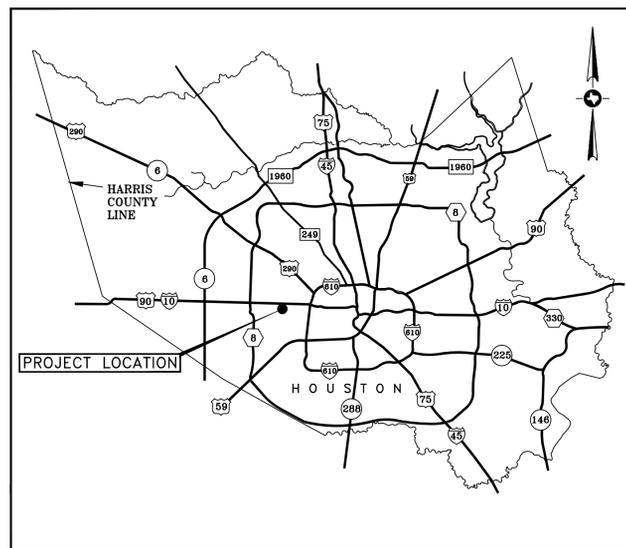


CITY OF BUNKER HILL VILLAGE

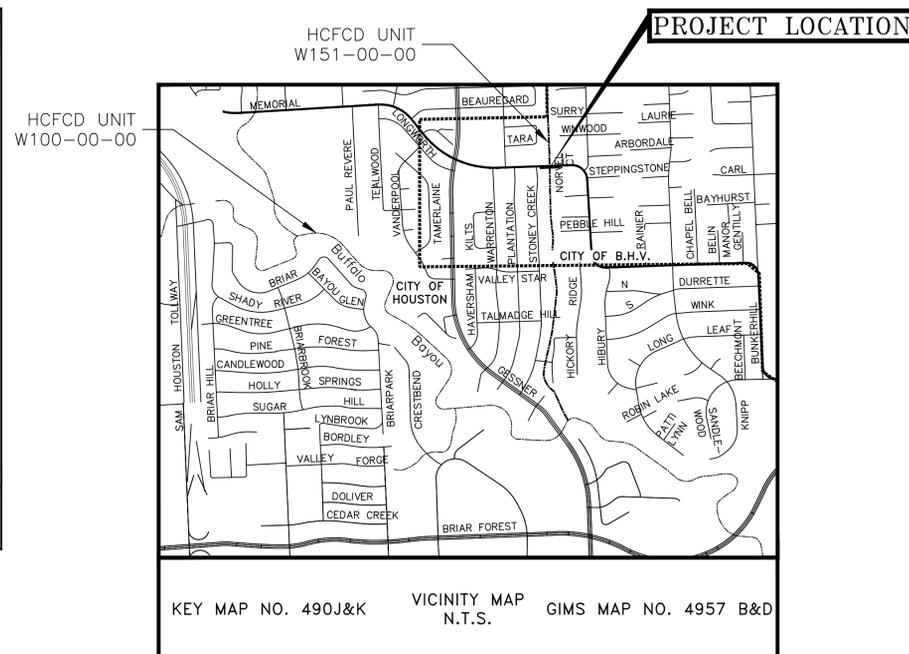
WASTEWATER REHABILITATION PROJECT

2016 SANITARY SEWER REHABILITATION

JOB NO. 200-016 CONTRACT. NO. 1



LOCATION MAP
NTS

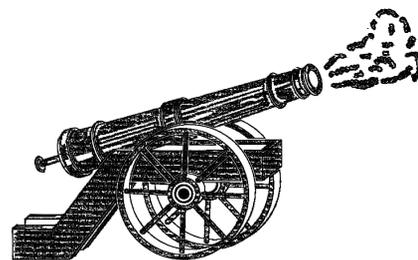


KEY MAP NO. 490J&K VICINITY MAP N.T.S. GIMS MAP NO. 4957 B&D

INDEX of DRAWINGS

Sheet	Description
1 of 8	COVER SHEET
2 of 8	GENERAL NOTES AND TCEQ NOTES
3 of 8	OVERALL LAYOUT
4 of 8	SANITARY SEWER PLAN SHEET 4
5 of 8	SANITARY SEWER PLAN SHEET 5
6 of 8	SANITARY SEWER PLAN SHEET 6
7 of 8	SANITARY SEWER PLAN SHEET 7 AND ADDITIONAL DETAIL
8 of 8	STANDARD SEWER DETAILS

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FEBRUARY 2016



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This document is released for purpose of interim review under the authority of JOHN K. DAVIS, P.E. No. 60888 on February 23, 2016. It is not to be used for construction/bidding purposes.

CENTERPOINT ENERGY NOTES

CAUTION: UNDERGROUND GAS FACILITIES

LOCATIONS OF CENTERPOINT ENERGY MAIN LINES (TO INCLUDE CENTERPOINT ENERGY, INTRASTATE PIPELINE, LLC. WHERE APPLICABLE) ARE SHOWN IN AN 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 CONFLICT ANALYSIS HAS BEEN MADE. THE CONTRACTOR SHALL CONTACT THE UTILITY COORDINATING COMMITTEE AT 1-800-545-6005, OR 811 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE MAIN AND SERVICE LINES FIELD LOCATED.

- WHEN CENTERPOINT ENERGY PIPE LINE MARKINGS ARE NOT VISIBLE, CALL (713) 945-8036 OR (713) 945-8037 (7:00 AM TO 4:30 PM) FOR STATUS OF LINE LOCATION REQUEST BEFORE EXCAVATION BEGINS.
- WHEN EXCAVATING WITHIN EIGHTEEN INCHES (18") OF THE INDICATED LOCATION OF CENTERPOINT ENERGY FACILITIES, ALL EXCAVATION MUST BE ACCOMPLISHED USING NON-MECHANIZED EXCAVATION PROCEDURES.
- WHEN CENTERPOINT ENERGY FACILITIES ARE EXPOSED, SUFFICIENT SUPPORT MUST BE PROVIDED TO THE FACILITIES TO PREVENT EXCESSIVE STRESS ON THE PIPING.
- FOR EMERGENCIES REGARDING GAS LINES CALL (713) 659-3552 OR (713) 207-4200

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

WARNING: OVERHEAD ELECTRICAL LINES

OVERHEAD LINES MAY EXIST ON THE PROPERTY. THE LOCATION OF OVERHEAD LINES HAS NOT BEEN SHOWN ON THESE DRAWINGS AS THE LINES ARE CLEARLY VISIBLE, BUT YOU SHOULD LOCATE THEM PRIOR TO BEGINNING ANY CONSTRUCTION. TEXAS LAW, SECTION 752, HEALTH & SAFETY CODE FORBIDS ACTIVITIES THAT OCCUR IN CLOSE PROXIMITY TO HIGH VOLTAGE LINES, SPECIFICALLY:

- ANY ACTIVITY WHERE PERSON OR THINGS MAY COME WITHIN SIX (6) FEET OF LIVE OVERHEAD HIGH VOLTAGE LINES; AND
- OPERATING A CRANE, DERRICK, POWER SHOVEL, DRILLING RIG, PILE DRIVER, HOISTING EQUIPMENT, OR SIMILAR APPARATUS WITHIN 10 FEET OF LIVE OVERHEAD HIGH VOLTAGE LINES.

PARTIES RESPONSIBLE FOR THE WORK, INCLUDING CONTRACTORS, ARE LEGALLY RESPONSIBLE FOR THE SAFETY OF CONSTRUCTION WORKERS UNDER THIS LAW. THIS LAW CARRIES BOTH CRIMINAL AND CIVIL LIABILITY. TO ARRANGE FOR LINES TO BE TURNED OFF OR REMOVED CALL CENTERPOINT ENERGY AT (713) 207-2222.

ACTIVITIES ON OR ACROSS CENTERPOINT ENERGY FEE OR EASEMENT PROPERTY

NO APPROVAL TO USE, CROSS OR OCCUPY CENTERPOINT FEE OR EASEMENT PROPERTY IS GIVEN. IF YOU NEED TO USE CENTERPOINT PROPERTY, PLEASE CONTACT OUR SURVEYING & RIGHT-OF-WAY DIVISION AT (713) 207-6248 OR (713) 207-5769.

REVISED NOVEMBER 2015

HARRIS COUNTY NOTES FOR ALL PROJECTS

- WATER LINES, WASTEWATER COLLECTION SYSTEMS, AND STORM DRAINAGE SYSTEMS SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE CITY OF HOUSTON'S, DEPARTMENT OF PUBLIC WORKS AND ENGINEERING DESIGN MANUAL, STANDARD CONSTRUCTION SPECIFICATIONS, AND DETAILS FOR WASTEWATER COLLECTION SYSTEMS, WATER LINES, STORM DRAINAGE AND STREET PAVING", DATED (NOVEMBER 1, 2008.)
 - THE CONTRACTOR(S) SHALL NOTIFY HARRIS COUNTY PUBLIC INFRASTRUCTURE DEPARTMENT - ARCHITECTURE AND ENGINEERING DIVISION - PERMIT OFFICE TWENTY-FOUR (24) HOURS IN ADVANCE OF COMMENCING UTILITY AND/OR PAVING CONSTRUCTION AT (713) 274-3823 AND WRITTEN NOTIFICATION FORTY-EIGHT (48) HOURS IN ADVANCE OF COMMENCING CONSTRUCTION AT 10555 NORTHWEST FREETWAY, SUITE 146, HOUSTON, TX 77092.
 - PAVING SHALL BE IN ACCORDANCE WITH THE "REGULATIONS OF HARRIS COUNTY, TEXAS FOR THE APPROVAL AND ACCEPTANCE OF INFRASTRUCTURE" AND/OR AMENDMENTS OF THE SAME.
 - GUIDELINES SET FORTH IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" SHALL BE OBSERVED.
 - OWNER OR OWNER'S AGENT TO OBTAIN ALL PERMITS REQUIRED BY THE "REGULATIONS OF HARRIS COUNTY, TEXAS FOR FLOOD PLAIN MANAGEMENT" PRIOR TO STARTING CONSTRUCTION.
 - OWNER OR OWNER'S AGENT TO OBTAIN ALL NOTIFICATIONS REQUIRED BY HARRIS COUNTY, TEXAS PRIOR TO STARTING CONSTRUCTION OF UTILITIES AND/OR CULVERTS WITHIN HARRIS COUNTY AND HARRIS COUNTY FLOOD CONTROL DISTRICT RIGHTS-OF-WAY.
- SOURCE: APPENDIX D FROM "REGULATIONS OF HARRIS COUNTY, TEXAS FOR THE APPROVAL AND ACCEPTANCE OF INFRASTRUCTURE" (AMENDED MAY 01, 2011)

BACKFILL

- ALL BACKFILL MATERIAL SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY.
- ALL SEWERS UNDER OR WITHIN ONE (1) FOOT OF EXISTING, PROPOSED, OR FUTURE PAVEMENT SHALL BE BACKFILLED WITH 1 1/2 SACK CEMENT/C.Y. STABILIZED SAND TO WITHIN ONE (1) FOOT OF SUBGRADE. THE REMAINING ONE FOOT SHALL BE BACKFILLED WITH SELECT MATERIALS LACED IN 8" MAXIMUM LAYERS AND COMPACTED TO A DENSITY OF 95% STANDARD PROCTOR.
- WATER LINES TO BE BACKFILLED WITH BANKSAND.

