

**Central Ohio, Pickaway County, Harrison Township, and Ashville
Detailed Description by Tebbe Civil Engineering LLC.**

General Description:

EARNHART HILL REGIONAL WATER & SEWER DISTRICT AND DEVELOPMENT WATER LINE SPECIFICATIONS

ALL WATERLINE MATERIALS AND INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE CURRENT RULES AND REGULATIONS OF EARNHART HILL REGIONAL WATER AND SEWER DISTRICT (EHRWSD) UP TO AND INCLUDING THE METER AND METER SETTING.

I. VALVES & APPURTENANCES

A. VALVES

1. ALL HAND-OPERATED GATE VALVES, THREE INCHES AND LARGER SHALL CONFORM TO THE LATEST STANDARD SPECIFICATIONS OF THE AMERICAN WATER WORKS ASSOCIATION (AWWA), SECTION C-515 FOR DUCTILE IRON RESILIENT SEATED VALVES. ALL GATE VALVES INSTALLED SHALL BE, AT A MINIMUM, OF THE SAME PRESSURE CLASS AS THE PIPE ON WHICH THEY ARE INSTALLED. VALVES SHALL HAVE JOINT ENDS COMPATIBLE WITH TYPE OF PIPE USED, NON-RISING STEMS, TWO INCH SQUARE OPERATING NUT AND SHALL OPEN COUNTERCLOCKWISE "LEFT". UNLESS OTHERWISE SHOWN ON THE PLANS ALL VALVES SHALL BE RESTRAINED AS A DEAD END FITTING FROM EACH SIDE OF THE VALVE.
2. ALL GATE VALVES 2 ½ INCHES AND SMALLER SHALL BE OF AN EHRWSD APPROVED MANUFACTURE AND SUITABLE FOR THE SERVICE REQUIRED. ALL VALVES SHALL HAVE OPENINGS THROUGH THE BODY OF THE SAME CIRCULAR AREA AS THAT OF THE PIPE TO WHICH THEY ARE ATTACHED. ALL VALVES SHALL BE DESIGNED TO TAKE THE FULL UNBALANCED PRESSURE UPON EITHER FACE.
3. UNDERGROUND VALVES SHALL BE FITTED WITH STANDARD, TWO INCH SQUARE OPERATING NUT. ALL VALVES IN INTERIOR OR ABOVE GROUND PIPING SHALL BE FITTED WITH HAND WHEELS AND SHALL HAVE FLANGED OR SCREWED ENDS DEPENDING UPON THE SIZE OF PIPE WITH WHICH THEY ARE BEING USED, OR AS SHOWN ON THE PLANS. UNDERGROUND VALVES WILL BE PROVIDED WITH BOXES AND COVERS EXTENDED TO GRADE. ALL UNDERGROUND VALVES SHALL HAVE DUCTILE IRON BODIES. OPERATING NUT SHALL BE NO DEEPER THAN 4 FEET BELOW FINISHED GRADE. EXTENSIONS SHALL BE PROVIDED TO ELEVATE THE OPERATING NUT TO THE APPROPRIATE DEPTH.
4. ALL HAND-OPERATED GATE VALVES SHALL OPEN BY TURNING COUNTERCLOCKWISE. THE DIRECTION OF OPENING SHALL BE INDICATED BY AN ARROW ON HAND WHEELS AND ON OPERATING NUTS.
5. UNLESS OTHERWISE NOTED ON THE PLANS OR DIRECTED BY THE ENGINEER, ALL VALVES WITHIN TRAVELED AREAS SHALL BE PROVIDED WITH STANDARD HEAVY DUTY THREE PIECE VALVE BOXES. ALL OTHER VALVES THREE INCHES AND LARGER SHALL BE FURNISHED WITH STANDARD REGULAR DUTY THREE PIECE VALVE BOXES WHICH IS HEREBY DEFINED AS A CLOW F-2450 VALVE BOX OR APPROVED EQUAL. BASES FOR REGULAR DUTY VALVE BOXES SHALL BE SIZED AS FOLLOWS: THREE INCH THROUGH FOUR INCH VALVES, CLOW F-2480 NO. 4 OR APPROVED EQUAL; SIX INCH AND EIGHT INCH VALVES, CLOW F-2465 NO.6 OR EQUAL; TEN INCH AND LARGER, CLOW F-2484 NO. 160 OR EQUAL. COVERS FOR BOXES SHALL BE MARKED "WATER". ALL BOXES SHALL BE INSTALLED TO FINISHED GRADE. ALL VALVE BOXES SHALL BE INSTALLED SUCH THAT THEY ARE CENTERED VERTICALLY OVER THE VALVE OPERATING NUT.

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B. HYDRANTS

1. 5 1/4" TYPE

A) MAIN LINE FLUSHING HYDRANTS OF THIS SIZE SHALL CONFORM TO AWWA C-502, LATEST REVISION. MODELS UTILIZED SHALL BE A ULFM LISTED AMERICAN DARLING B-84-B OR MUELLER SUPER CENTURION 250, 3-WAY N.S.T., MIN, 4'-6" BURY, W/6" MJ CONNECTION, LEFT HAND OPEN/CCW, TWO 2-1/2" NST HOSE NOZZLES, ONE 4-1/2" NST STEAMER NOZZLE, NOZZLE CAP CHAINS. GRADE SOIL AROUND HYDRANTS TO A DEPTH PER MANUFACTURER'S SPECIFICATION. UNLESS OTHERWISE NOTED ON THE PLANS, PUBLIC HYDRANTS SHALL HAVE "THE CAPTIVATER HYDRANT LOCK" #41020-1 IN LIEU OF THE STANDARD 2-1/2 INCH NOZZLE CAP. PUBLIC HYDRANTS SHALL BE FACTORY PAINTED RED OR YELLOW AS NOTED PER PLANS. PRIVATELY OWNED FIRE SYSTEM HYDRANTS SHALL BE FACTORY PAINTED RED WITH A PLACARD STATING "PRIVATE". ALL PUBLIC HYDRANTS SHALL HAVE A WATCH VALVE INSTALLED DIRECTLY TO THE TEE.

