

E:\ACAD\STANDARDS\_&\_SPECIFICATIONS\SPECIFICATIONS\DWGs\GENNOT1.dwg 11-Mar-19 1:57 PM

**1. REGULATIONS**  
ALL WORK MUST COMPLY WITH APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS IN ALL RESPECTS, INCLUDING COMPLIANCE WITH THE OCCUPATIONAL SAFETY AND HEALTH ACT.

ALL MATERIAL AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF BOWLING GREEN, AND THE LATEST REVISION OF THE OHIO DEPARTMENT OF TRANSPORTATION STANDARDS AND SPECIFICATIONS.

THE CONTRACTOR SHALL BE REQUIRED TO OBTAIN ALL CITY OF BOWLING GREEN LICENSES AND PERMITS APPLICABLE TO HIS WORK. CONTACT THE DEPARTMENT OF PUBLIC WORKS AT 419-354-6227 FOR LICENSE AND PERMIT REQUIREMENTS.

**2. ENGINEER**  
ALL REFERENCES TO THE STATE, THE DIRECTOR, THE ENGINEER OR THE INSPECTOR IN THE "STATE OF OHIO, DEPARTMENT OF TRANSPORTATION, CONSTRUCTION AND MATERIAL SPECIFICATIONS" (ODOT-CMS) MANUAL SHALL BE CONSIDERED REFERENCES TO THE ENGINEER OR HIS DULY AUTHORIZED REPRESENTATIVE.

**3. PRECONSTRUCTION MEETING**  
BEFORE ANY CONSTRUCTION MAY BEGIN, THE CONTRACTOR IS REQUIRED TO SCHEDULE AND ATTEND A PRECONSTRUCTION MEETING WITH THE CITY OF BOWLING GREEN-DIVISION OF ENGINEERING. REPRESENTATIVES OF THE CONTRACTOR MUST INCLUDE THE PROJECT SUPERINTENDENT AND THE PROJECT FOREMAN. THE MEETING CAN BE ARRANGED BY CALLING (419) 354-6227.

**4. ESTIMATED QUANTITIES**  
THE ESTIMATED PLAN QUANTITIES ARE FOR THE PURPOSE OF COMPETITIVE BIDDING AND ARE NOT NECESSARILY THE FINAL PAY QUANTITIES. FINAL FIELD MEASUREMENTS AND CALCULATIONS WILL DETERMINE THE FINAL QUANTITY TO BE PAID, UNLESS OTHERWISE SPECIFIED IN THESE GENERAL NOTES.

**5. CONSTRUCTION LIMITS**  
THE CONTRACTOR MUST AT ALL TIMES CONDUCT HIS OPERATIONS WITHIN THE PUBLIC RIGHT-OF-WAY, EASEMENTS, OR WORK AGREEMENT AS SHOWN ON THE PLANS.

**6. SHOP DRAWINGS**  
THE CONTRACTOR SHALL, AT A MINIMUM OF 10 DAYS PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, SUBMIT 5 COPIES TO THE ENGINEER OF ALL SHOP DRAWINGS AND SUBMITTALS SHOWING ALL MATERIAL AND EQUIPMENT THAT IS PROPOSED TO BE PROVIDED.

THE SUBMITTED SHOP DRAWINGS SHALL BE DRAWN TO SCALE AND INCLUDE ALL FIELD MEASURES, MATERIAL AND EQUIPMENT SPECIFICATIONS AS WELL AS ANY OTHER INFORMATION NECESSARY FOR THE ENGINEER'S REVIEW. AN APPROVED SHOP DRAWING DOES NOT RELIEVE THE CONTRACTOR FROM PROVIDING A COMPLETE WORKING SYSTEM AS DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL NOT BE PERMITTED TO INSTALL ANY MATERIAL OR EQUIPMENT WITHOUT AN APPROVED SHOP DRAWING FOR THAT PARTICULAR MATERIAL OR EQUIPMENT. MATERIAL OR EQUIPMENT INSTALLED WITHOUT AN APPROVED SHOP DRAWING IS DONE SO AT THE CONTRACTOR'S SOLE RISK AND BE SUBJECT TO REMOVAL AT NO ADDITIONAL COST TO THE OWNER, IF THE ENGINEER DETERMINES THE MATERIAL OR EQUIPMENT IS UNACCEPTABLE OR IMPROPERLY INSTALLED.

**7. VIDEO RECORD OF EXISTING CONDITIONS**  
PRIOR TO THE COMMENCEMENT OF CONSTRUCTION THE CONTRACTOR SHALL PROVIDE THE OWNER WITH A DIGITALLY RECORDED RECORD OF THE SITE CONDITIONS OF THE CONSTRUCTION AREA. THE PRECONSTRUCTION VIDEO RECORD SHALL BE OF SUFFICIENT DETAIL TO DESCRIBE ALL EXISTING SITE FEATURES AND CONDITIONS INCLUDING, BUT NOT LIMITED TO; ROADWAY, SIDEWALK AND DRIVEWAY PAVEMENT, CURBS, GUTTERS, DITCHES, BRIDGES, CULVERTS, HEADWALLS, LANDSCAPING, TREES, SIGNS, UTILITY POLES, MAILBOXES, STREET LIGHTS, CATCH BASINS, MANHOLES, VALVE BOXES, FIRE HYDRANTS, FENCES, AND ANY OTHER FEATURE THAT MAY BE AFFECTED BY THE WORK. BUILDINGS SHALL BE LOCATED BY STREET ADDRESS. THE CONTRACTOR SHALL PROVIDE TWO (2) COPIES OF THE VIDEO RECORD IN DVD FORMAT TO THE OWNER A MINIMUM OF FIVE (5) DAYS PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. THE DVD COPIES SHALL BE PROVIDED IN A NON-PROPRIETARY FORMAT THAT CAN BE READ BY CURRENT STANDARD DVD PLAYERS. ALL DISCS AND CASES PROVIDED TO THE OWNER SHALL BEAR THE FOLLOWING INFORMATION; NAME OF PROJECT, OWNER PROJECT NO (WL-XX), NAME OF CONTRACTOR, NAME OF VIDEO RECORDING SERVICE, DATE OF RECORDING.

A CONTINUOUSLY RUNNING TIME DIGITAL STAMP SHALL BE PROVIDED ON THE VIDEO RECORD TO PREVENT TAMPERING. THE DIGITAL STAMP SHALL INDICATE THE DATE, TIME (HH:MM:SS), DIRECTION OF TRAVEL AND STATIONING (xx+xx) OF THE RECORDING. THE DIGITAL STAMP SHALL BE RECORDED SIMULTANEOUSLY WITH THE VIDEO AND AUDIO TRACKS OF THE VIDEO RECORD. THE VIDEO RECORD SHALL CONSIST OF ONE (1) VIDEO TRACK AND TWO (2) AUDIO TRACKS. ONE AUDIO TRACK SHALL BE RECORDED BY THE CAMERA OPERATOR DESCRIBING THE FEATURES BEING RECORDED. THE OTHER AUDIO TRACK SHALL DESCRIBE FEATURES NOT READILY VISIBLE TO THE CAMERA OPERATOR SUCH AS THE RELATIVE ELEVATION OF OBJECTS BEING RECORDED.

THE CONTRACTOR SHALL UTILIZE A PROFESSIONAL RECORDING SERVICE SPECIALIZING IN THE PREPARATION OF MUNICIPAL PROJECT PRECONSTRUCTION VIDEO RECORDS. THE CONTRACTOR SHALL PROVIDE FIVE (5) REFERENCES OF THE RECORDING SERVICE INDICATING SATISFACTORY COMPLETION OF PRIOR PRECONSTRUCTION VIDEOS. WHEN FILMING FROM A WHEELED VEHICLE, THE DISTANCE FROM THE LENS TO THE SURFACE SHALL NOT BE LESS THAN 12 FEET TO INSURE ADEQUATE PERSPECTIVE.

ALL VIDEO RECORDS SHALL BE PERFORMED IN THE PRESENCE OF A REPRESENTATIVE OF THE OWNER UNLESS OTHERWISE DIRECTED IN WRITING BY THE OWNER.

**8. HAUL ROADS**  
THE CONTRACTOR SHALL MAINTAIN HAUL ROADS IN A CONDITION ACCEPTABLE TO THE ENGINEER. THE MAINTENANCE SHALL INCLUDE, BUT IS NOT LIMITED TO, THE REMOVAL OF MUD, STONE, AND OTHER MATERIALS FROM PAVEMENT SURFACES. HAUL ROUTES SHALL BE APPROVED BY THE ENGINEER PRIOR TO THE START OF CONSTRUCTION FOR THIS PROJECT.

**9. MAINTAINING TRAFFIC**  
MAINTENANCE OF TRAFFIC SHALL BE IN ACCORDANCE WITH ODOT ITEM 614 AND MEET WITH REQUIREMENTS OF THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES. A MINIMUM OF ONE-WAY TRAFFIC SHALL BE MAINTAINED AT ALL TIMES. PAYMENT FOR MAINTENANCE OF TRAFFIC SHALL BE INCLUDED IN ODOT ITEM 614.

**10. UNDERGROUND UTILITIES**  
THE LOCATIONS OF UNDERGROUND UTILITIES SHOWN ON THE PLANS ARE AS OBTAINED FROM THE OWNERS OF THE UTILITY. NO GUARANTEE OF ACCURACY OF THESE UTILITIES IS MADE.

**11. UTILITIES NOTIFICATION**  
AT LEAST THREE (3) WORKING DAYS PRIOR TO COMMENCING CONSTRUCTION OPERATIONS THE CONTRACTOR SHALL NOTIFY THE ENGINEER, THE OHIO UTILITIES PROTECTION SERVICE (1-800-362-2764), AND THE OWNERS OF EACH UNDERGROUND UTILITY FACILITY SHOWN IN THE PLANS.

