CITY OF ST. AUGUSTINE (C.O.S.A.) HORIZONTAL DIRECTIONAL DRILLING (HDD) CONSTRUCTION REQUIREMENTS

GENERAL:

1. THE CITY OF ST. AUGUSTINE (C.O.S.A.) STANDARDS AND SPECIFICATIONS DESIGN MANUAL AND DETAILS, AND ALL INTERIM STANDARDS UPDATES, LATEST EDITION, SHALL PRESIDE; THESE NOTES ARE NOT INTENDED TO BE ALL INCLUSIVE.
2. THE CONTRACTOR SHALL PERFORM ALL WORK NECESSARY TO LOCATE, EXCAVATE AND PREPARE FOR CONNECTIONS TO THE TERMINUS OF THE CITY'S EXISTING WATER OR SEWER SYSTEMS AT THOSE POINTS SHOWN ON THE DRAWINGS OR WHERE DIRECTED BY THE CITY OR THE ENGINEER. ALL COSTS ASSOCIATED WITH THIS WORK AND FOR THE ACTUAL CONNECTION OF THE EXISTING MAINS SHALL BE INCLUDED IN THE BID FOR THE PROJECT AND SHALL NOT RESULT IN ANY ADDITIONAL COST TO THE CITY.
3. THE CONTRACTOR'S WORK SHALL INCLUDE ALL SERVICES, EQUIPMENT, MATERIALS, AND LABOR FOR COMPLETE AND PROPER INSTALLATION, TESTING, RESTORATION OF UNDERGROUND UTILITIES AND ENVIRONMENTAL PROTECTION AND RESTORATION.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL INSTALLATION PROCESSES INCLUDING DRILLING, BACK-REAMING, MANAGEMENT AND DISPOSAL OF ALL DRILLING FLUID, DEWATERING, AND LEAK TESTING THE PIPE AND FITTINGS.
5. FOR THE SUPPLY OF DOMESTIC WATER DURING CONSTRUCTION, THE CONTRACTOR SHALL UTILIZE A CITY METER ASSEMBLY (METER & BACKFLOW DEVICE) AND PAY FOR ALL WATER CONSUMED, EXCEPT IN THE CASE WHERE A NEW WATER MAIN IS CONNECTED DIRECTLY INTO THE ACTIVE WATER SYSTEM FOR LINE FILLING AND FLUSHING OPERATION. UN-ACCOUNTABLE DOMESTIC WATER QUANTITIES SHALL BE MINIMIZED.
6. DIRECTIONAL DRILLING OPERATIONS SHALL BE PERFORMED COMPLETELY WITHIN THE RIGHT-OF-WAY AND/OR EASEMENTS SHOWN ON THE DRAWINGS.
7. CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR BEING FAMILIAR WITH THE CONDITIONS WHICH MAY BE ENCOUNTERED DURING THE HDD, AND FOR COMPETENTLY HANDLING THOSE CONDITIONS AS THEY ARISE.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ANY GEOTECHNICAL INVESTIGATIONS THEY DEEM NECESSARY AND ANY OTHER DATA NECESSARY TO ENSURE A SUCCESSFUL PROJECT.
9. ADHERENCE TO THE PLANS AND SPECIFICATIONS CONTAINED HEREIN, OR THE CITY REPRESENTATIVE'S APPROVAL ON ANY ASPECT OF ANY DIRECTIONAL BORE OPERATION COVERED BY THESE PLANS AND SPECIFICATIONS, SHALL IN NO WAY RELIEVE THE CONTRACTOR OF THEIR ULTIMATE RESPONSIBILITY FOR THE SATISFACTORY COMPLETION OF THE WORK.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR OF ALL DAMAGE TO PRIVATE AND/OR PUBLIC PROPERTY (AT NO EXPENSE TO THE CITY). REPAIR WORK SHALL MEET ALL LOCAL AND STATE RULES AND REQUIREMENTS.
11. PERMITS FOR ALL WORK WITHIN FDOT, COUNTY, CITY, AND SUBMERGED LAND OF THE STATE OF FLORIDA RIGHTS-OF-WAY SHALL BE OBTAINED BY THE OWNER. THE CONTRACTOR SHALL VERIFY THE EXISTENCE OF ALL PERMITS BEFORE COMMENCING ANY WORK ON THE PROJECT.
12. INDIVIDUAL PIPE LENGTHS SHALL BE ASSEMBLED BY BUTT-FUSION UNLESS OTHERWISE SPECIFIED. CONNECTED FITTINGS SHALL BE FUSED OR MECHANICALLY JOINED TO THE PIPING AS SPECIFIED.

HDD SUBMITTALS REQUIRED FROM CONTRACTOR:

BORE PLAN:

CONTRACTOR SHALL SUBMIT THE FOLLOWING REQUIRED INFORMATION FOR ALL INDIVIDUAL HDD SEGMENTS. ACCEPTABLE RESPONSES TO THE EVALUATION CRITERIA LISTED BELOW SHALL BE REQUIRED PRIOR TO BEGINNING ANY HDD WORK.

1. CONTRACTOR SHALL PROVIDE A BORE PLAN OF EACH HDD SEGMENT FOR THE PROJECT THAT IS COMPATIBLE WITH THE PIPE CHARACTERISTICS, SITE CONDITIONS, AND HDD EQUIPMENT.
2. CONTRACTOR SHALL PROVIDE CALCULATIONS (IN ACCORDANCE WITH ASTM F 1962 OR EQUAL) FOR PULL BACK FORCE REQUIRED AND THE RESULTING RIG SIZE PROPOSED FOR THE PROJECT.
3. CONTRACTOR SHALL PROVIDE CALCULATIONS (IN ACCORDANCE WITH INDUSTRY STANDARDS) PREDICTING THE EXPECTED ANNULAR PRESSURE AND IDENTIFY AREAS SUBJECT TO HYDROFRACTURE.
4. CONTRACTOR SHALL PROVIDE CALCULATIONS DEMONSTRATING THAT THE PIPE WILL NOT BE OVERSTRESSED.
5. CONTRACTOR SHALL VERIFY THAT THE INFORMATION AND CALCULATIONS PRESENTED IN THE BORE PLAN WILL BE FULLY INCORPORATED INTO THE WORK PLAN.
6. CONTRACTOR SHALL IDENTIFY WHICH, IF ANY, ITEMS OF THE BASIS OF DESIGN THAT THE CONTRACTOR PROPOSES TO CHANGE (ENTRY/EXIT ANGLES, DEPTH, RADIUS, ETC.). THESE CHANGES SHALL BE REFLECTED IN THE CALCULATIONS AND INFORMATION REQUIRED IN THESE EVALUATION CRITERIA.

WORK PLAN:

PRIOR TO BEGINNING WORK, THE CONTRACTOR MUST SUBMIT TO THE CITY FOR APPROVAL A WORK PLAN DETAILING PROCEDURE AND SCHEDULE TO EXECUTE THE PROJECT. WORK PLAN SHALL INCLUDE A DESCRIPTION OF ALL EQUIPMENT TO BE USED, DOWN-HOLE TOOLS, LIST OF PERSONNEL AND THEIR QUALIFICATIONS/EXPERIENCE (INCLUDING BACK-UP PERSONNEL IN THE EVENT THAT AN INDIVIDUAL IS UNAVAILABLE), LIST OF SUB-CONTRACTORS, SCHEDULE OF WORK ACTIVITY, SAFETY PLAN (INCLUDING MSDS OF ANY POTENTIALLY HAZARDOUS SUBSTANCES), TRAFFIC CONTROL PLAN (IF APPLICABLE), ENVIRONMENTAL PROTECTION PLAN AND CONTINGENCY PLANS FOR POSSIBLE PROBLEMS INCLUDING A FRAC-OUT AND SURFACE SPILL CONTINGENCY PLAN. WORK PLAN SHOULD BE COMPREHENSIVE, REALISTIC AND BASED ON ACTUAL WORKING CONDITIONS FOR THE PARTICULAR PROJECT. WORK PLAN SHOULD DOCUMENT THOUGHTFUL PLANNING REQUIRED TO SUCCESSFULLY COMPLETE PROJECT. CONTRACTOR SHALL SUBMIT AND OBTAIN CITY'S APPROVAL OF A PRE-CONSTRUCTION BORE-LOG DEPICTING A PLAN AND PROFILE (HORIZONTAL AND VERTICAL ALIGNMENT) OF THE PROPOSED BORE PATH. BORE-LOG SHALL SHOW ALL UTILITY CROSSINGS AND EXISTING STRUCTURES. ALL PROPOSED DEVIATIONS FROM THE DRAWINGS INCLUDED IN THE CONTRACT DOCUMENTS SHALL BE CLEARLY IDENTIFIED.

THE WORK PLAN SHALL SPECIFICALLY ADDRESS THE FOLLOWING POTENTIAL PROBLEMS:
1. A FRAC-OUT AND SURFACE SPILL CONTINGENCY PLAN AS COMPLETED BY THE CITY AS PART OF THE PERMIT.
2. LOSS OF RETURNS.
3. OBSTRUCTIONS ALONG BORE PATH DURING REAMING OR PULLBACK.
4. DRILL PIPE OR PRODUCT PIPE CANNOT BE ADVANCED.
5. DEVIATIONS FROM DESIGN LINE AND GRADE EXCEED ALLOWABLE TOLERANCES.
6. DRILL PIPE OR PRODUCT PIPE BROKEN OFF IN BOREHOLE.
7. COLLAPSE OF PRODUCT PIPE OR EXCESSIVE DEFORMATION.
8. DAMAGE TO A UTILITY.
9. EXCESSIVE SUBSIDENCE OR HEAVE.