2. POST TYPE FLUSHING HYDRANTS

A) BRANCH LINE POST TYPE FLUSHING HYDRANT, (TYPE A) SHALL BE KUPFERLE ECLIPSE NO. 2 POST HYDRANT, MIN FOUR FOOT BURY WITH TWO INCH PVC MECHANICAL JOINT TYPE CONNECTION. GRADE SOIL AROUND HYDRANTS TO A DEPTH PER MANUFACTURER'S SPECIFICATION.

C. HYDRANT TESTING

1. THE CONTRACTOR SHALL MAKE ALL VALVES TIGHT UNDER THEIR WORKING PRESSURE AFTER THEY HAVE BEEN INSTALLED AND BEFORE THEY ARE PLACED IN OPERATION. ANY DEFECTIVE PARTS SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

2. ALL VALVES SHALL BE PRESSURE TESTED IN CONJUNCTION WITH THEIR ADJOINING PIPING.

D. INSTALLATION AND STORAGE

1. THE VALVES AND APPURTENANCES SHALL BE INSTALLED IN ACCORDANCE WITH THE INSTALLATION MANUAL FURNISHED BY THE VALVE MANUFACTURER. EXTREME CARE SHALL BE USED IN THE HANDLING, STORAGE, AND INSTALLATION OF THESE VALVES TO PREVENT DAMAGE OR DISTORTION OF THE EQUIPMENT AND TO INSURE PROPER PERFORMANCE.

II. WATER DISTRIBUTION PIPING

A. PIPE

1. PIPE FOR WATER DISTRIBUTION AND TRANSMISSION MAINS SHALL BE AWWA PRESSURE RATED PIPE WITH PUSH-ON GASKETED JOINTS. THE TYPE OF PIPE AND MINIMUM PRESSURE RATING WILL BE ESTABLISHED BY THE DISTRICT ON A PROJECT BY PROJECT BASIS. EHRWSD MAY REQUEST CERTIFIED LAB DATA TO VERIFY THE PHYSICAL PROPERTIES OF THE MATERIALS SUPPLIED UNDER THIS SPECIFICATION OR MAY TAKE RANDOM SAMPLES AND HAVE THEM TESTED BY AN INDEPENDENT LABORATORY.

2. APPROVED PIPE MATERIAL

A) POLYVINYL CHLORIDE (PVC) PIPE

(1) 4" THROUGH 12" DIAMETER UP TO 150 PSI NORMAL WORKING PRESSURE AWWA C-900 DR-18 (FMPC 150, PC 235).

(2) 4" THROUGH 12" DIAMETER UP TO 200 PSI NORMAL WORKING PRESSURE OR AWWA C-900 DR-14 (FMPC 200, PC 305).

(3) 14" THROUGH 24" DIAMETER UP TO 235 PSI NORMAL WORKING PRESSURE AWWA C-905 DR18.

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B) HIGH DENSITY POLYETHYLENE HDPE PIPE

- (1) 4" THROUGH 24" DIAMETER AWWA M-55 DR11 IPS PC200 PSI 4710 RESIGN HDPE PIPE.

C) DUCTILE IRON PIPE

- (1) 4" THROUGH 12" DIAMETER UP TO 350 PSI NORMAL WORKING PRESSURE AWWA C-151 PC 350.
- (2) 14" THROUGH 20" DIAMETER UP TO 250 PSI NORMAL WORKING PRESSURE AWWA C-151 PC-250.
- (3) 24" THROUGH 64" DIAMETER UP TO 150 PSI NORMAL WORKING PRESSURE AWWA C-151 PC-150.

D) POLYETHYLENE (PE) TUBING

- (1) ¾" THROUGH 2 INCH DIAMETER, PE 4710. THE PIPE SHALL BE HIGH PERFORMANCE, HIGH MOLECULAR WEIGHT, HIGH DENSITY POLYETHYLENE PIPE EQUAL TO DRISCOFLEX 5100 AS MANUFACTURED BY CHEVRON PHILLIPS CHEMICAL COMPANY LP, PLANO, TEXAS, AND SHALL CONFORM TO AWWA C-901 LATEST REVISION. DIAMETER RATIO SHALL BE AS REQUIRED TO MEET A NOMINAL CTS (NOMINAL COPPER TUBING SIZE). PIPE SHALL BE RATED FOR A MAXIMUM WORKING PRESSURE OF 200 PSI, UNLESS OTHERWISE DIRECTED BY THE DISTRICT.

B. D.I. FITTINGS AND ACCESSORIES

1. DUCTILE IRON FITTINGS SHALL CONFORM TO AWWA C-153/ANSI 21.53, COMPACT FITTINGS. ALL LINING AND COATING FOR FITTINGS SHALL BE AS SPECIFIED FOR PIPE. THE FITTINGS SHALL BE DESIGNED TO WITHSTAND THE SAME PRESSURES AS REQUIRED FOR THE ADJOINING PIPE AND SHALL HAVE THE SAME TYPE OF JOINTS.
2. FITTINGS SHALL BE AS MANUFACTURED BY US. PIPE, AMERICAN CAST IRON PIPE CO. OR EHRWSD APPROVED EQUAL.
3. PUSH-ON (SLIP) JOINT FITTINGS SHALL ALSO CONFORM TO AWWA C111/ANSI 21.11.
4. MECHANICAL JOINT FITTINGS INCLUDING ACCESSORIES SHALL ALSO CONFORM TO AWWA C111/ANSI 21.11.
5. ALL FLANGED JOINT FITTINGS SHALL BE FURNISHED WITH 1/8 INCH THICK RUBBER GASKETS. THE BOLTS SHALL HAVE AMERICAN STANDARD HEAVY UNFINISHED HEXAGONAL HEAD AND NUT DIMENSIONS ALL AS SPECIFIED IN AMERICAN STANDARD FOR WRENCH HEAD BOLTS AND NUTS AND WRENCH OPENINGS (ANSI B18.2). MATERIAL FOR BOLTS AND NUTS SHALL CONFORM TO ASTM A307 GRADE B.

