***Fort Bend County, Texas***
***Invitation for Bid***

***Traffic Signal Installation at West Bellfort at Westmoor Drive and at Binion Lane for Fort Bend County***
***BID 24-051***

**SUBMIT BIDS TO:**

**Fort Bend County**
**Purchasing Department**
**Travis Annex**
**301 Jackson, Suite 201**
**Richmond, TX 77469**

**Note: All correspondence must include the term "Purchasing Department" in address to assist in proper delivery**

**SUBMIT NO LATER THAN:**

**Tuesday, May 7, 2024**
**2:00 PM (Central)**

**LABEL ENVELOPE:**

**BID 24-051**
**Traffic Signal West Bellfort**

***ALL BIDS MUST BE RECEIVED IN AND TIME/DATE STAMPED BY THE PURCHASING OFFICE OF FORT BEND COUNTY ON OR BEFORE THE SPECIFIED TIME/DATE STATED ABOVE.***

***BIDS RECEIVED AS REQUIRED WILL THEN BE OPENED AND PUBLICLY READ.***

***BIDS RECEIVED AFTER THE SPECIFIED TIME, WILL BE RETURNED UNOPENED.***

Results will not be given by phone.
Results will be provided to bidder in writing after Commissioners Court award.

Requests for information must be in writing and directed to:
LeAnn Cernoch
Senior Buyer
LeAnn.Cernoch@fortbendcountytx.gov

**Vendor Responsibilities:**

- Download and complete any addendums. (Addendums will be posted on the Fort Bend County website no Later than 48 hours prior to bid opening)
- Submit response in accordance with requirements stated on the cover of this document.
- DO NOT submit responses via email or fax.

Prepared: 04/11/24
Issued: 04/14/24

**COUNTY PURCHASING AGENT**
**Fort Bend County, Texas**

# Vendor Information

Jaime Kovar
Purchasing Agent
Office (281) 341-8640

| | | | |
|---|---|---|---|
| Legal Company Name (top line of W9) | | | |
| Business Name (if different from legal name) | | | |
| Type of Business | ☐ Corporation/LLC ☐ Partnership<br>☐ Sole Proprietor/Individual ☐ Tax Exempt | | Age in Business? |
| Federal ID # or S.S. # | | SAM.gov Unique Entity ID # | |
| SAM.gov CAGE / NCAGE | | | |
| Publicly Traded Business | ___ No ___ Yes Ticker Symbol _____ | | |
| Remittance Address | | | |
| City/State/Zip | | | |
| Physical Address | | | |
| City/State/Zip | | | |
| Phone Number | | | |
| E-mail | | | |
| Contact Person | | | |
| Check all that apply to the company listed above and provide certification number. | DBE-Disadvantaged Business Enterprise ☐<br>SBE-Small Business Enterprise ☐<br>HUB-Texas Historically Underutilized Business ☐<br>WBE-Women's Business Enterprise ☐ | **Certification #** _____<br>**Certification #** _____<br>**Certification #** _____<br>**Certification #** _____ | Cert Date / Exp Date<br>_____ _____<br>_____ _____<br>_____ _____<br>_____ _____ |
| Company's gross annual receipts | <$500,000 _____ | $500,000-$4,999,999 _____ | |
| | $5,000,000-$16,999,999 ___ | $17,000,000-$22,399,999 _____ | >$22,400,000 _____ |
| NAICs codes (Please enter all that apply) | | | |
| Signature of Authorized Representative | | | |
| Printed Name | | | |
| Title | | | |
| Date | | | |

**THIS FORM MUST BE SUBMITTED WITH THE SOLICITATION RESPONSE**

## 1.0 GENERAL REQUIREMENTS:

1.1 Read this entire document carefully. Follow all instructions. You are responsible for fulfilling all requirements and specifications. Be sure you understand them.

1.2 General Requirements apply to all advertised bids; however, these may be superseded, whole or in part, by the scope, special requirements, specifications, special specifications or other data contained herein.

1.3 Governing Law: Bidder is advised that these requirements shall be fully governed by the laws of the State of Texas and that Fort Bend County may request and rely on advice, decisions and opinions of the Attorney General of Texas and the County Attorney concerning any portion of these requirements.

1.4 Bid Form Completion: Fill out, sign, and return to the Fort Bend County Purchasing Department one (1) complete bid form. An authorized representative of the bidder must sign the Contract Sheet. The Contract will be binding only when signed by the County Judge, Fort Bend County and a purchase order authorizing the item(s) desired has been issued. The use of corrective fluid is not acceptable and may result in the disqualification of bid. If an error is made, the bidder must draw a line through error and initial each change.

1.5 Bid Returns: Bidders must return all completed bids to the Fort Bend County Purchasing Department at 301 Jackson, Suite 201 Richmond Texas no later than 2:00 P.M. on the date specified. Late bids will not be accepted. Bids must be submitted in a sealed envelope, addressed as follows: Fort Bend County Purchasing Agent, Travis Annex, 301 Jackson, Suite 201 Richmond, Texas 77469.

1.6 Addenda: No interpretation of the meaning of the drawings, specifications or other bid documents will be made to any bidder orally. All requests for such interpretations must be made in writing addressed to LeAnn Cernoch, Senior Buyer, 301, Jackson, Suite 201, Richmond, Texas, 77469, E-mail: LeAnn.Cernoch@fortbendcountytx.gov. Any and all interpretations and any supplemental instructions will be in the form of written addenda to the contract documents which will be posted on Fort Bend County's website. Addenda will **ONLY** be issued by the Fort Bend County Purchasing Agent. It is the sole responsibility of each bidder to insure receipt of any and all addenda. All addenda issued will become part of the contract documents. Bidders must sign and include it in the returned bid package. Deadline for submission of questions and/or clarification is no later than **Tuesday, April 30, 2024 at 9:30AM (central)** Requests received after the deadline will not be responded to due to the time constraints of this bid process.

1.7 References: All bidders must submit, **WITH BID**, at least three (3) references from clients for whom a project similar to that specified herein has been

Initials of Bidder: _____

successfully accomplished. References must include clients name, contact person and telephone number.

1.8 Bid Bond: All bidders must submit, **WITH BID**, a cashier's check or certified check for at least five percent (5%) of the total bid price, payable to the order of Fort Bend County, or a Bid Bond in the same amount issued by a surety, acceptable to Fort Bend County, authorized to do business in the State of Texas, as a guarantee that the Bidder will do the work described herein at the rates stated herein. Unsuccessful bidder's Cashier's Check or Certified Check will be returned only after a written request to do so have been received in the Office of the Fort Bend County Purchasing Agent.

1.9 Material Safety Data Sheets: Under the "Hazardous Communication Act", commonly known as the "Texas Right to Know Act", a bidder must provide to Fort Bend County and using departments, with each delivery, material safety data sheets, which are, applicable to hazardous substances defined in the Act. Bidders are obligated to maintain a current, updated file in the Fort Bend County Purchasing Department. Failure of the bidder to maintain such a file will be cause to reject any bid applying thereto.

1.10 Pricing: Prices for all goods and/or services shall be firm for the duration of this Contract and shall be stated on the bid sheet. Prices shall be all inclusive. No price changes, additions, or subsequent qualifications will be honored during the course of the Contract. All prices must be written in ink or typewritten. If there are any additional charges of any kind, other than those mentioned above, specified or unspecified, bidder MUST indicate the items required and attendant costs or forfeit the right to payment for such items.

1.11 Term Contracts: If the Contract is intended to cover a specific time period, said time will be given in the specifications under scope.

1.12 Recycled Materials: Fort Bend County encourages the use of products made of recycled materials and shall give preference in purchasing to products made of recycled materials if the products meet applicable specifications as to quantity and quality. Fort Bend County will be the sole judge in determining product preference application.

1.13 Evaluation: Evaluation shall be used as a determinant as to which bid items or services are the most efficient and/or most economical for Fort Bend County. It shall be based on all factors which have a bearing on price and performance of the items in the user environment. All bids are subject to tabulation by the Fort Bend County Purchasing Department and recommendation to Fort Bend County Commissioners Court. Compliance with all bid requirements, delivery and needs of the using department are considerations in evaluating bids. Pricing is NOT the only criteria for making a recommendation. The Fort Bend County Purchasing Department reserves the right to contact any bidder, at any time, to clarify, verify or request information with regard to any bid.

Initials of Bidder: _____

1.14 Disqualification of Bidder: Upon signing this bid document, a bidder offering to sell supplies, materials, services, or equipment to Fort Bend County certifies that the bidder has not violated the antitrust laws of this state codified in section 15.01, et seq., Business & Commerce Code, or the federal antitrust laws, and has not communicated directly or indirectly the bid made to any competitor or any other person engaged in such line of business. Any or all bids may be rejected if Fort Bend County believes that collusion exists among the bidders. Bids in which the prices are obviously unbalanced may be rejected. If multiple bids are submitted by a bidder and after the bids are opened, one of the bids is withdrawn, the result will be that all of the bids submitted by that bidder will be withdrawn; however, nothing herein prohibits a vendor from submitting multiple bids for different products or services.

1.15 Awards: Fort Bend County reserves the right to award this Contract on the basis of lowest and best bid in accordance with the laws of the State of Texas, to waive any formality or irregularity, to make awards to more than one bidder, to reject any or all bids. In the event the lowest dollar bidder meeting specifications is not awarded a contract, the bidder may appear before the Commissioners Court and present evidence concerning its responsibility.

1.16 Contract Obligation: Fort Bend County Commissioners Court must award the Contract and the County Judge or other person authorized by the Fort Bend County Commissioners Court must sign the Contract before it becomes binding on Fort Bend County or the bidders. Department heads are not authorized to sign agreements for Fort Bend County. Binding agreements shall remain in effect until all products and/or services covered by this purchase have been satisfactorily delivered and accepted.

## 2.0 SCOPE:

It is the intent of Fort Bend County to contract with one (1) vendor for all materials, supplies, equipment, tools, services, labor and supervision necessary to complete the Traffic Signal Installation at West Bellfort at Westmoor Drive and at Binion Lane, hereinafter referred to as the "Project," as specified herein.

2.1 *Work* means the procurement, delivery and proper construction and/or installation of all materials and facilities and associated appurtenances necessary to fulfill the winning bidder's obligations (hereinafter the "Contractor") under the Contract as awarded for the Project specified herein, including the coordination and administration of all services necessary for Contractor, and/or its agents and/or subcontractors, to fulfill Contractor's obligations under the Contract.

## 3.0 PRE-BID CONFERENCE:

A pre-bid conference will be conducted on **Tuesday, April 23, 2024 at 9:00 AM** (CST). The pre-bid conference will be held at the Fort Bend County Purchasing Department located in the Travis

Annex at 301 Jackson, Suite 201, Richmond, Texas 77469. All bidders are encouraged to attend.

## 4.0 LIQUIDATED DAMAGES:

The County and the Contractor recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by the County if the work is not complete on time. Accordingly, instead of requiring any such proof, the County and the Contractor agree that as liquidated damages for delay (but not as a penalty) the Contractor shall pay the County $1,500.00 for each day that expires after the time specified herein for completion until the Work is complete, unless contract time has been adjusted by extension of time approved by Commissioner's Court.

The Contractor will be placed on one (1) year probation if liquidated damages are accrued. During the probation period, if the Contractor accrues liquidated damages on another project, they will be disqualified from being awarded any County work for two (2) years.

## 5.0 COMPLETION TIME & PAYMENT:

5.1 Fort Bend County shall pay the Contractor in current funds for the Contractor's performance of the Contract the contract sum, as stated herein, after receipt of notice to proceed and a purchase order issued by the Fort Bend County Purchasing Agent.

5.2 Based upon Applications for payment submitted to the County Auditor, Fort Bend County shall make progress payments on account of the contract sum to the Contractor as provided below and elsewhere in the contract documents.

5.2.1 The period covered by each application for payment shall be one calendar month ending on the last day of the month.

5.2.2 Provided a customary, accurate and complete application for payment is received by the County Auditor not later than the 15th day of a month, Fort Bend County shall make payment of all undisputed amounts to the Contractor not later than the 15th day of the next month. If an application for payment is received by the County Auditor after the application deadline fixed above, payment shall be made by Fort Bend County not later than 30 days after the County Auditor receives the application for payment.

5.2.3 Application for payment shall indicate the percentage of completion of each portion of the Project as of the end of the period covered by the application for payment.

5.2.4 Subject to the provisions of the contract documents, the amount of each progress payment shall be computed as follows:

Initials of Bidder: _____

5.2.4.1 Take that portion of the contract sum properly allocable to completed Project less retainage of ten percent (10%).

5.2.4.2 Add that portion of the contract sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved by Fort Bend County, suitably stored off the site at a location agreed upon in writing), less retainage of ten percent (10%).

5.2.4.3 Subtract the aggregate of previous payments made by Fort Bend County.

5.2.4.4 The progress payment amount as determined in above shall be further modified under the following circumstances:

Upon substantial completion of the Project, add a sum sufficient to increase the total payments to one hundred percent (100%) of the contract sum, less such amounts as Fort Bend County shall determine should be deducted for incomplete work and unsettled claims.

5.2.4.5 Final payment, constituting the entire unpaid undisputed balance of the contract sum, shall be made by Fort Bend County to the Contractor when Fort Bend County and the Contractor agree that the Contract has been fully performed by the Contractor.

5.3 Before the first application for payment, the Contractor shall submit to the Facilities Management and Planning Department a schedule of values allocated to various portions of the work, prepared in such form and supported by such data to substantiate its accuracy as the Facilities Management and Planning Department may require. This schedule, unless objected to by the Facilities Management and Planning Department shall be used as a basis for reviewing the Contractor's application for payment.

5.4 Contractor must provide with each application for payment a contractor's affidavit certifying bills against the Contractor for labor, material and expendable equipment employed in the performance of Contractor have been paid in full prior to acceptance of final payment from Fort Bend County.

5.5 The Contractor will permit Fort Bend County, or any duly authorized agent of Fort Bend County, to inspect and examine the books and records of the Contractor for the purpose of verifying the amount of work performed under the Contract. Fort Bend County's right to inspect survives the termination of the Contract for a period of five years.

Initials of Bidder: _____

## 6.0 LIMIT OF APPROPRIATION:

Prior to the execution of this Contract, Contractor has been advised by County, and Contractor clearly understands and agrees, such understanding and agreement being of the absolute essence to this Contract, that County shall have available only those funds specifically allocated in this Contract to fully discharge any and all liabilities which may be incurred by County in bringing this Project to an absolute conclusion, resulting in a complete, fully furnished, fully equipped and fully usable facility, and that the total of any and all basic construction costs, costs of providing the required services and materials, all fees and compensation of any sort to the Contractor, and any and all costs for any and all things or purposes coming inuring under or out of this Contract, irrespective of the nature thereof, shall not exceed said specifically allocated sum, notwithstanding any word, statement or thing contained in or inferred from the preceding provision of this Contract which might in any light by any person be interpreted to the contrary.

## 7.0 RIGHT TO ASSURANCE:

Whenever Fort Bend County in good faith has reason to question the Contractor's intent or ability to perform, Fort Bend County may demand that the Contractor give written assurance of its intent to perform and its plan to properly continue performance, including a reasonably detailed timeline. In the event that a demand is made and no assurance is given within five (5) business days, Fort Bend County may treat this failure as an anticipatory repudiation of the Contract.

## 8.0 PERFORMANCE & PAYMENT BONDS:

Performance and Payment Bonds: In the event the total accepted bid price exceeds $25,000 the Contractor must provide to the Office of the County Purchasing Agent, a performance bond and a payment bond, each in the amount of 100% of the total contract sum within ten (10) calendar days after receipt of notification of bid award. Such bonds shall be executed by a corporate surety duly authorized and admitted to do business in the State of Texas and licensed in the State of Texas to issue surety bonds with a Best Rating of "A" or better. Fort Bend County reserves the right to accept or reject any surety company proposed by the Contractor. In the event Fort Bend County rejects, the proposed surety company, the Contractor will be afforded five (5) additional days to submit the required bonds issued by a surety company acceptable to Fort Bend County.

## 9.0 POWER OF ATTORNEY:

An attorney-in-fact who signs a bid bond, performance bond or payment bond must file with each bond a certified and effectively dated copy of his or her power of attorney.

## 10.0 INSURANCE:

10.1 All respondents shall submit, with response, a <u>current</u> certificate of insurance indicating coverage in the amounts stated below. In lieu of submitting a certificate of insurance, respondents may submit, with response, a notarized

Initials of Bidder: _____

statement from an Insurance company, authorized to conduct business in the State of Texas, and acceptable to Fort Bend County, guaranteeing the issuance of an insurance policy, with the coverage stated below, to the firm named therein, if successful, upon award of this Contract.

10.2 At contract execution, contractor shall furnish County with properly executed certificates of insurance which shall evidence all insurance required and provide that such insurance shall not be canceled, except on 30 days prior written notice to County. Contractor shall provide certified copies of insurance endorsements and/or policies if requested by County. Contractor shall maintain such insurance coverage from the time Services commence until Services are completed and provide replacement certificates, policies and/or endorsements for any such insurance expiring prior to completion of Services. Contractor shall obtain such insurance written on an Occurrence form (or a Claims Made form for Professional Liability insurance) from such companies having Best's rating of A/VII or better, licensed or approved to transact business in the State of Texas, and shall obtain such insurance of the following types and minimum limits:

10.2.1 Workers' Compensation insurance. Substitutes to genuine Workers' Compensation Insurance will not be allowed.

10.2.2 Employers' Liability insurance with limits of not less than $1,000,000 per injury by accident, $1,000,000 per injury by disease, and $1,000,000 per bodily injury by disease.

10.2.3 Commercial general liability insurance with a limit of not less than $1,000,000 each occurrence and $2,000,000 in the annual aggregate. Policy shall cover liability for bodily injury, personal injury, and property damage and products/completed operations arising out of the business operations of the policyholder.

10.2.4 Business Automobile Liability coverage with a combined Bodily Injury/Property Damage limit of not less than $1,000,000 each accident. The policy shall cover liability arising from the operation of licensed vehicles by policyholder.

10.3 County and the members of Commissioners Court shall be named as additional insured to all required coverage except for Workers' Compensation and Professional Liability (if required). All Liability policies including Workers' Compensation written on behalf of contractor, excluding Professional Liability, shall contain a waiver of subrogation in favor of County and members of Commissioners Court.

10.4 If required coverage is written on a claims-made basis, contractor warrants that any retroactive date applicable to coverage under the policy precedes the effective date of the contract; and that continuous coverage will be maintained or an

Initials of Bidder: _____

extended discovery period will be exercised for a period of two (2) years beginning from the time that work under the agreement is completed.

10.5 Contractor shall not commence any portion of the work under this Contract until it has obtained the insurance required herein and certificates of such insurance have been filed with and approved by Fort Bend County.

10.6 No cancellation of or changes to the certificates, or the policies, may be made without sixty (60) days prior, written notification to Fort Bend County.

10.7 Approval of the insurance by Fort Bend County shall not relieve or decrease the liability of the Contractor.

## 11.0 INDEMNIFICATION:

Respondent shall save harmless County from and against all claims, liability, and expenses, including reasonable attorney's fees, arising from activities of respondent, its agents, servants or employees, performed under this agreement that result from the negligent act, error, or omission of respondent or any of respondent's agents, servants or employees.

11.1 Respondent shall timely report all such matters to Fort Bend County and shall, upon the receipt of any such claim, demand, suit, action, proceeding, lien or judgment, not later than the fifteenth day of each month; provide Fort Bend County with a written report on each such matter, setting forth the status of each matter, the schedule or planned proceedings with respect to each matter and the cooperation or assistance, if any, of Fort Bend County required by Respondent in the defense of each matter.

11.2 Respondent's duty to defend, indemnify and hold Fort Bend County harmless shall be absolute. It shall not abate or end by reason of the expiration or termination of any contract unless otherwise agreed by Fort Bend County in writing. The provisions of this section shall survive the termination of the contract and shall remain in full force and effect with respect to all such matters no matter when they arise.

11.3 In the event of any dispute between the parties as to whether a claim, demand, suit, action, proceeding, lien or judgment appears to have been caused by or appears to have arisen out of or in connection with acts or omissions of Respondent, Respondent shall never-the-less fully defend such claim, demand, suit, action, proceeding, lien or judgment until and unless there is a determination by a court of competent jurisdiction that the acts and omissions of Respondent are not at issue in the matter.

11.4 Respondent's indemnification shall cover, and Respondent agrees to indemnify Fort Bend County, in the event Fort Bend County is found to have been negligent for having selected Respondent to perform the work described in this request.

Initials of Bidder: _____

11.5 The provision by Respondent of insurance shall not limit the liability of Respondent under an agreement.

11.6 Respondent shall cause all trade contractors and any other contractor who may have a contract to perform construction or installation work in the area where work will be performed under this request, to agree to indemnify Fort Bend County and to hold it harmless from all claims for bodily injury and property damage that may arise from said Respondent's operations. Such provisions shall be in form satisfactory to Fort Bend County.

11.7 Loss Deduction Clause - Fort Bend County shall be exempt from, and in no way liable for, any sums of money which may represent a deductible in any insurance policy. The payment of deductibles shall be the sole responsibility of Respondent and/or trade contractor providing such insurance.

## 12.0 PREVAILING WAGES:

This project is subject to the prevailing wage rate requirements of Chapter 2258 of the Government Code. All persons employed by Contractor shall be compensated at not less than the rates shown below. Contractor shall keep detailed records of each of its workers and said records shall be made available to County for inspection at all reasonable times. The Contractor shall pay Fort Bend County sixty dollars ($60.00) for each worker employed by the Contractor for the provision of services described herein for each calendar day or part of the day that the worker is paid less than the below stated rates. Contractors may also visit www.wdol.gov/dba.aspx.

General Decision Number: TX20240038 01/05/2024
Superseded General Decision Number: TX20230038

State: Texas
Construction Type: Highway

Counties: Austin, Brazoria, Chambers, Fort Bend, Galveston, Hardin, Harris, Jefferson, Liberty, Montgomery, Orange, San Jacinto and Waller Counties in Texas.

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects & railroad construction; bascule, suspension & spandrel arch bridges designed for commercial navigation, bridges involving marine construction; and other major bridges).

