INSTALLATION OF ISOLATION VALVES SHALL BE PRE-EXCAVATED AND PLATED TO MINIMIZE SHUT DOWN TIME.
  4. NOTIFY ALL WATER USERS IMPACTED BY THE WORK A MINIMUM OF 48 HOURS PRIOR TO ANY DISRUPTION IN WATER SERVICE.
  5. REMOVAL OF EXISTING HYDRANTS AND IN-KIND REPLACEMENT REPLACEMENT OF SIDEWALK DAMAGED BY HYDRANT REMOVAL SHALL BE CONSIDERED INCIDENTAL TO THE WORK.
  6. CAPPING OF EXISTING WATER MAINS, REMOVAL OF EXISTING VALVE BOXES, AND ASSOCIATED SURFACE RESTORATION SHALL BE CONSIDERED INCIDENTAL TO THE WORK.









**WATER MAIN PROFILE STA. 0+00 TO STA. 6+25**

HORIZONTAL SCALE: 1" = 40'  
VERTICAL SCALE: 1" = 4'

BAR SCALE  
1" = 40'  
CHECK GRAPHIC SCALE BEFORE USING

- NOTES:
1. INSTALL GATE VALVES AND APPURTENANCE REQUIRED TO ISOLATE WATER MAIN PRIOR TO BEGINNING WATER MAIN REPLACEMENT WORK.
  2. TRENCHES FOR INSTALLATION OF ISOLATION VALVES SHALL BE PRE-EXCAVATED AND PLATED TO MINIMIZE SHUT DOWN TIME.
  3. NOTIFY ALL WATER USERS IMPACTED BY THE WORK A MINIMUM OF 48 HOURS PRIOR TO ANY DISRUPTION IN WATER SERVICE.
  4. REMOVAL OF EXISTING HYDRANTS AND IN-KIND REPLACEMENT REPLACEMENT OF SIDEWALK DAMAGED BY HYDRANT REMOVAL SHALL BE CONSIDERED INCIDENTAL TO THE WORK.
  5. CAPPING OF EXISTING WATER MAINS, REMOVAL OF EXISTING VALVE BOXES, AND ASSOCIATED SURFACE RESTORATION SHALL BE CONSIDERED INCIDENTAL TO THE WORK.

\\ANDOVER\Projects\227251\_Lowell\_MA - FEB 2012\Map\Contract 2 - Water\_Main\Drawings\227251\_C10X.dwg, Feb 03, 2014 - 10:23am  
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DESIGNED BY: TRP	CHECKED BY: ADL	
DRAWN BY: RCP		2/27/2014 10:06:49am

**PHASE 5 - PAWTUCKET BLVD.  
STA 0+00 TO 6+25**

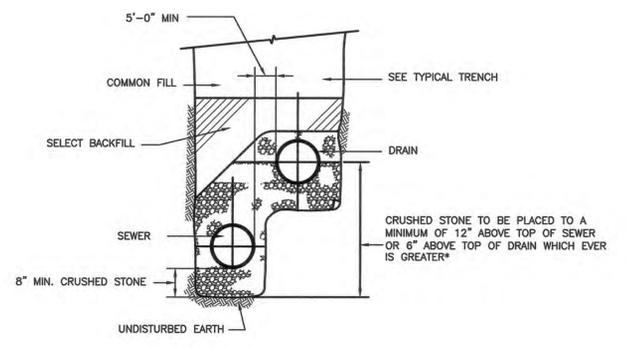
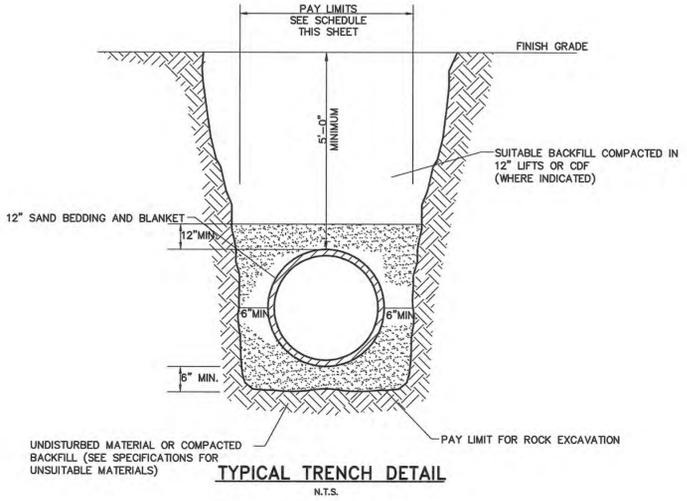
LOWELL REGIONAL WATER UTILITY  
LOWELL, MASSACHUSETTS

