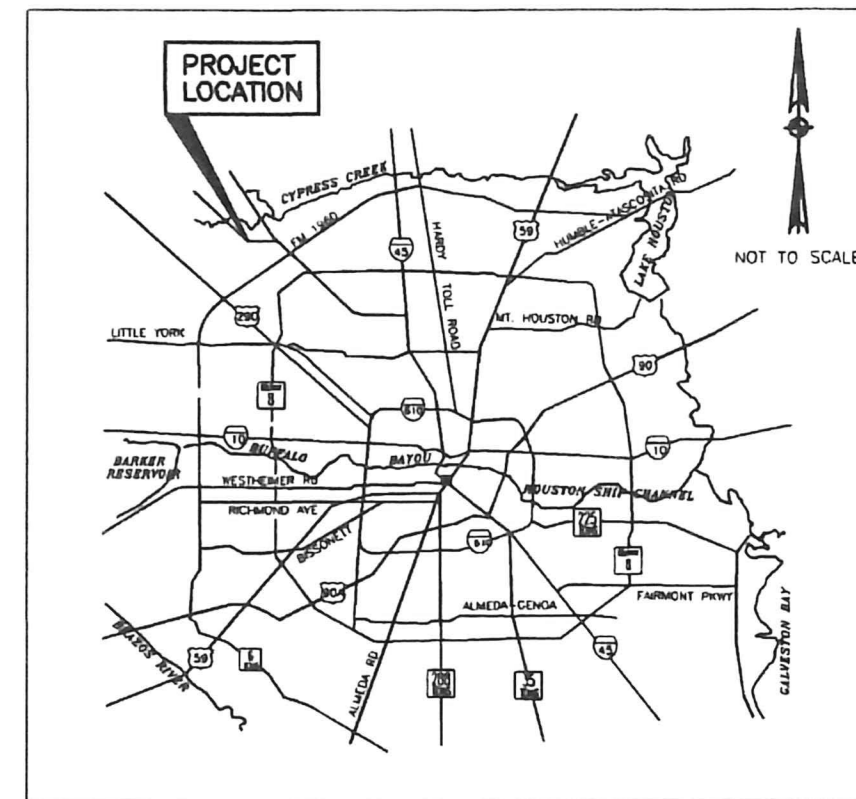


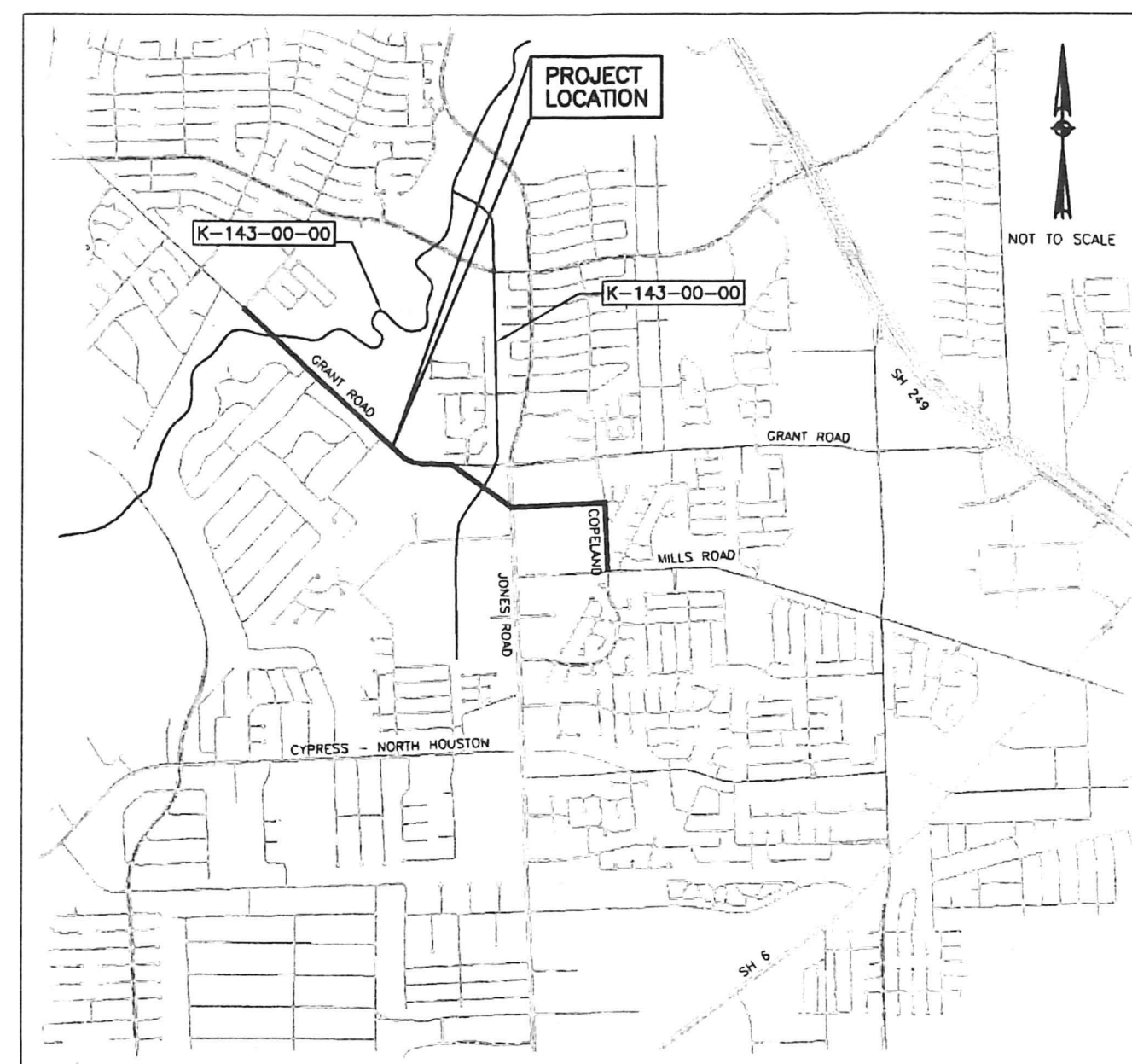
# NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY

## PROJECT 28-B

### PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD



LOCATION MAP



VICINITY MAP

KEY MAP NO 000  
GIMS MAP NO 00000



**TEXAS WATER  
DEVELOPMENT BOARD**  
 REVIEWED: *Matthew Young P.E.*  
 APPROVED: *Matthew Young P.E.*  
 DATE: *May 21, 2020*

48 Hour Notice: Contractor shall notify Harris County prior To Commencing Construction and/or Backfilling any utilities. Contractor(S) to contact Public Review Department @ (713-274-3931) or [public.review@hccpid.org](mailto:public.review@hccpid.org)

A Notification issued by HC Infrastructure Department-Permits Office- is required for proposed work within Harris County Right-of-Way. The project must be approved prior to obtaining the required Notification. A Notification must be obtained separately from a site development permit package. For additional information please visit: [http://hccpid.org/permits/pr\\_notification\\_of\\_construction.html](http://hccpid.org/permits/pr_notification_of_construction.html) or contact Public Review Inspections Department @ (713)274-3931

GENERAL MANAGER  
JIMMIE SCHINDEWOLF, P.E.

BOARD MEMBERS  
ALAN J. RENDL  
KELLY P. FESSLER  
LENOX A. SIGLER  
RON GRAHAM  
JAMES D. PULLIAM

**\*Construction in Harris County Flood Control District right-Of-Way**  
 Site plans must be approved prior to obtaining the required HCFCFD Right-of-way Notification. Be advised that the HCFCFD Right-of-way Notification is separated from the site development permit package

- 1.) HCFCFD Right-of-Way Notification (permit)
- 2.) HCFCFD 48-hr Pre-Construction Notice

Both are required prior to entering or working within Harris County Flood Control District right-of-way. The HCFCFD Right-of-Way Notification and 48-hour notice must be provided to HCFCFD at [dcid@hccfd.org](mailto:dcid@hccfd.org).

To apply for the HCFCFD Right-of-Way Notification please go to <http://apps.harriscountytexas.gov/EPermits> and apply for the HCFCFD ROW under ROW Notification.

Failure to provide both items could result in project delays.

<b>AECOM</b>	AECOM TECHNICAL SERVICES, INC. 19219 KATY FREEWAY, SUITE 100 HOUSTON, TEXAS 77094-1009 281.646.2400 WWW.AECOM.COM T&PE REG. NO. F-3580
<b>DANNENBAUM</b>	
ENGINEERING CORPORATION T.B.P.E. FIRM REGISTRATION #392 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570	
GENERAL MANAGER, NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	

ISSUE DATE: MAY, 2020

REF. NO. 01 SHEET No. 1 OF 99

REVISION DATE: 1/12/17

PROJECT 28-B







No.	Date	Revisions	App.

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SHEET NO.

DRAWING NAME

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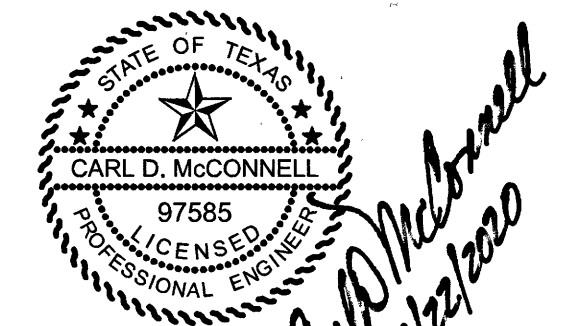
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**NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY**  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

SHEET INDEX



DRAWN BY: \_\_\_\_\_ CHECKED BY: \_\_\_\_\_

**DANNENBAUM**  
 ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

SHEET No: 3 OF 99



GENERAL CONSTRUCTION NOTES

- 1. THERE WILL BE NO SEPARATE PAYMENT FOR WORK SHOWN ON THESE PLANS, UNLESS SPECIFICALLY ESTABLISHED IN THE BID SECTION OF THE CONTRACT DOCUMENTS. CONTRACTOR SHALL INCLUDE COST OF THIS WORK IN THE CONTRACT UNIT PRICE FOR ITEMS OF WHICH THIS WORK IS A COMPONENT OR INCIDENTAL.
2. CONTRACTOR SHALL VERIFY LOCATION AND ELEVATION OF EXISTING FACILITIES PRIOR TO CONSTRUCTION OF PROPOSED FACILITIES. ANY DAMAGE TO EXISTING FACILITIES, INCLUDING PUBLIC OR PRIVATE UTILITIES, INCURRED AS A RESULT OF CONSTRUCTION OPERATIONS SHALL BE REPAIRED BY THE CONTRACTOR AT HIS EXPENSE.
3. CONTRACTOR SHALL VERIFY LOCATION OF UNDERGROUND UTILITY LINES AND SHALL NOTIFY THE FOLLOWING AGENCIES 48 HOURS PRIOR TO EXCAVATING NEAR EXISTING FACILITIES
A) TEXAS ONE CALL SYSTEM AT 1-800-245-4545
B) LINE STAR NOTIFICATION CENTER AT 713-223-4367
C) TEXAS EXCAVATION SAFETY SYSTEM INC. AT 1-800-344-8377
4. CONTRACTOR SHALL COMPLY WITH ALL FEDERAL, STATE, AND LOCAL LAWS AND ALL REGULATIONS OF UTILITY COMPANIES CONCERNING SAFETY AND HEALTH PRACTICES.
5. OWNER SHALL PERFORM INITIAL LABORATORY TESTS. SUBSEQUENT TESTING DUE TO FAILED DENSITIES SHALL BE AT CONTRACTOR'S EXPENSE. A COPY OF ALL TEST RESULTS SHALL BE SUBMITTED TO THE PROJECT MANAGER.
6. CONTRACTOR SHALL REMOVE ALL MUD, DIRT AND DEBRIS DEPOSITED OR DROPPED ON EXISTING PAVEMENT DUE TO HIS CONSTRUCTION ACTIVITY DAILY. MATERIAL THAT IS HAZARDOUS TO TRAFFIC SHALL BE REMOVED IMMEDIATELY.
7. THESE PLANS DO NOT EXTEND TO OR INCLUDE DESIGNS OR SYSTEMS PERTAINING TO THE SAFETY OF THE CONTRACTOR OR ITS EMPLOYEES, AGENTS, OR REPRESENTATIVES IN THE PERFORMANCE OF THE WORK. THE SEAL OF THE REGISTERED PROFESSIONAL ENGINEER(S) HEREDON DOES NOT EXTEND TO ANY SUCH SAFETY SYSTEMS THAT MAY NOW OR HEREAFTER BE INCORPORATED IN THESE PLANS. THE CONTRACTOR SHALL PREPARE OR OBTAIN THE APPROPRIATE SAFETY SYSTEM (S).
8. CONTRACTOR SHALL PROTECT ALL TREES ADJACENT TO WORK AREA. NO TREES OUTSIDE THE WORK AREA SHALL BE REMOVED WITHOUT PERMISSION OF OWNER.
9. CONTRACTOR SHALL GIVE NOTICE TO ALL AUTHORIZED INSPECTORS, SUPERINTENDENTS, OR PERSONS IN CHARGE OF PRIVATE AND PUBLIC UTILITIES OR RAILROADS AFFECTED BY HIS OPERATIONS PRIOR TO COMMENCEMENT OF WORK. CONTRACTOR SHALL OBTAIN ALL CONSTRUCTION PERMITS PRIOR TO STARTING CONSTRUCTION.
10. CONTRACTOR SHALL OBTAIN ALL PERMITS REQUIRED BY REGULATION OF HARRIS COUNTY, TEXAS FOR FLOOD PLAIN MANAGEMENT PRIOR TO STARTING CONSTRUCTION.
11. CONTRACTOR WILL OBTAIN ALL PERMITS REQUIRED BY HARRIS COUNTY, TEXAS PRIOR TO STARTING CONSTRUCTION OF UTILITIES AND/OR CULVERTS WITHIN COUNTY ROAD RIGHTS-OF-WAY, IF APPLICABLE.
NOTE: AUTHORIZATION NOTICE ISSUED BY HARRIS COUNTY PUBLIC INFRASTRUCTURE ENGINEERING DEPARTMENT PERMIT OFFICE REQUIRED PRIOR TO CONSTRUCTION OF UTILITIES OR LEFT TURN LANES WITHIN HARRIS COUNTY RIGHT OF WAY. CONTACT HARRIS COUNTY PERMIT OFFICE (713-956-3000).
12. CONTRACTOR SHALL NOTIFY THE NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY (281-440-3924) AT LEAST 48 HOURS PRIOR TO START OF CONSTRUCTION.

WATER LINE CONSTRUCTION NOTES

- 1. CONTRACTOR SHALL ALLOW A MINIMUM OF 2-FOOT VERTICAL AND 4-FOOT HORIZONTAL CLEARANCE BETWEEN PROPOSED WATER LINES AND OTHER UTILITIES UNLESS OTHERWISE SHOWN ON PLANS. IF EXISTING UTILITIES ARE FOUND IN A LOCATION OTHER THAN WHERE SHOWN ON PLANS AND MINIMUM SEPARATION DISTANCE CAN NOT BE MET, CONTRACTOR SHALL NOTIFY PROJECT MANAGER.
2. SEPARATION DISTANCES FOR INSTALLATION OF POTABLE WATER DISTRIBUTION LINES AND WASTEWATER COLLECTION LINES, WASTEWATER FORCE MAINS AND OTHER CONVEYANCES/APPURTENANCES IDENTIFIED AS POTENTIAL SOURCES OF CONTAMINATION MUST CONFORM TO CURRENT COMMISSION (TCEQ) RULES.
3. ALL WATER LINES WITHIN THE DEDICATED EASEMENTS SHALL HAVE A MINIMUM 6-FOOT COVER FROM THE NATURAL GROUND. ALL WATER LINES WITHIN THE RIGHT OF WAY (ROW) WITH IMPROVED ROADWAY SHALL HAVE A MINIMUM 6-FOOT COVER FROM THE EXISTING OR PROPOSED TOP OF CURB (TOC). ALL WATER LINES WITHIN THE ROW WITH UNIMPROVED ROADWAY SHALL HAVE A MINIMUM 8-FOOT COVER FROM THE NATURAL GROUND.
4. CONSTRUCT WATER LINES WITH ONE JOINT OF PIPE BETWEEN VALVES AND PLUG FOR FUTURE LINES, UNLESS SHOWN ON PLANS OTHERWISE.
5. VALVES SHALL BE EQUIPPED WITH OPERATING NUT EXTENSIONS TO WITHIN FOUR FEET OF NATURAL GROUND.
6. BACKFILL OF EXISTING STORM SEWER: WHEN CROSSING AN EXISTING STORM SEWER USING THE OPEN CUT METHOD, THE WATER LINE TRENCH ZONE SHALL BE BACKFILLED FOR 3 TO 5 FEET EITHER SIDE OF THE STORM SEWER WITH CEMENT STABILIZED SAND TO THE SPRING LINE OF THE STORM SEWER.
7. ALL WATER LINES 20-INCHES AND SMALLER SHALL BE PVC PIPE OR DUCTILE IRON PIPE.
8. ALL WATER LINES 24-INCHES TO 30-INCHES SHALL BE PRESTRESSED CONCRETE CYLINDER PIPE, BAR-WRAPPED CONCRETE CYLINDER PIPE, STEEL PIPE, DUCTILE IRON PIPE, OR PVC PIPE.
9. ALL WATER LINES 36-INCHES AND LARGER SHALL BE PRESTRESSED CONCRETE CYLINDER PIPE OR STEEL PIPE.

CONTRACTOR WORK ZONE NOTES

- 1. DRIVEWAY ACCESS WILL BE MAINTAINED OPEN AFTER WORKING HOURS. A MINIMUM OF ONE DRIVEWAY ACCESS WILL BE MAINTAINED OPEN AT ALL TIMES TO COMMERCIAL, APARTMENTS, AND/OR NON-RESIDENTIAL DEVELOPMENTS.
2. THE LENGTH OF THE WORK ZONE MUST BE MINIMIZED WITHIN THE HARRIS COUNTY ROW OR EASEMENTS. THERE SHALL NOT BE MORE THAN 200-FEET OF TRENCH OPEN AT ANY ONE TIME. THE CONSTRUCTION ZONE WILL BE A ROLLING CONSTRUCTION ZONE WITH APPROPRIATE TRANSITIONS ON EACH END UNLESS OTHERWISE SHOWN IN PLANS AND SPECIFICATIONS.
3. SIGNALIZED INTERSECTIONS: LANES WILL NOT BE CLOSED AT A SIGNALIZED INTERSECTION, UNLESS APPROVED BY THE COUNTY ENGINEER AND SHOWN IN THE PLANS AND SPECIFICATIONS.
4. TEMPORARY PAVEMENT MARKERS: TEMPORARY EPDXY-GLUED BOTTOMS OR 'CONSTRUCTION GRADE' TAPE PAVEMENT MARKERS SHOULD BE USED ON PERMANENT PAVEMENT TO ELIMINATE GRINDING AND SCARRING OF THE SURFACE.
5. PEDESTRIAN TRAFFIC: CARE SHALL BE TAKEN TO PROVIDE FOR TEMPORARY PEDESTRIAN TRAFFIC AND CROSSING AT AREAS SUCH AS SCHOOLS, PARKS, AND SHOPPING AREAS.

SANITARY SEWER CONSTRUCTION NOTES

- 1. ALL SANITARY SEWER MODIFICATION OR REPAIRS SHALL BE IN ACCORDANCE WITH TCEQ RULES AND REGULATIONS AS CURRENTLY AMENDED. CONTRACTOR SHALL NOTIFY PROJECT MANAGER OF ANY NEED FOR MODIFICATIONS OR REPAIRS TO EXISTING SANITARY SEWERS.

STORM WATER QUALITY PRE-CONSTRUCTION INSPECTION REQUIREMENTS

- 1. THE CONTRACTOR SHALL CONTACT THE HARRIS COUNTY STORM WATER QUALITY PERMITTING SECTION AT 713-956-3000 FOR A PRE-CONSTRUCTION INSPECTION PRIOR TO COMMENCING ANY CLEARING OR CONSTRUCTION ACTIVITIES ON THE SITE.
2. THE CONTRACTOR SHALL CONTACT THE HARRIS COUNTY STORM WATER QUALITY PERMITTING SECTION AT 713-956-3000 FOR A PRE-CONSTRUCTION INSPECTION PRIOR TO COMMENCING ANY CLEARING OR CONSTRUCTION ACTIVITIES ON THE SITE.
3. THE CONTRACTOR SHALL CONTACT THE HARRIS COUNTY STORM WATER QUALITY PERMITTING SECTION AT 713-956-3000 FOR A PRE-CONSTRUCTION INSPECTION PRIOR TO COMMENCING ANY CLEARING OR CONSTRUCTION ACTIVITIES ON THE SITE.
4. THE CONTRACTOR SHALL CONTACT THE HARRIS COUNTY STORM WATER QUALITY PERMITTING SECTION AT 713-956-3000 FOR A PRE-CONSTRUCTION INSPECTION PRIOR TO COMMENCING ANY CLEARING OR CONSTRUCTION ACTIVITIES ON THE SITE.

STORM SEWER CONSTRUCTION NOTES

- 1. ALL STORM SEWERS SHALL BE INSTALLED IN ACCORDANCE WITH HARRIS COUNTY RULES, REGULATIONS AND REQUIREMENTS, AS CURRENTLY AMENDED.
2. ALL STORM SEWER MANHOLE RIMS LOCATED OUTSIDE THE PAVED AREAS SHALL BE SET TO MATCH FINISHED GROUND ELEVATION.
3. ALL STORM SEWERS AND LEADS SHALL BE REINFORCED CONCRETE PIPE (RCP), CLASS III (ASTM C76), WITH RUBBER GASKET JOINTS (ASTM C443), UNLESS OTHERWISE NOTED ON PLANS.
4. ADEQUATE DRAINAGE SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION AND ANY DRAINAGE DITCH OR STRUCTURE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE SATISFACTION OF THE OWNING AUTHORITY. ALL CONSTRUCTION STORM RUNOFF SHALL COMPLY WITH THE STORM WATER MANAGEMENT HANDBOOK FOR CONSTRUCTION ACTIVITIES AS PREPARED BY HARRIS COUNTY, HCFCO AND THE CITY OF HOUSTON AND SHALL BE IN COMPLIANCE WITH THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) REQUIREMENTS.

PAVING CONSTRUCTION NOTES

- 1. CONCRETE PAVEMENT TO BE CONSTRUCTED IN ACCORDANCE WITH HARRIS COUNTY RULES, REGULATIONS AND REQUIREMENTS, AS CURRENTLY AMENDED.
2. ALL ROAD WIDTHS, CURB RADIUS AND CURVE ALIGNMENT SHOWN INDICATE BACK OF CURB. T.C. INDICATES TOP OF CURB ELEVATION AND T.P. INDICATES TOP OF PAVEMENT ELEVATION.
3. CONTRACTOR SHALL USE CONTINUOUS LONGITUDINAL REINFORCING BAR FOR 6 INCH CURB.
4. SUBGRADE STABILIZATION SHALL BE PERFORMED AS PER STANDARD SPECIFICATIONS AS ESTABLISHED BY LABORATORY TESTING OF SUBGRADE MATERIAL.
5. WHERE PROPOSED PAVEMENT IS TO MATCH EXISTING PAVEMENT, EXISTING REBARS OR DOVELS PROJECTING FROM EXISTING PAVEMENT TO BE CLEANED AND TIED INTO PROPOSED PAVEMENT. IF NO REINFORCING STEEL EXISTS, USE HORIZONTAL DOVELS. HORIZONTAL DOVELS SHALL BE #6 BARS, 24 INCHES LONG, DRILLED AND EMBEDDED 8 INCHES INTO THE CENTER OF THE EXISTING SLAB WITH 'PO ROD' OR EQUAL AT 18 INCHES CENTER TO CENTER.

CYPRESS-FAIRBANKS INDEPENDENT SCHOOL DISTRICT (CFISD) WATERLINE & TEMPORARY CONSTRUCTION EASEMENT AGREEMENT NOTES

- 1. THE AUTHORITY AGREES TO PERFORM THE PRIMARY WATER LINE CONSTRUCTION, SUCH AS TRENCH EXCAVATION, LAYING OF PIPE, AND FILLING THE TRENCH WITH SOIL, WHEN SCHOOL IS NOT IN SESSION.
2. EXCEPT FOR EMERGENCY SITUATIONS, NO OPEN EXCAVATION WILL OCCUR DURING THE DAY WHILE CHILDREN ARE IN ATTENDANCE.
3. ANY OPEN EXCAVATION WILL BE SECURED BY COVERING WITH STEEL PLATES OR SURROUNDED WITH TEMPORARY FENCING BY THE CONTRACTOR AT THE END OF EACH WORK DAY.
4. FINAL GRADING, VEGETATION RESTORATION AND UNDERGROUND TESTING WILL TAKE PLACE AFTER PRIMARY WATER LINE CONSTRUCTION HAS OCCURRED AND MAY TAKE PLACE DURING PERIODS WHEN SCHOOL IS IN SESSION, PROVIDED THERE IS NO INTERRUPTION TO ANY SCHOOL OPERATIONS.
5. WORK AREAS ALONG THE COMMON PROPERTY LINE WITH THE HARRIS COUNTY PARK WILL HAVE TEMPORARY CONSTRUCTION FENCING ALONG BOTH SIDES OF THE EASEMENT DURING CONSTRUCTION. A TEMPORARY CONSTRUCTION FENCE WILL ALSO BE PLACED AND MAINTAINED ALONG THE SCHOOL SIDE OF THE EASEMENT ALONG COPELAND DRIVE. TEMPORARY FENCING ALONG THE RIGHT OF WAY SIDE WILL BE INSTALLED BUT WILL BE REMOVED AND REPLACED DAILY AS NECESSARY TO ACCOMMODATE CONSTRUCTION.

STANDARD HCFCO NOTES FOR CONSTRUCTION DRAWINGS

- 1. Obtain and comply with all applicable City, County, State, and Federal permits and approvals, with assistance from Engineer, if necessary. Obtain permit (certification) from Harris County Engineer to enter Harris County Flood Control District right-of-way.
2. Notify the Harris County Flood Control District's Development Coordination and Inspection Department in writing at least 48 hours prior to construction. Submit the HCFCO 48 Hour Pre-Construction Notification form, a copy of the approved construction drawings, and a copy of the Corps of Engineers individual Section 404 Permit or compliance with Nationwide Permit, if applicable, to HCFCO, 9900 Northwest Freeway, Houston, Texas 77092, Attn: Development Coordination and Inspection Dept. by hand delivery, by email DCID@hccfd.org, or fax to 713-684-4129 (fax number).
3. Engineer shall submit certification letter and record drawings to the Harris County Flood Control District's Development Coordination and Inspection Section requesting inspection of items constructed in Harris County Flood Control District right-of-way. Prior to requesting inspection, the drainage right-of-way and/or easements shall be staked and flagged.
4. Protect, maintain, and restore existing backslope drainage systems.
5. Backslope swale and interceptor structure elevations and locations shown on plans are approximate. Final elevations and locations shall be field verified by the Engineer prior to installation.
6. Establish turf grass on all disturbed areas within the channel or detention right-of-way, except the channel bottom and where structural erosion measures are used. Minimum acceptance criteria are 75% coverage of live Bermuda grass and no erosion or rills deeper than 4".
7. Perform all activities within Harris County Flood Control District right-of-way in accordance with the most recent Harris County Flood Control District Standard Specifications Book.
8. Excavate channel flowline to design elevation as shown on plans and downstream, as necessary, to ensure no water remains in the facility (storm sewer, lateral channel, or dry bottom detention basin) during normal water surface conditions in the channel, so the facility will function as intended. For wet bottom detention basins, ensure no water is above the design level in the wet bottom during normal water surface conditions in the channel.
9. Maintain flow in channel during construction and restore channel to original condition.
10. Remove all excavated material from the Harris County Flood Control District or drainage right-of-way. No fill is to be placed within a designated flood plain area without first obtaining a fill permit from the appropriate jurisdictional authority.

Harris County Flood Control District Policy, Criteria, and Procedure Manual

D-2

TEXAS WATER DEVELOPMENT BOARD NOTES

PRIOR TO CONSTRUCTION WITHIN A 100-YEAR FLOODPLAIN, A FLOODPLAIN PERMIT OR WHATEVER MUST BE OBTAINED FROM THE LOCAL FLOODPLAIN ADMINISTRATOR (NATIONAL FLOOD INSURANCE PROGRAM).

AS PER AGREEMENT WITH THE TEXAS PARKS AND WILDLIFE DEPARTMENT AND TO ENSURE COMPLIANCE WITH THE MIGRATORY BIRD TREATY ACT, CLEARING WILL BE CONDUCTED OUTSIDE THE MIGRATORY BIRD NESTING SEASON WHERE POSSIBLE. IF CLEARING MUST BE PERFORMED DURING NESTING SEASON (MARCH 15TH - SEPTEMBER 15TH), NEST SURVEYS WILL BE CONDUCTED PRIOR TO CLEARING, AND A 25-FOOT BUFFER ZONE WILL BE ESTABLISHED AROUND ANY OBSERVED ACTIVE NESTS UNTIL THE YOUNG HAVE FLEDGED.

THE OWNER WILL COMPLY WITH THE TERMS AND CONDITIONS OF THE U.S. ARMY CORPS OF ENGINEERS' NATIONWIDE PERMIT 12, UTILITY LINE ACTIVITIES DURING CONSTRUCTION OF THE PROPOSED PIPELINES. THE PROJECT IS DESIGNED SUCH THAT CONSTRUCTION ACTIVITIES SHOULD NOT RESULT IN THE LOSS OF GREATER THAN 0.5 ACRE OF JURISDICTIONAL WATERS OF THE UNITED STATES, INCLUDING WETLANDS, FOR EACH SINGLE AND COMPLETE PROJECT. SIDE-CASTED EARTHEN MATERIAL GENERATED FROM TRENCH EXCAVATION IS NOT ANTICIPATED TO DISPERSE FROM THE PROJECT SITE. EXISTING AREAS RESISTING FROM CONSTRUCTION ACTIVITIES WILL BE STABILIZED AS FEASIBLE, AND SURFACE CONTOURS WILL BE RETURNED TO PRE-CONSTRUCTION CONDITIONS AS NEAR AS POSSIBLE. SHOULD ONE OR MORE OF THE CRITERIA DESCRIBED IN THE 'NOTIFICATION' SECTION OF NATIONWIDE PERMIT 12 BE ANTICIPATED, THE OWNER WILL PREPARE AND SUBMIT A PRE-CONSTRUCTION NOTIFICATION TO THE U.S. ARMY CORPS OF ENGINEERS AND AVOID PERMIT AUTHORIZATION PRIOR TO INITIATING PROJECT CONSTRUCTION ACTIVITIES.

THE OWNER HAS PREVIOUSLY COORDINATED WITH THE APPROPRIATE AGENCIES AND IMPACTS TO KNOWN CULTURAL OR ARCHEOLOGICAL DEPOSITS HAVE BEEN AVOIDED OR MITIGATED. HOWEVER, THE CONTRACTOR MAY ENCOUNTER UNANTICIPATED CULTURAL OR ARCHEOLOGICAL DEPOSITS DURING CONSTRUCTION. IF ARCHEOLOGICAL SITES OR HISTORIC STRUCTURES WHICH MAY QUALIFY FOR DESIGNATION AS A STATE ARCHEOLOGICAL LANDMARK ACCORDING TO THE CRITERIA IN 13 TAC CHAPTER 26, OR THAT MAY BE ELIGIBLE FOR LISTING ON THE NATIONAL REGISTER OF HISTORIC PLACES IN ACCORDANCE WITH 36 CFR PART 800, ARE DISCOVERED AFTER CONSTRUCTION OPERATIONS ARE BEGUN, THE CONTRACTOR SHALL IMMEDIATELY CEASE OPERATIONS IN THAT PARTICULAR AREA AND NOTIFY THE OWNER, THE TVDB, AND THE TEXAS HISTORICAL COMMISSION, 1511 N. COLORADO ST., P. O. BOX 12276, CAPITOL STATION, AUSTIN, TEXAS 78711-2276. THE CONTRACTOR SHALL TAKE REASONABLE STEPS TO PROTECT AND PRESERVE THE DISCOVERIES UNTIL THEY HAVE BEEN INSPECTED BY THE OWNER'S REPRESENTATIVE AND THE TVDB. THE OWNER WILL PROMPTLY COORDINATE WITH THE STATE HISTORIC PRESERVATION OFFICER AND ANY OTHER APPROPRIATE AGENCIES TO OBTAIN ANY NECESSARY APPROVALS OR PERMITS TO ENABLE THE WORK TO CONTINUE. THE CONTRACTOR SHALL NOT RESUME WORK IN THE AREA OF THE DISCOVERY UNTIL AUTHORIZED TO DO SO BY THE OWNER.

NO ACTIVITY IS AUTHORIZED THAT IS LIKELY TO JEOPARDIZE THE CONTINUED EXISTENCE OF A THREATENED OR ENDANGERED SPECIES AS LISTED OR PROPOSED FOR LISTING UNDER THE FEDERAL ENDANGERED SPECIES ACT (ESA), AND/OR THE STATE OF TEXAS PARKS AND WILDLIFE CODE ON ENDANGERED SPECIES, OR TO DESTROY OR ADVERSELY MODIFY THE HABITAT OF SUCH SPECIES. IF A THREATENED OR ENDANGERED SPECIES IS ENCOUNTERED DURING CONSTRUCTION, THE CONTRACTOR SHALL IMMEDIATELY CEASE WORK IN THE AREA OF THE ENCOUNTER AND NOTIFY THE OWNER, WHO WILL IMMEDIATELY IMPLEMENT ACTIONS IN ACCORDANCE WITH THE ESA AND APPLICABLE STATE STATUTES. THESE ACTIONS SHALL INCLUDE REPORTING THE ENCOUNTER TO THE TVDB, THE U.S. FISH AND WILDLIFE SERVICE, AND THE TEXAS PARKS AND WILDLIFE DEPARTMENT, OBTAINING ANY NECESSARY APPROVALS OR PERMITS TO ENABLE THE WORK TO CONTINUE, OR IMPLEMENT OTHER MITIGATION ACTIONS. THE CONTRACTOR SHALL NOT RESUME CONSTRUCTION IN THE AREA OF THE ENCOUNTER UNTIL AUTHORIZED TO DO SO BY THE OWNER.

CENTERPOINT ENERGY (GAS FACILITIES)

- 1. CONTRACTOR SHALL NOTIFY CENTERPOINT ENERGY GAS AT (281) 672-4816 AFTER UNCOVERING ANY GAS LINES NOT SHOWN ON THESE DRAWINGS. GAS LINES SHALL NOT BE DISTURBED BY THE CONTRACTOR UNTIL CENTERPOINT ENERGY GAS HAS VERIFIED THE STATUS OF THE LINE AND APPROPRIATE ACTION APPROVED.
2. LOCATION 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 713-207-4667 OR 1-800-669-8944 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 713-207-4667 (7 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) 207-3532 OR (713) 207-4320 BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND FACILITIES.
3. CENTERPOINT ENERGY GAS ASSUMES NO RESPONSIBILITY FOR THE SHOWN OWNERSHIP OR THE ACCURACY OF THE ABANDONED GAS LINES SHOWN ON THESE PLANS. THE CONTRACTOR SHALL NOTIFY CENTERPOINT ENERGY GAS AT (281) 672-4816 AFTER EXPOSING ANY ABANDONED OR ACTIVE GAS LINES. THE GAS LINES SHALL NOT BE DISTURBED BY THE CONTRACTOR UNTIL CENTERPOINT ENERGY GAS HAS VERIFIED THE STATUS OF THE LINE.

SBC FACILITIES

- 1. THE LOCATIONS OF SBC 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 HIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND UTILITIES.
2. THE CONTRACTOR SHALL CALL 1-800-344-8377 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD LOCATED.
3. WHEN EXCAVATING WITHIN EIGHTEEN INCHES (18") OF THE INDICATED LOCATION OF SBC FACILITIES, ALL EXCAVATIONS MUST BE ACCOMPLISHED USING NON-MECHANIZED EXCAVATION PROCEDURES. WHEN BORING, THE CONTRACTOR SHALL EXPOSE THE SBC FACILITIES.
4. WHEN SBC FACILITIES ARE EXPOSED, THE CONTRACTOR WILL PROVIDE SUPPORT TO PREVENT DAMAGES TO THE CONDUIT DUCTS OR CABLES. WHEN EXCAVATING NEAR TELEPHONE POLES, THE CONTRACTOR SHALL BRACE THE POLE FOR SUPPORT.

UTILITY NOTES

CENTERPOINT ENERGY (ELECTRICAL FACILITIES)

- 1. OVERHEAD LINES MAY EXIST ALONG THE PROJECT ROUTE. WE HAVE NOT ATTEMPTED TO MARK THOSE LINES SINCE THEY ARE CLEARLY VISIBLE. CONTRACTOR SHALL LOCATE THEM PRIOR TO BEGINNING ANY CONSTRUCTION. TEXAS LAW, SECTION 752, HEALTH AND SAFETY CODE, FORBIDS ALL ACTIVITIES IN WHICH PERSONS OR THINGS MAY COME WITHIN SIX (6) 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 'CENTER POINT' ENERGY AT 713-207-2222.
2. CONTRACTOR SHALL COORDINATE WITH CENTERPOINT ENERGY ELECTRIC BEFORE WORKING WITHIN TEN (10) FEET OF OVERHEAD POWER LINES. CONTACT CENTERPOINT ENERGY ELECTRIC REPRESENTATIVES AT (713) 207-7777 OR (713) 923-3292 FOR POLES TO BE BRACED AND LINES TO BE DE-ENERGIZED AND/OR MOVED. CONTRACTOR SHALL BE RESPONSIBLE TO 'CENTER POINT' ENERGY ELECTRIC FOR ANY COSTS ASSOCIATED WITH BRACING OF POWER POLES OR DE-ENERGIZING AND/OR MOVING ANY CONFLICTING OVERHEAD POWER LINES.
3. TO STAKE CENTERPOINT ENERGY ELECTRIC UNDERGROUND FACILITIES, PLEASE CALL THE LINE STAR INFORMATION CENTER AT (713) 223-4567, OR TOLL FREE AT (800) 669-8344, AT LEAST 48 HOURS BEFORE STARTING EXCAVATION.
4. PRIVATE UNDERGROUND ELECTRICAL FACILITIES MAY EXIST IN THE AREA AND THESE WILL NOT BE STAKED BY CENTERPOINT ENERGY ELECTRIC PERSONNEL.

ACTIVITIES ON/OR ACROSS CENTERPOINT ENERGY FEED OR EASEMENT PROPERTY. NO APPROVAL TO USE, CROSS OR OCCUPY CENTER POINT FEED OR EASEMENT PROPERTY IS GIVEN. IF YOU NEED TO USE CENTER POINT PROPERTY, PLEASE CONTACT OUR SURVEYOR & RIGHT OF WAY DIVISION AT (713) 207-6348 or (713) 207-5769.

OPERATIONS A CRANE, DERICK, SHIMBEL, DRILLING RIG, POLE DRIVER, HOISTING EQUIPMENT, OR SIMILAR APPARATUS WITHIN 10 FEET OF LIVE OVERHEAD HIGH VOLTAGE LINES.

Table with columns: No., Date, Revisions, App.

AT&T TEXAS/SWB/T FACILITIES

- 1. THE LOCATIONS OF AT&T TEXAS/SWB/T 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 HIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND UTILITIES.
2. THE CONTRACTOR SHALL CALL 1-800-344-8377 (TEXAS 811) A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD LOCATED.
3. WHEN EXCAVATING WITHIN EIGHTEEN INCHES (18") OF THE INDICATED LOCATION OF AT&T TEXAS/SWB/T FACILITIES, ALL EXCAVATIONS MUST BE ACCOMPLISHED USING NON-MECHANIZED EXCAVATION PROCEDURES. WHEN BORING, THE CONTRACTOR SHALL EXPOSE THE AT&T TEXAS/SWB/T FACILITIES.
4. WHEN AT&T TEXAS/SWB/T 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.
5. THE PRESENCE OR ABSENCE OF AT&T TEXAS/SWB/T 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.
6. PLEASE CONTACT THE AT&T TEXAS DAMAGE PREVENTION MANAGER ROSEVELT LEE JR. AT (713) 567-4552 OR E-MAIL HIM AT RL7259@ATT.COM, IF CABLE LOCATE REQUEST(S) ARE NOT COMPLETED FOR OUR AT&T TEXAS/SWB/T FACILITIES.

PRIVATE UTILITY LINES SHOWN. Includes signatures and dates for utility companies like Centerpoint Energy Electric and AECOM.

North Harris County REGIONAL WATER Authority logo and contact information.

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY PROJECT 28-B PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

CONSTRUCTION NOTES

Professional Engineer seal for Carl D. McConnell, License No. 97585, State of Texas.

DANNENBAUM ENGINEERING CORPORATION logo and address: 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

LAST MODIFIED: Jan 22, 2020 - 8:20am BY USER: yimyo DWG LOCATION: G:\1110\4876-01\_NHCRWA\_PROJECT\_28-B\CAD\Drawings\General\ DWG NAME: 4876-01\_04.dwg



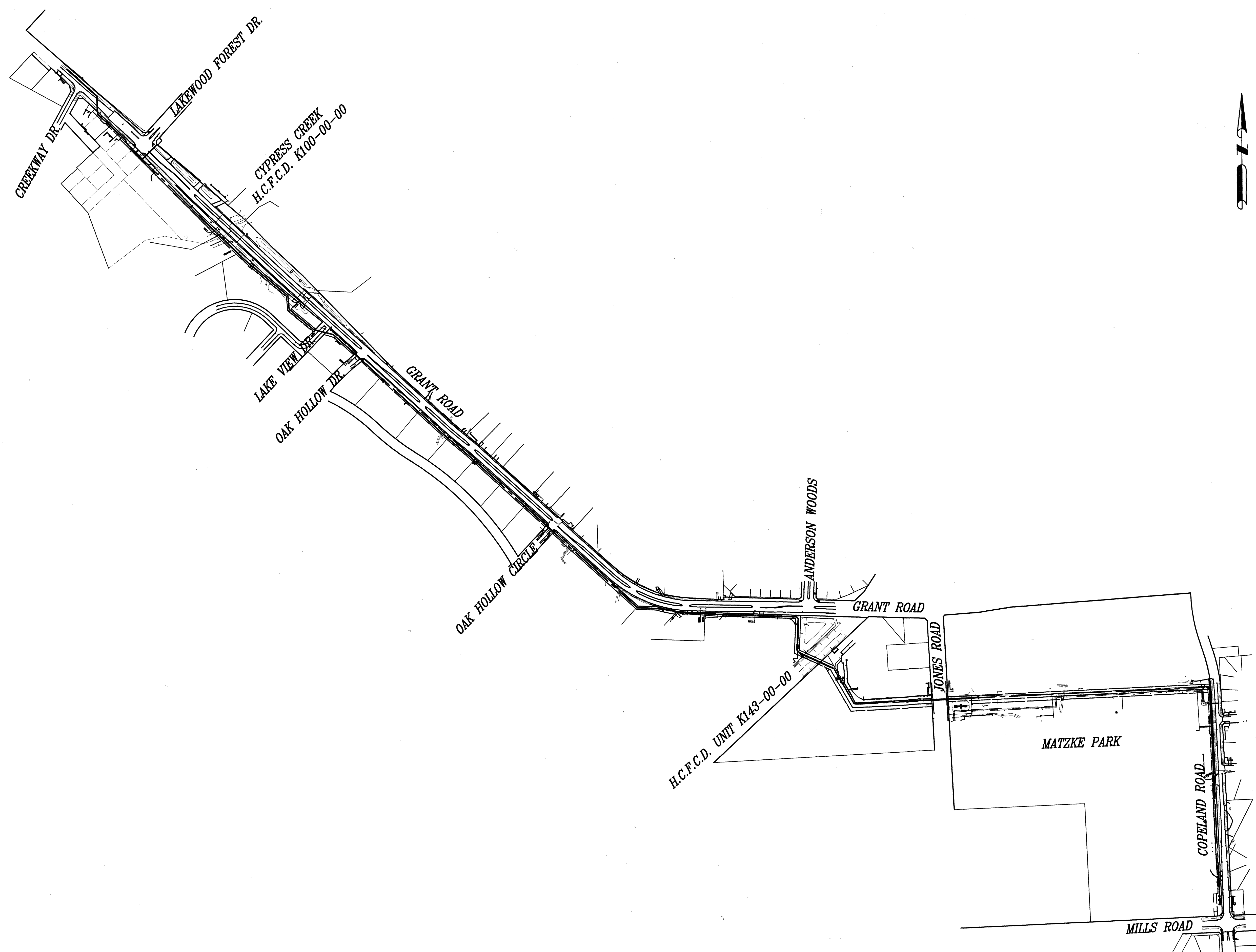
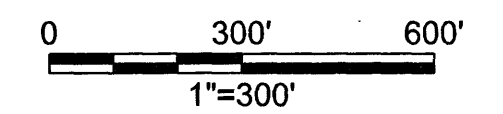
No.	Date	Revisions	App.

**BENCHMARK:**

FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCFCO BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY 0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE CYPRESS WATERSHED NEAR STREAM K100-00-00 ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**

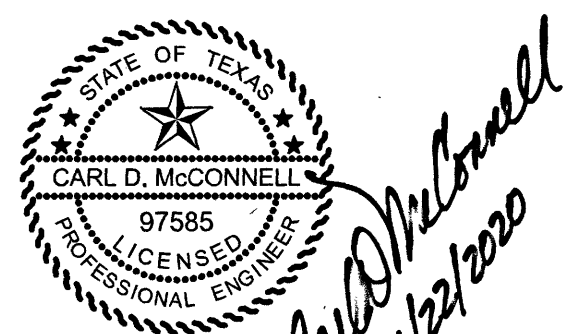
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100 YR FL=125.00'



**AECOM**  
AECOM TECHNICAL SERVICES, INC.  
19219 KATY FREEWAY, SUITE 100  
HOUSTON, TEXAS 77094-1009  
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TBP REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

**PROJECT OVERALL LAYOUT SHEET**



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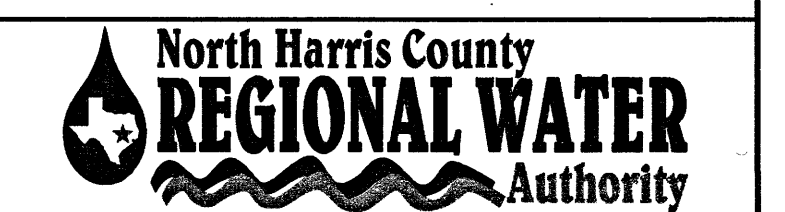
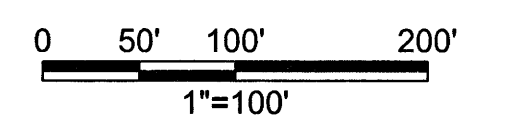
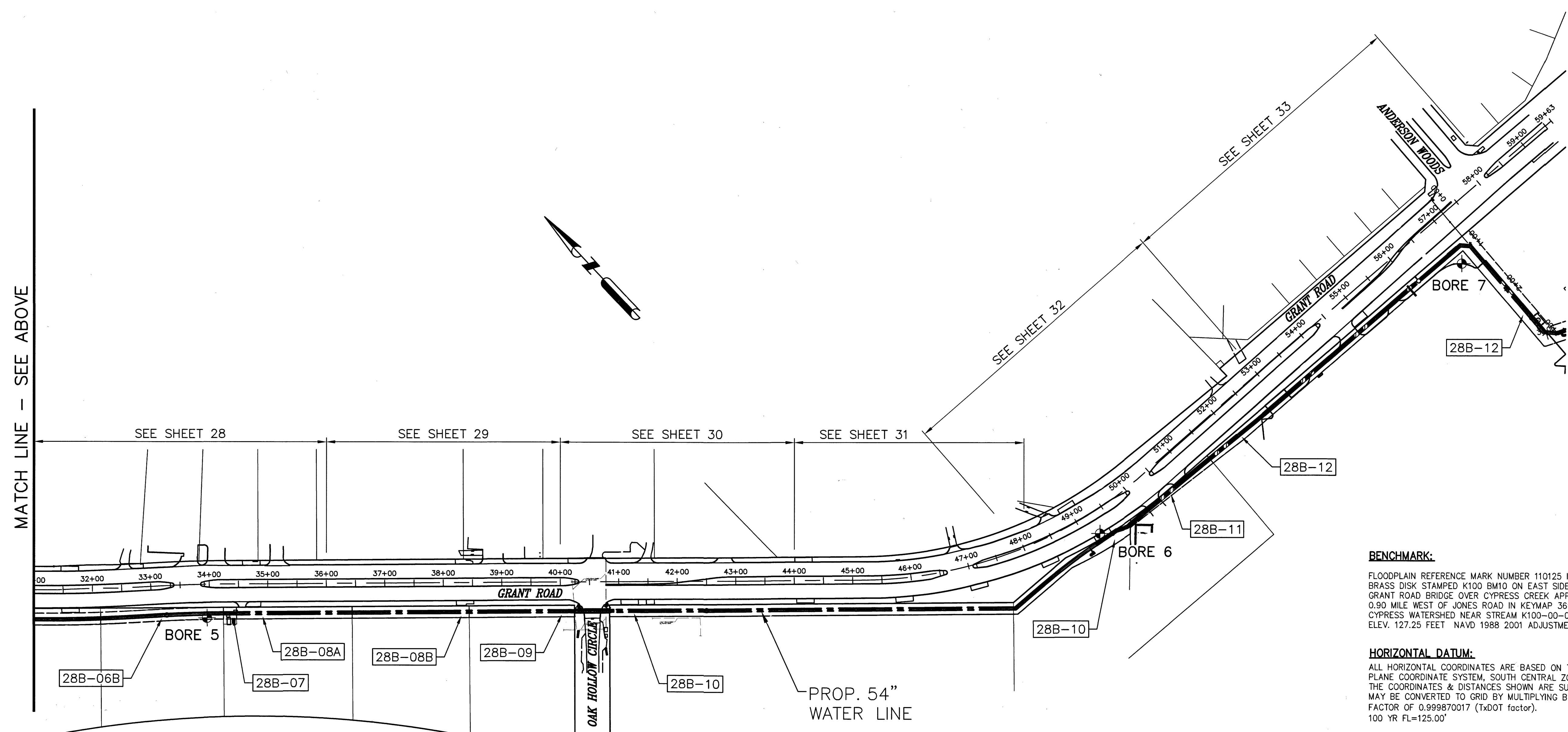
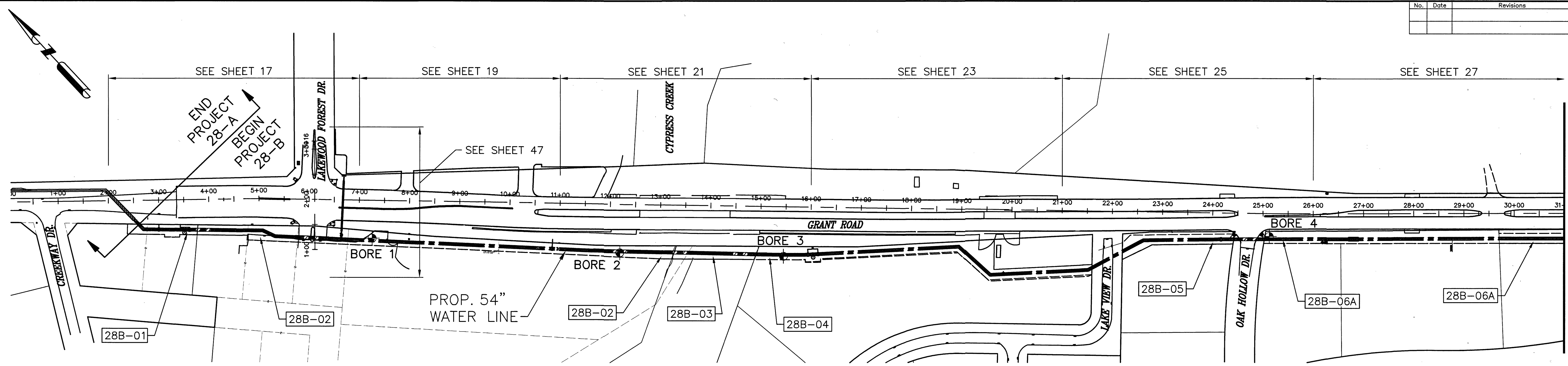
**DANNENBAUM**

ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

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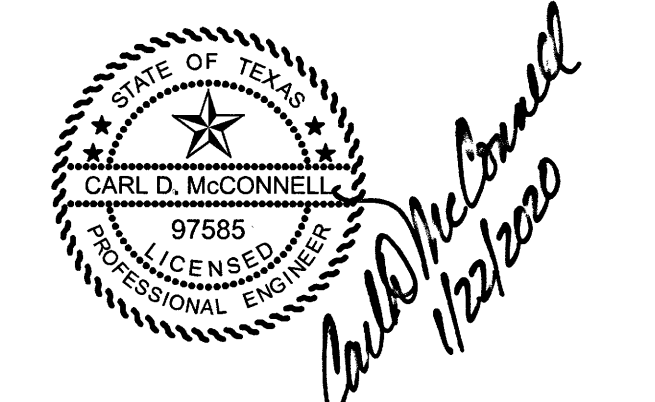


No.	Date	Revisions	App.



**AECOM**  
 AECOM TECHNICAL SERVICES, INC.  
 18219 KATY FREWAY, SUITE 100  
 HOUSTON, TEXAS 77054-1009  
 281.846.2400  
 WWW.AECOM.COM  
 TSP# REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**SHEET LAYOUT, PARCEL INDEX AND BORING PLAN**  
 (SHEET 1 OF 2)



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 ENGINEERING CORPORATION  
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 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

SHEET No: 6 of 99

**BENCHMARK:**  
 FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCFCD BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY 0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE CYPRESS WATERSHED NEAR STREAM K100-00-00 ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**  
 ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83. THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE FACTOR OF 0.999870017 (TxDOT factor).  
 100 YR FL=125.00'

LAST MODIFIED: Jan 21, 2020 - 9:50am BY USER: yimvy  
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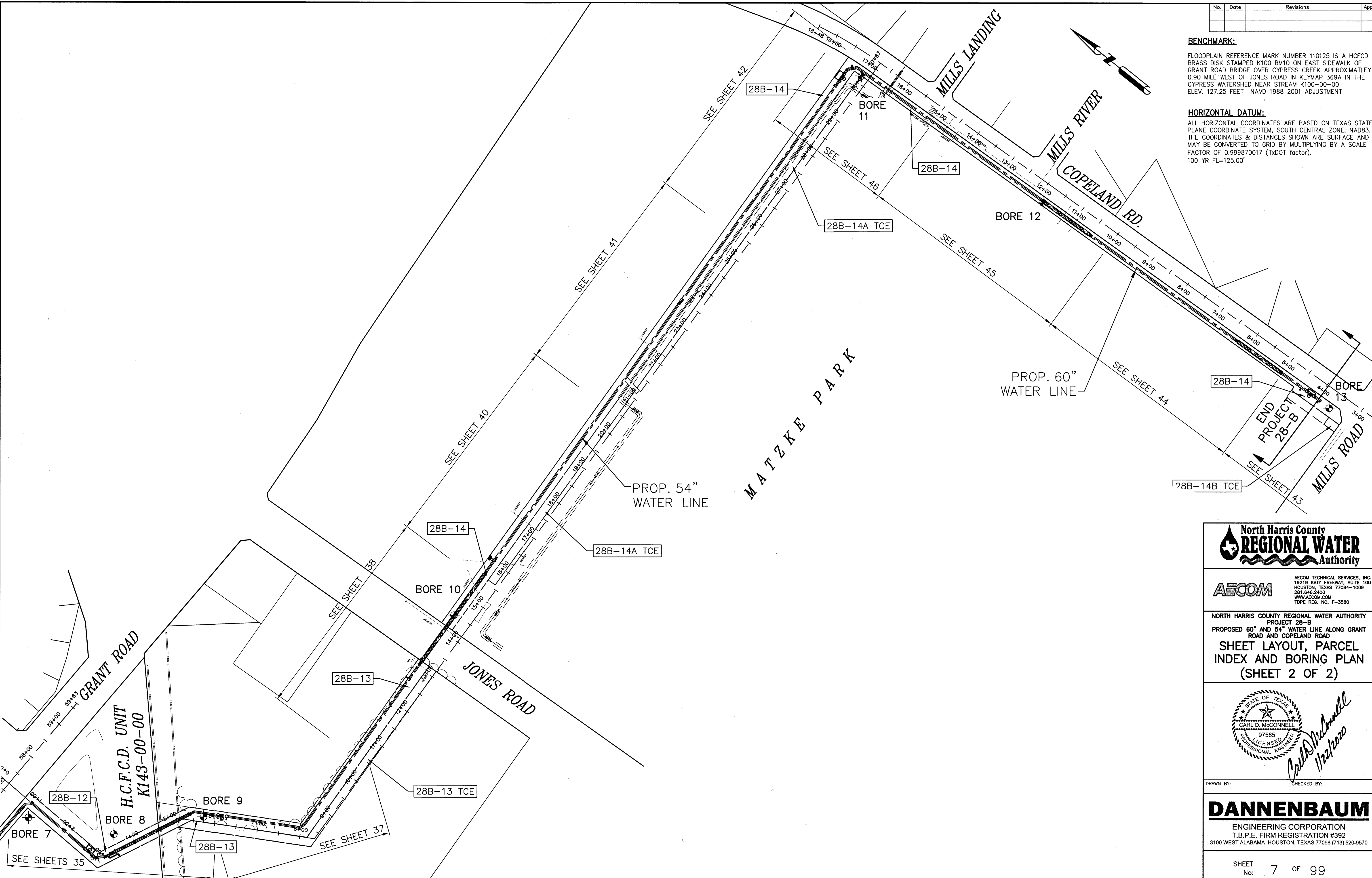
No.	Date	Revisions	App.

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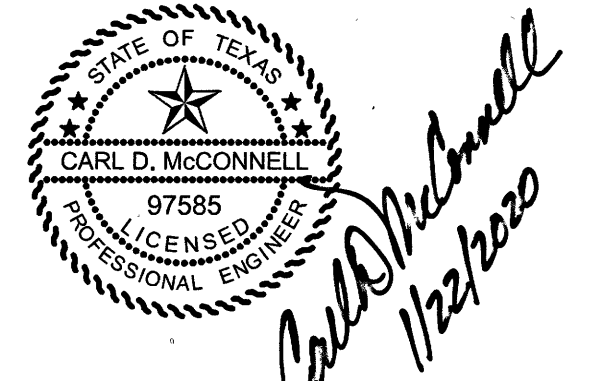


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**AECOM**  
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 TBP# REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**SHEET LAYOUT, PARCEL INDEX AND BORING PLAN**  
 (SHEET 2 OF 2)

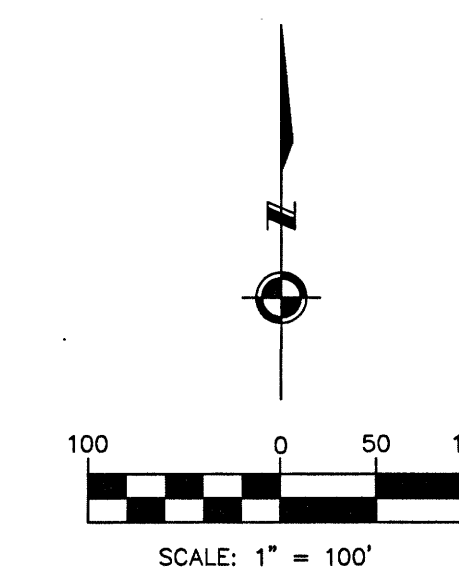


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No.	Date	Revisions	App.



**BENCHMARK:**

FLOODPLAIN REFERENCE MARK NUMBER 110125 IS AN HCFCD BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY 0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE CYPRESS WATERSHED NEAR STREAM K100-00-00

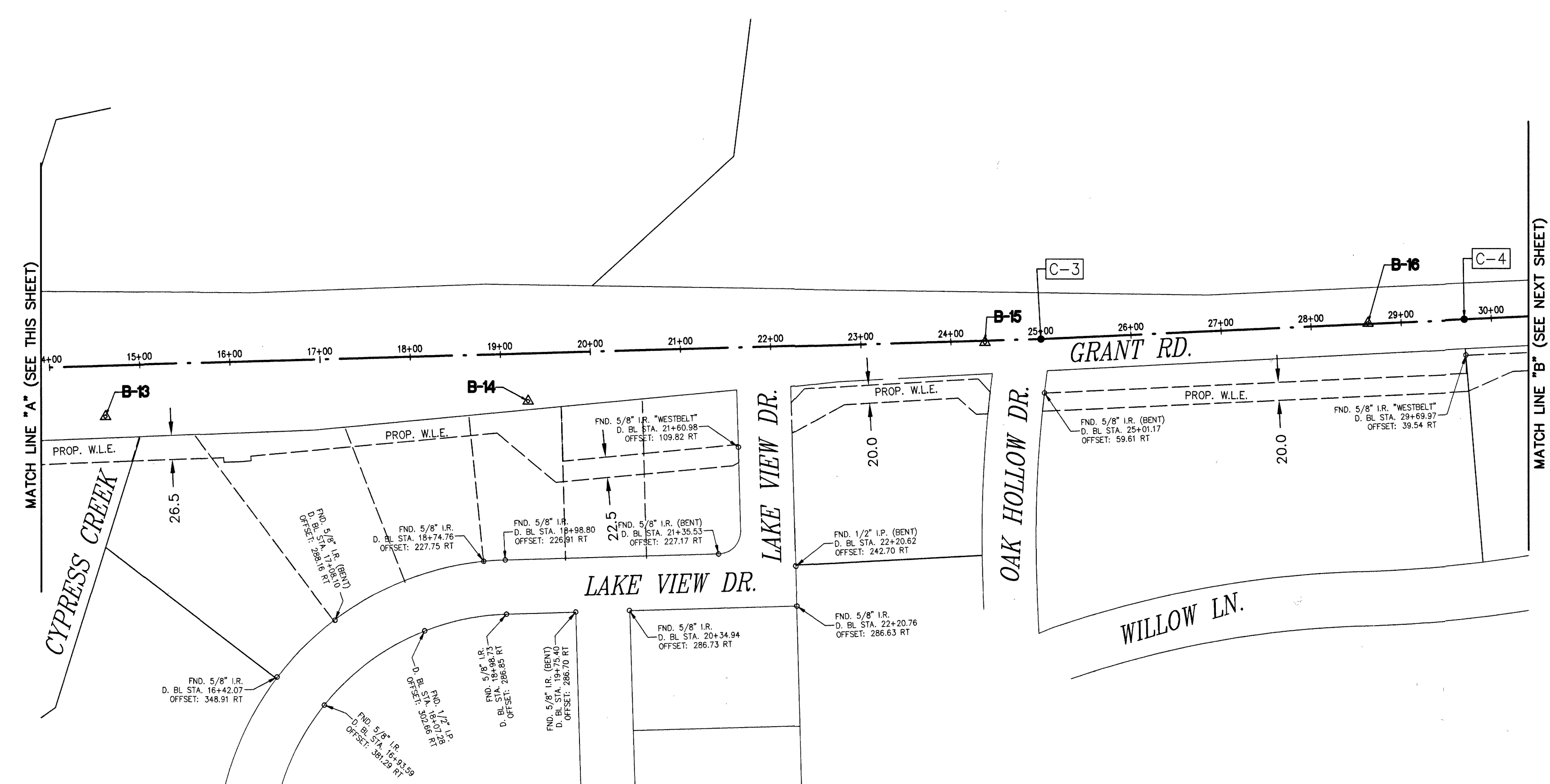
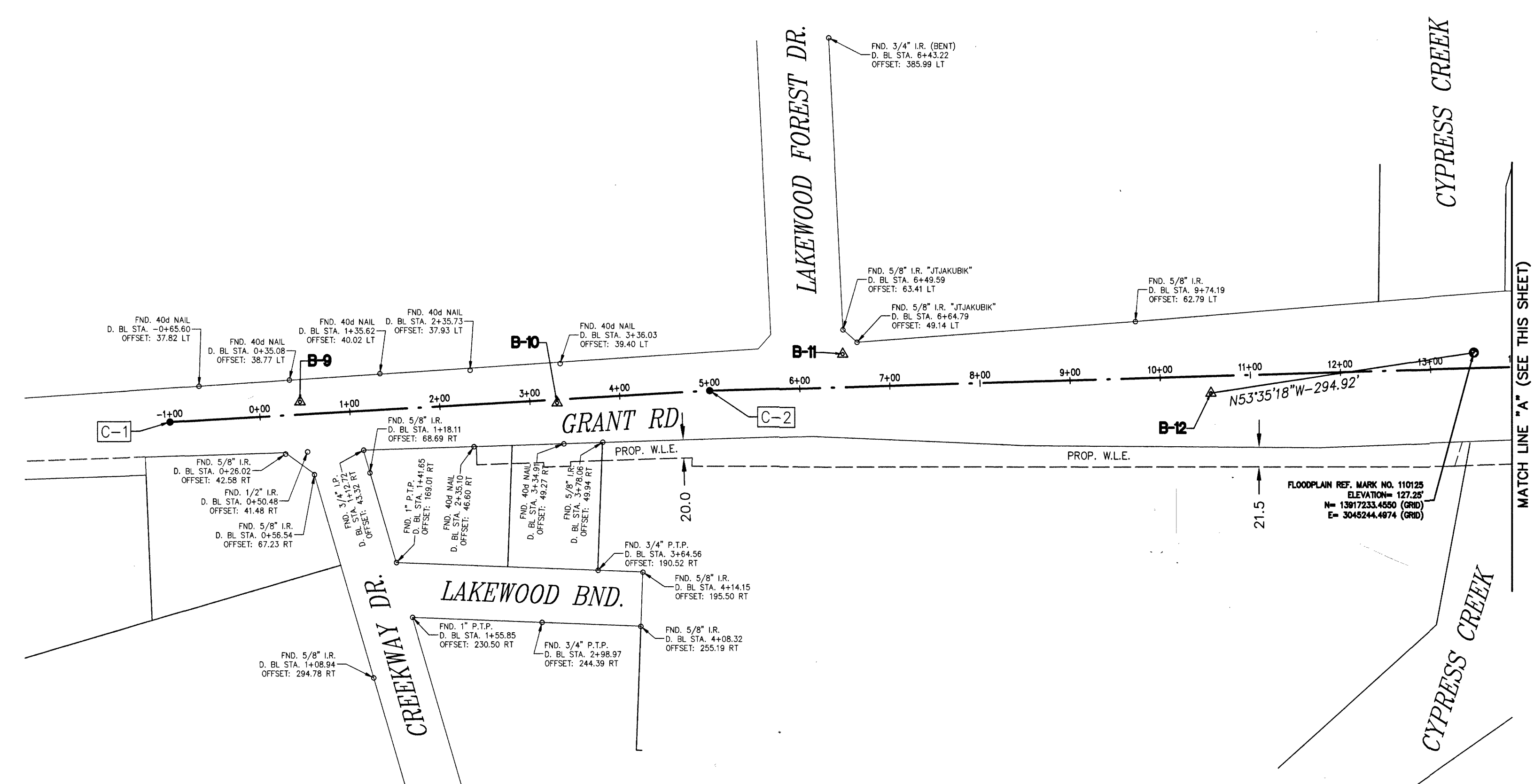
ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**

ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83. THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE FACTOR OF 0.999870017.

**LEGEND:**

- B-X** SURVEY CONTROL POINT NUMBER
- C-X** DESIGN BASELINE POINT NUMBER
- $\blacktriangle$  SURVEY CONTROL POINT
- $\bullet$  DESIGN BASELINE POINT
- $\odot$  CITY OF HOUSTON MONUMENT
- D. BL. DESIGN BASELINE

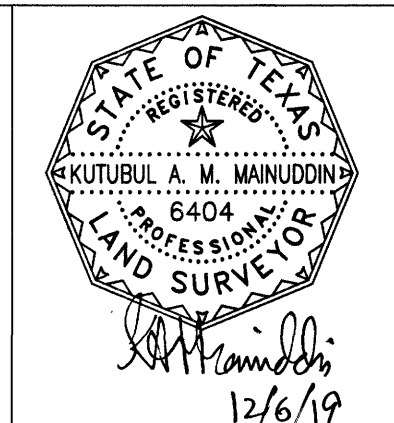


**AECOM**  
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 5444 WESTHEIMER RD., SUITE 200  
 HOUSTON, TEXAS 77056  
 WWW.AECOM.COM  
 TYPE REG. NO. F-3580  
 713.780.4100

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

**SURVEY CONTROL MAP**  
 (SHEET 1 OF 4)

**KUO & associates, Inc.**  
 Consulting Engineers & Surveyors  
 10300 Westoffice Dr., Suite 800, Houston, Texas 77042  
 Tel: 713-975-6769, Fax: 713-975-0520, www.kuasoc.com  
 Engineering Firm Registration No. F-4578  
 Surveying Firm Registration No. 1007560



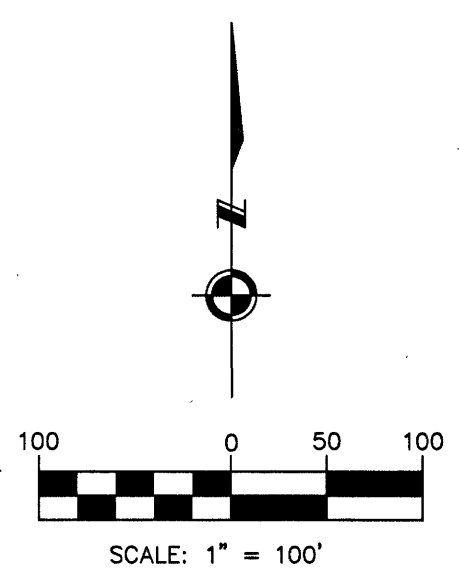
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**DANNENBAUM**  
 ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

LAST MODIFIED: Dec 05, 2019 - 5:48pm BY USER: kutubul  
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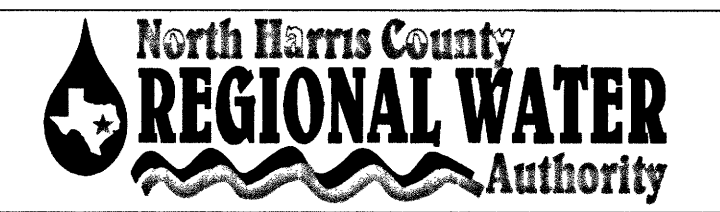
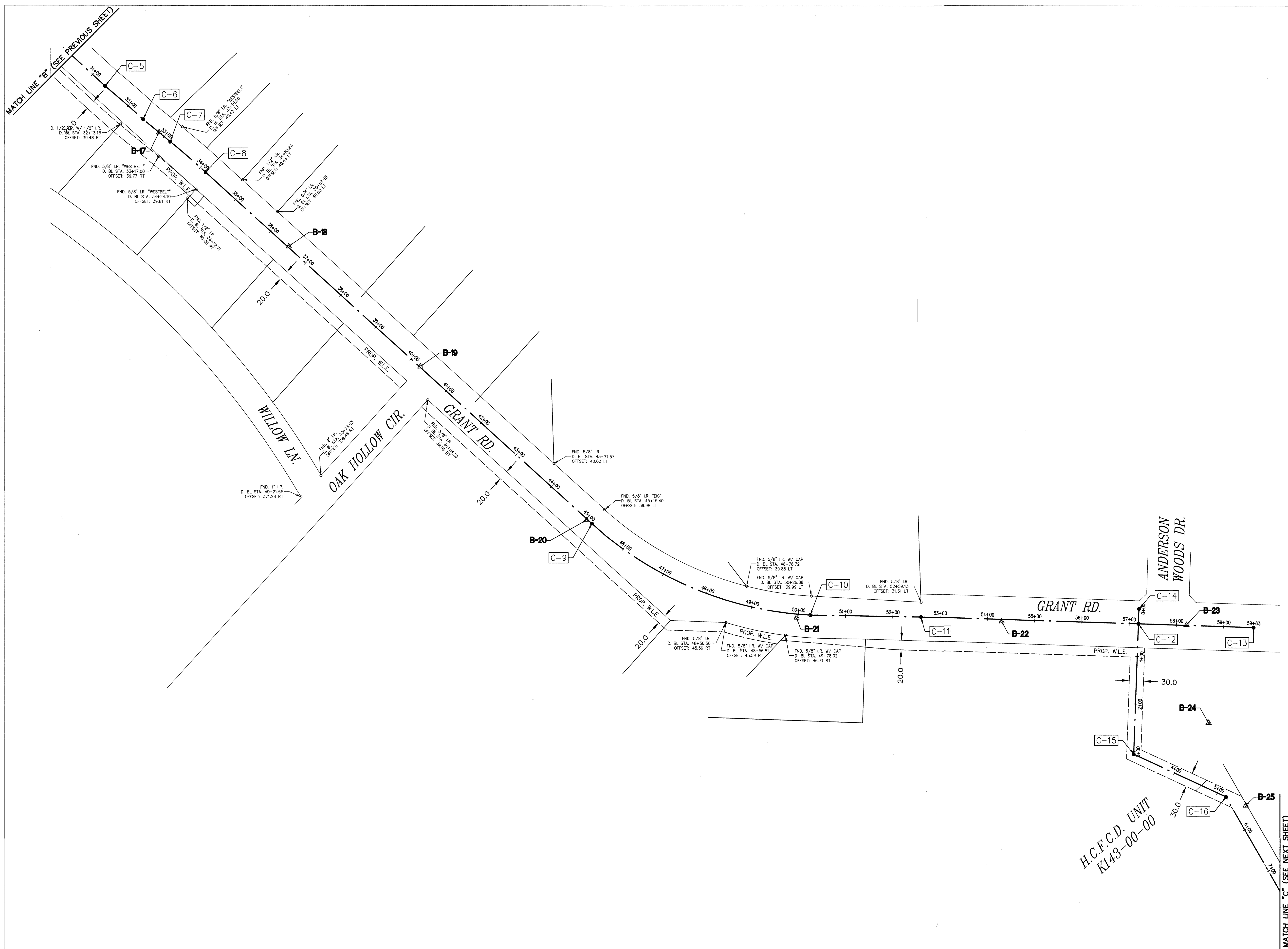
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**BENCHMARK:**  
 FLOODPLAIN REFERENCE MARK NUMBER 110125 IS AN HCFCD BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY 0.90 MILE WEST OF JONES ROAD IN KEYMAP 385A IN THE CYPRESS WATERSHED NEAR STREAM K100-00-00  
 ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

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- LEGEND:**
- B-X SURVEY CONTROL POINT NUMBER
  - C-X DESIGN BASELINE POINT NUMBER
  - ▲ SURVEY CONTROL POINT
  - DESIGN BASELINE POINT
  - CITY OF HOUSTON MONUMENT
  - D. BL: DESIGN BASELINE



**AECOM**  
 AECOM TECHNICAL SERVICES, INC.  
 5444 WESTHEIMER RD., SUITE 200  
 HOUSTON, TEXAS 77056  
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 TBP REG. NO. F-3580  
 713.780.4100

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

SURVEY CONTROL MAP  
 (SHEET 2 OF 4)

**KUO**  
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 Consulting Engineers  
 & Surveyors

10300 Westoffice Dr., Suite 800, Houston, Texas 77042  
 Tel: 713-975-8753, Fax: 713-975-0920, www.kuoassociates.com  
 Engineering Firm Registration No. 7-4578  
 Surveying Firm Registration No. 1107560



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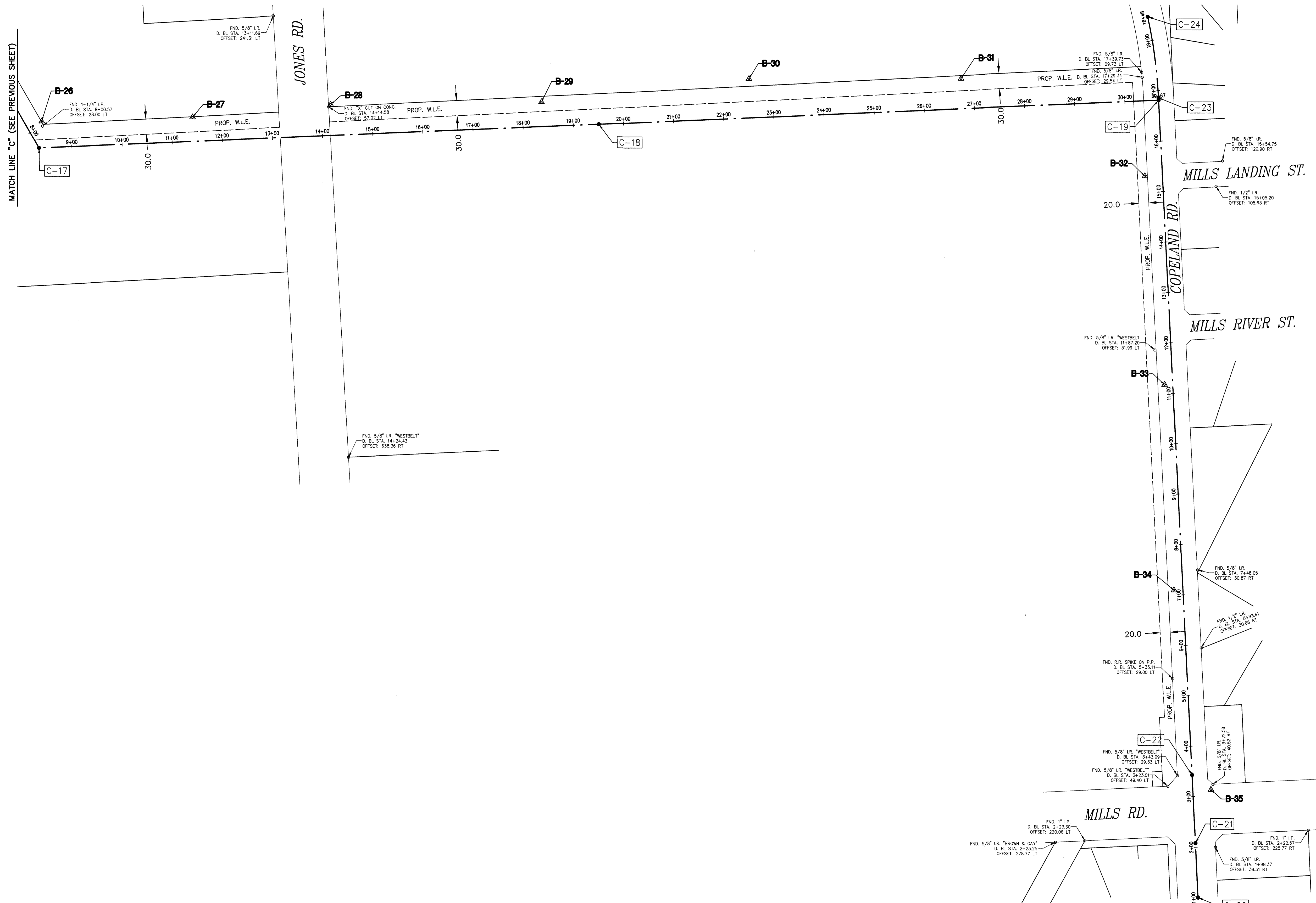
**DANNENBAUM**  
 ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

REF. NO. SHEET No. 9 OF 99

LAST MODIFIED: Dec 05, 2019 - 5:49pm BY USER: kutubul  
 DWG. LOCATION: S:\Proj-2016\16064 (NHCRWA 28-B)\Dwgs\SCM\  
 DWG. NAME: SCM-16064.dwg



No.	Date	Revisions	App.



**BENCHMARK:**

FLOODPLAIN REFERENCE MARK NUMBER 110125 IS AN HCFCD BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY 0.90 MILE WEST OF JONES ROAD IN KEMAP 369A IN THE CYPRESS WATERSHED NEAR STREAM K100-00-00  
ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**

ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83. THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE FACTOR OF 0.999870017.

**LEGEND:**

- B-X** SURVEY CONTROL POINT NUMBER
- C-X** DESIGN BASELINE POINT NUMBER
- $\Delta$  SURVEY CONTROL POINT
- $\bullet$  DESIGN BASELINE POINT
- $\odot$  CITY OF HOUSTON MONUMENT
- D. BL: DESIGN BASELINE



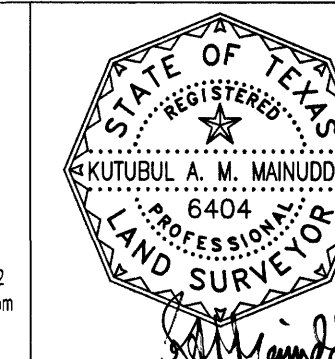
**AECOM**  
AECOM TECHNICAL SERVICES, INC.  
5444 WESTHEIMER RD., SUITE 200  
HOUSTON, TEXAS 77056  
WWW.AECOM.COM  
TBP REG. NO. F-3580  
713.780.4100

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

**SURVEY CONTROL MAP**  
(SHEET 3 OF 4)

**KUO & Associates, Inc.**  
Consulting Engineers & Surveyors

10300 Westoffice Dr., Suite 800, Houston, Texas 77042  
Tel: 713-975-9769; Fax: 713-975-0920; www.kuoassociates.com  
Engineering Firm Registration No. F-4578  
Surveying Firm Registration No. 1007560



DRAWN BY: TQT CHECKED BY: KAM

**DANNENBAUM**

ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

REF. NO.

SHEET No: 10 OF 99

LAST MODIFIED: Dec 05, 2019 - 5:50pm BY USER: kutubul  
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DWG. NAME: SCM-16064.dwg



No.	Date	Revisions	App.

**TEMPORARY BENCHMARKS**

TBM-9  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 29+45.31 OFFSET: 14.10L  
ELEV.=126.55 FEET

TBM-10  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 34+30.01 OFFSET: 3.50R  
ELEV.=125.16 FEET

TBM-11  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 6+48.45 OFFSET: 36.78L  
ELEV.=124.85 FEET

TBM-12  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 10+55.68 OFFSET: 18.59R  
ELEV.=125.89 FEET

TBM-13  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 14+60.30 OFFSET: 56.06R  
ELEV.=127.01 FEET

TBM-14  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 19+29.38 OFFSET: 52.42R  
ELEV.=123.11 FEET

TBM-15  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 24+37.83 OFFSET: 1.73R  
ELEV.=121.36 FEET

TBM-16  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 28+53.14 OFFSET: 0.85L  
ELEV.=121.91 FEET

TBM-17  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 32+46.00 OFFSET: 0.04L  
ELEV.=122.38 FEET

TBM-18  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 36+50.05 OFFSET: 2.07L  
ELEV.=124.50 FEET

TBM-19  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 40+25.57 OFFSET: 1.33L  
ELEV.=125.39 FEET

TBM-20  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 44+02.04 OFFSET: 2.32R  
ELEV.=126.07 FEET

TBM-21  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 49+26.86 OFFSET: 7.38R  
ELEV.=127.76 FEET

TBM-22  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 54+29.99 OFFSET: 4.16R  
ELEV.=130.15 FEET

TBM-23  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 09+20.99 OFFSET: 1.12L  
ELEV.=130.39 FEET

TBM-24  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 4+22.12 OFFSET: 126.05L  
ELEV.=128.60 FEET

TBM-25  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 5+56.62 OFFSET: 27.18L  
ELEV.=129.59 FEET

TBM-26  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 7+91.37 OFFSET: 31.19L  
ELEV.=129.59 FEET

TBM-27  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 11+42.76 OFFSET: 47.99L  
ELEV.=130.08 FEET

TBM-28  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 14+18.37 OFFSET: 61.37L  
ELEV.=126.43 FEET

TBM-29  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 16+38.56 OFFSET: 48.69L  
ELEV.=126.83 FEET

TBM-30  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 22+53.19 OFFSET: 77.29L  
ELEV.=128.43 FEET

TBM-31  
SETOUTONCONC AT GRANT RD.  
D. BL STA. 26+75.78 OFFSET: 59.77L  
ELEV.=128.35 FEET

TBM-32  
SETOUTONCONC AT COPELAND RD.  
D. BL STA. 15+30.05 OFFSET: 35.08L  
ELEV.=128.84 FEET

TBM-33  
SETOUTONCONC AT COPELAND RD.  
D. BL STA. 11+18.15 OFFSET: 16.26L  
ELEV.=127.42 FEET


TBM-34  
SETOUTONCONC AT COPELAND RD.  
D. BL STA. 7+10.33 OFFSET: 18.06L  
ELEV.=127.42 FEET

TBM-35  
SETOUTONCONC AT COPELAND RD.  
D. BL STA. 3+12.21 OFFSET: 35.99R  
ELEV.=126.06 FEET


SURVEY BASELINE POINTS DATA (TEMPORARY BENCHMARK)									
POINT No.	NORTHING (SURFACE)	EASTING (SURFACE)	NORTHING (GRID)	EASTING (GRID)	ELEVATION	D. BL STA.	OFFSET	DESCRIPTION	
B-9	13,919,925.52	3,044,681.41	13,918,116.17	3,044,285.65	126.55'	0+45.31	14.10L	SET 1/2" I.R. W/ CAP	
B-10	13,919,723.12	3,044,882.41	13,917,913.80	3,044,486.63	125.16'	3+30.01	3.50R	SET MAG W/ SHINER	
B-11	13,919,537.58	3,045,144.93	13,917,728.27	3,044,749.11	124.85'	6+48.45	36.78L	SET "X" CUT ON CONC.	
B-12	13,919,217.76	3,045,403.03	13,917,408.49	3,045,007.18	125.89'	10+55.68	18.59R	SET "X" CUT ON CONC.	
B-13	13,918,912.74	3,045,671.53	13,917,103.52	3,045,275.64	127.01'	14+60.30	56.06R	SET "X" CUT ON CONC.	
B-14	13,918,593.37	3,046,015.12	13,916,784.19	3,045,619.19	123.11'	19+29.38	52.42R	SETS/8" I.R. W/ CAP	
B-15	13,918,281.33	3,046,419.48	13,916,472.19	3,046,023.50	121.36'	24+37.83	1.73R	SETS/8" I.R. W/ CAP	
B-16	13,917,995.37	3,046,734.60	13,916,186.27	3,046,338.58	121.91'	28+53.14	0.85L	SET 1/2" I.R. W/ CAP	
B-17	13,917,713.46	3,047,049.66	13,915,904.40	3,046,653.60	122.36'	32+46.00	0.04L	SET 1/2" I.R. W/ CAP	
B-18	13,917,473.94	3,047,323.79	13,915,664.90	3,046,927.69	124.50'	36+50.05	2.07L	SET 1/2" I.R. W/ CAP	
B-19	13,917,221.75	3,047,602.01	13,915,412.74	3,047,205.88	125.39'	40+25.57	1.33L	SET "X" CUT ON CONC.	
B-20	13,916,899.73	3,047,953.22	13,915,090.77	3,047,557.04	126.07'	44+02.04	2.32R	SET 1/2" I.R. W/ CAP	
B-21	13,916,695.08	3,048,397.40	13,914,886.15	3,048,001.16	127.78'	49+26.86	7.38R	SET "X" CUT ON CONC.	
B-22	13,916,686.85	3,048,830.89	13,914,877.92	3,048,434.59	130.15'	54+29.99	4.16R	SET "X" CUT ON CONC.	
B-23	13,916,679.88	3,049,221.86	13,914,870.95	3,048,825.51	130.39'	58+20.99	1.12L	SET "X" CUT ON CONC.	
B-24	13,916,474.17	3,049,268.91	13,914,665.26	3,048,872.56	128.60'	6+48.45	36.78L	SET 1/2" I.R. W/ CAP	
B-25	13,916,300.69	3,049,347.38	13,914,491.81	3,048,951.02	129.59'	5+56.62	27.18L	SET 1/2" I.R. W/ CAP	
B-26	13,916,099.33	3,049,468.10	13,914,290.47	3,049,071.72	129.59'	7+91.37	31.19L	SET "X" CUT ON CONC.	
B-27	13,916,107.54	3,049,768.66	13,914,298.68	3,049,372.24	130.08'	11+42.76	47.99L	SET "X" CUT ON CONC.	
B-28	13,916,132.59	3,050,043.45	13,914,323.72	3,049,646.99	128.45'	14+18.37	61.37L	SET 1/2" I.R. W/ CAP	
B-29	13,916,137.72	3,050,463.80	13,914,328.86	3,050,067.29	128.63'	18+38.56	48.69L	SET 1/2" I.R. W/ CAP	
B-30	13,916,183.88	3,050,877.05	13,914,375.02	3,050,480.49	128.43'	22+53.19	77.29L	SET 1/2" I.R. W/ CAP	
B-31	13,916,184.28	3,051,299.80	13,914,375.41	3,050,903.18	128.35'	26+75.78	59.77L	SET 1/2" I.R. W/ CAP	
B-32	13,915,990.54	3,051,665.95	13,914,181.70	3,051,269.29	128.84'	15+32.05	35.08L	SET "X" CUT ON CONC.	
B-33	13,915,578.07	3,051,705.18	13,913,769.28	3,051,308.51	128.10'	11+18.15	16.26L	SET 1/2" I.R. W/ CAP	
B-34	13,915,170.67	3,051,723.50	13,913,361.93	3,051,326.83	127.42'	7+10.33	18.06L	SET 1/2" I.R. W/ CAP	
B-35	13,914,775.69	3,051,797.14	13,912,967.00	3,051,400.45	128.06'	3+12.21	35.99R	SET "X" CUT ON CONC.	

DESIGN BASELINE POINTS DATA					
POINT No.	D. BL STA.	NORTHING (SURFACE)	EASTING (SURFACE)	NORTHING (GRID)	EASTING (GRID)
C-1	-1+00.00	13,920,011.58	3,044,563.48	13,918,202.21	3,044,167.74
C-2	5+00.00	13,919,612.74	3,045,011.73	13,917,803.43	3,044,615.93
C-3	24+99.96	13,918,239.79	3,046,465.99	13,916,430.66	3,046,070.00
C-4	29+69.93	13,917,922.68	3,046,812.85	13,916,113.59	3,046,416.82
C-5	31+36.31	13,917,810.44	3,046,935.66	13,916,001.36	3,046,539.61
C-6	32+42.58	13,917,740.94	3,047,016.04	13,915,931.87	3,046,619.98
C-7	33+16.75	13,917,693.95	3,047,073.43	13,915,884.89	3,046,677.36
C-8	34+14.95	13,917,629.95	3,047,147.90	13,915,820.89	3,046,751.82
C-9	45+15.34	13,916,892.54	3,047,964.64	13,915,083.58	3,047,568.46
C-10	50+25.34	13,916,700.35	3,048,426.49	13,914,891.41	3,048,030.24
C-11	52+59.26	13,916,696.36	3,048,660.37	13,914,887.42	3,048,264.09
C-12	57+19.49	13,916,681.94	3,049,120.37	13,914,873.01	3,048,724.04
C-13	59+63.11	13,916,674.31	3,049,363.88	13,914,865.38	3,048,967.51
C-14	0+00.00	13,916,713.35	3,049,121.50	13,914,904.41	3,048,725.17
C-15	3+05.59	13,916,407.95	3,049,110.53	13,914,599.06	3,048,714.20
C-16	5+20.00	13,916,318.84	3,049,305.55	13,914,509.96	3,048,909.19
C-17	8+34.33	13,916,046.52	3,049,462.54	13,914,237.67	3,049,066.16
C-18	19+50.88	13,916,093.84	3,050,578.08	13,914,284.98	3,050,181.56
C-19	30+67.43	13,916,141.16	3,051,693.62	13,914,332.29	3,051,296.96
C-20	1+00.00	13,914,561.96	3,051,771.42	13,912,753.30	3,051,374.75
C-21	2+07.91	13,914,669.75	3,051,766.32	13,912,861.08	3,051,369.64
C-22	3+42.98	13,914,804.65	3,051,759.68	13,912,995.96	3,051,363.00
C-23	16+85.94	13,916,145.98	3,051,693.39	13,914,337.11	3,051,296.72
C-24	18+47.59	13,916,305.99	3,051,671.82	13,914,497.11	3,051,275.15

LAST MODIFIED: Dec 05, 2019 - 5:50pm  
 BY USER: kutubul  
 DWG. LOCATION: S:\Proj-2016\16064 (NCRWA 28-B)\Dwg\SCM\16064.dwg  
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**North Harris County  
REGIONAL WATER  
Authority**




**AECOM**

AECOM TECHNICAL SERVICES, INC.  
 5444 WESTHEIMER RD., SUITE 200  
 HOUSTON, TEXAS 77056  
 WWW.AECOM.COM  
 TBP REG. NO. F-3580  
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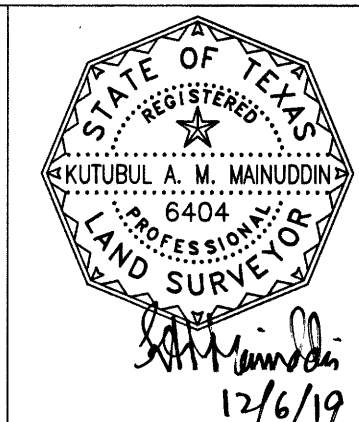
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT  
 ROAD AND COPELAND ROAD

**SURVEY CONTROL MAP**  
 (SHEET 4 OF 4)



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STATE OF TEXAS  
 REGISTERED  
 KUTUBUL A. M. MANUDDIN  
 6404  
 PROFESSIONAL  
 LAND SURVEYOR  
 12/6/19

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CHECKED BY: KAM



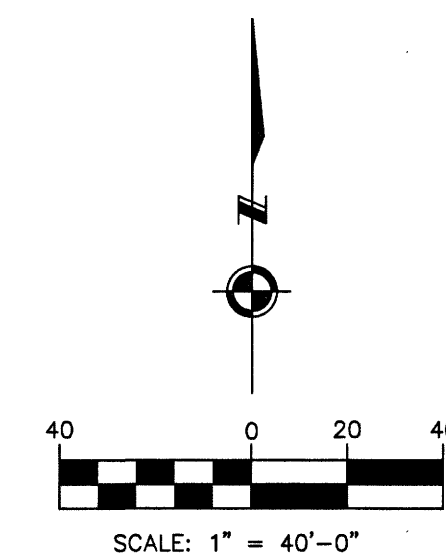
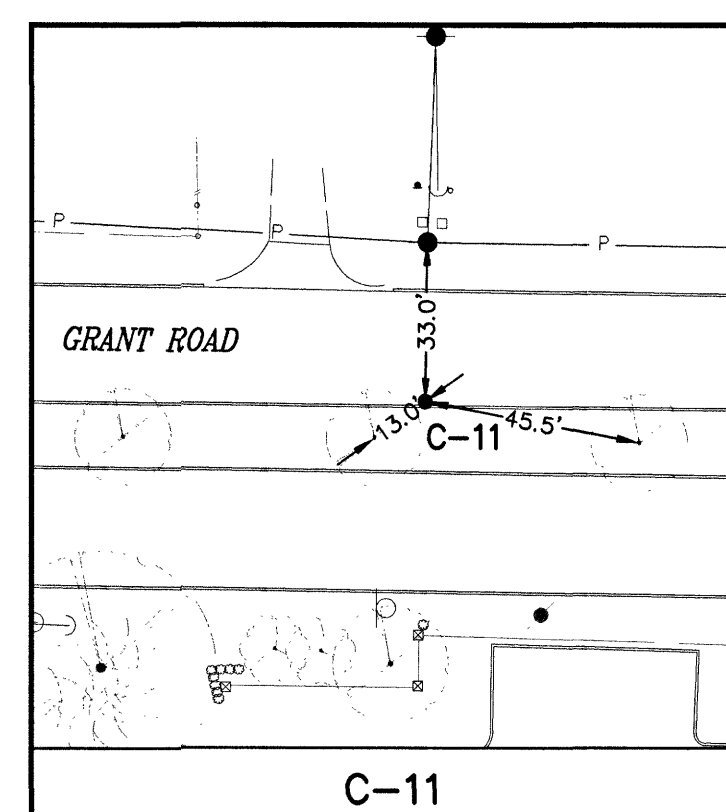
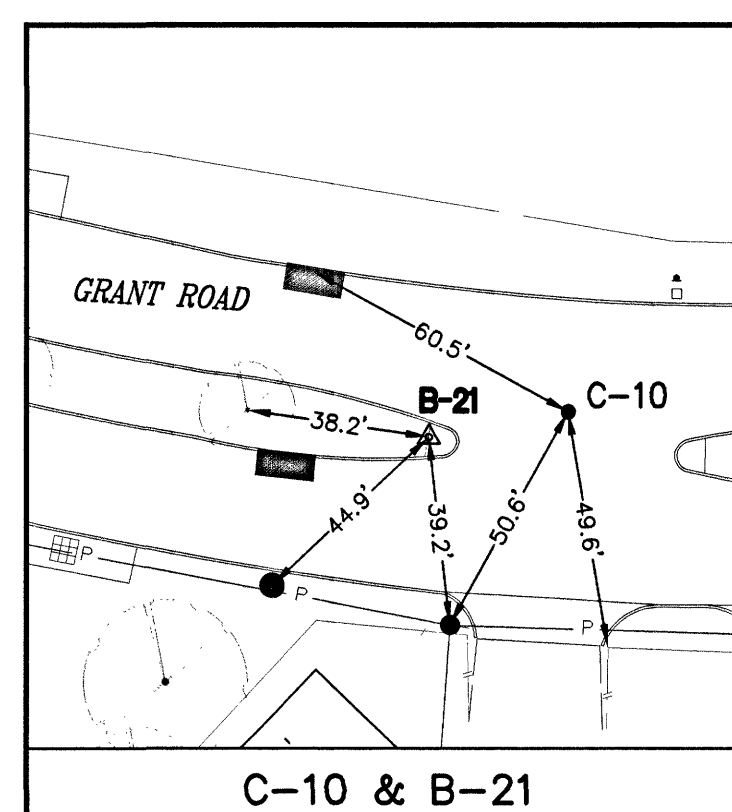
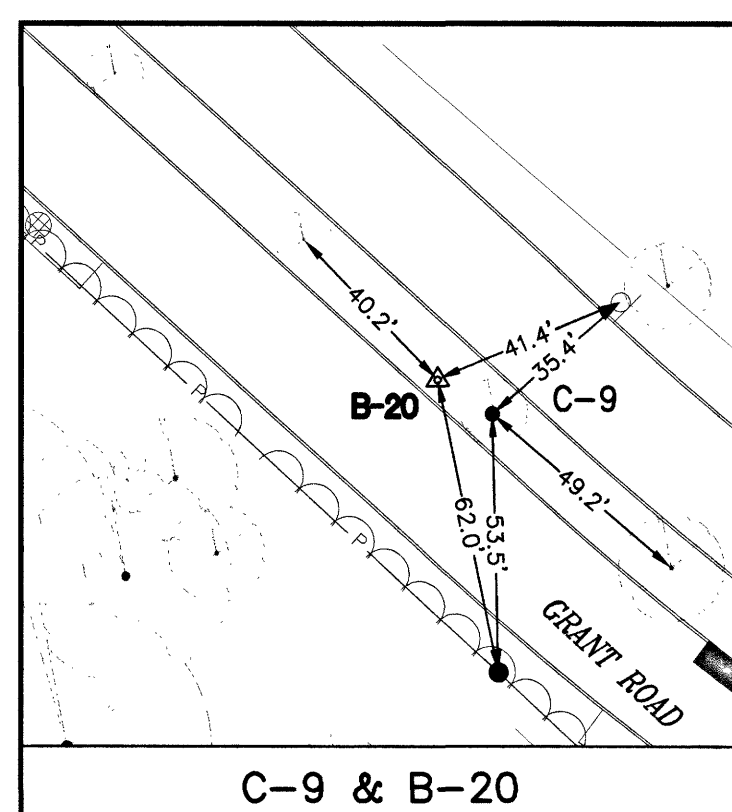
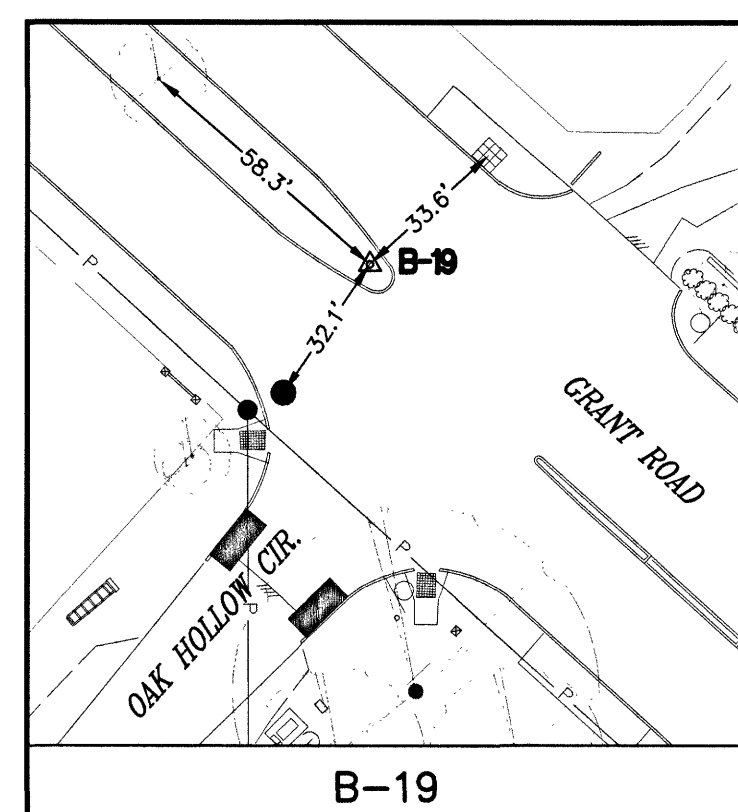
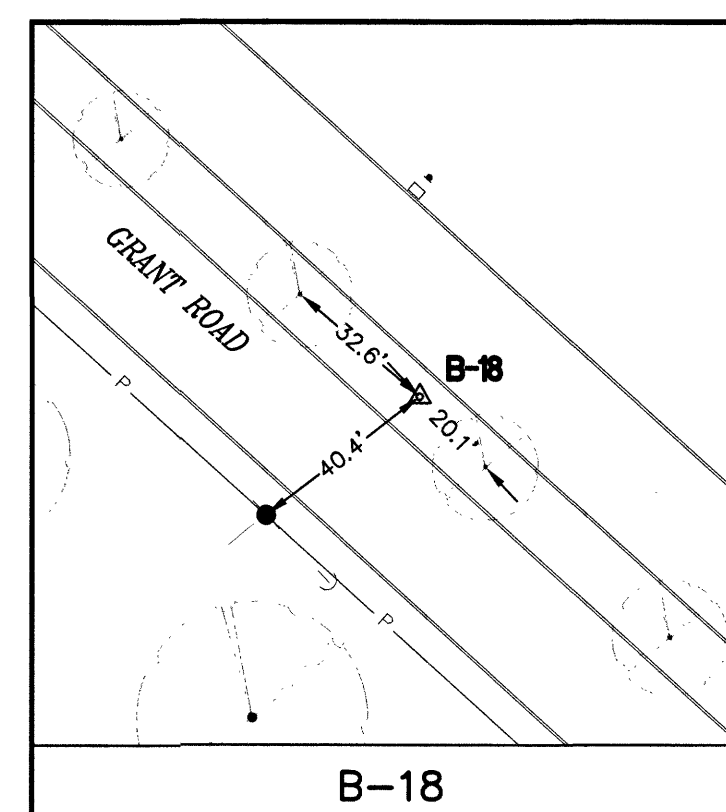
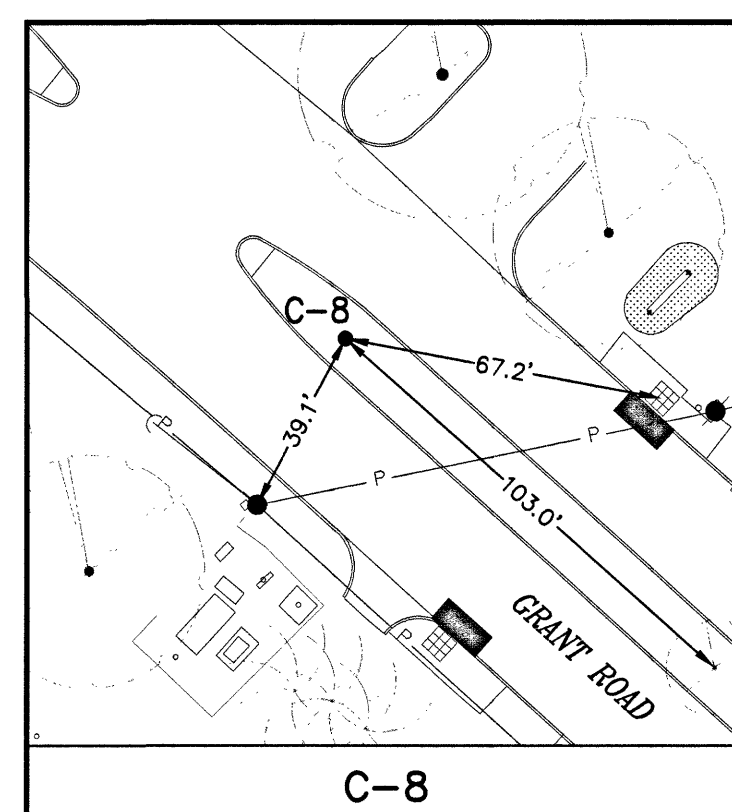
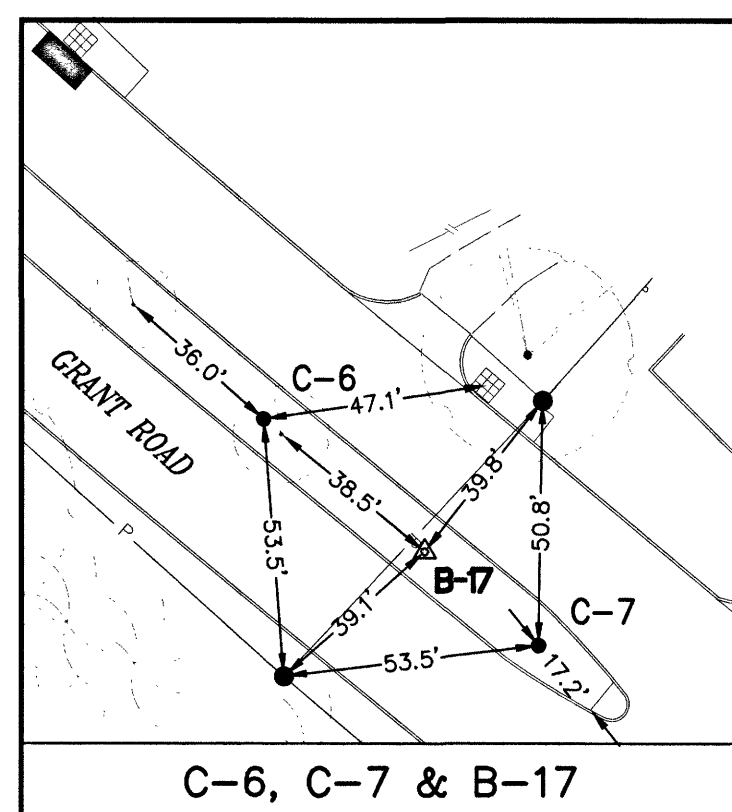
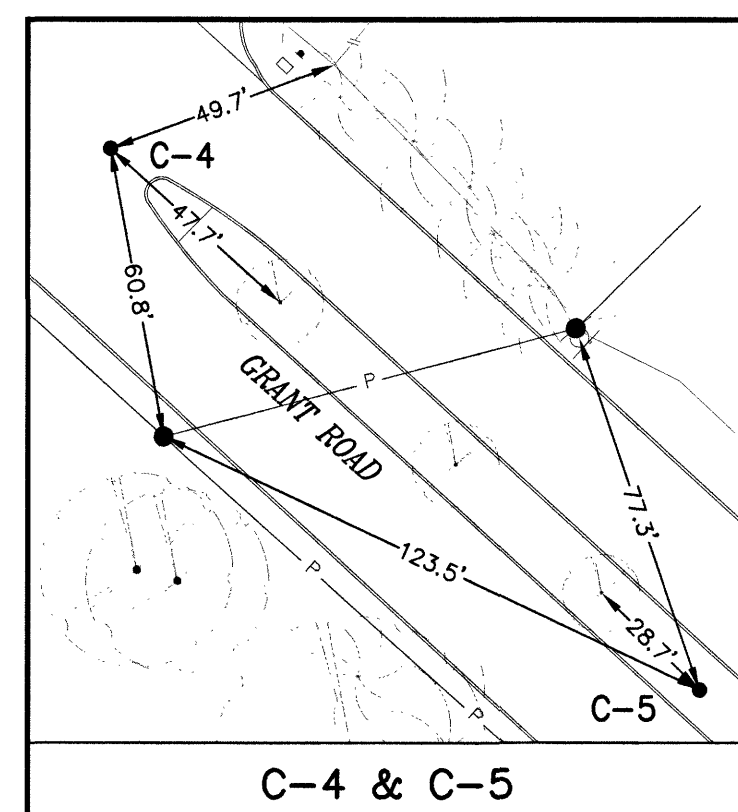
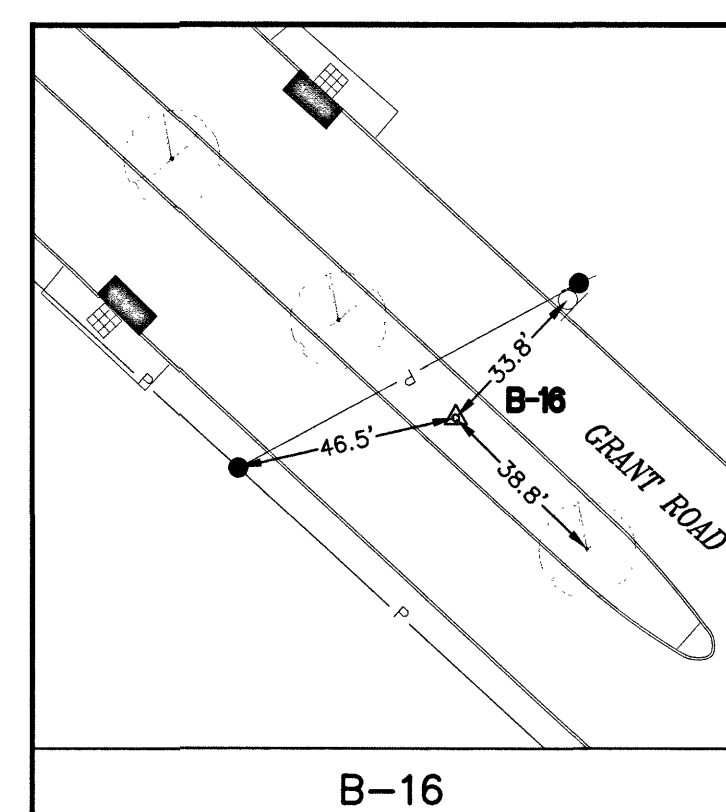
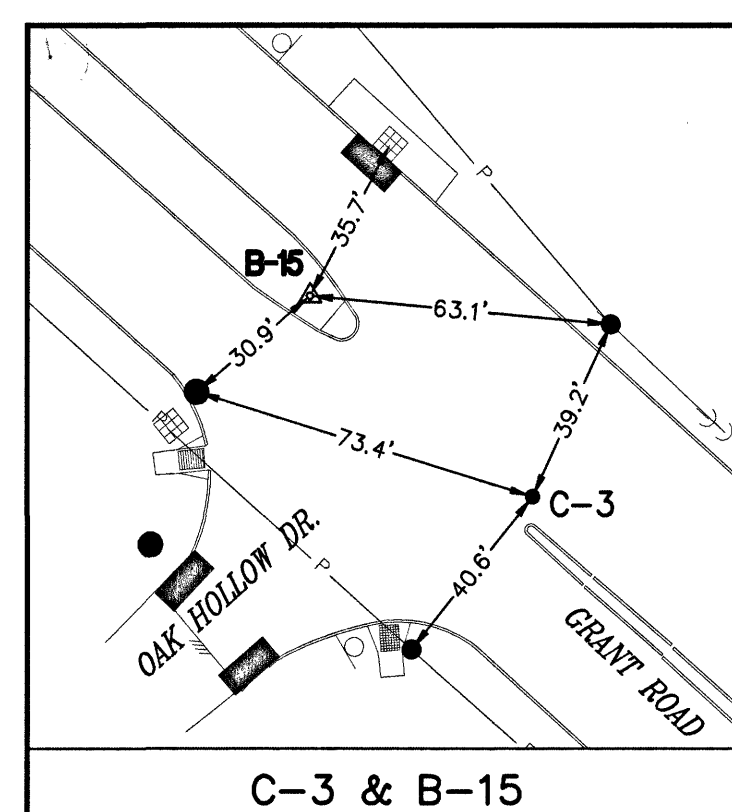
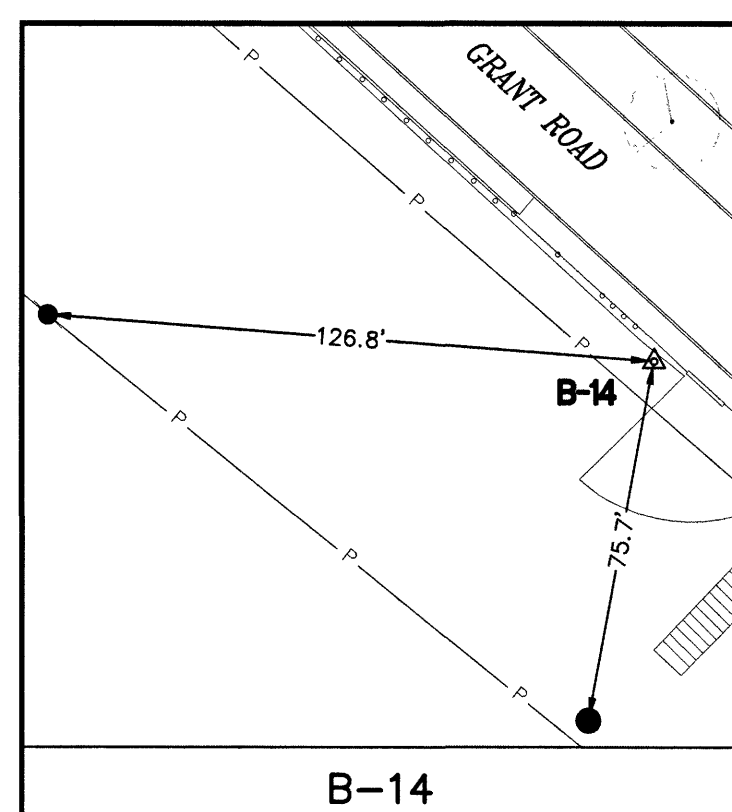
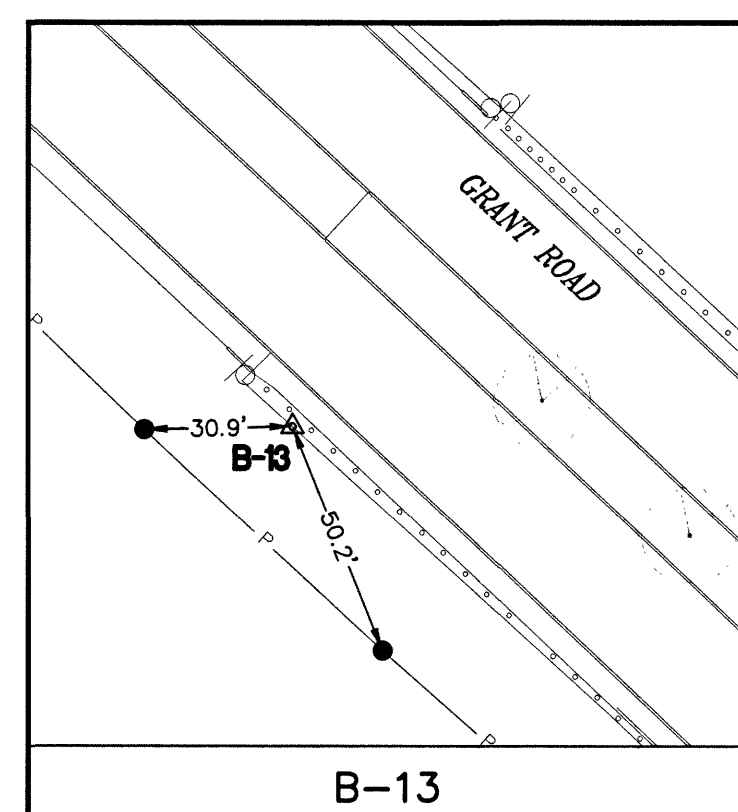
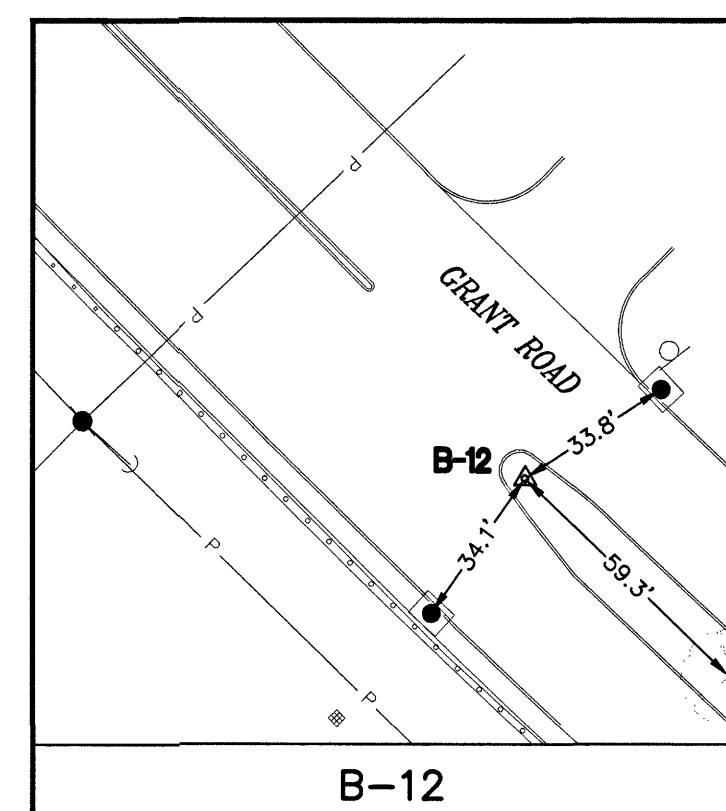
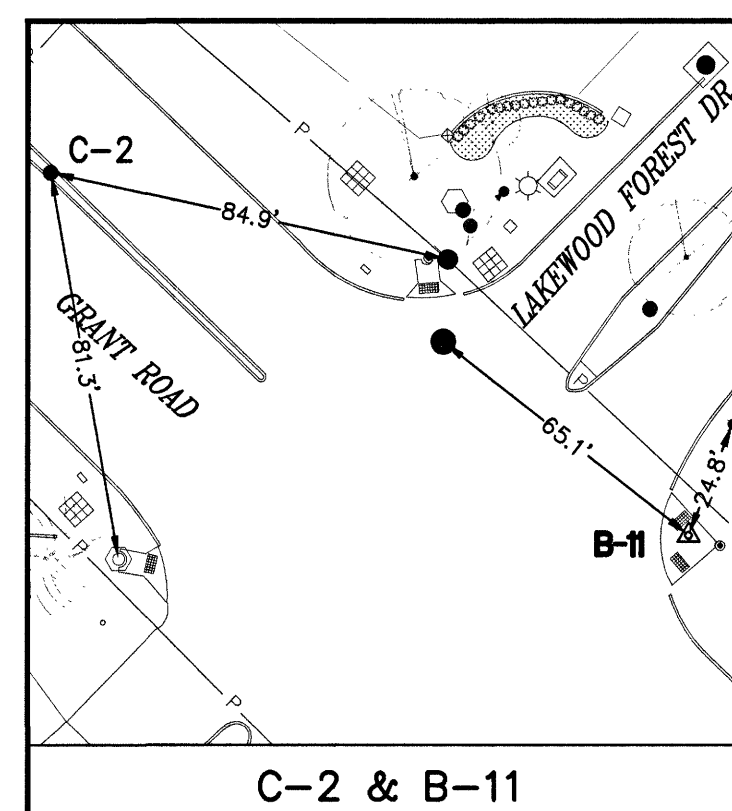
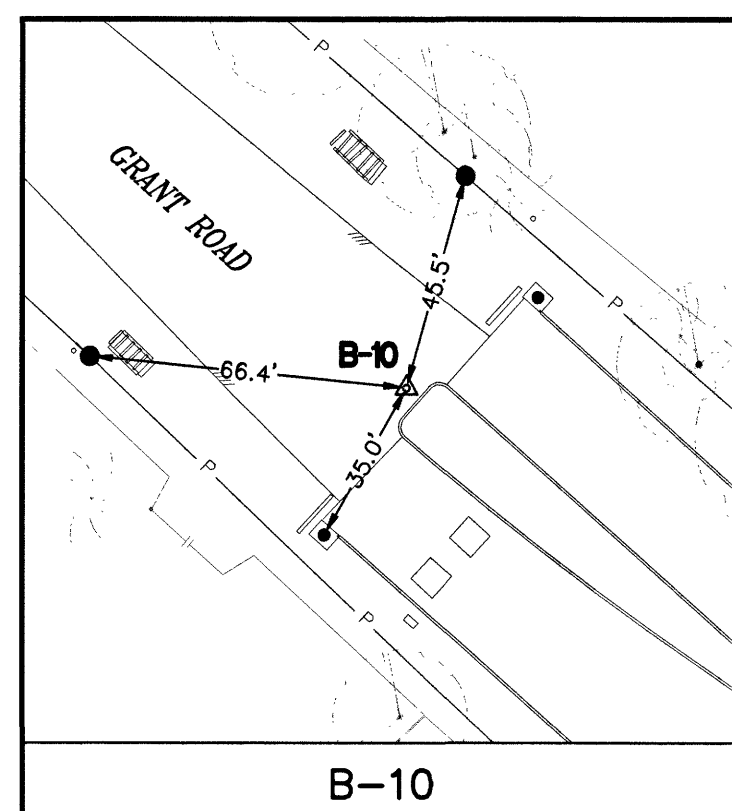
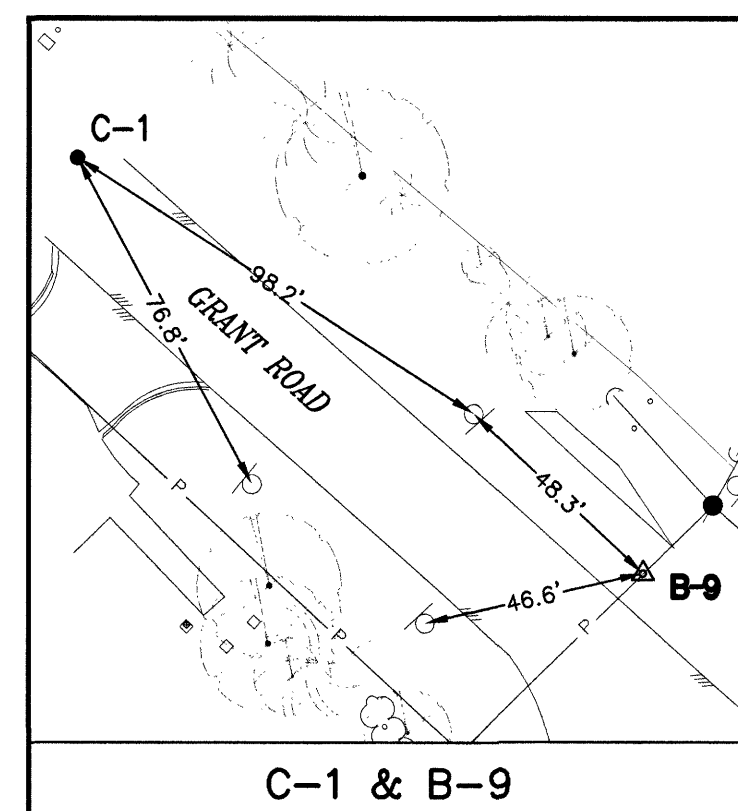
**DANNENBAUM**  
 ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

REF. NO.

SHEET  
No: 11 OF 99



No.	Date	Revisions	App.



- EXIST. TOPOGRAPHIC LEGEND**
- MANHOLE
  - ◻ GRATE INLET
  - B/BB INLET
  - ◆ FIRE HYDRANT
  - SIGNAL POLE
  - - - FENCE
  - ⊙ BUSH
  - ⚡ WATER VALVE
  - HIGH BANK
  - ☆ LIGHT
  - ⊠ SIGN
  - POWER POLE
  - ⚡ POWER POLE W/LIGHT
  - ⊖ DOWN GUY
  - ⊙ TREE
  - ⊠ PLANTER
  - ▭ BUILDING
  - WATER METER
  - ⊠ HEDGE ROW



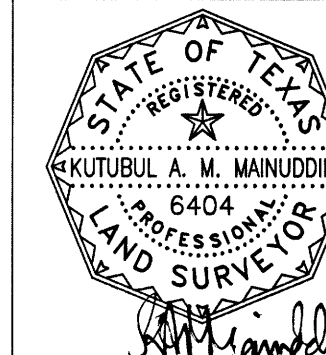
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SWING TIES  
 (SHEET 1 OF 3)

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 Engineering Firm Registration No. F-4578  
 Surveying Firm Registration No. 1007560



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CHECKED BY: KAM

**DANNENBAUM**

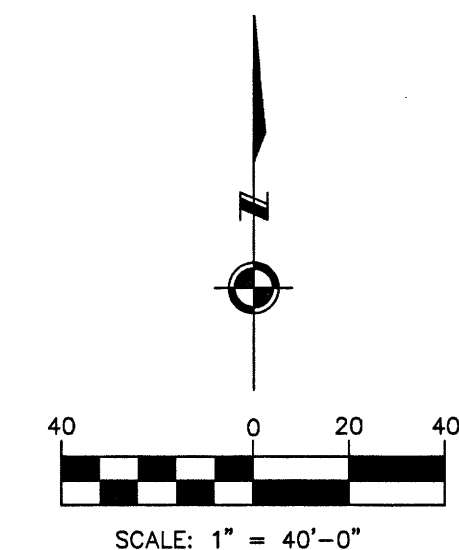
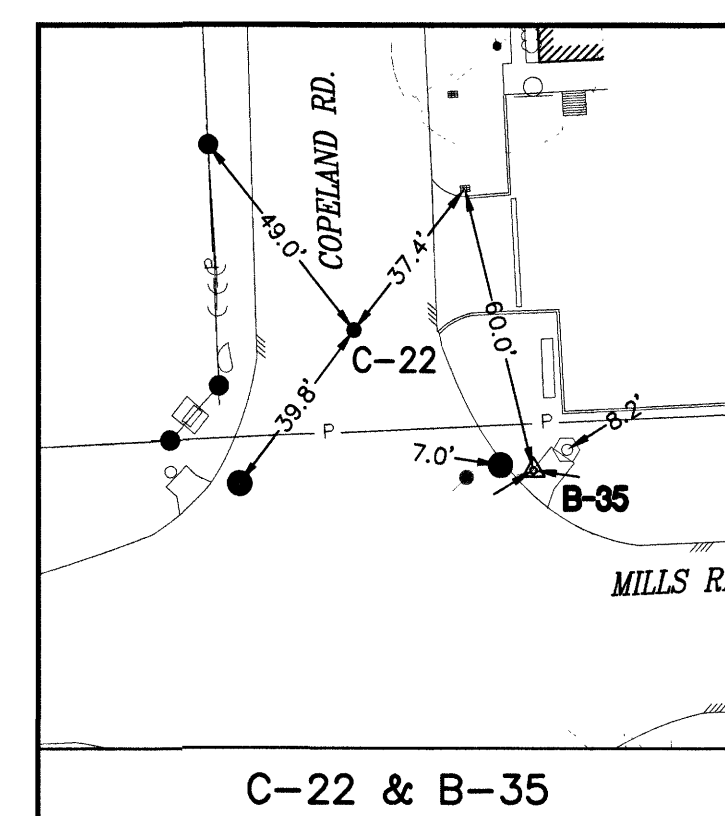
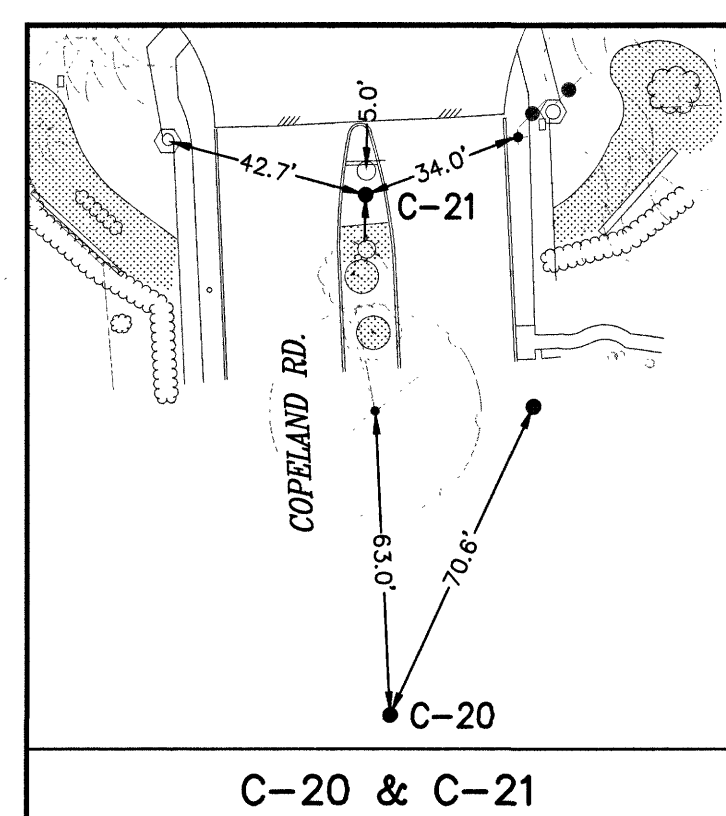
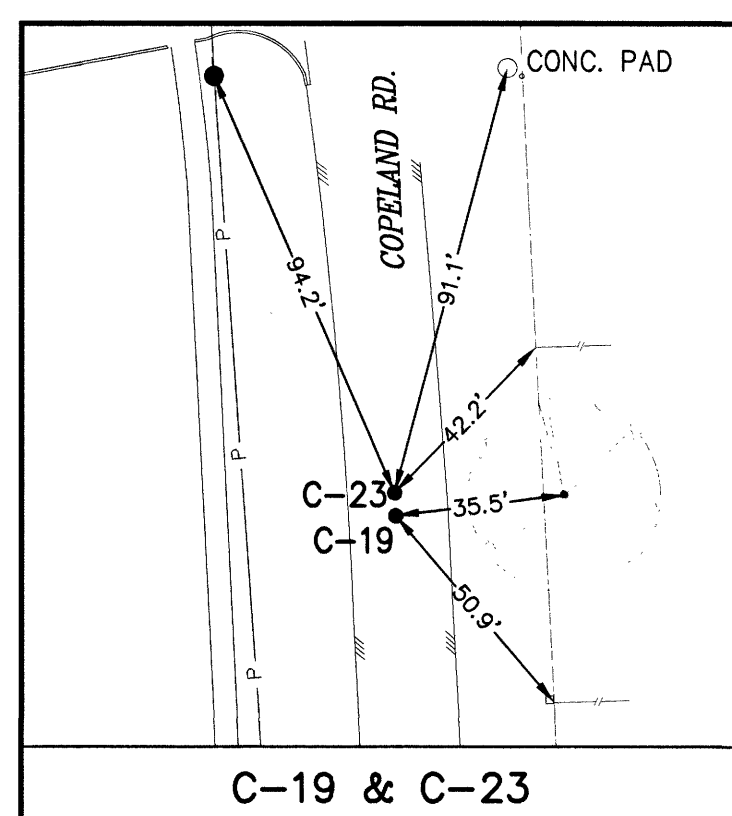
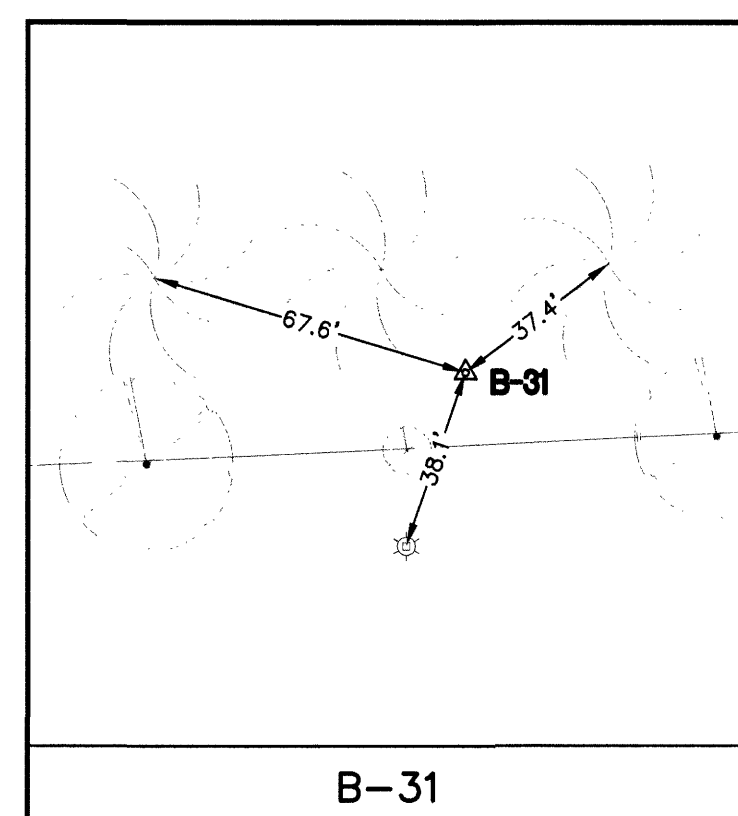
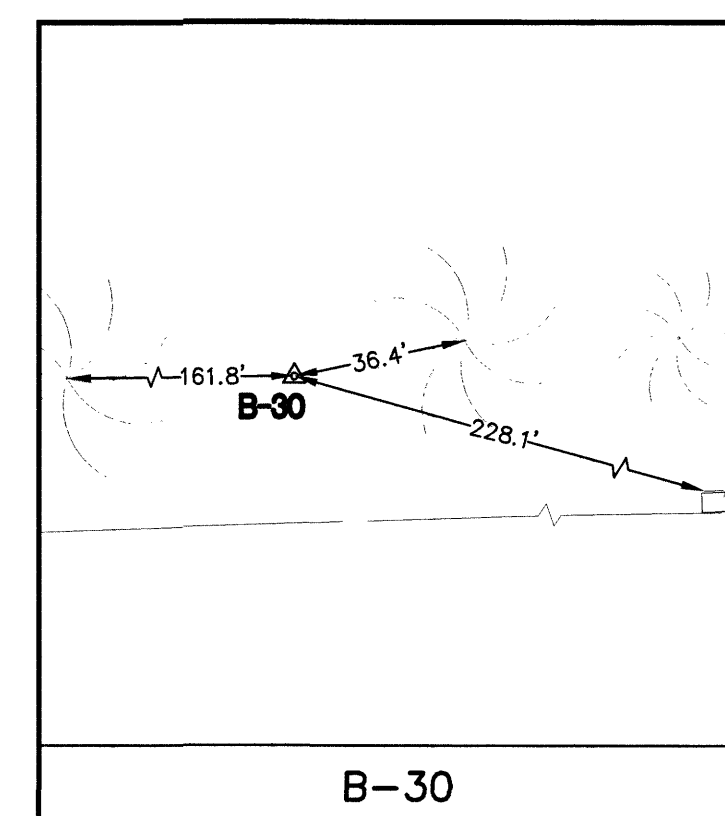
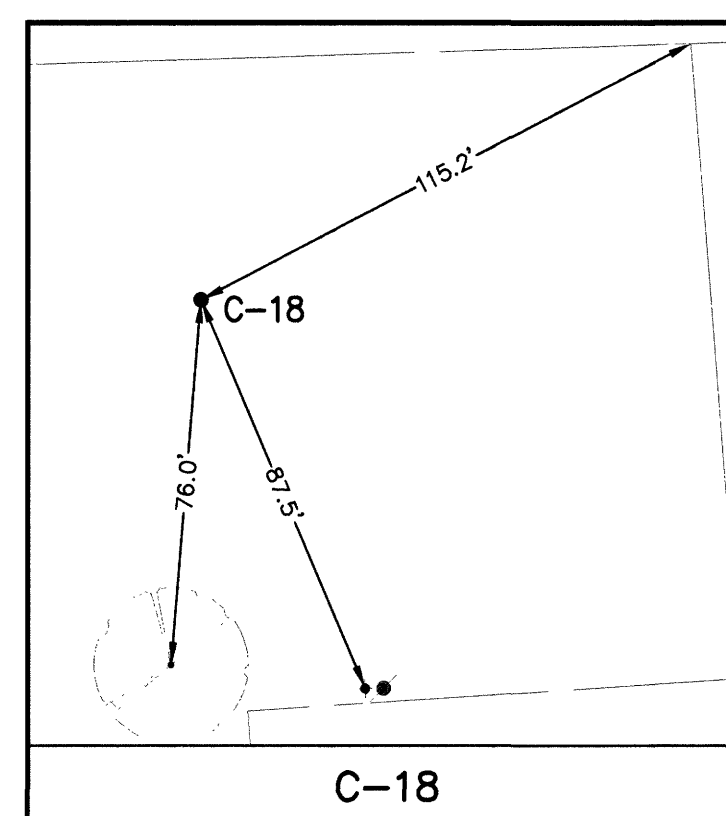
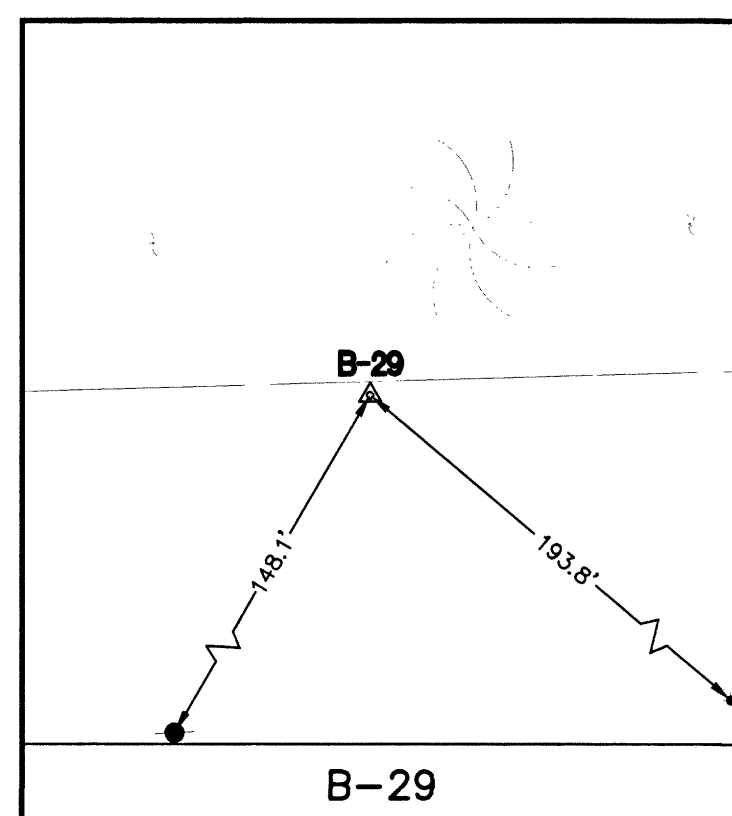
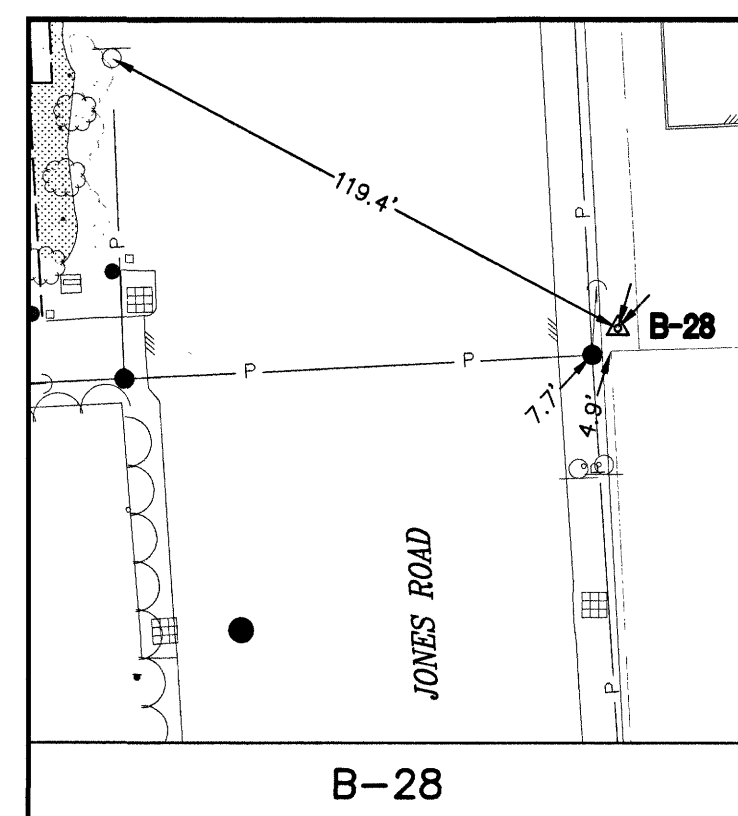
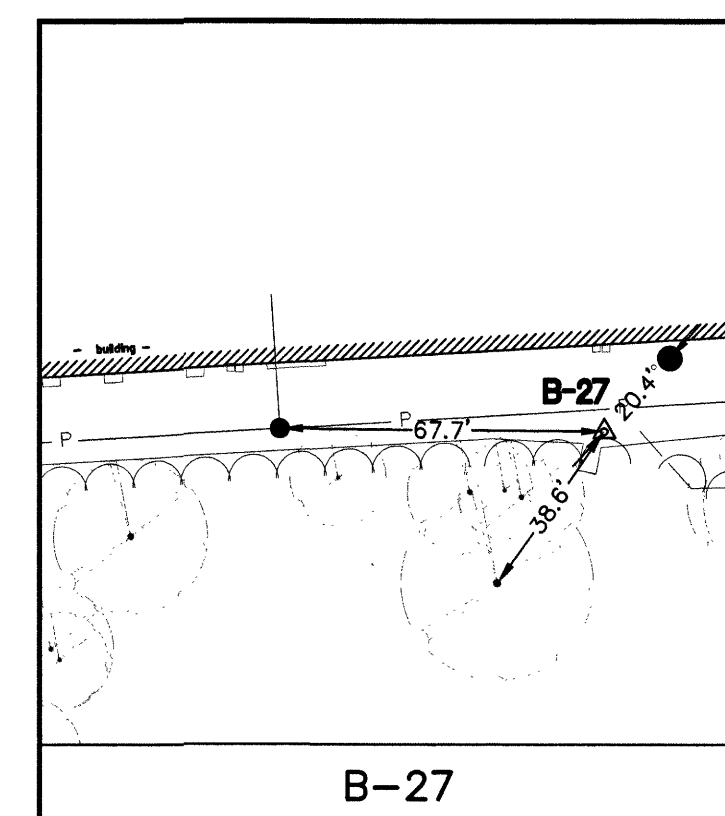
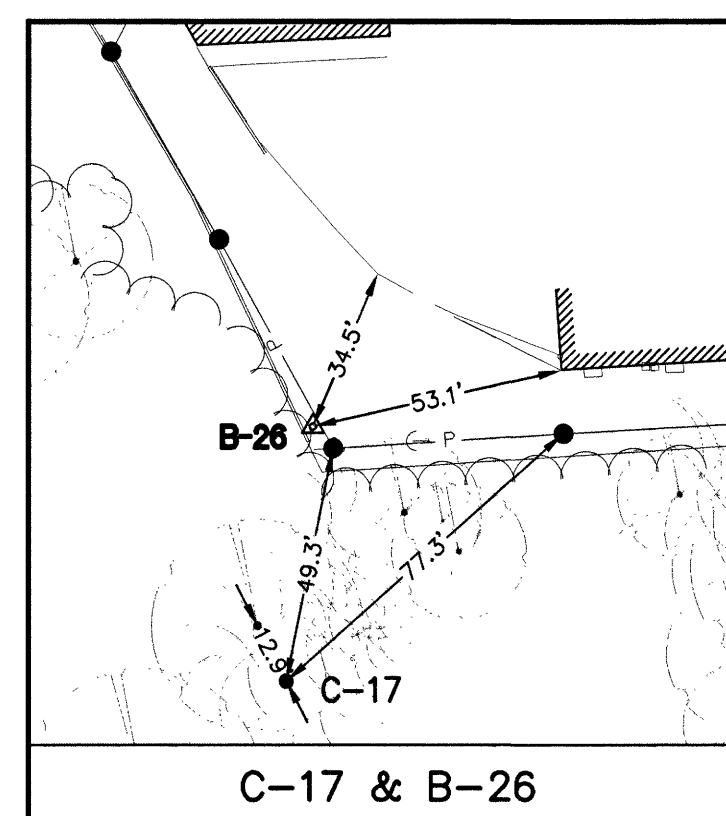
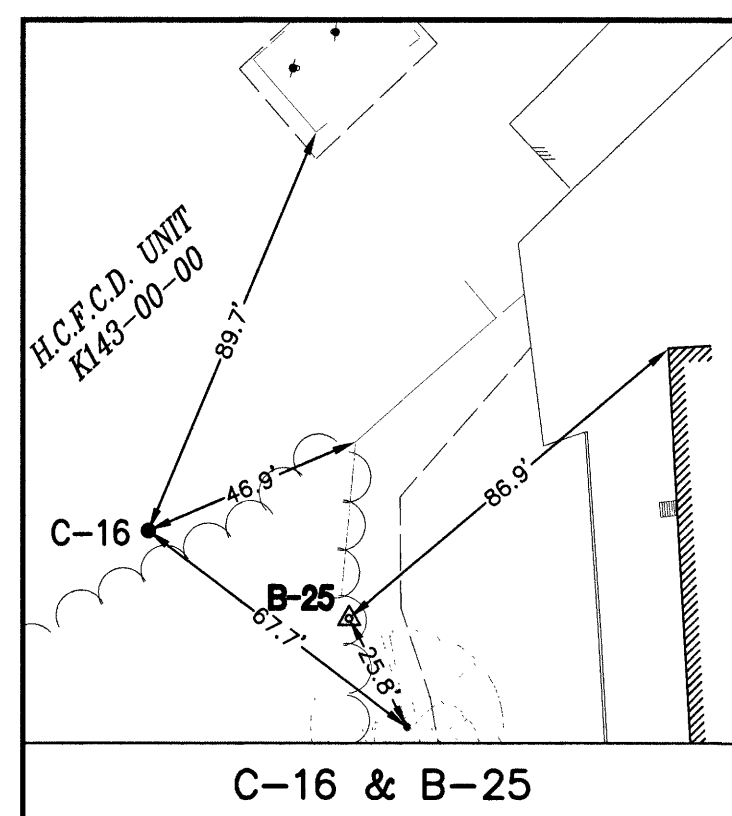
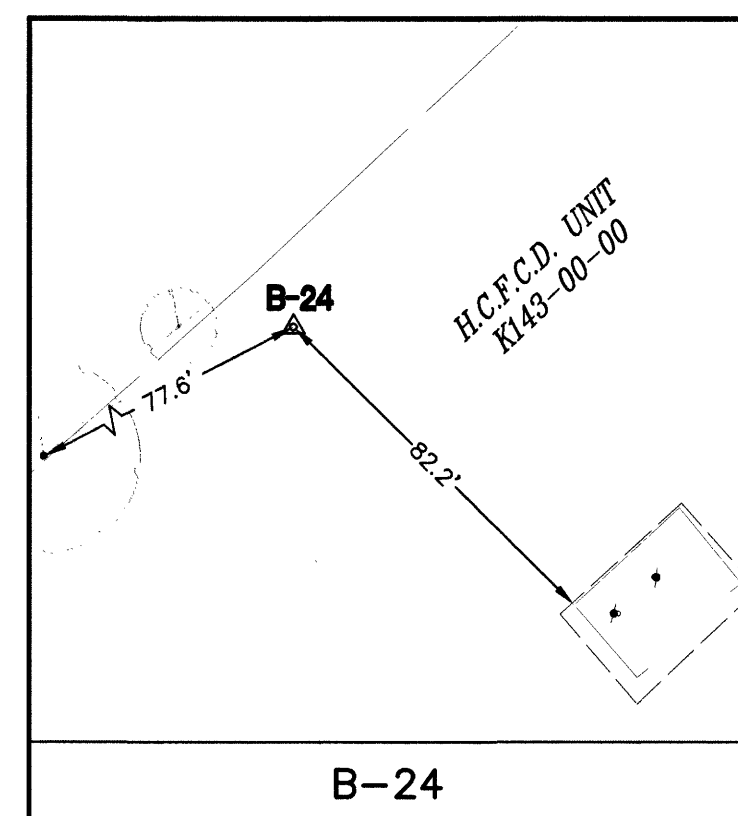
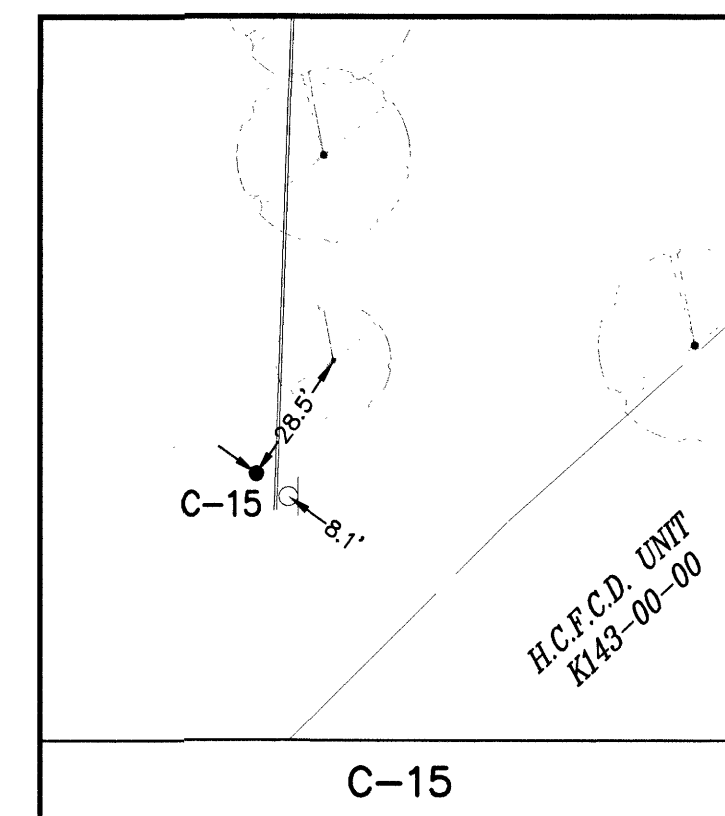
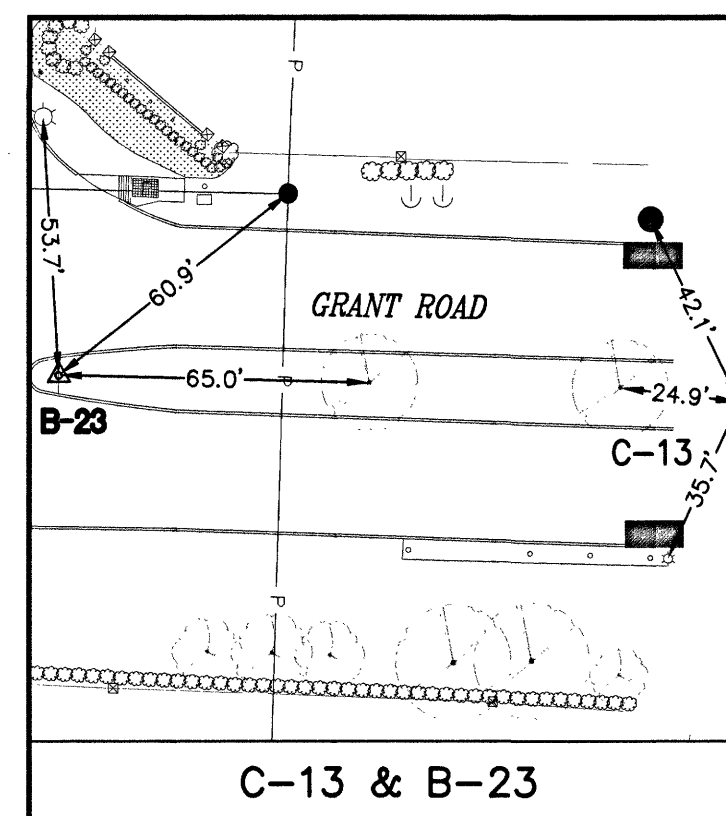
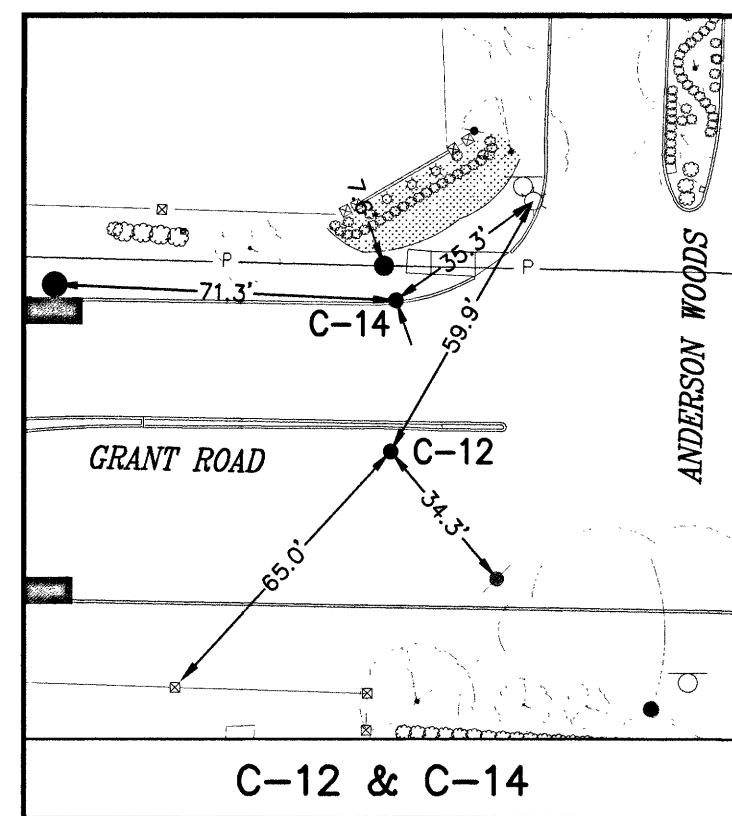
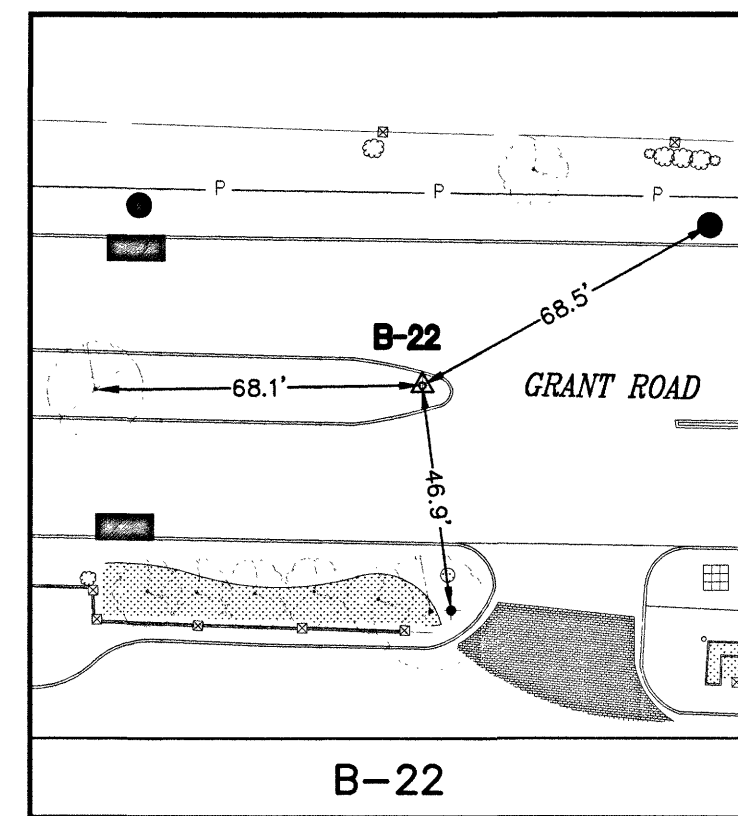
ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

REF. NO.

