

1. PVC PIPE

PVC PIPE 12-INCH DIAMETER AND SMALLER SHALL; MEET THE LATEST REQUIREMENTS OF ASTM F-794, WITH A MINIMUM PIPE STIFFNESS OF 60 PSI; MEET THE LATEST REQUIREMENTS OF ASTM F-949, WITH A MINIMUM PIPE STIFFNESS OF 50 PSI; MEET THE LATEST REQUIREMENTS OF ASTM D-3034, SDR 35 (TYPE PSM). PIPE SHALL HAVE A MINIMUM CELL CLASSIFICATION OF 12454-B, 12454-C, OR 12365-A PER ASTM D-1784.

PVC PIPE 15-INCH DIAMETER AND LARGER AND NOT OTHERWISE SPECIFIED; SHALL MEET THE LATEST REQUIREMENTS OF ASTM F-764, WITH A MINIMUM PIPE STIFFNESS OF 46 PSI; OR MEET THE LATEST REQUIREMENTS OF ASTM F-949, WITH A MINIMUM PIPE STIFFNESS OF 50 PSI. PIPE SHALL HAVE A MINIMUM CELL CLASSIFICATION OF 12454-B, 12454-C OR 12364-A PER ASTM D-1784.

ALL PVC PIPE SHALL BE APPROPRIATELY MARKED FOR THE PURPOSE OF IDENTIFICATION AND SHALL BE SUBJECT TO INSPECTION AND REJECTION AT THE FACTORY, TRENCH OR OTHER POINT OF DELIVERY.

ALL PIPE SHALL BE OF THE INTEGRAL BELL ELASTOMERIC GASKETED JOINT TYPE. THE JOINTS SHALL BE PUSH-ON TYPE MEETING THE REQUIREMENTS OF ASTM D-3212 AND THE JOINT SHALL BE DESIGNED TO PREVENT DISPLACEMENT OF THE GASKET WHEN ASSEMBLING THE JOINT.

THE PIPE SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D-2321 AND WITH THE REQUIREMENTS OF THESE SPECIFICATIONS. ANY REQUIREMENTS OF ASTM D-2321 WHICH MAY BE IN CONFLICT OR INCONSISTENT WITH THE REQUIREMENTS OF THESE SPECIFICATIONS SHALL BE VOID TO THE EXTENT OF SUCH CONFLICT OR INCONSISTENCY.

THE ENDS OF ALL RIBBED PVC PIPE THAT WILL BE INSTALLED IN MANHOLES SHALL BE PROVIDED WITH A FACTORY OVERSLEEVE. FIELD INSTALLED OVERSLEEVES WILL NOT BE PERMITTED.

2. REINFORCED CONCRETE PIPE

ALL SIZES OF REINFORCED CONCRETE PIPE SHALL MEET THE LATEST REQUIREMENTS OF ASTM C-76, CLASS III AND ASTM C-443.

REINFORCED CONCRETE SEWER PIPE (RCP) SHALL BE APPROPRIATELY MARKED FOR THE PURPOSE OF IDENTIFICATION AND NO PIPE SHALL BE DELIVERED UNTIL IT HAS REACHED THE APPROPRIATE STRENGTH REQUIREMENTS. ALL RCP SHALL BE SUBJECT TO INSPECTION AND REJECTION AT THE FACTORY, TRENCH OR OTHER POINT OF DELIVERY.

JOINTS FOR RCP SHALL BE OF THE RUBBER GASKET TYPE CONFORMING TO ASTM C-443. THE GASKET SHALL BE THE SOLE ELEMENT DEPENDED UPON TO MAKE THE JOINT WATERTIGHT.

REINFORCED CONCRETE ELLIPTICAL PIPE SHALL BE PROVIDED IN ACCORDANCE WITH ASTM C507.

3. HDPE PIPE

HIGH DENSITY POLYETHYLENE (HDPE) PIPE SHALL ONLY BE USED FOR GRAVITY STORM SEWER OR DRAINAGE TILE APPLICATIONS. IT SHALL BE MARKED FOR THE PURPOSE OF IDENTIFICATION AND SHALL BE SUBJECT TO INSPECTION AND REJECTION AT THE FACTORY, TRENCH OR OTHER POINT OF DELIVERY. ACCEPTABLE PIPE SIZE SHALL BE 36-INCH OR LESS.

HDPE PIPE SHALL HAVE A SMOOTH INTERIOR AND ANNULAR EXTERIOR CORRUGATIONS. PIPE 10-INCH AND SMALLER SHALL MEET AASHTO M252, TYPE S AND THE VIRGIN MATERIAL SHALL CONFORM WITH THE MINIMUM REQUIREMENTS OF CELL CLASSIFICATION 424420C. PIPE 12-INCH AND LARGER SHALL MEET AASHTO M294, TYPE S OR ASTM F2306 AND THE VIRGIN MATERIAL SHALL CONFORM WITH THE MINIMUM REQUIREMENTS OF CELL CLASSIFICATION 435400C. CELL CLASSIFICATION SHALL BE PER ASTM D3350 EXCEPT CARBON BLACK CONTENT SHOULD NOT EXCEED 5%.

PIPE JOINTS SHALL MEET THE REQUIREMENTS OF AASHTO M252, M294, OR ASTM F2306. JOINTS SHALL BE WATERTIGHT MEETING THE REQUIREMENTS OF ASTM D3212. GASKETS SHALL BE POLYISOPRENE MEETING THE REQUIREMENTS OF ASTM F477 AND SHALL BE INSTALLED BY THE MANUFACTURER AND COVERED WITH A REMOVABLE WRAP. JOINT LUBRICANT PROVIDED BY THE PIPE MANUFACTURER SHALL BE USED ON THE GASKET AND BELL. TWELVE INCH (12") AND LARGER PIPE SHALL HAVE A REINFORCED BELL WITH A BELL TOLERANCE DEVICE INSTALLED BY THE MANUFACTURER.

PIPE SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321 AND THE MANUFACTURER'S GUIDELINES. MINIMUM COVER IN TRAFFIC AREAS FOR 4-INCH THROUGH 36-INCH PIPE SHALL BE 12 INCHES, HOWEVER, PIPE FLOATATION SHALL ALSO BE CONSIDERED.

METAL PIPE SHALL NOT BE USED UNLESS APPROVED BY THE ENGINEER.

4. SERVICE CONNECTIONS

SERVICE CONNECTIONS INTO ALL NEW CONSTRUCTION MAIN LINE PIPES SHALL BE INSTALLED INTO FACTORY MADE TEES OF THE SAME MATERIAL AS THE MAIN SEWER.