THE WORK PLAN SHALL SPECIFICALLY ADDRESS THE FOLLOWING PROCEDURES:
1. METHODS:
   THE CONTRACTOR SHALL PROVIDE COMPLETE DESCRIPTIONS OF PROPOSED PLANS, PROCEDURES, AND PERSONNEL, AS WELL AS SUPPORTING CALCULATIONS, FOR THE FOLLOWING:
   a. DRILLING OPERATIONS, ADDRESSING: PROCEDURES FOR PILOT HOLE DRILLING AND REAMING. PROCEDURES FOR TRACKING AND CONTROLLING THE DRILLING HEAD LOCATION. PROCEDURES FOR DOCUMENTING AND PREPARING AS-BUILTS.
   b. DRILLING FLUID MANAGEMENT PLAN.
   c. SPOILS HANDLING AND DISPOSAL PLAN.
   d. PIPE STORAGE AND HANDLING, ADDRESSING: THE MEANS AND METHODS FOR PROTECTING PIPE AND ENSURING TEMPERATURE CONTROL IN ACCORDANCE WITH THE CONTRACTOR'S INSTALLATION CALCULATIONS.
   e. PIPELINE ASSEMBLY AND INSTALLATION, ADDRESSING: PROCEDURES FOR PIPE JOINING, PIPELINE PULLBACK, AND PULLBACK MONITORING.
   f. PREVENTION OF INADVERTENT FLUID LOSSES AND SPILLS, AND CONTINGENCIES FOR RAPID CONTAINMENT AND CLEANUP, ADDRESSING: MEASURES TO MITIGATE RISK OF INADVERTENT FLUID RETURNS TO SURFACE. PROCEDURES FOR MONITORING AND CONTROLLING DRILLING FLUID FLOWS AND PRESSURES. EQUIPMENT, RESOURCES, AND PROCEDURES FOR IDENTIFYING, CONTAINING, AND CLEANING UP FLUID LOSSES AND SPILLS.
   g. QUALITY CONTROL AND TESTING PROCEDURES.
   h. SAFETY PLAN.
   i. TIE-IN/CONNECTION(S) TO EXISTING SYSTEM.
2. EQUIPMENT:
   THE CONTRACTOR SHALL PROVIDE THE MAKE, MODEL, AND TECHNICAL SPECIFICATIONS FOR EACH OF THE FOLLOWING:
   a. HORIZONTAL DIRECTIONAL DRILL RIG.
   b. DRILLING SYSTEM COMPONENTS.
   c. DOWNHOLE DRILLING ASSEMBLY AND REAMING EQUIPMENT.
   d. DOWNHOLE PRESSURE SUB.
   e. GUIDANCE AND CONTROL SYSTEM.
   f. PULLING HEAD.
   g. SWIVEL.
   h. ROLLERS.
   i. SOLIDS SEPARATION AND DRILL FLUID RECIRCULATION SYSTEMS.
   j. PIPE FUSION EQUIPMENT.
   k. PIPE FUSION DATA LOGGER.
   l. PIPE HANDLING EQUIPMENT.
   m. PIGS AND PIGGING EQUIPMENT.

THE CONTRACTOR SHALL PROVIDE THE FOLLOWING SPECIFIC EQUIPMENT INFORMATION: CALIBRATION CERTIFICATION FOR THE PILOT BORE GUIDANCE AND CONTROL SYSTEM; CALIBRATION CERTIFICATION FOR THE HEAT FUSION DATA LOGGER.

CALCULATIONS:

THE FOLLOWING CALCULATIONS SHALL BE SIGN AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF FLORIDA AND SUBMITTED PRIOR TO BEGINNING ANY HDD WORK:
1. PULLBACK LOAD CALCULATION.
2. PIPE STRESS CALCULATION.
3. RATE OF PENETRATION.
4. MAXIMUM ALLOWABLE DRILLING FLUID PRESSURE CALCULATION.
5. CONTRACTOR SHALL CONFIRM THAT THE DESIGN PARAMETERS DO NOT RESULT IN INSTALLATION STRESSES THAT EXCEED ALLOWABLE PIPE STRESSES.

SHOP DRAWING SUBMITTALS:

ACTUAL CATALOG DATA, BROCHURES AND DESCRIPTIVE LITERATURE WILL NOT BE REQUIRED FOR ITEMS OF STANDARD USAGE WHICH MEET THE REQUIREMENTS OF THIS MANUAL. ANY SPECIALTY ITEM NOT LISTED AS A PART OF THIS MANUAL WILL REQUIRE A COMPLETE SHOP DRAWING SUBMITTAL FOR ANY MATERIAL WHICH MAY, IN THE ENGINEER'S OR THE CITY'S OPINION, NOT BE IN COMPLIANCE WITH THIS MANUAL.

THE FOLLOWING DATA SHALL BE PROVIDED FOR ITEMS WHICH ARE NOT INCLUDED IN THIS MANUAL:
1. THE CONTRACTOR SHALL PROVIDE DETAILED SUBMITTALS OF THE PROPOSED PIPE AND FITTING PRODUCTS. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR PRODUCTS DELIVERED TO THE SITE WITHIN THREE (3) DAYS OF DELIVERY TO THE SITE. HORIZONTAL DIRECTIONAL DRILLING SHALL NOT COMMENCE UNTIL THE CONTRACTOR HAS RECEIVED WRITTEN CITY APPROVAL OF ALL PROPOSED PRODUCT SUBMITTALS.
2. THE FOLLOWING INFORMATION SHALL BE SUBMITTED FOR ALL PROPOSED PIPES, FITTINGS, FLANGES, AND SPECIALS:
   a. CATALOG SHEETS AND/OR SPECIFICATIONS, VERIFYING COMPLIANCE WITH THE REQUIREMENTS OF THIS SECTION.
   b. SHOP DRAWINGS.
   c. MANUFACTURING QUALITY CONTROL AND QUALITY ASSURANCE PROCEDURES.
   d. MANUFACTURER'S RECOMMENDATIONS FOR TRANSPORTATION, HANDLING, AND STORAGE.
   e. MANUFACTURER'S RECOMMENDATIONS FOR FIELD JOINING AND JOINT QUALITY CONTROL.
   f. MANUFACTURER'S RECOMMENDATIONS FOR FIELD TESTING.
   g. PIPE AND FITTINGS MATERIAL QUALITY CONTROL AND ASSURANCE TEST RESULTS.
   h. PIPE MANUFACTURER'S RETESTS AND REJECTIONS TESTS.
   i. PRODUCT AND MATERIAL CERTIFICATIONS FOR COMPLIANCE WITH THE REFERENCED STANDARDS, FOR ALL PRODUCTS DELIVERED TO THE SITE.

DAILY REPORTS:

CONTRACTOR SHALL MAINTAIN DAILY ACTIVITY REPORTS THROUGHOUT ALL DRILLING OPERATIONS, INCLUDING PIPE INSTALLATION. A SAMPLE DAILY REPORT SHALL BE SUBMITTED TO THE CITY FOR APPROVAL PRIOR TO THE COMMENCEMENT OF DRILLING OPERATIONS.
DAILY REPORTS SHALL BE SUBMITTED WITHIN 24 HOURS OF COMPLETION, AND SHALL INCLUDE, FOR EACH DRILL ROD ADDED OR WITHDRAWN, OR EVERY 25 FEET DURING DRILLING, PRE-REAMING, AND PULLBACK:
1. DOWNHOLE TOOLS AND EQUIPMENT IN USE.
2. DESCRIPTION OF GROUND CONDITIONS ENCOUNTERED.
3. DESCRIPTION OF DRILLING FLUID.
4. DRILLING FLUID PUMPING RATE.
5. MAXIMUM AND MINIMUM DOWNHOLE FLUID PRESSURES.
6. DRILLING HEAD LOCATION - AT LEAST EVERY 10 FEET ALONG THE BORE PATH.
7. DRILL STEM TORQUE.
8. DETAILS AND PERCEIVED REASONS FOR DELAYS GREATER THAN ONE HOUR OTHER THAN NORMAL BREAKS AND SHIFT CHANGES.
9. DETAILS OF ANY UNUSUAL CONDITIONS OR EVENTS.

RECORD DRAWINGS:

SUBMIT FOR CITY'S APPROVAL AS-BUILT RECORDS WITHIN FIVE WORKING DAYS OF COMPLETING PULL BACK. RECORD DRAWINGS AND BORE LOG SHALL BE IN VERTICAL DATUM NAVD88 AND HORIZONTAL DATUM NAD83 STATE PLANE FLORIDA EAST COORDINATE SYSTEM (US FEET), AND CONTAIN MINIMUM FOUR COORDINATE POINTS OF PROPERTY CORNERS WITHIN OR ADJACENT TO PROJECT SITE. RECORD DRAWINGS SHALL BE SIGNED AND SEALED BY A FLORIDA LICENSED PROFESSIONAL LAND SURVEYOR AND THE ENGINEER OF RECORD. CONTRACTOR SHALL CERTIFY ACCURACY OF ALL AS-BUILTS. FOLLOWING THE CITY'S APPROVAL OF THE PRELIMINARY AS-BUILT SUBMITTAL, THE FINAL AS-BUILT RECORDS SHALL BE SUBMITTED.

THE PRELIMINARY AS-BUILT SUBMITTAL SHALL CONSIST OF:
1. TWO (2) COPIES OF THE BORE LOG.
2. TWO (2) 24? X 36? PAPER COPIES AT A SCALE NOT LARGER THAN 1:20 HORIZONTAL AND 1:2 VERTICAL, PROVIDING A PLAN AND PROFILE (DATA EVERY 25LF OF MAIN, MINIMUM), AND ALL INFORMATION RECORDED DURING WORK PROGRESS, INCLUDING ALL IDENTIFIED SUBSURFACE ANOMALIES.

THE FINAL AS-BUILT SUBMITTAL SHALL CONSIST OF:
1. ONE (1) ELECTRONIC (CD) IN AUTOCAD FORMAT "DWG" ON NAD83 STATE PLANE FLORIDA EAST COORDINATE SYSTEM (US FEET), AND ONE "PDF".
2. THREE (3) COPIES OF THE BORE LOG.
3. THREE (3) 24? X 36? SIGNED AND SEALED PAPER SETS.
4. ONE (1) 24? X 36? SIGNED AND SEALED REPRODUCIBLE MYLAR SET.

NOTIFICATION:

THE CITY MUST BE NOTIFIED 48 HOURS (MINIMUM) IN ADVANCE OF STARTING THE HDD WORK. THE HDD SHALL NOT BEGIN UNTIL ALL NECESSARY SUBMITTALS FOR THE OPERATION HAVE BEEN COMPLETED AND APPROVED BY THE CITY.

SITE PREPARATION:

1. IF REQUIRED BY THE CONTRACT DOCUMENTS, PRIOR TO ANY ALTERATIONS TO THE WORK-SITE, THE CONTRACTOR SHALL PROVIDE A DIGITAL VIDEO RECORDING OF THE ENTIRE WORK AREA. ONE (1) COPY OF WHICH SHALL BE GIVEN TO THE CITY AND ONE (1) COPY TO REMAIN WITH CONTRACTOR FOR A PERIOD OF TWO (2) YEARS FOLLOWING THE COMPLETION OF THE PROJECT.
2. AT A MINIMUM, CONTRACTOR SHALL ENSURE THE PROTECTION OF ALL EXISTING UTILITIES BY FOLLOWING THE COMMON GROUND ALLIANCE BEST PRACTICES VERSION 1.0 OR LATEST VERSION, UNLESS EXCEPTIONS ARE SPECIFICALLY AGREED TO BY THE CITY.
3. THE CONTRACTOR SHALL COORDINATE UTILITIES LOCATES WITH SUNSHINE STATE ONE-CALL OF FLORIDA, INC. (#800/432-4770 OR WEBSITE WWW.CALLSUNSHINE.COM).
4. ONCE THE LOCATE SERVICE HAS FIELD MARKED ALL UTILITIES, THE CONTRACTOR SHALL VERIFY EACH UTILITY (INCLUDING ANY SERVICE LATERALS, I.E. WATER, SEWER, CABLE, GAS, ELECTRIC, PHONE, ETC.) AND THOSE WITHIN EACH PAVED AREA. VERIFICATION MAY BE PERFORMED UTILIZING GROUND PENETRATING RADAR, HAND DIG, OR VACUUM EXCAVATION.
5. PRIOR TO INITIATING DRILLING, THE CONTRACTOR SHALL RECORD ON THE DRAWINGS BOTH THE HORIZONTAL AND VERTICAL LOCATION OF THE UTILITIES OFF OF A PREDETERMINED BASELINE.
6. THE CONTRACTOR SHALL MANAGE AND CONTROL DRILLING PRACTICES TO PREVENT DAMAGE TO EXISTING UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL LOSSES AND REPAIRS AS A RESULT OF DAMAGE TO UNDERGROUND UTILITIES RESULTING FROM DRILLING OPERATIONS.
7. THE CONTRACTOR SHALL MAKE A REASONABLE EFFORT TO LOCATE EVIDENCE OF ANY OTHER POTENTIAL SUBSURFACE OBSTRUCTIONS SUCH AS PILES OR PIERS.
8. THE WORK SITE SHALL BE GRADED AND FILLED TO PROVIDE A LEVEL WORKING AREA. NO ALTERATIONS BEYOND WHAT IS REQUIRED FOR OPERATIONS ARE TO BE MADE. CONTRACTOR SHALL CONFINE ALL ACTIVITIES TO DESIGNATED WORK AREAS.
9. FOLLOWING DRILLING OPERATIONS, CONTRACTOR WILL DE-MOBILIZE EQUIPMENT AND RESTORE THE WORK SITE TO ORIGINAL CONDITION. ALL EXCAVATIONS WILL BE BACKFILLED AND COMPACTED TO 95% OF ORIGINAL DENSITY (AT A MINIMUM), OR AS OTHERWISE SPECIFIED.