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).
If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022, Executive Order 14026 generally

applies to the contract. The contractor must pay all covered workers at least $17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.

If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022, Executive Order 13658 generally applies to the contract. The contractor must pay all covered workers at least $12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at www.dol.gov/whd/govcontracts.

| Modification Number | Publication Date |
|---|---|
| 0 | 01/05/2024 |

SUTX2011-013 08/10/2011

| | Rates | Fringes |
|---|---|---|
| CEMENT MASON/CONCRETE FINISHER (Paving and Structures) | $ 12.98 ** | |
| ELECTRICIAN | $ 27.11 | |
| FORM BUILDER/FORM SETTER | | |
| Paving & Curb | $ 12.34 ** | |
| Structures | $ 12.23 ** | |
| LABORER | | |
| Asphalt Raker | $ 12.36 ** | |
| Flagger | $ 10.33 ** | |
| Laborer, Common | $ 11.02 ** | |
| Laborer, Utility | $ 11.73 ** | |
| Pipelayer | $ 12.12 ** | |
| Work Zone Barricade Servicer | $ 11.67 ** | |
| PAINTER (Structures) | $ 18.62 | |
| POWER EQUIPMENT OPERATOR: | | |
| Asphalt Distributor | $ 14.06 ** | |

Initials of Bidder: _____

| | |
|---|---|
| Asphalt Paving Machine | $ 14.32 ** |
| Broom or Sweeper | $ 12.68 ** |
| Concrete Pavement Finishing Machine | $ 13.07 ** |
| Concrete Paving, Curing, Float, Texturing Machine | $ 11.71 ** |
| Concrete Saw | $ 13.99 ** |
| Crane, Hydraulic 80 Tons or less | $ 13.86 ** |
| Crane, Lattice boom 80 tons or less | $ 14.97 ** |
| Crane, Lattice boom over 80 Tons | $ 15.80 ** |
| Crawler Tractor | $ 13.68 ** |
| Excavator, 50,000 pounds or less | $ 12.71 ** |
| Excavator, Over 50,000 pounds | $ 14.53 ** |
| Foundation Drill, Crawler Mounted | $ 17.43 |
| Foundation Drill, Truck Mounted | $ 15.89 ** |
| Front End Loader 3 CY or Less | $ 13.32 ** |
| Front End Loader, Over 3 CY | $ 13.17 ** |
| Loader/Backhoe | $ 14.29 ** |
| Mechanic | $ 16.96 ** |
| Milling Machine | $ 13.53 ** |
| Motor Grader, Fine Grade | $ 15.69 ** |
| Motor Grader, Rough | $ 14.23 ** |
| Off Road Hauler | $ 14.60 ** |
| Pavement Marking Machine | $ 11.18 ** |
| Piledriver | $ 14.95 ** |
| Roller, Asphalt | $ 11.95 ** |
| Roller, Other | $ 11.57 ** |
| Scraper | $ 13.47 ** |
| Spreader Box | $ 13.58 ** |
| | |
| Servicer | $ 13.97 ** |
| Steel Worker | |
| Reinforcing Steel | $ 15.15 ** |
| Structural Steel Welder | $ 12.85 ** |
| Structural Steel | $ 14.39 ** |
| | |
| TRUCK DRIVER | |
| Low Boy Float | $ 16.03 ** |
| Single Axle | $ 11.46 ** |
| Single or Tandem Axle Dump | $ 11.48 ** |
| Tandem Axle Tractor w/Semi Trailer | $ 12.27 ** |

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 ($17.20) or 13658 ($12.90). Please see the Note at the top of the wage

Initials of Bidder: _____

determination for more information. Please also note that the minimum wage requirements of Executive Order 14026 are not currently being enforced as to any contract or subcontract to which the states of Texas, Louisiana, or Mississippi, including their agencies, are a party.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates.

Initials of Bidder: _____

Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Initials of Bidder: _____

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

## 13.0 PERMITS:

It shall be the sole responsibility of the successful bidder to obtain all required permits in the name of Fort Bend County.

## 14.0 CONTRACTOR'S RESPONSIBILITY FOR WORK:

14.1 Preconstruction Work. Contractor shall do (or cause to be done) the following as preconstruction work:

14.1.1 On written demand as requested by Fort Bend County, cause the Contractor's personnel to meet with Fort Bend County and the Engineer to discuss the status of the Project.

14.1.2 On written demand as requested by Fort Bend County, review drawings and specifications with the Engineer to permit the Contractor and the Engineer to determine the compliance of the proposed facility with applicable building codes.

14.2 Construction Work. Contractor shall do (or cause to be done) the following as construction work:

14.2.1 Perform (or cause to be performed) all preparatory work at the construction site required herein, including (without limitation) soil and

concrete testing and demolition of improvements existing at the construction site and all actions necessary for compliance with all laws and regulations as to actions to be taken by owners or contractors before construction begins, including without limitation those in regard to archaeological and environmental requirements.

14.2.2 Construct and install (or cause to be constructed and installed) the Project on the construction site in accordance with this Contract and the drawings and specifications approved by Fort Bend County.

14.2.3 Furnish (or cause to be furnished) all materials, supplies, equipment, tools, labor, supervision, utilities, transportation, and other materials and services necessary to complete the Project described herein.

14.2.4 Materials testing necessary for the Project and required by laws and regulations, construction industry standards as approved by Fort Bend County and this Contract; the frequency of testing shall be approved by Fort Bend County. **It is the contractor's responsibility to engage a material testing laboratory to perform testing on the structural concrete to be used for foundation work in this project. The cost of testing shall be incidental to bid item for drill shaft foundation. Testing of concrete shall comply with current TXDOT criteria. Contractor has to submit the name of the testing laboratory, intended to be used by the contractor for this project, for County's approval.**

14.3 Standards for Review and Approval. Fort Bend County acknowledges that in order to meet the deadlines for the completion of the Project, and in order to accomplish the efficient completion of the Project, the Contractor may submit matters to Fort Bend County in stages for approval or consent. Upon receipt of any matter submitted by the Contractor for review and approval, Fort Bend County shall review the same and shall diligently and promptly (but in any event within 14 calendar days for any such matter, other than a proposed change order, and within 28 calendar days for a proposed change order) give the Contractor notice of Fort Bend County's approval or disapproval, setting forth in detail all reasons for any disapproval. Fort Bend County's right to disapprove any such matter submitted (other than a proposed change order) shall be limited to the elements thereof (a) which do not conform substantially to matters previously approved, (b) which are new elements not previously presented and approved and the Contractor is unable to demonstrate that such new element is reasonably necessary for completion of the Project, or (c) which depict matters that are violations of this Contract or applicable laws and regulations.

14.3.1 If Fort Bend County disapproves of a particular matter or Proposed Change Order, the Contractor shall have the right to resubmit such matter or Proposed Change Order to Fort Bend County, altered to satisfy Fort Bend County's basis for disapproval. Any resubmission shall be subject to review and approval by Fort Bend County.

Initials of Bidder: _____

14.3.2 Fort Bend County and the Contractor shall attempt in good faith to resolve any disputes concerning the approval of any aspect of the Project expeditiously, so as not to delay the completion of the Project in accordance with this Contract.

14.3.3 Expedited Approvals. Fort Bend County recognizes the importance of expeditious action upon all matters submitted to Fort Bend County for review and approval and of expeditious response to those aspects of the Project requiring approval by governmental authorities having jurisdiction there over. Fort Bend County agrees to exercise its rights of review and approval hereunder with due diligence, reasonableness, and good faith. Fort Bend County shall use its reasonable efforts to expedite any required review of the Project or other matters by any governmental authority.

14.4 Changes.

14.4.1 General. Fort Bend County may make changes to the Project by altering, adding to, or deducting from the Project. All changes in the Project which (a) require an adjustment in the contract sum or an adjustment in the final completion date or (b) involve a material change in the overall scope or function of the Project shall be requested and authorized before commencing such changes by use of written change order notices, Proposed Change Orders and Change Orders, which change order procedure shall be the exclusive means to effect such changes in the Project.

14.4.2 Change Order Procedure. If at any time Fort Bend County desires to make any change in the Project requiring the issuance of a Change Order, Fort Bend County shall so advise the Contractor in writing by delivery to the Contractor of a written notice describing the change. Upon receipt of such notice initiated by Fort Bend County, the Contractor shall within a reasonable period of time advise Fort Bend County of the Contractor's proposal for the adjustments, if any, in the contract sum, the schedule of values, and the final completion date attributable to such change by delivering a written notice thereof (the "Proposed Change Order") to Fort Bend County. Such Proposed Change Order shall contain a description of the proposed change and shall set forth the Contractor's estimate of the increase or decrease, if any, in the contract sum and the change, if any, in the schedule of values and the final completion date attributable to such change. If the Contractor desires to make a change in the Project requiring the issuance of a change order, the Contractor shall deliver to Fort Bend County a Proposed Change Order. Upon execution by Fort Bend County, a Proposed Change Order shall constitute (and be defined herein as) a "Change Order" for purposes of this Contract. The Contractor shall forthwith perform the work as changed in accordance with such Change Order. All work performed pursuant to a Change Order shall be performed in accordance with the terms of this Contract. All Proposed Change Orders

shall be submitted for approval by Fort Bend County. No action, acquiescence or inaction by Fort Bend County or any representative of Fort Bend County shall be construed to be a waiver of requirements set forth in this Contract in regard to Change Orders or ratification of a violation of such requirements, and all acts in violation of this provision shall be considered void.

14.4.3 Change Order Authorization. Each Change Order shall be signed by Fort Bend County and an authorized representative of the Contractor.

14.4.4 Contract Sum Adjustments. The contract sum and the schedule of values shall be adjusted only as a result of a Change Order requiring such adjustment. Any extra work performed without a proper Change Order shall be considered voluntary and not subject to additional compensation. The Contractor shall not be entitled to an adjustment in the contract sum (or a Change Order permitting such adjustment) or to damages as a result of any delays in the Project caused by the acts or omissions of Fort Bend County, provided that this sentence is not applicable to delays that constitute more than 90 days in any 365-day period or cause the Project to be interrupted for a continuous period of 45 days through no fault of the Contractor.

14.4.5 When Fort Bend County and the Contractor agree upon the adjustments in the contract sum, the schedule of values, and the final completion date attributable to such adjustment, such agreement will be documented by preparation and if approved by the Fort Bend County Commissioners Court, execution of an appropriate Change Order.

14.5 Site Access. Prior to the transfer date, Fort Bend County and the Contractor shall have uninterrupted access to the construction site. Subsequent to the transfer date, Fort Bend County will permit the Contractor, the Engineer, and their representatives and subcontractors to enter upon the Project at times reasonably necessary to complete the punch list items.

14.6 Applicable Laws and Regulations. Contractor shall in its performance of the Project comply with all applicable laws and regulations. Any delays in the prosecution of the Project caused by any changes in the laws and regulations or the application or enforcement of the laws and regulations may entitle the Contractor to an extension of time.

14.7 Familiarity with Project. The Contractor represents and accepts that it has: (a) visited the property(ies), (b) taken such other steps as may be necessary to ascertain the nature and location of the Project and the general and local conditions which affect the Project or the cost thereof, (c) investigated the labor situation as regards to the Project, (d) examined the property(ies), the obstacles which may be encountered and all other observable conditions having a bearing upon the performance of the Project, the superintendence of the Project, the time of completion and all other relevant matters, and (e) reported to Fort Bend County

Initials of Bidder: _____

the results of all of the foregoing. The Contractor represents that it is familiar with all phases of the Project and the matters that may affect the Project or its prosecution under this Contract.

14.8 Standard of Performance. The Contractor shall prosecute (or cause to be prosecuted) the Project in accordance with the best efforts for the construction and development of projects similar to the Project in the State of Texas, using qualified, careful, and efficient contractors and workers and in conformity with the provisions of this Contract. The Contractor shall perform the work in a good and workmanlike manner.

14.9 Warranty of Contractor. The Contractor warrants to Fort Bend County that: (i) the Contractor possesses the skill and knowledge ordinarily possessed by well-informed members of its trade or profession and the Contractor will use its best efforts to ensure that the services provided under this Contract will be performed, delivered, and conducted in accordance with the best professional standards and in accordance with industry standards, and (ii) the Contractor is fully experienced and properly qualified to perform the class of work provided for herein, and that it is properly equipped, organized and financed to perform such work, and (iii) following the date of acceptance of this Contract, the services provided by the Contractor to Fort Bend County will conform to the representations contained in this Contract, including all attachments, schedules and exhibits. All warranties provided by the Contractor in this Contract shall be cumulative, shall be deemed consistent and not in conflict, are intended to be given full force and effect and to be interpreted expansively to give the broadest warranty protection to Fort Bend County.

14.10 Contractor's Personnel. Contractor shall employ only competent, skilled personnel for the Project. Prior to the final completion date, the Contractor shall maintain a superintendent who shall be authorized to act on behalf of the Contractor and with whom Fort Bend County may consult at all reasonable times. The superintendent shall not be transferred from the Project without Fort Bend County's consent (which shall not be unreasonably withheld or delayed); provided, however, the superintendent shall not be assigned solely to the Project and shall be entitled to spend reasonable time working on matters unrelated to the Project so long as such work on other matters does not render the superintendent unavailable to the Project or unavailable to Fort Bend County. However, such obligation to furnish the superintendent and such staff personnel shall not be construed (a) to preclude the promotion within the Contractor's organization of any person assigned to the Project or (b) to give rise to any liability of the Contractor if any person assigned to the Project (including, without limitation, the superintendent) leaves the Contractor's employment. If the superintendent is transferred from the Project, Fort Bend County shall have the right to approve the replacement superintendent (which approval will not be unreasonably withheld or delayed). The Contractor, the Architect, and the other subcontractors shall comply with all applicable health, safety, and loss prevention rules of applicable governmental authorities. The

Contractor shall, at its own expense, remove from the Project any person who fails to comply with such rules and instructions. The Contractor shall at all times enforce strict discipline and good order among its employees and shall not employ on the Project any unfit person or anyone not skilled in the work assigned to him. Fort Bend County may, upon written notice to the Contractor, require the Contractor to remove an individual immediately from providing services for the following reasons: violation of the terms and conditions of this Contract; violation of Fort Bend County's or the Contractor's work rules and regulations; criminal activity; or violation of state, federal, or municipal statutes. Fort Bend County may, upon thirty (30) days written notice to the Contractor, require the removal of any individual from providing services without cause.

14.11 Inspection. The Project and all parts thereof shall be subject to inspection from time to time by inspectors designated by Fort Bend County. No such inspections shall relieve The Contractor of any of its obligations hereunder. Neither failure to inspect nor failure to discover or reject any of the work as not in accordance with the drawings and specifications or any provision of this Contract shall be construed to imply an acceptance of such work or to relieve the Contractor of any of its obligations hereunder. Fort Bend County agrees that its right of inspection shall be used reasonably and in a timely manner so as not to delay orderly completion of the Project.

14.12 Protection Against Risks. The Contractor shall take all precautions which are necessary and adequate, against conditions created during the progress of the Project which involve a risk of bodily harm to persons or a risk of damage or loss to any property. The Contractor shall regularly inspect all work, materials and equipment to discover and determine any such conditions and shall be responsible for discovery, determination, and correction of any such conditions. The Contractor shall comply with all federal, state, and local occupational hazard and safety standards, codes and regulations applicable in the jurisdiction where the Project is being performed. The Contractor shall include the substance of this clause in its entirety in all subcontracts for any work to be performed at the construction site.

14.13 Equipment. Except as expressly provided herein to the contrary, the Contractor shall furnish (or cause to be furnished) all construction, transportation, installation, tools, and other equipment and facilities required for the performance of the Project within the times specified herein. Such equipment and facilities shall be serviceable and kept fit for the uses intended. Defective items shall be removed from the construction site promptly and at the Contractor's cost. The Contractor shall schedule (or cause to be scheduled) its other operations so as to not interfere with its duty to timely furnish the necessary equipment and facilities and personnel to operate the same at the times necessary for the orderly completion of the Project.

Initials of Bidder: _____

14.14 Materials. Except as may be specifically provided otherwise in the Contract or approved in advance by Fort Bend County, the Contractor shall provide Fort Bend County with copies of material testing reports and to cause all materials, equipment, and fabricated items incorporated in the Project to be new and of a suitable grade of their respective kinds for their intended use.

14.15 Delay, Disruption or Hindrance Damages. Contractor and the County contemplate that Contractor's performance may be delayed, disrupted or interfered with by unanticipated causes including but not limited to the following:

a) Severe and unavoidable natural disasters such as fires, floods, epidemics and earthquakes;
b) Abnormal weather conditions;
c) Acts or failures to act of the County , third party utility owners or other third – party entities; and
d) Acts of war or terrorism.

Contractor and the County agree and stipulate that an extension of the Contract Time shall be the sole remedy of Contractor for delays in performance of the Work, whether or not such delays are foreseeable, except for delays caused solely by acts of the County that constitute fraud, intentional misrepresentation, gross negligence, intentional arbitrary or capricious acts and/or omissions or intentional interference with Contractor's performance of the Work and then only to the extent such acts continue after Contractor notifies Owner in writing of such conduct. For delays caused by any act(s) other than fraud, intentional misrepresentation, gross negligence, intentional arbitrary or capricious acts and/or omissions or intentional interference with Contractor's performance of the Work Contractor shall not be entitled to any compensation or recovery of any damages including, without limitation, those damages prohibited or limited in Sections 14.15.1 – 14.15.8 below. The County's exercise of any of its rights or remedies under the Contract including, without limitation, ordering changes in the Work or directing suspension, rescheduling, or correction of the Work, in response to any breach or failure by the Contractor to comply with the terms of the Contract Documents or the Contractor's obligations arising therefrom, shall not be construed as intentional interference with Contractor's performance of the Work regardless of the extent or frequency of the County's exercise of such rights or remedies.

Without limiting the foregoing, except as otherwise expressly provided in this Agreement in calculating the amount of any claim recoverable by Contractor, the following limitations on the recovery of damages shall apply:

14.15.1 No indirect or consequential damages will be allowed.

14.15.2 No recovery shall be based on a comparison of planned expenditures to

Initials of Bidder: _____

total actual expenditures, or on estimated losses of labor efficiency, or on a comparison of planned manloading to actual manloading, or any other analysis that is used to show damages indirectly.

14.15.3 Damages, to the extent recoverable, are limited to the additional, actual costs specifically shown to have been directly incurred by the Contractor and solely caused by the proven wrong.

14.15.4 No damages will be allowed for home office overhead or other home office charges.

14.15.5 No exemplary damages or unjust enrichment damages shall be recoverable.

14.15.6 No recovery of attorney's fees shall be recoverable except as expressly permitted under the Agreement.

14.15.7 No profit will be allowed on any damage claim, except as expressly recoverable under the Agreement as Fee on Cost of the Work incurred.

14.15.8 Notwithstanding any other damage limitation herein the County and the Contractor recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by the Contractor if the County is found to have intentionally interfered with Contractor's performance of the Work by fraud, misrepresentation, gross negligence, or intentional arbitrary or capricious acts and/or omissions. Accordingly, instead of requiring any such proof, the County and the Contractor agree that as liquidated damages (in lieu of any other remedy or damages ) for delay, disruption or hindrance (but not as a penalty) the County shall pay the Contractor $1,500.00 for each day that a court of competent jurisdiction finds the County's conduct referenced in Section14.15 (above) is the sole cause of Contractor's delay in completing the Work.

## 15.0 TERMINATION:

15.1 Fort Bend County may terminate the Contract for cause if the Contractor:

15.1.1 Persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials.

15.1.2 Fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractor.

Initials of Bidder: _____

15.1.3 Persistently disregards laws, ordinances, or rules, regulations or orders of a public authority having jurisdiction.

15.1.4 Otherwise commits substantial breach of a provision of the Contract Documents.

15.2 When any of the above reasons exists, Fort Bend County may, without prejudice to any other rights or remedies of Fort Bend County and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

15.2.1 Take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor.

15.2.2 Finish the Project by whatever reasonable method Fort Bend County may deem expedient.

15.2.3 When Fort Bend County terminates the Contract for one of the reasons stated in this section, the Contractor shall not be entitled to receive further payment until the Project is finished. Therefore, the Contractor shall be promptly paid for all work actually and satisfactorily completed.

15.3 Termination for Convenience of Fort Bend County

Fort Bend county reserves the right, without breach, to terminate the Contract prior to, or during the performance of the Work, for any reason. Upon such an occurrence, the following shall apply.

15.3.1 The County will notify Contractor in writing of the county’s determination to terminate the contract for convenience and the effective date of the Contract termination. The notice may also contain instructions necessary for the protection, storage or decommissioning of incomplete work or systems, and for safety.

15.3.2 Upon receipt of the notice of termination, Contractor shall immediately proceed with the following obligations, regardless of any dispute in determining or adjusting any amounts due at that point in the Contract:

15.3.2.1 Stop all work.

15.3.2.2 Place no further subcontracts or orders for materials or services.

15.3.2.3 Terminate all subcontracts for convenience.

15.3.2.4 Cancel all materials and equipment orders as applicable.

Initials of Bidder: _____

15.3.2.5 Take appropriate action that is necessary to protect and preserve all property related to the Contract which is in the possession of Contractor.

15.3.2.6 When the Contract is terminated for Owner's convenience, Contractor may recover from Owner payment for all Work executed. Contractor may not claim lost profits or lost business opportunities.

15.4 Settlement on Termination. When the Contract is terminated by the County under 15.3, at any time prior to one hundred eighty (180) days after the effective date of termination, Contractor shall submit a final termination settlement proposal to the County based upon recoverable costs as provided under the Contract. If Contractor fails to submit the proposal within the time allowed, the County may unilaterally determine the amount due to Contractor because of the termination and pay the determined amount to Contractor.

## 16.0 COMPLETION, TRANSFER, & ACCEPTANCE:

16.1 Final Completion. Upon the occurrence of the final completion date, the punch list items shall be promptly commenced and thereafter completed within thirty (30) days after final completion.