SERVICE CONNECTIONS INTO ALL EXISTING MAIN LINE SEWERS SHALL BE INSTALLED INTO THE MAIN SEWER BY ONE OF THE FOLLOWING METHODS. IN PVC OR HDPE SEWER MAINS THE CONNECTIONS SHALL BE MADE WITH INSERTA-TEES AS MANUFACTURED BY ADVANCED DRAINAGE SYSTEMS, INC. OR APPROVED EQUAL. NO ALTERNATIVE INSERTA-TEES SHALL BE CONSIDERED EQUAL UNTIL APPROVED BY THE ENGINEER. IN RCP SEWER MAINS THE CONNECTIONS SHALL BE MADE BY CORING THE CONCRETE MAIN AND INSTALLING A FLEXIBLE WATERTIGHT KOR-N-SEAL BOOT AS MANUFACTURED BY TRELLEBORG OR APPROVED EQUAL. NO OTHER BOOT ASSEMBLY SHALL BE CONSIDERED EQUAL UNTIL APPROVED BY THE ENGINEER.

MATERIALS USED TO CONSTRUCT SEWER SERVICE CONNECTIONS SHALL BE ASTM 3034. EXISTING SEWER SERVICES TO NEW SERVICES SHALL BE WITH A FERNCO OR APPROVED FLEXIBLE WATERTIGHT CONNECTION. IF THE EXISTING SERVICE IS PVC, A GASKETED PVC COUPLING SHALL BE UTILIZED.

4. SERVICE CONNECTIONS (CONT)

TRACER WIRE SHALL BE INSTALLED WITH ALL NEW SERVICES FROM THE MAIN TO THE CLEANOUT.

5. PLUGS

PLUGS SHALL BE PROVIDED AT THE FOLLWING LOCATIONS:

PERMANENT PLUGS SHALL BE PROVIDED AT ALL LOCATIONS WHERE EXISTING SEWERS ARE CUT AND NOT RECONNECTED.

TEMPORARY PLUGS SHALL BE PROVIDED AT ALL LOCATIONS WHERE NEW PIPE STUBS ARE INSTALLED FOR FUTURE SEWER EXTENSIONS.

THE PLUGS SHALL BE DESIGNED SPECIFICALLY FOR USE WITH THE TYPE OF PIPE IN WHICH THEY ARE INSTALLED, SHALL BE WATERTIGHT, AND SHALL BE CAPABLE OF REMOVAL WITHOUT CAUSING DAMAGE TO THE PIPE IN WHICH THEY ARE INSTALLED.

THE COST OF ALL LABOR, EQUIPMENT, AND MATERIALS REQUIRED TO INSTALL PLUGS SHALL BE INCLUDED IN THE APPROPRIATE UNIT PRICE BID FOR THE PERTINENT SEWER ITEM.

6. PIPE SEALING

PIPE SEALING SHALL CONSIST OF FILLING THE END OF THE PIPE WITH GROUT OR CLASS C CONCRETE. THE GROUT OR CONCRETE SHALL EXTEND INTO THE PIPE FOR A LEAST 12 INCHES, FORMING A SOLID WATERPROOF PLUG COMPLETELY BONDED TO THE PIPE. GROUT MIX SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO ANY SEALING OPERATION. THE COST FOR PIPE SEALING SHALL BE INCLUDED IN THE PRICE OF THE APPROPRIATE ITEM REQUIRING THE PIPE SEALING.

7. PIPE ABANDONMENT

PIPE ABANDONMENT SHALL CONSIST OF PROVIDING PERMANENT PLUGS OR PIPE SEALING AS DEFINED ABOVE, AT LOCATIONS IDENTIFIED IN THE PLANS AND LEAVING THE PIPE IN PLACE. THE COST FOR PIPE ABANDONMENT SHALL BE INCLUDED IN THE PRICE OF THE APPROPRIATE ITEM REQUIRING THE PIPE ABANDONMENT.

8. PIPE GROUT FILLING

PIPE GROUT FILLING SHALL CONSIST OF FILLING THE PIPE BY PUMPING A GROUT MIXTURE INTO THE PIPE. THE PIPE SHALL BE COMPLETELY FILLED, LEAVING NO VOIDS OR AIR SPACES. GROUT MIX SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO ANY FILLING OPERATION. THE COST FOR PIPE GROUT FILLING SHALL BE INCLUDED IN THE PRICE FOR THE APPROPRIATE ITEM REQUIRING THE PIPE GROUT FILLING.

9. PIPE REMOVAL

PIPE REMOVAL SHALL BE PERFORMED IN ACCORDANCE WITH ODOT ITEM 202.

PIPE REMOVED SHALL BE PAID PER LINEAL FOOT AND SHALL INCLUDE THE PIPE REMOVED AND ANY ADDITIONAL ITEMS AS REQUIRED ON THE DRAWINGS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER DISPOSAL OF THE MATERIALS AT THEIR COST.

10. PIPE REPLACEMENT

FOR LOCATIONS WHERE THE SEWER IS TO BE INSTALLED ALONG THE SAME ALIGNMENT AS THE EXISTING SEWER, THE COST FOR REMOVING THE EXISTING PIPE SHALL BE INCLUDED IN THE UNIT BID PRICE FOR NEW SEWER INSTALLED AT THE PROPOSED DIAMETER.

THE CONTRACTOR MAY BE ABLE TO BLOCK THE FLOW IN THE EXISTING SEWER PERIODICALLY, HOWEVER THE SEWER FLOW SHALL BE RESTORED TO THE SATISFACTION OF THE ENGINEER AT THE END OF EACH DAY.

11. TRENCHES

EXCEPT WHERE OTHERWISE SPECIFICALLY REQUIRED OR PERMITTED BY THE ENGINEER, SEWERS SHALL BE INSTALLED IN OPEN TRENCH; SHALL BE STARTED AT THE LOWEST POINT; AND SHALL HAVE SPIGOT ENDS POINTING IN THE DIRECTION OF FLOW.

THE MAXIMUM ALLOWABLE TRENCH WIDTHS AT THE TOP OF THE PIPE FOR THE VARIOUS SIZES OF PIPE SHALL EQUAL THE PIPES OUTSIDE DIAMETER PLUS 24 INCHES OR AS SPECIFIED ON THE DRAWINGS. WHENEVER THE MAXIMUM ALLOWABLE TRENCH WIDTH IS EXCEEDED FOR ANY REASON, THE ENGINEER RESERVES THE RIGHT TO DIRECT THE CONTRACTOR TO UTILIZE PIPE OF GREATER STRENGTH, TO MODIFY THE TYPE OF BACKFILL, TO EMBED THE PIPE IN CONCRETE, OR TO UTILIZE A COMBINATION OF THESE PROCEDURES, ALL AT THE EXPENSE OF THE CONTRACTOR.

TRENCH EXCAVATION SHALL INCLUDE THE REMOVAL OF EXISTING PAVEMENTS, CURBS AND SIDEWALKS.

ALL TRENCHES SHALL BE KEPT SUFFICIENTLY FREE OF WATER DURING PIPE LAYING AND JOINTING TO PREVENT DAMAGE TO THE JOINTS. WHEN WATER EXISTS IN THE TRENCHES AT THE TIME OF PIPE LAYING, THE CONTRACTOR SHALL, AT HIS EXPENSE, DEWATER THE TRENCH IN A MANNER APPROVED BY THE ENGINEER.