ENVIRONMENTAL PROTECTION:

1. CONTRACTOR SHALL INSTALL SILT FENCE BETWEEN ALL DRILLING OPERATIONS AND ANY DRAINAGE, WETLAND, WATERWAY OR OTHER AREA DESIGNATED FOR SUCH PROTECTION BY THE CITY OR OTHER STATE, FEDERAL AND LOCAL REGULATIONS.
2. CONTRACTOR SHALL FOLLOW ALL REQUIREMENTS OF THE CITY'S STORM WATER POLLUTION PREVENTION PLAN (SEE STANDARD DETAILS) AND THE DEWATERING SECTION OF THE CITY'S STANDARDS AND SPECIFICATIONS DESIGN MANUAL AND DETAILS, LATEST EDITION,
3. ADDITIONAL ENVIRONMENTAL PROTECTION NECESSARY TO CONTAIN ANY HYDRAULIC OR DRILLING FLUID SPILLS SHALL BE PUT IN PLACE, INCLUDING BERMS, LINERS, TURBIDITY CURTAINS AND OTHER MEASURES.
4. CONTRACTOR SHALL ADHERE TO ALL APPLICABLE ENVIRONMENTAL REGULATIONS STATED IN LOCAL, STATE AND FEDERAL PERMITS, LAWS, RULES AND REGULATIONS.
5. FUEL MAY NOT BE STORED IN BULK CONTAINERS (GREATER THAN 25 GALLONS) WITHIN 200 FEET OF ANY WATER BODY, WETLAND OR ENVIRONMENTALLY SENSITIVE AREA.
6. A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT SHALL BE OBTAINED BY THE CONTRACTOR.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A "GENERIC PERMIT FOR DISCHARGE OF PRODUCED GROUND WATER FROM ANY NON-CONTAMINATED SITE ACTIVITY" FROM THE FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION (FDEP) IN ACCORDANCE WITH THE DEWATERING SECTION OF THE CITY'S STANDARDS AND SPECIFICATIONS DESIGN MANUAL.
8. CONTRACTOR SHALL VERIFY THAT ALL ENVIRONMENTAL PERMITS ARE IN PLACE BEFORE COMMENCING ANY WORK ON THE PROJECT.

PERSONNEL QUALIFICATIONS CERTIFICATION:

1. DIRECTIONAL BORING:
   a. ALL PERSONNEL SHALL BE FULLY TRAINED IN THEIR RESPECTIVE DUTIES AS PART OF THE DIRECTIONAL DRILLING CREW AND IN SAFETY. EACH PERSON MUST HAVE BEEN FULLY TRAINED FOR OVER 1,000 HOURS ON ALL FACETS OF DIRECTIONAL DRILLING, INCLUDING, BUT NOT LIMITED TO MACHINE OPERATIONS, MUD MIXING, LOCATING, AND MATERIAL FUSION.
   b. A RESPONSIBLE REPRESENTATIVE WHO IS THOROUGHLY FAMILIAR WITH THE EQUIPMENT AND TYPE OF WORK TO BE PERFORMED, MUST BE IN DIRECT CHARGE AND CONTROL OF THE OPERATION AT ALL TIMES. IN ALL CASES THE SUPERVISOR MUST BE CONTINUALLY PRESENT AT THE JOB SITE DURING THE ACTUAL DIRECTIONAL BORE OPERATION.
   c. THE CONTRACTOR SHALL HAVE A SUFFICIENT NUMBER OF COMPETENT WORKERS ON THE JOB AT ALL TIMES TO ENSURE THE DIRECTIONAL BORE IS MADE IN A TIMELY AND SATISFACTORY MANNER.
2. PIPE ASSEMBLY:
   d. INDIVIDUAL PIPE LENGTHS SHALL BE ASSEMBLED BY BUTT-FUSION UNLESS OTHERWISE SPECIFIED. CONNECTED FITTINGS SHALL BE FUSED OR MECHANICALLY JOINED TO THE PIPING AS SPECIFIED. JOINTS BETWEEN PLAIN END PIPES AND PIPE FITTINGS SHALL BE MADE BY BUTT FUSION WHEN POSSIBLE.
   e. THE ON-SITE WELDER MAKING THE JOINTS SHALL HAVE RECEIVED SPECIFIC TRAINING FROM THE MANUFACTURER OF THE FITTINGS AND/OR PIPE BEING WELDED AND SHALL HAVE WRITTEN PROOF OF PROPER TRAINING/CERTIFICATION FROM THE ASSOCIATED MANUFACTURERS.
   f. ONLY CERTIFIED WELDERS WHO HAVE WRITTEN TRAINING CERTIFICATIONS FROM THE FITTING AND/OR PIPE MANUFACTURER WILL BE ALLOWED TO PERFORM THIS WORK. THAT IS, TO WELD A FITTING IN PLACE, THE ON-SITE WELDER (EMPLOYEE) MUST BE TRAINED AND CERTIFIED BY THE FITTING MANUFACTURER. TO BUTT WELD PIPE, THE ON-SITE WELDER (EMPLOYEE) MUST BE TRAINED AND CERTIFIED BY THE PIPE MANUFACTURER.
   g. THE FUSION WORK SHALL BE ACCOMPLISHED (WELDING AND COOL-DOWN/CLOSING TIMES) IN ACCORDANCE WITH THE FITTING AND PIPE MANUFACTURERS' RECOMMENDATIONS, AT A MINIMUM.
   h. EXTERNAL AND INTERNAL BEADS SHALL NOT BE REMOVED UNLESS APPROVED BY THE CITY.
   i. UPON REQUEST BY THE CITY OR CONTRACTOR, THE PIPE MANUFACTURER SHALL PROVIDE TRAINING AND TRAINING MATERIALS IN THE MANUFACTURER'S RECOMMENDED BUTT FUSION, SADDLE FUSION AND ELECTRO FUSION PROCEDURES TO THE CONTRACTOR'S INSTALLATION PERSONNEL, AND TO INSPECTORS REPRESENTING THE CITY, AT NO ADDITIONAL COST TO THE CITY.
   j. ONLY CERTIFIED (MANUFACTURER CERTIFICATION) EMPLOYEES WILL BE ALLOWED TO COMPLETE THIS FUSION WORK.

MATERIALS:

ALL HIGH DENSITY POLYETHYLENE (HDPE, PE) PIPE AND FITTINGS:

MATERIALS USED FOR THE MANUFACTURER OF POLYETHYLENE PIPE AND FITTINGS SHALL BE PE3408 HIGH DENSITY POLYETHYLENE MEETING CELL CLASSIFICATION 345464C PER ASTM D3350; AND MEETING TYPE III, CLASS B OR CLASS C, CATEGORY 5, GRADE P34 PER ASTM D1248; AND SHALL BE LISTED IN THE NAME OF THE PIPE AND FITTING MANUFACTURER IN PPI TR-4, RECOMMENDED HYDROSTATIC STRENGTHS AND DESIGN STRESSES FOR THERMOPLASTIC PIPE AND FITTINGS COMPOUNDS, WITH A STANDARD GRADE RATING OF 1600 PSI AT 730F PER ASTM D-2837. THE MANUFACTURER SHALL CERTIFY THAT THE MATERIALS USED TO MANUFACTURE PIPE AND FITTINGS MEET THESE REQUIREMENTS. NOTE THAT NOMINAL PIPE SIZES ONLY MAY BE INDICATED ON THE DRAWINGS AND/OR BID FORM. OUTSIDE DIAMETER OF PIPE IS GENERALLY 1 TO 2-INCHES GREATER THAN THE NOMINAL PIPE DIAMETER.

2" POLYETHYLENE TUBING LINES (LOW PRESSURE SEWER LINES ONLY):

TUBING SHALL BE MANUFACTURED OF PE 3408, HIGH DENSITY POLYETHYLENE (HDPE), IN ACCORDANCE WITH AWWA C901, ASTM D1248, ASTM D2239, ASTM D2737 AND ASTM D3350. THE TUBING SHALL HAVE A MINIMUM WORKING PRESSURE OF 200 PSI. POLYETHYLENE TUBING SHALL BE COPPER TUBE SIZE OR IPS SDR-9 AND SHALL BE COLORED BLACK OR GREEN. HDPE PIPE SHALL HAVE ULTRAVIOLET (UV) INHIBITORS FOR PROTECTION AGAINST DIRECT SUNLIGHT FOR ONE (1) YEAR. INSERTS FOR POLYETHYLENE TUBING MAY BE UTILIZED, AT CONTRACTOR'S OPTION, AND IF USED, SHALL BE 316 STAINLESS STEEL. THE CITY PREFERS STAINLESS STEEL FITTINGS BE UTILIZED WHEN AT ALL POSSIBLE. THE USE OF BRASS FITTINGS (INCLUDING COUPLINGS) IS NOT ACCEPTABLE, UNLESS A SUITABLE STAINLESS STEEL FITTING CANNOT BE FOUND. IN SUCH CASES, THE CITY MAY APPROVE BRASS FITTINGS IN ADVANCE ON A CASE-BY-CASE BASIS. TUBING SHALL BE APPROVED FOR USE WITH POTABLE WATER BY THE NATIONAL SANITATION FOUNDATION (NSF-14) AND SHALL BE CONTINUOUSLY MARKED AT INTERVALS OF NOT MORE THAN FOUR FEET WITH THE FOLLOWING:

1. NOMINAL SIZE	4. MANUFACTURER'S NAME OR TRADEMARK
2. PRESSURE RATING	5. STANDARD DIMENSION RATIO
3. NSF SEAL	6. ASTM SPECIFICATION

POLYETHYLENE PIPE (4 INCH AND LARGER):

HDPE PIPE SHALL CONFORM TO AWWA C906, DR-II, DUCTILE IRON PIPE (DIP) SIZE AND NSF 61 STANDARD. FOR PIPE SIZES 24-INCH AND LARGER, THE HDPE MAY BE IPS SIZE, DR 11. POLYETHYLENE PIPE SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM F714, POLYETHYLENE (PE) PLASTIC PIPE (SDR-PR) BASED ON CONTROLLED OUTSIDE DIAMETER AND SHALL BE SO MARKED. EACH PRODUCTION LOT OF PIPE SHALL BE TESTED FOR (FROM MATERIAL OR PIPE) MELT INDEX, DENSITY, % CARBON, DIMENSIONS AND EITHER QUICK BURST OR RING TENSILE STRENGTH (EQUIPMENT PERMITTING).

