

## RECORD PLANS



CLEVELAND WATER NOTES FOR WATER MAIN INSTALLATION AND/OR REPLACEMENT (STD-011)

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 GREED 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 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 RADIALY 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 “PREVENTITIVE 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.

IF THE CONTRACTOR ENCOUNTERS EXISTING LEAD SERVICE CONNECTION IN THE FIELD, IMMEDIATELY NOTIFY CLEVELAND WATER DEPARTMENT. CLEVELAND WATER DEPARTMENT FORCES WILL CONTACT THE PROPERTY OWNER AND PERFORM THE LEAD SERVICE LINE REPLACEMENT.

0	2019-07-31	RFC
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CLEVELAND WATER NOTES FOR WATER MAIN INSTALLATION AND/OR REPLACEMENT (STD-011)

GENERAL SERVICE CONNECTIONS:

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.

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 CITYSIDE AND OWNERSIDE 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. DISPOSITION OF WATER SERVICES ARE SHOWN IN THE PLAN. HOWEVER, UPON CONFIRMATION OF ACCOUNT STATUS BY THE CLEVELAND WATER DEPARTMENT, THE FOLLOWING DISPOSITION INSTRUCTIONS SHALL APPLY:

- A. IF PAVEMENT AND WATERLINES ARE BEING REPLACED, ABANDON OLD SERVICE CONNECTION AND DO NOT RECONNECT TO NEW MAIN. (WSA)
- B. IF PAVEMENT IS BEING REPLACED, BUT EXISTING WATERLINE IS TO REMAIN, REMOVE ABANDONED SERVICE CONNECTIONS ALL THE WAY TO THE MAIN (INSTALL A REPAIR SADDLE). (WSR)
- C. IF EXISTING PAVEMENT IS TO REMAIN, AND WATERLINE IS TO REMAIN, THEN REMOVE ABANDONED SERVICE CONNECTION TO THE CURB SHUT OFF. (WSX)

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

NOTES:

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 SHEETS5-19

FOR PROJECT SPECIFIC DETAILS, SEE SHEETS81-93

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WATERWORK 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.

(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 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.

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WATER MAIN DISINFECTION (CONT.)

(D) SAMPLING:

1. A TIME PERIOD AS DETERMINED BY THE CITY SHALL ELAPSE BEFORE WATER SAMPLES ARE TAKEN FROM THE WATER MAIN(S) AND BRANCHES) 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.

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:

CONNECTION OF NEW MAINS, CONT'D

(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 15, 2016 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.

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.

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WORK TO BE DONE BY THE CITY (CONT.)

(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.

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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 BRACINGS 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.

(F) CONT'D, 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.

A. CONT'D, 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.

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BACKFILLING (CONT.)

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.

G. PREMIUM BACKFILL CONSISTING OF CONTROLLED LOW STRENGTH MATERIAL CONTROLLED DENTISTY 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 81

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 (6) 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".

PROVISIONS FOR PROTECTING THE 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.

(C) CONT'D, 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.

(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 2016 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 AWARDDING THE CONTRACT.

(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.

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PAVEMENTS, ROAD SURFACES, BERMS, SIDEWALKS, DRIVEWAYS, CURBING, AND UNDERDRAINS (CONT.)

(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.

ITEM 202 - REMOVAL MISC.: 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.

(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. 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

PIPE SIZE	WORKING CLASS					FITTINGS PSI
	PRESSURE	52	53	54	56	
	(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, 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. 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.

(H) CONT'D, BOLTS AND NUTS SHALL BE CORROSION RESISTANT, HIGH-STRENGTH, LOW ALLOY STEEL 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.

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.

(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, 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.

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ISSUE RECORD		

ITEM SPECIAL - DUCTILE IRON PIPE AND FITTINGS - 20" AND SMALLER (CONT.)

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, 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 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, ANSI/AWWA 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, 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 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, 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 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.

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 POLYETHYLENE WRAPPING IN ACCORDANCE WITH THE MOST CURRENT REVISION OF ANSI/AWWA 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 RETRAINED 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 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 ANSI/AWWA 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 ANSI/AWWA C110/A21.10-87, "DUCTILE IRON AND GRAY-IRON FITTINGS, 3-INCH THROUGH 48-INCH, FOR WATER AND OTHER LIQUIDS," OR ANSI/AWWA 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.

(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.

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PIPE SUPPORTS

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.

ITEM SPECIAL – TAPPING SLEEVE, VALVE BOX, COMPLETE

WORK INCLUDED

THE CONTRACTOR SHALL FURNISH AND INSTALL THE TAPPING SLEEVE, VALVE AND VALVE BOX AND THE CITY OF CLEVELAND DIVISION OF WATER WILL MAKE THE TAP, AT THE LOCATION SHOWN IN THESE PLANS OR AS DIRECTED BY THE ENGINEER. THE WORK SHALL INCLUDE ALL NECESSARY EXCAVATING, BACKFILLING, REPAVING AND FOR FURNISHING MATERIAL FOR THESE ITEMS AND ALL THAT IS NECESSARY FOR THE PROPER COMPLETION OF THE WORK.

TAPPING SLEEVES

THE TAPPING SLEEVES SHALL BE PROPERLY SIZED TO FIT THE EXISTING CAST/DUCTILE IRON PIPE TO BE TAPPED. THE OUTSIDE DIAMETER OF THE EXISTING PIPE SHALL BE DETERMINED BY THE FIELD MEASUREMENTS MADE BY THE CONTRACTOR.

A. COMPRESSION TYPE TAPPING SLEEVE: TAPPING SLEEVES FOR CAST/DUCTILE IRON PIPE SIZES TO 16-INCHES SHALL BE A TWO (2) PART DUCTILE-IRON BOLTED COMPRESSION SEAL TYPE WITH SEALING GASKET OF RUBBER COMPRESSED BY OUTLET HALF OF THE BOLTED SLEEVE AND INTERNAL PIPE PRESSURE. MAXIMUM OUTLET SIZE SHALL BE ONE (1) NOMINAL PIPE DIAMETER LESS THAN PIPE TO BE TAPPED. BACK HALF OF BOLTED TAPPING SLEEVE SHALL BE ONE (1) PIECE SECTION AND HAVE PROVISION FOR SUPPORT AND LOCKING ACTION.

B. MECHANICAL JOINT TYPE TAPPING SLEEVE. TAPPING SLEEVES FOR CAST/DUCTILE PIPE SHALL BE OF GRAY OR DUCTILE CAST IRON TWO (2) PART BOLTED TYPE HAVING DUCTILE-IRON SPLIT-GLAND MECHANICAL JOINT ENDS.

C. TAPPING SLEEVE OUTLET: OUTLET OF TAPPING SLEEVE SHALL BE FLANGED TO RECEIVED FLANGED END OF TAPPING VALVE AND SHALL BE DESIGNED TO SAFELY WITHSTAND A WORKING PRESSURE OF 150 PSI. OUTLET OF TAPPING SLEEVE SHALL BE FURNISHED WITH A DRILLED AND TAPPED IRON PIPE THREAD AND PLUGGED IN THE SHOP WITH GRAY OR DUCTILE-IRON THREADED PLUG, BEFORE SHIPMENT. IRON PIPE THREADED OUTLET SHALL BE FOR TAPPING SLEEVE INSTALLATION PRESSURE TEST BEFORE TAPPING. BOLTING MATERIAL FOR TAPPING SLEEVE SHALL MEET THE REQUIREMENTS FOR VALVES.

THE TAPPING VALVES SHALL MEET THE SPECIFICATIONS FOR GATE VALVES EXCEPT THAT OVERSIZED SEAT RINGS SHALL BE PROVIDED TO PERMIT THE USE OF FULL SIZED CUTTERS THROUGH THE VALVE. ONE END OF THE TAPPING VALVE SHALL BE FLANGED OR HAVE LUGGED SPIGOT TO MATE WITH THE TAPPING SLEEVED. THE OUTLET END OF THE TAPPING VALVE SHALL BE A STANDARD AWWA HUB WITH SPECIAL PROVISION FOR BOLTING ON THE TAPPING MACHINE. OUTLET END OF TAPPING VALVE SHALL HAVE A RETAINED MECHANICAL JOINT.

TAPPING VALVES FOR USE IN BURIED LOCATIONS SHALL BE NUT OPERATED WITH NUTS, AND SHALL OPEN BY CLOCKWISE ROTATION OF THE OPERATING NUT. BOLTS FOR FLANGED JOINTS SHALL BE MADE OF SILICON BRONZE (ASTM B98-55, SQUARE GRADE 65-45-12), KORETEN “A” OR AN ACCEPTABLE EQUIVALENT.

INSTALLATION

(A) THE EXISTING CAST/DUCTILE IRON PIPE TO BE TAPPED SHALL BE THOROUGHLY CLEANED IN THE AREA TO BE COVERED BY THE TAPPING SLEEVE. THE SLEEVE SHALL BE PROPERLY INSTALLED IN POSITION AND THE BOLTS TIGHTENED.

(B) ALL EXPOSED FERROUS METAL SURFACES OF BURIED TAPPING SLEEVES AND VALVES SHALL, AFTER ERECTION, BE CLEANED AND PAINTED WITH TWO (2) COATS OF COAL TAR PITCH PAINT EQUAL TO INERTOL 66 OR KOPPERS BITUMASTIC 50. PAINTING SHALL BE ACCORDING TO PAINTING OF VALVES. MECHANICAL JOINT TYPE TAPPING SLEEVE AND VALVE SHALL BE POLYETHYLENE ENCASED.

(C) THE ACTUAL TAPPING OF THE MAIN SHALL BE PERFORMED BY THE DIVISION OF WATER AT NO EXTRA COST TO THE CONTRACTOR.

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.

(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.

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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.

(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 BRITTLINESS, 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.”

(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 1/2 HR., 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.

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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.

**INSPECTION**

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.

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 ASSEMBLE SHALL CONFORM WITH THE REQUIREMENTS OF THE "ITEM SPECIAL - VALVES" OF THESE SPECIFICATIONS, INsofar AS THEY APPLY.

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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.

(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 – WATERWORK 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.

(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 RADIALLY 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-EIGHTHS (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 REVERSE RED BRASS PIPE AS MANUFACTURED BY REVERSE COPPER AND BRASS, INCORPORATED. FITTINGS SHALL BE EXTRA STRONG WEIGHT AND SHALL HAVE SOUND WELL-FITTING THREADS.

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.

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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 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 GRASS 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.

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.

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ITEM SPECIAL - WATER SERVICE CONNECTIONS (CONT.)

GENERAL (CONT.)

(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.

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. SIZES (X FT AND X”) SHALL BE AS NOTED IN THE PLANS OR MATCH EXISTING WHERE NOT LISTED.

A GENERAL LISTING OF MATERIALS IS AS FOLLOWS:

X” CORPORATION STOP - COPPER TO IRON

X” CURB STOP VALVE - COPPER TO IRON

CURB STOP VALVE BOX COVER

CURB STOP VALVE BOX TOP

CURB STOP VALVE BOX BOTTOM  
X FT X” TYPE K, ASTM B88, COPPER TUBING OR  
X” COMPRESSION CORPORATION STOP

X” ORISEAL COMPRESSION VALVE

ORISEAL VALVE BOX

ORISEAL VALVE BOX FOOTPIECE

X FT X” TYPE K, ASTM B88, COPPER TUBING ON CONCRETE WATER MAINS:

SOM x X” TAPPING SADDLE FOR CONCRETE PIPE

X” CORPORATION STOP - COPPER TO IRON

X” CURB STOP VALVE - COPPER TO IRON

CURB STOP VALVE BOX TOP

CURB STOP VALVE BOX BOTTOM  
X FT X” TYPE K, ASTM B88, COPPER TUBING OR  
SOM x X” TAPPING SADDLE FOR CONCRETE PIPE

X” COMPRESSION CORPORATION STOP

X” ORISEAL COMPRESSION VALVE

ORISEAL VALVE BOX

ORISEAL VALVE BOX FOOTPIECE  
X FT X” TYPE K, ASTM B88, COPPER TUBING

NOTE: SOM = SIZE OF MAIN

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.

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.

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ITEM SPECIAL - MAINTENANCE OF WATER SERVICE (CONT.)  
WORK INCLUDED (CONT.)

(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 RATIONS 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.

C. 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 DURATIONS 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:

1. 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.

2. 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.

3. 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.

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.

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LEGEND

- 1

EX. WATER

WSR

EXIST. WATER SERVICE REMOVED, SEE NOTES, SHEETS 3 AND 4
- 2

EX. SANITARY

WSA

EXIST. WATER SERVICE ABANDONED, SEE NOTES, SHEETS 3 AND 4
- 3

EX. GAS

WSX

EXIST. WATER SERVICE CUT, SEE NOTES, SHEETS 3 AND 4
- 4

EX. STORM

W-##

PROP. PIPE FITTING
- 5

PROP. STORM SEWER  
SEE BU-13, BU-17A,  
OR BU-21 PLAN

WV-##

PROP. WATER VALVE
- 6

PROP. ELEC. DUCT  
SEE BU-11 PLANS

FH-##

PROP. FIRE HYDRANT ASSEMBLY
- 7

PROP. SANITARY SEWER  
SEE BU-13 PLANS

WS-##

PROP. WATER SERVICE  
SEE NOTES, SHEETS 3 AND 4
- 8

EX. ELEC. DUCT

W

PROP. AIR RELIEF ASSEMBLY
- TBR = TO BE REMOVED

TBA = TO BE ABANDONED

RESTRAINED LENGTH TABLES FOR FITTINGS

PIPE DIA., INCHES	HORZ. BENDS *			PLUG *
	11.25	22.5	45	
6	3	5	9	53
8	3	6	12	70
12	4	8	16	99
16	5	10	21	127

PIPE DIA., INCHES	REDUCER *		
	8	12	16
6	29	72	107
8	--	52	93
12	--	--	54

TEE (BRANCH DIA.)	PIPE DIA., INCHES	TEE (RUN DIA.) *			
		6	8	12	16
	6	39	35	25	15
	8	--	55	48	41
	12	--	--	84	79
	16	--	--	--	113

PIPE DIA., INCHES	VERT. BENDS *			
	11.25 UP	11.25 DN	22.5 UP	22.5 DN
6	3	6	5	11
8	3	7	6	14
12	4	10	8	20
16	5	13	10	26

NOTES:

1. \* REQUIRED RESTRAINED LENGTH (FT) ON BOTH SIDES OF FITTING, POLYETHYLENE ENCASED. INSTALL JOINT RESTRAINT TO ALL JOINTS THAT OCCUR WITHIN THE LENGTH NOTED.
2. RESTRAINED LENGTHS ARE BASED ON THE DUCTILE IRON PIPE RESEARCH ASSOCIATION (DIPRA) RECOMMENDATIONS FOR POLYETHYLENE ENCASED PIPE. THE CONTRACTOR MAY BE REQUIRED TO ADJUST LENGTHS BASED ON FIELD CONDITIONS ENCOUNTERED DURING WATER MAIN INSTALLATION.
3. VERTICAL RESTRAINED LENGTHS LISTED DO NOT APPLY TO PIPE LOWERING CONDITIONS. CONTRACTOR SHALL USE THE DETAILS FOUND ON SHEETS 89 AND 90 FOR PIPE LOWERING CONDITIONS.

NOT USED

- WV-3, WV-4, WV-12, WV-16, WV-22, WV-25, WV-44, WV-49, WV-51, WV-54, WV-55, WV-56, WV-59, WV-60, WV-76, WV-77, WV-78, WV-87
- WV-1

STA. 0+91.20, @ WATER MAIN BUTLER-E64  
STA. 138+69.94, 95.33 RT, @ OC BLVD  
STA. 24+51.10, 6.03 LT, @ BUTLER  
STA. 11+15.26, 38.24 RT, @ E64  
6" CUTTING-IN VALVE AND VALVE BOX COMPLETE
- WV-2

STA. 1+59.62, @ WATER MAIN BUTLER-E64  
STA. 139+18.43, 128.79 RT, @ OC BLVD  
STA. 25+07.89, 20.27 RT, @ BUTLER  
STA. 11+60.49, 5.15 LT, @ E64  
6" CUTTING-IN VALVE AND VALVE BOX COMPLETE
- WV-5

STA. 302+33.87, @ WATER MAIN OC BLVD  
8" VALVE AND VALVE BOX COMPLETE
- WV-6

STA. 303+29.93, @ WATER MAIN OC BLVD  
8" VALVE AND VALVE BOX COMPLETE
- WV-7

STA. 6+05.00, @ WATER MAIN BUCKEYE  
8" CUTTING-IN VALVE AND VALVE BOX COMPLETE
- WV-8

STA. 7+67.69, @ WATER MAIN BUCKEYE  
8" CUTTING-IN VALVE AND VALVE BOX COMPLETE
- WV-9

STA. 79+72.00, @ WATER MAIN KINSMAN  
12" VALVE AND VALVE BOX COMPLETE
- WV-10

STA. 82+05.28, @ WATER MAIN KINSMAN  
12X8 REDUCER  
8" CUTTING-IN VALVE AND VALVE BOX COMPLETE
- WV-11

STA. 308+55.34, @ 8" WATER MAIN OC BLVD  
6" CUTTING-IN VALVE AND VALVE BOX COMPLETE
- WV-13

STA. 10+09.99, @ WATER MAIN WOODLAND  
8" CUTTING-IN VALVE AND VALVE BOX COMPLETE
- WV-14

STA. 202+70.78, @ WATER MAIN OC BLVD  
12" VALVE AND VALVE BOX COMPLETE
- WV-15

STA. 203+46.82, @ WATER MAIN OC BLVD  
12" VALVE AND VALVE BOX COMPLETE
- WV-17

STA. 10+55.19, @ WATER MAIN WOODLAND  
8" CUTTING-IN VALVE AND VALVE BOX COMPLETE
- WV-18

STA. 29+21.99, @ WATER MAIN E 73  
6" CUTTING-IN VALVE AND VALVE BOX COMPLETE
- WV-19

STA. 205+85.55, @ WATER MAIN OC BLVD  
12" VALVE AND VALVE BOX COMPLETE
- WV-20

STA. 207+19.54, @ WATER MAIN OC BLVD  
16" VALVE AND VALVE BOX COMPLETE
- WV-21

STA. 21+45.00, @ WATER MAIN E 75 WEST  
16" CUTTING-IN VALVE AND VALVE BOX COMPLETE
- WV-23

STA. 20+22.11, @ WATER MAIN E 75 WEST  
16" CUTTING-IN VALVE AND VALVE BOX COMPLETE
- WV-24

STA. 30+22.54, @ WATER MAIN E 75 EAST  
12" VALVE AND VALVE BOX COMPLETE
- WV-26

STA. 31+46.10, @ WATER MAIN E 75 EAST  
12" CUTTING-IN VALVE AND VALVE BOX COMPLETE
- WV-27

STA. 215+38.31, @ WATER MAIN OC BLVD  
16" VALVE AND VALVE BOX COMPLETE
- WV-28

STA. 40+75.65, 3.64 RT, @ WATER MAIN E89 EAST  
RESET 16" WV
- WV-29

STA. 216+36.50, @ WATER MAIN OC BLVD  
16" VALVE AND VALVE BOX COMPLETE

- WV-30

STA. 16+82.77, @ WATER MAIN E 79  
16" VALVE AND VALVE BOX COMPLETE
- WV-31

STA. 10+06.69, 13.33 RT, @ WATER E 79 8" LATERAL  
8" CUTTING-IN VALVE AND VALVE BOX COMPLETE
- WV-32

STA. 13+67.55, @ WATER MAIN E 79  
12" VALVE AND VALVE BOX COMPLETE
- WV-33

STA. 222+66.80, @ WATER MAIN OC BLVD  
16" VALVE AND VALVE BOX COMPLETE
- WV-34

STA. 222+76.97, @ WATER MAIN OC BLVD  
16" VALVE AND VALVE BOX COMPLETE
- WV-35

STA. 10+12.37, @ WATER MAIN GRAND  
8" VALVE AND VALVE BOX COMPLETE
- WV-36

STA. 230+25.63, @ WATER MAIN OC BLVD  
16" VALVE AND VALVE BOX COMPLETE
- WV-37

STA. 230+70.40, @ WATER MAIN OC BLVD  
16" VALVE AND VALVE BOX COMPLETE
- WV-38

STA. 40+15.18, @ WATER MAIN LISBON  
12" VALVE AND VALVE BOX COMPLETE
- WV-39

STA. 43+08.55, @ WATER MAIN LISBON  
6" CUTTING-IN VALVE AND VALVE BOX
- WV-40

STA. 233+49.61, @ WATER MAIN OC BLVD  
16" VALVE AND VALVE BOX COMPLETE
- WV-41

STA. 234+01.33, @ WATER MAIN OC BLVD  
16" VALVE AND VALVE BOX COMPLETE
- WV-42

STA. 10+07.37, @ WATER E 79 16" LATERAL  
16" CUTTING-IN VALVE AND VALVE BOX COMPLETE
- WV-43

STA. 50+58.07, @ WATER MAIN EVARTS-GRAND EAST  
STA. 234+23.41, 47.40 LT, @ WATER MAIN OC BLVD  
8" CUTTING-IN VALVE AND VALVE BOX COMPLETE
- WV-45

STA. 100+04.95, @ WATER GRAND-EVARTS  
16" CUTTING-IN VALVE
- WV-46

STA. 16+35.08, @ WATER MAIN E 79  
12" VALVE AND VALVE BOX COMPLETE
- WV-47

STA. 235+27.11, @ WATER MAIN OC BLVD  
16" VALVE AND VALVE BOX COMPLETE
- WV-48

STA. 238+77.64, @ WATER MAIN OC BLVD  
16" VALVE AND VALVE BOX COMPLETE
- WV-50

STA. 9+70.23, @ WATER MAIN BUCKEYE  
8" CUTTING-IN VALVE AND VALVE BOX COMPLETE
- WV-52

STA. 11+18.16, @ WATER MAIN BUCKEYE  
12" VALVE AND VALVE BOX COMPLETE
- WV-53

STA. 239+81.47, @ WATER MAIN OC BLVD  
16" VALVE AND VALVE BOX COMPLETE
- WV-57

STA. 242+48.22, @ WATER MAIN OC BLVD  
16" VALVE AND VALVE BOX COMPLETE
- WV-58

STA. 242+56.95, @ WATER MAIN OC BLVD  
16" VALVE AND VALVE BOX COMPLETE
- WV-61

STA. 72+22.92, @ WATER MAIN KENNEDY  
8" CUTTING-IN VALVE AND VALVE BOX COMPLETE
- WV-62

STA. 71+86.26, 1.65 RT, @ WATER MAIN KENNEDY  
8" CUTTING-IN VALVE AND VALVE BOX COMPLETE
- WV-63

STA. 71+97.51, 2.02 RT, @ WATER MAIN KENNEDY  
12" CUTTING-IN VALVE AND VALVE BOX COMPLETE

- WV-64

STA. 245+60.44, @ WATER MAIN OC BLVD  
16" VALVE AND VALVE BOX COMPLETE
- WV-65

STA. 11+85.05, @ WATER MAIN WOODLAND  
8" VALVE AND VALVE BOX COMPLETE
- WV-66

STA. 11+96.61, @ WATER MAIN WOODLAND  
16" VALVE AND VALVE BOX COMPLETE
- WV-67

STA. 12+64.68, @ WATER MAIN WOODLAND  
16" VALVE AND VALVE BOX COMPLETE
- WV-68

STA. 13+48.84, @ WATER MAIN WOODLAND  
8" VALVE AND VALVE BOX COMPLETE
- WV-69

STA. 40+15.71, @ WATER MAIN E89 EAST  
16" VALVE AND VALVE BOX COMPLETE
- WV-70

STA. 90+15.25, @ WATER MAIN E89 WEST  
12" VALVE AND VALVE BOX COMPLETE
- WV-71

STA. 91+58.00, @ WATER MAIN E89 WEST  
12" VALVE AND VALVE BOX COMPLETE
- WV-72

STA. 41+49.77, @ WATER MAIN E89 EAST  
16" VALVE AND VALVE BOX COMPLETE
- WV-73

STA. 95+58.67, @ WATER MAIN E89 WEST  
12" VALVE AND VALVE BOX COMPLETE
- WV-74

STA. 45+20.02, @ WATER MAIN E89 EAST  
12" VALVE AND VALVE BOX COMPLETE
- WV-75

STA. 45+58.92, @ WATER MAIN E89 EAST  
16" CUTTING-IN VALVE AND VALVE BOX COMPLETE
- WV-79

STA. 45+51.31, 10.01 LT, @ WATER MAIN E 89 (16")  
STA. 95+51.76, 4.45 RT @ WATER MAIN E 89 (12")  
STA. 28+55.31, 2.04 LT, @ R/W E 89  
12" VALVE AND VALVE BOX COMPLETE
- WV-80

STA. 10+55.52, 6.10 LT, @ R/W E 89 SOUTH  
8" CUTTING-IN VALVE AND VALVE BOX COMPLETE
- WV-81

STA. 22+61.06, 4.88 RT, @ GRAND WEST  
8" VALVE AND VALVE BOX COMPLETE
- WV-82

STA. 10+14.67, @ WATER MAIN E 79  
12" VALVE AND VALVE BOX COMPLETE
- WV-83

STA. 11+74.00, 24.53 RT, @ WATER MAIN GRAND  
8" VALVE AND VALVE BOX COMPLETE
- WV-84

STA. 23+26.22, 6.12 RT, @ GRAND WEST  
8" VALVE AND VALVE BOX COMPLETE
- WV-85

STA. 13+00.92, 23.99 RT, @ WATER MAIN E 79  
8" VALVE AND VALVE BOX COMPLETE
- WV-86

STA. 11+74.67, 1.64 RT, @ WATER MAIN GRAND  
8" VALVE AND VALVE BOX COMPLETE
- WV-88

STA. 70+12.23, @ WATER MAIN KENNEDY  
16" VALVE AND VALVE BOX COMPLETE
- WV-89

STA. 14+18.33, 50.47 RT, @ WATER MAIN BUCKEYE  
6" CUTTING-IN VALVE AND VALVE BOX COMPLETE
- WV-90

STA. 14+29.75, 49.47 RT, @ WATER MAIN BUCKEYE  
16" CUTTING-IN VALVE AND VALVE BOX COMPLETE

3	2024-09-10	RECORD DRAWINGS
2	2020-06-15	DC042
1	2020-04-17	DC038
0	2019-07-31	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		

W-1	STA. 1+46.30, @ WATER MAIN BUTLER-E64 STA. 139+16.19, 115.70 RT, @ OC BLVD STA. 24+94.43, 7.18 RT, @ BUTLER STA. 11+46.16, 4.46 LT, @ E64 6" 45 BEND	W-21	STA. 100+86.24, @ WATER MAIN EVARTS-GRAND WEST 16" 11.25 BEND	W-43	STA. 91+62.69, @ WATER MAIN E 89 12" 22.5 BEND	W-262	NOT USED
W-2	STA. 300+67.29, 139.71 RT @ WATER MAIN OC BLVD 6" CAP	W-22	STA. 50+05.00, @ WATER MAIN EVARTS-GRAND EAST STA. 234+08.63, @ WATER MAIN OC BLVD @ ELEV. 683.25 16" X 12" TEE	W-44	STA. 41+68.57, @ WATER MAIN E 89 16" X 12" REDUCER	W-263	NOT USED
W-3	STA. 302+71.84, @ WATER MAIN OC BLVD STA. 81+31.84, @ WATER MAIN KINSMAN @ ELEV. 667.04 12" X 8" CROSS	W-23	STA. 50+23.41, @ WATER MAIN EVARTS-GRAND EAST @ ELEV. 682.85 12" 22.5 BEND	W-45	STA. 91+68.13, @ WATER MAIN E 89 12" 22.5 BEND	W-264	NOT USED
W-4	STA. 302+73.49, @ WATER MAIN OC BLVD 8" 45 BEND	W-24	STA. 50+50.73, @ WATER MAIN EVARTS-GRAND EAST @ ELEV. 680.96 12" 45 BEND	W-46	STA. 95+31.52, @ WATER MAIN E 89 12" 22.5 BEND	W-265	NOT USED
W-5	STA. 307+24.04, @ WATER MAIN OC BLVD 8" 45 BEND					W-266	NOT USED
W-5A	STA. 307+27.04, @ WATER MAIN OC BLVD ELEV. 671.85 8" X 6" REDUCER	W-25	STA. 40+75.78, @ WATER MAIN E 89 @ ELEV. 691.13 16" TEE	W-48	STA. 45+51.32, @ WATER MAIN E 89 @ ELEV. 693.30 16" X 12" TEE	W-268	STA. 302+79.89, @ WATER MAIN OC BLVD 8" - 45 BEND
W-6	STA. 30+99.44, @ WATER MAIN E 73 12" X 8" REDUCER	W-26	STA. 239+10.94 (AH), @ WATER MAIN OC BLVD STA. 9+91.96, @ WATER MAIN BUCKEYE @ ELEV. 680.97 16" X 12" CROSS	W-49	STA. 29+27.52, @ WATER MAIN E 73 8" X 6" REDUCER	W-269	STA. 302+84.55, @ WATER MAIN OC BLVD 8" - 11.25 BEND
W-7	STA. 202+94.39, @ WATER MAIN OC BLVD STA. 31+03.89, @ WATER MAIN E 73 @ ELEV. 672.98 12" TEE	W-27	STA. 11+20.97, @ WATER MAIN BUCKEYE 12" X 8" REDUCER	W-50	STA. 95+51.78, @ WATER MAIN E 89 @ ELEV. 692.67 12" TEE	W-270	STA. 79+73.13, @ WATER MAIN KINSMAN 12" 45 BEND
W-8	STA. 206+38.64, @ WATER MAIN OC BLVD STA. 21+25.84, @ WATER MAIN E 75 WEST @ ELEV. 672.21 16" X 16" CROSS 16" X 12" REDUCER WEST	W-30	STA. 242+53.40, @ WATER MAIN OC BLVD STA. 70+10.00, @ WATER MAIN KENNEDY @ ELEV. 686.20 16" TEE	W-51	STA. 10+53.29, 6.11 LT, @ R/W E 89 SOUTH 8" 45 BEND	W-271	STA. 79+80.11, @ WATER MAIN KINSMAN 12" 45 BEND
W-9	STA. 206+54.58, @ WATER MAIN OC BLVD STA. 31+26.96, @ WATER MAIN E 75 EAST @ ELEV. 672.45 16"x12" CROSS	W-31	STA. 71+63.73, @ WATER MAIN KENNEDY 16" 22.5 BEND	W-52	STA. 10+51.42, 4.34 LT, @ R/W E 89 SOUTH 8" 45 BEND	W-272	NOT USED
W-10	STA. 50+55.85, @ WATER MAIN GRAND-EVARTS EAST @ ELEV. 681.00 12" X 6" REDUCER	W-32	STA. 71+86.55, @ WATER MAIN KENNEDY 16" X 8" TEE	W-53	STA. 10+53.29, 6.11 LT, @ R/W E 79 16" LATERAL 16" 45 BEND	W-273	NOT USED
W-11	STA. 216+02.82, @ WATER MAIN OC BLVD STA. 15+08.74, @ WATER MAIN E 79 @ ELEV. 676.52 16" X 12" CROSS	W-33	STA. 71+97.68, @ WATER MAIN KENNEDY 16" X 12" TEE	W-54	STA. 95+62.89, @ WATER MAIN E 89 WEST 12" X 8" REDUCER	W-274	NOT USED
W-12	STA. 1+10.00, @ WATER MAIN BUTLER-E64 6" 22.5 BEND	W-34	STA. 245+23.04, @ WATER MAIN OC BLVD 16" 45 BEND	W-110	STA. 11+86.83, @ WATER MAIN WOODLAND @ ELEV. 690.91 8" X 12" REDUCER	W-275	NOT USED
W-13	STA. 222+71.59, @ WATER MAIN OC BLVD STA. 10+10.00, @ WATER MAIN GRAND @ ELEV. 677.20 16" X 8" CROSS	W-35	STA. 245+64.08, @ WATER MAIN OC BLVD STA. 11+91.77, @ WATER MAIN WOODLAND @ ELEV. 690.31 12" X 16" TEE	W-210	STA. 301+49.84, @ WATER MAIN OC BLVD 8" 22.5 BEND	W-276	NOT USED
W-14	STA. 11+39.88, @ WATER MAIN GRAND 8" 22.5 BEND 8" 11.25 BEND	W-36	STA. 12+15.54, @ WATER MAIN WOODLAND STA. 90+10.00, @ WATER MAIN E 89 @ ELEV. 689.89 16" X 12" TEE	W-211	STA. 301+43.00, @ WATER MAIN OC BLVD 8" 22.5 BEND	W-277	NOT USED
W-16	STA. 230+58.91, @ WATER MAIN OC BLVD STA. 40+10.00, @ WATER MAIN LISBON @ ELEV. 678.08 16" X 12" CROSS	W-37	STA. 12+24.62, @ WATER MAIN WOODLAND STA. 40+10.00, @ WATER MAIN E 89 @ ELEV. 689.51 16" TEE	W-212	NOT USED	W-278	NOT USED
W-17	STA. 41+74.02, @ WATER MAIN LISBON 12" 22.5 BEND	W-38	STA. 13+42.73, @ WATER MAIN WOODLAND 16" X 8" REDUCER	W-213	NOT USED	W-279	NOT USED
W-18	STA. 42+27.16, @ WATER MAIN LISBON 12" 22.5 BEND	W-39	STA. 10+31.05, 3.91' RT, @ WATER E. 79 8" LATERAL 8" 22.5 BEND	W-214	STA. 205+94.13, @ WATER MAIN OC BLVD @ ELEV. 672.65 12" - 45 BEND	W-280	NOT USED
W-19	STA. 42+58.09, @ WATER MAIN LISBON 12" 22.5 BEND	W-40	STA. 10+41.66, @ WATER E. 79 16" LATERAL 16" 45 BEND	W-225	STA. 206+18.23, @ WATER MAIN OC BLVD @ ELEV. 672.49 12" - 45 BEND	W-281	STA. 30+19.33, @ WATER MAIN E 75 EAST 12" X 6" REDUCER
W-20	STA. 233+87.40, @ WATER MAIN OC BLVD STA. 102+50.18, @ WATER MAIN EVARTS-GRAND WEST @ ELEV. 681.17 16" TEE	W-41	STA. 10+17.62, @ WATER E 79 8" LATERAL STA. 10+31.05, @ WATER E 79 16" LATERAL @ ELEV. 678.22 16" X 8" TEE	W-257	STA. 102+36.64, @ WATER GRAND-EVARTS 16" - 45 BEND	W-282	STA. 16+37.08, @ WATER MAIN E 79 16" X 12" REDUCER
		W-42	STA. 11+18.11, @ WATER E 79 16" LATERAL STA. 16+40.80, @ WATER MAIN E 79 @ ELEV. 678.67 16" TEE	W-258	NOT USED	W-284	STA. 13+02.07, @ WATER MAIN E 79 @ ELEV. 678.87 12" X 8" TEE
				W-259	STA. 303+13.13, @ WATER MAIN OC BLVD 8" - 22.5 BEND	W-285	STA. 10+10.93, @ WATER MAIN E 79 12" X 8" REDUCER
				W-260	STA. 303+27.50, @ WATER MAIN OC BLVD 8" - 11.25 BEND	W-286	STA. 23+93.11, 6.48 RT, @ R/W E 79 8" - 22.5 BEND
						W-287	STA. 23+95.84, 4.97 RT, @ R/W E 79 8" 22.5 BEND

3	2024-09-10	RECORD DRAWINGS	
2	2020-06-15	DC042	
1	2020-04-17	DC038	
0	2019-07-31	RFC	
NO.	DATE	DESCRIPTION	
ISSUE RECORD			

3	2024-09-10	RECORD DRAWINGS
2	2020-06-15	DC042
1	2020-04-17	DC038
0	2019-07-31	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		

- W-288

STA. 23+98.12, 5.06 RT, @ R/W E 79  
8" 22.5 BEND
- W-289

STA. 24+01.22, 6.44 RT, @ R/W E 79  
8" 22.5 BEND
- W-290

STA. 216+95.66, @ WATER MAIN OC BLVD  
16" 11.25 BEND
- W-291

STA. 217+10.37, @ WATER MAIN OC BLVD  
16" 11.25 BEND
- W-292

NOT USED
- W-293

NOT USED
- W-294

NOT USED
- W-295

NOT USED
- W-296

NOT USED
- W-297

NOT USED
- W-298

NOT USED
- W-299

NOT USED
- W-300

NOT USED
- W-301

NOT USED
- W-302

NOT USED
- W-303

NOT USED
- W-304

NOT USED
- W-305

NOT USED
- W-306

STA. 11+74.90, @ WATER MAIN GRAND  
@ ELEV. 680.00  
8" TEE
- W-307

STA. 11+24.86, 3.92 RT, @ WATER MAIN GRAND  
8" 22.5 BEND
- W-308

STA. 11+74.17, 6.61 RT, @ WATER MAIN GRAND  
8" 22.5 BEND
- W-309

NOT USED
- W-310

NOT USED
- W-311

NOT USED
- W-312

NOT USED
- W-313

NOT USED

- W-314

NOT USED
- W-315

NOT USED
- W-316

NOT USED
- W-317

NOT USED
- W-318

NOT USED
- W-319

STA. 102+47.24, @ WATER GRAND-EVARTS  
16" - 45 BEND
- W-320

NOT USED
- W-321

NOT USED
- W-322

NOT USED
- W-323

NOT USED
- W-324

NOT USED
- W-325

NOT USED
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NOT USED
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NOT USED
- W-342

NOT USED
- W-343

NOT USED
- W-344

NOT USED
- W-345

NOT USED
- W-346

STA. 6+17.06, @ WATER MAIN BUCKEYE  
8" - 45 BEND
- W-347

NOT USED
- W-348

NOT USED
- W-349

STA. 9+74.69, @ WATER MAIN BUCKEYE  
12" X 8" REDUCER
- W-350

NOT USED
- W-351

NOT USED
- W-352

STA. 72+04.36, @ WATER MAIN KENNEDY  
16" X 8" REDUCER
- W-353

NOT USED
- W-354

NOT USED
- W-355

NOT USED
- W-356

NOT USED
- W-357

NOT USED
- W-358

NOT USED
- W-359

STA. 45+14.93, @ WATER MAIN E 89 EAST  
12" 22.5 BEND
- W-360

STA. 45+25.27, @ WATER MAIN E 89 EAST  
12" 22.5 BEND
- W-361

NOT USED
- W-362

NOT USED
- W-363

STA. 45+45.76, @ WATER MAIN E 89 EAST  
16" X 12" REDUCER

- W-364

NOT USED
- W-365

NOT USED
- W-366

STA. 10+60.85, 6.09 LT, @ R/W E 89 SOUTH  
8" X 6" REDUCER
- W-367

STA. 10+51.40, 5.65 RT, @ R/W E 89 SOUTH  
@ ELEV. 687.95  
16" X 8" TEE
- W-368

STA. 1+07.75, @ WATER MAIN E 64  
6" 22.5 BEND
- W-369

STA. 1+27.17, @ WATER MAIN E 64  
6" 45 BEND
- W-370

STA. 82+02.44, @ WATER MAIN KINSMAN  
12" X 8" REDUCER
- W-371

NOT USED
- W-372

STA. 71+97.99, 1.81 LT, @ WATER MAIN KENNEDY  
12" CAP
- W-374

STA. 31+49.85, @ WATER MAIN E 75 EAST  
12" X 6" REDUCER
- W-375

STA. 20+56.47, @ WATER MAIN E 75 WEST  
16" 22.5 BEND
- W-376

STA. 20+54.16, @ WATER MAIN E 75 WEST  
16" 22.5 BEND
- W-377

NOT USED
- W-378

NOT USED
- W-379

NOT USED
- W-380

NOT USED
- W-381

NOT USED
- W-382

NOT USED
- W-383

NOT USED

3	2024-09-10	RECORD DRAWINGS
2	2020-06-15	DC042
1	2020-04-17	DC038
0	2019-07-31	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		

- W-386 NOT USED
- W-387 NOT USED
- W-388 NOT USED
- W-389 NOT USED
- W-390 NOT USED
- W-391 NOT USED
- W-392 NOT USED
- W-393 NOT USED
- W-394 NOT USED
- W-395 NOT USED
- W-396 NOT USED
- W-397 NOT USED
- W-398 STA. 215+47.63, @ WATER MAIN OC BLVD  
16" 22.5 BEND
- W-399 STA. 215+56.67, @ WATER MAIN OC BLVD  
16" 22.5 BEND
- W-400 NOT USED
- W-401 NOT USED
- W-402 NOT USED
- W-403 NOT USED
- W-404 STA. 16+85.48, @ WATER MAIN E 79  
16" X 8" REDUCER
- W-405 NOT USED
- W-406 NOT USED
- W-407 NOT USED
- W-408 STA. 11+06.17, @ WATER MAIN E 79 LATERAL  
16" 22.5 BEND
- W-409 NOT USED
- W-410 NOT USED
- W-411 NOT USED

- W-413 STA. 13+00.81, 26.42 RT, @ WATER MAIN E 79  
8" X 6" REDUCER
- W-419 STA. 43+04.44, @ WATER MAIN LISBON  
12" X 6" REDUCER
- W-423 STA. 101+45.21, @ WATER MAIN EVARTS TO GRAND  
16" 11.25 BEND
- W-429 NOT USED
- W-430 NOT USED
- W-431 NOT USED
- W-432 NOT USED
- W-433 NOT USED
- W-434 NOT USED
- W-435 STA. 8+73.24, @ , WATER MAIN BUCKEYE  
8" BEND
- W-436 NOT USED
- W-437 NOT USED
- W-438 NOT USED
- W-439 NOT USED
- W-440 NOT USED
- W-441 NOT USED
- W-442 NOT USED
- W-443 NOT USED
- W-444 NOT USED
- W-445 NOT USED
- W-446 NOT USED
- W-447 STA. 79+79.96, 18.62 RT @ WATER MAIN KINSMAN  
6" 22.5 BEND
- W-448 STA. 8+67.80, @ WATER MAIN BUCKEYE  
8" 45 BEND
- W-449 NOT USED
- W-450 STA. 95+36.99, @ WATER MAIN E 89 WEST  
12" 22.5 BEND

- FH-32
- FH-1 STA. 19+75.09, 8.11 RT, @ BOWER AVE.  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-2 STA. 81+96.97, 23.32 RT, @ WATER MAIN KINSMAN  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-3 STA.306+48.70, 3.15 LT, @ WATER MAIN OC BLVD  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-4 STA. 200+25.35, 11.75 LT, @ WATER MAIN OC BLVD.  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-5 STA. 202+68.13, 11.03 LT, @ WATER MAIN OC BLVD.  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-6 STA. 205+40.40, 15.69 LT, @ WATER MAIN OC BLVD.  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-7 STA. 23+45.43, 44.76 RT, @ GRAND WEST  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE D
- FH-8 STA. 208+25.58, 3.78 RT, @ WATER MAIN OC BLVD  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-9 STA. 211+00.71, 5.02 RT, @ WATER MAIN OC BLVD  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-10 STA. 213+76.13, 4.60 RT, @ WATER MAIN OC BLVD  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-11 STA. 216+56.25, 15.64 LT, @ WATER MAIN OC BLVD.  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-12 STA. 219+35.96, 5.54 RT, @ WATER MAIN OC BLVD.  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-13 STA. 222+09.11, 4.21 RT, @ WATER MAIN OC BLVD.  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-14 STA. 224+39.99, 3.29 RT, @ WATER MAIN OC BLVD.  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-15 STA. 227+13.04, 4.92 RT, @ WATER MAIN OC BLVD.  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-16 STA. 229+93.32, 3.74 RT, @ WATER MAIN OC BLVD.  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-17 STA. 232+70.47, 3.56 RT, @ WATER MAIN OC BLVD.  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-18 STA. 42+83.62, 13.34 RT, @ WATER MAIN LISBON  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE B
- FH-19 STA. 235+43.33, 3.59 RT, @ WATER MAIN OC BLVD.  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-20 STA. 238+19.39, 5.38 LT, @ WATER MAIN OC BLVD.  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-21 STA. 240+95.72, 4.03 RT, @ WATER MAIN OC BLVD.  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-22 STA. 243+71.29, 4.70 RT, @ WATER MAIN OC BLVD.  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-23 STA. 41+03.74, 56.37 LT, @ WATER MAIN E89 - 16"  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A

- FH-24 STA. 14+20.62, 25.08 LT, @ WATER MAIN WOODLAND  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE B
- FH-25 STA. 79+78.77, 28.12 RT, @ WATER MAIN KINSMAN  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-26 STA. 12+83.76, 4.71 RT, @ WATER MAIN GRAND  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-27 STA. 12+59.61, 29.51 RT, @ WATER MAIN E 79  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE C
- FH-28 STA. 6+23.44, 20.43 LT, @ WATER MAIN BUCKEYE  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-29 STA. 8+45.87, 19.97 LT, @ WATER MAIN BUCKEYE  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE B
- FH-30 STA. 13+44.93, 24.76 LT, @ WATER MAIN BUCKEYE  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE B
- FH-31 STA. 16+27.10, 22.24 LT, @ WATER MAIN BUCKEYE  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE B
- FH-33 STA. 16+56.68, 14.23 LT @ WATER MAIN E 79 16" LATERAL  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-34 STA. 300+49.59, 6.87 LT, @ WATER MAIN OC BLVD  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-35 STA. 20+91.34, 4.17 LT, @ WATER MAIN BUTLER AVE.  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE D
- FH-36 STA. 1+52.11, 16.76 LT, @ WATER MAIN BUTLER-E64  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-37 STA. 14+79.13, 34.31 LT, @ EX R/W E 75  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE C
- FH-38 STA. 11+56.68, 35.98 LT, @ WATER MAIN BUCKEYE  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE B
- FH-40 STA. 91+24.35, 12.33 LT, @ WATER MAIN E 89  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-41 STA. 304+05.04, 3.77 LT, @ WATER MAIN OC BLVD  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-42 STA. 29+42.51, 11.26 RT, @ WATER MAIN E 73  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-43 STA. 22+36.61, 18.50 RT, @ GRAND WEST  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A
- FH-44 STA. 10+58.09, 14.72 LT, @ EX R/W E 89 SOUTH  
INSTALL FIRE HYDRANT ASSEMBLY, TYPE A

FIRE HYDRANT TYPE LEGEND

- TYPE A -NEW FIRE HYDRANT ON NEW WATER LINE PER ITEM SPECIAL - FURNISHING AND SETTING 6" HYDRANT COMPLETE
- TYPE B -NEW FIRE HYDRANT ON EXISTING WATER LINE PER ITEM 638 - WATERWORK MISC.: FURNISHING AND SETTING 6" HYDRANT, COMPLETE WITH 6" X (X") CUT IN TEE
- TYPE C -REPLACE/EXTEND HYDRANT PER ITEM 638 - WATERWORK MISC.: FURNISHING AND SETTING 6" HYDRANT, COMPLETE WITH 6" X (X") CUT IN TEE
- TYPE D -REPLACE HYDRANT IN NEW LOCATION PER ITEM 638 - WATERWORK MISC.: FURNISHING AND SETTING 6" HYDRANT, COMPLETE WITH 6" X (X") CUT IN TEE

2	2024-09-10	RECORD DRAWINGS
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ISSUE RECORD		

WATER SERVICE CONNECTIONS LEGEND

WS-1 STA. 35+90.64, 1.01 LT, @ KINSMAN  
1" WATER SERVICE, COMPLETE  
(NEW SERVICE FOR FUTURE PUBLIC PLAZA)

WS-2 STA. 36+02.08, 46.01 RT, @ KINSMAN  
1" WATER SERVICE, COMPLETE  
(NEW SERVICE FOR FUTURE PUBLIC PLAZA)

WS-3 STA. 11+76.88, 28.59 LT, @ WATER MAIN E79  
1" WATER SERVICE, COMPLETE

WS-4 STA. 10+95.86, 28.59 LT, @ WATER MAIN E79  
1" WATER SERVICE, COMPLETE

WS-5 NOT USED

WS-6 NOT USED

WS-7 STA. 12+62.61, 33.62 RT, @ WATER MAIN GRAND  
1" WATER SERVICE, COMPLETE

WS-8 STA. 41+34.13, 38.80 LT, @ WATER MAIN LISBON  
1" WATER SERVICE, COMPLETE

WS-9 STA. 238+21.09, 115.27 RT, @ WATER MAIN OC BLVD  
1" WATER SERVICE, COMPLETE  
(NEW SERVICE FOR FUTURE PUBLIC PLAZA)

WS-10 NOT USED

WS-11 STA. 13+32.19, 57.07 RT, @ WATER MAIN WOODLAND  
1" WATER SERVICE, COMPLETE  
(NEW SERVICE FOR FUTURE PUBLIC PLAZA)

WS-12 STA. 91+00.41, 35.05 LT, @ WATER MAIN W 89TH  
1" WATER SERVICE, COMPLETE  
(NEW SERVICE FOR FUTURE PUBLIC PLAZA)

WS-13 NOT USED

WS-14 NOT USED

WS-15 NOT USED

WS-16 NOT USED

WS-17 NOT USED

WS-18 NOT USED

WS-19 STA. 8+86.97, 17.98 LT, @ WATER MAIN BUCKEYE  
WATER SERVICE CONNECTION EXTENSION, COMPLETE

WS-20 NOT USED

WS-21 NOT USED

WS-22 STA. 7+22.34, 43.81 RT, @ WATER MAIN BUCKEYE  
WATER SERVICE CONNECTION EXTENSION, COMPLETE

WS-23 NOT USED

WS-24 NOT USED

WS-25 NOT USED

WS-26 NOT USED

WS-27 NOT USED

WS-28 NOT USED

WS-29 NOT USED

WS-30 NOT USED

WS-31 NOT USED

WS-32 NOT USED

WS-33 NOT USED

WS-34 NOT USED

WS-35 NOT USED

WS-36 NOT USED

WS-37 STA. 12+40+79, 36.05 RT, @ WATER MAIN BUCKEYE  
WATER SERVICE CONNECTION EXTENSION, COMPLETE

WS-38 NOT USED

WS-39 NOT USED

WS-40 NOT USED

WS-41 NOT USED

WS-42 NOT USED

WS-43 NOT USED

WS-44 NOT USED

WS-45 NOT USED

WS-46 NOT USED

WS-47 NOT USED

WS-48 NOT USED

WS-49 NOT USED

WS-50 NOT USED

WS-51 NOT USED

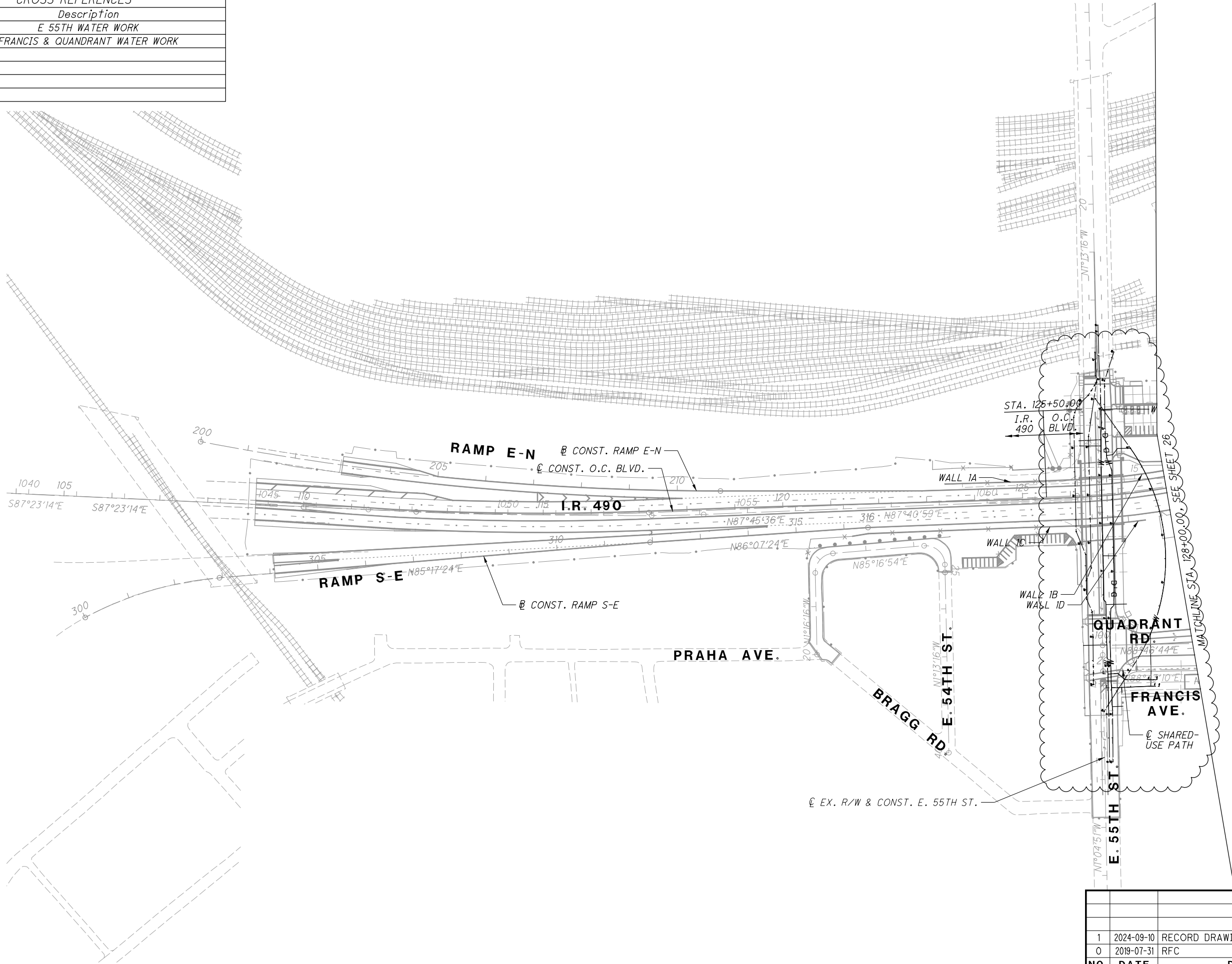
WS-52 NOT USED

WS-53 NOT USED

1	2024-09-10	RECORD DRAWINGS
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NO.	DATE	DESCRIPTION
ISSUE RECORD		

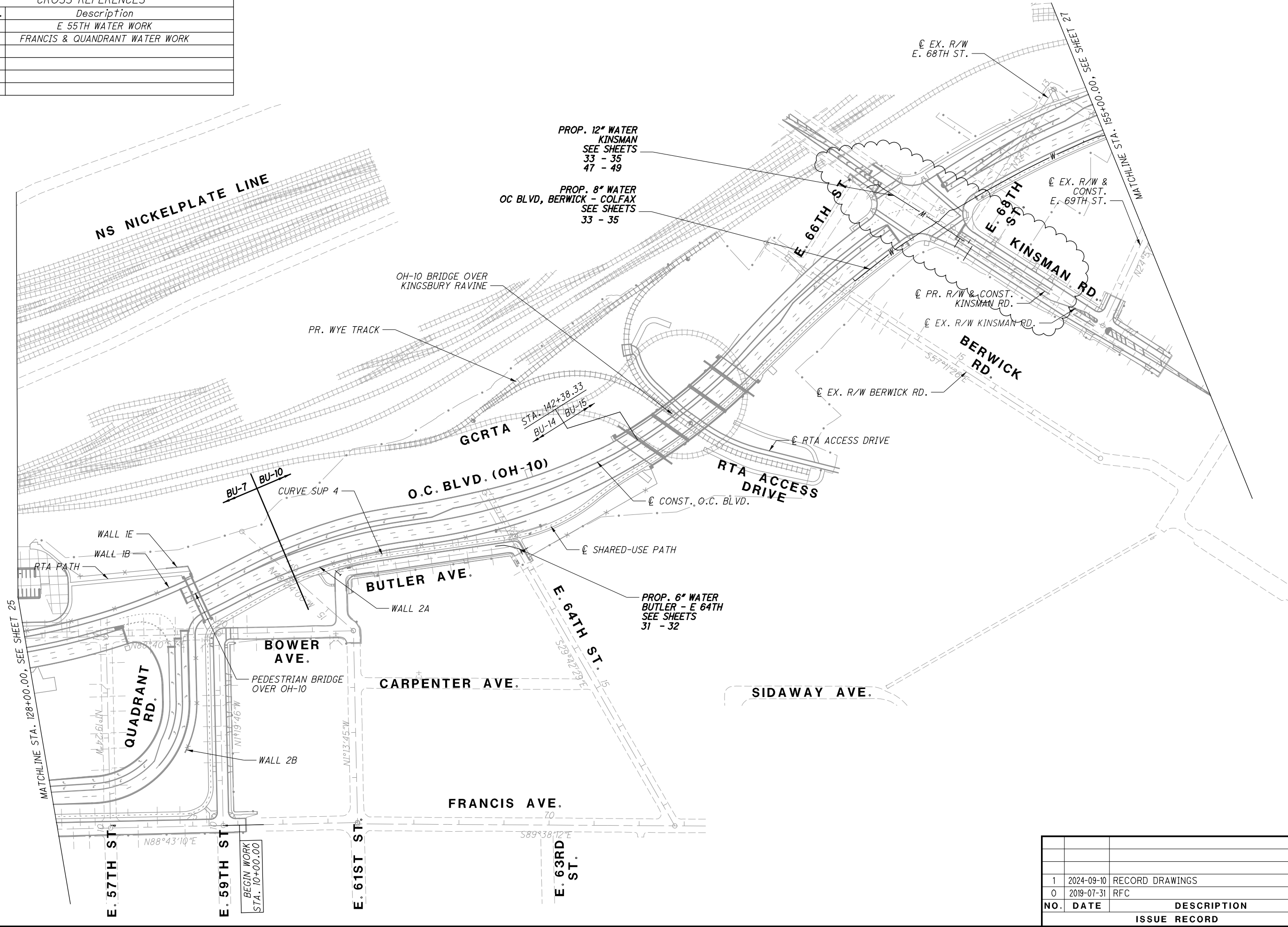


CROSS REFERENCES	
Sheet No.	Description
BU-07	E 55TH WATER WORK
BU-07	FRANCIS & QUADRANT WATER WORK



NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
ISSUE RECORD		

CROSS REFERENCES	
Sheet No.	Description
BU-07	E 55TH WATER WORK
BU-07	FRANCIS & QUADRANT WATER WORK



NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
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CUY-IR490/ SR010-2.09 / 19.28

WATER WORK - GENERAL LAYOUT PLAN  
STA. 128+00 TO STA. 155+00

RECORD PLANS

26  
93

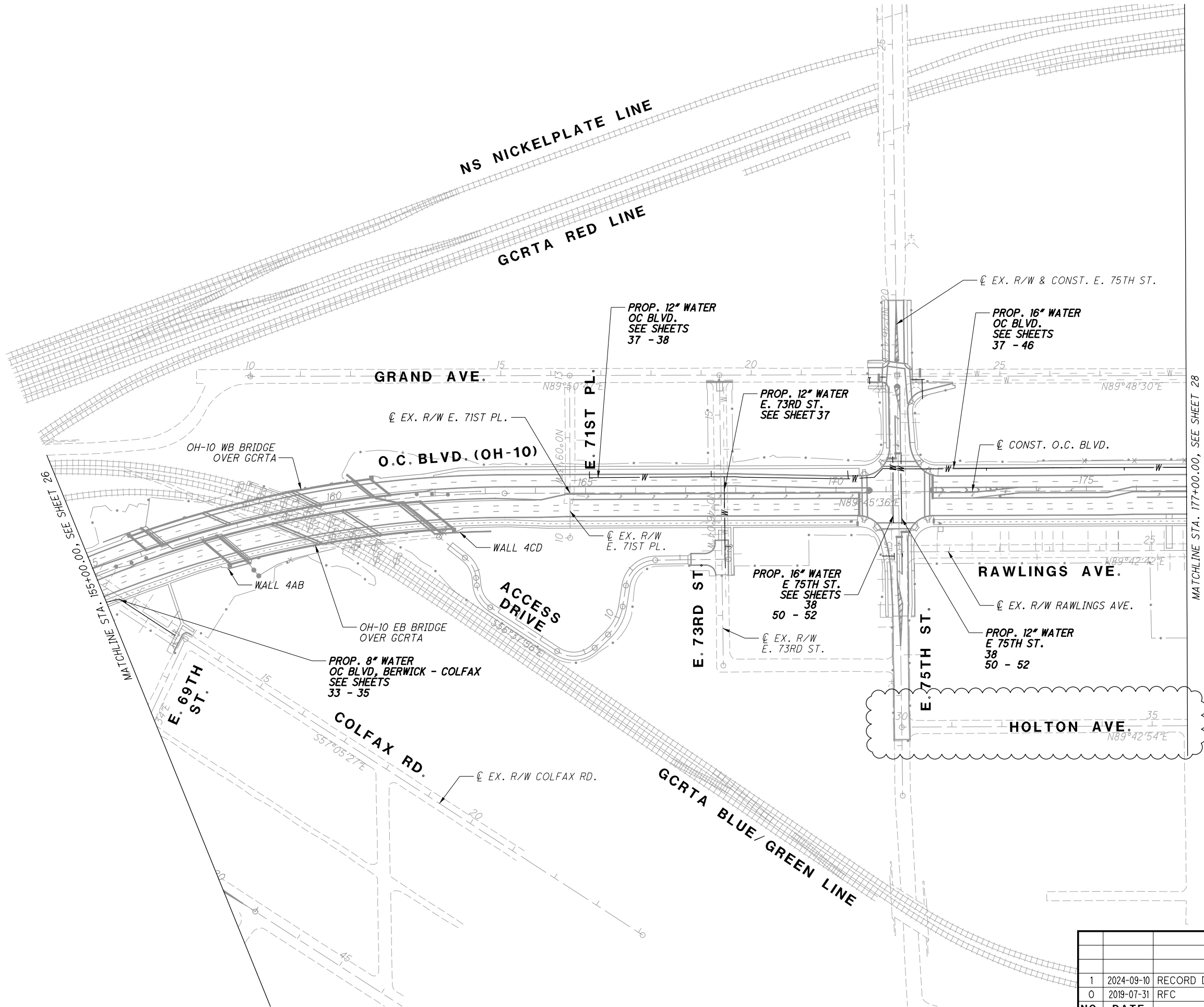
RECORD PLANS

RECORD PLANS

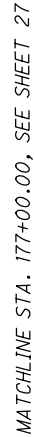
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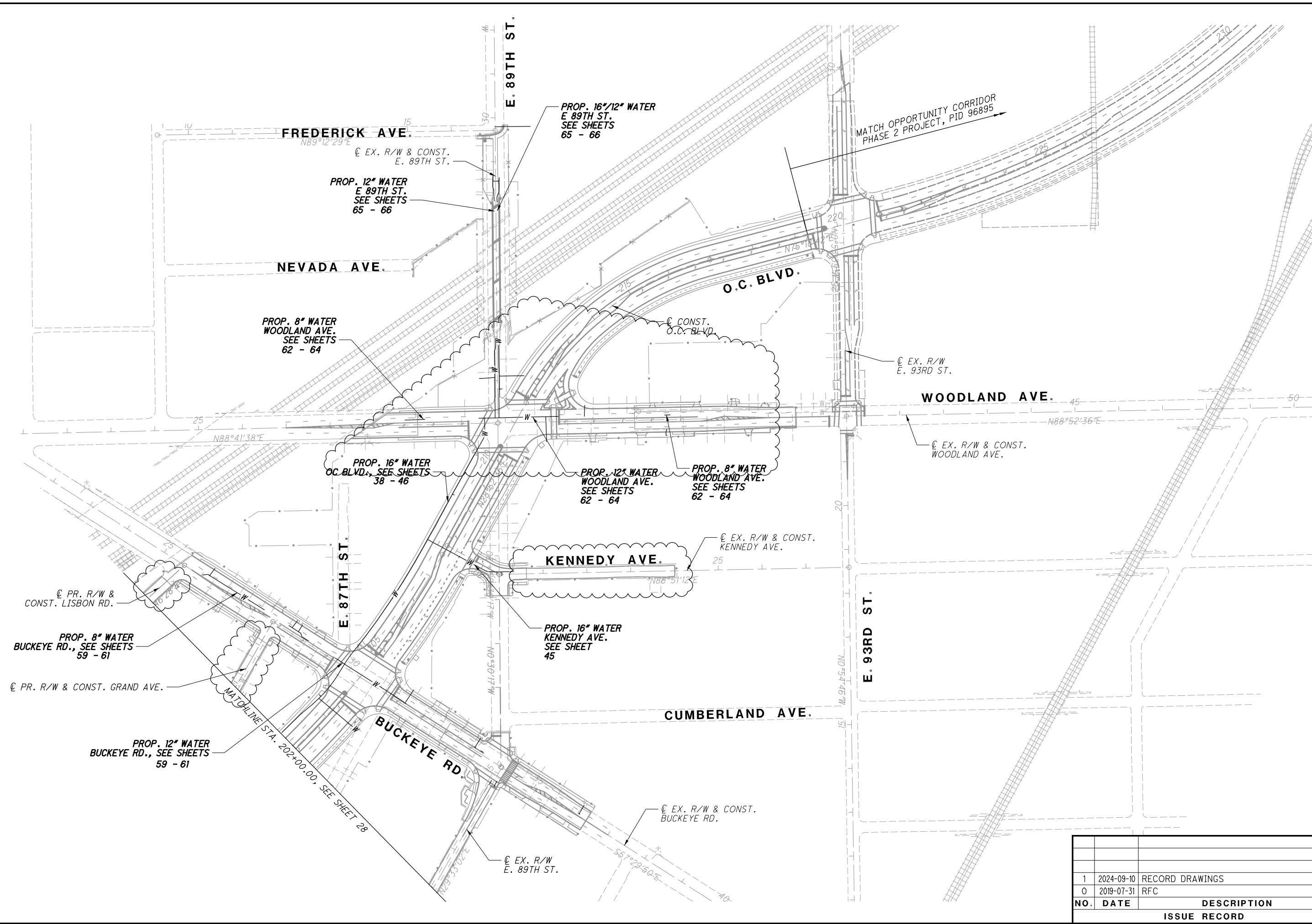
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NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC



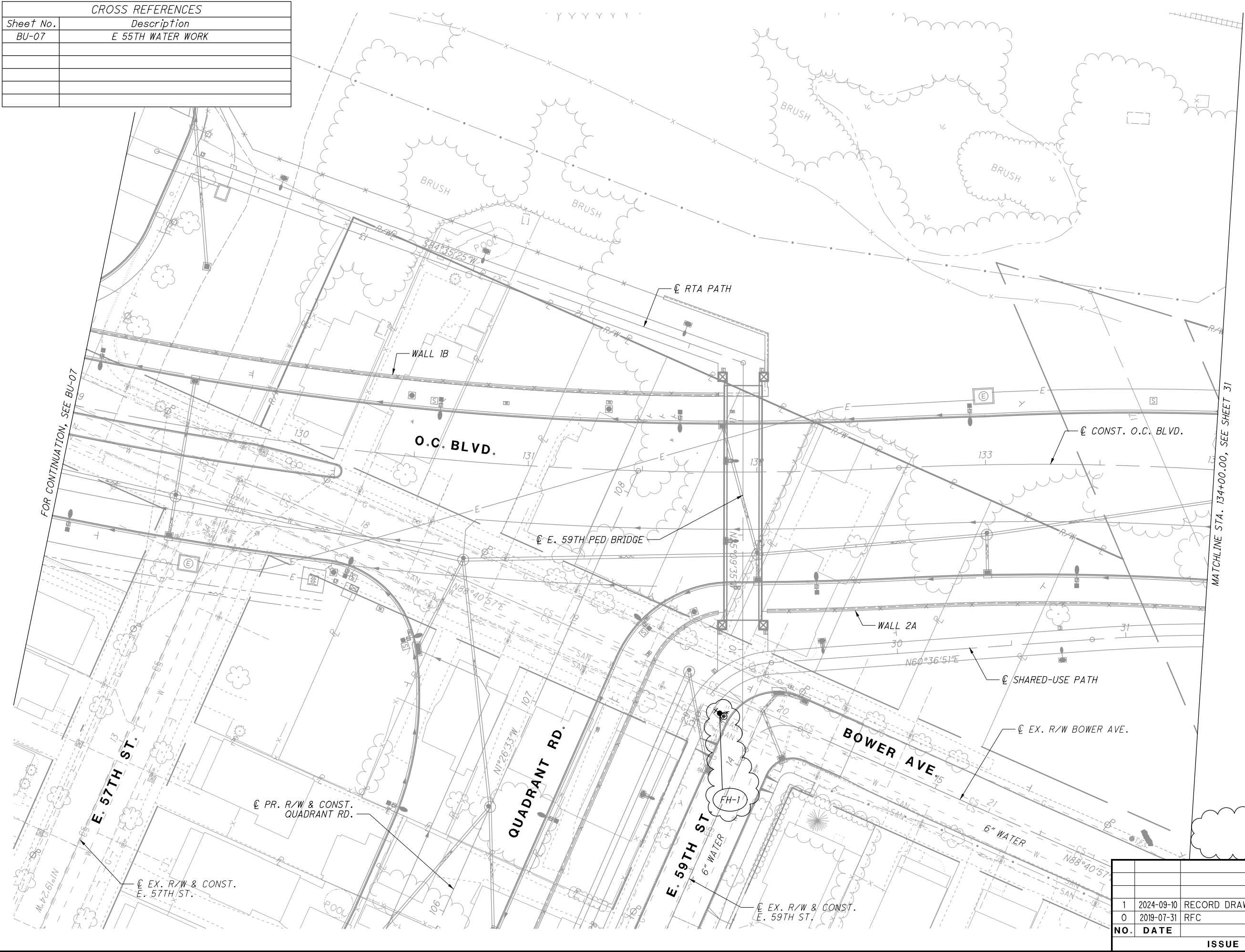
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0	2019-07-31	RFC
<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		



1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		



CROSS REFERENCES	
Sheet No.	Description
BU-07	E 55TH WATER WORK



NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
ISSUE RECORD		

WATER WORK PLAN - O.C. BLVD.  
STA. 129+00.00 TO STA. 134+00.00

CUY-IR490/ SR010-  
2.09 / 19.28

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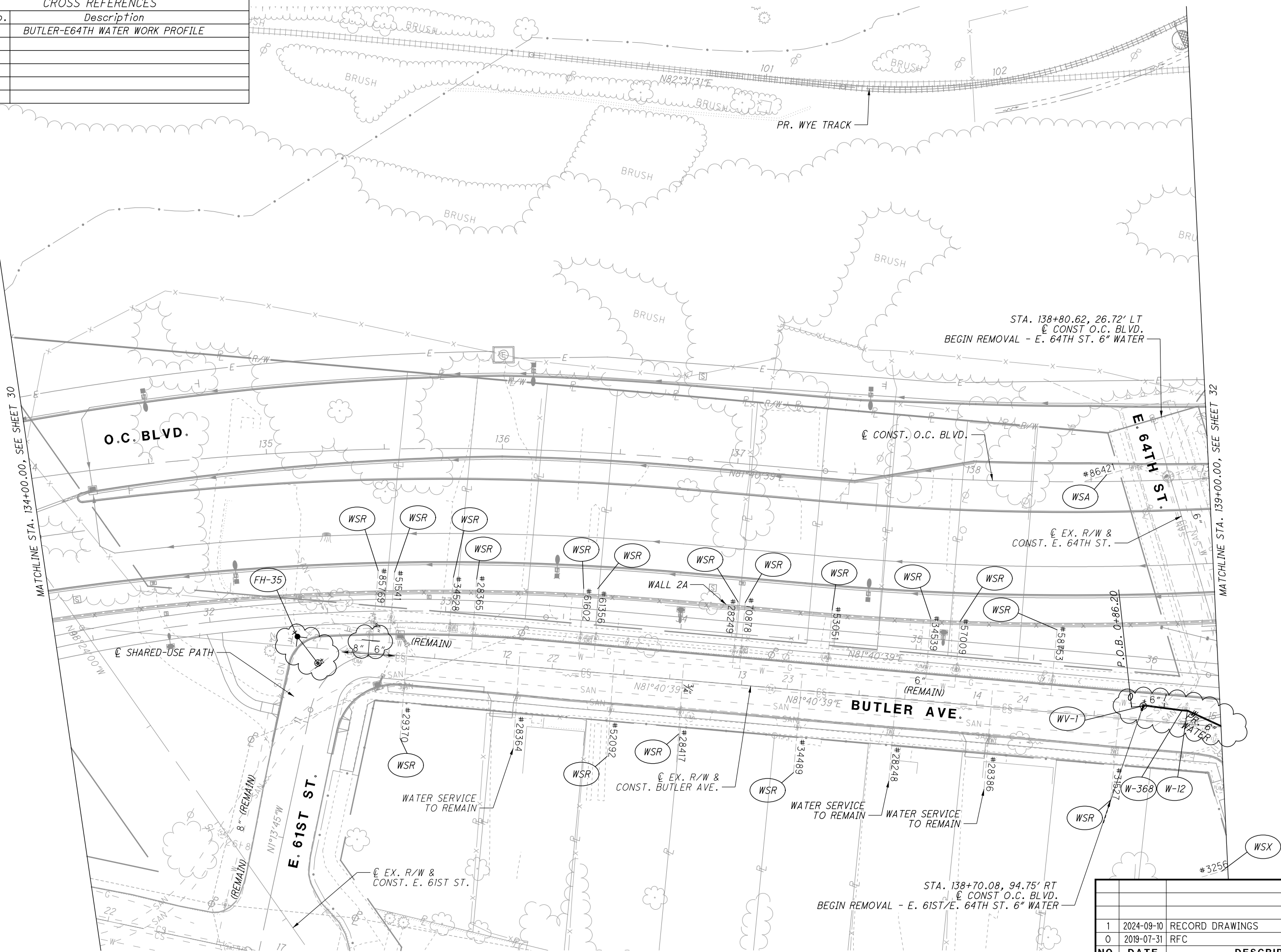
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SCALE IN FEET

North Arrow

RECORD PLANS

RECORD PLANS

CROSS REFERENCES	
Sheet No.	Description
73	BUTLER-E64TH WATER WORK PROFILE



NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
ISSUE RECORD		

WATER WORK PLAN - O.C. BLVD.  
STA. 134+00.00 TO STA. 139+00.00

CUY-IR490/ SR010-  
2.09/ 19.28

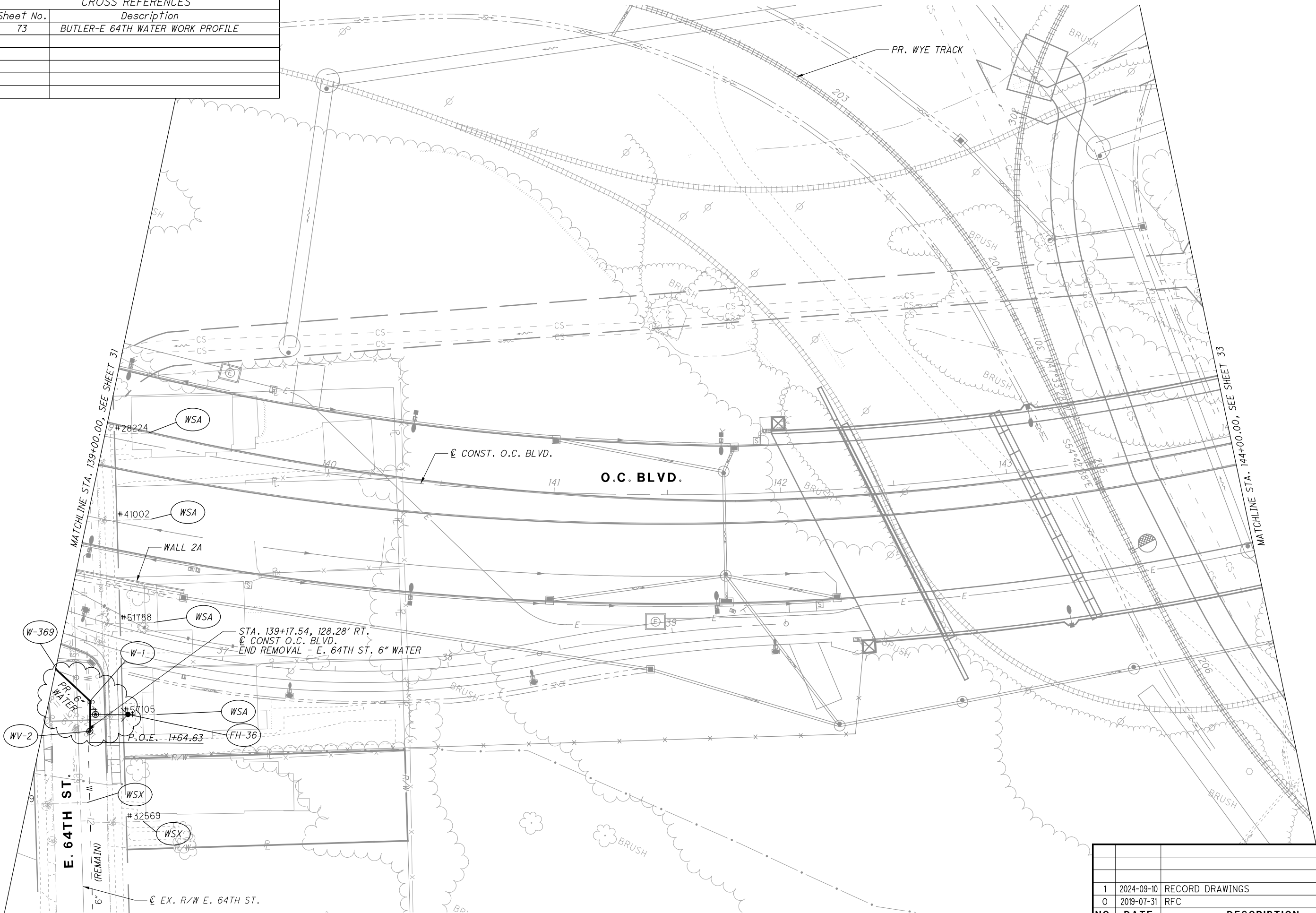
31  
93

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HORIZONTAL  
SCALE IN FEET

RECORD PLANS

CROSS REFERENCES	
Sheet No.	Description
73	BUTLER-E 64TH WATER WORK PROFILE



NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
ISSUE RECORD		

WATER WORK PLAN - O.C. BLVD.  
STA. 139+00.00 TO STA. 144+00.00

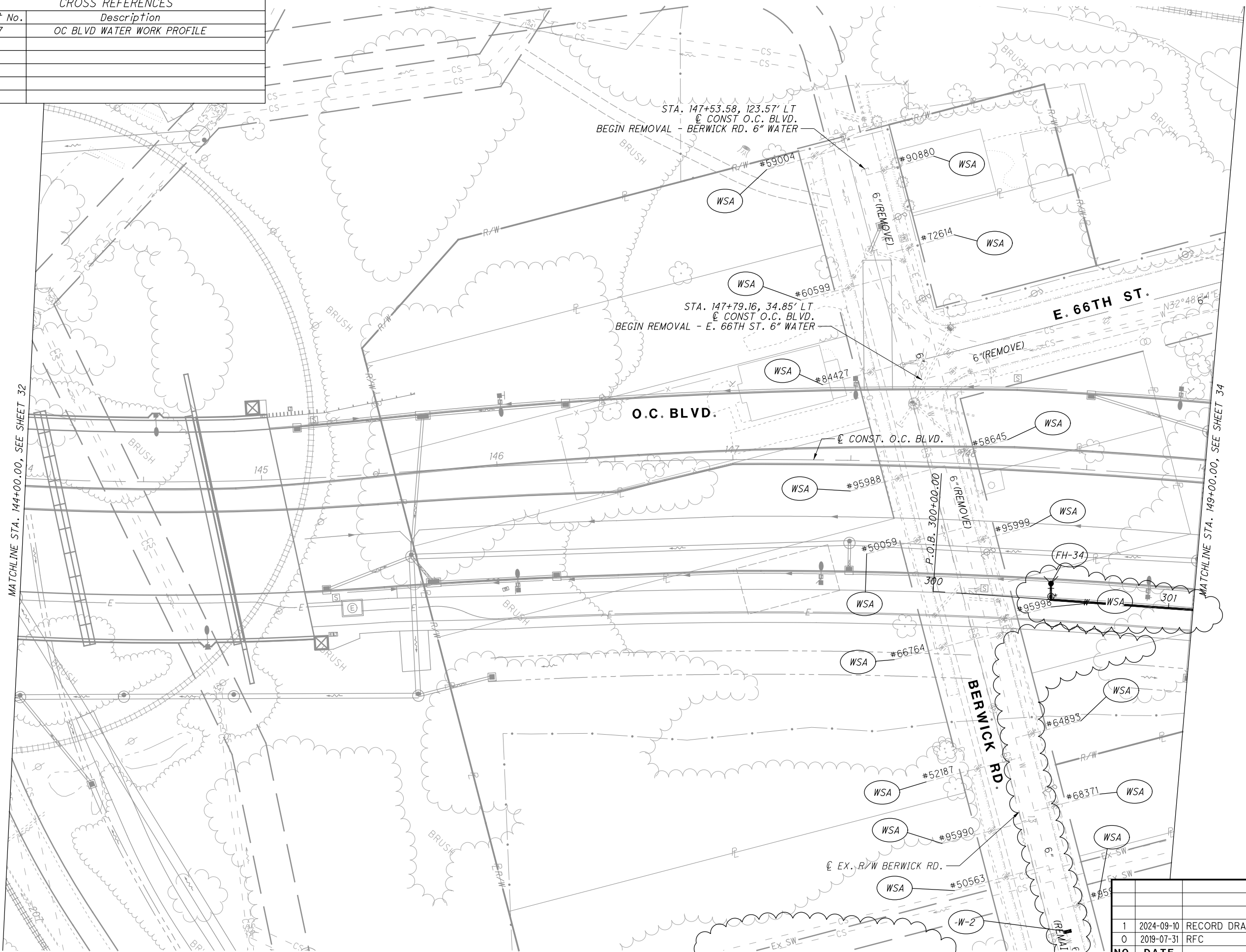
CUY-IR490/ SR010-  
2.09 / 19.28

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HORIZONTAL  
SCALE IN FEET

RECORD PLANS

CROSS REFERENCES	
Sheet No.	Description
67	OC BLVD WATER WORK PROFILE



NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
ISSUE RECORD		

WATER WORK PLAN - O.C. BLVD.  
STA. 144+00.00 TO STA. 149+00.00

CUY-IR490/ SR010-  
2.09 / 19.28

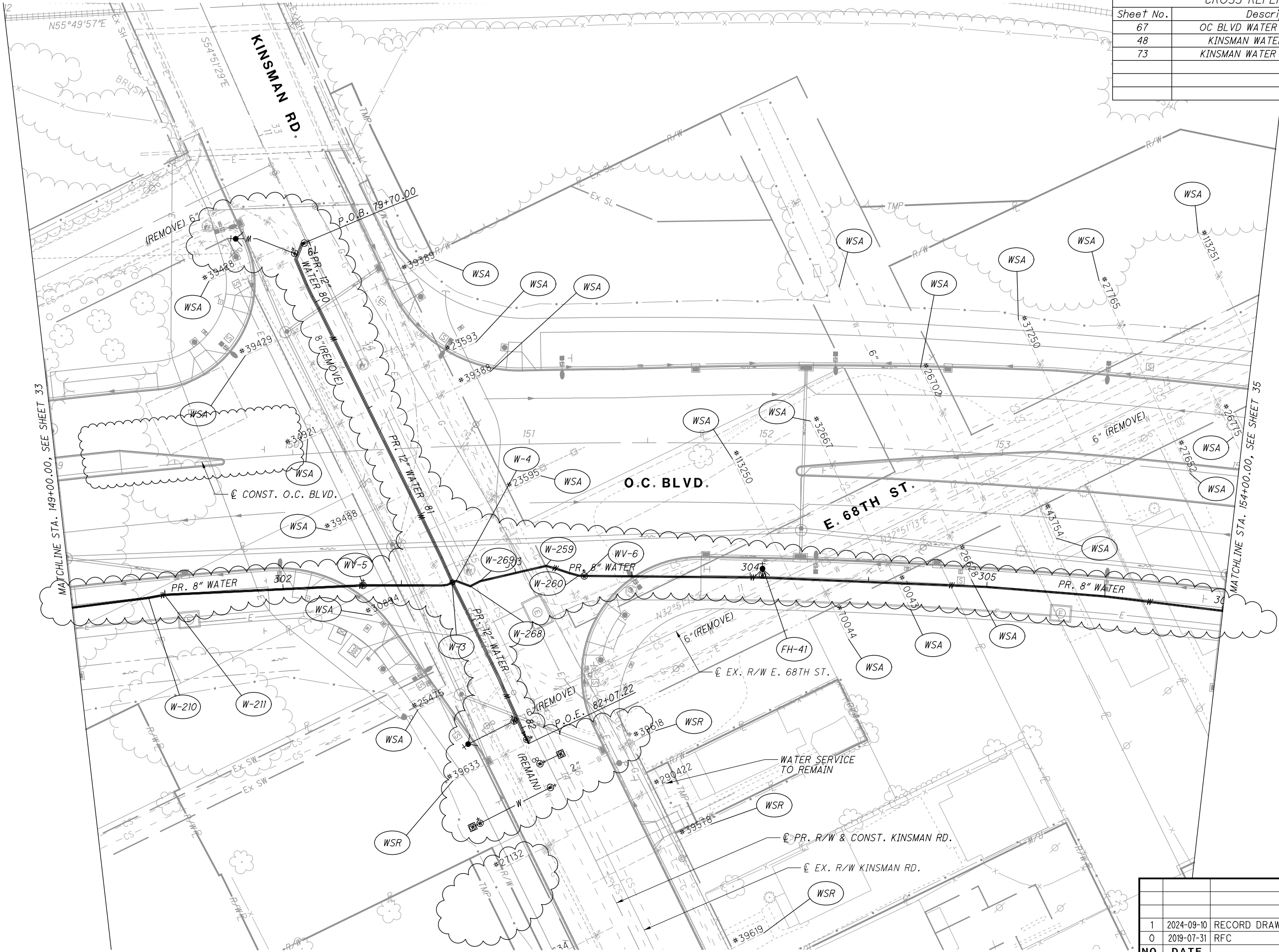
33  
93

CALCULATED  
AUE  
CHECKED  
MBM

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HORIZONTAL  
SCALE IN FEET

RECORD PLANS

RECORD PLANS



CROSS REFERENCES	
Sheet No.	Description
67	OC BLVD WATER WORK PROFILE
48	KINSMAN WATER WORK PLAN
73	KINSMAN WATER WORK PROFILE

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SCALE IN FEET

WATER WORK PLAN - O.C. BLVD.  
STA. 149+00.00 TO STA. 154+00.00

CUY-IR490/ SR010-  
2.09 / 19.28

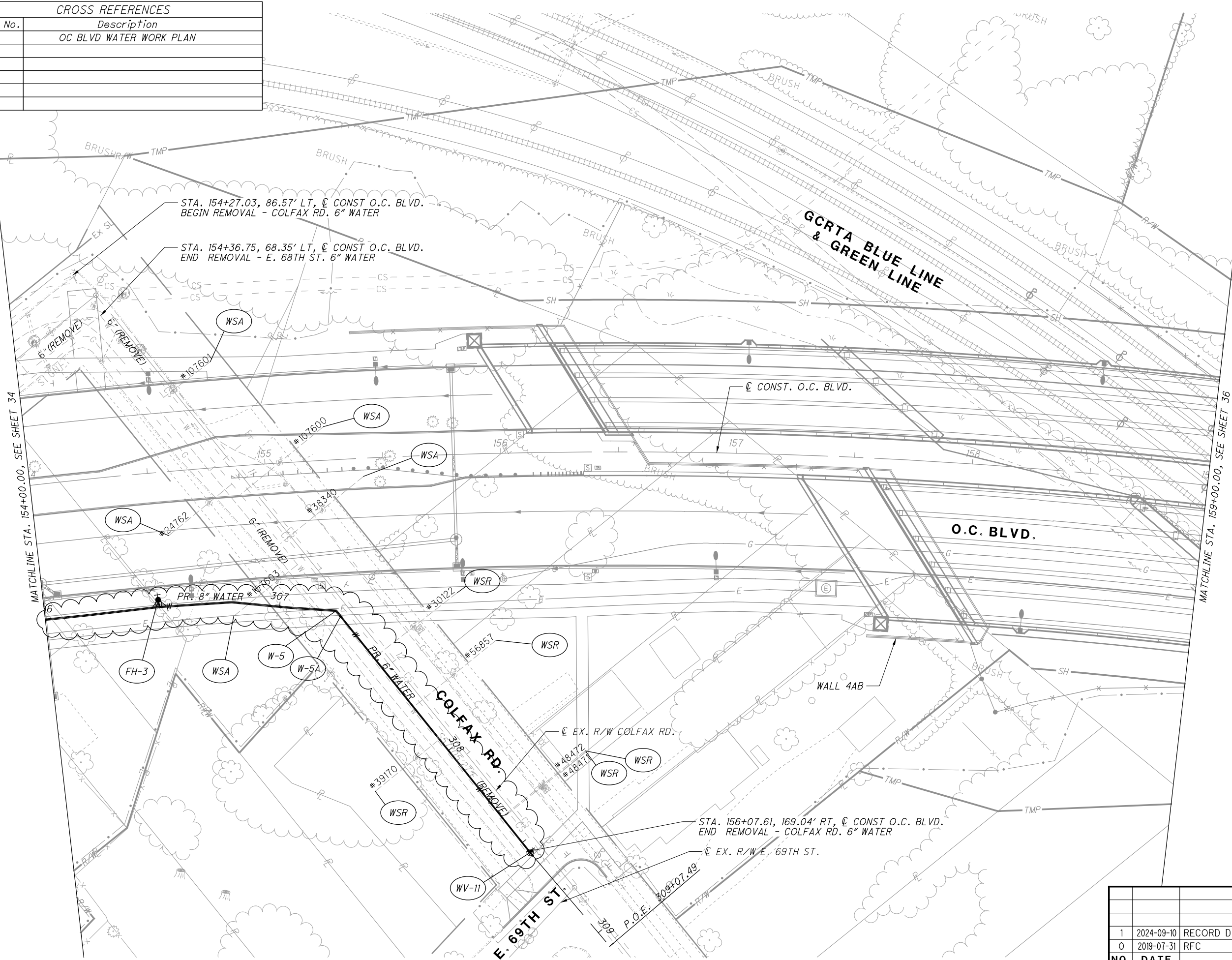
NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
ISSUE RECORD		

RECORD PLANS

RECORD PLANS



CROSS REFERENCES	
Sheet No.	Description
67	OC BLVD WATER WORK PLAN



NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
ISSUE RECORD		

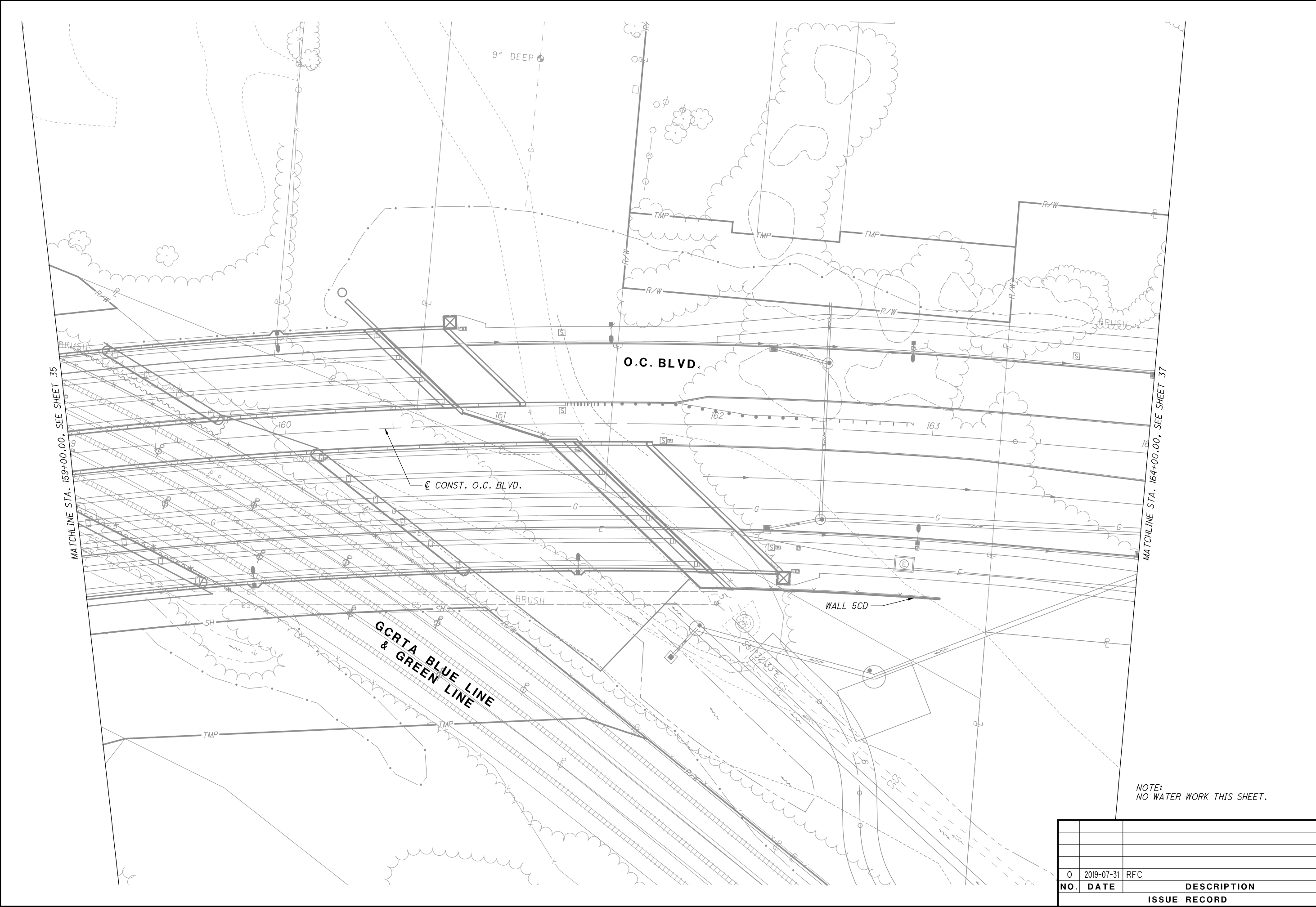
WATER WORK PLAN - O.C. BLVD.  
STA. 154+00.00 TO STA. 159+00.00

CUY-IR490/ SR010-  
2.09 / 19.28

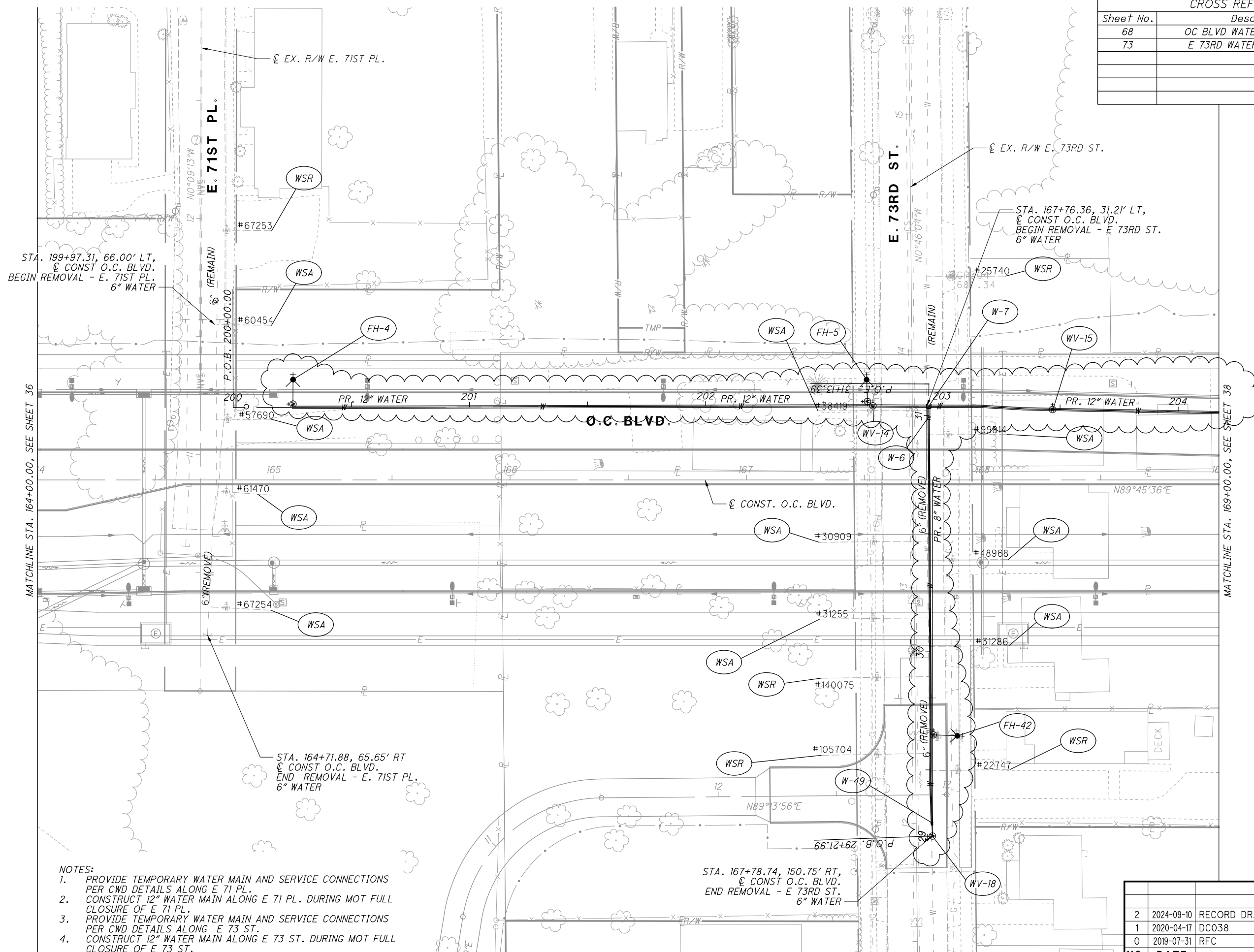
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RECORD PLANS



0	2019-07-31	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		

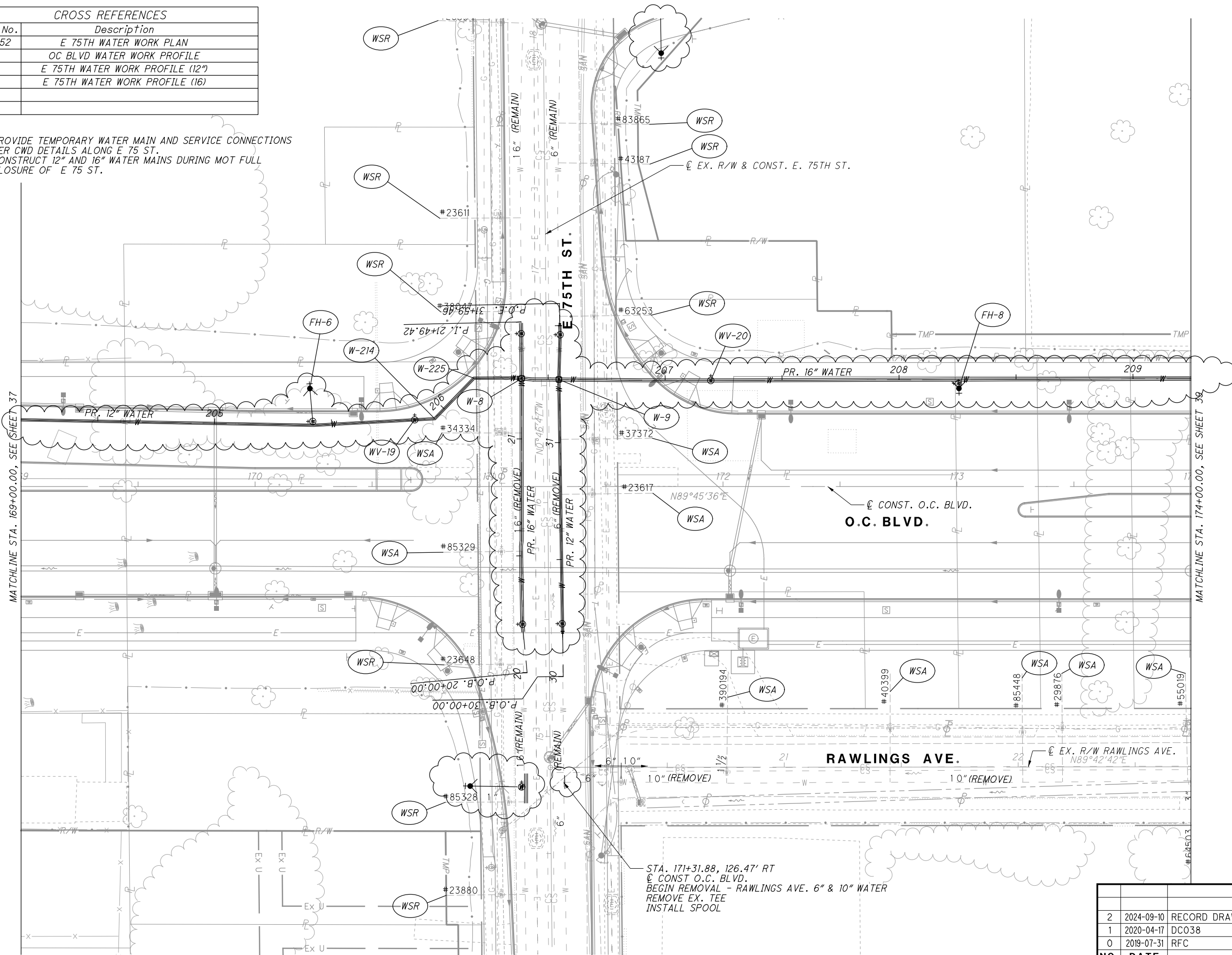


CROSS REFERENCES	
Sheet No.	Description
68	OC BLVD WATER WORK PROFILE
73	E 73RD WATER WORK PROFILE

2	2024-09-10	RECORD DRAWINGS
1	2020-04-17	DC038
0	2019-07-31	RFC
<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		

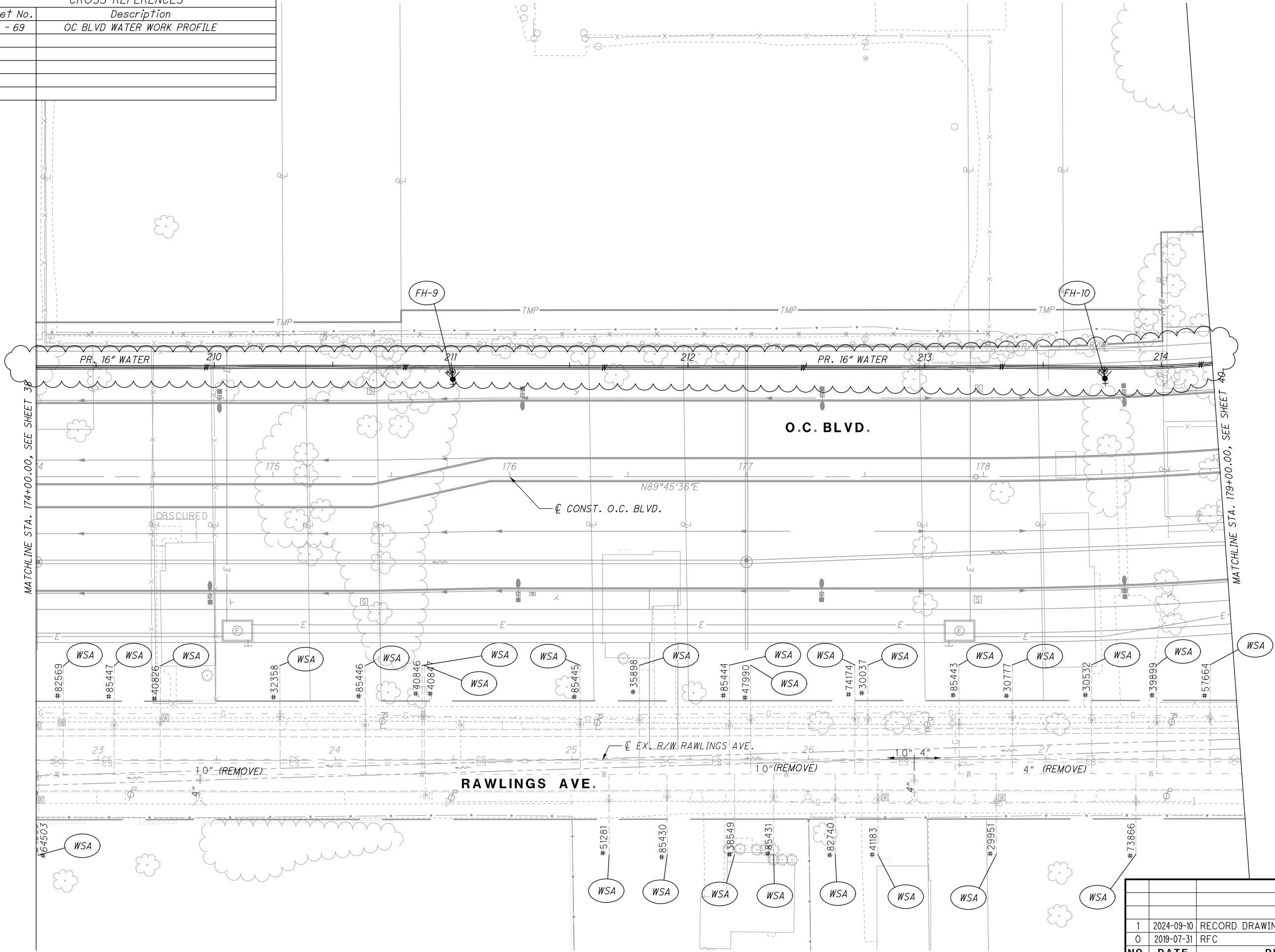
CROSS REFERENCES	
Sheet No.	Description
50 - 52	E 75TH WATER WORK PLAN
68	OC BLVD WATER WORK PROFILE
74	E 75TH WATER WORK PROFILE (12")
74	E 75TH WATER WORK PROFILE (16)

1. PROVIDE TEMPORARY WATER MAIN AND SERVICE CONNECTIONS PER CWD DETAILS ALONG E 75 ST.
2. CONSTRUCT 12" AND 16" WATER MAINS DURING MOT FULL CLOSURE OF E 75 ST.



2	2024-09-10	RECORD DRAWINGS
1	2020-04-17	DC038
0	2019-07-31	RFC
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<b>ISSUE RECORD</b>		

CROSS REFERENCES	
Sheet No.	Description
68 - 69	OC BLVD WATER WORK PROFILE



NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
ISSUE RECORD		

WATER WORK PLAN - O.C. BLVD.  
STA. 174+00.00 TO STA. 179+00.00

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SCALE IN FEET

North Arrow

RECORD PLANS

RECORD PLANS



CROSS REFERENCES	
Sheet No.	Description
53 - 55	E 79TH WATER WORK PLAN
69	OC BLVD WATER WORK PROFILE
74	E 79TH WATER WORK PROFILE

- NOTES:
1. PROVIDE TEMPORARY WATER MAIN AND SERVICE CONNECTIONS PER CWD DETAILS ALONG E 79 ST.
  2. CONSTRUCT 12" WATER MAIN DURING MOT FULL CLOSURE OF E 79 ST.
  3. PER CWD REQUIREMENTS, EX. 16" WATER TO BE REMOVED ALONG GRAND AVE., BETWEEN E 79TH AND EVARTS, MUST REMAIN IN SERVICE UNTIL PROP. 16" WATER ALONG OC BLVD., BETWEEN E 79TH AND EVARTS HAS BEEN PLACED IN SERVICE.

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SCALE IN FEET

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RECORD PLANS

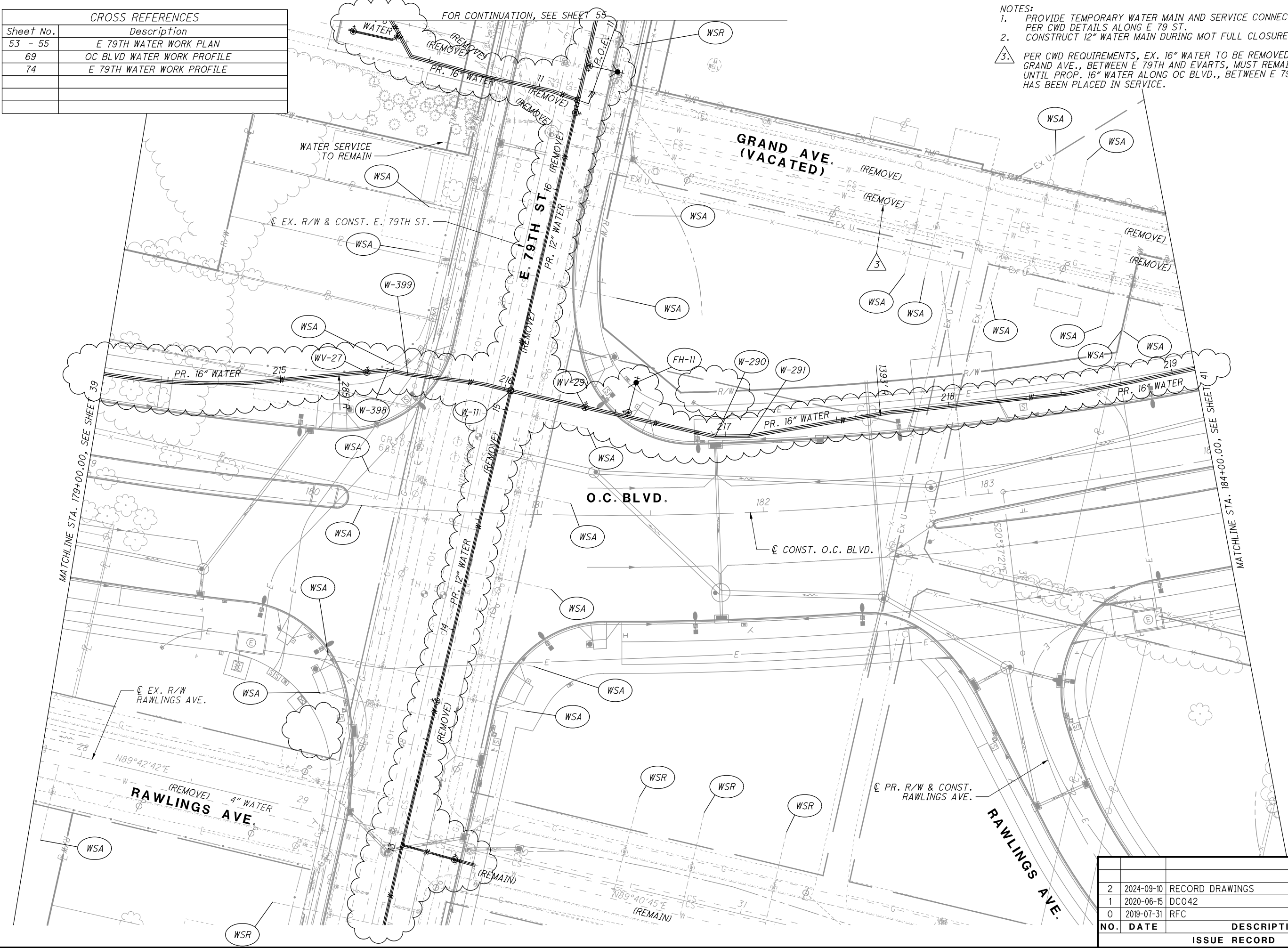
WATER WORK PLAN - O.C. BLVD.  
STA. 179+00.00 TO STA. 184+00.00

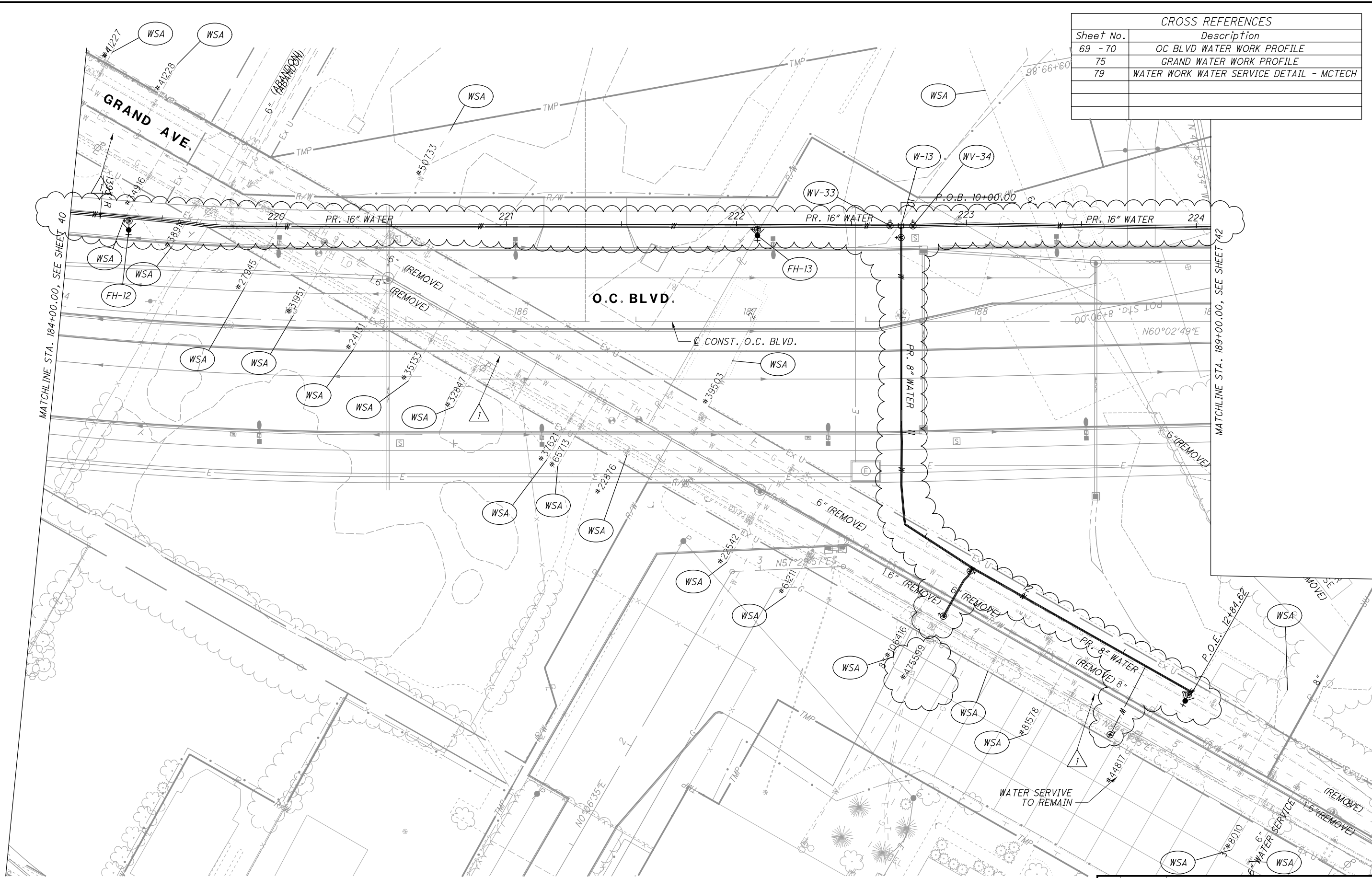
RECORD PLANS

CUY-IR490/ SR010-  
2.09/ 19.28

RECORD PLANS

NO.	DATE	DESCRIPTION
2	2024-09-10	RECORD DRAWINGS
1	2020-06-15	DC042
0	2019-07-31	RFC
ISSUE RECORD		





CROSS REFERENCES	
Sheet No.	Description
69 - 70	OC BLVD WATER WORK PROFILE
75	GRAND WATER WORK PROFILE
79	WATER WORK WATER SERVICE DETAIL - MCTECH

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SCALE IN FEET

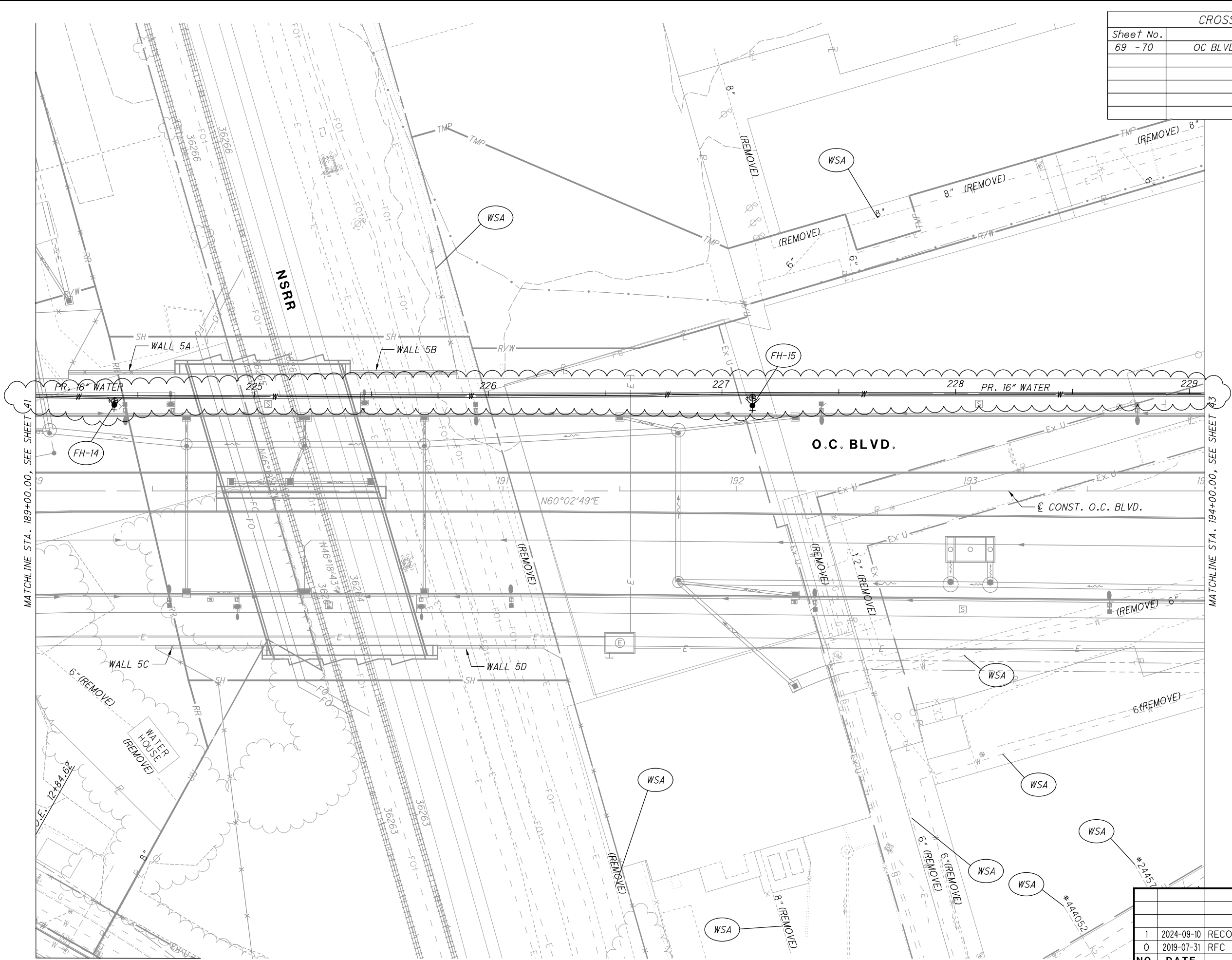
RECORD PLANS

WATER WORK PLAN - O.C. BLVD.  
STA. 184+00.00 TO STA. 189+00.00

CUY-IR490/ SR010-  
2.09 / 19.28

- NOTES:
1. PER CWD REQUIREMENTS, EX. 16" WATER TO BE REMOVED ALONG GRAND AVE., BETWEEN E 79TH AND EVARTS, MUST REMAIN IN SERVICE UNTIL PROP. 16" WATER ALONG OC BLVD., BETWEEN E 79TH AND EVARTS, HAS BEEN PLACED IN SERVICE.

NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
ISSUE RECORD		



CROSS REFERENCES	
Sheet No.	Description
69 - 70	OC BLVD WATER WORK PROFILE

CALCULATED  
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HORIZONTAL  
SCALE IN FEET

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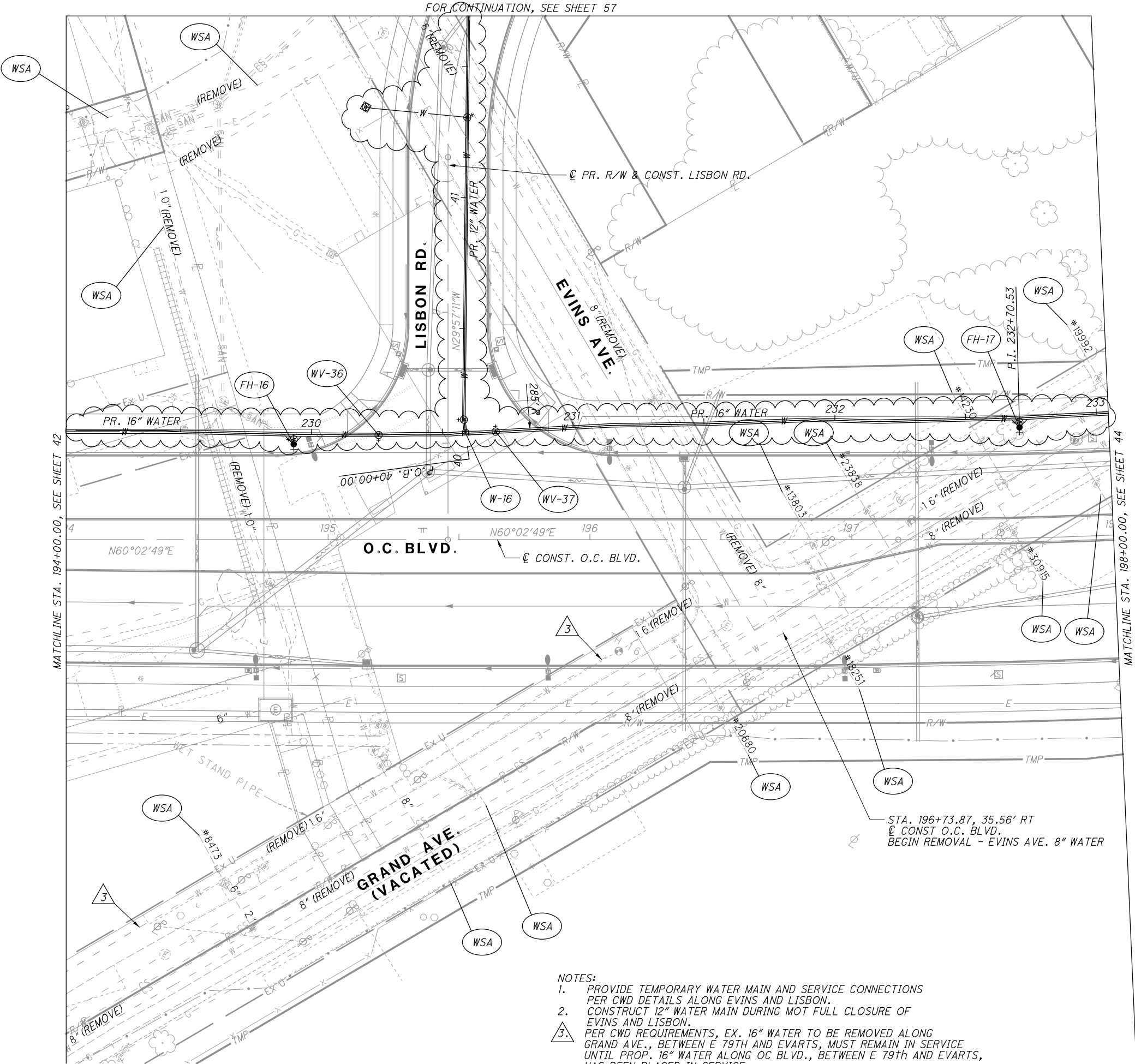
WATER WORK PLAN - O.C. BLVD.  
STA. 189+00.00 TO STA. 194+00.00

CUY-IR490/ SR010-  
2.09 / 19.28

ISSUE RECORD		
NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC

RECORD PLANS

RECORD PLANS



- NOTES:
1. PROVIDE TEMPORARY WATER MAIN AND SERVICE CONNECTIONS PER CWD DETAILS ALONG EVINS AND LISBON.
  2. CONSTRUCT 12" WATER MAIN DURING MOT FULL CLOSURE OF EVINS AND LISBON.
  3. PER CWD REQUIREMENTS, EX. 16" WATER TO BE REMOVED ALONG GRAND AVE., BETWEEN E 79TH AND EVARTS, MUST REMAIN IN SERVICE UNTIL PROP. 16" WATER ALONG OC BLVD., BETWEEN E 79TH AND EVARTS, HAS BEEN PLACED IN SERVICE.

CROSS REFERENCES	
Sheet No.	Description
57	LISBON WATER WORK PLAN
69 - 70	OC BLVD WATER WORK PROFILE
74	LISBON WATER WORK PROFILE

CALCULATED  
AUE

CHECKED  
MBM

0 20 40

HORIZONTAL  
SCALE IN FEET

WATER WORK PLAN - O.C. BLVD.  
STA. 194+00.00 TO STA. 198+00.00

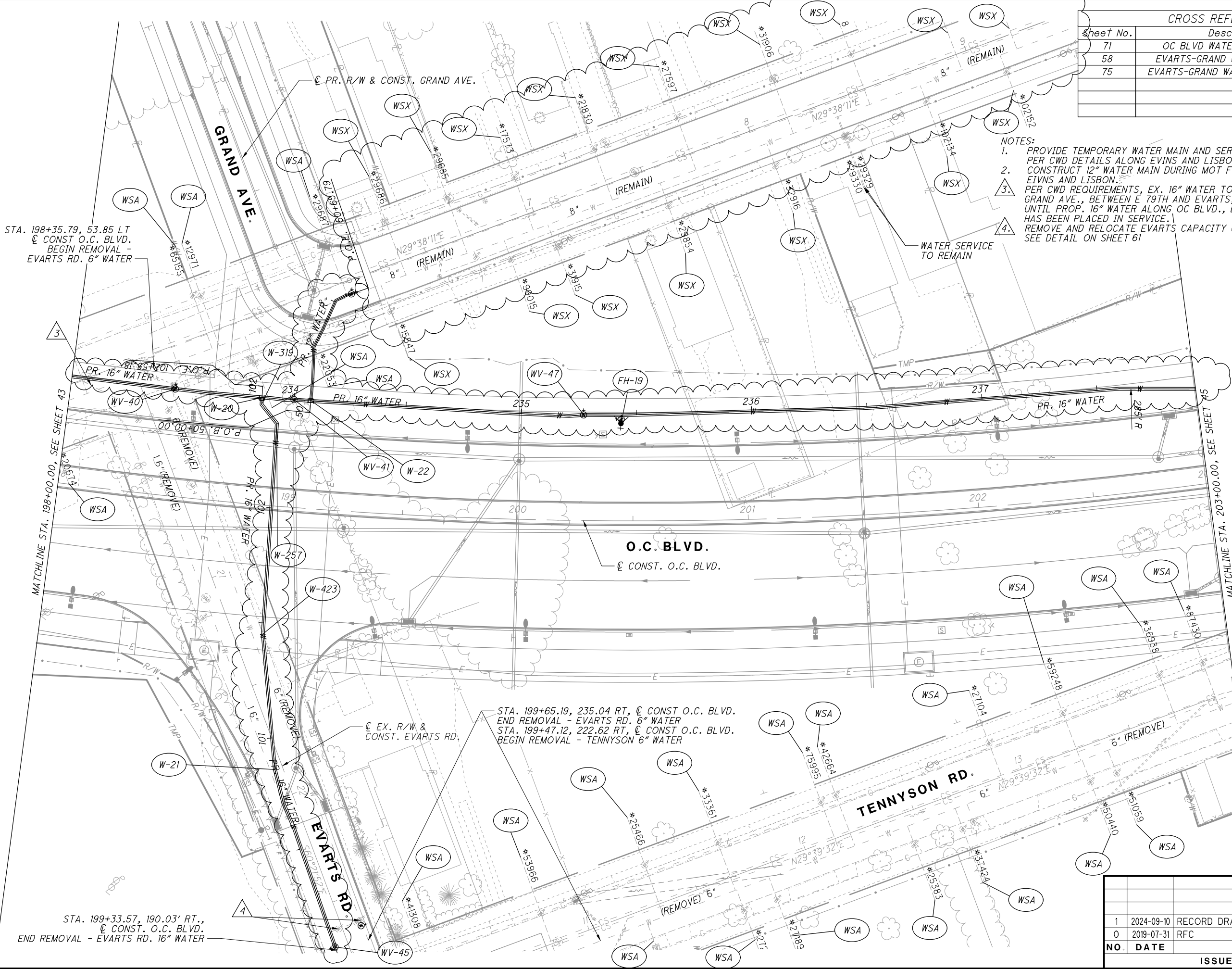
CUY-IR490/ SR010-  
2.09 / 19.28

NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
ISSUE RECORD		

RECORD PLANS

RECORD PLANS





CROSS REFERENCES	
Sheet No.	Description
71	OC BLVD WATER WORK PROFILE
58	EVARTS-GRAND WATER WORK PLAN
75	EVARTS-GRAND WATER WORK PROFILE

- NOTES:
1. PROVIDE TEMPORARY WATER MAIN AND SERVICE CONNECTIONS PER CWD DETAILS ALONG EVINS AND LISBON.
  2. CONSTRUCT 12" WATER MAIN DURING MOT FULL CLOSURE OF EVINS AND LISBON.
  3. PER CWD REQUIREMENTS, EX. 16" WATER TO BE REMOVED ALONG GRAND AVE., BETWEEN E 79TH AND EVARTS, MUST REMAIN IN SERVICE UNTIL PROP. 16" WATER ALONG OC BLVD., BETWEEN E 79th AND EVARTS, HAS BEEN PLACED IN SERVICE.
  4. REMOVE AND RELOCATE EVARTS CAPACITY CONNECTION. SEE DETAIL ON SHEET 61

ISSUE RECORD		
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
NO.	DATE	DESCRIPTION

WATER WORK PLAN - O.C. BLVD.  
STA. 198+00.00 TO STA. 203+00.00

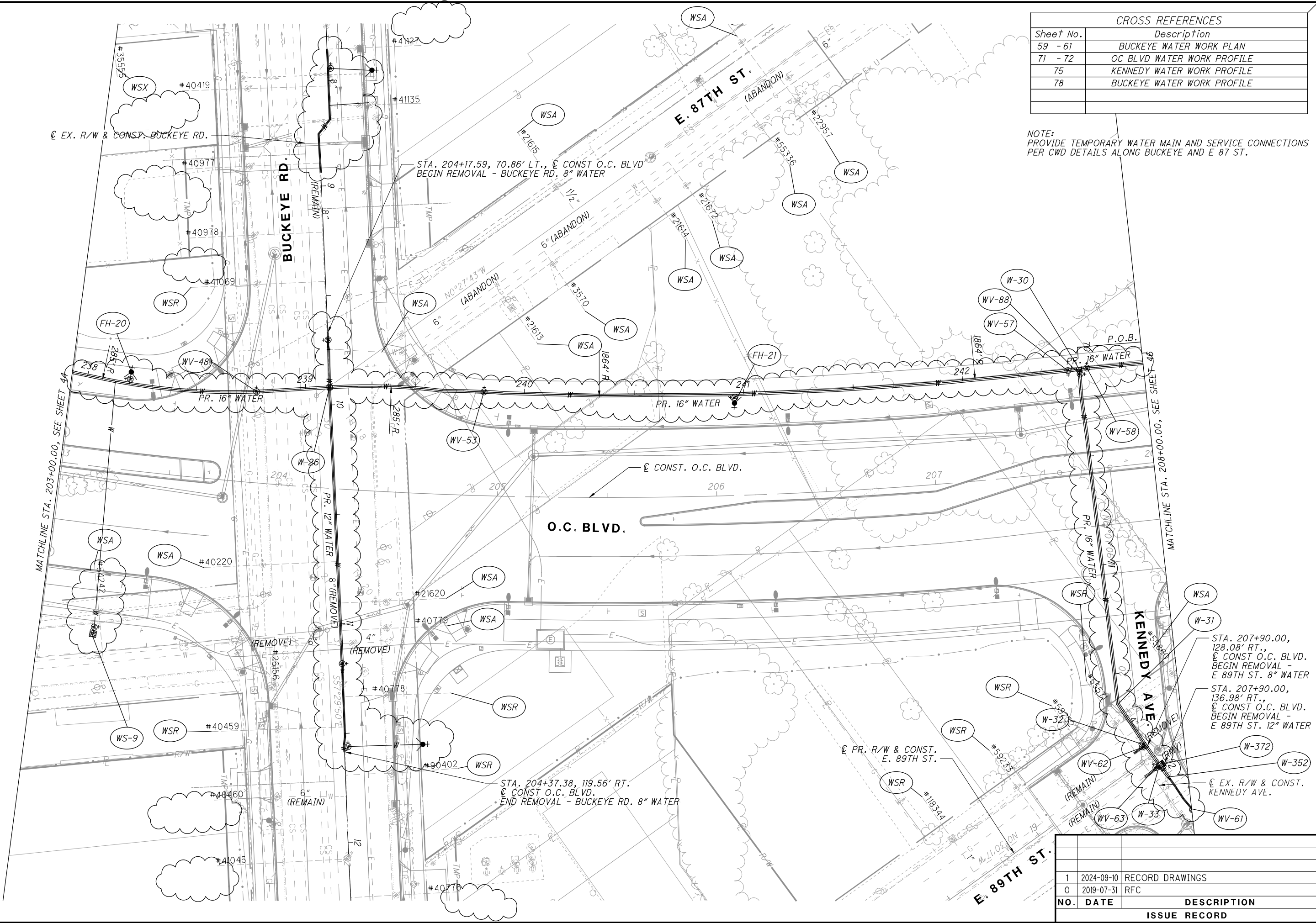
CUY-IR490/ SR010-  
2.09 / 19.28

RECORD PLANS

0 20 40  
HORIZONTAL  
SCALE IN FEET

CALCULATED  
AUE  
CHECKED  
MBM





CROSS REFERENCES	
Sheet No.	Description
59 - 61	BUCKEYE WATER WORK PLAN
71 - 72	OC BLVD WATER WORK PROFILE
75	KENNEDY WATER WORK PROFILE
78	BUCKEYE WATER WORK PROFILE

NOTE:  
PROVIDE TEMPORARY WATER MAIN AND SERVICE CONNECTIONS  
PER CWD DETAILS ALONG BUCKEYE AND E 87 ST.

