

ITEM 899 - CURED-IN-PLACE PIPE LINER, AS PER PLAN

899.01 DESCRIPTION. THIS WORK CONSISTS OF FURNISHING AND INSTALLING A CURED-IN-PLACE PIPE (CIPP) LINER IN A HOST CONDUIT. CIPP IS INSERTED INTO THE HOST CONDUIT USING HYDROSTATIC HEAD OR IS MECHANICALLY PULLED INTO PLACE. THE LINER IS CURED WITH STEAM, HOT WATER, OR UV LIGHT. THE LINER MATERIAL USED FOR CIPP CAN BE A RESIN-IMPREGNATED FELT OR GLASS REINFORCED PLASTIC. WHEN INSTALLED, CURED, AND COMPLETE, THE LINER EXTENDS THE LENGTH OF THE HOST CONDUIT IN A CONTINUOUS TIGHT-FITTING MANNER.

899.02 MATERIALS. FURNISH LINER MATERIALS CONFORMING TO:

TEST METHOD	TEST PROPERTY	REQUIREMENT
ASTM D-790	INITIAL MODULUS OF ELASTICITY	MINIMUM 300,000 PSI
ASTM D-790	INITIAL FLEXURAL STRENGTH	MINIMUM 4,500 PSI
ASTM D-2990	LONG-TERM MODULUS OF ELASTICITY (50 YR)	MINIMUM 150,000 PSI
ASTM D-2990	LONG-TERM FLEXURAL STRENGTH (50 YR)	MINIMUM 2,250 PSI

SUBMIT TO THE ENGINEER CERTIFIED TEST DATA AND A LETTER OF CERTIFICATION FROM THE MANUFACTURER THAT STATES THE MATERIAL CONFORMS TO THE SPECIFICATION REQUIREMENTS.

899.03 SHIPMENT AND STORAGE. FOLLOW THE MANUFACTURER'S RECOMMENDATIONS FOR SHIPMENT AND STORAGE FOR ALL MATERIALS. ENSURE THAT THE MATERIAL SAFETY DATA SHEET ACCOMPANIES THE MATERIAL.

899.04 SUBMITTALS. SUBMIT THE DETAILED LINER INSTALLATION PROCEDURES TO THE ENGINEER FOR ACCEPTANCE AT LEAST TEN WORKING DAYS BEFORE BEGINNING WORK INCLUDING THE FOLLOWING INFORMATION:

1. ALL CALCULATIONS PERFORMED AND STAMPED BY A REGISTERED ENGINEER.

DESIGN THE CIPP LINER SYSTEM ACCORDING TO ASCE MANUAL OF REPORTS NO. 145 "DESIGN OF CLOSE-FIT LINERS FOR THE REHABILITATION OF GRAVITY PIPES"(ASCE MOP-145) OR FINITE ELEMENT ANALYSIS WITH APPROPRIATE BOUNDARY CONDITIONS USING DESIGN STATE III. PROVIDE A LOAD RATING ANALYSIS IF REQUIRED PER THE BRIDGE DESIGN MANUAL SECTION 900 TO THE DISTRICT BRIDGE ENGINEER.

DESIGN THE LINER USING LOADING PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS. USE VEHICULAR LIVE LOAD FROM THE ODOT BRIDGE DESIGN MANUAL. DESIGN USING THE FOLLOWING LOAD AND RESISTANCE FACTORS:

TABLE 899.04-1  
DESIGN LOAD FACTORS

LOAD	LOAD FACTOR
GROUND WATER	1.6*
DEAD LOAD	1.2
LIVE LOAD	1.6

\* VALUE OF 1.2 MAY BE USED IF SEASONAL GROUND WATER TABLE OBSERVATIONS ARE USED TO DETERMINE THE MAXIMUM GROUND WATER HEIGHT

TABLE 899.04-2  
DESIGN RESISTANCE FACTORS

DESIGN PARAMETER	RESISTANCE FACTOR
LONG-TERM FLEXURAL STRENGTH	0.85
LONG-TERM FLEXURAL MODULUS	0.80
LONG-TERM BUCKLING STABILITY	0.80
CONSTRAINED SOIL MODULUS OF REACTION FOR THE BACKFILL SOIL	0.80 **

\*\* VALUE OF 0.9 MAY BE USED IF GEOTECHNICAL INVESTIGATIONS ARE PERFORMED

USE THE FOLLOWING VARIABLES FOR CIPP LINER DESIGN:

TABLE 899.04-3  
DESIGN CIPP LINER VARIABLES

VARIABLE	VALUE	UNITS
GROUND WATER HEIGHT	1.5 FEET ABOVE THE TOP OF THE PIPE AND 5 FEET FROM THE INVERT NOT TO EXCEED THE SURFACE ELEVATION ABOVE THE PIPE UNLESS SITE CONDITIONS OR PLANS INDICATE A HIGHER VALUE	FT
SOIL DENSITY	120 MINIMUM	LB/CF
LATERAL EARTH PRESSURE COEFFICIENT	0.5	N/A
LINER POISSON'S RATIO	0.3	N/A
DOCUMENT ALL ASSUMPTIONS AND ORIGIN OF ALL OTHER VARIABLES USED IN THE DESIGN		

2. THICKNESS OF CURED PIPE LINER TO BE INSTALLED IN THE HOST PIPE.
3. METHODS OF CLEANING THE HOST PIPE.
4. PLAN TO BYPASS FLOW AROUND THE HOST PIPE.
5. METHODS OF REPAIRING EXISTING PIPE WALLS.
6. PIPE LINER CURING PLAN.
7. METHODS FOR FINISHING LINER PIPE ENDS.
8. METHODS FOR COLLECTING PROCESS WATER.
9. METHODS OF REPAIRING CIPP AFTER INSTALLATION IF DEFECTIVE.
10. SITE SPECIFIC HEALTH AND SAFETY PLAN.
11. CERTIFICATION LETTER FROM THE MANUFACTURER STATING THAT THE CONTRACTOR IS AN APPROVED INSTALLER OF THE LINER SYSTEM.
12. INSTALLATION PLAN PER CMS 611.04.B FOR THE CIPP LINER AND ANY MANHOLE STRUCTURE OR PIPE TO BE REMOVED AND REPLACED TO ALLOW ACCESS FOR EQUIPMENT AND MATERIALS.

ALLOW AT LEAST TEN WORKING DAYS FOR REVIEW. DO NOT BEGIN WORK UNTIL THE SUBMITTALS HAVE BEEN ACCEPTED BY THE ENGINEER. ANY CHANGES OR DEVIATIONS FROM THE ACCEPTED SUBMITTALS MUST BE RESUBMITTED. THE ENGINEER WILL NOT GRANT AN EXTENSION OF TIME BECAUSE OF INCOMPLETE SUBMITTALS.

899.05 CONSTRUCTION

A. PREPARATION. CLEAN AND REMOVE DEBRIS, INCLUDING ANY OBSTRUCTIONS, FROM THE HOST PIPE TO THE EXTENTS NECESSARY FOR PROPER INSTALLATION OF THE PIPE LINER PRIOR TO INSTALLATION.

B. FLOW BYPASS. PREVENT THE ACCUMULATION AND FLOW OF WATER THROUGH THE HOST PIPE AND LINER UNTIL AFTER THE WORK IS COMPLETE. WHERE NECESSARY TO ADEQUATELY COMPLETE THE WORK, BYPASS FLOWS AROUND THE HOST PIPE. ENSURE CONFORMANCE WITH ALL WATERWAY SPECIAL PROVISIONS REQUIREMENTS ASSOCIATED WITH THE PROJECT AND ALL APPLICABLE ENVIRONMENTAL LAWS. AFTER THE LINING PROCESS BEGINS, MAINTAIN THE BYPASS FLOW UNTIL THE LINING PROCESS IS COMPLETE.

C. PRE-INSTALLATION INSPECTION. AFTER CLEANING AND BEFORE BEGINNING THE LINING PROCESS, HAVE EXPERIENCED PERSONNEL INSPECT THE HOST PIPE TO ENSURE THERE ARE NO OBSTRUCTIONS THAT WOULD HINDER THE LINING PROCESS. NOTE THE LOCATIONS OF ALL LATERAL CONNECTIONS TO THE HOST PIPE. PERFORM A PRE-INSTALLATION VIDEO SURVEY OF THE HOST PIPE AND PROVIDE A COPY OF THE VIDEO TO THE ENGINEER. PROVIDE A CRAWLER MOUNTED RECORDING DEVICE THAT IS CAPABLE OF RECORDING VIDEO WITH THE CONDUIT IDENTIFICATION, LOCATION AND TYPE SHOWN ON THE VIDEO. FURNISH THE VIDEO RECORDING IN MPEG2 FORMAT AT A RESOLUTION OF 720 X 480 ON ONE OF THE FOLLOWING MEDIA TYPES: PORTABLE HARD DRIVE, FLASH DRIVE OR AS DETERMINED APPROPRIATE BY THE ENGINEER.

D. MATERIAL. INSPECT ALL PIPE LINER MATERIALS FOR DEFECTS IN THE PRESENCE OF THE ENGINEER PRIOR TO INSTALLATION. THE LINER MUST BE HOMOGENEOUS THROUGHOUT, UNIFORM IN COLOR, FREE OF TEARS, HOLES, FOREIGN MATERIALS, BLISTERS, OR OTHER DELETERIOUS FAULTS. ANY MATERIAL FOUND TO HAVE FLAWS OR DEFECTS WILL BE REJECTED AND MUST BE REPLACED. FOLLOW ALL PROCEDURES TO PREPARE THE MATERIAL FOR INSTALLATION IN COMPLIANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. ANY MATERIAL NOT PROPERLY PREPARED WILL BE REJECTED.

E. INSTALLATION. INSTALL THE PIPE LINER PER ASTM F1216, ASTM F1743, ASTM F2019, OR ASTM D5813. HOT WATER, STEAM, OR UV CURING IS PERMITTED. SUBMIT A COPY OF THE CURE LOGS FOR EACH RUN. MANAGE ALL PROCESS WATER AND CONDENSATE FROM STEAM USED IN THE INSTALLATION AND CURING PROCESS AS A LIQUID WASTE PER CMS 107.19. DO NOT DISCHARGE ANY LIQUID WASTE FROM PROCESS WATER, CONDENSATE, OR CLEANING OF INSTALLED PIPE LINER WITHOUT APPROPRIATE REGULATORY PERMITS.

F. FINISH. CUT EXCESS LINER PIPE FLUSH WITH THE HOST PIPE OR AS RECOMMENDED IN THE MANUFACTURER'S INSTALLATION PROCEDURES. THE FINISHED PRODUCT MUST BE CONTINUOUS OVER THE LENGTH OF THE AREA OF THE PIPE RELINED AND BE WITHOUT DRY SPOTS, WRINKLING, LIFTS, DELAMINATION, SPLITTING AND RUPTURES. IF ANY UNSATISFACTORY CONDITION IS PRESENT IN THE LINED PIPE, PROVIDE A SUITABLE REPAIR AS ACCEPTED BY THE ENGINEER. COLLECT AND APPROPRIATELY DISPOSE OF ALL LINER SHAVINGS AND EXCESS MATERIALS CREATED DURING EXECUTION OF THE WORK.

G. LINER THICKNESS. ENSURE THE FINAL INSTALLED LINER THICKNESS IS NOT LESS THAN THE SPECIFIED THICKNESS. ENSURE THE LINER THICKNESS IS NOT MORE THAN TEN (10) PERCENT THICKER THAN THE SPECIFIED THICKNESS. MEASURE FROM PIPE LINER SAMPLE COUPONS PREPARED PER ASTM F1216 SEC. 8.1.

H. AFTER INSTALLATION. RESTORE ALL ACTIVE LATERAL CONNECTIONS. PERFORM A POST-INSTALLATION VIDEO SURVEY OF THE PIPE AND PROVIDE A COPY OF THE VIDEO TO THE ENGINEER. PROVIDE A CRAWLER MOUNTED RECORDING DEVICE THAT IS CAPABLE OF RECORDING VIDEO WITH THE CONDUIT IDENTIFICATION, LOCATION AND TYPE SHOWN ON THE VIDEO. FURNISH THE VIDEO RECORDING IN MPEG2 FORMAT AT A RESOLUTION OF 720 X 480 ON ONE OF THE FOLLOWING MEDIA TYPES: PORTABLE HARD DRIVE, FLASH DRIVE OR AS DETERMINED APPROPRIATE BY THE ENGINEER.

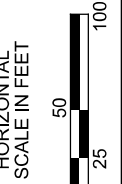
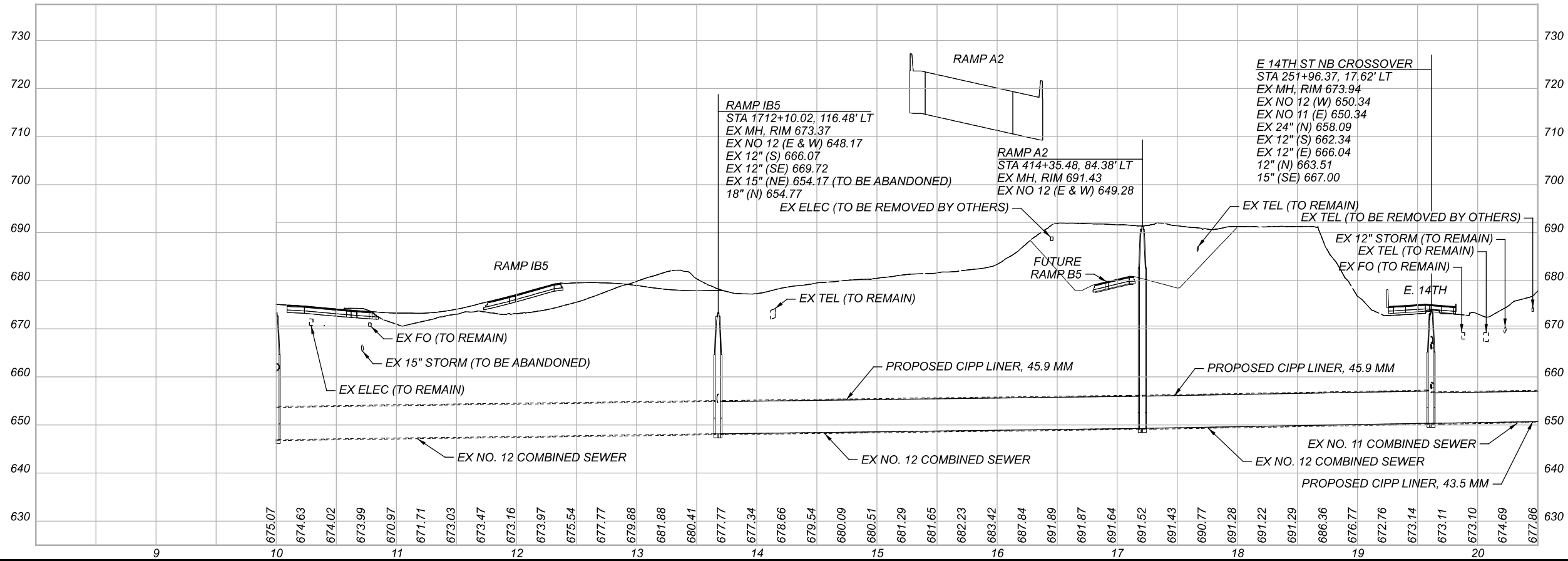
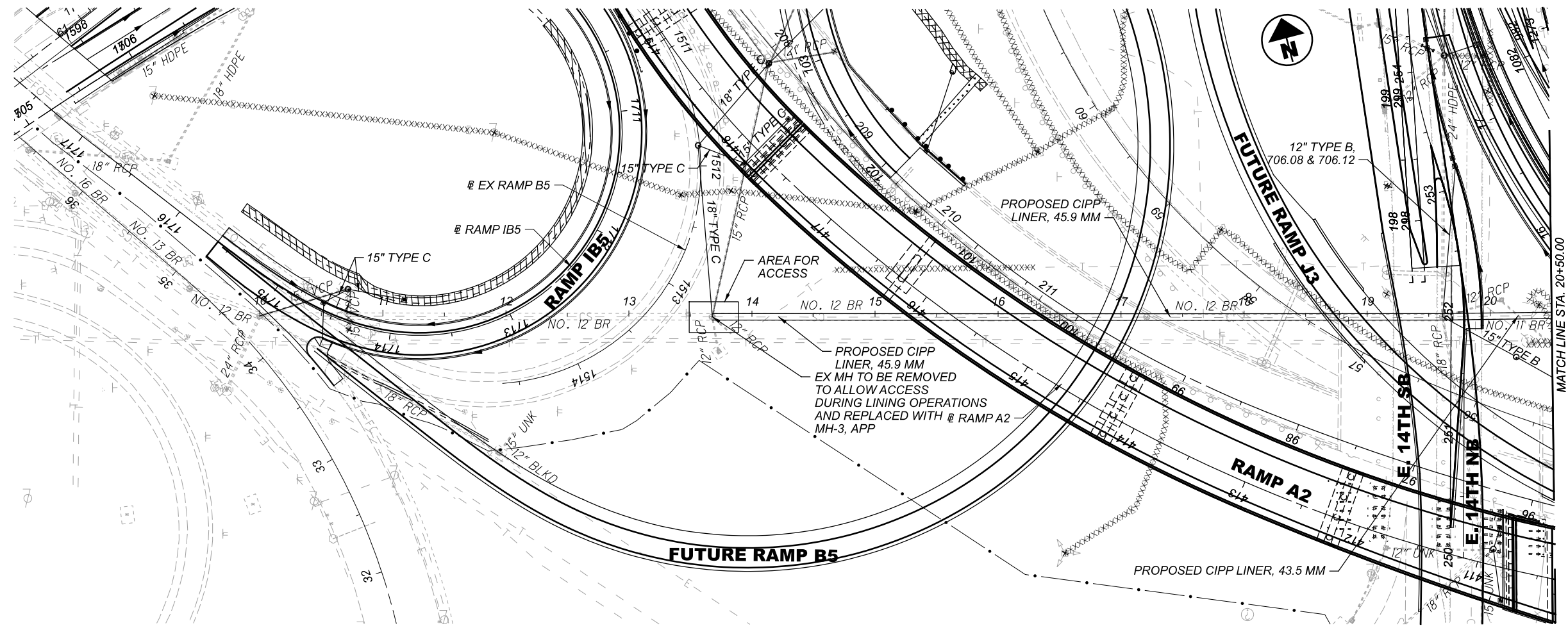
PROVIDE A WRITTEN ANALYSIS OF THE INSPECTION VIDEO IDENTIFYING ALL DEFECTS INCLUDING BUT NOT LIMITED TO DRY SPOTS, WRINKLING, LIFTS, DELAMINATION, SPLITTING, AND RUPTURES.

899.06 METHOD OF MEASUREMENT. THE DEPARTMENT WILL MEASURE CIPP LINER BY THE NUMBER OF FEET OF HOST PIPE LINED. HOST PIPES ARE CITY OF CLEVELAND WATER POLLUTION CONTROL COMBINED BRICK SEWERS. TABULAR DIMENSIONS FOR EGG SHAPED SEWERS CAN BE FOUND ON SHT XXX OF THESE PLANS.

899.07 BASIS OF PAYMENT. PAYMENT FOR CIPP INCLUDES PIPE CLEANING, PIPE PREPARATION, FLOW BYPASS, LINER PIPE, LINER RESINS, WATER, EQUIPMENT, LABOR, TESTING, INSPECTIONS, CLEAN UP, PROPER DISPOSAL OF ANY WASTE.

THE DEPARTMENT WILL PAY FOR ACCEPTED QUANTITIES AT THE CONTRACT PRICE AS FOLLOWS:

ITEM	UNIT	DESCRIPTION
899	FOOT	NO. 6 EGG-SHAPED CURED-IN-PLACE-PIPE LINER
899	FOOT	NO. 7 EGG-SHAPED CURED-IN-PLACE-PIPE LINER
899	FOOT	NO. 10 EGG-SHAPED CURED-IN-PLACE-PIPE LINER
899	FOOT	NO. 11 EGG-SHAPED CURED-IN-PLACE-PIPE LINER
899	FOOT	NO. 12 EGG-SHAPED CURED-IN-PLACE-PIPE LINER



PLAN AND PROFILE - WOODLAND AVE. SEWER  
 SHEET 1 OF 2

DESIGN AGENCY

**Michael Baker**  
 INTERNATIONAL

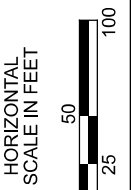
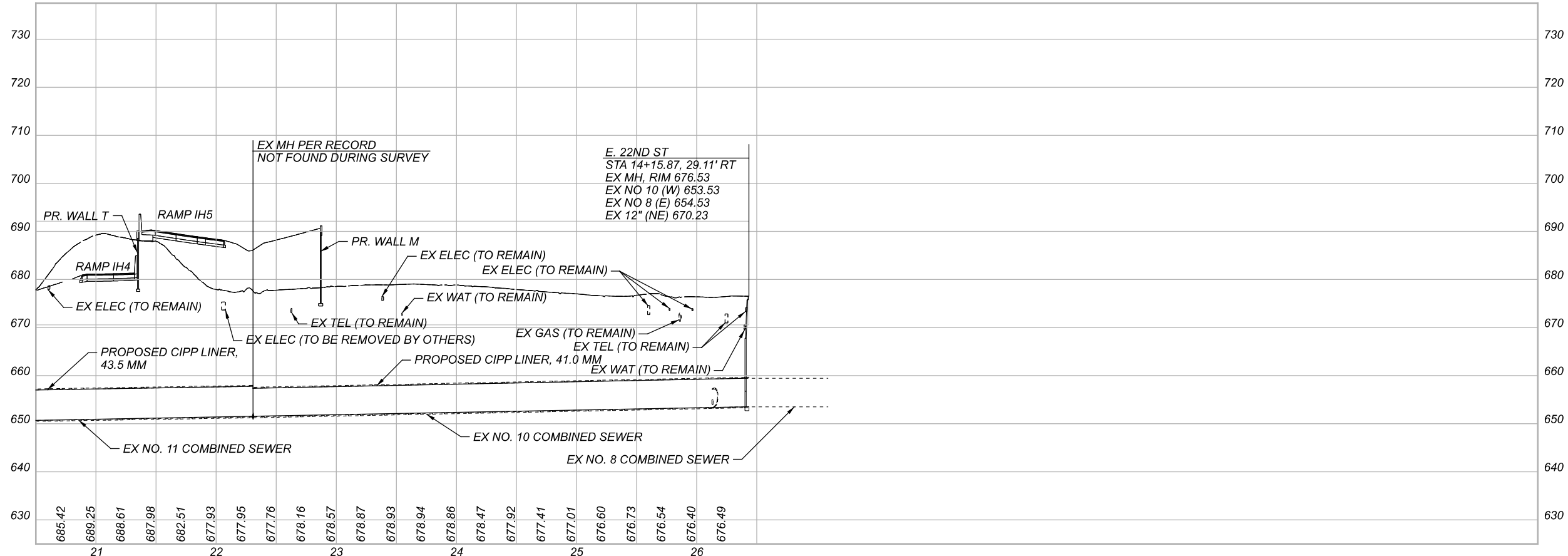
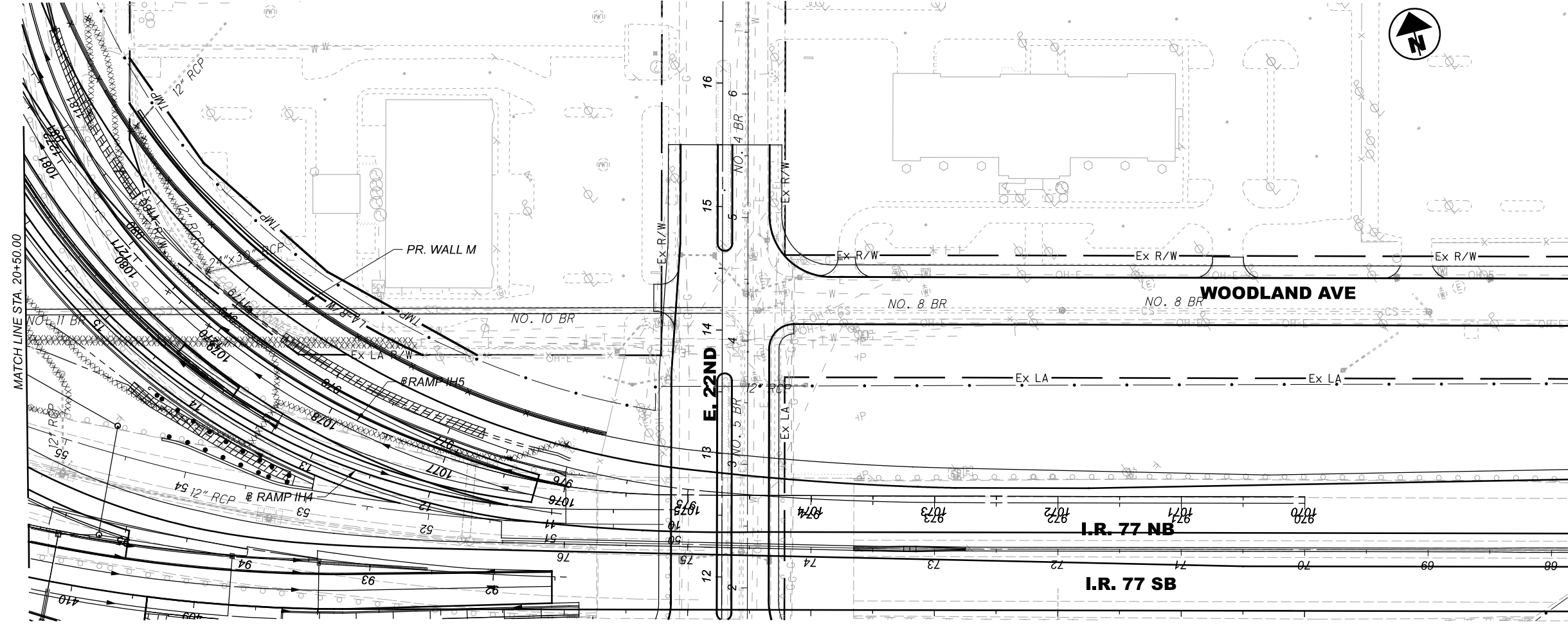
DESIGNER

REVIEWER

PROJECT ID  
 82382

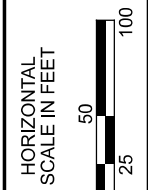
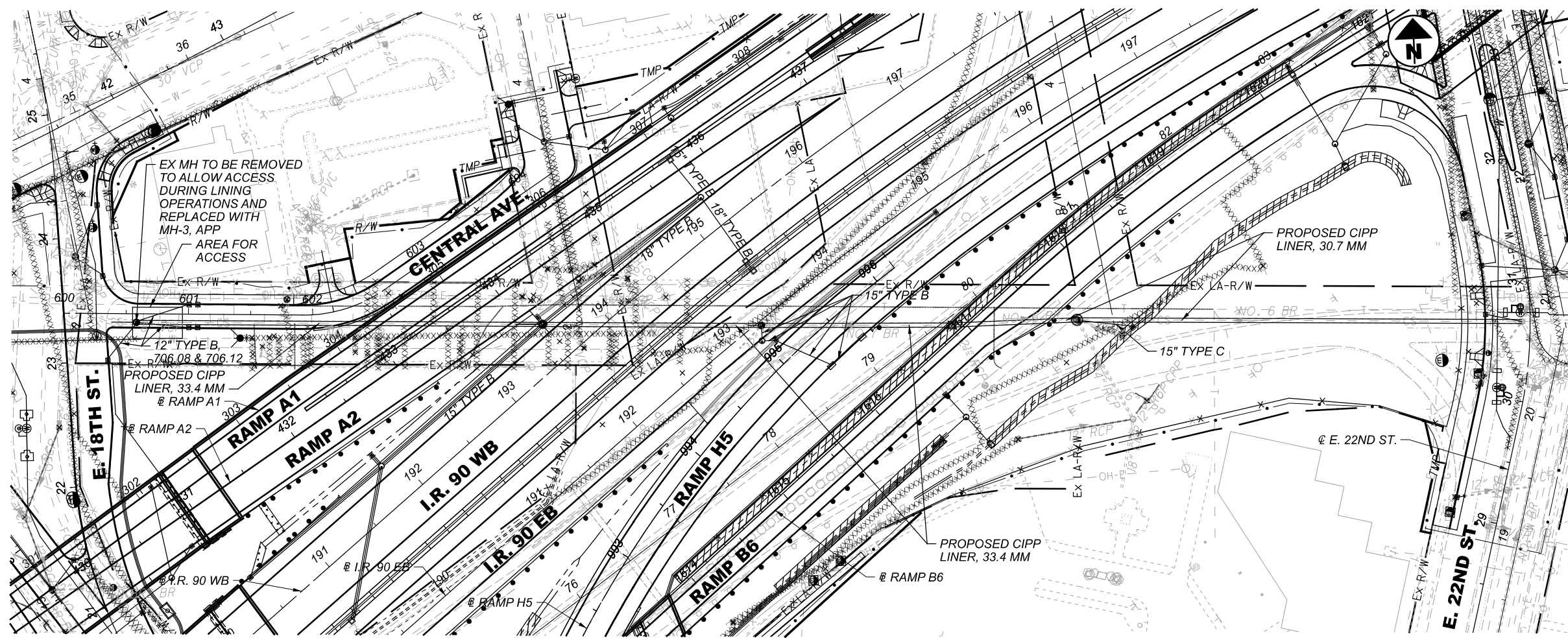
SHEET TOTAL  
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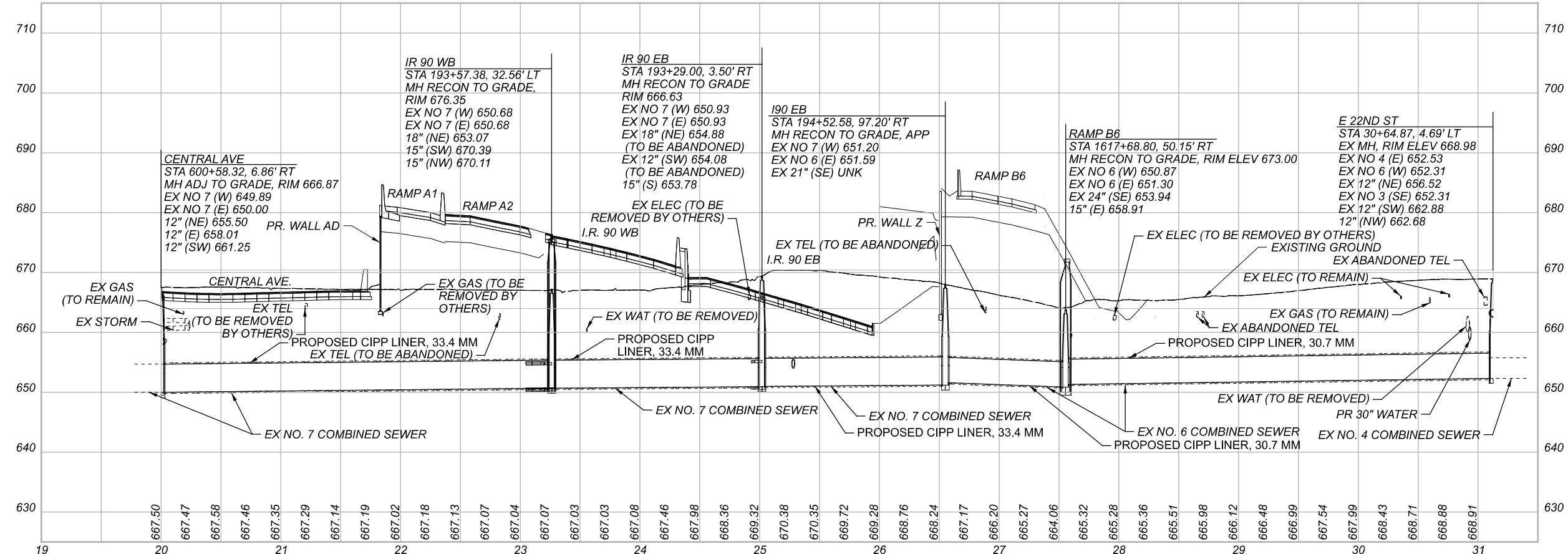


PLAN AND PROFILE - WOODLAND AVE. SEWER  
 SHEET 2 OF 2

DESIGN AGENCY	
DESIGNER	
REVIEWER	
PROJECT ID	82382
SHEET	1158
TOTAL	2339



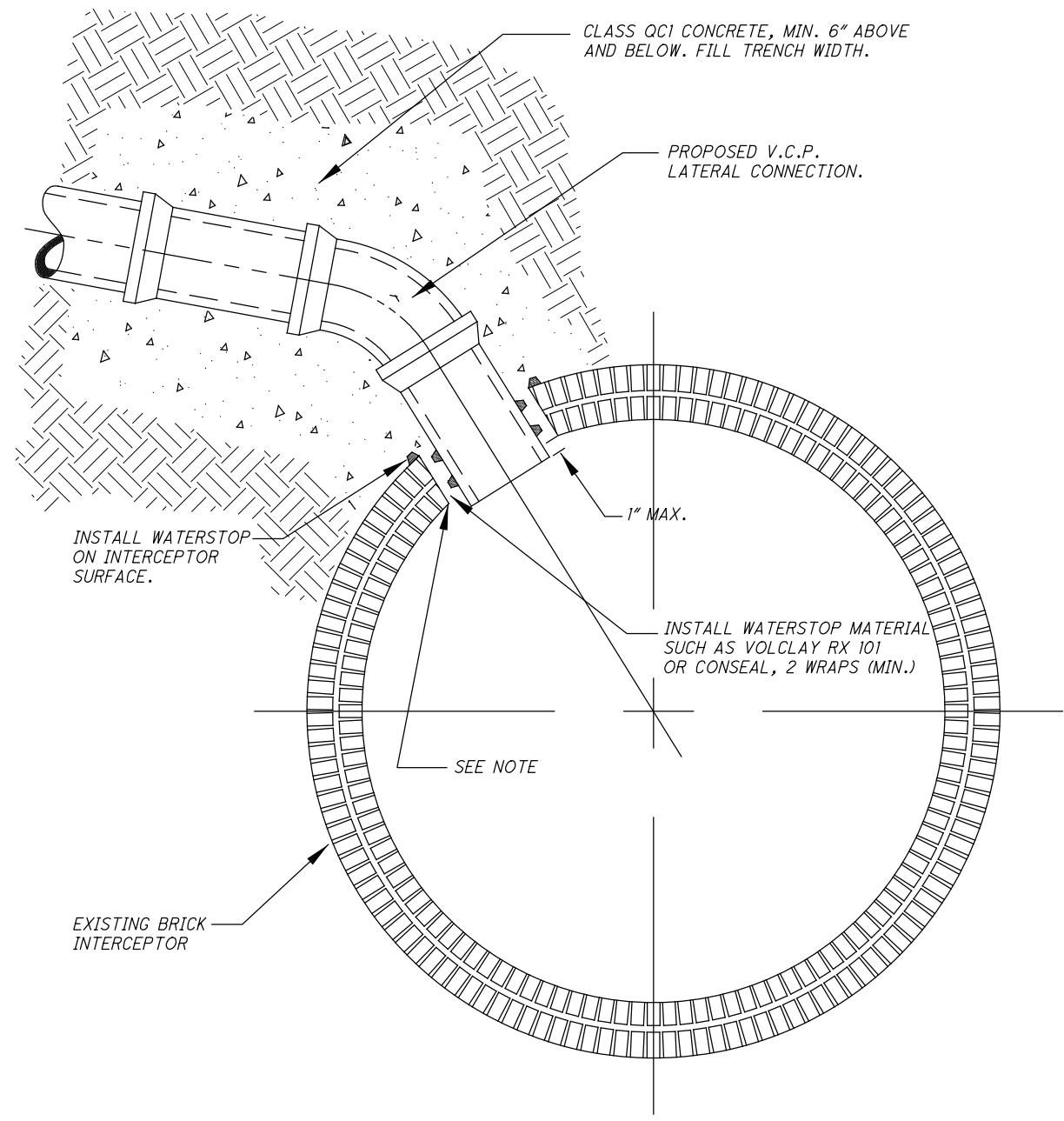
PLAN AND PROFILE - CENTRAL AVE. SEWER  
 SHEET 1 OF 1



DESIGN AGENCY	
DESIGNER	
REVIEWER	
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TOTAL	2339

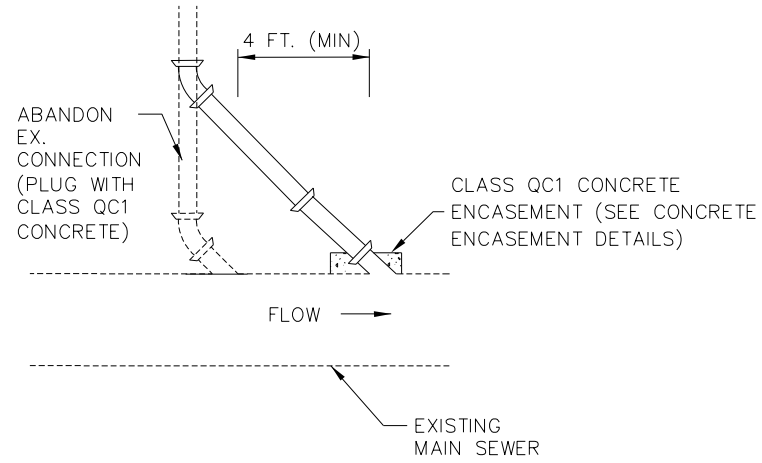
**NOTE:**

1. CORE DRILL HOLE WITH SUFFICIENT CLEARANCE FOR LATERAL PIPE. POSITION LATERAL CONNECTION IN WALL OF THE INTERCEPTOR SUCH THAT ALL RINGS OF BRICK REMAIN SUPPORTED. THE LATERAL SHALL NOT PROTRUDE INTO THE INTERCEPTOR MORE THEN ONE (1) INCH AT ANY POINT. THE CONTRACTOR SHALL TRIM THE CONNECTION END AS NEEDED, TO MEET BOTH OF THESE REQUIREMENTS. THE ANNULAR SPACE BETWEEN THE CORED HOLE AND THE LATERAL SHALL BE COMPLETELY FILLED TO THE INSIDE FACE OF THE INTERCEPTOR, WITH NON-SHRINK HYDRAULIC CEMENT.
2. IF THE CONNECTION IS TO A REINFORCED CONCRETE OR VITRIFIED CLAY PIPE THEN THE LATERAL SHALL BE CONNECTED TO THE SEWER USING A MANUFACTURED BOOT THAT MAKE A WATERTIGHT CONNECTION. IF THE CONNECTION IS TO A BRICK SEWER THEN THE LATERAL SHALL BE CONNECTED BY WRAPPING A WATERSTOP MATERIAL SUCH AS A VOLCLAY RX101 OR EQUAL AROUND THE LATERAL, 2 WRAPS MINIMUM IN ACCORDANCE WITH THE DETAIL. IF WATERSTOP MATERIAL IS USED, THE ANNULAR SPACE BETWEEN THE SEWER WALL AND THE LATERAL SHALL BE FILLED WITH HYDRAULIC CEMENT. EITHER TYPE OF CONNECTION SHALL THEN BE ENCASED IN CONCRETE CLASS QC1.
3. CONNECTIONS SHALL BE ABOVE PIPE SPRING LINE. CONNECTIONS SHALL BE ACCOMPLISHED BY MEANS OF DEFLECTION AT THE PIPE JOINT. THIS DEFLECTION SHALL NOT EXCEED 1/2" FOR 12" CONDUIT OR 3/8" FOR 15" CONDUIT OR THE MAXIMUM ALLOWABLE DEFLECTION AS RECOMMENDED BY THE MANUFACTURER. FOR CONNECTIONS NOT ABLE TO BE MADE BY DEFLECTIONS, CONNECTIONS SHALL BE ACHIEVED BY USING RADIUS CURVE FITTINGS OF 22.5, 30, 45, OR OTHER SUITABLE FITTINGS APPROVED BY THE ENGINEER. THE FITTINGS TO BE USED SHALL BE THAT WHICH MINIMIZES THE LENGTH OF CONNECTION REPLACEMENT.
4. ALL NECESSARY BENDS, BRANCHES, COLLARS, CONCRETE ENCASEMENT SHALL BE INCLUDED IN PAYMENT FOR THE APPROPRIATE ITEM 611 - CONDUIT PAY ITEM.
5. SEE GENERAL NOTES FOR ADDITIONAL CONSTRUCTION AND COORDINATION REQUIREMENTS.

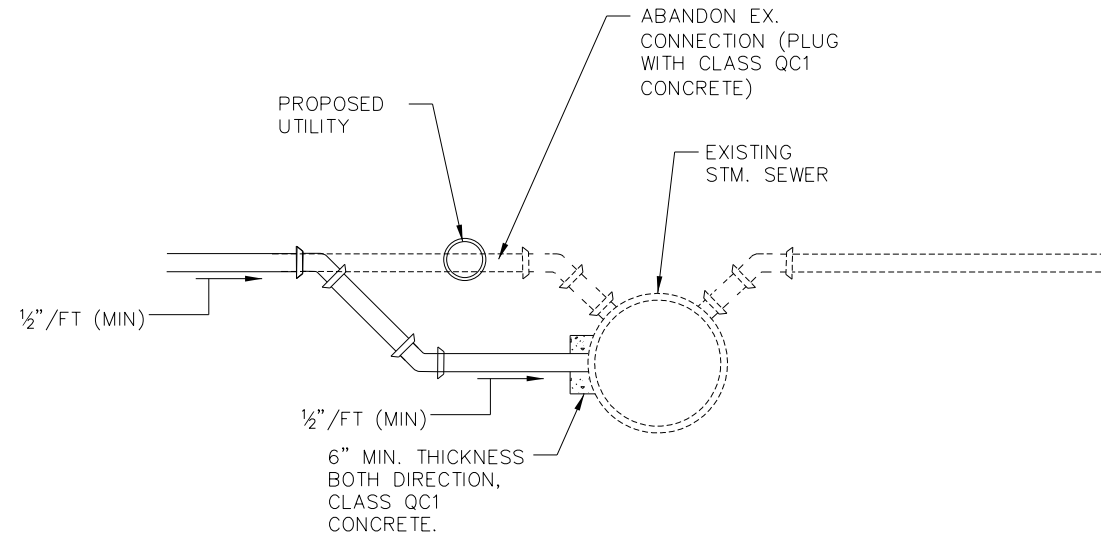


COMBINED SEWER DETAILS  
BLIND CONNECTION

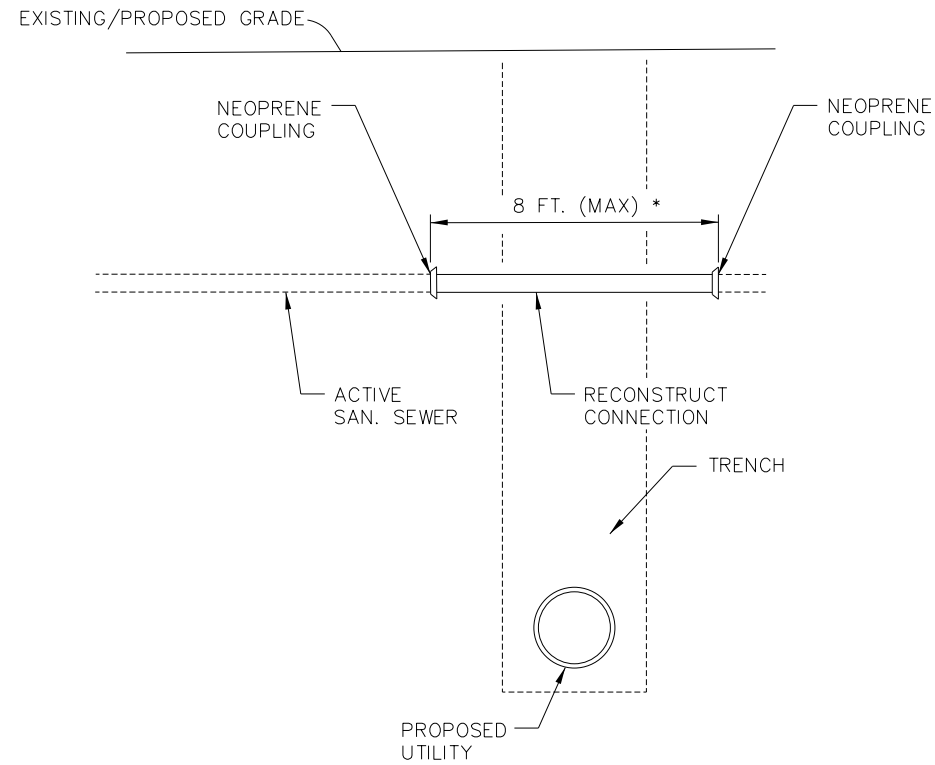
DESIGN AGENCY	
DESIGNER	—
REVIEWER	—
PROJECT ID	82382
SHEET	1160
TOTAL	2339



SANITARY CONNECTION LOWERING PLAN VIEW  
 NOT TO SCALE

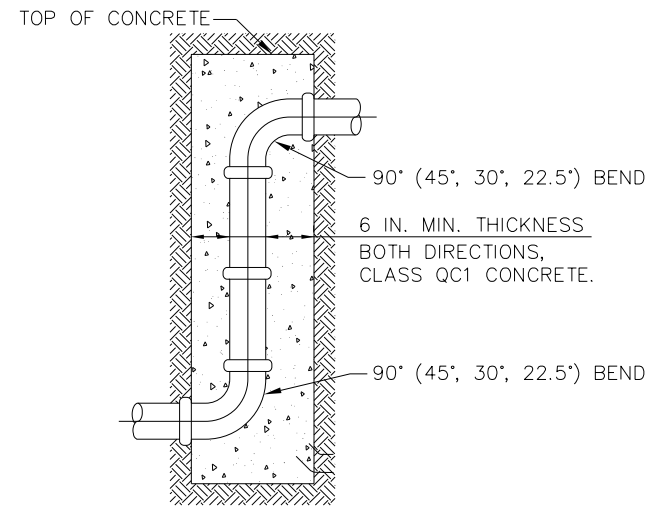


SEWER CONNECTION LOWERING SECTION VIEW  
 NOT TO SCALE



SANITARY CONNECTION TRENCH DETAIL  
 NOT TO SCALE

\* ESTIMATED LENGTH OVER TRENCH.



TYPICAL SEWER RISER DETAIL  
 NOT TO SCALE

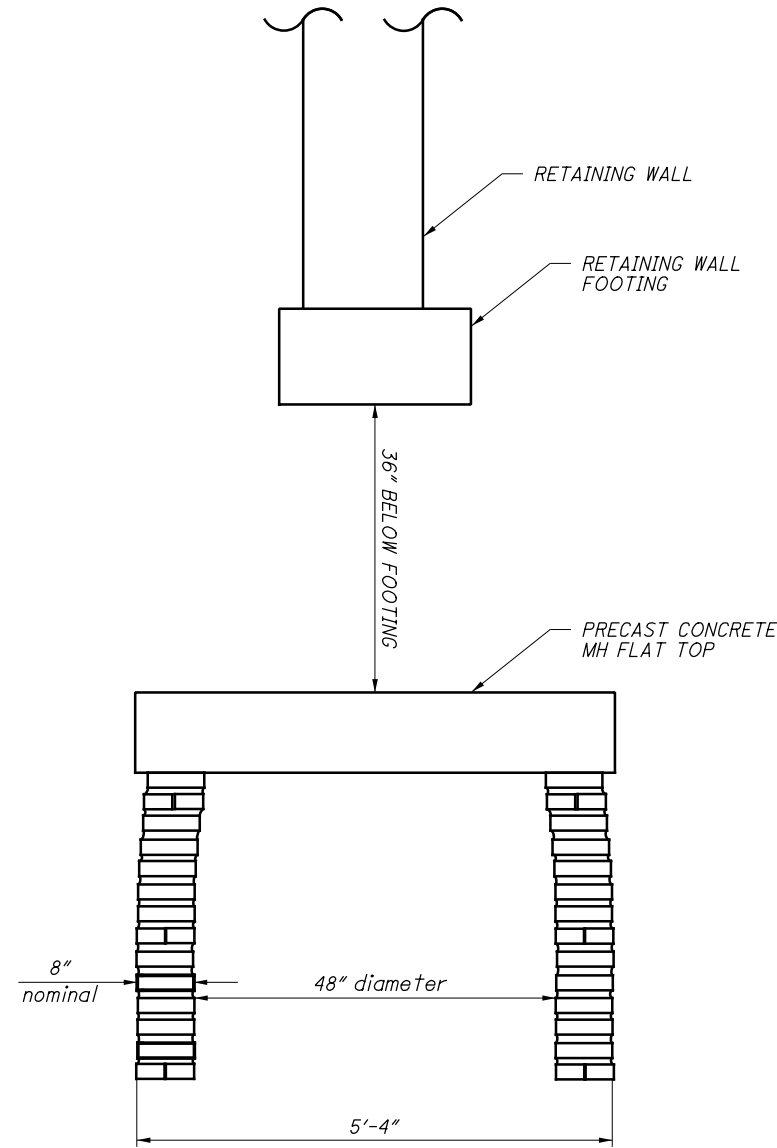
NOTES

- 1.) ABANDON ALL INACTIVE STORM AND SANITARY CONNECTIONS IMPACTED BY CONSTRUCTION.
- 2.) EXISTING CONNECTIONS ARE ANTICIPATED TO RANGE FROM 5" TO 8". EXISTING 5" & 6" CONNECTIONS SHALL BE REPLACED WITH ITEM 611 - 6" CONDUIT, TYPE B(C), 706.08 WITH 706.12 JOINTS.

NOTES

RECONSTRUCT TO GRADE PER CMS 611 EXCEPT THAT THE WALLS OF THE MANHOLE SHALL BE REMOVED ONLY TO THE ELEVATION AS REQUIRED TO CONSTRUCT THE TOP AS PRESCRIBED ON THIS SHEET. TAKE OWNERSHIP OF EXISTING CASTING PER CMS 202.10. DO NOT DAMAGE THE EXISTING COMBINED SEWER CONNECTIONS. PROVIDE A PRECAST CONCRETE FLAT TOP MANHOLE WITH NO CASTING OR HOLE FOR A CASTING.

PAYMENT FOR THE ABOVE WORK SHALL BE MADE AT THE UNIT PRICE BID FOR ITEM 611 - MANHOLE RECONSTRUCTED TO GRADE, AS PER PLAN, EACH, AND SHALL INCLUDE THE REMOVAL, DISPOSAL, EXCAVATION AND BACKFILL INCIDENTAL TO THE REMOVAL, SAW CUTTING, ALL LABOR, TOOLS, EQUIPMENT AND MATERIALS NECESSARY TO RECONSTRUCT TO GRADE.



COMBINED SEWER DETAILS  
 ITEM 611 - MANHOLE RECONSTRUCTED TO GRADE, AS PER PLAN

DESIGN AGENCY

**Michael Baker**  
 INTERNATIONAL

DESIGNER

REVIEWER

PROJECT ID

82382

SHEET TOTAL

1162 2339



**CLEVELAND WATER NOTES FOR WATER MAIN INSTALLATION AND/OR REPLACEMENT**

DEVELOPERS, ENGINEERS, AND CONTRACTORS ARE TO ABIDE BY THE MOST CURRENT VERSION OF THE CLEVELAND WATER NOTES AND DETAILS. THE MOST UP-TO-DATE VERSION CAN BE FOUND AT WWW.CLEVELANDWATER.COM/CONSTRUCTION/

**GENERAL:**

1. ALL WATER WORK REQUIRED, WHETHER SHOWN ON THE PLANS OR AS DIRECTED BY CLEVELAND WATER, SHALL BE AT THE EXPENSE OF THE PROJECT UNLESS OTHERWISE AGREED TO BY THE COMMISSIONER OF THE CLEVELAND DIVISION OF WATER.

2. THE INFORMATION SHOWN ON THE CLEVELAND DIVISION OF WATER'S SUMMARY OF WORK/CHARGE LETTER, STRIP MAPS, AS BUILT DRAWINGS, AND GIS ARE TAKEN FROM EXISTING AVAILABLE RECORDS, AND THEIR ACCURACY IS NOT GUARANTEED.

3. CALL THE INSPECTION AND ENFORCEMENT UNIT AT 216-664-2342 TO SCHEDULE A PRECONSTRUCTION MEETING AT LEAST 1 WEEK PRIOR TO STARTING CONSTRUCTION. THE OPERATION OF ANY VALVE OR ALTERATION OF ANY PART OF THE WATER SYSTEM BY CONTRACTORS OR THEIR EMPLOYEES IS PROHIBITED WITHOUT THE SUPERVISION OF THE CLEVELAND DIVISION OF WATER INSPECTOR. SEE ALSO NOTE 20 REGARDING ADDITIONAL ADVANCE NOTIFICATION REQUIRED IN AREAS SUSPECTED TO CONTAIN LEAD SERVICE CONNECTION (ALL AREAS INSTALLED PRIOR TO 1954).

4. PRIOR TO REQUESTING CHLORINATION, THE CONTRACTOR SHALL SUPPLY THE CLEVELAND WATER INSPECTOR WITH REDLINE DRAWINGS SHOWING CHANGES MADE FROM THE APPROVED DESIGN DRAWINGS AND ACTUAL MEASUREMENTS. CHLORINATION SHALL NOT OCCUR BEFORE THESE DRAWINGS ARE SUBMITTED.

5. FOR THE PURPOSES OF CHLORINATION AND BACTERIOLOGICAL TESTING OF THE WATER MAINS THE CONTRACTOR SHALL PROVIDE AND INSTALL, AT EACH OF THE CHLORINATION PIT LOCATIONS SHOWN AND AT OTHER LOCATIONS DETERMINED BY CLEVELAND WATER. FLUSHING / SAMPLING TAP SIZES ARE TO BE DETERMINED BY CLEVELAND WATER. CHLORINATION PITS SHALL BE SIX (6) FOOT SQUARE AND ARE TO MEET OSHA STANDARDS. NO CUSTOMER TAPS SHALL BE INSTALLED PRIOR TO CHLORINATION.

6. A TWO-YEAR WARRANTY, COMMENCING FROM THE DATE OF ACCEPTANCE OF THE FINAL CHLORINATION OF THE WATER MAIN INSTALLATION SHALL BE PROVIDED BY THE BUILDER/DEVELOPER AND/OR CONTRACTOR FOR ALL WATER MAINS AND SERVICE CONNECTION WORK PERFORMED BY THE CONTRACTOR, INCLUDING TAPS IF PERFORMED. SHOULD ANY LEAKS OCCUR AND REPAIRS BE REQUIRED DUE TO DEFECTIVE MATERIAL OR POOR WORKMANSHIP. A LETTER INDICATING THE COMMENCEMENT DATE AND END DATE OF THE WARRANTY SHALL BE INCLUDE WITH THE AS-BUILT SUBMISSION IN NOTE 12.

7. USE BACKFILL MATERIAL AS SPECIFIED AND COMPACT SUFFICIENTLY IN THOSE AREAS WHERE EXISTING MAINS AND WATER SERVICE CONNECTIONS ARE EXPOSED. (SEE CLEVELAND WATER STANDARD DETAIL STD-001)

8. ALL MATERIALS, INCLUDING BUT NOT LIMITED TO WATER MAINS, FIRE HYDRANTS, VALVES, CONNECTION MATERIALS AND OTHER WATER APPURTENANCES, SHALL BE NEW AND UNUSED AND SHALL CONFORM TO THE MOST CURRENT CLEVELAND WATER SPECIFICATIONS. ALL MATERIAL SHALL BE INSTALLED IN ACCORDANCE WITH CLEVELAND WATER'S STANDARDS.

9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING WATER MAINS AND APPURTENANCES THEREOF WHEN CONSTRUCTING OR CONNECTING THE NEW WATER MAIN. THIS SHALL INCLUDE LEADED JOINTS IN EXISTING FITTINGS WHICH MAY REQUIRE REPLACEMENT FITTINGS AT THE DISCRETION OF THE INSPECTOR IF IT IS DETERMINED THEY WERE DISTURBED. ALL REPAIRS TO DAMAGED EXISTING FACILITIES SHALL BE MADE BY THE CONTRACTOR, AT THE PROJECT'S EXPENSE, TO THE SATISFACTION OF CLEVELAND WATER.

10. ALL HYDROSTATIC PRESSURE TESTING SHALL BE DONE BY THE CONTRACTOR IN THE PRESENCE OF THE CLEVELAND WATER INSPECTOR. THE HYDROSTATIC TEST PRESSURE SHALL BE 75 PSI ABOVE THE STATIC PRESSURE PREVAILING AT THE SITE, BUT IN NO CASE LESS THAN 150 PSI. THE PRESSURE TEST SHALL BE FOR A DURATION OF TWO (2) HOURS WITH THE PRESSURE BEING MAINTAINED WITHIN 5 PSI OF THE REQUIRED TEST PRESSURE. SHOULD THE PRESSURE TEST FAIL THE CONTRACTOR SHALL FIND AND CORRECT THE DEFICIENCY(IES) TO THE SATISFACTION OF CLEVELAND WATER AND REPEAT THE TWO (2) HOUR PRESSURE TEST.

11. ALL BURIED WATER MAINS, FITTINGS, VALVES, FIRE HYDRANT BRANCH PIPING AND APPURTENANCES SHALL BE ENCASED WITH "V-BIO" ENHANCED POLYETHYLENE ENCASEMENT INSTALLED IN ACCORDANCE WITH THE MOST CURRENT REVISION OF ANSI/AWWA C-105/A21.5 MODIFIED METHOD "A".

12. THE PROJECT'S PROFESSIONAL ENGINEER OR A DESIGNATED PROFESSIONAL SURVEYOR SHALL OBTAIN ACTUAL FIELD MEASUREMENTS OF THE MAIN DURING INSTALLATION AND SHALL FURNISH THE CLEVELAND WATER INSPECTOR WITH AS-BUILT DRAWINGS MEETING CLEVELAND WATER STANDARDS WITHIN 30 DAYS OF THE WATER MAIN GOING INTO SERVICE AND ALL TAPS/RETAPS BEING MADE. ONE HARD COPY AND ONE PDF COPY SHALL BE PROVIDED. DRAWINGS SHALL BE SIGNED, DATED, AND STAMPED WITH THE ENGINEER OR SURVEYOR'S SEAL. REDLINE DRAWINGS ARE NOT SUFFICIENT. CLEVELAND WATER RESERVES THE RIGHT TO WITHHOLD PAYMENT AND/OR APPROVAL OF FUTURE WORK IF AS-BUILTS ARE NOT SUBMITTED.

**WATER MAINS:**

13. ALL PIPE, UNLESS OTHERWISE APPROVED BY CLEVELAND WATER, SHALL BE DUCTILE IRON, MINIMUM CLASS 52, CEMENT LINED HAVING PUSH-ON JOINTS WITH RADIALLY COMPRESSED RUBBER RING GASKET AND INSTALLED AS PER THE MOST CURRENT REVISION OF AWWA C600.

14. ALL FITTINGS, UNLESS OTHERWISE CALLED FOR, SHALL BE APPROVED DUCTILE IRON, CLASS 350, CEMENT-LINED OR FUSION BONDED EPOXY COATED. ALL FITTINGS AND PIPE CONNECTED TO FITTINGS SHALL BE RESTRAINED USING "RETAINED" MECHANICAL JOINT CONFORMING TO THE MATERIAL AND PERFORMANCE REQUIREMENTS OF ANSI/AWWA C-110/A21.10 AND ANSI/AWWA C-111/A21.11, OR "COMPACT" FITTINGS IN ACCORDANCE WITH ANSI/AWWA C-153/A21.53. EXCEPT FOR ANCHOR TEES, REDUCERS OR OTHER SPECIAL CIRCUMSTANCES WHEN BY CLEVELAND WATER, ALL FITTINGS ARE TO HAVE BELL ENDS.

15. ALL BOLTS AND NUTS ON ALL "RETAINED" MECHANICAL JOINTS SHALL HAVE FIELD APPLIED ONE (1) COAT OF BITUMASTIC PAINTING.

16. WHERE SHOWN ON THE PLANS, OR WHEN OTHERWISE CALLED FOR, PIPE AND FITTINGS SHALL HAVE AN APPROVED "TYPE I" OR "TYPE II" BOLTLESS RESTRAINED PUSH-ON JOINTS TO THE LIMITS SHOWN ON THE DRAWINGS.

17. AT THE END OF EACH WORKDAY, THE CONTRACTOR SHALL PLUG ALL OPEN PIPE ENDS WITH WATER TIGHT PLUGS AS PER THE "PREVENTATIVE AND CORRECTIVE MEASURES DURING CONSTRUCTION" SECTION OF THE MOST CURRENT REVISION OF AWWA C-651 AS TO PREVENT THE INFILTRATION OR INTRUSION OF ANY FOREIGN OBJECTS OR MATERIALS.

DATE STAMPED DIGITAL PHOTOS SHALL BE PROVIDED FOR EACH WORKDAY DEMONSTRATING THAT PROPER AWWA C-651 METHODS WERE USED TO PLUG ALL OPEN WATER MAIN ENDS. EACH PHOTO SHALL CLEARLY IDENTIFY THE STATION AT WHICH THE PIPE IS PLUGGED. THE STATIONING SHALL BE SHOWN BY THE USE OF A STATION MARKER PLACED AT THE PLUGGED PIPE END.

PHOTOS SHALL BE SUBMITTED ON A DAILY BASIS UNLESS OTHERWISE DEFINED BY THE CLEVELAND WATER INSPECTOR OR ENGINEER. ALL PHOTOS TAKEN OVER THE COURSE OF THE PROJECT SHALL BE SUBMITTED BY THE CONTRACTOR AS PART OF THE AS-BUILT SUBMITTAL. PHOTOS ARE TO INCLUDE STATIONING MARKERS. AS-BUILTS SHALL BE DEEMED INCOMPLETE WITHOUT SAID COLLECTION OF DIGITAL PHOTOS.

**HYDRANTS:**

18. IN ALL HYDRANT INSTALLATIONS THE CONTRACTOR SHALL FACE ALL HYDRANT'S 4" (STEAMER) NOZZLE TOWARD THE PAVEMENT PRIOR TO TESTING AND CHLORINATION OF WATER MAINS. ONLY CLEVELAND WATER APPROVED HYDRANT MODELS SHALL BE INSTALLED. CONTRACTOR SHALL CONSULT WITH THE LOCAL MUNICIPALITY'S ENGINEERING OR SERVICE DEPARTMENT TO OBTAIN HYDRANT NOZZLE THREAD REQUIREMENTS IF NOT INDICATED ON THE APPROVED PLANS. ALL HYDRANTS SHALL BE FACTORY EQUIPPED WITH THE APPROPRIATE HYDRANT NOZZLE.

HYDRANT BRANCHES SHALL BE FULLY RESTRAINED AND INSTALLED PER THE APPROPRIATE HYDRANT CLEVELAND WATER HYDRANT DETAIL. HYDRANT BRANCH VALVES SHALL BE PLACED DIRECTLY AFTER THE HYDRANT TEE UNLESS OTHERWISE APPROVED BY THE INSPECTOR IN WRITING.

**VALVES:**

19. ALL VALVES SHALL BE AN APPROVED MODEL RESILIENT SEATED GATE VALVES AS PER THE MOST CURRENT VERSION OF AWWA C509 OR C515. VALVE OPERATING NUTS SHALL BE TAPERED (1 7/8" TO 2" FROM TOP TO BOTTOM) AND 2" DEEP. VALVES MORE THAN 10 YEARS OLD AT TIE IN POINTS TO EXISTING MAINS SHALL BE REPLACED AT THE PROJECT'S EXPENSE UNLESS OTHERWISE DIRECTED.

**LEAD SERVICE CONNECTIONS:**

20. LEAD SERVICES: A MINIMUM OF 45 DAYS BEFORE THE PRECONSTRUCTION MEETING, CWD SHALL PROVIDE A NOTICE TO ALL AFFECTED CUSTOMERS THAT THEIR WATER SERVICE LINE WILL BE DISTURBED. A MINIMUM OF 75 DAYS BEFORE THE PRECONSTRUCTION MEETING, THE CONTRACTOR OR ENGINEER SHALL PROVIDE CWD (AND THE LOCAL MUNICIPALITY OF OUTSIDE THE CITY OF CLEVELAND) A LIST OF ALL CUSTOMER ADDRESSES THAT WILL BE AFFECTED BY THE WATER MAIN REPLACEMENT PROJECT. FAILURE TO PROVIDE A LIST OF CUSTOMER ADDRESSES IN A TIMELY MANNER MAY RESULT IN PROJECT DELAYS.

ANY CITY-OWNED LEAD SERVICE LINE ENCOUNTERED SHALL BE REPLACED WITH TYPE K COPPER. THE REPLACEMENT SERVICE LINE SHALL BE SIZE-ON-SIZE WITH A 1-INCH MINIMUM DIAMETER. IF A CUSTOMER-OWNED LEAD SERVICE LINE IS ENCOUNTERED,

THE CONTRACTOR SHALL LEAVE A CWD-SUPPLIED CUSTOMER NOTIFICATION DOOR HANGER ON ALL ACCESSIBLE POINTS OF ENTRY TO THE HOME AND IMMEDIATELY NOTIFY THE CWD INSPECTOR. IF THE CWD INSPECTOR IS NOT AVAILABLE, CALL PAYTON HALL AT (216) 664-2444, EXT. 73000 OR (216) 971-2721. CUSTOMERS WITH A CUSTOMER-OWNED LEAD SERVICE LINE SHALL NOT BE RECONNECTED TO THE NEW WATER MAIN WITHOUT EXPRESS WRITTEN APPROVAL FROM PAYTON HALL, OR HIS APPROVED REPRESENTATIVE AT CWD.

AS PART OF THIS CONTRACT, THE CONTRACTOR SHALL OFFER EACH CUSTOMER TO REPLACE LEAD SERVICES FROM THE CORPORATION STOP TO THE INLET STOP & WASTE VALVE INSIDE THE CUSTOMER'S HOME. IF THE REPLACEMENT IS NOT COVERED UNDER THE BID ITEMS, THE CONTRACTOR SHALL PROVIDE CWD (AND THE LOCAL MUNICIPALITY IF OUTSIDE THE CITY OF CLEVELAND) WITH A CHANGE ORDER AND COST ESTIMATES FOR THE CUSTOMER-OWNED LEAD SERVICE LINE REPLACEMENT. UPON APPROVAL FROM CWD (AND THE LOCAL MUNICIPALITY IF OUTSIDE THE CITY OF CLEVELAND), THE CONTRACTOR SHALL PERFORM THE REPLACEMENT OF THE CUSTOMER-OWNED LEAD SERVICE LINE. AS STATED ABOVE, CUSTOMERS WITH CUSTOMER-OWNED LEAD SERVICE LINES SHALL NOT BE RECONNECTED TO THE NEW WATER MAIN WITHOUT EXPRESS WRITTEN APPROVAL FROM PAYTON HALL, OR HIS APPROVED REPRESENTATIVE AT CWD.

IN THE EVENT THAT A CWD WAIVER IS GRANTED SUCH THAT A CUSTOMER-OWNED LEAD SERVICE LINE IS NOT REPLACED, CWD SHALL SUPPLY THE CONTRACTOR WITH LEAD FILTERS AND PITCHERS THAT THE CONTRACTOR SHALL DISTRIBUTE TO EACH RESIDENCE WITHIN THE PROJECT AREA, INCLUDING TO ALL UNITS OF MULTI-UNIT HOUSING BUILDINGS. THE FILTERS SHALL BE POUR-THROUGH PITCHER TYPE LEAD FILTERS THAT ARE NSF/ANSI-53 CERTIFIED TO REMOVE LEAD. THE PITCHER, A 3-MONTH SUPPLY OF FILTERS, AND CWD-SUPPLIED USE INSTRUCTIONS AND OTHER APPLICABLE MATERIALS SHALL BE DISTRIBUTED. RECORDS OF RESIDENTS WHO RECEIVED AND WHO REFUSED THE FILTERS SHALL BE PROVIDED BY THE CONTRACTOR TO CWD (AND THE LOCAL MUNICIPALITY IF OUTSIDE THE CITY OF CLEVELAND).

AT THE BEGINNING OF THE DAY THAT A CUSTOMER IS SCHEDULED TO BE CONNECTED TO THE NEW WATER MAIN, THE CONTRACTOR SHALL DISTRIBUTE THE APPROPRIATE CWD-SUPPLIED CUSTOMER NOTIFICATION DOOR HANGER AND OTHER APPLICABLE MATERIALS ON ALL ACCESSIBLE POINTS OF ENTRY TO THE HOME AND IN A PROMINENT LOCATION AT ALL MULTI-UNIT HOUSING BUILDINGS. THE APPROPRIATE DOOR NOTIFICATION WILL BE DETERMINED BY (1) WHETHER A CUSTOMER-OWNED LEAD SERVICE LINE REMAINS IN THE PROJECT AREA AND (2) THE TYPE OF MATERIAL OF THE INDIVIDUAL CUSTOMER-OWNED SERVICE LINE.

21. DIELECTRIC COUPLINGS: IN THE EVENT THAT A CWD WAIVER IS GRANTED SUCH THAT A CUSTOMER-OWNED LEAD SERVICE LINE IS NOT REPLACED, AND A NEW SERVICE IS CONNECTED TO A CUSTOMER-OWNED LEAD SERVICE LINE, A DIELECTRIC COUPLING SHALL BE PROVIDED TO TRANSITION FROM THE NEW MATERIALS TO THE LEAD PIPE. THE MODEL COUPLING USED IS SUBJECT TO APPROVAL FROM CWD. HARCO 13#32 PHILMAC UTC OR CWD-APPROVED EQUAL.

**GENERAL SERVICE CONNECTIONS:**

22. AS PART OF THE AS BUILT SUBMISSION IN NOTE 12, THE CONTRACTOR SHALL PROVIDE A TABLE SHOWING ALL EXISTING CONNECTIONS, IDENTIFIED BY CLEVELAND WATER CONNECTION NUMBER, SHOWING THE FOUND CONNECTION MATERIAL FOR BOTH THE CITY SIDE AND OWNER SIDE CONNECTION, AS WELL AS THE NEW CONNECTION MATERIAL FOR ALL CONNECTIONS REPLACED. THE TABLE SHALL ALSO NOTE ANY REVISED CONNECTION MEASUREMENTS AND SIZES. A SAMPLE TABLE WILL BE PROVIDED. THE SUBMISSION SHALL BE IN MICROSOFT EXCEL FORMAT. CLEVELAND WATER SHALL REQUIRE THE DELIVERY AND ACCEPTANCE OF THIS TABLE BEFORE THE PRESSURE TEST AND CHLORINATION / DISINFECTION OF THE MAIN WILL BE PERMITTED.

23. NEW WATER SERVICE CONNECTIONS LOCATIONS SHOWN ON THESE DRAWINGS ARE FOR REFERENCE ONLY AND ARE NOT PART OF THE WATER MAIN APPROVAL. THE SPECIFIC LOCATION FOR EACH CONNECTION WILL BE DETERMINED BY CLEVELAND WATER PRIOR TO THE TAPS BEING INSTALLED. ALL PERMITS FOR TAPS AND METERS FOR PARCELS ASSOCIATED WITH THE WATER MAINS INSTALLED ON THIS PROJECT ARE TO BE OBTAINED BY THE LAND OWNER OF SAID IMPROVEMENT PLANS. IT IS THE LAND OWNERS RESPONSIBILITY TO ARRANGE FOR OBTAINING PERMITS FOR ALL WATER SERVICE CONNECTIONS BEFORE ANY SERVICE CONNECTION WORK MAY PROCEED. ALL FEES CAN BE OBTAINED FROM THE CLEVELAND WATER PERMITS AND SALES SECTION AT 216-664-3130 PROMPT #7 OR 216-664-2444 X75209.

ACCOUNTS SHALL BE INITIATED IN THE LAND OWNER'S NAME AS PART OF THE PERMITTING PROCESS. ALL RESPONSIBILITIES ASSOCIATED WITH EACH WATER SERVICE, INCLUDING, THE OWNER SIDE INSPECTIONS, METER SET/METER PIPING INSPECTION AND THE METER INSTALLATION SHALL BE THE RESPONSIBILITY OF SAID OWNER. METERS INSTALLATIONS WILL NOT BE AUTHORIZED TO BE INSTALLED UNTIL ALL INSPECTIONS HAVE BEEN COMPLETED. ESTIMATED BILLS MAY ENSUE IF A HOME IS IDENTIFIED AS HAVING WATER SERVICE BUT NO METER HAS BEEN INSTALLED. IF NEW OWNERS, ONCE PARCELS ARE SOLD OFF AND TRANSFER TITLE, DO NOT CONTACT CLEVELAND WATER TO ESTABLISH ACCOUNTS IN THEIR NAME, ACCOUNTS AND THEIR ASSOCIATED BILLS WILL REMAIN IN THE NAME OF OUR LAST OWNER OF RECORD WHICH MAY BE THE DEVELOPER OR BUILDER. IT IS THE RESPONSIBILITY OF THE NEW OWNER TO TRANSFER ACCOUNTS INTO THEIR NAME WHEN THE PROPERTIES LEGALLY TRANSFER. UPON TRANSFER OF PROPERTY, SELLER OF PROPERTY MUST COMMUNICATE ALL UNCOMPLETED PORTIONS OF THE REFERENCED RESPONSIBILITIES TO THE NEW OWNER.

24. ONE INCH SERVICE CONNECTIONS SHALL BE PERMITTED TO SERVICE NEW HOMES (AS SHOWN ON APPROVED WATER MAIN EXTENSION PLANS) BASED ON THE FOLLOWING CRITERIA:

- A. PEAK FLOW DEMANDS DO NOT EXCEED 25 GPM FOR AN INDIVIDUAL HOME/UNIT. INCLUSIVE OF ALL USAGE (DOMESTIC AND/OR IRRIGATION),
- B. LENGTH OF ONE INCH CONNECTION DOES NOT EXCEED 75 FEET AS MEASURED FROM THE MAIN TO THE POINT OF ENTRY INTO THE PROPOSED HOME/UNIT.
- C. THE CONNECTIONS DO NOT INCLUDE LIMITED AREA OR NFPA 13D SPRINKLER SYSTEMS

ANY SERVICE REQUESTS DIFFERING FROM THE STATED CRITERIA SHALL REQUIRE THE SUBMITTAL OF A COMPLETE WATER SERVICE APPLICATION FOR EACH WATER SERVICE REQUESTED.

25. ALL CURB VALVE BOXES & METER VAULTS WILL BE INSTALLED IN GRASS AREAS WHEN POSSIBLE. CURB VALVES SHALL BE PLACED APPROXIMATELY 2 FEET OFF THE CURB. CURB VALVES IN EASEMENTS SHALL BE PLACED APPROXIMATELY 3 FEET OFF THE WATER MAIN. IF VALVE BOXES OR METER VAULTS ARE INSTALLED OUTSIDE OF A DEDICATED RIGHT OF WAY OR EASEMENT FOR THE PURPOSES OF WATER SUPPLY, A STANDARD CLEVELAND EASEMENT FOR A VAULT SHALL BE PROVIDED.

**EMERGENCIES:**

26. IF A WATER MAIN OR SERVICE CONNECTION BREAK OCCURS DURING CONSTRUCTION AND EMERGENCY ASSISTANCE IS REQUIRED, PLEASE NOTIFY CLEVELAND WATER AT 216-664-3060. THIS LINE IS AVAILABLE 24/7/365

**NOTE:**

THE PROJECT SHALL COMPLY WITH ALL APPLICABLE CLEVELAND WATER DEPARTMENT (CWD) STANDARDS, NOTES, AND DETAILS; EXCEPT AS MODIFIED WITHIN THIS PLAN.

FOR PROJECT SPECIFIC NOTES, SEE SHEETS 1165 - 1177  
FOR PROJECT SPECIFIC DETAILS, SEE SHEETS 1195 - 1208

DESIGN AGENCY
<b>Michael Baker</b> INTERNATIONAL
DESIGNER
REVIEWER
PROJECT ID
82382
SHEET TOTAL
1163 2339

**CLEVELAND WATER NOTES FOR WATER MAIN INSTALLATION ON BRIDGES**

**DRAWINGS**

1. THE CONTRACTOR, THROUGH THE ENGINEER, SHALL SUBMIT TO THE CITY FOR APPROVAL A MINIMUM OF SIX (6) SETS OF PIPE ASSEMBLY LAYOUT DRAWINGS GENERATED BY THE PIPE OR STRUCTURAL FABRICATOR. PIPE ASSEMBLY LAYOUT DRAWINGS SHALL INCLUDE ALL OF THE FOLLOWING:

- a.) PIPE DIMENSIONS
- b.) FITTING DIMENSIONS
- c.) LOCATION AND ELEVATION OF ALL PIPES, FITTINGS, PIPE JOINTS, PIPE SUPPORTS, EXPANSION JOINTS AND ANY OTHER APPURTENANCES.
- d.) TYPE OF PIPE, FITTINGS, PIPE JOINTS, PIPE SUPPORTS, EXPANSION JOINTS AND ANY OTHER APPURTENANCES

2. THE CONTRACTOR SHALL SUBMIT TO THE CITY THROUGH THE ENGINEER FOR APPROVAL A MINIMUM OF SIX (6) SETS OF PRINTS OF ALL SHOP DRAWINGS GENERATED BY THE PIPE OR STRUCTURAL FABRICATOR. DRAWINGS SHALL INCLUDE ALL OF THE FOLLOWING.

- a.) PIPE
- b.) COUPLINGS
- c.) INSULATION
- d.) WATER STOP
- e.) EXPANSION JOINT ASSEMBLY
- f.) PIPE SUPPORTS

3. NO WORK SHALL BE PERFORMED IN THE SHOP OR IN THE FIELD UNTIL AFTER THE DRAWINGS HAVE BEEN APPROVED.

4. THE APPROVAL OF THE DRAWINGS BY THE CITY SHALL NOT RELIEVE THE CONTRACTOR OF ANY OF HIS OBLIGATIONS WITH THIS CONTRACT.

**MATERIALS**

5. CARRIER PIPE SHALL BE GALVANIZED STEEL ASTM A-53 GRADE B, HAVING A MINIMUM WORKING PRESSURE OF 350 PSI. CARRIER PIPE SHALL BE OF THE FOLLOWING DIMENSIONS:

- a.) 12.75" OD. X 0.5" WALL THICKNESS.
- b.) 16" OD. X 0.5" WALL THICKNESS.
- c.) 24" OD. X 0.5" WALL THICKNESS.

**INSULATION**

6. JACKETING MATERIAL SHALL BE INTERNAL LOCK SEAL, 22 GAUGE, SPIRAL WOUND, GALVANIZED STEEL WITH A RUBBER "O" RING FORMED IN THE SEAM, FORMED INTO STEEL TUBES. (AT THE ENGINEER'S OPTION, SPIRAL WOUND, LOCK SEAMED ALUMINUM JACKET .032" THICK OR STAINLESS STEEL 24 GAUGE MAY BE USED.)

7. ALL JOINTS ARE TO BE INSULATED USING POURED URETHANE OR SECTIONAL URETHANE FOAM TO THE THICKNESS SPECIFIED, COVERED WITH A METAL SLEEVE, SEALED WITH MASTIC OR SILICON, AND HELD IN PLACE WITH TWO 1/2" STAINLESS STEEL BANDS.

8. BURIED PIPE BEYOND THE BACK WALLS OF THE BRIDGE ABUTMENTS HAVING LESS THAN 4 1/2 FT OF COVER SHALL BE INSULATED WITH A MINIMUM OF A 1 FOOT INSULATION ENVELOPE EQUAL TO "WTTCOLITE" OR "GILSULATE 500XR."

**VICTAULIC COUPLINGS**

9. VICTAULIC TYPE COUPLINGS SHALL BE INSTALLED BY THE CONTRACTOR FOR THE CONNECTION OF PIPE ENDS, WHERE REQUIRED OR SHOWN ON DRAWINGS. VICTAULIC TYPE COUPLINGS ARE TO BE STYLE 77 OR "DEPEND-O-LOK" TYPE.

**MEASUREMENT**

10. THE NUMBER OF LINEAR FEET OF STEEL PIPE TO BE PAID FOR SHALL BE THE ACTUAL NUMBER OF LINEAR FEET FURNISHED AND PLACED IN ACCORDANCE WITH THESE SPECIFICATIONS AS MEASURED ALONG THE AXIS OF THE PIPING.

**PAYMENT**

11. a.) THE FOOTAGE MEASURED AS PROVIDED ABOVE SHALL BE PAID FOR AT THE CONTRACT PRICE BID PER LINEAR FOOT FOR "ITEM SPECIAL - WATER MAIN EXTRA STRONG WELDED GALVANIZED STEEL PIPE ASTM A-53, GRADE B " CLASSIFIED AS TO SIZE AND TYPE, WHICH PRICE AND PAYMENT SHALL CONSTITUTE FULL COMPENSATION FOR FURNISHING, HAULING, PLACING, CUTTING INTO AND CONNECTING THE PIPE, INCLUDING ALL EXPANSION JOINTS, COUPLINGS, PIPE INSULATION, INSTALLING SUPPORT ASSEMBLIES, AND OTHER PIPE APPURTENANCE, FURNISHING AND COMPLETING THE SLEEVE PACKING DETAIL, INCLUDING THE SEAL, AND FOR ALL LABOR, EQUIPMENT, TOOLS AND INCIDENTALS NECESSARY TO COMPLETE THIS ITEM EXCEPT FOR THE ITEMS SPECIFICALLY LISTED AS SEPARATE PAY ITEMS.

b.) THE CONTRACTOR WILL BE ASSESSED A CWD LABOR CHARGE FOR THE CHLORINATION OR THE FLUSHING, TESTING AND SAMPLING OF THE NEWLY LAID WATER MAIN BY THE CITY OF CLEVELAND, DIVISION OF WATER. PAYMENT OF THE CWD LABOR CHARGE FOR CHLORINATION OR THE FLUSHING, TESTING AND SAMPLING SHALL BE MADE BY THE CONTRACTOR TO THE PERMITS AND SALES SECTION OF THE DIVISION OF WATER BEFORE ANY WATER WORK. IS PERFORMED.

DESIGN AGENCY

**Michael Baker**  
INTERNATIONAL

DESIGNER

REVIEWER

PROJECT ID

82382

SHEET TOTAL

1164 2339

**WATER WORK NOTES GENERAL**

**SCOPE OF WORK**

THE WORK CONTEMPLATED UNDER THIS CONTRACT COMPRISES OF THE FURNISHING AND INSTALLING COMPLETE WITH VALVES AND OTHER APPURTENANCES, WATER DISTRIBUTION MAIN, FIRE HYDRANT REPLACEMENT, APPURTENANCE ADJUSTMENTS AND PERFORMING OTHER INCIDENTAL WORK NECESSARY AS SHOWN IN THE PLANS.

**GENERAL NOTES**

THE FIELD TESTING HEAD SHALL BE 75 PSI PLUS THAT DUE TO THE STATIC HEAD PREVAILING AT THE SITE, BUT IN NO CASE LESS THAN 150 PSI. THE CONTRACTOR SHALL NOTIFY THE CLEVELAND WATER DEPARTMENT INSPECTION AND ENFORCEMENT THREE (3) WEEKS PRIOR TO STARTING ANY WATER WORKS CONSTRUCTION. CALL 216-664-2342.

AFTER AWARD OF CONTRACT, THE CONTRACTOR THROUGH THE ENGINEER SHALL SUBMIT TO THE CITY OF CLEVELAND WATER DEPARTMENT, INSPECTION AND ENFORCEMENT SECTION, A CONSTRUCTION SCHEDULE AND CONSTRUCTION SEQUENCE RELATING TO WATER WORK. THE CONTRACTOR SHALL ALSO MAKE PAYMENT TO THE DIVISION OF WATER FOR ALL DIVISION OF WATER LABOR REQUIRED TO COMPLETE THE WORK REQUIRED HEREIN. THE CONTRACTOR SHALL MAKE ALL PAYMENT FOR DIVISION OF WATER LABOR BEFORE ANY WATER WORK IS PERFORMED. SEE PARAGRAPH "DIVISION OF WATER - LABOR CHARGES." ALL DIVISION OF WATER LABOR CHARGES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE DEEMED TO BE INCLUDED IN THE APPROPRIATE ITEM.

**DEFINITIONS**

WHEREVER IN THESE SPECIFICATIONS OR IN OTHER CONTRACT DOCUMENTS THE FOLLOWING TERMS OR PRONOUNS IN PLACE OF THEM ARE USED, THE INTENT AND MEANING SHALL BE INTERPRETED AS FOLLOWS:

THE STATE: THE STATE IS THE STATE OF OHIO ACTING THROUGH ITS AUTHORIZED REPRESENTATIVE.

ENGINEER: THE ENGINEER IS DISTRICT DEPUTY DIRECTOR OR DISTRICT ENGINEER, THE DISTRICT CONSTRUCTION ENGINEER OR THE DISTRICT MAINTENANCE ENGINEER OR THE PROJECT ENGINEER ASSIGNED TO ADMINISTER THE CONTRACT, OR THEIR DULY DESIGNATED DEPUTIES, AGENTS, OR REPRESENTATIVES.

THE CITY: THE CITY IS THE DIRECTOR OF THE DEPARTMENT OF PUBLIC UTILITIES OF THE CITY OF CLEVELAND, OR HIS DULY DESIGNATED REPRESENTATIVE(S), CITY INSPECTOR, AND/OR THE WATER DESIGN REVIEW ENGINEER OF THE DIVISION OF WATER.

**STATUS OF CITY INSPECTORS**

INSPECTORS AS DESIGNATED BY THE DIRECTOR OF PUBLIC UTILITIES ARE AUTHORIZED TO INSPECT ALL WORK DONE AND MATERIALS FURNISHED, SUCH INSPECTION MAY EXTEND TO ALL OR ANY PART OF THE WATER WORK, AND TO THE PREPARATION OR MANUFACTURE OF THE MATERIALS TO BE USED IN THE WATER WORK.

THE CITY INSPECTOR AS DESIGNATED BY THE DIRECTOR OF PUBLIC UTILITIES WILL MAKE WORK INSTRUCTIONS THROUGH THE ENGINEER. ARRANGEMENTS FOR CITY INSPECTORS ARE TO BE MADE BY NOTIFYING INSPECTION AND ENFORCEMENT DIVISION OF WATER (216-664-2342), WITHIN THE TIME SPECIFIED. NO WORK SHALL BE ACCEPTED UNLESS INSPECTED.

**ACCESS TO WORK AND PLACE OF MANUFACTURE**

THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND CITY, AT LEAST SEVEN (7) DAYS PREVIOUS TO THE COMMENCEMENT OF THE MANUFACTURE OF ANY MATERIALS, OF THE TIME AND PLACE WHERE THE MANUFACTURE IS TO COMMENCE, IN ORDER THAT A REPRESENTATIVE OF THE ENGINEER AND THE CITY, OR HIS DESIGNEE, MAY BE PRESENT TO INSPECT THE MANUFACTURE.

THE CONTRACTOR SHALL PROVIDE, WITHOUT CHARGE OR EXPENSE TO THE STATE AND CITY, ALL NECESSARY ASSISTANCE TO THE ENGINEER AND THE CITY, OR HIS DESIGNEE, WHEN REQUIRED FOR INSPECTION OR VERIFICATION OF WORK DONE.

**FLOODS AND FREEZING WEATHER**

PROPER FACILITIES SHALL BE PROVIDED FOR PROTECTING THE WORK FROM DAMAGE BY FLOOD RAIN OR FROST, AND WORK DONE IN FREEZING WEATHER SHALL BE DONE IN SUCH MANNER AS THE ENGINEER MAY APPROVE. VALVES SHALL BE PROTECTED FROM FREEZING UNTIL BACKFILLED IN THE COMPLETED WORK.

**ADDITIONAL WORK**

(A) ATTENTION IS CALLED TO THE FACT THAT THE WORK UNDER THIS CONTRACT INCLUDES CERTAIN PERFORMANCE AS INCIDENTAL TO THE ITEMIZED REQUIREMENTS HEREOF, THOUGH NOT EXCLUSIVE AS FOLLOWS: TO PERFORM ALL EXCAVATION, BACKFILLING, SHEETING, SHORING, AND TO TEST AND CHLORINATE THE INSTALLATION. THE STATE WILL MAKE NO SPECIFIC OR SEPARATE PAYMENT OR ALLOWANCE, BUT THE COST THERE SHALL BE INCLUDED IN THE PRICES STIPULATED TO BE PAID FOR UNDER THE VARIOUS WATER WORK ITEMS TO BE DONE UNDER THIS CONTRACT.

(B) PRELIMINARY FLUSHING: BEFORE BEING PLACED IN SERVICE, ALL DIRT AND FOREIGN MATTER SHALL BE REMOVED FROM THE NEW AND/OR RELOCATED WATER MAIN OR EXTENSIONS TO EXISTING MAINS BY A THOROUGH FLUSHING THROUGH THE HYDRANTS OR BY OTHER APPROVED MEANS. EACH VALVED SECTION OF NEWLY LAID PIPE SHALL BE FLUSHED INDEPENDENTLY. THIS SHALL BE DONE AFTER THE PRESSURE TEST AND MAY BE DONE BEFORE OR AFTER THE TRENCH SHALL HAVE BEEN BACKFILLED.

(C) FLUSH, TEST AND SAMPLE: THE CITY, DIVISION OF WATER, WILL CHARGE TO THE CONTRACTOR A "FLUSHING, TEST AND SAMPLE" FEE FOR DIVISION OF WATER LABOR INCURRED IN THE WORK, PAYABLE TO THE PERMITS AND SALES SECTION OF THE DIVISION OF WATER BEFORE ANY WORK IS PERFORMED. FLUSHING, TEST AND SAMPLING IS LIMITED TO XXXX' OF 12" MAIN. NEW AND/OR RELOCATED WATER MAINS OR EXTENSION OF WATER MAINS EXCEEDING XXXX' OF XX" MAIN SHALL BE CHLORINATED. CHLORINATION FEES WILL BE CHARGED TO THE CONTRACTOR FOR CWD LABOR INCURRED IN THE CHLORINATION OF MAINS. FEE SCHEDULE FOR CHLORINATION OF WATER MAINS APPEARS ELSEWHERE IN THESE NOTES.

**TESTING MAINS**

(A) ALL PIPES, VALVES, FITTINGS, ETC., SHALL BE LAID IN SUCH A MANNER AS TO LEAVE ALL JOINTS WATERTIGHT. AFTER THE PIPE IS LAID, SUCH LENGTHS OF THE WATER MAIN AS THE CITY OR HIS DESIGNATE MAY DETERMINE, SHALL BE TESTED UNDER HYDROSTATIC PRESSURE INDICATED IN GENERAL NOTES.

(B) THE HYDROSTATIC TEST SHALL BE UNDER THE DIRECTION OF THE CITY, OR HIS DESIGNATE. THE CONTRACTOR MAY OBTAIN WATER FOR TESTING BY OBSERVING THE RULES AND REGULATIONS ENFORCED IN THE MUNICIPALITIES OR TOWNSHIPS IN WHICH THE WORK IS BEING DONE. THE CITY WILL FURNISH A PRESSURE GAUGE FOR MEASURING THE PRESSURE ON THE WATER MAIN, BUT THE CONTRACTOR SHALL FURNISH A SUITABLE PUMP, PIPES, TEST HEADS AND ALL APPLIANCES, LABOR, FUEL AND OTHER APPURTENANCES NECESSARY TO MAKE THESE TESTS.

(C) THE HYDROSTATIC TEST PRESSURE SHALL BE FOR A DURATION OF A MINIMUM OF TWO (2) HOURS WITH ALL VALVES CLOSED DURING WHICH TIME THE INTERNAL PRESSURE SHALL REMAIN WITHIN 5 PSI OF THE SPECIFIED TEST PRESSURE. SHOULD THE TEST PRESSURE DROP MORE THAN 5 PSI, THE CONTRACTOR SHALL RECHARGE THE WATER MAIN TO THE SPECIFIED TEST PRESSURE AND LOCATE AND REPAIR THE LEAK TO THE SATISFACTION OF THE CITY. ANY DAMAGED OR DEFECTIVE PIPE, PIPE JOINTS, FITTINGS, VALVES, HYDRANTS OR APPURTENANCES SHALL BE REPAIRED OR REPLACED WITH SOUND MATERIAL AND THE HYDROSTATIC PRESSURE TEST REPEATED.

(D) AFTER A SECTION OF THE WATER MAIN HAS BEEN TESTED, THE CONTRACTOR SHALL FLUSH THE SAME. IN THE CASE OF SUPPLY MAINS WHERE DRAINS ARE CONNECTED TO VALVE OR DRAIN VAULTS, THE CONTRACTOR SHALL, WITHIN A REASONABLE TIME AFTER THE TEST HAS BEEN COMPLETED, PUMP ALL WATER OUT OF THE VAULTS. FLUSHING SHALL BE DONE IN ACCORDANCE WITH THESE SPECIFICATIONS.