THE OWNER OF THE UNDERGROUND UTILITY FACILITY SHALL, WITHIN SEVENTY-TWO (72) HOURS, EXCLUDING SATURDAYS, SUNDAYS, AND LEGAL HOLIDAYS AFTER NOTICE IS RECEIVED, STAKE, MARK, OR OTHERWISE DESIGNATE THE LOCATION OF THE UNDERGROUND FACILITIES IN THE CONSTRUCTION AREA IN SUCH A MANNER AS TO INDICATE THEIR COURSE TOGETHER WITH THE APPROXIMATE DEPTH AT WHICH THEY WERE INSTALLED. THE MARKING OR LOCATING SHALL BE COORDINATED TO STAY APPROXIMATELY TWO (2) DAYS AHEAD OF THE PLANNED CONSTRUCTION.

**12. PROTECTION OF EXISTING UTILITIES**  
ALL UTILITIES ENCOUNTERED SHALL BE PROPERLY SUPPORTED, SHORED OR OTHERWISE PROTECTED WHENEVER EXPOSED IN AN EXCAVATION AS APPROVED BY THE ENGINEER. SUCH SUPPORTS, SHORING OR OTHER MEASURES SHALL BE PROVIDED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER. THE ENGINEER RESERVES THE RIGHT TO REQUIRE SIGNED AND SEALED ENGINEERING DESIGN CALCULATIONS FOR THE SUPPORTS, SHORING OR OTHER MEASURES PROVIDED BY THE CONTRACTOR.

**13. SITE RESTORATION**  
ALL AREAS SHALL BE RETURNED TO THE GRADE AND CONDITION EXISTING PRIOR TO THE COMMENCEMENT OF WORK WITHIN 30 DAYS OF DISTURBANCE OF THE AREA UNLESS APPROVED OTHERWISE BY THE OWNER. THIS INCLUDES PAVEMENT REPLACEMENT.

**14. EXISTING STORM SEWERS**  
ALL EXISTING STORM SEWERS AND SUBSURFACE DRAINAGE OR FIELD TILE DAMAGED OR INTERFERED WITH DURING CONSTRUCTION SHALL BE REPLACED WITH NEW PIPE MATCHING THE EXISTING SEWER OR OF A MATERIAL APPROVED BY THE ENGINEER. REMOVED PIPE SHALL NOT BE REUSED UNLESS APPROVED BY THE ENGINEER. THE REPLACEMENT PIPE SHALL BE INSTALLED WITH PROPER BEDDING AND BACKFILL AND SHALL BE INSTALLED TO MATCH THE GRADE AND SIZE OF THE EXISTING SEWER. FERNCO ADAPTERS SHALL BE USED AT ALL JOINTS CONNECTING NEW SEWER PIPE TO THE EXISTING SEWER PIPE. THE CONTRACTOR IS CAUTIONED TO USE THE GREATEST CARE IN REPORTING TO THE ENGINEER ALL EXISTING SEWER LINES OF ANY TYPE WHICH ARE EXPOSED IN TRENCHING FOR THE NEW WATERLINE. PAYMENT FOR THIS WORK SHALL BE INCLUDED IN THE APPROPRIATE ITEM THAT INTERFERES WITH THE STORM SEWER.

**15. MAINTENANCE OF FLOW**  
WHERE EXISTING SEWERS ARE ENCOUNTERED AND ARE INTERFERED WITH, FLOW SHALL BE MAINTAINED. SEWAGE AND OTHER LIQUID MUST BE HANDLED BY THE CONTRACTOR EITHER INTO CONNECTIONS BY OTHER SEWERS (WITH THE APPROVAL OF THE OWNER) OR BY THE TEMPORARY PUMPING TO A SATISFACTORY OUTLET. SEWAGE OR OTHER LIQUID SHALL NOT BE PUMPED, BAILED, OR FLUMED OVER THE STREET OR ONTO ANY SURFACE.

**16. TREES, BUSHES AND SHRUBS**  
TREES AND BUSHES WHICH ARE TOO NEAR THE CONSTRUCTION TO AVOID DESTRUCTION, DESPITE EXTREME CARE ON THE PART OF THE CONTRACTOR SHALL BE REMOVED AND DISPOSED OF BY THE CONTRACTOR TO THE SATISFACTION OF THE ENGINEER. THE ENGINEER'S PERMISSION SHALL BE OBTAINED PRIOR TO THE REMOVAL OF ANY TREE OR BUSH. PAYMENT FOR TREE REMOVAL WILL BE ON A PER TREE BASIS PER THE BID SCHEDULE. IF NOT A BID ITEM, THE COST OF TREE REMOVAL SHALL BE INCLUDED IN ITEM 201, CLEARING AND GRUBBING.

OTHER TREES, TREE LIMBS, AND BUSHES THAT ARE SO LOCATED THAT EQUIPMENT OF THE CONTRACTOR WILL DAMAGE THEM DURING CONSTRUCTION, SHALL BE CAREFULLY TRIMMED AND SHAPED BY WORKMEN SKILLED IN THE TRIMMING. ALL LIMBS AND BRANCHES SHALL BE FLUSHED OUT. ALL EXPOSED SURFACES IN EXCESS OF ONE INCH DIAMETER SHALL BE IMMEDIATELY PAINTED WITH AN APPROVED PRUNING COMPOUND. TREES AND BUSHES, OTHER THAN THOSE WHOSE REMOVAL AS APPROVED BY THE ENGINEER, WHICH ARE DESTROYED OR DAMAGED TO THE EXTENT THAT THEIR CONTINUED LIFE IS IMPAIRED, SHALL BE REPLACED BY THE CONTRACTOR AT HIS EXPENSE AND TO THE SATISFACTION OF THE OWNER. NO PAYMENT WILL BE MADE FOR TREE TRIMMING.

**17. SEEDING, MULCHING AND TOPSOIL**  
ALL AREAS DISTURBED BY CONSTRUCTION AND NOT PAVED WITH SOME OTHER MATERIAL SHALL BE SEEDED, MULCHED, AND FERTILIZED ACCORDING TO ITEM 659 OF THE ODOT CONSTRUCTION AND MATERIAL SPECIFICATIONS, LATEST EDITION OR AS MODIFIED BY THESE SPECIFICATIONS. ALL AREAS DISTURBED BY CONSTRUCTION BETWEEN MARCH 15 AND OCTOBER 15 SHALL BE PERMANENTLY SEEDED WITHIN THIRTY (30) DAYS, BUT NO LATER THAN OCTOBER 15 UNLESS OTHERWISE APPROVED BY THE ENGINEER AND OWNER. ALL AREAS DISTURBED BY CONSTRUCTION BETWEEN SEPTEMBER 16 AND MARCH 14 SHALL BE STABILIZED IN ACCORDANCE WITH ITEM 207 OF ODOT CONSTRUCTION AND MATERIAL SPECIFICATIONS AND PERMANENTLY SEEDED AFTER MARCH 15 AS SOON AS WEATHER PERMITS.

ALL SEEDED AREAS SHALL HAVE A MINIMUM OF 4 INCHES OF TOPSOIL AS SPECIFIED AND PREPARED IN ACCORDANCE WITH ODOT ITEM 653. TOPSOIL SHALL BE PLACED AND TESTED PER ODOT ITEM 659 OF THE ODOT CONSTRUCTION AND MATERIAL SPECIFICATIONS, LATEST EDITION AND SHALL BE RAKED FREE OF ROCKS AND CLODS.

IN NO CASE SHALL THE RESTORED SEED BED TOPSOIL BE OF LESS THAN WAS PRESENT PRIOR TO CONSTRUCTION. ALL TOPSOIL AND SEED MUST BE APPROVED BY THE OWNER PRIOR TO PLACEMENT.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR BACKFILLING, RESEEDING AND RE-FERTILIZING ANY TRENCH AREAS THAT MAY SETTLE AFTER THE PERMANENT SEEDING IS COMPLETED FOR THE WARRANTY TIME PERIOD SPECIFIED IN THE GENERAL CONDITIONS OF THE CONTRACT DOCUMENTS.

ALL AREAS REQUIRING SEEDING SHALL USE A SEED MIXTURE OF 60% PERENNIAL RYEGRASS, 20% KENTUCKY BLUEGRASS AND 20% CREEPING RED FESCUE, WITH GERMINATION RATES IDENTIFIED AS "HIGH QUALITY PERCENT" IN ODOT CMS TABLE 659.07-1. THE MIX SHALL BE FREE OF ALL WEED SEEDS INCLUDING NOXIOUS WEED SEEDS. THE PROPOSED MIX DESIGN MUST BE SUBMITTED TO THE ENGINEER FOR APPROVAL, WITH ADEQUATE TIME FOR REVIEW, PRIOR TO BEGINNING THE WORK.

ALL SEEDING AND MULCHING SHALL BE SOWN HYDRAULICALLY BY "HYDRO SEEDING" TECHNIQUES. THE SEEDED SLURRY SHALL BE APPLIED BY A HYDRAULIC SEEDER AT A RATE OF 3 LBS. PER 1,000 SQUARE FEET IN TWO INTERSECTING DIRECTIONS. HYDROMULCH WITH A TACKIFIER SHALL CONSIST OF 2/3 WOOD AND 1/3 PAPER FIBER AND SHALL BE APPLIED TO A MINIMUM THICKNESS OF 1/8 INCH. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESEEDING AREAS AS NECESSARY AT TIME INTERVALS APPROPRIATE FOR THE GROUND AND WEATHER CONDITIONS UNTIL A DENSE STAND OF GRASS IS OBTAINED. SEEDED AREAS SHALL BE MAINTAINED AND WATERED BY THE CONTRACTOR IN ACCORDANCE WITH ODOT ITEM 659 AND OTHER APPLICABLE SPECIFICATIONS.