16.2 Transfer and Acceptance. Upon the occurrence of final completion, care, custody and control of the Project shall pass to Fort Bend County. As referenced herein, the "Transfer Date" shall mean the date on which the care, custody and control of the Project passes to Fort Bend County. Subsequent to the Transfer Date all risk of loss with respect to the Project shall be by Fort Bend County and the Contractor shall be thereafter obligated to cover the Project with their Insurance.

## 17.0 SUSPENSION BY FORT BEND COUNTY FOR CONVENIENCE:

17.1 Fort Bend County may, without cause, order the Contractor in writing to suspend, delay or interrupt the Project in whole or in part for such period of time as Fort Bend County may determine.

17.2 An adjustment shall be made for increase in the cost of performance, caused by suspension, delay or interruption. No adjustment shall be made to the extent:

17.2.1 That performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible.

17.2.2 That an equitable adjustment is made or denied under another provision of this Contract.

Initials of Bidder: _____

17.3 Adjustments made in the cost of performance may have a mutually agreed fixed or percentage fee.

## 18.0 INDEPENDENT CONTRACTOR:

The Contractor shall be an independent contractor and any provisions of this Contract that may appear to give Fort Bend County the right to direct the Contractor as to the details of the manner of doing the Project shall be deemed to mean that the Contractor shall follow the desires of Fort Bend County in the results of the Project only and not in the means whereby the Project is to be accomplished. The Contractor shall be responsible as to the details of completing the Project. Neither the agents, representatives, nor employees of the Contractor, shall be deemed to be the agents, representatives, or employees of Fort Bend County. The Contractor further represents that it accepts a fiduciary role and responsibility with respect to Fort Bend County and will, to its best abilities, act in the best interests of Fort Bend County and the timely completion of the Project. The Contractor agrees and understands that neither it nor any of its agents or employees may act in the name of Fort Bend County except and unless specifically authorized in writing by Fort Bend County to do so. The Contractor shall furnish construction administration and management services and use the Contractor's best efforts to complete the Project in an expeditious and economical manner consistent with the interests of Fort Bend County.

## 19.0 NOTICE

19.1 All written notices, demands, and other papers or documents to be delivered to Fort Bend County under this Contract shall be delivered to the Engineering Department, 301 Jackson, Richmond, Texas 77469, or at such other place or places as Fort Bend County may from time to time designate by written notice delivered to the Contractor. For purposes of notice under this Contract, a copy of any notice or communication hereunder shall also be forwarded to the following address: Fort Bend County, 301 Jackson Street, Richmond, Texas 77469, Attention: County Judge.

19.2 All written notices, demands, and other papers or documents to be delivered to the Contractor under this Contract shall be delivered to the Authorized Representative identified in the Contract documents or such other place or places as the Contractor may designate by written notice delivered to Fort Bend County.

## 20.0 RECORDS:

20.1 Fort Bend County shall be the absolute and unqualified owner of all drawings, preliminary layouts, record drawings, sketches and other documents prepared pursuant to the Contract by Contractor.

20.2 The Contractor agrees to maintain and preserve for a period of at least five years after the earlier of the expiration of the defects period or termination of this Contract, accurate and complete records relating to the performance of the

Initials of Bidder: _____

Project. The Contractor agrees to, upon request, provide Fort Bend County with such records.

## 21.0 SUCCESSORS & ASSIGNS:

21.1 Fort Bend County and the Contractor bind themselves and their successors, executors, administrators and assigns to the other party of this Contract and to the successors, executors, administrators and assigns of such other party, in respect to all covenants of this Contract.

21.2 Neither Fort Bend County nor the Contractor shall assign, sublet or transfer its interest in this Contract without the prior written consent of the other.

21.3 Nothing herein shall be construed as creating any personal liability on the part of any officer or agent of any public and/or governmental body that may be a party hereto.

## 22.0 PUBLIC CONTACT:

Contact with the news media, citizens of Fort Bend County or governmental agencies shall be the sole responsibility of Fort Bend County. Under no circumstances, whatsoever, shall Contractor release any material or information developed in the performance of its services hereunder without the express written permission of Fort Bend County, except where required to do so by law.

## 23.0 MODIFICATIONS:

This instrument contains the entire Contract between the parties relating to the rights herein granted and obligations herein assumed. Any oral or written representations or modifications concerning this instrument shall be of no force and effect excepting a subsequent written modification signed by both parties hereto.

## 24.0 SILENCE OF SPECIFICATIONS:

The apparent silence of specifications as to any detail, or the apparent omission from it of a detailed description concerning any point, shall be regarded as meaning that only the best commercial practice is to prevail and that only material and workmanship of the finest quality are to be used. All interpretations of specifications shall be made on the basis of this statement. The items furnished under this contract shall be new, unused of the latest product in production to commercial trade and shall be of the highest quality as to materials used and workmanship. Manufacturer furnishing these items shall be experienced in design and construction of such items and shall be an established supplier of the item bid.

## 25.0 SEVERABILITY:

In the event one or more of the provisions contained in these requirements or the specifications shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity,

illegality, or unenforceability shall not affect any other provision hereof and these requirements or the specifications shall be construed as if such invalid, illegal, or unenforceable provision had never been contained herein.

**26.0 GOVERNING FORMS:**

In the event of any conflict between the terms and provisions of these requirements and the specifications, the specifications shall govern. In the event of any conflict of interpretation of any part of this overall document, Fort Bend County's interpretation shall govern.

**27.0 TAX EXEMPT:**

Fort Bend County is exempt from state and local sales and use taxes under Section 151.309 of the Texas Tax Code. This Contract is deemed to be a separate contract for Texas tax purposes, and as such, Fort Bend County hereby issues its Texas Exemption for the purchase of any items qualifying for exemption under this Contract. Contractor is to issue its Texas Resale Certificate to vendors and subcontractors for such items qualifying for this exemption, and further, contractor should state these items at cost.

**28.0 ENTIRE AGREEMENT:**

The Parties agree that this Contract contains all of the terms and conditions of the understanding of the parties relating to the subject matter hereof. All prior negotiations, discussions, correspondence and preliminary understandings between the parties and others relating hereto are superseded by this Contract. By entering into this Contract, the parties do not intend to create any obligations, express or implied, other than those specifically set out in this Contract.

**29.0 APPLICABLE LAW & VENUE**

This Contract shall be construed under and in accord with the laws of the State of Texas, and all obligations of the parties created hereunder are performable in Fort Bend County, Texas, and that venue for any litigation arising out of or related to this Contract shall lie solely in the court of appropriate jurisdiction located in Fort Bend County, Texas.

**30.0 ENCLOSURE:**

The following being incorporated herein by reference for all purposes as though fully set forth herein word for word.

Enclosure #1 – Specifications and Plans

**31.0 PRICING:** Complete excel unit pricing form.

**32.0 PROJECT DURATION:**

Bidder agrees, if awarded the contract, to complete all work required by the contract documents **within _____ calendar days (maximum 280 days)** after issuance of a purchase order by the

Initials of Bidder: _____

County Purchasing Agent and notice to proceed by the Engineering Department.

## 33.0 AWARD:

This contract will be awarded to the overall lowest and best bid.

## 34.0 TEXAS ETHICS COMMISSION FORM 1295:

34.1 Effective January 1, 2016 all contracts executed by Commissioners Court, regardless of the dollar amount, will require completion of Form 1295 "Certificate of Interested Parties", per the new Government Code Statute §2252.908. All vendors submitting a response to a formal Bid, RFP, SOQ or any contracts, contract amendments, renewals or change orders are required to complete the Form 1295 online through the State of Texas Ethics Commission website. Please visit: https://www.ethics.state.tx.us/filinginfo/1295/

34.2 On-line instructions:

34.2.1 Name of governmental entity is to read: Fort Bend County.

34.2.2 Identification number used by the governmental entity is: B24-051.

34.2.3 Description is the title of the solicitation: Traffic Signal Installation at West Bellfort at Westmoor Drive and at Binion Lane

34.3 Apparent low bidder(s) will be required to provide the Form 1295 within three (3) calendar days from notification; however, if your company is publicly traded you are not required to complete this form.

## 35.0 STATE LAW REQUIREMENTS FOR CONTRACTS:

The contents of this section are required by Texas Law and are included by County regardless of content.

35.1 Agreement to Not Boycott Israel Chapter 2271 Texas Government Code: Contractor verifies that if Contractor employs ten (10) or more full-time employees and this Agreement has a value of $100,000 or more, Contractor does not boycott Israel and will not boycott Israel during the term of this Agreement.

35.2 Texas Government Code Section 2251.152 Acknowledgment: By signature on vendor form, Contractor represents pursuant to Section 2252.152 of the Texas Government Code, that Contractor is not listed on the website of the Comptroller of the State of Texas concerning the listing of companies that are identified under Section 806.051, Section 807.051 or Section 2253.153.

Initials of Bidder: _____

## 36.0 HUMAN TRAFFICKING:

By acceptance of this contract, Contractor acknowledges that Fort Bend County is opposed to human trafficking and that no County funds will be used in support of services or activities that violate human trafficking laws

## 37.0 INDEMNITY FOR BODILY INJURY OR DEATH CLAIMS

Indemnity for certain bodily injury or death claims. To the fullest extent permitted by law, contractor shall indemnify, defend and hold harmless the county from and against all claims, losses, expenses, costs, demands, suits, causes of action, and damages, including without limitation, attorneys' fees and expenses, for bodily injury or death of any employee of contractor, its agents, or its subcontractors of every tier, even if the bodily injury or death is caused by or alleged to have been caused by the sole or partial negligence, fault or strict liability of any indemnitee.

Indemnity for all other claims. For all claims not addressed in the preceding section or section 11.0 above , including, without limitation, claims for damage to or loss of use of property and claims for bodily injury to or death of any person other than that addressed in the immediately preceding section, to the fullest extent permitted by law, contractor shall indemnify, defend and hold harmless the county from and against all claims, losses, expenses, costs, demands, suits, causes of action, and damages, including without limitation, attorneys' fees and expenses, of any nature whatsoever arising out of or related to this contract or the work to be performed under this contract, but only to the extent of the negligence or other fault of the contractor, its agents, representatives, employees or subcontractors of any tier.

## 38.0 AGREEMENT TO ARBITRATE UNDER THE FEDERAL ARBITRATION ACT

To the maximum extent allowed by law, any controversy or claim arising out of or relating to this contract, or the breach thereof, shall be settled by arbitration under the Federal Arbitration Act, 9 U.S.C. § 1, et seq. administered by the American Arbitration Association under its Construction Industry Arbitration Rules, and judgment on the award rendered by the arbitrator(s) may be entered in any court having jurisdiction thereof. For cases in which the amount in controversy is less than $250,000, there shall be no discovery other than an expeditious and complete exchange of documents relative to the dispute. For cases in which the amount in controversy is between $250,000 and $1,000,000, there shall be no discovery except for an expeditious and complete exchange of such documentary information and up to three (3) depositions per side (including expert depositions, if any). For cases in which the amount in controversy exceeds $1,000,000, there shall be no discovery except for an expeditious and complete exchange of such documentary information up to five (5) depositions per side (including expert depositions, if any). No formal interrogatories, request for admissions or formal request for production of documents shall be allowed in the arbitration process. The hearing on the merits will be completed no later than ninety (90) days after the initial demand for arbitration is made for disputes involving amounts in controversy of up to $250,000; no later than no later than one hundred twenty (120) days after the initial demand for arbitration is made for disputes involving amounts in controversy of between $250,000 and $1,000,000; and, no

Initials of Bidder: _____

later than three hundred sixty five (365) days after the initial demand for arbitration is made for disputes involving amounts in controversy of over $1,000,000.

## 39.0 ADDITIONAL REQUIRED FORMS:

All vendors submitting are required to complete and return with submission

39.1 Vendor Form

39.2 W9 Form

39.3 Tax Form/Debt/Residence Certification

39.4 Contractor Acknowledgement of Stormwater Management Program

Initials of Bidder: _____

## Contract Sheet
## Bid 24-051

**THE STATE OF TEXAS**
**COUNTY OF FORT BEND**

This memorandum of agreement made and entered into on the _____ day of _____, 20_____, by and between Fort Bend County in the State of Texas (hereinafter designated County), acting herein by County Judge KP George, by virtue of an order of Fort Bend County Commissioners Court, and _____ (hereinafter designated Contractor).

**(company name)**

WITNESSETH:

The Contractor and the County agree that the bid and specifications for the **Traffic Signal Installation at West Bellfort at Westmoor Drive and at Binion Lane** which are hereto attached and made a part hereof, together with this instrument and the bond (when required) shall constitute the full agreement and contract between parties and for furnishing the items set out and described; the County agrees to pay the prices stipulated in the accepted bid.

It is further agreed that this contract shall not become binding or effective until signed by the parties hereto and a purchase order authorizing the items desired has been issued.

Executed at Richmond, Texas this _____day of _____20_____.

**Fort Bend County, Texas**

**By:_____**
**County Judge, KP George**

**By:_____**
**Signature of Contractor**

**By:_____**
**Printed Name and Title**

Form **W-9**
(Rev. December 2014)
Department of the Treasury
Internal Revenue Service

# Request for Taxpayer Identification Number and Certification

**Give Form to the requester. Do not send to the IRS.**

Print or type
See **Specific Instructions** on page 2.

**1** Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.

**2** Business name/disregarded entity name, if different from above

**3** Check appropriate box for federal tax classification; check only **one** of the following seven boxes:

☐ Individual/sole proprietor or single-member LLC ☐ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate

☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▶ _____

**Note.** For a single-member LLC that is disregarded, do not check LLC; check the appropriate box in the line above for the tax classification of the single-member owner.

☐ Other (see instructions) ▶

**4** Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):

Exempt payee code (if any) _____

Exemption from FATCA reporting code (if any) _____

*(Applies to accounts maintained outside the U.S.)*

**5** Address (number, street, and apt. or suite no.)

Requester's name and address (optional)

**6** City, state, and ZIP code

**7** List account number(s) here (optional)

## Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

**Note.** If the account is in more than one name, see the instructions for line 1 and the chart on page 4 for guidelines on whose number to enter.

**Social security number**

| | | | – | | – | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

**or**

**Employer identification number**

| | | – | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

## Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

**Certification instructions.** You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 3.

| **Sign Here** | **Signature of U.S. person** ▶ | **Date** ▶ |
|---|---|---|

# General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

**Future developments**. Information about developments affecting Form W-9 (such as legislation enacted after we release it) is at *www.irs.gov/fw9*.

## Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following:

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

*If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding.* See *What is backup withholding?* on page 2.

By signing the filled-out form, you:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and
4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting?* on page 2 for further information.

**Note.** If you are a U.S. person and a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

**Definition of a U.S. person.** For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien;
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States;
- An estate (other than a foreign estate); or
- A domestic trust (as defined in Regulations section 301.7701-7).

**Special rules for partnerships.** Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax under section 1446 on any foreign partners' share of effectively connected taxable income from such business. Further, in certain cases where a Form W-9 has not been received, the rules under section 1446 require a partnership to presume that a partner is a foreign person, and pay the section 1446 withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid section 1446 withholding on your share of partnership income.

In the cases below, the following person must give Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States:

- In the case of a disregarded entity with a U.S. owner, the U.S. owner of the disregarded entity and not the entity;
- In the case of a grantor trust with a U.S. grantor or other U.S. owner, generally, the U.S. grantor or other U.S. owner of the grantor trust and not the trust; and
- In the case of a U.S. trust (other than a grantor trust), the U.S. trust (other than a grantor trust) and not the beneficiaries of the trust.

**Foreign person.** If you are a foreign person or the U.S. branch of a foreign bank that has elected to be treated as a U.S. person, do not use Form W-9. Instead, use the appropriate Form W-8 or Form 8233 (see Publication 515, Withholding of Tax on Nonresident Aliens and Foreign Entities).

**Nonresident alien who becomes a resident alien.** Generally, only a nonresident alien individual may use the terms of a tax treaty to reduce or eliminate U.S. tax on certain types of income. However, most tax treaties contain a provision known as a "saving clause." Exceptions specified in the saving clause may permit an exemption from tax to continue for certain types of income even after the payee has otherwise become a U.S. resident alien for tax purposes.

If you are a U.S. resident alien who is relying on an exception contained in the saving clause of a tax treaty to claim an exemption from U.S. tax on certain types of income, you must attach a statement to Form W-9 that specifies the following five items:

1. The treaty country. Generally, this must be the same treaty under which you claimed exemption from tax as a nonresident alien.
2. The treaty article addressing the income.
3. The article number (or location) in the tax treaty that contains the saving clause and its exceptions.
4. The type and amount of income that qualifies for the exemption from tax.
5. Sufficient facts to justify the exemption from tax under the terms of the treaty article.

***Example.*** Article 20 of the U.S.-China income tax treaty allows an exemption from tax for scholarship income received by a Chinese student temporarily present in the United States. Under U.S. law, this student will become a resident alien for tax purposes if his or her stay in the United States exceeds 5 calendar years. However, paragraph 2 of the first Protocol to the U.S.-China treaty (dated April 30, 1984) allows the provisions of Article 20 to continue to apply even after the Chinese student becomes a resident alien of the United States. A Chinese student who qualifies for this exception (under paragraph 2 of the first protocol) and is relying on this exception to claim an exemption from tax on his or her scholarship or fellowship income would attach to Form W-9 a statement that includes the information described above to support that exemption.

If you are a nonresident alien or a foreign entity, give the requester the appropriate completed Form W-8 or Form 8233.

## Backup Withholding

**What is backup withholding?** Persons making certain payments to you must under certain conditions withhold and pay to the IRS 28% of such payments. This is called "backup withholding." Payments that may be subject to backup withholding include interest, tax-exempt interest, dividends, broker and barter exchange transactions, rents, royalties, nonemployee pay, payments made in settlement of payment card and third party network transactions, and certain payments from fishing boat operators. Real estate transactions are not subject to backup withholding.

You will not be subject to backup withholding on payments you receive if you give the requester your correct TIN, make the proper certifications, and report all your taxable interest and dividends on your tax return.

**Payments you receive will be subject to backup withholding if:**

1. You do not furnish your TIN to the requester,
2. You do not certify your TIN when required (see the Part II instructions on page 3 for details),
3. The IRS tells the requester that you furnished an incorrect TIN,
4. The IRS tells you that you are subject to backup withholding because you did not report all your interest and dividends on your tax return (for reportable interest and dividends only), or
5. You do not certify to the requester that you are not subject to backup withholding under 4 above (for reportable interest and dividend accounts opened after 1983 only).

Certain payees and payments are exempt from backup withholding. See *Exempt payee code* on page 3 and the separate Instructions for the Requester of Form W-9 for more information.

Also see *Special rules for partnerships* above.

## What is FATCA reporting?

The Foreign Account Tax Compliance Act (FATCA) requires a participating foreign financial institution to report all United States account holders that are specified United States persons. Certain payees are exempt from FATCA reporting. See *Exemption from FATCA reporting code* on page 3 and the Instructions for the Requester of Form W-9 for more information.

## Updating Your Information

You must provide updated information to any person to whom you claimed to be an exempt payee if you are no longer an exempt payee and anticipate receiving reportable payments in the future from this person. For example, you may need to provide updated information if you are a C corporation that elects to be an S corporation, or if you no longer are tax exempt. In addition, you must furnish a new Form W-9 if the name or TIN changes for the account; for example, if the grantor of a grantor trust dies.

## Penalties

**Failure to furnish TIN.** If you fail to furnish your correct TIN to a requester, you are subject to a penalty of $50 for each such failure unless your failure is due to reasonable cause and not to willful neglect.

**Civil penalty for false information with respect to withholding.** If you make a false statement with no reasonable basis that results in no backup withholding, you are subject to a $500 penalty.

**Criminal penalty for falsifying information.** Willfully falsifying certifications or affirmations may subject you to criminal penalties including fines and/or imprisonment.

**Misuse of TINs.** If the requester discloses or uses TINs in violation of federal law, the requester may be subject to civil and criminal penalties.

# Specific Instructions

## Line 1

You must enter one of the following on this line; **do not** leave this line blank. The name should match the name on your tax return.

If this Form W-9 is for a joint account, list first, and then circle, the name of the person or entity whose number you entered in Part I of Form W-9.

a. **Individual.** Generally, enter the name shown on your tax return. If you have changed your last name without informing the Social Security Administration (SSA) of the name change, enter your first name, the last name as shown on your social security card, and your new last name.

**Note. ITIN applicant:** Enter your individual name as it was entered on your Form W-7 application, line 1a. This should also be the same as the name you entered on the Form 1040/1040A/1040EZ you filed with your application.

b. **Sole proprietor or single-member LLC.** Enter your individual name as shown on your 1040/1040A/1040EZ on line 1. You may enter your business, trade, or "doing business as" (DBA) name on line 2.

c. **Partnership, LLC that is not a single-member LLC, C Corporation, or S Corporation.** Enter the entity's name as shown on the entity's tax return on line 1 and any business, trade, or DBA name on line 2.

d. **Other entities.** Enter your name as shown on required U.S. federal tax documents on line 1. This name should match the name shown on the charter or other legal document creating the entity. You may enter any business, trade, or DBA name on line 2.

e. **Disregarded entity.** For U.S. federal tax purposes, an entity that is disregarded as an entity separate from its owner is treated as a "disregarded entity." See Regulations section 301.7701-2(c)(2)(iii). Enter the owner's name on line 1. The name of the entity entered on line 1 should never be a disregarded entity. The name on line 1 should be the name shown on the income tax return on which the income should be reported. For example, if a foreign LLC that is treated as a disregarded entity for U.S. federal tax purposes has a single owner that is a U.S. person, the U.S. owner's name is required to be provided on line 1. If the direct owner of the entity is also a disregarded entity, enter the first owner that is not disregarded for federal tax purposes. Enter the disregarded entity's name on line 2, "Business name/disregarded entity name." If the owner of the disregarded entity is a foreign person, the owner must complete an appropriate Form W-8 instead of a Form W-9. This is the case even if the foreign person has a U.S. TIN.

## Line 2

If you have a business name, trade name, DBA name, or disregarded entity name, you may enter it on line 2.

## Line 3

Check the appropriate box in line 3 for the U.S. federal tax classification of the person whose name is entered on line 1. Check only one box in line 3.