C. MECHANICAL JOINT RESTRAINTS

1. SHALL BE PLACED AT ALL PIPE JOINTS FROM TEES, BENDS, AND VALVE LOCATIONS FOR A DISTANCE AS SPECIFIED IN THE PLANS.
 - A) FAST-GRIP GASKET OR APPROVED EQUAL ON DI PIPE PROVIDING AT LEAST TWO TIMES THE RESTRAINT NEEDED FOR THE RATED WORKING PRESSURE. RESTRAINT LENGTHS SHALL BE DESIGNED TO AT LEAST 1.5 TIMES THE RATED HYDROSTATIC TEST PRESSURE.
 - B) MEGALUG, UNI-FLANGE, AND SIGMA ONE MECHANICAL JOINT RESTRAINT AND EBAA IRON SERIES 1600 BELL RESTRAINT HARNESS PROVIDING AT LEAST TWO TIMES THE RESTRAINT NEEDED FOR THE RATED WORKING PRESSURE. RESTRAINT LENGTHS SHALL BE DESIGNED TO AT LEAST 1.5 TIMES THE RATED HYDROSTATIC TEST PRESSURE.

D. CONCRETE BLOCKING (SHALL ONLY BE PROVIDED WHEN SPECIFICALLY REQUESTED IN THE PLANS)

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1. CONCRETE BLOCKING WILL BE PLACED AT ALL TEES, BENDS, AND VALVE LOCATIONS AS SPECIFIED IN THE PROJECT PLANS. THE BLOCKING SHALL BE DESIGNED TO PROVIDE A SAFETY FACTOR OF 3:1 FOR THE RESTRAINT FORCE NEEDED FOR THE RATED WORKING PRESSURE OF THE PIPING SYSTEM.
2. REQUIRED CONCRETE WILL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 2,500 POUNDS AT 28 DAYS.

E. METER ENCLOSURES/SETTERS

1. METER ENCLOSURES/SETTERS SHALL INCORPORATE THE FOLLOWING MATERIALS OR MATERIALS OF SIMILAR MANUFACTURE WHICH HAVE BEEN APPROVED BY EHRWSD.
2. SINGLE SETTER - 3/4" FORD VH72-15W-44-33-G-NL COPPER METER SETTER - 3/4" CTS-GJ BOTH ENDS - ANGLE KEY VALVE INLET X ANGLE CHECK VALVE OUTLET OR
3. TANDEM SETTER - 3/4" FORD TVH72-15W-44-33-G-NL COPPER TANDEM METER SETTER - 3/4" CTS - GJ BOTH ENDS - ANGLE KEY VALVE INLET X ANGLE CHECK VALVE OUTLET.
4. METER BOXES - 18" X 30" ADS 1805AAH METER BOXES W/NOTCHES
5. METER BOX LIDS - (FOR NON-PAVED AREAS) PROSOURCE PS200 WITH SMALL PENTAGON NUT AND TRANSPONDER BOTTOM PLATE, (FOR PAVED AREAS) CAST IRON VESTAL 32-452
6. METER BOX COVERS - 18" VESTAL 32-042 OR 20" VESTAL 32-058.
7. BASE FOR METER ENCLOSURE SHALL BE CLEAN, WASHED #57 GRAVEL, A MINIMUM OF TWO FEET DEEP AND EXTENDED BEYOND THE OUTSIDE OF THE METER ENCLOSURE A MINIMUM OF SIX INCHES ON ALL SIDES. BACKFILL SHALL BE TAMPED IN SIX INCH LAYERS TO PREVENT SETTLEMENT.
8. WHERE SPECIFIED THAT THE OWNER WILL SUPPLY AND INSTALL THE METERS, THE CONTRACTOR SHALL ALSO PROVIDE CROSS-OVER PIECES TO ALLOW FOR PRESSURE TESTING THROUGH THE METER SETTER AND ENCLOSURE TO A POINT BEYOND THE ENCLOSURE.
9. ALL SETTERS SHALL BE SHIPPED COMPLETE WITH NEOPRENE OR APPROVED ALTERNATE METER GASKETS.
10. INSERT STIFFENERS ARE REQUIRED FOR USE WITH P.E. PIPE SERVICE LINE SIZES 3/4" THROUGH TWO INCH AT PACK JOINT CONNECTIONS. INSERT STIFFENERS SHALL BE FORMED OF QUALITY STAINLESS STEEL AND SHALL BE AS MANUFACTURED BY THE FORD METER BOX COMPANY, INC., MODEL #50 OR 70 SERIES., OR EHRWSD APPROVED ALTERNATE.

F. SERVICE SADDLES, CORPORATION STOPS AND CURB STOPS

1. SERVICE CLAMPS SHALL BE PERMANENTLY HINGED TYPE, OF BRASS WITH BRASS SCREWS, CONFINED "O" RING SEAL AND AWWA THREAD OUTLET. SERVICE SADDLES SHALL BE OF A DESIGN WHICH WILL ACCURATELY FIT PLASTIC PIPE (OD.) TO PROVIDE A POSITIVE SEAL BETWEEN PLASTIC MAIN AND SADDLE AT A MINIMUM WORKING PRESSURE OF 200 PSI. MODEL SHALL BE FORD MODEL S70 OR S90 AS APPLICABLE, OR AN EHRWSD APPROVED ALTERNATE.
2. THE SERVICE SADDLES SHALL BE MARKED TO INDICATE SIZE OF PLASTIC MAIN (OD.) AND OUTLET SIZE ON BODY AND STRAP. SERVICE SADDLES SHALL BE AS MANUFACTURED BY FORD METER BOX CO., INC., OR AN EHRWSD APPROVED ALTERNATE.
3. CORPORATION STOPS SHALL BE BRASS, DESIGNED AND MANUFACTURED IN ACCORDANCE WITH AWWA STANDARD SPECIFICATION C800, LATEST EDITION, AND SHALL BE INDIVIDUALLY INSPECTED AND TESTED FOR LEAKS AT THE FACTORY PRIOR TO SHIPMENT. CORPORATION STOPS SHALL BE OF A DESIGN WHICH WILL PERMIT USE WITH DRILLING MACHINES OF CURRENT DESIGN.