REDUNDANT TRANSMISSION MAIN

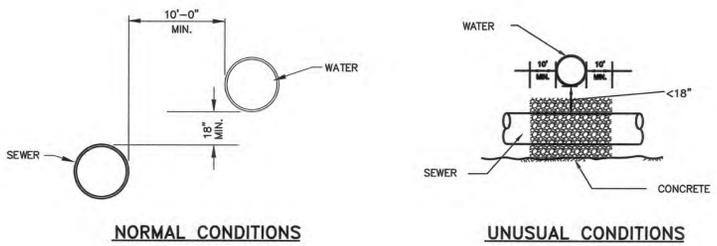
JOB NO.: 227251  
DATE: FEBRUARY 2014  
SCALE: AS NOTED  
SHEET: 8 OF 11

**C-107**

TRENCH, PAVEMENT & ROCK WIDTH PAY LIMITS					
TRENCH DEPTH	NOMINAL PIPE DIAMETER (D)	TRENCH WIDTH	TEMPORARY AND BINDER PAVEMENT	PERMANENT TOP PAVEMENT	ROCK EXCAVATION
<12'	LESS THAN 24"	4' - 0"	4' - 0"	6' - 0"	4' - 0"
<12'	24 TO 30"	5' - 0"	5' - 0"	7' - 0"	5' - 0"
<12'	GREATER THAN 30"	6' - 0"	6' - 0"	8' - 0"	6' - 0"
12' TO 16'	LESS THAN 24"	5' - 0"	5' - 0"	7' - 0"	5' - 0"
12' TO 16'	24 TO 30"	6' - 0"	6' - 0"	8' - 0"	6' - 0"
12' TO 16'	GREATER THAN 30"	7' - 0"	7' - 0"	9' - 0"	7' - 0"
>16'	LESS THAN 24"	6' - 0"	6' - 0"	8' - 0"	6' - 0"
>16'	24 TO 30"	7' - 0"	7' - 0"	9' - 0"	7' - 0"
>16'	GREATER THAN 30"	8' - 0"	8' - 0"	10' - 0"	8' - 0"