(E) IN COLD WEATHER IMMEDIATELY AFTER TESTING A SECTION OF THE WATER MAIN, THE CONTRACTOR SHALL OPEN ALL VALVES, AND IN THE CASE OF SUPPLY MAINS ALL AIR RELIEF VALVES, BYPASSES AND DRAINS AND PROPERLY DRAIN BONNETS OF ALL VALVES IN THE SECTION OF THE WATER MAIN, AND TAKE ALL OTHER PRECAUTIONS NECESSARY TO PREVENT INJURY TO WATER MAIN AND APPURTENANCES DUE TO FREEZING.

(F) IN ORDER TO BE ABLE TO MAKE PROPER ALLOWANCE FOR LEAKAGE AT VALVES, AIR RELIEF VALVES, BYPASSES, AND DRAINS, ONLY THOSE SECTIONS OF WATER MAIN MAY BE TESTED AS SHALL HAVE SUCH VALVES, TEST PLUGS AND CAPS ACCESSIBLE. THE PERMITTED LEAKAGE SHALL NOT EXCEED A RATE OF SEVENTY-FIVE (75) GALLONS PER TWENTY-FOUR (24) HOURS PER MILE OF PIPE PER INCH OF NOMINAL DIAMETER.

**TESTING MAINS (CONTINUED)**

(G) IN TESTING NEW MAINS, THE CONTRACTOR SHALL NOT BE PERMITTED TO USE ANY PART OF THE EXISTING MAINS IN HIS TEST UNLESS OTHERWISE SHOWN ON THE CONTRACT DRAWINGS. THE LIMITS OF THE HYDROSTATIC SHALL BE AS SHOWN ON THE PLANS. THE CONTRACTOR SHALL PROVIDE BLIND FLANGES, PLUGS OR CAPS, DEPENDING ON DESIGN, TO THE TESTED LENGTH OF THE PROPOSED MAIN SO THAT IT WILL BE COMPLETELY INDEPENDENT OF THE SAID EXISTING MAINS. PROPER RESTRAINT OF ALL BLIND FLANGES, PLUGS OR CAPS TO PREVENT BLOWOFF SHALL BE PROVIDED AND IN THE CASE OF DEAD END MAINS CONCRETE PIERS WILL BE REQUIRED. NO EXTRA PAYMENT WILL BE MADE AND THE ENTIRE COST SHALL BE DEEMED TO BE INCLUDED IN THE BID PRICE.

**WATER MAIN DISINFECTION**

WATER MAIN DISINFECTION SHALL CONSIST OF: PRELIMINARY FLUSHING WATER MAINS AFTER THE HYDROSTATIC TEST AND PRIOR TO THE CHLORINATION PROCEDURE, THE FINAL FLUSHING, AND SAMPLING. ALL CONTRACTOR LABOR AND MATERIAL REQUIRED TO ASSIST THE CITY IN THE DISINFECTION OF WATER MAINS SHALL BE INCLUDED IN THE PRICE PER FOOT OF WATER MAIN BID. THE CITY, DIVISION OF WATER WILL CHARGE TO THE CONTRACTOR A "CHLORINATION" FEE FOR DIVISION OF WATER LABOR INCURRED IN THE WORK, PAYABLE TO THE PERMITS AND SALES SECTION OF THE DIVISION OF WATER BEFORE ANY WORK IS PERFORMED.

(A) PRELIMINARY FLUSHING: BEFORE DISINFECTION ALL DIRT AND FOREIGN MATTER SHALL BE REMOVED FROM THE NEW AND/OR RELOCATED WATER MAIN OR EXTENSIONS TO EXISTING MAINS BY A THOROUGH FLUSHING THROUGH THE HYDRANTS OR BY OTHER APPROVED MEANS BY THE CONTRACTOR. EACH VALVED SECTION OF THE NEWLY LAID PIPE SHALL BE FLUSHED INDEPENDENTLY. THIS SHALL BE DONE AFTER THE PRESSURE TEST. FLUSHING SHALL BE IN ACCORDANCE WITH ANSI/AWWA C-651 STANDARD FOR "DISINFECTING WATER MAINS." WHERE THE FLUSHING VELOCITY SPECIFIED THEREIN CANNOT BE ATTAINED FLUSHING RATES AS DETERMINED BY THE CITY TO BE SUFFICIENT WILL BE PERMITTED. IF IN THE OPINION OF THE CITY THE FLUSHING PRIOR TO THE CHLORINATION PROCEDURE DOES NOT REMOVE DIRT OR OTHER ACCUMULATIONS IN THE PIPE, THE PIPE SHALL BE CLEANED BY MECHANICAL MEANS BY THE CONTRACTOR AND THE FLUSHING SHALL BE REPEATED.

(B) CHLORINATION PROCEDURE: SUCH LENGTHS OF THE WATER MAIN AS THE CITY MAY DETERMINE SHALL BE CHLORINATED; HOWEVER, IN NO CASE SHALL THE LENGTH EXCEED THAT WHICH CAN BE CHLORINATED SATISFACTORILY IN ONE (1) WORK DAY. SUCH MAXIMUM LENGTH IS GENERALLY UP TO THREE (3) MILES TOTAL, INCLUDING BRANCHES AND CONNECTING WATER MAIN(S), FOR SIXTEEN INCH (16") AND SMALLER; AND THREE (3) VALVE SECTIONS, OR TWO (2) MILES, FOR TWENTY INCH (20") OR LARGER WATER MAINS.

THE CONTRACTOR SHALL COOPERATE WITH THE CITY'S CHLORINATION CREW AND/OR INSPECTOR BY OPERATING ANY REQUIRED WATER MAIN APPURTENANCES TO ASSURE THE DISINFECTION OF SUCH APPURTENANCES AND OF ANY PIPE BRANCHES TO ASSURE CHLORINATION SOLUTION IS CONFINED TO WATER MAIN BEING DISINFECTED. NO OPERATION OF WATER MAIN APPURTENANCES BY THE CONTRACTOR SHALL BE PERFORMED WITHOUT THE CONSENT OF THE CITY.

THE CITY OF CLEVELAND, DIVISION OF WATER'S, CHLORINATION CREW WILL DETERMINE THE LENGTH OF TIME THE CHLORINE SOLUTION IS TO REMAIN IN THE WATER MAIN BEING DISINFECTED.

(C) FINAL FLUSHING: 1. THE FLUSHING OF THE CHLORINATION SOLUTION SHALL BE DONE BY THE CONTRACTOR UNTIL THE CHLORINE SOLUTION IS TOTALLY FLUSHED OUT OF THE SYSTEM BEING DISINFECTED. ALL FLUSHING SHALL BE UNDER THE CONTROL OF THE CITY, OR HIS DESIGNATE. THE CONTRACTOR SHALL OBTAIN WATER FOR FLUSHING IN THE SAME MANNER AS FOR TESTING.

2. IN FLUSHING, THE CONTRACTOR SHALL PROPERLY DISPOSE OF THE CHLORINATION SOLUTION. ONLY POINTS OF DISCHARGE APPROVED BY THE ENGINEER AND THE CITY'S CHLORINATION CREW SHALL BE UTILIZED WITHOUT ANY TREATMENT TO CHEMICALLY NEUTRALIZE THE SOLUTION. IN CASES WHERE DIRECT DISPOSAL IS NOT APPROVED, THE CONTRACTOR SHALL NEUTRALIZE THE CHLORINE SOLUTION AS PROVIDED IN APPENDIX B OF AWWA C-651. CONTRACTOR SHALL OBTAIN APPROVAL, IN WRITING, OF THE LOCAL SEWER AUTHORITY BEFORE DISPOSING TO A SANITARY SEWER. A COPY OF SUCH WRITTEN APPROVAL SHALL BE PROVIDED TO THE INSPECTOR AND CHLORINATION CREW BEFORE ANY FLUSHING IS BEGUN.

3. THE CITY'S CHLORINATION CREW WILL DETERMINE WHEN THE DISINFECTION SOLUTION HAS BEEN SATISFACTORILY FLUSHED FROM THE MAIN AND BRANCHES.

**WATER MAIN DISINFECTION (CONTINUED)**

(D) SAMPLING: 1. A TIME PERIOD AS DETERMINED BY THE CITY SHALL ELAPSE BEFORE WATER SAMPLES ARE TAKEN FROM THE WATER MAIN(S) AND BRANCH(ES) TO DETERMINE THE BACTERIOLOGICAL QUALITY OF THE WATER THEREIN. IN NO CASE, SHALL THE TIME PERIOD BE LESS THAN TWENTY-FOUR (24) HOURS. NO SAMPLES SHALL BE TAKEN FROM FIRE HYDRANTS. THE CONTRACTOR SHALL ASSIST THE CITY'S CHLORINATION CREW IN OBTAINING SAMPLES. THE CITY WILL FURNISH ALL CONTAINERS AND CONTROL PROCEDURES FOR OBTAINING SAMPLES. THE CITY WILL DETERMINE THE NUMBER AND LOCATIONS OF SAMPLES TO BE TAKEN FROM THE DISINFECTED SECTIONS.

2. IN CASES WHERE THE LENGTH OF WATER MAIN IS LESS THAN 350 FEET, AFTER HYDROSTATIC TESTING ONLY, PRELIMINARY FLUSHING AND SAMPLING WILL BE DONE; HOWEVER, IF THERE ARE TWO (2) POSITIVE SAMPLES, AFTER FLUSHING, THE ENTIRE PROCEDURE OF PRELIMINARY FLUSHING, CHLORINATION, FLUSHING AND SAMPLING SHALL BE REQUIRED. THE CITY'S CHLORINATION CREW WILL COMPLETE AND DISTRIBUTE THE CHLORINATION APPROVAL FORM.

THE CITY WILL DETERMINE THE BACTERIOLOGICAL QUALITY OF THE WATER SAMPLES. IF SAMPLING RESULTS IN TWO (2) CONSECUTIVE POSITIVE SAMPLES, THE PROCEDURE OF CHLORINATION, FLUSHING AND SAMPLING SHALL BE REPEATED. FIGURE 1, SUGGESTED COMBINATION AND SAMPLING TAP, TAKEN FROM AWWA C-651, IS HEREIN MADE A PART OF THESE SPECIFICATIONS.

**CONTRACTOR'S LABOR**

THE CONTRACTOR SHALL FURNISH AT LEAST TWO (2) TRAINED WORKMEN TO PERFORM ALL LABOR UNDER THE SUPERVISION AND DIRECTION OF THE CITY'S CHLORINATION CREW. THE CONTRACTOR'S LABORERS SHALL PERFORM ALL DUTIES SPECIFIED IN WATER MAIN DISINFECTION GENERAL NOTE. THE CONTRACTOR SHALL PROVIDE PROPER EQUIPMENT AND PROTECTIVE CLOTHING AS MAY BE REQUIRED BY THE LABORERS IN PERFORMING THE NEEDED TASK.

**ACCESS PIT**

(A) THE CONTRACTOR SHALL PROVIDE TIGHTLY WOOD SHEETED ACCESS PITS, CONFORMING TO THE REQUIREMENTS OF "THE SPECIFIC SAFETY REQUIREMENTS OF THE INDUSTRIAL COMMISSION OF OHIO RELATING TO CONSTRUCTION" RULE 4121:1-3-13, FOR ACCESS TO ALL WATER MAIN APPURTENANCES TO BE UTILIZED IN DISINFECTING WATER MAINS.

(B) THE CONTRACTOR SHALL HAVE ON HAND READY FOR USE, PUMPING EQUIPMENT TO DEWATER ANY AND ALL ACCESS PITS USED FOR DISINFECTING WATER MAINS AND SHALL DEWATER THE ACCESS PITS WHEN ORDERED BY THE CITY.

**SUBSURFACE UTILITIES**

EXISTING UTILITIES AND DEPTHS SHOWN HEREON ARE BASED ON BEST AVAILABLE DATA. WHILE THE LOCATIONS AND DEPTHS ARE PRESUMED CORRECT, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY LOCATION AND DEPTHS OF ALL UTILITIES IN WORK AREA PRIOR TO COMMENCEMENT OF WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER.

WATER WORK GENERAL NOTES

CUY-90-16.28 (CCG3A)

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DESIGN AGENCY
<b>Michael Baker INTERNATIONAL</b>
DESIGNER
REVIEWER
PROJECT ID
82382
SHEET TOTAL
1165 2339



**CONNECTION OF NEW MAINS**

WHEN THE NEW AND/OR RELOCATED WATER MAINS HAVE BEEN TESTED AND CHLORINATED AND ARE READY TO BE CONNECTED TO THE EXISTING MAIN, THE CONTRACTOR SHALL MAKE SUCH CONNECTIONS AT A TIME DESIGNATED BY THE CITY. PRIOR TO SHUTTING DOWN THE EXISTING MAINS, THE CONTRACTOR SHALL TAKE SUITABLE PRECAUTIONS TO ASSURE A MINIMUM INTERRUPTION TO SERVICE, INCLUDING THE FOLLOWING:

- (A) PERFORM ALL NECESSARY EXCAVATION, INCLUDING BELL HOLES, EXPOSING THE EXISTING MAIN SUFFICIENTLY FOR THE OPERATION OF THE PIPE SAW BY THE CITY, OR PIPE CUTTING BY THE CONTRACTOR.
- (B) REMOVE THE CAP OR PLUG FROM THE END OF THE NEW MAIN.
- (C) SWAB THE INSIDE OF ALL PIPES, BENDS, SLEEVES, COUPLINGS AND OTHER FITTINGS TO BE USED IN CONNECTION THOROUGHLY WITH A CHLORINE SOLUTION OF AT LEAST 100 P.P.M.
- (D) MAKE UP AS MUCH OF THE WATER MAIN CONNECTION AS POSSIBLE OUTSIDE THE DITCH TO ELIMINATE THE NEED FOR MAKING MOST OF THE NECESSARY JOINTS DURING THE SHUTDOWN. BY CAREFUL MEASUREMENT ALL PIPE CUTS MAY BE MADE BY THE CONTRACTOR PRIOR TO SHUTTING DOWN.
- (E) HAVE SUFFICIENT MANPOWER AND EQUIPMENT ON THE SITE TO PERFORM THE OPERATION IN A MINIMUM AMOUNT OF TIME.
- (F) PERFORM AS MUCH OF THE SERVICE AND HYDRANT CONNECTION WORK ALONG RELOCATED MAINS AS IS POSSIBLE.
- (G) IN THE TIME PERIOD FROM APRIL 1, THRU TO NOVEMBER 1, NO SHUTDOWNS WILL BE PERMITTED DUE TO SEASONAL AND SYSTEM DEMANDS UNLESS OTHERWISE APPROVED BY THE CITY.

**PAINTING**

- (A) IT IS THE INTENTION OF THESE SPECIFICATIONS TO PROVIDE THAT ALL METAL WORK SUBJECT TO CORROSION SHALL BE SATISFACTORILY PROTECTED BY A DURABLE COATING OF PAINT OR OTHER APPROVED MATERIAL AND THAT ALL METAL SURFACES NOT BURIED IN EARTH, OR IN CONCRETE SHALL BE LEFT CLEAN AND WELL PAINTED AT THE COMPLETION OF THE CONTRACT. UNLESS OTHERWISE SPECIFIED, THE PROTECTION SHALL BE AT LEAST THAT GIVEN BY THREE (3) COATS OF APPROVED PAINT. THE FIRST COAT IS TO BE APPLIED AT THE SHOP BEFORE THE METAL HAS RUSTED AND AFTER ALL GREASE, DIRT AND SCALE HAS BEEN REMOVED. BOLTS AND NUTS SHALL NOT BE SHOP COATED, BUT SHALL RECEIVE THREE (3) COATS OF APPROVED PAINT AFTER INSTALLATION.
- (B) ALL METAL WORK WHICH HAS NOT BEEN COATED BEFORE THE ARRIVAL ON THE JOB SHALL BE GIVEN A TEMPORARY PROTECTIVE COATING OF SUCH A NATURE AS TO PERMIT THE READY ADHERENCE OF FUTURE COATINGS. THE TEMPORARY COATING SHALL BE A GOOD GRADE ASPHALTIC PAINT OR OTHER APPROVED MATERIAL. THE TEMPORARY PROTECTION SHALL APPLY PARTICULARLY TO THE VALVE BOXES AND COVERS, MANHOLE RINGS AND COVERS, LADDERS AND LADDER RUNGS, DRESSER TYPE/VICTAULIC TYPE COUPLINGS AND ELSEWHERE WHEN IN THE OPINION OF THE CITY, SUCH PROTECTION IS NECESSARY.
- (C) ALL SURFACES OF METAL WHICH WILL BE IN CONTACT AFTER ASSEMBLING SHALL BE PAINTED, AT LEAST ONE (1) COAT, BEFORE ASSEMBLING. THE FINAL COAT OF PAINT ON ALL EXPOSED WORK SHALL BE GIVEN SHORTLY BEFORE THE COMPLETION OF THE CONTRACT.
- (D) WHERE PAINTING CLAUSES APPEAR HEREINAFTER, THEY SHALL TAKE PRECEDENCE OVER THIS SECTION, EXCEPT THAT TEMPORARY PROTECTION HEREIN DESCRIBED MAY BE REQUIRED.
- (E) ALL OF THIS WORK SHALL BE INCLUDED IN THE PRICE BID FOR THE PARTICULAR ITEM REQUIRING THE PAINTING.

**TESTS, INSPECTION AND REPORTS**

NOTWITHSTANDING THE REQUIREMENTS OF ANY OTHER PROVISIONS OF THESE SPECIFICATIONS, THE CONTRACTOR SHALL ARRANGE FOR AND PAY ALL COSTS INVOLVED FOR SHOP INSPECTION OF ALL MATERIALS FURNISHED, MANUFACTURE OF ALL PIPE, VALVES, FITTINGS, ETC., FIELD AND SHOP WELDS AND WELDING, AND FURNISH TO THE STATE AND THE CITY OF CLEVELAND COPIES OF ALL SHOP, FABRICATION, MANUFACTURE AND OTHER RELATED INSPECTION REPORTS OF MATERIALS FURNISHED. THIS INSPECTION SHALL BE DONE BY A RECOGNIZED INSPECTION LABORATORY APPROVED BY THE CITY OF CLEVELAND. IN THE CASE OF ANY ITEM NOT SPECIFICALLY MENTIONED IN THE "WATER WORK NOTES," OHIO DEPARTMENT OF TRANSPORTATION CONSTRUCTION AND MATERIAL SPECIFICATIONS - JANUARY 1, 2019 SHALL GOVERN.

**HANDLING PIPE AND ACCESSORIES**

- (A) UNLOADING PIPE, FITTINGS, VALVES, HYDRANTS, AND OTHER ACCESSORIES SHALL, UNLESS OTHERWISE DIRECTED, BE UNLOADED AT THE POINT OF DELIVERY, HAULED TO AND DISTRIBUTED AT THE SITE OF THE PROJECT BY THE CONTRACTOR. THEY SHALL AT ALL TIMES BE HANDLED WITH CARE TO AVOID DAMAGE. IN LOADING AND UNLOADING, THEY SHALL BE LIFTED BY HOISTS OR SLID, OR ROLLED ON SKIDWAYS IN SUCH MANNER AS TO AVOID SHOCK. UNDER NO CIRCUMSTANCES SHALL THEY BE DROPPED. PIPE HANDLED ON SKIDWAYS MUST NOT BE SKIDDED OR ROLLED AGAINST PIPE ALREADY ON THE GROUND.
- (B) AT SITE OF WORK: IN DISTRIBUTING THE MATERIAL AT THE SITE OF THE WORK, EACH PIECE SHALL BE UNLOADED OPPOSITE OR NEAR THE PLACE WHERE IT IS TO BE LAID IN THE TRENCH.
- (C) PROTECTION OF PIPE COATING: PIPE SHALL BE HANDLED IN SUCH MANNER THAT A MINIMUM AMOUNT OF DAMAGE TO THE COATING WILL RESULT. ANY PIPE OR FITTING, THE COATING OF WHICH HAS BEEN DAMAGED IN SHIPPING OR HANDLING, SHALL HAVE THE DAMAGED PORTION WELL CLEANED AND COATED IN THE SHOP WITH A MATERIAL EQUAL TO THAT APPLIED TO THE PIPE AND FITTINGS AND APPROVED BY THE CITY BEFORE BEING PLACED IN THE WORK. THE CONTRACTOR SHALL THOROUGHLY COAT ALL EXPOSED PARTS OF BOLTS AND NUTS WITH AN APPROVED ASPHALT PAINT, AFTER ALL PIPE HAS BEEN LAID AND BEFORE BACKFILLING HAS BEEN PLACED. ALL FIELD COATINGS SHALL BE FURNISHED AND APPLIED BY THE CONTRACTOR.
- (D) PROTECTION OF CONCRETE PIPE: IF, IN THE PROCESS OF MANUFACTURE, TRANSPORTATION, OR HANDLING, ANY CONCRETE PIPE, FITTING OR SPECIAL RECEIVES ANY INDENTATION OR DEFORMATION TO THE CONCRETE, STEEL ENDS OR CONNECTIONS, THE REMOVAL OF WHICH WILL IN ANY DEGREE INJURE IT, SUCH PIPE, FITTING OR SPECIAL SHALL BE REJECTED AND REPLACED WITH NEW MATERIAL TO THE SATISFACTION OF THE CITY AT THE CONTRACTOR'S EXPENSE.

(E) PIPE KEPT CLEAN: THE INTERIOR OF THE PIPE, FITTINGS, AND OTHER ACCESSORIES SHALL BE KEPT FREE FROM DIRT AND FOREIGN MATTER AT ALL TIMES.

(F) FROST PROTECTION: VALVES AND HYDRANTS BEFORE INSTALLATION SHALL BE DRAINED AND STORED IN A MANNER THAT WILL PROTECT THEM FROM DAMAGE BY FREEZING.

**CHANGES IN WATER MAINS**

WHEREVER IT BECOMES NECESSARY, IN THE OPINION OF THE ENGINEER OR THE CITY TO CHANGE THE LOCATION OR ELEVATION OF WATER MAINS AND HYDRANTS AND WHERE WATER MAIN CONNECTIONS ARE TO BE MADE BETWEEN EXISTING DISTRIBUTION MAINS AND WATER MAINS INSTALLED UNDER THIS CONTRACT, THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL EXISTING LINE MATERIALS AS REQUIRED IN ORDER TO RECONNECT THE WATER MAIN AND SHALL FURNISH AND INSTALL COMPLETE, ALL NEW WATER MAIN MATERIALS INCLUDING PIPE, FITTINGS AND VALVES TO MAKE THE CONNECTIONS INDICATED, EXCEPT BRANCH SLEEVES AND VALVES WHICH SHALL BE FURNISHED BY THE CONTRACTOR BUT WILL BE INSTALLED BY THE CITY, EXCEPT WHERE OTHERWISE SPECIFIED UNDER THE SECTION ENTITLED "WORK TO BE DONE BY THE CITY."

THE CONTRACTOR SHALL ALSO FURNISH ALL NECESSARY LABOR, MATERIALS, TOOLS AND EQUIPMENT AND MAKE THE EXCAVATION, BACKFILL AND REPAVING FOR SUCH CONNECTIONS. PAYMENT FOR THIS SHALL BE INCLUDED IN PRICE BID UNDER THE APPROPRIATE ITEM FOR SIZE OF WATER MAIN OR CONNECTION TO BE INSTALLED. ALL WATER MAIN MATERIALS, VALVES, AND APPURTENANCES REMOVED SHALL BECOME THE PROPERTY OF THE CONTRACTOR. (SEE WORK TO BE DONE BY THE CITY).

**WORK TO BE DONE BY THE CITY**

- (A) TAPPING MAINS: THE CONTRACTOR SHALL FURNISH ALL BRANCH SLEEVES, TAPPING SADDLES AND TAPPING VALVES OF THE SIZES AND TYPES INDICATED ON THE CONTRACT DRAWINGS. THE CONTRACTOR SHALL DO ALL THE NECESSARY EXCAVATION, BACKFILLING, SEEDING OR SODDING AND REPAVING REQUIRED THEREFORE. THE CONTRACTOR SHALL ALSO FURNISH ALL EQUIPMENT, TOOLS AND INCIDENTALS, INCLUDING AIR COMPRESSOR, REQUIRED TO DO THIS WORK.
- 1) THE CITY WILL INSTALL ALL BRANCH SLEEVES, TAPPING SLEEVES AND TAPPING VALVES ON ALL CAST IRON, DUCTILE IRON AND CONCRETE PIPE OF ALL SIZES.
- 2) THE CITY WILL MAKE THE PRESSURE TAPS ON CAST IRON OR DUCTILE IRON WATER MAINS FOR TAP SIZES UP TO AND INCLUDING 16-INCHES, AND ON CONCRETE WATER MAINS FOR TAP SIZES UP TO AND INCLUDING 12-INCHES.

**WORK TO BE DONE BY THE CITY (CONTINUED)**

- 3) THE CONTRACTOR SHALL ARRANGE FOR AND SHALL PAY FOR ALL PRESSURE TAPS OF 20-INCH AND LARGER ON CAST IRON OR DUCTILE IRON WATER MAINS AND FOR ALL PRESSURE TAPS OF 16-INCH AND LARGER ON CONCRETE AND STEEL WATER MAINS. THE CONTRACTOR'S COSTS FOR SUCH ARRANGEMENTS FOR PRESSURE TAPPING SHALL BE INCLUDED IN THE APPROPRIATE BID ITEM.
- 4) THE CITY WILL NOT OPERATE EQUIPMENT PROVIDED BY THE CONTRACTOR. HOWEVER, THE CITY WILL INSTALL ALL BRANCH SLEEVES, TAPPING SADDLES AND TAPPING VALVES AS INDICATED HEREIN AND WILL ASSIST IN MAKING THE PRESSURE TAP WHERE PRESSURE TAPPING IS PROVIDED BY THE CONTRACTOR. THE CITY WILL ONLY OPERATE EQUIPMENT BELONGING TO THE CITY. ALL LABOR COSTS INCURRED BY THE CITY FOR WORK REQUIRED TO BE DONE BY THE CITY IN THE TAPPING OF WATER MAINS WILL BE CHARGED TO THE CONTRACTOR IN ACCORDANCE WITH THE FEE SCHEDULE APPEARING ELSEWHERE IN THESE NOTES. THE CITY, DIVISION OF WATER, WILL CHARGE TO THE CONTRACTOR A "TAPPING FEE" FOR DIVISION OF WATER LABOR INCURRED IN THE WORK, PAYABLE TO THE PERMITS AND SALES SECTION OF THE DIVISION OF WATER BEFORE ANY WORK IS PERFORMED.

(B) PIPE CUTTING: IN LOCATIONS WHERE BRANCH SLEEVES AND VALVES CANNOT BE INSTALLED, THE CONTRACTOR WILL BE REQUIRED TO CUT IN TEES AND SLEEVE-IN THE REMAINDER OF THE CUT SECTION OF THE EXISTING MAIN, OR, WHEN OTHERWISE REQUIRED WHERE THE CONTRACTOR MUST MAKE PIPE CUTS, IT IS CALLED TO THE CONTRACTOR'S ATTENTION THAT THE DIVISION OF WATER HAS ON HAND AT HARVARD YARDS MOTOR OPERATED PIPE CUTTERS WHICH ARE AVAILABLE FOR CUTTING PIPE BY CITY FORCES.

THE COSTS CHARGED FOR PIPE CUTTING BY CITY FORCES MAY BE OBTAINED FROM THE PERMITS AND SALES SECTION OF THE DIVISION OF WATER, PUBLIC UTILITIES BUILDING, 1201 LAKESIDE AVENUE, CLEVELAND, OHIO 44114. THE CONTRACTOR SHALL DO ALL NECESSARY EXCAVATION, BACKFILLING AND REPAVING AND ALL AIR COMPRESSOR AND CRANE SERVICE SHALL BE FURNISHED BY THE CONTRACTOR. THE CITY, DIVISION OF WATER, WILL CHARGE TO THE CONTRACTOR A "PIPE CUTTING FEE" FOR DIVISION OF WATER LABOR INCURRED IN THE WORK, PAYABLE TO THE PERMITS AND SALES SECTION OF THE DIVISION OF WATER BEFORE ANY WORK IS PERFORMED.

**DIVISION OF WATER - LABOR CHARGES**

THE CITY, DIVISION OF WATER, WILL CHARGE TO THE CONTRACTOR CERTAIN CHARGES PURSUANT TO SECTION 531.03(a) OF THE CODIFIED ORDINANCES OF THE DIVISION OF WATER, AS AMENDED BY ORDINANCE 1043-75 AND ADOPTED BY THE CITY OF CLEVELAND BOARD OF CONTROL RESOLUTION NO: 003-82, AND PER ORDINANCE NO: 2661-81, FOR DIVISION OF WATER LABOR REQUIRED IN THE WORK, PAYABLE TO THE PERMITS AND SALES SECTION OF THE DIVISION OF WATER BEFORE ANY WORK IS PERFORMED. NOTE THAT THE CHARGES INDICATED HEREIN ARE SUBJECT TO CHANGE AND THAT THE CONTRACTOR SHALL VERIFY THE LATEST PRICES WITH THE PERMITS AND SALES SECTION OF THE DIVISION OF WATER.

THE CONTRACTOR SHALL PROVIDE IN HIS BID, INCLUDED WITH THE APPROPRIATE PAY ITEM FOR WATER WORK TO BE PERFORMED IN THIS CONTRACT, ANY AND ALL CITY OF CLEVELAND, DIVISION OF WATER, LABOR CHARGES IN THE AMOUNTS INDICATED HEREIN. NO COMPENSATION WILL BE PROVIDED TO THE CONTRACTORS BY THE STATE FOR DIVISION OF WATER LABOR CHARGES FOR WORK REQUIRED TO BE PERFORMED BY THE DIVISION OF WATER BUT THE REQUIRED DIVISION OF LABOR CHARGES WILL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR(S) AND SHALL BE DEEMED TO BE INCLUDED IN THE PRICE BID FOR THE APPROPRIATE WATER WORK PAY ITEM.

DIVISION OF WATER CHARGES STIPULATED HEREIN ARE ON A FLAT RATE BASIS, UNLESS OTHERWISE SPECIFIED AS A "DEPOSIT - COST PLUS" BASIS.

CHARGES INDICATED HEREIN ARE PER EACH FOR THE QUANTITIES LISTED IN THE "SUMMARY OF WATER WORK."

FOR CURRENT CWD SERVICES AND ASSOCIATED FEES SEE: <http://www.clevelandwater.com/construction/construction-fees>

**EXCAVATION**

- (A) THE CONTRACTOR SHALL REMOVE ALL EXISTING STRUCTURES, ROADWAYS, DRIVEWAYS AND OTHER SIMILAR MATERIALS AND MAKE ALL EXCAVATION NECESSARY FOR THE PROPER CONSTRUCTION OF THE WATER MAIN, PIPE CONNECTIONS AND APPURTENANT STRUCTURES, INCLUDING TUNNEL AND SHAFT EXCAVATION. THE EXCAVATION SHALL INCLUDE THE REMOVAL, HANDLING, REHANDLING AND DISPOSAL OF MATERIALS ENCOUNTERED IN THE WORK AND SHALL INCLUDE ALL PUMPING, BAILING, DRAINAGE, SHEETING AND BRACING. MOREOVER, THE CONTRACTOR MUST ASSUME ALL RESPONSIBILITY FOR ANY ADDED EXPENSE OR OTHER LIABILITY WHICH MAY ARISE BY MEANS OF QUICKSAND, OBSTACLES OR CONDITIONS FORESEEN AND UNFORESEEN OR ENCOUNTERED IN THE WORK OF THIS CONTRACT.
- (B) TRENCHES SHALL IN EVERY CASE BE OF SUFFICIENT WIDTH TO PERMIT SOLID PACKING OF BACKFILL UNDER AND AROUND PIPES, AND SATISFACTORY CONSTRUCTION OF ALL APPURTENANCES AND FOR SUCH SHEETING AND SHORING, PUMPING AND DRAINING AS MAY BE NECESSARY.
- (C) THE TRENCH SHALL BE DUG TO THE ALIGNMENT AND DEPTH REQUIRED AND ONLY SO FAR IN ADVANCE OF PIPE LAYING AS THE ENGINEER SHALL PERMIT. THE TRENCH SHALL BE SO BRACED AND DRAINED THAT WORKMEN MAY WORK THEREIN SAFELY AND EFFICIENTLY. IT IS ESSENTIAL THAT THE DISCHARGE FROM PUMPS BE LED TO NATURAL DRAINAGE CHANNELS, TO DRAINS, OR TO SEWERS.
- (D) THE TRENCH WIDTH MAY VARY WITH AND DEPEND UPON THE DEPTH OF TRENCH AND THE NATURE OF THE EXCAVATED MATERIAL ENCOUNTERED, BUT IN ANY CASE SHALL BE OF AMPLE WIDTH TO PERMIT THE PIPE TO BE LAID AND JOINTED PROPERLY AND OF THE BACKFILL TO BE PLACED AND COMPACTED PROPERLY. THE MINIMUM WIDTH OF UNSHEETED TRENCH SHALL BE EIGHTEEN (18) INCHES LARGER THAN THE OUTSIDE DIAMETER OF THE PIPE EXCEPT BY CONSENT OF THE CITY; THE MAXIMUM CLEAR WIDTH OF TRENCH SHALL BE NOT MORE THAN TWO (2) FEET GREATER THAN THE OUTSIDE PIPE DIAMETER. WHEN SHEETING AND BRACING IS USED, THE TRENCH WIDTH SHALL BE INCREASED ACCORDINGLY.
- (E) THE TRENCH, UNLESS OTHERWISE SPECIFIED, SHALL HAVE A FLAT BOTTOM CONFORMING TO THE GRADE TO WHICH THE PIPE IS TO BE LAID. THE PIPE SHALL BE LAID UPON SOUND SOIL CUT TRUE AND EVEN, SO THAT THE BARREL OF THE PIPE WILL HAVE A BEARING FOR ITS FULL LENGTH.
- (F) ANY PART OF THE TRENCH EXCAVATED BELOW GRADE SHALL BE CORRECTED WITH APPROVED MATERIAL, THOROUGHLY COMPACTED.
- (G) WHEN THE UNCOVERED TRENCH BOTTOM AT SUBGRADE IS SOFT AND IN THE OPINION OF THE ENGINEER CANNOT SUPPORT THE PIPE, A FURTHER DEPTH AND OR WIDTH SHALL BE EXCAVATED AND BACKFILLED TO PIPE FOUNDATION GRADE AS REQUIRED UNDER (F), OR OTHER APPROVED MEANS SHALL BE ADOPTED TO ASSURE A FIRM FOUNDATION FOR THE PIPE.
- (H) LEDGE ROCK, BOULDERS, LARGE STONES, AND SHALE SHALL BE REMOVED TO PROVIDE A CLEARANCE OF AT LEAST SIX (6) INCHES BELOW ALL PARTS OF THE PIPE, VALVES, OR FITTINGS AND A CLEAR WIDTH OF NINE (9) INCHES ON EACH SIDE OF ALL IRON PIPE, CONCRETE PIPE, AND STEEL PIPE SHALL BE PROVIDED.
- (I) EXCAVATION BELOW SUBGRADE IN ROCK, SHALE OR IN BOULDERS SHALL BE BACKFILLED TO SUBGRADE WITH APPROVED MATERIAL, THOROUGHLY COMPACTED.
- (J) BELL HOLES OF AMPLE DIMENSIONS SHALL BE DUG IN EARTH TRENCHES AT EACH JOINT TO PERMIT THE JOINTING TO BE MADE PROPERLY. ADEQUATE CLEARANCE FOR PROPER JOINTING OF PIPE LAID IN ROCK SHALL BE PROVIDED AT BELL HOLES.
- (K) THE USE OF EXCAVATING MACHINERY WILL BE PERMITTED EXCEPT IN PLACES WHERE ITS OPERATION WILL CAUSE DAMAGE TO TREES, BUILDINGS, OR EXISTING STRUCTURES ABOVE OR BELOW GROUND, IN WHICH CASE HAND METHODS SHALL BE EMPLOYED.
- (L) TREES, FENCES, POLES AND ALL OTHER PROPERTY SHALL BE PROTECTED UNLESS THEIR REMOVAL IS AUTHORIZED. ANY PROPERTY DAMAGED SHALL BE SATISFACTORILY RESTORED BY THE CONTRACTOR.
- (M) HYDRANTS UNDER PRESSURE, VALVE PIT COVERS, VALVE BOXES, CURB STOP BOXES FIRE OR POLICE CALL BOXES, OR OTHER UTILITY CONTROLS SHALL BE LEFT UNOBSTRUCTED AND ACCESSIBLE DURING THE CONSTRUCTION PERIOD.
- (N) THE CONTRACTOR SHALL MAINTAIN ALL EXCAVATIONS IN GOOD ORDER DURING THE CONSTRUCTION, SO AS NOT TO HINDER OR INJURE THE PIPE LAYING, MASONRY OR OTHER WORK. HE SHALL TAKE ALL REASONABLE PRECAUTIONS TO PREVENT MOVEMENT OF THE SIDES OF SUCH EXCAVATION, AND SHALL REMOVE AT HIS OWN EXPENSE ANY MATERIAL SLIDING INTO THE EXCAVATION.

DESIGN AGENCY	
<b>Michael Baker</b> INTERNATIONAL	
DESIGNER	—
REVIEWER	—
PROJECT ID	82382
SHEET	TOTAL
1166	2339

**SHEETING AND BRACING**

(A) THE CONTRACTOR SHALL FURNISH AND PUT IN PLACE SUCH SHEETING AND BRACING AS MAY BE REQUIRED TO SUPPORT THE SIDES OF TRENCHES OR OTHER EXCAVATION AND SHALL REMOVE SUCH SHEETING AND BRACING, AS THE TRENCH OR EXCAVATION IS FILLED UP, UNLESS THE ENGINEER SHALL ORDER IT LEFT IN PLACE, IN WHICH CASE THE CONTRACTOR SHALL CUT THE PLANK OFF AT A HEIGHT AS ORDERED BY THE ENGINEER, OR AS CALLED FOR ON THE CONTRACT DRAWINGS. THAT PORTION OF THE TIMBER ORDERED TO BE LEFT IN PLACE WILL BE PAID FOR AT THE CONTRACT UNIT PRICE BID PER THOUSAND BOARD FEET MEASURE. NO PAYMENT WILL BE MADE FOR WASTED ENDS.

(B) FOR ALL EXCAVATIONS FOR THE WORK DESCRIBED HEREIN, THE CONTRACTOR SHALL FURNISH AND PLACE SHEETING AND BRACING SO AS TO REDUCE TO A MINIMUM THE POSSIBILITY OF INJURY OR DAMAGE TO THE SAME.

(C) IF THE ENGINEER IS OF THE OPINION THAT AT ANY POINT SUFFICIENT OR PROPER SUPPORTS, SHEETING, OR BRACING HAVE NOT BEEN PROVIDED, HE MAY ORDER ADDITIONAL SUPPORTS, SHEETING OR BRACING, AT THE EXPENSE OF THE CONTRACTOR, AND THE COMPLIANCE WITH SUCH ORDERS BY THE CONTRACTOR SHALL NOT RELIEVE OR RELEASE HIM FROM HIS RESPONSIBILITY FOR SUFFICIENCY OF SUCH SUPPORTS.

(D) SHEETING AND BRACING SHALL BE PROVIDED IN ACCORDANCE WITH RULE 4121.1-3-13 OF "THE SPECIFIC SAFETY REQUIREMENTS OF THE INDUSTRIAL COMMISSION OF OHIO RELATING TO CONSTRUCTION."

**PREQUALIFICATIONS OF CONTRACTOR FOR TAPPING OF SERVICE CONNECTIONS ONE (1) INCH AND UNDER**

FOR THE RETAPPING OF EXISTING SERVICE CONNECTIONS ONE (1) INCH AND UNDER THE COMMISSIONER OF WATER IS AUTHORIZED TO DEEM PERSONS OR FIRMS QUALIFIED TO TAP MAINS FOR SERVICE CONNECTION REINSTALLATION AFTER QUALIFICATIONS OF TAPPER, INSPECTION OF EQUIPMENT, AND PROVEN ABILITY AND WORKMANSHIP HAVE BEEN ESTABLISHED TO THE COMMISSIONER'S SATISFACTION. TO DETERMINE THE QUALIFICATIONS OF ANY PERSON OR FIRM TO TAP MAINS, THE COMMISSIONER, OR HIS DESIGNEE, SHALL WITNESS THE INSTALLATION OF A SERVICE CONNECTION IN A WATER MAIN UNDER PRESSURE AND INSPECT TAPPING EQUIPMENT TO BE USED BY TAPPER. UPON SUCCESSFUL COMPLETION OF A TAP, THE TAPPER SHALL BE CERTIFIED BY LETTER FROM THE COMMISSIONER TO THE ENGINEER INDICATING THE TAPPER'S COMPETENCE AND QUALIFICATIONS. THIS QUALIFICATION MAY BE REVOKED BY THE COMMISSIONER OF WATER IF IT IS DETERMINED THAT THE TAPPER'S COMPETENCY IS NOT MAINTAINED OR EQUIPMENT IS CHANGED. CERTIFICATION FOR TAPPING ONE (1) INCH AND UNDER SERVICE CONNECTIONS WILL BE REQUIRED ON A JOB BY JOB BASIS AND SUCH CERTIFICATION SHALL ONLY BE IN FORCE FOR THE PROJECT APPLIED FOR.

ALL TAPPING SHALL BE DONE UNDER THE INSPECTION OF THE DIVISION OF WATER'S INSPECTOR. FOR EACH SERVICE TAP TO BE MADE IN ORDER TO REINSTALL A WATER SERVICE CONNECTION, THE TAPPER SHALL OBTAIN AND COMPLETE A CITY OF CLEVELAND "CITY METER REPAIRS HY" FORM C OF C 101-130A FROM THE INSPECTOR. FAILURE TO PRESENT FORM AT TIME OF COMPLETION OF REINSTALLATION SHALL BE CAUSE FOR IMMEDIATE DISQUALIFICATION.

**REMOVAL OF EXCAVATED MATERIAL**

(A) ALL SURPLUS MATERIAL AND SUCH OTHER MATERIAL AS THE ENGINEER MAY DEEM UNFIT FOR USE AS BACKFILL SHALL BE DISPOSED OF BY THE CONTRACTOR SO AS TO GIVE A MINIMUM OF INCONVENIENCE TO THE PUBLIC. IN CASE OF SETTLEMENT AFTER BACKFILL, THE CONTRACTOR SHALL SUPPLY SUFFICIENT MATERIAL SATISFACTORY TO THE ENGINEER TO MAKE UP FOR THE DEFICIENCY.

(B) IN THE STORING OF EXCAVATED MATERIAL, WHICH IS TO BE USED AS A BACKFILL, THE CONTRACTOR SHALL EXERCISE CARE SO AS TO AVOID INCONVENIENCING THE PUBLIC. IF IN THE OPINION OF THE ENGINEER IT IS NECESSARY TO REMOVE THIS EXCAVATED MATERIAL FROM THE STREET OR LOTS, THE CONTRACTOR SHALL BE REQUIRED TO DO SO.

(C) ANY MATERIAL WHICH MAY SPILL OR DRIP FROM VEHICLES BY HAULING IN THE STREETS SHALL BE REMOVED AND THE STREETS CLEANED BY THE CONTRACTOR, TO THE SATISFACTION OF THE ENGINEER.

(D) WHEN SO DIRECTED BY THE ENGINEER, THE CONTRACTOR SHALL IMMEDIATELY REMOVE ALL EXCAVATED MATERIALS FROM THE SITE.

**LAYING PIPE**

(A) PROPER IMPLEMENTS, TOOLS, AND FACILITIES, SATISFACTORY TO THE ENGINEER, SHALL BE PROVIDED AND USED BY THE CONTRACTOR FOR THE SAFE AND CONVENIENT PROSECUTION OF THE WORK. ALL PIPE, FITTINGS, AND VALVES SHALL BE CAREFULLY LOWERED INTO THE TRENCH, PIECE BY PIECE, BY MEANS OF DERRICK, PROPER SLINGS, AND OTHER SUITABLE TOOLS OR EQUIPMENT, IN SUCH MANNER AS TO PREVENT DAMAGE TO PIPE OR COATING. UNDER NO CIRCUMSTANCES SHALL PIPE OR ACCESSORIES BE DROPPED OR DUMPED INTO THE TRENCH. IF ANY DEFECTIVE PIECE IS DISCOVERED WHILE PIPE IS SUSPENDED OR AFTER BEING LAID, A NEW PIECE SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR.

(B) ALL FOREIGN MATTER OR DIRT SHALL BE REMOVED FROM THE INSIDE OF THE PIPE BEFORE IT IS LOWERED INTO ITS POSITION IN THE TRENCH, AND IT SHALL BE KEPT CLEAN BY APPROVED MEANS DURING AND AFTER LAYING.

(C) AT TIMES WHEN PIPE LAYING IS NOT IN PROGRESS, THE OPEN ENDS OF PIPE SHALL BE CLOSED BY APPROVED MEANS, AND NO TRENCH WATER SHALL BE PERMITTED TO ENTER THE PIPE. NO PIPE SHALL BE LAID IN WATER, OR WHEN THE TRENCH CONDITIONS OR THE WEATHER IS UNSUITABLE FOR SUCH WORK, EXCEPT BY PERMISSION OF THE ENGINEER.

(D) WHEREVER NECESSARY TO DEFLECT PIPE FROM A STRAIGHT LINE, EITHER IN THE VERTICAL OR HORIZONTAL PLANE TO AVOID OBSTRUCTIONS, TO PLUMB STEMS, OR FOR OTHER REASONS, THE DEGREE OF DEFLECTION SHALL BE APPROVED BY THE ENGINEER.

(E) BEFORE LAYING DUCTILE IRON PIPE, ALL LUMPS, BLISTERS AND EXCESS COAL TAR COATING SHALL BE REMOVED FROM THE BELL AND SPIGOT ENDS OF EACH PIPE. THE PIPE ENDS SHALL THEN BE KEPT CLEAN UNTIL JOINTS ARE MADE.

(F) BEFORE LAYING CONCRETE PIPE, THE PIPE ENDS SHALL BE MADE SMOOTH WITH EMERY CLOTH, FILE OR OTHER APPROVED MEANS, WIRE BRUSHED AND WIPED UNTIL CLEAN AND DRY. PIPE ENDS SHALL BE KEPT CLEAN UNTIL JOINTS ARE MADE. AFTER CLEANING AND DRYING, ALL CONTACT SURFACES OF THE GASKETS AND STEEL JOINT RINGS SHALL BE COATED WITH AN APPROVED FLAX SOAP BEFORE ENTERING THE SPIGOT ENDS INTO THE SOCKET. IMMEDIATELY AFTER THE JOINT IS PULLED TOGETHER, THE PIPE SHALL BE BLOCKED WITH WOOD BLOCKING. A SURCINGLE SHALL BE INSTALLED AROUND THE JOINT AND THE PIPE SHALL BE SECURED WITH EARTH OR SAND AS REQUIRED, CAREFULLY TAMPED UNDER AND ON EACH SIDE UP TO THE SPRING-LINE OF THE PIPE, INCLUDING THE BELL HOLES. ALL BLOCKING SHALL BE REMOVED WHEN BACKFILL HAS REACHED THE SPRING LINE FOR THE PIPE.

(G) BEFORE LAYING STEEL PIPE, THE PREPARATION OF PIPE ENDS FOR THE STEEL PIPE AND FITTINGS SHALL MADE IN ACCORDANCE WITH THE AWWA SPECIFICATIONS, C 200-86, "STEEL PIPE 6" AND LARGER," OR LATEST REVISION THEREOF.

**FLOATING**

THE CONTRACTOR SHALL TAKE EVERY PRECAUTION AGAINST THE FLOATING OF THE PIPE DUE TO WATER COMING INTO THE TRENCH, OR THROUGH CAVING IN, FLUSHING OR PUDDLING. IN CASE OF SUCH FLOATING THE CONTRACTOR SHALL REPLACE THE PIPE AT HIS OWN EXPENSE AND MAKE WHOLLY GOOD ANY INJURY OR DAMAGE WHICH MAY HAVE RESULTED.

**PLUGGING DEAD ENDS**

THE CONTRACTOR SHALL INSTALL STANDARD RESTRAINED PLUG WITH RODS CLAMPS INTO THE BELLS OF ALL DEAD ENDS OF PIPES, TEES, OR CROSSES, AND SHALL INSTALL STANDARD RESTRAINED CAP WITH RODS AND CLAMPS ONTO SPIGOT ENDS OF DEAD END MAINS WHERE INDICATED ON THE CONTRACT DRAWINGS OR AS ORDERED BY THE ENGINEER. CONCRETE PIERS SHALL BE PLACED BEHIND ALL PLUGS AND CAPS. THE COST OF FURNISHING AND INSTALLING THE PLUGS AND CAPS, COMPLETE WITH RODS AND CLAMPS AND CONCRETE PIER, SHALL BE INCLUDED IN THE PER FOOT PRICE BID FOR THE VARIOUS SIZES OF NEW/RELOCATED OR LOWERED WATER MAINS.

THE COST OF FURNISHING AND INSTALLING THE PLUG OR CAP, COMPLETE WITH RODS AND CLAMPS AND CONCRETE PIER, IN EXISTING WATER MAINS, SHALL BE INCLUDED IN THE UNIT PRICE BID FOR EACH "ITEM SPECIAL - PLUGGING EXISTING WATER MAINS AND BRANCHES," CLASSIFIED AS TO SIZE AS SHOWN ELSEWHERE IN THESE PLANS. PAYMENT FOR TEMPORARY PLUGS OR CAPS USED FOR PRESSURE TESTING AND/OR CHLORINATION SHALL BE INCLUDED IN THE UNIT PRICE BID PER FOOT OF WATER MAIN TO BE TESTED AND CHLORINATED.

**CASING PIPE OR TUNNELING**

THE INSTALLATION OF CASING PIPE OR TUNNELING WILL NOT BE PERMITTED WITHOUT PERMISSION OF THE CITY.

**LISTS AND INVOICES**

(A) THE CONTRACTOR SHALL FURNISH THE CITY WITH THE LIST IN DUPLICATE OF PIECES IN EACH SHIPMENT OF PIPE AND SPECIALS, GIVING THE SERIAL NUMBER AND DESIGNATION OF EACH PIPE AND SPECIAL SENT AT THAT TIME.

(B) THE MATERIAL SHALL BE SHIPPED IN SUCH SECTIONS AS THE STATE AND CITY MAY ORDER.

**BACKFILLING**

A. BACKFILLING SHALL CONSIST OF A SAND BEDDING BACKFILL AND BACKFILL, UNLESS OTHERWISE SPECIFIED, OR WHERE PREMIUM BACKFILL IS REQUIRED, MADE WITH MATERIAL EXCAVATED FROM THE TRENCHES, PROVIDING THE SAME IS SATISFACTORY TO THE ENGINEER AND THE CITY. IF, IN THE OPINION OF THE ENGINEER AND THE CITY, THE MATERIAL EXCAVATED IS UNSATISFACTORY, THEN THE CONTRACTOR SHALL FURNISH AT HIS OWN EXPENSE OTHER SUITABLE MATERIAL FOR BACKFILL.

ALL BACKFILL MATERIAL SHALL BE FREE FROM SLAG, CINDERS, RUBBISH, AND OTHER OBJECTIONABLE MATERIAL. BACKFILL SHALL BE PLACED INTO THE TRENCH AND NOT DOZED OR DUMPED FROM THE TOP OF THE TRENCH. THIS WORK INCLUDES ALL BACKFILLING, TOGETHER WITH RAMMING, PUDDLING, AND ROLLING, AS REQUIRED; THE FURNISHING OF SAND BEDDING BACKFILL, SUITABLE MATERIAL FOR BACKFILL, INCLUDING PREMIUM BACKFILL; AND ALL APPURTENANT WORK INCIDENTAL THERETO.

B. BEFORE LAYING THE PIPE, THE BOTTOM OF THE TRENCH SHALL BE BROUGHT TO THE GRADE OF THE BOTTOM OF THE PIPE, EXCEPT AT PIPE JOINTS. WHEREVER THE BOTTOM OF THE TRENCH HAS BEEN EXCAVATED BELOW THE BOTTOM OF THE PIPE, THE CONTRACTOR SHALL PLACE SAND BEDDING, OR OTHER APPROVED MATERIAL SATISFACTORY TO THE ENGINEER AND THE CITY, TO BRING THE BOTTOM OF THE TRENCH TO THE GRADE OF THE BOTTOM OF THE PIPE. THIS SAND BEDDING SHALL BE THOROUGHLY TAMPED BEFORE THE PIPE IS PLACED IN THE TRENCH.

C. THE BEDDING BACKFILL THREE (3) INCHES UNDER, AROUND AND TO A DEPTH OF ONE (1) FOOT ABOVE THE TOP OF ALL PIPE, SHALL BE MADE WITH SAND, WHICH MATERIAL SHALL BE FREE FROM STONE AND OTHER OBJECTIONABLE MATERIAL NOTED ABOVE IN PARAGRAPH (A) AND HEREIN. THE SAND USED FOR BEDDING BACKFILL SHALL BE A NATURAL BANK SAND, GRADED FROM FINE TO COARSE, NOT LUMPY OR FROZEN, AND FREE FROM SLAG, CINDERS, ASHES, RUBBISH, OR OTHER DELETERIOUS OR OBJECTIONABLE MATERIAL. THE SAND USED FOR BEDDING BACKFILL SHALL NOT CONTAIN A TOTAL OF MORE THAN 10% BY WEIGHT OF LOAM AND CLAY, AND ALL SUCH MATERIAL MUST BE CAPABLE OF BEING PASSED THROUGH A 3/4 INCH SIEVE. NOT MORE THAN 5% SHALL REMAIN ON A #4 SIEVE. THE CONTRACTOR MUST USE SPECIAL CARE IN PLACING THIS PORTION OF THE SAND BEDDING BACKFILL, SO AS TO AVOID SCRAPING OF THE EXTERIOR COATING, INJURING THE PIPE, AND DISTORTING OR MOVING THE PIPE WHEN COMPACTING THE SAME. THE SAND BEDDING BACKFILL SHALL BE TAMPED IN THIN LAYERS OF SIX (6) INCHES, SIMULTANEOUSLY ON EACH SIDE OF THE PIPE, AND THOROUGHLY COMPACTED SO AS TO PROVIDE A SOLID BACKING AGAINST THE EXTERNAL SURFACE OF THE PIPE.

D. BACKFILL ABOVE THE ONE (1) FOOT SAND BEDDING BACKFILL SHALL BE MADE WITH MATERIAL SPECIFIED HEREIN IN EITHER PARAGRAPH (A) OR AS SPECIFIED HEREIN FOR PREMIUM BACKFILL IN PARAGRAPH (G).

E. PREMIUM BACKFILL SHALL BE PLACED WHERE EXISTING AND FUTURE PERMANENT PAVEMENT, SIDEWALKS, DRIVEWAYS, SEWER PIPE CROSSINGS AND CURB CROSSINGS HAVE BEEN OPEN OR UNDERCUT. THE PLACEMENT OF PREMIUM BACKFILL ALSO APPLIES TO ALL EXCAVATION WITHIN THREE (3) FEET OF EXISTING OR FUTURE PERMANENT PAVEMENT, SIDEWALKS, DRIVEWAYS, SEWER PIPE CROSSINGS AND CURB CROSSINGS. IF PART OF THE TRENCH IS UNDER EXISTING OR FUTURE PAVEMENT, SIDEWALK, DRIVEWAY OR CURB THE ENTIRE TRENCH SHALL BE BACKFILLED WITH PREMIUM BACKFILL MATERIAL SPECIFIED HEREIN.

F. ONLY AFTER THE ONE (1) FOOT SAND BEDDING BACKFILL HAS BEEN SATISFACTORILY COMPACTED, MAY WORK PROCEED IN PLACING THE REMAINING BACKFILL WHICH MUST BE CAREFULLY PLACED AND COMPACTED BY TAMPING, PUDDLING, OR ROLLING. ALL PRECAUTIONS MUST BE TAKEN TO ELIMINATE FUTURE SETTLEMENT. THE NUMBER OF MEN TAMPING SHALL BE NOT LESS THAN THE NUMBER BACKFILLING, AND ADDITIONAL MEN SHALL BE KEPT IN THE TRENCH TO SPREAD THE MATERIAL.

**BACKFILLING (CONTINUED)**

G. PREMIUM BACKFILL CONSISTING OF CONTROLLED LOW STRENGTH MATERIAL CONTROLLED DENSITY FILL (CLSM-CDF) "FLOWABLE FILL" IS REQUIRED:

A: UNDER ALL EXISTING OR FUTURE PAVEMENTS, SIDEWALKS, AND DRIVES WITHIN MEETING THE FOLLOWING REQUIREMENTS:

B: AS SPECIFIED IN THE WATER MAIN TRENCH DETAIL FOUND ON SHEET 1195

WHEN PREMIUM BACKFILL IS REQUIRED BY THE LOCAL MUNICIPALITY FOR CASES OTHER THAN THOSE LISTED ABOVE, IT SHALL BE LIMESTONE GRADED PER ODOT 304.02 OR ODOT 411. NO SLAG IS PERMITTED.

SIEVE	% PASSING GRADING
2-INCH	100
1-INCH	70-100
3/4-INCH	50-90
NO. 4	30-60
NO. 30	9-33
NO. 200	0-13

THE FRACTION OF THESE MATERIALS PASSING A #40 SIEVE SHALL HAVE A LIQUID LIMIT NOT GREATER THAN 30 (THIRTY) AND A PLASTICITY INDEX NOT GREATER THAN 6 (SIX).

SLAG; NATURAL OR SYNTHETIC CRUSHED AGGREGATE SUCH AS BROKEN OR CRUSHED ROCK; CRUSHED CONCRETE; OR OTHER TYPE OF MATERIAL IN LIEU OF THE SAND BEDDING BACKFILL AND THE LIMESTONE SCREENING BACKFILL MATERIAL WILL NOT BE PERMITTED.

THE MINIMUM COMPACTION FOR ALL SAND BEDDING BACKFILL, BACKFILL AND PREMIUM BACKFILL SHALL BE 95% STANDARD PROCTER.

H. BACKFILLING SHALL NOT BE DONE IN FREEZING WEATHER, EXCEPT BY PERMISSION OF THE ENGINEER AND THE CITY, AND IT SHALL NOT BE MADE WITH FROZEN MATERIAL, NOR SHALL ANY FILL BE MADE WHERE THE MATERIAL ALREADY IN THE DITCH IS FROZEN.

I. SPECIAL TREATMENT OF THE TRENCH WILL BE REQUIRED WHERE CINDER EXCAVATION, EXCEEDING ONE (1) FOOT MEASURED FROM THE GROUND OR PAVEMENT SURFACE IS ENCOUNTERED. BEFORE LAYING THE PIPE, THE BOTTOM OF THE TRENCH SHALL BE DUG EIGHT (8) INCHES BELOW PIPE GRADE AND THEN BROUGHT TO THE GRADE OF THE PIPE IN THE FOLLOWING MANNER. A FOUR (4) INCH LAYER OF CRUSHED LIMESTONE SHALL BE PLACED ON THE ENTIRE WIDTH OF THE BOTTOM OF THE TRENCH, FOLLOWED BY A FILLER OF HYDRATED LIME AND A LAYER OF SAND BEDDING TO SIX (6) INCHES ABOVE THE TOP OF THE PIPE. THE FOUR (4) INCH CRUSHED LIMESTONE SHALL BE WELL GRADED FROM FINE TO COARSE, AND FREE FROM SLAG, CINDERS, ASHES, RUBBISH OR OTHER OBJECTIONABLE MATERIAL. ALL LIMESTONE MUST BE CAPABLE OF BEING PASSED THROUGH A 3/4 INCH SIEVE. ON TOP OF THIS LAYER OF CRUSHED LIMESTONE, HYDRATED LIME SHALL BE SUPPLIED IN THE AMOUNT OF 3/8 OF A POUND PER SQUARE FOOT OF TRENCH.

THIS BED OF CRUSHED LIMESTONE, WITH FILLER OF HYDRATED LIME IN PLACE, SHALL BE THOROUGHLY TAMPED BEFORE THE PIPE IS LAID IN THE TRENCH AND THE SAND BEDDING BACKFILL IS PLACED. THE SAND BEDDING BACKFILL SHALL BE FOR THREE (3) INCHES UNDER, AROUND AND TO A DEPTH OF SIX (6) INCHES ABOVE THE TOP OF THE PIPE. THE CONTRACTOR MUST USE SPECIAL CARE IN PLACING THIS PORTION OF THE BACKFILL SO AS TO AVOID SCRAPING OF THE EXTERIOR COATING, INJURING THE PIPE, AND DISTORTING OR MOVING THE PIPE WHEN COMPACTING THE SAME. ON TOP OF THE SAND BEDDING BACKFILL THE CONTRACTOR SHALL PLACE ANOTHER LAYER OF CRUSHED LIMESTONE SIX (6) INCHES THICK FOR THE ENTIRE WIDTH OF THE TRENCH. ON TOP OF THIS SIX (6) INCH LAYER OF COMPACTED LIMESTONE A SECOND FILLER OF HYDRATED LIME SHALL THEN BE APPLIED IN THE AMOUNT OF 3/4 OF A POUND PER SQUARE FOOT OF TRENCH. THE REMAINING BACKFILL SHALL BE MADE WITH LIMESTONE SCREENINGS AS ELSEWHERE SPECIFIED HEREIN, CAREFULLY PLACED AND COMPACTED BY TAMPING, OR ROLLING. ALL PRECAUTIONS SHALL BE TAKEN TO ELIMINATE FUTURE SETTLEMENT. THE TREATMENT OF THE TRENCH BOTTOM PREVIOUSLY DESCRIBED MAY BE OMITTED WHERE THE CINDER DEPTH, MEASURED FROM THE TOP SURFACE DOES NOT EXCEED 2'-6".

DESIGN AGENCY

Michael Baker INTERNATIONAL

DESIGNER

REVIEWER

PROJECT ID

82382

SHEET TOTAL

1167 2339



**PROVISIONS FOR PROTECTING WORK**

THE CONTRACTOR SHALL FURNISH ALL THE NECESSARY EQUIPMENT, SHALL TAKE ALL NECESSARY PRECAUTIONS AND SHALL ASSUME THE ENTIRE COST OF HANDLING ANY SEWAGE, SEEPAGE, STORM SURFACE AND FLOOD FLOWS OR ICE, WHICH MAY BE ENCOUNTERED AT ANY TIME DURING THE CONSTRUCTION OF THE WORK. THE MANNER OF PROVIDING FOR THESE OCCURRENCES SHALL MEET WITH THE APPROVAL OF THE ENGINEER. AFTER INSTALLATION, THE CONTRACTOR SHALL FURNISH AND MAINTAIN SATISFACTORY PROTECTION TO ALL EQUIPMENT WHETHER OF THIS OR OTHER CONTRACT AGAINST INJURY BY WEATHER, FLOODING OR BY DIRECT OR INCIDENTAL DAMAGE FROM HIS OWN OPERATIONS, LEAVING ALL WORK IN A PERFECT CONDITION AT THE COMPLETION OF THE CONTRACT. NO EXTRA PAYMENT WILL BE MADE FOR THIS WORK BUT THE ENTIRE COST OF THE SAME SHALL BE INCLUDED IN THE WORK TO BE DONE IN THIS CONTRACT.

**DRAWINGS**

(A) THE CONTRACTOR SHALL SUBMIT TO THE CITY THROUGH THE ENGINEER FOR APPROVAL, SIX (6) SETS OF PRINTS OF ALL SHOP DRAWINGS. SHOP DRAWINGS SHALL BE FULLY DIMENSIONED LEGIBLE DRAWINGS AS DEVELOPED BY THE MATERIALS FABRICATOR. SHOP DRAWINGS SHALL BE SUBMITTED FOR ALL BOLTLESS RESTRAINED IRON PIPE AND FITTINGS, PRESTRESSED CONCRETE PIPE AND FITTINGS, STEEL PIPE AND FITTINGS, SPECIAL FITTINGS, COUPLINGS, SPECIALS, AND MISCELLANEOUS DETAILS, SUCH AS VALVES, DRAIN FORGINGS, PRECAST VAULTS, CASTINGS, ETC. DRAWINGS SHALL INCLUDE DETAILS, LAYOUTS AND LAYING SCHEDULE FOR ALL PIECES FURNISHED REQUIRING DRAWING SUBMITTAL.

(B) TWO (2) SETS OF PRINTS OF EACH OF THE DRAWINGS SUBMITTED WILL BE RETURNED TO THE CONTRACTOR THROUGH THE ENGINEER WITH THE CRITICISMS OR APPROVAL OF THE CITY NOTED THEREON. IN CASE THE DRAWINGS ARE NOT APPROVED, THE CONTRACTOR SHALL AGAIN SEND FOR APPROVAL SIX (6) SETS OF REVISED PRINTS OF EACH OF THE DRAWINGS TO TAKE CARE OF THE CRITICISMS NOTED. NO WORK SHALL BE DONE IN THE SHOP UNTIL AFTER THE DRAWINGS HAVE BEEN FINALLY APPROVED.

(C) AFTER THE DRAWINGS HAVE BEEN FINALLY APPROVED, THE CONTRACTOR SHALL FURNISH THE CITY THROUGH THE ENGINEER WITH ONE (1) COMPLETE SET OF REPRODUCIBLE TRACINGS ON MYLAR OF EACH OF THE FINAL SHOP DRAWINGS. MYLAR SHALL BE OF MINIMUM 4-MIL THICKNESS, SHALL BE OF A SINGLE BASE STOCK WITH AN ETCHED SURFACE TO PROVIDE A MATTE FINISH ON THE FRONT AND SHALL BE OF A PERMANENT NON-ERASABLE, "WASH-OFF" TYPE, OF WHICH THE IMAGE ON THE MYLAR MEDIUM CANNOT BE REMOVED BY ERASURE. ALL SHOP DRAWINGS SHALL BE REPRODUCED FROM THEIR FULL SIZED ORIGINAL TRACINGS AND NOT AS REDUCED SIZES AS MAY HAVE BEEN SUBMITTED DURING THE REVIEW PROCESS. SMALL SIZED DRAWINGS PERTAINING TO A GIVEN ITEM SHALL BE GROUPED FOR REPRODUCTION SO THAT ALL TRACINGS SHALL BE 24" X 36" OVERALL. TRACINGS NOT 24" X 36" IN SIZE WILL NOT BE ACCEPTED.

(D) THE APPROVAL OF THE DRAWINGS BY THE ENGINEER AND THE CITY SHALL NOT RELIEVE THE CONTRACTOR OF ANY OF HIS OBLIGATIONS IN CONNECTION WITH THIS CONTRACT.

**PAVEMENTS, ROAD SURFACES, BERMS, SIDEWALKS, DRIVEWAYS, CURBING, AND UNDERDRAINS**

(A) THE CONTRACTOR SHALL REMOVE ALL PAVEMENTS AND ROAD SURFACES INCLUDING BERMS, SIDEWALKS, DRIVEWAYS, CURBING, AND UNDERDRAINS WITHIN THE LINES OF EXCAVATION. AFTER THE PIPE HAS BEEN LAID, ALL APPURTENANT WORK CONSTRUCTED AND BACKFILL COMPLETED, HE SHALL FURNISH, PLACE AND MAINTAIN, WHEREVER THE PAVEMENT OR ROAD SURFACE INCLUDING BERMS, SIDEWALKS, DRIVEWAYS, CURBING, AND UNDERDRAINS HAS BEEN REMOVED OR DAMAGED BY HIM, A TEMPORARY PAVEMENT IN THE PAVED PORTION OF STREETS, OR A TEMPORARY ROAD SURFACE IN THE UNPAVED PORTION OF STREETS, SO AS TO PROVIDE A SAFE AND PASSABLE ROADWAY UNTIL SUCH TIME AS THE FINAL PAVEMENT OR ROAD SURFACE INCLUDING BERMS, SIDEWALKS, DRIVEWAYS, CURBING, AND UNDERDRAINS IS COMPLETED.

(B) WHEN ONLY A PORTION OF THE STREET IS PAVED AND THE LINES OF EXCAVATION ARE IN THE UNPAVED PORTION OF SAME, THE CONTRACTOR SHALL USE THE UTMOST CARE IN PREVENTING INJURY TO THE PAVEMENT. IF, IN MAKING THE EXCAVATION OR FOR ANY OTHER CAUSE, THE PAVEMENT IS REMOVED OR INJURED BY THE CONTRACTOR, HE SHALL FURNISH, PLACE AND MAINTAIN A TEMPORARY PAVEMENT WHEREVER THE PAVEMENT HAS BEEN REMOVED OR DAMAGED, SO AS TO PROVIDE A SAFE AND PASSABLE ROADWAY UNTIL SUCH TIME AS THE FINAL PAVEMENT IS COMPLETED.

**PAVEMENTS, ROAD SURFACES, BERMS, SIDEWALKS, DRIVEWAYS, CURBING, AND UNDERDRAINS (CONTINUED)**

(C) ALL FINAL PAVING OF ROAD SURFACE, INCLUDING BASE PAVEMENT, BERMS, SIDEWALKS, DRIVEWAYS, CURBING, AND UNDERDRAINS SHALL BE DONE BY THE CONTRACTOR IN CONFORMITY TO ODOT SPECIFICATIONS DATED 2019 OR APPLICABLE STANDARD CUYAHOGA COUNTY DRAWINGS. THE CONTRACTOR SHALL BEAR THE ENTIRE COST OF WORK. THE BASE OF PAVEMENT CONCRETE SHALL BE INSTALLED ON A CAREFULLY PREPARED BED (LEVEL WITH THE BOTTOM OF THE ABUTTING BASE) OVER DISTURBED AREAS AND SHALL BE OF THE THICKNESS SPECIFIED, BUT IN NO CASE LESS THAN 7" THICK. WHERE PAVEMENT OR BASE OF PAVEMENT HAS BEEN DAMAGED BY CAVE-IN, OR BY TRENCH CUT LEAVING A PORTION OR PORTIONS OF PAVEMENT 18 INCHES OR LESS IN WIDTH (BETWEEN SUCH CUT OR DAMAGE) TO CURB OR OTHER SUBSTRUCTURE, THAT REMAINING PORTION OF PAVEMENT SHALL BE REMOVED AND RESTORED MONOLITHIC WITH THE TYPE AND KIND OF PAVEMENT SPECIFIED FOR THE ADJACENT TRENCH AREA. THE WEARING COURSE OVER TRENCH OR OTHER DISTURBED AREAS SHALL BE RESTORED TO MATCH EXISTING PAVEMENT UNLESS OTHERWISE SPECIFIED. ASPHALTIC CONCRETE WEARING COURSE OVER SUCH AREAS SHALL BE NEATLY AND SQUARELY CUT, NOT LESS THAN 3 FEET WIDE, BEFORE THE INSTALLATION OF A CAREFULLY TOOTHED-IN TO ADJACENT PAVEMENT, UNLESS OTHERWISE SPECIFIED. EXPANSION JOINTS SHALL BE INSTALLED BETWEEN BRICK WEARING COURSE (IF GROUTED) AND CURB OR OTHER SUBSTRUCTURE, WHERE SUCH RESTORATION IS REQUIRED BY THESE SPECIFICATIONS.

(D) ALL DAMAGED OR DISPLACED CURB AND UNDERDRAIN SHALL BE RENEWED, OR REPLACED OR RESET TO THE SATISFACTION OF THE ENGINEER. NO FAULTY CURB OR CURB LESS THAN 30" LONG WILL BE PERMITTED FOR REUSE.

(E) AT LOCATIONS NOT SPECIFICALLY MENTIONED, THE CONTRACTOR SHALL RESTORE THE SAME TYPE OF PAVEMENT INCLUDING BERMS, SIDEWALKS, DRIVEWAYS, CURBING, AND UNDERDRAIN AS ENCOUNTERED. IF THE THICKNESS OF THE CONCRETE BASE IS GREATER THAN THE RECORD CALLS FOR, THE CONTRACTOR SHALL RESTORE THE THICKNESS GIVEN IN THE RECORD. IF RECORDS ARE NOT AVAILABLE, THE CONTRACTOR SHALL MATCH EXISTING THICKNESSES WHICH HAS BEEN DONE BY THE CONTRACTOR, THEN HE SHALL RELAY SAME AFTER ALL WORK, INCLUDING BACKFILLING HAS BEEN COMPLETED.

(F) IF PRIOR TO THE EXPIRATION OF THIS CONTRACT, ANY OF THE PAVEMENTS, OR ROAD SURFACES, WITHIN THE LINES OF EXCAVATION OR ADJACENT THERETO, SHALL HAVE BEEN DAMAGED OR INJURED, DUE TO UNDERMINING, OR FOR ANY OTHER CAUSE WHICH MAY BE ATTRIBUTED TO THE WORK WHICH IS BEING DONE BY THE CONTRACTOR, THEN THE CONTRACTOR SHALL REMOVE SUCH DAMAGED OR INJURED PAVEMENTS OR ROAD SURFACES, FOUNDATIONS OF SAME AND ALL LOOSE EARTH. HE SHALL THEN BACKFILL WITH MATERIAL SPECIFIED HEREIN, PROPERLY COMPACTED AND REPLACE THE FINAL PAVEMENT, ROAD SURFACE INCLUDING BERMS, SIDEWALKS, DRIVEWAYS, CURBING, AND UNDERDRAINS.

(G) IF ANY SIDEWALKS, DRIVEWAYS, CURBS, OR UNDERDRAINS ARE REMOVED OR INJURED BY THE CONTRACTOR IN THE COURSE OF MAKING EXCAVATION OR HANDLING MATERIALS, OR FOR ANY REASON WHICH MAY BE ATTRIBUTED TO WORK WHICH HAS BEEN DONE BY THE CONTRACTOR, THEN HE SHALL RELAY SAME AFTER ALL WORK, INCLUDING BACKFILLING HAS BEEN COMPLETED. IF ANY STONE SIDEWALKS, DRIVEWAYS, OR CURBS WHICH HAVE BEEN REMOVED OR INJURED, ARE UNFIT TO BE RELAID, THEN THE CONTRACTOR SHALL FURNISH NEW MATERIAL AND RELAY SAME. ALL CONCRETE OR CEMENT SIDEWALKS, DRIVEWAYS OR CURBS, WHICH ARE REMOVED OR INJURED BY THE CONTRACTOR SHALL BE BROKEN UP BY HIM AND HE SHALL FURNISH ALL LABOR AND MATERIALS AND CONSTRUCT NEW SIDEWALKS, DRIVEWAYS OR CURBS, TO REPLACE THOSE REMOVED OR INJURED. AT INTERSECTING WALKS, DRIVE, ETC., ADDITIONAL CONCRETE SLABS BEYOND THE EXCAVATION LIMITS SHALL BE REMOVED AND REPLACED WITH NEW MATERIAL, IN ORDER TO AVOID HAVING MORE JOINTS THAN IN THE ORIGINAL WORK. ALL SLABS REPLACED SHALL BE OF FULL WIDTH. THE CONTRACTOR SHALL FURNISH, PLACE AND MAINTAIN, WHEREVER THE SIDEWALK HAS BEEN REMOVED OR DAMAGED BY HIM, A TEMPORARY SIDEWALK SO AS TO PROVIDE A SAFE AND PASSABLE SIDEWALK UNTIL SUCH TIME AS THE FINAL SIDEWALK IS COMPLETED.

(H) ALL PAVEMENTS, BASE PAVEMENTS, ROAD SURFACES, BERMS, SIDEWALKS, DRIVEWAYS, CURBS, OR UNDERDRAINS WHICH THE CONTRACTOR IS REQUIRED TO REPLACE OR TO HAVE REPLACED, SHALL, AT THE EXPIRATION OF THE PERIOD OF MAINTENANCE, BE IN AT LEAST AS GOOD CONDITION AS AT THE TIME OF AWARDED THE CONTRACT.

**PAVEMENTS, ROAD SURFACES, BERMS, SIDEWALKS, DRIVEWAYS, CURBING, AND UNDERDRAINS (CONTINUED)**

(I) ALL WORK WHICH THE CONTRACTOR MAY DO IN CONNECTION WITH THE OPENING UP OR REPLACING OF PAVEMENTS, ROAD SURFACES, BERMS, SIDEWALKS, DRIVEWAYS, CURBS, OR UNDERDRAINS AS WELL AS THE FINAL REPAVING, SHALL BE DONE AT HIS EXPENSE, IN ACCORDANCE WITH THE RULES AND REQUIREMENTS OF THE STREET OR SIDEWALK DEPARTMENTS OF THE CITY OF CLEVELAND, MUNICIPALITY OR TOWNSHIP IN WHICH THE WORK IS BEING DONE, AND IN ACCORDANCE WITH THE ADDITIONAL REQUIREMENTS OF THESE SPECIFICATIONS AND CONTRACT DRAWINGS. THE CONTRACTOR SHALL FURNISH EVIDENCE TO THE ENGINEER THAT THE WORK HAS BEEN COMPLETED TO THEIR SATISFACTION.

(J) THE CONTRACTOR SHALL MAKE ALL PAVEMENT CUTS BY CHANNELING MACHINE, HAND-OPERATED PNEUMATIC TOOLS OR BY SUCH OTHER METHODS AS WILL FURNISH A CLEAN CUT IN THE PAVEMENT AND PAVEMENT BASE WITHOUT UNDUE SHATTERING. THE USE OF BALL OR WEIGHT TO BREAK PAVEMENT WILL NOT BE PERMITTED.

(K) NO SPECIFIC OR SEPARATE PAYMENT WILL BE MADE FOR ALL OF THIS WORK, BUT THE COST OF ALL PAVEMENT REPLACEMENT, BOTH TEMPORARY AND PERMANENT INCLUDING PAVEMENT, BASE PAVEMENTS, ROAD SURFACES, BERMS, SIDEWALKS, CURBING, DRIVEWAYS, AND UNDERDRAINS SHALL BE INCLUDED IN THE PRICES BID FOR THE VARIOUS ITEMS OF WORK TO BE DONE UNDER THIS CONTRACT.

**PAVEMENT SAW CUTS**

WHERE "VERMEER" TYPE SAW, OR ANY OTHER TYPE OF MACHINERY OR MEANS IS USED TO CUT THE EXISTING PAVEMENT IN ADVANCE OF THE PAVEMENT REMOVAL, THE CONTRACTOR SHALL IMMEDIATELY FILL THE SAW-CUT GAP WITH ASPHALT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR, AND AT HIS EXPENSE, MAINTAIN, THE SAW-CUT GAPS AND SHALL REPAIR AND/OR REPLACE ASPHALT AS NECESSARY.

**PAVEMENT DAMAGE - CONTRACTOR'S RESPONSIBILITY**

THE CONTRACTOR SHALL BE RESPONSIBLE FOR, AND AT HIS EXPENSE, MAINTAIN, REPAIR AND/OR REPLACE ANY PAVEMENT, ROADWAYS, DRIVEWAYS, BERMS, CURBS, SIDEWALKS AND TREELAWNS OR OTHER AREAS WITHIN THE LIMITS OF THIS PROJECT, THAT MAY BE DAMAGED BY HIM OR BY THOSE IN HIS EMPLOY DUE TO MANEUVERING OF CONSTRUCTION EQUIPMENT, OR DAMAGED BY VEHICULAR TRAFFIC REROUTED DUE TO CONSTRUCTION AND TRAFFIC MAINTENANCE.

THE CONTRACTOR SHALL MAINTAIN, REPAIR AND/OR REPLACE ALL DAMAGED OR INJURED PAVEMENT, ROADWAYS, DRIVEWAYS, BERMS, CURBS, SIDEWALKS AND TREELAWNS, BOTH TEMPORARY AND PERMANENT, IN ACCORDANCE WITH THESE SPECIFICATIONS, CONTRACT DRAWINGS OR APPLICABLE CONSTRUCTION AND MATERIAL SPECIFICATIONS OF THE CUYAHOGA COUNTY ENGINEER OR STATE OF OHIO DEPARTMENT OF TRANSPORTATION (O.D.O.T.).

**REMOVED ITEMS**

ALL MATERIALS CONSISTING OF PIPE, FITTINGS, VALVES, CASTINGS AND OTHER WATER MAIN STRUCTURES, UNLESS SPECIFICALLY INDICATED OTHERWISE HEREIN, WHICH ARE DESIGNATED FOR REMOVAL BY THE CONTRACTOR SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND BE REMOVED AND DISPOSED BY HIM.

**ITEM 202 - REMOVAL MISC.: WATER MAIN REMOVED**

ALL WATER MAINS AND APPURTENANCES WHICH ARE NOT TO REMAIN IN SERVICE SHALL BE REMOVED. ALL SUCH WATER WORK SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE DISPOSED OF BY HIM.

ALL WATER MAINS AND APPURTENANCES WHICH WOULD NORMALLY BE REMOVED WITH ROADWAY EXCAVATION OR OTHER ITEMS OF WORK CALLED FOR IN THESE PLANS SHALL NOT BE PAID FOR SEPARATELY.

**VALVE AND VALVE BOX REMOVAL**

REMOVAL AND DISPOSAL OF EXISTING WATERMAIN AND WATER SERVICE CONNECTION VALVES AND VALVE BOXES, WHEN PERFORMED IN CONJUNCTION WITH SERVICE CONNECTION AND WATERMAIN REMOVALS SHALL BE CONSIDERED INCIDENTAL TO THE RESPECTIVE "SERVICE CONNECTION REMOVED" AND "WATERMAIN REMOVED" PAY ITEMS. NO SEPARATE PAYMENT SHALL BE MADE.

**ITEM SPECIAL - DUCTILE IRON PIPE AND FITTINGS - 20" AND SMALLER**

**WORK INCLUDED**

(A) THE CONTRACTOR SHALL, UNDER ITEM SPECIAL - DUCTILE IRON PIPE AND FITTINGS - 20" AND SMALLER, FURNISH ALL THE MATERIALS FOR AND SHALL PROPERLY CONSTRUCT AND CONNECT IN PLACE AT THE LOCATIONS SHOWN ON THE DRAWINGS OR AS DIRECTED, ALL DUCTILE IRON PIPE AND FITTINGS, INCLUDING ALL EXCAVATION WORK, THE CUTTING INTO AND REMOVAL OF EXISTING PIPE, BACKFILLING, SAND BEDDING AND PREMIUM BACKFILL, AND REPAVING (BOTH TEMPORARY AND PERMANENT), ALL AS REQUIRED FOR THE PROPER COMPLETION OF THE WORK INCLUDED UNDER THIS CONTRACT. IN GENERAL THIS WORK SHALL INCLUDE THE FURNISHING, LAYING, CONNECTING, PAINTING, TESTING OF PIPE AND FITTINGS, THE EXCAVATION, REMOVAL AND RESTORATION OF MISCELLANEOUS ITEMS, SHEETING AND SHORING, BACKFILLING, SAND BEDDING AND PREMIUM BACKFILL, SEEDING AND SODDING, THE PERMANENT REPAVING, IF SO NOTED ON THE CONTRACT DRAWINGS, THE CUTTING INTO, REMOVAL AND STORAGE OF EXISTING MAINS, AND THE FURNISHING OF ALL LABOR, MATERIALS, TOOLS AND EQUIPMENT TO COMPLETE THE WORK AS SPECIFIED, SHOWN OR ORDERED.

(B) IN MAKING THE CONNECTION TO EXISTING MAINS WHERE BRANCH SLEEVES CAN BE USED, THE CONTRACTOR SHALL SUPPLY THE SAME. THE DIVISION OF WATER WILL INSTALL THE BRANCH SLEEVE AND WILL MAKE THE PRESSURE TAP (IF APPLICABLE) IN ACCORDANCE WITH THE REQUIREMENTS INDICATED UNDER "WORK TO BE DONE BY CITY." IF THE INSTALLATION OF BRANCH SLEEVES AND VALVES CANNOT BE ACCOMPLISHED, THE CONTRACTOR WILL BE REQUIRED TO FURNISH AND INSTALL TEES WITH SLEEVES OR COUPLINGS TO COMPLETE THE CONNECTION. THE CONTRACTOR WILL BE REQUIRED TO MAKE THE NECESSARY EXCAVATION, BACKFILL AND REPAVING (IF NOT PAID FOR SEPARATELY AS PART OF THIS CONTRACT).

**DUCTILE IRON PIPE AND FITTINGS - 20" AND SMALLER**

(A) ALL PIPE AND FITTINGS SHALL BE MANUFACTURED IN ACCORDANCE WITH AND IN ALL RESPECTS WITH THE REQUIREMENTS OF THE LATEST SPECIFICATIONS OF THE "AMERICAN NATIONAL STANDARD" FOR ANSI/AWWA C151/A21.51-86, "DUCTILE IRON PIPE CENTRIFUGALLY CAST IN METAL MOLDS OR SAND-LINED MOLDS, AND DUCTILE IRON FITTINGS FOR WATER AND OTHER LIQUIDS," AND ANSI/AWWA C111/A21.11-85, "RUBBER-GASKET JOINTS FOR DUCTILE-IRON PIPE AND GRAY-IRON PRESSURE PIPE AND FITTINGS," ADOPTED BY THE AMERICAN WATER WORKS ASSOCIATION; WHICH STANDARDS EXCEPT AS HEREIN MODIFIED ARE MADE A PART OF THESE SPECIFICATIONS. PIPE AND FITTINGS UP TO AND INCLUDING 20-INCHES SHALL HAVE RETAINED MECHANICAL JOINTS EXCEPT WHERE BOLTLESS RESTRAINED PUSH-ON JOINT PIPE AND FITTINGS IS CALLED FOR ON THE CONTRACT DRAWINGS OR DIRECTLY SPECIFIED.

(B) ALL PIPE AND FITTINGS SHALL BE CEMENT LINED AND OF THE SIZE AND THICKNESS AND PRESSURE CLASSES NOTED ON THE RESPECTIVE CONTRACT DRAWINGS OR DIRECTLY SPECIFIED. FITTINGS ON PIPE SIZES UP TO AND INCLUDING 12-INCHES MAY BE OF THE SHORT BODIED (COMPACT) TYPE.

(C) ALL DUCTILE IRON FITTINGS SHALL BE MANUFACTURED IN ACCORDANCE WITH AMERICAN NATIONAL STANDARD, ANSI/AWWA C110/A21.10-87, "DUCTILE IRON AND GRAY-IRON FITTINGS, 3-INCH THROUGH 48-INCH, FOR WATER OTHER LIQUIDS," AND ALL SUBSEQUENT AMENDMENTS THERETO. METAL FOR FITTINGS SHALL CONFORM TO AMERICAN NATIONAL STANDARD ANSI A21.10-87. FITTINGS ON PIPE SIZE UP TO AND INCLUDING 12" MAY BE OF THE SHORT BODIED TYPE IN ACCORDANCE WITH ANSI/AWWA C153/A21.53-88, "DUCTILE IRON COMPACT FITTINGS, 3" THROUGH 16" FOR WATER AND OTHER LIQUIDS," AND ALL SUBSEQUENT AMENDMENTS THERETO.

DESIGN AGENCY

Michael Baker INTERNATIONAL

DESIGNER

REVIEWER

PROJECT ID

82382

SHEET TOTAL

1168 2339

**ITEM SPECIAL - DUCTILE IRON PIPE AND FITTINGS - 20" AND SMALLER (CONTINUED)**

**DUCTILE IRON PIPE AND FITTINGS - 20" AND SMALLER (CONTINUED)**

(D) THE CONTRACTOR SHALL FURNISH CENTRIFUGAL CAST DUCTILE IRON CEMENT LINED PIPE. DUCTILE IRON METAL SHALL HAVE A MINIMUM TENSILE STRENGTH OF 60,000 PSI, MINIMUM YIELD STRENGTH OF 42,000 PSI AND MINIMUM ELONGATION OF 10 PERCENT AND SHALL BE FOR THE THICKNESS CLASS NOTED ON THE CONTRACT DRAWINGS OR DIRECTLY SPECIFIED. PIPE MAY BE FURNISHED IN 18 OR 20 FEET NOMINAL LAYING LENGTHS. THE CENTRIFUGALLY CAST DUCTILE SHALL CONFORM TO THE AMERICAN NATIONAL STANDARD ANSIAWWA C151/A21.51-86, "DUCTILE IRON PIPE CENTRIFUGALLY CAST IN METAL MOLDS OR SAND-LINED MOLDS, AND DUCTILE IRON FITTINGS FOR WATER AND OTHER LIQUIDS;" AND ALL SUBSEQUENT AMENDMENTS THERETO. PIPE ON STRAIGHT RUNS SHALL HAVE PUSH-ON SINGLE RUBBER-GASKET COMPRESSION JOINTS, ALL IN ACCORDANCE WITH AMERICAN NATIONAL STANDARD, ANSIAWWA C111/A21.11-85, "RUBBER-GASKET JOINTS FOR DUCTILE-IRON PIPE AND GRAY-IRON PRESSURE PIPE AND FITTINGS," AND ALL SUBSEQUENT AMENDMENTS THERETO. FOR PIPE SIZES UP TO AND INCLUDING 20-INCHES RETAINED MECHANICAL JOINTS SHALL BE FURNISHED AT BENDS, TEES, CROSSES, SPECIAL FITTINGS AND BETWEEN VERTICAL OFFSETS OR BENDS, ON HYDRANT BRANCHES AND SHALL BE RETAINED AS SPECIFIED IN SECTION "JOINTS", (B), "MECHANICAL JOINTS/RETAINED MECHANICAL JOINTS."

(E) STANDARD THICKNESS AND PIPE CLASS TABLES THE THICKNESS OF THE CENTRIFUGALLY CAST DUCTILE IRON PIPE SHALL CONFORM TO THE FOLLOWING TABLE: STANDARD THICKNESS OF CENTRIFUGALLY CAST, DUCTILE IRON PIPE

STANDARD PIPE SIZE	WORKING PRESSURE (PSI)	THICKNESS CLASS 52 53 54 56	FITTINGS PSI
4"	350	.29 .32 .35 .41	350
6"	350	.31 .34 .37 .43	350
8"	350	.33 .36 .39 .45	350
10"	350	.35 .38 .41 .47	350
12"	350	.37 .40 .43 .49	350
16"	350	.40 .43 .46 .52	350
20"	350	.42 .45 .48 .54	350

(F) ALL FITTINGS, UNLESS OTHERWISE NOTED ON THE CONTRACT DRAWINGS, SUCH AS BENDS, TEES, CROSSES, HYDRANT BRANCHES, ETC. SHALL HAVE BELL AND BELL, BELL AND PLAIN ENDS OF THE MECHANICAL BOLTED STUFFING-BOX TYPE WITH PIPE OR FITTING PLAIN END SEALING GASKET AND BOLTED FOLLOWER GLAND. MECHANICAL JOINT FITTINGS SHALL BE THE MECHANICAL JOINTED BOLTED STUFFING-BOX TYPE IN ACCORDANCE WITH AMERICAN NATIONAL STANDARD, ANSIAWWA C111/A21.11-85, "RUBBER-GASKET JOINTS FOR DUCTILE-IRON PIPE AND GRAY-IRON PRESSURE PIPE AND FITTINGS," AND ALL SUBSEQUENT AMENDMENTS THERETO. ALL FITTINGS SHALL BE CEMENT LINED. ALL MECHANICAL JOINTS SHALL BE RETAINED AS SPECIFIED IN SECTION, "JOINTS", (B) "RETAINED MECHANICAL JOINTS".

(G) WHERE CALLED FOR ON THE CONTRACT DRAWINGS OR DIRECTLY SPECIFIED, PIPE AND FITTINGS HAVING BOLTLESS RESTRAINED TYPE JOINTS SHALL BE FURNISHED. BOLTLESS RESTRAINED TYPE JOINTS SHALL BE AS SPECIFIED IN SECTION "JOINTS", (D) "BOLTLESS RESTRAINED SLIP-ON JOINTS."

(H) GLANDS FOR ALL MECHANICAL JOINT PIPE AND FITTINGS SHALL BE DUCTILE IRON. BOLTS AND NUTS SHALL BE CORROSION RESISTANT, HIGH-STRENGTH, LOW ALLOY STEEL IN ACCORDANCE WITH AMERICAN NATIONAL STANDARD, ANSIAWWA C111/A21.11-85, "RUBBER-GASKET JOINTS FOR DUCTILE-IRON PIPE AND GRAY-IRON PRESSURE PIPE AND FITTINGS," AND ALL SUBSEQUENT AMENDMENTS THERETO.

GASKETS SHALL BE OF RUBBER OR OTHER EQUALLY EFFECTIVE PROTECTION AGAINST UNEVEN DISTORTION OF GASKET.

(I) WHERE FITTINGS ARE SHOWN WHICH ARE NOT COVERED BY THE ABOVE SPECIFICATIONS, THEY IN SUCH PARTICULARS AS ARE LACKING THEREON SHALL CONFORM TO THE DIMENSIONS AND OTHERWISE MEET THE SPECIFICATIONS FOR THE RESPECTIVE TYPE WHICH ARE CARRIED IN THE LATEST REVISIONS TO THE CURRENT EDITION OF THE DUCTILE IRON PIPE RESEARCH ASSOCIATION "HANDBOOK OF DUCTILE IRON PIPE" OR WHICH ARE OTHERWISE SHOWN ON THE CONTRACT DRAWINGS.