**Limited Liability Company (LLC).** If the name on line 1 is an LLC treated as a partnership for U.S. federal tax purposes, check the "Limited Liability Company" box and enter "P" in the space provided. If the LLC has filed Form 8832 or 2553 to be taxed as a corporation, check the "Limited Liability Company" box and in the space provided enter "C" for C corporation or "S" for S corporation. If it is a single-member LLC that is a disregarded entity, do not check the "Limited Liability Company" box; instead check the first box in line 3 "Individual/sole proprietor or single-member LLC."

## Line 4, Exemptions

If you are exempt from backup withholding and/or FATCA reporting, enter in the appropriate space in line 4 any code(s) that may apply to you.

**Exempt payee code.**

- Generally, individuals (including sole proprietors) are not exempt from backup withholding.
- Except as provided below, corporations are exempt from backup withholding for certain payments, including interest and dividends.
- Corporations are not exempt from backup withholding for payments made in settlement of payment card or third party network transactions.
- Corporations are not exempt from backup withholding with respect to attorneys' fees or gross proceeds paid to attorneys, and corporations that provide medical or health care services are not exempt with respect to payments reportable on Form 1099-MISC.

The following codes identify payees that are exempt from backup withholding. Enter the appropriate code in the space in line 4.

1—An organization exempt from tax under section 501(a), any IRA, or a custodial account under section 403(b)(7) if the account satisfies the requirements of section 401(f)(2)

2—The United States or any of its agencies or instrumentalities

3—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

4—A foreign government or any of its political subdivisions, agencies, or instrumentalities

5—A corporation

6—A dealer in securities or commodities required to register in the United States, the District of Columbia, or a U.S. commonwealth or possession

7—A futures commission merchant registered with the Commodity Futures Trading Commission

8—A real estate investment trust

9—An entity registered at all times during the tax year under the Investment Company Act of 1940

10—A common trust fund operated by a bank under section 584(a)

11—A financial institution

12—A middleman known in the investment community as a nominee or custodian

13—A trust exempt from tax under section 664 or described in section 4947

The following chart shows types of payments that may be exempt from backup withholding. The chart applies to the exempt payees listed above, 1 through 13.

| IF the payment is for . . . | THEN the payment is exempt for . . . |
|---|---|
| Interest and dividend payments | All exempt payees except for 7 |
| Broker transactions | Exempt payees 1 through 4 and 6 through 11 and all C corporations. S corporations must not enter an exempt payee code because they are exempt only for sales of noncovered securities acquired prior to 2012. |
| Barter exchange transactions and patronage dividends | Exempt payees 1 through 4 |
| Payments over $600 required to be reported and direct sales over $5,000[1] | Generally, exempt payees 1 through 5[2] |
| Payments made in settlement of payment card or third party network transactions | Exempt payees 1 through 4 |

[1] See Form 1099-MISC, Miscellaneous Income, and its instructions.

[2] However, the following payments made to a corporation and reportable on Form 1099-MISC are not exempt from backup withholding: medical and health care payments, attorneys' fees, gross proceeds paid to an attorney reportable under section 6045(f), and payments for services paid by a federal executive agency.

**Exemption from FATCA reporting code.** The following codes identify payees that are exempt from reporting under FATCA. These codes apply to persons submitting this form for accounts maintained outside of the United States by certain foreign financial institutions. Therefore, if you are only submitting this form for an account you hold in the United States, you may leave this field blank. Consult with the person requesting this form if you are uncertain if the financial institution is subject to these requirements. A requester may indicate that a code is not required by providing you with a Form W-9 with "Not Applicable" (or any similar indication) written or printed on the line for a FATCA exemption code.

A—An organization exempt from tax under section 501(a) or any individual retirement plan as defined in section 7701(a)(37)

B—The United States or any of its agencies or instrumentalities

C—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

D—A corporation the stock of which is regularly traded on one or more established securities markets, as described in Regulations section 1.1472-1(c)(1)(i)

E—A corporation that is a member of the same expanded affiliated group as a corporation described in Regulations section 1.1472-1(c)(1)(i)

F—A dealer in securities, commodities, or derivative financial instruments (including notional principal contracts, futures, forwards, and options) that is registered as such under the laws of the United States or any state

G—A real estate investment trust

H—A regulated investment company as defined in section 851 or an entity registered at all times during the tax year under the Investment Company Act of 1940

I—A common trust fund as defined in section 584(a)

J—A bank as defined in section 581

K—A broker

L—A trust exempt from tax under section 664 or described in section 4947(a)(1)

M—A tax exempt trust under a section 403(b) plan or section 457(g) plan

**Note.** You may wish to consult with the financial institution requesting this form to determine whether the FATCA code and/or exempt payee code should be completed.

## Line 5

Enter your address (number, street, and apartment or suite number). This is where the requester of this Form W-9 will mail your information returns.

## Line 6

Enter your city, state, and ZIP code.

# Part I. Taxpayer Identification Number (TIN)

**Enter your TIN in the appropriate box.** If you are a resident alien and you do not have and are not eligible to get an SSN, your TIN is your IRS individual taxpayer identification number (ITIN). Enter it in the social security number box. If you do not have an ITIN, see *How to get a TIN* below.

If you are a sole proprietor and you have an EIN, you may enter either your SSN or EIN. However, the IRS prefers that you use your SSN.

If you are a single-member LLC that is disregarded as an entity separate from its owner (see *Limited Liability Company (LLC)* on this page), enter the owner's SSN (or EIN, if the owner has one). Do not enter the disregarded entity's EIN. If the LLC is classified as a corporation or partnership, enter the entity's EIN.

**Note.** See the chart on page 4 for further clarification of name and TIN combinations.

**How to get a TIN.** If you do not have a TIN, apply for one immediately. To apply for an SSN, get Form SS-5, Application for a Social Security Card, from your local SSA office or get this form online at *www.ssa.gov*. You may also get this form by calling 1-800-772-1213. Use Form W-7, Application for IRS Individual Taxpayer Identification Number, to apply for an ITIN, or Form SS-4, Application for Employer Identification Number, to apply for an EIN. You can apply for an EIN online by accessing the IRS website at *www.irs.gov/businesses* and clicking on Employer Identification Number (EIN) under Starting a Business. You can get Forms W-7 and SS-4 from the IRS by visiting IRS.gov or by calling 1-800-TAX-FORM (1-800-829-3676).

If you are asked to complete Form W-9 but do not have a TIN, apply for a TIN and write "Applied For" in the space for the TIN, sign and date the form, and give it to the requester. For interest and dividend payments, and certain payments made with respect to readily tradable instruments, generally you will have 60 days to get a TIN and give it to the requester before you are subject to backup withholding on payments. The 60-day rule does not apply to other types of payments. You will be subject to backup withholding on all such payments until you provide your TIN to the requester.

**Note.** Entering "Applied For" means that you have already applied for a TIN or that you intend to apply for one soon.

**Caution:** *A disregarded U.S. entity that has a foreign owner must use the appropriate Form W-8.*

## Part II. Certification

To establish to the withholding agent that you are a U.S. person, or resident alien, sign Form W-9. You may be requested to sign by the withholding agent even if items 1, 4, or 5 below indicate otherwise.

For a joint account, only the person whose TIN is shown in Part I should sign (when required). In the case of a disregarded entity, the person identified on line 1 must sign. Exempt payees, see *Exempt payee code* earlier.

**Signature requirements.** Complete the certification as indicated in items 1 through 5 below.

**1. Interest, dividend, and barter exchange accounts opened before 1984 and broker accounts considered active during 1983.** You must give your correct TIN, but you do not have to sign the certification.

**2. Interest, dividend, broker, and barter exchange accounts opened after 1983 and broker accounts considered inactive during 1983.** You must sign the certification or backup withholding will apply. If you are subject to backup withholding and you are merely providing your correct TIN to the requester, you must cross out item 2 in the certification before signing the form.

**3. Real estate transactions.** You must sign the certification. You may cross out item 2 of the certification.

**4. Other payments.** You must give your correct TIN, but you do not have to sign the certification unless you have been notified that you have previously given an incorrect TIN. "Other payments" include payments made in the course of the requester's trade or business for rents, royalties, goods (other than bills for merchandise), medical and health care services (including payments to corporations), payments to a nonemployee for services, payments made in settlement of payment card and third party network transactions, payments to certain fishing boat crew members and fishermen, and gross proceeds paid to attorneys (including payments to corporations).

**5. Mortgage interest paid by you, acquisition or abandonment of secured property, cancellation of debt, qualified tuition program payments (under section 529), IRA, Coverdell ESA, Archer MSA or HSA contributions or distributions, and pension distributions.** You must give your correct TIN, but you do not have to sign the certification.

## What Name and Number To Give the Requester

| For this type of account: | Give name and SSN of: |
|---|---|
| 1. Individual | The individual |
| 2. Two or more individuals (joint account) | The actual owner of the account or, if combined funds, the first individual on the account[1] |
| 3. Custodian account of a minor (Uniform Gift to Minors Act) | The minor[2] |
| 4. a. The usual revocable savings trust (grantor is also trustee)<br>b. So-called trust account that is not a legal or valid trust under state law | The grantor-trustee[1]<br>The actual owner[1] |
| 5. Sole proprietorship or disregarded entity owned by an individual | The owner[3] |
| 6. Grantor trust filing under Optional Form 1099 Filing Method 1 (see Regulations section 1.671-4(b)(2)(i)(A)) | The grantor* |
| **For this type of account:** | **Give name and EIN of:** |
| 7. Disregarded entity not owned by an individual | The owner |
| 8. A valid trust, estate, or pension trust | Legal entity[4] |
| 9. Corporation or LLC electing corporate status on Form 8832 or Form 2553 | The corporation |
| 10. Association, club, religious, charitable, educational, or other tax-exempt organization | The organization |
| 11. Partnership or multi-member LLC | The partnership |
| 12. A broker or registered nominee | The broker or nominee |
| 13. Account with the Department of Agriculture in the name of a public entity (such as a state or local government, school district, or prison) that receives agricultural program payments | The public entity |
| 14. Grantor trust filing under the Form 1041 Filing Method or the Optional Form 1099 Filing Method 2 (see Regulations section 1.671-4(b)(2)(i)(B)) | The trust |

[1] List first and circle the name of the person whose number you furnish. If only one person on a joint account has an SSN, that person's number must be furnished.

[2] Circle the minor's name and furnish the minor's SSN.

[3] You must show your individual name and you may also enter your business or DBA name on the "Business name/disregarded entity" name line. You may use either your SSN or EIN (if you have one), but the IRS encourages you to use your SSN.

[4] List first and circle the name of the trust, estate, or pension trust. (Do not furnish the TIN of the personal representative or trustee unless the legal entity itself is not designated in the account title.) Also see *Special rules for partnerships* on page 2.

***Note.** Grantor also must provide a Form W-9 to trustee of trust.

**Note.** If no name is circled when more than one name is listed, the number will be considered to be that of the first name listed.

## Secure Your Tax Records from Identity Theft

Identity theft occurs when someone uses your personal information such as your name, SSN, or other identifying information, without your permission, to commit fraud or other crimes. An identity thief may use your SSN to get a job or may file a tax return using your SSN to receive a refund.

To reduce your risk:

- Protect your SSN,
- Ensure your employer is protecting your SSN, and
- Be careful when choosing a tax preparer.

If your tax records are affected by identity theft and you receive a notice from the IRS, respond right away to the name and phone number printed on the IRS notice or letter.

If your tax records are not currently affected by identity theft but you think you are at risk due to a lost or stolen purse or wallet, questionable credit card activity or credit report, contact the IRS Identity Theft Hotline at 1-800-908-4490 or submit Form 14039.

For more information, see Publication 4535, Identity Theft Prevention and Victim Assistance.

Victims of identity theft who are experiencing economic harm or a system problem, or are seeking help in resolving tax problems that have not been resolved through normal channels, may be eligible for Taxpayer Advocate Service (TAS) assistance. You can reach TAS by calling the TAS toll-free case intake line at 1-877-777-4778 or TTY/TDD 1-800-829-4059.

**Protect yourself from suspicious emails or phishing schemes.** Phishing is the creation and use of email and websites designed to mimic legitimate business emails and websites. The most common act is sending an email to a user falsely claiming to be an established legitimate enterprise in an attempt to scam the user into surrendering private information that will be used for identity theft.

The IRS does not initiate contacts with taxpayers via emails. Also, the IRS does not request personal detailed information through email or ask taxpayers for the PIN numbers, passwords, or similar secret access information for their credit card, bank, or other financial accounts.

If you receive an unsolicited email claiming to be from the IRS, forward this message to *phishing@irs.gov.* You may also report misuse of the IRS name, logo, or other IRS property to the Treasury Inspector General for Tax Administration (TIGTA) at 1-800-366-4484. You can forward suspicious emails to the Federal Trade Commission at: *spam@uce.gov* or contact them at *www.ftc.gov/idtheft* or 1-877-IDTHEFT (1-877-438-4338).

Visit IRS.gov to learn more about identity theft and how to reduce your risk.

## Privacy Act Notice

Section 6109 of the Internal Revenue Code requires you to provide your correct TIN to persons (including federal agencies) who are required to file information returns with the IRS to report interest, dividends, or certain other income paid to you; mortgage interest you paid; the acquisition or abandonment of secured property; the cancellation of debt; or contributions you made to an IRA, Archer MSA, or HSA. The person collecting this form uses the information on the form to file information returns with the IRS, reporting the above information. Routine uses of this information include giving it to the Department of Justice for civil and criminal litigation and to cities, states, the District of Columbia, and U.S. commonwealths and possessions for use in administering their laws. The information also may be disclosed to other countries under a treaty, to federal and state agencies to enforce civil and criminal laws, or to federal law enforcement and intelligence agencies to combat terrorism. You must provide your TIN whether or not you are required to file a tax return. Under section 3406, payers must generally withhold a percentage of taxable interest, dividend, and certain other payments to a payee who does not give a TIN to the payer. Certain penalties may also apply for providing false or fraudulent information.

Job No.: _____

**TAX FORM/DEBT/ RESIDENCE CERTIFICATION**
**(for Advertised Projects)**

Taxpayer Identification Number (T.I.N.): _____

Company Name submitting Bid/Proposal: _____

Mailing Address: _____

Are you registered to do business in the State of Texas? Yes No

If you are an individual, list the names and addresses of any partnership of which you are a general partner or any assumed name(s) under which you operate your business

_____

_____

I. **Property:** List all taxable property in Fort Bend County owned by you or above partnerships as well as any d/b/a names. Include real and personal property as well as mineral interest accounts. (Use a second sheet of paper if necessary.)

| Fort Bend County Tax Acct. No.* | Property address or location** |
|---|---|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

** This is the property account identification number assigned by the Fort Bend County Appraisal District.*

*** For real property, specify the property address or legal description. For business personal property, specify the address where the property is located. For example, office equipment will normally be at your office, but inventory may be stored at a warehouse or other location.*

**II.** **Fort Bend County Debt** - Do you owe any debts to Fort Bend County (taxes on properties listed in I above, tickets, fines, tolls, court judgments, etc.)?

Yes No If yes, attach a separate page explaining the debt.

**III.** **Residence Certification** - Pursuant to Texas Government Code §2252.001 *et seq.*, as amended, Fort Bend County requests Residence Certification. §2252.001 *et seq.* of the Government Code provides some restrictions on the awarding of governmental contracts; pertinent provisions of §2252.001 are stated below:

(3) "Nonresident bidder" refers to a person who is not a resident.

(4) "Resident bidder" refers to a person whose principal place of business is in this state, including a contractor whose ultimate parent company or majority owner has its principal place of business in this state.

I certify that _____ is a Resident Bidder of Texas as defined in Government Code
[Company Name]
§2252.001.

I certify that _____ is a Nonresident Bidder as defined in Government Code
[Company Name]
§2252.001 and our principal place of business is _____.
[City and State]

**Mandatory Form**

## Contractor Acknowledgement of Storm Water Management Program

I hereby acknowledge that I am aware of the stormwater management program and standard operating procedures developed by Fort Bend County in compliance with the TPDES General Permit No. TXR040000. I agree to comply with all applicable best management practices and standard operating procedures while conducting my services for Fort Bend County. I agree to conduct all services in a manner that does not introduce illicit discharges of pollutants to streets, stormwater inlets, drainage ditches or any portion of the drainage system. The following materials and/or pollutant sources must not be discharged to the drainage system as a result of any services provided:

1. Grass clippings, leaves, mulch, rocks, sand, dirt or other waste materials resulting from landscaping activities, (except those materials resulting from ditch mowing or maintenance activities)
2. Herbicides, pesticides and/or fertilizers, (except those intended for aquatic use)
3. Detergents, fuels, solvents, oils and/or lubricants, other equipment and/or vehicle fluids,
4. Other hazardous materials including paints, thinners, chemicals or related waste materials,
5. Uncontrolled dewatering discharges, equipment and/or vehicle wash waters,
6. Sanitary waste, trash, debris, or other waste products
7. Wastewater from wet saw machinery,
8. Other pollutants that degrade water quality or pose a threat to human health or the environment.

Furthermore, I agree to notify Fort Bend County immediately of any issue caused by or identified by:

_____

(Company/Contractor)

that is believed to be an immediate threat to human health or the environment.

_____ _____

Contractor Signature Date

_____

Printed Name

_____

Title

 **BID _____**

# NOTICE OF SPECIFICATIONS

For this project, the contractor shall use the attached Special Provisions, Special Specifications and reference the Specification Book, TXDOT 2014 STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS AND BRIDGES, November 1, 2014. (SPECIFICATIONS ARE NOT INCLUDED – ITEMS IN PARENTHESIS ARE REFERENCE ITEMS TO SPECIFICATIONS)

| | |
|---|---|
| 104 | REMOVING CONCRETE |
| 134 | BACKFILLING PAVEMENT EDGES (162), (166), (168), (300), (314) |
| 162 | SODDING FOR EROSION CONTROL (166), (168) |
| 166 | FERTILIZER (520) |
| 168 | VEGETATIVE WATERING |
| 275 | CEMENT TREATMENT (ROAD-MIXED) (4), (132), (204), (210), (216), (247), (300), (310), (520) |
| 360 | CONCRETE PAVEMENT (421), (422), (438), (440), (529), (585) |
| 416 | DRILLED SHAFT FOUNDATIONS (9), (405), (420), (421), (423), (440), (448) |
| 529 | CONCRETE CURB, GUTTER, AND COMBINED CURB AND GUTTER (360), (420), (421), (440) |
| 531 | SIDEWALKS (104), (360), (420), (421), (440), (530) |
| 536 | CONCRETE MEDIANS AND DIRECTIONAL ISLANDS (420), (421), (427), (440), (529) |
| 618 | CONDUIT (9), (400), (476) |
| 620 | ELECTRICAL CONDUCTORS (9), (610), (628) |
| 621 | TRAY CABLE (9), (620) |
| 624 | GROUND BOXES (420), (421), (432), (440), (618), (620) |
| 628 | ELECTRICAL SERVICES (441), (445), (449), (618), (620), (627), (656) |
| 666 | REFLECTORIZED PAVEMENT MARKINGS (9), (316), (502), (662), (677), (678) |
| 672 | RAISED PAVEMENT MARKERS (9), (677), (678) |
| 677 | ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS (9), (300), (302), (316) |
| 678 | PAVEMENT SURFACE PREPARATION FOR MARKINGS (9), (677) |
| 680 | INSTALLATION OF HIGHWAY TRAFFIC SIGNALS (416), (610), (618), (624), (625), (627), (628), (636), (656), (682), (684), (686), (688) |
| 682 | VEHICLE AND PEDESTRIAN SIGNAL HEADS |
| 684 | TRAFFIC SIGNAL CABLES (9) |
| 686 | TRAFFIC SIGNAL POLE ASSEMBLIES (STEEL) (416), (421), (441), (442), (445), (449) |
| 687 | PEDESTAL POLE ASSEMBLIES (445), (449), (656), (682) |
| 688 | PEDESTRIAN DETECTORS AND VEHICLE LOOP DETECTORS (9), (618), (624), (682), (684) |

## SPECIAL SPECIFICATIONS (INCLUDED)

| | |
|---|---|
| SS6058 | BATTERY BACK-UP SYSTEM FOR SIGNAL CABINETS |
| SS6306 | VIDEO IMAGING VEHICLE DETECTION SYSTEM |

## SPECIAL PROVISIONS (INCLUDED)

| | |
|---|---|
| 360-001 | CONCRETE PAVEMENT |
| 666-007 | REFLECTORIZED PAVEMENT MARKINGS |
| 672-001 | RAISED PAVEMENT MARKERS |
| 680-006 | HIGHWAY TRAFFIC SIGNALS |
| 686-002 | TRAFFIC SIGNAL POLE ASSEMBLIES |

END OF DOCUMENT

# Special Specification 6058
# Battery Back-Up System for Signal Cabinets

## 1. DESCRIPTION

Install a Battery Back-Up System (BBU System) for traffic signals that will provide reliable emergency power in the event of utility power failure or interruption. The system will also function as a power conditioner and/or voltage regulation device.

A BBU System consists of inverter/charger, manual bypass switch, power transfer switch or automatic bypass switch, batteries, battery monitoring device, wiring, external cabinet or stand-alone cabinet, concrete pad, all necessary hardware and software, and all associated equipment required to operate in a field environment.

The BBU System shall be capable of operating an “LED only” signalized intersection (700W load) for 4 hours of full runtime when utility power is disabled and under ambient temperatures of 25oC. The BBU System shall switch the intersection to flash mode of operation when approximately 40% of battery charge is remaining, via relay contact connection points on the front panel of the unit. The BBU system shall operate the intersection in the flash mode of operation (300W load) for an additional 2 hours. BBU system components shall be rated for a minimum 1400W load capacity.

The BBU shall be designed for outdoor applications in accordance with NEMA TS2-2003, Section 2. All components of the BBU system shall be rated to operate under temperature extremes of -34oC to +74oC.

## 2. DEFINITIONS

2.1. **Automatic Bypass Switch**. A unit connected between the utility power supply and the inverter/charger which can automatically switch power to the controller cabinet service panel from inverter output power to utility line power.