TRENCH EXCAVATION IN EARTH AND ROCK SHALL BE 6 INCHES BELOW THE OUTSIDE BOTTOM OF THE PIPE BARREL AND BELL.

WHERE ROCK IS ENCOUNTERED WHICH CANNOT BE REMOVED BY ORDINARY EXCAVATING METHODS, ROCK EXCAVATION, UNLESS SUBSEQUENTLY SPECIFIED TO BE BY HAND, MAY BE ACCOMPLISHED BY THE USE OF ROCK SAWS, HOE RAMS, OR OTHER METHODS APPROVED BY THE ENGINEER. ROCK REMOVAL BY BLASTING WILL NOT BE PERMITTED ON THIS PROJECT. THE COST FOR ROCK REMOVAL SHALL BE INCLUDED IN THE UNIT BED PRICE FOR THE APPROPRIATE ITEM REQUIRING THE EXCAVATION.

WHERE INDICATED AS A BID ITEM, EXCAVATION SHALL BE PAID PER CUBIC YARD AND PER PLAN QUANTITIES. QUANTITIES HAVE BEEN CALCULATED BY THE END AREA METHOD AND CAN BE FOUND IN THE DRAWINGS ON THE QUANTITIES SHEET AND THE CROSS SECTIONS SHEET.

12. STORM SEWER AND TILE REPAIR

ALL EXISTING STORM SEWERS, FIELD TILES OR OTHER SUBSURFACE DRAINAGE FACILITY DAMAGED, INTERFERED WITH OR OTHERWISE ENCOUNTERED AND REQUIRING REPAIRS SHALL BE REPLACED WITH NEW PIPE. DRAINAGE FACILITIES SHALL INCLUDE BUT MAY NOT NECESSARILY BE LIMITED TO PIPING, CLEANOUTS OR OTHER APPURTENANCES. THE NEW PIPE SHALL BE CONSTRUCTED OF MATERIALS MEETING THE REQUIREMENTS OF THIS SPECIFICATION OR AS APPROVED BY THE ENGINEER.

THE SECTION OF PIPE TO BE REPAIRED SHALL BE CUT AT A RIGHT ANGLE TO THE CENTERLINE OF THE PIPE, LEAVING SUFFICIENT LENGTH BEYOND A JOINT TO INSTALL A FERNCO ADAPTER. FERNCO ADAPTERS SHALL BE USED AT ALL JOINTS CONNECTING NEW PIPE TO EXISTING PIPE UNLESS OTHERWISE APPROVED BY THE ENGINEER. THE REPLACED PIPE SHALL BE INSTALLED TO MATCH ELEVATIONS AND SIZE OF THE EXISTING SEWER.

REPLACEMENT OF STORM SEWER OR TILE REPAIR SHALL BE PAID PER LINEAL FOOT BASED UPON THE BID ITEM FOR PIPE REPAIR. THE BID ITEM SHALL INCLUDE ALL BACKFILL AND BEDDING OF THE REPLACED SECTION OF PIPE.

13. PIPE LAYING

PIPES LAID IN OPEN TRENCH SHALL BE LAID WITH THEIR FULL LENGTHS TRUE TO LINE AND GRADE WITH THE AID OF LASER BEAM EQUIPMENT OR OTHER METHOD APPROVED BY ENGINEER.

APPROVED LASER BEAM EQUIPMENT SHALL BE A ROTATING LASER WITH GRADE/SLOPE CONTROL OR INTERNAL PIPE LASER WITH TARGET.

LASER BEAM EQUIPMENT SHALL BE CHECKED A MINIMUM OF TWICE DAILY, ONCE IN THE AM AND ONCE IN THE PM, IN THE PRESENCE OF THE ENGINEER'S REPRESENTATIVE TO VERIFY THAT THE EQUIPMENT IS MAINTAINING THE ESTABLISH LINE AND GRADE. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER OF ANY DEVIATION IN THE DESIGN LINE AND GRADE.

REGARDLESS OF THE METHOD USED, THE ENGINEER SHALL BE IMMEDIATELY NOTIFIED OF ANY MISALIGNMENT OF THE PIPE WHEN LAID IN ACCORDANCE WITH ESTABLISHED CUTS OR ELEVATIONS.

PIPES SHALL BE LAID WITH THE SPIGOT END ON THE LOW END OF THE SEWER SECTION. EXCAVATION AND INSTALLATION OF THE SEWER SHALL START AT THE LOWEST POINT AND WORK TOWARD THE HIGHEST POINT OF THE SEWER SECTION.

ALL PIPES SHALL BE THOROUGHLY CLEANED INSIDE AND OUTSIDE BEFORE BEING LOWERED INTO THE TRENCH AND SHALL BE KEPT CLEAN DURING INSTALLATION. THE END OF THE PIPE SHALL BE PLUGGED TO EXCLUDE WATER, ANIMALS OR OTHER FOREIGN MATERIAL FROM ENTERING THE PIPE WHEN PIPE INSTALLATION IS STOPPED FOR ANY REASON.

SURFACES TO BE IN CONTACT WITH THE RUBBER GASKET SHALL BE WIPED CLEAN AND DRY JUST PRIOR TO MAKING THE JOINT AND WHEN MAKING THE JOINT A LUBRICANT SHALL BE USED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

14. PIPE EMBEDMENT

PIPE EMBEDMENT SHALL INCLUDE THE MATERIAL PLACED BENEATH THE PIPE TO THE DEPTHS OF EXCAVATION PREVIOUSLY SPECIFIED AND AROUND THE PIPE IN ACCORDANCE WITH THIS SPECIFICATION AND/OR AS SHOWN ON THE DRAWINGS.

THE MATERIAL SHALL BE COARSE AGGREGATE MEETING THE REQUIREMENTS OF THE LATEST REVISION OF THE OHIO DEPARTMENT OF TRANSPORTATION CONSTRUCTION AND MATERIAL SPECIFICATIONS FOR THE RESPECTIVE BEDDING MATERIALS SHOWN ON THE DRAWINGS. ALL BEDDING MATERIAL SHALL BE PROVIDED AT THE CONTRACTOR'S EXPENSE. GRANULAR MATERIAL SHALL BE APPROVED BY THE ENGINEER.

NO LESS THAN THE MINIMUM OF BEDDING MATERIAL SHALL BE PROVIDED UNDER THE FULL LENGTH OF EACH PIPE, INCLUDING PIPE BELLS OR COUPLINGS. THE BEDDING MATERIAL SHALL BE SHAPED TO CONFORM TO THE BOTTOM QUADRANT OF THE PIPE BARREL. THE MATERIAL SHALL BE CAREFULLY PLACED SO AS NOT TO DAMAGE THE JOINTS OR DISPLACE THE PIPE AND NO MATERIAL SHALL BE DROPPED DIRECTLY ON THE PIPE.