Descriptions Exhibit Continued

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4. CORPORATION STOPS SHALL BE PLUG TYPE FURNISHED WITH AWWA INLET THREAD AND PACK JOINT OUTLET FOR PE PIPE, TYPE F1000, AS MANUFACTURED BY FORD METER BOX CO OR AN EHRWSD APPROVED ALTERNATE.
5. CURB STOPS SHALL BE BALL VALVE TYPE WITH PACK JOINT INLET AND OUTLET FOR PE PIPE, FORD MODEL TYPE BH44-233-G -NL OR AN EHRWSD APPROVED ALTERNATE.

G. METERS

UNLESS OTHERWISE NOTED ON THE PLANS, METERS SHALL BE PURCHASED FROM EHRWSD AT THE CURRENT MARKET PRICE AND INSTALLED BY EHRWSD WHEN SERVICE IS REQUESTED. ALLOW EIGHT WEEKS DELIVERY TIME FOR METERS LARGER THE 5/8" X 3/4".

H. INSTALLATION OF PIPE

1. ALL WATER LINES SHALL BE INSTALLED ON PRIVATE PROPERTY (EASEMENTS OBTAINED BY THE DEVELOPER) UNLESS APPROVED BY EHRWSD. THE ACTUAL LOCATION SHALL BE FLAGGED BY THE CONTRACTOR AND APPROVED BY EHRWSD BEFORE INSTALLATION. RESTORATION SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS.
2. IF REQUIRED BY EHRWSD, EACH PIPE MANUFACTURER (OR SUPPLIER) SHALL PROVIDE A REPRESENTATIVE FOR A PERIOD OF ONE (1) WEEK, FIVE (5) CONSECUTIVE WORKING DAYS, TO INSTRUCT THE PIPE INSTALLER OF THE PROPER AND APPROVED METHOD OF INSTALLING PIPE IN THE FIELD ON THE CONSTRUCTION SITE WHEN REQUESTED BY EHRWSD. ALL PIPE SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S PUBLISHED INSTRUCTIONS, MODIFIED ONLY AS MAY BE DIRECTED HEREIN OR BY EHRWSD.
3. ALL PIPE INSTALLATIONS SHALL COMPLY WITH APPLICABLE PARAGRAPHS CONTAINED AS PART OF THESE CONSTRUCTION SPECIFICATIONS.
4. NORMAL LAYING DEPTH SHALL BE 48 INCHES OF COVER REGARDLESS OF PIPE DIAMETER. WHERE ROCK IS ENCOUNTERED ON THE TRENCH BOTTOM, SIX INCHES OF WASHED #57 GRAVEL BEDDING AND ONE FOOT OF WASHED #57 GRAVEL COVER OVER THE CROWN OF THE PIPE SHALL BE REQUIRED.
5. ALL PIPING SHALL BE ASSEMBLED IN ACCORDANCE WITH THE LAYOUT SHOWN ON THE PLANS WITH ONLY SUCH MODIFICATIONS AS MAY BE NECESSARY TO CONFORM TO THE FINAL DETAIL DIMENSIONS OR LOCATION OF EXISTING WATER MAINS, HYDRANTS, EXISTING UTILITIES, TANKS, VALVE VAULTS, BOOSTER STATIONS, VALVES, COUNTY ROADS, HIGHWAY AND STREAM CROSSINGS, ETC.. IN CROSSING UNDER DITCHES AND STREAMS THE STANDARD DEPTH SHALL BE SIX FEET OR AS OTHERWISE REQUIRED UNDER THE CONSTRUCTION SPECIFICATIONS/PLANS. STANDARD FITTINGS SHALL BE USED IF REQUIRED TO DEPRESS THE PIPE BUT IN NO CASE SHALL THE APPROACH TO THE CROSSING BE LAID AT A STEEPER ANGLE THAN FORTY-FIVE (45) DEGREES WITH THE HORIZONTAL.
6. ALL PIPE INSTALLED UNDER THIS CONTRACT SHALL BE INSTALLED IN ACCORDANCE WITH THE APPLICABLE SECTIONS OF AWWA SPECIFICATION (C600 FOR DI PIPE), (C900/C905 FOR PVC PIPE). UNLESS OTHERWISE NOTED ON THE PLANS, TYPE 5 LAYING CONDITIONS SHALL BE MAINTAINED FOR DUCTILE IRON AND PLASTIC PIPE INSTALLATIONS. TRENCH WIDTH AT THE TOP OF THE PIPE SHALL NOT EXCEED THE PIPE DIAMETER PLUS TWO FEET UNLESS APPROVED BY THE EHRWSD. MINIMUM TRENCH WIDTH SHALL BE TWO FEET GREATER THAN THE MAXIMUM OUTSIDE PIPE DIAMETER. DUCTILE IRON PIPE SHALL BE LAID DIRECTLY ON A TRENCH BOTTOM CONTAINING COUPLING OR BELL JOINT HOLES WITH TRENCH SHAPED TO PROVIDE CONTINUOUS CONTACT WITH THE PIPE BETWEEN COUPLING OR BELL JOINT HOLES AS RECOMMENDED BY THE PIPE MANUFACTURER OR AS DIRECTED BY EHRWSD. REFER TO STANDARD TRENCH DETAIL FOR BACKFILL REQUIREMENTS.