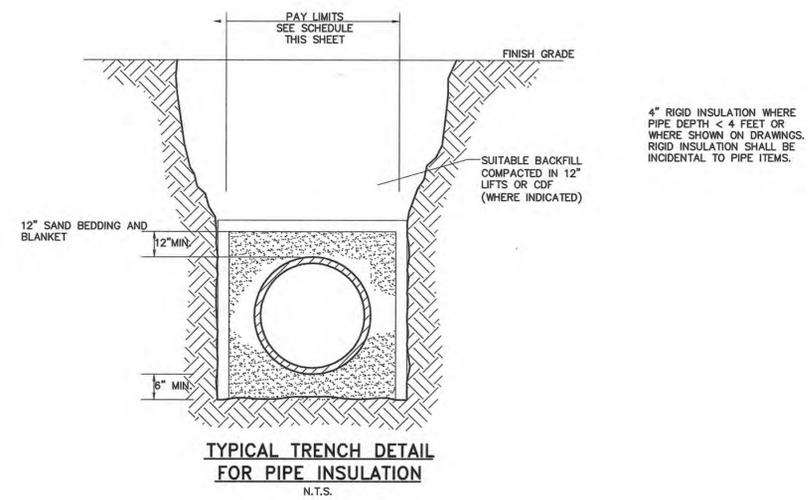


CRUSHED STONE CONFORMING TO ASTM C33 GRADATION 67 SHALL BE USED AS BEDDING FOR EACH PIPE FROM A MINIMUM OF 8 INCHES BELOW THE PIPE TO MID-DIAMETER OF THE PIPE. A SAND CUSHION, COMPACTED IN 12-INCH LAYERS SHALL BE USED FROM MID-DIAMETER TO 12 INCHES MINIMUM OVER EACH PIPE. COMPACT SELECT COMMON FILL MAY BE USED FROM THE TOP OF THE SAND CUSHION OF THE LOWER PIPE TO BOTTOM OF THE CRUSHED STONE BEDDING FOR THE UPPER PIPE.



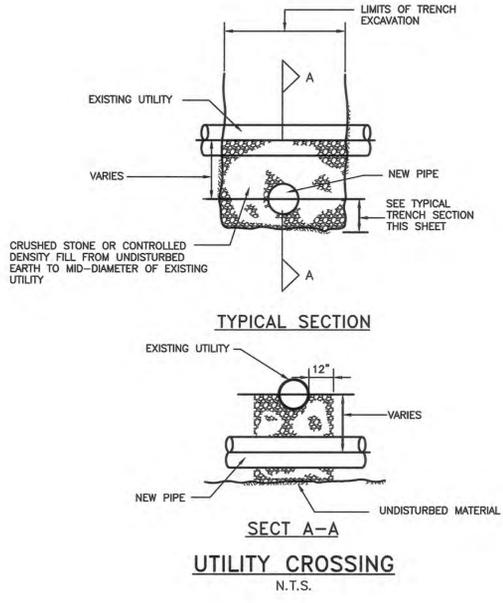
- NOTES:**  
THE SEPARATION OF WATER MAINS AND SEWERS SHALL COMPLY WITH THE FOLLOWING GENERAL REQUIREMENTS.
- A. PARALLEL INSTALLATION:**
- NORMAL CONDITIONS:** THE INSIDE EDGE OF A WATER MAIN SHALL BE LAID AT LEAST 10 FEET HORIZONTALLY FROM THE INSIDE EDGE OF ANY SANITARY SEWER, STORM SEWER OR SEWER MANHOLE.
  - UNUSUAL CONDITIONS:** WHEN LOCAL CONDITIONS PREVENT A HORIZONTAL SEPARATION OF 10 FEET, THE INSIDE EDGE OF A WATER MAIN MAY BE LAID A MINIMUM OF 5 FEET FROM THE INSIDE EDGE OF A SEWER PROVIDED THAT THE BOTTOM OF THE WATER MAIN IS AT LEAST 18 INCHES HIGHER THAN THE TOP OF THE SEWER (SEE DETAIL) AND THE WATER MAIN IS IN A SEPARATE TRENCH OR ON AN UNDISTURBED EARTH SHELF.
- B. CROSSINGS:**
- NORMAL CONDITIONS:** WHEREVER POSSIBLE, SEWERS CROSSING WATER MAINS SHALL BE LAID A MINIMUM VERTICAL DISTANCE OF 18" FROM OUTSIDE OF WATER MAIN TO OUTSIDE OF SEWER. WHERE WATER MAIN CROSSES UNDER SEWER, ADEQUATE STRUCTURAL SUPPORT SHALL BE PROVIDED FOR THE SEWER TO MAINTAIN LINE AND GRADE.
  - UNUSUAL CONDITIONS:** WHEN IT IS IMPOSSIBLE TO OBTAIN 10' HORIZONTAL AND 18" VERTICAL SEPARATION, THE SEWER SHALL BE ENCASED IN CONCRETE 10' ON BOTH SIDES OF THE CROSSING MEASURED PERPENDICULAR TO THE WATER MAIN.

