

REVISIONS AND ISSUANCE

NO.	DATE	DESCRIPTION

IVY KIDS EARLY LEARNING CENTER
 4434 CR 94
 MANVEL, TEXAS 77578

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04/16/2019

DRAWING TITLE

CONSTRUCTION DETAILS

DRAWN BY KN	CHECKED BY EL
DATE 04/16/2019	JOB NO. 1806251

DRAWING NO.

C7

2. CAST-IN-PLACE CONCRETE MANHOLES AND PRECAST CONCRETE MANHOLES SHALL CONFORM TO TCEG REQUIREMENTS §217.59:
- 1.1. INFILTRATION TEST SHALL BE REQUIRED FOR EACH MANHOLE SYSTEM.
 - 1.1.1. EACH MANHOLE IS TO BE PLUGGED, FILLED TO THE TOP OF THE RIM WITH WATER FOR THIRTY (30) MINUTES WITH THE ALLOWABLE LEAKAGE OF NOT MORE THAN THAT:
 - 1.1.2. PLUG MANHOLE AND VACUUM TEST PER TCEG REQUIREMENTS.

1. WATER LINES
- 1.1. PRESSURE TEST:
 - 1.1.1. A TEST, TO BE SUCCESSFUL, SHALL BE WITNESSED BY THE CITY OF MANVEL PROJECT MANAGER FOR A FOUR (4) HOUR PERIOD, DURING REASONABLE HOURS. THE ALLOWABLE LEAKAGE SHALL BE NO GREATER THAN DETERMINED BY THE FOLLOWING FORMULA:

1. Permit to dig TAC §200.44(4)(C), the hydrostatic leakage rate shall not exceed the amount allowed or recommended by the most current AWWA Manual for PVC pipe and iron and ductile iron pipe. Include the formula in the notes on the plans.

2. The hydrostatic test shall be performed after the pipe and appurtenances shall not exceed the amount allowed or recommended by the most current AWWA Manual for PVC pipe and iron and ductile iron pipe. Include the formula in the notes on the plans.

$$Q = \frac{L \times D \times P}{1000 \times 144}$$
 Where:
 Q = the quantity of leakage water in gallons per hour.
 L = the length of the pipe section being tested, in feet.
 D = the nominal diameter of the pipe in inches, and
 P = the average test pressure during the hydrostatic test in pounds per square inch (psi).

- 3.1.2. FIRE LINES SHALL BE TESTED AT 200 PSF FOR TWO (2) HOURS AND SHALL BE WITNESSED BY THE FIRE MARSHAL. LEAKAGE SHALL BE CALCULATED AS STATED ABOVE.
- 1.2. BACTERIAL TEST (BAC-T)
 - 1.2.1. BACTERIAL SAMPLE IS REQUIRED FOR EACH 1,000 FEET OF WATER MAIN, OR CLOSER DEPENDING ON FIRE HYDRANT LOCATIONS, OR PORTION THEREOF. ALSO DEAD ENDS ARE SUBJECT TO TESTING, SUCH AS CUL-DE-SAC. THE FORM NEEDS TO BE LABELED "CONSTRUCTION" OR "SPECIAL."

2. GRAVITY SANITARY SEWERS:
- LOW PRESSURE AIR TEST - THE PIPE SHALL UNDERGO A LOW PRESSURE AIR TEST WHICH SHALL CONFORM TO TCEG REQUIREMENTS §217.57.

- 2.1. MANHOLE DEFLECTION TEST - FLEXIBLE AND SEMI-RIGID PIPE DIAMETER DEFLECTION TEST SHALL BE DONE NO SOONER THAN THIRTY (30) DAYS AFTER FINAL BACKFILL. REIN TEST WITH A MANHOLE HAVING A DIAMETER EQUAL TO 95% OF THE INSIDE NOMINAL DIAMETER OF THE PIPE BEING TESTED. MANHOLE SHALL BE NINE (9) ARM WITH STEEL PROVING RING 3/4 INCH RING WIDTH. TO PASS, MANHOLE SHALL PASS FREELY THROUGH THE PIPE, PULLED BY ONE (1) WORKER. NO MECHANICAL MEANS SHALL BE ALLOWED TO PULL THE MANHOLE.
- 2.2. FORCE MAIN TEST - FORCE MAINS SHALL BE TESTED IN THE SAME MANNER AS WATER MAINS ACCORDING TO PARAGRAPH 3.1.1.1.
- 2.3. ALL GRAVITY SANITARY SEWER MAIN LINE SHALL BE TELEVIEWED AT THE ONE-YEAR WARRANTY PERIOD PRIOR TO FINAL ACCEPTANCE.

3. LIME-STABILIZED SUBGRADE:
- 3.1. LIME
 - 3.1.1. PERCENT LIME DETERMINATION TEST SHALL BE TAKEN BY A CERTIFIED TESTING LABORATORY IN ACCORDANCE WITH ASTM C977-92, BUT SHALL NOT BE LESS THAN 6%.
 - 3.1.1.1. THE PERCENT LIME USED SHALL BRING THE SOIL TO A P.1. OF NOT MORE THAN 15.
 - 3.1.2. HYDRATED LIME SHALL BE SAMPLED AND TAKEN AT THE DISTRIBUTION AREA OF THE TANKER TRUCK AND TESTED.

- 3.2. SUBGRADE
 - 3.2.1. ALL SUBGRADE SHALL MEET THE FOLLOWING REQUIREMENTS WHEN TEST DRY BY LABORATORY TESTS:
 - MINIMUM PASSING 1 1/2 INCH SIEVE - 100%
 - MINIMUM PASSING 3/8 INCH SIEVE - 65%
 - MINIMUM PASSING #4 SIEVE - 60%.