SHEET  
 No: 12 of 99

LAST MODIFIED: Dec 05, 2019 - 5:51pm BY USER: kutubul  
 DWG. LOCATION: S:\Proj-2016\16064 (NHCRWA 28-B)\Dwg\SCM  
 DWG. NAME: SwingTies-16064.dwg

No.	Date	Revisions	App.



- EXIST. TOPOGRAPHIC LEGEND**
- MANHOLE
  - GRATE INLET
  - B/BB INLET
  - ◆ FIRE HYDRANT
  - SIGNAL POLE
  - - - FENCE
  - ⊙ BUSH
  - ⚡ WATER VALVE
  - HIGH BANK
  - ☆ LIGHT
  - ⊠ SIGN
  - POWER POLE
  - ★ POWER POLE W/LIGHT
  - ← DOWN GUY
  - ⊙ TREE
  - ⊠ PLANTER
  - ▨ BUILDING
  - WATER METER
  - ⊠ HEDGE ROW



**AECOM**  
 AECOM TECHNICAL SERVICES, INC.  
 5444 WESTHEIMER RD., SUITE 200  
 HOUSTON, TEXAS 77056  
 WWW.AECOM.COM  
 TBPE REG. NO. F-3580  
 713.780.4100

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

SWING TIES  
 (SHEET 2 OF 3)

**KUO**  
 & associates, Inc.  
 Consulting Engineers  
 & Surveyors

10300 Westoffice Dr., Suite 800, Houston, Texas 77042  
 Tel: 713-975-8769, Fax: 713-975-9220, www.kuasociates.com  
 Engineering Firm Registration No. F-4278  
 Surveying Firm Registration No. 1007560



DRAWN BY: TOT CHECKED BY: KAM

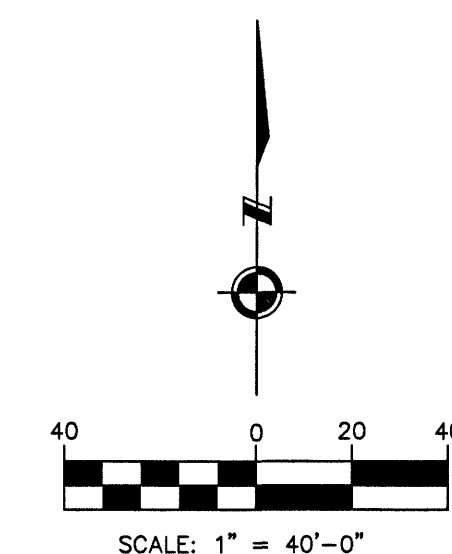
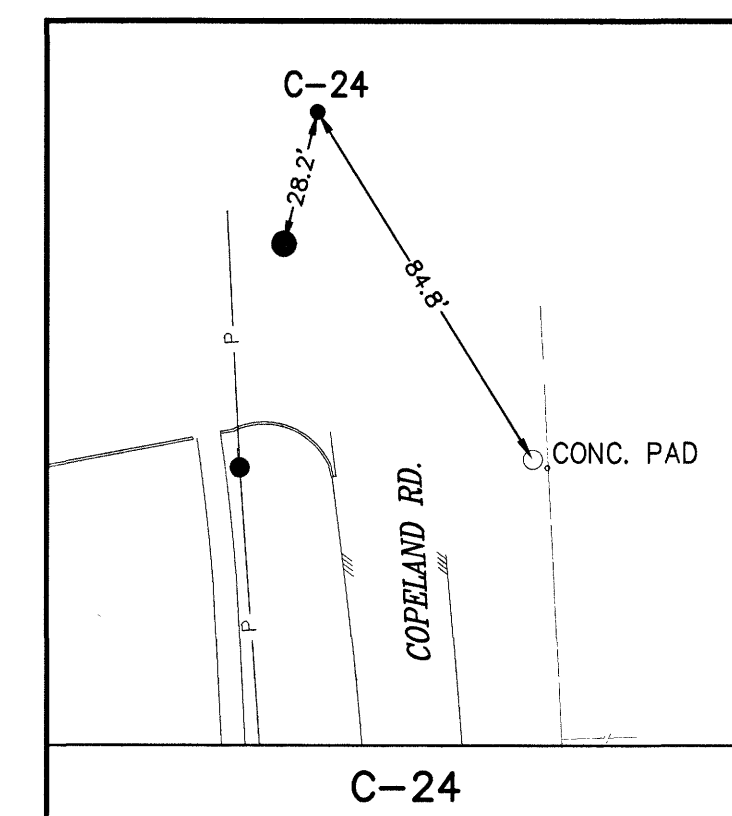
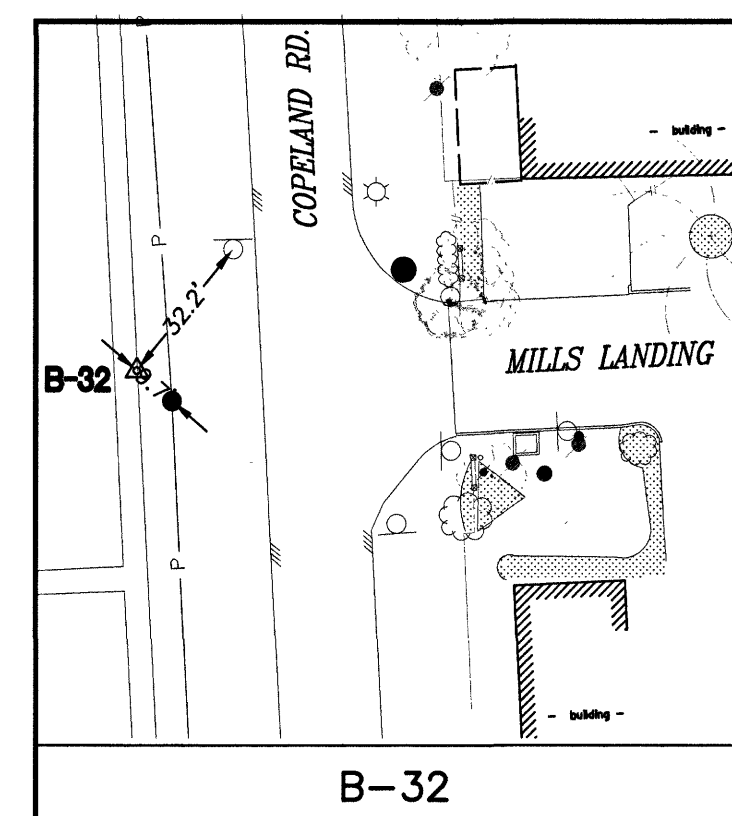
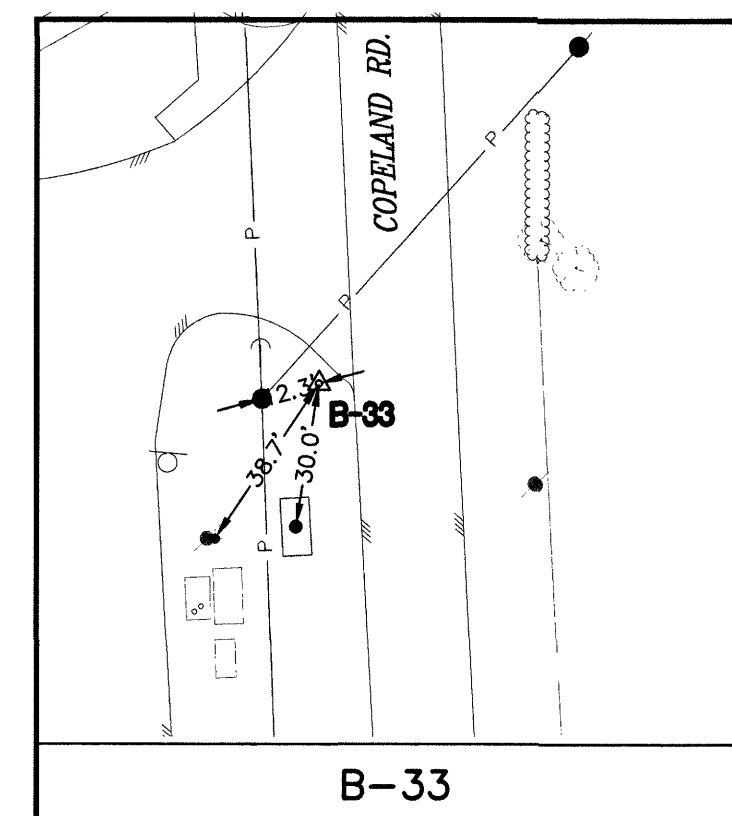
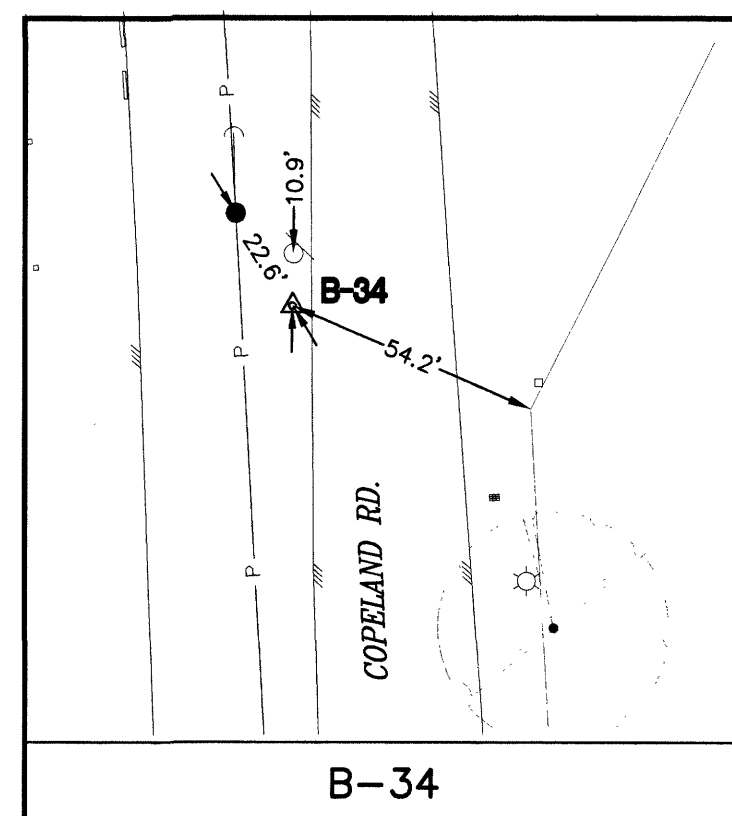
**DANNENBAUM**  
 ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

REF. NO. SHEET No: 13 of 99

LAST MODIFIED: Dec 05, 2019 - 5:51pm BY USER: kutubul  
 DWG. LOCATION: S:\Proj-2016\16064 (NHC RWA 28-B)\Dwgs\SCM\  
 DWG. NAME: SwingTies-16064.dwg



No.	Date	Revisions	App.



**EXIST. TOPOGRAPHIC LEGEND**

● MANHOLE	☆ LIGHT
■ GRATE INLET	◇ SIGN
■ B/BB INLET	◆ POWER POLE
◆ FIRE HYDRANT	◆ POWER POLE W/LIGHT
○ SIGNAL POLE	← DOWN GUY
-/- FENCE	⊙ TREE
⊙ BUSH	⊞ PLANTER
⚡ WATER VALVE	▨ BUILDING
— HIGH BANK	● WATER METER
	⊞ HEDGE ROW

6/21/2016 Floodplain Reference Mark Description Sheet

**HARRIS COUNTY FLOODPLAIN REFERENCE MARKS**

<b>Floodplain RM No.:</b>	110125	<b>Reference Mark Status:</b>	Recovered
<b>Stream Number:</b>	K100-00-00	<b>Date:</b>	
<b>County:</b>	Harris	<b>State:</b>	Texas
<b>Key Map No.:</b>	36SA	<b>Established By:</b>	Landtech Consultants, Inc.
<b>NGS Classification<sup>[1]</sup>:</b>	Range VI	<b>Date Established:</b>	5/2/2003
<b>Watershed:</b>	Cypress	<b>Survey Method Horz:</b>	GPS/BS
<b>RM's Directly Tied:</b>	110130 110120	<b>Survey Method Vert:</b>	GPS/BS
<b>Units of Measure:</b>	US Survey Foot	<b>Vertical Datum:</b>	NAVD83
<b>Horizontal Datum:</b>	NAVD83	<b>Vertical Adj.<sup>[3]</sup>:</b>	2001 Adjustment
<b>Horizontal Adj.<sup>[2]</sup>:</b>	2001 Adjustment	<b>Geoid Model Used:</b>	GEOID 99(Conus)
<b>Projection Zone:</b>	Texas South Central 4204	<b>Contractor PID:</b>	110125
<b>Station Name:</b>	110125	<b>Marker:</b>	BRASS DISK
<b>Marker:</b>	BRASS DISK	<b>Rod Depth:</b>	0.00
<b>Stamping:</b>	K100 BM10	<b>Sleeve Depth:</b>	0.00
<b>Mark Logo:</b>	HCFC	<b>Geoid Height:</b>	-89.91
<b>Latitude:</b>	29° 58' 25.14634" N	<b>Northing:</b>	13817233.34
<b>Longitude:</b>	95° 35' 55.40481" W	<b>Easting:</b>	3045244.40
<b>Ellipsoid Height:</b>	37.09	<b>Elevation<sup>[4]</sup>:</b>	127.25
<b>Convergence:</b>	1° 39' 59"	<b>Scale Factor:</b>	0.99998252
<b>Satellite Observable:</b>	Yes	<b>Elevation Factor:</b>	0.9999822
<b>NGS PID (if applicable):</b>	N/A	<b>Combined Factor:</b>	0.99982343

**Notes:**

- This is NGS' new classification system. Range VI indicates that this position meets the 0.02m-0.05m Accuracy Standard for Horizontal Position, Ellipsoidal Height, and Orthometric Height (elevation) at the 95% confidence level (m-meters).
- Horizontal Adjustment - This survey is constrained to the NGS Published Horizontal positions of the geodetic stations adjusted by NGS in 2001.
- Vertical Adjustment - This survey is constrained to the NGS Published Elevation for Northeast 2250 CORS ARP adjusted by NGS in 2001 and as published in PID AJ6430. Epoch Date 1997.00.
- The elevation shown equals the Ellipsoid Height minus Geoid Height (from GEOID99) plus a constant of 0.253 feet.

**Station Recovery Data:** Report an Issue with a Reference Mark - submit to Harris County Flood Control

<http://www.harriscountyfm.org/DataSheets/CombinePrint/7/d-110125>

1/2

6/21/2016 Floodplain Reference Mark Description Sheet

**HARRIS COUNTY FLOODPLAIN REFERENCE MARKS**

Floodplain RM Number: 110125  
Stream Number: K100-00-00  
Northing: 13817233.34 Easting: 3045244.40 Elevation: 127.25

**Location:**  
Intersection of Jones and Grant.

**To Reach Description:**  
From the intersection of Jones and Grant, west along Grant 0.9 miles to the benchmark on the right.

**Photo 1-Station Detail:**

**Photo 2-Station Area Picture:**

<http://www.harriscountyfm.org/DataSheets/CombinePrint/7/d-110125>

2/2



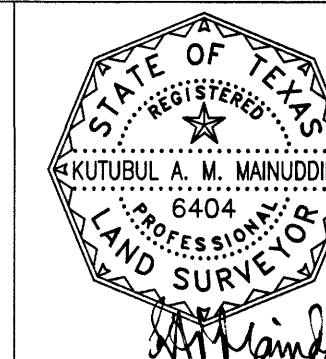
**AECOM**  
AECOM TECHNICAL SERVICES, INC.  
5444 WESTHEIMER RD., SUITE 200  
HOUSTON, TEXAS 77056  
WWW.AECOM.COM  
TBP REG. NO. F-3580  
713.780.4100

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

SWING TIES  
(SHEET 3 OF 3)

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Tel: 713-975-8765, Fax: 713-975-9200, www.kuoassociates.com  
Engineering Firm Registration No. F-4578  
Surveying Firm Registration No. 1007560



DRAWN BY: TOT

CHECKED BY: KAM

**DANNENBAUM**

ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

REF. NO.

SHEET  
No: 14 of 99

No.	Date	Revisions	App.

**CAUTION:**  
EXISTING GAS PIPELINE LOCATIONS  
AND ELEVATIONS HAVE NOT BEEN VERIFIED.  
CONTRACTOR RESPONSIBLE FOR FIELD  
VERIFICATION OF UNDERGROUND PIPELINES.

THE LOCATION OF THE BURIED CABLES WITHIN THE PROJECT  
LIMITS HAVE NOT BEEN VERIFIED. BEFORE COMMENCING WORK  
CALL 1-800-344-8377 A MINIMUM OF 48 HOURS PRIOR TO  
CONSTRUCTION TO HAVE UNDERGROUND LINES  
FIELD-LOCATED.

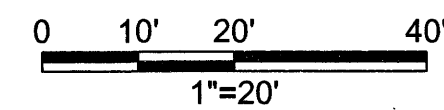
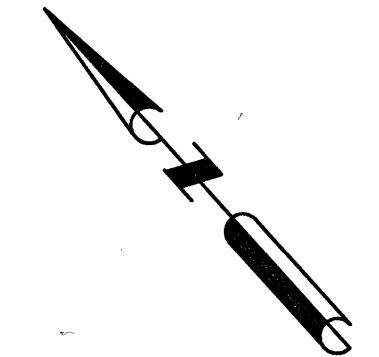
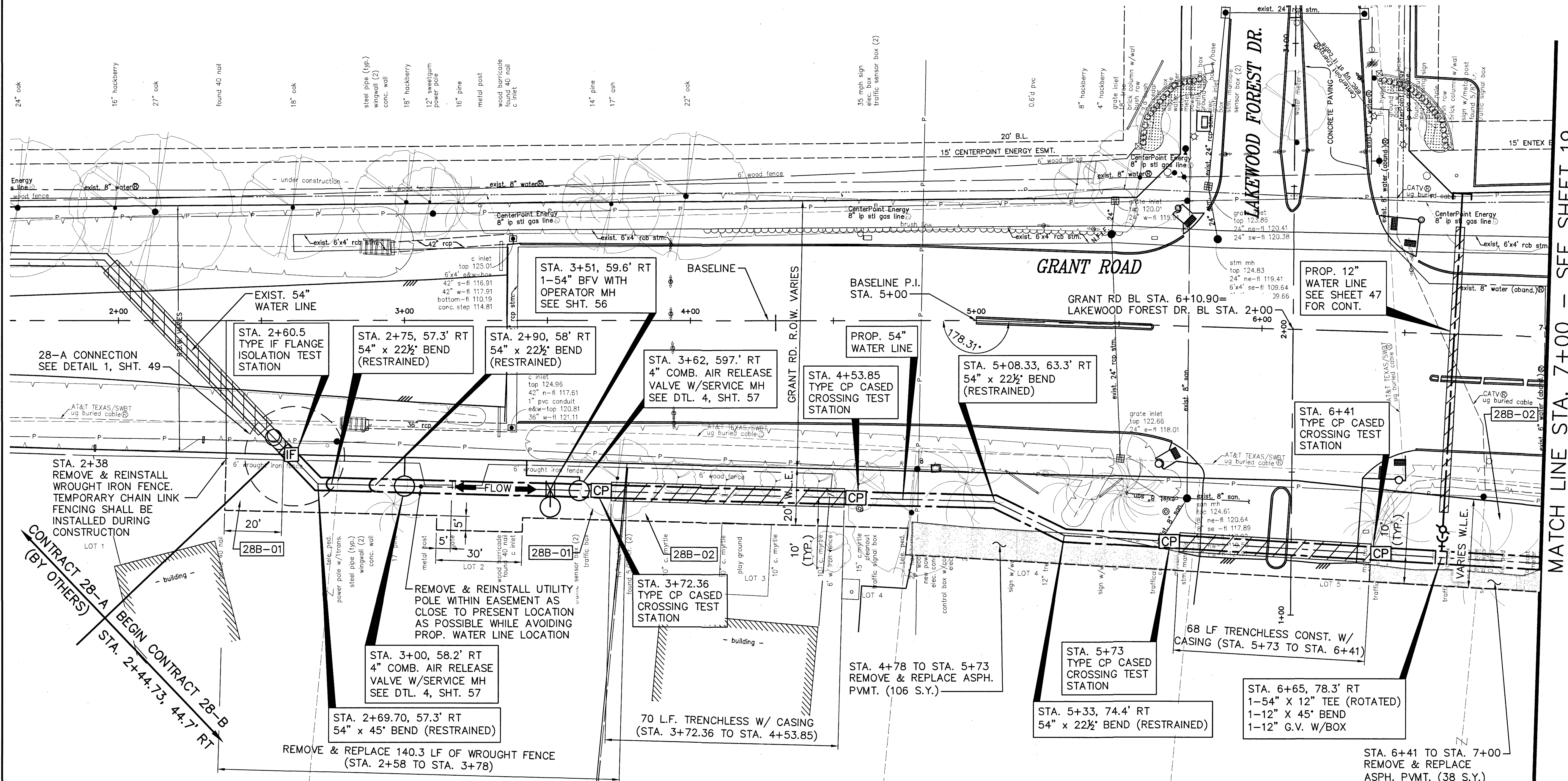
**CAUTION:**  
OVERHEAD POWER LINES

**BENCHMARK:**

FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCPCD  
BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF  
GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY  
0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE  
CYPRESS WATERSHED NEAR STREAM K100-00-00  
ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**

ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE  
PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83.  
THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND  
MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE  
FACTOR OF 0.999870017 (TxDOT factor).  
100 YR FL=125.00'



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

**NOTICE:**  
FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

**PRIVATE UTILITY LINES SHOWN**

*[Signature]* Date: 1-23-20  
CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY

*[Signature]* Date: 1-23-20  
CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY.  
(THE SIGNATURE VERIFIES EXISTING UNDERGROUND FACILITIES - NOT TO BE USED FOR CONTACT VERIFICATION) SIGNATURE VALID FOR SIX MONTHS.

*[Signature]* Date: 1-22-20  
Approved for AT&T Texas/SWBT underground conduit facilities only.  
SIGNATURE VALID FOR ONE YEAR



**AECOM**  
AECOM TECHNICAL SERVICES, INC.  
19219 KATY FREEWAY, SUITE 100  
HOUSTON, TEXAS 77094-1009  
281.646.2400  
WWW.AECOM.COM  
TPE REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**GRANT ROAD BASELINE PLAN**  
STA. 2+00 TO 7+00

STATE OF TEXAS  
CARL D. MCCONNELL  
97585  
LICENSED PROFESSIONAL ENGINEER  
*[Signature]*

DRAWN BY: CHECKED BY:

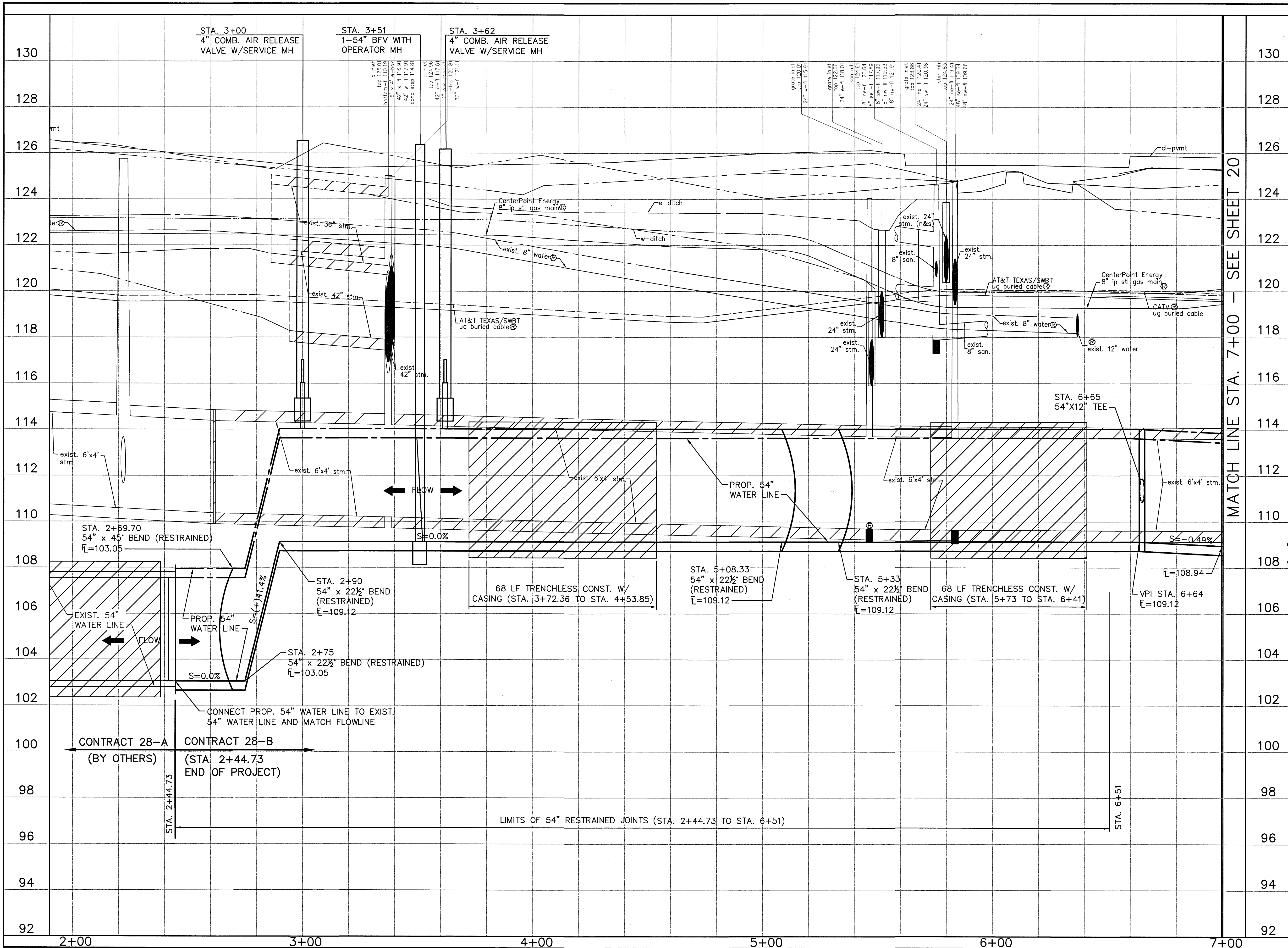
**DANNENBAUM**  
ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

LAST MODIFIED: Jan 21, 2020 - 9:50am  
 BY USER: yimv  
 DWG. LOCATION: G:\1110\4876-01 NHCRWA PROJECT 28-B\ACAD\Drawings\Civil\  
 Dwg. NAME: 4876-01\_17.dwg

PROJECT 28-A PLANS WERE PREPARED USING NGDV 1929, 1973  
ADJ. NGDV 1988, 2001 ADJ = NGDV 1929, 1973 ADJ - 2.45 FEET  
(PROJECT 28-B) (PROJECT 28-A)



LAST MODIFIED: Jan 21, 2020 - 9:50am BY USER: yimvw  
 DWG. LOCATION: C:\1110\4876-01 NHCRWA PROJECT 28-B\ACAD\Drawings\Civil  
 DWG. NAME: 4876-01\_18.dwg



No.	Date	Revisions	App.

HORIZ 0 10' 20' 40'  
 1"=20'

VERT 0 1' 2' 4'  
 1"=2'

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

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PRIVATE UTILITY LINES SHOWN

*Al. ch* Date: 1-23-20  
 CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY

*Al. ch* Date: 1-23-20  
 CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY.

*Al. ch* Date: 1-22-20  
 APPROVED FOR AT&T TEXAS/SWBT UNDERGROUND CONDUIT FACILITIES ONLY. SIGNATURE VALID FOR ONE YEAR.

**North Harris County REGIONAL WATER Authority**

**AECOM**  
 AECOM TECHNICAL SERVICES, INC.  
 19219 KATY FREEWAY, SUITE 100  
 HOUSTON, TEXAS 77054-1009  
 281.646.2400  
 WWW.AECOM.COM  
 TBP# REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**GRANT ROAD BASELINE PROFILE**  
 STA. 2+00 TO 7+00

STATE OF TEXAS  
 CARL D. MCCONNELL  
 97585  
 LICENSED PROFESSIONAL ENGINEER

*Carl D. McConnell*  
*1/23/20*

DRAWN BY: CHECKED BY:

**DANNENBAUM**  
 ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

SHEET No. 18 OF 99

MATCH LINE STA. 7+00 - SEE SHEET 20

No.	Date	Revisions	App.

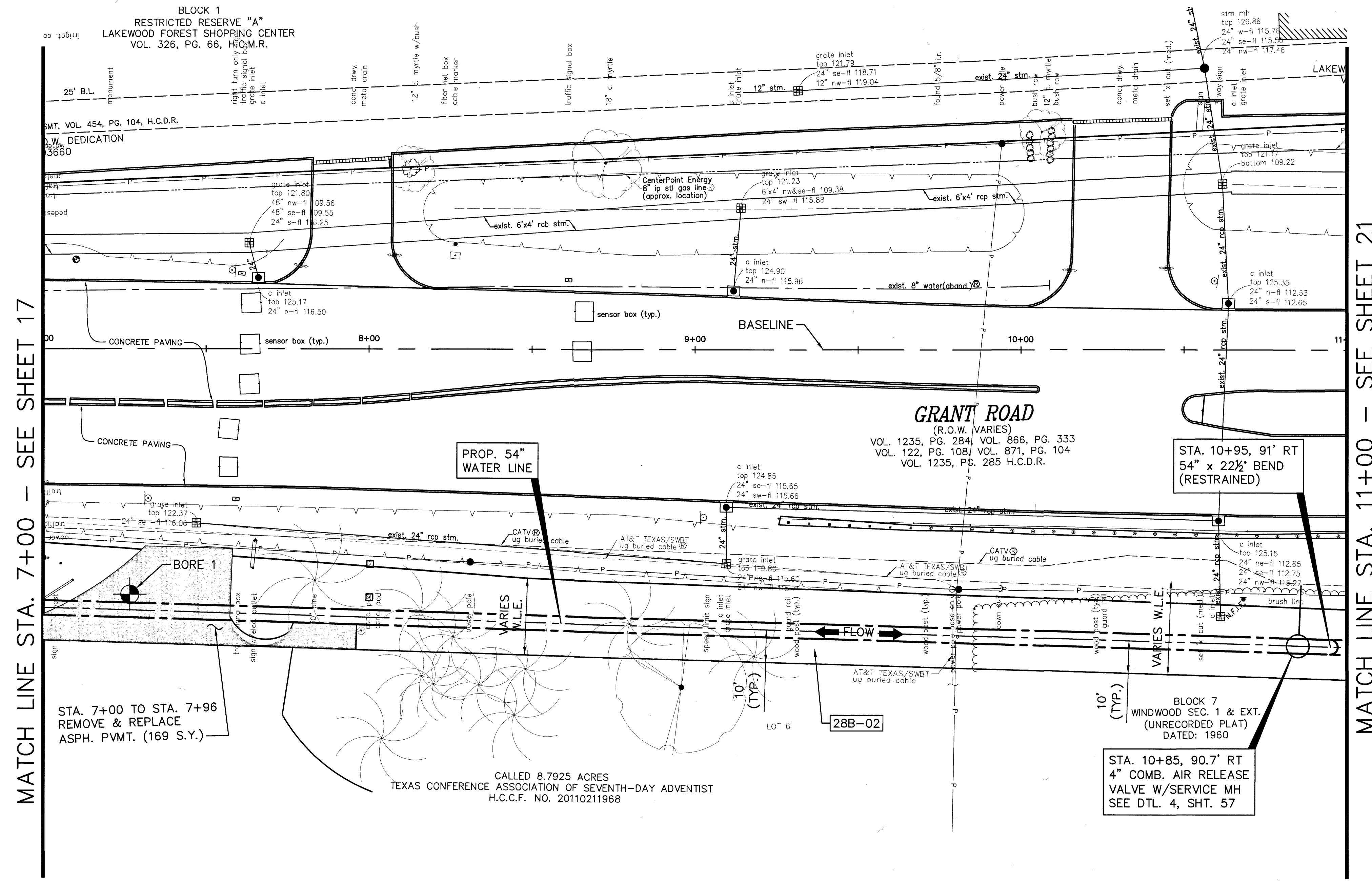
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OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE  
UNDERGROUND LINES FIELD-LOCATED.

**CAUTION:**  
OVERHEAD POWER LINES.

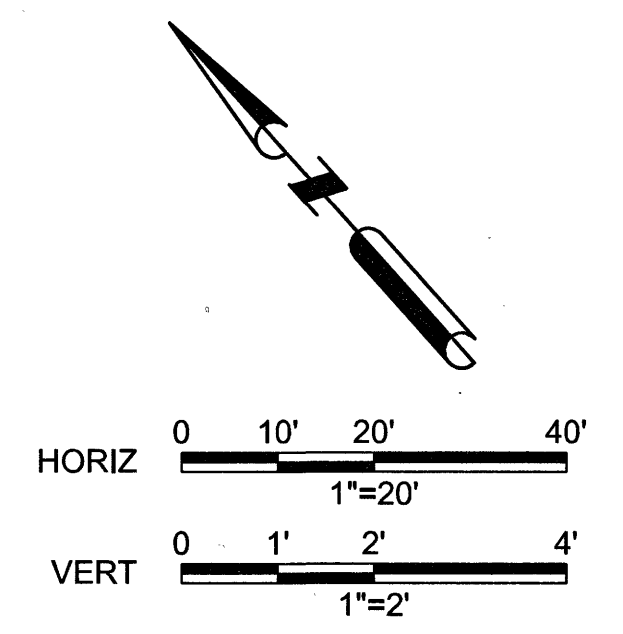
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FACTOR OF 0.999870017 (TxDOT factor).  
100 YR FL=125.00'



MATCH LINE STA. 7+00 - SEE SHEET 17

MATCH LINE STA. 11+00 - SEE SHEET 21



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

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PRIVATE UTILITY LINES SHOWN

*Alch* 1-23-20  
CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY

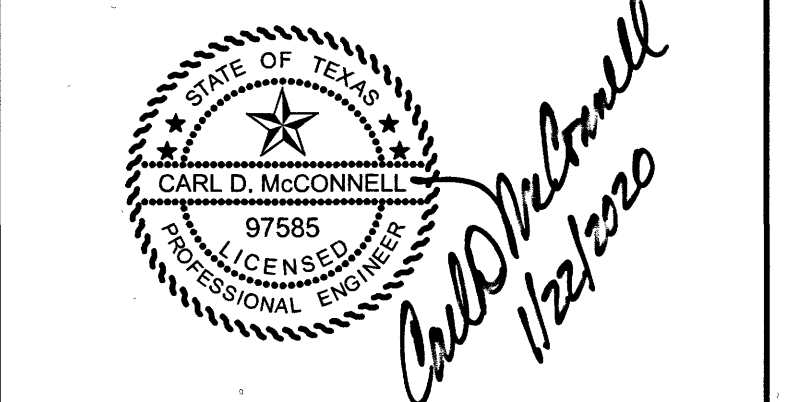
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CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY.

*James* 1-22-20  
Approved for AT&T Texas/SWBT underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR.



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HOUSTON, TEXAS 77058-1009  
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TSPC REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**GRANT ROAD BASELINE PLAN**  
STA. 7+00 TO 11+00



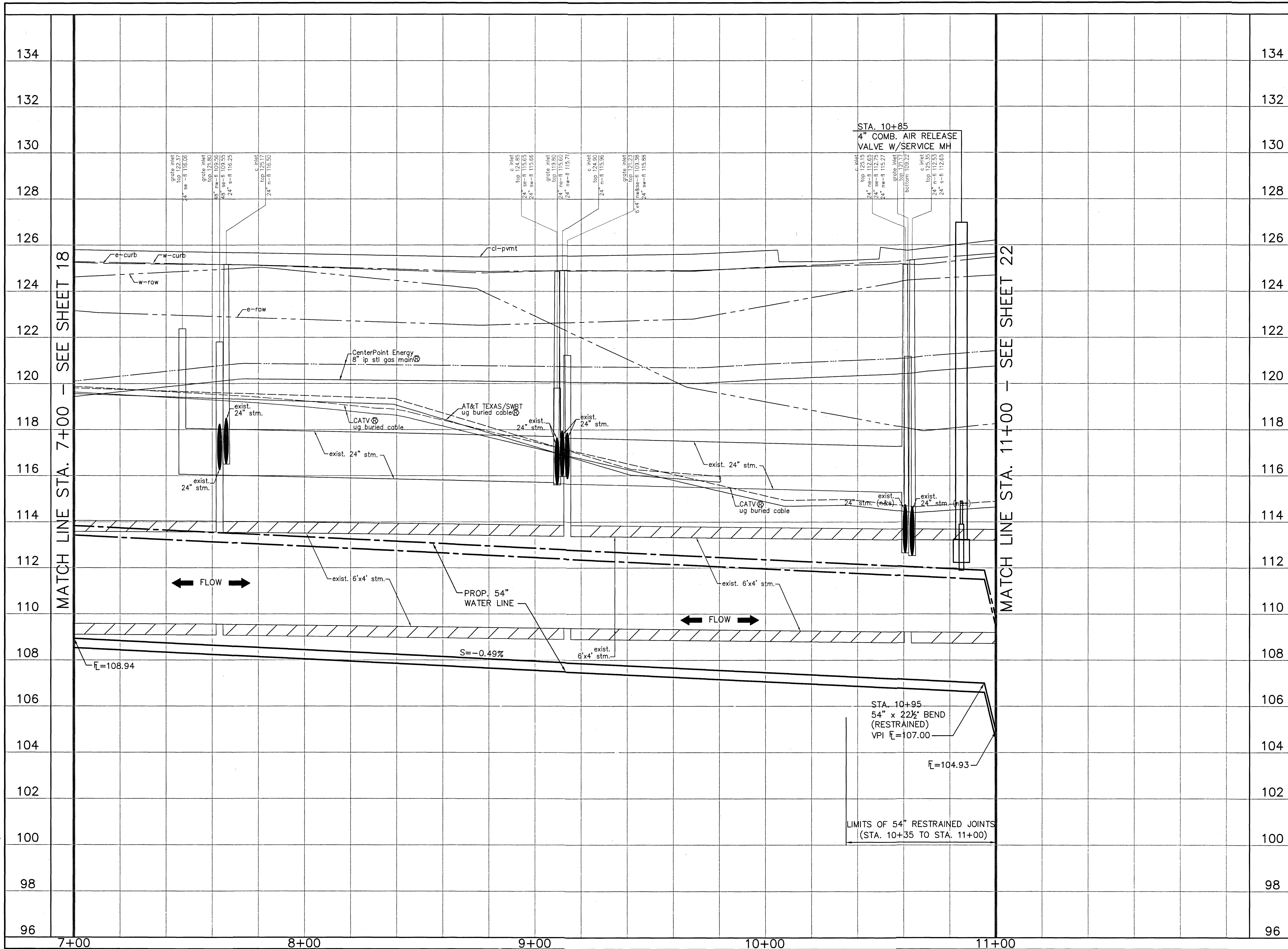
DRAWN BY: CHECKED BY:

**DANNENBAUM**  
ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

LAST MODIFIED: Jan 21, 2020 - 9:51am BY USER: yimvy  
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DWG. NAME: 4876-01\_19.dwg



LAST MODIFIED: Jan 21, 2020 - 9:51am BY USER: yirmv  
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No.	Date	Revisions	App.

HORIZ 0 10' 20' 40'  
 1"=20'

VERT 0 1' 2' 4'  
 1"=2'

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PRIVATE UTILITY LINES SHOWN

*[Signature]* Date: 1-23-20  
 CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY

*[Signature]* Date: 1-23-20  
 CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY. OTHER SIGNATURES THAT YOU HAVE SHOWN ON NATURAL GAS LINES (NOT TO BE USED FOR CONFLICT VERIFICATION). (GAS SERVICE LINES ARE NOT SHOWN). SIGNATURE VALID FOR SIX MONTHS.

*[Signature]* Date: 1-22-20  
 Approved for AT&T Texas/SWBT underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR.

**North Harris County REGIONAL WATER Authority**

**AECOM**  
 AECOM TECHNICAL SERVICES, INC.  
 19219 KATY FREEWAY, SUITE 100  
 HOUSTON, TEXAS 77094-1009  
 281.546.2400  
 WWW.AECOM.COM  
 TBPE REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**GRANT ROAD PROFILE**  
 STA. 7+00 TO 11+00

*[Signature]*  
 STATE OF TEXAS  
 CARL D. MCCONNELL  
 97585  
 LICENSED PROFESSIONAL ENGINEER

DRAWN BY: \_\_\_\_\_ CHECKED BY: \_\_\_\_\_

**DANNENBAUM**  
 ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

SHEET No. 20 OF 99

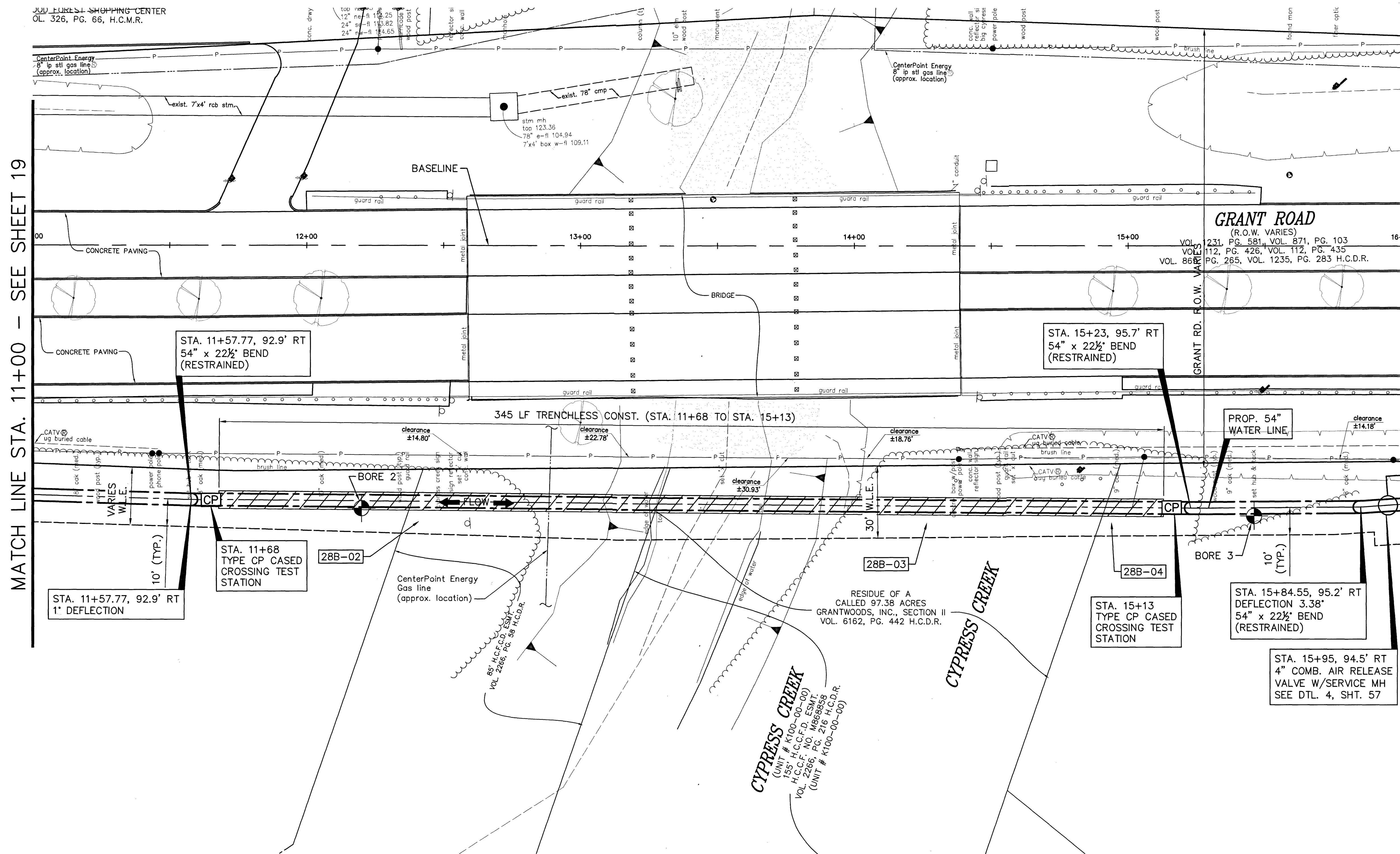
No.	Date	Revisions	App.

**BENCHMARK:**

FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCFCO BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY 0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE CYPRESS WATERSHED NEAR STREAM K100-00-00 ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

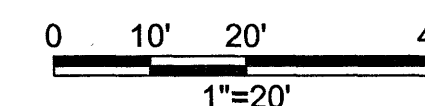
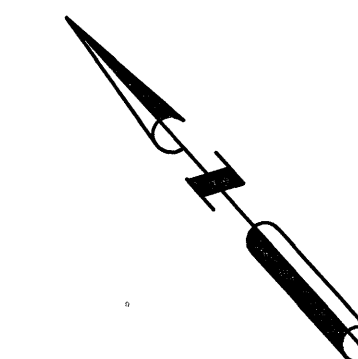
**HORIZONTAL DATUM:**

ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83. THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE FACTOR OF 0.999870017 (TxDOT factor). 100 YR FL=125.00'



MATCH LINE STA. 11+00 - SEE SHEET 19

MATCH LINE STA. 16+00 - SEE SHEET 23



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

FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

**PRIVATE UTILITY LINES SHOWN**

*Alph* DATE: 1-23-20  
CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY

*Alph* DATE: 1-23-20  
CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY

*Alph* DATE: 1-22-20  
APPROVED FOR AT&T TEXAS/SWBT UNDERGROUND CONDUIT FACILITIES ONLY

**North Harris County REGIONAL WATER Authority**

AECOM TECHNICAL SERVICES, INC.  
15219 KATY FREEWAY, SUITE 100  
HOUSTON, TEXAS 77094-1009  
281.645.2400  
WWW.AECOM.COM  
TBPE REG. NO. F-3580

**AECOM**

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

**GRANT ROAD BASELINE PLAN**  
STA. 11+00 TO 16+00

*Carl D. McConnell*  
*1/23/20*

DRAWN BY: CHECKED BY:

**DANNENBAUM**  
ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

LAST MODIFIED: Jan 21, 2020 - 9:51am BY USER: yimvy  
DWG. LOCATION: G:\1110\4876-01 NHCRWA PROJECT 28-B\ACAD\Drawings\Civil\ DWG. NAME: 4876-01\_21.dwg

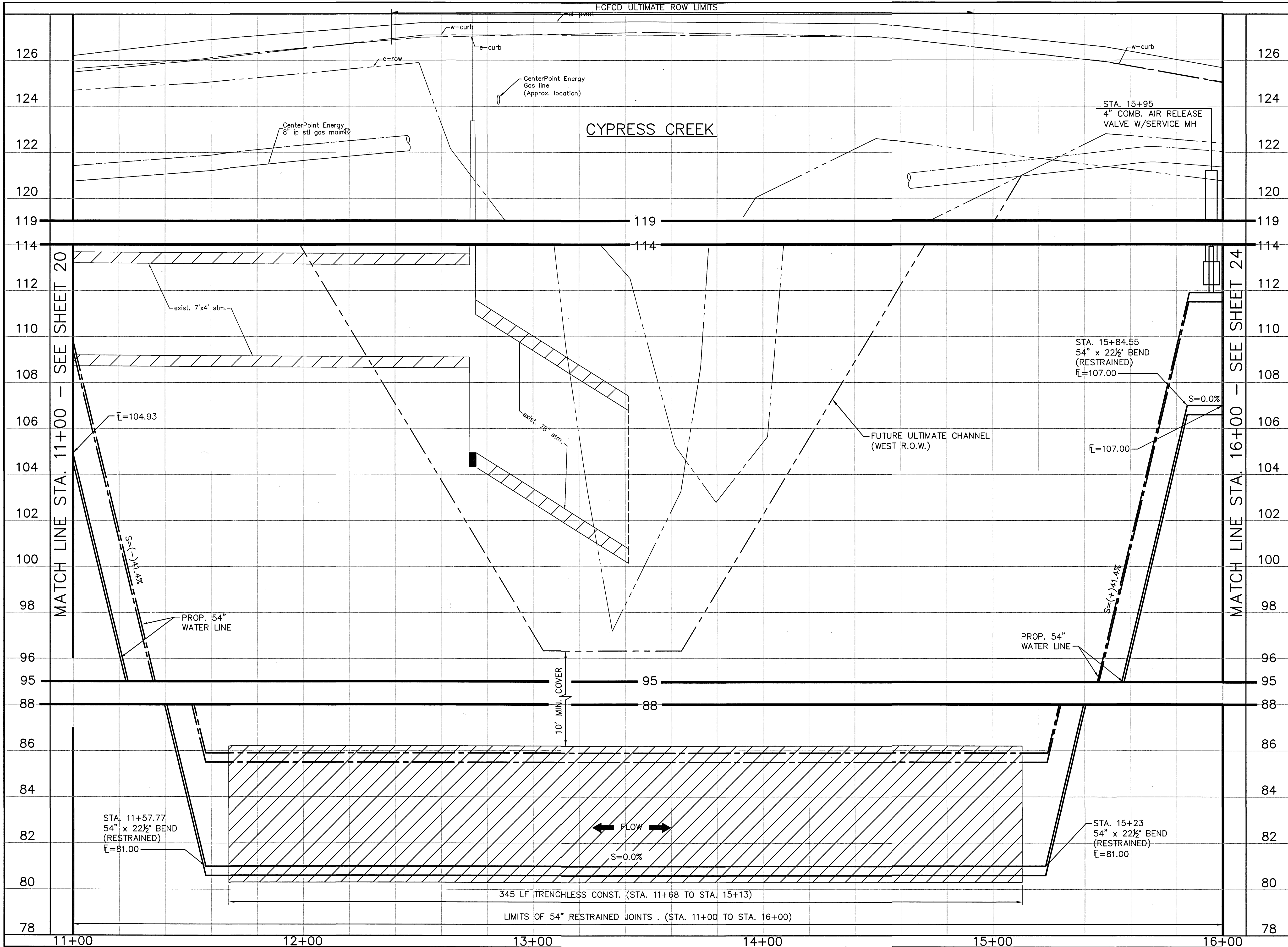
**CAUTION:**  
EXISTING GAS PIPELINE LOCATIONS AND ELEVATIONS HAVE NOT BEEN VERIFIED. CONTRACTOR RESPONSIBLE FOR FIELD VERIFICATION OF UNDERGROUND PIPELINES.

**THE LOCATION OF THE BURIED CABLES WITHIN THE PROJECT LIMITS HAVE NOT BEEN VERIFIED. BEFORE COMMENCING WORK CALL 1-800-344-8377 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD-LOCATED.**

**CAUTION:**  
OVERHEAD POWER LINES.



LAST MODIFIED: Jan 21, 2020 - 9:51am BY USER: yimvy  
 DWG. LOCATION: G:\1110\4876-01 NHCRWA PROJECT 28-B\ACAD\Drawings\Civil\  
 DWG. NAME: 4876-01\_22.dwg



No.	Date	Revisions	App.

HORIZ 0 10' 20' 40'  
 1"=20'

VERT 0 1' 2' 4'  
 1"=2'

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

**NOTICE:**  
 FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

PRIVATE UTILITY LINES SHOWN

*Alch* Date: 1-23-20  
 CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY

*Alch* Date: 1-23-20  
 CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY. (THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN OFF NATURAL GAS LINES CORRECTLY - NOT TO BE USED FOR CONFLICT VERIFICATION.) (GAS SERVICE LINES ARE NOT SHOWN) SIGNATURE VALID FOR SIX MONTHS.

*Alch* Date: 1-23-20  
 APPROVED FOR AT&T TEXAS/SWBT UNDERGROUND CONDUIT FACILITIES ONLY. SIGNATURE VALID FOR ONE YEAR.

**North Harris County REGIONAL WATER Authority**

**AECOM** AECOM TECHNICAL SERVICES, INC.  
 19219 KATY FREEWAY, SUITE 100  
 HOUSTON, TEXAS 77094-1009  
 281.646.2400  
 WWW.AECOM.COM  
 TBP REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

**GRANT ROAD BASELINE PROFILE**  
 STA. 11+00 TO 16+00

STATE OF TEXAS  
 PROFESSIONAL ENGINEER  
 97585  
*Carl D. McConnell*  
 1/21/2020

DRAWN BY: \_\_\_\_\_ CHECKED BY: \_\_\_\_\_

**DANNENBAUM**  
 ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

SHEET No: 22 OF 99

No.	Date	Revisions	App.

**CAUTION:**  
EXISTING GAS PIPELINE LOCATIONS  
AND ELEVATIONS HAVE NOT BEEN VERIFIED.  
CONTRACTOR RESPONSIBLE FOR FIELD  
VERIFICATION OF UNDERGROUND PIPELINES.

THE LOCATION OF THE BURIED CABLES WITHIN THE  
PROJECT LIMITS HAVE NOT BEEN VERIFIED. BEFORE  
COMMENCING WORK CALL 1-800-344-8377 A MINIMUM  
OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE  
UNDERGROUND LINES FIELD-LOCATED.

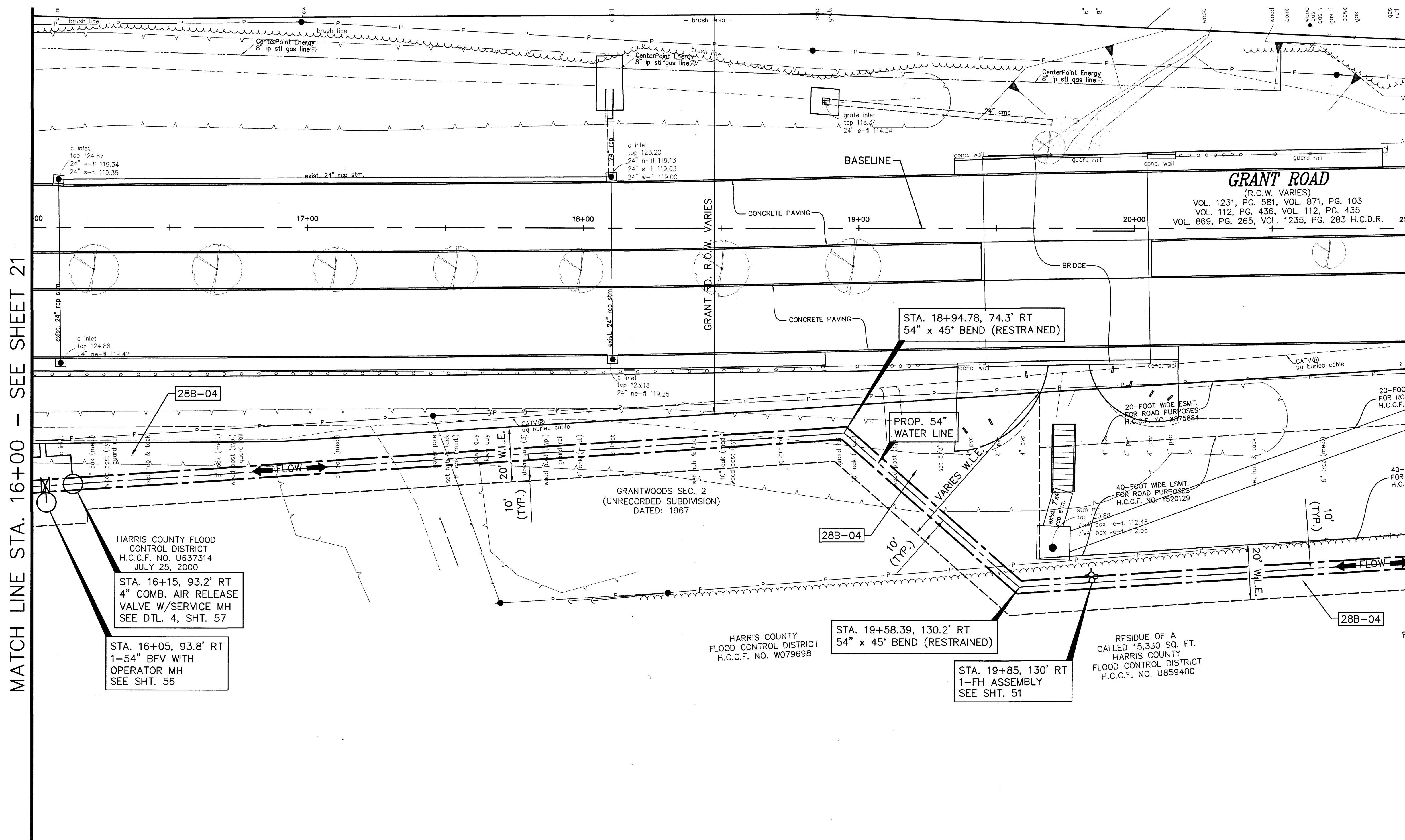
**CAUTION:**  
OVERHEAD POWER LINES.

**BENCHMARK:**

FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCFCO  
BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF  
GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY  
0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE  
CYPRESS WATERSHED NEAR STREAM K100-00-00  
ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

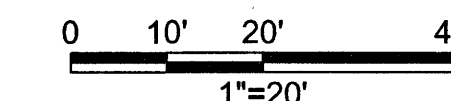
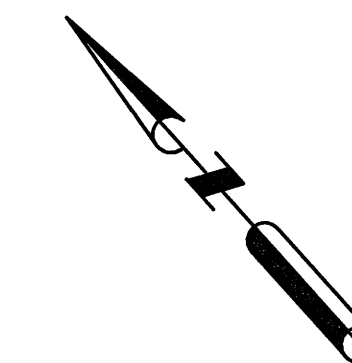
**HORIZONTAL DATUM:**

ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE  
PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83.  
THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND  
MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE  
FACTOR OF 0.999870017 (TxDOT factor).  
100 YR FL=125.00'



MATCH LINE STA. 16+00 - SEE SHEET 21

MATCH LINE STA. 21+00 - SEE SHEET 25



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

**NOTICE:**  
FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

**PRIVATE UTILITY LINES SHOWN**

*Olch* Date: 1-23-28  
CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY

*Olch* Date: 1-23-20  
CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY. (THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN OUP NATURAL GAS LINES CORRECTLY. NOT TO BE USED FOR CONFLICT VERIFICATION.) (GAS SERVICE LINES ARE NOT SHOWN) SIGNATURE VALID FOR SIX MONTHS.

*Loebl* Date: 1-22-20  
Approved for AT&T Texas/SWBT underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR



**AECOM**  
AECOM TECHNICAL SERVICES, INC.  
15219 KATY FREEWAY, SUITE 100  
HOUSTON, TEXAS 77094-1009  
281.646.2400  
WWW.AECOM.COM  
TBP REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**GRANT ROAD BASELINE PLAN**  
STA. 16+00 TO 21+00

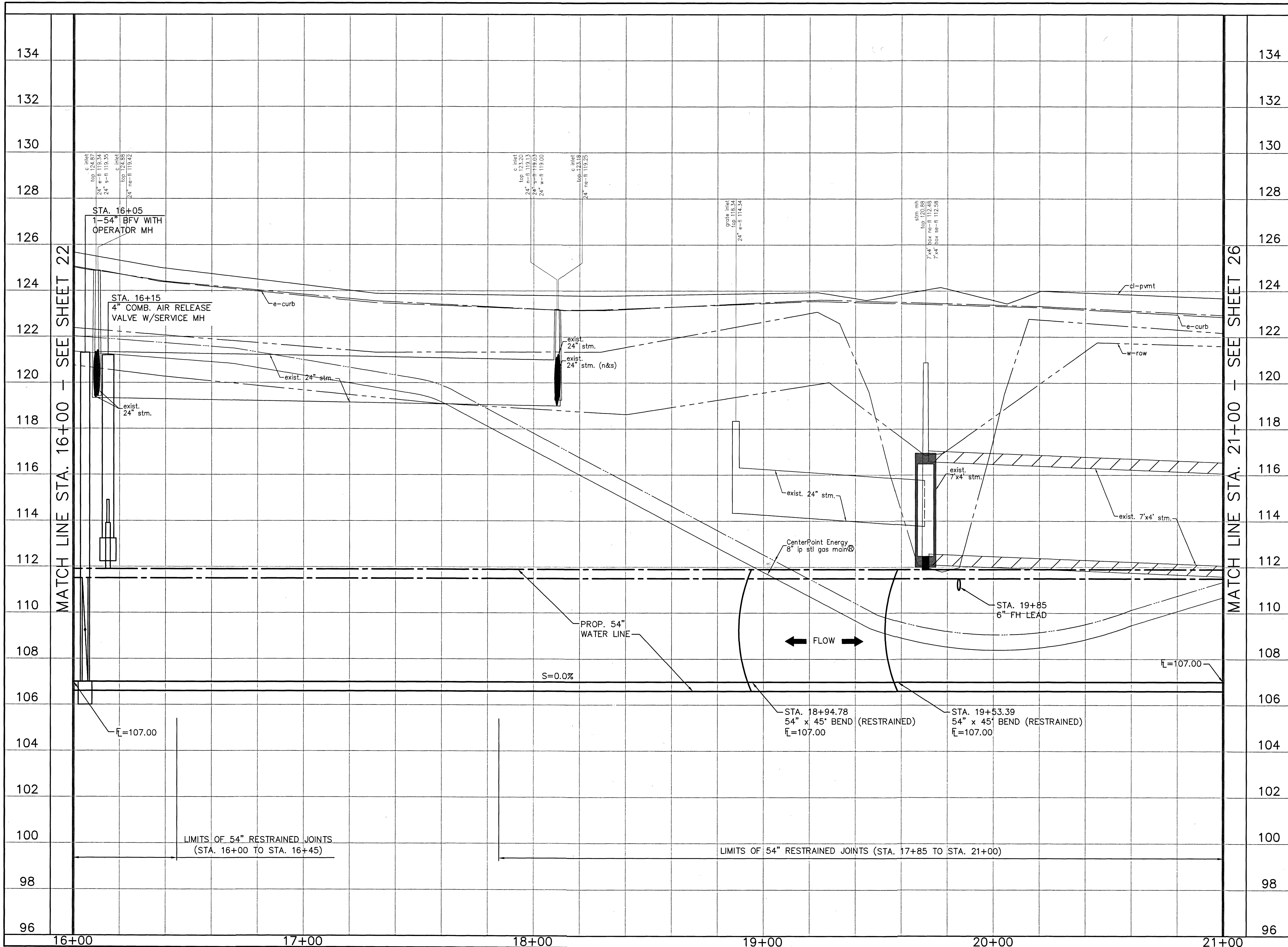
STATE OF TEXAS  
CARL D. MCCONNELL  
97585  
LICENSED PROFESSIONAL ENGINEER  
*Carl D. McConnell*  
1/23/2020

DRAWN BY: CHECKED BY:

**DANNENBAUM**  
ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570



LAST MODIFIED: Jan 21, 2020 - 9:52am BY USER: yimvy  
 DWG. LOCATION: G:\1110\4876-01 NHCRA PROJECT 28-B\ACAD\Drawings\Civil\  
 Dwg. NAME: 4876-01\_24.dwg



No.	Date	Revisions	App.

HORIZ 0 10' 20' 40'  
 1"=20'

VERT 0 1' 2' 4'  
 1"=2'

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

**NOTICE:**  
 FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DO SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

PRIVATE UTILITY LINES SHOWN

*APL* Date 1-23-20  
 CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY

*APB* Date 1-23-20  
 CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY. (THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN ALL NATURAL GAS LINES. (FOR SERVICE LINES NOT SHOWN) SIGNATURE VALID FOR SIX MONTHS.)

*J. Cant* Date 1-22-20  
 Approved for AT&T Texas/SWBT underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR

**North Harris County REGIONAL WATER Authority**

**AECOM**  
 AECOM TECHNICAL SERVICES, INC.  
 19219 KATY FREEWAY, SUITE 100  
 HOUSTON, TEXAS 77094-1009  
 281.646.2400  
 WWW.AECOM.COM  
 TBPE REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**GRANT ROAD BASELINE PROFILE**  
 STA. 16+00 TO 21+00

**CARL D. MCCONNELL**  
 97585  
 LICENSED PROFESSIONAL ENGINEER  
*Carl D. McConnell*  
 1/22/2020

DRAWN BY: CHECKED BY:

**DANNENBAUM**  
 ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

SHEET No: 24 of 99

No.	Date	Revisions	App.

**CAUTION:**  
EXISTING GAS PIPELINE LOCATIONS  
AND ELEVATIONS HAVE NOT BEEN VERIFIED.  
CONTRACTOR RESPONSIBLE FOR FIELD  
VERIFICATION OF UNDERGROUND PIPELINES.

THE LOCATION OF THE BURIED CABLES WITHIN THE  
PROJECT LIMITS HAVE NOT BEEN VERIFIED. BEFORE  
COMMENCING WORK CALL 1-800-344-8377 A MINIMUM  
OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE  
UNDERGROUND LINES FIELD-LOCATED.

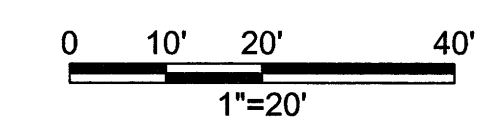
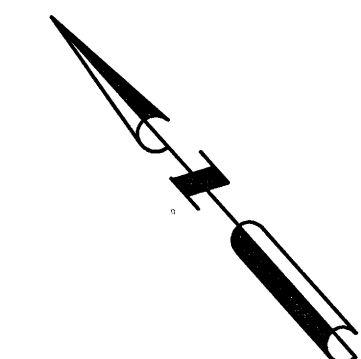
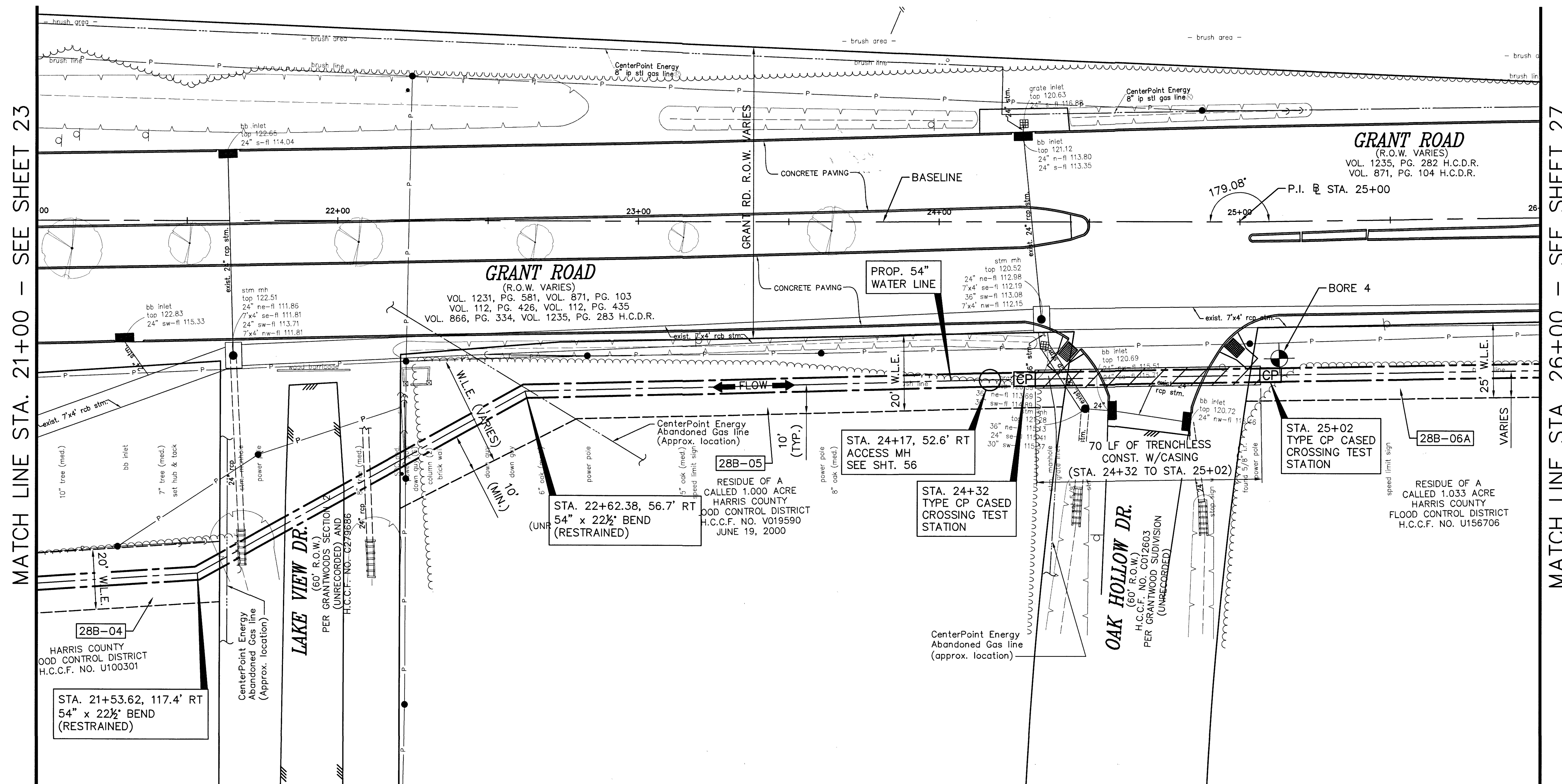
**CAUTION:**  
OVERHEAD POWER LINES.

**BENCHMARK:**

FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCFC  
BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF  
GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY  
0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE  
CYPRESS WATERSHED NEAR STREAM K100-00-00  
ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**

ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE  
PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83.  
THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND  
MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE  
FACTOR OF 0.999870017 (TxDOT factor).  
100 YR FL=125.00'



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

**NOTICE:**  
FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

**PRIVATE UTILITY LINES SHOWN**

*[Signature]* Date: 1-23-20  
CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY

*[Signature]* Date: 1-23-20  
CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY. (THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN ONP NATURAL GAS LINES CORRECTLY - NOT TO BE USED FOR CONVEYANCE)

*[Signature]* Date: 1-22-20  
Approved for AT&T Texas/SWBt underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR.



**AECOM**  
AECOM TECHNICAL SERVICES, INC.  
18219 KATY FREEWAY, SUITE 100  
HOUSTON, TEXAS 77054-1009  
281.646.2400  
WWW.AECOM.COM  
TSP# REG. NO. F-3580

**NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY**  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**GRANT ROAD BASELINE PLAN**  
STA. 21+00 TO 26+00

STATE OF TEXAS  
CARL D. MCCONNELL  
97585  
LICENSED PROFESSIONAL ENGINEER  
*[Signature]*  
1/22/2020

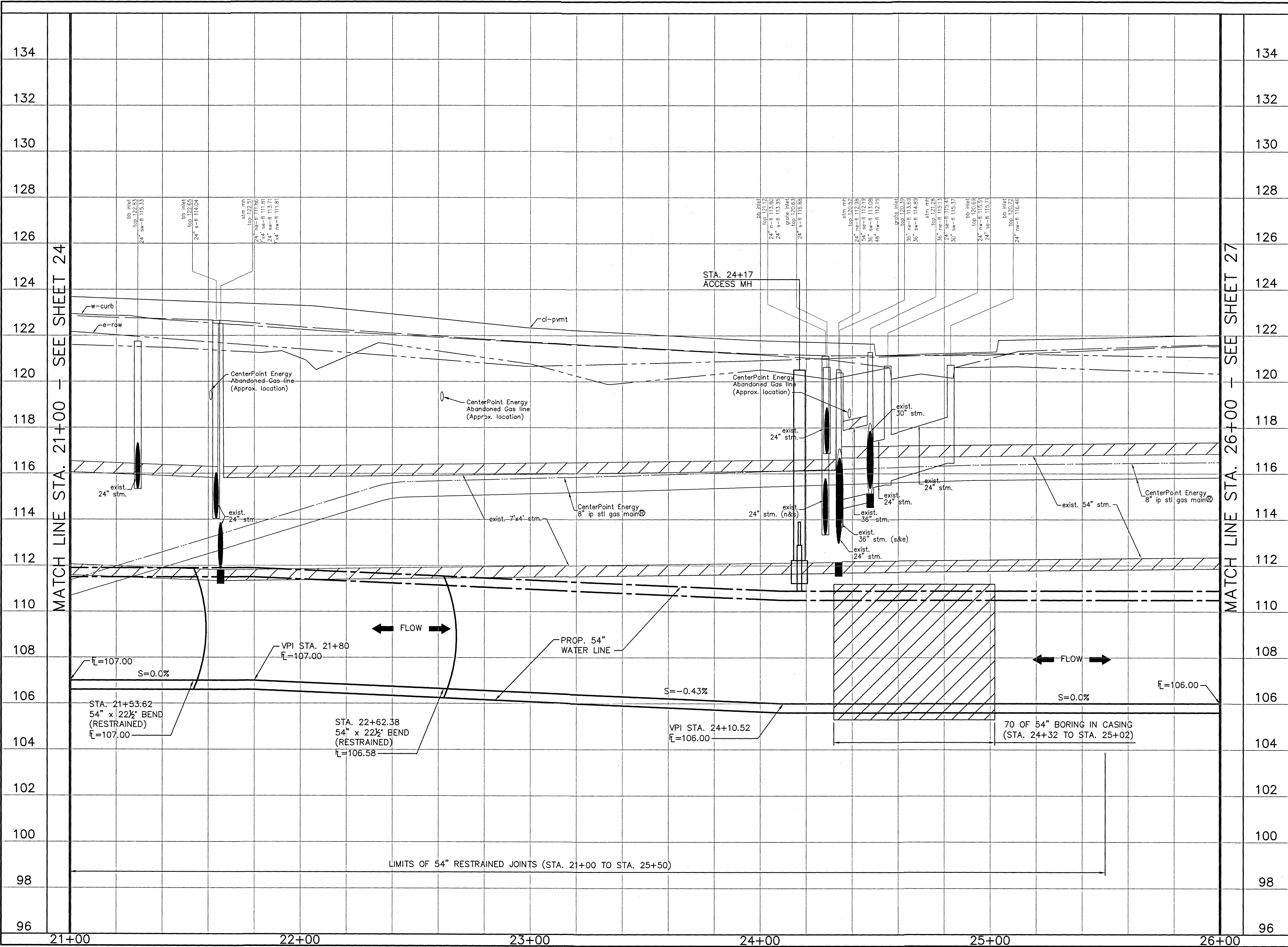
DRAWN BY: CHECKED BY:

**DANNENBAUM**  
ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77058 (713) 520-9570

LAST MODIFIED: Jan 21, 2020 - 11:14am BY USER: jimvy  
DWG. LOCATION: G:\1110\4876-01 NHCRWA PROJECT 28-B\ACAD\Drawings\Civil\  
DWG. NAME: 4876-01\_25.dwg



LAST MODIFIED: Jan 21, 2020 - 11:14am  
 BY USER: vimvw  
 DWG. LOCATION: C:\1110\4876-01 NHCROWA PROJECT 28-B\ACAD\Drawings\Civil  
 DWG. NAME: 4876-01\_26.dwg



No.	Date	Revisions	App.

HORIZ 0 10' 20' 40'  
 1"=20'

VERT 0 1' 2' 4'  
 1"=2'

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

NOTICE:  
 FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

PRIVATE UTILITY LINES SHOWN

*Abdel* Date: 1-23-20  
 CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY  
 (THE SIGNATURE VERIFIES EXISTING UNDERGROUND FACILITIES - NOT TO BE USED FOR CONFLICT VERIFICATION) SIGNATURE VALID FOR SIX MONTHS.

*Abdel* Date: 1-23-20  
 CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY  
 (THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN OIP NATURAL GAS LINES CORRECTLY. NOT TO BE USED FOR CONFLICT VERIFICATION.)  
 (OIP SERVICE LINES ARE NOT SHOWN) SIGNATURE VALID FOR SIX MONTHS.

*Carl D. McConnell* Date: 1-22-20  
 Approved for AT&T Texas/SWB/T underground conduit facilities only  
 SIGNATURE VALID FOR ONE YEAR

**North Harris County REGIONAL WATER Authority**

**AECOM**  
 AECOM TECHNICAL SERVICES, INC.  
 19219 KATY FREEWAY, SUITE 100  
 HOUSTON, TEXAS 77094-1009  
 281.646.2400  
 WWW.AECOM.COM  
 TBPE REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

**GRANT ROAD BASELINE PROFILE  
 STA. 21+00 TO 26+00**

**DANNENBAUM**  
 ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

DRAWN BY: \_\_\_\_\_ CHECKED BY: \_\_\_\_\_

SHEET No: 26 OF 99

LAST MODIFIED: Jan 21, 2020 - 11:15am BY USER: yimv  
 DWG. LOCATION: G:\1110\4876-01 NHCRWA PROJECT 28-B\ACAD\Drawings\Civil  
 DWG. NAME: 4876-01\_27.dwg

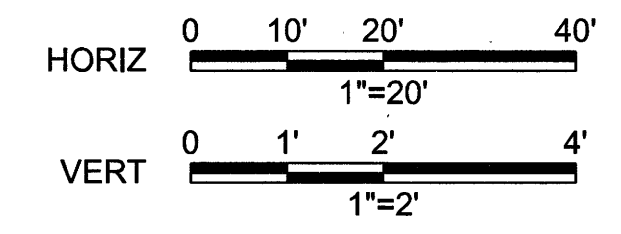
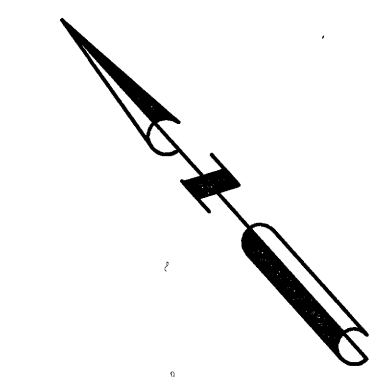
MATCH LINE STA. 26+00 - SEE SHEET 25

MATCH LINE STA. 31+00 - SEE SHEET 28

No.	Date	Revisions	App.

**BENCHMARK:**  
 FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCFCO BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY 0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE CYPRESS WATERSHED NEAR STREAM K100-00-00 ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**  
 ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83. THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE FACTOR OF 0.999870017 (TXDOT factor).  
 100 YR FL=125.0'



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

**NOTICE:**  
 FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

PRIVATE UTILITY LINES SHOWN

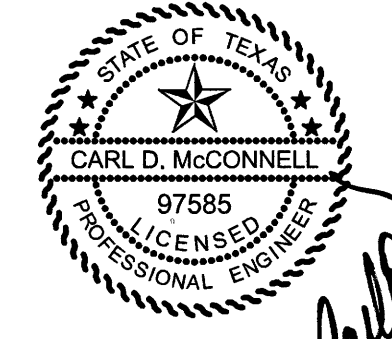
*alpk* Date: 1-23-20  
 CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY

*alpk* Date: 1-23-20  
 CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY. (THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN CNP NATURAL GAS LINES CORRECTLY - NOT TO BE USED FOR CONTACT VERIFICATION)

*David* Date: 1-22-20  
 Approved for AT&T Texas/SWBT underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR



NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**GRANT ROAD BASELINE  
 PLAN AND PROFILE  
 STA. 26+00 TO 31+00**



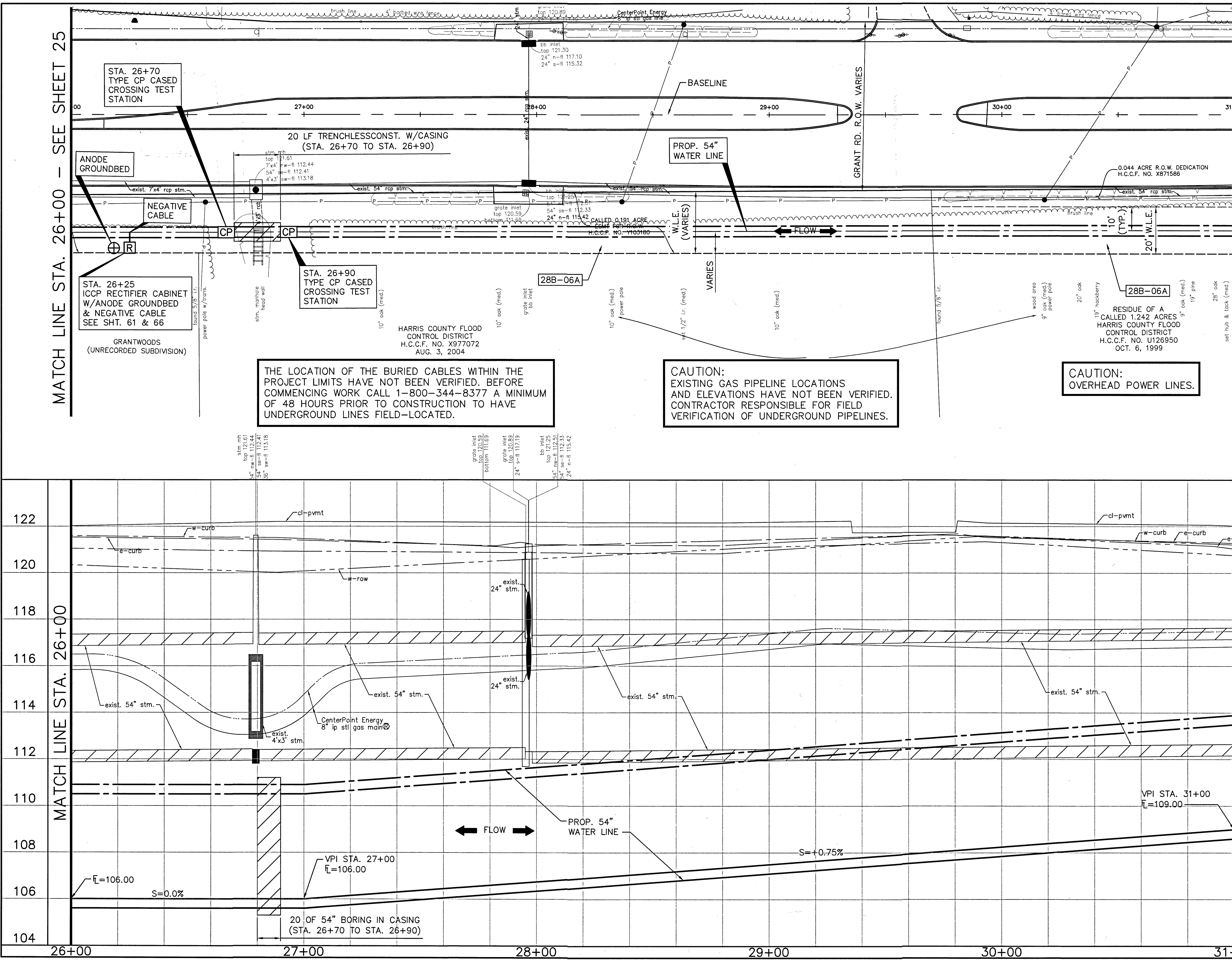
*Carl D. McConnell*  
 1/22/2020

DRAWN BY: CHECKED BY:



ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

SHEET No. 27 OF 99



THE LOCATION OF THE BURIED CABLES WITHIN THE PROJECT LIMITS HAVE NOT BEEN VERIFIED. BEFORE COMMENCING WORK CALL 1-800-344-8377 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD-LOCATED.

**CAUTION:**  
 EXISTING GAS PIPELINE LOCATIONS AND ELEVATIONS HAVE NOT BEEN VERIFIED. CONTRACTOR RESPONSIBLE FOR FIELD VERIFICATION OF UNDERGROUND PIPELINES.

**CAUTION:**  
 OVERHEAD POWER LINES.

stm. inlet top 121.61 54" nw-fl 112.44 54" sw-fl 112.41 36" sw-fl 113.18	grate inlet top 120.59 bottom 111.69	bb inlet top 120.83 top 117.19 54" nw-fl 112.51 54" sw-fl 112.33 24" n-fl 115.42
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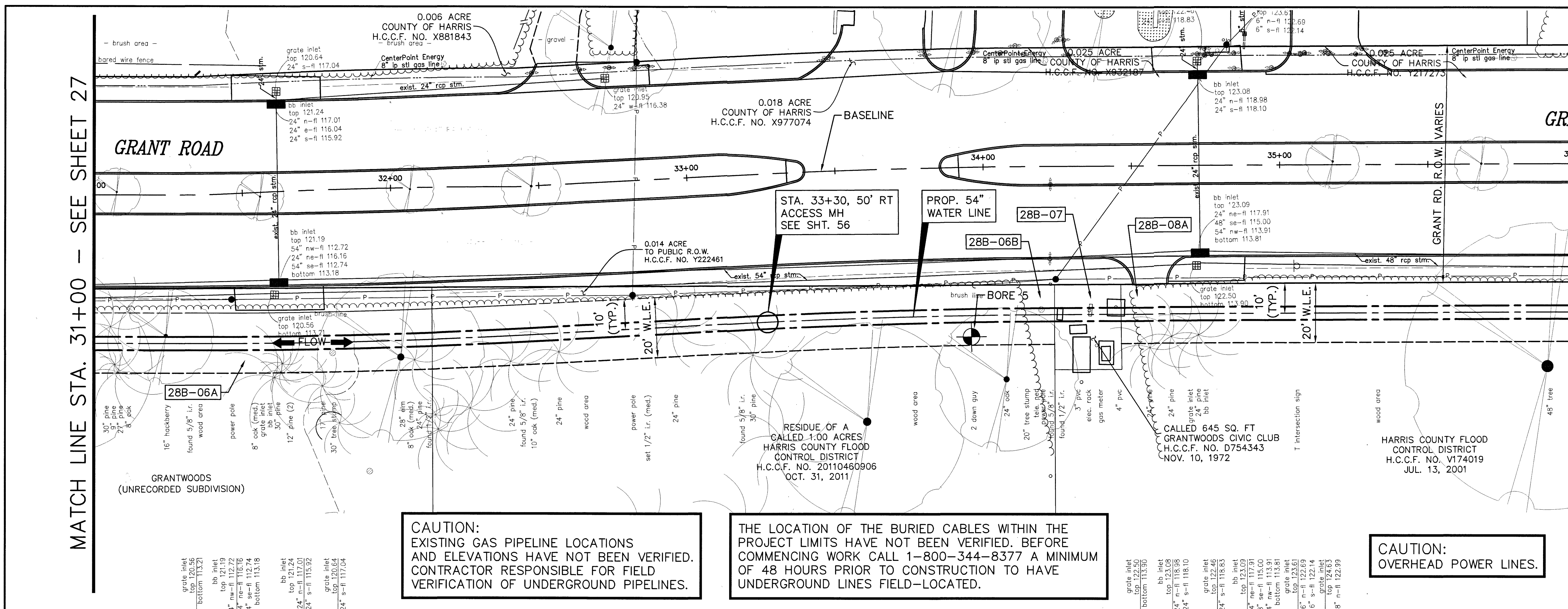
20 OF 54" BORING IN CASING  
 (STA. 26+70 TO STA. 26+90)



LAST MODIFIED: Jan 21, 2020 - 11:17am BY USER: vimxy  
 DWG. LOCATION: G:\1110\4876-01 NHCRWA PROJECT 28-B\ACAD\Drawings\Civil\  
 DWG. NAME: 4876-01\_28.dwg

MATCH LINE STA. 31+00 - SEE SHEET 27

MATCH LINE STA. 36+00 - SEE SHEET 29



**CAUTION:**  
 EXISTING GAS PIPELINE LOCATIONS  
 AND ELEVATIONS HAVE NOT BEEN VERIFIED.  
 CONTRACTOR RESPONSIBLE FOR FIELD  
 VERIFICATION OF UNDERGROUND PIPELINES.

**THE LOCATION OF THE BURIED CABLES WITHIN THE  
 PROJECT LIMITS HAVE NOT BEEN VERIFIED. BEFORE  
 COMMENCING WORK CALL 1-800-344-8377 A MINIMUM  
 OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE  
 UNDERGROUND LINES FIELD-LOCATED.**

**CAUTION:**  
 OVERHEAD POWER LINES.

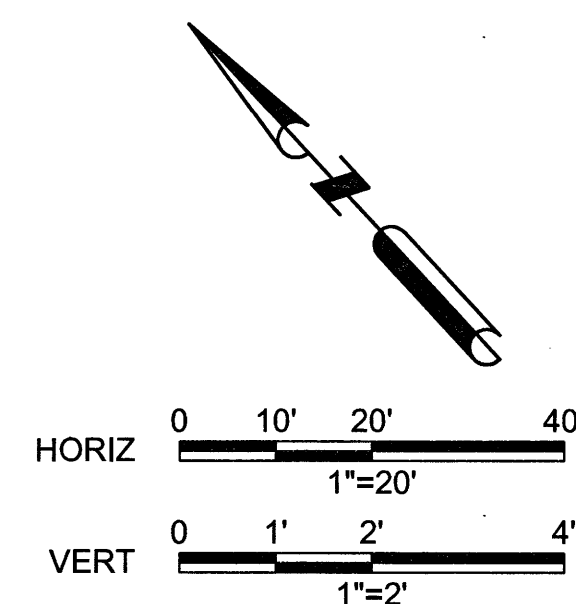
No.	Date	Revisions	App.

**BENCHMARK:**

FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCFCO BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY 0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE CYPRESS WATERSHED NEAR STREAM K100-00-00 ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**

ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83. THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE FACTOR OF 0.999870017 (TxDOT factor).  
 100 YR FL=125.00'



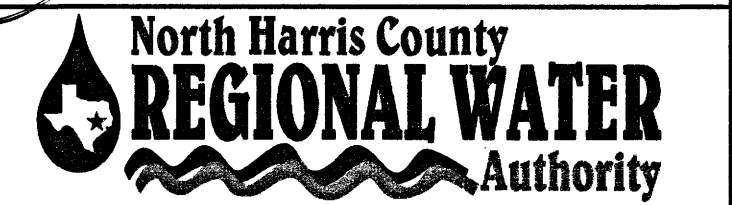
TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED CALL CENTERPOINT ENERGY AT 713-207-2222.  
**NOTICE:**  
 FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

**PRIVATE UTILITY LINES SHOWN**

*Alch* Date: 1-23-20  
 CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY  
 (THE SIGNATURE VERIFIES EXISTING UNDERGROUND FACILITIES - NOT TO BE USED FOR CONDUIT VERIFICATION) SIGNATURE VALID FOR SIX MONTHS.

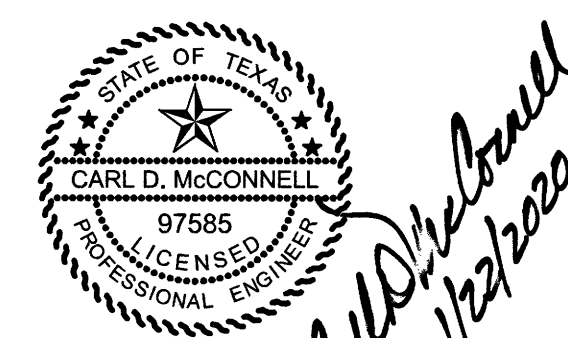
*Alch* Date: 1-23-20  
 CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY.  
 (THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN CNP NATURAL GAS LINES CORRECTLY - NOT TO BE USED FOR CONDUIT VERIFICATION) SIGNATURE VALID FOR SIX MONTHS.

*Alch* Date: 1-22-20  
 Approved for T&T Taxes/SWBT underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR.



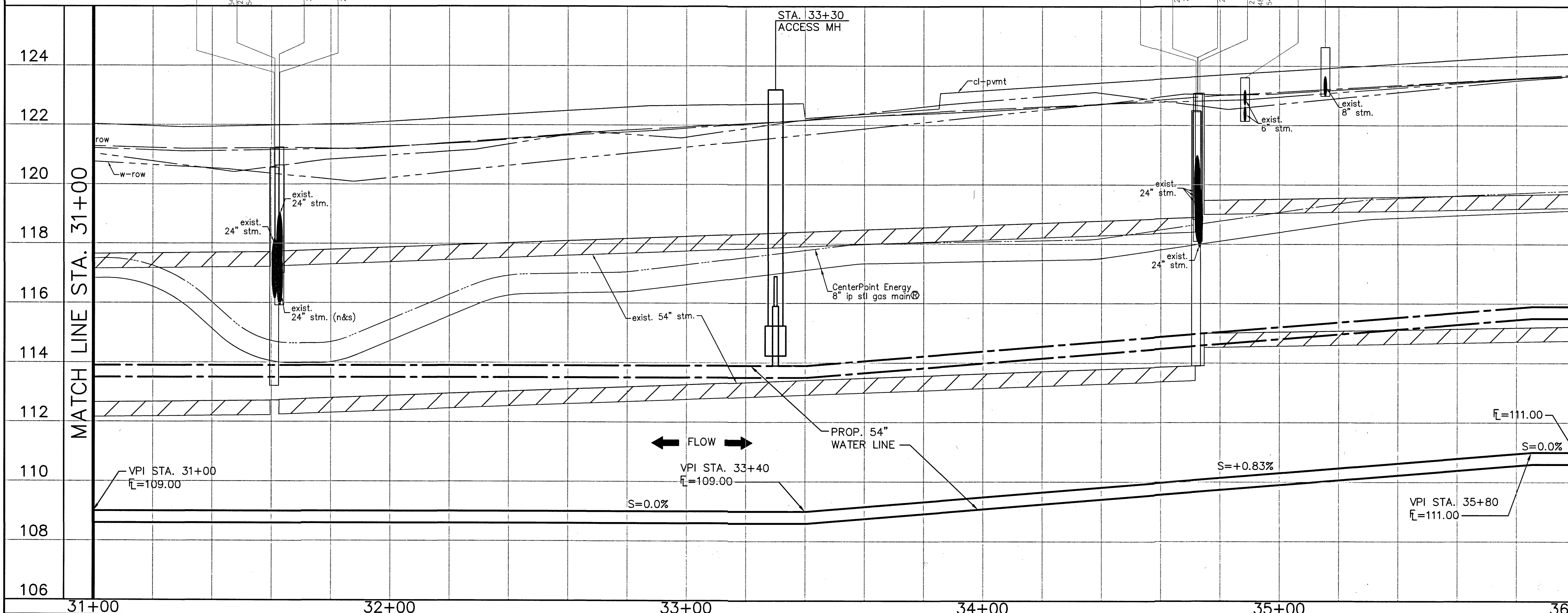
**AECOM**  
 AECOM TECHNICAL SERVICES, INC.  
 18219 KATY FREEWAY, SUITE 100  
 HOUSTON, TEXAS 77054-1009  
 281.646.2400  
 WWW.AECOM.COM  
 T&PE REG. NO. F-3580

**NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY**  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**GRANT ROAD BASELINE**  
**PLAN AND PROFILE**  
 STA. 31+00 TO 36+00



DRAWN BY: CHECKED BY:

**DANNENBAUM**  
 ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570



No.	Date	Revisions	App.

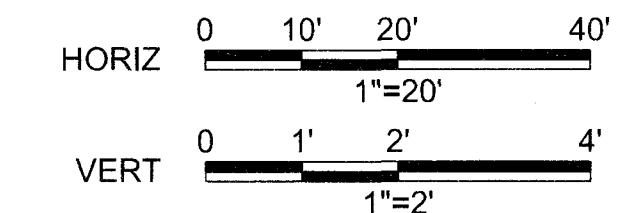
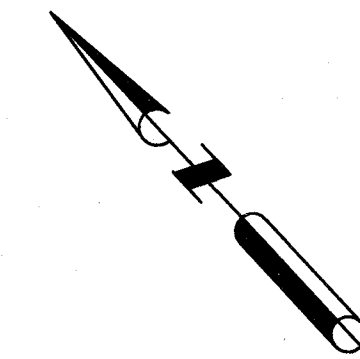
**BENCHMARK:**  
 FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCFD BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY 0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE CYPRESS WATERSHED NEAR STREAM K100-00-00 ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**  
 ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83. THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE FACTOR OF 0.999870017 (TxDOT factor).  
 100 YR FL=125.00'

**CAUTION:**  
 OVERHEAD POWER LINES.

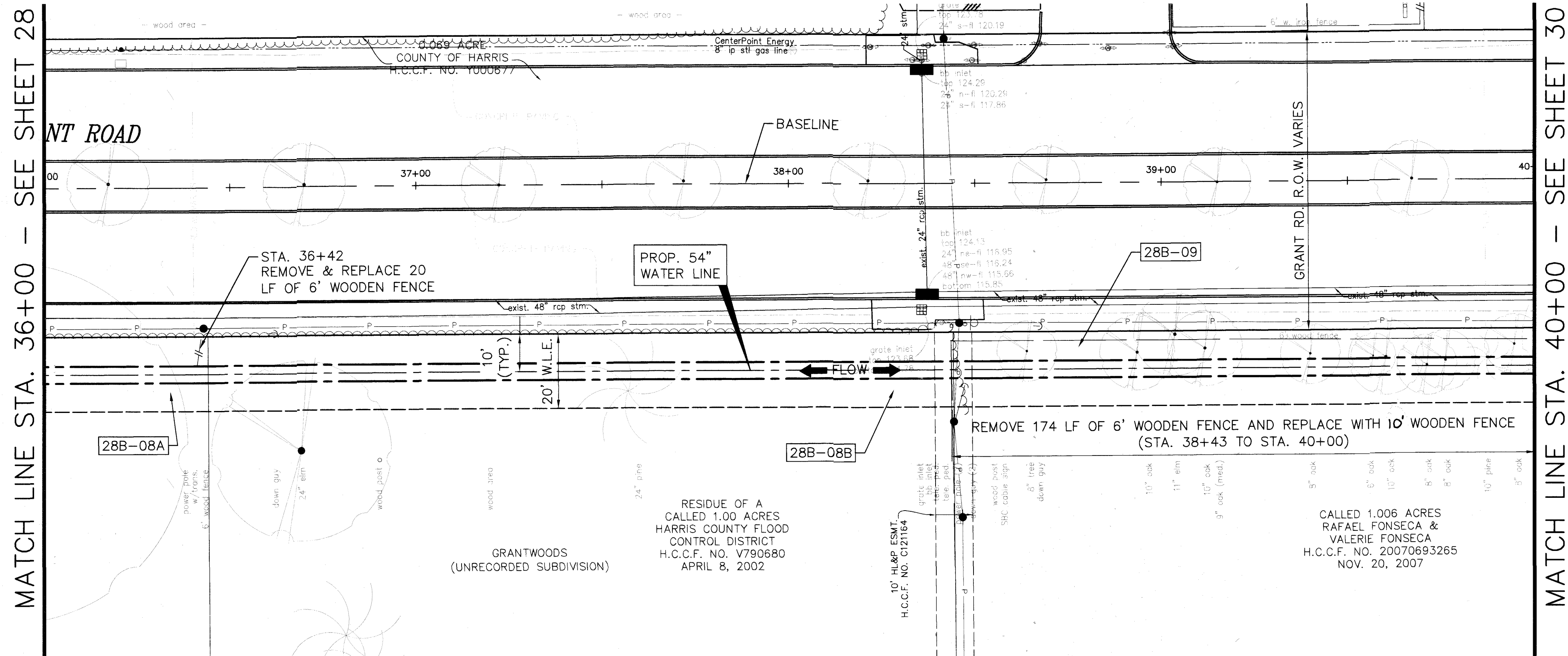
**CAUTION:**  
 EXISTING GAS PIPELINE LOCATIONS AND ELEVATIONS HAVE NOT BEEN VERIFIED. CONTRACTOR RESPONSIBLE FOR FIELD VERIFICATION OF UNDERGROUND PIPELINES.

THE LOCATION OF THE BURIED CABLES WITHIN THE PROJECT LIMITS HAVE NOT BEEN VERIFIED. BEFORE COMMENCING WORK CALL 1-800-344-8377 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD-LOCATED.



**RIGHT OF WAY AND EASEMENT AGREEMENT PARCEL 28B-09**

- THE PORTIONS OF THE FENCE RUNNING ALONG THE WESTERLY BOUNDARY OF PARCEL 28B-09, ADJACENT TO OAK HOLLOW DR. AND THE PORTIONS OF THE FENCE RUNNING ALONG THE WESTERLY BOUNDARY OF PARCEL 28B-09 ADJACENT TO THE PARK THAT ARE REMOVED BY THE AUTHORITY FOR CONSTRUCTION OF THE WATER PIPELINE SHALL BE REPLACED WITH A WOODEN FENCES THE SAME HEIGHT AND SIMILAR IN KIND TO THE EXISTING FENCES.



MATCH LINE STA. 36+00 - SEE SHEET 28

MATCH LINE STA. 40+00 - SEE SHEET 30



MATCH LINE STA. 36+00

MATCH LINE STA. 40+00

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

**NOTICE:**  
 FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

**PRIVATE UTILITY LINES SHOWN**

*[Signature]* Date: 1-23-20  
 CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY  
 (THE SIGNATURE VERIFIES EXISTING UNDERGROUND FACILITIES - NOT TO BE USED FOR CONFLICT VERIFICATION) SIGNATURE VALID FOR SIX MONTHS.  
*[Signature]* Date: 1-23-20  
 CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY.  
 (THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN CNP NATURAL GAS LINES CORRECTLY - NOT TO BE USED FOR CONFLICT VERIFICATION) SIGNATURE VALID FOR SIX MONTHS.  
*[Signature]* Date: 1-22-20  
 Approved for AT&T Texas/SWBT underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR.



**AECOM**  
 AECOM TECHNICAL SERVICES, INC.  
 19219 KATY FREEWAY, SUITE 100  
 HOUSTON, TEXAS 77054-1009  
 281.646.2400  
 WWW.AECOM.COM  
 TSP# REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**GRANT ROAD BASELINE  
 PLAN AND PROFILE  
 STA. 36+00 TO 40+00**

STATE OF TEXAS  
 CARL D. MCCONNELL  
 97585  
 LICENSED PROFESSIONAL ENGINEER  
*Carl D. McConnell*  
 1/23/2020

DRAWN BY: CHECKED BY:

**DANNENBAUM**  
 ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

SHEET No: 29 of 99

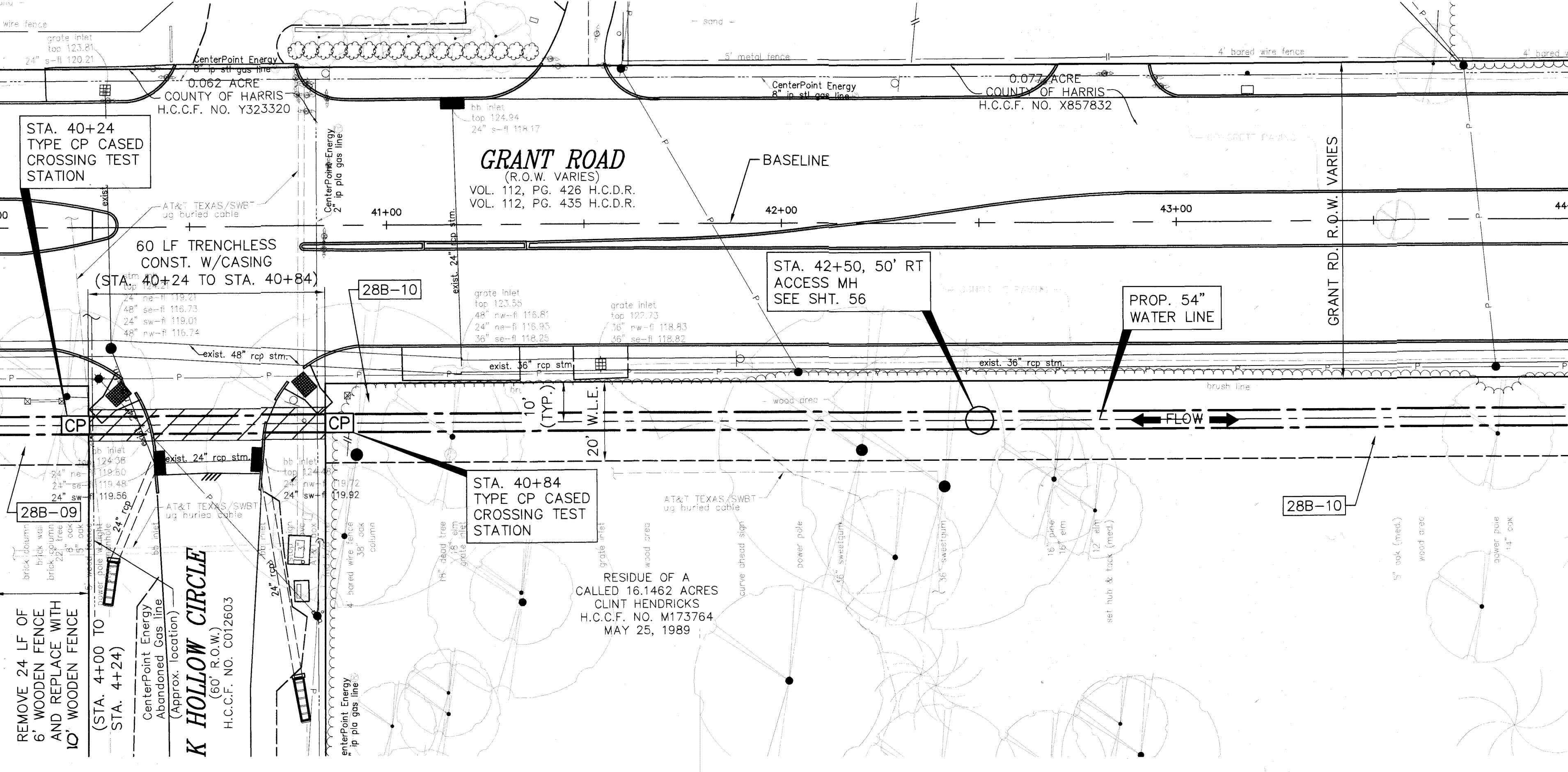
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 DWG. LOCATION: C:\1110\4876-01 NHCRWA PROJECT 28-B\ACAD\Drawings\Civil\ DWG. NAME: 4876-01\_29.dwg



No.	Date	Revisions	App.

MATCH LINE STA. 40+00 - SEE SHEET 29

MATCH LINE STA. 44+00 - SEE SHEET 31



**CAUTION:**  
OVERHEAD POWER LINES.

**CAUTION:**  
EXISTING GAS PIPELINE LOCATIONS AND ELEVATIONS HAVE NOT BEEN VERIFIED. CONTRACTOR RESPONSIBLE FOR FIELD VERIFICATION OF UNDERGROUND PIPELINES.

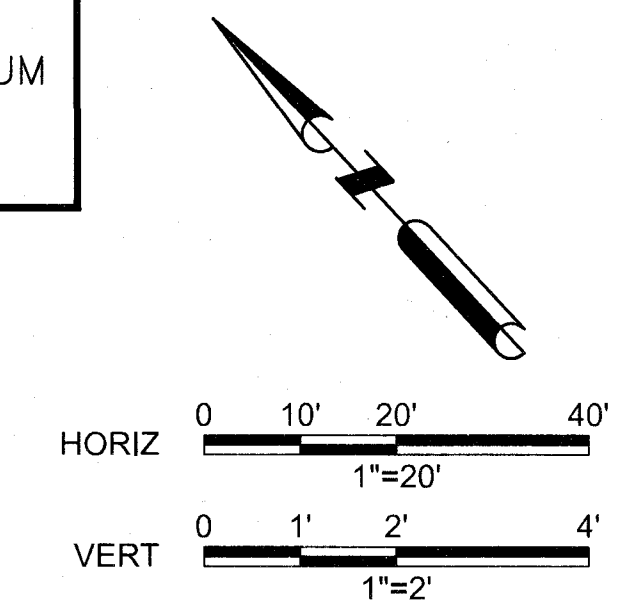
THE LOCATION OF THE BURIED CABLES WITHIN THE PROJECT LIMITS HAVE NOT BEEN VERIFIED. BEFORE COMMENCING WORK CALL 1-800-344-8377 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD-LOCATED.

**BENCHMARK:**

FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HOFCD BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY 0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE CYPRESS WATERSHED NEAR STREAM K100-00-00 ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**

ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83. THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE FACTOR OF 0.999870017 (1xTDOT factor). 100 YR FL=125.00'



**RIGHT OF WAY AND EASEMENT AGREEMENT PARCEL 28B-09**

1. THE PORTIONS OF THE FENCE RUNNING ALONG THE WESTERLY BOUNDARY OF PARCEL 28B-09, ADJACENT TO OAK HOLLOW DR. AND THE PORTIONS OF THE FENCE RUNNING ALONG THE WESTERLY BOUNDARY OF PARCEL 28B-09 ADJACENT TO THE PARK THAT ARE REMOVED BY THE AUTHORITY FOR CONSTRUCTION OF THE WATER PIPELINE SHALL BE REPLACED WITH A WOODEN FENCES THE SAME HEIGHT AND SIMILAR IN KIND TO THE EXISTING FENCES.

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

FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

**PRIVATE UTILITY LINES SHOWN**

*[Signature]* Date: 1-23-20  
CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY  
*[Signature]* Date: 1-23-20  
CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY. (THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN CNP NATURAL GAS LINES CORRECTLY - NOT TO BE USED FOR CONDUIT VERIFICATION)  
*[Signature]* Date: 1-22-20  
Approved for AT&T Texas/SWBT underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR.



**AECOM**  
AECOM TECHNICAL SERVICES, INC.  
19219 KATY FREEWAY, SUITE 100  
HOUSTON, TEXAS 77094-1009  
281.846.2400  
WWW.AECOM.COM  
TPOE REG. NO. F-3580

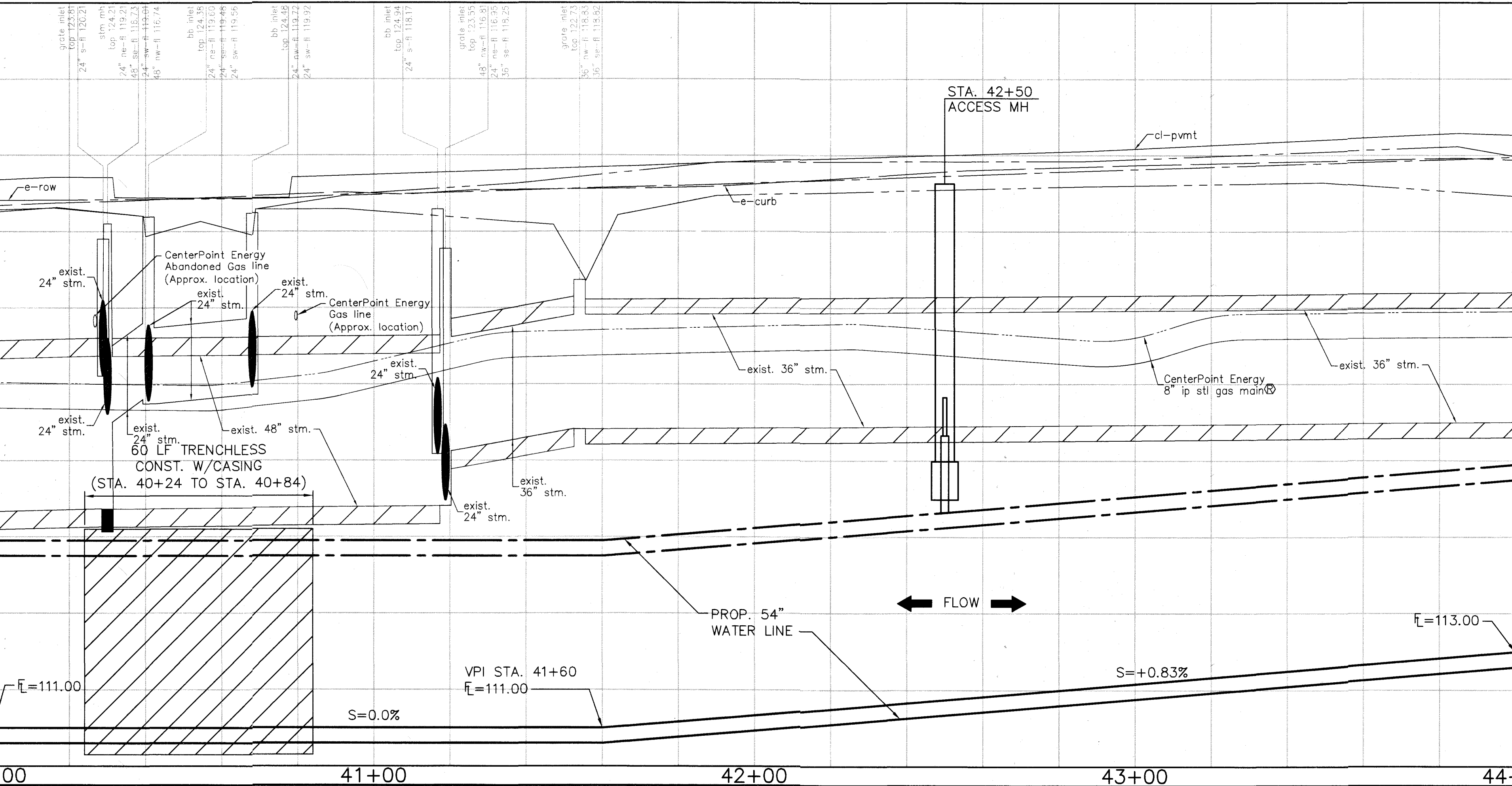
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**GRANT ROAD BASELINE  
PLAN AND PROFILE  
STA. 40+00 TO 44+00**



DRAWN BY: \_\_\_\_\_ CHECKED BY: \_\_\_\_\_  
**DANNENBAUM**  
ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

MATCH LINE STA. 40+00

MATCH LINE STA. 44+00



LAST MODIFIED: Jan 21, 2020 - 9:57am BY USER: yimmy  
DWG. LOCATION: G:\1110\4876-01 NHCROWA PROJECT 28-B\ACAD\Drawings\Civil\  
DWG. NAME: 4876-01\_30.dwg

No.	Date	Revisions	App.

CAUTION:  
OVERHEAD POWER LINES.

CAUTION:  
EXISTING GAS PIPELINE LOCATIONS  
AND ELEVATIONS HAVE NOT BEEN VERIFIED.  
CONTRACTOR RESPONSIBLE FOR FIELD  
VERIFICATION OF UNDERGROUND PIPELINES.

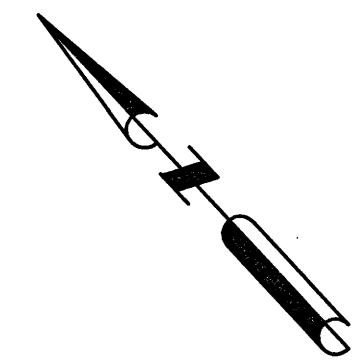
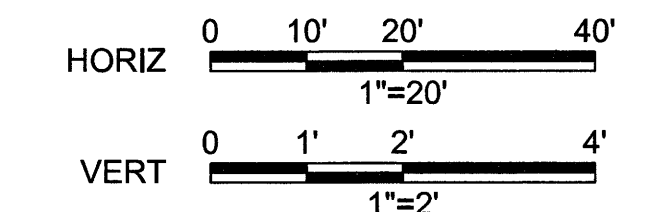
THE LOCATION OF THE BURIED CABLES WITHIN THE  
PROJECT LIMITS HAVE NOT BEEN VERIFIED. BEFORE  
COMMENCING WORK CALL 1-800-344-8377 A MINIMUM  
OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE  
UNDERGROUND LINES FIELD-LOCATED.

**BENCHMARK:**

FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCFCO  
BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF  
GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY  
0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE  
CYPRESS WATERSHED NEAR STREAM K100-00-00  
ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

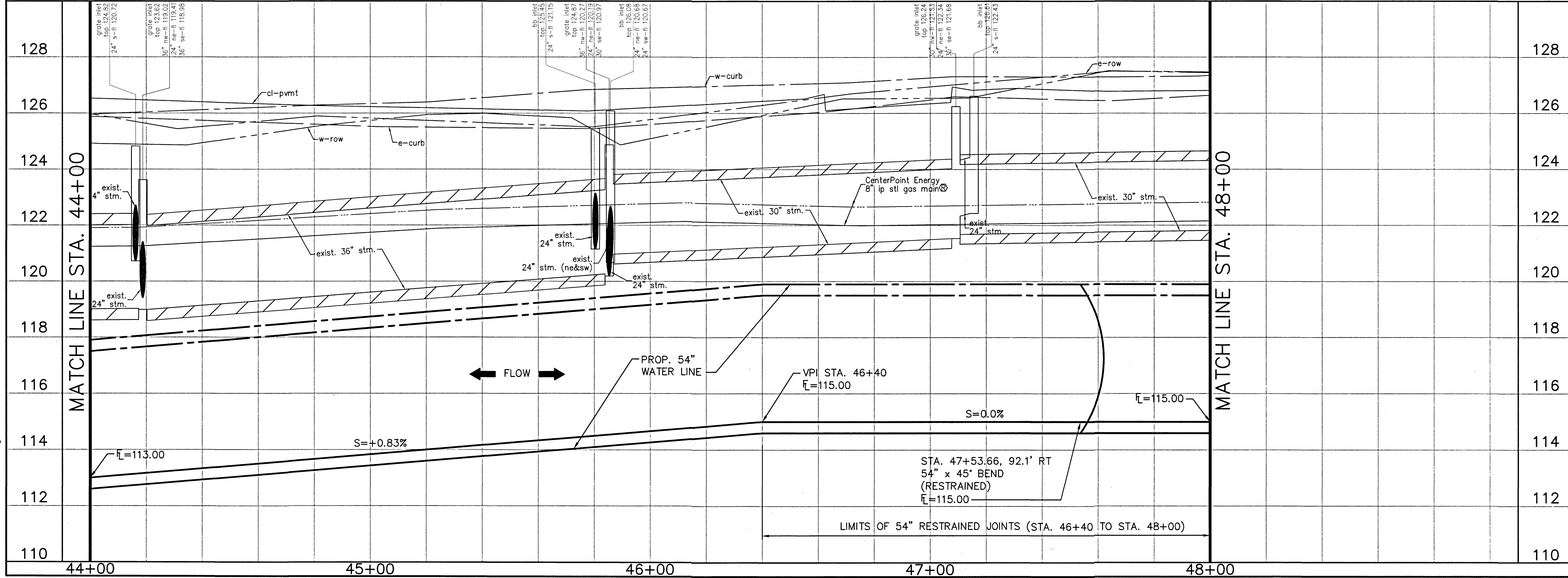
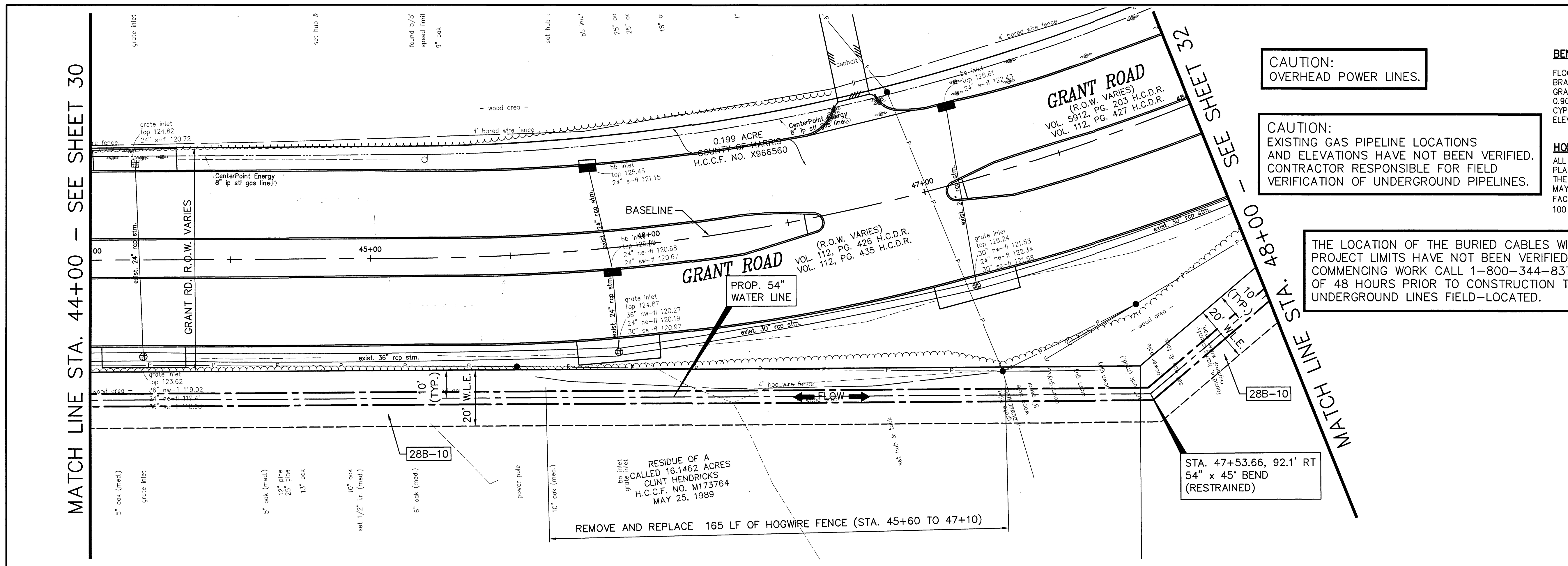
**HORIZONTAL DATUM:**

ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE  
PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83.  
THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND  
MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE  
FACTOR OF 0.999870017 (TxDOT factor).  
100 YR FL=125.00'



MATCH LINE STA. 44+00 - SEE SHEET 30

SEE SHEET 32  
MATCH LINE STA. 48+00



TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED CALL CENTERPOINT ENERGY AT 713-207-2222.  
NOTICE:  
FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

PRIVATE UTILITY LINES SHOWN

*Signature* Date: 1-23-20  
CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY

*Signature* Date: 1-23-20  
CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY. (THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN CNP NATURAL GAS LINES ORIGINALLY - NOT TO BE USED FOR CONSULT VERIFICATION) SIGNATURE VALID FOR SIX MONTHS.

*Signature* Date: 1-22-20  
Approved for AT&T Texas/SWBT underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR.



AECOM  
AECOM TECHNICAL SERVICES, INC.  
18219 KATY FREEWAY, SUITE 100  
HOUSTON, TEXAS 77054-1009  
281.646.2400  
WWW.AECOM.COM  
TSP# REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
GRANT ROAD BASELINE  
PLAN AND PROFILE  
STA. 44+00 TO 48+00

STATE OF TEXAS  
CARL D. MCCONNELL  
97585  
LICENSED PROFESSIONAL ENGINEER  
1/24/2020

DANNENBAUM  
ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

LAST MODIFIED: Jan 21, 2020 - 9:59am BY USER: yimvy  
DWG. LOCATION: G:\1110\4876-01 NHCRMA PROJECT 28-B\ACAD\Drawings\Civil\  
DWG. NAME: 4876-01\_31.dwg



No.	Date	Revisions	App.

**CAUTION:**  
EXISTING GAS PIPELINE LOCATIONS  
AND ELEVATIONS HAVE NOT BEEN VERIFIED.  
CONTRACTOR RESPONSIBLE FOR FIELD  
VERIFICATION OF UNDERGROUND PIPELINES.

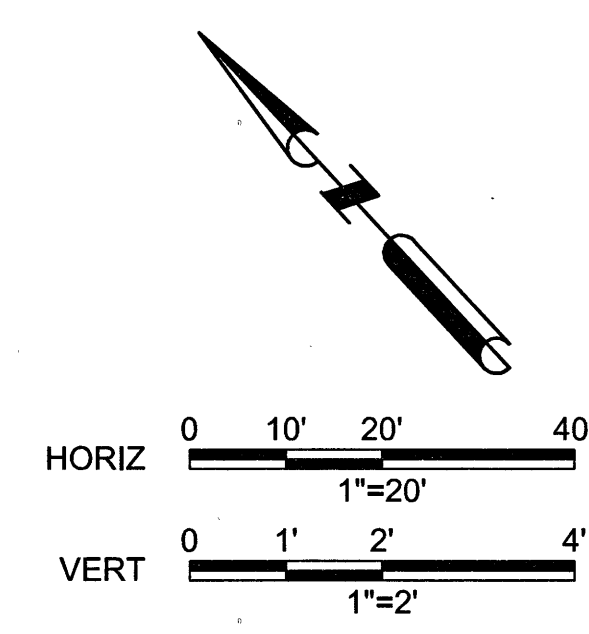
THE LOCATION OF THE BURIED CABLES WITHIN THE  
PROJECT LIMITS HAVE NOT BEEN VERIFIED. BEFORE  
COMMENCING WORK CALL 1-800-344-8377 A MINIMUM  
OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE  
UNDERGROUND LINES FIELD-LOCATED.

CALLED 0.0024 ACRES  
COY L. BASKIN, SR.  
H.C.C.F. NO. RP-2016-316941  
JULY 20, 2016

**BENCHMARK:**  
FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCFCD  
BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF  
GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY  
0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE  
CYPRESS WATERSHED NEAR STREAM K100-00-00  
ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**  
ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE  
PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83.  
THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND  
MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE  
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100 YR FL=125.00'

**CAUTION:**  
OVERHEAD POWER LINES.



TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED CALL CENTERPOINT  
ENERGY AT 713-207-2222.  
**NOTICE:**  
FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE  
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FULFILL YOUR OBLIGATION TO CALL 811.