**18. SIDEWALKS**  
EXISTING CONCRETE OR BRICK SIDEWALKS WHICH MUST BE REMOVED OR WHICH ARE DAMAGED IN CONNECTION WITH THE WORK SHALL BE REPLACED UPON COMPLETION OF THE WORK. FULL DEPTH ODOT 304 SHALL BE REQUIRED UNDER ALL SIDEWALK REPLACEMENTS. NEW CONCRETE SIDEWALKS SHALL BE 4 INCHES THICK AND THE SAME WIDTH AS THE ORIGINAL SIDEWALK. SIDEWALKS IN NEW DEVELOPMENTS SHALL BE 5 FEET WIDE. SIDEWALKS PASSING THROUGH RESIDENTIAL DRIVEWAYS SHALL BE 6 INCHES THICK ON 4 INCHES OF ODOT 304. SIDEWALKS PASSING THROUGH COMMERCIAL DRIVEWAYS SHALL BE 8 INCHES THICK ON 6 INCHES OF ODOT 304. ALL CONCRETE SHALL BE A 4000 PSI AIR-ENTRAINED MIX. ALL MATERIAL SHALL BE APPROVED BY THE ENGINEER.

THE CONCRETE SHALL BE THOROUGHLY SPADED INTO PLACE AND STRUCK EVEN WITH THE TOP OF THE FORMS AFTER WHICH IT SHALL BE WOOD FLOATED TO A SMOOTH, SKID-RESISTANT BROOM SURFACE.

PROVIDE 1/2 INCH MASTIC EXPANSION STRIPS AT INTERVALS OF 40 FEET AND AT JUNCTIONS WITH OTHER WALLS OR STRUCTURES. SIDEWALKS OTHER THAN CONCRETE OR BRICK SHALL BE CLASSIFIED AS PAVEMENT AND SHALL BE REPLACED AS PREVIOUSLY SPECIFIED FOR THE APPROPRIATE TYPE OF PAVEMENT.

PAYMENT FOR THIS WORK IS TO BE INCLUDED IN THE APPROPRIATE ITEM REQUIRING SIDEWALK REMOVAL. SIDEWALK DAMAGED OUTSIDE THE TRENCH/WORK LIMITS SHALL BE REPLACED AT THE EXPENSE OF THE CONTRACTOR.

**19. CURBS AND GUTTERS**  
ANY CURB, CURB DRAIN OR CURB AND GUTTER WHICH IS DAMAGED OR REMOVED MUST BE REPLACED IN ITS ORIGINAL CONDITION AS FOUND.

**20. EXISTING SURVEY POINTS**  
THE CONTRACTOR SHALL, PRIOR TO ACTUAL CONSTRUCTION, ERECT PROTECTIVE BARRICADES AROUND ALL VISIBLE SURVEY MONUMENTS THAT ARE TO REMAIN IN OR ADJACENT TO THE CONSTRUCTION LIMITS. ANY MONUMENT, BENCH MARK, CONTROL POINT, PROPERTY CORNER STAKE, PIN, OR MARKER DAMAGED OR DISTURBED BY CONSTRUCTION SHALL BE REPLACED BY A REGISTERED LAND SURVEYOR AT THE EXPENSE OF THE CONTRACTOR. SHOULD THE CONTRACTOR FAIL TO PROPERLY RESTORE THESE POINTS AFTER 21 DAYS, THE OWNER WILL RESTORE THEM AT THE CONTRACTOR'S EXPENSE.

**21. CONNECTING TO/OR CROSSING EXISTING UTILITIES**  
WHERE THE PLANS PROVIDE FOR PROPOSED CONDUIT TO BE CONNECTED TO, OR TO CROSS OVER OR UNDER AN EXISTING UTILITY; IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE THE EXISTING UTILITY TO VERIFY LINE, GRADE, AND MATERIAL BEFORE ORDERING MATERIALS NECESSARY TO COMPLETE THE WORK AND LAYING THE PROPOSED CONDUIT. WHEN CONNECTING TO AN EXISTING MANHOLE, ALL PIPE PENETRATIONS 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.

**22. RESTORATION OF EXISTING UTILITIES**  
WHEREVER EXISTING TELEPHONE, GAS OR OTHER UTILITIES REQUIRE RELOCATION, THE WORK SHALL BE DONE BY OTHERS. PLEASE CONTACT THE CITY OF BOWLING GREEN ELECTRIC DIVISION FOR RELOCATION OF ANY ELECTRIC. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING ANY UTILITIES DAMAGED DURING CONSTRUCTION.

**23. EMBANKMENT CONSTRUCTION**  
WHERE NECESSARY TO CONSTRUCT PAVEMENT SUBGRADE IN FILL, THE CONTRACTOR SHALL REMOVE ALL TOPSOIL BENEATH THE PROPOSED PAVEMENT AND INCLUDE THE COST OF REMOVAL IN THE LUMP SUM BID FOR ITEM 201, CLEARING AND GRUBBING.

**24. TRENCH MAINTENANCE**  
AT ALL TIMES DURING THE PROGRESS OF THE WORK, AND UNTIL THE RELEASE FROM HIS GUARANTEE BY THE CITY, THE CONTRACTOR SHALL MAINTAIN ALL BACKFILLED TRENCHES. ANY SETTLEMENT THAT OCCURS DURING SUCH TIME SHALL BE FILLED IMMEDIATELY. ALL TRENCHES IN PAVED AREAS THAT ARE TO BE SUBSEQUENTLY REPAVED SHALL BE TEMPORARILY FILLED WITH COLD PATCH MATERIALS; IF SAID TRENCHES WILL NOT BE REPAVED WITHIN 7 CALENDAR DAYS OF BACKFILLING THE TRENCH.

**25. RIGHT-OF-WAY RESTORATION**  
ALL FEATURES IN EXISTING RIGHTS-OF-WAY; INCLUDING PAVEMENT, DRIVES, WALKS, PIPES, SOD, ETC.; THAT ARE DISTURBED DUE TO CONSTRUCTION, SHALL BE REPLACED TO THE SATISFACTION OF THE ENGINEER.

**26. ITEM 611, MANHOLE ADJUSTED TO GRADE, AS PER PLAN**  
IN ADDITION TO ITEM 611, THE EXISTING MANHOLE SHALL HAVE THE CASTING REMOVED AND REPLACED WITH A NEW CASTING AND CONCRETE COLLAR PER BG STD DWG 3-1. PAVEMENT SURROUNDING THE EXISTING CASTING SHALL BE REMOVED BY FIRST SAW CUTTING A CLEAN CIRCLE BY MEANS OF A MANHOLE SAW OR HOLE SAW AND THEN CAREFULLY REMOVE THE EXISTING PAVEMENT BETWEEN THE CASTING AND THE SAW CUT WITHOUT DAMAGING THE PAVEMENT TO REMAIN.

ALL WORK, INCLUDING BUT NOT LIMITED TO REMOVAL OF THE EXISTING FRAME AND COVER AND SURROUNDING PAVEMENT, MODIFICATION OF THE EXISTING STRUCTURE, NEW CASTING, FINAL ADJUSTMENT TO GRADE AND CASTING THE CONCRETE COLLAR, SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE FOR ITEM 611, MANHOLE ADJUSTED TO GRADE, AS PER PLAN.

**27. ITEM 638, VALVE BOX ADJUSTED TO GRADE, AS PER PLAN**  
IN ADDITION TO THE REQUIREMENTS OF CMS 638, VALVE BOXES ADJUSTED TO GRADE WITHIN PAVEMENT LIMITS SHALL RECEIVE A CONCRETE COLLAR AS DESCRIBED IN ITEM 611, MANHOLE ADJUSTED TO GRADE, AS PER PLAN.

**28. WORK ZONE MARKINGS AND SIGNS**  
CONTRACTOR SHALL UTILIZE PAVEMENT MARKINGS AND SIGNS TO MAINTAIN TRAFFIC PER THE REQUIREMENTS OF 614.04 AND 614.11. THE COST OF THIS OPERATION SHALL BE INCLUDED IN THE LUMP SUM ITEM FOR MAINTAINING TRAFFIC.

**29. AS-BUILT DRAWINGS**  
THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING A COMPLETE SET OF CONSTRUCTION DRAWINGS CLEARLY MARKED TO SHOW ALL DEVIATIONS FROM THE APPROVED PLANS. AT COMPLETION OF CONSTRUCTION, THE CONTRACTOR WILL PROVIDE THE ENGINEER WITH A SET OF MARKED UP "AS-BUILT" DRAWINGS. THE ENGINEER ON RECORD FROM THE PROJECT SHALL SUPPLY THE ENGINEER AN AUTOCAD COMPATIBLE DIGITAL FILE WITH THE COMPLETED "AS-BUILT" DRAWINGS, CONTACT THE CITY OF BOWLING GREEN, ENGINEERING DIVISION FOR FURTHER DETAILS.

CALCULATED XXX	CHECKED XXX	GENERAL NOTES (SHEET 1 OF 1)



E:\ACAD\STANDARDS\_&\_SPECIFICATIONS\SPECIFICATIONS\DWGs\WATNOT1.dwg 11-Mar-19 2:00 PM

**1. REFERENCE STANDARDS**

THE WORK SHALL CONFORM TO APPLICABLE PROVISIONS OF THESE CONTRACT DOCUMENTS AND THE FOLLOWING REFERENCE STANDARDS, LATEST EDITION, EXCEPT AS MODIFIED HEREIN. ANY CONFLICT BETWEEN THE REFERENCE STANDARDS AND THESE SPECIFICATIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR REVIEW.