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CALCULATED

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CHECKED

MBM

WATER WORK PLAN - O.C. BLVD.

STA. 203+00.00 TO STA. 208+00.00

CUY-IR490/ SR010-

2.09 / 19.28

RECORD PLANS

RECORD PLANS

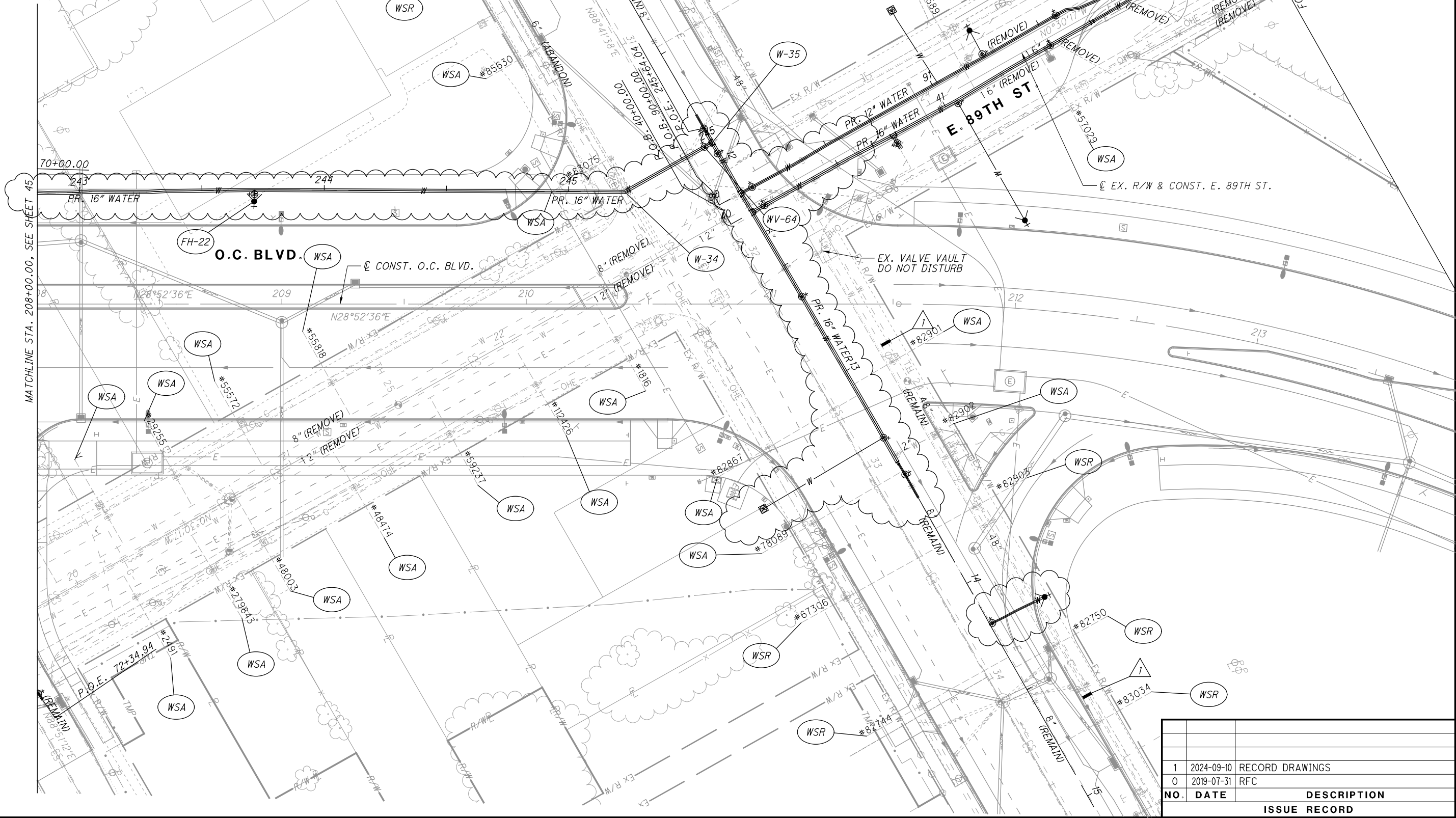
45

93

CROSS REFERENCES	
Sheet No.	Description
65 -66	E 89TH WATER WORK PLAN
62 -64	WOODLAND WATER WORK PLAN
72	OC BLVD WATER WORK PROFILE
76	E 89TH WATER WORK PROFILE (16"/12")
77	E 89TH WATER WORK PROFILE (12")
78	WOODLAND WATER WORK PROFILE

NOTE:  
PROVIDE TEMPORARY WATER MAIN AND SERVICE CONNECTIONS  
PER CWD DETAILS ALONG WOODLAND AND E 89 ST.

1 DO NOT DISTURB EX. 48" WATER LOCATED UNDER  
THE NORTH EDGE OF PAVEMENT, WOODLAND AVE.



NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
ISSUE RECORD		

WATER WORK PLAN - O.C. BLVD.  
STA. 208+00.00 TO STA. 213+00.00

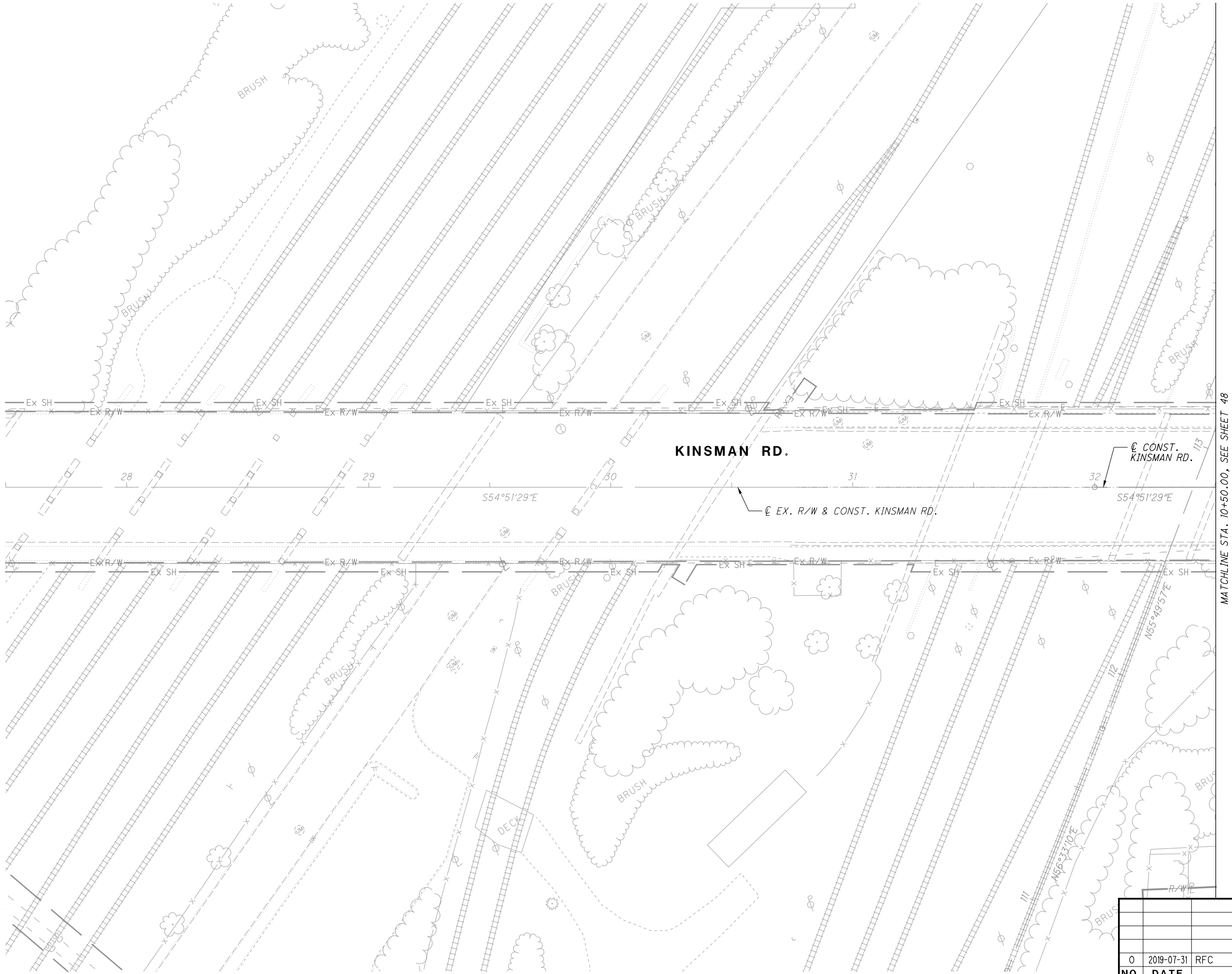
CUY-IR490/ SR010-  
2.09 / 19.28

46  
93



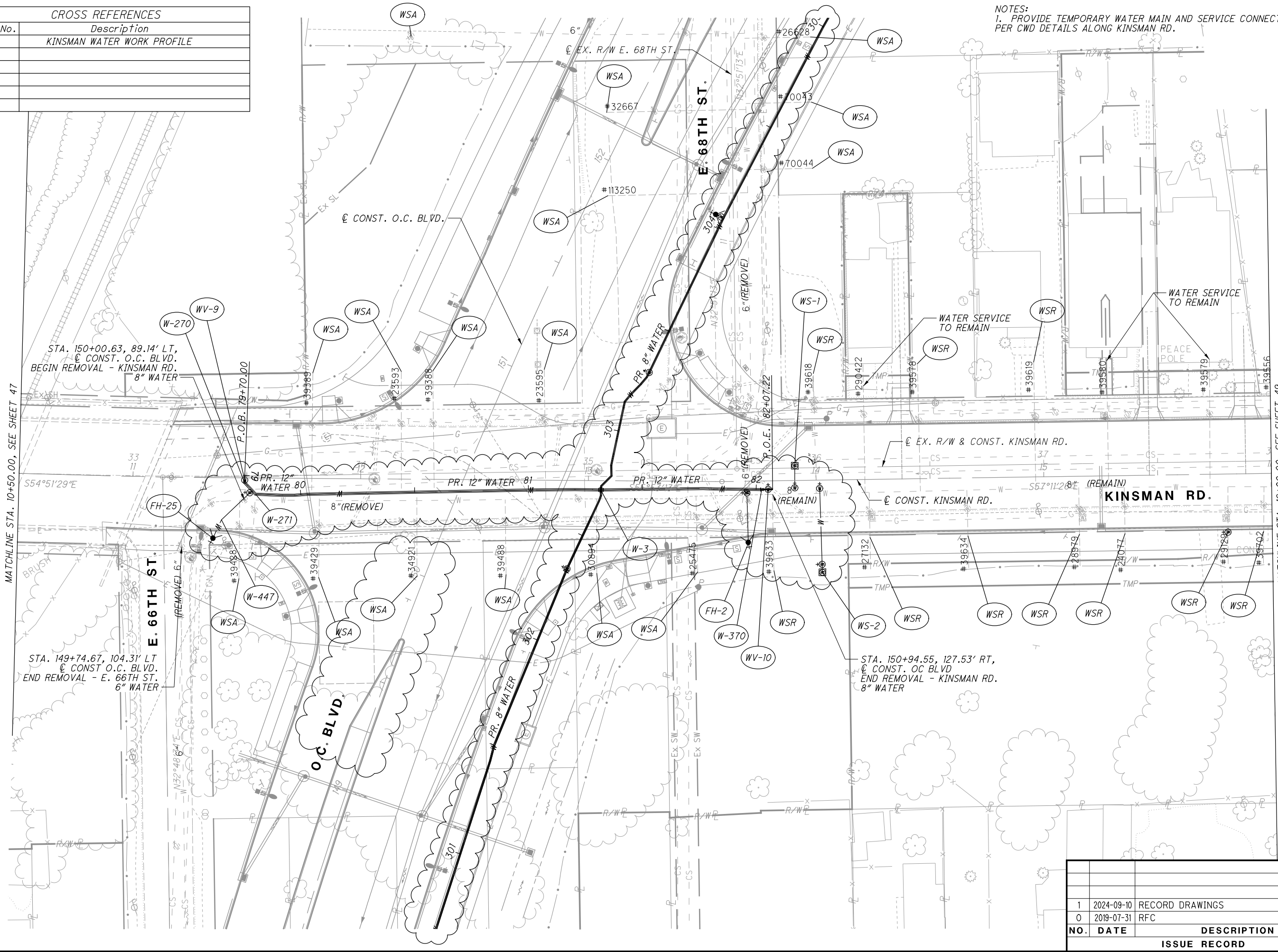
RECORD PLANS

RECORD PLANS



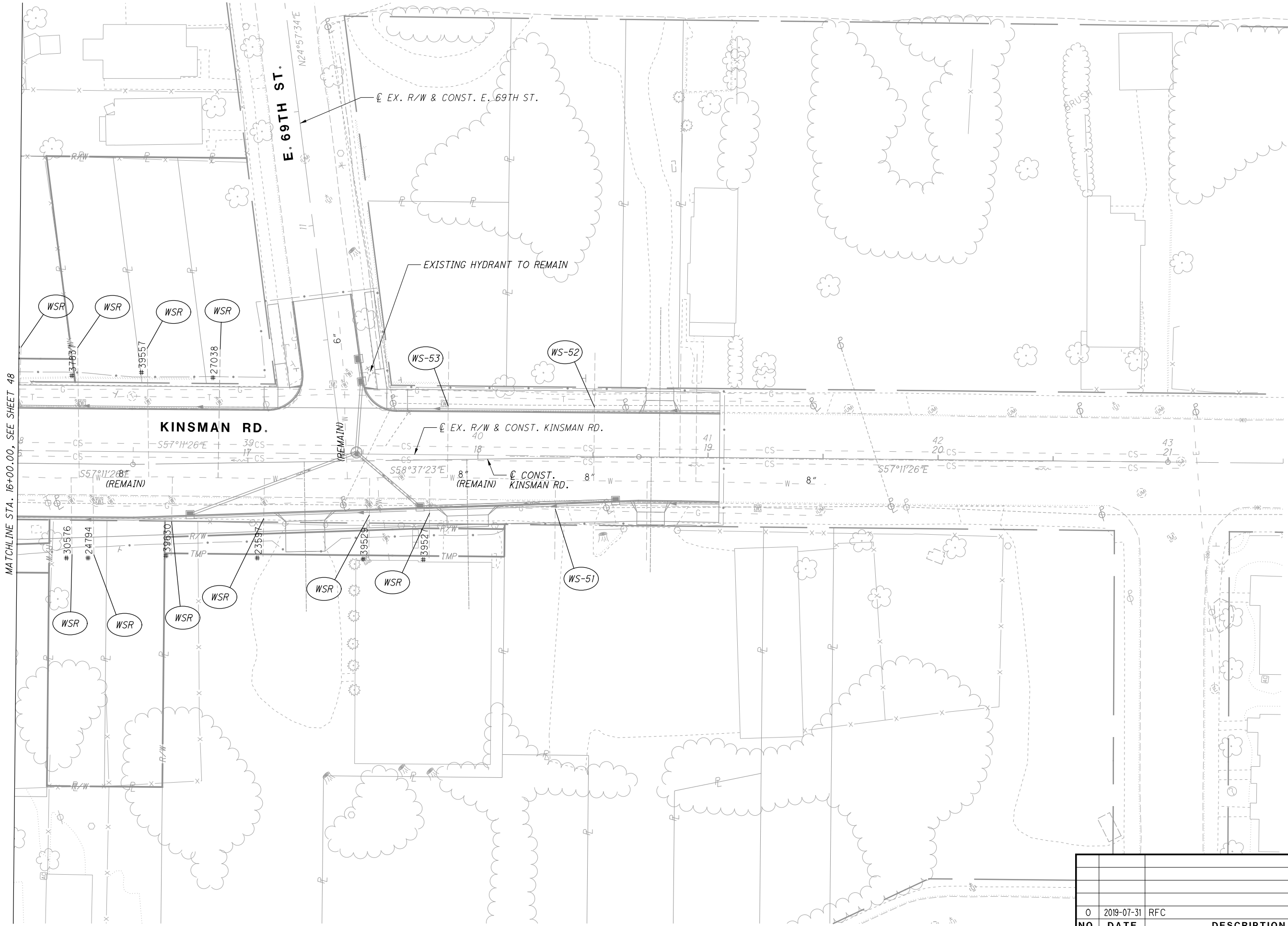
ISSUE RECORD		
NO.	DATE	DESCRIPTION
0	2019-07-31	RFC

CROSS REFERENCES	
Sheet No.	Description
73	KINSMAN WATER WORK PROFILE



NOTES:  
1. PROVIDE TEMPORARY WATER MAIN AND SERVICE CONNECTIONS PER CWD DETAILS ALONG KINSMAN RD.

NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
ISSUE RECORD		



ISSUE RECORD		
NO.	DATE	DESCRIPTION
0	2019-07-31	RFC



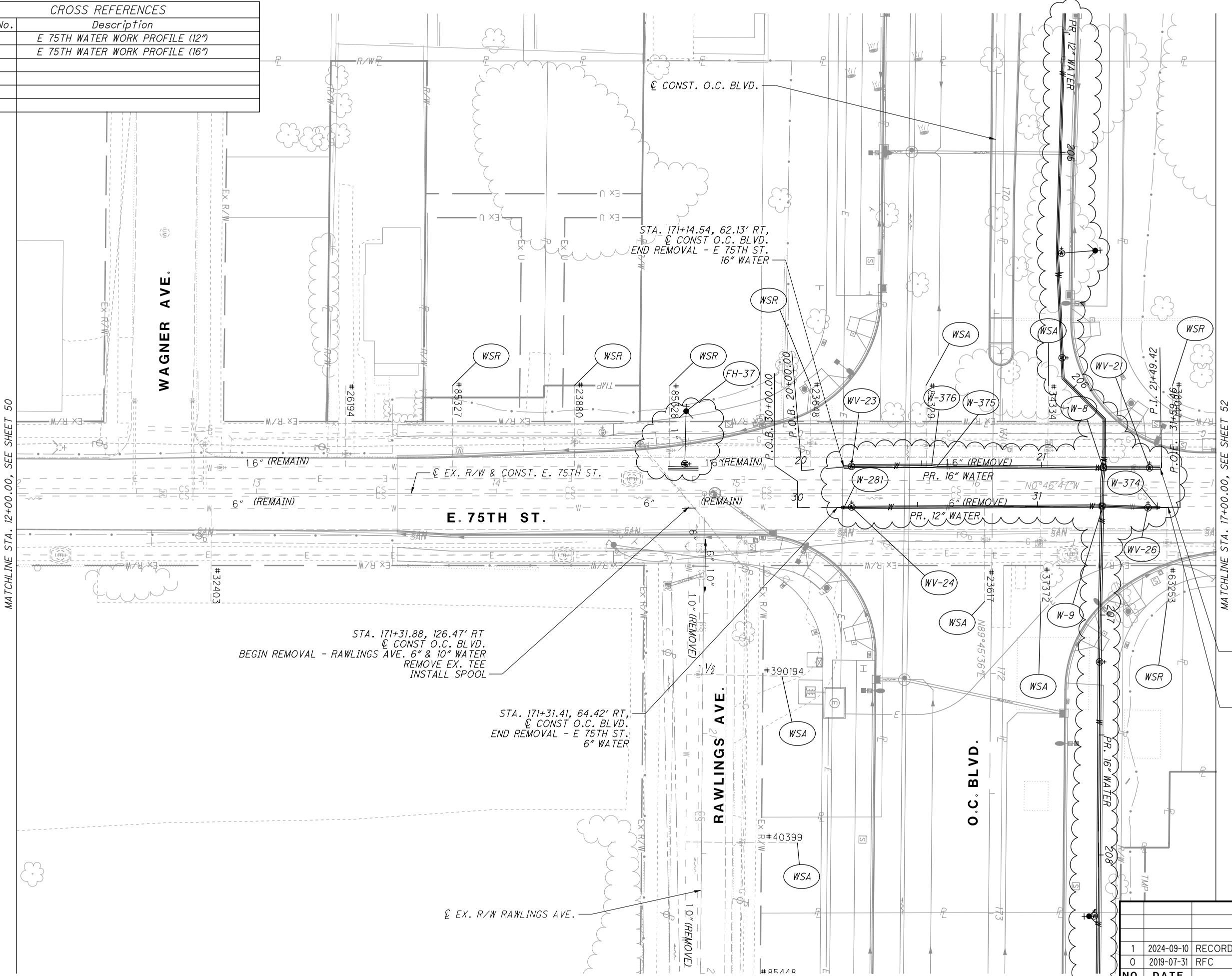


**E. 75TH ST.**

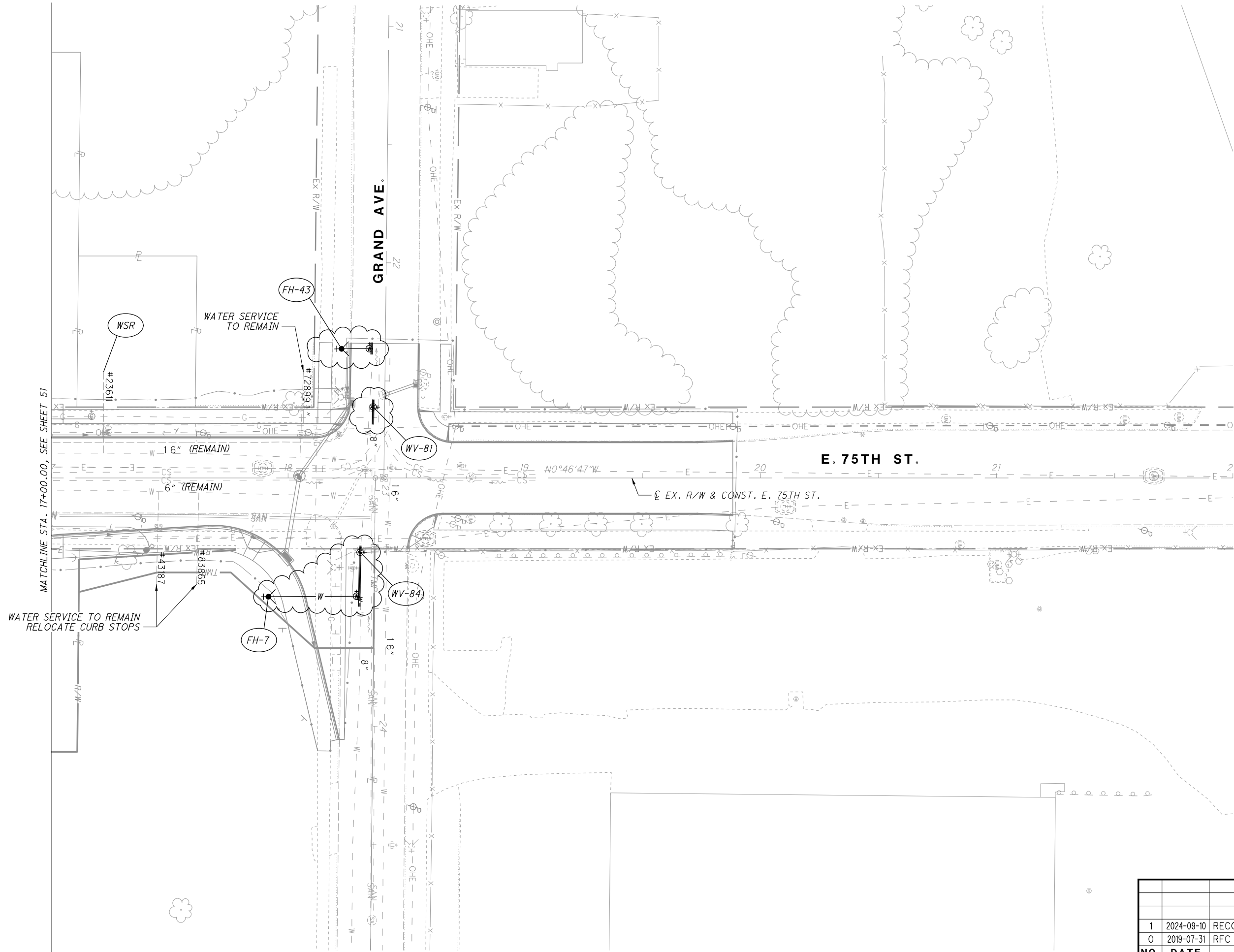
**HOLTON AVE.**

O	2019-07-31	RFC
<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		

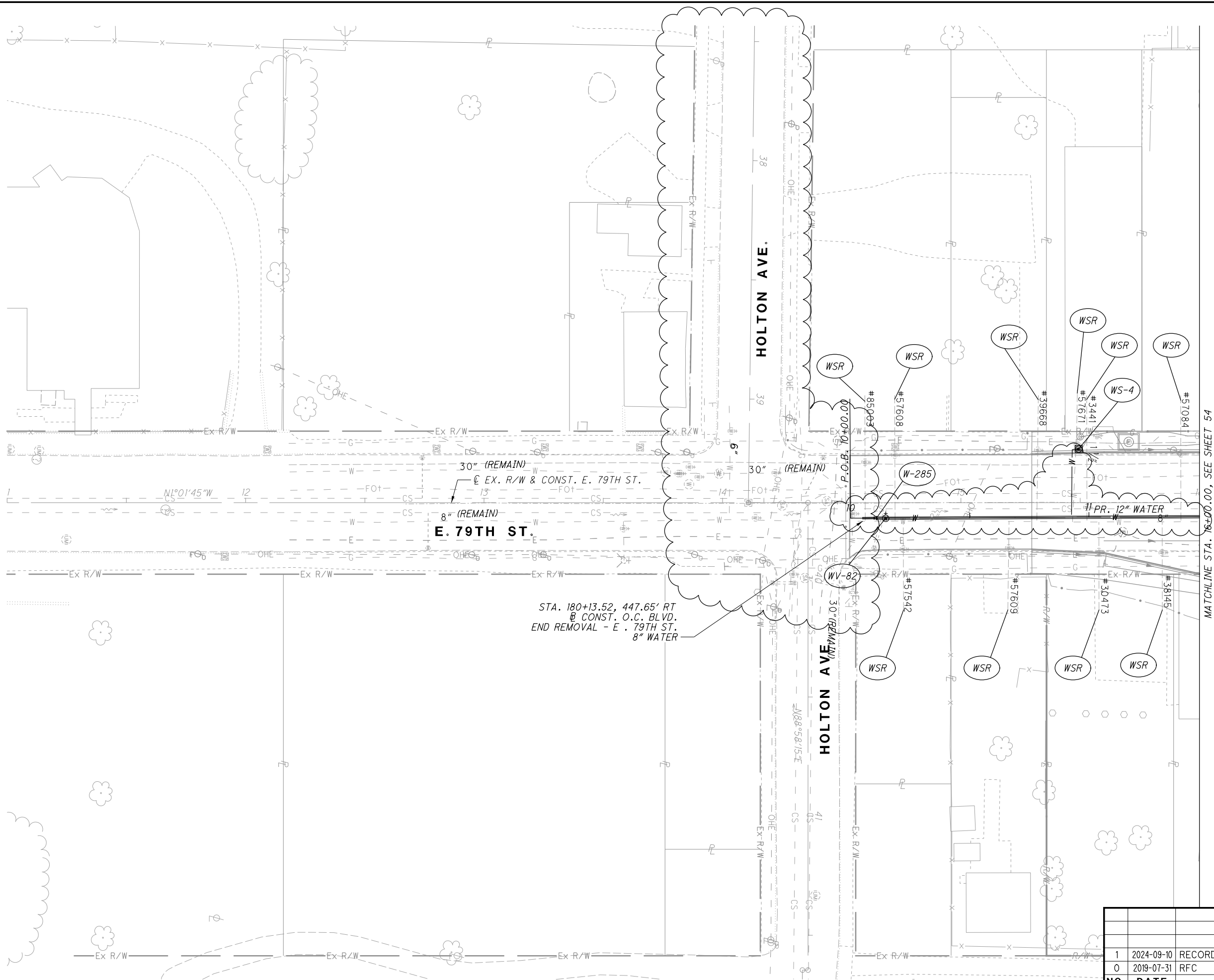
CROSS REFERENCES	
Sheet No.	Description
74	E 75TH WATER WORK PROFILE (12")
74	E 75TH WATER WORK PROFILE (16")



ISSUE RECORD		
NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC



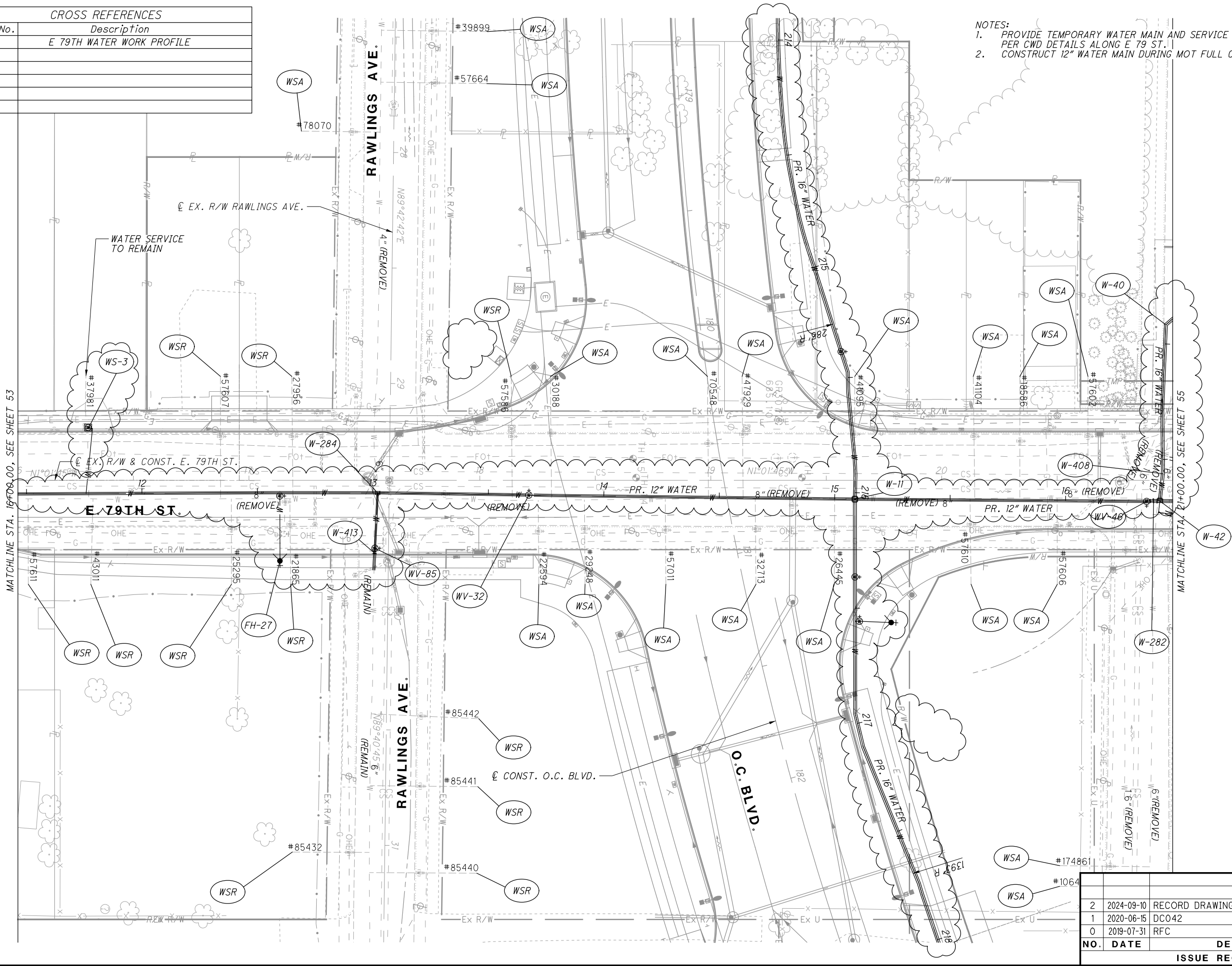
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0	2019-07-31	RFC
<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		



1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		



CROSS REFERENCES	
Sheet No.	Description
74	E 79TH WATER WORK PROFILE

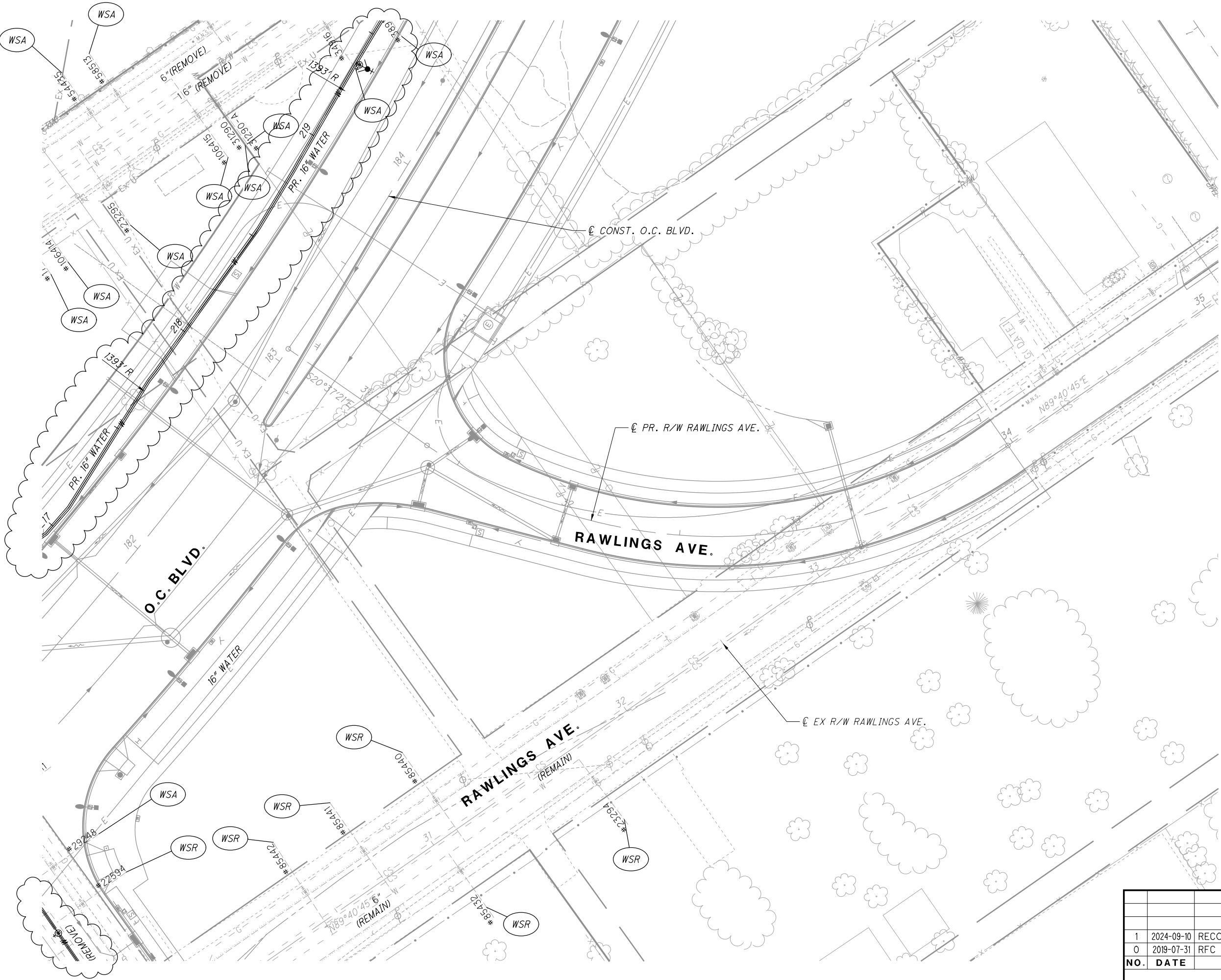


NO.	DATE	DESCRIPTION	
		ISSUE RECORD	
2	2024-09-10	RECORD DRAWINGS	
1	2020-06-15	DC042	
0	2019-07-31	RFC	

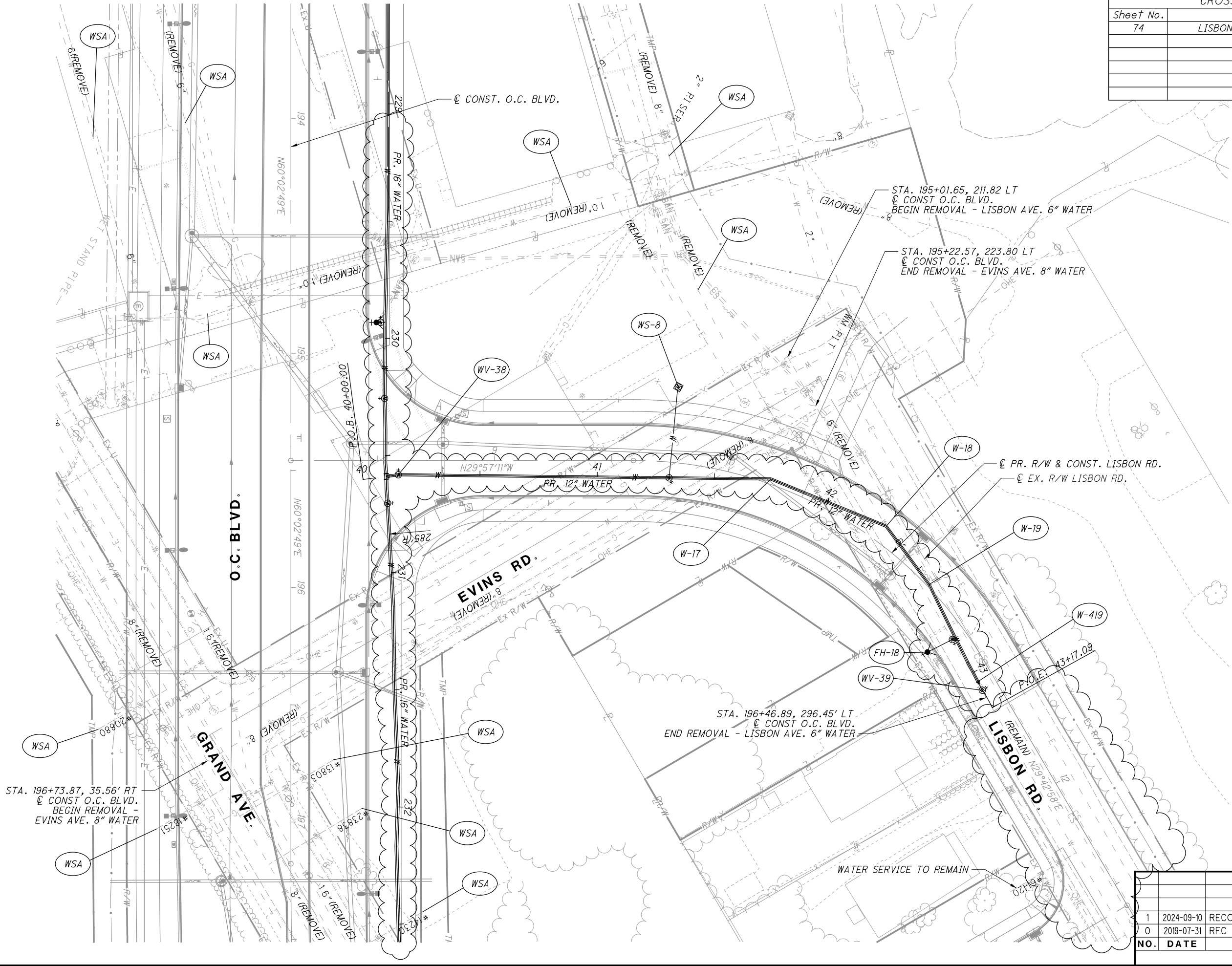




2	2024-09-10	RECORD DRAWINGS
1	2020-06-15	DC042
0	2019-07-31	RFC
<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		



1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		



CROSS REFERENCES	
Sheet No.	Description
74	LISBON WATER WORK PROFILE

CALCULATED  
AUE  
CHECKED  
MBM

0 20 40  
HORIZONTAL  
SCALE IN FEET

57  
93

WATER WORK PLAN - LISBON RD.  
BEGIN TO END

CUY-IR490/ SR010-  
2.09 / 19.28

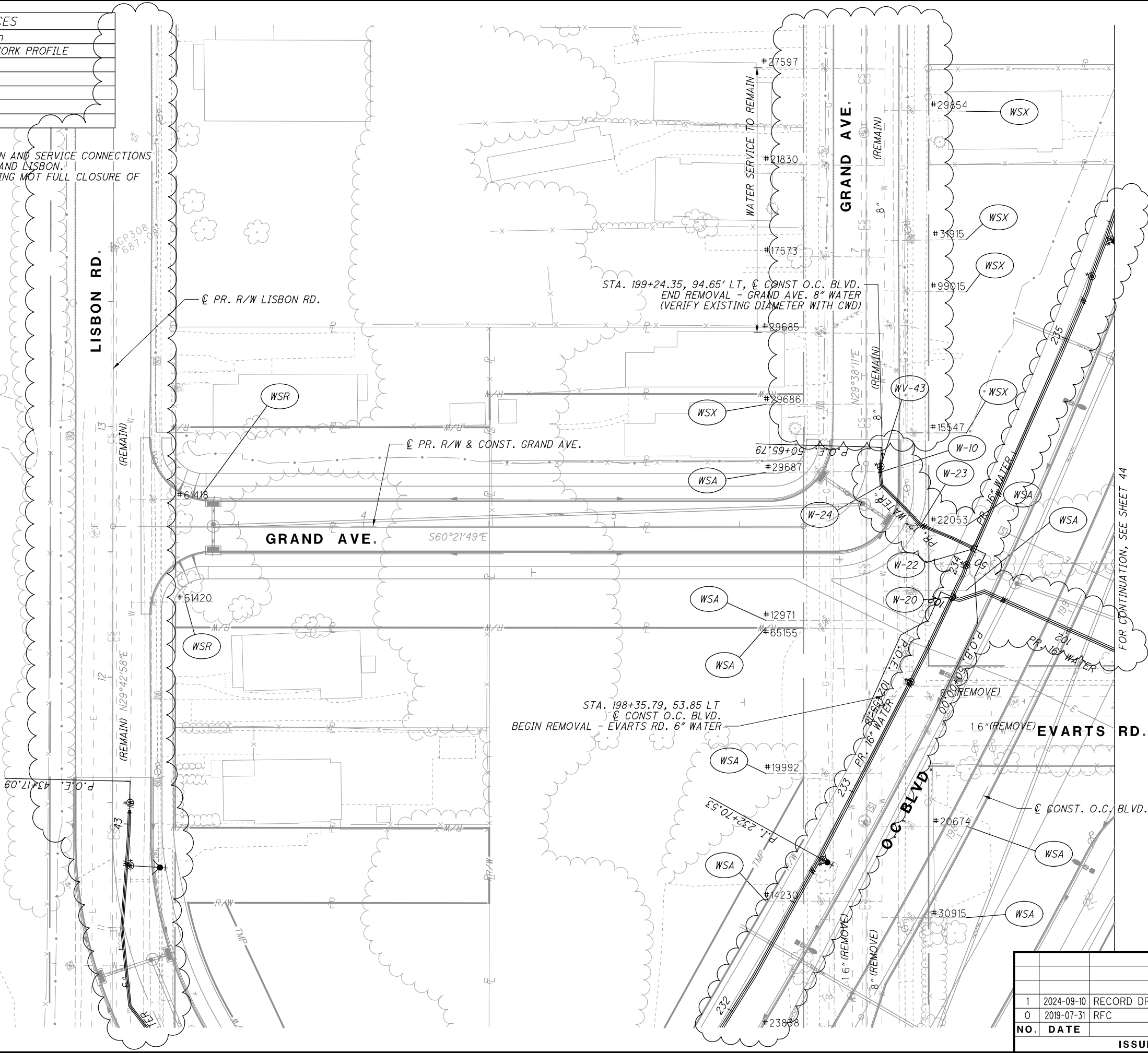
RECORD PLANS

RECORD PLANS

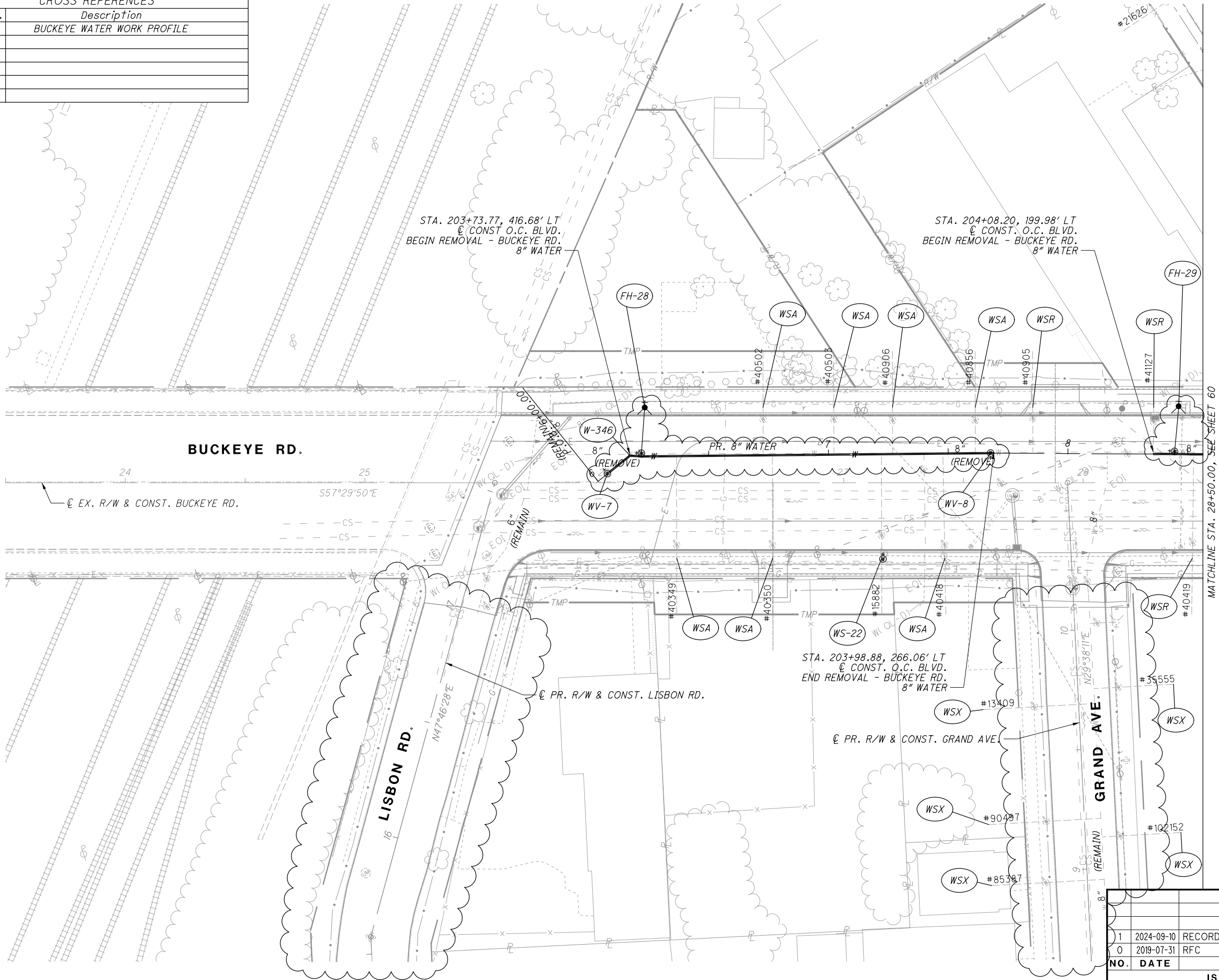
NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
ISSUE RECORD		

CROSS REFERENCES	
Sheet No.	Description
75	EVARTS-GRAND WATER WORK PROFILE

- NOTES:
- PROVIDE TEMPORARY WATER MAIN AND SERVICE CONNECTIONS PER CWD DETAILS ALONG EVINS AND LISBON.
  - CONSTRUCT 12" WATER MAIN DURING NOT FULL CLOSURE OF EVINS AND LISBON.



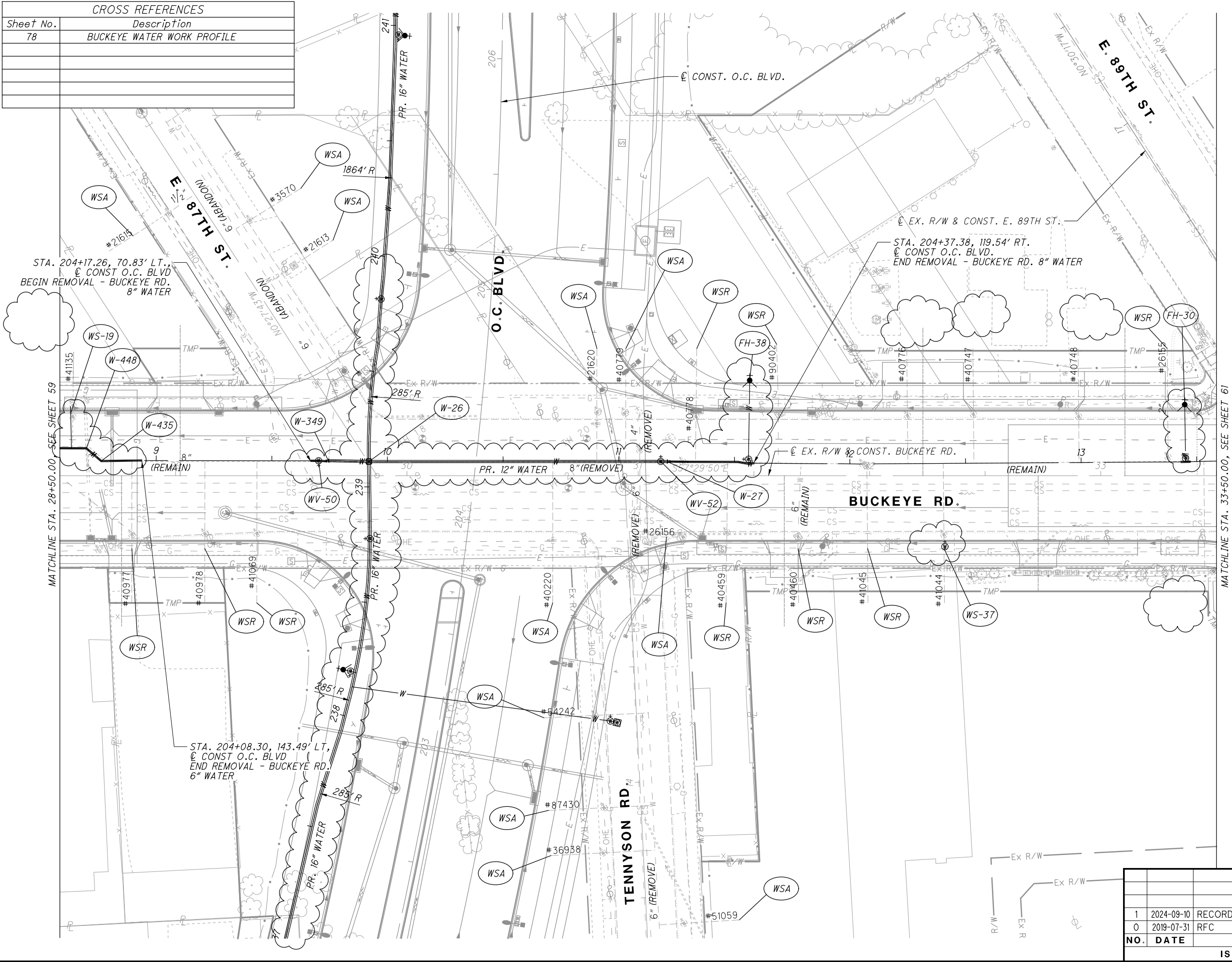
CROSS REFERENCES	
Sheet No.	Description
78	BUCKEYE WATER WORK PROFILE



NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
ISSUE RECORD		



CROSS REFERENCES	
Sheet No.	Description
78	BUCKEYE WATER WORK PROFILE




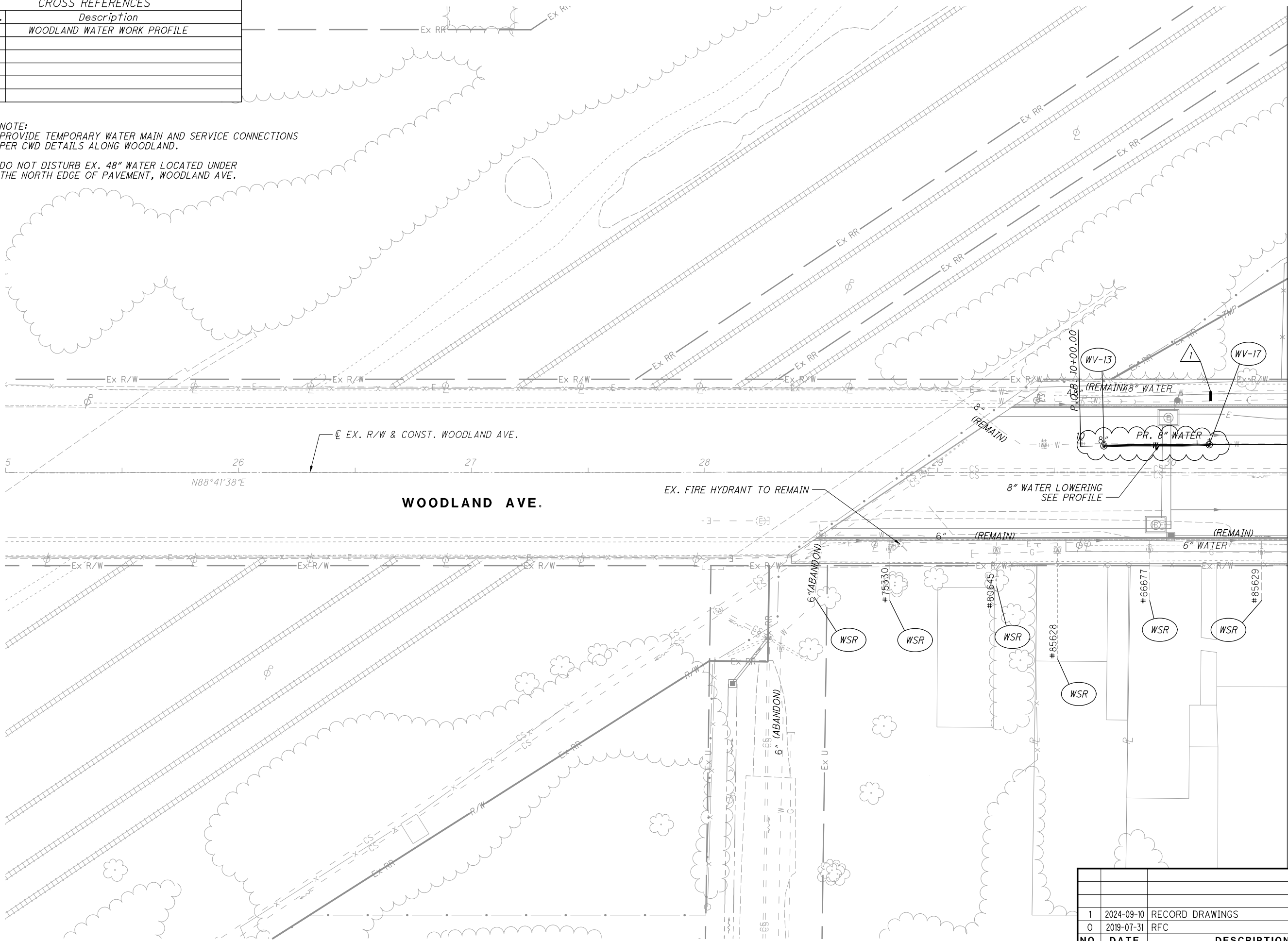
NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
ISSUE RECORD		



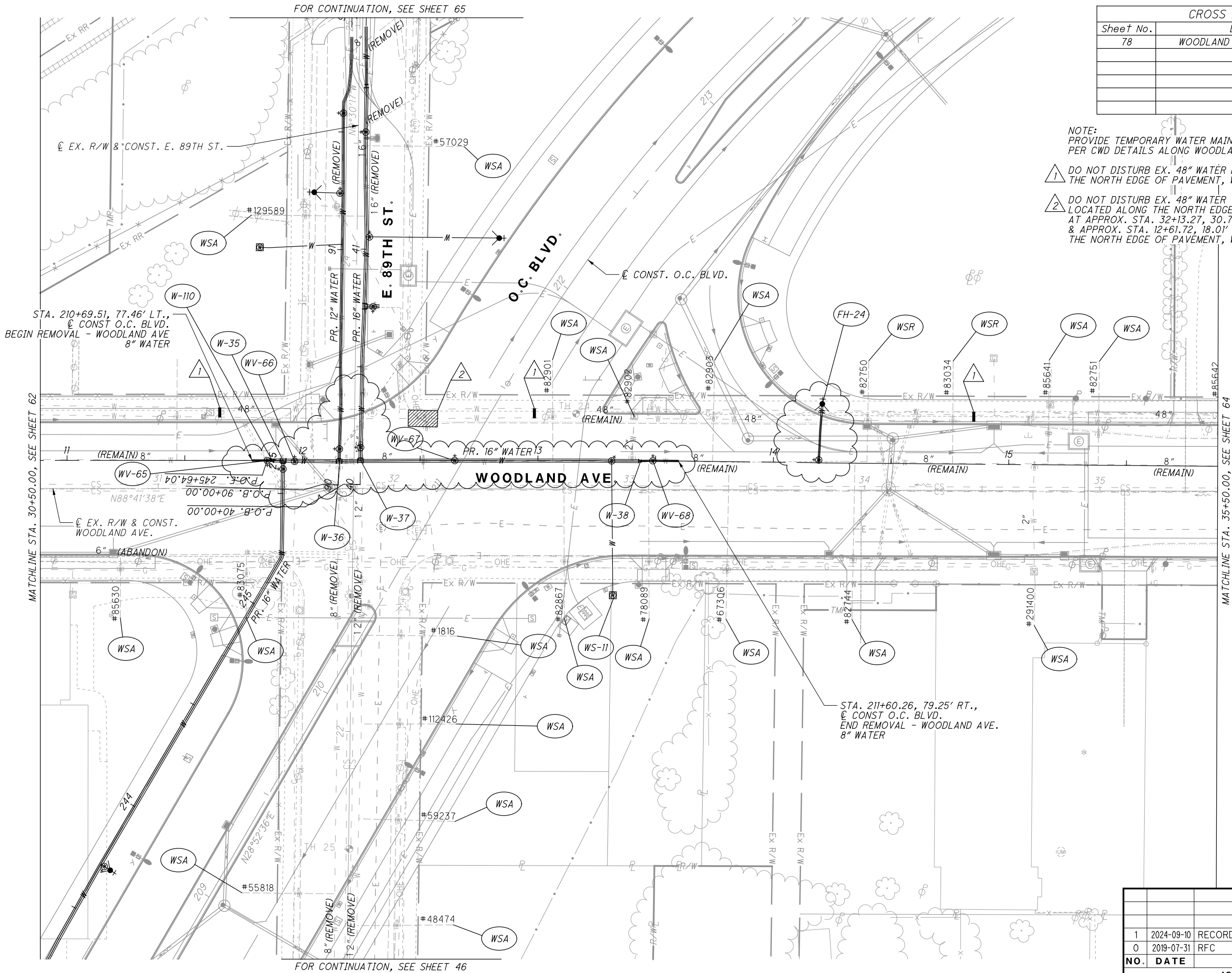
CROSS REFERENCES	
Sheet No.	Description
78	WOODLAND WATER WORK PROFILE

NOTE:  
PROVIDE TEMPORARY WATER MAIN AND SERVICE CONNECTIONS  
PER CWD DETAILS ALONG WOODLAND.

 DO NOT DISTURB EX. 48" WATER LOCATED UNDER  
THE NORTH EDGE OF PAVEMENT, WOODLAND AVE.



NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
ISSUE RECORD		



CROSS REFERENCES	
Sheet No.	Description
78	WOODLAND WATER WORK PROFILE

NOTE:  
PROVIDE TEMPORARY WATER MAIN AND SERVICE CONNECTIONS  
PER CWD DETAILS ALONG WOODLAND AND E 89 ST.

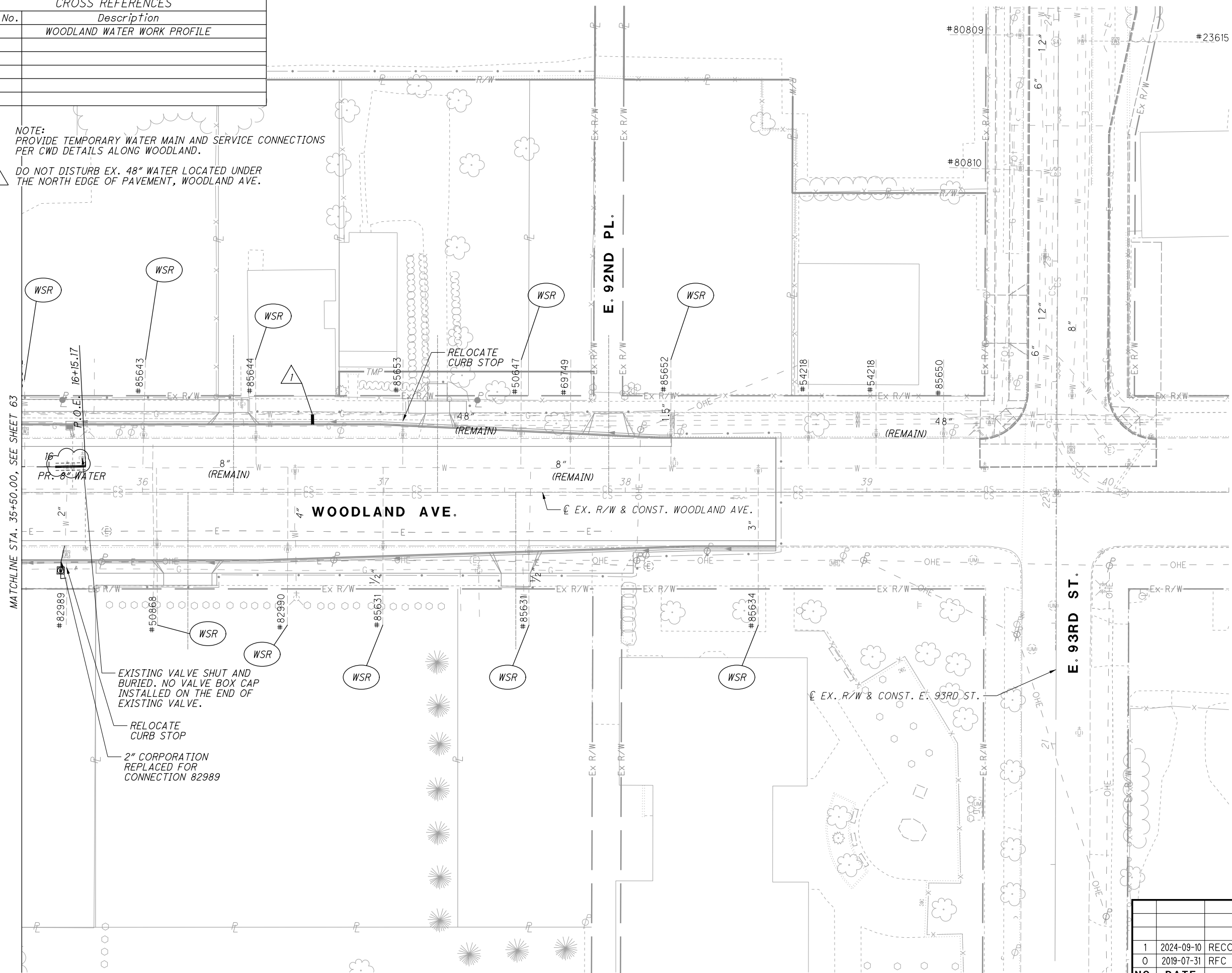
- 1 DO NOT DISTURB EX. 48" WATER LOCATED UNDER THE NORTH EDGE OF PAVEMENT, WOODLAND AVE.
- 2 DO NOT DISTURB EX. 48" WATER VALVE VAULT LOCATED ALONG THE NORTH EDGE OF PAVEMENT AT APPROX. STA. 32+13.27, 30.73' LT., EX. C R/W WOODLAND AVE & APPROX. STA. 12+61.72, 18.01' LT., PROP. 16" WATER MAIN THE NORTH EDGE OF PAVEMENT, WOODLAND AVE.

NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
ISSUE RECORD		

<i>CROSS REFERENCES</i>	
<i>Sheet No.</i>	<i>Description</i>
<i>78</i>	<i>WOODLAND WATER WORK PROFILE</i>

NOTE:  
PROVIDE TEMPORARY WATER MAIN AND SERVICE CONNECTIONS  
PER CWD DETAILS ALONG WOODLAND.

1 DO NOT DISTURB EX. 48" WATER LOCATED UNDER  
THE NORTH EDGE OF PAVEMENT, WOODLAND AVE.

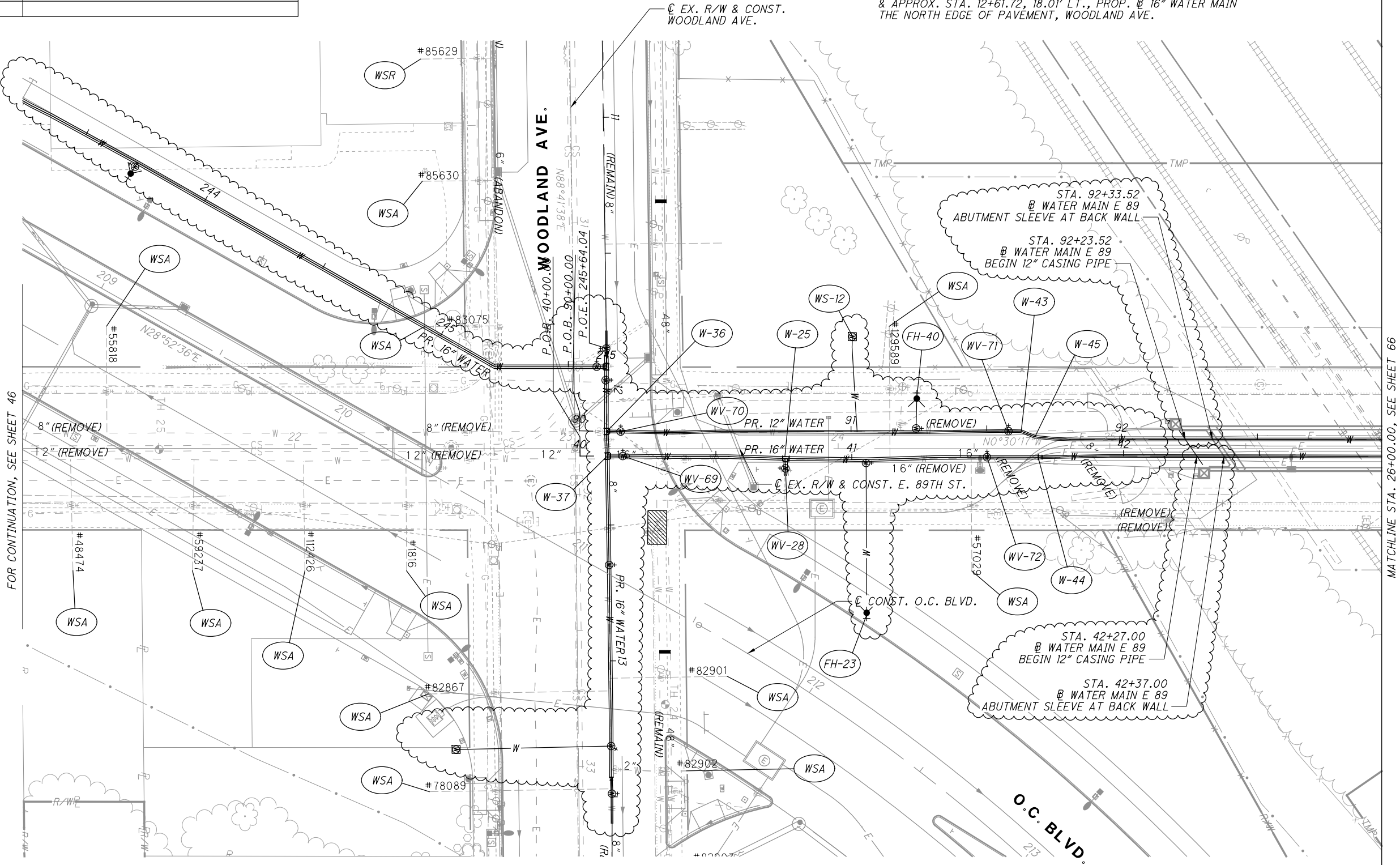


1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		





CROSS REFERENCES	
Sheet No.	Description
BU-25	E 89TH PEDESTRIAN BRIDGE PLANS
80	WATER WORK BRIDGE ENLARGEMENT PLAN
77	E 89TH WATER WORK PROFILE (12")
76	E 89TH WATER WORK PROFILE (16"/12")



NOTE:  
PROVIDE TEMPORARY WATER MAIN AND SERVICE CONNECTIONS  
PER CWD DETAILS ALONG WOODLAND AND E 89 ST.

DO NOT DISTURB EX. 48" WATER LOCATED UNDER  
THE NORTH EDGE OF PAVEMENT, WOODLAND AVE.

DO NOT DISTURB EX. 48" WATER VALVE VAULT  
LOCATED ALONG THE NORTH EDGE OF PAVEMENT  
AT APPROX. STA. 32+13.27, 30.73' LT., EX. @ R/W WOODLAND AVE  
& APPROX. STA. 12+61.72, 18.01' LT., PROP. @ 16" WATER MAIN  
THE NORTH EDGE OF PAVEMENT, WOODLAND AVE.

NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
ISSUE RECORD		

CUY-IR490/ SR010-  
2.09 / 19.28

WATER WORK PLAN - E. 89TH ST.  
BEGIN TO STA. 26+00.00

RECORD PLANS

65  
93

RECORD PLANS

RECORD PLANS

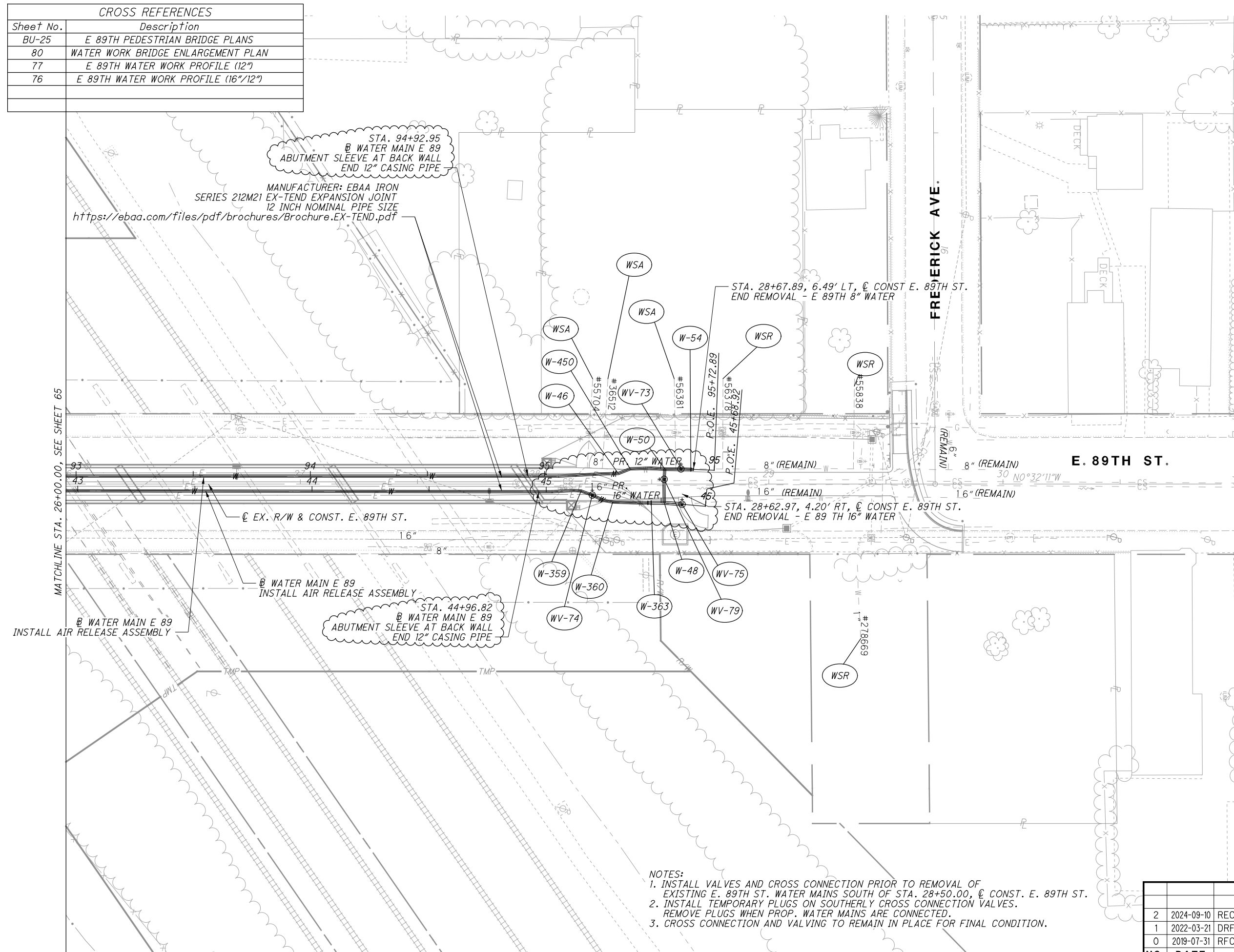
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SCALE IN FEET

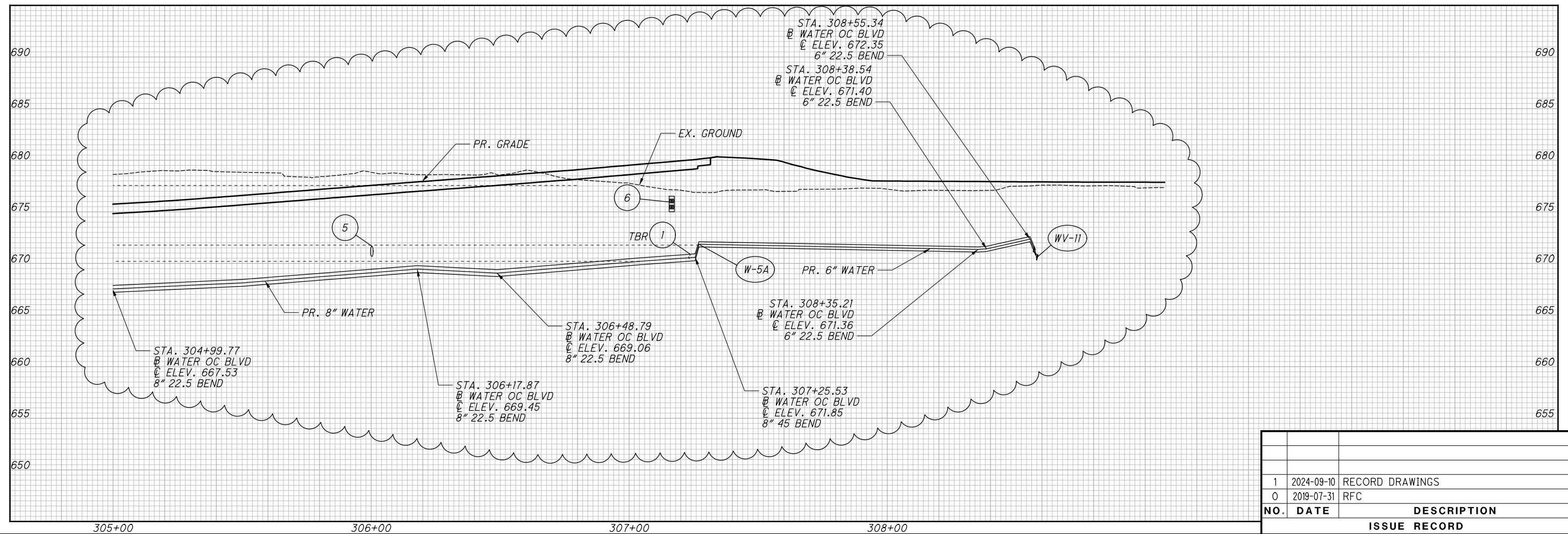
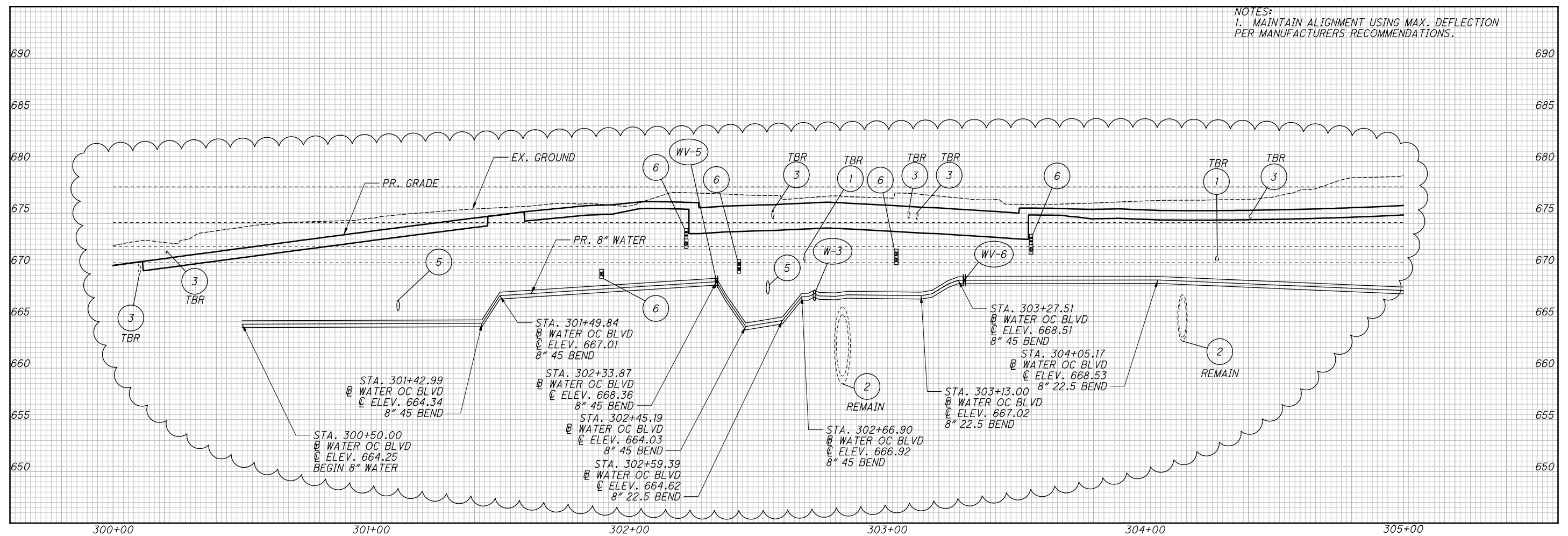
NOTE: NORTH

CROSS REFERENCES	
Sheet No.	Description
BU-25	E 89TH PEDESTRIAN BRIDGE PLANS
80	WATER WORK BRIDGE ENLARGEMENT PLAN
77	E 89TH WATER WORK PROFILE (12")
76	E 89TH WATER WORK PROFILE (16"/12")

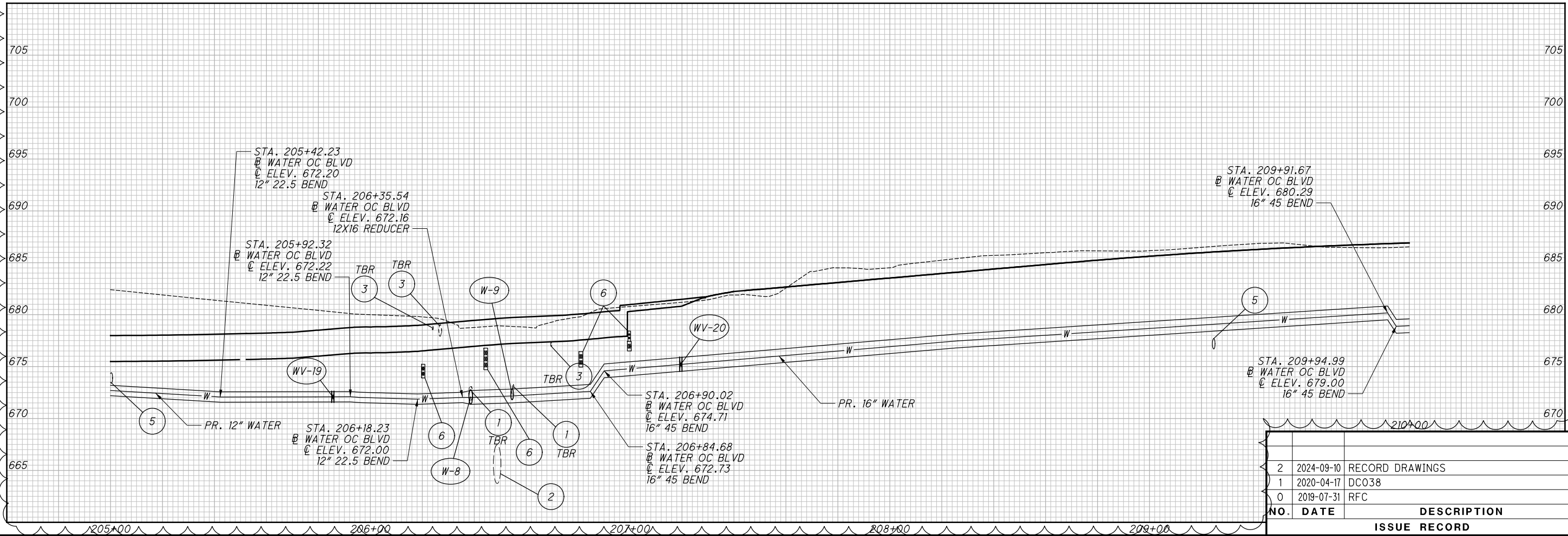
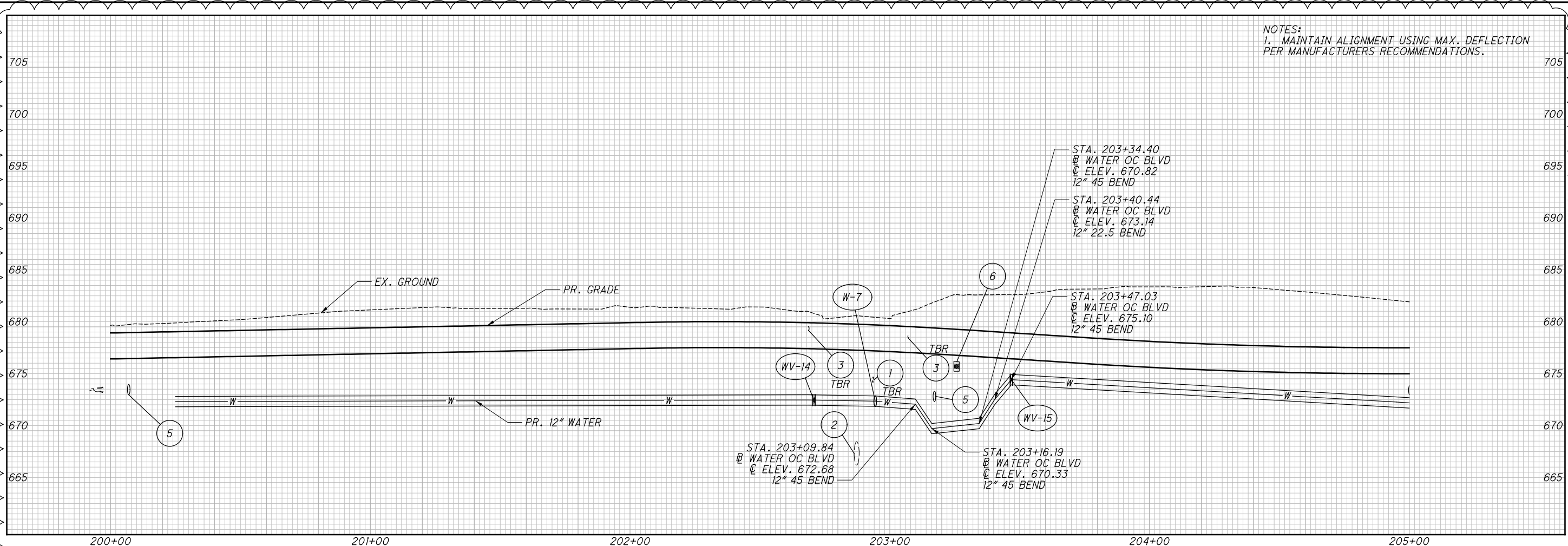


- NOTES:
1. INSTALL VALVES AND CROSS CONNECTION PRIOR TO REMOVAL OF EXISTING E. 89TH ST. WATER MAINS SOUTH OF STA. 28+50.00, @ CONST. E. 89TH ST.
  2. INSTALL TEMPORARY PLUGS ON SOUTHERLY CROSS CONNECTION VALVES. REMOVE PLUGS WHEN PROP. WATER MAINS ARE CONNECTED.
  3. CROSS CONNECTION AND VALVING TO REMAIN IN PLACE FOR FINAL CONDITION.

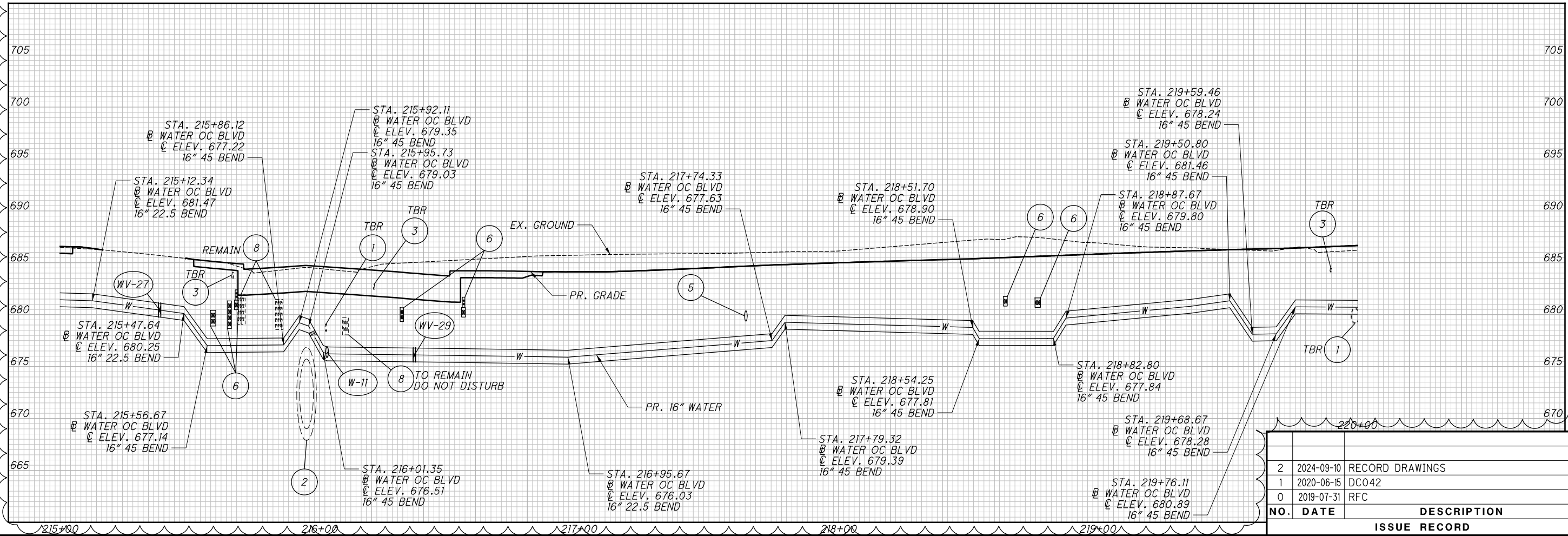
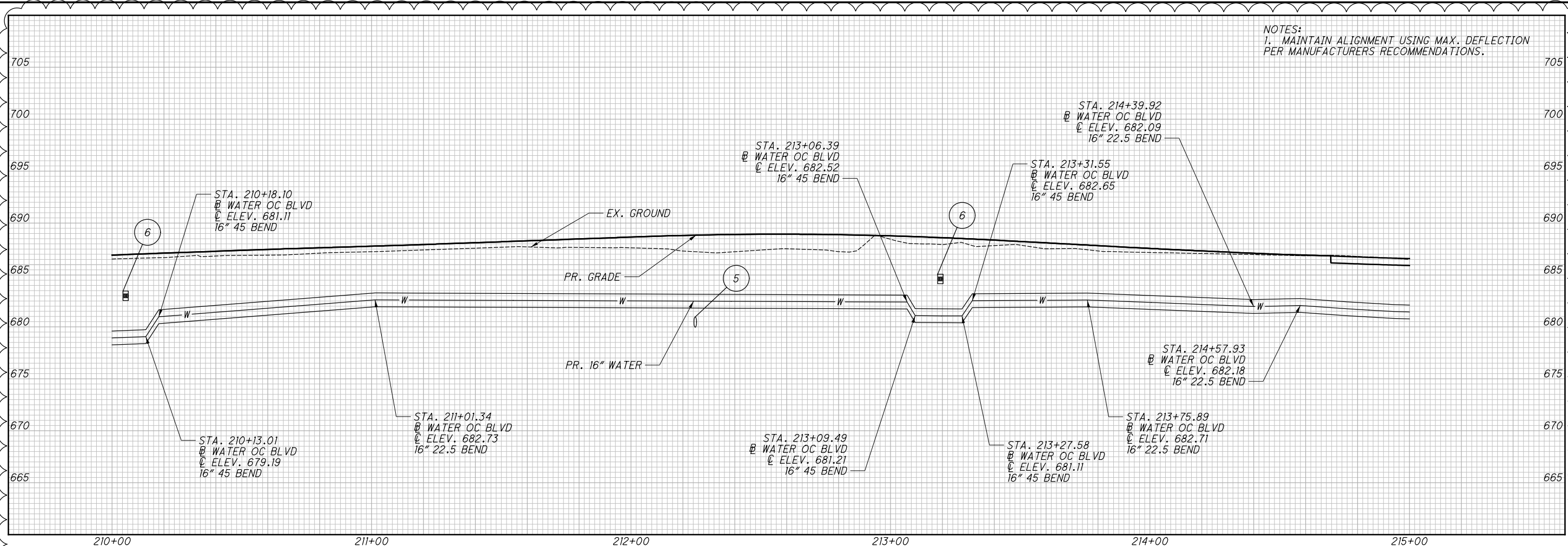
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1	2022-03-21	DRF1141
0	2019-07-31	RFC
<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		



1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		



NO.	DATE	DESCRIPTION
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ISSUE RECORD		

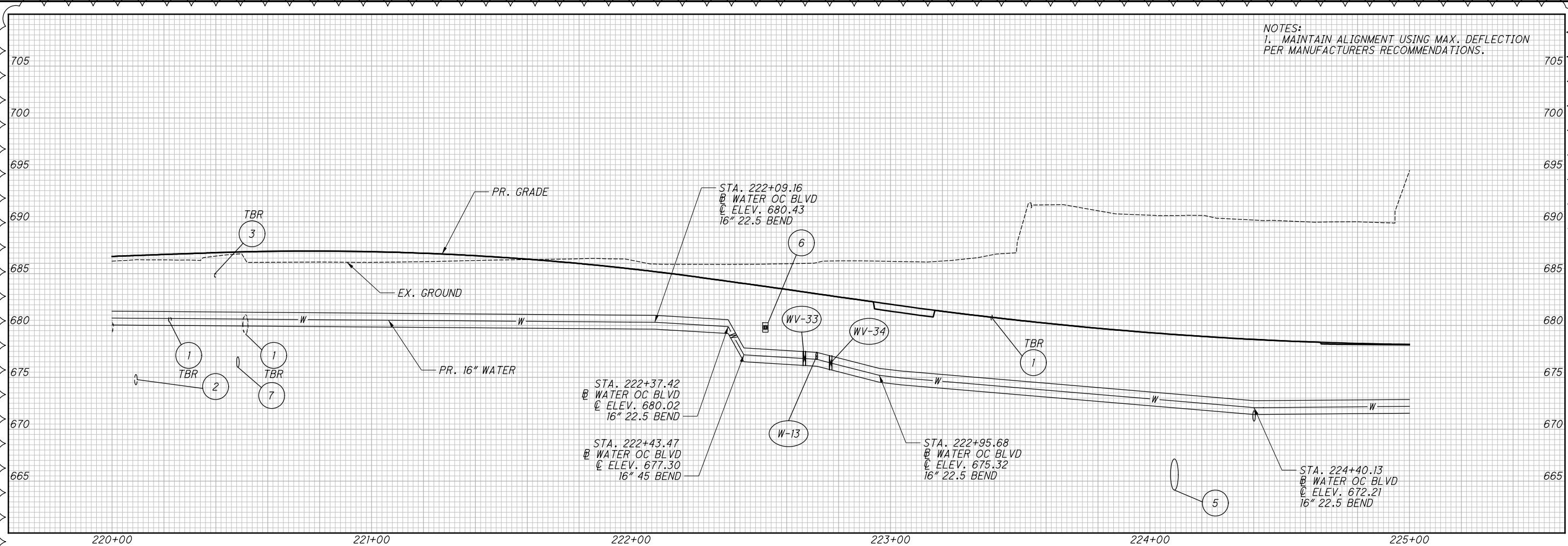
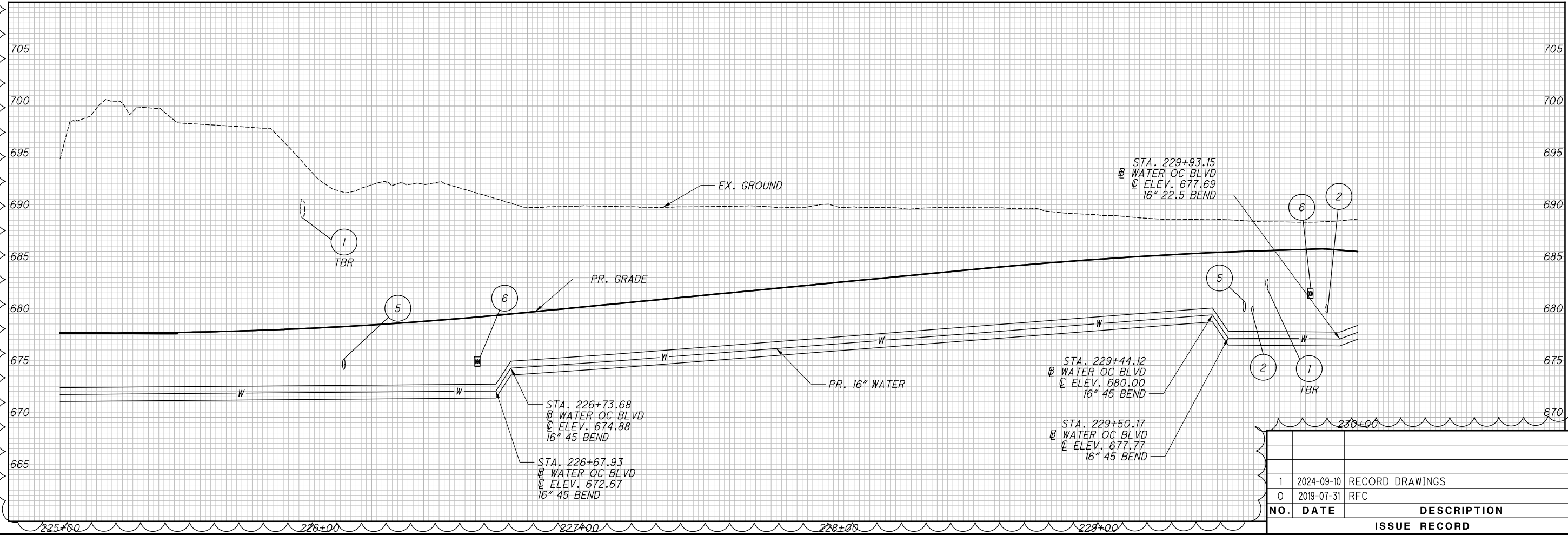


NOTES:  
1. MAINTAIN ALIGNMENT USING MAX. DEFLECTION  
PER MANUFACTURERS RECOMMENDATIONS.

NO.	DATE	DESCRIPTION
2	2024-09-10	RECORD DRAWINGS
1	2020-06-15	DC042
0	2019-07-31	RFC

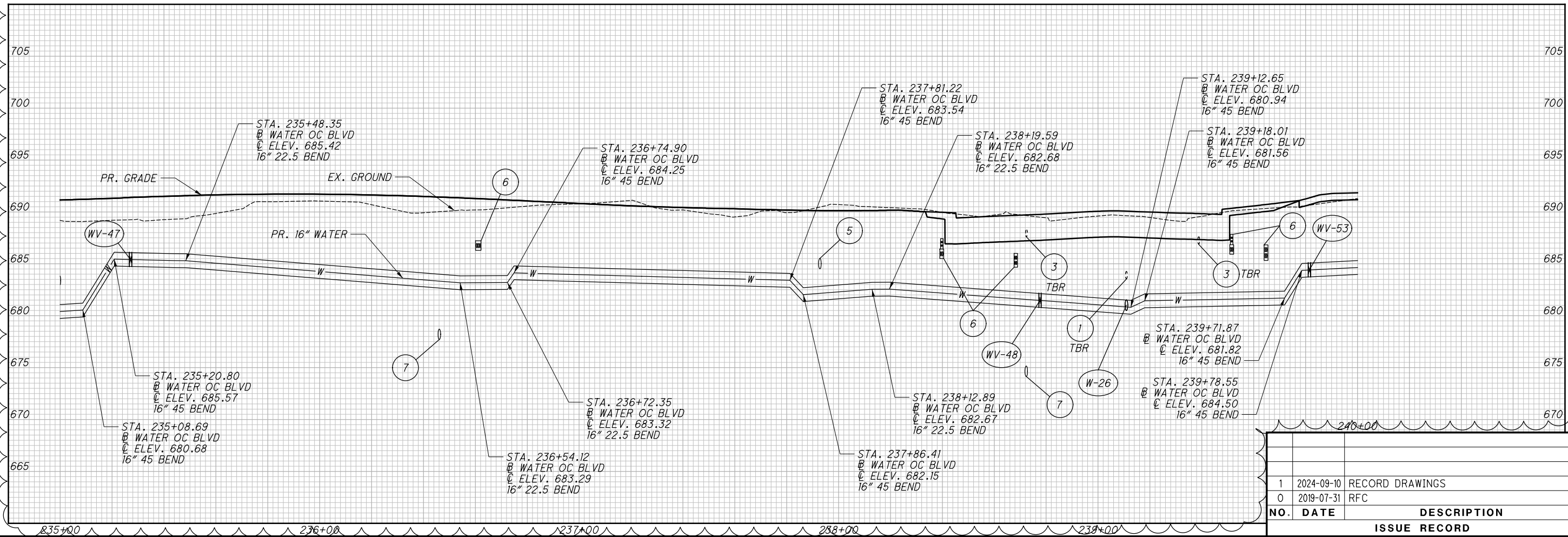
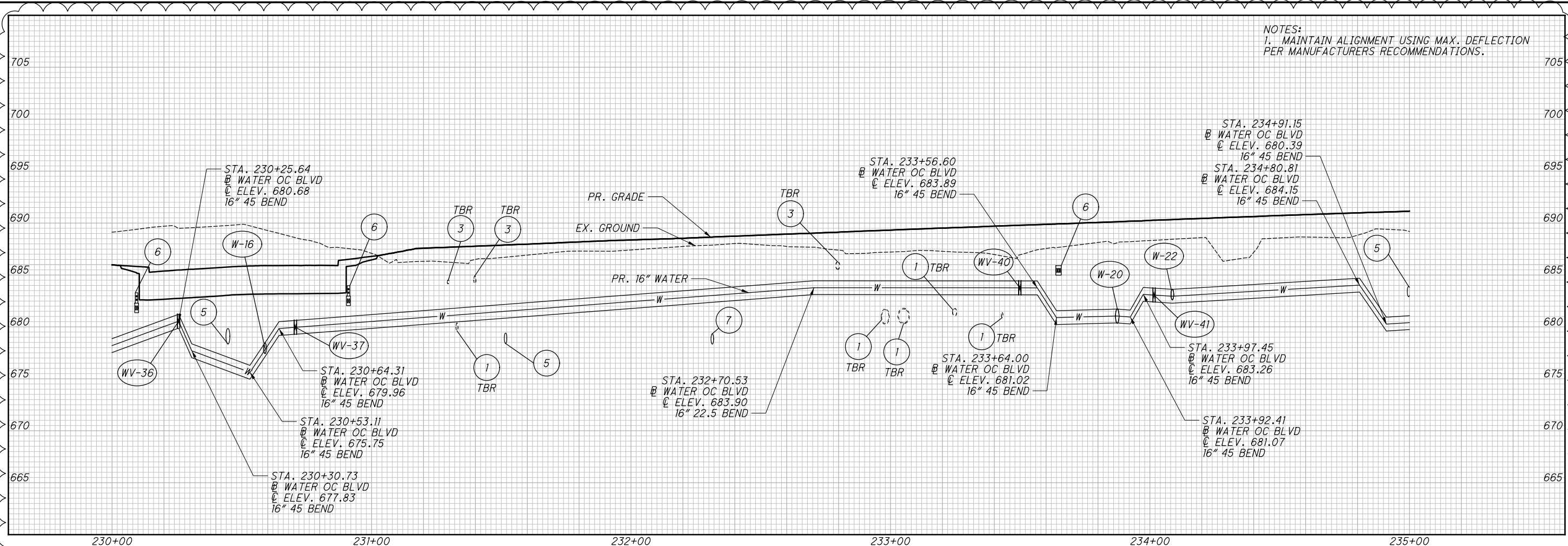
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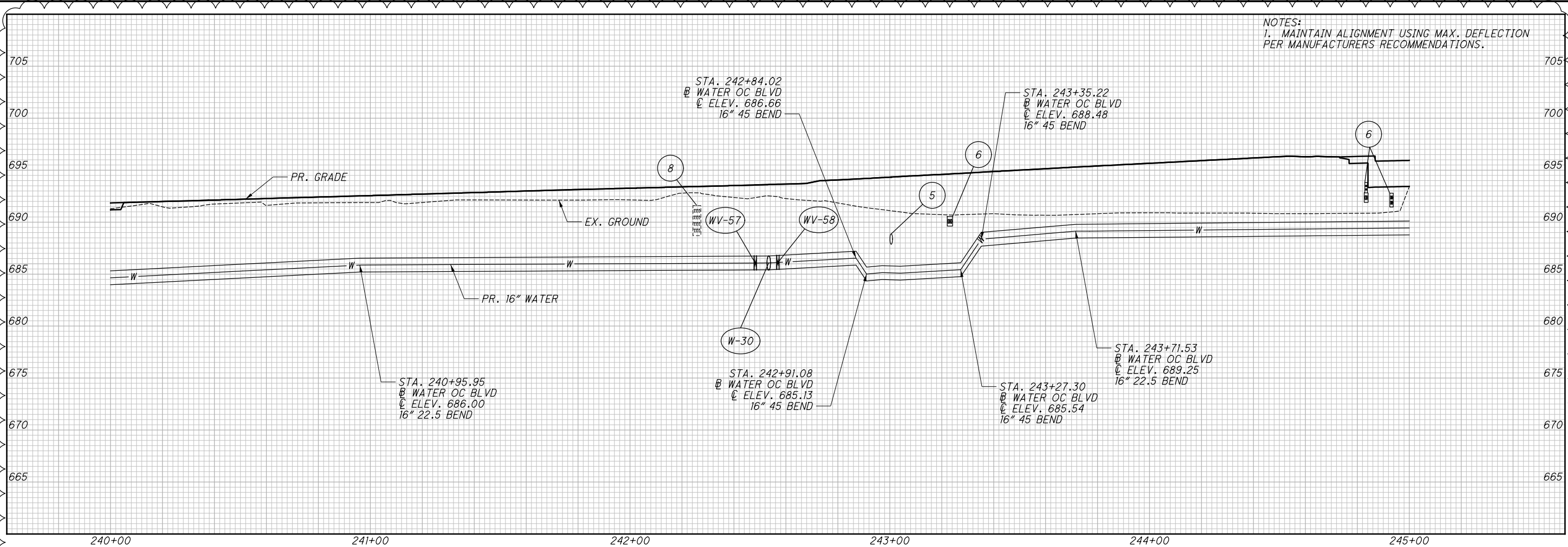
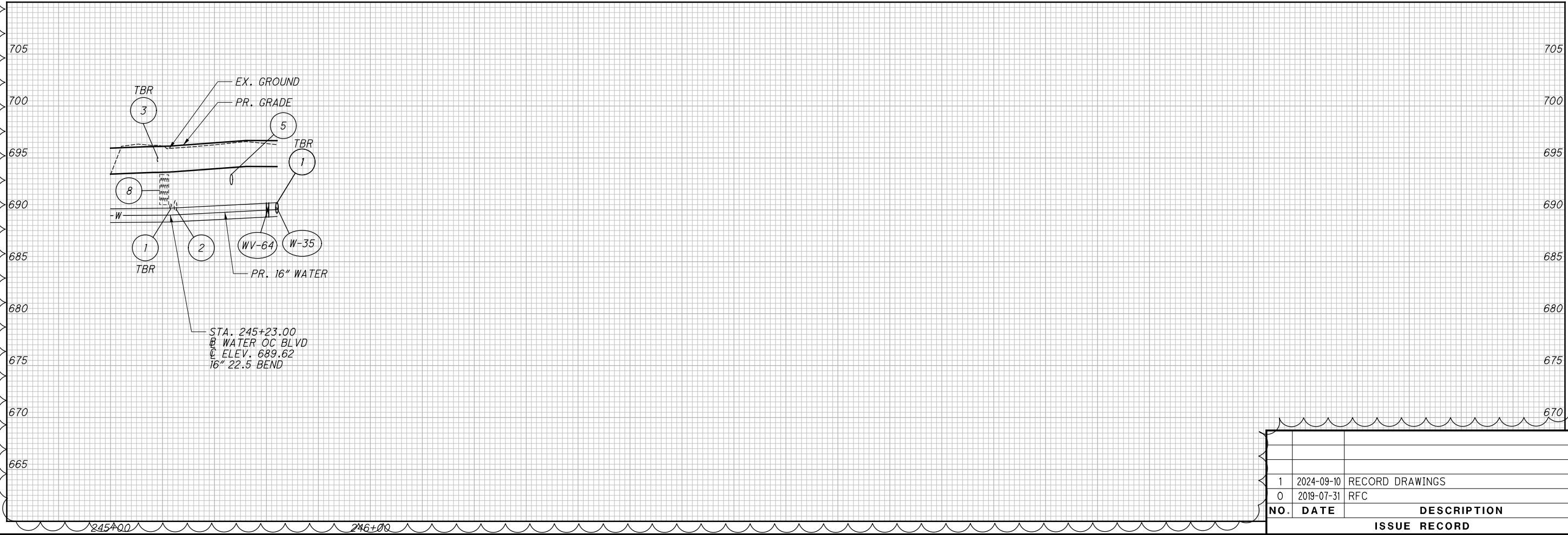


ISSUE RECORD		
NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC

NOTES:  
1. MAINTAIN ALIGNMENT USING MAX. DEFLECTION PER MANUFACTURERS RECOMMENDATIONS.



NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
ISSUE RECORD		



ISSUE RECORD		
NO.	DATE	DESCRIPTION
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0	2019-07-31	RFC

CUY-IR490/ SR010-2.09 / 19.28

72  
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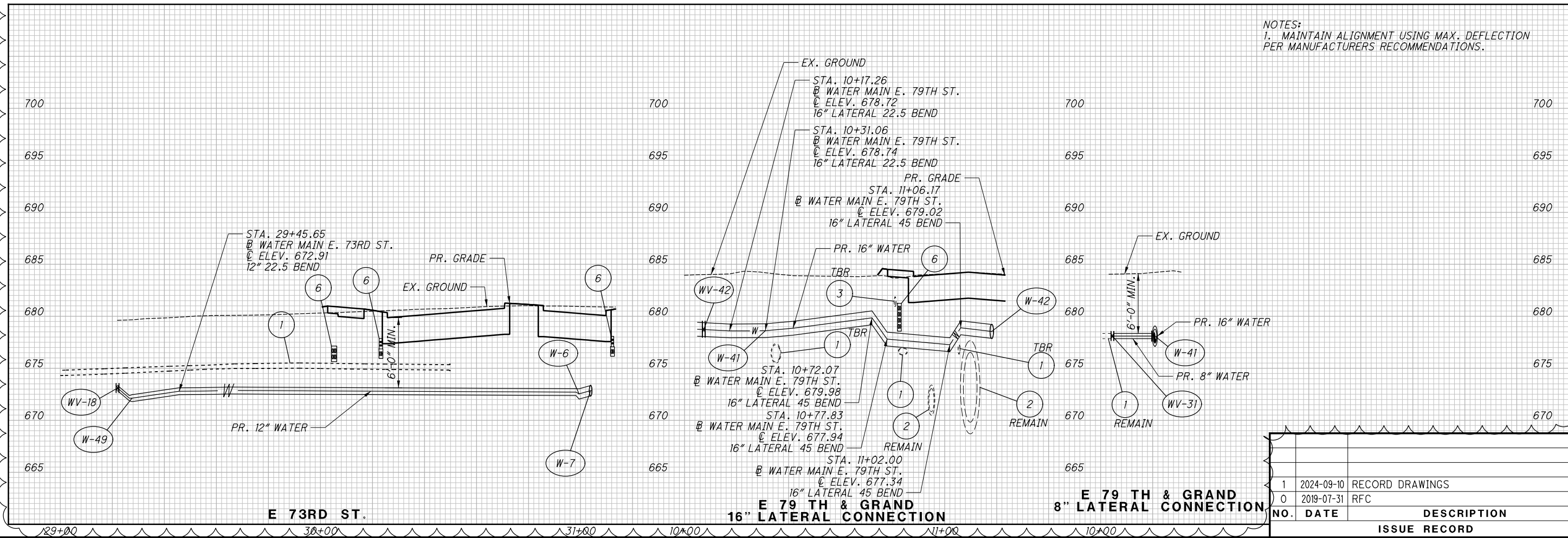
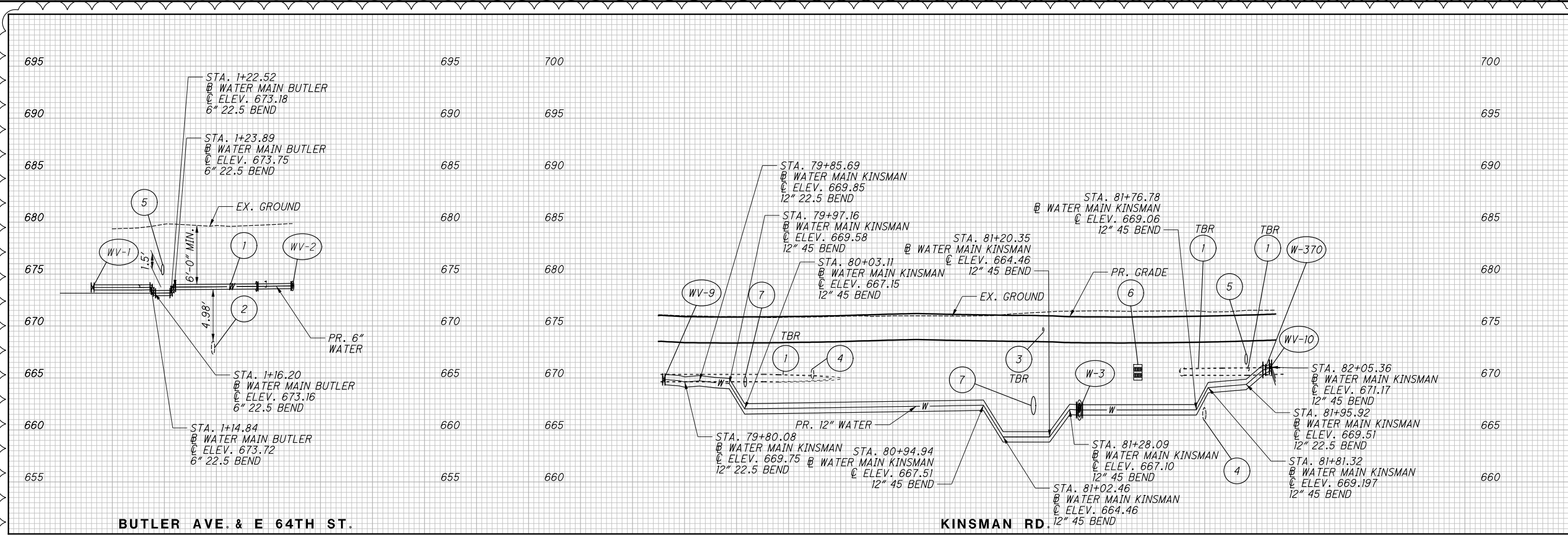
WATER WORK PROFILE - OPPORTUNITY CORRIDOR BLVD.

16" WATER MAIN

CALCULATED  
AJE

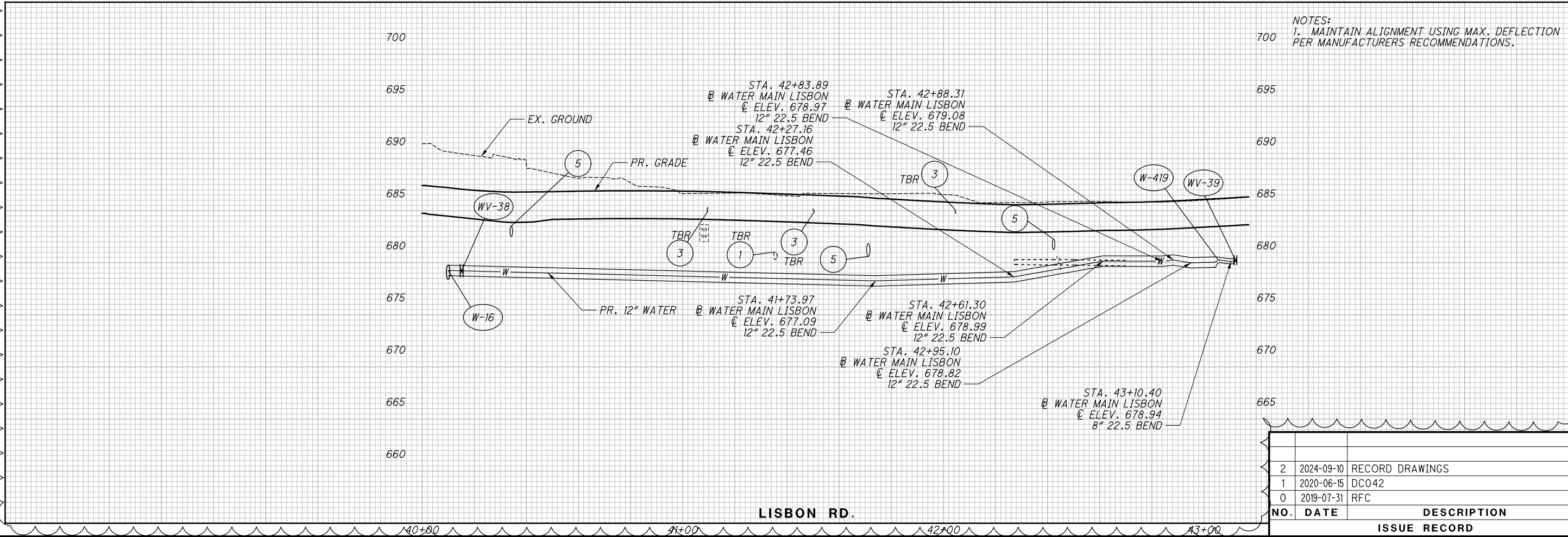
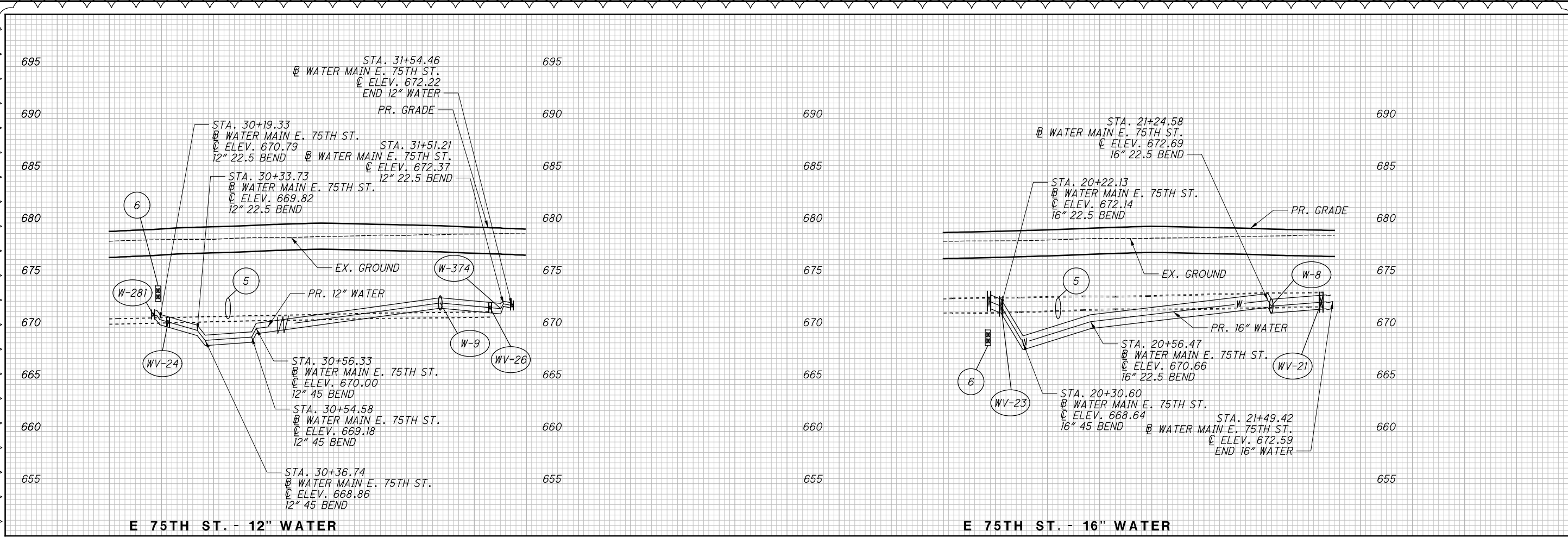
CHECKED  
MBM

RECORD PLANS



NOTES:  
1. MAINTAIN ALIGNMENT USING MAX. DEFLECTION PER MANUFACTURERS RECOMMENDATIONS.

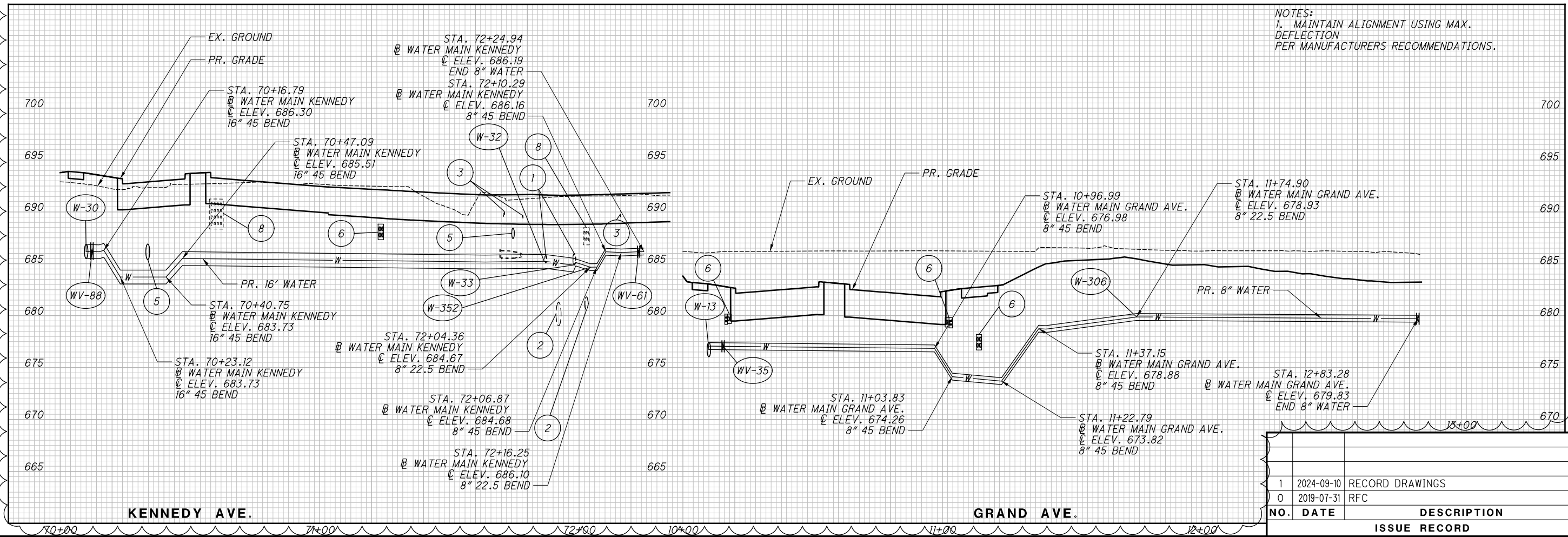
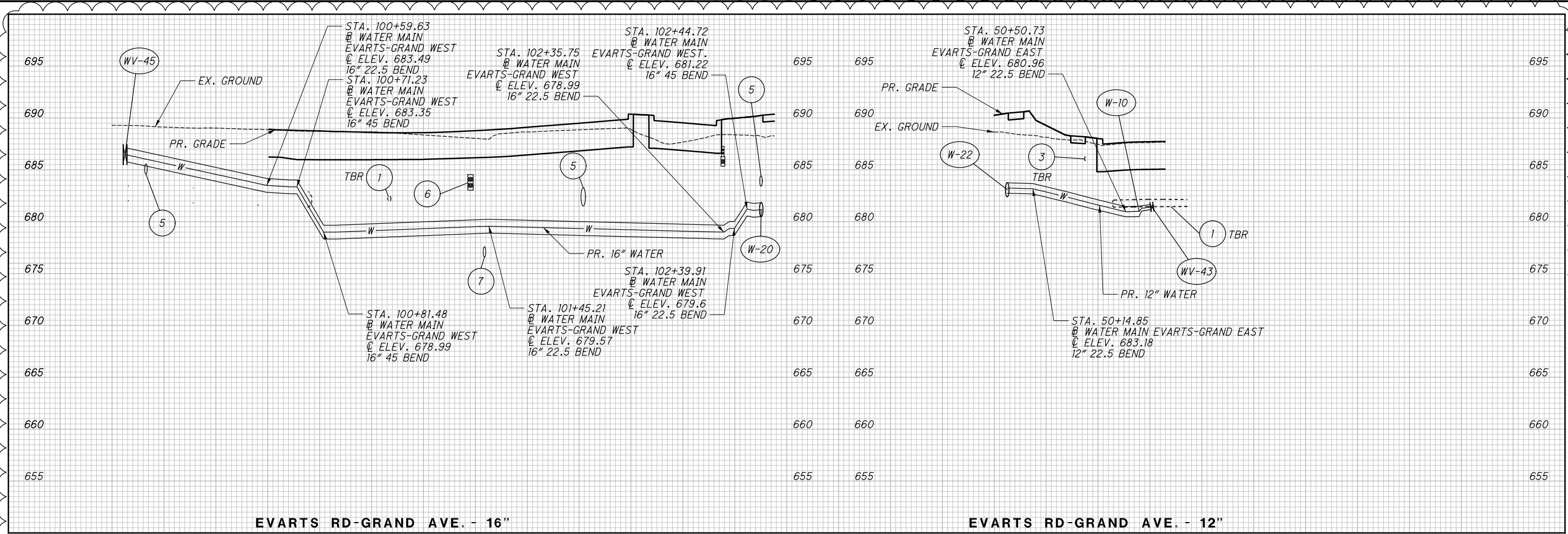
NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
ISSUE RECORD		

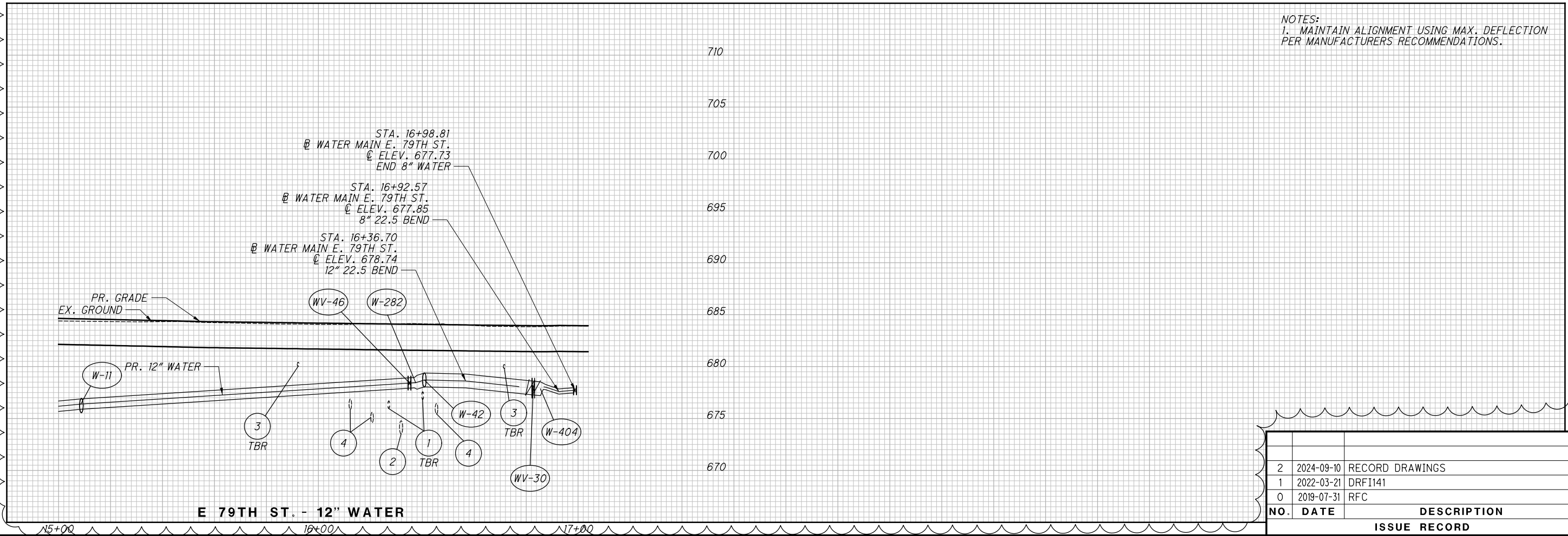
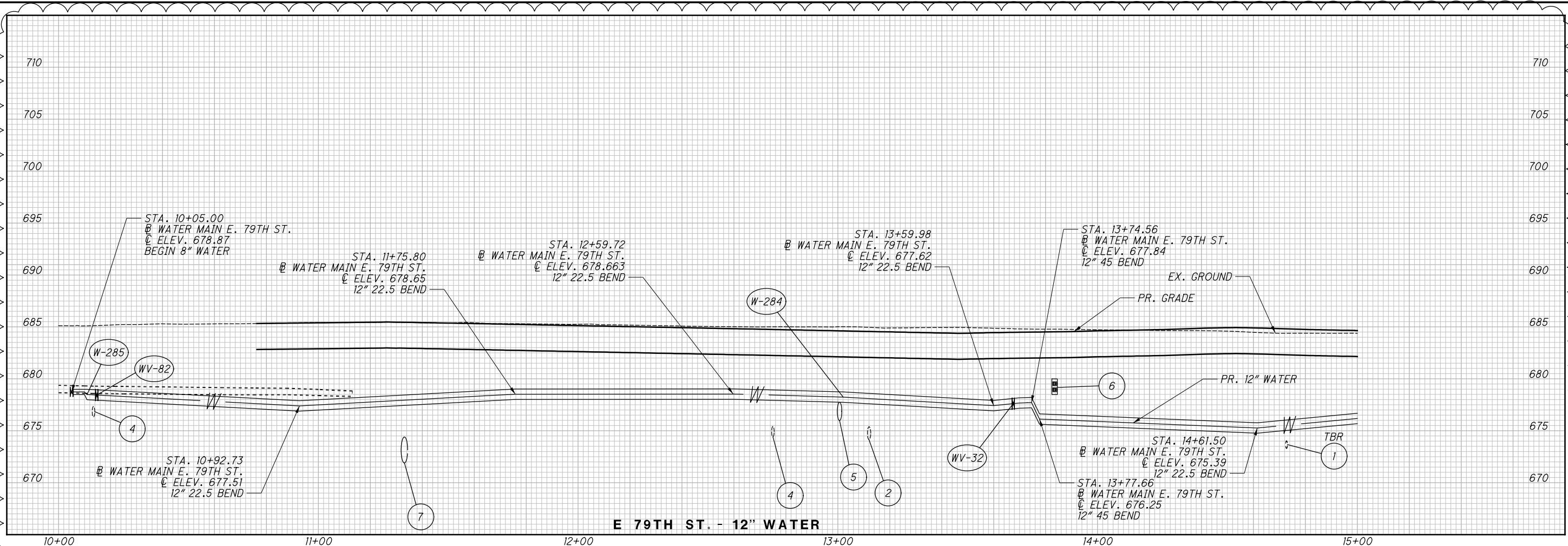


NOTES:  
1. MAINTAIN ALIGNMENT USING MAX. DEFLECTION PER MANUFACTURERS RECOMMENDATIONS.