(J) WHEREVER CHANGES IN LINE AND GRADES OF THE MAIN AS SHOWN ON THE DRAWINGS ARE NOT STANDARD FITTING DEFLECTIONS, THE CONTRACTOR WILL BE PERMITTED TO SUBMIT DETAILS USING COMBINATIONS OF STANDARD FITTINGS AND SMALL DEFLECTIONS (NOT TO EXCEED THE MANUFACTURER'S MAXIMUM SUGGESTED JOINT OPENING) IN THE ADJOINING LENGTHS OF PIPE.

**DUCTILE IRON PIPE AND FITTINGS - 20" AND SMALLER (CONTINUED)**

(K) ON NEW AND/OR RELOCATED OR EXTENDED WATER MAINS, UP TO AND INCLUDING 20-INCH DIAMETER, WHERE WATER MAINS END OR TERMINATE AND ARE NOT CONNECTED TO EXISTING MAINS, RETAINED MECHANICAL BELL JOINT PLUGS ARE TO BE INSTALLED. PLUGS CAPS SHALL BE FURNISHED WITH TWO (2) PLUGGED TWO (2)-INCH TAPS FOR DRAIN AND AIR RELIEF CONNECTIONS.

(L) CLOSURE PIECES SHALL BE ACCURATELY MEASURED AND CUT IN THE FIELD AND INSTALLED USING SOLID SHORT PATTERN SLEEVES HAVING MECHANICAL BELL JOINTS. MECHANICAL BELL JOINT SLEEVES SHALL BE OF THE RETAINED TYPE AS SPECIFIED IN SECTION, "JOINTS", (B) "MECHANICAL JOINTS/RETAINED MECHANICAL JOINTS."

(M) TESTS, INSPECTION, REPORTS AND ANALYSES OF TESTS OF SAMPLES FOR ALL MATERIALS SHALL BE FURNISHED IN ACCORDANCE WITH PARAGRAPH "TEST, INSPECTION AND REPORTS" OF THE GENERAL NOTES.

(N) BITUMASTIC COATING SHALL BE APPLIED ON THE EXTERIOR OF ALL DUCTILE IRON PIPE AND FITTINGS IN ACCORDANCE WITH AWWA SPECIFICATIONS.

**CEMENT LINING**

ALL PIPE FITTINGS, SHALL BE GIVEN A CEMENT MORTAR LINING AT THE POINT OF MANUFACTURE. THE LINING SHALL CONFORM TO THE AMERICAN NATIONAL STANDARD, ANSIAWWA C104/A21.4-1990, "CEMENT-MORTAR LINING FOR DUCTILE-IRON PIPE AND FITTINGS," AND ALL SUBSEQUENT AMENDMENTS THERETO.

**MARKING**

ALL PIPE AND FITTINGS SHALL BE SUITABLY MARKED TO DENOTE THE MANUFACTURER, CLASS, DATE, WEIGHT AND OTHER ELEMENTS OF IDENTIFICATION.

**FACING AND DRILLING**

ALL FLANGES SHALL BE CAST SOLID AND FACED ACCURATELY AT RIGHT ANGLES TO THE AXIS OF THE PIPE. ALL FLANGES SHALL BE SHOP COATED WITH A COAT OF COAL TAR EPOXY, EXCEPT THE FACE OF THE FLANGE WHICH SHALL RECEIVE ONE (1) COAT OF A ZINC RICH PRIMER AT THE SHOP IMMEDIATELY AFTER THEY HAVE BEEN FACED AND DRILLED. ALL FLANGED PIPE AND FITTINGS SHALL BE FACED AND DRILLED TO ANSI B16-1, 125 LB. DRILLING, UNLESS SPECIAL DRILLING IS CALLED FOR. WHERE TAP OR STUD BOLTS ARE REQUIRED, FLANGES SHALL ALSO BE TAPPED.

**LAYING**

(A) PROPER AND SUITABLE TOOLS AND APPLIANCES FOR THE SAFE AND CONVENIENT HANDLING AND LAYING OF THE PIPE AND FITTINGS SHALL BE USED. GREAT CARE SHALL BE TAKEN TO PREVENT THE PIPE COATING AND FITTINGS FROM BEING DAMAGED PARTICULARLY ON THE INSIDE OF THE PIPES AND FITTINGS AND ANY SUCH DAMAGE SHALL BE REMEDIED AS DIRECTED. ALL PIPES AND FITTINGS SHALL BE CAREFULLY EXAMINED BY THE CONTRACTOR FOR DEFECTS JUST BEFORE LAYING AND NO PIPE OR FITTINGS SHALL BE LAID WHICH IS KNOWN TO BE DEFECTIVE.

(B) IF ANY DEFECTIVE PIPE IS DISCOVERED AFTER HAVING BEEN LAID, IT SHALL BE REMOVED AND REPLACED WITH A SOUND PIPE OR FITTING IN A SATISFACTORY MANNER, BY THE CONTRACTOR AT HIS OWN EXPENSE. ALL PIPES AND FITTINGS SHALL BE THOROUGHLY CLEANED BEFORE THEY ARE LAID, SHALL BE KEPT CLEAN UNTIL THEY ARE USED IN THE COMPLETED WORK, AND WHEN LAID, SHALL CONFORM TO THE LINES AND GRADES GIVEN BY THE ENGINEER. OPEN ENDS OF PIPES SHALL BE KEPT PLUGGED WITH A BULK HEAD DURING CONSTRUCTION.

(C) PIPE LAID IN TRENCH SHALL BE LAID TO A FIRM AND EVEN BEARING FOR ITS FULL LENGTH. PRECAUTIONS SHALL BE TAKEN AGAINST FLOATING.

(D) IT IS THE INTENTION OF THESE SPECIFICATIONS TO SECURE FIRST CLASS WORKMANSHIP IN THE PLACING OF PIPE AND ACCESSORIES. IN SUCH DETAILS AS ARE NOT SPECIFICALLY MENTIONED HEREIN OR CALLED FOR ON THE DRAWINGS, THE CONTRACTOR WILL BE REQUIRED TO CONFORM WITH THE APPLICABLE SECTIONS OF THE LATEST AMERICAN NATIONAL STANDARD, ANSIAWWA C 600-87, INSTALLATION OF GRAY AND DUCTILE CAST IRON WATER MAINS AND APPURTENANCES," AS ADOPTED BY THE AMERICAN WATER WORKS ASSOCIATION.

**PROTECTION OF UTILITIES**

CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO SUPPORT, MAINTAIN, OR OTHERWISE PROTECT EXISTING UTILITIES AND OTHER FACILITIES AT ALL TIMES DURING CONSTRUCTION.

**CUTTING PIPE**

WHENEVER THE PIPES REQUIRE CUTTING TO FIT INTO THE LINES, THE WORK SHALL BE DONE IN A SATISFACTORY MANNER SO AS TO LEAVE A SMOOTH END AT RIGHT ANGLES TO THE AXIS OF THE PIPE. WHEN A PIECE OF PIPE IS CUT TO FIT INTO THE LINE, NO PAYMENT WILL BE MADE FOR THE PORTION CUT OFF AND NOT USED IN THE LINE. THE CONTRACTOR'S ATTENTION IS CALLED TO THE PARAGRAPH "WORK TO BE DONE BY THE CITY."

**JOINTS**

(A) SLIP-ON JOINTS:

ALL PIPE UNLESS OTHERWISE REQUIRED, SHOWN ON CONTRACT DRAWINGS, DIRECTLY SPECIFIED OR CONNECTED TO FITTINGS, VALVES AND HYDRANTS SHALL HAVE SOCKET BY PLAIN END RUBBER-GASKET PUSH-ON JOINTS WITH RADIALLY COMPRESSED LOCKED IN PLACE RUBBER RING GASKETS APPROVED BY THE COMMISSIONER OF WATER. SLIP-ON COMPRESSION JOINTS SHALL CONFORM TO THE REGULAR AND SPECIAL REQUIREMENT FOR PUSH-ON JOINTS IN AMERICAN NATIONAL STANDARD, ANSIAWWA C111/A21.11-85, "RUBBER GASKET JOINTS FOR DUCTILE-IRON AND GRAY-IRON PRESSURE PIPE AND FITTINGS," AND ALL SUBSEQUENT AMENDMENTS THERETO.

(B) MECHANICAL JOINTS/RETAINED MECHANICAL JOINTS:

1. ALL FITTINGS AND PIPE BELL ENDS CONNECTED TO FITTINGS, UNLESS OTHERWISE REQUIRED, SHOWN ON CONTRACT DRAWINGS, OR DIRECTLY SPECIFIED SHALL HAVE BELL OR PLAIN END JOINTS OF THE MECHANICAL BOLTED STUFFING-BOX TYPE WITH SEALING GASKET AND BOLTED DUCTILE IRON FOLLOWER GLAND AND SHALL BE OF THE SPECIFIED RETAINED TYPE. BOLTS AND NUTS FOR MECHANICAL JOINTS SHALL BE CORROSION RESISTANT, HIGH STRENGTH, LOW ALLOY STEEL.

2. MECHANICAL JOINTS SHALL CONFORM TO THE REGULAR AND SPECIAL REQUIREMENT THAT ALL GLANDS SHALL BE DUCTILE IRON WITH JOINT DIMENSIONS AND TOLERANCES, BOLT HOLES AND SLOTS, GASKETS, RUBBER, QUALITY CONTROL, BOLTS AND NUTS AND MARKING BE IN CONFORMANCE WITH AMERICAN NATIONAL STANDARD, ANSIAWWA C111/A21.11-85, "RUBBER GASKET JOINTS FOR DUCTILE IRON AND GRAY IRON PRESSURE PIPE AND FITTINGS," ON ALL PIPE AND FITTINGS AT BENDS, TEES, CROSSES, SPECIAL FITTINGS, BETWEEN VERTICAL OFFSETS OR BENDS, ON HYDRANT BRANCHES, ON VALVES AND HYDRANT BASE ELBOWS, UP TO AND INCLUDING 16-INCH SIZE, THE CONTRACTOR SHALL FURNISH AND INSTALL RETAINED TYPE MECHANICAL JOINTS.

3. ON ALL PIPE AND FITTINGS AT BENDS, TEES, CROSSES, SPECIAL FITTINGS, BETWEEN VERTICAL OFFSETS OR BENDS, ON HYDRANT BRANCHES, ON VALVES AND HYDRANT BASE ELBOWS, UP TO AND INCLUDING 16-INCH SIZE, THE CONTRACTOR SHALL FURNISH AND INSTALL RETAINED TYPE MECHANICAL JOINTS.

4. PIPE AND FITTING BELL JOINT AND GASKETS SHALL BE FURNISHED AS SPECIFIED. GLANDS FOR RETAINED MECHANICAL JOINTS SHALL BE BOLTED TYPE OF DUCTILE-IRON MATERIAL CONFORMING TO AMERICAN NATIONAL STANDARD, ANSIAWWA C111/A21.11-85, "RUBBER-GASKET JOINTS FOR DUCTILE-IRON AND GRAY-IRON PRESSURE PIPE AND FITTINGS," AND/OR CONFORMING WITH ASTM A 536-84, "SPECIFICATION FOR DUCTILE-IRON CASTINGS." RETAINED MECHANICAL JOINT FOLLOWER GLANDS SHALL BE EQUAL TO THE "MEG-A-LUG" AS MANUFACTURED BY EBAA IRON SALES, INC., THE "SUPER-LUG" AS MANUFACTURED BY THE SIGMA CORPORATION OR THE "UNI-FLANGE SERIES 1400" AS MANUFACTURED BY THE FORD METER BOX COMPANY, INC. PROPER TORQUE SHALL BE THAT AS RECOMMENDED BY THE RETAINER GLAND MANUFACTURER. WHERE JOINT DEFLECTION IS NECESSARY FOR ALIGNMENT SUCH DEFLECTION SHALL BE LIMITED TO MANUFACTURER'S MAXIMUM JOINT OPENING. ALL RETAINED JOINTS SHALL BE RATED FOR MINIMUM 250 PSI PRESSURE. ALL RETAINED JOINTS SHALL BE POLYETHYLENE ENCASED AS SPECIFIED IN SECTION, "JOINTS", (C), EXCEPT WHERE SUCH RETAINED MECHANICAL JOINTS ARE BONDED JOINTS WHERE NO POLYETHYLENE ENCASEMENT WILL BE REQUIRED.

**JOINTS (CONTINUED)**

5. RETAINER GLANDS USING PERPENDICULAR SET SCREWS AS A MEANS RESTRAINT WILL NOT BE PERMITTED.

(C) POLYETHYLENE ENCASEMENT:

1. ALL BURIED WATER MAINS, FITTINGS, VALVES, FIRE HYDRANT BRANCH PIPING AND APPURTENANCES SHALL BE ENCASED WITH "V-Bio" POLYETHYLENE WRAPPING IN ACCORDANCE WITH THE MOST CURRENT REVISION OF ANSIAWWA C-105/A21.5 INSTALLATION METHOD A. ALTERNATE INSTALLATION METHOD A FOR WET TRENCH CONDITIONS SHALL BE USED WHEN WATER MAIN ARE INSTALLED IN UNPAVED LOCATIONS SUCH AS TREE LAWNS AND EASEMENTS TRAVERSING PRIVATE PROPERTY.

2. ALL BOLTS AND NUTS ON ALL MECHANICAL JOINTS, RETAINED MECHANICAL JOINTS, FLANGES, VICTAULIC AND COMPRESSION TYPE BOLTED SLEEVED COUPLINGS, SHALL HAVE FIELD APPLIED THREE (3) COATS OF BITUMASTIC COATING PRIOR TO POLYETHYLENE ENCASEMENT.

(D) BOLTLESS RESTRAINED SLIP-ON JOINTS:

1) WHERE CALLED FOR ON THE CONTRACT DRAWINGS OR DIRECTLY SPECIFIED ALL JOINT RESTRAINT SHALL BE OF THE BOLTLESS RESTRAINED SLIP-ON JOINT DESIGN DESIGNATED AS EITHER "TYPE I" OR "TYPE II" AS SPECIFIED HEREIN. VALVES AND VALVE JOINT TYPE WITHIN THE LIMITS OF THE BOLTLESS RESTRAINED PIPE AND FITTINGS SHALL BE OF THE TYPE INDICATED ON THE CONTRACT DRAWINGS OR AS SPECIFIED.

2) TYPE I - BOLTLESS RESTRAINED PUSH-ON JOINT PIPE AND FITTINGS DESIGNATED AS "TYPE I" SHALL BE OF A DESIGN CONSISTING OF A SHOP WELDED RETAINER RING OR SEGMENT ON THE SPIGOT END OF THE PIPE THAT WHEN THE JOINT IS FULLY ASSEMBLED "LOCKS" INTO THE BELL OF THE ADJACENT PIPE OR FITTING PROVIDING A POSITIVE RESTRAINED JOINT. NO FIELD WELDED RESTRAINED JOINTS ARE PERMITTED EXCEPT ON LENGTHS OF PIPE LESS THAN NOMINAL LENGTH NEED TO CLOSE THE LINE. BOLTLESS RESTRAINED JOINTS SHALL BE OF A DESIGN THAT PROVIDES RESTRAINED ACTION BETWEEN THE SPIGOT AND BELL OF THE PIPE OR FITTING INDEPENDENT OF THE GASKET. "TYPE I" BOLTLESS RESTRAINED PUSH-ON JOINTS SHALL BE EQUAL TO: "FLEX-RING" AS MANUFACTURED BY AMERICAN CAST IRON PIPE COMPANY; "SUPER-LOCK" AS MANUFACTURED BY CLOW CORPORATION (MCWANE, INC.); OR "TR-FLEX" AS MANUFACTURED BY U. S. PIPE AND FOUNDRY.

3) TYPE II - BOLTLESS RESTRAINED PUSH-ON JOINT PIPE AND FITTINGS DESIGNATED AS "TYPE II" SHALL BE OF A DESIGN IN WHICH A PUSH-ON BELL JOINT PIPE END OR PUSH-ON BELL FITTING JOINTS UTILIZE A WEDGING TYPE APPROVED GASKET TO PROVIDE RESTRAINT. THE "TYPE II" BOLTLESS RESTRAINED JOINT SHALL BE EQUAL TO THE "FIELD-LOK" GASKET AS MANUFACTURED BY U.S.PIPE AND FOUNDRY OR THE "FAST-GRIP" GASKET AS MANUFACTURED BY THE AMERICAN CAST IRON COMPANY. THE GASKET SHALL COMPLY WITH THE MATERIAL REQUIREMENTS OF ANSIAWWA C111/A21.11, "RUBBER-GASKET JOINTS FOR DUCTILE-IRON PIPE AND GRAY-IRON PRESSURE PIPE AND FITTINGS". THE PUSH-ON JOINT USED IN THE "TYPE II" BOLTLESS RESTRAINED JOINT PIPE AND FITTINGS SHALL BE MANUFACTURED IN ACCORDANCE WITH ANSIAWWA C110/A21.10-87, "DUCTILE IRON AND GRAY-IRON FITTINGS, 3-INCH THROUGH 48-INCH, FOR WATER AND OTHER LIQUIDS," OR ANSIAWWA C153/A21.53, "DUCTILE IRON COMPACT FITTINGS, 3" THROUGH 16" FOR WATER AND OTHER LIQUIDS".

(E) COMPRESSION COUPLINGS:

1. ALL PIPE COMPRESSION COUPLINGS SHALL BE OF A GASKETED, SLEEVE TYPE WITH DIAMETERS TO PROPERLY FIT PLAIN END IRON PIPE. EACH COUPLING SHALL CONSIST OF ONE (1) MIDDLE RING WITH STOPS REMOVED; TWO (2) FOLLOWER GLANDS; TWO (2) RUBBER-COMPOUND, BUNA-N BLEND, WEDGE SECTION GASKETS; AND SUFFICIENT TRACKHEAD STAINLESS STEEL BOLTS AND NUTS (ASTM A276-89A, TYPE 304) TO PROPERLY COMPRESS THE GASKETS. THE MIDDLE RING AND FOLLOWER GLANDS SHALL BE OF EITHER STEEL OR DUCTILE IRON (ASTM-A536). THE COMPRESSION COUPLING SHALL HAVE A MINIMUM WORKING PRESSURE RATING OF 250 PSI AND SHALL BE EQUAL TO THE DRESSER STYLE NOS: 38, 138, OR 162 (TRANSITION TYPE), OR SMITH-BLAIR 441 STRAIGHT AND TRANSITION COUPLINGS. ALL COMPRESSION COUPLINGS SHALL BE FURNISHED WITH ELECTROLIC INSULATION.

2. ALL COMPRESSION COUPLINGS SHALL BE COATED IN THE SHOP WITH A FACTORY COATING COMPATIBLE WITH FIELD APPLIED PRIMER AND ENAMEL COATINGS. COMPRESSION COUPLINGS SHALL BE CLEANED AND PAINTED WITH THREE (3) FIELD COATS OF KOPPERS BITUMASTIC SUPER TANK SOLUTION OR EQUIVALENT.

**ITEM SPECIAL - DUCTILE IRON PIPE AND FITTINGS - 20" AND SMALLER (CONTINUED)**

**JOINTS (CONTINUED)**

(F) FLANGED JOINTS:

1. FLANGED JOINTS SHALL BE INSTALLED AS SHOWN ON THE DRAWINGS OR AS SPECIFIED. FLANGES SHALL BE EITHER CAST STEEL, FORGED OR ROLLED STEEL, OR PROPERLY WELDED AND MACHINED FABRICATED STEEL PLATES, WELDED TO PIPE WITH TWO CONTINUOUS WELDS. THEY SHALL HAVE PLAIN FACES AND SHALL BE FACED TRUE AND SMOOTH AT RIGHT ANGLES TO THE AXIS OF THE PIPE AND SHALL BE SPOT FACED ON THE BACK. DRILLING SHALL CONFORM TO ANSI B16.1, 125 LBS. EACH BLIND FLANGE SHALL BE CAST IRON AND HAVE BOSSES TAPPED AT TOP AND BOTTOM FOR TWO (2) INCH STANDARD PIPE AND FURNISHED WITH PLUGS.

2. ALL MACHINED STEEL SURFACES AT THE ENDS OF PIPE AND/OR FITTINGS TO RECEIVE VICTAULIC TYPE COUPLINGS OR PIPE ENDS HAVING FLANGES (FACE OF FLANGE) SHALL BE COATED WITH ONE (1) SHOP COAT OF AN APPROVED ZINC RICH PAINT.

3. ALL BOLTS AND NUTS USED IN THE FINISHED WORK FOR FLANGES SHALL BE MADE OF SILICON BRONZE (ASTM B 98-84, ALLOY A, "SPECIFICATION FOR COPPER-SILICON ALLOY ROD, BARS, AND SHAPES") OR STAINLESS STEEL (ASTM A 276-89A, TYPE 304, "SPECIFICATION FOR STAINLESS AND HEAT-RESISTING STEEL BARS AND SHAPES"). THE ENDS OF ALL BOLTS MUST BE FINISHED TO STANDARD RADIUS IN ACCEPTABLE MANNER. ALL SCREW THREADS SHALL BE AMERICAN STANDARD COARSE THREAD (N.C.). STUD BOLTS DOUBLE END (ROD) SHALL BE USED TO MAKE THE FLANGED JOINTS ON PIPE. ALL DIMENSIONS TO BE ACCORDING TO AMERICAN STANDARD HEAVY. BOLTS AND NUTS SHALL BE DELIVERED TO THE FIELD FREE FROM GREASE, RUST AND DIRT AND SHALL BE PROPERLY PROTECTED FROM MOISTURE AND DIRT IN THE FIELD. GASKETS FOR FLANGED PIPE SHALL BE 5X MANILA ROPE PATTERN OR OTHER APPROVED TYPE.

(G) TRANSITION COUPLINGS:

THE CONTRACTOR SHALL PROVIDE SHOP DRAWINGS TO THE CITY THROUGH THE ENGINEER FOR APPROVAL OF THE TRANSITION COUPLING ASSEMBLY. THE TRANSITION COUPLING SHALL BE "DRESSER STYLE 63/39, TYPE 1" SLIP TYPE WITH ELECTROLIC INSULATION, OR APPROVED EQUAL, WITH MINIMUM 1/2" THICK BODY AND SLIP, WITH AN 8-IN. TRAVERSE. THE TRANSITION COUPLING SHALL INCLUDE ALL MATERIALS, BOLTS, NUTS AND WASHERS, WELDED NECK FLANGES A.S.A. 150# AND GASKETS. ALL BOLTS AND NUTS SHALL BE MADE OF STAINLESS STEEL: ASTM A 276-89A, TYPE 304, "SPECIFICATION FOR STAINLESS AND HEAT-RESISTING SHEET BARS AND SHAPES," NO FIELD WELDING OF GALVANIZED STEEL PIPE WILL BE PERMITTED. THE TRANSITION COUPLING SHALL BE GALVANIZED EXCEPT SLIP PIPE. THE TRANSITION COUPLING SHALL HAVE FIELD APPLIED INSULATION AS PER DETAILS ON THE CONTRACT DRAWINGS.

**PAINTING**

AFTER INSTALLATION AND BEFORE POLYETHYLENE ENCASEMENT, ALL EXPOSED OR DAMAGED COATING AND ALL BOLTS FOR MECHANICAL JOINTS, RETAINED MECHANICAL JOINTS, FLANGES AND VICTAULIC OR COMPRESSION TYPE BOLTED SLEEVED COUPLINGS SHALL BE CLEANED AND PAINTED WITH THREE (3) FIELD COATS OF KOPPERS BITUMASTIC SUPER TANK SOLUTION OR EQUIVALENT.

**DRAWINGS**

(A) THE CONTRACTOR SHALL SUBMIT TO THE CITY THROUGH THE ENGINEER FOR APPROVAL SIX (6) SETS OF PRINTS OF ALL SHOP DRAWINGS FOR PIPE AND FITTINGS AND MISCELLANEOUS OR SPECIAL DETAILS OF PIPE AND FITTING JOINTS WHICH ARE NOT STANDARD CONSTRUCTION OR FULLY DETAILED IN THE REGULAR CATALOGUE OF THE COMPANY FURNISHING THE PIPE, FITTINGS AND SPECIALS. NO WORK SHALL BE DONE IN THE SHOP UNTIL AFTER THE DRAWINGS HAVE BEEN APPROVED.

(B) THE APPROVAL OF THE DRAWINGS BY THE CITY SHALL NOT RELIEVE THE CONTRACTOR OF ANY OF HIS OBLIGATIONS IN CONNECTION WITH THIS CONTRACT.

**MEASUREMENTS**

THE NUMBER OF FEET OF DUCTILE IRON PIPE AND FITTINGS TO BE PAID FOR SHALL BE THE ACTUAL NUMBER OF FEET FURNISHED AND PLACED IN ACCORDANCE WITH THE CONTRACT DRAWINGS AND THESE SPECIFICATIONS AS MEASURED ALONG THE AXIS OF THE PIPING, INCLUDING FITTINGS AND VALVES CONNECTED UP IN PLACE. FOR CONNECTIONS BETWEEN NEW AND/OR EXISTING WATER MAINS THE NUMBER OF FEET OF DUCTILE IRON PIPE AND FITTINGS, INCLUDING CONNECTIONS THERETO, TO BE PAID FOR SHALL BE ACTUAL NUMBER OF FEET FURNISHED AND PLACED IN ACCORDANCE WITH THE CONTRACT DRAWINGS AND THESE SPECIFICATIONS AS MEASURED ALONG THE AXIS OF THE PIPING FROM CENTER TO CENTER OF EXISTING MAINS.

**ITEM SPECIAL - DUCTILE IRON PIPE AND FITTINGS - 24" AND LARGER**

**WORK INCLUDED**

(A) THE CONTRACTOR SHALL UNDER ITEM SPECIAL - DUCTILE IRON PIPE AND FITTINGS - 24" AND LARGER, FURNISH ALL THE MATERIALS FOR AND SHALL PROPERLY CONSTRUCT AND CONNECT IN PLACE AT THE LOCATIONS SHOWN ON THE DRAWINGS OR AS DIRECTED. ALL DUCTILE IRON PIPE AND FITTINGS, INCLUDING ALL EXCAVATION WORK, THE CUTTING INTO AND REMOVAL OF EXISTING PIPE, BACKFILLING, SAND BEDDING AND PREMIUM BACKFILL, AND REPAVING (BOTH TEMPORARY AND PERMANENT), ALL AS REQUIRED FOR THE PROPER COMPLETION OF THE WORK INCLUDED UNDER THIS CONTRACT. IN GENERAL THIS WORK SHALL INCLUDE THE FURNISHING, LAYING, CONNECTING, PAINTING, SPECIAL EXTERIOR COATING, JOINT BONDING, AND TESTING OF PIPE AND FITTINGS, THE EXCAVATION, REMOVAL AND RESTORATION OF MISCELLANEOUS ITEMS, SHEETING AND SHORING, BACKFILLING, SAND BEDDING AND PREMIUM BACKFILL, SEEDING AND SODDING, THE PERMANENT REPAVING, IF SO NOTED ON THE CONTRACT DRAWINGS, THE CUTTING INTO, REMOVAL AND STORAGE OF EXISTING MAINS, AND THE FURNISHING OF ALL LABOR, MATERIALS, TOOLS AND EQUIPMENT TO COMPLETE THE WORK AS SPECIFIED, SHOWN OR ORDERED.

(B) IN MAKING THE CONNECTION TO EXISTING MAINS WHERE BRANCH SLEEVES CAN BE USED, THE CONTRACTOR SHALL SUPPLY THE SAME. THE DIVISION OF WATER WILL INSTALL THE BRANCH SLEEVE AND WILL MAKE THE PRESSURE TAP (IF APPLICABLE) IN ACCORDANCE WITH THE REQUIREMENTS INDICATED UNDER "WORK TO BE DONE BY THE CITY." IF THE INSTALLATION OF BRANCH SLEEVES AND VALVES CANNOT BE ACCOMPLISHED, THE CONTRACTOR WILL BE REQUIRED TO FURNISH AND INSTALL TEES WITH SLEEVES OR COUPLINGS TO COMPLETE THE CONNECTION. THE CONTRACTOR WILL BE REQUIRED TO MAKE THE NECESSARY EXCAVATION, BACKFILL AND REPAVING (IF NOT PAID FOR SEPARATELY AS PART OF THIS CONTRACT).

**LAYOUT OF DUCTILE IRON PIPE AND FITTINGS 24" AND LARGER**

(A) AS ONE (1) OF THE ALTERNATE MATERIALS THE CONTRACTOR SHALL FURNISH, UNDER ITEM SPECIAL - DUCTILE IRON PIPE AND FITTINGS - 24" AND LARGER. CLASS OF PIPE SHALL BE MINIMUM CLASS 52 OR HIGHER AS SPECIFIED HEREIN UNDER PARAGRAPHS F, G AND H. CLASS OF FITTINGS SHALL BE AS SPECIFIED IN PARAGRAPH E. VALVE ASSEMBLIES, PLAIN ANCHORS, ACCESS MANHOLES, DRAIN ASSEMBLIES, AIR RELIEF OUTLETS, PITOMETER OUTLETS AND JOINT BONDING AND CATHODIC TEST STATION ASSEMBLIES SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD DETAIL DRAWINGS. THE PLANS, THE DUCTILE IRON PIPE AND FITTINGS FURNISHED UNDER THIS ITEM SHALL HAVE A SPECIAL EXTERIOR PIPE COATING AS SPECIFIED IN PARAGRAPH I. ALL TEES SHALL HAVE FLANGED OUTLETS EXCEPT AS OTHERWISE SPECIFIED HEREIN. ALL RESTRAINED JOINTS SHALL BE OF THE BOLTLESS TYPE AS SPECIFIED HEREIN.

(B) PIPE LAYOUT INDICATED ON THE CONTRACT DRAWINGS IS BASED UPON GEOMETRIC DESIGN THAT WILL ALLOW INSTALLATION OF EITHER DUCTILE IRON PIPE AND FITTINGS OR STEEL PIPE AND FITTINGS. IN ORDER TO ACHIEVE THE HORIZONTAL AND VERTICAL DEFLECTIONS SHOWN ON THE CONTRACT DRAWINGS STANDARD BENDS OF 5- 5/8, 11- 1/4, 22-1/2, OR 45 DEGREES SHALL BE USED (45 DEGREE BENDS SHALL NOT BE USED FOR VERTICAL DEFLECTIONS). JOINT OPENINGS AS REQUIRED, NOT TO EXCEED THE MANUFACTURER'S MAXIMUM SUGGESTED JOINT OPENING, SHALL BE USED TO MEET THE HORIZONTAL AND VERTICAL DEFLECTIONS SHOWN ON THE DRAWINGS. THE MAXIMUM PIPE LENGTH SHALL BE 20'-0". IN SOME CASES DUE TO RESTRAINED JOINTS ON CURVES, LENGTHS LESS THAN 20'-0" MAY BE USED. THESE SHALL BE INCLUDED IN THE BID PRICE PER FOOT OF PIPE. CONTRACTOR SHALL MAINTAIN ALL HORIZONTAL POINTS OF INTERSECTION (HPI), AND AS CLOSE AS POSSIBLE, THE VERTICAL POINTS OF INTERSECTION (VPI), AS SHOWN ON THE CONTRACT DRAWINGS.

(C) WHERE "RESTRAINED DISTANCE" IS SHOWN ON THE CONTRACT DRAWINGS AND STANDARD FITTINGS ARE USED TO OBTAIN THE REQUIRED LINE AND GRADE, THE CONTRACTOR SHALL FURNISH DUCTILE IRON MINIMUM CLASS 52 (SEE PARAGRAPHS F, G, AND H) CEMENT LINED BOLTLESS RESTRAINED PUSH-ON JOINT FITTINGS TO THE LIMITS OF THE "RESTRAINED DISTANCE" SHOWN ON THE CONTRACT DRAWINGS. ALL RESTRAINED JOINTS SHALL BE DESIGNED FOR A BULKHEAD THRUST WITH A PRESSURE OF MINIMUM 225 PSI

(D) IN VALVE ASSEMBLIES ALL PIPE JOINTS, FITTINGS, AND VALVE JOINTS, BETWEEN THE TWO PLAIN ANCHORS OR ACCESS MANHOLES AND ANCHORAGES WHETHER WITHIN "RESTRAINED DISTANCE" OR WHERE NO "RESTRAINED DISTANCE" IS SHOWN ON THE DRAWINGS SHALL HAVE JOINTS DESIGNED FOR A BULKHEAD THRUST WITH A PRESSURE OF MINIMUM 225 PSI. VALVE ENDS SHALL BE OF THE TYPE CALLED FOR ON THE CONTRACT DRAWINGS OR AS SPECIFIED HEREIN.

**LAYOUT OF DUCTILE IRON PIPE AND FITTINGS 24" AND LARGER**

(E) SUPPLEMENTAL CONNECTIONS, WHERE CALLED FOR ON THE PLANS, SHALL BE CONSTRUCTED WITH STANDARD FULL BODIED FITTINGS FOR THOSE CONNECTIONS 16-INCHES AND LARGER; SHORT BODIED FITTINGS MAY BE USED FOR THOSE SUPPLEMENTAL CONNECTIONS 12-INCHES IN SIZE. OUTLET FOR SUPPLEMENTAL CONNECTIONS ON SUPPLY MAINS SHALL BE FURNISHED BY PROVIDING INSULATED FLANGED OUTLET TEES; SEE SECTION ENTITLED "JOINTS, PARAGRAPH (E)(4). THE TEES WHERE FALLING WITHIN "RESTRAINED DISTANCE" SHOWN ON THE DRAWINGS SHALL BE A FULL BODIED BOLTLESS RESTRAINED FITTING. WHERE THE SUPPLEMENTAL CONNECTION FALLS OUTSIDE THE LIMITS OF RESTRAINED DISTANCE THE TEE MAY BE A RETAINED MECHANICAL JOINT FITTING IF SUCH IS AVAILABLE OTHERWISE THE TEE SHALL BE A BOLTLESS RESTRAINED FITTING. THE RESTRAINED JOINTS AND RETAINED MECHANICAL SHALL BE DESIGNED FOR BULKHEAD THRUST WITH A PRESSURE OF MINIMUM 225 PSI.

(F) WHERE DEPTH OF COVER FOR 30-INCH, 36-INCH, 42-INCH AND 48-INCH DUCTILE IRON PIPE EXCEEDS TWENTY (20) FEET, PIPE THICKNESS SHALL BE INCREASED TO MINIMUM CLASS 53. WHERE DEPTH OF COVER EXCEEDS TWENTY-FOUR (24) FEET, PIPE THICKNESS SHALL BE INCREASED TO MINIMUM CLASS 54.

(G) WHERE DEPTH OF COVER FOR 24-INCH DUCTILE IRON PIPE EXCEEDS TWENTY-FOUR (24) FEET, PIPE THICKNESS SHALL BE INCREASED TO MINIMUM CLASS 54.

(H) WHERE DEPTH OF COVER FOR 20-INCH DUCTILE IRON PIPE EXCEEDS TWENTY-EIGHT (28) FEET, PIPE THICKNESS SHALL BE INCREASED TO MINIMUM CLASS 54.

(I) SPECIAL EXTERIOR COATING:

DUCTILE IRON PIPE AND FITTINGS (24" AND LARGER) SHALL HAVE SHOP APPLIED A 16 MIL THICKNESS OF AN APPROVED COAL TAR EPOXY EXTERIOR COATING. THE COATING SHALL BE APPLIED IN TWO (2) COATS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS AND SHALL HAVE A DRY FILM THICKNESS (DFT) OF 16 MILS.

(J) BONDED JOINTS:

1. GENERAL: ALL DUCTILE IRON PIPE JOINTS AND PIPE FITTING JOINTS ON DUCTILE IRON PIPE SHALL HAVE APPROVED TYPE BONDED JOINTS. THE BONDED TYPE JOINTS SHALL BE OF A TYPE THAT CAN BE USED IN CONJUNCTION WITH A CATHODIC PROTECTION SYSTEM AND BE OF A TYPE THAT WILL PROVIDE POSITIVE ELECTRICAL CONTINUITY ACROSS THE JOINTS OF ALL PUSH-ON JOINT PIPE; ALL RESTRAINED MECHANICAL JOINT FITTINGS; ALL BOLTLESS RESTRAINED JOINT PIPE AND FITTINGS; ALL FLANGED JOINTS, EXCEPT WHERE INSULATED FLANGED JOINTS ARE REQUIRED OR ORDERED; ALL COMPRESSION TYPE COUPLING JOINTS, EXCEPT WHERE INSULATED COMPRESSION COUPLINGS ARE REQUIRED OR ORDERED; ALL VICTAULIC TYPE JOINTS; AND ANY OTHER SPECIALS. CATHODIC TEST STATIONS SHALL BE FURNISHED AND INSTALLED WHERE SHOWN ON THE CONTRACT DRAWINGS. THE BONDING WIRE, CONNECTORS, AND TEST STATION ASSEMBLIES SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH THE DETAILED DRAWINGS EXCEPT THAT BONDING CONNECTORS SHALL BE INSTALLED AT EACH PIPE JOINT AT THE ELEVEN (11) AND ONE (1) O'CLOCK POSITIONS ON PIPE SIZES 30", 36", 42", AND 48". AFTER THE JOINT BONDING HAS BEEN INSTALLED THE CONTRACTOR SHALL COMPLETE THE EXTERIOR JOINT PER CONTRACT DRAWING DETAILS INCLUDING EXTERIOR COATING REPAIR.

2. CATHODIC TEST STATIONS: WHERE SHOWN ON THE PLANS OR WHERE ORDERED THE CONTRACTOR SHALL FURNISH AND INSTALL CATHODIC TEST STATION ASSEMBLIES. ALL MATERIALS REQUIRED FOR THE CATHODIC TEST STATION ASSEMBLIES SHALL CONFORM WITH THE DETAILS SHOWN ON THE DETAIL DRAWINGS OR AS SPECIFIED ELSEWHERE IN THESE SPECIFICATIONS.

3. PAYMENT: PAYMENT FOR FURNISHING AND INSTALLING BONDED JOINTS AND CATHODIC TEST STATIONS SHALL BE INCLUDED IN THE COST PER FOOT OF DUCTILE IRON PIPE AND FITTINGS FURNISHED AND INSTALLED IN THE WORK. ADDITIONAL JOINT BONDING AND TEST STATIONS REQUIRED AS A RESULT OF CATHODIC PROTECTION REQUIREMENTS SHALL BE FURNISHED, INSTALLED AND PAID FOR UNDER THAT ITEM.

**DRAWINGS - WATER MAINS 24" AND LARGER**

(A) THE CONTRACTOR SHALL SUBMIT TO THE CITY THROUGH THE ENGINEER FOR REVIEW AND/OR APPROVAL, SIX (6) COMPLETE SETS OF ALL SHOP DRAWINGS FOR FITTINGS AND SPECIALS, AND MISCELLANEOUS DETAILS, SUCH AS AIR RELIEF AND DRAIN OUTLETS, BONDING OF JOINTS, ANCHORS, PITOMETER OPENING, RESTRAINED JOINT, ACCESS OPENINGS, DRAIN PIPE ASSEMBLY, PIPING FOR GATE VALVE ASSEMBLY, ETC.

(B) THE CONTRACTOR SHALL ALSO INITIALLY FURNISH TO THE CITY THROUGH THE ENGINEER A MINIMUM OF SIX (6) SETS OF A COMPLETE ASSEMBLY PLAN FOR THE ENTIRE LENGTH OF THE PIPE LINE INCLUDING A DETAILED TABULATED LAYING SCHEDULE. THIS ASSEMBLY PLAN SHALL ALSO SHOW THE CORRECT LOCATION OF ALL FITTINGS TO BE FURNISHED, INCLUDING AIR RELIEF VALVES, DRAINS, ANCHORS, MANHOLES, PITOMETER VAULTS, VALVE VAULTS, RESTRAINED JOINTS, ACCESS MANHOLES, CATHODIC TEST STATIONS, VALVES, ETC.

(C) AT LEAST TWO (2) SETS OF EACH OF THE SHOP DRAWINGS AND ASSEMBLY PLAN SUBMITTED WILL BE RETURNED TO THE CONTRACTOR WITH THE CRITICISMS OR APPROVAL OF THE ENGINEER. IN CASE THE DRAWINGS ARE NOT APPROVED, THE CONTRACTOR SHALL AGAIN SUBMIT FOR APPROVAL, SIX (6) COMPLETE SETS OF REVISED SHOP DRAWINGS AND ASSEMBLY PLAN REQUIRED FOR REVIEW AND/OR APPROVAL. AFTER THE DRAWINGS HAVE BEEN FINALLY APPROVED, THE CONTRACTOR SHALL AGAIN FURNISH TO THE CITY, THROUGH THE ENGINEER, A SUFFICIENT NUMBER OF ADDITIONAL SETS OF SHOP DRAWINGS AND ASSEMBLY PLAN ON PAPER FOR HIS USE AND FOR THE CITY'S INTERNAL DISTRIBUTION AND FINALLY ONE (1) MYLAR OR REPRODUCIBLE CLOTH TRACING OF EACH DRAWING AS PREVIOUSLY SPECIFIED. NO WORK SHALL BE DONE IN THE SHOP OR IN THE FIELD UNTIL ALL THE DRAWINGS HAVE BEEN FINALLY APPROVED. MYLAR TRACINGS SHALL BE SUBMITTED AS SPECIFIED IN THE GENERAL NOTES "DRAWINGS."

(D) THE APPROVAL OF THE DRAWINGS BY THE CITY SHALL NOT RELIEVE THE CONTRACTOR OF ANY OF HIS OBLIGATIONS IN CONNECTION WITH THIS CONTRACT.

**MATERIALS DATA WITH PROPOSAL**

EACH BIDDER SHALL SUBMIT WITH HIS PROPOSAL, AND IN FORM PROVIDED, THE INFORMATION CALLED FOR BELOW:

- A. NAME OF PIPE MANUFACTURER AND LOCATION OF PLANT.
- B. NAME OF COUPLING MANUFACTURER AND LOCATION OF PLANT.
- C. NAME OF EXTERIOR PIPE COATING MANUFACTURER.
- D. NAME OF PIPE INSULATION MANUFACTURER.

DESIGN AGENCY

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**ITEM SPECIAL - DUCTILE IRON PIPE AND FITTINGS - 24" AND LARGER (CONTINUED)**

**CONNECTING TO EXISTING WATER MAINS**

(A) THE CONTRACTOR SHALL LOCATE ALL PIPE ENDS AND/OR ALL EXISTING PIPE JOINTS WHERE CONNECTIONS ARE TO BE MADE, INCLUDING WHERE EXISTING MAINS ARE TO BE TAPPED, ALONG WITH THE NEXT EXISTING PIPE JOINT TO DETERMINE THE EXACT LOCATION AND ELEVATION (LINE AND GRADE) OF THE EXISTING WATER MAIN. THE CONTRACTOR SHALL ALSO EXPOSE THE EXISTING PIPE JOINTS WHERE CONNECTIONS ARE TO BE MADE TO DETERMINE THE TYPE OF EXISTING JOINT AND THE DIRECTION OF THE EXISTING JOINT. NO PIPE FABRICATION DRAWING WILL BE APPROVED UNTIL THIS INFORMATION IS SUBMITTED TO THE ENGINEER AND TO THE CITY. ALL FIELD DATA SHALL BE OBTAINED IN THE PRESENCE OF THE DIVISION OF WATER'S RESIDENT INSPECTOR.

(B) IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL FIELD DIMENSIONS PRIOR TO PREPARING THE VARIOUS SHOP DRAWING SUBMITTALS. AT THE TIME OF EACH SUBMISSION, THE CONTRACTOR SHALL GIVE THE CITY SPECIFIC WRITTEN NOTICE OF EACH VARIATION THAT THE SHOP DRAWINGS MAY HAVE FROM THE REQUIREMENTS OF THE CONTRACT DOCUMENTS. IN ADDITION, THE CONTRACTOR SHALL CAUSE A SPECIFIC NOTATION TO BE MADE ON EACH SHOP DRAWING SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL OF EACH SUCH VARIATION. THE CITY'S REVIEW AND APPROVAL OF SHOP DRAWINGS SHALL NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR ANY VARIATION FROM THE REQUIREMENTS OF THE CONTRACT DRAWINGS. THE CITY'S APPROVAL SHALL NOT EXTEND TO ANY SUCH VARIATION UNLESS CONTRACTOR HAS, IN WRITING, CONSPICUOUSLY CALLED THE CITY'S ATTENTION TO EACH SUCH VARIATION AT THE TIME OF SUBMITTAL, AS REQUIRED BY THIS PARAGRAPH, AND THE CITY HAS GIVEN WRITTEN APPROVAL OF THAT PARTICULAR VARIATION BY A SPECIFIC WRITTEN NOTATION THEREOF INCORPORATED IN OR ACCOMPANYING THE SHOP DRAWING APPROVAL.

(C) THE FIELD DATA SHALL BE OBTAINED IN SUFFICIENT TIME IN ADVANCE OF THE PROPOSED CONNECTION IN ORDER TO DETERMINE IF ANY ADJUSTMENTS TO THE LINE AND GRADE OF THE PROPOSED WATER MAIN IS REQUIRED DUE TO THE INFORMATION OBTAINED IN THE FIELD DATA. THE INFORMATION OBTAINED IN THE FIELD DATA SHALL ALSO BE FORWARDED TO THE PIPE FABRICATOR WITH SUFFICIENT TIME TO ALLOW FOR THE PREPARATION OF REVISED SHOP DRAWINGS AND FOR FABRICATION OF THOSE PIPE AND FITTINGS REQUIRED TO MAKE THE CONNECTION. NO EXTRA COMPENSATION TO THE CONTRACTOR WILL BE ALLOWED FOR ANY DELAYS AND/OR ADDITIONAL PIPE AND FITTINGS FOR FAILURE TO HAVING PROPERLY OBTAINED FORWARDED THE REQUIRED FIELD INFORMATION DATA.

**DUCTILE - IRON PIPE AND FITTINGS - GENERAL**

(A) ALL PIPE AND FITTINGS SHALL BE MANUFACTURED IN ACCORDANCE WITH AND IN ALL RESPECTS WITH THE REQUIREMENTS OF THE LATEST SPECIFICATIONS OF THE "AMERICAN NATIONAL STANDARD" FOR ANSI/AWWA C151/A21.51-86, "DUCTILE IRON PIPE CENTRIFUGALLY CAST IN METAL MOLDS OR SAND-LINED MOLDS, AND DUCTILE IRON FITTINGS FOR WATER AND OTHER LIQUIDS," AND ANSI/AWWA C111/A21.11-85, "RUBBER-GASKET JOINTS FOR DUCTILE-IRON PIPE AND GRAY-IRON PRESSURE PIPE AND FITTINGS," ADOPTED BY THE AMERICAN WATER WORKS ASSOCIATION; WHICH STANDARDS EXCEPT AS HEREIN MODIFIED ARE MADE A PART OF THESE SPECIFICATIONS. PIPE AND FITTINGS ON 24-INCH AND LARGER WATER MAIN INSTALLATIONS SHALL HAVE BOLTLESS RESTRAINED PUSH-ON JOINT PIPE AND FITTINGS WITHIN "RESTRAINED DISTANCE" SHOWN ON THE CONTRACT DRAWINGS AND WHERE CALLED OUT TO BE RESTRAINED.

(B) ALL PIPE AND FITTINGS SHALL BE CEMENT LINED AND OF THE SIZE AND THICKNESS AND PRESSURE CLASSES NOTED ON THE RESPECTIVE CONTRACT DRAWING OR DIRECTLY SPECIFIED.

(C) ALL DUCTILE IRON FITTINGS SHALL BE MANUFACTURED IN ACCORDANCE WITH AMERICAN NATIONAL STANDARD, ANSI/AWWA C110/A21.10-87, "DUCTILE IRON AND GRAY-IRON FITTINGS, 3-INCH THROUGH 48-INCH, FOR WATER OTHER LIQUIDS," AND ALL SUBSEQUENT AMENDMENTS THERETO. METAL FOR FITTINGS SHALL CONFORM TO AMERICAN NATIONAL STANDARD ANSI A21.10-87.

**DUCTILE - IRON PIPE AND FITTINGS - GENERAL (CONTINUED)**

(D) THE CONTRACTOR SHALL FURNISH CENTRIFUGAL CAST DUCTILE IRON CEMENT LINED PIPE. DUCTILE IRON METAL SHALL HAVE A MINIMUM TENSILE STRENGTH OF 60,000 PSI, MINIMUM YIELD STRENGTH OF 42,000 PSI AND MINIMUM ELONGATION OF 10 PERCENT AND SHALL BE FOR THE THICKNESS CLASS NOTED ON THE CONTRACT DRAWINGS OR DIRECTLY SPECIFIED. PIPE MAY BE FURNISHED IN 18 OR 20 FEET NOMINAL LAYING LENGTHS. THE CENTRIFUGALLY CAST DUCTILE SHALL CONFORM TO THE AMERICAN NATIONAL STANDARD ANSI/AWWA C151/A21.51-86, "DUCTILE IRON PIPE CENTRIFUGALLY CAST IN METAL MOLDS OR SAND-LINED MOLDS, AND DUCTILE IRON FITTINGS FOR WATER AND OTHER LIQUIDS," AND ALL SUBSEQUENT AMENDMENTS THERETO. PIPE ON STRAIGHT RUNS SHALL HAVE PUSH-ON SINGLE RUBBER-GASKET COMPRESSION JOINTS, ALL IN ACCORDANCE WITH AMERICAN NATIONAL STANDARD, ANSI/AWWA C111/A21.11-85, "RUBBER-GASKET JOINTS FOR DUCTILE-IRON PIPE AND GRAY-IRON PRESSURE PIPE AND FITTINGS," AND ALL SUBSEQUENT AMENDMENTS THERETO.

(E) STANDARD THICKNESS AND PIPE CLASS TABLES

THE THICKNESS OF THE CENTRIFUGALLY CAST DUCTILE IRON PIPE SHALL CONFORM TO THE FOLLOWING TABLE:

STANDARD PIPE SIZE	WORKING PRESSURE (PSI)	THICKNESS CLASS				FITTINGS PSI
		52	53	54	56	
24"	350	.44	.47	.50	.56	350
30"	350	.47	.51	.55	.63	250
36"	350	.53	.58	.63	.73	250
42"	350	.59	.65	.71	.83	250
48"	350	.65	.72	.79	.93	250

(F) WHERE "RESTRAINED DISTANCES" ARE SHOWN ON THE PLANS OR DIRECTLY SPECIFIED, PIPE AND FITTINGS HAVING BOLTLESS RESTRAINED TYPE JOINTS SHALL BE FURNISHED. BOLTLESS RESTRAINED TYPE JOINTS SHALL BE AS SPECIFIED IN SECTION "JOINTS, D: "BOLTLESS RESTRAINED SLIP-ON JOINTS."

(G) WHERE FITTINGS ARE SHOWN WHICH ARE NOT COVERED BY THE ABOVE SPECIFICATIONS, THEY IN SUCH PARTICULARS AS ARE LACKING THEREON SHALL CONFORM TO THE DIMENSIONS AND OTHERWISE MEET THE SPECIFICATIONS FOR THE RESPECTIVE TYPE WHICH ARE CARRIED IN THE LATEST REVISIONS TO THE CURRENT EDITION OF THE DUCTILE IRON PIPE RESEARCH ASSOCIATION "HANDBOOK OF DUCTILE IRON PIPE" OR WHICH ARE OTHERWISE SHOWN ON THE CONTRACT DRAWINGS.

(H) WHEREVER CHANGES IN LINE AND GRADES OF THE MAIN AS SHOWN ON THE DRAWINGS ARE NOT STANDARD FITTING DEFLECTIONS, THE CONTRACTOR WILL BE PERMITTED TO SUBMIT DETAILS USING COMBINATIONS OF STANDARD FITTINGS AND SMALL DEFLECTIONS (NOT TO EXCEED THE MANUFACTURER'S MAXIMUM SUGGESTED JOINT OPENING) IN THE ADJOINING LENGTHS OF PIPE.

(I) ON NEW AND/OR RELOCATED OR EXTENDED WATER MAINS, 24-INCH DIAMETER AND LARGER, WHERE WATER MAINS END OR TERMINATE AND ARE NOT CONNECTED TO EXISTING MAINS, AN APPROVED TYPE D BOLTLESS RESTRAINED CAP/PLUG SHALL BE FURNISHED AND INSTALLED. PLUGS AND CAPS SHALL BE FURNISHED WITH TWO (2) PLUGGED TWO (2)"-INCH TAPS FOR DRAIN AND AIR RELIEF CONNECTIONS.

(J) CLOSURE PIECES SHALL BE ACCURATELY MEASURED AND CUT IN THE FIELD AND INSTALLED USING SOLID SHORT PATTERN SLEEVES HAVING RETAINED MECHANICAL BELL JOINTS OR APPROVED COMPRESSION TYPE COUPLINGS. RETAINED MECHANICAL BELL JOINT SLEEVES AND COMPRESSION TYPE COUPLINGS SHALL BE AS SPECIFIED ELSEWHERE IN THESE SPECIFICATIONS.

(K) TESTS, INSPECTION, REPORTS AND ANALYSES OF TESTS OF SAMPLES FOR ALL MATERIALS SHALL BE FURNISHED IN ACCORDANCE WITH THE PARAGRAPH "TEST, INSPECTION AND REPORTS" OF THE GENERAL NOTES.

**CEMENT LINING**

ALL PIPE FITTINGS, SHALL BE GIVEN A CEMENT MORTAR LINING AT THE POINT OF MANUFACTURE. THE LINING SHALL CONFORM TO THE AMERICAN NATIONAL STANDARD, ANSI/AWWA C104/A21.4-1990, "CEMENT-MORTAR LINING FOR DUCTILE-IRON PIPE AND FITTINGS," AND ALL SUBSEQUENT AMENDMENTS THERETO.

**MARKING**

ALL PIPE AND FITTINGS SHALL BE SUITABLY MARKED TO DENOTE THE MANUFACTURER, CLASS, DATE, WEIGHT AND OTHER ELEMENTS OF IDENTIFICATION.

**FACING AND DRILLING**

ALL FLANGES SHALL BE CAST SOLID AND FACED ACCURATELY AT RIGHT ANGLES TO THE AXIS OF THE PIPE. ALL FLANGES SHALL BE SHOP COATED WITH A COAT OF COAL TAR EPOXY, EXCEPT THE FACE OF THE FLANGE WHICH SHALL RECEIVE ONE (1) COAT OF A ZINC RICH PRIMER AT THE SHOP IMMEDIATELY AFTER THEY HAVE BEEN FACED AND DRILLED. ALL FLANGED PIPE AND FITTINGS SHALL BE FACED AND DRILLED TO ANSI B16-1, 125 LB. DRILLING, UNLESS SPECIAL DRILLING IS CALLED FOR. WHERE TAP OR STUD BOLTS ARE REQUIRED, FLANGES SHALL ALSO BE TAPPED.

**LAYING**

(A) PROPER AND SUITABLE TOOLS AND APPLIANCES FOR THE SAFE AND CONVENIENT HANDLING AND LAYING OF THE PIPE AND FITTINGS SHALL BE USED. GREAT CARE SHALL BE TAKEN TO PREVENT THE PIPE COATING AND FITTINGS FROM BEING DAMAGED PARTICULARLY ON THE INSIDE OF THE PIPES AND FITTINGS AND ANY SUCH DAMAGE SHALL BE REMEDIATED AS DIRECTED. ALL PIPES AND FITTINGS SHALL BE CAREFULLY EXAMINED BY THE CONTRACTOR FOR DEFECTS JUST BEFORE LAYING AND NO PIPE OR FITTINGS SHALL BE LAID WHICH IS KNOWN TO BE DEFECTIVE.

(B) IF ANY DEFECTIVE PIPE IS DISCOVERED AFTER HAVING BEEN LAID, IT SHALL BE REMOVED AND REPLACED WITH A SOUND PIPE OR FITTING IN A SATISFACTORY MANNER, BY THE CONTRACTOR AT HIS OWN EXPENSE. ALL PIPES AND FITTINGS SHALL BE THOROUGHLY CLEANED BEFORE THEY ARE LAID, SHALL BE KEPT CLEAN UNTIL THEY ARE USED IN THE COMPLETED WORK, AND WHEN LAID, SHALL CONFORM TO THE LINES AND GRADES GIVEN BY THE ENGINEER. OPEN ENDS OF PIPES SHALL BE KEPT PLUGGED WITH A BULK HEAD DURING CONSTRUCTION.

(C) PIPE LAID IN TRENCH SHALL BE LAID TO A FIRM AND EVEN BEARING FOR ITS FULL LENGTH. PRECAUTIONS SHALL BE TAKEN AGAINST FLOATING.

(D) IT IS THE INTENTION OF THESE SPECIFICATIONS TO SECURE FIRST CLASS WORKMANSHIP IN THE PLACING OF PIPE AND ACCESSORIES. IN SUCH DETAILS AS ARE NOT SPECIFICALLY MENTIONED HEREIN OR CALLED FOR ON THE DRAWINGS, THE CONTRACTOR WILL BE REQUIRED TO CONFORM WITH THE APPLICABLE SECTIONS OF THE LATEST AMERICAN NATIONAL STANDARD, ANSI/AWWA C 600-87, INSTALLATION OF GRAY AND DUCTILE CAST IRON WATER MAINS AND APPURTENANCES," AS ADOPTED BY THE AMERICAN WATER WORKS ASSOCIATION.

**PROTECTION OF UTILITIES**

CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO SUPPORT, MAINTAIN, OR OTHERWISE PROTECT EXISTING UTILITIES AND OTHER FACILITIES AT ALL TIMES DURING CONSTRUCTION.

**CUTTING PIPE**

WHENEVER THE PIPES REQUIRE CUTTING TO FIT INTO THE LINES, THE WORK SHALL BE DONE IN A SATISFACTORY MANNER SO AS TO LEAVE A SMOOTH END AT RIGHT ANGLES TO THE AXIS OF THE PIPE. WHEN A PIECE OF PIPE IS CUT TO FIT INTO THE LINE, NO PAYMENT WILL BE MADE FOR THE PORTION CUT OFF AND NOT USED IN THE LINE. THE CONTRACTOR'S ATTENTION IS CALLED TO PARAGRAPH "WORK TO BE DONE BY THE CITY."

**JOINTS**

(A) SLIP-ON JOINTS:

ALL PIPE UNLESS OTHERWISE REQUIRED, SHOWN ON CONTRACT DRAWINGS, DIRECTLY SPECIFIED SHALL HAVE SOCKET BY PLAIN END RUBBER-GASKET PUSH-ON JOINTS WITH RADIALLY COMPRESSED LOCKED IN PLACE RUBBER RING GASKETS APPROVED BY THE COMMISSIONER OF WATER. SLIP-ON COMPRESSION JOINTS SHALL CONFORM TO THE REGULAR AND SPECIAL REQUIREMENT FOR PUSH-ON JOINTS IN AMERICAN NATIONAL STANDARD, ANSI/AWWA C111/A21.11-85, "RUBBER GASKET JOINTS FOR DUCTILE-IRON AND GRAY-IRON PRESSURE PIPE AND FITTINGS," AND ALL SUBSEQUENT AMENDMENTS THERETO.

**JOINTS (CONTINUED)**

(B) MECHANICAL JOINTS/RESTRAINED MECHANICAL JOINTS:

1. ALL FITTINGS AND PIPE BELL ENDS CONNECTED TO FITTINGS, UNLESS OTHERWISE REQUIRED, SHOWN ON CONTRACT DRAWINGS, OR DIRECTLY SPECIFIED SHALL HAVE BELL OR PLAIN END JOINTS OF THE MECHANICAL BOLTED STUFFING-BOX TYPE WITH SEALING GASKET AND BOLTED DUCTILE IRON FOLLOWER GLAND AND SHALL BE OF THE SPECIFIED RETAINED TYPE. BOLTS AND NUTS FOR MECHANICAL JOINTS SHALL BE CORROSION RESISTANT, HIGH STRENGTH, LOW ALLOY STEEL.

2. MECHANICAL JOINTS SHALL CONFORM TO THE REGULAR AND SPECIAL REQUIREMENT THAT ALL GLANDS SHALL BE DUCTILE IRON WITH JOINT DIMENSIONS AND TOLERANCES, BOLT HOLES AND SLOTS, GASKETS, RUBBER, QUALITY CONTROL, BOLTS AND NUTS AND MARKING BE IN CONFORMANCE WITH AMERICAN NATIONAL STANDARD, ANSI/AWWA C111/A21.11-85, "RUBBER GASKET JOINTS FOR DUCTILE IRON AND GRAY IRON PRESSURE PIPE AND FITTINGS." ON ALL PIPE AND FITTINGS AT BENDS, TEES, CROSSES, SPECIAL FITTINGS, BETWEEN VERTICAL OFFSETS OR BENDS, ON HYDRANT BRANCHES, ON VALVES AND HYDRANT BASE ELBOWS, UP TO AND INCLUDING 16-INCH SIZE, THE CONTRACTOR SHALL FURNISH AND INSTALL RESTRAINED TYPE MECHANICAL JOINTS.

3. ON ALL PIPE AND FITTINGS AT BENDS, TEES, CROSSES, SPECIAL FITTINGS, BETWEEN VERTICAL OFFSETS OR BENDS, ON HYDRANT BRANCHES, ON VALVES AND HYDRANT BASE ELBOWS, UP TO AND INCLUDING 16-INCH SIZE, THE CONTRACTOR SHALL FURNISH AND INSTALL RETAINED TYPE MECHANICAL JOINTS.

4. PIPE AND FITTING BELL JOINT AND GASKETS SHALL BE FURNISHED AS SPECIFIED. GLANDS FOR RETAINED MECHANICAL JOINTS SHALL BE BOLTED TYPE OF DUCTILE-IRON MATERIAL CONFORMING TO AMERICAN NATIONAL STANDARD, ANSI/AWWA C111/A21.11-85, "RUBBER-GASKET JOINTS FOR DUCTILE-IRON AND GRAY-IRON PRESSURE PIPE AND FITTINGS," AND/OR CONFORMING WITH ASTM A 536-84, "SPECIFICATION FOR DUCTILE-IRON CASTINGS." RETAINED MECHANICAL JOINT FOLLOWER GLANDS SHALL BE EQUAL TO THE "MEG-A-LUG" AS MANUFACTURED BY EBAA IRON SALES, INC., THE "SUPER-LUG" AS MANUFACTURED BY THE SIGMA CORPORATION OR THE "UNI-FLANGE SERIES 1400" AS MANUFACTURED BY THE FORD METER BOX COMPANY, INC. PROPER TORQUE SHALL BE THAT AS RECOMMENDED BY THE RETAINER GLAND MANUFACTURER, WHERE JOINT DEFLECTION IS NECESSARY FOR ALIGNMENT SUCH DEFLECTION SHALL BE LIMITED TO MANUFACTURER'S MAXIMUM JOINT OPENING. ALL RETAINED JOINTS SHALL BE POLYETHYLENE ENCASED AS SPECIFIED IN SECTION, "JOINTS", (C), EXCEPT WHERE SUCH RETAINED MECHANICAL JOINTS ARE BONDED JOINTS WHERE NO POLYETHYLENE ENCASEMENT WILL BE REQUIRED.

5. RETAINER GLANDS USING PERPENDICULAR SET SCREWS AS A MEANS OF RESTRAINT WILL NOT BE PERMITTED.

(C) POLYETHYLENE ENCASEMENT:

1. ALL FLANGES, VICTAULIC AND COMPRESSION TYPE BOLTED SLEEVED COUPLINGS, AND ALL PIPE AND FITTINGS HAVING BOLTS OR OTHER TYPE OF FASTENERS IN JOINT CONSTRUCTION AND PIPE AND FITTINGS AS SHOWN ON THE CONTRACT DRAWINGS OR WHERE REQUIRED SHALL BE "V-Bio" POLYETHYLENE ENCASED. PIPE, FITTING AND OTHER JOINTS THAT ARE BONDED JOINTS NEED NOT BE POLYETHYLENE ENCASED. POLYETHYLENE ENCASEMENT SHALL BE WRAPPED IN ACCORDANCE WITH AMERICAN NATIONAL STANDARD, ANSI/AWWA C105/A21.5-88, "POLYETHYLENE ENCASEMENT FOR DUCTILE-IRON PIPING FOR WATER AND OTHER LIQUIDS," AND ALL SUBSEQUENT AMENDMENTS THERETO AND SHALL HAVE DOUBLE POLYETHYLENE ENCASEMENT OF CLASS "C" (BLACK) FILM, METHOD "C" DOUBLING SHEET AND PROVIDING ONE FOOT (1') MINIMUM OVERLAP ON PIPE OR FITTING ON BOTH SIDES OF JOINT.

2. ALL BOLTS AND NUTS ON ALL RETAINED MECHANICAL JOINTS, FLANGES, VICTAULIC AND COMPRESSION TYPE BOLTED SLEEVED COUPLINGS, SHALL HAVE FIELD APPLIED THREE (3) COATS OF BITUMASTIC COATING PRIOR TO POLYETHYLENE ENCASEMENT.

DESIGN AGENCY

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DESIGNER

REVIEWER

PROJECT ID

82382

SHEET TOTAL

1171 2339

**ITEM SPECIAL - DUCTILE IRON PIPE AND FITTINGS - 24" AND LARGER (CONTINUED)**

**JOINTS (CONTINUED)**

(D) BOLTLESS RESTRAINED SLIP-ON JOINTS:

WHERE SHOWN ON THE CONTRACT DRAWINGS ON ALL DUCTILE IRON PIPE AND FITTINGS, 24-INCHES OR LARGER, WHERE "RESTRAINED DISTANCE" IS REQUIRED OR SHOWN ALL RESTRAINT SHALL BE OF THE BOLTLESS RESTRAINED SLIP-ON JOINT TYPE. VALVES WITHIN "RESTRAINED DISTANCES" SHALL BE OF THE TYPE INDICATED ON THE CONTRACT DRAWINGS OR AS SPECIFIED. BOLTLESS RESTRAINED SLIP-ON JOINTS SHALL BE OF A DESIGN CONSISTING OF A SHOP WELDED RETAINER RING OR SEGMENT ON THE SPIGOT END OF THE PIPE THAT WHEN THE JOINT IS FULLY ASSEMBLED "LOCKS" INTO THE BELL OF THE ADJACENT PIPE OR FITTING PROVIDING A POSITIVE RESTRAINED JOINT. NO FIELD WELDED RESTRAINED JOINTS ARE PERMITTED EXCEPT ON LENGTHS OF PIPE LESS THAN NOMINAL LENGTH NEED TO CLOSE THE LINE. BOLTLESS RESTRAINED JOINTS SHALL BE OF A DESIGN THAT PROVIDES RESTRAINED ACTION BETWEEN THE SPIGOT AND BELL OF THE PIPE OR FITTING INDEPENDENT OF THE GASKET.

(E) COMPRESSION COUPLINGS:

1. ALL PIPE COMPRESSION COUPLINGS SHALL BE OF A GASKETED, SLEEVE TYPE WITH DIAMETERS TO PROPERLY FIT PLAIN END IRON PIPE. EACH COUPLING SHALL CONSIST OF ONE (1) MIDDLE RING WITH STOPS REMOVED; TWO (2) FOLLOWER GLANDS; TWO (2) RUBBER-COMPOUND, BUNA-N BLEND, WEDGE SECTION GASKETS; AND SUFFICIENT TRACKHEAD STAINLESS STEEL BOLTS AND NUTS (ASTM A276-89A, TYPE 304) TO PROPERLY COMPRESS THE GASKETS. THE MIDDLE RING AND FOLLOWER GLANDS SHALL BE OF EITHER STEEL OR DUCTILE IRON (ASTM-A536). THE COMPRESSION COUPLING SHALL HAVE STOPS REMOVED AND BE RATED FOR A MINIMUM WORKING PRESSURE OF 250 PSI AND SHALL BE EQUAL TO THE DRESSER STYLE NOS: 39, OR 39-62 (TRANSITION TYPE), ROMAC IC400 OR SMITH-BLAIR 416 STRAIGHT AND TRANSITION COUPLINGS. ALL COMPRESSION COUPLINGS SHALL HAVE ELETRIC INSULATION.

2. ALL COMPRESSION COUPLINGS SHALL BE COATED IN THE SHOP WITH A FACTORY COATING COMPATIBLE WITH FIELD APPLIED PRIMER AND ENAMEL COATINGS. COMPRESSION COUPLINGS SHALL BE CLEANED AND PAINTED WITH THREE (3) FIELD COATS OF KOPPERS BITUMASTIC SUPER TANK SOLUTION OR EQUIVALENT.

(F) PIPE TIEANCHOR HARNESS:

1. ALL COMPRESSION COUPLINGS SHALL INCLUDE TIEANCHOR-TO-TIEANCHOR HARNESSES AS MANUFACTURED BY STAR NATIONAL PRODUCTS, INC. THE HARNESS TIE RODS SHALL BE INSTALLED WITH INSULATING BUSHINGS FOR ELECTRIC INSULATION. PRESSURE RATING, MATERIAL FOR ROD AND NUTS SHALL MATCH COMPRESSION COUPLINGS.

(G) FLANGED JOINTS:

1. FLANGED JOINTS SHALL BE INSTALLED AS SHOWN ON THE DRAWINGS OR AS SPECIFIED. FLANGES SHALL BE EITHER CAST STEEL, FORGED OR ROLLED STEEL, OR PROPERLY WELDED AND MACHINED FABRICATED STEEL PLATES, WELDED TO PIPE WITH TWO CONTINUOUS WELDS. THEY SHALL HAVE PLAIN FACES AND SHALL BE FACED TRUE AND SMOOTH AT RIGHT ANGLES TO THE AXIS OF THE PIPE AND SHALL BE SPOT FACED ON THE BACK. DRILLING SHALL CONFORM TO ANSI B16.1, 125 LBS. EACH BLIND FLANGE SHALL BE CAST IRON AND HAVE BOSSES TAPPED AT TOP AND BOTTOM FOR TWO (2) INCH STANDARD PIPE AND FURNISHED WITH PLUGS.

2. ALL MACHINED STEEL SURFACES AT THE ENDS OF PIPE AND/OR FITTINGS TO RECEIVE VICTAULIC TYPE COUPLINGS OR PIPE ENDS HAVING FLANGES (FACE OF FLANGE) SHALL BE COATED WITH ONE (1) SHOP COAT OF AN APPROVED ZINC RICH PAINT.

3. ALL BOLTS AND NUTS USED IN THE FINISHED WORK FOR FLANGES SHALL BE MADE OF SILICON BRONZE (ASTM B 98-84, ALLOY A, "SPECIFICATION FOR COPPER-SILICON ALLOY ROD, BARS, AND SHAPES") OR STAINLESS STEEL (ASTM A 276-89A, TYPE 304, "SPECIFICATION FOR STAINLESS AND HEAT-RESISTING STEEL BARS AND SHAPES"). THE ENDS OF ALL BOLTS MUST BE FINISHED TO STANDARD RADIUS IN ACCEPTABLE MANNER. ALL SCREW THREADS SHALL BE AMERICAN STANDARD COARSE THREAD (N.C.). STUD BOLTS DOUBLE END (ROD) SHALL BE USED TO MAKE THE FLANGED JOINTS ON PIPE. ALL DIMENSIONS TO BE ACCORDING TO AMERICAN STANDARD HEAVY. BOLTS AND NUTS SHALL BE DELIVERED TO THE FIELD FREE FROM GREASE, RUST AND DIRT AND SHALL BE PROPERLY PROTECTED FROM MOISTURE AND DIRT IN THE FIELD. GASKETS FOR FLANGED PIPE SHALL BE 5X MANILA ROPE PATTERN OR OTHER APPROVED TYPE.

4. WHERE FLANGED VALVE INSULATORS ARE REQUIRED AT SUPPLEMENTAL CONNECTIONS, OR WHERE ORDERED, EACH OF THE FLANGE BOLT HOLES SHALL BE INCREASED BY 1/16" TO ACCEPT A BOLT INSULATOR SLEEVE.

**JOINTS (CONTINUED)**

(H) VICTAULIC TYPE COUPLINGS:

1. WHERE SHOWN ON THE DRAWINGS, SPECIFIED OR WHERE REQUIRED, THE CONTRACTOR SHALL FURNISH AND INSTALL VICTAULIC TYPE COUPLINGS FOR CONNECTION OF DUCTILE IRON PIPE ENDS TO VALVES. SHOULDERED PIPE ENDS SHALL BE DESIGNED FOR NOT LESS THAN THE WORKING PRESSURE NOTED ON THE CONTRACT DRAWINGS. COUPLINGS SHALL BE COMPOSED OF MALLEABLE IRON HOUSINGS HELD TOGETHER WITH STEEL BOLTS HEAT TREATED AND "HOT-DIP" GALVANIZED AND WITH A CONTINUOUS HOLLOW, MOLDED RUBBER SEALING RING, OF SUCH TYPE THAT THE SEAL BECOMES TIGHT AS THE PRESSURE WITHIN THE PIPE INCREASES. THE JOINTS SHALL BE CONSTRUCTED AND INSTALLED AND SHALL BE EQUAL IN ALL RESPECTS TO THOSE MANUFACTURED BY THE VICTAULIC COMPANY OF AMERICA. MALLEABLE HOUSINGS SHALL CONFORM TO THE "STANDARD SPECIFICATIONS FOR FERRITIC MALLEABLE IRON CASTINGS," ASTM DESIGNATION A 47-84; OR TO THE "STANDARD SPECIFICATIONS FOR DUCTILE IRON CASTINGS," ASTM DESIGNATION A 536, LATEST REVISION. BOLTS AND NUTS SHALL BE MANUFACTURED BY THE COUPLING MANUFACTURER AND SHALL BE HEAT TREATED STEEL BOLTS HAVING 100,000 PSI. TENSILE STRENGTH CONFORMING TO ASTM A 183-83, OR LATEST REVISION, STANDARD SPECIFICATION FOR "CARBON STEEL TRACK BOLTS AND NUTS." ALL BOLTS AND NUTS SHALL BE ZINC COATED BY THE "HOT-DIP" METHOD ACCORDING TO ASTM DESIGNATION A 123-89A, "SPECIFICATION FOR ZINC (HOT-DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS."

2. ALL METAL PARTS OF THE COUPLINGS SHALL BE COATED AT THE SHOP WITH ONE COAT OF BITUMINOUS PRIMER FURNISHED BY THE SAME MANUFACTURER WHO FURNISHES THE COATINGS AS SPECIFIED UNDER PARAGRAPH "PAINTING."

1) TRANSITION COUPLINGS:

THE CONTRACTOR SHALL PROVIDE SHOP DRAWINGS TO THE CITY THROUGH THE ENGINEER FOR APPROVAL OF THE TRANSITION COUPLING ASSEMBLY. THE TRANSITION COUPLING SHALL BE "DRESSER STYLE 63/39, TYPE 1" SLIP TYPE WITH ELECTRIC INSULATION, OR APPROVED EQUAL, WITH MINIMUM 1/2" THICK BODY AND SLIP, WITH AN 10-IN. TRAVERSE. THE TRANSITION COUPLING SHALL INCLUDE ALL MATERIALS, BOLTS, NUTS AND WASHERS, WELDED NECK FLANGES A.S.A. 150# AND GASKETS. ALL BOLTS AND NUTS SHALL BE MADE OF STAINLESS STEEL: ASTM A 276-89A, TYPE 304, "SPECIFICATION FOR STAINLESS AND HEAT-RESISTING SHEET BARS AND SHAPES." NO FIELD WELDING OF HEAT-RESISTING SHEET BARS AND SHAPES." NO FIELD WELDING OF GALVANIZED STEEL PIPE WILL BE PERMITTED. THE TRANSITION COUPLING SHALL BE GALVANIZED EXCEPT SLIP PIPE. THE TRANSITION COUPLING SHALL HAVE FIELD APPLIED INSULATION AS PER DETAILS ON THE CONTRACT DRAWINGS.

**PAINTING**

AFTER INSTALLATION AND BEFORE POLYETHYLENE ENCASEMENT, ALL EXPOSED OR DAMAGED COATING AND ALL BOLTS FOR RETAINED MECHANICAL JOINTS, FLANGES AND VICTAULIC OR COMPRESSION TYPE BOLTED SLEEVED COUPLINGS SHALL BE CLEANED AND PAINTED WITH THREE (3) FIELD COATS OF KOPPERS BITUMASTIC SUPER TANK SOLUTION OR EQUIVALENT.

**DRAWINGS**

(A) THE CONTRACTOR SHALL SUBMIT TO THE CITY THROUGH THE ENGINEER FOR APPROVAL SIX (6) SETS OF PRINTS OF ALL SHOP DRAWINGS FOR PIPE AND FITTINGS AND MISCELLANEOUS OR SPECIAL DETAILS OF PIPE AND FITTING JOINTS WHICH ARE NOT STANDARD CONSTRUCTION OR FULLY DETAILED IN THE REGULAR CATALOGUE OF THE COMPANY FURNISHING THE PIPE, FITTINGS AND SPECIALS. NO WORK SHALL BE DONE IN THE SHOP UNTIL AFTER THE DRAWINGS HAVE BEEN APPROVED.

(B) THE APPROVAL OF THE DRAWINGS BY THE CITY SHALL NOT RELIEVE THE CONTRACTOR OF ANY OF HIS OBLIGATIONS IN CONNECTION WITH THIS CONTRACT.

**PIPE SUPPORT ASSEMBLIES**

PIPE SUPPORT ASSEMBLIES SHALL BE FABRICATED AS DETAILED ON THE PLANS AND SHALL BE COMPLETE IN ALL RESPECTS INCLUDING ALL MATERIALS, CADMIUM PLATED SHOULDER AND CLAMP BOLTS, FASTENERS AND NUTS. THE SUPPORT ASSEMBLY CLAMP, SEAT PLATE ("LUBRITE" PLATE) AND SHIMS SHALL ALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION PER ASTM A-123, LATEST REVISION THEREOF. NO FIELD WELDING OF GALVANIZED STEEL PIPE WILL BE PERMITTED. THERE SHALL BE A MINIMUM OF TWO (2) PIPE SUPPORTS FOR EACH PIPE LENGTH.

**MEASUREMENT**

THE NUMBER OF FEET OF DUCTILE IRON PIPE AND FITTINGS TO BE PAID FOR UNDER ITEM SPECIAL - DUCTILE IRON PIPE AND FITTINGS - 20" AND LARGER, SHALL BE THAT ACTUALLY FURNISHED AND PLACED IN ACCORDANCE WITH THESE SPECIFICATIONS ALONG THE AXIS OF THE PIPING, INCLUDING FITTINGS AND VALVES CONNECTED UP IN PLACE.

**ITEM SPECIAL - POLYURETHANE COATED CEMENT LINED STEEL**

(A) WELDED STEEL PIPE SHALL BE 24" O.D. X 0.50" WALL ASTM A-53 GRADE B, HAVING A MINIMUM WORKING PRESSURE OF 350 PSI AND MEETING THE REQUIREMENTS OF AWWA C200-97.

(B) THE INTERIOR OF ALL STEEL PIPE SHALL BE TOTALLY COATED WITH CEMENT-MORTAR PROTECTIVE LINING FOR THE FULL DISTANCE OF THE PIPE.

**DRAWINGS - WELDED STEEL PIPE AND APPURTENANCES**

(A) THE CONTRACTOR SHALL SUBMIT TO THE CITY THROUGH THE ENGINEER FOR APPROVAL A MINIMUM OF SIX (6) SETS OF PRINTS OF ALL SHOP DRAWINGS GENERATED BY THE PIPE OR STRUCTURAL FABRICATOR OF ALL PIPE, FITTINGS AND MISCELLANEOUS OR SPECIAL DETAILS OF PIPE AND FITTING JOINTS INCLUDING LINE AND ASSEMBLY LAYOUT, FLANGE DETAILS, VICTAULIC GROOVING, VICTAULIC COUPLINGS, EXPANSION JOINTS, WELDING DETAILS, FACTORY APPLIED INSULATION, FIELD APPLIED INSULATION, JACKET, SLEEVE PACKING DETAILS, PIPE SUPPORT DETAILS INCLUDING CLAMP, SHIMS AND "LUBRITE" PLATE, AND ANY OTHER PIPE APPURTENANCES. THE LINE AND ASSEMBLY LAYOUT SHALL INCLUDE ALL PIPE AND FITTING DIMENSIONS, LOCATION OF ALL PIPE JOINT AND TYPE, ALL PIPE SUPPORTS, ELEVATIONS OF PIPE AT SUPPORTS, EXPANSION JOINTS AND LOCATION OF ANY OTHER PIPE APPURTENANCES. NO WORK SHALL BE DONE IN THE SHOP UNTIL AFTER THE DRAWINGS HAVE BEEN APPROVED.

(B) THE APPROVAL OF THE DRAWINGS BY THE CITY SHALL NOT RELIEVE THE CONTRACTOR OF ANY OF HIS OBLIGATIONS IN CONNECTION WITH THIS CONTRACT.

**JOINTS**

(A) FLANGED JOINTS: FLANGED JOINTS SHALL BE INSTALLED AS SHOWN ON THE DRAWINGS. FLANGES SHALL STRADDLE VERTICAL AND HORIZONTAL CENTERLINES. FLANGES FOR 12" AND 16" STEEL PIPE SHALL BE CLASS "D" OR WELDED NECK CLASS "D" FLANGES. FLANGES FOR 24" STEEL PIPE SHALL BE CLASS "E" OR WELDED NECK CLASS "E" FLANGES. FLANGES SHALL BE OF EITHER CAST STEEL, FORGED OR ROLLED STEEL, OR PROPERLY WELDED AND MACHINED FABRICATED STEEL PLATES, WELDED TO PIPE WITH TWO (2) CONTINUOUS WELDS. THEY SHALL HAVE PLAIN FACES AND SHALL BE FACED TRUE AND SMOOTH AT RIGHT ANGLES TO THE AXIS OF THE PIPE AND SHALL BE SPOT FACED ON THE BACK. DRILLING SHALL CONFORM TO "AMERICAN 1928 STANDARD" DRILLING 150 POUND TEMPLATE. BLIND FLANGES, WHERE REQUIRED, SHALL BE RIBBED STEEL OR SHALL BE DISHED CAST IRON HAVING BOSSES TAPPED AT TOP AND BOTTOM FOR TWO (2) INCH STANDARD PIPE AND FURNISHED WITH MALLEABLE IRON PLUGS. ALL BOLTS AND NUTS FOR FLANGES AND OTHER TYPES OF BOLTING SHALL BE MADE OF STAINLESS STEEL: ASTM A 276-89A, "SPECIFICATION FOR STAINLESS AND HEAT-RESISTING STEEL BARS AND SHAPES," TYPE 304, AND ASTM A 193/A 193M-89, "SPECIFICATION FOR ALLOY-STEEL AND STAINLESS STEEL BOLTING MATERIALS FOR HIGH TEMPERATURE SERVICE", HEAVY HEX.

(B) THE EXPANSION JOINT ASSEMBLY SHALL BE, "DRESSER STYLE 63, TYPE 1" SLIP TYPE, OR APPROVED EQUAL, WITH MINIMUM 1/2" THICK BODY AND SLIP, WITH A 10-IN. TRAVERSE. THE EXPANSION JOINT ASSEMBLY SHALL INCLUDE ALL MATERIALS, BOLTS, NUTS AND WASHERS, WELDED NECK FLANGES A.S.A. 150# AND GASKETS. ALL BOLTS AND NUTS SHALL BE MADE OF STAINLESS STEEL: ASTM A 276-89A, TYPE 304, "SPECIFICATION FOR STAINLESS AND HEAT-RESISTING SHEET BARS AND SHAPES." NO FIELD WELDING OF POLYURETHANE COATED STEEL PIPE WILL BE PERMITTED. THE EXPANSION JOINT SHALL BE GALVANIZED EXCEPT SLIP PIPE. THE EXPANSION JOINT SHALL HAVE FIELD APPLIED INSULATION AS PER DETAILS ON THE CONTRACT DRAWINGS.

(C) VICTAULIC TYPE COUPLINGS: THE CONTRACTOR SHALL PROVIDE SHOP DRAWINGS TO THE CITY THROUGH THE ENGINEER FOR APPROVAL OF THE VICTAULIC COUPLING.

(1) WHERE SHOWN ON THE DRAWINGS, OR WHERE REQUIRED, THE CONTRACTOR SHALL FURNISH AND INSTALL VICTAULIC TYPE JOINTS, INCLUDING COUPLINGS, FOR CONNECTION OF PIPE ENDS. STEEL PIPE ENDS SHALL BE FABRICATED AND GROOVED, AS SHOWN ON THE DRAWINGS, ADAPTED FOR INSTALLATION OF A STYLE 77 JOINT AND COUPLING.

**JOINTS CONTINUED**

VICTAULIC COUPLINGS SHALL BE STYLE 77 AND SHALL BE COMPOSED OF MALLEABLE IRON HOUSINGS HELD TOGETHER WITH STEEL BOLTS HEAT TREATED AND "HOT-DIP" GALVANIZED ACCORDING TO ASTM A 123-89A, "SPECIFICATION FOR ZINC (HOT-DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS," AND WITH A CONTINUOUS, HOLLOW, MOLDED RUBBER SEALING RING OF SUCH TYPE THAT THE SEAL BECOMES TIGHT AS THE PRESSURE WITHIN THE PIPE INCREASES. THE JOINTS SHALL BE CONSTRUCTED AND INSTALLED AND BE EQUAL IN ALL RESPECTS TO THOSE MANUFACTURED BY THE "VICTAULIC COMPANY OF AMERICA." MALLEABLE HOUSINGS SHALL CONFORM TO ASTM A 47-89, "SPECIFICATION FOR FERRITIC MALLEABLE IRON CASTINGS," OR TO THE REQUIREMENTS OF ASTM A 536-84, "SPECIFICATION FOR DUCTILE-IRON CASTINGS."

BOLTS AND NUTS SHALL BE MANUFACTURED BY THE COUPLING MANUFACTURER AND SHALL COMPLY IN MATERIAL WITH THE REQUIREMENTS ASTM A 183-83, "SPECIFICATION FOR CARBON STEEL TRACK BOLTS AND NUTS."

(2) ALL METAL PARTS OF THE COUPLINGS SHALL BE COATED AT THE SHOP WITH ONE COAT OF BITUMINOUS PRIMER FURNISHED BY THE SAME MANUFACTURER WHO FURNISHES THE COATINGS AS SPECIFIED UNDER "COATINGS."

**PIPE SUPPORT ASSEMBLIES**

PIPE SUPPORT ASSEMBLIES SHALL BE FABRICATED AS DETAILED ON THE PLANS AND SHALL BE COMPLETE IN ALL RESPECTS INCLUDING ALL MATERIALS, CADMIUM PLATED SHOULDER AND CLAMP BOLTS, FASTENERS AND NUTS. THE SUPPORT ASSEMBLY CLAMP, SEAT PLATE ("LUBRITE" PLATE) AND SHIMS SHALL ALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION PER ASTM A-123, LATEST REVISION THEREOF. NO FIELD WELDING OF GALVANIZED STEEL PIPE WILL BE PERMITTED. THERE SHALL BE A MINIMUM OF TWO (2) PIPE SUPPORTS FOR EACH PIPE LENGTH.

**PIPE EXTERIOR AND INTERIOR COATINGS**

EXTERIOR PIPE COATING ON 12" O.D., OR LARGER, STEEL WATER MAINS SHALL BE APPLIED IN ACCORDANCE WITH ANSII/AWWA C222-08, "POLYURETHANE COATINGS FOR THE INTERIOR AND EXTERIOR OF WATER PIPE AND FITTINGS" CONSISTING OF THE FOLLOWING:

1) COATING SYSTEM - ASTM D16 TYPE V, MINIMUM APPLIED DRY FILM EXTERIOR THICKNESS SHALL BE 25 MILS.

INTERIOR PIPE LINING ON 4" O.D., OR LARGER, STEEL WATER MAINS SHALL BE APPLIED IN ACCORDANCE WITH ANSII/AWWA C205-07, "CEMENT-MORTAR PROTECTIVE LINING AND COATINGS FOR STEEL WATER PIPE - 4 IN. (100 MM) AND LARGER - SHOP APPLIED".

**MEASUREMENT**

THE NUMBER OF LINEAR FEET OF STEEL PIPE TO BE PAID FOR SHALL BE THE ACTUAL NUMBER OF LINEAR FEET FURNISHED AND PLACED IN ACCORDANCE WITH THESE SPECIFICATIONS AS MEASURED ALONG THE AXIS OF THE PIPING.

**PAYMENT**

(A) THE FOOTAGE MEASURED AS PROVIDED ABOVE SHALL BE PAID FOR AT THE CONTRACT PRICE BID PER LINEAR FOOT FOR "ITEM 638 - WATER MAIN POLYURETHANE COATED CEMENT LINED STEEL PIPE" CLASSIFIED AS TO SIZE AND TYPE, WHICH PRICE AND PAYMENT SHALL CONSTITUTE FULL COMPENSATION FOR FURNISHING, HAULING, PLACING, CUTTING INTO AND CONNECTING THE PIPE, INCLUDING ALL EXPANSION JOINTS, COUPLINGS, PIPE INSULATION, INSTALLING SUPPORT ASSEMBLIES, AND OTHER PIPE APPURTENANCE, FURNISHING AND COMPLETING THE SLEEVE PACKING DETAIL, INCLUDING THE SEAL, AND FOR ALL LABOR, EQUIPMENT, TOOLS AND INCIDENTALS NECESSARY TO COMPLETE THIS ITEM EXCEPT FOR THE ITEMS SPECIFICALLY LISTED AS SEPARATE PAY ITEMS.

(B) THE CONTRACTOR WILL BE ASSESSED A CWD LABOR CHARGE FOR THE CHLORINATION OR THE FLUSHING, TESTING AND SAMPLING OF THE NEWLY LAID WATER MAIN BY THE CITY OF CLEVELAND, DIVISION OF WATER. PAYMENT OF THE CWD LABOR CHARGE FOR CHLORINATION OR THE FLUSHING, TESTING AND SAMPLING SHALL BE MADE BY THE CONTRACTOR TO THE PERMITS AND SALES SECTION OF THE DIVISION OF WATER BEFORE ANY WATER WORK IS PERFORMED

DESIGN AGENCY

**Michael Baker INTERNATIONAL**

DESIGNER

REVIEWER

PROJECT ID

82382

SHEET TOTAL

1172 2339



**ITEM SPECIAL - INSULATION AND OUTER PROTECTIVE JACKET**

THE INSULATION SHALL BE FOAMGLAS AS MANUFACTURED BY PITTSBURGH CORNING CORPORATION OR APPROVED EQUAL THAT IS CERTIFIED TO MEET THE REQUIREMENTS OF ISO 9002. INSULATION SHALL BE MINIMUM TWO (2") CELLULAR GLASS MANUFACTURED IN ACCORDANCE WITH ASTM C552, "STANDARD SPECIFICATION FOR CELLULAR GLASS THERMAL INSULATION", FOR 12" O.D. PIPE AND LARGER AND HAVING A MINIMUM DENSITY OF 8 POUNDS PER CUBIC FOOT AND COMPRESSIVE STRENGTH OF 100 PSI. THE CELLULAR INSULATION SHALL BE FABRICATED IN MINIMUM CURVED 24" LONG SIDEWALL SEGMENTS EMPLOYING TAPERED GROOVES THAT CLOSE COMPLETELY FILLING THE SPACE BETWEEN THE PIPE AND THE OUTER WEATHERPROOF JACKET. SEGMENTS SHALL BE JOINED WITH LONGITUDINAL AND BUTT JOINTS THAT ARE TIGHTLY FITTED TO ELIMINATE VOIDS. BUTT JOINTS SHOULD BE STAGGERED. THE OUTER JACKET SHALL BE PITTWRAP CW PLUS OR APPROVED EQUAL FOR DIRECT-BURIAL. THE BURIED JACKETING SHALL BE 50 MIL THICK SELF-SEALING, MODIFIED BITUMINOUS MEMBRANE FOR PROTECTING UNDERGROUND INSULATION SYSTEMS. EXPOSED JACKETING SHALL BE ALUMINUM JACKETING, 0.016" THICKNESS, AND INSTALLED WITH ALL LAPS POSITIONED TO SHED WATER. ALL LAPS SHALL BE A MINIMUM OF 2". JACKETING SHALL BE SECURED USING BANDS AND SEALS FOR BURIED AND EXPOSED JACKETING. JOINT SEALANT SHALL BE PITTSEAL 727 (A STYRENE-BUTADIENE RUBBER SEALANT) AVAILABLE FROM PITTSBURGH CORNING CORPORATION OR EQUAL. BAND SPACING SHALL BE TWO BANDS EQUALLY SPACED PER SECTION OF INSULATION OR 12" ON CENTER AND 6" FROM EACH END. BANDING SHALL BE ALUMINUM OR STAINLESS STEEL BANDS, 1/2" WIDE X 0.010" THICK WITH MATCHING SEALS. JACKETING SHALL BE FACTORY-APPLIED ON THE INSULATION. ALL SURFACES TO BE INSULATED SHALL BE CLEANED OF ALL SCALE, RUST, OIL, AND FOREIGN MATTER AND SHOULD BE DRY AND FREE OF FROST BEFORE AND DURING THE APPLICATION OF THE INSULATION. CLEANING, SUCH AS SAND BLASTING AND PRIMING OF SURFACES TO BE INSULATED IS REQUIRED. WHEN PRIMED THE PRIMER MUST BE THOROUGHLY DRY BEFORE APPLICATION OF ANY INSULATION MATERIALS.

