THE STATE OF TEXAS	§	
	§	**KNOW ALL MEN BY THESE PRESENTS:**
COUNTY OF FORT BEND	§	

INTERLOCAL AGREEMENT FOR CONSTRUCTION AND MAINTENANCE OF
TRAILS SYSTEM PHASE 1 – FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 25

This Agreement is made and entered into pursuant to the Interlocal Cooperation Act, Chapter 791 of the TEXAS GOVERNMENT CODE ("Act"), by and between Fort Bend County Municipal Utility District No. 25 ("District"), acting by and through its Board of Directors, and Fort Bend County, a body corporate and politic under the laws of the State of Texas, acting by and through its Commissioners Court, ("County").

RECITALS

WHEREAS, the District proposes to construct a system of trails within its boundaries consisting of concrete sidewalks, crushed granite trails and a Pedestrian Hybrid Beacon ("PHB") within public right of way owned, controlled or managed by the County, which includes a drainage channel utilized by the Fort Bend County Drainage District ("Drainage District"); and

WHEREAS, it is the County's desire to protect its public right of way and the facilities lying within such right of way; and

WHEREAS, the District desires to provide the County with certain assurances regarding the County's public right of way and the District's system of trails; and

WHEREAS, the District is a local government as defined by the Act, and as such is lawfully permitted to enter into an Interlocal Agreement; and

WHEREAS, the District is a local government as defined by the Act, and as such is lawfully permitted to enter into an Interlocal Agreement; and

WHEREAS, the County and the District believe it is in their respective best interests to enter into this Agreement to facilitate the provision of certain governmental functions to the citizens of Fort Bend County; and

WHEREAS, the Commissioners Court of the County finds that the Project contemplated in this Agreement serves a County purpose; and

WHEREAS, the governing bodies of the District and the County have authorized this Agreement;

NOW, THEREFORE, for and in consideration of the mutual covenants, agreements and benefits to both parties, it is agreed as follows:

AGREEMENT

Section 1. Incorporation of Recitals

The representations, covenants and recitations set forth in the foregoing recitals are material to this Agreement and are incorporated into this Agreement.

Section 2. Purpose

The purpose of this Agreement is to outline the obligations related to the construction and maintenance of an approximately 1,300 linear feet concrete sidewalk along Old Richmond Road from Garcia Middle School to Pecan Acres Drive and an approximately 4,200 linear foot crushed granite trail along Old Richmond Road from Pecan Acres Drive to Red Gully ditch, as depicted on Exhibit A, attached hereto and incorporated herein for all purposes, (hereinafter referred to as the "Project").

Section 3. District's Responsibilities and Rights

A. The District will construct the Project at its expense in accordance with the plans and specification attached hereto as Exhibit A, as approved by the County. The District shall not commence construction of the Project or any subsequent Improvements, as defined herein below, without first providing written notice to the County and obtaining its approval for such construction or Improvements. The District will require the contractor for the Project, (the "Contractor") to obtain a Right of Way Permit from the County.

B. Subject to approval by the County, the District may, at its sole expense, landscape and maintain the Project for the purposes of enhancing and/or preserving the natural beauty and aesthetic quality of the public right of way surrounding the Project, and construct and maintain recreational facilities, including but not limited to park benches, lights and exercise apparatus, ("Improvements"); provided, however, that nothing in this Agreement shall be construed to prohibit the County from widening the roadway or maintaining the right of way. The County currently has no plans for any widening of Old Richmond Road in this area.

C. At all times, upon completion of the construction of the Project, the District shall keep and maintain, or cause to be kept and maintained, the Project and any Improvements in a reasonable state of appearance at the District's sole expense. The Project shall not cause any sight distance restriction that would impact driver or pedestrian safety.

D. To prevent interference with the County's maintenance, repair, or improvement of the public right of way or any of its improvements therein, and to prevent risk of injury to the public, the District will provide for the ability to close the Project during the County's maintenance or construction operations in the public right of way surrounding the Project.

E. The District shall obtain a one-year maintenance bond for the PHB from the Contractor.

Section 4. County's Responsibilities and Rights

A. The County's sole obligation under this Agreement is, and it has hereby agreed to,

maintain the PHB after acceptance and authorize the District to use the public right of way to construct the Project in accordance with Exhibit A and maintain such Project. The purposes of the Project shall include, but are not limited to, exercising, walking, jogging, bicycling and other recreational activities. The County shall have the right to approve the final plans and specifications of the Project prior to the commencement of construction.

B. During the work on the Project, the County shall have the right to review all drawings, maps, plats, records and drawings affecting the construction and to inspect the work in progress.

C. After the one-year maintenance period for the PHB, the Contractor shall request final acceptance from the County. Upon the County issuing a final letter of acceptance for the construction of the PHB, the County will accept future maintenance of the PHB.

Section 5. Term

This Agreement shall become effective on the date executed by the final party, and remain in effect until September 30, 2047. This Agreement is subject to renewal thereafter upon the mutual written agreement of the parties hereto.

Section 6. Insurance and Liability

A. The District and the County are entitled to the immunities and defenses of the Texas Tort Claims Act.

B. The parties agree that neither party is an agent, servant, or employee of the other party and each party agrees that it is responsible for its individual acts and deeds as well as the acts and deeds of its contractors, employees, representatives, and agents.

C. At all times during the term of this Agreement, the District will provide and keep in force liability insurance covering the District for liability for property damage and personal injury. This insurance is to be carried by one or more insurance companies duly authorized or admitted to transact business in Texas. The insurance provided under this section must be in the amount of not less than $100,000.00 for property damage and not less than $100,000.00 for one person and $300,000.00 for one accident for personal injury. This insurance will protect the District against liability to any employees or servants of the District, and to any other person or persons whose property damage or personal injury arises out of or in connection with the occupation, use, or condition of the Project. The District shall include the County and the members of Commissioners Court as additional insureds on such insurance.

D. The District agrees that it will require any contractor who constructs any phase of the Project to maintain insurance policies as shown below. All insurance policies carried by such contractors shall name the County as well as the District as additional insureds on all policies except for Workers' Compensation and Professional Liability (with respect to liability arising out of work performed by the contractors or subcontractors, as applicable) and shall contain a waiver of subrogation. Any such insurance policies shall include at least the following minimum coverage:

i. Worker's Compensation in the amount required by law. The policy shall include the All States Endorsement.

ii. Comprehensive General Liability Insurance including contractual liability insurance, $1,000,000 per occurrence, $2,000,000 aggregate (defense costs excluded from face amount of policy).

iii. Comprehensive Automatic Liability Insurance, including owned, non-owned and hired vehicles used for the Project, with bodily injury and property damage with a combined limit of not less than $1,000,000 each occurrence.

iv. The District may require insurance in excess of the amount of coverage set out above, as it deems necessary, in such cases, the County shall remain an additional insured.

Section 8. Amendments

Amendments and changes to this Agreement due to changes in the character of the work or terms of this Agreement, or responsibilities of the parties relating to the Project, may be enacted though a mutually agreed upon, written amendment between the County and the District.

Section 9. Remedies

Unless otherwise specified elsewhere in this Agreement, the rights and remedies contained in this Agreement are not exclusive, but are cumulative of all rights and remedies which exist now or in the future.

Section 10. Legal Construction

In case one or more of the provisions contained in this Agreement shall for any reason be held invalid, illegal, or unenforceable in any aspect, such invalidity, illegality or unenforceability shall not affect any other provisions and this Agreement shall be construed as if it did not contain the invalid, illegal, or unenforceable provision.

Section 11. Notices

A. All notices and communications under this Agreement shall be mailed by certified U.S. mail, return receipt requested, or delivered to the following addresses:

County:	Fort Bend County Engineering Department Attn: Richard Stolleis, P.E., County Engineer 301 Jackson Street Richmond, Texas 77469
With a copy to:	Fort Bend County Attn: Robert E. Hebert, County Judge 401 Jackson Street, 1st Floor Richmond, Texas 77469

District: Fort Bend County Municipal Utility District No. 25
c/o Sechrist Duckers, LLP
Attn: Terrie Sechrist
16300 West Loop South, Suite 415
Bellaire, Texas 77401

B. All notices shall be deemed given on the date do delivered or so deposited in the mail, unless otherwise provided herein. Either party may change the above address by sending written notice of the change to the other party. Either party may request in writing that such notices shall be delivered personally or by certified U.S. mail and such request shall be honored and carried out by the other party.

Section 12. Entire Agreement

This Agreement contains the entire agreement between the parties relating to the rights granted and the obligations assumed. Any modifications concerning this instrument shall be of no force or effect, unless a subsequent modification in writing is signed by all parties hereto.

Section 13. Execution

This Agreement has been executed by the County and the District upon and by the authority of their respective governing bodies. This Agreement shall become effective on the date executed by the final party.

[THE REMAINDER OF THIS PAGE INTENTIONALL Y LEFT BLANK.]

FORT BEND COUNTY, TEXAS

Robert E. Hebert, County Judge

Date: _____

ATTEST:

Laura Richard, County Clerk

APPROVED:

Richard W. Stolleis, P.E., County Engineer

APPROVED AS TO LEGAL FORM:

Marcus D. Spencer, First Assistant County Attorney

FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 25

President, Board of Directors

Date: May 18, 2017

ATTEST:

ATTACHMENTS:

Exhibit "A" – Construction Plans

I:\Marcus\Agreements\Engineering\Trails System Phase 1\ILA - FBMUD 25.Trail System Ph 1.v3.docx

EXHIBIT A

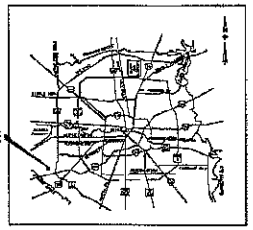
FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 25

CONSTRUCTION PLANS FOR

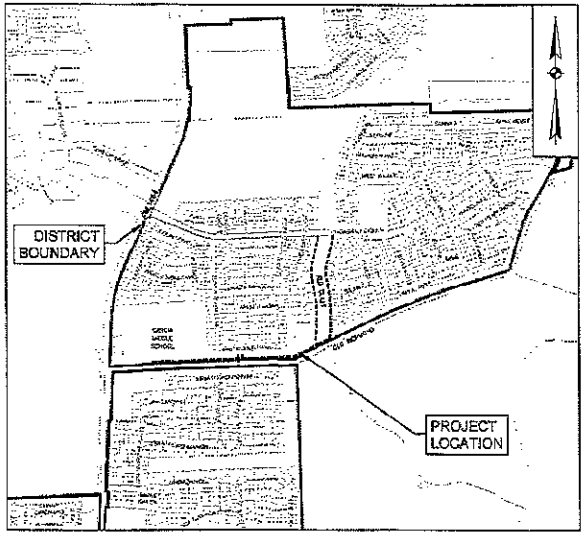
TRAILS SYSTEM PHASE 1

FROM PHEASANT CREEK TO OLD RICHMOND ROAD TO GARCIA MIDDLE SCHOOL

FT. BEND COUNTY, TEXAS



LOCATION MAP



VICINITY MAP

NOT TO SCALE

KEY MAP NO. 587F, 587K

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ONE-CALL NOTIFICATION SYSTEM
CALL BEFORE YOU DIG!!!
(713) 223-4567 (IN HOUSTON)
(NEW STATEWIDE NUMBER OUTSIDE HOUSTON)
1-800-545-6005

May 2017

PROJECT NO. 120-11942-000-400

FORT BEND COUNTY ENGINEER

ENGINEER: _____
Richard W. Stolhanske, P.E.

DATE: _____

THESE SIGNATURES ARE VOID IF CONSTRUCTION HAS NOT COMMENCED WITHIN THREE YEARS FROM DATE OF APPROVAL.

APPROVED: _____
Development Coordinator

DATE: _____

DESIGNED BY: _____

CHECKED BY: _____

APPROVED BY: _____

INTERIM REVIEW ONLY
Document incomplete, not intended for permit, bidding or construction.
Engineer: Edward C. Stimich
P.E. No.: 101294
Firm: Lockwood, Andrews & Newnam, Inc.
Firm No.: F-2614
Date: 5/2/17

LAN
Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
2925 Briar Park Drive Houston, TX 77042

SURVEYED BY: FB NO.:

SHEET No. 1 OF 53

FBCMUD NO. 25 TRAILS SYSTEM PHASE 1

PLAN SHEET
FILE NO.
PROJECT No. 120-11942-000-400

GENERAL CONSTRUCTION NOTES:

1. WATER LINES, WASTEWATER COLLECTIONS SYSTEMS AND DRAINAGE SYSTEMS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST VERSION OF THE CITY OF HOUSTON, DEPARTMENT OF PUBLIC WORKS AND ENGINEERING'S "STANDARD CONSTRUCTION SPECIFICATIONS", AND "STANDARD CONSTRUCTION DETAILS FOR WASTEWATER COLLECTION SYSTEMS, WATER LINES, STORM DRAINAGE AND STREET PAVING" WITH ALL SUBSEQUENT AMENDMENTS ADDED THERETO UNLESS OTHERWISE NOTED AND APPROVED ON THESE PLANS. THE DESIGN MUST AGREE WITH THE MINIMUM STANDARDS ESTABLISHED IN THE LATEST VERSION OF THE "INFRASTRUCTURE DESIGN MANUAL". NOTE THAT PLAN SIGNATURES EXPIRE AFTER 1 YEAR AND THE LATEST EDITIONS OF DESIGN RULES, SPECIFICATIONS & MANUALS SHALL GOVERN AS OF THE RESIGNING.

2. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGE TO THE EXISTING PUBLIC OR PRIVATE UTILITY LINES, INCLUDING BUT NOT LIMITED TO WATER LINES, WASTEWATER COLLECTOR SYSTEMS AND STORM SEWERS, DURING CONSTRUCTION. ALL DAMAGES SHALL BE REPAIRED IN ACCORDANCE WITH CITY OF HOUSTON, DEPARTMENT OF PUBLIC WORKS AND ENGINEERING "STANDARD CONSTRUCTION SPECIFICATIONS" WITH LATEST ADDENDA AND AMENDMENTS THERETO, WITH NO COST TO THE PUBLIC.

3. THE CONTRACTOR SHALL BE LIABLE FOR ALL LEGAL ACTIONS RESULTING FROM CONSTRUCTION ACTIVITY IN THE VICINITY OF THIS PROJECT AND BY ACCEPTING THESE PLANS, AGREES TO HOLD THE OWNER AND ENGINEER NOT RESPONSIBLE FOR ANY CLAIMS OR DAMAGES RESULTING FROM HIS WORK.

4. CONTRACTOR SHALL NOTIFY "ONE CALL" AT 1-800-669-8344 OR 811, 48 HOURS PRIOR TO COMMENCING ANY WORK.

5. EXISTING UTILITY INFORMATION SHOWN IS NOT GUARANTEED TO BE ACCURATE AND ALL INCLUSIVE. LOCATIONS AND SIZES FOR EXISTING UTILITIES, INCLUDING SERVICE LATERALS, ARE APPROXIMATE AND SHOULD BE VERIFIED BY THE CONTRACTOR IN ADVANCE OF HIS CONSTRUCTION OR MATERIAL ORDERING. ANY CONFLICT OR DISCREPANCY DISCOVERED MUST BE IMMEDIATELY BROUGHT TO THE ENGINEER'S ATTENTION PRIOR TO CONSTRUCTION.

6. CONTRACTOR SHALL SUBMIT A NOTIFICATION TO THE OWNER AND ENGINEER ON A DAILY BASIS STATING WHERE THEY WILL BE WORKING.

7. THE CONTRACTOR, ON BEHALF OF THE OWNER, IS TO OBTAIN ALL PERMITS REQUIRED BY THE CITY OF HOUSTON OR FORT BEND COUNTY, PRIOR TO STARTING CONSTRUCTION OF UTILITIES WITHIN ROAD RIGHTS-OF-WAY.

8. THE CONTRACTOR SHALL OBTAIN AND COMPLY WITH ALL APPLICABLE CITY, COUNTY, STATE AND FEDERAL PERMITS AND APPROVALS, ALL RULES AND REGULATIONS THEREIN, AND THE REQUIREMENTS AND THE DIRECTION OF THEIR INSPECTORS.

9. GUIDELINES SET FORTH IN THE TEXAS "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", AS CURRENTLY AMENDED, SHALL BE OBSERVED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ADEQUATE FLAG MEN, SIGNAGE, STRIPING, AND WARNING DEVICES, ETC. . . DURING CONSTRUCTION - BOTH DAY AND NIGHT.

10. THE LOADING AND UNLOADING OF ALL PIPE, VALVES, HYDRANTS, MANHOLES, AND OTHER ACCESSORIES SHALL BE IN ACCORDANCE WITH THE MANUFACTURER RECOMMENDED PRACTICES AND SHALL AT ALL TIMES BE PERFORMED WITH CARE TO AVOID ANY DAMAGE TO THE MATERIAL. THE CONTRACTOR SHALL LOCATE AND PROVIDE THE NECESSARY STORAGE AREAS FOR THE MATERIALS AND EQUIPMENT.

11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SHIPPING AND STORING OF ALL MATERIALS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO EXAMINE SUCH MATERIAL AT THE POINT OF DELIVERY AND TO REJECT ALL DEFECTIVE MATERIAL. ANY DEFECTIVE MATERIAL INCORPORATED INTO THE WORK SHALL BE REMOVED AND REPLACED AT THE CONTRACTOR'S EXPENSE. THERE SHALL BE NO PAYMENT MADE FOR STORED MATERIAL.

12. ALL PIPE AND REINFORCEMENT STEEL SHALL BE KEPT FREE OF DIRT AND OTHER DEBRIS. ANY DAMAGE TO THE COATING OF THE VARIOUS MATERIAL MUST BE REPAIRED.

13. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ADEQUATE AND POSITIVE DRAINAGE AT ALL TIMES DURING CONSTRUCTION OF PROPOSED FACILITIES.

14. ACCESS TO ALL EXISTING STREETS AND DRIVEWAYS SHALL BE MAINTAINED AT ALL TIMES. STEEL PLATE ANCHORED PROPERLY SHALL BE USED AS NEEDED.

15. CONTRACTOR SHALL USE HIGH EARLY STRENGTH CONCRETE FOR ALL PAVEMENT INCLUDING DRIVEWAYS. ALL DRIVEWAYS TO BE REMOVED SHALL BE RESTORED AND OPENED TO TRAFFIC WITHIN 7 DAYS, AND WITHIN 24 HOURS IF DRIVEWAY IS ONLY ACCESS TO PROPERTY. ALL PAVEMENT TO BE REMOVED SHALL BE RESTORED AND OPENED TO TRAFFIC WITHIN 24 HOURS.

16. CONTRACTOR IS TO MAINTAIN A CLEAN PROJECT AREA, FREE FROM WORKMAN TRASH AND REFUSE, AT ALL TIMES. WASTE MATERIAL AND DEBRIS SHALL BE REMOVED FROM THE SITE ON A DAILY BASIS.

17. THE CONTRACTOR IS REQUIRED TO FOLLOW ALL APPLICABLE OSHA RULES AND REGULATIONS. TRENCH SAFETY SHALL BE DONE IN ACCORDANCE WITH OSHA STANDARDS.

18. CONTRACTOR SHALL COMPLY WITH OSHA REGULATIONS REGARDING CONFINED SPACE ENTRY WHEN WORKING IN ANY EXISTING MANHOLES, SEWER AND INTERSECTION PITS.

19. ALL STATIONS ARE CENTERLINE OF STREET RIGHT-OF-WAY UNLESS OTHERWISE NOTED.

20. ALL GEOTECHNICAL REPORTS (IF ANY) FOR THIS PROJECT ARE AVAILABLE FOR REFERENCE AT THE OFFICE OF THE ENGINEER.

21. CONTRACTOR SHALL BE RESPONSIBLE FOR AND ADEQUATELY PROTECT EXISTING STRUCTURES, UTILITIES, TREES, SHRUBS, AND OTHER ADJOINING FACILITIES. CONTRACTOR SHALL REPAIR OR REPLACE ALL EXISTING FACILITIES DAMAGED BY CONSTRUCTION TO ORIGINAL CONDITION OR BETTER AT NO ADDITIONAL COST.

22. SURFACE RESTORATION: THE CONTRACTOR SHALL RESTORE THE EXISTING FACILITIES, I.E. THE PROPERTY, EQUAL TO OR BETTER THAN EXISTING SITE CONDITIONS PRIOR TO THE CONSTRUCTION. ALL FINISHED GRADES SHALL VARY UNIFORMLY BETWEEN THE FINISHED ELEVATIONS SHOWN.

23. CONDITION OF THE ROAD AND/OR RIGHT-OF-WAY, UPON COMPLETION OF JOB, SHALL BE AS GOOD AS OR BETTER THAN THE CONDITION PRIOR TO STARTING WORK. ANY DISTURBED NON-PAVED AREAS SHALL HAVE SOD PLACED ON THEM.

24. CONTRACTOR SHALL DIGITALLY VIDEO RECORD ALL AREAS INCLUDING RESIDENTIAL YARDS THAT WILL BE ENTERED TO PERFORM CONSTRUCTION ACTIVITIES. A PRE-CONSTRUCTION VIDEO WILL BE SUBMITTED TO ENGINEER PRIOR TO STARTING WORK. NO SEPARATE PAY.

25. FINAL ACCEPTANCE OF THE UTILITIES WILL NOT BE GIVEN TO THE CONTRACTOR UNTIL THEY ARE INSPECTED AND APPROVED BY TCEQ AND THE CITY OF HOUSTON. FINAL ACCEPTANCE OF THE PAVING WILL NOT BE GIVEN TO THE CONTRACTOR UNTIL IT IS INSPECTED AND APPROVED BY THE CITY OF HOUSTON AND FORT BEND COUNTY.

26. CONTRACTOR SHALL NOT STORE CONSTRUCTION MATERIALS IN ROAD RIGHT-OF-WAY OVERNIGHT.

27. WHENEVER POSSIBLE, CONTRACTOR SHALL LIMIT WORKING HOURS TO BETWEEN 7 AM TO 4:30 PM ONLY. PERFORMANCE OF WORK OUTSIDE OF THESE HOURS AND ON SATURDAY, SUNDAY OR OTHER LEGAL HOLIDAY SHALL ONLY BE PERMITTED WITH WRITTEN CONSENT OF THE OWNER. IF INSPECTION IS REQUIRED AFTER HOURS, CONTRACTOR WILL BE RESPONSIBLE FOR OVERTIME PAY OF THE INSPECTOR.

UPDATED: 11/04/2016

FORT BEND COUNTY ENGINEERING:

CONSTRUCTION GENERAL NOTES:

1. FORT BEND COUNTY MUST BE INVITED TO THE PRE-CONSTRUCTION MEETING.

2. CONTRACTOR SHALL NOTIFY FORT BEND COUNTY ENGINEERING DEPARTMENT 48 HOURS PRIOR TO COMMENCING CONSTRUCTION AND 48 HOUR NOTICE TO ANY CONSTRUCTION ACTIVITY WITHIN THE LINES OF THE PAVING AT CONSTRUCTION@FORTBENDCOUNTYTX.GOV.

3. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED FROM FORT BEND COUNTY PRIOR TO COMMENCING CONSTRUCTION OF ANY IMPROVEMENTS WITHIN COUNTY ROAD RIGHT OF WAY.

4. ALL PAVING IMPROVEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH FORT BEND COUNTY "RULES, REGULATIONS AND REQUIREMENTS RELATING TO THE APPROVAL AND ACCEPTANCE OF IMPROVEMENTS IN SUBDIVISIONS" AS CURRENTLY AMENDED.

5. ALL ROAD BOTHS, CURB PADS AND CURB ALIGNMENT SHOWN INDICATE BACK OF CURB.

6. A CONTINUOUS LONGITUDINAL REINFORCING BAR SHALL BE USED IN THE CURBS.

7. ALL CONCRETE PAVEMENT SHALL BE 5 1/2 SACK CEMENT WITH A MINIMUM COMPRESSIVE STRENGTH OF 3500 PSI AT 28 DAYS. TRANSVERSE EXPANSION JOINTS SHALL BE INSTALLED AT EACH CURB RETURN AND AT A MAXIMUM SPACING OF 60 FEET.

8. ALL WEATHER ACCESS TO ALL EXISTING STREETS AND DRIVEWAYS SHALL BE MAINTAINED AT ALL TIMES.

9. 4" X 12" REINFORCED CONCRETE CURB SHALL BE PLACED IN FRONT OF SINGLE FAMILY LOTS ONLY. ALL OTHER AREAS SHALL BE 6" REINFORCED CONCRETE CURB.

10. AT ALL INTERSECTION LOCATIONS, TYPE 7 RAMPS SHALL BE PLACED IN ACCORDANCE WITH TXDOT PED-12A STANDARD DETAIL SHEET. A.D.A. - HANDICAP RAMPS SHALL BE INSTALLED WITH STREET PAVING AT ALL INTERSECTIONS AND COMPLY WITH CURRENT A.D.A. REGULATIONS.

11. CURB HEADERS ARE REQUIRED AT CURB CONNECTIONS TO HANDICAP RAMPS, WITH NO CONSTRUCTION JOINT WITHIN 5' OF RAMPS.

12. ALL INTERSECTIONS UTILIZING TRAFFIC CONTROL MEASURES SHALL HAVE A.D.A. WHEEL CHAIR RAMPS INSTALLED.

13. GUIDELINES ARE SET FORTH IN THE TEXAS "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES," AS CURRENTLY AMENDED, SHALL BE OBSERVED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ADEQUATE FLAGMEN, SIGNING, STRIPING AND WARNING DEVICES, ETC. DURING CONSTRUCTION — BOTH DAY AND NIGHT.

14. ALL R1-1 STOP SIGNS SHALL BE 30"X30" WITH DIAMOND GRADE SHEETING PER TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

15. STREET NAME SIGNAGE SHALL BE ON A 5" HIGH SIGN FLAT BLADE W/ REFLECTIVE GREEN BACKGROUND. STREET NAMES SHALL BE UPPER AND LOWERCASE LETTERING WITH UPPERCASE LETTERS OF 6" MINIMUM AND LOWERCASE LETTERS OF 4.5" MINIMUM. THE LETTERS SHALL BE REFLECTIVE WHITE. STREET NAME SIGNS SHALL BE MOUNTED ON STOP SIGN POST.

16. A BLUE DOUBLE REFLECTORIZED BUTTON SHALL BE PLACED AT ALL FIRE HYDRANT LOCATIONS. THE BUTTON SHALL BE PLACED 12 INCHES OFF OF THE CENTERLINE OF THE STREET ON THE SAME SIDE AS THE HYDRANT.

TRAFFIC NOTES:

1. CONTRACTOR SHALL PROVIDE AND INSTALL TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH PART VI OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TEXAS MUTCD, MOST RECENT EDITION WITH REVISIONS) DURING CONSTRUCTION.

2. NO LANES SHALL BE CLOSED DURING THE HOURS OF 7:00 AM TO 9:00 AM AND 2:00 PM TO 8:00 PM MONDAY THRU FRIDAY.

3. NO LANES SHALL BE CLOSED IN RESIDENTIAL AREA FROM 7:00 PM TO 7:00 AM.

4. CONTRACTOR SHALL MAINTAIN ONE LANE OF TRAFFIC IN EACH DIRECTION DURING WORKING HOURS.

5. OFF DUTY POLICE OFFICERS/FLAGGERS ARE REQUIRED TO DIRECT TRAFFIC WHEN LANES ARE BLOCKED.

6. CONTRACTOR SHALL COVER OPEN EXCAVATIONS WITH STEEL PLATES ANCHORED PROPERLY DURING NON-WORKING HOURS AND OPEN LANES FOR NORMAL TRAFFIC FLOW.

7. IN THE EVENT WHEN NO "TRAFFIC CONTROL PLANS" EXIST AS A PART OF CONTRACT DRAWINGS, CONTRACTOR MAY PREPARE* PLANS AND SUBMIT TO PLAN REVIEW SECTION FOR APPROVAL TEN WORKING DAYS PRIOR TO IMPLEMENTATION.

*THESE PLANS SHALL BE DRAWN TO SCALE ON PRODUCIBLE MYLARS AND SEALED BY A LICENSED ENGINEER IN THE STATE OF TEXAS. PLANS WILL BECOME A PART OF THE CONTRACT DRAWINGS.

8. APPROVED COPIES OF "TRAFFIC CONTROL PLANS" AND LANE SIDEWALK CLOSURE PERMITS SHALL BE AVAILABLE FOR INSPECTION AT THE JOB SITE AT ALL TIMES.

9. IF THE PROJECT IS WITHIN 400 FEET FROM A SIGNALIZED INTERSECTION, THE CONTRACTOR SHALL CONTACT FORT BEND COUNTY ENGINEERING DEPARTMENT, TRAFFIC DIVISION, AT TRAFFIC@FORTBENDCOUNTYTX.GOV OR (281) 633-7500 A MINIMUM OF 24 HOURS PRIOR TO START OF CONSTRUCTION.

10. LOW PROFILE CONCRETE BARRIER IS REQUIRED FOR ALL AREAS WHERE THE EXCAVATION IS WITHIN 12' OF THE TRAVELED LANE.

PRIVATE UTILITY NOTES:

CAUTION: AT&T TEXAS/SWBT FACILITIES

1. THE LOCATIONS OF AT&T TEXAS/SWBT FACILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION BEFORE COMMENCING WORK. HE AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY 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/SWBT FACILITIES, ALL EXCAVATIONS MUST BE ACCOMPLISHED USING NON-MECHANIZED EXCAVATION PROCEDURES. WHEN BORING, THE CONTRACTOR SHALL EXPOSE THE AT&T TEXAS/SWBT FACILITIES.

4. WHEN AT&T TEXAS/SWBT FACILITIES ARE EXPOSED, THE CONTRACTOR WILL PROVIDE SUPPORT TO PREVENT DAMAGE TO THE CONDUIT DUCTS OR CABLES. WHEN EXCAVATING NEAR TELEPHONE POLES THE CONTRACTOR SHALL BRACE THE POLE FOR SUPPORT.

5. THE PRESENCE OR ABSENCE OF AT&T TEXAS/SWBT UNDERGROUND CONDUIT FACILITIES OR BURIED CABLE FACILITIES SHOWN ON THESE PLANS DOES NOT MEAN THAT THERE ARE NO DIRECT BURIED CABLES OR OTHER CABLES IN CONDUIT IN THE AREA.

6. PLEASE CONTACT THE AT&T TEXAS DAMAGE PREVENTION MANAGER MR. ROOSEVELT LEE JR. AT (713) 567-4582 OR EMAIL HIM AT rl2259@att.com, IF THERE ARE QUESTIONS ABOUT BORING OR EXCAVATING NEAR OUR AT&T TEXAS/SWBT FACILITIES.

CAUTION: UNDERGROUND GAS FACILITIES

LOCATIONS OF CENTERPOINT ENERGY MAIN LINES (TO INCLUDE CENTERPOINT ENERGY, INTRASTATE PIPELINE, LLC, WHERE APPLICABLE) ARE SHOWN IN AN APPROXIMATE LOCATION ONLY. SERVICE LINES ARE USUALLY NOT SHOWN. OUR SIGNATURE ON THESE PLANS ONLY INDICATES THAT OUR FACILITIES ARE SHOWN IN APPROXIMATE LOCATION. IT DOES NOT IMPLY THAT A CONFLICT ANALYSIS HAS BEEN MADE. THE CONTRACTOR SHALL CONTACT THE UTILITY COORDINATING COMMITTEE AT 1-800-545-6005 OR 811 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE MAIN AND SERVICE LINES FIELD LOCATED.

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

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

WARNING: OVERHEAD ELECTRICAL LINES

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

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

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

ACTIVITIES ON OR ACROSS CENTERPOINT ENERGY FEE OR EASEMENT PROPERTY

NO APPROVAL TO USE, CROSS OR OCCUPY CENTERPOINT FEE OR EASEMENT PROPERTY IS GIVEN. IF YOU NEED TO USE CENTERPOINT PROPERTY, PLEASE CONTACT OUR SURVEYING & RIGHT OF WAY DIVISION AT 713-207-6348 OR 713-207-5769.

OTHER:

UNDERGROUND PIPELINES ARE SHOWN ACCORDING TO BEST AVAILABLE INFORMATION. CONTRACTOR TO PROCEED WITH CAUTION DURING EXCAVATION. CONTRACTOR TO COORDINATE WITH PIPELINE OWNER IN CASE OF CONFLICTS OR QUESTIONS.

ALL EXISTING UNDERGROUND UTILITIES ARE NOT GUARANTEED TO BE COMPLETE OR DEFINITE. THE APPROXIMATE LOCATIONS OF KNOWN EXISTING UTILITIES ARE SHOWN. CONTRACTOR SHALL DETERMINE THE EXACT SIZE AND HORIZONTAL AND VERTICAL LOCATIONS IN THE FIELD PRIOR TO COMMENCING WORK.

ANY PERMANENT RELOCATION OF AN EXISTING UTILITY NOT SHOWN ON THE DRAWINGS SHALL BE APPROVED BY THE ENGINEER PRIOR TO RELOCATION AND SHALL CONFORM TO THE APPLICABLE STANDARDS OF GOVERNING AUTHORITIES.

SWPPP CONSTRUCTION NOTES:

1. CONTRACTOR SHALL IMPLEMENT INLET PROTECTION DEVICES AND REINFORCED FILTER FABRIC BARRIER ALONG ROAD AND SIDE DITCHES AT LOCATIONS SHOWN ON THE TYPICAL STORM WATER POLLUTION PREVENTION (SWPPP) PLANS TO KEEP SILT AND/OR EXCAVATED MATERIALS FROM ENTERING INTO THE STORM WATER INLETS AND DITCHES EVENTUALLY POLLUTING THE RECEIVING STREAM.

2. DURING THE EXCAVATION PHASE OF THE PROJECT, CONTRACTOR SHALL SCHEDULE THE WORK IN SHORT SEGMENTS SO THAT EXCAVATED MATERIAL CAN BE QUICKLY HAULED AWAY FROM THE SITE AND TO PREVENT IT FROM STAYING UNCOLLECTED ON THE EXISTING PAVEMENT. ANY LOOSE EXCAVATED MATERIAL WHICH FALLS ON PAVEMENTS OR DRIVEWAYS SHALL BE SWEPT BACK INTO THE EXCAVATED AREAS.

3. CONTRACTOR SHALL CLEAN UP THE EXISTING STREET INTERSECTIONS AND DRIVEWAYS DAILY, AS NECESSARY, TO REMOVE ANY EXCESS MUD, SILT OR ROCK TRACKED FROM THE EXCAVATED AREA.

4. CONTRACTOR SHALL FOLLOW GOOD HOUSEKEEPING PRACTICES DURING THE CONSTRUCTION OF THE PROJECT, ALWAYS CLEANING UP DIRT AND LOOSE MATERIAL AS CONSTRUCTION PROGRESSES.

5. CONTRACTOR TO INSPECT AND MAINTAIN THE AREAS LISTED BELOW AT LEAST ONCE EVERY FOURTEEN (14) CALENDAR DAYS AND WITHIN 24 HOURS OF THE END OF A STORM EVENT OF 0.5 INCHES OR GREATER.

- DISTURBED AREAS OF THE CONSTRUCTION SITE THAT HAVE NOT BEEN FINALLY STABILIZED.
- AREAS USED FOR STORAGE OF MATERIALS THAT ARE EXPOSED TO PRECIPITATION.
- STRUCTURAL CONTROL MEASURES.
- LOCATION WHERE VEHICLES ENTER OR EXIT THE SITE.

6. CONTRACTOR TO BE RESPONSIBLE TO MAINTAIN EXISTING DITCHES AND/OR CULVERTS FOR UNOBSTRUCTED DRAINAGE AT ALL TIMES. WHERE SODDING IS DISTURBED BY EXCAVATION OR BACKFILLING OPERATIONS, SUCH AREAS SHALL BE REPLACED BY SEEDING OR SODDING. SLOPES 4:1 OR STEEPER SHALL BE REPLACED BY BLOCK SODDING.

ABBREVIATIONS

LT = LEFT	PROP = PROPOSED
RT = RIGHT	R = RADIUS
TP = TOP OF PAVEMENT	EXIST = EXISTING
TC = TOP OF CURB	WS&D = WATER, SANITARY & DRAINAGE
TG = TOP OF GRATE	HDPE = HIGH-DENSITY POLYETHYLENE PIPE
TB = TOP OF BANK	SSE = SANITARY SEWER EASEMENT
G = GUTTER	DE = DRAINAGE EASEMENT
ESMT = EASEMENT	ROW = RIGHT-OF-WAY
BLDG = BUILDING	MH = MANHOLE
WL = WATER LINE	OHE = OVERHEAD ELECTRICAL
BL = BUILDING LINE	UTIL = UTILITY
PL = PROPERTY LINE	TBM = TEMPORARY BENCHMARK
UE = UTILITY EASEMENT	FBCPR = FORT BEND COUNTY PLAT RECORDS
FL = FLOWLINE	FBCDR = FORT BEND COUNTY DEED RECORDS
LF = LINEAR FEET	FBCCF = FORT BEND COUNTY CLERK'S FILE
SY = SQUARE YARD	FBCDD = FORT BEND COUNTY DRAINAGE DISTRICT
STM SWR = STORM SEWER	NO = NUMBER
SAN SWR = SANITARY SEWER	SWBT = SOUTH WESTERN BELL TELEPHONE
BOC = BACK OF CURB	ADA = AMERICANS WITH DISABILITIES ACT
	HL&P = HOUSTON LIGHTING AND POWER

APPROVED: ____________
Development Coordinator

DATE: ____________

INTERIM REVIEW ONLY
Document incomplete: not intended for permit, bidding or construction.
Engineer: Edward C. Shelob
P.E. No.: 151290
Firm: Lockwood, Andrews & Newnam, Inc.
Firm No.: F-2614
Date: 5/2/17

LAN Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
PLANNING | ENGINEERING | PROGRAM MANAGEMENT
2925 Briarpark Drive
Houston, Texas 77042-3720
Tel 713-266-6900 Fax 713-266-7590

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

NOTICE:
For your safety, you are required by Texas Law to call 811 at least 48 hours before you dig so that underground lines can be marked. This verification does not fulfill your obligation to call 811.

VERIFICATION OF PRIVATE UTILITY LINES

N/A — Date
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.

N/A — Date
CenterPoint Energy/UNDERGROUND Electric Facilities Verification Only. This signature verifies existing underground facilities - not to be used for conflict verification. Signature Valid for six months.

N/A — Date
Approval for AT&T Texas/SWBT underground conduit location only. Signature valid for one year.

FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 25
TRAILS SYSTEM PHASE 4

GENERAL NOTES

FORT BEND COUNTY, TX.

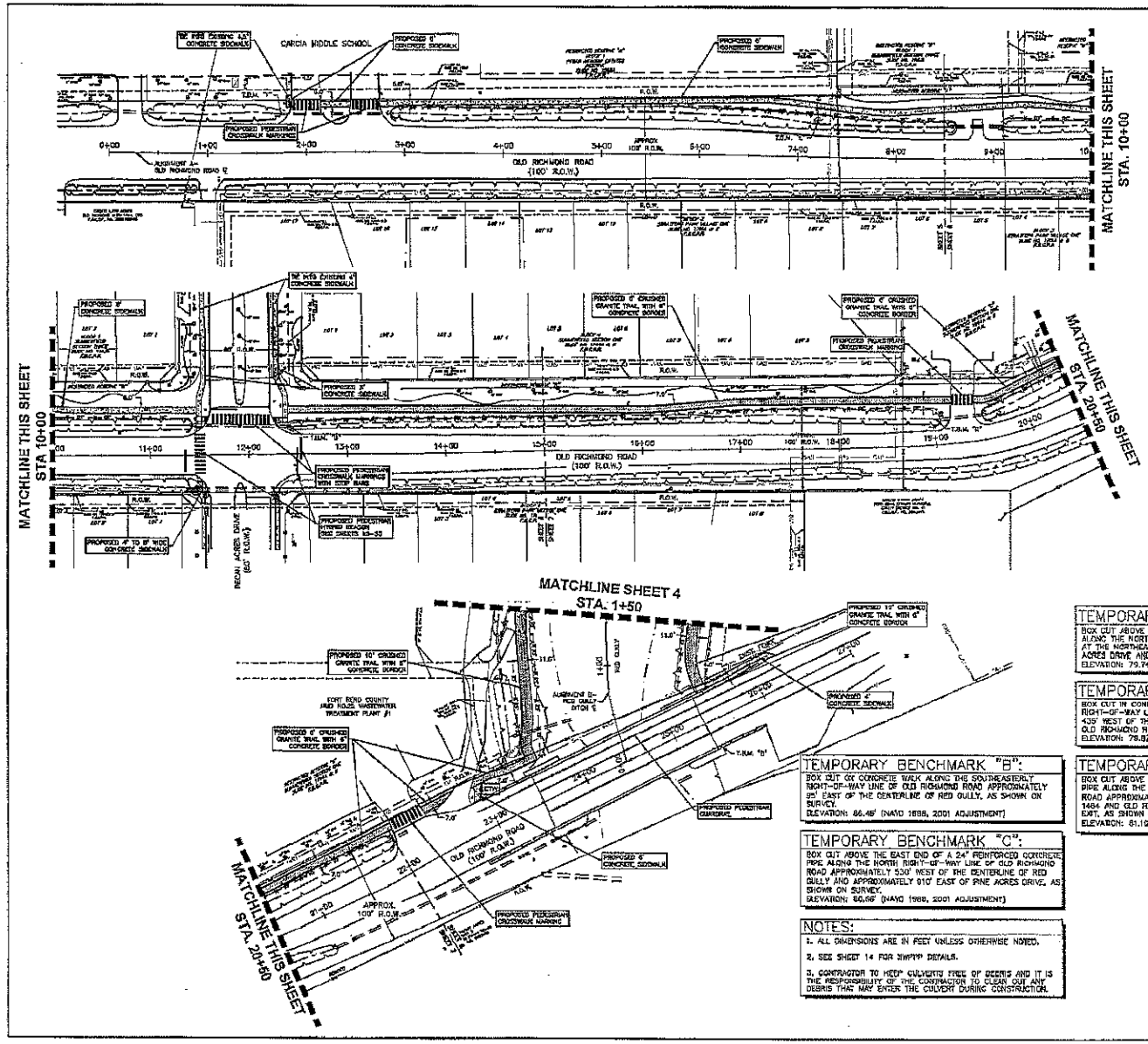
FILE NO:

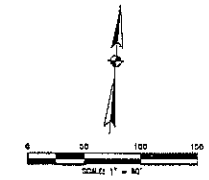
DRAWING SCALE
HORZ: NONE
VERT:

SHEET No: 2 OF 53

No.	Date	Revisions	App.

PATH: ...\Documents\Projects\120-11842-000\4-0-Production-Work\...\Land Development
FILE SAVED: G09-GENERAL NOTES.dwg
PROJECT NO. 120-11842-000-400





BENCHMARK:

CITY OF SUGAR LAND GEODETIC CONTROL STATION SGR-74 (RESET) BEING A STAINLESS STEEL ROD IN SLEEVE WITH CAP APPROXIMATELY 60' EAST OF THE EAST RIGHT-OF-WAY LINE OF BROOKS STREET, APPROXIMATELY 40' SOUTH OF A LIGHT POLE, AND APPROXIMATELY 35' NORTHEAST OF A POWER POLE.
ELEVATION = 79.17
(NAVD 1988, 2001 ADJUSTMENT)

LEGEND:

- EXIST. R.O.W. OR PROPERTY LINE
- EXIST. EASEMENT LINE
- EXIST. TOP OF BANK (TOB)
- EXIST. SWALE CENTERLINE
- EXIST. CONCRETE SIDEWALK
- PROP. CONCRETE SIDEWALK
- PROP. CRUSHED GRANITE TRAIL WITH 6"-INCH WIDE CONCRETE BORDER
- PROP. REINFORCED FILTER FABRIC BARRIER
- PROP. INLET PROTECTION BARRIER
- PROP. CONCRETE TRUCK WASHOUT AREA

TEMPORARY BENCHMARK "B":

BOX CUT ON CONCRETE WALK ALONG THE SOUTHEASTERLY RIGHT-OF-WAY LINE OF OLD RICHMOND ROAD APPROXIMATELY 25' EAST OF THE CENTERLINE OF RED GULLY, AS SHOWN ON SURVEY.
ELEVATION: 86.48' (NAVD 1988, 2001 ADJUSTMENT)

TEMPORARY BENCHMARK "C":

BOX CUT ABOVE THE EAST END OF A 24" REINFORCED CONCRETE PIPE ALONG THE NORTH RIGHT-OF-WAY LINE OF OLD RICHMOND ROAD APPROXIMATELY 530' WEST OF THE CENTERLINE OF RED GULLY AND APPROXIMATELY 610' EAST OF PINE ACRES DRIVE, AS SHOWN ON SURVEY.
ELEVATION: 80.68' (NAVD 1988, 2001 ADJUSTMENT)

NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED.
2. SEE SHEET 14 FOR SWPPP DETAILS.
3. CONTRACTOR TO KEEP CULVERTS FREE OF DEBRIS AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CLEAN OUT ANY DEBRIS THAT MAY ENTER THE CULVERT DURING CONSTRUCTION.