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7. IF, IN THE COURSE OF CONSTRUCTION, GROUND WATER IS ENCOUNTERED, THE CONTRACTOR SHALL, BY MEANS OF WELL POINTS OR OTHER ACCEPTABLE METHODS REDUCE THE WATER LEVEL TO THE INVERT OF THE MAIN OR BOTTOM OF THE STRUCTURE. THE CONTRACTOR SHALL MAINTAIN THIS DEWATERED CONDITION UNTIL THE AREA AROUND THE STRUCTURE HAS BEEN BACKFILLED TO EXISTING GRADE. 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 EHRWSD. AT TIMES WHEN PIPE LAYING IS NOT IN PROGRESS, THE OPEN ENDS OF THE PIPE SHALL BE CLOSED USING A WATER TIGHT PLUG AND NO TRENCH WATER SHALL BE PERMITTED TO ENTER THE PIPE. IT SHALL BE BORNE IN MIND THAT PRECAUTIONS MUST BE TAKEN TO PREVENT EMPTY PIPE FROM FLOATING, SHOULD THE TRENCHED PIPE BECOME FLOODED BEFORE BACKFILLING HAS BEEN COMPLETED.
8. WHEN RECOMMENDED BY THE MANUFACTURER, EACH PIECE OF PIPE SHALL BE LOWERED INTO TRENCH AND INSTALLED SEPARATELY. ALL PIPE SHALL BE LAID IN THE TRENCH SO THAT IT IS FIRMLY SUPPORTED ON THE BEDDING MATERIAL THROUGHOUT ITS LENGTH. THIS INCLUDES EXCAVATING FOR PIPE BELLS AT THE APPROPRIATE INTERVALS.
9. AS SHOWN ON THE PLANS, THE CONTRACTOR SHALL PROVIDE JOINT RESTRAINTS WHERE REQUIRED. THIS WORK SHALL BE INCLUDED IN THE UNIT PRICES BID FOR INSTALLING PIPE, FITTINGS, AND APPURTENANCES.
10. PIECES OF PIPE OR FITTING WHICH ARE KNOWN TO BE DEFECTIVE SHALL NOT BE LAID OR PLACED. ANY DEFECTIVE PIECE OF PIPE OR FITTING DISCOVERED AFTER THE PIPING IS LAID SHALL BE REMOVED AND REPLACED WITH SATISFACTORY PIPE OR FITTING. IN CASE A LENGTH OF PIPE IS CUT TO FIT IN A LINE, IT SHALL BE SO CUT AS TO LEAVE A SMOOTH END AT RIGHT ANGLES TO THE LONGITUDINAL AXIS OF THE PIPE. CUTS SHALL BE MADE WITH PROPER TOOLS FOR CUTTING THE PIPE. IN THE EVENT THE PIPE IS DAMAGED AS A RESULT OF THE PIPE BEING CUT, THE AFFECTED JOINT SHALL BE REJECTED.
11. GRAVEL BEDDING AS SPECIFIED SHALL BE REQUIRED WHERE ROCK, EITHER LOOSE OR SOLID, IS EXPOSED AT TRENCH BOTTOM AT THE REQUIRED BURY DEPTH. IT IS INTENDED THAT THE PIPE AT ALL TIMES IS PROTECTED AGAINST DAMAGE FROM PROTRUDING OBJECTS AND RESTS ON A SMOOTH AND CONTINUOUS BEDDING OF EARTH OR GRAVEL. UNDER PAVEMENT AREAS AND/OR TYPE 5 LAYING CONDITIONS GRAVEL BEDDING IS REQUIRED.
12. MATERIAL USED FOR BACKFILLING TRENCHES OVER THE PIPE SHALL BE FREE FROM ANY ROCK OR DEBRIS THAT MAY BE A POTENTIAL SOURCE OF DAMAGE TO THE PIPE. WHERE MATERIAL ORIGINALLY EXCAVATED FROM THE TRENCH IS DEEMED UNSUITABLE, THE CONTRACTOR SHALL OBTAIN OTHER SUITABLE MATERIAL FOR USE AS BACKFILL.
13. TRACER WIRE SHALL BE INSTALLED PER DETAILS AND NOTED INDICATED HEREIN.

I. TRACING WIRE

1. ALL TRACE WIRE AND TRACE WIRE PRODUCTS SHALL BE DOMESTICALLY MANUFACTURED IN THE U.S.A AND COMPLYING WITH ALL ASTM SPECIFICATIONS.
2. ALL TRACE WIRE SHALL HAVE HDPE INSULATION INTENDED FOR DIRECT BURY, COLOR COATED PER APWA STANDARD (BLUE FOR POTABLE WATER AND GREEN FOR SANITARY SEWER) FOR THE SPECIFIC UTILITY BEING MARKED.