2.2. **Battery Back-Up System (BBU System).** The battery back-us system includes, but is not limited to, a manual bypass switch, automatic bypass switch or power transfer switch, inverter/charger, batteries, battery monitoring device, wiring, external cabinet and all necessary hardware for system operation.

2.3. **Battery Back-Up System Software.** All software associated with operation, programming and functional requirements of the BBU system.

2.4. **Battery Monitoring Device.** The device which monitors battery temperatures and charge rate of the batteries used in the BBU system.

2.5. **Batteries.** Standard 12V batteries wired in series to create a 36VDC to 96VDC voltage storage.

2.6. **Boost.** When enabled, the BBU inverter/charger shall automatically switch into this mode to raise the utility line voltage when it drops below a preset limit. The limit may be user defined or use manufacturer default settings (typically 100V AC).

2.7. **Buck.** When enabled, the unit shall automatically switch into this mode to reduce the utility line voltage when it rises above a preset limit. The limit may be user defined or use manufacturer default settings (typically 135V AC).

2.8. **External or Stand-Alone Cabinet.** The structure which houses the system components and/or batteries for the BBU System.

2.9. **Inverter/Charger.** The unit which converts the DC voltage input into 120 VAC output for the traffic signal cabinet to operate. As a minimum the inverter/charger shall be rated for 1400 watts.

2.10. **Inverter Line Voltage.** The power supplied from the BBU system to the traffic signal cabinet from the BBU System inverter.

2.11. **Manual Bypass.** Manual switch that allows user to bypass BBU power to service system equipment. Manual bypass switch switches utility line power directly to cabinet.

2.12. **Power Transfer Switch.** A unit connected between the utility power supply and the inverter/charger which can automatically switch from utility line power to inverter output power. The power transfer relay may be a separate unit or combined with the manual bypass switch. In the event of battery voltage loss, the power transfer switch will automatically return to utility line power.

2.13. **Signal Operation Mode.** A signalized intersection generating a 700W load when running in normal operation.

2.14. **Signal Flash Mode.** A signalized intersection generating a 300W load when running in the flash mode of operation.

2.15. **Utility Line Voltage.** The 120V AC power supplied to the BBU system.

## 3. EQUIPMENT

Ensure electrical materials and construction methods conform to the current NEC and additional local utility requirements. Furnish battery back-up systems prequalified by the Department. The Traffic Operations Division maintains a Material Producer List (MPL) of prequalified battery back-up systems. Ensure all materials and construction methods conform to the details shown on the plans, the requirements of this Item, and the pertinent requirements of the following Items:

- Item 420, “Concrete Substructures”
- Item 620, “Electrical Conductors”

Provide and install a BBU system that is able to fulfill the following requirements:

3.1. **Method of Operation.** The BBU system shall operate using one or more of the following methods:

3.1.1. **Buck and Boost Method**. When the buck and boost functions are enabled they shall set the upper and lower control limit allowable for the utility line voltage.

If the utility line voltage fluctuates above or below the buck and boost values, the BBU system shall raise or lower the voltage by approximately 10-15% of the utility line voltage in an attempt to bring the voltage back into the upper and lower control limits. Buck and boost shall have preset manufacturer defaults.

If the utility line voltage falls above or below the functional capabilities of buck and boost, then the BBU system will transfer power from the utility line voltage to the inverter line voltage.

3.1.2. **Stand-by Method.** The stand-by method shall set upper and lower control limits for the utility line power. If the utility line voltage falls above or below the upper or lower control limits, then the BBU system will transfer power from the utility line voltage to the inverter line voltage.

3.1.3. **Continuous Operating Mode, Double Conversion Method.** The continuous method supplies the cabinet with inverter line voltage at all times. This method requires the disabling of buck and boost functions.

3.2. **System Capabilities.** The BBU system shall be capable of providing 1400W peak load, with a minimum of 80% inverter efficiency, for at least 10 seconds.

The BBU system shall be capable of providing 700W signal operation load for a minimum of 4 hours, and then switching to and providing 300W signal flash load for an additional 2 hours minimum, when batteries are fully charged.

When the BBU system is running on battery power, the inverter/charger shall be capable of allowing the voltage at which the transition from normal operating load to flash mode occurs (usually 47.5V) to be selected by a user, via relay contacts and connection points on the front panel of the inverter/charger.

The transfer time allowed, from disruption of normal utility line voltage to stabilized inverter line voltage from batteries, shall be less than 65 milliseconds. The same allowable transfer time shall also apply when switching from inverter line voltage to utility line voltage.

The BBU system shall bypass utility line voltage whenever the utility line voltage is outside of the manufacturer's default, or a user-programmed voltage range, ±2VAC.

When the utility line power has been restored to a normal operating voltage for more than a user defined setting (default 30 seconds), the BBU system shall transfer from inverter line voltage to utility line voltage. The BBU system shall be equipped to prevent a malfunction feedback to the cabinet or from feeding back to the utility service.

The BBU system shall be compatible with TS1, TS2 and Model 170/2070 controllers and cabinet components for full run-time operation.

Unless the plans indicate otherwise, provide a BBU in an external battery cabinet. When indicated by the plans, provide a BBU system that can be shelf-mounted in NEMA TS-1 and TS-2 cabinets, or rack-mounted for Model 170/2070 332 cabinets. Provide a manual bypass that is capable of shelf mounting or that can be attached to the side of the signal cabinet. Provide interconnect cables that are no less than 10 ft. in length.

Relay contact wiring for each set of NO/NC relay contact closure terminals shall be no less than 6 feet long and #18 AWG wire. Use manufacturer recommendations for size of wire for any cables lengths greater than 10 feet.

The BBU system shall have lightning surge protection compliant with IEEE/ANSI C.62.41 latest edition and meeting all current UL1449 standards. Lightning surge protection shall be provided to the utility line voltage coming into the inverter/charger. The surge protection device shall be easily accessible and mounted externally from the inverter/charger.

The BBU system, including batteries and hardware, shall be easily replaceable and shall not require any special tools for installation.

The BBU system shall operate in automatic "fail-safe" mode. Should a breaker trip on the inverter/charger and/or the power transfer switch, the system will automatically operate from utility line power and bypass the BBU system.

As stated above, in addition to the inverter/charger, the BBU shall be provided with both an external manual bypass switch and either an external automatic transfer switch or external automatic bypass switch.

The BBU system shall be capable of logging up to 100 events. Events shall date- and time-stamp faults with utility line voltage and battery voltages. At the minimum, the BBU system shall log an event when:

- the utility line voltage falls above or below the upper or lower control limits,
- the BBU system automatically switches to battery power, and
- when self-monitoring BBU system components fail.

3.3. **Displays, Controls, Diagnostics and Maintenance.** The BBU system shall include a front panel display. All applicable programmable functions of the operational methods described in this specification shall be viewable from the front panel display.

All events described in Section 3.2, "System Capabilities" shall be viewable from the front panel display.

The BBU system software shall be programmable from the front panel of the inverter/charger by means of a keyboard or momentary buttons allowing user to step through menu driven software.

A 10/100 Ethernet port shall be provided on the front panel of the inverter/charger.

A RS232 port shall be provided on the front panel of the inverter/charger.

The BBU system software shall be provided for the operational needs of the BBU system. The user/operator shall be able to access all system software via the Ethernet and RS232 ports on the front panel of the inverter/charger. The user shall be able to read logged events and change programmable parameters from the keyboard, laptop or local area network via the Ethernet port.

System software shall be upgradeable via the RS232 port on the front panel of the inverter/charger.

3.4. **Inverter/Charger.** The inverter/charger is the unit that provides the voltage regulation; power conditioning of utility line power; convert the DC voltage input into 120 VAC output for the traffic signal cabinet to operate; provides emergency backup power upon loss of utility power and provides for temperature compensated battery charging. As a minimum the inverter/charger shall be rated for 1400 watts. Provide a minimum of 6 sets of normally open (NO) and normally closed (NC) single-pole double-throw dry contact relay closures on the front face of the inverter/charger and labeled so as to identify each contact. The relay closures shall consist a set of NO/NC contact closures that shall be energized whenever the unit switches to battery power (contact shall be labeled or marked as “On Battery” or equivalent) and a second set of NO/NC contact closures shall be energized whenever the battery approaches 40% remaining capacity (contact shall be labeled or marked as “Low battery” or equivalent”), which will determine when the unit will switch from normal operation to flash. A third set of NO/NC contact closures shall be energized after a user settable time after the unit switches to battery power. The contact may be labeled “Timer. The remaining relays shall be user definable.

Operating temperature range for both the inverter/charger and power transfer relay shall be -34°C to +74°C. When battery power is used, the BBU system output voltage shall be between 110VAC and 125VAC, pure sine wave output, ≤ 3% THD, 60Hz ± 3Hz.

3.5. **Manual Bypass Switch.** The manual bypass switch shall be provided as a separate unit external to the inverter/charger unit. The manual bypass switch shall consist of housing, two position switch, terminal blocks, internal wiring, service outlet, circuit breakers and mounting hardware. All components shall be rated at a minimum of 240VAC / 30 amp. Provide the manual bypass switch with # 8 terminal blocks. The manual bypass switch shall be 2 position and allow the user to switch utility line power directly to the cabinet service panel. The switch positions will provide the following functions. In the “Bypass” position the inverter is bypassed, utility power is removed from the BBU and passed directly to the signal power panel. In the “UPS” position the inverter / switch is powered and the signal circuits are supplied by the output of the inverter. When the manual bypass switch is in the “Bypass” position the user may replace the automatic bypass switch (or transfer switch) and the inverter/charger without interrupting power to the intersection. Provide the manual bypass switch with over current protection (20 Amp circuit breaker).

3.6. **Power Transfer Switch.** These requirements are for BBU systems provided with a power transfer switch. The power transfer switch will operate such that the inverter/charger input and cabinet power panel are supplied with power from the utility line, in the event that the utility line power is lost or requires conditioning (buck or boost) the power transfer switch will automatically connect the inverter/charger output to the cabinet power panel such that the inverter/charger output provides the power. In the event of inverter/charger failure, battery failure, or complete battery discharge, the power transfer shall revert to the NC (de-energized) state, where utility line power is connected to the cabinet service panel.

All wire to the power transfer switch from the manual bypass switch, to and from the inverter/ charger and from the manual bypass switch to utility power service shall be sized accordingly with system requirements.

3.7. **Automatic Bypass Switch.** These requirements are for BBU systems provided with an automatic bypass switch. The automatic bypass switch will operate such that the inverter/charger input is supplied with power

from the utility line and the cabinet power panel is supplied with power from the output of the inverter/charger. In the event of inverter/charger failure, battery failure, or complete battery discharge, or other loss of power from the output of the inverter/charger, the automatic bypass switch shall revert to the NC (de-energized) state, where utility line power is connected to the cabinet service panel.

3.8. **Batteries.** Provide batteries from the same manufacturer/vendor of the BBU system.

Individual batteries shall be 12V type, and shall be easily replaceable and commonly available for purchase by common off-the-shelf equivalent.

Batteries shall be sized and rated to operate a 700W load for 4 hours (normal operation) followed by a 300W load for 2 hours (flash operation) for a total of 6 hours.

Battery configuration shall consist of 12V batteries arranged for total voltages of 36V, 48V, 60V, 72V, 84V or 96V.

Batteries shall be deep-discharge, sealed prismatic lead-calcium based, valve-regulated maintenance-free batteries.

Batteries shall operate over a temperature range of -34°C to +74°C.

Batteries shall indicate maximum recharge data and recharging cycles, and manufacturer defaults on the inverter/charger shall not allow the recharging process to exceed the batteries maximum values.

Battery interconnect wiring shall connect to the inverter unit via modular harness with red and black cabling that terminates into a typical power pole style connector. Harness shall be equipped with mating power flag style connectors for batteries and a single insulated plug-in style connection to inverter/charger unit. Harness shall allow batteries to be quickly and easily connected in any order and shall be keyed to ensure proper polarity and circuit configuration. A fusible link or device sized accordingly with system requirements and to protect against currents exceeding each battery current rating shall be provided within 3 inches of the negative and positive leads of each battery. Fusible links shall be insulated stranded wire.

Insulated covers shall be provided at the connection points (post) as to prevent accidental shorting.

Battery cables provided to connect battery to battery harness main cable shall be a minimum of 18 in. or long enough to accommodate the battery covers provided with the battery ground box, whichever is longer. Battery harness shall be sized accordingly with system requirements.

3.9. **Battery Monitoring System.** The BBU system shall use a temperature-compensated battery charging system. The charging system shall compensate over a range of 2.5 – 4.0 mV/°C per cell.

The temperature sensor shall be used to monitor the temperature and regulate the charge rate of the batteries. Unless required otherwise by the plans the temperature sensor wire shall be as follows:

- 8 feet long if external side-mounted cabinet is attached to existing controller cabinet.
- 8 feet long if batteries are housed in traffic signal base used for cabinet foundation and batteries are stored on shelf within base.
- 8 feet long if stand-alone cabinet is used.

Should the temperature sensor fail, the inverter/charger shall not allow the BBU system to overcharge the batteries. The BBU system shall provide an alarm should the temperature sensor fail.

Recharge time for the batteries to obtain 80% or more of full battery charge capacity shall not exceed 20 hours at 21°C (70°F).

Batteries shall not be charged when battery temperature exceeds 50°C.

The BBU system shall monitor battery strings within a system and set a fault indicator if battery voltage falls below normal operating voltage.

3.10. **Battery Housing.** Unless plans require otherwise, project an external battery cabinet or stand-alone BBU/battery cabinet as specified below.

3.10.1. **External Battery Cabinet.** The external cabinet shall be NEMA type 3R all-aluminum with stainless-steel hardware, or approved equivalent. The external cabinet shall be designed to attach on the side of a TS2 size 6 base-mount cabinet. The batteries, inverter, transfer switches, manual bypass and all associated hardware shall be housed in the external cabinet.

The external cabinet shall be equipped with proper ventilation, electric fan, and air filter in accordance with TS2 standards.

External cabinets will be equipped with a door opening to the entire cabinet. The door shall be attached to the cabinet with a full length stainless steel piano hinge or four, two-bolts per leaf, hinges. The door shall be provided with the same latch and lock mechanism as required for standard traffic signal cabinet. In addition, a padlock clasp will be provided.

When using battery ground boxes, an external cabinet is required for the non-battery components. .

3.10.2. **Stand-Alone BBU/Battery Cabinet.** When required for installation by the plans a stand-alone cabinet in accordance with the following shall be provided.

The stand-alone cabinet shall conform to all the specifications of the External BBU/Battery Cabinet, except that it will not mount to the controller cabinet. The stand-alone cabinet shall be designed to attach to a concrete pad.

3.11. **Concrete Pad.** Provide a Class B concrete pad as a foundation for stand-alone cabinets of the size shown in the plans. For external cabinets, extend the controller foundation to provide a class B concrete pad under the external cabinet of the size shown in the plans.

3.12. **Documentation.** Operation and maintenance manuals shall be provided. The operation manual shall include a block diagram schematic of all system hardware components. The manual shall include instructions for programming and viewing software features. The manual shall include all uploading/downloading (communications protocol) requirements via RS232 or Ethernet port.

Board level schematics shall be provided when requested.

Battery documentation and replacement information shall be provided.

3.13. **Testing.** The Department reserves the right to do testing on BBU systems to ensure Quality Assurance on unit before installation and random sampling of units being provided to the State. BBU systems that fail will be taken off the Qualified Products List (QPL).

Department QPL testing procedures will check compliance with all the criteria of this specification including the following:

- Event logging for fault/alarm conditions
- Demonstrated use of one or more of the operating methods described in Section 3.1., “Method of Operation.”
- Testing of ability to power a 700W load for 4 hours, transfer to flash mode and power a 300W load for 2 additional hours, at an ambient temperature of +25°C.
- Testing of all components in environmental chamber (temperature ranges from -30°C to +74°C) following NEMA TS2 2003 standards, Section 2.

3.14. **Warranty, Maintenance and Support.** Provide a BBU containing a warranty that requires the manufacturer to replace failed BBUs when non-operable due to defect in material or workmanship within five years of date of purchase from manufacturer. Supply a BBU with no less than 95% of the manufacturer's warranty remaining on the date that the BBU is installed and begins operating. The replacement BBU must meet requirements of this specification. The Contractor will handle all warranty issues until the date of final acceptance.

Batteries shall be warranted for full replacement for 5 years. Batteries shall be defined as bad if they are not able to deliver 80% of battery rating.

## 4. MEASUREMENT

This Item will be measured by each BBU system installed.

## 5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "BBU System" of the type (type of BBU cabinet) specified. This price is full compensation for furnishing, installing, and testing the completed installation, BBU system and associated equipment, mounting hardware, class B concrete pad, software, conduit, conductors; and equipment, labor, tools; and incidentals.

# Special Specification 6306
# Video Imaging Vehicle Detection System

## 1. DESCRIPTION

Furnish, install, relocate, or remove video imaging vehicle detection system (VIVDS) at locations shown on the plans, or as directed. Use VIVDS listed on the Department's Prequalified Products List.

## 2. MATERIALS

2.1. **General**. Furnish, assemble, and install only new materials except as allowed for relocation of VIVDS equipment. Ensure all VIVDS within the project are from the same manufacturer.

VIVDS must analyze video images and produce vehicle detector outputs that can serve as inputs to a traffic signal controller. Provide VIVDS field equipment that is compatible with existing infrastructure and software located in the Department's Traffic Management Control Centers across the state as directed. VIVDS must meet Department TSS Protocol requirements when integration with Traffic Management Center software or systems is shown on the plans.

VIVDS equipment must include the following:

- Camera and mounting hardware (fixed or variable focal length; infrared; or 360° "fish-eye"),
- VIVDS processor,
- Cabinet control unit and associated devices required for system integration, and
- Data, power, and communication cable, connectors, and assemblies.

The VIVDS must use one or more cameras and video processing equipment to accurately provide detector calls for the intersection, approach, or roadway segment where they are installed, and provide detection as shown on the plans. A single camera placed per manufacturer recommendations must be capable of monitoring and detecting 5 lanes of traffic simultaneously.

Ensure the system is designed and constructed with subassemblies, circuits, cards, and modules to maximize standardization and commonality.

Ensure field replaceable parts are accessible for inspection and maintenance. Provide test points for checking essential voltages and waveforms.

VIVDS devices must self-recover from power failure once power is restored.

2.2. **Configuration and Management**. Ensure that the VIVDS allows local and remote configuration and monitoring. The VIVDS must allow the user to fully configure the system and place detection zones using a mouse, monitor, and keyboard (or keypad) connected to the VIVDS. Provide each VIVDS with all associated equipment required to configure and operate the system in a field environment including a video monitor, mouse, keyboard (or keypad), software, and interface cables as applicable. The VIVDS must also support local configuration and monitoring using a laptop computer, but must not require a computer for local configuration, monitoring, and operation.

Ensure that the system can display detection zones and detection activations overlaid on live video from VIVDS cameras.

Ensure that the VIVDS allows a user to edit previously defined configuration parameters, including size, placement, and sensitivity of detection zones.

Ensure that the VIVDS retains its programming in nonvolatile memory. Ensure that the detection system configuration settings can be saved to a computer and restored from a saved file locally and remotely. The system must allow stored configurations to be modified for fine-tuning and optimization. The VIVDS must continue to detect vehicles and operate normally while configuration and detection zone modifications are made.

Ensure the VIVDS does not require adjustment or recalibration to maintain performance once initial calibration and configuration is complete.

2.3. **Detection Zones**. The VIVDS must allow a user to configure detection zones using a graphical user interface (GUI) superimposed on a video image of the roadway. Ensure detection zones can be placed anywhere within a camera field of view. Ensure VIVDS detection zones can detect vehicle presence and collect traffic data, such as traffic counts.

Detection zones must appear as lines or polygons in the field of view. The system must allow a minimum of 8 detection zones per field of view. VIVDS detection zones must be able to provide detection equivalent to a 6 ft. by 6 ft. loop. Ensure zones can be sized, shaped, and overlapped to accurately detect vehicles at the locations shown on the plans.

The system must allow zones to be configured with directionality, delay, extension, and logic functions including “AND” and “OR.” If each detection zone provides a unique output to the signal controller and the controller includes logical functions, then the VIVDS is not required to support logic functions.

Ensure zones displayed on a monitor provide a visual indication when vehicles are detected during configuration and operation.

2.4. **Detection.** VIVDS processor must compensate for minor camera movement. Movement up to 2% of field of view at 400 ft. must not produce a false detection.

Ensure VIVDS processor operates regardless of whether monitoring equipment is connected. If monitoring equipment is connected to the processor unit, vehicle detections are displayed real-time as they occur.

VIVDS must simultaneously detect vehicles in all lanes. VIVDS must be able to accurately detect approaching and departing vehicles in multiple lanes. VIVDS is configurable for which direction of travel to detect. Ensure vehicles traveling in any direction other than the configured direction of travel (e.g., cross-street and wrong-way traffic) do not activate a call to the controller.

Ensure a constant call is placed on outputs associated with zones or cameras that are in an error state or failed. Ensure a constant call is placed on assigned outputs whenever the system is unable to provide accurate detection.

2.5. **Accuracy.** Ensure VIVDS individual lane accuracy for vehicle presence detection is within 5% of actual.

2.6. **Camera.** Use color or thermal cameras that are provided as part of an engineered system by the VIVDS processor manufacturer or approved for use by the VIVDS processor manufacturer. Ensure that analog cameras provide NTSC composite video with a minimum resolution of at least 480 TVL.

Cameras must produce useable video suitable for detection in low light. Cameras with day and night modes must automatically and seamlessly transition between modes without producing vehicle detection errors such as false calls and missed calls. Nighttime monochrome operation must produce feature resolvable video with luminance as low as 0.1 lux. Nighttime color operation must produce feature resolvable video with luminance as low as 1.0 lux.

Cameras must produce resolvable features in the video with luminance as high as 10,000 lux.

Visual spectrum cameras must include automatic electronic shutter and iris control based on average scene luminance.

Variable focal length lenses must be adjustable from 6 mm to 34 mm.

Processed images produced by the VIVDS must use a standard encoding format such as H.264 or MJPEG unless otherwise shown on the plans.

2.6.1. **Thermal cameras.** Thermal imaging cameras must use a long-life, uncooled vanadium oxide microbolometer thermal detector with a spectral range of 7.5 to 13.5 µm.