PRIVATE UTILITY LINES SHOWN

*Arif* Date: 1-22-20  
CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES  
VERIFICATION ONLY

*Arif* Date: 1-22-20  
CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY.  
(THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN CNP NATURAL GAS LINES CORRECTLY -  
NOT TO BE USED FOR CONTACT VERIFICATION)

*Arif* Date: 1-22-20  
Approved for AT&T Texas/SWBT underground conduit facilities only.  
SIGNATURE VALID FOR ONE YEAR

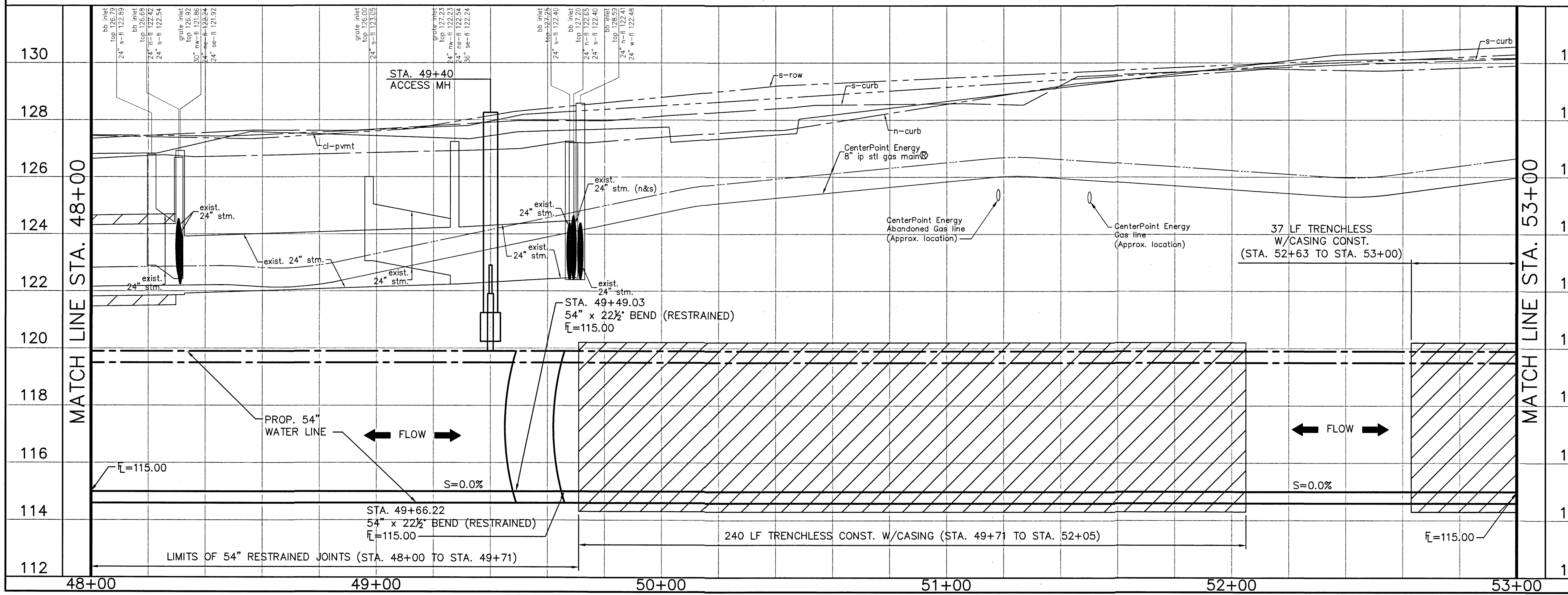
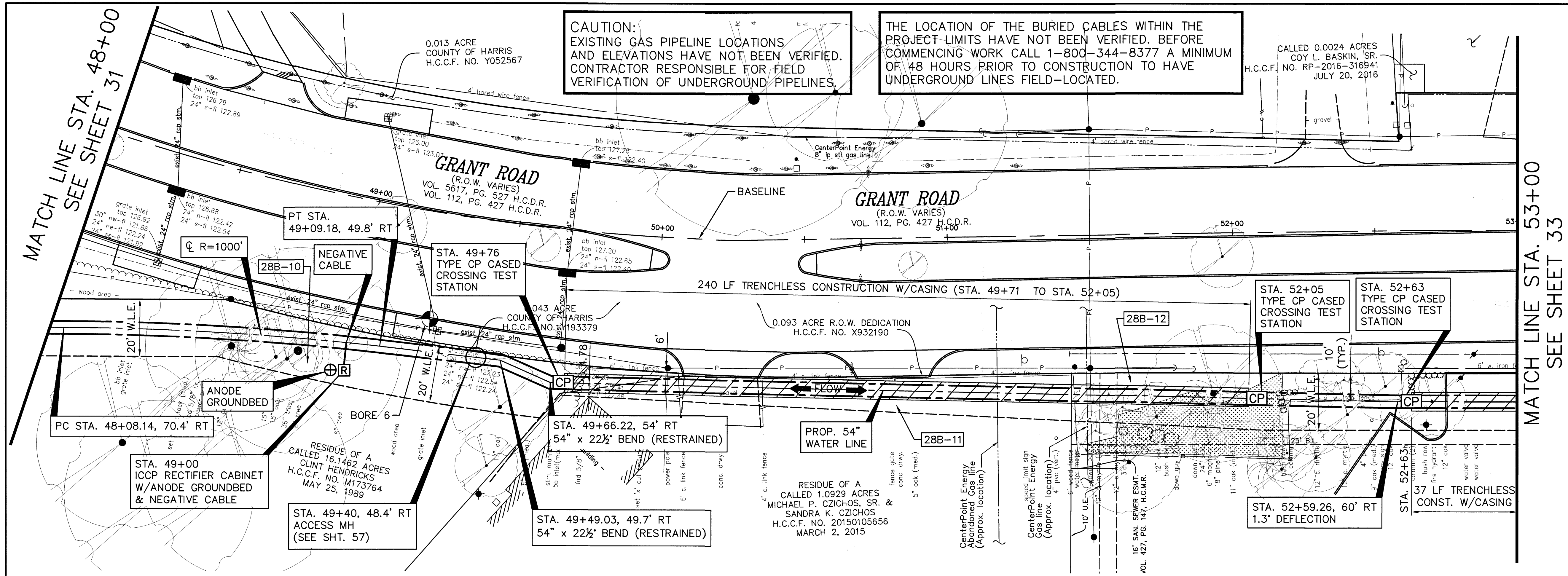


AECOM  
AECOM TECHNICAL SERVICES, INC.  
15219 KATY FREEWAY, SUITE 100  
HOUSTON, TEXAS 77054-1009  
281.648.2400  
WWW.AECOM.COM  
TBP REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT  
ROAD AND COPELAND ROAD  
**GRANT ROAD BASELINE  
PLAN AND PROFILE  
STA. 48+00 TO 53+00**

STATE OF TEXAS  
CARL D. MCCONNELL  
97585  
LICENSED PROFESSIONAL ENGINEER  
*Carl D. McConnell*  
1/22/2020

DANNENBAUM  
ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 920-9570



LAST MODIFIED: Jan 21, 2020 - 10:00am BY USER: yimyy  
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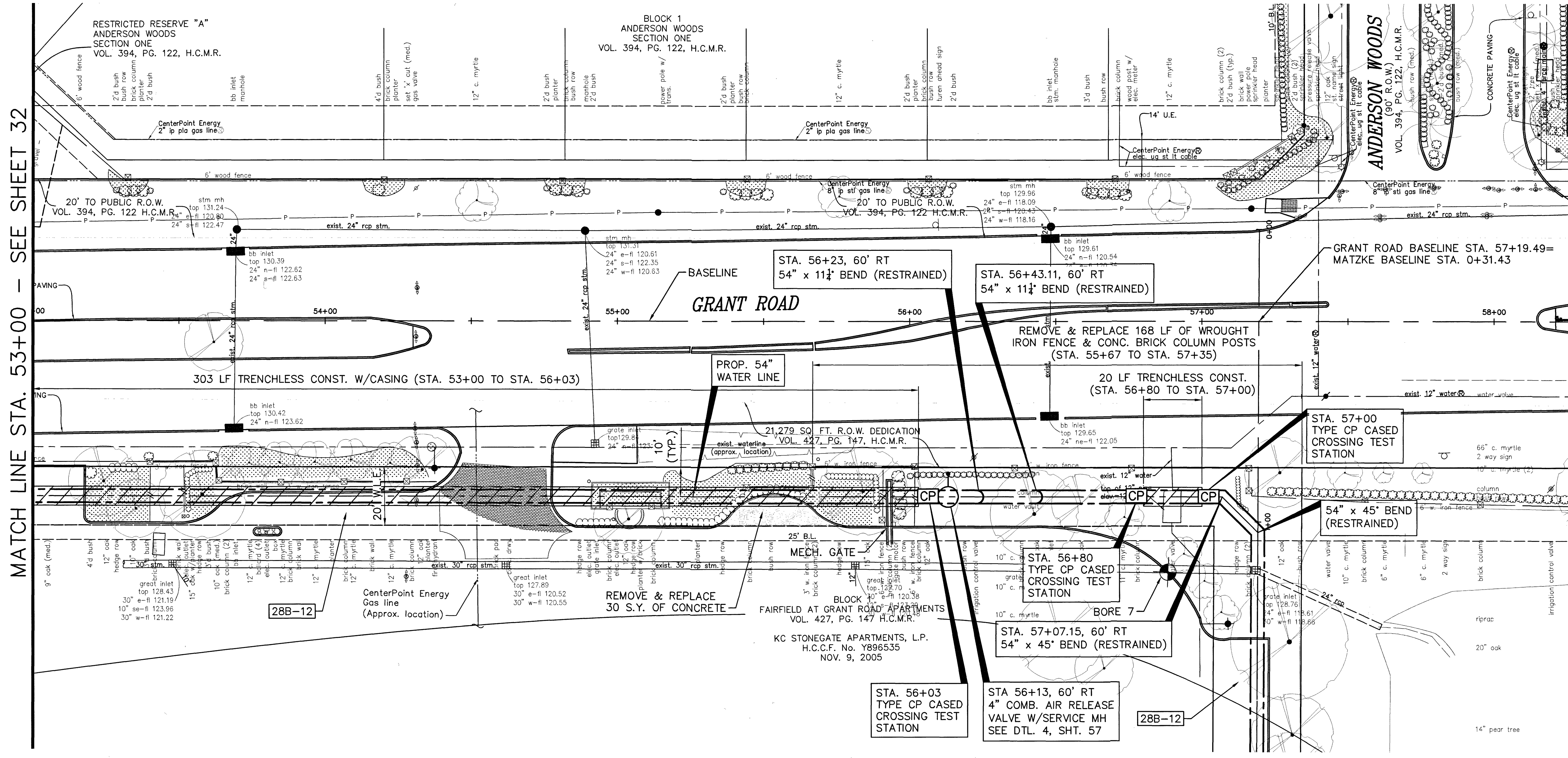
No.	Date	Revisions	App.

**BENCHMARK:**

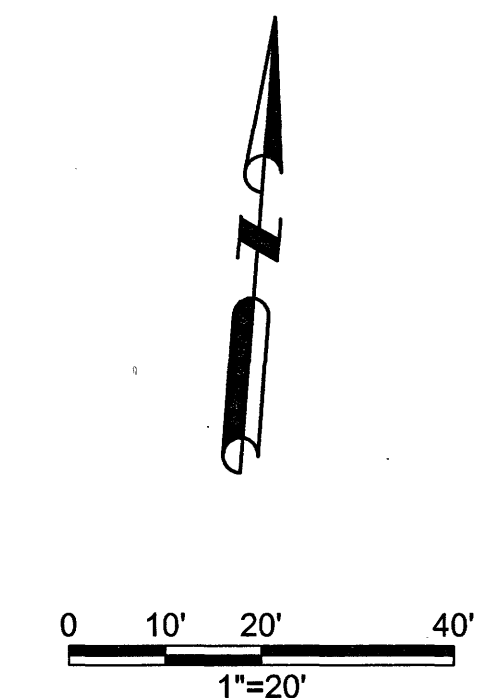
FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCFCD BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY 0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE CYPRESS WATERSHED NEAR STREAM K100-00-00 ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**

ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83. THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE FACTOR OF 0.999870017 (TXDOT factor).  
100 YR FL=125.00'



MATCH LINE STA. 53+00 - SEE SHEET 32



**CAUTION:**  
EXISTING GAS PIPELINE LOCATIONS AND ELEVATIONS HAVE NOT BEEN VERIFIED. CONTRACTOR RESPONSIBLE FOR FIELD VERIFICATION OF UNDERGROUND PIPELINES.

THE LOCATION OF THE BURIED CABLES WITHIN THE PROJECT LIMITS HAVE NOT BEEN VERIFIED. BEFORE COMMENCING WORK CALL 1-800-344-8377 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD-LOCATED.

**CAUTION:**  
OVERHEAD POWER LINES.

FOR CONTINUATION  
SEE SHEET 35

TO AVOID FOR LINES TO BE TURNED OFF OR MOVED CALL CENTERPOINT ENERGY AT 713-207-2222  
**NOTICE:**  
FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DO SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

PRIVATE UTILITY LINES SHOWN  
Date: 1-23-20  
CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY  
Date: 1-23-20  
CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY.  
Approved for AT&T Texas/SWBT underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR



**AECOM**  
AECOM TECHNICAL SERVICES, INC.  
19219 KATY FREEWAY, SUITE 100  
HOUSTON, TEXAS 77094-1009  
281.646.2400  
WWW.AECOM.COM  
TBP REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**GRANT ROAD BASELINE PLAN**  
STA. 53+00 TO 58+00

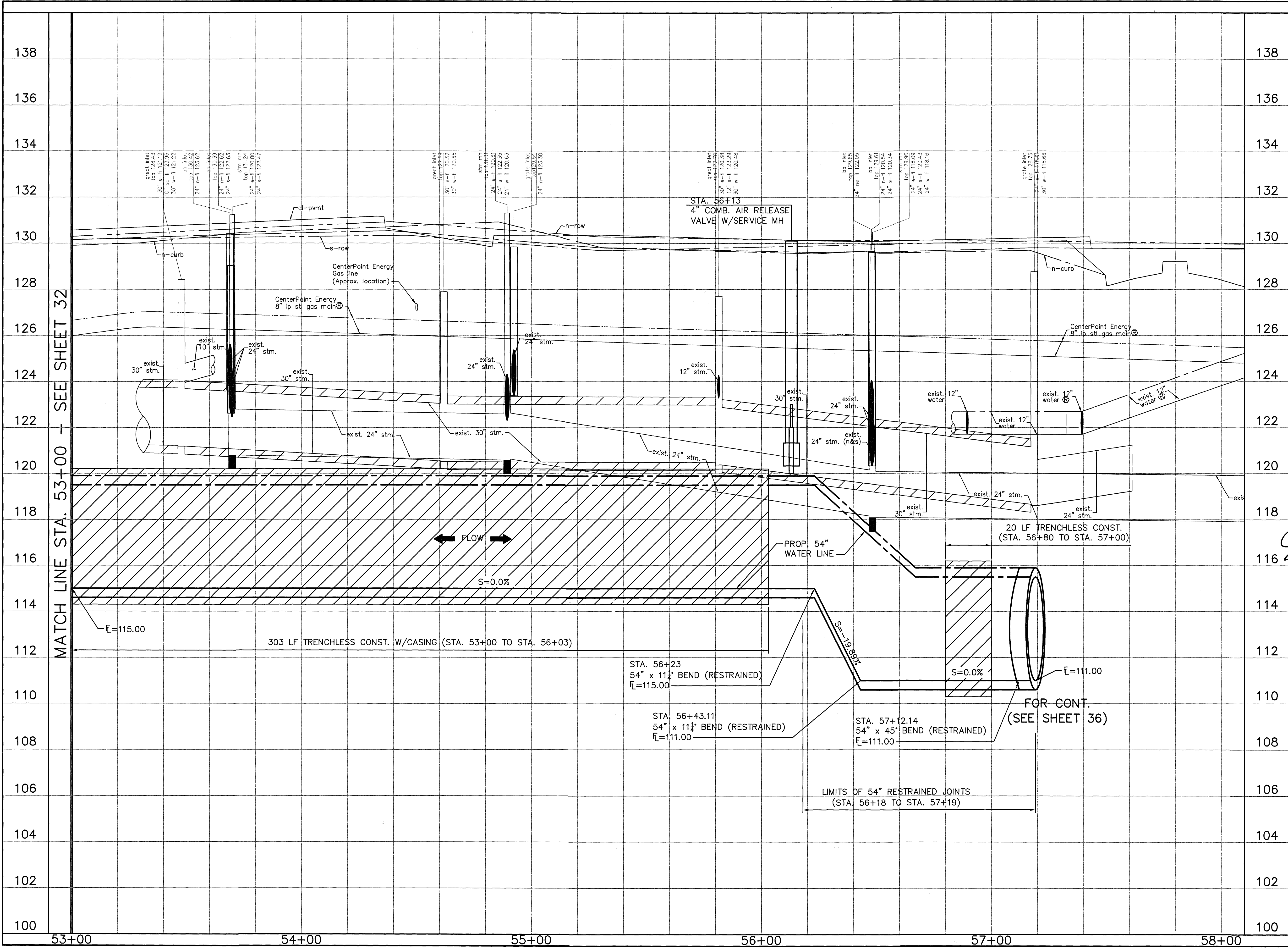
STATE OF TEXAS  
CARL D. MCCONNELL  
97585  
LICENSED PROFESSIONAL ENGINEER  
Date: 1/23/20

DRAWN BY: CHECKED BY:  
**DANNENBAUM**  
ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

LAST MODIFIED: Jan 21, 2020 - 10:01am BY USER: yimvy  
DWG. LOCATION: C:\1110\4876-01 NHCRWA PROJECT 28-B\ACAD\Drawings\Civil\  
DWG. NAME: 4876-01\_33.dwg



LAST MODIFIED: Jan 21, 2020 - 10:01am BY USER: yimyy  
 DWG. LOCATION: G:\1110\4876-01 NHCRWA PROJECT 28-B\ACAD\Drawings\Civil\  
 DWS. NAME: 4876-01\_34.dwg



MATCH LINE STA. 53+00 - SEE SHEET 32

No.	Date	Revisions	App.

HORIZ 0 10' 20' 40'  
1"=20'

VERT 0 1' 2' 4'  
1"=2'

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

**NOTICE:**  
 FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

PRIVATE UTILITY LINES SHOWN

*[Signature]* Date: 1-23-20  
 CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY

*[Signature]* Date: 1-23-20  
 CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY. (THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN OUR NATURAL GAS LINES CORRECTLY - NOT TO BE USED FOR CONFLICT VERIFICATION.) (GAS SERVICE LINES ARE NOT SHOWN) SIGNATURE VALID FOR SIX MONTHS.

*[Signature]* Date: 1-22-20  
 Approved for AT&T Texas/SWB/T underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR.

**North Harris County REGIONAL WATER Authority**

**AECOM**

AECOM TECHNICAL SERVICES, INC.  
 15219 KATY FREEWAY, SUITE 100  
 HOUSTON, TEXAS 77084-1009  
 281.846.2400  
 WWW.AECOM.COM  
 TBPE REG. NO. F-3580

**NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
 GRANT ROAD BASELINE PROFILE  
 STA. 53+00 TO 58+00**

*Carl D. McConinnell*  
 1/22/2020

DRAWN BY:

CHECKED BY:

**DANNENBAUM**

ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

SHEET No. 34 OF 99



No.	Date	Revisions	App.

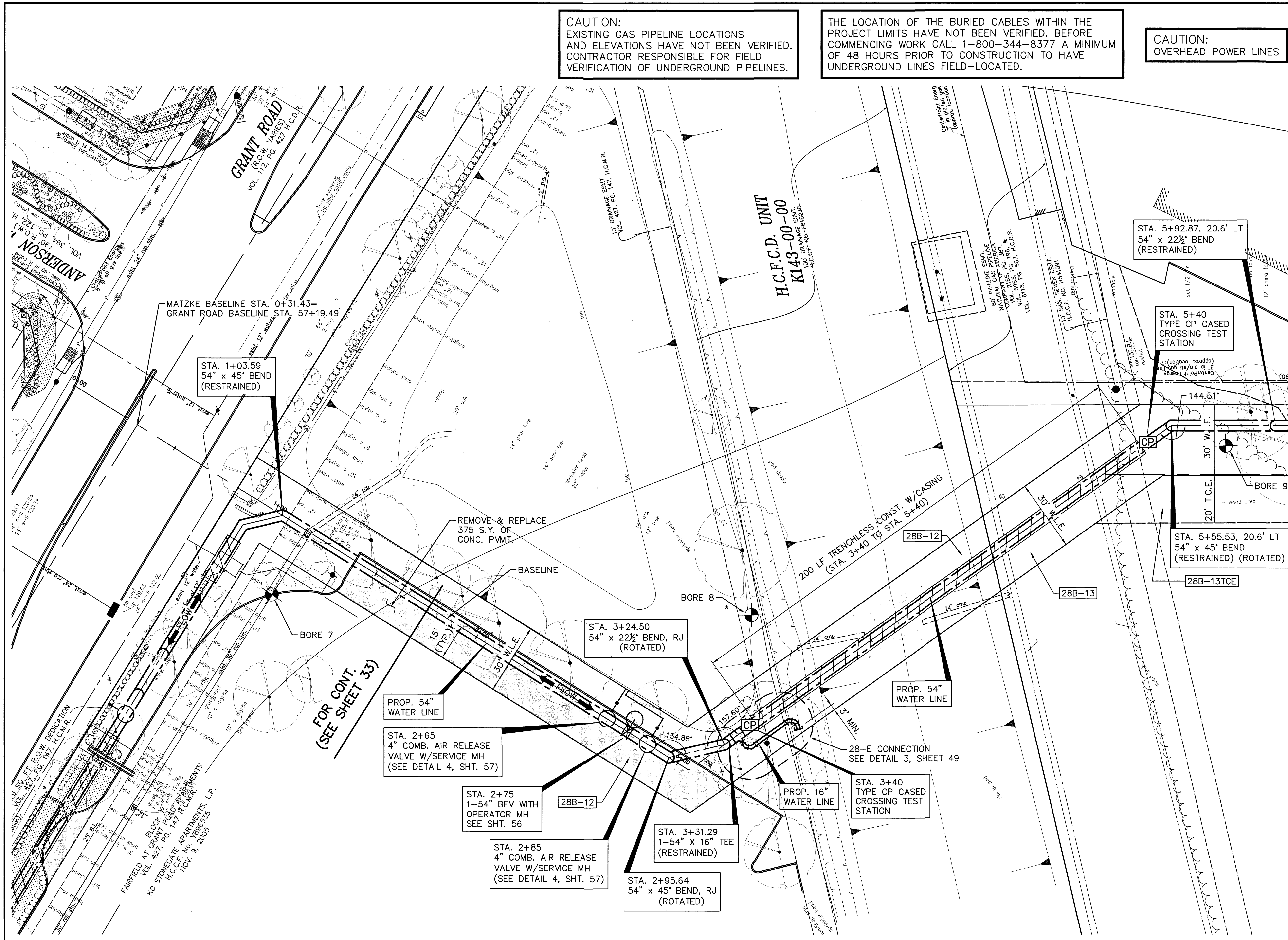
**CAUTION:**  
EXISTING GAS PIPELINE LOCATIONS  
AND ELEVATIONS HAVE NOT BEEN VERIFIED.  
CONTRACTOR RESPONSIBLE FOR FIELD  
VERIFICATION OF UNDERGROUND PIPELINES.

THE LOCATION OF THE BURIED CABLES WITHIN THE  
PROJECT LIMITS HAVE NOT BEEN VERIFIED. BEFORE  
COMMENCING WORK CALL 1-800-344-8377 A MINIMUM  
OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE  
UNDERGROUND LINES FIELD-LOCATED.

**CAUTION:**  
OVERHEAD POWER LINES

**BENCHMARK:**  
FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCFCD  
BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF  
GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY  
0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE  
CYPRESS WATERSHED NEAR STREAM K100-00-00  
ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**  
ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE  
PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83.  
THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND  
MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE  
FACTOR OF 0.999870017 (TxDOT factor).  
100 YR FL=125.00'



MATCH LINE STA. 6+00 - SEE SHEET 37

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

**NOTICE:**  
FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

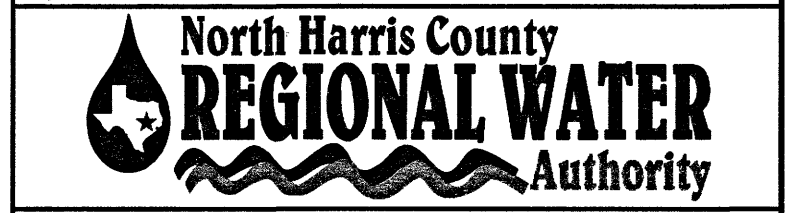
PRIVATE UTILITY LINES SHOWN

*alch*  
DATE: 1-23-20  
CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY

*alch*  
DATE: 1-23-20  
CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY. (THE SIGNATURE VERIFIES EXISTING UNDERGROUND FACILITIES - NOT TO BE USED FOR CONDUIT VERIFICATION) SIGNATURE VALID FOR SIX MONTHS.

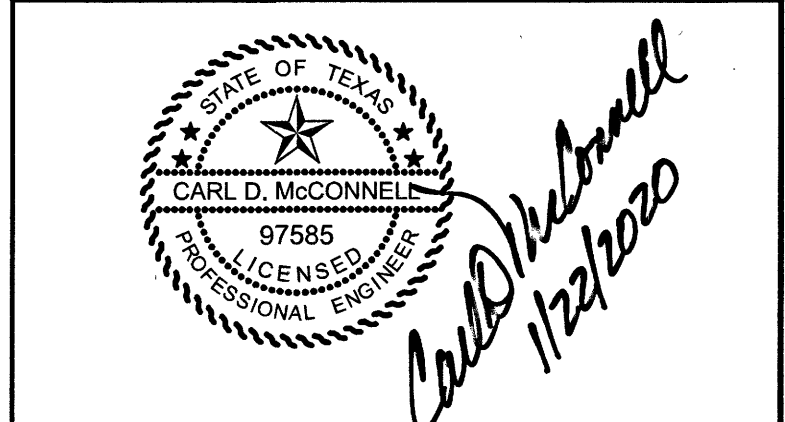
*alch*  
DATE: 1-22-20  
CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY. (THE SIGNATURE VERIFIES THAT YOU HAVE SHOWN CNP NATURAL GAS LINES CORRECTLY - NOT TO BE USED FOR CONDUIT VERIFICATION) (GAS SERVICE LINES NOT SHOWN) SIGNATURE VALID FOR SIX MONTHS.

Approved for AT&T Texas/SWOT underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR.



**AECOM**  
AECOM TECHNICAL SERVICES, INC.  
19219 KATY FREEWAY, SUITE 100  
HOUSTON, TEXAS 77054-1009  
281.646.2400  
WWW.AECOM.COM  
TYPE REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**MATZKE PARK BASELINE PLAN**  
STA. 1+00 TO 6+00



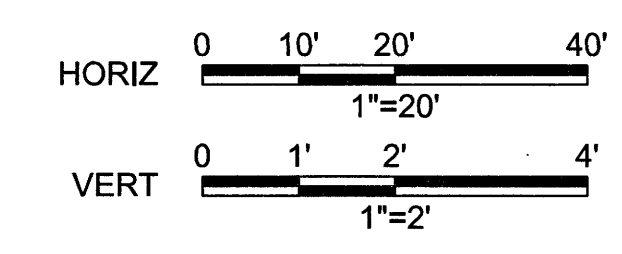
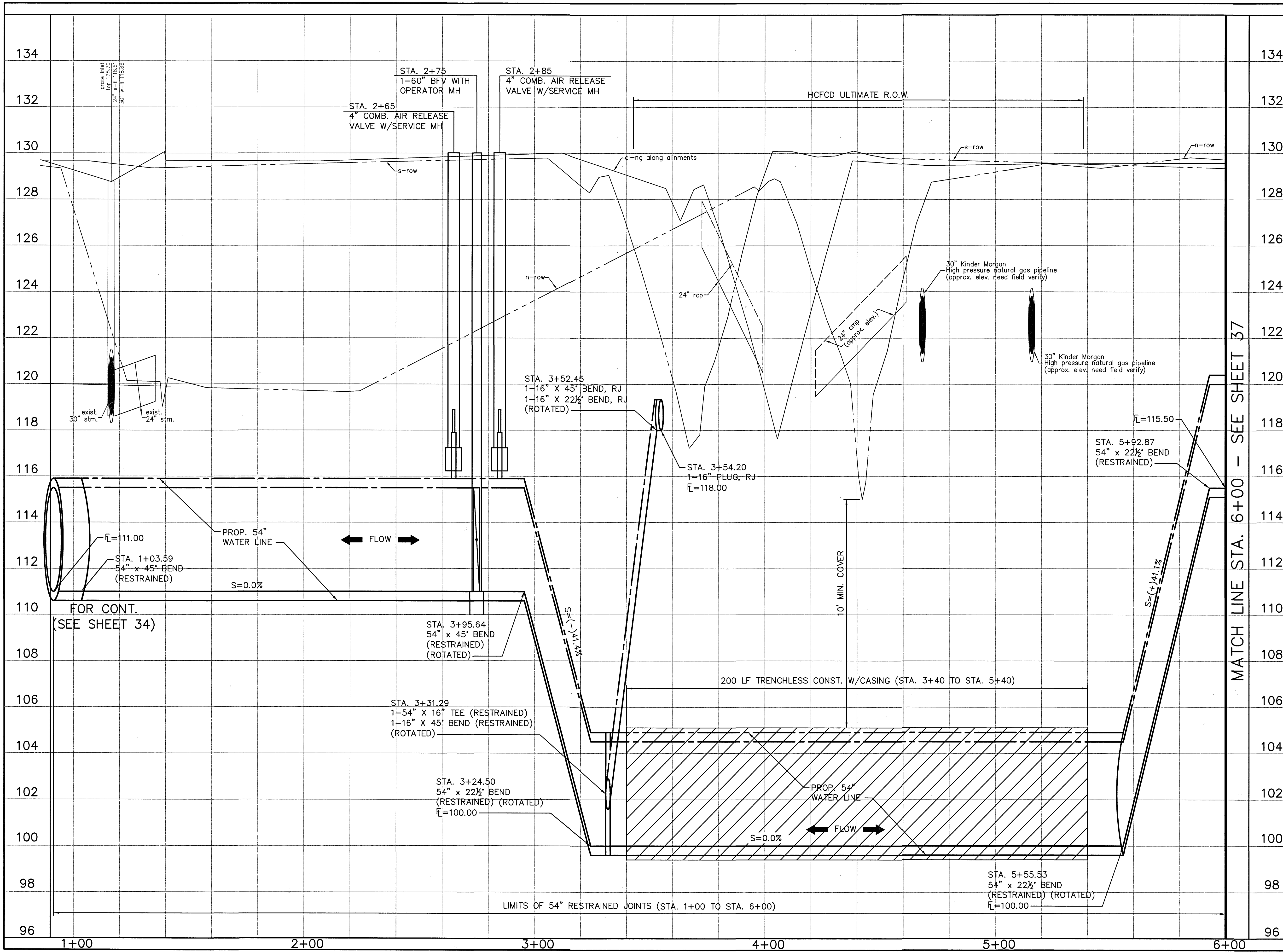
DRAWN BY: CHECKED BY:

**DANNENBAUM**  
ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

LAST MODIFIED: Jan 21, 2020 - 10:01am BY USER: jimmy  
DWC. LOCATION: G:\1110\4876-01 NHCRA PROJECT 28-B\ACAD\Drawings\Civil  
DWC. NAME: 4876-01\_35.dwg



No.	Date	Revisions	App.



TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED CALL CENTERPOINT ENERGY AT 713-207-2222.  
 NOTICE:  
 FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

PRIVATE UTILITY LINES SHOWN

*al.e* Date: 1-23-20  
 CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY

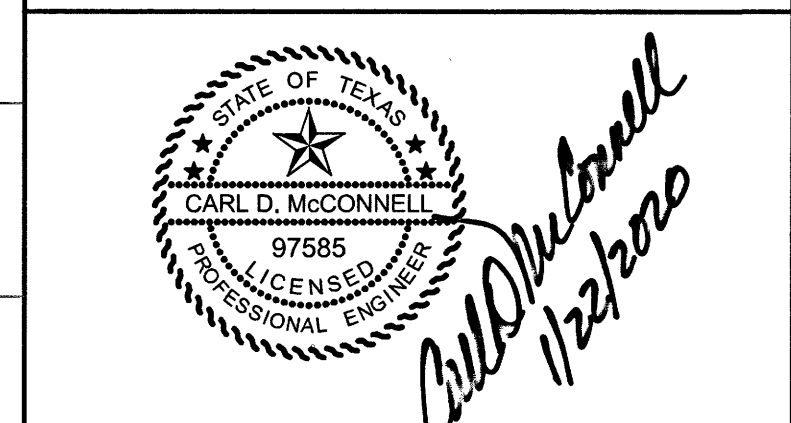
*al.e* Date: 1-23-20  
 CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY. (THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN CNP NATURAL GAS LINES CORRECTLY - NOT TO BE USED FOR CONTACT VERIFICATION)

*al.e* Date: 1-23-20  
 Approved for AT&T Texas/SWBT underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR



**AECOM**  
 AECOM TECHNICAL SERVICES, INC.  
 15219 KATY FREEWAY, SUITE 100  
 HOUSTON, TEXAS 77054-1009  
 WWW.AECOM.COM  
 TSP REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**MATZKE PARK BASELINE PROFILE**  
 STA. 1+00 TO 6+00



DRAWN BY: CHECKED BY:

**DANNENBAUM**  
 ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA, HOUSTON, TEXAS 77098 (713) 620-9570

LAST MODIFIED: Jan 21, 2020 - 10:02am BY USER: jimmy  
 DWG. LOCATION: G:\1110\4876-01 NHCRWA PROJECT 28-B\ACAD\Drawings\Civil\  
 DWG. NAME: 4876-01\_36.dwg

No.	Date	Revisions	App.

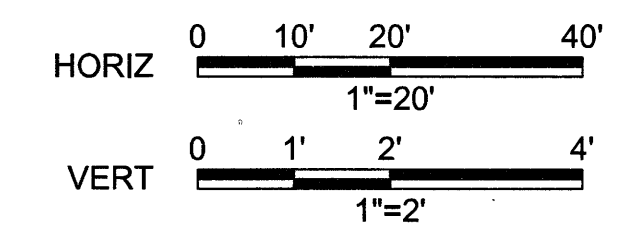
**BENCHMARK:**  
 FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCFCD BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY 0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE CYPRESS WATERSHED NEAR STREAM K100-00-00 ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**  
 ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83. THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE FACTOR OF 0.999870017 (1xDOT factor).  
 100 YR FL=125.00'

**CAUTION:**  
 OVERHEAD POWER LINES

THE LOCATION OF THE BURIED CABLES WITHIN THE PROJECT LIMITS HAVE NOT BEEN VERIFIED. BEFORE COMMENCING WORK CALL 1-800-344-8377 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD-LOCATED.

**CAUTION:**  
 EXISTING GAS PIPELINE LOCATIONS AND ELEVATIONS HAVE NOT BEEN VERIFIED. CONTRACTOR RESPONSIBLE FOR FIELD VERIFICATION OF UNDERGROUND PIPELINES.



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

**NOTICE:**  
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PRIVATE UTILITY LINES SHOWN

*al* Date: 1-23-20  
 CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY

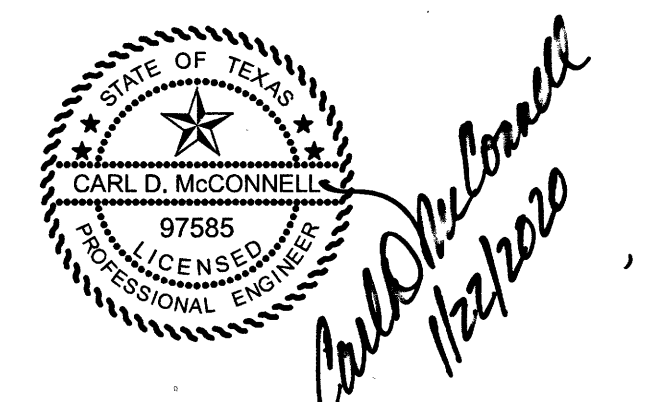
*al* Date: 1-23-20  
 CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY. THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN CNP NATURAL GAS LINES CORRECTLY - NOT TO BE USED FOR CONTACT VERIFICATION. (GAS SERVICE LINES ARE NOT SHOWN) SIGNATURE VALID FOR SIX MONTHS.

*al* Date: 1-22-20  
 Approved for AT&T Texas/SWBT underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR



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 19219 KATY FREEWAY, SUITE 100  
 HOUSTON, TEXAS 77054-1009  
 281.646.2400  
 WWW.AECOM.COM  
 TPE REG. NO. F-3580

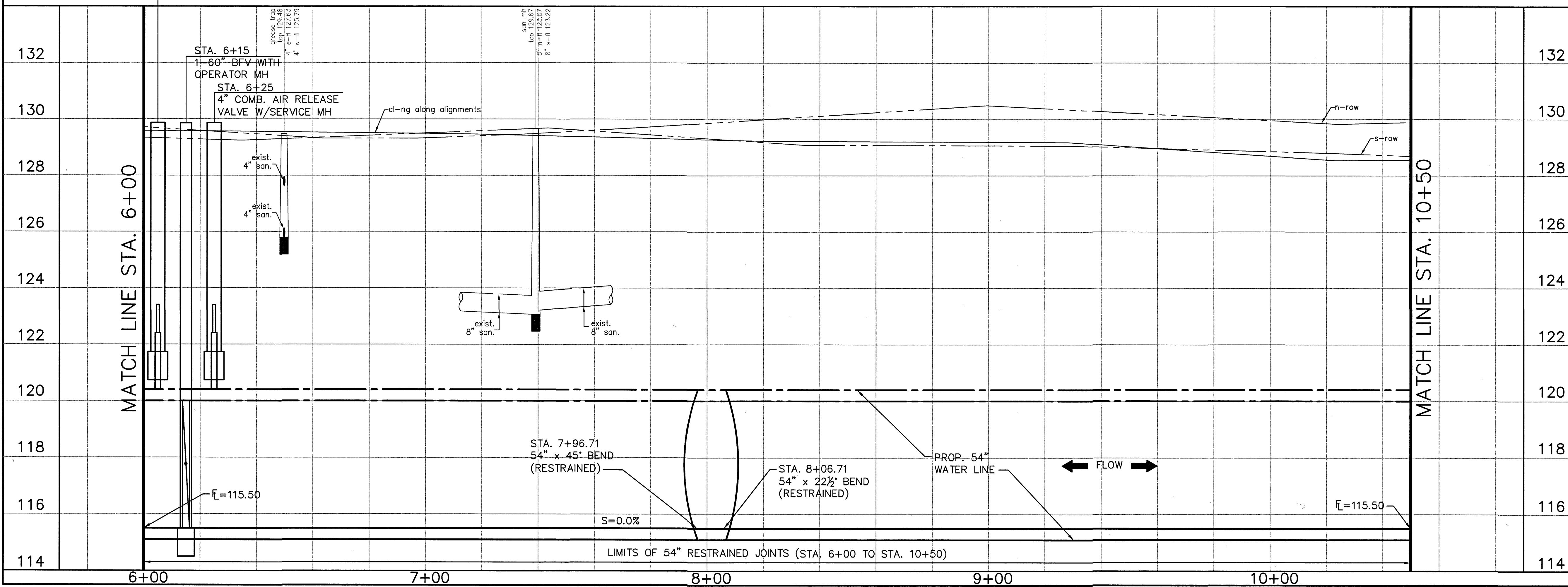
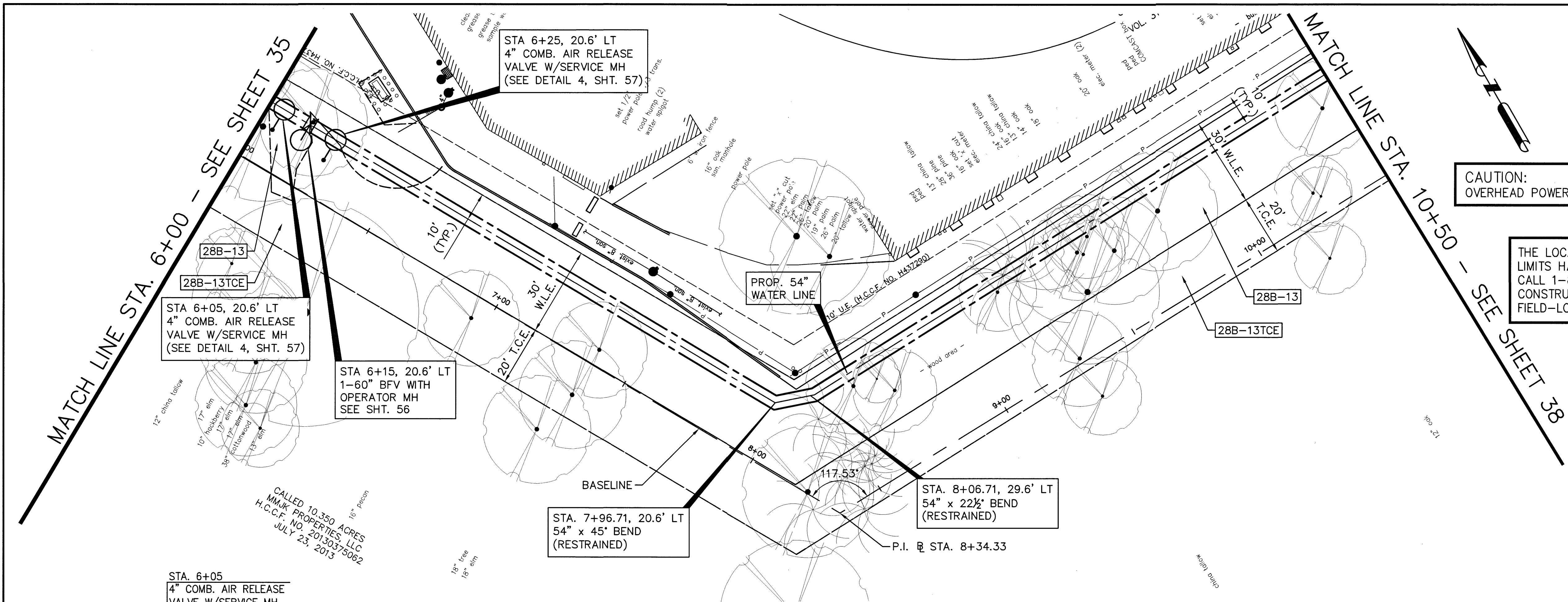
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**MATZKE PARK BASELINE  
 PLAN AND PROFILE  
 STA. 6+00 TO 10+50**



DRAWN BY: CHECKED BY:

**DANNENBAUM**  
 ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

SHEET No. 37 OF 99



LAST MODIFIED: Jan 21, 2020, - 10:03am BY USER: jimmy  
 DWG. LOCATION: C:\1110\4876-01 NHCRWA PROJECT 28-B\ACAD\Drawings\Civil\  
 DWS. NAME: 4876-01\_37.dwg

CALL 10,350 ACRES  
 MMK PROPERTIES, LLC  
 H.C.C.F. NO. 20130375062  
 JULY 23, 2013



No.	Date	Revisions	App.

**BENCHMARK:**  
 FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCFCD BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY 0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE CYPRESS WATERSHED NEAR STREAM K100-00-00 ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**  
 ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83. THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE FACTOR OF 0.999870017 (TxDOT factor).  
 100 YR FL=125.00'

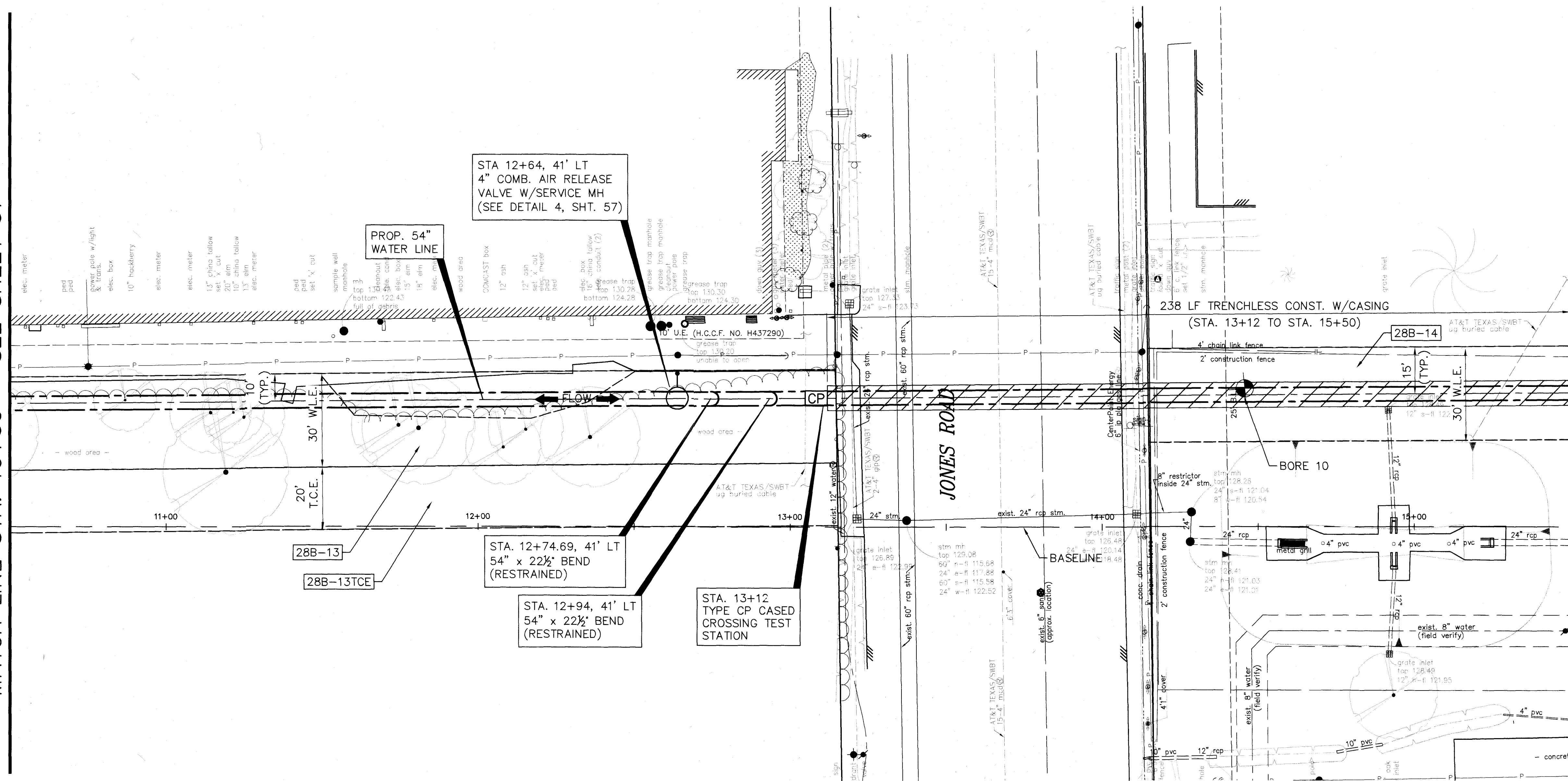
**CAUTION:**  
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THE LOCATION OF THE BURIED CABLES WITHIN THE PROJECT LIMITS HAVE NOT BEEN VERIFIED. BEFORE COMMENCING WORK CALL 1-800-344-8377 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD-LOCATED.

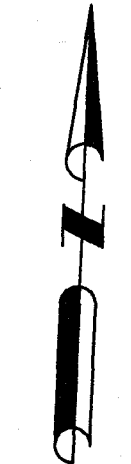
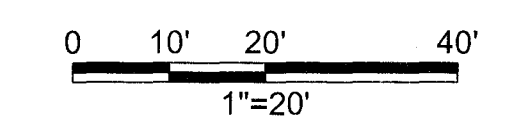
**CAUTION:**  
 OVERHEAD POWER LINES

MATCH LINE STA. 10+50 - SEE SHEET 37

MATCH LINE STA. 15+50 - SEE SHEET 40



SEE CONSTRUCTION NOTES ON SHEET 4 FOR CONSTRUCTION REQUIREMENTS ON CYPRESS-FAIRBANKS ISD PROPERTY.



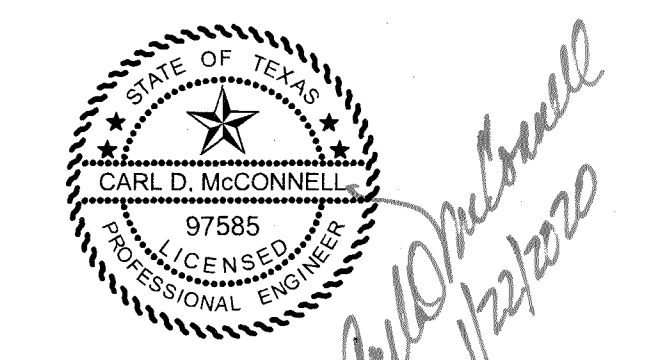
TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED CALL CENTERPOINT ENERGY AT 713-207-2222.  
**NOTICE:**  
 FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

**PRIVATE UTILITY LINES SHOWN**  
 CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY  
 (THE SIGNATURE VERIFIES EXISTING UNDERGROUND FACILITIES - NOT TO BE USED FOR CONFLICT VERIFICATION) SIGNATURE VALID FOR SIX MONTHS.  
 CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY.  
 (THE SIGNATURE VERIFIES THAT YOU HAVE SHOWN ONP NATURAL GAS LINES CORRECTLY - NOT TO BE USED FOR CONFLICT VERIFICATION) SIGNATURE VALID FOR SIX MONTHS.  
 Approved for AT&T Texas/SWBT underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR.



**AECOM**  
 AECOM TECHNICAL SERVICES, INC.  
 19219 KATY FREEWAY, SUITE 100  
 HOUSTON, TEXAS 77094-1009  
 281.646.2400  
 WWW.AECOM.COM  
 TBP# REG. NO. F-3580

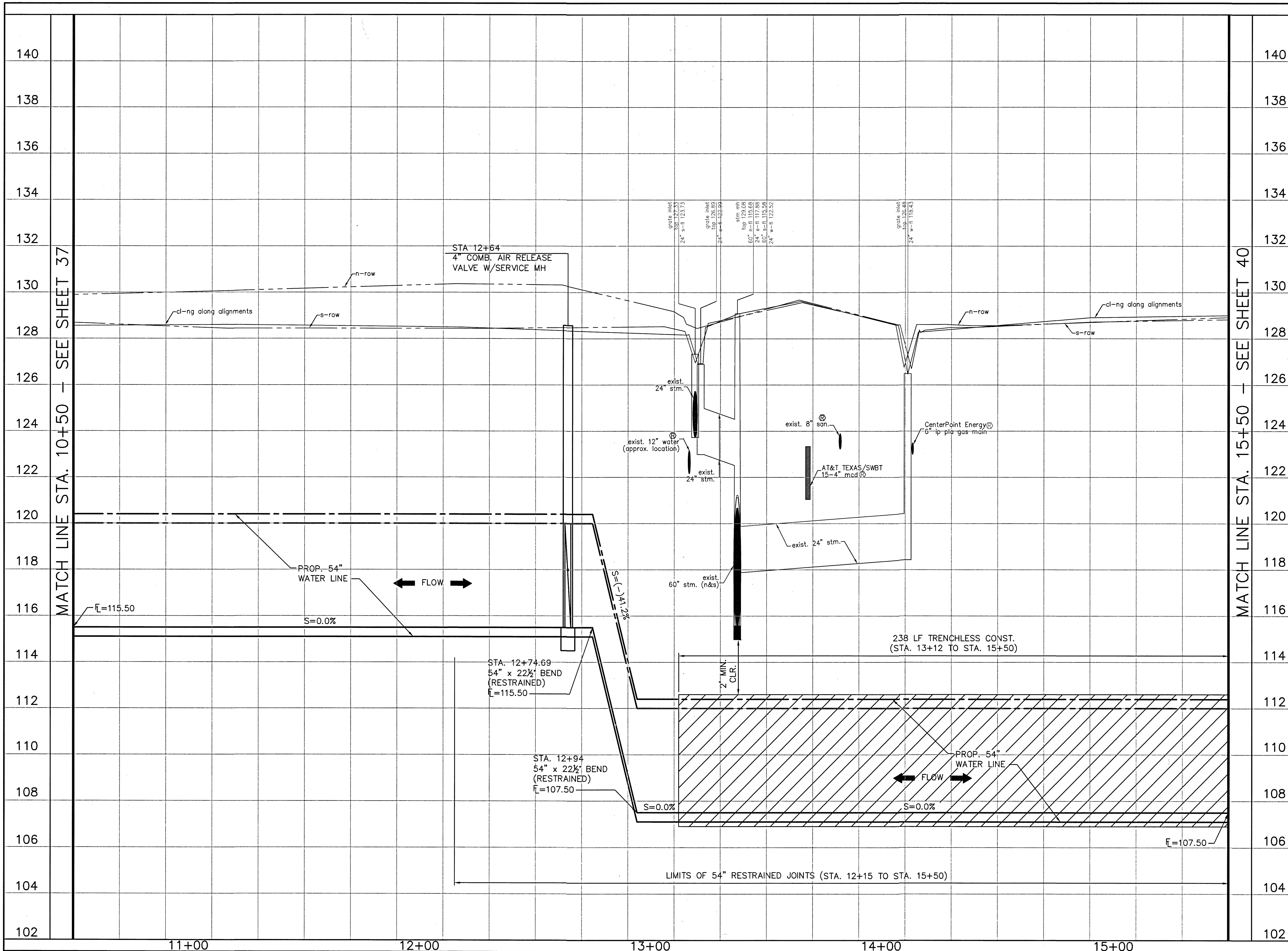
**NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY**  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**MATZKE PARK BASELINE PLAN**  
 STA. 10+50 TO 15+50



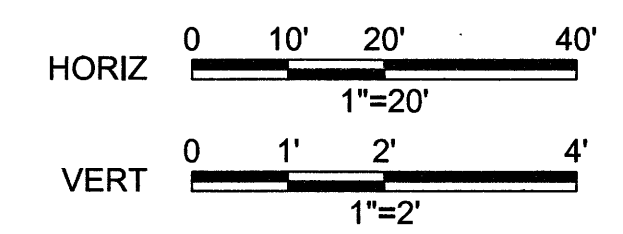
DRAWN BY: CHECKED BY:

**DANNENBAUM**  
 ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

LAST MODIFIED: Jan 21, 2020 - 11:17am BY USER: yimvy  
 DWG. LOCATION: G:\1110\4876-01 NHCRWA PROJECT 28-B\ACAD\Drawings\Civil\  
 DWG. NAME: 4876-01\_39.dwg

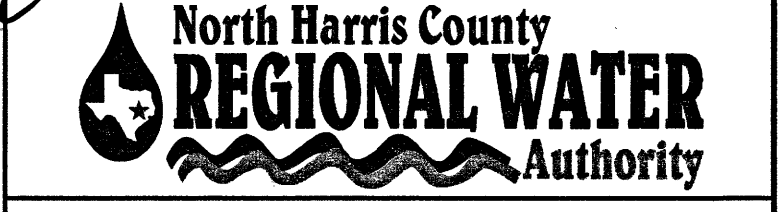


No.	Date	Revisions	App.



TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED CALL CENTERPOINT ENERGY AT 713-207-2222.  
 NOTICE:  
 FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.  
 PRIVATE UTILITY LINES SHOWN

*alch* Date: 1-23-20  
 CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY  
 (THE SIGNATURE VERIFIES EXISTING UNDERGROUND FACILITIES - NOT TO BE USED FOR CONFLICT VERIFICATION) SIGNATURE VALID FOR SIX MONTHS.  
*alch* Date: 1-23-20  
 CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY.  
 (THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN CNP NATURAL GAS LINES - NOT TO BE USED FOR CONFLICT VERIFICATION) SIGNATURE VALID FOR SIX MONTHS.  
*alch* Date: 1-22-20  
 APPROVED FOR AT&T TEXAS/SWBUT UNDERGROUND CONDUIT FACILITIES ONLY. SIGNATURE VALID FOR ONE YEAR.



**AECOM**  
 AECOM TECHNICAL SERVICES, INC.  
 18219 KATY FREEWAY, SUITE 100  
 HOUSTON, TEXAS 77054-1000  
 WWW.AECOM.COM  
 TBP# REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**MATZKE PARK BASELINE PROFILE**  
 STA. 10+50 TO 15+50

STATE OF TEXAS  
 CARL D. MCCONNELLE  
 97585  
 LICENSED PROFESSIONAL ENGINEER  
*Carl D. McConnell*  
 1/22/2020

DRAWN BY: CHECKED BY:  
**DANNENBAUM**  
 ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570



LAST MODIFIED: Jan 21, 2020 - 11:19am BY USER: yimvy  
 DWG. LOCATION: G:\1110\4876-01 NHCRWA PROJECT 28-B\ACAD\Drawings\Civil\  
 DWG. NAME: 4876-01\_40.dwg

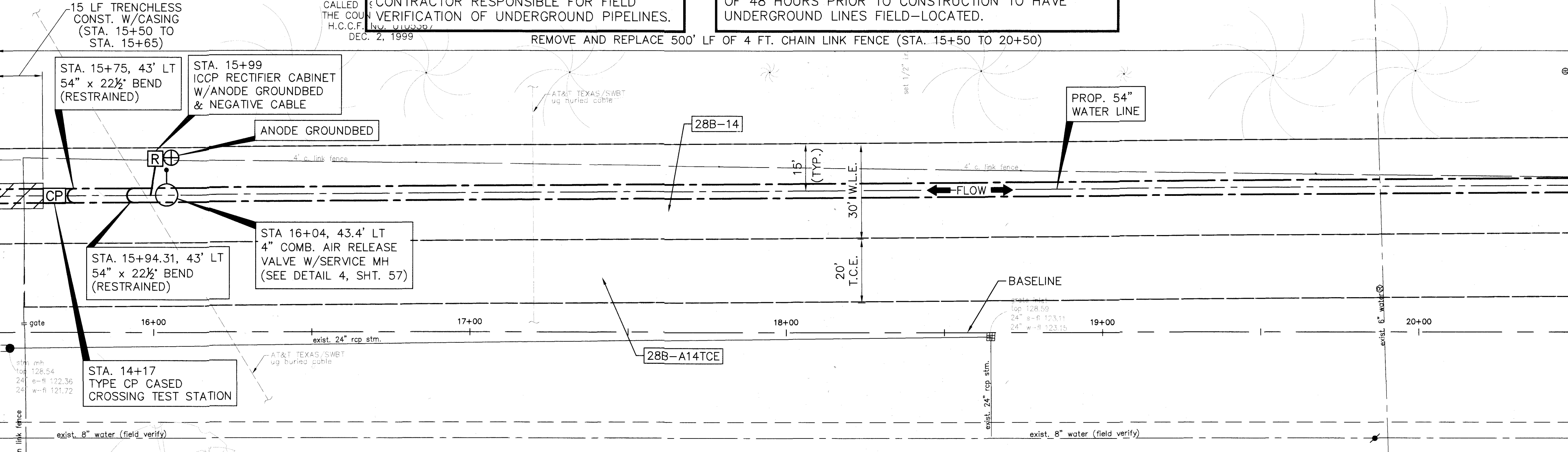
MATCH LINE STA. 15+50 - SEE SHEET 38

MATCH LINE STA. 20+50 - SEE SHEET 41

**CAUTION:**  
 EXISTING GAS PIPELINE LOCATIONS  
 AND ELEVATIONS HAVE NOT BEEN VERIFIED.  
 CONTRACTOR RESPONSIBLE FOR FIELD  
 VERIFICATION OF UNDERGROUND PIPELINES.

THE LOCATION OF THE BURIED CABLES WITHIN THE  
 PROJECT LIMITS HAVE NOT BEEN VERIFIED. BEFORE  
 COMMENCING WORK CALL 1-800-344-8377 A MINIMUM  
 OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE  
 UNDERGROUND LINES FIELD-LOCATED.

**CAUTION:**  
 OVERHEAD POWER LINES

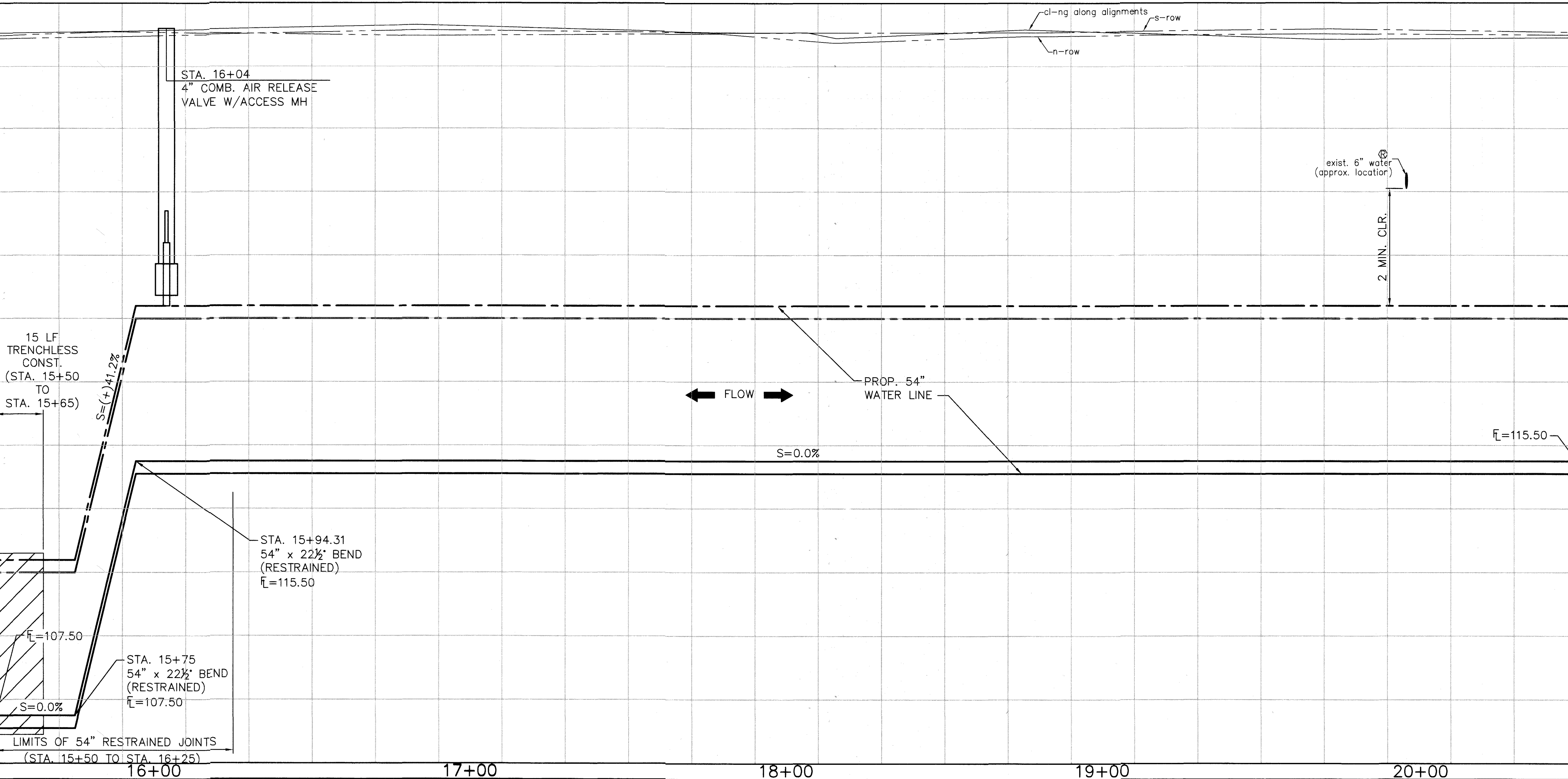
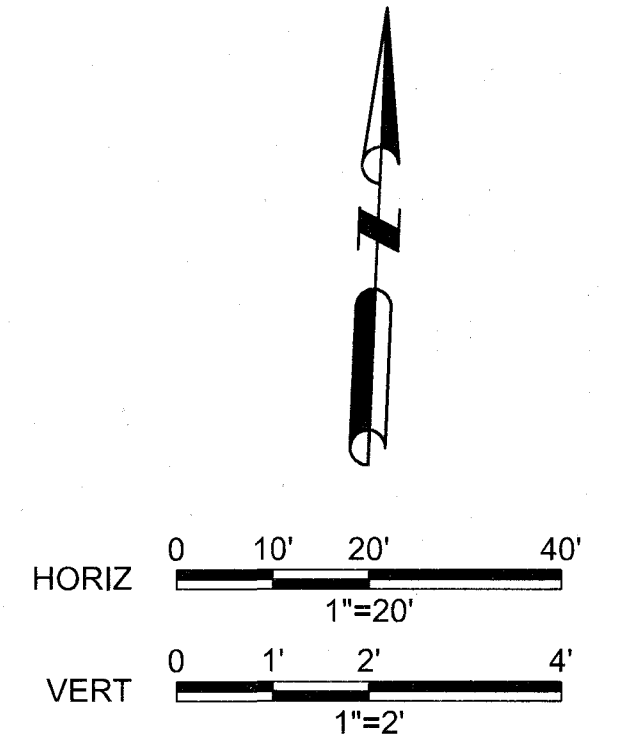


No.	Date	Revisions	App.

**BENCHMARK:**  
 FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCFCD BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY 0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE CYPRESS WATERSHED NEAR STREAM K100-00-00 ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**  
 ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83. THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE FACTOR OF 0.999870017 (TxDOT factor).  
 100 YR FL=125.00'

SEE CONSTRUCTION NOTES ON SHEET 4 FOR CONSTRUCTION REQUIREMENTS ON CYPRESS-FAIRBANKS ISD PROPERTY.



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

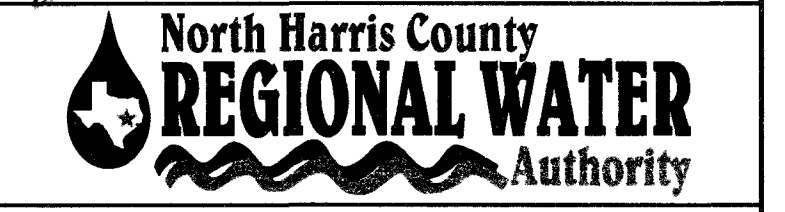
**NOTICE:**  
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**PRIVATE UTILITY LINES SHOWN**

*Alch* Date: 1-23-20  
 CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY

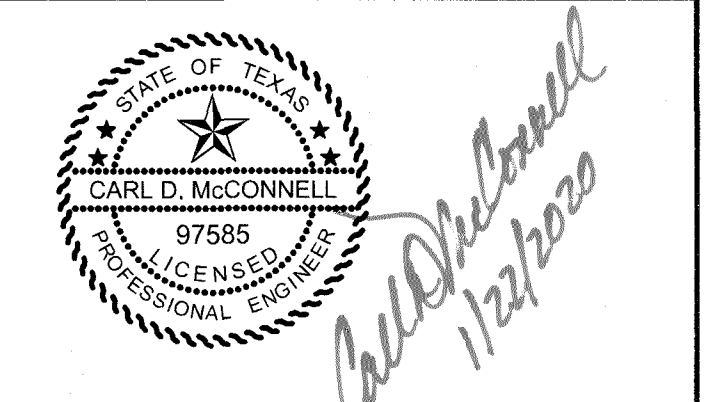
*Alch* Date: 1-23-20  
 CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY. (THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN CNP NATURAL GAS LINES CORRECTLY - NOT TO BE USED FOR CONFLICT VERIFICATION.) (GAS SERVICE LINES ARE NOT SHOWN) SIGNATURE VALID FOR SIX MONTHS.

*Alch* Date: 1-22-20  
 Approved for AT&T Texas/SWBT underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR.



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 HOUSTON, TEXAS 77094-1009  
 281.646.2400  
 WWW.AECOM.COM  
 TSP# REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**MATZKE PARK BASELINE  
 PLAN AND PROFILE  
 STA. 15+50 TO 20+50**



DRAWN BY: \_\_\_\_\_ CHECKED BY: \_\_\_\_\_

**DANNENBAUM**  
 ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

No.	Date	Revisions	App.

**CAUTION:**  
EXISTING GAS PIPELINE LOCATIONS AND ELEVATIONS HAVE NOT BEEN VERIFIED. CONTRACTOR RESPONSIBLE FOR FIELD VERIFICATION OF UNDERGROUND PIPELINES.

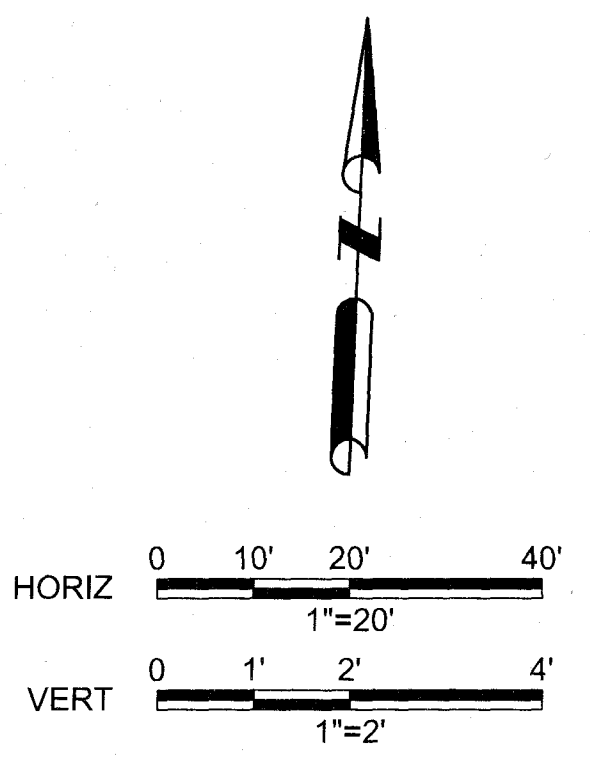
THE LOCATION OF THE BURIED CABLES WITHIN THE PROJECT LIMITS HAVE NOT BEEN VERIFIED. BEFORE COMMENCING WORK CALL 1-800-344-8377 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD-LOCATED.

**CAUTION:**  
OVERHEAD POWER LINES

**BENCHMARK:**  
FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCFCD BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY 0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE CYPRESS WATERSHED NEAR STREAM K100-00-00 ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**  
ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83. THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE FACTOR OF 0.999870017 (TxDOT factor).  
100 YR FL=125.00'

SEE CONSTRUCTION NOTES ON SHEET 4 FOR CONSTRUCTION REQUIREMENTS ON CYPRESS-FAIRBANKS ISD PROPERTY.

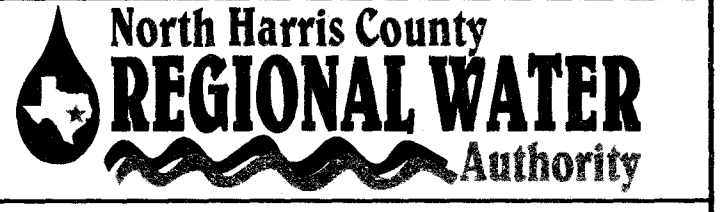


TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED CALL CENTERPOINT ENERGY AT 713-207-2222.  
**NOTICE:**  
FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DO SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

PRIVATE UTILITY LINES SHOWN  
*Michael* Date: 1-22-20  
CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY

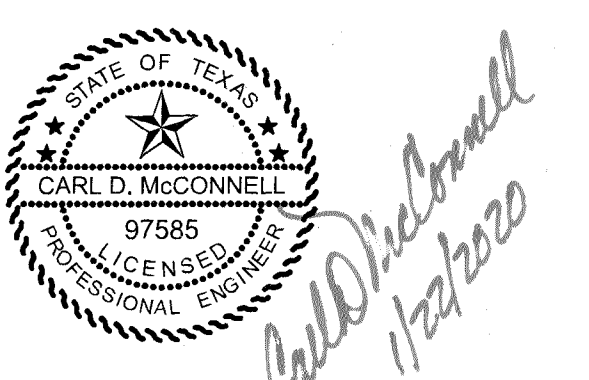
(THE SIGNATURE VERIFIES EXISTING UNDERGROUND FACILITIES - NOT TO BE USED FOR CONDUIT VERIFICATION) SIGNATURE VALID FOR SIX MONTHS.  
*Michael* Date: 1-23-20  
CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY. (THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN CNP NATURAL GAS LINES CORRECTLY - NOT TO BE USED FOR CONDUIT VERIFICATION.) SIGNATURE VALID FOR SIX MONTHS.

*David* Date: 1-22-20  
Approved for AT&T Texas/SWB/T underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR



**AECOM**  
AECOM TECHNICAL SERVICES, INC.  
19219 KATY FREEWAY, SUITE 100  
HOUSTON, TEXAS 77094-1009  
281.646.2400  
WWW.AECOM.COM  
TBP REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**MATZKE PARK BASELINE  
PLAN AND PROFILE  
STA. 20+50 TO 25+50**



DRAWN BY: \_\_\_\_\_ CHECKED BY: \_\_\_\_\_

**DANNENBAUM**  
ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

SHEET No: 41 OF 99

MATCH LINE STA. 20+50 - SEE SHEET 40

MATCH LINE STA. 25+50 - SEE SHEET 42

CALLED 19.4463 ACRES THE COUNTY OF HARRIS REMOVE AND REPLACE 500' LF OF 6 FT. CHAIN LINK FENCE (STA. 20+50 TO 25+50)  
H.C.C.F. NO. U105367  
DEC. 2, 1999

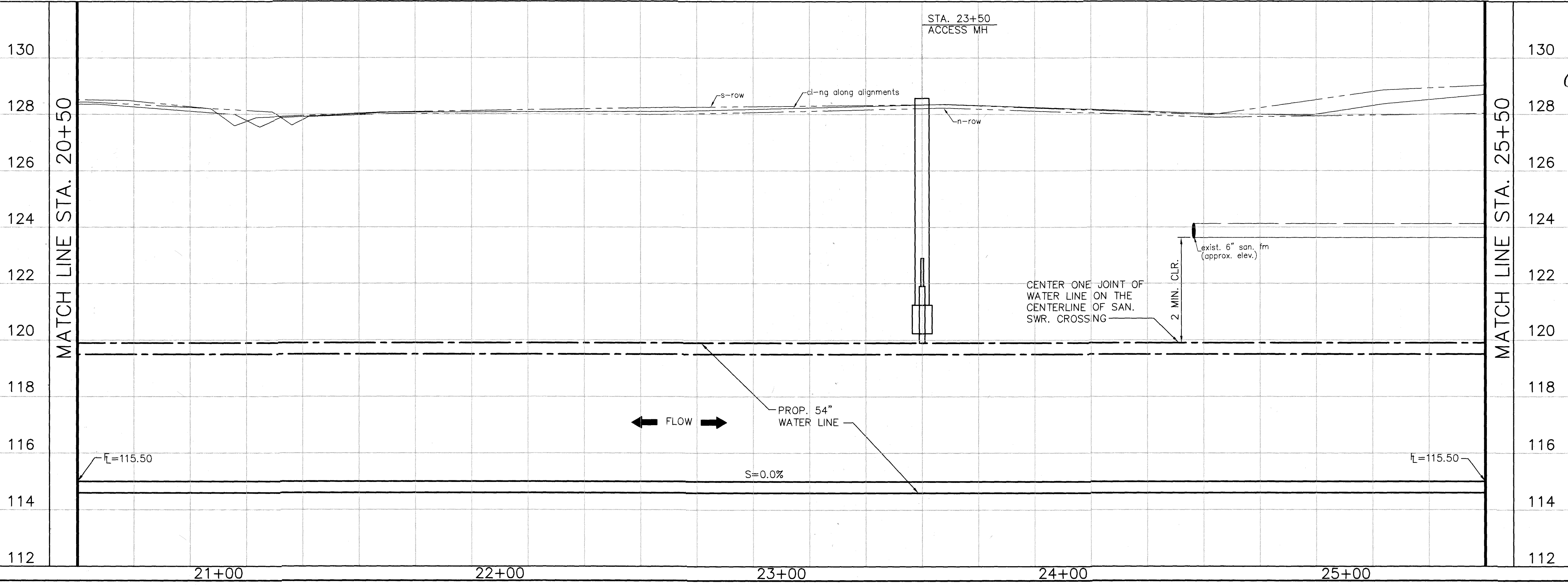
PROP. 54" WATER LINE

STA. 23+48 TYPE TS POTENTIAL TEST

STA. 23+50, 48.4' LT ACCESS MH DETAIL 5, SEE SHT. 57

SAN. SWR CROSSING N 13916172.00 E 3051077.02 (FIELD VERIFIED)

REMOVE AND REPLACE METAL CONTAINERS TO FACILITATE CONST.

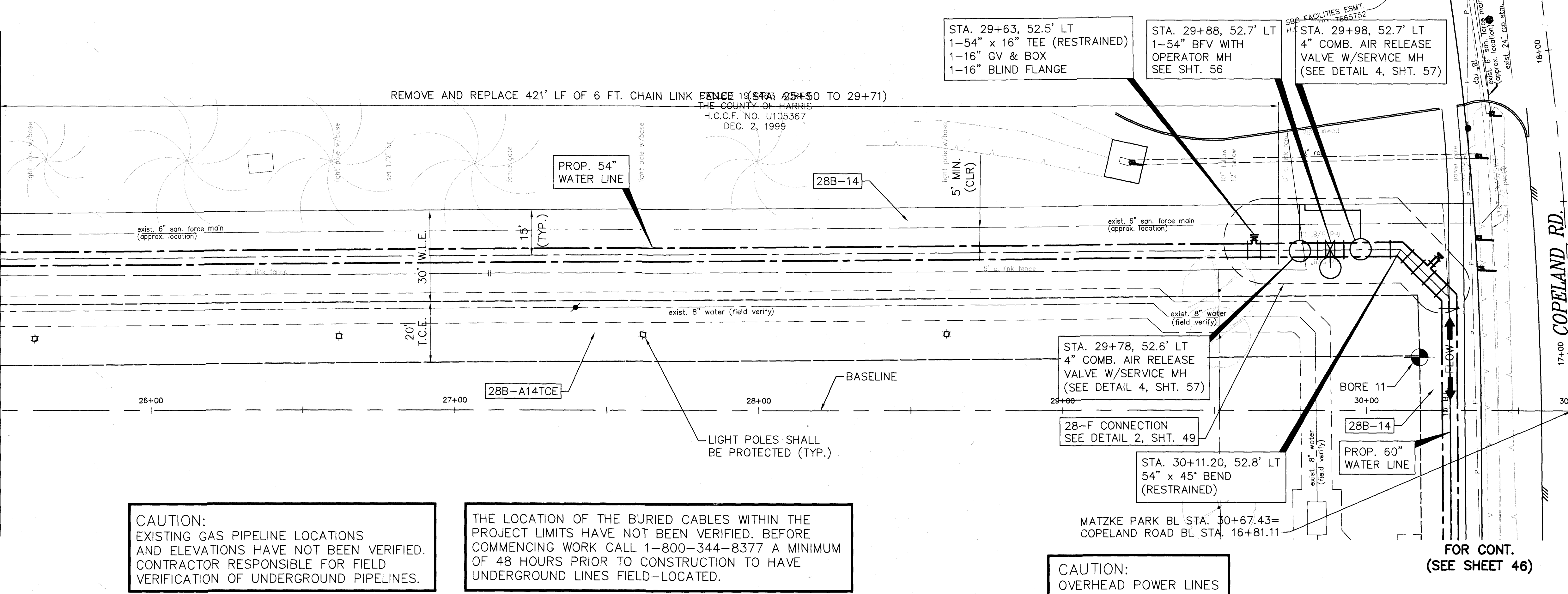


LAST MODIFIED: Jan 21, 2020 - 11:21am BY USER: yirmay  
DWG. LOCATION: C:\1110\4876-01 NHCRWA PROJECT 28-B\ACAD\Drawings\Civil\ DWG. NAME: 4876-01\_4.dwg



No.	Date	Revisions	App.

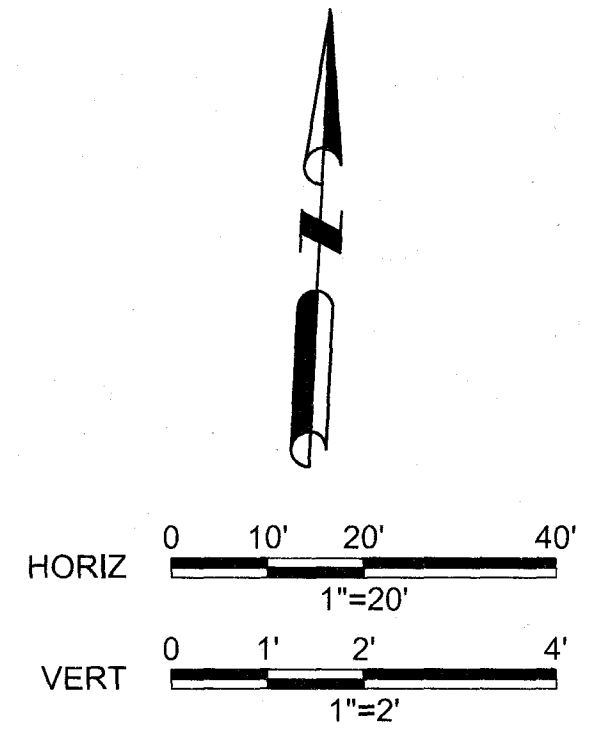
MATCH LINE STA. 25+50 - SEE SHEET 41



**BENCHMARK:**  
 FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCFCD BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY 0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE CYPRESS WATERSHED NEAR STREAM K100-00-00 ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**  
 ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83. THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE FACTOR OF 0.999870017 (TxDOT factor).  
 100 YR FL=125.00'

SEE CONSTRUCTION NOTES ON SHEET 4 FOR CONSTRUCTION REQUIREMENTS ON CYPRESS-FAIRBANKS ISD PROPERTY.



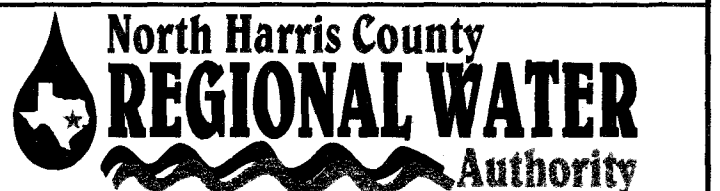
TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED CALL CENTERPOINT ENERGY AT 713-207-2222.  
 NOTICE:  
 FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

PRIVATE UTILITY LINES SHOWN

*Art. ed* Date: 1-23-20  
 CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY  
 (THIS SIGNATURE VERIFIES EXISTING UNDERGROUND FACILITIES - NOT TO BE USED FOR CONFLICT VERIFICATION) SIGNATURE VALID FOR SIX MONTHS.

*A. J. G.* Date: 1-23-20  
 CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY  
 (THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN CNP NATURAL GAS LINES CORRECTLY - NOT TO BE USED FOR CONFLICT VERIFICATION) SIGNATURE VALID FOR SIX MONTHS.

*Carl* Date: 1-22-20  
 Approved for AT&T Texas/SWBT underground conduit facilities only.  
 SIGNATURE VALID FOR ONE YEAR.



**AECOM**  
 AECOM TECHNICAL SERVICES, INC.  
 19219 KATY FREEWAY, SUITE 100  
 HOUSTON, TEXAS 77094-1009  
 281.546.2400  
 WWW.AECOM.COM  
 TBPE REG. NO. F-3580

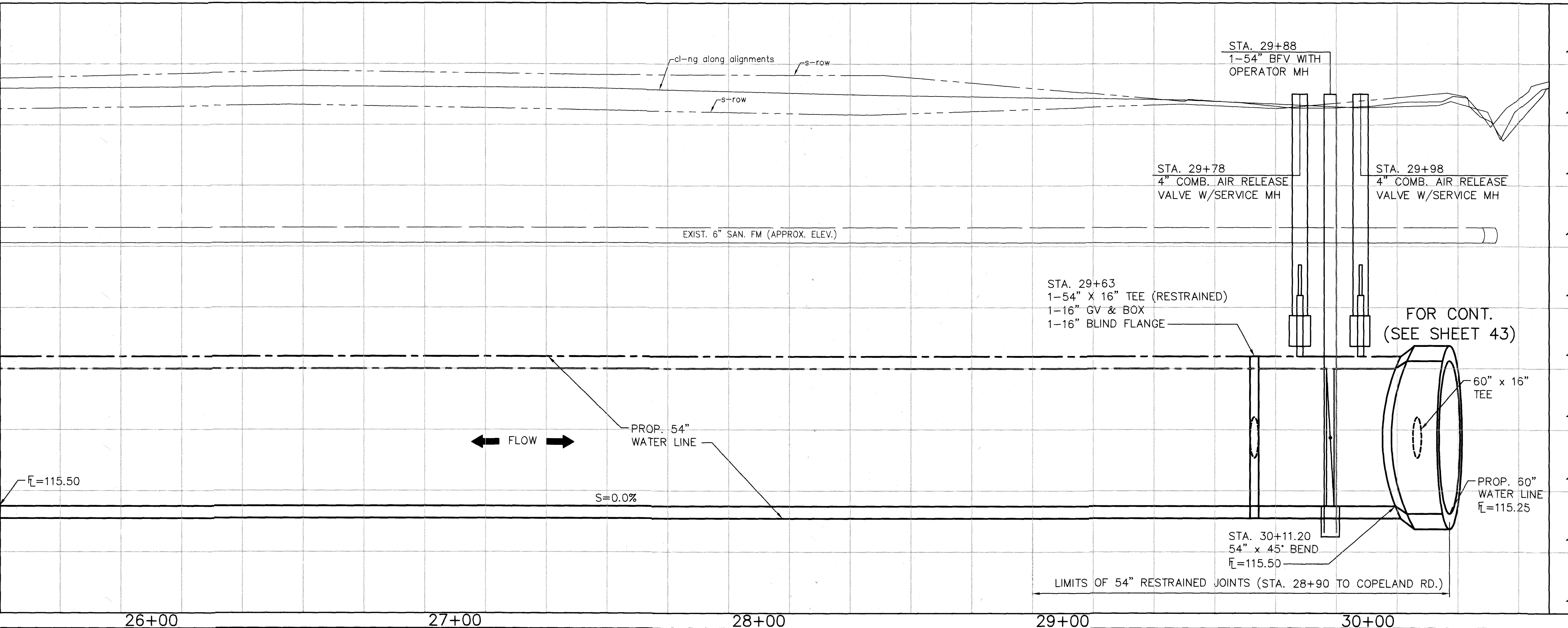
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**MATZKE PARK BASELINE PLAN AND PROFILE**  
 STA. 25+50 TO 30+50



DRAWN BY: CHECKED BY:

**DANNENBAUM**  
 ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

MATCH LINE STA. 25+50

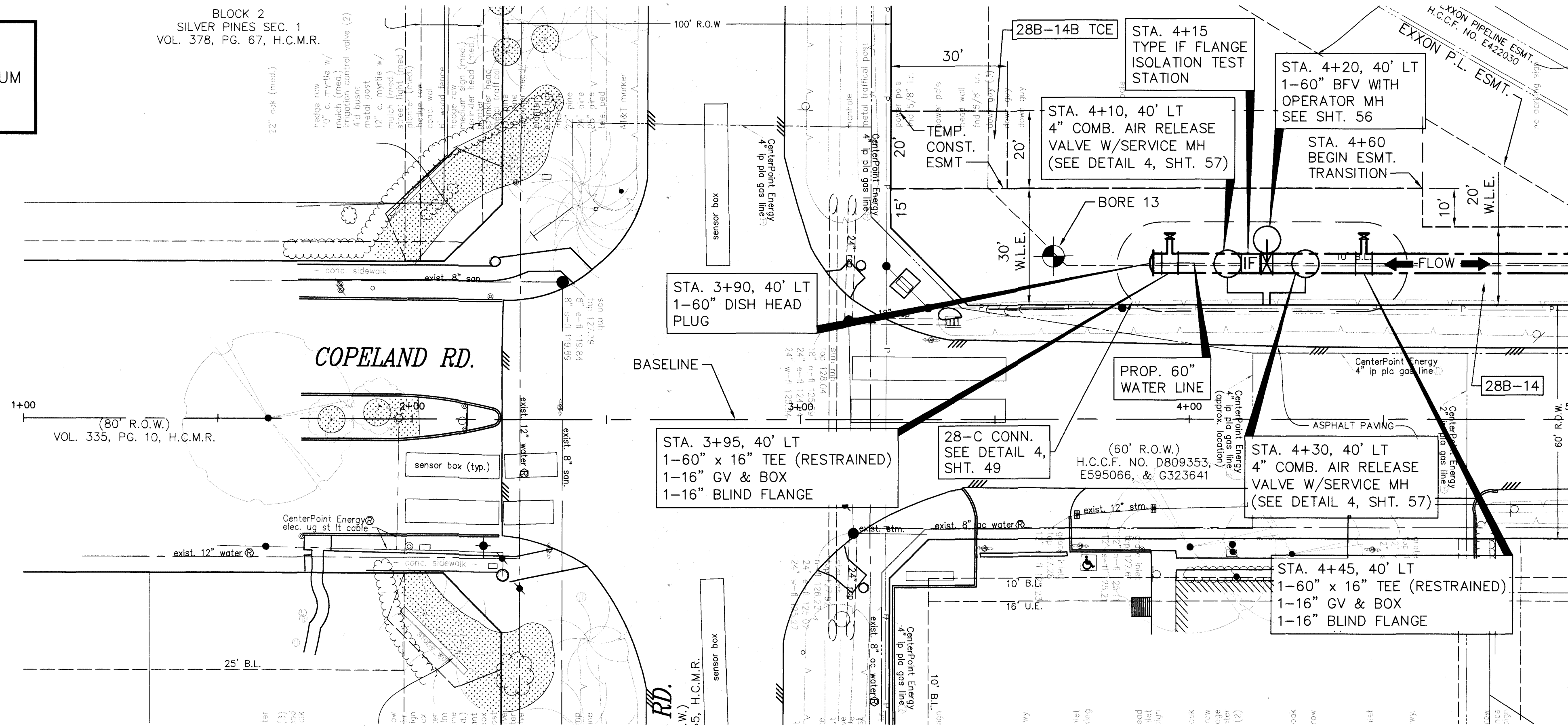


LAST MODIFIED: Jan 21, 2020 - 11:23am BY USER: yimv  
 DWG. LOCATION: G:\1110\4876-01 NHCRWA PROJECT 28-B\ACAD\Drawings\Civil\ DWG. NAME: 4876-01\_42.dwg

THE LOCATION OF THE BURIED CABLES WITHIN THE PROJECT LIMITS HAVE NOT BEEN VERIFIED. BEFORE COMMENCING WORK CALL 1-800-344-8377 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD-LOCATED.

CAUTION: EXISTING GAS PIPELINE LOCATIONS AND ELEVATIONS HAVE NOT BEEN VERIFIED. CONTRACTOR RESPONSIBLE FOR FIELD VERIFICATION OF UNDERGROUND PIPELINES.

CAUTION: OVERHEAD POWER LINES

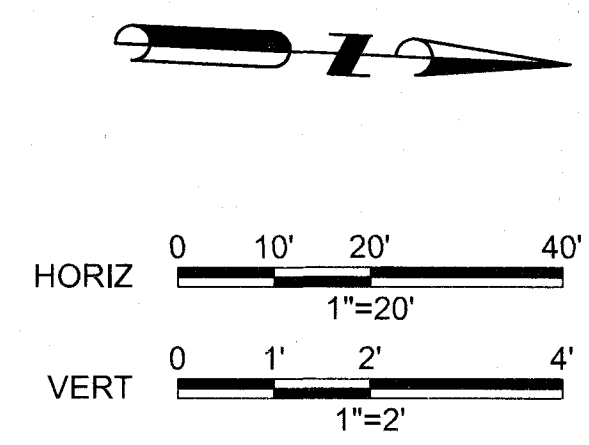


No.	Date	Revisions	App.

**BENCHMARK:**  
FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HOCD BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY 0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE CYPRESS WATERSHED NEAR STREAM K100-00-00 ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**  
ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83. THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE FACTOR OF 0.999870017 (TxDot factor).  
100 YR FL=125.00'

SEE CONSTRUCTION NOTES ON SHEET 4 FOR CONSTRUCTION REQUIREMENTS ON CYPRESS-FAIRBANKS ISD PROPERTY.



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

**NOTICE:**  
FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

PRIVATE UTILITY LINES SHOWN

*Alch* Date: 1-23-20  
CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY  
(THE SIGNATURE VERIFIES EXISTING UNDERGROUND FACILITIES - NOT TO BE USED FOR CONFLICT VERIFICATION) SIGNATURE VALID FOR SIX MONTHS.

*Alch* Date: 1-23-20  
CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY.  
(THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN CHP NATURAL GAS LINES CORRECTLY - NOT TO BE USED FOR CONFLICT VERIFICATION) SIGNATURE VALID FOR SIX MONTHS.  
(GAS SERVICE LINES ARE NOT SHOWN) SIGNATURE VALID FOR SIX MONTHS.

*Sam* Date: 1-22-20  
Approved for AT&T Texas/SWB/T underground conduit facilities only.  
SIGNATURE VALID FOR ONE YEAR.



**AECOM**  
AECOM TECHNICAL SERVICES, INC.  
19219 KATY FREEWAY, SUITE 100  
HOUSTON, TEXAS 77094-1009  
281-446-2400  
WWW.AECOM.COM  
TSPC REG. NO. F-3580

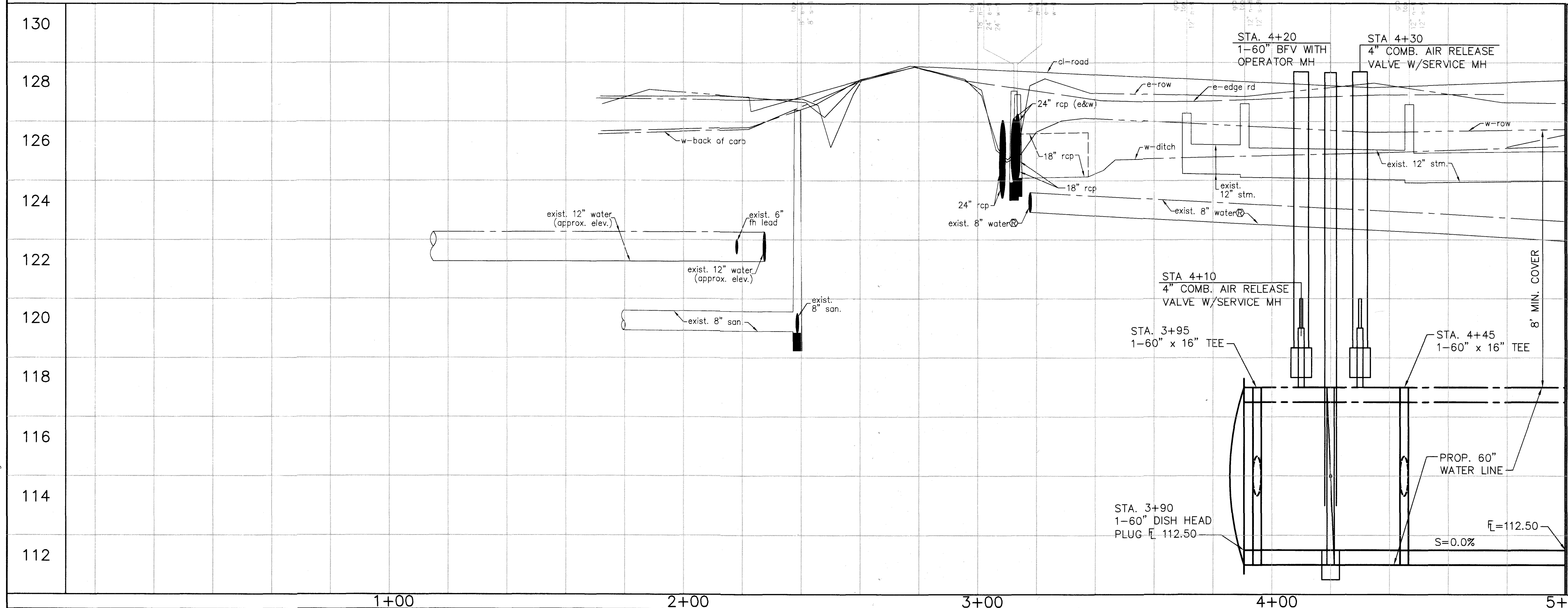
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**COPELAND ROAD BASELINE  
PLAN AND PROFILE  
STA. 1+00 TO 5+00**

STATE OF TEXAS  
CARL D. MCCONNELL  
97585  
LICENSED PROFESSIONAL ENGINEER  
*Carl D. McConnell*  
1/24/2020

DRAWN BY: CHECKED BY:  
**DANNENBAUM**  
ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

SHEET No: 43 OF 99

LAST MODIFIED: Jan 21, 2020 - 11:24am  
BY USER: yimvy  
DWG. LOCATION: G:\1110\4876-01 NHRWA PROJECT 28-B\ACAD\Drawings\Civil  
DWG. NAME: 4876-01\_43.dwg

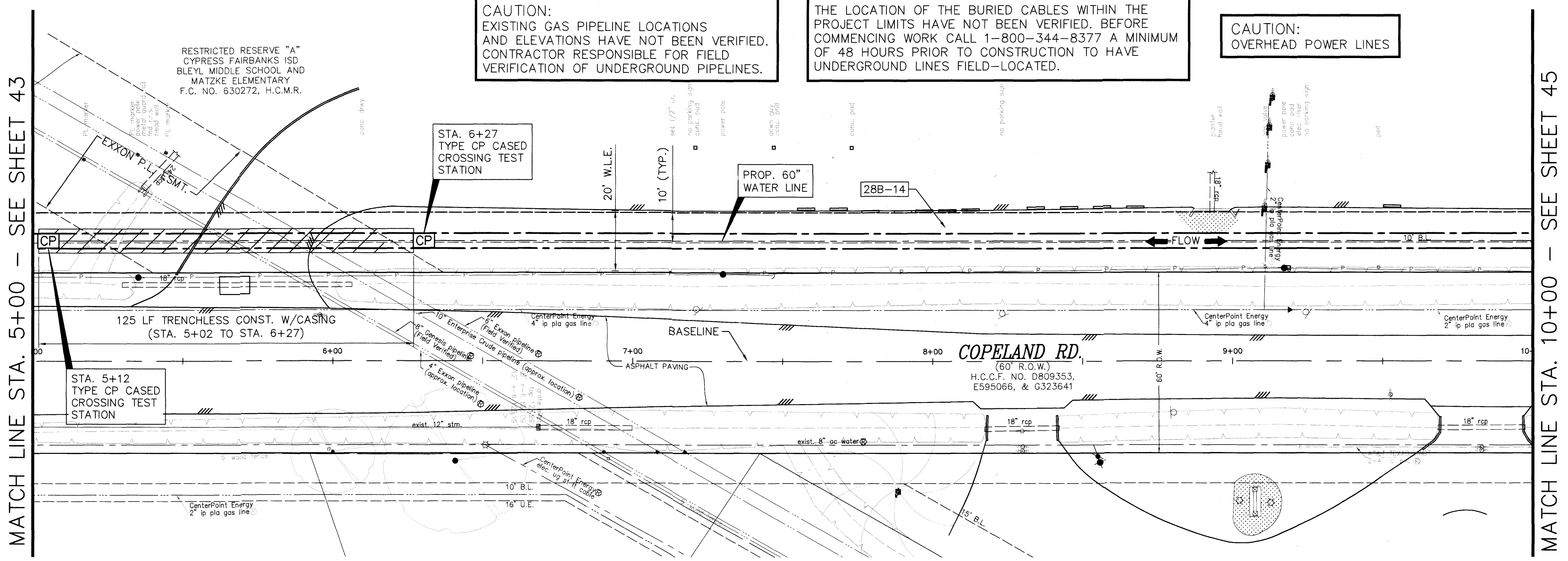


MATCH LINE STA. 5+00 - SEE SHEET 44

MATCH LINE STA. 5+00



No.	Date	Revisions	App.



**CAUTION:**  
EXISTING GAS PIPELINE LOCATIONS AND ELEVATIONS HAVE NOT BEEN VERIFIED. CONTRACTOR RESPONSIBLE FOR FIELD VERIFICATION OF UNDERGROUND PIPELINES.

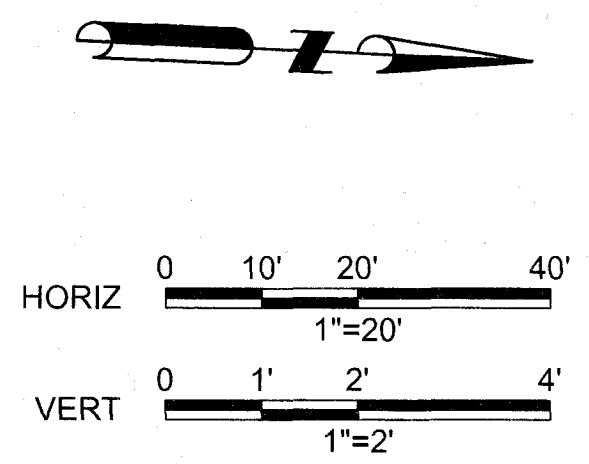
THE LOCATION OF THE BURIED CABLES WITHIN THE PROJECT LIMITS HAVE NOT BEEN VERIFIED. BEFORE COMMENCING WORK CALL 1-800-344-8377 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD-LOCATED.

**CAUTION:**  
OVERHEAD POWER LINES

**BENCHMARK:**  
FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCFCD BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY 0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE CYPRESS WATERSHED NEAR STREAM K100-00-00 ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**  
ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83. THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE FACTOR OF 0.999870017 (TxDOT factor).  
100 YR FL=125.0'

SEE CONSTRUCTION NOTES ON SHEET 4 FOR CONSTRUCTION REQUIREMENTS ON CYPRESS-FAIRBANKS ISD PROPERTY.



TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED CALL CENTERPOINT ENERGY AT 713-297-2222.  
**NOTICE:**  
FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

PRIVATE UTILITY LINES SHOWN

*[Signature]* dated 1-23-20  
CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY

*[Signature]* dated 1-27-20  
CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY. THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN OWN PROPERTY LINES CORRECTLY. NOT TO BE USED FOR CONFLICT VERIFICATION. (GAS SERVICE LINES ARE NOT SHOWN) SIGNATURE VALID FOR SIX MONTHS.

*[Signature]* dated 1-22-20  
Approved for AT&T Texas/SWB/T underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR.



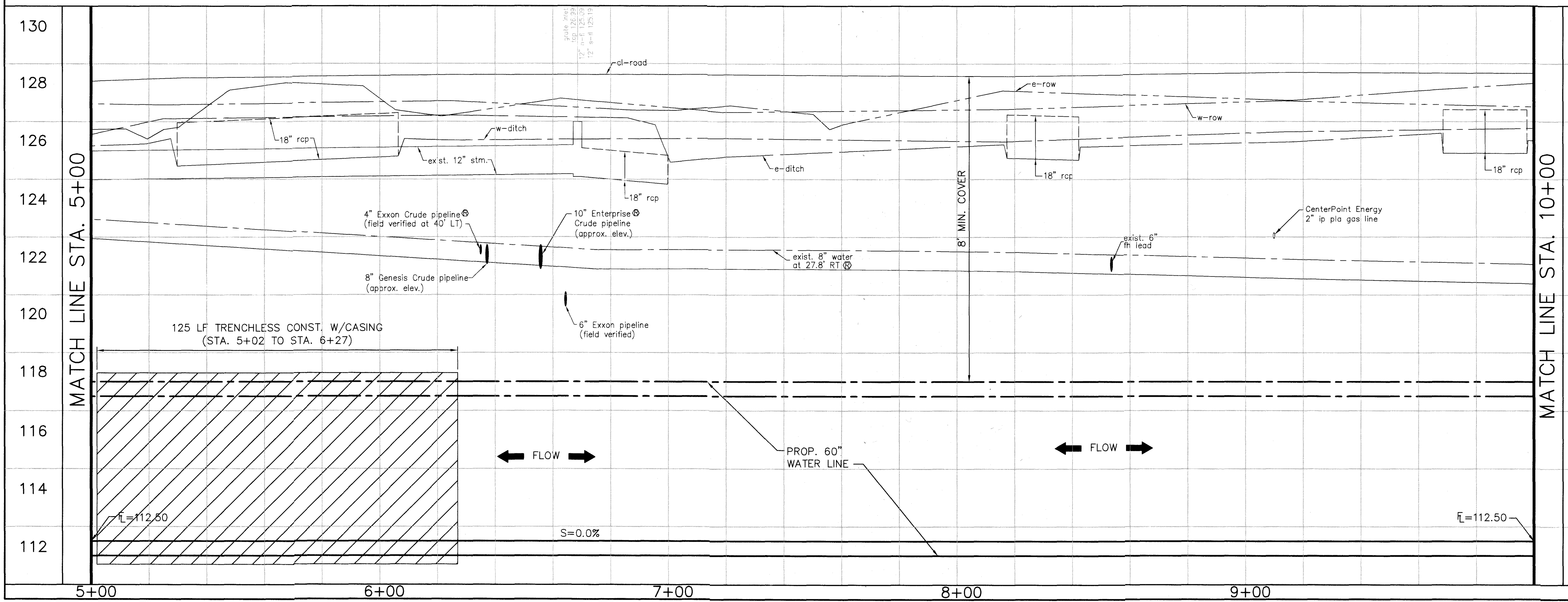
**AECOM**  
AECOM TECHNICAL SERVICES, INC.  
19219 KATY FREEWAY, SUITE 100  
HOUSTON, TEXAS 77094-1009  
281.646.2400  
WWW.AECOM.COM  
TBP REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**COPELAND BASELINE PLAN AND PROFILE**  
STA. 5+00 TO 10+00

*[Professional Engineer Seal]*  
CARL D. McCONNELL  
97585  
LICENSED PROFESSIONAL ENGINEER  
*[Signature]*  
1/22/2020

DRAWN BY: \_\_\_\_\_ CHECKED BY: \_\_\_\_\_  
**DANNENBAUM**  
ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

SHEET No. 44 OF 99



LAST MODIFIED: Jan 21, 2020 - 11:24am BY USER: ximyy  
DWG. LOCATION: C:\1110\4876-01 NHCRA PROJECT 28-B\ACAD\Drawings\Civil\  
DWC. NAME: 4876-01\_44.dwg

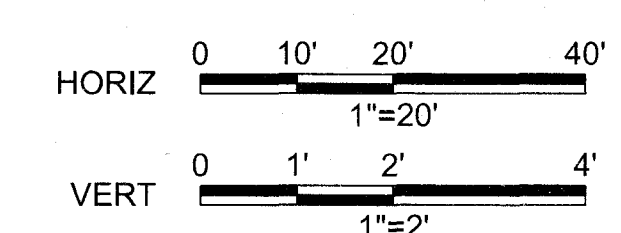
No.	Date	Revisions	App.

**BENCHMARK:**  
 FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCFOD BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY 0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE CYPRESS WATERSHED NEAR STREAM K100-00-00 ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**  
 ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83. THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE FACTOR OF 0.999870017 (1xDOT factor).  
 100 YR FL=125.00'

**CAUTION:**  
 OVERHEAD POWER LINES

SEE CONSTRUCTION NOTES ON SHEET 4 FOR CONSTRUCTION REQUIREMENTS ON CYPRESS-FAIRBANKS ISD PROPERTY.



TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED CALL CENTERPOINT ENERGY AT 713-207-1222  
**NOTICE:**  
 FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

PRIVATE UTILITY LINES SHOWN

*Alch* Date: 1-23-20  
 CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY

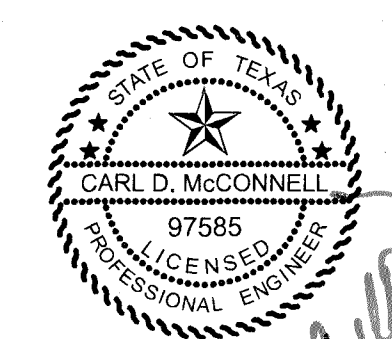
*Alch* Date: 1-23-20  
 CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY. (THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN ALL NATURAL GAS LINES OPERATED - NOT TO BE USED FOR CONDUIT VERIFICATION.) (GAS SERVICE LINES NOT SHOWN) SIGNATURE VALID FOR SIX MONTHS.

*Jan* Date: 1-22-20  
 Approved for AT&T Texas/SWB underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR



**AECOM**  
 AECOM TECHNICAL SERVICES, INC.  
 19219 KATY FREEWAY, SUITE 100  
 HOUSTON, TEXAS 77094-1009  
 281.646.2400  
 WWW.AECOM.COM  
 TBPE REG. NO. F-3580

**NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY**  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**COPELAND ROAD BASELINE PLAN AND PROFILE**  
 STA. 10+00 TO 15+00



*Carl D. McConnel*  
 1/22/2020

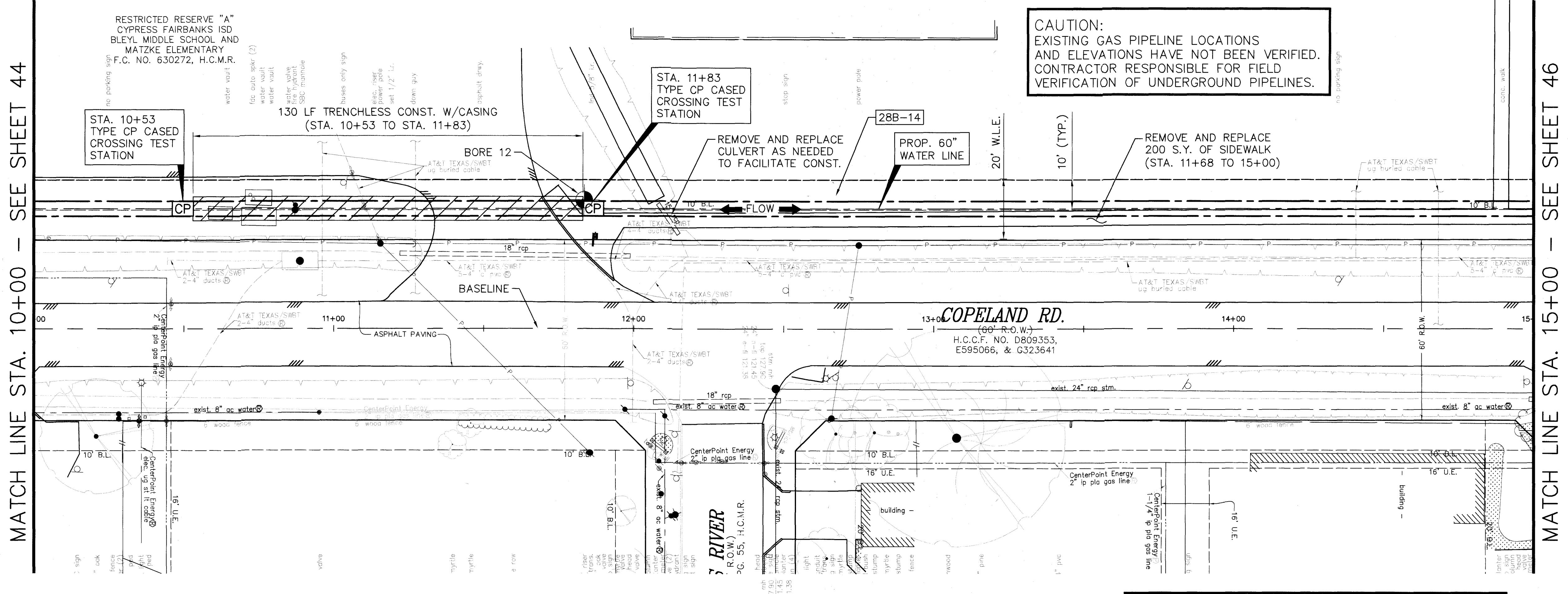
DRAWN BY: CHECKED BY:

**DANNENBAUM**  
 ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

SHEET No: 45 of 99

MATCH LINE STA. 10+00 - SEE SHEET 44

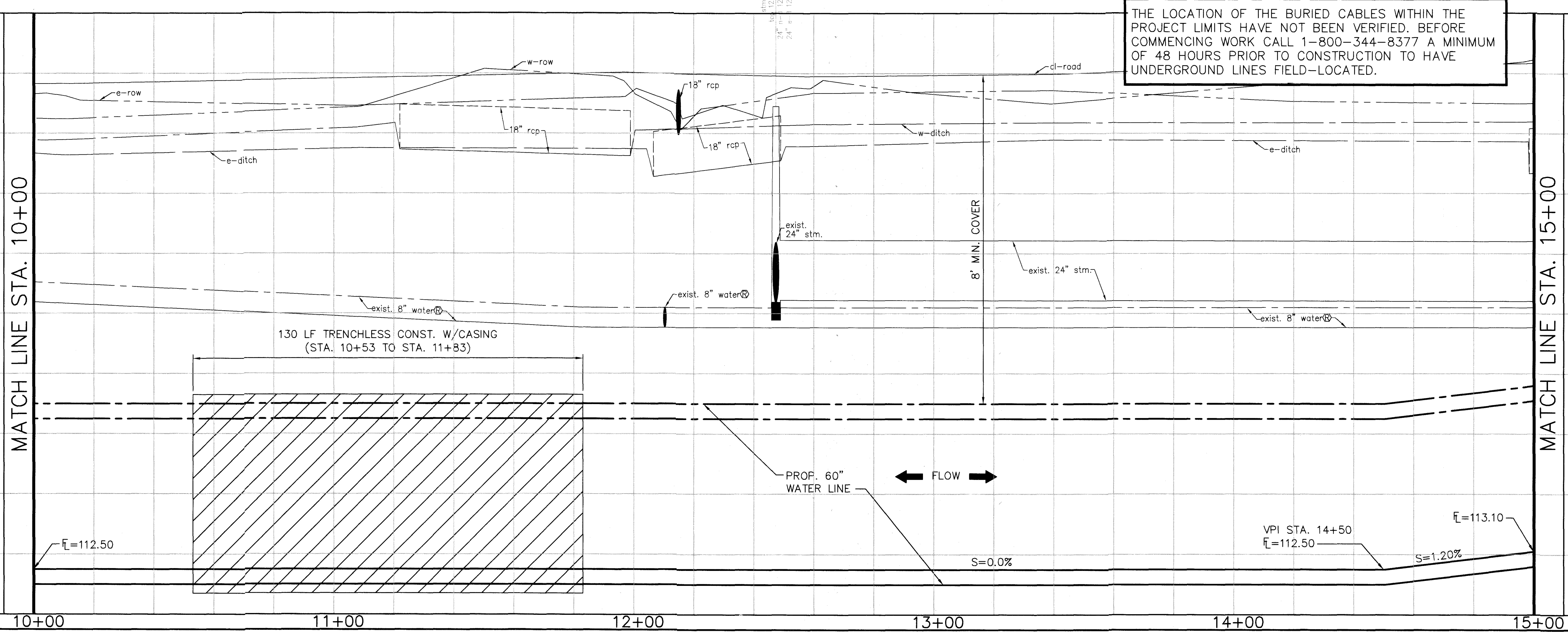
MATCH LINE STA. 15+00 - SEE SHEET 46



THE LOCATION OF THE BURIED CABLES WITHIN THE PROJECT LIMITS HAVE NOT BEEN VERIFIED. BEFORE COMMENCING WORK CALL 1-800-344-8377 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD-LOCATED.

MATCH LINE STA. 10+00

MATCH LINE STA. 15+00



LAST MODIFIED: Jan 21, 2020 - 11:25am BY USER: yimv  
 DWG. LOCATION: G:\1110\4876-01 NHCRWA PROJECT 28-B\ACAD\Drawings\Civil\  
 DWG. NAME: 4876-01\_45.dwg



No.	Date	Revisions	App.

THE LOCATION OF THE BURIED CABLES WITHIN THE PROJECT LIMITS HAVE NOT BEEN VERIFIED. BEFORE COMMENCING WORK CALL 1-800-344-8377 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD-LOCATED.

CAUTION:  
EXISTING GAS PIPELINE LOCATIONS AND ELEVATIONS HAVE NOT BEEN VERIFIED. CONTRACTOR RESPONSIBLE FOR FIELD VERIFICATION OF UNDERGROUND PIPELINES.

CAUTION:  
OVERHEAD POWER LINES.

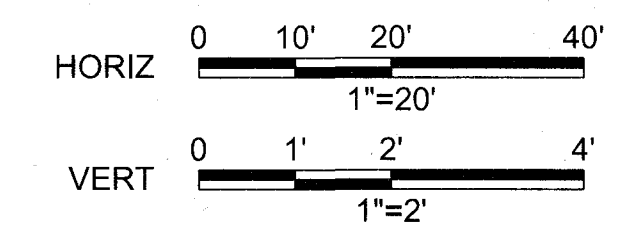
**BENCHMARK:**

FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCFCD BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY 0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE CYPRESS WATERSHED NEAR STREAM K100-00-00 ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

**HORIZONTAL DATUM:**

ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83. THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE FACTOR OF 0.999870017 (TxDOT factor).  
100 YR FL=125.00'

SEE CONSTRUCTION NOTES ON SHEET 4 FOR CONSTRUCTION REQUIREMENTS ON CYPRESS-FAIRBANKS ISD PROPERTY.



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

NOTICE:  
FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

**PRIVATE UTILITY LINES SHOWN**

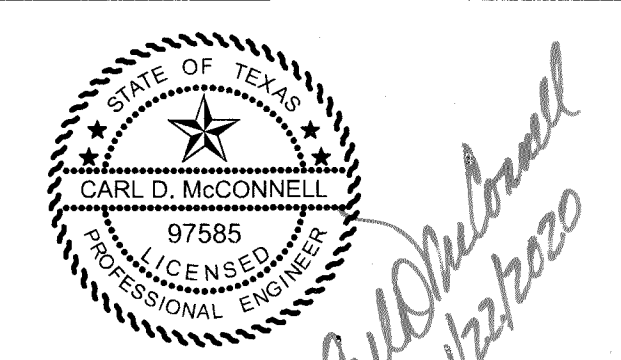
*Atch* Date: 1-23-20  
CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY

*Atch* Date: 1-23-20  
CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY. (THIS SIGNATURE VERIFIES THAT YOU HAVE SHOWN CNP NATURAL GAS LINES CORRECTLY - NOT TO BE USED FOR CONFLICT VERIFICATION) (GAS SERVICE LINES ARE NOT SHOWN) SIGNATURE VALID FOR SIX MONTHS.

*Cent* Date: 1-22-20  
Approved for AT&T Texas/SWBT underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR.



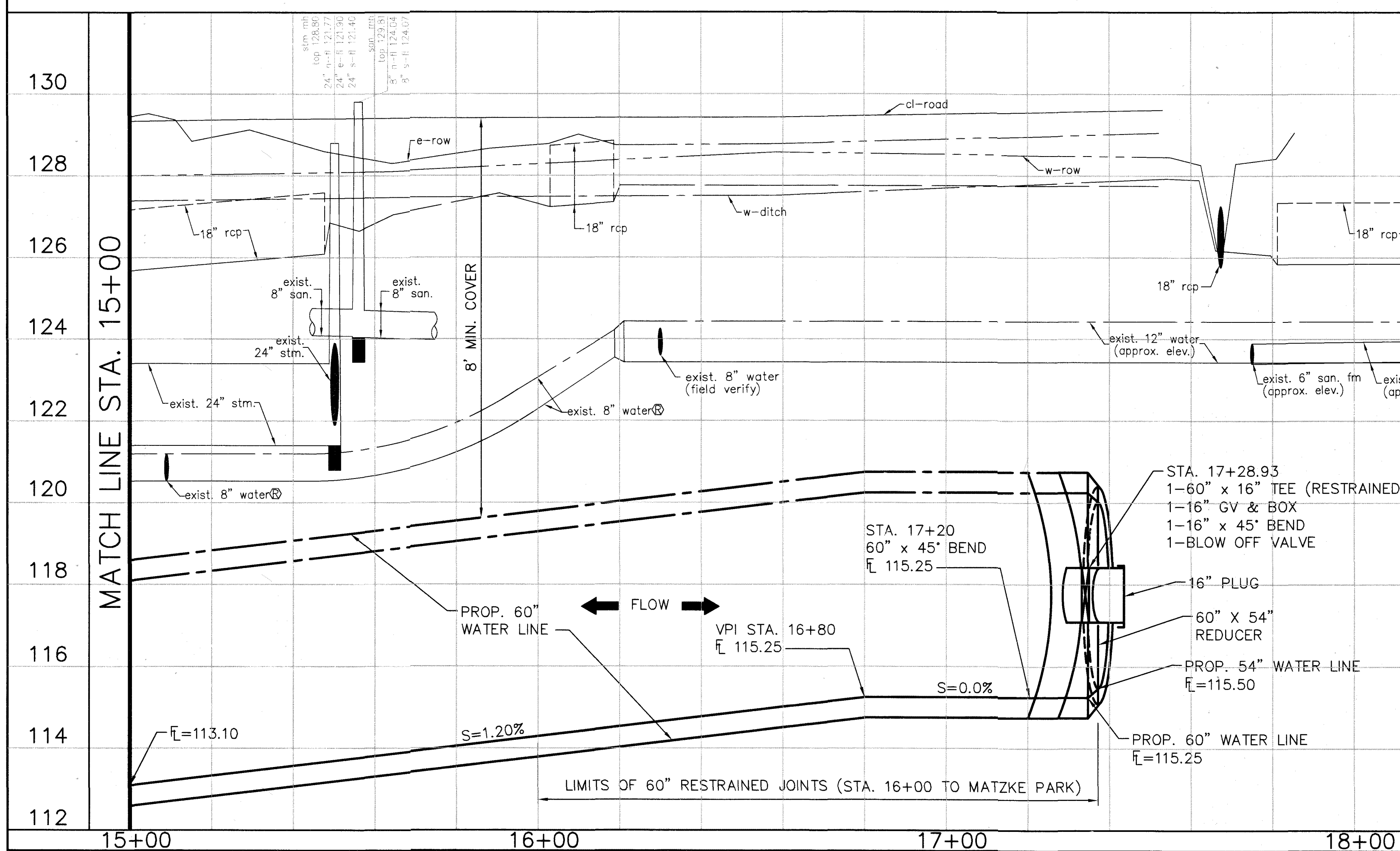
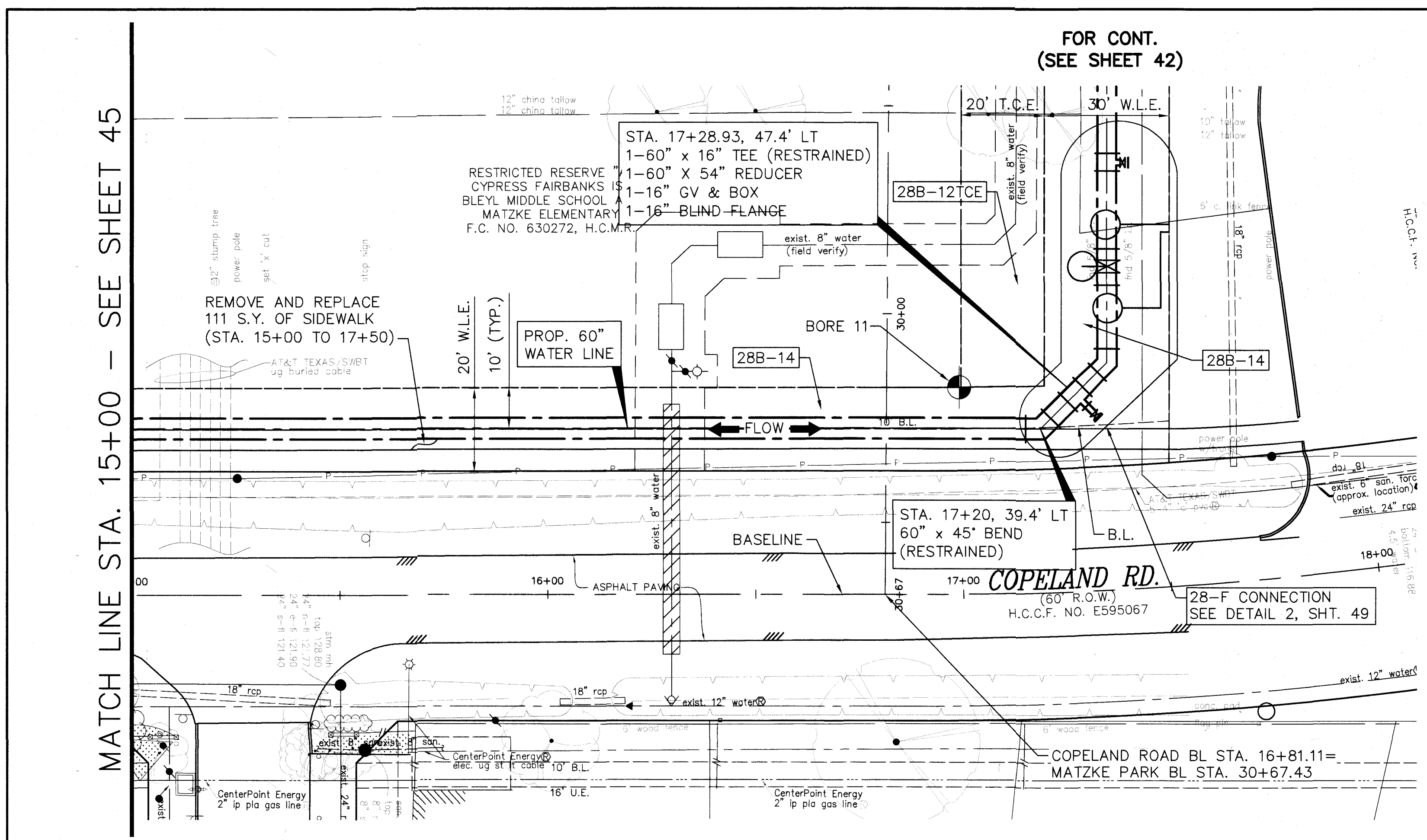
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**COPELAND ROAD BASELINE PLAN AND PROFILE**  
STA. 15+00 TO 18+00



DRAWN BY: CHECKED BY:

**DANNENBAUM**  
ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77096 (713) 520-9570

SHEET No. 46 OF 99



LAST MODIFIED: Jan 21, 2020 - 11:26am BY USER: yimvy  
 DWG. LOCATION: G:\1110\4876-01 NHCRWA PROJECT 28-B\ACAD\Drawings\Civil\  
 DWG. NAME: 4876-01\_46.dwg

No.	Date	Revisions	App.

**BENCHMARK:**

FLOODPLAIN REFERENCE MARK NUMBER 110125 IS A HCFCD BRASS DISK STAMPED K100 BM10 ON EAST SIDEWALK OF GRANT ROAD BRIDGE OVER CYPRESS CREEK APPROXIMATELY 0.90 MILE WEST OF JONES ROAD IN KEYMAP 369A IN THE CYPRESS WATERSHED NEAR STREAM K100-00-00 ELEV. 127.25 FEET NAVD 1988 2001 ADJUSTMENT

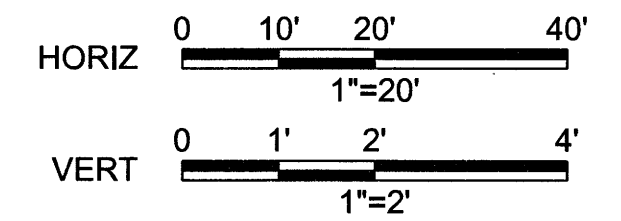
**HORIZONTAL DATUM:**

ALL HORIZONTAL COORDINATES ARE BASED ON TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NAD83. THE COORDINATES & DISTANCES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY MULTIPLYING BY A SCALE FACTOR OF 0.999870017 (TxDOT factor). 100 YR FL=125.00'

**CAUTION:**  
OVERHEAD POWER LINES.

**CAUTION:**  
EXISTING GAS PIPELINE LOCATIONS AND ELEVATIONS HAVE NOT BEEN VERIFIED. CONTRACTOR RESPONSIBLE FOR FIELD VERIFICATION OF UNDERGROUND PIPELINES.

THE LOCATION OF THE BURIED CABLES WITHIN THE PROJECT LIMITS HAVE NOT BEEN VERIFIED. BEFORE COMMENCING WORK CALL 1-800-344-8377 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD-LOCATED.



TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED CALL CENTERPOINT ENERGY AT 715-207-2222.

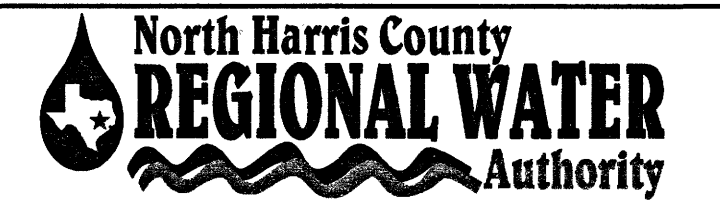
**NOTICE:**  
FOR YOUR SAFETY, YOU ARE REQUIRED BY TEXAS LAW TO CALL 811 AT 48 HOURS BEFORE YOU DIG SO THAT UNDERGROUND LINES CAN BE MARKED. THIS VERIFICATION DOES NOT FULFILL YOUR OBLIGATION TO CALL 811.

**PRIVATE UTILITY LINES SHOWN**

*[Signature]* Date: 1-23-20  
CENTERPOINT ENERGY/UNDERGROUND ELECTRICAL FACILITIES VERIFICATION ONLY

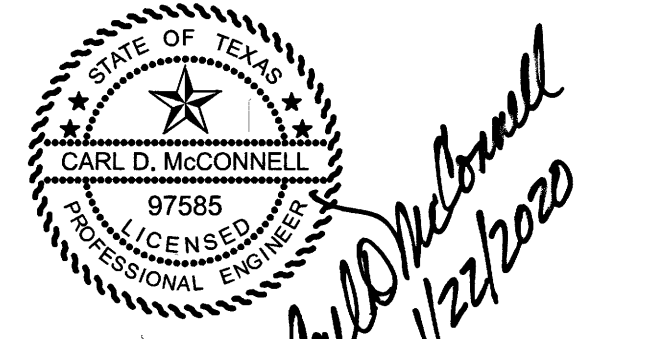
*[Signature]* Date: 1-23-20  
CENTERPOINT ENERGY/NATURAL GAS FACILITIES VERIFICATION ONLY. (THIS SIGNATURE VERIFIES EXISTING UNDERGROUND FACILITIES - NOT TO BE USED FOR CONDUIT VERIFICATION) SIGNATURE VALID FOR SIX MONTHS.

*[Signature]* Date: 1-22-20  
Approved for AT&T Texas/SWBT underground conduit facilities only. SIGNATURE VALID FOR ONE YEAR.



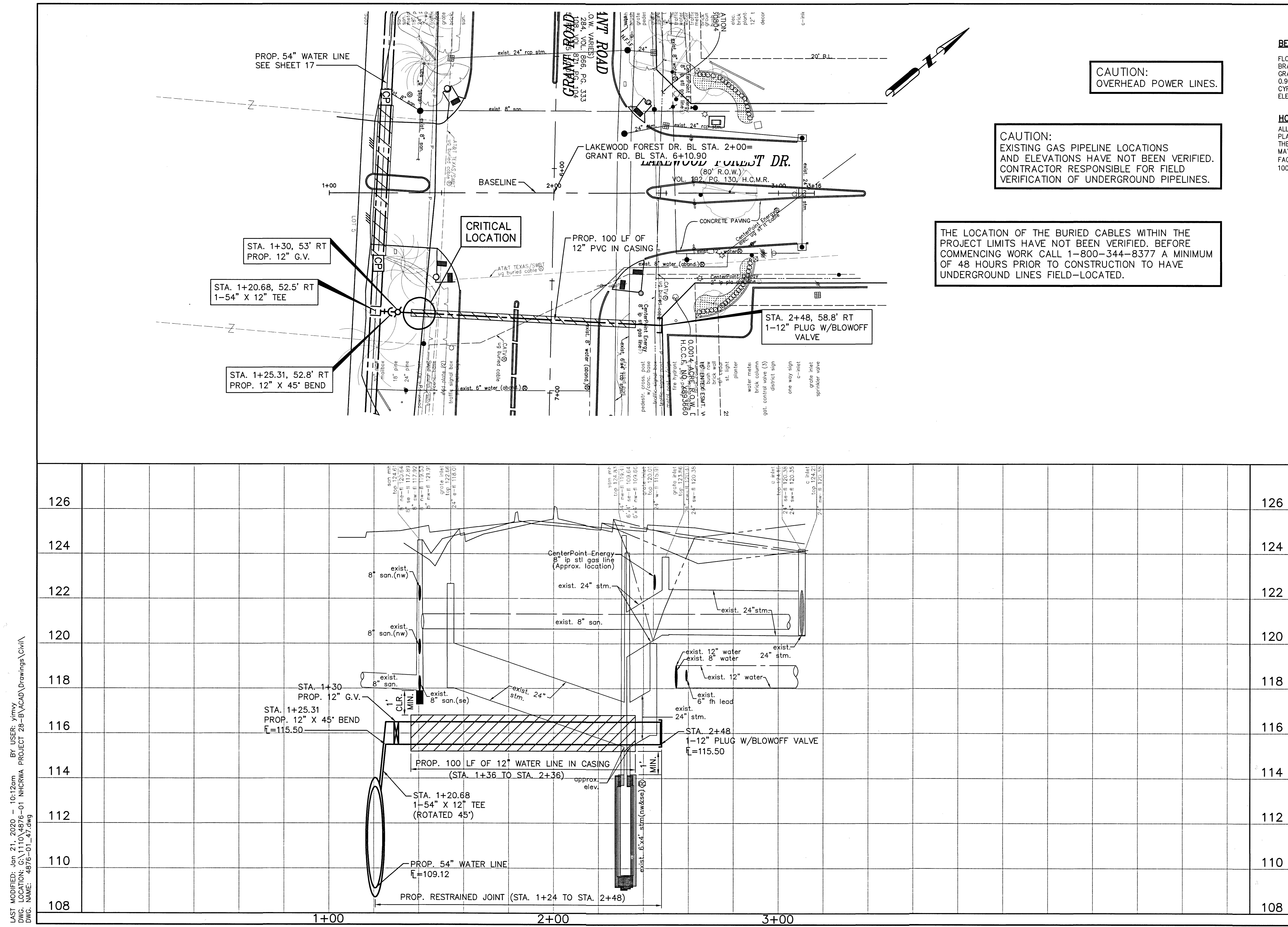
**AECOM**  
AECOM TECHNICAL SERVICES, INC.  
19219 KATY FREEWAY, SUITE 100  
HOUSTON, TEXAS 77054-1008  
281.648.2400  
WWW.AECOM.COM  
TSPC REG. NO. F-3580

**NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY**  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**LAKWOOD FOREST DR. BASELINE PLAN AND PROFILE STA. 1+00 TO 3+00**



DRAWN BY: CHECKED BY:

**DANNENBAUM**  
ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570



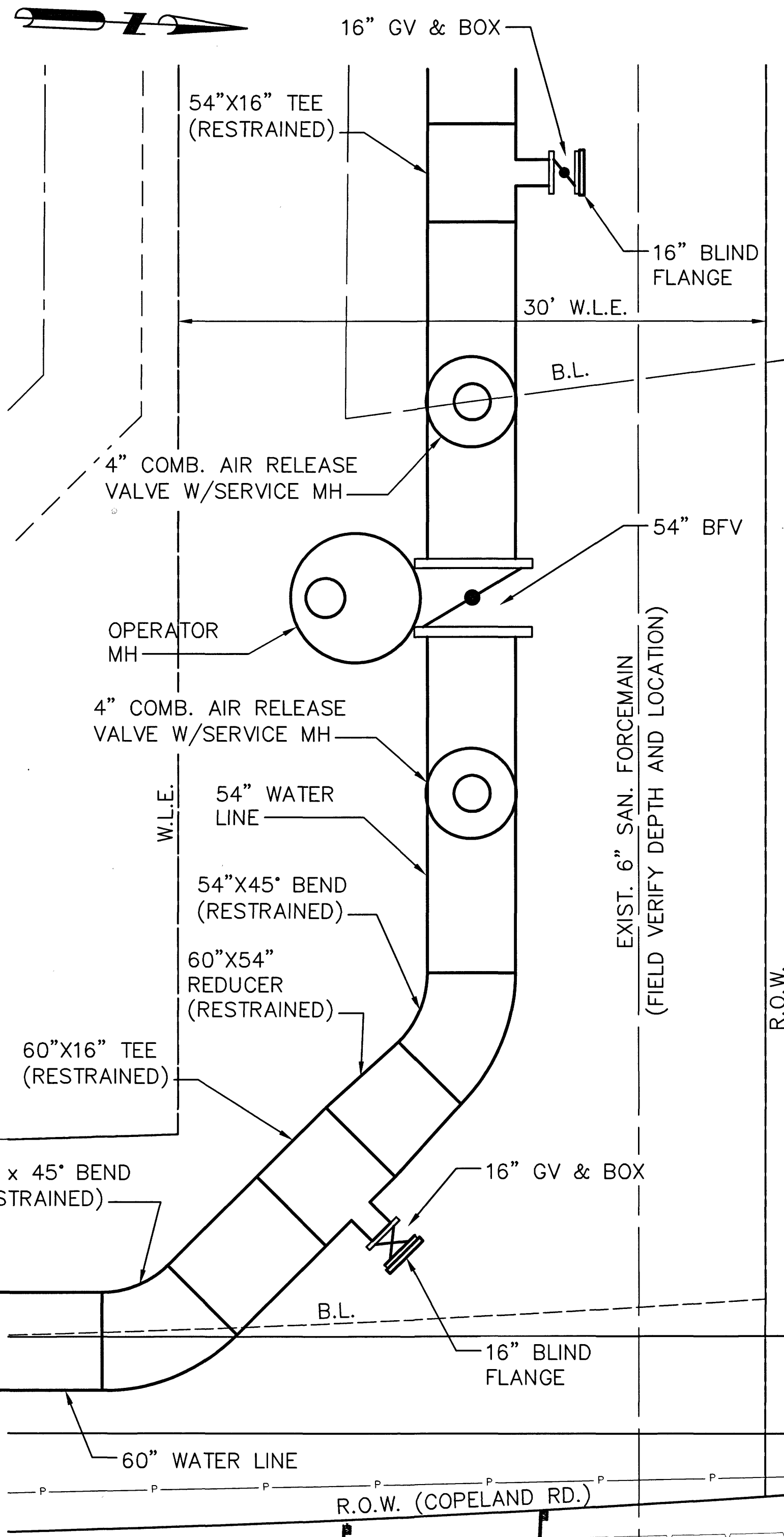
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 DWG. NAME: 4876-01\_47.dwg



No.	Date	Revisions	App.

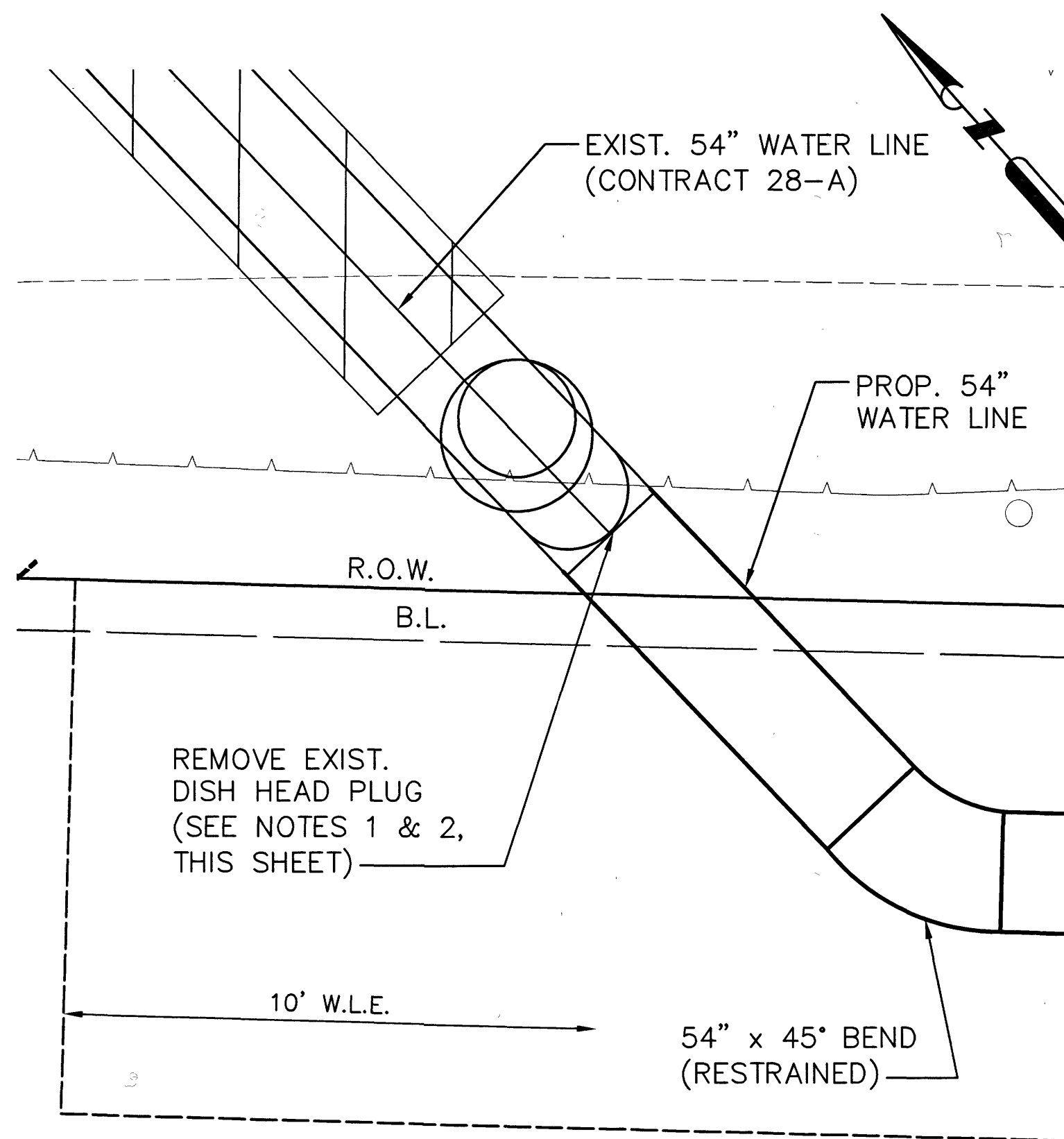
NOTES:

- IF PROJECT 28A/C HAS BEEN CONSTRUCTED, REMOVE DISH HEAD PLUG.
- IF PROJECT 28A/C HAS NOT BEEN CONSTRUCTED, INSTALL DISH HEAD PLUG AND BLOW OFF VALVE.