TEMPORARY BENCHMARK "D":

BOX CUT ABOVE EAST END OF A 18" REINFORCED CONCRETE PIPE ALONG THE NORTH RIGHT-OF-WAY LINE OF OLD RICHMOND ROAD AT THE NORTHEAST CORNER OF THE INTERSECTION OF PECAN ACRES DRIVE AND OLD RICHMOND ROAD, AS SHOWN ON SURVEY.
ELEVATION: 79.74' (NAVD 1988, 2001 ADJUSTMENT)

TEMPORARY BENCHMARK "E":

BOX CUT IN CONCRETE RIND OF A MANHOLE ALONG THE NORTH RIGHT-OF-WAY LINE OF OLD RICHMOND ROAD, APPROXIMATELY 435' WEST OF THE INTERSECTION OF PECAN ACRES DRIVE AND OLD RICHMOND ROAD, AS SHOWN ON SURVEY.
ELEVATION: 78.97' (NAVD 1988, 2001 ADJUSTMENT)

TEMPORARY BENCHMARK "F":

BOX CUT ABOVE WEST END OF A 18" REINFORCED CONCRETE PIPE ALONG THE NORTH RIGHT-OF-WAY LINE OF OLD RICHMOND ROAD APPROXIMATELY 805' EAST OF THE INTERSECTION OF F.M. 1464 AND OLD RICHMOND ROAD AT THE GARCIA MIDDLE SCHOOL EAST, AS SHOWN ON SURVEY.
ELEVATION: 81.19' (NAVD 1988, 2001 ADJUSTMENT)

APPROVED: _____
Development Coordinator

DATE: _____

INTERIM REVIEW ONLY
Document incomplete not intended for permit, bidding or construction.

Engineer:	Howard C. Strauch
P.E. No.:	101298
Firm:	Lockwood, Andrews & Newnam, Inc.
Firm No.:	F-2614
Date:	5/2/17

LAN Lockwood, Andrews & Newnam, Inc.
A MWH & BALL COMPANY
PLANNING ENGINEERING PROGRAM MANAGEMENT
2925 Briarpark Drive
Houston, Texas 77042-3720
Tel 713-266-6900 Fax 713-266-7505

NOTICE:
For your safety, you are required to "Call 811" or 1-800-245-4545 at least 48 hours before you dig so that underground lines can be located. This verification does not cover your obligation to call 811.

VERIFICATION OF PRIVATE UTILITY LINES

N/A — Date
Centerline Energy/Underground Gas Facilities Verification ONLY.
This signature verifies that you have shown CEP Natural Gas lines correctly - not to be used for septic verification. Gas service lines are not marked.
Signature valid for six months.

N/A — Date
Centerline Energy/UNDERGROUND Electrical Facilities Verification ONLY.
This signature verifies existing underground facilities - not to be used for septic verification.
Signature valid for six months.

N/A — Date
Approval for AERO Septic/ONSF underground drainfield facilities only.
Signature valid for one year

FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 25
TRAILS SYSTEM PHASE 1

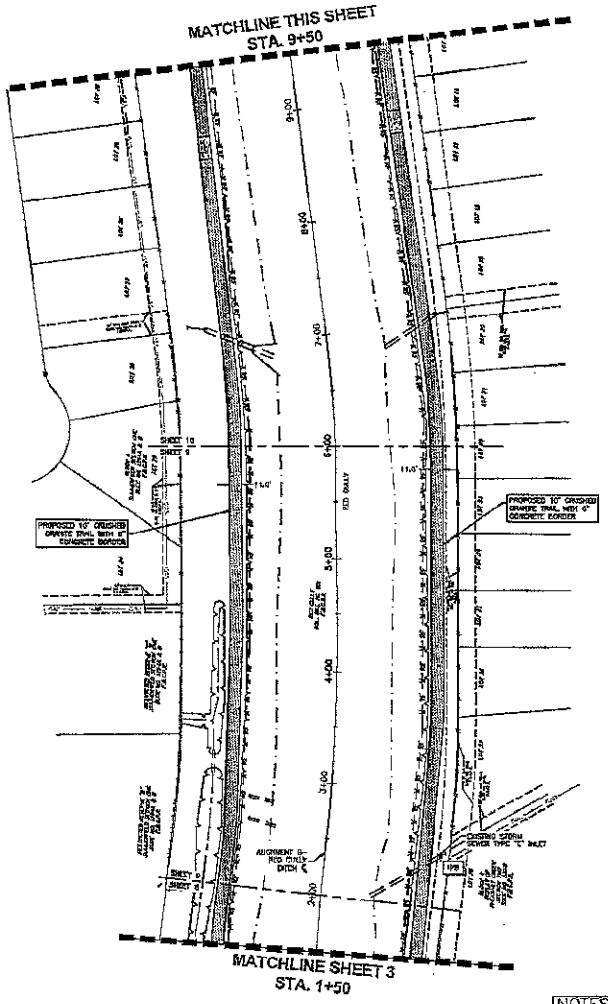
OVERALL LAYOUT & SWPPP 1 OF 2

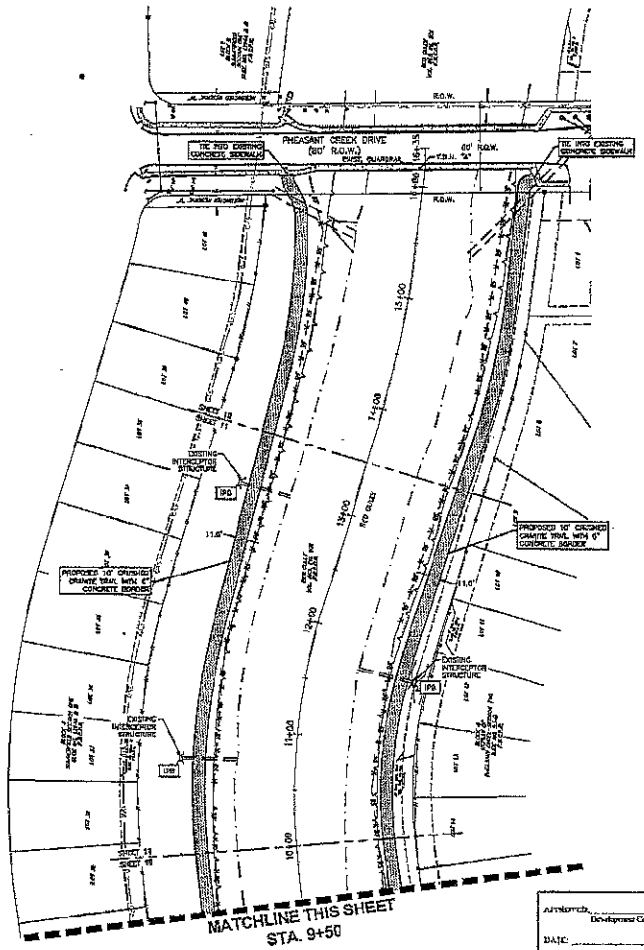
FORT BEND COUNTY, TX

FILE NO:

DRAWING SCALE
HORIZ: 1" = 50'
VERT: N/A

SHEET No: 3 of 53





SCALE: 1" = 50'

BENCHMARK:

CITY OF SUGAR LAND GEODETIC CONTROL STATION SGR-14 (RESET) BEING A STAINLESS STEEL ROD IN SLEEVE WITH CAP APPROXIMATELY 60' EAST OF THE EAST RIGHT-OF-WAY LINE OF BROOKS STREET, APPROXIMATELY 40' SOUTH OF A LIGHT POLE, AND APPROXIMATELY 33' NORTHEAST OF A POWER POLE. ELEVATION = 79.17' (NAVD 1988, 2001 ADJUSTMENT)

LEGEND:

- EXIST. R.O.W. OR PROPERTY LINE
- EXIST. EASEMENT LINE
- EXIST. TOP OF BANK (TOB)
- EXIST. SWALE CENTERLINE
- EXIST. CONCRETE SIDEWALK
- PROP. CONCRETE SIDEWALK
- PROP. CRUSHED GRANITE TRAIL WITH 6-INCH WIDE CONCRETE BORDER
- PROP. REINFORCED FILTER FABRIC BARRIER
- IPB PROP. INLET PROTECTION BARRIER
- CTW PROP. CONCRETE TRUCK WASHOUT AREA

NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED.
2. SEE SHEET 14 FOR SWPPP DETAILS.
3. CONTRACTOR TO KEEP CULVERTS FREE OF DEBRIS AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CLEAR OUT ANY DEBRIS THAT MAY ENTER THE CULVERT DURING CONSTRUCTION.

TEMPORARY BENCHMARK "A":

BOX CUT IN THE CENTER OF A CONCRETE SIDEWALK ALONG THE SOUTH RIGHT-OF-WAY OF PHEASANT CREEK DRIVE AT THE DOWNSTREAM CENTERLINE OF RED GULLY, AS SHOWN ON SURVEY. ELEVATION: 83.77' (NAVD 1988, 2001 ADJUSTMENT)

APPROVED: _____ Development Coordinator

DATE: _____

INTERIM REVIEW ONLY

Document incomplete; not intended for permit, bidding or construction.

Engineer: Edward D. Strauch
P.E. No.: 101290
Firm: Lockwood, Andrews & Newnam, Inc.
Firm No.: F-2614
Date: 5/2/17

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
PLANNERS ENGINEERS PROGRAM MANAGEMENT
2925 Briarpark Drive
Houston, Texas 77042-3720
Tel 713-266-6900 Fax 713-266-7595

TO ARRANGE FOR LINES TO BE STAKED OFF OR MARKED, CALL CENTERPOINT AT 713-207-2222.

NOTICE:

The information, plans and specifications by Texas Law to be valid, must be issued bearing the seal of the undersigned. Any alterations made to these documents shall not have our approval or consent.

VERIFICATION OF PRIVATE UTILITY LINES

N/A — Date
Centerpoint Energy/Reliant Gas Pipeline Verification ONLY.
(This signature verifies that gas lines shown CNP Natural Gas lines correctly – not to be used for conflict verification) (Has service been one year minimum) Signature valid for six months.

N/A — Date
Centerpoint Energy/Reliant Electrical Facilities Verification ONLY.
This signature verifies existing underground facilities – not to be used for conflict verification.
Signature valid for six months.

N/A — Date
Approval for AT&T Texas/SNW underground cable locations only.
Signature valid for one year.

FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 25
TRAILS SYSTEM PHASE 1

OVERALL LAYOUT & SWPPP 2 OF 2

FORT BEND COUNTY, TX

FILE NO:

DRAWING SCALE
HORIZ: 1" = 50'
VERT: N/A

SHEET No: 4 OF 53

REF: C:\Users\Public\Documents\Autodesk\Vault\Projects\101290\01-Project Data\Drawings\01-20-Overall Layout.dwg
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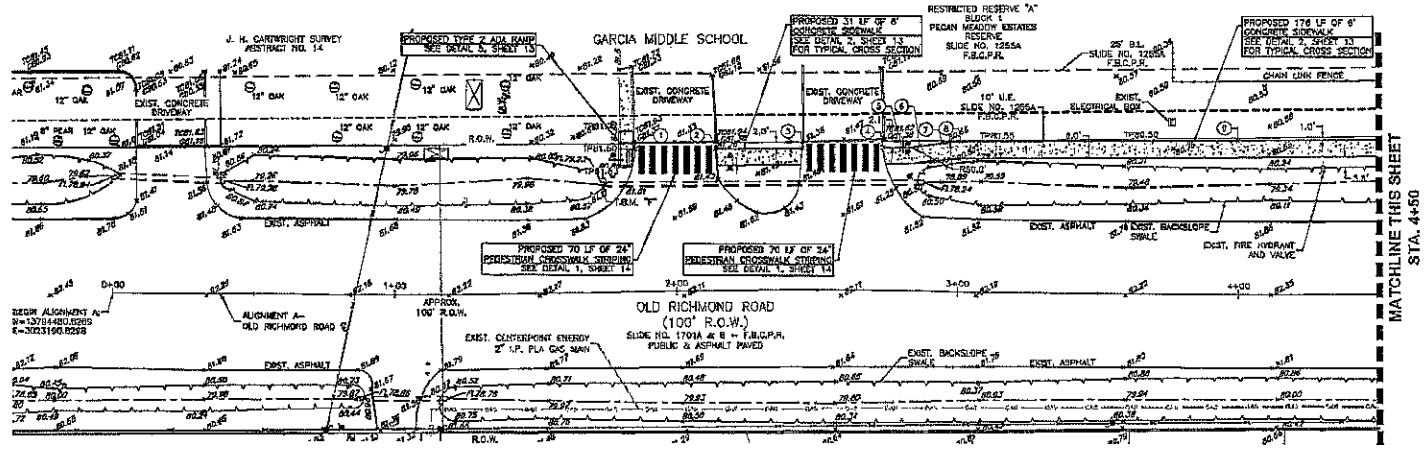
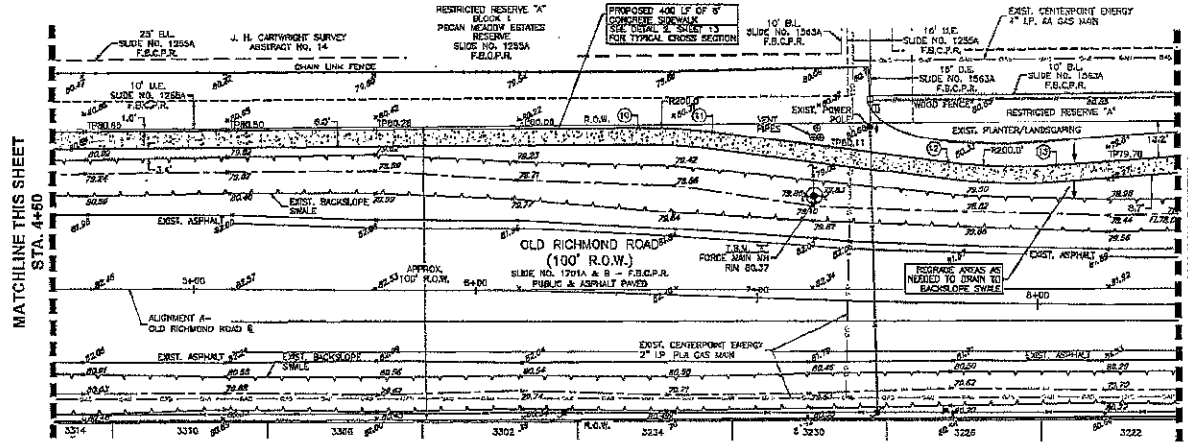
PRINTED: 05-11-17 8:00 AM





TEMPORARY BENCHMARK "E":

BOX CUT IN CONCRETE RING OF A MANHOLE ALONG THE NORTH RIGHT-OF-WAY LINE OF OLD RICHMOND ROAD, APPROXIMATELY 435' WEST OF THE INTERSECTION OF PECAN ACRES DRIVE AND OLD RICHMOND ROAD, AS SHOWN ON SURVEY.
ELEVATION: 79.87' (NAVD 1988, 2001 ADJUSTMENT)

TEMPORARY BENCHMARK "F":

BOX CUT ABOVE WEST END OF A 18" REINFORCED CONCRETE PIPE ALONG THE NORTH RIGHT-OF-WAY LINE OF OLD RICHMOND ROAD APPROXIMATELY 805' EAST OF THE INTERSECTION OF F.M. 1464 AND OLD RICHMOND ROAD AT THE GARCIA MIDDLE SCHOOL EAST, AS SHOWN ON SURVEY.
ELEVATION: 81.10' (NAVD 1988, 2001 ADJUSTMENT)

#	NORTHING	EASTING	ELEV.
1	13794539.2849	3023373.9801	81.40
2	13794540.6969	3023402.8100	81.28
3	13794542.0115	3023433.4536	81.39
4	13794543.3332	3023462.2840	81.31
5	13794543.5379	3023466.9282	81.12
6	13794544.3358	3023476.2984	80.94
7	13794546.7368	3023483.2834	80.80
8	13794546.4406	3023489.8793	80.65
9	13794550.4190	3023526.4121	80.70
10	13794562.5480	3023845.0944	80.30
11	13794562.1316	3023872.5841	80.22
12	13794554.0934	3023856.5128	80.00
13	13794555.3395	3023995.4800	79.85

APPROVED: _____
Development Coordinator
Date: _____

INTERIM REVIEW ONLY

Document exempted: not intended for permit bidding or construction.

Engineer: Edward C. Smith
P.E. No.: 101280
Firm: Lockwood, Andrews & Newnam, Inc.
Firm No.: F-2014
Date: 5/2/17

BENCHMARK:

CITY OF SUGAR LAND GEODETIC CONTROL STATION SGR-14 (RESET) BEING A STAINLESS STEEL ROD IN SLEEVE WITH CAP APPROXIMATELY 60' EAST OF THE EAST RIGHT-OF-WAY LINE OF BROOKS STREET, APPROXIMATELY 40' SOUTH OF A LIGHT POLE, AND APPROXIMATELY 38' NORTHEAST OF A POWER POLE.
ELEVATION = 79.17' (NAVD 1988, 2001 ADJUSTMENT)

LEGEND:

- EXIST. R.O.W. OR PROPERTY LINE
- EXIST. EASEMENT LINE
- EXIST. TOP OF BANK (TOB)
- EXIST. SWALE CENTERLINE
- EXIST. CONCRETE SIDEWALK
- PROP. CONCRETE SIDEWALK
- PROP. CRUSHED GRANITE TRAIL WITH 6-INCH WIDE CONCRETE BORDER
- 80.00 EXIST. ELEVATIONS
- TB/TP/TC/80.00 PROP. TOP-OF-BANK/TOP-OF-PAVEMENT/TOP-OF-CURB/CENTER
- 1 PROP. POINTS, SEE TABLE THIS SHEET
- RELOCATE SIGN IN PATH OF SIDEWALK
- DRAINAGE DIRECTION ARROW

NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED.
2. EXISTING UTILITY LINE LOCATIONS ARE APPROXIMATE. CONTRACTOR SHALL FIELD VERIFY ALL LINE SIZES, DEPTHS AND LOCATIONS PRIOR TO EXCAVATION.
3. TOP OF PAVEMENT ELEVATIONS ARE ONLY APPROXIMATE AND MAY NEED TO BE ADJUSTED AS TO MEET ADA REQUIREMENTS.
4. THE MAXIMUM TRANSVERSE SLOPE (SIDEWALK CROSS SLOPE) IS 1:48 OR 2%. WHEN CROSS SLOPE IS NOT SHOWN, CONTRACTOR SHALL MAKE IT BETWEEN 1.5-2%.
5. THE MAXIMUM RUNNING SLOPE IS 1:20 OR 5%, AND MAXIMUM LONGITUDINAL SLOPE FOR THE CONCRETE RAMP IS 1:12 OR 8.33%.
6. CONCRETE SIDEWALK SHALL HAVE EXPANSION JOINTS AT 40 FEET MAXIMUM AND CONTROL JOINTS AT 5 FEET MAXIMUM.
7. CRUSHED GRANITE TRAIL SHALL HAVE 6-INCH WIDE CONCRETE BORDER AT THE GIVEN ELEVATION OF THE TRAIL WITH 1.5-2% CROSS SLOPE.
8. CONTRACTOR TO REGRADE BACKSLOPE SWALE AND DITCH HIGH BANK AS NEEDED ALONG PROPOSED TRAIL.
9. THE CONTRACTOR SHALL ADJUST ALL BOXES, VALVES, MANHOLES AND OTHER OBJECTS IN THE GROUND THAT ARE IN THE PATH OF THE TRAIL TO MATCH TRAIL ELEVATION.
10. THE CONTRACTOR SHALL RESTORE THE LANDSCAPE TO ITS ORIGINAL CONDITION OR BETTER. HYDROMULCH SHALL BE USED TO REPLACE GRASS THAT HAS BEEN DISTURBED IN AN" CHANNEL OR POND, ANYWHERE ELSE, SOD SHALL BE USED TO REPLACE ANY GRASS THAT HAS BEEN DISTURBED.
11. THE CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE ALONG DITCHES AND TO INTERCEPTOR STRUCTURES & PROTECT INLETS FROM SEDIMENT. DURING CONSTRUCTION, ANY DITCHES AND STRUCTURES DISTURBED SHALL BE RE-CONSTRUCTED IN THE SAME LOCATION AND SIZE AS PRE-CONSTRUCTION CONDITIONS.
12. SURVEY BY GMLI-SURV LAND SURVEYING, L.C. NOVEMBER 8, 2016, CONTRACTOR MAY REQUEST A COPY OF SURVEY FROM ENGINEER.

Lockwood, Andrews & Newnam, Inc.
A MEMBER OF WSP GROUP
PLANNING
ENGINEERING
PROGRAM MANAGEMENT
2925 Briarpark Drive
Houston, Texas 77042-3720
Tel 713-266-6900 Fax 713-266-2596

TO ENSURE FOR LINES TO BE MARKED OFF ON MAPS, CALL CONTEMPORARY AT 713-307-3333.

NOTICE:
For your safety, you are required by Texas Law to call 811 at least 48 hours before you dig to find underground lines on your property. This invitation does not take your obligation away.

VERIFICATION OF PRIVATE UTILITY LINES

Date
Contractor Group/Individual Gas Facilities Verification Only.
This signature verifies that you have shown CGF Natural Gas lines correctly - not to be used for permit validation. Gas mains may not be shown. Signature valid for six months.

Date
Contractor Group/Individual Underground Facilities Verification Only.
This signature verifies existing underground facilities - not to be used for permit validation.
Signature valid for six months.

Date
Approved for MUD Construction underground facilities only.
Signature valid for one year

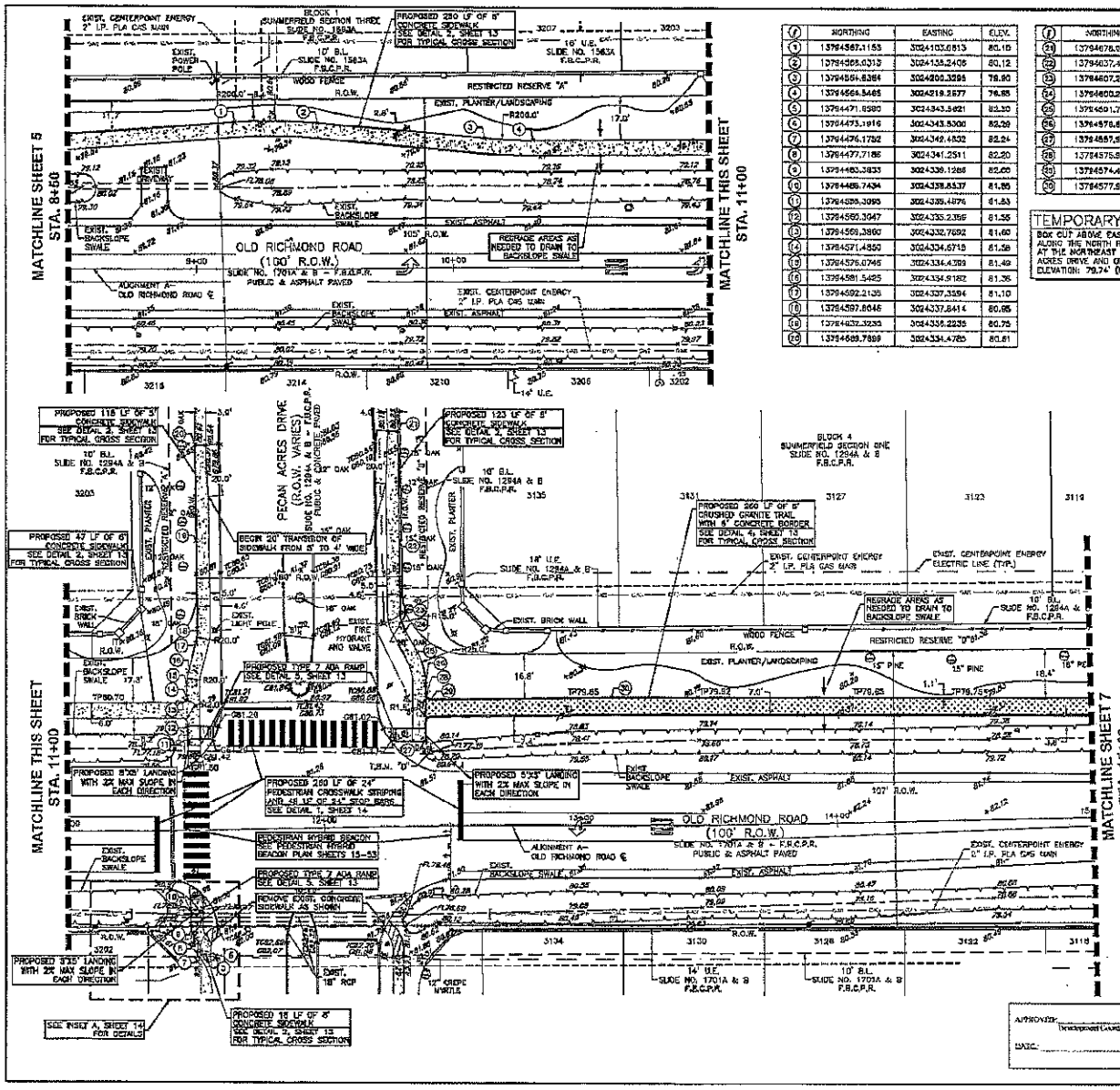
FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 25
TRAILS SYSTEM PHASE 1

ALIGNMENT A - STA. 0+00 TO 8+50

FORT BEND COUNTY, TX

FILE NO:

DRAWING SCALE
HORZ: 1" = 20'
VERT: N/A



#	NORTHING	EASTING	ELEV.
1	13794567.1153	3024103.6513	80.15
2	13794565.0313	3024135.2405	80.12
3	13794561.8361	3024200.3295	79.90
4	13794564.5465	3024219.3677	79.85
5	13794471.8580	3024343.3621	82.30
6	13794473.1916	3024343.5300	82.29
7	13794476.1752	3024342.4832	82.24
8	13794477.7186	3024341.2511	82.20
9	13794483.3833	3024336.1288	82.00
10	13794488.7434	3024335.5537	81.85
11	13794555.3095	3024335.4876	81.83
12	13794560.3947	3024335.2356	81.56
13	13794569.3860	3024332.7692	81.60
14	13794571.4850	3024334.6713	81.58
15	13794575.0745	3024334.4399	81.49
16	13794581.5425	3024334.9182	81.35
17	13794592.2135	3024337.3594	81.10
18	13794597.8646	3024337.8414	80.95
19	13794632.3233	3024336.2235	80.75
20	13794669.7889	3024334.4785	80.61

#	NORTHING	EASTING	ELEV.
21	13794678.0598	3024413.2229	80.23
22	13794637.4733	3024415.1494	80.26
23	13794607.2387	3024416.5845	80.36
24	13794600.2488	3024418.9924	81.05
25	13794591.2763	3024423.9643	81.10
26	13794578.6797	3024427.2597	81.15
27	13794567.8300	3024427.5424	81.22
28	13794575.9299	3024427.5907	81.17
29	13794574.4834	3024429.4837	81.16
30	13794577.5453	3024499.7510	79.87

TEMPORARY BENCHMARK "D":

BOX CUT ABOVE EAST END OF A 18" REINFORCED CONCRETE PIPE ALONG THE NORTH RIGHT-OF-WAY LINE OF OLD RICHMOND ROAD AT THE NORTHEAST CORNER OF THE INTERSECTION OF PECAN ACRES DRIVE AND OLD RICHMOND ROAD, AS SHOWN ON SURVEY. ELEVATION: 79.74' (NAVD 1988, 2001 ADJUSTMENT)

BENCHMARK:

CITY OF SUGAR LAND GEODETIC CONTROL STATION BCR-14 (RESCT) BEING A STAINLESS STEEL ROD IN SLEEVE WITH CAP APPROXIMATELY 60' EAST OF THE EAST RIGHT-OF-WAY LINE OF BROOKS STREET, APPROXIMATELY 40' SOUTH OF A LIGHT POLE, AND APPROXIMATELY 35' NORTHEAST OF A POWER POLE. ELEVATION = 75.17' (NAVD 1988, 2001 ADJUSTMENT)

LEGEND:

- EXIST. R.O.W. OR PROPERTY LINE
- EXIST. EASEMENT LINE
- EXIST. TOP OF BANK (TOB)
- PROP. TOP OF BANK (TOB)
- EXIST. SWALE CENTERLINE
- PROP. REINFORCED CONCRETE PIPE
- EXIST. CONCRETE SIDEWALK
- PROP. CONCRETE SIDEWALK
- PROP. CRUSHED GRANITE TRAIL WITH 6-INCH WIDE CONCRETE BORDER
- *83.00 EXIST. ELEVATIONS
- *TB/TP/TC/C80.00 PROP. TOP-OF-BANK/TOP-OF-PAVEMENT/TOP-OF-CURB/CUTTER
- (#) PROP. POINTS, SEE TABLE THIS SHEET
- RELOCATE SIGN IN PATH OF SIDEWALK
- DRAINAGE DIRECTION ARROW

SCALE: 1" = 20'

NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED.
2. EXISTING UTILITY LINE LOCATIONS ARE APPROXIMATE. CONTRACTOR SHALL FIELD VERIFY ALL LINE SIZES, DEPTHS AND LOCATIONS PRIOR TO EXCAVATION.
3. TOP OF PAVEMENT ELEVATIONS ARE ONLY APPROXIMATE AND MAY NEED TO BE ADJUSTED AS TO MEET ADA REQUIREMENTS.
4. THE MAXIMUM TRANSVERSE SLOPE (SIDEWALK CROSS SLOPE) IS 1:48 OR 2%. WHEN CROSS SLOPE IS NOT SHOWN, CONTRACTOR SHALL MAKE IT BETWEEN 1.5-2%.
5. THE MAXIMUM RUNNING SLOPE IS 1:20 OR 5%, AND MAXIMUM LONGITUDINAL SLOPE FOR THE CONCRETE RAMP IS 1:12 OR 8.33%.
6. CONCRETE SIDEWALK SHALL HAVE EXPANSION JOINTS AT 40 FEET MAXIMUM AND CONTROL JOINTS AT 5 FEET MAXIMUM.
7. CRUSHED GRANITE TRAIL SHALL HAVE 6-INCH WIDE CONCRETE BORDER AT THE GIVEN ELEVATION OF THE TRAIL WITH 1.5-2% CROSS SLOPE.
8. CONTRACTOR TO REGRADE BACKSLOPE SWALE AND DITCH HIGH BANK AS NEEDED ALONG PROPOSED TRAIL.
9. THE CONTRACTOR SHALL ADJUST ALL BOXES, VALVES, MANHOLES AND OTHER OBJECTS IN THE GROUND THAT ARE IN THE PATH OF THE TRAIL TO MATCH TRAIL ELEVATION.
10. THE CONTRACTOR SHALL RESTORE THE LANDSCAPE TO ITS ORIGINAL CONDITION OR BETTER. HYDROMULCH SHALL BE USED TO REPLACE GRASS THAT HAS BEEN DISTURBED IN ANY CHANNEL OR POND, ANYWHERE ELSE, SOD SHALL BE USED TO REPLACE ANY GRASS THAT HAS BEEN DISTURBED.
11. THE CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE ALONG DITCHES AND TO INTERCEPTOR STRUCTURES & PROTECT INLETS FROM SEDIMENT DURING CONSTRUCTION. ANY DITCHES AND STRUCTURES DISTURBED SHALL BE RE-CONSTRUCTED IN THE SAME LOCATION AND SIZE AS PRE-CONSTRUCTION CONDITIONS.
12. SURVEY BY CIVIL-SURV LAND SURVEYING, LC. NOVEMBER 8, 2016. CONTRACTOR MAY REQUEST A COPY OF SURVEY FROM ENGINEER.

APPROVED: _____ Development Coordinator

DATE: _____

INTERIM REVIEW ONLY

Document is incomplete and intended for partial bidding or construction.

Engineer: Edward C. Stasch

P.E. No.: 108280

Firm: Lockwood, Andrews & Newnam, Inc.

Firm No.: F-2614

Date: 5/2/17

Lockwood, Andrews & Newnam, Inc.
A CH2M & AECOM COMPANY
PLANNING
ENGINEERING
MANAGEMENT
2925 Briarpark Drive
Houston, Texas 77042-3720
Tel 713-266-6900 Fax 713-266-2596

TO ENSURE YOUR LINES TO BE SIGNED OFF ON MAPS, CALL CENTERPOINT AT 713-207-2222.

NOTICE:

For your safety, you are required by Texas Law to call 811 at least 48 hours before you dig at this location to have the underground utilities marked and fulfill your obligation to call 811.

VERIFICATION OF PRIVATE UTILITY LINES

Date: _____
Centerpoint Energy/Reliant Gas Facilities Verification ONLY.
(This signature verifies that you have shown CNP Natural Gas Lines correctly - not to be used for permit verifications. Use where also are not shown.)
Signature Valid for six months.

Date: _____
CenterPoint Energy/RELIANT Electric Facilities Verification ONLY.
(This signature verifies existing underground facilities - not to be used for permit verification)
Signature Valid for six months.

Date: _____
Approved for AMS Tower/DAS non-asphalt detail (Applied step. Signature valid for one year

FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 30

TRAILS SYSTEM PHASE 1

ALIGNMENT A - STA. 8+50 TO 15+00

FORT BEND COUNTY, TX

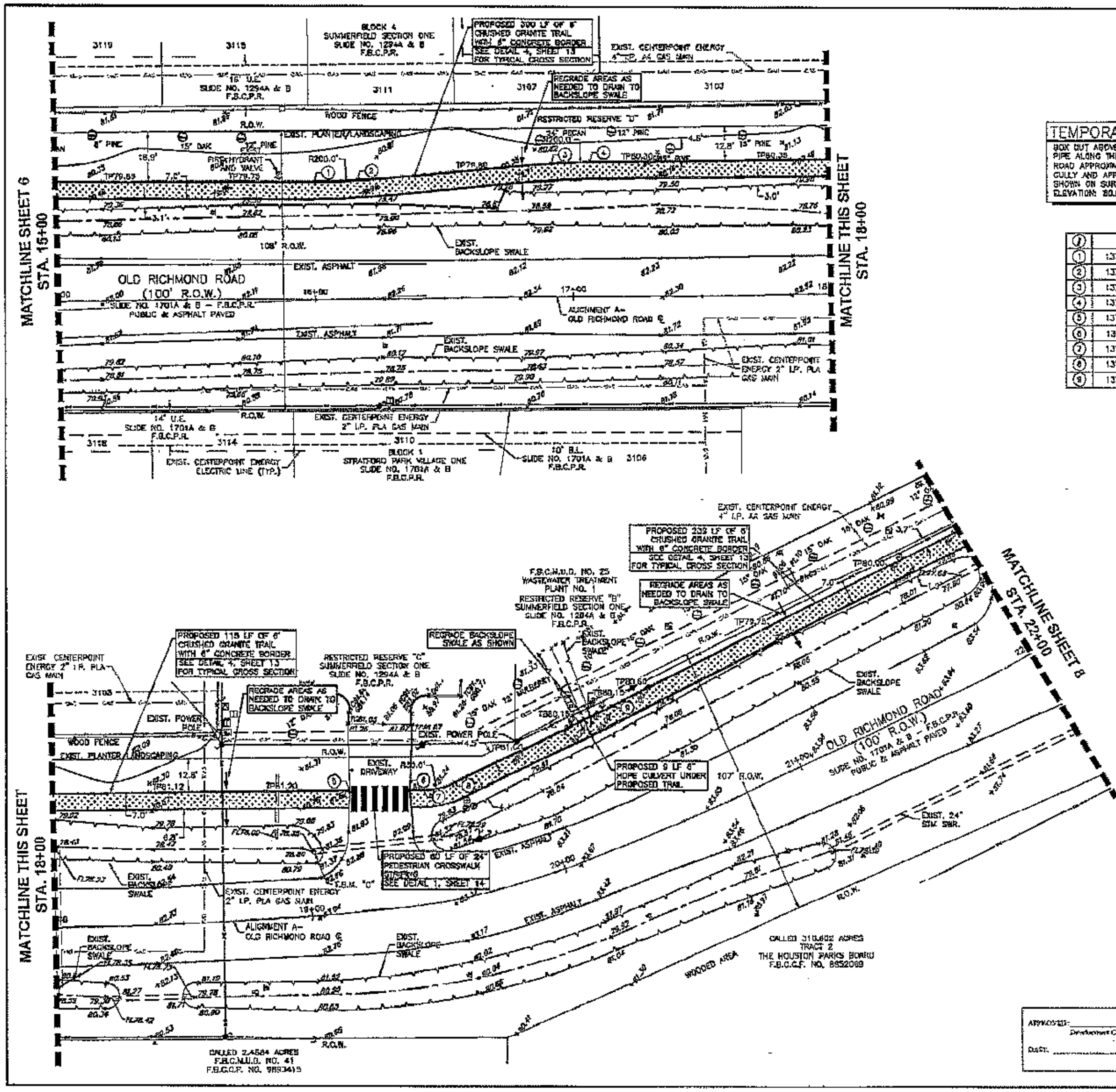
FILE NO:

DRAWING SCALE

HORIZ: 1" = 20'

VERT: N/A

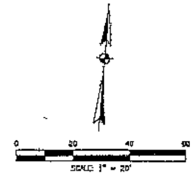
SHEET No: 6 of 53



TEMPORARY BENCHMARK "C":

BOX CUT ABOVE THE EAST END OF A 24" REINFORCED CONCRETE PIPE ALONG THE NORTH RIGHT-OF-WAY LINE OF OLD RICHMOND ROAD APPROXIMATELY 530' WEST OF THE CENTERLINE OF RED GULLY AND APPROXIMATELY 810' EAST OF PINE ACRES DRIVE, AS SHOWN ON SURVEY.
ELEVATION: 80.86' (NAVD 1988, 2001 ADJUSTMENT)

#	NORTHING	EASTING	ELEV.
1	13794586.8115	3024787.4360	79.70
2	13794590.1549	3024804.2088	79.78
3	13794599.3252	3024878.9313	79.85
4	13794600.5916	3024893.8245	79.95
5	13794610.4695	3025101.4256	81.52
6	13794611.6831	3025124.6274	81.55
7	13794611.8189	3025129.7632	81.55
8	13794615.0479	3025141.8857	81.35
9	13794645.7479	3025201.7898	81.00



BENCHMARK:

CITY OF SUGAR LAND GEODETIC CONTROL STATION SGR-14 (RESET) BEING A STAINLESS STEEL ROD IN SLEEVE WITH CAP APPROXIMATELY 60' EAST OF THE EAST RIGHT-OF-WAY LINE OF BROOKS STREET, APPROXIMATELY 40' SOUTH OF A LIGHT POLE, AND APPROXIMATELY 35' NORTHEAST OF A POWER POLE.
ELEVATION = 79.17' (NAVD 1988, 2001 ADJUSTMENT)

LEGEND:

- EXIST. R.O.W. OR PROPERTY LINE
- EXIST. EASEMENT LINE
- EXIST. TOP OF BANK (TOB)
- EXIST. SWALE CENTERLINE
- EXIST. CONCRETE SIDEWALK
- PROP. CONCRETE SIDEWALK
- PROP. CRUSHED GRANITE TRAIL WITH 6-INCH WIDE CONCRETE BORDER
- ×80.00 — EXIST. ELEVATIONS
- ×TB/TP/TC/G80.00 — PROP. TOP-OF-BANK/TOP-OF-PAVEMENT/TOP-OF-CURB/GUTTER
- PROP. POINTS, SEE TABLE THIS SHEET
- RELOCATE SIGN IN PATH OF SIDEWALK
- DRAINAGE DIRECTION ARROW

NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED.
2. EXISTING UTILITY LINE LOCATIONS ARE APPROXIMATE. CONTRACTOR SHALL FIELD VERIFY ALL LINE SIZES, DEPTHS AND LOCATIONS PRIOR TO EXCAVATION.
3. TOP OF PAVEMENT ELEVATIONS ARE ONLY APPROXIMATE AND MAY NEED TO BE ADJUSTED AS TO MEET ADA REQUIREMENTS.
4. THE MAXIMUM TRANSVERSE SLOPE (SIDEWALK CROSS SLOPE) IS 1:48 OR 2%. WHEN CROSS SLOPE IS NOT SHOWN, CONTRACTOR SHALL MAKE IT BETWEEN 1.5-2%.
5. THE MAXIMUM RUNNING SLOPE IS 1:20 OR 5%, AND MAXIMUM LONGITUDINAL SLOPE FOR THE CONCRETE RAMP IS 1:12 OR 8.33%.
6. CONCRETE SIDEWALK SHALL HAVE EXPANSION JOINTS AT 40 FEET MAXIMUM AND CONTROL JOINTS AT 5 FEET MAXIMUM.
7. CRUSHED GRANITE TRAIL SHALL HAVE 6-INCH WIDE CONCRETE BORDER AT THE GIVEN ELEVATION OF THE TRAIL WITH 1.5-2% CROSS SLOPE.
8. CONTRACTOR TO REGRADE BACKSLOPE SWALE AND DITCH HIGH BANK AS NEEDED ALONG PROPOSED TRAIL.
9. THE CONTRACTOR SHALL ADJUST ALL BOXES, VALVES, MANHOLES AND OTHER OBJECTS IN THE GROUND THAT ARE IN THE PATH OF THE TRAIL TO MATCH TRAIL ELEVATION.
10. THE CONTRACTOR SHALL RESTORE THE LANDSCAPE TO ITS ORIGINAL CONDITION OR BETTER. HYDROMULCH SHALL BE USED TO REPLACE GRASS THAT HAS BEEN DISTURBED IN ANY CHANNEL OR POND. ANYWHERE ELSE, SOD SHALL BE USED TO REPLACE ANY GRASS THAT HAS BEEN DISTURBED.
11. THE CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE ALONG DITCHES AND TO INTERCEPTOR STRUCTURES & PROTECT INLETS FROM SEDIMENT. DURING CONSTRUCTION, ANY DITCHES AND STRUCTURES DISTURBED SHALL BE RE-CONSTRUCTED IN THE SAME LOCATION AND SIZE AS PRE-CONSTRUCTION CONDITIONS.
12. SURVEY BY CIVIL-SURV LAND SURVEYING, L.C. NOVEMBER 8, 2016. CONTRACTOR MAY REQUEST A COPY OF SURVEY FROM ENGINEER.

APPROVED: ______________________
Development Coordinator
DATE: ______________________

INTERIM REVIEW ONLY

Document incomplete: not intended for permit, bidding or construction.