- 3.2.2. ALL SUBGRADE SHALL PASS A DENSITY TEST OF NOT LESS THAN 95% STANDARD PROCTOR. METHOD OF TESTING AS PER ASTM D698. TEST TO BE TAKEN EVERY 200 FEET AS MEASURED ALONG CENTERLINE OF THE ROADWAY AT VARYING DISTANCES FROM CENTERLINE OF THE ROADWAY, OR AS DIRECTED BY THE CITY OF MANVEL.
- 3.2.3. THICKNESS TESTS SHALL BE TAKEN AT EVERY 200 FEET AS MEASURED ALONG THE CENTERLINE OF THE ROADWAY.
- 3.2.4. IF A SINGLE STORM EVENT PRODUCES ONE (1) INCH OR MORE OF RAINFALL, CONTRACTOR SHALL RE-TEST THE SUBGRADE FOR DENSITY. THE INTERVAL FOR DENSITY RE-TESTS SHALL BE NOT LESS THAN 500 FEET AS MEASURED ALONG THE CENTERLINE OF THE ROADWAY.

4. CONCRETE PAVING (INCLUDING CURBS, MEDIANS, SIDEWALKS, CAST-IN-PLACE MANHOLES AND INLETS, ETC.)
- 4.1. THE CONCRETE PAVEMENT WILL BE CORE DRILLED EACH 1,000 SQUARE YARDS OR FOR EACH STREET, WHICHEVER IS GREATER, AND WILL BE TESTED FOR DEPTHS IN ACCORDANCE WITH ASTM C174 TEST OR OTHER APPROVED TESTING METHOD. THICKNESS SHALL NOT BE DEFICIENT BY MORE THAN 1/8 INCH. THE CORE SHALL ALSO BE TESTED FOR COMPRESSIVE STRENGTH.

5. STRUCTURAL CONCRETE:
- 5.1. THE SLUMP, WHEN PLACING CONCRETE, SHALL NOT BE GREATER THAN FIVE (5) INCHES. THIS TEST SHALL BE TAKEN FOR EVERY FIFTY (50) CUBIC YARDS OF CONCRETE, BUT MAY BE TAKEN WHEN IN COMPLIANCE WITH THE TESTING LABORATORY WORKSHEET OF THE CITY OF MANVEL PROJECT MANAGER.
 - 5.2. TEMPERATURE OF THE CONCRETE WILL BE TAKEN AS DIRECTED BY THE CITY OF MANVEL PROJECT MANAGER AND SHALL BE LESS THAN 80° F.

- 5.3. THERE SHALL BE CYLINDERS TAKEN BY THE TESTING LABORATORY TECHNICIAN NUMBERING FOUR (4) CYLINDERS PER 100 CUBIC YARDS OF PAVING OR PART THEREOF FOR EACH DAY'S PLACEMENT. TWO (2) CYLINDERS SHALL BE TESTED AT SEVEN (7) DAYS AND TWO (2) CYLINDERS SHALL BE TESTED AT TWENTY-EIGHT (28) DAYS WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI IN TWENTY-EIGHT (28) DAYS IN ACCORDANCE WITH ASTM C31 TEST.

CAUTION: AT-T CABLES

THE LOCATION OF AT-T FACILITIES ARE SHOWN IN AN APPROXIMATE LOCATION ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION BEFORE COMMENCING WORK. CONTRACTOR AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND UTILITIES.

THE CONTRACTOR SHALL CALL 1-800-344-8377 A MINIMUM OF FORTY-EIGHT (48) HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD LOCATED.

WHEN EXCAVATING WITHIN TWENTY-FOUR (24) INCHES OF AT-T FACILITIES, ALL EXCAVATIONS MUST BE ACCOMPISHED USING NON-MECHANIZED EXCAVATION PROCEDURES. WHEN BORING THE CONTRACTOR SHALL EXPOSE THE AT-T FACILITIES.

WHEN AT-T TELEPHONE FACILITIES ARE EXPOSED, THE CONTRACTOR WILL PROVIDE SUPPORT TO THE CONDUIT DUCTS OR CABLES. WHEN EXCAVATING NEAR TELEPHONE POLES THE CONTRACTOR SHALL BRACE THE POLE FOR SUPPORT.

CAUTION: UNDERGROUND GAS FACILITIES

LOCATIONS OF CENTERPOINT ENERGY MAIN LINES (TO INCLUDE UNIT GAS TRANSMISSION AND/OR INDUSTRIAL GAS SUPPLY CORPORATION WHERE APPLICABLE) ARE SHOWN IN APPROXIMATE LOCATION ONLY. SERVICE LINES ARE USUALLY NOT SHOWN. OUR SIGNATURE ON THESE PLANS ONLY INDICATES THAT OUR FACILITIES ARE SHOWN IN APPROXIMATE LOCATION. IT DOES NOT IMPLY THAT A CONFIRMATION ANALYSIS HAS BEEN MADE. THE CONTRACTOR SHALL CONTACT THE UTILITY COORDINATING COMMITTEE AT 713-223-4567 OR 1-800-662-8344 A MINIMUM OF FORTY-EIGHT (48) HOURS PRIOR TO CONSTRUCTION TO HAVE MAIN AND SERVICE LINES FIELD LOCATED.

WHEN CENTERPOINT ENERGY PIPE LINE MARKINGS ARE NOT VISIBLE CALL 713-967-8037 (7:00 AM TO 4:30 PM) FOR STATUS OF LINE LOCATION REQUEST BEFORE EXCAVATION BEGINS.

WHEN EXCAVATING WITHIN TWENTY-FOUR (24) INCHES OF THE INDICATED LOCATION OF CENTERPOINT ENERGY FACILITIES, ALL EXCAVATIONS MUST BE ACCOMPISHED USING NON-MECHANIZED EXCAVATION PROCEDURES.

CAUTION: UNDERGROUND GAS FACILITIES (CONT.)