NO.	DATE	DESCRIPTION
2	2024-09-10	RECORD DRAWINGS
1	2020-06-15	DC042
0	2019-07-31	RFC
ISSUE RECORD		

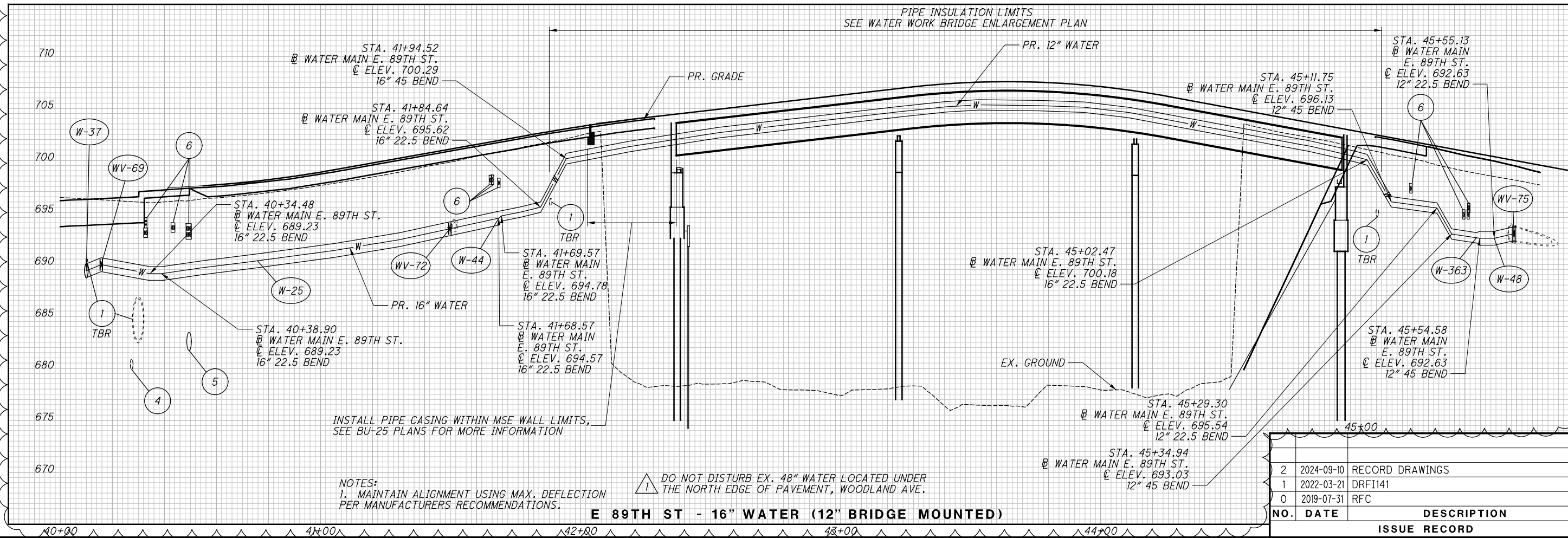
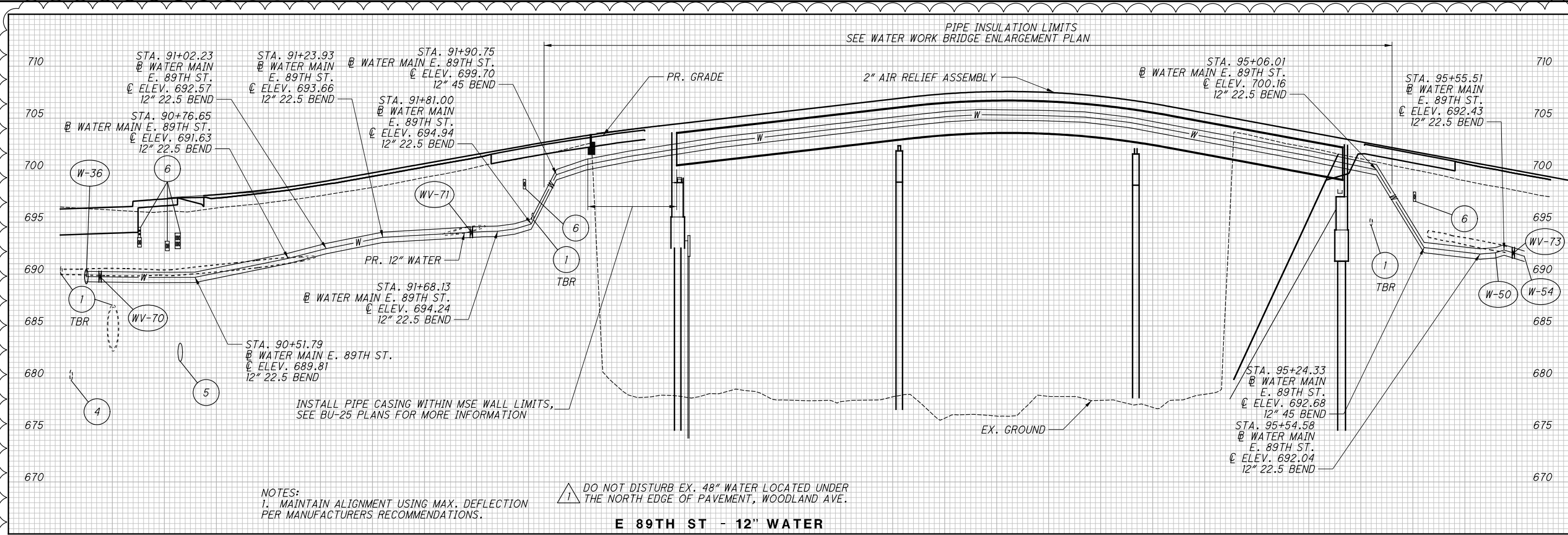






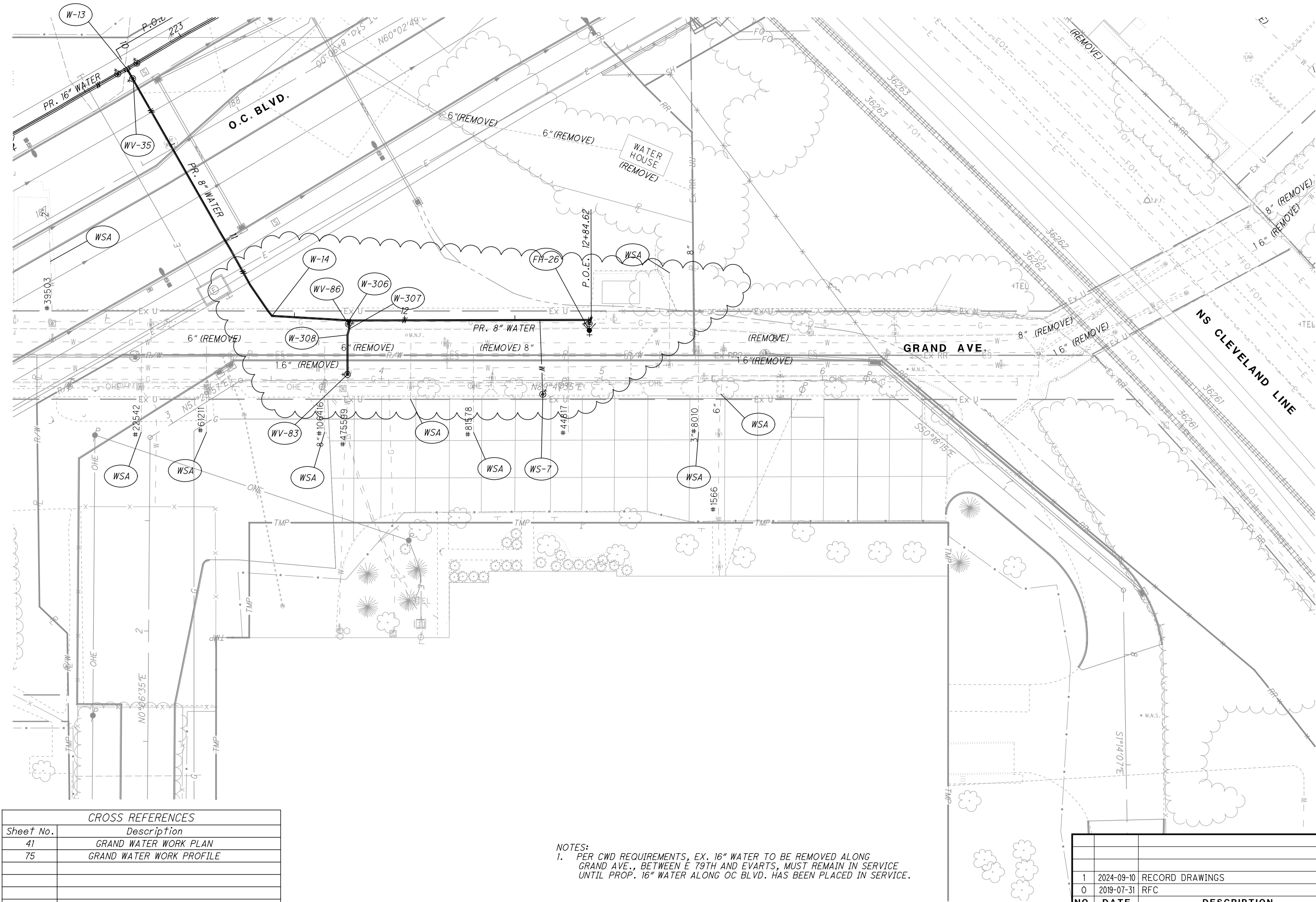
NOTES:  
1. MAINTAIN ALIGNMENT USING MAX. DEFLECTION  
PER MANUFACTURERS RECOMMENDATIONS.

NO.	DATE	DESCRIPTION
2	2024-09-10	RECORD DRAWINGS
1	2022-03-21	DRFI141
0	2019-07-31	RFC
ISSUE RECORD		



NO.		DATE	DESCRIPTION
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1		2022-03-21	DRFI141
0		2019-07-31	RFC
ISSUE RECORD			





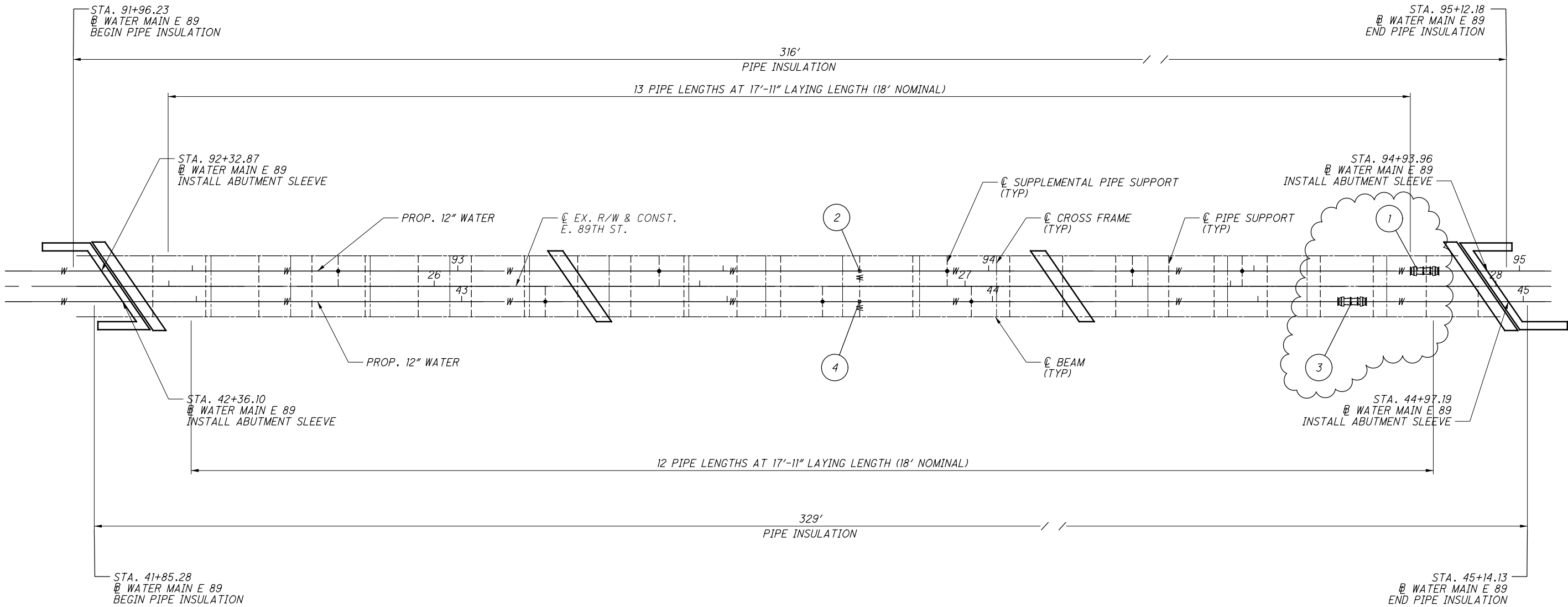
CROSS REFERENCES	
Sheet No.	Description
41	GRAND WATER WORK PLAN
75	GRAND WATER WORK PROFILE

NOTES:  
1. PER CWD REQUIREMENTS, EX. 16" WATER TO BE REMOVED ALONG GRAND AVE., BETWEEN E 79TH AND EVARTS, MUST REMAIN IN SERVICE UNTIL PROP. 16" WATER ALONG OC BLVD. HAS BEEN PLACED IN SERVICE.

ISSUE RECORD		
NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC



NOTES:  
FOR BRIDGE CROSS FRAMES & PIPE SUPPORT DETAILS, SEE BU-25  
FOR PIPE INSULATION DETAILS, SEE SHEET 83  
FOR PIPE EXPANSION JOINT DETAIL, SEE SHEET 83



- 1 STA. 94+81.12  
Ø WATER MAIN E 89  
INSTALL EXPANSION JOINT
- 2 STA. 93+75.73  
Ø WATER MAIN E 89  
INSTALL AIR RELEASE ASSEMBLY
- 3 STA. 44+66.72  
Ø WATER MAIN E 89  
INSTALL EXPANSION JOINT
- 4 STA. 43+74.95  
Ø WATER MAIN E 89  
INSTALL AIR RELEASE ASSEMBLY

NOTES:  
1. IN ADDITION TO MEETING MANUFACTURER'S INSTALLATION REQUIREMENTS, NSF APPROVED SILICON SEALANT SHALL BE INSTALLED BY CONTRACTOR TO LOCK SUPPORT BARS INTO PLACE.

1	2024-09-10	RECORD DRAWINGS
0	2019-07-31	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		

WATER WORK PLAN - E. 89TH ST.  
BRIDGE ENLARGEMENT PLAN

CUY-IR490/ SR010-  
2.09 / 19.28

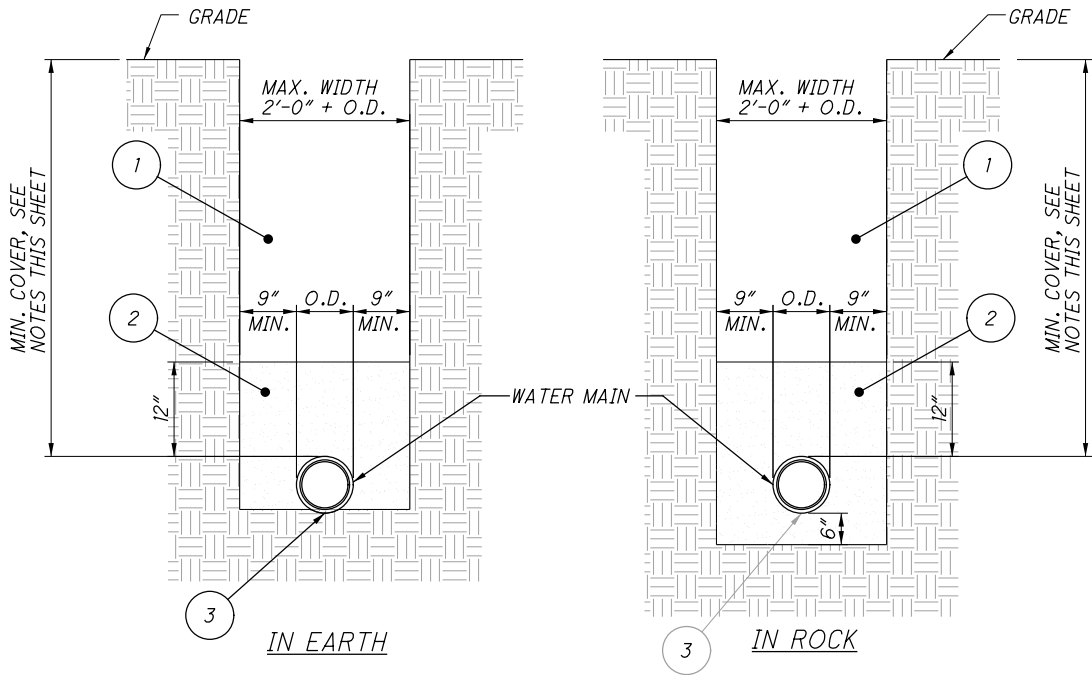
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AUE  
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HORIZONTAL  
SCALE IN FEET

8093

RECORD PLANS

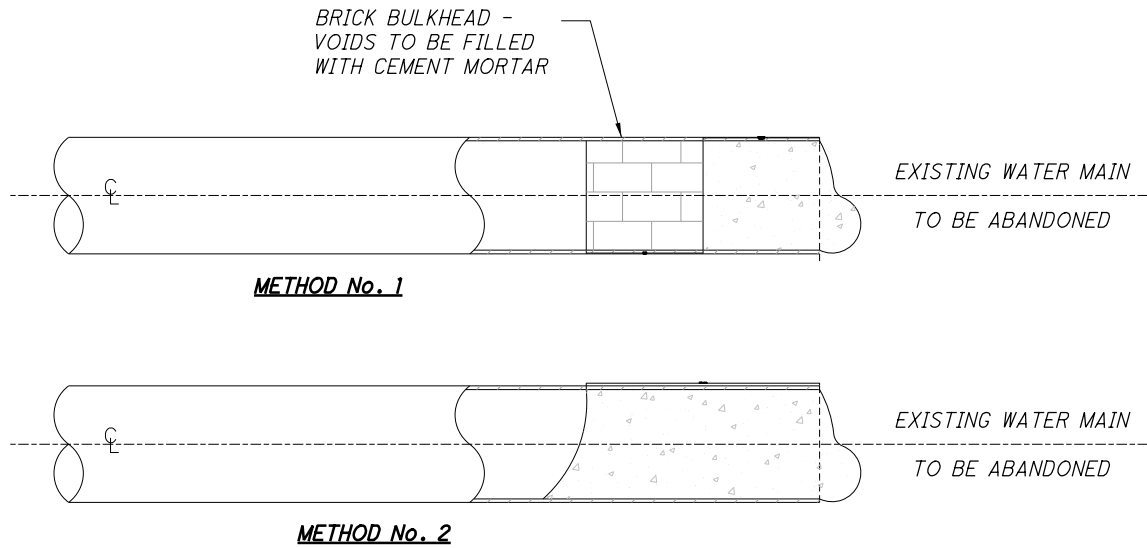
RECORD PLANS



- 1 COMPACTED SUITABLE BACKFILL. SEE NOTES 1, 2, OR 3 THIS SHEET.
- 2 BACKFILL TAMPED SAND
- 3 AMPLE BELL HOLES SHALL BE FORMED TO PERMIT PROPER JOINTING

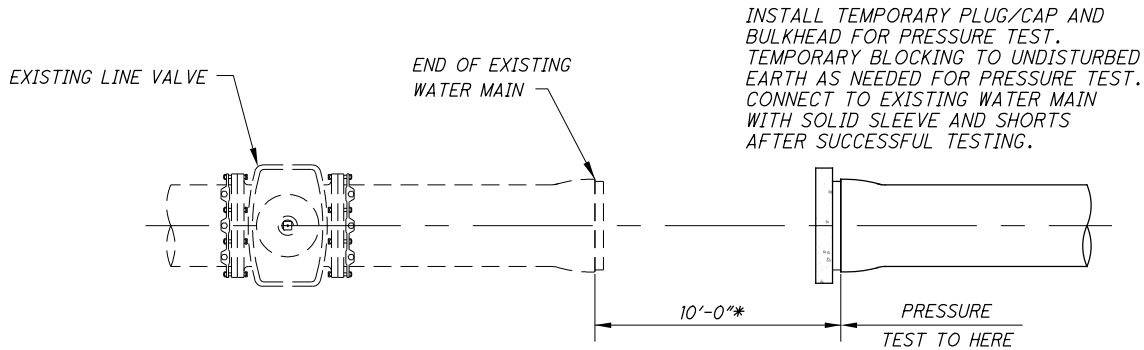
- NOTES:
- PREMIUM BACKFILL REQUIRED UNDER EXISTING OR FUTURE PAVEMENTS, SIDEWALKS, AND/OR DRIVES OR WHEN REQUIRED BY LOCAL MUNICIPALITY.
  - PREMIUM BACKFILL SHALL BE LIMESTONE GRADED PER ODOT 304.02 OR ODOT 411. NO SLAG IS PERMITTED.
  - UNLESS OTHERWISE SPECIFIED, ALL BACKFILLING OF TRENCHES WITHIN PAVEMENT LIMITS, WITH THE EXCEPTION OF UNDERDRAINS, SHALL BE BACKFILLED TO THE TOP OF THE TRENCH OR BOTTOM OF SUBGRADE, WHICHEVER IS LOWER, WITH LOW STRENGTH MORTAR (LSM) PER CITY OF CLEVELAND SPECIFICATIONS.  
  
LSM SHALL CONSIST OF THE FOLLOWING PROPORTIONS PER CUBIC YARD:  
CEMENT (ASTM C-150, TYPE 1): 50 LBS  
SAND (PER C&MS 703.03, SSD): 2475 LBS  
WATER: 25 GALLONS  
ADMIXTURE (AIR): 3 OZ.  
  
APPROVED ADMIXTURES: MASTER BUILDERS-RHEOFILL, AXIM-FLOW AIR, W.R. GRACE-DARAFILL (AN EQUAL MAY BE USED ONLY WITH DEPARTMENT APPROVAL)  
  
USE OF FLY ASH, SPENT FOUNDRY SAND, OR CORE SAND IS STRICTLY PROHIBITED.
  - 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.
  - MINIMUM COMPACTION FOR ALL SAND BEDDING BACKFILL, BACKFILL AND PREMIUM BACKFILL SHALL BE 95% STANDARD PROCTOR.
  - PAVEMENT, SIDEWALK OR DRIVES TO BE INSTALLED IN ACCORDANCE WITH LOCAL MUNICIPALITY'S SPECIFICATIONS.

**WATER MAIN TRENCH DETAILS**  
- NOT TO SCALE -  
CLEVELAND WATER DEPARTMENT - STD-001  
(MODIFIED)



- NOTES:
- UTILITY CONDUITS 10 INCHES IN DIAMETER OR LARGER WHICH ARE BEING ABANDONED IN PLACE MUST BE FILLED WITH ITEM 613 (LOW STRENGTH MORTAR BACKFILL) SO THAT, AFTER SETTLEMENT, AT LEAST 90 PERCENT OF THE CROSS-SECTIONAL AREA OF THE CONDUIT, FOR THE ENTIRE LENGTH IS FILLED.
  - PROPERLY DRAIN MAIN PRIOR TO ABANDONMENT.

**PLUGGING ABANDONED WATER MAIN ENDS**  
- NOT TO SCALE -  
CLEVELAND DIVISION OF WATER - STD-004  
(MODIFIED)

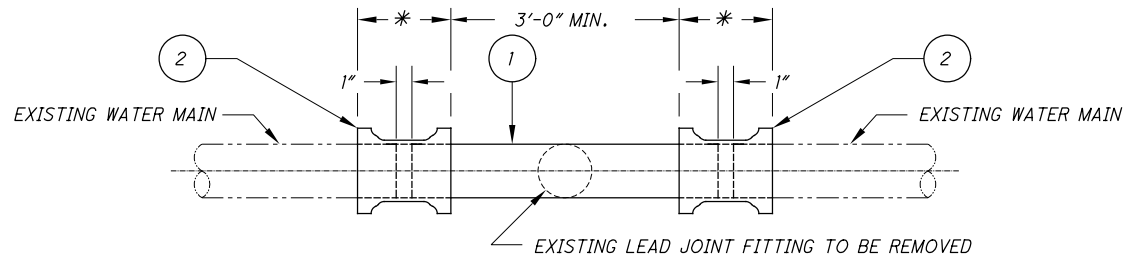


- NOTE:
- PRESSURE TESTING OF WATER MAINS:  
WHERE NEW/EXTENDED WATER MAINS ARE CONNECTED TO AN EXISTING WATER MAIN FOR PRESSURE TEST, RESULTING IN FAILURE OF THE PRESSURE TEST OR ANY DAMAGE TO THE EXISTING WATER MAIN, OR ITS APPURTENANCES, THE REPAIR THEREOF SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.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

**ALTERNATE PRESSURE TESTING DETAIL**  
- NOT TO SCALE -  
CLEVELAND WATER DEPARTMENT - STD-002

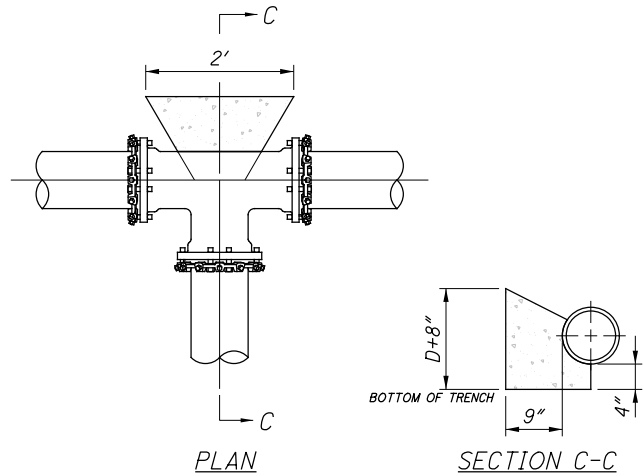
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ISSUE RECORD		

BU-10 - WATERLINE  
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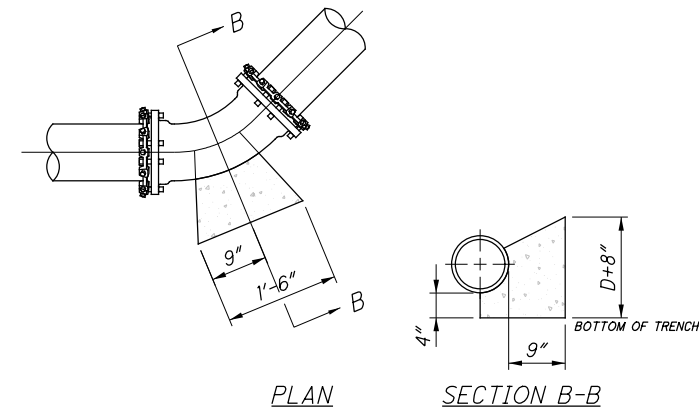
- 1) PLAIN END x PLAIN END DUCTILE IRON PIPE AS SPECIFIED (CUT TO SUIT).
- 2) \*CONNECTION SHALL BE MADE WITH RETAINED MECHANICAL JOINT SOLID SLEEVES (SHORT OR LONG PATTERN) DUCTILE IRON CLASS 350 OR CAST IRON CLASS 250 OR COMPRESSION COUPLINGS.
- COMPRESSION COUPLINGS SHALL BE OF A GASKETED, SLEEVE 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) ER-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".

**SPOOL-IN INSTALLATION DETAIL**  
- NOT TO SCALE -  
CLEVELAND WATER DEPARTMENT - STD-008

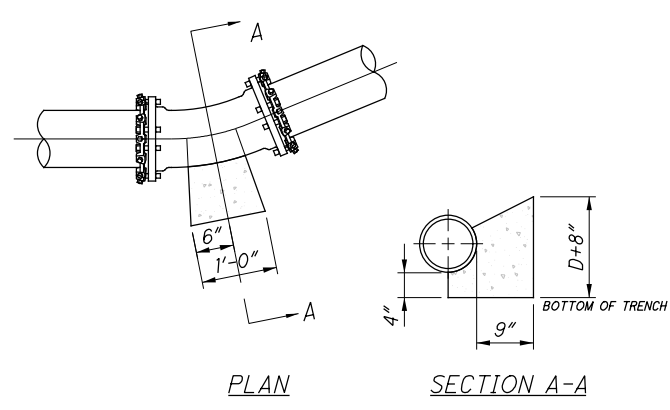


TEE AND TAPPING SLEEVES

- 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.
- D = PIPE DIAMETER

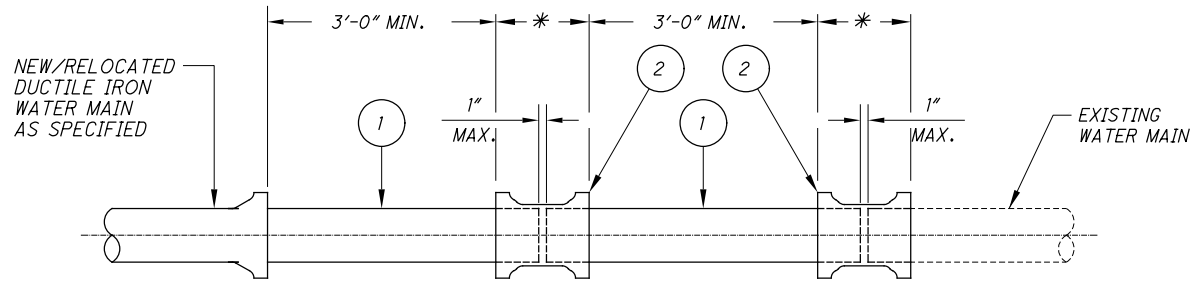


(45 DEGREE) BEND



(22-1/2 DEGREE) BEND

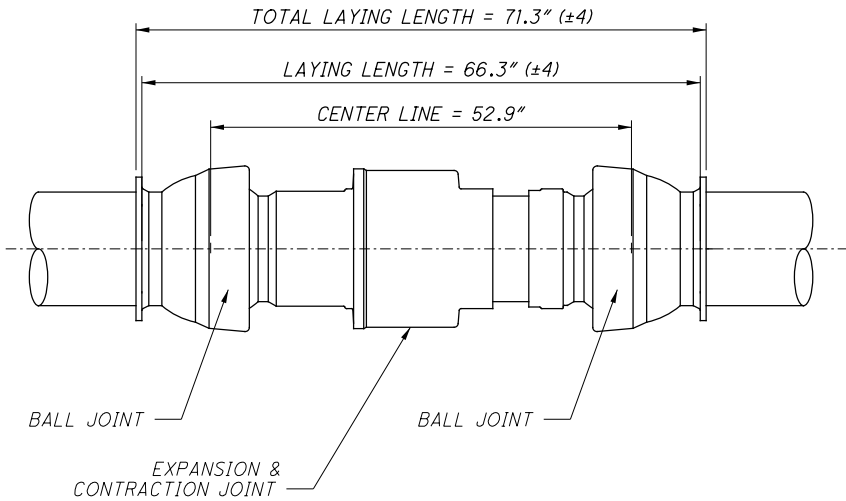
**TYPICAL THRUST BLOCK DETAIL**  
**FOR HORIZONTAL DEFLECTION FOR PIPE UP TO 16" DIAMETER**  
- NOT TO SCALE -  
CLEVELAND WATER DEPARTMENT - STD-006



- 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) ER-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".

**SLEEVE-IN INSTALLATION DETAIL**  
- NOT TO SCALE -  
CLEVELAND WATER DEPARTMENT - STD-007

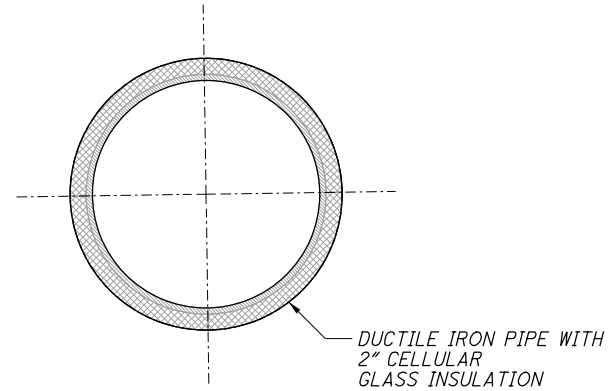
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NO.	DATE	DESCRIPTION
ISSUE RECORD		



**EXPANSION JOINT DETAIL**  
- NOT TO SCALE -

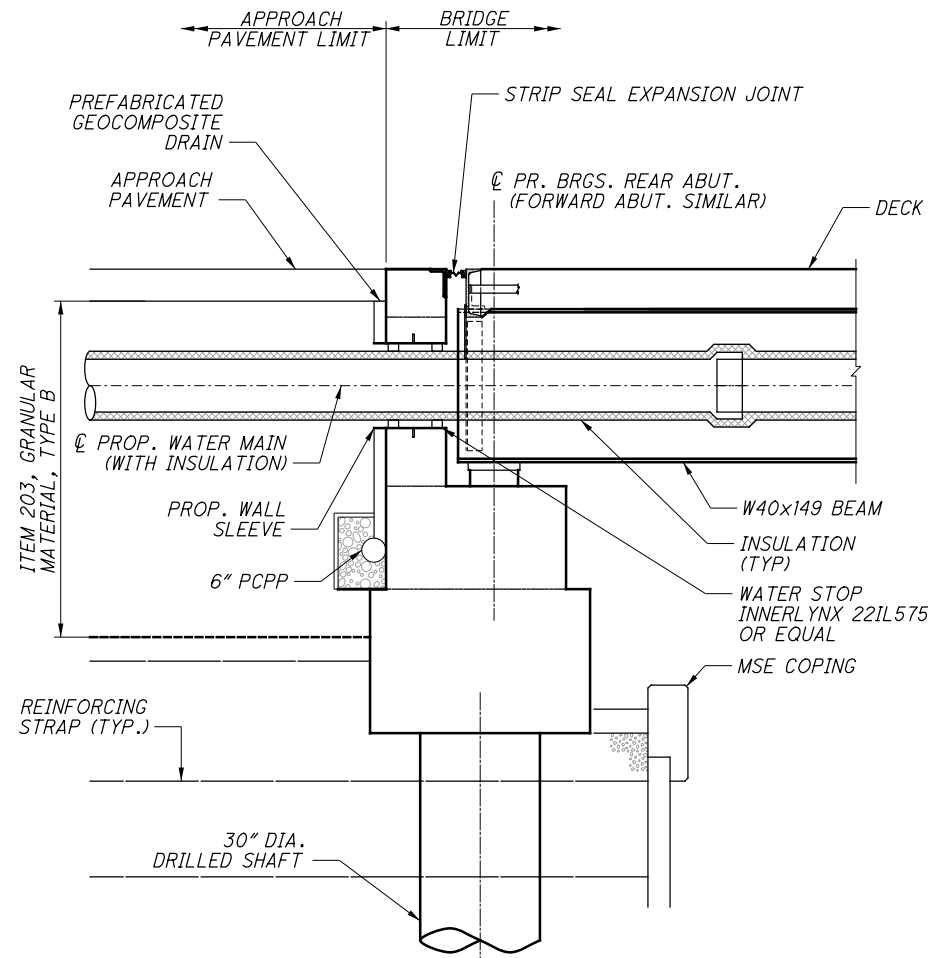
NOTES:

1. EXPANSION JOINT SHALL BE EBAA IRON SERIES 4412M20B FLEX-TEND FLEXIBLE EXPANSION JOINT, OR APPROVED EQUAL. DOUBLE BALL, MECHANICAL JOINT BY MECHANICAL JOINT WITH ONE ADDITIONAL SLEEVE 12 INCH NOMINAL PIPE SIZE
2. MANUFACTURERS CONTACT INFORMATION:  
EBAA IRON SALES, INC.  
P.O. BOX 857  
EASTLAND, TX 76448  
TELEPHONE: 254-629-1731  
FAX: 254-629-8931  
[HTTPS://EBAA.COM/FILES/PDF/BROCHURES/BROCHURE.FLEX-TEND.PDF](https://ebaa.com/files/pdf/brochures/brochure.flex-tend.pdf)
3. ALL ACTUAL DIMENSIONS TO BE VERIFIED WITH MANUFACTURER.
4. EXPANSION JOINT IS TO BE INSTALLED AT THE LOCATION SPECIFIED ON THE WATER WORK BRIDGE ENLARGEMENT PLAN, SHEET 80
5. THE EXPANSION JOINT ASSEMBLY IS TO BE COMPLETE; AND IS TO INCLUDE ALL MATERIALS, BOLTS, NUTS AND WASHERS.
6. EXPANSION JOINT SHALL BE INSULATED WITH THE SAME MATERIAL AS THE WATER MAIN.



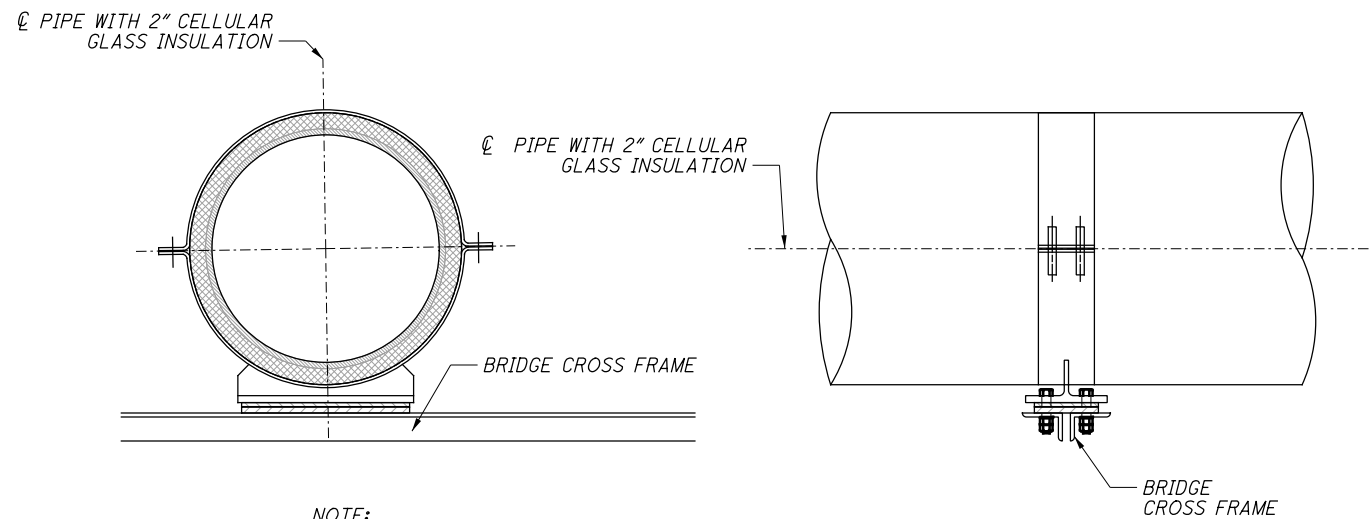
NOTE:  
FOR INSULATION NOTES AND SPECIFICATIONS, SEE  
ITEM 638 - INSULATION AND OUTER PROTECTIVE  
JACKET NOTES ON SHEET 12

**TYPICAL PIPE INSULATION DETAIL**  
- NOT TO SCALE -



NOTE:  
REFER TO BU-25, E 89TH STREET PED. BRIDGE, PLANS  
FOR MORE DETAILED INFORMATION ON ABUTMENT  
SLEEVE.

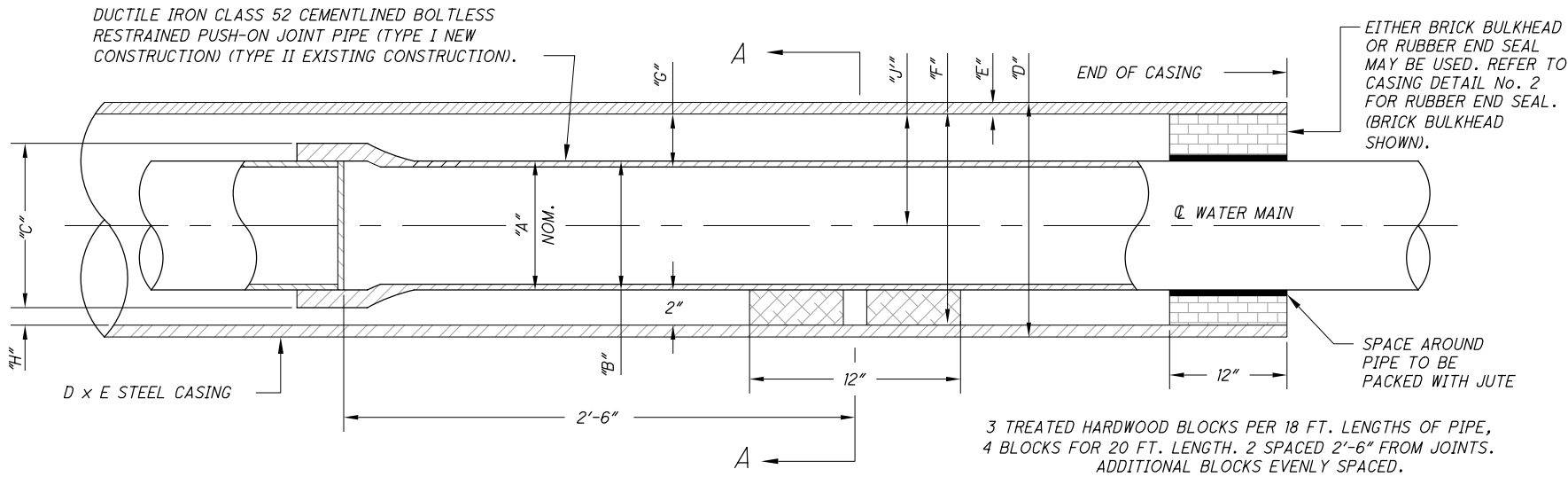
**ABUTMENT SLEEVE FOR WATER MAINS DETAIL**  
- NOT TO SCALE -



- NOTE:
1. PIPE SUPPORTS ARE TO BE FABRICATED AS DETAILED IN THE SHOP DRAWINGS.
  2. THERE SHALL BE A MINIMUM OF TWO (2) PIPE SUPPORTS FOR EACH PIPE LENGTH, NO MORE THAN 20' OF PIPE SHALL BE UNSUPPORTED.
  3. PIPE SUPPORTS ARE REQUIRED TO ALLOW MOVEMENT ONLY IN THE AXIAL DIRECTIONS. ALL OTHER MOVEMENT IS RESTRICTED.
  4. PIPE SUPPORTS SHALL NOT CRUSH PIPE INSULATION.
  5. REFER TO BU-25, E 89TH STREET PEDESTRIAN BRIDGE, PLANS FOR MORE DETAILED INFORMATION ON PIPE SUPPORT DESIGN.

**TYPICAL PIPE SUPPORT DETAIL**  
- NOT TO SCALE -

ISSUE RECORD		
NO.	DATE	DESCRIPTION
0	2019-07-31	RFC



A	B	C*	D	E	F	G	H	J
8"	9.05"	11.89"	16"	$\frac{3}{8}"$	$15\frac{1}{4}"$	4.20"	0.58"	8.73"
12"	13.20"	16.35"	20"	$\frac{3}{8}"$	$19\frac{1}{4}"$	4.05"	0.43"	10.65"
16"	17.40"	20.84"	24"	$\frac{1}{2}"$	23"	3.60"	0.28"	12.30"

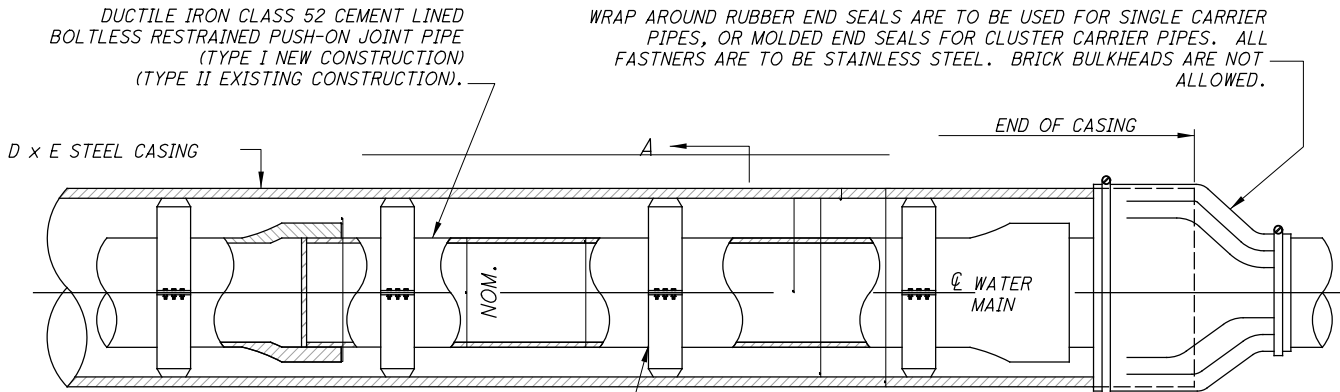
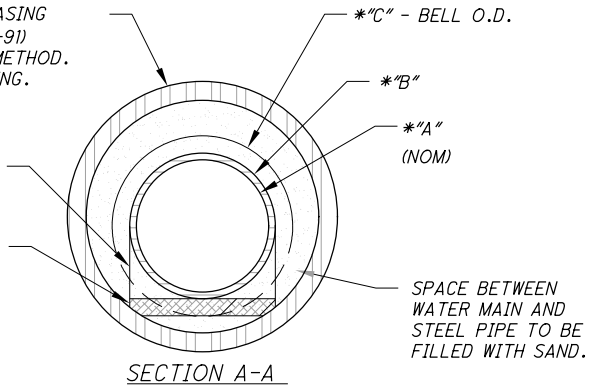
CASING DETAIL No. 1  
- NOT TO SCALE -

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.

UNCOATED - UNPROTECTED STEEL CASING  
ASTM A-53-89a (AWWA SPEC. C-200-91)  
INSTALLED BY JACKING OR BORING METHOD.  
1:6 GROUT IF ORDERED AROUND CASING.

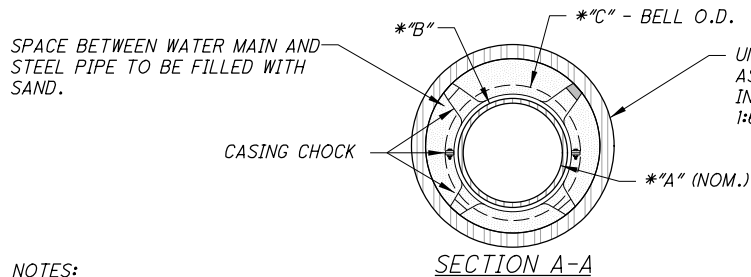
1/2" STEEL BANDS COMPLETELY AROUND PIPE FASTENED ON TOP.

TREATED HARDWOOD BLOCKS  
2" HIGH x 12" WIDE x 12" LONG



-CASING SPACER INSTALLATION-  
THREE CASING SPACER PER 18FT. OR 20 FT. PIPE JOINTS ARE TO BE USED FOR MAXIMUM CARRIER PIPE SUPPORT; ONE BEHIND THE BELL, ONE AT THE SPIGOT END MAKE-UP LINE, AND ONE CENTERED BETWEEN THE AFOREMENTIONED TWO SPACERS. CASING SPACERS SHOULD CENTER & RESTRAIN THE CARRIER PIPE. WOODEN SKIDS ARE NOT ALLOWED.

A	B	C*	D	E	F	G
8"	9.05"	11.89"	16"	$\frac{3}{8}"$	$15\frac{1}{4}"$	8.00"
12"	13.20"	16.35"	20"	$\frac{3}{8}"$	$19\frac{1}{4}"$	10.00"
16"	17.40"	20.84"	24"	$\frac{1}{2}"$	23"	12.00"



UNCOATED - UNPROTECTED STEEL CASING  
ASTM A-53-89a (AWWA SPEC. C-200-91)  
INSTALLED BY JACKING OR BORING METHOD.  
1:6 GROUT IF ORDERED AROUND CASING.

-CASING SPACER DETAIL-  
CASING SPACERS ARE TO BE STAINLESS STEEL, OR POLYMER COATED CARBON STEEL. STAINLESS STEEL IS NOT ALLOWED IF GROUTING IS REQUIRED. SPACER BAND WIDTHS ARE TO BE 8" CARRIER PIPES THROUGH 24" AND 21" FOR 26" AND LARGER. RUNNERS ARE TO BE GLASS-FILLED POLYMER PLASTIC AND LINER IS TO BE EPDM OR PVC.

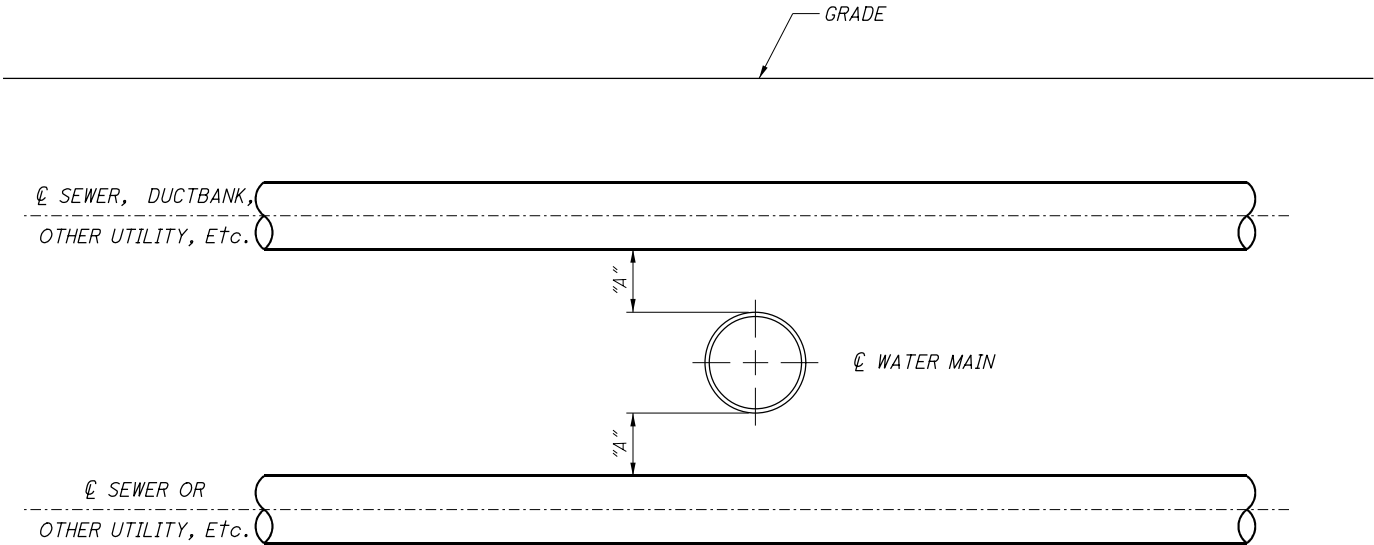
NOTES:  
1. CONTRACTOR'S FAILURE TO MAINTAIN THE CASING PIPE ON THE LINE AND GRADE AS SHOWN OR DIRECTED, RESULTING IN THE USE OF ADDITIONAL PIPE AND/OR FITTINGS TO MAKE CONNECTIONS TO EXISTING WATER MAIN WILL BE CAUSE FOR REJECTION OF CASING INSTALLATION.  
\*2. OUTSIDE DIAMETER OF BELL OF BOLTLESS RESTRAINED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

CASING DETAIL No. 2 END OF CASING AND CASING CHOCK DETAIL  
- NOT TO SCALE -  
CLEVELAND WATER DEPARTMENT - STD-016

0	2019-07-31	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		



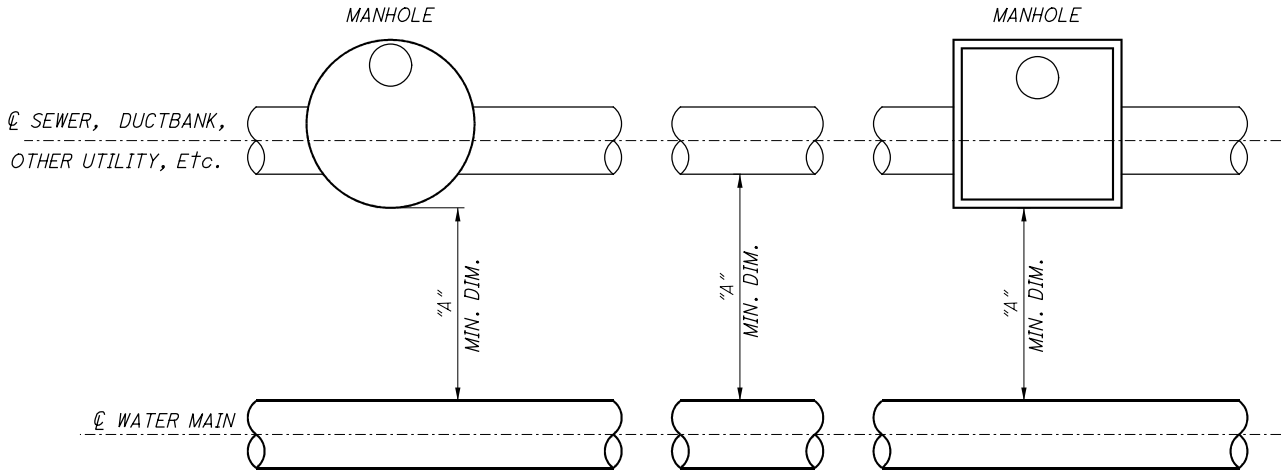
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PROFILE VIEW  
- SEE STD-017 FOR PLAN VIEW -

VERTICAL CLEARANCE	SANITARY SEWER LESS THAN 24"	SANITARY SEWER 24" & LARGER	STORM SEWER, DUCTBANK, GAS, OTHER UTILITY LESS THAN 24"	STORM SEWER, DUCTBANK, GAS, OTHER UTILITY 24" & LARGER	REMARKS
"A"	18" Min.	18" Min.	18" Min.	18" Min.	IF CANNOT ACHIEVE MIN. CLEARANCE WATER MAIN TO BE LOWERED

VERTICAL CLEARANCE FOR UTILITIES  
- NOT TO SCALE -  
CLEVELAND WATER DEPARTMENT - STD-018

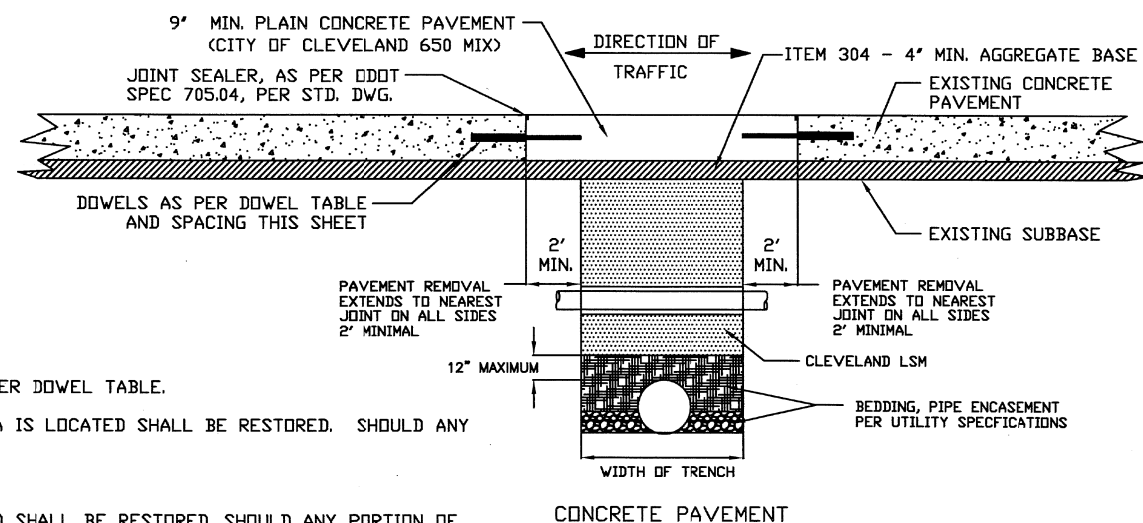
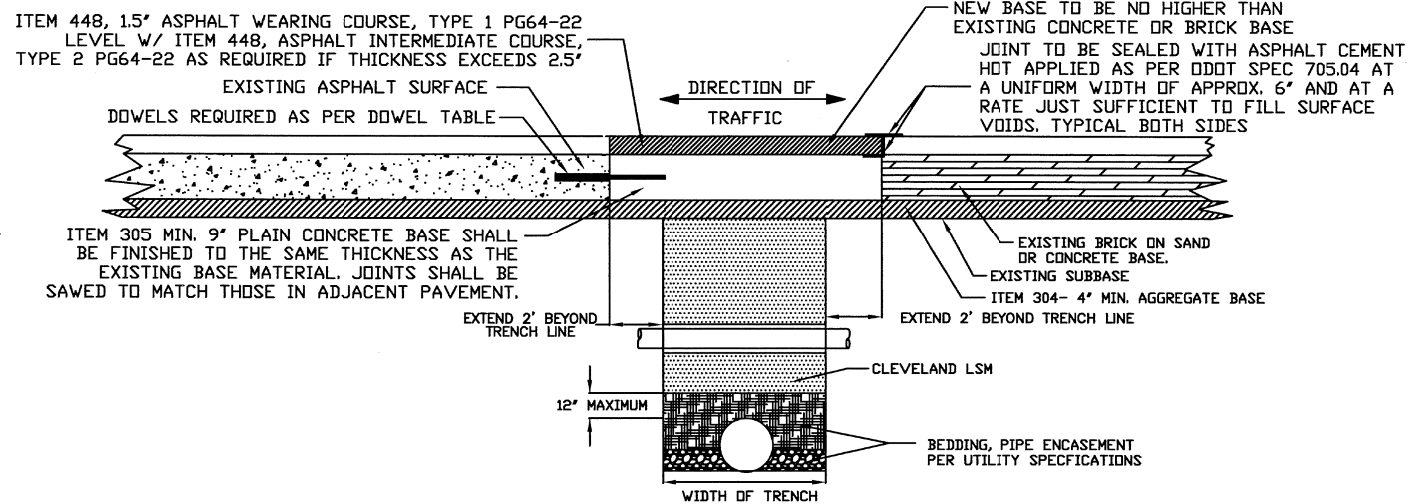
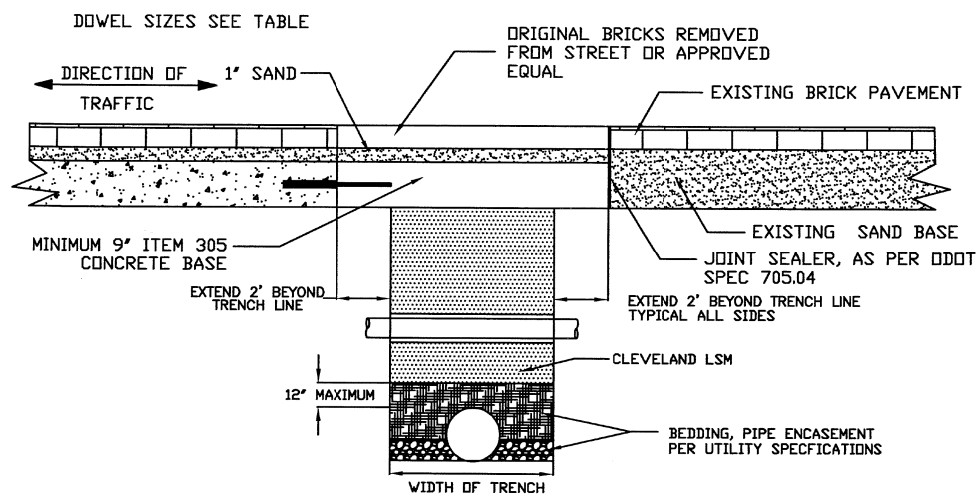


PLAN VIEW  
- SEE STD-018 FOR PROFILE VIEW -

HORIZONTAL CLEARANCE	STORM SEWER	SANITARY SEWER	GAS, DUCTBANK, OTHER UTILITY, Etc.
"A"	10'-0" MIN.	10'-0" MIN.	5'-0" MIN.

HORIZONTAL CLEARANCE FOR UTILITIES  
- NOT TO SCALE -  
CLEVELAND WATER DEPARTMENT - STD-017

0	2019-07-31	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		



DOWEL TABLE	
PAVEMENT THICKNESS	DIAMETER OF DOWELS
8" OR LESS	1"
9"	1 1/8"
10"	1 1/4"
OVER 10"	AS DIRECTED
DOWELS SHALL BE SPACED EVERY 30"	

NOTES:

1. ALL PAVEMENT OPENINGS SHALL BE SAWEED FULL DEPTH AND HAVE SMOOTH VERTICAL FACES. DOWELS SHALL BE REQUIRED, AS PER DOWEL TABLE.
2. CONCRETE REPAVING SHALL BE PERFORMED IN SUCH A MANNER THAT THE ENTIRE LANE AND/OR SLAB IN WHICH THE REPAIR AREA IS LOCATED SHALL BE RESTORED. SHOULD ANY PORTION OF THE REPAIR AREA EXTEND INTO AN ADJACENT LANE AND/OR SLAB, THAT LANE OR SLAB SHALL ALSO BE REPAVED.
3. EXTEND OVERCUT IN LONGITUDINAL DIRECTION TWO FEET (2') ONTO UNDISTURBED SUBGRADE.
4. ASPHALT RESURFACING SHALL BE PERFORMED IN SUCH A MANNER THAT THE ENTIRE LANE IN WHICH THE REPAIR AREA IS LOCATED SHALL BE RESTORED. SHOULD ANY PORTION OF THE REPAIR AREA EXTEND INTO AN ADJACENT LANE, THAT LANE SHALL ALSO BE RESURFACED. THE RESURFACING SHALL TAKE PLACE FROM BEGINNING PROJECT TO END PROJECT (I.E. WORK LIMITS). FOR PAVEMENTS WITH A WIDTH OF 40' OR LESS A LANE SHALL BE CONSIDERED 1/2 THE PAVEMENT WIDTH.
5. BRICKS REMOVED FROM A REPAIR SHALL BE STORED IN A SAFE PLACE BY THE CONTRACTOR FOR REUSE. THE CONTRACTOR WILL BE RESPONSIBLE FOR REPLACING ANY BRICKS THAT ARE STOLEN OR DAMAGED AT NO COST TO THE CITY.
6. ALL NEW BRICKS SUPPLIED BY THE CONTRACTOR MUST FIRST BE APPROVED BY THE CITY BEFORE THEY ARE USED.
7. SAWCUTTING: ALL PARTIAL BRICKS SHALL BE SAWCUT. FURTHER, NO BRICK WILL BE PERMITTED TO BE CUT, FOR REPLACEMENT, TO A LENGTH LESS THAN ONE-HALF ITS ORIGINAL LENGTH. THIS MAY REQUIRE SAWCUTTING OF ADJACENT UNDISTURBED BRICKS).
8. THE PERIMETER FACES OF THE EXISTING BASE MATERIAL SHALL BE CUT BACK TO AS NEARLY VERTICAL ORIENTATION AS POSSIBLE. IF SHEARING OF THE ADJACENT BASE RESULTS, THE CONTRACTOR SHALL REMOVE ADDITIONAL BRICK AND BASE AS SHOWN IN THE DETAIL.
9. THE MAXIMUM WIDTH OF A BRICK MORTAR JOINT SHALL BE 1/2" THIS RESTRICTION WILL ALSO APPLY TO THE PERIMETER OF A REPAIR AREA, WHERE THE ROWS MAY NOT BE PARALLEL TO ONE ANOTHER.
10. MORTARING OF JOINTS: ALL JOINTS SHALL BE MORTARED WITH A 50/50 MIXTURE BY VOLUME OF SAND /CEMENT, TO PROVIDE FOR A FLUSH FINISH. THIS MAY REQUIRE MORE THAN ONE APPLICATION; FURTHER MECHANICAL VIBRATION WILL BE REQUIRED FOR COMPACTION.
11. ALL BACKFILL MATERIALS USED UNDER ANY PAVEMENTS SHALL BE CLEVELAND LSM PLACED FROM THE INITIAL ONE FOOT OVER THE TOP OF UTILITIES, TO THE SUBGRADE.
12. TO PREVENT FLOTATION AND ENTRY OF FLOWABLE FILL INTO ANY OTHER AREASCOVER ALL JOINTS IN CLAY PIPE IN THE TRENCH AREA WITH POLYETHYLENE MATERIAL BEFORE POURING FLOWABLE FILL. REPAIR TECHNIQUES SHALL BE IN ACCORDANCE WITH THE UTILITY COMPANY'S STANDARD REPAIR PROCEDURES.