Engineer: Edmund D. Shulch
P.E. No.: 101790
Firm: Lockwood, Andrews & Newnam, Inc.
Firm No.: F-2614
Date: 5/2017

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
PLANNING
ENGINEERING
PROGRAM MANAGEMENT

2925 Briarpark Drive
Houston, Texas 77042-3720
Tel 713-266-6900 Fax 713-266-2596

NOTICE:

VERIFICATION OF PRIVATE UTILITY LINES

N/A — Date:

N/A — Date:

N/A — Date:

FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 23
TRAILS SYSTEM PHASE 1

ALIGNMENT A - STA. 15+00 TO 22+00

FORT BEND COUNTY, TX

FILE NO:

DRAWING SCALE
HORZ: 1" = 20'
VERT: N/A

SHEET No: 7 OF 53

#	NORTHING	EASTING	ELEV.
1	13794722.2016	3025330.9058	81.69
2	13794736.2046	3025368.6775	82.14
3	13794737.3378	3025402.5967	82.33
4	13794738.2399	3025422.5012	82.18
5	13794749.0497	3025430.7453	82.59
6	13794759.6579	3025430.3192	82.20
7	13794770.0913	3025430.2945	81.69
8	13794778.3521	3025442.5212	81.75
9	13794780.7657	3025449.8792	81.63
10	13794782.6359	3025454.5865	81.66
11	13794791.4002	3025472.0933	81.10
12	13794794.7548	3025473.2097	80.98
13	13794798.0147	3025472.5789	80.93
14	13794811.2907	3025469.3964	80.78

#	NORTHING	EASTING	ELEV.
15	13794826.1403	3025470.1865	82.90
16	13794837.2132	3025469.8339	81.20
17	13794907.1161	3025461.4827	81.55
18	13794969.4172	3025460.5844	80.95
19	13794912.5043	3025633.9113	82.70
20	13794879.1534	3025639.5369	83.00
21	13794870.4764	3025643.1346	82.65
22	13794876.7338	3025658.2305	82.89
23	13794880.4062	3025665.2912	82.91
24	13794883.1122	3025665.3794	82.94
25	13794900.2572	3025697.4658	82.97
26	13794905.0995	3025711.9643	83.00
27	13794905.0817	3025718.7238	82.85
28	13794907.4858	3025756.5809	82.92

TEMPORARY BENCHMARK "B":

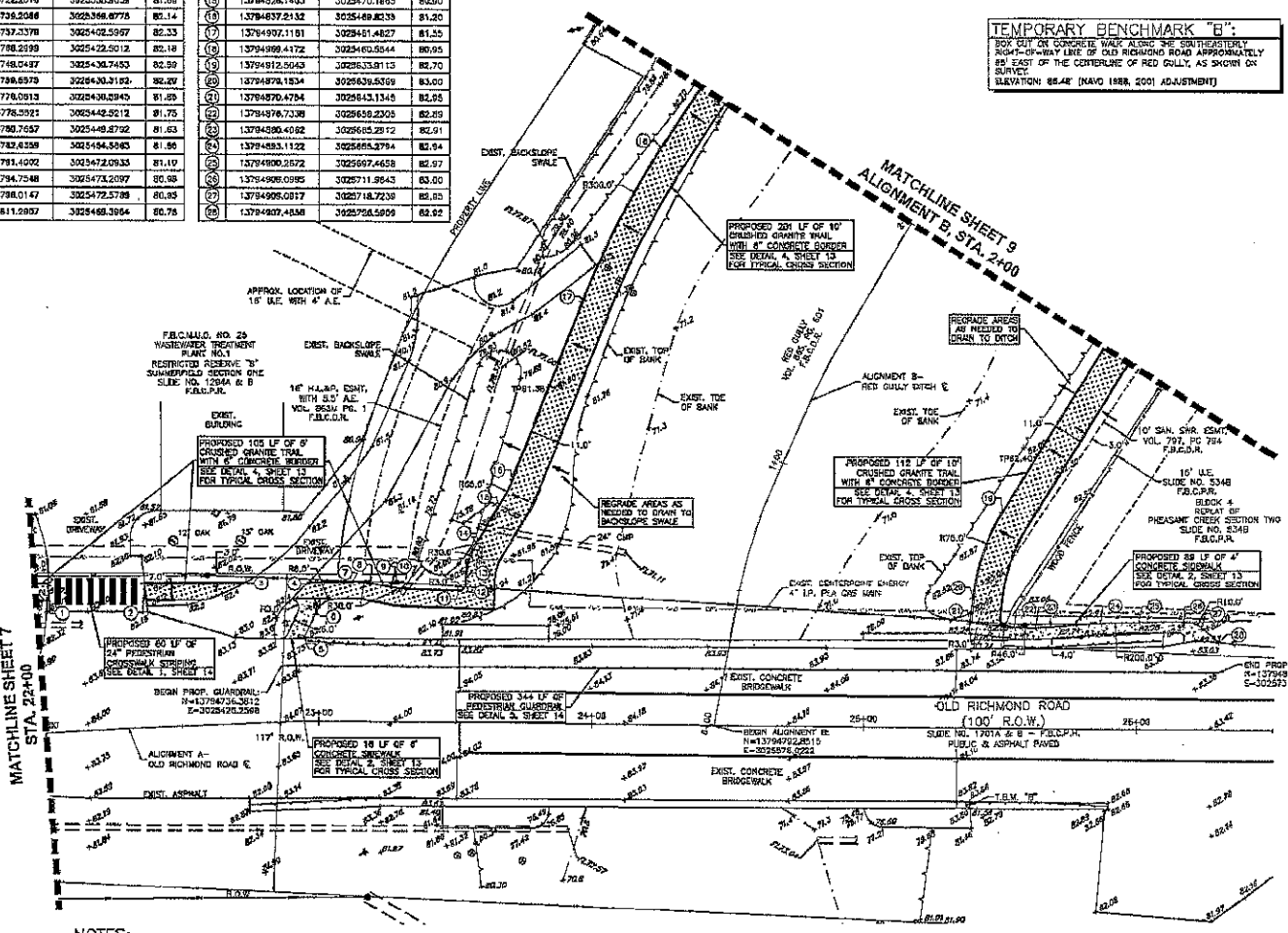
BOX CUT ON CONCRETE WALK ALONG THE SOUTHEASTERLY RIGHT-OF-WAY LINE OF OLD RICHMOND ROAD APPROXIMATELY 85' EAST OF THE CENTERLINE OF RED GULLY, AS SHOWN ON SURVEY.
ELEVATION: 85.48' (NAVD 1988, 2001 ADJUSTMENT)

BENCHMARK:

CITY OF SUGAR LAND GEODETIC CONTROL STATION SGR-14 (RESET) BEING A STAINLESS STEEL ROD IN SLEEVE WITH CAP APPROXIMATELY 60' EAST OF THE EAST RIGHT-OF-WAY LINE OF BROOKS STREET, APPROXIMATELY 40' SOUTH OF A LIGHT POLE, AND APPROXIMATELY 35' NORTHEAST OF A POWER POLE.
ELEVATION = 79.17' (NAVD 1988, 2001 ADJUSTMENT)

LEGEND:

- EXIST. R.O.W. OR PROPERTY LINE
- EXIST. EASEMENT LINE
- EXIST. TOP OF BANK (TOB)
- EXIST. SWALE CENTERLINE
- EXIST. CONCRETE SIDEWALK
- PROP. CONCRETE SIDEWALK
- PROP. CRUSHED GRANITE TRAIL WITH 6-INCH WIDE CONCRETE BORDER
- 80.00 EXIST. ELEVATIONS
- TB/TP/ TC/080.00 PROP. TOP-OF-BANK/TOP-OF-PAVEMENT/ TOP-OF-CURB/GUTTER
- PROP. POINTS, SEE TABLE THIS SHEET
- RELOCATE SIGN IN PATH OF SIDEWALK
- DRAINAGE DIRECTION ARROW



NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED.
2. EXISTING UTILITY LINE LOCATIONS ARE APPROXIMATE. CONTRACTOR SHALL FIELD VERIFY ALL LINE SIZES, DEPTHS AND LOCATIONS PRIOR TO EXCAVATION.
3. TOP OF PAVEMENT ELEVATIONS ARE ONLY APPROXIMATE AND MAY NEED TO BE ADJUSTED AS TO MEET ADA REQUIREMENTS.
4. THE MAXIMUM TRANSVERSE SLOPE (SIDEWALK CROSS SLOPE) IS 1:48 OR 2%. WHEN CROSS SLOPE IS NOT SHOWN, CONTRACTOR SHALL MAKE IT BETWEEN 1.5-2%.
5. THE MAXIMUM RUNNING SLOPE IS 1:20 OR 5% AND MAXIMUM LONGITUDINAL SLOPE FOR THE CONCRETE RAMP IS 1:12 OR 8.33%.
6. CONCRETE SIDEWALK SHALL HAVE EXPANSION JOINTS AT 40 FEET MAXIMUM AND CONTROL JOINTS AT 5 FEET MAXIMUM.
7. CRUSHED GRANITE TRAIL SHALL HAVE 6-INCH WIDE CONCRETE BORDER AT THE GIVEN ELEVATION OF THE TRAIL WITH 1.5-2% CROSS SLOPE.
8. CONTRACTOR TO REGRADE BACKSLOPE SWALE AND DITCH HIGH BANK AS NEEDED ALONG PROPOSED TRAIL.
9. THE CONTRACTOR SHALL ADJUST ALL BOXES, VALVES, MANHOLES AND OTHER OBJECTS IN THE GROUND THAT ARE IN THE PATH OF THE TRAIL TO MATCH TRAIL ELEVATION.
10. THE CONTRACTOR SHALL RESTORE THE LANDSCAPE TO ITS ORIGINAL CONDITION OR BETTER. HYDROMULCH SHALL BE USED TO REPLACE GRASS THAT HAS BEEN DISTURBED IN ANY CHANNEL OR POND, ANYWHERE ELSE, SOD SHALL BE USED TO REPLACE ANY GRASS THAT HAS BEEN DISTURBED.
11. THE CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE ALONG DITCHES AND TO INTERCEPTION STRUCTURES & PROTECT INLETS FROM SEDIMENT. DURING CONSTRUCTION, ANY DITCHES AND STRUCTURES DISTURBED SHALL BE RE-CONSTRUCTED IN THE SAME LOCATION AND SIZE AS PRE-CONSTRUCTION CONDITIONS.
12. SURVEY BY CIVIL-SURV LAND SURVEYING, L.C. NOVEMBER 8, 2016. CONTRACTOR MAY REQUEST A COPY OF SURVEY FROM ENGINEER.

APPROVED: _____ Development Coordinator
DATE: _____

INTERIM REVIEW ONLY
Document incomplete; not intended for permit, bidding or construction.
Engineer: Robert C. Strenk
P.E. No.: 101280
Firm: Lockwood, Andrews & Newnam, Inc.
Firm No.: F-2164
Date: 5/2/17

Lockwood, Andrews & Newnam, Inc.
A LJA & AKM COMPANY
PLANNING ENGINEERING ENVIRONMENTAL
2925 Briarpark Drive
Houston, Texas 77042-3726
Tel 713-268-6000 Fax 713-266-7596

TO AVOID DAMAGE OR LOSS TO UTILITIES IN THE AREA, CALL CENTERPOINT AT 713-207-2222.

NOTICE:
For your safety, you are required by Texas Law to call 811 at least 48 hours before you do any underground line work. Failure to do so may be a violation of Texas Law. Failure to call may result in fines and/or criminal prosecution.

VERIFICATION OF PRIVATE UTILITY LINES

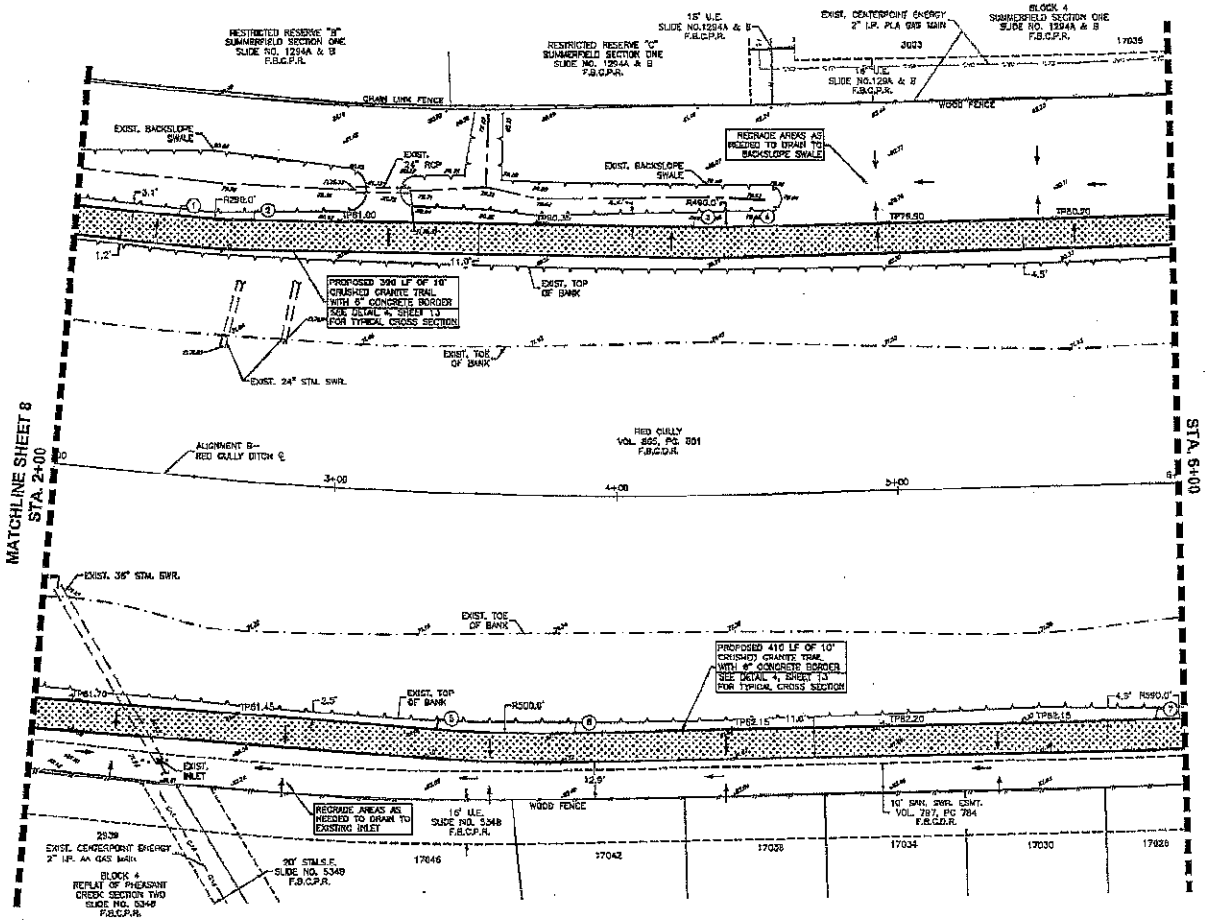
N/A Date
Underground Energy/Natural Gas facilities verification ONLY.
(This signature verifies that you have shown CNP Natural Gas lines correctly - not to be used for conflict verification.) (Gas service lines are not shown.)
Signature Valid for six months.

N/A Date
Underground Energy/UNDERGROUND Electric Facilities Verification ONLY.
(This signature verifies existing underground facilities - not to be used for conflict verification)
Signature Valid for six months.

N/A Date
Approved for AT&T (lease/SBC) underground conduit facilities only.
Signature valid for one year.

FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 25
TRAILS SYSTEM PHASE I
ALIGNMENT A - STA. 22+00 TO 26+60 AND ALIGNMENT B - STA. 0+00 TO 2+00
FORT BEND COUNTY, TX

FILE NO:
DRAWING SCALE
HORIZ: 1" = 20'
VERT: N/A
SHEET No: 8 OF 53



#	NORTHING	EASTING	ELEV.
1	13795032.5309	3025496.1845	81.15
2	13795058.9434	3025497.3289	81.29
3	13795215.1526	3025495.9593	80.10
4	13795236.3420	3025495.4804	80.00
5	13795128.2366	3025545.4931	81.50
6	13795175.1285	3025545.9741	82.10
7	13795382.0416	3025538.8750	82.25

SCALE: 1" = 20'

BENCHMARK:

CITY OF SUGAR LAND GEODETIC CONTROL STATION SGR-14 (RESET) BEING A STAINLESS STEEL ROD IN SLEEVE WITH CAP APPROXIMATELY 60' EAST OF THE EAST RIGHT-OF-WAY LINE OF BROOKS STREET, APPROXIMATELY 40' SOUTH OF A LIGHT POLE, AND APPROXIMATELY 38' NORTHEAST OF A POWER POLE. ELEVATION = 79.17' (NAVD 1988, 2001 ADJUSTMENT)

LEGEND:

- EXIST. R.O.W. OR PROPERTY LINE
- EXIST. EASEMENT LINE
- EXIST. TOP OF BANK (TOB)
- EXIST. SWALE CENTERLINE
- EXIST. CONCRETE SIDEWALK
- PROP. CONCRETE SIDEWALK
- PROP. CRUSHED GRANITE TRAIL WITH 6-INCH WIDE CONCRETE BORDER
- 80.00 EXIST. ELEVATIONS
- TB/TP/TC/60.00 PROP. TOP-OF-BANK/TOP-OF-PAVEMENT/TOP-OF-CURB/GUTTER
- PROP. POINTS, SEE TABLE THIS SHEET
- RELOCATE SIGN IN PATH OF SIDEWALK
- DRAINAGE DIRECTION ARROW

NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED.
2. EXISTING UTILITY LINE LOCATIONS ARE APPROXIMATE. CONTRACTOR SHALL FIELD VERIFY ALL LINE SIZES, DEPTHS AND LOCATIONS PRIOR TO EXCAVATION.
3. TOP OF PAVEMENT ELEVATIONS ARE ONLY APPROXIMATE AND MAY NEED TO BE ADJUSTED AS TO MEET ADA REQUIREMENTS.
4. THE MAXIMUM TRANSVERSE SLOPE (SIDEWALK CROSS SLOPE) IS 1:48 OR 2%. WHEN CROSS SLOPE IS NOT SHOWN, CONTRACTOR SHALL MAKE IT BETWEEN 1.5-2%.
5. THE MAXIMUM RUNNING SLOPE IS 1:20 OR 5%, AND MAXIMUM LONGITUDINAL SLOPE FOR THE CONCRETE RAMP IS 1:12 OR 8.33%.
6. CONCRETE SIDEWALK SHALL HAVE EXPANSION JOINTS AT 40 FEET MAXIMUM AND CONTROL JOINTS AT 5 FEET MAXIMUM.
7. CRUSHED GRANITE TRAIL SHALL HAVE 6-INCH WIDE CONCRETE BORDER AT THE OVEN ELEVATION OF THE TRAIL WITH 1.5-2% CROSS SLOPE.
8. CONTRACTOR TO REGRADE BACKSLOPE SWALE AND DITCH HIGH BANK AS NEEDED ALONG PROPOSED TRAIL.
9. THE CONTRACTOR SHALL ADJUST ALL BOXES, VALVES, MANHOLES AND OTHER OBJECTS IN THE GROUND THAT ARE IN THE PATH OF THE TRAIL TO MATCH TRAIL ELEVATION.
10. THE CONTRACTOR SHALL RESTORE THE LANDSCAPE TO ITS ORIGINAL CONDITION OR BETTER. HYDROMULCH SHALL BE USED TO REPLACE GRASS THAT HAS BEEN DISTURBED IN ANY CHANNEL OR POND. ANYWHERE ELSE, SOD SHALL BE USED TO REPLACE ANY GRASS THAT HAS BEEN DISTURBED.
11. THE CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE ALONG DITCHES AND TO INTERCEPTOR STRUCTURES & PROTECT INLETS FROM SEDIMENT. DURING CONSTRUCTION, ANY DITCHES AND STRUCTURES DISTURBED SHALL BE RE-CONSTRUCTED IN THE SAME LOCATION AND SIZE AS PRE-CONSTRUCTION CONDITIONS.
12. SURVEY BY CIVIL-SURV LAND SURVEYING, L.C. NOVEMBER 8, 2016. CONTRACTOR MAY REQUEST A COPY OF SURVEY FROM ENGINEER.

APPROVED: _____ Developers Consultant
DATE: _____

INTERIM REVIEW ONLY
Document incomplete not intended for permit, bidding or construction.
Engineer: Edward O. Gaston
P.E. No.: 81080
Firm: Lockwood, Andrews & Newnam, Inc.
Firm No.: F-2614
Date: 5/2/17

Lockwood, Andrews & Newnam, Inc.
PLANNING ENGINEERING PROGRAM MANAGEMENT
2925 Briarpark Drive
Houston, Texas 77042-3720
Tel 713-266-6900 Fax 713-266-7896

TO ALLOWANCE FOR CREW TO BE PRESENT OFF ON NORTH, CALL CENTERPOINT AT 713-207-2222.

NOTICE:
For your safety, you are required by law (see Lic 16 and 251 in back of book below) you dig so that underground line can be located. This verification does not fulfill your obligation in all 251.

VERIFICATION OF PRIVATE UTILITY LINES

N/A Date
Centerpoint Energy/Reliant Gas Facilities Verification ONLY.
(We assume visible lines are have shown GAS failure the lines correctly - not to be used for conflict verification.) (Gas service lines are not shown.)
Signature valid for six months.

N/A Date
Centerpoint Energy/Reliant Electric Facilities Verification ONLY.
(For alignment verifies existing underground facilities - not to be used for conflict verification)
Signature valid for six months.

N/A Date
Approval for AT&T Texas/SBC underground original facilities only.
Signature valid for one year.

FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 25
TRAILS SYSTEM PHASE 4

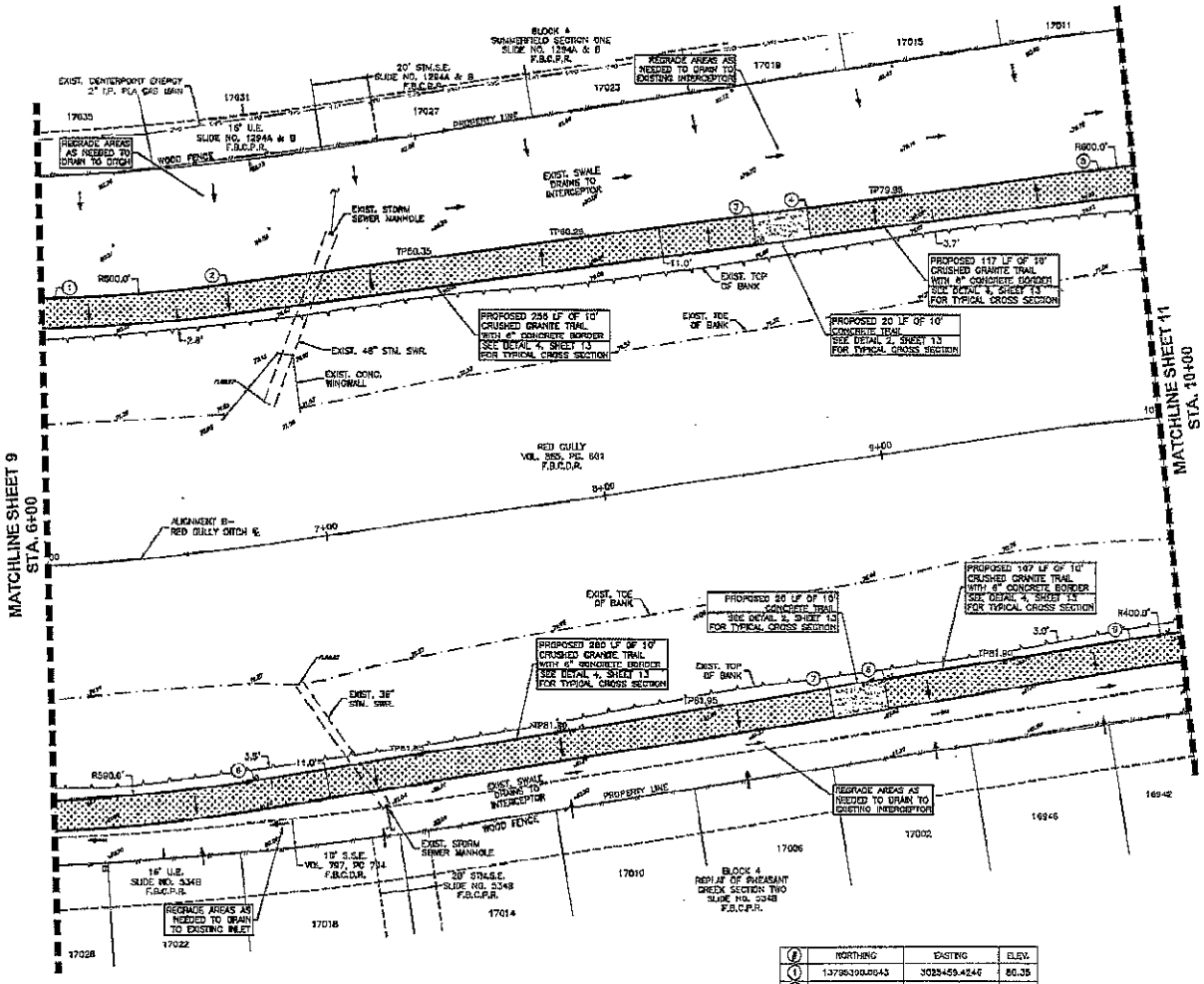
ALIGNMENT B - STA. 2+00 TO 6+00

FORT BEND COUNTY, TX

FILE NO.:

DRAWING SCALE
HORIZ: 1" = 20'
VERT: N/A

SHEET No: 9 OF 53



#	NORTHING	EASTING	ELEV.
1	13795300.0043	3025459.4240	80.35
2	13795451.7874	3025453.3053	80.33
3	13795638.0903	3025425.4052	80.03
4	13795657.6663	3025422.4337	80.02
5	13795761.2884	3025406.7834	79.90
6	13795453.7533	3025528.9414	82.00
7	13795658.0362	3025593.4482	81.08
8	13795687.7178	3025589.4937	82.00
9	13795773.5928	3025573.6239	81.03

SCALE: 1" = 20'

BENCHMARK:

CITY OF SUGAR LAND GEODETIC CONTROL STATION SGR-14 (RESET) BEND A STAINLESS STEEL ROD IN SLEEVE WITH CAP APPROXIMATELY 60' EAST OF THE EAST RIGHT-OF-WAY LINE OF BROOKS STREET, APPROXIMATELY 40' SOUTH OF A LIGHT POLE, AND APPROXIMATELY 35' NORTHEAST OF A POWER POLE. ELEVATION = 79.17' (NAVD 1988, 2001 ADJUSTMENT)

LEGEND:

- EXIST. R.O.W. OR PROPERTY LINE
- EXIST. EASEMENT LINE
- EXIST. TOP OF BANK (TOB)
- EXIST. SWALE CENTERLINE
- EXIST. CONCRETE SIDEWALK
- PROP. CONCRETE SIDEWALK
- PROP. CRUSHED GRANITE TRAIL WITH 6-INCH WIDE CONCRETE BORDER
- 80.00 EXIST. ELEVATIONS
- TB/TP/TC/080.00 PROP. TOP-OF-BANK/TOP-OF-PAVEMENT/TOP-OF-CURB/GUTTER
- 8 PROP. POSTS. SEE TABLE THIS SHEET
- RELOCATE SIGN IN PATH OF SIDEWALK
- DRAINAGE DIRECTION ARROW

NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED.
2. EXISTING UTILITY LINE LOCATIONS ARE APPROXIMATE. CONTRACTOR SHALL FIELD VERIFY ALL LINE SIZES, DEPTHS AND LOCATIONS PRIOR TO EXCAVATION.
3. TOP OF PAVEMENT ELEVATIONS ARE ONLY APPROXIMATE AND MAY NEED TO BE ADJUSTED AS TO MEET ADA REQUIREMENTS.
4. THE MAXIMUM TRANSVERSE SLOPE (SIDEWALK CROSS SLOPE) IS 1:48 OR 2%. WHEN CROSS SLOPE IS NOT SHOWN, CONTRACTOR SHALL MAKE IT BETWEEN 1.5-2%.
5. THE MAXIMUM RUNNING SLOPE IS 1:20 OR 5% AND MAXIMUM LONGITUDINAL SLOPE FOR THE CONCRETE RAMP IS 1:12 OR 8.33%.
6. CONCRETE SIDEWALK SHALL HAVE EXPANSION JOINTS AT 40 FEET MAXIMUM AND CONTROL JOINTS AT 5 FEET MAXIMUM.
7. CRUSHED GRANITE TRAIL SHALL HAVE 6-INCH WIDE CONCRETE BORDER AT THE GIVEN ELEVATION OF THE TRAIL WITH 1.5-2% CROSS SLOPE.
8. CONTRACTOR TO REGRADE BACKSLOPE SWALE AND DITCH HIGH BANK AS NEEDED ALONG PROPOSED TRAIL.
9. THE CONTRACTOR SHALL ADJUST ALL BOXES, VALVES, MANHOLES AND OTHER OBJECTS IN THE GROUND THAT ARE IN THE PATH OF THE TRAIL TO MATCH TRAIL ELEVATION.
10. THE CONTRACTOR SHALL RESTORE THE LANDSCAPE TO ITS ORIGINAL CONDITION OR BETTER. HYDROMULCH SHALL BE USED TO REPLACE GRASS THAT HAS BEEN DISTURBED IN ANY CHANNEL OR POND, ANYWHERE ELSE, SOD SHALL BE USED TO REPLACE ANY GRASS THAT HAS BEEN DISTURBED.
11. THE CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE ALONG DITCHES AND TO INTERCEPTOR STRUCTURES & PROTECT INLETS FROM SEDIMENT. DURING CONSTRUCTION, ANY DITCHES AND STRUCTURES DISTURBED SHALL BE RE-CONSTRUCTED IN THE SAME LOCATION AND SIZE AS PRE-CONSTRUCTION CONDITIONS.
12. SURVEY BY CIVIL-SURV LAND SURVEYING, LC. NOVEMBER 8, 2016. CONTRACTOR MAY REQUEST A COPY OF SURVEY FROM ENGINEER.

APPROVED: _____
Development Coordinator
DATE: _____

INTERIM REVIEW ONLY
Drawing not complete; not intended for permit, bidding or construction.
Engineer: Edward C. Stasch
P.E. No.: 101280
Firm: Lockwood, Andrews & Newnam, Inc.
Firm No.: F-2614
Date: 10/17

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
PLANNING ENGINEERING PROGRAM MANAGEMENT
2925 Briarpark Drive
Houston, Texas 77042-3720
Tel 713-266-6700 Fax 713-266-7596

NOTICE:
TO ENSURE THAT LINES TO BE TEMPO OFF CE NOVED, CALL SONTHCHAT AT 713-707-2222

VERIFICATION OF PRIVATE UTILITY LINES

N/A Date
Contractor Company/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 60 months.

N/A Date
Contractor Company/Underground Electrical Facilities Verification ONLY.
(This signature verifies existing underground facilities — not to be used for conflict verification.)
Signature Valid for 60 months.

N/A Date
Approved for field locate/GPS underground conduit facilities map.
Signature valid for one year.

FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 25
TRAILS SYSTEM PHASE 1

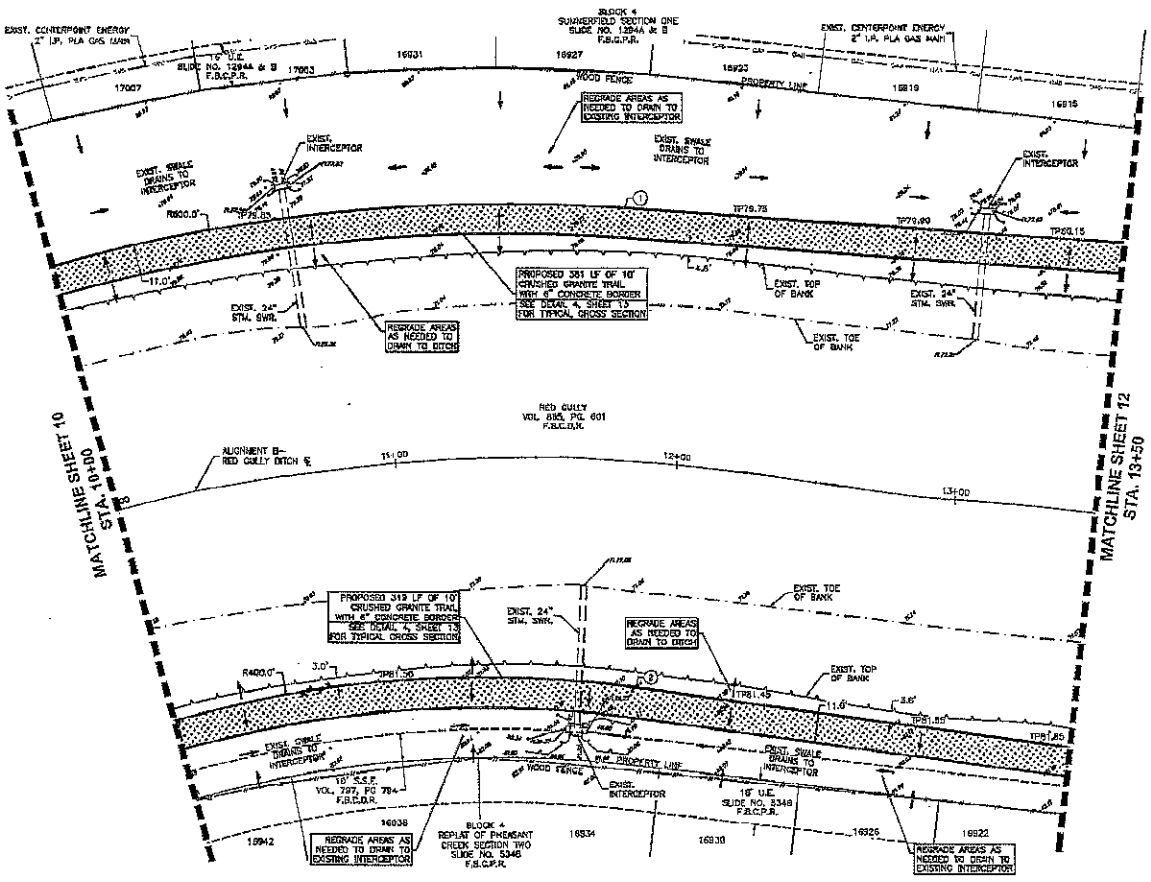
ALIGNMENT B - STA.6+00 TO 10+00

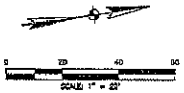
FORT BEND COUNTY, TX

FILE NO:

DRAWING SCALE
HORIZ: 1" = 20'
VERT: N/A

SHEET No: 10 OF 53





	NORTHING	EASTING	ELEV.
1	13795978.5369	3025413.7674	76.95
2	13795957.1551	3025662.7600	81.28

BENCHMARK:

CITY OF SUGAR LAND GEODETIC CONTROL STATION SGR-14 (RESET) BEING A STAINLESS STEEL ROD IN SLEEVE WITH CAP APPROXIMATELY 60' EAST OF THE EAST RIGHT-OF-WAY LINE OF BROOKS STREET, APPROXIMATELY 45' SOUTH OF A LIGHT POLE, AND APPROXIMATELY 35' NORTHEAST OF A POWER POLE. ELEVATION = 78.17' (NAVD 1988, 2001 ADJUSTMENT)

LEGEND:

- EXIST. R.O.W. OR PROPERTY LINE
- EXIST. EASEMENT LINE
- EXIST. TOP OF BANK (TOB)
- EXIST. SWALE CENTERLINE
- EXIST. CONCRETE SIDEWALK
- PROP. CONCRETE SIDEWALK
- PROP. CRUSHED GRANITE TRAIL WITH 6-INCH WIDE CONCRETE BORDER
- *80.00 EXIST. ELEVATIONS
- *TB/TP/TG/260.00 PROP. TOP-OF-BANK/TOP-OF-PAVEMENT/TOP-OF-CURB/GUTTER
- (#) PROP. POINTS, SEE TABLE THIS SHEET
- RELOCATE SIGN IN PATH OF SIDEWALK
- DRAINAGE DIRECTION ARROW

NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED.
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5. THE MAXIMUM RUNNING SLOPE IS 1:20 OR 5%, AND MAXIMUM LONGITUDINAL SLOPE FOR THE CONCRETE RAMP IS 1:12 OR 8.33%.
6. CONCRETE SIDEWALK SHALL HAVE EXPANSION JOINTS AT 40 FEET MAXIMUM AND CONTROL JOINTS AT 5 FEET MAXIMUM.
7. CRUSHED GRANITE TRAIL SHALL HAVE 6-INCH WIDE CONCRETE BORDER AT THE GIVEN ELEVATION OF THE TRAIL WITH 1.5-2% CROSS SLOPE.
8. CONTRACTOR TO REGRADE BACKSLOPE SWALE AND DITCH HIGH BANK AS NEEDED ALONG PROPOSED TRAIL.
9. THE CONTRACTOR SHALL ADJUST ALL BOXES, VALVES, MANHOLES AND OTHER OBJECTS IN THE GROUND THAT ARE IN THE PATH OF THE TRAIL TO MATCH TRAIL ELEVATION.
10. THE CONTRACTOR SHALL RESTORE THE LANDSCAPE TO ITS ORIGINAL CONDITION OR BETTER. HYDROMULCH SHALL BE USED TO REPLACE GRASS THAT HAS BEEN DISTURBED IN ANY DRAINAGE OR POND. ANYWHERE ELSE, SOD SHALL BE USED TO REPLACE ANY GRASS THAT HAS BEEN DISTURBED.
11. THE CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE ALONG DITCHES AND TO INTERCEPTION STRUCTURES & PROTECT INLETS FROM SEDIMENT, DURING CONSTRUCTION. ANY DITCHES AND STRUCTURES DISTURBED SHALL BE RE-CONSTRUCTED IN THE SAME LOCATION AND SIZE AS PRE-CONSTRUCTION CONDITIONS.
12. SURVEY BY CIVIL-SURV LAND SURVEYING, L.C. NOVEMBER 8, 2016. CONTRACTOR MAY REQUEST A COPY OF SURVEY FROM ENGINEER.

APPROVED: _____ Developers Contractor

DATE: _____

INTERIM REVIEW ONLY

Document incomplete: not intended for permit, bidding or construction.

Engineer: Edward O. Strench
P.E. No.: 101266
Firm: Lockwood, Andrews & Newnam, Inc.
Firm No.: F-2614
Date: 5/2/17

Lockwood, Andrews & Newnam, Inc.
A MEMBER OF WSP GROUP
PLANNING ENGINEERING ENVIRONMENT
2925 Briarpark Drive
Houston, Texas 77042-3720
Tel 713-266-6900 Fax 713-266-7596

TO AVOID DAMAGE OR DELAY IN UNDERGROUND WORK, CALL CENTERPOINT AT 713-207-2222

NOTICE:
For your safety, you are required to have size to pick out at least 48 hours before you dig so that underground gas lines can be located. Gas pipelines can be damaged by digging with equipment or cut off.

VERIFICATION OF PRIVATE UTILITY LINES

N/A Date
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 verifications) (Gas service lines are not shown.)
Signature valid for six months.

N/A Date
Centerpoint Energy/Electric/CATV Underground Facilities Verification ONLY.
(This signature verifies existing underground facilities - not to be used for conflict verification)
Signature valid for six months.

N/A Date
Approved for other Underground Underground Facilities Verification only.
Signature valid for one year.

FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 25
TRAILS SYSTEM PHASE 1

ALIGNMENT B - STA. 10+00 TO 13+50

FORT BEND COUNTY, TX

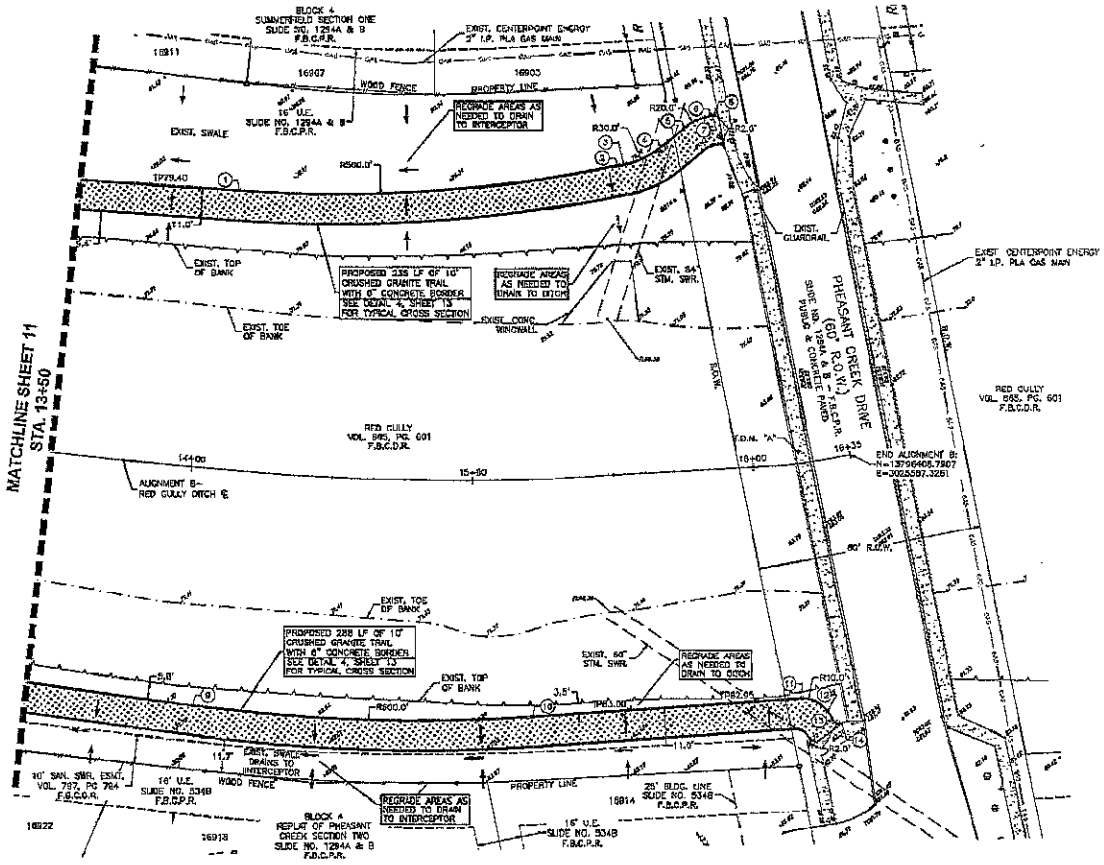
FILE NO:

DRAWING SCALE
HORIZ: 1" = 20'
VERT: N/A

SHEET No: 11 OF 53

Revisions | No. | Date | Description

PLOT: 7:\Projects\Fort Bend County MUD 25\Trails System Phase 1\Alignment B\Alignment B - 10+00 to 13+50.dwg
PLOT DATE: 5/2/2017 10:42 AM
PLOT BY: Hernandez, Oscar
PLOT SCALE: 1:1
PAGE SIZE: 24x36



BENCHMARK:

CITY OF SUGAR LAND GEODETIC CONTROL STATION SGR-14 (RESET) BEING A STAINLESS STEEL ROD IN SLEEVE WITH CAP APPROXIMATELY 60' EAST OF THE EAST RIGHT-OF-WAY LINE OF BROOKS STREET, APPROXIMATELY 40' SOUTH OF A LIGHT POLE, AND APPROXIMATELY 35' NORTHEAST OF A POWER POLE. ELEVATION = 75.17' (NAVD 1988, 2001 ADJUSTMENT)

LEGEND:

- EXIST. R.O.W. OR PROPERTY LINE
- EXIST. EASEMENT LINE
- EXIST. TOP OF BANK (TOB)
- EXIST. SWALE CENTERLINE
- EXIST. CONCRETE SIDEWALK
- PROP. CONCRETE SIDEWALK
- PROP. CRUSHED GRANITE TRAIL WITH 6-INCH WIDE CONCRETE BORDER
- ×80.00 EXIST. ELEVATIONS
- ×78/TP/TG/080.00 PROP. TOP-OF-BANK/TOP-OF-PAVEMENT/TOP-OF-CURB/GUTTER
- (2) PROP. POINTS, SEE TABLE THIS SHEET
- RELOCATE SIGN IN PATH OF SIDEWALK
- DRAINAGE DIRECTION ARROW

NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED.
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5. THE MAXIMUM RUNNING SLOPE IS 1:20 OR 5%, AND MAXIMUM LONGITUDINAL SLOPE FOR THE CONCRETE RAMP IS 1:12 OR 8.33%.
6. CONCRETE SIDEWALK SHALL HAVE EXPANSION JOINTS AT 40 FEET MAXIMUM AND CONTROL JOINTS AT 5 FEET MAXIMUM.
7. CRUSHED GRANITE TRAIL SHALL HAVE 6-INCH WIDE CONCRETE BORDER AT THE GIVEN ELEVATION OF THE TRAIL WITH 1.5–2% CROSS SLOPE.
8. CONTRACTOR TO REGRADE BACKSLOPE SWALE AND DITCH HIGH BANK AS NEEDED ALONG PROPOSED TRAIL.
9. THE CONTRACTOR SHALL ADJUST ALL BOXES, VALVES, MANHOLES AND OTHER OBJECTS IN THE GROUND THAT ARE IN THE PATH OF THE TRAIL TO MATCH TRAIL ELEVATION.
10. THE CONTRACTOR SHALL RESTORE THE LANDSCAPE TO ITS ORIGINAL CONDITION OR BETTER. HYDROMULCH SHALL BE USED TO REPLACE GRASS THAT HAS BEEN DISTURBED IN ANY CHANNEL OR POND, ANYWHERE ELSE, SOD SHALL BE USED TO REPLACE ANY GRASS THAT HAS BEEN DISTURBED.
11. THE CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE ALONG DITCHES AND TO INTERCEPTOR STRUCTURES & PROTECT INLETS FROM SEDIMENT. DURING CONSTRUCTION, ANY DITCHES AND STRUCTURES DISTURBED SHALL BE RE-CONSTRUCTED IN THE SAME LOCATION AND SIZE AS PRE-CONSTRUCTION CONDITIONS.
12. SURVEY BY CIVIL-SURV LAND SURVEYING, L.C. NOVEMBER 2, 2015. CONTRACTOR MAY REQUEST A COPY OF SURVEY FROM ENGINEER.