Ensure analog video is compliant with National Television System Committee (NTSC) Standard and has a minimum NTSC array format of 320 x 240 with a 76,800 pixel effective resolution.

2.6.2. **Camera enclosure.** Camera and lens assembly must be housed in an enclosure designed for outdoor use. The housing must be light in color to limit solar heating and prolong equipment life. Enclosure, including cable connections, must be waterproof and dust tight with a NEMA Type 4 rating.

Ensure enclosures for visual spectrum cameras include a sunshield. Sunshield must protrude beyond the front edge of the enclosure and divert water away from the camera's field of view. Ensure the sunshield overhang is adjustable. Any plastics used in the construction of the enclosure must include ultraviolet inhibitors.

Ensure the enclosure allows the camera horizon to be rotated in the field during installation. Ensure camera focus and zoom can be adjusted, if necessary, without entering the camera enclosure.

The camera enclosure must be provided with mounting bracket designed to mount directly to a pole, mast-arm, or other structure. Ensure the bracket allows the camera to be panned and tilted for alignment and then locked into place once properly positioned.

The camera enclosure with camera and lens installed must weigh 10 lb. or less.

Camera housing must include a means to prevent the formation of ice or condensation. If camera housing includes a heater, wiper, or other electronically controlled mechanism, such mechanism does not interfere with the camera operation or video signal.

2.7. **Video Processor**. Ensure the VIVDS includes a machine vision processor that provides video analysis, presence detection, and interfaces for inputs and outputs. VIVDS must provide data collection features, including storage and reporting of collected vehicle detection data, when shown on the plans.

VIVDS must be able to interface with the traffic controller unit (CU) via the detector rack, SDLC, or another detector interface described in NEMA TS2-2016, unless otherwise shown on the plans. Solid state detection outputs must meet the requirements of NEMA TS2-2016, 6.5.2.26.

Each VIVDS detector rack card must have a minimum of 4 detector outputs. The system must be able to provide a total of 24 detection outputs. Ensure each zone and output is user definable, and previously saved zones can be redefined.

The system must be capable of functioning as a detector BIU using an RS-485 SDLC connector. TS2 Type 1 VIVDS must include indicators that display detector output status for verification of calls.

Analog video inputs must use BNC connectors or be routed through existing loop inputs using connections designed for that purpose. Analog video outputs must use BNC or RCA connectors. Use of external cable connections to create a combined video output is not allowed.

Ensure processor includes provisions to view video image in the field and remotely.

VIVDS processors installed in the traffic controller cabinet must utilize digital video or accommodate asynchronous, synchronous, and line-locked analog video as part of a complete system engineered by the VIVDS manufacturer.

2.8. **Camera Interface Panel**. Supply the VIVDS with a camera interface panel as required by the manufacturer that provides a cabinet connection point between field wiring from VIVDS cameras and VIVDS equipment in the cabinet. The interface panel must be provided by the VIVDS manufacturer as part of a complete engineered system. The panel must include terminal facilities and surge suppression for all conductors used to connect VIVDS field equipment, including camera power and communications. Interface panels for analog cameras must include a 10 amp breaker or blade type fuses and a power terminal strip with a minimum of eight (8) 8/32 binder head screws for camera power connections. The panel must also have, as a minimum, four (4) coax protectors (EDCO CX06 or equivalent). Additional lightning and transient protection will be allowed. All components that reside on the panel must be Department approved. For cameras utilizing POE the interface panel must consist of surge protection meeting GR 1089 standards.

Ensure interface panel is capable of being mounted on the side walls of the controller cabinet. Video connections must be isolated from earth ground.

2.9. **Cabling**. Supply the VIVDS with connector cables of the appropriate length for each installation site. Connector cables must include all conductors necessary for power, video, and communication. All cabling used must meet the minimum recommended specifications of the VIVDS manufacturer.

Ensure the power and data cable connectors are IP 67 to protect against intrusion of solids and water. External connectors must be quick disconnect and keyed to prevent improper connections. All wiring must be color coded and marked appropriately. Ensure all conductors that interface with the connector are encased in a single jacket.

Fiber optic cable, if used, must meet the requirements of Special Specification Item Intelligent Transportation System (ITS) Fiber Optic Cable.

If coaxial cable is used, it must be low loss, 75 ohm, precision video cable suited for outdoor installation and approved by the VIVDS manufacturer.

RS-485 and RS-232 communication cable must meet the requirements of Special Specification 6004 Networking Intelligent Transportation System (ITS) Communications Cable.

2.10. **Communication**. Ensure that the VIVDS includes a minimum of one serial or Ethernet communications interface.

Ensure serial interfaces and connectors conform to Telecommunications Industry Association (TIA)-232 standards. Ensure that the serial ports support data rates up to 115200 bps; error detection utilizing parity bits (i.e., none, even, and odd); and stop bits (1 or 2).

Ensure that wired Ethernet interfaces provide a 10/100 Base TX connection. Verify that all unshielded twisted pair/shielded twisted pair network cables and connectors comply with TIA-568.

Ensure wireless communications are secure and that wireless devices are Federal Communications Commission (FCC) certified. Ensure that the FCC identification number is displayed on an external label and that all detection system devices operate within their FCC frequency allocation.

Ensure the system can be configured and monitored via one or more communications interface. Ensure that all communication addresses are user programmable.

2.11. **Software**. Ensure the VIVDS manufacturer includes all software required to configure and monitor operation of VIVDS field equipment locally and remotely. VIVDS software must be a stable production release approved by the Department's Traffic Operations Division.

Ensure VIVDS computer software includes a GUI that displays all configured lanes and provides visual representation of all detected vehicles. Server software must be designed to run on the Windows Server operating system (Windows Server 2012 or newer). Client workstation software must be designed to run on Microsoft Windows 7 Professional and newer.

VIVDS software must allow the user to program, operate, exercise, diagnose, and read status of all VIVDS features and functions using a laptop computer.

VIVDS computer software must be able to communicate with VIVDS field devices using TCP/IP and serial connections. The software must provide for local and remote configuration and monitoring, including display of detection zone activations on live video and modification of existing detection zone layouts.

System software must provide the user complete control over the configuration process for VIVDS devices and allow the user to load new firmware into non-volatile memory of VIVDS field devices locally and over any supported communication channel including TCP/IP networks.

The system software must include the ability to retrieve and store data collected by VIVDS field devices.

Ensure all licenses required for operation and use of software are included at no additional cost.

Software updates must be provided at no additional cost during the warranty period.

2.12. **Mechanical**. VIVDS detector card rack units must comply with dimensions specified in NEMA TS2-2016, 6.5.2.2.2.

Ensure that all parts are fabricated from corrosion resistant materials, such as plastic, stainless steel, aluminum, or brass.

Ensure that all screws, nuts, and locking washers are stainless steel. Do not use self-tapping screws.

Ensure equipment is clearly and permanently marked with manufacturer name or trademark and part number as well as date of manufacture or serial number.

Ensure VIVDS is modular in design for ease of field replacement and maintenance.

All printed circuit boards must have conformal coating to protect against moisture and fungus.

2.13. **Electrical**. Ensure equipment is designed to protect personnel from exposure to high voltage during installation, operation, and maintenance. Ensure all connections include the manufacturer recommend surge protective device (SPD). SPDs must not interfere with the performance of the VIVDS. VIVDS electrical design must be modular.

Ensure the VIVDS operates on nominal 120 $V_{AC}$. A power converter must be provided for devices that do not operate on nominal 120 $V_{AC}$. Camera sensors must operate between 12 $V_{DC}$ and 28 $V_{DC}$.

2.14. **Environmental.** All VIVDS devices must operate properly during and after being subjected to the environmental testing procedures described in NEMA TS2, Section 2. VIVDS cameras must be able to withstand the maximum wind load defined in the Department's basic wind velocity zone map standard without any damage or loosening from structure.

2.15. **Connectors and Harnesses.** External connections exposed to the outdoor environment must be made with weatherproof connectors. Connectors must be keyed to ensure correct alignment and mating.

Ensure all conductors are properly color coded and identified. Ensure that every conductive contact surface or pin is gold-plated or made of a noncorrosive, nonrusting, conductive metal.

RS-485 and RS-232 communication cables must:

- be shielded, twisted pair cable with a drain wire,
- have a nominal capacitance conductor to conductor @ 1Khz ≥ 26pF/ ft.,
- have nominal conductor DC resistance @ 68°F ≤ 15 ohms/1,000 ft.,
- be one continuous run with no splices, and
- be terminated only on the two farthest ends of the cable.

2.16. **Documentation**. Provide hardcopy operation and maintenance manuals, along with a copy of all product documentation on electronic media. Include the following documentation for all system devices and software:

- operator manuals,
- installation manuals with installation procedures,
- maintenance and troubleshooting procedures, and
- manufacturer's specifications (functional, electrical, mechanical, and environmental).

Provide certification from an independent laboratory demonstrating compliance with NEMA TS2 environmental requirements for temperature, humidity, transients, vibration, and shock.

Provide certification that VIVDS electronic equipment meets FCC Class B requirements for electromagnetic interference and emissions.

Ensure the VIVDS system manufacturer has a quality assurance program for manufacturing VIVDS as described in this specification. Manufacturer of the VIVDS must be ISO 9001 certified, or provide a copy of the company quality manual for review.

The VIVDS must pass testing to ensure functionality and reliability before delivery. Test results and supporting documentation, including serial number tested, must be submitted for each VIVDS. If requested, manufacturing data per serial number must be provided for each VIVDS.

2.17. **Warranty**. Warrant the equipment against defects or failure in design, materials, and workmanship for a minimum of 5 yr. or in accordance with the manufacturer's standard warranty if that warranty period is greater. The start date of the manufacturer's standard warranty will begin after the equipment has successfully passed all tests contained in the final acceptance test plan. Any VIVDS equipment with less than 90% of its warranty remaining after the final acceptance test is completed will not be accepted by the Department. Guarantee that equipment furnished and installed for this project performs per the manufacturer's published specifications. Assign, to the Department, all manufacturer's normal warranties or guarantees on all electronic, electrical, and mechanical equipment, materials, technical data, and products furnished for and installed on the project.

Malfunctioning equipment must be repaired or replaced at the Contractor's expense before completion of the final acceptance test plan. Furnish replacement parts for all equipment within 10 days of notification of failure by the Department.

During the warranty period, technical support must be available via telephone within 4 hr. of the time a call is made by a user, and this support must be available from factory certified personnel.

2.18. **Training**. Conduct a training class for a minimum of 8 hr., unless otherwise directed, for up to 10 representatives designated by the Department on installation, configuration, operation, testing, maintenance, troubleshooting, and repair. Submit a training session agenda, a complete set of training material, the names and qualifications of proposed instructors, and proposed training location for approval at least 30 days before the training. Conduct training within the local area unless otherwise directed. Provide 1 copy of course material for each attendee. Ensure that training includes:

- "Hands-on" operation of system software and equipment;
- explanation of all system commands, their function and usage; and
- system "troubleshooting," operation, and maintenance.

## 3. CONSTRUCTION

3.1. **System Installation**. Install VIVDS devices and configure detection zones and settings as shown on the plans, in accordance with the manufacturer's recommendations, and as directed. Provide configuration file backups, including detector placement, names, communication settings, and output assignments. Completion of the work must present a neat, workmanlike, and finished appearance.

VIVDS installer must be certified by VIVDS manufacturer in proper installation setup and procedures. VIVDS integrator must be certified by the manufacturer for training end users in the maintenance, configuration, and operation of VIVDS.

Ensure VIVDS detector rack cards are properly installed and seated in the controller cabinet detector rack and use the card edge connector to obtain power and provide outputs. Rewiring the backplane or any other cabinet panel for the system is not permitted except for power and grounding for camera interface panels, wiring from the video camera sensor to the loop detector panel for the video signal inputs, as applicable, and wiring to obtain power for the VIVDS cameras.

Mount and aim cameras in a manner that eliminates as much environmentally generated glare as possible.

All wiring must be cut to proper length before assembly. Provide cable service loops. All cable slack must be neatly laced and placed in the bottom of the cabinet. Ensure cables are secured with clamps. Ensure cables between the controller cabinet and VIVDS cameras are continuous with no splices.

Provisions must be made for installation and configuration of software on Department computers.

3.2. **Temporary Use.** When shown on the plans, the VIVDS equipment must be used to provide vehicle detection on a temporary basis. When the permanent vehicle detection system and related equipment are installed and made operational, the VIVDS equipment must be carefully removed and delivered to the location shown on the plans.

3.3. **Mechanical Components.** Ensure that all fasteners, including bolts, nuts, and washers with a diameter less than 5/8 in. are Type 316 or 304 stainless steel and meet the requirements of ASTM F593 and ASTM F594 for corrosion resistance. Ensure that all bolts and nuts 5/8 in. and over in diameter are galvanized and meet the requirements of ASTM A307. Separate dissimilar metals with an inert dielectric material.

3.4. **Wiring.** All wiring and electrical work supplying the equipment must meet the requirements of the most current version of the National Electrical Code (NEC). Supply and install all wiring necessary to interconnect VIVDS cameras to the controller cabinet and incidentals necessary to complete the work. If additional cables are required, the Contractor must furnish and install them at no additional cost to the Department. Provide conductors at least the minimum size indicated on the plans and insulated for 600 V.

Cables must be cut to proper length before assembly. Provide cable slack for ease of removal and replacement. All cable slack must be neatly laced with lacing or straps in the bottom of the cabinet. Ensure cables are secured with clamps and include service loops.

3.5. **Electrical Service.** The Contractor is responsible for checking the local electrical service to determine if a modification is needed for the equipment.

3.6. **Grounding.** Ensure all VIVDS devices and supports are grounded in accordance with the NEC and manufacturer recommendations.

3.7. **Relocation of VIVDS Field Equipment.** Perform the relocation in strict conformance with the requirements herein and as shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.

Inspect the existing VIVDS field equipment with a representative from the Department and document any evidence of damage before removal. Conduct a pre-removal test in accordance with the testing requirements contained in this Item to document operational functionality. Remove and deliver equipment that fails inspection to the Department.

Before removal of existing VIVDS field equipment, disconnect and isolate the power cables from the electric power supply and disconnect all communication cabling from the equipment located inside the cabinet. Coil and store power and communication cabling inside the cabinet until such time that it can be relocated. Remove existing VIVDS field equipment as shown on the plans only when authorized by the Engineer.

Use care to prevent damage to any support structures. Any equipment or structure damaged or lost must be replaced by the Contractor (with items approved by the Engineer) at no cost to the Department.

Make all arrangements for connection to power and communications including any permits required for the work to be done under the Contract. Provide conductors for the power connection at least the minimum size indicated on the plans and insulated for 600 V. Meet the requirements of the NEC most current version.

3.8. **Removal of VIVDS Field Equipment.** Perform the removal in strict conformance with the requirements herein and as shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Disconnect and isolate any existing electrical power supply before removal of existing field equipment.

Use care to prevent damage to any support structures. Any equipment or structure damaged or lost must be replaced by the Contractor (with items approved by the Engineer) at no cost to the Department.

All materials not designated for reuse or retention by the Department will become the property of the Contractor and be removed from the project site at the Contractor's expense. Deliver items to be retained by the Department to a location shown on the plans or general notes. The Contractor is fully responsible for any removed equipment until released by the Engineer.

3.9. **Contractor Experience Requirements.** Contractor or designated subcontractor must meet the following experience requirements:

3.9.1. **Minimum Experience.** Three years of continuous existence offering services in the installation of VIVDS.

3.9.2. **Completed Projects.** Three completed projects where personnel installed, tested, and integrated VIVDS field equipment. The completed installations must have been in continuous satisfactory operation for a minimum of 1 yr.

3.9.3. **Equipment Experience**. One project (may be 1 of the 3 projects in the preceding paragraph) in which the personnel worked in cooperation with technical representatives of the equipment supplier to perform installation, integration, or acceptance testing of the work. The Contractor will not be required to furnish equipment on this project from the same supplier who was referenced in the qualification documentation.

Submit the names, addresses, and telephone numbers of the references that can be contacted to verify the experience requirements given above.

## 4. TESTING

Ensure that the following tests are performed on equipment and systems unless otherwise shown on the plans. The Department may witness all the tests.

4.1. **Test Procedures Documentation.** Provide an electronic copy of the test procedures and blank data forms 60 days before testing for each test required on this project. Include the sequence of the tests in the

procedures. The Engineer will approve test procedures before submission of equipment for tests. Conduct all tests in accordance with the approved test procedures.

Record test data on the data forms as well as quantitative results. Ensure the data forms are signed by an authorized representative (company official) of the equipment manufacturer.

4.2. **Design Approval Test.** Ensure that the VIVDS has successfully completed a Design Approval Test that confirms compliance with the environmental requirements of this specification.

Provide a certification and test report from an independent testing laboratory as evidence of a successfully completed Design Approval Test. Ensure that the testing by this laboratory is performed in accordance with the requirements of this specification.

4.3. **Demonstration Test.** Conduct a Demonstration Test on applicable equipment at an approved Contractor facility. Notify the Engineer 10 working days before conducting this testing. Perform the following tests:

4.3.1. **Examination of Product.** Examine each unit carefully to verify that the materials, design, construction, markings, and workmanship comply with the requirements of this specification.

4.3.2. **Continuity Tests.** Check the wiring to determine conformance with the requirements this specification.

4.3.3. **Operational Test.** Operate each unit for at least 15 min. to permit equipment temperature stabilization and observation of a sufficient number of performance characteristics to ensure compliance with this specification.

4.4. **Stand-Alone Test.** Conduct a Stand-Alone Test for each unit after installation. The test must exercise all stand-alone (non-network) functional operations. Notify the Engineer 5 working days before conducting this test.

4.4.1. **Performance Test.** Ensure the VIVDS meets functional performance requirements of Section 2.55 using the following methods:

Verify presence detection accuracy at installed field sites by comparing sample data collected from the detection system with ground truth data collected by human observation. Collect samples and ground truth data for each detection zone for a minimum of 5 minutes during a peak period and 5 minutes during an off-peak period. Ensure the sample period for each zone includes a minimum of 3 vehicles. Perform tests in the presence of the Engineer.

Recorded video of all cameras showing vehicle detections during a 24 hr. period at each intersection must be provided within 30 days upon request. This video must allow verification of proper camera placement, field of view, focus, detection zone placement, and operation.

4.5. **System Integration Test.** Conduct a System Integration Test on the complete functional system. Demonstrate all control and monitor functions for each system component and operate the system for 72 hr.. Supply 2 copies of the System Operations manual before the System Integration Test. Notify the Engineer 10 working days before conducting this testing. The Department may witness all the tests. Conduct a System Integration Test on the complete functional system. Demonstrate all control and monitor functions for each system component for 72 hr. Supply 2 copies of the System Operations manual before the System Integration Test. Notify the Engineer 10 working days before conducting this testing.

4.6. **Consequences of Test Failure.** If a unit fails a test, submit a report describing the nature of the failure and the actions taken to remedy the situation before modification or replacement of the unit. If a unit requires modification, correct the fault and then repeat the test until successfully completed. Correct minor discrepancies within 30 days of written notice to the Engineer. If a unit requires replacement, provide a new unit and then repeat the test until successfully completed. Major discrepancies that will substantially delay receipt and acceptance of the unit will be enough cause for rejection of the unit.

If a failure pattern develops in similar units within the system, implement corrective measures, including modification or replacement of units, to all similar units within the system as directed. Perform the corrective measures without additional cost or extension of the contract period.

4.7. **Final Acceptance Test.** Conduct a Final Acceptance Test on the complete functional system. Demonstrate all control, monitor, and communication requirements and operate the system for 90 days. The Engineer will furnish a Letter of Approval stating the first day of the Final Acceptance Test. The completion of the Final Acceptance Test occurs when system downtime due to mechanical, electrical, or other malfunctions to equipment furnished or installed does not exceed 72 hr. and any individual points of failure identified during the test period have operated free of defects.

4.8. **Consequences of Final Acceptance Test Failure.** If a defect within the system is detected during the Final Acceptance Test, document and correct the source of failure. Once corrective measures are taken, monitor the point of failure until a consecutive 30-day period free of defects is achieved.

If after completion of the initial test period, the system downtime exceeds 72 hr. or individual points of failure have not operated for 30 consecutive days free of defects, extend the test period by an amount of time equal to the greater of the downtime more than 72 hr. or the number of days required to complete the performance requirement of the individual point of failure.

4.9. **Relocation and Removal**

4.9.1. **Pre-Test.** Tests may include, but are not limited to, physical inspection of the unit and cable assemblies. Include the sequence of the tests in the procedures along with acceptance thresholds. Contractor to resubmit, if necessary, rejected test procedures for final approval within 10 days. Review time is calendar days. Conduct all tests in accordance with the approved test procedures.

Conduct basic functionality testing before removal of VIVDS field equipment. Test all functional operations of the equipment in the presence of representatives of the Contractor and the Department. Ensure that both representatives sign the test report indicating that the equipment has passed or failed each function. Once removed, the equipment becomes the responsibility of the Contractor until accepted by the Department. Compare test data before removal and test data after installation. The performance test results after relocation must be equal to or better than the test results before removal. Repair or replace those components within the system that failed after relocation, but passed before removal.

4.9.2. **Post-Test.** Testing of the VIVDS field equipment is for relieving the Contractor of maintenance of the system. The Contractor will be relieved of the responsibility for maintenance of the system in accordance with Item 7, “Legal Relations and Responsibilities,” after a successful test period. The Contractor will not be required to pay for electrical energy consumed by the system.

After all existing VIVDS field equipment has been installed, conduct approved continuity, stand alone, and performance tests. Furnish test data forms containing the sequence of tests including all the data taken as well as quantitative results for all tests. Submit the test data forms to the Engineer at least 30 days before the day the tests are to begin. Obtain Engineer’s approval of test procedures before submission of equipment for tests. Send at least 1 copy of the data forms to the Engineer.

Conduct an approved stand-alone test of the equipment installation at the field sites. At a minimum, exercise all stand-alone (non-network) functional operations of the field equipment installed per the plans as directed. Complete the approved data forms with test results and turn over to the Engineer for review and either acceptance or rejection of equipment. Give at least 30 working days notice before all tests to permit the Engineer or his representative to observe each test.