COMPACTION OF FILL

- THE PLACEMENT OF ANY FILL OR THE DISPOSAL OF ANY EXCESS MATERIAL ON ANY PORTION OF THIS PROJECT SHALL BE MADE IN 8" LIFTS, UNIFORMLY SPREAD AND COMPACTED TO 95% STANDARD PROCTOR DENSITY.
- ALL AREAS TO BE FILLED ARE TO BE FREE OF VEGETATION, DEBRIS, PONDED WATER, LOOSE SOILS, MUD & MUCK.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY ORGANIZED SEWAGE COLLECTION SYSTEM GENERAL CONSTRUCTION NOTES (REV 10-01-10)

- THIS ORGANIZED SEWAGE COLLECTION SYSTEM MUST BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY'S (TCEQ) EDWARDS AQUIFER RULES 30 TEXAS ADMINISTRATIVE CODE (TAC) §213.5(C), THE DESIGN CRITERIA FOR SEWERAGE SYSTEMS 30 TAC §217.1 & 30 TAC §217 SUBCHAPTER C, AND THE CITY OF HOUSTON STANDARD SPECIFICATIONS, ON ENVIRONMENTAL QUALITY'S (TCEQ) EDWARDS AQUIFER RULES 30 TEXAS ADMINISTRATIVE CODE (TAC) §213.5(C), THE DESIGN CRITERIA FOR SEWERAGE SYSTEMS 30 TAC §217.1 & 30 TAC §217 SUBCHAPTER C, AND THE MEMORIAL VILLAGES WATER AUTHORITY STANDARD SPECIFICATIONS.
- ALL CONTRACTORS CONDUCTING REGULATED ACTIVITIES ASSOCIATED WITH THIS PROPOSED REGULATED PROJECT MUST BE PROVIDED WITH COPIES OF THE SEWAGE COLLECTION (SCS) SYSTEM PLAN AND THE TCEQ LETTER INDICATING THE SPECIFIC CONDITIONS OF ITS APPROVAL. DURING THE COURSE OF THESE REGULATED ACTIVITIES, THE CONTRACTORS MUST BE REQUIRED TO KEEP ON-SITE COPIES OF THE PLAN AND THE APPROVAL LETTER.
- PRIOR TO COMMENCING ANY REGULATED ACTIVITY, THE APPLICANT OR HIS AGENT MUST NOTIFY THE AUSTIN REGIONAL OFFICE, IN WRITING, OF THE DATE ON WHICH THE REGULATED ACTIVITY WILL BEGIN.
- ANY MODIFICATION TO THE ACTIVITIES DESCRIBED IN THE REFERENCED SCS APPLICATION FOLLOWING THE DATE OF APPROVAL MAY REQUIRE THE SUBMITTAL OF AN SCS APPLICATION TO MODIFY THIS APPROVAL, INCLUDING THE PAYMENT OF APPROPRIATE FEES AND ALL INFORMATION NECESSARY FOR ITS REVIEW AND APPROVAL.
- THE TEMPORARY EROSION AND SEDIMENTATION CONTROLS MUST BE INSTALLED PRIOR TO INITIATING ANY OTHER CONSTRUCTION ACTIVITY AND MAINTAINED IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONSTRUCTION PLANS. ALL TEMPORARY EROSION AND SEDIMENTATION CONTROLS MUST BE REMOVED WHEN THE CONSTRUCTION AREA IS STABILIZED.
- THE SEWER LINE TRENCH DETAILS SHOWING THE CROSS SECTION WITH THE DIMENSIONS, PIPE PLACEMENT, AND BACKFILL INSTRUCTIONS ARE INCLUDED ON PLAN SHEET 26 OF 26 OF THESE PLANS. ALL SEWER PIPES JOINTS MUST MEET THE REQUIREMENTS IN 30 TAC §217 SUBCHAPTER C.

GRAVITY LINES MUST BE SDR 35 OR LESS. PRESSURIZED SEWER SYSTEMS MUST HAVE PIPE WITH A MINIMUM WORKING PRESSURE RATING OF 150 PSI.

THE ASTM, ANSI, OR AWWA SPECIFICATION NUMBERS FOR THE PIPE(S) AND JOINTS ARE ASTM D1248, ASTM D3350, ASTM D2122, ASTM D1784, ASTM D3034, ASTM D3212, ASTM D1785, ASTM D2466.

THE PIPE MATERIAL, THE PRESSURE CLASSES, AND THE SDR AND/OR DR DESIGNATIONS ARE PVC SCH 80 FITTINGS, PVC SCH40, HDPE SDR19.

- IF ANY SENSITIVE FEATURES ARE DISCOVERED DURING THE WASTEWATER LINE TRENCHING ACTIVITIES, ALL REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MUST BE SUSPENDED IMMEDIATELY. THE OWNER MUST NOTIFY THE APPROPRIATE REGIONAL OFFICE OF THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY IN WRITING WITHIN TWO WORKING DAYS OF THE FEATURE DISCOVERY. THE APPLICANT MUST SUBMIT A PLAN FOR ENSURING THE STRUCTURAL INTEGRITY OF THE SEWER LINE OR FOR MODIFYING THE PROPOSED COLLECTION SYSTEM ALIGNMENT AROUND THE FEATURE. THE REGULATED ACTIVITIES NEAR THE SENSITIVE FEATURE MAY NOT PROCEED UNTIL THE EXECUTIVE DIRECTOR HAS REVIEWED AND APPROVED THE METHODS PROPOSED TO PROTECT THE SENSITIVE FEATURE AND THE EDWARDS AQUIFER FROM ANY POTENTIALLY ADVERSE IMPACTS TO WATER QUALITY WHILE MAINTAINING THE STRUCTURAL INTEGRITY OF THE LINE.
- SEWER LINES LOCATED WITHIN OR CROSSING THE 5-YEAR FLOODPLAIN OF A DRAINAGEWAY WILL BE PROTECTED FROM INUNDATION AND STREAM VELOCITIES WHICH COULD CAUSE EROSION AND SCOURING OF BACKFILL. THE TRENCH MUST BE CAPPED WITH CONCRETE TO PREVENT SCOURING OF BACKFILL, OR THE SEWER LINES MUST BE ENCASED IN CONCRETE. ALL CONCRETE SHALL HAVE A MINIMUM THICKNESS OF SIX (6) INCHES.
- BLASTING PROCEDURES FOR PROTECTION OF EXISTING SEWER LINES AND OTHER UTILITIES WILL BE IN ACCORDANCE WITH THE NATIONAL FIRE PROTECTION ASSOCIATION CRITERIA. SAND IS NOT ALLOWED AS BEDDING OR BACKFILL IN TRENCHES THAT HAVE BEEN BLASTED. IF ANY EXISTING SEWER LINES ARE DAMAGED, THE LINES MUST BE REPAIRED AND RETESTED.
- ALL MANHOLES CONSTRUCTED OR REHABILITATED ON THIS PROJECT MUST HAVE WATERTIGHT SIZE ON SIZE RESILIENT CONNECTORS ALLOWING FOR DIFFERENTIAL SETTLEMENT. IF MANHOLES ARE CONSTRUCTED WITHIN THE 100-YEAR FLOOD-PLAIN, THE COVER MUST HAVE A GASKET AND BE BOLTED TO THE RING. WHERE GASKETED MANHOLE COVERS ARE REQUIRED FOR MORE THAN THREE MANHOLES IN SEQUENCE OR FOR MORE THAN 1500 FEET, ALTERNATE MEANS OF VENTING WILL BE PROVIDED. BRICKS ARE NOT AN ACCEPTABLE CONSTRUCTION MATERIAL FOR ANY PORTION OF THE MANHOLE.

THE DIAMETER OF THE MANHOLES MUST BE A MINIMUM OF FOUR FEET AND THE MANHOLE COVERS MUST HAVE A MINIMUM NOMINAL DIAMETER OF TWO FEET. THESE DIMENSIONS AND OTHER DETAILS SHOWING COMPLIANCE WITH THE COMMISSION'S RULES CONCERNING MANHOLES AND SEWER LINE/MANHOLE INVERTS DESCRIBED IN 30 TAC 217.55(L)(2) DESCRIBED IN 30 TAC 217.55(L)(2) ARE INCLUDED ON PLAN SHEET 26 OF 26.

IT IS SUGGESTED THAT ENTRANCE INTO MANHOLES IN EXCESS OF FOUR FEET DEEP BE ACCOMPLISHED BY MEANS OF A PORTABLE LADDER. WHERE STEPS ARE USED, THEY SHALL BE MADE OF A NON-CORROSIVE MATERIAL AND BE IN ACCORDANCE WITH APPLICABLE OSHA SPECIFICATIONS.

- WHERE WATER LINES AND NEW SEWER LINE ARE INSTALLED WITH A SEPARATION DISTANCE CLOSER THAN NINE FEET (I.E., WATER LINES CROSSING WASTEWATER LINES, WATER LINES PARALLELING WASTEWATER LINES, OR WATER LINES NEXT TO MANHOLES) THE INSTALLATION MUST MEET THE REQUIREMENTS OF 30 TAC §217.53 OR 30 TAC §290.44(E) LOCATION OF WATERLINES.
 - WHERE SEWERS LINES DEVIATE FROM STRAIGHT ALIGNMENT AND UNIFORM GRADE ALL CURVATURE OF SEWER PIPE MUST BE ACHIEVED BY A PROCEDURE APPROVED BY THE PIPE MANUFACTURER.
 - IF PIPE FLEXURE IS PROPOSED, THE METHOD OF PREVENTING DEFLECTION OF THE JOINT SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION.
- SPECIFIC CARE MUST BE TAKEN TO ENSURE THAT THE JOINT IS PLACED IN THE CENTER OF THE TRENCH AND PROPERLY BEDDED IN ACCORDANCE WITH 30 TAC §217.54(A).

NEW SEWAGE COLLECTION SYSTEM LINES MUST BE CONSTRUCTED WITH "STUB OUTS" FOR THE CONNECTION OF ANTICIPATED EXTENSIONS. THE LOCATION OF SUCH "STUB OUTS" MUST BE MARKED ON THE GROUND SUCH THAT THE LOCATION OF SUCH "STUB OUTS" CAN BE EASILY DETERMINED AT THE TIME OF CONNECTION OF THE EXTENSIONS. SUCH "STUB OUTS" MUST BE MANUFACTURED WYES OR TEES THAT ARE COMPATIBLE IN SIZE AND MATERIAL WITH BOTH THE SEWER LINE AND THE EXTENSION. AT THE TIME OF ORIGINAL CONSTRUCTION, NEW "STUB-OUTS" MUST BE CONSTRUCTED SUFFICIENTLY TO EXTEND BEYOND THE EDGE(S) OF ANY STREET PAVEMENT UNDER WHICH THEY WILL PASS TO THE PROPERTY LINE. ALL "STUB-OUTS" MUST BE SEALED WITH A MANUFACTURED CAP TO PREVENT LEAKAGE. EXTENSIONS THAT WERE NOT ANTICIPATED AT THE TIME OF ORIGINAL CONSTRUCTION OR THAT ARE TO BE CONNECTED TO AN EXISTING SEWER LINE NOT FURNISHED WITH "STUB OUTS" MUST BE CONNECTED USING A MANUFACTURED SADDLE AND IN ACCORDANCE WITH ACCEPTED PLUMBING TECHNIQUES.

IF NO STUB-OUT IS PRESENT AN ALTERNATE METHOD OF JOINING LATERALS IS SHOWN IN THE DETAIL ON PLAN SHEET THE PRIVATE SERVICE LATERAL STUB-OUTS MUST BE INSTALLED AS SHOWN IN THE STANDARD SANITARY SEWER CONSTRUCTION DETAILS AND MARKED AFTER BACKFILLING.