TEMPORARY BENCHMARK "A":

BOX CUT IN THE CENTER OF A CONCRETE SIDEWALK ALONG THE SOUTH RIGHT-OF-WAY OF PHEASANT CREEK DRIVE AT THE DOWNSTREAM CENTERLINE OF RED GULLY, AS SHOWN ON SURVEY. ELEVATION: 83.77' (NAVD 1988, 2001 ADJUSTMENT)

#	NORTHING	EASTING	ELEV.
1	13796207.9069	3025463.3408	78.80
2	13796342.0718	3025474.0881	80.20
3	13796344.3739	3025473.9859	80.28
4	13796358.1346	3025469.8022	80.76
5	13796367.7751	3025464.0054	81.24
6	13796377.4627	3025461.6927	81.62
7	13796378.3147	3025461.6605	81.64
8	13796379.5980	3025459.4870	81.72
9	13796384.3372	3025442.1635	82.20
10	13796385.6424	3025433.3753	82.30
11	13796386.5439	3025371.8172	82.55
12	13796387.3054	3025376.5708	82.45
13	13796389.4057	3025324.1590	82.35
14	13796391.9226	3025282.0706	82.29

APPROVED: _____ Development Coordinator

DATE: _____

INTERIM REVIEW ONLY

Document incomplete; not intended for permit, bidding or construction.

Engineer: Edward C. Sinnich
P.E. No.: 108290
Firm: Lockwood, Andrews & Newnam, Inc.
Firm No.: F-2614
Date: 5/2/17

Lockwood, Andrews & Newnam, Inc.
PLANNING
ENGINEERING
PROGRAM MANAGEMENT
2925 Briarpark Drive
Houston, Texas 77042-3720
Tel 713-266-6900 Fax 713-266-7596

TO AVOID/ FOR USE TO BE RUNED BY 48 HOURS CALL CENTERPOINT AT 713-207-2222.

NOTICE:
For your safety, you are required by State law to call 811 at least 48 hours before you dig so that underground lines can be located. This notification does not fulfill your obligation to call 811.

VERIFICATION OF PRIVATE UTILITY LINES

N/A Date:
CenterPoint Energy/Reliant Gas Facilities Verification ONLY.
(This sentence verifies that you have shown CPE Reliant Gas lines correctly - not to be used for conflict verification) (Gas service lines are not shown.)
Signature valid for six months.

N/A Date:
CenterPoint Energy/UNDERGROUND ELECTRIC Facilities Verification ONLY.
(This sentence verifies existing underground facilities - not to be used for conflict verification)
Signature valid for six months.

N/A Date:
Approved for field layout/staking underground conflict location only.
Signature valid for one year.

FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 25
TRAILS SYSTEM PHASE 1

ALIGNMENT B - STA. 13+50 TO 16+35

FORT BEND COUNTY, TX

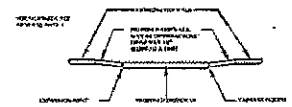
FILE NO:

DRAWING SCALE
HORZ: 1" = 20'
VERT: N/A

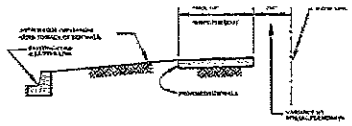
SHEET No. 12 OF 53

WHEN A RESIDENTIAL SIDEWALK, DRIVEWAY, CURB OR GUTTER IS CONSTRUCTED, RECONSTRUCTED, REPAIRED OR REGRADED IN COUNTY RIGHT-OF-WAY, FOR USE WITH CONCRETE OR ASPHALT OPEN DITCH TYPE STREETS, THE SECTIONS APPLICABLE:

C. USE WHEN PROPOSED DRIVEWAY IS TO BE BUILT WITH EXISTING SIDEWALKS WITH DIAGONAL GRADE:



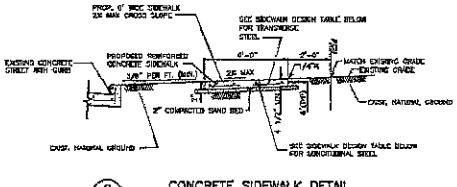
D. USE WHEN SIDEWALK TO BE BUILT OTHER THAN DRIVEWAY:



GENERAL NOTES:

SIDEWALKS & DRIVEWAYS ON CURB TYPE STREETS RESIDENTIAL AREA	DRAWN BY: L. BRIDEOK DATE DRAWN: 2-1-94	REVISED BY: R. GOMEZ DATE REVISED: 11-4-05
	APPROVED BY: L. HOOD DATE: 2-1-94	DRAWING NO. FBC-0108
FORT BEND COUNTY ENGINEERING DEPARTMENT		

1/13 SIDEWALKS FOR RESIDENTIAL AREA
NOT TO SCALE

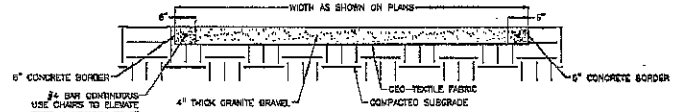


2/13 CONCRETE SIDEWALK DETAIL
NOT TO SCALE

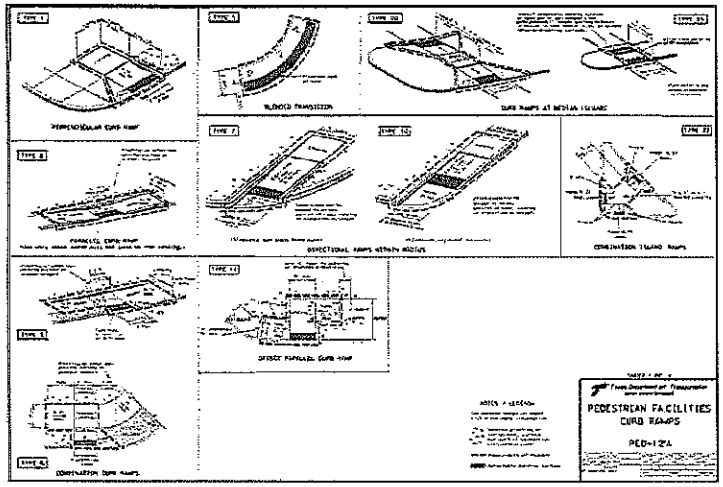
REINFORCING STEEL INFORMATION
FOR 4 1/2" THICK SIDEWALKS
EXPANSION JOINT SPACING = 40 FT
f'c = 3,000 PSI AND fy = 60,000 PSI

SIDEWALK THICKNESS (IN)	WIDTH (FT)	LONGITUDINAL STEEL #3 BARS			TRANSVERSE STEEL #3 BARS SPACING (IN)
		NUMBER OF BARS	SPACING (IN)	END BAR SPACING (IN)	
4.5	4	3	18	3	15

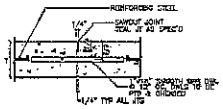
3/13 SIDEWALK DESIGN TABLE



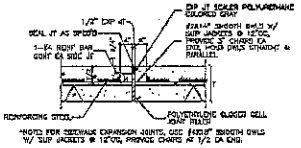
4/13 CRUSHED GRANITE TRAIL CROSS SECTION
NOT TO SCALE



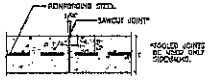
6/13 WHEELCHAIR RAMP DETAILS
NOT TO SCALE



7/13 CONSTRUCTION JOINT DETAIL
NOT TO SCALE



8/13 EXPANSION JOINT DETAIL
NOT TO SCALE



9/13 CONTROL JOINT DETAIL
NOT TO SCALE

NOTES:

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED.

2. EXISTING UTILITY LINE LOCATIONS ARE APPROXIMATE. CONTRACTOR SHALL FIELD VERIFY ALL LINE SIZES, DEPTHS AND LOCATIONS PRIOR TO EXCAVATION.

3. TOP OF PAVEMENT ELEVATIONS ARE ONLY APPROXIMATE AND MAY NEED TO BE ADJUSTED AS TO MEET ADA REQUIREMENTS OR ADJACENT GRADES.

4. THE MAXIMUM TRANSVERSE SLOPE (SIDEWALK CROSS SLOPE) IS 1:48 OR 2%. WHEN CROSS SLOPE IS NOT SHOWN, CONTRACTOR SHALL MAKE IT BETWEEN 1.5–2%.

5. THE MAXIMUM RUNNING SLOPE IS 1:20 OR 5%, AND MAXIMUM LONGITUDINAL SLOPE FOR THE CONCRETE RAMP IS 1:12 OR 8.33%.

6. THE CONCRETE SIDEWALK SHALL BE MINIMUM CLASS D2, 3,000 PSI IN 28 DAYS CONCRETE, 4 1/2" MINIMUM THICKNESS AND 7" MINIMUM THICKNESS AT DRIVEWAYS WITH LIGHT BROOM FINISH, AND EXPANSION JOINTS AT 40 FEET MAXIMUM AND CONTROL JOINTS AT 5 FEET MAXIMUM.

7. TRUNCATED DOMES SHALL EXTEND THE FULL WIDTH OF THE CURB RAMP, AND SHALL ALSO HAVE A CENTER-TO-CENTER SPACING OF 1.6 INCHES MINIMUM AND 2.4 INCHES MAXIMUM, AND A BASE-TO-BASE SPACING OF 0.65 INCH MINIMUM, MEASURED BETWEEN THE MOST ADJACENT DOMES ON A SQUARE GRID. DOMES SHALL BE 6 INCHES OFF FACE OF CURB.

8. DETECTABLE WARNING SURFACES SHALL CONTRAST VISUALLY WITH ADJACENT WALKING SURFACES EITHER LIGHT-ON-DARK, OR DARK-ON-LIGHT.

9. CONTRACTOR SHALL TRIM TREES AND SHRUBBERY AWAY FROM SIDEWALK AS TO MEET THE ADA REQUIREMENTS FOR PROTRUSION LIMITS.

10. OUTSIDE FORMS SHALL BE OF WOOD OR METAL, OF A SECTION SATISFACTORY TO THE ENGINEER, STRAIGHT, FREE OF WARP AND OF A DEPTH EQUAL TO THE DEPTH REQUIRED. THEY SHALL BE SECURELY STAKED TO LINE AND GRADE, AND MAINTAINED IN A TRUE POSITION DURING THE DEPOSITING OF CONCRETE. INSIDE FORMS FOR CURBS SHALL BE OF APPROVED MATERIAL, SHALL BE OF SUCH DESIGN AS TO PROVIDE THE CURB REQUIRED AND SHALL BE RIGIDLY ATTACHED TO THE OUTSIDE FORMS.

11. THE REINFORCING STEEL SHALL BE PLACED IN THE POSITION SHOWN BY THE DETAIL. CARE SHALL BE EXERCISED TO KEEP ALL STEEL FREE FROM RUST AND IN ITS PROPER LOCATION.

12. SIDEWALKS SHALL BE CONSTRUCTED IN SECTIONS OF THE LENGTHS SHOWN ON THE DETAIL UNLESS OTHERWISE PROVIDED BY THE PLANS. NO SECTION SHALL BE OF A LENGTH LESS THAN 8-FEET AND ANY SECTION LESS THAN 8-FEET SHALL BE REMOVED BY THE CONTRACTOR AT HIS OWN EXPENSE. THE DIFFERENT SECTIONS SHALL BE SEPARATED BY A PREMOLDED OR BOND JOINT OF THE THICKNESS SHOWN ON THE PLANS, PLACED VERTICALLY AND AT RIGHT ANGLES TO THE LONGITUDINAL AND OF THE SIDEWALK.

13. WHERE THE SIDEWALKS ABUT A DRIVEWAY, CURB, INLET, OR RETAINING WALL, APPROVED EXPANSION MATERIAL SHALL BE PLACED ALONG THEIR ENTIRE LENGTH. SIMILAR EXPANSION MATERIAL SHALL BE PLACED AROUND ALL OBSTRUCTIONS PROTRUDING THROUGH THE SIDEWALKS.

14. THE REINFORCED CONCRETE SIDEWALK SHALL BE PLACED ON A BEDDING MATERIAL OF BANK SAND, AT A MINIMUM OF 2" THICK.

15. THE CONTRACTOR SHALL ADJUST ALL BOXES INCLUDING TRAFFIC CONTROL GROUND BOXES, VALVE AND METER BOXES, MANHOLES, AND OTHER OBJECTS IN THE GROUND THAT ARE IN THE PATH OF THE SIDEWALK OR TRAIL TO MATCH TRAIL ELEVATION.

16. THE CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE ALONG DITCHES AND TO INTERCEPTOR STRUCTURES & PROTECT INLETS FROM SEDIMENT, DURING CONSTRUCTION. ANY DITCHES AND STRUCTURES DISTURBED SHALL BE RE-CONSTRUCTED IN THE SAME LOCATION AND SIZE AS PRE-CONSTRUCTION CONDITIONS.

17. CONTRACTOR SHALL GRADE ADJACENT GROUND TO SIDEWALK OR TRAIL AS NECESSARY AND RE-GRADE AREAS AS SHOWN ON THE PLANS.

18. CONTRACTOR SHALL BE RESPONSIBLE FOR AND ADEQUATELY PROTECT EXISTING STRUCTURES, LIGHTS, SIGNS, POLES, UTILITIES INCLUDING IRRIGATION SYSTEMS, TREES, SHRUBS, AND OTHER ADJOINING FACILITIES. CONTRACTOR SHALL REPAIR OR REPLACE ALL EXISTING FACILITIES DAMAGED BY CONSTRUCTION TO ORIGINAL CONDITION OR BETTER AT NO ADDITIONAL COST.

19. THE CONTRACTOR SHALL RESTORE THE LANDSCAPE TO ITS ORIGINAL CONDITION OR BETTER IN ALL AREAS DISTURBED BY CONSTRUCTION. HYDROMULCH SHALL BE USED TO REPLACE GRASS THAT HAS BEEN DISTURBED IN ANY CHANNEL OR POND. ANYWHERE ELSE, SOD SHALL BE USED TO REPLACE ANY GRASS THAT HAS BEEN DISTURBED.

6/13 CONSTRUCTION NOTES FOR SIDEWALKS AND TRAILS

APPROVED: _____ Development Coordinator
DATE: _____

INTERIM REVIEW ONLY
Document incomplete; not intended for permit, bidding or construction.
Engineer: Edward G. Blaylock
P.E. No.: 101290
Firm: Lockwood, Andrews & Newnam, Inc.
Firm No.: F-2614
Date: 02/17

Lockwood, Andrews & Newnam, Inc.
A CH2M HILL COMPANY
PLANNING
ENGINEERING
PROGRAM MANAGEMENT
2925 Briarpark Drive
Houston, Texas 77042-3720
Tel 713-266-6080 Fax 713-266-7594

TO ARRANGE FOR UNDERGROUND UTILITIES TO BE MARKED OUT ON YOUR LOT, CALL CENTERPOINT AT 713-207-2222.

NOTICE:
For your safety, you are required by Texas Law to call 811 at least 48 hours before you dig to find underground gas lines. Failure to comply, the landowner does not have proper authorization to dig.

VERIFICATION OF PRIVATE UTILITY LINES

N/A Date:
Centerpoint Energy/Reliant Gas facilities verification ONLY.
This signature verifies that you have Marked Out Gas lines correctly - not to be used for control verification. Gas service lines are not shown.
Signature valid for six months.

N/A Date:
Centerpoint Energy/NRG/HL&P Electric Facilities Verification ONLY.
This signature verifies related underground facilities - not to be used for control verification.
Signature valid for six months.

N/A Date:
Approval for AT&T Texas/SBC underground network facilities only.
Signature valid for one year.

FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 25
TRAILS SYSTEM PHASE 1

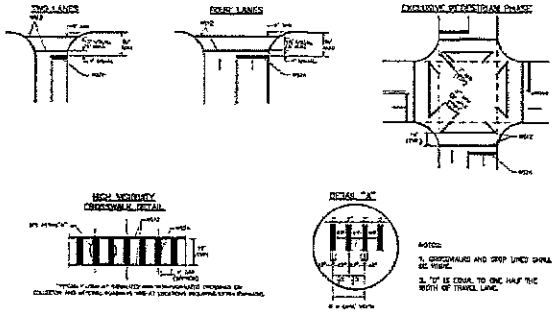
DETAILS SHEET 1

FORT BEND COUNTY, TX

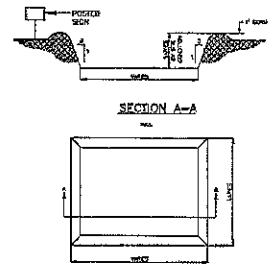
FILE NO:

DRAWING SCALE
HORZ: 1" = 20'
VERT: N/A

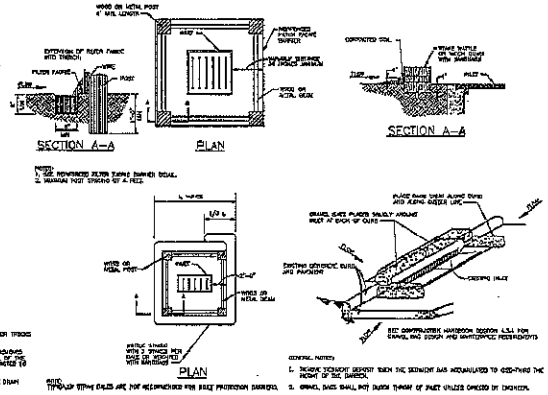
SHEET No: 13 OF 53



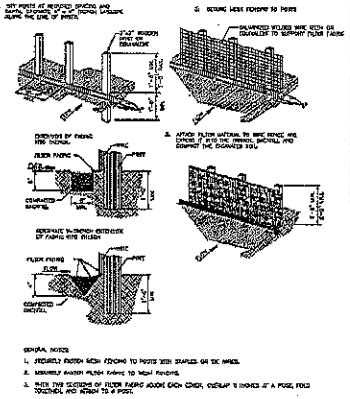
1/14 CROSSWALK PAVEMENT MARKING DETAIL
NOT TO SCALE



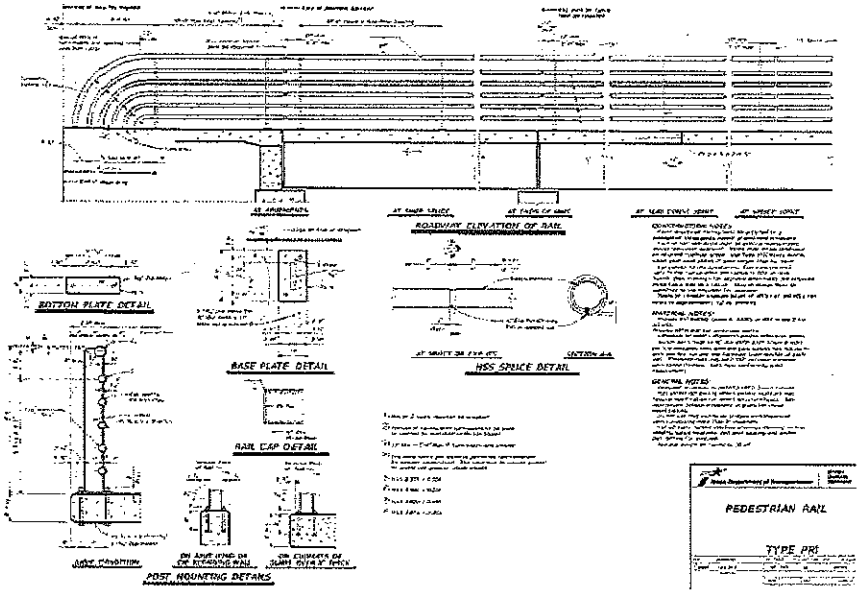
2/14 CONCRETE TRUCK WASHOUT AREA
NOT TO SCALE



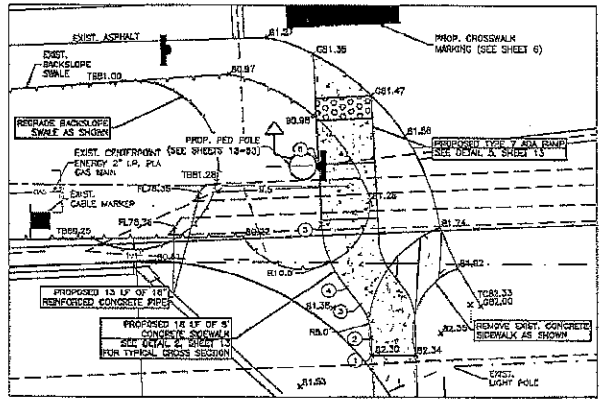
3/14 INLET PROTECTION BARRIER (IPB) DETAIL FOR STAGE I & II INLETS
NOT TO SCALE



4/14 REINFORCED FILTER FABRIC BARRIER DETAIL
NOT TO SCALE



5/14 PEDESTRIAN GUARDRAIL DETAIL
NOT TO SCALE



6/14 INSET A – SHEET 6
SCALE 1" = 5'

#	NORTHING	EASTING	ELEV.
1	13794564.5446	3024310.2377	79.85
2	13794471.5580	3024343.3621	82.30
3	13794473.1916	3024343.5300	82.29
4	13794476.1732	3024342.4832	82.24
5	13794477.7186	3024341.2511	82.20
6	13794483.3653	3024339.1288	82.00

APPROVED: _____ Development Coordinator

DATE: _____

INTERIM REVIEW ONLY

Document incomplete: not intended for permit, bidding or construction.

Engineer: Edward C. Smith

P.E. No.: 101790

Firm: Lockwood, Andrews & Newnam, Inc.

Firm No.: F-0614

Date: 5/2/17

LAN Lockwood, Andrews & Newnam, Inc.
A SNC-LAVALIN COMPANY
PLANNING ENGINEERING PROGRAM MANAGEMENT
2925 Briarpark Drive
Houston, Texas 77042-3720
Tel 713-268-6900 Fax 713-268-7996

IN ADVANCE FOR USED TO BE TURNED OFF THE SAFETY DIGS COMPONENT AT 713-207-4222

NOTICE:

For your safety, you are required by Texas Law to call 811 at least 48 hours before you dig on this subproject and has be marked, flag facilities found and have your obligation to call 811.

VERIFICATION OF PRIVATE UTILITY LINES

N/A — Date:
Centerpoint Energy/Reliant Gas Facilities Verification ONLY.
(This signature verifies that you have spoke CNP Reliant Gas lines correctly - not to be used for conflict verification) (Gas marker lines are not shown.) Signature Valid for six months.

N/A — Date:
CenterPoint Energy/UNCONTROLLED Electrical Facilities Verification ONLY.
(This signature verifies locating underground facilities - not to be used for conflict verification.)
Signature Valid for six months.

N/A — Date:
Approval for AT&T Texas/SNET underground central facilities only.
Signature Valid for one year.

FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 25

TRAILS SYSTEM PHASE 1

DETAILS SHEET 2

FORT BEND COUNTY, TX

FILE NO:

DRAWING SCALE

HORIZ: 1" = 20'

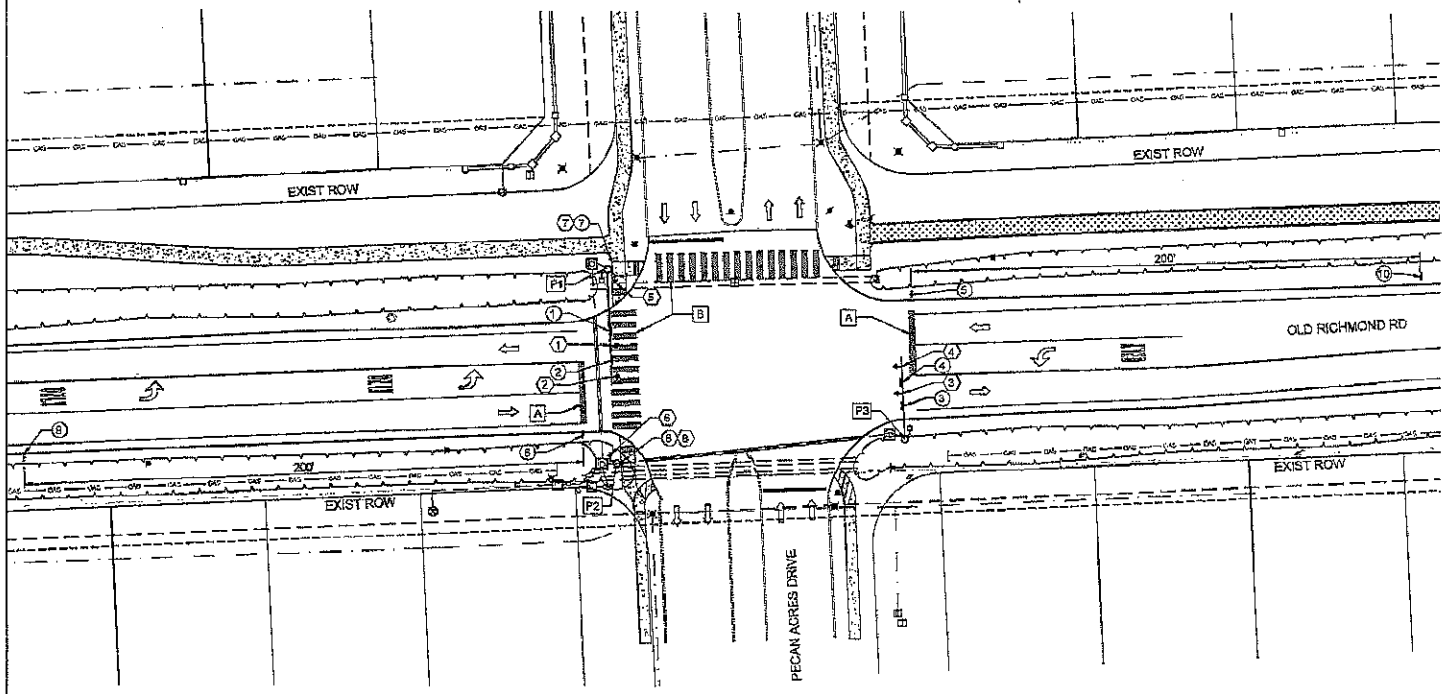
VERT: N/A

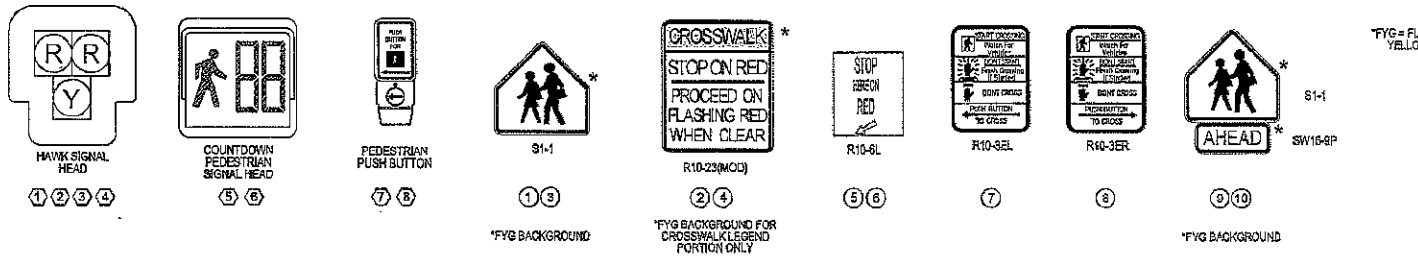
SHEET No: 14 of 53

Revisions | Date | By

LEGEND:

- SIGN
- SIGNAL POLE
- HAWK SIGNAL HEAD
- PEDESTRIAN SIGNAL HEAD
- PEDESTRIAN PUSH BUTTON
- 24" STOP BAR
- 24" CONTINENTAL CROSSWALK
- LUMINAIRE
- CONTROLLER CABINET
- CONDUIT
- PEDESTAL SERVICE
- JUNCTION BOX (TYPE D)
- JUNCTION BOX (TYPE E)
- EXIST CENTERPOINT PEDESTAL
- CONDUIT (TRENCHED)
- CONDUIT (BORED)





*FYG = FLUORESCENT YELLOW GREEN

INTERIM REVIEW ONLY
Document Incomplete: not intended for permit, bidding or construction.

Engineer: Suki Y. Hsu
P.E. No.: 98248
Firm: Lockwood, Andrews & Newnam, Inc.
Firm No.: F-2814
Date: 4/18/07

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
PLANNING ENGINEERING PROGRAM MANAGEMENT
2925 Briarpark Drive
Houston, Texas 77042-3720
Tel 713-266-6900 Fax 713-266-7596

TO AVOID FOR LINES TO BE TURNED OFF OR BORED, CALL CENTERPOINT AT 713-207-2222

NOTICE:
For your safety, you are required by Texas Law to call 811 at least 48 hours before you dig so that underground lines can be marked. This protection does not rule your obligations to you.

VERIFICATION OF PRIVATE UTILITY LINES

N/A	Date
Centerpoint Energy/Reliant Gas Services Verification ONLY. This signature verifies that you have made CNP Reliant Gas lines correctly - not to be used for conflict verifications. (Gas service lines are not located.) Signature field for six months.	

N/A	Date
Centerpoint Energy/UNDERGROUND Electrical Facilities Verification ONLY. This signature verifies existing underground facilities - not to be used for conflict verifications. Signature field for six months.	

N/A	Date
Approved for AT&T Texas/SBC underground conflict facilities only. Signature valid for one year	

FORT BEND COUNTY PRINCIPAL UTILITY DISTRICT NO. 25
TRAILS SYSTEM PHASE 1

SIGNAL LAYOUT

FORT BEND COUNTY, TX

FILE NO:

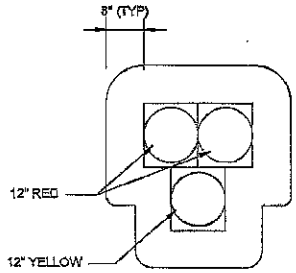
DRAWING SCALE
HORZ: 1" = 20'
VERT:

SHEET No: 15 OF 53

SIGNAL SEQUENCING OPERATION

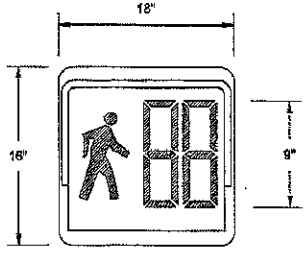
STEP	VEHICLE SIGNAL		PEDESTRIAN SIGNAL		SUGGESTED MIN. TIME (s)
1		DARK UNTIL ACTIVATED		SOLID HAND	-
2		FLASHING YELLOW UPON ACTIVATION		SOLID HAND	3
3		SOLID YELLOW VEHICLE CLEARANCE		SOLID HAND	3
4		SOLID DOUBLE RED		PEDESTRIAN WALK INTERVAL	7
5		ALTERNATE FLASHING DOUBLE RED		FLASHING PEDESTRIAN CLEARANCE INTERVAL	20
6		DARK AGAIN UNTIL ACTIVATED, MIN TIME UNTIL NEXT ACTIVATION		SOLID HAND	45 *

NOTE:
1. IF THE HYBRID PEDESTRIAN TRAFFIC SIGNAL GOES INTO CONFLICT FLASH, THE PEDESTRIAN INDICATIONS SHALL GO DARK AND THE VEHICLE INDICATIONS SHALL FLASH YELLOW IN BOTH DIRECTIONS.
2. AUDIBLE APS COUNTDOWN SPEECH IS TO REMAIN OFF.
3. APS PROGRAMMED SETTINGS SHALL BE IN CONFORMANCE WITH TMUTCD OPERATION REQUIREMENTS.

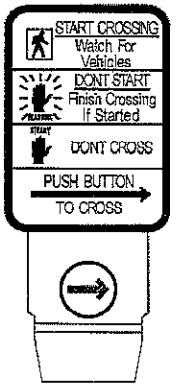


VEHICLE SIGNAL HEAD

* NOTE:
1. 2013 ITE TCDH: RECOMMENDS 15 TO 45 SECONDS TO CLEAR CAR QUEUING.
2. MINIMUM "BLANK-OUT" TIME BETWEEN ACTIVATIONS CAN BE SHORTER DURING PEAK CROSSING TIMES
3. EXAMPLE - SCHOOL ARRIVAL & DISMISSAL TIMES
4. THIS CAN BE FIELD ADJUSTED BASED ON LOCAL CONDITIONS.

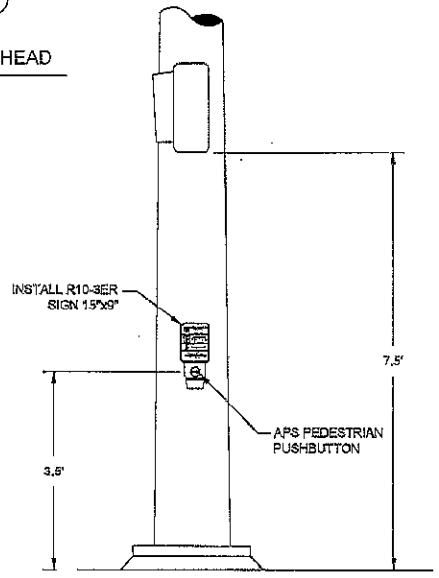


COUNTDOWN PEDESTRIAN SIGNAL



APS PEDESTRIAN PUSHBUTTON

NOTES: ACCESSIBLE PEDESTRIAN SIGNAL (APS) UNITS (ITEM #988) ARE TO BE USED.



PEDESTRIAN HARDWARE
SIGNAL POLE 2

NOTE: USE THE SAME PEDESTRIAN HARDWARE SIGNAL POLE 1 EXCEPT USE A R10-3EL SIGN.

INTERIM REVIEW ONLY
Document incomplete, not intended for permit, bidding or construction.
Engineer: Salt Y. Hay
P.E. No.: 98748
Firm: Lockwood, Andrews & Newnam, Inc.
Firm No.: F-2614
Date: 4/18/17

Lockwood, Andrews & Newnam, Inc.
A LJB & DALY COMPANY
PLANNING ENGINEERING PROGRAM MANAGEMENT
2925 Briarpark Drive
Houston, Texas 77042-3720
Tel 713-266-6900 Fax 713-266-7595

IF ANYONE FOR WHOM YOU ARE TRYING OFF OR MOVED, CALL DIGGERS AT 713-307-0222.

NOTICE!
For your safety you are required by Texas Law to call 811 at least 48 hours before you dig so that underground line can be marked. The verification you are now your responsibility to 811.

VERIFICATION OF PRIVATE UTILITY LINES

N/A Date
Centerpoint Energy/Reliant Gas Pipeline Verification ONLY.
Gas signature verifies that you have areas ONP Natural Gas lines correctly - not to be used for service verification. (Gas meters lines are not there.) Signature valid for six months.

N/A Date
Centerpoint Energy/ONP/SSGWC Electric Pipeline Verification ONLY.
Gas signature verifies electric underground location - not to be used for service verification.
Signature valid for six months.

N/A Date
Approval for AT&T Texas/SBC underground cable/fiber only.
Signature valid for one year.

FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 25
TRAILS SYSTEM PHASE 1

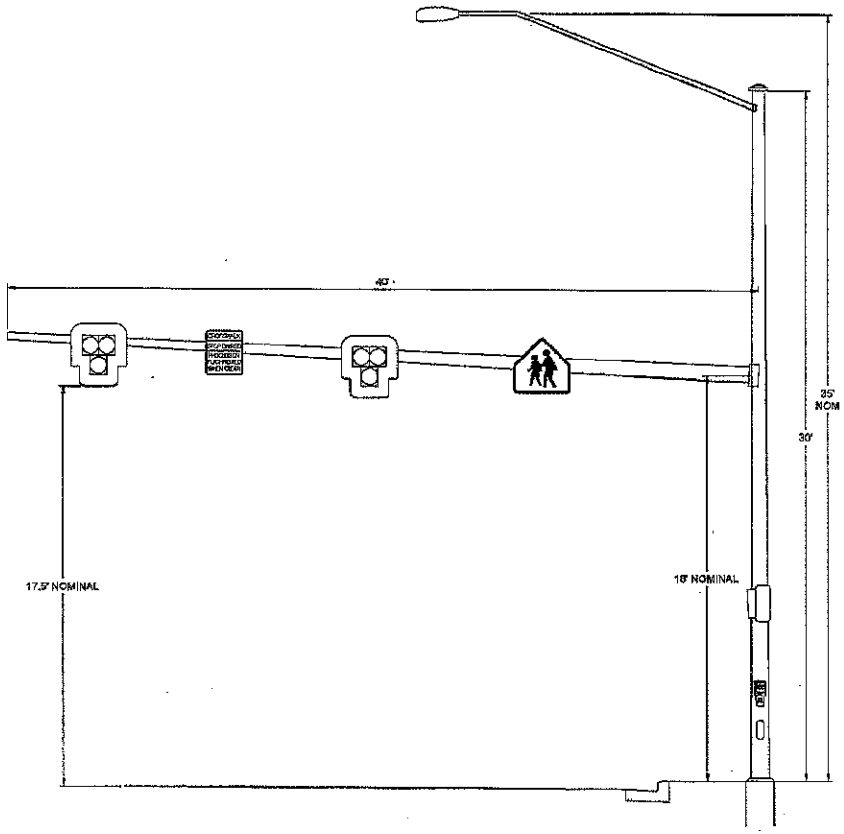
SIGNAL DETAILS

FORT BEND COUNTY, TX

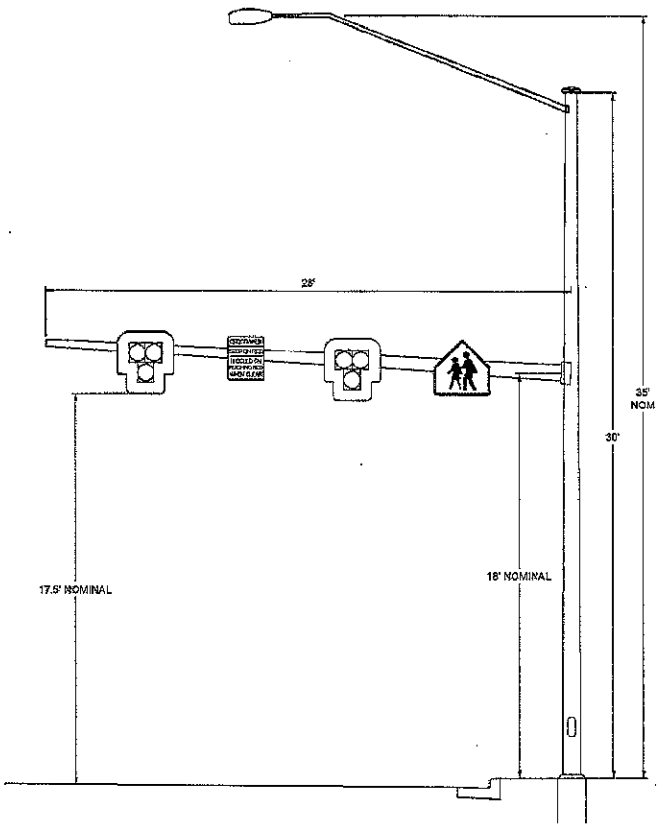
FILE NO:

DRAWING SCALE
HORIZ: NTS
VERT:

SHEET NO: 16 OF 53



POLE #1 WESTBOUND



POLE #3 EASTBOUND

SIGNAL POLE ELEVATIONS

NOTES:

1. VEHICLE SIGNAL INDICATIONS, SIGNING, DIMENSIONS, AND LAYOUT FOR VEHICLE INDICATIONS AND SIGNING SHALL BE THE SAME ON SIGNAL POLES 1 AND 3, EXCEPT AS NOTED.
2. CENTER VEHICLE SIGNAL HEADS ON EACH APPROACHING LANE.
3. USE TxDOT STANDARD MOUNTING BRACKETS (ASTRO-BRAC) TO MOUNT HAWK SIGNAL HEADS ON MAST ARMS.

INTERIM REVIEW ONLY
Document incomplete; not intended for permit, bidding or construction.
Engineer: Sidi Y. Hay
P.E. No.: 87745
Firm: Lockwood, Andrews & Newnam, Inc.
Firm No.: F-2614
Date: 4/18/17

LAN Lockwood, Andrews & Newnam, Inc.
A AECOM COMPANY
PLANNING ENGINEERING PROGRAM MANAGEMENT
2925 Briarpark Drive
Houston, Texas 77042-3720
Tel 713-266-6900 Fax 713-266-7356

TO ARRANGE FOR LINES TO BE TURNED OFF ON SITE, CALL CENTERPOINT AT 713-207-2222.

NOTICE:
For your safety, you are required by Texas law to wait 48 hours before you do so that underground line can be marked. This verification does not suffice as notice to dig.

VERIFICATION OF PRIVATE UTILITY LINES

S/A Date
Centerpoint Energy/Reliant Gas Facilities Verification ONLY.
(Sign signature verifies that you have shown CPE Reliant Gas lines correctly or not to be used for conflict verification.) [Gas service lines are not shown.]
Signature Valid for six months.

S/A Date
Centerpoint Energy/UNDERGROUND Electric Facilities Verification ONLY.
(Sign signature verifies existing underground facilities or not to be used for conflict verification.)
Signature Valid for six months.

S/A Date
Approved for AT&T Lines/Other underground cable/telecom only.
Signature valid for one year

FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 25
TRAILS SYSTEM PHASE I

SIGNAL POLE ELEVATIONS

FORT BEND COUNTY, TX

FILE NO:

DRAWING SCALE
HORZ: NTS
VERT:

SHEET No: 17 of 53

F:\Projects\Fort Bend Co MUD 25\Trails System Phase 1\18-1818-000\1-1-18-1818-000-S-000\1-1-18-1818-000-S-000-17-Signal Elevations.dwg
Plotted On: Apr 18, 2017-9:36am

SIGN SUMMARY							
SIGN NO.	DESCRIPTION	CODE	LOCATION	WIDTH (IN)	HEIGHT (IN)	AREA (SF)	FACING
1	PEDESTRIAN CROSSING SYMBOL	S1-1	P1				EAST
2	CROSSWALK STOP ON RED (CUSTOM)	R10-23(MOD)	P1				EAST
3	PEDESTRIAN CROSSING SYMBOL	S1-1	P3				WEST
4	CROSSWALK STOP ON RED (CUSTOM)	R10-23(MOD)	P3				WEST
5	STOP HERE ON RED	R10-6L	-				EAST
6	STOP HERE ON RED	R10-6L	-				WEST
7	ED. PLAQUE FOR PEDESTRIAN SIGNALS	R10-3EL	P1				EAST
8	ED. PLAQUE FOR PEDESTRIAN SIGNALS	R10-3ER	P2				EAST

S1-1

(1)(3)

*FYG BACKGROUND

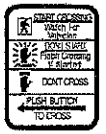
R10-23(MOD)

(2)(4)

*FYG BACKGROUND FOR CROSSWALK LEGEND PORTION ONLY

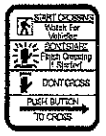
R10-6L

(5)(6)



R10-3EL

(7)

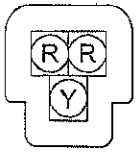


R10-3ER

(8)

*FYG = FLUORESCENT YELLOW GREEN

SIGNAL HEAD SUMMARY					
SIGNAL HEAD NO.	DESCRIPTION	POLE	LENS SIZE	MOUNTING TYPE	FACING
1	VEHICLE SIGNAL HEAD	1	12"	-	EAST
2	VEHICLE SIGNAL HEAD	1	12"	-	EAST
3	VEHICLE SIGNAL HEAD	3	12"	-	WEST
4	VEHICLE SIGNAL HEAD	3	12"	-	WEST
5	PEDESTRIAN SIGNAL HEAD	1	-	CLAMSHELL	SOUTH
6	PEDESTRIAN SIGNAL HEAD	2	-	CLAMSHELL	NORTH



HAWK SIGNAL HEAD

(1)(2)(3)(4)

COUNTDOWN PEDESTRIAN SIGNAL HEAD

(5)(6)

NOTES:

1. SIGNS MOUNTED ON MAST ARMS SHALL USE DIAMOND GRADE SIGN SHEETING.
2. MAST ARM MOUNTED SIGNS AND SIGNAL POLE MOUNTED SIGNS SHALL BE 0.100 INCHES THICK. MATERIALS AND CONSTRUCTION OF SIGNS SHALL BE IN ACCORDANCE WITH ITEM 636. MAST ARM MOUNTED SIGNS AND MOUNTING HARDWARE (ASTRO-BRAC TYPE OR EQUIVALENT) SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH ITEM 644. MEASUREMENT AND PAYMENT SHALL BE IN ACCORDANCE WITH ITEM 680 "INSTALLATION OF HIGHWAY TRAFFIC SIGNALS".
3. COMPLETE ALL PAVEMENT MARKING WORK PRIOR TO SIGNAL TURN-ON.