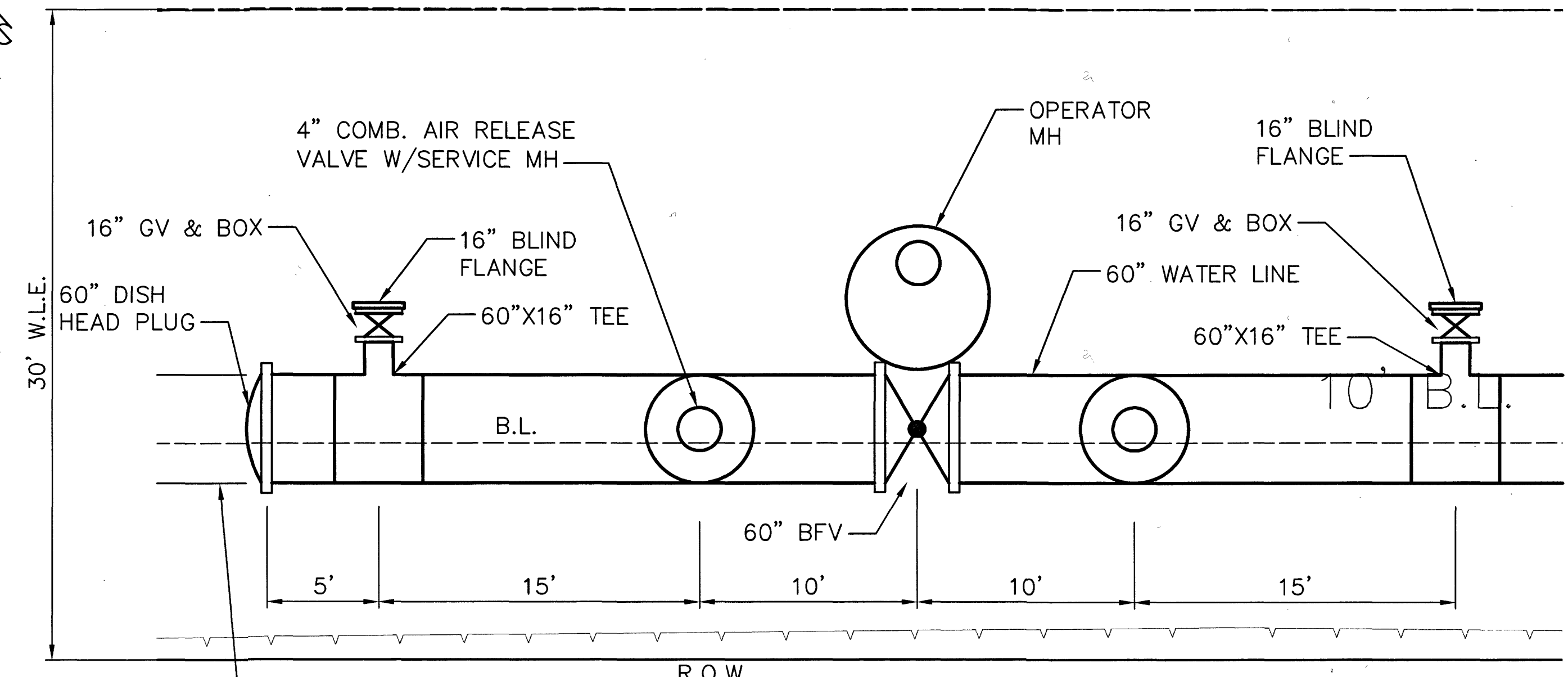
PLAN 2  
SCALE: 1" = 5'-0" 46

(28-F CONNECTION, SHEET 42 OF 99)



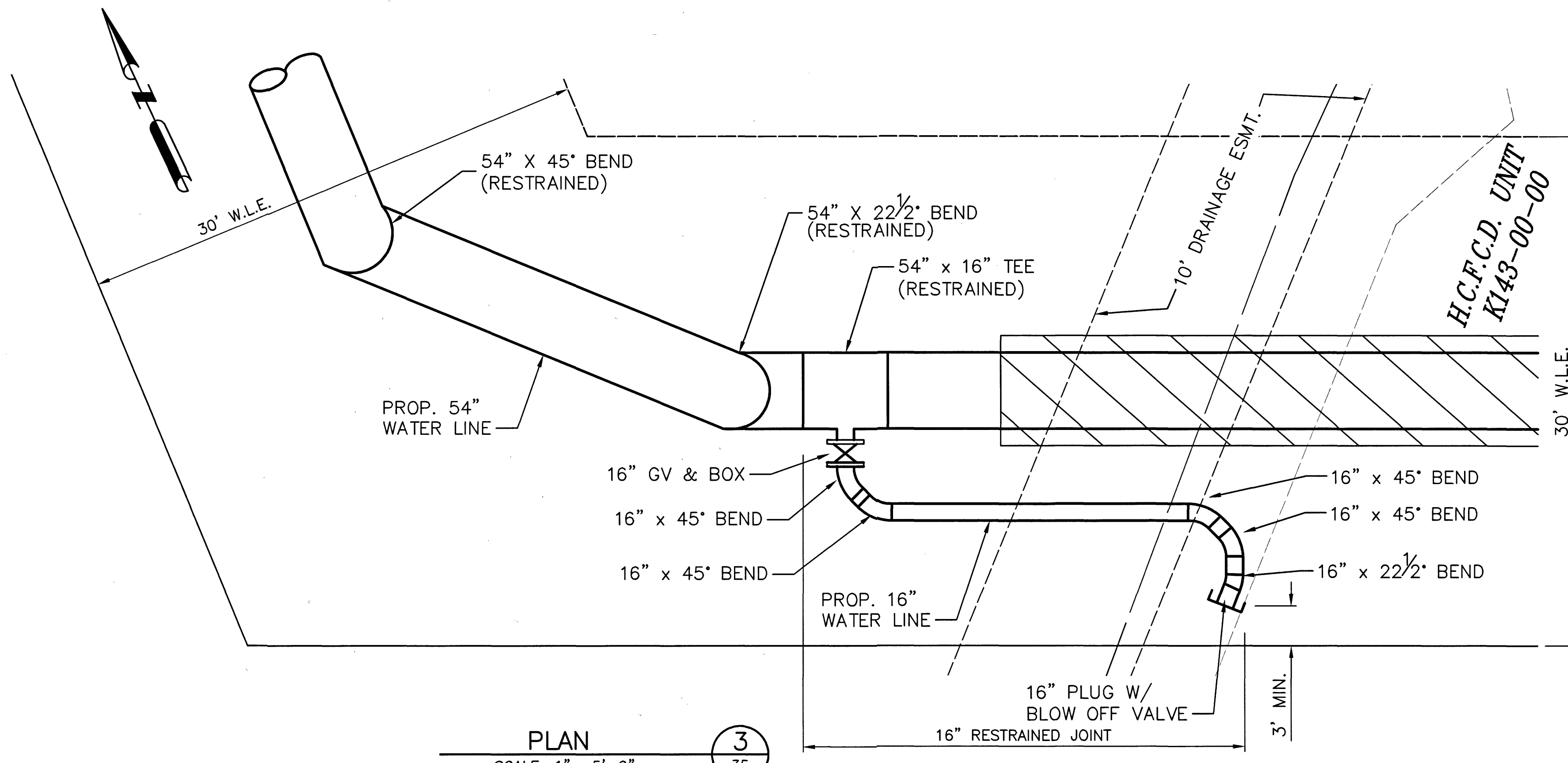
PLAN 1  
SCALE: 1" = 5'-0" 17

(28-A CONNECTION, SHEET 17 OF 99)



PLAN 4  
SCALE: 1" = 5'-0" 43

(28-C CONNECTION, SHEET 43 OF 99)



PLAN 3  
SCALE: 1" = 5'-0" 35

(28-E CONNECTION, SHEET 35 OF 99)

LAST MODIFIED: Jan 21, 2020 - 11:26am  
 BY USER: vjw  
 DWG. LOCATION: C:\1110\4876-01 NHCRWA PROJECT 28-B\CAD\Drawings\Details  
 DWG. NAME: 4876-01\_49.dwg

**North Harris County REGIONAL WATER Authority**

**AECOM**  
AECOM TECHNICAL SERVICES, INC.  
19219 KATY FREEWAY, SUITE 100  
HOUSTON, TEXAS 77094-1009  
281.646.2400  
WWW.AECOM.COM  
TBP REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

**WATER LINE CONNECTION DETAILS**

STATE OF TEXAS  
CARL D. MCCONNELL  
97585  
LICENSED PROFESSIONAL ENGINEER

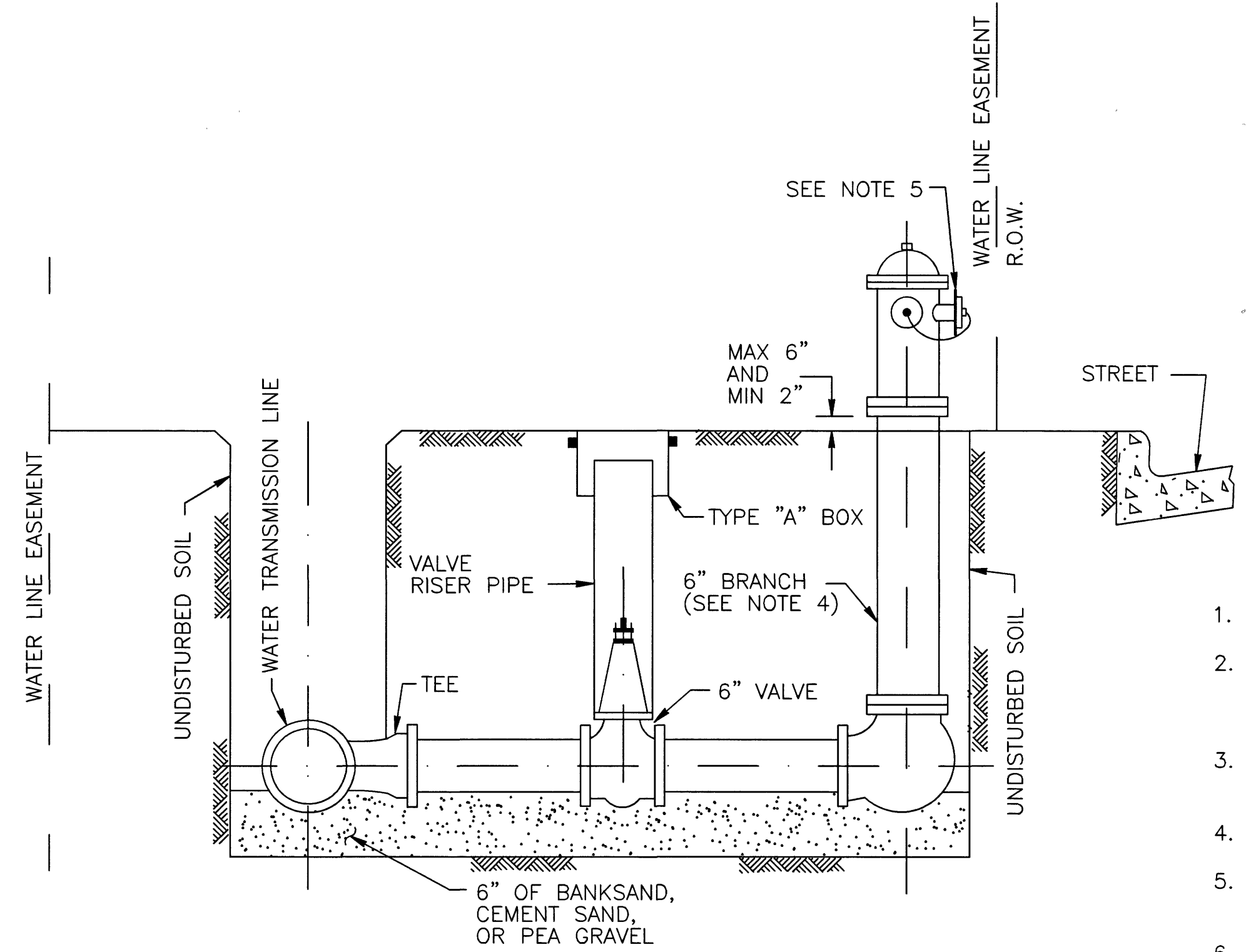
*Carl D. McConnell*  
1/22/2020

DRAWN BY: CHECKED BY:

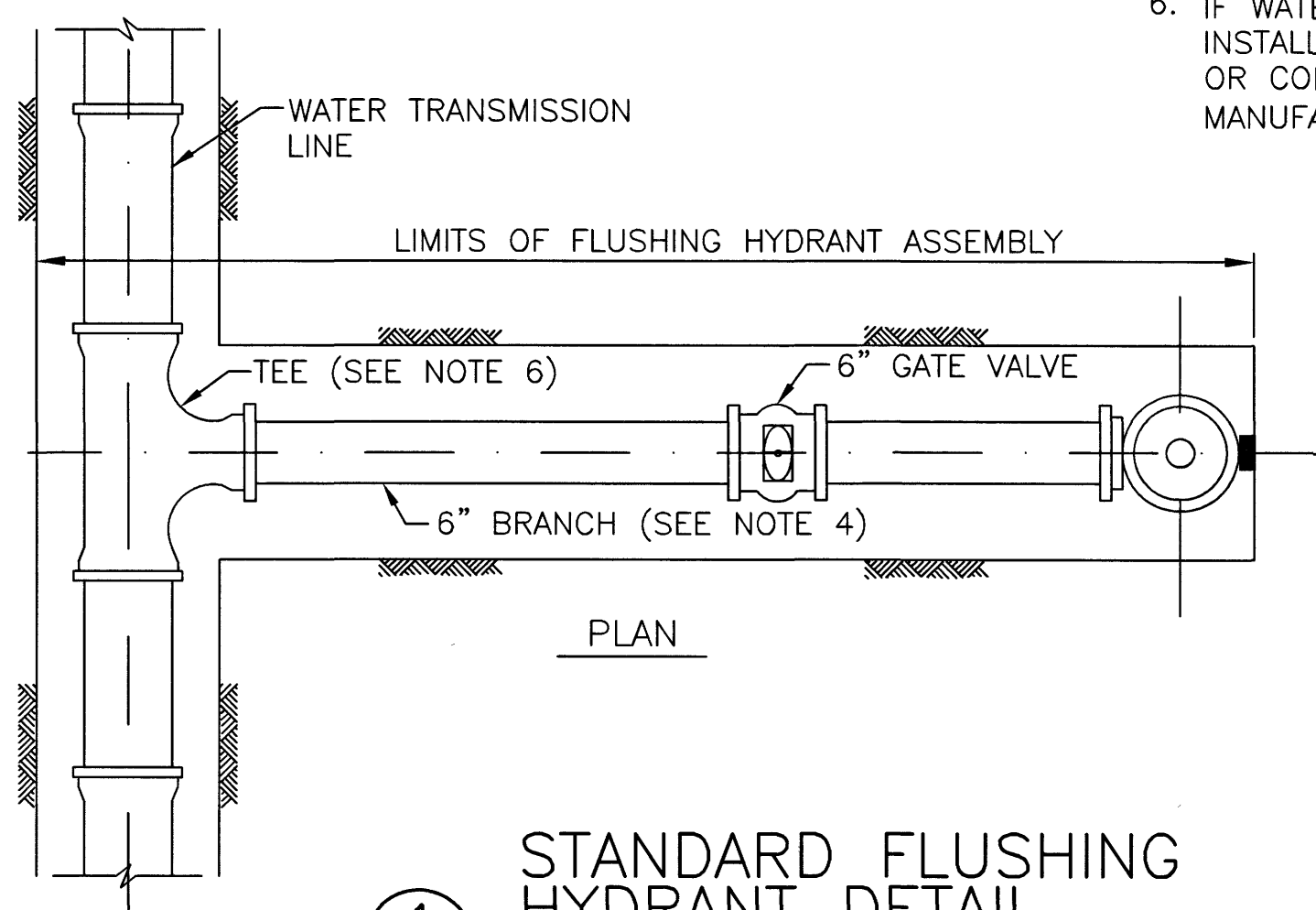
**DANNENBAUM**  
ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

SHEET No: 49 OF 99

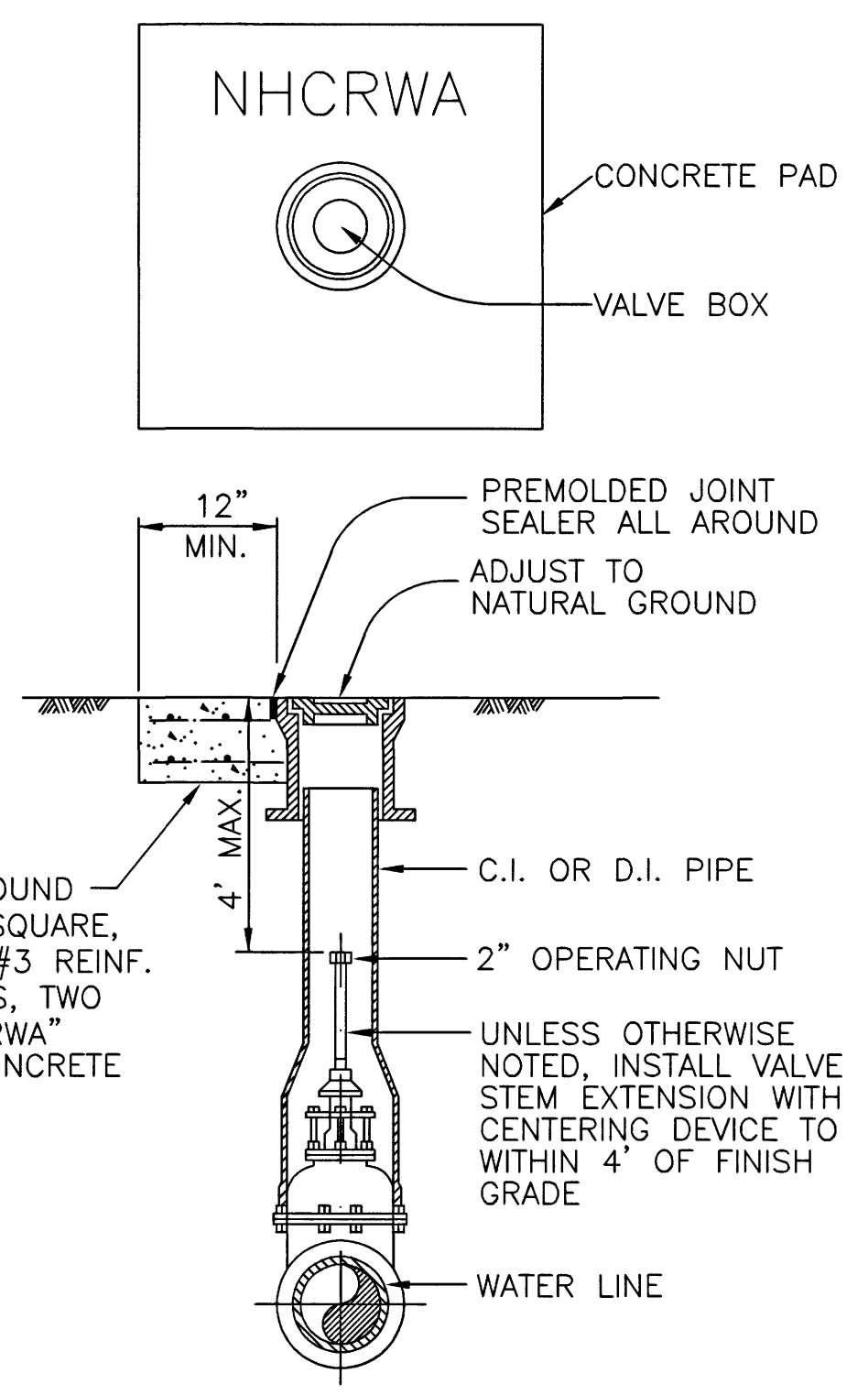
No.	Date	Revisions	App.



- NOTES:**
1. LOCATE FLUSHING HYDRANTS AS SHOWN ON PLANS.
  2. ON OPEN-DITCH ROADWAYS OR OTHER CORRIDORS, SET THE FLUSHING HYDRANTS WITHIN 3 FEET OF RIGHTS-OF-WAY LINES, EASEMENT LINE OR AS SHOWN ON PLANS.
  3. THE FLUSHING HYDRANT STEAMER NOZZLE SHALL FACE THE STREET UNLESS DIRECTED OTHERWISE BY ENGINEER.
  4. PROVIDE RESTRAINED JOINTS FOR FLUSHING HYDRANT ASSEMBLY.
  5. PAINT FLUSHING HYDRANT GLOSS BLACK PER SPEC 02520. INSTALL DISK ON PUMPER NOZZLE AND LABEL "FOR FLUSHING ONLY".
  6. IF WATER TRANSMISSION LINE IS PVC OR D.I. PIPE MATERIAL, INSTALL A D.I. TEE. IF WATER TRANSMISSION LINE IS STEEL OR CONCRETE CYLINDER PIPE MATERIAL, INSTALL A MANUFACTURER'S FLANGED TEE AT THE SPRING LINE.



**1** STANDARD FLUSHING HYDRANT DETAIL  
N.T.S.



PROVIDE CONCRETE PAD AROUND TOP OF VALVE BOXES 30" SQUARE, 8" THICK. REINFORCE WITH #3 REINF. BARS @ 8" C-C BOTH WAYS, TWO LAYERS. THE LETTERS "NHCRWA" SHALL BE STAMPED INTO CONCRETE (SEE NOTE 1).

**2** VALVE BOX DETAIL  
N.T.S.

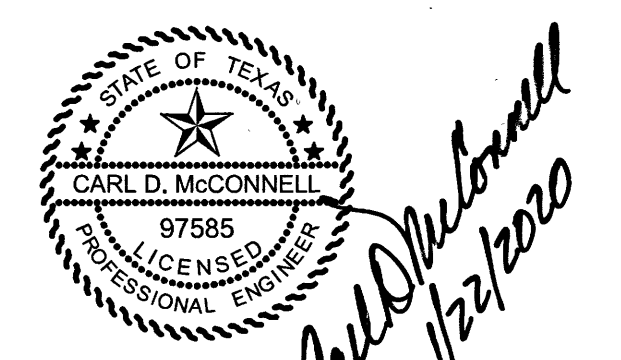
- NOTES:**
1. CONTRACTOR TO CONTACT AUTHORITY'S CONSTRUCTION MANAGER FOR USE OF NHCRWA CONCRETE STAMP.



**AECOM**  
AECOM TECHNICAL SERVICES, INC.  
18219 KATY FREEWAY, SUITE 100  
HOUSTON, TEXAS 77054-1009  
281.646.2400  
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TPE REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

**STANDARD WATER LINE DETAILS**



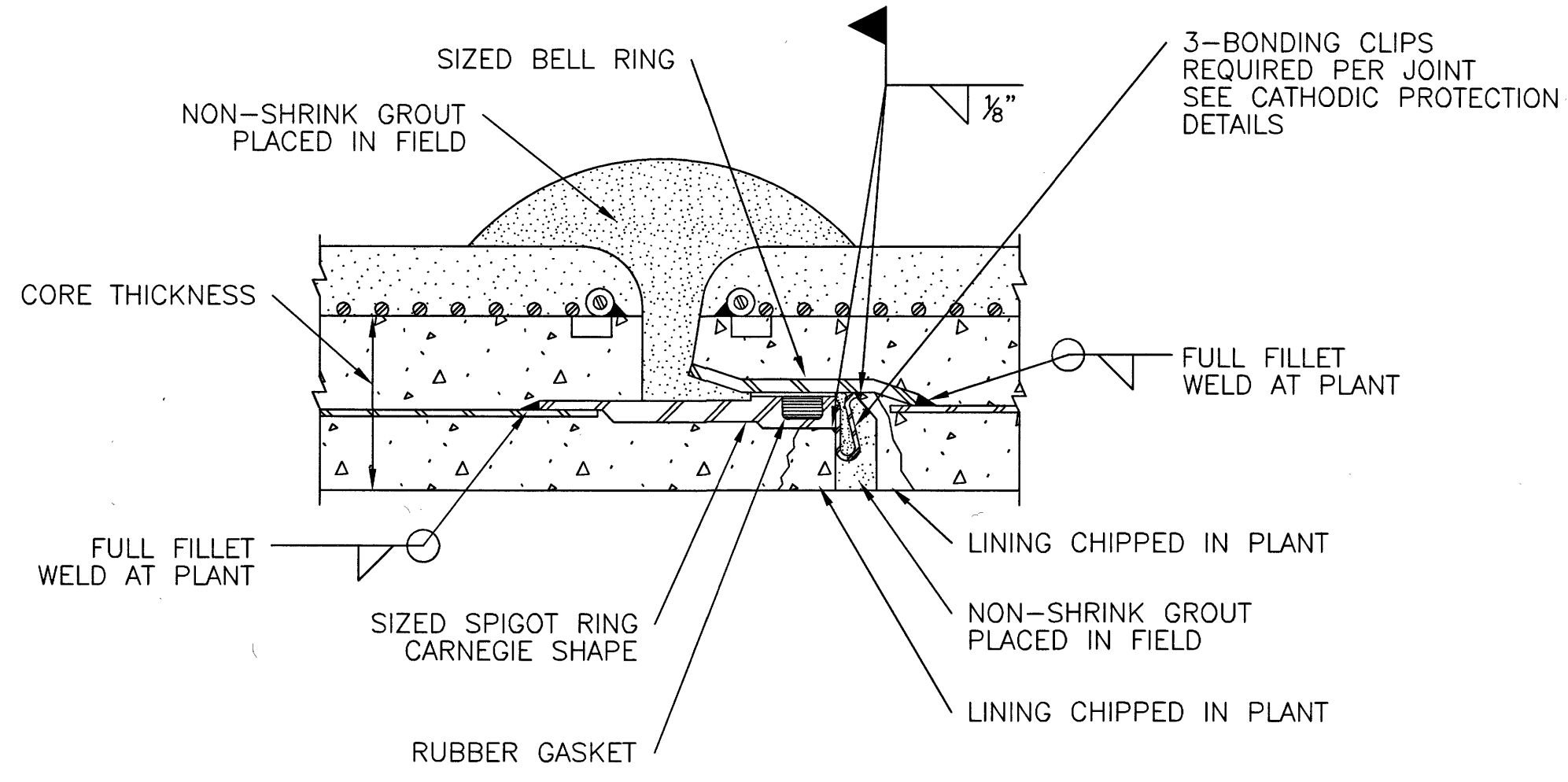
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ENGINEERING CORPORATION  
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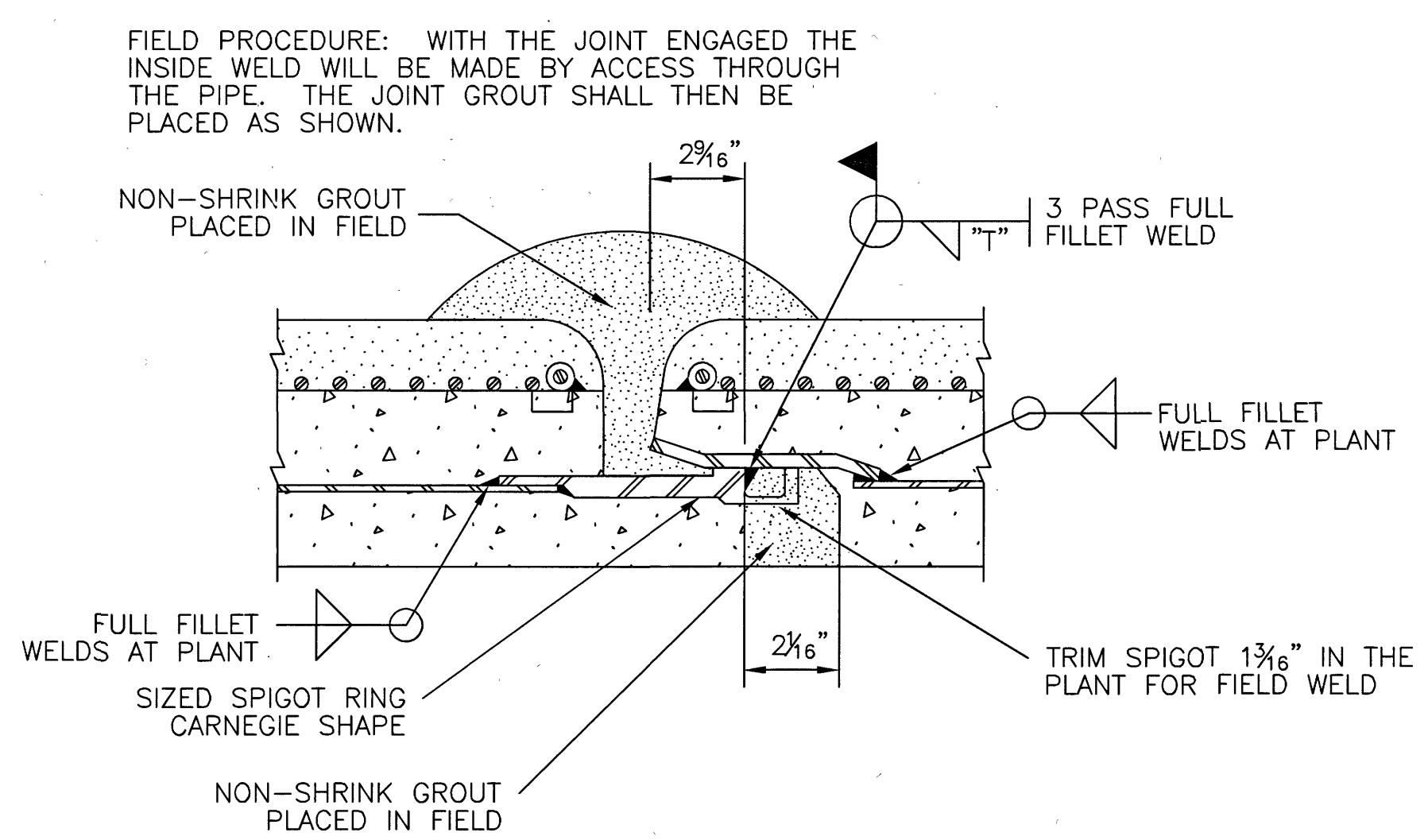
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 DWG. NAME: 4876-01\_51.dwg



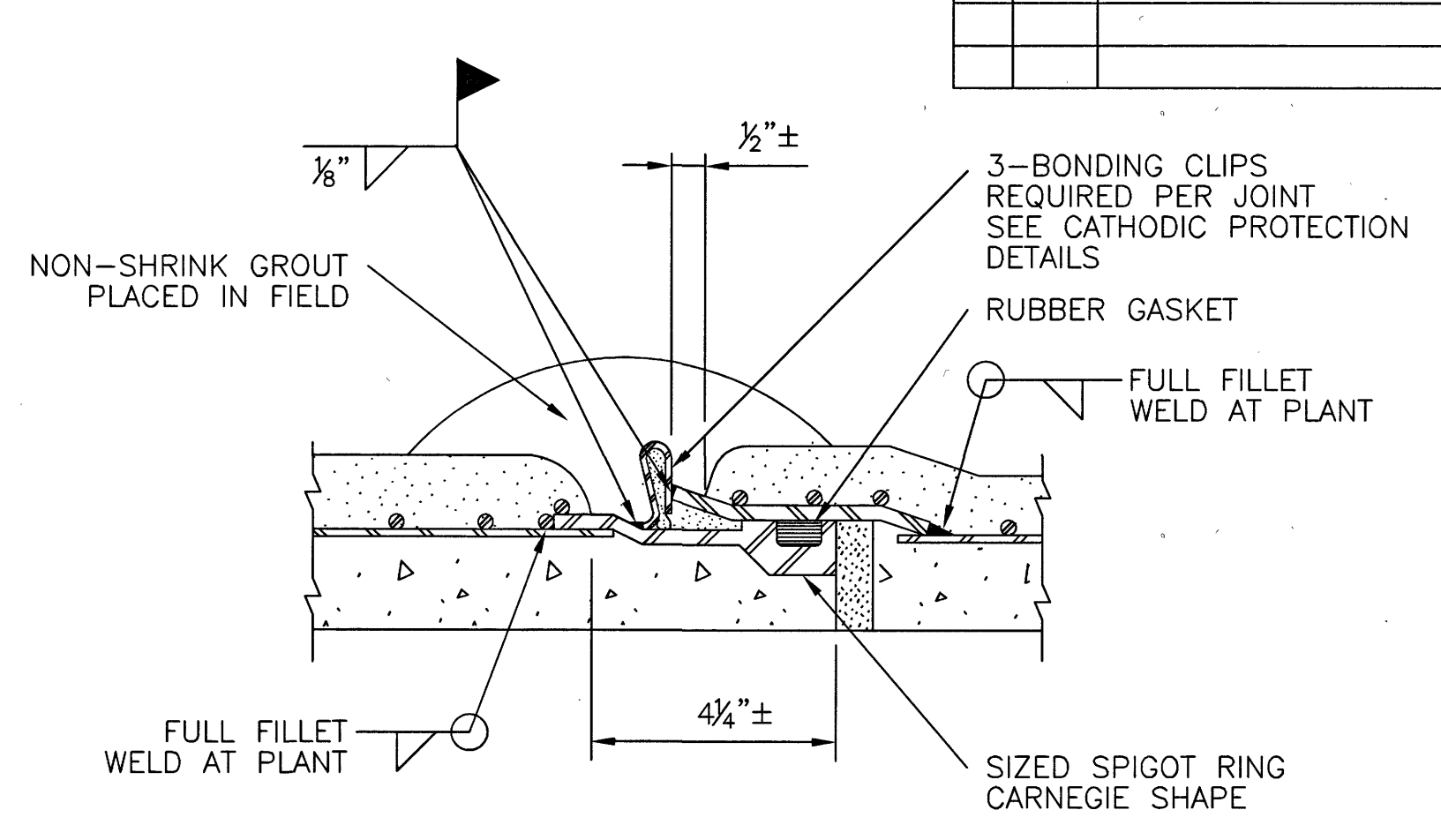
No.	Date	Revisions	App.



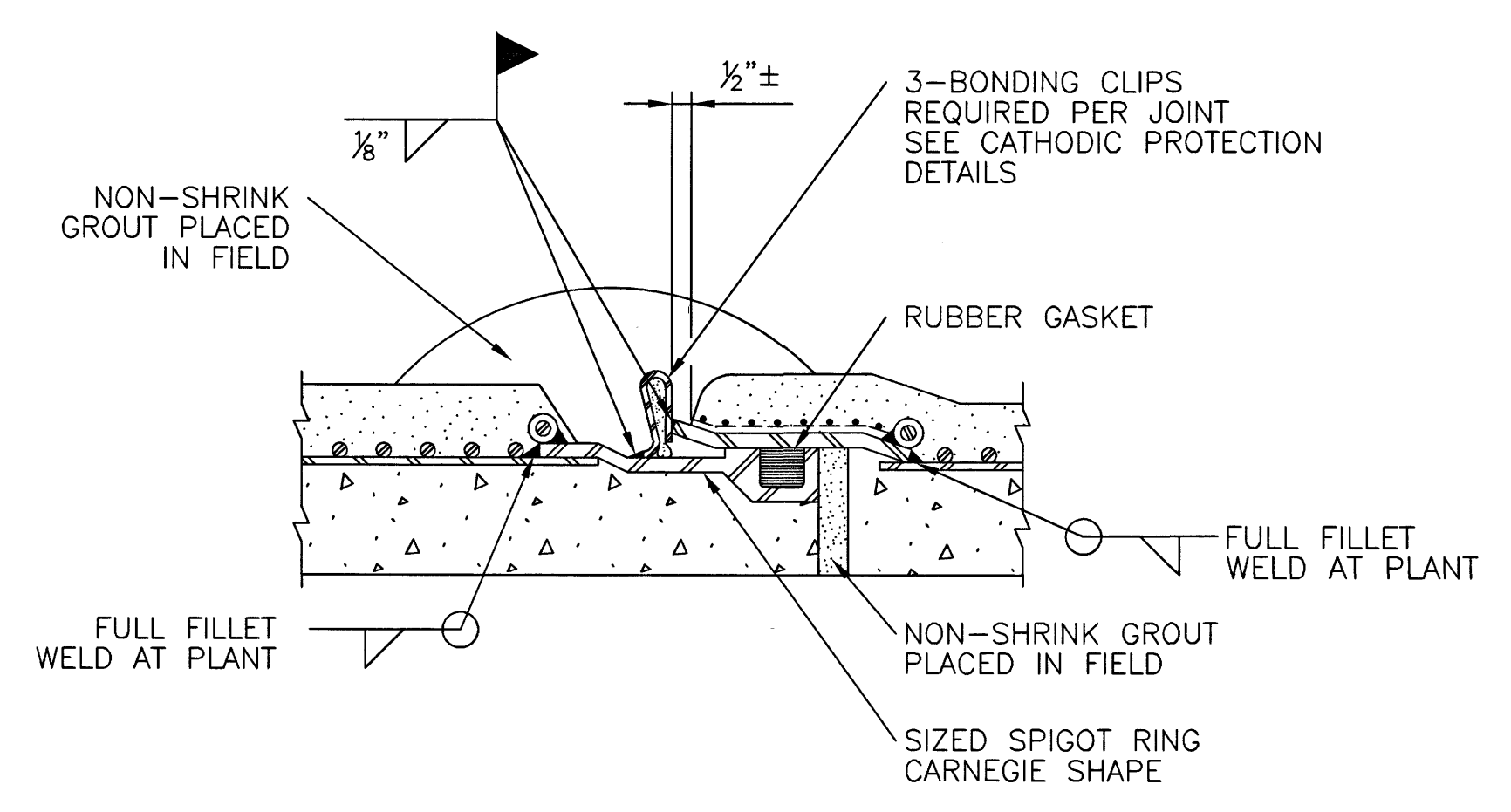
1 JOINT - EMBEDDED CYLINDER PIPE



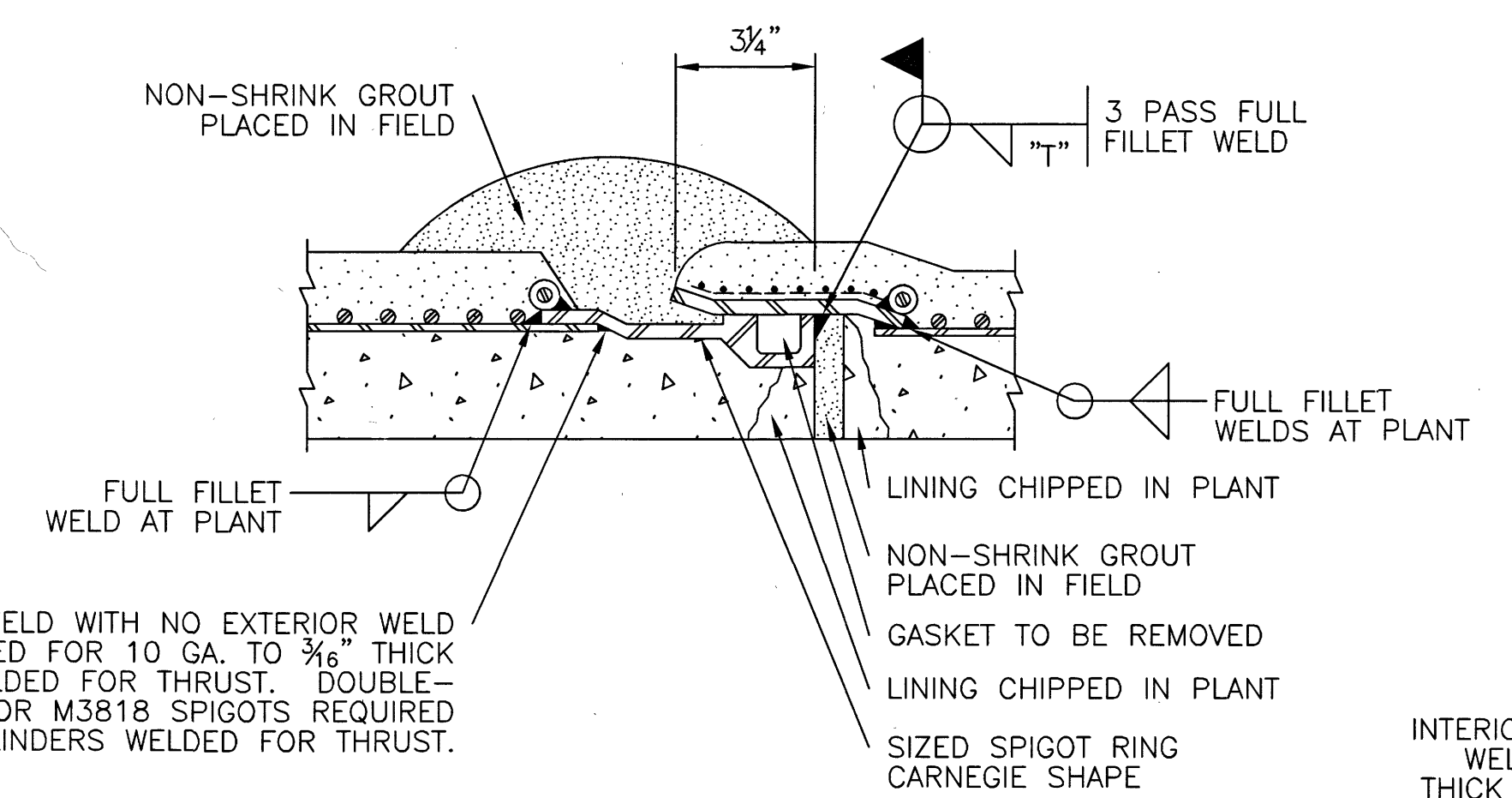
2 WELDED JOINT WITH TRIMMED SPIGOT - EMBEDDED CYLINDER PIPE



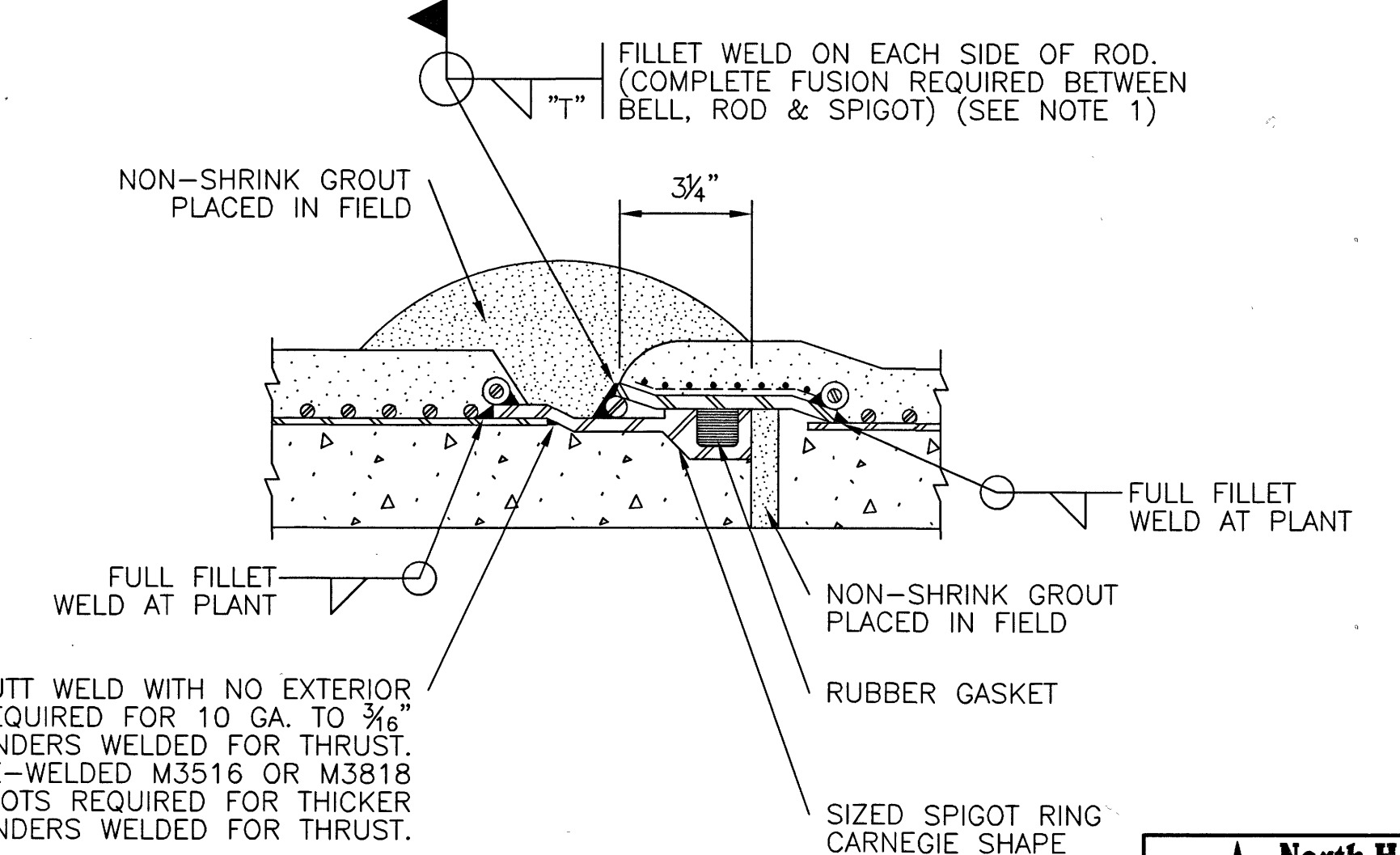
3 JOINT - BAR WRAPPED CYLINDER PIPE



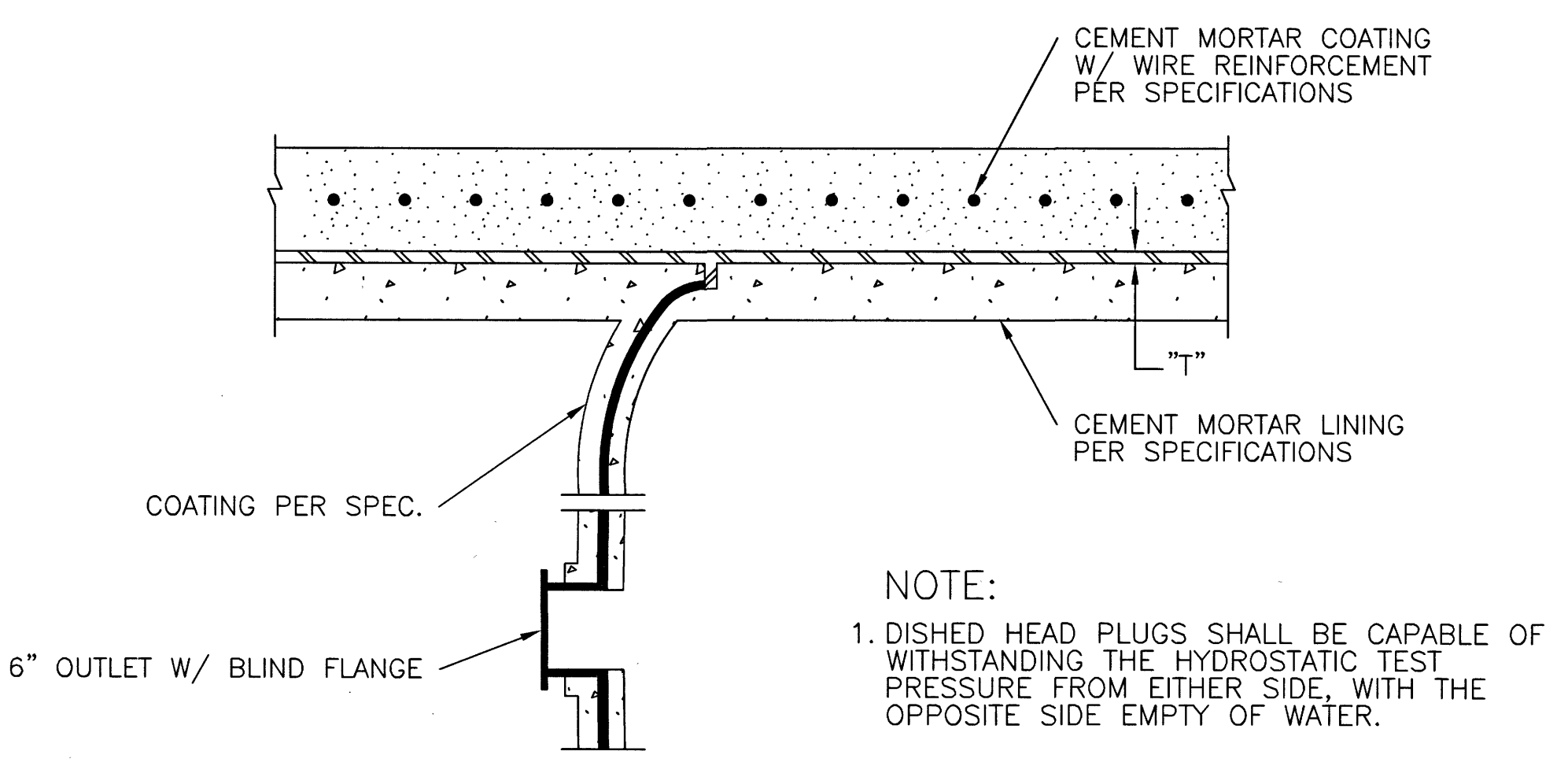
4 JOINT - LINED CYLINDER PIPE



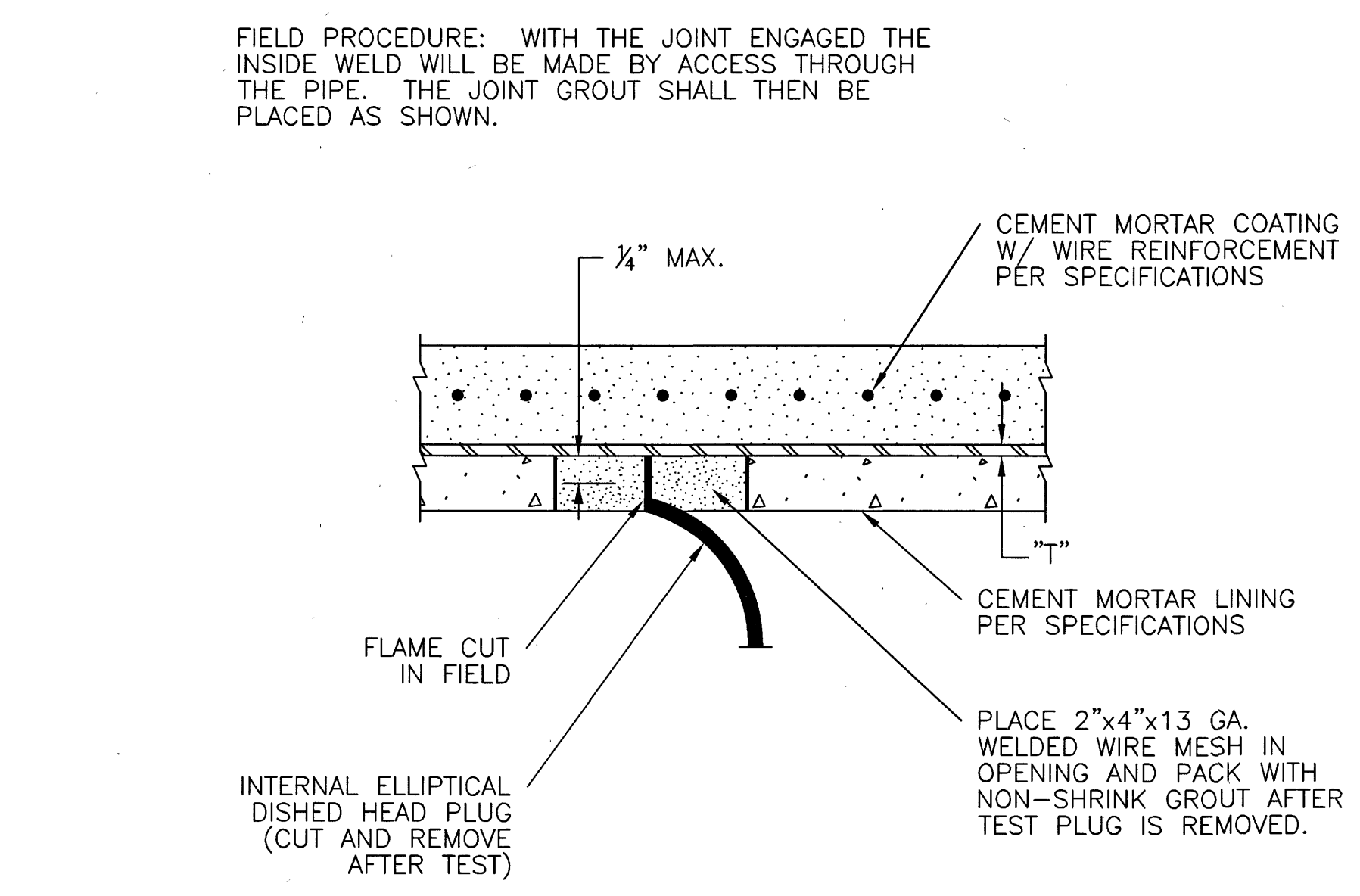
5 WELDED JOINT - LINED CYLINDER PIPE  
(INTERIOR WELD FOR WATERLINES 36-INCHES TO 84-INCHES DIAMETER)



6 WELDED JOINT - LINED CYLINDER PIPE  
(EXTERIOR WELD FOR WATER LINES LESS THAN 36-INCHES IN DIAMETER)



7 INTERNAL ELLIPTICAL DISHED HEAD PLUG  
CEMENT MORTAR LINING AND CEMENT MORTAR COATED STEEL PIPE SPECIAL



8 INTERNAL ELLIPTICAL DISHED HEAD PLUG REMOVAL  
CEMENT MORTAR LINING AND CEMENT MORTAR COATED STEEL PIPE SPECIAL

FIELD PROCEDURE: PLACE STEEL ROD SNUGLY INTO THE RECESS BETWEEN THE BELL AND SPIGOT. THE WELD MUST BE CONTINUOUS.

NOTES:

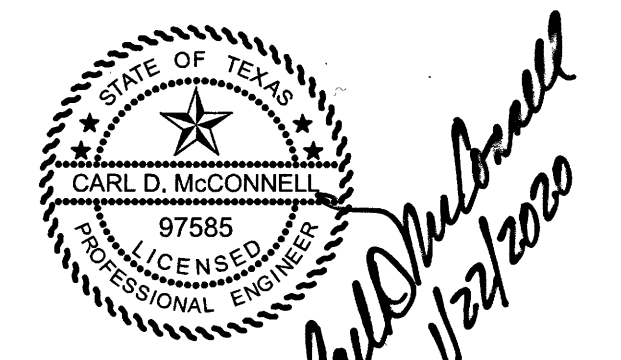
1. T = STEEL CYLINDER THICKNESS AND SIZE OF FILLET ATTACHMENT WELD.
2. FLEXIBLE MASTIC SEALER SHALL BE APPLIED TO THE EXTERIOR OF THE JOINT PRIOR TO JOINT ENGAGEMENT WHEN PIPE IS INSTALLED IN A TUNNEL OR ENCASEMENT PIPE.
3. DETAILS ON THIS SHEET ARE FOR WATER LINES 84-INCH DIAMETER AND UNDER.



AECOM TECHNICAL SERVICES, INC.  
19219 KATY FREEWAY, SUITE 100  
HOUSTON, TEXAS 77054-1009  
281.646.2400  
WWW.AECOM.COM  
TYPE REG. NO. F-3580

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

PRESTRESSED CONCRETE CYLINDER PIPE DETAILS



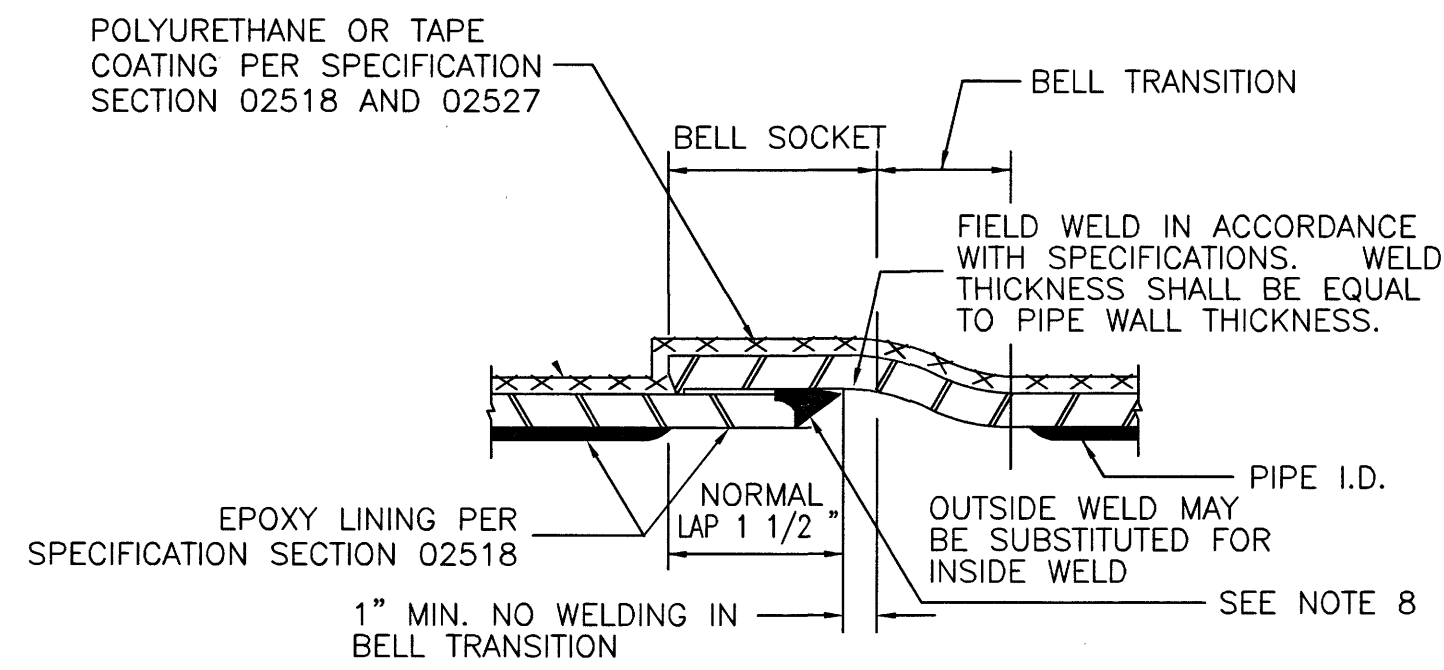
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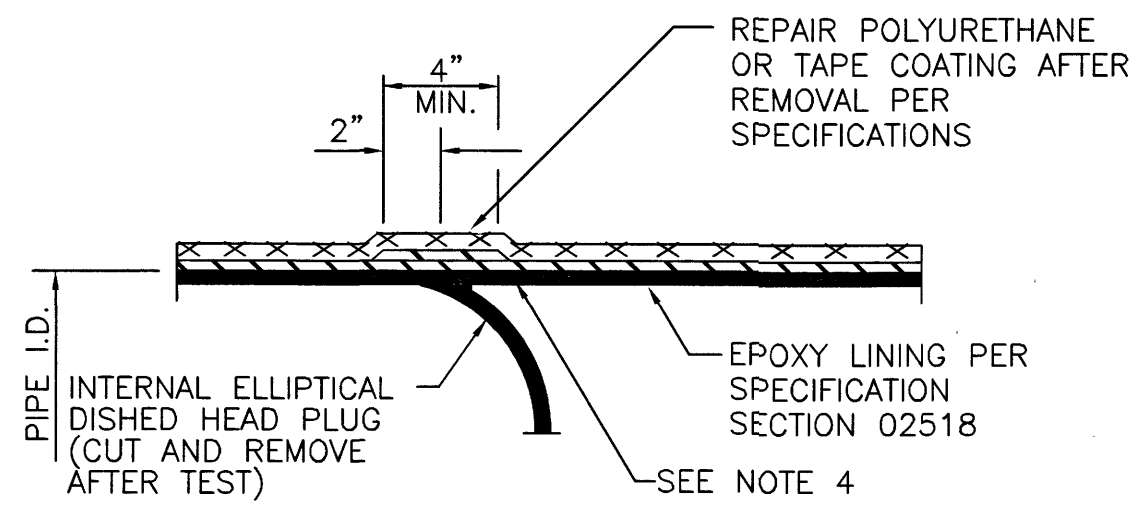
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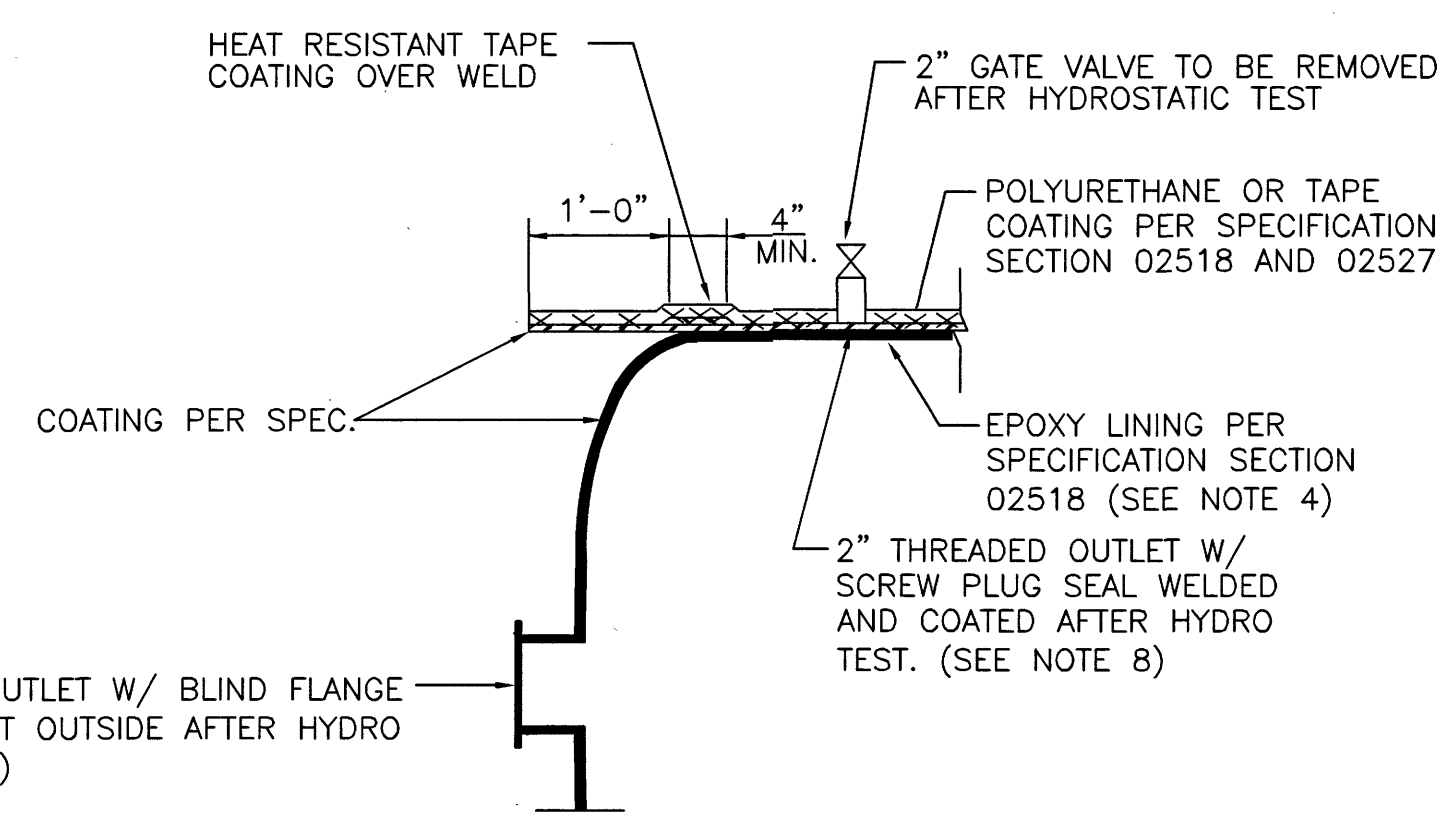
No.	Date	Revisions	App.



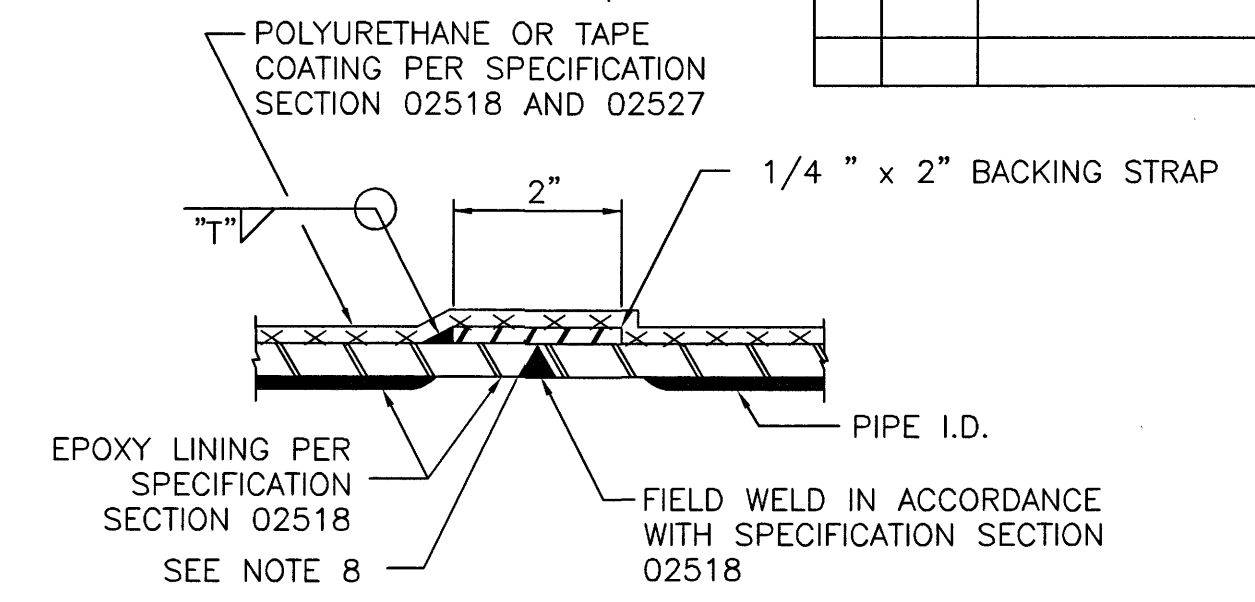
**1** LAP-WELD FIELD JOINT - STEEL PIPE  
FLEXIBLE COATING AND LINING



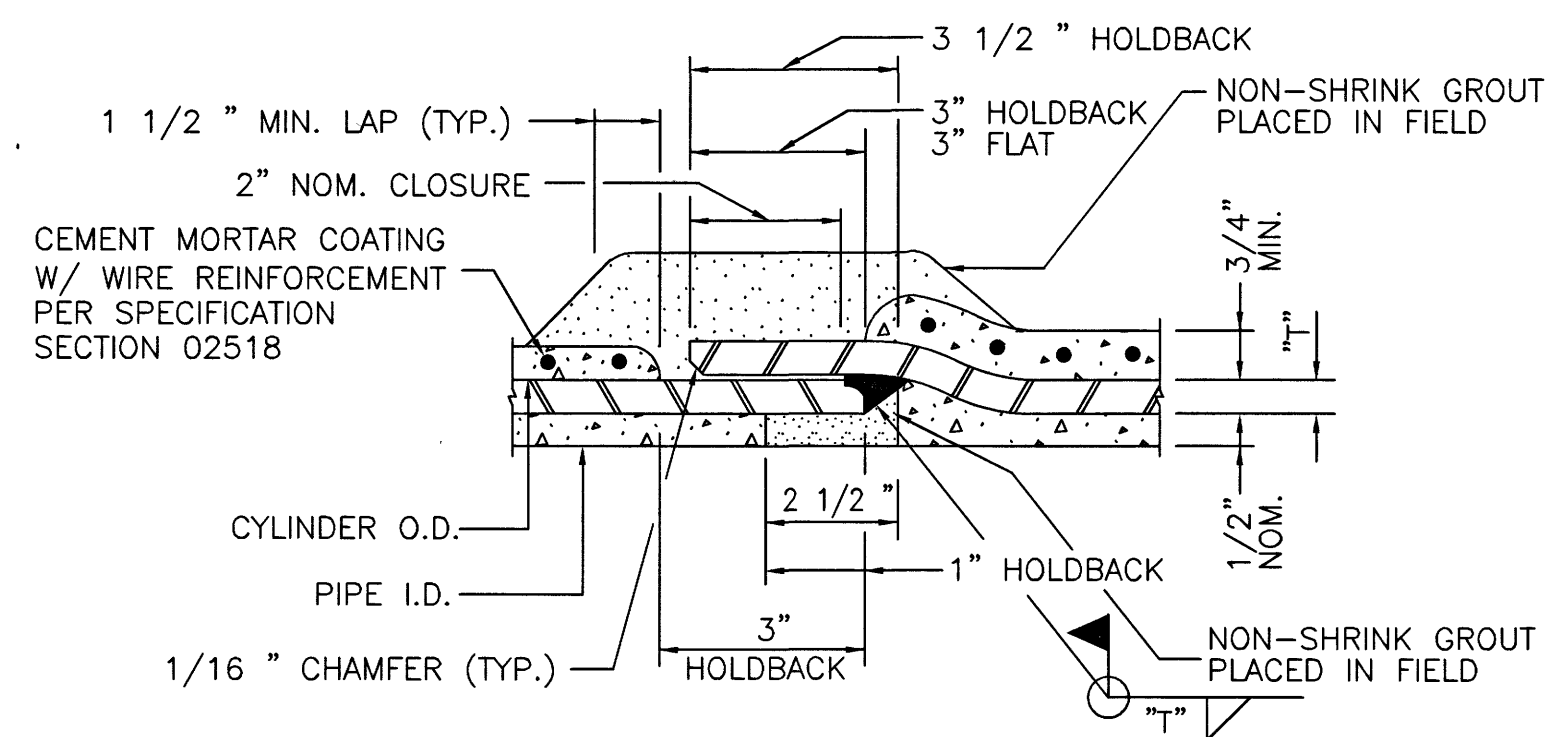
**2** INTERNAL ELLIPTICAL DISHED HEAD PLUG REMOVAL STEEL PIPE  
FLEXIBLE COATING AND LINING



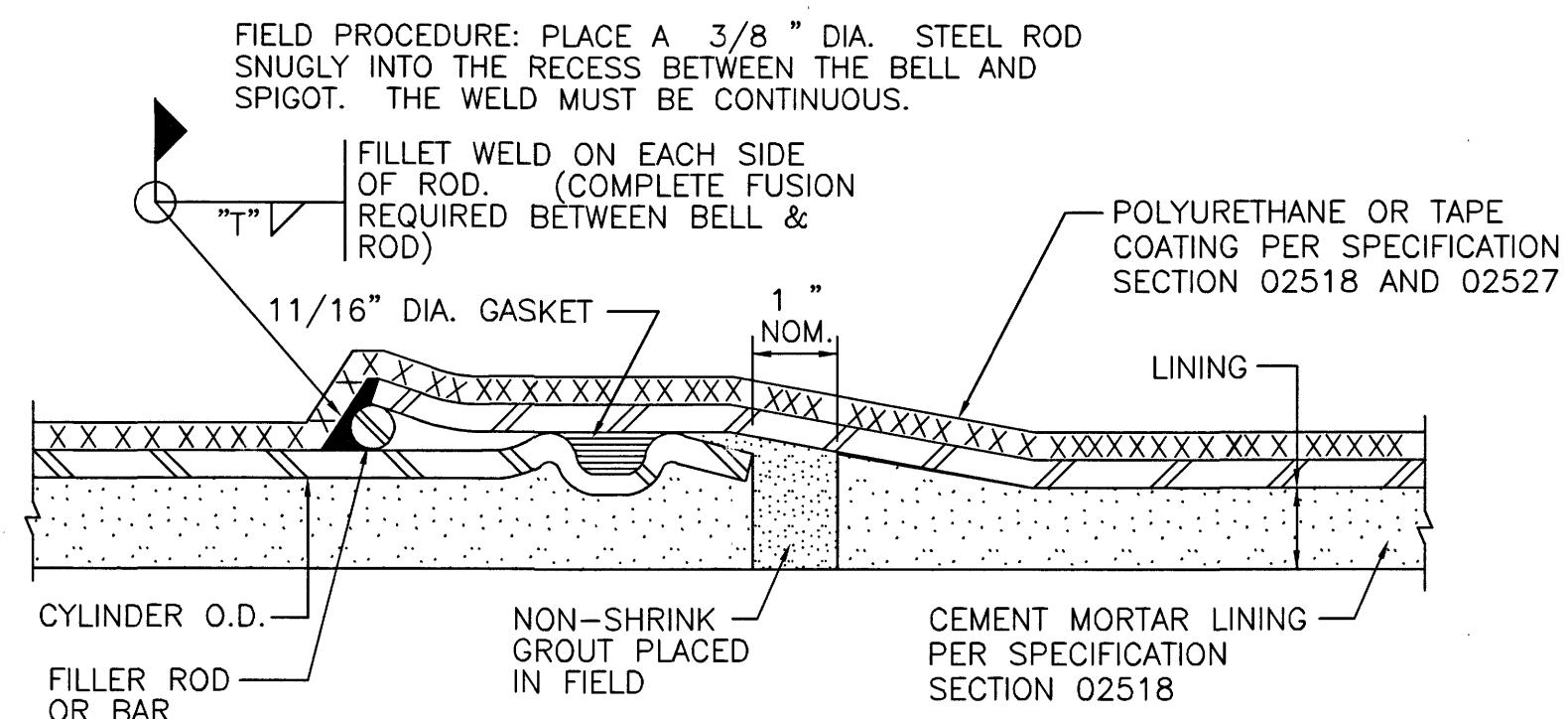
**3** INTERNAL ELLIPTICAL DISHED HEAD PLUG STEEL PIPE  
FLEXIBLE COATING AND LINING



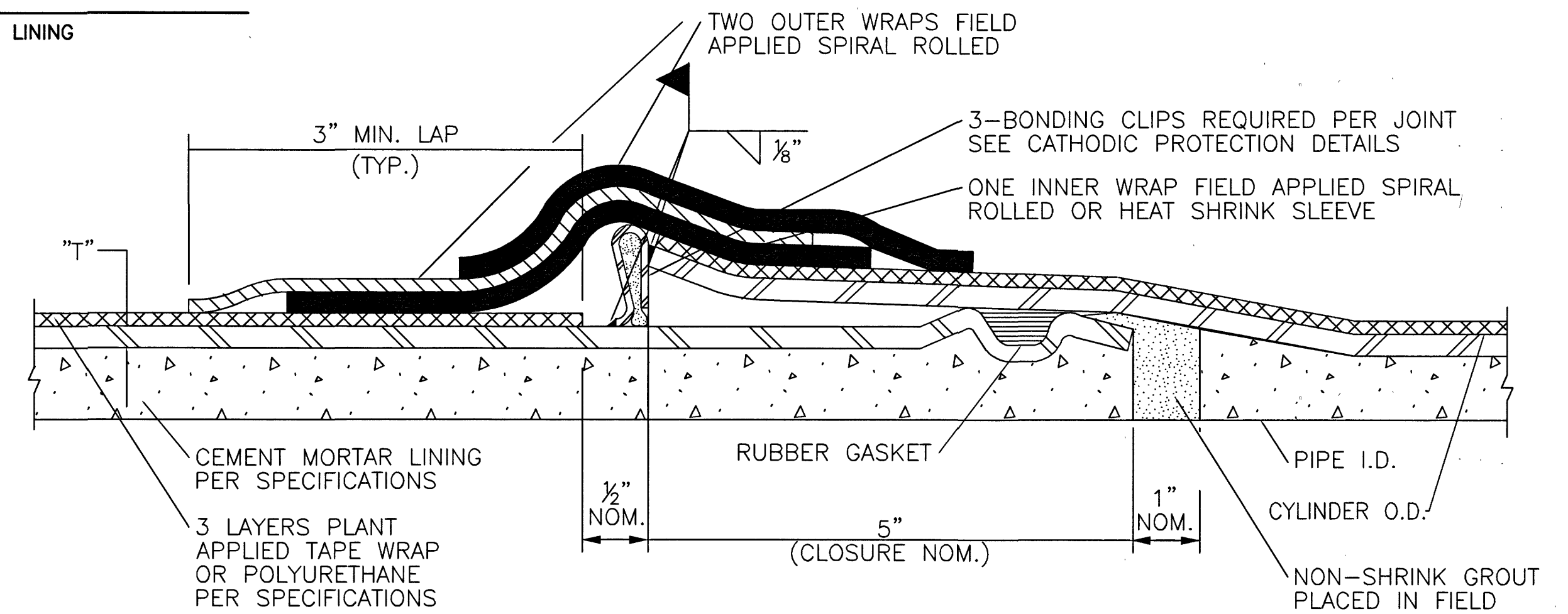
**4** BUTT WELD FIELD JOINT - STEEL PIPE  
FLEXIBLE COATING AND LINING



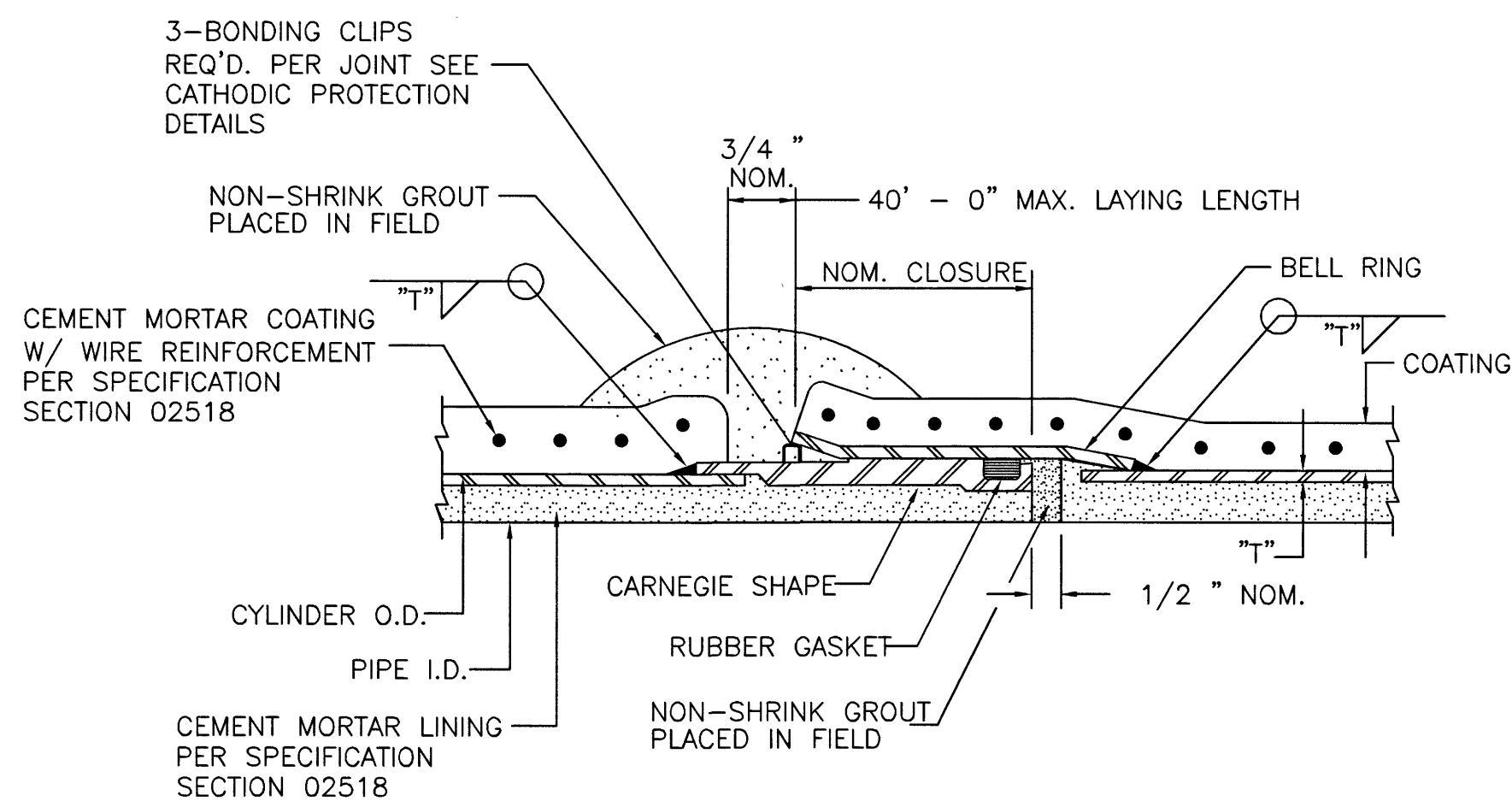
**5** LAP-WELD FIELD JOINT-STEEL PIPE  
CEMENT MORTAR LINED AND CEMENT MORTAR COATED



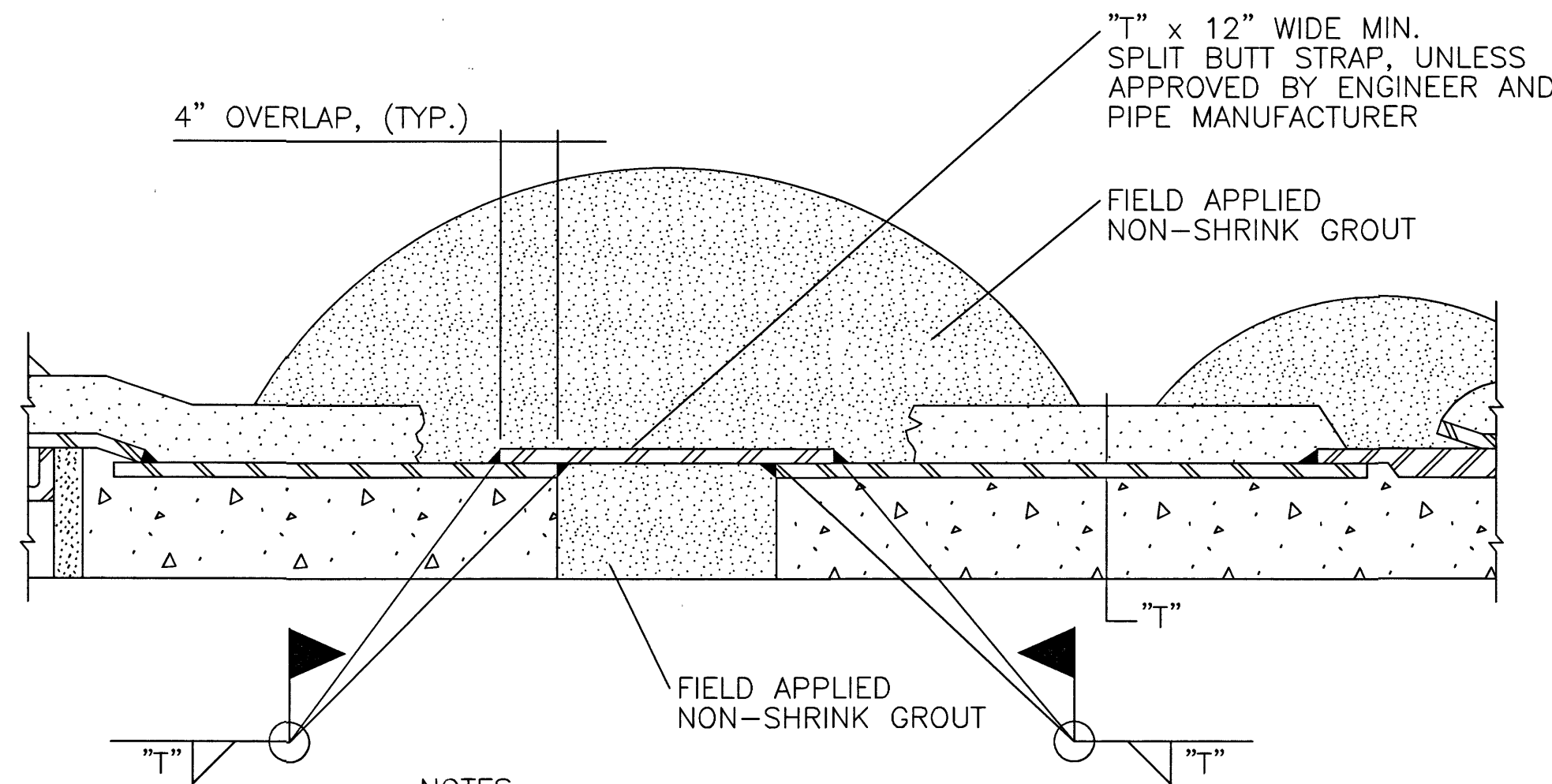
**6** FIELD WELDED O-RING JOINT  
FLEXIBLE COATING AND CEMENT MORTAR LINING (FOR ADJUSTMENTS ONLY AS APPROVED BY ENGINEER AND PIPE MANUFACTURER)



**7** O-RING - STEEL PIPE JOINT  
CEMENT MORTAR LINED & FLEXIBLE COATING



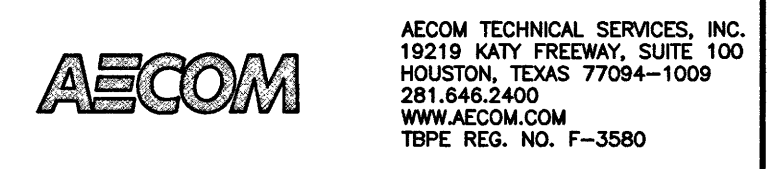
**8** CARNEGIE JOINT - STEEL PIPE  
CEMENT MORTAR LINED AND CEMENT MORTAR COATED



**9** CLOSURE PIECE  
FOR STEEL PIPE WITH CEMENT MORTAR LINED AND CEMENT MORTAR COATED (SIMILAR FOR FLEXIBLE COATING AND LINING)

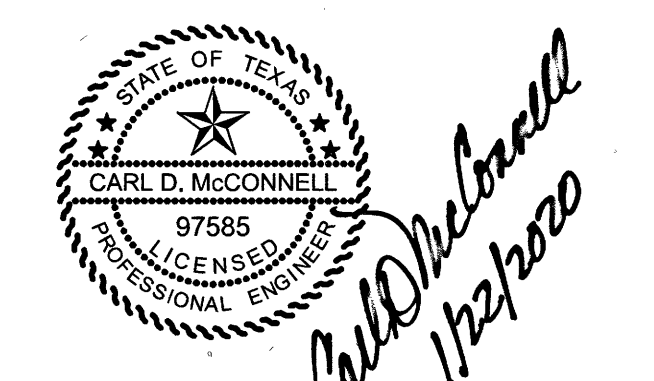
**NOTES:**

1. T = STEEL PIPE WALL THICKNESS AND SIZE OF FILLET ATTACHMENT WELD.
2. ALL REFERENCES TO PIPE DIAMETER FOR THIS PROJECT SHALL SIGNIFY SIZE MEASURED TO INSIDE DIAMETER OF THE LINED PIPE.
3. REFER TO SPECIFICATION SECTIONS 02518 AND 02527 FOR POLYURETHANE ALTERNATIVE TO TAPE OR CEMENT MORTAR COATING.
4. DETAILS 1, 2, 3 AND 4 SHOW EPOXY LINING. CEMENT MORTAR LINING TO BE SIMILAR TO DETAILS ON THIS SHEET SHOWING CEMENT MORTAR LINED PIPE, AS APPROVED BY ENGINEER.
5. DETAILS 5 AND 8 SHOW CEMENT MORTAR COATING. POLYURETHANE OR TAPE COATING TO BE SIMILAR TO DETAILS ON THIS SHEET SHOWING POLYURETHANE OR TAPE COATING, AS APPROVED BY ENGINEER.
6. INSTALL 6 INCH FLANGED OUTLETS ON EITHER SIDE OF THE DISHED HEAD PLUG
7. DISHED HEAD PLUGS SHALL BE CAPABLE OF WITHSTANDING THE HYDROSTATIC TEST PRESSURE FROM EITHER SIDE, WITH THE OPPOSITE SIDE EMPTY OF WATER.
8. SEE SPECIFICATION SECTION 02518 FOR REPAIR OF EPOXY LINING.
9. WHEN CEMENT MORTAR COATING IS USED FOR STEEL PIPE, FLEXIBLE MASTIC SEALER SHALL BE APPLIED TO THE EXTERIOR OF THE JOINT PRIOR TO JOINT ENGAGEMENT WHEN PIPE IS INSTALLED IN A TUNNEL OR ENCASEMENT PIPE.



NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

**STEEL PIPE DETAILS**



DRAWN BY: CHECKED BY:



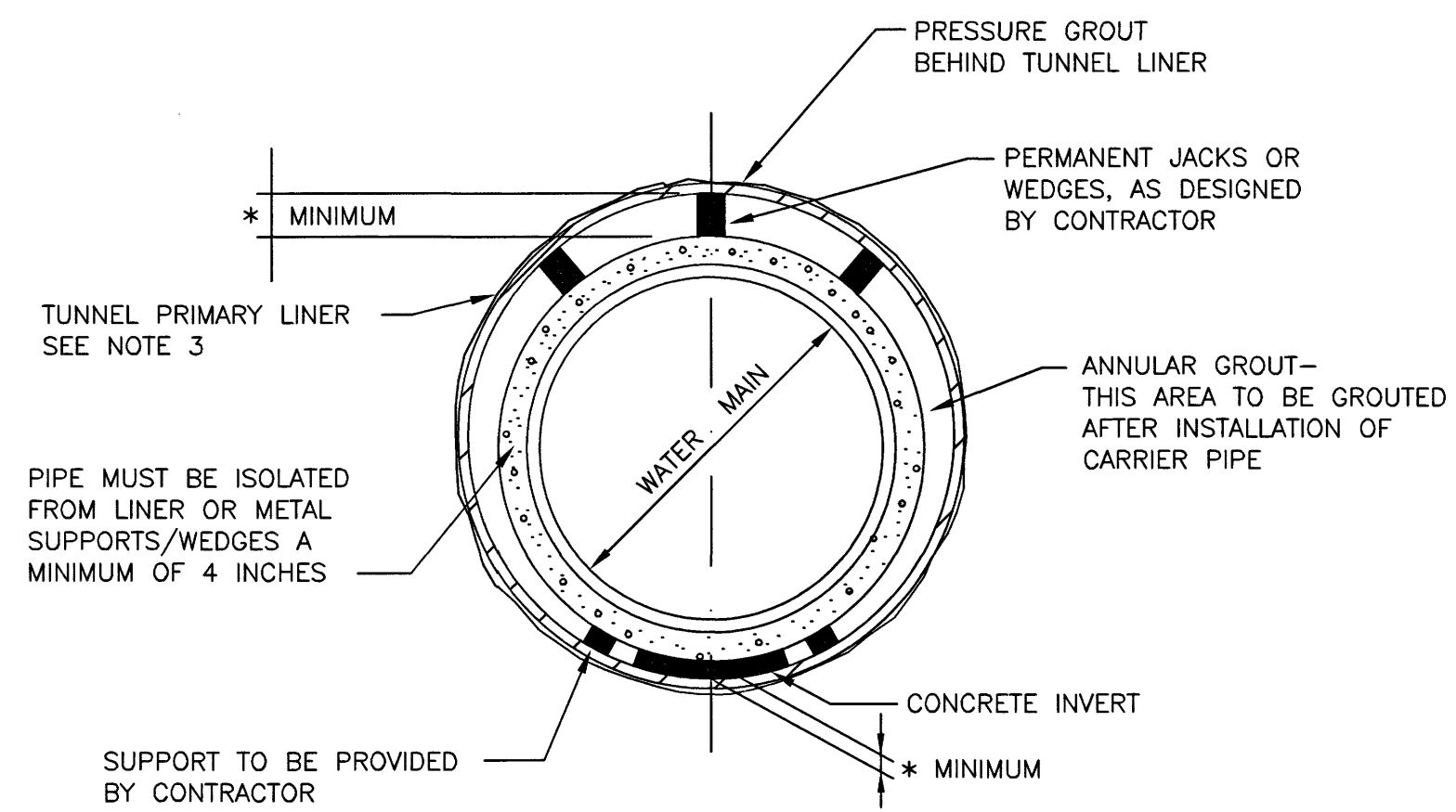
SHEET No. 53 OF 99

LAST MODIFIED: Jan 21, 2020 - 10:13am BY USER: jimvy  
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No.	Date	Revisions	App.

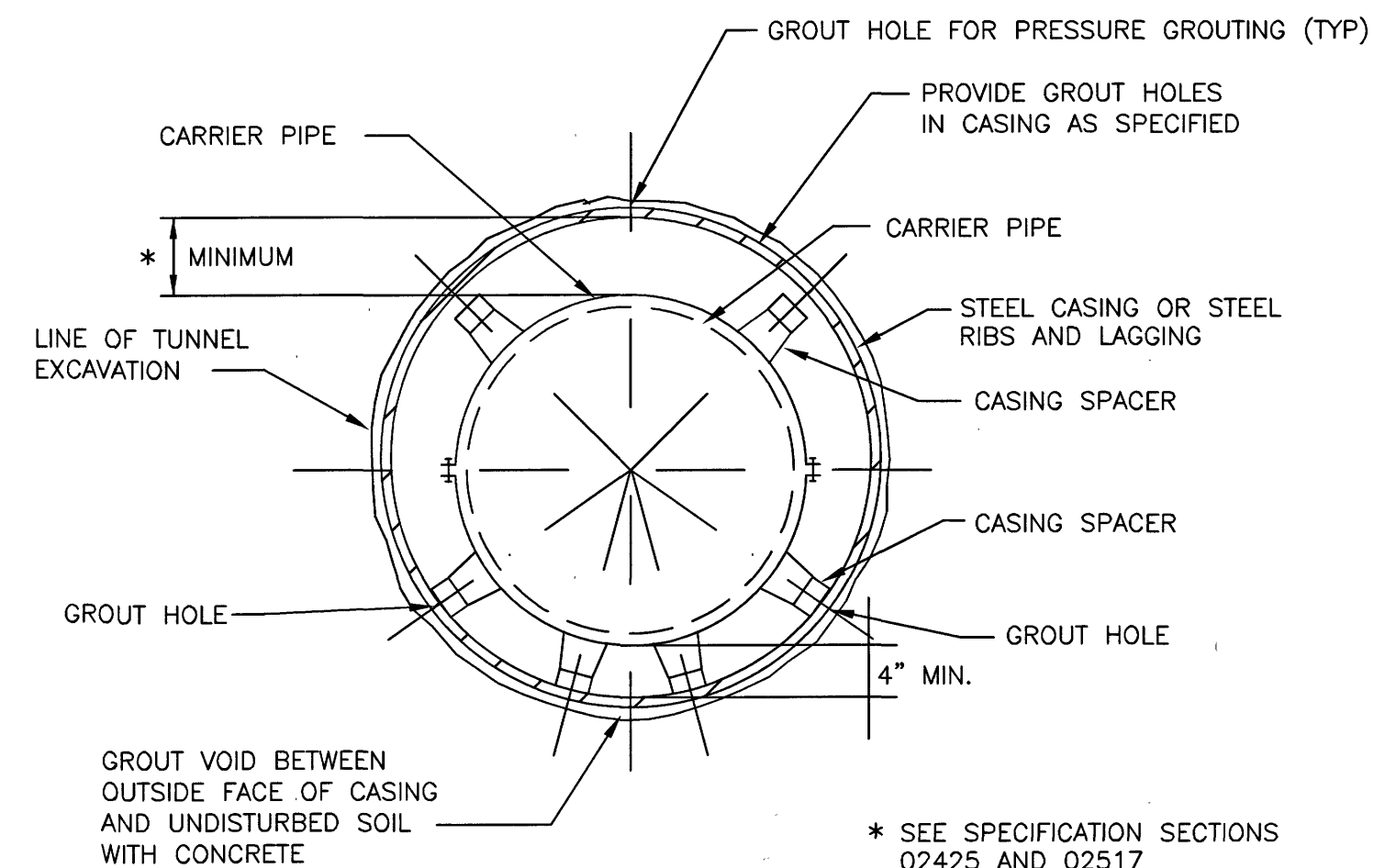


**NOTES:**

1. DETAIL IS FOR PRESTRESSED CONCRETE CYLINDER PIPE (STEEL PIPE AND D.I.P. ALTERNATE SIMILAR).
2. MINIMUM CLEARANCES SHOWN ON THE PLAN & PROFILE DRAWINGS ARE TO THE O.D. OF TUNNEL LINER. ADJUST PROFILE AS REQUIRED TO MAINTAIN CLEARANCES IDENTIFIED. NO SEPARATE PAY.
3. CONTRACTOR TO PROVIDE SUBMITTAL OF THE TUNNEL LINER DESIGN SIGNED AND SEALED BY A PROFESSIONAL ENGINEER.

\* SEE SPECIFICATION SECTIONS 02425 AND 02517

**1 TUNNEL DETAIL**  
(FOR WATER MAINS 36 INCHES AND LARGER)

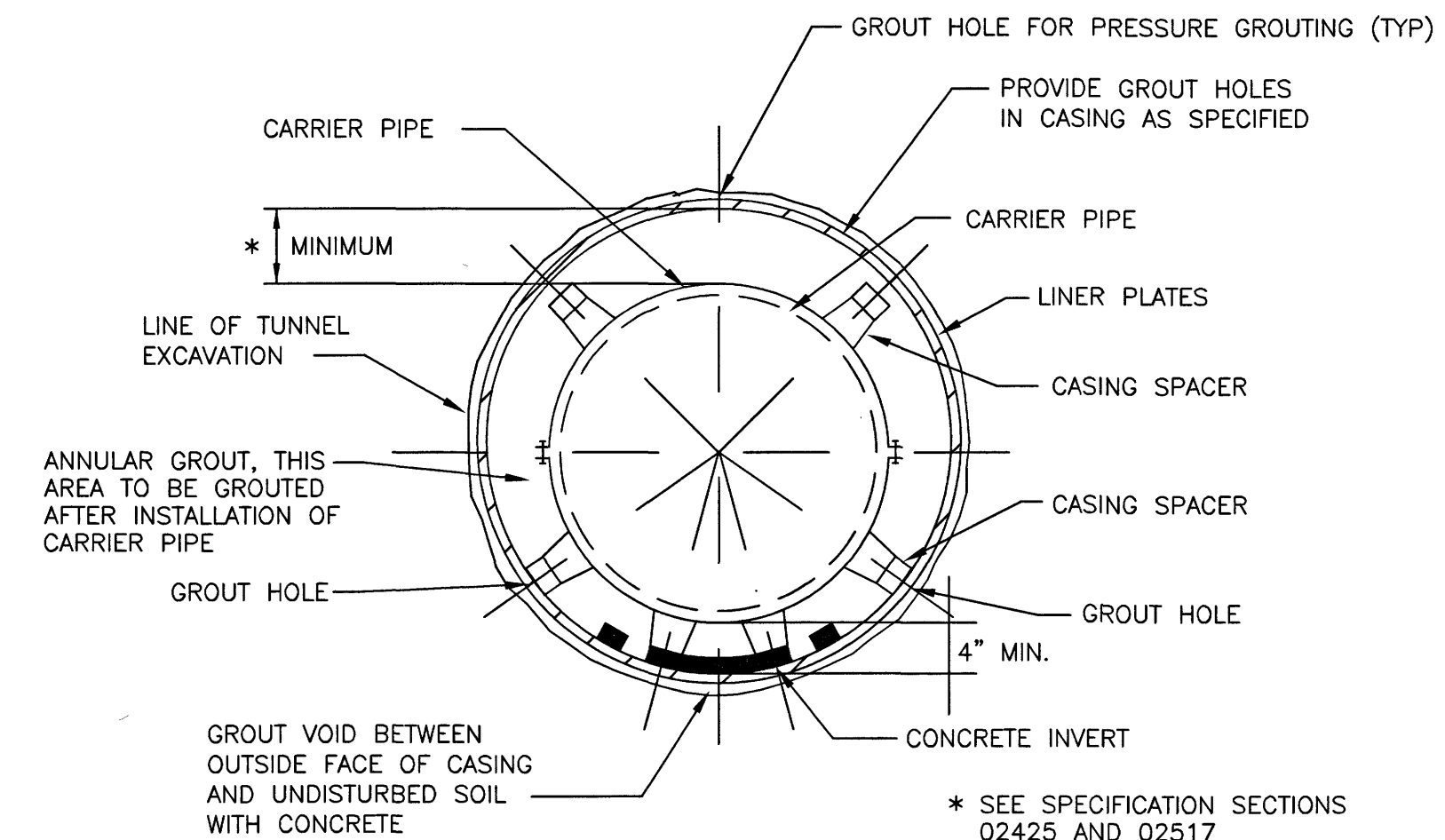


**NOTES:**

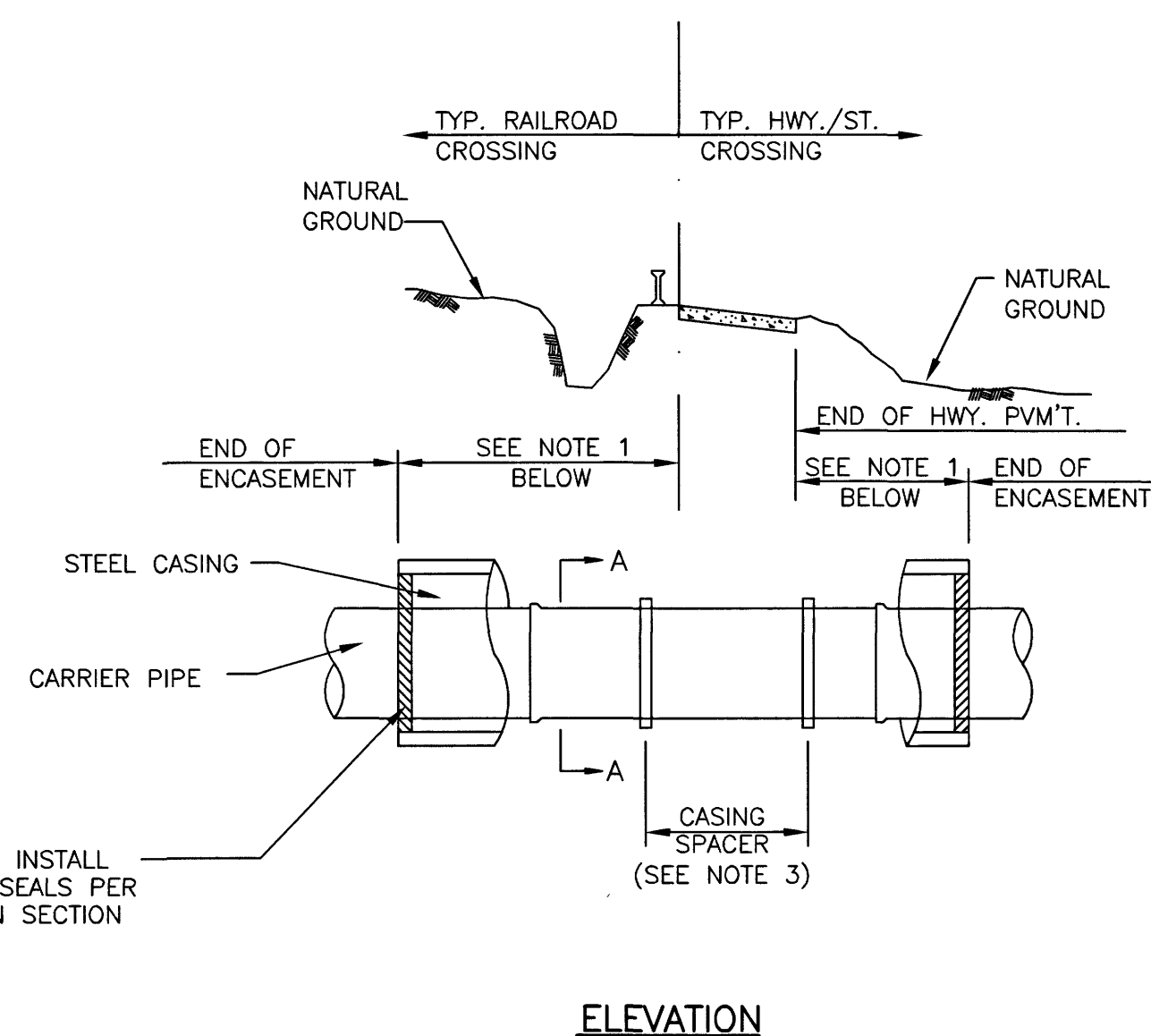
1. DETAIL IS FOR PVC PIPE (PRESTRESSED CONCRETE CYLINDER PIPE, STEEL PIPE, AND D.I.P. ALTERNATE SIMILAR).
2. MINIMUM CLEARANCES SHOWN ON THE PLAN & PROFILE DRAWINGS ARE TO THE O.D. OF TUNNEL LINER. ADJUST PROFILE AS REQUIRED TO MAINTAIN CLEARANCES IDENTIFIED. NO SEPARATE PAY.
3. CONTRACTOR TO PROVIDE SUBMITTAL OF THE TUNNEL LINER DESIGN SIGNED AND SEALED BY A PROFESSIONAL ENGINEER.

\* SEE SPECIFICATION SECTIONS 02425 AND 02517

**2 TUNNEL DETAIL**  
(FOR WATER MAINS LESS THAN 36 INCHES WITH STEEL CASING OR STEEL RIBS AND LADDING)



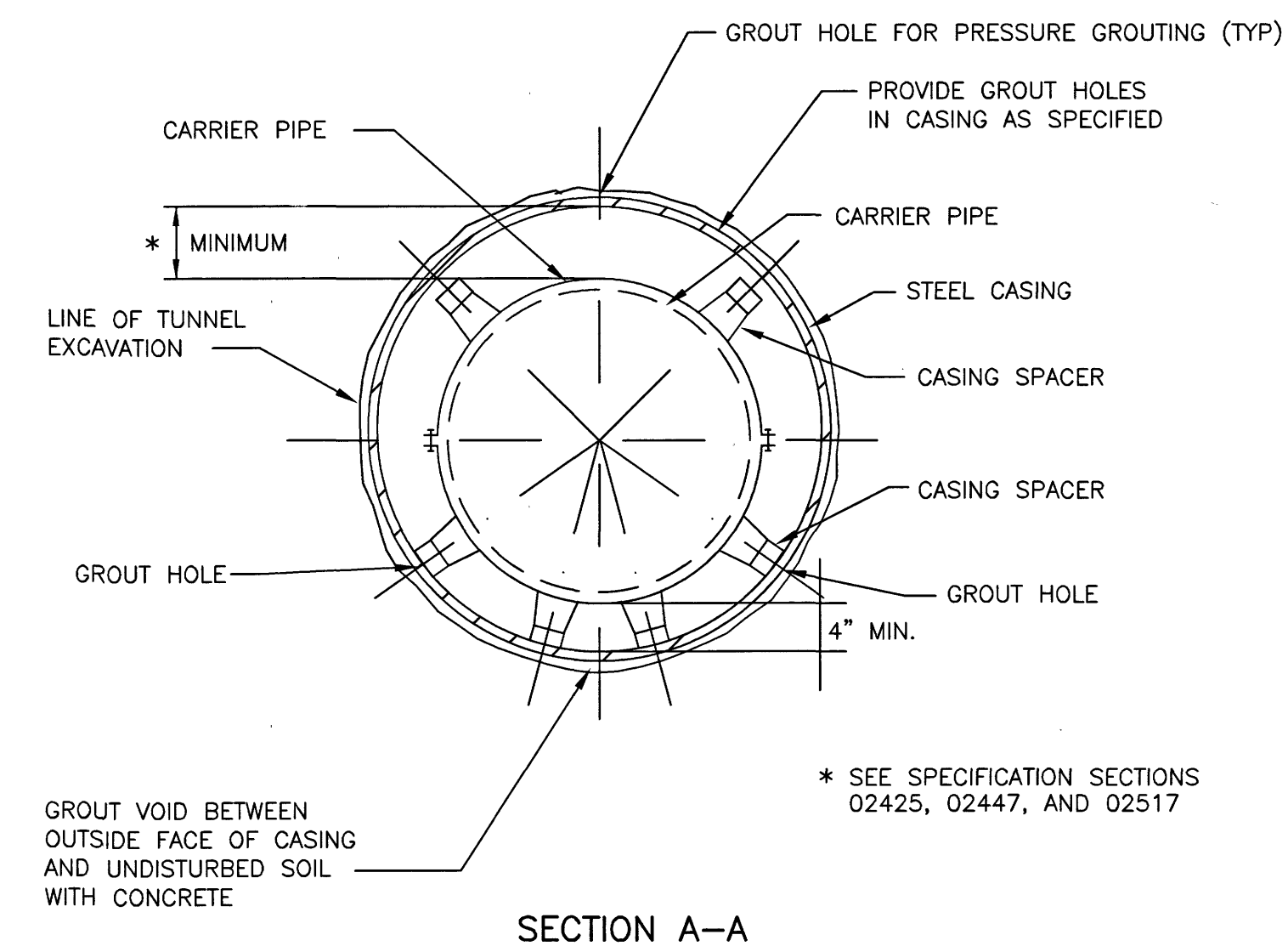
**3 TUNNEL DETAIL**  
(FOR WATER MAINS LESS THAN 36 INCHES WITH LINER PLATES)



**NOTES:**

1. LENGTH OF ENCASEMENT SHALL BE AS SHOWN ON THE PLAN & PROFILE DRAWINGS.
2. LAY CASING PIPE IN OPEN CUT, TUNNEL OR BORE, AS NOTED ON PLAN & PROFILE DRAWINGS.
3. SEE SPECIFICATION SECTIONS 02447 AND 02517 FOR APPROPRIATE MODEL ACCORDING TO PIPE DIAMETER.

**4 CASING DETAIL FOR DRY SLURRY AUGERING OF PIPE AND CONDUIT**  
(FOR WATER MAINS LESS THAN 36-INCHES IN DIAMETER)



**NOTE**

1. ALL CASING IN PPCM AREA TO BE GROUTED.

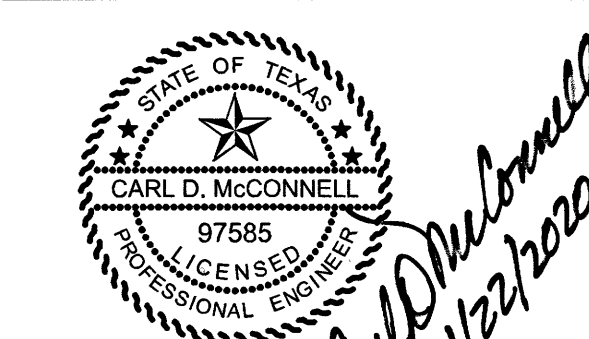
\* SEE SPECIFICATION SECTIONS 02425, 02447, AND 02517



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NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

**TUNNEL AND CASING DETAILS**



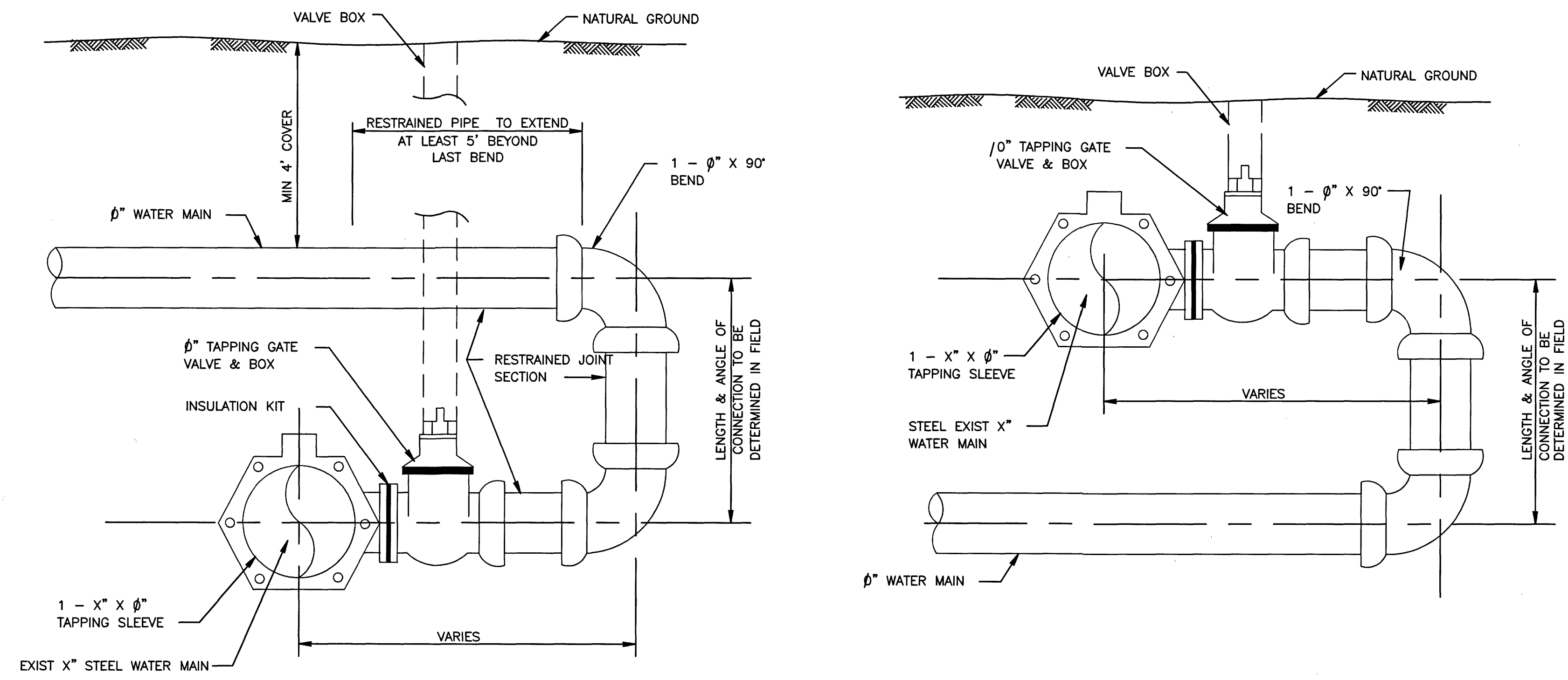
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**DANNENBAUM**

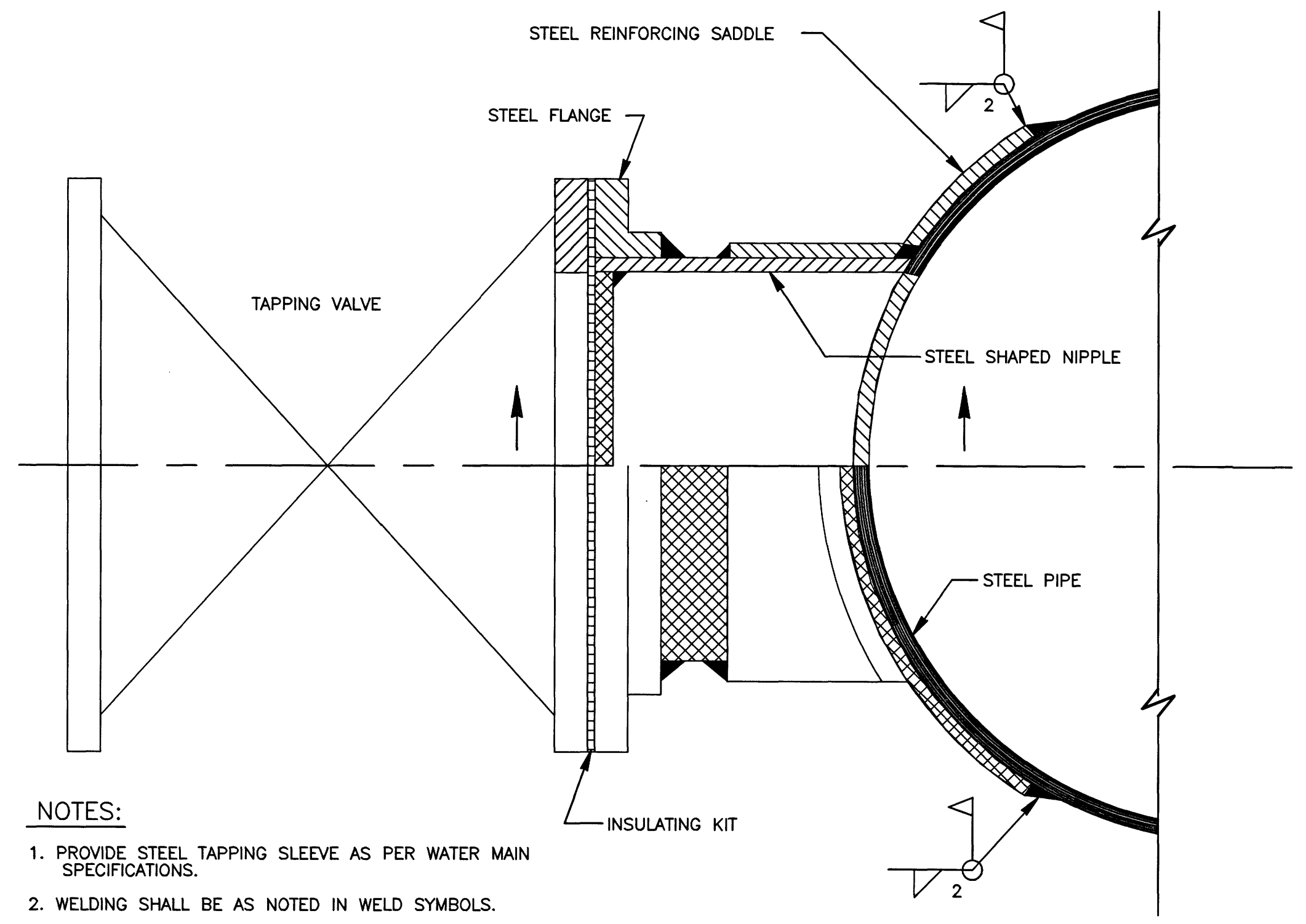
ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

SHEET No: 54 OF 99

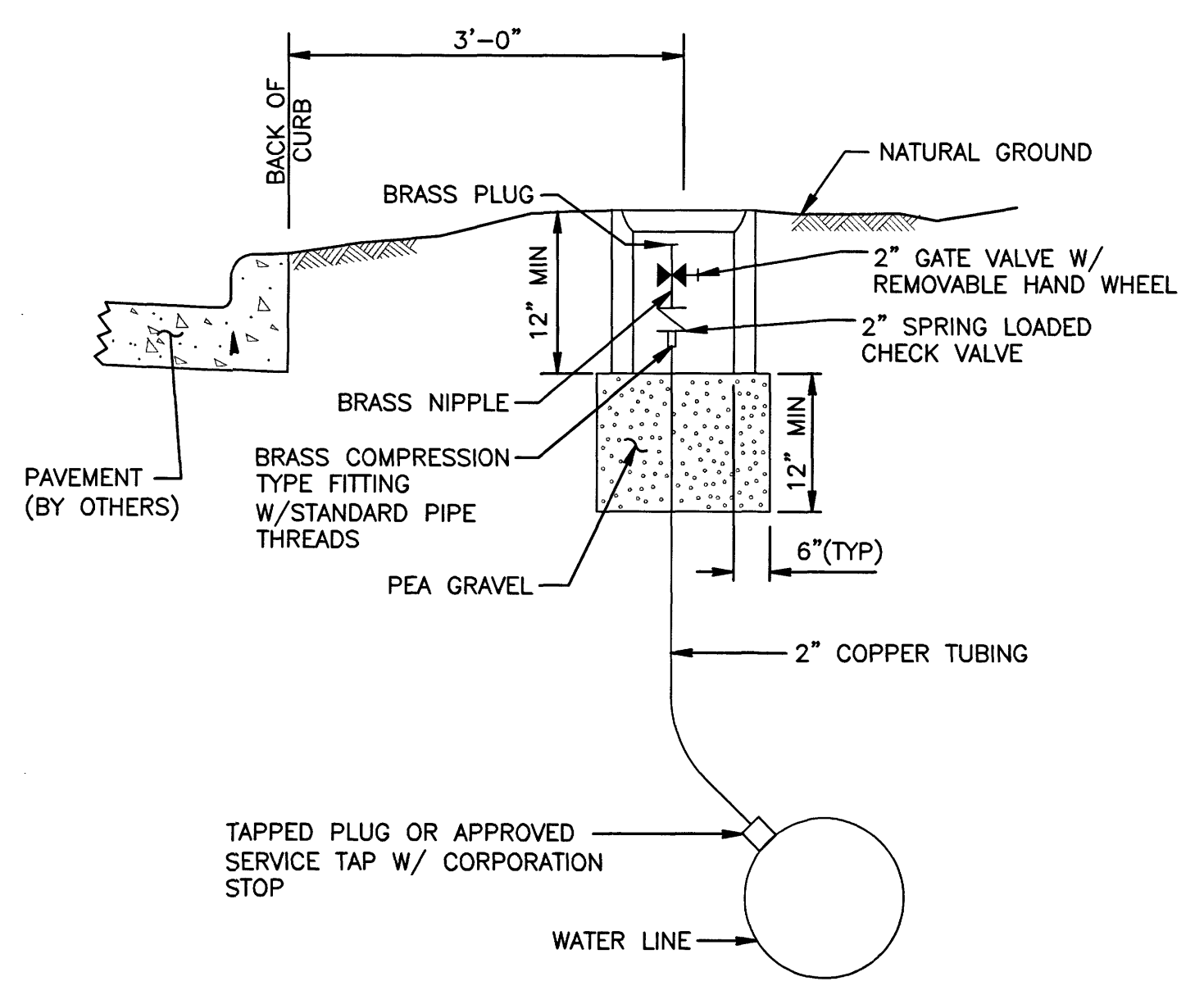
No.	Date	Revisions	App.



- NOTES:**
1. ALL MATERIALS AND COATINGS TO BE IN ACCORDANCE WITH WATER MAIN STANDARD SPECIFICATION 02511.
  2. RESTRAIN EXISTING PIPING BEYOND OFFSET SECTION AS REQUIRED TO PREVENT MOVEMENT.



- NOTES:**
1. PROVIDE STEEL TAPPING SLEEVE AS PER WATER MAIN SPECIFICATIONS.
  2. WELDING SHALL BE AS NOTED IN WELD SYMBOLS.
  3. INSULATING KIT IN ACCORDANCE WITH WATER MAIN STANDARD SPECIFICATIONS.
  4. REPAIR COATING AS PER WATER MAIN SPECIFICATIONS.

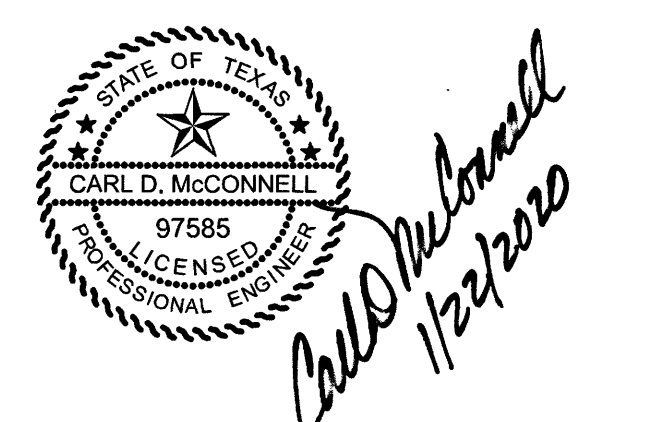


- NOTES:**
1. PLACE GATE VALVE HORIZONTAL TO GROUND WITH END OF BRASS PLUG 3 INCHES FROM SURFACE
  2. PLACE METER BOX CENTERED AROUND GATE VALVE BODY WITH LONG SIDE PARALLEL TO VALVE.



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**NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY**  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
**MISCELLANEOUS WATER LINE DETAILS**



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SHEET No. 55 OF 99

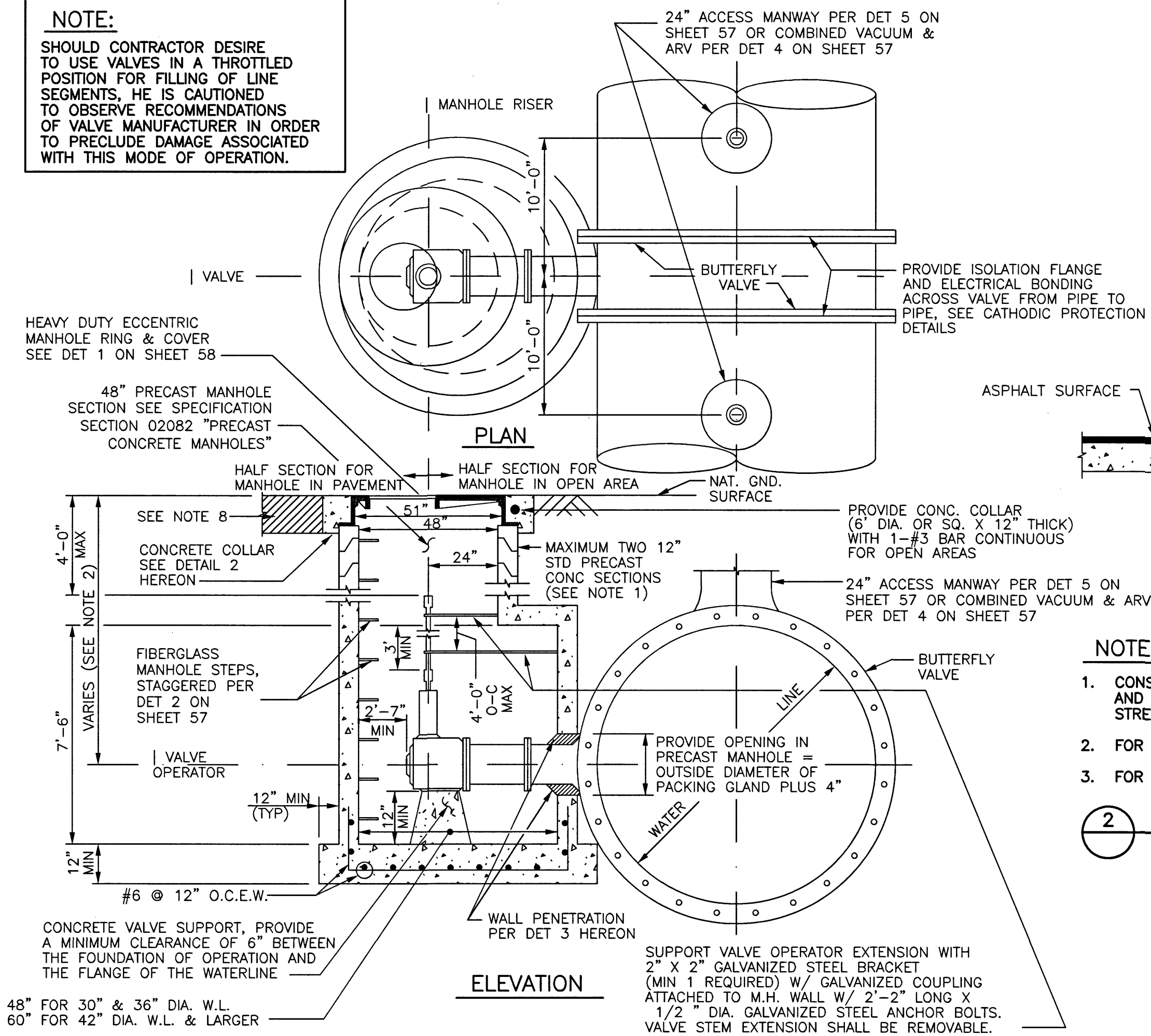
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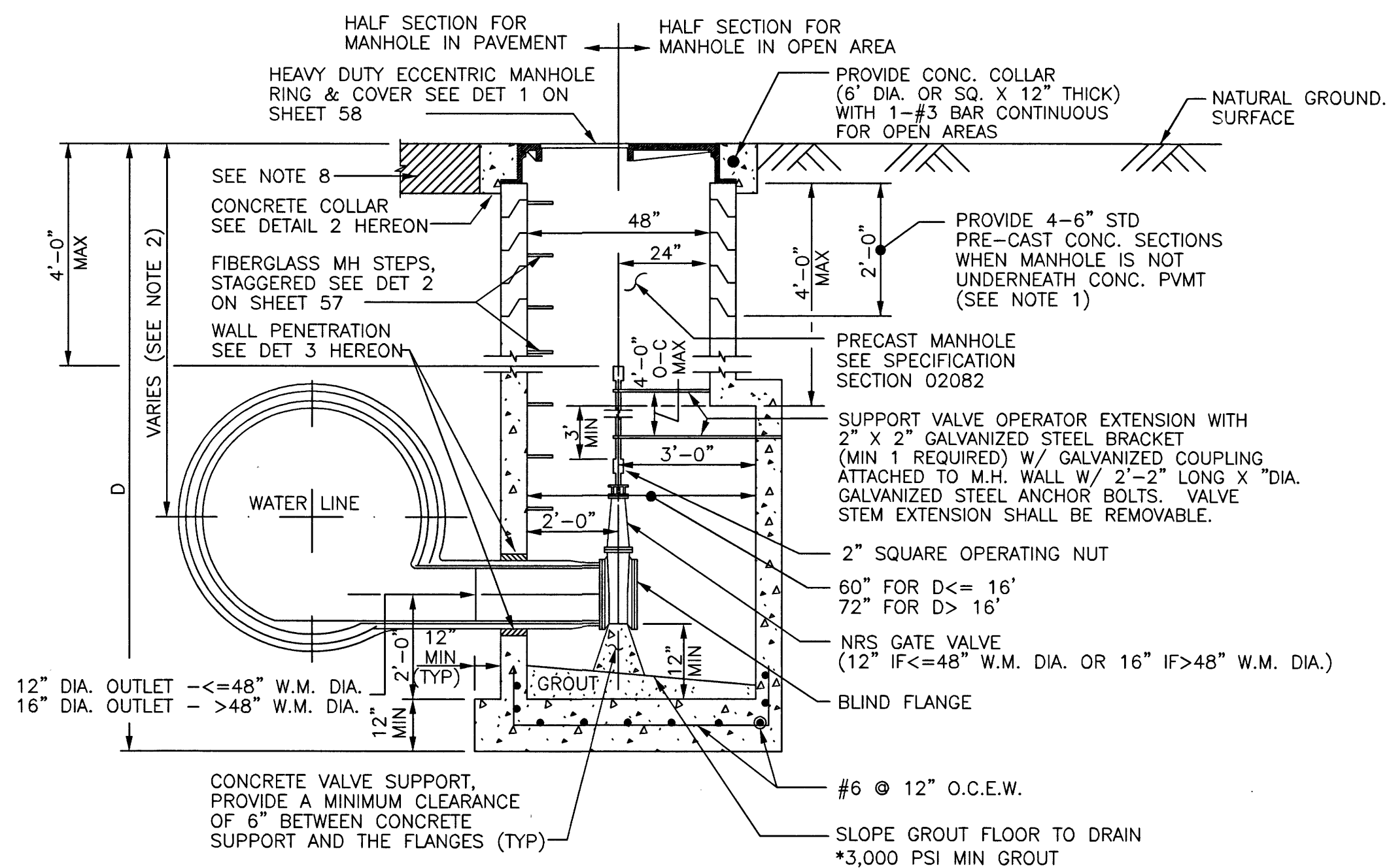


No.	Date	Revisions	App.

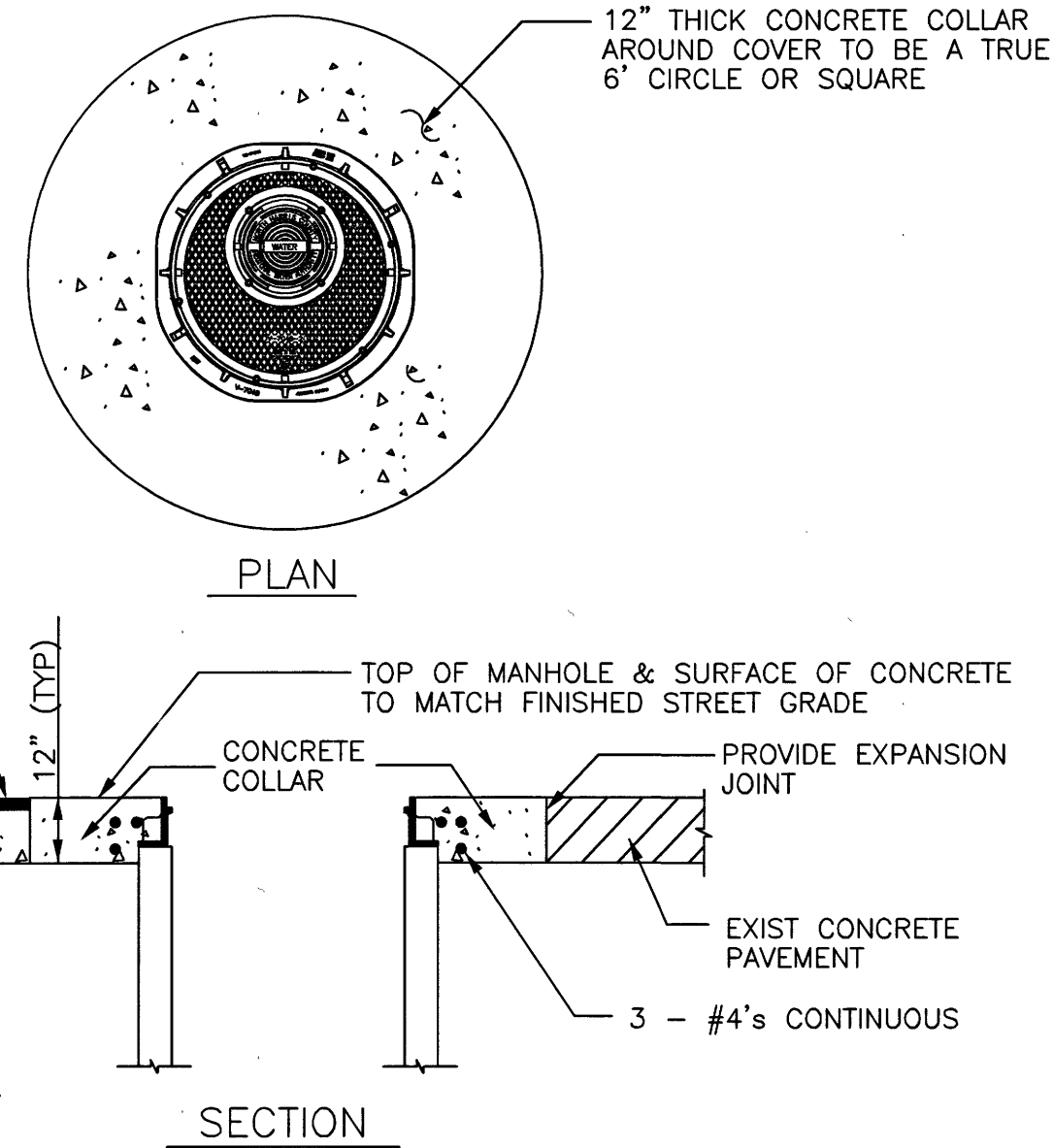
**NOTE:**  
SHOULD CONTRACTOR DESIRE TO USE VALVES IN A THROTTLED POSITION FOR FILLING OF LINE SEGMENTS, HE IS CAUTIONED TO OBSERVE RECOMMENDATIONS OF VALVE MANUFACTURER IN ORDER TO PRECLUDE DAMAGE ASSOCIATED WITH THIS MODE OF OPERATION.



**1 OPERATOR MANHOLE DETAILS FOR MAINLINE VALVES**  
(FOR WATER LINES 30-INCHES AND LARGER IN DIAMETER)

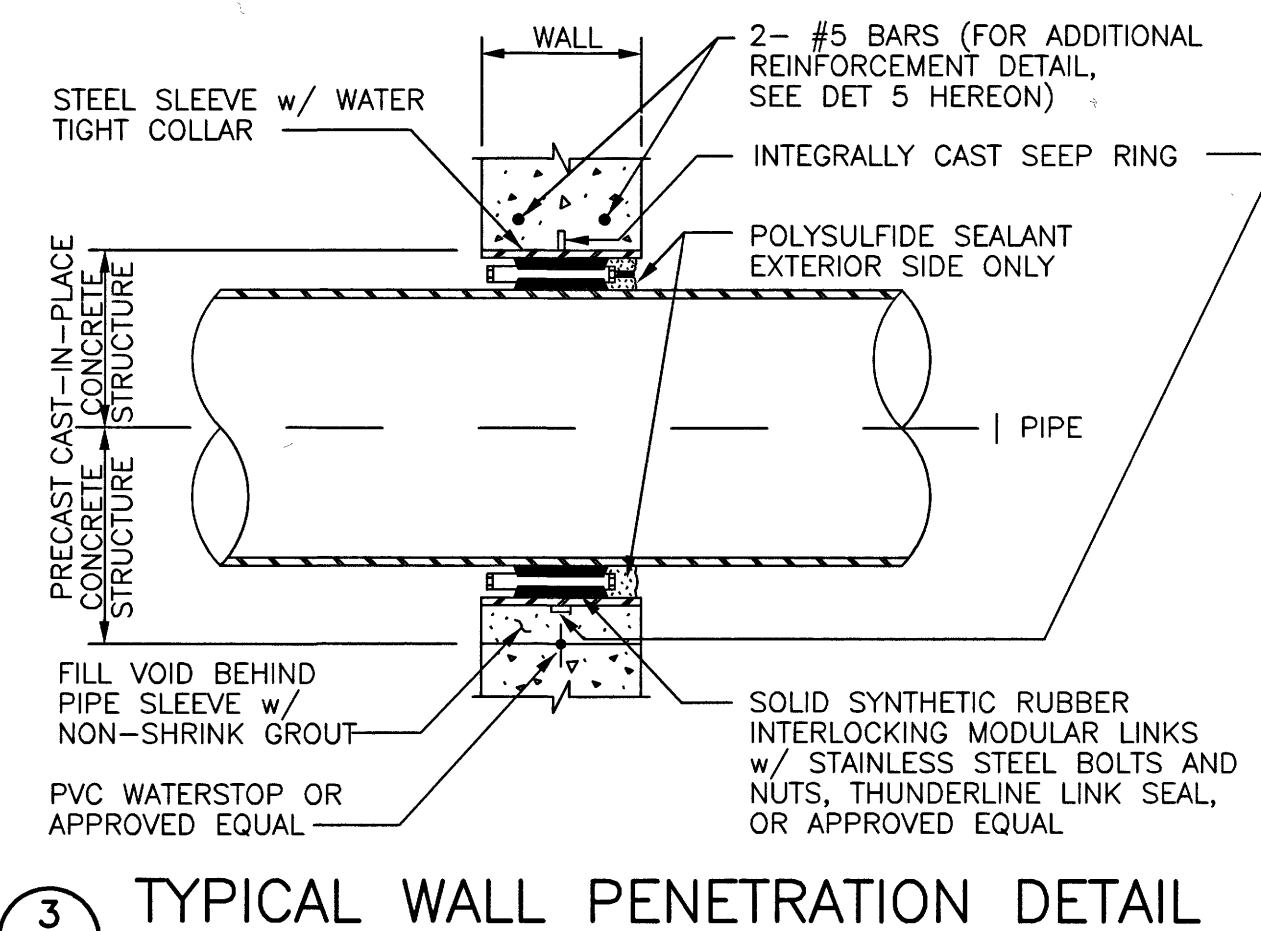


**4 SERVICE MANHOLE DETAIL FOR DRAINLINE VALVE CONNECTION**



**2 MANHOLE IN PAVEMENT**

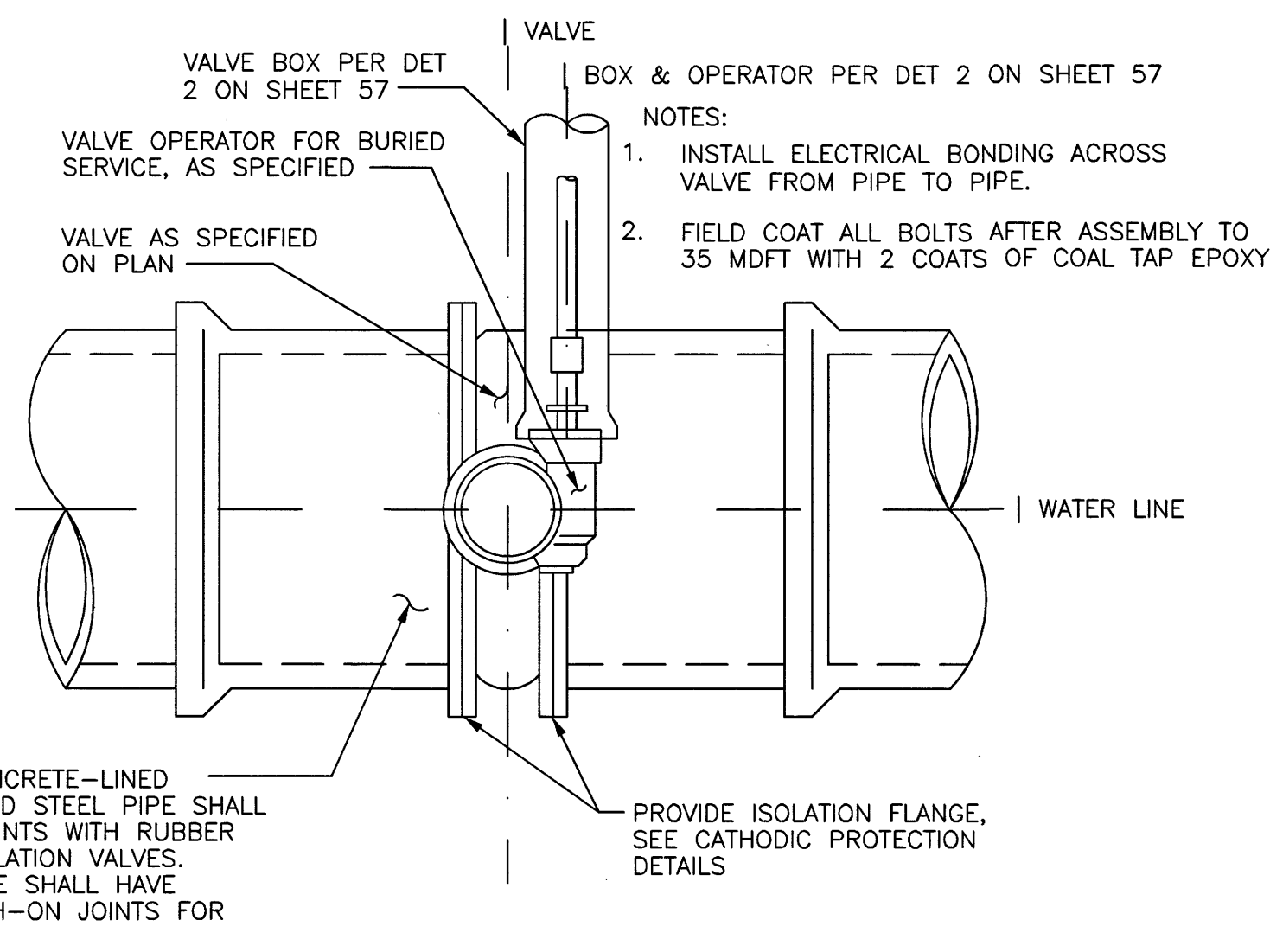
- NOTES:**
- CONSTRUCT THE FINAL TWO FEET OF THE MANHOLE AND PLACE CONCRETE WITHIN BLOCKOUT AFTER THE STREET PAVEMENT HAS BEEN INSTALLED.
  - FOR HEAVY DUTY MANHOLE RING, SEE DET 1 ON SHEET 58.
  - FOR PAVEMENT REPAIR, SEE DET 2 & 3 ON SHEET 70.