WHEN CENTERPOINT ENERGY FACILITIES ARE EXPOSED, SUFFICIENT SUPPORT MUST BE PROVIDED TO THE FACILITIES TO PREVENT EXCESSIVE STRESS ON THE PIPING.

THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY THE CONTRACTORS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND FACILITIES.

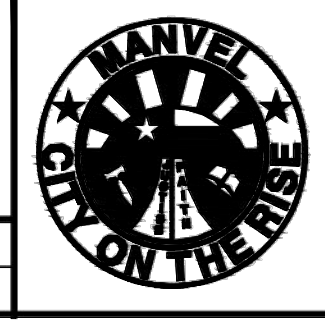
CAUTION: OVERHEAD POWER LINES

TEXAS LAW ARTICLE 1436C, PROHIBITS ALL ACTIVITIES IN WHICH PERSONS OF EQUIPMENT MAY COME WITHIN SIX (6) FEET OF ENERGIZED OVERHEAD POWER LINES, AND FEDERAL REGULATIONS, TITLE 29, PART 191 (O), 192 (I) AND PART 1926.550 (A) (5) REQUIRE A MINIMUM CLEARANCE OF TEN (10) FEET FROM THESE FACILITIES. THE ABOVE LAWS CARRY BOTH CRIMINAL AND CIVIL LIABILITIES. IF THE CONTRACTOR PERFORMS ANY WORK NEAR OVERHEAD POWER LINES HE MUST CALL 281-896-0453 FOR THE LINES TO BE DE-ENERGIZED AND/OR MOVED AT HIS OWN RISK PRIOR TO PERFORMING THE WORK.

LOCATION OF CENTERPOINT ENERGY POWER COMPANY FACILITIES ARE APPROXIMATE AND HAVE NOT BEEN VERIFIED BY ACTUAL FIELD CHECK.

OVERHEAD LINES MAY EXIST ON THE PROPERTY. WE HAVE NOT ATTEMPTED TO MARK THOSE LINES SINCE THEY ARE CLEARLY VISIBLE. BUT CONTRACTOR SHOULD LOCATE THEM PRIOR TO BEGINNING ANY CONSTRUCTION. TEXAS LAW, SECTION 752, HEALTH AND SAFETY CODE, FORBIDS ALL ACTIVITIES WHICH PERSONS OR THINGS MAY COME WITHIN SIX (6) FEET OF LIVE OVERHEAD HIGH VOLTAGE LINES. CONTRACTORS ARE LEGALLY RESPONSIBLE FOR SAFETY OF CONSTRUCTION WORKERS UNDER THIS LAW. LAW CARRIES BOTH CRIMINAL AND CIVIL LIABILITY. TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED, CALL CENTERPOINT ENERGY POWER COMPANY.

CONTRACTOR TO NOTIFY THE UTILITY COORDINATING COMMITTEE TELEPHONE 713-223-4567 FORTY-EIGHT (48) HOURS BEFORE STARTING WORK IN STREET RIGHTS-OF-WAY OR EASEMENTS.