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3. OPEN TRENCH - TRACE WIRE SHALL BE #12 AWG COPPER CLAD STEEL, HIGH STRENGTH WITH MINIMUM 450LB. BREAK LOAD, WITH MINIMUM 30 MIL HDPE INSULATION THICKNESS.
4. DIRECTIONAL DRILLING/BORING - TRACER WIRE SHALL BE #12 AWG COPPER CLAD STEEL, EXTRA HIGH STRENGTH WITH MINIMUM 1,150 LB. BREAK LOAD, WITH MINIMUM 45 MIL HDPE INSULATION THICKNESS.
5. PIPE BURSTING/SLIP LINING - TRACE WIRE SHALL BE #.2043" AWG COPPER CLAD STEEL, TOTALLY ANNEALED 1055 STEEL. EXTREME STRENGTH WITH MINIMUM 4,700 LB. BREAK LOAD, WITH MINIMUM 50 MIL HDPE INSULATION THICKNESS.
6. SPLICES AT SPOOL ENDS SHALL BE AT A MINIMUM AND SHALL UTILIZE A 3M DBR/Y-6 TYPE CONNECTOR. EHRWSD RESERVES THE RIGHT TO ADD A TRACER WIRE ACCESS POINT IN LIEU OF A SPLICE.
7. TRACER WIRE SHALL BE PLACED ON TOP OF THE PIPE AND ATTACHED WITH 12 INCHES OF POLYWRAP TAPE EVERY 5 FEET.
8. FOR DIRECTIONAL BORING AND PIPE BURSTING/SLIP LINING INSTALLATIONS, PROVIDE TWO TRACER WIRES SECURELY ATTACHED TO THE PIPE AND CONNECTED TO THE TRACER WIRE AT BOTH ENDS.
9. TRACER WIRE ACCESS POINTS SHALL BE NO FARTHER THAN 500 FEET APART AND AS LOCATED ON THE PLANS AND SHALL BE SNAKE PIT ACCESS MODEL # CD14BTP, FOR DRIVEWAYS AND PAVEMENT, AND MODEL # LD14BTP FOR GRASS AREAS.
10. AFTER WATERLINE IS BACKFILLED, EHRWSD SHALL WITNESS CONTRACTOR LOCATE WATERLINE TO CONFIRM SUCCESSFUL TRACER WIRE SIGNAL THROUGHOUT. CONTRACTOR SHALL MAKE REPAIRS AS NECESSARY TO ENSURE PROPER SIGNAL TO ACCEPTANCE OF EHRWSD.

J. MARKER POSTS

PROVIDE MARKER POSTS FOR BURIED WATER LINES AT VALVES, BENDS, ROAD CROSSINGS, TRACER WIRE ACCESS POINTS, OR AS NOTED ON THE PLANS. MARKERS SHALL BE RHINODOME MODEL RDR, 72" TALL WHITE POST WITH APPROPRIATE EHRWSD CONTACT INFORMATION MADE BY RHINO MARKER SYSTEMS.

K. WATER MAIN CLEANING AND FLUSHING

1. BEFORE A HYDROSTATIC TEST IS APPLIED TO ANY NEWLY CONSTRUCTED WATER MAIN THE MAIN SHALL BE FLUSHED OR CLEANED AS HEREIN PRESCRIBED. DURING THE CONSTRUCTION OPERATIONS, WORKERS SHALL USE CARE TO ASSURE THAT THE INTERIOR SURFACES OF ALL PIPE AND FITTINGS ARE MAINTAINED IN A SANITARY CONDITION. EVERY EFFORT SHALL BE MADE TO KEEP LOOSE FOREIGN MATERIAL OUT OF ALL PIPE AND FITTINGS. EXPOSED OPEN ENDS OF PIPE MUST BE TEMPORARILY BLOCKED OR CAPPED DURING CONSTRUCTION. PARTICULAR CARE SHALL BE TAKEN TO PROTECT THE MAIN WHENEVER WORK IS TEMPORARILY INTERRUPTED.
2. ALL MAIN SIZES 12 INCHES AND SMALLER SHALL BE FLUSHED THROUGH AVAILABLE FIRE HYDRANTS AS DIRECTED AND WITNESSED BY A DESIGNATED EHRWSD REPRESENTATIVE. VALVING OPERATIONS MAY BE REQUIRED TO ASSURE THAT ALL SECTIONS OF THE MAIN ARE THOROUGHLY CLEANED. FLOW RATES FOR ADEQUATE FLUSHING VELOCITIES SHALL BE 1,500 GALLONS PER MINUTE FOR 12 INCH MAINS, 1,000 GALLONS PER MINUTE FOR EIGHT INCH MAINS AND 600 GALLONS PER MINUTE FOR SIX INCH MAINS OR MAXIMUM AVAILABLE FLOWS FROM THE SYSTEM. SECTIONS OF MAIN WHICH CANNOT BE FLUSHED BY VALVING AND HYDRANT OPERATIONS SHALL BE CLEANED AS DIRECTED BY EHRWSD.

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3. ALL MAINS LARGER THAN 12 INCHES SHALL BE CLEANED BY PASSING A PROPERLY SIZED POLY PIG THROUGH THE PIPE. THE POLY PIG SHALL HAVE A MINIMUM DENSITY OF FIVE POUNDS PER CUBIC FOOT (30 KG PER CUBIC METER), BE COATED WITH A DOUBLE SPIRAL WRAP WITHOUT WIRE BRUSHES OR SCRAPPING TOOLS. ACCEPTABLE POLY PIGS INCLUDE: PIPELINE PIGGING PRODUCTS MODEL B4, GIRARD MODEL RCC, AND KNAPP MODEL 1-C OR APPROVED EQUAL.
4. THE CONTRACTOR SHALL PREPARE THE MAIN FOR THE INSERTION AND REMOVAL OF THE POLY PIG AT POINTS IDENTIFIED BY EHRWSD AS INSERTION PORTS, IF REQUIRED, AND EXIT PORTS. IN GENERAL, THIS WILL CONSIST OF PROVIDING ALL MATERIAL, EQUIPMENT AND LABOR TO INSERT THE POLY PIG AND CONSTRUCT A SANITARY EXIT PORT. WHERE PRACTICAL, THE POLY PIG SHALL BE INSERTED INTO THE FIRST LENGTH OF PIPE DURING THE INITIAL INSTALLATION. AT THE EXIT PORT THE CONTRACTOR SHALL PREVENT THE BACKFLOW OF PURGED WATER INTO THE MAIN BY THE TEMPORARY INSTALLATION OF MECHANICAL JOINT BENDS AND PIPE JOINTS TO PROVIDE A RISER OUT OF THE TRENCH. ON LARGER PIPE ADDITIONAL EXCAVATION OF THE TRENCH MAY SERVE THE SAME PURPOSE.
5. WHERE TRENCH IS USED, THE EXCAVATION SHALL BE LINED WITH POLYETHYLENE. PUMPS AND/OR DITCHES SHALL BE PROVIDED TO PREVENT CONTAMINATED WATER FROM REENTERING THE MAIN. AFTER THE MAIN IS CLEANED TO THE SATISFACTION OF EHRWSD, THE CONTRACTOR SHALL REMOVE ALL TEMPORARY CONSTRUCTIONS AND COMPLETE ALL WORK NECESSARY TO SECURE THE SYSTEM PRIOR TO BACKFILLING INSERTION AND EXIT SITES. ADDITIONAL POLY PIG RUNS MAY BE REQUIRED BY EHRWSD WHEN WATER PURGED FROM THE MAIN INDICATES THE PRESENCE OF EXCESSIVE DIRT OR DEBRIS.