SERVICE IDENTIFICATION:

PERMANENT IDENTIFICATION OF PIPING SERVICE SHALL BE PROVIDED BY CO-EXTRUDING MULTIPLE EQUALLY SPACED COLOR STRIPES INTO THE PIPE OUTSIDE SURFACE OR BY SOLID COLORED PIPE SHELL. THE STRIPING MATERIAL SHALL BE THE SAME MATERIAL AS THE PIPE MATERIAL EXCEPT FOR COLOR. THE FOLLOWING COLORS SHALL BE USED TO IDENTIFY PIPING SERVICE (PRESSURE SERVICE):
BLUE - POTABLE WATER
GREEN - WASTEWATER OR FORCE MAIN
PURPLE - RECLAIMED WATER
BLACK - RAW WATER

POLYETHYLENE FITTINGS AND CUSTOM FABRICATION:

POLYETHYLENE FITTINGS AND CUSTOM FABRICATIONS SHALL BE MOLDED OR FABRICATED BY THE PIPE MANUFACTURER OR TRAINED PERSONNEL. BUTT FUSION OUTLETS SHALL BE MADE TO THE SAME OUTSIDE DIAMETER, WALL THICKNESS, AND TOLERANCES AS THE MATING PIPE. ALL FITTINGS AND CUSTOM FABRICATIONS SHALL BE FULLY RATED FOR THE SAME INTERNAL PRESSURE AS THE MATING PIPE. FABRICATED FITTINGS MUST HAVE THE SAME WORKING PRESSURE AS THE MATING PIPE.

MOLDED FITTINGS:

MOLDED FITTINGS SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM D3261, BUTT HEAT FUSION POLYETHYLENE (PE) PLASTIC FITTINGS FOR POLYETHYLENE (PE) PLASTIC PIPE AND TUBING, AND SHALL BE SO MARKED. EACH PRODUCTION LOT OF MOLDED FITTINGS SHALL BE SUBJECTED TO THE TEST REQUIRED UNDER ASTM D3261.

FABRICATED FITTINGS:

FABRICATED FITTINGS SHALL BE MADE BY HEAT FUSION JOINING SPECIALLY MACHINED SHAPES CUT FROM PIPE, POLYETHYLENE SHEET STOCK, OR MOLDED FITTINGS. FABRICATED FITTINGS SHALL BE RATED FOR INTERNAL PRESSURE SERVICE EQUIVALENT TO THE FULL SERVICE PRESSURE RATING OF THE MATING PIPE. DIRECTIONAL FITTINGS 16" AND LARGER SUCH AS ELBOWS, TEES, CROSSES, ETC., SHALL HAVE A PLAIN END INLET FOR BUTT FUSION AND FLANGED DIRECTIONAL OUTLETS.

ELECTRO FUSION BRANCH SADDLES:

SHALL MEET AWWA C-906, OUTLET SHALL COMPLY WITH ASTM-D3261, AND SHALL BE SPECIFICALLY MANUFACTURED FOR HDPE PIPE. THIS SADDLE MAY BE UTILIZED FOR WET-TAP APPLICATIONS. THESE ELECTRO FUSION FITTINGS SHALL BE DESIGNED AND MANUFACTURED IN ACCORDANCE WITH ASTM SPECIFICATIONS F-1055 FOR USE WITH HDPE (DIPS) PIPE.

POLYETHYLENE FLANGE ADAPTERS:

FLANGE ADAPTER SHALL BE MADE WITH SUFFICIENT THROUGHBORE LENGTH TO BE CLAMPED IN A BUTT FUSION JOINING MACHINE WITHOUT THE USE OF A STUB-END HOLDER. THE SEALING SURFACE OF THE FLANGE ADAPTER SHALL BE MACHINED WITH A SERIES OF SMALL V-SHAPED GROOVED TO PROVIDE GASKETLESS SEALING, OR TO RESTRAIN THE GASKET AGAINST BLOW-OUT. BELOW GROUND FLANGE ADAPTER MAY BE UTILIZED FOR 30" AND LARGER, DIP AND VALVES. ADAPTERS FOR 24 INCH AND SMALLER UTILIZE AN MJ ADAPTER (SEE BELOW).

BACK-UP RINGS AND FLANGE BOLTS:

FLANGE ADAPTERS SHALL BE FITTED WITH LAP JOINT FLANGES PRESSURE RATED EQUAL TO OR GREATER THAN THE MATING PIPE. CONVOLUTED STYLE BACKUP RINGS PREFERRED OVER THE FLAT STOCK RINGS. THE LAP JOINT FLANGE BORE SHALL BE CHAMFERED TO PROVIDE CLEARANCE TO THE FLANGE ADAPTER RADIUS. FLANGE BOLTS AND NUTS SHALL BE GRADE 2 OR HIGHER.

MANUFACTURER'S QUALITY CONTROL:

PIPE AND FITTING MANUFACTURER SHALL HAVE AN ESTABLISHED QUALITY CONTROL PROGRAM RESPONSIBLE FOR INSPECTING INCOMING AND OUTGOING MATERIALS. INCOMING POLYETHYLENE MATERIALS SHALL BE INSPECTED FOR DENSITY, MELT FLOW RATED, AND CONTAMINATION. THE CELL CLASSIFICATION PROPERTIES OF THE MATERIAL SHALL BE CERTIFIED BY THE SUPPLIER, AND VERIFIED BY MANUFACTURER'S QUALITY CONTROL.

POLYETHYLENE MECHANICAL JOINT (MJ) ADAPTERS:

MECHANICAL CONNECTIONS OF HDPE PIPE (4" THROUGH 24" DIAMETER) TO DUCTILE IRON OR PVC PIPING, MECHANICAL JOINT FITTINGS, OR VALVES SHALL BE THROUGH A SELF-RESTRAINING, FUSIBLE MECHANICAL JOINT ADAPTER WITH OR WITHOUT AN INTEGRAL, INTERNAL STAINLESS STEEL INSERT. MECHANICAL JOINT ADAPTER SHALL BE OF THE SAME SDR RATING AS THE PIPE. A SEPARATE, LOOSE STAINLESS STEEL TYPE INSERT WILL ONLY BE ALLOWED FOR PIPE SIZES 4 INCH THROUGH 8 INCHES. PROVIDE THE MECHANICAL JOINT ADAPTER, INCLUDING BUT NOT LIMITED TO LONGER TEE BOLTS OR ALL THREAD RODS WITH NUTS AT THE MECHANICAL JOINT BELL. NOTE THAT PE FLANGED ADAPTERS MAY BE UTILIZED FOR PIPE SIZES 30 INCHES AND LARGER.

CAST TRANSITION COUPLINGS:

HDPE TO MJ CAST TRANSITION COUPLING MAY ONLY BE UTILIZED FOR 8 INCH AND SMALLER PIPE SIZE. A STAINLESS STEEL STIFFENER IS REQUIRED SIZED AT PROPER ID OF HDPE PIPE. THE TRANSITION COUPLING MUST BE EPOXY LINED (3 MILS MINIMUM FOR WATER USE AND 12 MILS MINIMUM FOR SEWER USE). ACCEPTABLE IS A POWER SEAL MODEL 3520 OR APPROVED EQUAL.

MATERIALS (CONT'D):

ELECTRO FUSION COUPLINGS:

POLYETHYLENE PIPE AND FITTINGS MAY BE JOINED USING APPROVED ELECTRO FUSION COUPLINGS. FITTINGS SHALL BE PE3408 HDPE, CELL CLASS 345464C AS DETERMINED BY ASTM D3350-99. ELECTRO FUSION FITTINGS SHALL HAVE A MANUFACTURING STANDARD OF ASTM F1055. FITTINGS SHALL HAVE A PRESSURE RATING EQUAL TO THE PIPE. ALL ELECTRO FUSION FITTINGS SHALL BE SUITABLE FOR USE AS PRESSURE CONDUIT PER AWWA C906, AND HAVE NOMINAL BURST VALUE OF 3.5 TIMES THE WORKING PRESSURE OF THE FITTING. TO MINIMIZE "TOE-IN" PROBLEMS WHEN INSTALLING AN ELECTRO FUSION COUPLING LARGER THAN 12 INCH SIZE, THE CONTRACTOR SHALL REMOVE 12 INCHES (MINIMUM) FROM ALL ASSOCIATED "FACTORY ENDS" AND USE A RE-ROUNDING CLAMP ON THE ASSOCIATED PIPE. THE CONTRACTOR SHALL MARK PIPE INSERTION DEPTH PRIOR TO ASSEMBLY AND CONSTRUCT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

FUSIBLE PVC PIPE (4"-12" SIZE):

ONLY WITH SPECIFIC WRITTEN APPROVAL FROM THE CITY ENGINEER, FUSIBLE PVC MAY BE USED ON POTABLE WATER OR RECLAIMED WATER SYSTEMS (NOT ACCEPTABLE ON SEWER APPLICATIONS). FUSIBLE PVC MAY BE UTILIZED FOR DIRECTIONAL DRILLING AND DIRECT BURY APPLICATIONS. PIPE SHALL MEET C-900 PRESSURE CLASS, DR-18 WALL THICKNESS AND COLOR CODED. THE PIPE SHALL BE MARKED WITH THE NAME AND LOCATION OF THE MANUFACTURER, PRESSURE RATING AND SIZE. UNLESS APPROVED OTHERWISE BY THE CITY, THE BENDING RADIUS SHALL NOT EXCEED 50% OF THE MANUFACTURER'S RECOMMENDATION AND THE PULLING FORCE SHALL NOT EXCEED 80% OF THE MANUFACTURER'S RECOMMENDATION.

SERVICE CONNECTIONS:

POLYETHYLENE SERVICE LINE TUBING SHALL CONFORM TO SPECIFICATIONS IN THIS MANUAL, EXCEPT AS SPECIFIED HEREIN. SERVICES 2 INCHES AND SMALLER SHALL INCLUDE AN INTEGRAL SHUT-OFF VALVE AND BE PHILMAC FUSE-A-CORP FUSIBLE VALVE; OR CENTRAL PLASTICS ELECTRO FUSION SADDLE TAPPING TEE (USE SHELL CUTTER TO CUT THE HDPE OR CITY APPROVED EQUAL). THE CONTRACTOR SHALL SUPPLY ALL ADAPTERS, ELECTROFUSED COUPLINGS, AND SPECIAL CONNECTIONS NECESSARY TO TRANSITION FROM THE SERVICE CONNECTION TO THE CITY STANDARD POLYETHYLENE SERVICE TUBING AT BOTH ENDS. SERVICES ARE TO BE IN ACCORDANCE WITH ALL CITY STANDARDS.