ASTM A536	STANDARD SPECIFICATIONS FOR DUCTILE IRON CASTINGS
AWWA C111	RUBBER-GASKET JOINTS FOR DUCTILE-IRON PRESSURE PIPE AND FITTINGS
AWWA C151	DUCTILE IRON CENTRIFUGALLY CAST
AWWA C153	DUCTILE IRON COMPACT FITTINGS FOR WATER SERVICE
AWWA C104	CEMENT-MORTAR LINING FOR DUCTILE-IRON PIPE AND FITTINGS
AWWA C502	DRY-BARREL FIRE HYDRANTS
AWWA C509	RESILIENT-SEALED GATE VALVES FOR WATER SUPPLY SERVICE
AWWA C600	INSTALLATION OF DUCTILE-IRON WATER MAINS AND THEIR APPURTENANCES
AWWA C605	UNDERGROUND INSTALLATION OF POLYVINYL CHLORIDE (PVC) PRESSURE PIPE AND FITTINGS FOR WATER
AWWA C651	DISINFECTING WATER MAINS
AWWA C800	UNDERGROUND SERVICE LINE VALVE AND FITTINGS
AWWA C901	POLYETHYLENE (PE) PRESSURE PIPE AND TUBING, ½ INCH THROUGH 3 INCH FOR WATER SERVICE
AWWA C900	POLYVINYL CHLORIDE (PVC) PRESSURE PIPE AND FABRICATED FITTINGS, 4 INCH THROUGH 12 INCH FOR WATER TRANSMISSION AND DISTRIBUTION
AWWA C905	POLYVINYL CHLORIDE (PVC) PRESSURE PIPE AND FABRICATED FITTINGS, 14 INCH THROUGH 48 INCH
AWWA C909	MOLECULARLY ORIENTED POLYVINYL CHLORIDE (PVCO) PRESSURE PIPE 4 INCH THROUGH 24 INCH FOR WATER, WASTEWATER AND RECLAIMED WATER SERVICE
ODOT CMS	OHIO DEPARTMENT OF TRANSPORTATION CONSTRUCTION MATERIALS SPECIFICATIONS
	TEN STATE STANDARDS - RECOMMENDED STANDARDS FOR WATER WORKS

**2. PIPE MATERIALS GENERAL**

THE PIPE SHALL BE APPROPRIATELY MARKED TO ALLOW THE ENGINEER TO VERIFY THE PROVIDED PIPE MATERIAL MEETS THE REQUIREMENTS OF THESE SPECIFICATIONS.

MATERIALS NOT SPECIFICALLY MEETING THE REQUIREMENTS OF THESE SPECIFICATIONS MAY BE SUBMITTED FOR REVIEW AND APPROVAL BY THE ENGINEER. THE CONTRACTOR SHALL SUBMIT A BID UNIT PRICE FOR MATERIALS TO BE PROVIDED UNDER THIS SPECIFICATION UPON MATERIALS THAT MEET THE REQUIREMENTS OF THESE SPECIFICATIONS. IF ALTERNATE MATERIALS ARE APPROVED, THE ENGINEER MAY REQUEST A UNIT PRICE DEDUCT FROM THE CONTRACTOR.

THE ENGINEER RESERVES THE RIGHT TO SPECIFY MATERIALS WITH MORE STRINGENT OR CONSERVATIVE PERFORMANCE CHARACTERISTICS FOR PARTICULAR APPLICATIONS.

THE ENGINEER RESERVES THE RIGHT TO REQUIRE MANUFACTURER OR SUPPLIER CERTIFICATIONS OR TEST REPORTS THAT THE SUPPLIED MATERIAL MEETS THE REQUIREMENTS OF THESE SPECIFICATIONS.

**3. DUCTILE IRON PIPE**

DUCTILE IRON PIPE TO BE USED FOR WATER MAINS SHALL BE PROVIDED IN ACCORDANCE WITH AWWA C151. DUCTILE IRON PIPE SHALL BE USED FOR ALL WATER MAINS 16 INCHES AND LARGER.

DUCTILE IRON PIPE SHALL BE THICKNESS CLASS 50. DUCTILE IRON PIPE SHALL BE PROVIDED WITH A RUBBER-GASKET JOINT IN ACCORDANCE WITH AWWA C111. BRONZE WEDGES SHALL BE USED AT ALL PUSH-ON JOINTS (2 PER JOINT). THE WEDGE SHALL BE DRIVEN INTO THE PUSH-ON JOINT TO PROVIDE ELECTRICAL CONDUCTIVITY BETWEEN PIPES.

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.

DUCTILE IRON PIPE AND FITTINGS SHALL BE WRAPPED IN A MINIMUM 8 MIL THICK POLYETHYLENE FILM PER AWWA C-105, UNLESS THE REQUIREMENT IS WAIVED BY THE CITY. FITTINGS SHALL BE WRAPPED FOR A DISTANCE OF 5 FEET ON EACH SIDE OF THE FITTING. RIPS, TEARS, PUNCTURES OR OTHER DAMAGE TO THE POLYETHYLENE FILM SHALL BE REPAIRED PRIOR TO PLACEMENT OF BACKFILL.

**4. POLYVINYL CHLORIDE (PVC) PIPE**

PVC PIPE TO BE USED FOR WATER MAINS SHALL BE PROVIDED IN ACCORDANCE WITH AWWA C900, DR18, PC 235 FOR PIPE SIZES 4-INCH THROUGH 12-INCH DIAMETER.

PVC PIPE SHALL BE DUCTILE IRON EQUIVALENT OUTSIDE DIAMETER. PIPE SHALL BE OF THE INTEGRAL ALL-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.

PIPE SHALL BE BLUE IN COLOR.

**5. MOLECULARLY ORIENTED POLYVINYL CHLORIDE (PVCO) PIPE**

PVCO PIPE TO BE USED FOR WATER MAINS 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.

PIPE SHALL BE BLUE IN COLOR.

**6. DUCTILE IRON FITTINGS**

ALL FITTINGS SHALL BE DOMESTIC 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 WATER MAINS 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 WATERMAIN INSTALLED.

**7. MECHANICAL JOINT RESTRAINTS**

MECHANICAL JOINT RESTRAINTS SHALL BE DOMESTIC AND 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.

THE CONTRACTOR SHALL PROVIDE THRUST BLOCKING AS SHOWN ON THE PLAN DETAIL SHEET. THRUST BLOCKS MAY BE USED IN LIEU OF MECHANICAL JOINT RESTRAINTS WITH THE APPROVAL OF THE ENGINEER.

WATERMAIN PIPES SHALL BE ANCHORED USING MECHANICAL JOINT RESTRAINTS AT ALL DEAD ENDS, BENDS, TEES, VALVES AND CHANGES IN DIRECTION OF THE PIPE IN ACCORDANCE WITH THE APPLICABLE TABLE AS SHOWN ON THE PLAN DETAIL SHEET.

THE COST OF ALL MECHANICAL JOINT RESTRAINTS/THRUST BLOCKING SHALL BE INCLUDED IN THE UNIT BID PRICE FOR WATERMAIN INSTALLED.

**8. CATHODIC PROTECTION**

ALL T-HEAD BOLTS AND NUTS FOR MECHANICAL JOINTS SHALL BE STAINLESS STEEL WITH POLYTETRAFLUOROETHYLENE (PTFE) OR A COR-BLUE BOLT WITH A ZINC END CAP.

ALL TEES, FITTINGS, HYDRANT LEADS 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.

ANODES SHALL BE SET A MINIMUM OF 5-FEET HORIZONTALLY OFFSET FROM WATER MAIN.

ANODES AND LEAD WIRES SHALL BE BACKFILLED WITH STONE FREE NATIVE SOIL COMPACTED IN 6-INCH LAYERS.

ANODES SHALL BE CONNECTED TO THE ANODE LEAD WIRE USING A COPPER CRIMP. CONNECTIONS BETWEEN LEAD WIRES SHALL BE WRAPPED WITH RUBBER TAPE FOLLOWED BY ONE WRAP OF VINYL TAPE. THE ANODE LEAD CONNECTION WIRES SHALL BE INSTALL A MINIMUM OF 24 INCHES BELOW GRADE.

THE WATER MAIN PIPE COATING MATERIALS SHALL BE REMOVED TO WHITE METAL OVER AREAS SUFFICIENT TO MAKE THE CONNECTION. USE OF RESIN IMPREGNATED WHEELS OR DISCS WILL NOT BE PERMITTED. THE LEAD WIRE SHALL BE WELDED TO THE PIPELINE USING AN EXOTHERMIC PROCESS AS APPROVED BY THE ENGINEER. ALL SLAG MATERIAL SHALL BE REMOVED, AND THE WELD SHALL BE TESTED WITH A SHARP HAMMER BLOW TO ENSURE A PROPER METALLURGICAL BOND. ALL DEFECTIVE WELDS SHALL BE REMOVED AND REPLACED AT NO ADDITIONAL COST TO THE OWNER. ALL EXPOSED SURFACES OF COPPER AND STEEL SHALL BE COVERED WITH A BITUMASTIC FILLED SHIELD ENCAPSULATING THE CONNECTION.

FOR ANODE BEDS CONSISTING OF MORE THAN ONE ANODE INSTALLED IN SERIES; INSTALL A 3-INCH WIDE NON-DETECTABLE WARNING TAPE AS MANUFACTURED BY PRO-LINE SAFETY PRODUCTS OR APPROVED EQUAL. WARNING TAPE SHALL BE BURIED 12-INCHES BELOW FINAL GRADE AND ABOVE THE ANODE LEAD WIRE. WARNING TAPE FOR ANODE LEADS SHALL BE PRINTED "CAUTION CATHODIC PROTECTION LINE BURIED BELOW."