THE ENGINEER RESERVES THE PRIVILEGE OF ALTERING THE TYPE OF BEDDING MATERIAL, DEPENDING UPON THE WATER CHARACTERISTICS OF THE TRENCH.

AFTER THE PIPE IS LAID, THE BEDDING MATERIAL SHALL BE SHOVELED, PLACED AND TAMPED TO FILL ALL VOIDS UNDER AND AROUND THE PIPE TO THE LIMITS PREVIOUSLY SPECIFIED.

IF MATERIAL FOUND AT THE SPECIFIED DEPTHS OF EXCAVATION BELOW THE ELEVATION OF THE OUTSIDE BOTTOM OF THE PIPE BARREL IS NOT SUITABLE TO PROVIDE ADEQUATE FOUNDATION FOR THE PIPE, A FURTHER DEPTH SHALL BE EXCAVATED AND FILLED WITH GRANULAR BEDDING MATERIAL APPROVED BY THE ENGINEER. SUCH ADDITIONAL GRANULAR BEDDING MATERIAL, AS WELL AS THE ADDITIONAL EXCAVATION, WILL BE AT NO COST TO THE OWNER; BUT WILL HAVE BEEN CONSIDERED AND INCLUDED IN THE UNIT PRICE BID FOR CONDUIT.

UNAUTHORIZED EXCAVATION BELOW THE PREVIOUSLY INDICATED LEVELS SHALL BE FILLED WITH THE SPECIFIED BEDDING MATERIAL AT THE EXPENSE OF THE CONTRACTOR. THE COST OF THE GRANULAR MATERIAL FOR BEDDING SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CONDUIT.

15. BACKFILLING

ONCE THE SEWER HAS BEEN PROPERLY BEDDED, THE REMAINDER OF THE OPEN TRENCH SHALL BE BACKFILLED TO MATCH THE SURROUNDING GRADE. THE BACKFILL MATERIAL SHALL BE INSTALLED IN 6-INCH LOOSE LIFTS AND COMPACTED BY HAND OR MECHANICAL METHODS TO 95% PROCTOR DENSITY (AASHTO T99)

IN TRENCH AREAS UNDER OR WITHIN 5 FEET OF THE PAVED SURFACE (INCLUDING SIDEWALK) OR BACK OF CURB, THE BACKFILL MATERIAL SHALL BE A GRANULAR AGGREGATE MATERIAL IN ACCORDANCE WITH ODOT ITEM 304 OR AS SHOWN IN THE CONTRACT DOCUMENTS. IN TRENCH AREAS OUTSIDE OF 5 FEET OF THE PAVEMENT, SPOIL MATERIAL MAY BE REUSED SO LONG AS IT IS CLEAN AND FREE FROM DEBRIS OR OTHER MATERIAL THAT MAY AFFECT THE LONG TERM PERFORMANCE OF THE BACK FILLED AREA. THE CONTRACTOR SHALL USE SPECIAL CARE TO AVOID SETTLEMENT OF THE BACKFILL MATERIAL.

16. PROGRESS

THE CONTRACTOR SHALL BE REQUIRED TO COMPLETE BACKFILLING OPERATIONS AND GENERAL CLEANUP WITHIN A REASONABLE DISTANCE OF TRENCHING AND PIPE LAYING OPERATIONS, AND OTHER EXCAVATIONS. THE SPECIFIC LIMITATIONS OF THE PARAGRAPH SHALL BE AT THE DISCRETION OF THE ENGINEER, BUT THE GENERAL INTENT IS TO REQUIRE THE CONTRACTOR TO MINIMIZE THE INCONVENIENCE TO THE PUBLIC WHERE THE SEWERS ARE CONSTRUCTED IN STREETS AND ALLEYS OR IN OTHER LOCATIONS WHERE THE CONSTRUCTION PRODUCES AN INCONVENIENCE. THE ENGINEER SHALL BE PERMITTED TO REQUIRE THE CONTRACTOR TO CEASE TRENCHING AND PIPE LAYING OPERATIONS AT SUCH TIME AS HE FEELS THAT BACKFILLING AND CLEANUP HAVE NOT PROGRESSED SATISFACTORILY.

17. SANITARY SEWER LEAKAGE TESTING

IN ALL SUBSEQUENT REFERENCES TO TEST PRESSURES, A PRESSURE ADJUSTMENT SHALL BE MADE WHERE GROUND WATER IS ABOVE THE SEWER LINE BEING TESTED, BY ADDING 0.433 PSI PRESSURE FOR EACH FOOT THE GROUND WATER LEVEL IS ABOVE THE INVERT OF THE PIPE, BASED UPON MAXIMUM FOR THE TESTING SECTION. THE CONTRACTOR SHALL MAKE PROVISIONS FOR DETERMINING THE GROUND WATER LEVEL, AND THE LEVEL SHALL BE CONFIRMED BY THE ENGINEER.

TEST PROCEDURE SHALL BE AS FOLLOWS: THE SECTION OF PIPE TO BE TESTED SHALL BE PLUGGED AT EACH END. THE ENDS OF ALL BRANCHES, WYES AND LATERALS SHALL BE SEALED OR PLUGGED. ALL PLUGS SHALL BE BRACED TO PREVENT SLIPPAGE OR BLOWOUT. ONE OF THE PLUGS PROVIDED SHALL HAVE AN INLET TAP OR OTHER PROVISION FOR CONNECTING AN AIR HOSE.

CONNECT ONE END OF THE AIR HOSE TO THE INLET TAP ON THE PLUG AND THE OTHER END TO PORTABLE AIR CONTROL EQUIPMENT, WHICH SHALL CONSIST OF PRESSURE GAUGES AND VALVES TO CONTROL THE RATE OF WHICH AIR FLOWS INTO THE TEST SECTION. PRESSURE GAUGES SHALL HAVE A MINIMUM GRADATION OF 0.1 PSI AND AN ACCURACY OF ±0.04 PSI. THE AIR CONTROL EQUIPMENT SHALL BE CONNECTED TO A SOURCE OF AIR SUPPLY SUCH AS AN AIR COMPRESSOR.

AIR SHALL BE APPLIED SLOWLY TO THE TEST SECTION UNTIL THE PRESSURE REACHES 3 PSIG (POUNDS PER SQUARE INCH, GAUGE) PLUS ADJUSTMENT FOR GROUND WATER. THE PRESSURE INSIDE THE PIPE SHALL NOT EXCEED 5 PSIG, PLUS ADJUSTMENT FOR GROUND WATER. WHEN THE PRESSURE INSIDE THE TEST SECTION REACHES 4.0 PSIG, PLUS ADJUSTMENT FOR GROUND WATER. WHEN THE PRESSURE INSIDE THE TEST SECTION REACHES 4.0 PSIG, THE AIR PRESSURE SHALL BE THROTTLED SO THAT THE INTERNAL PRESSURE IS MAINTAINED BETWEEN 4.0 AND 3.5 PSIG FOR AT LEAST TWO MINUTES, TO PERMIT TEMPERATURE STABILIZATION.