DRILLING FLUIDS:

DRILLING FLUIDS SHALL BE A BENTONITE SLURRY.

DELIVERY, STORAGE AND HANDLING OF MATERIALS:

1. CONTRACTOR SHALL INSPECT MATERIALS DELIVERED TO THE SITE FOR DAMAGE. ALL MATERIALS FOUND DURING INSPECTION OR DURING THE PROGRESS OF WORK TO HAVE CRACKS, FLAWS, CRACKED LININGS, OR OTHER DEFECTS SHALL BE REJECTED AND REMOVED FROM THE JOB SITE WITHOUT DELAY.
2. CONTRACTOR SHALL UNLOAD AND STORE OPPOSITE OR NEAR THE PLACE WHERE THE WORK WILL PROCEED WITH MINIMUM HANDLING. STORE MATERIAL UNDER COVER OUT OF DIRECT SUN LIGHT. DO NOT STORE DIRECTLY ON THE GROUND. KEEP ALL MATERIALS FREE OF DIRT AND DEBRIS.
3. CONTRACTOR IS RESPONSIBLE FOR OBTAINING, TRANSPORTING AND SORTING ANY FLUIDS, INCLUDING WATER, TO THE WORK SITE.
4. DISPOSAL OF FLUIDS IS THE RESPONSIBILITY OF THE CONTRACTOR. DISPOSAL OF FLUIDS SHALL BE DONE IN A MANNER THAT IS IN COMPLIANCE WITH ALL PERMITS AND APPLICABLE FEDERAL, STATE, OR LOCAL ENVIRONMENTAL REGULATIONS. THE BENTONITE DRILLING SLURRY MAY BE RECYCLED FOR REUSE IN THE HOLE OPENING OPERATION, OR SHALL BE HAULED BY THE CONTRACTOR TO AN APPROVED LOCATION OR LANDFILL FOR PROPER DISPOSAL. CONTRACTOR SHALL THOROUGHLY CLEAN ENTIRE AREA OF ANY FLUID RESIDUE UPON COMPLETION OF INSTALLATION, AND REPLACE ANY AND ALL PLANTS AND SOD DAMAGED, DISCOLORED OR STAINED BY DRILLING FLUIDS.

EQUIPMENT REQUIREMENTS:

GENERAL:

THE DIRECTIONAL DRILLING EQUIPMENT SHALL CONSIST OF A DIRECTIONAL DRILLING RIG OF SUFFICIENT CAPACITY TO PERFORM THE BORE AND PULLBACK THE PIPE, A DRILLING FLUID MIXING, DELIVERY AND RECOVERY SYSTEM OF SUFFICIENT CAPACITY TO SUCCESSFULLY COMPLETE THE DRILL, A DRILLING FLUID RECYCLING SYSTEM TO REMOVE SOLIDS FROM THE DRILLING FLUID SO THAT THE FLUID CAN BE REUSED, A GUIDANCE SYSTEM TO ACCURATELY GUIDE BORING OPERATIONS, A VACUUM TRUCK OF SUFFICIENT CAPACITY TO HANDLE THE DRILLING FLUID VOLUME, TRAINED AND COMPETENT PERSONNEL TO OPERATE THE SYSTEM. ALL EQUIPMENT SHALL BE IN GOOD, SAFETY OPERATING CONDITION WITH SUFFICIENT SUPPLIES, MATERIALS AND SPARE PARTS ON HAND TO MAINTAIN THE SYSTEM IN GOOD WORKING ORDER FOR THE PROJECT DURATION.

DRILLING SYSTEM:

1. THE DIRECTIONAL DRILLING MACHINE SHALL CONSIST OF A POWER SYSTEM TO ROTATE, PUSH AND PULL HOLLOW DRILL PIPE INTO THE GROUND AT A VARIABLE ANGLE WHILE DELIVERING A PRESSURIZED FLUID MIXTURE TO A GUIDABLE DRILL (BORE) HEAD. THE POWER SYSTEM SHALL BE SELF CONTAINED WITH SUFFICIENT PRESSURE AND VOLUME TO POWER DRILLING OPERATIONS. HYDRAULIC SYSTEM SHALL BE FREE OF LEAKS. RIG SHALL HAVE A SYSTEM TO MONITOR AND RECORD MAXIMUM PULL-BACK PRESSURE DURING PULL-BACK OPERATIONS. THE RIG SHALL BE GROUNDED DURING DRILLING AND PULL-BACK OPERATIONS. THERE SHALL BE A SYSTEM TO DETECT ELECTRICAL CURRENT FROM THE DRILLING STRING AND AN AUDIBLE ALARM WHICH AUTOMATICALLY SOUNDS WHEN AN ELECTRICAL CURRENT IS DETECTED.
2. DRILLHEAD SHALL BE STEERABLE BY CHANGING ITS ROTATION AND SHALL PROVIDE NECESSARY CUTTING SURFACES AND DRILLING FLUID JETS.
3. MUD MOTORS (IF REQUIRED): MUD MOTORS SHALL BE OF ADEQUATE POWER TO TURN THE REQUIRED DRILLING TOOLS.
4. DRILL PIPE: SHALL BE CONSTRUCTED OF HIGH QUALITY 4130 SEAMLESS TUBING, GRADE D OR BETTER.

GUIDANCE SYSTEM:

1. GENERAL: A MAGNETIC GUIDANCE SYSTEM (MGS) OR PROVEN GYROSCOPIC SYSTEM SHALL BE USED TO PROVIDE A CONTINUOUS AND ACCURATE DETERMINATION OF THE LOCATION OF THE DRILL HEAD DURING THE DRILLING OPERATION. THE GUIDANCE SHALL BE CAPABLE OF TRACKING AT ALL DEPTHS UP TO EIGHTY (80) FEET AND IN ANY SOIL CONDITION, INCLUDING HARD ROCK. IT SHALL ENABLE THE DRILLER TO GUIDE THE DRILL HEAD BY PROVIDING IMMEDIATE INFORMATION ON THE TOOL FACE, AZIMUTH (HORIZONTAL DIRECTION), AND INCLINATION (VERTICAL DIRECTION). THE GUIDANCE SYSTEM SHALL BE ACCURATE TO +/-2% OF THE VERTICAL DEPTH OF THE BOREHOLE AT SENSING POSITION AT DEPTHS UP TO ONE EIGHTY (80) FEET AND ACCURATE WITHIN TWO (2) FEET HORIZONTALLY. THE GUIDANCE SYSTEM SHALL BE OF A PROVEN TYPE AND SHALL BE OPERATED BY PERSONNEL TRAINED AND EXPERIENCED WITH THIS SYSTEM. THE OPERATOR SHALL BE AWARE OF ANY MAGNETIC ANOMALIES ON THE SURFACE OF THE DRILL PATH AND SHALL CONSIDER SUCH INFLUENCES IN THE OPERATION OF THE GUIDANCE SYSTEM IF USING A MAGNETIC SYSTEM.
2. BORE TRACKING AND MONITORING: AT ALL TIMES DURING THE PILOT BORE THE CONTRACTOR SHALL PROVIDE AND MAINTAIN A BORE TRACKING SYSTEM THAT IS CAPABLE OF ACCURATELY LOCATING THE POSITION OF THE DRILL HEAD IN THE X, Y, AND Z AXES. THE CONTRACTOR SHALL RECORD THESE DATA AT LEAST ONCE PER DRILL PIPE LENGTH OR EVERY TWENTY-FIVE (25) FEET, WHICHEVER IS MOST FREQUENT, AND THE DATA LOGGED SHALL BE TIED TO THE SURFACE GRID TRACKING SYSTEM.
3. DOWNHOLE AND SURFACE GRID TRACKING SYSTEM: CONTRACTOR SHALL MONITOR AND RECORD X, Y, AND Z COORDINATES RELATIVE TO AN ESTABLISHED SURFACE SURVEY BENCH MARK AND BASELINE STATIONING THAT IS TIED TO EXISTING, FIXED AND VISIBLE SIGHT FEATURES. THE SURVEY BASELINE SHALL BE REFERENCED TO THE NAD 83 STATE PLANE FLORIDA EAST COORDINATE SYSTEM (US FEET). THE DATA SHALL BE CONTINUOUSLY MONITORED AND RECORDED AT LEAST ONCE PER DRILL PIPE-LENGTH OR AT TWENTY-FIVE (25) FEET, WHICHEVER IS MORE FREQUENT.
4. DEVIATIONS: ALL DEVIATIONS BETWEEN THE RECORDED AND DESIGN BORE PATH SHALL BE CALCULATED AND REPORTED ON THE DAILY LOG. IF THE DEVIATIONS EXCEED +/-2% OF THE VERTICAL DEPTH OF THE BOREHOLE AT SENSING POSITION AND/OR TWO (2) FEET HORIZONTALLY FROM THE DESIGN PATH, SUCH OCCURRENCES SHALL BE REPORTED IMMEDIATELY TO THE CITY. THE CONTRACTOR SHALL UNDERTAKE ALL NECESSARY MEASURES TO CORRECT DEVIATIONS AND RETURN TO DESIGN LINE AND GRADE.
5. DRILLING FLUID PRESSURES AND FLOW RATES: SHALL BE CONTINUOUSLY MONITORED AND RECORDED BY THE CONTRACTOR. THE PRESSURES SHALL BE MONITORED AT THE PUMP. THESE MEASUREMENTS SHALL BE MADE DURING PILOT BORE DRILLING, REAMING, AND PULLBACK OPERATIONS.