REVISÉD 8/3/09

CITY OF CLEVELAND

DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF ENGINEERING & CONSTRUCTION  
JOMARIE WASIK—DIRECTOR OF PUBLIC SERVICE  
**STREET OPENING REPAIR—SUPPLEMENTAL**  
NOT TO SCALE

DRAWN BY: R. PLIODZINSKAS DATE: 4/8/08  
SUBMITTED BY: W. MCLAUGHLIN DATE: 4/8/08

APPROVED: [Signature] DATE: 4/14/08

COMMISSIONER OF ENGINEERING AND CONSTRUCTION

FILE NO. : PR 1	SHEET 1/2
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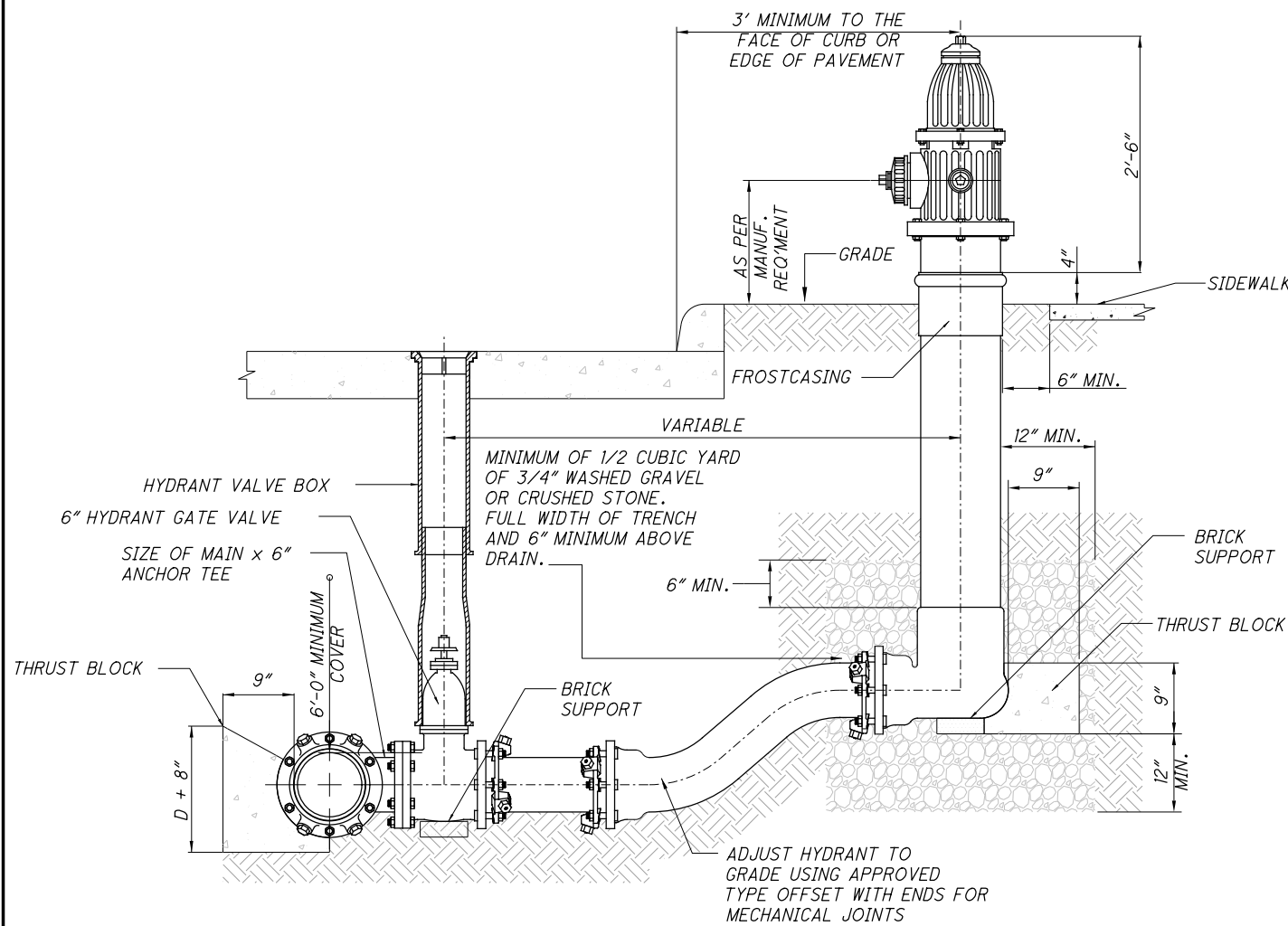
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STREET OPENING REPAIR

- NOT TO SCALE -  
CITY OF CLEVELAND

0	2019-07-31	RFC
<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		

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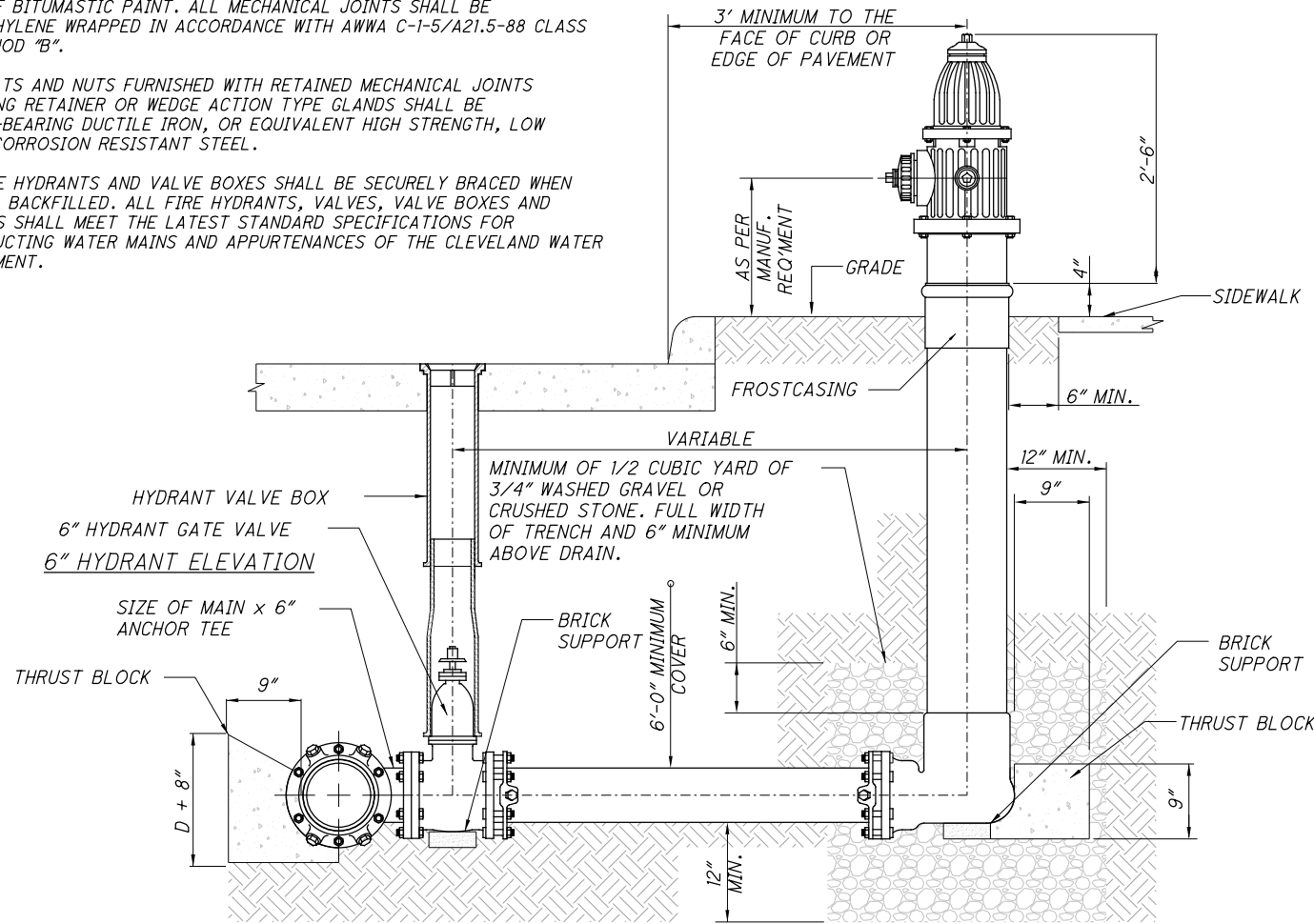


**ADJUSTING 6" HYDRANT ELEVATION**  
- NOT TO SCALE -  
CLEVELAND WATER DEPARTMENT - STD-H12

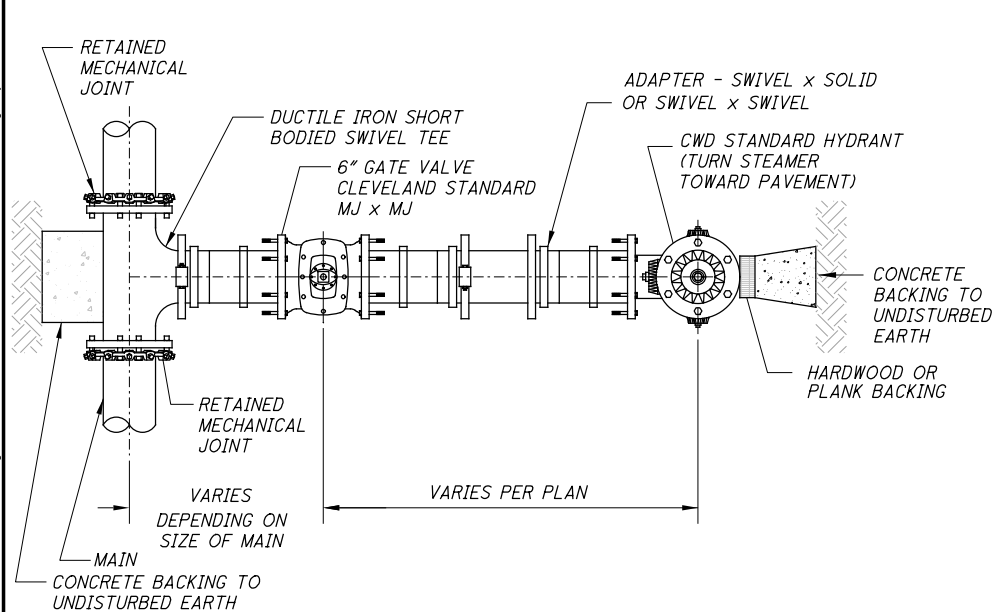
NOTE:  
IN LIEU OF SWIVEL BRANCH TEES AND ADAPTERS CONTRACTORS MAY FURNISH HYDRANT BRANCHES HAVING RETAINED MECHANICAL JOINTS INCLUDING HYDRANT SHOE. ALL MECHANICAL JOINTS SHALL HAVE FIELD APPLIED ONE (1) COAT OF BITUMASTIC PAINT. ALL MECHANICAL JOINTS SHALL BE POLYETHYLENE WRAPPED IN ACCORDANCE WITH 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.

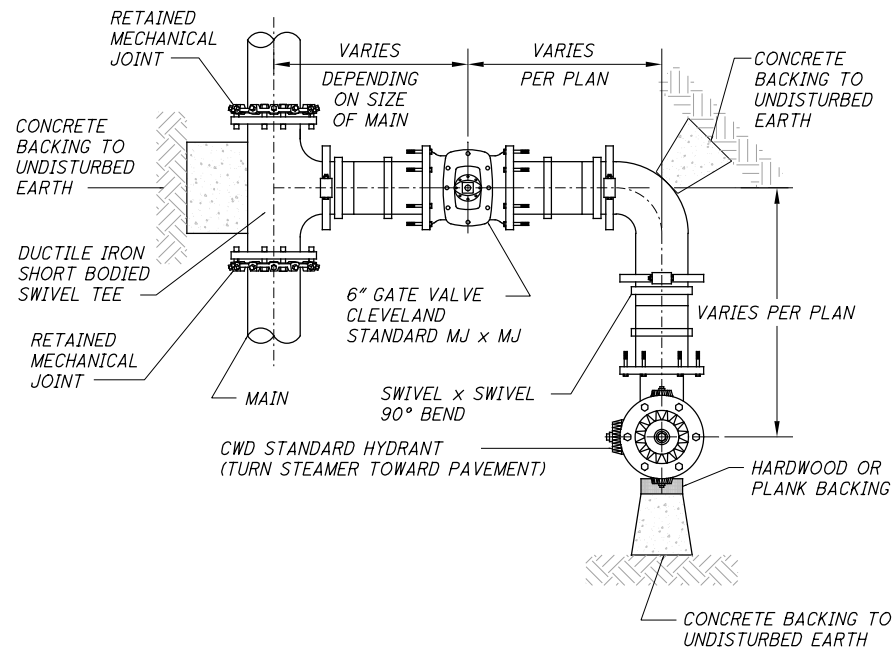
ALL FIRE HYDRANTS AND VALVE BOXES SHALL BE SECURELY BRACED WHEN SET AND BACKFILLED. ALL FIRE HYDRANTS, VALVES, VALVE BOXES AND FITTINGS SHALL MEET THE LATEST STANDARD SPECIFICATIONS FOR CONSTRUCTING WATER MAINS AND APPURTENANCES OF THE CLEVELAND WATER DEPARTMENT.



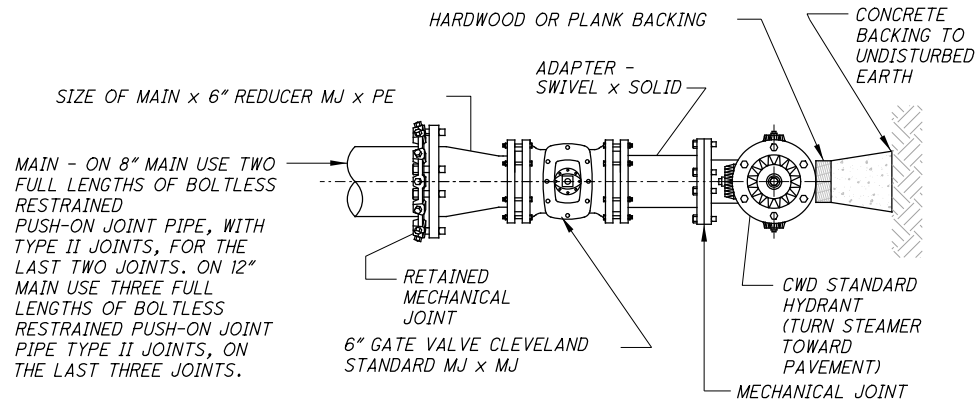
**6" HYDRANT ELEVATION**  
- NOT TO SCALE -  
CLEVELAND WATER DEPARTMENT - STD-H13



**TYPICAL NEW HYDRANT INSTALLATION DETAIL "A"**  
- NOT TO SCALE -  
CLEVELAND WATER DEPARTMENT - STD-H09



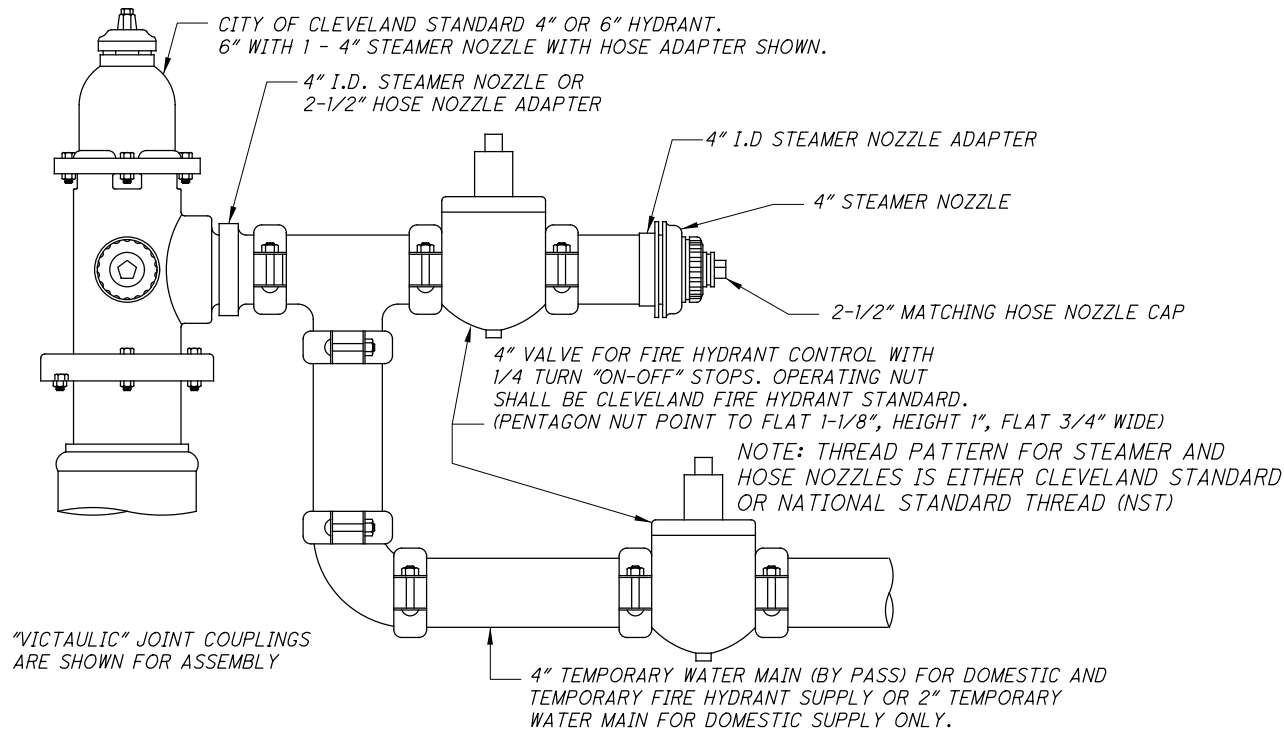
**TYPICAL NEW HYDRANT INSTALLATION DETAIL "B"**  
- NOT TO SCALE -  
CLEVELAND WATER DEPARTMENT - STD-H10



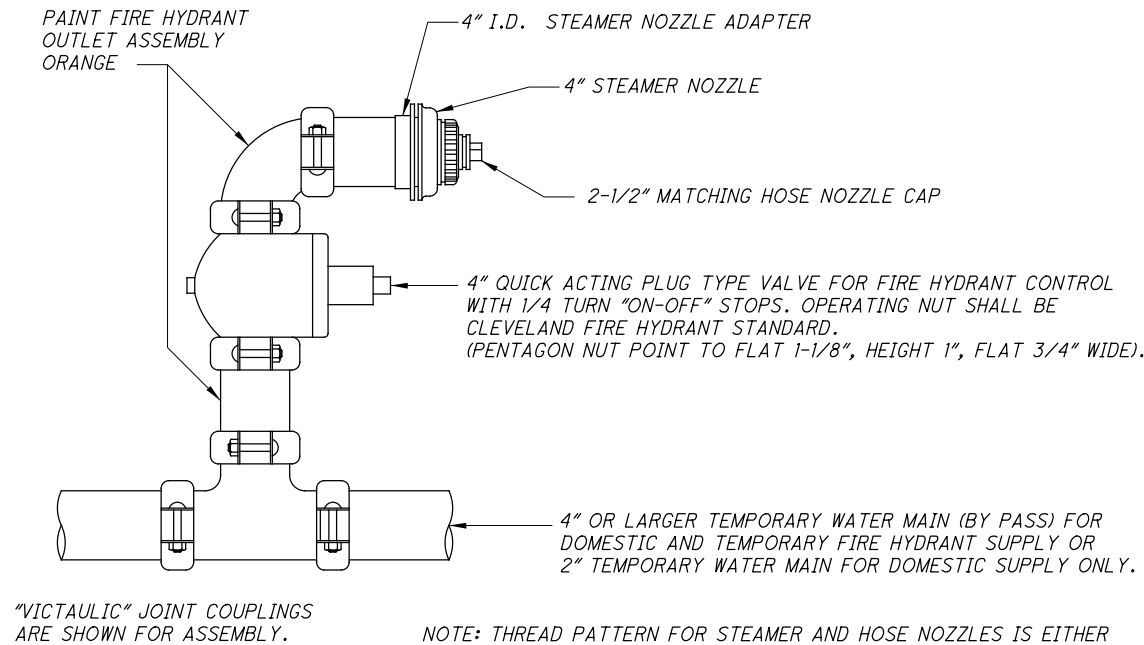
**TYPICAL NEW HYDRANT INSTALLATION DETAIL "C"**  
- NOT TO SCALE -  
CLEVELAND WATER DEPARTMENT - STD-H11

NO.	DATE	DESCRIPTION
0	2019-07-31	RFC
ISSUE RECORD		

BU-10 - WATERLINE  
...\\Sheets\\BU-10\\96833\_UD008.dgn 11/22/2019 9:50:21 AM Gregory.Hertler

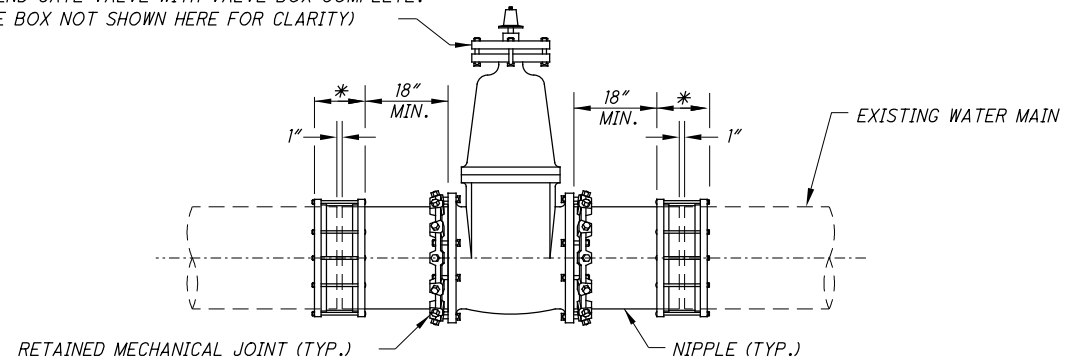


**TEMPORARY WATER MAIN & HYDRANT CONNECTION ASSEMBLY-A**  
**TO PROVIDE SIMULTANEOUS SERVICE IN EXISTING HYDRANT AND TEMPORARY BYPASS MAIN**  
**- NOT TO SCALE -**  
**CLEVELAND WATER DEPARTMENT - STD-H14**



**TEMPORARY WATER MAIN & HYDRANT CONNECTION ASSEMBLY-C OUTLET END**  
**- NOT TO SCALE -**  
**CLEVELAND WATER DEPARTMENT - STD-H16**

C.W.D. SQUARE HEAD RETAINED MECHANICAL JOINT  
BELL END GATE VALVE WITH VALVE BOX COMPLETE.  
(VALVE BOX NOT SHOWN HERE FOR CLARITY)



NOTE:  
BEFORE CUTTING EXISTING WATER MAIN, THE  
NIPPLES SHALL BE CONNECTED TO THE  
CUTTING PIPE. FINAL CONNECTIONS SHALL BE  
MECHANICAL JOINT BELL END GATE VALVE. AFTER  
MADE WITH COUPLINGS/SOLID SLEEVES AS  
SPECIFIED.

\*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.

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".

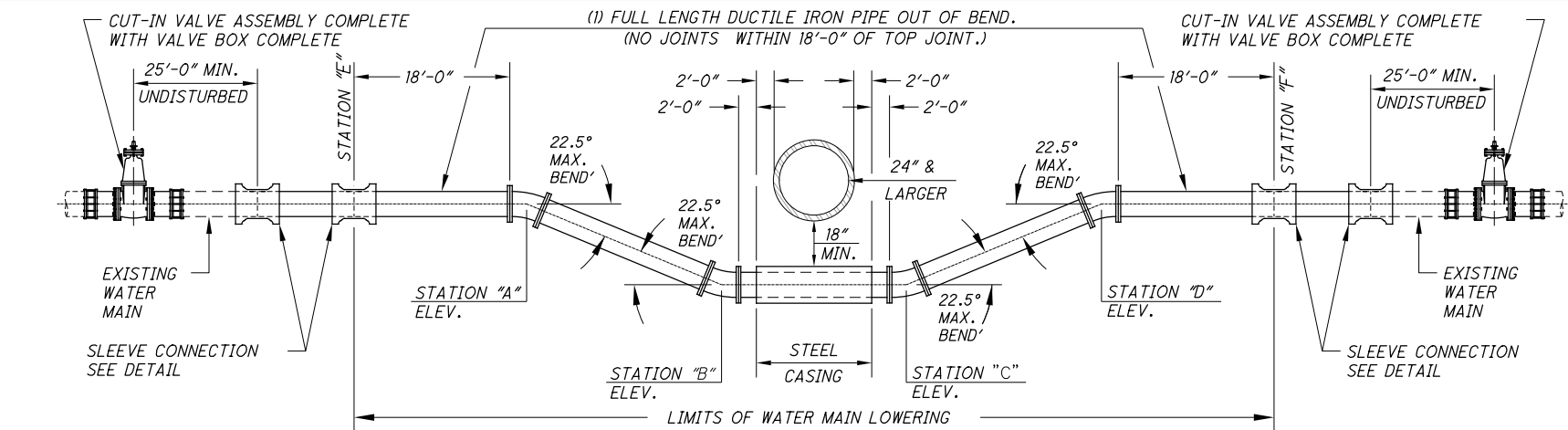
THE DIVISION OF WATER WILL DETERMINE THE FIELD LOCATION OF THE CUT-IN-VALVE ASSEMBLY. THE DIVISION OF WATER WILL ALSO SET  
THE TIME OF INSTALLATION OF THE CUT-IN-VALVE ASSEMBLY.

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.

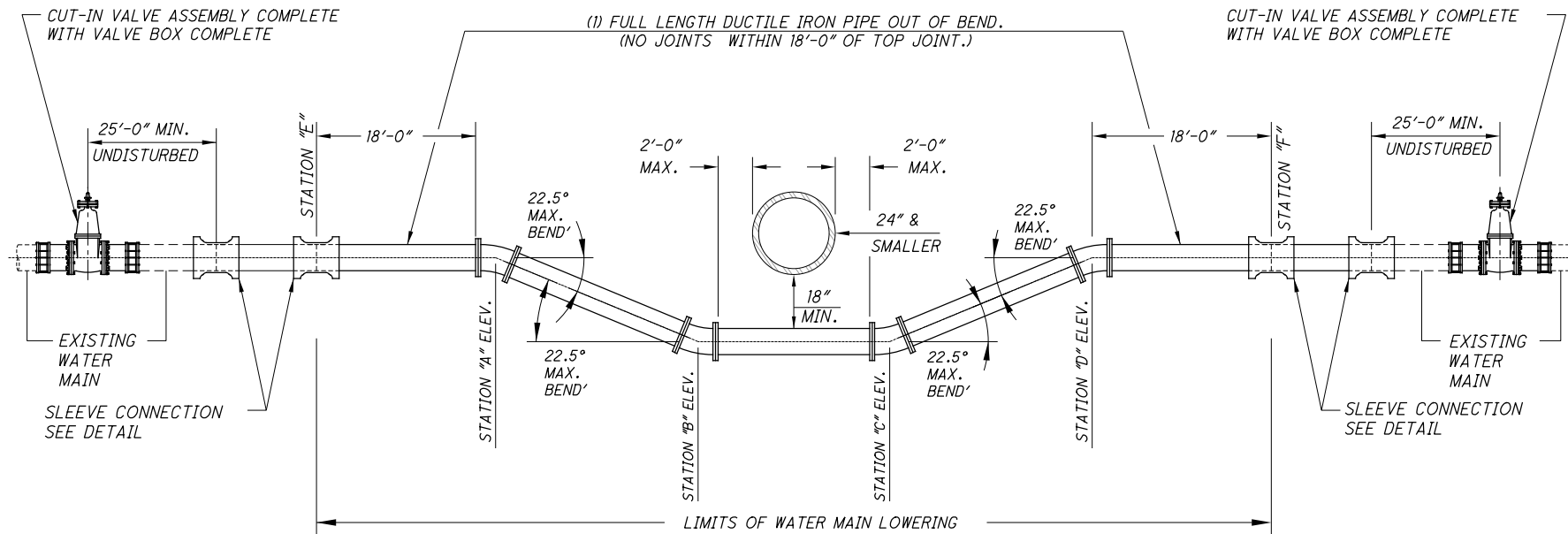
**CUT-IN-VALVE DETAIL**  
**- NOT TO SCALE -**  
**CLEVELAND WATER DEPARTMENT - STD-005**

NO.	DATE	DESCRIPTION
0	2019-07-31	RFC
88		
93		

ISSUE RECORD



**DETAIL FOR WATER MAIN LOWERING UNDER OBSTRUCTIONS 24" & LARGER IN DIAMETER OR WIDTH FOR "EXISTING CONSTRUCTION"**  
- NOT TO SCALE -  
CLEVELAND DIVISION OF WATER - STD-L03



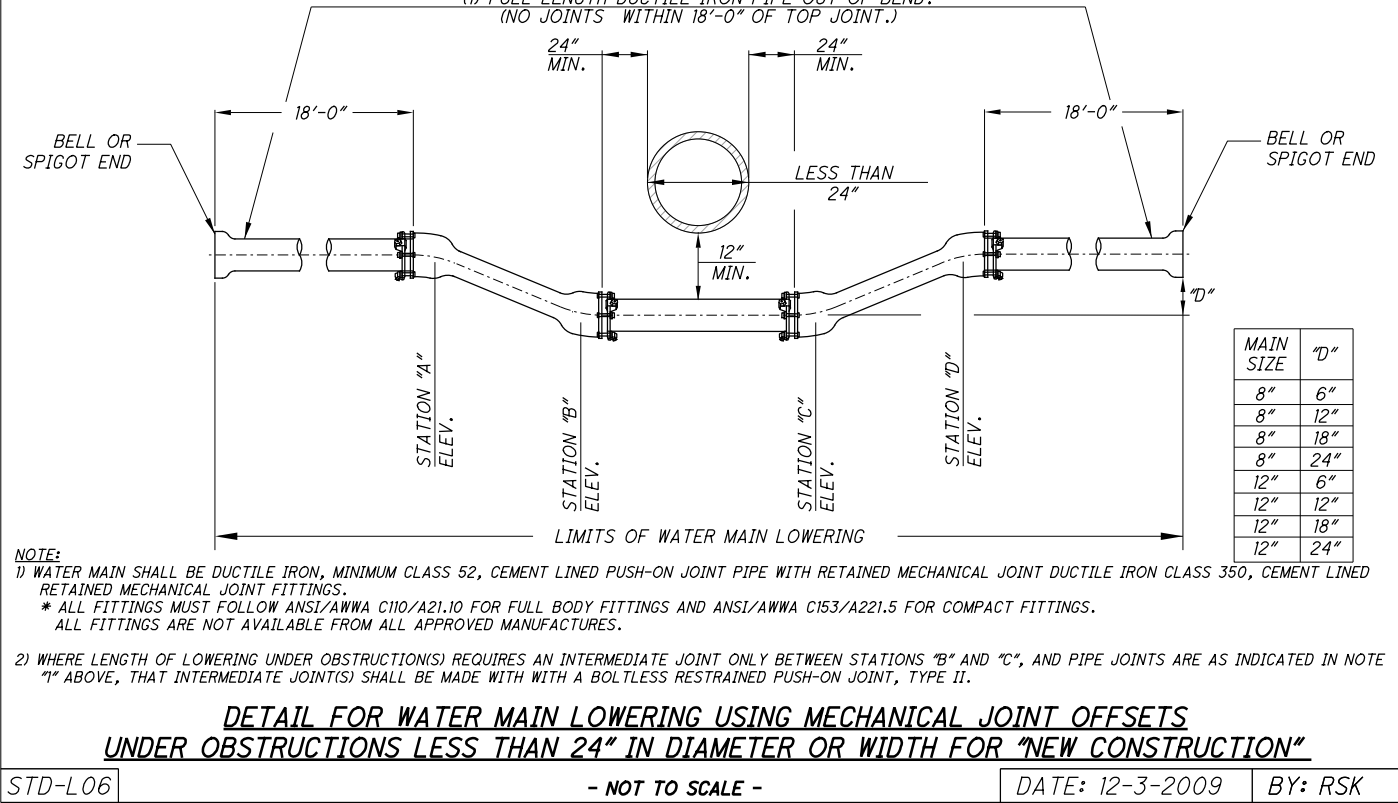
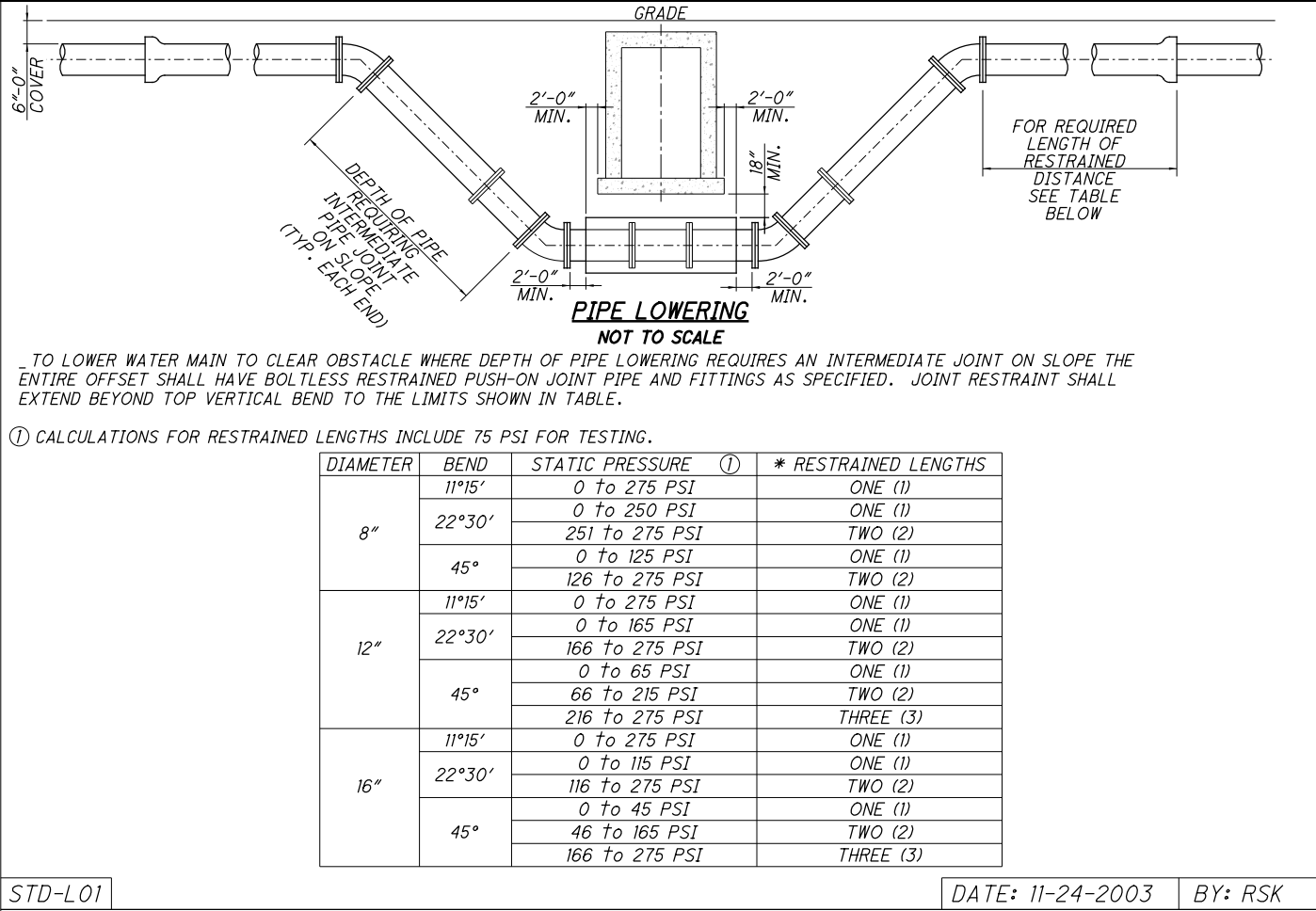
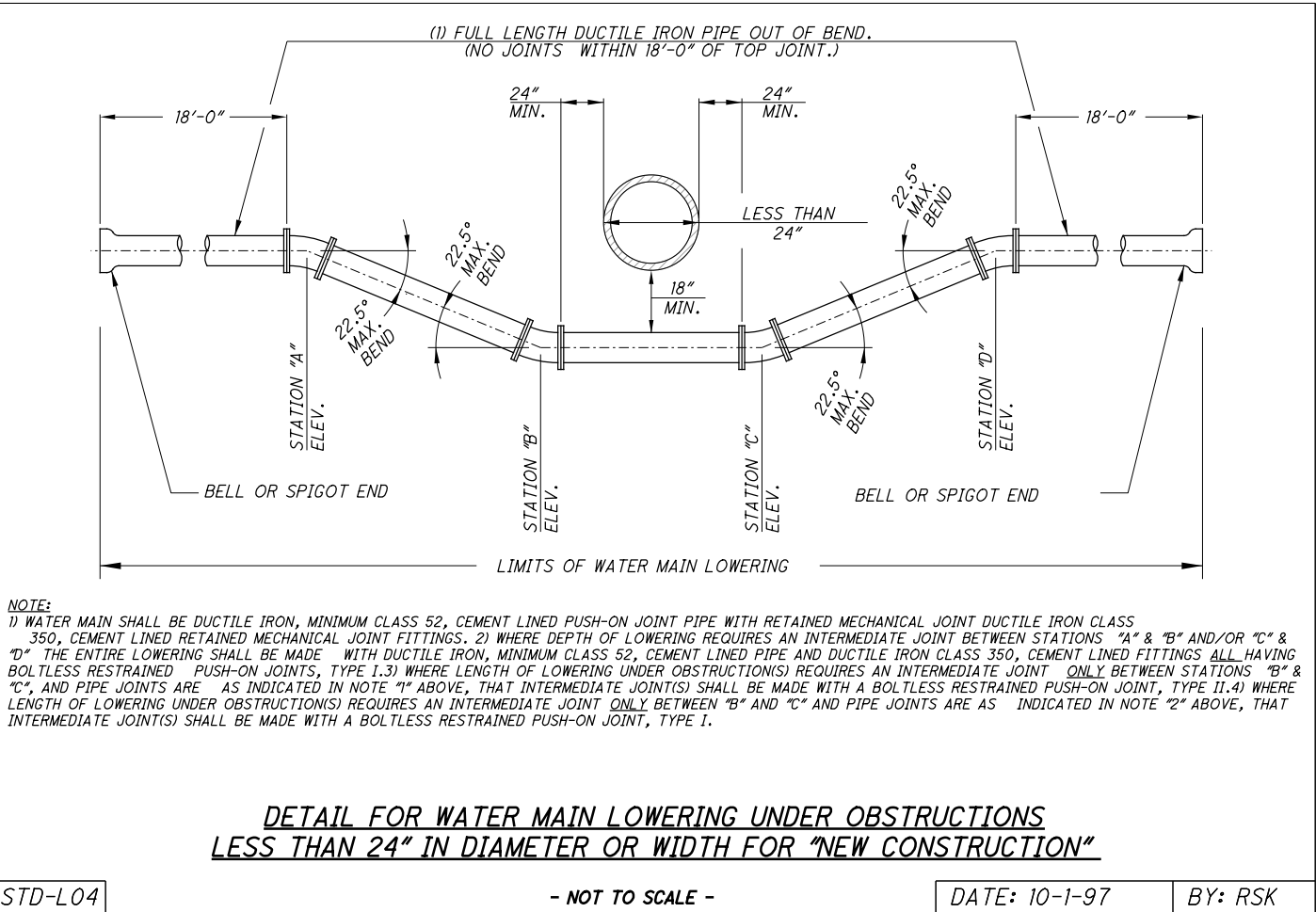
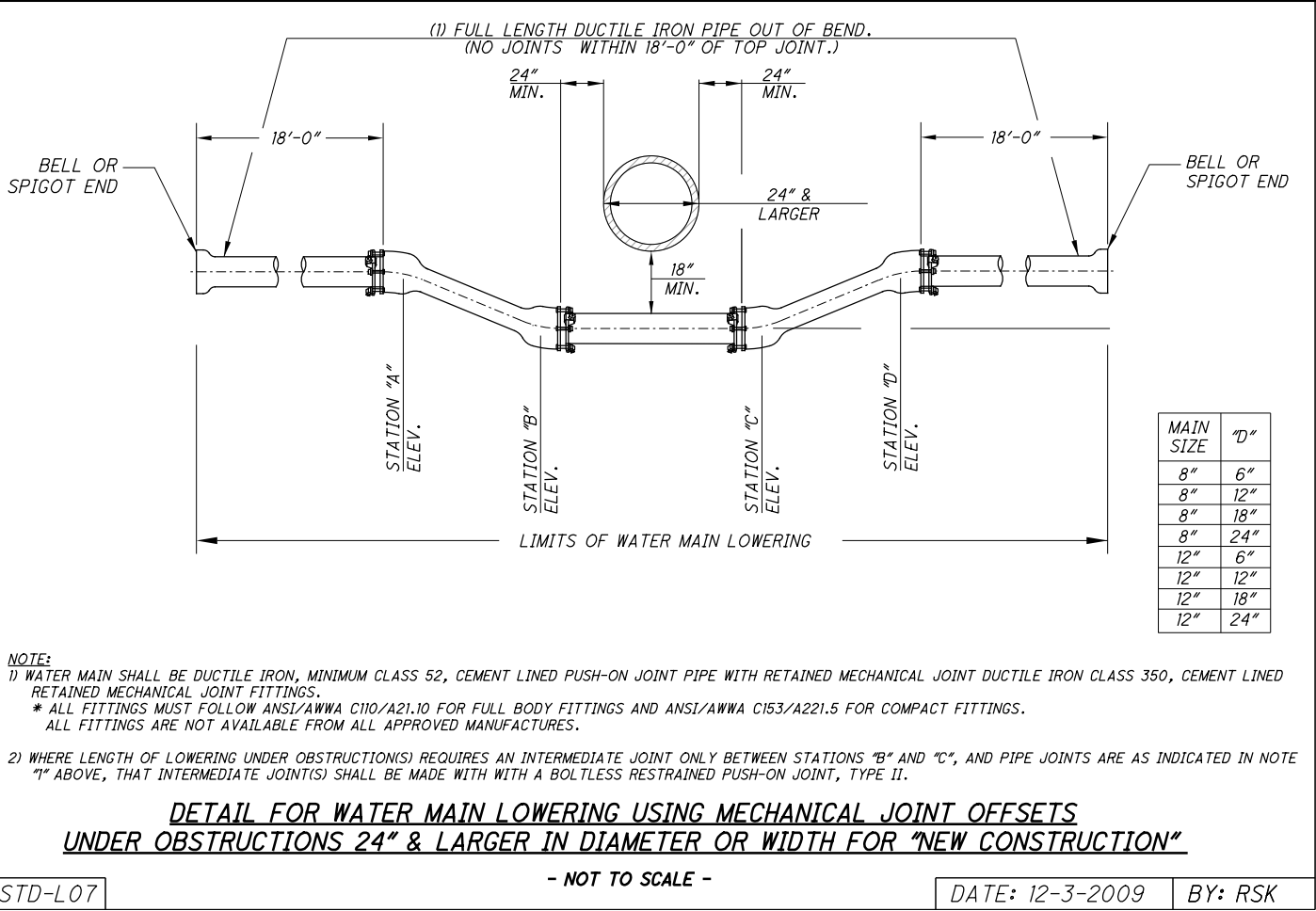
**DETAIL FOR WATER MAIN LOWERING UNDER OBSTRUCTIONS 24" & SMALLER IN DIAMETER OR WIDTH FOR "EXISTING CONSTRUCTION"**  
- NOT TO SCALE -  
CLEVELAND DIVISION OF WATER - STD-L02

**NOTE:**

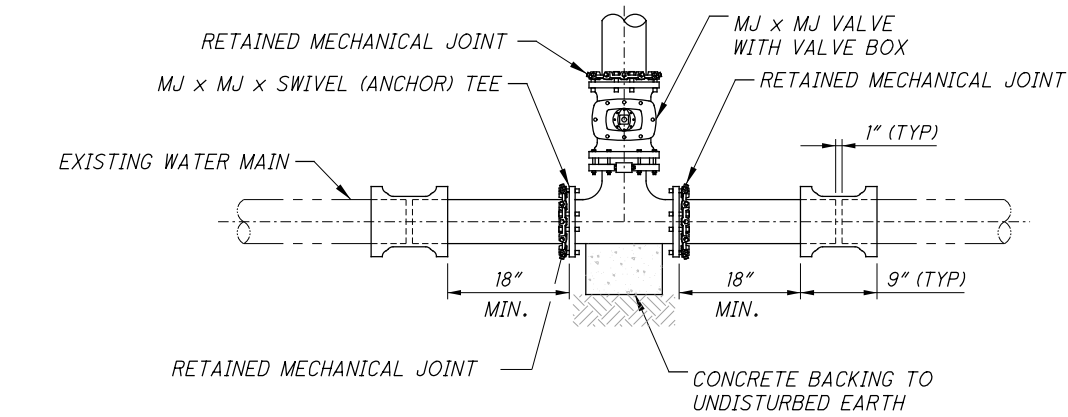
- 1) WATER MAIN SHALL BE DUCTILE IRON, MINIMUM CLASS 52, CEMENT LINED PUSH-ON JOINT PIPE WITH RETAINED MECHANICAL JOINT DUCTILE IRON CLASS 350, CEMENT LINED RETAINED MECHANICAL JOINT FITTINGS.
- 2) WHERE DEPTH OF LOWERING REQUIRES AN INTERMEDIATE JOINT BETWEEN STATIONS "A" & "B" AND/OR "C" & "D" THE 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 II.
- 3) WHERE LENGTH OF LOWERING UNDER OBSTRUCTION(S) REQUIRES AN INTERMEDIATE JOINT "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 "E" AND "F". 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 "E" AND STATIONS "D" AND "F". NO RETAPPING OF SERVICE CONNECTIONS WILL BE ALLOWED BETWEEN STATIONS "A" AND "D".

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ISSUE RECORD		

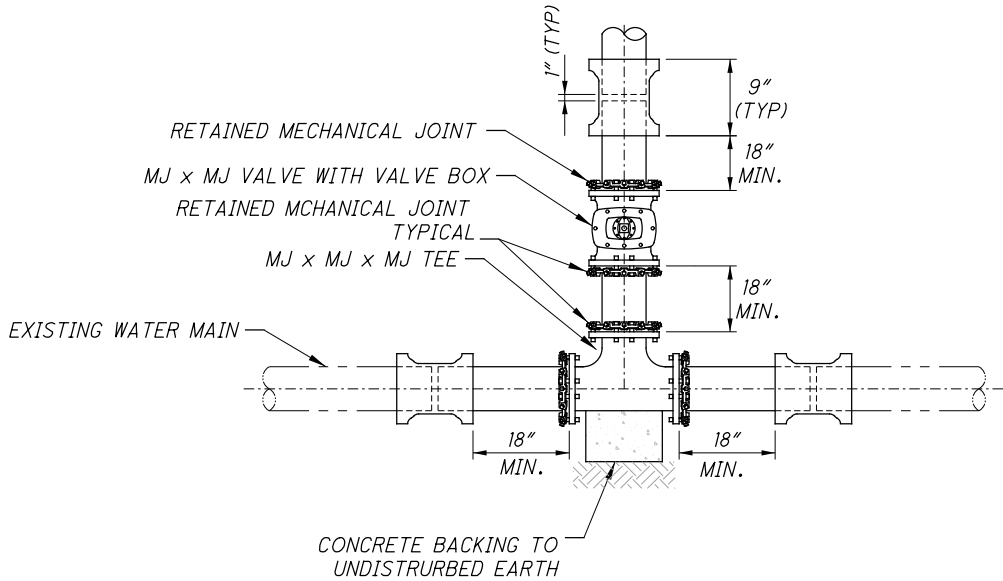




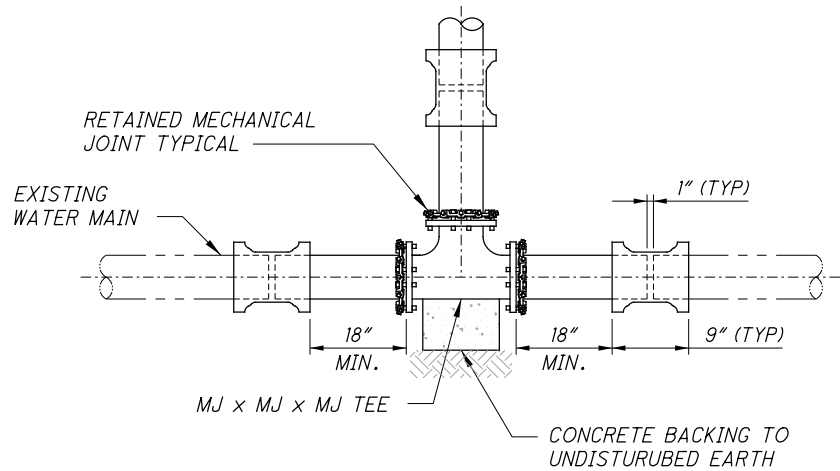
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NO.	DATE	DESCRIPTION
ISSUE RECORD		



**CUT-IN TEE DETAIL METHOD No.1**  
- NOT TO SCALE -  
CLEVELAND WATER DEPARTMENT - STD-T01



**CUT-IN TEE DETAIL METHOD No.2**  
- NOT TO SCALE -  
CLEVELAND WATER DEPARTMENT - STD-T02



**CUT-IN TEE DETAIL METHOD No.3**  
- NOT TO SCALE -  
CLEVELAND WATER DEPARTMENT - STD-T03

\* 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.

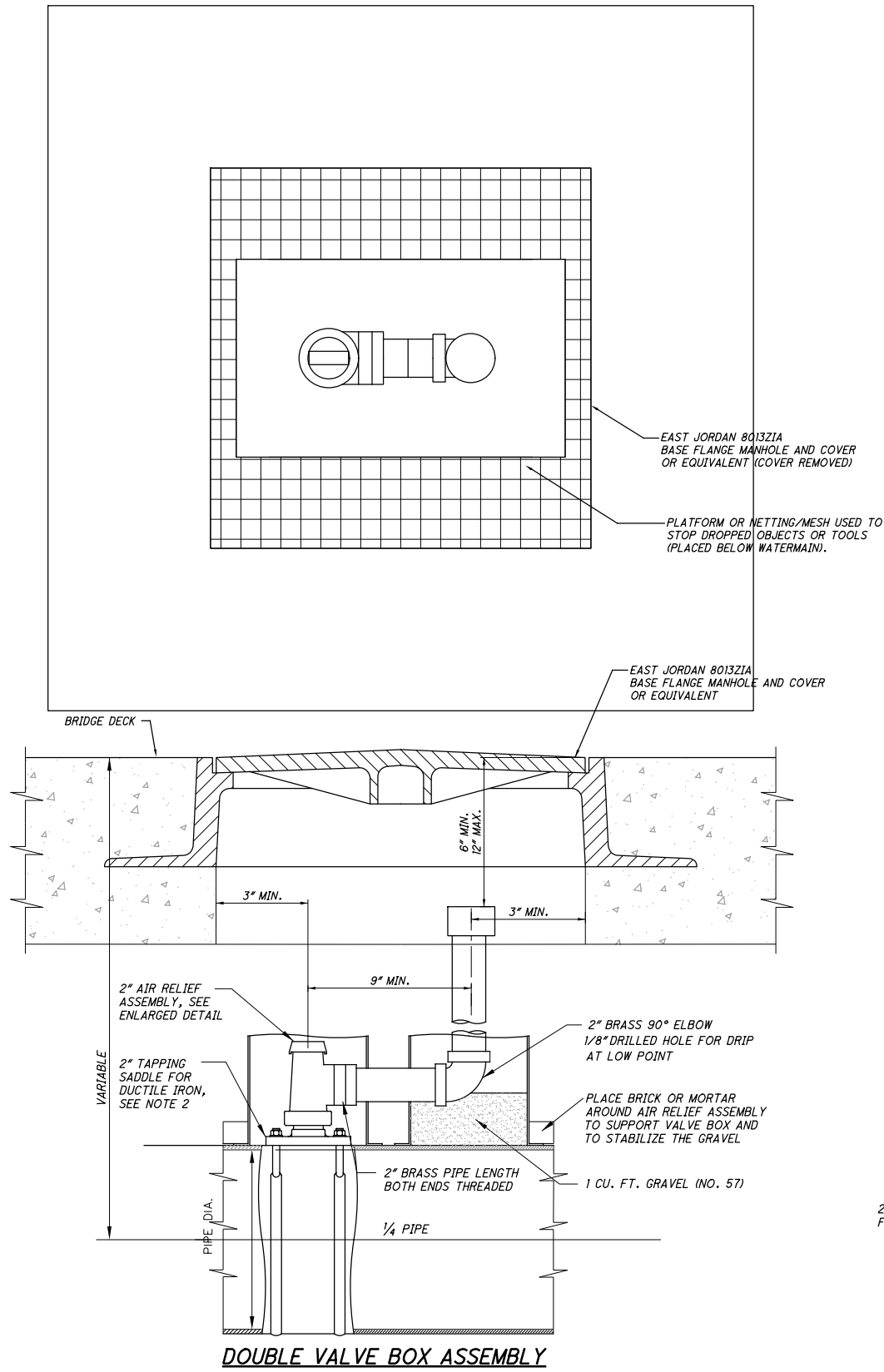
COMPRESSION COUPLINGS SHALL BE OF A GASKETED, SLEEVE TYPE WITH DIAMETERS TO PROPERLY FIT PLAIN END IRON PIPE. EACH COUPLING SHALL CONSIST OF ONE (1) MIDDLE RING, WITHOUT STOPS; TWO (2) FOLLOWER GLANDS; TWO (2) RUBBER-COMPOUND BUNA-N BLEND, WEDGE SECTION GASKETS; AND SUFFICIENT TRACKHEAD STAINLESS STEEL 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).

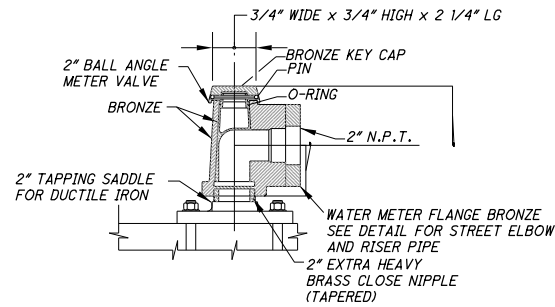
THE COMPRESSION COUPLING SHALL BE WITHOUT STOPS AND BE RATED FOR A MINIMUM WORKING PRESSURE OF 250 PSI AND SHALL BE EQUAL TO THE DRESSER STYLE No's 38, 138 OR 162 (TRANSITION TYPE), OR SMITH-BLAIR 441 STRAIGHT AND TRANSITION COUPLINGS.

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".

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ISSUE RECORD		



DOUBLE VALVE BOX ASSEMBLY

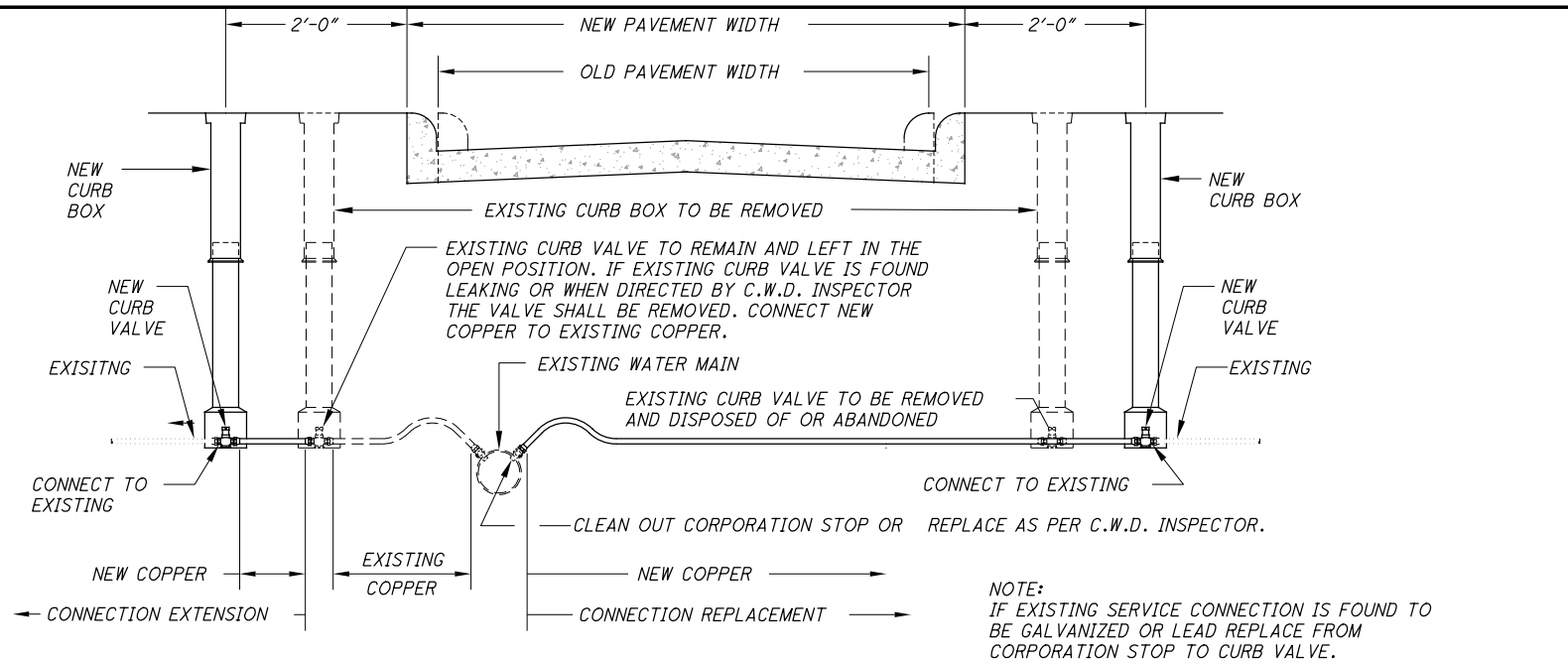


AIR RELIEF VALVE ASSEMBLY

2" AIR RELIEF FOR DUCTILE IRON MAINS

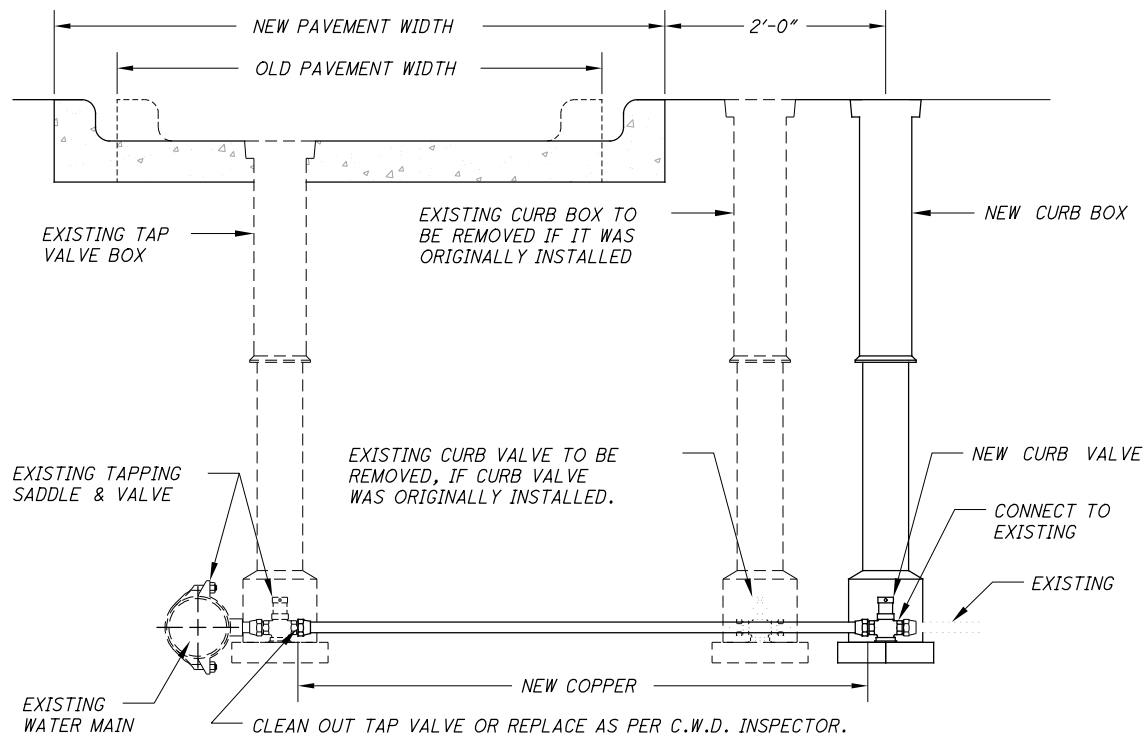
2" AIR RELIEF DETAILS  
- NOT TO SCALE -  
CLEVELAND WATER DEPARTMENT - SM-STD6  
MODIFIED

0	2019-07-31	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		

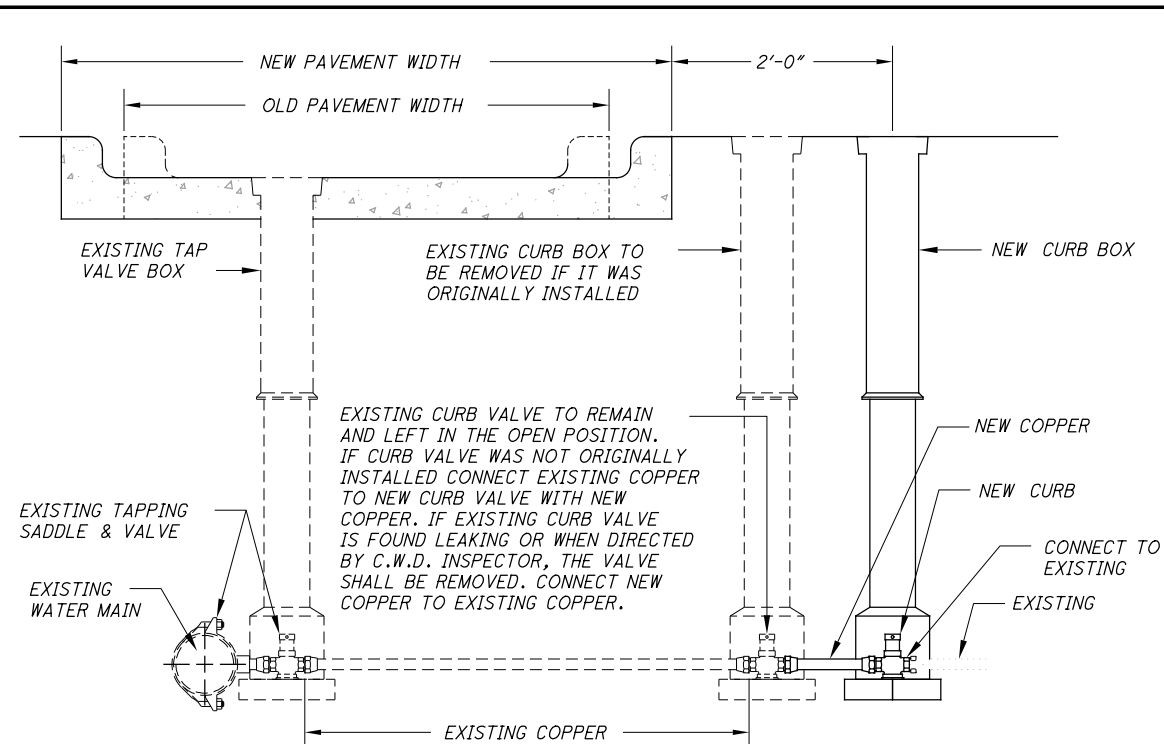


NOTE: PAYMENT INCLUDED IN ITEM SPECIAL - WATER SERVICE CONNECTION EXTENSION. ALL CONNECTION REPLACEMENTS SHALL BE 1" MINIMUM SIZE.

**WATER SERVICE CONNECTION EXTENSION OR REPLACEMENT FOR 1" & SMALLER**  
- NOT TO SCALE -  
CLEVELAND WATER DEPARTMENT - STD-C01

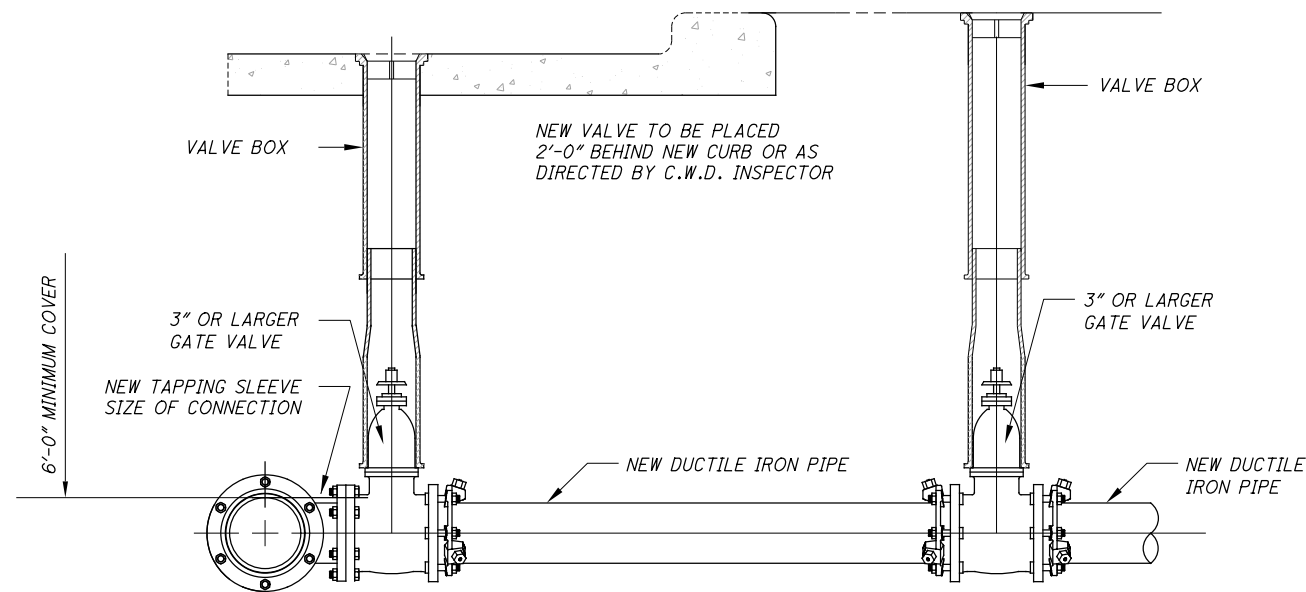


**WATER SERVICE CONNECTION REPLACEMENT FOR 1-1/2" & 2"**  
- NOT TO SCALE -  
CLEVELAND WATER DEPARTMENT - STD-C03



NOTE: IF EXISTING SERVICE CONNECTION IS FOUND TO BE GALVANIZED OR LEAD REPLACE FROM TAP VALVE TO CURB VALVE AS DETAILED IN "WATER SERVICE REPLACEMENT".  
NOTE: PAYMENT INCLUDED IN ITEM SPECIAL - WATER SERVICE CONNECTION EXTENSION.

**WATER SERVICE CONNECTION EXTENSION FOR 1-1/2" & 2"**  
- NOT TO SCALE -  
CLEVELAND WATER DEPARTMENT - STD-C02



**WATER SERVICE CONNECTION 3" AND LARGER**  
- NOT TO SCALE -  
CLEVELAND WATER DEPARTMENT - STD-C11

FOR SINGLE FEED DUAL SERVICE CONNECTIONS (FIRE & COMESTIC) SEE STANDARD DETAILS V-03, V-04, V-05 AND V-06.