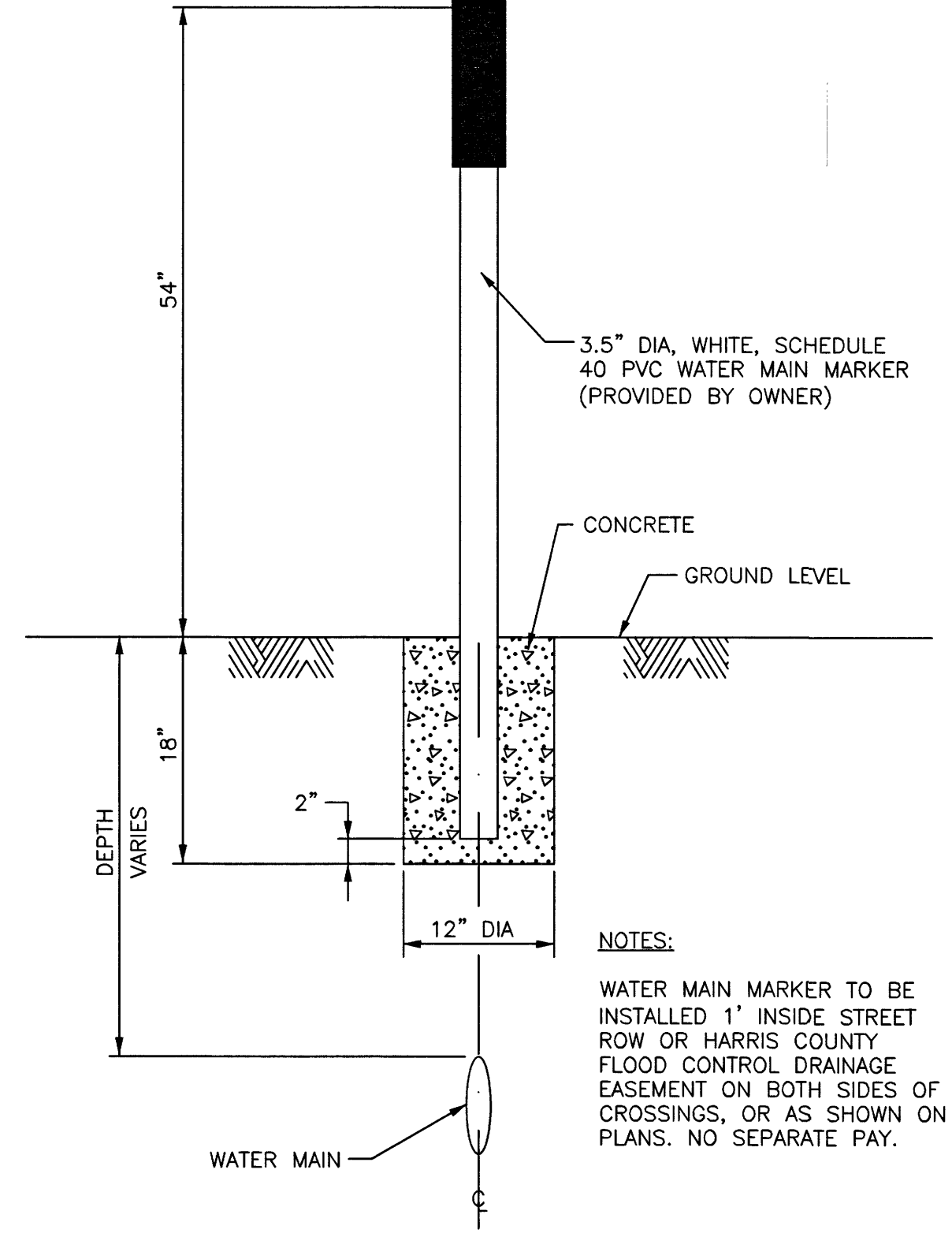
**3 TYPICAL WALL PENETRATION DETAIL**

- NOTES:**
- PROVIDE RAMNEK OR APPROVED EQUAL BETWEEN PRECAST SEGMENTS OF THE MANHOLE. SEE SPECIFICATION SECTION 02082.
  - FOR MANHOLES DEEPER THAN 20 FEET, INCREASE SIZE OF ACCESS MANHOLES TO 72-INCH OR 84-INCH DIAMETER & PROVIDE SAFETY CLIMBING RAIL (SAF-T-CLIMB) OR APPROVED EQUAL. SEE SPECIFICATION SECTION 02082.
  - PROVIDE AN APPROVED PETROLEUM BASED TAPE ENCAPSULATING ALL BOLTS IN ACCESS MANHOLES & VALVE VAULTS, INCLUDING PRESSURE-REDUCING STATIONS.
  - ALL JOINTS SHALL BE BONDED, SEE THE CATHODIC PROTECTION DETAILS.
  - FIELD COAT ALL FLANGE BOLTS, FLANGE COUPLING, FLANGE COUPLING ADAPTER AND THRUST TIE ASSEMBLIES AFTER ASSEMBLY TO 35 MDFT W/ 2 COATS OF COAL TAR EPOXY.
  - 2" OPERATING NUT ON LARGE DIAMETER BUTTERFLY VALVES SHALL TURN CLOCKWISE TO OPEN VALVE.
  - PLACE MANHOLE ON NEW COMPACTED (95% SPD) BOTTOM.
  - FOR PAVEMENT REPAIR, SEE SHEET "EXCAVATION, BEDDING, BACKFILL AND PAVEMENT REPAIR DETAILS".

**5 SERVICE MANHOLE WALL PENETRATION REINFORCEMENT DETAIL**



**6 ISOLATION VALVE ASSEMBLY**  
(FOR WATER LINES SMALLER THAN 30-INCHES IN DIAMETER)



**7 PVC WATER MAIN MARKER**

**North Harris County REGIONAL WATER Authority**

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PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

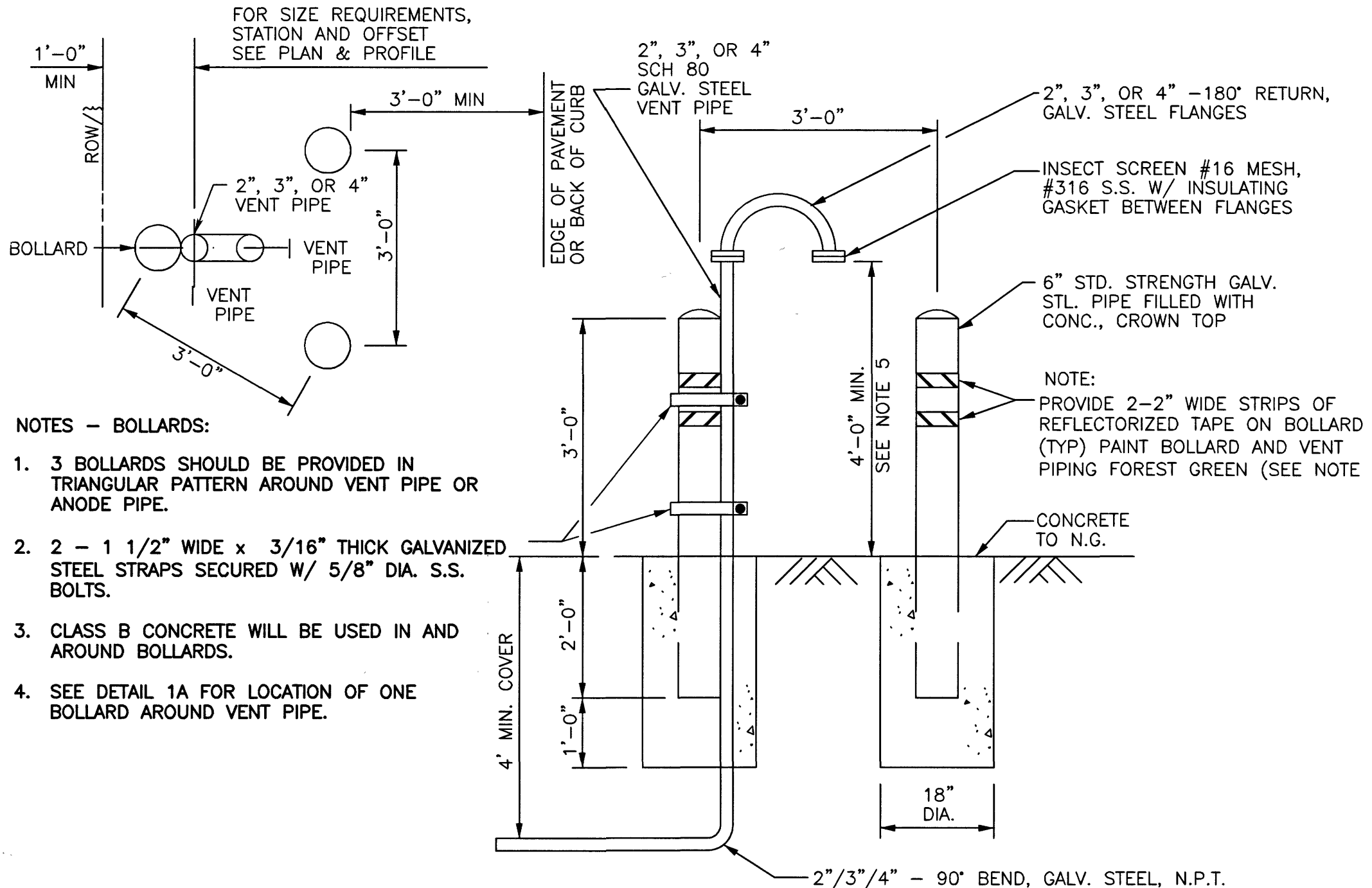
**VALVE AND SERVICE MANHOLE DETAILS**

**CARL D. MCCONNELL**  
97585  
LICENSED PROFESSIONAL ENGINEER  
1/22/2020

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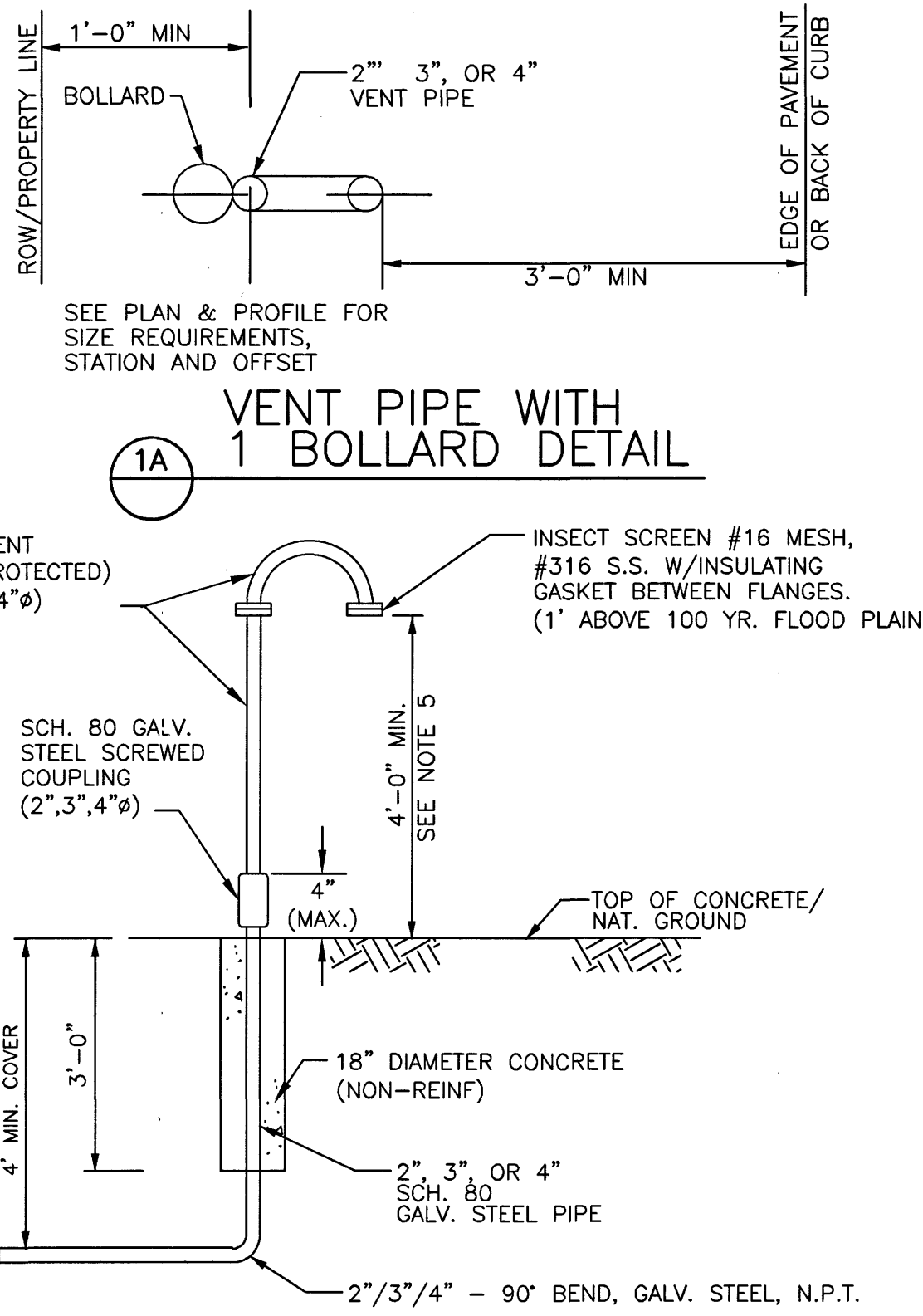
SHEET No: 56 OF 99

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- NOTES - BOLLARDS:**
- 3 BOLLARDS SHOULD BE PROVIDED IN TRIANGULAR PATTERN AROUND VENT PIPE OR ANODE PIPE.
  - 2 - 1 1/2" WIDE x 3/16" THICK GALVANIZED STEEL STRAPS SECURED W/ 5/8" DIA. S.S. BOLTS.
  - CLASS B CONCRETE WILL BE USED IN AND AROUND BOLLARDS.
  - SEE DETAIL 1A FOR LOCATION OF ONE BOLLARD AROUND VENT PIPE.

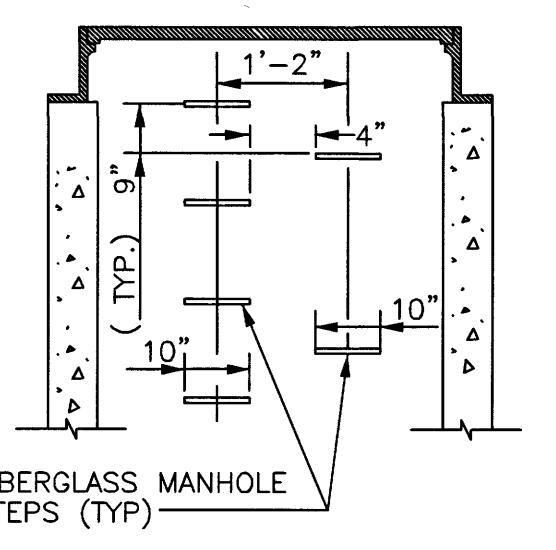
**1 VENT PIPE WITH 3 BOLLARDS DETAIL**



**1A VENT PIPE WITH 1 BOLLARD DETAIL**

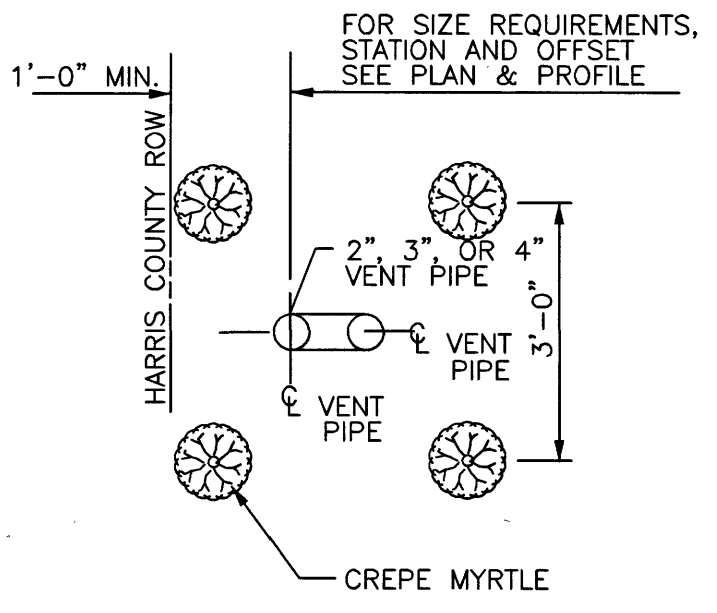


**1B BREAKAWAY VENT PIPE DETAIL (VENT PIPES WITHIN HARRIS COUNTY ROW)**

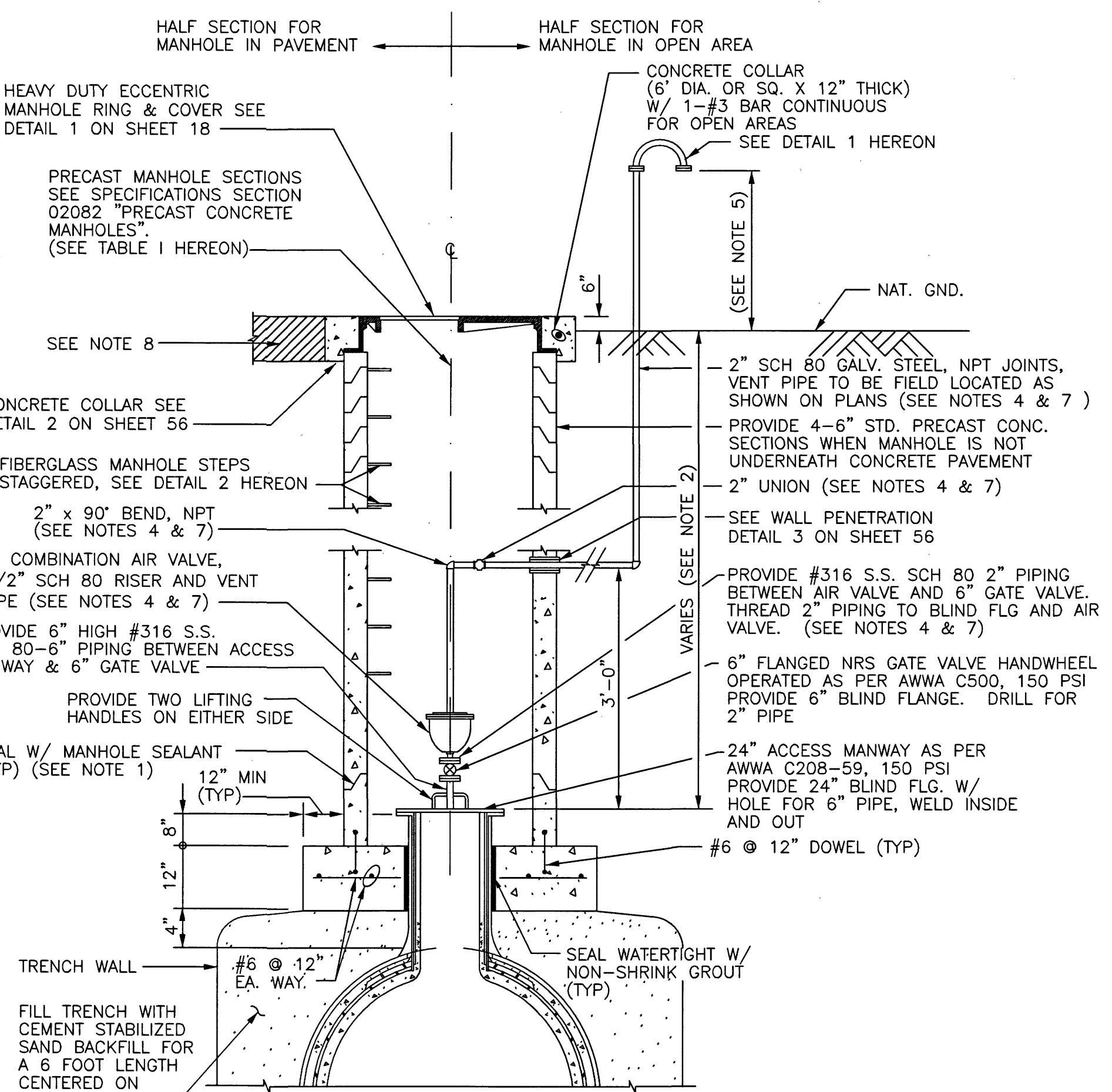


- NOTES - MANHOLE STEPS:**
- PROVIDE STEPS PER SPECIFICATION SECTION 02082.
  - BOTTOM MANHOLE STEP SHALL BE NO HIGHER THAN 12" ABOVE MANHOLE INVERT.

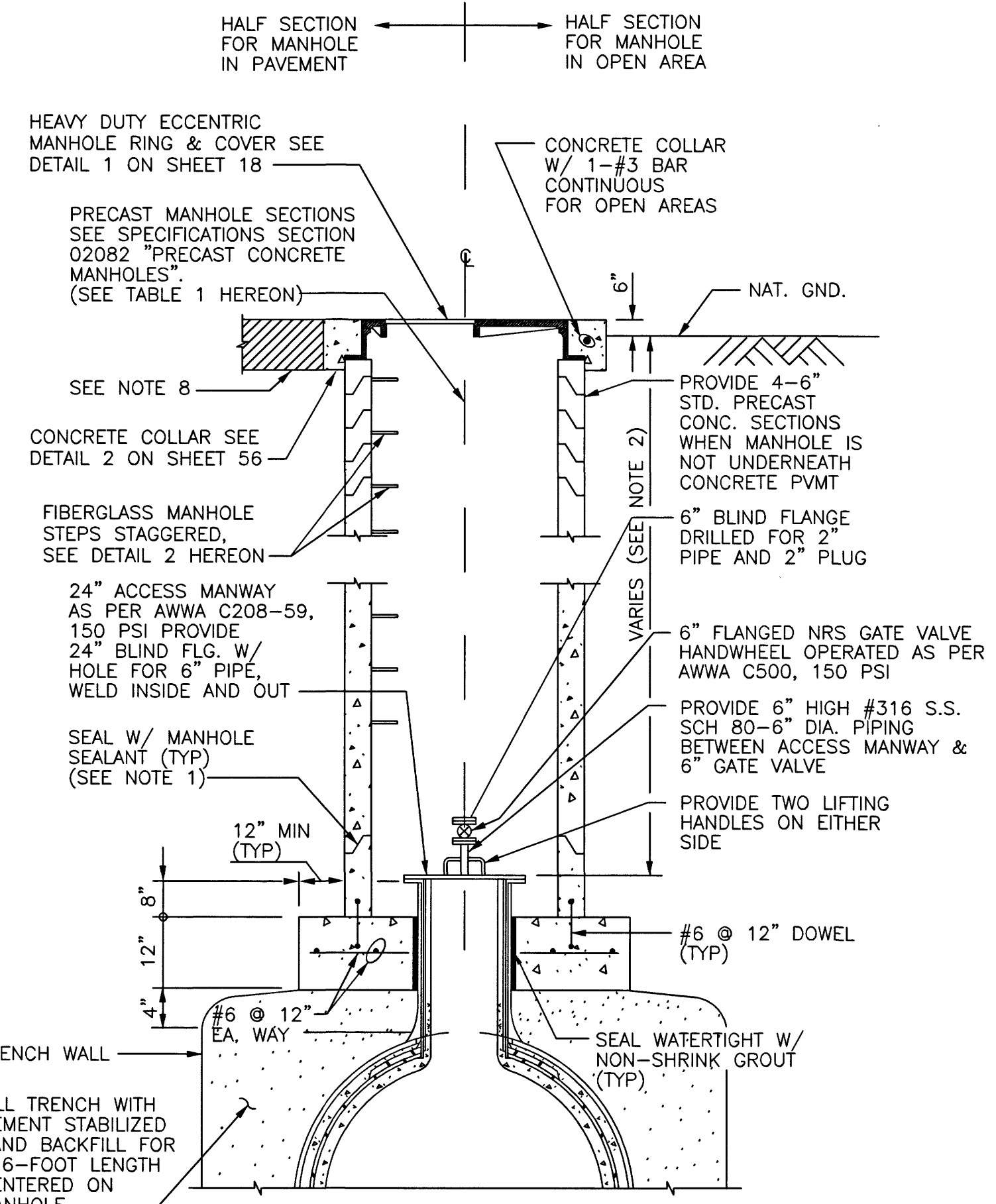
**2 MANHOLE STEP DETAIL**



**3 COMBINATION AIR VALVE ASSEMBLY (FOR WATER LINES SMALLER THAN 30-INCHES IN DIAMETER)**



**4 COMBINATION VACUUM RELIEF AIR RELEASE VALVE ASSEMBLY IN SERVICE MANHOLE (FOR DUCTILE IRON, STEEL AND CONCRETE CYLINDER PIPE WATER LINES 30-INCHES AND LARGER IN DIAMETER)**



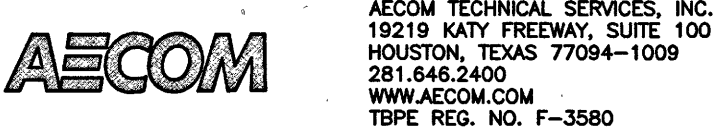
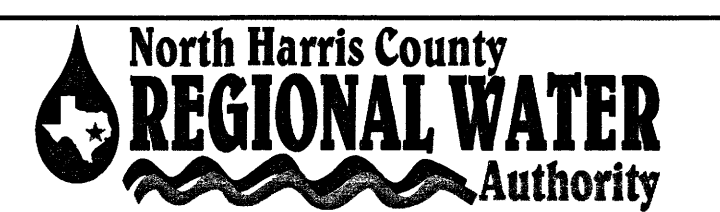
**5 ACCESS MANWAY IN SERVICE MANHOLE (FOR DUCTILE IRON, STEEL AND CONCRETE CYLINDER PIPE WATER LINES 30-INCHES AND LARGER IN DIAMETER)**

**TABLE 1 - Manhole Size**

Water Main Diameter	MH Size
<30"	60"
30"-36"	60"
>36"	72"

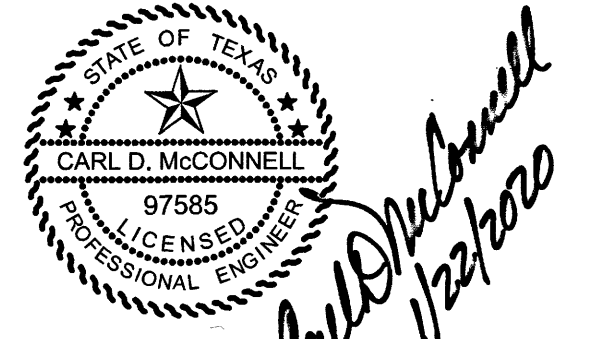
**NOTES:**

- PROVIDE RAM-NEK OR APPROVED EQUAL BETWEEN PRECAST SEGMENTS OF THE MANHOLE. SEE SPECIFICATION SECTION 02082.
- FOR MANHOLES DEEPER THAN 20 FEET, INCREASE SIZE OF ACCESS MANHOLES TO 72-INCH OR 84-INCH DIAMETER & PROVIDE SAFETY CLIMBING RAIL (SAF-T-CLIMB) OR APPROVED EQUAL. SEE SPECIFICATION SECTION 02082.
- PROVIDE AN APPROVED PETROLEUM BASED TAPE ENCAPSULATING ALL BOLTS IN ACCESS MANHOLES & VALVE VAULTS, INCLUDING PRESSURE-REDUCING STATIONS.
- IF 3" AIR VALVE IS CALLED FOR ON THE PLAN AND PROFILE SHEETS THEN PIPING AND APPURTENANCES SHOWN TO BE 2" IN DIAMETER SHALL BE 3" IN DIAMETER, AND SHALL BE CONSTRUCTED OF THE SAME MATERIAL AND CLASS. SEE SPECIFICATION SECTION 02524.
- VERIFY THAT LOCATION OF SCREEN IS 1 FOOT ABOVE 100-YEAR FLOOD PLAIN ELEVATION OR 4 FEET ABOVE NATURAL GROUND WHICHEVER IS HIGHER.
- REFER TO PLAN AND PROFILE SHEETS FOR TYPES AND LOCATIONS OF COMBINATION AIR VALVES.
- IF 4" AIR VALVE IS CALLED FOR ON THE PLAN AND PROFILE SHEETS, THEN PIPING AND APPURTENANCES SHOWN TO BE 2" DIAMETER SHALL BE 4" IN DIAMETER, AND SHALL BE CONSTRUCTED OF THE SAME MATERIAL AND CLASS. SEE SPECIFICATION SECTION 02524.
- FOR PAVEMENT REPAIR. SEE SHEET 'EXCAVATION, BEDDING, BACKFILL AND PAVEMENT REPAIR DETAILS'.
- PAINT ALL VENT PIPING AND BOLLARDS PER SPECIFICATION 09902 USING SHERWIN WILLIAMS ISLE OF PINES 6461.



NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

**COMBINATION AIR VALVE AND DETAILS**



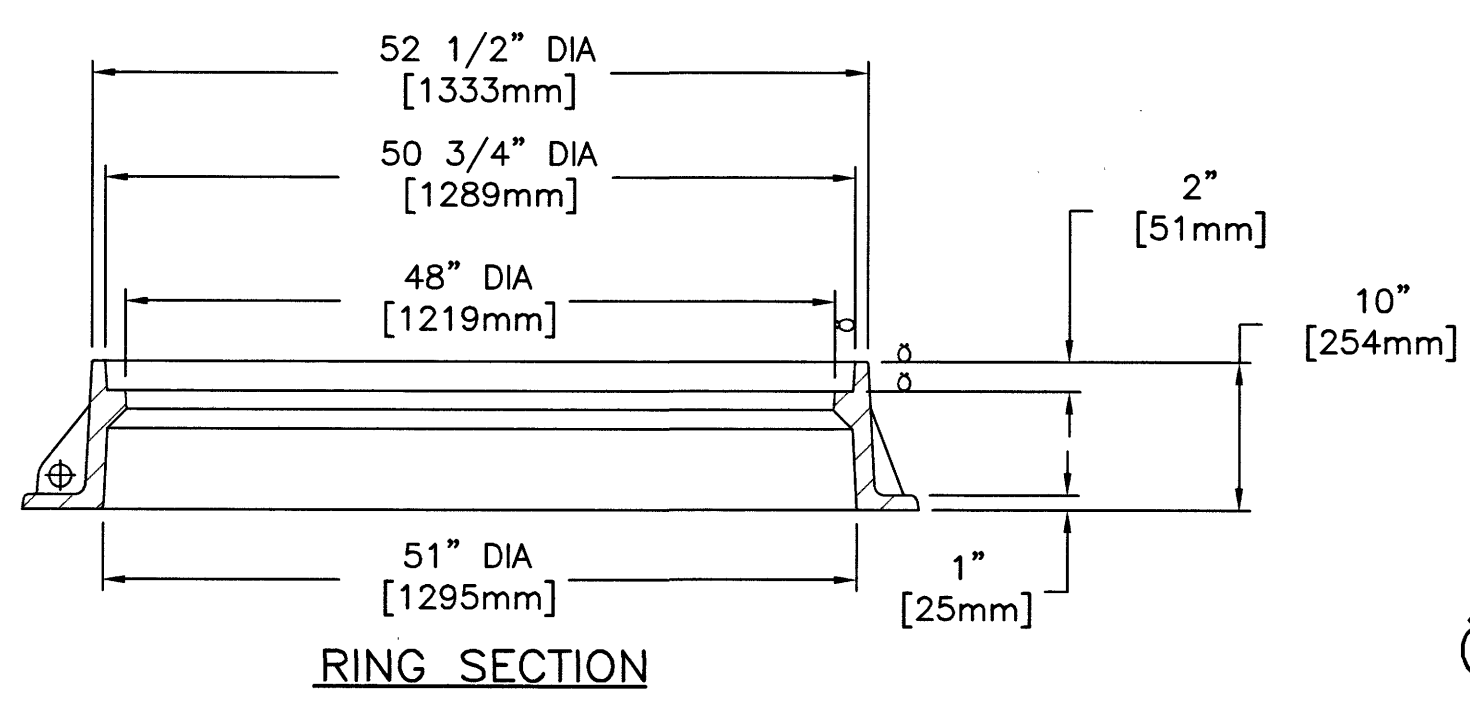
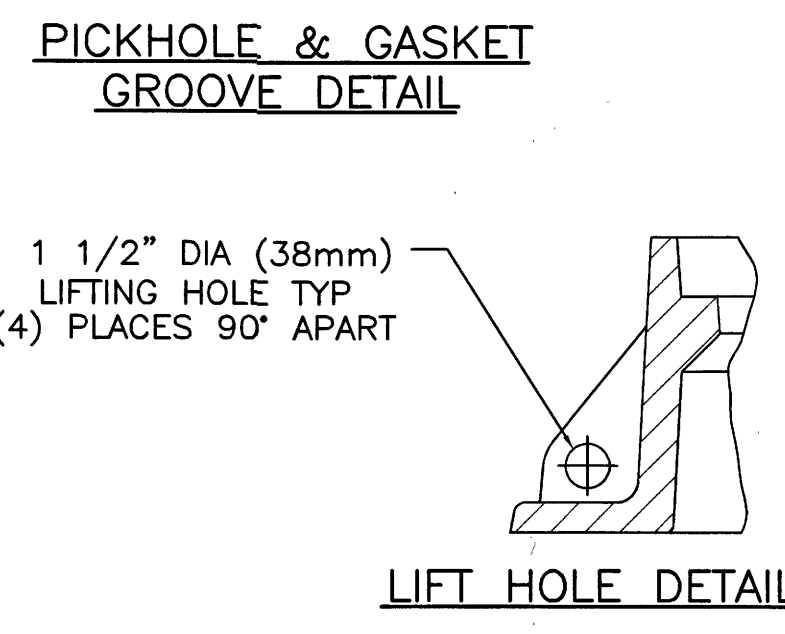
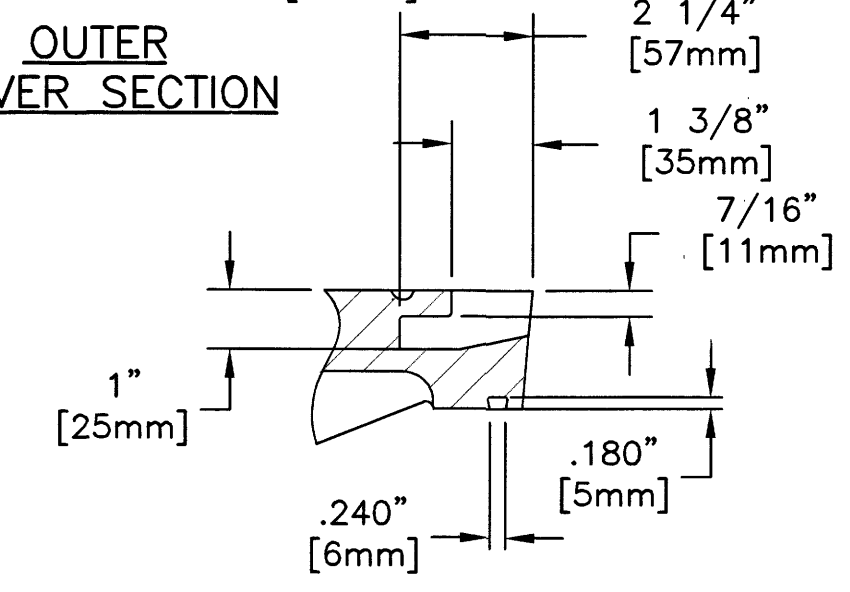
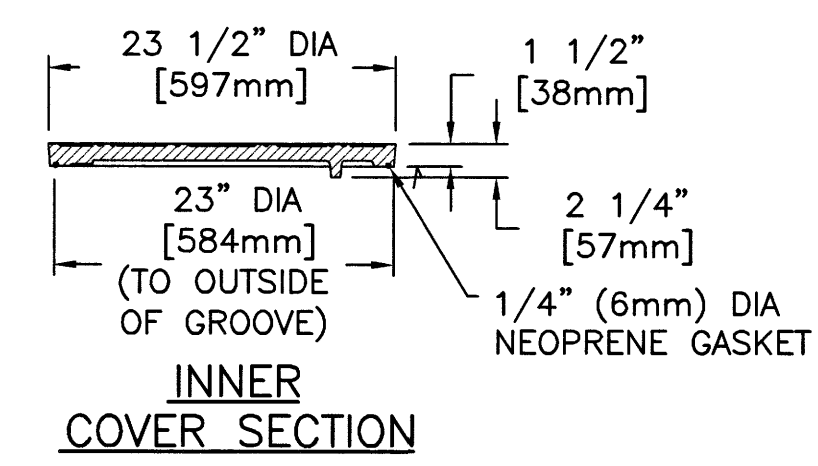
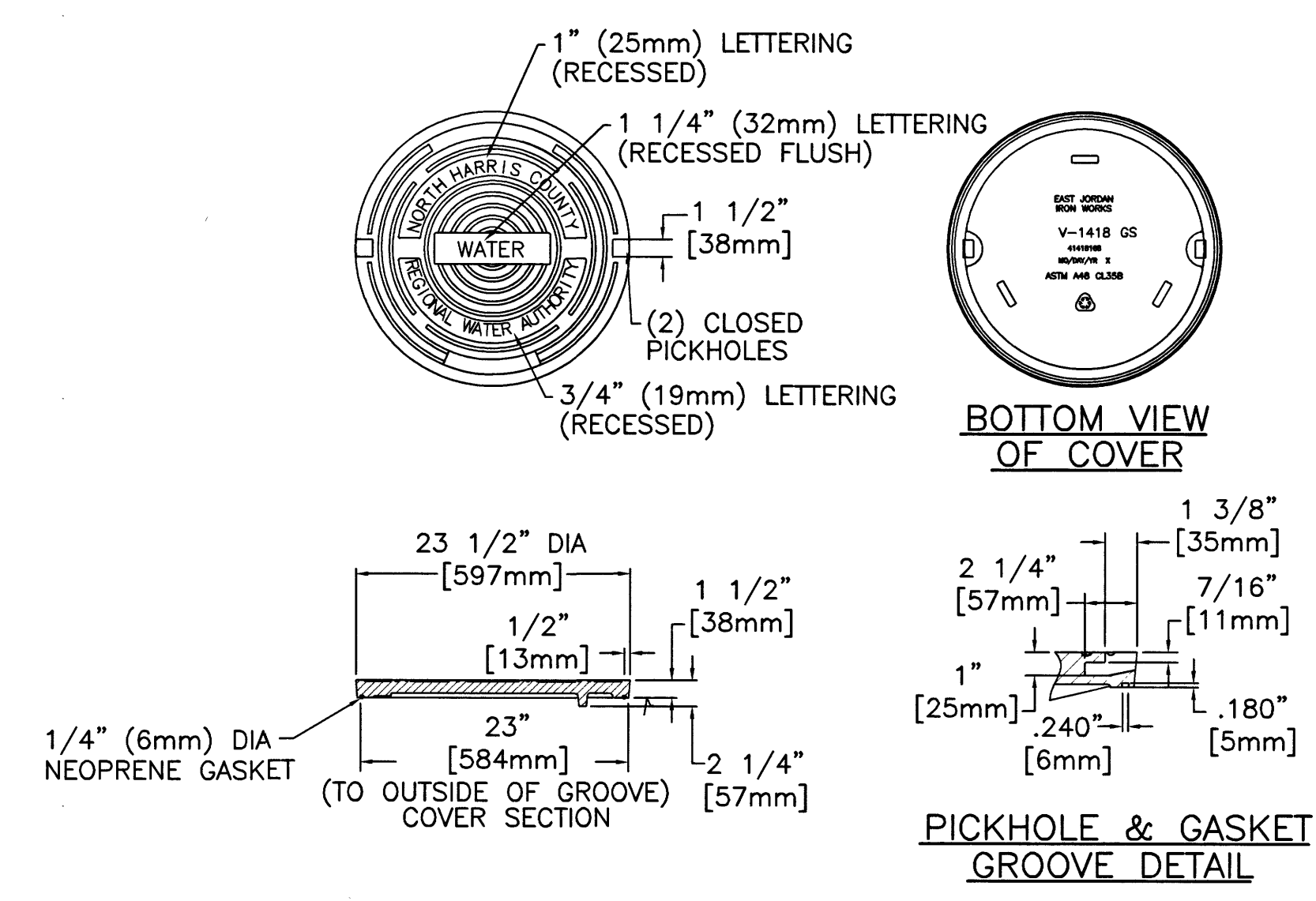
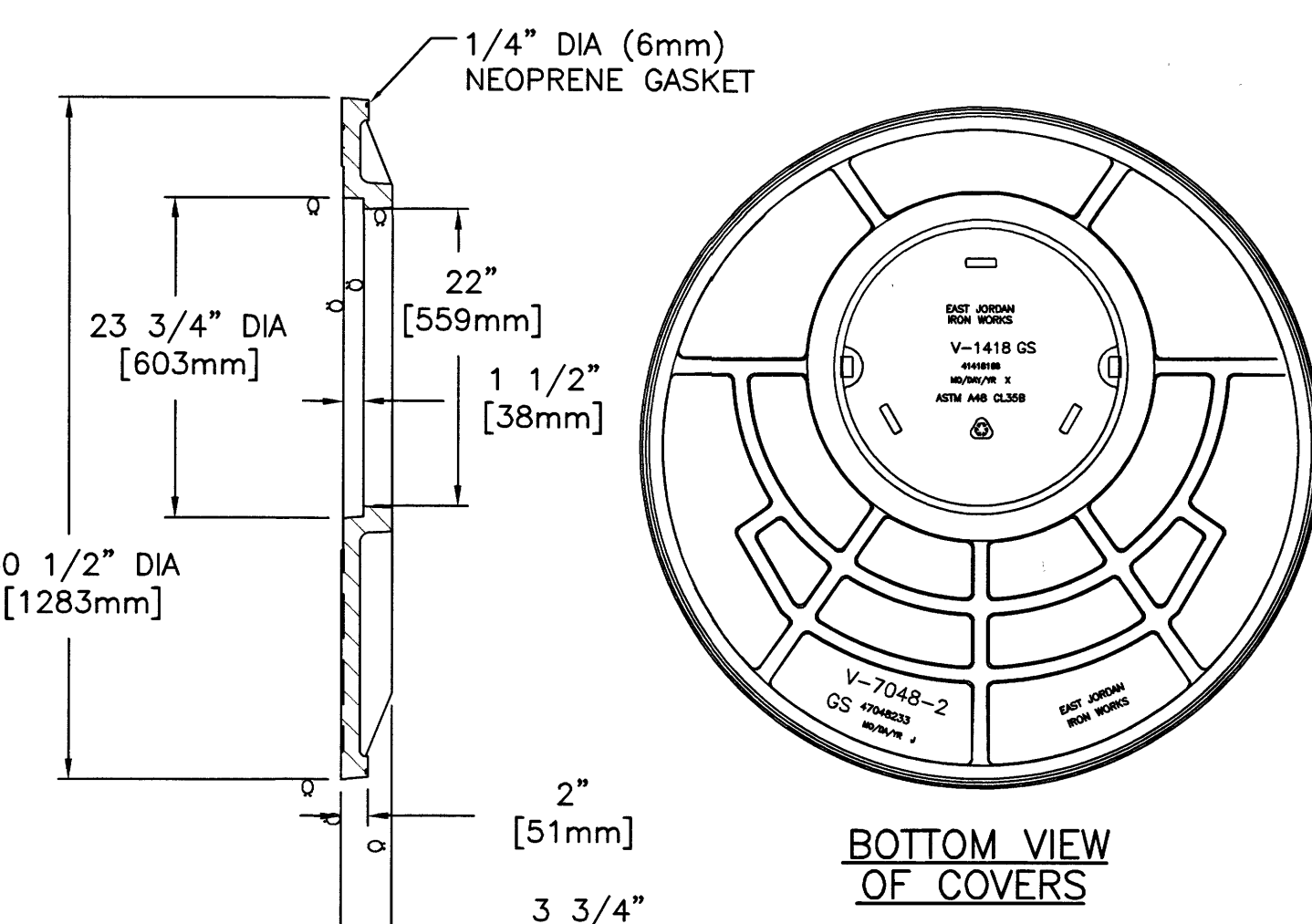
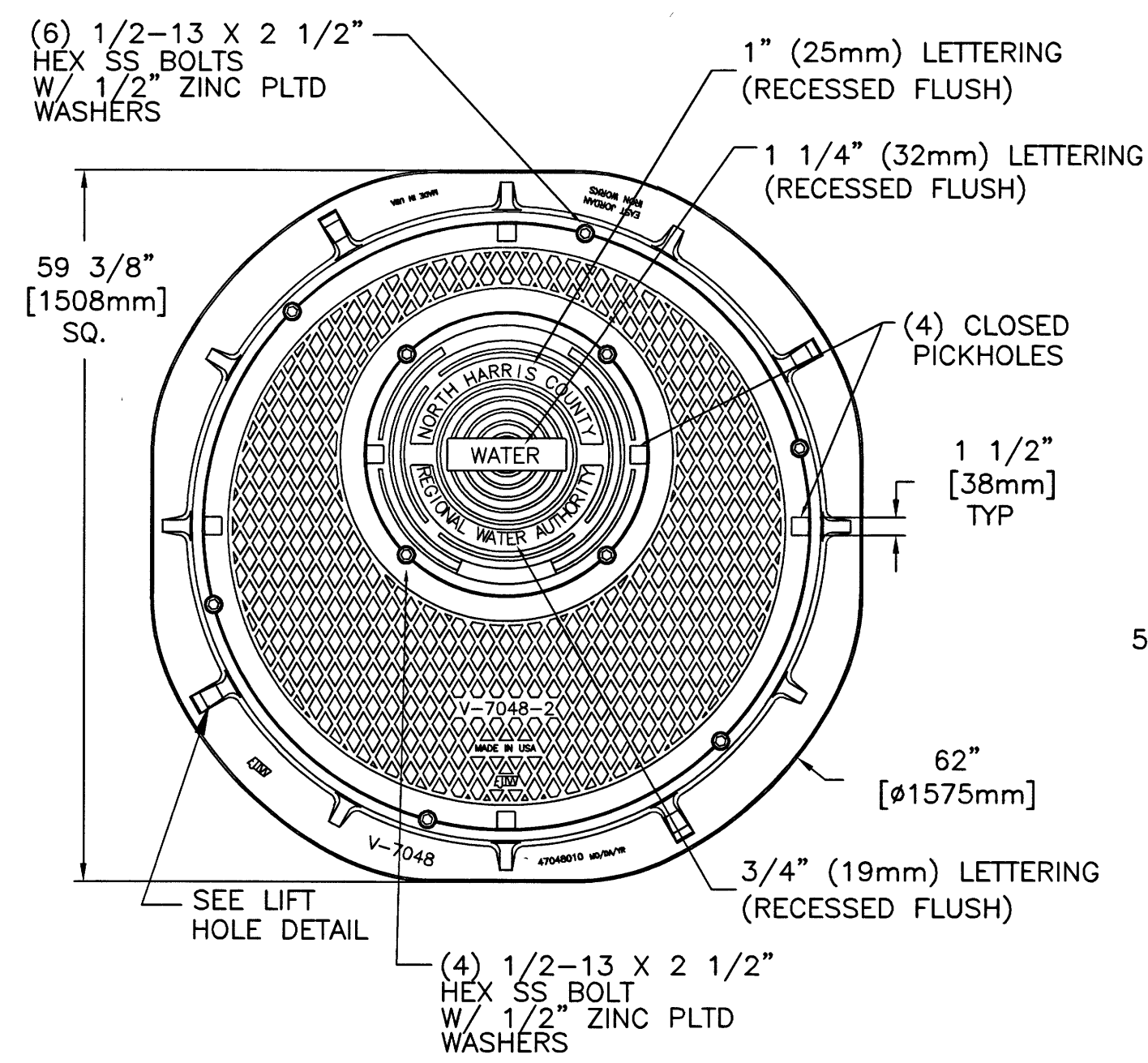
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No.	Date	Revisions	App.



1 HEAVY DUTY MANHOLE RING AND COVER  
(MANHOLE RING AND COVER TO BE EAST JORDAN IRON WORKS OR EQUAL)

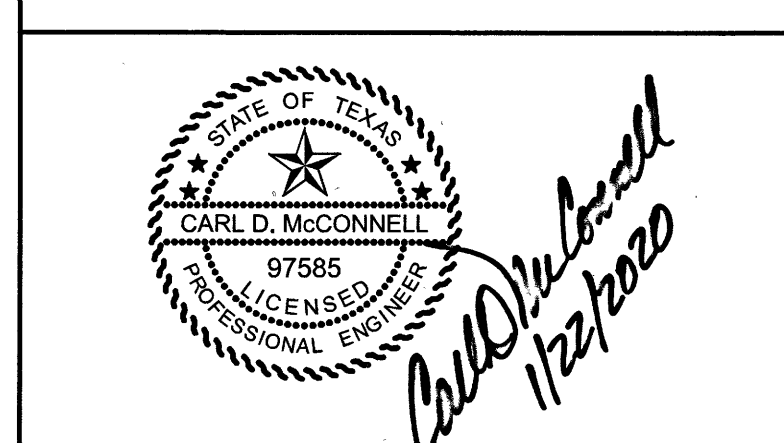
2 HEAVY DUTY MANHOLE COVER



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NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT  
ROAD AND COPELAND ROAD

HEAVY DUTY MANHOLE  
RING AND COVER DETAILS



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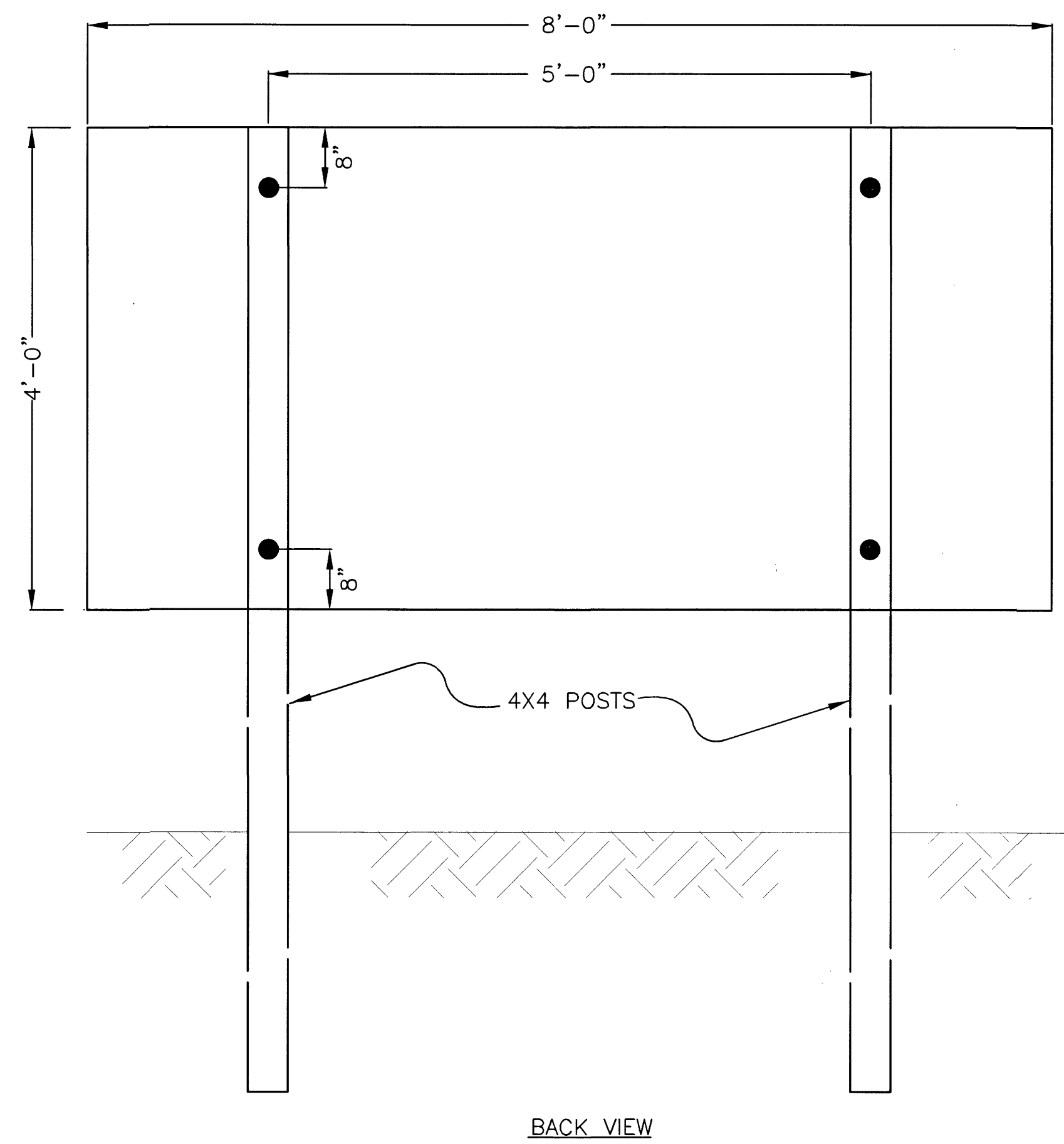
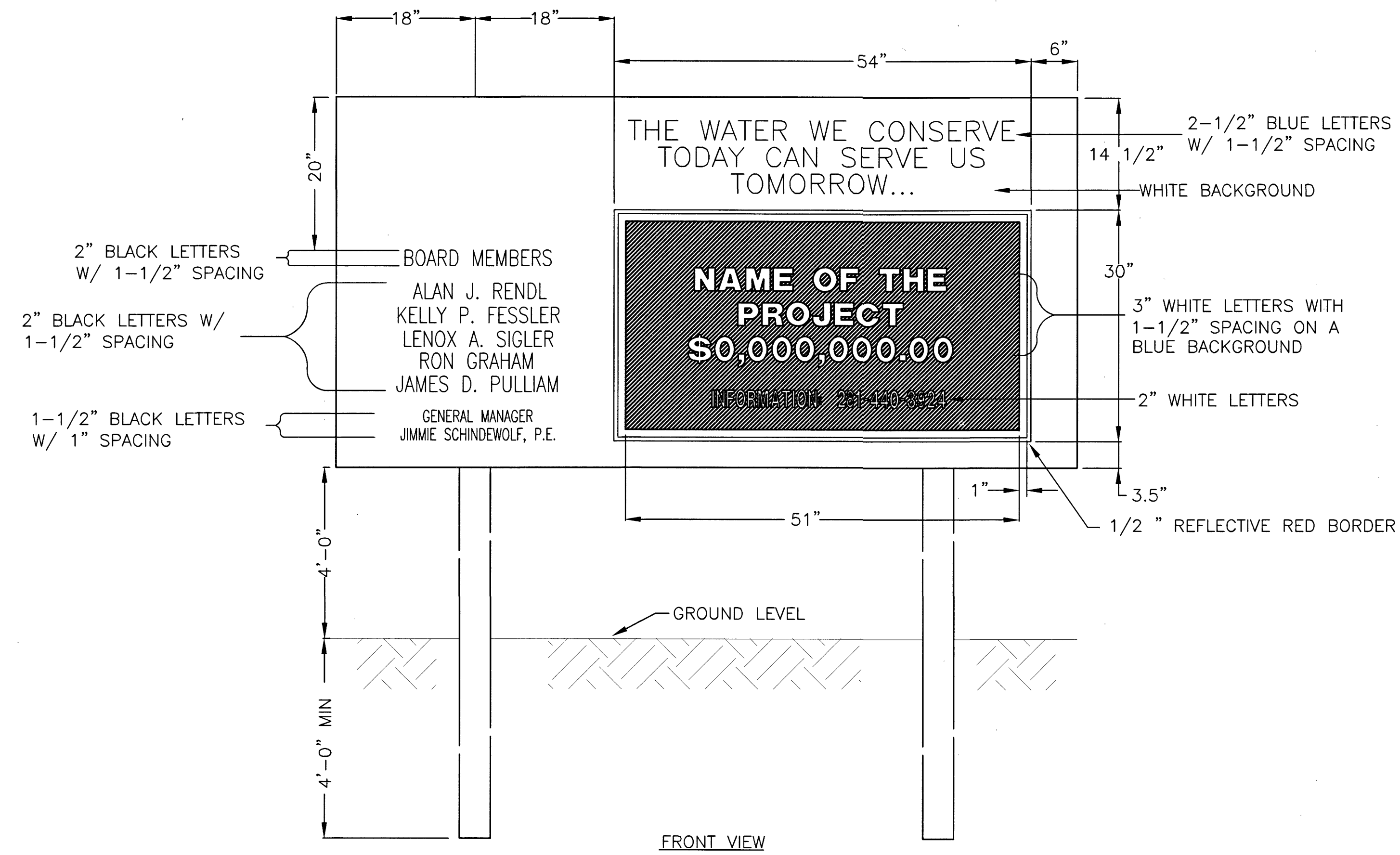
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REVISION DATE: 6/26/14

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PROJECT SIGN  
SCALE: 1"=1'



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NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT  
ROAD AND COPELAND ROAD

PROJECT SIGN  
DETAIL

CARL D. McCONNELL  
97585  
LICENSED PROFESSIONAL ENGINEER  
1/22/2020

DRAWN BY: CHECKED BY:

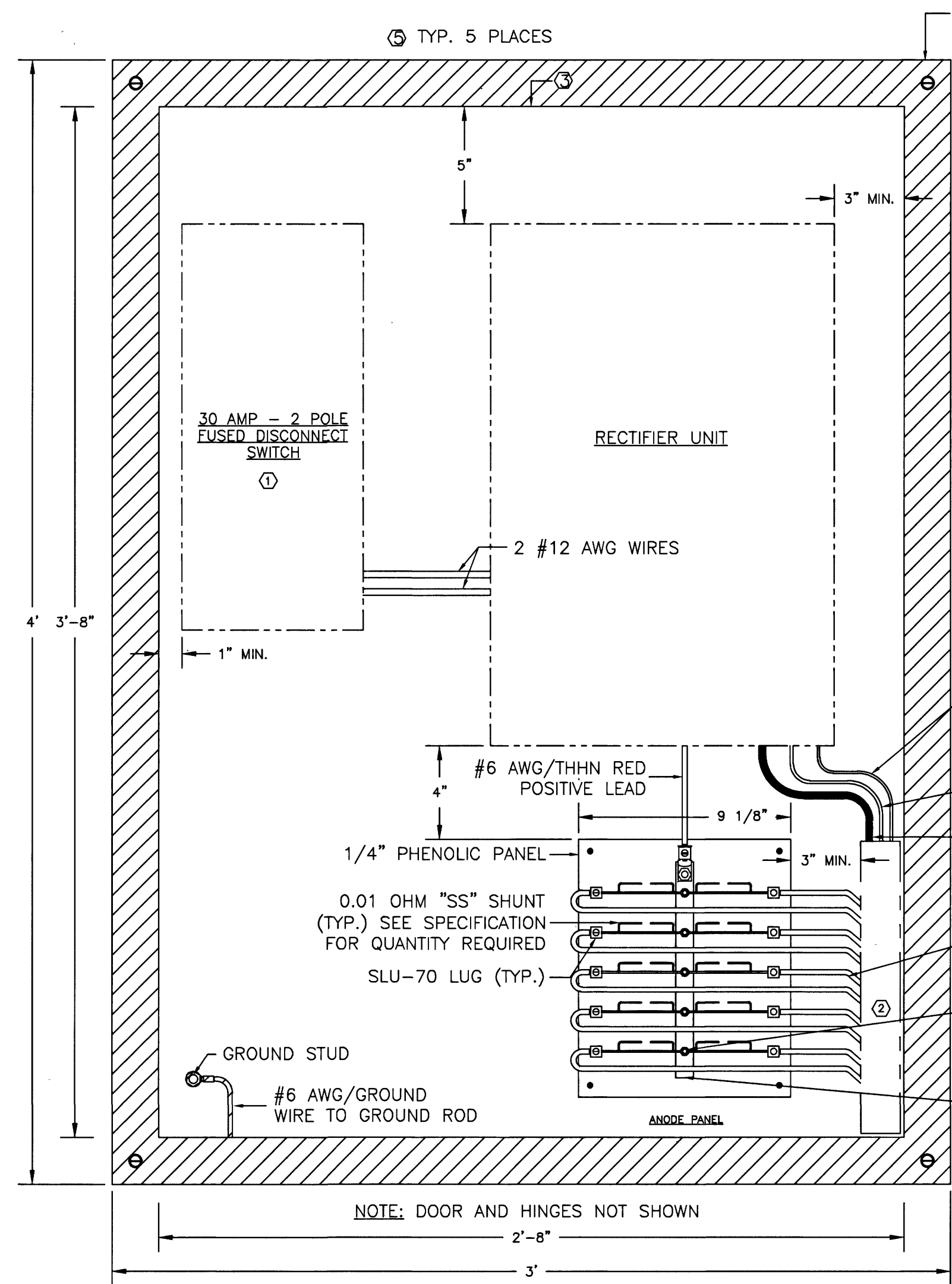
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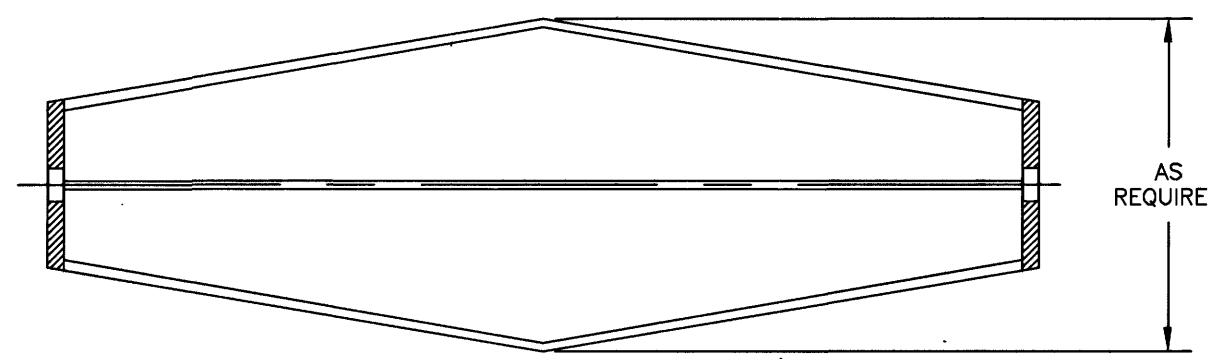
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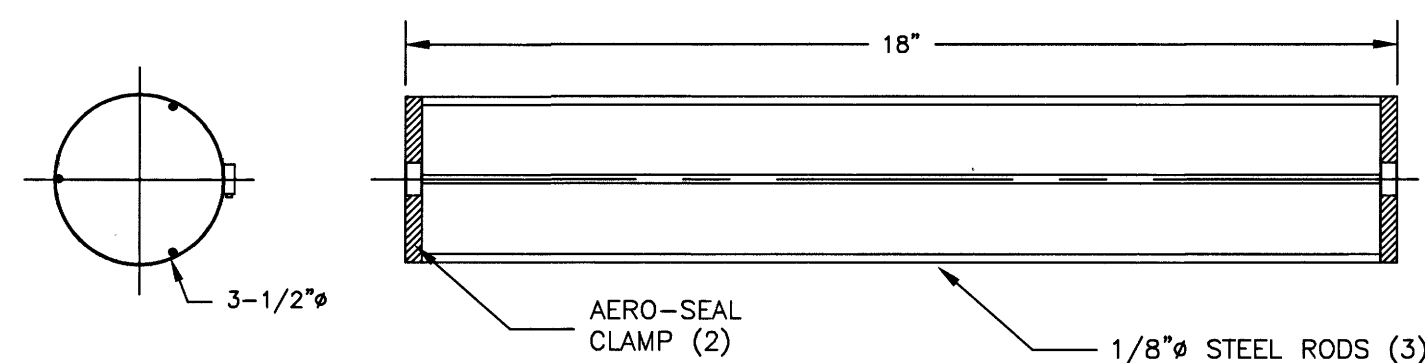
No.	Date	Revisions	App.



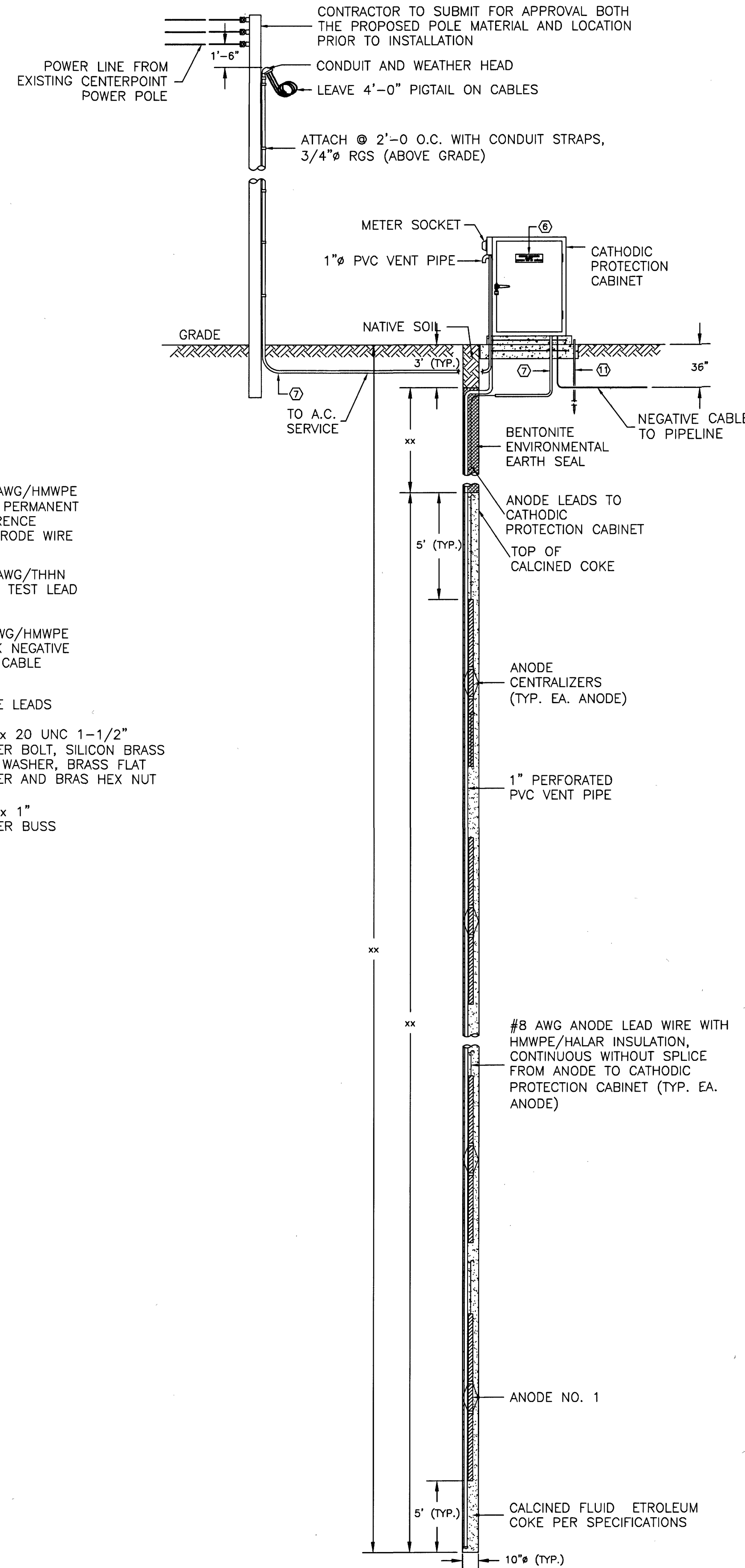
1 CATHODIC PROTECTION CABINET  
NO SCALE



NOTE:  
CENTRALIZERS ARE SHIPPED STRAIGHT AS SHOWN BELOW.  
1/8" Ø RODS ARE BENT AS SHOWN ABOVE TO FIT THE HOLE FOR PROPER CENTERING OF ANODE.



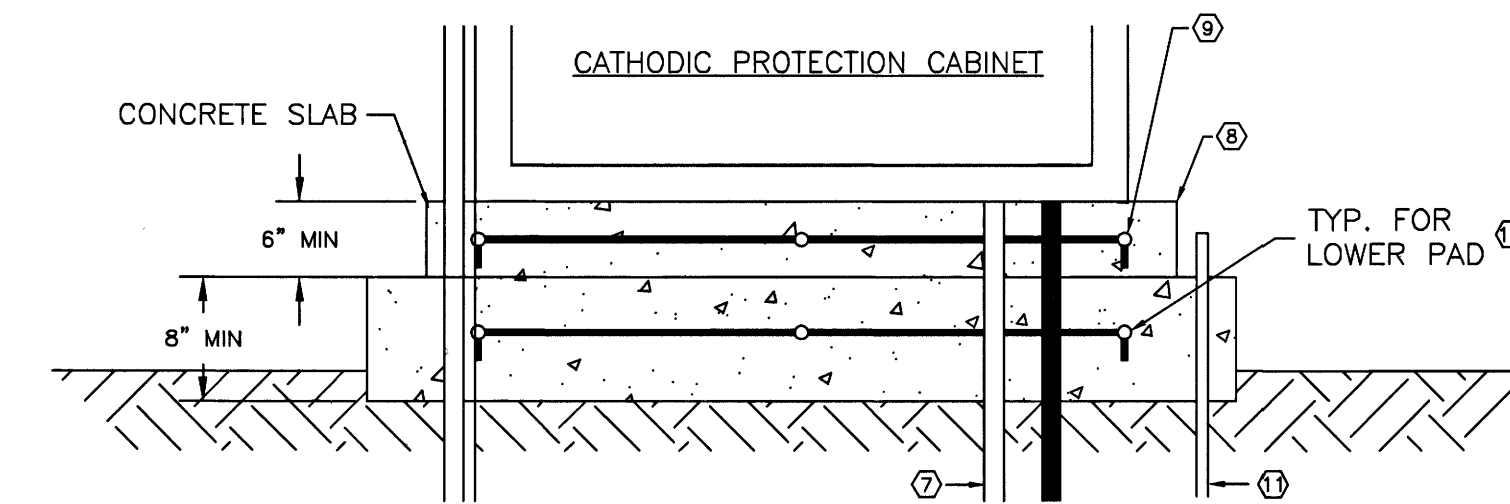
2 ANODE CENTRALIZER  
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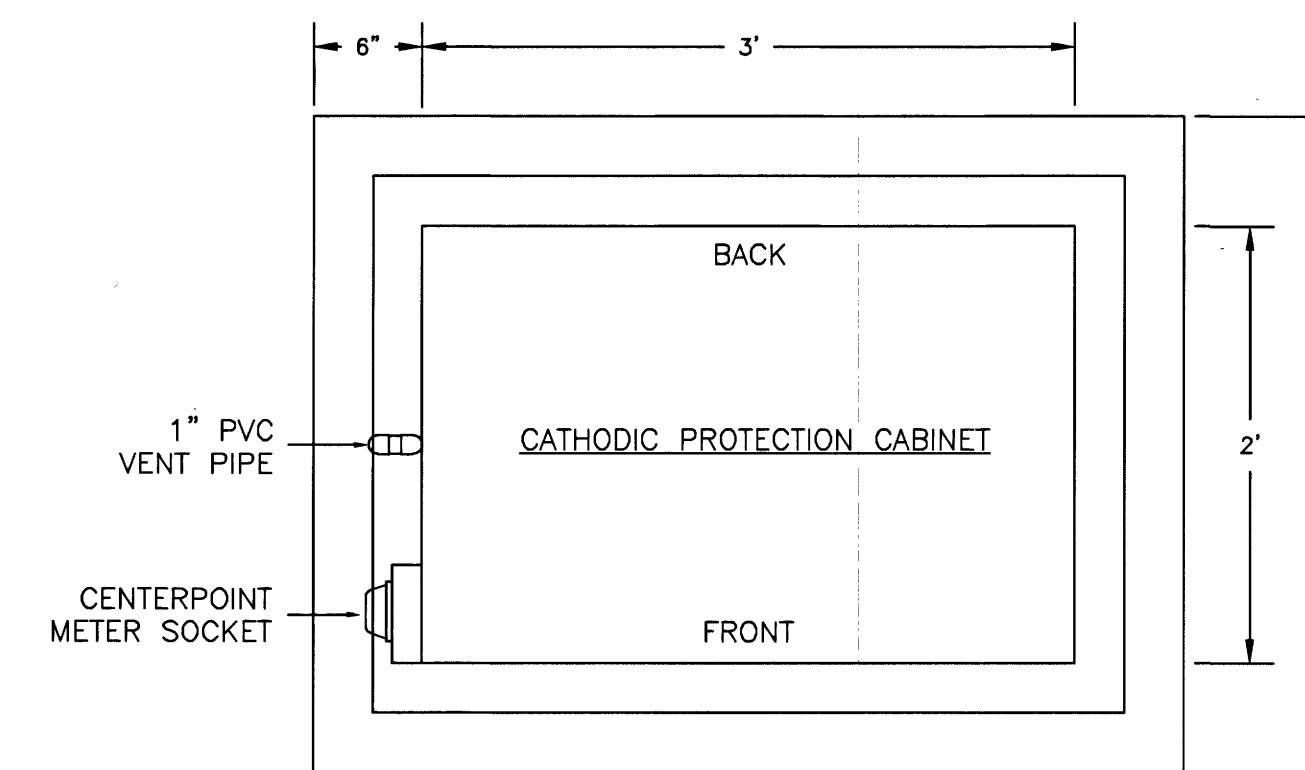
3 AC SERVICE FOR CATHODIC PROTECTION CABINET AND TYPICAL DEEP ANODE GROUND BED  
NO SCALE (SEE SPECIFICATION FOR DETAILS)

NOTES:

- FUSED DISCONNECT SWITCH IN A NEMA 1 ENCLOSURE WITH 1-30A FUSED DISCONNECT SWITCH.
- PLASTIC WIRING DUCT (PANDUIT OR EQUAL) 2" W. x 4" H. (MIN.) LENGTH AS REQUIRED. FURNISH WITH COVERS.
- BACK PANEL LOCATED INSIDE OF ENCLOSURE.
- ENCLOSURE: 36" W. x 48" H. x 24" D., 12 GA. TYPE 304 S.S. NEMA 4X, SINGLE DOOR, FREE STANDING, PROVISIONS TO PADLOCK UNIT, LIFTING EYES AND GROUNDING STUD ON DOOR. PROVIDE LOUVERED DOOR TO VENTILATE RECTIFIER UNIT. PROVIDE DRIP SHIELD AND INSIDE SCREEN TO REPEL INSECTS.
- PLACE STICKERS THAT READ: "DANGER HIGH VOLTAGE KEEP OUT" ON ALL FOUR SIDES AND TOP OF ENCLOSURE.
- PROVIDE PERMANENT ENGRAVED NAME PLATE (BLACK LETTERS ON WHITE BACKGROUND) THAT READS: "CATHODIC PROTECTION CABINET, PROPERTY OF THE NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY"
- MAKE TRANSITION FROM PVC CONDUIT (UNDERGROUND TO RGS CONDUIT) ABOVE GROUND.
- COORDINATE SIZE OF CONCRETE PAD WITH SIZE OF CABINET. THE CONCRETE PEDESTAL THAT THE CABINET RESTS ON TO BE 6" WIDER THAN THE CABINET ON ALL SIDES.
- #4 GRADE 60 REBAR @12" OC BOTH WAYS.
- #5 GRADE 60 REBAR @12" OC BOTH WAYS.
- 3/4" x 10' LONG GROUND ROD AND #6 COPPER GROUND CABLE.
- CATHODIC PROTECTION CABINET TO BE MINIMUM 1 FT ABOVE GRADE ON CONCRETE PAD.
- ALL CONDUIT THROUGH SLAB NOT RUN OVER.



4 FRONT VIEW OF CONCRETE PAD WITH CATHODIC PROTECTION CABINET  
NO SCALE



5 PLAN VIEW OF CONCRETE PAD WITH CATHODIC PROTECTION CABINET  
NO SCALE



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713.780.4100

DETAILS FOR CATHODIC PROTECTION CABINET AND ANODE GROUND BED

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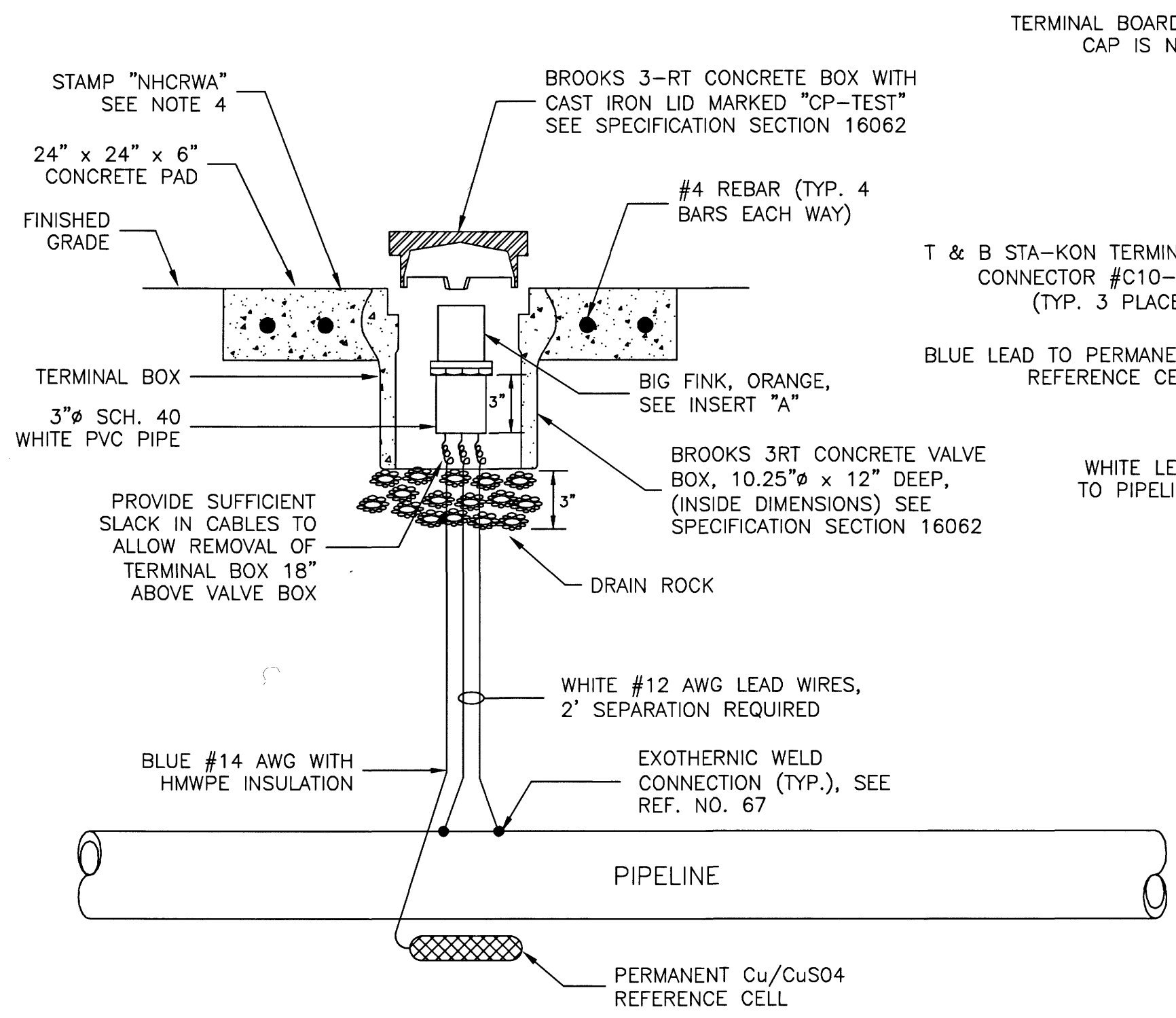
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12/10/19  
DATE

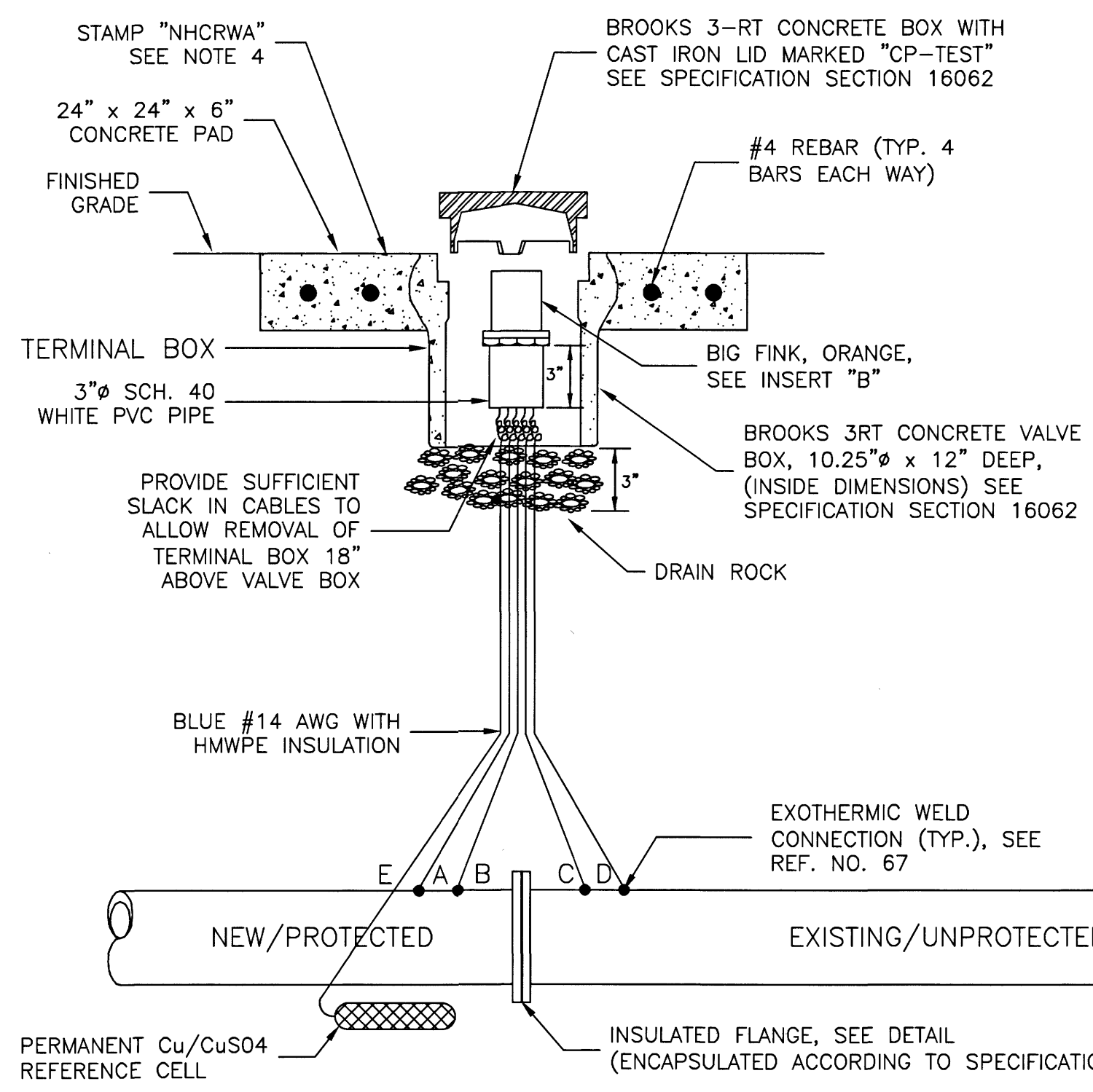
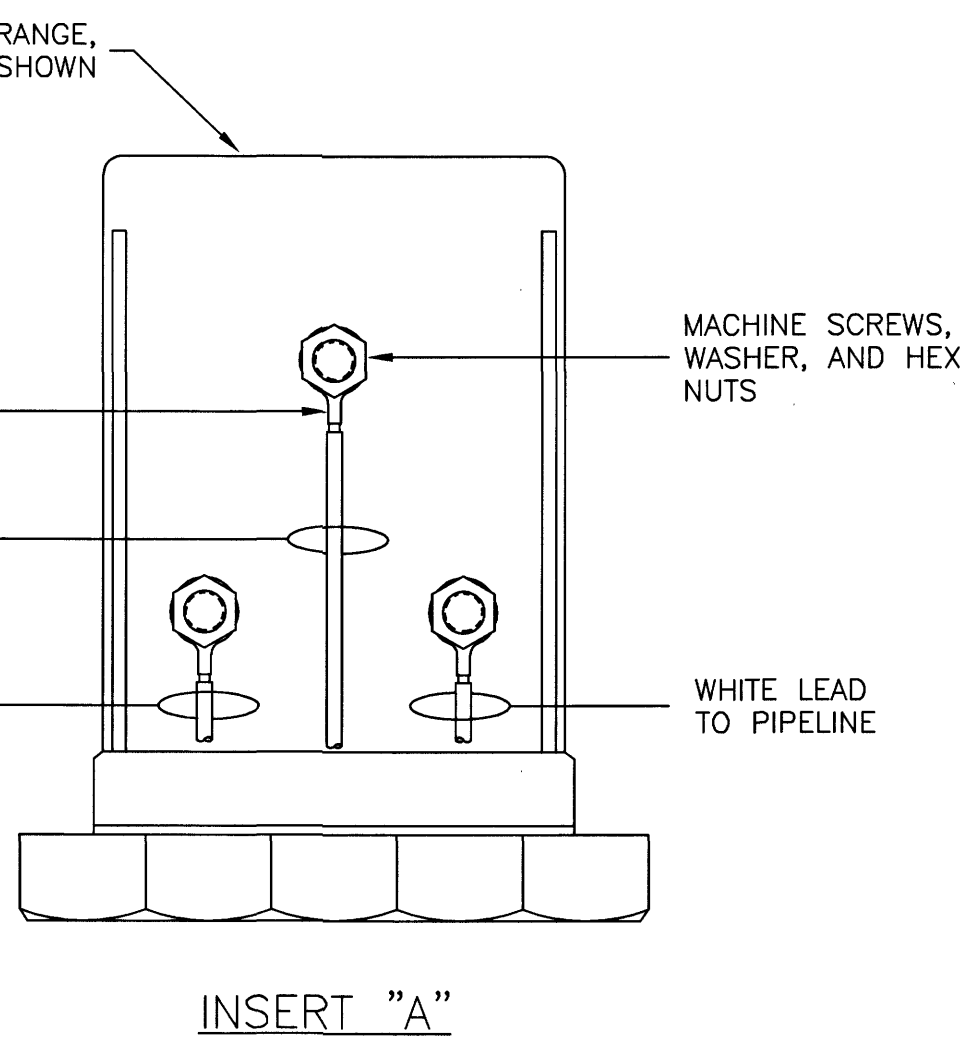
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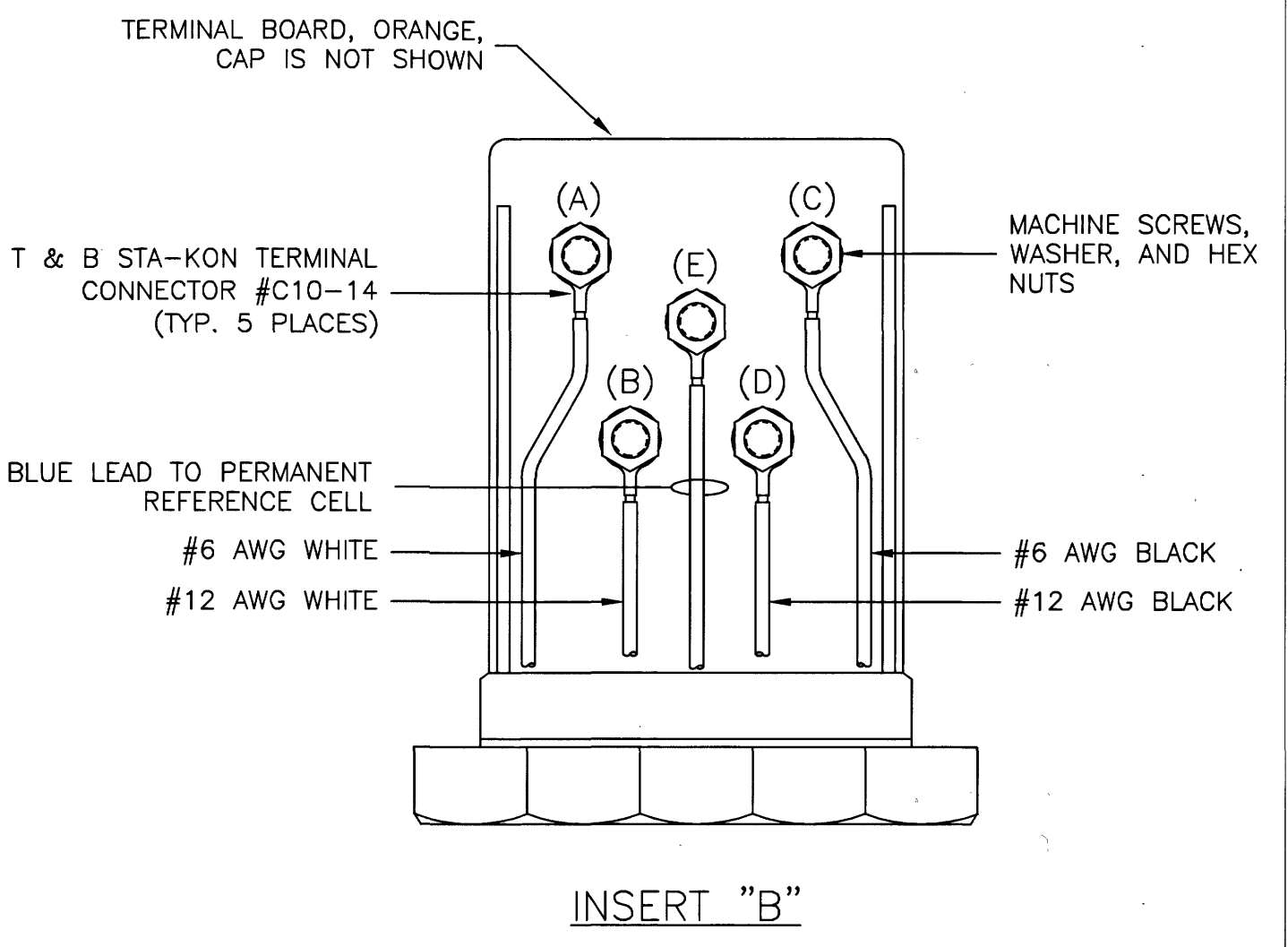
No.	Date	Revisions	App.



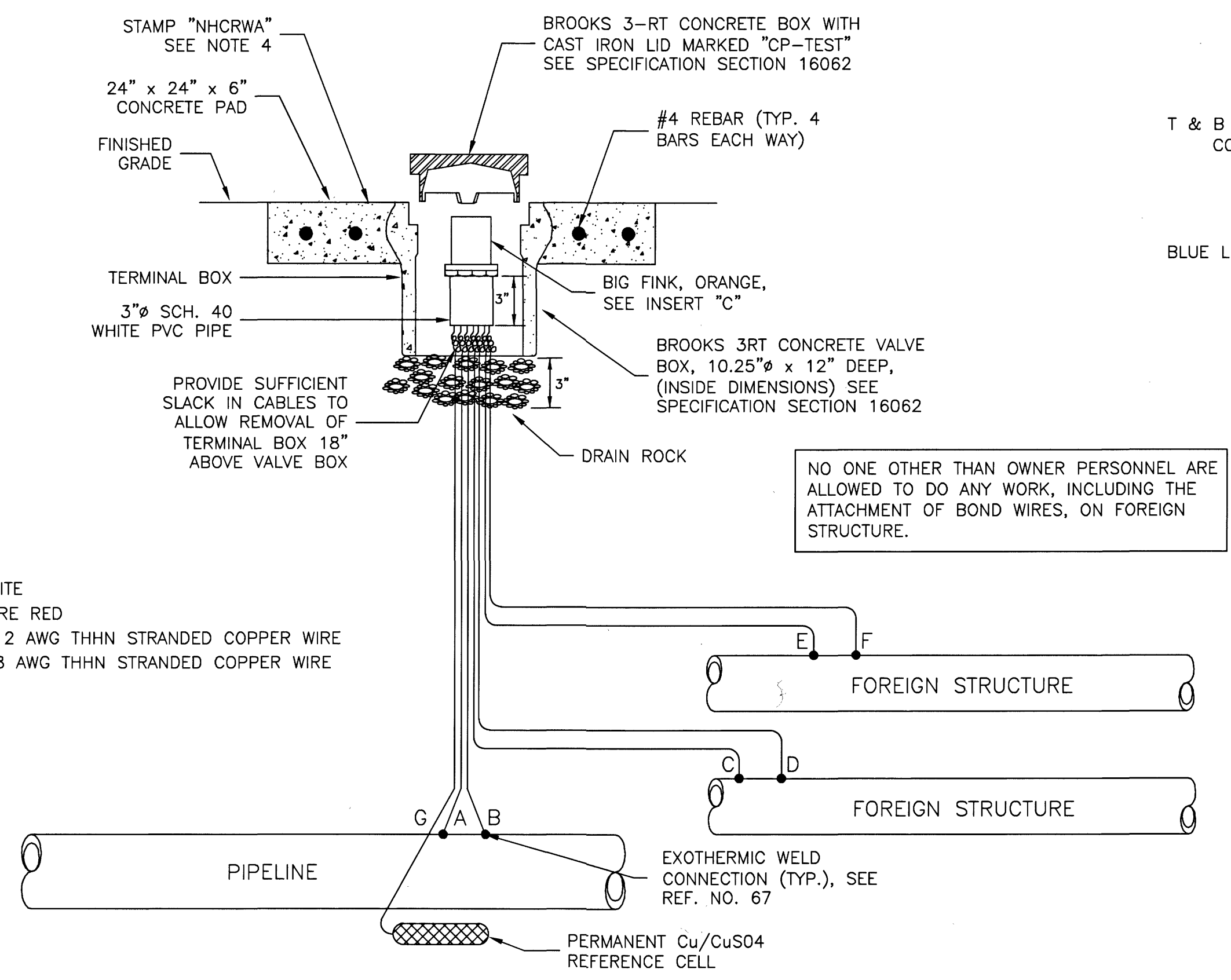
① TYPE TS FLUSH MOUNTED POTENTIAL TEST STATION



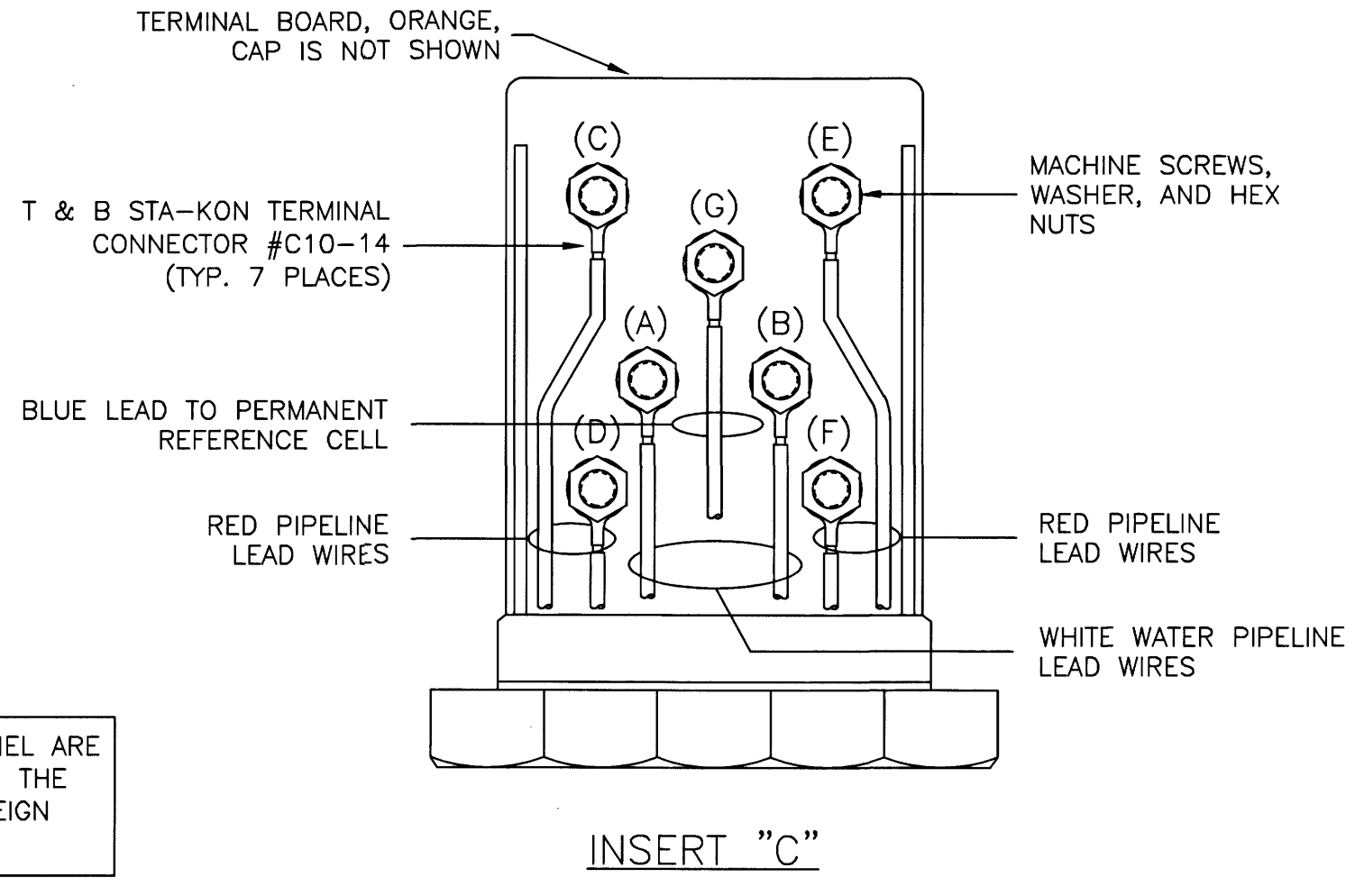
② TYPE IF FLUSH MOUNTED FLANGE ISOLATION TEST STATION



- WIRE CODING:**
- \* WIRES A & B ARE WHITE, WIRES C & D ARE BLACK
  - \* WIRES A & C ARE #6 AWG THHN STRANDED CONDUCTOR WIRE
  - \* WIRES B & D ARE #12 AWG THHN STRANDED CONDUCTOR WIRE
  - \* WHITE WIRES ATTACH TO PROTECTED OR NEW PIPE
  - \* BLACK WIRES ATTACH TO UNPROTECTED OR EXISTING PIPE
  - \* SPLICING WIRES IS NOT ALLOWED



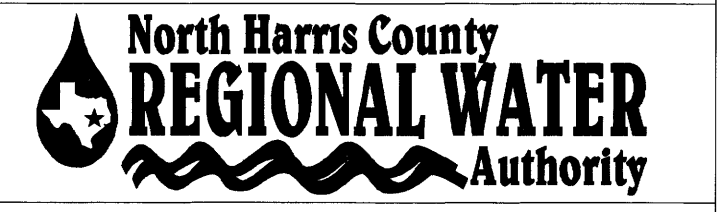
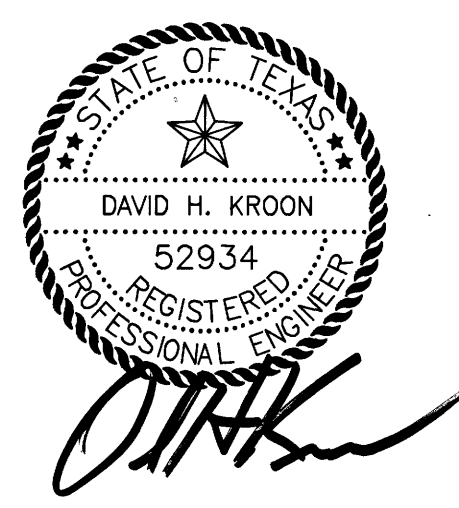
③ TYPE FL FLUSH MOUNTED FOREIGN LINE TEST STATION



- NOTES:**
- TEST STATION SHALL BE MOUNTED DIRECTLY ABOVE THE NEW WATER LINE.
  - FOR MORE THAN TWO (2) FOREIGN LINES, INSTALL A COTTBOX TYPE TEST STATION. (UP TO 20 TERMINALS)
  - CONTACT FOREIGN PIPELINES OWNER AT LEAST 48 HOURS PRIOR TO THE REQUIREMENT FOR INSTALLATION OF A FOREIGN PIPELINE CATHODIC PROTECTION TEST STATION. OWNER WILL MAKE ARRANGEMENTS FOR ACCOMPLISHMENT OF THE REQUIRED WORK.
  - CONTRACTOR TO STUMP NHCRTWA INTO CONCRETE PAD. STAMP PROVIDED BY OWNER

NO ONE OTHER THAN OWNER PERSONNEL ARE ALLOWED TO DO ANY WORK, INCLUDING THE ATTACHMENT OF BOND WIRES, ON FOREIGN STRUCTURE.

- WIRE CODING:**
- \* WIRES A & B ARE WHITE
  - \* WIRES C, D, E & F ARE RED
  - \* WIRES A, C, E ARE #12 AWG THHN STRANDED COPPER WIRE
  - \* WIRES B, D, F ARE #8 AWG THHN STRANDED COPPER WIRE



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**CATHODIC PROTECTION  
DETAILS FOR  
TEST STATIONS**

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TEXAS SERIAL NO.  
12/10/19  
DATE

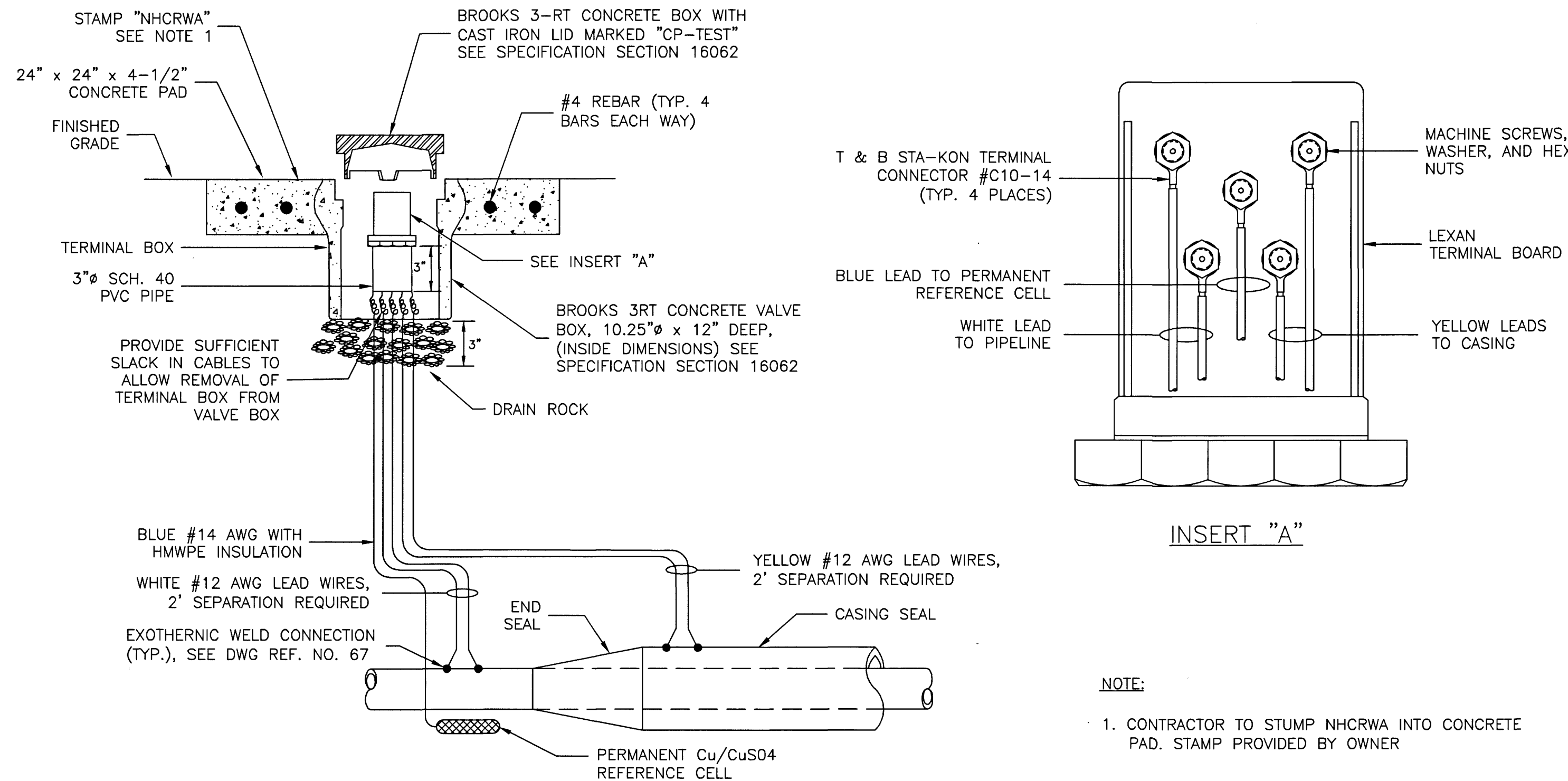
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DWG. LOCATION: G:\Regional\JOBS\2017\30 HOUSTON\340303196 NORTH HARRIS COUNTY WATER 28B - CYPRESS, TX\6 - Design & Specs\Detail Drawings 28B\ DWG. NAME: 62-Cathodic Protection for Test Stations.dwg



No.	Date	Revisions	App.



**NOTE:**  
 1. CONTRACTOR TO STUMP NHCRTWA INTO CONCRETE PAD. STAMP PROVIDED BY OWNER

① TYPE CP FLUSH MOUNTED CASSED CROSSING TEST STATION

Test Station	Station No.	Type of Test Sta.	Remarks
1	2+60.5	IF	Insulation flange at tie-in to Project 28A
2	5+73	CP	Crossing Lakewood Forest Dr.
3	6+41	CP	Crossing Lakewood Forest Dr.
4	11+68	CP	Crossing Cypress Creek
5	15+13	CP	Crossing Cypress Creek
6	24+40	CP	Crossing Oak Hollow Dr.
7	24+95	CP	Crossing Oak Hollow Dr.
8	40+24	CP	Crossing Oak Hollow Circle
9	40+84	CP	Crossing Oak Hollow Circle
10	49+76	CP	
11	52+05	CP	
12	52+63	CP	
13	55+27	CP	
14	56+80	CP	
15	57+00	CP	
16	3+40	CP	Crossing HCFCD drainage ditch and KM pipeline crossings
17	5+40	CP	Crossing HCFCD drainage ditch and KM pipeline crossings
18	13+12	CP	Crossing Jones Rd.
19	14+17	CP	Crossing Jones Rd.
20	23+48	TS	Beside Manhole
21	11+83	CP	Crossing AT&T Texas / SWBT
22	10+53	CP	Crossing AT&T Texas / SWBT
23	6+27	CP	Enterprise Pipeline crossings
24	5+12	CP	Enterprise Pipeline crossings
25	4+15	IF	Insulation flange at tie-in to Project 28C

**TEST STATION TYPE**  
 TS = POTENTIAL TEST STATION  
 CP = CASING TEST STATION  
 IF = ISOLATION FLANGE TEST STATION  
 FL = FOREIGN LINE TEST STATION

② TEST STATION TABLE

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 DWG. LOCATION: G:\Regional\JOBS\2017\30 HOUSTON\340303196 NORTH HARRIS COUNTY WATER 28B - CYPRESS, TX\6 - Design & Specs\Detail Drawings 28B\DWG. NAME: 63-Cathodic Protection for Tunnel.dwg



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**CATHODIC PROTECTION DETAILS FOR TUNNEL OR CASSED CROSSING**

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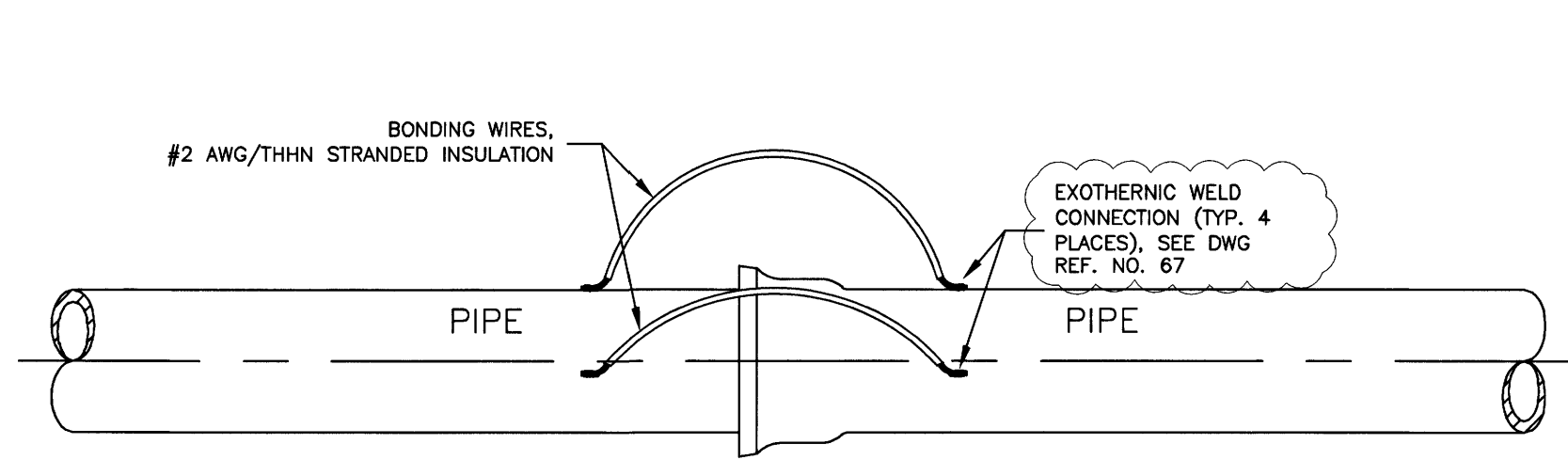
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 TEXAS SERIAL NO. \_\_\_\_\_  
 12/10/19  
 DATE \_\_\_\_\_

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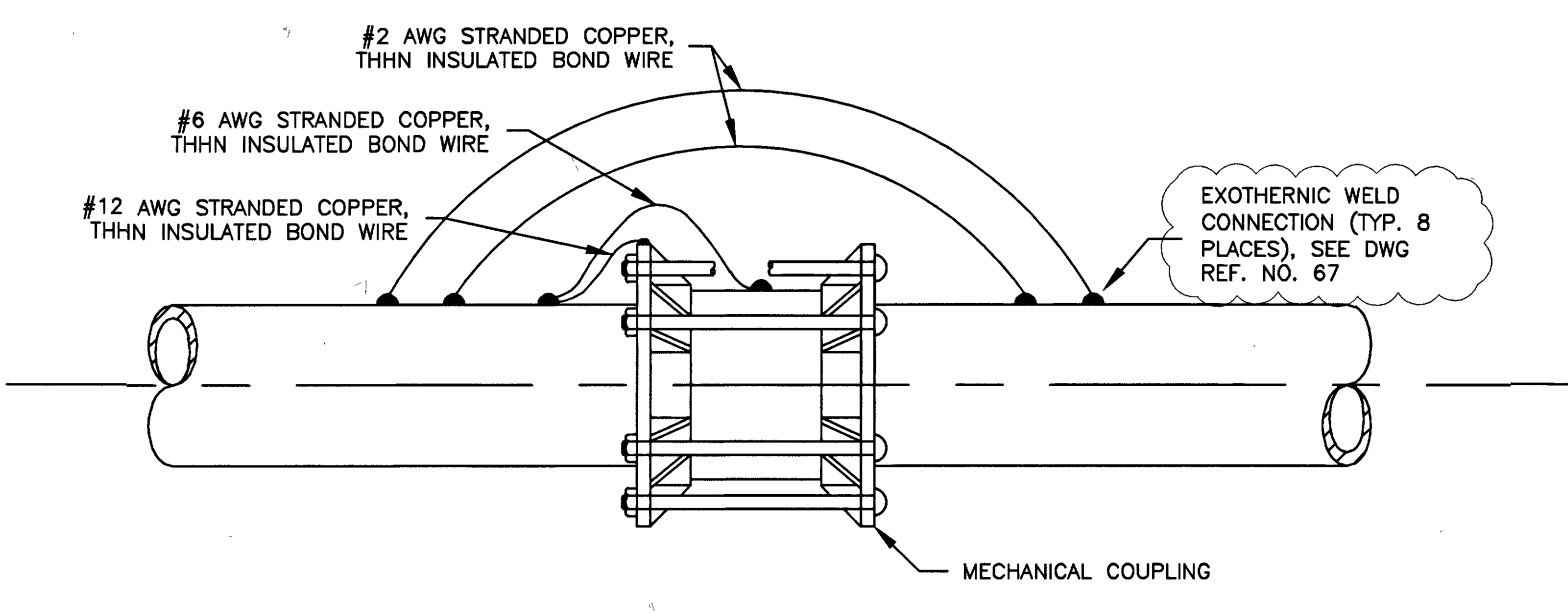
**corrpro**  
 An Aegion Company

REF. NO. 63 SHEET No. 63 of 99

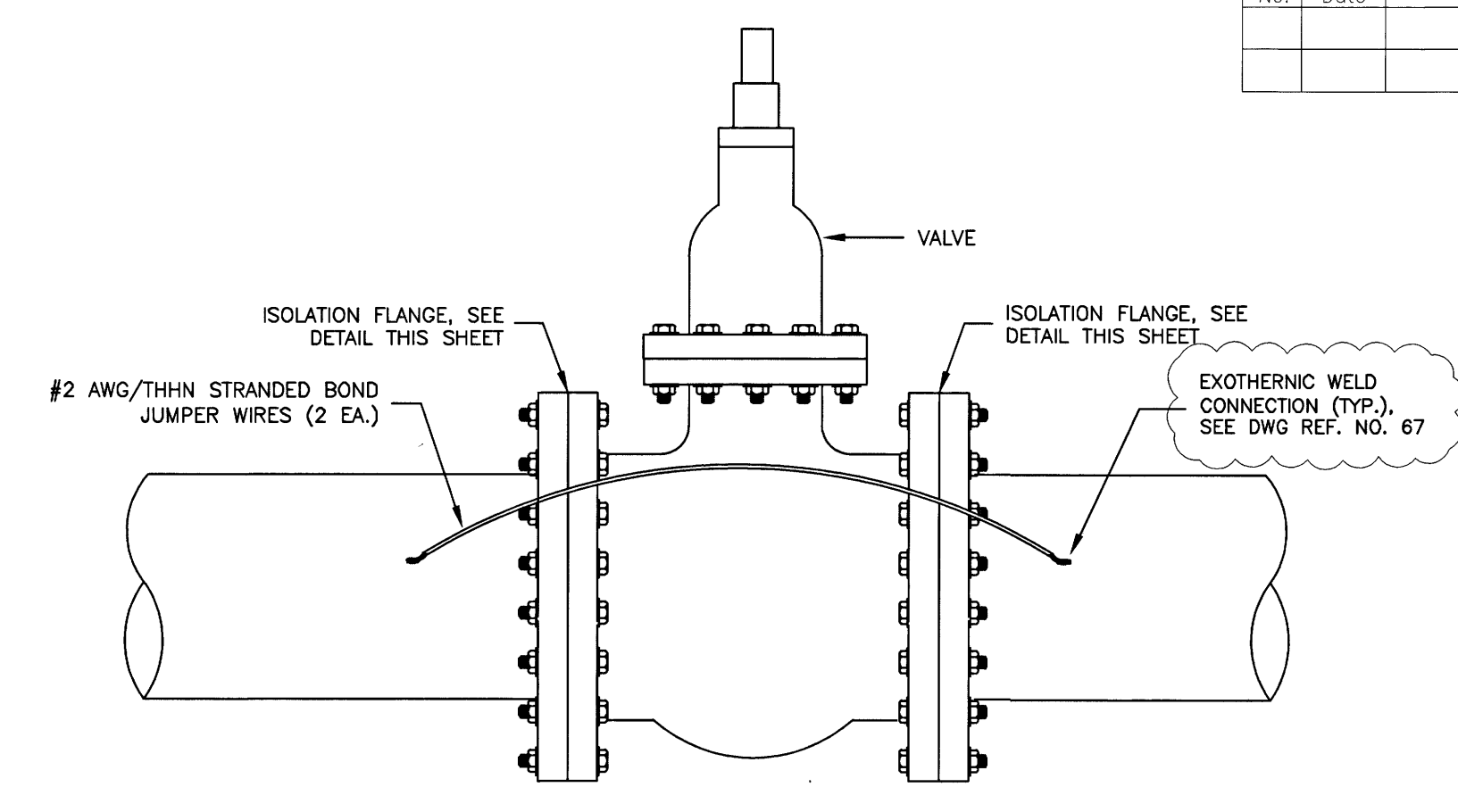
No.	Date	Revisions	App.



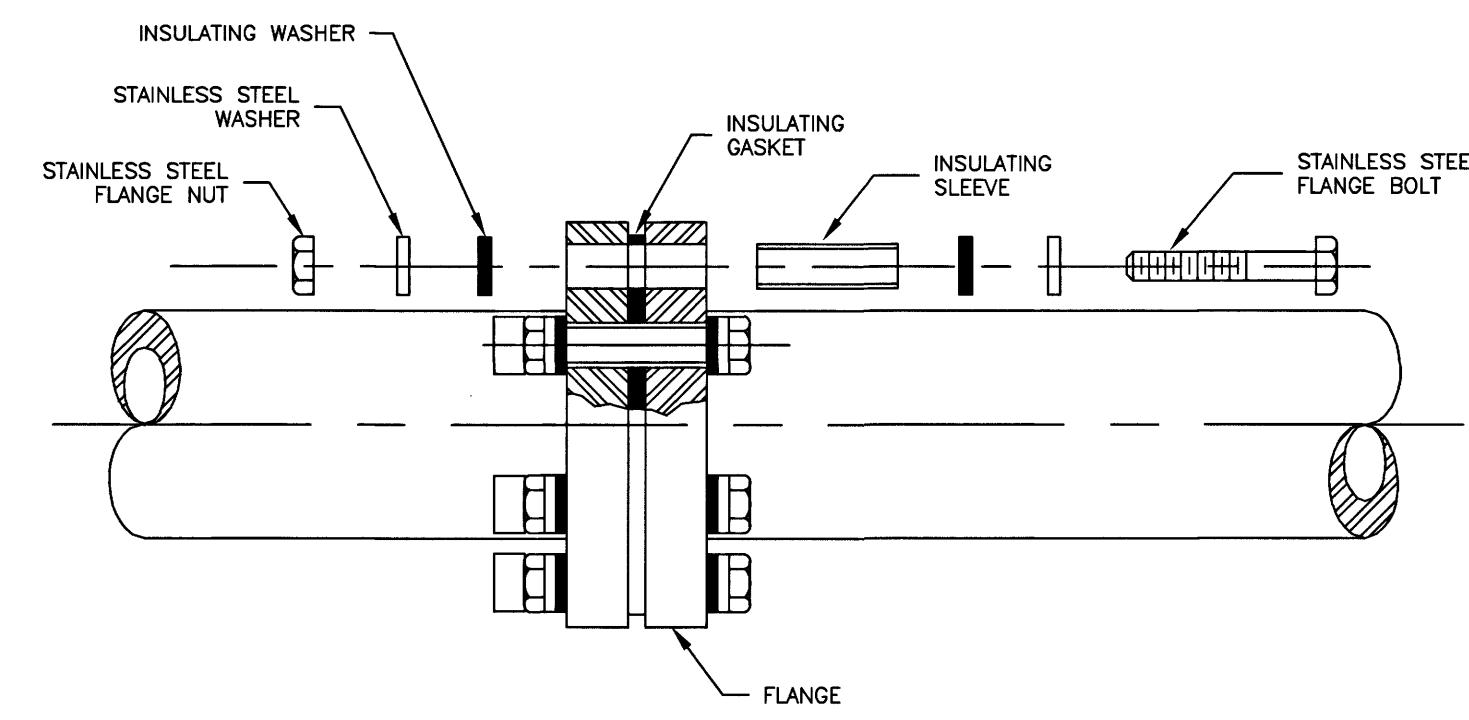
1 BELL & SPIGOT BONDING DETAIL  
(PUSH ON JOINTS SIMILAR)



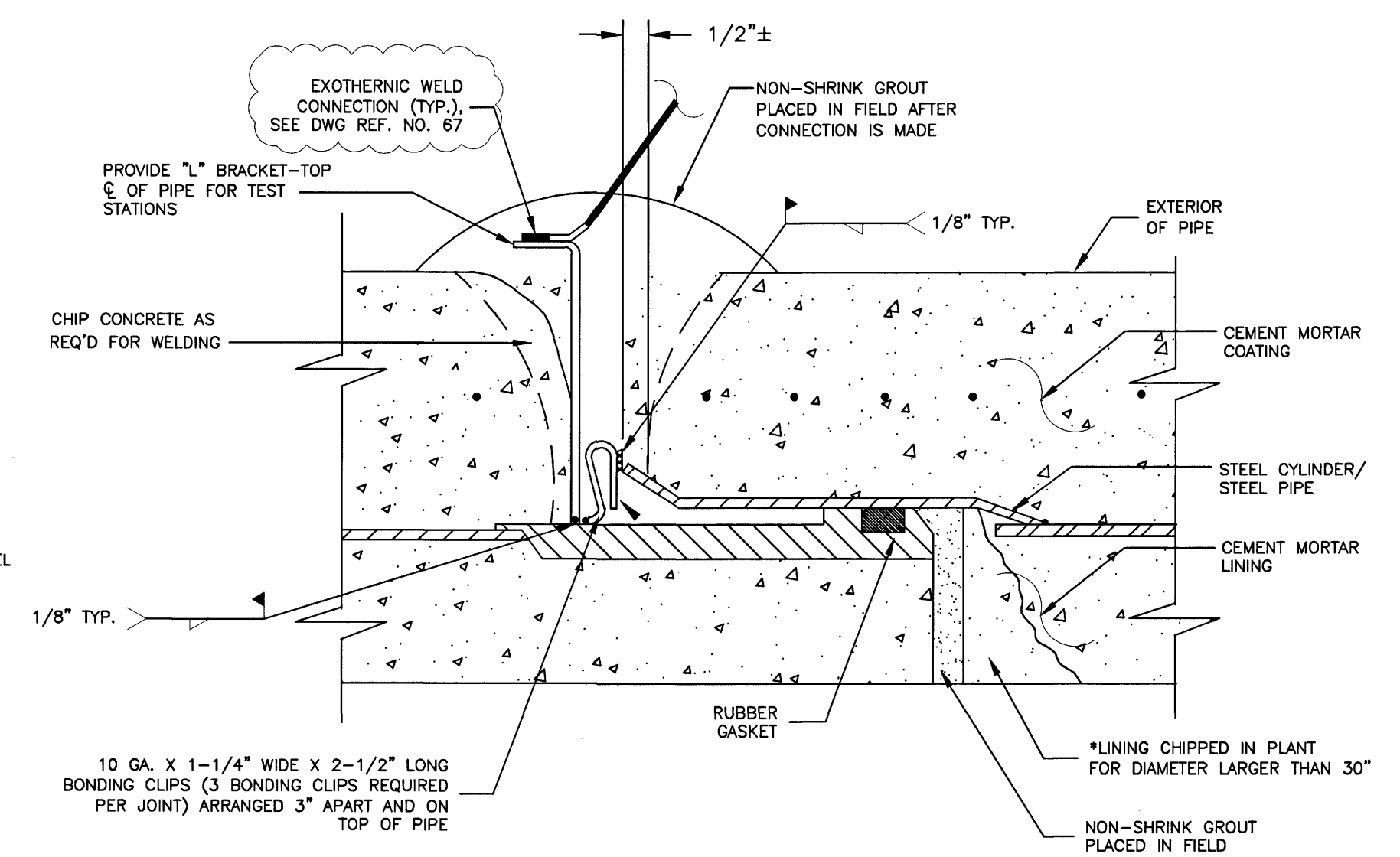
2 MECHANICAL COUPLING BONDING DETAIL



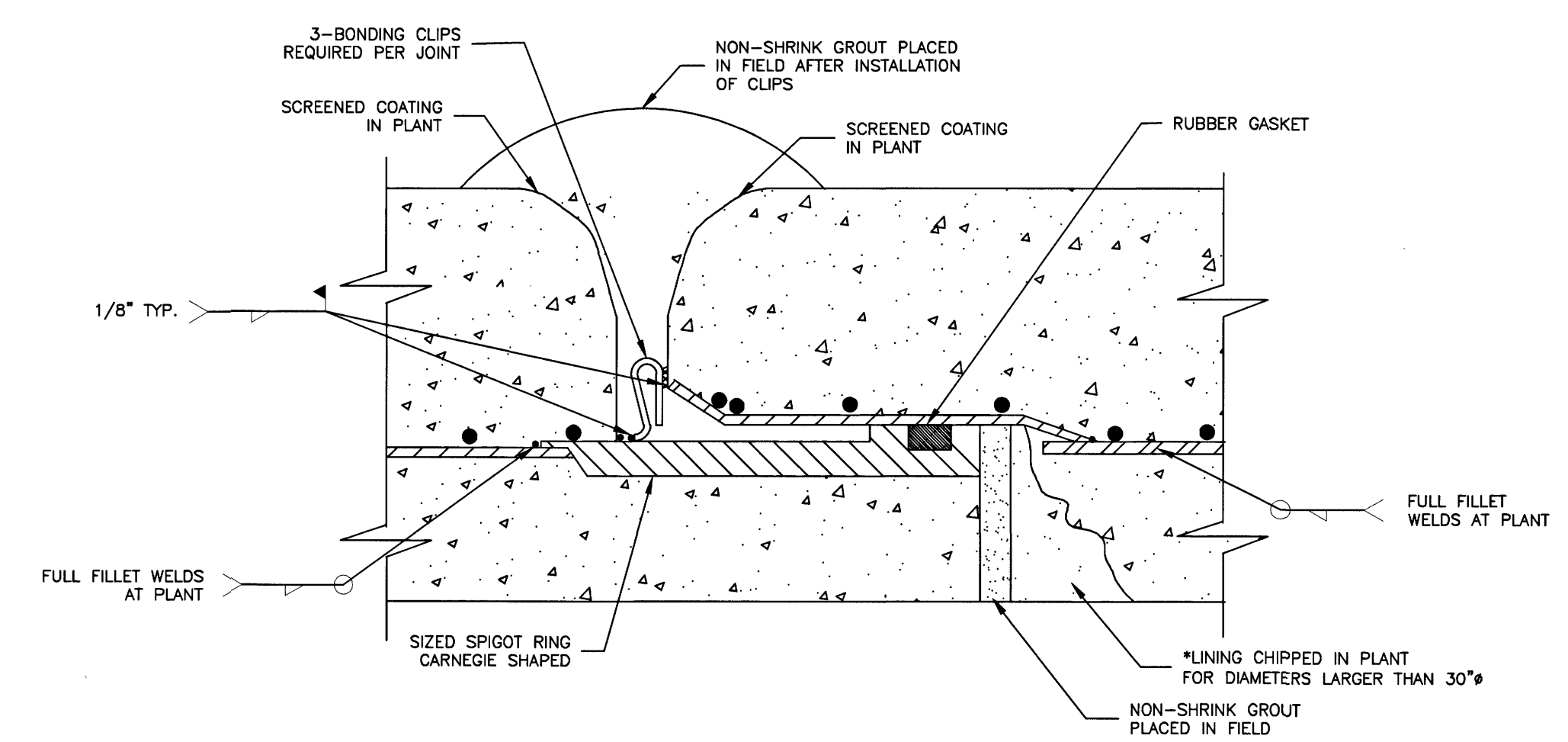
3 IN-LINE VALVE ISOLATION DETAIL



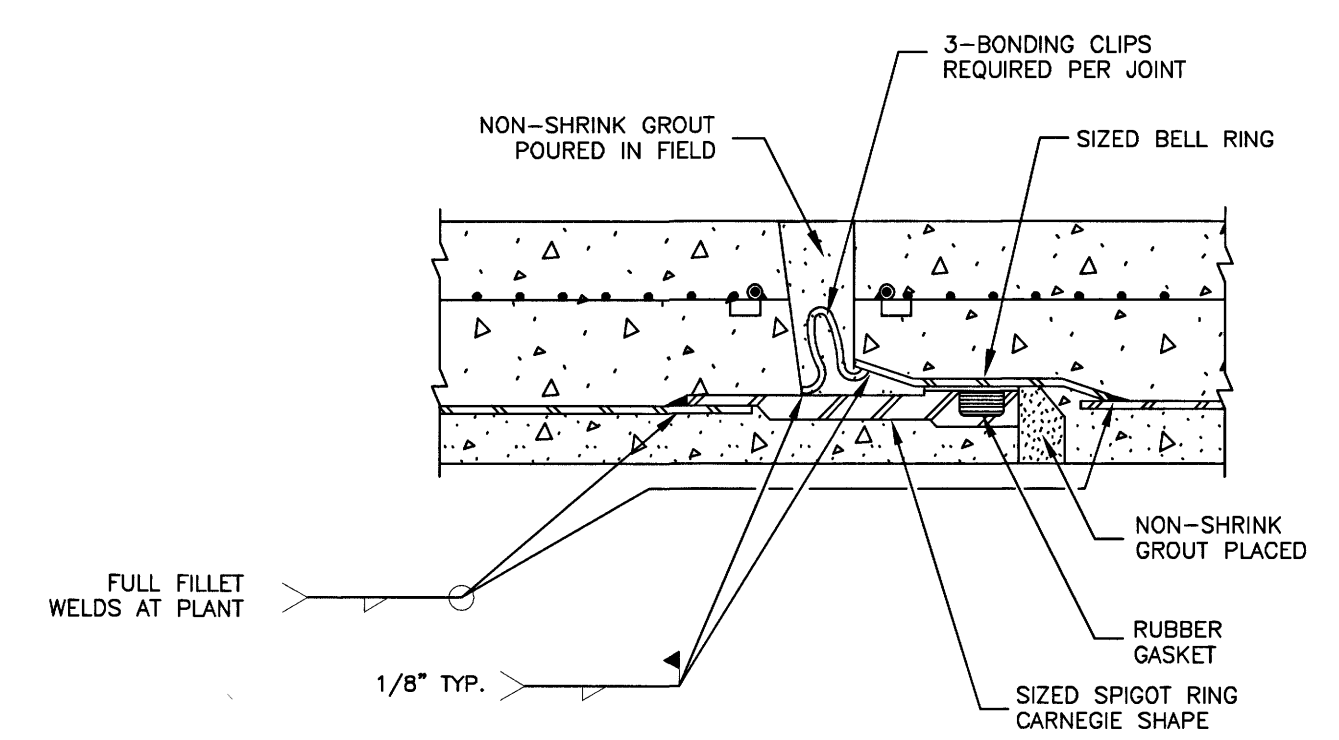
4 ISOLATION FLANGE DETAIL



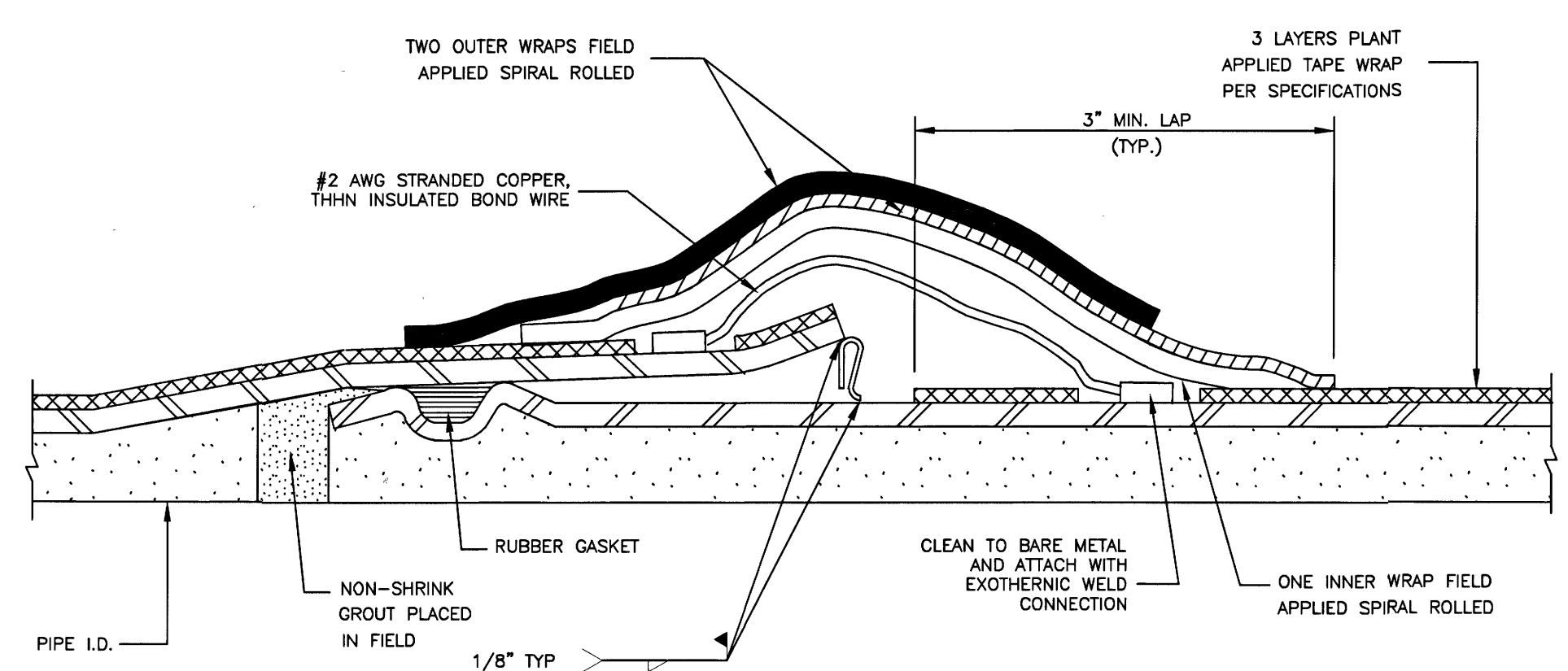
5 BONDED JOINT - MORTAR COATED STEEL PIPE



6 BONDED JOINT - LINED CYLINDER PIPE



7 BONDED JOINT - EMBEDDED CYLINDER PIPE

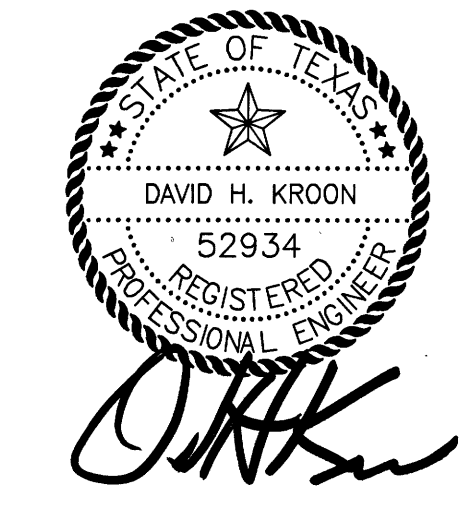


8 BONDED JOINT - O-RING STEEL PIPE  
(CEMENT MORTAR LINED & TAPE WRAPPED SHOWN. EPOXY LINING SIMILAR)

NOTE:  
1. BONDING CLIP TO BE INSTALLED IN THE INTERIOR OF PIPE FOR DIAMETERS LARGER THAN 30". FOR 30" AND SMALLER, BONDING CLIP IS TO BE INSTALLED ON EXTERIOR OF PIPE.

DESIGNER ENGINEER NOTES:  
A. DESIGN ENGINEER TO UPDATE TO CORRECT SHEET NUMBERS AS PER DESIGN DRAWINGS.

GENERAL NOTES:  
1. DETAILS 1, 2, AND 3 SHOW BONDING ARRANGEMENTS ONLY. SEE JOINT DETAIL FOR PIPE JOINT REQUIREMENTS.  
2. BOND WIRES SHALL BE PLACED A MINIMUM OF 6" APART.  
3. CONTRACTOR TO VERIFY ISOLATION OF VALVE PRIOR TO PIPE BACKFILL.