The Department will conduct approved VIVDS field equipment system tests on the field equipment with the central equipment. The tests will, as a minimum, exercise remote control functions and confirm communication with field equipment.

If any unit fails to pass a test, prepare a report and deliver it to the Engineer. Describe the nature of the failure and the corrective action needed. If the failure is the result of improper installation or damage during reinstallation, reinstall or replace the unit and repeat the test until the unit passes successfully, at no additional cost to the Department or extension of the Contract period.

## 5. MEASUREMENT

The VIVDS will be measured as each major system component furnished, installed, relocated, made fully operational, and tested or removed in accordance with this Special Specification or as directed.

The VIVDS communication cable will be measured by the foot of the appropriate media type furnished, installed, made fully operational, and tested in accordance with this Specification, other referenced Special Specifications, or as directed.

When the VIVDS is used on a temporary basis, the VIVDS will be measured as each system furnished, installed, made fully operational, including reconfiguration and removal if required by the plans, and tested in accordance with this Special Specification or as directed.

This is a plans quantity measurement Item. The quantity to be paid is the quantity shown in the proposal unless modified by Article 9.2., “Plans Quantity Measurement.” Additional measurements or calculations will be made if adjustments of quantities are required.

When recorded, video is required. It will be paid for by each camera recorded.

## 6. PAYMENT

6.1. **Furnish and Install.** The work performed, materials, and all accompanying software furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "VIVDS Processor System," "VIVDS Camera Assembly" of the various types, "VIVDS Central Control Software," "VIVDS Temporary," "VIVDS Cabling," and “VIVDS Video Recording.” These prices are full compensation for furnishing, configuring, placing, and testing all materials and equipment, and for all tools, labor, equipment, hardware, operational software packages, supplies, support, personnel training, shop drawings, documentation, and incidentals.

These prices include all interfaces required for the field and remote communications links along with any associated peripheral equipment, including cables; all associated mounting hardware and associated field equipment; and incidentals required for a complete and fully functional video imaging vehicle detection system.

6.2. **Install Only.** The work performed and materials furnished in accordance with this Item will be paid for at the unit bid price for "VIVDS Processor System (Install Only)," "VIVDS Camera Assembly (Install Only)," "VIVDS Temporary (Install Only)," and "VIVDS Cabling (Install Only)." This price is full compensation for installing, configuring, integrating, and testing the completed installation, including VIVDS equipment, voltage converters or injectors, cables, connectors, associated equipment, and mounting hardware; and for all labor, tools, equipment, documentation, testing, training, software, and incidentals necessary to complete the work.

6.3. **Relocate.** The work performed and materials furnished in accordance with this Item will be paid for at the unit bid price for "VIVDS Processor System (Relocate)," "VIVDS Camera Assembly (Relocate)," "VIVDS Temporary (Relocate)," and "VIVDS Cabling (Relocate)." This price is full compensation for relocating and making fully operational existing equipment; furnishing and installing additional cables or connectors; testing, delivery, and storage of components designated for salvage or reuse; and all labor, tools, equipment and incidentals necessary to complete the work.

6.4. **Remove.** The work performed and materials furnished in accordance with this Item will be paid for at the unit bid price for "VIVDS Processor System (Remove)," "VIVDS Camera Assembly (Remove)," "VIVDS Temporary (Remove)," and "VIVDS Cabling (Remove)." This price is full compensation for removing existing

equipment as shown on the plans; testing, delivery, and storage of components designated for salvage; and all labor, materials, tools, equipment, and incidentals necessary to complete the work.

# Special Provision to Item 360
# Concrete Pavement

Item 360, "Concrete Pavement" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Section 360.2.1., "Materials,"** the third paragraph is voided and replaced by the following:

For continuously reinforced concrete pavements, use a coarse aggregate with a rated coefficient of thermal expansion of not more than $5.5 \times 10^{-6}$ in./in./°F as listed in the Department's *Concrete Rated Source Quality Catalog*.

**Section 360.4.8.3., "Surface Texture,"** the second paragraph is voided and replaced by the following:

A metal-tine texture finish is required unless otherwise shown on the plans. Provide transverse or longitudinal tining unless otherwise shown on the plans. Immediately following the carpet drag, apply a single coat of evaporation retardant, if needed, at the rate recommended by the manufacturer. Provide the metal-tine finish immediately after the concrete surface has set enough for consistent tining. Operate the metal-tine device to obtain grooves approximately 3/16 in. deep, with a minimum depth of 1/8 in., and approximately 1/12 in. wide. Do not overlap a previously tined area. Use manual methods to achieve similar results on ramps, small or irregular areas, and narrow width sections of pavements. Repair damage to the edge of the slab and joints immediately after texturing. Do not tine pavement that will be overlaid or that is scheduled for blanket diamond grinding or shot blasting.

# Special Provision to Item 666
# Retroreflectorized Pavement Markings

Item 666, "Retroreflectorized Pavement Markings," of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Section 2.3., "Glass Traffic Beads." The first paragraph is voided and replaced by the following:

Furnish drop-on glass beads in accordance with DMS-8290, "Glass Traffic Beads," or as approved. Furnish a double-drop of Type II and Type III drop-on glass beads for longitudinal pavement markings where each type bead is applied separately in equal portions (by weight), unless otherwise approved. Apply the Type III beads before applying the Type II beads. Furnish Type II beads for work zone pavement markings and transverse markings or symbols.

Section 4.3.1., "Type I Markings.," is supplemented by the following:

4.3.1.3. Spot Striping. Perform spot striping on a callout basis with a minimum callout quantity as shown on the plans.

Section 4.3.2., "Type II Markings.," is supplemented by the following:

4.3.2.1. Spot Striping. Perform spot striping on a callout basis with a minimum callout quantity as shown on the plans.

Section 4.4., "Retroreflectivity Requirements.," is voided and replaced by the following.

Type I markings for Contracts totaling more than 20,000 ft. of pavement markings must meet the following minimum retroreflectivity values for all longitudinal edgeline, centerline or no passing barrier-line, and lane line markings when measured any time after 3 days, but not later than 10 days after application.

- White markings: 250 millicandelas per square meter per lux (mcd/m$^2$/lx)
- Yellow markings: 175 mcd/m$^2$/lx

Retroreflectivity requirements for Type I markings are not required for Contracts with less than 20,000 ft. of pavement markings or Contracts with callout work, unless otherwise shown on the plans.

Section 4.5., "Retroreflectivity Measurements.," is voided and replaced by the following:

Use a mobile retroreflectometer to measure retroreflectivity for Contracts totaling more than 50,000 ft. of pavement markings, unless otherwise shown on the plans. For Contracts with less than 50,000 ft. of pavement markings, mobile or portable retroreflectometers may be used at the Contractor's discretion. Coordinate with and obtain authorization from the Engineer before starting any retroreflectivity data collection.

Section 4.5.1., "Mobile Retroreflectometer Measurements." The last paragraph is voided and replaced by the following.

Restripe again at the Contractor's expense with a minimum of 0.060 in. (60 mils) of Type I marking material if the average of these measurements falls below the minimum retroreflectivity requirements. Take measurements every 0.1 miles a minimum of 10 days after this third application within that mile segment for that series of markings. If the markings do not meet minimum retroreflectivity after this third application, the Engineer may require removal of all existing markings, a new application as initially specified, and a repeat of the application process until minimum retroreflectivity requirements are met.

Section 4.5.2., "Portable Retroreflectometer Measurements." The first and second paragraphs are voided and replaced by the following.

Provide portable measurement averages for every 1.0 mile unless otherwise specified or approved. Take a minimum of 20 measurements for each 1-mi. section of roadway for each series of markings (e.g., edgeline, center skip line, each line of a double line) and direction of traffic flow when using a portable reflectometer. Measure each line in both directions for centerlines on two-way roadways (i.e., measure both double solid lines in both directions and measure all center skip lines in both directions). The spacing between each measurement must be at least 100 ft. The Engineer may decrease the mileage frequency for measurements if the previous measurements provide satisfactory results. The Engineer may require the original number of measurements if concerns arise.

Restripe at the Contractor's expense with a minimum of 0.060 in. (60 mils) of Type I marking material if the averages of these measurements fail. Take a minimum of 10 more measurements after 10 days of this second application within that mile segment for that series of markings. Restripe again at the Contractor's expense with a minimum of 0.060 in. (60 mils) of Type I marking material if the average of these measurements falls below the minimum retroreflectivity requirements. If the markings do not meet minimum retroreflectivity after this third application, the Engineer may require removal of all existing markings, a new application as initially specified, and a repeat of the application process until minimum retroreflectivity requirements are met.

Section 4.6. "Performance Period." The first sentence is voided and replaced by the following:

All longitudinal markings must meet the minimum retroreflectivity requirements within the time frame specified. All markings must meet all other performance requirements of this specification for at least 30 calendar days after installation.

Article 6. "Payment." The first two paragraphs are voided and replaced by the following.

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Pavement Sealer" of the size specified; "Retroreflectorized Pavement Markings" of the type and color specified and the shape, width, size, and thickness (Type I markings only) specified, as applicable; "Retroreflectorized Pavement Markings with Retroreflective Requirements" of the types, colors, sizes, widths, and thicknesses specified; "Retroreflectorized Profile Pavement Markings" of the various types, colors, shapes, sizes, and widths specified; or "Reflectorized Pavement Marking (Call Out)" of the shape, width, size, and thickness (Type I markings only) specified, as applicable; or "Pavement Sealer (Call Out)" of the size specified.

This price is full compensation for materials, application of pavement markings, equipment, labor, tools, and incidentals.

# Special Provision to Item 672
# Raised Pavement Markings

For this project, Item 672, "Raised Pavement Markings," of the Standard Specifications, is hereby amended with respect to the clauses cited below, and no other clauses or requirements of this Item are waived or changed hereby.

Article 672.3., "Construction," the twelfth paragraph is voided and replaced by the following:

Provide a 30-day performance period that begins the day following written acceptance for each separate location or patch. The date of written acceptance will be the last calendar day of each month for the RPMs installed that month for the completed separate project locations. This written acceptance does not constitute final acceptance.

Article 672.3., "Construction," is supplemented by the following:

672.3.1. Raised Pavement Markers Patch. Raised Pavement Markers will be in accordance with Item 672, "Raised Pavement Markers." Unless otherwise directed in the General Notes and Specification Data, a patch will be defined as 1,000 LF or less along the center line of the roadway. The Engineer will determine whether to remove and place markers on the entire roadway segment or just the patch areas. Unless otherwise directed on the plans, the Contractor will remove temporary pavement markings (tabs or temporary tape) prior to placement of permanent markers.

Article 672.5., "Payment," the first paragraph is voided and replaced by the following:

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid at the unit price bid for "Reflectorized Pavement Marker," "Traffic Button," "Plowable Reflectorized Pavement Marker," or "Reflectorized Pavement Marker (Patch)" of the types specified.

RPMs INSTALLATION RECORD

The 30-day performance period begins the day after written acceptance for each separate location. The date of written acceptance will be the last calendar day of each month for the RPMs installed that month for the completed separate project locations.

| COUNTY<br>HIGHWAY | CONTROL<br>PROJECT | LIMITS FROM<br>LIMITS TO | MONTH/YR<br>OF INSTALLATION |
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Contractor signature _____ _____
Date

Department signature _____ _____
Date

# Special Provision to Item 680
# Highway Traffic Signals

Item 680, “Highway Traffic Signals” of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Article 680.3.1.1.2,”Conduit,”** The fourth sentence of the first paragraph is voided and replaced by the following.

Seal the ends of each conduit with approved sealant, after all cables and conductors are installed.

# Special Provision to Item 686
# Traffic Signal Pole Assemblies

Item 686, "Traffic Signal Pole Assemblies" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Section 686.3.2., "Fabrication,"** is voided and replaced with the following:

**Fabrication.** Fabricate and weld in accordance with Item 441, "Steel Structures," AWS D1.1, *Structural Welding Code—Steel*, and the requirements of this Item. Fabrication tolerances are given in Table 1.

**Table 1**
**Fabrication Tolerances**

| Part | Dimension | Tolerance (in.) |
|---|---|---|
| Pole and mast arm shaft | Length | ±1 |
| | Thickness | +0.12, –0.02 |
| | Difference between flats or diameter | ±3/16 |
| | Straightness | 1/8 in 10 ft. |
| | Attachment locations | ±1 |
| Base and mast arm mounting plates | Overall | ±3/16 |
| | Thickness | +1/4, –0 |
| | Deviations from flat[1] | 3/16 in 24 in. |
| | Spacing between holes | ±1/8 |
| | Bolt hole size | ±1/16 |
| Anchor bolts | Length | ±1/2 |
| | Threaded Length | ±1/2 |
| | Galvanized Length | –1/4 |
| Assembled shafts | Angular Orientation | 1/16 in 12 in.[2] |
| | Centering | ±3/16 |
| | Twist | 3°in 50 ft. |

1. For long mast arm assembly (LMA) structures, refer to plan sheets for mast arm mounting plate tolerance.
2. One-eighth in 12 in. between mounting plates and between mounting plates and base plates.

Fabrication plants that produce steel traffic signal pole assemblies must be approved in accordance with DMS-7380, "Steel Non-Bridge Member Fabrication Plant Qualification." The Department maintains a Material Producer List (MPL) of approved traffic signal pole assembly fabrication plants.

Provide properly fitting components. Provide round or octagonal shafts for poles and mast arms tapered as shown on the plans. Fabricate mast arms straight in the unloaded condition unless otherwise shown on the plans. The Department will accept bolted slip joints overlapping by at least 1.5 diameters in mast arms 40 ft. and longer.

Provide circumferential welds only at the ends of the shafts. Provide no more than two longitudinal seam welds in shaft sections. Provide 100% penetration within 6 in. of circumferential base welds and 60% minimum penetration at other locations along the longitudinal seam welds. Provide longitudinal seam weld and fit-up that will minimize acid entrapment during later galvanizing.

For long mast arm assembly (LMA) structures, perform at least 10% ultrasonic testing (UT) of longitudinal seam welds on the arm and pole shafts. Use a Department approved UT procedure to ensure 60% minimum penetration where specified. Perform testing at a minimum of three locations on each shaft (at both ends and middle). The minimum length of each test area must be 10 in. If minimum penetration is not achieved in any of the tested areas, test an additional 24 in. beyond the originally selected test areas requiring 60% penetration. Test the entire arm or pole shaft seam weld if any locations within the additional 24 in. test areas does not achieve 60% penetration. Repair the deficient areas with a Department approved repair procedure and retest.

Hot-dip galvanize all fabricated parts in accordance with Item 445, "Galvanizing." Provide punched, drilled, or mechanically guided thermal-cut holes in steel parts or members, when allowed, before galvanizing. Mechanically guided thermal-cut hole quality should be per Item 445, "Galvanizing."

Connect the luminaire arm to the pole with simplex fittings. Ensure the fittings have no defects affecting strength or appearance.

Permanently mark, at a visible location when erected, pole base plates and mast arm mounting plates with the design wind speed.

Permanently mark, at a visible location when erected, pole base plates and fixed mast arm mounting plates with the fabrication plant's insignia. Place the mark on the pole base plate adjacent to the hand-hole access compartment.

Deliver each traffic signal pole assembly with fittings and hardware either installed or packaged with its associated components.

# CONSTRUCTION PLANS FOR TRAFFIC SIGNALIZATION

# WEST BELLFORT AT WESTMOOR DRIVE
# AND AT BINION LANE
# IN
# FORT BEND COUNTY, TEXAS

## COUNTY JUDGE

KP GEORGE

## COUNTY COMMISSIONERS

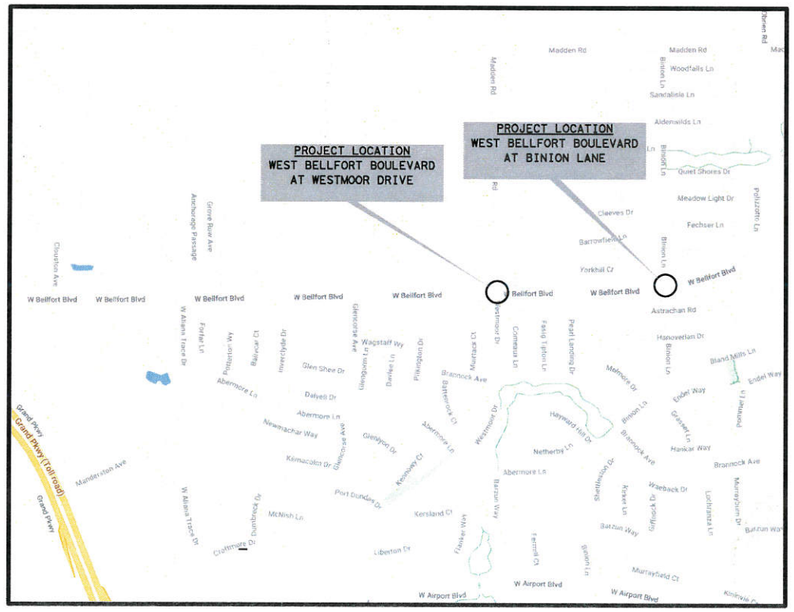
PRECINCT 1 - VINCENT MORALES, JR.
PRECINCT 2 - GRADY PRESTAGE
PRECINCT 3 - ANDY MEYERS
PRECINCT 4 - DEXTER L. MCCOY

## COUNTY ENGINEER

J. STACY SLAWINSKI, P.E.

## COUNTY AUDITOR

ROBERT "ED" STURDIVANT, CPA




NOT TO SCALE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*Houston, Texas 77079*
*(832) 619-1000*

TEDSI
*TBPE F-1640*


STATE OF TEXAS
YOHANNES A. TADESSE
107781
REGISTERED
PROFESSIONAL ENGINEER
Yohannes Tadesse
3/12/2024

APPROVED Rudy Stanglo, PE, PTOE DATE 3/20/24
FOR J. STACY SLAWINSKI, P.E.
FORT BEND COUNTY ENGINEER

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DATE:3/12/2024
FILE:pw:\\tedsi-pw.bentley.com:tedsi-pw-01\Documents\Projects\2023\2023-2148-01 - West Bellfort Blvd Traffic Signals\6.0 TEDSI Design\6.08 CADD\6.08.01 Sheet Files\Signal\SHT_COVER.

DATE:3/12/2024
FILE:pw:\\tedsi-pw.bentley.com:tedsi-pw-01\Documents\Projects\2023\2023-2148-01 - West Bellfort Blvd Traffic Signals\6.0 TEDSI Design\6.08 CADD\6.08.01 Sheet Files\Signal\SHT_INDEX

## INDEX OF SHEETS



FORT BEND COUNTY
APPROVED
MAR 19 2024
Valid One Year From Date
ENGINEERING DEPARTMENT

NOT TO SCALE

| NO. | DATE | REVISION | APPROVED |
|---|---|---|---|
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STATE OF TEXAS
YOHANNES A. TADESSE
107781
PROFESSIONAL ENGINEER
REGISTERED
3/12/2024

**FORT BEND COUNTY, TEXAS**

TEDSI INFRASTRUCTURE GROUP
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WEST BELLFORT BOULEVARD
AT WESTMOOR DRIVE
AND BINION LANE

INDEX OF SHEETS

| FED.RD. DIV.NO. | STATE | PROJECT NO. | | | HIGHWAY NO. |
|---|---|---|---|---|---|
| 6 | TEXAS | | | | |
| STATE DISTRICT | COUNTY | CONTROL NO. | SECTION NO. | JOB NO. | SHEET NO. |
| HOUSTON | FORT BEND | | | | 2 |