STRIPING SUMMARY				
SYMBOL	DESCRIPTION	WIDTH	LENGTH	COMMENTS
A	SOLID WHITE	24"	24'	STOP BARS (2 TOTAL)
B	SOLID WHITE	24"	10'	CONTINENTAL CROSSWALK W/ 24" SPACES BETWEEN BARS (25 BARS TOTAL)

BID ITEMS														
LOCATION	416	416	616	616	616	616	620	620	621	624	624	623	644	666
	6031	6032	6023	6029	6030	6039	6009	6010	6003	6010	6012	6135	6004	6046
	DRILL SHAFT (TRF SIG POLE) (36 IN)	DRILL SHAFT (TRF SIG POLE) (36 IN)	CONDT (PVC) (SCH 40) (2")	CONDT (PVC) (SCH 40) (3")	CONDT (PVC) (SCH 40) (3") (BORE)	CONDT (PVC) (SCH 40) (4")	ELEC CONDR (NO.6) BARE	ELEC CONDR (NO.6) INSULATED	TRAY CABLE (4 CONDR) (12 AWG)	GROUND BOX TY D (162922)(WA PRON	GROUND BOX TY E (122317)(WA PRON	ELC SRV TY D 120/240 060(NS)AL(E)PS(U)	IN SM RD SN SUP & AM TY10BWG (1) SA (7)	REFL PAV MRK TY I (W) 24" (SLD)
	LF	LF	LF	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA	LF
OLD RICHMOND ROAD	11	13	100	30	160	15	285	160	320	3	1	1	4	308
TOTALS	11	13	100	30	160	15	285	160	320	3	1	1	4	308

BID ITEMS														
LOCATION	666	678	680	682	682	682	682	684	684	686	686	687	688
	6182	6008	6002	6003	6005	6018	6055	6031	6079	6031	6043	6001	6001
	REFL PAV MRK TY II (W) 24" (SLD)	PAV SURF PREP FOR MRK (24")	INSTALL HWY TRF SIG (ISOLATED)	VEH SIG SEC (12")LED(YEL)	VEH SIG SEC (12")LED(RED)	PED SIG SEC (LED)(COUNTDOWN)	BACK PLATE (12")(3 SEC)(VENTED)ALUM	TRF SIG CBL (TY A)(14 AWG)(5 CONDR)	TRF SIG CBL (TY C)(12 AWG)(2 CONDR)	INS TRF SIG PL AM(S)1 ARM(25)LUM	INS TRF SIG PL AM(S)1 ARM(40)LUM	PED POLE ASSEMBLY	PED DETECT PUSH BUTTON (APS)
	LF	LF	EA	EA	EA	EA	EA	LF	LF	EA	EA	EA	EA
OLD RICHMOND ROAD	308	308	1	4	8	2	4	790	135	1	1	1	2
TOTALS	308	308	1	4	8	2	4	790	135	1	1	1	2

INTERIM REVIEW ONLY
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Engineer: Bala Y. May
P.E. No.: 86708
Firm: Lockwood, Andrews & Newnam, Inc.
Firm No.: F-2034
Date: 4/1/07

Lockwood, Andrews & Newnam, Inc.
A LAN & DALY COMPANY
PLANNING ENGINEERING PROGRAM MGMT
2925 Briarpark Drive
Houston, Texas 77042-3720
Tel 713-266-6900 fax 713-266-7506

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

NOTICE:
For your safety, we are required by Texas Law to call 811 at least 48 hours before you dig, drill or blast. If lines are not marked, the Verification form will hold your activities to an OSHA.

VERIFICATION OF PRIVATE UTILITY LINES

N/A Date
CenterPoint Energy/Natural Gas (Houston Metropolitan Area)
(We signature verifies that you have called CNP Natural Gas lines correctly - not to be used for control verification.) (Gas service lines are not shown.)
Signature Valid for six months.

N/A Date
CenterPoint Energy/UNDERGROUND Electric Facilities Verification Only.
(Our signature verifies existing underground facilities - not to be used for control verification).
Signature Valid for six months.

N/A Date
Approved for AT&T Aerial/UNDERGROUND underground conduit facilities only.
Signature valid for one year.

FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 23
TRAILS SYSTEM PHASE 1

SIGNING AND STRIPING SUMMARY

FORT BEND COUNTY, TX

FILE NO:

DRAWING SCALE
HORIZ: NTS
VERT:

SHEET No: 18 OF 53

NOTES:

1. DRAWING DEPICTS CONDUCTORS REQUIRED TO OPERATE HAWK.
2. 7C #14 CONDUCTORS MAY BE USED IN LIEU OF 5C #14 CONDUCTORS.
3. 3/C #6 AWG WIRING FROM POWER SOURCE TO METER/DISCONNECT PEDESTAL BY SERVICE PROVIDER
4. 3' EXTRA LENGTH WAS GIVEN AS BUFFER FOR ALL THE CONDUIT RUNS.
5. ACCESSIBLE PEDESTRIAN SIGNAL (APS) UNITS (ITEM #688) ARE TO BE USED.
6. INCISE ALL FOUNDATIONS WHERE CONDUIT LEAVES THE FOUNDATION.
7. CONTRACTOR SHALL COIL 5' ADDITIONAL SERVICE WIRE AT THE UNDERGROUND ELECTRICAL PEDESTAL SHOWN FOR HOOK UP BY UTILITY PROVIDER. CONTRACTOR SHALL CONTACT CENTERPOINT ENERGY FOR ADDRESS SET UP AT 713-207-4450.
8. LUMINAIRES SHALL BE LED TYPE (250W HPS EQUIVALENT).

CONDUIT AND CABLE

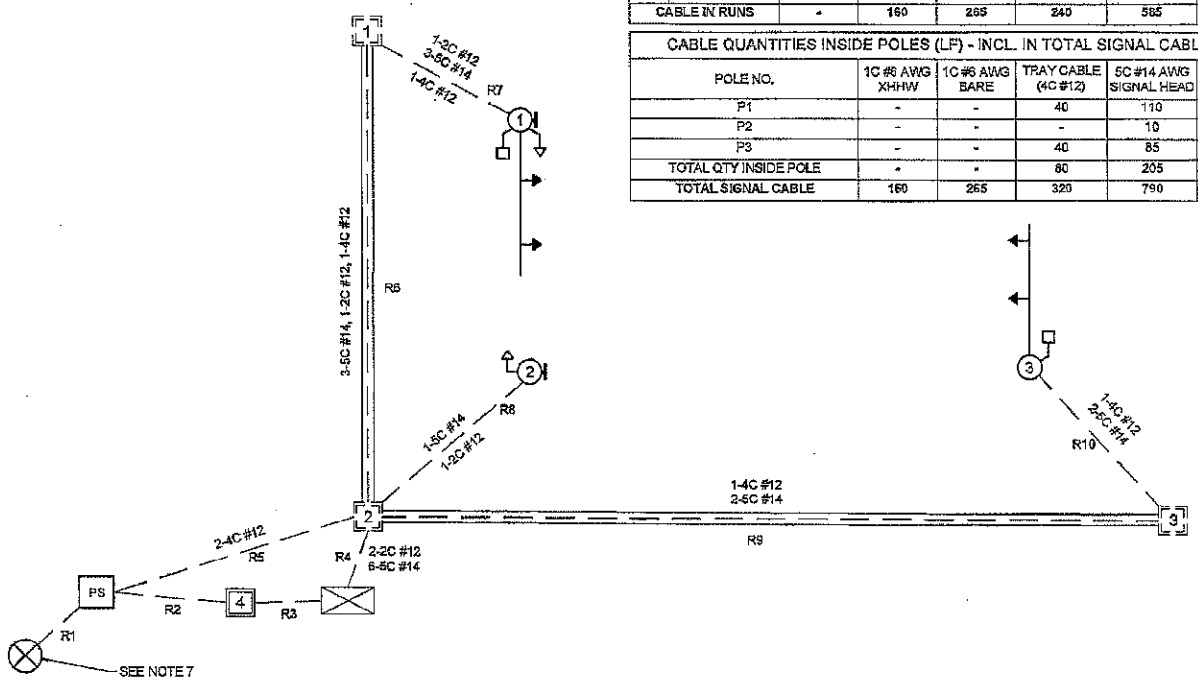
RUN NO.	SIZE & INSTALLATION	LENGTH (FT)	1C #6 AWG XHHW	1C #6 AWG BARE	TRAY CABLE (4C #12)	5C #14 AWG	2C #12 AWG APS
1	2" - T	80	2				
2	2" - T	10	2	1			
3	2" - T	10	2	1			
4	4" - T	15		1		6	2
5	2" - T	20		1	2		
6	3" - B	75		1	1	3	1
7	3" - T	10		1	1	3	1
8	3" - T	10		1		1	1
9	3" - B	105		1	1	2	
10	3" - T	10		1	1	2	
CABLE IN RUNS		-	160	265	240	585	125

CABLE QUANTITIES INSIDE POLES (LF) - INCL. IN TOTAL SIGNAL CABLE QTY

POLE NO.	1C #6 AWG XHHW	1C #6 AWG BARE	TRAY CABLE (4C #12)	5C #14 AWG SIGNAL HEAD	2C #12 AWG APS PB
P1	-	-	40	110	5
P2	-	-	-	10	5
P3	-	-	40	85	-
TOTAL QTY INSIDE POLE	-	-	80	205	10
TOTAL SIGNAL CABLE	160	265	320	790	135

LEGEND:

- JUNCTION BOX (TYPE D)
- JUNCTION BOX (TYPE E)
- PEDESTAL SERVICE
- CONTROLLER
- PEDESTRIAN SIGNAL
- PEDESTRIAN PUSH BUTTON
- HAWK SIGNAL HEAD
- LUMINAIRE
- SIGNAL POLE AND MAST ARM
- EXIST CENTERPOINT PEDESTAL
- CONDUIT (TRENCHED)
- CONDUIT (BORED)



ELECTRICAL SERVICES 2003 DATA SHEET

ELEC. SERVICE NO.	SHEET NO.	ELECTRICAL SERVICE DESCRIPTION (SEE ED (4) & (5) - 03)	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BKR. POLE/AMP	TWO-POLE CONTRACTOR AMPS	PANELBD/ LOADCENTER AMP RATING	CIRCUIT NO.	BRANCH CKT. BKR. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
1	-	ELC SRV TY D 120/240 060 (NS)AL(E)PS(U)	1 1/2"	3/#6	N/A	2P/60	N/A	100	A	1P/50	40	5.3
									B	2P/20	2	

INTERIM REVIEW ONLY
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Engineer: Said Y. May
P.E. No.: 88785
Firm: Lockwood, Andrews & Newnam, Inc.
Firm No.: F-2614
Date: 4/18/17

Lockwood, Andrews & Newnam, Inc.
A SGS & ALLY COMPANY
2925 Briarpark Drive
Houston, Texas 77042-3720
Tel 713-266-6900 Fax 713-266-7596

NOTICE:
For your safety you are required by Texas Law to call 811 at least 48 hours before you dig so that underground lines can be marked. CNL Verification does not take your responsibility in any way.

VERIFICATION OF PRIVATE UTILITY LINES

N/A — Date
Centerpoint Energy/Source Gas Facilities Verification ONLY.
(This signature verifies that you have called ONY Natural Gas lines correctly – not to be used for permit verification.) (Gas service lines are not shown.)
Signature Valid for six months.

N/A — Date
Centerpoint Energy/UNDERGROUND Electric Facilities Verification ONLY.
(This signature verifies entering underground facilities – not to be used for permit verification.)
Signature Valid for six months.

N/A — Date
Approved for ONLY "NEW/ONLY" underground conduit locates only.
Signature valid for one year

FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 25
TRAILS SYSTEM PHASE 1

SIGNAL WIRING DIAGRAM

FORT BEND COUNTY, TX

FILE NO:
DRAWING SCALE
HORZ: NTS
VERT:
SHEET No: 19 OF 53

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GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.

2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.

3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is ½ in. or less in diameter.

4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.

5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.

6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinylchloride (PVC) systems.

2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.

3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.

5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.

6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.

7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.

9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC for RMC elbow when required at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.

10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.

2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surfaces of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.

3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.

4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.

5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."

6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.

7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bellend fittings. Provide and install a grounding type bushing on all metal conduit terminations.

10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required if the duct extends the full length through the casing.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation | Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

FILE: ed1-14.dgn	DN:	CK:	DW:	CK:
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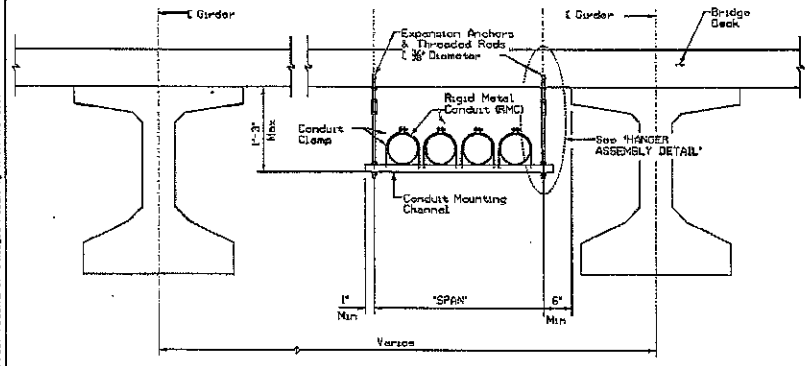
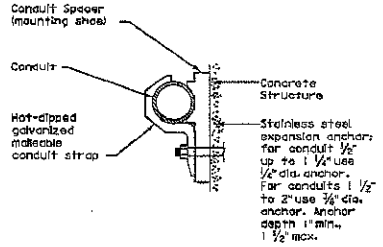
REVISIONS				
	DIST	COUNTY		SHEET NO. 39

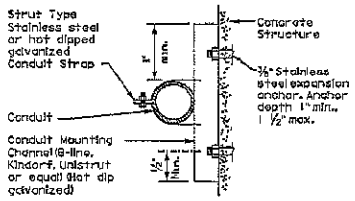
TIA

DATE: FILE:



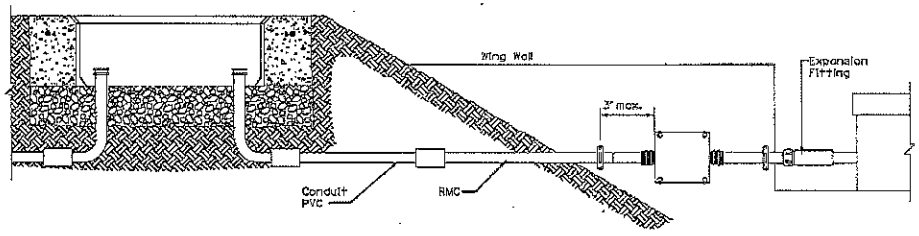
CONDUIT HANGING DETAIL





CONDUIT MOUNTING OPTIONS

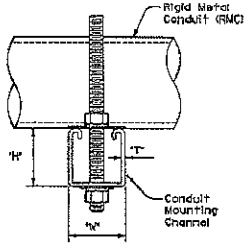
Attachment to concrete surfaces
See ED(1)3.2

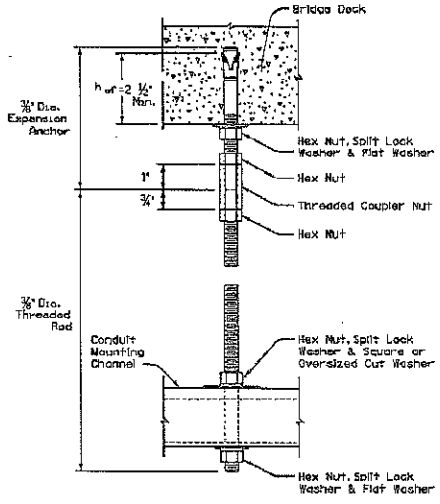


TYPICAL CONDUIT ENTRY TO BRIDGE STRUCTURE DETAIL

CONDUIT MOUNTING CHANNEL		
"SPAN"	"W" x "H"	"T"
Less than 2'	1 ⅝" x 1 ⅜"	12 Ga.
2'-0" to 2'-6"	1 ⅝" x 1 ⅜"	12 Ga.
>2'-6" to 3'-0"	1 ⅝" x 2 7/16"	12 Ga.

Channels with round or short slotted hole patterns are allowed, if the load carrying capacity is not reduced by more than 15%.





HANGER ASSEMBLY DETAIL

ELECTRIC CONDUIT TO BRIDGE DECK ATTACHMENT

EXPANSION ANCHOR NOTES FOR BRIDGE DECK ATTACHMENT

1. Use torque controlled mechanical expansion anchors that are approved for use in cracked concrete by the International Code Council, Evaluation Service (ICC-ES). The chosen anchor product shall have a designated ICC-ES Evaluation Report number, and its approval status shall be maintained on the ICC-ES website under Division 031600 for Concrete Anchors.

2. Unless otherwise approved by the Engineer: do not use adhesive anchors; do not use expansion anchors that are not included in the ICC-ES approval list; and do not use expansion anchors that are only approved for use in uncracked concrete.

3. Use anchors manufactured with stainless steel expansion wedges. Anchors manufactured with carbon-steel expansion wedges are not allowed. Anchor bodies can be either zinc-plated carbon steel or stainless steel. For application in marine environment, both the anchor body and expansion wedge shall be stainless steel.

4. Install anchors as shown on the plans and in accordance with the anchor manufacturer's published installation instructions. Arrange a field demonstration test to evaluate the procedures and tools. The test shall be witnessed and approved by the Engineer prior to furnishing anchors on the structure.

5. Prior to hole drilling, use rebar locator to ensure clearing of existing deck strands or reinforcement. Install anchors to ensure a minimum effective embedment depth, (e_f), as shown. Increase (e_f) as needed to ensure sufficient thread length for proper torqueing and tightening of anchors.

6. Use anchors of minimum 1500 Lbs tensile capacity (minimum of steel, concrete breakout, and concrete pullout strengths as determined by ACI 318 Appendix D) at the required minimum embedment depth (e_f). No lateral loads shall be introduced after conduit installation.

Texas Department of Transportation | Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUIT SUPPORTS

ED(2)-14

FILE: ed2-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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				21

FHWA

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DATE/FILE:

ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS) 11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.

2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.

3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.

4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.

2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.

3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.

4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.

5. Wire nuts with factory applied waterproof sealant may be used for 6 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.

6. Support conductors in illumination poles with a J-hook at the top of the pole.

7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.

8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.

9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.

10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.

11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.

12. Provide and install separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.

2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.

3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.

4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.

5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in specific locations including electrical service, see individual plan sheets.

B. CONSTRUCTION METHODS

1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.

2. Do not place ground rods in the same drilled hole as a timber pole.

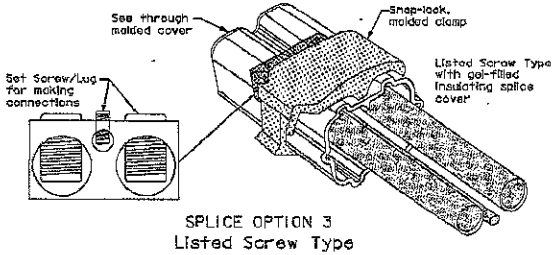
3. Install ground rods so the imprinted part number is at the upper end of the rod.

4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.

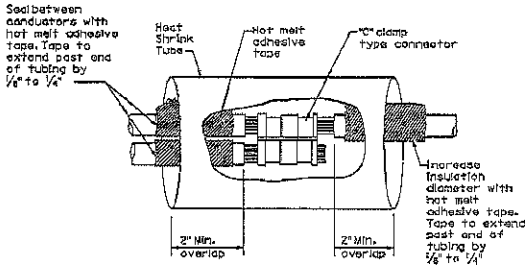
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install grounding type bushing and properly sized bonding jumper on each end of the metal conduit.

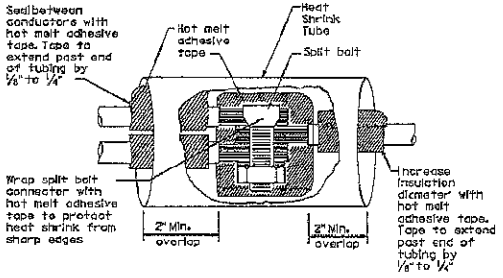
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 3
Listed Screw Type



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type

Texas Department of Transportation | Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

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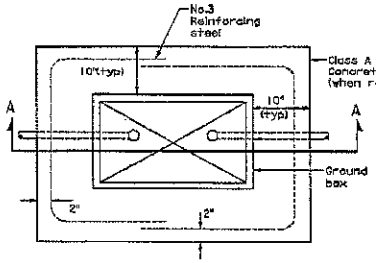
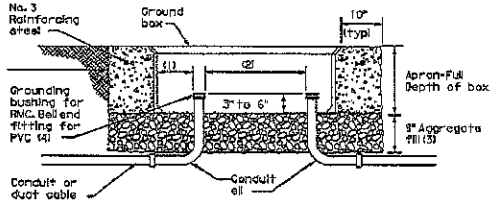


PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

(4) Install grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."

2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.

4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.

2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.

3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.

4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.

5. Temporarily seal all conduits in the ground box until conductors are installed.

6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.

7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.

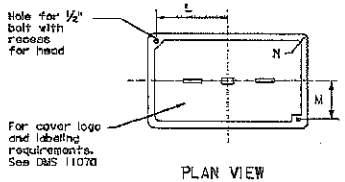
8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.

9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.

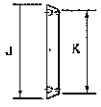
10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.

11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

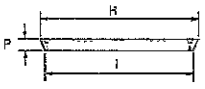
GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



PLAN VIEW



END



SIDE

GROUND BOX COVER

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS GROUND BOXES

ED(4)-14

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ELECTRICAL SERVICES NOTES

1. Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure materials Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.

2. Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services," DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.

3. Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.

4. Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.

5. The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers Keyed #2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock #2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock #2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.

6. Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.

7. When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.

8. Provide wiring and electrical components rated for 75°C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.

9. All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.

10. Provide rigid metal conduit (RMC) for all conduits on service, except for the ½ in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.

11. Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull-test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.

12. Ensure all mounting hardware and installation details of services conform to utility company specifications.

13. For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.

14. When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in. before laminating. Deliver these drawings before completion of the work to the Engineer. Instead of placing in enclosure that has no door pocket.

15. Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

DATE:
FILE:

SERVICE ASSEMBLY ENCLOSURE

1. Provide threaded hub for all conduit entries into the top of enclosure.

2. Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.

3. Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.

4. Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

1. Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.

2. When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

1. Provide photocell as listed on the MPL. Move, adjust, or shield the photocell from stray or ambient night time light to ensure proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted Photocell Detail.

* ELECTRICAL SERVICE DATA

Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit ** Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 100(SS)AL(E)SF(U)	2"	3/#2	100	2P/100	100	N/A	Lighting NB	2P/40	26	28.1
									Lighting SB	2P/40	25	
									Underpass	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 060(NS)SS(E)TS(O)	1 ¼"	3/#6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
							30		Luminaires	2P/20	9	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(NS)P(O)	1 ¼"	3/#6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National Electrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

ELEC SERV TY X XXX/XXX XXX (XX) XX (X) XX (X)

Schematic Type

Service Voltage V / V

Disconnect Amp Rating
000 indicates main lug only/
Typically Type T

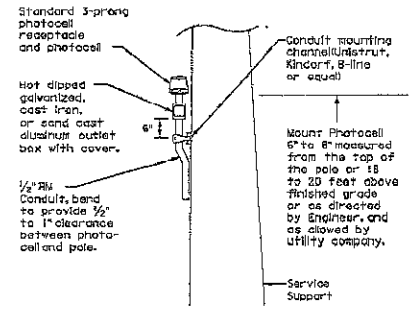
(SS)= Safety Switch Ahead of Meter-Check with Utility
(NS)= No safety Switch Ahead of Meter-Check with Utility

Enclosure Type
GS= Galvanized steel("off the shelf")
SS= Stainless steel(Custom Enclosure)See MPL
AL= Aluminum (Custom Enclosure)See MPL

Photocell Mounting Location
(E)= Inside Service/Enclosure Mounted
(T)= Top of pole
(L)= Luminaire mounted
(N)= None/No Photocell or Lighting Contactor Required

Service Support Type
GC= Granite concrete
OC= Other concrete
TP= Timber pole
SP= Steel pole
SF= Steel frame
OT= Pole by others or paid for separately
EX= Existing pole
TS= Service on traffic signal pole
PS= Pedestal Service

O= Overhead Service Feed from Utility
U= Underground Service Feed from Utility



TOP MOUNTED PHOTOCELL

Install conduit strap maximum 3 feet from box, 5 feet maximum spacing between straps supporting conduit.

Texas Department of Transportation — Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

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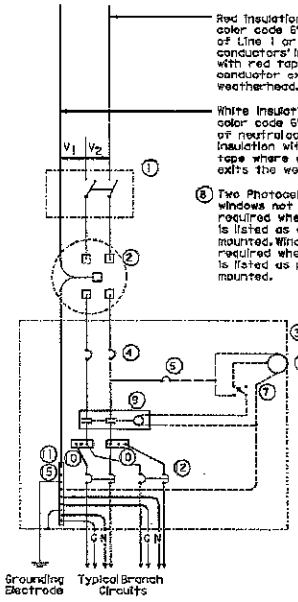
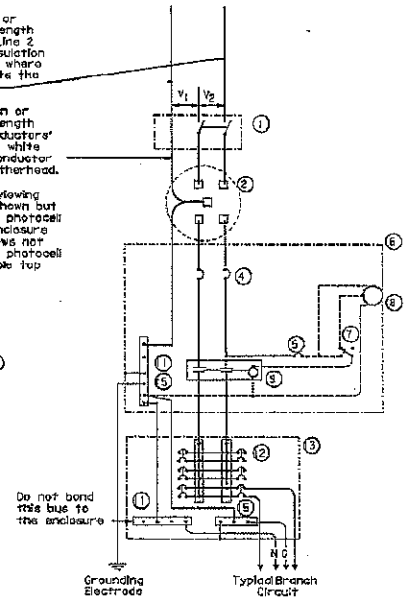
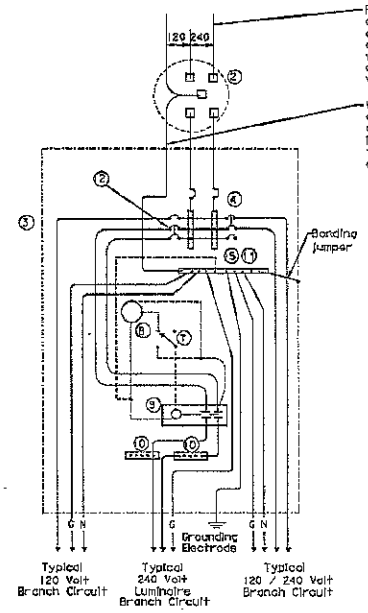


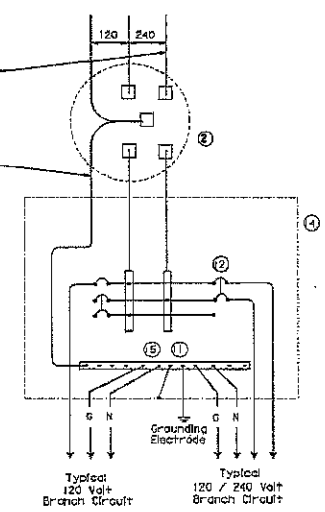
SCHEMATIC TYPE A
THREE WIRE



SCHEMATIC TYPE C
THREE WIRE



SCHEMATIC TYPE D - CUSTOM
120/240 VOLTS - THREE WIRE



SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE

Galvanized steel-"Buy Off The Shelf" only. When required install photocell top of the pole or on luminaire only, no lighting contractor will be installed.

WIRING LEGEND	
———	Power Wiring
- - - - -	Control Wiring
—N—	Neutral Conductor
—G—	Equipment grounding conductor-always required

SCHEMATIC LEGEND	
1	Safety Switch (when required)
2	Meter (when required-verify with electric utility provider)
3	Service Assembly Enclosure
4	Main Disconnect Breaker (See Electrical Service Data)
5	Circuit Breaker, 15 Amp (Control Circuit)
6	Auxiliary Enclosure
7	Control Station ("H-O-A" Switch)
8	Photo Electric Control (enclosure-mounted shown)
9	Lighting Contactor
10	Power Distribution Terminal Blocks
11	Neutral Bus
12	Branch Circuit Breaker (See Electrical Service Data)
13	Separate Circuit Breaker Panelboard
14	Load Center
15	Ground Bus

Texas Department of Transportation — Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

ED(6)-14

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SUPPORT TYPE STEEL POLE (SP) AND STEEL FRAME (SF)

1. Provide steel pole and steel frame supports as per TxDOT Departmental Material Specification DMS11060 "Electrical Services." Mount all equipment and conduit on 12 gauge galvanized steel or stainless steel channel strut, 1 ½ in. or 1 ⅝ in. wide by 1 in. up to 3 ¾ in. deep Unistrut, Kindorf, B-line or equal. Bolt or weld all channel and hardware to vertical members as approved. Do not stack channel. File smooth and paint field cut ends of all channel with zinc-rich paint before installing.

2. Provide poles for overhead service with an eyebolt or similar fitting for attachment of the service drop to the pole in conformance with the electric utility provider's specifications.

3. Provide and install galvanized ¾ in. x 18 in. x 4 in. dia. x length x hook length) anchor bolts for underground service supports. Provide and install galvanized ¾ in. x 56 in. x 4 in. anchor bolts for overhead service supports. Ensure anchor bolts have 3 in of thread, with 3 ¼ in. to 3 ½ in. of the exposed anchor bolt projecting above finished foundation. Provide and install leveling nuts for all anchor bolts.

4. Bond one of the anchor bolts to the rebar cage with 6 AWG bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. See Inset B.

5. Furnish and install rigid metallic ells in all steel pole and steel frame foundations for all conduits entering the service from underground.

6. Use class C concrete for foundations. Ensure reinforcing steel is Grade 60 with 3" of unobstructed concrete cover.

7. Drill and tap steel poles and frames for ½ in. X 13 UNC tank ground fitting. For steel pole service supports, provide and install tank ground fitting 4 in. to 6 in. below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. For steel frame service supports, provide and install tank ground fitting on steel frame post. Install service grounding electrode conductor in a non-metallic conduit or tubing from the enclosure to the steel frame post. Connect electrical service grounding electrode conductor to the tank ground fitting. See steel frame and steel pole details and Inset A for more information. Size service entrance conduit and branch circuit conduit as shown in the plans. For underground conduit runs from the electrical service, extend RMC from the service enclosure to an RMC elbow, and then connect the schedule type and size of conduit shown in the plans. Provide and install grounding bushings where RMC terminates in the enclosure. Grounding bushings are not required when RMC is fitted into a sealing hub or threaded boss.

8. If Steel pole or frame is painted, bond each separate painted piece with a bonding jumper attached to a tapped hole.

9. Provide ¼" - 20 machine screws for bonding. Do not use sheet metal screws. Remove all non-conductive material at contact points. Terminate bonding jumpers with listed devices. Install minimum size 6 AWG stranded copper bonding jumpers. Make up all threaded bonding connections wrench tight.

10. Avoid contact of the service drop and service entrance conductors with the metal pole to prevent abrasion of the insulated conductors.

11. Shop drawings are not required for service support structure unless specifically stated elsewhere or directed by the Engineer.

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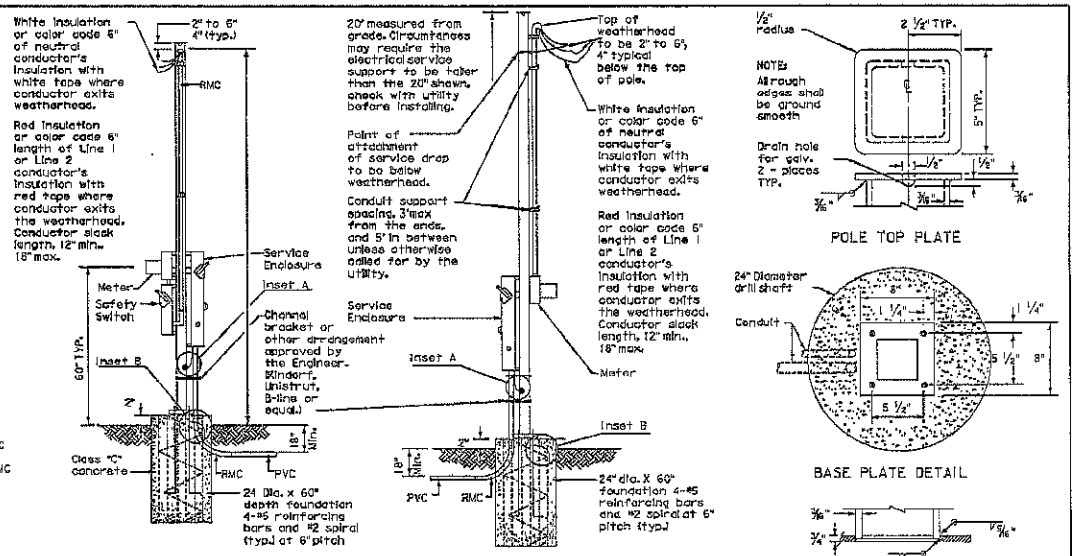
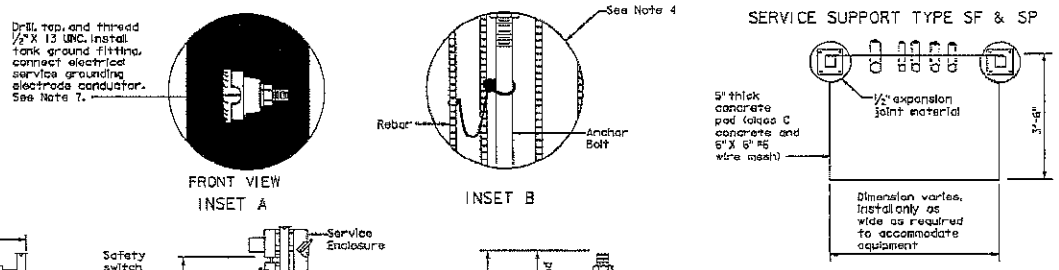


WITH SAFETY SWITCH — WITHOUT SAFETY SWITCH

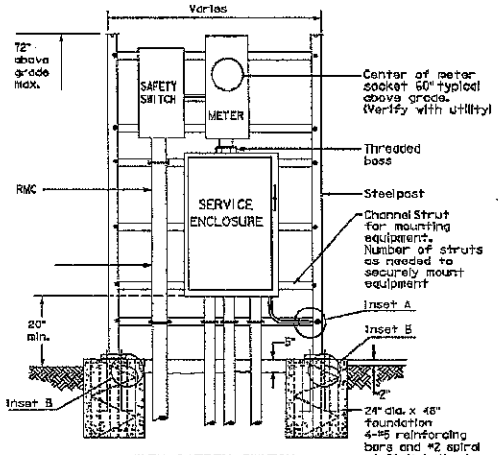
SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE

SERVICE SUPPORT TYPE SF & SP



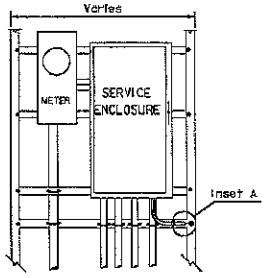
FRONT VIEW — INSET A — INSET B — TOP VIEW

SERVICE SUPPORT TY SF (O) & SF (U)

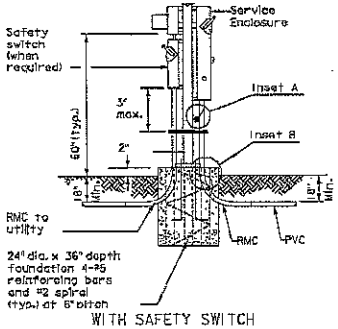


WITH SAFETY SWITCH
FRONT VIEW

SERVICE SUPPORT TYPE SF(U) - UNDERGROUND SERVICE

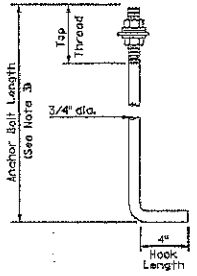


WITHOUT SAFETY SWITCH



WITH SAFETY SWITCH

SERVICE SUPPORT TYPE SP(U) - UNDERGROUND SERVICE



HOOKED ANCHOR DETAIL

Texas Department of Transportation — Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES SF & SP

ED(7)-14

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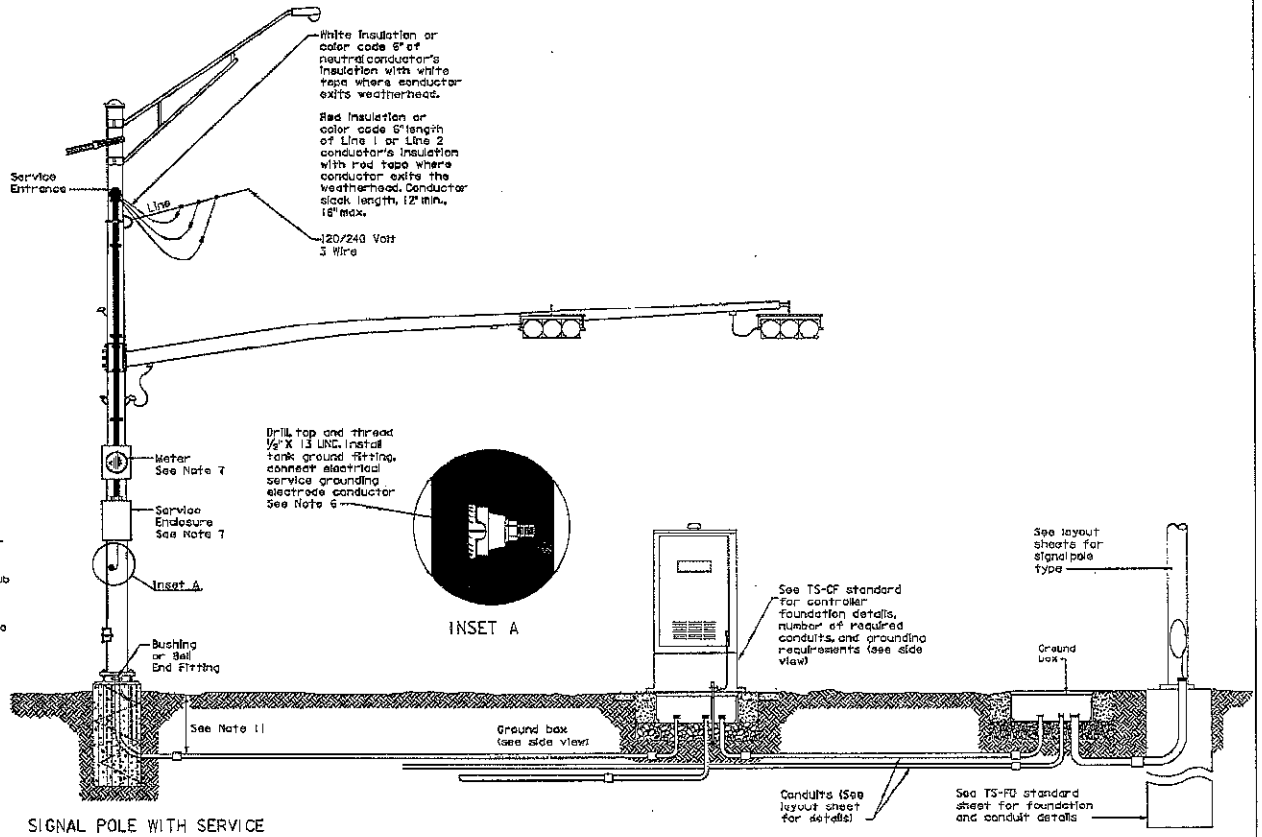
TRAFFIC SIGNAL NOTES

1. Do not pass luminaire conductors through the signal controller cabinet.
2. Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
3. Provide roadway luminaires, when required, in accordance with the material and construction sections of Item 610, "Roadway Illumination Assemblies," except for performance testing of luminaires. Test installed roadway luminaires for proper operation as a part of the associated traffic signal system test.
4. If internally illuminated street name signs are approved for use, ground the fixture to the pole with a 12 AWG green XHHW conductor.
5. Bond anchor bolts to rebar cage in two locations using #3 bare or 6 AWG stranded copper conductors. Use listed mechanical connectors rated for embedment in concrete. See TXDOT standard TS-FD for further details.
6. Drill and tap signal poles for ½ in. X 13 UNC tank ground fitting. Provide and install tank ground fitting 4 in. to 6 in. directly below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Connect the electrical service grounding electrode conductor to the tank ground fitting. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. See Inset A detail for further information. Size service entrance conduit and branch circuit conduit as shown in the plans.
7. Mount electrical service enclosure and meter to signal pole with stainless steel bands. Ensure bands are a minimum width of ¾ in. Secure enclosures to bands using two-bolt brackets. Install brackets near top and bottom of each enclosure. Install properly sized stainless steel washers on each bolt in the enclosure. Bend or drill and tap properly sized stand-off straps to signal pole for attaching conduit.
8. Conduct pull tests and insulation resistance tests on all illumination and power conductors as required in Item 620 "Electrical Conductors" and ED(3). To prevent electronics damage, do not conduct insulation resistance tests on traffic signal cables after termination.
9. Lock all enclosures and bolt down all ground box covers before applying power to the signal installation.
10. Terminate conduits entering the top of enclosures with a conduit-sealing hub or threaded boss such as meter hub. Install a grounding bushing on all metal conduits not connected to conduit-sealing hub or threaded boss. Bond the grounding bushing to the ground bus with a bonding jumper. Seal all conduits entering enclosures with duct sealer expanding foam. Do not use silicone to seal conduit ends.
11. For all conduits, ensure the burial depth is a minimum of 18". Ensure the minimum burial depth for conduit placed under a roadway is 24".

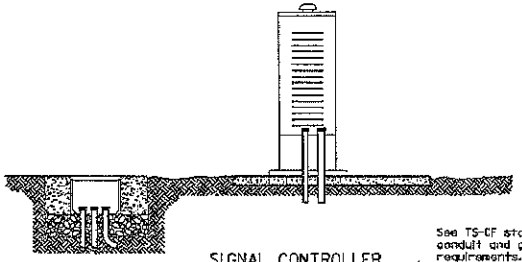


SIGNAL POLE WITH SERVICE

Type 1 electrical service mounted on signal pole shown as an example. See electrical details, layout sheets, and electrical service data chart for additional details.

SIGNAL CONTROLLER FRONT VIEW

SIGNAL POLE



SIGNAL CONTROLLER SIDE VIEW

See TS-CF standard for conduit and grounding requirements. See layout sheets for ground box locations and any additional conduits that are required.

Texas Department of Transportation — Traffic Operations Division Standard

ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS

ED(8)-14

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PEDESTAL SERVICE NOTES

1. Manufacture pedestal electrical services in accordance with Departmental Material Specifications (DMS) 11080 "Electrical Services", 11085 "Electrical Services-Pedestal (PS)" and Item 528 "Electrical Services." Provide pedestal electrical services as listed on the Material Producers list (MPL) on the Department's web site under "Roadway Illumination and Electrical Supplies," Item 528. Ensure all mounting hardware and installation details of services meet utility company specifications. Contact the local utility company for approval of pedestal details prior to installing the electrical pedestal service. Submit any changes required by the utility company prior to manufacturing the pedestal enclosure.

2. When a meter socket is required, provide a socket with a minimum 100 amp rating that complies with local utility requirements.

3. Provide Class A or C concrete for pedestal service foundations in accordance with Item 420, "Concrete Substructures," except that concrete will not be paid for directly but is considered subsidiary to Item 528.

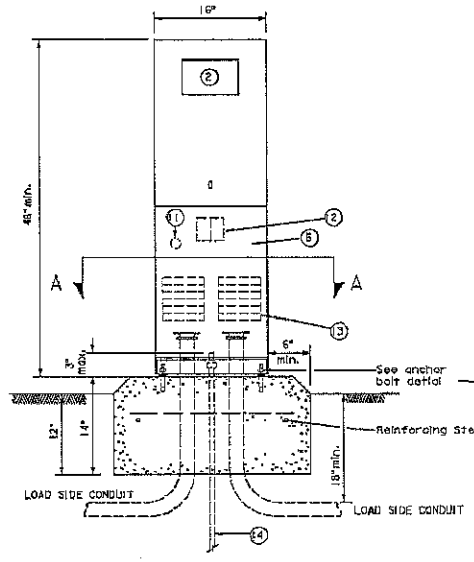
4. Provide #4 reinforcing steel for foundations in accordance with Item 440, "Reinforcement for Concrete."