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CATHODIC PROTECTION  
DETAILS FOR  
JOINT BONDING

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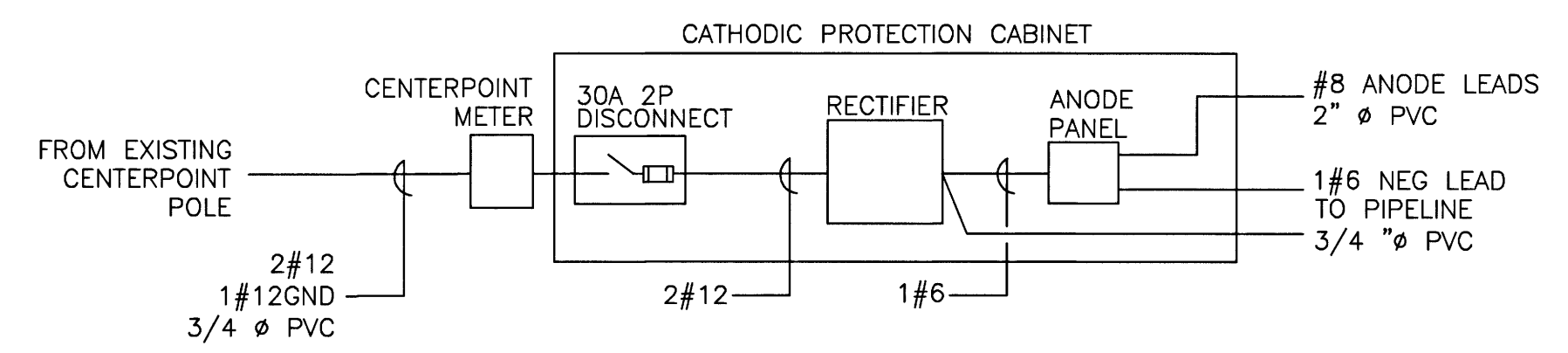
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REF. NO.  
64 SHEET No. 64 of 99

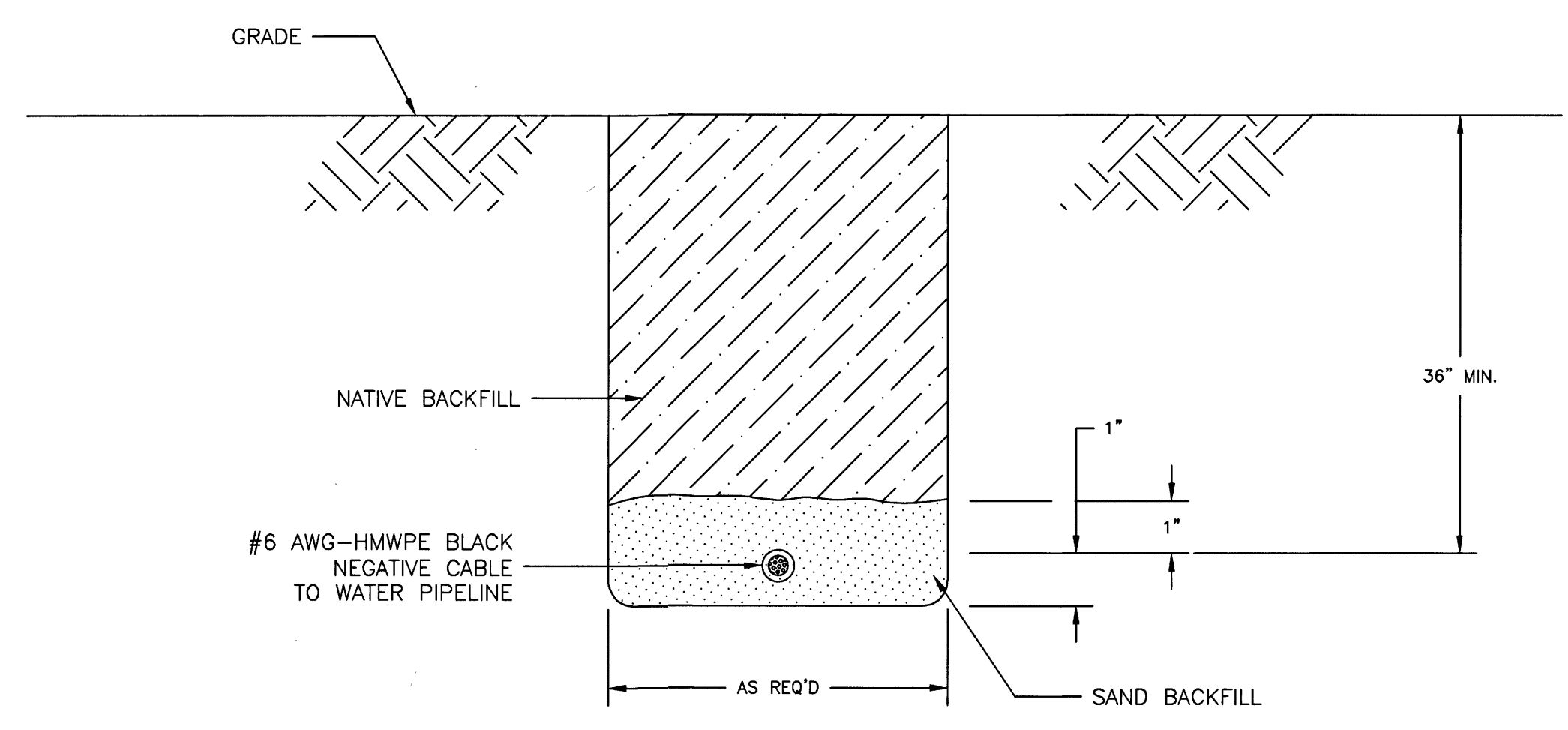
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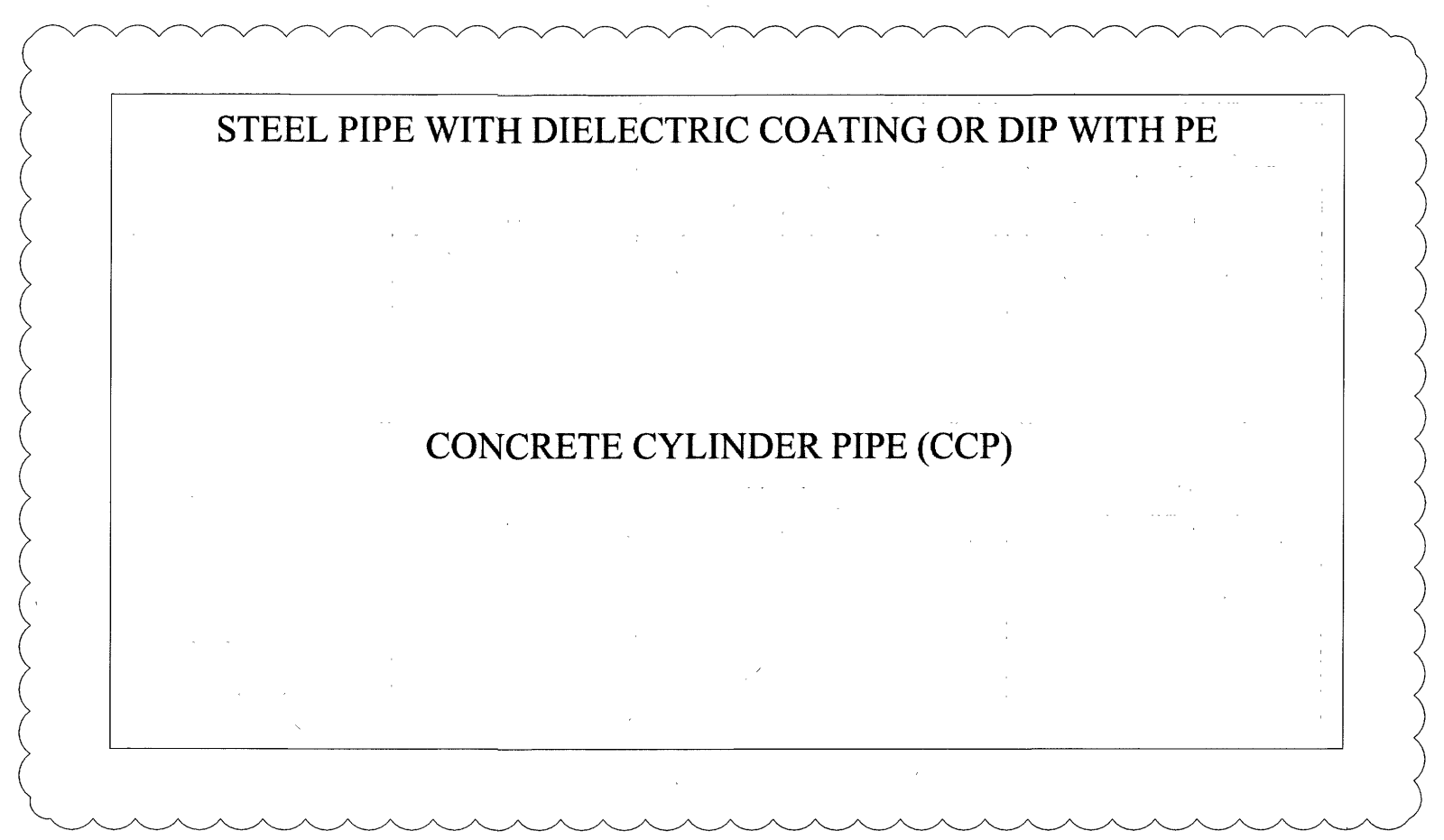
No.	Date	Revisions	App.



1 WIRING DIAGRAM FOR IMPRESSED CURRENT CATHODIC PROTECTION CABINET  
NO SCALE



2 NEGATIVE CABLE TO PIPELINE TRENCH DETAIL



3 ICCP/RECTIFIER TABLE

**DESIGNER ENGINEER NOTES:**  
A. DESIGN ENGINEER TO UPDATE TO CORRECT SHEET NUMBERS AS PER DESIGN DRAWINGS.



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CATHODIC PROTECTION  
GROUNDBED LAYOUT AND  
NEGATIVE CABLE TRENCH DETAIL

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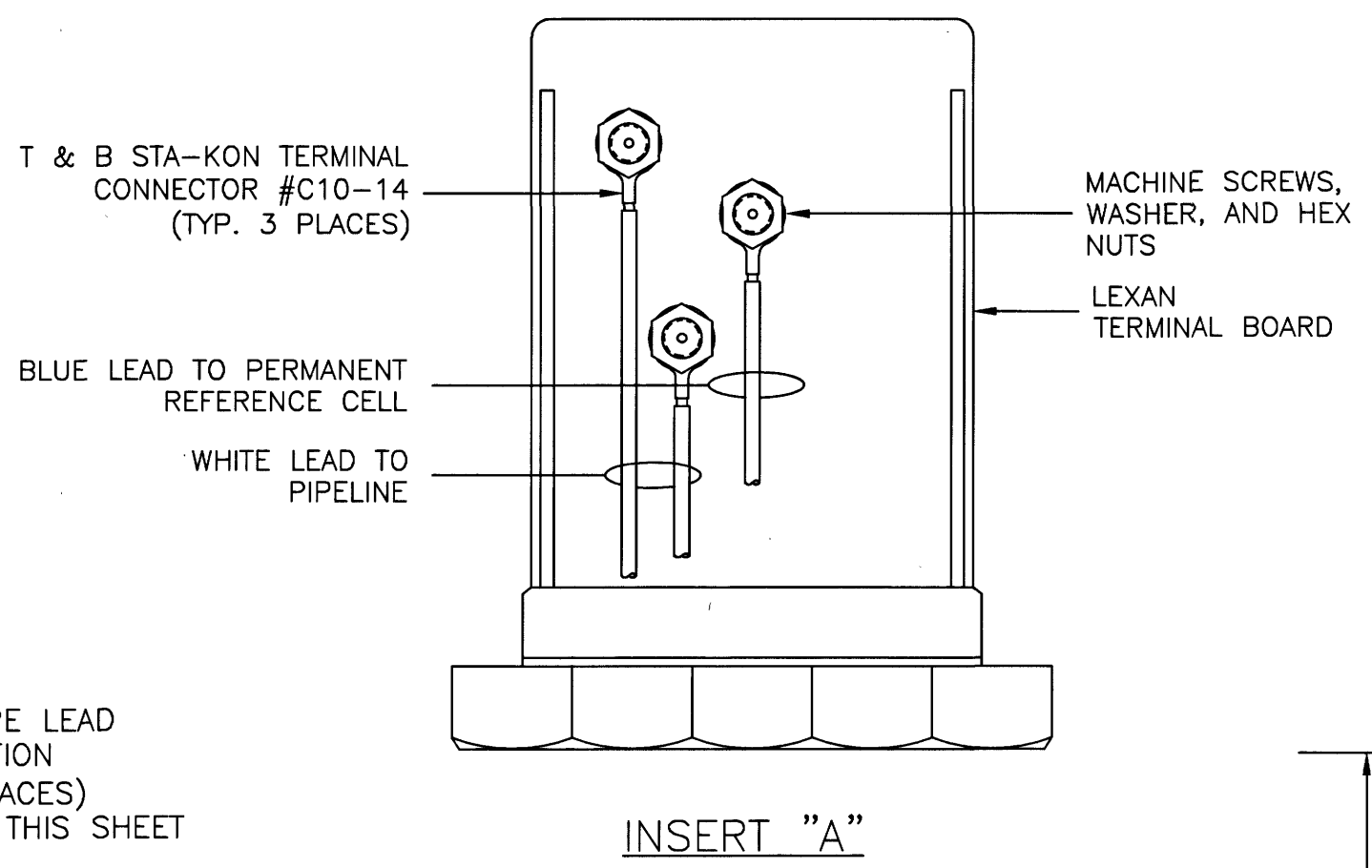
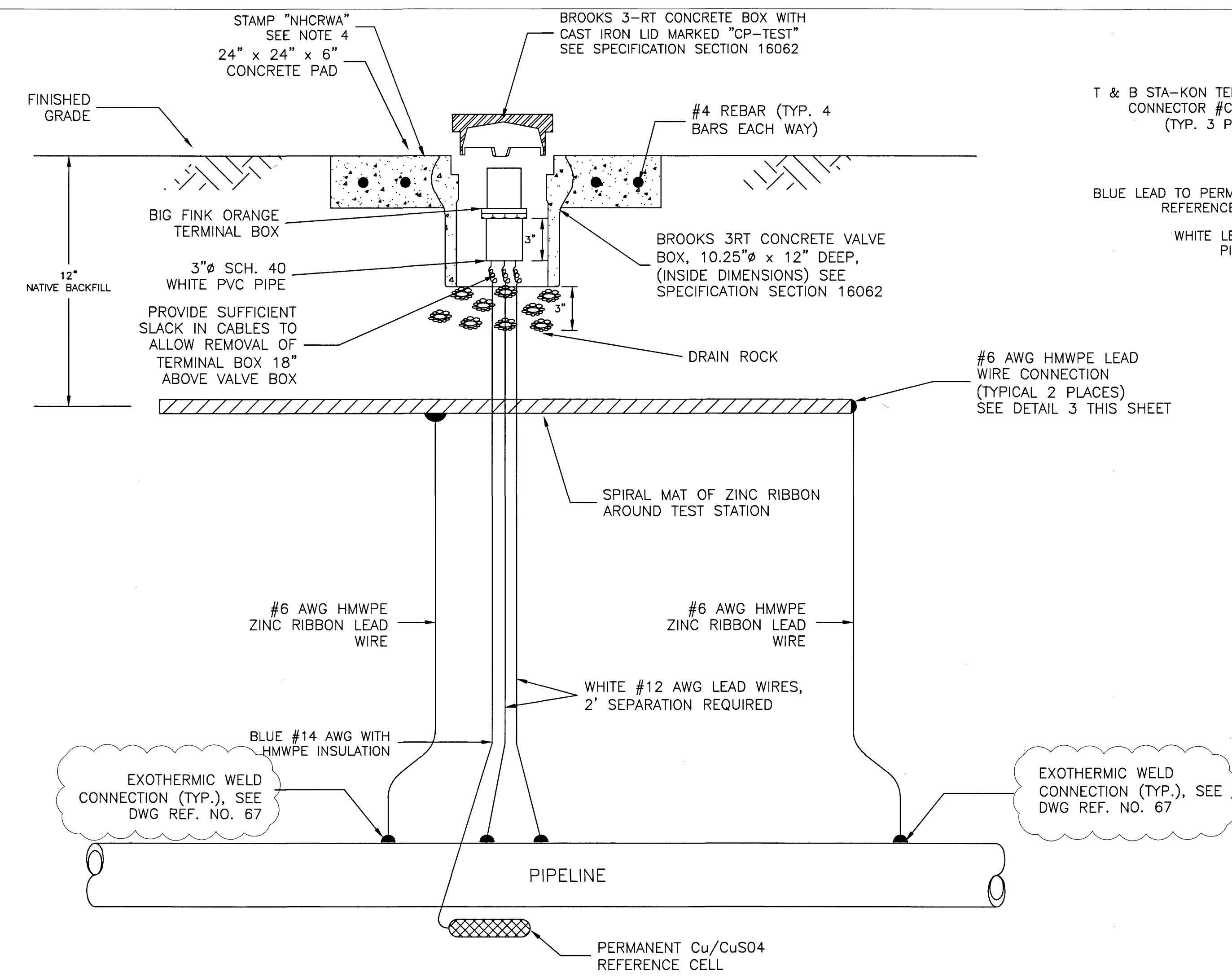


REF. NO. 65 SHEET No: 65 of 99

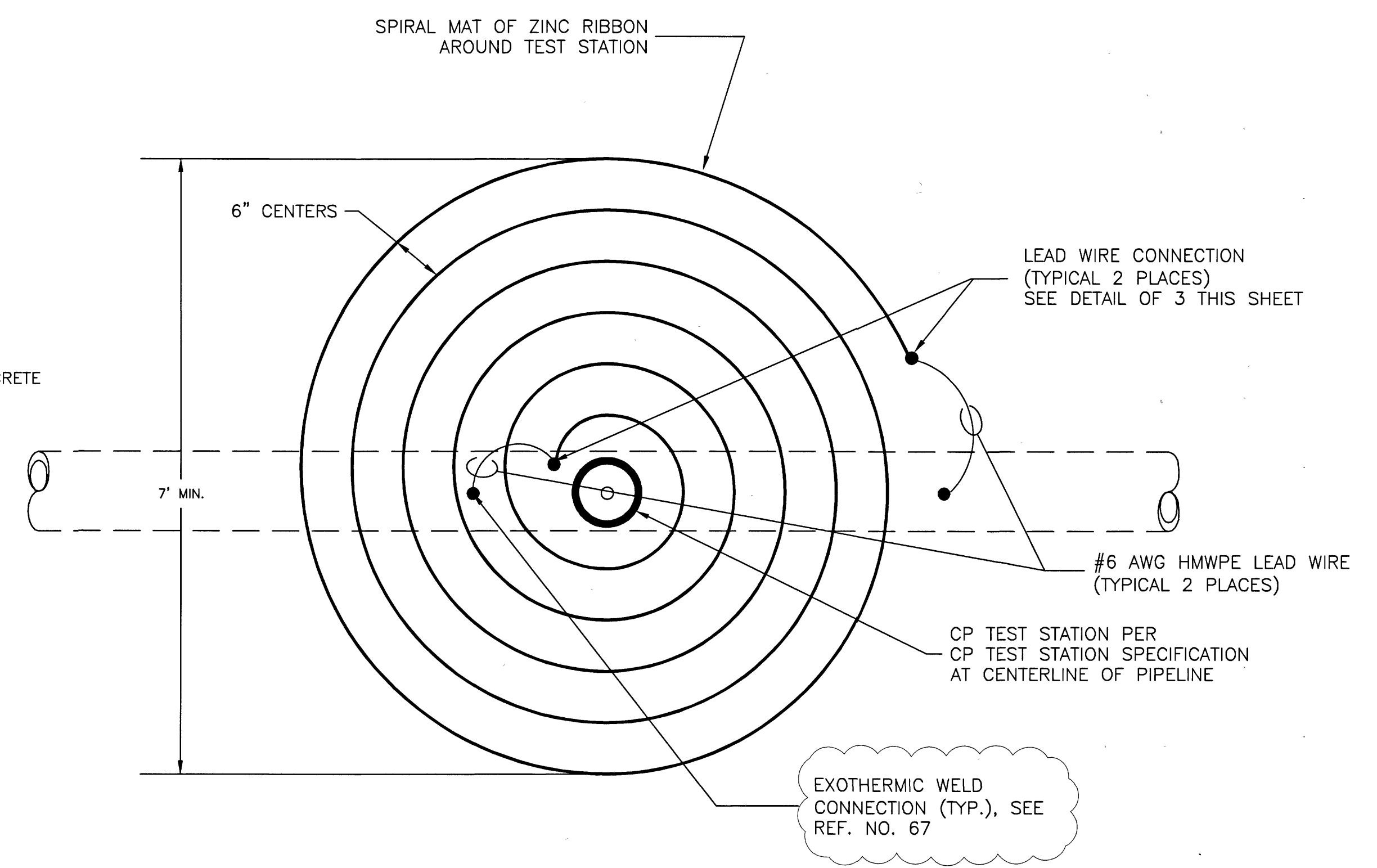
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No.	Date	Revisions	App.

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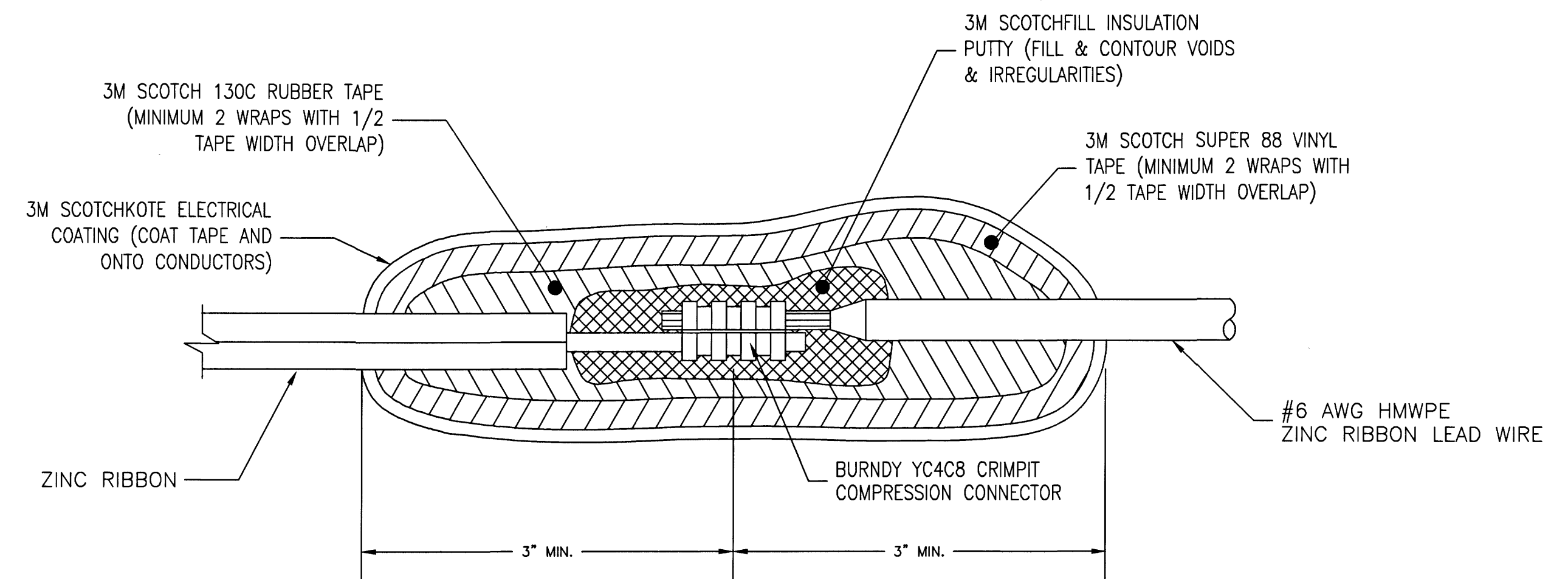


**NOTE:**  
 1. CONTRACTOR TO STUMP NHCROWA INTO CONCRETE PAD. STAMP PROVIDED BY OWNER

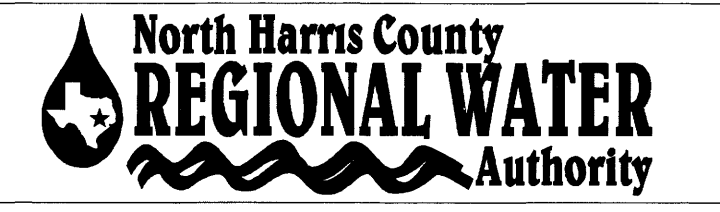


① POTENTIAL GRADIENT CONTROL MAT FOR CATHODIC PROTECTION TEST STATION – SECTION VIEW

② POTENTIAL GRADIENT CONTROL MAT FOR CATHODIC PROTECTION TEST STATION – PLAN VIEW



③ ZINC RIBBON SPLICE AND LEAD WIRE CONNECTION FOR #6 AWG LEAD WIRES



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**ACIM POTENTIAL GRADIENT CONTROL MAT DETAILS**

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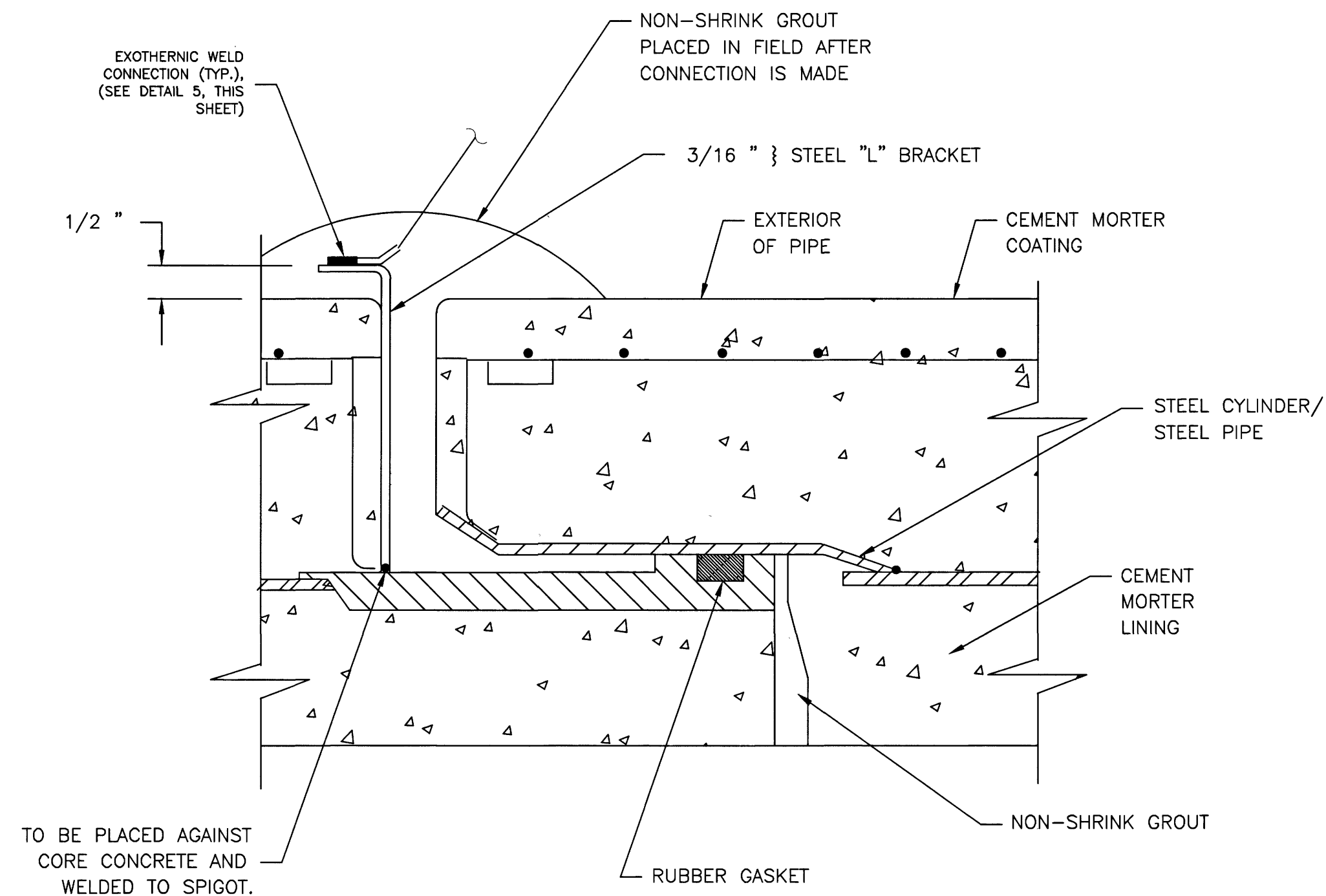


REF. NO. 66 SHEET No. 66 OF 99

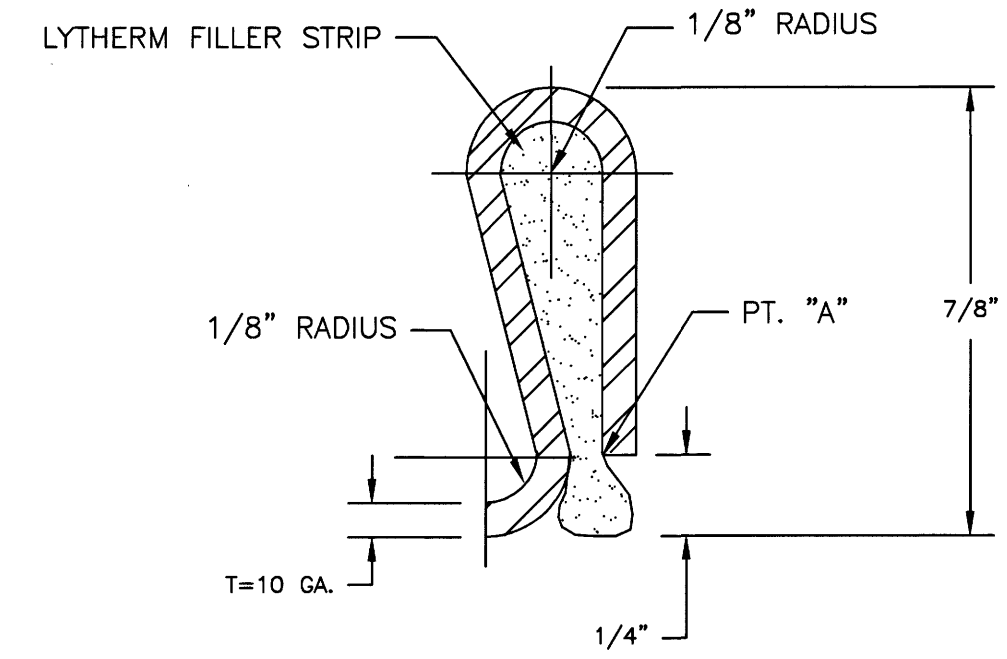
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 NORTH HARRIS COUNTY WATER 28B - CYPRESS, TX 6 - Design & Specs\Detail Drawings 28B



No.	Date	Revisions	App.



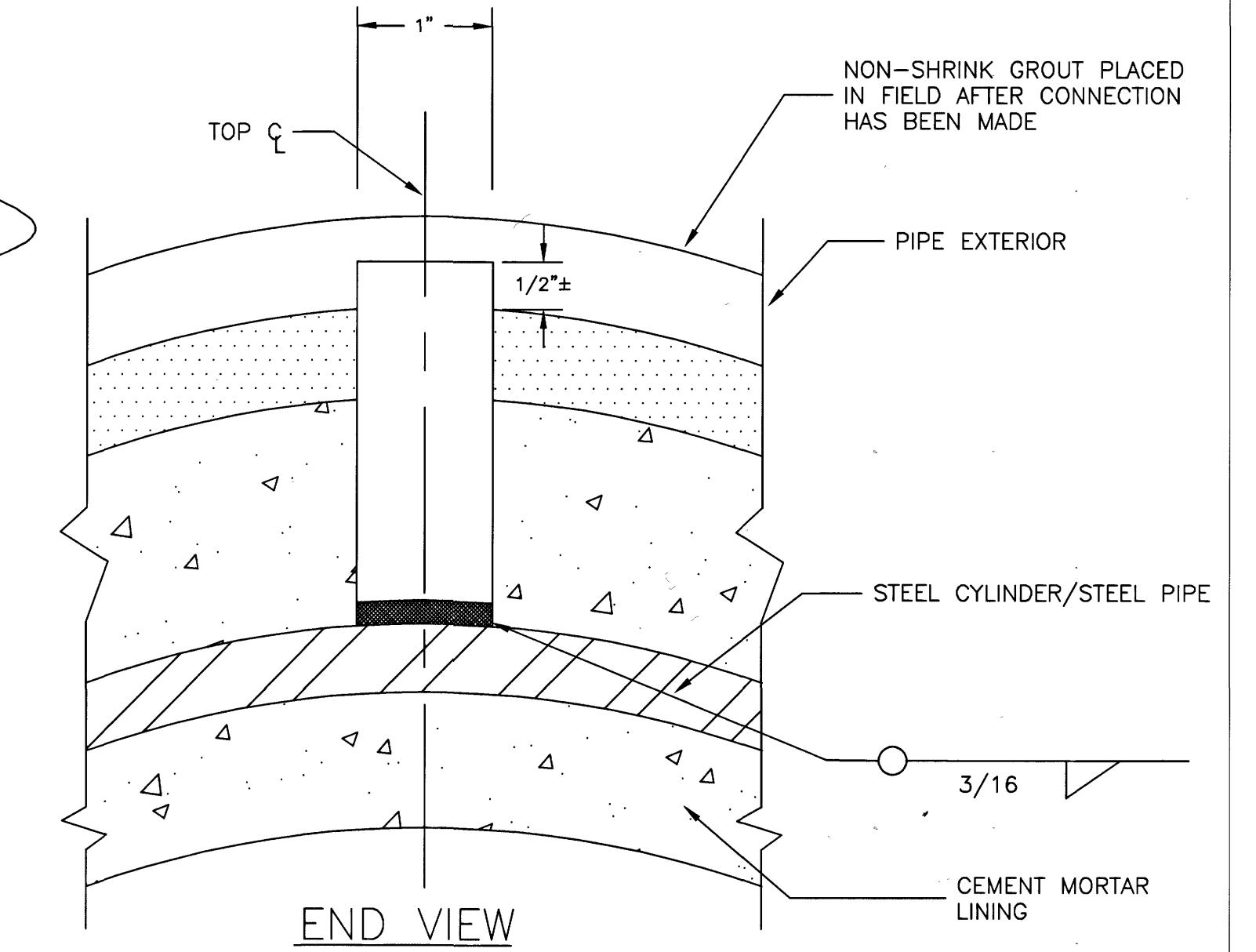
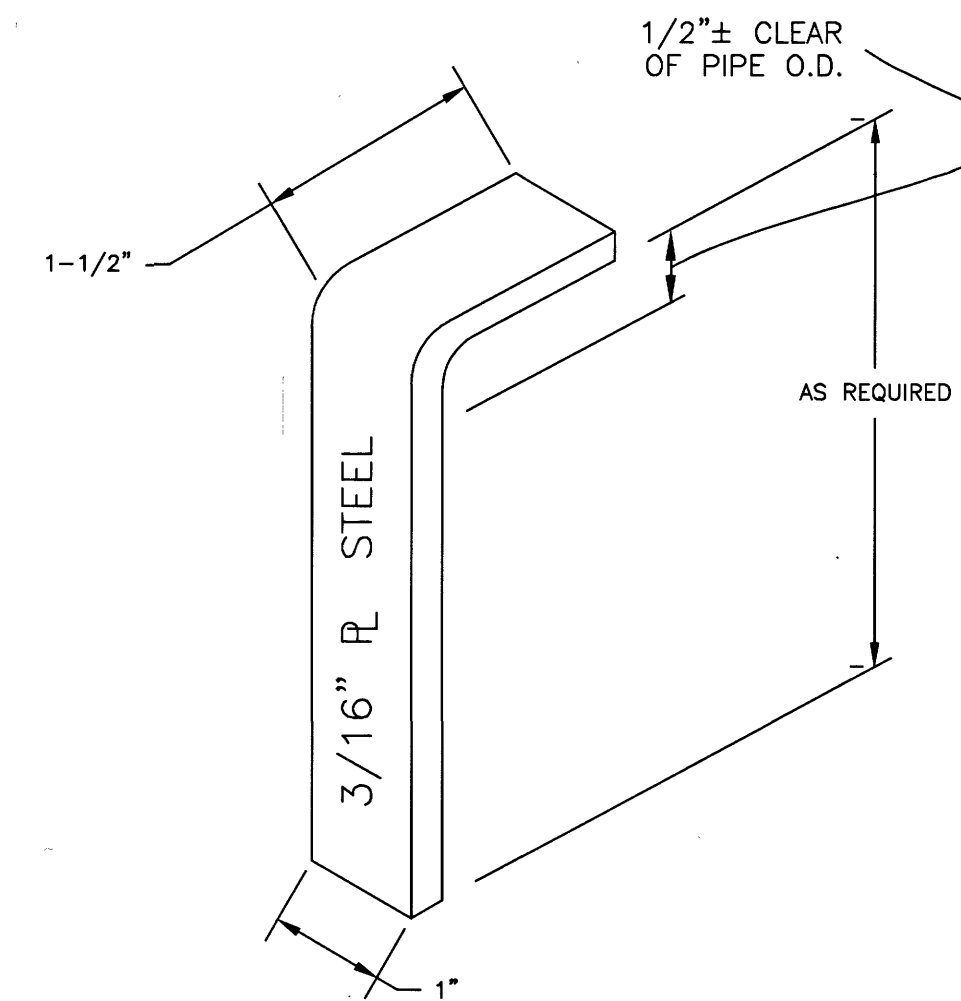
① TEST LEAD CONNECTION DETAIL



NOTES:

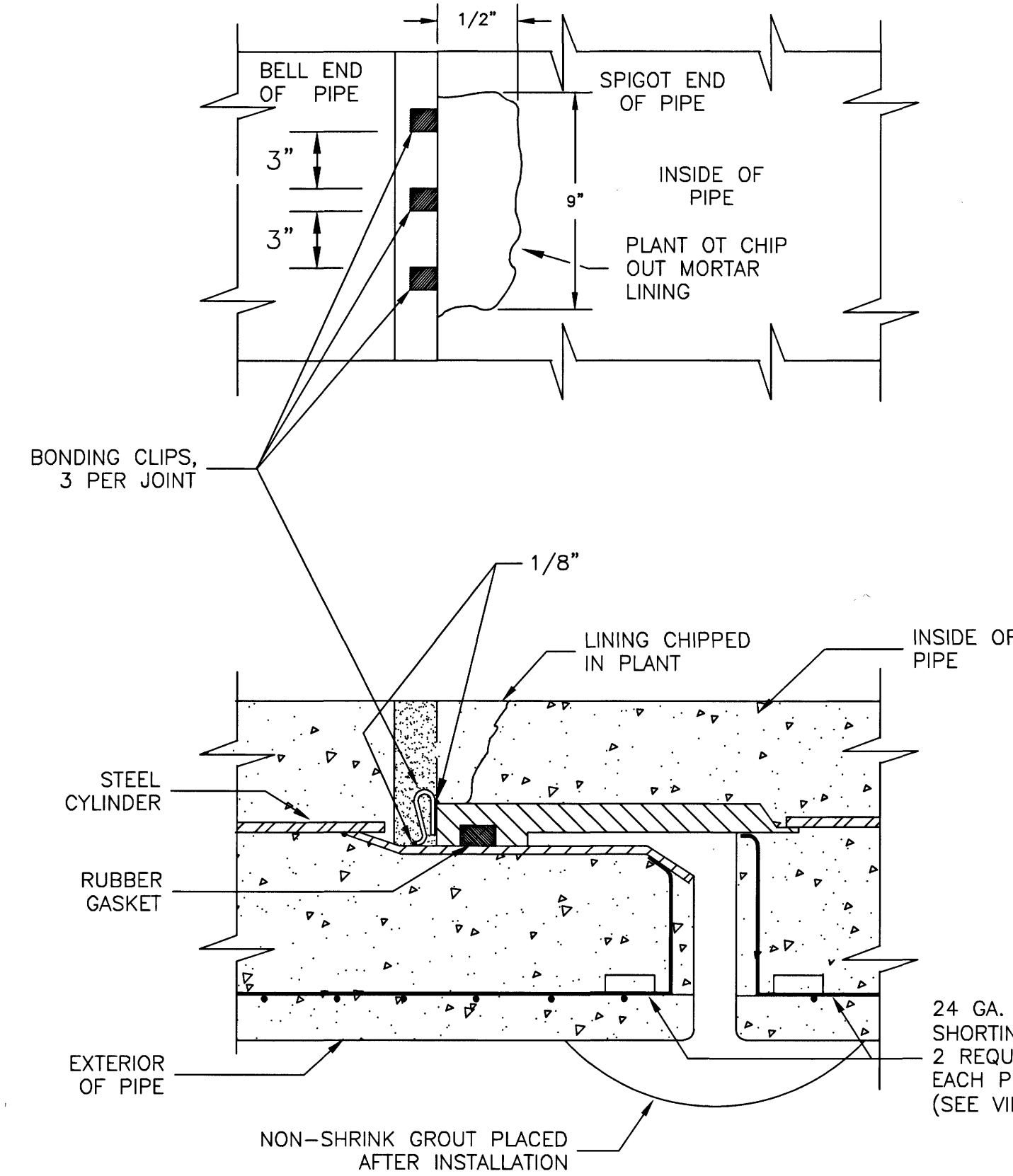
1. STEEL BONDING CLIP: MATERIAL SPECIFICATION ----- ASTM A36 (COMMERCIAL QUALITY)  
CUT LENGTH ----- 2 1/2" ± 1/16"  
WIDTH ----- 1 1/4" ± 1/16"
2. LYTHERM FILLER STRIP TO BE 1" x 1 1/2" WIDE TO OVERLAP SIDES OF CLIP.
3. CRIMP JUMPER OVER FILLER AT "A" TO COMPRESS FILLER CLOSE AT PT. "A" AS MUCH AS POSSIBLE WITHOUT CUTTING FILLER PAD.
4. BONDING CLIP TO BE INSTALLED IN THE INTERIOR OF PIPE FOR DIAMETERS LARGER THAN 30". FOR 30" AND SMALLER, BONDING CLIP IS TO BE INSTALLED ON EXTERIOR OF PIPE.
5. ARRANGE BONDING CLIPS ON TOP OF PIPE, 30" TO LEFT & RIGHT OF TOP CLIP.
6. THREE REQUIRED PER JOINT (TYPICAL).

② STEEL BONDING CLIP DETAIL

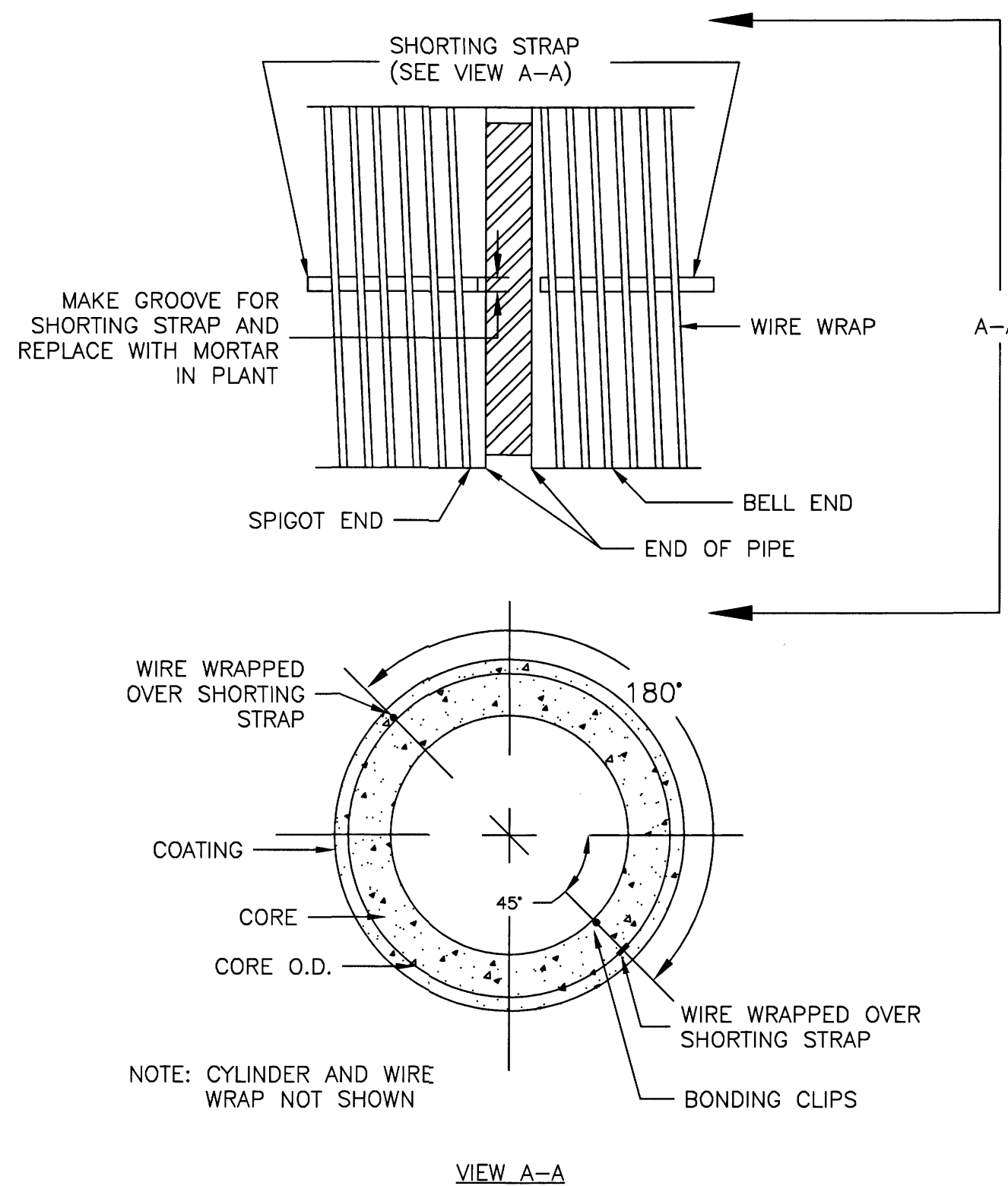


NOTE: TYPICALLY THREE REQUIRED PER JOINT

③ "L" BRACKET DETAIL



NOTE: COATING NOT SHOWN

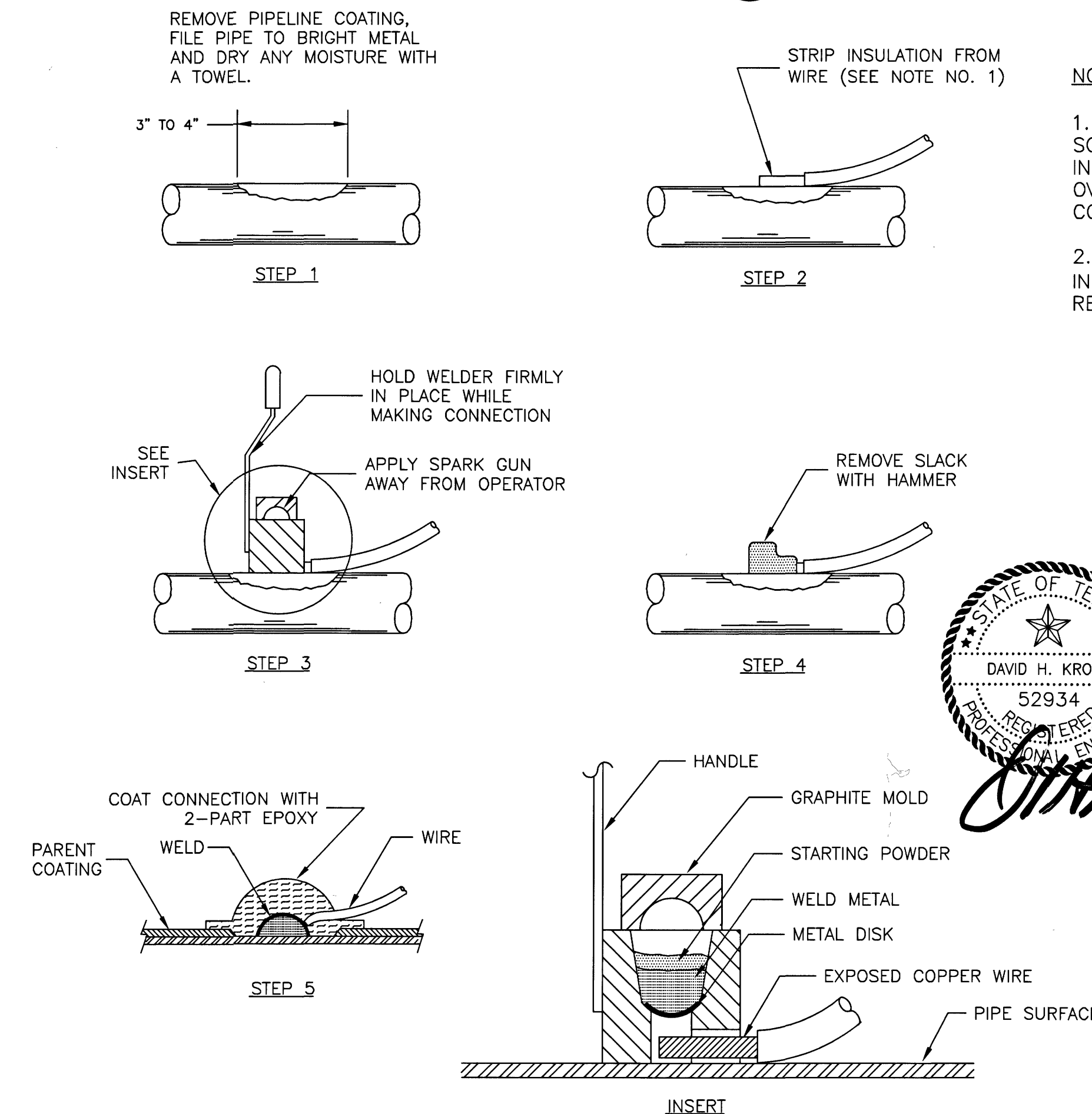


NOTE:

PLACE BONDING CLIPS IN INTERIOR JOINT RECESS\* AS SHOWN. WELD CLIPS TO BELL AND SPIGOT USING 1/8" FILLET WELD. REMOVE SLAG FROM WELD AND FILL RECESS WITH CEMENT MORTAR, COVERING ALL EXPOSED STEEL.

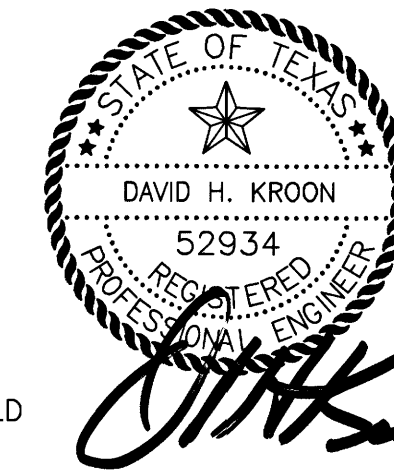
\* SEE NOTE 4 DETAIL 2 FOR EXCEPTION

④ ELECTRICAL CONTINUITY BONDING OF PCCP



NOTES:

1. WHEN #14 AWG SOLID TO STRANDED TO #10 SOLID WIRE IS USED, IT WILL BE NECESSARY TO INSTALL A COPPER SLEEVE OF ADEQUATE SIZE OVER BARE SECTION OF WIRE BEFORE CONNECTION IS ATTEMPTED.
2. REPAIR ALL DAMAGE TO COATING AND LINING IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.



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MISCELLANEOUS  
CATHODIC PROTECTION  
DETAILS

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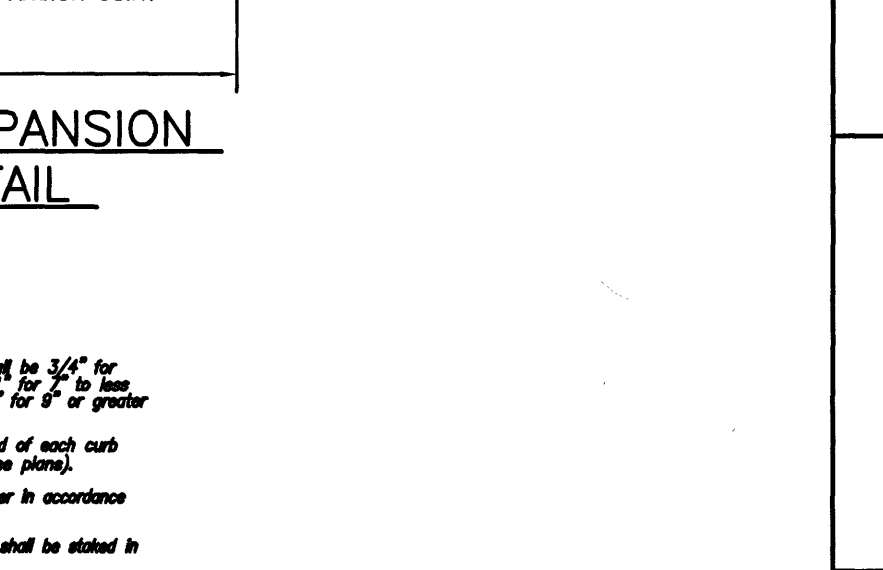
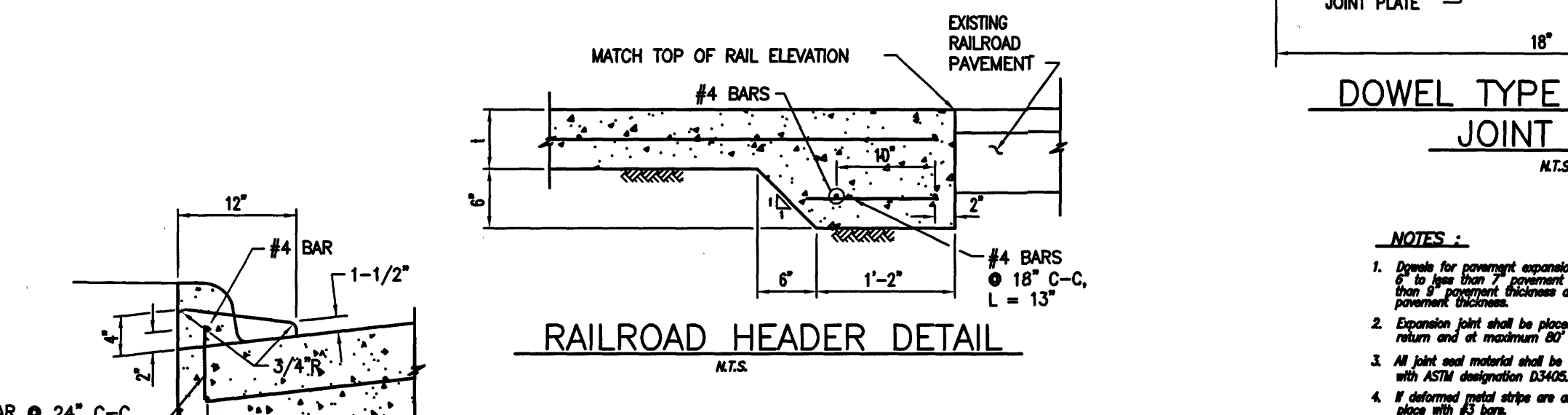
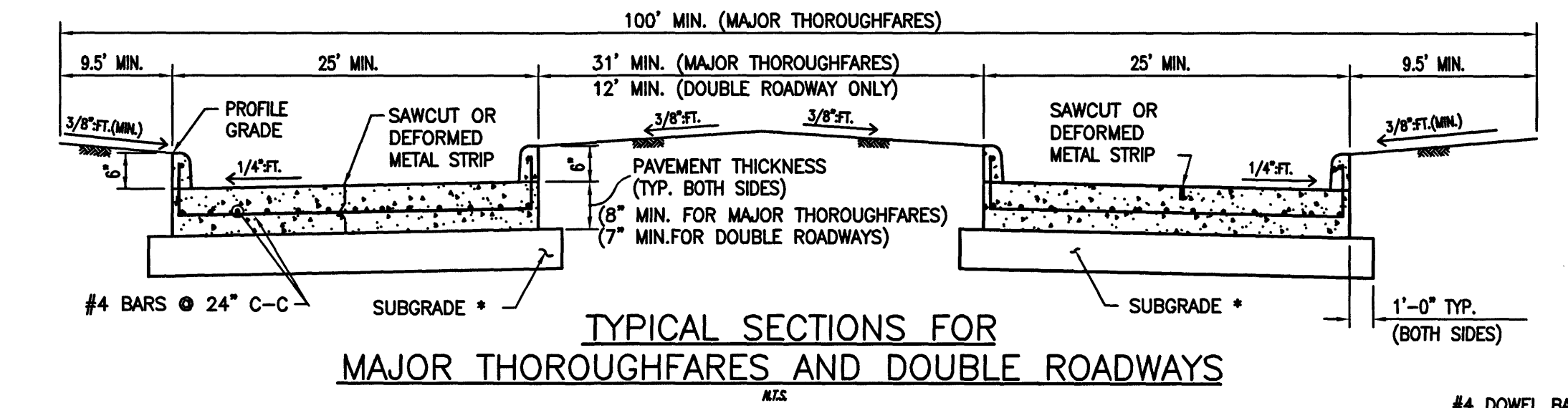
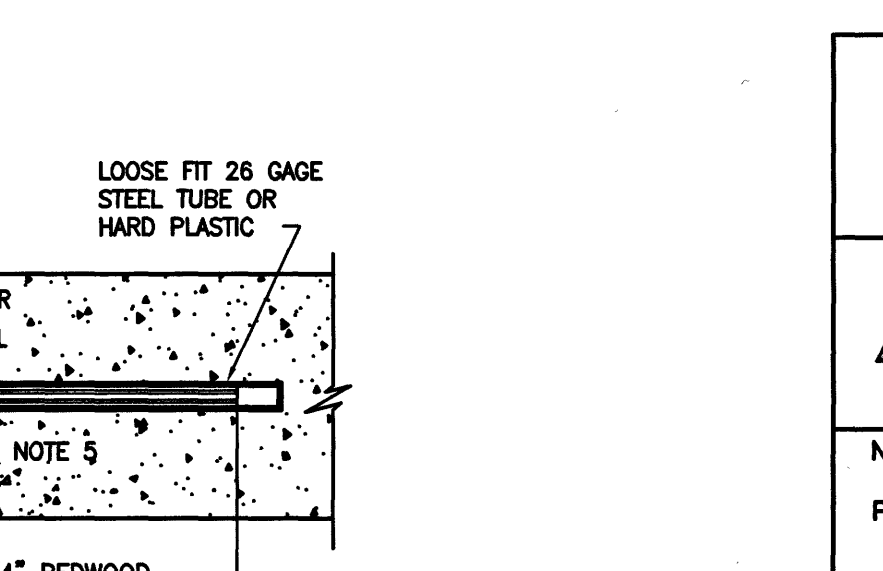
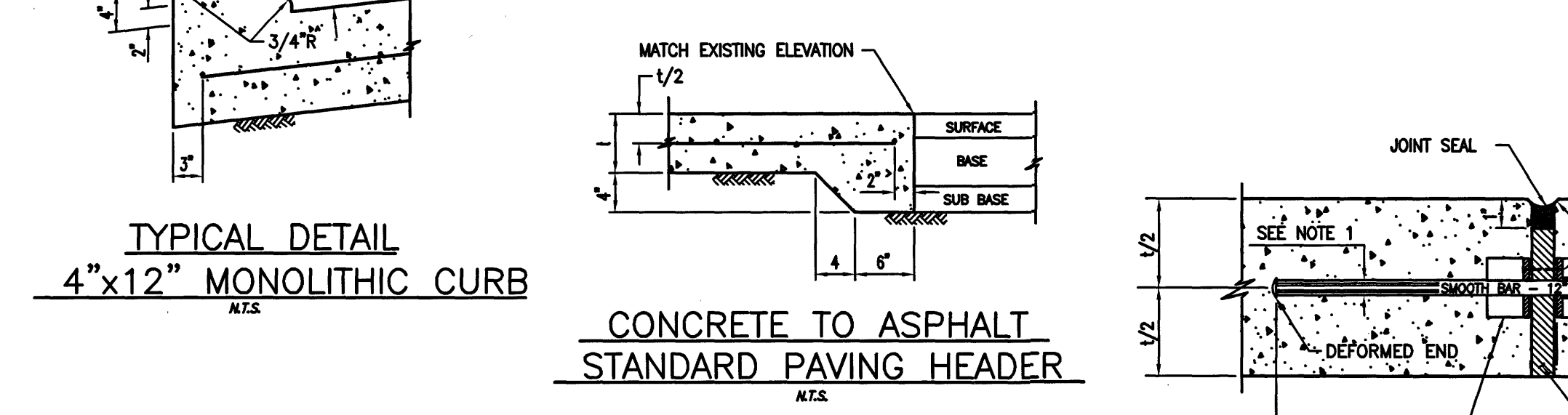
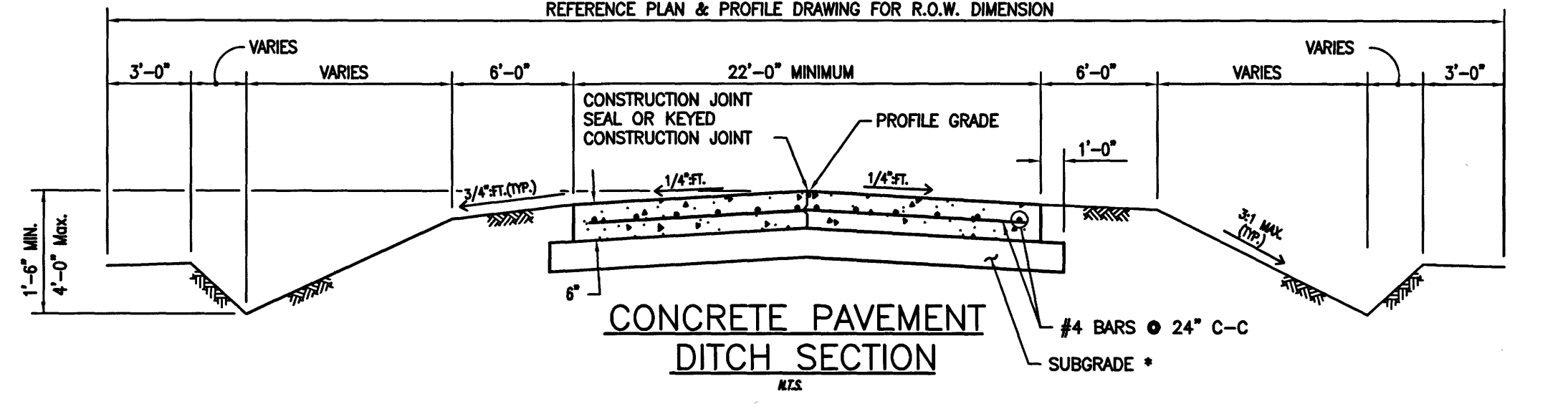
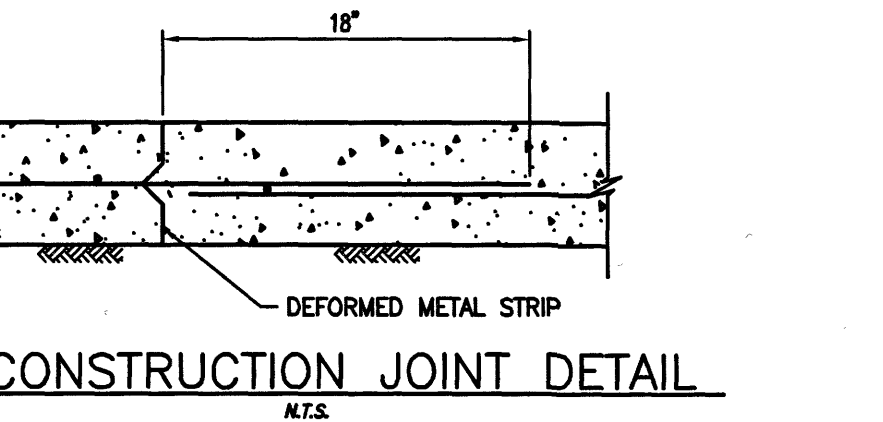
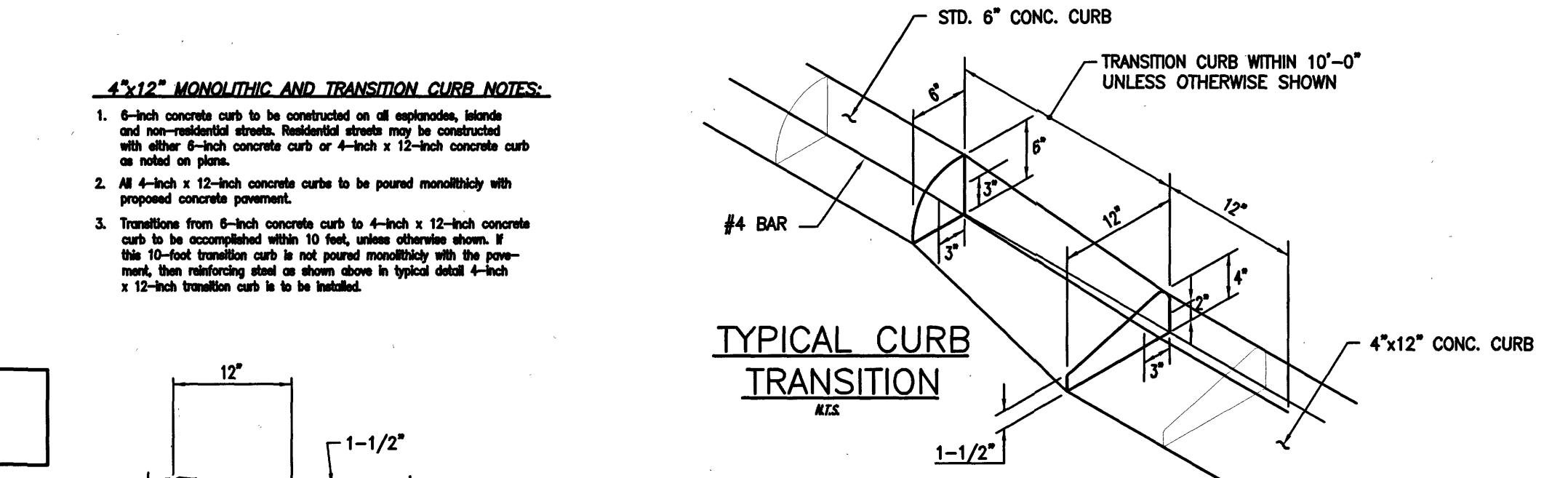
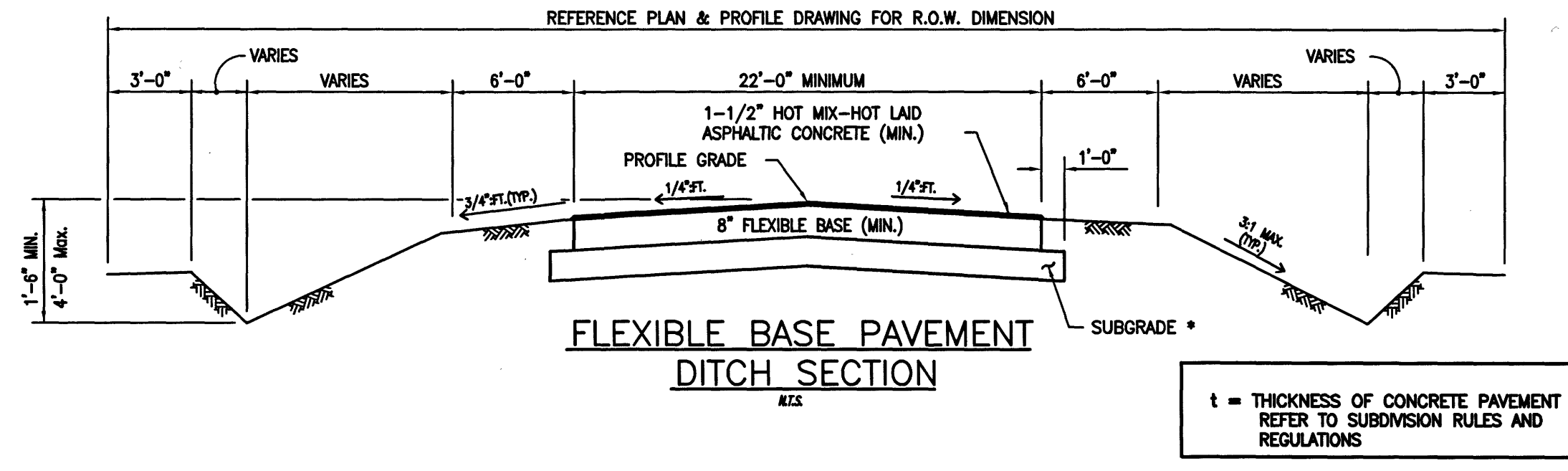
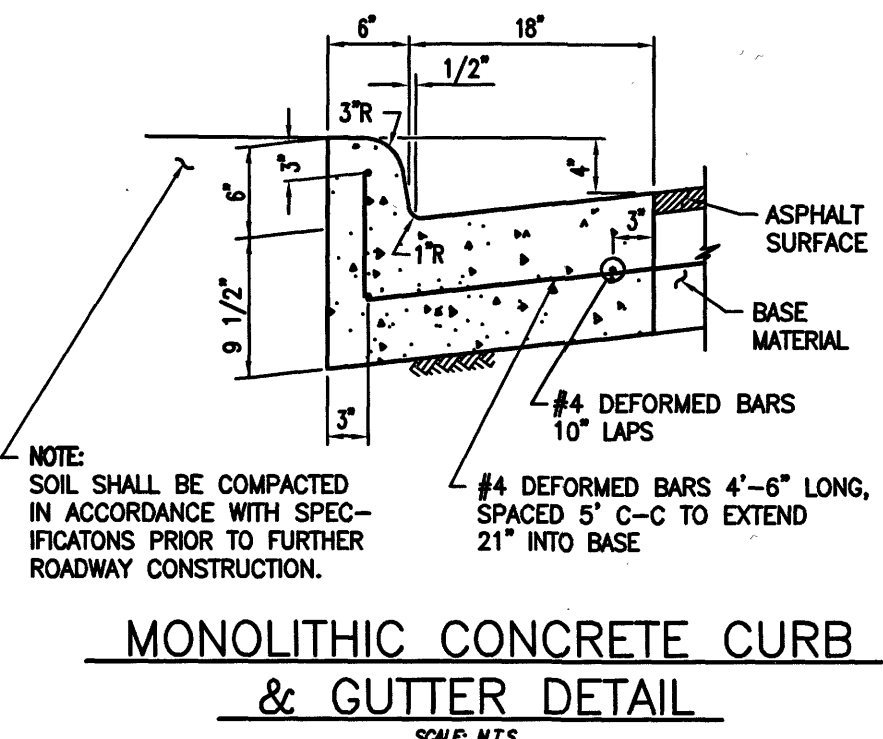
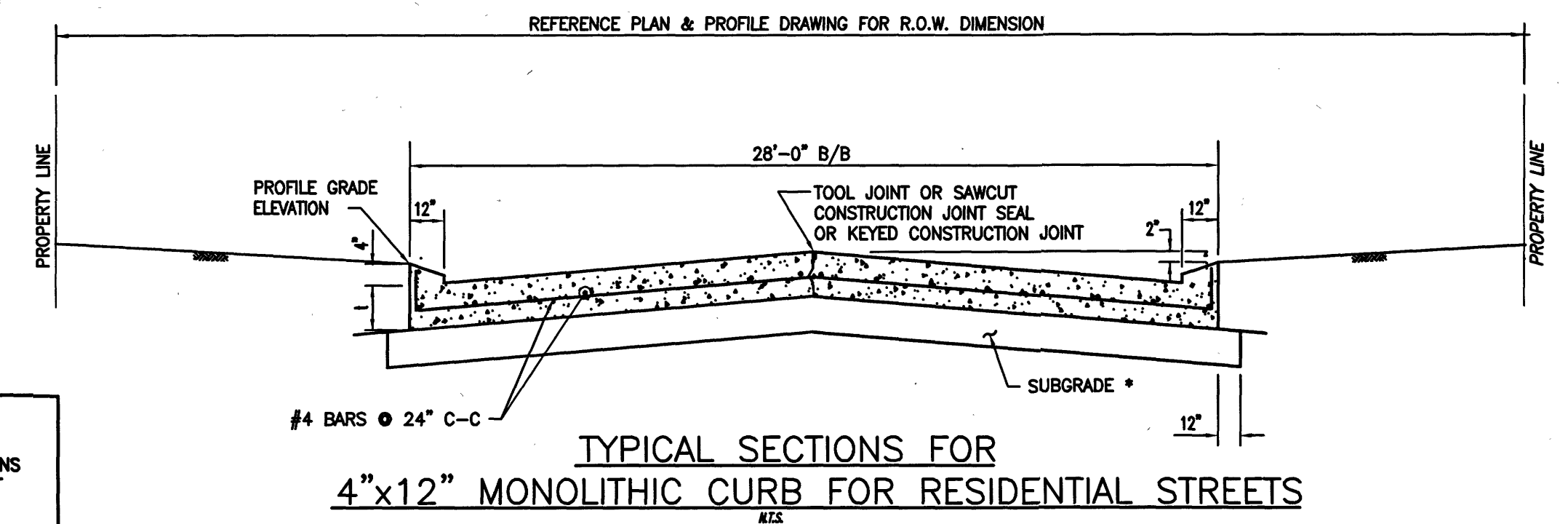
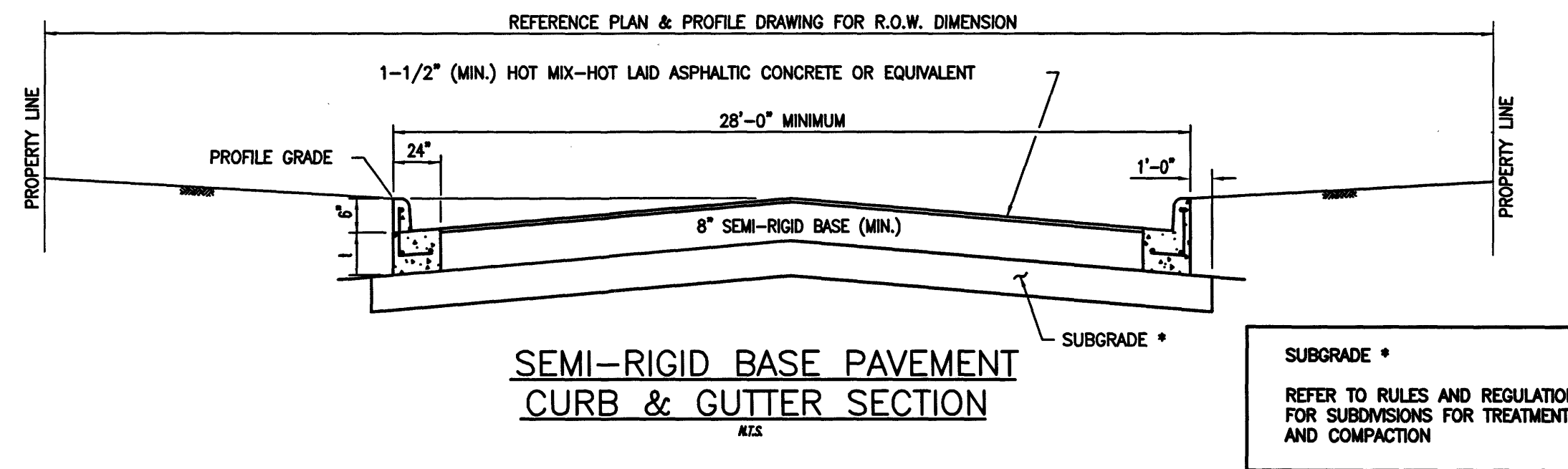
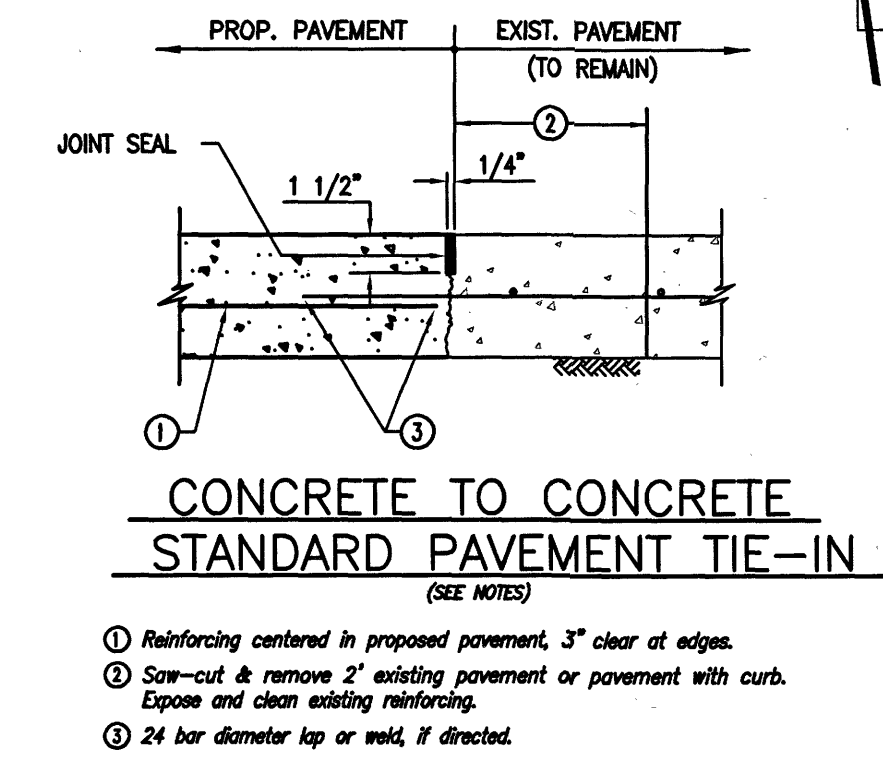
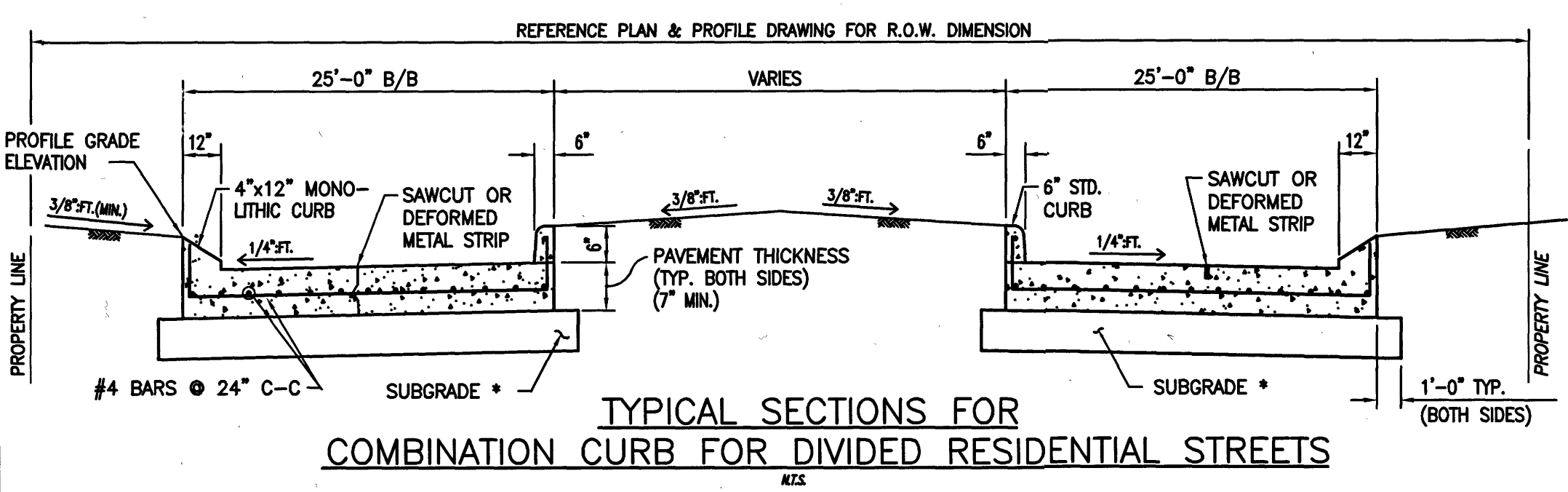
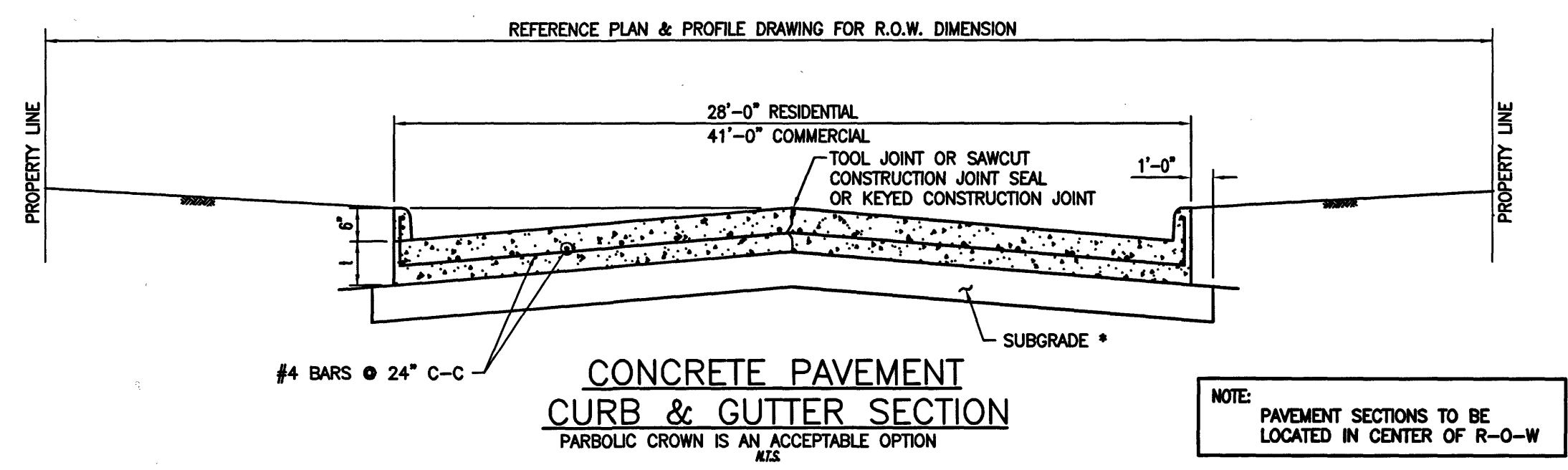
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67

SHEET  
No: 67 of 99

No.	Date	Revisions	App.



- NOTES:**
- Dowels for pavement expansion joints shall be 3/4" for 6" to less than 7" pavement thickness, 7/8" for 7" to less than 8" pavement thickness and 1" for 8" or greater pavement thickness.
  - Expansion joint shall be placed at the end of each curb return and at maximum 80' spacing (See plans).
  - All joint seal material shall be asphalt rubber in accordance with ASTM designation DR306.
  - If deformed metal strips are allowed, they shall be placed in place with #3 bars.
  - Pre-manufactured joint plates.

**North Harris County REGIONAL WATER Authority**

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NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

**STANDARD PAVING DETAILS**

CARL D. MCCONNELL  
 97585  
 LICENSED PROFESSIONAL ENGINEER

Carl D. McConnell  
 1/22/2020

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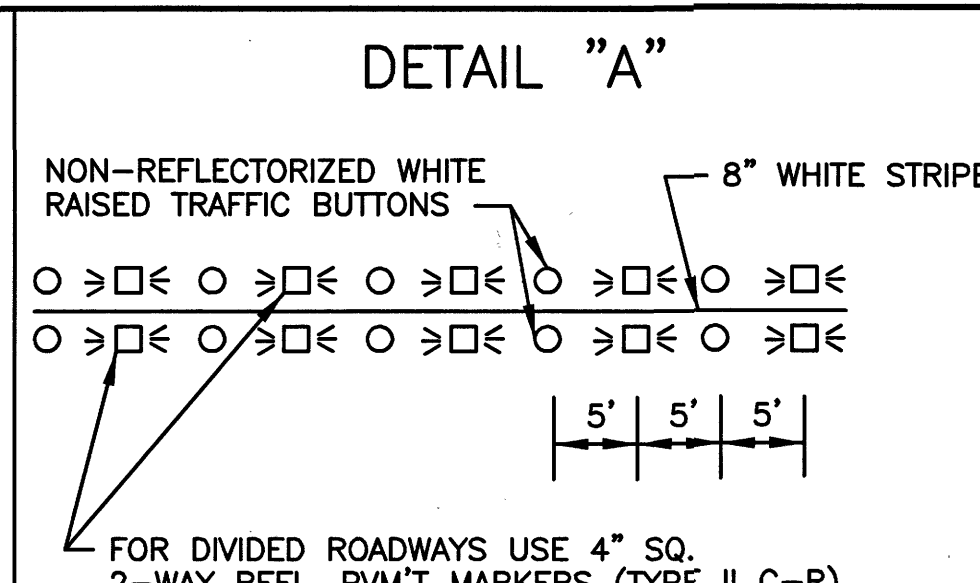
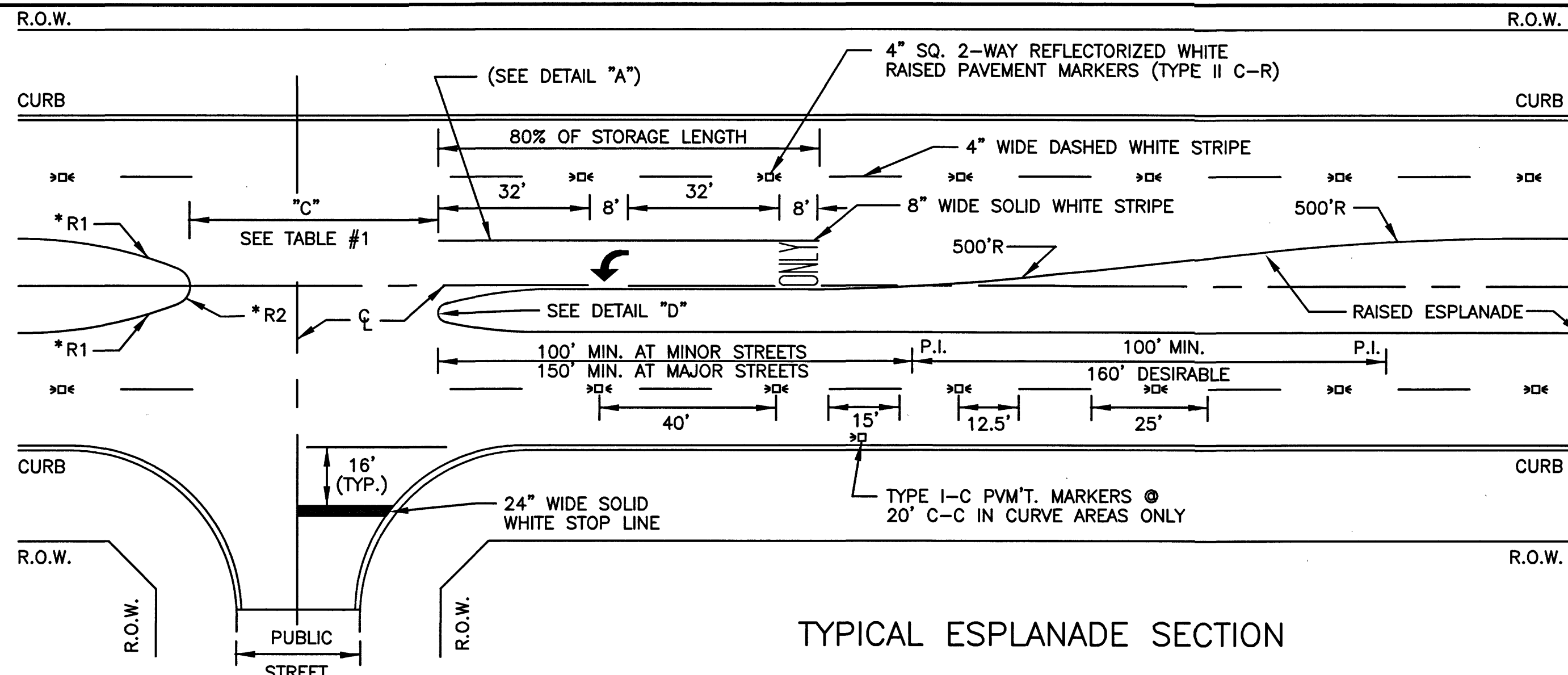
**DANNENBAUM**  
 ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

SHEET No. 68 OF 99

LAST MODIFIED: Jan 21, 2020 - 10:15am BY USER: yimiy  
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**TABLE #1**  
TYPICAL LENGTH OF ESPLANADE OPENING "C" FOR PUBLIC STREET

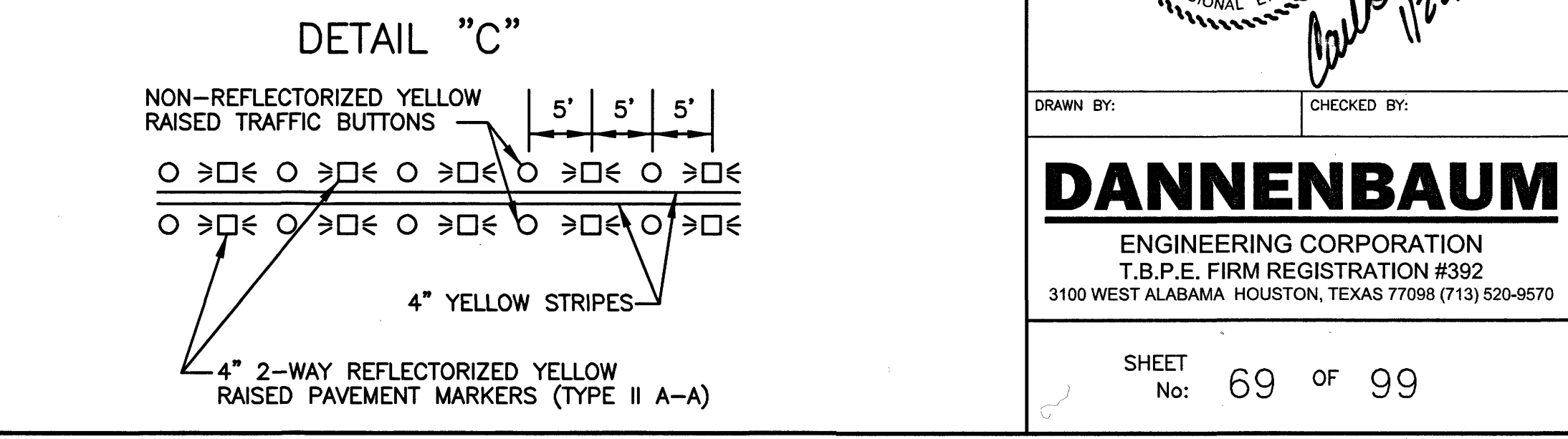
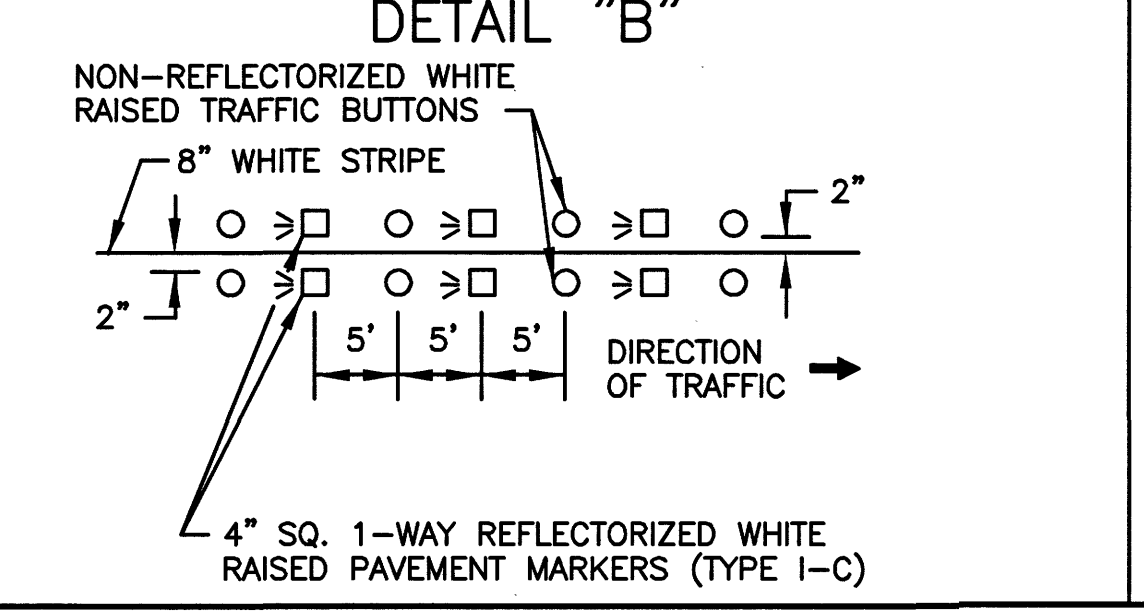
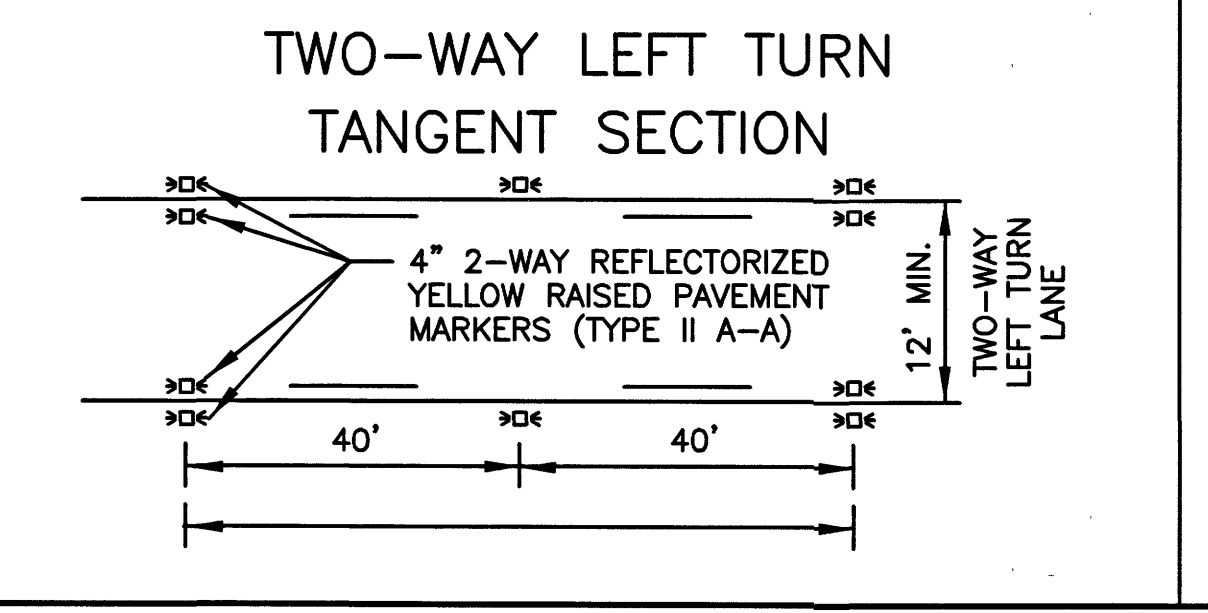
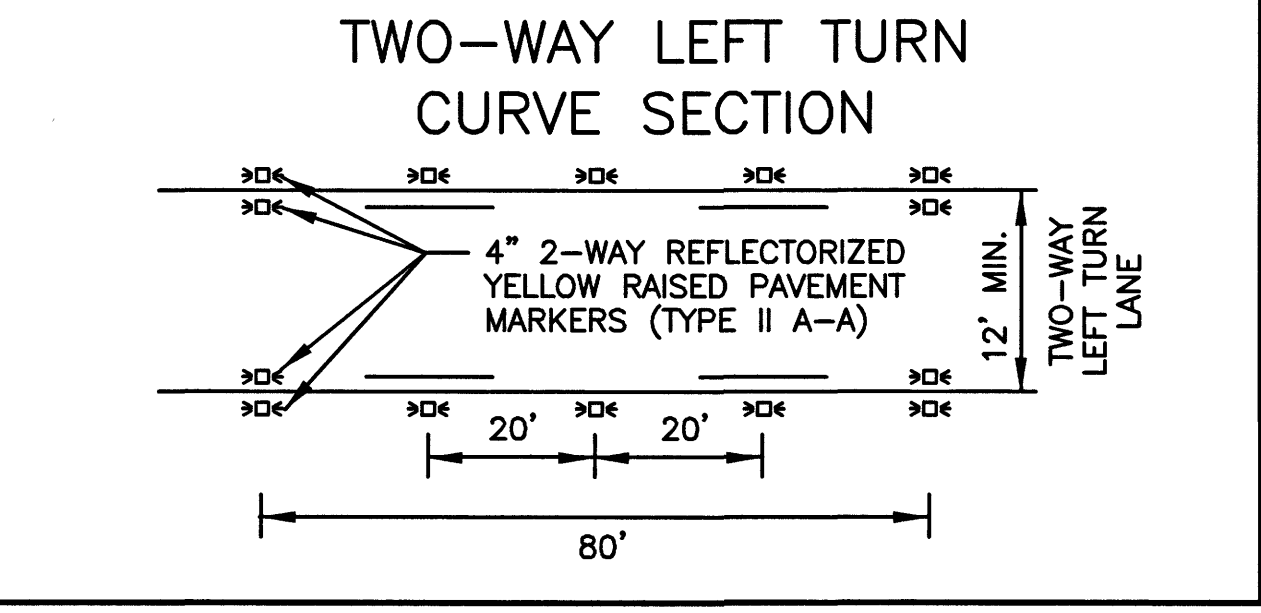
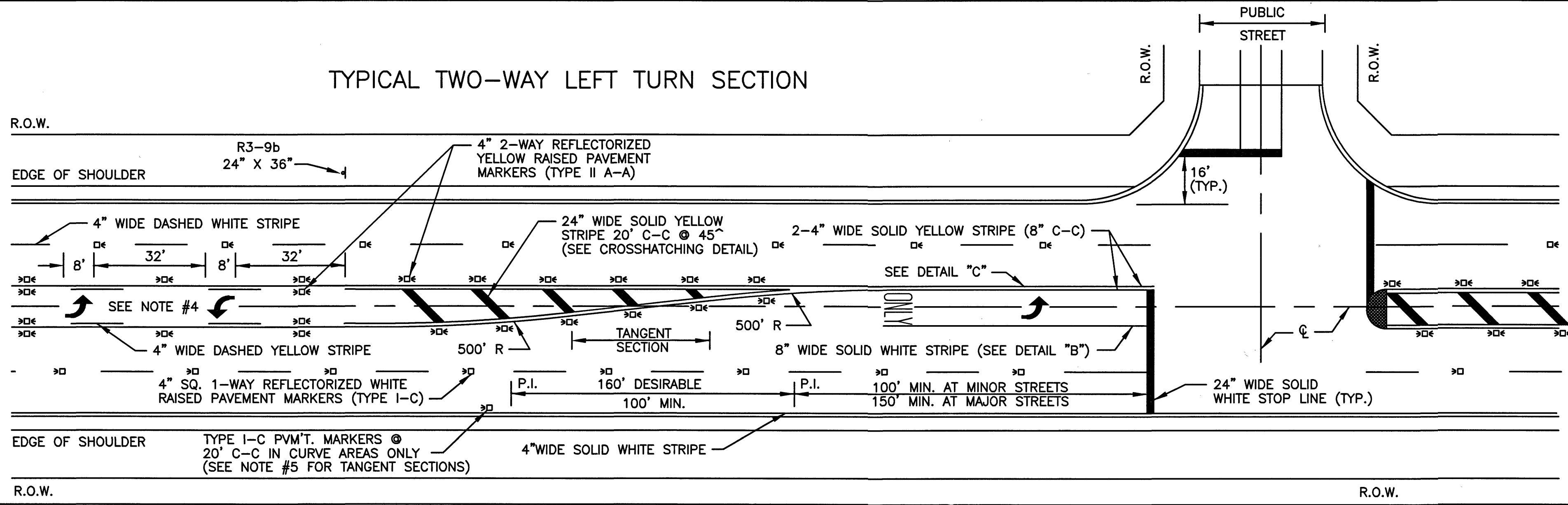
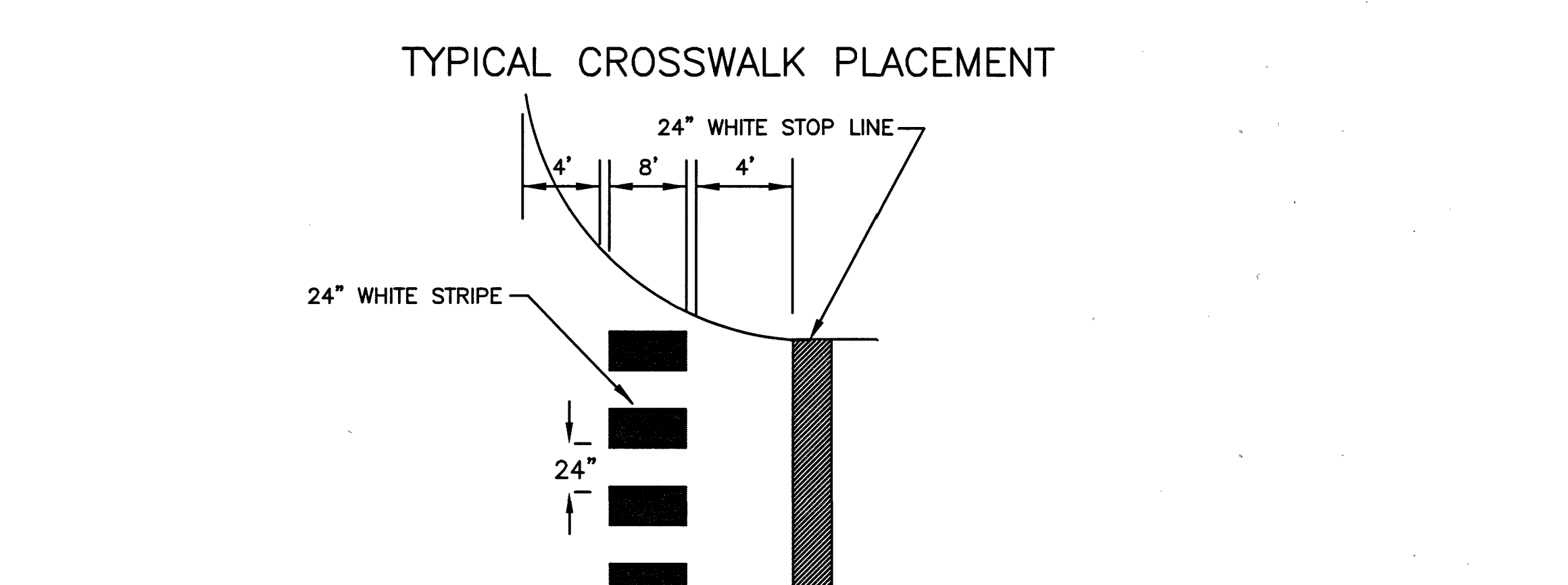
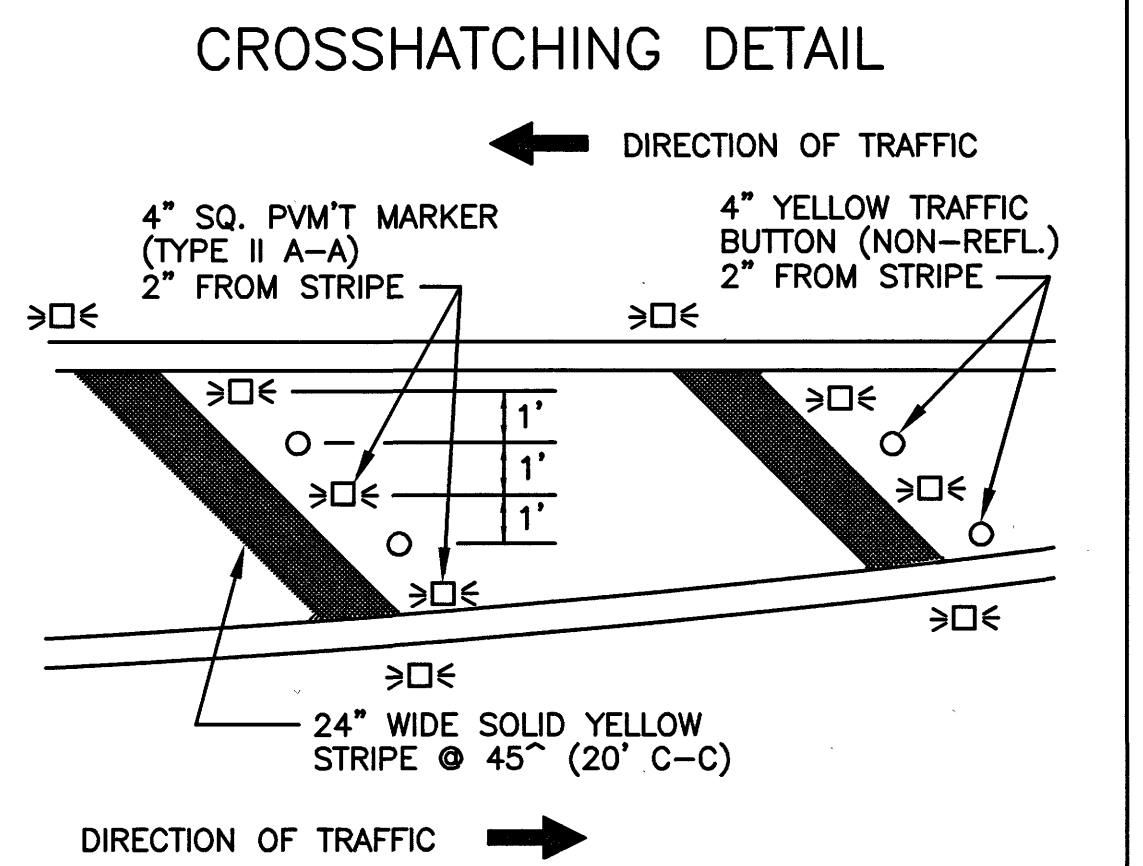
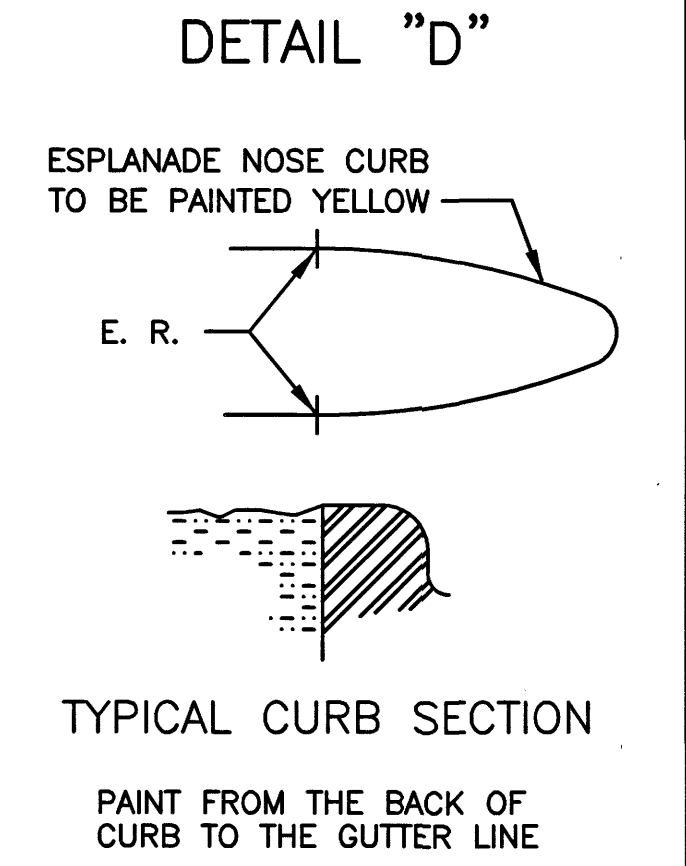
ESPLANADE INTERRUPTION	(1)		
	NO LTB	1 LTB	2LTB
UNDIVIDED STREET <40' 44'	45' 50'	52.5'(2) 55'(2)	60' 60'
DIVIDED STREET	D+10'	D+10'	D+10'

**RADIUS DIMENSIONS**

ESPLANADE	*R1	*R2
<8'	N/A	W/2
8'-38'	90'	W/5
>38'	N/A	15'

**NOTES:**  
(1) LEFT TURN BAY  
(2) DISTANCE FROM CENTERLINE OF OPENING TO ESPLANADE NOSE WITH LEFT TURN LANE MUST BE 30'

- NOTES:**
1. ALL STRIPING & MARKERS SHALL CONFORM WITH THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS.
  2. ALL TRAFFIC BUTTONS AND MARKERS SHALL BE INSTALLED ADJACENT TO STRIPES (APPROX. 2").
  3. LEFT TURN STORAGE BAYS SHALL BE A MIN. OF 100' AT MINOR STREETS AND A MIN. OF 150' AT MAJOR STREETS.
  4. REPEAT ARROWS AT APPROX. 1000' INTERVALS WITHIN TWO-WAY LEFT TURN SECTION.
  5. WITHIN A TANGENT SECTION THE TYPE I-C PAVEMENT MARKERS CAN BE PLACED AT 40' C-C ON ROADWAYS WITHOUT CURB AND GUTTERS.



**North Harris County REGIONAL WATER Authority**

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TBPB REG. NO. F-3580

**NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY**  
PROJECT 28-B  
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**PAVEMENT MARKING DETAILS**

**DANNENBAUM**  
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SHEET No. 69 OF 99

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WHEN A DRIVEWAY, OR CURB & GUTTER OR SIDEWALK IS CONSTRUCTED, RECONSTRUCTED , REPAIRED OR REGRADED ON COUNTY RIGHT-OF WAY USE THE FOLLOWING APPROPRIATE DETAILS.

No.	Date	Revisions	App.

GENERAL NOTES:

- PROPOSED DRIVEWAY, SIDEWALK, CURB, GUTTER LINE AND GRADE SHALL MATCH EXISTING STREET.
- PROPOSED SIDEWALK SHALL BE CONSTRUCTED WITH PORTLAND CEMENT, 4-1/2 SACK CEMENT PER CUBIC YARD, 4-1/2 INCHES THICK AND 4' MINIMUM WIDTH.
- PROPOSED GUTTER LINE IS TO BE MAINTAINED AT FACE OF EXISTING CURB.
- SAW CUT EXISTING CURB AT EACH END AND KNOCK OUT CURB FROM BEGINNING TO END OF PROPOSED DRIVEWAY.
- SAW CUT EXISTING PAVEMENT A MINIMUM OF 2 INCHES DEEP AND 12 INCHES AWAY FROM FACE OF CURB (GUTTER LINE) AND BREAK OUT TO EXPOSE EXISTING REINFORCEMENT STEEL.
- COMPACT SUBGRADE FOR PROPOSED DRIVEWAY CONNECTION FROM PROPOSED SAW CUT AT EXISTING PAVEMENT TO RIGHT-OF-WAY LINE COMPACT TO 95% OF STANDARD PROCTOR DENSITY (+/- 2% OPT. MOISTURE).
- IF MORE THAN ONE DRIVEWAY IS BUILT ON THE SAME PROPERTY, SAID DRIVEWAYS SHALL BE SEPARATED BY A MINIMUM DISTANCE OF 20 FEET (ROADS WITH CURBS AND SIDEWALKS).
- REINFORCING STEEL TO BE ELEVATED A MINIMUM OF 3 INCHES ABOVE SUBGRADE. (3-INCH MANUFACTURED CHAIRS ARE REQUIRED WITH MAXIMUM SPACING OF 72 INCHES C.C. EACH WAY).
- WIDTH OF NEW RESIDENTIAL DRIVEWAY SHALL NOT EXCEED 20-FOOT. WIDTH OF NEW COMMERCIAL DRIVEWAY SHALL NOT EXCEED 36-FOOT AND HAVE A MINIMUM WIDTH OF 12-FOOT. MATCH WIDTH OF ANY EXISTING DRIVEWAY THAT IS RECONSTRUCTED, REPAIRED OR REGRADED ON COUNTY RIGHT-OF-WAYS, UNLESS OTHERWISE NOTED.
- SEE DETAILS FOR ADDITIONAL INFORMATION.

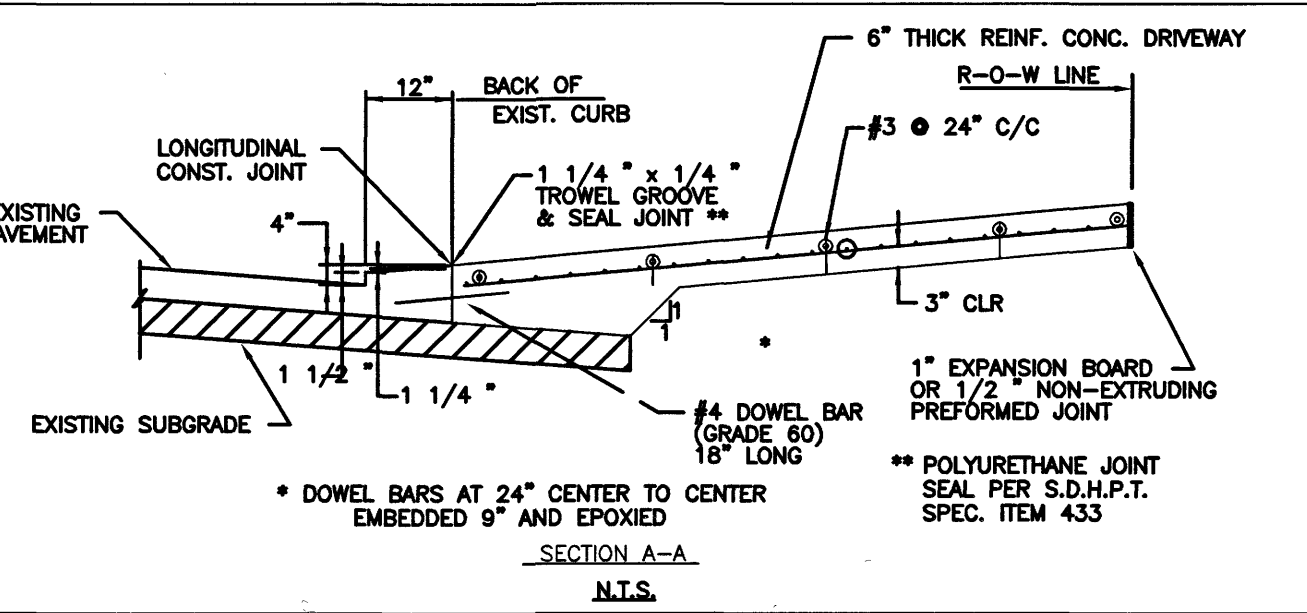
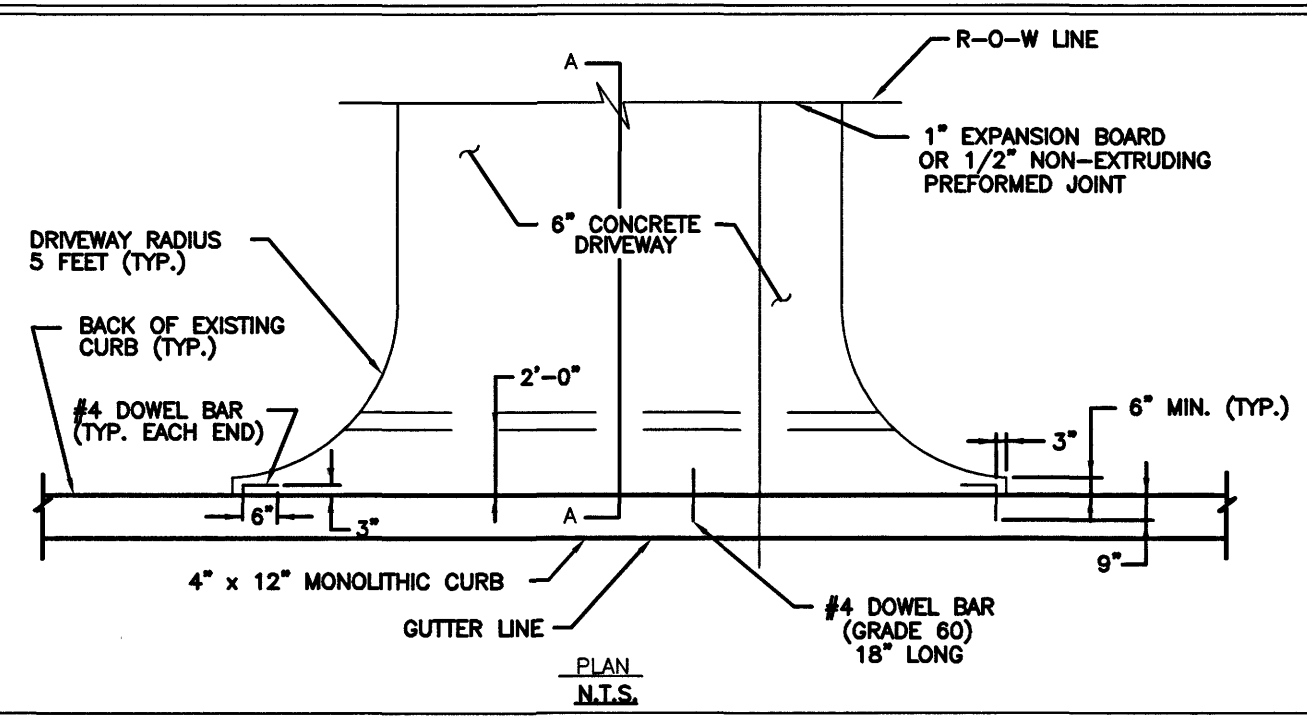
CULVERT NO.	SHEET NO.	CULVERT STATION	OFFSET	DESCRIPTION

NOTES:

- FOR PUBLIC AND PRIVATE STREET CULVERTS. REFER TO PLANS. ROADWAY CULVERTS ARE NOT INCLUDED IN THIS TABLE.
- REMOVE CONCRETE RIPRAP IN EXISTING DITCH.
- WHERE CULVERTS ARE REPLACED UNDER ORNAMENTAL WALLS, PROTECT EXISTING STRUCTURE. REMOVE AND REPLACE OR REPAIR ANY DAMAGED WALLS TO EXISTING OR BETTER CONDITIONS. NO SEPARATE PAY.

CULVERT REPLACEMENT SCHEDULE

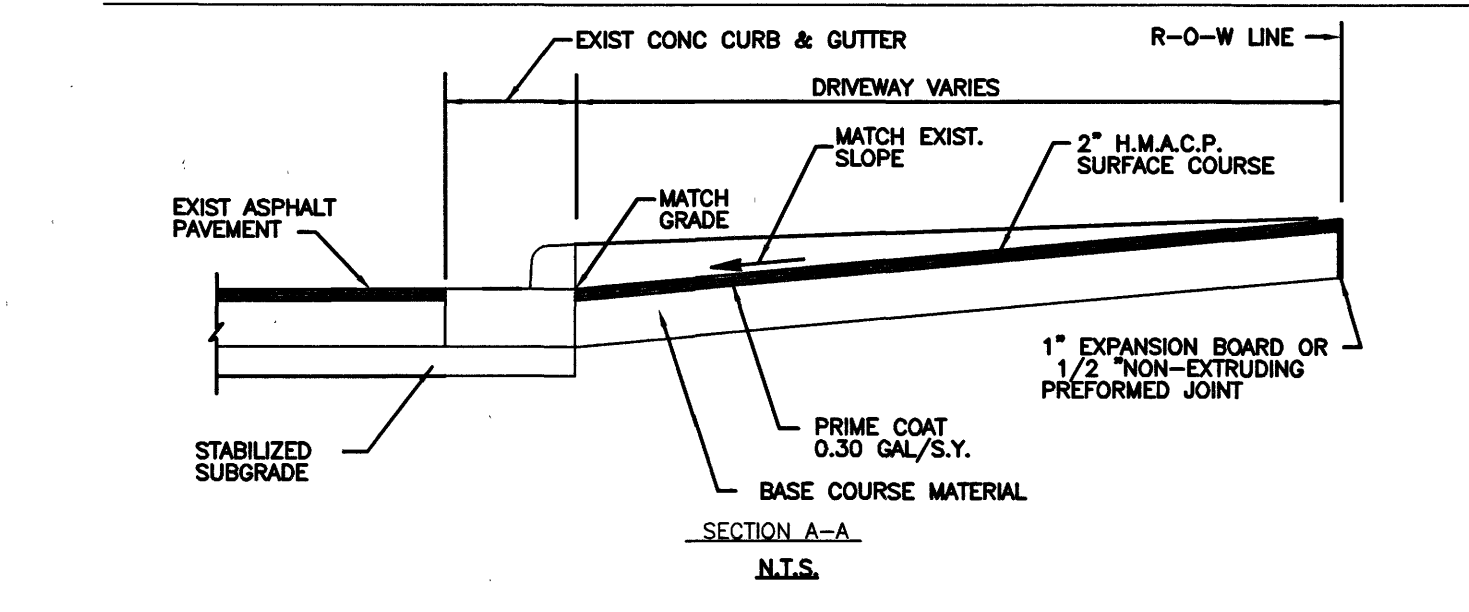
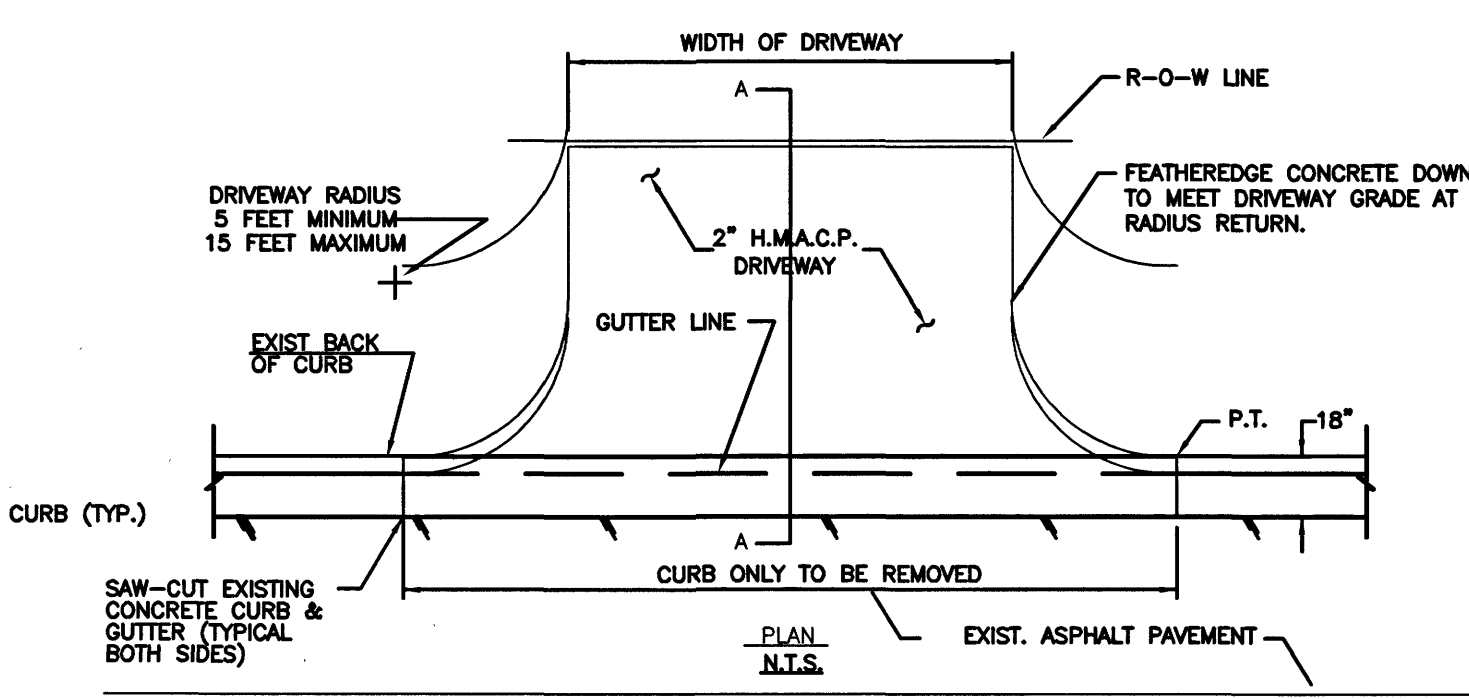
USE FOR ALL RESIDENTIAL DRIVEWAYS ON 4" x 12" MONOLITHIC CURBED TYPE STREETS.



- NOTES:
- PROPOSED DRIVEWAY SHALL MATCH EXISTING TOP OF CURB.
  - PROPOSED DRIVEWAY SHALL BE BUILT WITH PORTLAND CEMENT CONCRETE, 4 1/2 SACK MIN. CEMENT PER CUBIC YARD, 8 INCHES THICK, FROM EXISTING PAVEMENT TO RIGHT-OF-WAY LINE WITH A 10-INCH THICKEN EDGE FOR 2 FEET, AND TO BE REINFORCED WITH #3 DEFORMED REINFORCING BARS (MINIMUM ASTM A615 GRADE 40, UNLESS NOTED) SPACED AT 24 INCHES C.C. EACH WAY, WITH 6-INCH MINIMUM LAP.
  - THE OUTER DOWEL BARS ARE TO BE LOCATED 3 INCHES FROM END OF PROPOSED EDGE OF DRIVEWAY RETURN. EXTEND DOWEL 3 INCHES INTO PROPOSED DRIVEWAY AND BEND REMAINING BAR TO EXTEND AWAY FROM RADIUS RETURN BOTH SIDES.
  - SEE GENERAL NOTES FOR ADDITIONAL INFORMATION.

1 RESIDENTIAL DRIVEWAY ON 4" x 12" CURB TYPE STREETS

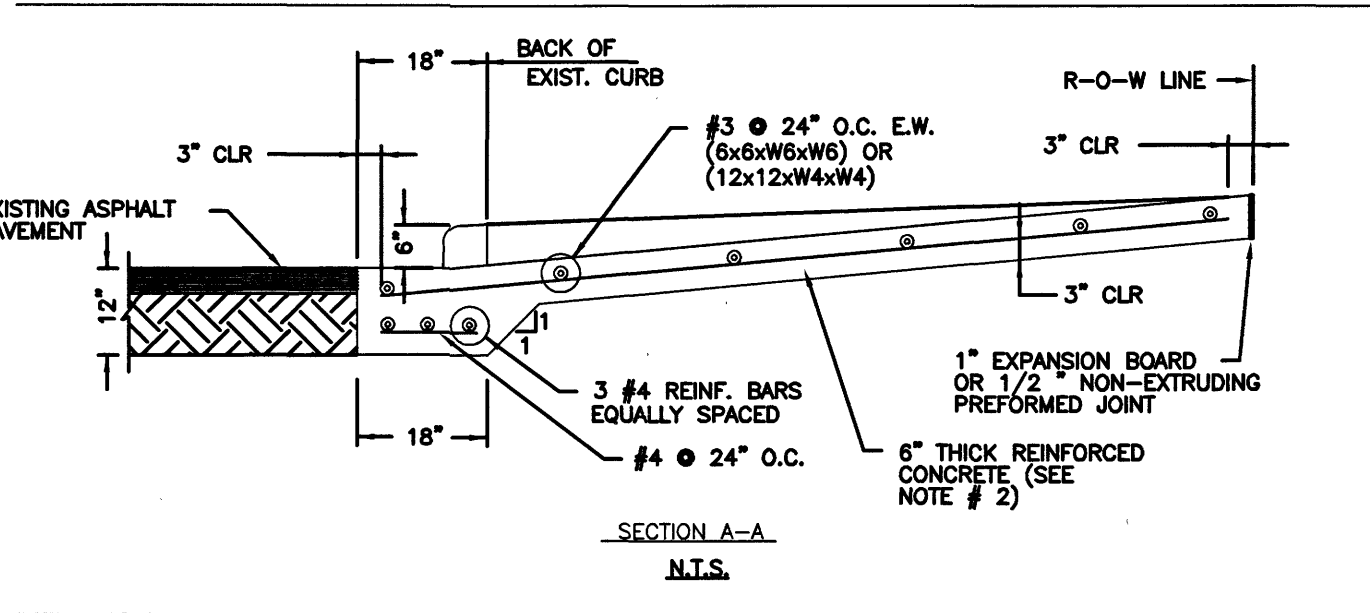
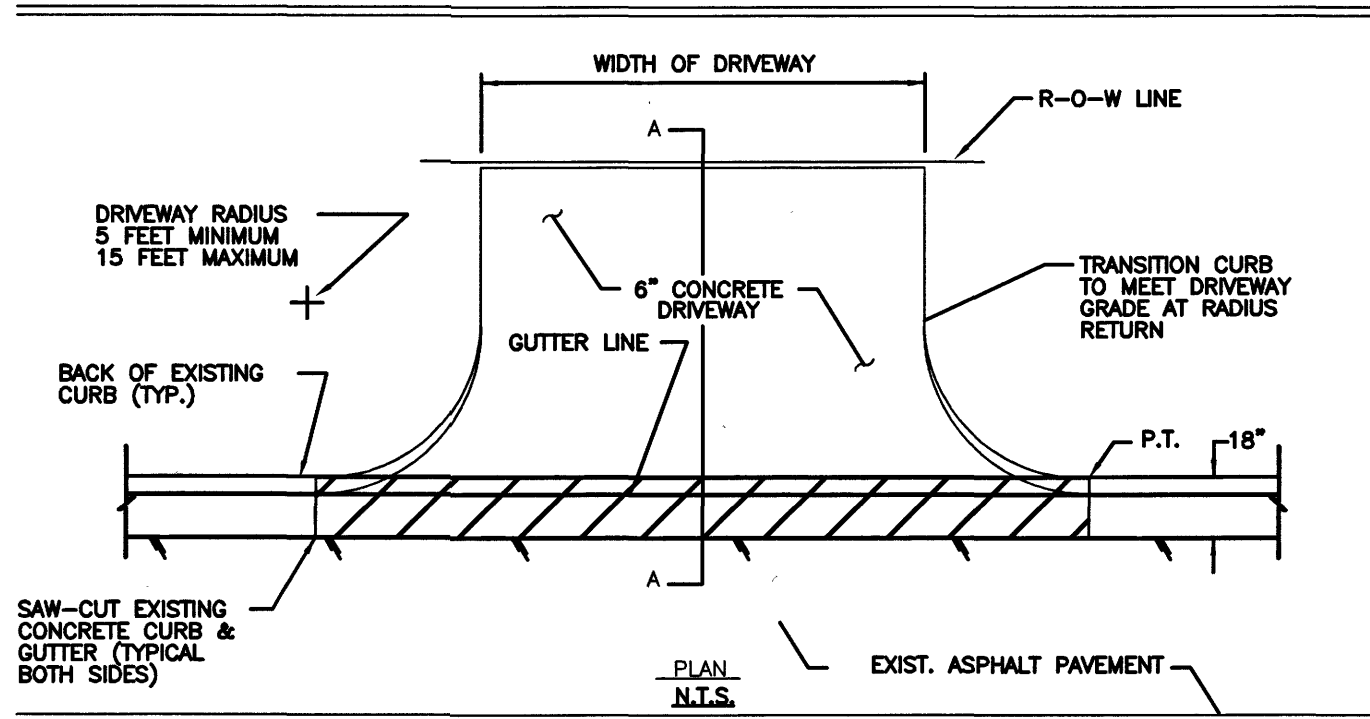
ASPHALT DRIVEWAY ON CONCRETE CURBED ASPHALT STREETS



- NOTES:
- PROPOSED ASPHALT DRIVEWAY SHALL MATCH EXISTING EDGE OF PAVEMENT.
  - PROPOSED ASPHALT DRIVEWAY TO BE BUILT WITH 2" H.M.A.C.P. PAVING SURFACE OVER A LAYER OF PRIME COAT (0.30 GAL./S.Y.) ON A BASE COURSE MATERIAL.
  - BASE COURSE MATERIAL SHALL BE EITHER 8-INCH HOT MIX ASPHALTIC CONCRETE OR 8-INCH (MIM) RECYCLED CRUSHED CONCRETE BASE COURSE.
  - SEE GENERAL NOTES FOR ADDITIONAL INFORMATION.

4 ASPHALT DRIVEWAY DETAIL

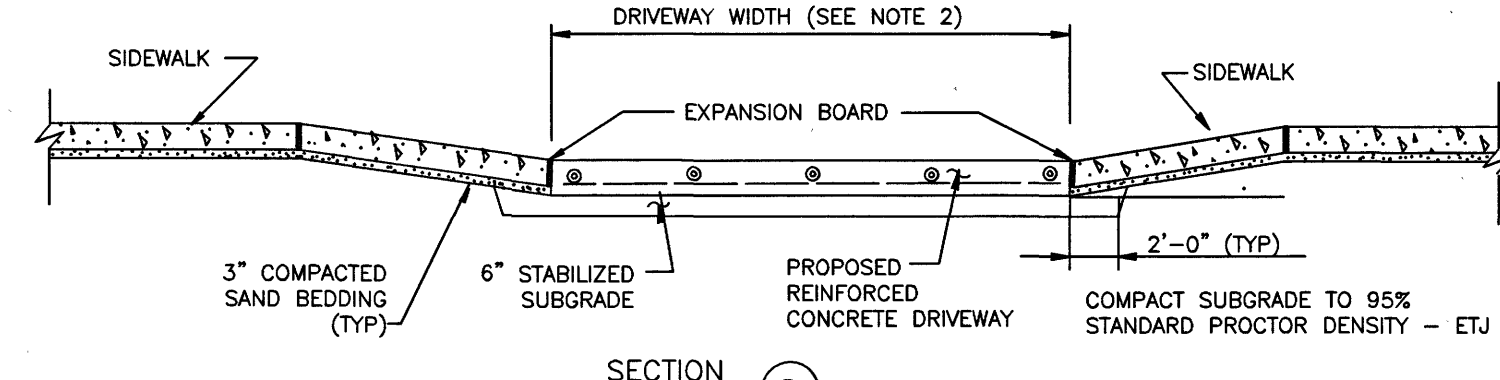
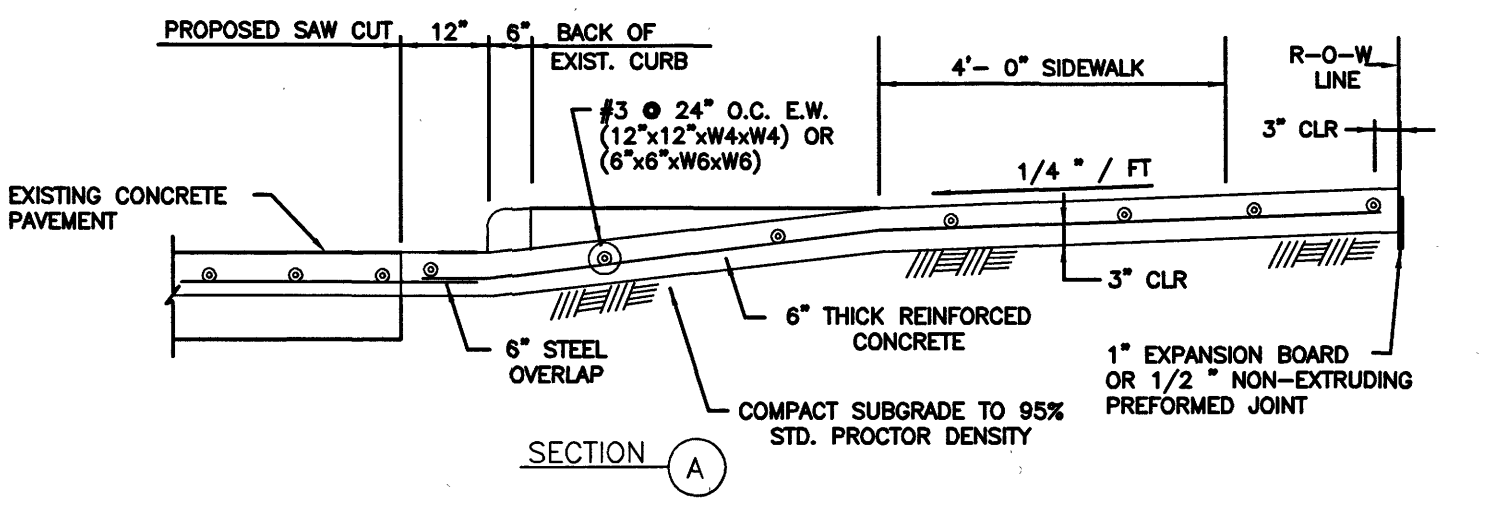
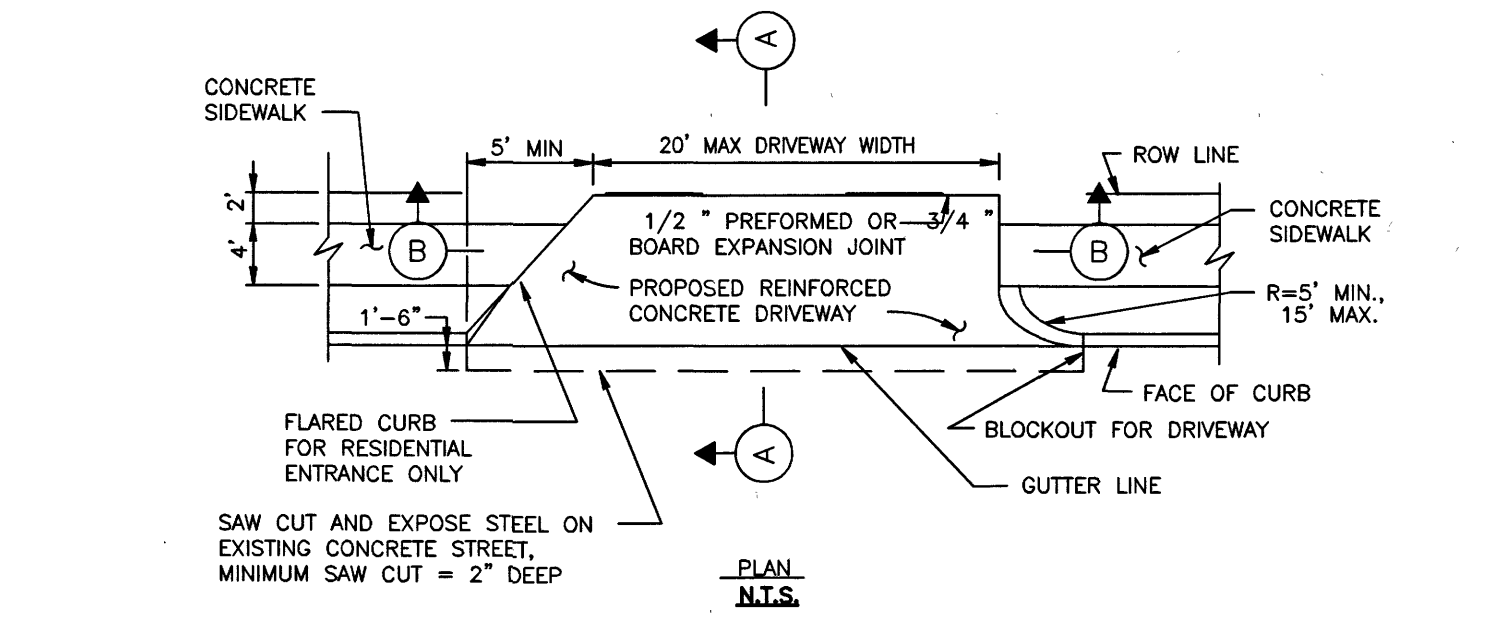
USE FOR ALL RESIDENTIAL DRIVEWAYS ON CONCRETE CURBED TYPE ASPHALT STREETS



- NOTES:
- PROPOSED DRIVEWAY SHALL MATCH EXISTING CURB AT POINT OF TANGENCY.
  - PROPOSED DRIVEWAY SHALL BE BUILT WITH PORTLAND CEMENT CONCRETE, 4 1/2 MIN. SACK CEMENT PER CUBIC YARD, 8 INCHES THICK, FROM EXISTING PAVEMENT (SAWCUT) TO RIGHT-OF-WAY LINE.
  - REINFORCING BARS SHALL HAVE A MINIMUM EDGE DISTANCE OF 3 INCHES. BEND EXCESS REINFORCING BAR PARALLEL TO EDGE OF PAVEMENT.
  - PROPOSED DRIVEWAY REINFORCING STEEL IS TO BE TIED TO EXISTING CURB & GUTTER STEEL WITH A MINIMUM LAP OF 6 INCHES.
  - SEE GENERAL NOTES FOR ADDITIONAL INFORMATION.