- TRENCHING, BEDDING AND BACKFILL MUST CONFORM WITH 30 TAC §217.54. THE BEDDING AND BACKFILL FOR FLEXIBLE PIPE MUST COMPLY WITH THE STANDARDS OF ASTM D-2321, CLASSES IA, IB, II OR III. RIGID PIPE BEDDING MUST COMPLY WITH THE REQUIREMENTS OF ASTM C 12 (ANSI A 106.2) CLASSES A, B OR C.
- SEWER LINES MUST BE TESTED FROM MANHOLE TO MANHOLE. WHEN A NEW SEWER LINE IS CONNECTED TO AN EXISTING STUB OR CLEAN-OUT, IT MUST BE TESTED FROM EXISTING MANHOLE TO NEW MANHOLE. IF A STUB OR CLEAN-OUT IS USED AT THE END OF THE PROPOSED SEWER LINE, NO PRIVATE SERVICE ATTACHMENTS MAY BE CONNECTED BETWEEN THE LAST MANHOLE AND THE CLEANOUT UNLESS IT CAN BE CERTIFIED AS CONFORMING WITH THE PROVISIONS OF 30 TAC §213.5(c)(3)(E).

- ALL SEWER LINES MUST BE TESTED IN ACCORDANCE WITH 30 TAC §217.57. THE ENGINEER MUST RETAIN COPIES OF ALL TEST RESULTS WHICH MUST BE MADE AVAILABLE TO THE EXECUTIVE DIRECTOR UPON REQUEST. THE ENGINEER MUST CERTIFY IN WRITING THAT ALL WASTEWATER LINES HAVE PASSED ALL REQUIRED TESTING TO THE APPROPRIATE REGIONAL OFFICE WITHIN 30 DAYS OF TEST COMPLETION AND PRIOR TO USE OF THE NEW COLLECTION SYSTEM. TESTING WILL BE:
 - (a) FOR A COLLECTION SYSTEM PIPE THAT WILL TRANSPORT WASTEWATER BY GRAVITY FLOW, THE DESIGN MUST SPECIFY AN INFILTRATION AND EXFILTRATION TEST OR A LOW-PRESSURE AIR TEST. A TEST MUST CONFORM TO THE FOLLOWING REQUIREMENTS:
 - (1) LOW PRESSURE AIR TEST.
 - (A) A LOW PRESSURE AIR TEST MUST FOLLOW THE PROCEDURES DESCRIBED IN AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) C-928, ASTM C-924, OR ASTM F-1411 OR OTHER PROCEDURE APPROVED BY THE EXECUTIVE DIRECTOR, EXCEPT AS TO TESTING TIMES AS REQUIRED IN TABLE C.3 IN SUBPARAGRAPH (C) OF THIS PARAGRAPH OR EQUATION C.3 IN PARAGRAPH (B)(II) OF THIS PARAGRAPH.
 - (B) FOR SECTIONS OF COLLECTION SYSTEM PIPE LESS THAN 36-INCH AVERAGE INSIDE DIAMETER, THE FOLLOWING PROCEDURE MUST APPLY, UNLESS THE PIPE IS TO BE TESTED AS REQUIRED BY PARAGRAPH (2) OF THIS SUBSECTION.
 - (i) A PIPE MUST BE PRESSURIZED TO 3.5 POUNDS PER SQUARE INCH (PSI) GREATER THAN THE PRESSURE EXERTED BY GROUNDWATER ABOVE THE PIPE.
 - (ii) ONCE PRESSURE IS STABILIZED, THE MINIMUM TIME ALLOWABLE FOR THE PRESSURE TO DROP FROM 3.5 PSI GAUGE TO 2.5 PSI GAUGE IS COMPUTED FROM THE FOLLOWING EQUATION:

$$\text{EQUATION C.3} \quad T = \frac{0.085 \times D \times K}{Q}$$

WHERE:

- T = TIME FOR PRESSURE TO DROP 1.0 POUND PER SQUARE INCH GAUGE IN SECONDS
- K = 0.000419 X D X D X L, BUT NOT LESS THAN 1.0
- D = AVERAGE INSIDE PIPE DIAMETER IN INCHES
- L = LENGTH OF LINE OF SAME SIZE BEING TESTED, IN FEET
- Q = RATE OF LOSS, 0.0015 CUBIC FEET PER MINUTE PER SQUARE FOOT INTERNAL SURFACE

(C) SINCE A K VALUE OF LESS THAN 1.0 MAY NOT BE USED, THE MINIMUM TESTING TIME FOR EACH PIPE DIAMETER IS SHOWN IN THE FOLLOWING TABLE C.3:

PIPE DIAMETER (INCHES)	MINIMUM TIME (SECONDS)	MAXIMUM LENGTH FOR MINIMUM TIME (FEET)	TIME FOR LENGTH (SEC/FOOT)
6	340	398	0.855(L)
8	454	298	1.520(L)
10	567	239	2.374(L)
12	680	199	3.419(L)
15	850	159	5.342(L)
18	1020	133	7.693(L)
21	1190	114	10.471(L)
24	1360	100	13.676(L)
27	1530	88	17.309(L)
30	1700	80	21.369(L)
33	1870	72	25.856(L)

- AN OWNER MAY STOP A TEST IF NO PRESSURE LOSS HAS OCCURRED DURING THE FIRST 25% OF THE CALCULATED TESTING TIME.
- IF ANY PRESSURE LOSS OR LEAKAGE HAS OCCURRED DURING THE FIRST 25% OF A TESTING PERIOD, THEN THE TEST MUST CONTINUE FOR THE ENTIRE TEST DURATION AS OUTLINED ABOVE OR UNTIL FAILURE.
- WASTEWATER COLLECTION SYSTEM PIPES WITH A 27-INCH OR LARGER AVERAGE INSIDE DIAMETER MAY BE AIR TESTED AT EACH JOINT INSTEAD OF FOLLOWING THE PROCEDURE OUTLINED IN THE SECTION.
- A TESTING PROCEDURE FOR PIPE WITH THE INSIDE DIAMETER GREATER THAN 33 INCHES MUST BE APPROVED BY THE EXECUTIVE DIRECTOR.

- INFILTRATION OR EXFILTRATION TESTS.
 - (A) THE TOTAL EXFILTRATION, AS DETERMINED BY A HYDROSTATIC HEAD TEST, MUST NOT EXCEED 50 GALLONS GALLONS PER INCH DIAMETER PER MILE OF PIPE PER 24 HOURS AT A MINIMUM TEST HEAD OF 2.0 FEET ABOVE THE CROWN OF THE PIPE AT THE UPSTREAM MANHOLE.
 - (B) AN OWNER SHALL USE AN INFILTRATION TEST IN LIEU OF AN EXFILTRATION TEST WHEN PIPES ARE INSTALLED BELOW THE GROUNDWATER LEVEL.
 - (C) THE TOTAL EXFILTRATION, AS DETERMINED BY A HYDROSTATIC HEAD TEST, MUST NOT EXCEED 50 GALLONS PER INCH DIAMETER PER MILE OF PIPE PER 24 HOURS AT A MINIMUM TEST HEAD OF TWO FEET ABOVE THE CROWN OF A PIPE AT AN UPSTREAM MANHOLE, OR AT LEAST TWO FEET ABOVE EXISTING GROUNDWATER LEVEL, WHICHEVER IS GREATER.
 - (D) FOR CONSTRUCTION WITHIN A 25-YEAR FLOOD PLAIN, THE INFILTRATION OD EXFILTRATION MUST NOT EXCEED 10 GALLONS PER SQUARE DIAMETER PER MILE OF PIPE PER 24 HOURS AT THE SAME MINIMUM TEST HEAD AS IN SUBPARAGRAPH (C) OF THIS PARAGRAPH.
 - (E) IF THE QUANTITY OF INFILTRATION OF EXFILTRATION EXCEEDS THE MAXIMUM QUANTITY SPECIFIED, AN OWNER SHALL UNDERTAKE REMEDIAL ACTION IN ORDER TO REDUCEN INFILTRATION OR EXFILTRATION TO AN AMOUNT WITHIN THE LIMITS SPECIFIED. AN OWNER SHALL RETEST A PIPE FOLLOWING A REMEDIATION ACTION.

(b) IF A GRAVITY COLLECTION PIPE IS COMPOSED OF FLEXIBLE PIPE, DEFLECTION TESTING IS ALSO REQUIRED. THE FOLLOWING PROCEDURE MUST BE FOLLOWED:

- FOR A COLLECTION PIPE WITH INSIDE DIAMETER LESS THAN 27 INCHES, DEFLECTION MEASUREMENT REQUIRES A RIGID MANDREL.
 - (A) MANDREL SIZING.
 - (i) THE RIGID MANDREL SHALL HAVE AN OUTSIDE DIAMETER (O.D.) NOT LESS THAN 95% OF THE BASE INSIDE DIAMETER (I.D.) OR AVERAGE ID OF A PIPE, AS SPECIFIED IN THE APPROPRIATE STANDARD BY THE ASTM'S, AMERICAN WATER WORKS ASSOCIATION, UNI-BELL, OR AMERICAN NATIONAL STANDARDS INSTITUTE, OR ANY RELATED AGENCY.
 - (ii) IF MANDREL DIAMETER IS NOT SPECIFIED IN THE APPROPRIATE STANDARD, THE MANDREL MUST HAVE AN EQUAL TO 95% OF THE ID OF A PIPE. IN THIS CASE, THE ID OF THE PIPE, FOR THE PURPOSE OF DETERMINING THE OD OF THE MANDREL, MUST EQUAL BE THE AVERAGE OUTSIDE DIAMETER MINUS TWO MINIMUM WALL THICKNESSES FOR OD CONTROLLED PIPE AND THE AVERAGE INSIDE DIAMETER FOR ID CONTROLLED PIPE.
 - (iii) ALL DIMENSIONS MUST MEET THE APPROPRIATE STANDARD.
 - (B) MANDREL DESIGN.
 - (i) A RIGID MANDREL MUST BE CONSTRUCTED OF A METAL OR A RIGID PLASTIC MATERIAL THAT CAN WITHSTAND 200 PSI WITHOUT BEING DEFORMED.
 - (ii) A RIGID MANDREL MUST HAVE NINE OR MORE ODD NUMBER OF RUNNERS OR LEGS.
 - (iii) A BARREL SECTION LENGTH MUST EQUAL AT LEAST 75% OF THE INSIDE DIAMETER OF A PIPE.
 - (iv) EACH SIZE MANDREL MUST USE A SEPARATE PROVING RING.
 - (C) MANDREL OPTIONS.
 - (i) AN ADJUSTABLE OR FLEXIBLE MANDREL IS PROHIBITED.
 - (ii) A TEST MAY NOT USE TELEVISION INSPECTION AS A SUBSTITUTE FOR A DEFLECTION TEST.
 - (iii) IF REQUESTED, THE EXECUTIVE DIRECTOR MAY APPROVE THE USE OF A DEFLECTOMETER OR A MANDREL WITH REMOVABLE LEGS OR RUNNERS ON A CASE-BY-CASE BASIS.

- FOR A GRAVITY COLLECTION SYSTEM PIPE WITH AN INSIDE DIAMETER 27 INCHES AND GREATER, OTHER TEST MAY BE USED TO DETERMINE VERTICAL DEFLECTION.
 - (3) A DEFLECTION TEST METHOD MUST BE ACCURATE TO WITHIN PLUS OR MINUS 0.2% DEFLECTION.
 - (4) AN OWNER SHALL NOT CONDUCT A DEFLECTION TEST UNTIL AT LEAST 30 DAYS AFTER THE FINAL BACKFILL.
 - (5) GRAVITY COLLECTION SYSTEM PIPE DEFLECTION MUST NOT EXCEED FIVE PERCENT (5%).
 - (6) IF A PIPE SECTION FAILS A DEFLECTION TEST, AN OWNER SHALL CORRECT THE PROBLEM AND CONDUCT A SECOND TEST AFTER THE FINAL BACKFILL HAS BEEN IN PLACE AT LEAST 30 DAYS.