PIPE JOINTS, INCLUDING EXPANSION JOINTS AND SUPPORT AREAS, AND PIPE BETWEEN THE BACKWALLS OF THE BRIDGE ABUTMENTS SHALL BE FIELD INSULATED WITH PREFORMED POLYURETHANE FOAM (OR FRP IF APPLICABLE) OR CELLULAR GLASS AND JACKETING CUT IN SHAPES TO FIT, OR WITH A FIVE LAYER APPLICATION OF PITTCOTE 300 FINISH AND REINFORCING FABRIC. FOLLOW CELLULAR GLASS MANUFACTURES RECOMMENDATIONS FOR COVERING IRREGULAR SHAPES. ALL FIELD APPLIED INSULATION SHALL BE INSTALLED TO FULLY FILL ANY VOIDS.

FIELD PLACED INSULATION AND JACKET SHALL BE REMOVABLE IN ORDER TO PERFORM MAINTENANCE OR MAKE ADJUSTMENTS TO THE PACKING GLAND OF THE EXPANSION JOINT(S).

BURIED PIPE 15 FEET BEYOND THE BACKWALLS OF THE PROPOSED BRIDGE ABUTMENTS HAVING LESS THAN FOUR AND ONE-HALF (4-1/2) FEET OF COVER SHALL BE INSULATED WITH A MINIMUM OF A ONE (1) FOOT INSULATION ENVELOPE EQUAL TO "WITCOLITE" OR "GILSULATE 500XR", OR INSULATE WITH DIRECT-BURIAL CELLULAR GLASS INSULATION.

THE VOID BETWEEN THE SPLIT SLEEVE AND THE STEEL WATER MAIN THROUGH EACH BRIDGE ABUTMENT WALL SHALL BE FILLED WITH JUTE PACKING OR BACKER ROD AND SEALED AT BOTH ENDS WITH THREE (3") INCHES OF NON-SHRINKING GROUT.

**PIPE SUPPORTS**

STEEL WATER MAIN SHALL BE SUPPORTED ON THE INSULATION EXTERIOR USING A HANGER SYSTEM SHOWN ON THE PLANS. ROLLED STEEL PIPE CRADLES OF ONE-HALF (1/2) THE CIRCUMFERENCE OF THE INSULATED PIPING, INCLUDING THE INSULATION JACKETING OR FINISH. HIGH DENSITY MOLDED RIGID POLYURETHANE FOAM SADDLE SHALL BE MONOLITHICALLY MOLDED IN 180 DEGREE SEAMLESS SECTIONS AND FACTORY OR SHOP SECURED TO THE STEEL CRADLES PER THE SADDLE MANUFACTURER'S RECOMMENDATIONS. THE DENSITY OF THE MOLDED RIGID POLYURETHANE FOAM SHALL BE 20 POUNDS PER CUBIC FOOT HAVING AN ULTIMATE COMPRESSIVE STRENGTH OF 1322 PSI WITH A DESIGN COMPRESSIVE STRENGTH OF 264.4 PSI. TYPICAL MANUFACTURES FOR FOAM PIPE SADDLES ARE POWER PIPING, BERGEN POWER, AND PIPE SHIELDS, INC.

**GATE VALVES - 20 INCH AND LARGER**

(A) BYPASSES:

BYPASSES ON GATE VALVES SHALL BE PROVIDED ON VALVES 20-INCH AND LARGER. THE BYPASSES SHALL BE LOCATED ON OR BELOW THE HORIZONTAL CENTERLINE OF THE VALVES. BYPASS VALVES SHALL BE OF THE SAME SIZE AS THE BYPASS AND SHALL CONFORM TO THE REQUIREMENT OF THESE SPECIFICATIONS FOR THE SPECIFIC VALVE USED. THE SIZE REQUIREMENTS OF BYPASSES SHALL BE AS FOLLOWS: 20-INCH VALVES SHALL BE PROVIDED WITH 3-INCH BYPASSES; VALVES 24-INCH THRU 30-INCH INCLUSIVE, SHALL BE PROVIDED WITH 4-INCH BYPASSES; VALVES 36-INCH THRU 42-INCH INCLUSIVE SHALL BE PROVIDED WITH 6-INCH BYPASSES; AND 48-INCH VALVES SHALL BE PROVIDED WITH 8-INCH BYPASSES.

(B) INDICATORS:

ALL VALVES 20-INCHES IN DIAMETER AND OVER SHALL BE EQUIPPED WITH INDICATORS DENOTING THE POSITIONS OF THE GATE. THE MOVING PARTS AND BEARINGS TO BE OF BRONZE OR BRONZE-LINED.

(C) GREASE CASES:

ALL VALVES 20-INCHES IN DIAMETER AND LARGER SHALL HAVE WATERTIGHT GREASE CASES INSTALLED. THE GREASE CASES SHALL BE OF THE EXTENDED TYPE AND SHALL BE MADE OF CAST IRON CONFORMING TO ASTM A 126-84, CLASS B, "SPECIFICATIONS FOR GRAY-IRON CASTINGS FOR VALVES, FLANGES, AND PIPE FITTINGS" OR ANY SUBSEQUENT AMENDMENTS THERETO. BEARING SURFACES FOR VALVE STEM AND PINION SHAFT SHALL BE BRONZED BUSHED WITH GRADE ONE BRONZE. THE GREASE CASES SHALL BE SECURELY BOLTED TO THE VALVE BONNET THROUGH A HEAVY CAST IRON YOKE. THE YOKE SHALL BE OF SUFFICIENT LENGTH TO PROVIDE SPACE FOR REPACKING VALVE AND GREASE CASE STUFFING BOXES. ALL GREASE CASES SHALL BE PROVIDED WITH A REMOVABLE COVER SECURELY BOLTED IN PLACE TO ALLOW EASY ACCESS TO THE GEARS.

THERE SHALL ALSO BE PROVIDED CONVENIENT FILLING AND DRAINING PLUGS AND SUFFICIENT OIL TO FULLY SUBMERGE THE PINION GEAR. THE VALVES SHALL BE DELIVERED WITH THE GREASE CASES FILLED WITH THE PROPER OIL AS RECOMMENDED BY THE MANUFACTURER.

(D) ROLLERS AND SCRAPERS:

IN ALL VALVES 20-INCHES IN DIAMETER AND LARGER, DESIGNED TO LIE HORIZONTALLY, EACH GATE OR DISC SHALL BE PROVIDED WITH TWO (2) BRONZE ROLLERS TRAVELLING ON BRONZE TRACKS AND PROVIDED WITH SUITABLE BRONZE SCRAPER; OR TWO STAINLESS STEEL ROLLERS TRAVELLING ON STAINLESS STEEL FACED TRACKS AND PROVIDED WITH SUITABLE STAINLESS STEEL SCRAPERS.

(E) GEARING:

ALL VALVES 20-INCHES IN DIAMETER AND LARGER SHALL BE EQUIPPED WITH ENCLOSED CUT-TOOTH STEEL GEARS. GEARS, SHAFTS AND BEARINGS SHALL BE SUCH AS TO PRODUCE EASY OPERATING WITHOUT BENDING OR TWISTING.

**ITEM SPECIAL - VALVES**

**WORK INCLUDED**

THE CONTRACTOR SHALL FURNISH ALL MATERIALS FOR AND SHALL PROPERLY SET IN PLACE AND CONNECT AT THE LOCATIONS SHOWN ON THE DRAWINGS OR AS DIRECTED. ALL GATE VALVES WITH VALVE BOX COMPLETE, CHECK VALVES, DOUBLE CHECK BACKFLOW ASSEMBLIES OF THE VARIOUS SIZES AND TYPE SPECIFIED.

IN GENERAL, THIS WORK SHALL INCLUDE THE FURNISHING, PLACING, TESTING, AND PAINTING OF THE GATE VALVES, INCLUDING BYPASS VALVES, CHECK VALVES, BACKFLOW ASSEMBLIES COMPLETE, OPERATING NUTS AND OTHER ACCESSORIES AND APPURTENANCES AND THE FURNISHING OF ALL LABOR, TOOLS AND APPLIANCES NECESSARY TO COMPLETE THE WORK AS SPECIFIED OR AS SHOWN.

THE CONTRACTOR SHALL, UNDER THIS ITEM, ALSO FURNISH TAPPING VALVES WITH VALVE BOX COMPLETE OF THE VARIOUS SIZES AND TYPE SPECIFIED. TAPPING VALVES SHALL CONFORM WITH THESE SPECIFICATIONS BUT SHALL BE FURNISHED, INSTALLED AND PAID FOR UNDER THE APPROPRIATE TAPPING VALVE ITEM. SEE PARAGRAPH "WORK TO BE DONE BY THE CITY".

**GATE VALVES AND CHECK VALVES**

(A) STRENGTH OF VALVES:

THE GATE VALVES, 3" TO 12", SHALL BE DESIGNED FOR 200 PSI WORKING PRESSURE AND GATE VALVES 16" AND ABOVE FOR 150 PSI WORKING PRESSURE; AND SHALL WITHSTAND AN INTERNALLY APPLIED HYDROSTATIC PRESSURE AT ALL POINTS OF AT LEAST TWICE THE RATED WORKING PRESSURE, EXCEPT AS SPECIFIED UNDER PARAGRAPH I, "HYDROSTATIC TESTS AT SHOP". SHOULD TESTS REVEAL ANY WEAKNESS, THE VALVES FROM THAT DESIGN SHALL BE REJECTED AND A NEW DESIGN MADE.

(B) PARTS TO BE INTERCHANGEABLE:

ALL PARTS OF VALVES OF THE SAME SIZE AND MAKE MUST BE PERFECTLY INTERCHANGEABLE AND ALL WORK DONE IN A THOROUGH AND WORKMANLIKE MANNER.

(C) VALVE BODY:

THE VALVE BODY SHALL BE OF SHORT BODY DESIGN. THE VALVE BODY SHALL HAVE CAST THEREON IN A CONSPICUOUS PLACE THE MANUFACTURER'S NAME OR INITIALS, RATED WORKING PRESSURE, AND THE YEAR OF MANUFACTURE. THESE LETTERS SHALL BE 1/8-INCH IN RELIEF AND OF AN APPROVED HEIGHT.

(D) CASTINGS:

ALL CASTINGS, WHETHER OF BRONZE, IRON, OR STEEL, SHALL BE SOUND AND SMOOTH WITHOUT COLD SHUTS, SWELLS, LUMPS, SCABS, BLISTERS, SAND HOLES OR OTHER IMPERFECTIONS, AND SHALL BE MADE IN ACCORDANCE WITH THE BEST MODERN FOUNDRY PRACTICE TO OBTAIN CASTINGS OF THE BEST QUALITY AND OF UNIFORM THICKNESS. NO WELDING, PLUGGING OR FILLING OF HOLES OR OTHER DEFECT WILL BE PERMITTED. FOR PARTS WHOSE THICKNESS IS LESS THAN ONE (1") INCH, CASTINGS BEING THINNER THAN THE SPECIFIED THICKNESS BY .06 INCH OR MORE SHALL BE REJECTED; AND FOR PARTS FOR WHOSE THICKNESS IS ONE (1") INCH OR MORE, CASTINGS BEING THINNER THAN SPECIFIED BY .08 INCH OR MORE SHALL BE REJECTED.

(E) MECHANICAL JOINT ENDS:

ALL VALVES REQUIRING MECHANICAL JOINT ENDS SHALL BE FURNISHED WITH RETAINED MECHANICAL JOINT ENDS COMPLETE WITH GASKETS AND RETAINER TYPE GLANDS AND SHALL FIT THE PLAIN-END OF ALL DUCTILE IRON PIPE, CLASSES 150, 200 AND 250 MANUFACTURED TO SPECIFICATIONS ASA A21.8, OR LATEST REVISION, INCLUDING THE PLAIN-END OF ALL MAKES OF DUCTILE IRON PIPE OF THE SLIP-ON CONNECTION TYPE.

(F) VICTAULIC ENDS:

VICTAULIC ENDS, WHEN REQUIRED, SHALL CONFORM TO THE DIMENSIONS GIVEN ON THE CONTRACT DRAWINGS OR AS SPECIFIED. VICTAULIC COUPLINGS TO BE FURNISHED AND INSTALLED TO CONNECT THE VICTAULIC VALVE END TO THE VICTAULIC PIPE END SHALL BE INCLUDED AND PAID FOR UNDER THE APPROPRIATE PIPE ITEM.

**GATE VALVES AND CHECK VALVES (CONTINUED)**

(G) FLANGED ENDS:

WHEN FLANGED VALVES ARE REQUIRED, THE FLANGES SHALL BE FACED AND DRILLED. BOLT HOLES SHALL BE SPOT FACED ON THE BACK WHEN NECESSARY TO SECURE AN EVEN BEARING. SPOT FACING SHALL BE REQUIRED ON THE BACK OF VALVE FLANGES WHERE SUCH IS NOT PARALLEL TO THE FACE OF THE FLANGE WITHIN THREE (3) DEGREES AS SPECIFIED IN ASME/ANSI B16.1. ALL SPOT FACING, WHEN REQUIRED SHALL BE IN ACCORDANCE WITH THE MANUFACTURERS STANDARDIZATION SOCIETY (MSS) STANDARD PRACTICES, SP-9. ALL BOLT HOLES SHALL BE OF THE SIZE SHOWN ON THE DRAWINGS OR AS SPECIFIED TO BE SUBMITTED AND APPROVED, AND SHALL BE ACCURATELY DRILLED FROM TEMPLATES, SPACED EQUAL DISTANCES APART AND SHALL STRADDLE HORIZONTAL AND VERTICAL AXIS, ALL AS SHOWN ON THE DRAWINGS. FLANGED ENDS SHALL BE RATED FOR THE TEST PRESSURE OF 225 PSI AND WORKING PRESSURE OF 150 PSI.

THE DIMENSIONS AND DRILLING OF ALL END FLANGES SHALL CONFORM TO THE SPACING INDICATED ON THE DRAWINGS OR AS SPECIFIED, WHICH SHALL BE AMERICAN 125 LB. CAST IRON FLANGE STANDARD. FLANGES SHALL BE PLAIN FACE WITH A SMOOTH FINISH.

WHERE FLANGED VALVE INSULATORS ARE REQUIRED AT SUPPLEMENTAL CONNECTIONS, CONNECTING TO EXISTING MAINS, OR WHERE ORDERED, EACH OF THE FLANGE BOLT HOLES SHALL BE INCREASED BY 1/16" TO ACCEPT A BOLT INSULATOR SLEEVE. CONTRACTOR'S ATTENTION IS DIRECTED TO THE PARAGRAPH "FLANGED VALVE INSULATORS" OF THIS SPECIFICATION. IN LIEU OF INSULATED FLANGED CONNECTIONS, INCLUDING THE FLANGED END VALVE, AT SUPPLEMENTAL CONNECTIONS THE CONTRACTOR MAY FURNISH RETAINED MECHANICAL JOINT BELL END GATE VALVE AND INSTALL AN INSULATED COUPLING EQUAL TO THAT MANUFACTURED BY SMITH-BLAIR COUPLING NO: 438.

(H) HUB ENDS:

WHERE SPECIFICALLY CALLED FOR ON THE CONTRACT DRAWINGS THE DIMENSIONS OF HUB BELLS ON THE VALVES UP TO AND INCLUDING 24-INCH IN DIAMETER, SHALL CONFORM TO THOSE FOR CLASS D PRESSURE FITTINGS, AS REQUIRED BY AWWA C-100. ON VALVES 30-INCH AND LARGER IN SIZE, THE BELL DIMENSIONS SHALL BE FOR THE CLASSES ORDERED.

(I) SLIP-ON JOINT ENDS:

ALL VALVES 4" UP TO AND INCLUDING 12" IN DIAMETER WHEN SPECIFICALLY ORDERED SHALL BE FURNISHED WITH SLIP-ON JOINT ENDS COMPLETE WITH GASKETS WHICH WILL FIT THE PLAIN-END OF ALL DUCTILE IRON PIPE CLASSES 150, 200, AND 250 MANUFACTURED TO SPECIFICATIONS ASA A21.8, OR LATEST REVISION THEREOF, INCLUDING THE PLAIN-END OF ALL MAKES OF DUCTILE IRON PIPE OF THE SLIP-ON CONNECTION TYPE.

THE DESIGN OF THE MECHANICAL WEDGING ACTION SHALL BE SUCH THAT SEATING FORCE IS APPLIED EQUALLY TO TWO OR MORE CONTACT POINTS NEAR THE OUTER EDGE OF EACH DISC AT OR ABOVE AND BELOW THE HORIZONTAL CENTERLINE OF DISC. THE MECHANISM SHALL BE DESIGNED SO THAT ALL WEDGING MEMBERS ARE ACTIVATED AT ONE TIME. IT SHOULD BE OF THE TYPE WHICH WILL ELIMINATE UNBALANCED SEATING PRESSURE AND MINIMIZE DISTORTION OF THE DISCS.

DESIGN AGENCY

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DESIGNER

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PROJECT ID

82382

SHEET TOTAL

1173 2339

**GATE VALVES GENERAL**

(A) TYPE OF VALVES:

THE GATE VALVES SHALL BE MANUFACTURED IN FULL COMPLIANCE WITH THE STANDARD SPECIFICATIONS FOR "GATE VALVES FOR WATER AND SEWERAGE SYSTEMS" OF THE AMERICAN WATER WORKS ASSOCIATION AWWA C 500-86, OR LATEST REVISION THEREOF, AND IN ADDITION SHALL COMPLY WITH THE FOLLOWING SUPPLEMENTARY REQUIREMENTS. ALL GATE VALVES SHALL BE OF THE DOUBLE-DISC PARALLEL SEAT BOTTOM WEDGE OR SIDE WEDGE TYPE OR DOUBLE REVOLVING DISC PARALLEL SEAT BOTTOM WEDGE OR SIDE WEDGE TYPE. ALL GATE VALVES 20-INCHES AND OVER IN SIZE SHALL INCLUDE BYPASS VALVES ATTACHED THERETO. IN OPENING OR CLOSING THE VALVE, THE GATES SHALL BE FORCED TO ASCENT OR DESCENT BY REASON OF THE THRUST EXERTED UPON THE GATES DIRECTLY BY THE VALVE STEM WRENCH NUT, THIS THRUST BEING GENERATED BY THE ROTATION OF THE VALVE STEM. IN CLOSING THE VALVE, THE DISCS, WHEN OPPOSITE THE PORTS, SHALL BE PRESSED FIRMLY AGAINST THE BODY SEATS BY WEDGES OR SOME OTHER DEVICE EQUALLY SUITABLE AND APPROVED BY THE COMMISSIONER OF WATER.

THE DESIGN OF THE MECHANICAL WEDGING ACTION SHALL BE SUCH THAT SEATING FORCE IS APPLIED EQUALLY TO TWO OR MORE CONTACT POINTS NEAR THE OUTER EDGE OF EACH DISC AT OR ABOVE AND BELOW THE HORIZONTAL CENTERLINE OF DISC. THE MECHANISM SHALL BE DESIGNED SO THAT ALL WEDGING MEMBERS ARE ACTIVATED AT ONE TIME. IT SHOULD BE OF THE TYPE WHICH WILL ELIMINATE UNBALANCED SEATING PRESSURE AND MINIMIZE DISTORTION OF THE DISCS.

(B) CAST IRON PARTS:

THE VALVE BODIES, COVERS, DISCS, FRAMES, ETC., OF ALL GATE VALVES 3-INCH AND OVER, SHALL BE CAST IRON.

(C) VERTICAL AND HORIZONTAL VALVES:

ALL GATE VALVES, 16-INCH AND UNDER, SHALL BE CONSTRUCTED TO WORK VERTICALLY. VALVES HAVING 20-INCH AND OVER WATERWAY SHALL BE CONSTRUCTED TO WORK HORIZONTALLY.

(D) WATERWAY OPENING:

WITH THE GATE VALVE OPEN, AN UNOBSTRUCTED WATERWAY SHALL BE AFFORDED; THE DIAMETER OF WHICH IS NOT TO BE LESS THAN THE FULL NOMINAL DIAMETER OF THE VALVE, EXCEPT WHERE LUGS ARE PROVIDED FOR INSERTING OR REMOVING THE BODY-SEAT RINGS. THE LUGS NEED NOT BE REMOVED AFTER THE VALVE IS ASSEMBLED.

(E) STUFFING BOXES:

THE STUFFING BOX ON EACH GATE VALVE 3-INCH OR OVER, MUST BE SEPARATE FROM THE DOME AND FASTENED TO IT BY BOLTS. FOR 2-INCH VALVES AND UNDER, THE STUFFING BOXES MAY BE FORMED IN THE DOME OF THE VALVE. WHEN REQUIRED BY THE CITY, VALVES 16-INCH AND SMALLER, SHALL BE FURNISHED WITH "O" RING TYPE SEALS. THE SEALS SHALL BE FITTED WITH AT LEAST TWO (2) "O" RINGS; THE LOWER "O" RING SERVING AS THE PRESSURE SEAL AND THE UPPER "O" RING AS A COMBINED DIRT AND MOISTURE SEAL. THE "O" RING SHALL BE COMPOUNDED TO MEET ASTM D 2000-86, "CLASSIFICATION SYSTEM FOR RUBBER PRODUCTS IN AUTOMOTIVE APPLICATIONS," AND HAVE PHYSICAL PROPERTIES SUITABLE FOR THE APPLICATION.

THE DIMENSIONS OF THE STUFFING BOX FLANGES SHALL BE OF A THICKNESS AND UNIFORMITY PROPORTIONED TO FIT THE VARIOUS EXTERNALLY APPLIED TORQUE AND INTERNAL THRUST PRESSURE. BOLT HOLES SHALL BE FITTED AND OF A NUMBER SUCH THAT WILL LEAVE A SUFFICIENT CROSS SECTIONAL AREA OF METAL THEREBY PROVIDING SATISFACTORY STRENGTH TO THE UPPER AND LOWER STUFFING BOX FLANGE.

(F) VALVE STEMS:

THE STEM SHALL BE OF SUFFICIENT LENGTH TO ALLOW THE REMOVAL OF PACKING WITHOUT NECESSITATING THE REMOVAL OF THE OPERATING NUT. THE STEM OPENING AND THRUST BEARING RECESS SHALL BE BRONZE BUSHED WITH TWO (2) "O" RINGS LOCATED ABOVE THE THRUST COLLAR AND ONE (1) "O" RING BELOW FORMING A LUBRICANT CHAMBER. THE NUMBER OF THREADS PER INCH SHALL BE AS INDICATED IN AWWA C 500-86.

(G) VALVES WITH STATIONARY STEMS:

ALL GATE VALVES, UNLESS OTHERWISE ORDERED, SHALL BE MADE WITH SINGLE, NON-RISING STEMS.

(H) VALVES TO OPEN CLOCKWISE, EXCEPT 2-INCH AND UNDER:

ALL GATE VALVES 3-INCH AND OVER, INCLUDING BYPASS VALVES, SHALL BE MADE TO OPEN BY TURNING IN A CLOCKWISE DIRECTION. VALVES 2-INCH AND UNDER SHALL BE MADE TO OPEN BY TURNING IN A COUNTERCLOCKWISE DIRECTION. ALL VALVES TO BE MADE SO THAT THEY CAN BE EASILY OPERATED.

**GATE VALVES GENERAL (CONTINUED)**

(I) WRENCH CAPS:

THE WRENCH CAPS (OPERATING NUTS) AND RETAINING NUTS ON HEADS OF VALVE STEMS AND PINION SHAFTS SHALL BE OF BRONZE OR DUCTILE IRON SPECIFICATION A-536. ON VALVES 24-INCH AND OVER, WRENCH CAPS SHALL BE 2-INCH SQUARE AND 2-INCH DEEP. ON VALVES 3-INCH THRU 20-INCH INCLUSIVE, THEY SHALL BE 1-3/4 INCH SQUARE ON TOP, 1-7/8 INCH SQUARE AT BASE AND 1-3/4 INCH DEEP. ON 2-INCH VALVES AND UNDER, THEY SHALL BE 1-1/4 INCH SQUARE ON TOP, 1-3/8 INCH SQUARE AT BASE AND 1-1/2 INCH DEEP. MACHINED WRENCH CAPS FOR VALVES 3-INCH TO 48-INCH INCLUSIVE SHALL BE FITTED TO A MACHINED SQUARE STEM OR PINION SHAFT AND HELD IN PLACE BY A RETAINING NUT OF BRONZE, ASTM B 584-90, C.A. 867, "SPECIFICATION FOR COPPER ALLOY SAND CASTINGS FOR GENERAL APPLICATIONS." ON 1-1/2 INCH AND 2-INCH VALVES THE WRENCH CAP SHALL BE SECURED TO THE SHAFT WITH A BRASS PIN. WRENCH CAPS SHALL HAVE A CUT-AWAY SKIRT TO PERMIT EASY ACCESS TO GLAND BOLTS.

(J) FACING OF GATES:

ALL DISCS OF GATES AND THREADS FOR SEAT RINGS IN THE BODY SHALL BE MACHINED TRUE AND ANY GROOVE OR GROOVES SHALL BE MACHINED IN EACH DISC OR GATE FOR THE RECEPTION OF THE FACE RING. THE DISC AND SEAT RINGS SHALL BE SECURELY AND RIGIDLY ATTACHED TO THE DISCS OR BODY SEATS IN A MANNER APPROVED BY THE CITY; THE RINGS ARE TO BE FINISHED TO A TRUE SURFACE.

(K) OUTSIDE SCREW AND YOKE VALVES:

GATE VALVES WITH OUTSIDE SCREW AND YOKES, SHALL BE MADE WITH SINGLE RISING STEMS. ALL OUTSIDE SCREW AND YOKE VALVES SHALL BE EQUIPPED WITH WHEELS FOR OPERATING SAME. WHEELS ARE TO BE OF CAST IRON OR DUCTILE IRON. WHEELS SHALL HAVE CAST ON THEM AN ARROW INDICATING THE DIRECTION OF TURNING FOR OPENING THE VALVE. OUTSIDE SCREW AND YOKE GATE VALVES 6-INCH AND LARGER IN SIZE SHALL BE PROVIDED WITH TWO BOSSES ON ONE SIDE OF THE BODY, LOCATED ON THE HORIZONTAL CENTERLINE OF GATE VALVES, TO PERMIT THE INSTALLATION OF BYPASS AROUND THE GATE. BOSSES ARE TO BE LEFT SOLID AND OF AMPLE SIZE TO PERMIT DRILLING AND TAPPING FOR BYPASSES.

(L) MARKING:

ALL GATE VALVES 3-INCH AND OVER SHALL HAVE THE IDENTITY OF THE MAKER, SIZE AND YEAR WHEN MADE AND ALSO THE LETTERS "C.W.D." CAST UPON ITS BODY OR DOME IN RAISED LETTERS OR HAVE AN PERMANENT BRONZE TAG OF SUFFICIENT SIZE AFFIXED TO THE BODY OF THE VALVE WITH THE IDENTITY OF THE MAKER, SIZE AND YEAR WHEN MADE AND THE LETTERS "C.W.D." INDICATED THEREON.

**GATE VALVES MATERIAL SPECIFICATIONS**

(A) BOLTS AND NUTS:

ALL BOLTS AND NUTS ON THE EXTERNAL VALVE BODIES OF ALL GATE, CHECK AND BACKFLOW DEVICES SHALL BE MADE OF STAINLESS STEEL: ASTM A 276-89A, TYPE 304, "SPECIFICATION FOR STAINLESS AND HEAT-RESISTING SHEET BARS AND SHAPES."

(B) BRONZE PARTS:

ALL GRADES OF BRONZE SHALL BE IN ACCORDANCE WITH AWWA C 500-86 UNLESS OTHERWISE SPECIFIED HEREIN.

(C) CAST IRON:

CAST IRON SHALL CONFORM TO ASTM SPECIFICATION A 126-84, CLASS B, "SPECIFICATION FOR GRAY IRON CASTINGS FOR VALVES, FLANGES, AND PIPE FITTINGS," OR LATEST REVISION THEREOF. ALL IRON CASTINGS SHALL BE TOUGH AND WITHOUT BRITTLENESS, SUCH AS MAY BE CUT, DRILLED AND CHIPPED BY HAND WITH DUE EASE. A BLOW FROM A HAMMER SHALL PRODUCE AN INDENTATION ON THE EDGE OF THE CASTING WITHOUT FLAKING THE METAL.

(D) SILICON BRONZE:

THIS BRONZE SHALL CONFORM TO ASTM SPECIFICATION B 98-84, ALLOY 655, "SPECIFICATION FOR COPPER-SILICON ALLOY ROD, BAR AND SHAPES;

(E) STAINLESS STEEL:

THE STAINLESS STEEL SHALL CONFORM TO ASTM SPECIFICATION A 276-89A, TYPE 304 AND TYPE 316, "SPECIFICATION FOR STAINLESS AND HEAT-RESISTING SHEET BARS AND SHAPES.

**GATE VALVES MATERIAL SPECIFICATIONS (CONTINUED)**

(F) OTHER MATERIALS:

ALL OTHER MATERIALS USED IN THE MANUFACTURE OF THESE VALVES AND NOT SPECIFIED IN THE SPECIFICATIONS, SHALL BE OF THE BEST QUALITY OF THEIR RESPECTIVE KINDS, AND SUBJECT TO INSPECTION, TESTS, AND APPROVAL BY THE CITY.

(G) CHEMICAL ANALYSIS:

CHEMICAL ANALYSIS OF THE MATERIAL USED SHALL BE FURNISHED BY THE CONTRACTOR WHENEVER REQUIRED BY THE ENGINEER OR THE CITY.

(H) CLEANING OF CASTINGS:

ALL IRON CASTINGS SHALL BE THOROUGHLY CLEANED ON THE OUTSIDE AND INSIDE SURFACES AND PROTECTED FROM RAIN OR MOISTURE UNTIL THEY ARE PAINTED.

(I) HYDROSTATIC TESTS AT SHOP:

ALL GATE VALVES SHALL BE TESTED IN THE SHOP BY HYDROSTATIC PRESSURE, BY CLOSING THE VALVE AND APPLYING THE REQUIRED TEST PRESSURE IN THE BODY AND DOME OF THE VALVE AS SPECIFIED BELOW.

3" THROUGH 12" ... 400 PSI. - NO TIME REQUIREMENT  
 14" THROUGH 20" ...300 PSI. - FOR 15 MINUTES, DROP PRESSURE TO 150 PSI, THEN ELEVATE AGAIN TO 300 PSI FOR 15 MIN. - A TOTAL OF 1/2 HOUR.

24" THROUGH 48" .. 300 PSI - FOR 30 MIN., DROP PRESSURE TO 150 PSI, THEN ELEVATE AGAIN TO 300 PSI FOR 30 MIN. - A TOTAL OF 1 HR.

THIS IS MODIFICATION OF SECTION 5.1 OF THE STANDARD SPECIFICATIONS, AWWA DESIGNATION: C 500-86. ALL LEAKS, FLAWS OR OTHER DEFECTS DEVELOPED IN MAKING THESE TESTS SHALL BE CORRECTED TO THE SATISFACTION OF THE ENGINEER AND/OR THE CITY OR THE ENTIRE PIECE SHALL BE REJECTED. AFTER TESTING, ALL VALVES SHALL BE THOROUGHLY DRAINED. ALL EQUIPMENT FOR TESTING AND ALL TESTS SHALL BE MADE AT THE CONTRACTOR'S EXPENSE.

THE CONTRACTOR SHALL INCLUDE WITH EACH VALVE THREE (3) CERTIFIED COPIES OF REPORTS SHOWING THE RESULTS OF ALL SHOP TESTS, AND A BRIEF DESCRIPTION OF HOW THE TESTS WERE PERFORMED.

(J) PERFORMANCE TESTS:

EACH VALVE SHALL BE OPERATED IN THE POSITION THAT IT WILL ASSUME IN SERVICE AND FOR THE FULL LENGTH OF GATE TRAVEL IN BOTH DIRECTION, TO DEMONSTRATE THE FREE AND PERFECT FUNCTIONING OF ALL PARTS IN THE INTENDED MANNER. ANY DEFECTS OF WORKMANSHIP SHALL BE CORRECTED AND THE TEST REPEATED UNTIL SATISFACTORY PERFORMANCE IS DEMONSTRATED.

**PLACING AND TESTING**

(A) ALL VALVES SHALL BE TESTED ACCURATELY AND CAREFULLY TO THE LINES AND GRADES GIVEN. ALL CONNECTIONS TO PIPE SHALL HAVE THE NECESSARY MECHANICAL JOINT, FLANGED, SCREWED, VICTAULIC OR SOLDERED ENDS AS REQUIRED.

(B) AFTER THE VALVES ARE SET IN PLACE AND READY TO OPERATE, THE CONTRACTOR SHALL TEST THEM UNDER THE TEST PRESSURE AND CONDITIONS HEREIN SPECIFIED ELSEWHERE IN THESE SPECIFICATIONS AND ANY VALVE FOUND TO LEAK SHALL BE MADE WATERTIGHT AND, IF FOUND TO BE OF FAULTY DESIGN, SHALL BE SATISFACTORILY REPAIRED OR REPLACED BY THE CONTRACTOR.

(C) ALL BURIED VALVES SHALL COME COMPLETE WITH VALVE BOXES TO GRADE. THIS SHALL INCLUDE MAIN VALVE OPERATION AND THE BYPASS VALVE.

**VALVE BOXES AND COVERS**

(A) THE CONTRACTOR SHALL FURNISH AND INSTALL, OVER EACH VERTICALLY SET VALVE AT THE LOCATIONS SHOWN ON THE DRAWINGS, OR AS REQUIRED, VALVE BOXES WITH COVERS OF THE ASSEMBLED TYPES AND SIZES INDICATED ON THE CONTRACT PLANS. ASSEMBLED TYPE VALVE BOXES SHALL EXTEND FROM THE VALVE BONNET TO THE FINISHED GRADE OR THE ELEVATION REQUIRED, BEING CAREFULLY LOCATED OVER THE VALVE OPERATING NUT(S) AND SHALL BE SET PLUMB AND TRUE AS REQUIRED.

(B) VALVE BOXES AND COVER ASSEMBLIES SHALL BE COMPLETED AND THEIR PARTS SHALL COMPLY WITH THOSE PARTS SHOWN ON STANDARD DETAIL DRAWINGS.

**PAINTING**

(A) IRON BODY VALVES SHALL EITHER BE DIPPED IN ASPHALT PAINT AND ALL BRONZE AND PLASTIC COATED INTERNAL PARTS CLEANED, OR AFTER PASSING THE HYDRAULIC TEST, SHALL BE GIVEN AT LEAST TWO (2) COATS OF APPROVED PAINT OUTSIDE.

(B) ALL INTERIOR OR EXTERIOR FERROUS METAL SURFACES, EXCEPT MACHINE SURFACES, SHALL BE THOROUGHLY CLEANED OF ALL RUST, WIRE BRUSHED AND WASHED WITH BENZENE BEFORE PAINTING OR COATING.

(C) AFTER INSTALLATION, ALL EXPOSED METAL SURFACES OF VALVES EXCEPT BRASS OR BRONZE SHALL BE PAINTED WITH TWO (2) FIELD COATS OF COAL TAR PITCH PAINT EQUAL TO KOPPERS BITUMASTIC SUPER TANK SOLUTION.

**INSPECTIONS**

THE ENGINEER, CITY, OR HIS AUTHORIZED DESIGNATE, WILL INSPECT THE MATERIAL AND WORK DONE, AS THE INTEREST OF THE CITY MAY REQUIRE. SUCH OFFICER SHALL HAVE UNRESTRICTED ACCESS TO THE CONTRACTOR'S PLANT, AND TO ALL PARTS OF THE WORK AND OTHER PLACES AT WHICH THE PREPARATION OF THE MATERIAL AND THE CONSTRUCTION OF THE DIFFERENT PARTS OF THE WORK TO BE DONE UNDER THESE SPECIFICATIONS ARE CARRIED ON, AND HE SHALL RECEIVE ALL FACILITIES AND ASSISTANCE TO CARRY OUT HIS WORK OF INSPECTION AND TESTING, IN A MANNER SATISFACTORY TO THE CITY. SUCH INSPECTION SHALL NOT RELIEVE THE CONTRACTOR FROM ANY OBLIGATION TO PERFORM SAID WORK STRICTLY IN ACCORDANCE WITH THE SPECIFICATIONS, OR ANY MODIFICATIONS THEREOF, AS HEREIN PROVIDED, AND WORK NOT SO CONSTRUCTED SHALL BE REMOVED AND MADE GOOD BY THE CONTRACTOR, AT HIS OWN EXPENSE.

**DATA WITH PROPOSALS**

PROPOSALS SHALL BE ACCOMPANIED BY DRAWINGS FURNISHED BY THE MANUFACTURER, FULLY AND DISTINCTLY ILLUSTRATING, DESCRIBING AND GIVING THE WEIGHT OF EACH OF THE VALVES PROPOSED TO BE FURNISHED. VALVE DRAWINGS PREVIOUSLY APPROVED AND ON FILE WITH DIVISION OF WATER NEED NOT BE FURNISHED IN PROPOSAL BUT WILL BE REQUIRED AS SUBMITTAL FOR APPROVAL AS INDICATED IN THE PARAGRAPH "DRAWINGS".

**FLANGED VALVE INSULATORS**

THE CONTRACTOR SHALL FURNISH, WHERE REQUIRED, FLANGED VALVE INSULATORS. ALL OF THE FLANGED BOLT HOLES ON EACH OF THE TWO (2) FLANGES OF THE VALVE SHALL BE INCREASED BY 1/16 INCH IN DIAMETER TO ACCEPT THE BOLT INSULATOR SLEEVES. THE BOLT INSULATOR SLEEVE SHALL EXTEND FOR THE FULL THICKNESS OF THE TWO (2) MATING FLANGES. THE DRILLING OF THE ENLARGED FLANGE BOLT HOLES SHALL BE DONE BY THE VALVE MANUFACTURER IN THE SHOP.

FLANGE INSULATING MATERIALS FOR EACH FLANGE SHALL BE PROVIDED AT EACH OF THE SUPPLEMENTAL CONNECTIONS, OR WHERE ORDERED, AND SHALL INCLUDE THE FOLLOWING:

- 1) TWO (2) FULL FACED INSULATING FLANGE GASKETS OF PYROX IE GLASS REINFORCED EPOXY, 1/8 INCH THICK;
- 2) ONE FULL LENGTH MYLAR BOLT INSULATING SLEEVE, 1/32 INCH THICK, FOR EACH FLANGE BOLT ON EACH OF THE TWO (2) VALVE FLANGES;
- 3) TWO (2) FLAT PHENOLIC LAMINATE INSULATING WASHERS, 1/8 INCH THICK, FOR EACH FLANGE BOLT ON EACH OF THE TWO (2) VALVE FLANGES;
- 4) TWO (2) FLAT STEEL WASHERS, 1/8 INCH THICK, FOR EACH FLANGE BOLT ON EACH OF THE TWO (2) VALVE FLANGES. THE STEEL WASHER OUTSIDE DIAMETER SHALL NOT BE LARGER THAN THE OUTSIDE DIAMETER OF THE INSULATING WASHER.

FLANGE INSULATOR SIZES SHALL BE AS REQUIRED FOR THE TYPE AND SIZE FLANGES SPECIFIED HEREIN OR AS INDICATED ON THE DRAWINGS FOR EACH OF THE INSULATED FLANGE LOCATIONS REQUIRED.

TEST TO VERIFY ACCEPTABLE INSULATED FLANGED VALVE INSTALLATIONS SHALL BE PERFORMED BY THE CONTRACTOR. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY EQUIPMENT, MATERIALS, AND LABOR FOR THE PERFORMANCE OF THE TESTS. IF THE TESTS INDICATE THAT AN INSULATING FLANGED CONNECTION IS NOT PROVIDING SATISFACTORY ISOLATION OF CONNECTING PIPING, THE CONTRACTOR SHALL PERFORM ADDITIONAL TESTS AND WORK AS REQUIRED TO LOCATE AND CORRECT ANY SUCH DEFICIENCIES THAT MAY EXIST.

PAYMENT FOR THE FURNISHING AND INSTALLATION OF THE FLANGED VALVE INSULATORS SHALL BE INCLUDED, UNDER THIS ITEM, WITH THE APPROPRIATE INSULATED FLANGED VALVE TO BE BID AS INDICATED IN THE SCHEDULE OF BID ITEMS. PAYMENT FOR THE PERFORMANCE AND ALL NECESSARY EQUIPMENT, MATERIALS AND LABOR FOR THE TESTING FOR THE ACCEPTABILITY OF THE INSULATED FLANGED VALVE CONNECTIONS SHALL BE INCLUDED.

DESIGN AGENCY	
<b>Michael Baker</b> INTERNATIONAL	
DESIGNER	—
REVIEWER	—
PROJECT ID	82382
SHEET	TOTAL
1174	2339

**ITEM SPECIAL - VALVES (CONTINUED)**

**DRAWINGS**

(A) PRIOR TO THE MANUFACTURE OF ANY VALVES, THE CONTRACTOR SHALL SUBMIT TO THE CITY THROUGH THE ENGINEER FOR APPROVAL OF THE CITY, SIX (6) COMPLETE WORKING, DETAIL, AND DIMENSION DRAWINGS SHOWING THICKNESSES AND KINDS OF MATERIAL AND SIMILAR INFORMATION.

(B) TWO (2) PRINTS OF EACH OF THE DRAWINGS SUBMITTED WILL BE RETURNED WITH THE CRITICISMS OR APPROVAL OF THE CITY. IN CASE THE DRAWINGS ARE NOT APPROVED, THE CONTRACTOR SHALL AGAIN SEND FOR APPROVAL, SIX (6) REVISED PRINTS OF THE DRAWINGS TO TAKE CARE OF THE CRITICISMS NOTED, AND AFTER THE DRAWINGS HAVE BEEN FINALLY APPROVED, THE CONTRACTOR SHALL FURNISH TO THE CITY SIX (6) ADDITIONAL PRINTS, AND ONE (1) MYLAR OR REPRODUCIBLE CLOTH TRACING OF EACH DRAWING. MYLAR TRACINGS SHALL BE SUBMITTED AS SPECIFIED IN THE GENERAL NOTES "DRAWINGS." NO WORK SHALL BE DONE IN THE SHOP UNTIL AFTER THE DRAWINGS HAVE BEEN FINALLY APPROVED.

**ITEM SPECIAL - CUT-IN-VALVE ASSEMBLY WITH VALVE BOX, COMPLETE**

THE CONTRACTOR SHALL FURNISH AND INSTALL AT THE LOCATION(S) NOTED ON THE CONTRACT DRAWINGS OR WHERE ORDERED ALL CUT-IN-VALVE ASSEMBLIES WITH VALVE BOX COMPLETE INCLUDING THE FURNISHING AND INSTALLATION OF A VALVE STEM EXTENSION IF SO REQUIRED. THE DIVISION OF WATER WILL SET THE TIME OF INSTALLATION OF THE CUT-IN-VALVE AND THE CONTRACTOR SHALL DO ALL PIPE CUTTING AND INSTALLATION. THE INSTALLATION OF THE CUT-IN-VALVE SHALL BE DONE UNDER THE SUPERVISION OF THE DIVISION OF WATER. THE CONTRACTOR SHALL FURNISH AND DELIVER TO AND INSTALL AT THE LOCATION(S) SHOWN ON THE PLANS A RETAINED MECHANICAL JOINT BELL END GATE VALVE, VALVE BOX COMPLETE, STAR NATIONAL TIEANCHOR HARNESSSES AND COMPRESSION COUPLINGS (WITH STOPS REMOVED) EQUAL TO DRESSER STYLE NO. 38, 138 OR 162 OR SMITH-BLAIR NO. 441, HAVING STAINLESS STEEL BOLTS AND NUTS (ASTM A276-89A, TYPE 304), DUCTILE IRON PIPE SHORTS AND, IF REQUIRED, A VALVE STEM EXTENSION. COMPRESSION COUPLINGS SHALL HAVE A MINIMUM PRESSURE RATING OF 250 PSI. THE CONTRACTOR SHALL FURNISH ALL MATERIALS AND DO ALL NECESSARY EXCAVATION, SHEETING, SHORING, BACKFILLING, MISCELLANEOUS REMOVAL AND RESTORATION, SEEDING AND/OR SODDING, REPAVING AND REPLACEMENT OF SIDEWALK REQUIRED TO COMPLETE THE WORK AS HEREIN SPECIFIED.

**QUALITY OF VALVES**

THE GATE VALVES FURNISHED AND INSTALLED AS PART OF THE CUT-IN-VALVE ASSEMBLY SHALL CONFORM WITH THE REQUIREMENTS OF THE "ITEM SPECIAL - VALVES" OF THESE SPECIFICATIONS, INSOFAR AS THEY APPLY.

**ITEM SPECIAL - FURNISHING AND SETTING 6" HYDRANT COMPLETE**

**WORK INCLUDED**

THE CONTRACTOR SHALL FURNISH ALL HYDRANTS, HYDRANT BRANCH PIPE AND FITTINGS, TAPPING, VALVES, VALVE BOXES AND COVERS, CAULKING MATERIAL, LABOR, TOOLS, AND EQUIPMENT FOR AND SHALL PROPERLY CONNECT AT THE LOCATION SHOWN ON THE CONTRACT DRAWINGS, 6" HYDRANTS, COMPLETE, AS REQUIRED FOR THE PROPER COMPLETION OF THE WORK INCLUDED UNDER THIS CONTRACT.

**HYDRANTS**

THE 6" HYDRANT DETAILS SHOWN IN THE PLANS IS A CITY OF CLEVELAND STANDARD IN ADDITION TO THE 6" HYDRANT DETAILS IN THE PLANS, THE CITY OF CLEVELAND HAS APPROVED THREE ADDITIONAL 6" HYDRANT DETAILS ON FILE AT 1201 LAKESIDE AVENUE, CLEVELAND, OHIO 44114. THE DRAWING NOS. ARE D525, D526, AND D530.

**SETTING**

(A) GENERAL LOCATION; THE HYDRANT SHALL BE LOCATED IN A MANNER TO PROVIDE COMPLETE ACCESSIBILITY, AND IN SUCH MANNER THAT THE POSSIBILITY OF DAMAGE FROM VEHICLES OR INJURY TO PEDESTRIANS WILL BE MINIMIZED.

(B) LOCATION REGARDING CURB LINES: WHEN PLACED BEHIND CURB THE HYDRANT BARREL SHALL BE SET SO THAT NO PORTION OF THE HYDRANT WILL BE LESS THAN TWO (2) FEET FROM THE FACE OF THE CURB EXCEPT BY CONSENT OF THE ENGINEER.

(C) LOCATION REGARDING SIDEWALK: WHEN SET IN THE LAWN SPACE BETWEEN THE CURB AND THE SIDEWALK, OR BETWEEN THE SIDEWALK AND THE PROPERTY LINE, NO PORTION OF THE HYDRANT OR NOZZLE CAP SHALL BE WITHIN 6 INCHES OF THE SIDEWALK.

**SETTING (CONTINUED)**

(D) POSITION OF NOZZLE: THE HYDRANT SHALL STAND PLUMB WITH THE NOZZLES POINTING TOWARD THE ROAD AT AN ANGLE OF FORTY-FIVE DEGREES THEREFROM. WHERE HYDRANT BRANCH PIPING IS PARALLEL WITH OR NOT AT RIGHT ANGLES TO THE CURB, THE CONTRACTOR SHALL RELEASE SWIVEL HEAD BOLTS AND ADJUST THE HYDRANT NOZZLES TO FACE THE ROAD AT THE PROPER ANGLE. A HYDRANT WITHOUT SWIVEL HEADS WILL BE ADJUSTED BY THE CITY WHERE NECESSARY TO CORRECT THE ANGLE OF NOZZLES. THE ELEVATION SHALL CONFORM TO THE ESTABLISHED GRADE WITH TOPS OF FROST CASING AT LEAST FOUR (4) INCHES ABOVE THE GRADE.

(E) CONNECTION TO MAIN: THE HYDRANT SHALL BE CONNECTED TO THE MAIN PIPE WITH A BRANCH CONTROLLED BY THE INDEPENDENT GATE VALVES OF THE SAME SIZE AS THE HYDRANT, EXCEPT AS OTHERWISE DIRECTED.

(F) DRAINAGE AT HYDRANT: DRAINAGE SHALL BE PROVIDED AT THE BASE OF THE HYDRANT BY FILLING AROUND THE ELBOW WITH COURSE GRAVEL OR CRUSHED STONE TO AT LEAST SIX (6) INCHES ABOVE THE WASTE OPENING. WHEREVER A HYDRANT IS SET IN ROCK, CLAY OR OTHER IMPERVIOUS SOIL, THE TRENCH SHALL BE WIDENED AND DEEPENED ON EACH SIDE OF THE HYDRANT BASE AND THE SPACE SHALL BE FILLED COMPACTLY WITH COARSE GRAVEL OR BROKEN STONE MIXED WITH COARSE SAND OF SUFFICIENT QUANTITY TO ABSORB ALL WATER TO BE DRAINED FROM THE HYDRANT WHEN THE VALVE IS CLOSED.

(G) ANCHORAGE FOR HYDRANT: THE HYDRANT SHALL BE SET ON A STONE SLAB OR A SIMILAR FOUNDATION AND THE BASE OF THE HYDRANT AND THE HYDRANT TEE SHALL BE WELL BRACED AGAINST UNEXCAVATED EARTH AT THE END OF THE TRENCH WITH CONCRETE BACKING, OR IT SHALL BE TIED TO THE PIPE WITH SUITABLE RODS OR CLAMPS, TIED WITH MECHANICAL JOINT FITTING OR AS DIRECTED BY THE ENGINEER.

(H) CLEANING: THE HYDRANT SHALL BE THOROUGHLY CLEANED OF DIRT OR FOREIGN MATTER BEFORE SETTING.

**ITEM 638 - WATER WORK MISC.: FURNISHING AND SETTING 6" HYDRANT, COMPLETE WITH 6" x X" CUT IN TEE**

IN ADDITION TO THE REQUIREMENTS OF NOTE "ITEM SPECIAL - FURNISHING AND SETTING 6" HYDRANT, COMPLETE", THIS ITEM SHALL INCLUDE CUTTING A NEW HYDRANT BRANCH TEE AND SPOOL PIECES INTO EXISTING WATERMAINS, PER "CUT-IN TEE DETAIL METHOD NO. 1" WITHIN THE WATERLINE DETAILS.

**ITEM SPECIAL - VAULTS, MANHOLES OR CHAMBERS**

**WORK INCLUDED**

UNDER THESE ITEMS THE CONTRACTOR SHALL FURNISH ALL NECESSARY LABOR, MATERIALS, INCLUDING FRAMES, COVERS AND STEPS, TOOLS AND EQUIPMENT FOR THE CONSTRUCTION, COMPLETE, OF ALL MISCELLANEOUS MASONRY STRUCTURES AND INCLUDING ALL WATER MAIN DRAIN AND PITOMETER VAULTS, METER AND FIRE SERVICE VAULTS, AND APPURTENANT WORK TOGETHER WITH THE HAULING, MIXING, PLACING, FORMING, SCAFFOLDING, SHEETING AND BRACING, GROUTING, PLASTERING, CURING, ETC., ALL AS SPECIFIED, REQUIRED OR SHOWN ON THE CONTRACT DRAWINGS.

**BRICK AND MASONRY MATERIAL**

THE MATERIAL FURNISHED BY THE CONTRACTOR FOR THE VARIOUS KINDS OF MASONRY CONSTRUCTION TO BE CONSTRUCTED SHALL CONFORM TO THE FOLLOWING OHIO DEPARTMENT OF TRANSPORTATION (ODOT) SPECIFICATIONS:

(A) ALL BRICK FURNISHED AND USED SHALL BE NO. 2 SHALE BRICK AND SHALL COMPLY WITH THE REQUIREMENTS FOR "GRADE SA" ASTM C 32, OR ODOT 704.02 CONCRETE BRICK.

(B) PORTLAND CEMENT SHALL CONFORM TO THE REQUIREMENTS OF 701.04 (ASTM C 150 TYPE 1) ODOT.

(C) FINE AGGREGATE FOR MORTAR OR GROUT SHALL CONFORM TO THE REQUIREMENTS OF 703.03 ODOT.

(D) AGGREGATE FOR PORTLAND CEMENT CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF 703.02 ODOT.

(E) ALL WATER SHALL BE CLEAN AND ACCURATELY MEASURED FOR EACH BATCH OF CONCRETE.

(F) ALL PLAIN CONCRETE SHALL BE THE ODOT 499 CLASS "QC 1".

(G) ALL REINFORCING STEEL SHALL BE ODOT ITEM 509.

(H) ALL CEMENT MORTAR SHALL BE MIXED IN THE PROPORTION OF ONE (1) PART OF CEMENT TO THREE (3) PARTS OF SAND, EXCEPT THE MORTAR FOR BRICK CATCH BASINS AND SEWER MANHOLES WHICH SHALL BE 1 TO 2 MIX.

**ITEM SPECIAL - VAULTS, MANHOLES OR CHAMBERS (CONTINUED)**

**BRICK AND MASONRY MATERIAL (CONTINUED)**

(I) PRECAST MASONRY VAULT SECTIONS MAY BE FURNISHED IF THEY MEET THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS ON FILE WITH THE CLEVELAND DIVISION OF WATER OR APPROVED BY THE ENGINEER.

**VAULT, MANHOLE, AND CHAMBER CONSTRUCTION**

(A) ALL VAULTS, MANHOLES, CHAMBERS, BRICK NECKS & EXTENSION, AND TEMPORARY EXTENSIONS SHALL BE BUILT IN ACCORDANCE WITH THE CONTRACT DRAWINGS.

(B) THE WALLS OF CIRCULAR STRUCTURES SHALL BE BUILT OF NO. 2 SHALE BRICK OR CONCRETE BRICK LAID IN 1:3 PORTLAND CEMENT MORTAR, WITH BRICK ARRANGED RADIIALLY AS HEADERS, FORMING A WALL NINE (9) INCHES THICK. IN DEEP MANHOLES, THE WALL SHALL BE THIRTEEN (13) INCHES THICK BELOW A POINT 12 FEET FROM THE SURFACE, ALL OF THE BRICK COMPOSING SAID STRUCTURES SHALL BE LAID IN FULL MORTAR BEDS AND JOINTS, WITH NO MORTAR JOINTS APPEARING ON THE INNER SURFACE OF THE MANHOLE EXCEEDING THREE-EIGHTS (3/8) INCHES THICK.

(C) THE TOP OF THE WALL OF THE STRUCTURES SHALL BE PROPERLY LEVELED OFF WITH MORTAR SO AS TO FORM A FLAT SURFACE UPON WHICH THE CAST IRON MANHOLE RING IS TO REST, AND THE STRUCTURE SHALL BE BUILT TO PROPER HEIGHT AS INDICATED BY THE CONTRACT DRAWINGS.

(D) THE ENTIRE OUTER SURFACE OF ALL BRICK STRUCTURES SHALL BE PLASTERED WITH A SMOOTH COATING OF 1:3 PORTLAND CEMENT MORTAR, AT LEAST ONE-HALF (1/2) INCH THICK.

(E) PRECAST OR CAST IN PLACE CONCRETE MASONRY CONSTRUCTION SHALL FOLLOW THE APPLICABLE SECTION OF ITEM 611 ODOT SPECIFICATION.

**ITEM SPECIAL - 2" AIR RELIEF VALVE WITH VALVE BOX, COMPLETE**

**WORK INCLUDED**

THE CONTRACTOR SHALL FURNISH PIPE WITH A 2" AIR RELIEF CONNECTION AND FURNISH AND INSTALL THE 2" AIR RELIEF COMPLETE, INCLUDING VALVE BOXES, AS SHOWN IN THE "WATER WORK DETAILS" AT THE LOCATIONS SHOWN IN THE PLANS.

**AIR RELIEF VALVE ASSEMBLY COMPLETE WITH VALVE BOXES COMPLETE**

EACH "2" AIR RELIEF/FLUSHING OUTLET VALVE ASSEMBLY COMPLETE" SHALL CONSIST OF A 2-INCH BRONZE BALL ANGLE METER VALVE (F.I.P. X METER FLANGE), 2-INCH IRON PIPE THREADED METER COMPANION FLANGE, AND A 2-INCH EXTRA HEAVY BRASS "CLOSE" (2-INCH LONG) NIPPLE, TAPERED AT EACH END. THE BRONZE 2-INCH AIR RELIEF BALL ANGLE METER VALVE SHALL BE RATED FOR MINIMUM 300 PSI WORKING PRESSURE AND BE EQUAL IN ALL RESPECTS TO THE 2-INCH BALL ANGLE METER VALVE MANUFACTURED BY FORD METER BOX CO. NO: BFA13-777W; A.Y. MCDONALD MFG. CO. NO: 4604B; OR MUELLER CO. NO: B-24286. THE THREADED METER COMPANION FLANGE SHALL ALSO BE RATED FOR MINIMUM 300 PSI WORKING PRESSURE. THE AIR RELIEF/FLUSHING OUTLET VALVE ASSEMBLY SHALL ALSO INCLUDE ALL 2" GALVANIZED BLACK IRON PIPE AND BRASS PIPE AS REQUIRED AND SPECIFIED UNDER "2-INCH GALVANIZED BLACK IRON AND BRASS PIPE" AND ALL VALVE BOXES AS REQUIRED AND SPECIFIED UNDER "MISCELLANEOUS METAL." THE AIR RELIEF/FLUSHING OUTLET VALVE ASSEMBLY WITH VALVE BOXES COMPLETE SHALL CONFORM WITH THE DETAILS SHOWN ON THE CONTRACT DRAWINGS.

**2" GALVANIZED BLACK IRON PIPE AND BRASS PIPE**

THE CONTRACTOR SHALL ALSO UNDER "ITEM SPECIAL - 2" AIR RELIEF VALVE ASSEMBLY WITH VALVE BOX, COMPLETE" FURNISH ALL THE MATERIALS FOR AND SHALL PROPERLY CONNECT IN PLACE AT THE LOCATIONS SHOWN ON THE DRAWINGS OR AS ORDERED. ALL 2-INCH EXTRA STRONG BRASS PIPE AND FITTINGS AND ALL 2-INCH EXTRA HEAVY GALVANIZED BLACK IRON PIPE AND FITTINGS RESPECTIVELY, WHICH ARE NECESSARY FOR THE PROPER COMPLETION OF THE WORK INCLUDED UNDER THIS CONTRACT.

**BRASS PIPE AND FITTINGS**

ALL BRASS PIPE AND FITTINGS SHALL BE EXTRA STRONG 2-INCH PIPE SIZE RATED FOR MINIMUM 150 PSI WORKING PRESSURE AND 225 PSI TEST PRESSURE AND SHALL CONFORM TO ASTM B 43-88, "SPECIFICATION FOR SEAMLESS RED BRASS PIPE, STANDARD SIZES," AND BE EQUAL TO REVERE RED BRASS PIPE AS MANUFACTURED BY REVERE COPPER AND BRASS, INCORPORATED. FITTINGS SHALL BE EXTRA STRONG WEIGHT AND SHALL HAVE SOUND WELL-FITTING THREADS.

**ITEM SPECIAL - 2" AIR RELIEF VALVE WITH VALVE BOX, COMPLETE (CONTINUED)**

**GALVANIZED BLACK IRON PIPE AND BRASS FITTINGS**

ALL GALVANIZED BLACK IRON PIPE, NIPPLES AND FITTINGS SHALL BE EXTRA HEAVY BLACK IRON PIPE RATED FOR MINIMUM 150 PSI WORKING PRESSURE AND 225 PSI TEST PRESSURE AND SHALL CONFORM TO ASTM DESIGNATION A 53-89A, "SPECIFICATION FOR PIPE, STEEL, BLACK AND HOT-DIPPED, ZINC COATED WELDED AND SEAMLESS," OR EQUAL. THE FITTINGS SHALL BE BEADED, OR MALLEABLE IRON EXTRA HEAVY WEIGHT. ALL PIPE AND FITTINGS SHALL BE HOT-DIPPED GALVANIZED INSIDE AND OUTSIDE, AND SHALL HAVE SOUND, WELL-FITTING THREADS.

**ITEM SPECIAL - MISCELLANEOUS METAL WORK**

**WORK INCLUDED**

(A) THE CONTRACTOR SHALL FURNISH AND INSTALL ALL MISCELLANEOUS METAL WORK WHICH IS REQUIRED UNDER THIS CONTRACT AND IS NOT SPECIFICALLY INCLUDED UNDER THE OTHER ITEMS OF THESE SPECIFICATIONS.

(B) IN GENERAL, THE WORK SHALL INCLUDE THE REPLACEMENT OF ANY VALVE BOXES, COVERS, MANHOLE RINGS AND COVERS, WATER SERVICE STOP BOXES, BRONZE BOLTS, MANHOLE STEPS, EXTENSION STEMS, BRACE STRUCTURAL MEMBERS AND OTHER SIMILAR ITEMS DETERMINED BY THE ENGINEER AS BEING UNSUITABLE.

**MATERIALS**

ALL CASTINGS SHALL CONFORM TO THE REQUIREMENTS OF ITEM 611 OF THE OHIO DEPARTMENT OF TRANSPORTATION CONSTRUCTION AND MATERIALS SPECIFICATIONS. ALL STRUCTURAL STEEL SHALL MEET THE REQUIREMENTS OF THE ASTM SPECIFICATIONS A 36. ALL BRONZE BOLTS AND NUTS SHALL CONFORM TO THE U.S. STANDARDS SIZES, AND SHALL BE CLEAN CUT AND HAVE WELL FITTED THREADS. ALL BRONZE BOLTS AND NUTS SHALL BE TOBIN OR MANGANESE BRONZE, OR OF SIMILAR APPROVED MATERIAL.

ALUMINUM, EXCEPT AS OTHERWISE REQUIRED, SHALL BE ALUMINUM ALLOY EQUIVALENT TO SPECIFICATION 6063; RIVETS AND SCREWS SHALL BE 2017 ALLOY; ALUMINUM PLATE AND STRUCTURAL SHAPES SHALL BE 2017 ALLOY; ALUMINUM PLATE AND STRUCTURAL SHAPES SHALL BE 6061-T6 AND EXTRUDED SHAPES SHALL BE 6063-T5; ALL AS MANUFACTURED BY THE ALUMINUM COMPANY OF AMERICA, OR EQUAL.

BRASS SHALL BE OF A COMMERCIAL GRADE CONFORMING TO THE "STANDARD SPECIFICATIONS FOR BRASS PLATE, SHEET, STRIP AND ROLLED BAR", ASTM DESIGNATION B 36-71, ALLOY NO. 3.

COPPER-SILICON ALLOY OR "EVERDUR" SHALL CONFORM TO THE "STANDARD SPECIFICATIONS FOR COPPER-SILICON ALLOY PLATE, SHEET, STRIP AND ROLLED BAR FOR GENERAL PURPOSES", ASTM DESIGNATION B97-70, TYPE B.

STAINLESS STEEL RODS AND FASTENERS SHALL CONFORM TO THE REQUIREMENTS OF "SPECIFICATIONS FOR HOT ROLLED AND COLD-FINISHED STAINLESS AND HEAT-RESISTANT BARS", ASTM DESIGNATION A 276-72, TYPE 304. ALL WROUGHT IRON SHALL MEET THE REQUIREMENTS OF "SPECIFICATION FOR ROLLED WROUGHT IRON SHAPES AND BARS", ASTM DESIGNATION A 207-68, OR THE "SPECIFICATIONS FOR WROUGHT IRON PLATES", ASTM DESIGNATION A42-66.

CAST IRON VALVE BOXES AND COVERS SHALL BE GRAY IRON CASTINGS, IN WHICH APPEARANCE AND DIMENSION TOLERANCES ARE PRIMARY CONSIDERATIONS AND STRENGTH IS NOT A PRIMARY OR MAJOR CONSIDERATION. VALVE BOXES AND COVERS SHALL BE ASTM DESIGNATION A-48 WITH NO SPECIFIC REQUIREMENT AS TO CLASS. CHEMICAL COMPOSITION SHALL NOT BE CONSIDERED, BUT THE MATERIAL SHALL BE OF GOOD QUALITY AND OF SUCH CHARACTER AS SHALL MAKE THE METAL OF THE CASTINGS STRONG, TOUGH AND OF EVEN GRAIN. THE METAL SHALL BE MADE WITHOUT ANY ADMIXTURE AND SURFACE SMOOTHNESS IN COMPARISON WITH SAMPLES ACCEPTED AS STANDARD.

**CLEANING AND TESTING**

ALL CASTINGS SHALL BE THOROUGHLY CLEANED AND SUBJECTED TO A CAREFUL HAMMER TEST.

NO CASTINGS SHALL BE COATED UNLESS CLEAN AND FREE FROM RUST, AND APPROVED IN THESE RESPECTS BY THE ENGINEER OR HIS AUTHORIZED INSPECTOR IMMEDIATELY BEFORE BEING DIPPED.

SAMPLE CASTINGS FROM EACH PATTERN, WHEN REQUIRED BY THE ENGINEER, SHALL BE SUBMITTED BY THE MANUFACTURER FOR THE PURPOSE OF ESTABLISHING STANDARDS OF APPEARANCE AND DIMENSIONAL TOLERANCES. THE MANUFACTURER SHALL CERTIFY THAT HIS PRODUCT CONFORMS TO THESE SPECIFICATIONS. EACH CERTIFICATION SO FURNISHED SHALL BE SIGNED BY AN AUTHORIZED AGENT OF THE MANUFACTURER.

DESIGN AGENCY

Michael Baker INTERNATIONAL

DESIGNER

REVIEWER

PROJECT ID

82382

SHEET TOTAL

1175 2339



**ITEM SPECIAL - MISCELLANEOUS METAL WORK (CONTINUED)  
 COATING**

EACH COATING SHALL BE SPRAYED OR BRUSHED INSIDE AND OUT WITH ONE COAT OF ASPHALTIC COMPOUND VARNISH. THE VARNISH SHALL BE MADE OF HIGH GRADE ASPHALT FLUXED AND BLENDED WITH PROPERLY TREATED DRYING OILS AND TINNED TO A PROPER CONSISTENCY WITH A VOLATILE SOLVENT. THE VARNISH SHALL BE MADE TO COMPLY WITH FEDERAL SPECIFICATION 77-V-51A OR JOINT ARMY-NAVY SPECIFICATION JAN-P- 450. OTHER METHODS OF COATING AND TYPES OR COATING MATERIAL SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER. IN ADDITION TO THE SHOP COAT, THE CASTINGS SHALL RECEIVE TWO (2) COATS OF APPROVED PAINT.

**INSPECTION**

THE ENGINEER OR HIS AUTHORIZED REPRESENTATIVE SHALL HAVE THE RIGHT TO INSPECT THE MATERIAL AND WORK DONE, AS THE INTERESTS OF THE CITY OR STATE MAY REQUIRE. SUCH INSPECTION SHALL NOT RELIEVE THE CONTRACTOR FROM ANY OBLIGATION TO PERFORM SAID WORK STRICTLY IN ACCORDANCE WITH THE SPECIFICATIONS, AND ANY MODIFICATION THEREOF, AS HEREIN PROVIDED, AND WORK NOT SO CONSTRUCTED SHALL BE REMOVED AND MADE GOOD BY THE CONTRACTOR AT HIS EXPENSE. ALL MANHOLE RINGS AND COVERS MUST BE SOUND AND SHALL CONFORM TO THESE SPECIFICATIONS, AND ANY DEFECTIVE CASTINGS WHICH MAY HAVE PASSED THE INSPECTOR AT THE WORKS, OR ELSEWHERE, SHALL BE AT ALL TIMES LIABLE TO REJECTION WHEN DISCOVERED, UNTIL THE DATE OF FINAL PAYMENT UNDER THIS CONTRACT.

**STEPS AND LADDERS**

DUCTILE IRON STEPS AND LADDERS OF THE SIZE AND SHAPE SHOWN ON THE CONTRACT DRAWINGS SHALL BE BUILT INTO THE BRICK AND CONCRETE MASONRY OF THE MANHOLES AS INDICATED ON THE DRAWINGS.

**RIMS AND COVERS**

(A) ALL CAST IRON MANHOLE RIMS AND COVERS OF THE FORMS, DIMENSIONS AND DETAILS SHOWN ON THE CONTRACT DRAWINGS SHALL BE FURNISHED AND INSTALLED AS DIRECTED.

(B) THE RIMS SHALL BE PROPERLY SET IN PLACE IN A FULL BED OF MORTAR OR POURED MONOLITHIC IN THE MASONRY, AT SUCH ELEVATION AS TO MAKE THE TOP OF THE RIM CONFORM TO THE FINISHED SURFACES OF THE STRUCTURES OR THE FINISHED GRADE AS ESTABLISHED BY THE ENGINEER.

**DETAIL DRAWINGS**

COMPLETE DETAIL DRAWINGS OF MISCELLANEOUS METAL WORK SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL, PRIOR TO THE MANUFACTURE OF ANY WORK TO BE FURNISHED UNDER THIS ITEM IN ACCORDANCE WITH THESE SPECIFICATIONS.

**PAINTING**

ALL MISCELLANEOUS METAL WORK NOT GALVANIZED SHALL BE THOROUGHLY CLEANED AND GIVEN THREE (3) COATS OF COAL TAR PITCH, USING INTERTOL 50 OR BITUMASTIC 50, OR APPROVED EQUAL.

**MEASUREMENT**

THE MISCELLANEOUS METAL WORK SHALL BE THE METAL WORK ACTUALLY FURNISHED AND PLACED IN ACCORDANCE WITH THESE SPECIFICATIONS AND THE DETAILED DRAWINGS APPROVED BY THE DIRECTOR. IN THE COMPUTING OF WEIGHTS, IF NOT DETERMINED BY WEIGHING, ONE (1) CUBIC FOOT OF CAST IRON SHALL BE ASSUMED TO WEIGH FOUR HUNDRED AND FIFTY (450) POUNDS, AND ONE (1) CUBIC FOOT OF STEEL SHALL BE ASSUMED TO WEIGH FOUR HUNDRED AND NINETY (490) POUNDS. THE WEIGHT OF CAST IRON SHALL BE USED FOR CAST IRON VALVE BOXES AND COVERS AND ANY CAST IRON SECTIONS OF THE VALVE BOXES AND COVERS. WHERE PLASTIC PIPE IS USED AS THE EXTENSION, THE PIPE SHALL BE INCLUDED IN THE CAST IRON WEIGHT WITH NO SEPARATE ALLOWANCE FOR LENGTH OR WEIGHT.

**ITEM SPECIAL - WATER SERVICE CONNECTIONS  
 GENERAL**

ALL NEW AND UNUSED MATERIALS SHALL BE USED IN THE FOLLOWING SITUATION(S) INVOLVING WATER SERVICE CONNECTIONS.

(A) WHERE A GENERAL SUPPLY WATER SERVICE CONNECTION OR FIRE SERVICE CONNECTION IS DAMAGED OR IS DISTURBED FOR LOWERING, RAISING, EXTENDING, OR RELOCATING BETWEEN THE WATER MAIN AT THE "CORPORATION SHUTOFF VALVE" AND THE "CURB SHUTOFF VALVE", IT SHALL BE TOTALLY REPLACED WITH NEW AND UNUSED MATERIALS FROM THE "CORPORATION SHUTOFF VALVE" TO "CURB SHUTOFF VALVE."

(B) WHERE AN EXISTING CONNECTION REQUIRES TOTAL REPLACEMENT AND IS FOUND TO HAVE A FERRULE TYPE "TAP" THE CONNECTION SHALL BE REINSTALLED BY THE CONTRACTOR WITH A BRONZE DOUBLE STRAP TAP SADDLE. REPLACEMENT OF EXISTING 5/8" AND 3/4" WATER SERVICE CONNECTIONS SHALL INCLUDE ALL FITTINGS, ADAPTERS, CORPORATIONS AND STRAP SADDLES AS REQUIRED TO INSTALL A 3/4" COPPER WATER SERVICE CONNECTION COMPLETE. EXISTING ONE (1") INCH WATER SERVICE CONNECTIONS, WHEN REQUIRED TO BE TOTALLY REPLACED, SHALL BE REPLACED AS A ONE (1") INCH COPPER WATER SERVICE CONNECTION COMPLETE INCLUDING ALL FITTINGS, CORPORATIONS AND ADAPTERS. WHEN REPLACING EXISTING LEAD OR GALVANIZED 5/8" WATER SERVICE CONNECTIONS THE REPLACEMENT SHALL ALSO INCLUDE A NEW CURB SHUT-OFF VALVE AND CURB VALVE BOX COMPLETE.

(C) WHERE AN EXISTING COPPER GENERAL SUPPLY WATER SERVICE CONNECTION OR FIRE SERVICE CONNECTION IS DAMAGED OR IS DISTURBED FOR LOWERING, RAISING, EXTENDING BETWEEN THE "CORPORATION SHUTOFF VALVE" AND THE "CURB SHUTOFF VALVE", IT MAY BE RECONNECTED USING APPROVED COMPRESSION COUPLING. NO MORE THAN TWO (2) SUCH COMPRESSION COUPLINGS SHALL BE USED ON ONE (1) WATER SERVICE CONNECTION.

(D) WHERE A GENERAL SUPPLY WATER SERVICE CONNECTION OR FIRE SERVICE CONNECTION IS DISTURBED ON THE "PROPERTY SIDE" OF THE CURB SHUT-OFF VALVE, FOR LOWERING, RAISING AND/OR EXTENDING, OR NEEDS REPLACEMENT BECAUSE IT IS OF LEAD OR GALVANIZED PIPING MATERIAL, THE PIPING MATERIALS AND FITTINGS SHALL BE TOTALLY REPLACED WITH NEW AND UNUSED MATERIALS FROM THE EXISTING CURB SHUT-OFF VALVE TO THE NEW CURB SHUT-OFF VALVE REQUIRED AS A RESULT OF THE EXTENSION LOWERING, RAISING OR REPLACEMENT.

(E) WHERE A GENERAL SUPPLY WATER SERVICE CONNECTION OR FIRE SERVICE CONNECTION IS DISTURBED FOR LOWERING, RAISING AND/OR EXTENDING, IT SHALL BE EXTENDED IN A STRAIGHT PROLONGATION OF THE EXISTING CONNECTION. WHERE THE "PROPERTY SIDE" CONNECTION PIPING IS NOT IMMEDIATELY CONTIGUOUS TO THE EXTENDED CONNECTION CURB SHUTOFF, ALL LABOR, MATERIALS AND EQUIPMENT REQUIRED TO RECONNECT SHALL BE PROVIDED AS PROJECT WORK. ALL RECONNECTION ON THE "PROPERTY SIDE" OF THE CURB SHUT-OFF MUST BE PARALLEL TO THE STREET CENTERLINE OR RIGHT-OF-WAY FROM THE CURB SHUT-OFF. IF UPON INSPECTION OF THE "PROPERTY SIDE" PIPING IT IS FOUND UNSUITABLE FOR SUCH RECONNECTION, THE CONNECTION SHALL NOT BE DISTURBED UNTIL SUCH TIME AS THE ENGINEER HAS ARRANGED FOR REPLACEMENT.

(F) WHERE A CONNECTION IS INADVERTENTLY DAMAGED OR BROKEN WHICH WAS NOT TO BE DISTURBED, ONLY THE DAMAGED PORTION NEEDS TO BE REPLACED. IF THE EXTENT OF DAMAGE CANNOT BE FULLY ASSESSED, THE CONNECTION SHALL BE REPLACED AS NOTED IN PARAGRAPH A AT THE CONTRACTOR'S EXPENSE.

(G) ANY CLEVELAND WATER DEPARTMENT VALVE BOXES, CURB SHUT-OFF VALVE BOXES OR OTHER CASTINGS DAMAGED DURING CONSTRUCTION OR FOUND UNSUITABLE FOR REUSE SHALL BE REPLACED WITH NEW AND UNUSED MATERIAL IN ACCORDANCE WITH THE SPECIFICATION, MISCELLANEOUS METAL WORK. PAYMENT FOR ADDITIONAL REQUIRED VALVE BOXES, CURB SHUT-OFF VALVE BOXES OR OTHER CASTINGS WILL BE MADE UNDER "ITEM SPECIAL, MISCELLANEOUS METAL WORK".

(H) ALL GENERAL SUPPLY WATER SERVICE CONNECTIONS AND FIRE SERVICE CONNECTIONS SHALL BE LAID NOT LESS THAN SIX (6) FEET BELOW ESTABLISHED STREET GRADE AND NOT LESS THAN FIVE AND ONE-HALF (5-1/2) FEET BELOW GROUND SURFACE.

**WORK INCLUDED**

IN ADDITION TO THE WORK DESCRIBED ABOVE, THE CONTRACTOR SHALL INSTALL NEW AND/OR RECONSTRUCT GENERAL SUPPLY WATER SERVICE CONNECTIONS AND FIRE LINE SERVICE CONNECTIONS AS DETAILED IN THE PLANS.

**ITEM SPECIAL - WATER SERVICE CONNECTIONS (CONTINUED)  
 PIPE MATERIAL FOR SERVICE CONNECTIONS**

THE FOLLOWING PIPE MATERIAL SHALL BE USED FOR THE SERVICE CONNECTIONS ON THIS PROJECT:

COPPER WATER TUBING, TYPE K, ASTM B88-74, 3/4" TO 2" DIAMETER

DUCTILE IRON PIPE AND FITTINGS, ANSI CLASS 52 (NEW); ANSI CLASS 56 (RECONSTRUCT), CEMENT LINED, 3" DIAMETER AND UP UNLESS OTHERWISE NOTED.

**MATERIALS REQUIRED FOR INSTALLATION**

GENERAL SUPPLY WATER SERVICE CONNECTIONS ON DUCTILE/CAST IRON WATER MAINS SHALL BE PER CLEVELAND WATER DEPARTMENT SPECIFICATIONS AND STANDARD DETAILS. MATCH EXISTING SIZES.

WATER MAIN DUCTILE IRON PIPE WITH BOLTLESS RESTRAINED JOINTS AND FITTINGS, ANSI CLASS 52

WHERE INDICATED ON THE CONTRACT DRAWINGS OR WHERE ORDERED, THE CONTRACTOR SHALL PROVIDE ALL MATERIALS, LABOR AND EQUIPMENT TO TRANSFER AND TO EXTEND EXISTING GENERAL SUPPLY WATER SERVICE CONNECTIONS, FIRE SERVICE CONNECTIONS AND COMBINATION SERVICE CONNECTIONS WITH NEW PIPING MATERIAL FROM THE EXISTING WATER MAIN TO THE REPLACEMENT OR RELOCATED WATER MAIN TO AND INCLUDING A NEW RELOCATED SERVICE CURB SHUT-OFF VALVE AND CURB VALVE BOX. WHERE EXTENDING CONNECTION CONTRACTOR SHALL REMOVE THE EXISTING CURB VALVE BOX AND ABANDON EXISTING CURB VALVE IN-PLACE. ALL WORK AND MATERIALS REQUIRED FOR CONNECTIONS TO BE TRANSFERRED SHALL CONFORM TO THE GENERAL REQUIREMENTS SPECIFIED HEREIN.

**MATERIALS REQUIRED FOR INSTALLATION (CONTINUED)**

THE CONTRACTOR SHALL ARRANGE WITH THE DIVISION OF WATER FOR THE DIVISION OF WATER TO MAKE THE PRESSURE TAPS ON ALL GENERAL SUPPLY WATER SERVICE CONNECTIONS AND FIRE LINE CONNECTIONS. THE DIVISION OF WATER WILL NOT FURNISH ANY MATERIALS. THE CONTRACTOR SHALL FURNISH ALL MATERIALS AND DO ALL NECESSARY EXCAVATION, SHEETING, SHORING, BACKFILLING, MISCELLANEOUS REMOVAL AND RESTORATION, SEEDING AND/OR SODDING, REPAVING AND REPLACEMENT OF SIDEWALK REQUIRED TO COMPLETE THE WORK. THE COST OF BORING AND/OR JACKING AND EXCAVATION FOR SERVICE CONNECTIONS SHALL BE AS HEREIN SPECIFIED TO COMPLETE THE WORK.

SEE LISTS FOR MATERIALS REQUIRED FOR GENERAL SUPPLY AND FIRE SERVICE CONNECTIONS INSTALLATIONS IN THE CONTRACT DRAWINGS.

**ITEM 611 - MANHOLE ADJUSTED TO GRADE, AS PER PLAN**

THE CONTRACTOR SHALL ADJUST THE EXISTING MANHOLE FRAME AND COVER TO FIT THE REVISED GRADE BY EXCAVATING AROUND THE FRAME AND RAISING OR LOWERING THE FRAME AND COVER BY ADDING TO OR REMOVING THE EXISTING BRICKS AND MORTAR. USE OF ADJUSTING RINGS SHALL NOT BE PERMITTED. IF REQUIRED BY THE ENGINEER, NEW FRAMES AND/OR COVERS WILL BE PAID FOR UNDER "ITEM SPECIAL-MISCELLANEOUS METAL WORK".

**ITEM 638 - VALVE BOX ADJUSTED TO GRADE, AS PER PLAN**

**ITEM 638 - SERVICE BOX ADJUSTED TO GRADE, AS PER PLAN**  
 THE CONTRACTOR SHALL RESET EXISTING VALVE BOXES OR EXISTING CURB SHUT-OFF VALVE BOXES TO ESTABLISHED GRADE BY RAISING OR LOWERING THE EXISTING CASTINGS OR BY EITHER ADDING, DELETING OR CUTTING THE APPROPRIATE VALVE BOX STEM SECTIONS. IN RAISING OF THE CASTINGS, NO INSERTS WILL BE PERMITTED. ANY VALVE BOXES OR CURB SHUT-OFF VALVE BOXES FOUND TO BE DAMAGED OR UNSUITABLE FOR REUSE SHALL BE REPLACED BY THE CONTRACTOR AND PAID FOR UNDER ITEM SPECIAL - MISCELLANEOUS METAL. THE CONTRACTOR SHALL PERFORM ALL WORK NECESSARY AS REQUIRED OR AS ORDERED TO COMPLETE THE ITEM.

**ITEM SPECIAL - MAINTENANCE OF WATER SERVICE**

(A) THE CONTRACTOR SHALL PROVIDE, INSTALL, MAINTAIN AND REMOVE ALL TEMPORARY WATER MAINS AND TEMPORARY SERVICE CONNECTIONS, INCLUDING NECESSARY VALVES AND TEMPORARY HYDRANTS FOR FIRE PROTECTION ON THE TEMPORARY WATER MAINS, TO ALL AFFECTED PREMISES WHERE THE RELOCATIONS OF THE EXISTING WATER MAIN AND CONSTRUCTION OF NEW SERVICE CONNECTIONS WILL RESULT IN THE INTERRUPTION OF SERVICE FOR PERIODS LONGER THAN FOUR (4) HOURS BETWEEN 6:00 A.M. AND MIDNIGHT. BETWEEN MIDNIGHT AND 6:00 A.M. SERVICES MAY BE INTERRUPTED FOR THE ENTIRE SIX (6) HOUR PERIOD. THE PROVIDING OF TEMPORARY WATER MAINS SHALL ALSO INCLUDE FLUSHING, TESTING, SAMPLING AND, IF REQUIRED, CHLORINATION; ALL AS SPECIFIED ELSEWHERE IN THESE SPECIFICATIONS.

THE FAILURE OF THE CONTRACTOR TO INSTALL TEMPORARY MAINS OF SUFFICIENT SIZE MAY MAKE THE CONTRACTOR LIABLE WHERE CONFLAGRATION DUE TO LACK OF WATER FOR FIRE PROTECTION MAY GIVE RISE TO ACTIONABLE CLAIMS FOR DAMAGES CHARGEABLE TO THE CONTRACTOR BY REASON OF SAID FAILURE.

(B) THE CONTRACTOR SHALL SUBMIT A PLAN FOR MAINTAINING WATER SERVICE IN CONFORMANCE WITH THE REQUIREMENTS HEREIN STIPULATED 2 WEEKS PRIOR TO INSTALLATION. THE PLAN SHALL ALSO SPECIFY ALL CONSTRUCTION METHODS, MATERIALS UTILIZED, VALVE LOCATIONS AND MEET THE APPROVAL OF THE ENGINEER, LOCAL FIRE DEPARTMENT AND THE CLEVELAND WATER DEPARTMENT BEFORE THE CONTRACTOR BEGINS ANY OF THE WATERWORK. APPROVAL OF SUCH A PLAN FOR TEMPORARY WATER MAINS SHALL NOT RELIEVE THE CONTRACTOR RESPONSIBILITY FOR PROVIDING SUFFICIENT SUPPLY. THE CONTRACTOR SHALL AT HIS OWN EXPENSE INCREASE THE SIZES OF THE TEMPORARY WATER MAINS BEYOND THE SIZES INDICATED HEREIN IF THE SIZES AS NOTED IN THESE SPECIFICATIONS ARE FOUND TO BE INSUFFICIENT.

(C) TEMPORARY WATER MAINS SHALL BE PLACED ON ONE OR BOTH SIDES OF THE STREET. CONNECTIONS ARE PERMISSIBLE ONLY ON THE SIDE OF THE STREET ON WHICH THE PARTICULAR TEMPORARY MAIN IS LOCATED. THE TEMPORARY MAINS SHALL NOT OBSTRUCT ANY STREETS, SIDEWALKS OR DRIVEWAYS. TRENCHING OR RAMPING SHALL BE PERFORMED AS REQUIRED TO PROVIDE PROTECTION FOR THE TEMPORARY WATER MAINS AND TO PROVIDE FOR THE SAFE MOVEMENT OF VEHICULAR AND PEDESTRIAN TRAFFIC. TEMPORARY WATER MAINS THAT CROSS DRIVEWAYS AND SIDEWALKS SHALL BE RAMPED WITH RUBBERIZED/NEOPRENE TYPE RAMPING; NO ASPHALT OR STONE RAMPING SHALL BE ALLOWED FOR THIS PURPOSE. ALL LINES CROSSING STREETS SHALL BE TRENCHED ACROSS TO ALLOW BYPASS PIPE TO LIE FLUSH WITH THE PAVEMENT SURFACE. NO RAMPING WILL BE ALLOWED ON STREET CROSSINGS EXCEPT FOR SIDE STREETS APPROVED BY THE CITY. THE CONTRACTOR SHALL PROVIDE SUPPLEMENTARY CONNECTIONS WHERE VALVES WITH NIPPLES HAVE BEEN REMOVED, WHERE ADJACENT WATER MAINS CONNECT, OR WHERE ORDERED BY THE CITY.

DESIGN AGENCY	---
<b>Michael Baker</b> INTERNATIONAL	
DESIGNER	---
REVIEWER	---
PROJECT ID	82382
SHEET	TOTAL
1176	2339

**ITEM SPECIAL - MAINTENANCE OF WATER SERVICE (CONTINUED)**

(D) SIZES FOR TEMPORARY WATER MAINS SHALL BE AS FOLLOWS:  
 1. WHERE IT IS NOT POSSIBLE TO HAVE BOTH RELOCATED/ NEW AND EXISTING WATER MAINS SIMULTANEOUSLY IN SERVICE IN ORDER TO TRANSFER AND RECONNECT EXISTING SERVICE CONNECTIONS TO THE RELOCATED/NEW WATER MAIN, OR WHEN THE TIME REQUIRED TO PUT THE RELOCATED/NEW WATER MAIN, EXCLUDING SERVICE CONNECTIONS, INTO SERVICE EXCEEDS THE RATINGS SPECIFIED IN PARAGRAPH "A", THE SIZES FOR TEMPORARY WATER MAINS SHALL BE AS FOLLOWS:

A. WHEN WITHIN THE LIMITS OF THE WATER MAIN RELOCATION NO SERVICE CONNECTIONS EXIST, OR SERVICE CONNECTIONS EXIST ON ONLY ONE SIDE OF THE STREET, THE TEMPORARY WATER MAIN SHALL NOT BE LESS THAN TWO (2) NOMINAL PIPE DIAMETERS SMALLER THAN EXISTING PIPE BUT IN NO CASE LESS THAN FOUR (4) INCHES IN DIAMETER AND SUCH TEMPORARY WATER MAIN SHALL BE PLACED ON ONLY ONE SIDE OF THE STREET. FOR EXAMPLE, IF EXISTING WATER MAIN IS TWELVE (12) INCH NOMINAL DIAMETER, TEMPORARY WATER MAIN SHALL NOT BE LESS THAN EIGHT (8) INCH NOMINAL DIAMETER.

B. WHEN THE LIMITS OF THE WATER MAIN RELOCATION SERVICE CONNECTIONS EXIST ON BOTH SIDES OF THE STREET, THE TEMPORARY WATER MAINS SHALL NOT BE LESS THAN ONE (1) NOMINAL PIPE DIAMETER SMALLER THAN THE EXISTING PIPE BUT IN NO CASE LESS THAN SIX (6) INCHES IN DIAMETER AND SUCH TEMPORARY WATER MAINS SHALL BE PLACED ON BOTH SIDES OF THE STREET.

FOR EXAMPLE, IF EXISTING WATER MAIN IS TWELVE (12) INCH NOMINAL DIAMETER, TEMPORARY WATER MAINS SHALL NOT BE LESS THAN TEN (10) INCH NOMINAL DIAMETER, ON EACH SIDE.

2. WHEN TEMPORARY WATERLINES AS DESCRIBED IN PARAGRAPH D-1 ARE NOT REQUIRED, BUT THE INTERRUPTION IN WATER SERVICE EXCEEDS THE DURATION SPECIFIED IN PARAGRAPH "A" BECAUSE OF THE TIME REQUIRED TO CONNECT NEW/RELOCATED WATER MAINS TO EXISTING MAINS AND/OR TO RE-CONNECT EXISTING SERVICE CONNECTIONS TO THE NEW/RELOCATED MAIN, THE SIZES FOR TEMPORARY WATER MAINS, ON ONE OR BOTH SIDES OF THE STREET, AS REQUIRED, SHALL NOT BE LESS THAN THAT INDICATED BELOW PROVIDED THAT THESE SIZES ARE APPROVED BY THE FIRE DEPARTMENT OF THE MUNICIPALITY IN WHICH THE WORK IS BEING PERFORMED.
3. THE SIZE OF THE TEMPORARY CONNECTION SHALL BE OF AT LEAST THE SAME SIZE AS THE PERMANENT CONNECTION THAT HAS GONE TO THE BUILDING UNLESS THE CONNECTION IS LARGER THAN THE BYPASS PIPING. IF THE PERMANENT CONNECTION IS LARGER THAN THE BYPASS PIPING, THEN THE TEMPORARY CONNECTION WILL BE OF THE SAME SIZE AS THE BYPASS PIPING.

THE CONTRACTOR SHALL PROVIDE ENOUGH ISOLATION VALVES IN THE TEMPORARY WATER MAIN SYSTEM SUCH THAT PIPE SEGMENTS ON EACH SIDE OF THE STREET OF EACH STREET BLOCK CAN BE ISOLATED. IN NO CASE SHALL SEGMENTS OF PIPE BETWEEN VALVES BE LONGER THAN 1000 FEET.

MINIMUM FLOWS THAT SHALL BE AVAILABLE FROM TEMPORARY BYPASS WATER LINES, 4-INCHES IN DIAMETER OR LARGER, SHALL BE:

- ON RESIDENTIAL DEAD END AND SIDE STREETS WHICH MUST BE OR ARE SUPPLIED FROM THE EXISTING WATER LINE BEING CLEANED AND LINED, A MINIMUM OF 600 GALLONS PER MINUTE (GPM) AT A 20 POUND PER SQUARE INCH (PSI) RESIDUAL PRESSURE AT ANY POINT ALONG SAID TEMPORARY BYPASS WATER LINE.
- ON RESIDENTIAL MAIN OR THROUGH STREETS CONNECTING TWO (2) OR MORE DEAD END OR SIDE STREETS WHICH MUST BE OR ARE SUPPLIED FROM THE EXISTING WATER LINE BEING CLEANED AND LINED, A MINIMUM OF 1,000 GPM AT A 20 PSI RESIDUAL PRESSURE AT ANY POINT ALONG SAID TEMPORARY BYPASS WATERLINE.
- ON A STREET IN COMMERCIAL, INDUSTRIAL OR MULTI-FAMILY COMPLEX AREAS, WHICH MUST BE OR ARE SUPPLIED FROM THE EXISTING WATER LINE BEING CLEANED AND LINED, A MINIMUM OF 1,300 GPM AT 20 PSI RESIDUAL PRESSURE AT ANY POINT ALONG SAID TEMPORARY BYPASS WATERLINE.

**ITEM SPECIAL - MAINTENANCE OF WATER SERVICE (CONTINUED)**

THE CONTRACTOR SHALL FURNISH NECESSARY HOSES, VALVES, PIPE AND FITTINGS FOR WATER SERVICE CONNECTIONS. THE CONTRACTOR SHALL ONLY CONNECT TO AN OUTSIDE HOSE BIB OR SILL COCK, UNLESS OTHERWISE APPROVED BY THE CITY. ALL CONNECTIONS TO OUTSIDE HOSE BIBS OR SILL COCKS SHALL BE SUPPLIED WITH Y CONNECTORS.