UPON EXPIRATION OF THE TWO-MINUTE PERIOD, THE AIR SUPPLY SHALL BE SHUT OFF OR DISCONNECTED AND THE PRESSURE ALLOWED TO DROP TO EXACTLY 3.5 PSIG. AT THE EXACT TIME 3.5 PSIG IS REACHED, A STOP WATCH SHALL BE STARTED AND THE TIME REQUIRED FOR THE PRESSURE TO DROP TO EXACTLY 2.5 PSIG SHALL BE DETERMINED.

NOTE: MAKE PROPER PRESSURE ADJUSTMENT FOR GROUND WATER, WHERE APPLICABLE, IN DETERMINING THE BEGINNING AND END OF THE PERIOD FOR THE 1.0 PSIG PRESSURE DROP. TO AVOID OVER PRESSURIZING THE SEWER THE TEST PRESSURE SHALL NOT EXCEED 9 PSIG.

THE PERMISSIBLE TIME ALLOCATION FOR THE 1.0 PSIG PRESSURE DROP SHALL BE CALCULATED ON THE BASIS OF THE DIAMETER AND LENGTH OF MAIN SEWER TESTED AND NO ADJUSTMENT SHALL BE MADE FOR SERVICE CONNECTIONS INCLUDED IN THE TEST.

THE AIR TEST FOR THE TEST SECTION SHALL BE CONSIDERED ACCEPTABLE IF THE TIME ELAPSED FOR THE 1.0 PSIG PRESSURE DROP, AS PREVIOUSLY SPECIFIED, IS EQUAL OR GREATER THAN THE TIME SHOWN IN THE FOLLOWING TABLE:

Pipe Diameter	Minimum Holding Time in Minutes:Seconds for 1.0 psi Pressure Drop							
	Length of Mainline Tested							
	100'	150'	200'	250'	300'	350'	400'	450'
4"	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6"	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8"	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10"	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12"	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15"	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18"	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41

THE CONTRACTOR SHALL INCLUDE IN HIS BID ALL COSTS FOR LABOR AND MATERIALS NECESSARY TO COMPLETE THE LEAKAGE TESTS SPECIFIED HEREIN. ALL TESTS SHALL BE CONDUCTED IN THE PRESENCE OF THE ENGINEER OR HIS AGENT WHOSE JUDGEMENT SHALL BE FINAL AS TO THE ACCEPTANCE OF ANY TEST.

18. STORM SEWER LEAKAGE TESTING

TESTING OF STORM SEWER SHALL CONSIST OF A VISUAL INSPECTION OF THE SEWER AND APPURTENANT STRUCTURES, WITH ALL VISIBLE LEAKAGE REPAIRED TO THE SATISFACTION OF THE OWNER AND ENGINEER.

19. DEFLECTION TESTING

THE CONTRACTOR SHALL PERFORM DEFLECTION TESTS ON ALL PLASTIC PIPE. NO TESTS MAY BE CONDUCTED UNTIL AFTER THE FINAL BACKFILL HAS BEEN IN PLACE FOR AT LEAST 30 DAYS.

PRIOR TO PERFORMING THE DEFLECTION TEST, THE CONTRACTOR SHALL CLEAN ALL SEWERS WITH A JET TRUCK. ALL SEDIMENT, DIRT DEBRIS, STONE, TRASH AND ANY OTHER FOREIGN ITEMS SHALL BE FLUSHED AND REMOVED FROM THE SEWER.

NO PIPE SHALL EXCEED A DEFLECTION OF 5%. WHERE POSSIBLE, ELECTRONIC EQUIPMENT SHALL BE USED TO MEASURE AND RECORD THE DEFLECTION IN FLEXIBLE PIPE. IF SUCH EQUIPMENT IS NOT AVAILABLE, DEFLECTION TESTS CAN BE RUN USING RIGID MANDRELS WITH DIAMETERS EQUAL TO 95% OF THE INSIDE DIAMETER OF THE PIPE. ALL DEFLECTION TESTS SHALL BE PERFORMED WITHOUT MECHANICAL PULLING DEVICES. THE SYSTEM WILL NOT BE CONDITIONALLY ACCEPTED UNTIL A SATISFACTORY DEFLECTION TEST, WITNESSED BY THE ENGINEER, IS OBTAINED.

THE CONTRACTOR SHALL INCLUDE IN THE BID ALL COSTS FOR LABOR AND MATERIALS NECESSARY TO COMPLETE THE DEFLECTION TESTING HEREIN SPECIFIED. ALL TESTS SHALL BE CONDUCTED IN THE PRESENCE OF THE ENGINEER OR HIS AGENT WHOSE JUDGMENT SHALL BE FINAL AS THE THE ACCEPTANCE OF ANY TEST.

CALCULATED
XXX
CHECKED
XXX

SEWER NOTES (SHEET 1 OF 2)

CITY OF BOWLING GREEN:
ENGINEERING DIVISION
304 N. CHURCH ST.
BOWLING GREEN, OH 43402



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20. POST CONSTRUCTION TELEVISION INSPECTION
AFTER THE DEFLECTION TEST HAS PASSED, THE CONTRACTOR SHALL TELEVISE ALL SEWERS. SEWERS SHALL NOT BE CONSIDERED COMPLETE AND ACCEPTED BY THE CITY OF BOWLING GREEN UNTIL RECORDED VIDEO HAS BEEN RECEIVED AND REVIEWED BY THE ENGINEER.

THE CONTRACTOR SHALL UTILIZE CLOSED CIRCUIT TELEVISION (CCTV) EQUIPMENT TO VISUALLY ASSESS THE CONDITION OF THE SEWERS. ALL SANITARY SEWERS CONSTRUCTED UNDER THIS PROJECT SHALL BE VISUALLY INSPECTED. THE CONTRACTOR SHALL PROVIDE A PICTURE QUALITY ACCEPTABLE TO THE ENGINEER. THE ENGINEER AND OWNER SHALL BE NOTIFIED 48 HOURS PRIOR TO THE TELEVISION OF ALL SEWERS AND THE CONTRACTOR SHALL MAKE ARRANGEMENTS FOR REPRESENTATIVES OF THE ENGINEER AND OWNER TO WITNESS THE TELEVISION INSPECTION AS REQUIRED. THE CONTRACTOR SHALL RE-INSPECT THE SEWER IF THE INSPECTION IS DETERMINED TO BE UNSATISFACTORY IN THE OPINION OF THE ENGINEER.

THE CAMERA SHALL BE MOVED THROUGH THE LINE IN EITHER DIRECTION AT A UNIFORM RATE NOT TO EXCEED 3.00 FEET PER SECOND AND STOPPING WHEN NECESSARY TO ENSURE PROPER DOCUMENTATION OF THE SEWER'S CONDITION. EQUIPMENT USED TO MOVE THE CAMERA THROUGH THE SEWER SHALL BE SELF-PROPELLED AND NOT INTERFERE WITH THE CAMERA VIEW.