- ALL MANHOLES MUST BE TESTED TO MEET OR EXCEED THE REQUIREMENTS OF 30 TAC §217.58.
 - (a) ALL MANHOLES MUST PASS A LEAKAGE TEST.
 - (b) AN OWNER SHALL TEST EACH MANHOLE (AFTER ASSEMBLY AND BACKFILLING) FOR LEAKAGE, SEPARATE AND INDEPENDENT INFILTRATION SYSTEM PIPES, BY HYDROSTATIC EXFILTRATION TESTING, VACUUM TESTING, OR OTHER METHOD APPROVED BY THE EXECUTIVE DIRECTOR.

- HYDROSTATIC TESTING.
 - (A) THE MAXIMUM LEAKAGE FOR HYDROSTATIC TESTING OR ANY ALTERNATIVE TEST METHODS IS 0.025 GALLONS PER FOOT DIAMETER PER FOOT OF MANHOLE DEPTH PER HOUR.
 - (B) TO PERFORM A HYDROSTATIC EXFILTRATION TEST, AN OWNER SHALL SEAL ALL WASTEWATER PIPES COMING INTO A MANHOLE WITH AN INTERNAL PIPE PLUG, FILL THE MANHOLE WITH WATER, AND MAINTAIN THE TEST FOR AT LEAST ONE HOUR.
 - (C) THE TEST FOR CONCRETE MANHOLES MAY USE 24-HOUR WETTING PERIOD BEFORE TESTING TO ALLOW SATURATION OF THE CONCRETE.
- VACUUM TESTING.
 - (A) TO PERFORM A VACUUM TEST, AN OWNER SHALL PLUG ALL LIFTS HOLES AND EXTERIOR JOINTS WITH A NON-SHRINK GROUT AND PLUG ALL PIPES ENTERING A MANHOLE.
 - (B) NO GROUT MUST BE PLACED IN HORIZONTAL JOINTS BEFORE TESTING.
 - (C) STUB-OUTS, MANHOLE BOOTS, AND PIPING PLUGS MUST BE SECURED TO PREVENT MOVEMENT WHILE A VACUUM IS DRAWN.
 - (D) AN OWNER SHALL USE A MINIMUM 60 INCH/18 TORQUE WRENCH TO TIGHTEN THE EXTERNAL CLAMPS THAT SECURE A TEST COVER TO THE TOP OF MANHOLE.
 - (E) A TEST HEAD MUST BE PLACED AT THE INSIDE OF THE TOP OF A CONE SECTION, AND THE SEAL INFLATED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
 - (F) THERE MUST BE A VACUUM OF 10 INCHES OF MERCURY INSIDE A MANHOLE TO PERFORM A VALID TEST.
 - (G) A TEST DOES NOT BEGIN UNTIL AFTER THE VACUUM PUMP IS OFF.
 - (H) A MANHOLE PASSES THE TEST IF AFTER 2.0 MINUTES AND WITH ALL VALVES CLOSED, THE VACUUM IS AT LEAST 9.0 INCHES OF MERCURY.

- ALL PRIVATE SERVICE LATERALS MUST BE INSPECTED AND CERTIFIED IN ACCORDANCE WITH 30 TAC §213.5(C)(1). AFTER INSTALLATION OF AND, PRIOR TO COVERING AND CONNECTING A PRIVATE SERVICE LATERAL TO AN EXISTING ORGANIZED SEWAGE COLLECTION SYSTEM, A TEXAS LICENSED PROFESSIONAL ENGINEER, TEXAS REGISTERED SANITARIAN, OR APPROPRIATE CITY INSPECTOR MUST VISUALLY INSPECT THE PRIVATE SERVICE LATERAL AND THE CONNECTION TO THE SEWAGE COLLECTION SYSTEM, AND CERTIFY THAT IT IS CONSTRUCTED IN CONFORMITY WITH THE APPLICABLE PROVISIONS OF THIS SECTION. THE OWNER OF THE COLLECTION SYSTEM MUST MAINTAIN SUCH CERTIFICATIONS FOR FIVE YEARS AND FORWARD COPIES TO THE APPROPRIATE REGIONAL OFFICE UPON REQUEST. CONNECTIONS MAY ONLY BE MADE TO AN APPROVED SEWAGE COLLECTION SYSTEM.

AT&T / SWBT FACILITIES

- THE LOCATIONS OF AT&T TEXAS/SWBT FACILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION BEFORE COMMENCING WORK. HE AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND UTILITIES.
- THE CONTRACTOR SHALL CALL 1-800-344-8377 (TEXAS 811) A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD LOCATED.
- WHEN EXCAVATING WITHIN EIGHTEEN INCHES (18") OF THE INDICATED LOCATION OF AT&T TEXAS/SWBT FACILITIES, ALL EXCAVATIONS MUST BE ACCOMPLISHED USING NON-MECHANIZED EXCAVATION PROCEDURES. WHEN BORING, THE CONTRACTOR SHALL EXPOSE THE AT&T TEXAS/SWBT FACILITIES.
- WHEN AT&T TEXAS/SWBT FACILITIES ARE EXPOSED, THE CONTRACTOR WILL PROVIDE SUPPORT TO PREVENT DAMAGE TO THE CONDUIT DUCTS OR CABLES. WHEN EXCAVATING NEAR TELEPHONE POLES THE CONTRACTOR SHALL BRACE THE POLE FOR SUPPORT.
- THE PRESENCE OR ABSENCE OF AT&T TEXAS/SWBT UNDERGROUND CONDUIT FACILITIES OR BURIED CABLE FACILITIES SHOWN ON THESE PLANS DOES NOT MEAN THAT THERE ARE NO DIRECT BURIED CABLES OR OTHER CABLES IN CONDUIT IN THE AREA.
- PLEASE CONTACT THE AT&T TEXAS DAMAGE PREVENTION MANAGER ROOSEVELT LEE JR. AT (713) 567-4552 OR EMAIL HIM AT r17259@att.com, IF THERE ARE ANY QUESTIONS ABOUT BORING OR EXCAVATING NEAR OUR AT&T TEXAS/SWBT FACILITIES.

REVISED 10-21-15

HARRIS COUNTY TRAFFIC CONTROL GENERAL NOTES

- THE CONTRACTOR SHALL PROVIDE AND INSTALL TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH PART VI OF TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD - LATEST EDITION WITH REVISIONS) DURING CONSTRUCTION.
 - THE CONTRACTOR SHALL MAINTAIN AT LEAST ONE LANE OF TRAFFIC IN EACH DIRECTION DURING WORKING HOURS EXCEPT DURING FLAGGING OPERATION OR PROVIDE DETOURS AROUND THE CONSTRUCTION SITE AND PROVIDE PUBLIC NOTIFICATION.
 - NO LANES SHALL BE BLOCKED FROM 7 A.M. TO 9 A.M. AND 4 P.M. TO 6:30 P.M. MONDAY THROUGH FRIDAY.
 - DETOURS REQUIRE PRIOR APPROVAL OF THE FIELD ENGINEER AND PRECINCT. DETOUR PLANS, IF ALLOWED, MUST INCLUDE APPROPRIATE DETOUR SIGNAGE, PUBLIC NOTICE VIA SIGNAGE TWO WEEKS IN ADVANCE STATING THE DATES OF THE AGREED UPON DATE OF CLOSURE AND DATE THE ROAD WILL RE-OPEN TO TRAFFIC. CONTRACTOR TO USE (WITH PRIOR APPROVAL OF THE FIELD ENGINEER) HIGH EARLY STRENGTH CONCRETE AND OTHER RELATED CONSTRUCTION METHODS TO MINIMIZE THE DURATION OF THE DETOUR AND TO ENSURE THAT THE ROADWAY IS OPEN ON, OR PRIOR TO, THE AGREED UPON DATE.
 - ONE DAY PRIOR TO THE IMPLEMENTATION OF A TRAFFIC CONTROL PLAN PHASE OR STEP, OR THE IMPLEMENTATION OF AN ADDITIONAL, REVISED, OR NEW TRAFFIC CONTROL ELEMENT, THE CONTRACTOR SHALL MEET WITH THE ENGINEER TO GIVE A DETAILED DESCRIPTION OF THE CONTRACTOR'S PLAN AND PREPARATIONS. THE CONTRACTOR SHALL OBTAIN WRITTEN CONCURRENCE FROM THE ENGINEER THAT ADEQUATE PROJECT PROGRESS HAS BEEN ACHIEVED AND THAT ADEQUATE PREPARATIONS ARE IN PLACE PRIOR TO SWITCHING TRAFFIC. IF, IN THE OPINION OF THE ENGINEER, REQUIRED PROGRESS AND ADEQUATE PREPARATIONS ARE NOT COMPLETE, THE CONTRACTOR SHALL NOT IMPLEMENT THE NEXT PHASE, STEP, OR ELEMENT OF TRAFFIC CONTROL UNTIL INCOMPLETE CONSTRUCTION ITEMS OR PREPARATIONS ARE COMPLETED. TIME EXTENSIONS WILL NOT BE GRANTED FOR DELAYS CAUSED BY THE INCOMPLETE CONSTRUCTION ITEMS OR INADEQUATE CONTRACTOR PREPARATIONS REQUIRED TO IMPLEMENT TRAFFIC CONTROL.
 - TRAFFIC CONTROL PER THE CONTRACT IS REQUIRED FOR THE ENTIRE DURATION OF THE PROJECT, INCLUDING THE PUNCHLIST PERIOD. PAYMENT FOR TRAFFIC CONTROL THAT IS PROPERLY INSTALLED FOR LESS THAN A FULL MONTH SHALL BE BASED ON A PERCENTAGE BASIS OF THE TIME INSTALLED. TRAFFIC CONTROL PAYMENTS TO THE CONTRACTOR SHALL END 10 DAYS AFTER SUBSTANTIAL COMPLETION, ALTHOUGH PROPER TRAFFIC CONTROL MUST BE MAINTAINED UNTIL PUNCHLIST COMPLETION.
 - THE PURPOSE OF THE CONSTRUCTION SEQUENCE AND TRAFFIC HANDLING OUTLINED HEREIN IS TO DOCUMENT A VIABLE TOP THAT CAN BE UTILIZED TO CONSTRUCT THE PROJECT. IT IS THE BASIS OF ESTIMATION FOR THE TRAFFIC CONTROL BID ITEMS, AND IS TO BE UTILIZED AND IMPLEMENTED, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
- IF THE CONTRACTOR CHOOSES TO USE A DIFFERENT TCP, HE/SHE SHALL PREPARE AND SUBMIT THE ALTERNATIVE TCP TO THE COUNTY FOR APPROVAL NO LESS THAN 10 WORKING DAYS PRIOR TO THE PROPOSED IMPLEMENTATION DATE. THE TCP SHALL BE DRAWN TO SCALE AND SIGNED & SEALED BY A PROFESSIONAL ENGINEER LICENSED TO PRACTICE IN THE STATE OF TEXAS. UPON APPROVAL BY HARRIS COUNTY, THE ALTERNATIVE PLAN SHALL BECOME THE BASIS FOR A "CHANGE IN CONTRACT" TO REVISE THE TRAFFIC CONTROL BID ITEMS ACCORDINGLY AND BECOME PART OF THE CONTRACT DOCUMENTS.
- SOURCE: HARRIS COUNTY ENGINEERING DEPARTMENT STANDARD CIVIL DRAWINGS SHEET 3 (UPDATED APRIL 01, 2015)

TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED, CALL CENTERPOINT ENERGY AT 713-207-2222.