L. HYDROSTATIC TESTING

1. A HYDROSTATIC TEST AS REQUIRED PER AWWA PIPE SPECIFICATION (C605-5 FOR PLASTIC PIPE, C600-05 FOR DUCTILE IRON PIPE) SHALL BE APPLIED TO THE MAINS, SERVICE LINES AND FIRE HYDRANT LEADS. EACH VALVED SECTION OF WATER MAIN SHALL BE TESTED INDEPENDENTLY OF ONE ANOTHER UNLESS OTHERWISE APPROVED BY EHRWSD. PRESSURE TEST SHALL BE CONDUCTED WITH ALL WATCH VALVES OPEN AND HYDRANT FOOT VALVES CLOSED. THE PRESSURE DURING THE TEST SHALL BE MAINTAINED AT A MINIMUM OF 150 PSI IN ANY SECTION BEING TESTED OR AS REQUIRED BY EHRWSD. DESIGNER NOTE: (A 200 PSI TEST PRESSURE IS REQUIRED WHEN USING JEDD AREA WATER AND OTHER PRESSURE ZONES WHERE THE STATIC PRESSURE IS GREATER THAN 90 PSI). THE DURATION OF EACH PRESSURE TEST SHALL BE AT LEAST TWO HOURS. EHRWSD WILL FURNISH GAUGES AND TEST PUMP FOR THE TEST, BUT THE CONTRACTOR SHALL FURNISH ALL MATERIALS, MAKE ALL TAPS REQUIRED, PIPING, AND OTHER ITEMS AS NECESSARY. CONTRACTOR TO PROVIDE LABOR ASSISTANCE AS REQUESTED BY EHRWSD FOR CONDUCTING THE TESTS.
2. IF THERE ARE INDICATIONS OF LEAKS UNDER THIS PRESSURE TEST, THE CONTRACTOR SHALL LOCATE THEM AT HIS COST AND EXPENSE. ANY CRACKED OR DEFECTIVE PIPES, FITTINGS, VALVES, JOINTS, OR OTHER APPURTENANCES DISCOVERED AS A CONSEQUENCE OF THIS PRESSURE TEST SHALL BE REMOVED AND REPLACED BY THE CONTRACTOR WITH APPROVED MATERIAL, AT HIS COST AND EXPENSE AND THE TEST SHALL BE REPEATED UNTIL SATISFACTORY TO EHRWSD.

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3. A TEST SHALL BE MADE TO DETERMINE THE QUANTITY OF WATER LOST BY LEAKAGE UNDER THE SPECIFIED TEST PRESSURE AS PROVIDED IN APPROPRIATE AWWA PIPE SPECIFICATIONS.
4. BEFORE APPLYING THE SPECIFIED PRESSURE, ALL AIR SHALL BE EXPELLED FROM THE PIPE. TO ACCOMPLISH THIS, AIR RELEASE OUTLETS SHALL BE INSTALLED BY THE CONTRACTOR AS INDICATED ON THE PLANS, OR AS REQUIRED BY EHRWSD. COST FOR AIR RELEASE OUTLETS SHALL BE INCLUDED IN THE VARIOUS LINE ITEMS OF THE WATER LINE PROJECT.
5. SHOULD ANY TEST OF COMBINED SECTIONS OF PIPE LAID DISCLOSE LEAKAGE GREATER THAN THAT SPECIFIED, OR IF INDIVIDUAL SECTIONS SHOW LEAKAGE GREATER THAN THE SPECIFIED LIMIT, THE CONTRACTOR SHALL AT HIS OWN EXPENSE LOCATE AND REPAIR THE LEAKS UNTIL THE LEAKAGE IS WITHIN THE SPECIFIED ALLOWANCE.
6. LEAKAGE SHALL BE DEFINED AS THE QUANTITY OF WATER THAT MUST BE SUPPLIED INTO THE NEWLY LAID PIPE, OR ANY VALVED SECTION THEREOF, TO MAINTAIN PRESSURE WITHIN FIVE PSI (34.5 KPA) OF THE SPECIFIED TEST PRESSURE AFTER THE AIR IN THE PIPE LINE HAS BEEN EXPELLED AND THE PIPE HAS BEEN FILLED WITH WATER. REFER TO TABLE BELOW FOR HYDROSTATIC TESTING ALLOWANCE.
7. ANY TESTING PERFORMED AGAINST EXISTING VALVES SHALL BE AT THE CONTRACTOR'S RISK AND IN STRICT COMPLIANCE WITH THE REQUIREMENTS OF EHRWSD. IF UNABLE TO ACHIEVE THE REQUIRED TEST THE CONTRACTOR SHALL DISCONNECT FROM THE EXISTING VALVE, PLUG AND RE-TEST UNTIL SATISFACTORY RESULTS ARE OBTAINED. ANY DAMAGE CAUSED TO EXISTING FACILITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