THE CONTRACTOR SHALL SUBMIT A TYPED INSPECTION LOG CLEARLY INDICATING DATE, TIME, STREET, SANITARY SEWER NUMBER AS WELL AS THE LOCATION OF ANY SIGNIFICANT POINTS SUCH AS: DAMAGED PIPE, EGG-SHAPED PIPE, INFILTRATION POINTS, LATERAL LOCATIONS OR ANY OTHER UNUSUAL CONDITIONS.

THE CONTRACTOR SHALL SUBMIT 2 COPIES OF THE VIDEO RECORD IN DVD FORMAT TO THE OWNER. THE VIDEO RECORD SHALL HAVE BOTH AUDIO AND VIDEO TRACKS DESCRIBING AND DEPICTING PERTINENT FEATURES VIEWED DURING THE INSPECTION. THE VIDEO TRACK SHALL INCLUDE THE FOLLOWING: STREET, MANHOLE NUMBER AND SEWER SECTION, DATE, CURRENT DISTANCE ALONG REACH AND DESCRIPTIVE PRINTED LABELS ON EACH CONTAINER. THE AUDIO TRACK SHALL INCLUDE THE DATE AND TIME OF INSPECTION, SANITARY SEWER NUMBER AND SECTION, VERBAL DESCRIPTION OF PIPE SIZE AND TYPE, DESCRIPTION OF ANY DEFECTS OR SIGNIFICANT FEATURES OBSERVED.

THE ENGINEER RESERVES THE RIGHT TO REQUIRE TELEVISION INSPECTION ON ANY PUBLIC OR PRIVATE SANITARY SEWER INSTALLATION.

THE CONTRACTOR SHALL INCLUDE IN THE BID PRICE FOR INSTALLED PIPE ALL COSTS FOR LABOR, MATERIALS AND EQUIPMENT NECESSARY TO COMPLETE TELEVISION OF THE SEWER.

21. PRECAST MANHOLE STRUCTURES.
ALL PRECAST MANHOLE STRUCTURES SHALL BE PROVIDED IN ACCORDANCE WITH ASTM C478, ASTM C443 AND MEETING THE REQUIREMENTS OF RECOMMENDED STANDARDS FOR WASTEWATER FACILITIES (TEN STATES STANDARDS).

PRECAST MANHOLE STRUCTURES SHALL BE PROVIDED UTILIZING CONCRETE WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 5000 PSI WITH AN AIR CONTENT BETWEEN 5% AND 7%. PRECAST SANITARY AND COMBINATION SEWER MANHOLES SHALL CONTAIN XYPEX BIO-SAN C500 ADMIXTURE OR APPROVED EQUAL.

ALL REINFORCING STEEL SHALL BE GRADE 60.

ALL JOINTS BETWEEN PRECAST MANHOLE SECTIONS SHALL BE O-RING TYPE JOINTS ASTM C443. ADJOINING SECTIONS SHALL BE FIRMLY KEYED TOGETHER BY MEANS OF TONGUE AND GROOVE JOINTS.

BASES FOR MANHOLES SHALL BE OF THE PRECAST REINFORCED CONCRETE TYPE WITH THE BOTTOM INTEGRALLY CAST WITH THE WALLS. BOTTOM REINFORCEMENT SHALL BE ADEQUATELY TIED TO WALL REINFORCEMENT.

IF NOT INTEGRALLY CAST WITH THE BASE, THE CONTRACTOR SHALL PROVIDE A CLASS II CONCRETE INVERT THROUGH THE MANHOLE. THE CAST-IN-PLACE INVERT SHALL BE PLACED FOLLOWING THE INSTALLATION OF ALL PIPE CONNECTIONS. THE INVERT SHALL HAVE A DEPTH THROUGH THE MANHOLE EQUAL TO THE RADIUS OF THE SEWER PIPE AND SHALL SLOPE UPWARD TOWARD THE MANHOLE WALLS FROM THE CENTERLINE OF THE SEWER PIPE APPROXIMATELY 3 INCHES, TROWELED SMOOTH.

ALL PIPE PENETRATIONS INTO THE MANHOLE SECTION SHALL BE SHOCK ABSORBENT AND SHEAR RESISTANT, DESIGNED TO PREVENT ANY DIRECT CONTACT BETWEEN THE PIPE AND MANHOLE AND SHALL PROVIDE A WATERTIGHT SEAL CONNECTION BETWEEN THE PIPE BARREL AND MANHOLE STRUCTURE WITH THE PIPE DEFLECTED UP TO 12-DEGREES IN ANY DIRECTION. THE FLEXIBLE JOINTS SHALL BE A-LOK, KOR-N-SEAL, PRESS WEDGE II OR APPROVED EQUAL.

ALL TYPE MH 3-5 AND LARGER MANHOLES SHALL BE PROVIDED WITH A FLAT SLAB TRANSITION SECTION BETWEEN THE BASE SECTION AND RISER SECTIONS.

RISER SECTIONS SHALL HAVE A MINIMUM INSIDE DIAMETER OF 48 INCHES WITH WALL THICKNESS AS SHOWN IN THE CONTRACT DOCUMENTS.

TOP SECTIONS MAY BE EITHER FLAT TOP SLABS OR ECCENTRIC TRANSITIONS. TOP SECTIONS SHALL HAVE 24-INCH DIAMETER OPENINGS SO AS TO ACCOMMODATE THE CAST IRON FRAME AND COVER. FLAT TOP SLABS SHALL BE A MINIMUM OF 8-INCHES THICK.

THE CAST IRON MANHOLE FRAME SHALL BE SET AT THE PROPER ELEVATION BY USE OF HDPE ADJUSTING RINGS IF THE MANHOLE IS IN PAVEMENT OR PRECAST CONCRETE ADJUSTING RINGS IF THE MANHOLE IS NOT IN PAVEMENT. HDPE ADJUSTING RINGS SHALL BE MANUFACTURED BY LADTECH OR APPROVED EQUAL. HDPE MATERIAL SHALL BE IN ACCORDANCE WITH ASTM D-4976. BUTYL RUBBER SEALANT SHALL BE USED BETWEEN RINGS PER THE MANUFACTURER'S RECOMMENDATION TO PREVENT INFILTRATION. CONCRETE ADJUSTING RINGS SHALL BE HELD IN PLACE WITH MORTAR COMPOSED OF 1 PART, BY VOLUME, PORTLAND CEMENT AND 2 PARTS CLEAN, HARD SAND. ALL ADJUSTING RINGS SHALL BE A MINIMUM OF 4 INCHES IN HEIGHT AND SHALL NOT EXCEED 16 INCHES IN TOTAL HEIGHT.