NOTICE:
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VERIFICATION OF PRIVATE UTILITY LINES	
Date:	
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Date:	
Approved for AT&T Texas/SWBT underground conduit facilities only. Signature Valid for one year.	

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CITY OF BUNKER HILL VILLAGE
WASTEWATER REHABILITATION PROJECT
2016 SANITARY SEWER REHABILITATION
GENERAL NOTES AND
TCEQ NOTES

DESIGN :	J.L.	JOB NO. :	200-016	CONT. NO. :	001
DRAWN :	S.H.C	DATE :	FEBRUARY 2016		
CHECKED :	M.J.H./N.G.	SCALE :	1:60	VERT. :	
APPROVED :	J.K.D.				
		SHEET NO. :	2	OF :	8

E:\Current Proj\200-016 #102 GENERAL NOTES AND TCEQ NOTES.dwg Feb 23, 2016 - 8:19am stevens

E:\Current Proj\200-016 #\Overall Layout.dwg Feb 23, 2016-8:21am stevenc



CO	CLEAN OUT
CONC	CONCRETE
ELEC	ELECTRIC
ESMT	EASEMENT
EXIST	EXISTING
FT	FEET
LF	LINEAR FEET
HDPE	HIGH DENSITY POLYETHYLENE
MH	MANHOLE
NTS	NOT TO SCALE
PROP	PROPOSED
REHAB	REHABILITATION
ROW	RIGHT OF WAY
PVC	POLYVINYL CHLORIDE
SAN	SANITARY
STD	STANDARD
TYP	TYPICAL
UATL	UNABLE TO LOCATE
UATO	UNABLE TO OPEN
UE	UTILITY EASEMENT
UG	UNDERGROUND



0 100 200
GRAPHIC SCALE

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Date:
Approved for AT&T Texas/SWBt underground conduit facilities only. Signature Valid for one year.

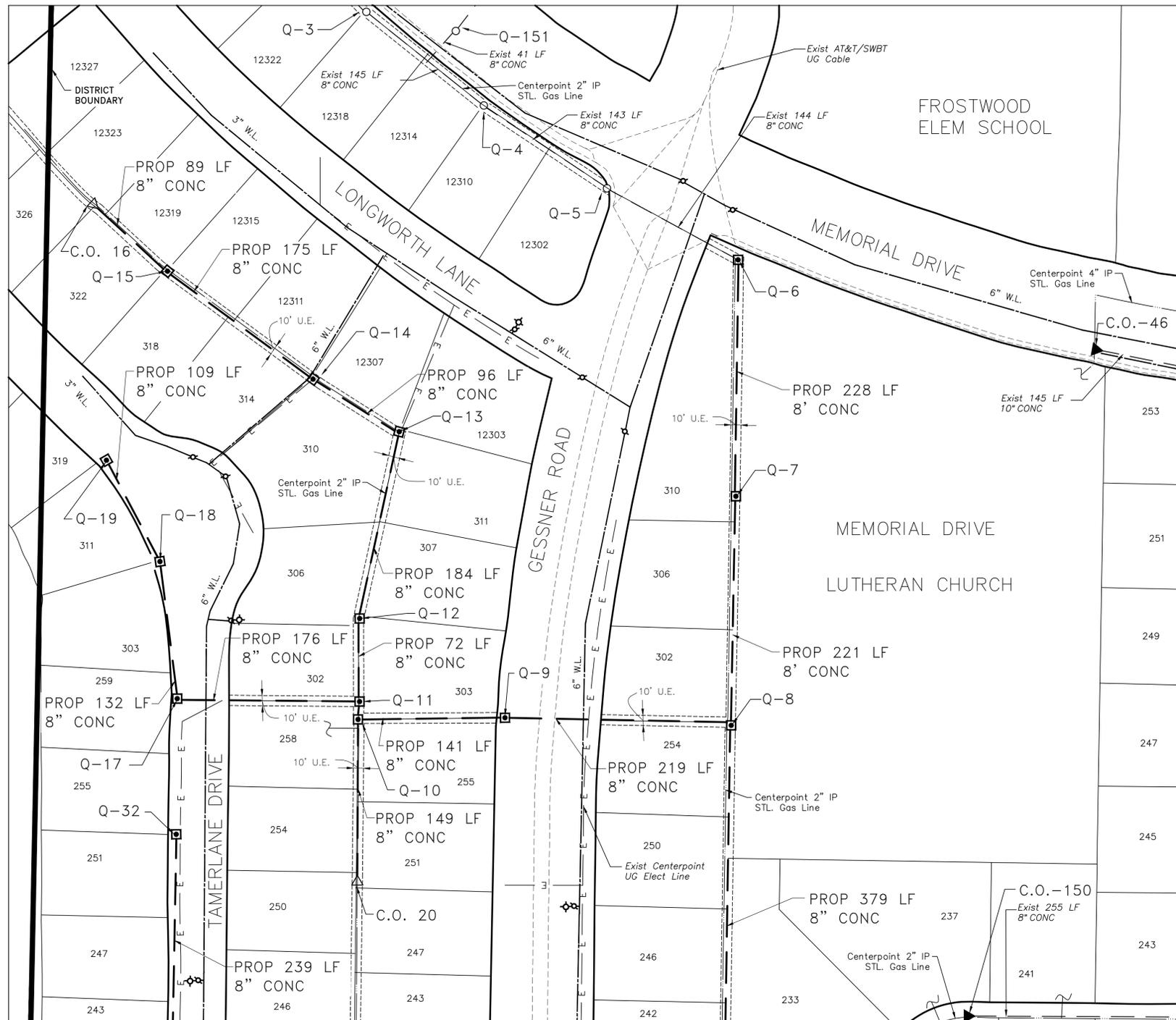
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CITY OF BUNKER HILL VILLAGE
WASTEWATER REHABILITATION PROJECT
2016 SANITARY SEWER REHABILITATION
OVERALL LAYOUT

LANGFORD ENGINEERING INC.
Consulting Engineers
1080 W. Sam Houston Pkwy N. Ste 200
Houston, Texas 77043-5014
Ph. 713-961-3510 Fax 713-932-7505
TBE FIRM #449

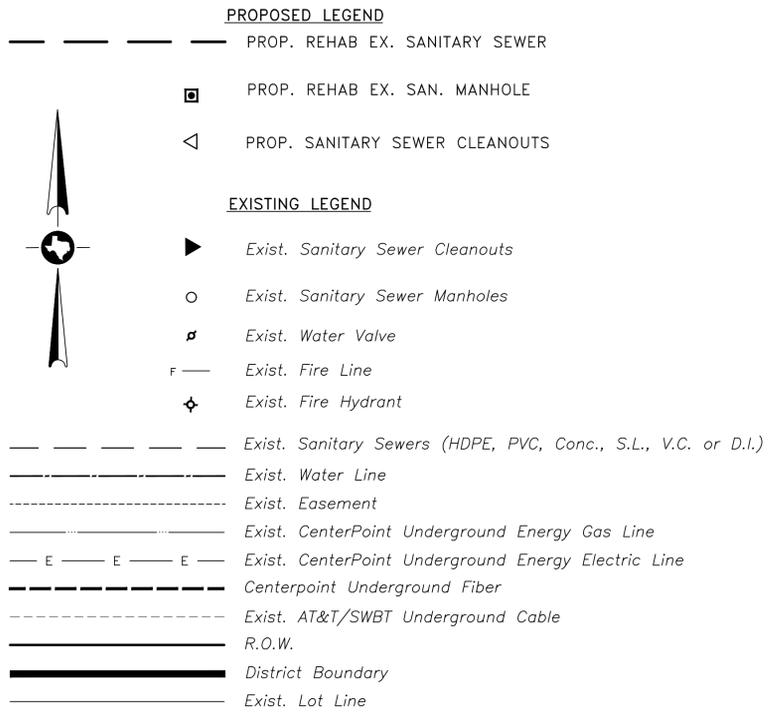
DESIGN : J.L.	JOB NO. : 200-016	CONT. NO. : 001
DRAWN : S.H.C.	DATE : FEBRUARY 2016	
CHECKED : M.J.H./N.G.	SCALE : 1"=100'	DATE : FEBRUARY 2016
APPROVED : J.K.D.	SHEET NO. : 3	OF : 8

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MATCHLINE - SHEET 5 OF 8

MATCHLINE - SHEET 6 OF 8



MH #	DEPTH (ft)
Q - 6	5
Q - 7	5.25
Q - 8	5.5
Q - 9	5.25
Q - 10	5
Q - 11	4.75
Q - 12	5
Q - 13	3.75
Q - 14	3.5
Q - 15	3.25
Q - 17	4.5
Q - 18	3.75
Q - 19	3.5
Q - 32	4.25

C/O #	DEPTH (ft)
16	3
20	4.75

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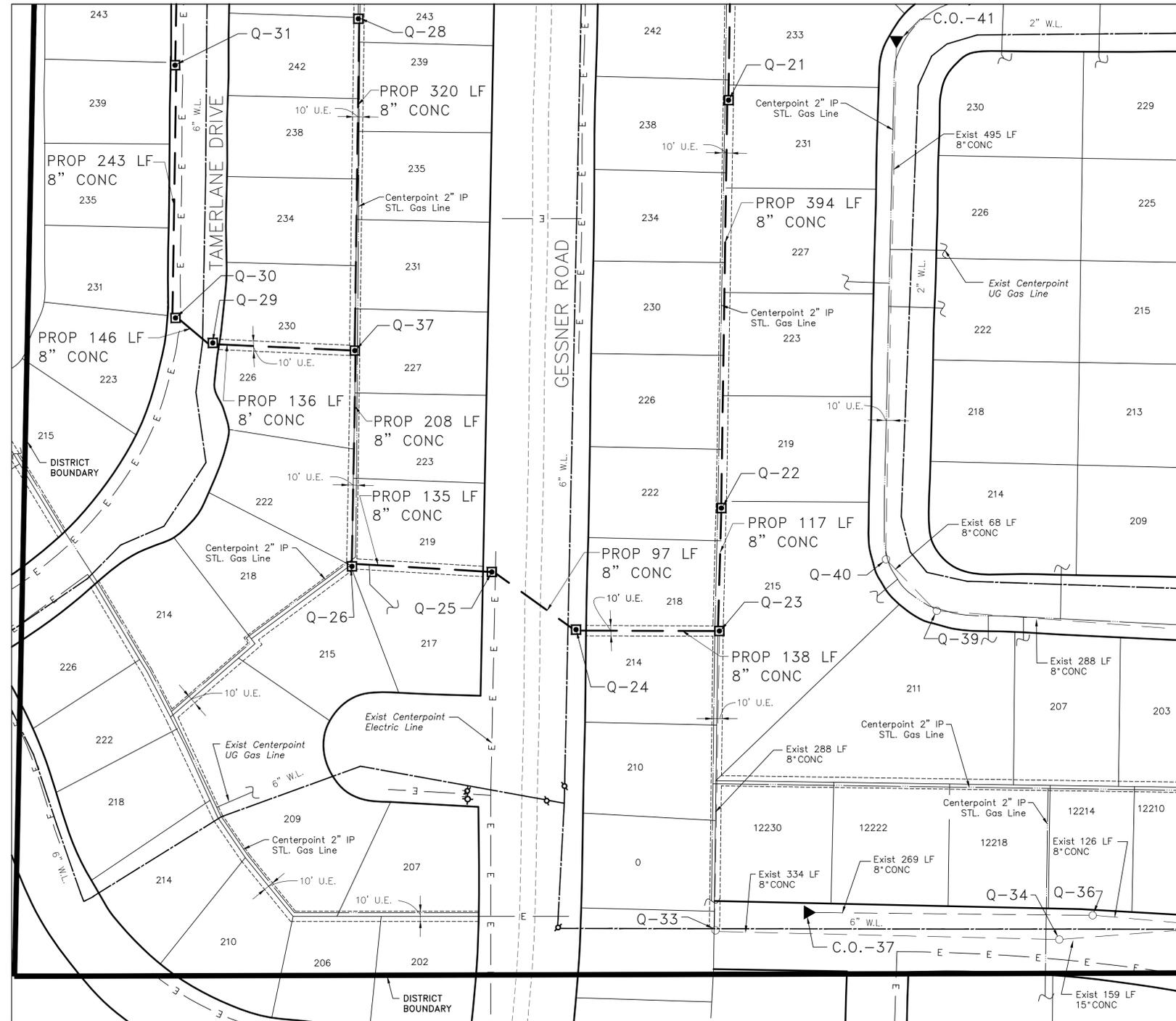
CITY OF BUNKER HILL VILLAGE
WASTEWATER REHABILITATION PROJECT
2016 SANITARY SEWER REHABILITATION
SANITARY SEWER PLAN SHEET 4