2 RESIDENTIAL DRIVEWAY ON ASPHALT STREETS

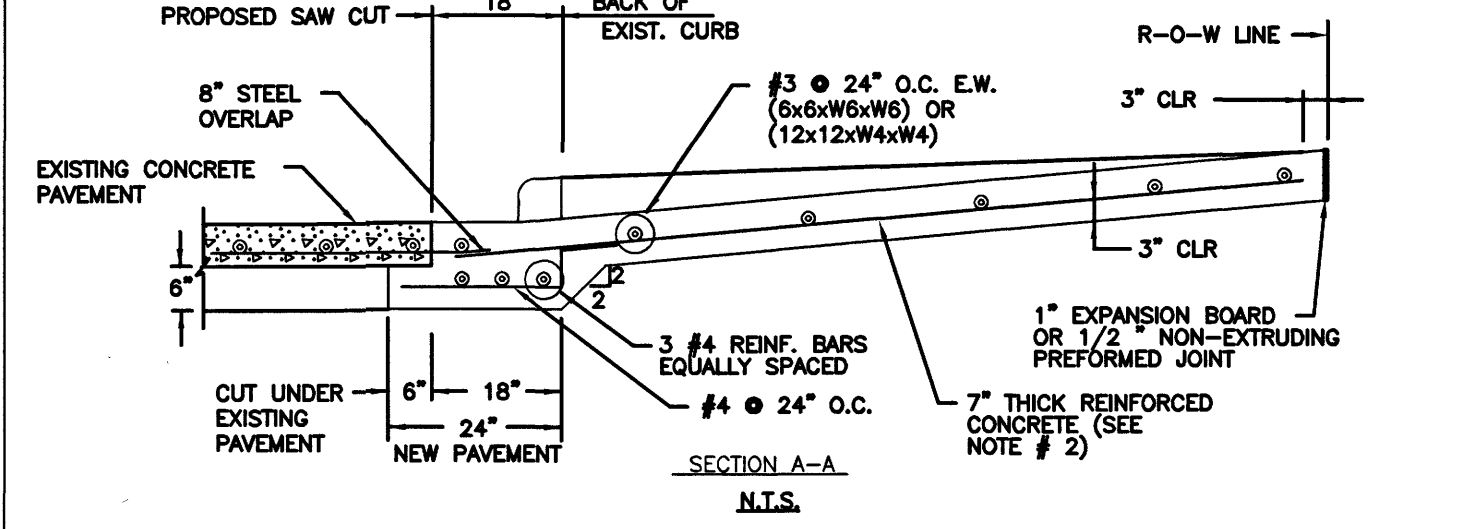
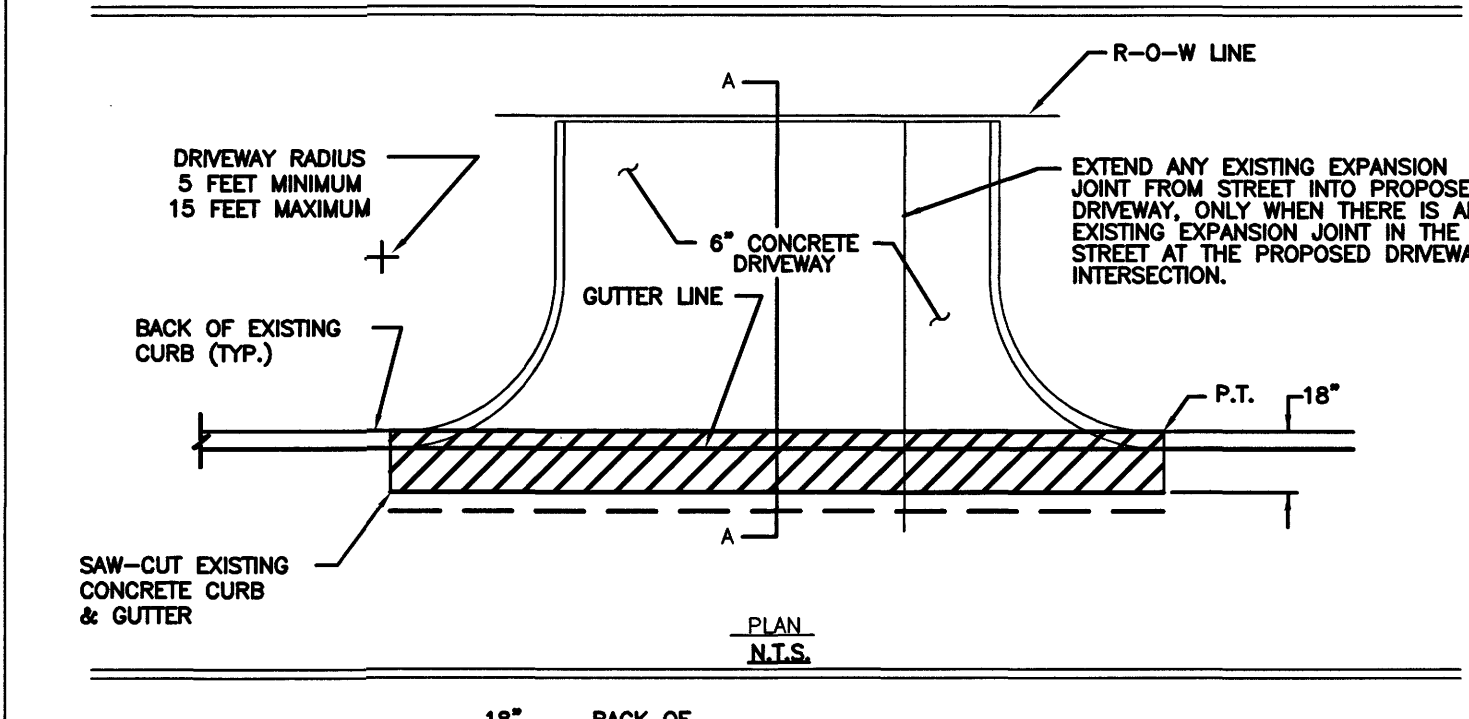
USE FOR ALL SIDEWALKS & DRIVEWAYS ON CONCRETE CURBED TYPE STREETS IN RESIDENTIAL AREAS.



- NOTES:
- SEE NOTES FOR RESIDENTIAL DRIVEWAY ON ASPHALT STREETS.
  - PROPOSED WIDTH TO MATCH EXISTING UNLESS OTHERWISE SHOWN ON PLANS

5 RESIDENTIAL DRIVEWAY ON CONCRETE STREETS

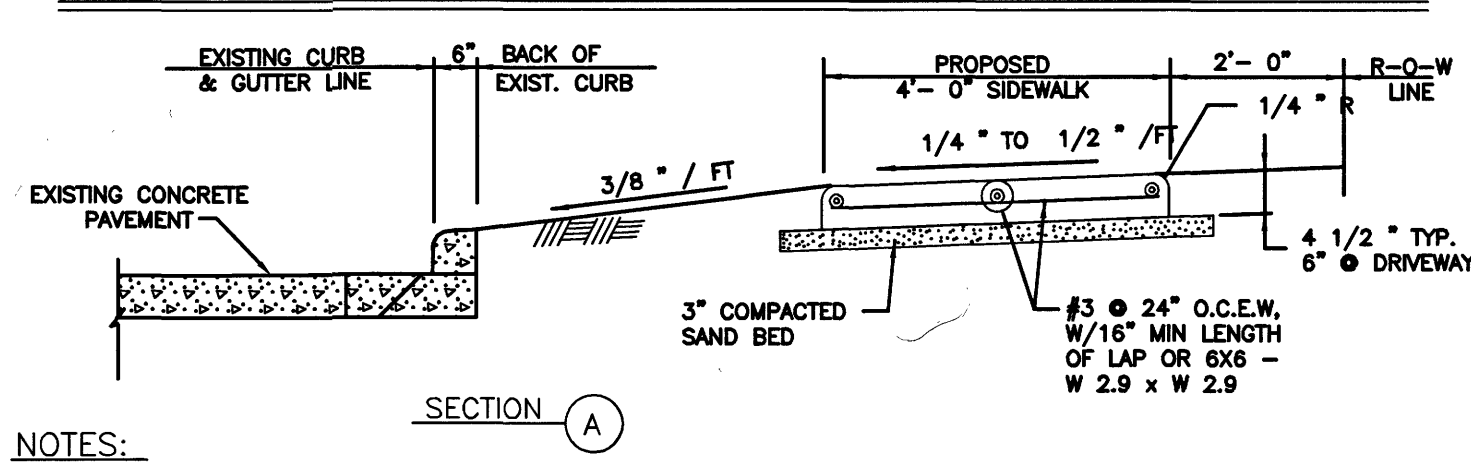
USE FOR COMMERCIAL DRIVEWAYS ON CONCRETE PAVEMENT WITH CONCRETE CURBED & GUTTER TYPE STREETS



- NOTES:
- PROPOSED DRIVEWAY, SIDEWALK, CURB, GUTTER LINE AND GRADE SHALL MATCH EXISTING STREET.
  - PROPOSED DRIVEWAY SHALL BE CONSTRUCTED WITH PORTLAND CEMENT CONCRETE, 5 SACK CEMENT PER CUBIC YARD, 7 INCHES THICK, FROM PROPOSED SAW CUT TO RIGHT-OF-WAY LINE.
  - PROPOSED DRIVEWAY REINFORCING STEEL IS TO BE #4 DEFORMED BARS SPACE AT 24 INCHES C.C., EACH WAY, WITH 10 INCHES MINIMUM LAP (6"x12" W5x4 AS ALTERNATE) FROM PROPOSED SAW CUT TO RIGHT-OF-WAY LINE.
  - PROPOSED DRIVEWAY REINFORCING STEEL IS TO BE TIED TO EXISTING ROADWAY REINFORCING STEEL WITH A MINIMUM LAP OF 8 INCHES.
  - SEE GENERAL NOTES FOR ADDITIONAL INFORMATION.

3 COMMERCIAL DRIVEWAY DETAIL

USE WHEN SIDEWALK TO BE BUILT OTHER THAN DRIVEWAY



- NOTES:
- PROPOSED SIDEWALK, WHEN BUILT OTHER THAN WITH DRIVEWAY, SHALL BE CONSTRUCTED WITH PORTLAND CEMENT, 4-1/2 SACK CEMENT PER CUBIC YARD, 4-1/2 INCHES THICK AND 4' MINIMUM WIDTH.
  - PROPOSED SIDEWALK, WHEN BUILT THROUGH A PROPOSED DRIVEWAY OPENING, SHALL BE CONSTRUCTED WITH PORTLAND CEMENT, 4-1/2 SACK PER CUBIC YARD, 6-INCHES THICK FOR RESIDENTIAL AND 5-1/2 SACK PER CUBIC YARD, 7-INCHES THICK FOR COMMERCIAL DRIVEWAYS AND 4' MINIMUM WIDTH FOR BOTH.
  - PROPOSED SIDEWALK SHALL HAVE ONE-INCH (1") BOARD EXPANSION JOINTS OR HALF-INCH (1/2") NON-EXTRUDING PERFORMED JOINTS EVERY 20 FEET (MINIMUM) OR 36 FEET (MAXIMUM) THROUGH OUT ENTIRE LENGTH OF PROPOSED SIDEWALK OR WHERE NEW SIDEWALK MEETS EXISTING SIDEWALK AND/OR NEW PROPOSED DRIVEWAY.
  - PROPOSED SIDEWALK REINFORCING STEEL IS TO BE #4 DEFORMED BARS SPACE AT 24 INCHES C.C., EACH WAY, WITH 16-INCH MINIMUM LAP LENGTH OR 6x6-W 2.9 x W 2.9 THROUGH DRIVEWAY OPENINGS USE #3 @ 11, EACH WAY, WITH 16-INCH MINIMUM LAP LENGTH OR #4 @ 20" EACH WAY WITH 22-INCH MINIMUM LAP LENGTH AND 6-INCH STABILIZED SUBGRADE.
  - SEE DRIVEWAY DETAILS AND GENERAL NOTES.

6 SIDEWALK DETAIL

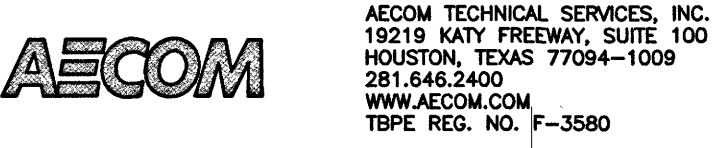
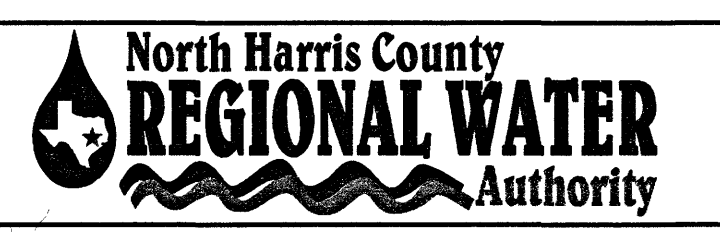
DESIGNATED WIDTH IN PLANS

DRIVEWAY DESIGNATION	DRIVEWAY CENTERLINE & STATION	EXISTING WIDTH	EXISTING LENGTH (1)	EXISTING SURFACE	PROPOSED SURFACE (2)

- TABLE FOOTNOTES:
- FROM EXIST. ROAD EDGE TO R.O.W.
  - PROPOSED SURFACE WIDTH TO MATCH EXISTING, UNLESS OTHERWISE SHOWN ON DRAWINGS
  - CULVERT L TO MATCH PROPOSED DITCH GRADE LINE

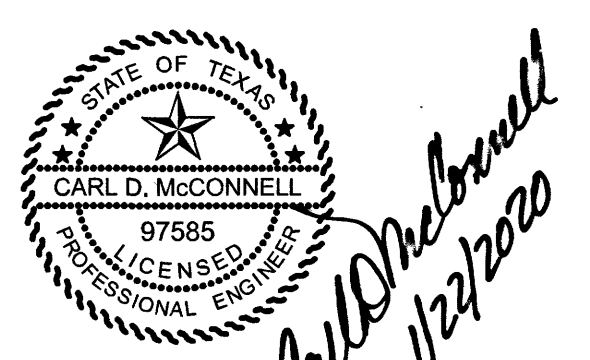
7 DRIVEWAY SURFACE TABLE

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PROJECT 28-B  
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DRIVEWAY AND SIDEWALK PAVING DETAILS

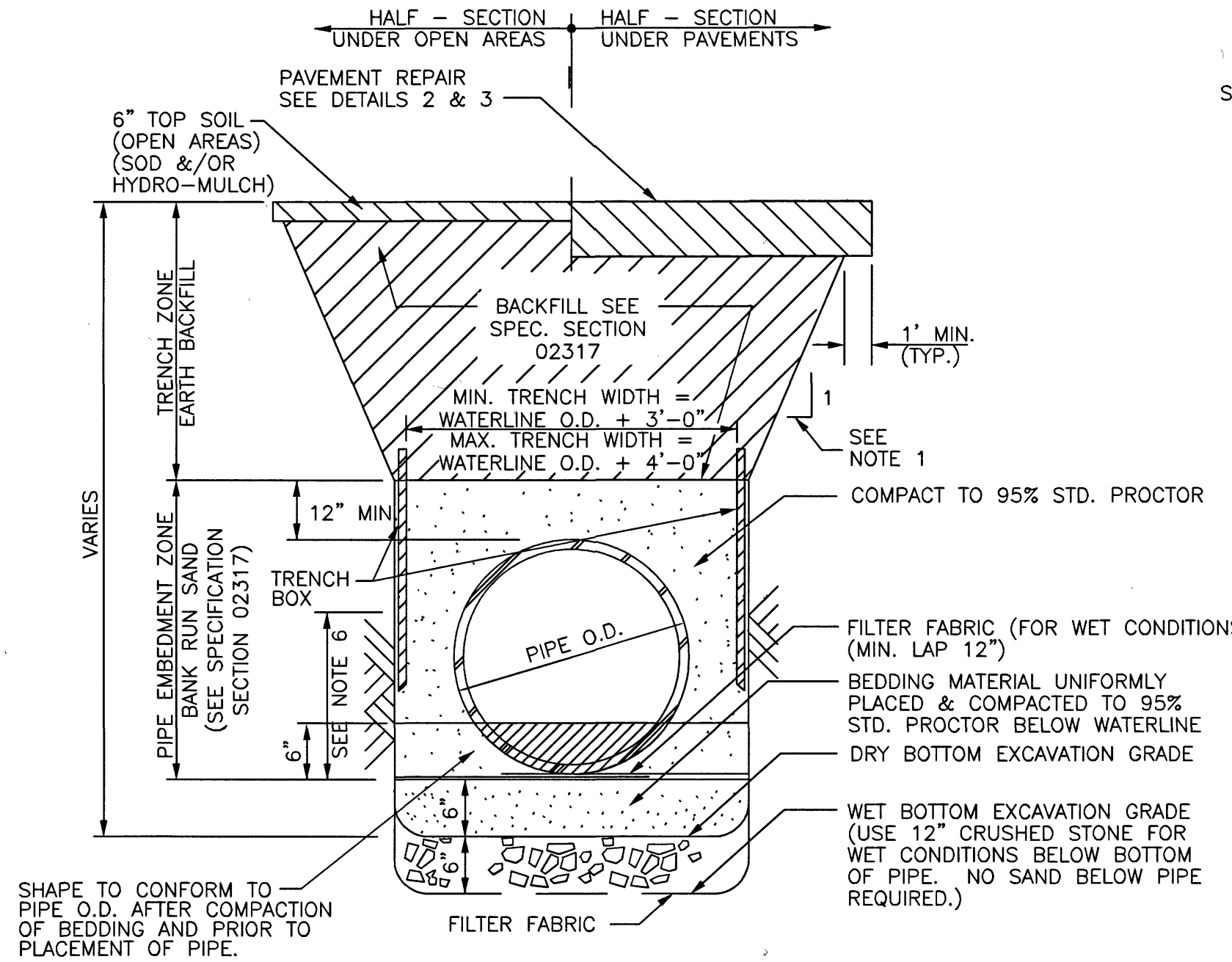


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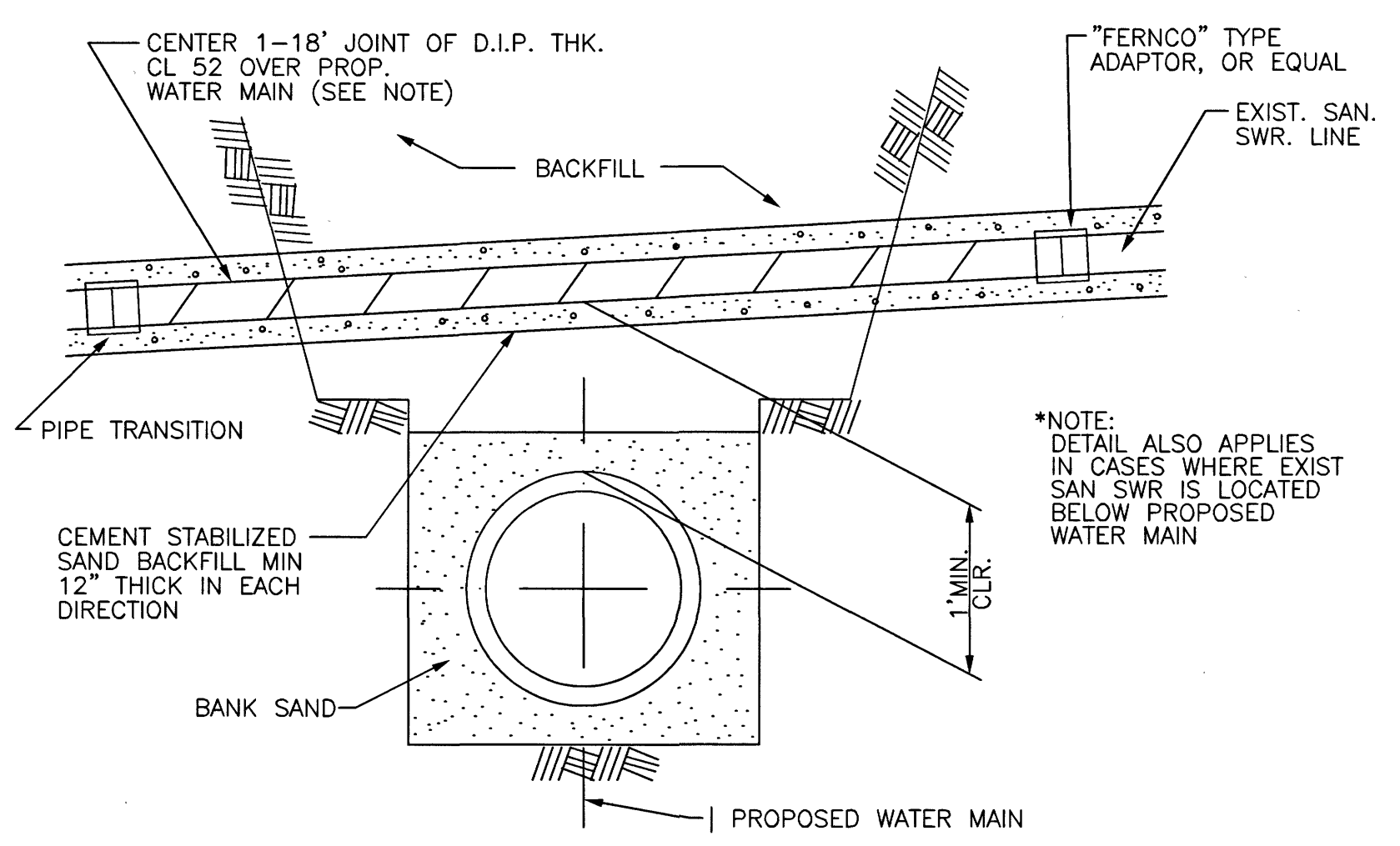


No.	Date	Revisions	App.



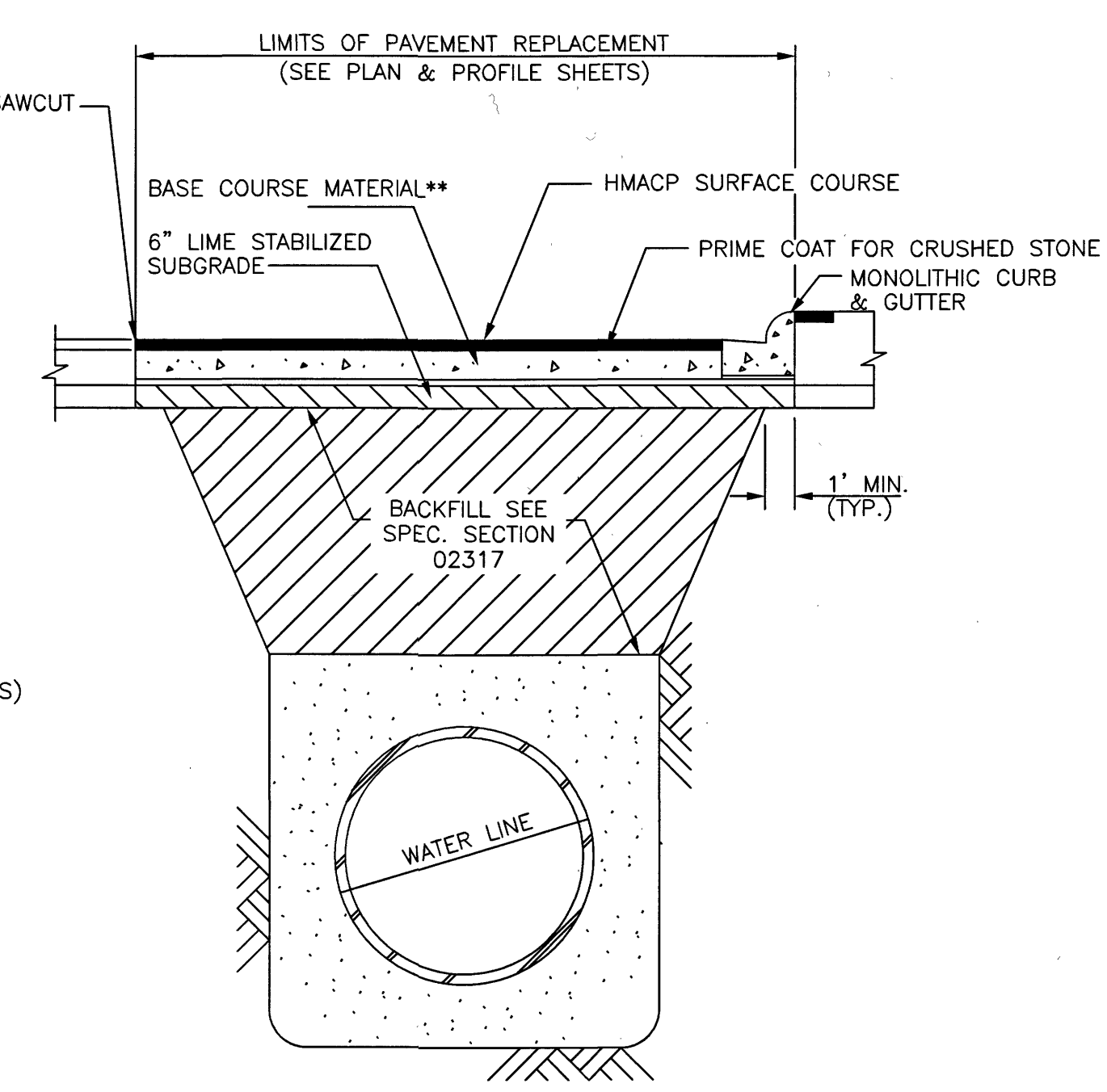
- NOTES:**
- SEE TRENCH SAFETY SYSTEM SPECIFICATIONS FOR MAXIMUM ALLOWABLE SLOPES.
  - FOR WET BOTTOM EXCAVATION LIMITS OF CRUSHED STONE, EXTEND AS SHOWN.
  - KEY CONCRETE TRENCH DAM MINIMUM OF 6 INCHES INTO TRENCH BOTTOM AND WALLS.
  - TRENCH DAM MAY BE FORMED OR UNFORMED. ACTUAL SHAPE OF CONCRETE TRENCH DAM CROSS SECTION MAY BE DETERMINED BY CONTRACTOR IN FIELD, MEETING 6-INCH MINIMUM THICKNESS AND 6-INCH KEY DEPTH REQUIREMENTS.
  - TRENCH DAM SHALL BE PLACED AT LEAST 5 FT. AWAY FROM ANY PIPELINE STRUCTURE (EACH SIDE).
  - THIS PORTION OF PIPE EMBEDMENT ZONE MUST BE RECOMPACTED TO PROPER DENSITIES AFTER MOVING SUPPORT SYSTEM FORWARD.
  - ALL DISTURBED AREAS SHALL BE RETURNED TO EXISTING OR BETTER CONDITIONS. DISTURBED VEGETATED AREAS SHALL BE SODDED AND/OR HYDRO-MULCH.
  - PROVIDE CEMENT STABILIZED SAND IN THE PIPE ZONE FOR ENCASEMENT IN THE PCA.
  - WHEN CROSSING UNDER AN EXISTING STORM SEWER USING THE OPEN CUT METHOD, THE WATER LINE TRENCH ZONE SHALL BE BACKFILLED FOR 3 TO 5 FEET EITHER SIDE OF THE STORM SEWER WITH CEMENT STABILIZED SAND TO THE SPRING LINE OF THE STORM SEWER.

**1 EXCAVATION & BACKFILL DETAIL**



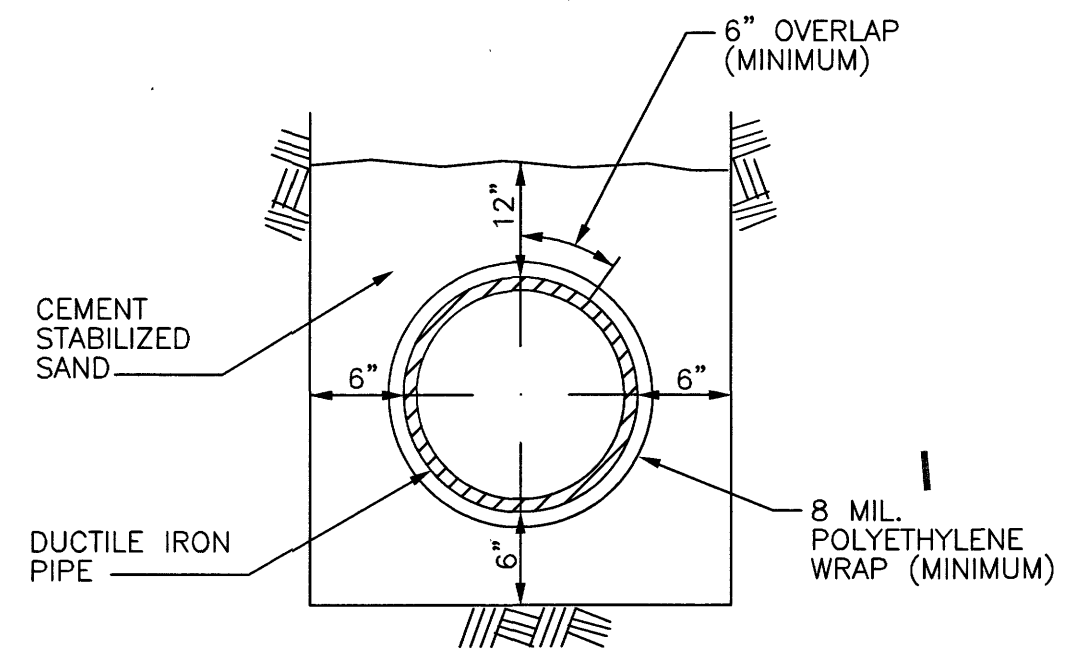
- NOTES:**
- P.V.C. PIPE WITH PRESSURE RATING OF 250, DR18 MAY BE USED.

**4 D.I.P. OVER PROPOSED WATER LINE**



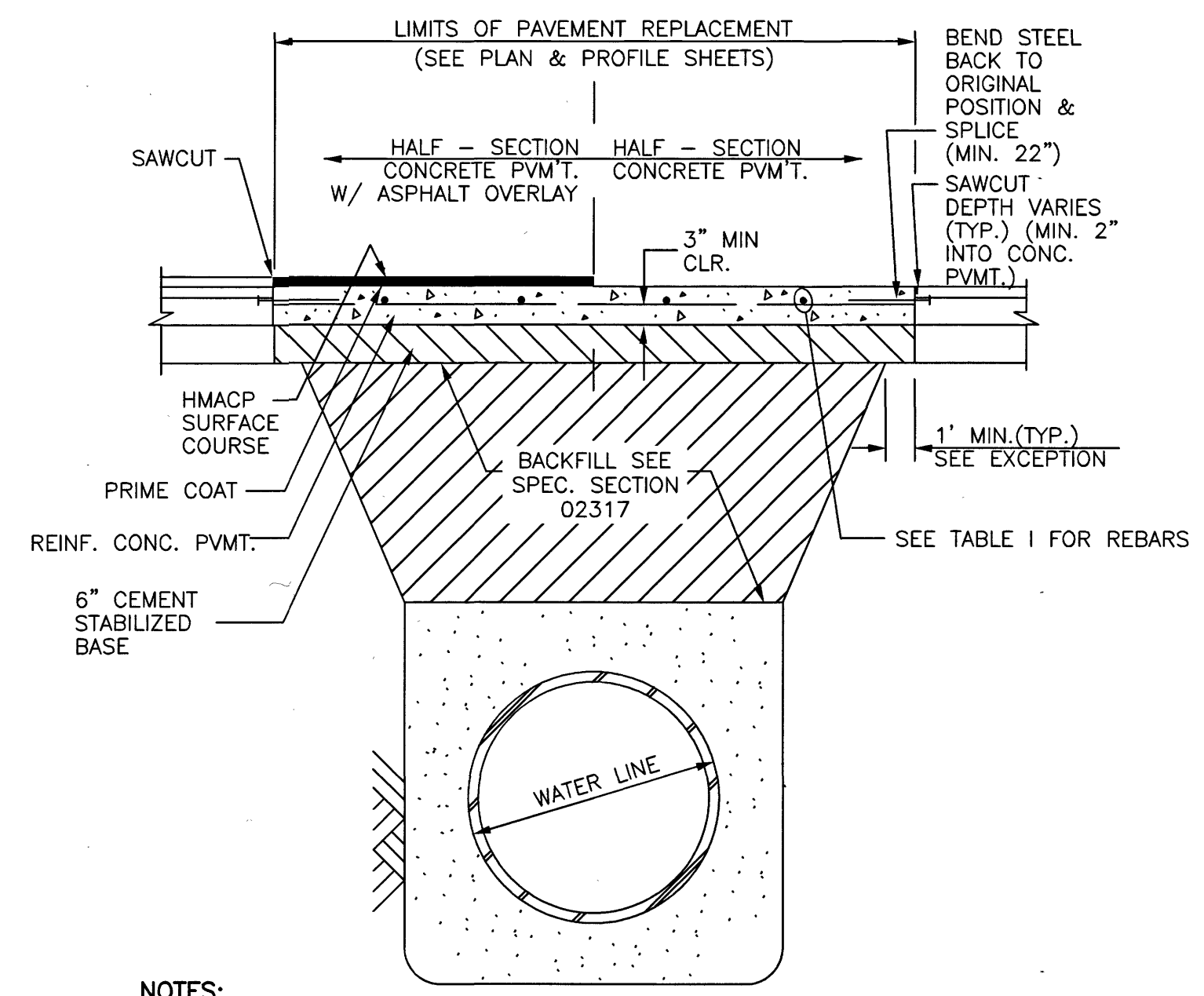
- NOTES:**
- \* OMIT CURB WHEN EXISTING ROADWAY DOES NOT HAVE ONE
  - \*\* BASE COURSE MATERIAL SHALL CONSIST OF THE FOLLOWING OPTIONS:
    - 8" HOT MIX ASPHALTIC BASE COURSE
    - 8" STABILIZED CRUSHED CONCRETE BASE COURSE

**2 TYPICAL REPAIR OF FLEXIBLE BASE PAVEMENT**



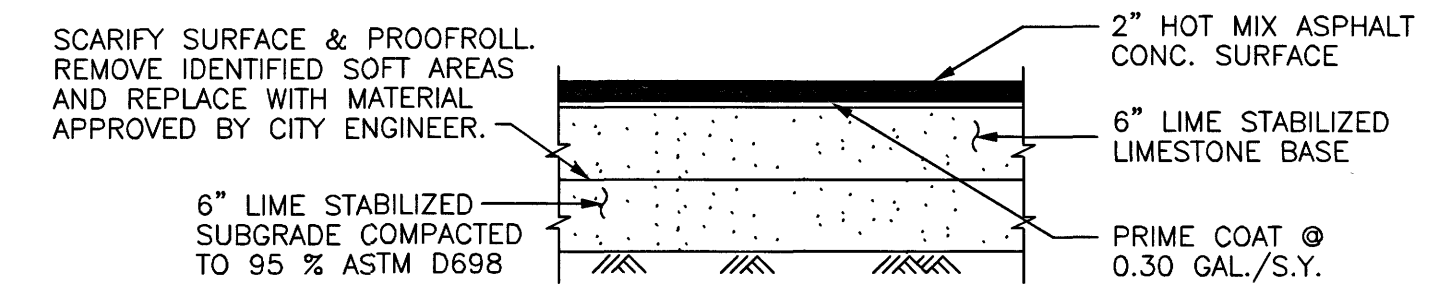
- NOTES:**
- FOLLOWING EXCAVATION OF TRENCH, PLACE A 6" LAYER OF CEMENT STAB. SAND AT BOTTOM OF TRENCH. LAY POLYETHYLENE WRAP IN TRENCH, AND LAY PIPE ON TOP OF WRAP. FOLD WRAP AROUND PIPE WITH A 6" OVERLAP (MIN.) AND TIE AROUND PIPE WITH HEAVY BINDER TWINE, OR EQUAL, ON 6" CENTERS. PROVIDE A 12" OVERLAP (MIN.) AND TIE WITH HEAVY BINDER TWINE END LAPS. PLACE ADDITIONAL CEMENT SAND UP TO 12" ABOVE
  - ALL DUCTILE IRON PIPE SHALL HAVE A POLYETHYLENE "WRAP" OF 8 MIL. THICKNESS (MINIMUM) EXCEPT AS NOTED BELOW.
  - WHERE PIPE IS PLACED IN AN AUGER OR TUNNEL OR IN A CASING, PIPE IS TO HAVE A DOUBLE WRAP OF 16 MIL POLYETHYLENE AND SHALL BE BONDED ON 12" CENTERS WITH 1/2" STAINLESS STEEL BANDS. END LAPS TO BE AS SPECIFIED FOR TRENCH SECTIONS.

**5 EMBEDMENT AND CORROSION PROTECTION FOR SANITARY SEWER DUCTILE IRON PIPE**



- NOTES:**
- MIN. THICKNESS 6" FOR ROADWAY WIDTH LESS THAN OR EQUAL TO 27' F/F OF CURB.
  - MIN. THICKNESS 7" FOR ROADWAY WIDTH GREATER THAN 27' F/F OF CURB.
  - MIN. THICKNESS 8" FOR MAJOR THOROUGHFARES.
  - REINFORCING STEEL ARE SHOWN ON TABLE I & II.
  - SEAL CONCRETE JOINTS BEFORE APPLYING ASPHALT OVERLAY
  - WHERE PROPOSED PAVEMENT IS TO MATCH EXISTING PAVEMENT, EXISTING REBARS OR DOWELS PROJECTING FROM EXISTING PAVEMENT TO BE CLEANED AND TIED INTO PROPOSED PAVEMENT. IF NO REINFORCING STEEL EXISTS, USE HORIZONTAL DOWELS. HORIZONTAL DOWELS SHALL BE #6 BARS, 24 INCHES LONG, DRILLED AND EMBEDDED 8 INCHES INTO THE CENTER OF THE EXISTING SLAB WITH \*PO ROC\* OR EQUAL AT 18 INCHES CENTER TO CENTER.

**3 TYPICAL REPAIR OF CONCRETE PAVEMENT OR CONCRETE PAVEMENT WITH ASPHALT OVERLAY**



**6 TEMPORARY ASPHALT PAVEMENT SECTION**

**" PAVEMENTS FOR BIDDING PURPOSES ONLY "**

PAVEMENT TYPE & THICKNESS	STATION	STREET

- NOTES:**
- ACCOMPANYING TABLE "PAVEMENTS FOR BIDDING PURPOSES ONLY", WAS COMPILED FROM RECORD DWG'S. AND REPRESENTATIVE CORE SAMPLES OF THE PAVEMENT TO BE REMOVED AND REPLACED ALONG THE PROJECT ROUTES.
  - MEASUREMENT AND PAYMENTS (INCLUDING DRIVEWAYS) SHALL BE AS PER SPECIFICATION SECTIONS UNLESS OTHERWISE SHOWN ON BID FORM.
  - NEW ASPHALTIC PAVEMENTS SHALL BE MIN. 2" H.M.A.C. TOP, W/BASE AND SUBGRADE PER DETAILS AND SPEC'S.
  - NEW CONCRETE PAVEMENTS TO BE SAME THICKNESS AS EXISTING, UNLESS OTHERWISE DIRECTED
  - STREETS OR DRIVEWAYS SHALL BE REPAIRED OR REPLACED USING HIGH EARLY STRENGTH CONCRETE AS INDICATED ON DRAWINGS, ACCORDING TO PAVEMENT REPLACEMENT SCHEDULE ABOVE, OR AS DIRECTED BY ENGINEER.
  - APPLICABLE TO EXISTING CONCRETE AREAS THAT REQUIRE REMOVAL AND REPLACEMENT CONCRETE DUE TO OPEN TRENCH (EXCLUDE THE MEDIAN ISLAND)
  - ADD 2' WIDE, 2" THICK CRUSHED LIMESTONE SHOULDER AT EDGE OF ASPHALT PAVEMENT REPAIR.

**7 PAVEMENT REPLACEMENTS**

**TABLE I : REINFORCING STEEL INFORMATION FOR VARIOUS PAVEMENT THICKNESS (F) WITH L = EXPANSION JOINT SPACING = 80 FT. FC = 3000 PSI AND FY = 60,000 PSI**

F (IN.)	A=TRANSVERSE STEEL	B=LONGITUDINAL STEEL	MIN LENGTH OF LAP (IN.)
6.	A) #3 AT 11 IN.	B) #4 AT 20 IN.	16 & 22
7.	#4 AT 17 IN.		22
8.	A) #5 AT 23 IN.	B) #4 AT 15 IN.	22
9.	A) #5 AT 20 IN.	B) #4 AT 13 IN.	22
10.	A) #4 AT 12 IN.	B) #5 AT 18 IN.	22 & 27
11.	A) #4 AT 10 IN.	B) #5 AT 16 IN.	22 & 27
12.	A) #4 AT 10 IN.	B) #5 AT 15 IN.	22 & 27

**DOWELS AT EXPANSION JOINTS FOR REINFORCED PAVEMENT : CHANGE THE DOWELS SIZES & SPACING AT EXPANSION JOINTS FOR REINFORCED PAVEMENTS FROM 3/4 IN. DIAMETER, 10 IN. LONG & SPACED AT 22 IN. ON CENTERS TO THE FOLLOWING : (SEE TABLE II BELOW)**

**TABLE II : DOWEL SIZES & SPACINGS AT EXPANSION JOINTS FOR VARIOUS PAVEMENT THICKNESS.**

PAVEMENT THICKNESS (IN.)	DOWEL SIZES & SPACING		
	DIAMETER (IN.)	LENGTH (IN.)	SPACING (IN.)
6	3/4	18	12
7	7/8	18	12
8	1	18	12
9	1 - 1/8	20	12
10	1 - 1/4	20	12
11	1 - 1/4	20	12
12	1 - 1/4	20	12



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NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

**EXCAVATION, BEDDING, BACKFILL & PAVEMENT REPAIR DETAILS**

CARL D. MCCONNELL  
97585  
LICENSED PROFESSIONAL ENGINEER  
1/27/2020

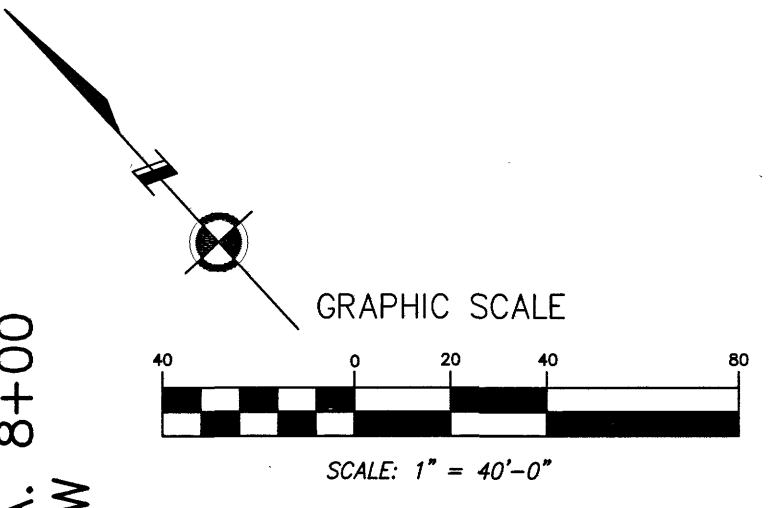
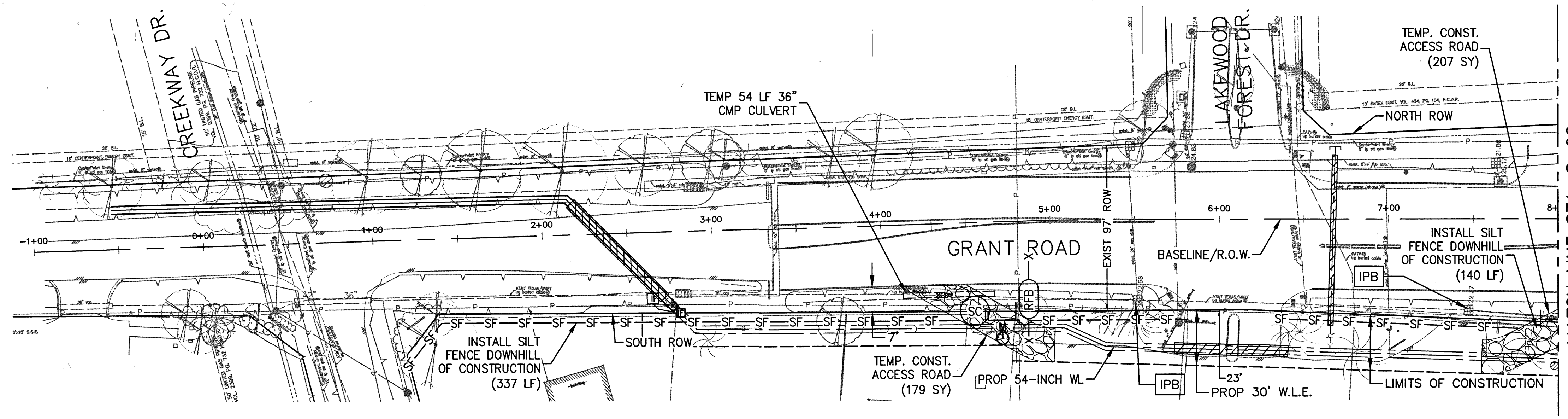
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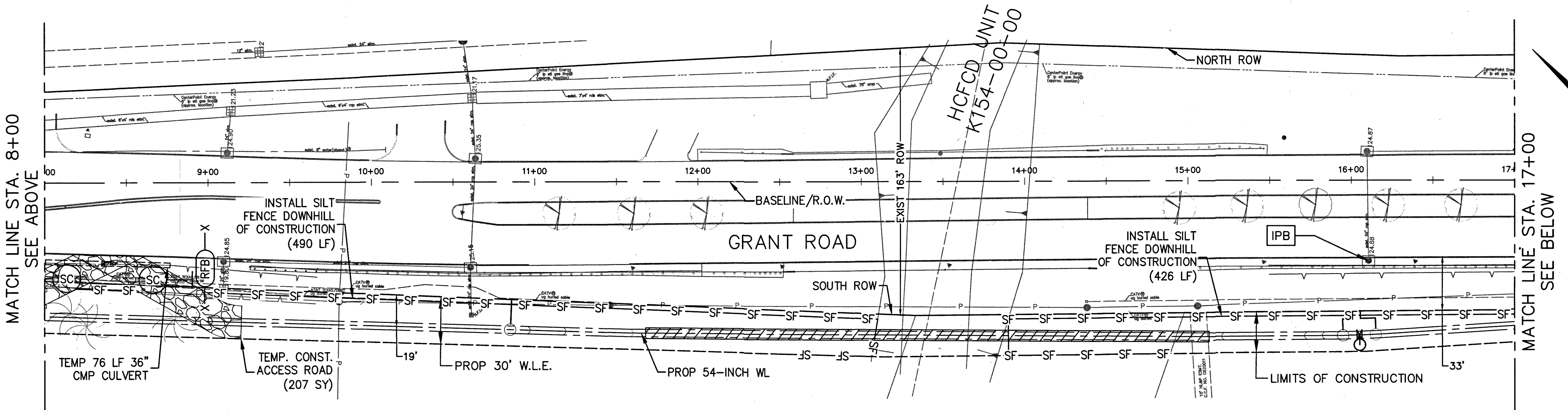
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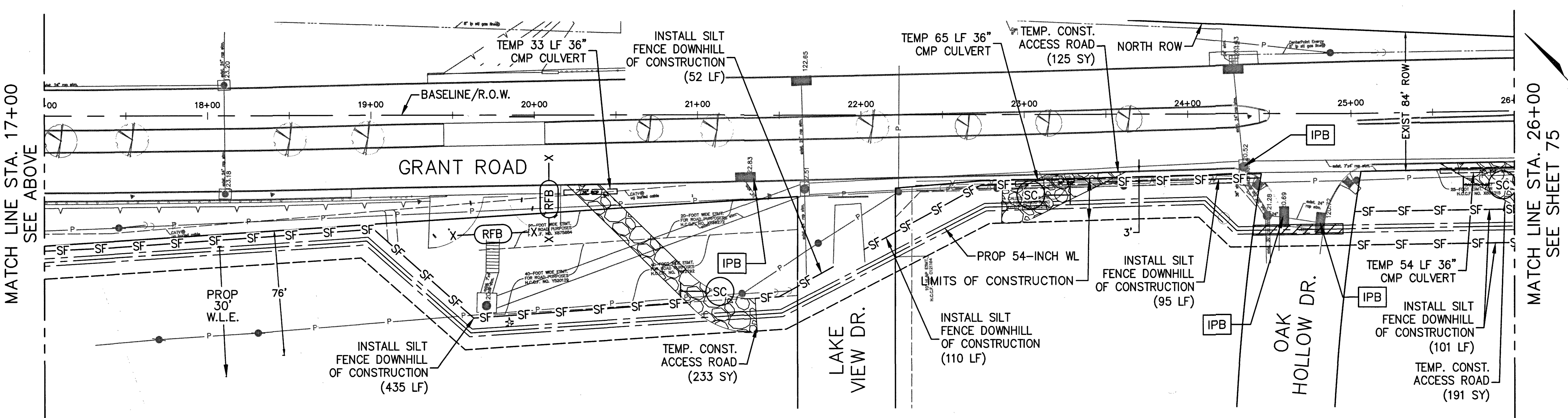


- LEGEND**
- SF — SILT FENCE (SEE FILTER FABRIC FENCE DETAIL)
  - X—RFB—X REINFORCED FILTER FABRIC BARRIER
  - SC ○ STABILIZED CONSTRUCTION EXIT
  - IPB INLET PROTECTION BARRIER - TYPE 1
  - ▨ TRENCHLESS WATER LINE
- NOTE: SEE SHEET 79 FOR STORM WATER POLLUTION PREVENTION PLAN DETAILS



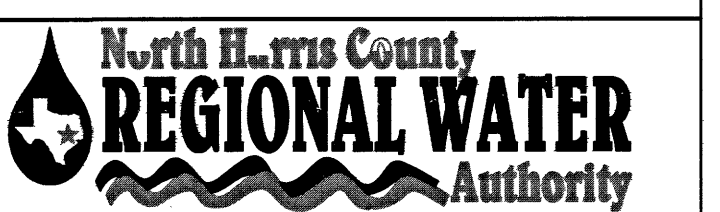
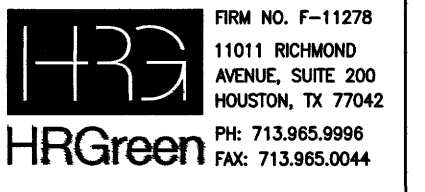
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SEE ABOVE

MATCH LINE STA. 17+00  
SEE BELOW



MATCH LINE STA. 17+00  
SEE ABOVE

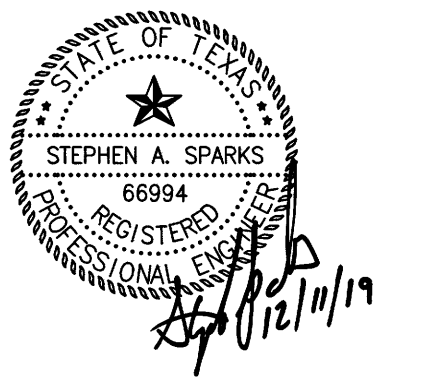
MATCH LINE STA. 26+00  
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PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

STORM WATER POLLUTION PREVENTION PLAN (SHEET 1 OF 5)



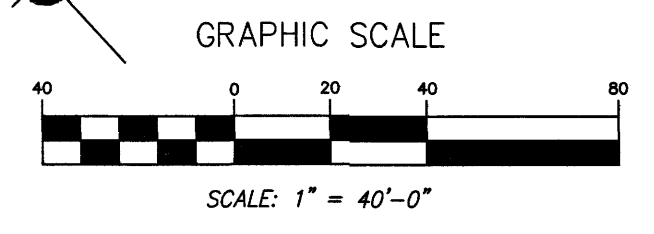
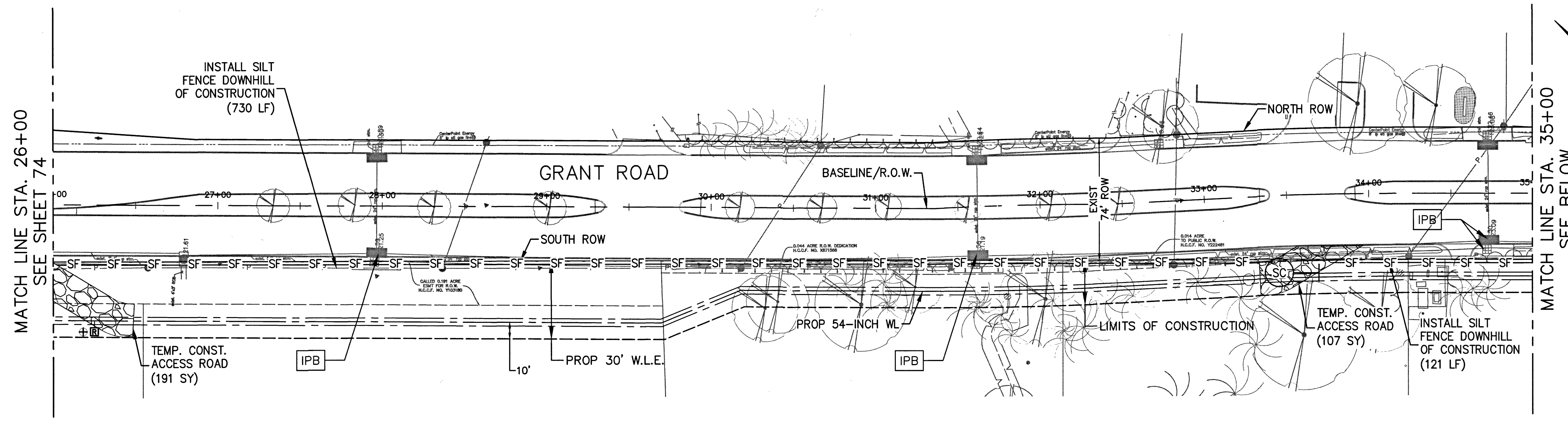
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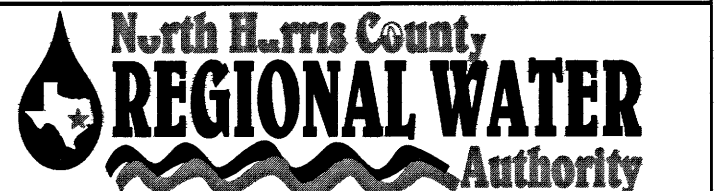
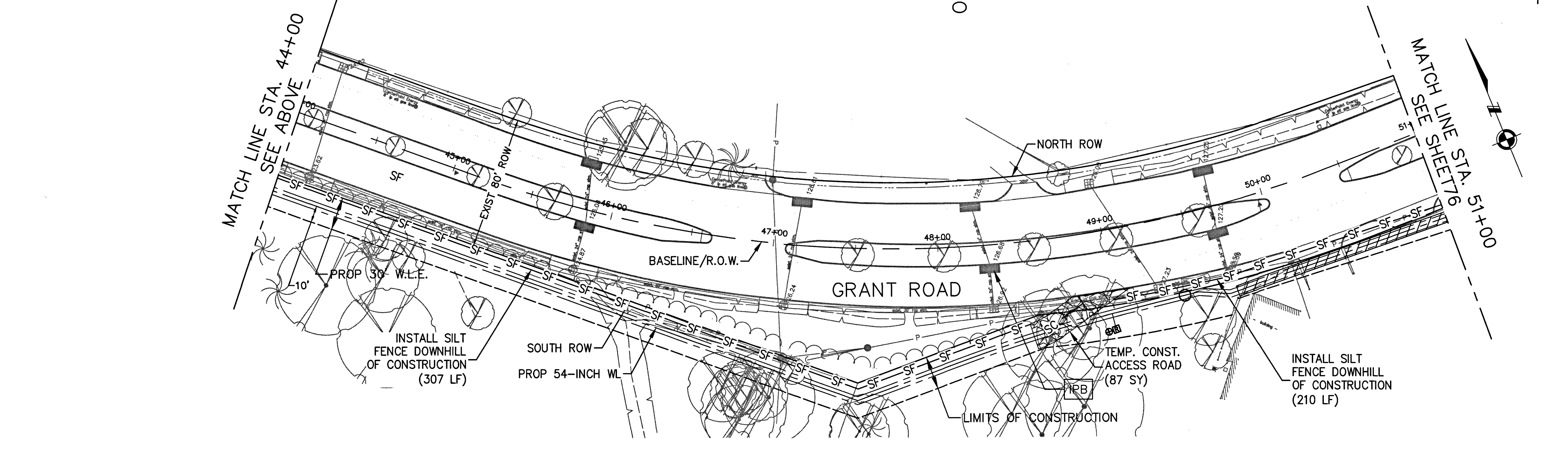
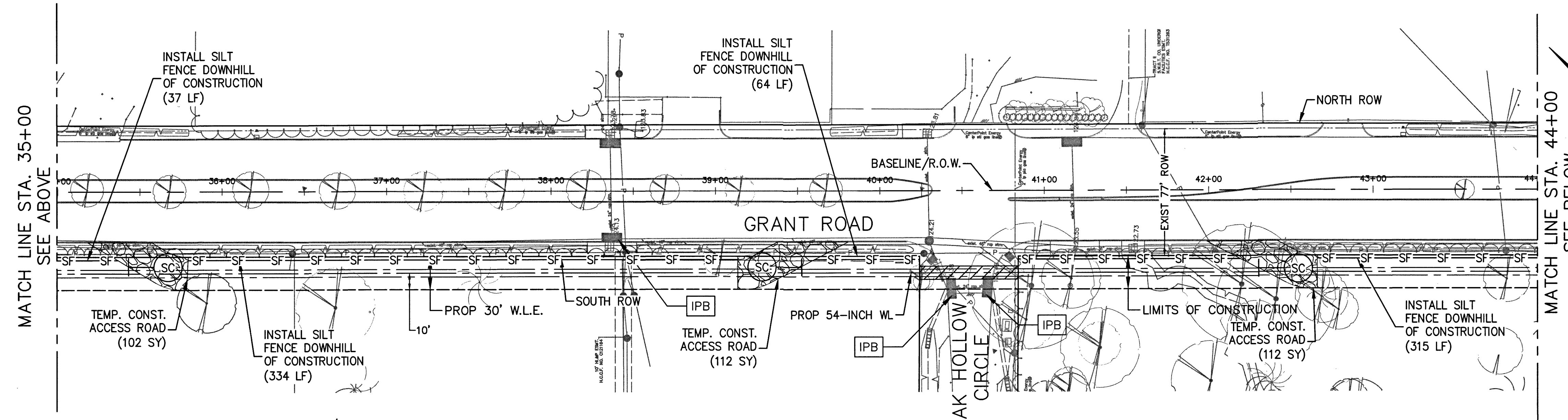
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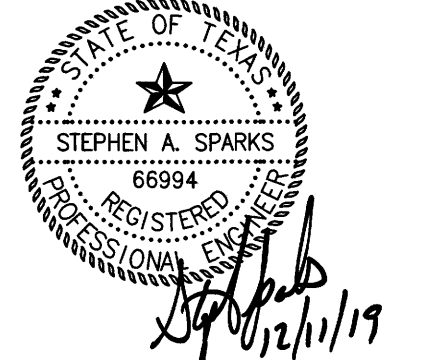
- LEGEND**
- SF — SILT FENCE (SEE FILTER FABRIC FENCE DETAIL)
  - X (RFB) X REINFORCED FILTER FABRIC BARRIER
  - (SC) STABILIZED CONSTRUCTION EXIT
  - [IPB] INLET PROTECTION BARRIER - TYPE 1
  - ▨ TRENCHLESS WATER LINE
- NOTE: SEE SHEET 79 FOR STORM WATER POLLUTION PREVENTION PLAN DETAILS



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 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

STORM WATER POLLUTION PREVENTION PLAN (SHEET 2 OF 5)

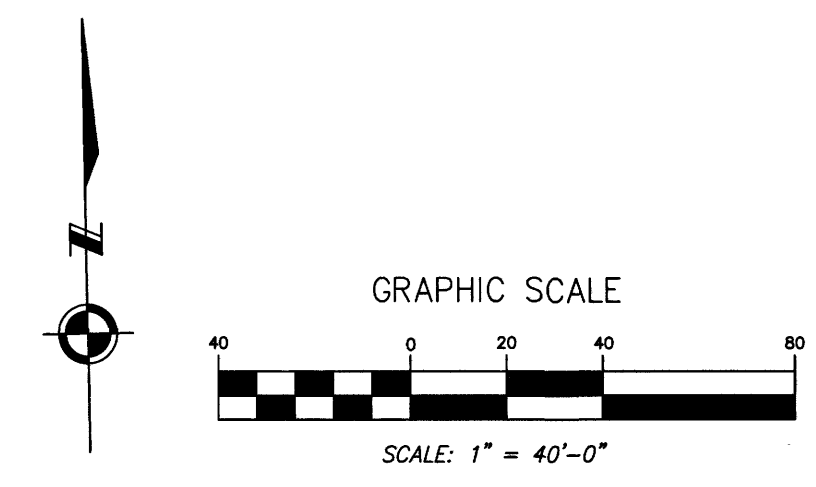
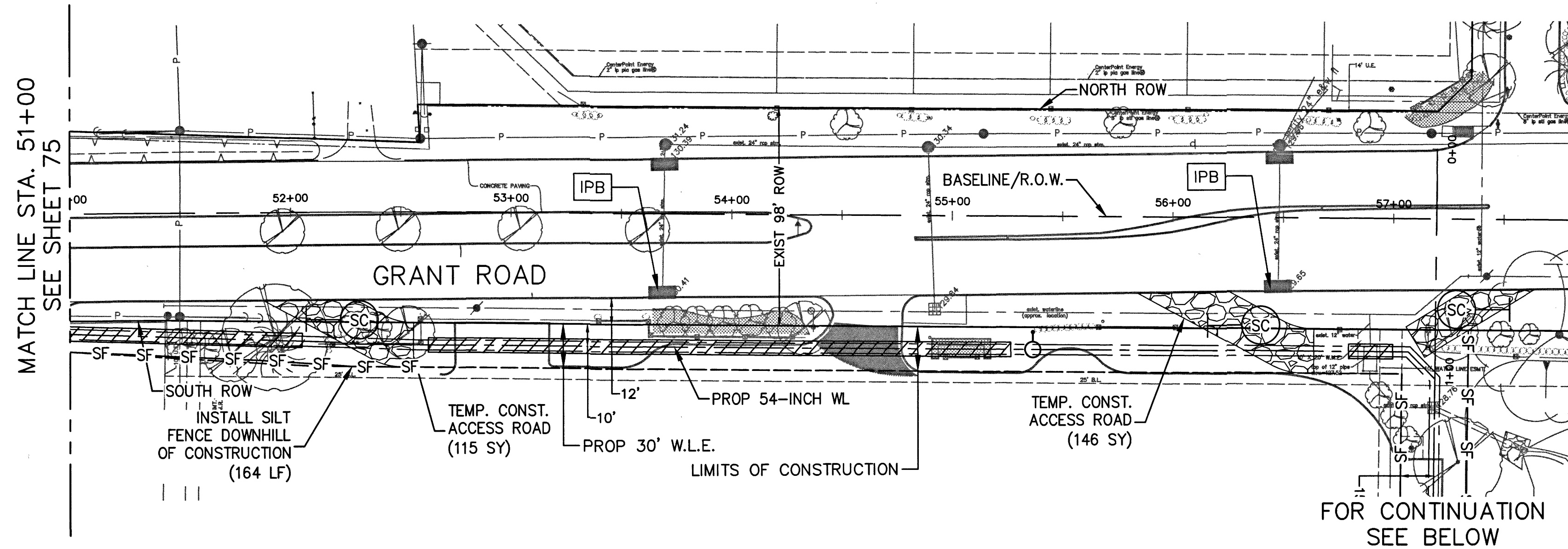


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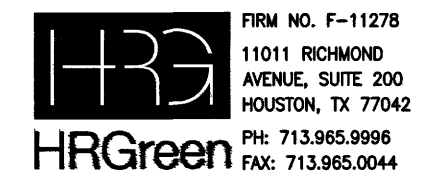
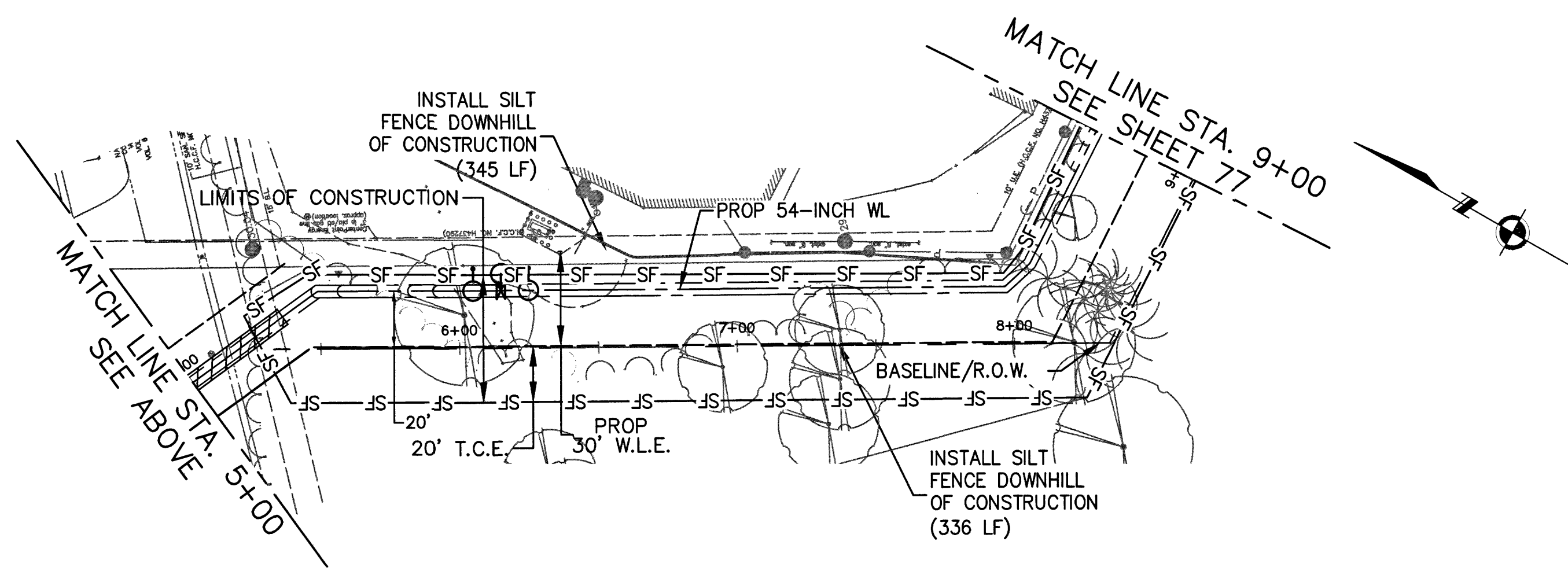
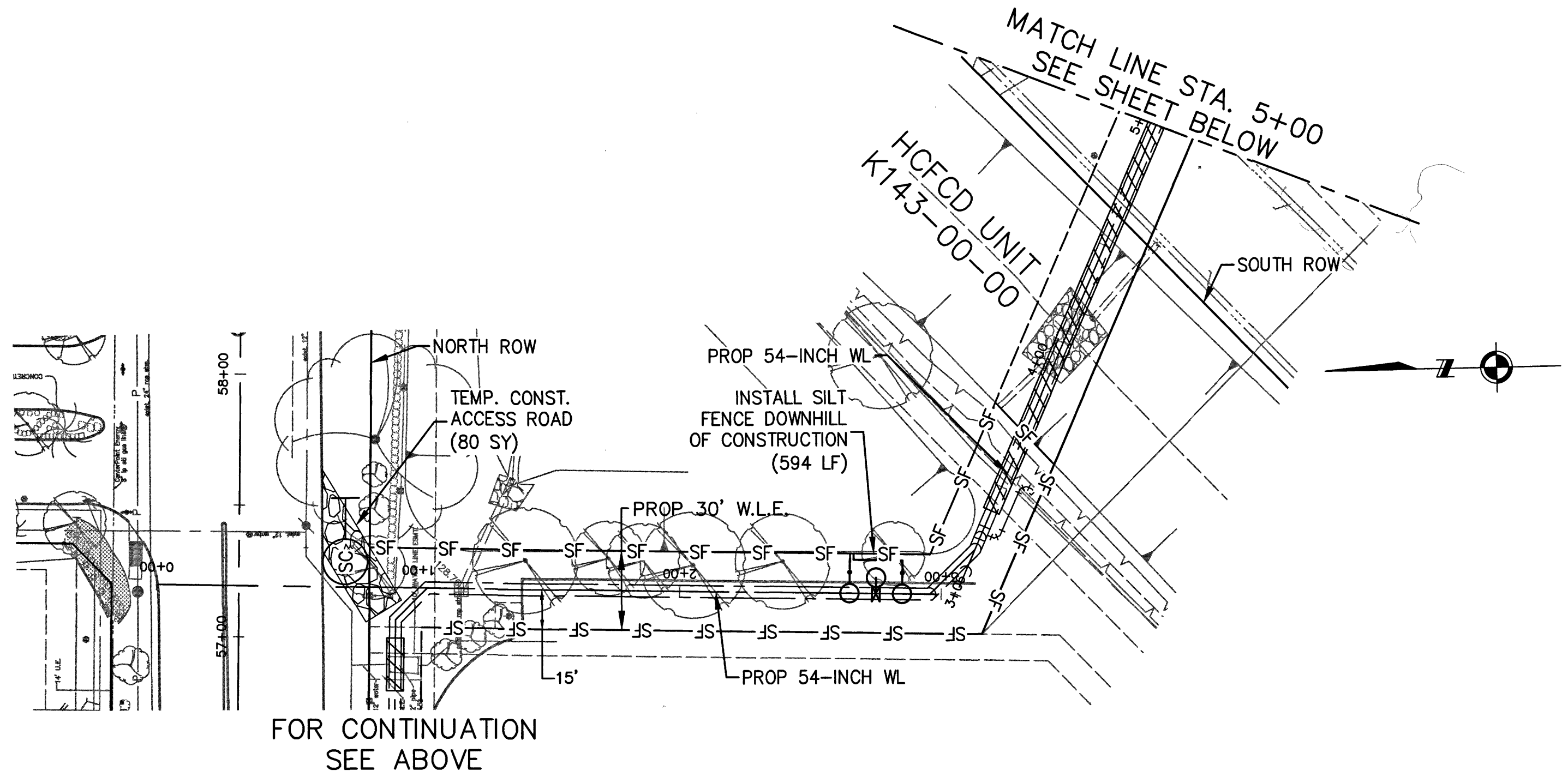
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- LEGEND**
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  - X—RFB—X REINFORCED FILTER FABRIC BARRIER
  - SC STABILIZED CONSTRUCTION EXIT
  - IPB INLET PROTECTION BARRIER - TYPE 1
  - ▨ TRENCHLESS WATER LINE
- NOTE: SEE SHEET 79 FOR STORM WATER POLLUTION PREVENTION PLAN DETAILS



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PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

STORM WATER POLLUTION PREVENTION PLAN (SHEET 3 OF 5)



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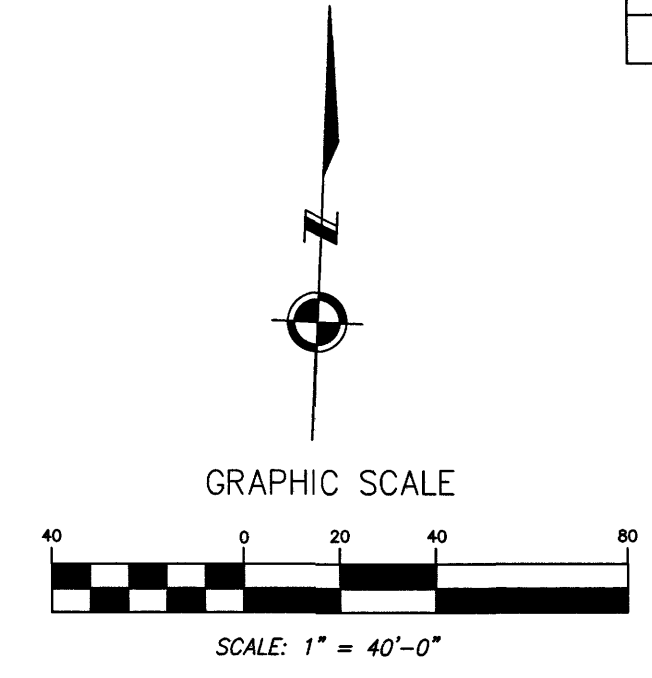
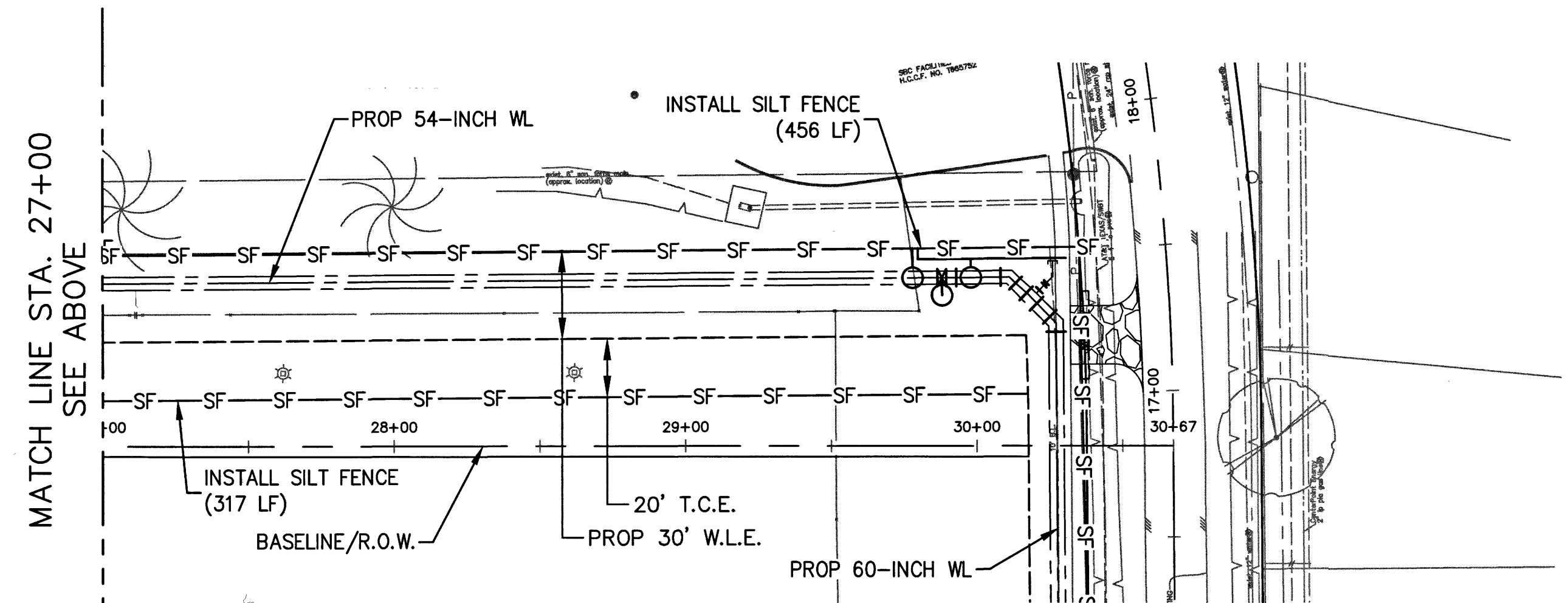
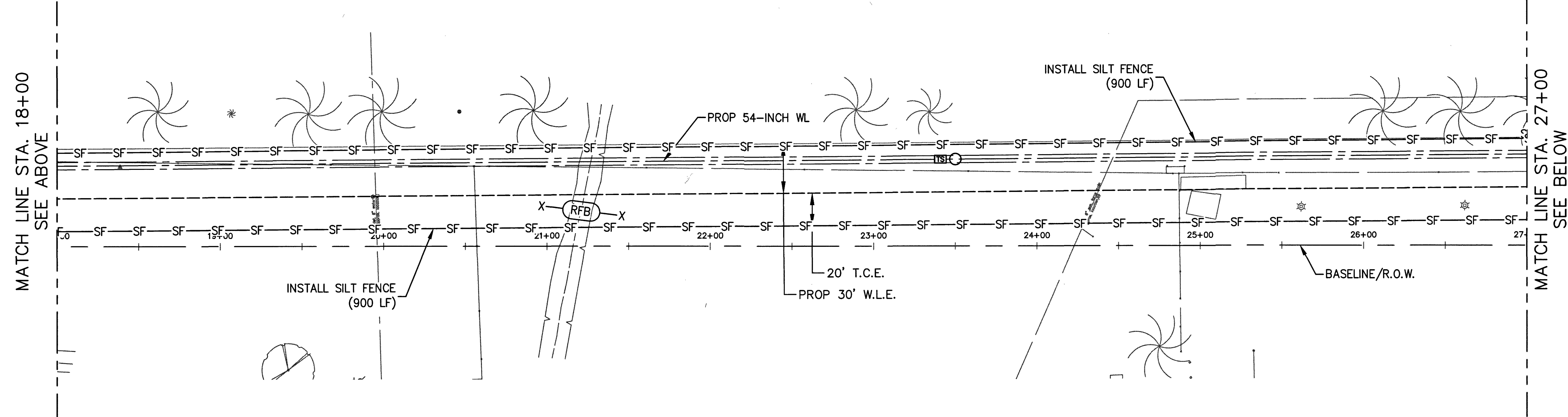
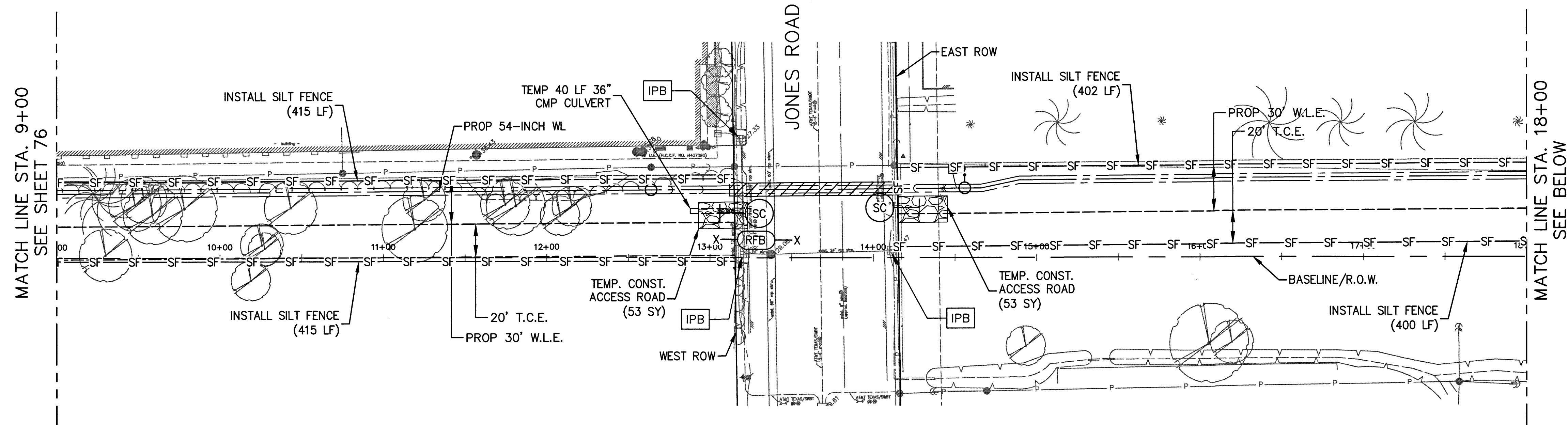
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SHEET No: 76 of 99

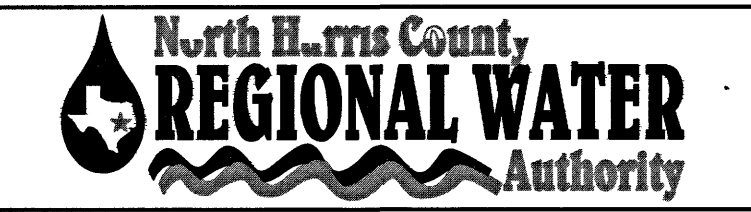
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- LEGEND**
- SF — SILT FENCE (SEE FILTER FABRIC FENCE DETAIL)
  - X (RFB) X REINFORCED FILTER FABRIC BARRIER
  - (SC) STABILIZED CONSTRUCTION EXIT
  - (IPB) INLET PROTECTION BARRIER - TYPE 1
  - ▨ TRENCHLESS WATER LINE
- NOTE: SEE SHEET 79 FOR STORM WATER POLLUTION PREVENTION PLAN DETAILS



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STORM WATER POLLUTION PREVENTION PLAN (SHEET 4 OF 5)



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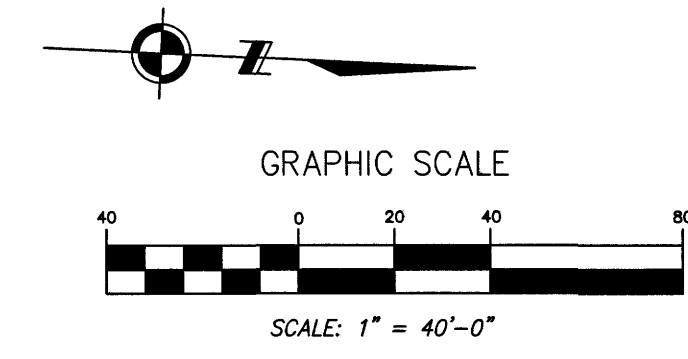
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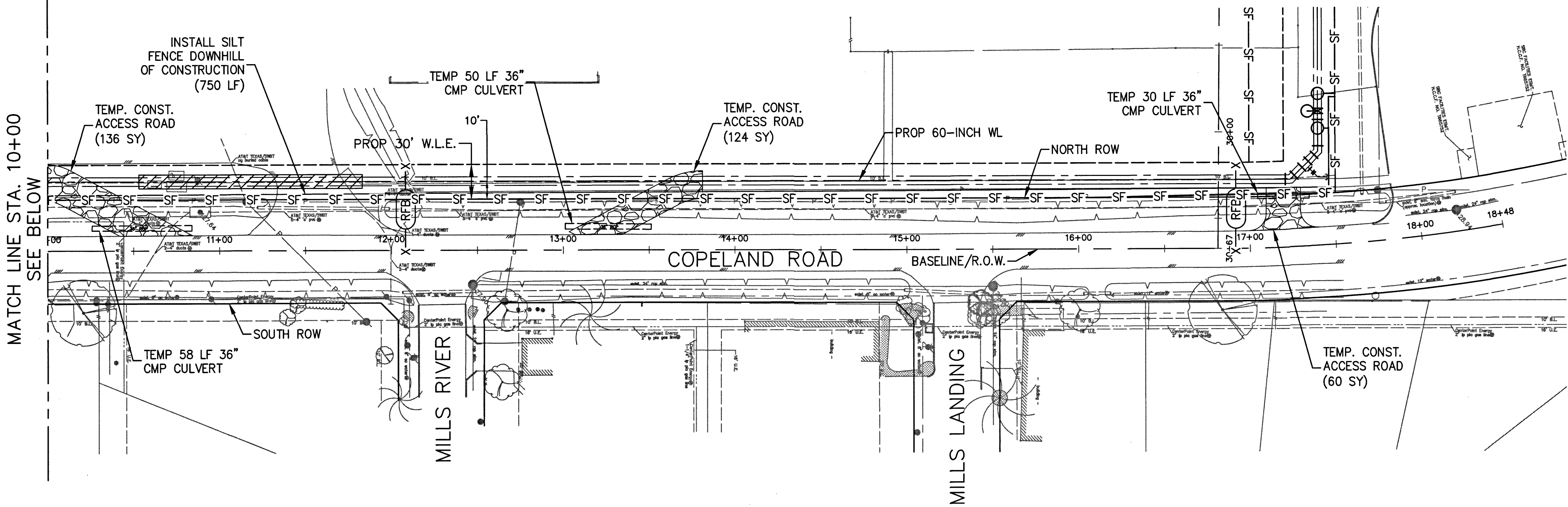
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FOR CONTINUATION  
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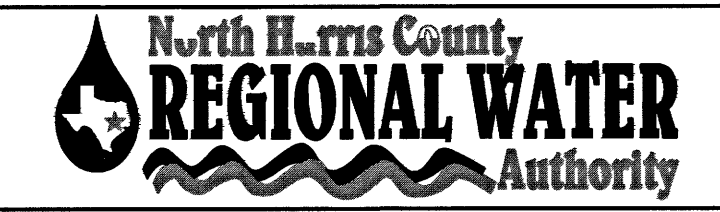
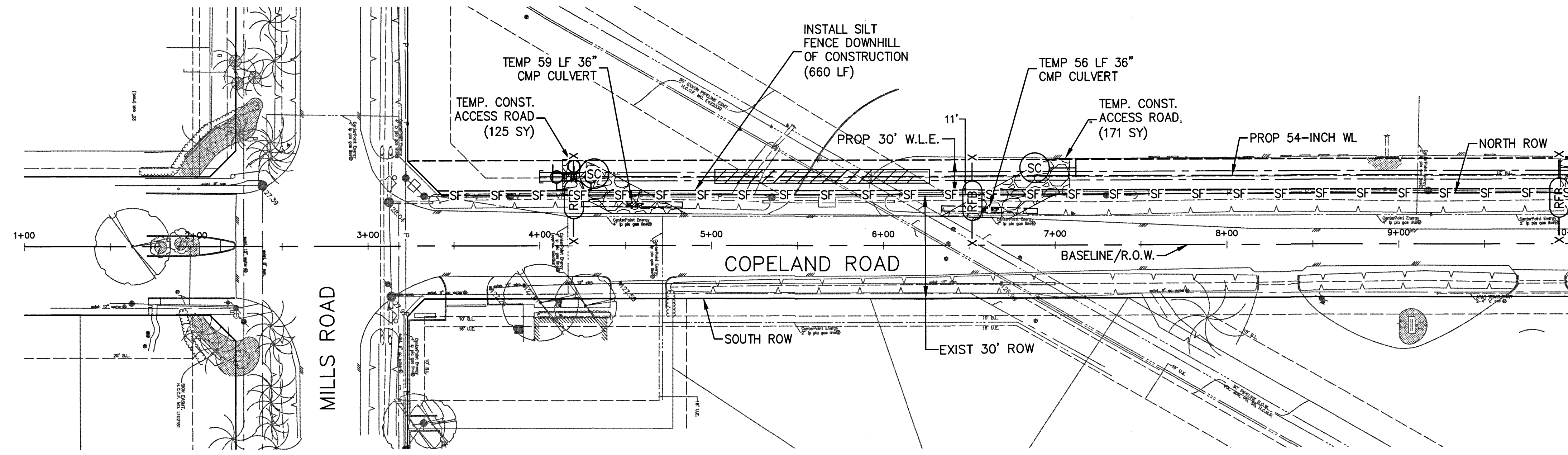


MATCH LINE STA. 10+00  
SEE BELOW



- LEGEND**
- SF — SILT FENCE (SEE FILTER FABRIC FENCE DETAIL)
  - X (RFB) X REINFORCED FILTER FABRIC BARRIER
  - (SC) STABILIZED CONSTRUCTION EXIT
  - (IPB) INLET PROTECTION BARRIER - TYPE 1
  - ▨ TRENCHLESS WATER LINE
- NOTE: SEE SHEET 79 FOR STORM WATER POLLUTION PREVENTION PLAN DETAILS

MATCH LINE STA. 10+00  
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PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

STORM WATER  
POLLUTION PREVENTION  
PLAN (SHEET 5 OF 5)



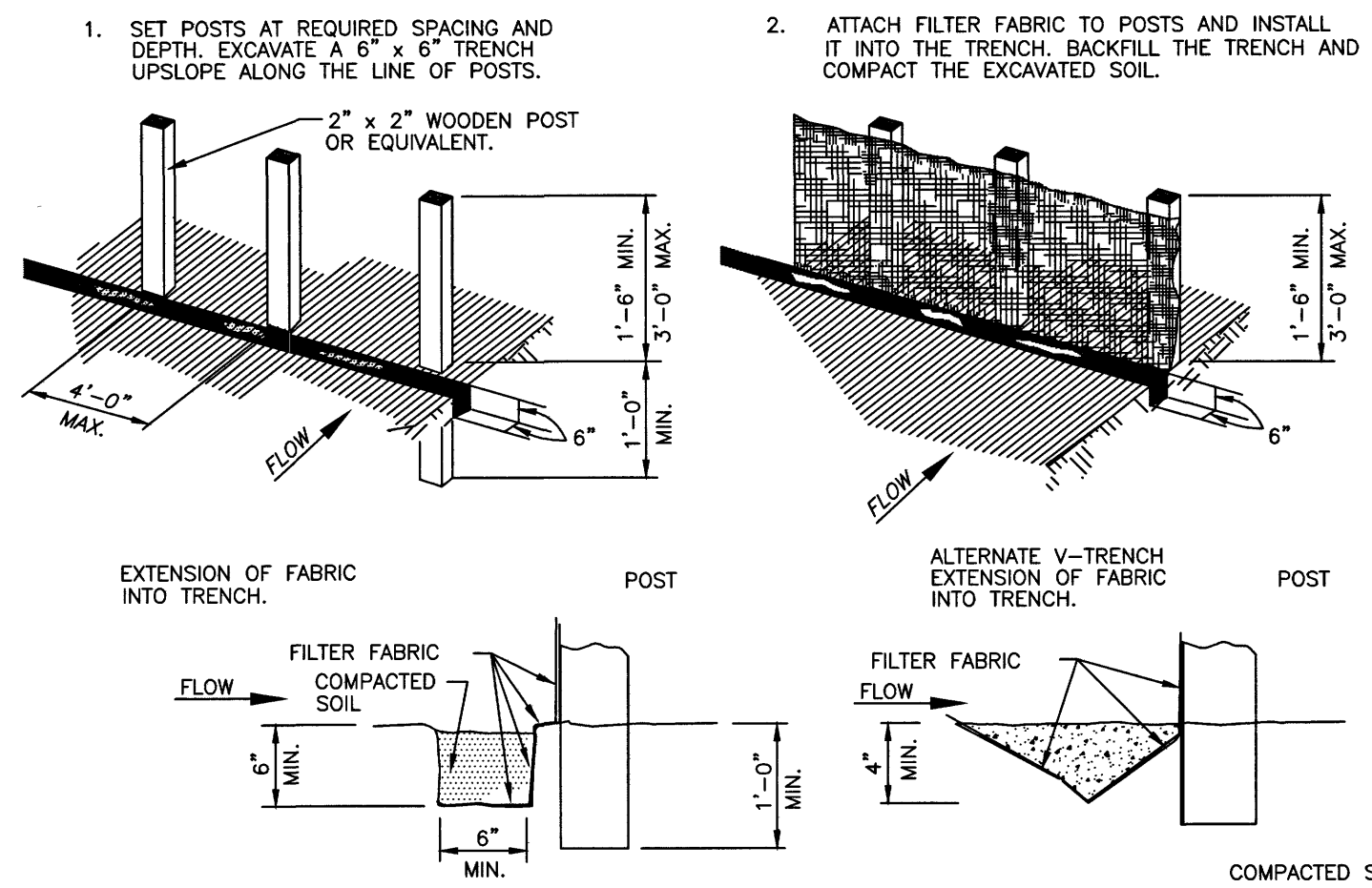
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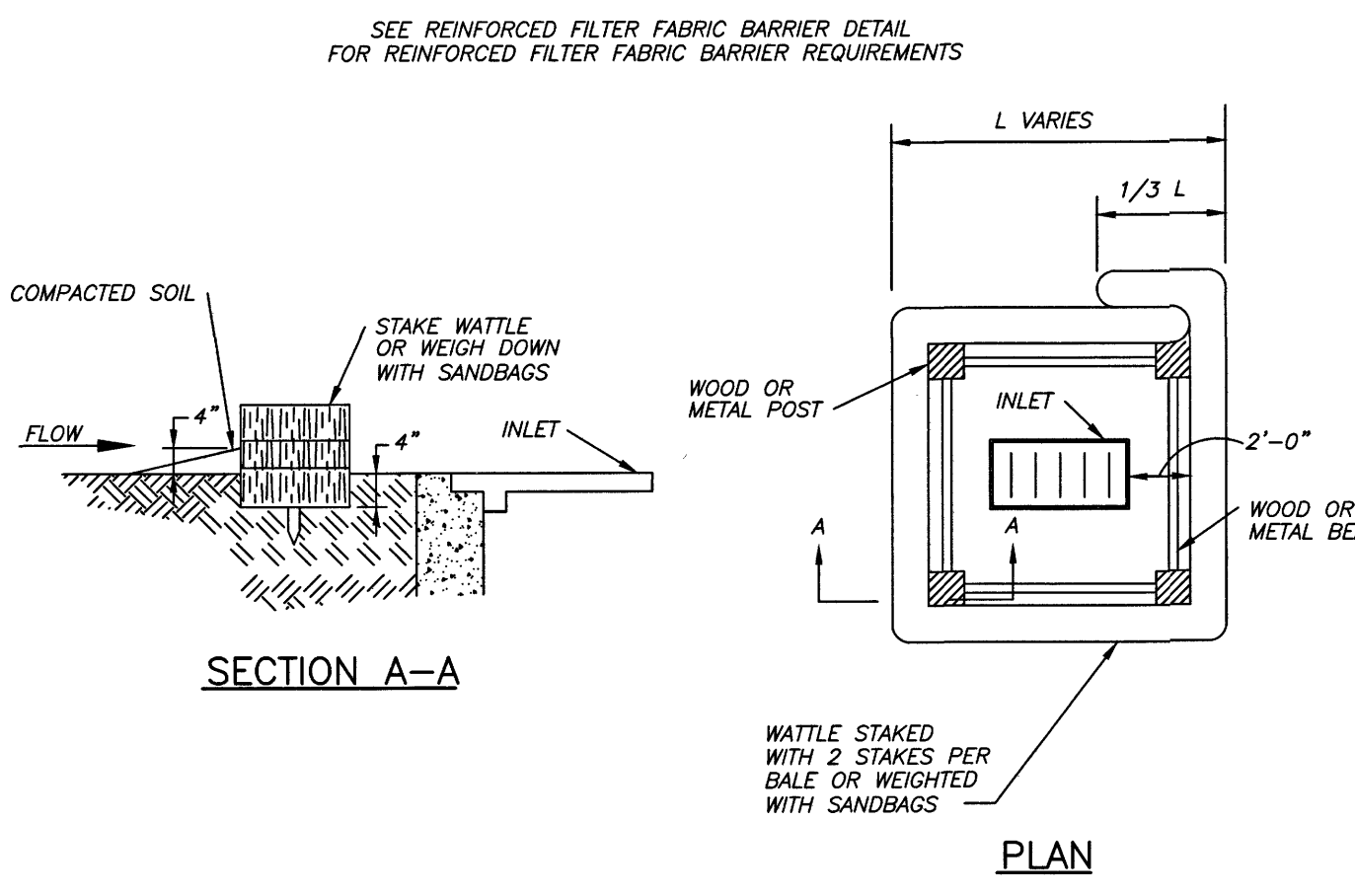
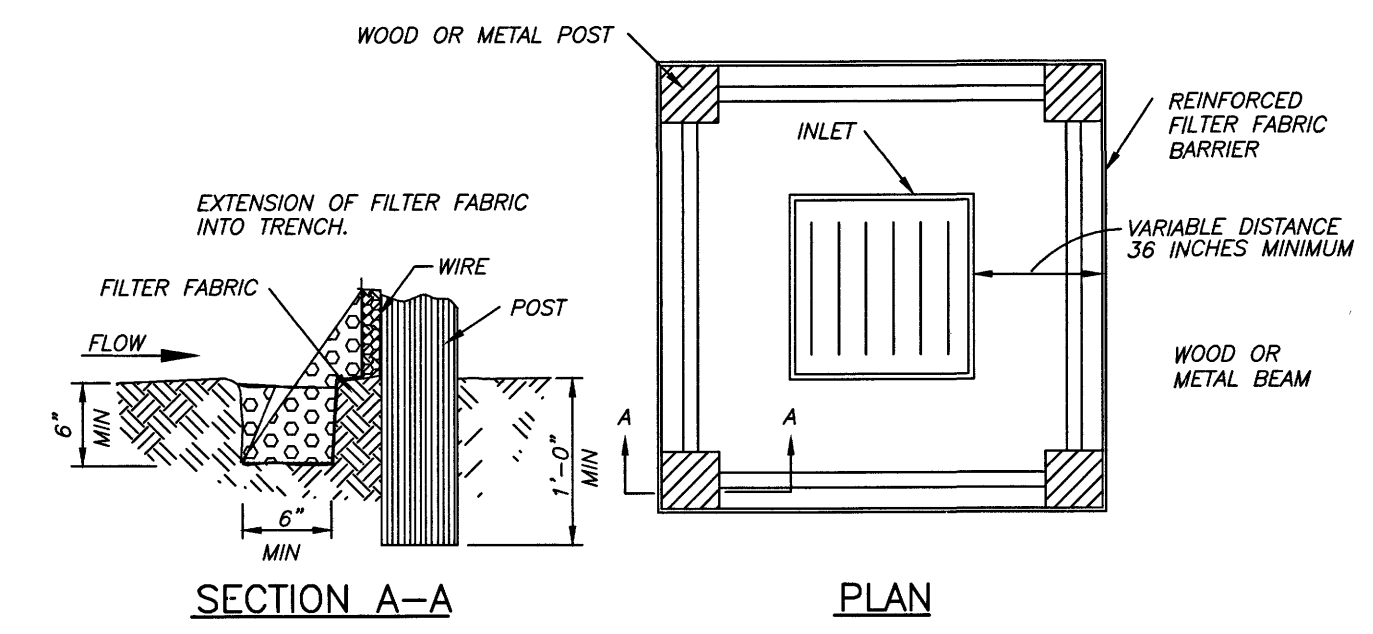
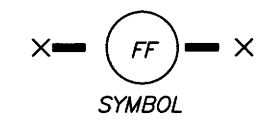


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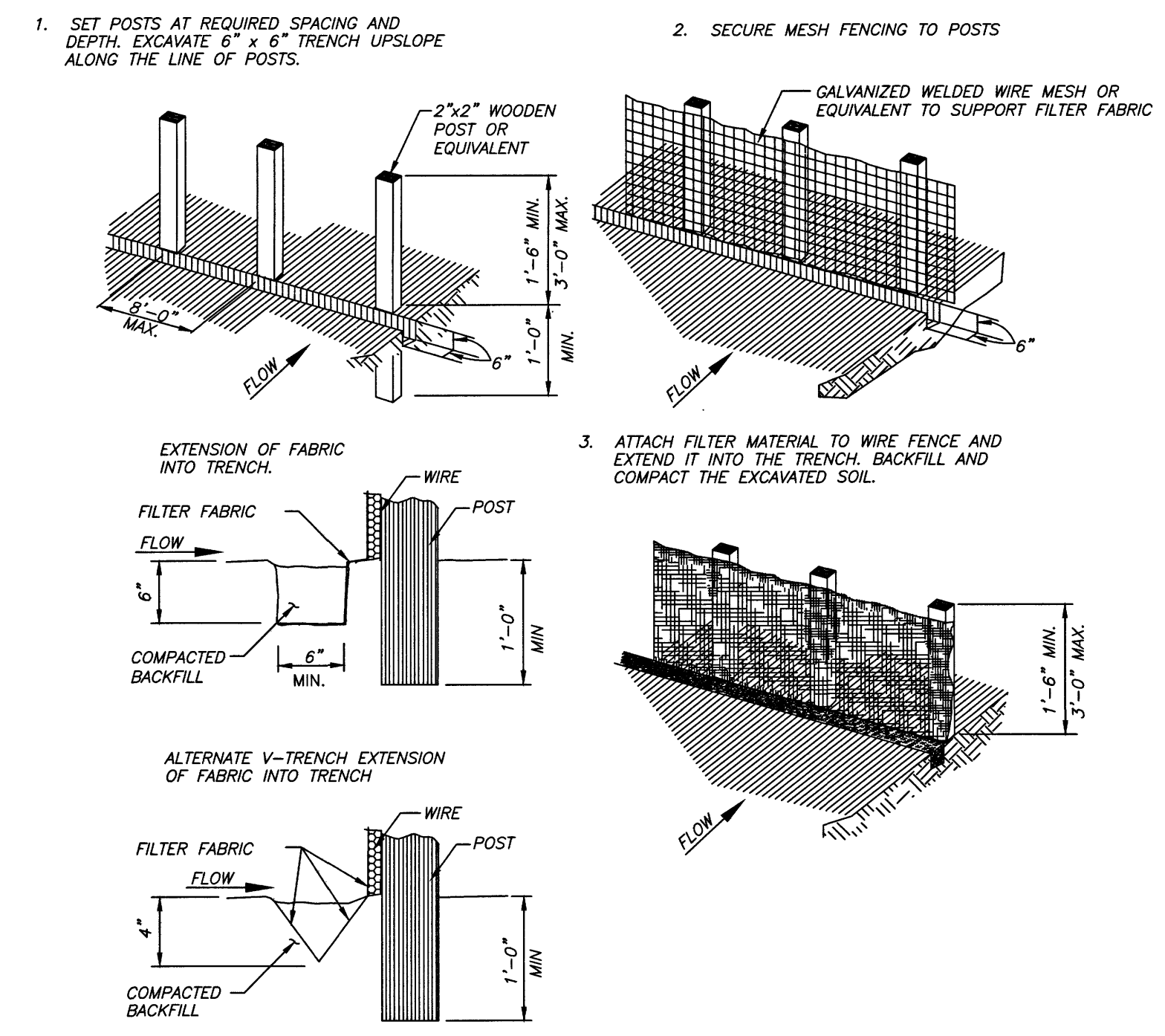
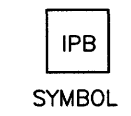
- GENERAL NOTES:
1. SET POSTS AT 4-FOOT MAXIMUM SPACING. IF FACTORY PREASSEMBLED FENCE WITH SUPPORT NETTING IS USED, SPACING OF POST MAY BE INCREASED TO 8 FEET MAXIMUM.
  2. WHEN TWO SECTIONS OF FILTER FABRIC ADJOIN EACH OTHER, OVERLAP 6 INCHES AT THE POST, AND ATTACH TO THE POSTS.
  3. REMOVE SEDIMENT DEPOSITS WHEN SILT DEPTH REACHES ONE-THIRD OF THE HEIGHT OF THE FENCE.

**FILTER FABRIC FENCE**



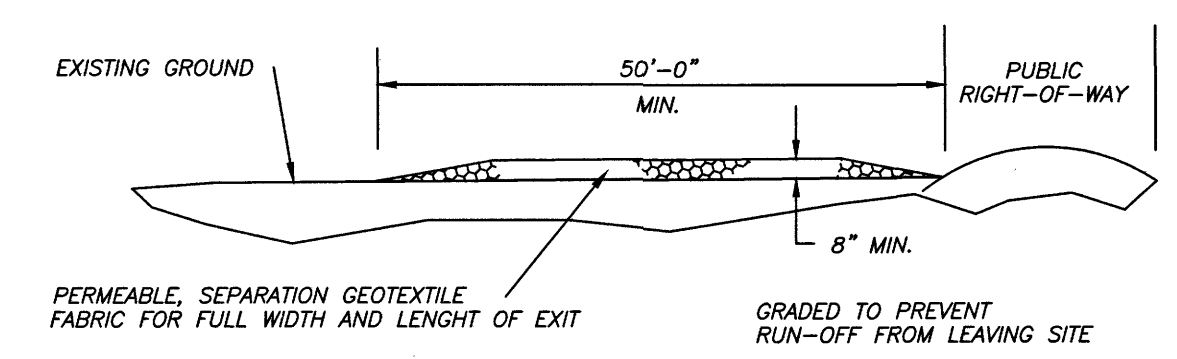
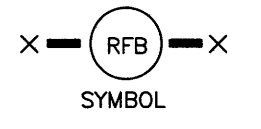
NOTE: TYPICALLY STRAW BALES ARE NOT RECOMMENDED FOR INLET PROTECTION BARRIERS.

**INLET PROTECTION BARRIERS FOR STAGE I INLETS**



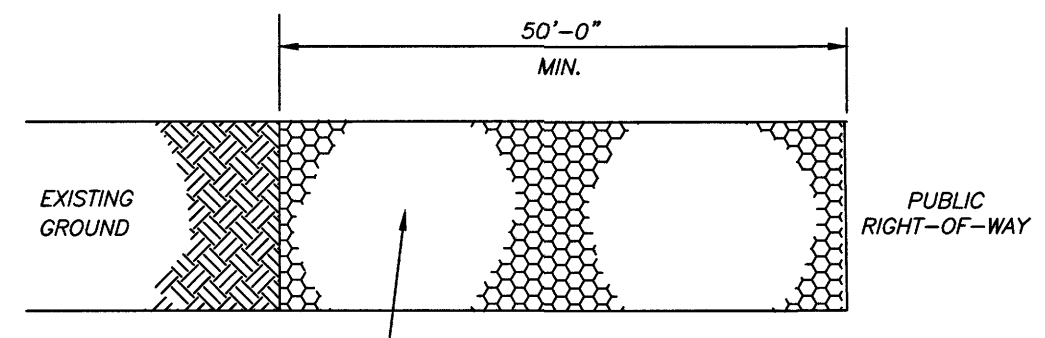
- GENERAL NOTES:
1. SECURELY FASTEN MESH FENCING TO POSTS WITH STAPLES OR TIE WIRES.
  2. SECURELY FASTEN FILTER FABRIC TO MESH FENCING.
  3. WHEN TWO SECTIONS OF FILTER FABRIC ADJOIN EACH OTHER, OVERLAP 6 INCHES AT A POST, FOLD TOGETHER, AND ATTACH TO A POST.
  4. REMOVE SEDIMENT DEPOSITS WHEN SILT REACHES ONE-THIRD OF THE HEIGHT OF THE FENCE IN DEPTH.

**REINFORCED FILTER FABRIC BARRIER**



**PROFILE**

PROVIDE APPROPRIATE TRANSITION BETWEEN STABILIZED CONSTRUCTION ENTRANCE AND PUBLIC RIGHT-OF-WAY

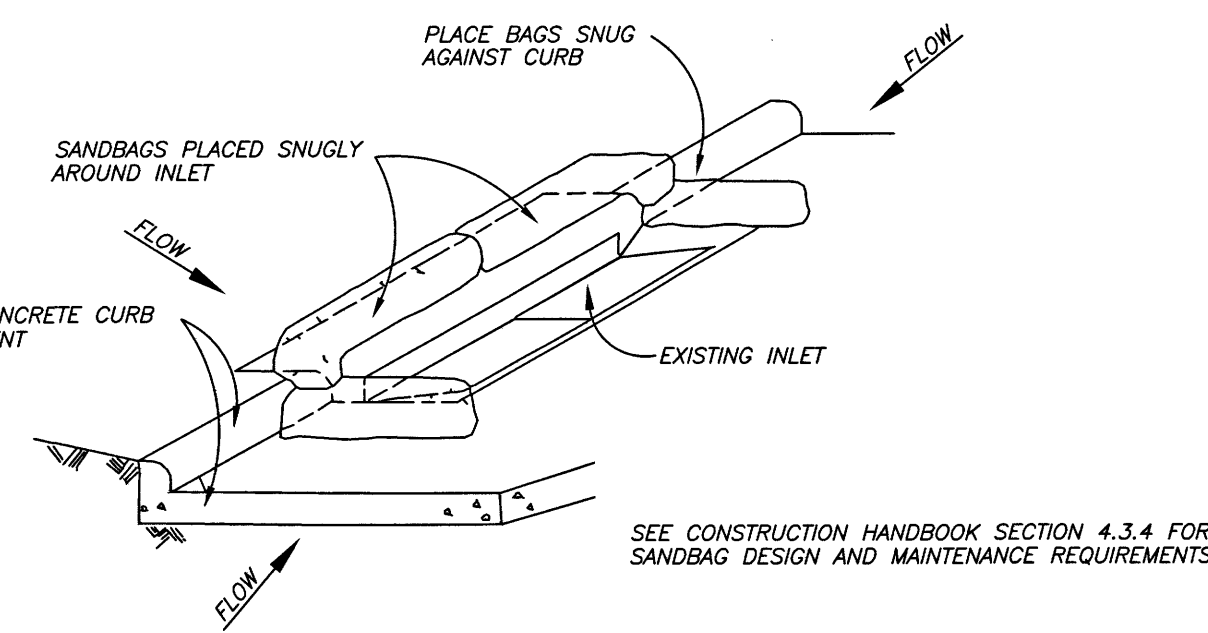
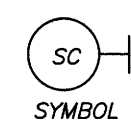


**PLAN VIEW**

- GENERAL NOTES:
1. MINIMUM LENGTH IS AS SHOWN ON CONSTRUCTION DRAWINGS OR 50 FEET, WHICHEVER IS MORE.
  2. CONSTRUCT AND MAINTAIN CONSTRUCTION EXIT WITH CONSTANT WIDTH ACROSS ITS LENGTH, INCLUDING ALL POINTS OF INGRESS OR EGRESS.
  3. UNLESS SHOWN ON THE CONSTRUCTION DRAWING, STABILIZATION FOR OTHER AREAS WILL HAVE THE SAME AGGREGATE THICKNESS AND WIDTH REQUIREMENTS AS THE STABILIZED CONSTRUCTION EXIT.
  4. WHEN SHOWN ON THE CONSTRUCTION DRAWINGS, WIDEN OR LENGTHEN STABILIZED AREA TO ACCOMMODATE A TRUCK WASHING AREA. PROVIDE
  5. OUTLET SEDIMENT TRAP FOR THE TRUCK WASHING AREA.
  6. PROVIDE PERIODIC TOP DRESSING WITH ADDITIONAL COARSE AGGREGATE TO MAINTAIN THE REQUIRED DEPTH OR WHEN SURFACE BECOMES PACKED WITH MUD.
  7. PERIODICALLY TURN AGGREGATE TO EXPOSE A CLEAN DRIVING SURFACE.

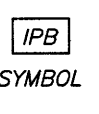
ALTERNATIVE METHODS OF CONSTRUCTION INCLUDE:  
 -CEMENT STABILIZED SOIL: COMPACTED CEMENT STABILIZED SOIL, LIMESTONE AGGREGATE, OR OTHER FILL MATERIAL IN AN APPLICATION OF THICKNESS OF 8 INCHES.  
 -WOOD MATS: OAK OR OTHER HARDWOOD TIMBERS PLACED EDGE TO EDGE AND ACROSS SUPPORT WOODEN BEAMS WHICH ARE PLACED ON TOP OF EXISTING SOIL IN AN APPLICATION THICKNESS OF 6 INCHES.  
 -STEEL MATS: PERFORATED MATS PLACED ACROSS PERPENDICULAR SUPPORT MEMBERS.

**STABILIZED CONSTRUCTION ACCESS**



- GENERAL NOTES:
1. BAGS OR WATTLES CAN BE USED FOR THIS APPLICATION.
  2. PROVIDE WOVEN OR UNWOVEN GEOTEXTILE FILTER FABRIC FOR BAGS.
  3. PROVIDE COARSE SAND AND AGGREGATE MIX FOR FILL MATERIAL FOR BAGS. USE ONLY PARTICLES CONSISTING OF CLEAN, HARD, DURABLE MATERIALS FREE FROM ADHERENT COATINGS, SALT, ALKALI, DIRT, CLAY, LOAM, SHALE, SOFT OR FLAKY MATERIALS, OR ORGANIC AND INJURIOUS MATTER.
  4. REMOVE SEDIMENT DEPOSIT WHEN THE SEDIMENT HAS ACCUMULATED TO ONE-THIRD THE HEIGHT OF THE BARRIER.

**INLET PROTECTION BARRIERS FOR STAGE II INLETS**



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**HRGreen** FIRM NO. F-11278  
 11011 RICHMOND AVENUE, SUITE 200 HOUSTON, TX 77042  
 PH: 713.965.9996 FAX: 713.965.0044

**North Harris County REGIONAL WATER Authority**

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 WWW.AECOM.COM TBE REG. NO. F-3580 713.780.4100

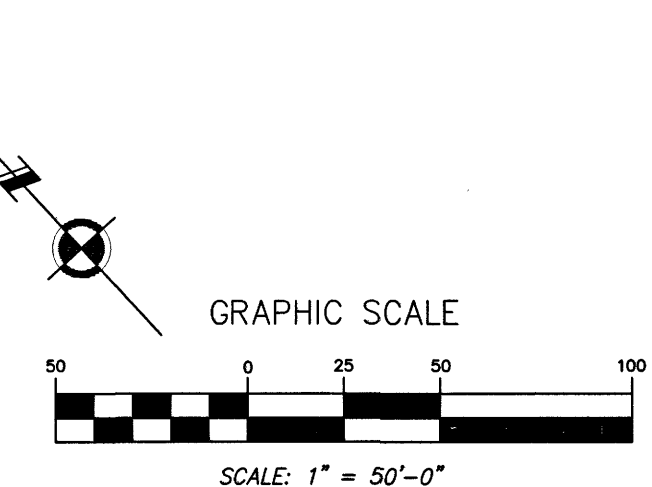
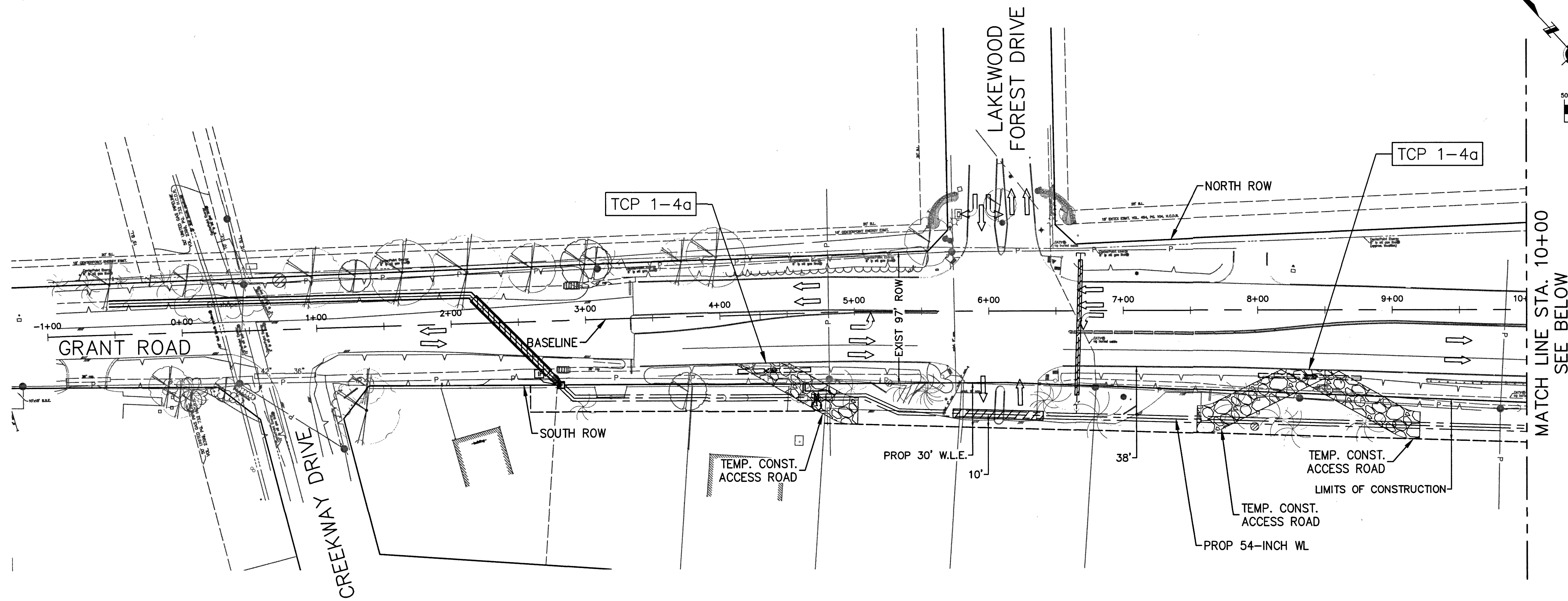
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**STORM WATER POLLUTION PREVENTION PLAN DETAILS**

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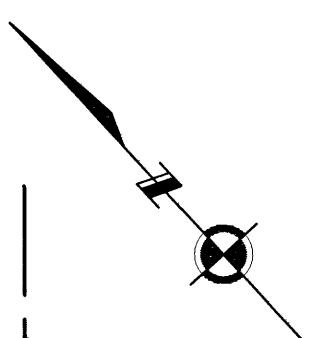
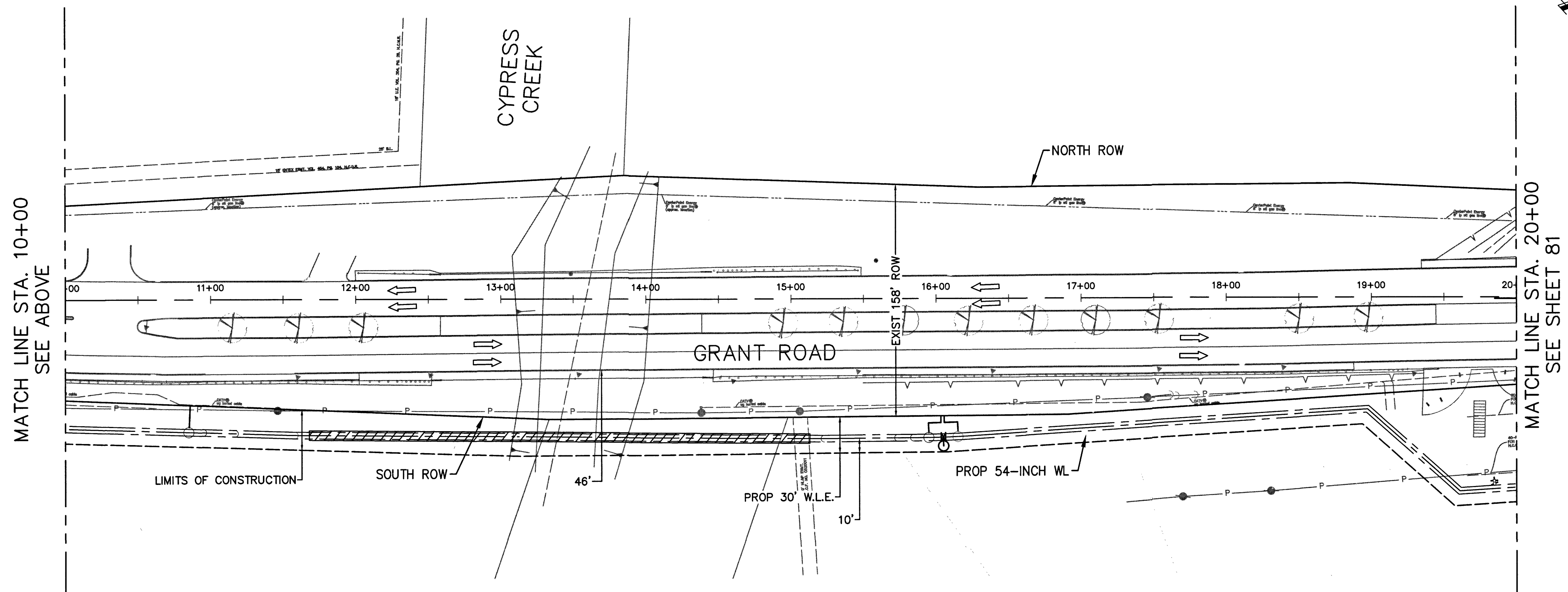
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- LEGEND**
- TEMPORARY ACCESS ROAD
  - TRAFFIC LANE
  - TRENCHLESS WATER LINE
- TCP X-XX** TYPICAL DETAIL TO BE USED FOR TRAFFIC CONTROL IN AREA
- NOTE: SEE SHEETS 85 - ## FOR TYPICAL TRAFFIC CONTROL DETAILS

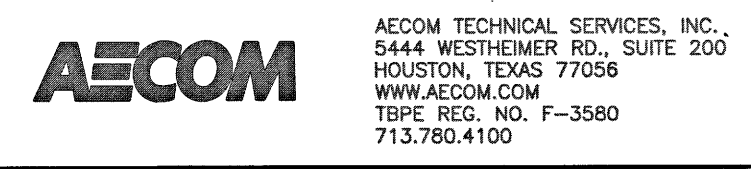
MATCH LINE STA. 10+00  
SEE BELOW



MATCH LINE STA. 10+00  
SEE ABOVE

MATCH LINE STA. 20+00  
SEE SHEET 81

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NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

GRANT ROAD STA. 0+00 TO STA. 20+00



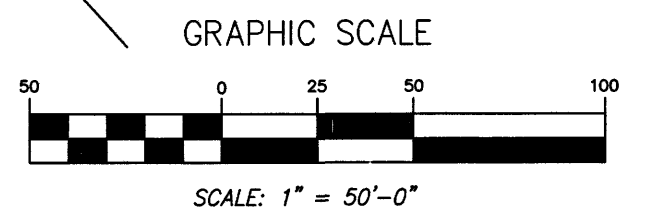
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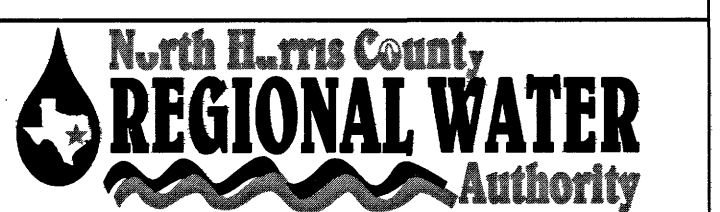
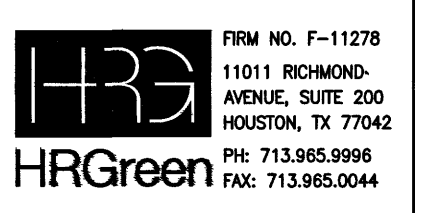
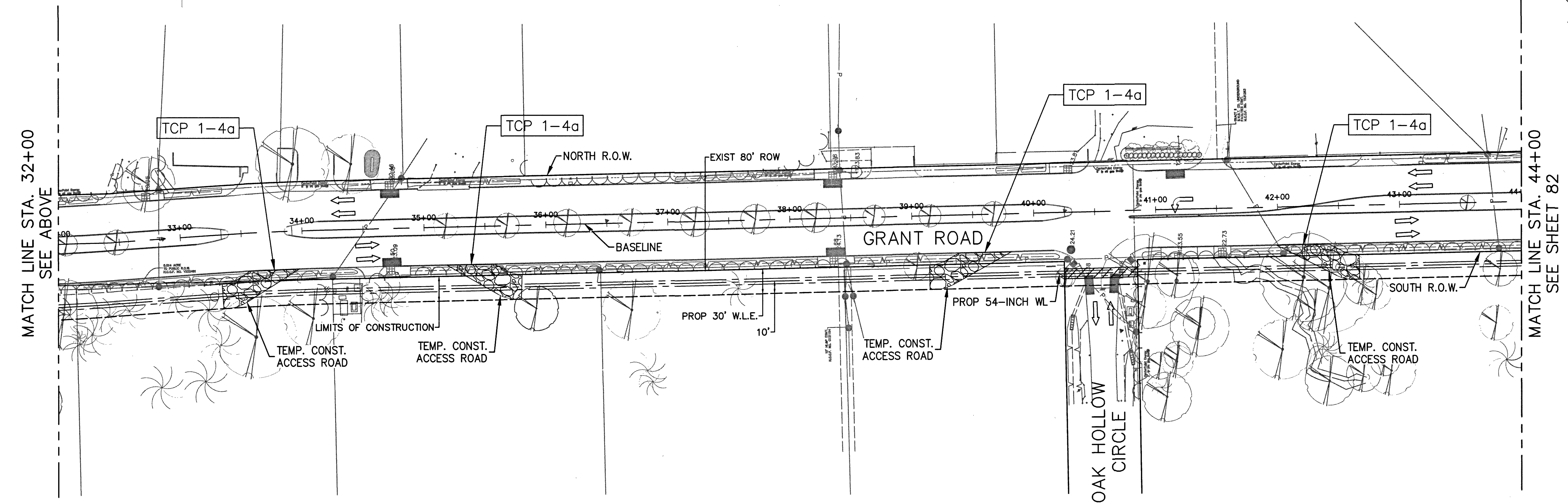
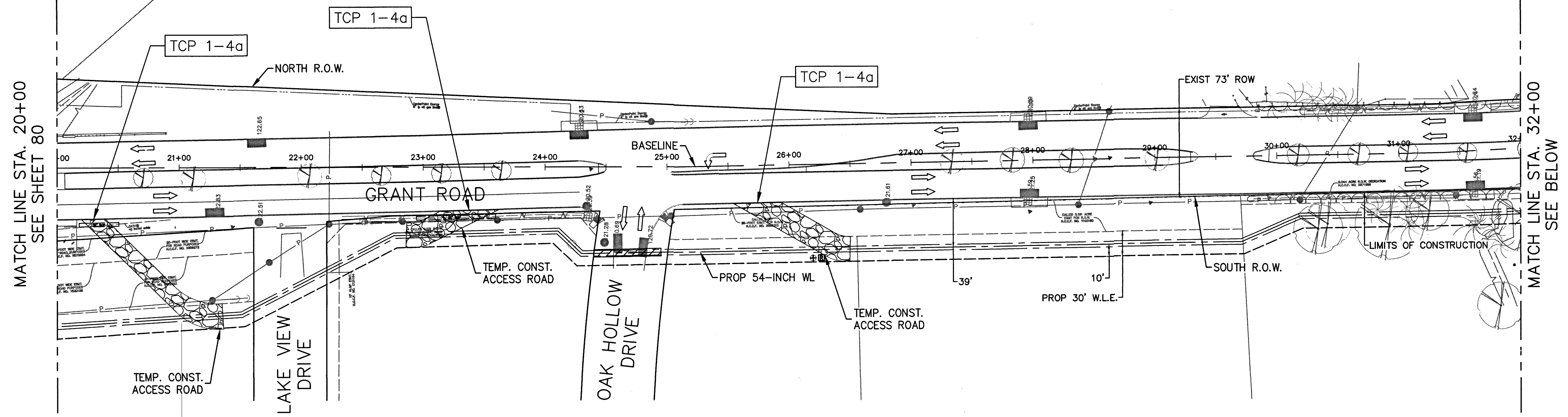
SHEET No: 80 OF 99



No.	Date	Revisions	App.



- LEGEND**
- TEMPORARY ACCESS ROAD
  - TRAFFIC LANE
  - TRENCHLESS WATER LINE
- TCP X-XX** TYPICAL DETAIL TO BE USED FOR TRAFFIC CONTROL IN AREA
- NOTE: SEE SHEETS 85 - ## FOR TYPICAL TRAFFIC CONTROL DETAILS



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PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD  
GRANT ROAD STA. 20+00 TO STA. 44+00




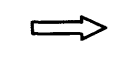
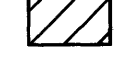
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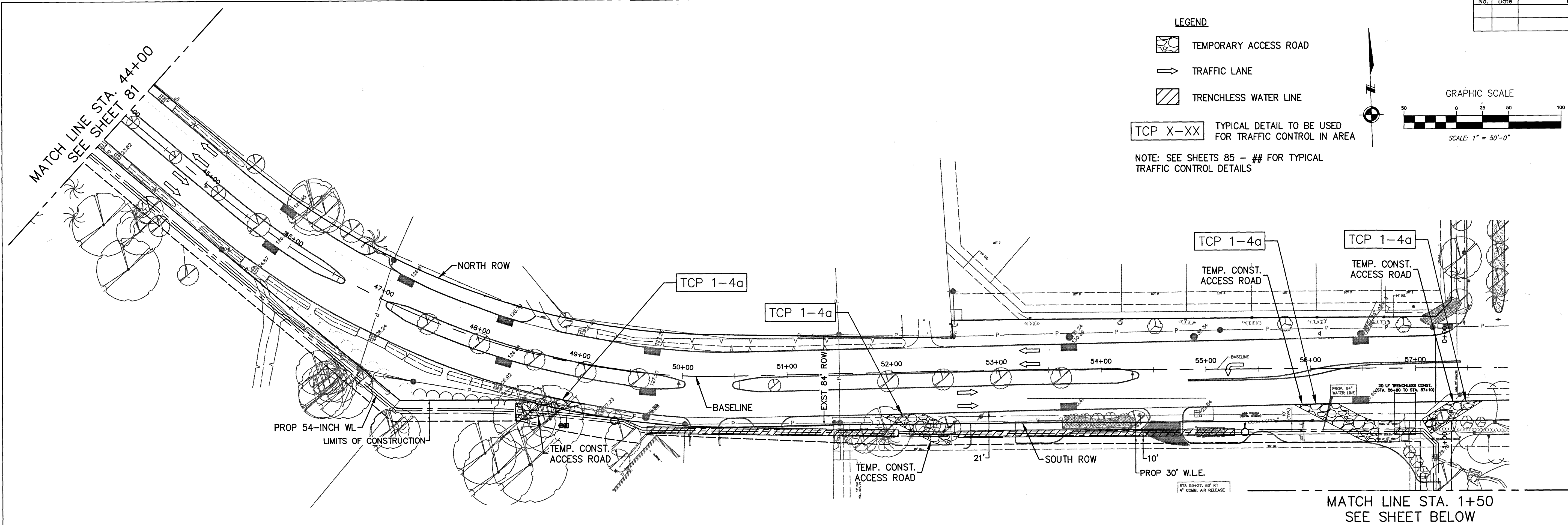
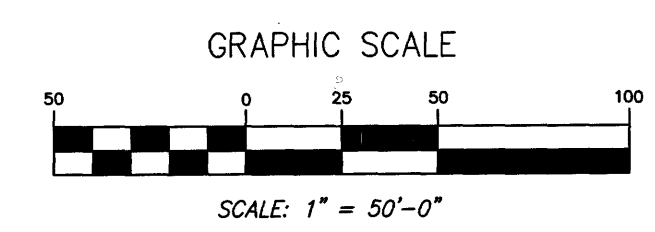
No.	Date	Revisions	App.

**LEGEND**

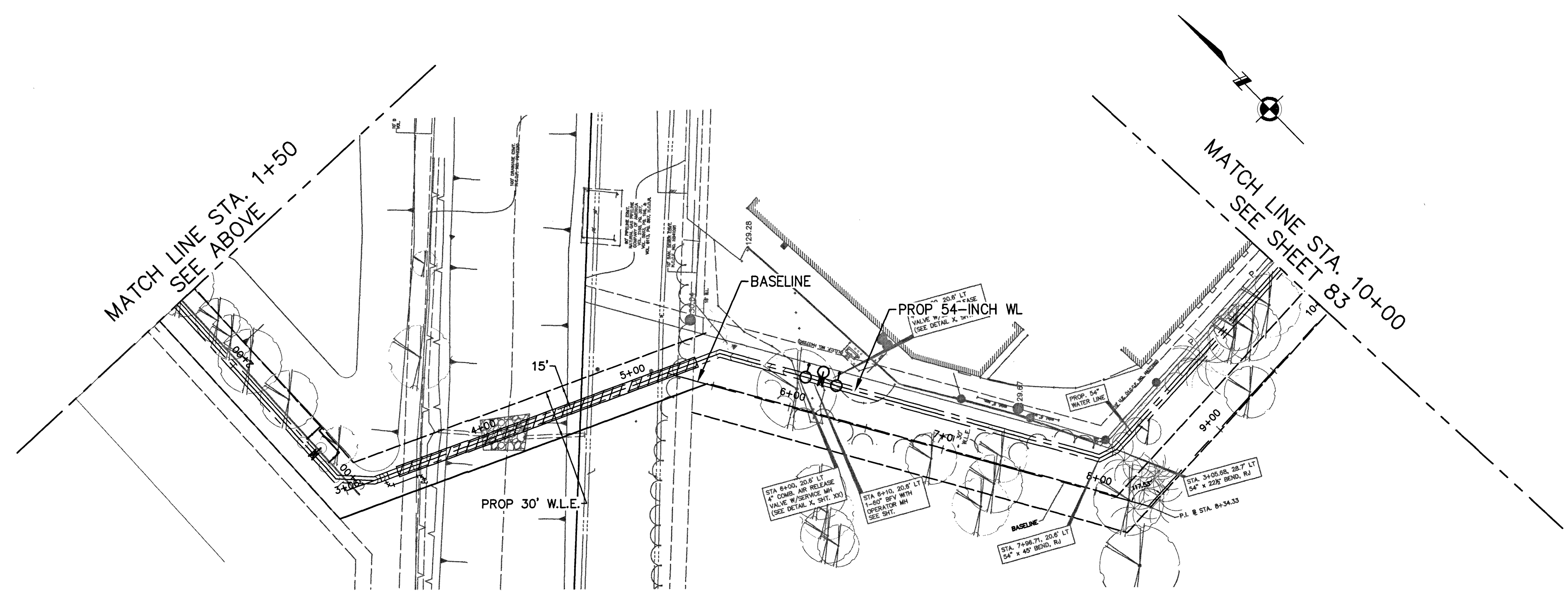
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-  TRAFFIC LANE
-  TRENCHLESS WATER LINE

TCP X-XX TYPICAL DETAIL TO BE USED FOR TRAFFIC CONTROL IN AREA

NOTE: SEE SHEETS 85 - ## FOR TYPICAL TRAFFIC CONTROL DETAILS



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 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

GRANT ROAD STA. 44+00 TO STA. 58+00

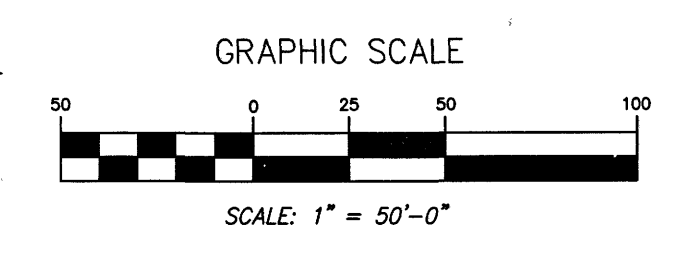
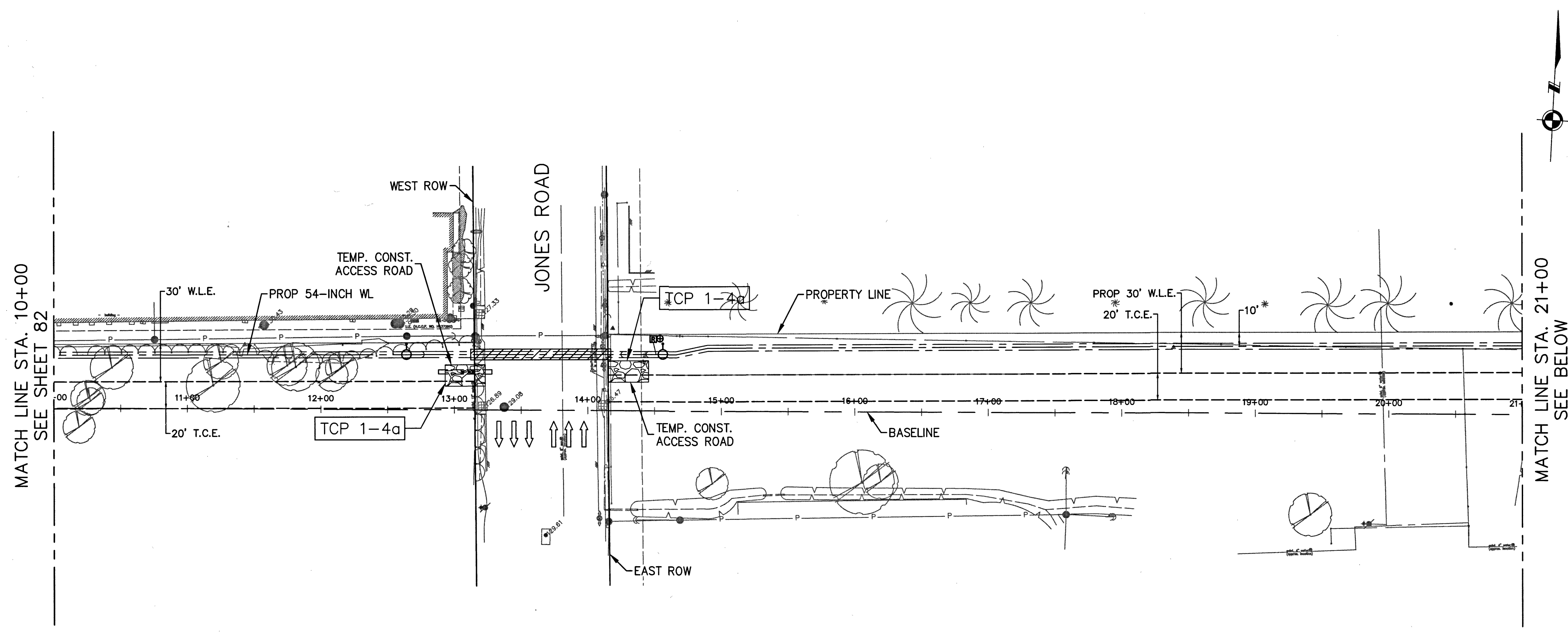


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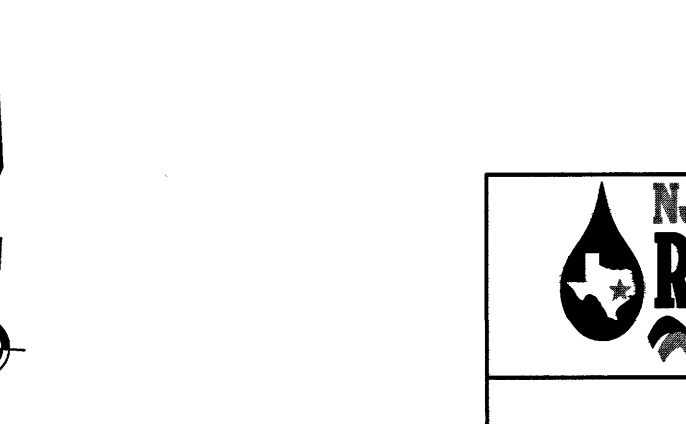
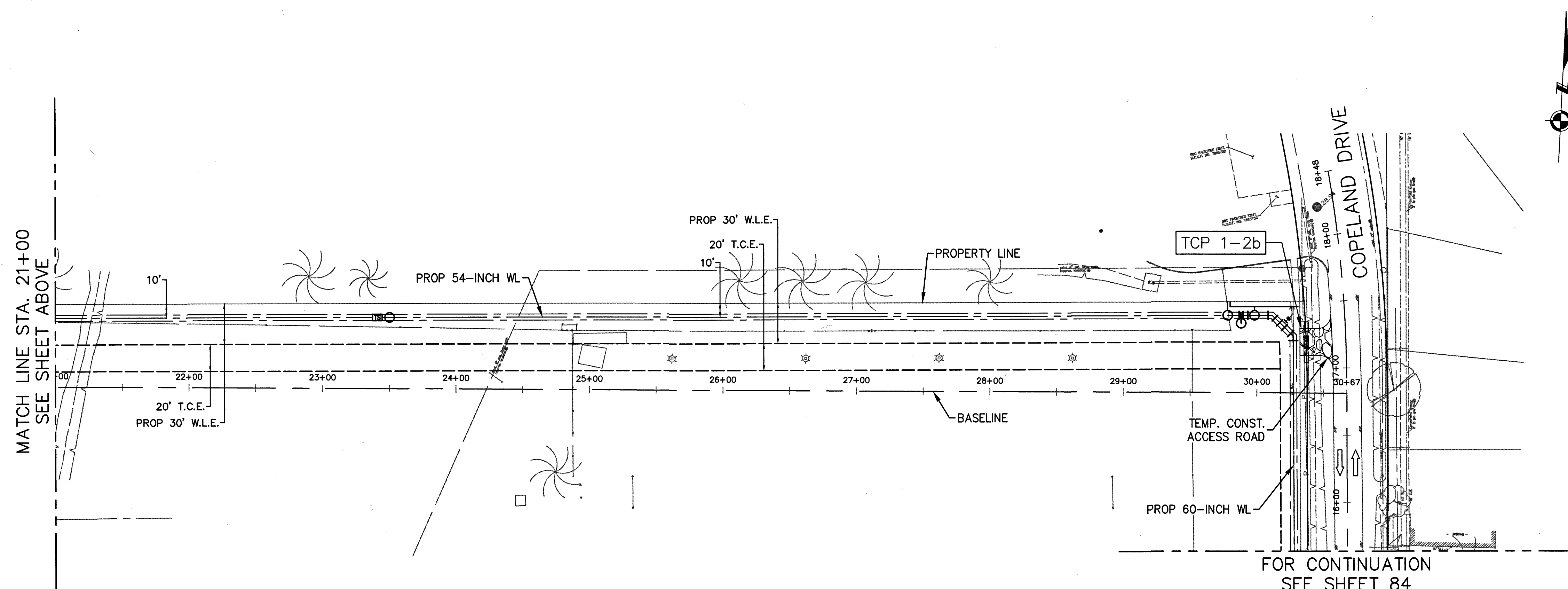
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No.	Date	Revisions	App.