**MINIMUM WATER AND SEWER PIPE SEPARATION DETAIL**  
N.T.S.

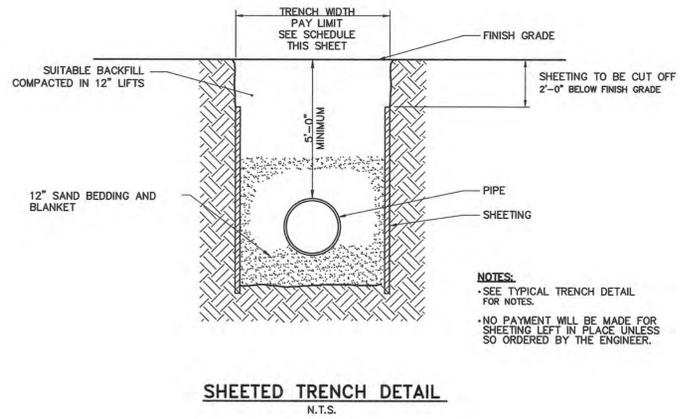


4" RIGID INSULATION WHERE PIPE DEPTH < 4 FEET OR WHERE SHOWN ON DRAWINGS. RIGID INSULATION SHALL BE INCIDENTAL TO PIPE ITEMS.

**TYPICAL TRENCH DETAIL FOR PIPE INSULATION**  
N.T.S.



**SECT A-A UTILITY CROSSING**  
N.T.S.



- NOTES:**
- SEE TYPICAL TRENCH DETAIL FOR NOTES.
  - NO PAYMENT WILL BE MADE FOR SHEETING LEFT IN PLACE UNLESS SO ORDERED BY THE ENGINEER.

**SHEETED TRENCH DETAIL**  
N.T.S.

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		ADL	
		HCP	

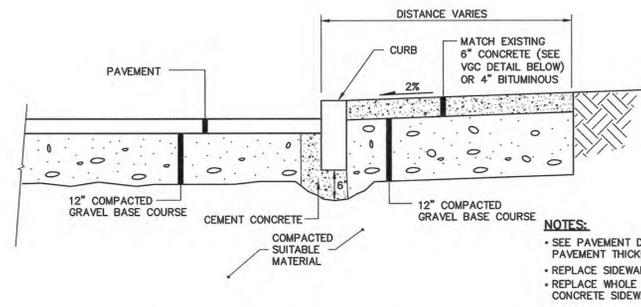
**WATER MAIN DETAILS 1**

LOWELL REGIONAL WATER UTILITY  
LOWELL, MASSACHUSETTS

REDUNDANT TRANSMISSION MAIN

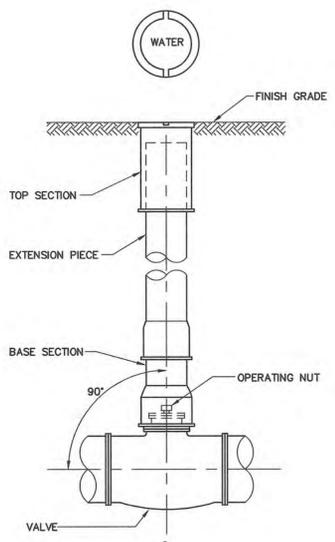
JOB NO.: 227251  
DATE: FEBRUARY 2014  
SCALE: AS NOTED  
SHEET: 9 OF 11