LANGFORD ENGINEERING INC.
Consulting Engineers
1080 W. Sam Houston Pkwy N. Ste 200
Houston, Texas 77043-5014
Ph: 713-961-3550 Fax: 713-932-7505
TBE FIRM #449

DESIGN: J.L.	JOB NO. 200-016	CONT. NO. 001
DRAWN: S.H.C.	DATE: FEBRUARY 2016	
CHECKED: M.J.H./N.G.	SCALE: 1"=60'	VERT. HORZ.
APPROVED: J.K.D.	SHEET NO. 4	OF 8

E:\Current Proj\200-016 #\Plan Sheet 2.dwg Feb 23, 2016-8:24am stevenc

MATCHLINE - SHEET 4 OF 8



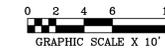
MATCHLINE - SHEET 7 OF 8

PROPOSED LEGEND

- PROP. REHAB EX. SANITARY SEWER
- PROP. REHAB EX. SAN. MANHOLE
- ◁ PROP. SANITARY SEWER CLEANOUTS

EXISTING LEGEND

- ▶ Exist. Sanitary Sewer Cleanouts
- Exist. Sanitary Sewer Manholes
- ⊕ Exist. Water Valve
- F Exist. Fire Line
- ⊕ Exist. Fire Hydrant
- Exist. Sanitary Sewers (HDPE, PVC, Conc., S.L., V.C. or D.I.)
- Exist. Water Line
- Exist. Easement
- Exist. CenterPoint Underground Energy Gas Line
- Exist. CenterPoint Underground Energy Electric Line
- Centerpoint Underground Fiber
- Exist. AT&T/SWBT Underground Cable
- R.O.W.
- District Boundary
- Exist. Lot Line



MH #	DEPTH (ft)
Q - 21	5.75
Q - 22	6.5
Q - 23	7
Q - 24	4.5
Q - 25	4
Q - 26	4
Q - 27	3.75
Q - 28	5.25
Q - 29	3.75
Q - 30	3.25
Q - 31	3.25

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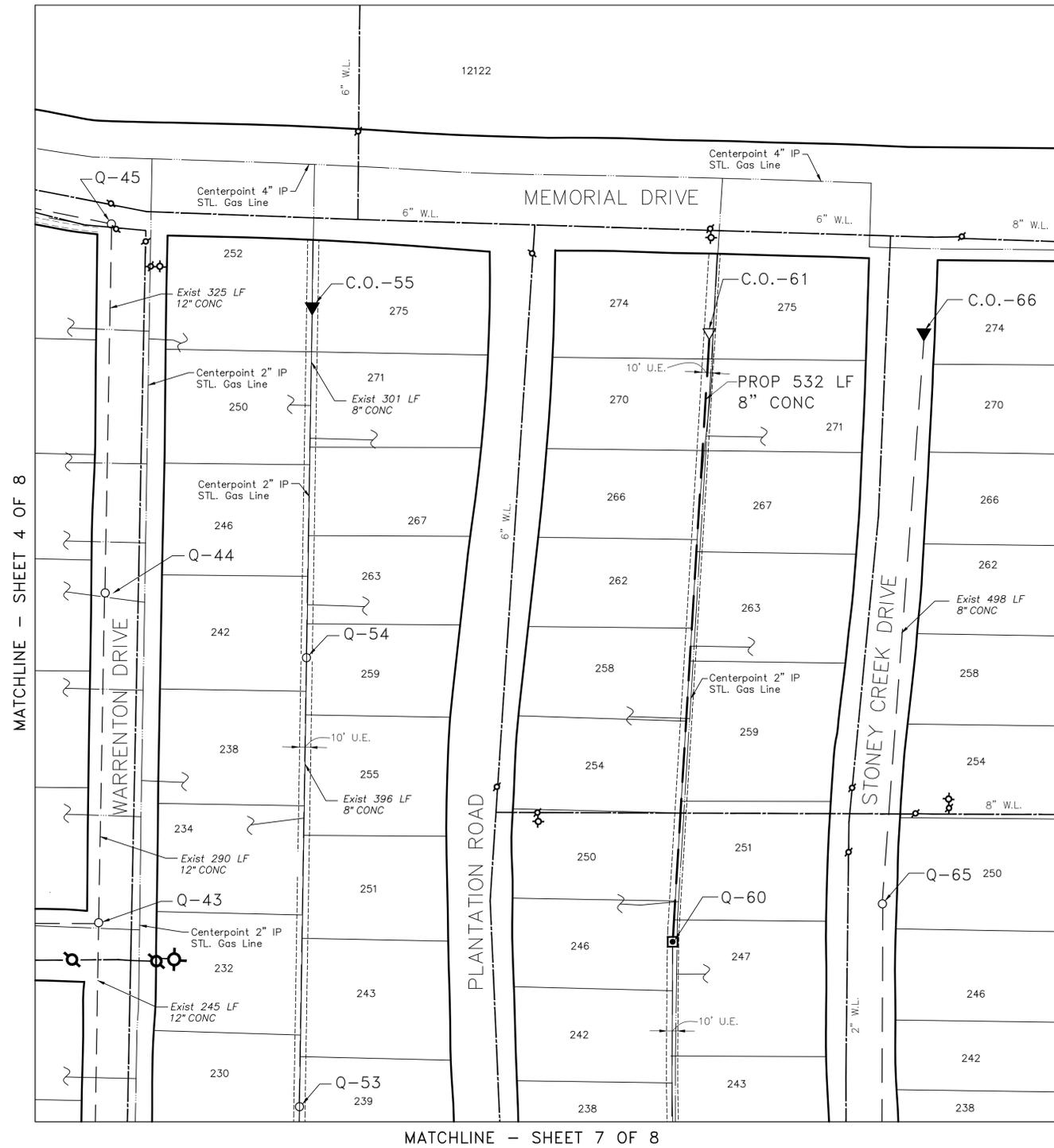
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CITY OF BUNKER HILL VILLAGE
WASTEWATER REHABILITATION PROJECT
2016 SANITARY SEWER REHABILITATION
SANITARY SEWER PLAN SHEET 5

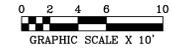
LANGFORD ENGINEERING INC.
Consulting Engineers
1080 W. Sam Houston Pkwy N. Ste 200
Houston, Texas 77043-5014
Ph: 713-961-3530 Fax: 713-932-7505
TBE FIRM #449

DESIGN: J.L.	JOB NO. 200-016	CONT. NO. 001
DRAWN: S.H.C.	DATE: FEBRUARY 2016	
CHECKED: M.J.H./N.G.	SCALE: 1"=60'	VERT. HORZ.
APPROVED: J.K.D.	SHEET NO. 5	OF 8

E:\Current Proj\200-016 #\Plan Sheet 3.dwg Feb 23, 2016-8:26am stevens



- PROPOSED LEGEND**
- PROP. REHAB EX. SANITARY SEWER
 - ▣ PROP. REHAB EX. SAN. MANHOLE
 - ◁ PROP. SANITARY SEWER CLEANOUTS
- EXISTING LEGEND**
- ▶ Exist. Sanitary Sewer Cleanouts
 - Exist. Sanitary Sewer Manholes
 - ⊕ Exist. Water Valve
 - Exist. Fire Line
 - ⊕ Exist. Fire Hydrant
 - Exist. Sanitary Sewers (HDPE, PVC, Conc., S.L., V.C. or D.I.)
 - Exist. Water Line
 - Exist. Easement
 - Exist. CenterPoint Underground Energy Gas Line
 - E — E — E — Exist. CenterPoint Underground Energy Electric Line
 - Centerpoint Underground Fiber
 - Exist. AT&T/SWBT Underground Cable
 - R.O.W.
 - District Boundary
 - Exist. Lot Line



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CITY OF BUNKER HILL VILLAGE
WASTEWATER REHABILITATION PROJECT
2016 SANITARY SEWER REHABILITATION
SANITARY SEWER PLAN SHEET 6