GENERAL CONSTRUCTION NOTES

DATE APPROVED: JUNE 2018
 SCALE: NTS REVISED DATE: JUNE 2018

PROJECT NUMBER: DATE SUBMITTED: SHEET: xx OF xx

SANITARY SEWERS

1. FINISHED ELEVATION ON SANITARY MANHOLE RIMS SHALL BE THREE (3) INCHES ABOVE FINISHED GRADE WITHIN THE UTILITY EASEMENT. IF MANHOLE IS LOCATED ADJACENT TO A PUBLIC STREET, THE FINAL ELEVATION OF THE MANHOLE RIM SHALL BE TWO (2) INCHES ABOVE THE CURB OR CENTRELINE OF STREET FOR STREETS WITHOUT PERMETER CURB.
2. WATER LINES AND SANITARY SEWERS SHALL BE INSTALLED IN SEPARATE TRENCHES AND BE A MINIMUM SEPARATION OF NINE (9) FEET.
3. POLYVINYL CHLORIDE (PVC) SHALL BE IN ACCORDANCE WITH ASTM D3034, SDR 26 FOR ALL DEPTHS. SANITARY SEWER LINE PIPE SHALL BE THE COLOR GREEN.
4. ALL PVC FITTINGS ALL TYPES AND SDR OR WALL THICKNESS TO BE USED SHALL HAVE A RUBBER GASKET EQUIPPED BELL AND SPIGOT JOINTS CONFORMING TO ASTM D321.2. THE GASKET MATERIAL SHALL CONFORM TO ASTM F477, SOLVENT WELDED JOINTS WILL NOT BE APPROVED FOR CITY SANITARY SEWER LINES.
5. ALL DUCTILE IRON (DI) PIPE SHALL BE 150 PSI WITH EIGHT (8) MIL BLACK VIRGIN POLYETHYLENE WRAP AS SPECIFIED IN ANSIAWWA A21.5C1.05.
6. SANITARY SEWER MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF MANVEL DESIGN CRITERIA MANUAL, LATEST REVISION. CONTRACTOR TO FURNISH TEST PLUGS AND RISERS. ALL SANITARY SEWER LINES TO BE AIR TESTED IN ACCORDANCE WITH THE CITY OF MANVEL DESIGN CRITERIA MANUAL.
7. SANITARY SEWER TRENCHES UNDER OR WITHIN ONE (1) FOOT OF PROPOSED OR FUTURE PAVEMENT ARE TO BE BACKFILLED WITH CEMENT-STABILIZED SAND BACKFILL, AS SPECIFIED, TO WITHIN ONE (1) FOOT OF SUBGRADE. BEDDING WILL BE CEMENT-STABILIZED SAND BACKFILL (1.1 SACKS CEMENT PER TON OF SAND) FOR ALL SANITARY SEWERS.
8. WATER LINE/SEWER LINE SEPARATION. WHEN NEW SANITARY SEWERS ARE INSTALLED, THEY SHALL BE INSTALLED NO CLOSER TO WATER LINES THAN NINE (9) FEET IN ALL DIRECTIONS. SEWERS THAT PARALLEL TO WATER LINES MUST BE INSTALLED IN SEPARATE TRENCHES. WHEN NINE (9) FEET OF SEPARATION CANNOT BE MAINTAINED, THE FOLLOWING GUIDELINES APPLY: (A) ALL TIMES WATER AND SANITARY CROSSINGS OR SEPARATIONS SHALL CONFORM TO TCEG REQUIREMENTS - SEE NOTES 2.2-2.6 BELOW FOR MORE DETAIL.
- 8.1. WHEN THE SANITARY SEWER PARALLELS A WATER LINE, THE SANITARY SEWER SHALL BE CONSTRUCTED OF CAST IRON, DUCTILE IRON OR PVC MEETING ASTM SPECIFICATIONS WITH A PRESSURE RATING FOR BOTH THE PIPE AND JOINTS OF 150 PSI. THE VERTICAL SEPARATION SHALL BE A MINIMUM OF TWO (2) FEET BETWEEN OUTSIDE DIAMETERS AND THE HORIZONTAL SEPARATION SHALL BE A MINIMUM OF FOUR (4) FEET BETWEEN OUTSIDE DIAMETERS. THE SANITARY SEWER SHALL BE LOCATED BELOW THE WATER LINE.
- 8.2. WHEN A SANITARY SEWER CROSSES A WATER LINE AND THE SEWER IS CONSTRUCTED OF CAST IRON, DUCTILE IRON OR PVC WITH A MINIMUM PRESSURE RATING OF 150 PSI, AN ABSOLUTE MINIMUM OF SIX (6) INCHES BETWEEN OUTSIDE DIAMETERS SHALL BE MAINTAINED. THE SANITARY SEWER SHALL BE LOCATED BELOW THE WATER LINE WHEN POSSIBLE AND ONE (1) LENGTH OF THE SANITARY SEWER PIPE MUST BE CENTERED ON THE WATER LINE. SEE NOTES 2.2, 2.3 & 2.6 BELOW FOR MORE DETAIL.
- 8.3. WHEN A SANITARY SEWER CROSSES UNDER A WATER LINE AND THE SEWER IS CONSTRUCTED OF ABS TRUSS PIPE, SIMILAR SEMI-RIGID PLASTIC COMPOSITE PIPE, CLAY PIPE OR CONCRETE PIPE WITH GASKETED JOINTS, A MINIMUM OF TWO (2) FEET OF SEPARATION SHALL BE MAINTAINED. THE INITIAL BACKFILL SHALL BE CEMENT-STABILIZED SAND (MINIMUM 1.1 SACKS OF CEMENT PER TON OF SAND) FOR ALL SECTIONS OF SANITARY SEWER WITHIN NINE (9) FEET OF THE WATER LINE. THE INITIAL BACKFILL SHALL BE FROM A DIAMETER BELOW THE CENTERLINE OF THE PIPE TO ONE PIPE DIAMETER (BUT NOT LESS THAN TWELVE (12) INCHES) ABOVE THE PIPE. SEE NOTES 2.2, 2.3 & 2.6 BELOW FOR MORE DETAIL.
- 8.4. WHEN A SANITARY SEWER CROSSES OVER A WATER LINE, ALL PORTIONS OF THE SANITARY SEWER WITHIN NINE (9) FEET OF THE WATER LINE SHALL BE CONSTRUCTED OF CAST IRON, DUCTILE IRON OR PVC PIPE WITH A PRESSURE RATING OF AT LEAST 150 PSI USING APPROPRIATE ADAPTERS. IN THE USE OF THIS PROCEDURE THE NEW WATERLINE MAY BE ENCASED IN A JOINT OF 150 PSI PRESSURE RATED PIPE AT LEAST EIGHTEEN (18) FEET LONG AND TWO (2) NOMINAL SIZES LARGER THAN THE NEW WATERLINE. THE SPACE AROUND THE CARRIER PIPE SHALL BE SUPPORTED AT INTERVALS OF FIVE (5) FEET WITH SPACERS OR BE FILLED TO THE SPRINGLINE WITH WASHED SAND. THE ENCASEMENT PIPE SHOULD BE CENTERED ON THE CROSSING AND BOTH ENDS SEALED WITH NON-SHRINK CEMENT GROUT OR WITH A MANUFACTURED SEAL. SEE NOTE 2.4 BELOW FOR MORE DETAIL.