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

**9. SERVICE CONNECTIONS**

THE CONTRACTOR SHALL CONSTRUCT NEW OR REINSTATE ALL WATER SERVICE LINES SHOWN ON THE PLANS OR DISCOVERED TO THE NEW WATER MAIN. ALL NEW WATER SERVICES SHALL BE MINIMUM 1-INCH DIAMETER. WATER SERVICE REINSTATEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD DETAILS SHOWN IN THE CONTRACT DOCUMENTS. WATER SERVICES SHALL BE REINSTATED USING THE FOLLOWING PARTS DEPENDING ON THE EXISTING WATER SERVICE MATERIAL.

SADDLE - FORD BRASS SADDLE STYLE 202BS WITH DOUBLE STAINLESS BAND OR MUELLER BR2W. ALL SADDLES SHALL BE FOR A MINIMUM 1-INCH DIAMETER SERVICE.

CORPORATION STOP - FORD FB1000 WITH PACK JOINT, GRIP JOINT, OR QUICK JOINT OUTLET OR MUELLER B-25008N. ALL CORPORATION STOPS SHALL BE MINIMUM 1-INCH.

TUBING - AWWA C800 TYPE "K" SOFT COPPER OR AWWA C901 SDR9 POLYETHYLENE TUBING (BLUE). THE MINIMUM DIAMETER OF THE NEW TUBING SHALL BE 1-INCH NOMINAL DIAMETER.

CURB STOP - FORD B44 QUICK JOINT ENDS WITH COMPRESSION ENDS OR MUELLER B-25209N QUICK JOINT WITH COMPRESSION ENDS.

CURB BOX - AMERICAN MADE TYLER UNION 6500 SCREW TYPE CURB BOX WITH "CITY OF BOWLING GREEN WATER" STAMPED ON THE LID.

THE PRICE BID FOR WATER SERVICES SHALL INCLUDE ALL PARTS, MATERIALS AND LABOR REQUIRED TO CONSTRUCT A COMPLETE CONNECTION TO THE WATER MAIN. OTHER PARTS OF ITEMS NOT SPECIFICALLY LISTED BUT REQUIRED TO PROVIDE A COMPLETE CONNECTION SHALL ALSO BE INCLUDED. TUBING SHALL BE PAID UNDER THE BID ITEM FOR WATER SERVICE TUBING.

WHEN A BUILDING IS SERVED BY A FIRE LINE, ALL DOMESTIC WATER SERVICES SHALL BE SEPARATED FROM THE FIRE LINE BEFORE ENTERING THE BUILDING AND SHALL HAVE A CURB VALVE AND CURB BOX A MINIMUM OF 8 FEET OUTSIDE THE BUILDING FOOTPRINT.

**10. WATER MAIN INSTALLATION**

WATER MAINS SHALL BE INSTALLED IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE PIPE MANUFACTURER AND AWWA C600 AND AWWA C605.

ALL WATERLINES SHALL BE INSTALLED WITH A MINIMUM OF 5 FEET AND A MAXIMUM OF 6 FEET OF GROUND COVER, AS MEASURED FROM THE TOP OF THE PIPE TO FINISH GRADE OR AS MODIFIED ON THE PLANS. WATERLINE SERVICE CONNECTIONS SHALL BE INSTALLED WITH A MINIMUM OF 4 FEET OF COVER. WATERLINES SHALL BE INSTALLED IN AN OPEN TRENCH TRUE TO THE LINE AND GRADE WITH THE AID OF A ROTATING LASER WITH GRADE AND SLOPE CONTROL OR AN INTERNAL PIPE LASER WITH TARGET.

LASER BEAM EQUIPMENT SHALL BE CHECKED TWICE DAILY, ONCE IN THE AM AND ONCE IN THE PM, IN THE PRESENCE OF THE ENGINEER OR ENGINEER'S REPRESENTATIVE TO VERIFY THAT THE PIPE IS BEING LAID TRUE TO DESIGN LINE AND GRADE. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER OF ANY DEVIATION IN THE DESIGN LINE AND GRADE.

PIPE SECTIONS LESS THAN 10 FEET IN LENGTH SHALL NOT BE USED WHERE A FULL PIPE SECTION CAN BE USED.

NO WATER MAINS OR ANY APPURTENANCES TO THE POTABLE WATER SYSTEM SHALL BE ALLOWED TO DIRECTLY ENTER OR CONTACT WITH A SANITARY OR STORM SEWER OR MANHOLE. A SUITABLE AIR-GAP SHALL BE PROVIDED WHERE SUCH ITEMS AS TANK DRAINS, ETC. MUST BE INSTALLED.

ALL PIPES SHALL BE THOROUGHLY CLEANED INSIDE AND OUTSIDE BEFORE BEING LOWERED INTO THE TRENCH AND SHALL BE KEPT CLEAN DURING THE INSTALLATION. THE END OF THE PIPE SHALL BE PLUGGED TO EXCLUDE WATER, ANIMALS OR OTHER DEBRIS FROM ENTERING THE PIPE.

SURFACES TO BE IN CONTACT WITH THE RUBBER GASKET SHALL BE BRUSHED CLEAN WITH SOAPY WATER AND DRIED JUST PRIOR TO MAKING THE JOINT. A LUBRICANT SHALL BE USED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATION WHEN MAKING THE JOINT.

**11. TRENCH EXCAVATIONS**

EXCEPT WHERE OTHERWISE SPECIFIED BY THE ENGINEER, WATER MAINS SHALL BE INSTALLED IN OPEN TRENCHES.

THE MAXIMUM ALLOWABLE TRENCH WIDTH SHALL EQUAL THE OUTSIDE DIAMETER OF THE PIPE PLUS 24 INCHES OR AS SPECIFIED IN THE CONTRACT DOCUMENTS. IF THE MAXIMUM 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 OR BEDDING OR A COMBINATION OF THESE OPTIONS AT THE EXPENSE OF THE CONTRACTOR.

TRENCH EXCAVATION SHALL INCLUDE IN THE UNIT PRICE FOR PIPE INSTALLED, THE REMOVAL OF EXISTING PAVEMENT, CURB, SIDEWALKS AND OTHER FEATURES AS SHOWN IN THE CONTRACT DOCUMENTS.

TRENCHES SHALL BE KEPT SUFFICIENTLY FREE OF WATER DURING PIPE LAYING AND JOINTING TO PREVENT DAMAGE TO THE PIPE JOINTS OR OVERALL INSTALLATION. DEWATERING SHALL BE PERFORMED IN A MANNER AS APPROVED BY THE ENGINEER.

WHERE NECESSARY TO PREVENT CAVING OF THE TRENCH AND OTHER EXCAVATIONS, AND FOR PROTECTION OF WORKMEN AND NEARBY STRUCTURES, ADEQUATE SHEETING AND BRACING SHALL BE PROVIDED AT THE EXPENSE OF THE CONTRACTOR.

TRENCH EXCAVATION SHALL BE TO 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 IS NOT PERMITTED. THE COST FOR ROCK REMOVAL SHALL BE INCLUDED IN THE UNIT BID PRICE FOR THE APPROPRIATE ITEM REQUIRING THE EXCAVATION, UNLESS OTHERWISE INDICATED IN THE BIDDING DOCUMENTS.

**12. BEDDING**

THE WATER MAIN SHALL BE PROPERLY EMBEDDED IN ACCORDANCE WITH THE PIPE MANUFACTURER, THESE SPECIFICATIONS AND DETAILS SHOWN IN THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL USE SPECIAL CARE TO PLACE BEDDING MATERIAL UNDER AND ALONG THE ENTIRE LENGTH OF PIPE TO PROVIDE ADEQUATE SUPPORT FOR THE PIPE. BEDDING MATERIAL SHALL BE CAREFULLY PLACED TO AVOID DAMAGE TO THE PIPE MATERIAL. THE BEDDING MATERIAL SHALL BE PLACED AND TAMPED TO PROPERLY CLOSE ALL VOIDS AND PROVIDE PROPER SUPPORT OF THE PIPE.

THE BEDDING MATERIAL SHALL BE COARSE AGGREGATE MEETING THE REQUIREMENTS OF ODOT CMS AND SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER. ALL BEDDING MATERIAL SHALL BE INCLUDED IN THE UNIT PRICE FOR WATER MAIN INSTALLED.

IF MATERIAL IS FOUND AT THE SPECIFIED DEPTHS OF EXCAVATION BELOW THE PROPOSED BEDDING THAT IS UNSUITABLE TO PROVIDE ADEQUATE SUPPORT OF THE PIPE AND BEDDING MATERIAL, THE CONTRACTOR SHALL EXCAVATE ADDITIONAL DEPTH UNTIL ADEQUATE FOUNDATION CAN BE ACHIEVED. THIS ADDITIONAL EXCAVATION SHALL BE FILLED WITH GRANULAR BEDDING MATERIAL APPROVED BY THE ENGINEER. SUCH ADDITIONAL GRANULAR BEDDING MATERIAL AND ADDITIONAL EXCAVATION SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER AND SHALL BE INCLUDED IN THE PRICE FOR WATER MAIN INSTALLED.

ANY UNAUTHORIZED OVER-EXCAVATION SHALL BE FILLED WITH GRANULAR BEDDING MATERIAL AT NO ADDITIONAL COST TO THE OWNER AND SHALL BE INCLUDED IN THE UNIT PRICE FOR WATER MAIN INSTALLED.

**13. BACKFILL**

ONCE THE WATER MAIN 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 BACKFILLED AREA. THE CONTRACTOR SHALL USE SPECIAL CARE TO AVOID SETTLEMENT OF THE BACKFILL MATERIAL.