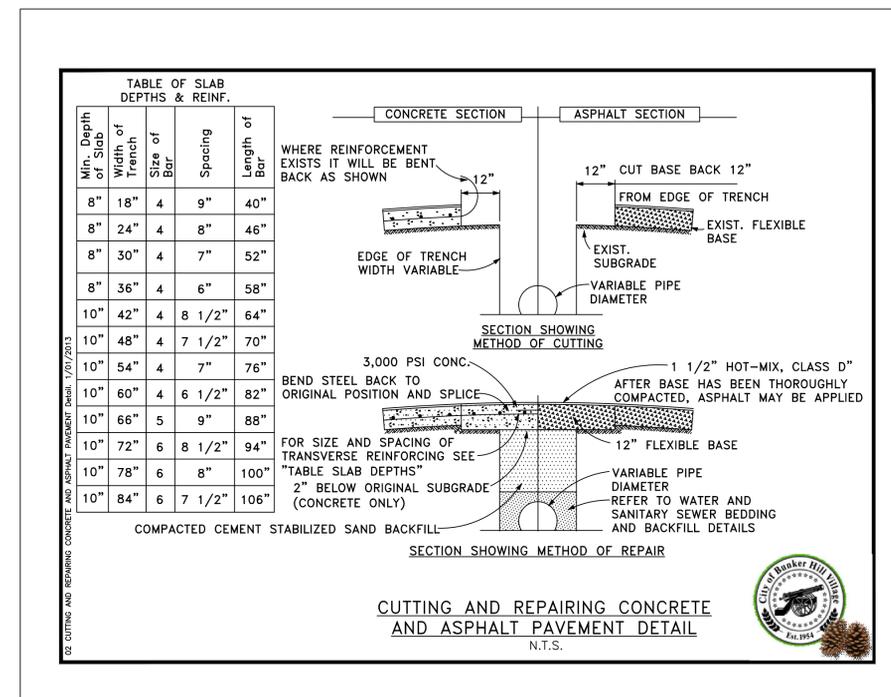
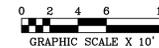
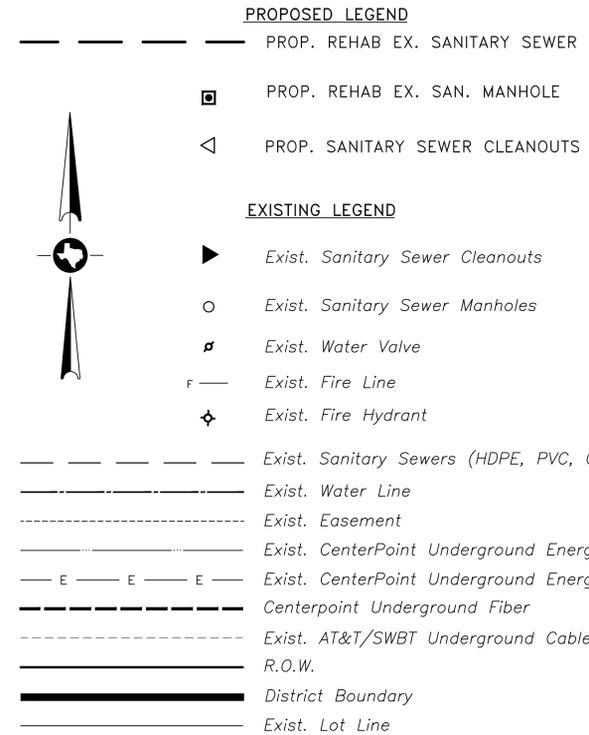
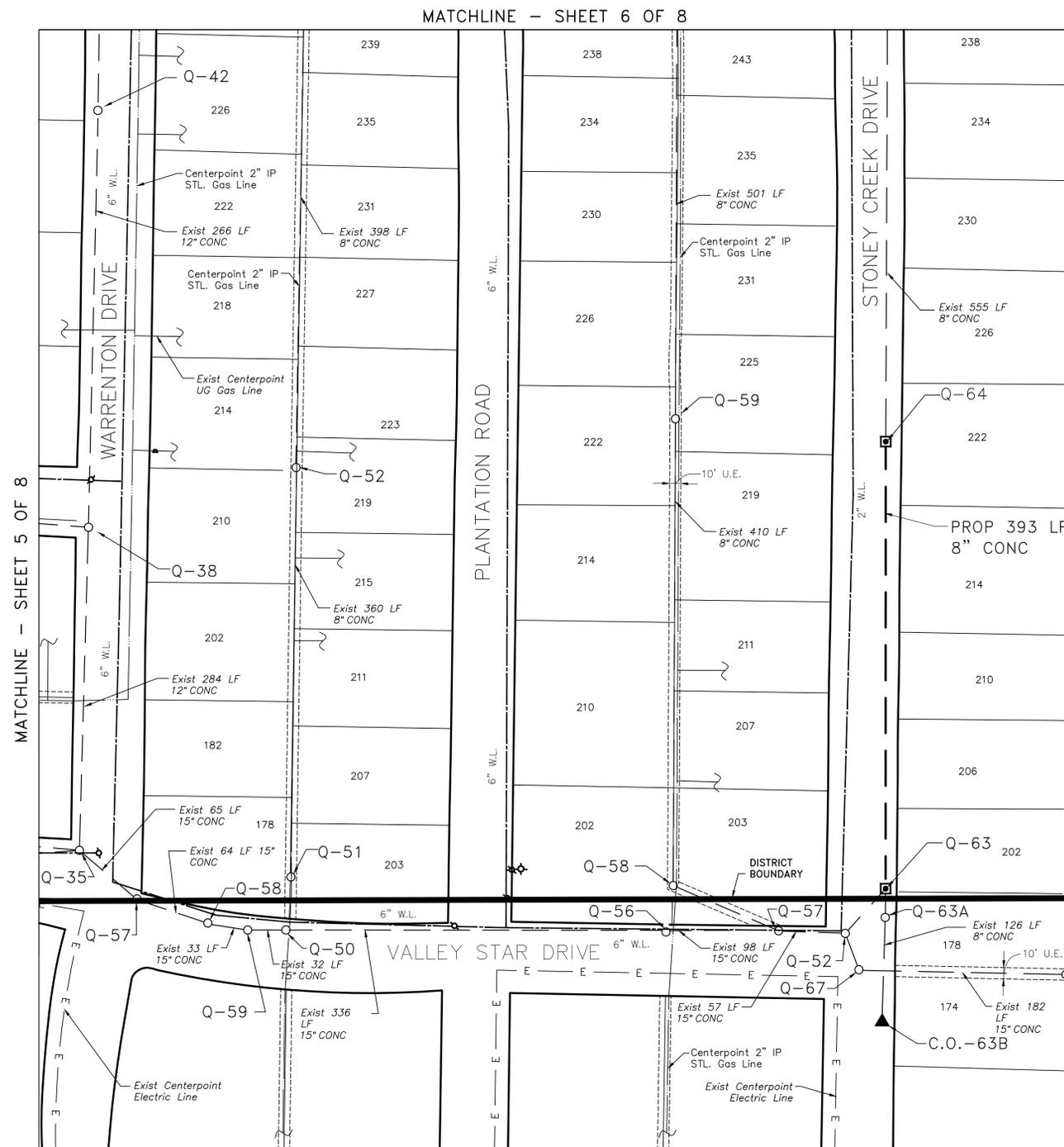
LANGFORD ENGINEERING INC.
Consulting Engineers
1080 W. Sam Houston Pkwy N. Ste 200
Houston, Texas 77043-5014
Ph. 713-461-3530 Fax 713-932-7505
TXPE FORM #449

C/O #	DEPTH (ft)
61	7

MH #	DEPTH (ft)
60	7.5

DESIGN : J.L.	JOB NO. 200-016	CONT. NO. 001
DRAWN : S.H.C.	DATE : FEBRUARY 2016	
CHECKED : M.J.H./N.G.	SCALE : 1"=60'	VERT. HORZ.
APPROVED : J.K.D.	SHEET NO. 6	OF 8

E:\Current Proj\200-016 #\Plan Sheet 4.dwg Feb 23, 2016-8:27am stevens



TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED, CALL CENTERPOINT ENERGY AT 713-207-2222.

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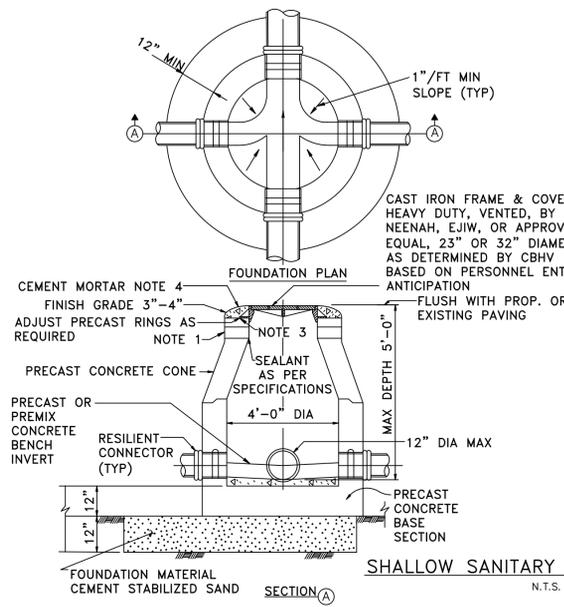
CITY OF BUNKER HILL VILLAGE

WASTEWATER REHABILITATION PROJECT
2016 SANITARY SEWER REHABILITATION
SANITARY SEWER PLAN SHEET 7

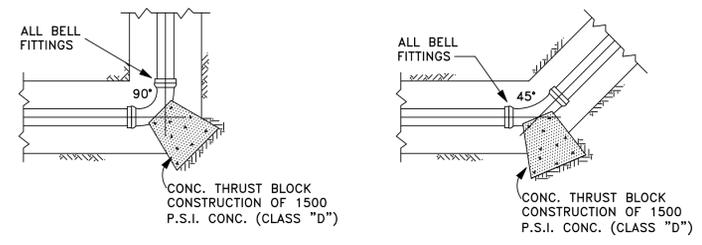


DESIGN : J.L.	JOB NO. 200-016	CONT. NO. 001
DRAWN : S.H.C.	DATE : FEBRUARY 2016	
CHECKED : M.J.H./N.G.	SCALE : 1"=60'	VERT. HORZ.
APPROVED : J.K.D.	SHEET NO. 7	OF 8

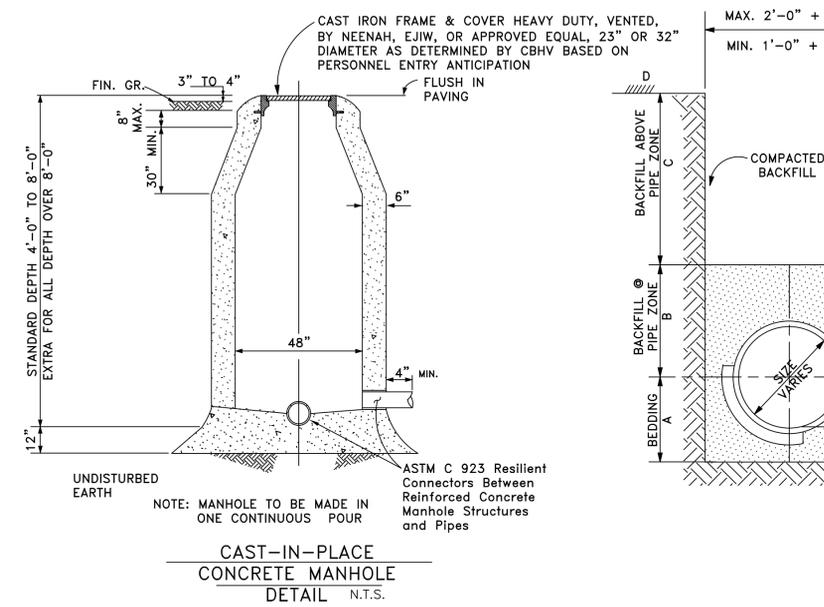
MH #	DEPTH (ft)
Q - 63	6.5
Q - 64	6.5



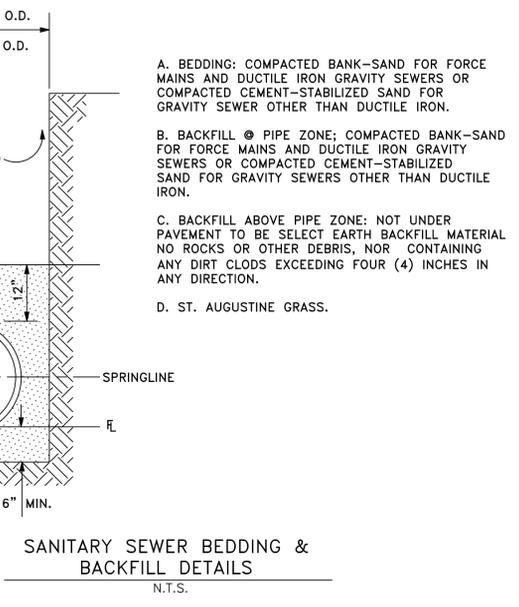
- NOTES:**
1. A MINIMUM OF 4" ADJUSTMENT RING SHALL BE PROVIDED. THE TOTAL HEIGHT OF THE ADJUSTMENT RINGS SHALL NOT EXCEED 12"
 2. MANHOLE INTERSECTING PIPES SHALL BE INSTALLED ONLY WHEN CALLED FOR IN PLAN AND PROFILE DRAWING.
 3. SEAT MANHOLE FRAME IN SEALANT PER STANDARD SPECIFICATION.
 4. OMIT CEMENT MORTAR WHEN MANHOLE IS LOCATED IN PAVED AREAS.
 5. MINIMUM REINFORCING IN THE BASE TO BE # 5 @ 8 EW.
 6. PROVIDE BACKFILL MATERIAL AS PER STANDARD SPECIFICATION.