DRILLING FLUID (MUD) SYSTEM:

1. MIXING SYSTEM: A SELF-CONTAINED, CLOSED, DRILLING FLUID MIXING SYSTEM SHALL BE OF SUFFICIENT SIZE TO MIX AND DELIVER DRILLING FLUID. MIXING SYSTEM SHALL CONTINUALLY AGITATE THE DRILLING FLUID DURING OPERATIONS.
2. DRILLING FLUIDS: SHALL BE COMPOSED OF CLEAN WATER, APPROPRIATE ADDITIVES AND CLAY. WATER SHALL BE FROM AN AUTHORIZED SOURCE WITH A MINIMUM PH OF 6.0. WATER OF A LOWER PH OR WITH EXCESSIVE CALCIUM SHALL BE TREATED WITH THE APPROPRIATE AMOUNT OF SODIUM CARBONATE OR EQUAL. THE WATER AND ADDITIVES SHALL BE MIXED THOROUGHLY AND BE ABSENT OF ANY CLUMPS OR CLODS. NO POTENTIALLY HAZARDOUS MATERIAL MAY BE USED IN DRILLING FLUID.
3. DELIVERY SYSTEM: SHALL HAVE FILTERS IN-LINE TO PREVENT SOLIDS FROM BEING PUMPED INTO THE DRILL PIPE. CONNECTIONS BETWEEN THE PUMP AND DRILL PIPE SHALL BE RELATIVELY LEAK-FREE. USED DRILLING FLUID AND DRILLING FLUID SPILLED DURING DRILLING OPERATIONS SHALL BE CONTAINED AND CONVEYED TO THE DRILLING FLUID RECYCLING SYSTEM. A BERM, MINIMUM OF 12" HIGH, SHALL BE MAINTAINED AROUND DRILL RIGS, DRILLING FLUID MIXING SYSTEM, ENTRY AND EXIT PITS AND DRILLING FLUID CYCLING SYSTEM TO PREVENT SPILLS INTO THE SURROUNDING ENVIRONMENT. PUMPS AND OR VACUUM TRUCK(S) OF SUFFICIENT SIZE SHALL BE IN PLACE TO CONVEY EXCESS DRILLING FLUID FROM CONTAINMENT AREAS TO STORAGE AND RECYCLING FACILITIES.
4. DRILLING FLUID RECYCLING SYSTEM: SHALL SEPARATE SAND, DIRT AND OTHER SOLIDS FROM THE DRILLING FLUID TO RENDER THE DRILLING FLUID RE-USABLE. SPOILS SEPARATED FROM THE DRILLING FLUID WILL BE STOCKPILED FOR LATER USE OR DISPOSAL.
5. CONTROL OF DRILLING FLUIDS: THE CONTRACTOR SHALL FOLLOW ALL REQUIREMENTS OF THE FRAC-OUT AND SURFACE SPILL CONTINGENCY PLAN AS SUBMITTED AND APPROVED AND SHALL CONTROL OPERATIONAL PRESSURES, DRILLING MUD WEIGHTS, DRILLING SPEEDS, AND ANY OTHER OPERATIONAL FACTORS REQUIRED TO AVOID HYDRO-FRACTURE FLUID LOSSES TO FORMATIONS, AND CONTROL DRILLING FLUID SPILLAGE. THIS INCLUDES ANY SPILLAGES OR RETURNS AT ENTRY AND EXIT LOCATIONS OR AT ANY INTERMEDIATE POINT. ALL INADVERTENT RETURNS OR SPILLS SHALL BE PROMPTLY CONTAINED AND CLEANED UP. THE CONTRACTOR SHALL MAINTAIN ONSITE MOBILE SPOIL REMOVAL EQUIPMENT DURING ALL DRILLING, PRE-REAMING, REAMING AND PULLBACK OPERATIONS AND SHALL BE CAPABLE OF QUICKLY REMOVING SPOILS. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE CITY OF ANY INADVERTENT RETURNS OR SPILLS AND IMMEDIATELY CONTAIN AND CLEAN UP THE RETURN OR SPILL.

OTHER EQUIPMENT:

1. PIPE ROLLERS: IF UTILIZED, SHALL BE OF SUFFICIENT SIZE TO FULLY SUPPORT THE WEIGHT OF THE PIPE WHILE BEING HYDRO-TESTED AND DURING PULL-BACK OPERATIONS. SUFFICIENT NUMBER OF ROLLERS SHALL USED TO PREVENT EXCESS SAGGING OF PIPE.
2. HYDRAULIC OR PNEUMATIC PIPE RAMMERS MAY ONLY BE USED IF NECESSARY AND WITH THE AUTHORIZATION OF THE CITY REPRESENTATIVE.
3. RESTRICTIONS: OTHER DEVICES OR UTILITY PLACEMENT SYSTEMS FOR PROVIDING HORIZONTAL THRUST OTHER THAN THOSE DEFINED ABOVE IN THE PRECEDING SECTIONS SHALL NOT BE USED UNLESS APPROVED BY THE CITY PRIOR TO COMMENCEMENT OF THE WORK. CONSIDERATION FOR APPROVAL WILL BE MADE ON AN INDIVIDUAL BASIS FOR EACH SPECIFIED LOCATION. THE PROPOSED DEVICE OR SYSTEM WILL BE EVALUATED PRIOR TO APPROVAL OR REJECTION ON ITS POTENTIAL ABILITY TO COMPLETE THE UTILITY PLACEMENT SATISFACTORILY WITHOUT UNDUE STOPPAGE AND TO MAINTAIN LINE AND GRADE WITHIN THE TOLERANCES PRESCRIBED BY THE PARTICULAR CONDITIONS.

PIPE ASSEMBLY:

1. PIPE SHALL BE WELDED/FUSED TOGETHER IN ONE LENGTH, IF SPACE PERMITS. PIPE SHALL BE PLACED ON PIPE ROLLERS BEFORE PULLING INTO BORE HOLE. PIPES 16 INCH AND LARGER, A RE-ROUNDING CLAMP TOOL SHALL BE UTILIZED DURING ELECTRO-FUSION. PIPE SIZES LARGER THAN 12 INCH, MECHANICAL SCRAPPERS (PER THE FITTING MANUFACTURER'S RECOMMENDATION) SHALL BE UTILIZED DURING ELECTRO-FUSION. ALL ORIGINAL OXIDIZED PIPE SURFACES SHALL BE REMOVED IN ORDER FOR FUSION TO TAKE PLACE. SCRAPING PROCESS REQUIRES THAT APPROXIMATELY 0.10" OF THE OUTER "SKIN" BE REMOVED IN ORDER TO PENETRATE OXIDATION AND CONTAMINATION BARRIER. CUTS OR GOUGES THAT REDUCE WALL THICKNESS BY MORE THAN 10% ARE NOT ACCEPTABLE AND MUST BE CUT OUT AND DISCARDED.
2. BUTT FUSION TESTING WILL BE PERFORMED. THE TEST FUSION SHALL BE ALLOWED TO COOL COMPLETELY, AND THEN FUSION TEST STRAPS SHALL BE CUT OUT. THE TEST STRAP SHALL BE 12" (MIN) OR 30 TIMES THE WALL THICKNESS IN LENGTH WITH THE FUSION IN THE CENTER AND 1" (MIN) OR 1.5 TIMES THE WALL THICKNESS IN WIDTH. BEND THE TEST STRAP UNTIL THE ENDS OF THE STRAP TOUCH. IF THE FUSION FAILS AT THE JOINT, A NEW TEST FUSION SHALL BE MADE, COOLED COMPLETELY AND TESTED.
3. POLYETHYLENE PIPE AND FITTINGS MAY BE JOINED TOGETHER OR TO THE MATERIALS BY MEANS OF FLANGED CONNECTIONS (FLANGE ADAPTERS, ELECTROFUSED COUPLINGS, AND BACK-UP RINGS) OR MECHANICAL COUPLINGS DESIGNED FOR JOINING POLYETHYLENE PIPE OR FOR JOINING POLYETHYLENE PIPE TO ANOTHER MATERIAL. MECHANICAL COUPLINGS SHALL BE FULLY PRESSURE RATED AND FULLY THRUST RESTRAINED SUCH THAT WHEN INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, A LONGITUDINAL LOAD APPLIED TO THE MECHANICAL COUPLING WILL CAUSE THE PIPE TO YIELD BEFORE THE MECHANICAL COUPLING DISJOINS. EXTERNAL JOINT RESTRAINTS SHALL NOT BE USED IN LIEU OF FULLY RESTRAINED MECHANICAL COUPLINGS.
4. MECHANICAL JOINTS AND FLANGE CONNECTIONS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDED PROCEDURE. FLANGE FACES SHALL BE CENTERED AND ALIGNED TO EACH OTHER BEFORE ASSEMBLING AND TIGHTENING BOLTS. IN NO CASE SHALL THE FLANGE BOLTS BE USED TO DRAW THE FLANGES INTO ALIGNMENT. BOLT THREADS SHALL BE LUBRICATED, AND FLAT WASHERS SHALL BE FITTED UNDER THE FLANGE NUTS. BOLTS SHALL BE EVENLY TIGHTENED ACCORDING TO THE TIGHTENING PATTERN AND TORQUE STEP RECOMMENDATIONS OF THE MANUFACTURER. AT LEAST ONE (1) HOUR AFTER INITIAL ASSEMBLY, FLANGE CONNECTIONS SHALL BE RE-TIGHTENED FOLLOWING THE TIGHTENING PATTERN AND TORQUE STEP RECOMMENDATIONS OF THE MANUFACTURER. FINAL TIGHTENING TORQUE SHALL BE 100 FT-LBS OR LESS AS RECOMMENDED BY THE MANUFACTURER.
5. HDPE PIPE 24 INCH AND LARGER, UNLESS APPROVED OTHERWISE BY THE CITY, A FOUNDATION BED OF GRANULAR MATERIAL (#57 STONE) SHALL BE PLACED UNDER AND AROUND ALL D.I. FITTINGS AND VALVES FOR ADDITIONAL SUPPORT. FOUNDATION BED OF GRANULAR MATERIAL SHALL BE PROVIDED FOR ALL VALVES 20 SIZE AND LARGER. FOR GRANULAR MATERIALS, THE MINIMUM VERTICAL LIMIT IS 12 INCHES UNDER THE FITTING OR VALVE, UP TO 1/3 THE OVERALL HEIGHT OF THE FITTING OR VALVE. MINIMUM HORIZONTAL LIMITS OF THE GRANULAR MATERIAL SHALL BE 12 INCHES IN ALL DIRECTIONS BEYOND THE OUTER EDGES OF THE FITTING OR VALVE. COMPACTION OF SOILS BELOW THE GRANULAR MATERIAL SHALL BE AT 98% OF THE MAXIMUM DENSITY. ALL SPOOL PIECES BETWEEN 24 INCH AND LARGER D.I. FITTINGS AND VALVES SHALL BE AT LEAST 5 FEET LONG. NO JOINT DEFLECTION SHALL BE ALLOWED AT THE FITTINGS OR VALVES.
6. GENERAL REQUIREMENTS FOR OPEN-CUT CONSTRUCTION SHALL MEET ALL REQUIREMENTS IN THE CITY'S STANDARDS AND SPECIFICATIONS DESIGN MANUAL AND DETAILS, AND ALL INTERIM STANDARDS UPDATES, LATEST EDITION.

DRILLING PROCEDURES:

DRILL PATH:

PRIOR TO DRILLING CONTRACTOR SHALL UTILIZE ALL VERIFIED LOCATE INFORMATION TO DETERMINE DRILL PATHWAY. MARKED UP DRAWINGS SHALL BE ONSITE AT ALL TIMES, AND REFERRED TO DURING THE DRILL OPERATION.

GUIDANCE SYSTEM:

CONTRACTOR SHALL PROVIDE AND MAINTAIN INSTRUMENTATION NECESSARY TO ACCURATELY LOCATE THE PILOT HOLE (BOTH HORIZONTAL AND VERTICAL DISPLACEMENTS), MEASURE PILOT STRING TORSIONAL AND AXIAL AND MEASURE DRILLING FLUID DISCHARGE RATE AND PRESSURE. THE CITY REPRESENTATIVE SHALL HAVE ACCESS TO INSTRUMENTATION AND READINGS AT ALL TIMES DURING OPERATION.