TESTING FOR COMPACTION SHALL BE PERFORMED IN ACCORDANCE WITH ASTM D698, WITH ONE TEST PERFORMED PER LIFT FOR EACH 2,000 SQUARE FEET OF AREA OR FRACTION THEREOF INVOLVED IN THE LIFT. TESTS SHALL CONTINUE FOR EACH LIFT UNTIL SATISFACTORY RESULTS ARE OBTAINED AS DETERMINED BY THE ENGINEER. THE OWNER WILL EMPLOY A TESTING LABORATORY TO MAKE TESTS ON THE SITE AND WILL PAY ALL COSTS FOR THE FIRST SET OF TESTS PERFORMED PER LIFT. IF COMPACTION FAILS TO MEET THAT WHICH IS SPECIFIED, ALL SUCCEEDING TESTS FOR THAT LIFT SHALL BE AT THE EXPENSE OF THE CONTRACTOR.

ALL UTILITIES ENCOUNTERED SHALL BE PROPERLY SUPPORTED, SHORED OR OTHERWISE PROTECTED WHENEVER EXPOSED IN THE EXCAVATION AS APPROVED BY THE ENGINEER. SUCH SUPPORTS, SHORING OR OTHER MEASURES SHALL BE PROVIDED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER. THE ENGINEER RESERVES THE RIGHT TO REQUIRE SIGNED AND SEALED ENGINEERING DESIGN CALCULATIONS FOR THE SUPPORTS, SHORING OR OTHER MEASURES PROVIDED BY THE CONTRACTOR. PIPE SHALL BE LOCATED WITH RESPECT TO OTHER UTILITIES SO AS TO ALLOW FOR TAPS TO BE INSERTED. THE ENGINEER SHALL ESTABLISH A MINIMUM CLEARANCE BASED UPON FIELD CONDITIONS.

**14. TRACER TAPE**

TRACER WARNING TAPE AND TRACER WIRE SHALL BE INSTALLED WITH ALL NEW WATER MAINS.

TRACER WARNING TAPE SHALL BE A MINIMUM 3 INCHES WIDE WITH THE WORDS "BURIED WATERLINE BELOW" IN 1.5-INCH HIGH BOLD BLACK LETTERS REPEATED EVERY 21 INCHES PRINTED WITH BLUE WARNING COLORS. TRACER WARNING TAPE SHALL BE INSTALLED 30 INCHES BELOW FINAL GRADE DIRECTLY ABOVE THE WATER MAIN.

CALCULATED  
XXX

CHECKED  
XXX

WATER NOTES (SHEET 1 OF 2)

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



E:\ACAD\STANDARDS\_&\_SPECIFICATIONS\DWGs\WATNOT2.dwg 11-Mar-19 2:01 PM

**15. TRACER WIRE**

TRACER WIRE SHALL BE INSTALLED CONTINUOUSLY OVER WATERMANS AND SERVICE LINES AND SHALL BE CONNECTED TO THE WATERMAIN OR SERVICE LINE WITH TAPE AT 15-FOOT MAXIMUM INTERVALS. THE WIRE SHALL NOT BE WRAPPED AROUND THE WATERMAIN.

**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.

THE TRACER WIRE SHALL BE BROUGHT TO THE SURFACE EVERY 300 FEET OR AT ANY CHANGES IN DIRECTION AS APPROVED BY THE ENGINEER. ACCESS POINTS MAY BE VALVE BOXES, VAULTS, TRACER WIRE ACCESS BOX OR OTHER COVERED ACCESS DEVICES CLEARLY MARKED "WATER." THE CONTRACTOR SHALL PROVIDE AN EXTRA 24" OF WIRE AT ALL ACCESS POINTS. THE CONTRACTOR SHALL INCLUDE NECESSARY APPURTENANCES FOR ACCESS IN THE BID UNIT PRICE FOR WATER MAIN INSTALLED.

SERVICE LINE TRACER WIRE SHALL BE SPLICED TO WATER MAIN TRACER WIRES. SPLICES IN THE TRACER WIRE SHALL BE CONNECTED BY MEANS OF A SPLIT BOLT OR COMPRESSION TYPE CONNECTOR TO ENSURE CONTINUITY. WIRE NUTS SHALL NOT BE USED. A WATERPROOF OR CORROSION-PROOF CONNECTOR FOR DIRECT BURY APPLICATIONS SHALL BE USED. AFTER INSTALLATION, THE TRACER WIRE SHALL BE TESTED BY THE CONTRACTOR WITH A REPRESENTATIVE OF THE CITY OF BOWLING GREEN PRESENT TO VERIFY CONTINUITY OF THE TRACER WIRE SYSTEM.

**16. EXISTING WATER MAINS**

NEW WATER MAINS SHALL BE CONNECTED TO EXISTING WATER MAINS IN ACCORDANCE WITH THE REQUIREMENTS OF THESE SPECIFICATIONS AND IN A MANNER ACCEPTABLE TO THE OWNER AND ENGINEER. THE CONTRACTOR SHALL PROVIDE A MINIMUM OF 24-HOURS NOTICE TO THE SUPERINTENDENT OF THE WATER DEPARTMENT, (419-354-6278) AND TO THE ENGINEER PRIOR TO MAKING ANY CONNECTIONS TO EXISTING WATER MAINS. EXTREME CARE SHALL BE TAKEN IN MAKING SUCH CONNECTIONS TO PREVENT CONTAMINATION OF THE EXISTING MAINS. BEFORE MAKING CUT-INS OR CONNECTIONS TO EXISTING MAINS, ALL FITTINGS, VALVES AND PIPE SHALL BE WASHED WITH CLEAN WATER AND THE STERILIZED BY WASHING WITH A CHLORINE SOLUTION HAVING RESIDUAL CHLORINE STRENGTH OF NOT LESS THAN 50 PPM.

**17. TEMPORARY WATER SERVICE**

THE CONTRACTOR SHALL PROVIDE TEMPORARY WATER SERVICE WHEN WATER SERVICE AND FIRE PROTECTION WILL BE TEMPORARILY DISRUPTED DUE TO CONSTRUCTION. THE PROPOSED TEMPORARY WATER SERVICE SHALL BE AS APPROVED BY THE OWNER AND ENGINEER.

**18. DISINFECTION**

ALL NEW WATER MAINS SHALL BE DISINFECTED IN ACCORDANCE WITH PROCEDURES OUTLINED IN AWWA C651. DISINFECTION MAY BE ACCOMPLISHED BY THE TABLET METHOD, THE CONTINUOUS FEED METHOD OR THE SLUG METHOD. IN ALL CASES, TESTS FOR CHLORINE CONTENT SHALL BE PERFORMED IN ACCORDANCE WITH STANDARD METHODS FOR EXAMINATION OF WATER AND WASTEWATER. ALL FILLING OPERATIONS MUST BE CONDUCTED UNDER THE SUPERVISION OF THE ENGINEER. THE CONTRACTOR SHALL USE SPECIAL CARE TO ENSURE THE PRESSURE IN THE NEW MAIN DOES NOT RISE ABOVE 20-PSI DURING FILLING APPLICATIONS.

CHLORINATED WATER SHALL BE DECHLORINATED PRIOR TO DISCHARGE.

THE CONTRACTOR SHALL FURNISH ALL MATERIALS, CORPORATION STOPS, LABOR AND EQUIPMENT REQUIRED TO PROPERLY DISINFECT THE MAIN.

**19. HYDROSTATIC TESTING**

ALL NEW WATER MAINS SHALL BE HYDROSTATICALLY TESTED IN ACCORDANCE WITH PROCEDURES OUTLINED IN AWWA C600 AND AWWA C605.

WATER MAINS SHALL BE SUBJECTED TO HYDROSTATIC TESTING FOLLOWING DISINFECTION AND FLUSHING OF DISINFECTION SOLUTION OUT OF THE WATER MAIN. THE CONTRACTOR SHALL REMOVE ALL AIR FROM THE SECTION OF WATER MAIN TO BE TESTED. THE NEW WATER MAIN SHALL REMAIN ISOLATED FROM ADJACENT MAINS DURING THE HYDROSTATIC TESTING. THE FOLLOWING IS A SUMMARY OF THE PROCEDURE TO BE USED FOR HYDROSTATIC TESTING.

**19. HYDROSTATIC TESTING (CONT)**

- a. AN INITIAL PRESSURE OF AT LEAST 150 PSI SHALL BE APPLIED TO THE WATER MAIN BY PUMPING CLEAN WATER CONTAINING 10 PPM CHLORINE FROM A CLEANED AND STERILIZED CONTAINER THROUGH A 1-INCH CORPORATION STOP INSTALLED ON THE WATER MAIN.
- b. AFTER 18 HOURS, THE WATER MAIN SHALL BE MAINTAINED AT 150 PSI FOR 6-HOURS. AT THE END OF THE 6-HOUR PERIOD, THE WATER SHALL BE MEASURED AND THE LOSS BY LEAKAGE SHALL NOT EXCEED THAT AS DETERMINED BY THE FOLLOWING FORMULA:

$$Q = \frac{LD \sqrt{P}}{148,000}$$

WHERE:

- Q = QUANTITY OF MAKEUP WATER, IN GALLONS PER HOUR
- L = LENGTH OF PIPE SECTION BEING TESTED, IN FEET
- D = DIAMETER OF PIPE, IN INCHES
- P = AVERAGE TEST PRESSURE DURING HYDROSTATIC TEST, IN POUNDS PER SQUARE INCH (GAUGE)

- c. HYDRANTS - WHEN HYDRANTS ARE IN THE TEST SECTION, THE TEST SHALL BE MADE AGAINST THE CLOSED HYDRANT.

- d. VALVES - PRESSURE TESTING OF EACH SIDE OF THE INTERMEDIATE VALVES SHALL BE DONE AT THIS TIME BY SHUTTING EACH VALVE AND EXHAUSTING THE PRESSURE ON ONE SIDE AND THE APPLYING A MINIMUM TEST PRESSURE OF 150 PSI ON THE OPPOSITE SIDE OF THE VALVE. THIS PROCEDURE SHALL BE REPEATED FOR EACH INTERMEDIATE VALVE. IF THE MAIN VALVES DO NOT PASS THE LEAKAGE TEST, THE LEAK OR LEAKS SHALL BE LOCATED AND REPAIRED AND THE TESTING PROCEDURE REPEATED.