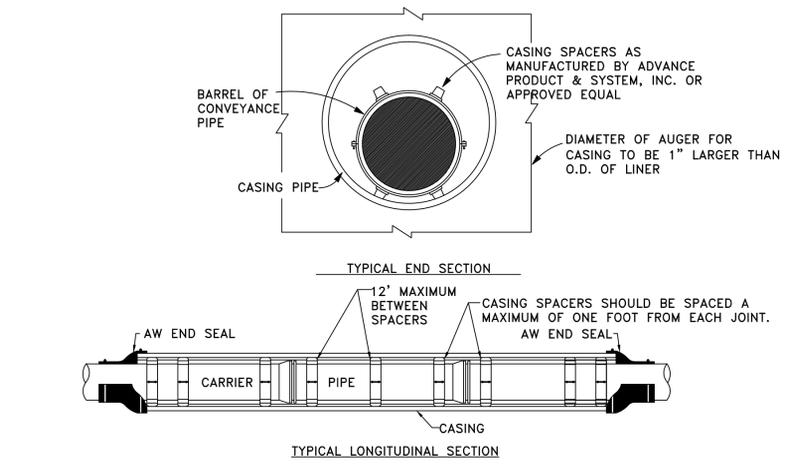
THRUST BLOCKING DETAILS
N.T.S.



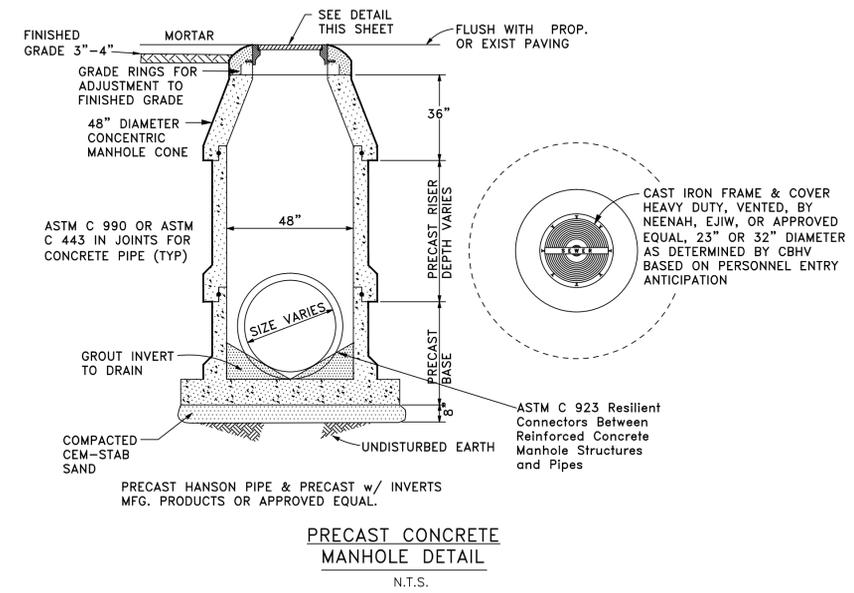
CAST-IN-PLACE CONCRETE MANHOLE DETAIL
N.T.S.



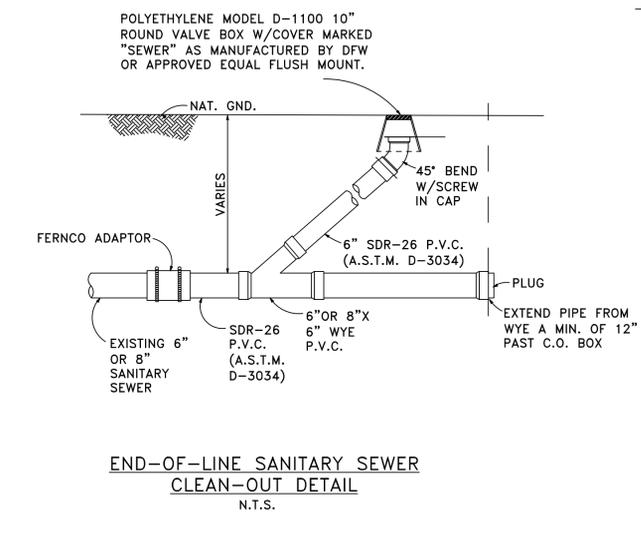
SANITARY SEWER BEDDING & BACKFILL DETAILS
N.T.S.



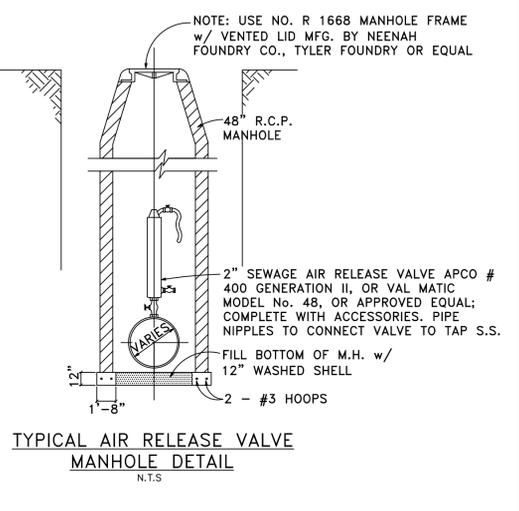
AUGERED HOLE CONSTRUCTION w/ CASING DETAIL
N.T.S.



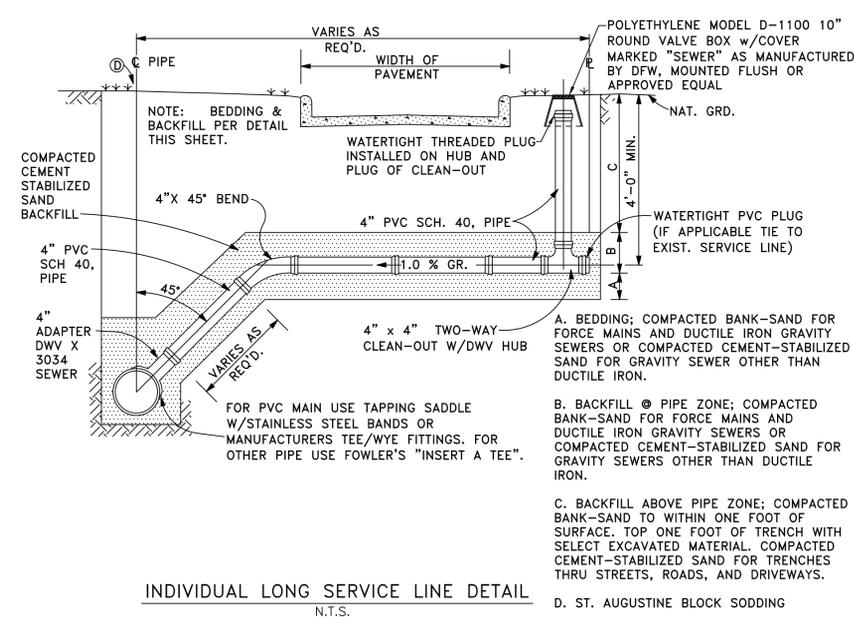
PRECAST CONCRETE MANHOLE DETAIL
N.T.S.



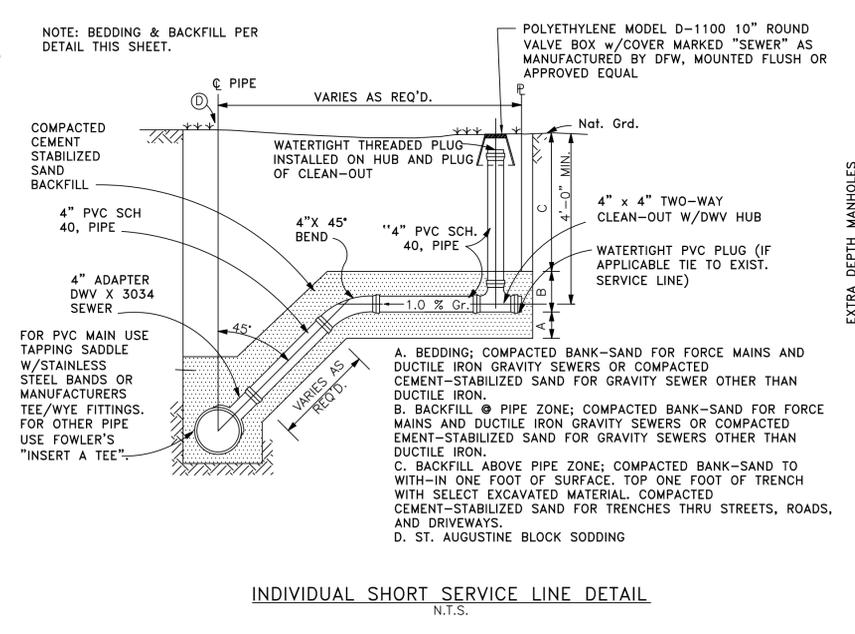
END-OF-LINE SANITARY SEWER CLEAN-OUT DETAIL
N.T.S.



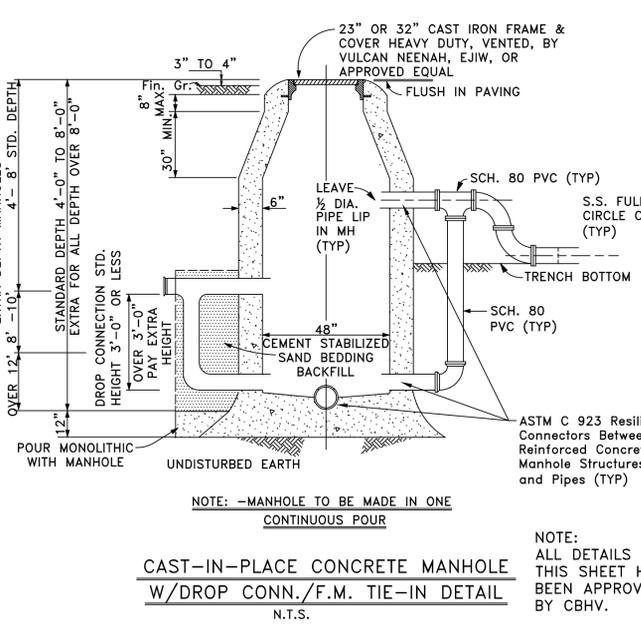
TYPICAL AIR RELEASE VALVE MANHOLE DETAIL
N.T.S.



INDIVIDUAL LONG SERVICE LINE DETAIL
N.T.S.



INDIVIDUAL SHORT SERVICE LINE DETAIL
N.T.S.



CAST-IN-PLACE CONCRETE MANHOLE W/DROP CONN./F.M. TIE-IN DETAIL
N.T.S.

This document is released for purpose of interim review under the authority of JOHN K. DAVIS, P.E. No. 80688 on February 23, 2016. It is not to be used for construction/bidding purposes.

CITY OF BUNKER HILL VILLAGE

WASTEWATER REHABILITATION PROJECT
2016 SANITARY SEWER REHABILITATION
STANDARD SEWER DETAILS

LANGFORD ENGINEERING INC.
Consulting Engineers
1080 W. Sam Houston Pkwy N. Ste 200
Houston, Texas 77043-3014
Ph: 713-461-3530 Fax: 713-932-7505
TBE FIRM #449

DESIGN: J.L.	JOB NO. 200-016	CONT. NO. 001
DRAWN: S.H.C.	DATE: FEBRUARY 2016	
CHECKED: M.J.H./N.G.	SCALE: 1"=60'	VERT. HORIZ.
APPROVED: J.K.D.	SHEET NO. 8	OF 8