22. MANHOLE FRAMES AND COVERS
ALL MANHOLE FRAMES AND COVERS SHALL BE A GRAY IRON CASTING CONFORMING TO ASTM A48.

ALL MANHOLE FRAMES AND COVERS SHALL BE NEENAH FOUNDRY COMPANY R-1772 WITH TYPE B COVER, EAST JORDAN 1020 AGS WITH TYPE A COVER OR APPROVED EQUAL. MANHOLE LIDS SHALL INCLUDE A FACTORY INSTALLED WATER TIGHT GASKET.

BOTH THE UNDERSIDE OF THE LID AND THE UPPER SURFACE OF THE LEDGE UPON WHICH THE LID RESTS SHALL BE MACHINED SO AS TO PREVENT ROCKING OF THE LID ON ITS SUPPORTING SURFACE. CASTINGS SHALL BE CLEANED AND DIPPED IN COAL TAR PITCH VARNISH AT THE FACTORY.

MANHOLE COVERS SHALL HAVE THE CITY SEAL AND BE MARKED TO INDICATE THE PROPOSED SEWER SERVICE. THE WORDS "SANITARY" CAST INTO THE TOP OF THE CASTINGS USED FOR SANITARY MANHOLES; "STORM" CAST INTO THE TOP OF CASTINGS USED FOR STORM MANHOLES; AND "SEWER" CAST INTO THE TOP OF CASTINGS USED FOR COMBINED SEWER MANHOLES. THE CONTRACTOR SHALL VERIFY WHICH COVER IS REQUIRED FOR EACH MANHOLE PRIOR TO ORDERING.

23. MANHOLE SEALING SYSTEM
ALL SANITARY SEWER MANHOLES SHALL BE PROVIDED WITH AN EXTERNAL WATER-TIGHT SEAL BETWEEN THE CASTING AND THE TOP SECTION. THE ADJUSTING RINGS AND CASTING OF EACH MANHOLE SHALL BE SEALED WITH AN EXTERNAL RUBBER SEALING SLEEVE AS MANUFACTURED BY INFI-SHIELD, INC., WRAPIDSEAL, OR AN APPROVED EQUAL. THE SEAL SHALL BE MADE OF NEOPRENE AND OR EPDM RUBBER AND HAVE A MINIMUM THICKNESS OF 60 MILS. THE SLEEVE SHALL BE SEALED TO THE TOP OF THE TOP SLAB OR ECCENTRIC SECTION OF THE MANHOLE CONTINUING OVER THE TOP OF THE CASTING FLANGE WITH A NON-HARDENING BUTYL RUBBER MASTIC.

MANHOLE SECTIONS SHALL BE SEALED WITH A RUBBER GASKET AND A BUTYL RUBBER SEALANT MEETING ASTM C990 SUCH AS CONSEAL CS-102 OR APPROVED EQUAL.

24. SANITARY MANHOLE LEAKAGE TESTING
ALL SANITARY OR COMBINATION SEWER MANHOLES SHALL BE VACUUM TESTED IN ACCORDANCE WITH THE PROCEDURES DESCRIBED IN ASTM C1244 IN THE PRESENCE OF THE ENGINEER. THE PROCEDURE FOR MANHOLE TESTING IS SUMMARIZED AS FOLLOWS:

- A. ALL PIPES ENTERING THE MANHOLE SHALL BE PLUGGED AND BRACED.
- B. ONCE A VACUUM OF 10 INCHES OF MERCURY IS DRAWN INTO THE MANHOLE THE VACUUM EQUIPMENT SHALL BE SHUT OFF.
- C. THE TIME OF FOR THE VACUUM TO DROP FROM 10 INCHES OF MERCURY TO 9 INCHES OF MERCURY SHALL BE MEASURED AND COMPARED TO THE FOLLOWING TABLE.

Minimum Test Time in Seconds				
Manhole Depth	Manhole Diameter			
	48"	60"	72"	84"
10' & under	20	26	41	50
12'	25	33	49	59
14'	30	39	57	68
16'	35	46	65	77
18'	40	52	73	87
20'	45	59	81	97
22'	50	65	89	106
24'	55	72	97	116

- D. IF THE TIME OF THE VACUUM DROP IS LESS THAN THE SPECIFIED TIME, THE CONTRACTOR SHALL LOCATE AND CORRECT THE DEFECT AT NO ADDITIONAL COST TO THE OWNER. REPAIRS SHALL BE PERFORMED IN ACCORDANCE WITH ASTM C478.

THE CONTRACTOR SHALL INCLUDE ALL COSTS NECESSARY TO PERFORM THE AIR TESTS IN THE BID UNIT PRICE FOR MANHOLE INSTALLED.

25. MAINTENANCE OF EXISTING FLOW
THE CONTRACTOR SHALL MAKE ALLOWANCES TO MAINTAIN THE FLOW IN ALL SEWERS ENCOUNTERED DURING THE WORK. THE MAINTENANCE OF FLOW MAY REQUIRE THE CONTRACTOR TO PROVIDE BYPASS PUMPING EQUIPMENT. THE ENGINEER MAY ALLOW THE CONTRACTOR TO BLOCK THE FLOW TEMPORARILY TO EXECUTE THE WORK, HOWEVER THE CONTRACTOR IS EXPECTED TO RESTORE THE FLOW AT THE END OF EACH DAY, RECONNECTING THE SEWER TO THE SATISFACTION OF THE ENGINEER.

26. DUCTILE IRON PIPE FORCEMAIN
DUCTILE IRON PIPE TO BE USED FOR FORCEMAINS SHALL BE PROVIDED IN ACCORDANCE WITH AWWA C151.

DUCTILE IRON PIPE SHALL BE THICKNESS CLASS 50. DUCTILE IRON PIPE SHALL BE PROVIDED WITH A RUBBER-GASKET JOINT IN ACCORDANCE WITH AWWA C111.

DUCTILE IRON PIPE SHALL BE COATED WITH A BITUMINOUS MATERIAL ON THE EXTERIOR OF THE PIPE IN ACCORDANCE WITH AWWA C151 AND THE INTERIOR OF THE PIPE SHALL BE CEMENT MORTAR LINED IN ACCORDANCE WITH AWWA C104.

27. POLYVINYL CHLORIDE (PVC) PIPE FORCEMAIN
PVC PIPE TO BE USED FOR FORCEMAINS SHALL BE PROVIDED IN ACCORDANCE WITH AWWA C900, DR18, PC235 FOR PIPE SIZES 4-INCH THROUGH 12-INCH DIAMETER.

PVC PIPE SHALL BE DUCTILE IRON EQUIVALENT OUTSIDE DIAMETER. PIPE SHALL BE OF THE INTEGRAL WALL-THICKENED BELL END TYPE INCORPORATING ELASTOMERIC GASKETS TO AFFECT THE PRESSURE SEAL. PIPE SHALL HAVE A NOMINAL LAYING LENGTH OF 20 FEET. PIPE SHALL BE DESIGNED FOR DIRECT CONNECTION INTO DUCTILE IRON FITTINGS USING MECHANICAL JOINTS.