**C-501**

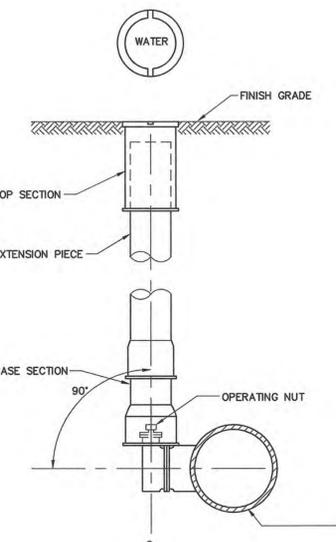


**TYPICAL REPLACEMENT SIDEWALK DETAIL**  
N.T.S.

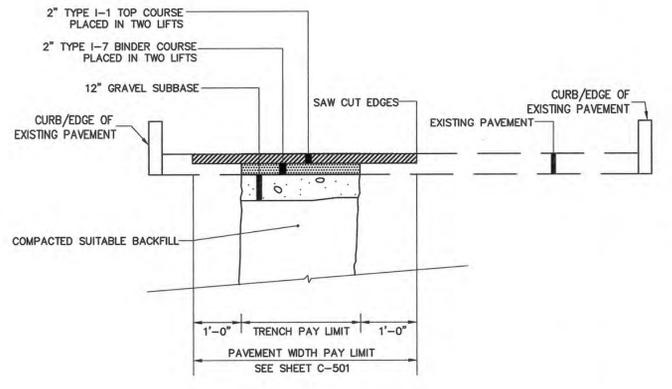
- NOTES:**
- SEE PAVEMENT DETAILS FOR PAVEMENT THICKNESS.
  - REPLACE SIDEWALK IN KIND.
  - REPLACE WHOLE PANELS FOR CONCRETE SIDEWALK REPAIR.



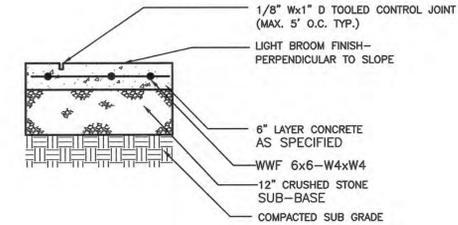
**VALVE WITH VALVE BOX, 18" AND SMALLER**  
N.T.S.



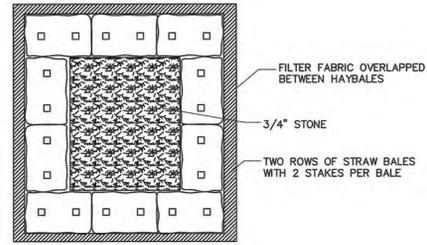
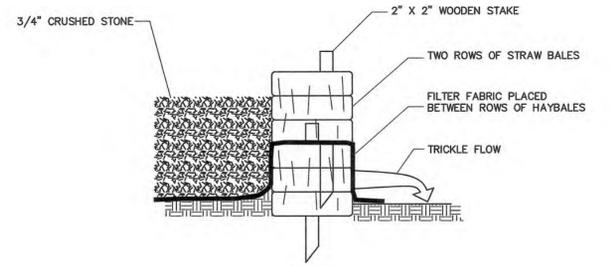
**VALVE WITH VALVE BOX, LARGER THAN 18"**  
N.T.S.