9. ALL PROPOSED SANITARY SEWER LINES SHALL BE DUCTILE IRON OR SDR 26 PVC. DUCTILE IRON PIPE SHALL ONLY BE USED AS APPROVED BY THE CITY OF MANVEL.
10. FOR ALL PVC PIPE, USE MANHOLE WATER STOP GASKET AND CLAMP ASSEMBLY AT MANHOLE CONNECTIONS.
11. SANITARY SEWER MANHOLES SHALL BE STANDARD TYPE, UNLESS OTHERWISE NOTED. ALL SANITARY SEWER MANHOLES SHALL BE AT LEAST THREE (3) INCHES ABOVE FINISHED GRADE OR ABOVE 100-YEAR BASE FLOOD ELEVATION (BFE). FOR MANHOLES LOCATED IN THE 100-YEAR FLOOD PLAIN, MAIN VENT AND SOIL BROADCAST MANHOLE IS WITH FOUR (4) BOLTS, IN THE LID) THE MANHOLE TOP AND PROVIDE INFLOW PROTECTION INSERT UNDER COVER. SECTIONS OF PRECAST MANHOLES SHALL BE JOINED WITH "RAM-NEX" IN FLOOD PLAIN.
12. SANITARY SEWER LINE IN PIPE ZONE INSIDE LOT EASEMENT SHALL BE BACKFILLED WITH CEMENT-STABILIZED SAND OR SELECT FILL MATERIAL WITH A PI BETWEEN 20 AND 40.
13. IF WET SAND IS ENCOUNTERED IN TRENCH, USE SPECIAL BEDDING.
14. SANITARY SEWERS CROSSING UTILITIES OTHER THAN WATER LINES SHALL HAVE A MINIMUM CLEARANCE OF SIX (6) INCHES.
15. ALL PRECAST MANHOLES SHALL HAVE THE TOP ADJUSTMENT CONSTRUCTED OF PRECAST FCC RINGS NO GREATER THAN TWENTY-FOUR (24) INCHES IN HEIGHT, SEALED WITH NON-SHRINK GROUT INSIDE AND OUT. BRICK MANHOLES SHALL NOT BE ALLOWED.
16. ALL SANITARY SEWER MANHOLE COVERS MUST INCLUDE THE WORDS "SANITARY SEWER" AND "CITY OF MANVEL". THEY MUST ALSO HAVE THE CITY SEAL.
17. SANITARY SEWER MANHOLE COVERS SHALL BE A MINIMUM OF THIRTY-TWO (32) INCHES IN DIAMETER.
18. ALL SANITARY SEWER MANHOLES SHALL HAVE AN INFLOW PROTECTOR.
19. CONTRACTOR TO INSTALL TRACING LINE ON ALL PUBLIC FORCE MAINS.
20. ALL INTERIOR CONCRETE ABOVE THE MANHOLE INVERT SHALL BE COATED COMPLETE WITH RAVEN 405 PROTECTIVE COATING WITH A MINIMUM THICKNESS OF 1/25 MIL OR APPROVED EQUAL.

21. ALL MANHOLES WITHIN ANY FLOODZONE OTHER THAN ZONE X AND SHADED X SHALL HAVE THEIR COVERS BOLTED TO THE FRAME.
22. WHEN A NON-PERFORATED WATERLINE CROSSES ABOVE A SANITARY SEWER OR LATERAL, THE SEPARATION OF THE WATERLINE PIPE SHALL BE CENTERED OVER AND SHALL BE PERPENDICULAR TO THE SANITARY SEWER OR LATERAL SUCH THAT THE JOINTS OF THE WATERLINE PIPE ARE COLLINEAR AND AT LEAST ONE (1) FOOT FROM THE CENTERLINE OF THE SANITARY SEWER OR LATERAL. THE PERFORATED WATERLINE SHALL BE AT LEAST TWO (2) FEET ABOVE THE SANITARY SEWER OR LATERAL. THE COVER SHALL BE REPLACED FOR AT LEAST FIVE (5) FEET IN BOTH DIRECTIONS (A FEET TOTAL) WITH AT LEAST 150 PSI PRESSURE RATED PIPE SUBJECTED TO COUNTY STABILIZED SAND TEST FROM ALL SIDES FOR THE TOTAL LENGTH OF ONE (1) SEPARATION PLUS 1 (3) FEET BEYOND THE JOINTS ON EACH END.
23. WHEN A NON-PERFORATED WATER LINE CROSSES A NEW NON-PERFORATED SANITARY SEWER OR LATERAL, THE SEPARATION OF THE WATERLINE PIPE SHALL BE CENTERED OVER AND SHALL BE PERPENDICULAR TO THE SANITARY SEWER OR LATERAL SUCH THAT THE JOINTS OF THE WATERLINE PIPE ARE COLLINEAR AND AT LEAST ONE (1) FOOT FROM THE CENTERLINE OF THE SANITARY SEWER OR LATERAL. THE PERFORATED WATERLINE SHALL BE AT LEAST TWO (2) FEET ABOVE THE SANITARY SEWER OR LATERAL. THE COVER SHALL BE REPLACED FOR AT LEAST FIVE (5) FEET IN BOTH DIRECTIONS (A FEET TOTAL) WITH AT LEAST 150 PSI PRESSURE RATED PIPE SUBJECTED TO COUNTY STABILIZED SAND TEST FROM ALL SIDES FOR THE TOTAL LENGTH OF ONE (1) SEPARATION PLUS 1 (3) FEET BEYOND THE JOINTS ON EACH END. THE WATERLINE AND SANITARY SEWER SHALL BE CONSTRUCTED AND JOINTS SHALL BE CONSTRUCTED AND JOINTS SHALL BE CONSTRUCTED TO PROVIDE A MINIMUM PRESSURE RATING OF 150 PSI. AN ABSOLUTE MINIMUM VERTICAL SEPARATION DISTANCE OF TWO (2) FEET SHALL BE MAINTAINED. THE SANITARY SEWER OR LATERAL SHALL BE LOCATED BELOW THE WATERLINE.
- 23.1. ALL SECTIONS OF SANITARY SEWER OR LATERAL WITHIN THE WATERLINE SHALL BE ENCASED IN A JOINT OF 150 PSI OR CLOSER SECTION OF PIPE. FLEXIBLE ENCASEMENT PIPE SHALL A MINIMUM PIPE STIFFNESS OF 1 IS PER 1% DEFLECTION. THE ENCASEMENT PIPE SHALL BE CENTERED ON THE WATERLINE AND SHALL BE AT LEAST TWO (2) NOMINAL PIPE SIZES LARGER THAN THE SANITARY SEWER OR LATERAL. THE SPACE AROUND THE CARRIER PIPE SHALL BE SUPPORTED AT INTERVALS OF FIVE (5) FEET WITH SPACERS OR BE FILLED TO THE SPRINGLINE WITH WASHED SAND. THE ENCASEMENT PIPE SHOULD BE CENTERED ON THE CROSSING AND BOTH ENDS SEALED WITH NON-SHRINK CEMENT GROUT OR A MANUFACTURED SEAL. SEE NOTE 2.4 BELOW FOR MORE DETAIL.
24. WHEN A SANITARY SEWER CROSSES ABOVE A SANITARY SEWER OR LATERAL, THE WATERLINE SHALL BE ENCASED AS DESCRIBED FOR SANITARY SEWER OR LATERAL IN ITEM 8.4 OR CONSTRUCTED TO EXCEED RISE OR STEEL WITH MECHANICAL OR RESISTO JOINTS AS APPROPRIATE. AN ABSOLUTE MINIMUM VERTICAL SEPARATION DISTANCE OF ONE (1) FOOT BETWEEN THE WATERLINE AND THE SANITARY SEWER OR LATERAL SHALL BE PROVIDED. WHEN A NEW WATERLINE CROSSES UNDER A SANITARY SEWER, THE PROCEEDING IN 8.4.1 SHALL BE OBSERVED FOR PIPE DESIGN AND JOINTS.
25. WHEN A SANITARY SEWER CROSSES ABOVE A SANITARY SEWER OR LATERAL, THE SEPARATION OF THE WATERLINE PIPE SHALL BE CENTERED OVER AND SHALL BE PERPENDICULAR TO THE SANITARY SEWER OR LATERAL SUCH THAT THE JOINTS OF THE WATERLINE PIPE ARE COLLINEAR AND AT LEAST ONE (1) FOOT FROM THE CENTERLINE OF THE SANITARY SEWER OR LATERAL. THE PERFORATED WATERLINE SHALL BE AT LEAST TWO (2) FEET ABOVE THE SANITARY SEWER OR LATERAL. THE COVER SHALL BE REPLACED FOR AT LEAST FIVE (5) FEET IN BOTH DIRECTIONS (A FEET TOTAL) WITH AT LEAST 150 PSI PRESSURE RATED PIPE SUBJECTED TO COUNTY STABILIZED SAND TEST FROM ALL SIDES FOR THE TOTAL LENGTH OF ONE (1) SEPARATION PLUS 1 (3) FEET BEYOND THE JOINTS ON EACH END.
26. WHEN CENTER STABILIZED SAND BEDDING IS REQUIRED, THE COUNTY STABILIZED SAND BEDDING SHALL BE A MINIMUM OF 10% CEMENT PER CUBIC YARD OF CEMENT STABILIZED SAND MIXTURE, BASED ON WEIGHT VOLUME AT LEAST 3.5 BAGS OF CEMENT PER CUBIC YARD OF MIXTURE. THE COUNTY STABILIZED SAND BEDDING SHALL BE A MINIMUM OF SIX (6) INCHES ABOVE AND FOUR INCHES BELOW THE SANITARY SEWER OR LATERAL. THE USE OF BROWN COLORED IN CEMENT STABILIZED SAND FOR SANITARY SEWER OR LATERAL, BEYOND IS RECOMMENDED FOR THE REDUCTION OF PRESSURE RATED UNDERSEWER MANHOLES POLICE CONSTRUCTION.