THE CONTRACTOR SHALL MAKE A REASONABLE EFFORT TO SHUT OFF CONNECTIONS AT THE SERVICE STOP BOX WHERE POSSIBLE. IF A SERVICE STOP BOX IS NOT AVAILABLE, THE CONTRACTOR SHALL SHUT OFF THE CONNECTIONS INSIDE THE RESIDENCE OR BUILDING, AND SHALL CLEAR SERVICE CONNECTIONS USING INTERNAL PLUMBING.

THE CONTRACTOR SHALL NOT BE PAID ANY EXTRA ALLOWANCE IF REQUIRED TO SHUT A CONNECTION WITHIN A BUILDING OR CLEAR SERVICE CONNECTIONS USING INTERNAL PLUMBING. ALL SUCH COSTS SHALL BE INCLUDED IN THE BID.

(E) THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY REQUIRED REPAIRS TO, OR REPLACEMENT OF, DAMAGED TEMPORARY WATER MAINS AND APPURTENANCES. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR MAINTAINING AND REPAIRING ANY DAMAGED PAVEMENT, SIDEWALKS, CURBS, TREE LAWNS OR OTHER AREAS DISTURBED BY THE INSTALLATION; AND FOR MAINTENANCE OR REPAIR OF THE TEMPORARY WATER MAINS, TEMPORARY SERVICE CONNECTIONS AND APPURTENANCES THERETO. PAYMENT FOR THIS WORK SHALL BE INCLUDED IN THE CONTRACT LUMP SUM PRICE BID FOR "ITEM SPECIAL - MAINTENANCE OF WATER SERVICE".

(F) THE CONTRACTOR SHALL NOT PUT ANY TEMPORARY WATER MAINS INTO SERVICE WITHOUT AN APPROVED PLAN AS INDICATED IN PARAGRAPH B.

(G) THE TEMPORARY WATER MAIN AND ALL APPURTENANCES SHALL BE FURNISHED, MAINTAINED AND REMOVED BY THE CONTRACTOR. THE TEMPORARY WATER MAIN PIPE AND APPURTENANCES FURNISHED SHALL BE CLEAN AND IN SUCH CONDITION THAT THEY MAY BE TESTED, FLUSHED, CHLORINATED AND PRODUCE SATISFACTORY WATER SAMPLES AS REQUIRED BY THE CITY. ANY NECESSARY CHLORINATION SHALL BE DONE BY THE CITY AS STIPULATED ELSEWHERE IN THESE SPECIFICATIONS AND SHALL BE DONE AT THE CONTRACTOR'S EXPENSE. ALL CONNECTIONS TO THE TEMPORARY WATER MAIN SHALL BE MADE BY THE CONTRACTOR UNDER THE SUPERVISION OF THE CITY.

(H) THE CONTRACTOR SHALL PROVIDE TEMPORARY FOUR (4) INCH FIRE HYDRANTS ON THE TEMPORARY WATERLINE IN ACCORDANCE WITH THE "TEMPORARY WATER MAIN & HYDRANT CONNECTION ASSEMBLY" DETAIL, SEE CWD STANDARD DETAILS. THE CONTRACTOR SHALL PROVIDE A SUFFICIENT NUMBER OF VALVES ON THE TEMPORARY WATER MAIN AS TO ALLOW PROPER SEQUENCING OF THE NEW/RELOCATED WATER MAIN WORK WITHOUT UNDUE DELAY. WATER TO THE TEMPORARY WATER MAIN WILL BE PROVIDED FROM THE EXISTING PERMANENT HYDRANTS THROUGH THE TEMPORARY HYDRANTS JUST BEYOND THE LIMITS OF THE SHUTDOWN AND/OR FROM ADJACENT WATER MAINS.

(I) THE CONTRACTOR SHALL MINIMALLY INSTALL TEMPORARY FOUR (4) INCH FIRE HYDRANTS AT EACH LOCATION WHERE A PERMANENT FIRE HYDRANT IS TAKEN OUT OF SERVICE OR USED TO SUPPLY A TEMPORARY WATER MAIN

**PAYMENT**

THE DIVISION OF WATER WILL REQUIRE THAT THE CONTRACTOR PAY ALL DIVISION OF LABOR CHARGES FOR "FLUSHING AND SAMPLING" OF TEMPORARY WATER MAINS. CHARGES OR FEES FOR CHLORINATION WORK OR ANY WORK PERFORMED BY THE CITY MAY BE OBTAINED FROM THE PERMITS AND SALES UNIT OF THE DIVISION OF WATER AND HEAT. PAYMENT FOR DIVISION OF WATER LABOR SHALL BE MADE TO THE PERMITS AND SALES SECTION PRIOR TO ANY WATER WORK BEING PERFORMED.

**ITEM SPECIAL - CATHARDIC PROTECTION FOR WATER MAIN**

**GENERAL**

THE WORK UNDER CATHODIC PROTECTION FOR WATER MAINS INCLUDES FURNISHING THE SERVICES OF A QUALIFIED CORROSION ENGINEERING FIRM CAPABLE OF PROVIDING ALL NECESSARY MATERIALS, EQUIPMENT, EXPERTISE AND KNOW-HOW AND ALL LABOR FOR CONSTRUCTION OF A CATHODIC PROTECTION SYSTEM AS INDICATED HEREIN AND NECESSARY FOR THE PROPER COMPLETION OF THE PROJECT INCLUDED UNDER THIS ITEM INCLUDING THE GEOTECHNICAL SURVEY; THE FURNISHING AND INSTALLATION OF A GALVANIC ANODE SYSTEM; AND A FOLLOWUP BASELINE SURVEY.

ADDITIONALLY, THE QUALIFIED CORROSION ENGINEERING FIRM SHALL BE RESPONSIBLE FOR THE INSTALLATION, TESTS, AND THE CATHODIC PROTECTION SYSTEM SPECIFIED AND PROVIDE NECESSARY REPORTS, DESIGN CALCULATION DRAWINGS AND SYSTEM OPERATION AND MAINTENANCE (O&M) MANUALS.

"QUALIFIED" IMPLIES THAT THE WORK IS PERFORMED BY EXPERIENCED FIELD ENGINEERING PERSONNEL UNDER SUPERVISION OF A NATIONAL ASSOCIATION OF CORROSION ENGINEERS (NACE) ACCREDITED CORROSION SPECIALIST OR REGISTERED PROFESSIONAL CORROSION ENGINEER. CERTIFICATION OF QUALIFICATIONS SHALL BE SUBMITTED WITH THE SUBMITTAL PACKAGE.

**GEOTECHNICAL SURVEY**

IMMEDIATELY AFTER AWARD OF THIS CONTRACT AND BEFORE THE BEGINNING OF ANY WORK THE CONTRACTOR SHALL, UNDER ITEM SPECIAL - CATHODIC PROTECTION FOR WATER MAINS, HAVE AN CORROSION ENGINEERING FIRM PERFORM THE GEOTECHNICAL SURVEY.

THE RESULTS OF THIS SURVEY SHALL DETERMINE THE EXTENT OF THE DESIGN REQUIRED FOR THE GALVANIC CELL (SACRIFICIAL ANODE) SYSTEM TO BE INSTALLED.

SOIL BORINGS SHALL BE PERFORMED EVERY 500 FEET DIRECTLY ALONG THE PROPOSED PIPELINE. THE SOIL SAMPLE SHALL BE TAKEN AT ONE (1) FOOT DEPTH BELOW THE GROUND SURFACE AND AT THE PROPOSED PIPE DEPTH AND ANALYZED FOR MOISTURE CONTENT, PH, CONDUCTIVITY, CHLORIDE ION CONCENTRATION, AND SULFIDE ION CONCENTRATION. THIS WORK SHALL BE PERFORMED BY THE CATHODIC PROTECTION ENGINEERING FIRM. ALL BORING SAMPLES SHALL BE OBTAINED UNDER THE DIRECT SUPERVISION OF THE CORROSION ENGINEER.

AFTER COMPLETION OF THE SOIL SAMPLE ANALYSIS THE CONTRACTOR SHALL SUBMIT TO THE CITY THROUGH THE ENGINEER SIX (6) BOUND COPIES OF THE RESULTS OF THE GEOTECHNICAL SURVEY THAT INCLUDES AT LEAST THE FOLLOWING INFORMATION: (1) SOIL BORING LOG INDICATING LOCATION, DEPTH; (2) ANALYSIS OF SAMPLE; (3) PRESENCE OF ANY OTHER CATHODIC PROTECTION SYSTEM THAT MAY AFFECT THE WORK UNDER THIS CONTRACT; AND (3) RECOMMENDATIONS FOR CORRECTIVE ACTIONS TO TAKEN WHERE ADVERSE CONDITIONS EXISTS.

**CATHARDIC TEST STATIONS**

CATHODIC TEST STATIONS SHALL BE INSTALLED WHERE SHOWN ON THE CONTRACT DRAWING AND SHALL BE OF THE FLUSH-TO-GRADE TYPE AS SHOWN ON THE CONTRACT DRAWINGS. ADDITIONAL CATHODIC TEST STATIONS SHALL BE INSTALLED AT STEEL PIPE CASINGS, SUPPLEMENTAL CONNECTIONS OR OTHER LOCATIONS AS REQUIRED BY EITHER THE GEOTECHNICAL SURVEY OR AS ORDERED BY THE CITY. PAYMENT FOR ADDITIONAL CATHODIC TEST STATIONS SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR THE CATHODIC PROTECTION SYSTEM BEING INSTALLED. THE CATHODIC TEST STATION ASSEMBLY SHALL CONSIST OF:

(A) TERMINAL BOARD: TERMINAL BOARD SHALL BE MICARTA OR PHENOLIC, DIMENSIONED AS SHOWN 1/4-INCH THICK WITH BRASS MACHINE SCREWS, NUTS, AND WASHERS AND COPPER ALLOY TERMINALS SIZED TO ACCOMMODATE WIRE AS SHOWN.

(B) SHUNT: HAVING A 0.01 OHM, 6 AMPERE CAPACITY, WITH ACCURACY OF PLUS OR MINUS ONE (+/- 1%) PERCENT, OF THE MANGANIC WIRE TYPE.

(C) TEST LEAD WIRES: U.L. 93. ALL TEST LEAD WIRES SHALL BE AWG #12 TYPE TW STRANDED COPPER, COLOR CODED AS SHOWN ON THE CONTRACT DRAWINGS. NO SPLICES WILL BE PERMITTED. ALL TEST STATIONS SHALL HAVE 24" OF SLACK IN THE LEAD WIRES, COILED WITHIN THE TEST STATION BOX FOR CORE REMOVAL AND TESTING PURPOSES.

(D) DRAIN CABLES: ALL DRAIN CABLES FURNISHED AND INSTALLED SHALL COMPLY WITH ASTM STANDARD D1248 AND SHALL BE AWG #6 WHERE APPLICABLE WITH HMWPE INSULATION. NO SPLICES WILL BE PERMITTED.

(E) CONNECTION TO PIPE:

1. DUCTILE IRON PIPE AND FITTINGS: THE CONNECTIONS OF TEST LEADS, ANODE LEADS, AND DRAIN CABLES TO DUCTILE IRON PIPE AND FITTINGS SHALL BE BY THERMITE WELDING AS SPECIFIED HEREIN.

2. PRESTRESSED CONCRETE CYLINDER PIPE AND FITTINGS: FOR CONNECTIONS OF ANODE LEADS, TEST LEADS, AND DRAIN CABLES, THE PRESTRESSED CONCRETE CYLINDER PIPE AND FITTINGS SHALL BE PROVIDED WITH MILD STEEL RODS FOR WELDING TO THE STEEL PIPE CYLINDER. THE ANODE LEAD CABLES SHALL BE PROVIDED 1/4" DIAMETER BY 6" LONG RODS. THE DRAIN CABLES AND TEST LEADS SHALL BE PROVIDED WITH 5/8" DIAMETER BY 6" LONG MILD STEEL RODS. EACH CABLE-TO-ROD CONNECTION SHALL BE SHOP ASSEMBLED USING APPROPRIATELY SIZED THERMITE WELDED CONNECTION AND EACH WELDED CONNECTION SHALL BE SHOP COVERED WITH ADHESIVE LINED HEAT SHRINKABLE POLYETHYLENE SLEEVE. CAD WELDING, BONDING CABLES, TEST LEAD WIRES, AND ANODE LEAD WIRES TO STEEL ANGLE PLATES INCORPORATED INTO THE PIPE MANUFACTURE IS AN ACCEPTABLE ALTERNATE METHOD.

3. STEEL PIPE AND FITTINGS: THE CONNECTIONS OF TEST LEADS, ANODE LEADS, AND DRAIN CABLES TO STEEL PIPE AND FITTINGS SHALL BE BY THERMITE WELDING AS SPECIFIED HEREIN.

(F) COPPER-COPPER SULFATE REFERENCE ELECTRODES: REFERENCE ELECTRODES SHALL BE OF COPPER-COPPER SULFATE TYPE, ENCASED IN A 2-INCH DIAMETER BY 8-INCH LONG SCHEDULE 80 POLYVINYL CHLORIDE TUBE. THE COPPER ROD SHALL BE 99.9% PURITY 1/4-INCH DIAMETER BY 7-INCH LONG. THE ELECTRODE SHALL BE PACKAGED IN A 8-INCH DIAMETER BY 15-INCH LONG PERMEABLE CLOTH BAG CONTAINING A SPECIAL NON-POLARIZING BACKFILL MATERIAL. THE REFERENCE ELECTRODE SHALL BE EQUIPPED WITH 1/4-INCH DIAMETER BY 4-INCH LONG PVC REINFORCING RODS AT THE DISTAL END TO ENSURE INTIMATE CONTACT OF THE REFERENCE ELECTRODE WITH THE SPECIAL BACKFILL. TOTAL PACKAGE WEIGHT SHALL BE 15-POUNDS. REFERENCE ELECTRODE LEAD CABLES SHALL BE AWG NO. 14 HMWPE LENGTH AS NECESSARY. THE LEAD CABLES SHALL BE SILVER SOLDERED TO THE COPPER ROD AND COVERED WITH A HEAT SHRINKABLE SLEEVE AND AN EPOXY ENCAPSULATION 2-INCH DIAMETER BY 2-INCH LONG. REFERENCE ELECTRODE LEAD WIRES SHALL NOT BE SPLICED. THE CABLE INSULATION SHALL BE FREE OF NICKS, CUTS AND ABRASIONS OVER THE ENTIRE LENGTH. THE REFERENCE ELECTRODES SHALL HAVE A STABILITY OF +5 MILLIVOLTS WITH 3.0 MICROAMP LOAD. REFERENCE ELECTRODE SHALL BE DELIVERED IN PLASTIC OR PAPER SHIPPING BAGS TO PREVENT MOISTURE INTRUSION AND DAMAGE TO THE CLOTH BAG.

DESIGN AGENCY

**Michael Baker INTERNATIONAL**

DESIGNER

REVIEWER

PROJECT ID

82382

SHEET TOTAL

1177 2339



**ITEM SPECIAL - CATHODIC PROTECTION FOR WATER MAIN (CONTINUED)**

**BONDING CABLES**

CONTINUITY BOND CABLES: ALL PIPE AND FITTING JOINTS, EXCEPT DIELECTRIC INSULATED JOINTS AND WELDED JOINTS SHALL BE BONDED TO MAKE THE ENTIRE PIPELINE ELECTRICALLY CONTINUOUS.

(A) DUCTILE IRON PIPE: BOND CABLES SHALL BE 18-INCH LONG.

(B) PRESTRESSED CONCRETE CYLINDER PIPE AND FITTINGS: ALL PRESTRESSED CONCRETE CYLINDER PIPE AND FITTINGS AND SPECIAL FITTINGS SHALL BE FABRICATED IN SUCH A MANNER AS TO ESTABLISH ELECTRICAL CONTINUITY BETWEEN ALL APPLICABLE METALLIC COMPONENTS OF THE PIPING, INCLUDING CYLINDER, TENSILE WIRES, ANCHOR SOCKETS, ANCHOR SOCKET BRACKETS, JOINT RINGS, FLANGES, LUGS, DRAW BOLTS, AND SADDLE PLATES. BOND CABLES SHALL BE 18-INCH LONG.

(C) STEEL PIPE AND FITTINGS: ALL STEEL PIPE AND FITTINGS AND SPECIAL FITTINGS SHALL BE FABRICATED IN SUCH A MANNER AS TO ESTABLISH ELECTRICAL CONTINUITY BETWEEN ALL APPLICABLE METALLIC COMPONENTS OF THE PIPING, INCLUDING CYLINDER, ANCHOR SOCKETS, ANCHOR SOCKET BRACKETS, JOINT RINGS, FLANGES, LUGS, DRAW BOLTS, AND SADDLE PLATES. CONTINUITY SHALL BE ESTABLISHED THROUGH WELDING OR BONDING OF JOINTS. BOND CABLES SHALL BE 18-INCH LONG.

(D) BONDING AND DRAIN CABLES:

1. JOINT BONDING CABLES SHALL BE MINIMUM NO.4 AWG STRANDED COPPER CABLE WITH HMWPE INSULATION MINIMUM EIGHTEEN (18 INCHES IN LENGTH TWO (2) PER BOND PER JOINT.

2. DRAIN CABLES SHALL BE NO.6 AWG (MIN.) COPPER CABLE WITH HMWPE INSULATION AND SHALL BE OF SUFFICIENT LENGTH TO REACH THE ADJACENT CATHODIC TEST STATION.

**THERMITE WELDING**

(A) MATERIALS:

1. THERMITE WELD EQUIPMENT: ALL CATHODIC PROTECTION CABLE AND WIRE CONNECTIONS TO DUCTILE IRON PIPE AND FITTINGS, PRESTRESSED CONCRETE CYLINDER PIPE AND FITTINGS, AND STEEL PIPE AND FITTINGS SHALL BE MADE BY THE THERMITE WELD METHOD. THERMITE WELD MATERIALS SHALL BE EQUAL TO THOSE MANUFACTURED BY: "CADWELD" OF ERICO PRODUCTS, INC.; "THERMOWELD" OF CONTINENTAL INDUSTRIES, INC.; OR APPROVED EQUAL.

2. PLASTIC BACKFILL SHIELD FOR THERMITE WELD CONNECTIONS SHALL BE A ONE (1) PIECE MOLDED PLASTIC CAP RECESSED TO COVER CABLE AND THERMITE WELD CONNECTIONS WITH DIELECTRIC SEALER AS DEVELOPED BY ROYSTON LABORATORIES FOR COVERING THERMITE WELDS, OR APPROVED EQUAL.

3. BITUMINOUS COATING COMPOUND FOR THERMITE WELDS: SHALL BE EQUAL TO THAT MANUFACTURED BY KOPPERS COMPANY, B-50, OR APPROVED EQUAL AND SHALL BE SHIPPED TO THE JOB SITE IN ONE (1) GALLON SEALED CONTAINERS. THE MATERIAL SHALL CONFORM TO SPECIFICATION MIL-C-18480A FOR BITUMASTIC COATINGS.

(B) THERMITE WELD EQUIPMENT:

THE CONNECTION OF JOINT BONDING WIRE, TEST LEADS, DRAIN CABLES AND OTHER WELDED CONNECTIONS TO DUCTILE IRON PIPE AND FITTINGS SHALL BE AS FOLLOWS:

**APPLICATION MOLD SLEEVE CHARGE**

30" & LARGER CAHBA-IG CAB-133-1H CA25XF-19 DIA. DUCTILE IRON/STEEL PIPE

4" TO 24" CAHBA-IG-24 NONE CA25XF-19 DIA. DUCTILE IRON/STEEL PIPE

30" & LARGER CAHBA-IV NONE CA45XF-19 DIA. DUCTILE IRON/STEEL PIPE

4" TO 24" CAHBA-IV NONE CA45XF-19 DIA. DUCTILE IRON/STEEL PIPE

**GALVANIC ANODE SYSTEM**

(A) MATERIALS AND EQUIPMENT: MATERIALS AND EQUIPMENT FURNISHED AND INSTALLED TO PROVIDE A GALVANIC ANODE CATHODIC PROTECTION SYSTEM SHALL BE NEW AND STANDARD PRODUCTS OF MANUFACTURERS REGULARLY ENGAGED IN THE PRODUCTION OF SUCH MATERIAL OR EQUIPMENT. MATERIALS AND EQUIPMENT SHALL BE MANUFACTURER'S LATEST STANDARD DESIGN AND COMPLYING WITH THAT SPECIFIED HEREIN.

1. GALVANIC ANODES: THERE SHALL BE ONE ANODE OF THE FOLLOWING SIZE AND WEIGHT PER AVERAGE LENGTH OF PIPE INSTALLED ALONG THIS NEW WATER MAIN SECTION.

MAGNESIUM ANODES 32# PRE-PACKAGED, HIGH POTENTIAL WITH 40 FEET # 10 TW WIRE.

CHEMICAL COMPOSITION:

(ELEMENT CONTENT %)

AL	0.010
MN	0.500 - 1.300
CU	0.020 MAX.
NI	0.001 MAX.
FE	0.030 MAX.
OTHER	0.050 EACH OR 0.300 MAX TOTAL
MAGNESIUM	REMAINDER

2. ANODE CONSTRUCTION: 32# PACKAGED HI-POT MAGNESIUM ANODE #10THHN STRANDED - RED WIRE THE MAGNESIUM ANODE SHALL BE PACKAGED IN A PERMEABLE CLOTH BAG CONTAINING A BACKFILL MATERIAL WEIGHING 70 POUNDS HAVING THE FOLLOWING CHEMICAL COMPOSITION:

GROUND HYDRATED GYPSUM	75%
POWDERED BENTONITE	20%
ANHYDROUS (SODIUM SULFATE)	5%

BACKFILL SHALL HAVE A GRAIN SIZE SO THAT 100% IS CAPABLE OF PASSING THROUGH A 20 MESH SCREEN AND 50% WILL BE RETAINED BY A 100 MESH SCREEN. THE MIXTURE SHALL BE FIRMLY PACKAGED AROUND THE ZINC WITHIN THE CLOTH BAG WITH PACKAGED DIMENSIONS OF 5" DIA. X 21" LONG. THE PACKAGED ANODE SHALL WEIGH NO LESS THAN 70 POUNDS.

3. ANODE LEAD CABLES: LEAD CABLES SHALL BE SHOP CONNECTED TO THE STEEL STRAP CORE WITH SILVER SOLDER. THE CONNECTION SHALL BE INSULATED WITH AN ELECTRICAL POTTING COMPOUND. ANODE LEAD CABLES SHALL BE AWG NO. 10 WITH THERMOPLASTIC INSULATION LENGTH AS NECESSARY. NO SPLICES WILL BE PERMITTED BETWEEN THE ANODE CONNECTION AND THE PIPE OR TEST STATION. SPLICES AND ANODE LEAD WIRE TO MILD STEEL ROD FOR CONNECTION TO CONCRETE PIPE WILL BE PERMITTED.

(B) INSTALLATION:

1. ANODES:

A. AUGER OR DIG HOLES TO DEPTH INDICATED HEREIN. IF AUGER IS USED, HOLE SHALL BE 10-INCH MINIMUM DIAMETER. PLACE ANODE IN BOTTOM OF HOLE THREE (3) TO FIVE (5) FEET BELOW WATER MAIN OR THREE (3) TO FIVE (5) FEET Laterally FROM SIDE OF WATER MAIN. IF FOR ANY REASON THE LATERAL LOCATION OF THE ANODE CANNOT BE ACHIEVED, SUFFICIENT SOIL SHALL BE REMOVED (EITHER BY BACKHOE, BUCKET OR MANUALLY) ON THE BOTTOM OR IMMEDIATELY ADJACENT TO THE WATER MAIN TO ACHIEVE THE MINIMUM THREE (3) FOOT DISTANCE. DO NOT SUPPORT THE ANODE WITH LEAD WIRE.

BACKFILL THE ANODE IN 6-INCH LIFTS OF NATIVE SOIL. COMPACT THE SOIL AROUND THE ANODE. WHEN THE BACKFILL IS LEVEL WITH THE TOP OF THE ANODE, POUR MINIMUM TEN (10) GALLONS OF FRESH WATER INTO THE HOLE. WHEN THE ANODE HAS ABSORBED ALL THE WATER, COMPLETE THE BACKFILL OPERATION TO THE BOTTOM OF THE PIPE TRENCH.

B. BACKFILL THE ANODE LEAD WIRE IN STONE FREE EARTH OR SAND AT CONNECTION POINT ON PIPE.

C. CONNECT THE ANODE LEAD WIRE TO THE PIPE AFTER THE NECESSARY TESTING HAS BEEN PERFORMED.

2. TEST STATIONS: THERE SHALL BE A MINIMUM OF THREE TEST STATIONS INSTALLED. ADDITIONAL TEST STATIONS SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR WHERE ORDERED OR DIRECTED OR AS DETERMINED FROM THE GEOTECHNICAL SURVEY USING APPLICABLE EQUIPMENT AS SHOWN ON THE CONTRACT DRAWINGS, OR AS SPECIFIED HEREIN. ALL TEST STATIONS SHALL HAVE 24" OF SLACK IN THE LEAD WIRES, IN COILED WITHIN THE TEST STATION BOX FOR CORE REMOVAL AND TESTING PURPOSES.

A. INSTALL ANODES AS SPECIFIED HEREIN;

**GALVANIC ANODE SYSTEM (CONTINUED)**

B. INSTALL REFERENCE ELECTRODE AT LOCATIONS SHOWN ON THE CONTRACT DRAWINGS, SHOP DRAWINGS OR THE CORROSION FIRM'S RECOMMENDATIONS. THE REFERENCE ELECTRODE SHALL BE COMPLETELY SURROUNDED BY NATIVE SOIL, POSITIONED 4-INCHES BELOW THE BOTTOM OF THE TRENCH. SATURATE THE REFERENCE ELECTRODE WITH 5 GALLONS MINIMUM FRESH WATER (ONLY APPLICABLE WHERE PIPELINE IS UNDER PAVEMENT).

C. INSTALL DRAIN CABLE AND TEST LEAD CABLE ON PIPE AS SPECIFIED HEREIN;

D. RUN ALL TEST STATION CABLES IN 1-1/2 INCH DIAMETER PVC CONDUIT TO THE CATHODIC TEST STATION ASSEMBLY BOX LOCATIONS INDICATED ON THE CONTRACT DRAWINGS.

E. SET TEST BOX FLUSH TO GRADE AND LEVEL. INSTALL A CONCRETE COLLAR AROUND TEST STATION BOX IF IN UNPAVED AREA AS SHOWN ON THE CONTRACT DRAWINGS.

F. LEAVE THE TEST STATION LEAD WIRES COILED IN THE TEST BOX. EXCESS SLACK WIRE SHALL BE LEFT SUCH THAT ALL WIRES WILL EXTEND 24-INCHES ABOVE THE TOP OF THE TEST BOX. PLACE THE SPECIFIED TEST BOARD IN THE BOX FOR LATER CONNECTION BY THE CONTRACTOR'S CORROSION ENGINEER. PERFORM REQUIRED TESTING PRIOR TO BACKFILLING TO ENSURE PROPER OPERATION AND INSTALLATION OF ANODE AND REFERENCE ELECTRODE.

3. CASING TEST STATIONS: INSTALL ONE (1) CASING TEST STATION AT EACH END OF ALL CASING PIPE.

A. INSTALL ANODES AS SPECIFIED HEREIN;

B. INSTALL REFERENCE ELECTRODE AS HEREIN SPECIFIED (ONLY APPLICABLE AT PAVED LOCATIONS);

C. INSTALL DRAIN CABLES AND TEST LEADS AS SPECIFIED HEREIN;

D. INSTALL TEST BOX(ES) AS SPECIFIED HEREIN;

E. INSTALL TEST STATION LEAD WIRES AS SPECIFIED HEREIN;

4. LINE CROSSING (INTERFERENCE) TEST STATIONS: INTERFERENCE TEST STATIONS SHALL BE INSTALLED AT SELECTED FOREIGN CATHODICALLY PROTECTED LINE CROSSING LOCATIONS WHERE ORDERED.

A. INSTALL REFERENCE ELECTRODE MIDWAY BETWEEN CROSSING PIPES IN NATIVE BACKFILL SO THAT THE ELECTRODE IS UNIFORMLY SURROUNDED BY 4 INCHES NATIVE SOIL. SATURATE REFERENCE ELECTRODE WITH MINIMUM FIVE (5) GALLONS FRESH WATER DURING BACKFILLING.

B. INSTALL DRAIN CABLES AND TEST LEADS AS SPECIFIED HEREIN. DRAIN LEAD CABLE AND TEST LEAD CABLES TO FOREIGN PIPELINES SHALL BE INSTALLED BY THE FOREIGN PIPELINE OWNER. CONTACT THE FOREIGN PIPELINE OWNER TWO (2) WEEKS IN ADVANCE OF CONSTRUCTION TO COORDINATE INSTALLATION.

C. INSTALL TEST BOX(ES) AS SPECIFIED HEREIN;

D. INSTALL TEST STATION LEAD WIRES AS SPECIFIED HEREIN.

5. DIELECTRIC ISOLATION TEST STATIONS: INSTALL ELECTRIC ISOLATION TEST STATIONS AT ALL DIELECTRIC INSULATOR LOCATIONS. DIELECTRIC INSULATORS AND TEST STATIONS SHALL BE INSTALLED AT BOTH ENDS OF THE PROPOSED WATERLINE AT THE CONNECTION TO THE EXISTING WATERLINE.

A. INSTALL REFERENCE ELECTRODE AS SPECIFIED HEREIN;

B. INSTALL DRAIN CABLES AND TEST LEADS AS SPECIFIED HEREIN;

C. INSTALL TEST BOX(ES) AS SPECIFIED HEREIN;

D. INSTALL TEST STATION LEAD WIRES AS SPECIFIED HEREIN;

6. DIELECTRIC MATERIAL: DIELECTRIC FLANGE MATERIAL AND DIELECTRIC UNIONS SHALL BE OF PROPER SIZE AND BE EQUAL TO THAT MANUFACTURED BY F.H. MALONEY, PIPELINE SEAL & INSULATOR INC. OR APPROVED EQUAL.

7. CONNECTIONS TO PIPE - DUCTILE IRON PIPE AND STEEL PIPE CASINGS: THERMITE WELD TEST LEAD, DRAIN LEAD AND JOINT BOND CABLES TO PIPE PER THE THERMITE WELD EQUIPMENT MANUFACTURER'S INSTRUCTIONS. TEST EACH WELDED CONNECTION BY STRIKING WELD WITH A HAMMER SEVERAL TIMES. COVER THE TEST LEAD DRAIN CABLE AND ANODE CONNECTIONS WITH BITUMASTIC AND THERMITE WELD CAPS. LEAVE THE BONDING CABLE CONNECTIONS UNCOVERED UNTIL AFTER THE CONTINUITY TESTING HAS BEEN SATISFACTORILY PERFORMED BY THE CORROSION ENGINEER.

**GALVANIC ANODE SYSTEM (CONTINUED)**

8. ELECTRICAL ISOLATION FROM FOREIGN PIPING: ELECTRICAL CONTACT OF SUBJECT PIPING TO OTHER BURIED METAL STRUCTURES SHALL BE PREVENTED AT THE TIME OF INSTALLATION. WHERE THE PROPOSED SUBJECT PIPING IS BURIED WITHIN FOUR (4) INCHES OF A FOREIGN METAL STRUCTURE OR REINFORCING STEEL, A 1/4-INCH THICK MICARTA OR PHENOLIC SHEET OF APPROPRIATE SIZE SHALL BE INSERTED TO PREVENT CONTACT BETWEEN THE STRUCTURES.

(C) ENERGIZING AND TESTING: TESTING BY THE CONTRACTOR'S INDEPENDENT CORROSION CONSULTING ENGINEER SHALL CONSIST OF BUT MAY NOT BE LIMITED TO THE FOLLOWING:

1. STRUCTURE-TO-SOIL POTENTIAL TESTS: STRUCTURE TO SOIL POTENTIAL TESTS SHALL BE PERFORMED ON ANODES PRIOR TO THEIR CONNECTION TO THE PIPELINE TO ENSURE THAT THE PROPER ANODE MATERIAL IS PROVIDED. THE ANODE OPEN CIRCUIT POTENTIAL SHALL BE AT LEAST 1070 MV WITH RESPECT TO COPPER-COPPER SULFATE HALF CELL FOR ZINC ANODES. RANDOMLY TEST 10% OF THE ANODES. STRUCTURE TO SOIL POTENTIAL TESTS SHALL BE PERFORMED ON PERMANENT REFERENCE ELECTRODES TWENTY-FOUR (24) HOURS PRIOR TO COMPLETE BACKFILLING PIPE AND DOCUMENT THEIR OPERATING POTENTIAL.

2. ELECTRICAL CONTINUITY TESTING: AFTER COMPLETION OF THE PIPE CONSTRUCTION THE CORROSION ENGINEER SHALL PERFORM CONTINUITY TESTING TO DOCUMENT THAT THE WATER MAIN INSTALLED UNDER THIS CONTRACT IS CONTINUOUS BETWEEN TEST STATION ASSEMBLIES AND MEETS THE INTENT OF THE DESIGN TO THE SATISFACTION OF THE ENGINEER/DESIGN ENGINEER/FIELD ENGINEER. ANY AREAS WHERE DISCONTINUITIES ARE EVIDENT SHALL BE INVESTIGATED. EACH SECTION OF PIPE SHALL BE TESTED FOR ELECTRICAL CONTINUITY PRIOR TO FINAL PAVING. ANY DISCONTINUITY SHALL BE LOCATED, EXCAVATED AND REPAIRED AT THE EXPENSE OF THE CONTRACTOR, PRIOR TO FINAL PAVING.

3. DIELECTRIC ISOLATION TESTS: DIELECTRIC INSULATING FITTINGS SHALL BE TESTED PRIOR TO BACKFILLING TO ENSURE THEIR PROPER INSTALLATION. LEAD WIRES SHALL BE ATTACHED PRIOR TO BACKFILLING.

4. POST INSTALLATION SURVEY: THE POST INSTALLATION SURVEY SHALL BE PERFORMED BY THE CORROSION ENGINEER. HE SHALL COORDINATE WITH THE CWD'S CORROSION MITIGATION UNIT.

AS A MINIMUM, THE POST INSTALLATION SURVEY SHALL CONSIST OF TESTING THAT INCLUDES PIPE TO SOIL POTENTIALS, AS WELL AS COUPON "ON" AND "INSTANT-OFF" POTENTIAL BOTH WITH RESPECT TO THE BURIED REFERENCE ELECTRODE AND A PORTABLE CALIBRATED COPPER-COPPER SULFATE REFERENCE ELECTRODE, ANODE CURRENT OUTPUTS, AND LEAD WIRE CONTINUITY TESTS. THIS SURVEY SHALL ALSO INCLUDE ELECTRICAL CONTINUITY TESTING OF THE NEW LINE UNDER PROTECTION.

AFTER COMPLETION OF THE PROJECT, THE CORROSION ENGINEER SHALL SUBMIT A BOUND CORROSION SURVEY REPORT IN THREE (3) HARD COPIES AND ONE ELECTRONIC COPY IN PDF FORMAT TO THE CLEVELAND WATER DEPARTMENT. THE REPORT SHALL CONTAIN ALL FIELD DATA OBTAINED DURING THE PROJECT. TESTING BY THE CONTRACTOR'S INDEPENDENT CORROSION ENGINEER SHALL CONSIST OF BUT MAY NOT BE LIMITED TO THE TESTING LISTED ABOVE.

**BASELINE SURVEY**

SIX (6) TO TWELVE (12) MONTHS AFTER THE PIPELINE HAS BEEN INSTALLED THE CONTRACTOR SHALL, UNDER ITEM 638 WATERWORK MISC.: CATHODIC PROTECTION FOR WATER MAINS, PERFORM A BASELINE SURVEY. THE BASELINE SURVEY SHALL BE CONDUCTED BY THE CORROSION ENGINEERING FIRM. AFTER COMPLETION OF THE SURVEY, THE CONTRACTOR, CORROSION ENGINEER, SHALL SUBMIT SIX (6) BOUND COPIES OF THE SURVEY REPORT, SIGNED BY THE CORROSION ENGINEER, TO THE CITY. THIS REPORT SHALL CONTAIN: ALL FIELD DATA OBTAINED DURING THE SURVEY; ANALYSIS OF THE DATA OBTAINED; AND ANY RECOMMENDATIONS FOR MAINTENANCE OF THE CATHODIC PROTECTION SYSTEM INSTALLED AND OF THE PIPELINE.

**PAYMENT**

(A) PAYMENT FOR CATHODIC PROTECTION UNDER "ITEM 638 WATERWORK MISC.: CATHODIC PROTECTION FOR WATER MAINS" BE MADE ON A LUMP SUM BASIS FOR EACH OF THE FOLLOWING COMPONENTS: (1) GEOTECHNICAL SURVEY; (2) GALVANIC ANODE CELL (SACRIFICIAL ANODE) SYSTEM; AND (3) BASELINE SURVEY.

(B) THE CONTRACTOR SHALL FURNISH BID PRICES FOR EACH OF THE ITEMS INDICATED IN PARAGRAPH (A). FAILURE TO PROVIDE A BID PRICE FOR ANY OF THESE ITEMS MAY BE CAUSE FOR REJECTION OF THE BID.

DESIGN AGENCY

Michael Baker INTERNATIONAL

DESIGNER

REVIEWER

PROJECT ID

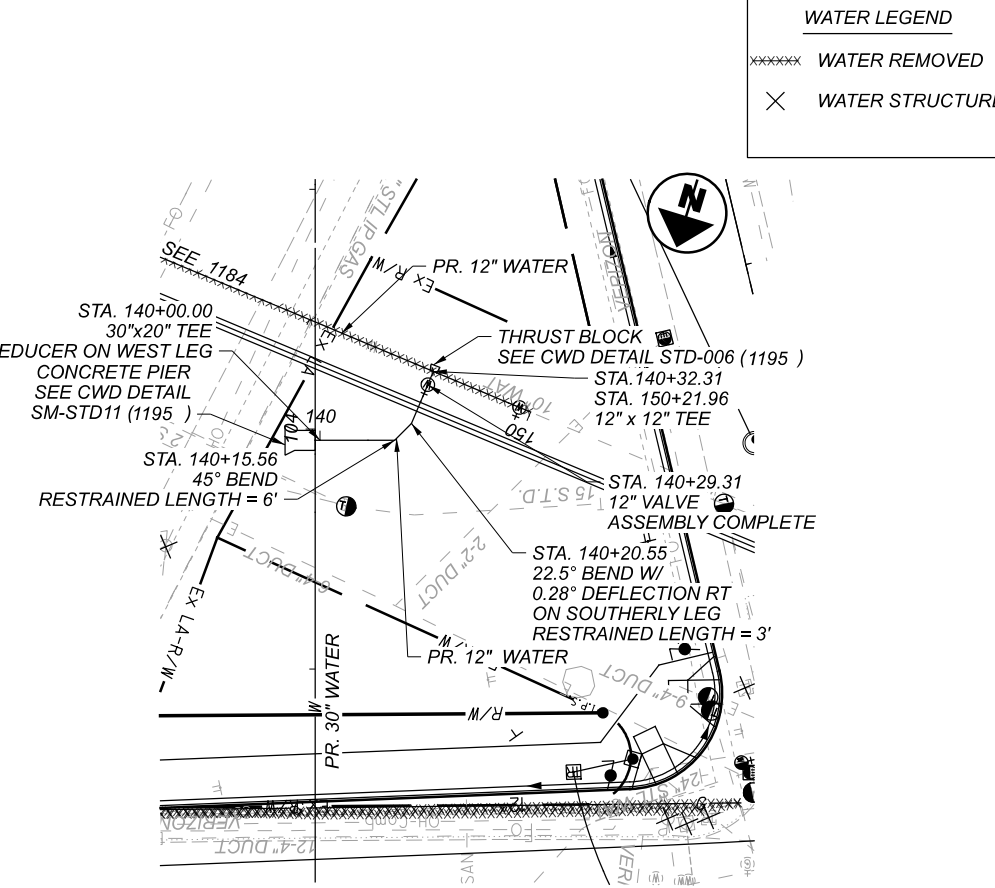
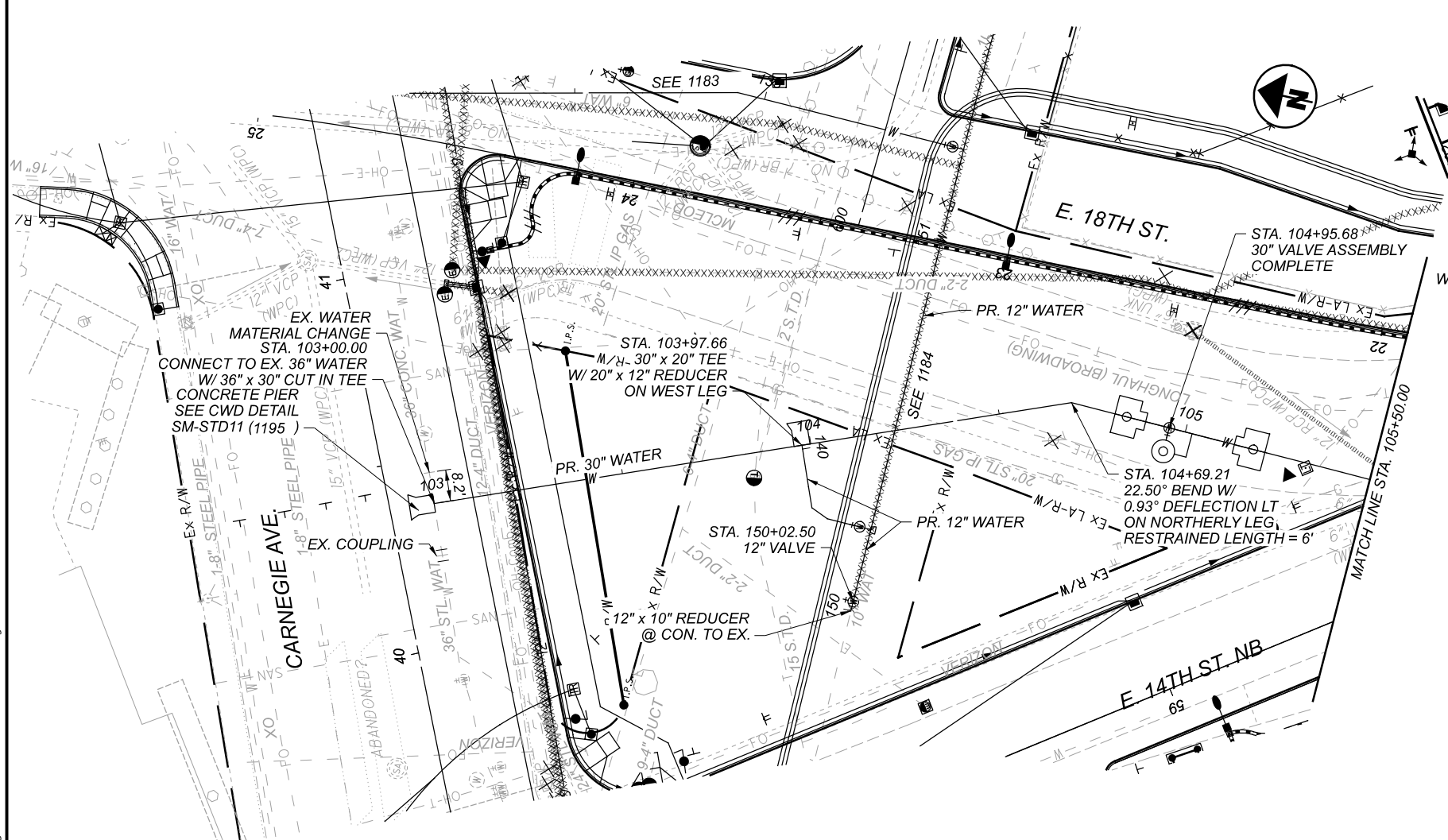
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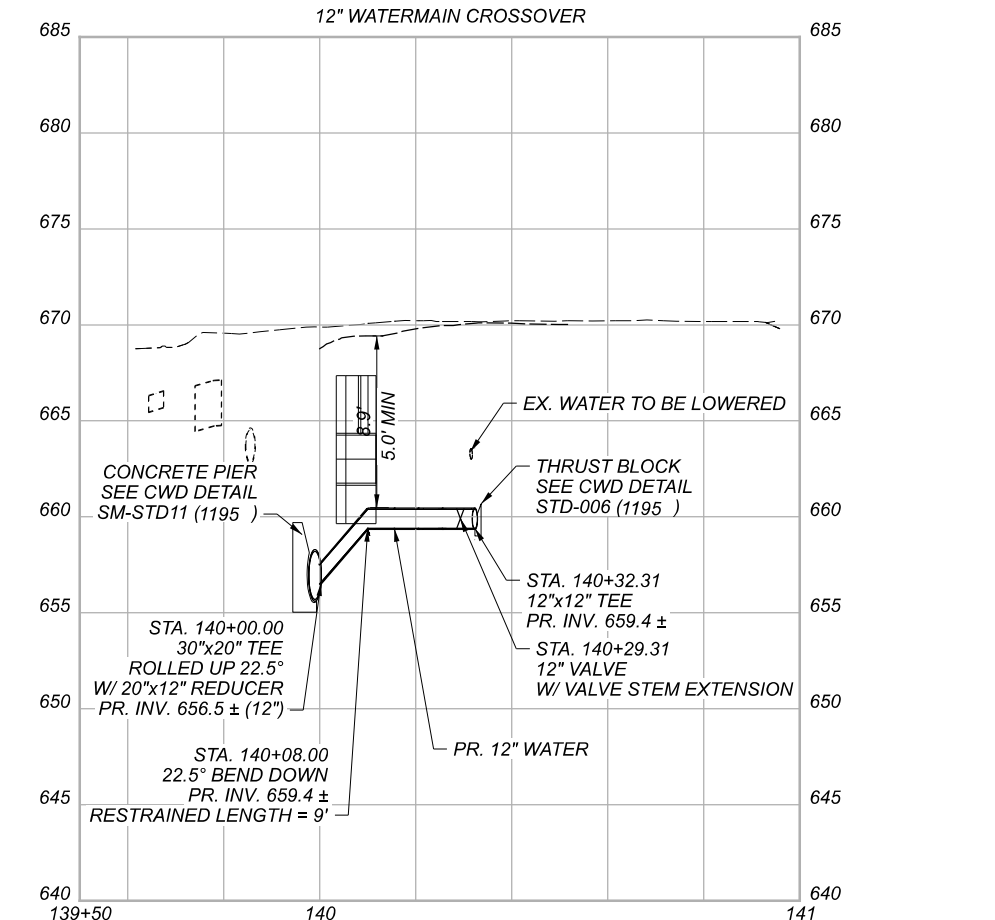
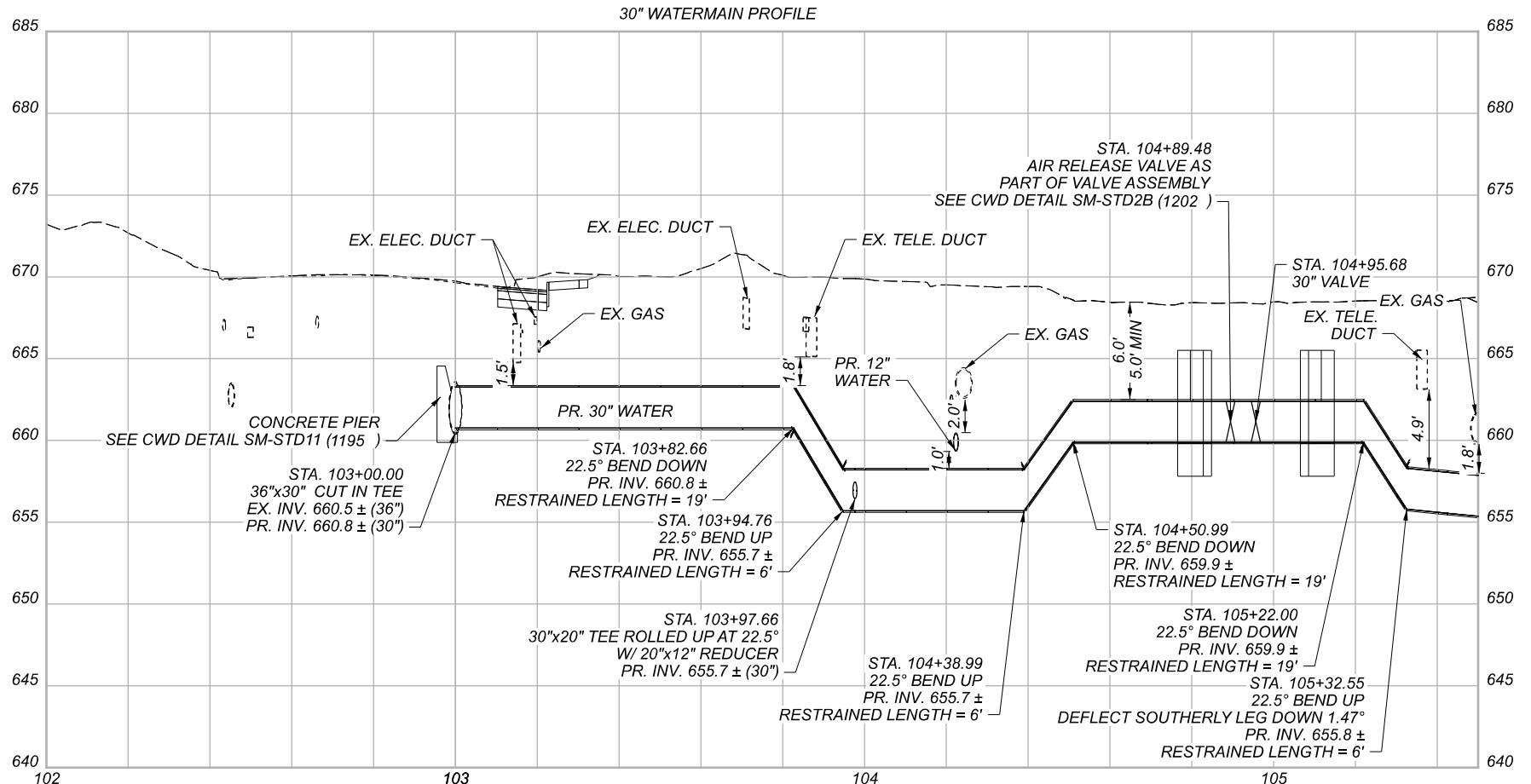
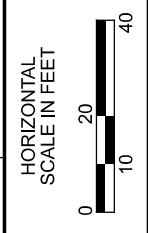
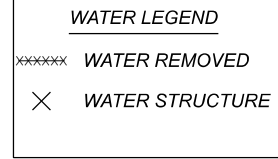
TOTAL

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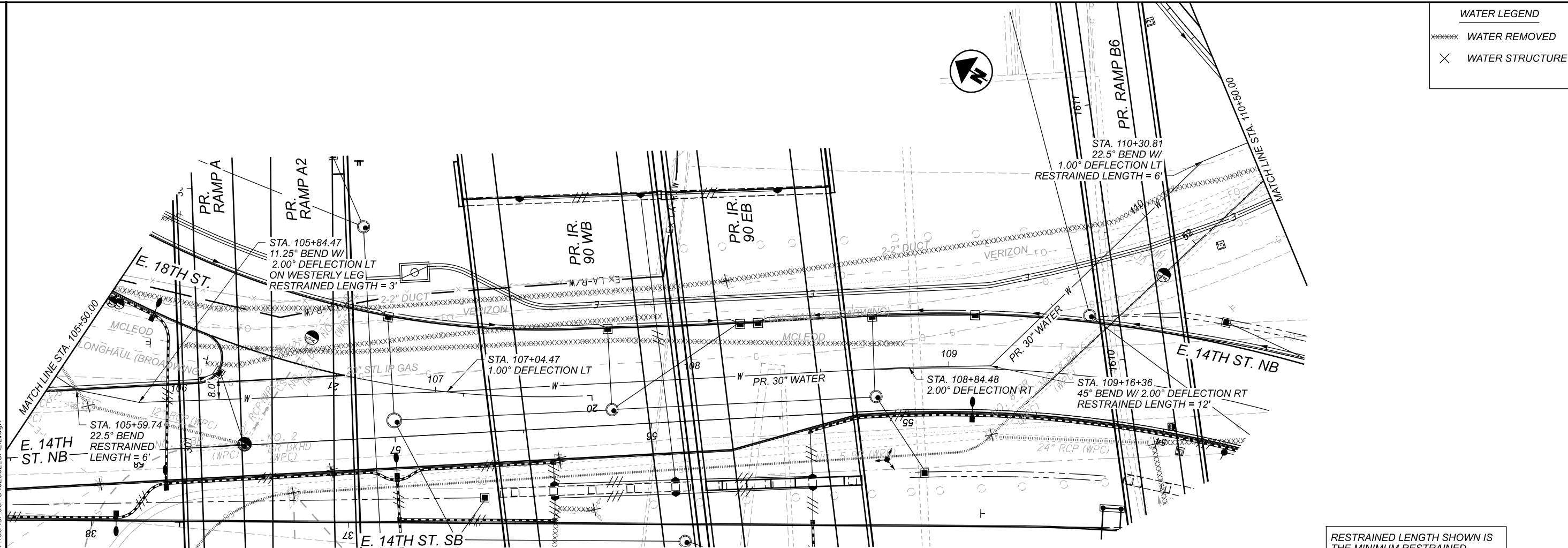


RESTRAINED LENGTH SHOWN IS THE MINIMUM RESTRAINED LENGTH FOR EACH SIDE OF BEND.



30" WATERLINE PLAN AND PROFILE (E. 18TH ST./COMMUNITY COLLEGE AVE.)  
 BEGIN TO STA. 105+50.00

DESIGN AGENCY	
Michael Baker INTERNATIONAL	
DESIGNER	
REVIEWER	
PROJECT ID	82382
SHEET	TOTAL
1179	2339



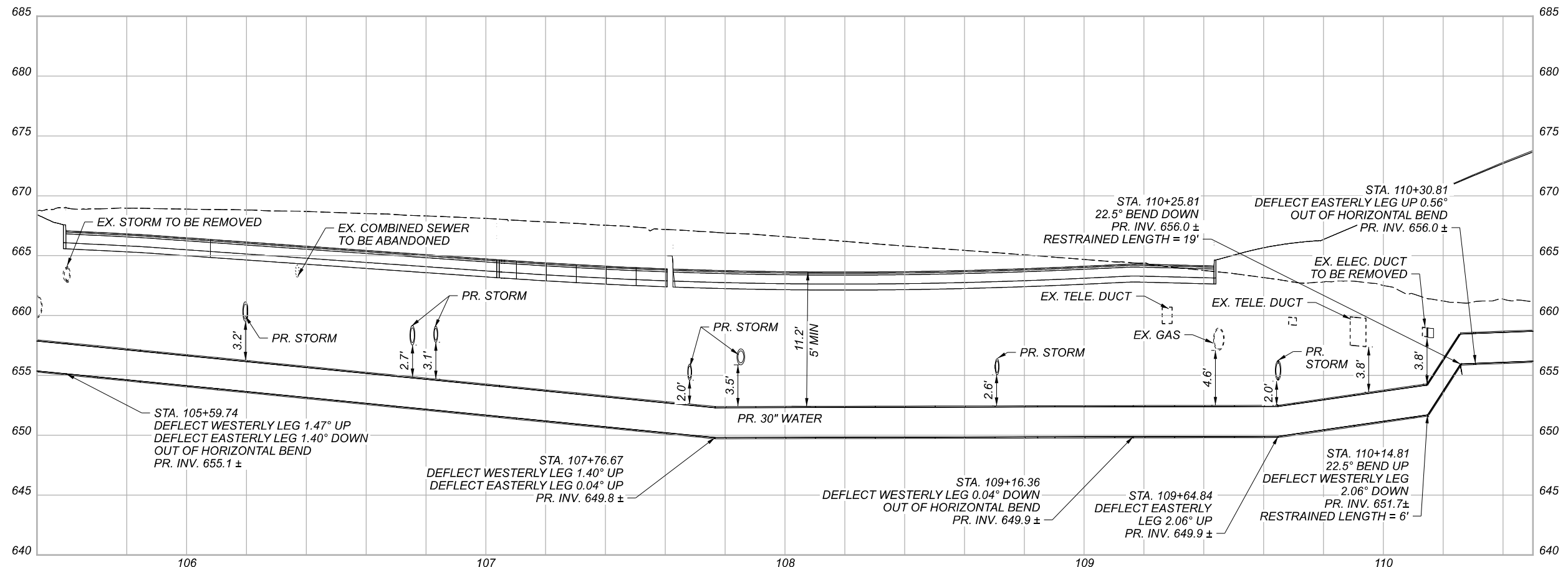
**WATER LEGEND**

- XXXXX WATER REMOVED
- X WATER STRUCTURE

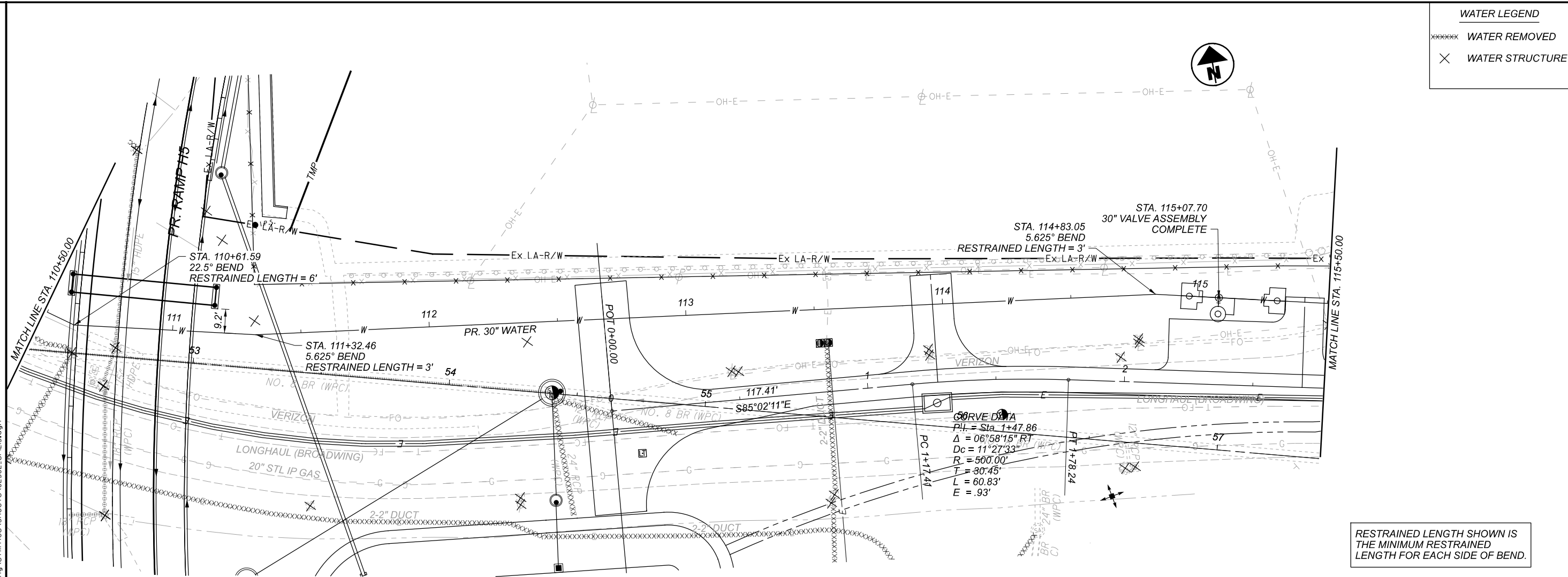


**30" WATERLINE PLAN AND PROFILE (E. 18TH ST./COMMUNITY COLLEGE AVE.)  
STA. 105+50.00 TO STA. 110+50.00**

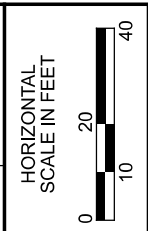
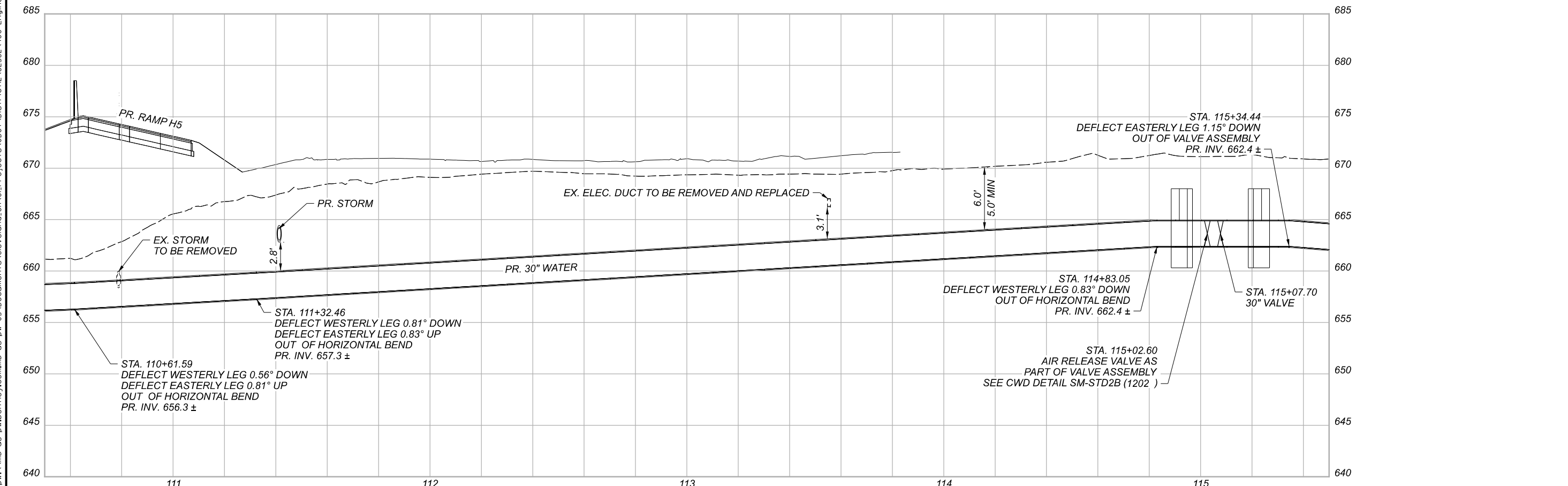
RESTRAINED LENGTH SHOWN IS THE MINIMUM RESTRAINED LENGTH FOR EACH SIDE OF BEND.



DESIGN AGENCY	
<b>Michael Baker</b> INTERNATIONAL	
DESIGNER	
REVIEWER	
PROJECT ID	82382
SHEET	TOTAL
1180	2339

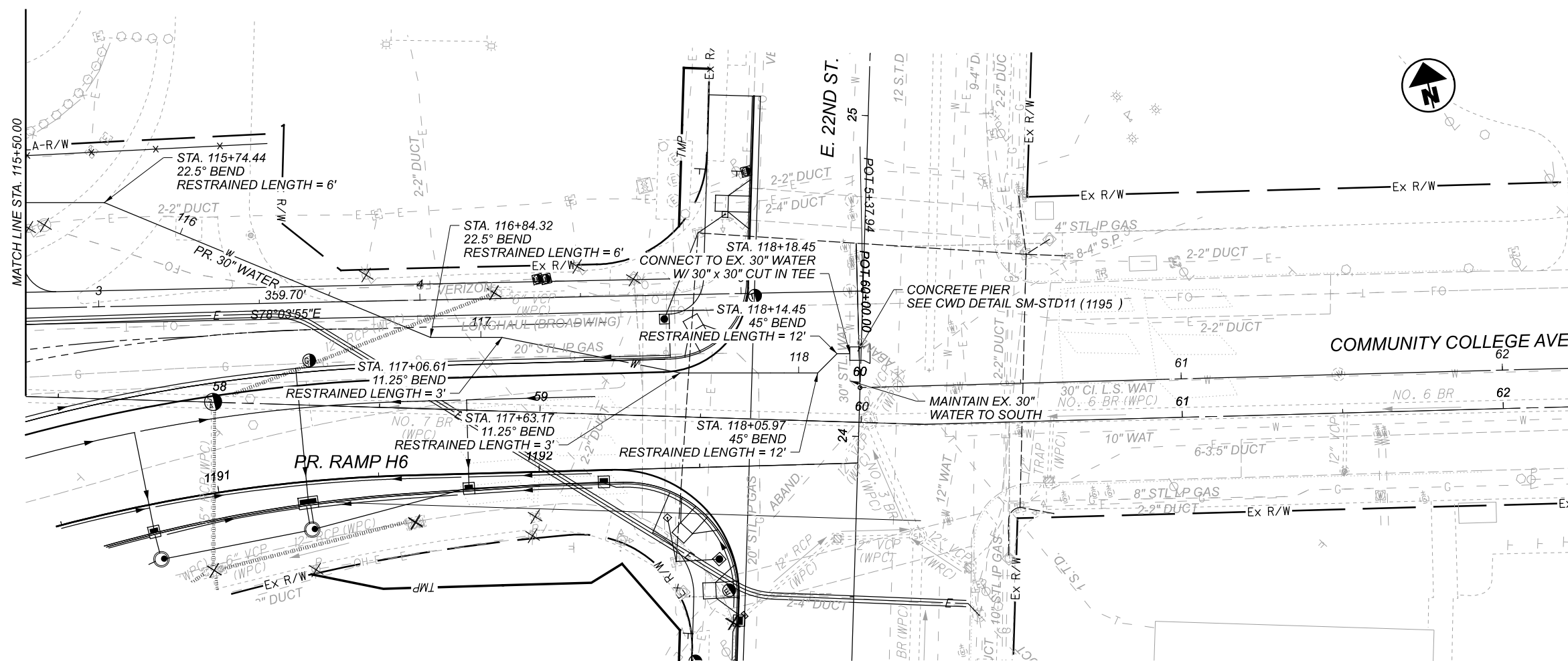


RESTRAINED LENGTH SHOWN IS THE MINIMUM RESTRAINED LENGTH FOR EACH SIDE OF BEND.



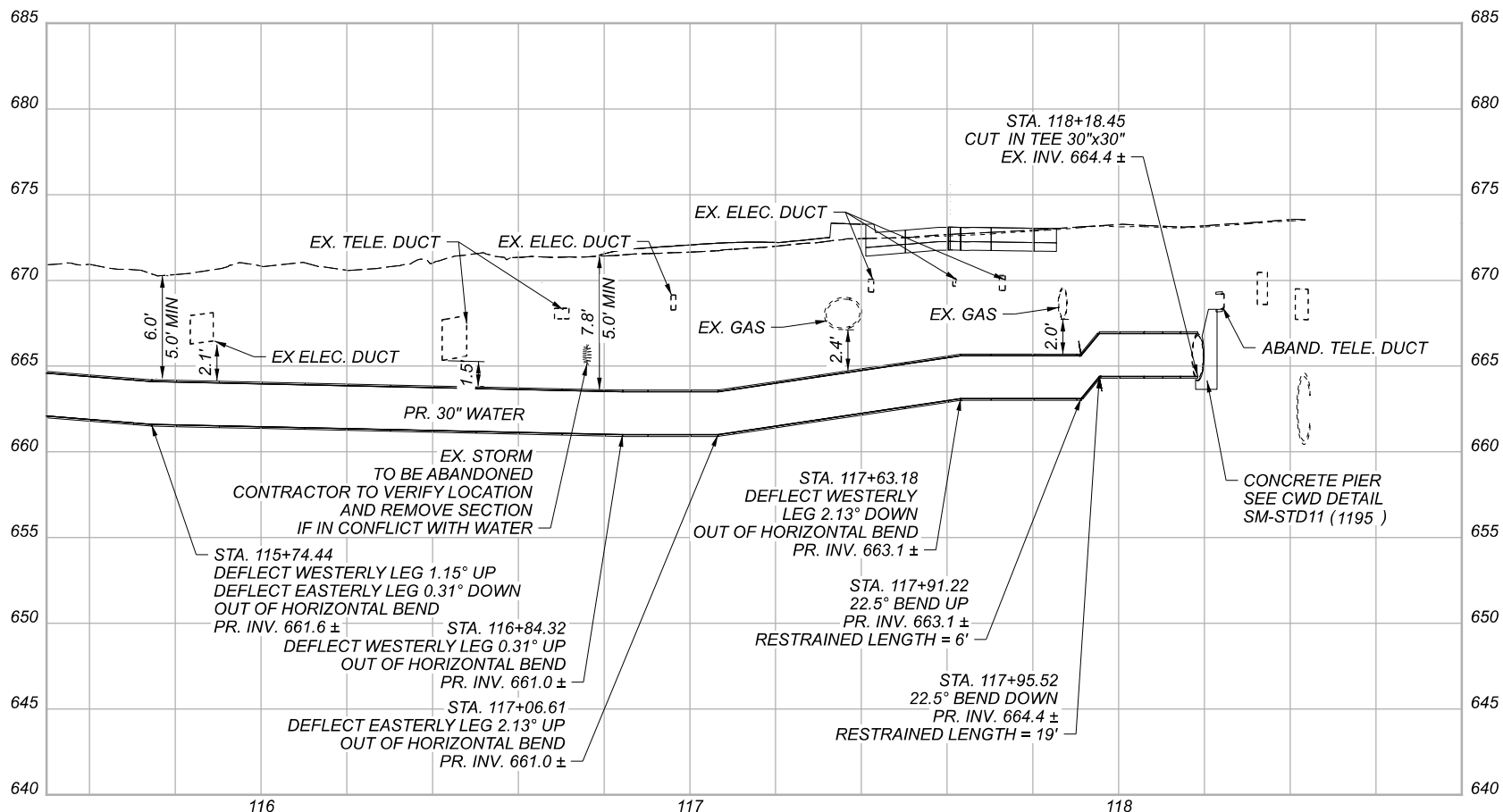
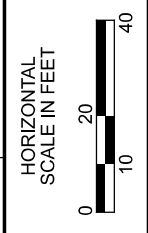
30" WATERLINE PLAN AND PROFILE (E.18TH ST./COMMUNITY COLLEGE AVE.)  
 STA. 110+50.00 TO STA. 115+50.00

DESIGN AGENCY	
Michael Baker INTERNATIONAL	
DESIGNER	
REVIEWER	
PROJECT ID	82382
SHEET	TOTAL
1181	2339



**WATER LEGEND**

XXXXX	WATER REMOVED
X	WATER STRUCTURE

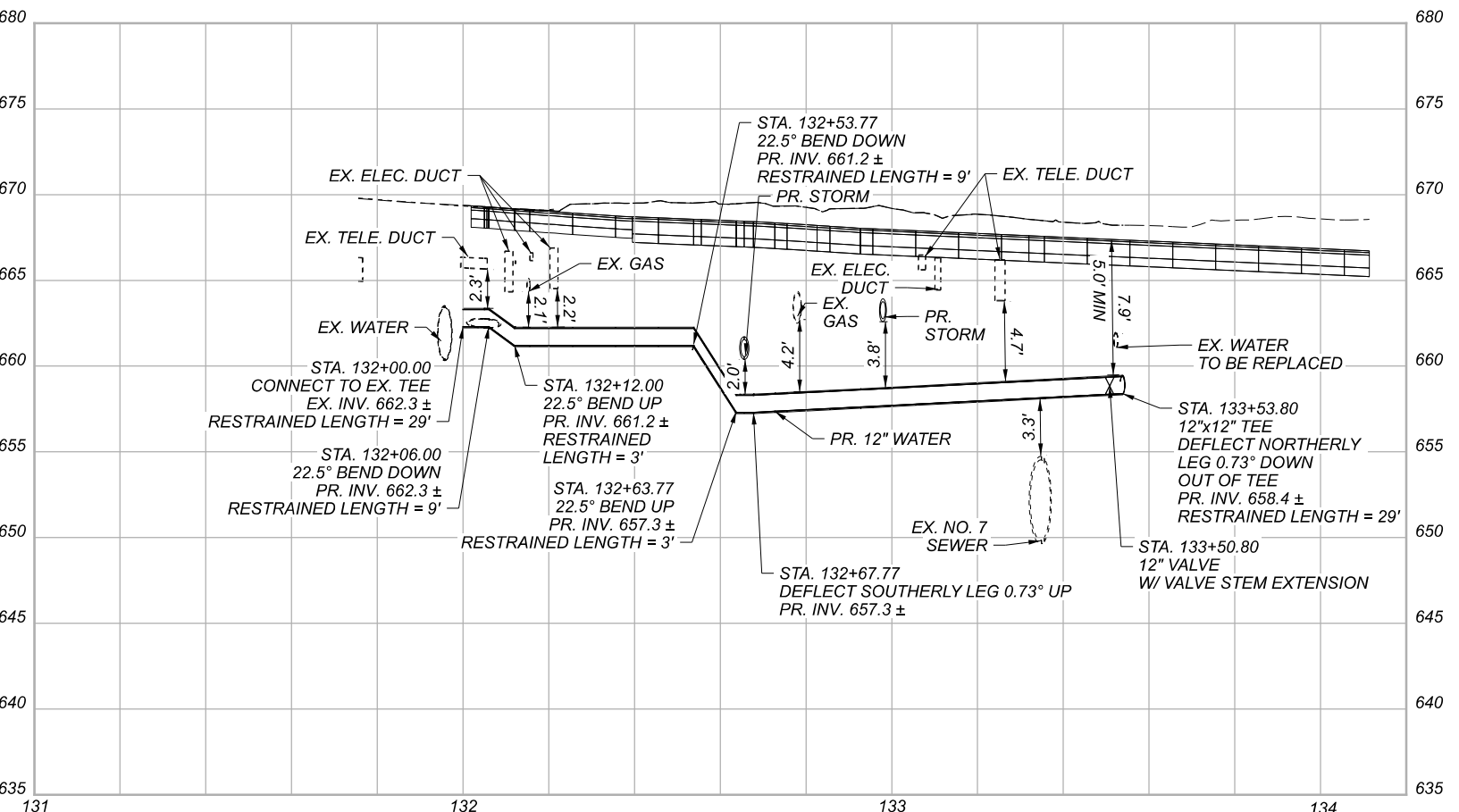
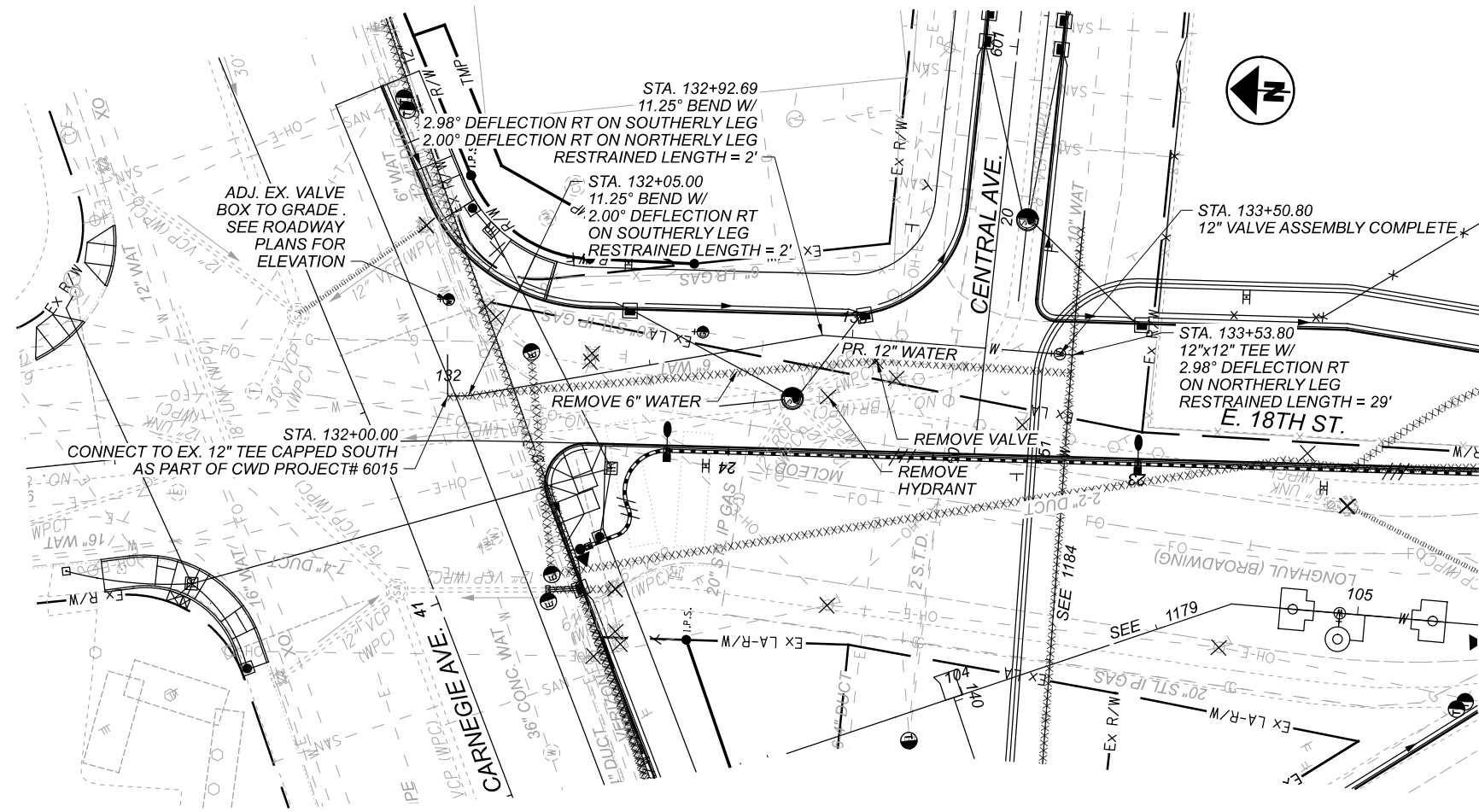


RESTRAINED LENGTH SHOWN IS THE MINIMUM RESTRAINED LENGTH FOR EACH SIDE OF BEND.

30" WATERLINE PLAN AND PROFILE (E. 18TH ST./COMMUNITY COLLEGE AVE.)  
 STA. 115+50.00 TO END

DESIGN AGENCY	
<b>Michael Baker INTERNATIONAL</b>	
DESIGNER	
REVIEWER	
PROJECT ID	82382
SHEET	TOTAL
1182	2339





**WATER LEGEND**

----- WATER REMOVED

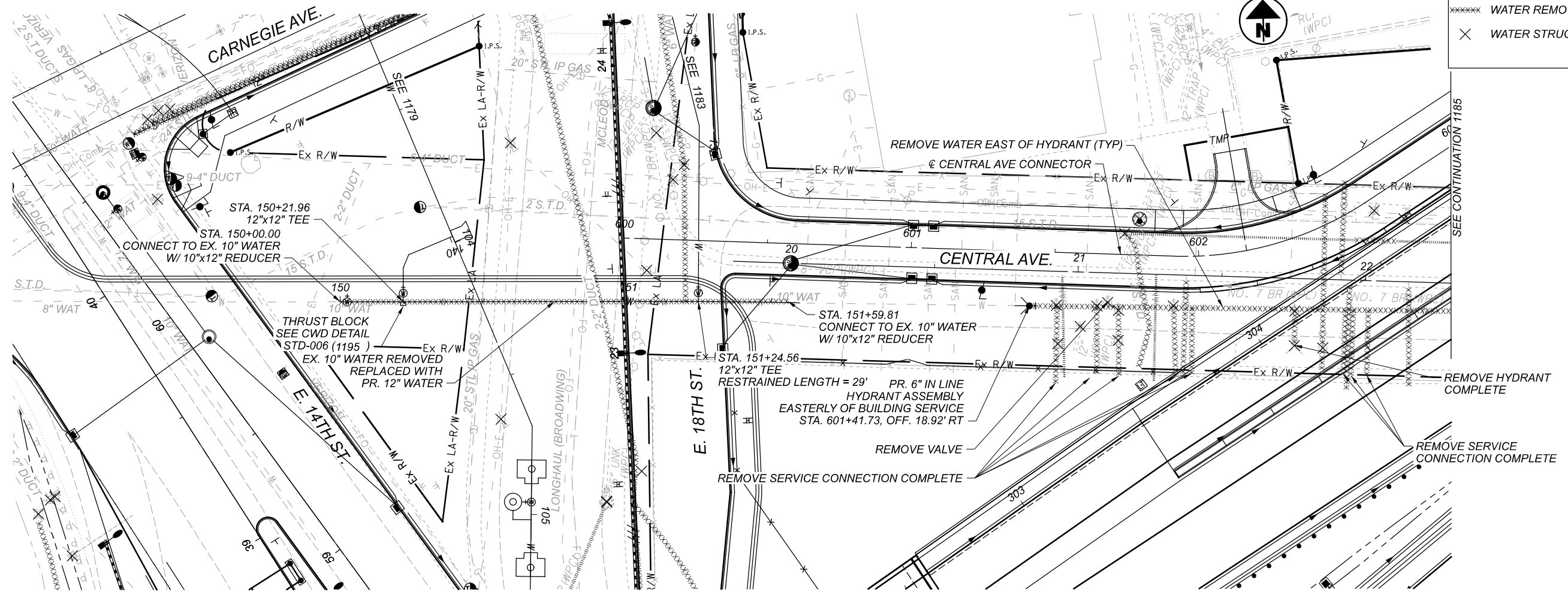
× WATER STRUCTURE



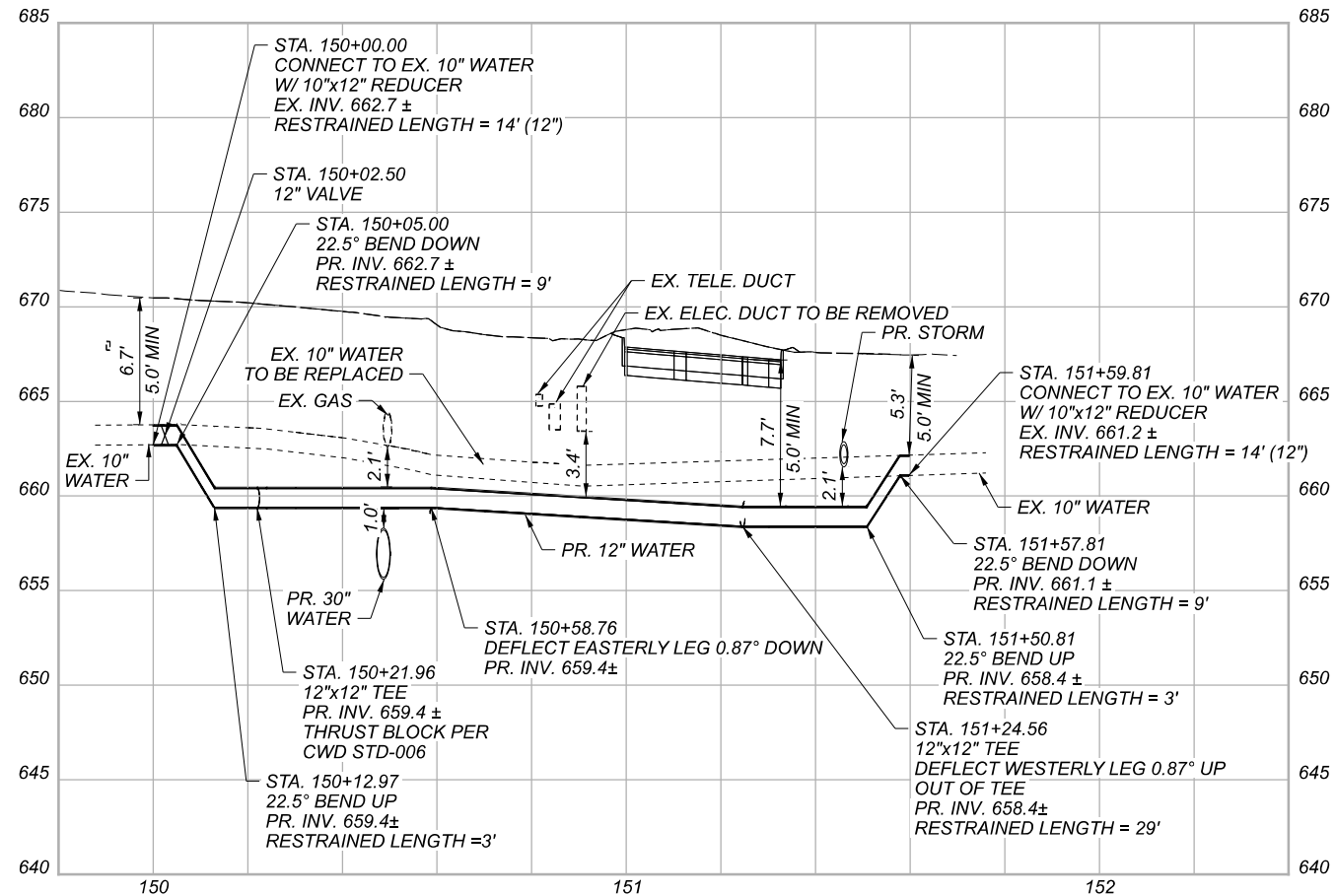
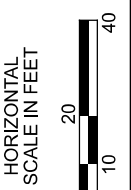
12" WATERLINE PLAN AND PROFILE (E. 18TH ST./CENTRAL AVE.)  
 STA. 130+00.00 TO STA. 133+53.80

DESIGN AGENCY	
Michael Baker INTERNATIONAL	
DESIGNER	
REVIEWER	
PROJECT ID	82382
SHEET	TOTAL
1183	2339

RESTRAINED LENGTH SHOWN IS THE MINIMUM RESTRAINED LENGTH FOR EACH SIDE OF BEND.



**WATER LEGEND**  
 ----- WATER REMOVED  
 X WATER STRUCTURE

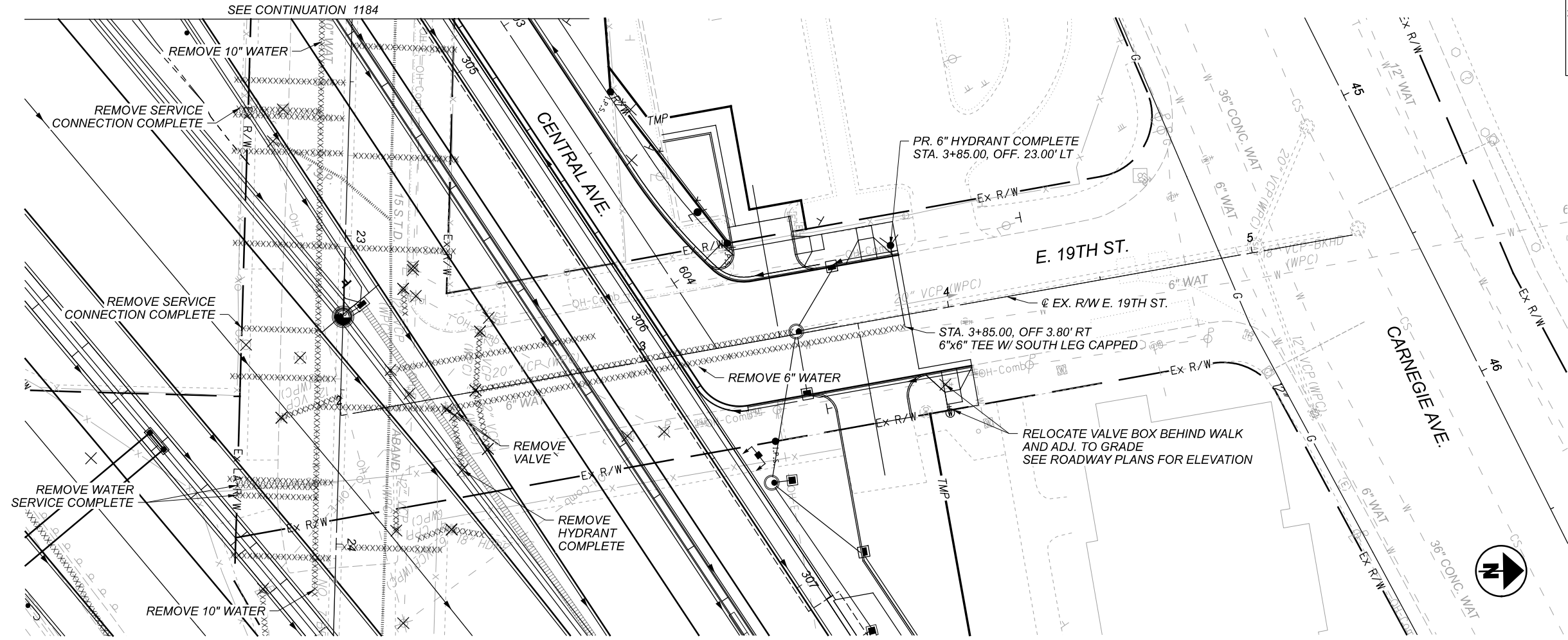


RESTRAINED LENGTH SHOWN IS THE MINIMUM RESTRAINED LENGTH FOR EACH SIDE OF BEND.