5. Install ½ in. X 2 ⅛ in. minimum length concrete single expansion type anchors for mounting pedestal enclosure to foundation. Anchor location to match mounting holes in each corner of enclosure. Secure each of the four corners of the pedestal enclosure to the anchors in the foundation with a ½ in. galvanized or stainless steel machine thread bolt, a properly sized locknut and a flat washer.

6. Finish top of concrete foundation in a neat and workmanlike manner. If leveling washers are used, ensure no more than ⅛ in. gap at any corner. Do not exceed a maximum dip or rise in the foundation of ⅛ in. per foot. When properly installed, ensure the top of the service enclosure is level front to back and side to side within ¼ in. Repair rocking or movement of the service enclosure at no additional cost to the department.

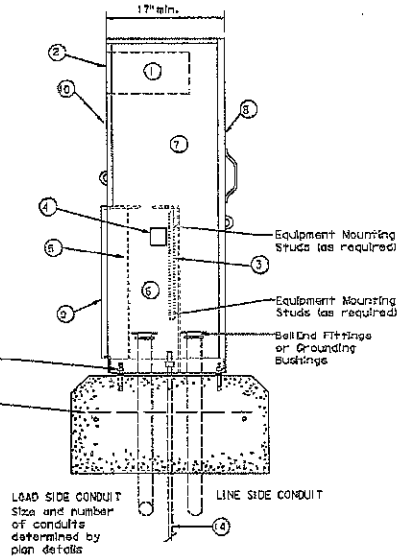
7. Do not use liquidtight flexible metal conduit (LFMC) on pedestal type services.

8. Ensure ell elbows in the foundation are sized as per utility provider's conduit requirements for underground conduit and feeders. PVC extensions may be installed provided the ends of the rigid metal conduits are more than 2 in. below the top of the concrete foundation. Where extension conduits are metal, grounding bushings must be installed with a bonding jumper properly terminated.

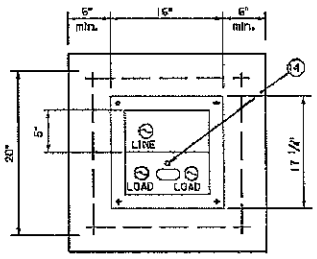


FRONT VIEW

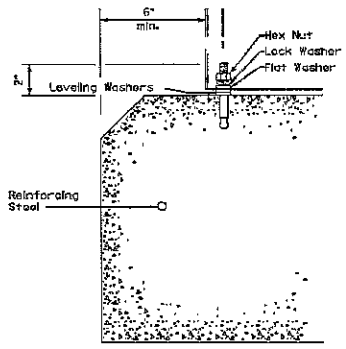
TYPE C shown. TYPE A similar except that TYPE A shall have individual circuit breakers (CB) mounted on an equipment mounting panel. CB Handles shall protrude through hinged deadfront trim.



SIDE VIEW



SECTION A-A



ANCHOR BOLT DETAIL

LEGEND	
1	Meter Socket. (When required)
2	Meter Socket Window. (When required)
3	Equipment Mounting Panel
4	Photo Electric Control Window. (When required)
5	Hinged Deadfront Trim
6	Load Side Conduit Trim
7	Line Side Conduit Area
8	Utility Access Door, with handle
9	Pedestal Door
10	Hinged Meter Access
11	Control Station (H-O-A Switch)
12	Main Disconnect
13	Branch Circuit Breakers
14	Copper Clad Ground Rod - 5/8" X 10'

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS ELECTRICAL SERVICE SUPPORT PEDESTAL SERVICE TYPE PS

ED(9)-14

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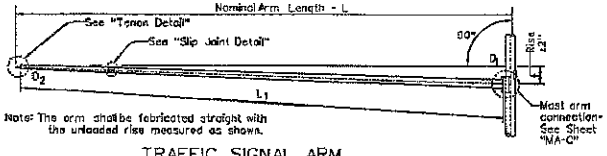
Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D_B	D_{TP}	D_{24}	D_{30}	① thk	D_B	D_{TP}	D_{24}	D_{30}	① thk	
ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
20	10.5	7.8	7.1	6.3	.179	11.5	8.5	7.7	6.8	.179	30-A
24	11.0	8.3	7.6	6.8	.179	12.0	9.0	8.2	7.3	.179	30-A
28	11.5	8.8	8.1	7.3	.179	12.5	9.5	8.7	7.8	.179	30-A
32	12.5	9.8	9.1	8.3	.179	12.0	9.0	8.2	7.3	.239	30-A
36	12.0	9.3	8.6	7.8	.239	12.5	9.5	8.7	7.8	.239	36-A
40	12.0	9.3	8.6	7.8	.239	13.5	10.5	9.7	8.8	.239	36-A
44	12.5	9.8	9.1	8.3	.239	14.0	11.0	10.2	9.3	.239	36-A
48	13.0	10.3	9.6	8.8	.239	15.0	12.0	11.2	10.3	.239	36-A

Arm Length	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	① thk	Rise	L_1	D_1	② D_2	① thk	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	8.5	3.8	.179	1'-9"	19.1	7.0	3.5	.179	1'-8"
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	3.5	.179	1'-9"
28	27.1	8.0	4.2	.179	2'-11"	27.1	8.0	3.5	.179	1'-10"
32	31.0	9.0	4.7	.179	2'-1"	31.0	9.0	3.5	.179	2'-0"
36	35.0	9.5	4.6	.179	2'-4"	35.0	10.0	3.5	.179	2'-1"
40	39.0	9.5	4.1	.239	2'-8"	39.0	9.5	3.5	.239	2'-3"
44	43.0	10.0	4.1	.239	2'-11"	43.0	10.0	3.5	.239	2'-6"
48	47.0	10.5	4.1	.239	3'-4"	47.0	11.0	3.5	.239	2'-9"

D_B = Pole Base O.D.
D_{TP} = Pole Top O.D. with no Luminaire and no ILSN
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L = Nominal Arm Length

① Thickness shown are minimums, thicker materials may be used.

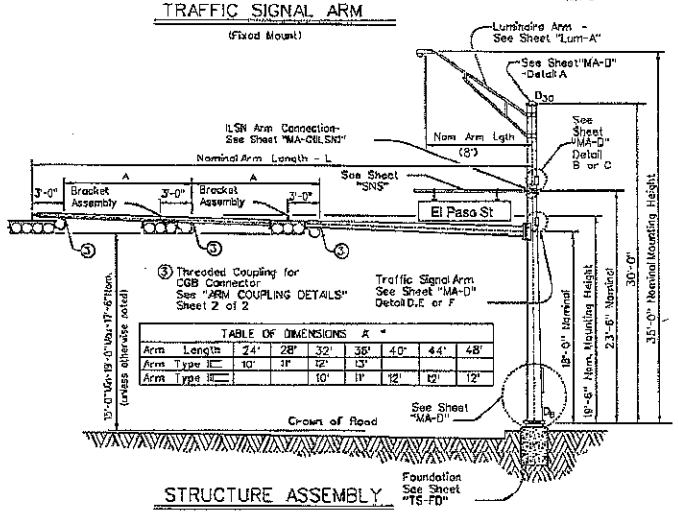
② D_2 may be increased by up to 1" for polygonal arms.



Note: The arm shall be fabricated straight with the unloaded rise measured as shown.

TRAFFIC SIGNAL ARM

(Fixed Mount)



STRUCTURE ASSEMBLY

TABLE OF DIMENSIONS A "

Arm Length	24'	28'	32'	36'	40'	44'	48'
Arm Type I	10'	11'	12'	13'			
Arm Type II			10'	11'	12'	12'	12'

SHIPPING PARTS LIST

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed-arm connection bolts and washers and any additional hardware listed in the table.

Nominal Arm Length	30' Poles With Luminaire		24' Poles With ILSN		28' Poles With No Luminaire and No ILSN	
	Above hardware plus: One (for two if ILSN attached) small hand hole, clamp-on dimpex		Above hardware plus one small hand hole		See note above	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20L-80		20S-80		20-80	
24	24L-80		24S-80		24-80	
28	28L-80	1	28S-80		28-80	
32	32L-80		32S-80		32-80	
36	36L-80		36S-80		36-80	
40	40L-80	1	40S-80		40-80	
44	44L-80		44S-80		44-80	
48	48L-80		48S-80		48-80	

Traffic Signal Arms (1 per Pole) Ship each arm with the listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal)		Type II Arm (2 Signals)		Type III Arm (3 Signals)	
	1 CGB connector		1 Bracket Assembly and 2 CGB Connectors		2 Bracket Assemblies and 3 CGB Connectors	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20□80					
24	24□80		24□80			
28	28□80		28□80	1		
32			32□80		32□80	
36			36□80		36□80	
40					40□80	1
44					44□80	
48					48□80	

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	2

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

Nominal Arm Length	Quantity
7' Arm	
9' Arm	

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
3/4"	1'-8"	1
1 1/8"	3'-4"	1
1 3/4"	1'-6"	1

Each anchor bolt assembly consists of the following: Top and Bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers, and 4 nut anchor devices (Type 2) per Standard Drawing "TS-FD".

Templates may be removed for shipment.

THESE TABLES WERE COMPLETED UNDER MY SUPERVISION.

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P.E. SERIAL No.: 98748
FIRM: LOCKWOOD, ANDREWS & NEWNAM, INC.
FIRM No.: F-2614
DATE: DATE

SHEET 1 OF 2

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(80 MPH WIND ZONE)

SMA-80(1)-12

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U2A

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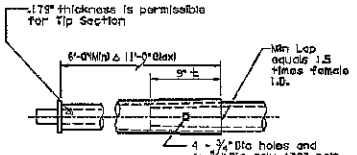
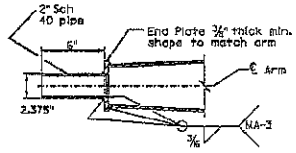


Notes: A slip joint is permissible for arms 40' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

SLIP JOINT DETAIL



TENON DETAIL

VIBRATION WARNING

Mast Arms of SMA and DMA structures and clamp-on Arms of LMA structures of approximately 40 ft or longer are subject to harmonic vertical vibrations in light wind conditions due to the aeroelastic characteristics of a few of the myriads of possible combinations of the following signal numbers, weights and positions; existence/solidity of backplates; presence of additional attachments to the arm, such as signs and cameras; arm-wind orientation; and arm-pole stiffness.

Such vibrations may cause fatigue damage to the structure and may lead to galloping in moderate wind conditions which may further damage the structure and alarm the public. Tests have indicated that when wind is blowing toward the back side of signalheads having unvented backplates attached the probability of unacceptable harmonic vibration and/or galloping is rather high.

If backplates are not required for improved visibility they should not be applied to the signal heads or, if they must be applied, they should be vented as a first and inexpensive measure to mitigate vibrations.

The traffic signal mast arms shall be visually inspected in 5 to 20 mph wind conditions after installation of signalheads and any attachments, including any required backplates. If vertical movements with a total excursion (maximum upward excursion to maximum downward excursion) of more than approximately 6" are observed at the arm tip, a damping plate shall be fitted to the arm. See "Damping Plate Mounting Details" on standard sheet, MA-DPD-10.

This visual inspection shall be repeated after each modification of the structure that could affect its aeroelastic response. Excessive vibrations shall not be allowed to continue for more than two days.

Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor.

Poles are designed to support one 8'-0" luminaire arm, one 9'-0" internally lighted street name sign and one traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 60 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.6 sq ft. The specified internally lighted street name sign load applied 4.5 ft from the centerline of the pole equals 85 lbs vertical dead load plus horizontal wind load on an effective projected area of 11.8 sq ft. The specified signal load applied at the end of the traffic signal arm equals 100 lbs vertical dead load plus the horizontal wind load on an effective projected area of 32.4 sq ft (actual area times drag coefficient).

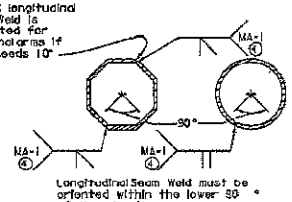
See Standard Sheet "MA-D" for pole details, "MA-C" for traffic signal arm connection details, "MA-C (ILSN)" for internally lighted street name sign arm connection details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details. See "MA-C" for material specifications.

Fabrication shall be in accordance with Item 586, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and Item 586, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing", after fabrication.

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

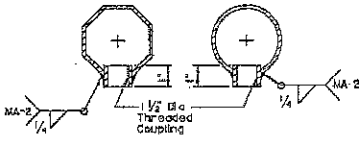
Second longitudinal Seam Weld is permitted for polygonal arms if D_1 exceeds 10"



Longitudinal Seam Weld must be oriented within the lower 90° of the signal arm.

ARM WELD DETAIL

(2) 60% Min. penetration
100% penetration within 6" of circumferential base welds.



ARM COUPLING DETAILS

SHEET 2 OF 2

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
SINGLE MAST ARM ASSEMBLY
(80 MPH WIND ZONE)

SMA-80(2)-12

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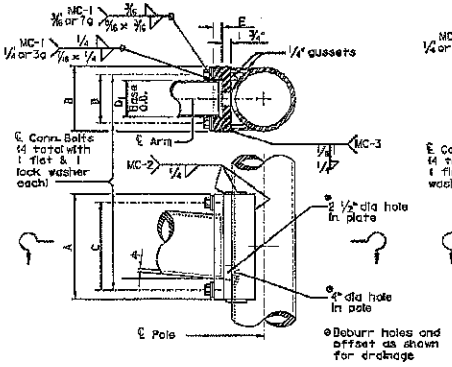
8-12	DIST	COUNTY		SHEET NO.	
				30	

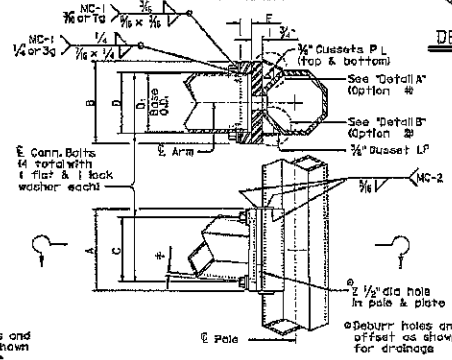
122B

ARM SIZE D_1	t	A	B	C	D	E	CONN BOLT DIA
In.	In.	In.	In.	In.	In.	In.	In.
6.5	.179	12	9	9	6	1 3/4	1
7.5	.179	13	9	10	6	1 3/4	1
8.0	.179	14	10	11	7	2	1 1/4
9.0	.179	15	11	12	8	2	1 1/4
9.5	.179	17	12	14	9	2	1 1/4
9.5	.239	18	12	15	9	2	1 1/4
10.0	.239	18	12	15	9	2	1 1/4
10.5	.239	18	13	15	10	3	1 1/2
11.0	.239	18	13	15	10	3	1 1/2

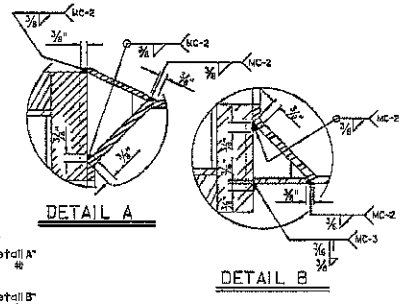


FIXED MOUNT DETAIL 1

ARM SIZE D_1	t	A	B	C	D	E	CONN BOLT DIA
In.	In.	In.	In.	In.	In.	In.	In.
7.0	.179	11	11	8	8	1 3/4	1 1/2
7.5	.179	13	11	8	8	1 3/4	1 1/2
8.0	.179	13	11	8	8	2	1 1/2
9.0	.179	13	13	10	10	2	1 1/2
10.0	.179	13	13	10	10	2	1 1/2
9.5	.239	13	13	10	10	2	1 1/2
10.0	.239	14	14	11	11	2	1 1/2
11.0	.239	14	14	11	11	3	1 1/2
11.5	.239	14	14	11	11	3	1 1/2



FIXED MOUNT DETAIL 2



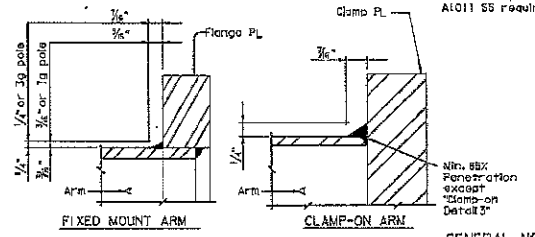
DETAIL A

DETAIL B

MATERIALS	
Round Shafts or Polygonal Shafts ①	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 ②
Plates ①	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325 or A449, except where noted
Pin Bolts	ASTM A325
Pipe ①	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

① ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

② ASTM A1011 SS Gr.50 material shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.



FIXED MOUNT ARM

CLAMP-ON ARM

ARM BASE WELD DETAILS

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies. A Maximum 1 1/2" wide vertical slotted hole shall be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1".

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

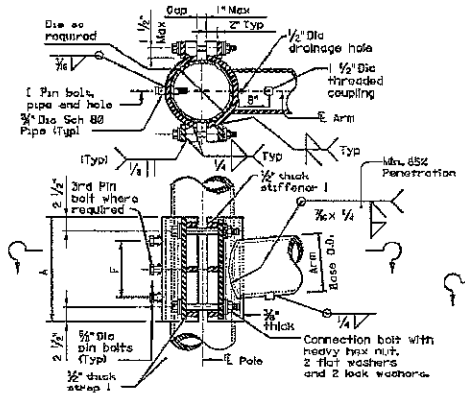
Where duplicate parts occur on a detail, holes shown for one part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

NOTE:

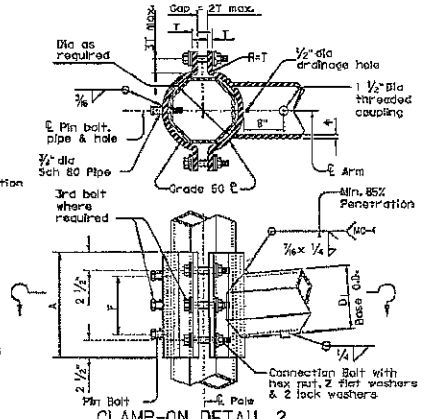
Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and 3/4" dia pipe shall have 3/4" dia holes for a 1/8" dia galvanized cotter pin. Back clamp plate shall be furnished with a 3/4" dia hole for each pin bolt. An 3/16" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

ARM SIZE D_1	t	A	F	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
In.	In.	In.	In.	ea.	In.	ea.	In.
6.5	.179	12	6	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	4	1 1/4	3	5/8
9.5	.239	18	12	4	1 1/4	3	5/8
10.0	.239	18	12	4	1 1/4	3	5/8



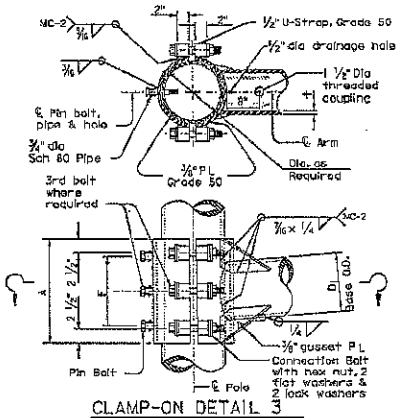
CLAMP-ON DETAIL 1

ARM SIZE D_1	t	A	F	T	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
In.	In.	In.	In.	In.	ea.	In.	ea.	In.
7.0	.179	12	6	3/4	4	3/4	2	5/8
7.5	.179	14	8	3/4	4	3/4	2	5/8
8.0	.179	14	8	3/4	4	3/4	2	5/8
9.0	.179	16	10	7/8	4	1	2	5/8
10.0	.179	18	10	7/8	4	1	2	5/8
9.5	.239	18	10	1	6	1	3	5/8
10.0	.239	18	10	1	6	1	3	5/8



CLAMP-ON DETAIL 2

ARM SIZE D_1	t	A	F	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
In.	In.	In.	In.	ea.	In.	ea.	In.
6.5	.179	12	8	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	6	1	3	5/8
9.5	.239	18	12	6	1	3	5/8
10.0	.239	18	12	6	1	3	5/8



CLAMP-ON DETAIL 3

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

MAST ARM CONNECTIONS

MA-C-12

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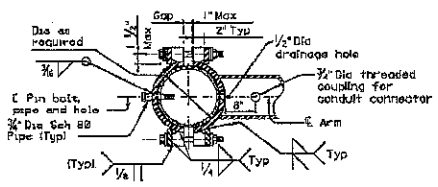
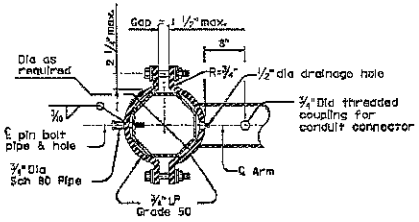
TABLE OF DIMENSIONS for ILSN Support Arm Clamp-on Details 1,2 and 3						
ILSN ARM SIZE	A	F	CONN. BOLTS		PIN BOLTS	
			No.	Dia	No.	Dia.
	in.	in.	ea.	in.	ea.	in.
3 in. dia Schedule 40 Pipe	10	4	4	3/4	2	5/8



SECTION A-A



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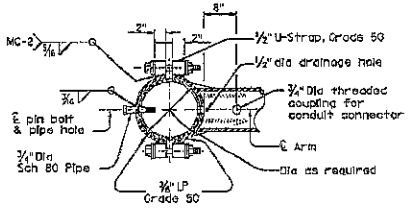
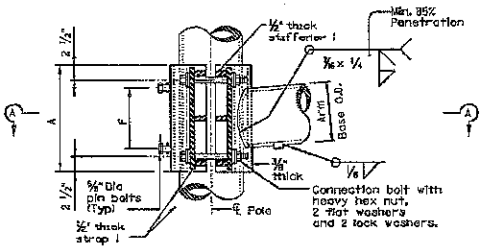
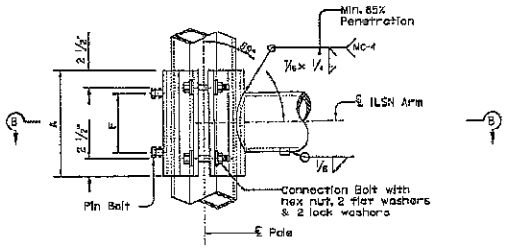


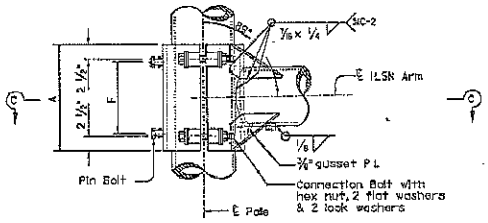
SECTION C-C



ILSN CLAMP-ON DETAIL 1



ILSN CLAMP-ON DETAIL 2



ILSN CLAMP-ON DETAIL 3

GENERAL NOTES:

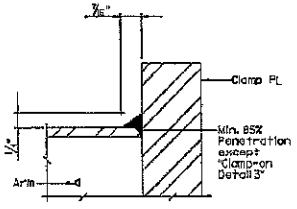
Clamp-on details shall be used for ILSN support arm assemblies. A 1 1/2" inch diameter hole shall be cut in the front clamp plate for wiring access. A matched hole shall be field drilled through the pole to provide wire access after arm is oriented. Deburr both holes.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the details.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

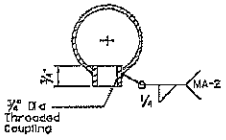
NOTE:

Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and 3/4" dia pipe shall have 3/16" dia holes for a 1/8" dia galvanized cotter pin. Each clamp plate shall be furnished with a 3/4" dia hole for each pin bolt. An 11/16" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.



CLAMP-ON ARM

ARM BASE WELD DETAILS



ILSN ARM COUPLING DETAIL

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

MAST-ARM CONNECTIONS

MA-C(ILSN)-12

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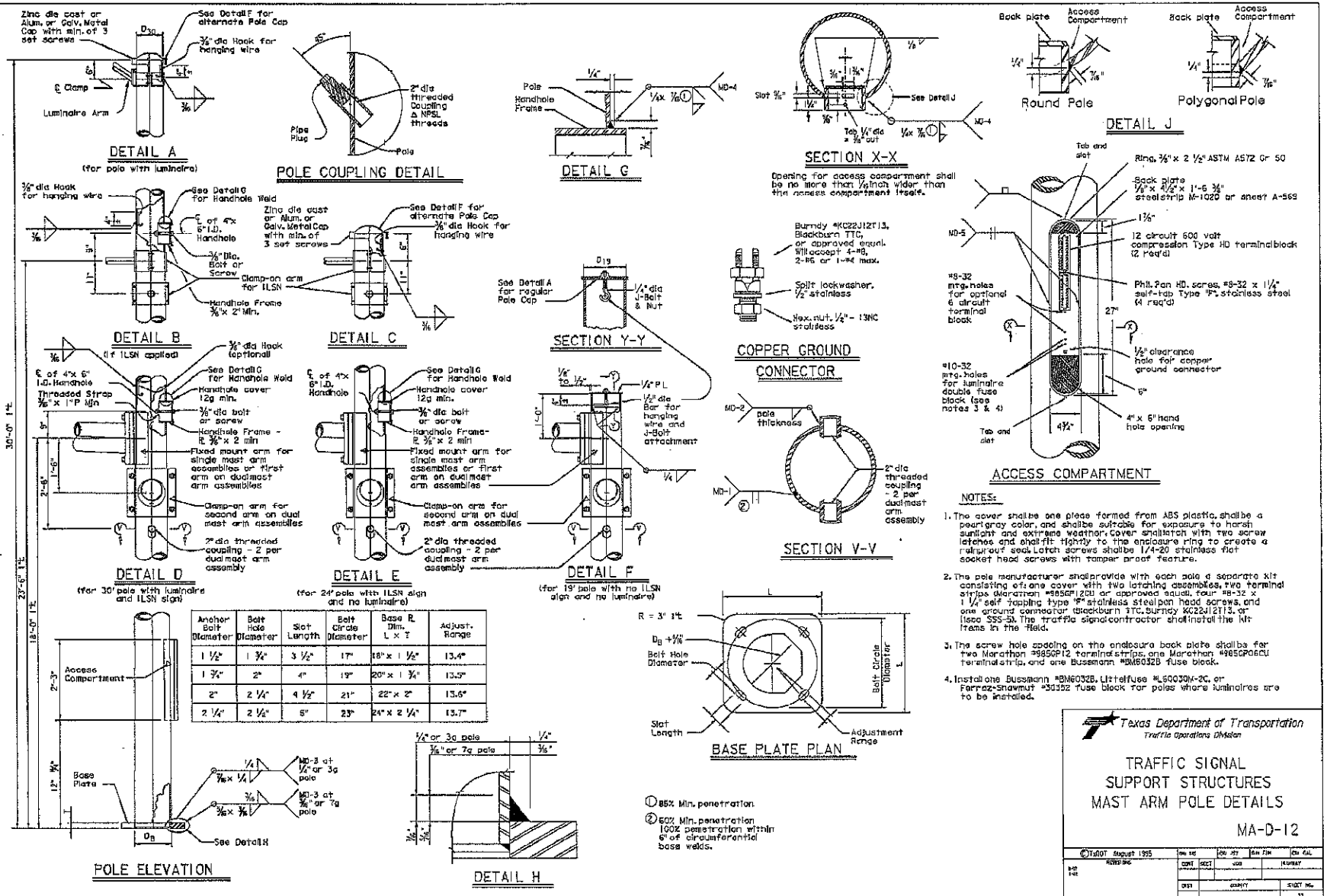

Anchor Bolt Diameter	Bolt Hole Diameter	Slot Length	Bolt Circle Diameter	Base PL Dim. L x T	Adjust. Range
1 1/2"	1 3/4"	3 1/2"	17"	18" x 1 1/2"	13.4"
1 3/4"	2"	4"	19"	20" x 1 3/4"	13.5"
2"	2 1/4"	4 1/2"	21"	22" x 2"	13.6"
2 1/4"	2 1/2"	5"	23"	24" x 2 1/4"	13.7"

① 85% Min. penetration.

② 60% Min. penetration 100% penetration within 6" of circumferential base welds.

NOTES:

1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.

2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.

3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.

4. Install one Bussmann #BM6032B, Littelfuse #LS60030W-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM POLE DETAILS

MA-D-12

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FOUNDATION DESIGN TABLE

FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL: VERT BARS	REINFORCING STEEL: SPIRAL & PITCH	EMBEDDED DRILLED SHAFT LENGTH-ft ④ 5 ⑥ TEXAS CONE PENETROMETER N blows/ft: 10	15	40	ANCHOR BOLT DESIGN ①: ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	FOUNDATION DESIGN LOAD ②: MOMENT K-ft	SHEAR Kips	TYPICAL APPLICATION
24-A	24"	4- #6	#2 at 12"	5.7	5.3	4.5	¾"	36	12 ¾"	1	10	1	Pedestal pole, pedestal mounted controller.
30-A	30"	8- #8	#3 at 6"	11.3	10.3	8.0	1½"	55	17"	2	87	3	Mast arm assembly. (see Selection Table)
36-A	36"	10- #	#3 at 6"	13.2	12.0	9.4	1¾"	55	19"	2	131	5	Mast arm assembly, (see Selection Table) 30' strain pole with or without luminaire.
36-B	36"	12- #	#3 at 6"	15.2	13.6	10.4	2"	55	21"	2	190	7	Mast arm assembly, (see Selection Table) Strain pole taller than 30' & strain pole with mast arm
42-A	42"	14- #	#3 at 6"	17.4	15.6	11.9	2 ¼"	55	23"	2	271	9	Mast arm assembly. (see Selection Table)

NOTES:

① Anchor bolt design develops the foundation capacity given under Foundation Design Loads.

② Foundation Design Loads are the allowable moments and shears at the base of the structure.

③ Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.

④ Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

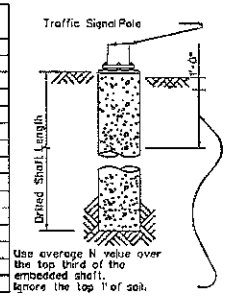
⑤ If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

⑥ Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM PLUS ILSN SUPPORT ASSEMBLIES (ft)

		FDN 30-A	FDN 36-A	FDN 36-B	FDN 42-A
80 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH	32'	48'		
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS	24' X 24'			
		28' X 28'			
		32' X 28'	32' X 32'		
			36' X 36'		
			40' X 36'		
		-	44' X 28'	44' X 36'	
100 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH		36'	44'	
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS		24' X 24'		
			28' X 28'		
			32' X 24'	32' X 32'	
				36' X 36'	
				40' X24'	40' X 36'
					44' X 36'

EXAMPLE:
1. For 80mph design wind speed, foundation 30-A can support up to a 32' arm with another arm up to 28'
2. For 100mph design wind speed, foundation 36-A can support a single 36' mast arm.



Use average N value over the top third of the embedded shaft. Ignore the top 1' of soil.

ANCHOR BOLT & TEMPLATE SIZES

BOLT DIA IN.	⑦ BOLT LENGTH	TOP THREAD	BOTTOM THREAD	BOLT CIRCLE	R2	R1
¾"	1'-6"	3"	—	12 ¾"	7 ⅛"	5 ⅝"
1½"	3'-4"	6"	4"	17"	10"	7"
1¾"	3'-10"	7"	4 ½"	19"	11 ½"	7 ¾"
2"	4'-3"	8"	5"	21"	12 ½"	8 ½"
2 ¼"	4'-8"	9"	5 ½"	23"	13 ¾"	9 ¼"

⑦ Min dimensions given, larger bolts are acceptable.

**FOUNDATION SUMMARY TABLE ③

LOCATION IDENTIFICATION	AVG. N BLOW /ft.	FDN TYPE	NO. EA	DRILLED SHAFT LENGTH (FEET) ⑥: 24-A	30-A	36-A	36-B	42-A
OLD RICHMOND								
P1	10	36-A	1			13		
P2	10	24-A	1	6				
P3	10	30-A	1		11			
TOTAL DRILLED SHAFT LENGTHS				6'	11	13		

*24-A FOUNDATION IS SUBSIDIARY TO ITEM 687

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and interim revisions thereto.

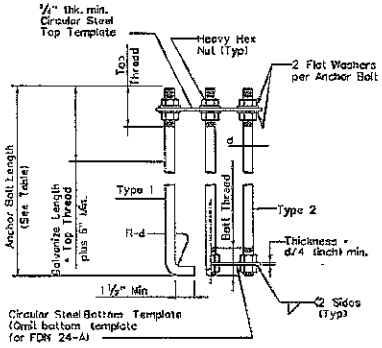
Reinforcing steel shall conform to Item 440, "Reinforcing Steel".

Concrete shall be Class "C".

Threads for anchor bolts and nuts shall be rolled or cut threads of 8UN series up to 2" in diameter or UNC series for all sizes. Bolts and nuts shall have Class 2A and 2B fit tolerances. Galvanized nuts shall be tapped after galvanizing.

Anchor bolts that are larger than 1" in diameter shall conform to "alloy steel" or "medium-strength mild steel" per Item 449, "Anchor Bolts". Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Galvanize a minimum of the top and thread length plus 6" for all anchor bolts unless otherwise noted. Exposed washers and exposed nuts shall be galvanized. All galvanizing shall be in accordance with Item 445, "Galvanizing".

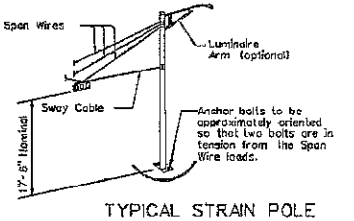
Templates and embedded nuts need not be galvanized. Lubricate and tighten anchor bolts when erecting the structure in accordance with Item 449, "Anchor Bolts".



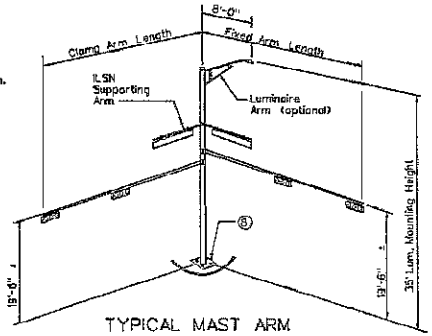
HOOKED ANCHOR (TYPE 1) — NUT ANCHOR (TYPE 2)

ANCHOR BOLT ASSEMBLY

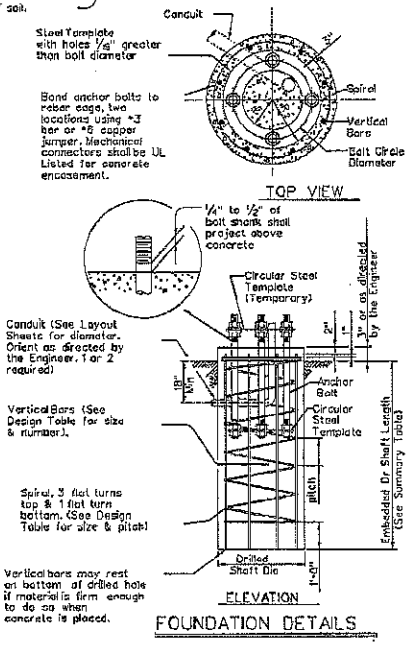
⑧ Orient anchor bolts orthogonal with the fixed arm direction to ensure that two bolts are in tension under dead load.



TYPICAL STRAIN POLE ASSEMBLY



TYPICAL MAST ARM ASSEMBLY



FOUNDATION DETAILS

100% INTERIM REVIEW ONLY
DOCUMENT INCOMPLETE; NOT INTENDED FOR FORMAL BIDDING OR CONSTRUCTION
ENGINEER: TERRY HAY
P.E. SEAL No.: 66748
FIRM: LOCKWOOD, ANDREWS & NEWNAM, INC.
FIRM No.: F-2614
DATE: 9/16/97

**THE ABOVE FOUNDATION TABLE WAS COMPLETED UNDER MY SUPERVISION.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL POLE FOUNDATION

TS-FD-12

©TxDOT August 1995

REVISIONS	CONT	SECT	JOB	HIGHWAY
	DIST		COUNTY	SHEET NO. 34

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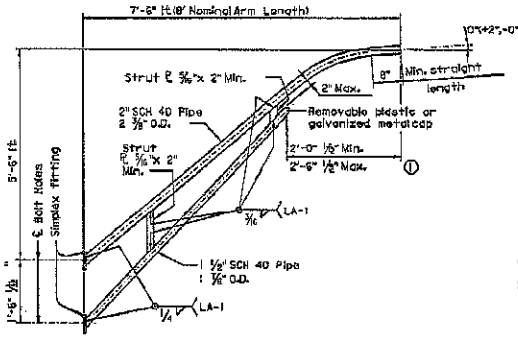
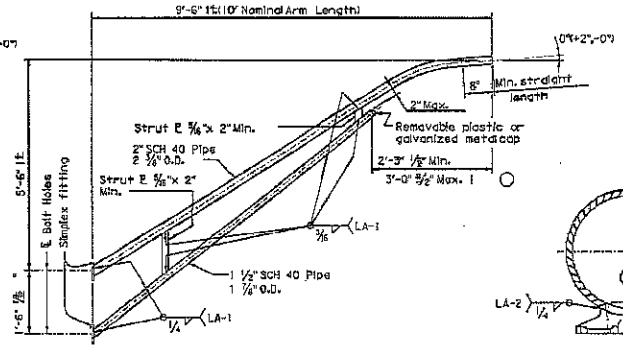
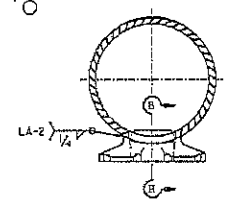
MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr.65-35 or A148 Gr.80-50, A576 Gr.1021 3 or A36 (Arm only)
Arm Pipes	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50 4 or A1011 HSLAS-F Gr.50 4
Arm Strut Plates 2	ASTM A36, A572 Gr.50 4 or A588
Misc.	ASTM designations as noted



8-FOOT LUMINAIRE ARM



10-FOOT LUMINAIRE ARM



DIRECT ATTACHMENT DETAIL

1. Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.
2. Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.
3. A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.
4. ASTM A572, A1008 HSLAS-F, and A1011 HSLAS-F may have higher yield strengths but shall not have less elongation than the grade indicated.

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Revisions thereto. Design Wind Speed equals 90 mph plus a 1.3 gust factor. Arms are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq. ft.

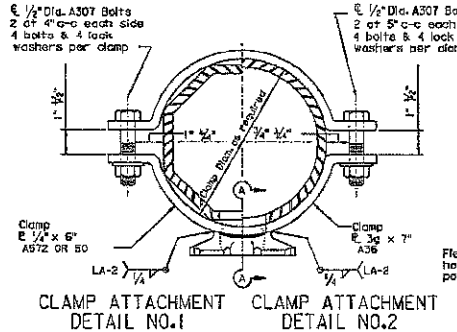
Materials and fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absence of specified Fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.

Unless otherwise noted, all parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing".

Deviation from the details and dimensions shown herein require submittal of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

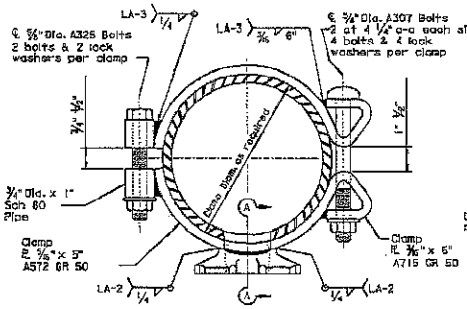
Each pole simplex fitting shall be supplied with 2 ASTM A325 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans. When clamp attachment is specified, the Fabricator shall ship the clamp assembly securely attached to the pole at the location shown on the plans.

If clamp assemblies are ordered without poles, the Fabricator shall ship one upper and one lower clamp assembly together in a single package, including all nuts and washers required for the clamps and simplex fittings.



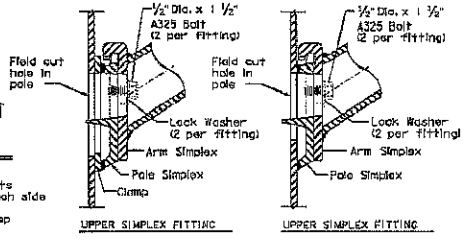
CLAMP ATTACHMENT DETAIL NO.1 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO.2 (HALF SECTION)



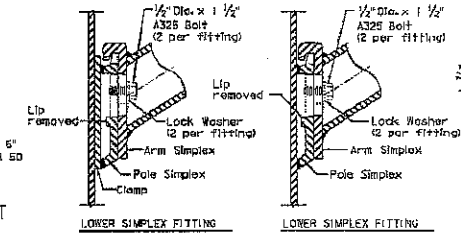
CLAMP ATTACHMENT DETAIL NO.3 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO.4 (HALF SECTION)



UPPER SIMPLEX FITTING

UPPER SIMPLEX FITTING

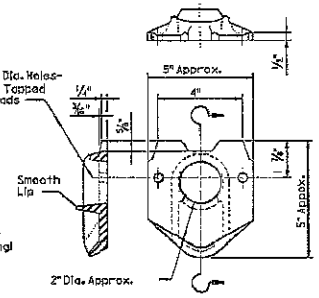


LOWER SIMPLEX FITTING

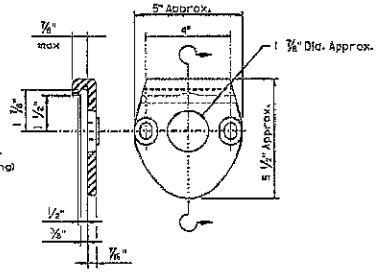
LOWER SIMPLEX FITTING

SECTON A-A

SECTON B-B



POLE SIMPLEX DETAIL



ARM SIMPLEX DETAIL

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY DRAWINGS FOR LUMINAIRE SUPPORT STRUCTURES

ARM DETAILS

LUM-A-12

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	DIST		COUNTY	SHEET NO. 35

DATE: FILE:

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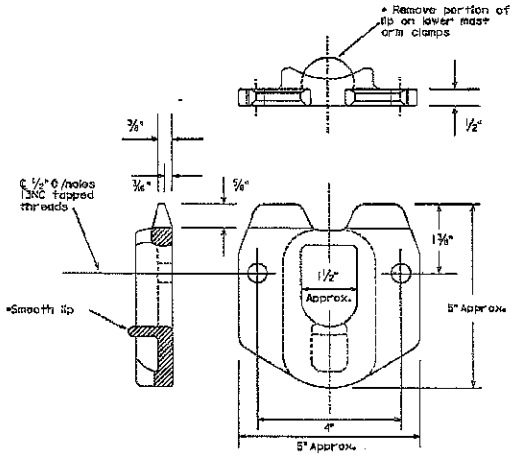
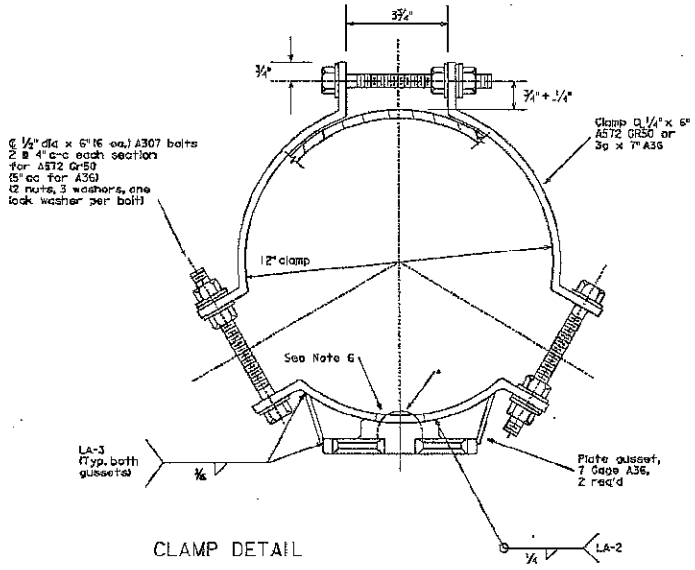
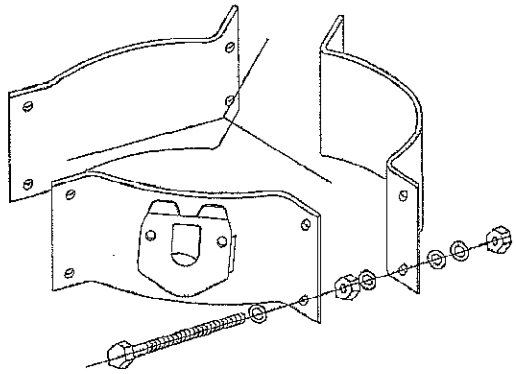


POLE SIMPLEX DETAILS



CLAMP DETAIL



PROJECTION

OTHER MATERIALS:

1. Pole simplex shall be ASTM A27 GR65-35 or A148 GR80-50 or A576 GR1021. ASTM A576 must be suitable for forging and also meet minimum tensile of 65ksi, minimum yield of 35ksi, and a minimum elongation of 22 percent in 2 inches.
2. Welded tabs and backplates shall be ASTM A-36 steel or better.
3. Nylon insert locknuts shall conform to ASTM A563.