STORM SEWERS:

1. STORM SEWERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CITY OF MANVEL DESIGN CRITERIA MANUAL, LATEST REVISIONS.
2. ALL STORM SEWER PIPE SHALL BE REINFORCED CONCRETE PIPE (RCP), ASTM C76, CLASS III, TONGUE AND GROOVE, RAM-NEX JOINTS UNLESS OTHERWISE NOTED.
3. REINFORCED CONCRETE STORM SEWER (PIPE, BOX, ETC.) SHALL BE INSTALLED, BEDDED AND BACKFILLED IN CONFORMITY WITH CITY OF MANVEL STANDARD DETAILS. STORM SEWER PIPE INSTALLED UNDER OR WITHIN ONE (1) FOOT OF PROPOSED OR EXISTING PAVEMENT SHALL BE BACKFILLED WITH CEMENT-STABILIZED SAND, (1.1 SACKS OF CEMENT PER TON OF SAND), TO THE BOTTOM OF THE SUBGRADE.
4. CONCRETE FOR INLETS AND MANHOLES SHALL BE CLASS "A" AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT TWENTY-EIGHT (28) DAYS.
5. ALL MANHOLES SHALL BE ADJUSTED TO FINISHED GRADE AFTER PAVING IS COMPLETE.
6. MINIMUM STORM SEWER SIZE IS TWENTY-FOUR (24) INCH DIAMETER. MINIMUM UPSTREAM ROADSIDE DITCH CULVERT SIZE IS EIGHTEEN (18) INCH DIAMETER.
7. ALL STORM SEWER MANHOLE COVERS MUST INCLUDE THE WORDS, "STORM SEWER" AND "CITY OF MANVEL" AND HAVE THE CITY SEAL. MANHOLES COVERS SHALL BE THIRTY-TWO (32) INCHES IN DIAMETER EXCEPT AT CURB INLET COVERS WHICH ARE TWENTY-FOUR (24) INCHES.
8. CONTRACTOR SHALL PROVIDE A MINIMUM OF SIX (6) INCHES CLEARANCE AT ALL UTILITY CROSSINGS WITH STORM SEWERS.
9. ALL INLETS IN RESIDENTIAL DEVELOPMENTS TO BE TYPE "H-2" OR TYPE "B-8" WITH GRATES. ALL INLETS IN COMMERCIAL DEVELOPMENTS AND ON MAJOR THOROUGHFARES TO BE TYPE "H-2" ONLY, UNLESS OTHERWISE APPROVED BY THE CITY OF MANVEL.
10. ALL DISTURBED AREAS IN DRAINAGE EASEMENTS OR DETENTION PONDS, SHALL BE HYDROMULCHED.
11. ALL STORM SEWER SHALL BE TELEVIEWED AT THE ONE-YEAR WARRANTY PERIOD PRIOR TO FINAL ACCEPTANCE.