**12" WATERLINE PLAN AND PROFILE (CENTRAL AVE. AT E. 18TH ST.)**  
 STA. 150+00.00 TO STA. 151+59.81

DESIGN AGENCY	
<b>Michael Baker</b>	INTERNATIONAL
DESIGNER	
REVIEWER	
PROJECT ID	82382
SHEET	1184
TOTAL	2339





DESIGN AGENCY

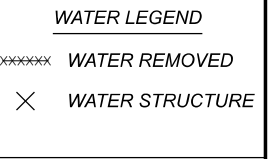
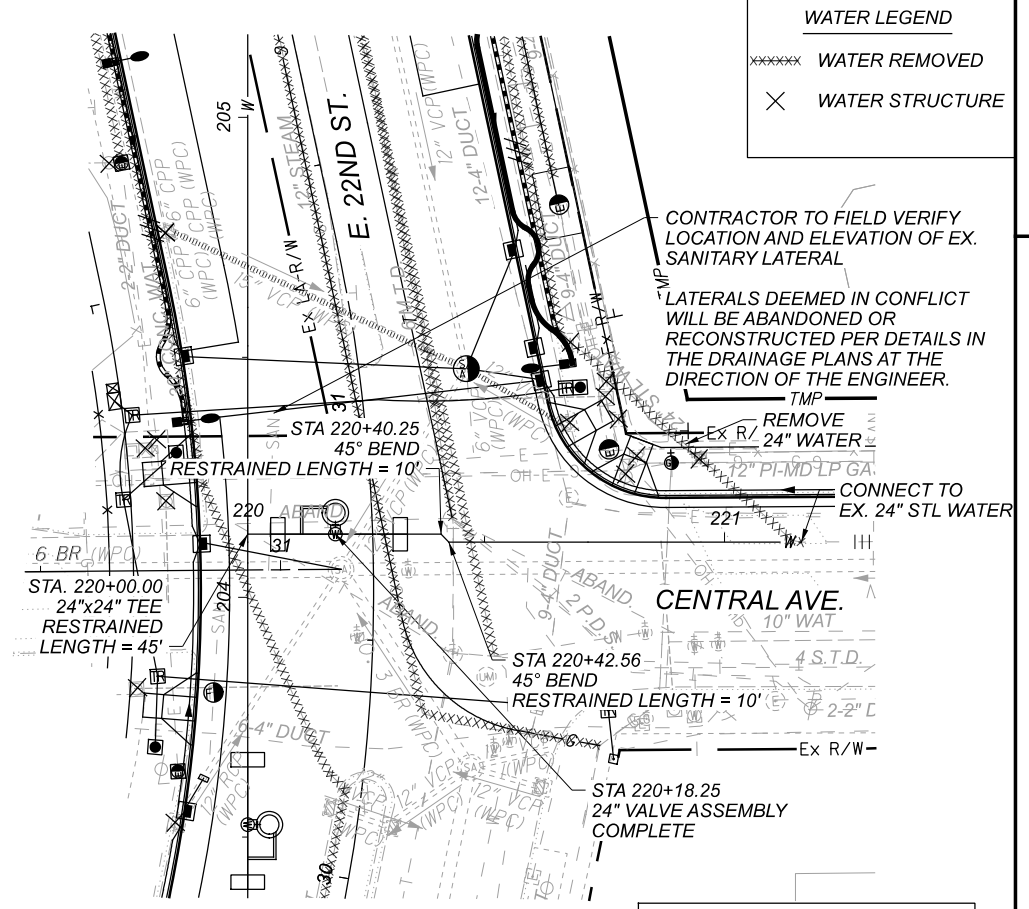
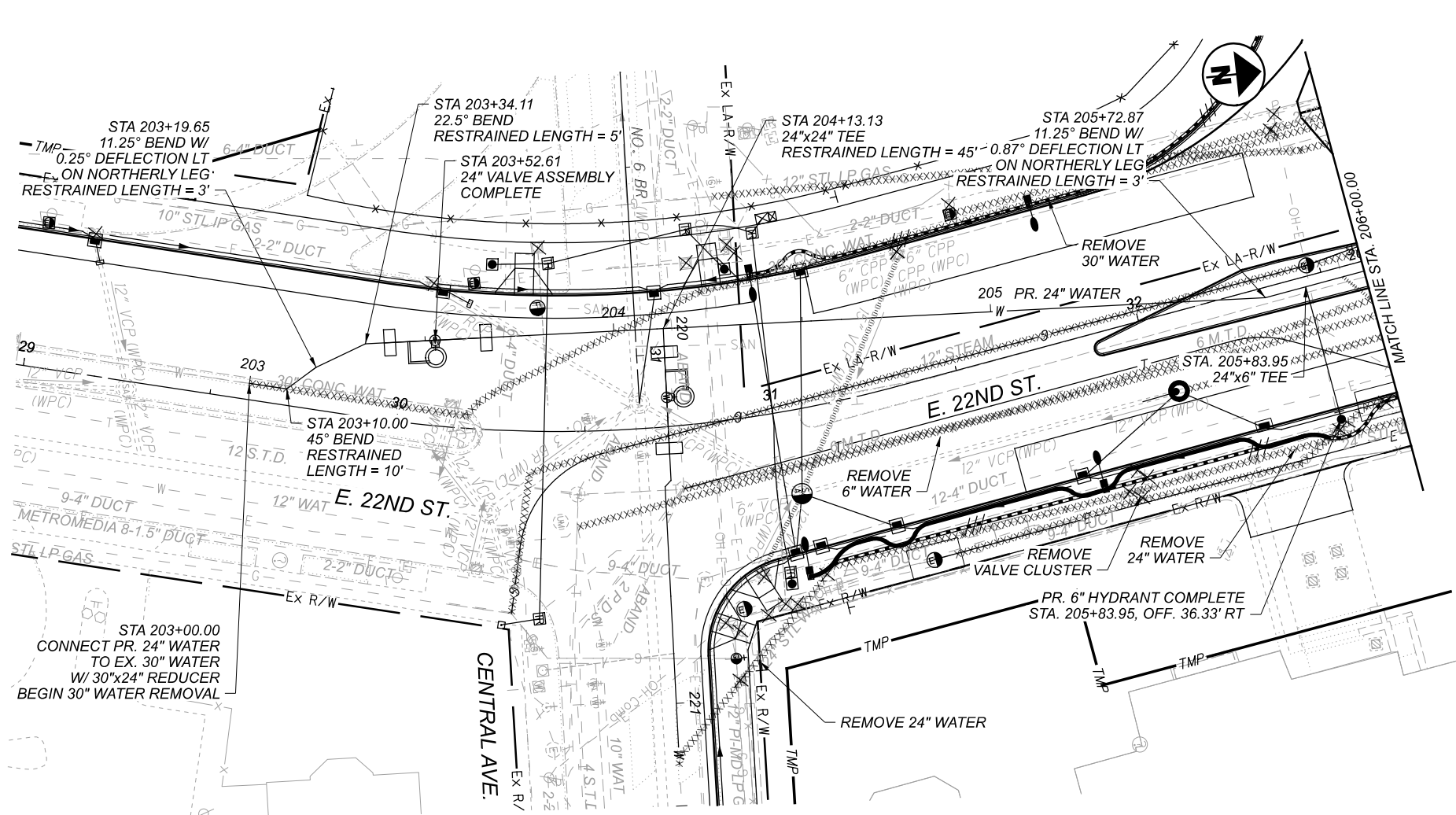
**Michael Baker**  
INTERNATIONAL

DESIGNER

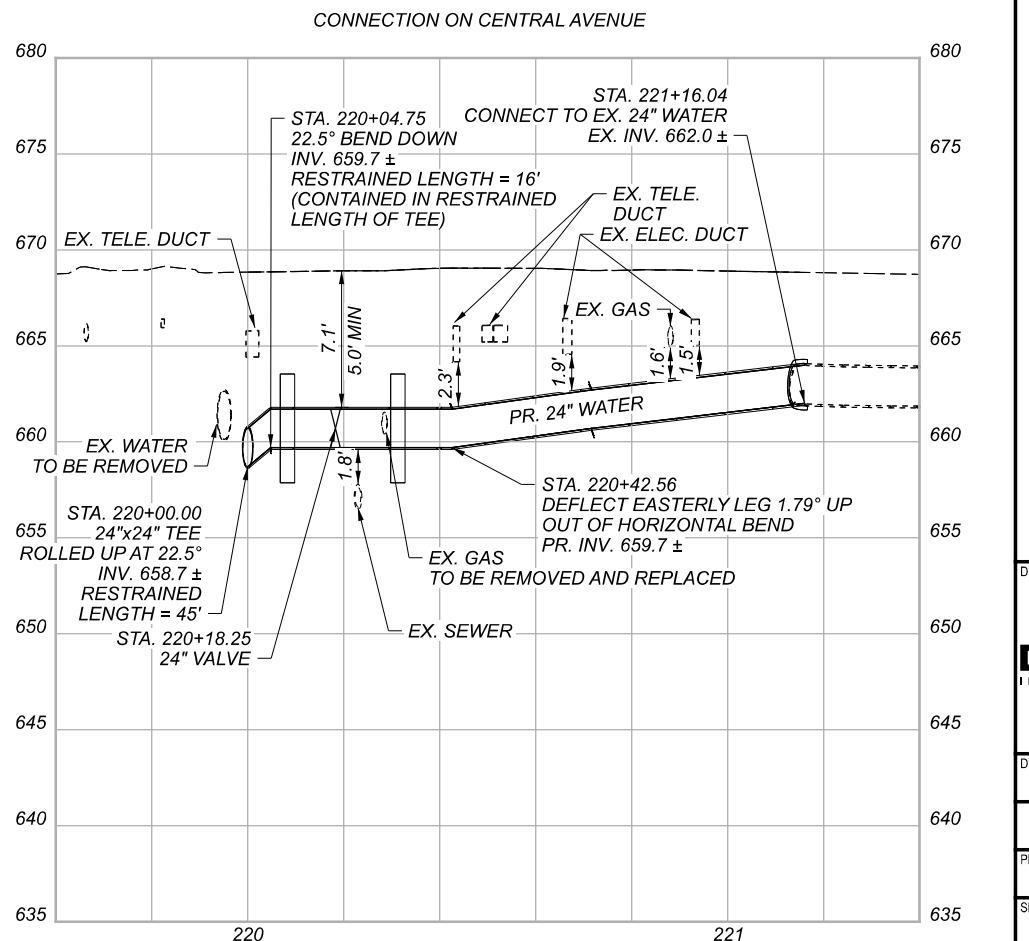
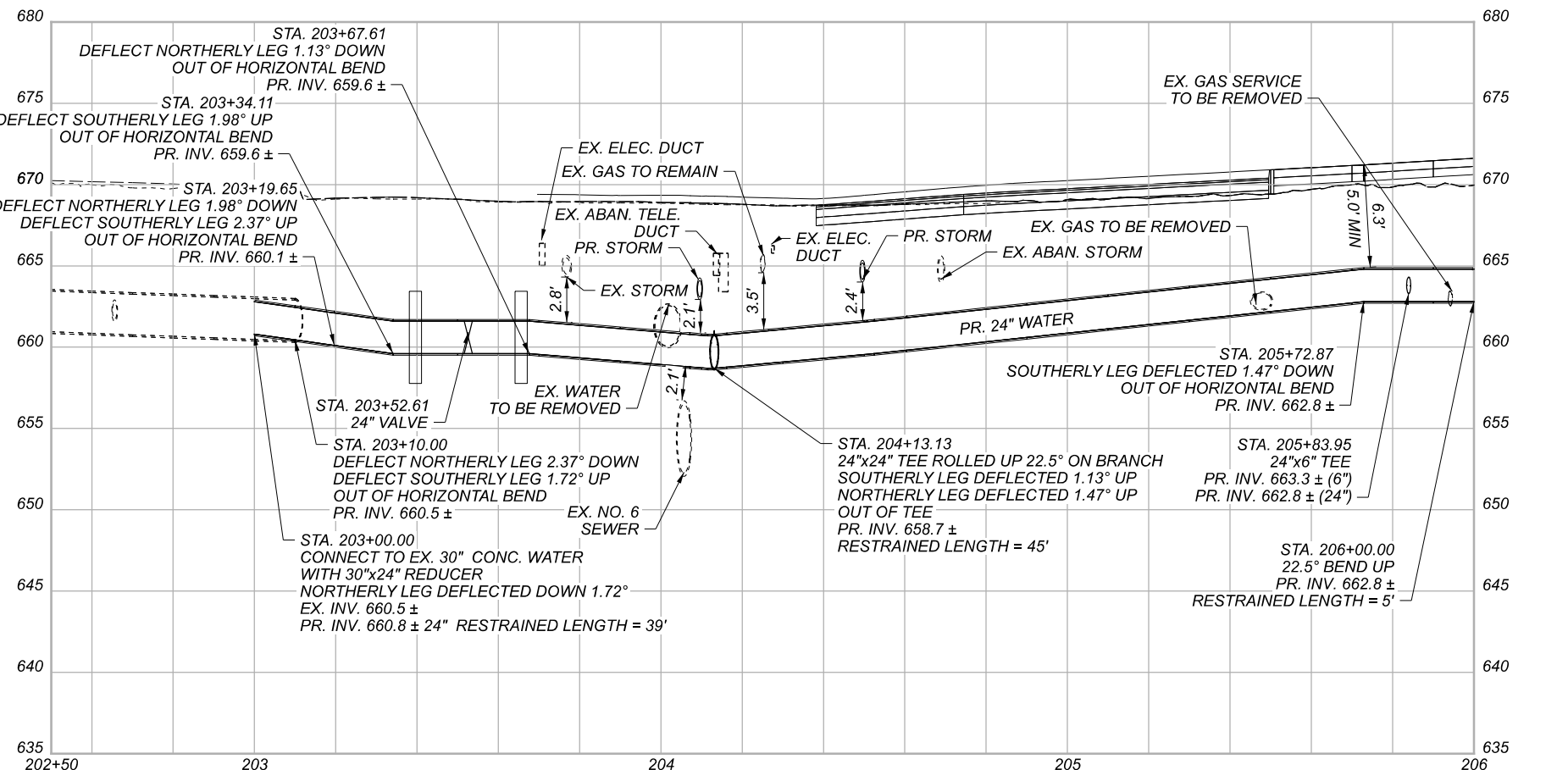
REVIEWER

PROJECT ID  
82382

SHEET TOTAL  
1185 2339

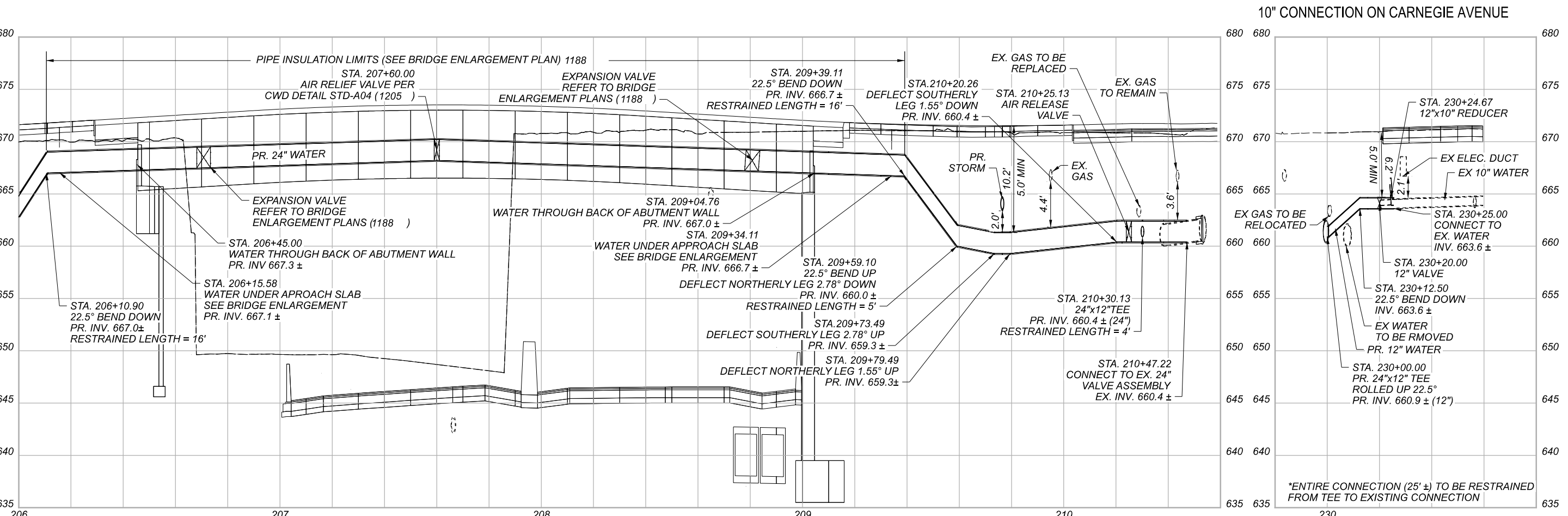
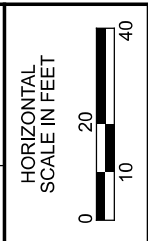
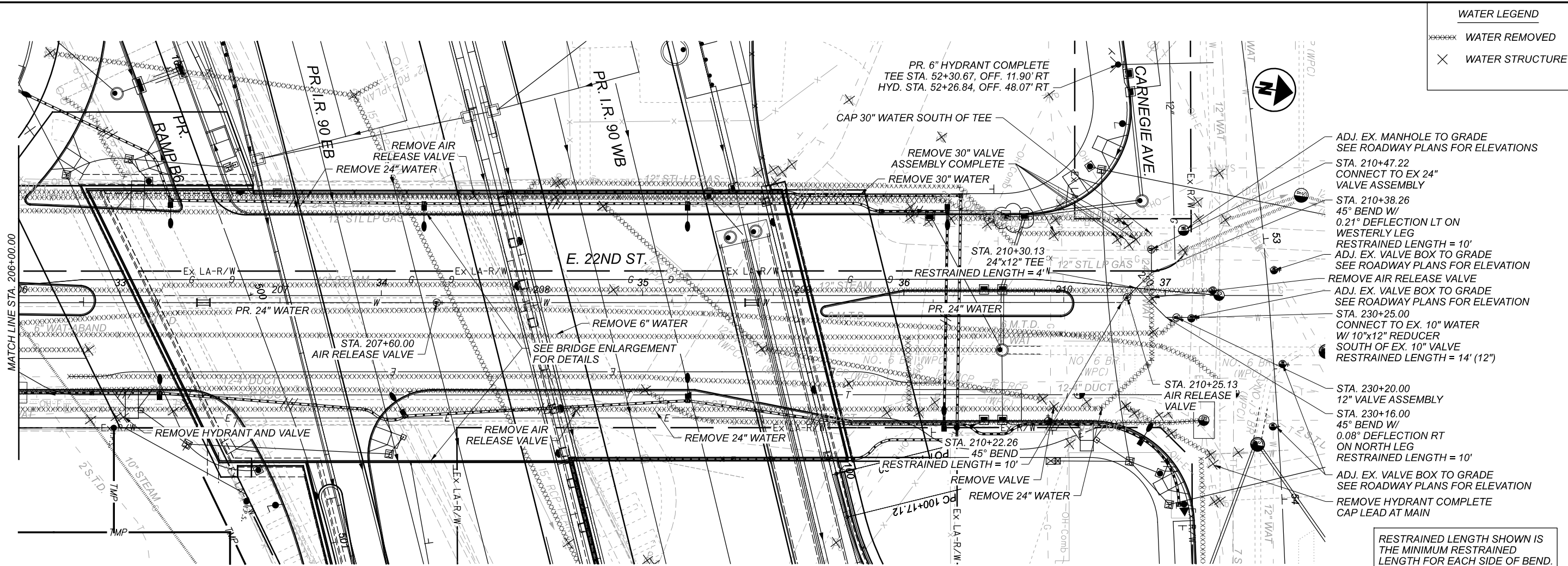


RESTRAINED LENGTH SHOWN IS THE MINIMUM RESTRAINED LENGTH FOR EACH SIDE OF BEND.



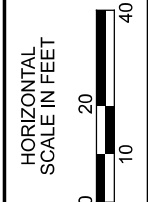
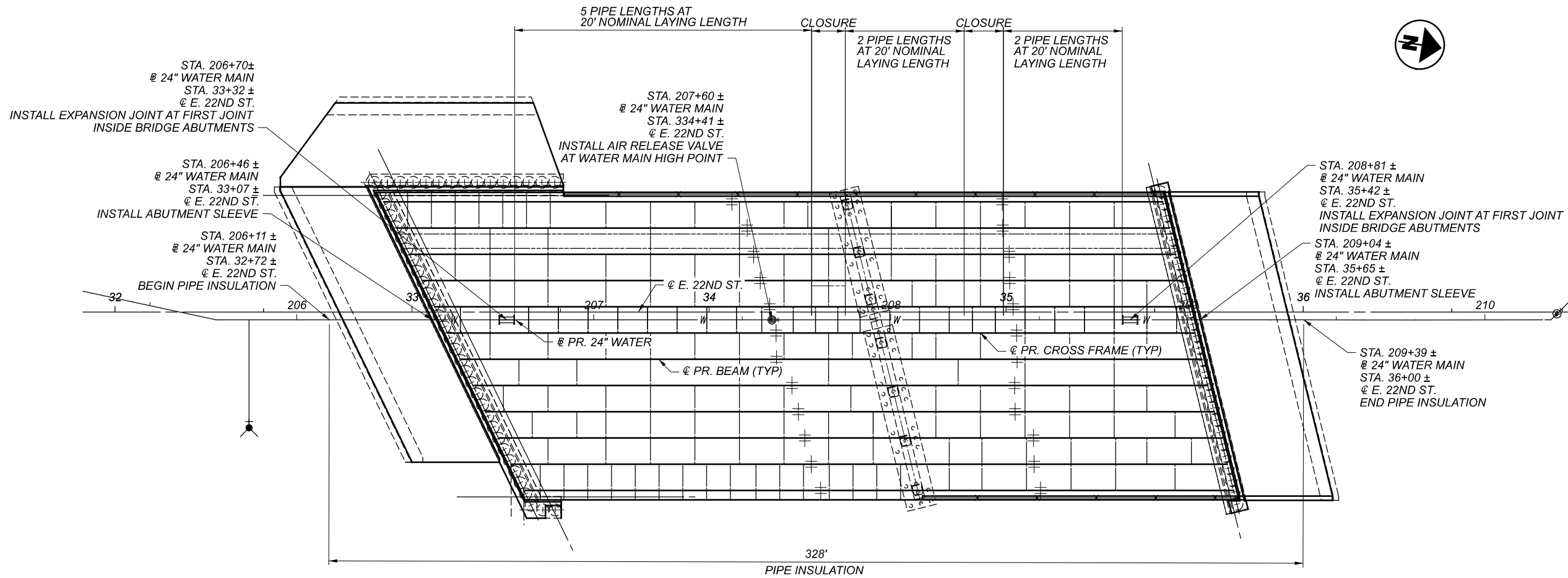
24" WATERLINE PLAN AND PROFILE (E. 22ND ST./ CENTRAL AVE.)  
 STA. 202+50.00 TO STA. 206+00.00

DESIGN AGENCY	
DESIGNER	
REVIEWER	
PROJECT ID	82382
SHEET	1186
TOTAL	2339



**24" WATERLINE PLAN AND PROFILE (E. 22ND ST. / CARNEGIE AVE.)**  
 STA. 206+00.00 TO STA. 210+47.22

DESIGN AGENCY	
Michael Baker INTERNATIONAL	
DESIGNER	
REVIEWER	
PROJECT ID	82382
SHEET	1187
TOTAL	2339



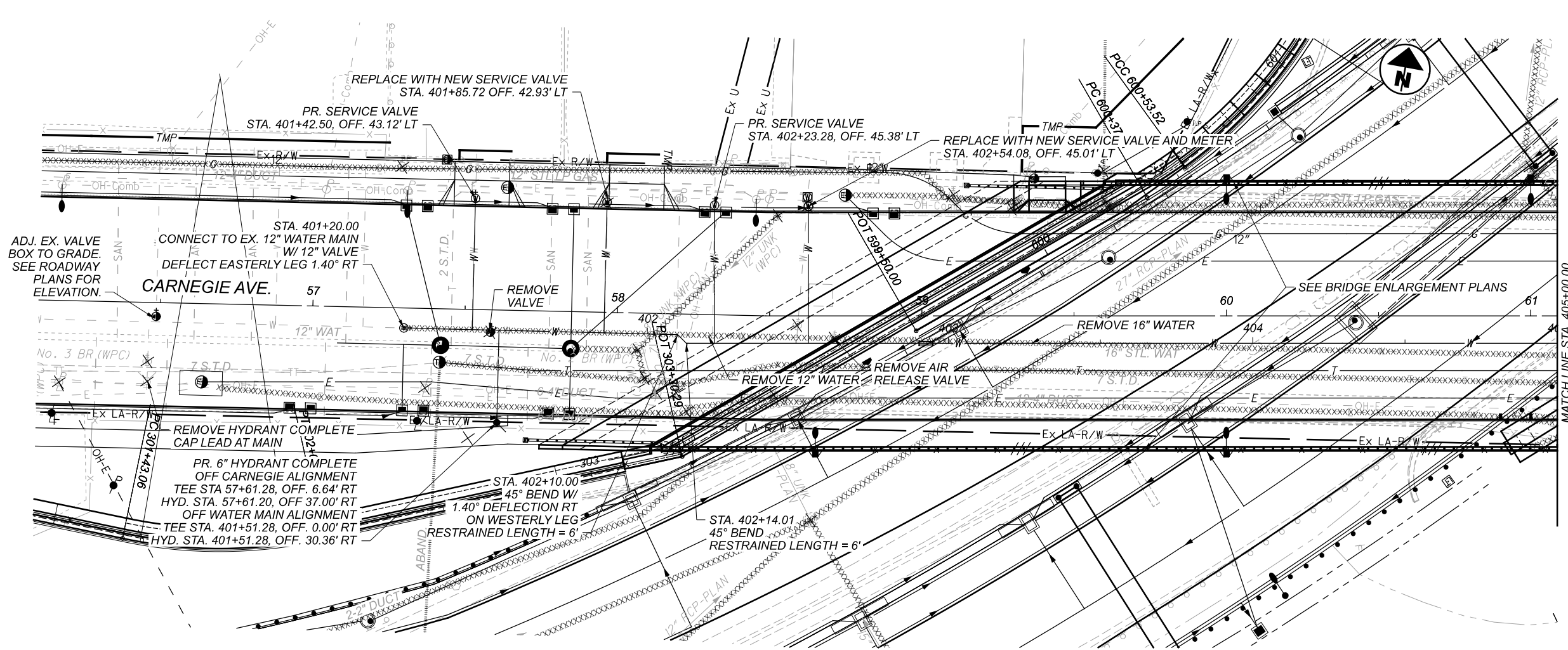
WATER WORK PLAN - E. 22ND ST.  
 BRIDGE 13 ENLARGEMENT PLAN

NOTE:  
 CONTRACTOR TO PROVIDE A LAYOUT PLAN  
 FOR THE WATERMAIN PRIOR TO  
 COMMENCING WORK ON THE BRIDGE

DESIGN AGENCY	
DESIGNER	
REVIEWER	
PROJECT ID	82382
SHEET	1188
TOTAL	2339

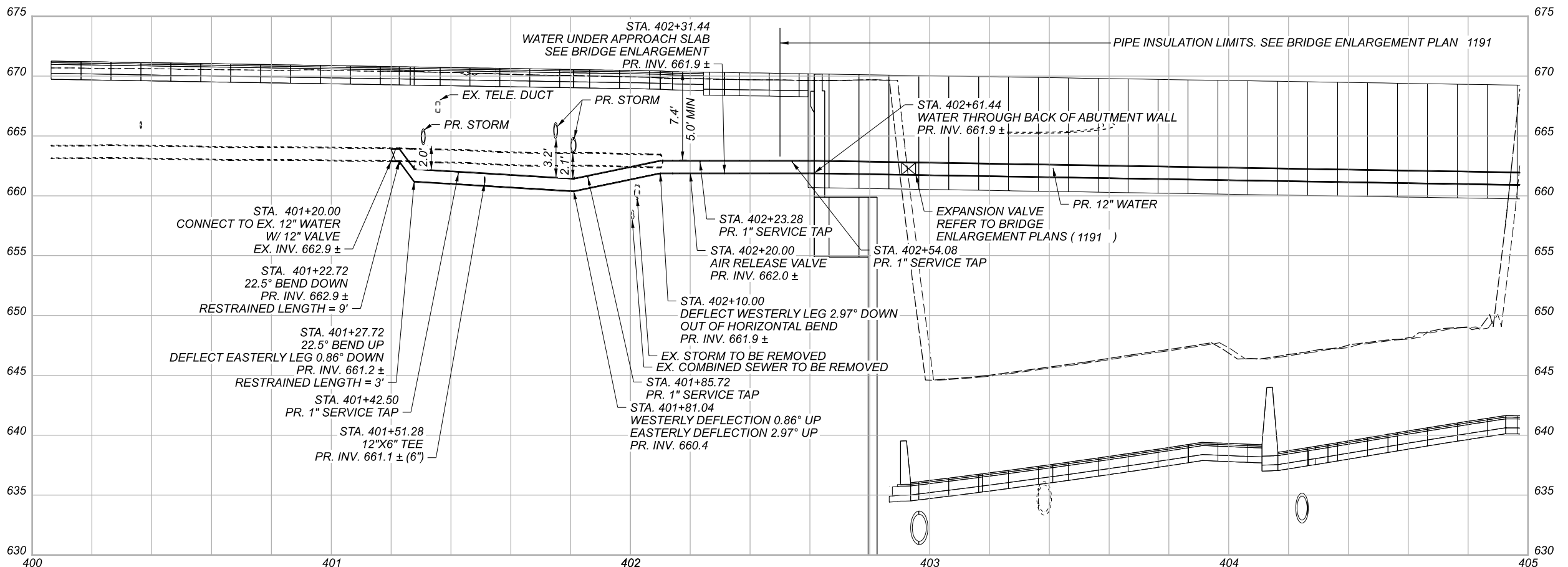


CUY-90-16.28 (CCG3A)  
 MODEL: 82382\_UPI231.PAPER(SIZE: 11x17(in.) DATE: 6/22/2022 TIME: 8:16:28 PM USER: Scott.Pruzin  
 p:\mb-us-pw\benfley\comb-us-pw-03\Documents\Cleveland\_OH\01\_Projects\ODOT\Distric12\82382\_400-Engineering\Utilities\Sheets\82382\_UPI231.dgn



**WATER LEGEND**

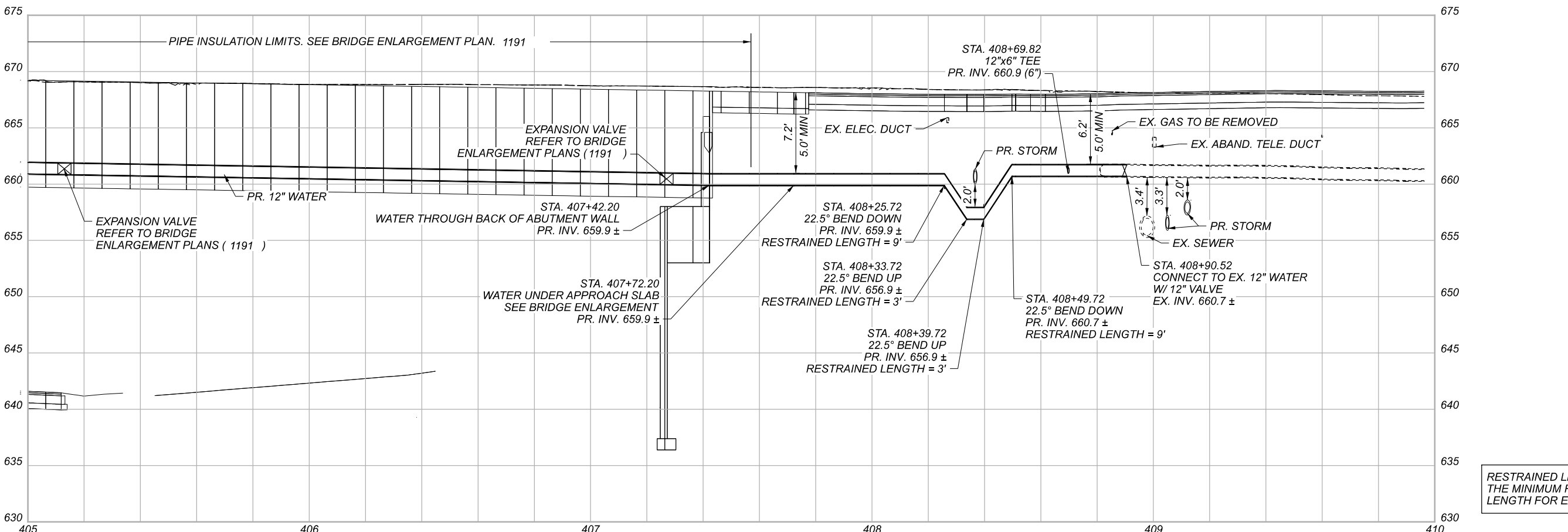
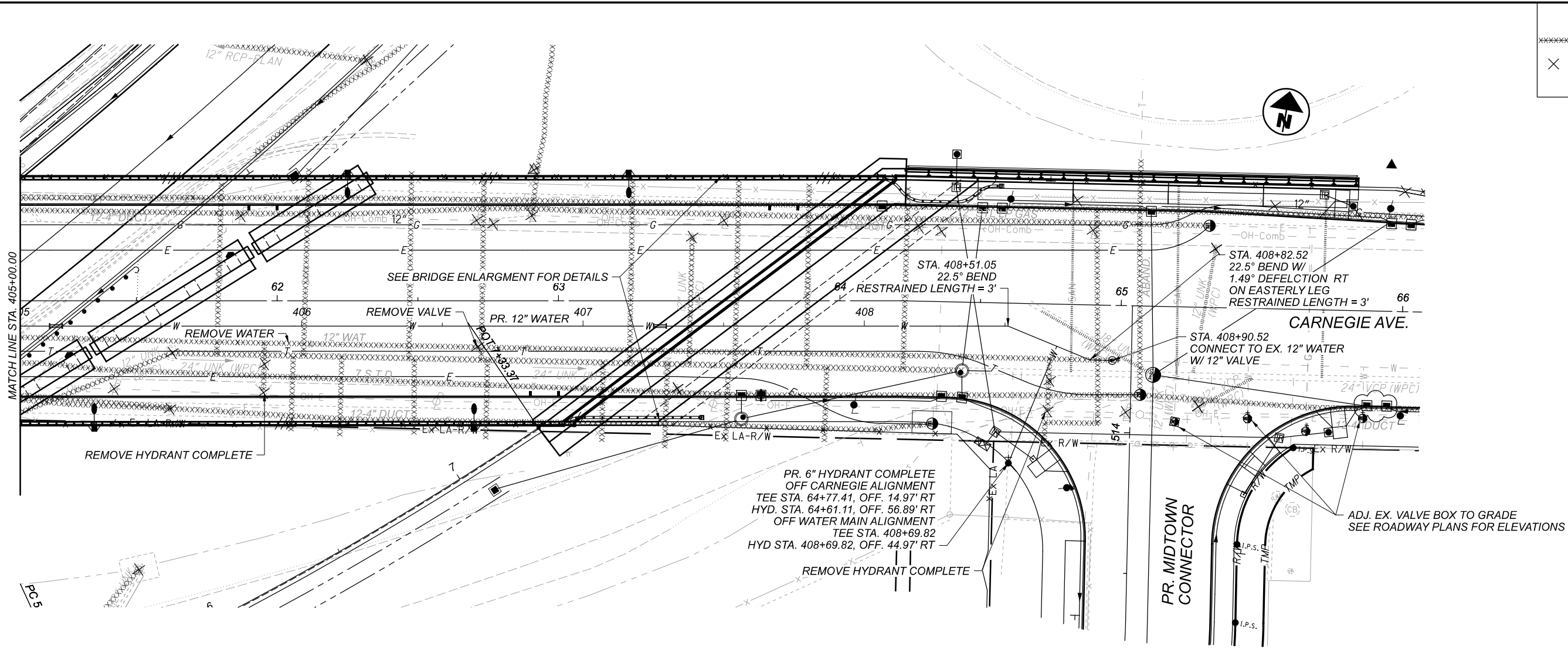
----- WATER REMOVED  
 X WATER STRUCTURE



RESTRAINED LENGTH SHOWN IS THE MINIMUM RESTRAINED LENGTH FOR EACH SIDE OF BEND.

**12" WATERLINE PLAN AND PROFILE (CARNEGIE AVE.)**  
 STA. 400+00.00 TO STA. 405+00.00

DESIGN AGENCY	
<b>Michael Baker INTERNATIONAL</b>	
DESIGNER	
REVIEWER	
PROJECT ID	82382
SHEET TOTAL	1189 2339



**WATER LEGEND**

XXXXXX WATER REMOVED

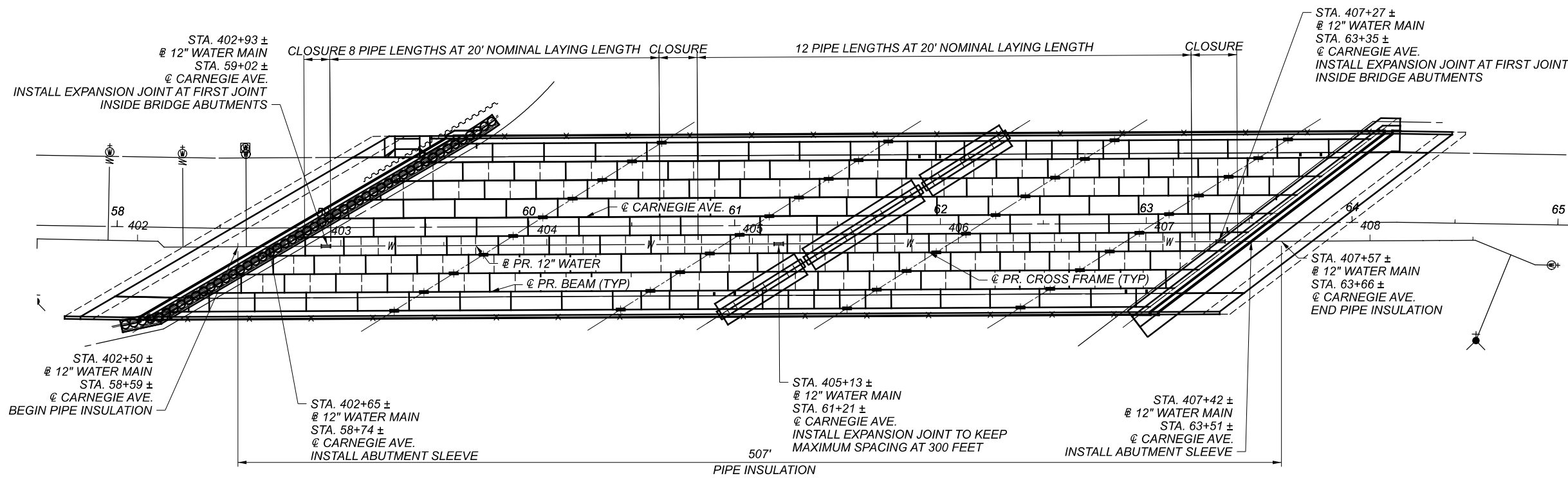
X WATER STRUCTURE



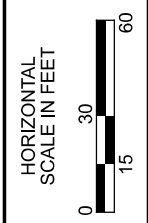
12" WATERLINE PLAN AND PROFILE (CARNEGIE AVE.)  
 STA. 405+00.00 TO STA. 410+00.00

DESIGN AGENCY	Michael Baker INTERNATIONAL
DESIGNER	
REVIEWER	
PROJECT ID	82382
SHEET	1190
TOTAL	2339

RESTRAINED LENGTH SHOWN IS THE MINIMUM RESTRAINED LENGTH FOR EACH SIDE OF BEND.



NOTE:  
 CONTRACTOR TO PROVIDE A LAYOUT PLAN  
 FOR THE WATERMAIN PRIOR TO  
 COMMENCING WORK ON THE BRIDGE

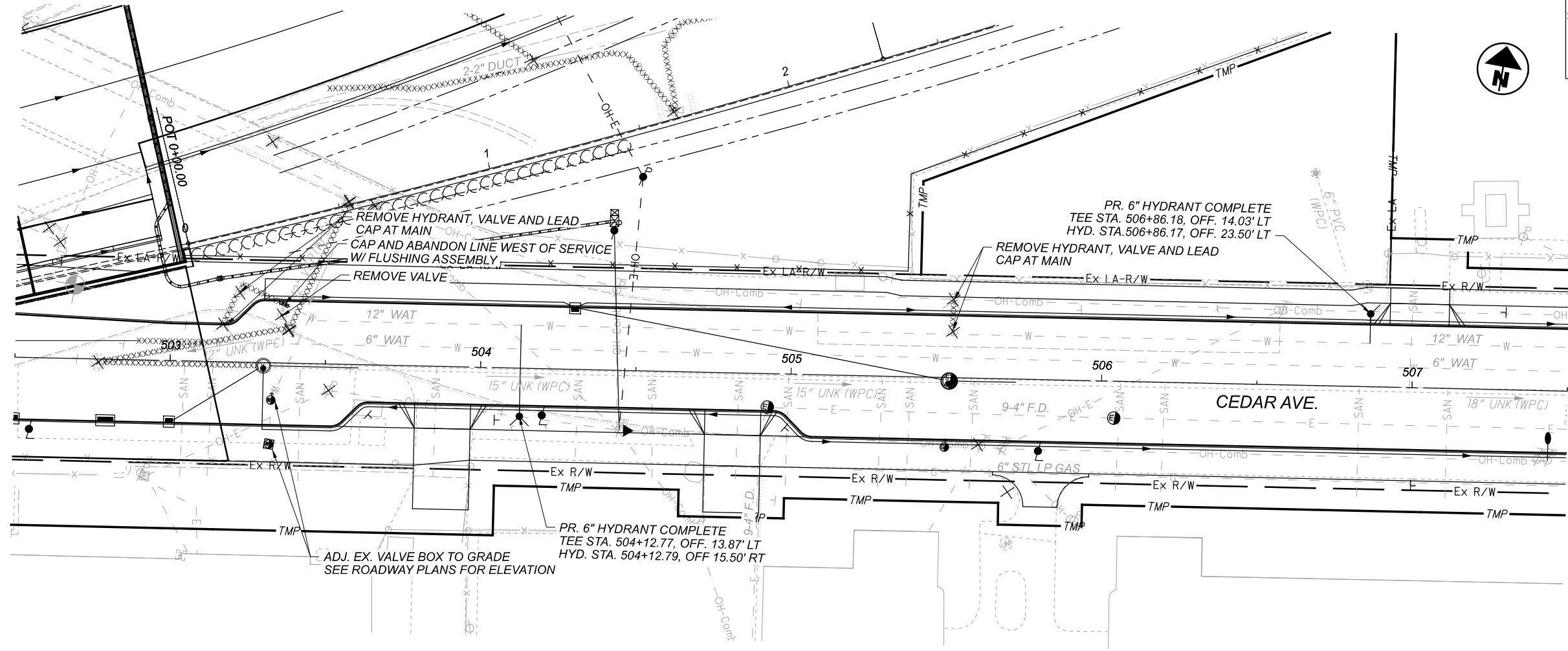


WATER WORK PLAN - CARNEGIE AVE.  
 BRIDGE 14 ENLARGEMENT PLAN

DESIGN AGENCY	
DESIGNER	
REVIEWER	
PROJECT ID	82382
SHEET	TOTAL
1191	2339

Michael Baker  
 INTERNATIONAL





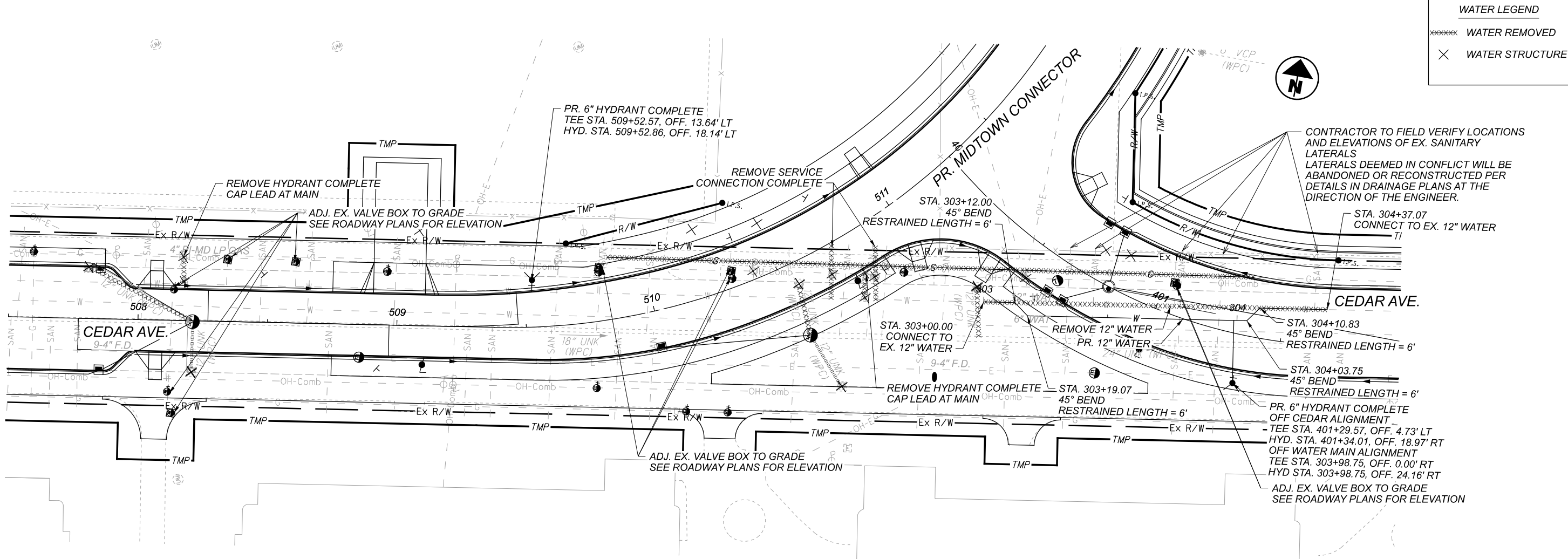
**WATER LEGEND**  
 XXXXXX WATER REMOVED  
 X WATER STRUCTURE



12" WATERLINE PLAN AND PROFILE (CEDAR AVE.)  
 WEST OF LOWERING

DESIGN AGENCY	
DESIGNER	—
REVIEWER	—
PROJECT ID	82382
SHEET	1192
TOTAL	2339

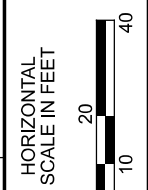
**Michael Baker**  
 INTERNATIONAL



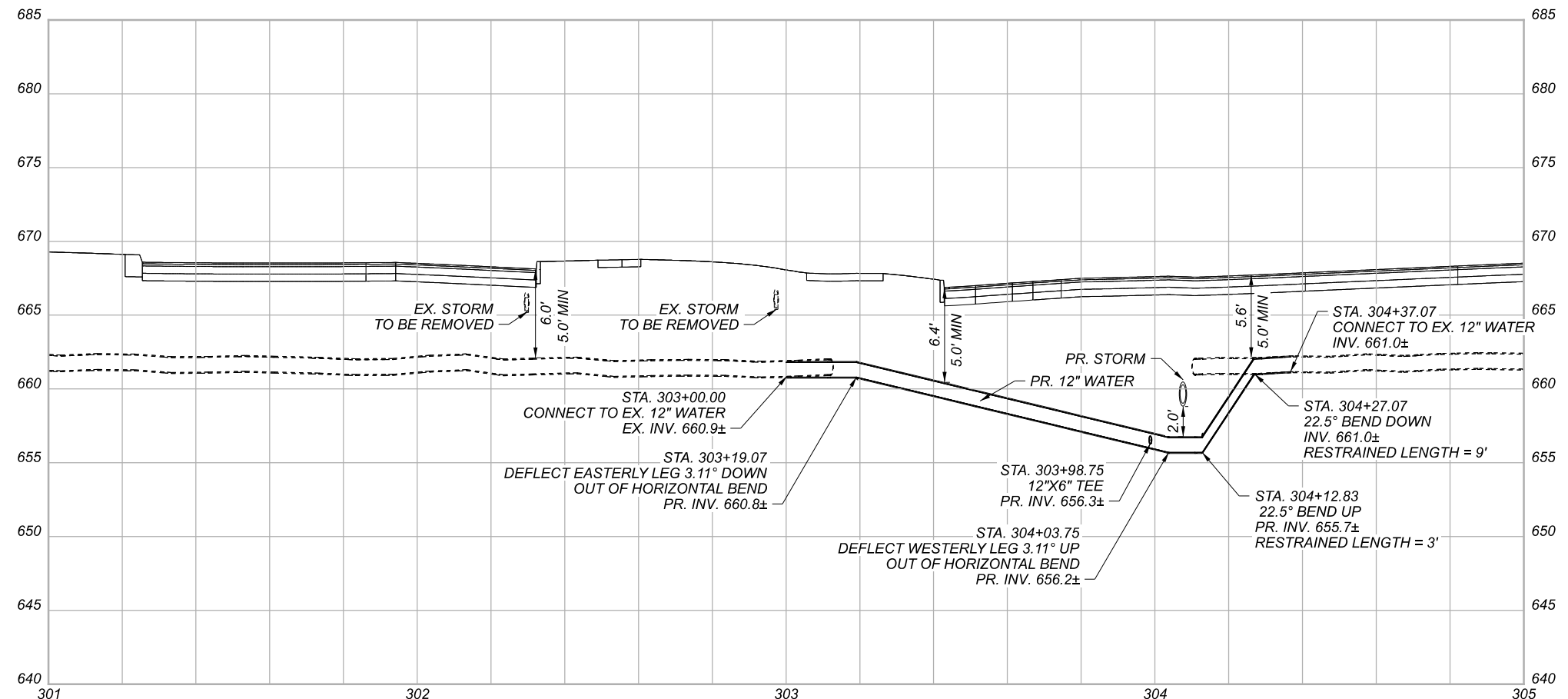
**WATER LEGEND**

XXXXXX WATER REMOVED

X WATER STRUCTURE

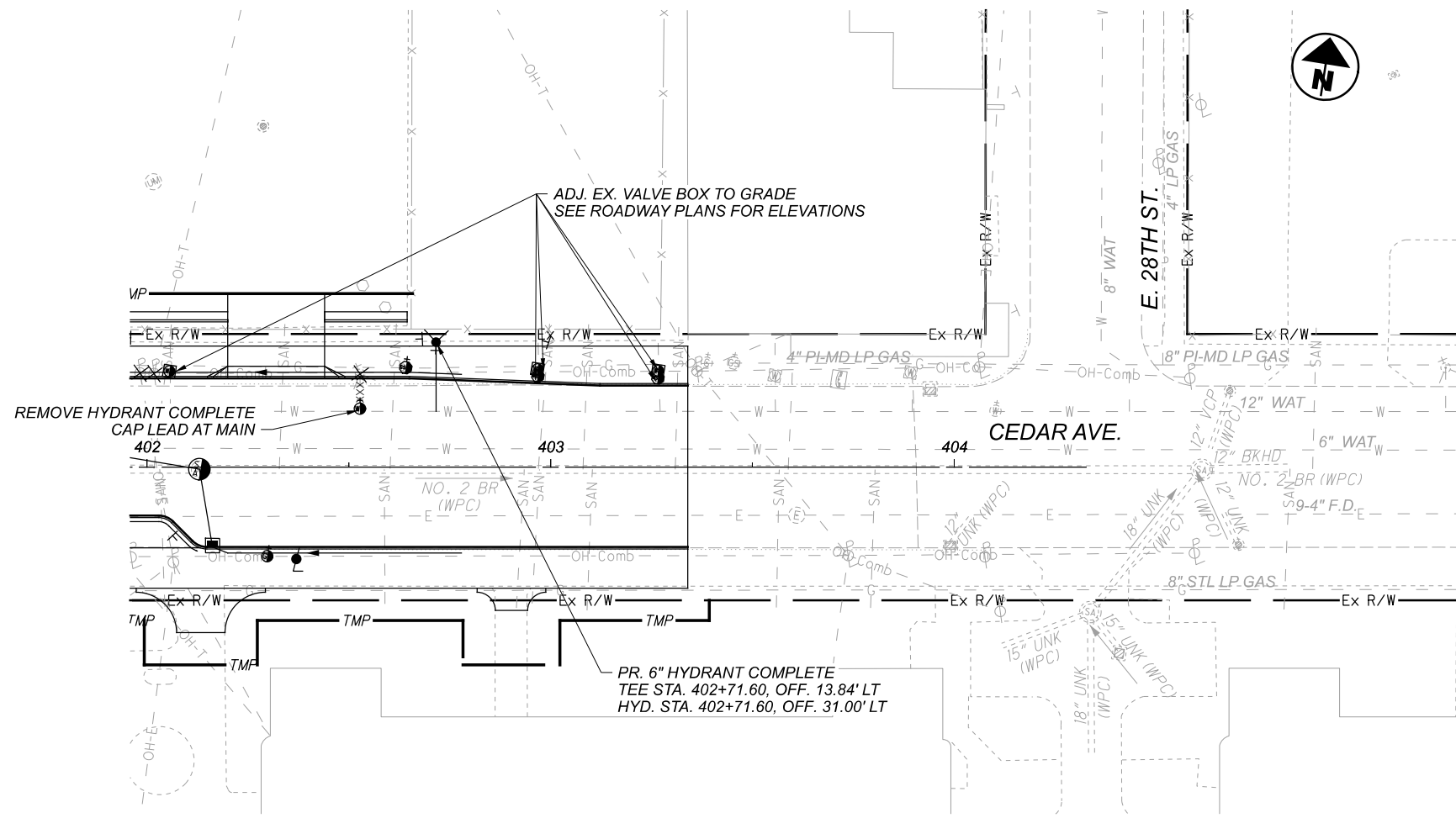


**12" WATERLINE PLAN AND PROFILE (CEDAR AVE.)**  
 STA. 303+00.00 TO STA 304+37.07



RESTRAINED LENGTH SHOWN IS THE MINIMUM RESTRAINED LENGTH FOR EACH SIDE OF BEND.

DESIGN AGENCY	
DESIGNER	
REVIEWER	
PROJECT ID	82382
SHEET	1193
TOTAL	2339



**WATER LEGEND**

----- WATER REMOVED

X WATER STRUCTURE

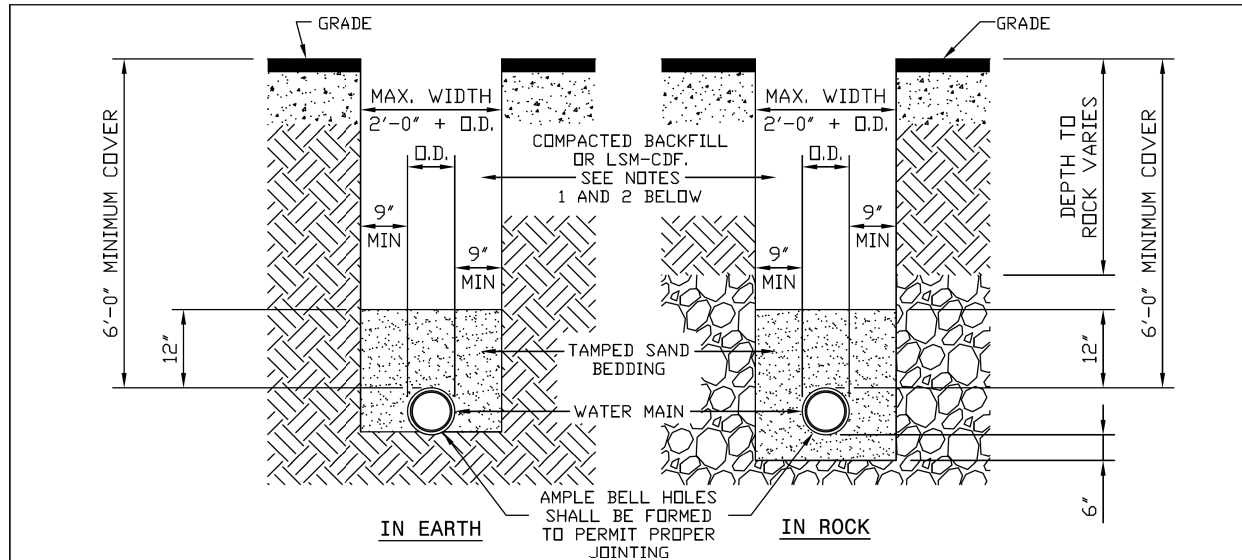


12" WATERLINE PLAN AND PROFILE (CEDAR AVE.)  
EAST OF LOWERING

DESIGN AGENCY	
DESIGNER	—
REVIEWER	—
PROJECT ID	82382
SHEET	1194
TOTAL	2339

**Michael Baker**  
INTERNATIONAL





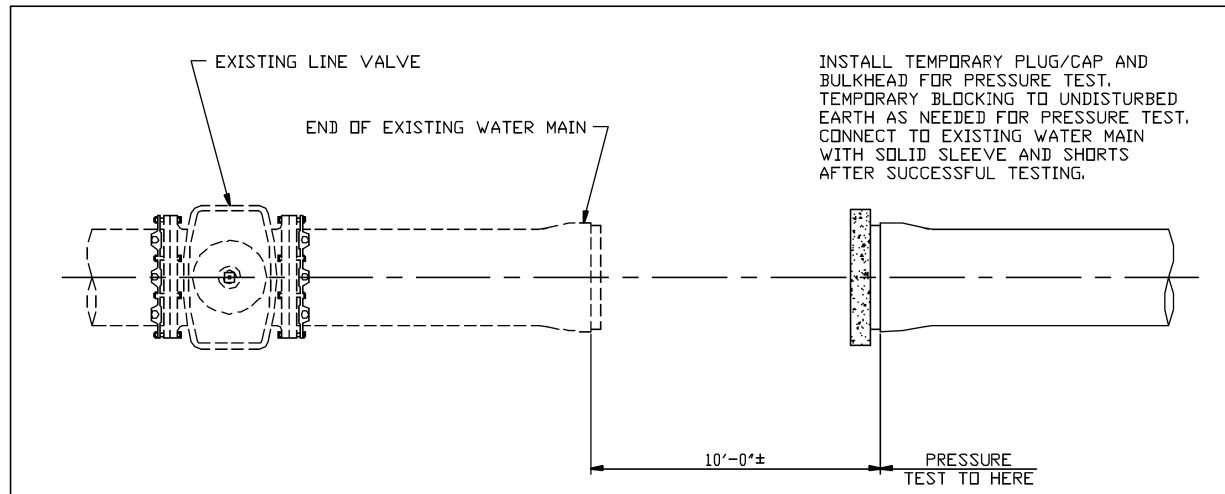
**WATER MAIN TRENCH DETAILS**

- NOT TO SCALE -

- NOTES:
- PREMIUM BACKFILL CONSISTING OF LOW STRENGTH MORTAR - CONTROLLED DENSITY FILL (LSM-CDF) 'FLOWABLE FILL' IS REQUIRED:  
 A) UNDER ALL EXISTING OR FUTURE PAVEMENTS, SIDEWALKS AND DRIVES WITHIN THE CITY OF CLEVELAND CORPORATION LIMITS.  
 B) AS SPECIFIED IN LOCAL MUNICIPALITIES SERVED BY CWD (SEE LOCAL REQUIREMENTS)
  - WHEN PREMIUM BACKFILL IS REQUIRED BY THE LOCAL MUNICIPALITY FOR CASES OTHER THAN THOSE LISTED IN NOTE 1 ABOVE, IT SHALL BE LIMESTONE GRADED PER ODOT 304.02 OR ODOT 411. NO SLAG IS PERMITTED.
  - CONTRACTOR SHALL USE SPECIAL CARE IN PLACING THE SAND BEDDING, SO AS TO AVOID SCRAPING OF THE EXTERIOR COATING, INJURING THE PIPE, DISTORTING OR MOVING THE PIPE WHEN COMPACTING THE SAME. THE SAND BEDDING SHALL BE TAMPED IN SIX (6) INCH LAYERS, SIMULTANEOUSLY ON EACH SIDE OF THE PIPE, AND THOROUGHLY COMPACTED SO AS TO PROVIDE A SOLID BACKING AGAINST THE EXTERNAL SURFACE OF THE PIPE.
  - MINIMUM COMPACTION FOR ALL SAND BEDDING, BACKFILL AND PREMIUM BACKFILL SHALL BE 95% STANDARD PROCTOR.
  - PAVEMENT, SIDEWALK OR DRIVES TO BE INSTALLED IN ACCORDANCE WITH LOCAL MUNICIPALITY'S SPECIFICATIONS.

STD-001

DATE: 6-21-2012



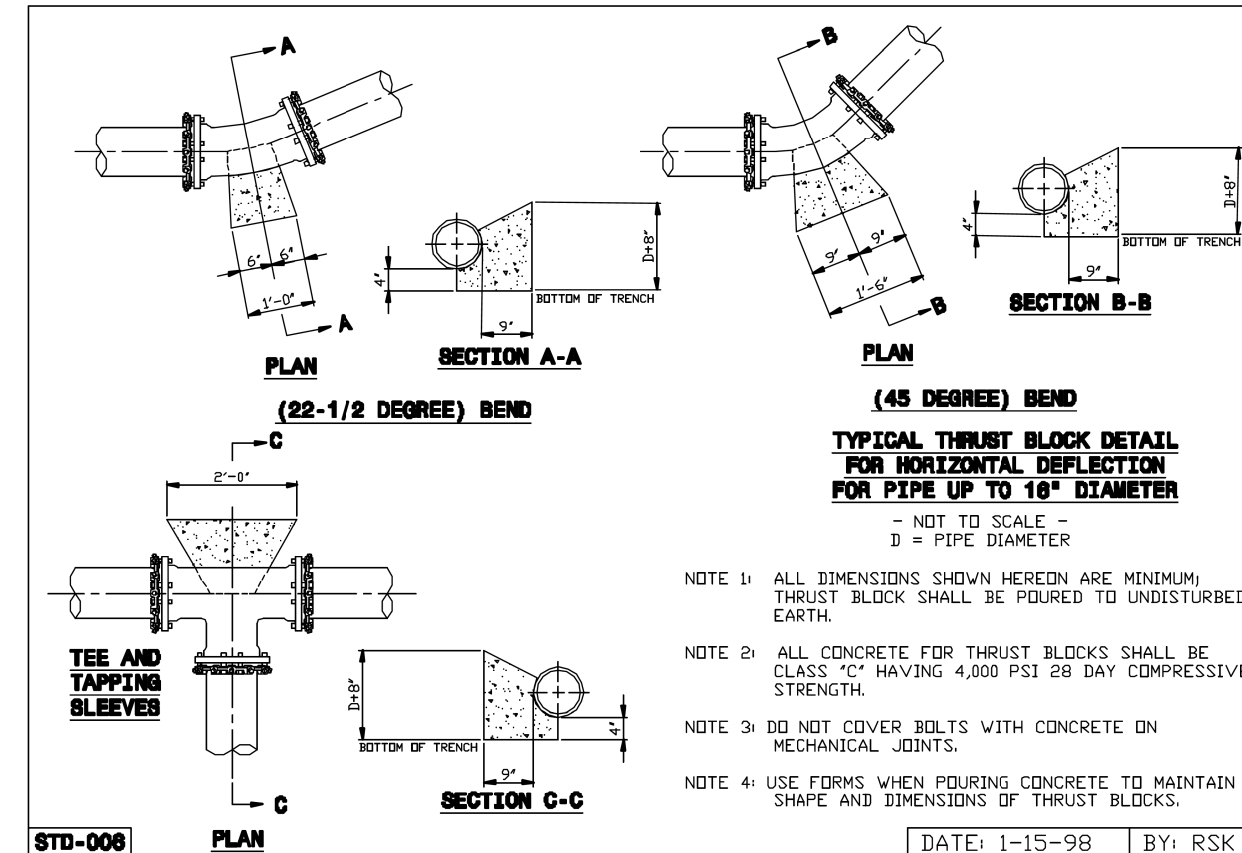
NOTE:  
 PRESSURE TESTING OF WATER MAINS:  
 WHERE NEW/EXTENDED WATER MAINS ARE CONNECTED TO AN EXISTING WATER MAIN FOR PRESSURE TEST, RESULTING IN FAILURE OF THE PRESSURE TEST OR ANY DAMAGE TO THE EXISTING WATER MAIN, OR ITS APPURTENANCES, THE REPAIR THEREOF SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.  
 ALL REPAIRS SHALL BE DONE TO THE SATISFACTION OF THE DIVISION OF WATER.

**ALTERNATE PRESSURE TESTING DETAIL**

- NOT TO SCALE -

STD-002

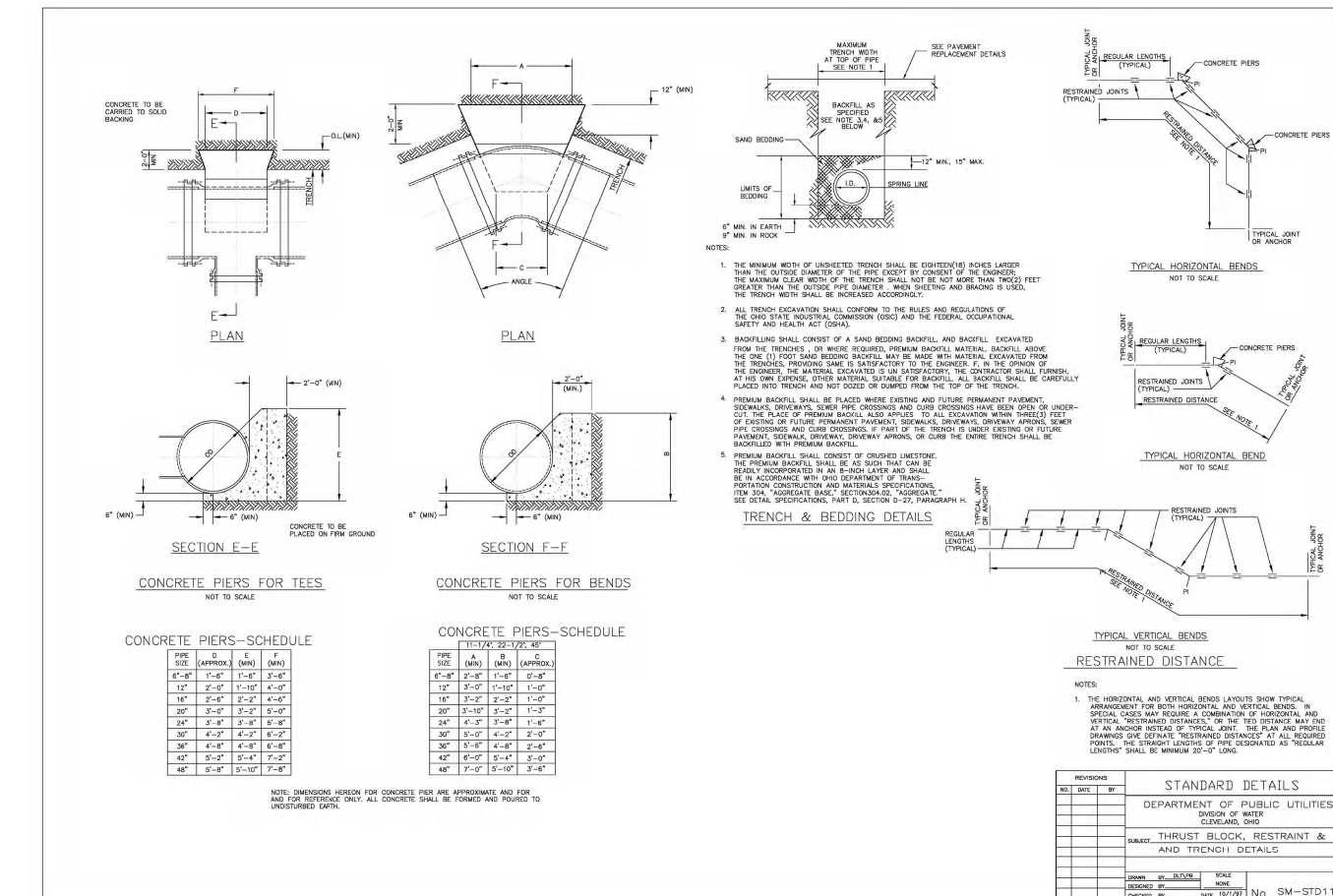
DATE: 10-1-97 BY: RSK



- NOTE 1: ALL DIMENSIONS SHOWN HEREON ARE MINIMUM; THRUST BLOCK SHALL BE POURED TO UNDISTURBED EARTH.
- NOTE 2: ALL CONCRETE FOR THRUST BLOCKS SHALL BE CLASS 'C' HAVING 4,000 PSI 28 DAY COMPRESSIVE STRENGTH.
- NOTE 3: DO NOT COVER BOLTS WITH CONCRETE ON MECHANICAL JOINTS.
- NOTE 4: USE FORMS WHEN POURING CONCRETE TO MAINTAIN SHAPE AND DIMENSIONS OF THRUST BLOCKS.

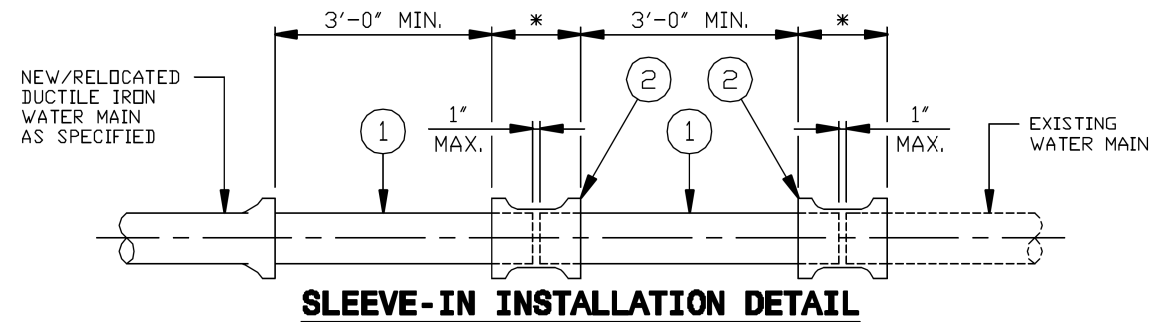
STD-006

DATE: 1-15-98 BY: RSK



NO.	DATE	BY	REVISION

STANDARD DETAILS  
 DEPARTMENT OF PUBLIC UTILITIES  
 DIVISION OF WATER  
 CLEVELAND, OHIO  
 SUBJECT: THRUST BLOCK, RESTRAINT & AND TRENCH DETAILS  
 DRAWN BY: RSK  
 CHECKED BY: RSK  
 DESIGNED BY: RSK  
 SCALE: NONE  
 SHEET: 1195 OF 1200  
 NO. SM-STD11



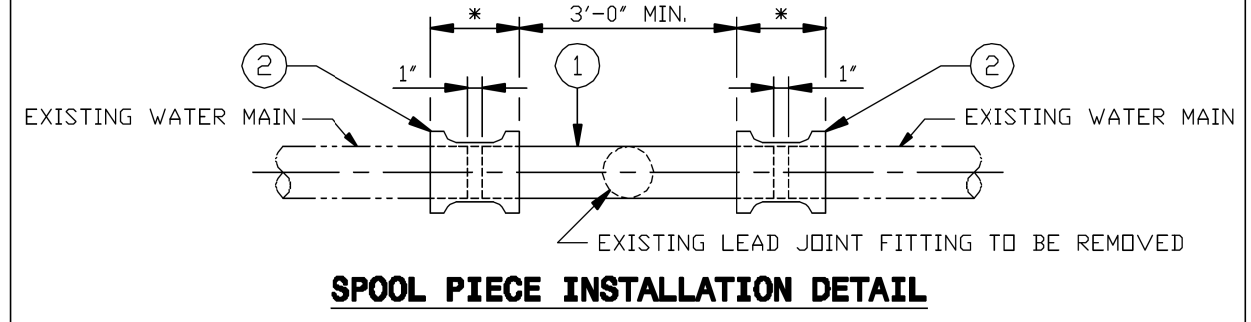
**SLEEVE-IN INSTALLATION DETAIL**

- NOT TO SCALE -

- 1) PLAIN END x PLAIN END DUCTILE IRON PIPE AS SPECIFIED (CUT TO SUIT).
- 2) \*CONNECTION SHALL BE MADE WITH RETAINED MECHANICAL JOINT SOLID SLEEVES (SHORT OR LONG PATTERN) DUCTILE IRON CLASS 350 OR CAST IRON CLASS 250 OR COMPRESSION COUPLINGS.  
 COMPRESSION COUPLINGS SHALL BE OF A GASKETED, SLEEVE TYPE WITH DIAMETERS TO PROPERLY FIT PLAIN END IRON PIPE. EACH COUPLING SHALL CONSIST OF ONE (1) MIDDLE RING, WITHOUT STOPS; TWO (2) FOLLOWER GLANDS; TWO (2) RUBBER-COMPOUND BUNA-N BLEND, WEDGE SECTION GASKETS; AND SUFFICIENT TRACKHEAD STAINLESS STEEL BOLTS AND NUTS (ASTM A276/A193/194, TYPE 304, EXTRA HEAVY HEX) TO PROPERLY COMPRESS THE GASKETS.  
 MIDDLE RING AND FOLLOWER GLANDS SHALL BE OF EITHER STEEL OR DUCTILE IRON (ASTM-A536).  
 THE COMPRESSION COUPLING SHALL BE WITHOUT STOPS AND BE RATED FOR A MINIMUM WORKING PRESSURE OF 250 PSI AND SHALL BE EQUAL TO THE DRESSER STYLE No's 38, 138 OR 162 (TRANSITION TYPE), OR SMITH-BLAIR 441 STRAIGHT AND TRANSITION COUPLINGS.
- 3) ALL BOLTS AND NUTS ON ALL MECHANICAL JOINTS, INCLUDING THOSE ON THE 'RETAINED' TYPE, SHALL HAVE FIELD APPLIED ONE (1) COAT OF BITUMASTIC PAINTING FOLLOWED BY AN ENCASEMENT OF POLYETHYLENE WRAPPING IN ACCORDANCE WITH ANSI/AWWA C-105/A21.5-88, CLASS 'C', METHOD 'B'.

STD-007

DATE: 10-1-97 BY: RSK



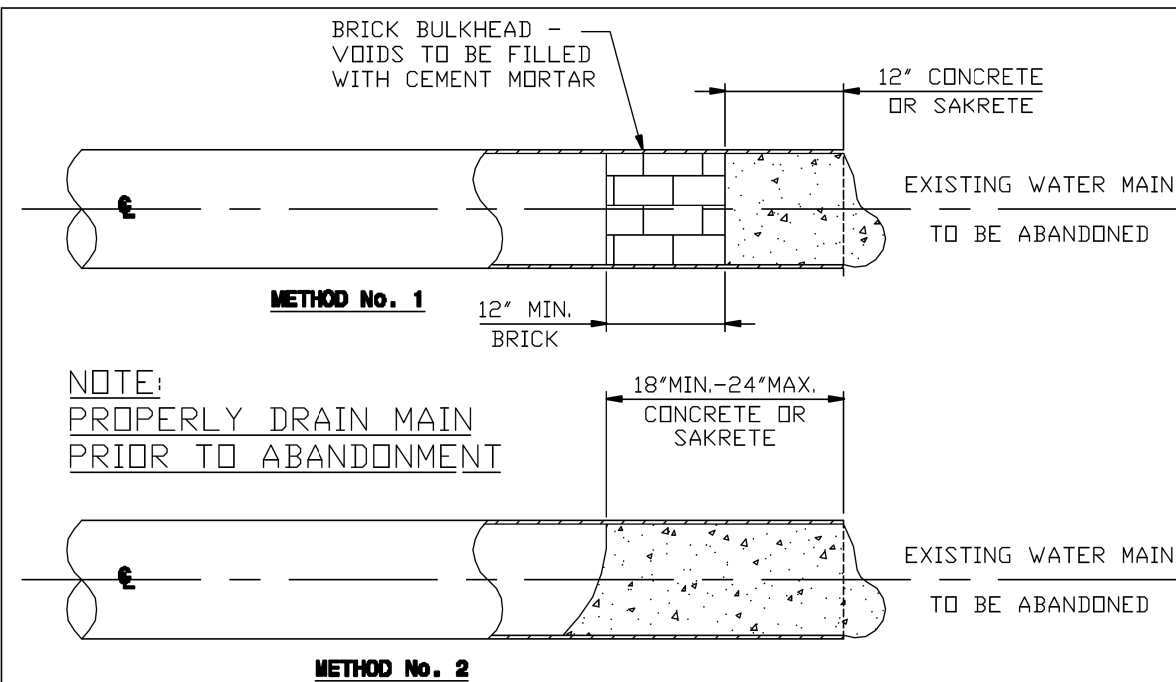
**SPOOL PIECE INSTALLATION DETAIL**

NOT TO SCALE

- 1) PLAIN END x PLAIN END DUCTILE IRON PIPE AS SPECIFIED (CUT TO SUIT).
- 2) \*CONNECTION SHALL BE MADE WITH RETAINED MECHANICAL JOINT SOLID SLEEVES (SHORT OR LONG PATTERN) DUCTILE IRON CLASS 350 OR CAST IRON CLASS 250 OR COMPRESSION COUPLINGS.  
 COMPRESSION COUPLINGS SHALL BE OF A GASKETED, SLEEVE TYPE WITH DIAMETERS TO PROPERLY FIT PLAIN END IRON PIPE. EACH COUPLING SHALL CONSIST OF ONE (1) MIDDLE RING, WITHOUT STOPS; TWO (2) FOLLOWER GLANDS; TWO (2) RUBBER-COMPOUND BUNA-N BLEND, WEDGE SECTION GASKETS; AND SUFFICIENT TRACKHEAD STAINLESS STEEL BOLTS AND NUTS (ASTM A276/A193/194, TYPE 304, EXTRA HEAVY HEX) TO PROPERLY COMPRESS THE GASKETS.  
 MIDDLE RING AND FOLLOWER GLANDS SHALL BE OF EITHER STEEL OR DUCTILE IRON (ASTM-A536).  
 THE COMPRESSION COUPLING SHALL BE WITHOUT STOPS AND BE RATED FOR A MINIMUM WORKING PRESSURE OF 250 PSI AND SHALL BE EQUAL TO THE DRESSER STYLE No's 38, 138 OR 162 (TRANSITION TYPE), OR SMITH-BLAIR 441 STRAIGHT AND TRANSITION COUPLINGS.
- 3) ALL BOLTS AND NUTS ON ALL MECHANICAL JOINTS, INCLUDING THOSE ON THE 'RETAINED' TYPE, SHALL HAVE FIELD APPLIED ONE (1) COAT OF BITUMASTIC PAINTING FOLLOWED BY AN ENCASEMENT OF POLYETHYLENE WRAPPING IN ACCORDANCE WITH ANSI/AWWA C-105/A21.5-88, CLASS 'C', METHOD 'B'.

STD-008

DATE: 10-1-97 BY: RSK

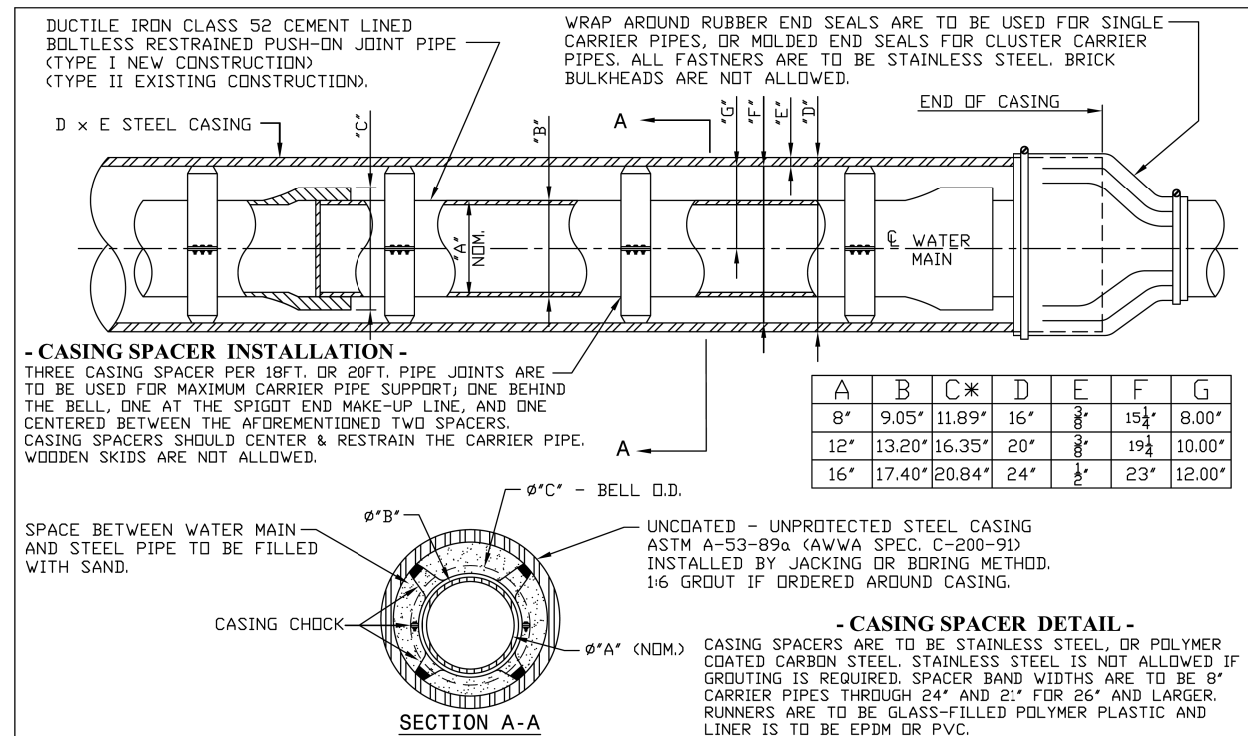


**PLUGGING ABANDONED WATER MAIN ENDS**

- NOT TO SCALE -

STD-004

DATE: 10-1-97 BY: RSK



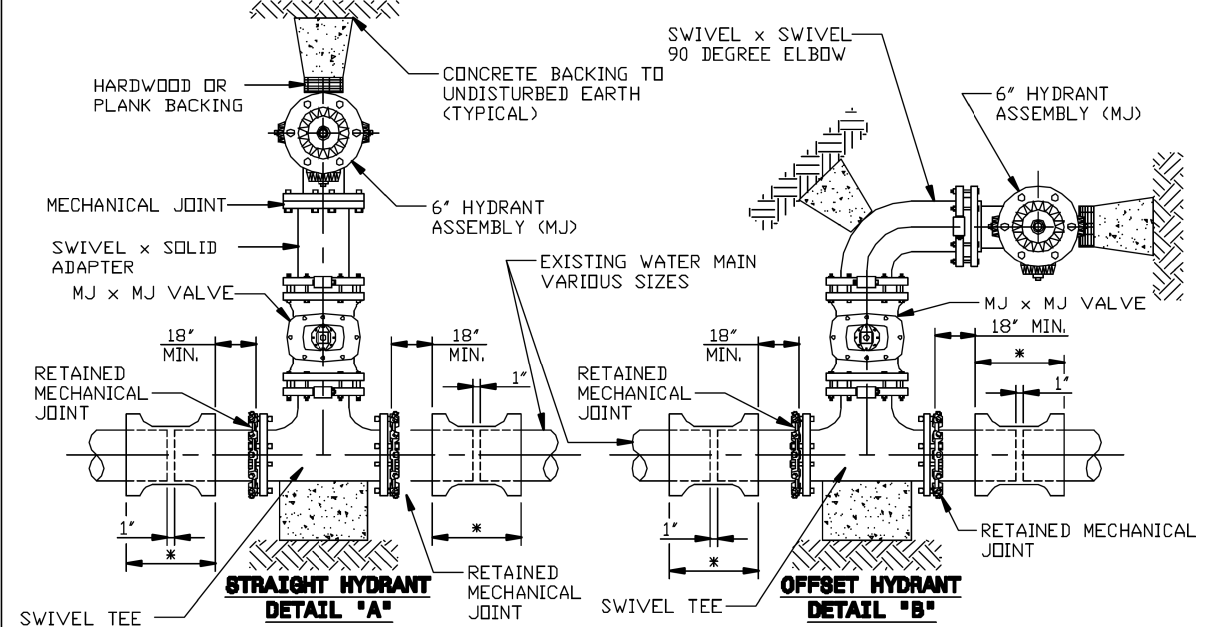
- NOTES:  
 1. CONTRACTOR'S FAILURE TO MAINTAIN THE CASING PIPE ON THE LINE AND GRADE AS SHOWN OR DIRECTED, RESULTING IN THE USE OF ADDITIONAL PIPE AND/OR FITTINGS TO MAKE CONNECTIONS TO EXISTING WATER MAIN WILL BE CAUSE FOR REJECTION OF CASING INSTALLATION.
- \*2. OUTSIDE DIAMETER OF BELL OF BOLTLESS RESTRAINED PIPE MAY VARY WITH MANUFACTURE, THEREFORE, CONTRACTOR SHALL VERIFY O.D. OF BELL AND INCREASE SIZE OF STEEL CASING AS REQUIRED.

STD-016

CASING DETAIL No. 2 END OF CASING AND CASING CHOCK DETAIL

DATE: 1-21-2010 BY: RSK

\*CONNECTION SHALL BE MADE WITH RETAINED MECHANICAL JOINT SOLID SLEEVES (SHORT OR LONG PATTERN) DUCTILE IRON CLASS 350 OR CAST IRON CLASS 250 OR COMPRESSION COUPLINGS. COMPRESSION COUPLINGS SHALL BE OF A GASKETED, SLEEVE TYPE WITH DIAMETERS TO PROPERLY FIT PLAIN END IRON PIPE. EACH COUPLING SHALL CONSIST OF ONE (1) MIDDLE RING, WITHOUT STOPS; TWO (2) FOLLOWER GLANDS; TWO (2) RUBBER-COMPOUND BUNA-N BLEND, WEDGE SECTION GASKETS; AND SUFFICIENT TRACKHEAD STAINLESS STEEL BOLTS AND NUTS (ASTM A276/A193/194, TYPE 304, EXTRA HEAVY HEX) TO PROPERLY COMPRESS THE GASKETS. MIDDLE RING AND FOLLOWER GLANDS SHALL BE OF EITHER STEEL OR DUCTILE IRON (ASTM-A536). THE COMPRESSION COUPLING SHALL BE WITHOUT STOPS AND BE RATED FOR A MINIMUM WORKING PRESSURE OF 250 PSI AND SHALL BE EQUAL TO THE DRESSER STYLE No's 38, 138 OR 162 (TRANSITION TYPE), OR SMITH-BLAIR 441 STRAIGHT AND TRANSITION COUPLINGS, ROD AND CLAMP COMPRESSION COUPLING AS DIRECTED BY C.W.D. INSPECTOR. ALL BOLTS AND NUTS ON ALL MECHANICAL JOINTS, INCLUDING THOSE ON THE "RETAINED" TYPE, SHALL HAVE FIELD APPLIED ONE (1) COAT OF BITUMASTIC PAINTING FOLLOWED BY AN ENCASEMENT OF POLYETHYLENE WRAPPING IN ACCORDANCE WITH ANSI/AWWA C-105/A21.5-88, CLASS "C", METHOD "B".



**CUT-IN TEE FOR NEW HYDRANT INSTALLATION ON EXISTING WATER MAIN**

FOR EXPLODED VIEW OF HYDRANT BRANCH SEE (STD-H09 OR STD-H10).

STD-H08

- NOT TO SCALE -

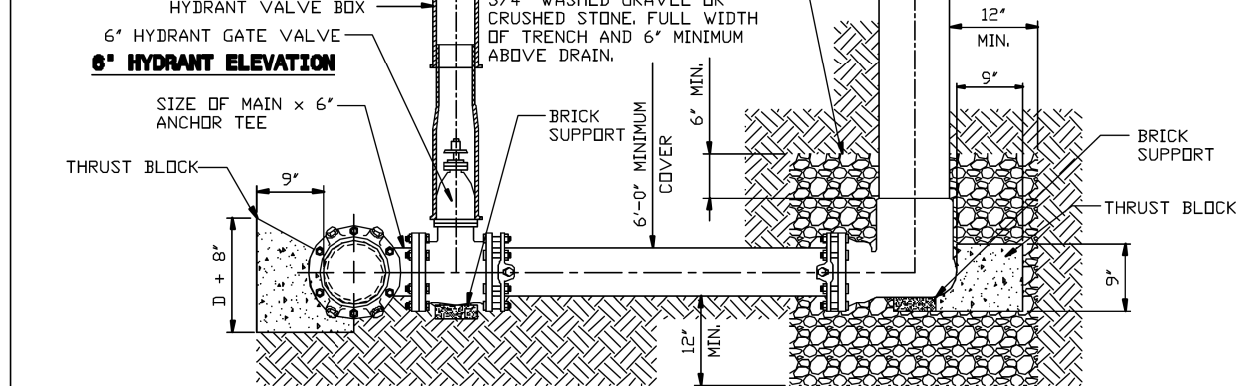
DATE: 10-1-97 BY: RSK

NOTE: IN LIEU OF SWIVEL BRANCH TEES AND ADAPTERS CONTRACTORS MAY FURNISH HYDRANT BRANCHES HAVING RETAINED MECHANICAL JOINTS INCLUDING HYDRANT SHOE. ALL MECHANICAL JOINTS SHALL HAVE FIELD APPLIED ONE (1) COAT OF BITUMASTIC PAINT. ALL MECHANICAL JOINTS SHALL BE POLYETHYLENE WRAPPED IN ACCORDANCE WITH AWWA C-105/A21.5-88 CLASS "C" METHOD "B".

ALL BOLTS AND NUTS FURNISHED WITH RETAINED MECHANICAL JOINTS INCLUDING RETAINER OR WEDGE ACTION TYPE GLANDS SHALL BE COPPER-BEARING DUCTILE IRON, OR EQUIVALENT HIGH STRENGTH, LOW ALLOY CORROSION RESISTANT STEEL.

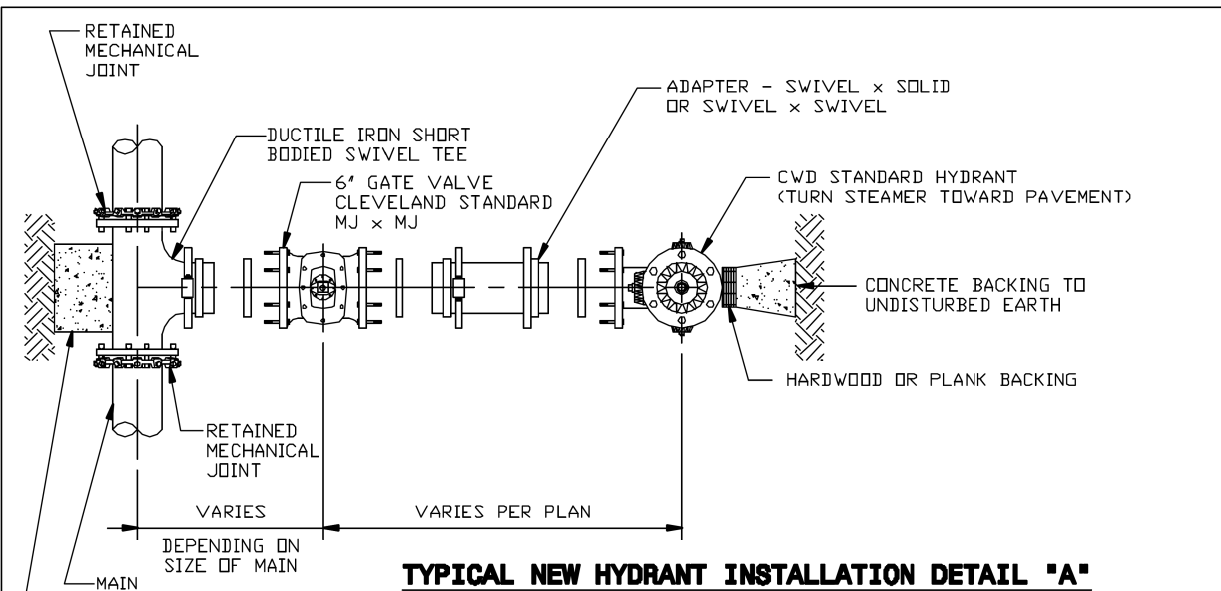
ALL FIRE HYDRANTS AND VALVE BOXES SHALL BE SECURELY BRACED WHEN SET AND BACKFILLED. ALL FIRE HYDRANTS, VALVES, VALVE BOXES AND FITTINGS SHALL MEET THE LATEST STANDARD SPECIFICATIONS FOR CONSTRUCTING WATER MAINS AND APPURTENANCES OF THE CLEVELAND WATER DEPARTMENT.

NOTE: SEE TYPICAL NEW HYDRANT INSTALLATION STD-H09, STD-H10 OR STD-H11



STD-H13

DATE: 2-23-2005 BY: RSK



**TYPICAL NEW HYDRANT INSTALLATION DETAIL "A"**

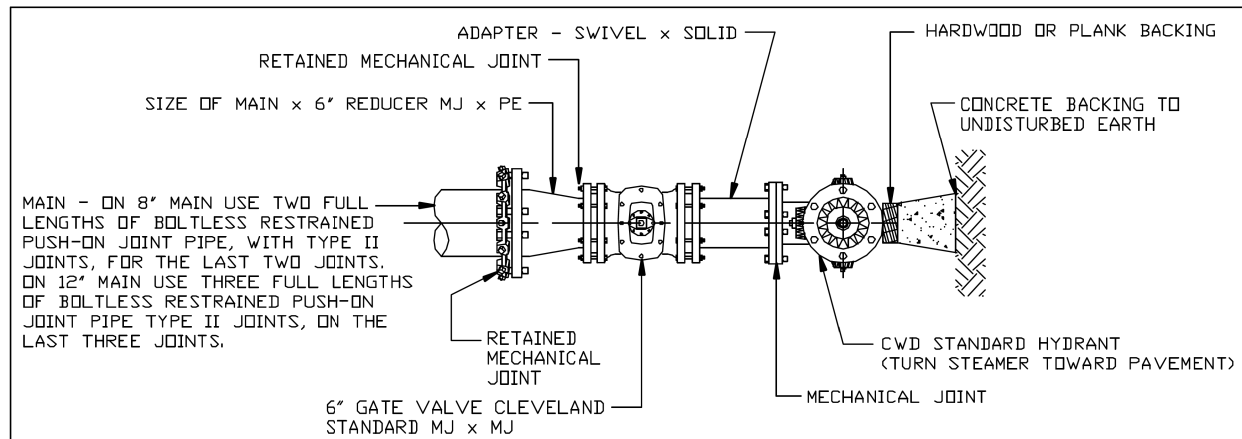
- NOT TO SCALE -

NOTE: IN LIEU OF SWIVEL BRANCH TEES AND ADAPTERS CONTRACTORS MAY FURNISH HYDRANT BRANCHES HAVING RETAINED MECHANICAL JOINTS INCLUDING HYDRANT SHOE. ALL MECHANICAL JOINTS SHALL HAVE FIELD APPLIED ONE (1) COAT OF BITUMASTIC PAINT. ALL MECHANICAL JOINTS SHALL BE POLYETHYLENE WRAPPED IN ACCORDANCE WITH AWWA C-1-5/A21.5-88 CLASS "C" METHOD "B".

ALL BOLTS AND NUTS FURNISHED WITH RETAINED MECHANICAL JOINTS INCLUDING RETAINER OR WEDGE ACTION TYPE GLANDS SHALL BE COPPER-BEARING DUCTILE IRON, OR EQUIVALENT HIGH STRENGTH, LOW ALLOY CORROSION RESISTANT STEEL.

STD-H09

DATE: 3-4-2002 BY: RSK



**TYPICAL NEW HYDRANT INSTALLATION DETAIL "C"**

NOT TO SCALE

NOTE: IN LIEU OF SWIVEL BRANCH TEES AND ADAPTERS CONTRACTORS MAY FURNISH HYDRANT BRANCHES HAVING RETAINED MECHANICAL JOINTS INCLUDING HYDRANT SHOE. ALL MECHANICAL JOINTS SHALL HAVE FIELD APPLIED ONE (1) COAT OF BITUMASTIC PAINT. ALL MECHANICAL JOINTS SHALL BE POLYETHYLENE WRAPPED IN ACCORDANCE WITH AWWA C-1-5/A21.5-88 CLASS "C" METHOD "B".

ALL BOLTS AND NUTS FURNISHED WITH RETAINED MECHANICAL JOINTS INCLUDING RETAINER OR WEDGE ACTION TYPE GLANDS SHALL BE COPPER-BEARING DUCTILE IRON, OR EQUIVALENT HIGH STRENGTH, LOW ALLOY CORROSION RESISTANT STEEL.