- e. FLUSHING - UPON COMPLETION OF THE LEAKAGE TESTS, THE MAIN SHALL BE THOROUGHLY FLUSHED WITH POTABLE WATER FROM THE PUBLIC SUPPLY UNTIL THE WATER IN THE MAIN HAS APPROXIMATELY THE SAME CHLORINE CONTENT AS WATER IN THE EXISTING MAIN.

- f. VISIBLE LEAKS - ALL VISIBLE LEAKS SHALL BE REPAIRED, REGARDLESS OF THE AMOUNT OF LEAKAGE.

9. THE CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT REQUIRED FOR HYDROSTATIC TESTING.

\*PRIVATE FIRE SERVICE MAINS ARE REQUIRED TO BE TESTED AT A MINIMUM PRESSURE OF 200 PSI.

**20. BACTERIOLOGICAL TESTING**

FOLLOWING THE SUCCESSFUL HYDROSTATIC TESTING, BACTERIOLOGICAL SAMPLES SHALL BE COLLECTED FROM THE WATER MAIN BY AN EMPLOYEE OF THE CITY OF BOWLING GREEN. BACTERIOLOGICAL SAMPLES SHALL NOT BE TAKEN BY THE CONTRACTOR. COLLECTION AND TESTING OF THE SAMPLES SHALL BE PERFORMED IN ACCORDANCE WITH STANDARD METHODS FOR EXAMINATION FOR WATER AND WASTEWATER.

IF RESULTS OF TWO CONSECUTIVE SETS OF BACTERIOLOGICAL TESTS ARE DEEMED ACCEPTABLE BY THE CITY OF BOWLING GREEN WATER DEPARTMENT, THE MAIN MAY BE PLACED IN SERVICE. IF BACTERIOLOGICAL RESULTS ARE NOT ACCEPTABLE, THE MAIN SHALL BE DISINFECTED AND TESTED AGAIN. THE CITY OF BOWLING GREEN WILL PERFORM TWO SETS OF BACTERIOLOGICAL TEST AT NO CHARGE TO THE CONTRACTOR. ADDITIONAL TESTS WILL BE AT THE EXPENSE OF THE CONTRACTOR.

**21. COST OF WATER PURCHASED**

UNLESS OTHERWISE SPECIFIED, COST OF WATER NECESSARY FOR INITIAL FLUSHING, TESTING, ETC. SHALL BE AT THE OWNER'S EXPENSE. SUBSEQUENT WATER NECESSARY FOR FLUSHING, TESTING, ETC. DUE TO FAILED TESTS SHALL BE AT THE CONTRACTOR'S EXPENSE.

**22. COMPLETION OF TEST**

WHEN ALL TESTS ON THE WATER MAIN HAVE BEEN SUCCESSFULLY COMPLETED AND THE MAIN IS PLACED IN SERVICE BY THE OWNER, NO FURTHER WORK ON THE MAIN OR VALVES WILL BE PERMITTED WITHOUT FULL KNOWLEDGE OF THE WORK BY THE BOWLING GREEN WATER DEPARTMENT AND THE ENGINEER.

**23. FIRE HYDRANTS**

HYDRANTS SHALL BE SET PLUMB AND TO MATCH THE SURROUNDING FINAL GRADE. PUMPER NOZZLE SHALL BE FACED TOWARD THE CENTER LINE OF THE PAVEMENT UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

HYDRANTS SHALL FIRST BE BACKFILLED WITH ODOT NO. 67 STONE TO A MINIMUM DEPTH OF TWO FEET. A 10 CUBIC FOOT GRAVEL POCKET SHALL BE PROVIDED AROUND THE HYDRANT DRAIN IN ACCORDANCE WITH TEN STATES STANDARDS, SECTION 8.4.4. THE REMAINDER OF EXCAVATION SHALL THEN BE BACKFILLED AS SPECIFIED FOR WATER MAINS. THE HYDRANT SHALL BE PROTECTED DURING BACKFILLING TO ENSURE THE COATING IS NOT DAMAGED.

THE HYDRANT BASE AND WATCH VALVE SHALL BE PLACED ON AN 8-INCH THICK BY 8-INCH BY 16-INCH SOLID CONCRETE BLOCK.

THE FIRE HYDRANT SHALL BE OF THE COMPRESSION TYPE, OPENING AGAINST AND CLOSING WITH THE WATER PRESSURE IN THE MAIN IN ACCORDANCE WITH AWWA C502. HYDRANTS SHALL BE SUITABLE FOR SETTING IN TRENCHES WITH 5 FEET OF GROUND COVER ABOVE THE HYDRANT LATERAL. THE HYDRANT ASSEMBLY SHALL HAVE A 6-INCH MECHANICAL JOINT BASE.

**23. FIRE HYDRANTS (CONT)**

FIRE HYDRANTS SHALL BE PROVIDED TO OPEN TO THE LEFT (COUNTERCLOCKWISE).

THE FIRE HYDRANT SHALL BE FITTED WITH A 5 1/4 INCH DIAMETER PUMPER NOZZLE AND TWO 2 1/2 INCH DIAMETER HOSE NOZZLES. THE CONTRACTOR SHALL VERIFY THAT THE PUMPER NOZZLE, HOSE NOZZLES, STORZ FITTING, CAP NUT SIZE AND HOSE THREADS CONFORM TO THE CITY OF BOWLING GREEN FIRE DEPARTMENT'S STANDARD SIZING PRIOR TO ORDERING MATERIALS. THE CHAINS SHALL BE CUT OFF THE 2 1/2 INCH DIAMETER HYDRANT CAPS.

THE PUMPER NOZZLE SHALL BE FITTED WITH A 5-INCH DIAMETER STORZ FITTING COMPATIBLE WITH 5-INCH DIAMETER COUPLED FIRE HOSES.

- a. THE STORZ FITTING SHALL BE CONSTRUCTED OF AIRCRAFT QUALITY ALUMINUM WITH BRASS CONNECTION, BRASS SEALING FACE AND UNINTERRUPTED BRASS WATERWAY. THE ALUMINUM TO BE HARD COAT ANODIZED IN ACCORDANCE WITH SAE-AMS-A-8625F, TYPE 3, DARK GRAY, FOR CORROSION PROTECTION. THE STORZ FITTING SHALL NOT BE PAINTED. THE STORZ FITTING SHALL BE INTEGRAL AND FACTORY MOUNTED TO THE FIRE HYDRANT ASSEMBLY AND RESISTANT TO TAMPERING OR REMOVAL BY UNAUTHORIZED PERSONNEL. ADD-ON STORZ COMPATIBLE ADAPTERS ARE NOT ACCEPTABLE.
- b. THE STORZ FITTING SHALL BE AS MANUFACTURED HARRINGTON, INC. OR EQUAL APPROVED BY THE FIRE CHIEF.

HYDRANTS SHALL BE PROVIDED WITH A POSITIVE OPERATING DRAIN VALVE AND SHALL BE INSTALLED WITH THE DRAIN VALVE OPEN.

HYDRANT NUTS AND BOLTS SHALL BE 316 STAINLESS STEEL AND LUBRICATED WITH POLYTETRAFLUOROETHYLENE (PTFE) TO PREVENT GALLING.

FIRE HYDRANTS SHALL BE MUELLER SUPER CENTURION A-423 OR KENNEDY K-81D BOWLING GREEN SPECIFICATION.

THE HYDRANT SHALL BE COATED AT THE FACTORY, PRIOR TO SHIPPING WITH EITHER A POLYESTER POWDER COAT OR A TWO PART POLYURETHANE COATING. THE BELOW GRADE PORTION OF THE HYDRANT SHALL BE COATED WITH RAL 9005 JET BLACK. THE ABOVE GRADE PORTION OF THE HYDRANT SHALL BE YELLOW, WITH THE EXCEPTION OF THE BONNET AND BOTH 2 1/2 INCH CAPS, WHICH SHALL BE GREEN. THE YELLOW AND GREEN COLORS, PER MANUFACTURER, SHALL CONFORM TO THE FOLLOWING:

- MUELLER: TRAFFIC YELLOW (RAL 1023), FIR GREEN (RAL 6009)
- KENNEDY: SAFETY YELLOW (RAL 1018), FOREST GREEN (RAL 6009)

PRIVATE HYDRANTS SHALL BE RED (RAL 3001)

**24. WATCH VALVES AND VALVE BOXES**

ALL FIRE HYDRANT ASSEMBLIES SHALL BE PROVIDED WITH A 6-INCH GATE VALVE AND VALVE BOX AS SHOWN IN THE STANDARD DRAWINGS. THE VALVE BOX COVER SHALL BE CAST WITH THE WORDS "CITY OF BOWLING GREEN WATER".

**25. ANCHORING PIPE, OFFSET ANCHORING PIPE AND FITTINGS**

HYDRANT ASSEMBLIES SHALL BE SECURED TO THE WATERMAIN WITH AN ANCHORING PIPE TO CONNECT THE WATCH VALVE TO THE 6-INCH OUTLET TEE ON THE WATERMAIN. THE ANCHORING PIPE SHALL BE A ONE PIECE DOMESTIC CASTING WITH PLAIN END MECHANICAL JOINT TYPE INCORPORATING AN INTEGRAL FOLLOWER GLAND AS MANUFACTURED BY CLOW CORPORATION, US PIPE AND FOUNDRY COMPANY OR APPROVED EQUAL.