- LEGEND**
- TEMPORARY ACCESS ROAD
  - TRAFFIC LANE
  - TRENCHLESS WATER LINE
- TCP X-XX** TYPICAL DETAIL TO BE USED FOR TRAFFIC CONTROL IN AREA
- NOTE: SEE SHEETS 85 - ## FOR TYPICAL TRAFFIC CONTROL DETAILS



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 TEL: 713.965.9996  
 FAX: 713.965.0044

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NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

JONES ROAD TO COPELAND ROAD

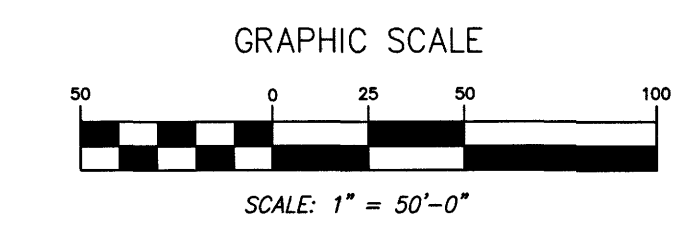
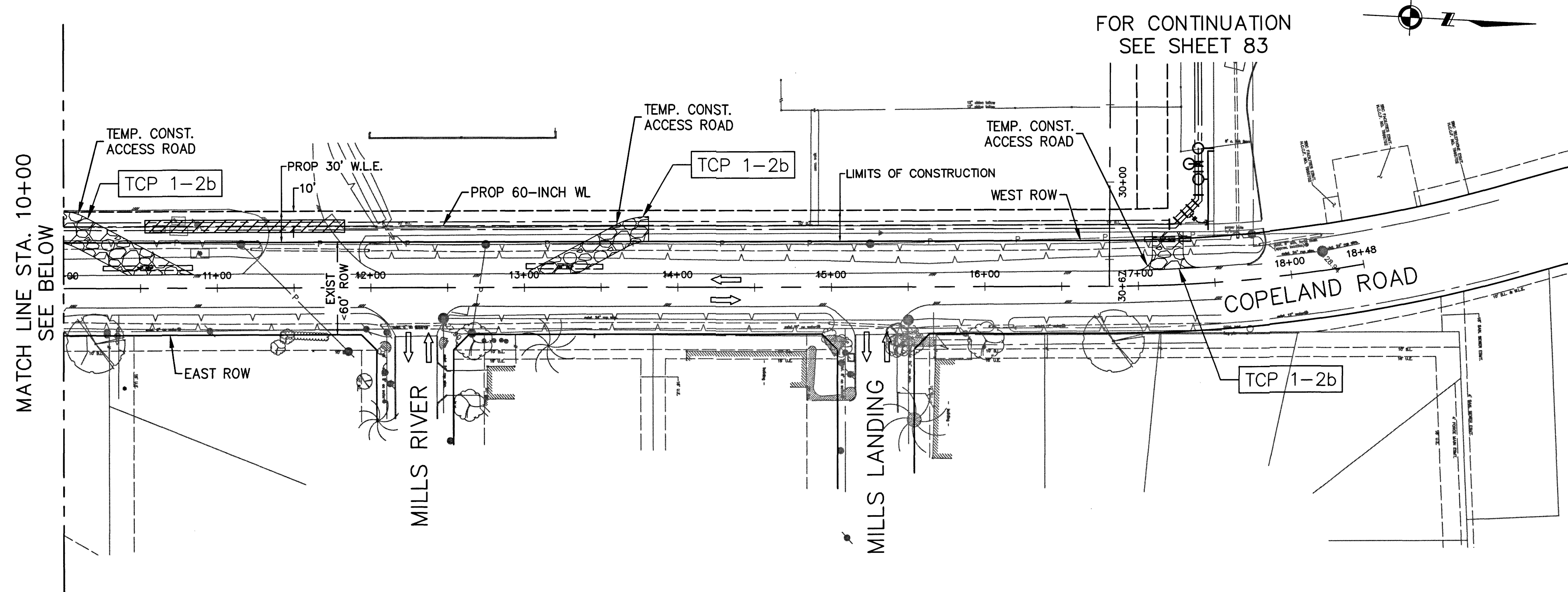
STATE OF TEXAS  
 REGISTERED PROFESSIONAL ENGINEER  
 STEPHEN A. SPARKS  
 66994  
 12/14/19




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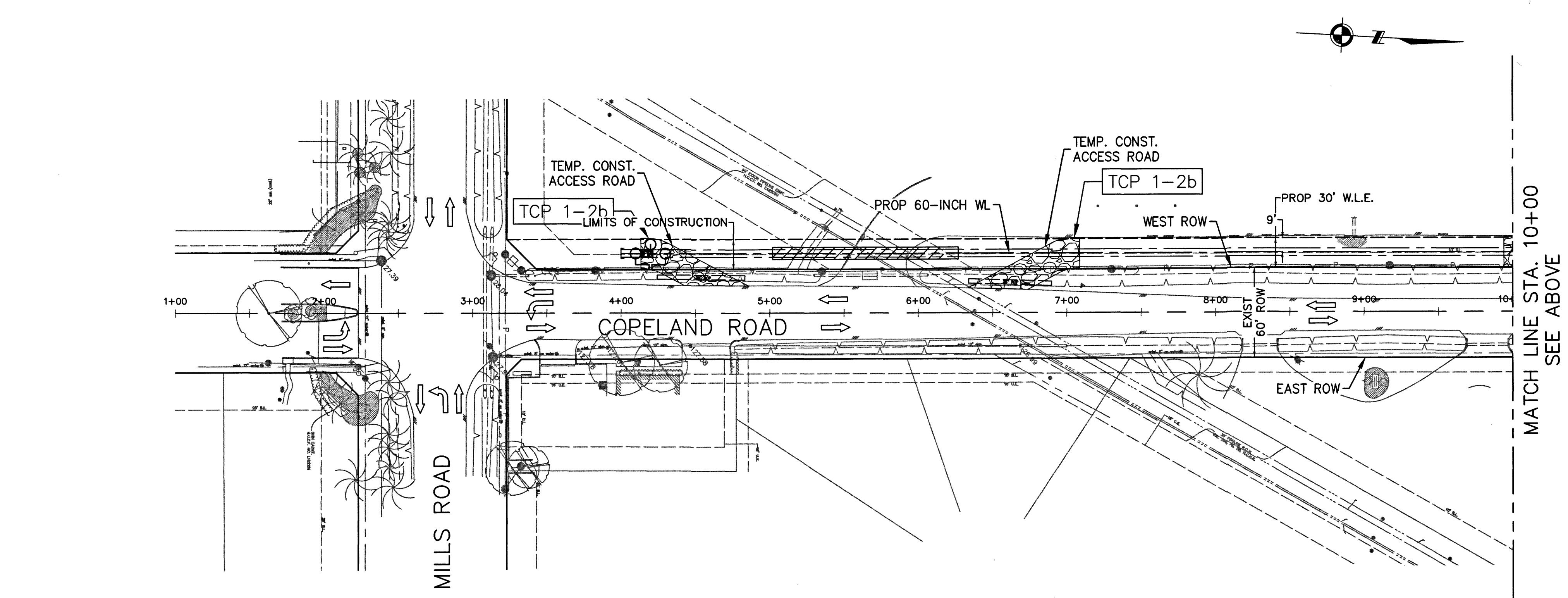
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- LEGEND**
-  TEMPORARY ACCESS ROAD
  -  TRAFFIC LANE
  -  TRENCHLESS WATER LINE
- TCP X-XX** TYPICAL DETAIL TO BE USED FOR TRAFFIC CONTROL IN AREA
- NOTE: SEE SHEETS 85 - ## FOR TYPICAL TRAFFIC CONTROL DETAILS




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HOUSTON, TX 77042  
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NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 34" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

COPELAND ROAD STA.  
0+00 TO STA 18+00



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SHEET No: 84 of 99

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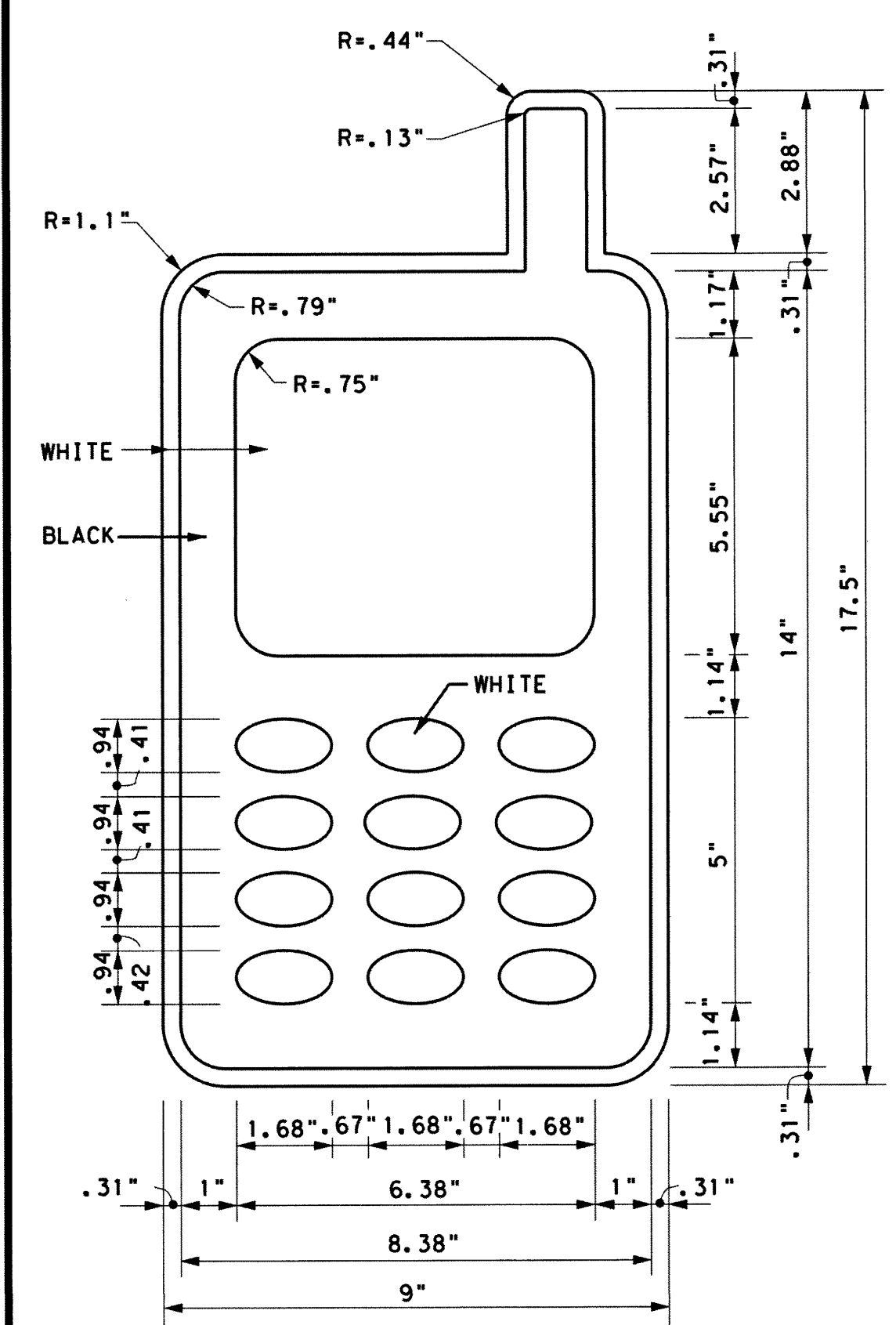
No.	Date	Revisions	App.

**BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:**

- The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
- The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.
- The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.
- Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.
- When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.
- The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.
- All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.
- The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.
- As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.
- Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.
- The Engineer has the final decision on the location of all traffic control devices.
- Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

**WORKER SAFETY APPAREL NOTES:**

- Workers on foot who are exposed to traffic or to construction equipment within the right-of-way shall wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel," or equivalent revisions, and labeled as ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. Class 3 garments should be considered for high traffic volume work areas or night time work.



**SIGN DETAIL (G20-10T)**



3.0" Radius, 1.25" Border, 0.75" Indent, Black on Yellow; [STAY ALERT] Font: D  
 3.0" Radius, 1.25" Border, 0.75" Indent, Black on Orange; [TALK OR TEXT LATER] Font: C specified length;

Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found on-line at the web address given below or by contacting:  
  
 Texas Department of Transportation  
 Traffic Operations Division - TE  
 Phone (512) 416-3118

THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT <a href="http://www.txdot.gov">http://www.txdot.gov</a>
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)
TRAFFIC ENGINEERING STANDARD SHEETS

SHEET 1 OF 12

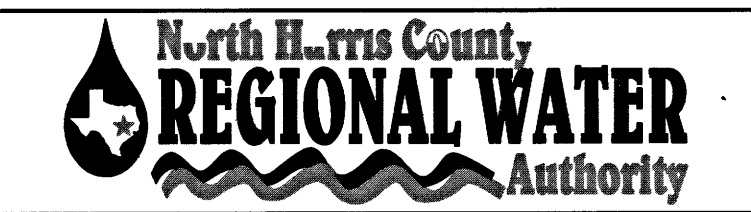
**Texas Department of Transportation**

**BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS**

**BC (1) - 14**

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				
4-03	5-10	8-14		
9-07	7-13			
DIST	COUNTY	SHEET NO.		

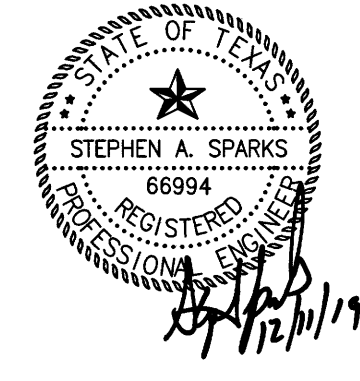
Traffic Operations Division Standard



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NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

BC (1) BARRICADE AND CONSTRUCTION GEN. NOTES AND REQUIREMENTS



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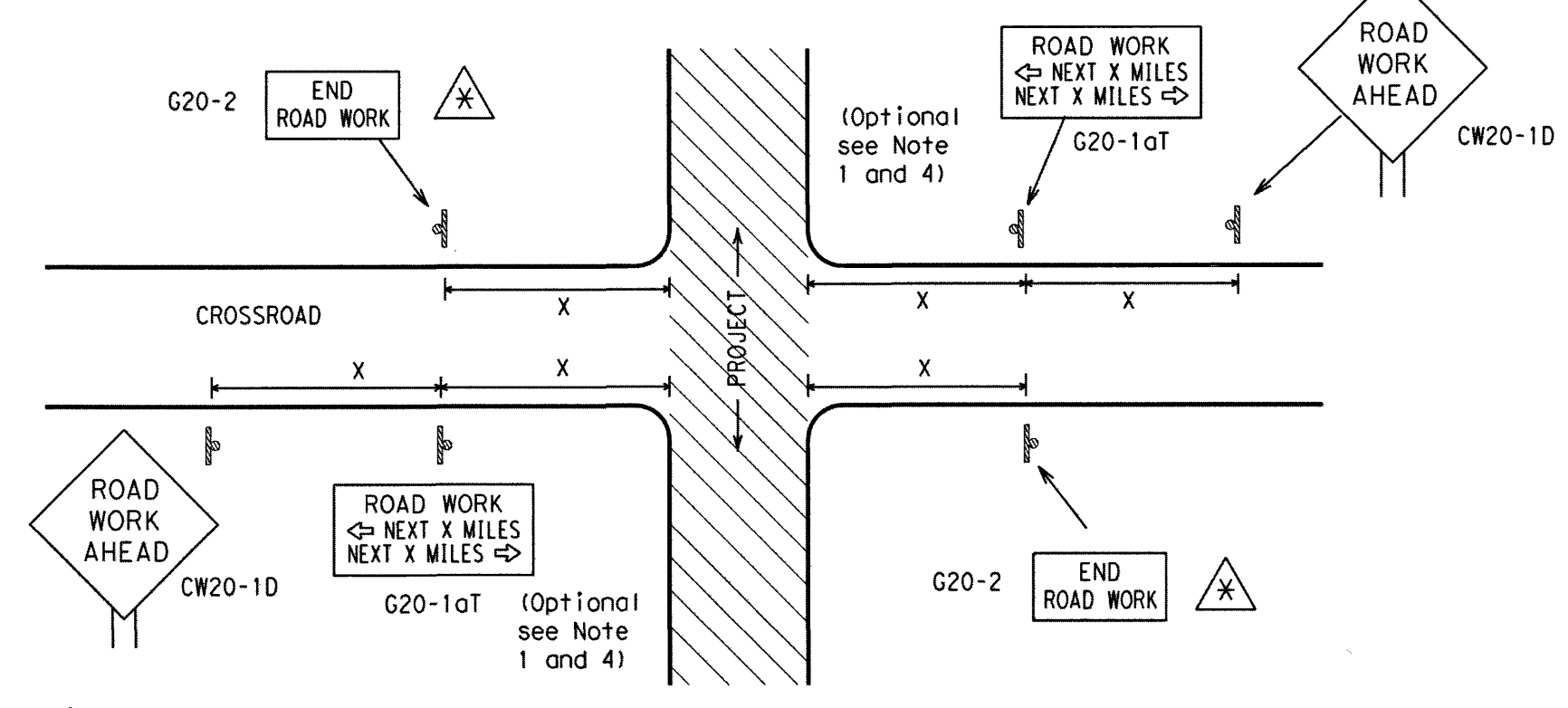
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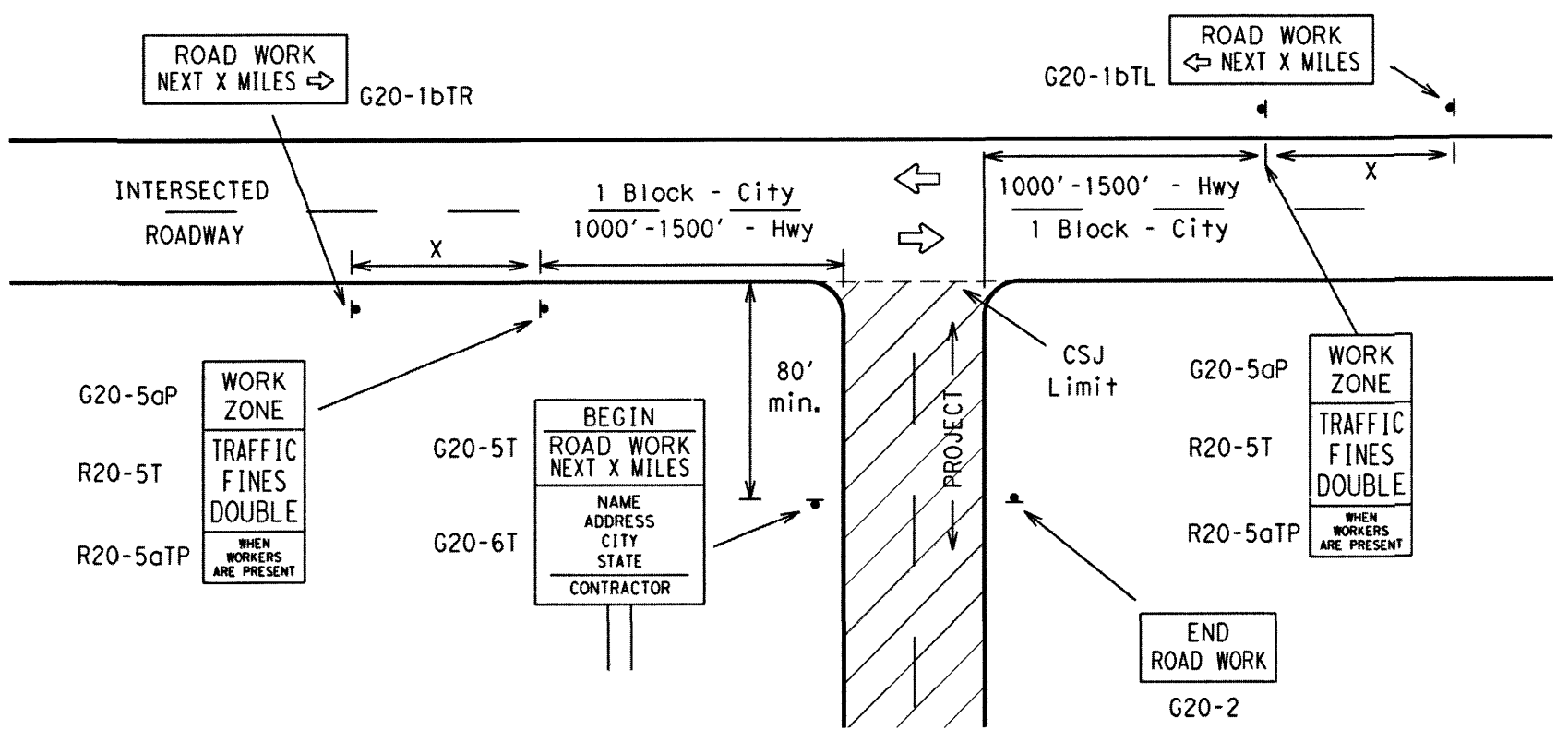
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**TYPICAL LOCATION OF CROSSROAD SIGNS**



- May be mounted on back of "ROAD WORK AHEAD" (CW20-1D) sign with approval of Engineer. (See note 2 below)
- The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D) sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
  - The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK" (G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume. This information shall be shown in the plans.
  - Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
  - The "ROAD WORK NEXT X MILES" (G20-1aT) sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
  - Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
  - When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.

**T-INTERSECTION**



**CSJ LIMITS AT T-INTERSECTION**

- The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at or near an intersection.
- If construction closes the road at a T-intersection the Contractor shall place the "CONTRACTOR NAME" (G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow (G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR) signs shall be replaced by the detour signing called for in the plans.

**TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING<sup>1,5,6</sup>**

Sign Number or Series	SIZE		SPACING	
	Conventional Road	Expressway/Freeway	Posted Speed MPH	Sign Spacing "X" Feet (Approx.)
CW20 <sup>4</sup>	48" x 48"	48" x 48"	30	120
CW21			35	160
CW23			40	240
CW25			45	320
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"	50	400
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"	55	500 <sup>2</sup>
			60	600 <sup>2</sup>
			65	700 <sup>2</sup>
			70	800 <sup>2</sup>
			75	900 <sup>2</sup>
			80	1000 <sup>2</sup>
			*	*

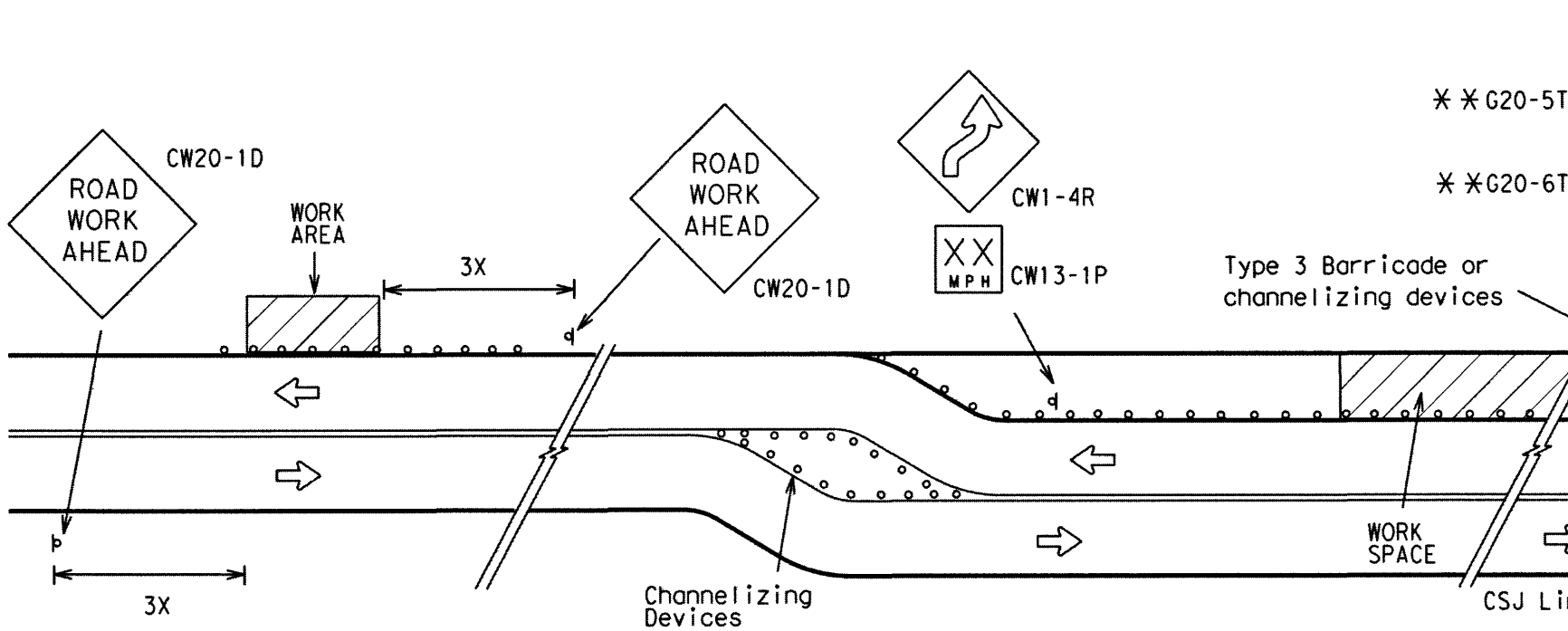
\* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

Δ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

**GENERAL NOTES**

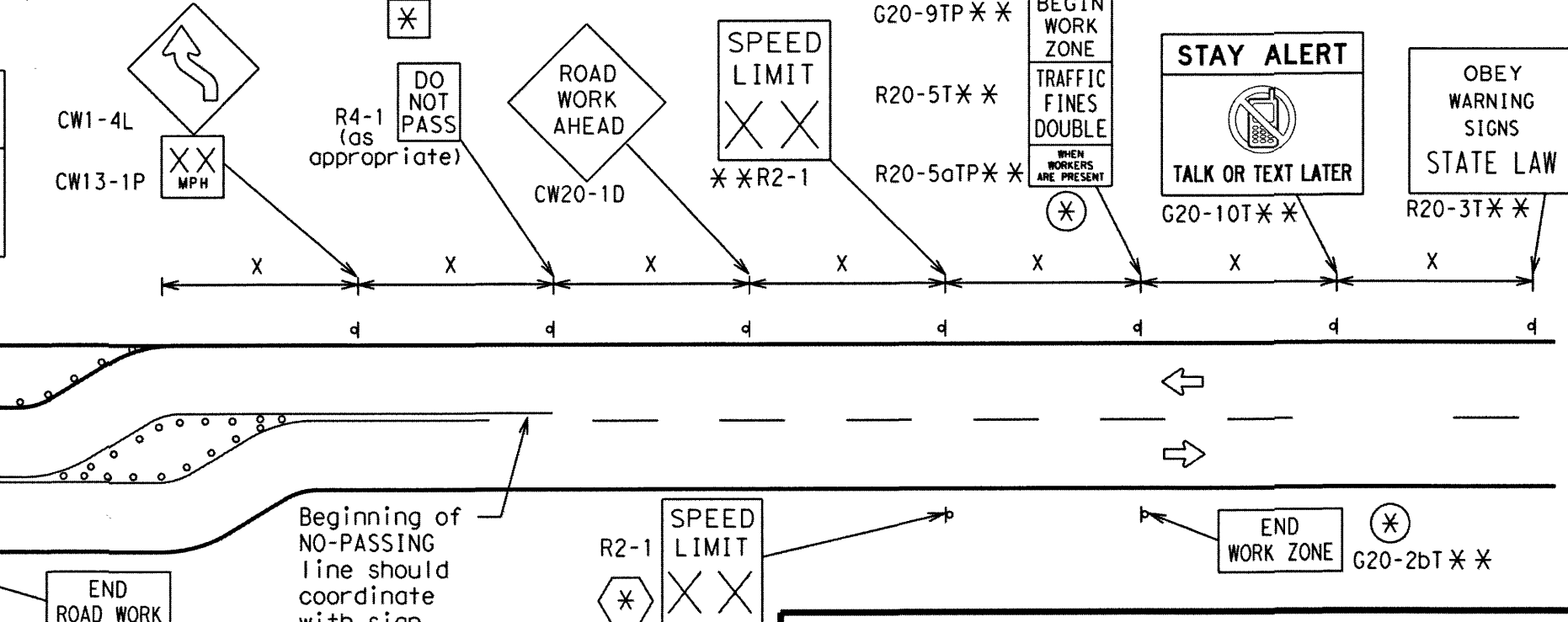
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be used on low volume crossroads at the discretion of the Engineer. See Note 2 under "Typical Location of Crossroad Signs".
- Only diamond shaped warning sign sizes are indicated.
- See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

**WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS**



When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing of signs and channelizing devices.

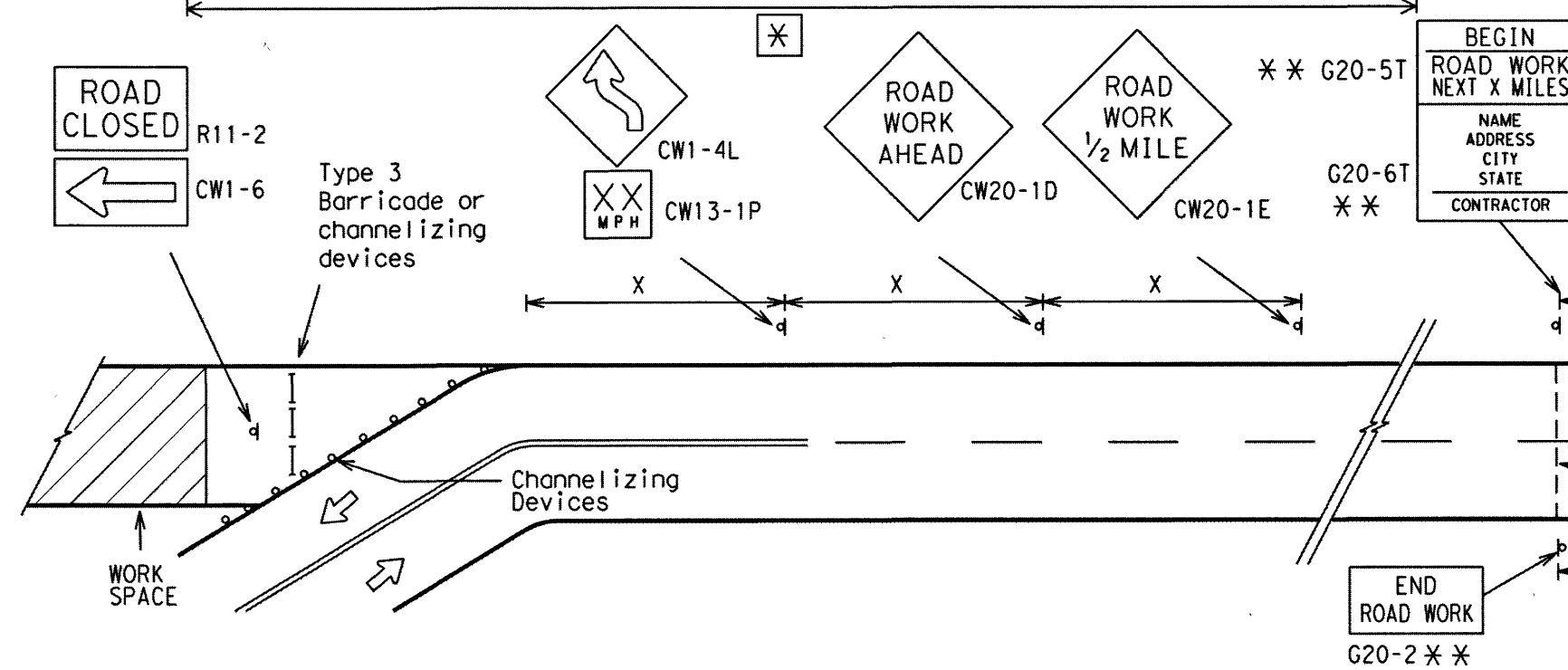
**SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS**



**NOTES**

- The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-5T) sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.
- \* The "BEGIN WORK ZONE" (G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.
- \*\* Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.
- \* Area for placement of "ROAD WORK AHEAD" (CW20-1D) sign and other signs or devices as called for on the Traffic Control Plan.
- \* Contractor will install a regulatory speed limit sign at the end of the work zone.

**SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF THE CSJ LIMITS**



**LEGEND**

—	Type 3 Barricade
○ ○ ○	Channelizing Devices
—	Sign
X	See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.

SHEET 2 OF 12

**BARRICADE AND CONSTRUCTION PROJECT LIMIT**

**BC (2) - 14**

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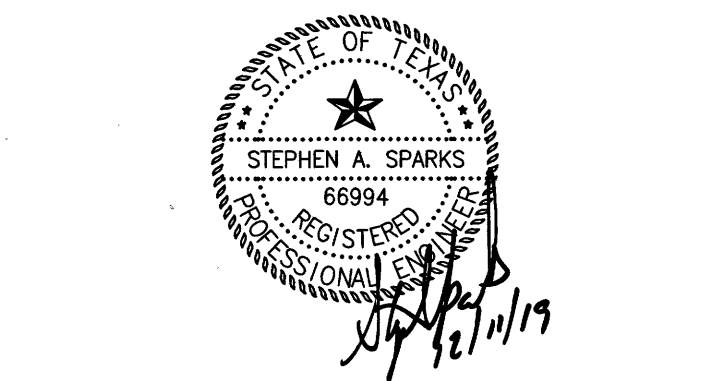
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NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

**BC (2) BARRICADE AND CONSTRUCTION PROJECT LIMIT**



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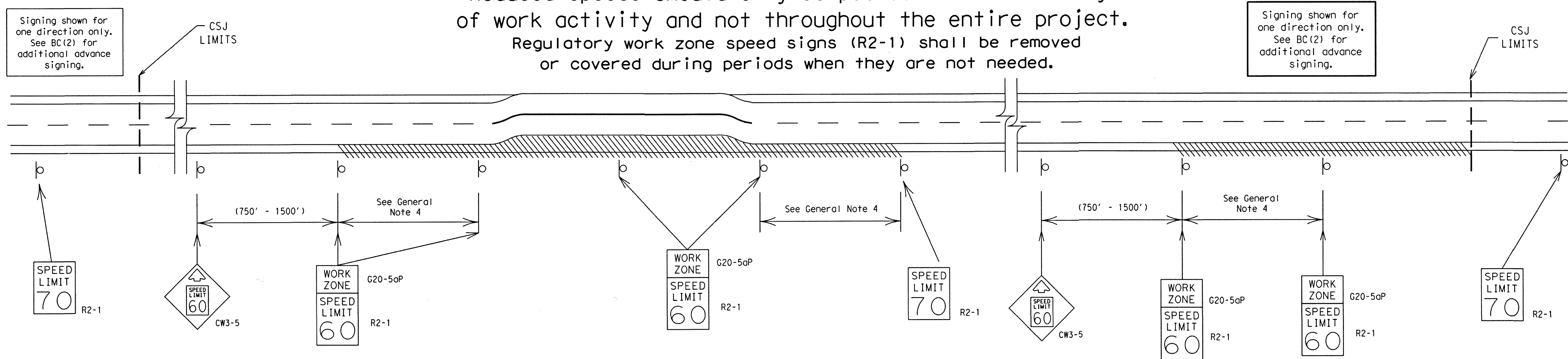


No.	Date	Revisions	App.

## TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within Incorporated City Limits.

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project. Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



### GUIDANCE FOR USE:

#### LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic control plans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

Long/Intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:

- rough road or damaged pavement surface
- substantial alteration of roadway geometrics (diversions)
- construction detours
- grade
- width
- other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

#### SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit may be included on the design of the traffic control plans when workers or equipment are not behind concrete barrier, when work activity is within 10 feet of the traveled way or actually in the travelled way.

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered. (See Removing or Covering on BC(4)).

#### GENERAL NOTES

- Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
- Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- Frequency of work zone speed limit signs should be:
  - 40 mph and greater 0.2 to 2 miles
  - 35 mph and less 0.2 to 1 mile
- Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
- Fabrication, erection and maintenance of the "ADVANCE SPEED LIMIT" (CW3-5) sign, "WORK ZONE" (G20-5aP) plaque and the "SPEED LIMIT" (R2-1) signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
- Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
- Techniques that may help reduce traffic speeds include but are not limited to:
  - Law enforcement.
  - Flagger stationed next to sign.
  - Portable changeable message sign (PCMS).
  - Low-power (drone) radar transmitter.
  - Speed monitor trailers or signs.
- Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
- For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.

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SHEET 3 OF 12

**Texas Department of Transportation**

**BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT**

**BC (3) - 14**

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NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

BC (3) BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT



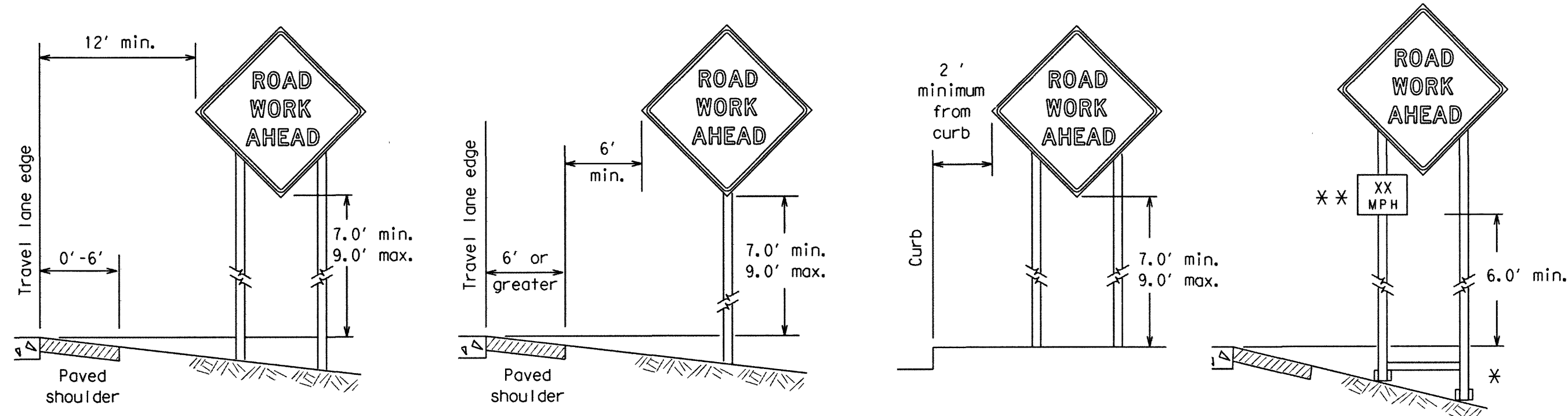
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SHEET No: 87 OF 99



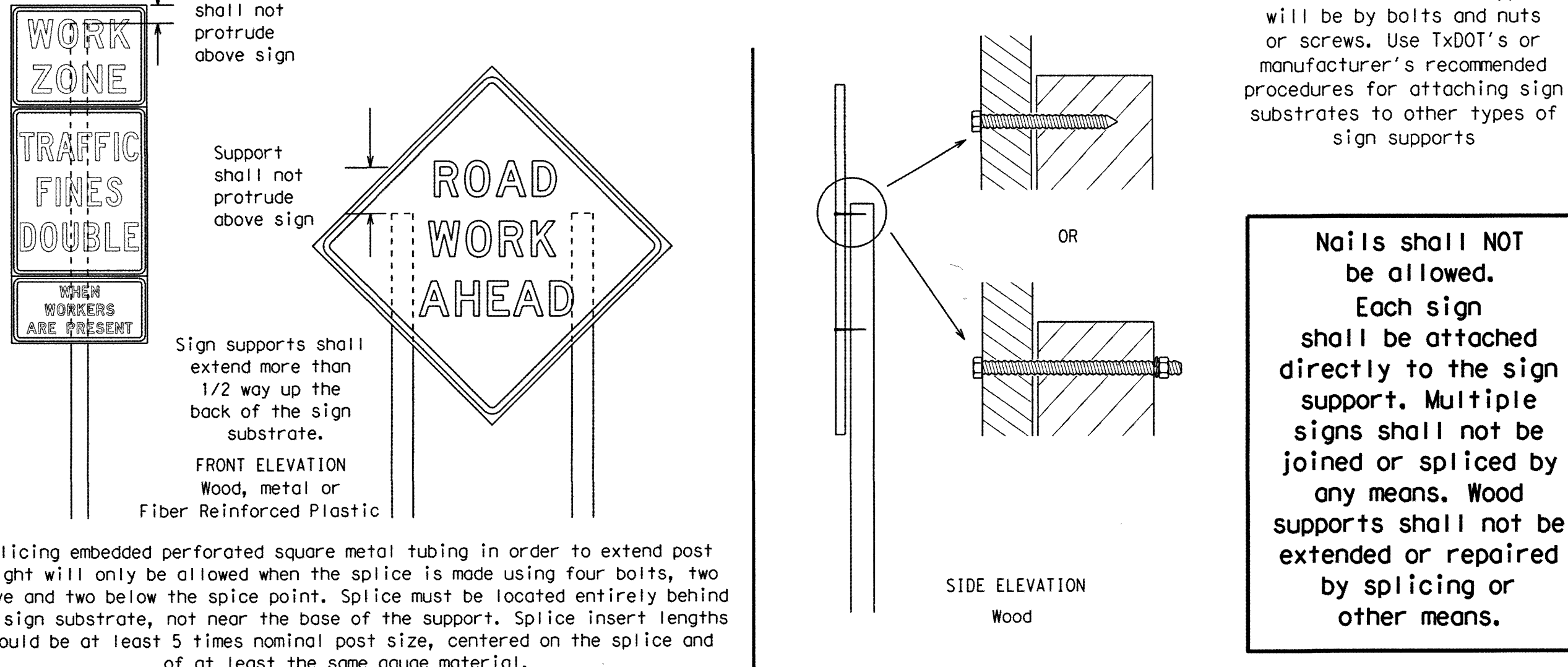
**TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS**



\* When placing skid supports on uneven ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

\*\* When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

**ATTACHMENT FOR SIGN SUPPORTS**



**GENERAL NOTES FOR WORK ZONE SIGNS**

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
- Wooden sign posts shall be painted white.
- Barricades shall NOT be used as sign supports.
- All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
- The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
- The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD). The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
- The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
- Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
- The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

**DURATION OF WORK (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6)**

- The types of sign supports, sign mounting height, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
  - Long-term stationary - work that occupies a location more than 3 days.
  - Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
  - Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
  - Short, duration - work that occupies a location up to 1 hour.
  - Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

**SIGN MOUNTING HEIGHT**

- The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for supplemental plaques mounted below other signs.
- The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
- Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
- Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
- Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

**SIZE OF SIGNS**

- The Contractor shall furnish the sign sizes shown on BC (2) unless otherwise shown in the plans or as directed by the Engineer.

**SIGN SUBSTRATES**

- The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
- "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
- All wooden individual sign panels fabricated from 2 or more pieces shall have one or more plywood cleat, 1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign. The cleat shall be attached to the back of the sign using wood screws that do not penetrate the face of the sign panel. The screws shall be placed on both sides of the splice and spaced at 6" centers. The Engineer may approve other methods of splicing the sign face.

**REFLECTIVE SHEETING**

- All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
- White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
- Orange sheeting, meeting the requirements of DMS-8300 Type B<sub>FL</sub> or Type C<sub>FL</sub>, shall be used for rigid signs with orange backgrounds.

**SIGN LETTERS**

- All sign letters and numbers shall be clear, and open rounded type uppercase alphabet letters as approved by the Federal Highway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs, letters and numbers shall be of first class workmanship in accordance with Department Standards and Specifications.

**REMOVING OR COVERING**

- When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
- Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
- Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
- When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
- Burlap shall NOT be used to cover signs.
- Duct tape or other adhesive material shall NOT be affixed to a sign face.
- Signs and anchor studs shall be removed and holes backfilled upon completion of work.

**SIGN SUPPORT WEIGHTS**

- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
- Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
- Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
- Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
- Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
- Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

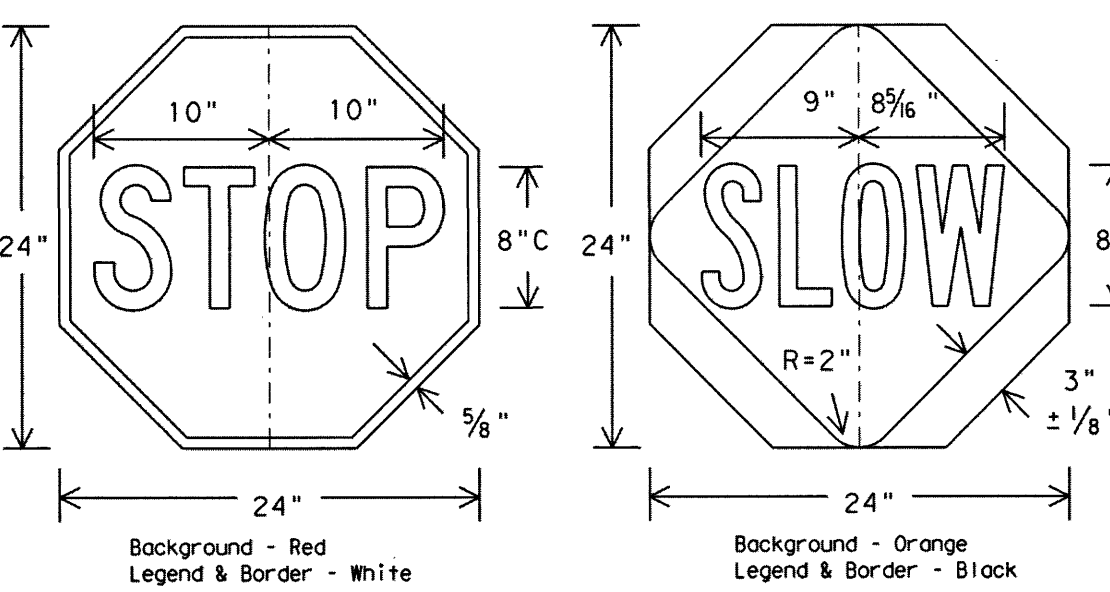
**FLAGS ON SIGNS**

- Flags may be used to draw attention to warning signs. When used the flag shall be 16 inches square or larger and shall be orange or fluorescent red-orange in color. Flags shall not be allowed to cover any portion of the sign face.

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**STOP/SLOW PADDLES**

- STOP/SLOW paddles are the primary method to control traffic by floggers. The STOP/SLOW paddle size should be 24" x 24" as detailed below.
- When used at night, the STOP/SLOW paddle shall be retroreflectORIZED.
- STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
- Any lights incorporated into the STOP or SLOW paddle faces shall only be as specifically described in Section 6E.03 Hand Signaling Devices in the TMUTCD.



**CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS**

- Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
- When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition.
- When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
- If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
- If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC sheets or the CWZTCD. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
- Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.

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NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

BC (4) BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES



SHEET 4 OF 12

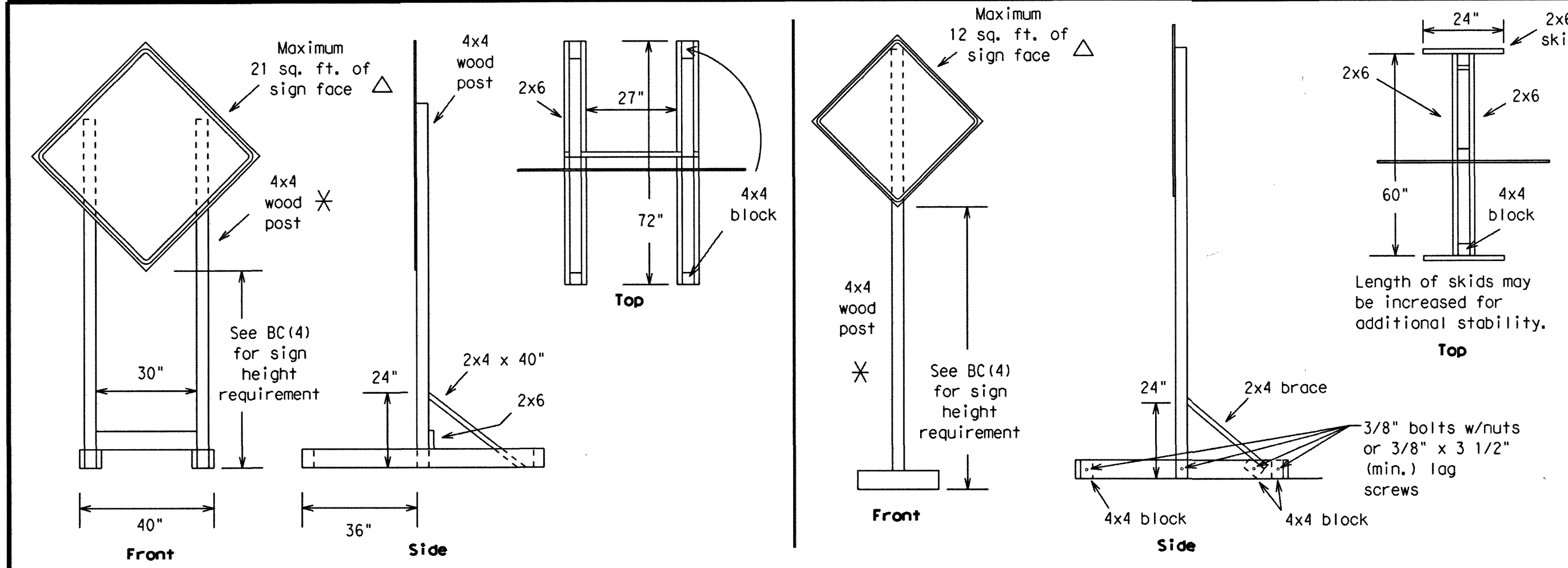
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<b>BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES</b>					
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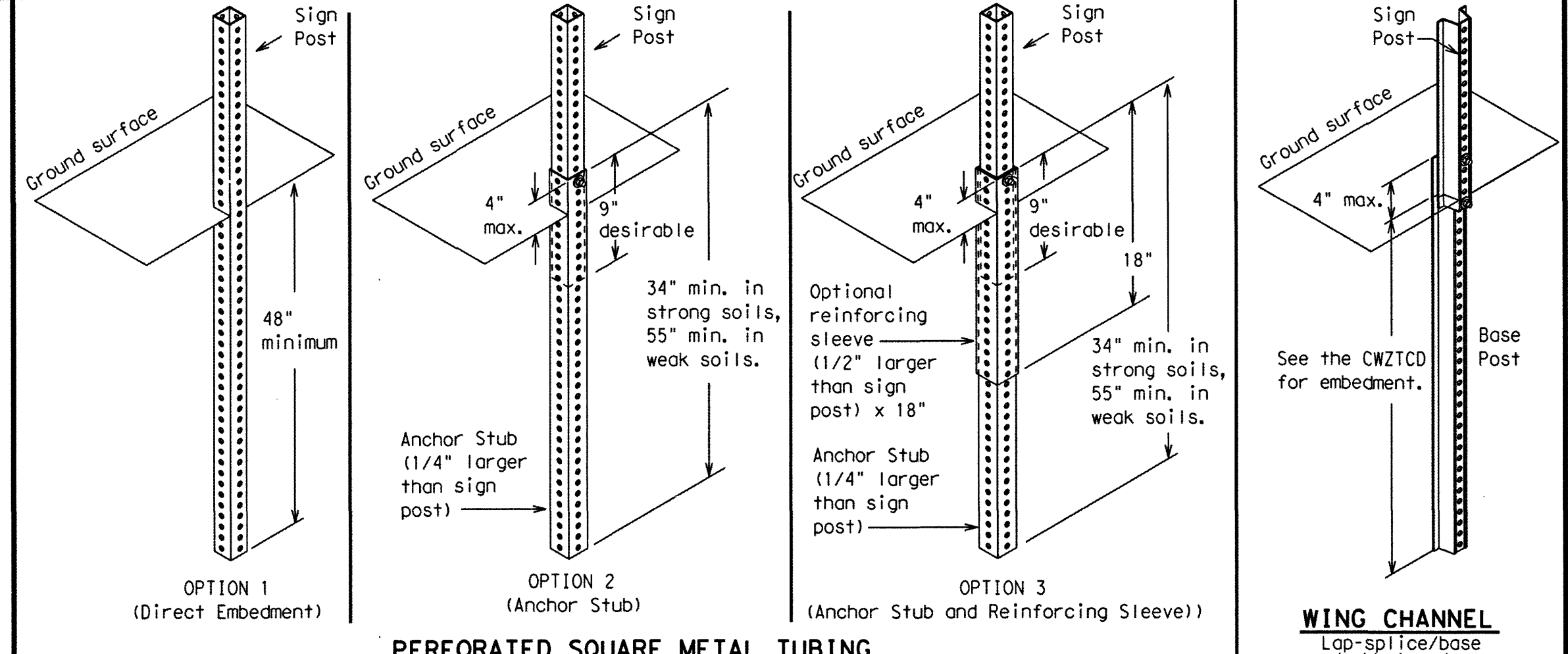
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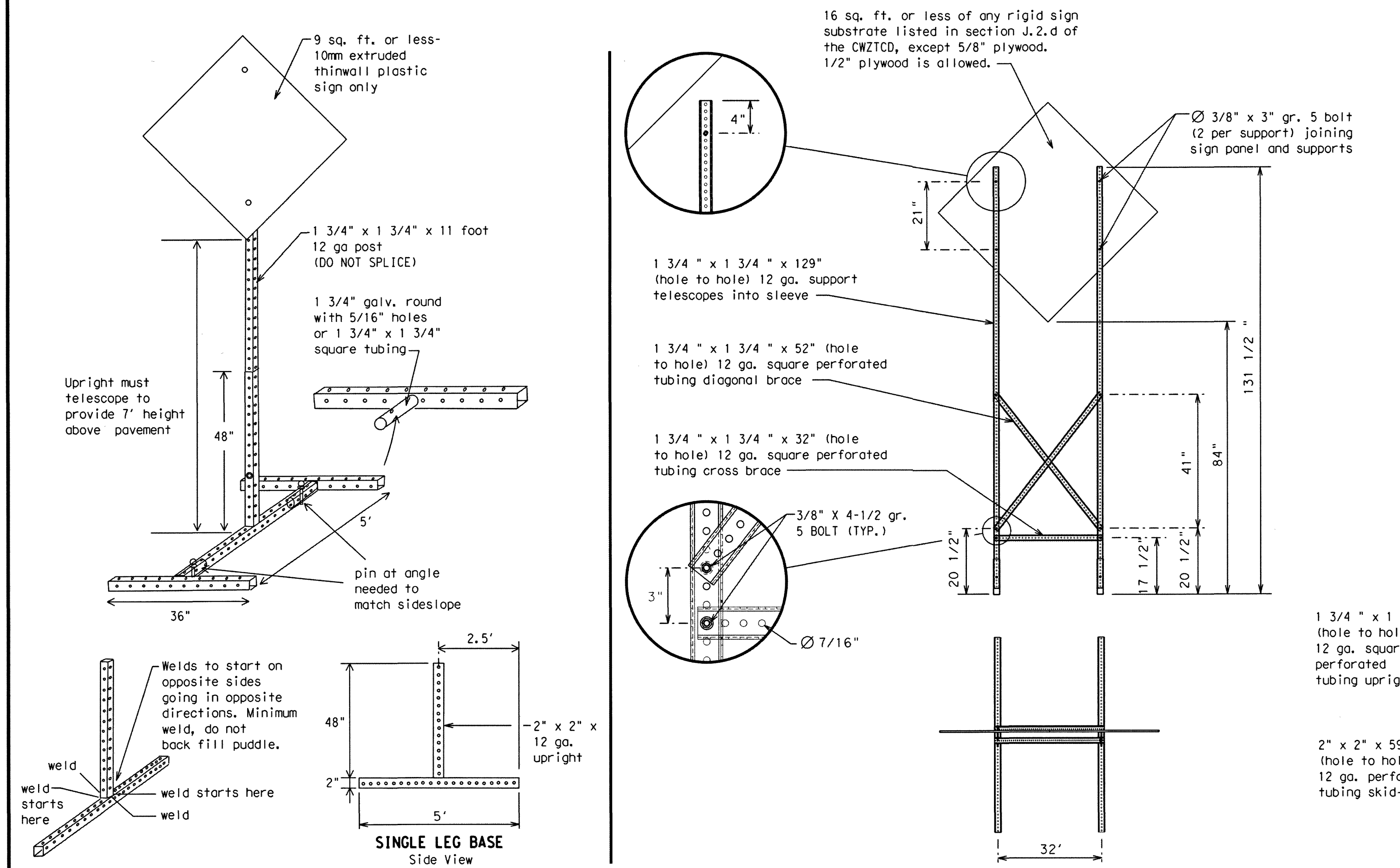
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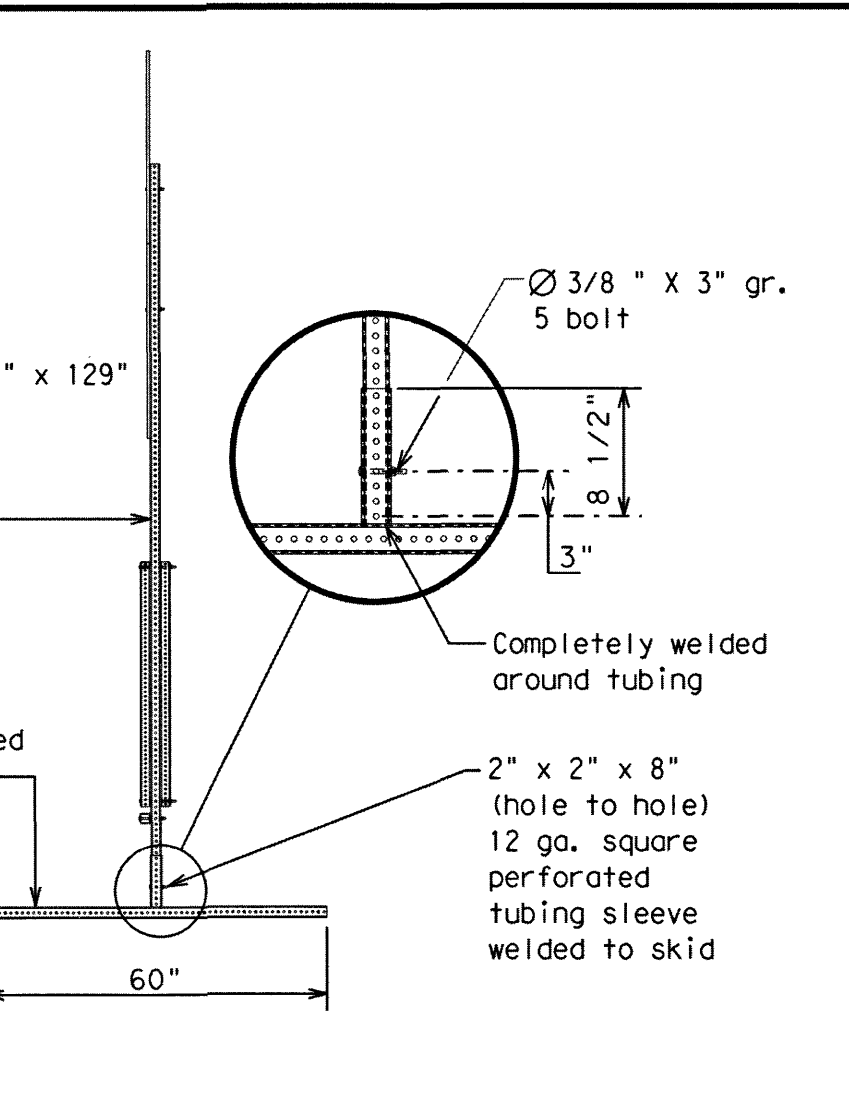
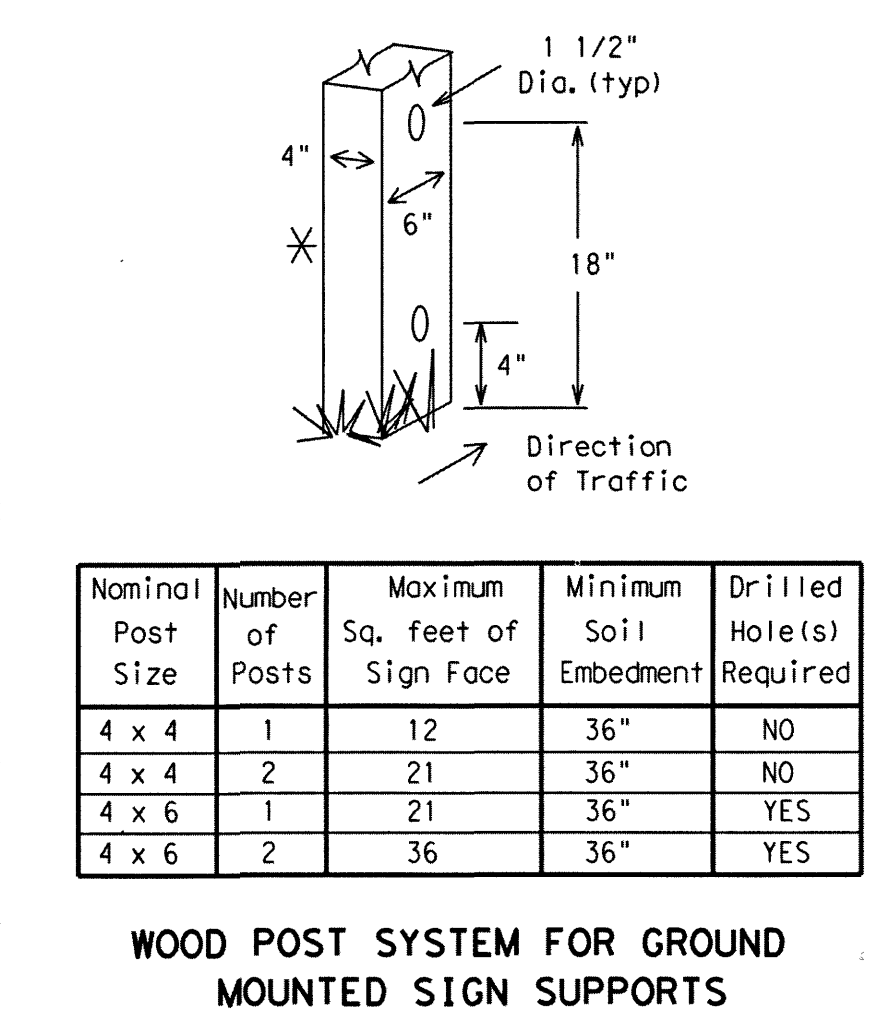
**SKID MOUNTED WOOD SIGN SUPPORTS**  
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □



**GROUND MOUNTED SIGN SUPPORTS**  
Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support. The maximum sign square footage shall adhere to the manufacturer's recommendation. Two post installations can be used for larger signs.



**SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS**



**WEDGE ANCHORS**  
Both steel and plastic Wedge Anchor Systems as shown on the SMD Standard Sheets may be used as temporary sign supports for signs up to 10 square feet of sign face. They may be set in concrete or in sturdy soils if approved by the Engineer. (See web address for "Traffic Engineering Standard Sheets" on BC(1)).

**OTHER DESIGNS**  
MORE DETAILS OF APPROVED LONG/INTERMEDIATE AND SHORT TERM SUPPORTS CAN BE FOUND ON THE CWZTCD LIST. SEE BC(1) FOR WEBSITE LOCATION.

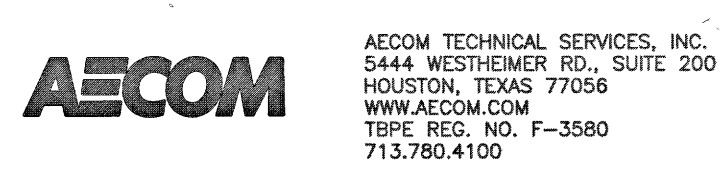
- GENERAL NOTES**
- Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
  - No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
  - When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.
- See BC(4) for definition of "Work Duration."
  - ✱ Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.
  - △ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

SHEET 5 OF 12  
Texas Department of Transportation  
Traffic Operations Division Standard

**BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT**

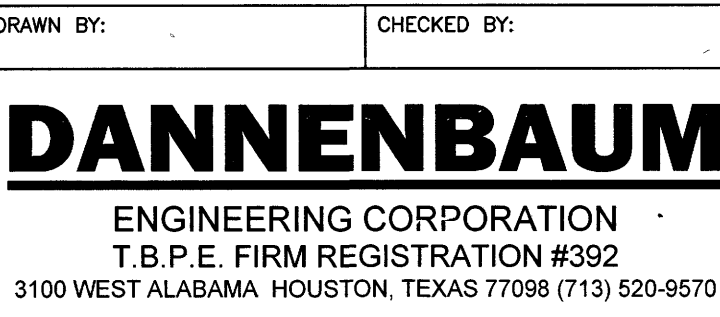
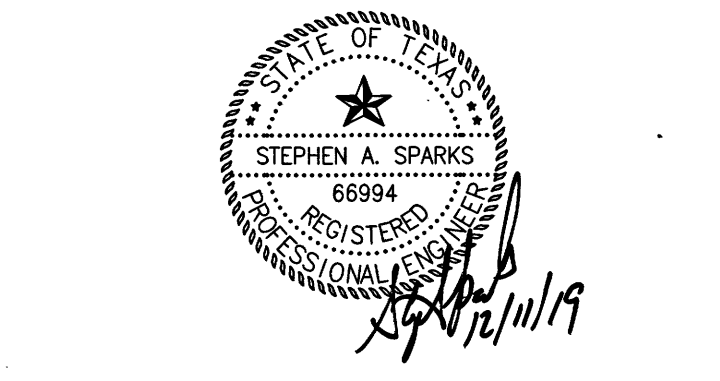
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NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

**BC (5) BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT**



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**GENERAL NOTES**

- For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
- For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
- For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
- Drums and all related items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
- The Contractor shall have a maximum of 24 hours to replace any plastic drums identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.

**GENERAL DESIGN REQUIREMENTS**

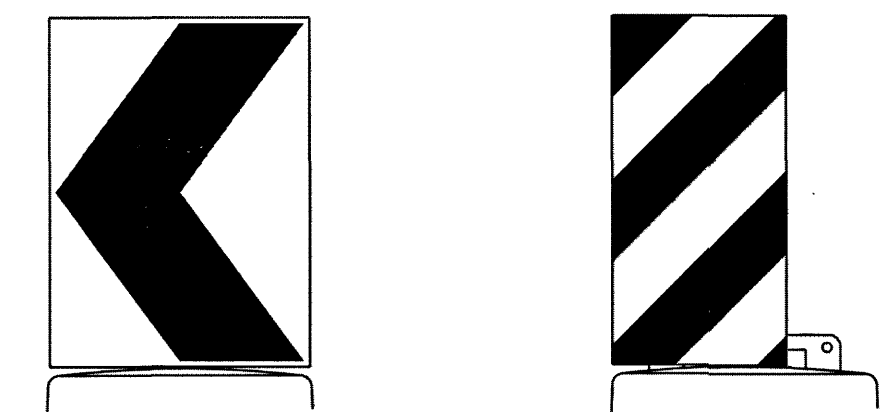
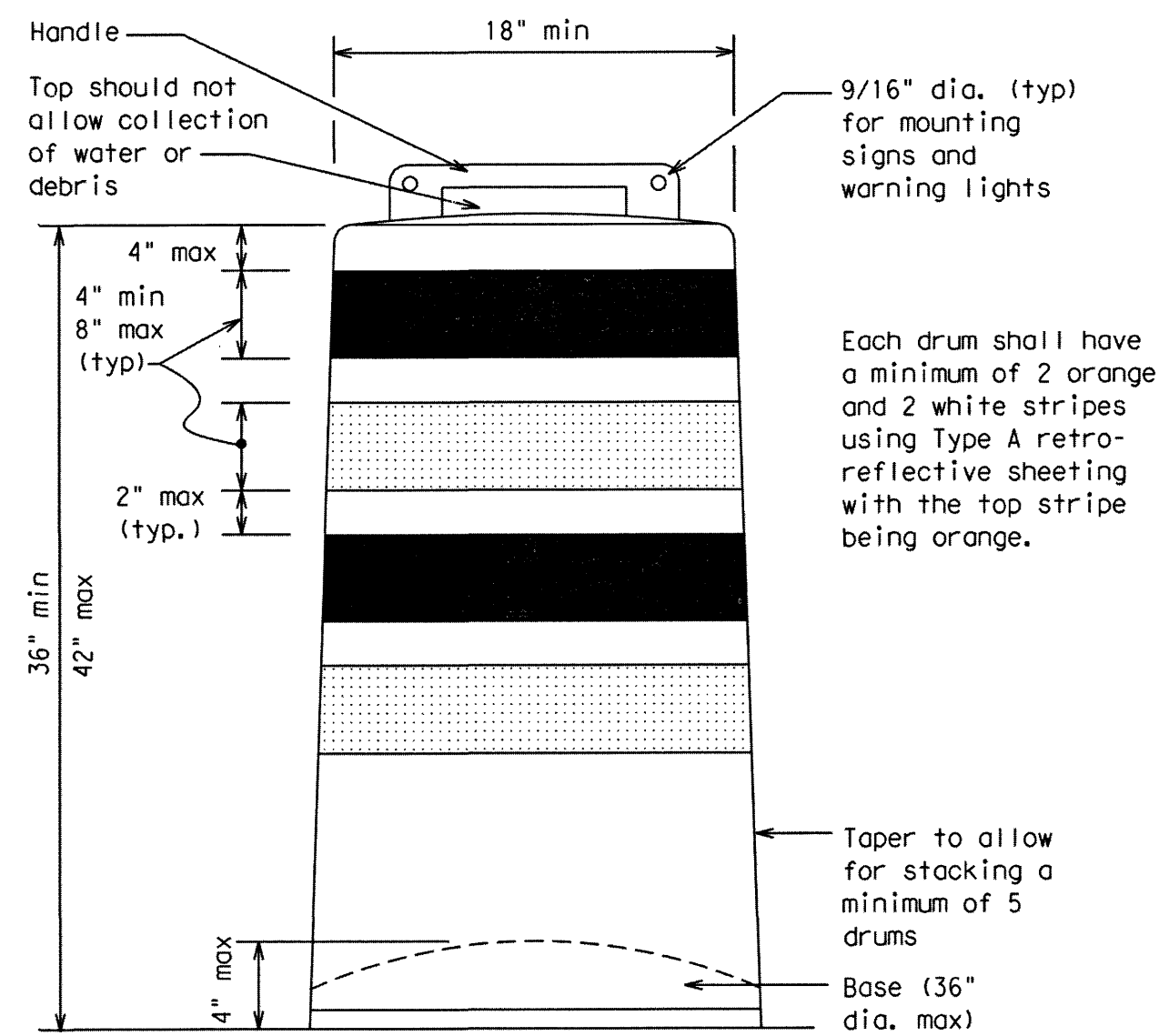
- Pre-qualified plastic drums shall meet the following requirements:
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
  - The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
  - Plastic drums shall be constructed of lightweight flexible, and deformable materials. The Contractor shall NOT use metal drums or single piece plastic drums as channelization devices or sign supports.
  - Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit (body installed on base) shall be a minimum of 36 inches and a maximum of 42 inches.
  - The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two widely spaced 9/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved compliant sign.
  - The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectorized space between any two adjacent stripes shall not exceed 2 inches in width.
  - Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be held down while separating the drum body from the base.
  - Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
  - Drum body shall have a maximum unballasted weight of 11 lbs.
  - Drum and base shall be marked with manufacturer's name and model number.

**RETROREFLECTIVE SHEETING**

- The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A reflective sheeting shall be supplied unless otherwise specified in the plans.
- The sheeting shall be suitable for use on and shall adhere to the drum surface such that, upon vehicular impact, the sheeting shall remain adhered in-place and exhibit no delaminating, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting surface.

**BALLAST**

- Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
- Bases with built-in ballast shall weigh between 40 lbs. and 50 lbs. Built-in ballast can be constructed of an integral crumb rubber base or a solid rubber base.
- Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
- The ballast shall not be heavy objects, water, or any material that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
- When used in regions susceptible to freezing, drums shall have drainage holes in the bottoms so that water will not collect and freeze becoming a hazard when struck by a vehicle.
- Ballast shall not be placed on top of drums.
- Adhesives may be used to secure base of drums to pavement.



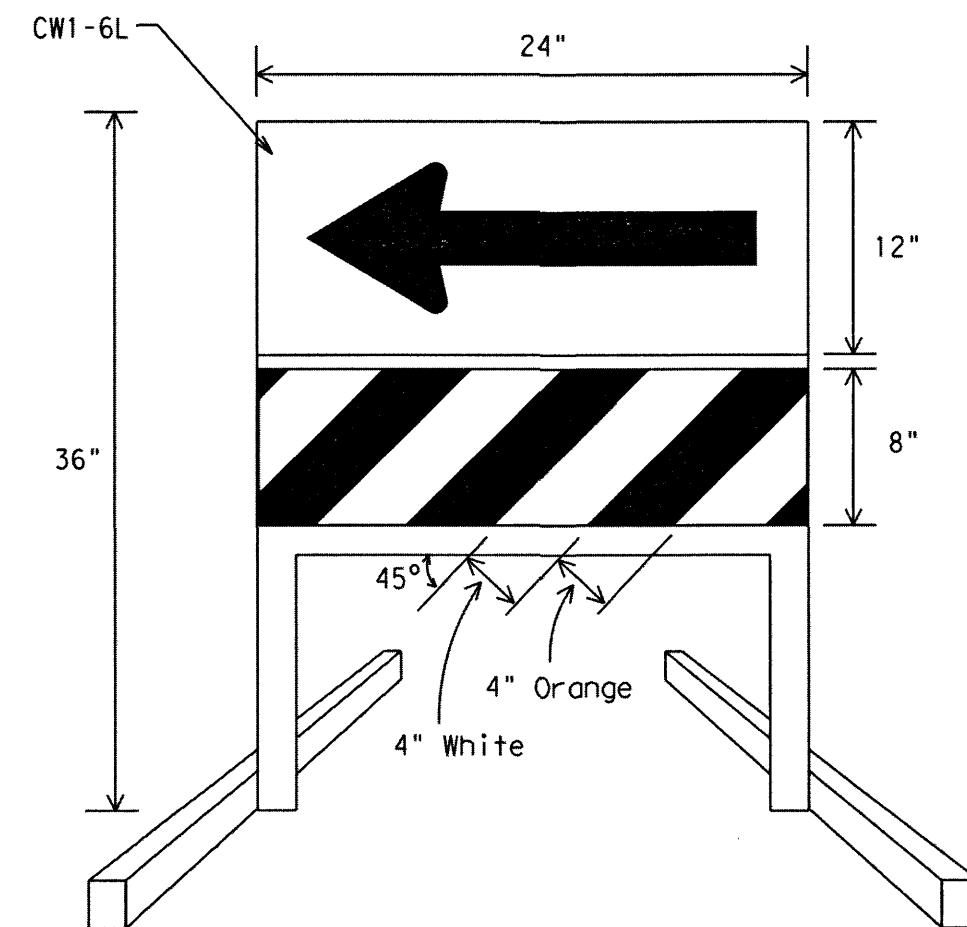
18" x 24" Sign (Maximum Sign Dimension)  
Chevron CW1-8, Opposing Traffic Lane Divider, Driveway sign D70a, Keep Right R4 series or other signs as approved by Engineer

12" x 24" Vertical Panel  
mount with diagonals sloping down towards travel way

Plywood, Aluminum or Metal sign substrates shall NOT be used on plastic drums

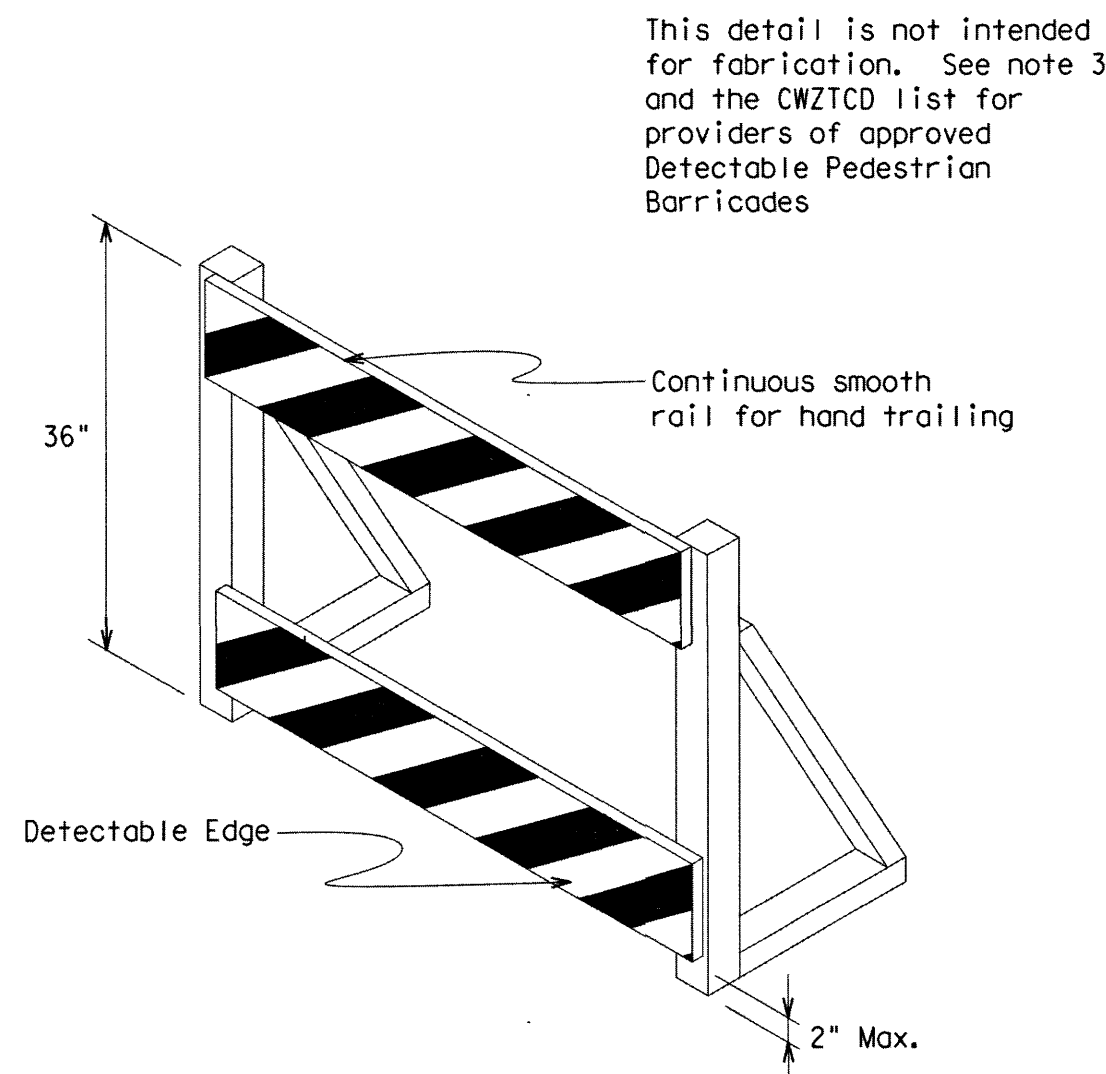
**SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS**

- Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- Chevrons and other work zone signs with an orange background shall be manufactured with Type B<sub>FL</sub> or Type C<sub>FL</sub> Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
- Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
- Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
- Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
- Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
- Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers. When used in these locations they may be placed on every drum or spaced not more than an every third drum. A minimum of three (3) should be used at each location called for in the plans.
- R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.



**DIRECTION INDICATOR BARRICADE**

- The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
- If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
- The Direction Indicator Barricade shall consist of One-Direction Large Arrow (CW1-6) sign in the size shown with a black arrow on a background of Type B<sub>FL</sub> or Type C<sub>FL</sub> Orange retroreflective sheeting above a rail with Type A retroreflective sheeting in alternating 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Sheeting types shall be as per DMS 8300.
- Double arrows on the Direction Indicator Barricade will not be allowed.
- Approved manufacturers are shown on the CWZTCD List. Ballast shall be as approved by the manufacturers instructions.



**DETECTABLE PEDESTRIAN BARRICADES**

- When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility.
- Where pedestrians with visual disabilities normally use the closed sidewalk, a device that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.
- Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
- Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)" and should not be used as a control for pedestrian movements.
- Warning lights shall not be attached to detectable pedestrian barricades.
- Detectable pedestrian barricades may use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.

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SHEET 8 OF 12

		<b>Traffic Operations Division Standard</b>	
<b>BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES</b>			
<b>BC (8) - 14</b>			
FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
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**North Harris County REGIONAL WATER Authority**

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NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

BC (8) BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

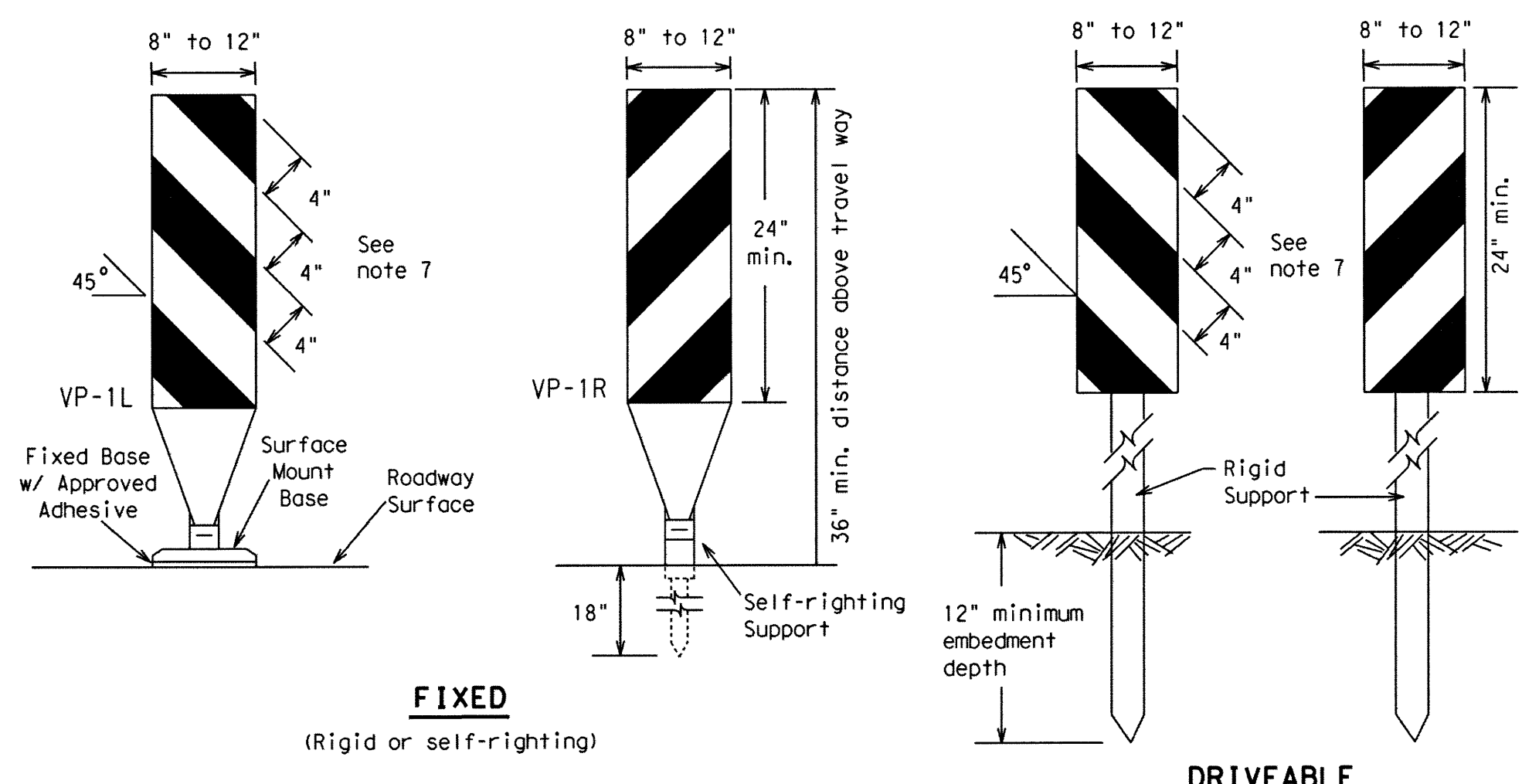
Stephen A. Sparks  
12/19

**DANNENBAUM**  
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T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570



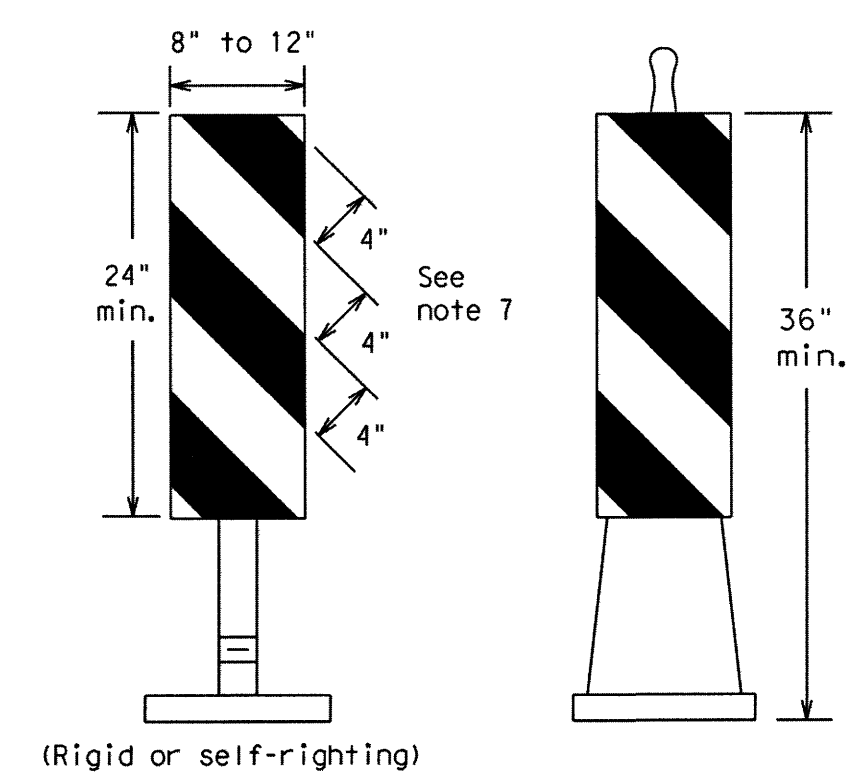
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**FIXED**  
(Rigid or self-righting)

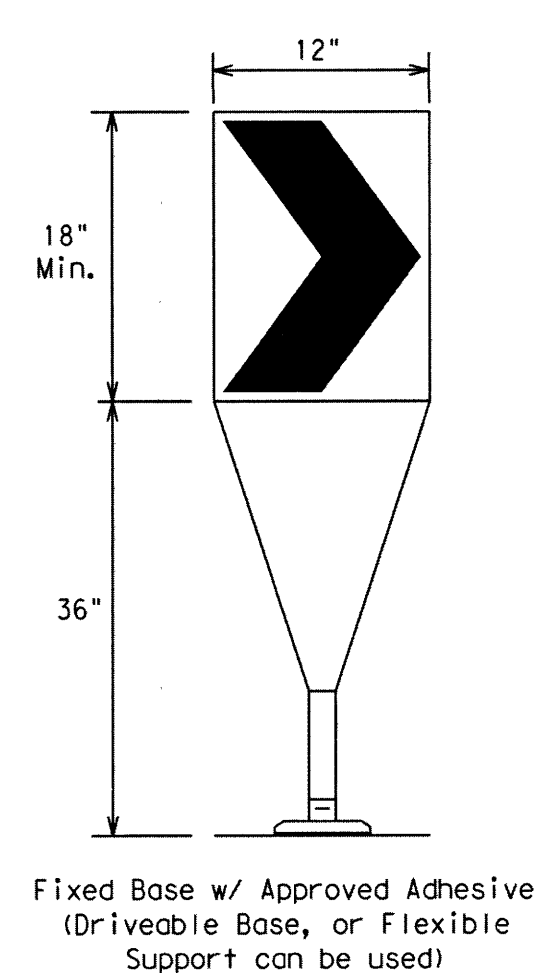
**DRIVEABLE**



**PORTABLE**

**VERTICAL PANELS (VPs)**

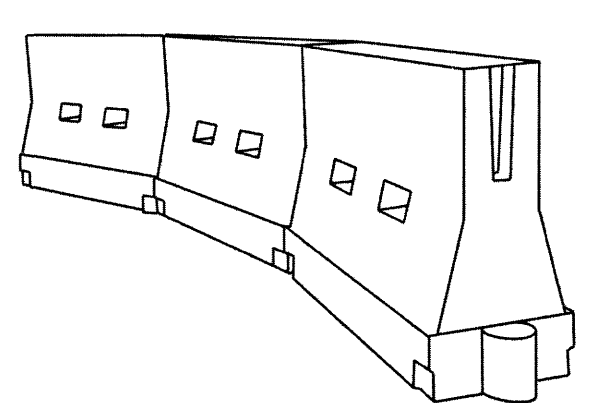
- Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
- VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual Appendix B "Treatment of Pavement Drop-offs in Work Zones" for additional guidelines on the use of VP's for drop-offs.
- VP's should be mounted back to back if used at the edge of cuts adjacent to two-way two lane roadways. Stripes are to be reflective orange and reflective white and should always slope downward toward the travel lane.
- VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
- Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- Sheeting for the VP's shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
- Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.



Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

- The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
- Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of the roadway.
- Chevrons, when used, shall be erected on the outside of a sharp curve or turn, or on the far side of an intersection. They shall be in line with and at right angles to approaching traffic. Spacing should be such that the motorist always has three in view, until the change in alignment eliminates its need.
- To be effective, the chevron should be visible for at least 500 feet.
- Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B<sub>FL</sub> or Type C<sub>FL</sub> conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
- For Long Term Stationary use on tapers or transitions on freeways and divided highways self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

**CHEVRONS**



**LONGITUDINAL CHANNELIZING DEVICES (LCD)**

- LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
- LCDs may be used instead of a line of cones or drums.
- LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
- LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
- LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10) placed near the top of the LCD along the full length of the device.

**WATER BALLASTED SYSTEMS USED AS BARRIERS**

- Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.
- Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
- Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
- When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

If used to channelize pedestrians, longitudinal channelizing devices or water ballasted systems must have a continuous detectable bottom for users of long cones and the top of the unit shall not be less than 32 inches in height.

**HOLLOW OR WATER BALLASTED SYSTEMS USED AS LONGITUDINAL CHANNELIZING DEVICES OR BARRIERS**

**GENERAL NOTES**

- Work Zone channelizing devices illustrated on this sheet may be installed in close proximity to traffic and are suitable for use on high or low speed roadways. The Engineer/Inspector shall ensure that spacing and placement is uniform and in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- Channelizing devices shown on this sheet may have a driveable, fixed or portable base. The requirement for self-righting channelizing devices must be specified in the General Notes or other plan sheets.
- Channelizing devices on self-righting supports should be used in work zone areas where channelizing devices are frequently impacted by errant vehicles or vehicle related wind gusts making alignment of the channelizing devices difficult to maintain. Locations of these devices shall be detailed elsewhere in the plans. These devices shall conform to the TMUTCD and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- The Contractor shall maintain devices in a clean condition and replace damaged, nonreflective, faded, or broken devices and bases as required by the Engineer/Inspector. The Contractor shall be required to maintain proper device spacing and alignment.
- Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
- Pavement surfaces shall be prepared in a manner that ensures proper bonding between the adhesives, the fixed mount bases and the pavement surface. Adhesives shall be prepared and applied according to the manufacturer's recommendations.
- The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final pavement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.

Posted Speed * *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices	
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent
30	L = WS <sup>2</sup> / 60	150'	165'	180'	30'	60'
35		205'	225'	245'	35'	70'
40		265'	295'	320'	40'	80'
45	L = WS	450'	495'	540'	45'	90'
50		500'	550'	600'	50'	100'
55		550'	605'	660'	55'	110'
60		600'	660'	720'	60'	120'
65		650'	715'	780'	65'	130'
70		700'	770'	840'	70'	140'
75		750'	825'	900'	75'	150'
80		800'	880'	960'	80'	160'

\*\*Taper lengths have been rounded off.  
L=Length of Taper (FT.) W=Width of Offset (FT.)  
S=Posted Speed (MPH)

**SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS**

SHEET 9 OF 12

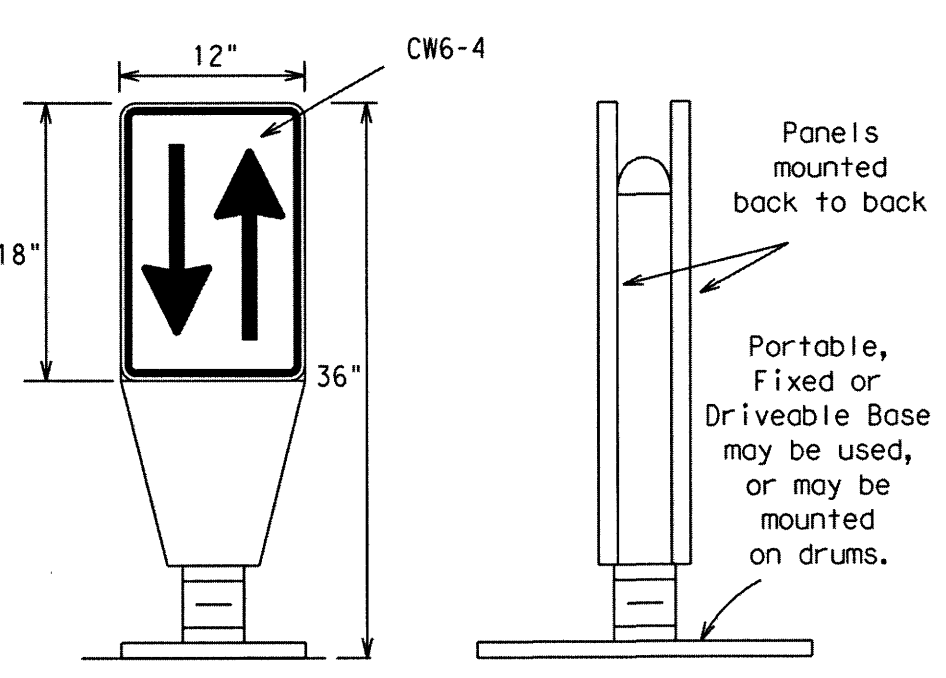


**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

BC (9) - 14

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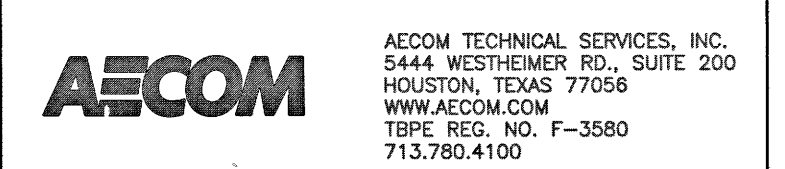


**OPPOSING TRAFFIC LANE DIVIDERS (OTLD)**

- Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base is secured to the pavement with an adhesive or rubber weight to minimize movement caused by a vehicle impact or wind gust.
- The OTLD may be used in combination with 42" cones or VPs.
- Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
- The OTLD shall be orange with a black non-reflective legend. Sheeting for the OTLD shall be retroreflective Type B<sub>FL</sub> or Type C<sub>FL</sub> conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.

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NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

BC (9) BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES



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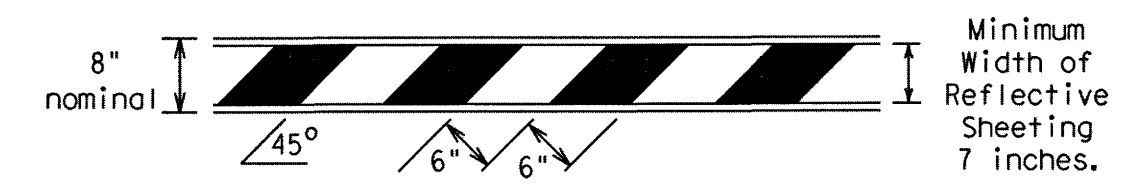


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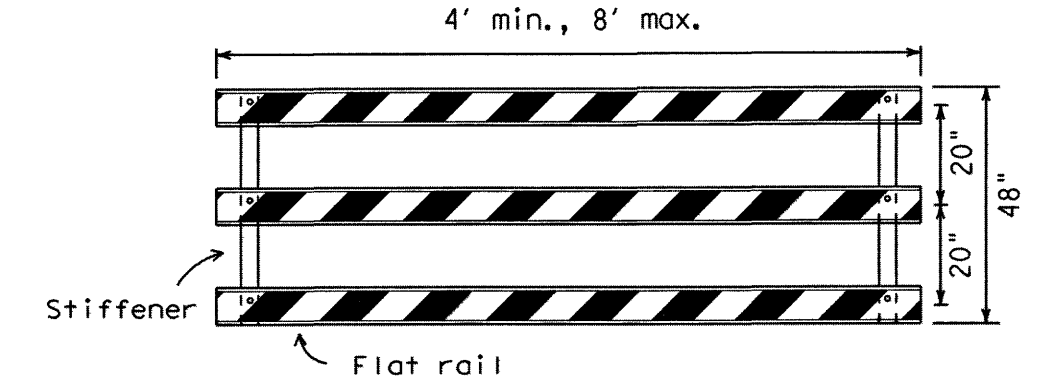
**TYPE 3 BARRICADES**

1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type 3 Barricades and a list of all materials used in the construction of Type 3 Barricades.
2. Type 3 Barricades shall be used at each end of construction projects closed to all traffic.
3. Barricades extending across a roadway should have stripes that slope downward in the direction toward which traffic must turn in detouring. When both right and left turns are provided, the chevron striping may slope downward in both directions from the center of the barricade. Where no turns are provided at a closed road striping should slope downward in both directions toward the center of roadway.
4. Striping of rails, for the right side of the roadway, should slope downward to the left. For the left side of the roadway, striping should slope downward to the right.
5. Identification markings may be shown only on the back of the barricade rails. The maximum height of letters and/or company logos used for identification shall be 1".
6. Barricades shall not be placed parallel to traffic unless an adequate clear zone is provided.
7. Warning lights shall NOT be installed on barricades.
8. Where barricades require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand is recommended. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight. Sand bags shall not be stacked in a manner that covers any portion of a barricade rails reflective sheeting. Rock, concrete, iron, steel or other solid objects will NOT be permitted. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall not be used for sandbags. Sandbags shall only be placed along or upon the base supports of the device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners.
9. Sheeting for barricades shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.

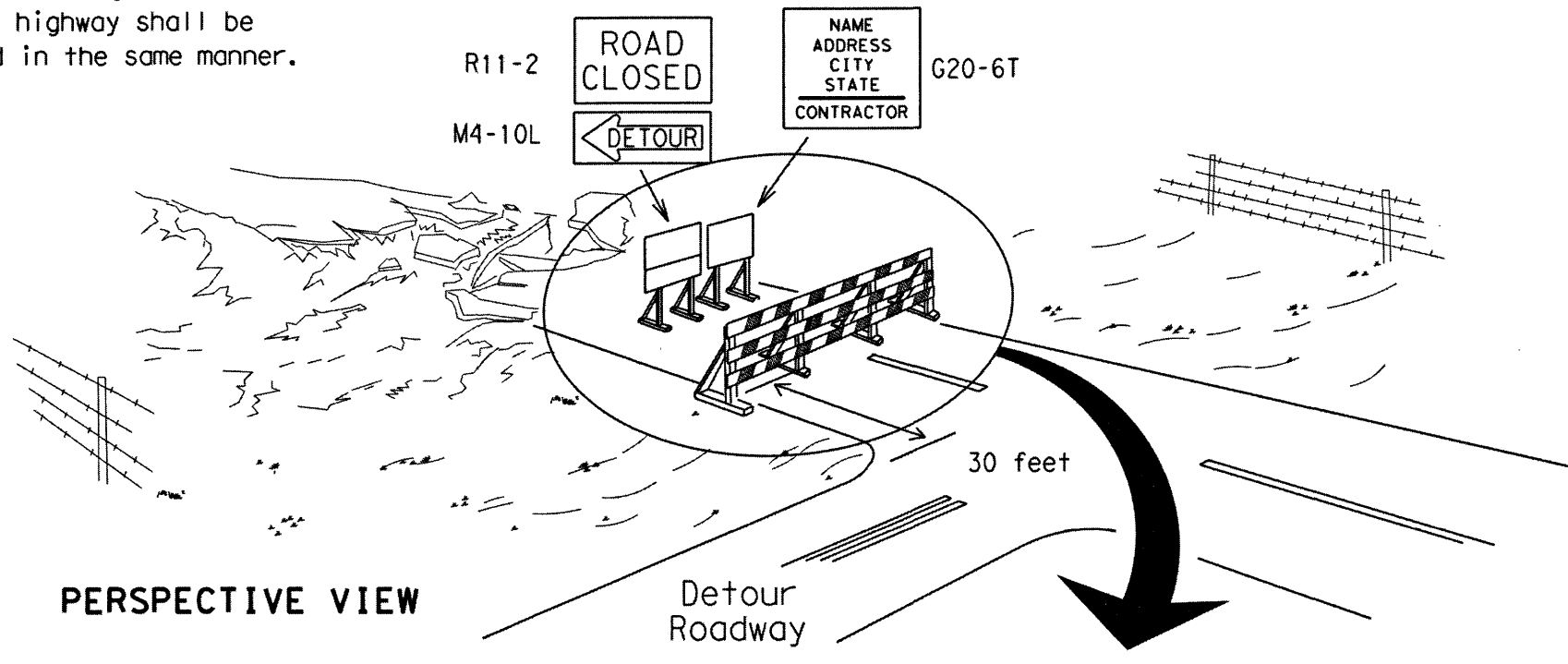


**TYPICAL STRIPING DETAIL FOR BARRICADE RAIL**



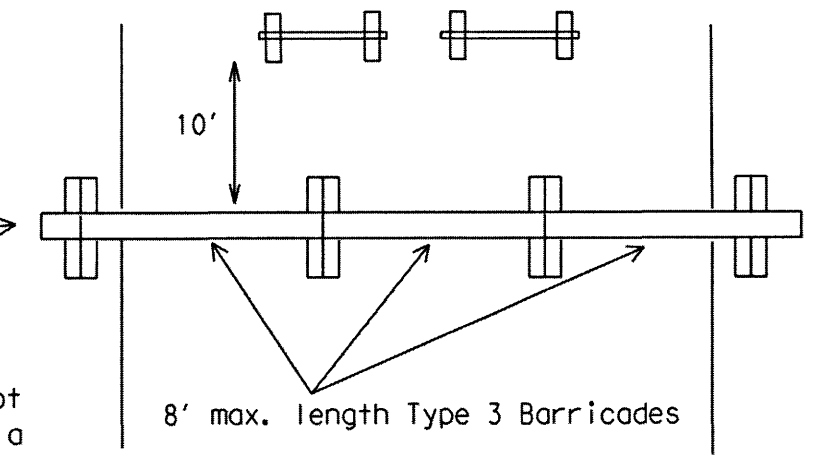
**TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES**

Each roadway of a divided highway shall be barricaded in the same manner.



**PERSPECTIVE VIEW**

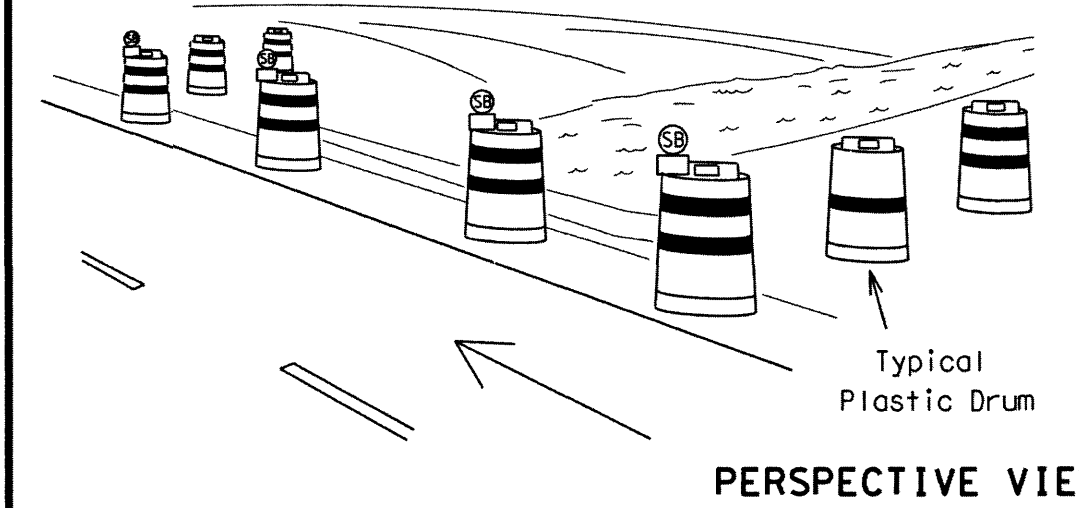
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



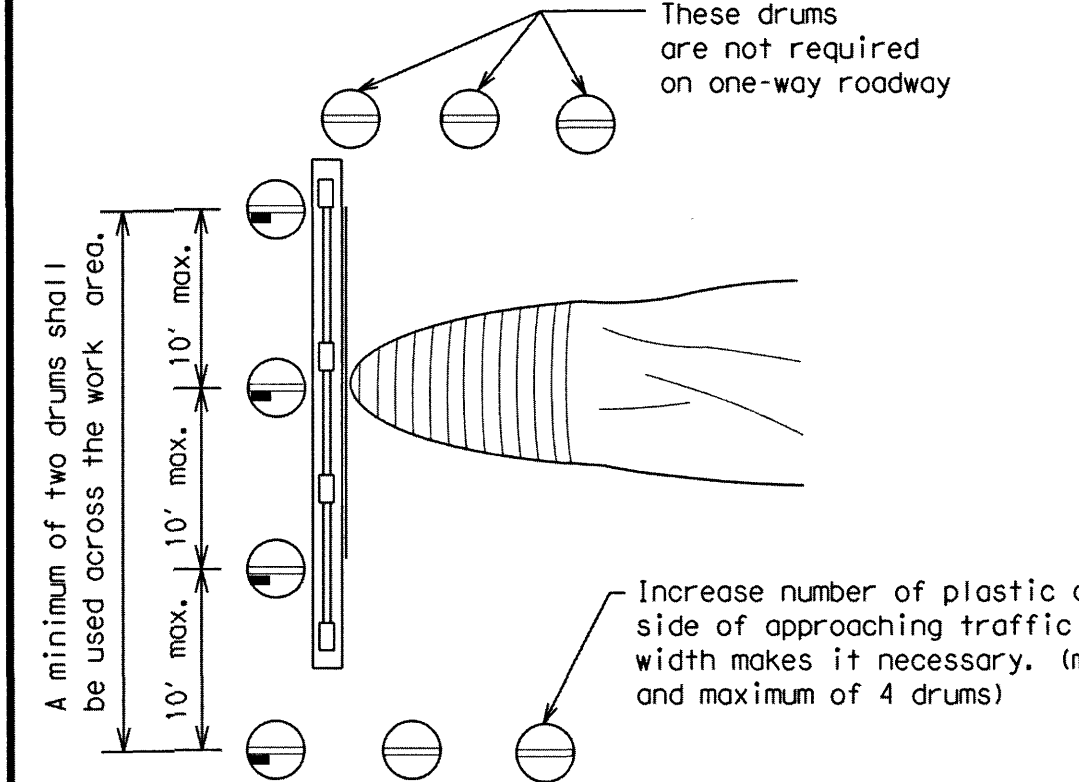
**PLAN VIEW**

1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

**TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION**



**PERSPECTIVE VIEW**

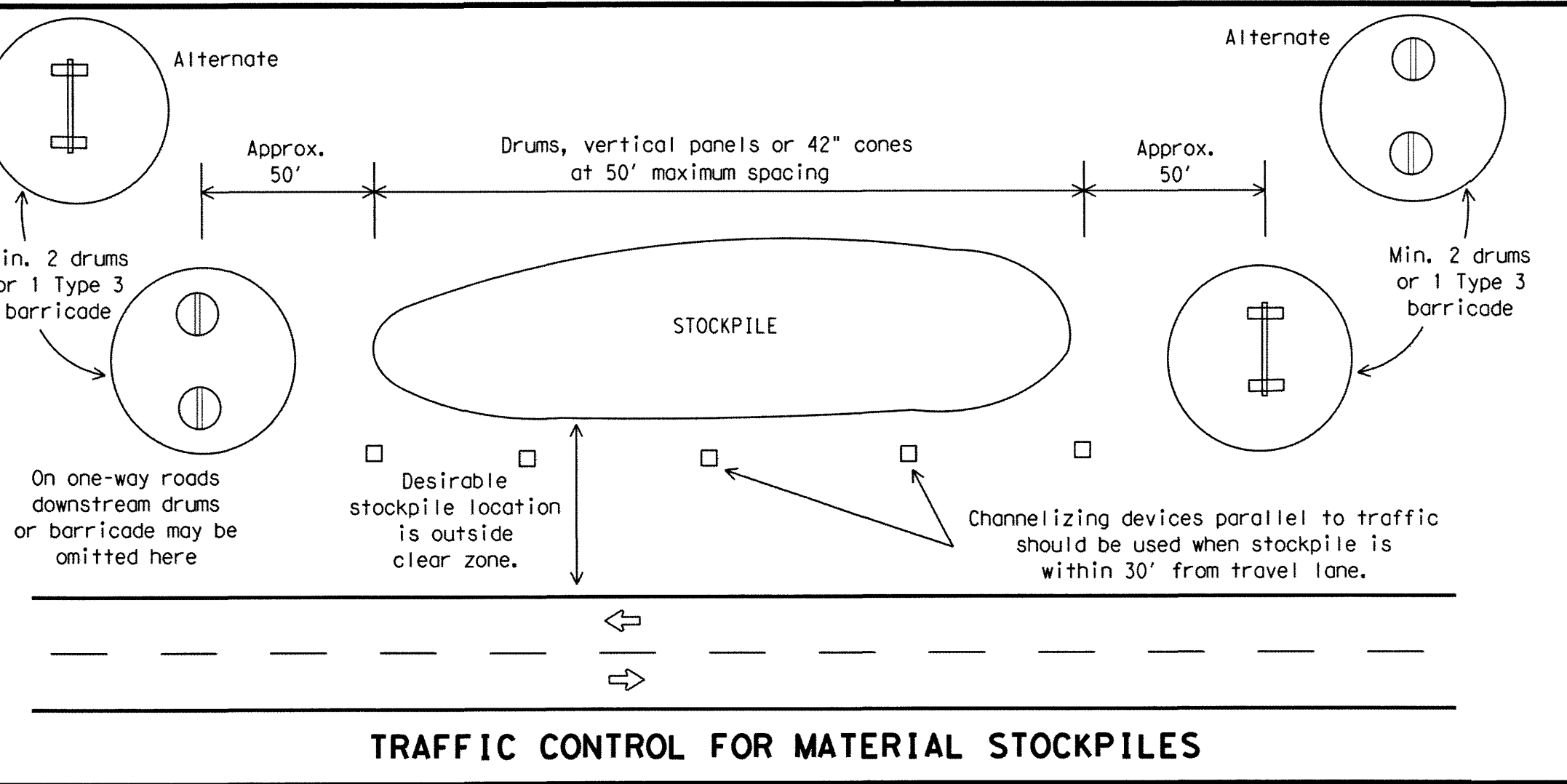


**PLAN VIEW**

1. Where positive redirection capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder width is greater than 12 feet, steady-burn lights may be omitted if drums are used.
5. Drums must extend the length of the culvert widening.

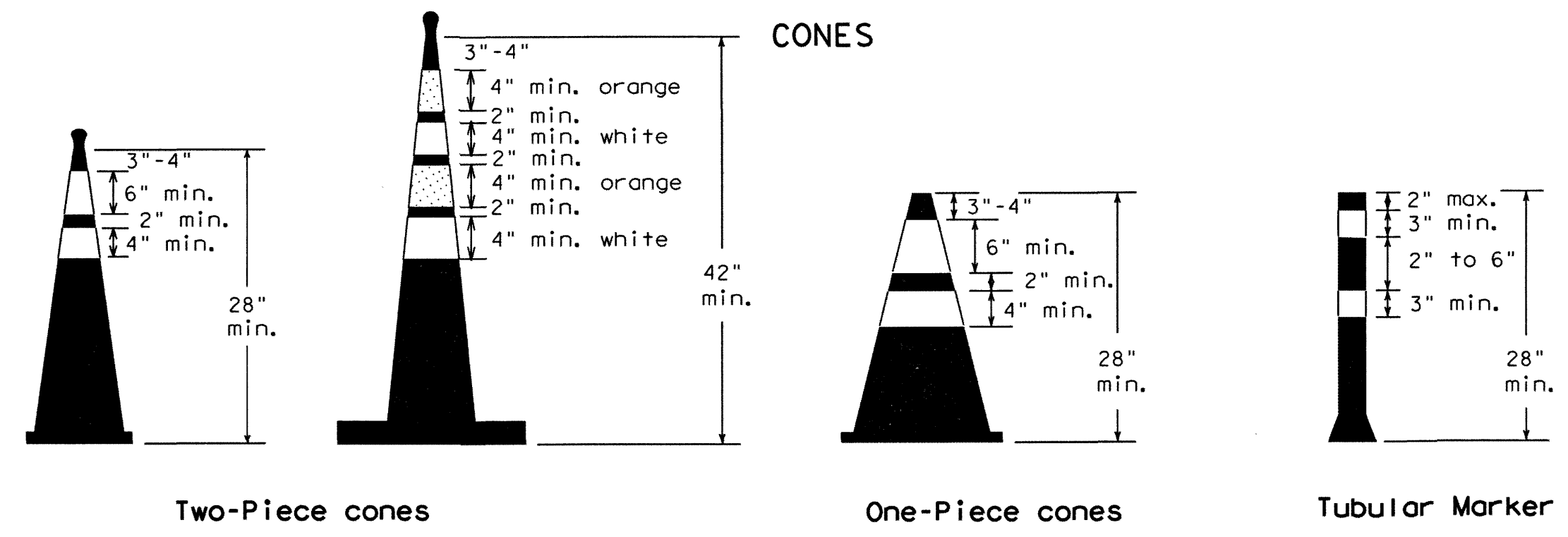
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
	Steady burn warning light or yellow warning reflector

**CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS**



**TRAFFIC CONTROL FOR MATERIAL STOCKPILES**

28" Cones shall have a minimum weight of 9 1/2 lbs.  
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.



**CONES**

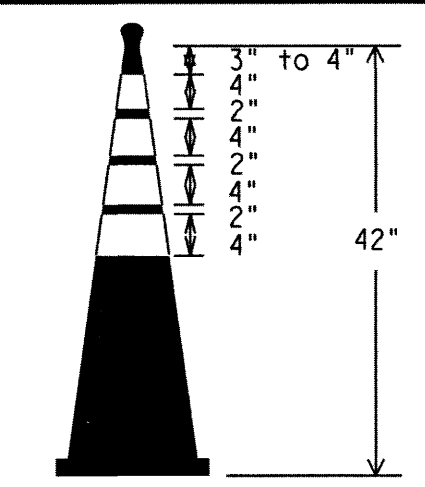
**Two-Piece cones**

**One-Piece cones**

**Tubular Marker**

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers used at night shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.

THIS DEVICE SHALL NOT BE USED ON PROJECTS LATER THAN MARCH 2014.



**EDGE LINE CHANNELIZER**

1. This device is intended only for use in place of a vertical panel to channelize traffic by indicating the edge of the travel lane. It is not intended to be used in transitions or tapers.
2. This device shall not be used to separate lanes of traffic (opposing or otherwise) or warn of objects.
3. This device is based on a 42 inch, two-piece cone with an alternate striping pattern: four 4 inch retroreflective bands, with an approximate 2 inch gap between bands. The color of the band should correspond to the color of the edgeline (yellow for left edgeline, white for right edgeline) for which the device is substituted or for which it supplements. The reflectorized bands shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
4. The base must weigh a minimum of 30 lbs.

SHEET 10 OF 12

Texas Department of Transportation  
Traffic Operations Division Standard

**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (10) - 14**

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NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

**BC (10) BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

STATE OF TEXAS  
REGISTERED PROFESSIONAL ENGINEER  
STEPHEN A. SPARKS  
66994  
12/11/14

DRAWN BY: CHECKED BY:

**DANNENBAUM**  
ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

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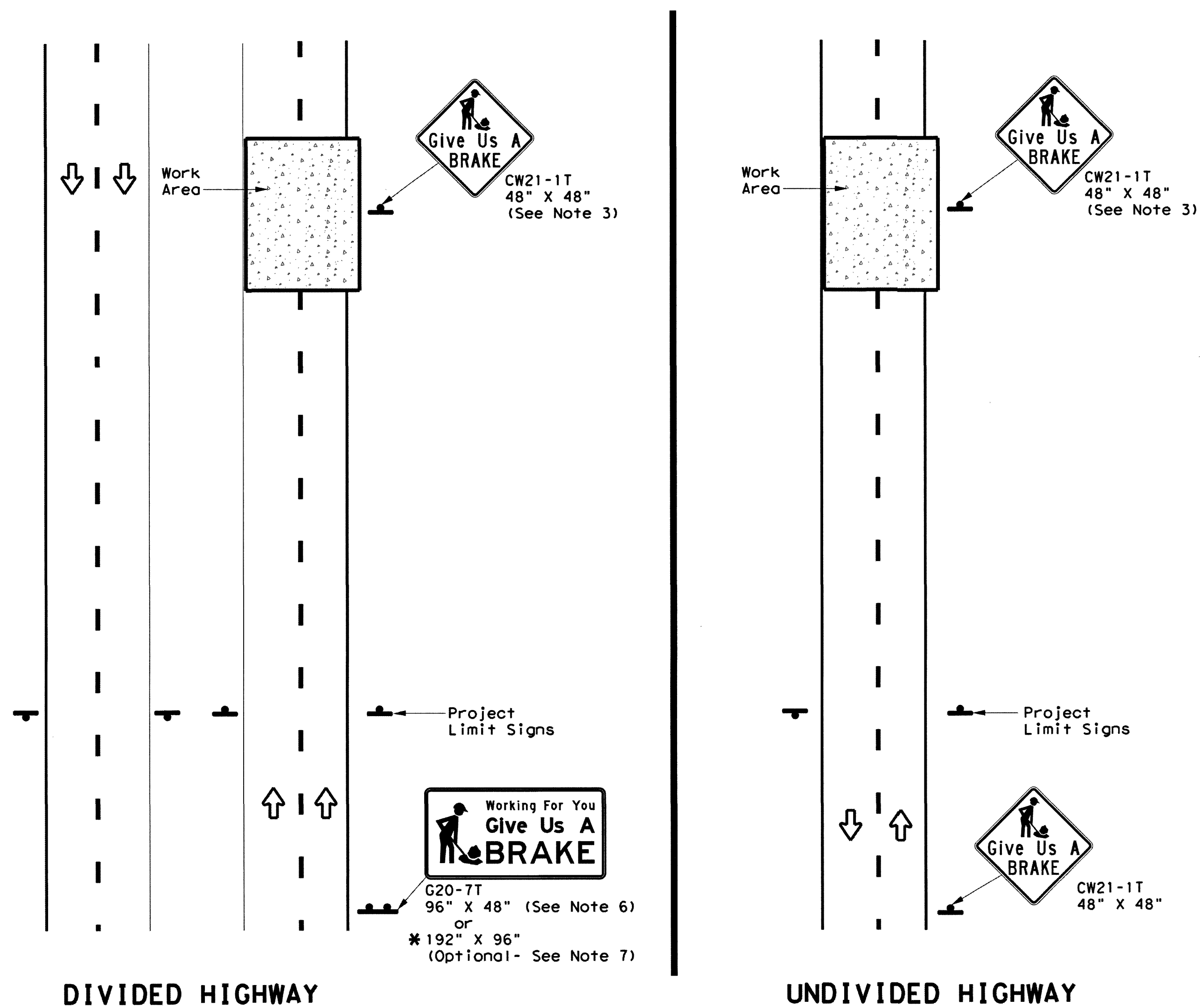
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**DIVIDED HIGHWAY**

**UNDIVIDED HIGHWAY**

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

\* When the optional larger WORKING FOR YOU GIVE US A BRAKE (G20-7T) 192" x 96" sign is required, the locations shall be noted elsewhere in the plans.

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**SUMMARY OF LARGE SIGNS**

BACKGROUND COLOR	SIGN DESIGNATION	SIGN	SIGN DIMENSIONS	REFLECTIVE SHEETING	SQ FT	GALVANIZED STRUCTURAL STEEL		DRILLED SHAFT 24" DIA. (LF)
						Size	(LF)	
Orange	G20-7T		96" X 48"	Type B <sub>FL</sub> or C <sub>FL</sub>	32	▲	▲	▲
Orange	G20-7T		192" X 96"	Type B <sub>FL</sub> or C <sub>FL</sub>	128	W8x18	16 17	12

▲ See Note 6 Below

**LEGEND**

	Sign
	Large Sign
	Traffic Flow

**DEPARTMENTAL MATERIAL SPECIFICATIONS**

PLYWOOD SIGN BLANKS	DMS-7100
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B <sub>FL</sub> OR TYPE C <sub>FL</sub>
BLACK	LEGEND & BORDERS	NON-REFLECTIVE ACRYLIC FILM

**GENERAL NOTES**

- See BC and SMD sheets for additional sign support details.
- Sign locations shall be approved by the Engineer.
- For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.
- Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.
- Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."
- The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.
- The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:  
 Item 636 - Aluminum Signs  
 Item 647 - Large Roadside Sign Supports and Assemblies.  
 Item 416 - Drilled Shaft Foundations
- All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

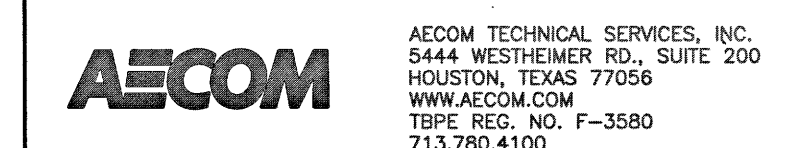
Texas Department of Transportation  
 Traffic Operations Division Standard

**WORK ZONE "GIVE US A BRAKE" SIGNS**

**WZ (BRK) - 13**

FILE: wzbrk-13.dgn	DN: TxDOT	CR: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY	SHEET NO.	
6-96 5-98 7-13				
8-96 3-03				

116



NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

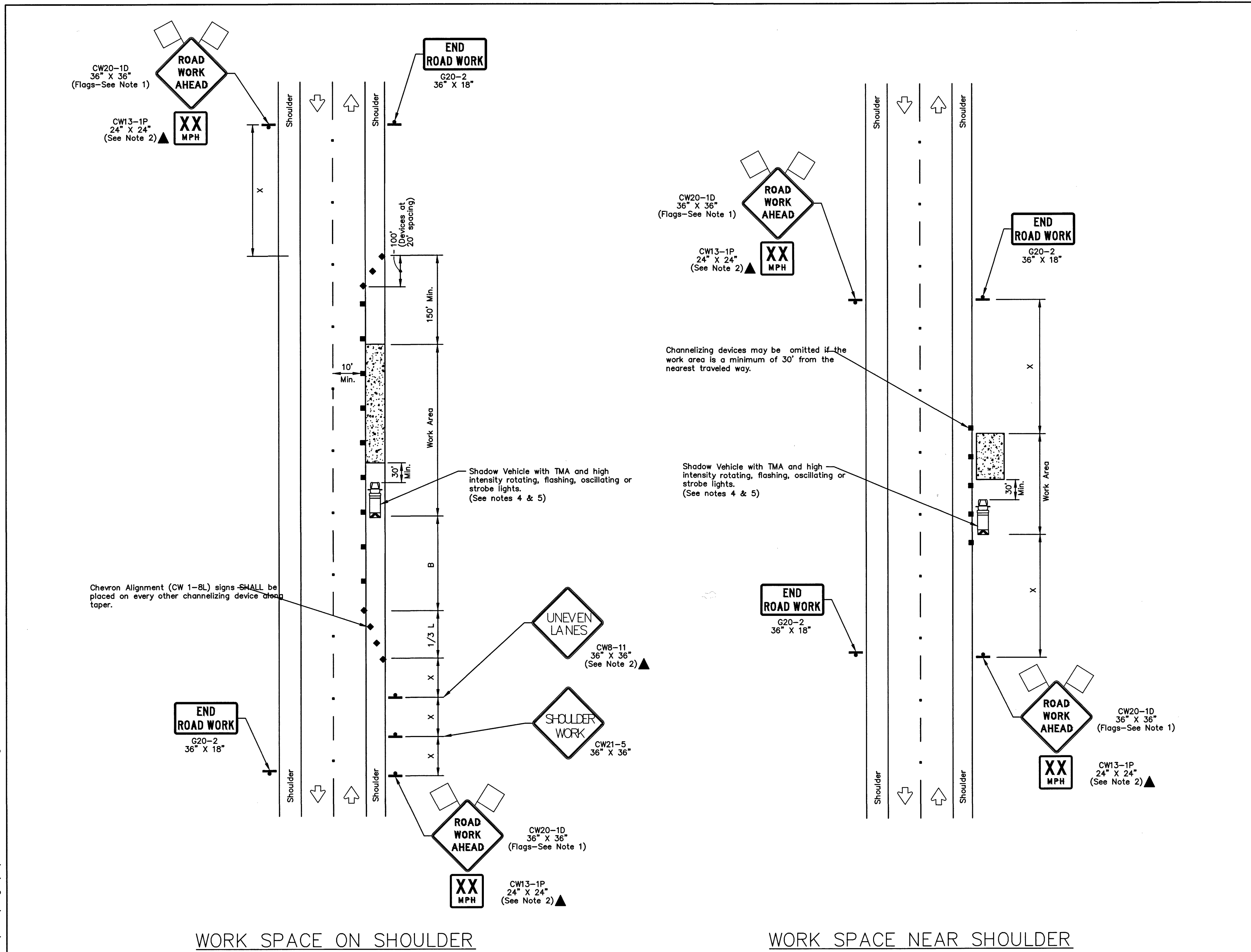
WZ (BRK) WORK ZONE  
 GIVE US A BRAKE SIGNS



DRAWN BY: CHECKED BY:



No.	Date	Revisions	App.



**TRAFFIC CONTROL PLAN SECTION SHALL BE COMPLETED BY ENGINEER**

ROADWAY	POSTED SPEED	TAPER LENGTH	SPACING CHANNELIZING DEVICES		SIGN SPACING	BUFFER SPACE
			TAPER	TANGENT		
GRANT ROAD	40	320	40	80	240	155
COPELAND ROAD	30	180	30	60	120	90

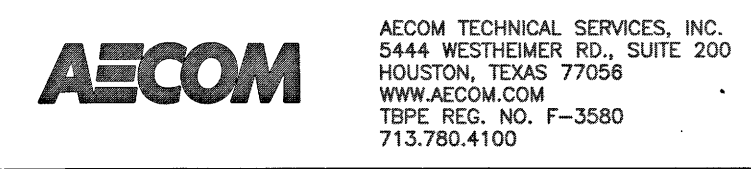
**LEGEND**

	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths "L"			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = WS <sup>2</sup> / 60	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70	700'	770'	840'	70'	140'	800'	475'	
75	750'	825'	900'	75'	150'	900'	540'	

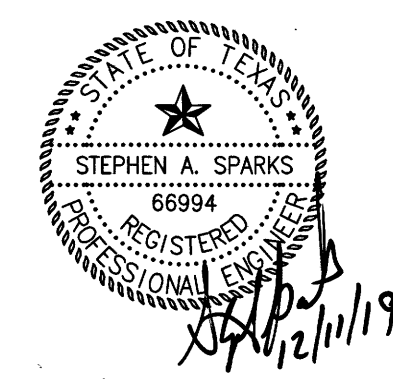
\* Conventional Roads Only  
 \*\* Taper lengths have been rounded off.  
 L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

- GENERAL NOTES**
- Flags attached to signs where shown are OPTIONAL.
  - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol are OPTIONAL.
  - Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
  - A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
  - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
  - 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.
  - No lanes shall be blocked during construction.
  - If project is within 400 feet from a signalized intersection, the Contractor shall contact Harris County Engineering Department, Traffic Signal Maintenance at (713) 881-3210 five (5) days prior to the start of construction.



NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

**TRAFFIC CONTROL PLAN (SHOULDER WORK)**



DRAWN BY: BSH CHECKED BY: [Signature]



SHEET No. 94 OF 99

NO.	REVISIONS	DATE	NAME
1	REVISION_TEXT	DATE	INIT
2	REVISION_TEXT	DATE	INIT
3	REVISION_TEXT	DATE	INIT
4	REVISION_TEXT	DATE	INIT
5	REVISION_TEXT	DATE	INIT

HARRIS COUNTY ENGINEERING DEPARTMENT

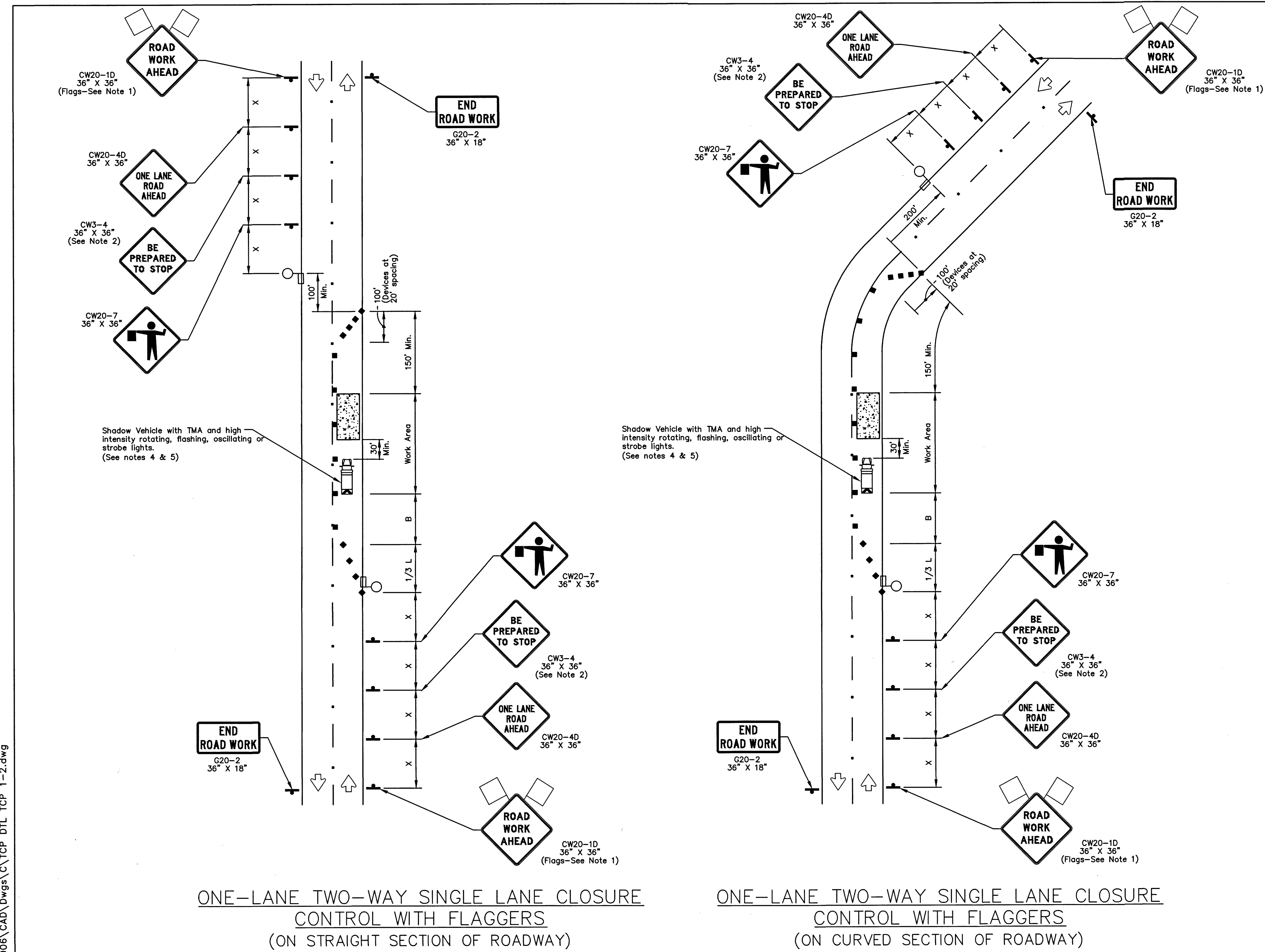


PROJECT TITLE:		TRAFFIC STANDARD
SHEET DESCRIPTION:		TCP-SW
DRAWN BY:	DATE:	10/24/2018
CK'D BY:	SCALE:	SHEET NO:
BSH	NTS	

LAST MODIFIED: Dec 11, 2019 - 8:57am BY USER: jblank  
 DWG. LOCATION: \\hrgplus\data\85110006\CAD\Draws\CAD\Draws\TC  
 DWG. NAME: TCP DTL TCP 1-1.dwg



No.	Date	Revisions	App.



ONE-LANE TWO-WAY SINGLE LANE CLOSURE  
CONTROL WITH FLAGGERS  
(ON STRAIGHT SECTION OF ROADWAY)

ONE-LANE TWO-WAY SINGLE LANE CLOSURE  
CONTROL WITH FLAGGERS  
(ON CURVED SECTION OF ROADWAY)

TRAFFIC CONTROL PLAN SECTION SHALL BE COMPLETED BY ENGINEER

ROADWAY	POSTED SPEED	TAPER LENGTH	SPACING CHANNELIZING DEVICES		SIGN SPACING	BUFFER SPACE
			TAPER	TANGENT		
COPELAND ROAD	30	180	30	60	120	90

LEGEND

	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger


Posted Speed *	Formula	Minimum Desirable Taper Lengths "L"			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = WS <sup>2</sup> / 60	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40	L=WS	265'	295'	320'	40'	80'	240'	155'
45		450'	495'	540'	45'	90'	320'	195'
50	L=WS	500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60	L=WS	600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70	L=WS	700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

\* Conventional Roads Only  
\*\* Taper lengths have been rounded off.  
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

- GENERAL NOTES
- Flags attached to signs where shown are OPTIONAL.
  - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol are OPTIONAL.
  - Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
  - A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
  - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
  - 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.
  - Flaggers should use two-way radios or other methods of communication to control traffic.
  - Length of work space should be based on the ability of flaggers to communicate.
  - If the work space is located near horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distances to the flagger and a queue of stopped vehicles (see table above).
  - Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
  - Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.
  - No lanes shall be blocked from 7am to 9am and 4pm to 6:30pm Monday thru Friday.
  - Off duty police officers required to direct traffic when applicable.
  - If project is within 400 feet from a signalized intersection, the Contractor shall contact Harris County Engineering Department, Traffic Signal Maintenance at (713) 881-3210 five (5) days prior to the start of construction.

NO.	REVISIONS	DATE	NAME
1	REVISION_TEXT	DATE	INIT
2	REVISION_TEXT	DATE	INIT
3	REVISION_TEXT	DATE	INIT
4	REVISION_TEXT	DATE	INIT

HARRIS COUNTY  
ENGINEERING DEPARTMENT



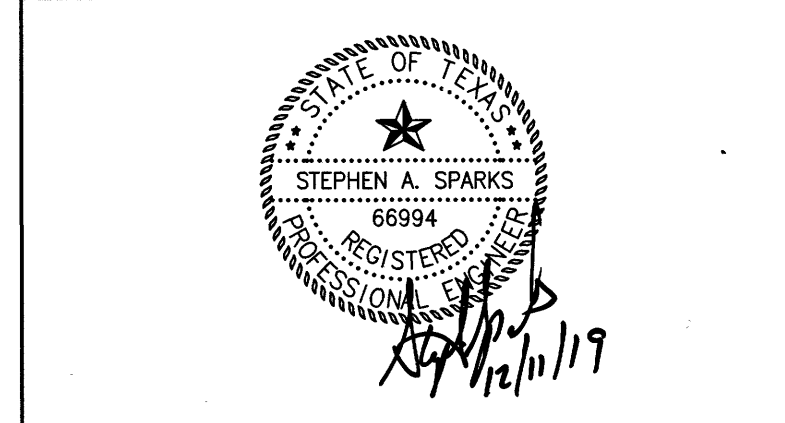
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SHEET DESCRIPTION:	(ONE-LANE, TWO-WAY OPERATION)	DATE:	10/24/2018
DRAWN BY:	BSH	SCALE:	NONE
CK'D BY:	BSH	SHEET NO.:	99



AECOM TECHNICAL SERVICES, INC.  
5444 WESTHEIMER RD., SUITE 200  
HOUSTON, TEXAS 77056  
WWW.AECOM.COM  
TBP# REG. NO. F-3580  
713.780.4100

NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
PROJECT 28-B  
PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

TRAFFIC CONTROL PLAN  
(ONE-LANE, TWO-WAY OPERATION)

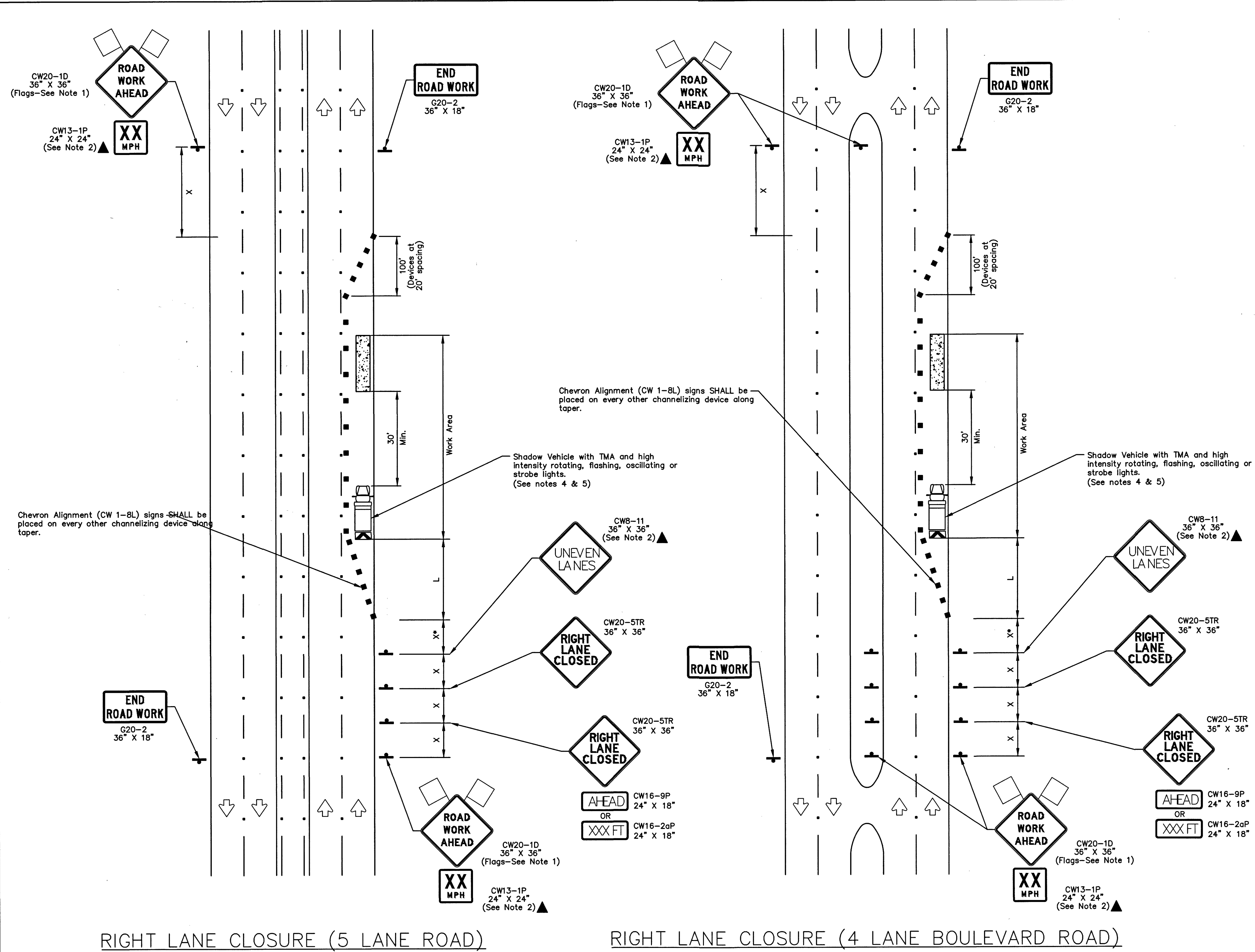


DANNENBAUM  
ENGINEERING CORPORATION  
T.B.P.E. FIRM REGISTRATION #392  
3100 WEST ALABAMA HOUSTON, TEXAS 77099 (713) 520-9570

LAST MODIFIED: Dec 11, 2019 - 8:57am  
BY USER: jblanks  
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No.	Date	Revisions	App.



TRAFFIC CONTROL PLAN SECTION SHALL BE COMPLETED BY ENGINEER

ROADWAY	POSTED SPEED	TAPER LENGTH	SPACING CHANNELIZING DEVICES		SIGN SPACING	BUFFER SPACE
			TAPER	TANGENT		
GRANT ROAD	40	320	40	80	240	155

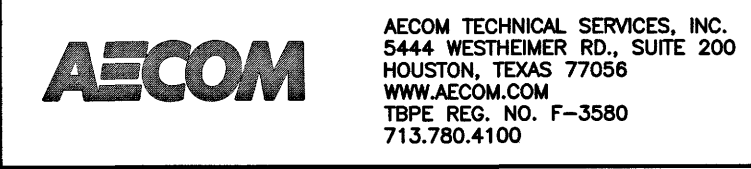
LEGEND

	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths "L"			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
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55		550'	605'	660'	55'	110'	500'	295'
60	L=WS	600'	660'	720'	60'	120'	600'	350'
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70	L=WS	700'	770'	840'	70'	140'	800'	475'
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 L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

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  - No lanes shall be blocked from 7am to 9am and 4pm to 6:30pm Monday thru Friday.
  - Off duty police officers/flaggers are required to direct traffic when applicable.
  - If project is within 400 feet from a signalized intersection, the Contractor shall contact Harris County Engineering Department, Traffic Signal Maintenance at (713) 881-3210 five (5) days prior to the start of construction.



NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY  
 PROJECT 28-B  
 PROPOSED 60" AND 54" WATER LINE ALONG GRANT ROAD AND COPELAND ROAD

TRAFFIC CONTROL PLAN  
 (RIGHT LANE CLOSURE)



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 ENGINEERING CORPORATION  
 T.B.P.E. FIRM REGISTRATION #392  
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

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NO.	REVISIONS	DATE	NAME
	REVISION_TEXT	DATE	INIT
	REVISION_TEXT	DATE	INIT
	REVISION_TEXT	DATE	INIT
	REVISION_TEXT	DATE	INIT
	REVISION_TEXT	DATE	INIT

HARRIS COUNTY  
 ENGINEERING DEPARTMENT



PROJECT TITLE:	TRAFFIC CONTROL PLAN (RIGHT LANE CLOSURE)
SHEET DESCRIPTION:	TRAFFIC CONTROL PLAN (RIGHT LANE CLOSURE)
DRAWN BY:	BHS
CHECKED BY:	BHS
DATE:	10/24/2018
SCALE:	NTS
SHEET NO.:	96