STD-H11

DATE: 3-4-2002 BY: RSK

CUY-90-16.28 (CCG3A)

MODEL: UD1203 PAPER SIZE: 17X11 (in.) DATE: 6/22/2022 TIME: 8:19:14 PM USER: Scott.Pruzin  
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WATER WORK DETAILS

DESIGN AGENCY

Michael Baker INTERNATIONAL

DESIGNER

REVIEWER

PROJECT ID

82382

SHEET TOTAL

1197 2339

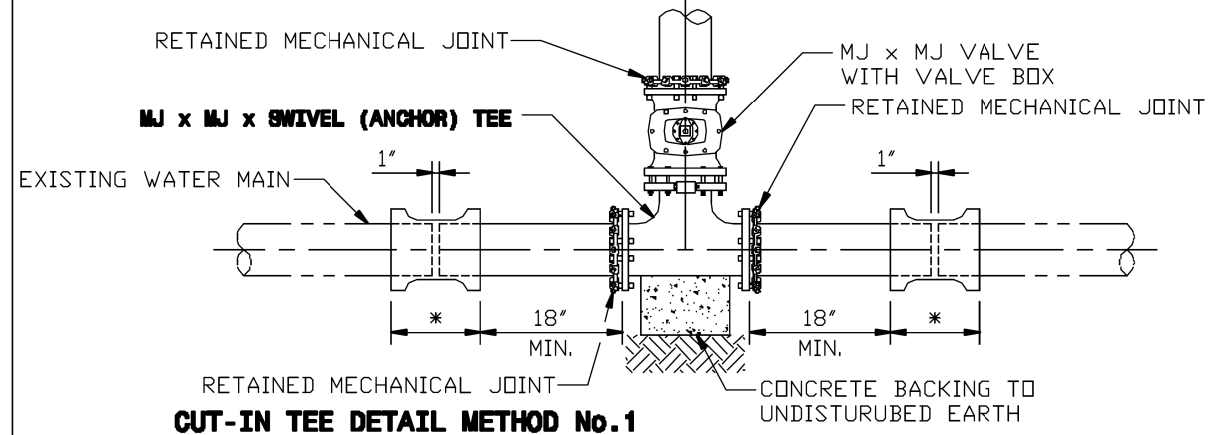
\* CONNECTION SHALL BE MADE WITH RETAINED MECHANICAL JOINT SOLID SLEEVES (SHORT OR LONG PATTERN) DUCTILE IRON CLASS 350 OR CAST IRON CLASS 250 OR COMPRESSION COUPLINGS.

COMPRESSION COUPLINGS SHALL BE OF A GASKETED, SLEEVE TYPE WITH DIAMETERS TO PROPERLY FIT PLAIN END IRON PIPE. EACH COUPLING SHALL CONSIST OF ONE (1) MIDDLE RING, WITHOUT STOPS; TWO (2) FOLLOWER GLANDS; TWO (2) RUBBER-COMPOUND BUNA-N BLEND, WEDGE SECTION GASKETS; AND SUFFICIENT TRACKHEAD STAINLESS STEEL BOLTS AND NUTS (ASTM A276/A193/A194, TYPE 304, EXTRA HEAVY HEX) TO PROPERLY COMPRESS THE GASKETS.

MIDDLE RING AND FOLLOWER GLANDS SHALL BE OF EITHER STEEL OR DUCTILE IRON (ASTM-A536).

THE COMPRESSION COUPLING SHALL BE WITHOUT STOPS AND BE RATED FOR A MINIMUM WORKING PRESSURE OF 250 PSI AND SHALL BE EQUAL TO THE DRESSER STYLE No's 38, 138 OR 162 (TRANSITION TYPE), OR SMITH-BLAIR 441 STRAIGHT AND TRANSITION COUPLINGS.

ALL BOLTS AND NUTS ON ALL MECHANICAL JOINTS, INCLUDING THOSE ON THE 'RETAINED' TYPE, SHALL HAVE FIELD APPLIED ONE (1) COAT OF BITUMASTIC PAINTING FOLLOWED BY AN ENCASEMENT OF POLYETHYLENE WRAPPING IN ACCORDANCE WITH ANSI/AWWA C-105/A21.5-88, CLASS 'C', METHOD 'B'.



**STD-T01** NOT TO SCALE DATE: 10-1-97 BY: RSK

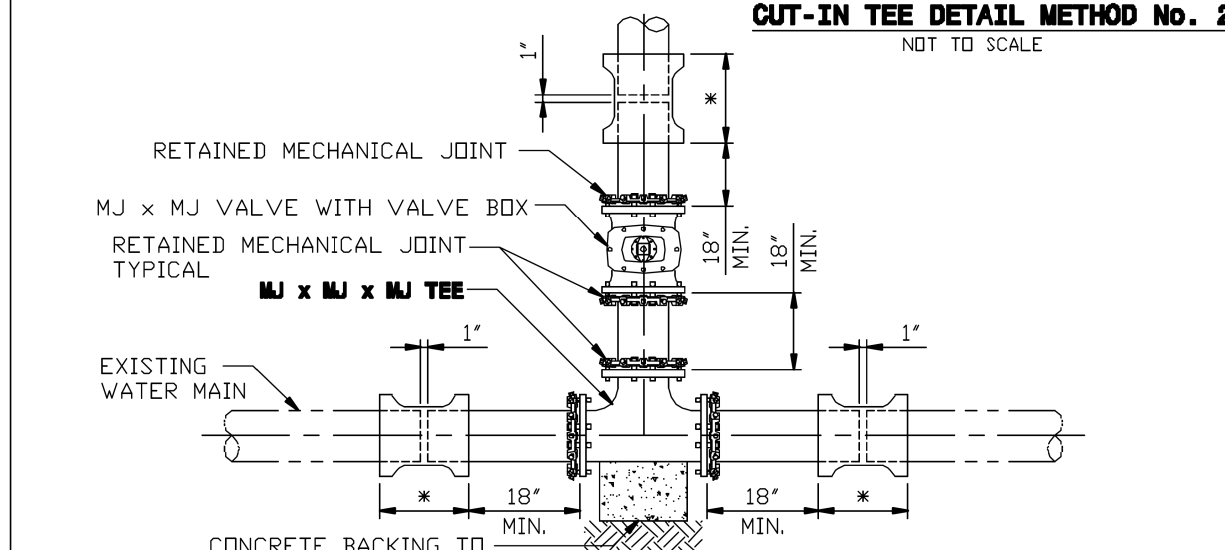
\* CONNECTION SHALL BE MADE WITH RETAINED MECHANICAL JOINT SOLID SLEEVES (SHORT OR LONG PATTERN) DUCTILE IRON CLASS 350 OR CAST IRON CLASS 250 OR COMPRESSION COUPLINGS.

COMPRESSION COUPLINGS SHALL BE OF A GASKETED, SLEEVE TYPE WITH DIAMETERS TO PROPERLY FIT PLAIN END IRON PIPE. EACH COUPLING SHALL CONSIST OF ONE (1) MIDDLE RING, WITHOUT STOPS; TWO (2) FOLLOWER GLANDS; TWO (2) RUBBER-COMPOUND BUNA-N BLEND, WEDGE SECTION GASKETS; AND SUFFICIENT TRACKHEAD STAINLESS STEEL BOLTS AND NUTS (ASTM A276/A193/A194, TYPE 304, EXTRA HEAVY HEX) TO PROPERLY COMPRESS THE GASKETS.

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**STD-T02** NOT TO SCALE DATE: 10-1-97 BY: RSK

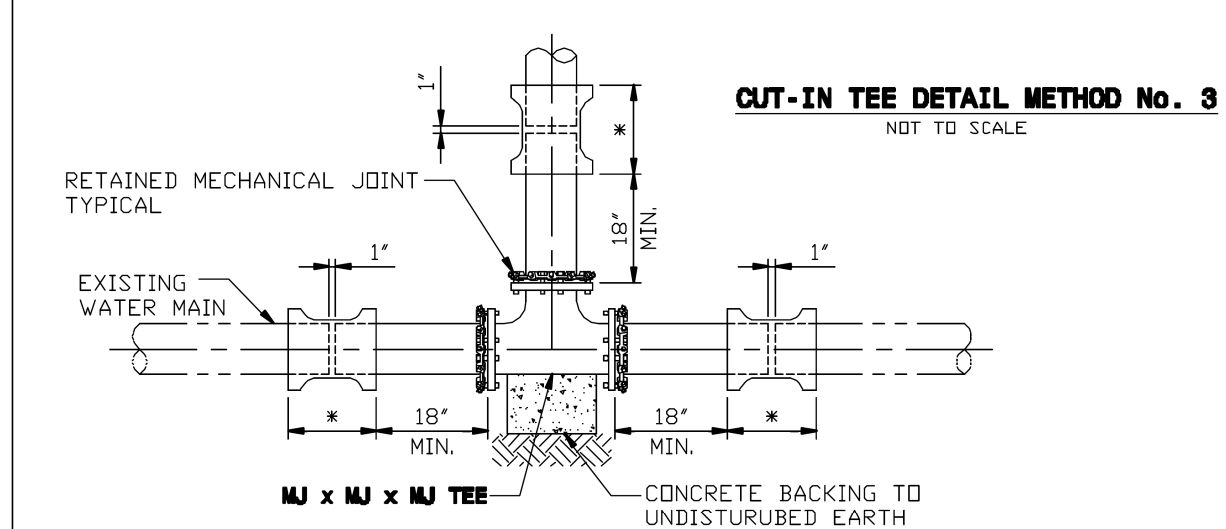
\* CONNECTION SHALL BE MADE WITH RETAINED MECHANICAL JOINT SOLID SLEEVES (SHORT OR LONG PATTERN) DUCTILE IRON CLASS 350 OR CAST IRON CLASS 250 OR COMPRESSION COUPLINGS.

COMPRESSION COUPLINGS SHALL BE OF A GASKETED, SLEEVE TYPE WITH DIAMETERS TO PROPERLY FIT PLAIN END IRON PIPE. EACH COUPLING SHALL CONSIST OF ONE (1) MIDDLE RING, WITHOUT STOPS; TWO (2) FOLLOWER GLANDS; TWO (2) RUBBER-COMPOUND BUNA-N BLEND, WEDGE SECTION GASKETS; AND SUFFICIENT TRACKHEAD STAINLESS STEEL BOLTS AND NUTS (ASTM A276/A193/A194, TYPE 304, EXTRA HEAVY HEX) TO PROPERLY COMPRESS THE GASKETS.

MIDDLE RING AND FOLLOWER GLANDS SHALL BE OF EITHER STEEL OR DUCTILE IRON (ASTM-A536).

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ALL BOLTS AND NUTS ON ALL MECHANICAL JOINTS, INCLUDING THOSE ON THE 'RETAINED' TYPE, SHALL HAVE FIELD APPLIED ONE (1) COAT OF BITUMASTIC PAINTING FOLLOWED BY AN ENCASEMENT OF POLYETHYLENE WRAPPING IN ACCORDANCE WITH ANSI/AWWA C-105/A21.5-88, CLASS 'C', METHOD 'B'.



**STD-T03** NOT TO SCALE DATE: 10-1-97 BY: RSK

\* CONNECTION SHALL BE MADE WITH RETAINED MECHANICAL JOINT SOLID SLEEVES (SHORT OR LONG PATTERN) DUCTILE IRON CLASS 350 OR CAST IRON CLASS 250 OR COMPRESSION COUPLINGS.

COMPRESSION COUPLINGS SHALL BE OF A GASKETED, SLEEVE TYPE WITH DIAMETERS TO PROPERLY FIT PLAIN END IRON PIPE. EACH COUPLING SHALL CONSIST OF ONE (1) MIDDLE RING, WITHOUT STOPS; TWO (2) FOLLOWER GLANDS; TWO (2) RUBBER-COMPOUND BUNA-N BLEND, WEDGE SECTION GASKETS; AND SUFFICIENT TRACKHEAD STAINLESS STEEL BOLTS AND NUTS (ASTM A276/A193/A194, TYPE 304, EXTRA HEAVY HEX) TO PROPERLY COMPRESS THE GASKETS.

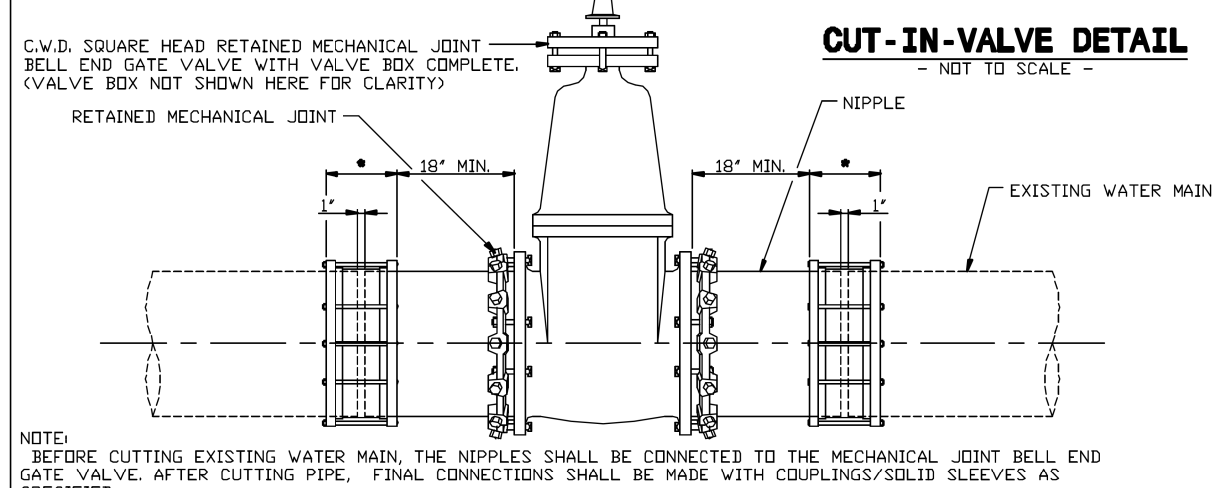
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THE DIVISION OF WATER WILL DETERMINE THE FIELD LOCATION OF THE CUT-IN-VALVE ASSEMBLY. THE DIVISION OF WATER WILL ALSO SET THE TIME OF INSTALLATION OF THE CUT-IN-VALVE ASSEMBLY.

THE CONTRACTOR SHALL DO ALL PIPE CUTTING AND INSTALLATION. HOWEVER, THE INSTALLATION OF THE CUT-IN-VALVE ASSEMBLY SHALL BE DONE UNDER THE SUPERVISION OF THE DIVISION OF WATER.



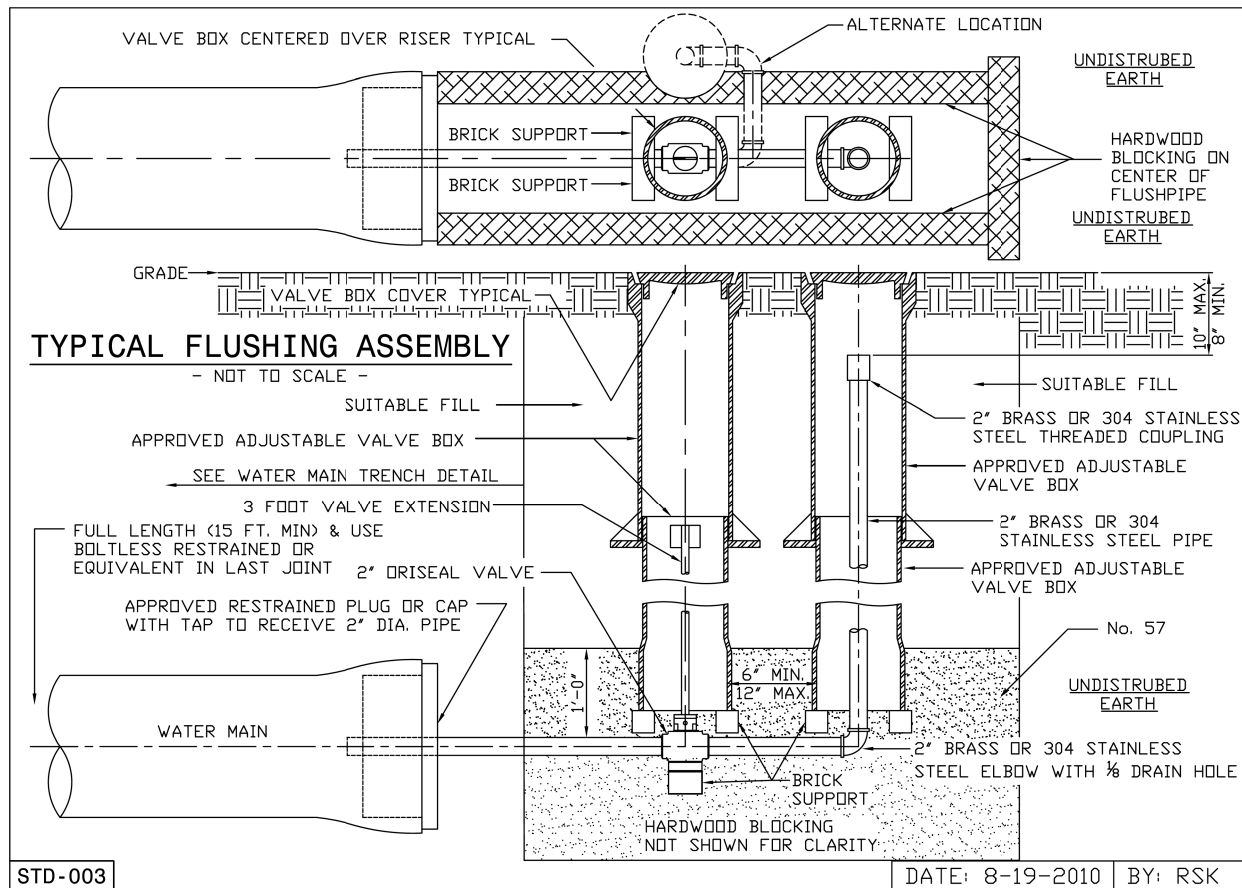
**STD-005** NOT TO SCALE DATE: 10-1-97 BY: RSK

WATER WORK DETAILS

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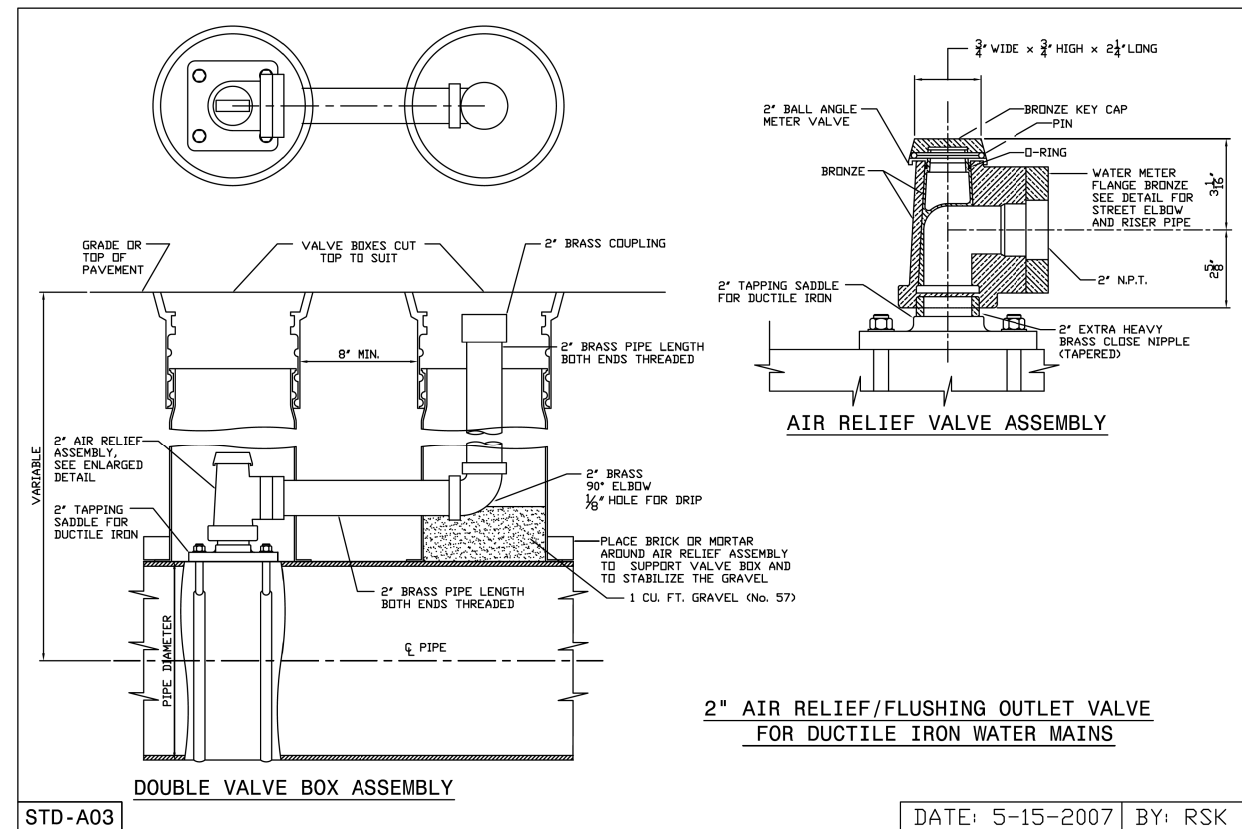
DESIGN AGENCY	
Michael Baker INTERNATIONAL	
DESIGNER	
REVIEWER	
PROJECT ID	82382
SHEET	TOTAL
1198	2339





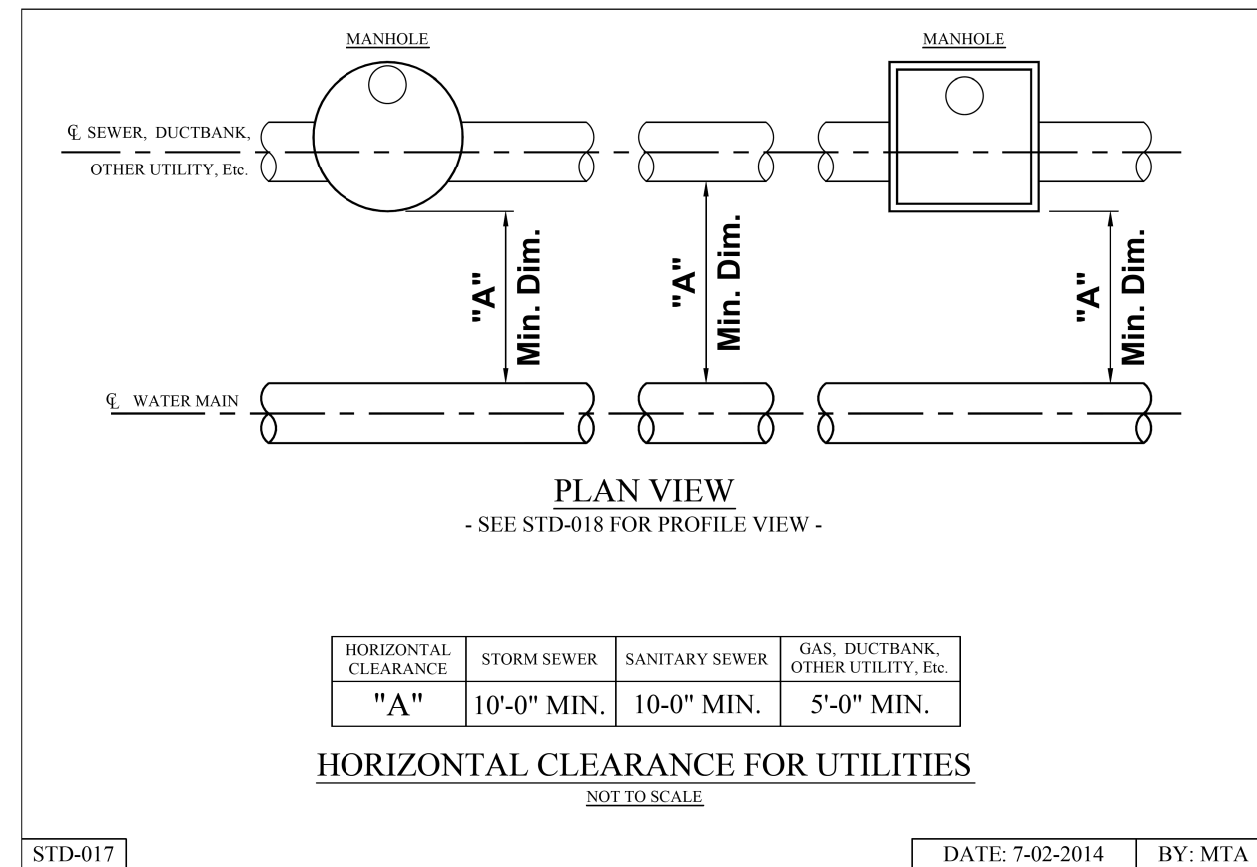
STD-003

DATE: 8-19-2010 BY: RSK



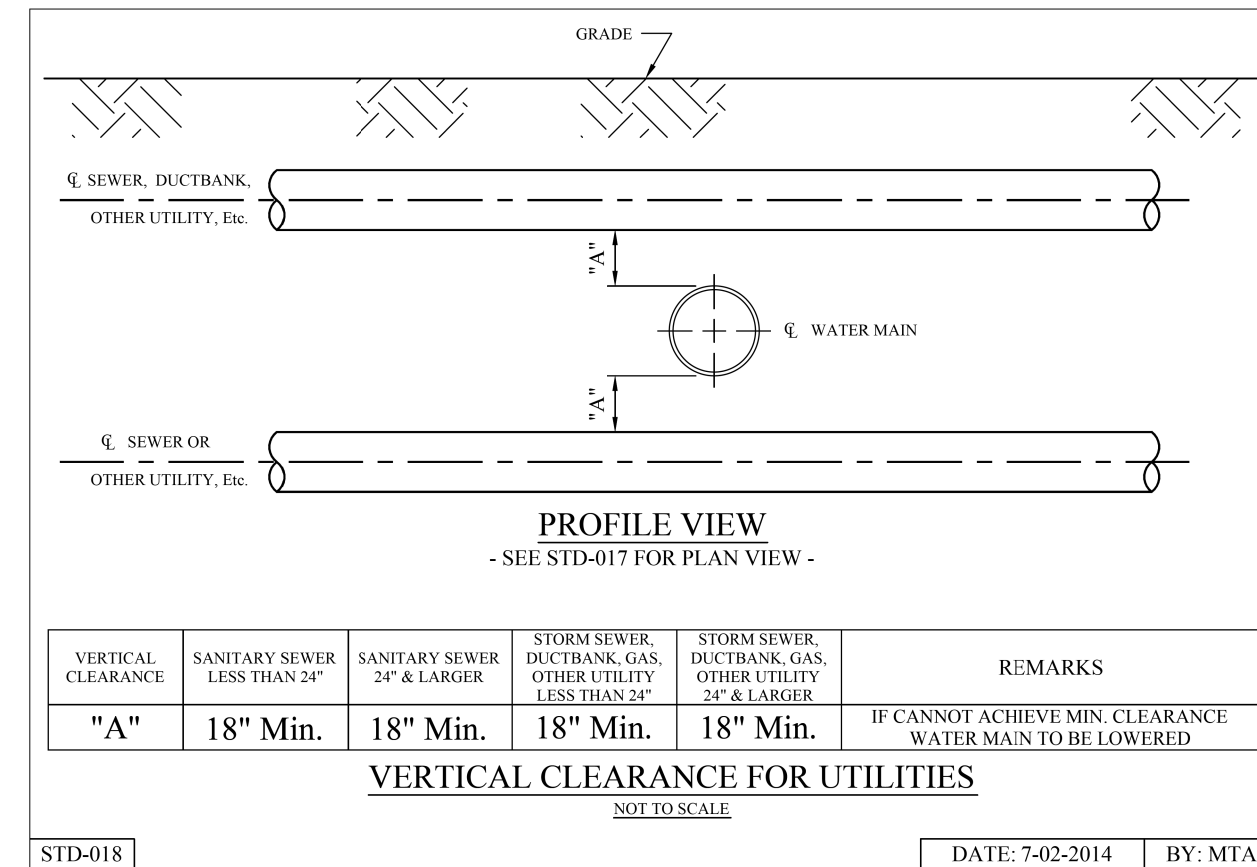
STD-A03

DATE: 5-15-2007 BY: RSK



STD-017

DATE: 7-02-2014 BY: MTA



STD-018

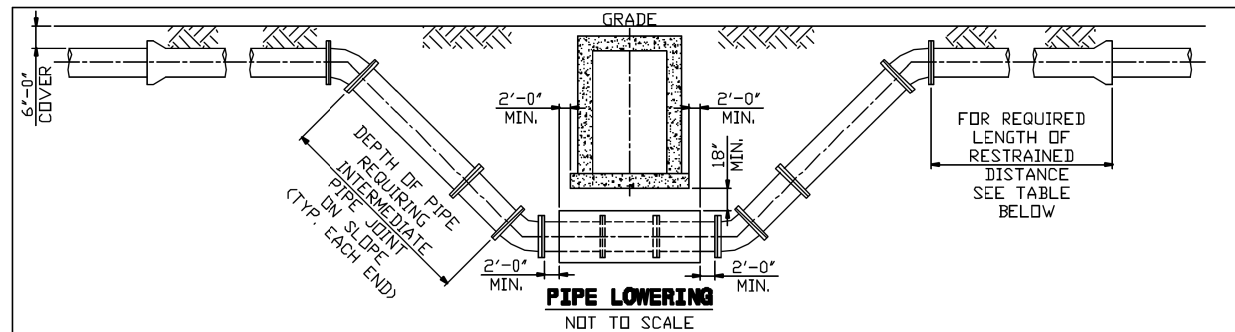
DATE: 7-02-2014 BY: MTA

CUY-90-16.28 (CCG3A)

MODEL: UD1205 PAPER SIZE: 17x11 (in.) DATE: 6/22/2022 TIME: 8:19:33 PM USER: Scott.Pruzin  
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WATER WORK DETAILS

DESIGN AGENCY	Michael Baker INTERNATIONAL
DESIGNER	—
REVIEWER	—
PROJECT ID	82382
SHEET TOTAL	1199 2339



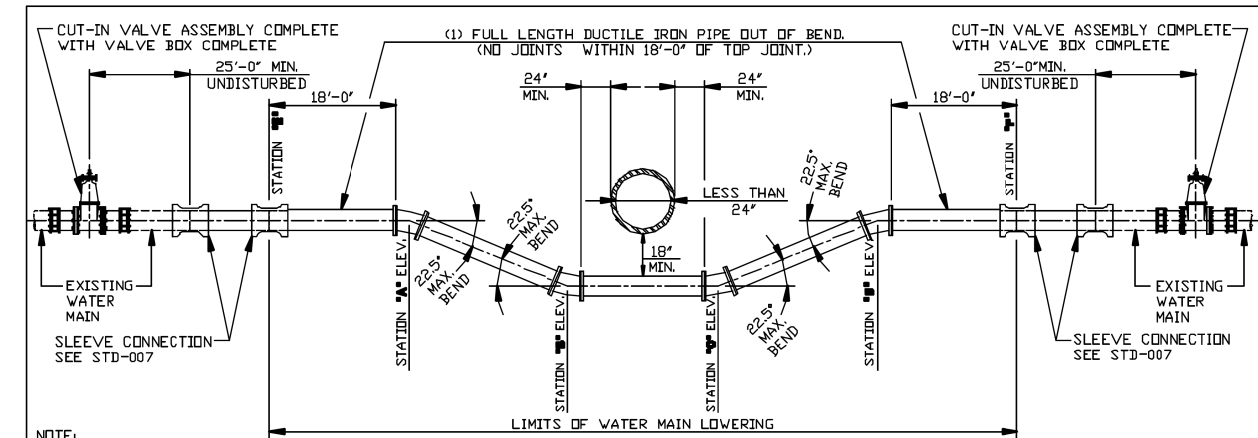
TO LOWER WATER MAIN TO CLEAR OBSTACLE WHERE DEPTH OF PIPE LOWERING REQUIRES AN INTERMEDIATE JOINT ON SLOPE THE ENTIRE OFFSET SHALL HAVE BOLTLESS RESTRAINED PUSH-ON JOINT PIPE AND FITTINGS AS SPECIFIED. JOINT RESTRAINT SHALL EXTEND BEYOND TOP VERTICAL BEND TO THE LIMITS SHOWN IN TABLE.

① CALCULATIONS FOR RESTRAINED LENGTHS INCLUDE 75 PSI FOR TESTING.

DIAMETER	BEND	STATIC PRESSURE ①	* RESTRAINED LENGTHS
8"	11°15'	0 to 275 PSI	ONE (1)
	22°30'	0 to 250 PSI	ONE (1)
		251 to 275 PSI	TWO (2)
12"	45°	0 to 125 PSI	ONE (1)
	22°30'	126 to 275 PSI	TWO (2)
		0 to 165 PSI	ONE (1)
16"	45°	0 to 65 PSI	ONE (1)
	22°30'	66 to 215 PSI	TWO (2)
		166 to 275 PSI	THREE (3)
	45°	0 to 275 PSI	ONE (1)
	22°30'	0 to 115 PSI	ONE (1)
		116 to 275 PSI	TWO (2)
16"	45°	0 to 45 PSI	ONE (1)
	22°30'	46 to 165 PSI	TWO (2)
		166 to 275 PSI	THREE (3)

STD-L01

DATE: 11-24-2003 BY: RSK



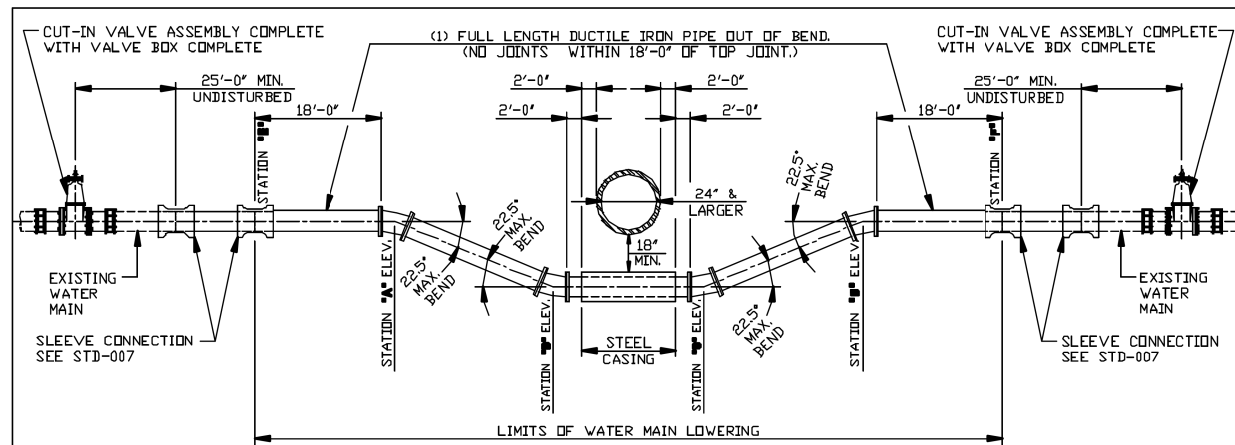
- NOTE:
- 1) WATER MAIN SHALL BE DUCTILE IRON, MINIMUM CLASS 52, CEMENT LINED PUSH-ON JOINT PIPE WITH RETAINED MECHANICAL JOINT DUCTILE IRON CLASS 350, CEMENT LINED OR FUSION BONDED EPOXY COATED RETAINED MECHANICAL JOINT FITTINGS.
  - 2) WHERE DEPTH OF LOWERING REQUIRES AN INTERMEDIATE JOINT BETWEEN STATIONS "A" & "B" AND/OR "C" & "D" THE ENTIRE LOWERING SHALL BE MADE WITH DUCTILE IRON, MINIMUM CLASS 52, CEMENT LINED PIPE AND DUCTILE IRON CLASS 350, CEMENT LINED FITTINGS ALL HAVING BOLTLESS RESTRAINED PUSH-ON JOINTS, TYPE II.
  - 3) WHERE LENGTH OF LOWERING UNDER OBSTRUCTION(S) REQUIRES AN INTERMEDIATE JOINT ONLY BETWEEN STATIONS "B" & "C", THAT INTERMEDIATE JOINT(S) SHALL BE MADE WITH A BOLTLESS RESTRAINED PUSH-ON JOINT, TYPE II.
  - 4) WHERE EXISTING WATER MAIN IS SIX (6)-INCHES IN DIAMETER THE PIPE LOWERING SHALL BE MADE WITH PIPE AND FITTINGS NO LESS THAN EIGHT (8)-INCH IN DIAMETER WITH REDUCERS INSTALLED AT STATIONS "B" AND "C". THE REDUCERS SHALL BE RETAINED MECHANICAL JOINT WITH SMALL END OF REDUCER PLAIN END FOR CONNECTION WITH SLEEVES OR COMPRESSION COUPLINGS.
  - 5) ALL EXISTING WATER SERVICE CONNECTIONS BETWEEN THE CUT-IN-VALVE ASSEMBLIES SHALL BE MAINTAINED BY TEMPORARY SERVICE CONNECTIONS PROVIDED AND MAINTAINED BY THE CONTRACTOR.
  - 6) EXISTING WATER SERVICE CONNECTIONS NEEDED TO BE RETAPPED AND RECONNECTED WILL ONLY BE PERMITTED BETWEEN STATIONS "A" AND "B" AND STATIONS "C" AND "D". NO RETAPPING OF SERVICE CONNECTIONS WILL BE ALLOWED BETWEEN STATIONS "A" AND "C".

DETAIL FOR WATER MAIN LOWERING UNDER OBSTRUCTIONS LESS THAN 24" IN DIAMETER OR WIDTH FOR "EXISTING CONSTRUCTION"

- NOT TO SCALE -

STD-L02

DATE: 3-4-2002 BY: RSK

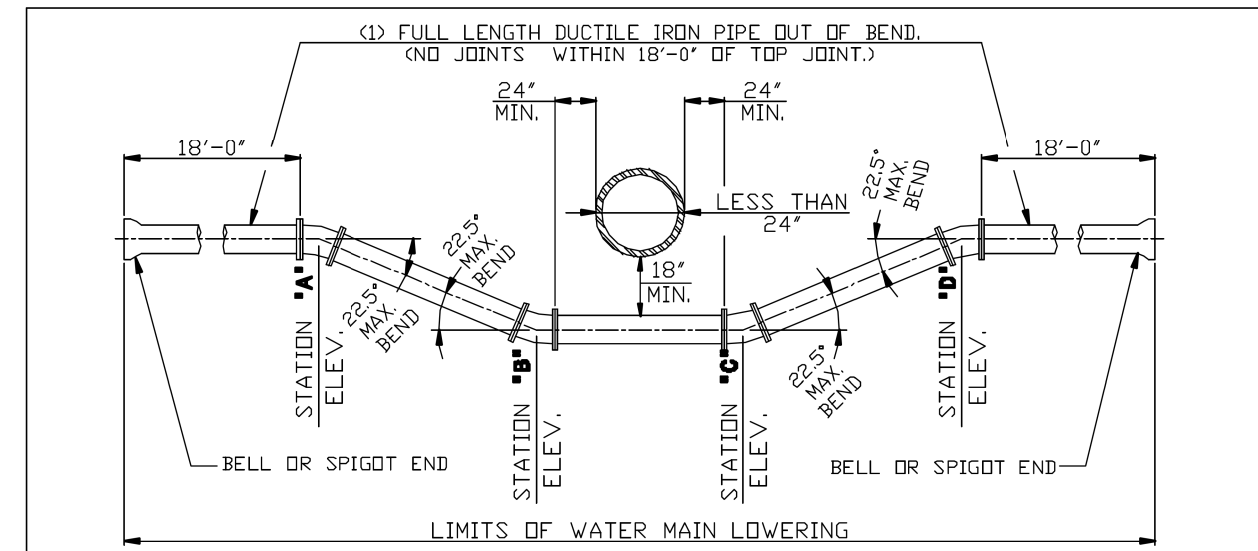


- NOTE:
- 1) WATER MAIN SHALL BE DUCTILE IRON, MINIMUM CLASS 52, CEMENT LINED PUSH-ON JOINT PIPE WITH RETAINED MECHANICAL JOINT DUCTILE IRON CLASS 350, CEMENT LINED OR FUSION BONDED EPOXY COATED RETAINED MECHANICAL JOINT FITTINGS.
  - 2) WHERE DEPTH OF LOWERING REQUIRES AN INTERMEDIATE JOINT BETWEEN STATIONS "A" & "B" AND/OR "C" & "D" THE ENTIRE LOWERING SHALL BE MADE WITH DUCTILE IRON, MINIMUM CLASS 52, CEMENT LINED PIPE AND DUCTILE IRON CLASS 350, CEMENT LINED FITTINGS ALL HAVING BOLTLESS RESTRAINED PUSH-ON JOINTS, TYPE II.
  - 3) WHERE LENGTH OF LOWERING UNDER OBSTRUCTION(S) REQUIRES AN INTERMEDIATE JOINT ONLY BETWEEN STATIONS "B" & "C", THAT INTERMEDIATE JOINT(S) SHALL BE MADE WITH A BOLTLESS RESTRAINED PUSH-ON JOINT, TYPE II.
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  - 5) ALL EXISTING WATER SERVICE CONNECTIONS BETWEEN THE CUT-IN-VALVE ASSEMBLIES SHALL BE MAINTAINED BY TEMPORARY SERVICE CONNECTIONS PROVIDED AND MAINTAINED BY THE CONTRACTOR.
  - 6) EXISTING WATER SERVICE CONNECTIONS NEEDED TO BE RETAPPED AND RECONNECTED WILL ONLY BE PERMITTED BETWEEN STATIONS "A" AND "B" AND STATIONS "C" AND "D". NO RETAPPING OF SERVICE CONNECTIONS WILL BE ALLOWED BETWEEN STATIONS "A" AND "C".

DETAIL FOR WATER MAIN LOWERING UNDER OBSTRUCTIONS 24" & LARGER IN DIAMETER OR WIDTH FOR "EXISTING CONSTRUCTION"

STD-L03

DATE: 3-4-2002 BY: RSK



- NOTE:
- 1) WATER MAIN SHALL BE DUCTILE IRON, MINIMUM CLASS 52, CEMENT LINED PUSH-ON JOINT PIPE WITH RETAINED MECHANICAL JOINT DUCTILE IRON CLASS 350, CEMENT LINED RETAINED MECHANICAL JOINT FITTINGS.
  - 2) WHERE DEPTH OF LOWERING REQUIRES AN INTERMEDIATE JOINT BETWEEN STATIONS "A" & "B" AND/OR "C" & "D" THE ENTIRE LOWERING SHALL BE MADE WITH DUCTILE IRON, MINIMUM CLASS 52, CEMENT LINED PIPE AND DUCTILE IRON CLASS 350, CEMENT LINED FITTINGS ALL HAVING BOLTLESS RESTRAINED PUSH-ON JOINTS, TYPE I.
  - 3) WHERE LENGTH OF LOWERING UNDER OBSTRUCTION(S) REQUIRES AN INTERMEDIATE JOINT ONLY BETWEEN STATIONS "B" & "C", AND PIPE JOINTS ARE AS INDICATED IN NOTE "1" ABOVE, THAT INTERMEDIATE JOINT(S) SHALL BE MADE WITH A BOLTLESS RESTRAINED PUSH-ON JOINT, TYPE II.
  - 4) WHERE LENGTH OF LOWERING UNDER OBSTRUCTION(S) REQUIRES AN INTERMEDIATE JOINT ONLY BETWEEN "B" AND "C" AND PIPE JOINTS ARE AS INDICATED IN NOTE "2" ABOVE, THAT INTERMEDIATE JOINT(S) SHALL BE MADE WITH A BOLTLESS RESTRAINED PUSH-ON JOINT, TYPE I.

DETAIL FOR WATER MAIN LOWERING UNDER OBSTRUCTIONS LESS THAN 24" IN DIAMETER OR WIDTH FOR "NEW CONSTRUCTION"

STD-L04

- NOT TO SCALE -

DATE: 10-1-97 BY: RSK

CUY-90-16-28 (CCG3A)  
 MODEL: JDI2106 PAPER SIZE: 17x11 (in.) DATE: 6/22/2022 TIME: 8:19:41 PM USER: Scott.Pruzin  
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WATER WORK DETAILS

DESIGN AGENCY

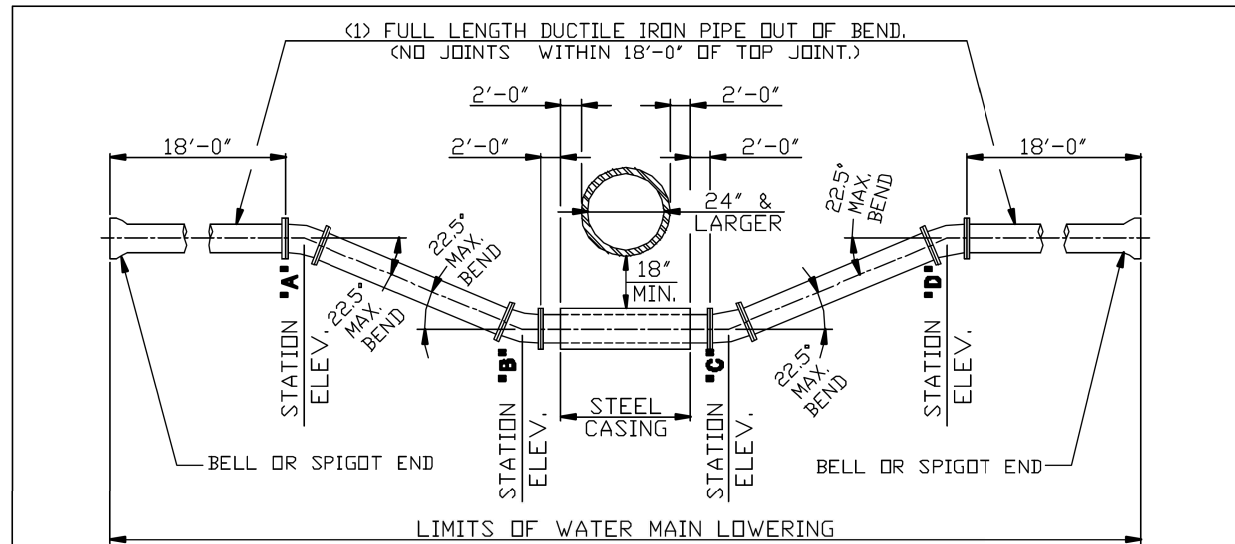
Michael Baker INTERNATIONAL

DESIGNER

REVIEWER

PROJECT ID  
82382

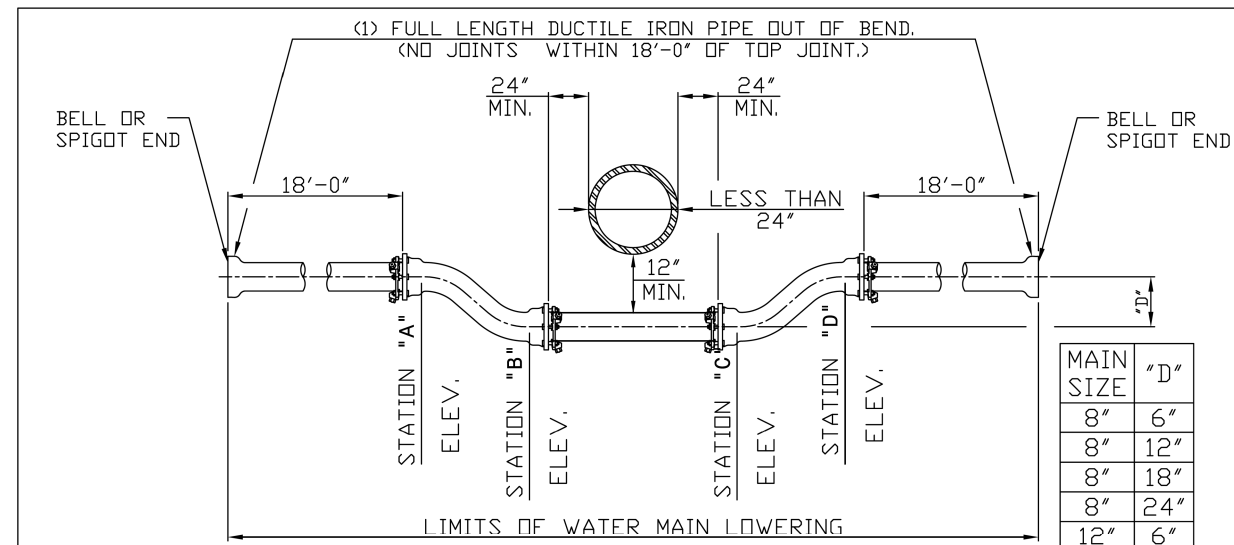
SHEET TOTAL  
1200 2339



- NOTE:**
- 1) WATER MAIN SHALL BE DUCTILE IRON, MINIMUM CLASS 52, CEMENT LINED PUSH-ON JOINT PIPE WITH RETAINED MECHANICAL JOINT DUCTILE IRON CLASS 350, CEMENT LINED RETAINED MECHANICAL JOINT FITTINGS.
  - 2) WHERE DEPTH OF LOWERING REQUIRES AN INTERMEDIATE JOINT BETWEEN STATIONS "A" & "B" AND/OR "C" & "D" THE ENTIRE LOWERING SHALL BE MADE WITH DUCTILE IRON, MINIMUM CLASS 52, CEMENT LINED PIPE AND DUCTILE IRON CLASS 350, CEMENT LINED FITTINGS ALL HAVING BOLTLESS RESTRAINED PUSH-ON JOINTS, TYPE I.
  - 3) WHERE LENGTH OF LOWERING UNDER OBSTRUCTION(S) REQUIRES AN INTERMEDIATE JOINT ONLY BETWEEN STATIONS "B" & "C", AND PIPE JOINTS ARE AS INDICATED IN NOTE "1" ABOVE, THAT INTERMEDIATE JOINT(S) SHALL BE MADE WITH A BOLTLESS RESTRAINED PUSH-ON JOINT, TYPE II.
  - 4) WHERE LENGTH OF LOWERING UNDER OBSTRUCTION(S) REQUIRES AN INTERMEDIATE JOINT ONLY BETWEEN "B" AND "C" AND PIPE JOINTS ARE AS INDICATED IN NOTE "1" ABOVE, THAT INTERMEDIATE JOINT(S) SHALL BE MADE WITH A BOLTLESS RESTRAINED PUSH-ON JOINT, TYPE I.

**DETAIL FOR WATER MAIN LOWERING UNDER OBSTRUCTIONS  
24" & LARGER IN DIAMETER OR WIDTH FOR "NEW CONSTRUCTION"**

STD-L05 - NOT TO SCALE - DATE: 10-1-97 BY: RSK

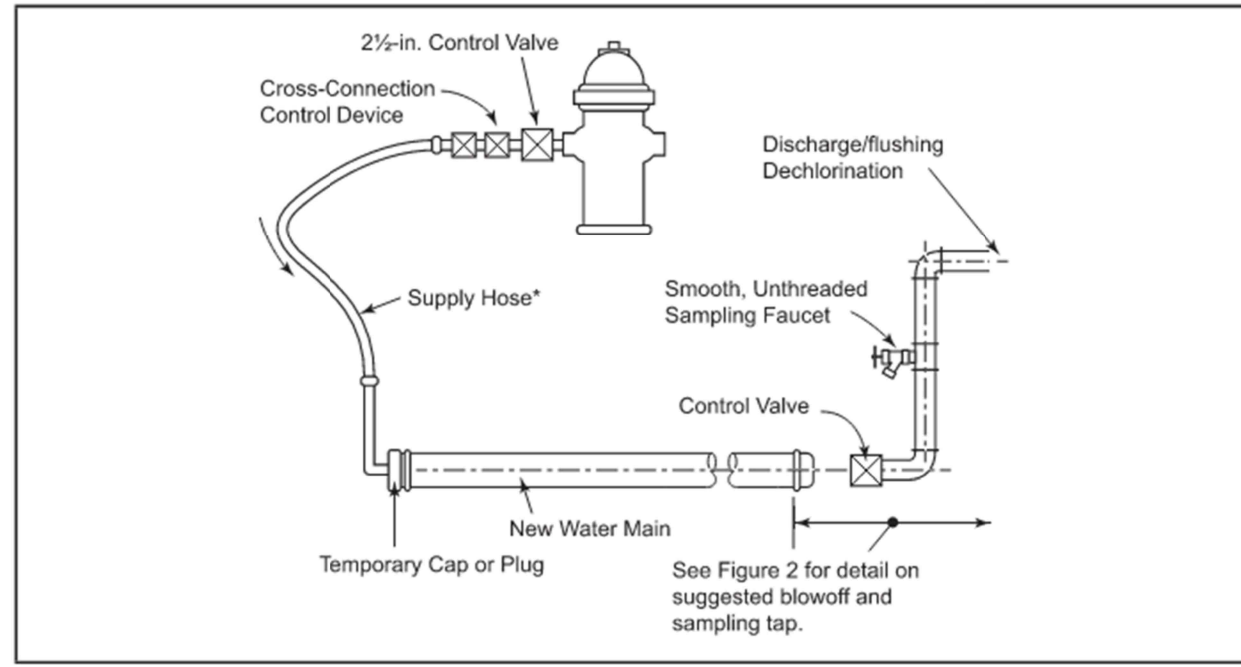


- NOTE:**
- 1) WATER MAIN SHALL BE DUCTILE IRON, MINIMUM CLASS 52, CEMENT LINED PUSH-ON JOINT PIPE WITH RETAINED MECHANICAL JOINT DUCTILE IRON CLASS 350, CEMENT LINED RETAINED MECHANICAL JOINT FITTINGS.  
\* ALL FITTINGS MUST FOLLOW ANSI/AWWA C110/A21.10 FOR FULL BODY FITTINGS AND ANSI/AWWA C153/A221.5 FOR COMPACT FITTINGS.  
ALL FITTINGS ARE NOT AVAILABLE FROM ALL APPROVED MANUFACTURERS.
  - 2) WHERE LENGTH OF LOWERING UNDER OBSTRUCTION(S) REQUIRES AN INTERMEDIATE JOINT ONLY BETWEEN STATIONS "B" & "C", AND PIPE JOINTS ARE AS INDICATED IN NOTE "1" ABOVE, THAT INTERMEDIATE JOINT(S) SHALL BE MADE WITH A BOLTLESS RESTRAINED PUSH-ON JOINT, TYPE II.

**DETAIL FOR WATER MAIN LOWERING USING MECHANICAL JOINT OFFSETS  
UNDER OBSTRUCTIONS LESS THAN 24" IN DIAMETER OR WIDTH FOR "NEW CONSTRUCTION"**

STD-L06 - NOT TO SCALE - DATE: 12-3-2009 BY: RSK

MAIN SIZE	"D"
8"	6"
8"	12"
8"	18"
8"	24"
12"	6"
12"	12"
12"	18"
12"	24"



**NOTE:** Figure 1 applies to pipes with diameters 4 in. (100 mm) through 12 in. (300 mm). Larger sizes must be handled on a case-by-case basis.

\*Clean potable-water hose only. Size and number of taps per Table 3. This hose must be removed during the hydrostatic pressure test.

Figure 1 Suggested temporary flushing/testing connection

SOURCE: AWWA C-651 – DISINFECTING WATER MAINS

DESIGN AGENCY

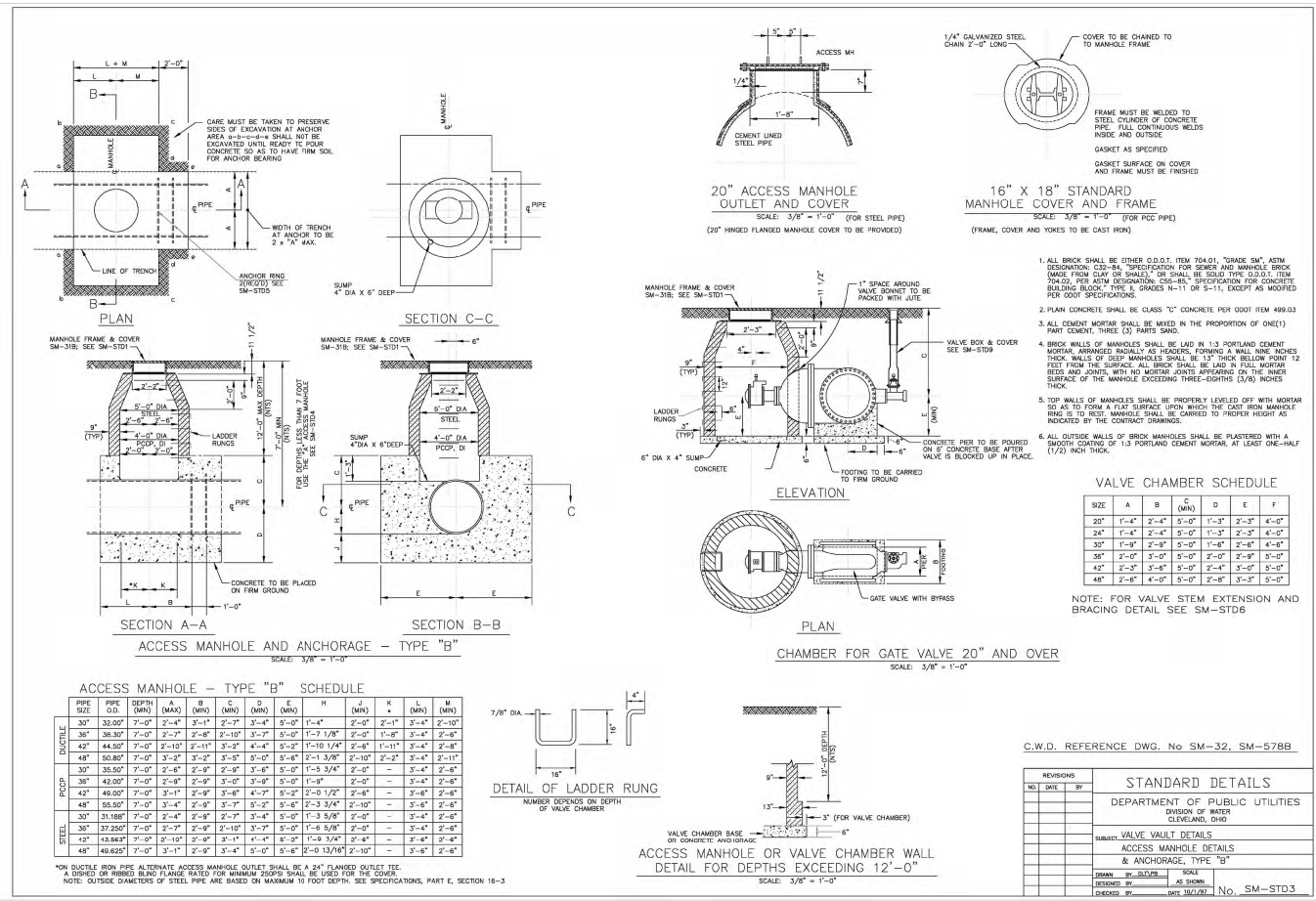
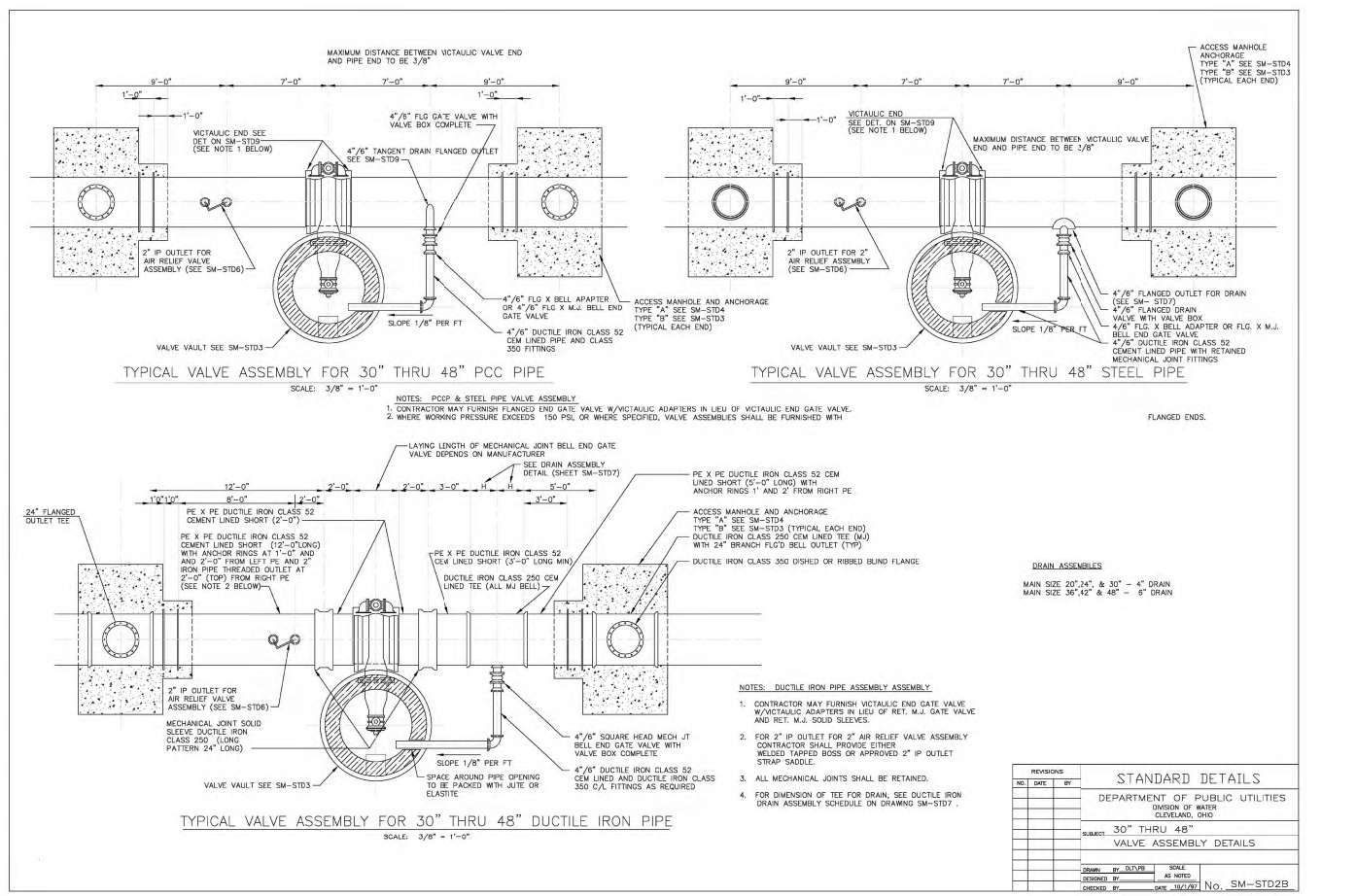
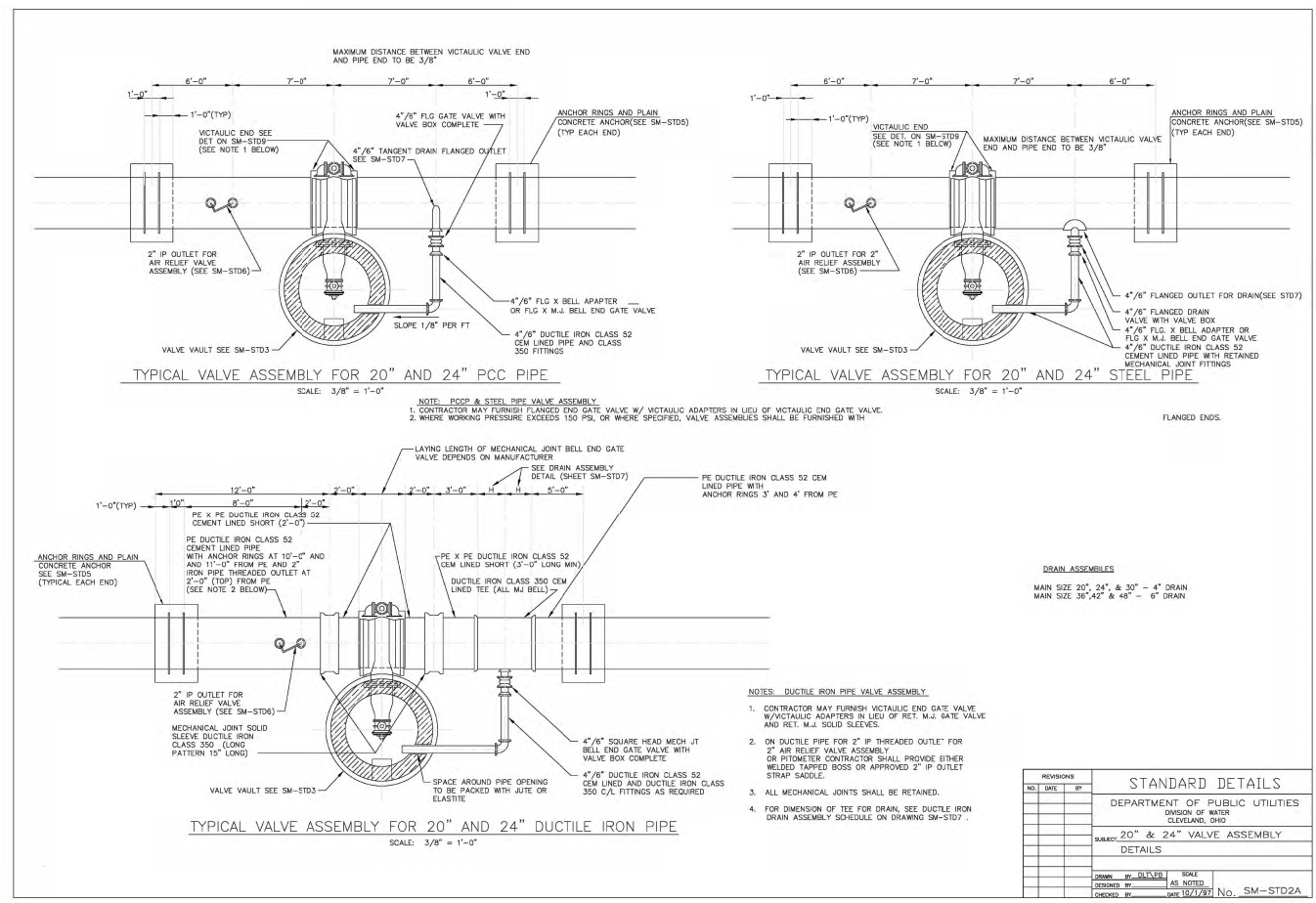
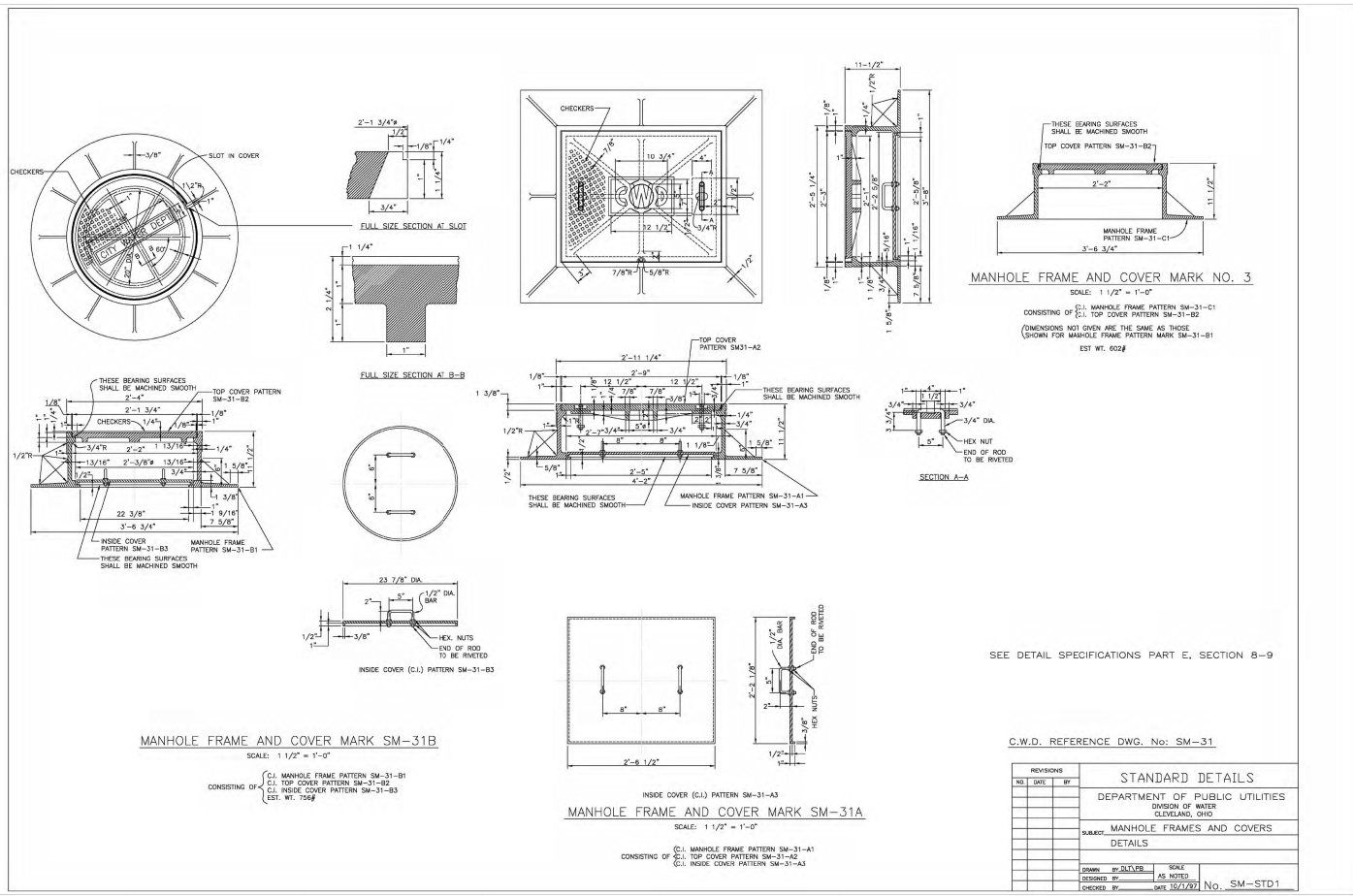
**Michael Baker**  
INTERNATIONAL

DESIGNER

REVIEWER

PROJECT ID  
82382

SHEET TOTAL  
1201 | 2339





**ACCESS MANHOLE AND ANCHORAGE - TYPE "A"**  
SCALE: 3/8" = 1'-0"

**ACCESS MANHOLE - TYPE A SCHEDULE**

PIPE SIZE (IN)	DEPTH (IN)	DEPTH (MM)	A (IN)	B (IN)	C (IN)	D (IN)	E (IN)	F (IN)	G (IN)	H (IN)	J (IN)	K (IN)	L (IN)	M (IN)
30"	32.00"	813	5'-0"	7'-0"	2'-4"	2'-11"	4'-4"	3'-0"	3'-0"	1'-0"	2'-0"	2'-11"	3'-4"	2'-10"
36"	38.30"	978	5'-6"	7'-0"	2'-7"	2'-8"	4'-4"	3'-7"	2'-8"	1'-1 1/8"	1'-1 1/8"	1'-8"	3'-4"	2'-8"
42"	44.50"	1132	6'-0"	7'-0"	2'-10"	2'-11"	4'-10"	4'-4"	3'-2"	1'-1 3/4"	1'-1 3/4"	2'-8"	3'-4"	2'-8"
48"	50.80"	1286	6'-6"	7'-0"	3'-2"	3'-2"	4'-10"	4'-4"	3'-8"	2'-8 3/8"	2'-8 3/8"	2'-10"	3'-4"	2'-11"
30"	35.50"	907	5'-6"	7'-0"	2'-6"	2'-9"	4'-4"	3'-4"	3'-0"	2'-10 1/4"	1'-1 3/4"	2'-0"	3'-4"	2'-8"
36"	42.00"	1067	6'-0"	7'-0"	2'-9"	2'-9"	4'-4"	3'-0"	2'-7"	1'-1"	2'-0"	2'-0"	3'-4"	2'-8"
42"	48.00"	1227	6'-6"	7'-0"	3'-1"	2'-9"	4'-10"	4'-7"	3'-2"	2'-9 1/2"	2'-1 1/2"	2'-8"	3'-4"	2'-8"
48"	54.00"	1387	7'-0"	7'-0"	3'-4"	2'-9"	4'-10"	4'-0"	2'-8"	2'-8 1/4"	2'-3 3/4"	2'-10"	3'-4"	2'-8"
30"	31.888"	811	5'-6"	7'-0"	2'-4"	2'-9"	4'-4"	3'-4"	3'-0"	3'-0 3/8"	1'-1 5/8"	2'-0"	3'-4"	2'-8"
36"	37.250"	944	6'-0"	7'-0"	2'-7"	2'-9"	4'-4"	3'-7"	3'-0"	2'-9 3/8"	1'-1 9/8"	2'-0"	3'-4"	2'-8"
42"	43.500"	1113	6'-6"	7'-0"	2'-10"	2'-9"	4'-10"	4'-4"	3'-2"	3'-0 1/4"	1'-1 3/4"	2'-8"	3'-4"	2'-8"
48"	49.800"	1282	7'-0"	7'-0"	3'-1"	2'-9"	4'-10"	4'-0"	3'-0"	2'-9 3/8"	1'-1 3/4"	2'-10"	3'-4"	2'-8"

NOTE: WHERE DEPTH OF WATER MAIN TO PIPE EXCEEDS 7'-0" USE TYPE "B" ACCESS MANHOLE - SEE SM-STD3

**STANDARD DETAILS**  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF WATER CLEVELAND, OHIO  
NUMBER: ACCESS MANHOLE & ANCHORAGE, TYPE "A" DETAILS  
DRAWN BY: S.B.S. SCALE: 1" = 1'-0"  
DESIGNED BY: S.M. No. SM-STD4

**PLAIN ANCHOR AND ANCHORAGE DETAIL**

**ANCHOR RING DETAILS**

NOTE: RING DIAMETERS AND RING THICKNESSES ARE MINIMUMS. DIAMETERS ARE FOR THICKNESS SHALL BE INCREASED WHEN WORKING PRESSURES EXCEED 150 PSI.

**ANCHOR AND FLANGE SCHEDULE**

PIPE DIA	A	B	C	D	E	F	G	H	TRENCH WIDTH (MAX)	RING DIA (MIN)	T (MIN)	W
20"	1'-0"	1'-0"	3'-0"	2'-3"	2'-3"	4'-6"	3'-8"	7'-0"	4'-0"	25.70"	1/2"	3/8"
24"	1'-0"	1'-0"	3'-0"	2'-3"	2'-3"	4'-6"	3'-8"	8'-0"	4'-0"	32.25"	1/2"	7/8"
30"	1'-0"	1'-0"	3'-0"	3'-0"	3'-0"	5'-6"	5'-0"	10'-0"	5'-0"	35.50"	5/8"	1 1/2"
36"	1'-0"	1'-0"	3'-0"	3'-0"	3'-0"	7'-0"	6'-8"	11'-0"	6'-0"	43.40"	5/8"	1 1/2"
42"	2'-0"	1'-6"	3'-0"	3'-0"	3'-0"	8'-0"	8'-0"	12'-0"	8'-0"	49.50"	3/4"	2"
48"	2'-0"	1'-6"	3'-0"	4'-0"	3'-0"	9'-0"	8'-8"	13'-0"	8'-8"	56.50"	3/4"	2"

NOTE: 1.) RING DIAMETERS AND RING THICKNESSES ARE MINIMUMS. DIAMETERS AND/OR THICKNESSES SHALL BE INCREASED WHEN WORKING PRESSURES EXCEED 150 PSI.  
2.) FOR ANCHORAGE ON ACCESS MANHOLES, TYPE "A" AND TYPE "B", DIMENSION "A" IS 1'-0".  
3.) FOR ANCHORAGE ON ACCESS MANHOLES, TYPE "A" AND TYPE "B", DIMENSION "B" IS 1'-0".  
4.) FOR PLAN ANCHORS ONLY.

**STANDARD DETAILS**  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF WATER CLEVELAND, OHIO  
NUMBER: ANCHOR RING AND PLAIN CONCRETE ANCHOR DETAILS  
DRAWN BY: S.B.S. SCALE: 1" = 1'-0"  
DESIGNED BY: S.M. No. SM-STD5

**2" AIR RELIEF VALVE INSTALLATION DETAIL**  
NOT TO SCALE

**2" AIR RELIEF ASSEMBLY**  
NOT TO SCALE

**VALVE STEM EXTENSION AND STEM BRACING DETAIL**  
NOT TO SCALE

**ENLARGED DETAIL SHOWING CONNECTION FOR AIR RELIEF VALVE OR PITOMETER P.C.C. PIPE**  
NOT TO SCALE

**2" IRON PIPE THREADED OUTLET FOR AIR RELIEF VALVE OR PITOMETER STEEL PIPE**  
NOT TO SCALE

**NOTES:**

1. ALL THREADED OUTLETS SHALL BE FURNISHED AND SHIPPED WITH MALLEABLE IRON PLUGS IN PLACE.
2. ON DUCTILE IRON PIPE, FOR 2" I.P. THREADED OUTLET FOR 2" AIR RELIEF ASSEMBLY OR 2" PITOMETER TAP CONTRACTOR SHALL FURNISH PIPE WITH EITHER WELDED TAPPED BOSS OR APPROVED 2" I.P. OUTLET DOUBLE STRAP SADDLE.
3. 2" I.P. OUTLET FOR PITOMETERS SHALL BE FURNISHED WITH 2" TO 1" BRONZE BUSHING AND 1" BRONZE COPPERATION VALVE.
4. FOR PITOMETER VAULT DETAILS SEE DETAIL DWG. SM-STD8

**STANDARD DETAILS**  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF WATER CLEVELAND, OHIO  
NUMBER: 2" AIR RELIEF DETAILS, 2" OUTLET DETAILS FOR AIR RELIEF/PITOMETER  
DRAWN BY: S.B.S. SCALE: 1" = 1'-0"  
DESIGNED BY: S.M. No. SM-STD6

**4" OR 6" DRAIN ASSEMBLY FOR DUCTILE IRON PIPE DETAIL**  
NOT TO SCALE

**4" OR 6" DRAIN ASSEMBLY FOR PCC PIPE DETAIL**  
NOT TO SCALE

**4" OR 6" TANGENTIAL OUTLET FOR STEEL PIPE DETAIL**  
NOT TO SCALE

**DUCTILE IRON DRAIN ASSEMBLY-SCHEDULE**

SIZE	H	J	K	L	REDUCER	1/8 BEND	1/4 BEND
20"x 6"	14"	17"	13"	5"	8"x 4"	26"	6 1/2"
24"x 6"	15"	19"	13"	5"	8"x 4"	26"	6 1/2"
30"x 6"	18"	22"	13"	5"	8"x 4"	26"	6 1/2"
36"x 6"	20"	26"	13.5"	5.5"	8"x 4"	27"	6 1/2"
36"x 6"	20"	26"	13.5"	5.5"	8"x 6"	27"	6"
42"x 6"	22"	30"	15.5"	5.5"	12"x 6"	30"	6"
48"x 6"	26"	34"	15.5"	7.5"	12"x 6"	30"	6"

**STANDARD DETAILS**  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF WATER CLEVELAND, OHIO  
NUMBER: DRAIN ASSEMBLY DETAILS OUTLET/ DRAIN/ VAULT DETAILS  
DRAWN BY: S.B.S. SCALE: 1" = 1'-0"  
DESIGNED BY: S.M. No. SM-STD7

CUY-90-16.28 (CCG3A)  
 MODEL: UDI209 PAPER SIZE: 17x11 (in.) DATE: 6/22/2022 TIME: 8:20:21 PM USER: Scott.Fuzhn  
 p:\mb-us-pw-bentley.com-us-pw-03\Documents\Cleveland\_OH\01\_Projects\ODOT\Drawings\Engineering\Utilities\Sheets\82382\_U01201.dgn

**BASE NO. VALVE SIZE**

2 & 3	3", 4", 6" & 8"	7 1/2", 10 3/4", 1 1/4", 1 3/4", 2", 2 1/2", 3", 3 1/2", 4", 4 1/2"
4	10", 12" & 16"	11", 14 1/4", 17 1/4", 21", 25 1/4", 31", 35 1/4", 41", 45"

**VALVE BOXES**  
SCALE: 1 1/2" = 1'-0"

**VALVE EXTENSION STEM DETAIL**  
SCALE: 1/4" = 1'-0"

**PITOMETER VAULT DETAIL**  
NOT TO SCALE

**PITOMETER VAULT - SCHEDULE**

PIPE SIZE (IN)	A	B	C	D	E	F	G	H	J	K	L	M
20"	6'-0"	7'	2'-5"	4'-0"	1'-7"	3'-2"	8"	2'-0"	7"	10"	5'-0"	6'-5"
24"	6'-0"	7'	2'-5"	4'-0"	1'-7"	3'-2"	8"	2'-0"	7"	10"	5'-0"	6'-5"
30"	6'-0"	7'	2'-5"	4'-0"	1'-7"	3'-2"	8"	2'-0"	7"	10"	5'-0"	6'-5"
36"	6'-0"	7'	2'-5"	4'-0"	1'-7"	3'-2"	8"	2'-0"	7"	10"	5'-0"	6'-5"
42"	6'-0"	7'	2'-5"	4'-0"	1'-7"	3'-2"	8"	2'-0"	7"	10"	5'-0"	6'-5"
48"	6'-0"	7'	2'-5"	4'-0"	1'-7"	3'-2"	8"	2'-0"	7"	10"	5'-0"	6'-5"

CWD REFERENCE No. SM-292, SM-292A & SM-723

**STANDARD DETAILS**  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF WATER  
CLEVELAND, OHIO  
SUBJECT: VALVE BOX, STEM & PITOMETER DETAILS  
SCALE: AS SHOWN  
DESIGNED BY: SHE 302/STB  
DATE: 3/20/01  
No. SM-STD8

**FABRICATED STEEL FLANGES-DETAIL**

**FABRICATED STEEL FLANGES-SCHEDULE**

NOSE DIA.	A	B	C	T <sub>1</sub>	T <sub>2</sub>	W	BC	DD	HOLE DIA.	HOLE BOLT SIZE
12"	1 3/4"	1 7/8"	1 3/4"	1/4"	1/4"	17"	19"	12	1"	3/8"
18"	2"	2 1/8"	1 3/4"	1/4"	1/4"	25 1/4"	27 1/2"	18	1 1/8"	1"
20"	2 3/8"	2 1/2"	1 3/4"	1/4"	1/4"	30"	32 1/2"	20	1 1/4"	1 1/8"
24"	3"	2 3/4"	1 3/4"	1/4"	1/4"	35"	37 1/2"	24	1 1/2"	1 1/4"
30"	3 3/4"	3 1/4"	1 3/4"	1/4"	1/4"	40"	42 1/2"	30	1 3/4"	1 1/2"
36"	4 1/4"	3 3/4"	1 3/4"	1/4"	1/4"	45"	47 1/2"	36	1 3/4"	1 1/2"
42"	5 1/4"	4 1/2"	1 3/4"	1/4"	1/4"	50"	52 1/2"	42	1 3/4"	1 1/2"
48"	6 1/4"	5 1/2"	1 3/4"	1/4"	1/4"	55"	57 1/2"	48	1 3/4"	1 1/2"

**FLANGE CONNECTIONS DETAIL**  
(SECTIONS THROUGH E)

**SHOULDERED PIPE END FOR VICALC COUPLING**

**VICALC COUPLING-SCHEDULE**

PIPE SIZE (IN)	A	B	C	D	E	F	G	H
20"	1"	4"	23 1/4"	3 1/4"	1 3/8"	23.84"	22.87"	
24"	1"	4"	27 1/2"	3 1/4"	1 3/8"	28.98"	27.13"	
30"	1 1/4"	4 1/2"	34 1/8"	3 1/2"	1 3/4"	33.07"	33.75"	
36"	1 1/4"	4 1/2"	40 7/8"	3 1/2"	1 3/4"	38.43"	43.19"	
42"	1 1/4"	4 1/2"	47 1/8"	3 1/2"	1 3/4"	43.81"	48.57"	
48"	1 1/2"	5"	53 7/8"	3 1/2"	1 3/4"	52.19"	53.17"	

**VICALC COUPLING-STYLE 44**

**STANDARD DETAILS**  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF WATER  
CLEVELAND, OHIO  
SUBJECT: FLANGE AND VICALC DETAILS;  
PCCP AND STEEL PIPE WELDED JOINTS  
SCALE: AS SHOWN  
DESIGNED BY: SHE 302/STB  
DATE: 3/20/01  
No. SM-STD9

**ELECTROLYSIS BOND DETAIL FOR VICALC OR MECHANICAL COUPLING FLANGE JOINT AND VALVE BODY**

**DETAIL OF ASSEMBLY FOR ELECTROLYSIS TAP FOR TEST STATION**

**POSITION OF BONDING WIRE/CONNECTORS**

**ELECTROLYSIS TEST STATION DETAIL**

**BONDED PIPE JOINT**

**CONCRETE PIPE BONDED JOINT DETAIL**

**STEEL PIPE BELL AND SPIGOT TYPICAL BONDED JOINT DETAIL**

**ANODE BED CATHODIC PROTECTION ASSEMBLY (ABCPA) DETAIL**

**POSITION OF BONDING WIRE/CONNECTORS**  
DUCTILE IRON, CONCRETE AND STEEL PIPE ALTERNATES

**STANDARD DETAILS**  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF WATER  
CLEVELAND, OHIO  
SUBJECT: BONDING AND ELECTROLYSIS DETAILS  
SCALE: AS SHOWN  
DESIGNED BY: SHE 302/STB  
DATE: 3/20/01  
No. SM-STD10

**Thermite Brazed connections to be CADWELD PROCESS as manufactured by ERICO PRODUCTS, INC. Solon, OH or approved equal.**

**ALL THERMITE BRAZED CONNECTIONS SHALL BE COATED WITH A-51 MASTIC OR HANDY CAPS AS MANUFACTURED BY ROYSTON LABS PITTSBURGH, PA OR APPROVED EQUAL.**

**2 Galvotec GA-S-60 pre-packaged Hi-Purity Zinc Anodes shall be installed at 10ft center to center spacing on the curb side of the pipe. They may be installed vertically or horizontally at a depth at least equal to or greater than the bottom of pipe and 3ft or more from the pipe. Anodes must be placed in and covered with native earth backfill, taken from the bottom of the pipe trench, for at least 2ft over all surfaces of anodes**

**ALL THERMITE BRAZED CONNECTIONS SHALL BE COATED WITH A-51 MASTIC OR HANDY CAPS AS MANUFACTURED BY ROYSTON LABS PITTSBURGH, PA OR APPROVED EQUAL.**

**#4 AWG STRANDED COPPER WIRE**

**THERMITE BRAZED CONNECTIONS TO BE CADWELD PROCESS AS MANUFACTURED BY ERICO PRODUCTS, INC. SOLON, OH OR APPROVED EQUAL.**

**DUCTILE IRON OR STEEL WATER LINE BONDED PIPE JOINT**

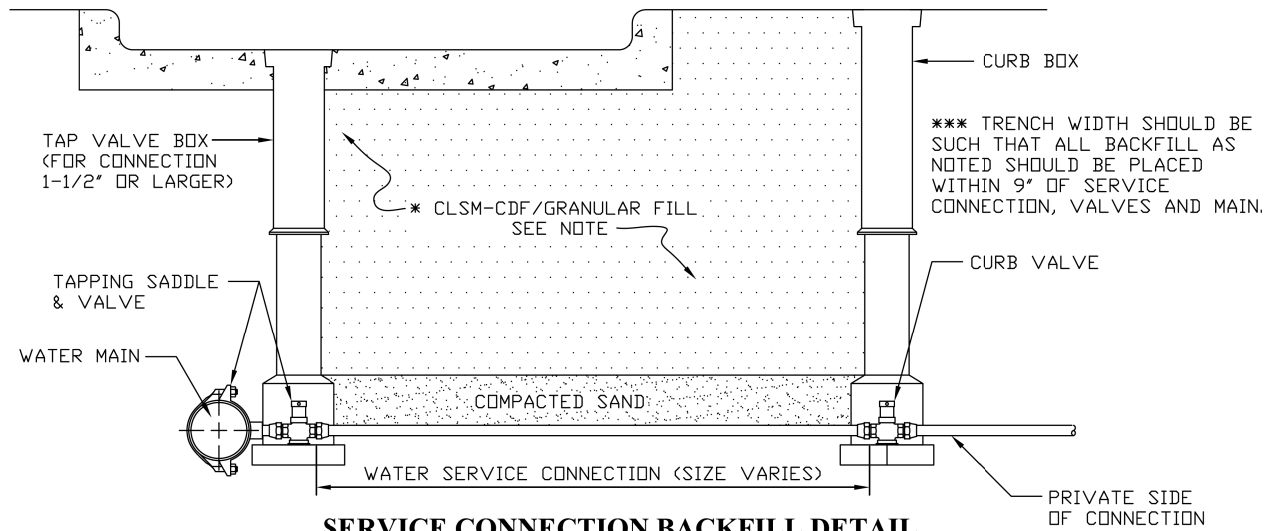
**ANODE BED CATHODIC PROTECTION ASSEMBLY (ABCPA) DETAIL**

**POSITION OF BONDING WIRE/CONNECTORS**  
DUCTILE IRON, CONCRETE AND STEEL PIPE ALTERNATES

**STANDARD DETAILS**  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF WATER  
CLEVELAND, OHIO  
SUBJECT: BONDING AND ANODE BED CATHODIC PROTECTION ASSEMBLY (ABCPA) DETAILS  
SCALE: NONE  
DESIGNED BY: SHE 302/STB  
DATE: 1/31/15  
No. SM-STD12

\*\* CLEVELAND REQUIRED MIX DESIGN -  
 CEMENT - 50 LBS. PER CUBIC YARD  
 SAND - 2850 LBS. PER CUBIC YARD  
 WATER - 50 GALLONS PER CUBIC YARD  
 RHEOCELL 30MB - 3 OZ. PER CUBIC YARD

\* CONTROLLED LOW STRENGTH MATERIAL-  
 CONTROLLED DENSITY FILL (CLSM-CDF)  
 "FLOWABLE FILL" IS REQUIRED WITHIN THE  
 CITY OF CLEVELAND CORPORATION LIMITS  
 AND PERMITTED IN ALL COMMUNITIES  
 SERVICED BY CWD. CHECK LOCAL REQUIREMENTS.



**SERVICE CONNECTION BACKFILL DETAIL**

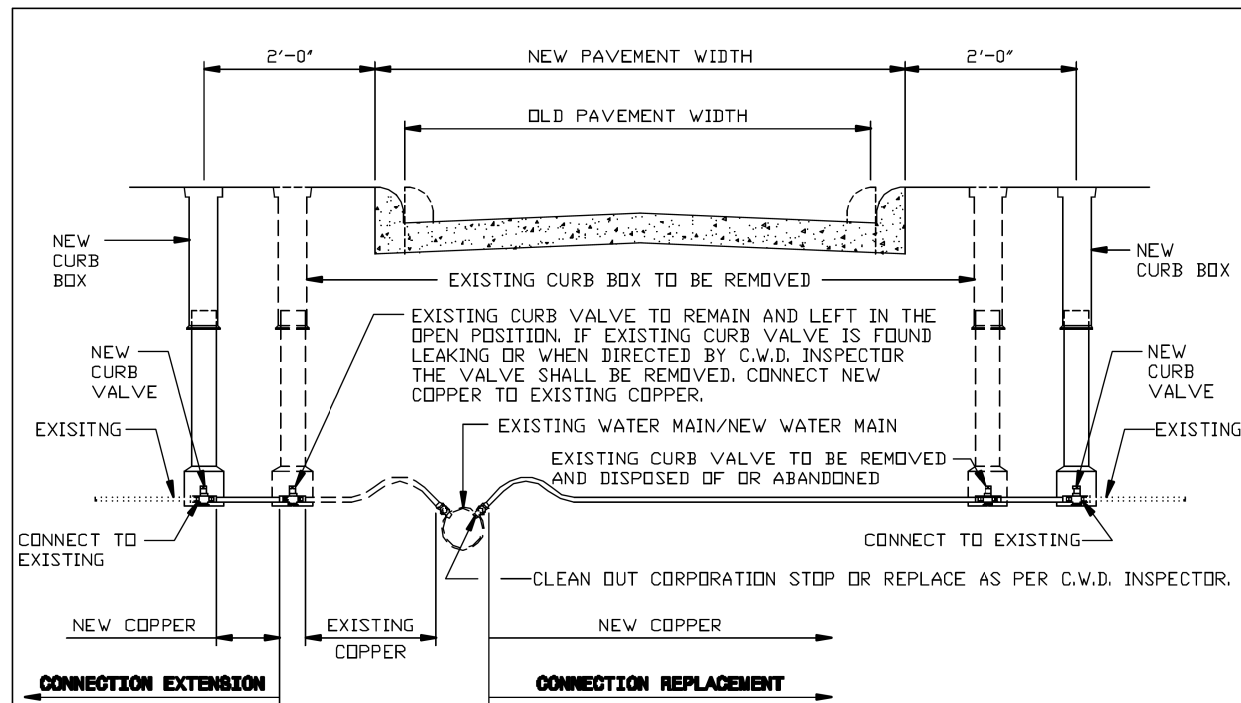
- NOT TO SCALE -

NOTES:

- 1) CONTRACTOR SHALL USE SPECIAL CARE IN PLACING THE SAND BEDDING BACKFILL, SO AS TO AVOID SCRAPING OF THE EXTERIOR COATING, INJURING THE PIPE, DISTORTING OR MOVING THE PIPE WHEN COMPACTING THE SAME. THE SAND BEDDING BACKFILL SHALL BE TAMPED IN SIX (6) INCH LAYERS, SIMULTANEOUSLY ON EACH SIDE OF THE PIPE, AND THOROUGHLY COMPACTED SO AS TO PROVIDE A SOLID BACKING AGAINST THE EXTERNAL SURFACE OF THE PIPE.
- 2) MINIMUM COMPACTION FOR ALL SAND BEDDING BACKFILL, BACKFILL AND PREMIUM BACKFILL SHALL BE 95% STANDARD PROCTOR.