PILOT HOLE:

THE PILOT HOLE SHALL BE DRILLED ALONG THE PATH SHOWN ON THE PLANS AND PROFILE DRAWINGS OR AS DIRECTED BY THE CITY REPRESENTATIVE IN THE FIELD. UNLESS APPROVED OTHERWISE BY THE CITY, THE PILOT-HOLE TOLERANCES SHALL BE AS FOLLOWS:

1. VERTICAL ALIGNMENT SHALL BE +/-2% OF THE VERTICAL DEPTH OF THE BOREHOLE AT SENSING POSITION AS SHOWN ON THE PLANS.
2. HORIZONTAL ALIGNMENT SHALL BE ± 2 FEET AND WITHIN 3 FEET OF RIGHT-OF-WAY OR EASEMENT BOUNDARY.
3. CURVE RADIUS: THE PILOT HOLE RADIUS SHALL BE NO LESS THAN 80% OF THE MAXIMUM BENDING RADIUS AS RECOMMENDED BY THE PIPE MANUFACTURER OF THE PIPE BEING INSTALLED. IN NO CASE SHALL THE BENDING RADIUS BE LESS THAN 30 PIPE DIAMETERS, UNLESS APPROVED OTHERWISE BY THE CITY.
4. THE EXACT PILOT HOLE ENTRY POINT SHALL BE WITHIN ± 2 FEET OF THE LOCATION SHOWN ON THE DRAWING OR AS DIRECTED BY THE CITY REPRESENTATIVE IN THE FIELD.
5. THE EXIT POINT LOCATION SHALL BE WITHIN ± 2 FEET OF THE LOCATION SHOWN ON THE DRAWING OR AS DIRECTED BY THE CITY REPRESENTATIVE IN THE FIELD.
6. LIMITATIONS ON DEPTH: IF NOT NOTED ON THE PLANS, 6" HDPE PIPE AND SMALLER SHALL BE INSTALLED WITH A DEPTH OF 3 TO 5 FEET AND 8" HDPE PIPE THRU 12" PIPE SHALL BE INSTALLED WITH A DEPTH OF 3 TO 6 FEET UNLESS IT IS REQUIRED TO INSTALL THE PIPE DEEPER DUE TO UTILITY CONFLICTS. HDPE PIPE LARGER THAN 12" SHALL BE SPECIFICALLY DESIGNED BY THE ENGINEER AND APPROVED BY THE CITY. WHERE UTILITIES CROSS UNDER FDOT, COUNTY, CITY, AND/OR SUBMERGED LAND OF THE STATE OF FLORIDA RIGHTS-OF-WAY, THE DEPTH OF COVER SHALL COMPLY WITH APPLICABLE PERMITS.
7. THE MINIMUM SEPARATION REQUIREMENTS BETWEEN HDPE WATER MAIN AND A NON-WATER MAIN SHALL BE AS OUTLINED IN THE CITY'S MANUAL, OR AS SHOWN ON THE PLANS AND APPROVED BY THE CITY, WHICHEVER IS MORE CONSERVATIVE.

PULL BACK:

1. AFTER SUCCESSFULLY REAMING THE BORE HOLE TO THE REQUIRED DIAMETER, CONTRACTOR WILL PULL THE PIPE THROUGH THE BORE HOLE. IN FRONT OF THE PIPE WILL BE A SWIVEL AND REAMER TO COMPACT BORE HOLE WALLS. ONCE PULL-BACK OPERATIONS HAVE COMMENCED, OPERATIONS MUST CONTINUE WITHOUT INTERRUPTION UNTIL PIPE IS COMPLETELY PULLED INTO BORE HOLE. DURING PULL-BACK OPERATIONS CONTRACTOR WILL NOT APPLY MORE THAN THE MAXIMUM SAFE PIPE PULL PRESSURE AT ANY TIME. MAXIMUM ALLOWABLE TENSILE FORCE IMPOSED ON THE PULL SECTION SHALL BE EQUAL TO 80% OF THE PIPE MANUFACTURER'S SAFETY PULL (OR TENSILE) STRENGTH.
2. TORSIONAL STRESS SHALL BE MINIMIZED BY USING A SWIVEL TO CONNECT A PULL SECTION TO THE REAMING ASSEMBLY.
3. THE PULLBACK SECTION OF THE PIPELINE SHALL BE SUPPORTED DURING PULLBACK OPERATIONS SO THAT IT MOVES FREELY AND THE PIPE IS NOT DAMAGED.
4. EXTERNAL PRESSURE SHALL BE MINIMIZED DURING INSTALLATION OF THE PULLBACK SECTION IN THE REAMED HOLE. DAMAGED PIPE RESULTING FROM EXTERNAL PRESSURE SHALL BE REPLACED AT NO COST TO THE CITY.
5. BUOYANCY MODIFICATION SHALL BE AT THE DISCRETION OF THE CONTRACTOR AND SHALL BE APPROVED BY THE CITY REPRESENTATIVE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO THE PULL SECTION RESULTING FROM SUCH MODIFICATIONS.
6. IN THE EVENT THAT THE PIPE BECOMES STUCK, CONTRACTOR WILL CEASE PULLING OPERATIONS TO ALLOW ANY POTENTIAL HYDRO-LOCK TO SUBSIDE AND WILL COMMENCE PULLING OPERATIONS. IF PIPE REMAINS STUCK, CONTRACTOR WILL NOTIFY THE CITY REPRESENTATIVE. THE CITY REPRESENTATIVE AND CONTRACTOR WILL DISCUSS OPTIONS AND THEN WORK WILL PROCEED ACCORDINGLY.

TESTING:

DISINFECTION TESTS:

1. ALL WATER PIPE AND FITTINGS SHALL BE THOROUGHLY DISINFECTED PRIOR TO BEING PLACED IN SERVICE. DISINFECTION SHALL FOLLOW THE APPLICABLE PROVISIONS OF THE PROCEDURE ESTABLISHED FOR THE DISINFECTION OF WATER MAINS AS SET FORTH IN AWWA - STANDARD C651 ENTITLED "AWWA STANDARD FOR DISINFECTING WATER MAINS" AND SHALL BE IN ACCORDANCE WITH CHAPTER III. 1.- SECTION 350. BACTERIOLOGICAL TESTING ON THE WATER MAIN SHALL BE SCHEDULED WITH THE CITY REPRESENTATIVE. CONTRACTOR WILL COLLECT THE WATER SAMPLES AND BE RESPONSIBLE FOR COMPLETING THE WATER ANALYSIS (LAB TESTING).
2. TEMPORARY BLOW-OFFS SHALL BE INSTALLED FOR THE PURPOSE OF CLEANING THE WATER MAIN. BLOW-OFFS INSTALLED ON WATER MAINS UP TO AND INCLUDING 12 INCHES SHALL BE THE SAME DIAMETER AS THE WATER MAIN. BLOW-OFFS INSTALLED ON 16 INCH WATER MAINS AND LARGER SHALL BE THE NEXT SMALLER SIZE, IN DIAMETER, THAN THE WATER MAIN BEING TESTED. TEMPORARY BLOW-OFFS SHALL BE REMOVED AND PLUGGED AFTER THE MAIN IS CLEARED. THE CITY REPRESENTATIVE SHALL BE PRESENT PRIOR TO AND DURING THE OPERATION OF BLOW-OFFS. THE MAIN SHALL BE FLUSHED PRIOR TO DISINFECTION.
3. THE NEW WATER MAIN SHALL BE CONNECTED TO THE EXISTING WATER MAIN AT ONE POINT ONLY FOR FLUSHING PURPOSES (NO LOOPING). THE NEW MAIN MUST HAVE A BLOW-OFF ON THE END AS REQUIRED PREVIOUSLY. AFTER THE NEW MAIN IS THOROUGHLY FLUSHED, THE OPEN END SHALL BE SEALED AND RESTRAINED AND THE MAIN SHALL BE THOROUGHLY DISINFECTED. ANYTIME THE NEW LINE IS REOPENED (TO REPAIR DEFECTIVE JOINTS OR PIPE, DEFECTIVE FITTINGS OR VALVES) THE COMPLETE DISINFECTION PROCESS SHALL BE REPEATED. ONCE BACTERIOLOGICAL CLEARANCE HAS BEEN RECEIVED FROM THE REGULATORY AUTHORITY, THE NEW MAIN MAY BE PRESSURE TESTED.

PRE-INSTALLATION PNEUMATIC PRESSURE TEST:

AFTER EACH HDPE PIPE SECTION HAS BEEN ASSEMBLED AND PRIOR TO PULLBACK, THE CONTRACTOR SHALL PERFORM AN AIR PRETEST. THE TEST PRESSURE SHALL BE 2 PSI AND THIS PRESSURE SHALL BE HELD FOR TWO (2) HOURS. CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL EQUIPMENT FOR THIS TEST. PRESSURE AND TEMPERATURE SHALL BE MONITORED AND RECORDED WITH CALIBRATED INSTRUMENTS THROUGHOUT THE TEST. END CAPS, FITTINGS OR VALVE CONNECTED TO THE PRODUCT PIPE SECTION SHALL HAVE A PRESSURE RATING EQUAL TO OR GREATER THAN THE TEST PRESSURE. THE CONTRACTOR SHALL CONFIRM WITH THE PRODUCT PIPE'S MANUFACTURER THAT THE SPECIFIED TEST PROCEDURES ARE SUITABLE FOR THE SUPPLIED PIPE. ANY RECOMMENDED MODIFICATIONS TO THE PROCEDURES OUTLINED IN THIS SPECIFICATION SHALL BE SUBMITTED TO THE CITY FOR APPROVAL. IF LEAKAGE IS INDICATED, THE PIPE SHALL BE VISUALLY INSPECTED AND THE LEAKING JOINT(S) SHALL BE CUT OUT AND REPLACED AND THE SECTION RE-TESTED IN ACCORDANCE WITH THE SPECIFICATION REQUIREMENTS. ALL COSTS OF REPAIR AND RETESTING SHALL BE BORNE BY THE CONTRACTOR.