TESTING:

1. EXCAVATION AND BACKFILL FOR UTILITIES:
 - 1.1. BACKFILL SHALL BE PLACED IN MAXIMUM LIFTS OF EIGHT (8) INCHES AND COMPACTED TO A DENSITY OF NOT LESS THAN 95% STANDARD PROCTOR WITH A MOISTURE CONTENT OF PLUS (+) OR MINUS (-) THREE PERCENT (3%) OF OPTIMUM MOISTURE OR AS OTHERWISE SPECIFIED BY THE SOILS LABORATORY. TEST SHALL BE TAKEN EVERY LIFT, EVERY 500 LINEAR FEET, OR BETWEEN MANHOLES, WHICHEVER RESULTS IN THE GREATEST NUMBER OF DENSITY TESTS.
 - 1.2. FIELD MOISTURE/DENSITY TEST SHALL BE PERFORMED AT A FREQUENCY OF AT LEAST ONE (1) TEST PER 500 SQUARE YARDS OF COMPACTED LIFT. THE DENSITY SHALL NOT BE LESS THAN 95% OF STANDARD PROCTOR WITH A MOISTURE CONTENT OF PLUS (+) OR MINUS (-) THREE PERCENT (3%) OF OPTIMUM MOISTURE, OR AS DETERMINED BY SOILS LABORATORY. MAXIMUM LIFT FOR TESTING COMPACTED FILL SHALL NOT EXCEED TWELVE (12) INCHES.

GENERAL NOTES:

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE LATEST REVISED CITY OF MANVEL DESIGN CRITERIA MANUAL.
2. TRENCH SAFETY SYSTEM TO MEET, AS A MINIMUM, THE REQUIREMENTS OF OSHA SAFETY AND HEALTH REGULATIONS, LATEST EDITION.
3. THE CONTRACTOR SHALL CONTACT THE UTILITY COORDINATING COMMITTEE AT (713-223-4567) FOR CENTERPOINT AND AT&T TELEPHONE AND TEXAS ONE-CALL SYSTEM (1-800-245-4545) FOR PIPELINES AND CABLE TV.
4. IT IS THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE DEPTH, ELEVATIONS, LOCATION AND EXISTENCE OF ALL EXISTING UTILITIES WHICH MAY CONFLICT WITH THE PROPOSED CONSTRUCTION.
5. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS IN THE FIELD BEFORE COMMENCING WORK. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO REPORT ANY AND ALL DISCREPANCIES TO THE OWNER AND THE ENGINEER IN A TIMELY MANNER.
6. CONTRACTOR SHALL ADEQUATELY PROTECT EXISTING STRUCTURES, UTILITIES, TREES, SHRUBS, OTHER PERMANENT OBJECTS AND ADJOINING PROPERTY.
7. NO OPEN EXCAVATIONS SHALL BE LEFT OPEN OVERNIGHT. ALL EXCAVATIONS WHICH CANNOT BE BACKFILLED OVERNIGHT SHALL BE COVERED, AS A MINIMUM, WITH STEEL PLATING WHEN IN PAVED AREAS, 3/4 INCH PLYWOOD, WOOD PLANKING WITH OSHA ORANGE PLASTIC EXPANDED MESH BARRIER AROUND PERIMETER IN UNPAVED AREAS, OR AS APPROVED BY THE CITY OF MANVEL.
8. EXISTING PAVEMENT, CURBS, SIDEWALKS AND DRIVEWAYS DAMAGED OR REMOVED DURING CONSTRUCTION BY THE CONTRACTOR FOR THEIR CONVENIENCE SHALL BE REPLACED PER CURRENT DESIGN CRITERIA MANUAL BY THE CONTRACTOR AT THEIR EXPENSE.
9. CONTRACTOR SHALL PLAN, SCHEDULE, AND PERFORM THEIR WORK SO AS TO PROVIDE AND MAINTAIN SAFE PUBLIC TRAFFIC (INGRESS AND EGRESS) AS WELL AS NON-CONVENIENCE TO ALL PROPERTY OWNERS ALONG THE PROJECT RIGHT OF WAYS DURING CONSTRUCTION PERIOD.
10. FOR LOCATIONS WHERE OPEN CUT CONSTRUCTION IS REQUIRED IN STREETS THE CONTRACTOR SHALL FURNISH AND MAINTAIN ADEQUATE BARRICADES, WARNING AND DIRECTING SIGNS, FLAGS, AND LIGHTS, NOTIFY CITY OF MANVEL PERMIT DEPARTMENT (281-489-0630).
11. ALL SIGNS, BARRICADES, PAVEMENT MARKINGS, TRAFFIC SIGNALS, AND CHANNELIZING DEVICES USED TO HANDLE TRAFFIC SHALL BE SHOWN ON A TRAFFIC CONTROL PLAN (TO BE APPROVED BY THE CITY OF MANVEL) AND SHALL CONFORM TO THE LATEST REVISIONS OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUCD), "PART VI-TRAFFIC CONTROLS FOR STREET AND HIGHWAY CONSTRUCTION AND MAINTENANCE OPERATIONS."
12. CONTRACTOR SHALL NOTIFY THE CITY OF MANVEL PERMIT DEPARTMENT (281-489-0630) 48 HOURS PRIOR TO THE START OF CONSTRUCTION.
13. NO INSPECTABLE WORK CAN BE CONDUCTED ON SATURDAYS.