28. MOLECULARLY ORIENTED POLYVINYL CHLORIDE (PVCO) PIPE FORCEMAIN
PVCO PIPE TO BE USED FOR FORCEMAINS SHALL BE PROVIDED IN ACCORDANCE WITH AWWA C909, PC235, FOR PIPE SIZES 4-INCH THROUGH 12-INCH.

PVCO PIPE SHALL BE DUCTILE IRON EQUIVALENT OUTSIDE DIAMETER. PIPE SHALL BE OF THE INTEGRAL WALL-THICKENED BELL END TYPE INCORPORATING ELASTOMERIC GASKETS TO AFFECT THE PRESSURE SEAL. PIPE SHALL HAVE A NOMINAL LAYING LENGTH OF 20 FEET. PIPE SHALL BE DESIGNED FOR DIRECT CONNECTION INTO DUCTILE IRON FITTINGS USING MECHANICAL JOINTS.

29. POLYETHYLENE (PE) PRESSURE PIPE FORCEMAIN
POLYETHYLENE PIPE TO BE USED FOR FORCEMAINS 4-INCHES IN DIAMETER AND LARGER SHALL BE PROVIDED IN ACCORDANCE WITH AWWA C906, SDR11. PIPE MUST BE JOINED USING THERMAL BUTT FUSION, SOCKET FUSION, OR ELECTROFUSION.

FITTINGS CONNECTED TO PE PIPE MUST BE JOINED TO THE PIPE BY THERMAL FUSION IN ACCORDANCE WITH AWWA C906. INSERT OR MECHANICAL FITTINGS ARE NOT ACCEPTABLE.

30. FORCEMAIN DUCTILE IRON FITTINGS
ALL FITTINGS SHALL BE DUCTILE IRON CONFORMING TO AWWA C153 AND AWWA C111 AND SHALL BE LINED AND COATED AS SPECIFIED ABOVE.

FITTINGS SHALL BE OF THE MECHANICAL JOINT OR PUSH-ON TYPE INCORPORATING RUBBER GASKETS. CAPS AND PLUG FITTINGS REQUIRED FOR TESTING OF THE FORCEMAINS SHALL BE PROVIDED WITH STANDARD TAPPED CONNECTIONS. PIPE COUPLINGS SHALL REQUIRE THE PIPE TO BE FURNISHED WITH GROOVED OR SHOULDERED ENDS PROPERLY MACHINED TO RECEIVE THE COUPLING.

ALL FITTINGS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR FORCEMAIN INSTALLED.

31. FORCEMAIN MECHANICAL JOINT RESTRAINTS
MECHANICAL JOINT RESTRAINTS SHALL BE PROVIDED IN ACCORDANCE WITH ASTM A536, AWWA C111 AND AWWA C153.

MECHANICAL JOINT RESTRAINTS SHALL INCLUDE A RESTRAINING MECHANISM THAT WHEN ACTUATED, IMPACTS MULTIPLE WEDGING ACTIONS AGAINST THE PIPE, INCREASING ITS RESISTANCE TO MOVEMENT AS INTERNAL PIPE PRESSURE INCREASES. THE JOINT SHALL MAINTAIN SOME FLEXIBILITY FOLLOWING PLACEMENT OF FINAL BEDDING AND BACKFILL. THE RESTRAINING DEVICE SHALL BE CONSTRUCTED OF DUCTILE IRON HEAT TREATED TO A HARDNESS OF 370 BHN WITH A MINIMUM WORKING PRESSURE OF 250 PSI AND A SAFETY FACTOR OF 2:1.

DIMENSIONS OF THE JOINT RESTRAINT SHALL BE SUCH THAT IT CAN BE USED WITH STANDARD MECHANICAL JOINT BELL AND T-HEAD BOLTS CONFORMING TO AWWA C111. TWIST-OFF NUTS SHALL BE USED TO INSURE PROPER ACTUATION OF THE RESTRAINING DEVICES.

FORCEMAIN PIPE SHALL BE ANCHORED USING MECHANICAL JOINT RESTRAINTS AT ALL DEAD ENDS, BENDS, TEE, VALVES AND OTHER LOCATIONS AS REQUIRED OR SPECIFIED.

32. FORCEMAIN CATHODIC PROTECTION
ALL FITTINGS AND MECHANICAL JOINTS SHALL BE INSTALLED WITH SACRIFICIAL ANODE BAGS AS SHOWN ON THE DETAIL SHEET. ANODE BAGS AND COPPER ANODE LEADS SHALL BE PROVIDED BY CORRPRO COMPANIES INC. OR APPROVED EQUAL.

ANODE BAGS SHALL BE 32 POUND HIGH POTENTIAL PREPACKAGED MAGNESIUM ANODES.

ANODE LEADS SHALL BE #12 TW SOLID COPPER.

THE COST OF ALL ANODES, INCLUDING INSTALLATION, PARTS AND ACCESSORIES, SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE FITTING.

33. FORCEMAIN TRACER WARNING TAPE AND WIRE
TRACER WARNING TAPE AND TRACER WIRE SHALL BE INSTALLED WITH ALL NEW FORCEMAINS.

TRACER WARNING TAPE SHALL BE A MINIMUM 3 INCHES WIDE WITH THE WORDS "BURIED FORCEMAIN BELOW" PRINTED WITH GREEN WARNING COLORS.

TRACER WIRE

- 1. OPEN TRENCH INSTALLATION - TRACER WIRE SHALL BE MINIMUM 12 AWG WITH A 30-MIL POLYETHYLENE JACKET, SPECIFICALLY DESIGNED FOR BURIED USE.
- 2. DIRECTIONAL BORE INSTALLATION - TRACER WIRE SHALL BE REINFORCED TRACER WIRE, COPPERHEAD EXTRA HIGH STRENGTH (EHS) OR CITY APPROVED EQUAL, 12 AWG SOLID (.0808" CONDUCTOR DIAMETER), 21% CONDUCTIVITY ANNEALED COPPER-CLAD HIGH CARBON STEEL HIGH STRENGTH TRACER WIRE, 1,150# AVERAGE TENSILE BREAK LOAD, 30 MIL. HIGH MOLECULAR WEIGHT HIGH DENSITY YELLOW POLYETHYLENE JACKET COMPLYING WITH ASTM-D-1248, 30 VOLT RATING.

34. FORCEMAIN THRUST BLOCKS
THE CONTRACTOR SHALL PROVIDE THRUST BLOCKING WHERE INDICATED ON THE PLANS. THRUST BLOCKS MAY BE USED IN LIEU OF MECHANICAL JOINT RESTRAINTS WITH THE APPROVAL OF THE ENGINEER.

CALCULATED
XXX
CHECKED
XXX

SEWER NOTES (SHEET 2 OF 2)

CITY OF BOWLING GREEN:
ENGINEERING DIVISION
304 N. CHURCH ST.
BOWLING GREEN, OHIO 43402