STD-023

DATE: 10-7-2008 BY: RSK



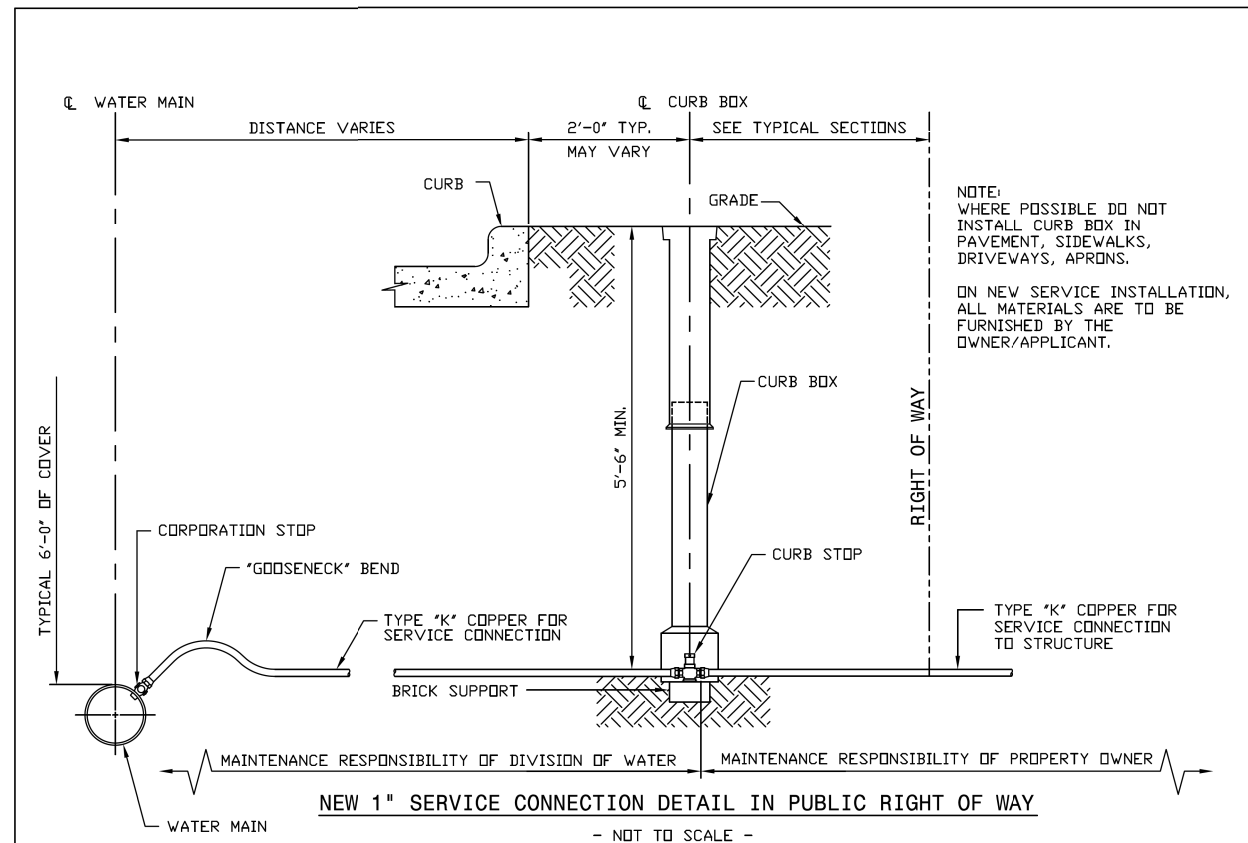
NOTE: IF EXISTING SERVICE CONNECTION IS FOUND TO BE GALVANIZED OR LEAD REPLACE FROM CORPORATION STOP TO CURB VALVE.

**WATER SERVICE CONNECTION EXTENSION OR REPLACEMENT FOR 1" & SMALLER**

- NOT TO SCALE -

STD-C01

DATE: 5-11-98 BY: RSK



**NEW 1" SERVICE CONNECTION DETAIL IN PUBLIC RIGHT OF WAY**

- NOT TO SCALE -

STD-C04

DATE: 8-1-2011 BY: RSK

WATER WORK DETAILS

DESIGN AGENCY

Michael Baker INTERNATIONAL

DESIGNER

REVIEWER

PROJECT ID

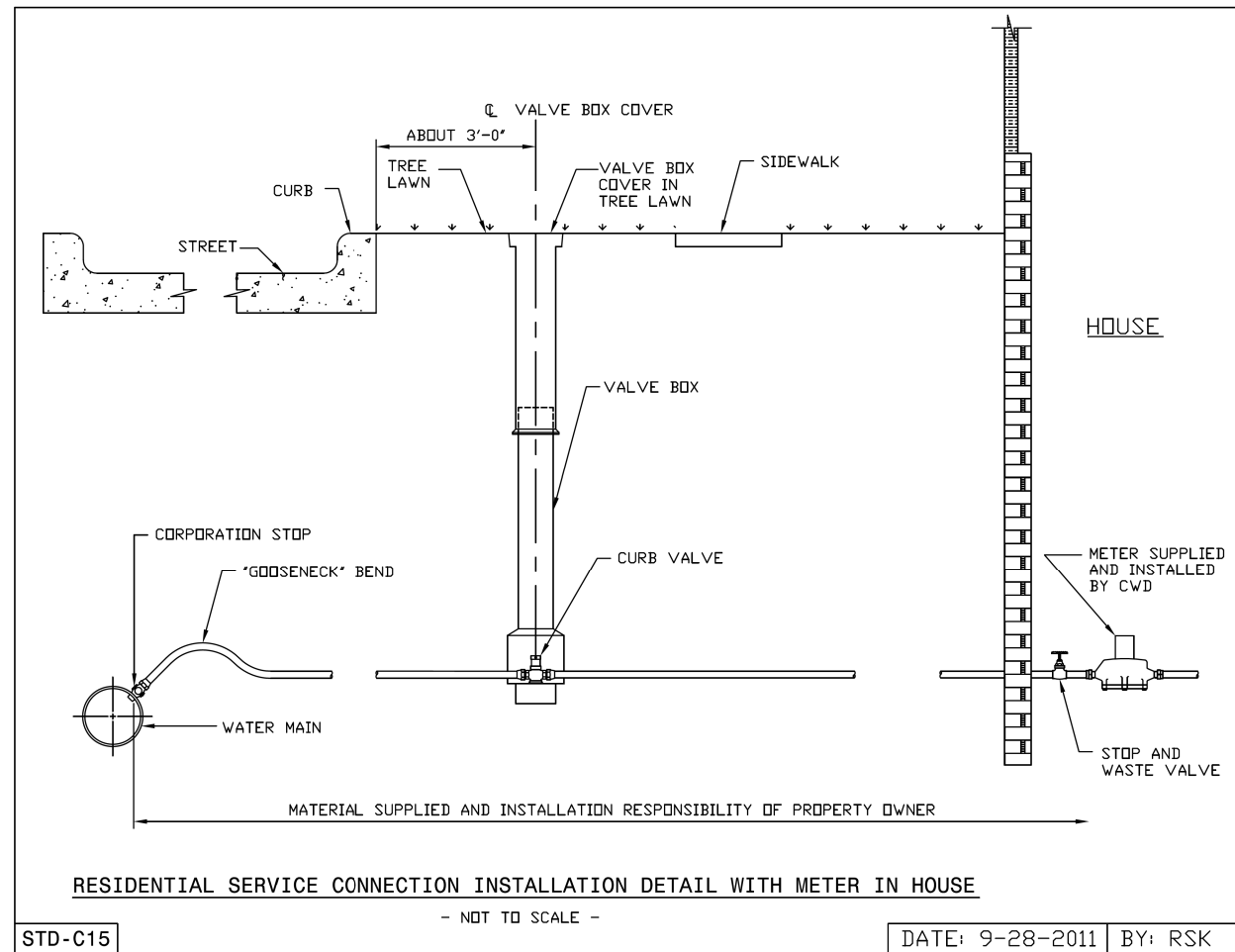
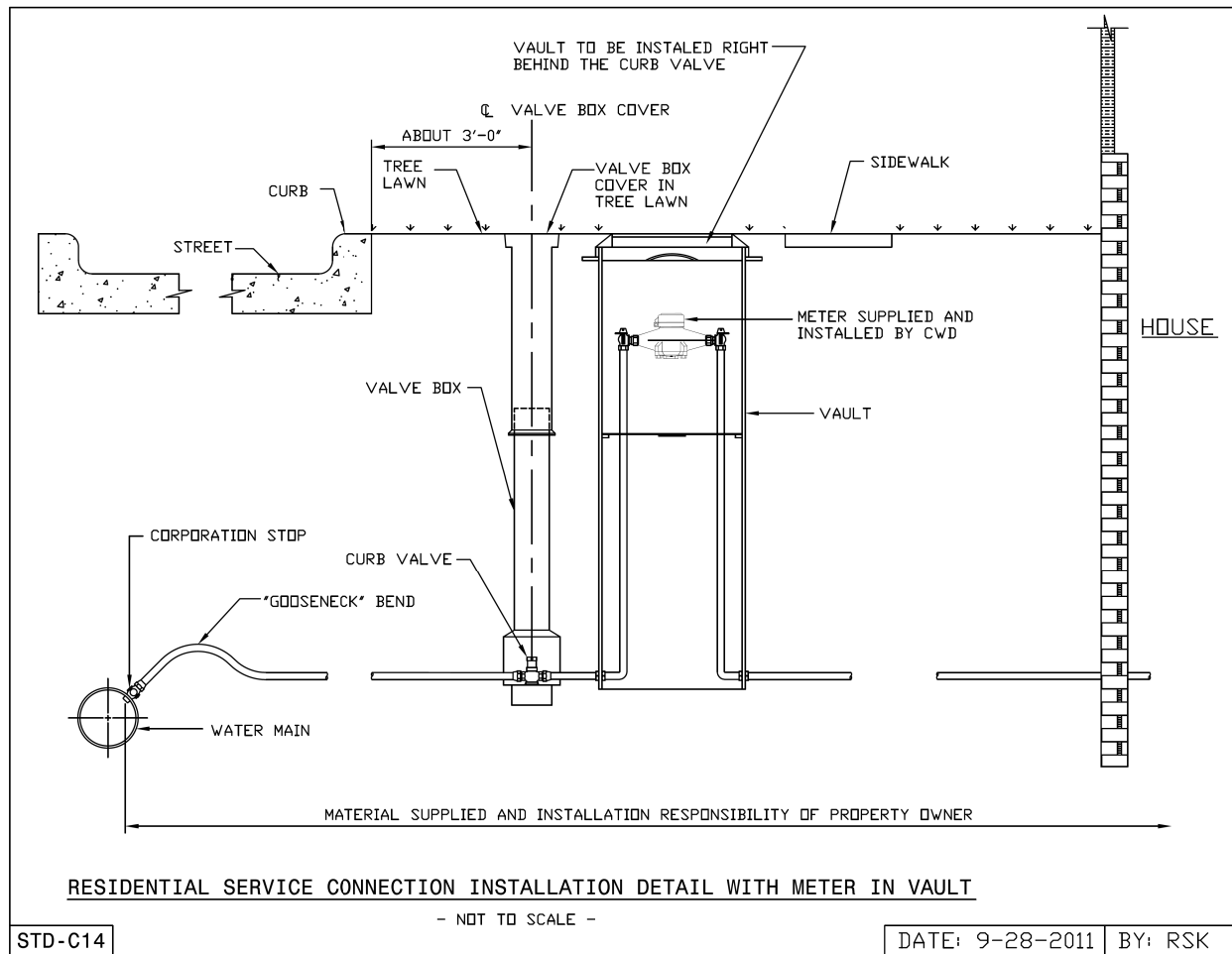
82382

SHEET TOTAL

1205 2339

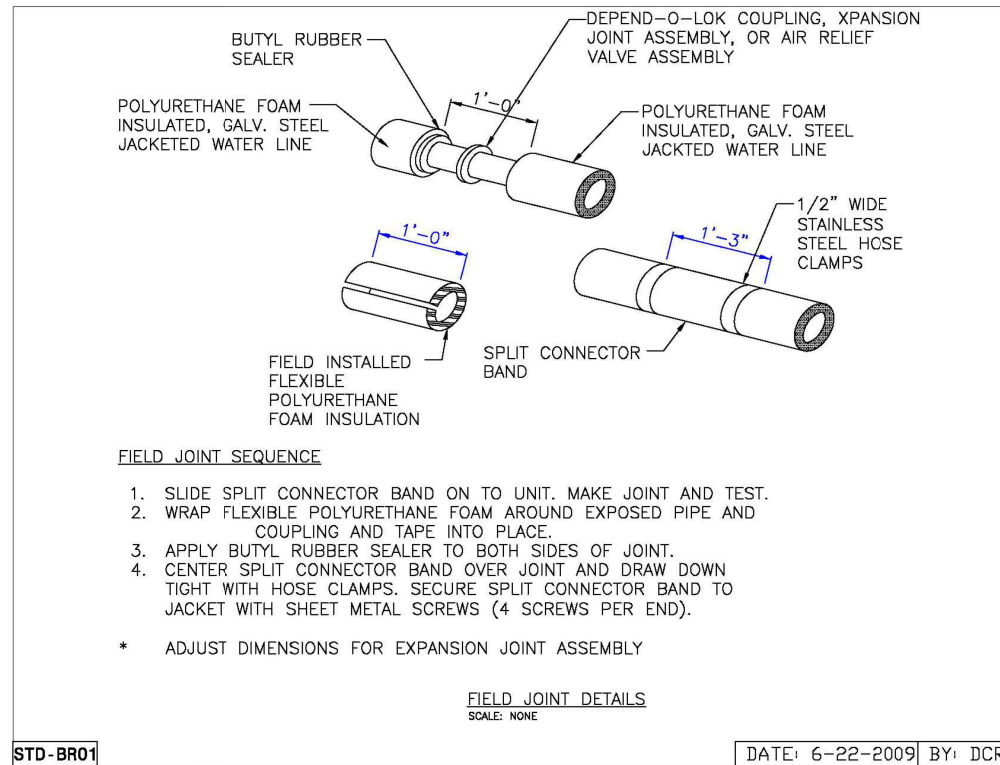
CUY-90-16.28 (CCG3A)

MODEL: UD1211 PAPER SIZE: 17x11 (in.) DATE: 6/22/2022 TIME: 8:21:07 PM USER: Scott.Pruzin pwc:\mb-us-pw-bentley.com\mb-us-pw-03\Documents\Cleveland\_OH101\_P\Projects\ODOT\District12\82382\400-Engineering\Utilities\Sheets\82382\_UD1201.dgn



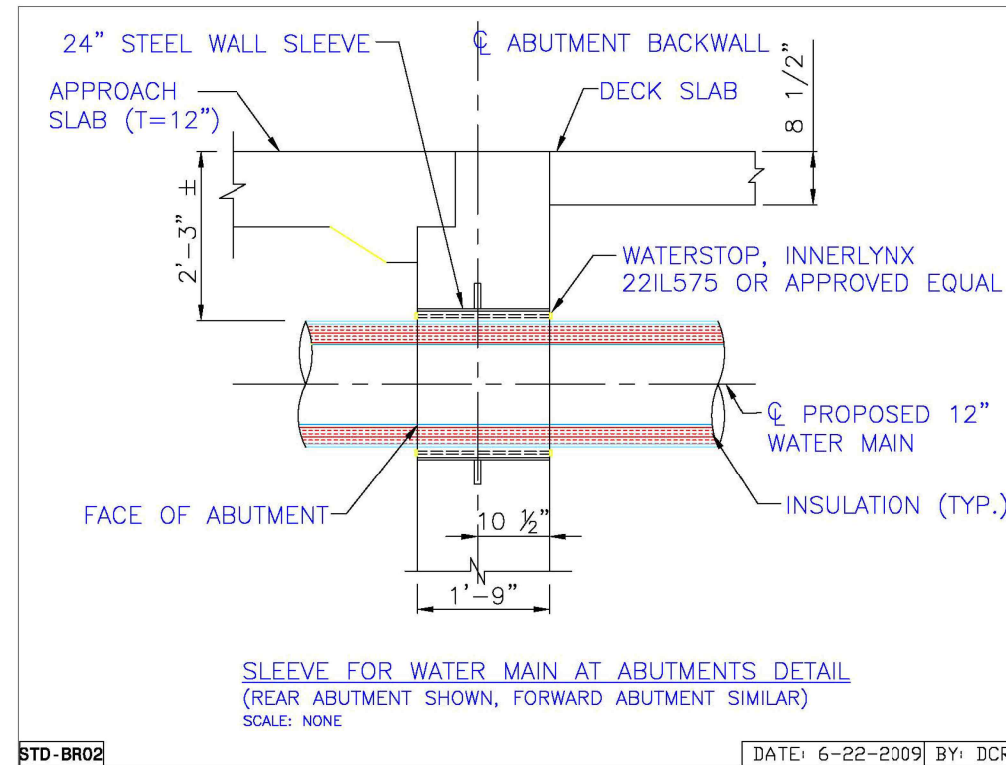
DESIGN AGENCY	
<b>Michael Baker</b> INTERNATIONAL	
DESIGNER	--
REVIEWER	--
PROJECT ID	82382
SHEET TOTAL	1206 2339





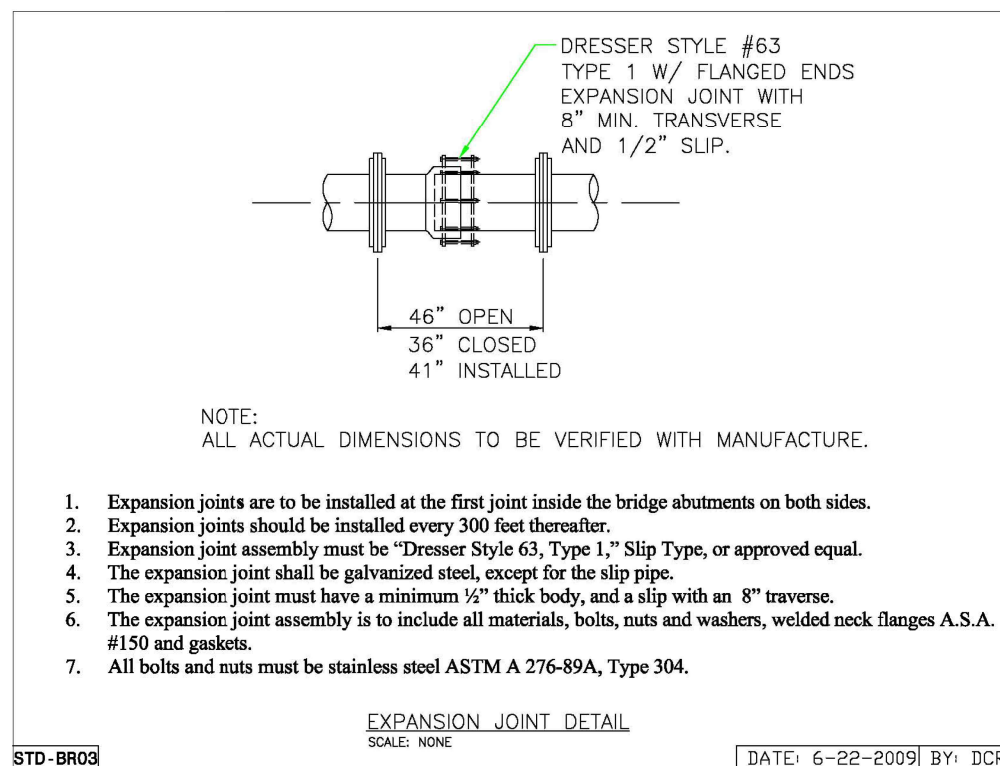
STD-BR01

DATE: 6-22-2009 BY: DCR



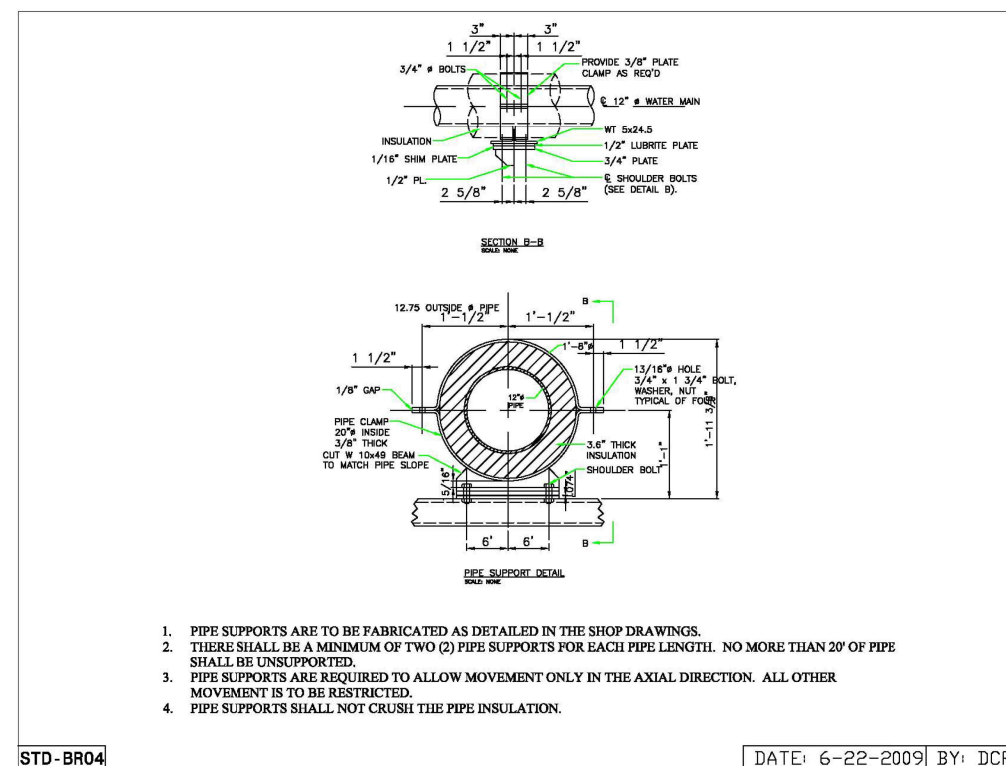
STD-BR02

DATE: 6-22-2009 BY: DCR



STD-BR03

DATE: 6-22-2009 BY: DCR



STD-BR04

DATE: 6-22-2009 BY: DCR

DESIGN AGENCY

Michael Baker  
INTERNATIONAL

DESIGNER

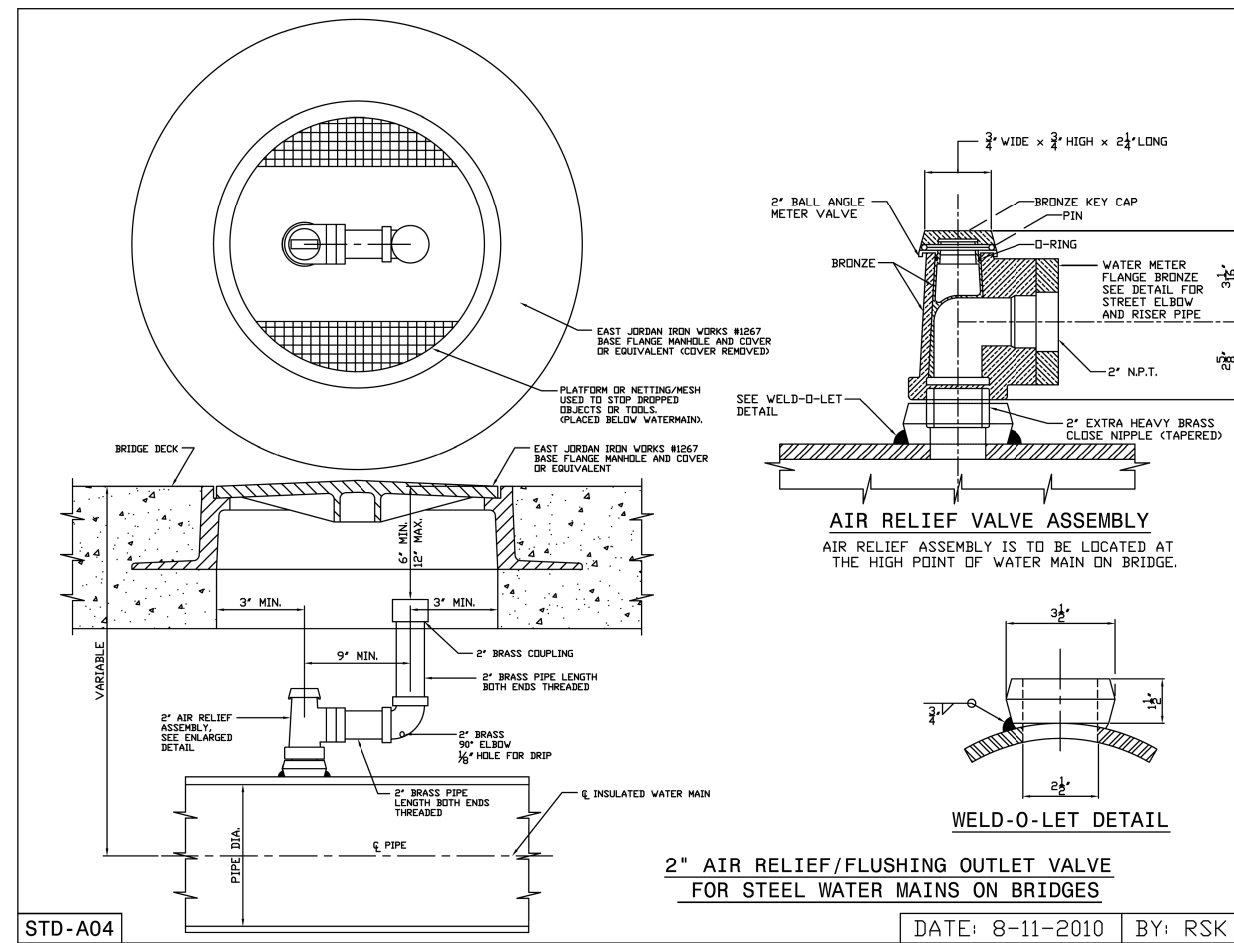
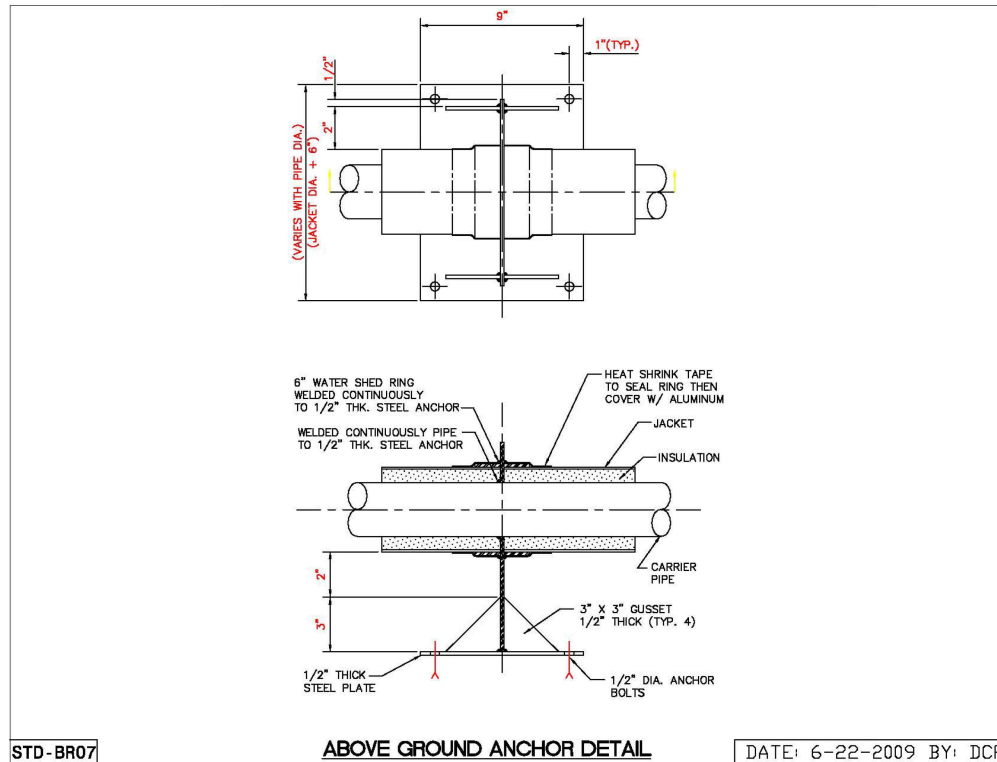
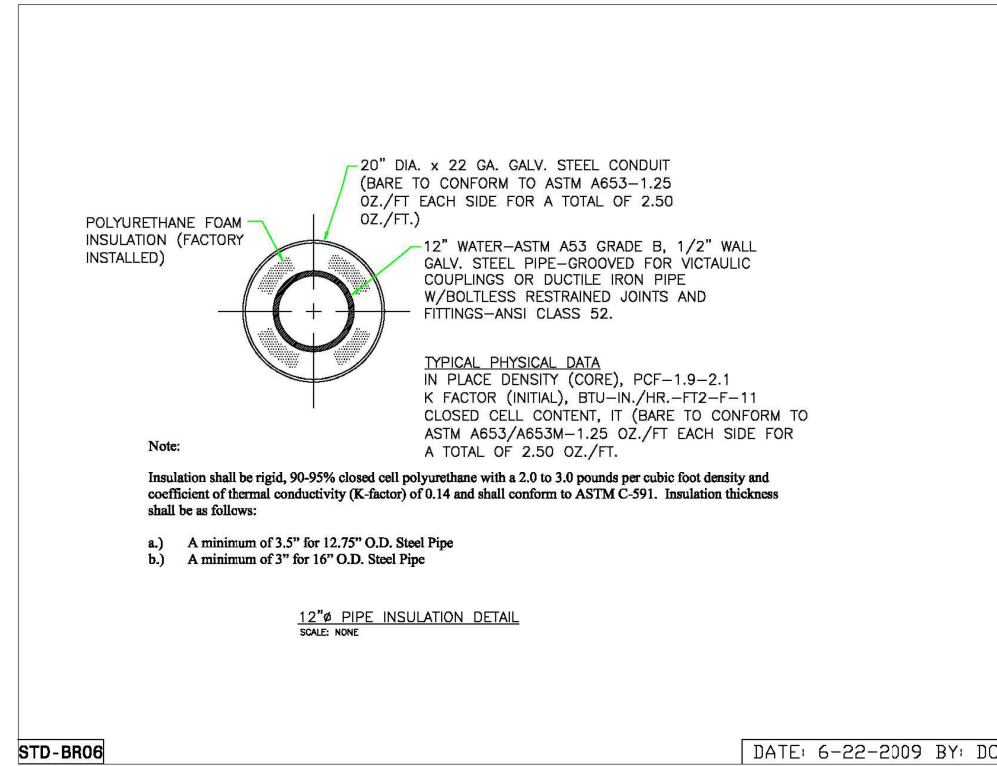
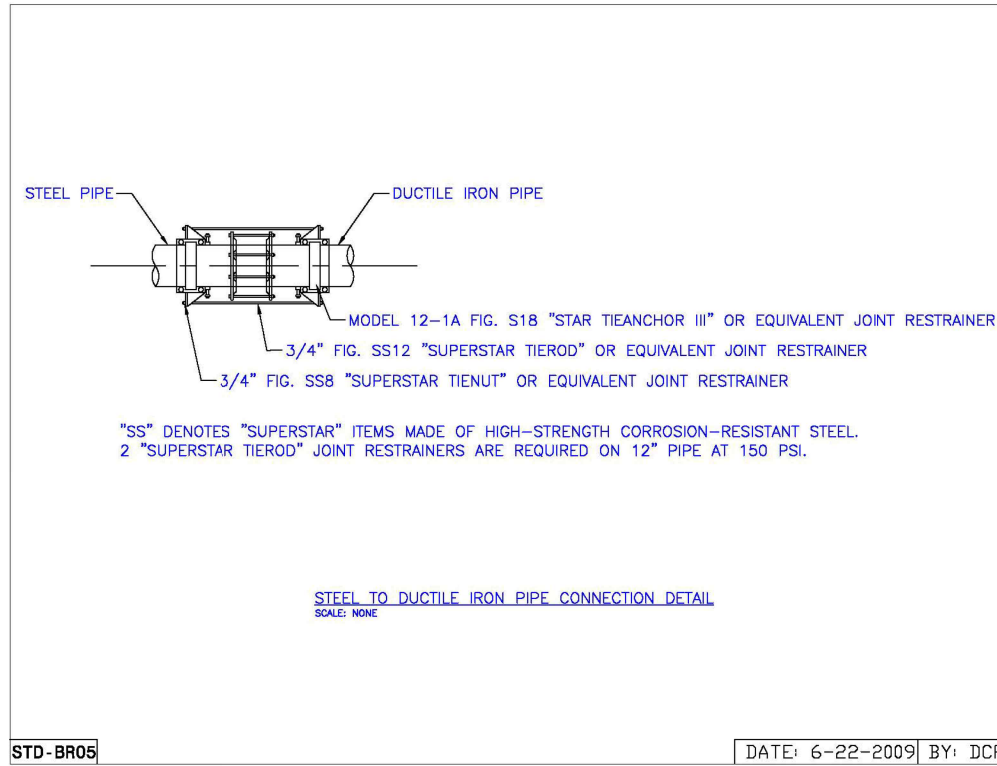
REVIEWER

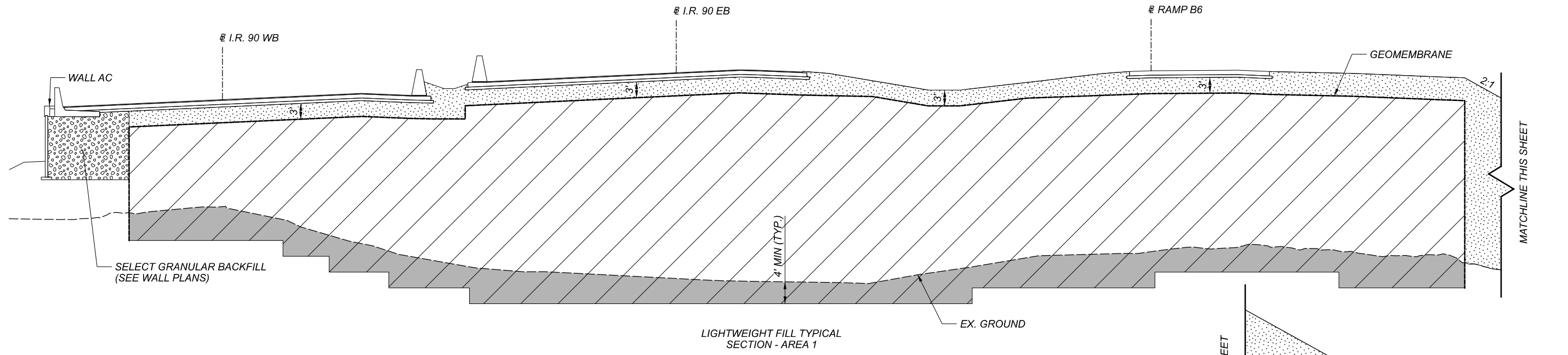
PROJECT ID

82382

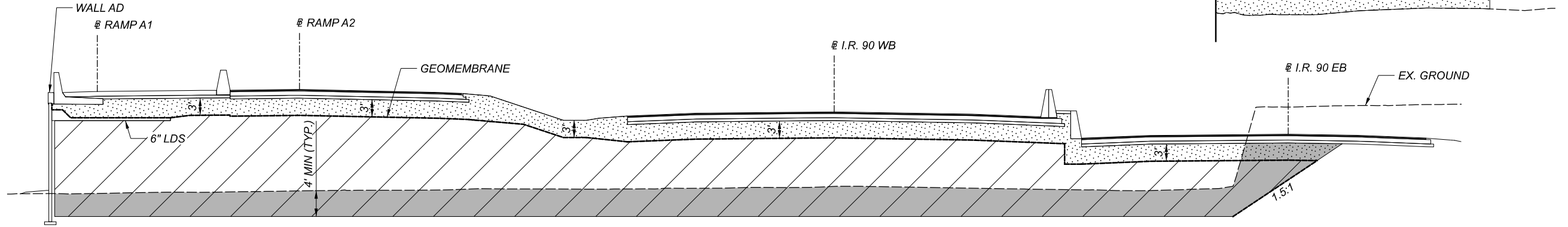
SHEET TOTAL

1207 2339

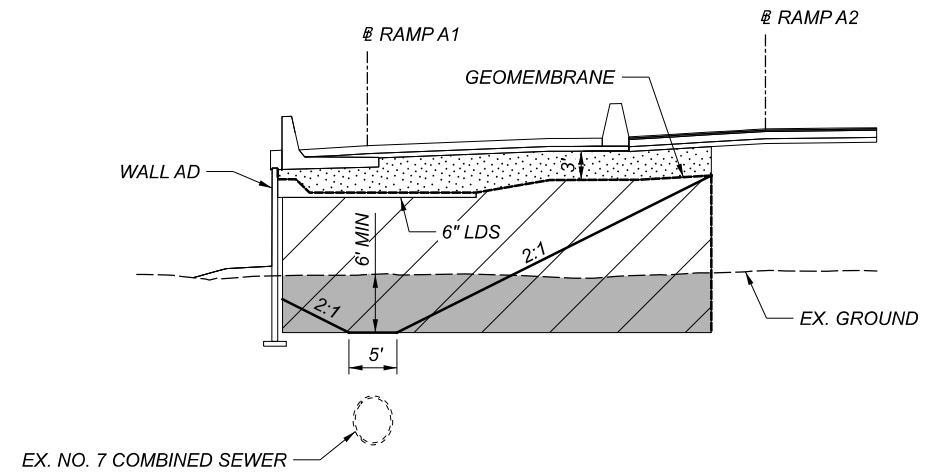




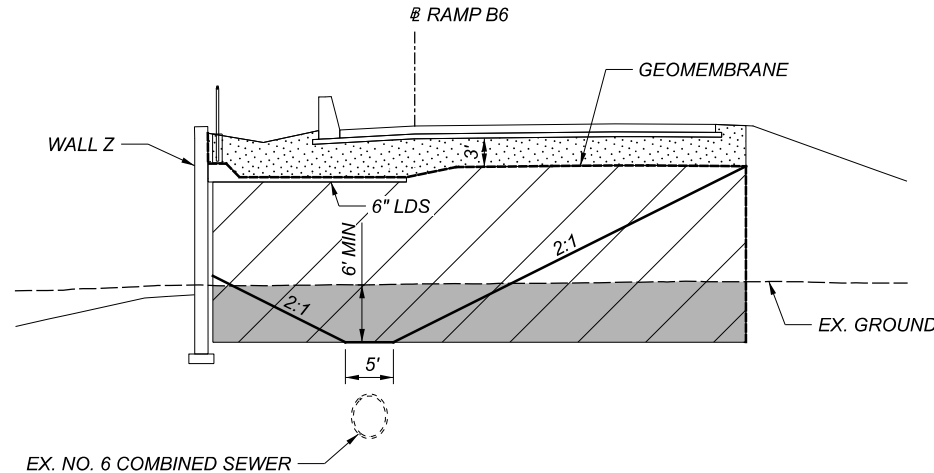
LIGHTWEIGHT FILL TYPICAL SECTION - AREA 1



LIGHTWEIGHT FILL TYPICAL SECTION - AREA 2




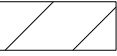

LIGHTWEIGHT FILL TYPICAL SECTION - AREA 3



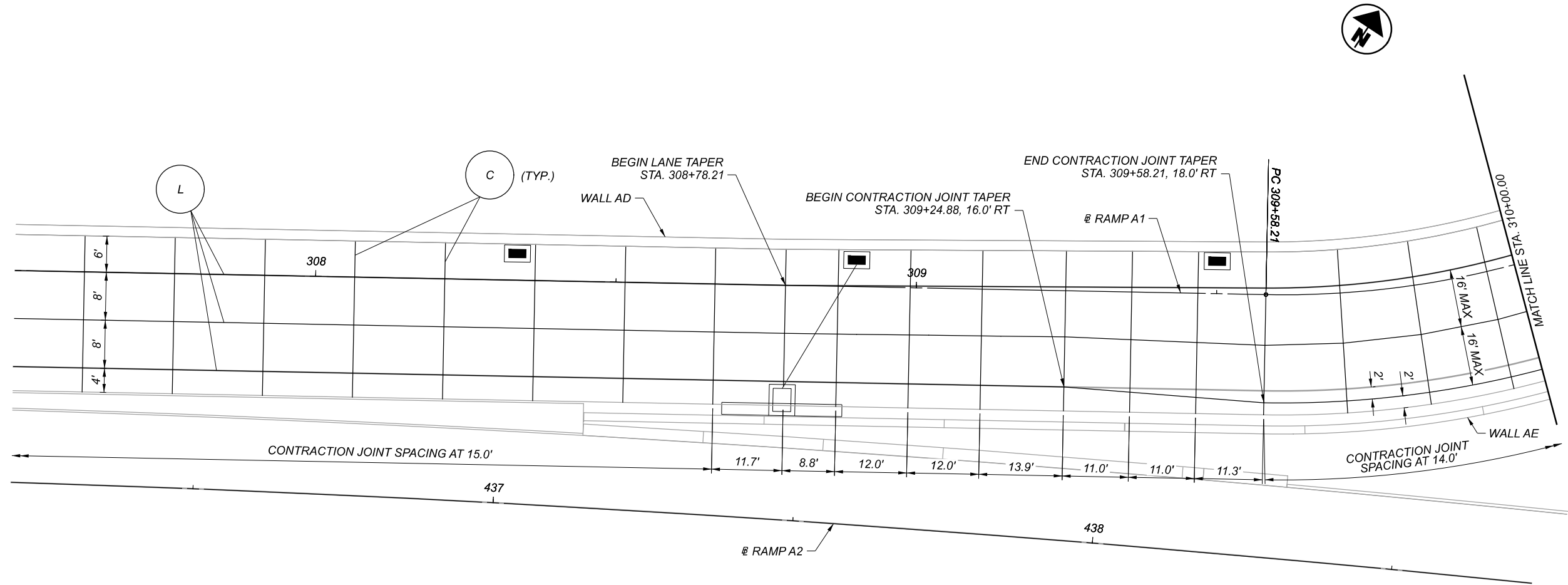
LIGHTWEIGHT FILL TYPICAL SECTION - AREA 4

- NOTES**
1. SEE ROADWAY TYPICAL SECTION, PLAN, PROFILE, AND CROSS SECTION SHEETS FOR LIGHTWEIGHT FILL LIMITS.
  2. SEE GENERAL NOTES SHEETS FOR NOTES CONCERNING LIGHTWEIGHT FILL.
  3. GEOMEMBRANE SHALL COVER TOP AND EDGES OF LIGHTWEIGHT FILL.

**LEGEND**

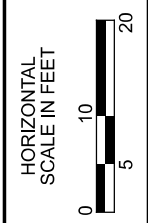
	ITEM 203 - EMBANKMENT, AS PER PLAN
	ITEM 203 - ROADWAY MISC.: EPS GEOFOAM FILL
	ITEM 203 - EXCAVATION, AS PER PLAN





**LEGEND**

- (L) STANDARD LONGITUDINAL JOINT AS PER BP-2.1
- (C) CONTRACTION JOINT AS PER BP-2.2
- (S) STANDARD LONGITUDINAL JOINT AS PER BP-2.1 WITHOUT TIE BARS
- (E) EXPANSION JOINT AS PER BP-2.2
- (W) EXPANSION JOINT (WITHOUT DOWELS) AS PER BP-2.2
- (A) PRESSURE RELIEF JOINT TYPE A AS PER BP-2.3
- (Y) BUTT JOINT BETWEEN EXISTING PAVEMENT AND PROPOSED PAVEMENT AS PER BP-2.5



**JOINT DETAIL - RAMP A1**  
 STA. 307+50.00 TO STA. 310+00.00

DESIGN AGENCY



DESIGNER

REVIEWER

PROJECT ID  
82382

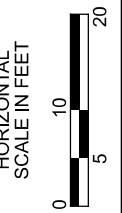
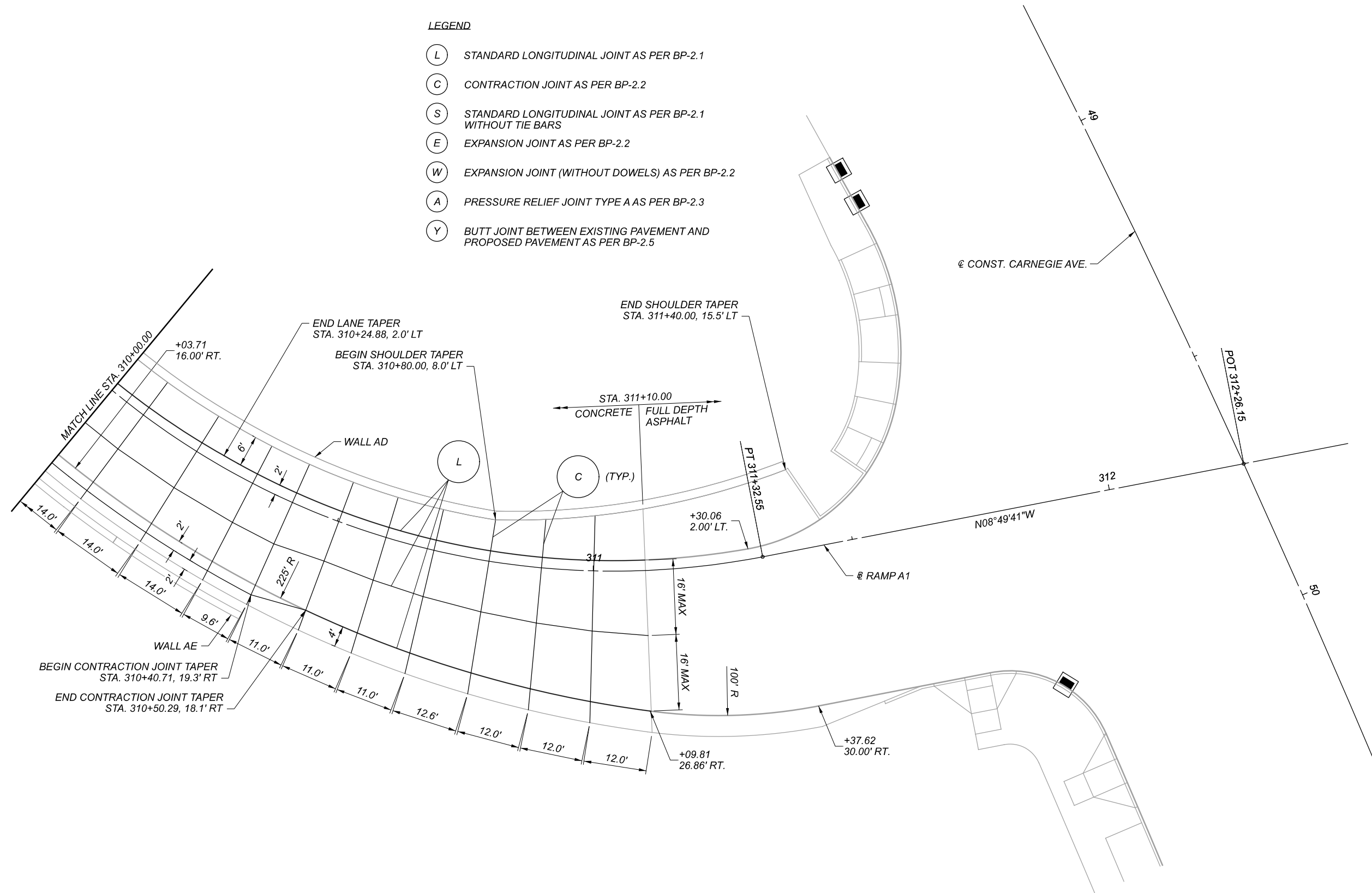
SHEET	TOTAL
1210	2339





**LEGEND**

- (L) STANDARD LONGITUDINAL JOINT AS PER BP-2.1
- (C) CONTRACTION JOINT AS PER BP-2.2
- (S) STANDARD LONGITUDINAL JOINT AS PER BP-2.1 WITHOUT TIE BARS
- (E) EXPANSION JOINT AS PER BP-2.2
- (W) EXPANSION JOINT (WITHOUT DOWELS) AS PER BP-2.2
- (A) PRESSURE RELIEF JOINT TYPE A AS PER BP-2.3
- (Y) BUTT JOINT BETWEEN EXISTING PAVEMENT AND PROPOSED PAVEMENT AS PER BP-2.5

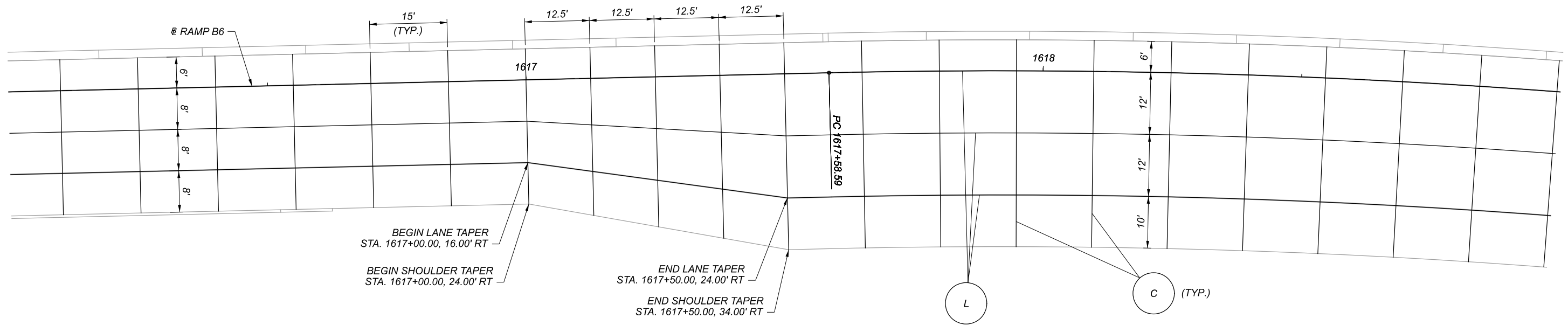


**JOINT DETAIL - RAMP A1**  
 STA. 310+00.00 TO END

DESIGN AGENCY



DESIGNER	—
REVIEWER	—
PROJECT ID	82382
SHEET	TOTAL
1211	2339



BEGIN LANE TAPER  
 STA. 1617+00.00, 16.00' RT  
 BEGIN SHOULDER TAPER  
 STA. 1617+00.00, 24.00' RT

END LANE TAPER  
 STA. 1617+50.00, 24.00' RT  
 END SHOULDER TAPER  
 STA. 1617+50.00, 34.00' RT

LEGEND

- (L) STANDARD LONGITUDINAL JOINT AS PER BP-2.1
- (C) CONTRACTION JOINT AS PER BP-2.2
- (S) STANDARD LONGITUDINAL JOINT AS PER BP-2.1 WITHOUT TIE BARS
- (E) EXPANSION JOINT AS PER BP-2.2
- (W) EXPANSION JOINT (WITHOUT DOWELS) AS PER BP-2.2
- (A) PRESSURE RELIEF JOINT TYPE A AS PER BP-2.3
- (Y) BUTT JOINT BETWEEN EXISTING PAVEMENT AND PROPOSED PAVEMENT AS PER BP-2.5

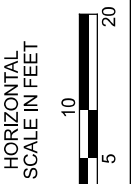
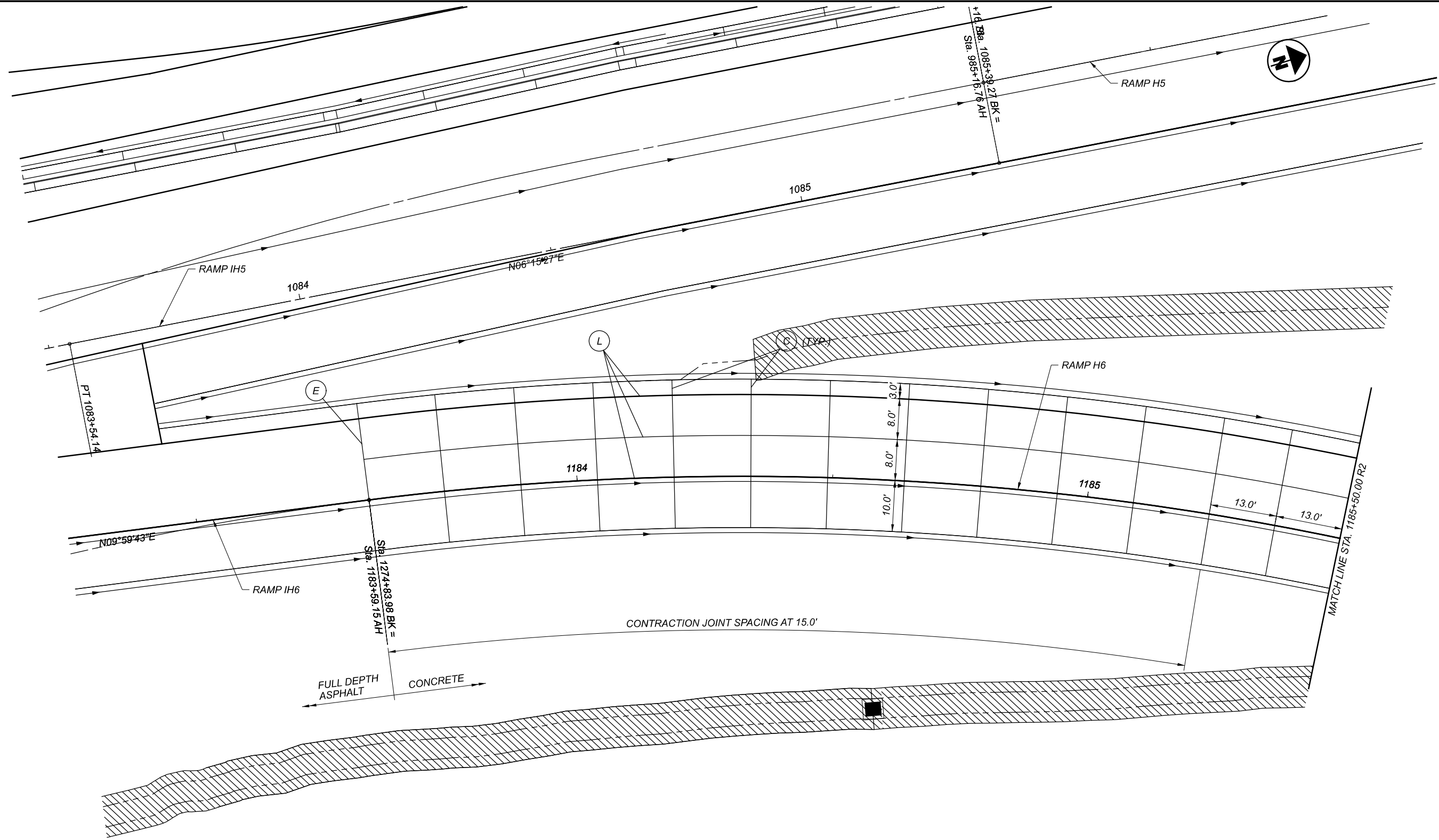


JOINT DETAIL - RAMP B6  
 STA. 1616+00.00 TO STA. 1619+00.00

DESIGN AGENCY



DESIGNER	—
REVIEWER	—
PROJECT ID	82382
SHEET	TOTAL
1212	2339

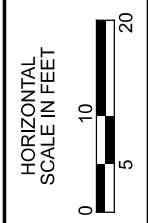
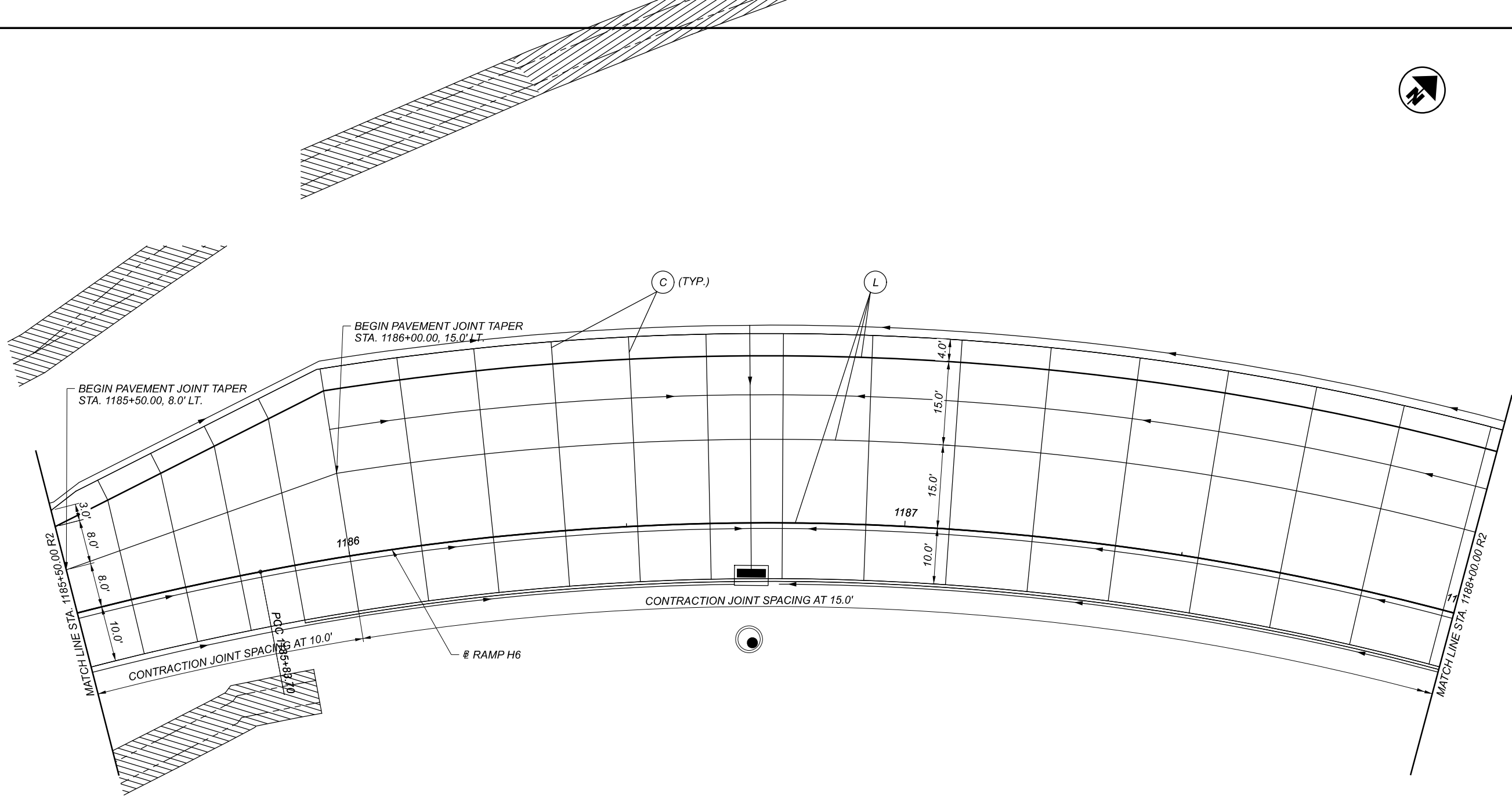


**JOINT DETAIL - RAMP H6**  
 BEGIN TO STA. 1185+50.00

**LEGEND**

(L)	STANDARD LONGITUDINAL JOINT AS PER BP-2.1
(C)	CONTRACTION JOINT AS PER BP-2.2
(S)	STANDARD LONGITUDINAL JOINT AS PER BP-2.1 WITHOUT TIE BARS
(E)	EXPANSION JOINT AS PER BP-2.2
(W)	EXPANSION JOINT (WITHOUT DOWELS) AS PER BP-2.2
(A)	PRESSURE RELIEF JOINT TYPE A AS PER BP-2.3
(Y)	BUTT JOINT BETWEEN EXISTING PAVEMENT AND PROPOSED PAVEMENT AS PER BP-2.5

DESIGN AGENCY	
<b>Michael Baker</b> INTERNATIONAL	
DESIGNER	--
REVIEWER	--
PROJECT ID	82382
SHEET	TOTAL
1213	2339



JOINT DETAIL - RAMP H6  
 STA. 1185+50.00 TO STA. 1188+00.00

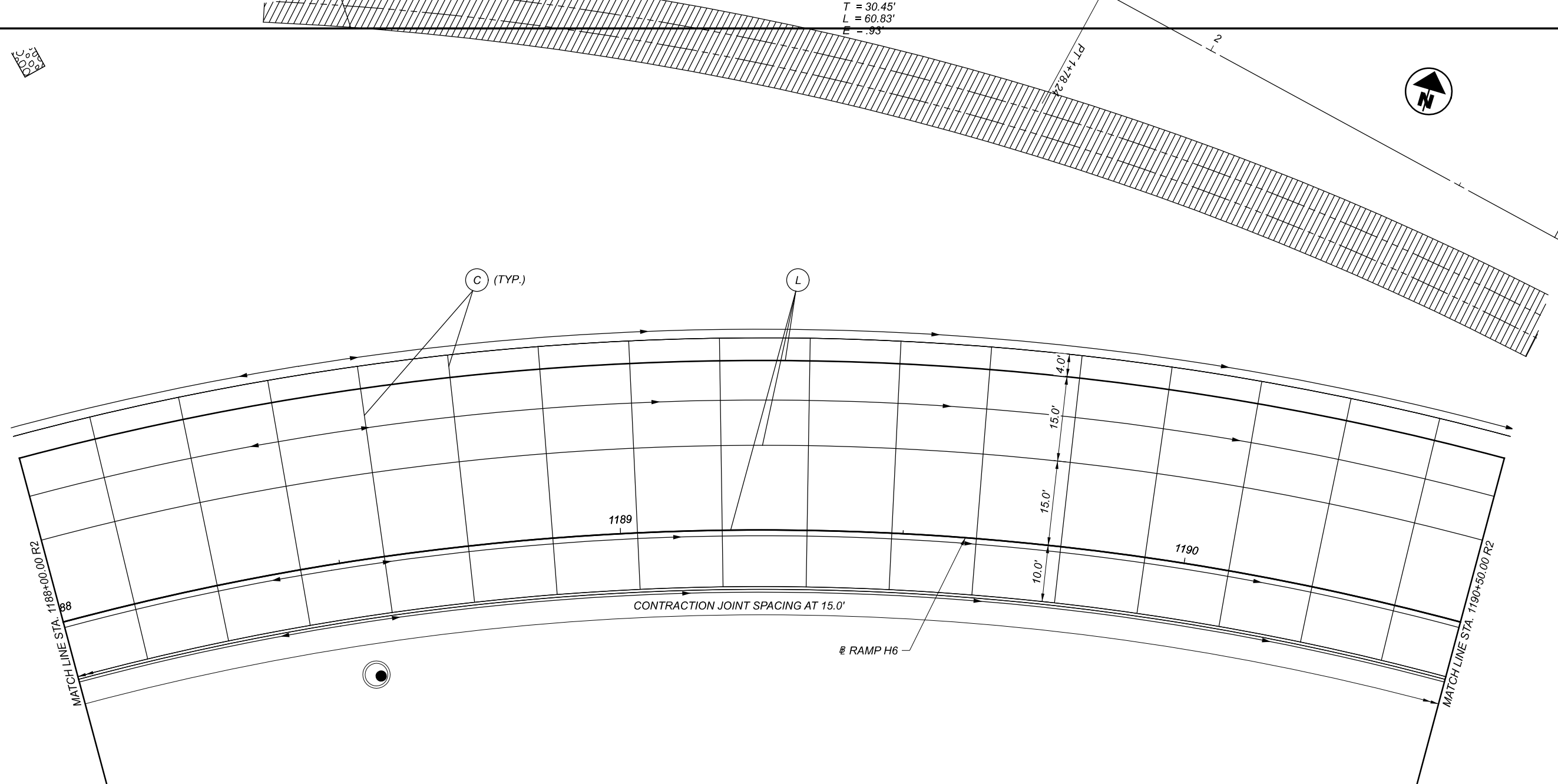
LEGEND

- (L) STANDARD LONGITUDINAL JOINT AS PER BP-2.1
- (C) CONTRACTION JOINT AS PER BP-2.2
- (S) STANDARD LONGITUDINAL JOINT AS PER BP-2.1 WITHOUT TIE BARS
- (E) EXPANSION JOINT AS PER BP-2.2
- (W) EXPANSION JOINT (WITHOUT DOWELS) AS PER BP-2.2
- (A) PRESSURE RELIEF JOINT TYPE A AS PER BP-2.3
- (Y) BUTT JOINT BETWEEN EXISTING PAVEMENT AND PROPOSED PAVEMENT AS PER BP-2.5

DESIGN AGENCY	
DESIGNER	—
REVIEWER	—
PROJECT ID	82382
SHEET	1214
TOTAL	2339

Michael Baker INTERNATIONAL

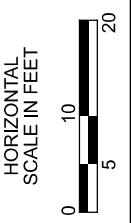




T = 30.45'  
 L = 60.83'  
 E = .93

LEGEND

- (L) STANDARD LONGITUDINAL JOINT AS PER BP-2.1
- (C) CONTRACTION JOINT AS PER BP-2.2
- (S) STANDARD LONGITUDINAL JOINT AS PER BP-2.1 WITHOUT TIE BARS
- (E) EXPANSION JOINT AS PER BP-2.2
- (W) EXPANSION JOINT (WITHOUT DOWELS) AS PER BP-2.2
- (A) PRESSURE RELIEF JOINT TYPE A AS PER BP-2.3
- (Y) BUTT JOINT BETWEEN EXISTING PAVEMENT AND PROPOSED PAVEMENT AS PER BP-2.5

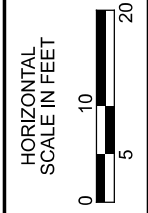
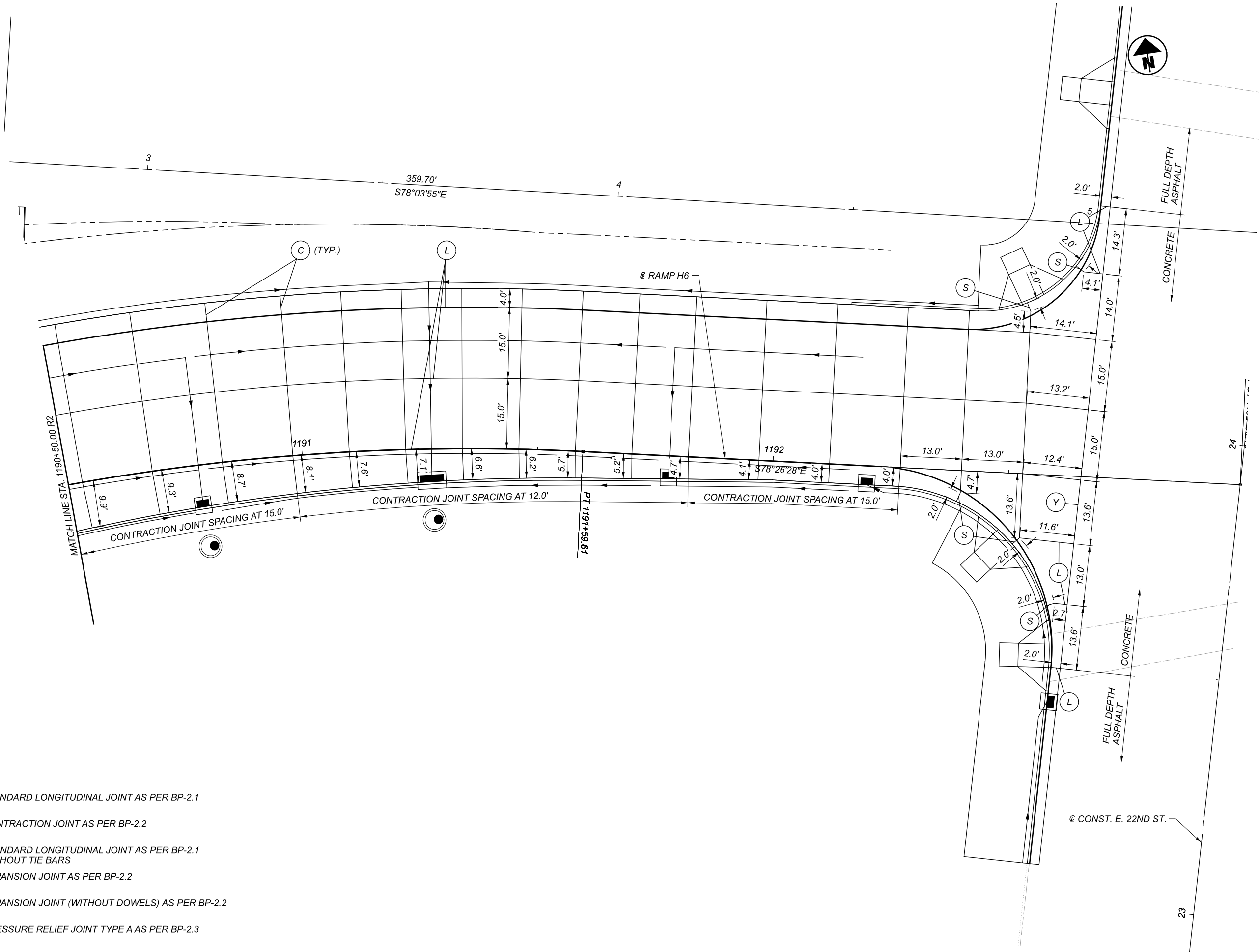


JOINT DETAIL - RAMP H6  
 STA. 1188+00.00 TO STA. 1190+50.00

DESIGN AGENCY	
Michael Baker INTERNATIONAL	
DESIGNER	--
REVIEWER	--
PROJECT ID	82382
SHEET	TOTAL
1215	2339

LEGEND

- (L) STANDARD LONGITUDINAL JOINT AS PER BP-2.1
- (C) CONTRACTION JOINT AS PER BP-2.2
- (S) STANDARD LONGITUDINAL JOINT AS PER BP-2.1 WITHOUT TIE BARS
- (E) EXPANSION JOINT AS PER BP-2.2
- (W) EXPANSION JOINT (WITHOUT DOWELS) AS PER BP-2.2
- (A) PRESSURE RELIEF JOINT TYPE A AS PER BP-2.3
- (Y) BUTT JOINT BETWEEN EXISTING PAVEMENT AND PROPOSED PAVEMENT AS PER BP-2.5



JOINT DETAIL - RAMP H6  
 STA. 1190+50.00 TO END

DESIGN AGENCY

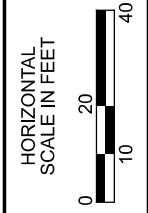
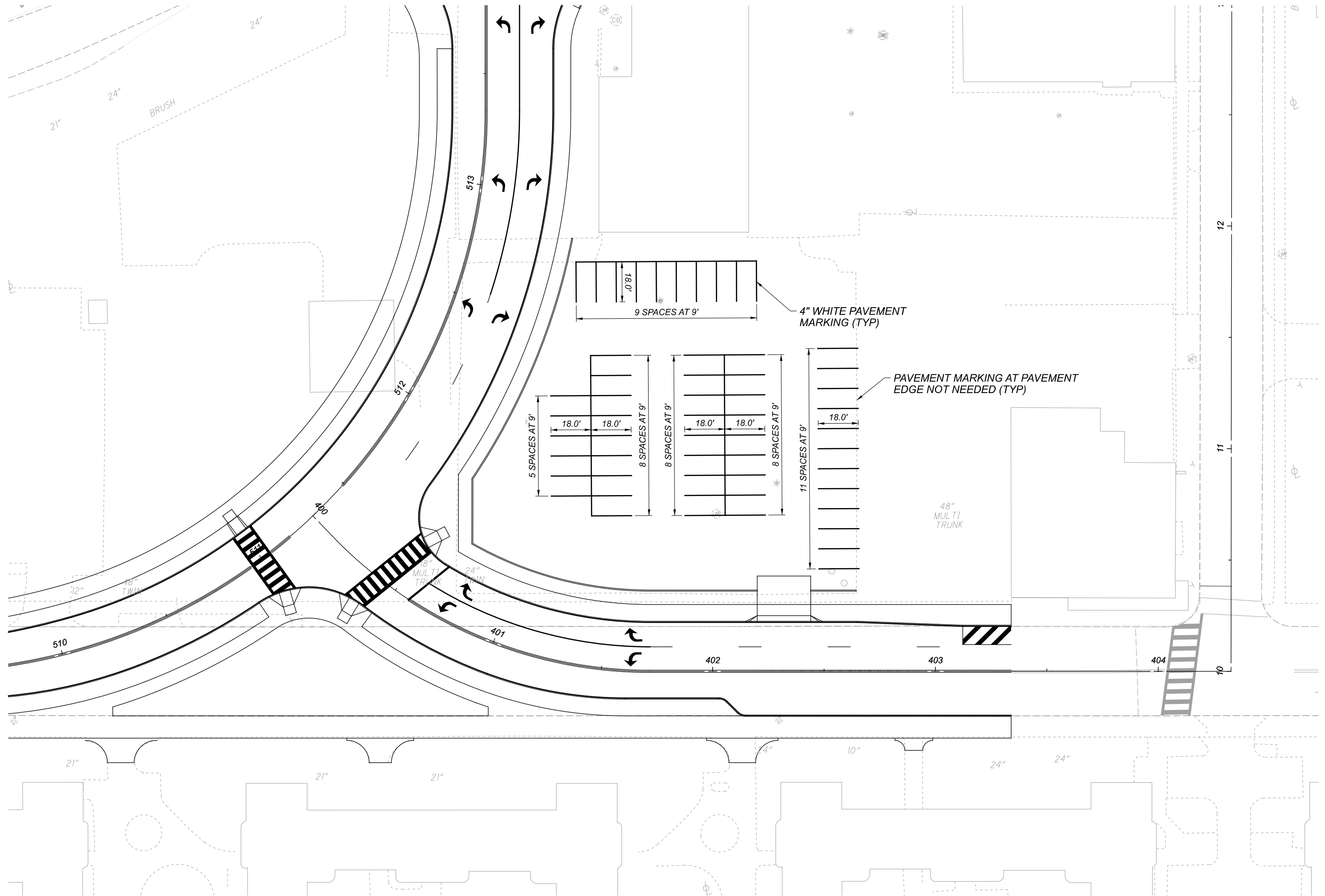
Michael Baker  
 INTERNATIONAL

DESIGNER

REVIEWER

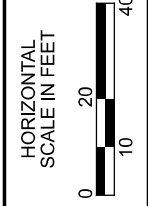
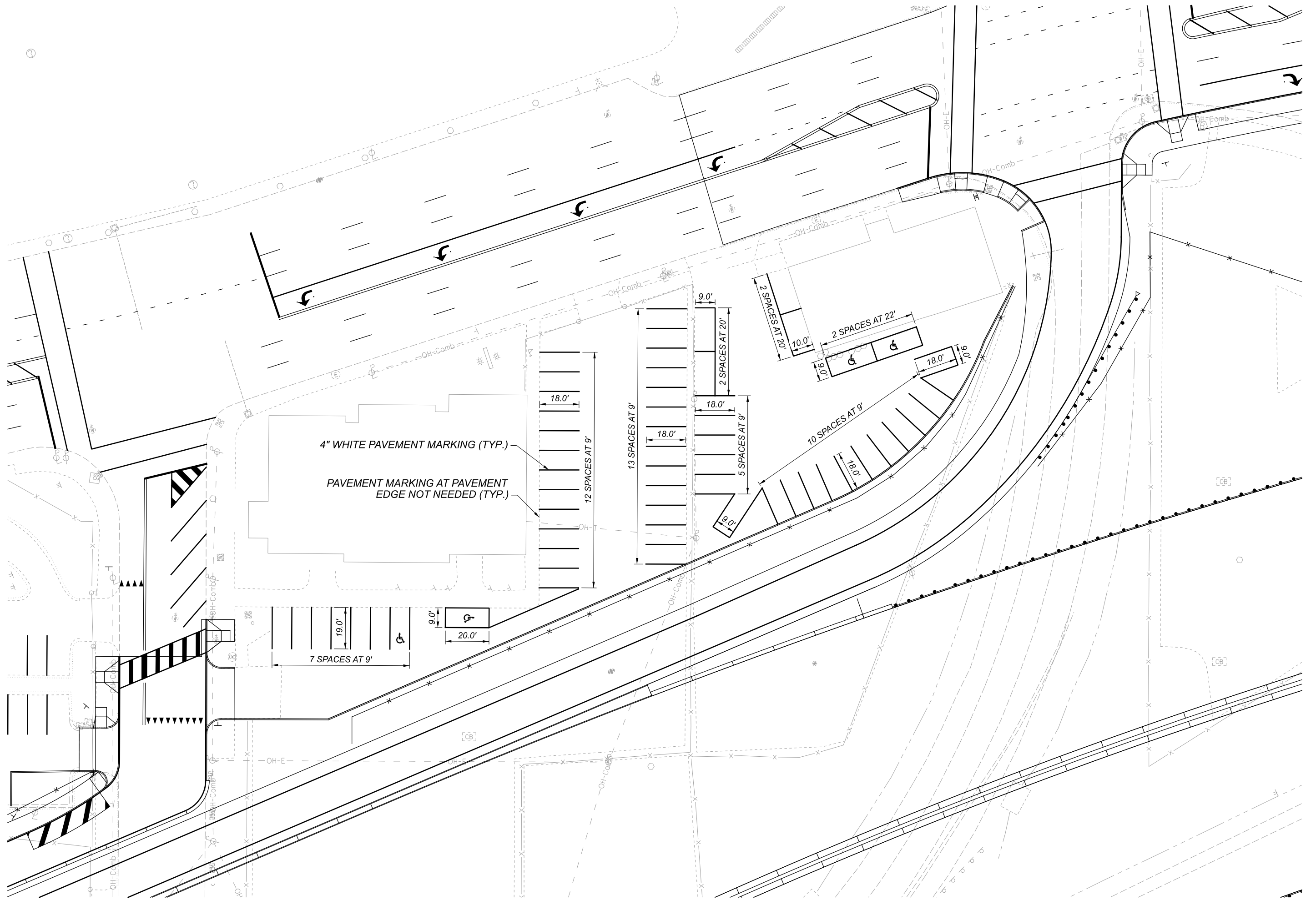
PROJECT ID  
 82382

SHEET	TOTAL
1216	2339



**PARKING DETAIL**  
**2640 CARNEGIE AVE**

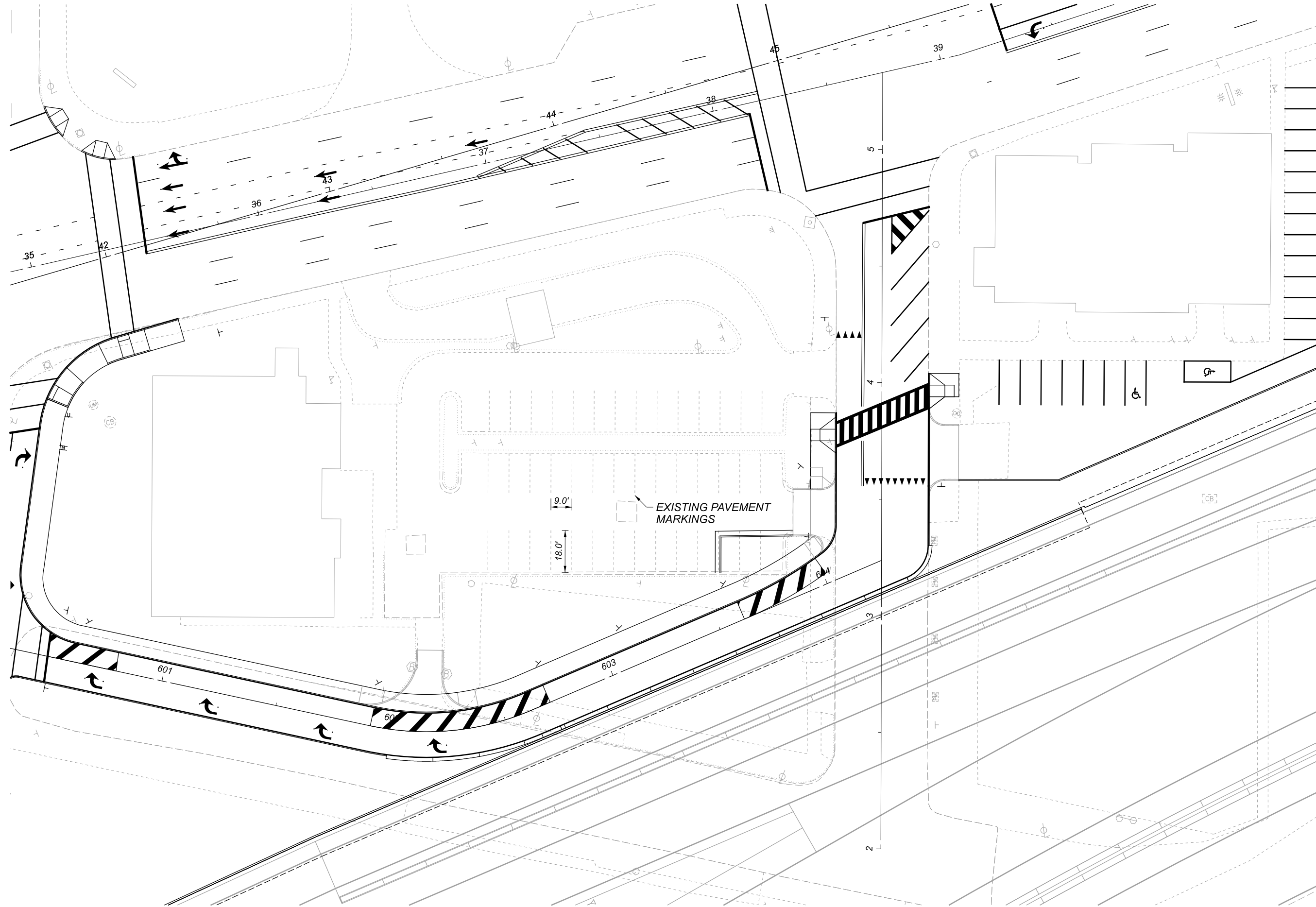
DESIGN AGENCY	Michael Baker INTERNATIONAL
DESIGNER	—
REVIEWER	—
PROJECT ID	82382
SHEET	TOTAL
1217	2339



**PARKING DETAIL**  
1910 & 2020 CARNEGIE AVE

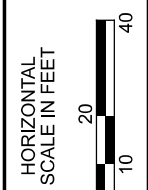
DESIGN AGENCY	Michael Baker INTERNATIONAL
DESIGNER	—
REVIEWER	—
PROJECT ID	82382
SHEET TOTAL	1218 2339

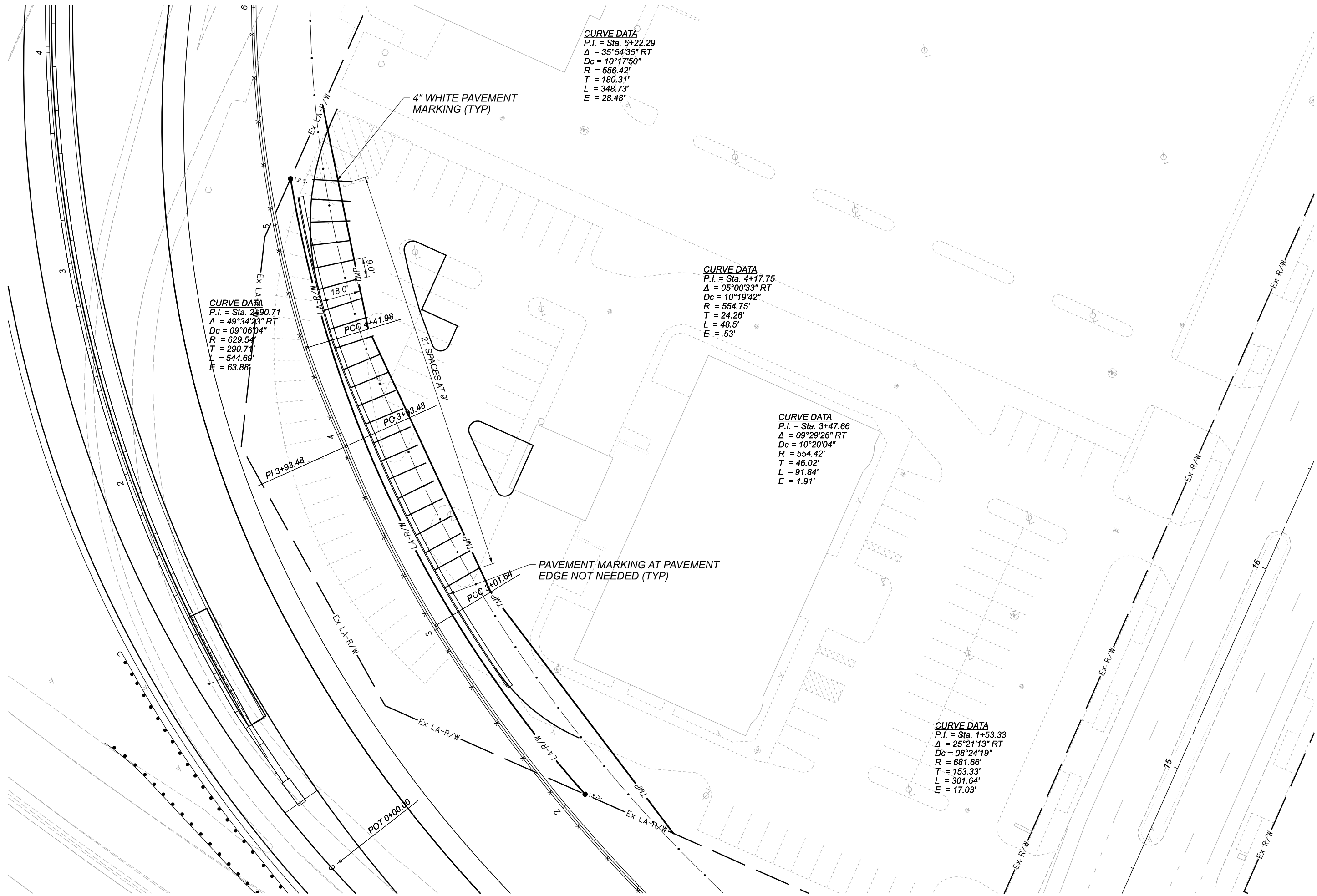




DESIGN AGENCY	<b>Michael Baker INTERNATIONAL</b>
DESIGNER	—
REVIEWER	—
PROJECT ID	82382
SHEET	TOTAL
1219	2339

PARKING DETAIL  
1800 CARNEGIE AVE





**CURVE DATA**  
 P.I. = Sta. 6+22.29  
 $\Delta = 35^\circ 54' 35''$  RT  
 $Dc = 10^\circ 17' 50''$   
 $R = 556.42'$   
 $T = 180.31'$   
 $L = 348.73'$   
 $E = 28.48'$

**CURVE DATA**  
 P.I. = Sta. 2+90.71  
 $\Delta = 49^\circ 34' 23''$  RT  
 $Dc = 09^\circ 06' 04''$   
 $R = 629.54'$   
 $T = 290.71'$   
 $L = 544.69'$   
 $E = 63.88'$

**CURVE DATA**  
 P.I. = Sta. 4+17.75  
 $\Delta = 05^\circ 00' 33''$  RT  
 $Dc = 10^\circ 19' 42''$   
 $R = 554.75'$   
 $T = 24.26'$   
 $L = 48.5'$   
 $E = .53'$

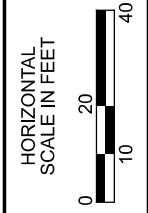
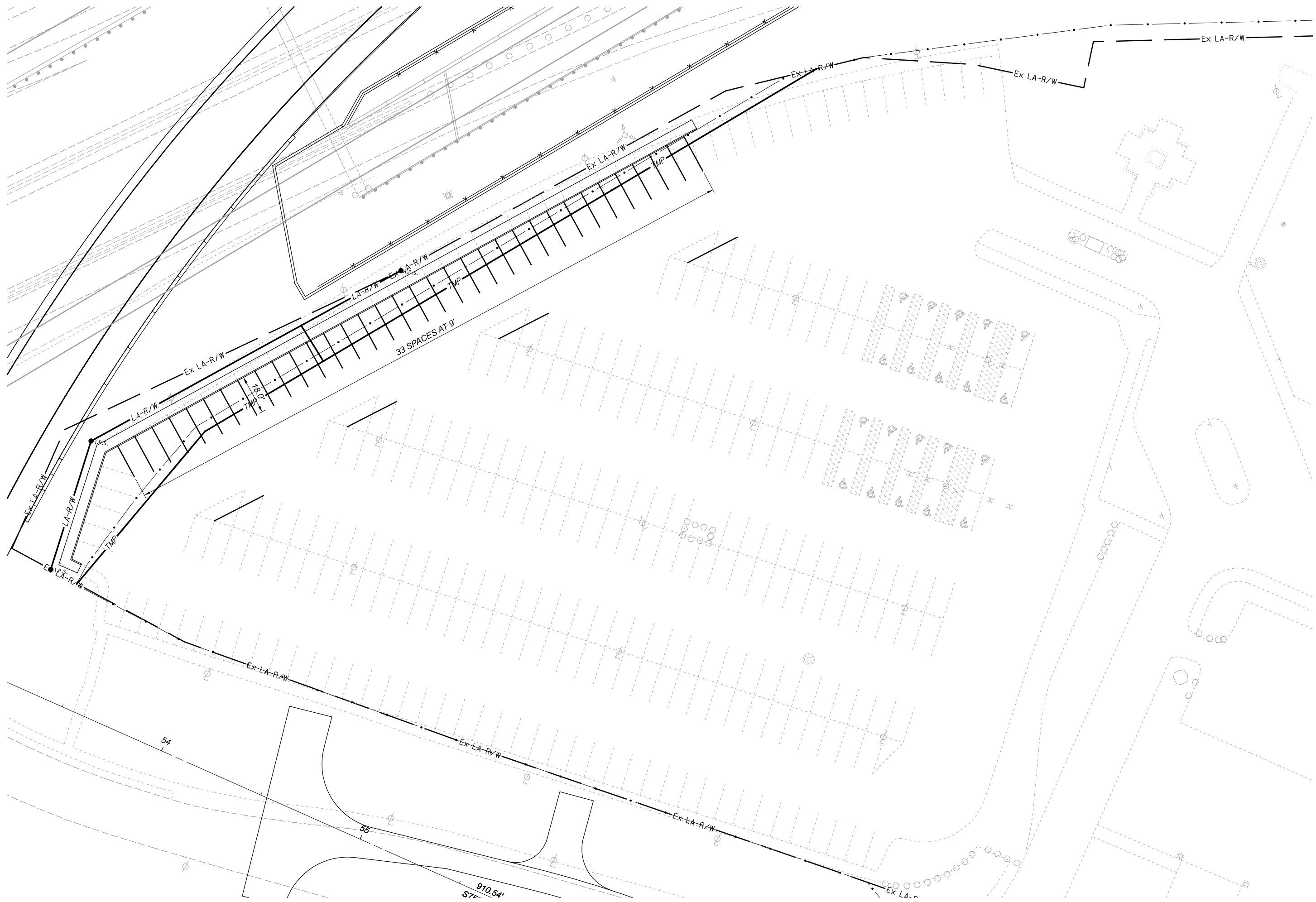
**CURVE DATA**  
 P.I. = Sta. 3+47.66  
 $\Delta = 09^\circ 29' 26''$  RT  
 $Dc = 10^\circ 20' 04''$   
 $R = 554.42'$   
 $T = 46.02'$   
 $L = 91.84'$   
 $E = 1.91'$

**CURVE DATA**  
 P.I. = Sta. 1+53.33  
 $\Delta = 25^\circ 21' 13''$  RT  
 $Dc = 08^\circ 24' 19''$   
 $R = 681.66'$   
 $T = 153.33'$   
 $L = 301.64'$   
 $E = 17.03'$



**PARKING DETAIL**  
 2554 E. CARNEGIE AVE.

DESIGN AGENCY	Michael Baker INTERNATIONAL
DESIGNER	—
REVIEWER	—
PROJECT ID	82382
SHEET TOTAL	1220 2339



PARKING DETAIL  
2322 E 22 ST

DESIGN AGENCY

**Michael Baker**  
INTERNATIONAL

DESIGNER

REVIEWER

PROJECT ID

82382

SHEET TOTAL

1221 2339