PAVING:

1. PAVEMENT SUBGRADE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CITY OF MANVEL DESIGN CRITERIA MANUAL, LATEST REVISIONS.
2. CONTRACTOR SHALL NOTIFY THE CITY OF MANVEL PERMIT DEPARTMENT (281-489-0630), TWENTY-FOUR (24) HOURS PRIOR TO ALL LIVING AND PAVING OPERATIONS.
3. ALL RETURNS SHALL HAVE A TWENTY-FIVE (25) FOOT RADIUS AT BACK OF CURB UNLESS OTHERWISE NOTED.
4. GUIDELINES SET FORTH IN THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" SHALL BE OBSERVED.
5. ALL FILL IN EXISTING OR PROPOSED RIGHTS-OF-WAY, INCLUDING BACKDRESSING BEHIND THE CURB, SHALL BE PLACED IN MAXIMUM LOOSE LIFTS OF EIGHT (8) INCHES OR LESS AND COMPACTED TO NINETY-FIVE PERCENT (95%) STANDARD PROCTOR DENSITY WITH A MOISTURE CONTENT OF ± THREE PERCENT (3%) OF OPTIMUM MOISTURE.
6. MINIMUM PAVEMENT REINFORCEMENT REQUIREMENT SHALL BE GRADE SIXTY (60), NO. FOUR (4) KEBAK, SPACED AT EIGHTEEN (18) INCH ON CENTERS EACH WAY.
7. ALL PAVEMENT TO BE A MINIMUM OF SIX (6) INCHES THICK REINFORCED CONCRETE UNLESS OTHERWISE NOTED.
8. PAVING EXPANSION JOINTS SHALL BE PLACED AT A MAXIMUM OF SIXTY FEET.
9. ALL CONCRETE USED FOR PAVEMENT SHALL BE CLASS "A" CONCRETE AND A MINIMUM 4,000 PSI COMPRESSIVE STRENGTH AT TWENTY-EIGHT (28) DAYS, UNLESS OTHERWISE NOTED.
10. CLASS "A" HYDRATED LIME SHALL BE APPLIED FOR SUBGRADE STABILIZATION AT A MINIMUM OF SIX PERCENT (6%) BY WEIGHT.
11. CONTRACTOR SHALL INSTALL STREET SIGNS AND STOP SIGNS PER CITY OF MANVEL DESIGN CRITERIA MANUAL.
12. ALIGNMENTS, CENTERLINE CURVE DATA, AND STATIONING FOR ALL CONSTRUCTION SHALL BE DETERMINED FROM SUBDIVISION PLAT.
13. FOR ALL CONCRETE TO BE REMOVED, A TWO (2) INCH DEEP SAW CUT SHALL BE PROVIDED PRIOR TO REMOVAL.
14. REPRESENTATIVES FROM THE CITY OF MANVEL, THE OWNER AND THE TESTING LABORATORY SHALL BE PRESENT FOR ALL DENSITY TESTS, LIME OPERATIONS AND PLACEMENT OF CONCRETE PAVING. NO INSPECTABLE WORK CAN BE CONDUCTED ON SATURDAYS.
15. UNDER NO CIRCUMSTANCES SHALL WATER BE ADDED TO A CONCRETE LOAD AFTER SLUMP TEST AND/OR CONCRETE CYLINDERS HAVE BEEN TAKEN.
16. BLUE REFLECTORIZED PAVEMENT MARKERS SHALL BE PLACED AT FIRE HYDRANT LOCATIONS AND OFFSET SIX (6) INCHES FROM THE CENTERLINE OF THE ROADWAY. REFLECTORS SHALL FACE FLOW OF TRAFFIC.
17. FOR PAVEMENT WIDTHS LESS THAN OR EQUAL TO TWENTY-EIGHT (28) FEET BB OF CURBS:
 - 17.1. MINIMUM STABILIZED SUBGRADE THICKNESS SHALL BE SIX (6) INCHES.
 - 17.2. MINIMUM CONCRETE SLAB THICKNESS SHALL BE SIX (6) INCHES.
18. FOR PAVEMENT WIDTHS GREATER THAN TWENTY-EIGHT (28) FEET BB OF CURB AND ALL MAJOR ARTERIAL THOROUGHFARES:
 - 18.1. MINIMUM STABILIZED SUBGRADE THICKNESS SHALL BE EIGHT (8) INCHES.
 - 18.2. MINIMUM CONCRETE SLAB THICKNESS SHALL BE SEVEN (7) INCHES.

19. BLOCKOUTS SHALL BE INSTALLED AROUND ALL MANHOLES, JUNCTION BOXES, WATER VALVES, ETC. THAT ARE WITHIN THE PAVEMENT AREA. BLOCKOUTS SHALL EXCEED A MINIMUM OF SIX (6) INCHES PAST THE LARGEST DIMENSION OF THE ITEM THAT IS BEING BLOCKED OUT AND SHALL HAVE AN EXPANSION JOINT BETWEEN THE BLOCKOUT AND THE PAVING.

WATER LINES:

1. WATER LINE CONSTRUCTION AND TESTING IS TO BE PERFORMED IN ACCORDANCE WITH CITY OF MANVEL DESIGN CRITERIA MANUAL, LATEST REVISION.
2. ALL WATER MAINS SHALL HAVE A MINIMUM COVER OF FOUR (4) FEET MEASURED FROM CENTERLINE OF STREET OR EXISTING NATURAL GROUND WHICHEVER DEPTH IS GREATER, UNLESS OTHERWISE NOTED. WATER MAINS 16" AND LARGER SHALL HAVE A MINIMUM OF 5 FEET OF COVER.
3. PRESSURE TEST OF ALL WATER LINES SHALL BE AT 150 PSI FOR FOUR (4) HOURS AND WITNESSED BY THE CITY OF MANVEL PROJECT MANAGER, EXCEPT FIRE LINES WHICH SHALL BE TESTED AT 200 PSI FOR TWO (2) HOURS AND SHALL BE WITNESSED BY THE FIRE MARSHAL.
4. SINGLE METER SERVICE LINES SHALL BE ONE (1) INCH MINIMUM I.D., C.T.S. POLYETHYLE