HYDRANT ASSEMBLIES SHALL BE SECURED TO THE WATCH VALVE WITH AN OFFSET ANCHORING PIPE. THE OFFSET ANCHORING PIPE SHALL BE A GRADELOK OFFSET ANCHOR PIPE WITH LIPLESS SPLIT FLANGES AS MANUFACTURED BY ASSURED FLOW SALES OR APPROVED EQUAL.

**26. EXISTING HYDRANT ASSEMBLIES REMOVED**

ALL EXISTING HYDRANT ASSEMBLIES REMOVED AS PART OF THIS WORK SHALL BECOME PROPERTY OF THE OWNER. THE CONTRACTOR SHALL STORE REMOVED HYDRANT ASSEMBLIES ON SITE AND THE OWNER SHALL PROVIDE TRANSPORTATION OF THE REMOVED HYDRANT ASSEMBLIES OFF SITE.

**27. RESILIENT SEATED GATE VALVES**

ALL GATE VALVES SHALL BE PROVIDED WITH RESILIENT SEATS WITH NO EXPOSED BARE METAL. VALVES SHALL BE EQUIPPED WITH MECHANICAL JOINT CONNECTIONS AND NON-RISING STEM OPERATORS. ALL INTERIOR AND EXTERIOR SURFACES OF THE VALVE BODY SHALL BE COATED WITH EPOXY PAINT MEETING THE REQUIREMENTS OF AWWA C550 AND NSF 61. RESILIENT SEATED GATE VALVES SHALL BE PROVIDED IN ACCORDANCE WITH AWWA C509.

BONNET BOLTS AND NUTS SHALL BE 316 STAINLESS STEEL AND LUBRICATED WITH POLYTETRAFLUOROETHYLENE (PTFE) TO PREVENT GALLING.

RESILIENT SEATED GATE VALVES SHALL BE DESIGNED FOR A MAXIMUM WORKING PRESSURE OF 250 PSI. RESILIENT SEATED GATE VALVES SHALL BE USED ON WATER MAINS UP TO AND INCLUDING 12-INCH DIAMETER.

**27. RESILIENT SEATED GATE VALVES (CONT)**

VALVES SHALL BE EQUIPPED WITH A 2-INCH OPERATING NUT AND SHALL OPEN TO THE LEFT (COUNTERCLOCKWISE).

RESILIENT SEATED GATE VALVES SHALL BE MUELLER A-2362 OR APPROVED EQUAL.

**28. BUTTERFLY VALVES**

ALL BUTTERFLY VALVES SHALL BE PROVIDED WITH AN ELASTOMERIC SEAT WITH A 316 STAINLESS STEEL DISC. BUTTERFLY VALVES SHALL BE EQUIPPED WITH MECHANICAL JOINT CONNECTIONS. ALL INTERIOR AND EXTERIOR SURFACES OF THE VALVE BODY SHALL BE COATED WITH EPOXY PAINT MEETING THE REQUIREMENTS OF AWWA C550 AND NSF 61. BUTTERFLY VALVES SHALL BE PROVIDED IN ACCORDANCE WITH AWWA C504. ALL EXPOSED BOLTS AND NUTS ON THE VALVE BODY SHALL BE 316 STAINLESS STEEL AND LUBRICATED WITH POLYTETRAFLUOROETHYLENE (PTFE) TO PREVENT GALLING.

BUTTERFLY VALVES SHALL BE DESIGNED FOR A MAXIMUM WORKING PRESSURE OF 150 PSI. BUTTERFLY VALVES SHALL BE USED ON WATER MAINS LARGER THAN 12 INCHES IN DIAMETER.

BUTTERFLY VALVES SHALL BE MUELLER LINESEAL III OR APPROVED EQUAL.

BUTTERFLY VALVES SHALL BE PLACED IN MANHOLES IN ACCORDANCE WITH THE DETAILS SHOWN IN THE CONTRACT DOCUMENTS.

**29. TAPPING SLEEVE AND VALVE**

TAPPING SLEEVES SHALL BE MECHANICAL JOINT TYPE IN ACCORDANCE WITH AWWA C223. ALL TAPPING SLEEVE HARDWARE SHALL BE CONSTRUCTED USING 316 STAINLESS STEEL. NO SIZE OR SIZE TAPS SHALL BE PERMITTED. THE TAPPING SLEEVE SHALL BE PROVIDED WITH A TEST PLUG AND SHALL BE COMPATIBLE WITH THE PROVIDED TAPPING VALVE.

THE CONTRACTOR SHALL HYDROSTATICALLY TEST ALL TAPPING SLEEVES PRIOR TO PERFORMING THE NEW TAP CONNECTION TO AN EXISTING WATER MAIN. TAPPING SLEEVES SHALL BE HYDROSTATICALLY TESTED FOR 15 MINUTES USING TEST PRESSURES IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR THE SIZE OF TAP AND WORKING PRESSURE OF THE NEW WATERLINE. COMPRESSED AIR TESTING OF THE NEW TAPPING SLEEVE SHALL NOT BE PERMITTED.

FOLLOWING THE PRESSURE TESTING, THE CONTRACTOR SHALL RE-TIGHTEN THE SLEEVE AND MECHANICAL JOINT CONNECTION TO ACCOUNT FOR ANY STRETCHING IN THE RESTRAINT BOLTS OR SLEEVES.

TAPPING VALVES SHALL MEET THE REQUIREMENTS FOR RESILIENT SEATED VALVES LISTED ABOVE. VALVE SHALL BE CLOW F-6114, MUELLER T2360, AMERICAN FLOW CONTROL RW-500 OR APPROVED EQUAL.

PRE-STRESSED CONCRETE CYLINDER PIPE (PCCP) SHALL ONLY BE TAPPED BY A LICENSED CONTRACTOR.

**30. VALVE BOXES**

VALVE BOXES AND COVERS SHALL BE TYLER UNION AND SHALL BE CONSTRUCTED OF CLASS 30 B DOMESTIC CAST IRON IN ACCORDANCE WITH ASTM A48. VALVE BOXES SHALL BE OF THE THREE PIECE SCREW TYPE WITH 5 1/4 INCH DIAMETER SHAFT. THE VALVE BOX COVER SHALL BE CAST WITH THE WORDS "CITY OF BOWLING GREEN WATER" ON THE TOP. VALVE BOXES SHALL BE FIRMLY SUPPORTED AND SHALL BE KEPT CENTERED AND PLUMB OVER THE WRENCH NUT OF THE GATE VALVE. THE VALVE BOX BASE SHALL COVER THE VALVE BONNET AND BE SET FLUSH WITH THE FINAL GRADE.

VALVE EXTENSIONS SHALL BE REQUIRED FOR ALL OPERATING NUTS LOCATED MORE THAN 5 FEET BELOW GRADE.

**31. VALVE INSTALLATION**

VALVES SHALL BE SET PLUMB WITH THE VALVE BOX CENTERED OVER THE VALVE OPERATING NUT. ALL VALVES SHALL BE IN THE ON POSITION AT THE TIME OF SUBSTANTIAL COMPLETION.

WHERE VALVE BOXES ARE LOCATED IN PAVED AREAS, THE SURFACE OF THE COVER SHALL BE SET 1/4-INCH BELOW THE PAVEMENT SURFACE. IN UNPAVED AREAS, THE COVER SHALL BE SET NOT TO EXCEED 1-INCH ABOVE THE GROUND SURFACE, OR AS DIRECTED BY THE ENGINEER.

VALVES SHALL BE BACKFILLED IN ACCORDANCE WITH THE REQUIREMENTS FOR WATER MAINS.

GATE VALVES SHALL BE PLACED ON AN 8-INCH THICK BY 8-INCH BY 16-INCH SOLID CONCRETE BLOCK.

**32. EXISTING VALVES ABANDONED**

VALVES SHALL BE ABANDONED IN THE OFF POSITION IN PLACE AS SHOWN ON THE PLANS. THE VALVE BOX CASTING SHALL BE REMOVED AND THE CASTING SHALL BE FILLED WITH STONE. THE PRICE BID FOR THE VALVES ABANDONED SHALL INCLUDE ALL LABOR AND MATERIAL TO ABANDON VALVES AS SHOWN ON THE PLANS.

**33. LARGE WATER SERVICE APPROVAL**

ALL WATER METER SETTINGS LARGER THAN 1-INCH, AND ALL FIRE PROTECTION SERVICES SHALL BE PRE-APPROVED BY THE CITY WATER DIVISION BEFORE ORDERING OR INSTALLING ANY METER OR BACKFLOW EQUIPMENT TO ENSURE CONFORMANCE WITH THE CITY STANDARDS AND POLICIES. CONTACT THE CITY WATER DIVISION AT 419-354-6277.

WHEN A BUILDING IS SERVED BY A FIRE LINE, ALL DOMESTIC WATER SERVICES SHALL BE SEPARATED FROM THE FIRE LINE BEFORE ENTERING THE BUILDING AND SHALL HAVE A CURB VALVE AND CURB BOX OUTSIDE THE BUILDING FOOTPRINT.

ALL WATER SERVICES 4 INCHES AND LARGER (INCLUDING FIRE SERVICE LINES) EXTENDING 150 FEET OR MORE FROM THE WATER MAIN SHALL HAVE A MASTER METER AND BACKFLOW PREVENTER INSTALLED AT THE RIGHT-OF-WAY LINE.

CALCULATED  
XXX

CHECKED  
XXX

WATER NOTES (SHEET 2 OF 2)

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



**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)**

TRAINER 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



E:\ACAD\STANDARDS\_&\_SPECIFICATIONS\DWG\SEWNOT2.dwg 11-Mar-19 1:59 PM

**20. POST CONSTRUCTION TELEVISION INSPECTION**  
AFTER THE DEFLECTION TEST HAS PASSED, THE CONTRACTOR SHALL TELEVISION 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