ISSUE RECORD		
NO.	DATE	DESCRIPTION
0	2019-07-31	RFC



For Generations

# TYTON® JOINT PIPE



**Tyton® Joint**

Pipe Size In.	Pipe Thickness In.		Outside Diameter In.	*Dimensions In.	
	From	To		A	B
3	.25	.40	3.96	5.80	3.00
4	.25	.41	4.80	7.10	3.15
6	.25	.43	6.90	8.63	3.38
8	.25	.45	9.05	10.94	3.69
10	.26	.47	11.10	13.32	3.75
12	.28	.49	13.20	15.06	3.75
14	.28	.51	15.30	17.80	5.00
16	.30	.52	17.40	19.98	5.00
18	.31	.53	19.50	22.00	5.00
20	.33	.54	21.60	24.12	5.25
24	.33	.56	25.80	28.43	5.50
30	.34	.63	32.00	35.40	6.55
36	.38	.73	38.30	41.84	7.00

\*Nominal laying length is 18 ft.

## ASSEMBLY INSTRUCTIONS

- Step 1. Thoroughly clean out the bell with special attention to the gasket recess. Remove any foreign material or excess paint. Clean the spigot or beveled plain end and remove any sharp edges with a standard file.
- Step 2. After making sure that the correct gasket is being used, insert it into the recess in the bell with the small end of the gasket facing the bell face.
- Step 3. Apply lubricant to the inside surface of the gasket, making sure that the entire surface is coated. Apply a generous coating of lubricant to the beveled portion of the plain end.
- Step 4. Guide the plain end into the bell and, while maintaining straight alignment, push the plain end into the bell socket. Once the joint is assembled, necessary deflection can be accomplished. When assembly is complete, the bell face should be aligned between the two white depth rings, for Tyton® Joints. Fastite® Joints have only 1 assembly stripe.



IRON STRONG

**NEW JERSEY**  
183 Sitgreaves St.  
Phillipsburg, NJ 08855  
908-454-1161  
mcwaneductile.com

**OHIO**  
2266 S. 6th St.  
Coshocton, OH 43812  
740-622-6651  
mcwaneductile.com

**UTAH**  
1401 E 2000 S.  
Provo, UT 84603  
801-373-6910  
mcwaneductile.com



Canada Pipe  
Company ULC

**CANADA**  
1757 Burlington St. E  
Hamilton, ON L8N-3R5  
905-547-3251  
canadapipe.com



NSF 61



ISO 9001



DIPRA



SMART

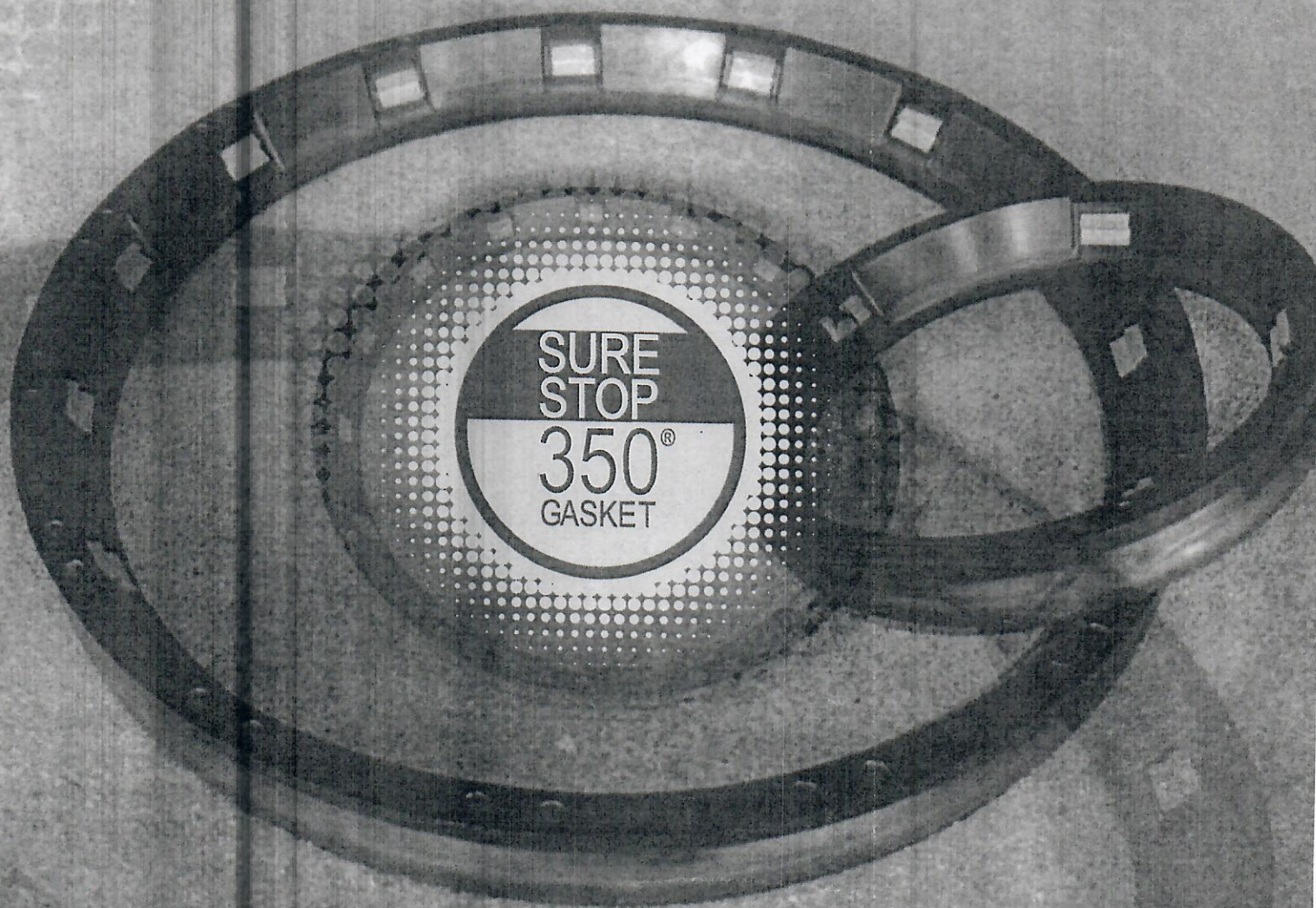
certified

Transparent,  
Quantified,  
Global.



# INSTANT JOINT RESTRAINT WITH McWANE'S NEW SURE STOP 350® GASKET

UL Listed at 350 PSI • NSF 61 Approved  
3"- 24" Listed and Approved



Atlantic States  
183 Sitgraves Street  
Phillipsburg, NJ 08865  
(908) 454-1161

Canada Pipe Company  
1757 Burlington Street East  
Hamilton, ON L8H 3L5  
(905) 547-3251

Clow Water Systems  
2266 South 6th Street  
Coshooton, OH 43812  
(740) 622-6651

McWane Pipe  
1201 Vanderbilt Road  
Birmingham, AL 35234  
(205) 322-3521

Pacific States  
1401 East 2000 South  
Provo, UT 84606  
(801) 373-6910



## SURE STOP 350® GASKETS



McWane's SURE STOP 350® GASKETS are a fast and easy way of restraining TYTON®, TRIM TYTON®, or TYTON JOINT® pipe, valves and fittings. The gaskets are suitable for water, wastewater, fire protection and other related applications. Simply install the gasket in a TYTON JOINT® pipe, valve or fitting socket, assemble the joint in accordance with proper procedures, and the joint is restrained for working pressures up to 350 psi.

The gaskets are available in sizes 3" - 24", and with a rating of 350 psi they will meet or exceed the capabilities of ductile iron pipe, valves and fittings. SURE STOP 350® GASKETS are NSF 61 approved, UL listed and approved by FM Approvals. There is no need to use bolts, clamps, rods, thrust blocks or other restraining devices when you can use an easy push on restraining SURE STOP 350® GASKET. SURE STOP 350® GASKETS are produced and tested in accordance with ANSI/AWWA C111/A21.11, and have a 350 psi pressure rating. The gaskets have been successfully tested at a minimum of 700 psi to nationally recognized listing agency requirements, as witnessed by independent testing agencies (certificates available upon request).

### Application Notes

1. For ductile iron applications utilizing TYTON® pipe, valves, and fittings made to AWWA specifications.
2. In cold weather assembly maintain the temperature of the gasket above 40° F.
3. The socket of the joint should be clean and free of debris or significant corrosion.
4. Gasket should be properly seated in the bell socket.
5. Keep the pipe and joint in alignment during assembly. If installed out of alignment, the gasket can be pushed out of position, creating the potential for leaks or failure.
6. If deflection is wanted in the joint, deflect before fully inserting the joint.
7. Some extension of the joint will occur when pressurized. To avoid this, the joint should be pulled out after assembly to "set" the stainless steel teeth in the inserted pipe.
8. Once assembled, the joint can be disassembled using steel shims.
9. When cut pipe are used, the following steps are required:
  - a. Ensure that the spigot end is properly beveled.
  - b. Mark the joint depth on the spigot so it is clear when the joint is fully inserted.
  - c. Ensure that the pipe meets the required dimensional tolerances, as follows:

Pipe Size (Nominal)	Circumference		Diameter	
	(Maximum)	Minimum	(Maximum)	Minimum
3"	12-5/8"	12-1/4"	4.02"	3.90"
4"	15-9/32"	14-29/32"	4.86"	4.74"
6"	21-7/8"	21-1/2"	6.96"	6.84"
8"	28-5/8"	28-1/4"	9.11"	8.99"
10"	35-1/16"	34-11/16"	11.16"	11.04"

Pipe Size (Nominal)	Circumference		Diameter	
	(Maximum)	Minimum	(Maximum)	Minimum
12"	41-21/32"	41-9/32"	13.26"	13.14"
14"	48-7/32"	47-13/16"	15.35"	15.22"
16"	54-13/16"	54-13/32"	17.45"	17.32"
18"	61-13/32"	61"	19.55"	19.42"
20"	68"	67-19/32"	21.65"	21.52"
24"	81-7/32"	80-13/16"	25.85"	25.72"

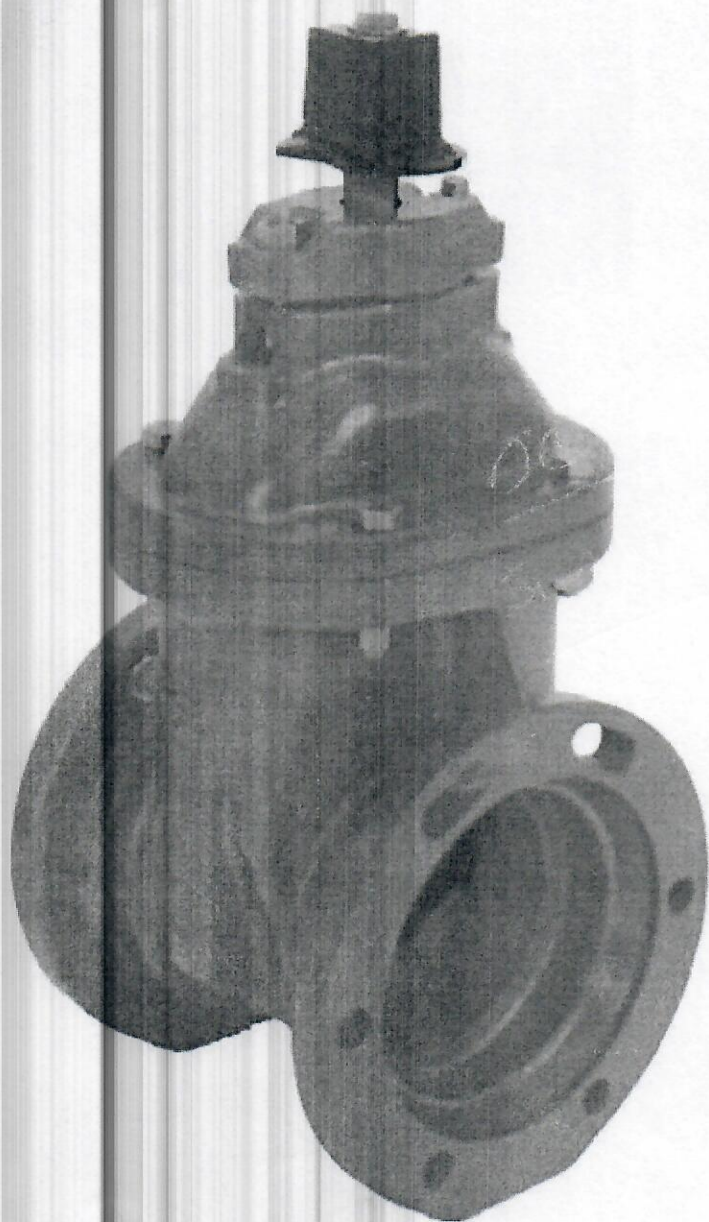
10. Do not reuse SURE STOP 350® GASKETS, as they may have been damaged during any previous installation or during removal.
11. Do not use SURE STOP 350® GASKETS to conduct electricity through the pipe joint, as they could be damaged and fail.
12. Do not use SURE STOP 350® GASKETS in above ground applications.
13. Do not use SURE STOP 350® GASKETS with thick coatings on the pipe exterior.





# CLOW

## RESILIENT WEDGE VALVE



**2" THROUGH 12"  
Model 2639/2640**

2", 2½", 3", 4", 6", 8", 10", & 12"  
AWWA C-509 250 PSI  
ULFM Approved 200 PSI  
NSF61 Approved  
Full Water Way  
C-R Coated  
10 Year Limited Warranty

*It is the Original, and the Definitive Standard*



MADE IN THE USA



**RESILIENT  
WEDGE VALVES**

**CLOW VALVE COMPANY**

**CLOW AWWA Resilient Wedge Gate Valves  
Meet or Exceed the Requirements of  
AWWA Standard C515**

Size Range	Water Working Pressure psi	Bubble Tight Test psi	Hydrostatic Shell Test psi
AWWA 4"-48"	250	250	500
ULFM 4"-16"	200	200	400

**Available in either non-rising stem, outside screw & yoke.**

**Available End Connections & Size Range**

**Figure No.**

FLG End (NRS)	4"-48"	F-6102
M.J.	4"-48"(except 2 1/2")	F-6100
FLG & M.J.	4"-48"	F-6106
Push-on for PVC (SDR)	4"-12"	F-6110
FLG End (OS & Y)	4"-24"	F-6136
M.J. for Tapping	4"-24"	F-6114
Tyton for D.I. & C900 PVC	4"-12" & 16"	F-6112
M.J. Cutting-in	4"-12"	F-6111
Tyton for D.I. X FLG	4"-12"	F-6113

**Accessories (Illustrated in the Gate Valve Section)**

Indicator Posts	2" Sq. Operating Nuts
Enclosed Gearing (14"-24")	Handwheels
"T" Handles	Extension Stems
Stem Guides	Floor Boxes
Electric Motor Actuators	Chain Wheels
Floorstands (non-rising stem)	

**NOTE:**

It is recommended that valves be installed with stems vertical when used in raw sewage or sludge applications or in water with excessive sediment.

**MODEL 2638 AWWA C515 REDUCED WALL DUCTILE IRON**

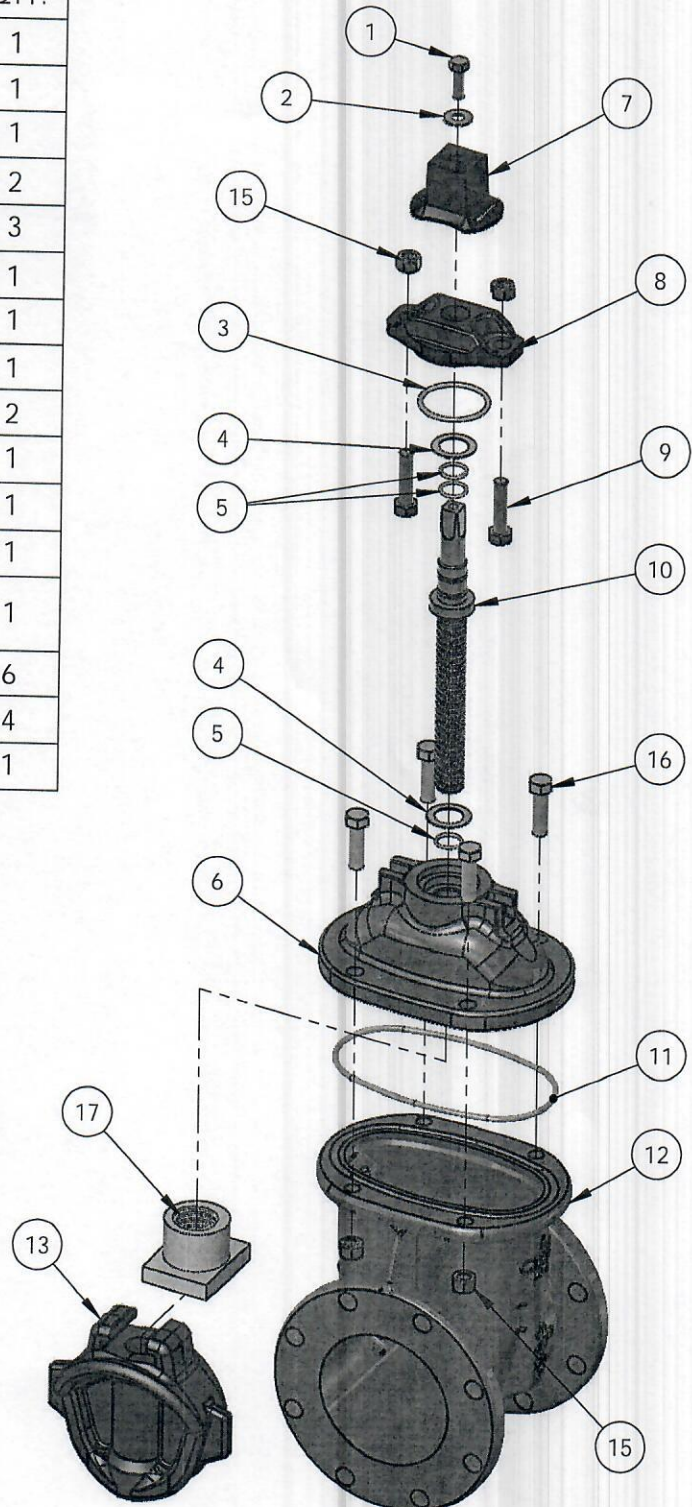


4"-12" R/S VALVE NRS  
EXPLODED VIEW MATERIAL LIST

**CLOW VALVE COMPANY**

MODEL 2638

ITEM NO.	DESCRIPTION	Material	QTY.
1	Hex Head Bolt	Stainless Steel	1
2	Flat Washer	Stainless Steel	1
3	O-Ring	Rubber	1
4	Thrust Washer	Delrin	2
5	O-Ring	Rubber	3
6	Cover	Ductile Iron	1
7	Operating Nut	Gray Iron	1
8	Follower Plate	Ductile Iron	1
9	Hex Head Bolt	Stainless Steel	2
10	Stem	Copper Alloy	1
11	O-Ring	Rubber	1
12	Body	Ductile Iron	1
13	Wedge	Ductile Iron / Rubber	1
15	Hex Nut	Stainless Steel	6
16	Hex Head Bolt	Stainless Steel	4
17	Stem Nut	Copper Alloy	1



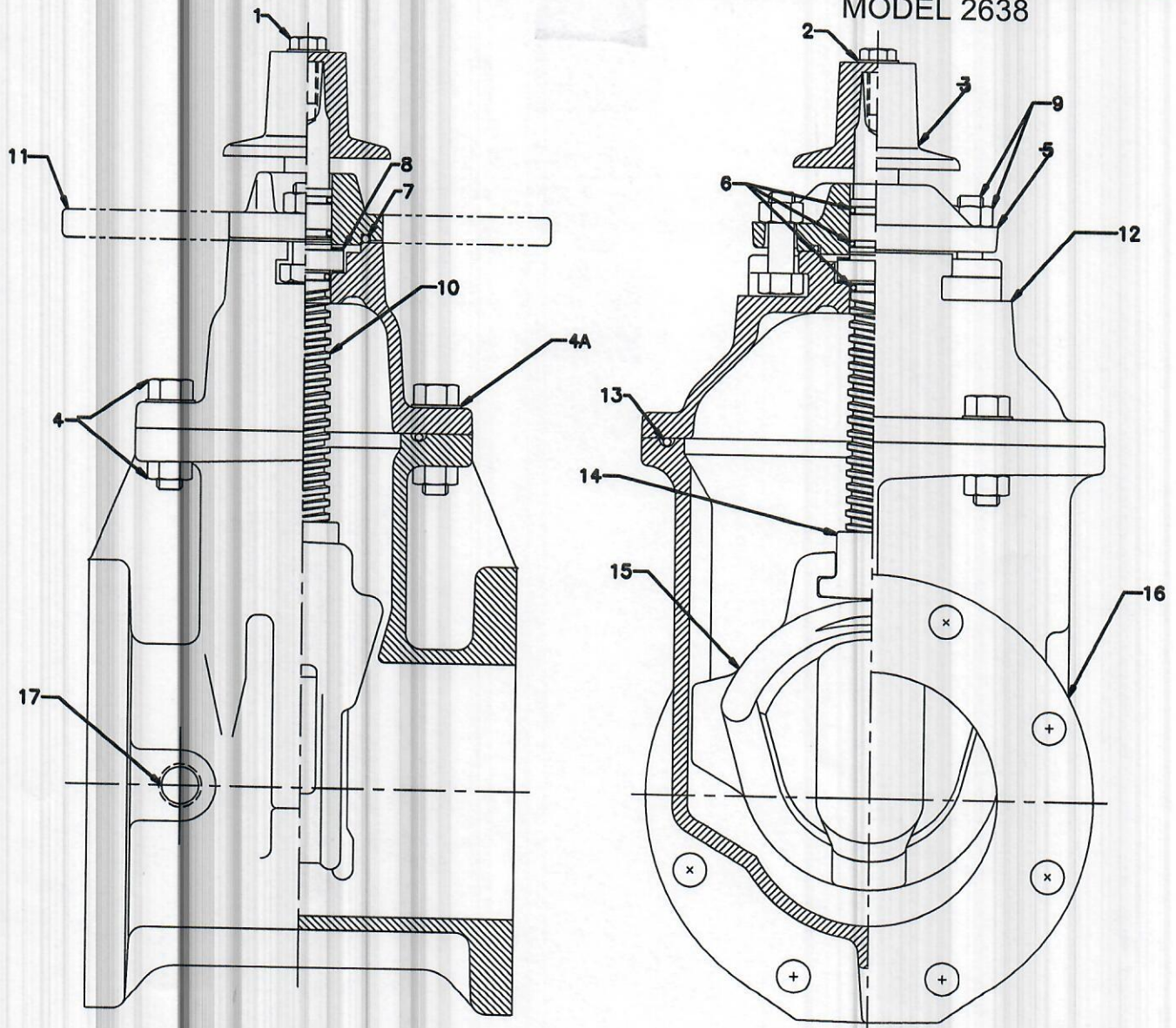


Complies with applicable  
requirements of AWWA C515

4"-12" R/W VALVE  
MATERIAL LIST

# CLOW VALVE COMPANY

MODEL 2638



ITEM	DESCRIPTION	MATERIAL
1	Hex Head Bolt	Stainless Steel
2	Flat Washer	Stainless Steel
3	Operating Nut	Gray Iron
4	Hex Head Bolts & Nuts	Stainless Steel
5	Follower Plate	Ductile Iron
6	Stem O-Ring	Rubber
7	Follower Plate O-Ring/gasket	Rubber
8	Thrust Washer Bearing	Delrin
9	Hex Head Bolts & Nuts	Stainless Steel
10	Stem	Copper Alloy
11	Indicator Post Plate (Optional)	Ductile Iron
12	Cover	Ductile Iron
13	Cover O-Ring	Rubber
14	Stem Nut	Copper Alloy
15	Wedge	Ductile Iron & Rubber
16	Body - all types	Ductile Iron
17	Pipe Plug (Optional Some Styles)	Stainless Steel

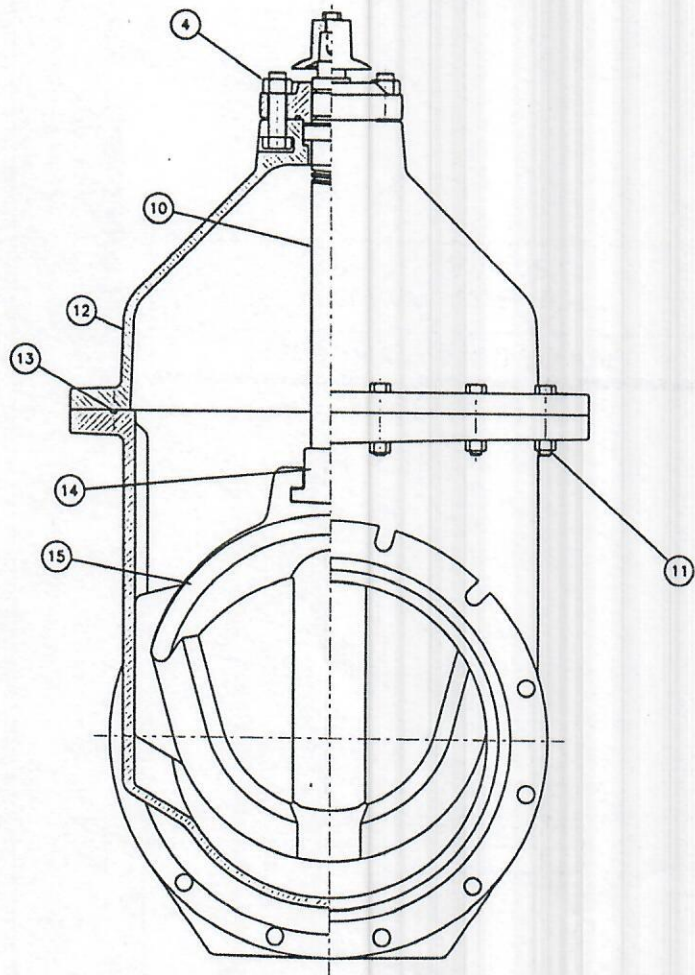
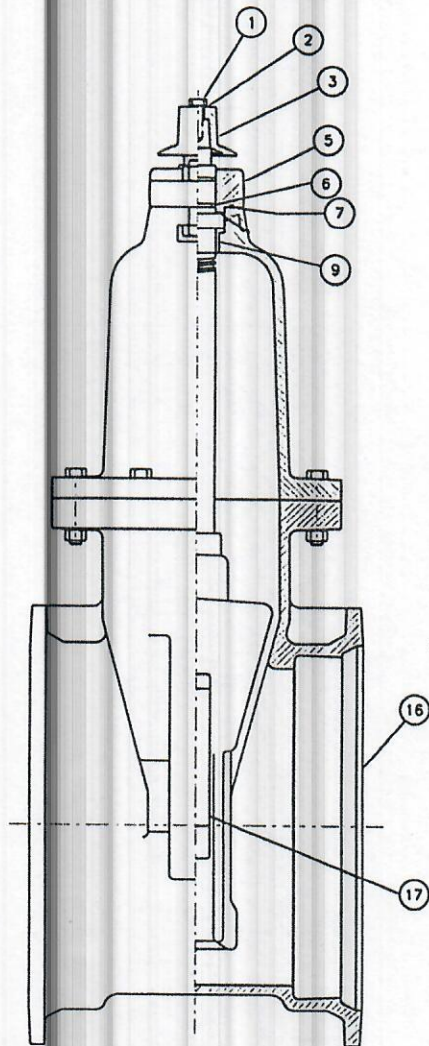


Complies with applicable  
requirements of AWWA C515

14"-16" R/W VALVE  
NRS ASSEMBLY MATERIAL LIST

**CLOW VALVE COMPANY**

MODEL 2638

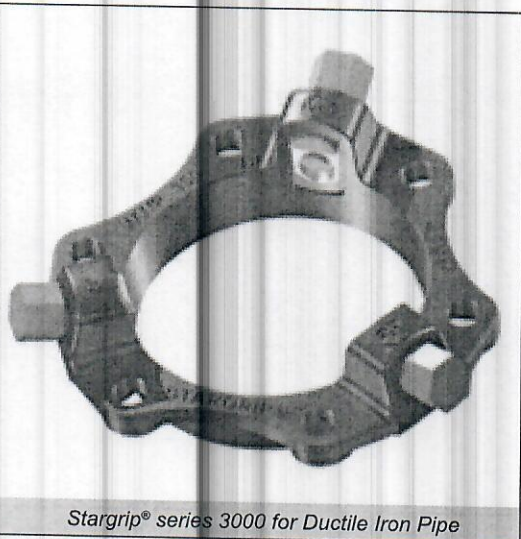


ITEM	DESCRIPTION	MATERIAL
1	HEX HEAD BOLTS	304 STAINLESS STEEL
2	FLAT WASHERS	304 STAINLESS STEEL
3	OPERATING NUT OR HANDWHEEL	CAST IRON
4	HEX HEAD BOLTS&NUTS	304 STAINLESS STEEL
5	FOLLOWER PLATE	DUCTILE IRON
6	STEM O-RING	RUBBER
7	FOLLOWER PLATE O-RING	RUBBER
9	BONNET BUSHING	COPPER ALLOY
10	STEM	COPPER ALLOY
11	HEX HEAD BOLTS&NUTS	304 STAINLESS STEEL
12	COVER	DUCTILE IRON
13	COVER O-RING	RUBBER
14	STEM NUT	COPPER ALLOY
15	WEDGE	DUCTILE IRON / RUBBER
16	BODY - ALL TYPES	DUCTILE IRON
17	WEDGE PROTECTOR CAP-18"-THRU 24"	DELTRIN



**Stargrip® series 3000**

Mechanical Joint Wedge Action Restraint  
for Ductile Iron Pipe  
Patent #5,772,252



Stargrip® series 3000 for Ductile Iron Pipe

**INFORMATION**

The Stargrip® Mechanical Joint Restraint System is a unique product with a proven design that provides an exceptional restraining system for mechanical joint fittings (AWWA C153 or C110), valves, fire hydrants and all classes of ductile iron pipe.

**More Adaptable for Field Use****FEATURES & ADVANTAGES**

- Gland is made from high strength Ductile Iron per ASTM A536, Grade 65-45-12 and is compatible with all Mechanical Joints conforming to ANSI/AWWA C111/A21.11.
- The Wedge Assembly is designed with a Break-Off Torque Control Nut that will only break off in one direction, ensuring proper installation.
- The Stargrip® offers a full 5° deflection through 12" size, 3° on 14"-24", 2° on 30"-36" and 1° on 42"-48".
- Minimum safety factor of 2:1.
- Stargrip® sizes 3"-36" are listed with Underwriters Laboratories Inc. and sizes 3"-12" are approved by Factory Mutual Research.
- The Wedges are heat treated to a minimum of 370 BHN.
- The Wedge Assembly is designed to fit specific pipe sizes and is field repairable.
- No special tools are required for installation of the Stargrip®.
- Stargrip® eliminates tie rods and thrust blocks.
- Standard gland color is Graphite Black (RAL 9011).

**SAMPLE SPECIFICATIONS**

*Restrainer mechanism shall be integrated into the design of the follower gland. As the mechanism is activated, multiple wedging action shall be imparted against the pipe increasing its resistance as internal pressure increases. After burial of the restraining mechanism, joint flexibility shall be maintained.*

*The actuating bolt shall be threaded into the restraining wedge and have a 1-1/4" hex operating nut. The operating nut shall be threaded onto the actuating bolt, not swaged or riveted. The restraining twist off nut bolt system shall have a torque-limiting feature designed to break off at preset torque levels, thus insuring proper action of restraining device. Glands shall be manufactured of high strength ductile iron in accordance with ASTM A536 Grade 65-45-12 requirements. The wedge shall be manufactured of high strength ductile iron and be heat treated to a minimum hardness of 370 BHN. Applicable dimensions shall conform to ANSI/AWWA C111/A21.11 and shall be incorporated into the mechanical joint restraint so that the device facilitates use with standard mechanical joint bells.*

*The mechanical joint restraint mechanism shall have a maximum water working pressure of 350 PSI for sizes 3"-16" and 250 PSI for sizes 18" and above. All sizes shall have a minimum safety factor of 2:1 (i.e. twice the maximum pressure rating of the restraint). The mechanical joint restraint mechanism shall be Underwriters Laboratories listed on size 3" through 36" and Factory Mutual Research Approved on size 3"-12". The restraint mechanism shall be Star® Pipe Products Stargrip® series 3000 or an approved equal.*

REV.07



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STAR® PIPE PRODUCTS  
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www.starpipeproducts.com

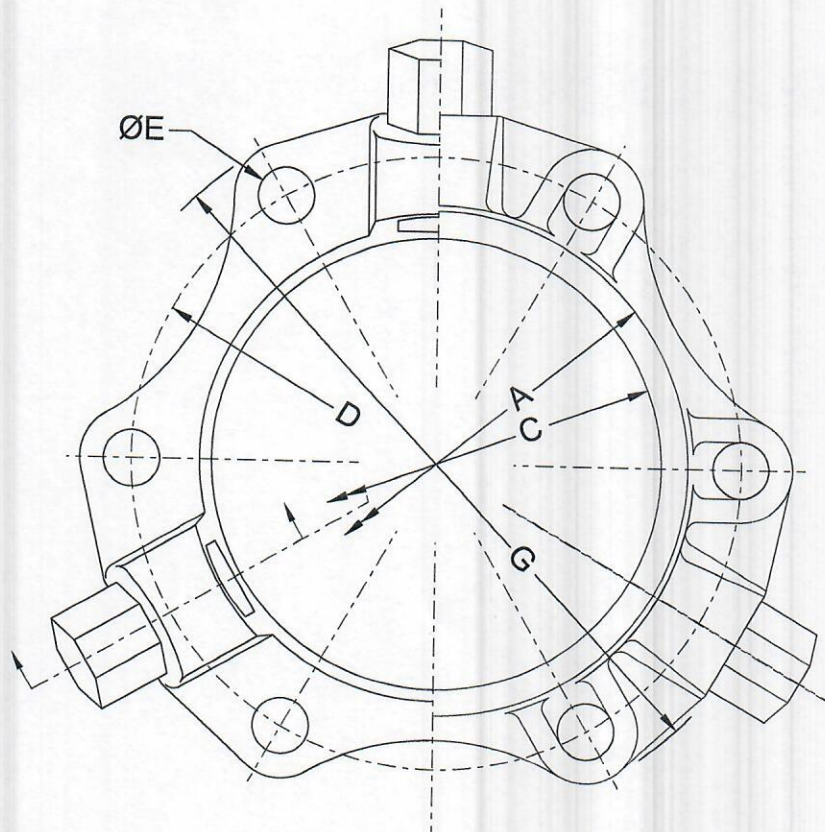
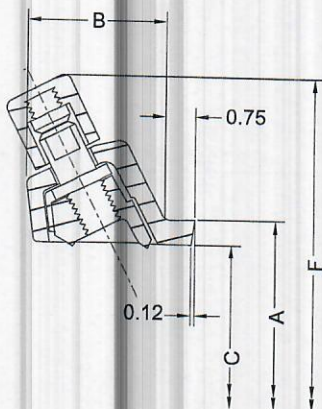




# Stargrip® series 3000

Mechanical Joint Wedge Action Restraint  
for Ductile Iron Pipe  
Patent #5,772,252

## TECHNICAL INFORMATION



### STARGRIP® 3000 SPECIFICATIONS\*

NOM. SIZE	MAX PRESSURE RATING (PSI)	A	B	C	D	E	F	F W/NUTS TWISTED OFF	G	NO. OF WEDGES	NO. OF T-BOLTS	APPROX WT. (LBS)
3	350	4.84	2.40	4.06	6.19	3/4	9.85	8.45	7.69	2	4	6
4	350	5.92	2.40	4.90	7.50	7/8	11.06	9.28	9.15	2	4	8
6	350	8.02	2.40	7.00	9.50	7/8	13.06	11.38	11.15	3	6	12
8	350	10.17	2.51	9.15	11.75	7/8	15.25	13.53	13.40	4	6	17
10	350	12.22	2.51	11.20	14.00	7/8	17.25	15.58	15.92	6	8	24
12	350	14.32	2.51	13.30	16.25	7/8	19.50	12.68	17.90	8	8	34
14	350	16.40	2.91	15.44	18.75	7/8	21.25	19.82	20.25	10	10	49
16	350	18.50	2.91	17.54	21.00	7/8	23.34	21.92	24.83	12	12	56
18	250	20.60	2.91	19.64	23.25	7/8	26.40	24.84	25.25	12	12	59
20	250	22.70	2.67	21.74	25.50	7/8	28.56	27.00	27.50	14	14	75
24	250	26.90	3.50	25.94	30.00	7/8	33.86	32.30	31.54	16	16	139
30	250	33.29	3.49	32.17	36.88	1-1/8	40.12	38.56	39.12	20	20	199
36	250	39.59	3.49	38.47	43.75	1-1/8	46.42	44.86	46.00	24	24	232
42	250	45.79	5.15	44.75	50.62	1-3/8	54.86	53.32	53.12	28	28	400
48	250	52.09	5.15	51.05	57.50	1-3/8	61.16	59.62	59.42	32	32	488

\*All dimensions in inches except where indicated.





# Domestic Ductile Iron MJ Compact Fittings

## ANSI/AWWA C153/A21.53

### GENERAL SPECIFICATIONS

MATERIAL:	Ductile Iron per ASTM A536
PRESSURE:	350 PSI rating for 2" - 24" sizes, 250 PSI rating for 30" - 48" sizes and 150 PSI rating for 54" - 64" sizes
TESTING:	In accordance with ANSI/AWWA C153/A21.53, ANSI/AWWA C111/A21.11, UL and FM requirements
LAYING LENGTH:	In accordance with ANSI/AWWA C153/A21.53 (fittings not listed in ANSI/AWWA have dimensions per Star design as noted in the catalog)
DEFLECTION:	2" - 4"=8°   6"=7°   8"-12"=5°   14"-16"=3 1/2°   18"-24"=3°   30"-64"=2°
WEIGHTS:	Are in pounds, unless noted otherwise and do not include accessories, cement lining and coating
FLANGES:	Flanged ends on fittings match ANSI/AWWA C115/A21.15 and ANSI B16.1 class 125 flanges
CEMENT LINING:	In accordance with ANSI/AWWA C104/A21.4 -- size 2" - 3" single thickness and sizes 4" - 64" double thickness
COATING:	Asphaltic seal coat inside and out in accordance with ANSI/AWWA C104/A21.4 and referenced in ANSI/AWWA C153/A21.53
GASKETS:	SBR in accordance with ANSI/AWWA C111/A21.11
T-BOLTS/NUTS:	Low alloy steel in accordance with ANSI/AWWA C111/A21.11
APPROVALS:	3" - 12" UL/ULC Listed   2" and greater are UL/ANSI/NSF Standards 61 and 372   3" - 16" FM APPROVED. Please consult factory for detail listing and approvals.
DIMENSIONS:	All dimensions are in inches unless noted otherwise.
INSTALLATION:	Per ANSI/AWWA C600 and C111 using DIP conforming to C150/C151 and PVC pipe conforming to C900/C905



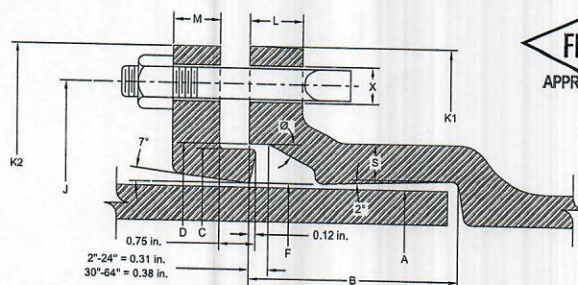
### SUBMITTAL INFORMATION

PROJECT NAME: \_\_\_\_\_

ENGINEER: \_\_\_\_\_

CONTRACTOR: \_\_\_\_\_

SPEC. SECTION: \_\_\_\_\_



### MECHANICALJOINT DIMENSIONS

NOM. SIZE	A DIA.	B	C DIA.	D DIA.	F DIA.	J DIA.	K1 DIA.	K2 DIA.	L	M	S	Ø	X DIA.	BOLTS	
														SIZE	NO.
2	2.50	2.50	3.39	3.50	2.61	4.75	6.19	6.25	0.58	0.62	0.36	28°	3/4	5/8 x 3	2
3	3.96	2.50	4.84	4.94	4.06	6.19	7.62	7.69	0.58	0.62	0.39	28°	3/4	5/8 x 3	4
4	4.80	2.50	5.92	6.02	4.90	7.50	9.06	9.12	0.60	0.75	0.39	28°	7/8	3/4 x 3 1/2	4
6	6.90	2.50	8.02	8.12	7.00	9.50	11.06	11.12	0.63	0.88	0.43	28°	7/8	3/4 x 3 1/2	6
8	9.05	2.50	10.17	10.27	9.15	11.75	13.31	13.37	0.66	1.00	0.45	28°	7/8	3/4 x 3 1/2	6
10	11.10	2.50	12.22	12.34	11.20	14.00	15.62	15.62	0.70	1.00	0.47	28°	7/8	3/4 x 3 1/2	8
12	13.20	2.50	14.32	14.44	13.30	16.25	17.88	17.88	0.73	1.00	0.49	28°	7/8	3/4 x 3 1/2	8
14	15.30	3.50	16.40	16.54	15.44	18.75	20.25	20.25	0.79	1.25	0.55	28°	7/8	3/4 x 4	10
16	17.40	3.50	18.50	18.64	17.54	21.00	22.50	22.50	0.85	1.31	0.58	28°	7/8	3/4 x 4	12
18	19.50	3.50	20.60	20.74	19.64	23.25	24.83	24.75	1.00	1.38	0.68	28°	7/8	3/4 x 4	12
20	21.60	3.50	22.70	22.84	21.74	25.50	27.08	27.00	1.02	1.44	0.69	28°	7/8	3/4 x 4	14
24	25.80	3.50	26.90	27.04	25.94	30.00	31.58	31.50	1.02	1.56	0.75	28°	7/8	3/4 x 4 1/2	16
30	32.00	4.00	33.29	33.46	32.17	36.88	39.12	39.12	1.31	2.00	0.82	20°	1 1/8	1 x 5 1/2	20
36	38.30	4.00	39.59	39.76	38.47	43.75	46.00	46.00	1.45	2.00	1.00	20°	1 1/8	1 x 5 1/2	24
42	44.50	4.00	45.79	45.96	44.67	50.62	53.12	53.12	1.45	2.00	1.25	20°	1 3/8	1 1/4 x 6	28
48	50.80	4.00	52.09	52.26	50.97	57.50	60.00	60.00	1.45	2.00	1.35	20°	1 3/8	1 1/4 x 6	32
54	57.56	4.00	58.82	59.02	57.73	63.20	65.70	65.70	1.88	2.00	1.50	20°	1 3/8	1 1/4 x 6 1/2	36
60	61.61	4.00	62.87	63.07	61.78	67.72	70.22	70.22	1.88	2.00	1.55	20°	1 3/8	1 1/4 x 6 1/2	36
64	65.67	4.00	66.96	67.13	65.84	71.86	74.36	74.36	1.88	2.00	1.62	20°	1 3/8	1 1/4 x 6 1/2	38

SIZE RANGE (Please specify): \_\_\_\_\_

Size Range \_\_\_\_\_

LINING OPTIONS (Please check one):

- ☒ Standard: Cement-lined and asphalt seal coat per ANSI/AWWA C104/A21.4 and UL/NSF-61
- ☐ Optional: FBE (Fusion Bonded Epoxy) per ANSI/AWWA C116/A21.15 and UL/NSF-61 - ID & OD Only
- ☐ Optional: P401 (Protecto 401) Ceramic Epoxy - sewer applications only. Not NSF-61
- ☐ Optional: Other (specify) \_\_\_\_\_

COATING OPTIONS (Please check one):

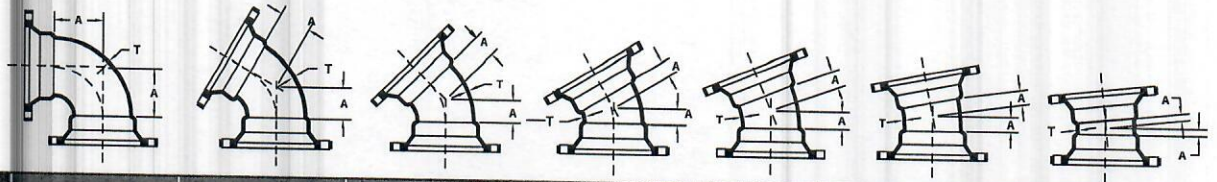
- ☒ Standard: Asphaltic seal coat per ANSI/AWWA C104/A21.4
- ☐ Optional: FBE (Fusion Bonded Epoxy) per ANSI/AWWA C116/A21.15 and UL/NSF-61 - ID & OD Only
- ☐ Optional: Other (specify) \_\_\_\_\_



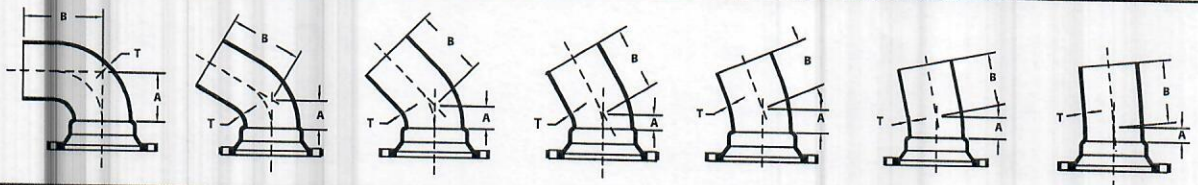


# Compact MJ Fittings

ANSI/AWWA C153/A21.53



MJ x MJ BENDS		90° MJ x MJ BENDS (¼)		60° MJ x MJ BENDS (⅙)		45° MJ x MJ BENDS (⅛)		30° MJ x MJ BENDS (¹¹²)		22 ½° MJ x MJ BENDS (¹¹⁶)		11 ¼° MJ x MJ BENDS (¹⁵²)		5 ⅝° MJ x MJ BENDS (¹⁶⁴)	
NOM. SIZE	T	A	WT (LBS.)	A	WT (LBS.)	A	WT (LBS.)	A	WT (LBS.)	A	WT (LBS.)	A	WT (LBS.)	A	WT (LBS.)
2	0.30	3.25	14	-	-	1.80	13	-	-	1.00	9	1.00	8	-	-
3	0.33	3.50	23	-	-	1.50	21	-	-	1.00	16	1.00	14	-	-
4	0.34	4.00	27	3.00	21	2.00	23	-	-	1.50	18	1.25	16	1.25	16
6	0.36	5.00	39	4.00	35	3.00	32	-	-	2.00	32	1.50	30	1.50	27
8	0.38	6.50	57	4.50	50	3.50	46	3.00	44	2.50	46	1.75	42	1.75	38
10	0.40	7.50	89	-	-	4.50	70	-	-	3.00	64	2.00	58	2.00	56
12	0.42	9.00	108	6.50	104	5.50	98	4.00	87	3.50	84	2.25	74	2.25	73
14	0.47	11.50	180	-	-	5.00	145	-	-	3.75	140	2.50	128	-	-
16	0.50	12.50	264	7.50	210	5.50	202	4.50	177	3.75	178	2.50	148	2.50	150
18	0.54	14.00	335	-	-	6.00	250	-	-	4.50	255	3.00	205	-	-
20	0.57	15.00	400	-	-	7.00	305	-	-	4.50	262	3.00	245	3.00	239
24	0.61	17.00	565	10.50	479	7.50	405	6.00	385	4.50	412	3.00	315	3.00	317
30	0.66	21.50	1005	13.50	843	11.50	798	9.75	692	6.75	665	4.75	568	4.75	568
36	0.74	24.50	1562	17.00	1350	11.50	1164	11.00	1080	7.75	960	5.00	840	5.00	825
42	0.82	29.25	2506	19.00	2150	14.00	1792	12.00	1465	9.00	1350	6.00	1319	6.00	1125
48	0.90	33.25	3045	21.00	2650	15.00	2390	13.25	2075	10.00	1886	6.50	1700	6.50	1600
54	1.05	37.00	4023	-	-	20.25	3062	-	-	10.25	2198	5.00	1711	-	-
60	1.10	39.50	4714	-	-	21.25	3487	-	-	10.75	2434	7.00	2033	-	-
64	1.16	42.00	5508	-	-	22.25	4000	-	-	11.00	2727	7.00	2245	-	-



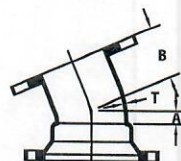
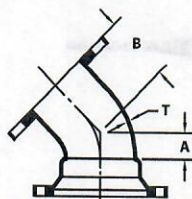
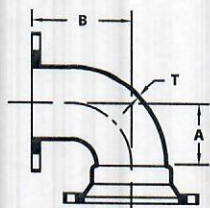
MJ x PE BENDS		90° MJ x PE BENDS (1/4)			60° MJ x PE BENDS (1/6)			45° MJ x PE BENDS (1/8)			30° MJ x PE BENDS (1/12)			22 1/2° MJ x PE BENDS (1/16)			11 1/4° MJ x PE BENDS (1/32)			5 5/8° MJ x PE BENDS (1/64)		
NOM. SIZE	T	A	B	WT (LBS.)	A	B	WT (LBS.)	A	B	WT (LBS.)	A	B	WT (LBS.)	A	B	WT (LBS.)	A	B	WT (LBS.)	A	B	WT (LBS.)
3	0.33	3.50	8.50	16	-	-	-	1.50	7.00	13	-	-	-	1.00	6.50	12	1.00	6.50	12	-	-	-
4	0.34	4.00	9.50	22	-	-	-	2.00	7.50	19	-	-	-	1.50	7.00	18	1.25	6.25	17	-	-	-
6	0.36	5.00	12.00	40	-	-	-	3.00	8.50	31	-	-	-	2.00	7.50	29	1.50	7.00	27	-	-	-
8	0.38	6.50	12.50	61	-	-	-	3.50	9.00	46	-	-	-	2.50	8.00	43	1.75	7.25	39	-	-	-
10	0.40	7.50	13.00	83	-	-	-	4.50	10.00	68	-	-	-	3.00	8.50	61	2.00	7.50	52	-	-	-
12	0.42	9.00	14.50	114	-	-	-	5.50	11.00	95	-	-	-	3.50	9.00	81	2.25	7.75	70	-	-	-
14	0.47	11.50	19.50	197	-	-	-	5.00	13.00	148	-	-	-	3.75	11.25	133	2.50	10.50	122	-	-	-
16	0.50	12.50	20.50	248	-	-	-	5.50	13.50	184	-	-	-	3.75	11.75	166	2.50	10.50	148	-	-	-
18	0.54	14.00	21.00	325	-	-	-	6.00	13.00	235	-	-	-	6.00	13.00	235	6.00	13.00	235	-	-	-
20	0.57	15.00	22.50	390	-	-	-	7.00	14.00	300	-	-	-	7.00	14.00	300	7.00	14.00	300	-	-	-
24	0.61	17.00	25.00	575	-	-	-	7.50	14.50	390	-	-	-	7.50	14.50	395	7.50	14.50	400	-	-	-
30	0.66	22.75	31.75	865	13.50	22.50	846	10.50	19.50	715	9.75	18.75	762	6.75	15.75	600	4.75	13.75	535	4.75	13.75	505
36	0.74	24.50	33.50	1355	-	-	-	12.00	21.00	1040	-	-	-	7.75	16.75	865	5.00	14.00	725	-	-	-
42	0.82	29.25	38.25	2055	-	-	-	14.00	23.00	1460	-	-	-	9.00	18.00	1200	6.00	15.00	1030	-	-	-
48	0.90	33.25	42.25	2805	-	-	-	15.00	24.00	1905	-	-	-	10.00	19.00	1575	6.50	15.50	1290	-	-	-



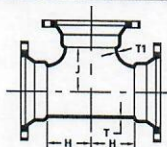
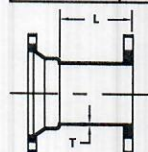


# Compact MJ Fittings

ANSI/AWWA C153/A21.53



MJ x FE BENDS		90° MJ x FE BENDS (1/4)			45° MJ x FE BENDS (1/8)			22 1/2° MJ x FE BENDS (1/16)			11 1/4° MJ x FE BENDS (1/32)		
NOM. SIZE	T	A	B	WT (LBS.)	A	B	WT (LBS.)	A	B	WT (LBS.)	A	B	WT (LBS.)
3	0.33	3.50	5.50	20	1.50	3.00	17	1.00	3.00	17	1.00	3.00	15
4	0.34	4.00	6.50	26	2.00	4.00	24	1.50	4.00	26	1.25	4.00	19
6	0.36	5.00	8.00	47	3.50	5.00	40	2.00	5.00	36	1.50	5.00	30
8	0.38	6.50	9.00	68	3.50	5.50	57	2.50	5.50	53	1.75	5.50	50
10	0.40	7.50	11.00	102	4.50	6.50	83	3.00	6.50	102	2.00	6.50	75
12	0.42	9.00	12.00	134	5.50	7.50	110	3.50	7.50	134	2.25	7.50	88
14	0.47	11.50	14.00	227	5.00	7.50	207	3.75	7.50	166	---	---	---
16	0.50	12.50	15.00	306	5.50	8.00	239	3.75	8.00	228	---	---	---
18	0.54	14.00	16.50	357	6.00	8.50	268	4.50	8.50	259	3.00	8.50	247
20	0.57	15.00	18.00	445	7.00	9.50	339	4.50	9.50	321	3.00	9.50	307
24	0.61	17.00	22.00	650	7.50	11.00	474	4.50	11.00	444	3.00	11.00	427
30	0.66	21.50	25.00	1070	10.50	15.00	858	---	---	---	---	---	---
36	0.74	24.50	28.00	1554	11.50	18.00	1240	7.75	18.00	1176	5.00	18.00	1118
42	0.82	29.25	31.00	2190	14.00	21.00	1820	---	---	---	6.00	21.00	1627
48	0.90	33.25	34.00	3015	15.00	24.00	2421	---	---	---	---	---	---



MJ x FLANGE ADAPTER			
NOM. SIZE	T	L	WT (LBS.)
3	0.33	3.50	13
4	0.34	3.50	22
6	0.36	3.50	32
8	0.38	3.50	47
10	0.40	4.00	66
12	0.42	4.00	91
14	0.47	5.00	141
16	0.50	5.00	170
18	0.54	5.00	176
20	0.57	5.00	252
24	0.61	5.00	320
30	0.66	7.00	558
36	0.74	8.50	796
42	0.82	12.00	1180
48	0.90	12.00	1499
54	1.05	13.00	1900
60	1.10	13.00	2163

MJ x MJ TEES					
NOM. SIZE	T	T1	H	J	WT (LBS.)
2 x 2	0.39	0.39	3.25	3.25	20
3 x 2	0.48	0.39	3.50	3.50	43
3 x 3	0.33	0.33	3.00	3.00	28
4 x 2	0.34	0.30	3.00	4.00	29
4 x 3	0.34	0.33	3.50	4.00	30
4 x 4	0.34	0.34	4.00	4.00	32
6 x 3	0.36	0.33	3.50	5.00	42
6 x 4	0.36	0.34	4.00	5.00	46
6 x 4 x 6	0.36	0.36	5.00	5.00	50
6 x 6	0.36	0.36	5.00	5.00	56
6 x 6 x 8	0.36	0.38	6.50	6.50	62
8 x 3	0.38	0.33	4.00	6.50	52
8 x 4	0.38	0.34	4.00	6.50	60
8 x 6	0.38	0.36	5.00	6.50	72
8 x 6 x 6	0.38	0.38	5.00	6.50	62
8 x 6 x 8	0.38	0.38	6.00	6.50	85
8 x 8	0.38	0.38	6.50	6.50	86
10 x 3	0.40	0.33	4.00	7.50	75
10 x 4	0.40	0.34	4.00	7.50	78
10 x 6	0.40	0.36	5.00	7.50	90
10 x 8	0.40	0.38	6.50	7.50	105
10 x 10	0.40	0.40	7.50	7.50	120
12 x 3	0.42	0.33	4.00	8.75	90
12 x 4	0.42	0.34	4.00	8.75	94

(Cont)

UCAT.18.01

\* REGISTERED TRADEMARK OF STAR PIPE PRODUCTS

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# Compact MJ Fittings

ANSI/AWWA C153/A21.53

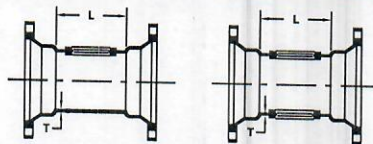
MJ x MJ TEES (Con't)

NOM. SIZE	T	T1	H	J	WT (LBS.)
12 x 6	0.42	0.36	5.00	8.75	110
12 x 8	0.42	0.38	6.50	8.75	125
12 x 10	0.42	0.40	7.50	8.75	140
12 x 12	0.42	0.42	8.75	8.75	160
14 x 6	0.47	0.36	6.50	10.50	182
14 x 8	0.47	0.38	7.50	10.50	190
14 x 10	0.47	0.40	8.50	10.50	206
14 x 12	0.47	0.42	9.50	10.50	221
14 x 14	0.47	0.47	10.50	10.50	251
16 x 6	0.50	0.36	6.50	11.50	218
16 x 8	0.50	0.38	7.50	11.50	223
16 x 10	0.50	0.40	8.50	11.50	264
16 x 12	0.50	0.42	9.50	11.50	280
16 x 14	0.50	0.47	10.50	11.50	316
16 x 16	0.50	0.50	11.50	11.50	322
18 x 6	0.54	0.36	6.50	12.50	275
18 x 8	0.54	0.38	7.50	12.50	295
18 x 10	0.54	0.40	8.50	12.50	315
18 x 12	0.54	0.42	9.50	12.50	335
18 x 14	0.54	0.47	10.50	12.50	380
18 x 16	0.54	0.50	11.50	12.50	405
18 x 18	0.54	0.54	12.50	12.50	435
20 x 4	0.57	0.34	5.50	14.00	295
20 x 6	0.57	0.36	6.50	14.00	315
20 x 8	0.57	0.38	8.00	14.00	345
20 x 10	0.57	0.40	9.00	14.00	370
20 x 12	0.57	0.42	10.00	14.00	395
20 x 14	0.57	0.47	11.00	14.00	440
20 x 16	0.57	0.50	12.00	14.00	465
20 x 18	0.57	0.54	13.00	14.00	505
20 x 20	0.57	0.57	14.00	14.00	535
24 x 4	0.61	0.34	6.00	16.00	398
24 x 6	0.61	0.36	7.00	16.00	415
24 x 8	0.61	0.38	8.00	16.00	445
24 x 10	0.61	0.40	9.00	16.00	470
24 x 12	0.61	0.42	10.00	16.00	500
24 x 14	0.61	0.47	11.00	16.00	550
24 x 16	0.61	0.50	12.00	16.00	580
24 x 18	0.61	0.54	13.00	16.00	625
24 x 20	0.61	0.57	14.00	16.00	660
24 x 24	0.61	0.61	16.00	16.00	720
30 x 6	0.66	0.36	8.00	20.00	685
30 x 8	0.66	0.38	8.50	20.00	739
30 x 10	0.66	0.40	10.00	20.00	760
30 x 12	0.66	0.42	10.00	20.00	830
30 x 14	0.66	0.47	11.00	20.00	880
30 x 16	0.66	0.50	12.50	20.00	878
30 x 18	0.66	0.54	14.00	20.00	1039
30 x 20	0.66	0.57	15.00	20.00	1000
30 x 24	0.66	0.61	21.00	22.00	1389
30 x 30	0.66	0.66	20.00	20.00	1323
36 x 4	0.74	0.34	7.00	23.50	924
36 x 6	0.74	0.36	8.00	23.50	1045

(Con't)➤

MJ x MJ TEES (Con't)

NOM. SIZE	T	T1	H	J	WT (LBS.)
36 x 8	0.74	0.38	9.00	23.50	1095
36 x 10	0.74	0.40	9.00	23.50	1024
36 x 12	0.74	0.42	10.00	23.50	1072
36 x 14	0.74	0.47	11.00	23.50	1135
36 x 16	0.74	0.50	12.50	23.50	1210
36 x 18	0.74	0.54	13.00	23.50	1251
36 x 20	0.74	0.57	15.00	23.50	1350
36 x 24	0.74	0.61	16.00	23.50	1550
36 x 30	0.74	0.66	20.00	23.50	1986
36 x 36	0.74	0.74	23.50	23.50	2072
42 x 6	0.82	0.36	9.00	27.50	1366
42 x 8	0.82	0.38	9.00	27.50	1369
42 x 12	0.82	0.42	14.00	27.50	1885
42 x 16	0.82	0.50	13.00	27.50	1929
42 x 18	0.82	0.54	16.00	27.50	2072
42 x 20	0.82	0.57	18.00	27.50	1947
42 x 24	0.82	0.61	20.00	27.50	2270
42 x 30	0.82	0.66	22.00	29.50	2608
42 x 36	0.82	0.74	30.00	30.00	3000
42 x 42	0.82	0.82	30.00	30.00	3175
48 x 6	0.90	0.36	10.00	32.00	1949
48 x 12	0.90	0.42	14.00	32.00	2535
48 x 16	0.90	0.50	13.00	32.00	2657
48 x 18	0.90	0.54	16.00	32.00	2293
48 x 24	0.90	0.61	23.00	32.00	2870
48 x 30	0.90	0.66	23.00	32.00	3050
48 x 36	0.90	0.74	33.50	32.25	3900
48 x 42	0.90	0.82	33.50	33.50	4100
48 x 48	0.90	0.90	33.50	33.50	4250
54 x 20	1.05	0.57	23.00	37.00	3486
54 x 24	1.05	0.61	23.00	37.00	3505
54 x 30	1.05	0.66	29.30	37.00	4162
54 x 36	1.05	0.77	29.30	37.00	4257
54 x 42	1.05	0.88	31.00	39.00	4610
60 x 30	1.10	0.66	29.50	39.00	4648
64 x 64	1.16	1.16	43.30	43.30	7454



MJ x MJ TAPPED TEES / CROSSES (2" TAP)

NOM. SIZE	T	L	MAX TAP	WT (LBS.)
3	0.33	6.00	2 1/2	18
4	0.34	6.00	3	25
6	0.36	6.00	3	42
8	0.38	6.00	3	55
10	0.40	6.00	3	70
12	0.42	6.00	3	85
16	0.50	6.00	3	164
24	0.61	8.00	3	325

Threads in Accordance with ANSI/ASME B1.20.1

STAR® PIPE PRODUCTS

UCAT18.01

\* REGISTERED TRADEMARK OF STAR PIPE PRODUCTS

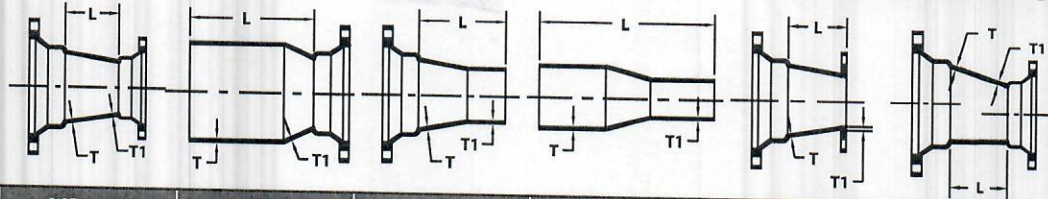
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# Compact MJ Fittings

ANSI/AWWA C153/A21.53



REDUCERS			MJ x MJ		SEB		LEB		PE x PE		MJ x FE		ECCENTRIC	
NOM. SIZE	T	T1	L	WT (LBS.)	L	WT (LBS.)	L	WT (LBS.)	L	WT (LBS.)	L	WT (LBS.)	L	WT (LBS.)
4 x 3	0.34	0.33	3.00	16	8.50	17	8.50	16	14.00	14	5.00	19	3.00	15
6 x 2	0.36	0.30	---	---	---	---	---	---	---	---	7.00	23	---	---
6 x 3	0.36	0.33	5.00	22	10.62	24	10.50	19	16.00	19	6.00	25	---	---
6 x 4	0.36	0.34	4.00	24	9.50	23	9.50	23	15.00	22	5.00	30	4.00	24
8 x 4	0.38	0.34	5.00	32	10.50	30	10.50	34	16.00	30	7.00	38	5.00	31
8 x 6	0.38	0.36	4.00	36	9.50	35	9.50	32	15.00	33	6.00	41	---	---
10 x 4	0.40	0.34	7.00	46	12.50	44	12.50	43	---	---	---	---	---	---
10 x 6	0.40	0.36	5.00	47	10.50	46	10.50	46	16.00	46	7.00	54	5.00	46
10 x 8	0.40	0.38	4.00	50	9.50	49	9.50	50	15.00	47	6.00	62	4.00	48
12 x 4	0.42	0.34	9.00	58	14.50	60	14.50	57	20.00	58	11.00	66	---	---
12 x 6	0.42	0.36	7.00	60	12.50	53	12.50	57	18.00	57	9.00	69	7.00	60
12 x 8	0.42	0.38	5.00	60	10.50	61	10.50	59	16.00	54	7.00	82	5.00	59
12 x 10	0.42	0.40	4.00	64	9.50	53	9.50	58	15.00	54	7.00	85	4.00	61
14 x 6	0.47	0.36	9.00	110	16.90	100	14.50	105	---	---	---	---	---	---
14 x 8	0.47	0.38	7.00	122	14.90	99	12.40	98	20.30	91	---	---	---	---
14 x 10	0.47	0.40	5.00	120	12.90	96	10.40	92	18.30	88	8.00	112	---	---
14 x 12	0.47	0.42	4.00	132	11.90	90	9.40	92	17.30	89	---	---	4.00	94
16 x 6	0.50	0.36	11.00	120	21.00	125	16.50	144	24.30	93	13.00	128	---	---
16 x 8	0.50	0.38	9.00	118	18.00	124	14.50	136	22.30	119	11.00	133	9.00	119
16 x 10	0.50	0.40	7.00	118	15.00	124	12.50	125	20.50	119	9.00	136	9.00	129
16 x 12	0.50	0.42	5.00	115	12.90	122	10.50	116	18.30	99	7.00	145	5.00	115
16 x 14	0.50	0.47	4.00	131	12.00	133	12.00	135	19.70	129	---	---	---	---
18 x 8	0.54	0.38	13.00	201	20.00	170	19.50	195	---	---	16.00	190	13.00	165
18 x 10	0.54	0.40	10.00	196	18.00	165	17.40	185	25.50	160	12.00	179	---	---
18 x 12	0.54	0.42	7.00	180	15.50	150	14.00	150	19.50	150	12.00	198	---	---
18 x 14	0.54	0.47	6.00	200	15.00	175	15.00	200	---	---	---	---	6.00	168
18 x 16	0.54	0.50	5.00	196	12.50	170	12.50	192	---	---	---	---	5.00	174
20 x 6	0.57	0.36	---	---	24.00	182	---	---	---	---	18.00	203	---	---
20 x 8	0.57	0.38	16.00	227	24.00	191	---	---	---	---	---	---	---	---
20 x 10	0.57	0.40	16.00	220	22.12	200	19.00	210	---	---	---	---	---	---
20 x 12	0.57	0.42	12.00	227	17.50	170	16.00	205	21.50	164	14.00	234	8.00	183
20 x 14	0.57	0.47	10.00	200	18.00	190	17.90	205	---	---	---	---	---	---
20 x 16	0.57	0.50	7.00	231	13.50	185	13.50	200	---	---	9.00	237	8.00	217
20 x 18	0.57	0.54	4.00	225	12.00	200	12.00	215	---	---	---	---	8.00	235
24 x 6	0.61	0.36	22.00	279	---	---	---	---	---	---	22.00	284	---	---
24 x 8	0.61	0.38	20.00	263	---	---	---	---	22.50	201	---	---	20.00	287
24 x 10	0.61	0.40	18.00	286	21.50	235	---	---	---	---	20.00	306	18.00	287
24 x 12	0.61	0.42	16.00	263	21.50	275	21.00	290	22.50	213	18.00	318	16.00	285
24 x 14	0.61	0.47	14.00	310	22.00	310	21.90	315	25.00	238	16.00	323	14.00	298
24 x 16	0.61	0.50	13.00	279	21.00	285	17.50	285	23.10	323	---	---	12.00	299
24 x 18	0.61	0.54	10.00	284	18.00	300	18.00	310	21.00	228	---	---	---	---
24 x 20	0.61	0.57	7.00	328	15.00	276	13.50	275	24.00	271	---	---	7.00	370
30 x 12	0.66	0.42	30.00	530	---	---	39.00	565	---	---	---	---	---	---
30 x 14	0.66	0.47	30.00	585	---	---	39.00	598	---	---	---	---	30.00	583
30 x 16	0.66	0.50	30.00	633	39.00	565	39.00	623	48.00	690	---	---	30.00	613
30 x 18	0.66	0.54	28.00	658	37.00	654	37.00	635	---	---	---	---	28.00	800
30 x 20	0.66	0.57	24.00	628	33.00	590	33.00	603	---	---	---	---	24.00	630
30 x 24	0.66	0.61	10.00	478	24.50	536	24.50	526	---	---	---	---	10.00	570
36 x 4	0.74	0.34	36.00	712	---	---	---	---	---	---	---	---	---	---