M. DISINFECTION

1. AFTER A SATISFACTORY HYDROSTATIC TESTING, THE COMPLETED PIPE WILL BE CHLORINATED IN ACCORDANCE WITH AWWA C651, LATEST EDITION. ALL LABOR, MATERIAL, AND EQUIPMENT INCLUDING CHLORINATION TAPS AND BLOW-OFF TAPS NECESSARY TO COMPLETE THE WORK SHALL BE FURNISHED AND PAID FOR BY THE CONTRACTOR. TAPS SHALL INCLUDE TAPPING VALVES, SUFFICIENT TUBING OR PIPE TO EXTEND OUTSIDE THE TRENCH, AND OPERABLE VALVE ABOVE GROUND. BLOW-OFFS SHALL BE INSTALLED AS REQUIRED. ACTUAL TESTING SHALL BE PERFORMED BY EHRWSD. THE TIME AND SECTION OF LINE TO BE CHLORINATED SHALL BE APPROVED BY EHRWSD.
2. UPON COMPLETING THE CHLORINATION AND THE SUBSEQUENT FLUSHING OF THE LINE, EHRWSD SHALL TAKE THE NECESSARY WATER SAMPLES FROM THE PIPE FOR TESTING. TESTING SHALL BE PERFORMED IN ACCORDANCE WITH OHIO ENVIRONMENTAL PROTECTION AGENCY RULES AND REGULATIONS, COPIES OF WHICH ARE AVAILABLE FROM THE OHIO ENVIRONMENTAL PROTECTION AGENCY. A CERTIFIED COPY OF THE TEST RESULTS SHALL BE SENT TO CONTRACTOR/DEVELOPER. THE COST OF TESTING SHALL BE BORNE BY THE CONTRACTOR/DEVELOPER. UPON APPROVAL OF SAMPLE TESTING, CONTRACTOR SHALL REMOVE TESTING PIPE AND CAP THE TAPS AT THE CORPORATION STOP.

N. CONNECTIONS

1. CONNECTIONS TO EXISTING WATER MAINS SHALL BE MADE UNDER THE SUPERVISION OF EHRWSD AT THE DEVELOPER'S EXPENSE. THE CONTRACTOR SHALL COORDINATE THIS WORK WITH EHRWSD.

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2. ALL REQUIRED EASEMENTS SHALL BE RECORDED BEFORE ANY CONNECTIONS ARE MADE TO THE EXISTING EHRWSD SYSTEM.

O. RESTORATION (PUBLIC AND PRIVATE RIGHT OF WAY)

1. ALL CONSTRUCTION WITHIN THE RIGHT-OF-WAY LIMITS OF A COUNTY OR STATE HIGHWAY SHALL BE RESTORED IN ACCORDANCE WITH THE REQUIREMENTS OF THE STATE OR COUNTY HIGHWAY DEPARTMENTS, AS APPLICABLE.
2. ATTENTION IS DIRECTED TO THE PROPOSED LOCATION IN YARDS, FIELDS, AND ALL OTHER PRIVATE PROPERTY IN THE CONSTRUCTION AREA. CONTRACTOR SHALL EXERCISE DUE CARE TO PROTECT TREES, SHRUBBERY, GARDEN PLOTS, FENCES, GRASSED AREAS, FIELD TOPSOIL, DRAINAGE TILE, AND ALL STRUCTURES WITHIN THE CONSTRUCTION AREA. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE REPAIR OR REPLACEMENT OF ALL THE ABOVE ITEMS THAT ARE REMOVED FOR CONSTRUCTION OR DAMAGED DURING CONSTRUCTION.
3. ALL CONSTRUCTION ON PRIVATE RIGHT-OF-WAY SHALL BE RESTORED TO IT'S ORIGINAL STATE BY THE CONTRACTOR.
4. ALL LAWN AND GRASS AREAS DAMAGED BY CONSTRUCTION SHALL BE RAKED AND SEEDED WITH A GRASS SEED MIXTURE OF 40 PERCENT KENTUCKY BLUEGRASS, 40 PERCENT CREEPING RED FESCUE, AND 20 PERCENT ANNUAL RYEGRASS. THE AREA WILL THEN BE FERTILIZED AT A RATE OF TEN LBS. PER 1,000 SQ. FT. OF 6-24-24 OR AS OTHERWISE APPROVED. THE AREA WILL THEN BE MULCHED WITH WHEAT STRAW TO A THICKNESS OF AT LEAST ½ INCH.
5. ALL VALVE BOXES INCLUDING CURB STOPS AND METER PITS, SHALL BE MARKED USING FIVE FEET LONG, TWO INCH OUTSIDE DIAMETER STEEL FENCE POSTS OR PERMANENT MARKER POST.

P. ROAD AND DRIVE CROSSINGS

1. ALL WORK IN THE STATE OR COUNTY RIGHT OF WAY SHALL BE PERFORMED IN ACCORDANCE WITH THE RESPECTIVE AGENCIES REQUIREMENTS. THE DEVELOPER WILL OBTAIN THE NECESSARY PERMITS FOR SUCH WORK. THE CONTRACTOR SHALL SECURE ACCEPTANCE OF WORK BY STATE AND/OR COUNTY HIGHWAY DEPARTMENT BEFORE FINAL ACCEPTANCE BY EHRWSD.
2. ALL ROAD CROSSINGS, WHETHER OPEN CUT OR JACK AND BORE, SHALL BE ENCASED AT A MINIMUM USING 0.375 INCH THICK WELDED STEEL CONDUIT. HORIZONTAL DIRECTIONAL DRILLING USING HDPE PIPE WILL NOT REQUIRE A CASING PIPE.
3. UNLESS OTHERWISE NOTED ON THE PLANS, ALL CROSSINGS OF PRIVATE BLACKTOP OR CONCRETE DRIVEWAYS SHALL BE MADE BY HORIZONTAL DIRECTIONAL DRILLING.

SEE AGREEMENT EXHIBIT FOR MORE INFORMATION ON ENGINEERING SCOPE OF SERVICES.