PRESSURE AND LEAKAGE TESTS:

1. CONTRACTOR SHALL TEST PIPELINES INSTALLED IN ACCORDANCE WITH THESE SPECIFICATIONS PRIOR TO ACCEPTANCE OF THE PIPELINE BY THE CITY. ALL FIELD TESTS SHALL BE MADE IN THE PRESENCE OF THE CITY REPRESENTATIVE. EXCEPT AS OTHERWISE DIRECTED, ALL PIPELINES SHALL BE TESTED. UNLESS APPROVED OTHERWISE BY THE CITY, ALL FUSIBLE OR BUTT WELD JOINTS SHALL BE TESTED, INCLUDING MJ ADAPTER FITTINGS ASSOCIATED WITH THE NEW CONSTRUCTION. ALL PIPING TO OPERATE UNDER LIQUID PRESSURE SHALL BE TESTED IN SECTIONS OF APPROVED LENGTH. THE PRESSURE TESTING OF AN HDPE LINE SECTION SHALL BE TESTED SEPARATELY FROM THE PVC AND DIP LINE SECTIONS. WHERE IMPRACTICAL, THE HDPE TEST SECTION SHALL INCLUDE ONLY A MINIMUM AMOUNT OF PVC AND DUCTILE IRON PIPE WITHIN THE TEST SECTION. IF AT ALL POSSIBLE, THE PVC AND DIP TEST SECTIONS SHALL BE LEFT EXPOSED DURING THE PRESSURE TEST FOR VISUAL LEAKAGE OBSERVATION. FOR THESE TESTS, THE CONTRACTOR SHALL FURNISH CLEAN WATER, SUITABLE TEMPORARY TESTING PLUGS OR CAPS, AND OTHER NECESSARY EQUIPMENT, AND ALL LABOR REQUIRED. IF THE CONTRACTOR CHOOSES TO PRESSURE TEST AGAINST AN EXISTING CITY WATER MAIN/VALVE, THE NEW WATER MAIN MUST BE DISINFECTED PRIOR TO CONNECTION TO THE CITY LINE. THE CITY WILL NOT BE RESPONSIBLE FOR FAILURE OF THE PRESSURE TEST DUE TO THE EXISTING VALVE LEAKING. THE CITY MAY ELECT TO FURNISH SUITABLE PRESSURE GAUGES FOR THESE TESTS. IF NOT, THE CONTRACTOR WILL FURNISH SUITABLE PRESSURE GAUGES, CALIBRATED BY AN APPROVED TESTING LABORATORY, WHICH INCREMENTS NO GREATER THAN 2 PSI. GAUGES USED SHALL BE OF SUCH SIZE THAT PRESSURES TESTED WILL NOT REGISTER LESS THAN 10% OR MORE THAN 90% OF THE GAUGE CAPACITY. ALL VALVED SECTIONS SHALL BE HYDROSTATIC TESTED TO ENSURE SEALING (LEAK ALLOWANCE) OF ALL LINE VALVES. ALL HDD OVER 100 LF SHALL BE AIR PRESSURE TESTED (ABOVE GROUND) ± 5 PSI FOR A PERIOD OF 15 MINUTES, PRIOR TO INSERTION. THERE SHALL BE NO PRESSURE LOSS ALLOWED.
2. UNLESS IT HAS ALREADY BEEN DONE, THE SECTION OF PIPE TO BE TESTED SHALL BE FILLED WITH POTABLE WATER AND AIR SHALL BE EXPELLED FROM THE PIPE. RECLAIMED WATER MAY BE UTILIZED FOR FILLING NEW RECLAIMED WATER OR SEWER FORCE MAIN INSTALLATIONS. IF BLOW-OFFS OR OTHER OUTLETS ARE NOT AVAILABLE AT HIGH POINTS FOR RELEASING AIR, THE CONTRACTOR SHALL PROVIDE 1 INCH (MINIMUM TAPS AND BLOW-OFF VALVES (AT THE 12:00 POSITION), AS NECESSARY. THE COST OF CONSTRUCTING BLOW-OFF VALVES AND PLUGGING THEM, AFTER A SUCCESSFUL PRESSURE TEST, SHALL BE INCLUDED IN THE UNIT PRICE BID AMOUNT FOR THE HDPE PIPE.
3. FOR MAINS LARGER THAN 20-INCH SIZE, IT IS HIGHLY RECOMMENDED THAT THE CONTRACTOR PROFILE (LINE AND GRADE) THE MAIN AFTER INSTALLATION AND PRIOR TO PRESSURE AND LEAKAGE TEST TO ACCURATELY LOCATE ALL HIGH POINTS. FIELD SURVEY INSTRUMENT (LEVEL EQUIPMENT) SHALL BE UTILIZED FOR THIS TASK. BLOW-OFF VALVES SHALL BE INSTALLED (AT A MINIMUM) AT ALL HIGH POINTS WHICH OFFSET VERTICALLY MORE THAN TWO PIPE DIAMETERS IN LENGTH (AT A MINIMUM). THE CONTRACTOR SHALL CONSULT THE ENGINEER ON ANY TECHNICAL QUESTIONS OR CONCERNS.
4. HYDROSTATIC TESTING SHALL CONSIST OF A 150 PSIG TEST PRESSURES, BASED ON THE ELEVATION OF THE HIGHEST POINT OF THE LINE OR SECTION UNDER TESTS. PRESSURE SHALL BE APPLIED BY MEANS OF A PUMP CONNECTED TO THE PIPE IN A MANNER SATISFACTORY TO THE CITY REPRESENTATIVE. THE PUMP, PIPE CONNECTION AND ALL NECESSARY APPARATUS SHALL BE FURNISHED BY THE CONTRACTOR AND SHALL BE SUBJECT TO THE APPROVAL OF THE CITY REPRESENTATIVE.
5. MAXIMUM DURATION FOR PRESSURE TEST, INCLUDING INITIAL AND FINAL PHASE OF THE TEST, SHALL NOT EXCEED EIGHT (8) HOURS. IF THE TEST IS NOT COMPLETED DUE TO LEAKAGE, EQUIPMENT FAILURE, ETC., DEPRESSURIZE THE TEST SECTION, AND THEN ALLOW IT TO "RELAX" FOR AT LEAST EIGHT (8) HOURS BEFORE BRINGING THE TEST SECTION UP TO TEST PRESSURE AGAIN.

INITIAL PHASE OF PRESSURE TESTING:

FIRST, ALL AIR MUST BE REMOVED FROM THE TEST SECTION. THE PRESSURE TEST SHALL BE COMPLETED AFTER THE LINE IS BACKFILLED. IF POSSIBLE, ALL FLANGED OR MECHANICAL JOINT VALVES AND FITTINGS SHALL BE LEFT EXPOSED FOR VISUAL LEAK INSPECTION. IF POSSIBLE ALL PVC AND DIP TEST SECTIONS SHALL BE LEFT EXPOSED FOR VISUAL LEAK INSPECTION. INITIALLY, THE PRESSURE WITHIN THE TEST SECTION SHOULD BE RAISED TO APPROXIMATELY 160 PSI AND THEN ALLOWED TO BE IDLE (NO ADDITIONAL MAKE-UP WATER/PRESSURE TO BE INJECTED), FOR APPROXIMATELY 3 HOURS. DURING THIS 3 HOUR PERIOD, THE TEST SECTION SHALL BE ALLOWED TO STABILIZE AND COME TO AN EQUILIBRIUM STAGE. NO ADDITIONAL MAKE-UP WATER/PRESSURE SHALL BE APPLIED TO THE TEST SECTION DURING THIS 3 HOUR STABILIZATION PERIOD UNLESS THE LINE PRESSURE DROPS BELOW 140 PSI. IN THIS CASE, MAKE-UP WATER/PRESSURE SHALL ONLY BE APPLIED TO THE TEST SECTION TO MAINTAIN A MINIMUM OF 140 PSI (DURING THE 3 HOUR STABILIZATION PERIOD).

FINAL PHASE OF PRESSURE TESTING:

1. THE FINAL PHASE OF THE PRESSURE TEST SHALL INVOLVE APPLYING MAKE-UP WATER/PRESSURE TO ACHIEVE AN "INITIAL TEST PRESSURE" OF 150 PSI (MINIMUM)/155 PSI (MAXIMUM). THE TEST SECTION IS THEN ALLOWED TO BE IDLE (NO MAKE-UP WATER/PRESSURE IS ADDED) FOR A PERIOD OF 2 HOURS. AFTER THIS 2 HOUR PERIOD, MAKE-UP WATER/PRESSURE IS APPLIED AND MEASURED TO RE-ESTABLISH THE "INITIAL TEST PRESSURE". THE QUANTITY OF WATER UTILIZED TO RE-PUMP THE LINE SHALL BE MEASURED AND COMPARED TO THE ALLOWABLE QUANTITIES AS DETERMINED BY THE TABLE IN SECTION 33.5 OF THE C.O.S.A. MANUAL. IF THE ACTUAL MAKE-UP WATER QUANTITY IS EQUAL OR LESS THAN THE ALLOWABLE AMOUNT, THE PRESSURE TEST PASSES. IF THE ACTUAL MAKE-UP WATER QUANTITIES ARE GREATER THAN THE ALLOWABLE AMOUNT, THE PRESSURE TEST FAILS.
2. IN THE EVENT A SECTION FAILS TO PASS THE TESTS, THE CONTRACTOR SHALL DO EVERYTHING NECESSARY TO LOCATE, UNCOVER (EVEN TO THE EXTENT OF UNCOVERING THE ENTIRE SECTION), AND REPLACE THE DEFECTIVE PIPE, VALVE, FITTING OR JOINT. VISIBLE LEAKS SHALL BE CORRECTED REGARDLESS OF TOTAL LEAKAGE. LINES WHICH FAIL TO MEET THESE TESTS SHALL BE RETESTED AS NECESSARY UNTIL TEST REQUIREMENTS ARE COMPLIED WITH. ALL TESTING SHALL BE PERFORMED AT THE CONTRACTOR'S EXPENSE.
3. IF, IN THE JUDGMENT OF THE CITY, IT IS IMPRACTICABLE TO FOLLOW THE FOREGOING PROCEDURES EXACTLY FOR ANY REASON, MODIFICATIONS IN THE PROCEDURE SHALL BE MADE WITH APPROVAL; BUT, IN ANY EVENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ULTIMATE TIGHTNESS OF THE PIPING WITHIN THE ABOVE REQUIREMENT. RE-DISINFECTION SHALL BE REQUIRED IF THE LINE IS DE-PRESSURIZED FOR REPAIRS PRIOR TO TYING.

LOCATE WIRE:

LOCATE WIRE SHALL BE PROVIDED ON ALL INSTALLATIONS. FOR HDD PROJECTS, LOCATE WIRE SHALL BE A MINIMUM 10AWG COPPER-CLAD CARBON STEEL WITH 30 MILS (MIN) INSULATION. FOR OPEN-CUT PROJECTS, THE LOCATE WIRE CONSTRUCTION AND TESTING SHALL MEET CITY LOCATE WIRE REQUIREMENTS. THE EXTERNAL COLOR SHALL BE EITHER WHITE OR YELLOW. LOCATE WIRE SHALL BE BROUGHT TO GRADE WITHIN A VALVE BOX OR LOCATE STATION BOX AT ALL "ENTRY POINT LOCATIONS" AND ALL "EXIT POINT LOCATIONS", REGARDLESS OF WHETHER SUCH BOXES ARE IDENTIFIED ON THE PLANS. FOR HDD PROJECTS, THERE IS NO MAXIMUM LENGTH OR INTERVAL BETWEEN LOCATE WIRE STATIONS. THE LOCATE WIRE TESTING AND REPORTING REQUIREMENTS SHALL BE AS PER CITY STANDARDS. IF THE LOCATE WIRE BREAKS OR IS NOT CONTINUOUS (FROM END TO END), THE CONTRACTOR SHALL, AT THE CONTRACTOR'S SOLE EXPENSE, PROVIDE SOFT-DIGS FOR THE PORTIONS OF THE MAIN WITH 12-FEET OR LESS COVER (EVERY 50 LF ALONG MAIN) TO CONFIRM AS-BUILT DATA. THIS SOFT-DIG DATA SHALL BE RECORDED ON THE AS-BUILT RECORD DRAWINGS.

CITY OF ST. AUGUSTINE HORIZONTAL DIRECTIONAL DRILLING (HDD) CONSTRUCTION REQUIREMENTS	REVISION DATE:	FEB 2017
	NOT TO SCALE	N-3

C.O.S.A.