GENERAL NOTES:

1. Materials and fabrication shall be in accordance with Standard Sheet "MA-C" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
2. All parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing". The thread of the Simplex shall be made free of through or sharp edges resulting from the galvanizing process.
3. Each simplex fitting shall be supplied with 2 ASTM A325 bolts, 1/2 in. X 1 1/2 in. and 2 lock washers. The bolts and lock washers shall be secured to the clamp with the other hardware items. The Fabricator shall ship clamp assembly together in a single package, including all bolts, nuts, and washers required for the clamp and simplex fitting.
4. Design conforms to 1994 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals" and interim revisions thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor. Clamps are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq.ft., 12 ft. maximum arm length.
5. Each assembly shall consist of one upper piece simplex fitting having a smooth lip and one lower piece simplex fitting with the lip removed.
6. Approximately 2 in. diameter hole in upper mast arm clamp.

For 8.9 - 12 inch diameter Signal Poles (Two req'd for each mast arm)

Texas Department of Transportation
Traffic Operations Division

CLAMP ON
FITTING ASSEMBLY FOR
LUMINAIRE MAST ARM

CFA-12

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12-98 1-12				
	DIST		COUNTY	SHEET NO.
				34

130

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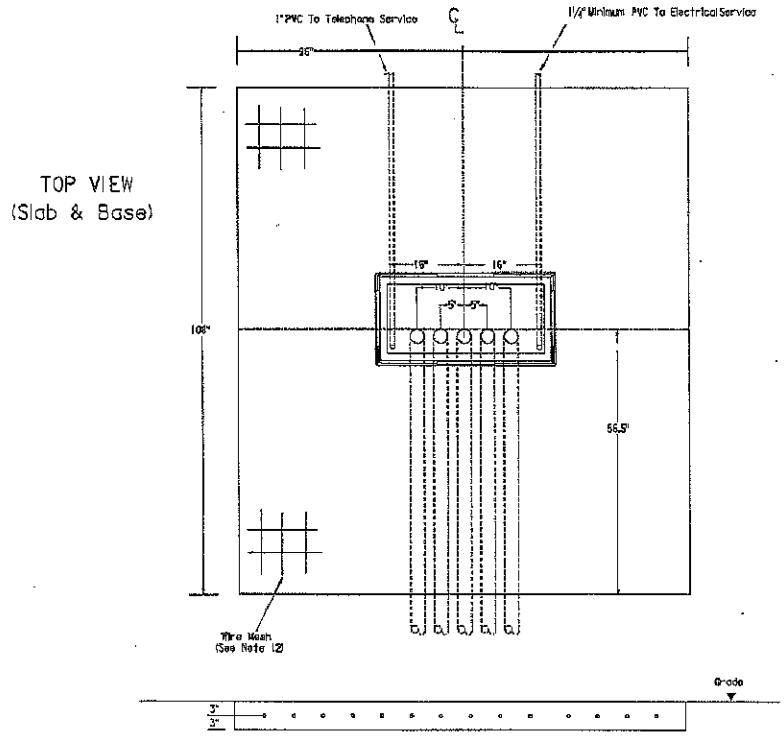
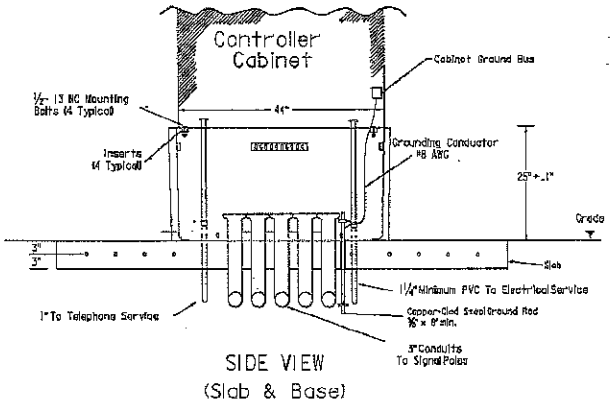
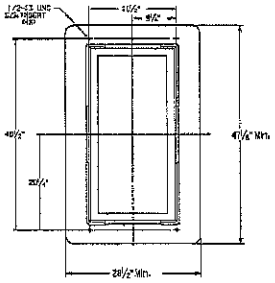




SIDE VIEW
(Slab & Base)



CABINET BASE

TRAFFIC SIGNAL CONTROLLER BASE:

1. Provide a traffic signal controller base (cabinet base) manufactured of polymer concrete material consisting of aggregate and siliceous chopped glass fibers and thermoset polyester resin. The polymer concrete cabinet base must be reinforced on the inside of the cabinet base with fiberglass matting. Provide one of the following bases: Armorcast® Part # A60S1848X24, Quazite Model # PC30482795, or other as approved by TxDOT Traffic Operation Division.
2. The polymer concrete material must have a minimum compressive strength of 18,500 pounds per square inch (psi), minimum flexural strength of 3600 psi, and minimum shear strength of 3600 psi.
3. The polymer concrete cabinet base must conform to the dimensions shown and must accommodate a standard TxDOT basement cabinet.
4. Supply the cabinet base with four ½"-13 UNC stainless steel inserts for attachment of the cabinet to the base. Inserts must withstand a minimum torque of 50 ft-lb and a minimum straight pull-out strength of 750 lbs.
5. Provide the cabinet base with 4 cable racks mounted one on each side of the base 2" to 3" from the top edge of the base. Unless approved otherwise, cable racks must be 1-1/2 x ⅜ x ⅜ inch steel channel with eight 1-slots spaced at 1-1/2 inches. The cable racks must easily accommodate the insertion of the wraps to attach field wiring to the racks to serve as strain relief. Secure cable racks to the base using ½"-13 UNC stainless steel screws and inserts.
6. The cabinet base, when secured to the concrete slab with controller cabinet attached, must withstand a minimum wind load of 125 mph or a 550 lb force applied at 48" above the bottom of the base without causing the base or cabinet to come out of their anchored position or cause any permanent deformation. The manufacturer must supply certification by an independent testing laboratory or sealed by a Texas Licensed Professional Engineer. Provide the cabinet base with hardware for attachment to a concrete slab.
7. The traffic signal base must be permanently marked either by impress or by permanent ink with the manufacturer's model number and name or logo.
8. Set the base to the concrete with a silicone caulk bead and fastened to the slab per manufacturer's instructions.

CONCRETE SLAB:

9. Traffic signal controller pad must be a portland cement concrete slab poured in place, must conform to the dimensions shown, and must be level.
10. Bond a #8 AWG copper ground wire and an 8 ft ground rod bonded to the reinforcing mesh by a suitable UL listed clamp and terminated to the cabinet grounding bus for the purpose of providing a local ground for the electrical grounding conductor. The electrical grounding conductor specified in Item 680-3.A.4 is required and must be terminated to the cabinet ground bus.
11. Install PVC sleeve to prevent the ground rod from direct embedment in the slab.
12. Provide welded wire mesh 6X6-W2.9 X W2.9 for reinforcement. Provide joints and splices in the mesh with a minimum 6-inch overlap. Center the mesh between top and bottom and provide a minimum 3 inch cover on the edges.
13. Provide Class B concrete minimum for the slab in accordance with Item 421. Construct the slab in accordance with Item 531.

CONDUITS:

14. Stub up and run 3-inch conduits through the slab to the various traffic signal poles and ground boxes as shown on the layouts. Install the number of conduits as shown on layouts plus two additional 3 inch conduits for future use. Terminate the conduits with a bushing between 2 and 4-inches above the slab.
15. Extend conduits for future use at least 18-inches from the edge of the slab, terminate underground with a coupling, and cap and section that the section be removed without damaging the coupling. This must also apply to unused telephone conduit.
16. Stub up two separate conduits through the slab from the electrical and telephone services. Run the conduit for the electrical feed directly to the electrical service enclosure. Run the conduit for the telephone line directly to the telephone service, usually located on the same pole as the electrical service. Telephone must not under any circumstance share a conduit with any other function.
17. Terminate electric and telephone conduits above the slab with a coupling. After the base is installed, extend the conduits above the top of the base and secure to the base using a stainless-hole strap or similar suitable substitute.

CONTROLLER CABINET:

18. Anchor the controller cabinet to the base using four stainless steel 1/2-13 NC bolts.
19. The silicone caulk bead specified in Item 680.5.B must be RTV 133.

PAYMENT:

20. Bid TS-CF as subsidiary to Item 680.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL CONTROLLER CABINET BASE AND PAD

TS-CF-04

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	DIST		COUNTY	SHEET NO. 37

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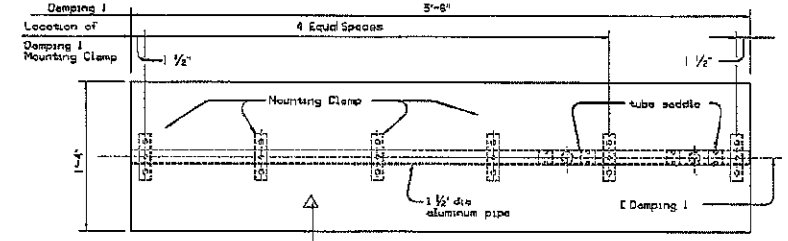
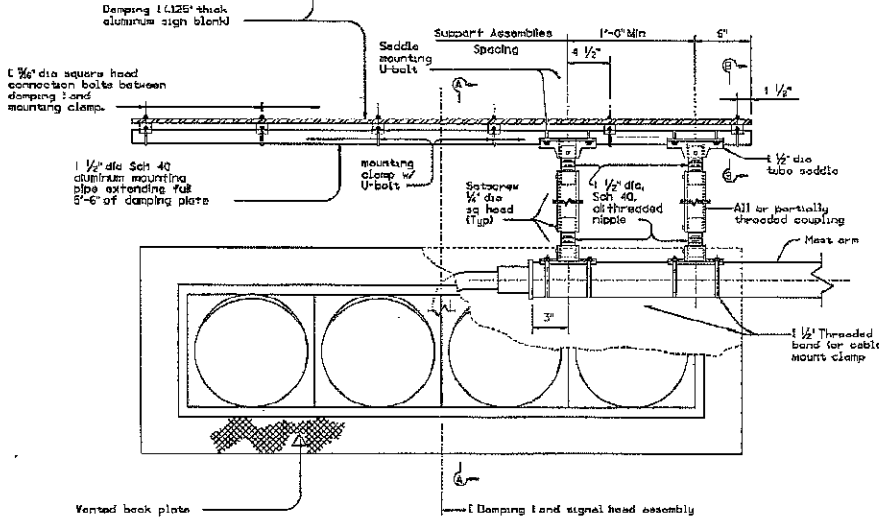


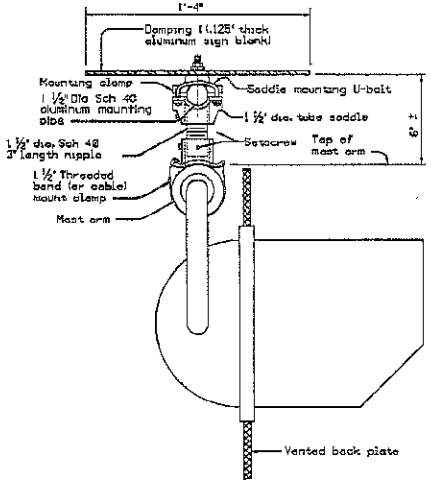
PLAN



ELEVATION

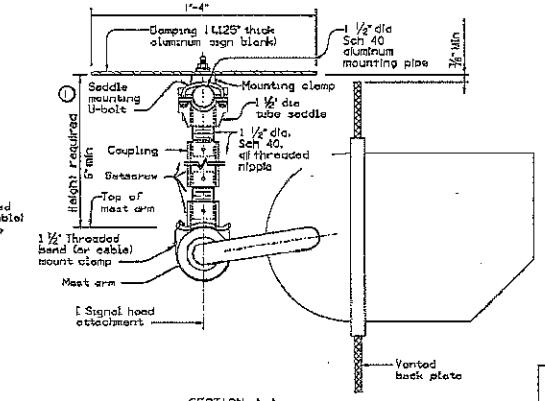
DAMPING PLATE MOUNTING DETAILS

(Showing alternate placement of signal head)



SECTION A-A

(Showing standard placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)



SECTION A-A

(Showing alternate placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)

① Recommended supporting assemblies to achieve required height				
Height required	One nipple each length	Two nipples each length	plus	One coupling each length
6'-8 ¾"	3"	-		-
7'-8 ½"	4"	-		-
9'-10 ½"	6"	-		-
11'-15 ½"	-	4"		5"
16'-24"	-	6"		10"

GENERAL NOTES:

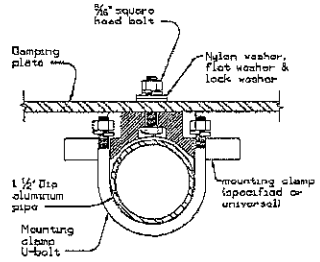
In accordance with the findings of TxDOT sponsored research, the installation of a damping plate in accordance with the details shown here at the end of signal mast arms of SMA and DMA standard structures reduces excessive harmonic vertical vibration, and thus fatigue damage. Any deviation from these details may reduce the effectiveness of this damping device.

Aluminum sign blank for damping plate shall conform to Departmental Material Specifications DMS-7110. Materials for mast arm mounting clamp and tube saddle shall be aluminum castings or aluminum alloys as in accordance with manufacturers' stipulations. Mounting pipe, pipe nipple and coupling shall be aluminum alloy 6061-T6 or 6063-T6. Damping plate mounting clamp and u-bolt assemblies shall conform to Standard Sheet SMD(GEN)-08. U-bolts for saddle mounting shall have a minimum yield strength of 36 ksi.

Damping plate shall be mounted horizontally. Position centerline of damping plate to align with centerline of signal head assembly. Vertical clearance between signal head (with or without backing plate) and bottom of damping plate shall be maintained as shown. The attachments shown here are examples only, other supporting details which meet both alignment and vertical clearance requirements are also acceptable.

Unless stipulated by the manufacturers, all steel parts shall be galvanized finish in accordance with Standard Specification Item 445, "Galvanizing".

Contractor shall verify applicable field dimensions before the installation.



SECTION B-B

(Showing damping plate attachment)

Texas Department of Transportation
Traffic Operations Division

MAST ARM DAMPING PLATE DETAILS

MA-DPD-12

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REVISIONS	CONT	SECT	JOB	HIGHWAY
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SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

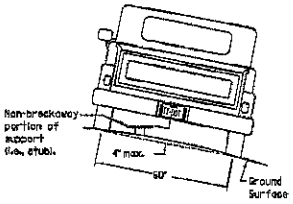
Post Type
- FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
- TWT = Thin-Walled Tubing (see SMD(TWT))
- 10SWG = 10 SWG Tubing (see SMD(SLIP-1) to (SLIP-3))
- SS0 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

Anchor Type
- UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
- UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
- WS = Wedge Anchor Steel- (see SMD(TWT))
- WP = Wedge Anchor Plastic (see SMD(TWT))
- SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
- SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation
- P = Prefix "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
- T = Prefix "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
- U = Prefix "U" (see SMD(SLIP-1) to (SLIP-3))
- 1F REQUIRED
- 1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
- BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
- BC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
- EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-3))

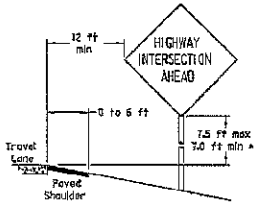
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheelpaths).

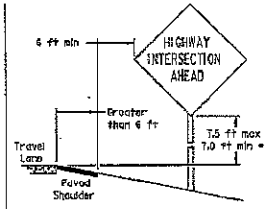
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

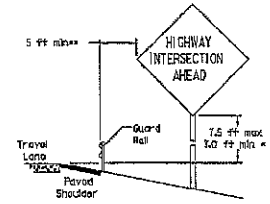
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travelane.



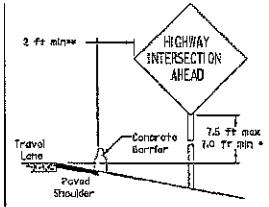
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

BEHIND BARRIER



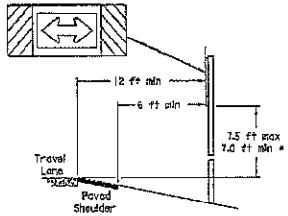
BEHIND GUARDRAIL



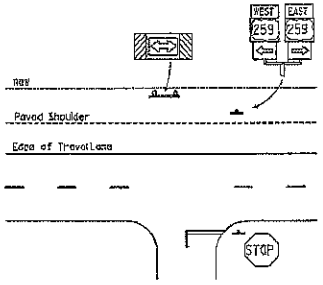
BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

T-INTERSECTION



When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travelane or

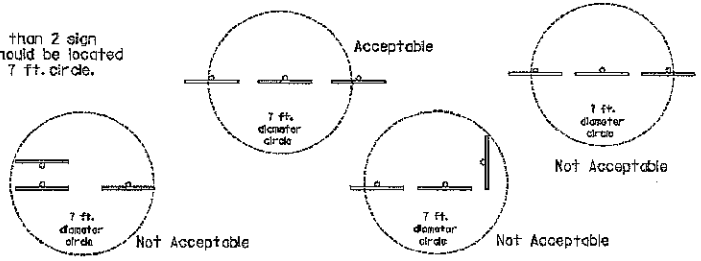
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

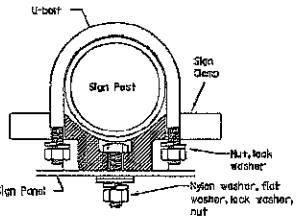
The website address is: http://www.txdot.gov/publications/traffic.htm

No more than 2 sign posts should be located within a 7 ft. circle.



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

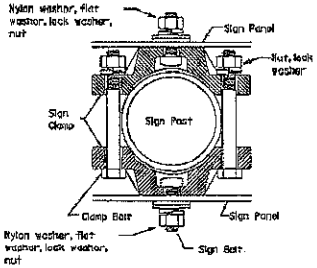


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

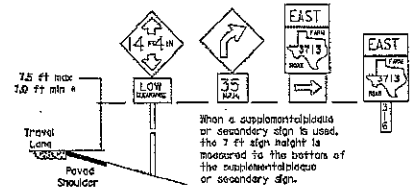
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs

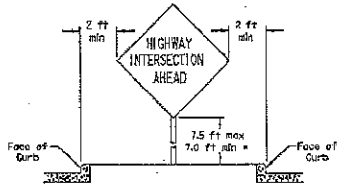


Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES

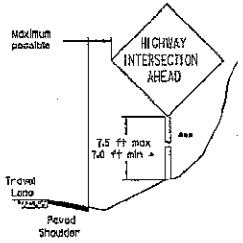


CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travelane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

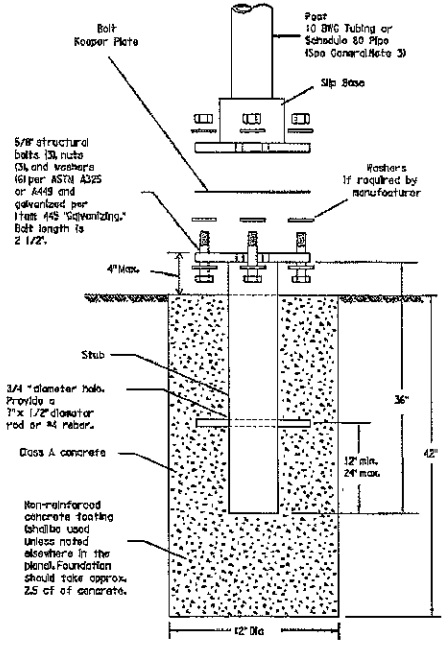
SMD(GEN)-08

©TxDOT July 2002	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08				
	DIST	COUNTY		SHEET NO.
				35

26A

DATE: FILE:

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



SM RD SGN ASSM TY XXXXXXXSAGX-XXXX

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   0.134" nominal wall thickness
   Seamless or electric-resistance welded steel tubing or pipe
   Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   Other steels may be used if they meet the following:
   55,000 PSI minimum yield strength
   70,000 PSI minimum tensile strength
   20% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metalizing with zinc wire per ASTM B833.
   Schedule 80 Pipe (2.875" outside diameter)
   0.276" nominal wall thickness
   Steel tubing per ASTM A500 Gr C
   Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
   46,000 PSI minimum yield strength
   62,000 PSI minimum tensile strength
   21% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is
   http://www.txdot.gov/publications/traffic.htm
4. Sign support shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

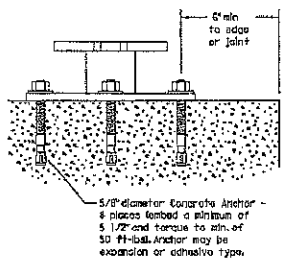
Foundation

1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support

1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the traveled way (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the traveled way. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



SM RD SGN ASSM TY XXXXXXXSGXX-XXXX

Concrete anchor consists of 5/8" diameter stud bolt with ISO series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3300 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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9-08 REVISIONS	CONT	SECT	JOB	HIGHWAY
	DIST		COUNTY	SHEET NO. 40

268

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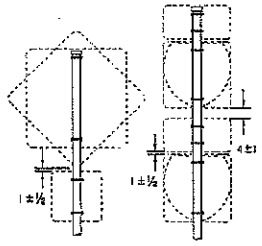
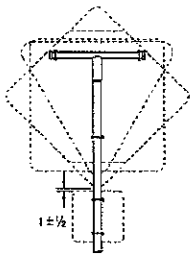
DISCLAIMER: The use of this standard is governed by the Texas Engineering Practice Act. No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



SM RD SGN ASSM TY XXXXX(1)XX(P)



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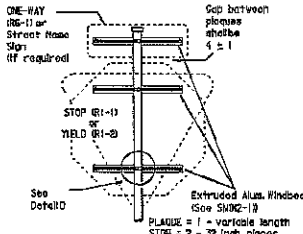

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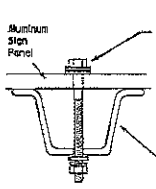
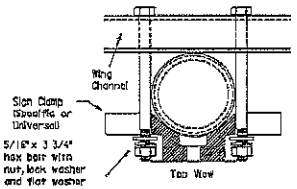


Detail A



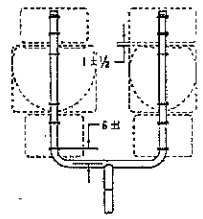
Detail B

GENERAL NOTES:

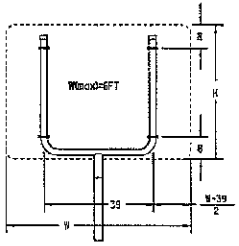
1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

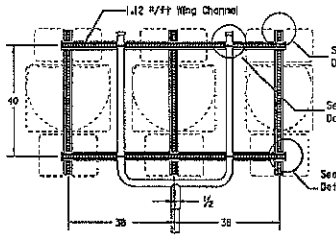
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front). Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.



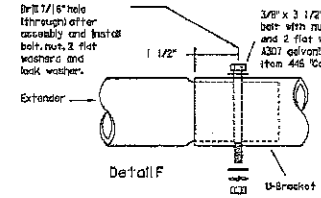
SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(U)

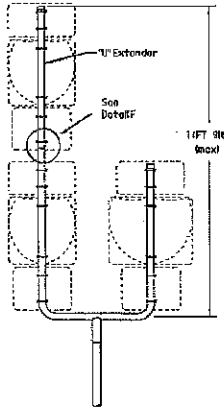


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

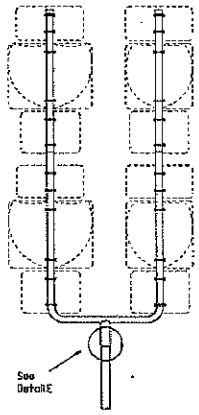


Detail F

Splices shall only be allowed behind the sign substrate.



SM RD SGN ASSM TY S80(1)XX(U-1EXT)



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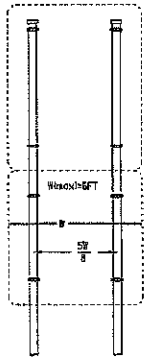
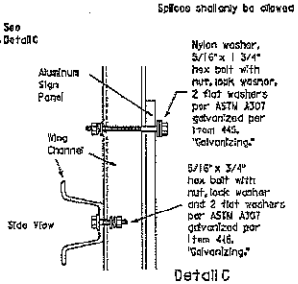
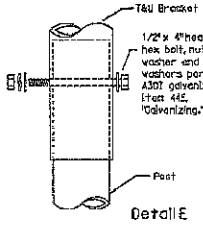


SM RD SGN ASSYM TY XXX(X)(2)XX(P)

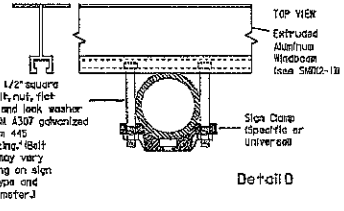


SIDE VIEW

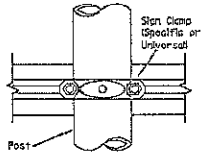
Detail C



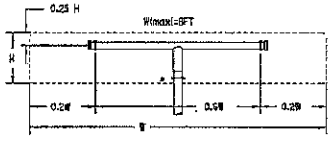
Detail E



Detail D



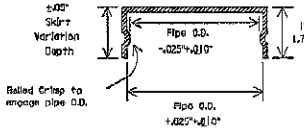
	REQUIRED SUPPORT	
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10SGS(1)XX(P-BW)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10SGS(1)XX(P-BW)
	48x18-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10SGS(1)XX(P-BW)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)



SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

DATE:
FILE:

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

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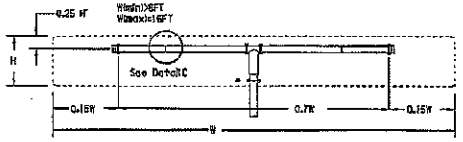
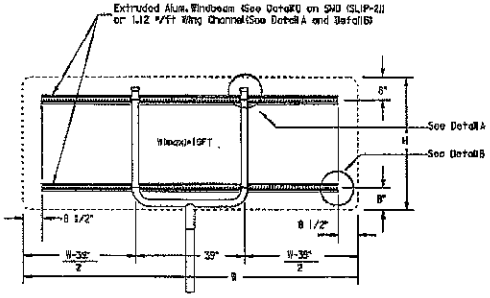
FILE: SMD(SLIP-2)-08 REVISIONS	DIST	AREA	JOB	HIGHWAY
	DIST		COUNTY	SHEET NO. 41

2GC



SM RD SGN ASSM TY XXXXX(1)XX(1-2)X(T)
(* - See Note 12)



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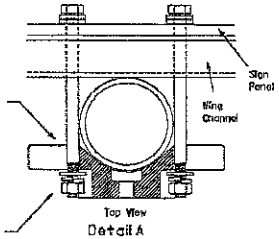
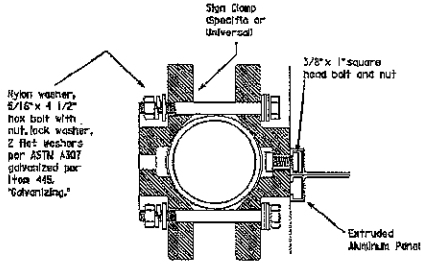
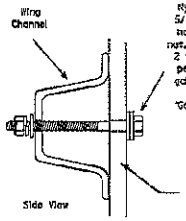


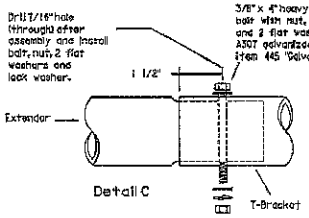
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

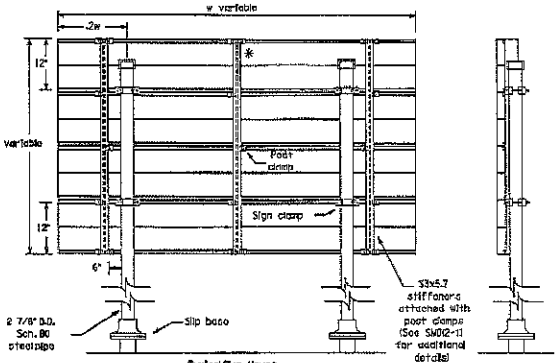


Detail B

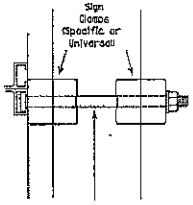


Detail C

Splices shallonly be allowed behind the sign substrate.

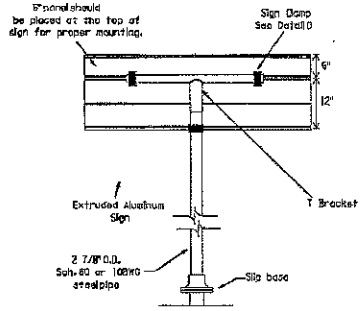


Typical Sign Mount
SM RD SGN ASSM TY S80(2)XX(P-EXA)
* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

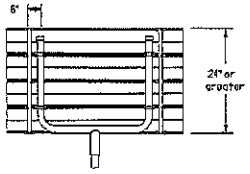


3/8" x 4 1/2"
square head
bolt, nut,
flat washer
and lock washer per
ASTM A307 galvanized
per Item 445,
"Galvanizing."

Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details
See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
2. Sign supports shallnot be spliced except where shown. Sign support posts shallnot be spliced.
3. Aluminum sign blanks shallconform to Departmental Material Specifications DMS-7110 and shallhave the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft. and 0.125 for signs greater than 15 sq. ft.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT"table on this sheet.
5. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
6. When two triangular slipbase supports are used to support a single sign, they shallnot be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
7. Wing channel shallmeet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. Excess pipe, wing channel, or windbeam should be cut off so that it does not extend beyond the sign panel (i.e., excess support shallnot be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Sign blanks shallbe the sizes and shapes shown on the plans.
11. Additional sign clamp required on the "T-bracket"post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shallbe fitted with Friction Caps.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-Inch STOP sign R1(-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-EXA)
	60-Inch YIELD sign R1(-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-EXA)
	48x16-Inch ONE-WAY sign R6-1	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-EXA)
	36x48, 40x36, and 48x48-Inch signs	TY 10BWG(1)XX(T)
	48x60-Inch signs	TY S80(1)XX(T)
Warning	48x48-Inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-Inch signs	TY S80(1)XX(T)
	48-Inch Advance School X-ing sign S1-1	TY 10BWG(1)XX(T)
	48-Inch School X-ing sign S2-1	TY 10BWG(1)XX(T)
	Large Arrow sign W1-6 & W1-7	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

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REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	DIST		COUNTY	SHEET NO. 42

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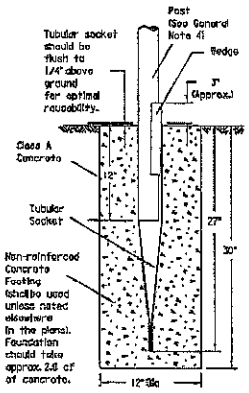
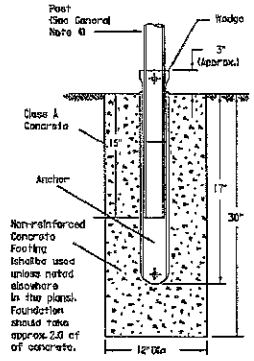
DATE:
FILE:

Wedge Anchor Steel System



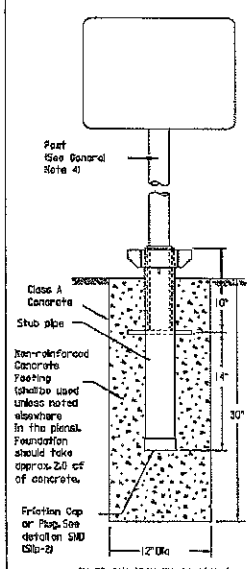
SM RD SGN ASSM TY TWTCONWS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

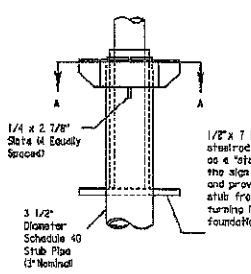


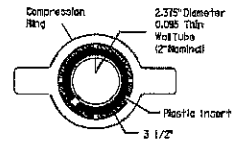
SMD RD SGN ASSM TY TWTCONPOD

Universal Anchor System with Thin-Walled Tubing Post



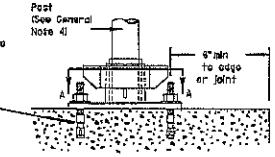
SM RD SGN ASSM TY TWTCOUAP4



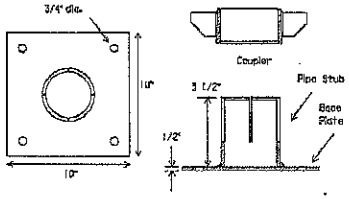


View A-A

Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

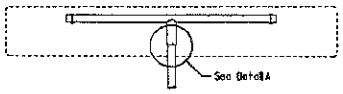


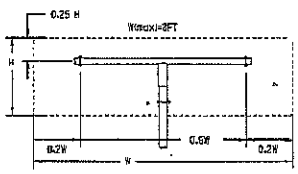
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 30 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type HI epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.



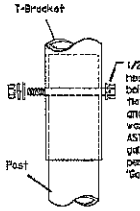
SM RD SGN ASSM TY TWTCOUBP1

Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post





SM RD SGN ASSM TY TWTCOUXNT2
(* - See General Note 6)



9/16" Hole may need to be drilled through post to accommodate bolt.

Detail A

NOTE

The devices shall be installed per manufacturer's recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 15 square feet of sign area.
2. The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer, method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
3. Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is:
   http://www.txdot.gov/business/producer list.htm
4. Material used as post with this system shall conform to the following specifications:
   13 BWG Tubing (2.375" outside diameter) (TWT)
   - 0.095" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing
   - Steel shall be 55LAS or 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 18% minimum elongation in 2"
   - Wall thickness uncoated shall be within the range of .083" to .099"
   - Outside diameter uncoated shall be within the range of 2.369" to 2.381"
   - Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
5. Sign blanks shall be the sizes and shapes shown on the plans.
6. Additional sign clamp required on the T-bracket post for 24" high signs. Place clamp at least 1" above bottom of sign when possible.
7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
8. See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is:
   http://www.txdot.gov/publications/trafficlight.htm

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
3. Insert tubular socket into concrete until top of socket is approximately 1/4" above the concrete footing.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer.
5. Attach the sign to the sign post.
6. Insert the sign post into socket and align sign face with roadway.
7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. Insert base post in hole to depths shown and backfill hole with concrete.
3. Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
4. Attach the sign to the sign post.
5. Install plastic insert around bottom of post.
6. Insert sign post into base post. Lower until the post comes to rest on shoulder.
7. Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
8. Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

SMD(TWT)-08

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	CONT	SECT	JOB	HIGHWAY	
	DIST		COUNTY		SHEET NO.
					47

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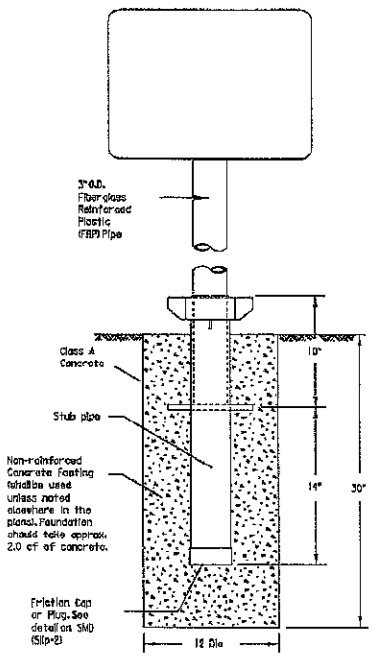
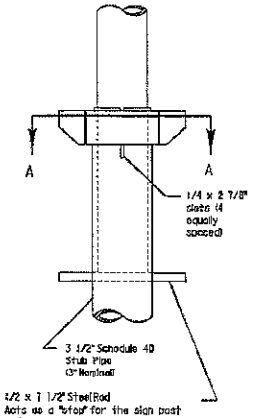
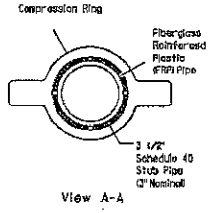
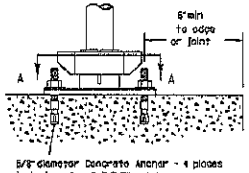
Universal Anchor System with Fiberglass Reinforced Plastic (FRP) Post





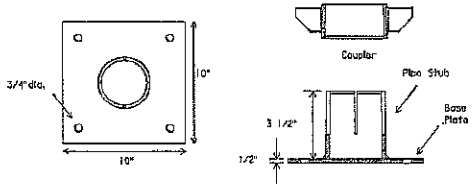




5/8" diameter Concrete Anchor - 4 places (embed a min. of 3 3/8" and torque to min. of 50 ft-lbs). Anchor may be expansion or adhesive type.

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.

BOLT-DOWN DETAILS



SM RD SGN ASSM TY FRPCOUB(P)

SM RD SGN ASSM TY FRPCOUA(P)

GENERAL NOTES:

1. FRP sign supports for a single type sign support may be used for signs up to and including 16 square feet. Dualpost installation may be used for signs up to and including 32 square feet.
2. All nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing."
3. See the Traffic Operations Division website for detailed drawings of sign clamps. The website address is http://www.txdot.gov/publications/traffic.htm

FRP POST REQUIREMENTS

1. Materials shall conform to the requirements of Departmental Material Specification DMS-4410 and will be furnished in a yellow or gray color as specified elsewhere in the plans.
2. Thickness of FRP sign support is 0.125" + 0.031", - 0.0".
3. FRP sign supports are prequalified by the Traffic Operations Division. Prequalification procedures are obtained by writing:
   Texas Department of Transportation
   Traffic Operations Division
   125 East 11th Street
   Austin, Texas 78701-2483

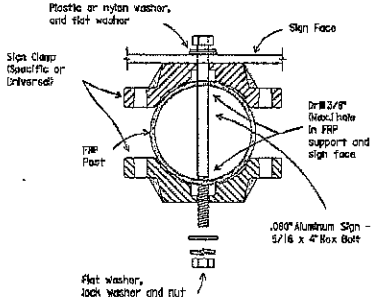
UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURES

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(SIGN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Insert base post in foundation hole to depths shown and fill hole with concrete. Cut base post from bottom and ensure a minimum of 18" embedment if installed in solid rock.
4. Level and plumb the base post with coupler using a torpedo level and let concrete set a minimum of 4 days, unless otherwise directed by Engineer. Bottom of base post slots shall be above the concrete footing.
5. Attach sign to FRP post.
6. Insert sign post into base post. Lower until the post comes to rest on the steel rod.
7. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
8. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

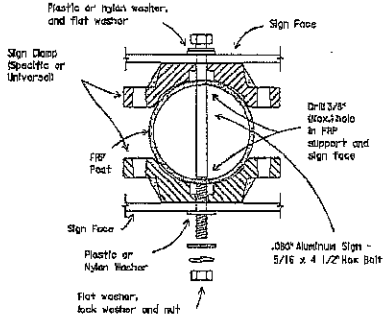
BOLT DOWN SIGN SUPPORT

1. Position base plate with coupler on existing concrete.
2. Drill holes into concrete and insert the 5/8" diameter bolts with wedge anchors, and tighten nuts.
3. Attach sign to FRP post.
4. Insert bottom of sign post into pipe stub.
5. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
6. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

Typical Sign Mounting Detail for FRP Support with Single Sign



Typical Sign Mounting Detail for FRP Support with Back-to-Back Signs



Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
UNIVERSAL ANCHOR SYSTEM
WITH FRP POST

SMD(FRP)-08

©TxDOT July 2002

REVISIONS	FED. ROAD DIV.	STATE	FED. AID PROJ. NO.
9-03			
	CONT.	SECT.	JOB.	HIGHWAY
	DIST.	COUNTY	SHEET NO.
			40

26F

DATE
FILE

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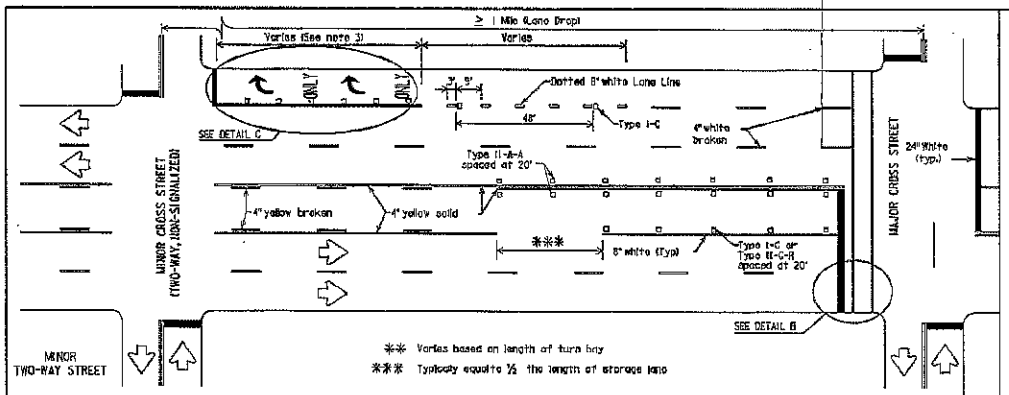
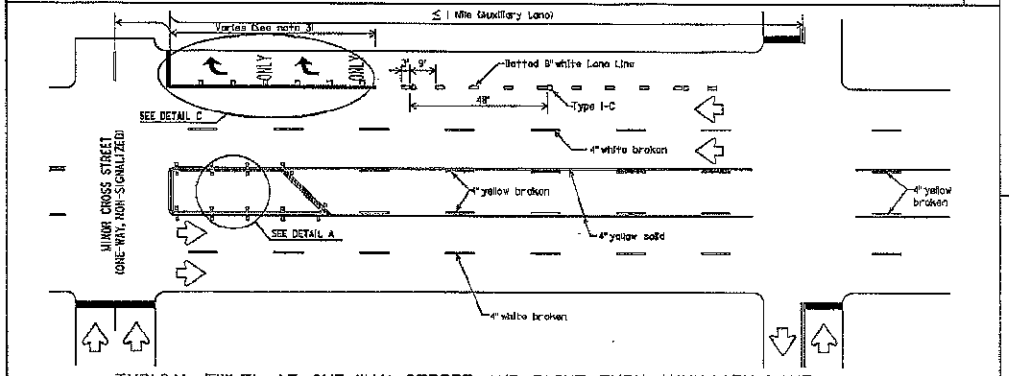
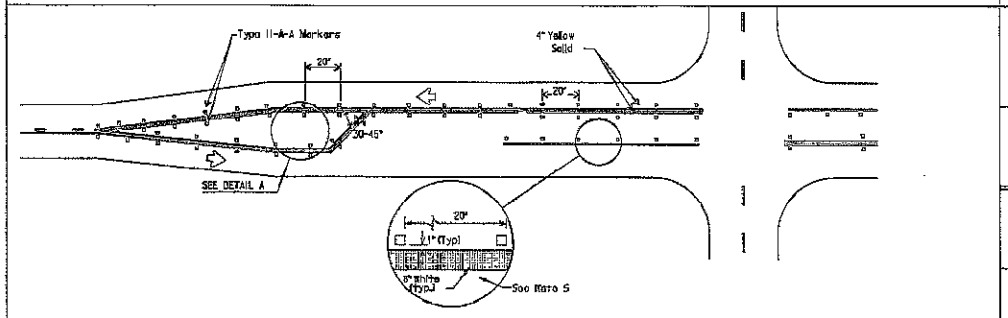


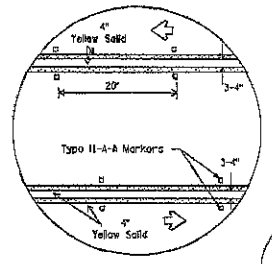
TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



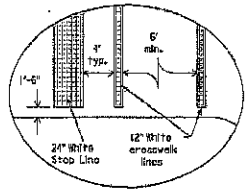
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS

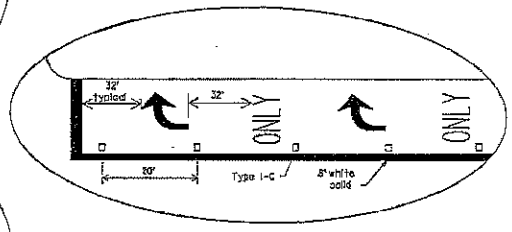


DETAIL A



Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

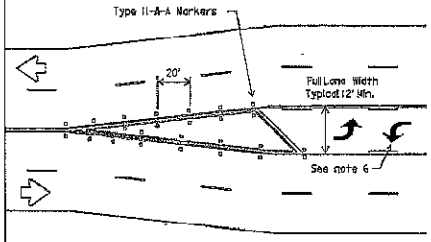
DETAIL B



DETAIL C

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Department Material Specifications as specified by the plans.



TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

1. Refer elsewhere in plans for additional RPM placement and details.
2. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows as shown in the Standard Highway Sign Designs for Texas.
3. When lane used word and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
4. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used.
5. Raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Raised pavement marker Type II-C-R with divided highways and raised medians.
6. A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

Texas Department of Transportation
Traffic Operations Division

PAVEMENT MARKINGS FOR TWO-WAY LEFT TURN LANES DIVIDED HIGHWAYS AND RURAL LEFT TURN BAYS

PM(3)-12

©TxDOT April 1998	CON TXDOT	CON TXDOT	CON TXDOT	CON TXDOT
REVISIONS	CONT	SECT	JOB	HIGHWAY
3-00 2-12				
8-00				
3-03				
2-10	DIST	COUNTY		SHEET NO.
				43

DATE: FILE:

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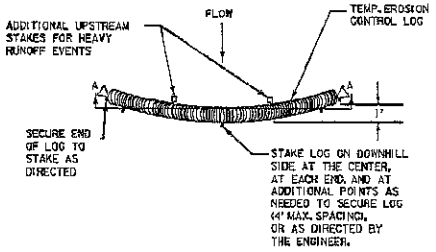
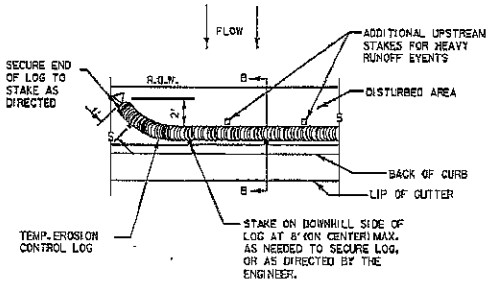
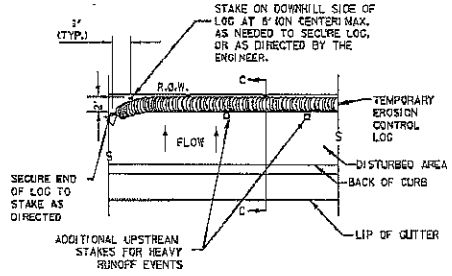


PLAN VIEW



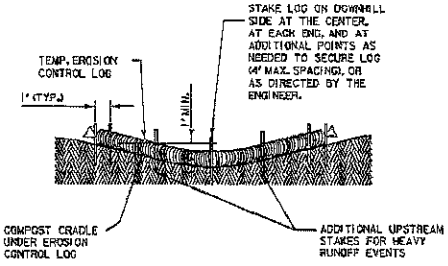
PLAN VIEW



PLAN VIEW

GENERAL NOTES:

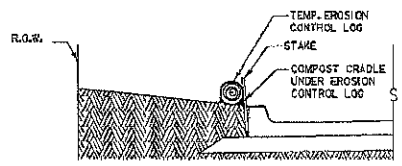
1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.



SECTION A-A

EROSION CONTROL LOG DAM

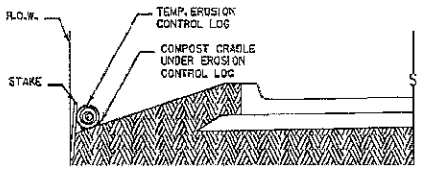
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

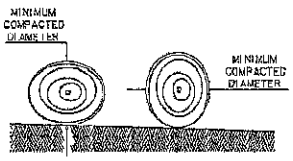
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

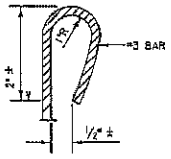
CL-ROW



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET



REBAR STAKE DETAIL

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion controllog sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Controllogs should be placed in the following locations:
1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

SHEET 1 OF 3

Texas Department of Transportation — Design Division Standard

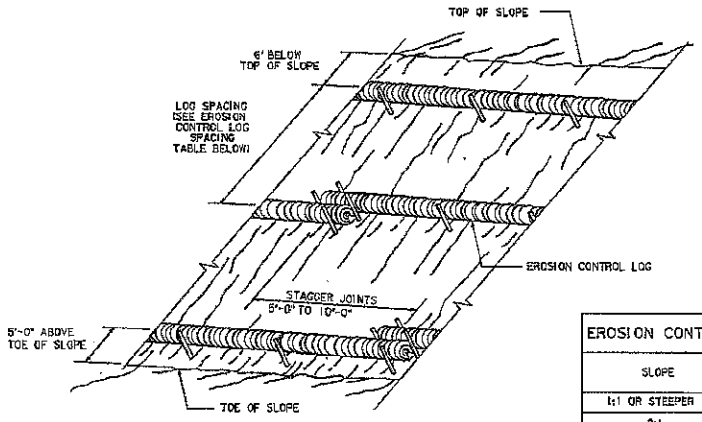
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

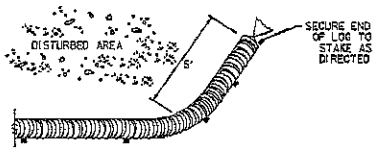
FILE: ec9i16	DN: TxDOT	CK: KW	DW: LS/PI	CK: LS
©TxDOT, JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST		COUNTY	SHEET NO. 45

DATE:
FILE:

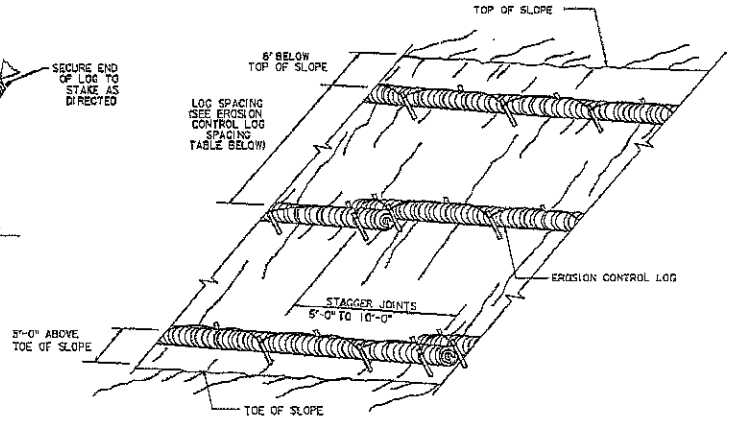


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

CL-SST



END SECTION RAP DETAIL

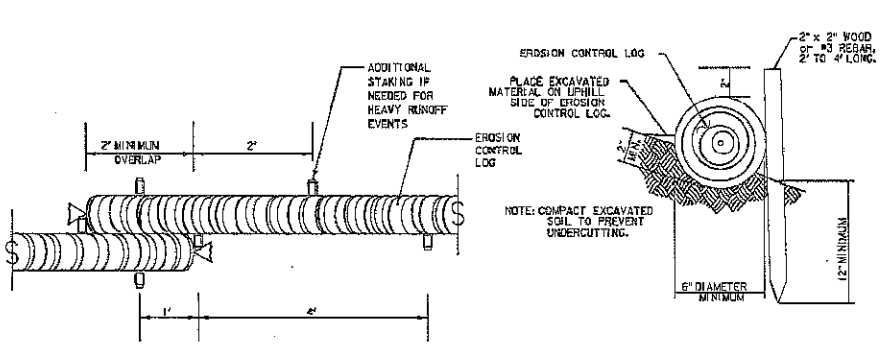


EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

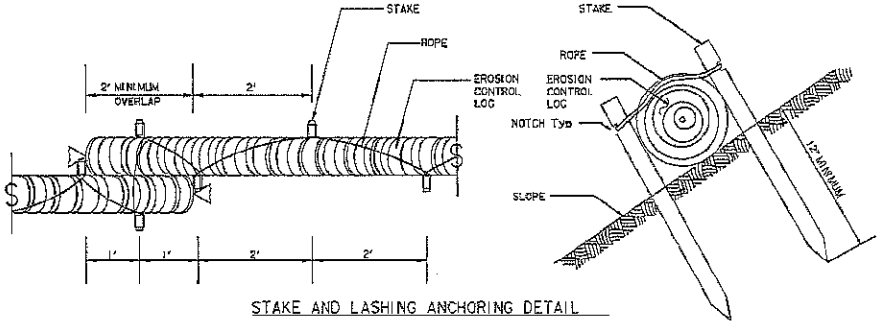
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



STAKE AND TRENCHING ANCHORING DETAIL

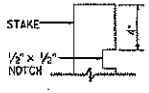
CL-SST



STAKE AND LASHING ANCHORING DETAIL

CL-SSL

TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"



STAKE NOTCH DETAIL

SHEET 2 OF 3

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST		COUNTY	SHEET NO. 41

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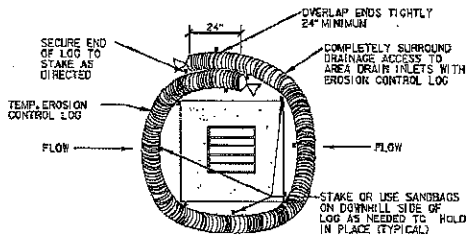
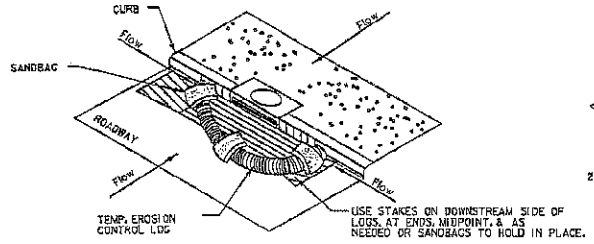
DATE:
FILE:



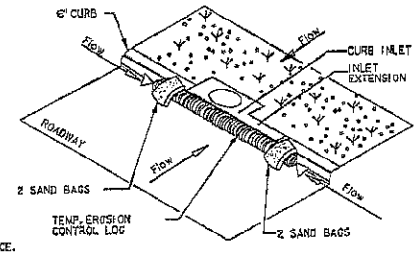
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

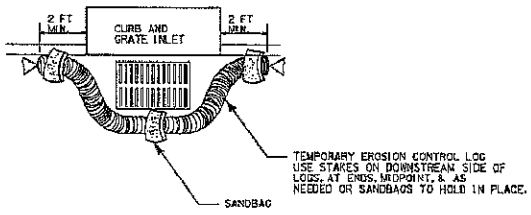
CL-CI



EROSION CONTROL LOG AT CURB INLET

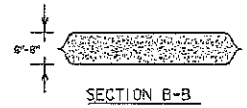
CL-CI

NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.

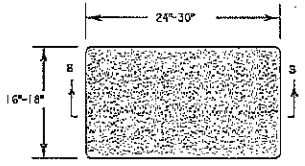


EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec016	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
©TxDOT: JULY 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.
				48

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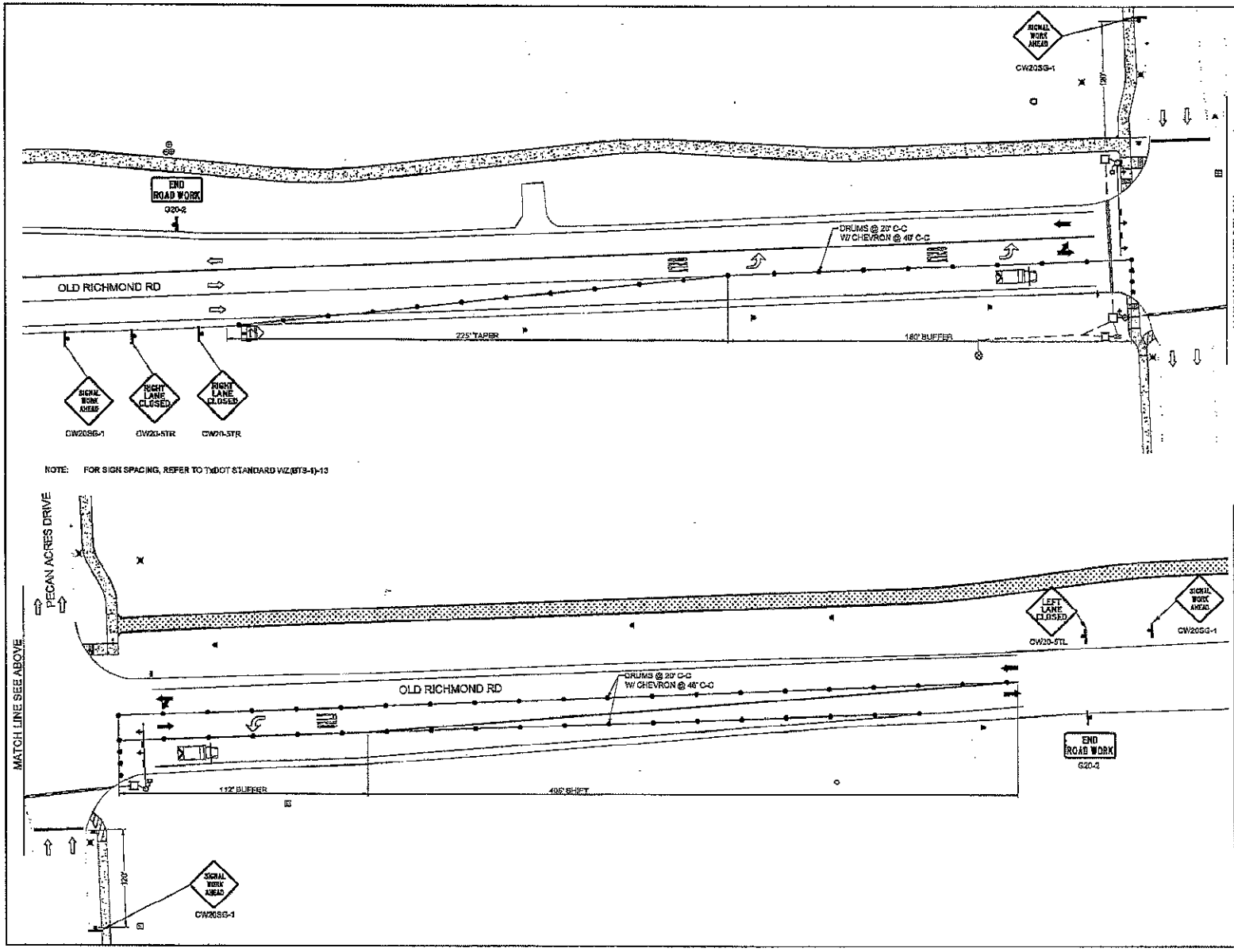
DATE:
FILE:



LEGEND:

- TYPE 3 BARRICADE
- TRAFFIC CONTROL SIGN
- CHANELIZING DEVICE
- PROP TRAFFIC FLOW
- EXIST TRAFFIC FLOW
- FLAGGER
- FLASHING ARROW BOARD

Lockwood, Andrews & Newnam, Inc.
Texas Registered Engineering Firm F-2614

Lockwood, Andrews & Newnam, Inc.
A SPX A AECOM COMPANY
PLANNING
ENGINEERING
PROGRAMMANAGEMENT

2925 Briarpark Drive
Houston, Texas 77042-3720
Tel 713-266-6900 Fax 713-266-7506

NOTICE:
WE ARRANGE FOR LINES TO BE TURNED OFF 48 HOURS. CALL CONTRACTOR AT 713-207-2222.
For your safety, you are required by Texas law to call 811 at least 48 hours before not do so that underground lines can be marked. Our verification does not notify your relocation to call 811.

VERIFICATION OF PRIVATE UTILITY LINES

N/A	Date
Centerpoint Energy/Reliant Gas Facilities Verification ONLY. (Our signature verifies that you have stated CNP Houston Gas lines accurately – not to be used for conflict verification). Gas service lines are not shown.) Signature Valid for six months.	
N/A	Date
Centerpoint Energy/Houston Electric Facilities Verification ONLY. (This signature verifies utility underground facilities – not to be used for conflict verification.) Signature Valid for six months.	
N/A	Date
Approved for AT&T SWBell/SBC underground facility location only. Signature valid for one year	

FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 25
TRAILS SYSTEM PHASE 1

TCP PHASE 1

FORT BEND COUNTY, TX

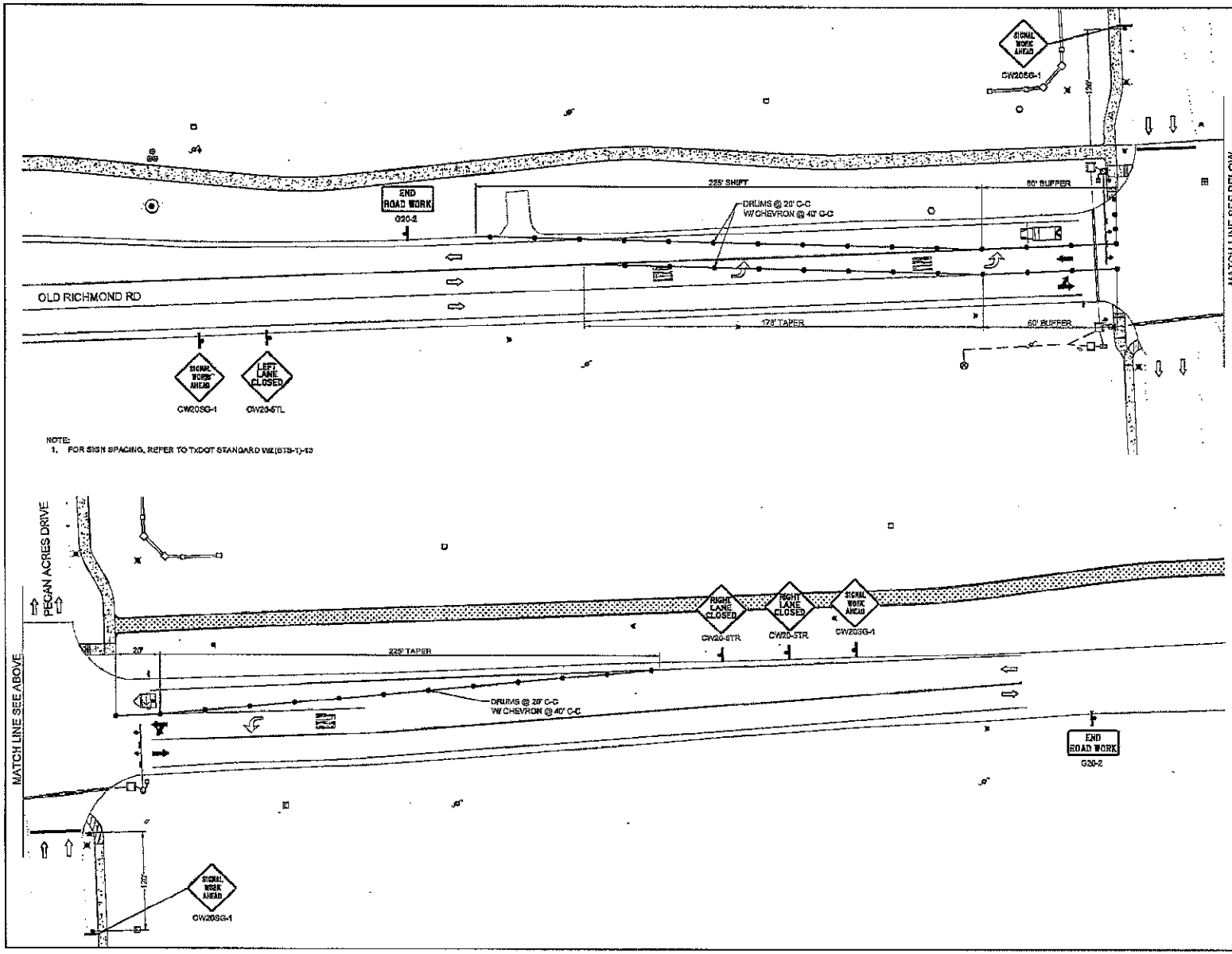
FILE NO:

DRAWING SCALE

HORZ: 1"=20'

VERT:

SHEET No: 49 OF 53



NOTE:
1. FOR SIGN SPACING, REFER TO TXDOT STANDARD WZ(BTS-1)-13

LEGEND:

- TYPE 3 BARRICADE
- TRAFFIC CONTROL SIGN
- CHANELIZING DEVICE
- PROP TRAFFIC FLOW
- EXIST TRAFFIC FLOW
- FLAGGER
- FLASHING ARROW BOARD

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Texas Registered Engineering Firm
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PROGRAM MANAGEMENT

2925 Briarpark Drive
Houston, Texas 77042-3720
Tel 713-266-6900 Fax 713-266-7596

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VERIFICATION OF PRIVATE UTILITY LINES

N/A	Date
Centerpoint Energy/Reliant Gas Facilities Verification Only (This signature verifies that gas from Sign) CNP Reliant Gas Mains primarily - not to be used for conflict verification) (See below line are not shown) Signature Valid for six months.	
N/A	Date
Centerpoint Energy/Reliant Electric Facilities Verification Only (This signature verifies existing underground facilities - not to be used for conflict verification) Signature Valid for six months.	
N/A	Date
Approval for AT&T Texas/other underground service facilities only Signature valid for one year	

FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 25
TRAILS SYSTEM PHASE 1

TCP PHASE 2

FORT BEND COUNTY, TX

FILE NO:

DRAWING SCALE
HORZ: 1"=20'
VERT:

SHEET No: 50 OF 53

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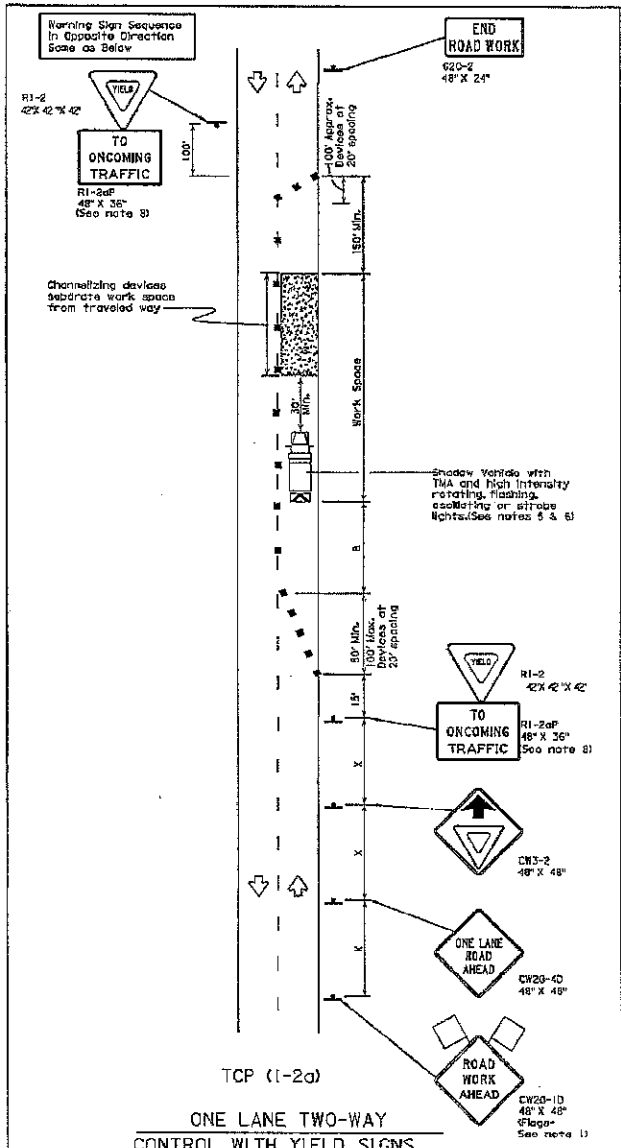
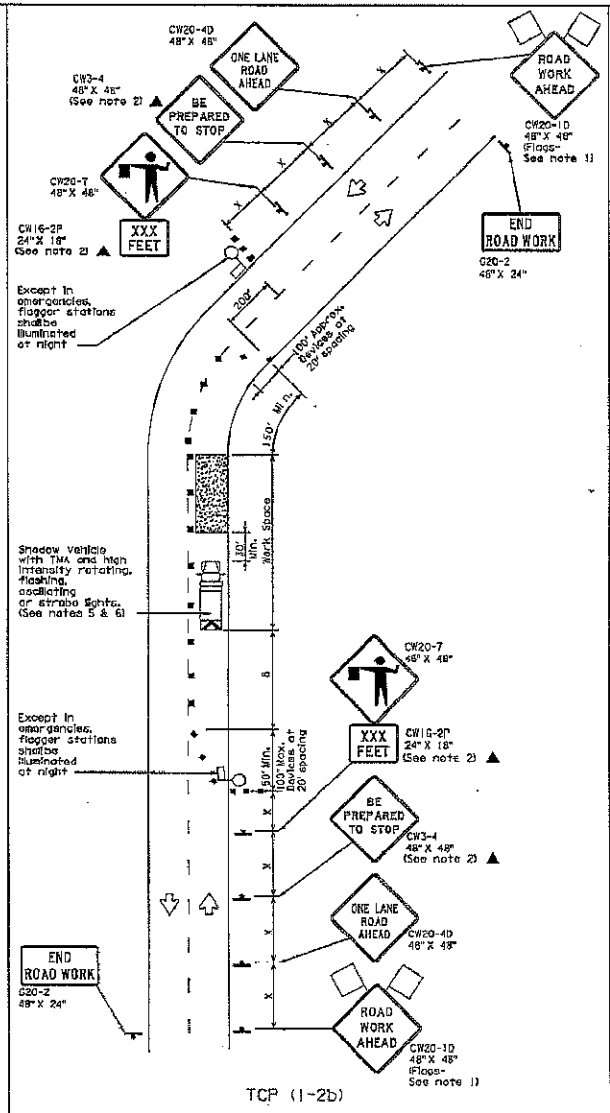


TCP (1-2a)

ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See note 7)



TCP (1-2b)

ONE LANE TWO-WAY CONTROL WITH FLAGGERS

LEGEND

	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	280'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L=WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* Conventional Roads Only

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

TYPICAL USAGE

MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
		✓	✓	

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
4. Sign spacing may be increased or an additional G20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
5. 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 controls remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-2a)

7. R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work spaces should be no longer than one half city block. In rural areas on roadways with less than 2000 ADT, work spaces should be no longer than 400 feet.
8. R1-2 "YIELD" sign with R1-2aP "TO ONCOMING TRAFFIC" plaque shall be placed on a support at a 7 feet minimum mounting height.

TCP (1-2b)

9. Flaggers should use two-way radios or other methods of communication to control traffic.
10. Length of work space should be based on the ability of flaggers to communicate.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
12. Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
13. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

For construction or maintenance contract work, specific project requirements for shadow vehicles can be found in the project GENERAL NOTES for Item 502, Barricades, Signs and Traffic Handling.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(1-2)-12

©TxDOT December 1985

REVISIONS		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
4-90	2-12	CONT	SECT	JOB	HIGHWAY
2-94					
1-97		DIST		COUNTY	SHEET NO.
4-98					51

152

DATE:
FILE:

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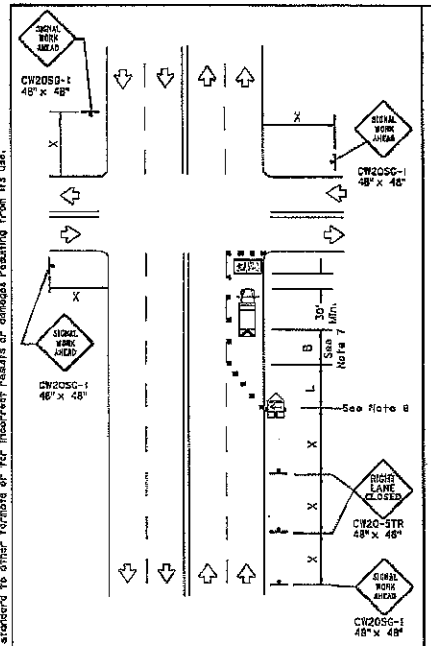
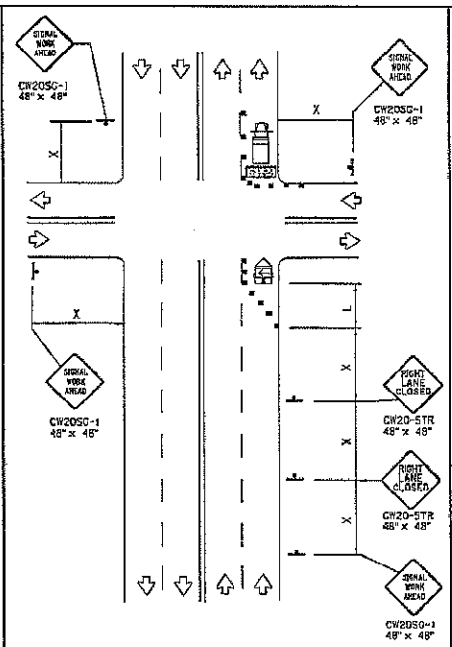


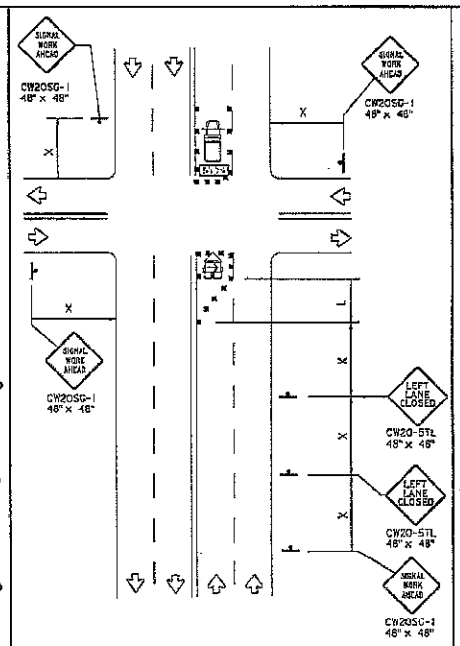
NEAR SIDE LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE RIGHT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE LEFT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
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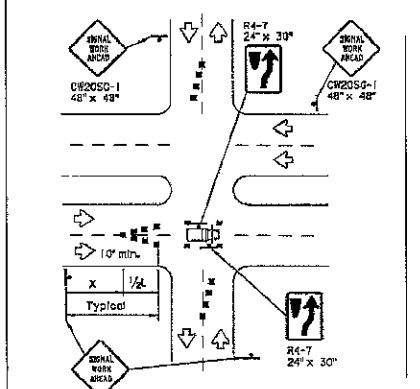
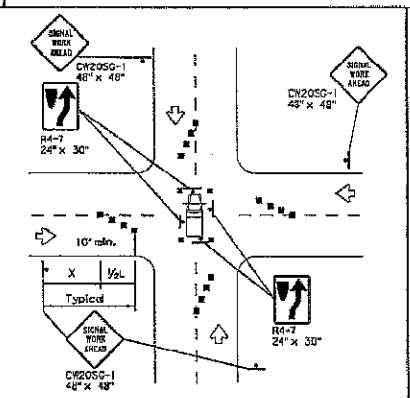
40		265'	295'	320'	40'	80'	240'	155'
45		450'	495'	540'	45'	90'	320'	195'
50	L=WS	500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

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

WORKERS IN BUCKET TRUCKS SHALL NOT WORK ABOVE OPEN LANES OF TRAFFIC.





OPERATIONS IN THE INTERSECTION

SHORT DURATION

GENERAL NOTES

1. The minimum size channelizing device is the 28" cone. 42" Two-piece cones, drums, vertical panels or barricades will be required when the device must be left unattended at night.
2. Obstructions or hazards at the work area shall be clearly marked and delineated at all times.
3. Flaggers and Flagger Symbol (CW20-7) signs may be required according to field conditions.
4. Vehicles parked in roadway shall be equipped with at least two high intensity rotating, flashing, oscillating or strobe type lights.
5. High level warning devices (flag trees) may be used at corners of the vehicle.
6. When work operations are performed on existing signals, the signals may be placed in flashing red mode when approved by the engineer. If existing signals do not have power, All-Way Stop (R1-1 and R1-3P) signs may be implemented when approved by the engineer.
7. For Short-Term Stationary work the buffer space "B" from the above table should be used if field conditions permit. For Short Duration (less than 1 hour) any buffer space provided will enhance the safety of the setup.
8. The arrow board at this location may be omitted for Short Duration work if the work vehicle has an arrow board in operation. As an option, the arrow board may be placed at the end of the taper in the closed lane if space is not available at the beginning of the taper.
9. Signs and devices for the NEAR SIDE LANE CLOSURE may be altered for a left lane closure by using a LEFT LANE CLOSED (CW20-5TL) and adding channelizing devices on the centerline to protect the work space from oncoming traffic.

SHEET 1 OF 2

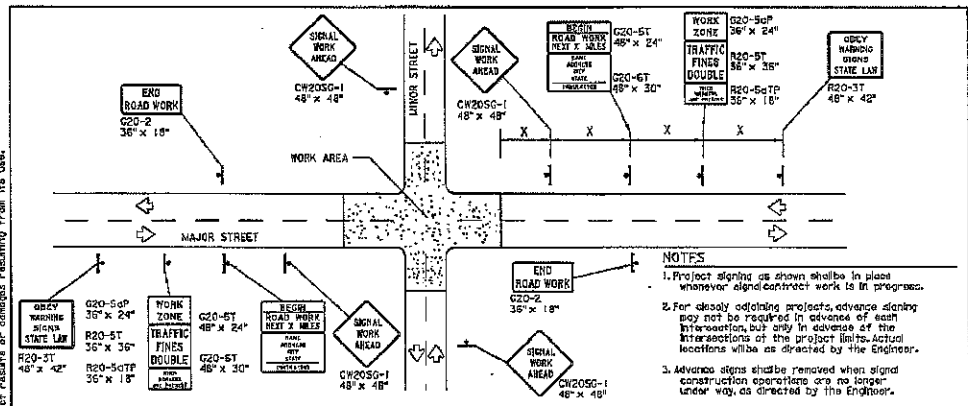
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ(BTS-1)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-98 10-98 7-13 4-02 3-03	DIST		COUNTY	SHEET NO. 52



TYPICAL ADVANCE SIGNAL PROJECT SIGNING

FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS

NOTES

1. Project signing as shown shall be in place whenever signal contract work is in progress.
2. For closely adjoining projects, advance signing may not be required in advance of each intersection, but only in advance of the intersections of the project limits. Actual locations will be as directed by the Engineer.
3. Advance signs shall be removed when signal construction operations are no longer under way, as directed by the Engineer.
4. Warning sign spacing shown is typical for both directions.
5. See the Table on sheet 1 of 2 for Typical warning sign spacing.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Signs shall be installed and maintained in a straight and plumb condition.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. Nails shall NOT be used to attach signs to any support.
5. All signs shall be installed in accordance with the plans or as directed by the Engineer.
6. The Contractor shall furnish the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD).
7. The Contractor shall furnish sign supports and substrates listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD), installed as per the manufacturer's recommendations.
8. Temporary signs that have damaged or cracked substrates and/or damaged or marred reflective sheeting shall be replaced as directed by the Engineer.
9. 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".
10. Damaged wood posts shall be replaced. Splicing wood posts will not be allowed.

DURATION OF WORK

1. Work zone durations are defined in Part 6, Section 6G.02 of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

SIGN MOUNTING HEIGHT

1. Sign height of Long-term/Intermediate-term warning signs shall be as shown on Figure 6F-1 of the TMUTCD.
2. Sign height of Short-term/Short Duration warning signs shall be as shown on Figure 6F-2 of the TMUTCD.
3. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the pavement surface regardless of work duration.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered, unless otherwise approved by the Engineer.
2. When signs are covered, the material used shall be opaque, such as heavy kraftback 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, or heavy materials such as plywood or aluminum shall not be used to cover signs.
3. Duct tape or other adhesive material shall NOT be affixed to a sign face.
4. Signs and/or stubs shall be removed and holes back filled upon completion of the work.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the requirements of the DMS and color usage table shown on this sheet.

SIGN SUPPORT WEIGHTS

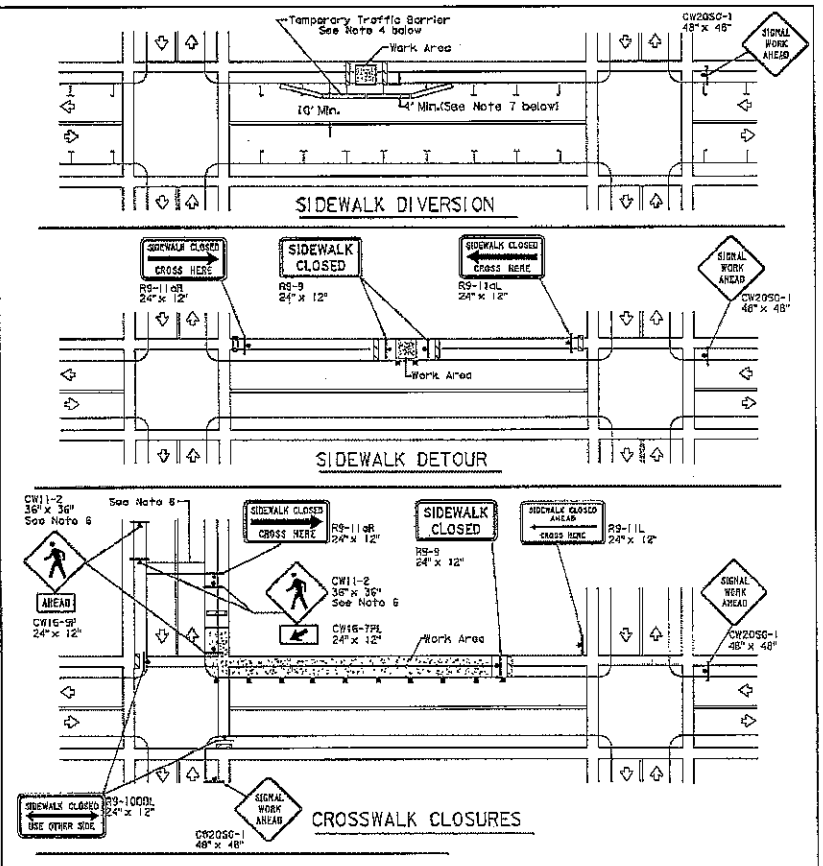
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber, such as tire inner tubes, shall not be used.
6. 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.
7. 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 slide to weigh down the sign support.
8. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

LEGEND	
	Sign
	Channelizing Devices
	Type 3 Barricade

DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL} SHEETING
WHITE	BACKGROUND	TYPE A SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



PEDESTRIAN CONTROL

1. Holes, trenches or other hazards shall be adequately protected by covering, delineating or surrounding the hazard with orange plastic pedestrian fencing or longitudinal channelizing devices, or as directed by the Engineer.
2. "CROSSWALK CLOSURES" as detailed above will require the Engineer's approval prior to installation.
3. R9 series signs shown may be placed on supports detailed on the BC standards or CWZTCD list, or when fabricated from approved lightweight plastic substrates, they may be mounted on top of a plastic drum at or near the location shown.
4. For speeds less than 45 mph longitudinal channelizing devices may be used instead of traffic barriers when approved by the Engineer. Attenuation of blunt ends and installation of water filled devices shall be as per BC(9) and manufacturer's recommendations.
5. Location of devices are for general guidance. Actual device spacing and location must be field adjusted to meet actual conditions.
6. Where pedestrians with visual disabilities normally use the closed sidewalk Detectable Pedestrian Barricades should be used instead of the Type 3 Barricades shown.
7. The width of existing sidewalk should be maintained if practical.
8. Pavement markings for mid-block crosswalks shall be paid for under the appropriate bid items.
9. When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.

SHEET 2 OF 2

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

WZ(BTS-2)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS 2-95 10-98 7-13 4-98 3-03	DIST		COUNTY	SHEET NO. 63

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SDuckers

Job : 3111 Corder.pdf

Host : SARAH-PC

Date : 2017/05/22

Time : 11:40

Elgee Associates
Profit & Loss by Class
January through December 2016

	3111 Corder	
Ordinary Income/Expense		
Income		
Dividend Income		
Investment Income - Exempt	0.00	
Investment Income - Taxable	0.00	
LT Capital Gain	0.00	
ST Capital Gain	0.00	
Total Dividend Income	0.00	
Rental Income	537,509.20	
Total Income	537,509.20	
Gross Profit	537,509.20	
Expense		
Bank Service Charges	0.00	
Depreciation Expense	0.00	18,495
Insurance		
Liability Insurance	2,525.33	
Property	14,031.00	
Umbrella	736.00	
Total Insurance	17,292.33	
Investment Management Fees	0.00	
Professional Fees		
Accounting	360.00	
Consulting	1,805.57	
Legal Fees	0.00	6,039
Total Professional Fees	2,165.57	
Property Management Fees	30,000.00	
Repairs		
Building Repairs	11,302.36	
Equipment Repairs	4,177.19	
Maintenance	2,326.14	
Total Repairs	17,805.69	
Supplies		
Office	0.00	
Total Supplies	0.00	
Taxes		
Franchise Tax	0.00	819
Property		

Elgee Associates
Profit & Loss by Class
January through December 2016

	3111 Corder	
Property tax consultant	~~0.00~~	1805
Property - Other	~~76,364.76~~	90,462
Total Property	~~76,364.76~~	
Total Taxes	~~76,364.76~~	
Telephone	34.63	
Utilities		
Gas and Electric	701.34	
Water	6,852.20	
Utilities - Other	-6,863.20	
Total Utilities	690.34	
Total Expense	~~144,358.82~~	185,606
Net Ordinary Income	~~393,155.88~~	351,903
Net Income	~~393,155.88~~	

MFP Comps

Parcel	Address	Econ	Class	Year Built	NRA	OWR	MKT Rent PSF	2016 Value	2017 Notice	2016 PSF	2017 PSF		LAND
0420150000086	11500 MAIN ST	20	D	1975	139,360	.11	$3.10	3,800,000	✓ 4,020,209	$27.27	8.90	$28.85	10.00
0420150000087	11502 WILLOW	20	D	1975	100,800	.04	$3.10	2,905,661	✓ 2,907,842	$28.83	11.08	$28.85	10.00
0610880000002	2702 HOLMES	20	D	1977	160,725	.02	$3.10	4,545,000	4,636,546	$28.28		$28.85	2.75
0610880000003	2750 HOLMES	20	D	1977	341,784	.02	$3.10	9,852,292	9,859,674	$28.83		$28.85	2.75
0610880000011	2748 HOLMES	20	D	1980	161,626	.02	$3.10	4,533,886	4,662,548	$28.05		$28.85	2.00
1020430000002	7710 CANNON	20	D	1977	215,000	.00	$3.15	4,031,803	6,202,257	$18.75		$28.85	3.00
1020440000001	7745 CANNON	20	D	1972	141,000	.03	$3.15	3,659,121	4,067,534	$25.95		$28.85	3.00
									Median	$28.05		$28.85	
0100180000008	3111 Corder	20	D	1973	101,061	[redacted]	$3.10		3,768,876			$37.29	
				2017	Value @ Median				2,915,383				

HCAD Comps

Parcel	Address	Econ	Class	Year Built	NRA	OWR	MKT Rent PSF		2017 Notice	Bldg	2017 PSF	
0410120020022	7210 Mykawa	2	C	1969	85,376	0.08	$3.50		3,186,481		$37.32	1.25
0410120020027	7300 Mykawa	2	C	1975	40,250	0.03	$3.50		1,502,243		$37.32	1.25
1067400000003	3130 Pawnee	20	C	1983	80,800	[redacted]	$3.50		✓ 3,015,703	12.35	$37.32	15.00
0410120020021	7100 Mykawa	2	C	1971	276,640	.02	$3.50		8,821,037		$31.89	1.25
0410120020019	7200 Mykawa	2	C	1969	157,899	.02	$3.50		5,893,270		$37.32	1.25
0421310020035	3240 S Loop	20	C	1973	212,961	0.05	$3.50		✓ 7,948,365	29.64	$37.32	3.00
0410070330028	4570 S Wayside	2	C	1978	44,040	0.11	$3.50		1,642,367		$37.29	3.00
0971590000001	7220 Nelms	12	C	1972	74,700	0.05	$3.50		2,604,735		$34.87	2.50
1033550000004	7010 Nelms St	12	C	1973	51,868	0.11	$3.50		1,808,605		$34.87	2.50

HCAD Comps are not in the same economic area.

Pawnee has two tenants. Last lease confirmed at $3.48 gross in 2012. Property has 10% office and rail access.

S Loop last confirmed asking rents was in 2015 for $3.36 NNN.

3111 CORDER 5.35 GROSS 13.48 15.00