**PERMANENT TRENCH PAVEMENT SECTION**  
N.T.S.

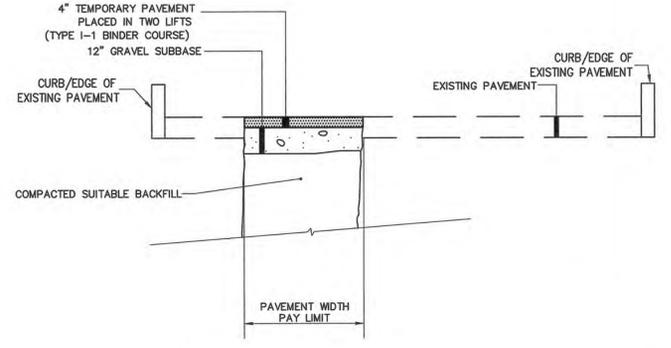


**CONCRETE WALK**  
N.T.S.



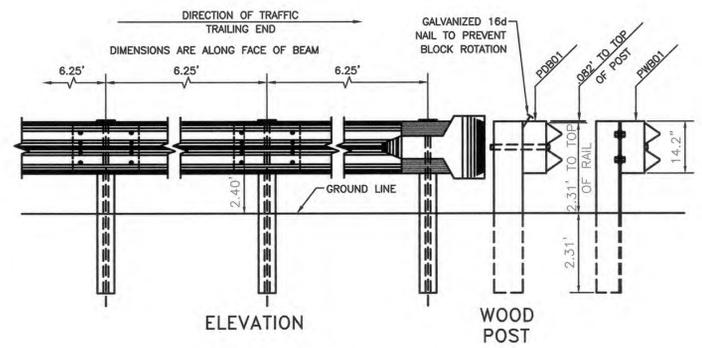
- DETENTION BASIN NOTES:**
1. ALL BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY, AT NO ADDITIONAL COST TO THE OWNER.
  2. SHOULD THE BARRIER DECOMPOSE OR BECOME INEFFECTIVE BEFORE THE END OF THE EXPECTED LIFE AND THE BARRIER IS STILL NECESSARY, IT SHALL BE REPLACED PROMPTLY.
  3. SEDIMENT DEPOSITS SHALL BE REMOVED AFTER EACH STORM EVENT. THEY MUST BE REMOVED WHEN THE DEPOSITS REACH APPROXIMATELY ONE-HALF THE HEIGHT OF THE BARRIER.
  4. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE BARRIER IS NO LONGER REQUIRED SHALL BE REMOVED AND DISPOSED.

**DETENTION BASIN DETAIL**  
N.T.S.



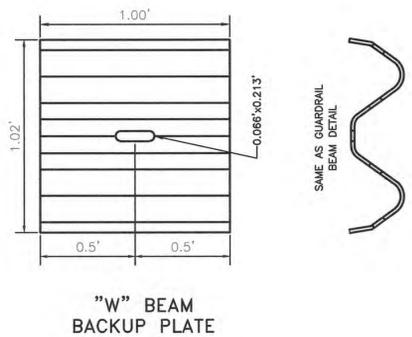
- NOTES:**
1. CONTRACTOR SHALL LAY 4 INCHES OF TEMPORARY PAVEMENT COMPACTED IN TWO LIFTS.
  2. TRENCHES WITHIN PAWTUCKET BOULEVARD MUST BE PAVED DAILY.

**TEMPORARY TRENCH PAVEMENT SECTION**  
N.T.S.



- NOTES:**
1. INTERMEDIATE POST SPACING SHALL BE 6.25' UNLESS OTHERWISE SHOWN.
  2. WOOD POSTS FOR GUARDRAIL SHALL BE 6x8 AND OFFSET BLOCKS SHALL BE 6x8.
  3. BEAM TYPE GUARDRAIL SET ON A RADIUS OF 1.75' OR LESS SHALL BE CIRCULAR GUARDRAIL. OFFSET BRACKETS SHALL BE INSTALLED ON ALL POSTS.
  4. GUARDRAIL TERMINAL END TO BE USED ON THE END OF GUARDRAIL.
  5. IDENTIFICATION LETTERS AND NUMBERS ON DRAWINGS REFER TO THE STANDARD DETAIL DRAWINGS SHOWN IN "A GUIDE TO STANDARDIZED HIGHWAY BARRIER HARDWARE" BY AASHTO-AGC-ARTBA JOINT COMMITTEE.

**GUARDRAIL DETAIL**  
N.T.S.



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			TRP	HCP	

**WATER MAIN DETAILS 2**

LOWELL REGIONAL WATER UTILITY  
LOWELL, MASSACHUSETTS

REDUNDANT TRANSMISSION MAIN

JOB NO.: 227251  
DATE: FEBRUARY 2014  
SCALE: AS NOTED  
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**C-502**