(Con't)

UCAT.18.01

\* REGISTERED TRADEMARK OF STAR PIPE PRODUCTS

STAR<sup>®</sup> PIPE PRODUCTS

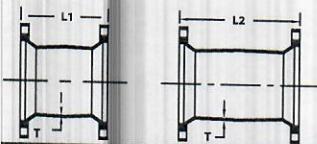




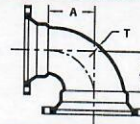
# Compact MJ Fittings

ANSI/AWWA C153/A21.53

REDUCERS (Con't)			MJ x MJ		SEB		LEB		PE x PE		MJ x FE		★ ECCENTRIC	
NOM. SIZE	T	TI	L	WT (LBS.)	L	WT (LBS.)	L	WT (LBS.)	L	WT (LBS.)	L	WT (LBS.)	L	WT (LBS.)
36 x 6	0.74	0.36	36.00	731	---	---	---	---	---	---	---	---	---	---
36 x 8	0.74	0.38	36.00	750	---	---	---	---	---	---	---	---	---	---
36 x 10	0.74	0.40	36.00	775	---	---	---	---	---	---	---	---	---	---
36 x 12	0.74	0.42	36.00	1058	---	---	---	---	---	---	---	---	---	---
36 x 16	0.74	0.50	40.00	1016	27.00	595	45.00	901	---	---	---	---	---	---
36 x 18	0.74	0.54	38.00	983	37.00	800	---	---	---	---	---	---	---	---
36 x 20	0.74	0.57	36.00	1165	45.00	850	45.00	950	---	---	---	---	38.00	963
36 x 24	0.74	0.61	19.00	822	33.12	746	33.00	810	42.00	747	21.00	807	19.00	765
36 x 30	0.74	0.66	15.50	811	24.62	788	24.50	758	---	---	17.50	846	15.50	811
42 x 24	0.82	0.61	40.00	1356	49.00	1204	49.00	1320	---	---	42.00	1410	40.00	1782
42 x 30	0.82	0.66	20.00	1083	29.12	1150	29.00	1015	---	---	---	---	20.00	1435
42 x 36	0.82	0.74	15.50	1114	24.62	962	24.50	1013	---	---	---	---	15.50	1114
48 x 20	0.90	0.57	40.00	1580	49.00	1320	---	---	---	---	---	---	---	---
48 x 24	0.90	0.61	40.00	1761	---	---	---	---	---	---	---	---	---	---
48 x 30	0.90	0.66	40.00	1779	49.00	1594	49.00	1711	---	---	---	---	40.00	1800
48 x 36	0.90	0.74	28.00	1641	37.00	1456	37.00	1540	---	---	---	---	40.00	1960
48 x 42	0.90	0.82	15.50	1426	24.50	1241	24.50	1275	---	---	---	---	28.00	1668
54 x 36	1.05	0.74	27.50	1916	---	---	---	---	---	---	---	---	15.50	1470
54 x 42	1.05	0.82	19.25	1817	---	---	---	---	---	---	---	---	---	---
60 x 48	1.10	0.90	18.00	2053	---	---	---	---	---	---	---	---	---	---

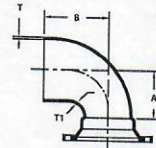


MJ SLEEVES					
NOM. SIZE	T	SHORT SLEEVES		LONG SLEEVES	
		L1	WT (LBS.)	L2	WT (LBS.)
2	0.30	7.50	8	12.00	13
3	0.33	7.50	12	12.00	17
4	0.34	7.50	15	12.00	22
6	0.36	7.50	23	12.00	29
8	0.38	7.50	31	12.00	45
10	0.40	7.50	45	12.00	61
12	0.42	7.50	57	12.00	79
14	0.47	9.50	94	15.00	128
16	0.50	9.50	118	15.00	159
18	0.54	9.00	145	15.00	200
20	0.57	9.00	173	15.00	236
24	0.61	9.00	226	15.00	306
30	0.66	15.00	472	24.00	634
36	0.74	15.00	673	24.00	889
42	0.82	15.00	887	24.00	1114
48	0.90	15.00	1059	24.00	1406
54	1.05	21.00	1534	24.00	1687
60	1.10	21.00	1758	24.00	1930
64	1.16	21.00	1974	24.00	2167



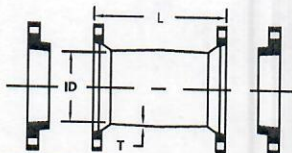
MJ x MJ RED 90°

Nom. SIZE	T	TI	A	WT (LBS.)
20 x 16	0.57	0.50	15.00	348
48 x 36	0.90	0.74	33.25	2500



PE x MJ RED 90°

Nom. SIZE	T	TI	A	B	WT (LBS.)
48 x 36	0.90	0.74	33.25	42.25	2643



MJ DUAL PURPOSE SLEEVES W/ OVERSIZE GLANDS

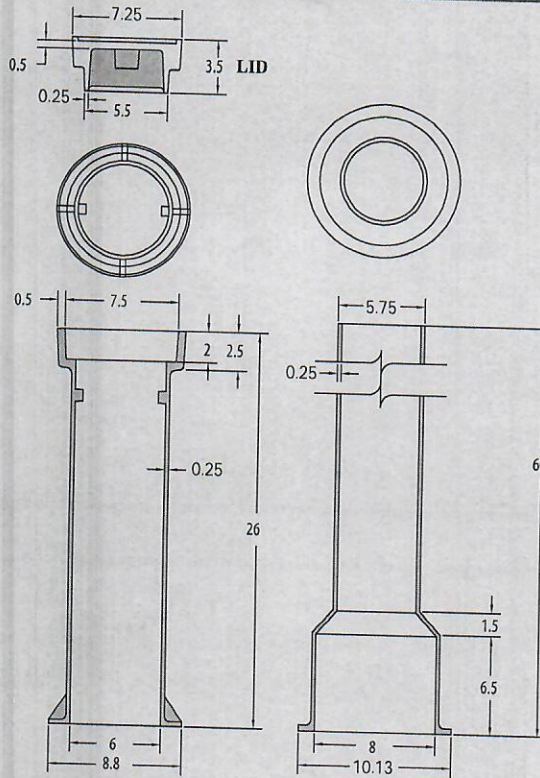
NOM. SIZE	PIPE SIZE	T	L	(I.D.)	WT (LBS.)
4	4.80 - 5.00	0.34	12.00	5.10	20
6	6.90 - 7.10	0.36	12.00	7.20	36
8	9.05 - 9.30	0.38	12.00	9.40	46
10	11.10 - 11.40	0.40	12.00	11.50	62
12	13.20 - 13.50	0.42	12.00	13.60	76
16	17.40 - 17.80	0.50	15.00	17.94	172





**CLEVELAND VALVE BOX**

**VB-0038**



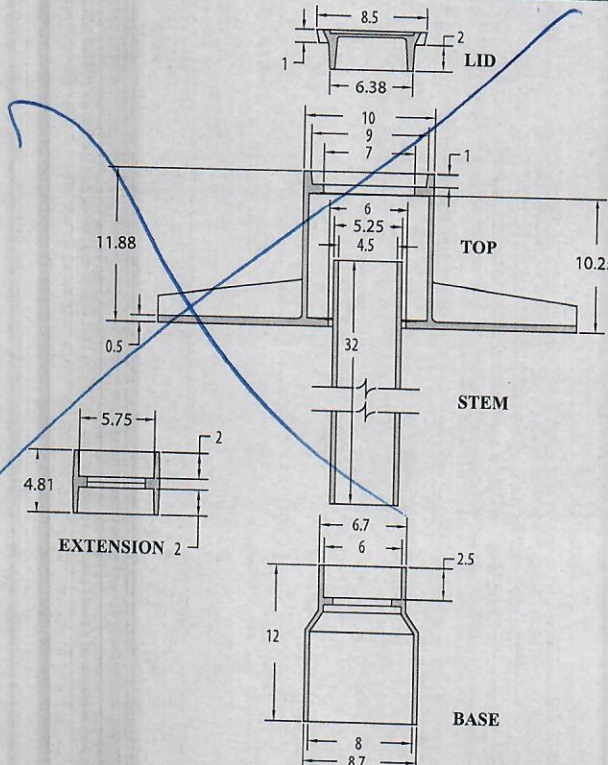
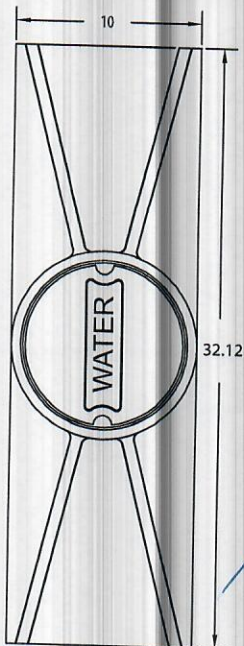
ITEM CODE	DETAILS
VBCL	COMPLETE
VBCLL	LID
VBCLT	TOP
VBCLB	BOTTOM

**Notes:**

- Material - Cast Iron
- Per ASTM A48 Class 30B
- Dimensions in Inches

**COLUMBUS HEAVY DUTY VALVE BOX**

**VB-0039**



ITEM CODE	DETAILS
VBCOLUMBUS	COMPLETE
VBCOLLID	LID
VBCOLTOP	TOP
VBCOLSTEM	STEM
VBCOLEXT	EXTENSION
VBCOLBASE	BASE

**Notes:**

- Material - Cast Iron
- Per ASTM A48 Class 30B
- Dimensions in Inches





## POLYETHYLENE ENCASEMENTS POLYWRAP > 8MIL BLACK POLYWRAP



### Polyethylene Encasements

PDF  
2019 PRODUCT CATALOG

made from 100% virgin polyethylene resins with carbon black added for coloring and UV  
gauged to 8.5MIL (0.0085") to maintain the minimum of 8MIL (0.008") as required by the  
5/A21.5 Standard. The material is available in perforated lengths of 20' and 22' for easy  
waste at roll ends while on the job site.

ction methods, proper installation is vital to the success of the Polywrap. Care needs to  
stalling this item so it is not damaged. If part of the wrap is damaged, repair it with tape  
e contact our staff with any additional questions about this product or how to install it.

#### ies of Finished Films

	<u>AWWA C105/A21.5 Min. Req.</u>	<u>AA Threads Film</u>
	3600 psi (ASTM D882) MD & TD	MD- 4595 psi TD- 4410 psi
	800% min. (ASTM D882) MD & TD	MD- 1073% TD- 1126%
th	800V/MIL (ASTM D149)	1946 V/MIL
ce	600 grams (ASTM D1709)	1189 grams
	2550 grams force (ASTM D1922)	MD- 4462 g/f
	8MIL (0.008")	8.5MIL (0.0085")

### PE Polywrap Pipe Sleeves

<u>Pipe Diam.</u>	<u>Size</u>	<u>Weight/Roll</u>
3" - 8"	20" x 400' / 20' Perf	57 lbs.
3" - 8"	20" x 220' / 22' Perf	32 lbs.
3" - 8"	20" x 440' / 22' Perf	63 lbs.
10"	24" x 400' / 20' Perf	68 lbs.
10"	24" x 440' / 22' Perf	76 lbs.
12"	27" x 220' / 22' Perf	43 lbs.
12"	27" x 440' / 22' Perf	85 lbs.
12" - 14"	30" x 200' / 20' Perf	43 lbs.
14"	30" x 220' / 22' Perf	47 lbs.
16"	34" x 220' / 22' Perf	53 lbs.





16" - 18"	37" x 200' / 20' Perf	53 lbs.
18"	37" x 220' / 22' Perf	58 lbs.
20"	41" x 220' / 22' Perf	64 lbs.
20" - 24"	54" x 200' / 20' Perf	77 lbs.
24"	54" x 220' / 22' Perf	84 lbs.
30"	67" x 140' / 20' Perf	67 lbs.
30"	67" x 154' / 22' Perf	74 lbs.
36" - 42"	81" x 110' / 22' Perf	63 lbs.
48"	95" x 110' / 22' Perf	75 lbs.
54" - 60"	108" x 110' / 22' Perf	84 lbs.



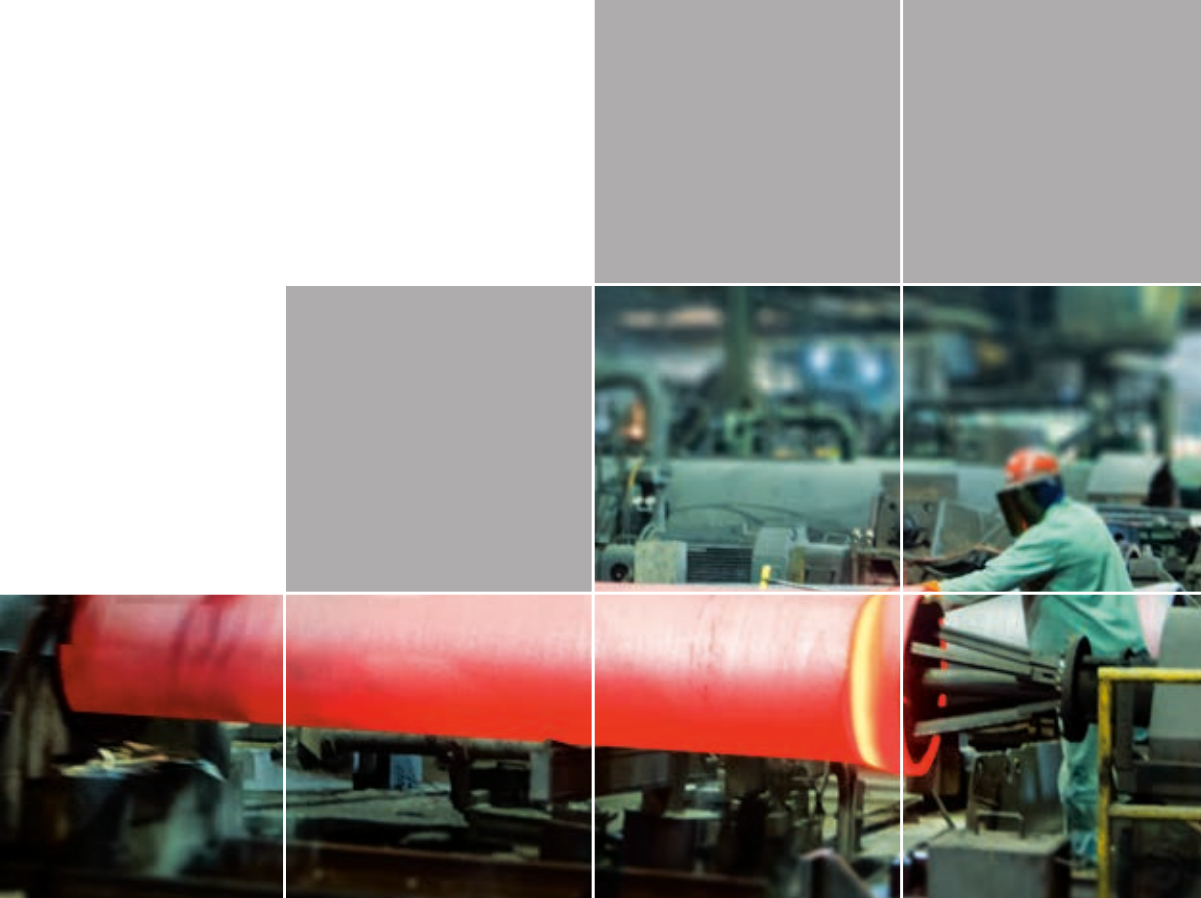
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Spec Sheet



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979-2019 AA Thread Seal Tape, Inc.  
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# TYTON JOINT® Pipe

DUCTILE IRON

## PIPE <

FABRICATION

RESTRAINED JOINTS

FITTINGS

GASKETS

COATINGS & LININGS





## CONTENTS

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## ANSI/AWWA STANDARDS

**ANSI/AWWA C151/A21.5, Ductile Iron Pipe, Centrifugally Cast for Water.**

Ductile Iron Tyton Joint Pipe is centrifugally cast in metal molds in accordance with ANSI/AWWA C151/A21.5.

The asphaltic outside coating is in accordance with ANSI/AWWA C151/A21.51.

As specified in ANSI/AWWA C151/A21.51, pipe weights have been calculated using standard barrel weights and weights of bells being produced.

**ANSI/AWWA C104/A21.4, Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.**

The cement-mortar lining and inside coating are in accordance with ANSI/AWWA C104/ A21.4. Special linings and/or coatings can be furnished for specific conditions.

**ANSI/AWWA C111/A21.11, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.**

Tyton Gaskets are furnished in accordance with ANSI/AWWA C111/A21.11.

**ANSI/AWWA C105/A21.5, Polyethylene Encasement for Ductile Iron Pipe Systems.**

If specifiers and users believe that corrosive soils will be encountered where our products are to be installed, please refer to ANSI/AWWA C105/A21.5, for proper external protection procedures.

**ASTM A746-03 "Standard specification for Ductile Iron Gravity Sewer Pipe."****ASTM A716-08 "Standard Specification for Ductile Iron Culvert Pipe."****ASTM A536 "Standard Specification for Ductile Iron Castings."**

Tyton Joint is U.S. Pipe's trademark for pipe with a push-on type connection. Simplicity, sturdiness and watertightness are built into the system by design. Convincing proof of its worldwide acceptance is shown by the fact that more than 95% of the pipe now sold by U.S. Pipe is Tyton Joint.

Tyton Joint Pipe is available in sizes 3" through 64". Sizes 3" through 42" are available in nominal 18-foot laying lengths. 4" through 30" sizes, along with sizes 48" through 64", are available in nominal 20-foot laying lengths.

Tyton Joint Pipe in sizes 4" through 36" are UL listed, and sizes 4" through 16" are FM Approved.

When Tyton Joint Pipe is used for bridge crossings or other above-ground installations, each length of pipe must be supported in a manner to restrict both vertical and horizontal movement.

A Tyton Gasket is the only accessory required when installing Tyton Joint Pipe. It is a circular rubber gasket that has a modified bulb shape in cross section. Gaskets are furnished in accordance with ANSI/AWWA C111/A21.1. Composition and dimensions of the gasket have been carefully engineered to ensure a watertight and lasting seal. The standard Tyton Gasket is manufactured of SBR — styrene butadiene rubber. Gaskets of special elastomers may be ordered for special applications. The gasket contour and bell socket contour ensure that the gasket will remain seated during proper assembly of the pipe. When joint restraint is required for push-on joint pipe, two options are available from U.S. Pipe. For joint restraint of 4" through 24", Field Lok 350 Gaskets may be used. Field Lok 350 Gaskets are rated for 350 psi in sizes 4" through 24". In addition, for 4" through 36" sizes, TR Flex Pipe and Fittings may be used, and for 30" through 64" sizes, HP Lok Pipe and Fittings may be used. TR Flex Pipe and Fittings are rated for working pressures for 350 psi in 4" through 24" sizes, 250 psi in sizes 30" through 36". For HP Lok Pipe and Fittings, the working pressure is 350 psi for 30" through 64". For higher pressure applications contact your U.S. Pipe representative. Complete details on Field Lok 350 Gaskets, TR Flex Pipe and Fittings, and HP Lok Pipe and Fittings can be found on our website, [www.uspipe.com](http://www.uspipe.com).

Tyton joint pipe is NSF/ANSI 61 Certified for drinking water system components.

**NOTE:** U.S. Pipe qualifies for Federal Procurement under Public Law No. 94-580, Section 6002, known as the Resource Recovery Act of 1976, since, due to modern technology, recycled iron and steel scrap are used to a large degree in our Ductile Iron Pipe production.

The plain end of the pipe is furnished beveled or with a quarter ellipse on the edge to allow assembly. More than 40 years of successful experience have proved its sealing capabilities. Hydrostatic tests have shown that the system will withstand pressures far in excess of rated pressures.

**NOTE:** Each of the following is a nationally recognized standards organization: American National Standards Institute (ANSI), American Water Works Association (AWWA), American Society for Testing and Materials (ASTM), Underwriters Laboratories (UL), National Fire Protection Association (NFPA), National Sanitation Foundation (NSF), Factory Mutual (FM)



**INSERTION OF GASKET (Figure 1)**

All foreign matter in the socket must be removed, i.e., mud, sand, cinders, gravel, pebbles, trash, frozen material, etc. The gasket seat should be thoroughly inspected to be certain it is clean. Foreign matter in the gasket seat may cause a leak. The gasket must be wiped clean with a clean cloth, flexed, and then placed into the socket with the rounded bulb end entering first. Looping the gasket in the initial insertion will facilitate seating the gasket heel evenly around the retainer seat. 3" through 12" sizes require only one loop. For larger sizes, additional loops may be required: 14" through 36", two to three loops; 42" through 54", four to six loops; 60" and 64", six or more loops. Evenly space the loops around the socket with each loop raised 4"–5" inches. After loops are established, push each loop down to finish installation of the gasket. When installing Tyton Joint Pipe in sub-freezing weather, the gaskets, prior to their use, must be kept at a temperature of at least 40°F by suitable means, such as storing in a heated area or keeping them immersed in a tank of warm water. If the gaskets are kept in warm water, they should be dried before placing in the pipe socket.

**APPLICATION OF LUBRICANT (Figure 2)**

A thin film of Tyton Joint Lubricant should be applied to the inside surface of the gasket, which will come in contact with the plain end of the pipe. In warm, dry weather conditions, the lubricant can dry out, especially when applied to warm or hot pipe. It will be necessary to add a small amount of water to hydrate the lubricant. Only Tyton Joint Lubricant should be used. Spray-on lubricants should not be used, as they may not provide sufficient lubricity. The plain end of the pipe must be cleaned of all foreign matter on the outside from the end to the stripes. Frozen materials may cling to the pipe in cold weather and must be removed. A thin film of lubricant is applied to the outside of the plain end for about 3" back from the end. Do not allow the plain end to touch the ground or trench side after lubricating since foreign matter may adhere to the plain end and cause a leak.

**INITIAL ENTRY OF PLAIN END IN SOCKET (Figure 3)**

The plain end of the pipe should be aligned and carefully entered into the socket until it just makes contact with the gasket. This is the starting position for the final assembly of the joint. Note the two painted stripes on the plain end.

**COMPLETELY ASSEMBLED JOINT (Figure 4)**

Joint assembly should be completed by forcing the plain end of the entering pipe past the gasket (*which is thereby compressed*) until the plain end makes contact with the bottom of the socket. Note that the first painted stripe will have disappeared into the socket and the front edge of the second stripe will be approximately flush with the bell face. Joint deflection may be achieved after the pipe is fully inserted. If assembly is not accomplished with the application of reasonable force by the methods indicated, the plain end of the pipe should be removed to check for the proper positioning of the gasket, adequate lubrication, and removal of foreign matter in the joint.

## ASSEMBLY GUIDE

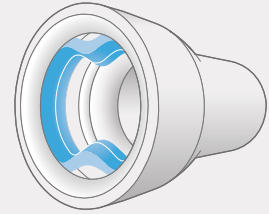


Figure 1

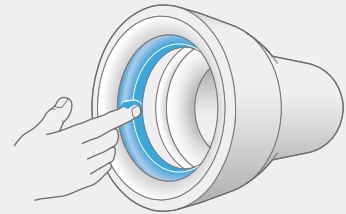


Figure 2

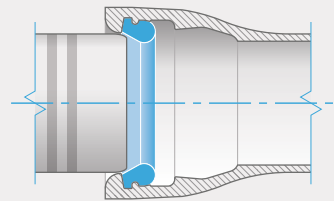


Figure 3

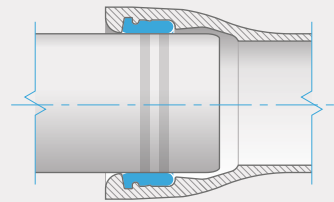


Figure 4

**NOTE:** When using Field Lok 350 Gaskets or pipe with special linings, assemble the joint until the inside edge of the first painted stripe (or the assembly mark) is flush with the bell face and to prevent damaging the cement lining or other special sewer linings.

**CAUTION:** The inside of the socket, the gasket, and the plain end to be inserted must be kept clean throughout the assembly. Joints are only as watertight as they are clean. If the joint is somewhat difficult to assemble, inspect for proper gasket positioning, adequate lubrication, and foreign matter in the joint.

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**NOTE:** Procedures outlined in figures 1–4 on page 4, showing the assembly of Tyton Joint Pipe, should be followed before proceeding with the methods shown below.

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A feeler gage may be inserted between the bell and the plain end of the assembled joint to verify the position of the gasket. When the gage encounters the gasket, increased resistance will be felt. Note the depth of insertion of the gage. Continue probing around the periphery of the joint, noting the depth to resistance each time. If the depth of insertion is uniform, the gasket has remained in place. If, at any point, the depth of insertion increases significantly, this indicates a dislodged gasket. The joint should be disassembled, thoroughly cleaned with water, and examined for any condition that might have caused the gasket to become dislodged before attempting to reassemble the joint.

**Backhoe Method of Assembly (8"–64" Pipe)**

A backhoe may be used to assemble pipe of intermediate and larger sizes. The plain end of the pipe should be carefully guided by hand into the bell of the previously assembled pipe. The bucket of the backhoe may then be used to carefully push the pipe until fully seated. A timber header should be used between the pipe and the backhoe bucket to avoid damage to the pipe. Caution: Avoid "slamming" the pipe home to prevent damage to lining material inside the bell at the back of the socket.

#### **CROWBAR METHOD OF ASSEMBLY (3"–6" Pipe)**

Smaller sizes of pipe may be assembled using a crowbar as a lever and pushing against the face of the bell. See figure 5 below.

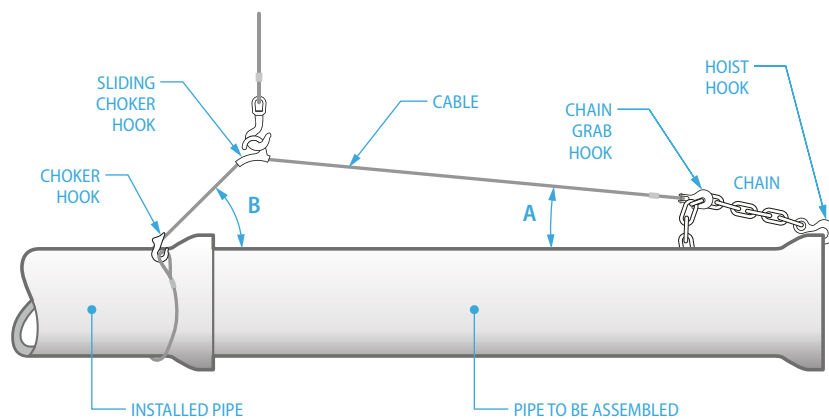


#### **COME-A-LONG METHOD OF ASSEMBLY (3"–64" Pipe)**

Installers may prefer to use come-a-longs to assemble pipe of all sizes. This method is especially useful in tight or hard to reach locations. Two (2) 3/4–2 ton chain hoists, 24 feet of chain and two (2) bell choker slings for 3"–24" or two (2) 2–4 ton (*minimum*) chain hoists for 30"–64" sizes.

### SIDE ASSEMBLY

The most common field method of assembling larger diameter Tyton Joint Pipe is to use a backhoe to push against the face of the bell end of the pipe to be assembled. Occasionally, there are installations where a backhoe cannot be located in line with the pipe and it is, therefore, difficult to develop enough axial force to assemble the pipe. In such cases, it may be possible to use the method described below to assemble the pipe from the side of the trench. With this method, the weight of the pipe is used to provide the axial force required for assembly. In general, a choker chain or cable is hooked around the bell of the previously laid pipe. The spigot end of the pipe to be assembled is first inserted as far as possible into the bell end of the previously laid pipe. The end of the choker is then hooked into the bell end of the pipe to be laid.



One such rigging is made from a long cable with a choker on one end and a chain grab hook on the other end, with a sliding choker hook between the two other hooks. A second section of the rigging is a shorter chain with a wide throat hoisting hook on one end. The cable is first "choked" around the bell of the previously laid pipe using the fixed choker hook. The chain is hooked into the bell end of the pipe to be laid. The cable is hooked to the chain with the grab hook. The connected length of the rigging can thus be adjusted with the connection between the cable grab hook and the chain. The pipe assembly is made by lifting up on the sliding choker hook.

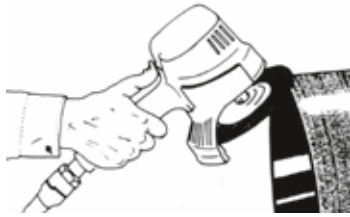
### A FEW RULES OF THUMB:

- Angle (A) should be no greater than 15 degrees.
- Angle (B) should be from 45 to 60 degrees.
- The sliding choker hook should be located from 2 to 8 feet from the bell of the previously laid pipe.
- Trial assembly may be made to get a "feel" for the correct amount of slack to be left in the rigging and the proper location of the sliding choker hook.

### A FEW PRECAUTIONS:

- The smaller the angle (A), the larger will be the assembly force and the tension in the rigging. The assembly force and the tension will generally range from 2 to 10 times the weight of the pipe being assembled. These forces are at a maximum when the assembly is bottomed out and lift is still being applied to the rigging. To minimize the loads on the rigging, it is recommended that the assembly be made slowly and the assembly stopped as soon as the joint is bottomed out.
- The rigging should be properly designed to accommodate the diameter, length, and weight of the pipe on the job and the loads previously described.
- This method should not be employed when installing Field Lok 350 Gaskets since alignment of the joint cannot be assured. For the proper installation practice, refer to U.S. Pipe brochure Field Lok 350 Gasket Joint Restraint for 4"–24" Ductile Iron Pipe for Water, Wastewater, Fire Protection and Industrial Applications.





**NOTE:** When necessary, pipe may be rounded in accordance with U.S. Pipe's brochure, recommended methods for rounding the cut ends of out-of-round 14" and larger diameter ductile iron pipe.

When field cutting pipe up to 12" to within approximately 2 feet of the bell chime or closer, the pipe diameter should be measured with a diameter tape graduated in 100th's before cutting. Abrasive saws are commonly used to cut pipe in the field, the cut end may be readily conditioned so that it can be used to make up the next joint. The outside of the cut end should be beveled with a portable grinder or disk grinder, refer to a shop manufactured bevel as a guide for proper shape.

Additional grinding may be required to further bevel the pipe if difficulty in assembly of the joint is encountered. This operation removes any sharp, rough edges that otherwise might damage the gasket. The pipe must be cut as square as is practical. A field cut end that is not square may leak, especially if the joint is fully deflected. Measure from the factory manufactured spigot end to the desired cut location. Mark the measured distance around the diameter of the pipe at sufficient intervals to determine a square cut-line (*a line perpendicular to the axis of the pipe*). Scribe the square cut-line around the O.D. of the pipe. When ductile iron pipe 14" and larger is to be cut in the field, the material should be ordered as "Gauged Pipe." A Gauged Pipe is a pipe whose barrel circumference is within the spigot dimensional specifications as determined by diameter tape measurements over the pipe's length to within approximately 2 feet of the bell chime. Pipe that is "gauged" is specially marked to avoid confusion with green paint on the bell face. ANSI/AWWA C151/A21.5 Standard for Ductile Iron pipe requires factory gauging of the spigot end. Accordingly, pipe selected for field cutting should also be field gauged in the location of the cut and ensured to be within the tolerances shown in Table 2. In the field a mechanical joint gland can be used as a gauging device, however, for accuracy it is recommended that a diameter tape graduated in 100th's be used.

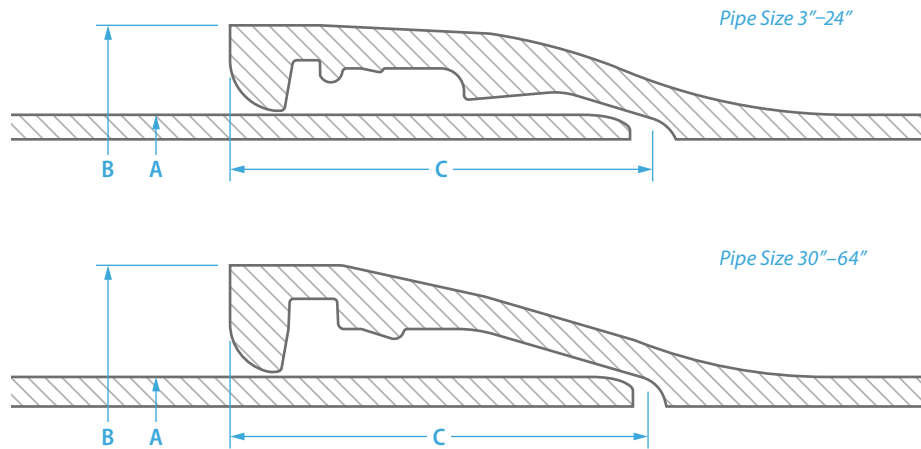
## SPECIFICATIONS

Pipe Diameter

TYTON JOINT® PIPE

SIZE	INCH	
	PIPE DIAMETER	
	Minimum	Maximum
3	3.90	4.02
4	4.74	4.86
6	6.84	6.96
8	8.99	9.11
10	11.04	11.16
12	13.14	13.26
14	15.22	15.35
16	17.32	17.45
18	19.42	19.55
20	21.52	21.65
24	25.72	25.85
30	31.94	32.08
36	38.24	38.38
42	44.44	44.58
48	50.74	50.88
54	57.46	57.60
60	61.51	61.65

**NOTE:** For accuracy, a diameter tape graduated in 100th's must be used. Above table based on ANSI/AWWA C151/A21.51 guidelines for push-on joints.



INCHES			
SIZE	PIPE OUTER DIAMETER	BELL OUTER DIAMETER	SOCKET DEPTH
	A	B	C
3	3.96	5.56	3.00
4	4.80	6.52	3.15
6	6.90	8.66	3.38
8	9.05	10.82	3.69
10	11.10	12.91	3.75
12	13.20	15.05	3.75
14	15.30	17.67	5.00
16	17.40	19.79	5.00
18	19.50	21.91	5.00
20	21.60	24.03	5.50
24	25.80	28.21	5.95
30	32.00	35.40	6.55
36	38.30	41.84	7.00
42	44.50	49.36	7.90
48	50.80	55.94	8.60
54	57.56	63.38	9.40
60	61.61	67.38	10.10
64	65.67	71.56	10.65

**NOTE:** Actual bell configuration may vary from illustration shown. Subject to manufacturing tolerances.



INCHES							
SIZE	OUTSIDE DIAMETER	NOMINAL THICKNESS					CASTING TOLERANCES
		Pressure Class <sup>a</sup>					
		150	200	250	300	350	
3	3.96	—	—	—	—	—	<sup>c</sup>
4	4.80	—	—	—	—	0.25 <sup>b</sup>	0.05
6	6.90	—	—	—	—	0.25 <sup>b</sup>	0.05
8	9.05	—	—	—	—	0.25 <sup>b</sup>	0.05
10	11.10	—	—	—	—	0.26	0.06
12	13.20	—	—	—	—	0.28	0.06
14	15.30	—	—	0.28	0.30	0.31	0.07
16	17.40	—	—	0.30	0.32	0.34	0.07
18	19.50	—	—	0.31	0.34	0.36	0.07
20	21.60	—	—	0.33	0.36	0.38	0.07
24	25.80	—	0.33	0.37	0.40	0.43	0.07
30	32.00	0.34	0.38	0.42	0.45	0.49	0.07
36	38.30	0.38	0.42	0.47	0.51	0.56	0.07
42	44.50	0.41	0.47	0.52	0.57	0.63	0.07
48	50.80	0.46	0.52	0.58	0.64	0.70	0.08
54	57.56	0.51	0.58	0.65	0.72	0.79	0.09
60	61.61	0.54	0.61	0.68	0.76	0.83	0.09
64	65.67	0.56	0.64	0.72	0.80	0.87	0.09

**NOTE:** Per ANSI/AWWA C150/A21.50 the thickness in the above table includes the 0.08" service allowance and the casting tolerance by size ranges. Dimensions and weights of Special Classes (Thickness Classes) are found on pages 13, 14, 15 and 16.

<sup>a</sup>Pressure Classes are defined as the rated water pressure of the pipe in psi. The thickness shown is adequate for the rated water working pressure plus a surge allowance of 100 psi. Calculations are based on a minimum yield strength of 42,000 and a 2.0 safety factor times the sum of the working pressure and 100 psi surge allowance.

<sup>b</sup>Presently these are the lowest nominal thickness available in these sizes.

<sup>c</sup>See thickness class for 3".

INCHES	PSI	INCHES		POUNDS		
SIZE	PRESSURE CLASS	THICKNESS	OUTSIDE DIAMETER <sup>a</sup>	BARREL WEIGHT PER FOOT	WEIGHT PER LAYING LENGTH <sup>b</sup>	
					18-FOOT	20-FOOT
3	—	—	—	—	—	—
4	350	0.25	4.80	10.9	205	230
6	350	0.25	6.90	16.0	305	335
8	350	0.25	9.05	21.1	400	445
10	350	0.26	11.10	27.1	515	570
12	350	0.28	13.20	34.8	660	730
14	250	0.28	15.30	40.4	780	865
14	300	0.30	15.30	43.3	920	1010
14	350	0.31	15.30	44.7	860	945
16	250	0.30	17.40	49.3	950	1050
16	300	0.32	17.40	52.5	1010	1115
16	350	0.34	17.40	55.8	1065	1175
18	250	0.31	19.50	57.2	1095	1210
18	300	0.34	19.50	62.6	1195	1320
18	350	0.36	19.50	66.2	1260	1390
20	250	0.33	21.60	67.5	1285	1420
20	300	0.36	21.60	73.5	1395	1540
20	350	0.38	21.60	77.5	1465	1620
24	200	0.33	25.80	80.8	1550	1710
24	250	0.37	25.80	90.5	1725	1905
24	300	0.40	25.80	97.7	1855	2050
24	350	0.43	25.80	104.9	1985	2195
30	150	0.34	32.00	103.5	2005	2210
30	200	0.38	32.00	115.5	2220	2450
30	250	0.42	32.00	127.5	2595	2690
30	300	0.45	32.00	136.5	2810	2870
30	350	0.49	32.00	148.4	2685	3110
36	150	0.38	38.30	138.5	2945	—
36	200	0.42	38.30	152.9	2940	—
36	250	0.47	38.30	170.9	3265	—
36	300	0.51	38.30	185.3	3525	—
36	350	0.56	38.30	203.2	3845	—

Table continued on next page. ►

**NOTE:** Thicknesses and dimensions of 3" through 64" ductile iron pipe conform to ANSI/AWWA C151/A21.51. Weights may vary from the standard because of differences in bell weights.

<sup>a</sup>Tolerance of O.D. of spigot end: 3–12 in., ±0.06 in.; 14–24 in., +0.05 in., -0.08 in.; 30–48 in., +0.08 in., -0.06 in.; 54–64 in., +0.04 in., -0.10 in.

<sup>b</sup>Including bell; calculated weight of pipe rounded off to nearest 5 lbs.

<sup>c</sup>See thickness class for 3".

## SPECIFICATIONS

Pressure Class (Thickness, Dimension & Weight)

TYTON JOINT® PIPE

INCHES		INCHES		POUNDS		
SIZE	PRESSURE CLASS	THICKNESS	OUTSIDE DIAMETER <sup>a</sup>	BARREL WEIGHT PER FOOT	WEIGHT PER LAYING LENGTH <sup>b</sup>	
					18-FOOT	20-FOOT
42	150	0.41	44.50	173.8	3505	—
42	200	0.47	44.50	198.9	3960	—
42	250	0.52	44.50	219.9	4335	—
42	300	0.57	44.50	240.7	4710	—
42	350	0.63	44.50	265.7	5160	—
48	150	0.46	50.80	—	—	4950
48	200	0.52	50.80	—	—	5525
48	250	0.58	50.80	—	—	6095
48	300	0.64	50.80	—	—	6670
48	350	0.70	50.80	—	—	7240
54	150	0.51	57.56	—	—	6430
54	200	0.58	57.56	—	—	7190
54	250	0.65	57.56	—	—	7945
54	300	0.72	57.56	—	—	8700
54	350	0.79	57.56	—	—	9455
60	150	0.54	61.61	—	—	7305
60	200	0.61	61.61	—	—	8120
60	250	0.68	61.61	—	—	8935
60	300	0.76	61.61	—	—	9860
60	350	0.83	61.61	—	—	10665
64	150	0.56	65.67	—	—	8100
64	200	0.64	65.67	—	—	9090
64	250	0.72	65.67	—	—	10080
64	300	0.80	65.67	—	—	11065
64	350	0.87	65.67	—	—	11925

**NOTE:** Thicknesses and dimensions of 3" through 64" ductile iron pipe conform to ANSI/AWWA C151/A21.51. Weights may vary from the standard because of differences in bell weights.

<sup>a</sup>Tolerance of O.D. of spigot end: 3–12 in., ±0.06 in.; 14–24 in., +0.05 in., -0.08 in.; 30–48 in., +0.08 in., -0.06 in.; 54–64 in., +0.04 in., -0.10 in.

<sup>b</sup>Including bell; calculated weight of pipe rounded off to nearest 5 lbs.



INCHES		INCHES		POUNDS		
SIZE	THICKNESS CLASS	THICKNESS	OUTSIDE DIAMETER	BARREL WEIGHT PER FOOT	WEIGHT PER LENGTH	WEIGHT PER LENGTH
					18-FOOT LAYING LENGTH	20-FOOT LAYING LENGTH
3	54	0.34	3.96	11.8	220	—
3	55	0.37	3.96	12.8	240	—
3	56	0.40	3.96	13.7	255	—
4	51	0.26	4.80	11.3	215	235
4	52	0.29	4.80	12.6	235	260
4	53	0.32	4.80	13.8	260	285
4	54	0.35	4.80	15.0	280	310
4	55	0.38	4.80	16.1	300	330
4	56	0.41	4.80	17.3	320	355
6	50	0.25	6.90	16.0	305	335
6	51	0.28	6.90	17.8	335	370
6	52	0.31	6.90	19.6	370	410
6	53	0.34	6.90	21.4	400	445
6	54	0.37	6.90	23.2	435	480
6	55	0.40	6.90	25.0	465	515
6	56	0.43	6.90	26.7	495	550
8	50	0.27	9.05	22.8	430	475
8	51	0.30	9.05	25.2	475	525
8	52	0.33	9.05	27.7	520	575
8	53	0.36	9.05	30.1	560	620
8	54	0.39	9.05	32.5	605	670
8	55	0.42	9.05	34.8	650	720
8	56	0.45	9.05	37.2	690	765
10	50	0.29	11.10	30.1	570	630
10	51	0.32	11.10	33.2	625	690
10	52	0.35	11.10	36.2	680	750
10	53	0.38	11.10	39.2	730	810
10	54	0.41	11.10	42.1	785	870
10	55	0.44	11.10	45.1	840	930
10	56	0.47	11.10	48.0	890	990

Table continued on next page. ►

**NOTE:** Thicknesses and dimensions of 3" through 64" ductile iron pipe conform to ANSI/AWWA C151/A21.51. Weights may vary from the standard because of differences in bell weights.

<sup>a</sup>Tolerance of O.D. of spigot end: 3–12 in., ±0.06 in.; 14–24 in., +0.05 in., -0.08 in.; 30–48 in., +0.08 in., -0.06 in.; 54–64 in., +0.04 in., -0.10 in.

<sup>b</sup>Including bell; calculated weight of pipe rounded off to nearest 5 lbs.

## SPECIFICATIONS

Thickness Class (*Thickness, Dimension & Weight*)

TYTON JOINT® PIPE

INCHES		INCHES		POUNDS		
SIZE	THICKNESS CLASS	THICKNESS	OUTSIDE DIAMETER	BARREL WEIGHT PER FOOT	WEIGHT PER LENGTH	WEIGHT PER LENGTH
					18-FOOT LAYING LENGTH	20-FOOT LAYING LENGTH
12	50	0.31	13.20	38.4	725	800
12	51	0.34	13.20	42.0	790	875
12	52	0.37	13.20	45.6	855	945
12	53	0.40	13.20	49.2	920	1015
12	54	0.43	13.20	52.8	985	1090
12	55	0.46	13.20	56.3	1045	1160
12	56	0.49	13.20	59.9	1110	1230
14	50	0.33	15.30	47.5	910	1005
14	51	0.36	15.30	51.7	985	1090
14	52	0.39	15.30	55.9	1060	1170
14	53	0.42	15.30	60.1	1135	1255
14	54	0.45	15.30	64.2	1210	1340
14	55	0.48	15.30	68.4	1285	1420
14	56	0.51	15.30	72.5	1360	1505
16	50	0.34	17.40	55.8	1065	1175
16	51	0.37	17.40	60.6	1150	1275
16	52	0.40	17.40	65.4	1240	1370
16	53	0.43	17.40	70.1	1325	1465
16	54	0.46	17.40	74.9	1410	1560
16	55	0.49	17.40	79.7	1495	1655
16	56	0.52	17.40	84.4	1580	1750
18	50	0.35	19.50	64.4	1225	1355
18	51	0.38	19.50	69.8	1325	1465
18	52	0.41	19.50	75.2	1420	1570
18	53	0.44	19.50	80.6	1520	1680
18	54	0.47	19.50	86.0	1615	1785
18	55	0.50	19.50	91.3	1710	1895
18	56	0.53	19.50	96.7	1805	2000

Table continued on next page. ►

**NOTE:** Thicknesses and dimensions of 3" through 64" ductile iron pipe conform to ANSI/AWWA C151/A21.51. Weights may vary from the standard because of differences in bell weights.

<sup>a</sup>Tolerance of O.D. of spigot end: 3–12 in., ±0.06 in.; 14–24 in., +0.05 in., -0.08 in.; 30–48 in., +0.08 in., -0.06 in.; 54–64 in., +0.04 in., -0.10 in.

<sup>b</sup>Including bell; calculated weight of pipe rounded off to nearest 5 lbs.

INCHES		INCHES		POUNDS		
SIZE	THICKNESS CLASS	THICKNESS	OUTSIDE DIAMETER	BARREL WEIGHT PER FOOT	WEIGHT PER LENGTH	WEIGHT PER LENGTH
					18-FOOT LAYING LENGTH	20-FOOT LAYING LENGTH
20	50	0.36	21.60	73.5	1395	1540
20	51	0.39	21.60	79.5	1505	1660
20	52	0.42	21.60	85.5	1610	1780
20	53	0.45	21.60	91.5	1720	1900
20	54	0.48	21.60	97.5	1825	2020
20	55	0.51	21.60	103.4	1935	2140
20	56	0.54	21.60	109.3	2040	2260
24	50	0.38	25.80	92.9	1765	1955
24	51	0.41	25.80	100.1	1895	2095
24	52	0.44	25.80	107.3	2025	2240
24	53	0.47	25.80	114.4	2155	2385
24	54	0.50	25.80	121.6	2285	2530
24	55	0.53	25.80	128.8	2415	2670
24	56	0.56	25.80	135.9	2540	2815
30	50	0.39	32.00	118.5	2275	2510
30	51	0.43	32.00	130.5	2490	2750
30	52	0.47	32.00	142.5	2705	2990
30	53	0.51	32.00	154.4	2920	3228
30	54	0.55	32.00	166.3	3135	3466
30	55	0.59	32.00	178.2	3350	3704
30	56	0.63	32.00	190.0	3560	3940
36	50	0.43	38.30	156.5	3010	—
36	51	0.48	38.30	174.5	3330	—
36	52	0.53	38.30	192.4	3655	—
36	53	0.58	38.30	210.3	3975	—
36	54	0.63	38.30	228.1	4295	—
36	55	0.68	38.30	245.9	4615	—
36	56	0.73	38.30	263.7	4935	—

Table continued on next page. ►

**NOTE:** Thicknesses and dimensions of 3" through 64" ductile iron pipe conform to ANSI/AWWA C151/A21.51. Weights may vary from the standard because of differences in bell weights.

<sup>a</sup>Tolerance of O.D. of spigot end: 3–12 in., ±0.06 in.; 14–24 in., +0.05 in., -0.08 in.; 30–48 in., +0.08 in., -0.06 in.; 54–64 in., +0.04 in., -0.10 in.

<sup>b</sup>Including bell; calculated weight of pipe rounded off to nearest 5 lbs.

## SPECIFICATIONS

Thickness Class (*Thickness, Dimension & Weight*)

TYTON JOINT® PIPE

INCHES		INCHES		POUNDS		
SIZE	THICKNESS CLASS	THICKNESS	OUTSIDE DIAMETER	BARREL WEIGHT PER FOOT	WEIGHT PER LENGTH	WEIGHT PER LENGTH
					18-FOOT LAYING LENGTH	20-FOOT LAYING LENGTH
42	50	0.47	44.50	198.9	3960	—
42	51	0.53	44.50	224.0	4410	—
42	52	0.59	44.50	249.1	4860	—
42	53	0.65	44.50	274.0	5310	—
42	54	0.71	44.50	298.9	5760	—
42	55	0.77	44.50	323.7	6205	—
42	56	0.83	44.50	348.4	6650	—
48	50	0.51	50.80	—	—	5430
48	51	0.58	50.80	—	—	6095
48	52	0.65	50.80	—	—	6765
48	53	0.72	50.80	—	—	7430
48	54	0.79	50.80	—	—	8095
48	55	0.86	50.80	—	—	8755
48	56	0.93	50.80	—	—	9415
54	50	0.57	57.56	—	—	7080
54	51	0.65	57.56	—	—	7945
54	52	0.73	57.56	—	—	8810
54	53	0.81	57.56	—	—	9670
54	54	0.89	57.56	—	—	10530
54	55	0.97	57.56	—	—	11390
54	56	1.05	57.56	—	—	12240

**NOTE:** Thicknesses and dimensions of 3" through 64" ductile iron pipe conform to ANSI/AWWA C151/A21.51. 60" and 64" classified as pressure class only. Weights may vary from the standard because of differences in bell weights.

<sup>a</sup>Tolerance of O.D. of spigot end: 3–12 in., ±0.06 in.; 14–24 in., +0.05 in., -0.08 in.; 30–48 in., +0.08 in., -0.06 in.; 54–64 in., +0.04 in., -0.10 in.

<sup>b</sup>Including bell; calculated weight of pipe rounded off to nearest 5 lbs.



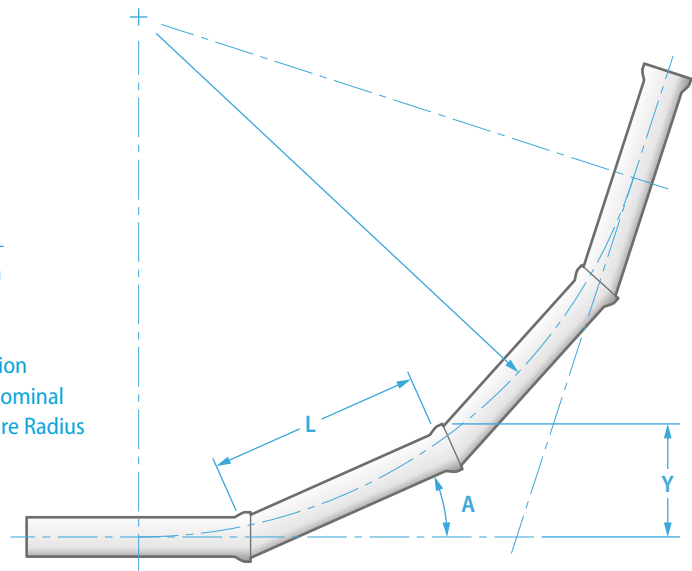
$$R = \frac{L}{2 \times \text{Tangent} \left( \frac{A}{2} \right)}$$

Where

A = Angle of Deflection

L = Laying Length Nominal

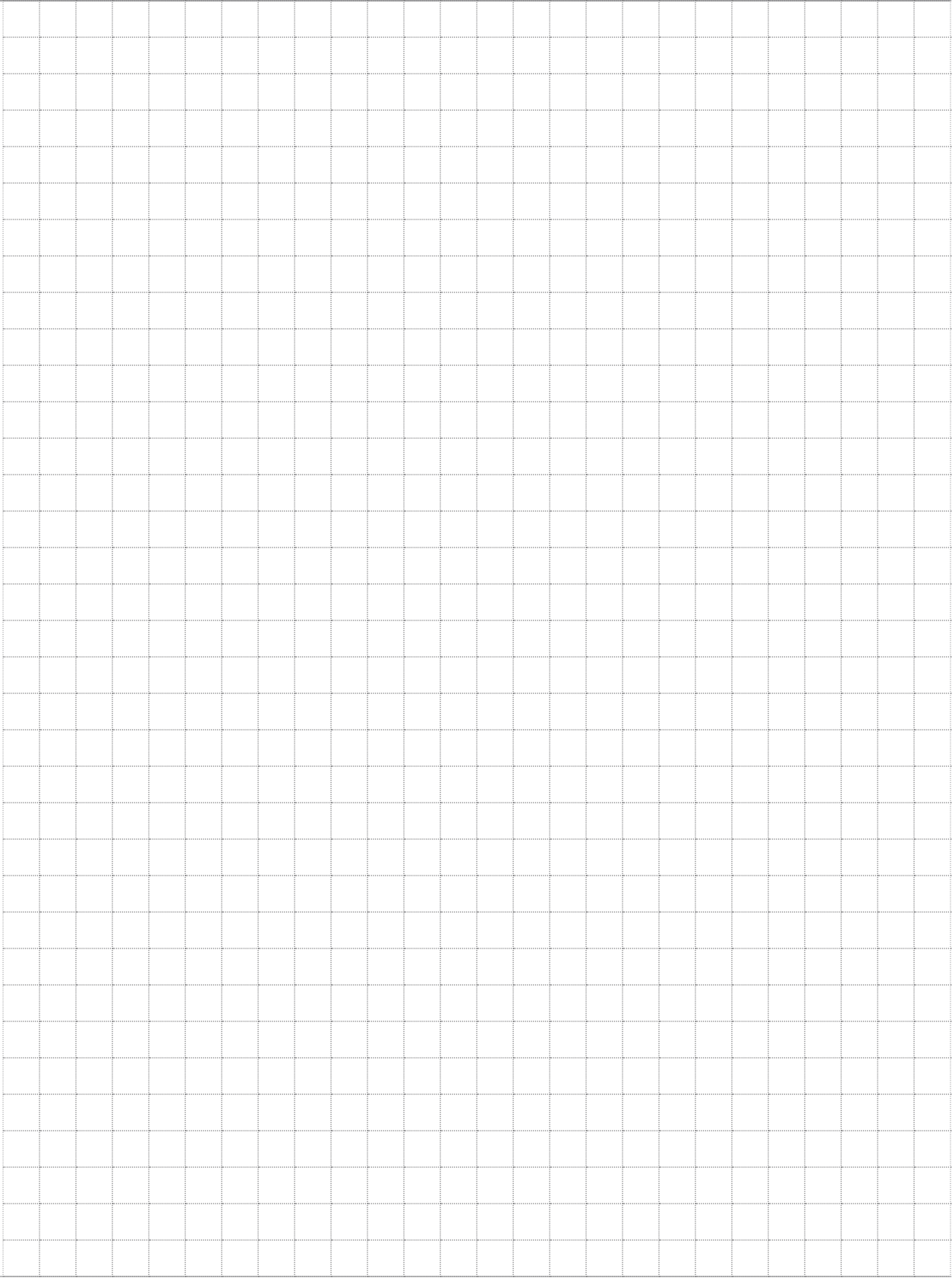
R = Pipeline Curvature Radius



INCHES	DEGREES	INCHES		FEET	
SIZE	MAXIMUM JOINT DEFLECTION	DEFLECTION/OFFSET - "Y"	RADIUS PRODUCED BY SUCCESSION OF JOINTS		
		18 FT. LENGTH	20 FT. LENGTH	18 FT. LENGTH	20 FT. LENGTH
3	5	19	21	206	229
4	5	19	21	206	229
6	5	19	21	206	229
8	5	19	21	206	229
10	5	19	21	206	229
12	5	19	21	206	229
14	5	19	21	206	229
16	5	19	21	206	229
18	5	19	21	206	229
20	5	19	21	206	229
24	5	19	21	206	229
30	5	19	21	206	229
36	5	19	—	206	—
42	4	15	—	258	—
48	4	—	17	—	287
54	4	—	17	—	287
60	4	—	17	—	287
64	4	—	17	—	287

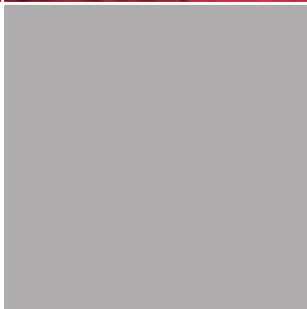
**NOTE:** Illustration above not to scale. Angles have been exaggerated for display purposes.

GRID SPACING 0.25"





U.S. Pipe, a Forterra Company, is the leading manufacturer and a principal supplier of highly engineered ductile iron pipe and fabrication in the United States and Canada. Providing custom solutions to owners, engineers and contractors for even the most demanding applications, including water transmission and distribution lines, plant piping, intake and outfall lines, and other diverse applications.



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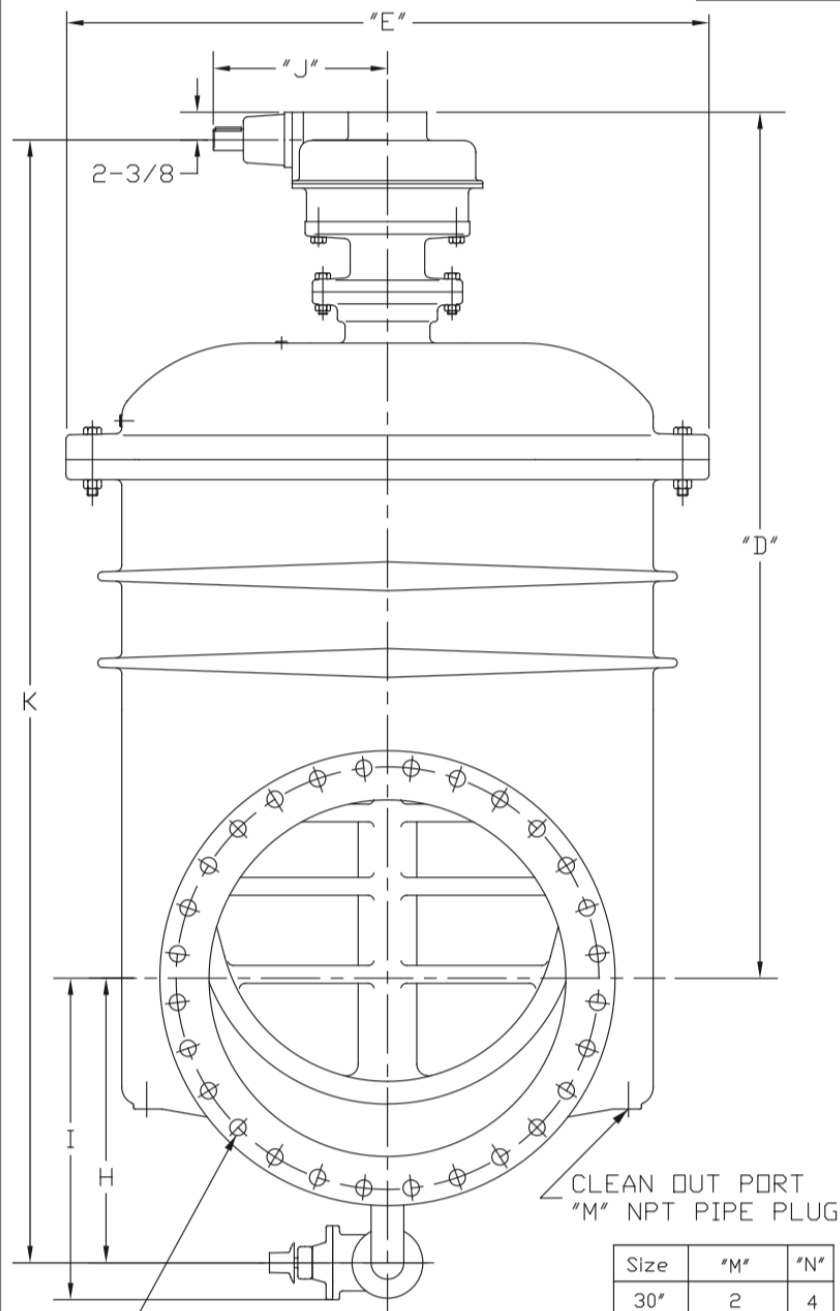


A Forterra Company

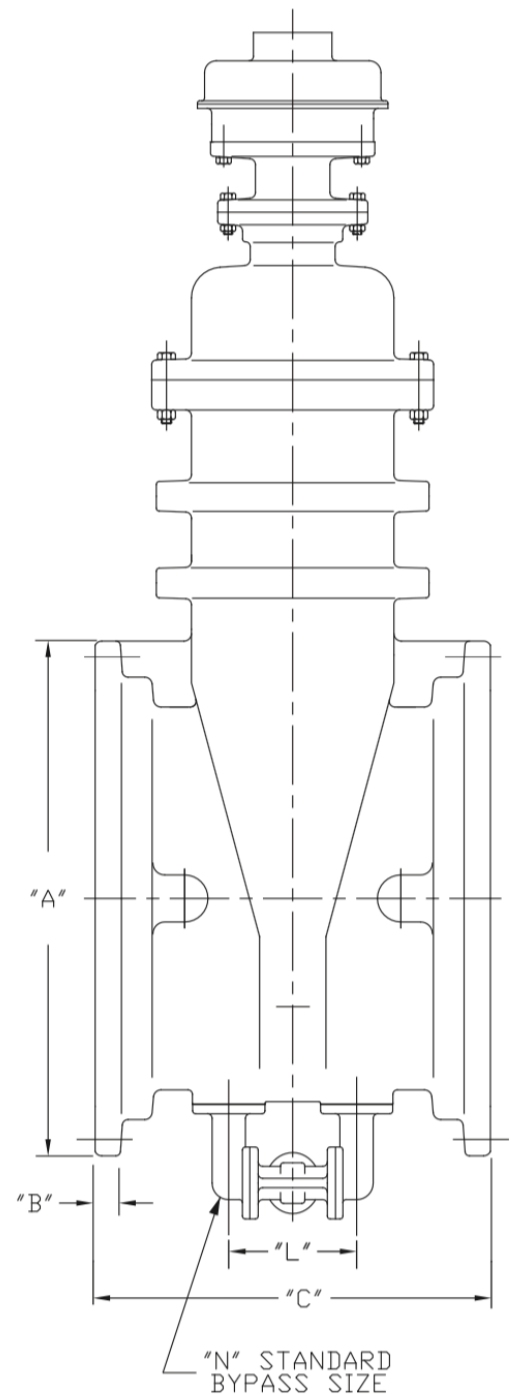


2638-68  
H 12/18Complies with applicable  
requirements of AWWA C51530"-48" R/W VALVE MJ ENDS BEVEL  
GEAR BYPASS GENERAL DIMENSIONS**CLOW VALVE COMPANY**

MODEL 2638



Size	"M"	"N"
30"	2	4
36"	1-1/4	2
42"	1-1/2	4
48"	1-1/2	4

ANSI/AWWA C111/A21.11 Drilling  
for "F" # & "G" Size Bolts

Valve Size	"A"	"B"	"C"	"D"	"E"	"F"	"G"	"H"	"I"	"J"	"K"	"L"
30"	39-1/2	1-3/4	48-1/2	73-7/8	54-3/4	20	1"	24	28-1/2	14-7/8	95-1/2	22
36"	46-1/2	2	38-3/4	83-7/16	58-7/8	24	1"	27-1/4	30-1/4	14-7/8	108-5/16	10-7/8
42"	54	2	39	100-3/4	78	28	1-1/4	30-15/16	35-7/16	17	129-5/16	14-3/8
48"	60-3/4	2	42	103-3/4	78	32	1-1/4	33-15/16	38-7/16	17	135-5/16	14-3/8