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| ITEM | CODE | DESCRIPTION | UNITS | W BELLFORT BLVD AT MADDEN RD/ WESTMOOR DR | W BELLFORT BLVD AT BINION LN | TOTAL |
|---|---|---|---|---|---|---|
| 104 | 6001 | REMOVING CONC (PAV) | SY | 100 | | 100 |
| 104 | 6021 | REMOVING CONC (CURB) | LF | 65 | 700 | 765 |
| 104 | 6067 | REMOVING CONC (SAWCUT) | LF | | 850 | 850 |
| | | | | | | |
| 134 | 6005 | BACKFILL TY A | CY | | 4 | 4 |
| | | | | | | |
| 162 | 6002 | BLOCK SODDING | SY | | 100 | 100 |
| | | | | | | |
| 166 | 6001 | FERTILIZER | AC | | 0.02 | 0.02 |
| | | | | | | |
| 168 | 6001 | VEGETATIVE WATERING | MG | | 2.40 | 2.40 |
| | | | | | | |
| 275 | 6010 | CEMENT TREAT (SUBGRADE) (8") | SY | | 940 | 940.00 |
| | | | | | | |
| 360 | 6002 | CONC PVMT (CONT REINF - CRCP) (8") | SY | | 895 | 895.00 |
| | | | | | | |
| 416 | 6032 | DRILL SHAFT (TRF SIG POLE) (36 IN) | LF | 15 | 28 | 43 |
| 416 | 6034 | DRILL SHAFT (TRF SIG POLE) (48 IN) | LF | 66 | 44 | 110 |
| | | | | | | |
| 529 | 6002 | CONC CURB (TY II) | LF | 65 | 825 | 890 |
| | | | | | | |
| 531 | 6001 | CONC SIDEWALKS (4") | SY | 19 | 105 | 124 |
| 531 | 6010 | CURB RAMPS (TY 7) | EA | 8 | 8 | 16 |
| | | | | | | |
| 536 | 6005 | CONCRETE MEDIAN (NOSE) | SY | | 12 | 12 |
| | | | | | | |
| 618 | 6046 | CONDT (PVC) (SCH 80) (2") | LF | 184 | 495 | 679 |
| 618 | 6047 | CONDT (PVC) (SCH 80) (2") (BORE) | LF | 395 | 253 | 648 |
| 618 | 6053 | CONDT (PVC) (SCH 80) (3") | LF | 53 | 115 | 168 |
| 618 | 6054 | CONDT (PVC) (SCH 80) (3") (BORE) | LF | 260 | | 260 |
| 618 | 6058 | CONDT (PVC) (SCH 80) (4") | LF | 50 | 35 | 85 |
| 618 | 6059 | CONDT (PVC) (SCH 80) (4") (BORE) | LF | 135 | 370 | 505 |
| | | | | | | |
| 620 | 6009 | ELEC CONDR (NO.6) BARE | LF | 1035 | 1188 | 2223 |
| 620 | 6011 | ELEC CONDR (NO.4) BARE | LF | 11 | 155 | 166 |
| 620 | 6012 | ELEC CONDR (NO.4) INSULATED | LF | 22 | 310 | 332 |
| | | | | | | |
| 621 | 6005 | TRAY CABLE (4 CONDR) (12 AWG) | LF | 762 | 1265 | 2027 |
| | | | | | | |
| 624 | 6010 | GROUND BOX TY D (162922)W/APRON | EA | 5 | 5 | 10 |
| | | | | | | |
| 628 | 6145 | ELC SRV TY D 120/240 060(NS)SS(E)SP(O) | EA | 1 | 1 | 2 |
| | | | | | | |
| 666 | 6036 | REFL PAV MRK TY I (W)8"(SLD)(100MIL) | LF | 1015 | 385 | 1400 |
| 666 | 6048 | REFL PAV MRK TY I (W)24"(SLD)(100MIL) | LF | 808 | 708 | 1516 |
| 666 | 6054 | REFL PAV MRK TY I (W)(ARROW)(100MIL) | EA | 10 | 6 | 16 |
| 666 | 6078 | REFL PAV MRK TY I (W)(WORD)(100MIL) | EA | 10 | 4 | 14 |
| 666 | 6147 | REFL PAV MRK TY I (Y)24"(SLD)(100MIL) | LF | | 40 | 40 |
| 666 | 6156 | REFL PAV MRK TY I(Y)(MED NOSE)(100MIL) | EA | 4 | 4 | 8 |
| 666 | 6224 | PAVEMENT SEALER 4" | LF | 455 | 995 | 1450 |
| 666 | 6226 | PAVEMENT SEALER 8" | LF | 1015 | 385 | 1400 |
| 666 | 6230 | PAVEMENT SEALER 24" | LF | 808 | 748 | 1556 |
| 666 | 6231 | PAVEMENT SEALER (ARROW) | EA | 10 | 6 | 16 |
| 666 | 6232 | PAVEMENT SEALER (WORD) | EA | 10 | 4 | 14 |
| 666 | 6233 | PAVEMENT SEALER (MED NOSE) | EA | 4 | 4 | 8 |
| 666 | 6300 | RE PM W/RET REQ TY I (W)4"(BRK)(100MIL) | LF | 375 | 345 | 720 |
| 666 | 6303 | RE PM W/RET REQ TY I (W)4"(SLD)(100MIL) | LF | 80 | 80 | 160 |
| 666 | 6315 | RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL) | LF | | 570 | 570 |
| | | | | | | |
| 672 | 6009 | REFL PAV MRKR TY II-A-A | EA | | 56 | 56 |
| 672 | 6010 | REFL PAV MRKR TY II-C-R | EA | 125 | 105 | 230 |
| | | | | | | |
| 677 | 6001 | ELIM EXT PAV MRK & MRKS (4") | LF | 445 | 995 | 1440 |
| 677 | 6003 | ELIM EXT PAV MRK & MRKS (8") | LF | 1015 | 385 | 1400 |
| 677 | 6007 | ELIM EXT PAV MRK & MRKS (24") | LF | 808 | 748 | 1556 |
| 677 | 6020 | ELIM EXT PAV MRK & MRKS (MED NOSE) | EA | 4 | 4 | 8 |
| | | | | | | |
| 678 | 6001 | PAV SURF PREP FOR MRK (4") | LF | 455 | 995 | 1450 |
| 678 | 6004 | PAV SURF PREP FOR MRK (8") | LF | 1015 | 385 | 1400 |
| 678 | 6008 | PAV SURF PREP FOR MRK (24") | LF | 808 | 748 | 1556 |
| 678 | 6009 | PAV SURF PREP FOR MRK (ARROW) | EA | 10 | 6 | 16 |
| 678 | 6016 | PAV SURF PREP FOR MRK (WORD) | EA | 10 | 4 | 14 |
| 678 | 6024 | PAV SURF PREP FOR MRK (MED NOSE) | EA | 4 | 4 | 8 |

* SUBSIDIARY TO ITEM 680 6003, "INSTALL HWY TRF SIG (SYSTEM)'
** SUBSIDIARY TO ITEM 687 6001, "PED POLE ASSEMBLY'
*** SUBSIDIARY TO ITEM 688 6001, "PED DETECT PUSH BUTTON (APS)'
**** SUBSIDIARY TO ITEM 6306-6001, "VIVDS PROSR SYS"
***** SUBSIDIARY TO ITEM 6306-6007, "VIVDS CABLING'

| ITEM | CODE | DESCRIPTION | UNITS | W BELLFORT BLVD AT MADDEN RD/ WESTMOOR DR | W BELLFORT BLVD AT BINION LN | TOTAL |
|---|---|---|---|---|---|---|
| 680 | 6003 | INSTALL HWY TRF SIG (SYSTEM) | EA | 1 | 1 | 2 |
| | * | CONTROLLER, FULL-ACTUATED W/CABINET | EA | 1 | 1 | 2 |
| | * | POWER SUPPLY | EA | 1 | 1 | 2 |
| | * | DETECTOR CARD RACK (8 SLOT) | EA | 1 | 1 | 2 |
| | * | CONTROL, PHOTOELECTRIC | EA | 1 | 1 | 2 |
| | * | CONTROLLER FOUNDATION, TRAFFIC SIGNAL | EA | 1 | 1 | 2 |
| | * | ROD, 5/8" X 10' COPPER GROUND (CONTROLLER ONLY) | EA | 1 | 1 | 2 |
| | * | MAST ARM, 8 - FT LUMINAIRE | EA | 4 | 4 | 8 |
| | * | SIGN, "West Bellfort" (D3-1G) (90"X18") | EA | 2 | 2 | 4 |
| | * | SIGN, "Binion Ln" (D3-1G) (60"x18") | EA | | 2 | 2 |
| | * | SIGN, "Westmoor Dr" (D3-1G) (84"X18") | EA | 2 | | 2 |
| | * | SIGN, "LEFT TURN YIELD ON FLASHING YELLOW ARROW" (R10-17T) (30"X30") | EA | 4 | 4 | 8 |
| | * | LED RDWY LUMINAIRE (.25 KW EQ) | EA | 4 | 4 | 8 |
| | * | DETECTOR UNIT | EA | 1 | 1 | 2 |
| | * | BBU FOUNDATION | EA | 1 | 1 | 2 |
| | * | EMERGENCY VEHICLE PRE-EMPTION UNIT | EA | 1 | 1 | 2 |
| | | | | | | |
| 0682 | 6001 | VEH SIG SEC (12")LED(GRN) | EA | 8 | 8 | 16 |
| 0682 | 6002 | VEH SIG SEC (12")LED(GRN ARW) | EA | 4 | 4 | 8 |
| 0682 | 6003 | VEH SIG SEC (12")LED(YEL) | EA | 8 | 8 | 16 |
| 0682 | 6004 | VEH SIG SEC (12")LED(YEL ARW) | EA | 8 | 8 | 16 |
| 0682 | 6005 | VEH SIG SEC (12")LED(RED) | EA | 8 | 8 | 16 |
| 0682 | 6006 | VEH SIG SEC (12")LED(RED ARW) | EA | 4 | 4 | 8 |
| 0682 | 6018 | PED SIG SEC (LED)(COUNTDOWN) | EA | 8 | 8 | 16 |
| 0682 | 6054 | BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM | EA | 8 | 8 | 16 |
| 0682 | 6055 | BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM | EA | 4 | 4 | 8 |
| | | | | | | |
| 0684 | 6007 | TRF SIG CBL (TY A)(12 AWG)(2 CONDR) | LF | 1477 | 1385 | 2862 |
| 0684 | 6009 | TRF SIG CBL (TY A)(12 AWG)(4 CONDR) | LF | 1521 | 1425 | 2946 |
| 0684 | 6012 | TRF SIG CBL (TY A)(12 AWG)(7 CONDR) | LF | 1938 | 1800 | 3738 |
| | | | | | | |
| 0686 | 6035 | INS TRF SIG PL AM(S)1 ARM(32')LUM | EA | | 1 | 1 |
| 0686 | 6043 | INS TRF SIG PL AM(S)1 ARM(40')LUM | EA | | 1 | 1 |
| 0686 | 6047 | INS TRF SIG PL AM(S)1 ARM(44')LUM | EA | 1 | | 1 |
| 0686 | 6055 | INS TRF SIG PL AM(S)1 ARM(50')LUM | EA | 1 | | 1 |
| 0686 | 6059 | INS TRF SIG PL AM(S)1 ARM(55')LUM | EA | | 2 | 2 |
| 0686 | 6063 | INS TRF SIG PL AM(S)1 ARM(60')LUM | EA | 2 | | 2 |
| | | | | | | |
| 0687 | 6001 | PED POLE ASSEMBLY | EA | 4 | 4 | 8 |
| | ** | SCREW-IN ANCHOR FOUNDATION | EA | 4 | 4 | 8 |
| | | | | | | |
| 0688 | 6001 | PED DETECT PUSH BUTTON (APS) | EA | 8 | 8 | 16 |
| | *** | SIGN, PEDESTRIAN PUSHBUTTON (SYMBOL TYPE) (9" X 15") | EA | 4 | 5 | 9 |
| | *** | SIGN, PEDESTRIAN PUSHBUTTON (SYMBOL TYPE) (9" X 15") | EA | 4 | 3 | 7 |
| 0688 | 6003 | PED DETECTOR CONTROLLER UNIT | EA | 1 | 1 | 2 |
| | | | | | | |
| 6058 | 6001 | BBU SYSTEM (EXTERNAL BATT CABINET) | EA | 1 | 1 | 2 |
| | | | | | | |
| 6306 | 6001 | VIVDS PROSR SYS | EA | 1 | 1 | 2 |
| | **** | VIVDS PROGRAMMING KIT | EA | 1 | 1 | 2 |
| 6306 | 6002 | VIVDS CAM ASSY FXD LNS | EA | 4 | 4 | 8 |
| 6306 | 6007 | VIVDS CABLING | LF | 916 | 885 | 1801 |
| | ***** | CABLE, 3/C-#16 POWER | LF | 916 | 885 | 1801 |
| | | | | | | |

* SUBSIDIARY TO ITEM 680 6003, "INSTALL HWY TRF SIG (SYSTEM)"
** SUBSIDIARY TO ITEM 687 6001, "PED POLE ASSEMBLY"
*** SUBSIDIARY TO ITEM 688 6001, "PED DETECT PUSH BUTTON (APS)"
**** SUBSIDIARY TO ITEM 6306-6001, "VIVDS PROSR SYS"
***** SUBSIDIARY TO ITEM 6306-6007, "VIVDS CABLING"

FORT BEND COUNTY
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STATE OF TEXAS
YOHANNES A. TADESSE
107781
PROFESSIONAL ENGINEER
REGISTERED
3/12/2024

FORT BEND COUNTY, TEXAS

TEDSI INFRASTRUCTURE GROUP
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WEST BELLFORT BOULEVARD
AT WESTMOOR DRIVE
AND BINION LANE

SUMMARY OF TRAFFIC SIGNAL QUANTITIES

| FED.RD. DIV.NO. | STATE | PROJECT NO. | | | HIGHWAY NO. |
|---|---|---|---|---|---|
| 6 | TEXAS | | | | |
| STATE DISTRICT | COUNTY | CONTROL NO. | SECTION NO. | JOB NO. | SHEET NO. |
| HOUSTON | FORT BEND | | | | 3 |

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DATE:3/12/2024
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## GENERAL:

REFER TO ORDINANCES AND REGULATIONS OF LOCAL MUNICIPAL AND COUNTY GOVERNMENTS AND THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY, WHICH MAY BE APPLICABLE.

REFERENCES TO MANUFACTURER'S TRADE NAME OR CATALOG NUMBERS ARE FOR THE PURPOSE OF IDENTIFICATION ONLY. SIMILAR MATERIALS FROM OTHER MANUFACTURERS ARE PERMITTED PROVIDED THEY ARE OF EQUAL QUALITY, COMPLY WITH SPECIFICATIONS FOR THIS PROJECT, AND ARE APPROVED, EXCEPT FOR ROADWAY ILLUMINATION, ELECTRICAL, AND TRAFFIC SIGNAL ITEMS.

ENSURE THE ROAD IS ALWAYS OPEN TO TRAFFIC. MAINTAIN ACCESS TO PUBLIC AND PRIVATE DRIVES AND SIDE ROADS AT ALL TIMES.

UNLESS OTHERWISE SHOWN ON THE PLANS OR OTHERWISE DIRECTED, COMMENCE WORK AFTER SUNRISE AND ENSURE CONSTRUCTION EQUIPMENT IS OFF THE ROAD BY SUNSET.

ASSUME OWNERSHIP OF DEBRIS AND DISPOSE OF AT AN APPROVED LOCATION.

THE LENGTHS OF THE POSTS FOR GROUND MOUNTED SIGNS AND THE TOWER LEGS FOR THE OVERHEAD SIGN SUPPORTS ARE APPROXIMATE. VERIFY THE LENGTHS BEFORE ORDERING THESE MATERIALS TO MEET THE EXISTING FIELD CONDITIONS AND TO CONFORM TO SIGN MINIMUM MOUNTING HEIGHTS SHOWN IN THE PLANS.

### GENERAL: TRAFFIC SIGNALS

FOR TRAFFIC SIGNAL ITEMS, USE MATERIALS FROM PRE-QUALIFIED PRODUCERS AS SHOWN ON THE GENERAL SERVICES DIVISION (GSD) OF THE TXDOT'S MATERIAL PRODUCERS LIST. USE THE FOLLOWING WEBSITES TO VIEW THIS LIST:

www.dot.state.tx.us/txdot_library/publications/producer_list.htm, AND

www.txdot.gov/txdot_library/consultants_contractors/publications/purchasing_specifications.htm

UNDER SUPPLEMENTAL SPECIFICATIONS AND ATTACHMENTS. NO SUBSTITUTIONS WILL BE ALLOWED FOR MATERIALS FOUND ON THIS LIST.

### GENERAL: UTILITIES

CONSIDER THE LOCATIONS OF UNDERGROUND UTILITIES DEPICTED IN THE PLANS AS APPROXIMATE AND EMPLOY RESPONSIBLE CARE TO AVOID DAMAGING UTILITY FACILITIES. DEPENDING UPON SCOPE AND MAGNITUDE OF PLANNED CONSTRUCTION ACTIVITIES, ADVANCED FIELD CONFIRMATION BY THE UTILITY OWNER OR OPERATOR MAY BE PRUDENT. WHERE POSSIBLE, PROTECT AND PRESERVE PERMANENT SIGNS, MARKERS, AND DESIGNATIONS OF UNDERGROUND FACILITIES.

IF THE CONTRACTOR DAMAGES OR CAUSE DAMAGE (BREAKS, LEAKS, NICKS, DENTS, GOUGES, ETC.) TO THE UTILITY, CONTACT THE UTILITY FACILITY OWNER OR OPERATOR IMMEDIATELY.

IF OVERHEAD OR UNDERGROUND POWER LINES NEED TO BE DE-ENERGIZED, CONTACT THE ELECTRICAL SERVICE PROVIDER TO PERFORM THIS WORK. COSTS ASSOCIATED WITH DE-ENERGIZING THE POWER LINES OR OTHER PROTECTIVE MEASURES REQUIRED ARE AT NO EXPENSE TO THE DEPARTMENT.

IF WORKING NEAR POWER LINES, COMPLY WITH THE APPROPRIATE SECTIONS OF TEXAS STATE LAW AND FEDERAL REGULATIONS RELATING TO THE TYPE OF WORK INVOLVED.

PERFORM ELECTRICAL WORK IN CONFORMANCE WITH THE NATIONAL ELECTRICAL CODE (NEC) AND DEPARTMENT STANDARD SHEETS.

### ITEM 416: DRILLED SHAFT FOUNDATIONS

INCLUDE THE COST FOR FURNISHING AND INSTALLING ANCHOR BOLTS MOUNTED IN THE DRILLED SHAFTS IN THE UNIT BID PRICE FOR THE VARIOUS DIAMETER DRILLED SHAFTS.

### ITEM 420: CONCRETE STRUCTURES

UNLESS OTHERWISE NOTED, USE CLASS C CONCRETE WITH AN ORDINARY SURFACE FINISH FOR SIGNAL FOUNDATIONS.

### ITEM 502: BARRICADES, SIGNS AND TRAFFIC HANDLING

USE A TRAFFIC CONTROL PLAN FOR HANDLING TRAFFIC THROUGH THE VARIOUS PHASES OF CONSTRUCTION. FOLLOW THE PHASING SEQUENCE UNLESS OTHERWISE AGREED UPON BY THE COUNTY ENGINEER. ENSURE THIS PLAN CONFORMS TO THE LATEST "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" AND THE LATEST BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS. THE LATEST VERSIONS OF WORK ZONE STANDARD SHEETS WZ (BTS-1) AND WZ (BTS-2) ARE THE TRAFFIC CONTROL PLAN FOR THE SIGNAL INSTALLATIONS.

SUBMIT CHANGES TO THE TRAFFIC CONTROL PLAN TO THE COUNTY ENGINEER. PROVIDE A LAYOUT SHOWING THE CONSTRUCTION PHASING, SIGNS, STRIPING, AND SIGNALIZATIONS FOR CHANGES TO THE ORIGINAL TRAFFIC CONTROL PLAN.

FURNISH AND MAINTAIN THE BARRICADES AND WARNING SIGNS, INCLUDING THE NECESSARY TEMPORARY AND PORTABLE TRAFFIC CONTROL DEVICES, DURING THE VARIOUS PHASES OF CONSTRUCTION. PLACE AND CONSTRUCT THESE BARRICADES AND WARNING SIGNS IN ACCORDANCE WITH THE LATEST "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" FOR TYPICAL CONSTRUCTION LAYOUTS.

COVER WORK ZONE SIGNS WHEN WORK RELATED TO THE SIGNS IS NOT IN PROGRESS, OR WHEN ANY HAZARD RELATED TO THE SIGNS NO LONGER EXISTS.

KEEP THE DELINEATION DEVICES, SIGNS, AND PAVEMENT MARKINGS CLEAN. THIS WORK IS SUBSIDIARY TO ITEM, "BARRICADES, SIGNS, AND TRAFFIC HANDLING".

OTHER CONTRACTORS MAY OPERATE WITHIN AND ADJACENT TO THE LIMITS OF THIS PROJECT. BECOME FAMILIAR WITH THE PLANS FOR ADJACENT CONTRACTS OR PROJECTS AND COORDINATE THIS PROJECT'S WORK TO MINIMIZE INTERRUPTIONS OR DELAYS TO THE TRAVELING PUBLIC, THIS PROJECT, AND THE ADJACENT PROJECTS.

COVER OR REMOVE THE PERMANENT SIGNS AND CONSTRUCTION SIGNS THAT ARE INCORRECT OR THAT DO NOT APPLY TO THE CURRENT SITUATION FOR A PARTICULAR PHASE.

DO NOT MOUNT SIGNS ON DRUMS OR BARRICADES, EXCEPT THOSE LISTED IN THE LATEST BARRICADES AND CONSTRUCTION STANDARD SHEETS.

USE TRAFFIC CONES FOR DAYTIME WORK ONLY. REPLACE THE CONES WITH PLASTIC DRUMS DURING NIGHTTIME HOURS.

DO NOT REDUCE THE EXISTING NUMBER OF LANES OPEN TO TRAFFIC EXCEPT AS SHOWN ON THE FOLLOWING TIME SCHEDULE:

**ONE LANE CLOSURE**

| DAY | DAYTIME WORK HOURS | NIGHTTIME WORK HOURS |
|---|---|---|
| MONDAY - FRIDAY | 8:30 AM - 3:30 PM | N/A |
| SATURDAY -SUNDAY | N/A | N/A |

THE ABOVE TIMES ARE APPROVED FOR THE TRAFFIC CONTROL CONDITIONS LISTED. THE COUNTY ENGINEER MAY APPROVE OTHER CLOSURE TIMES IF TRAFFIC COUNTS WARRANT. THE COUNTY ENGINEER MAY REDUCE THE ABOVE TIMES FOR SPECIAL EVENTS.

### ITEM 529: CONCRETE CURB, GUTTER AND COMBINED CURB AND GUTTER

### ITEM 531: SIDEWALKS

FOR REINFORCING STEEL IN SIDEWALKS AND PEDESTRIAN RAMPS, USE NO. 4 BARS AT A MAXIMUM 18 IN. SPACING CENTER-TO-CENTER IN BOTH DIRECTIONS.

### ITEM 618: CONDUIT

### ITEM 620: ELECTRICAL CONDUCTORS

### ITEM 628: ELECTRICAL SERVICES

IF THE SPECIFICATIONS FOR ELECTRICAL ITEMS REQUIRE UL-LISTED PRODUCTS, THIS MEANS UL-LISTED OR CSA-LISTED.

### ITEM 618: CONDUIT

WHEN BACKFILLING BORE PITS, ENSURE THAT THE CONDUIT IS NOT DAMAGED DURING INSTALLATION OR DUE TO SETTLING BACKFILL MATERIAL. COMPACT SELECT BACKFILL IN THREE EQUAL LIFTS TO THE BOTTOM OF THE CONDUIT; OR IF USING SAND, PLACE IT 2 IN. ABOVE THE CONDUIT. ENSURE BACKFILL DENSITY IS EQUAL TO THAT OF THE EXISTING SOIL. PREVENT MATERIAL FROM ENTERING THE CONDUIT.

CONSTRUCT BORE PITS A MINIMUM OF 5 FT. FROM THE EDGE OF THE BASE OR PAVEMENT. CLOSE THE BORE PIT HOLES OVERNIGHT.

UNLESS SHOWN ON THE PLANS, INSTALL THE UNDERGROUND CONDUIT A MINIMUM OF 24 IN. DEEP. INSTALL THE CONDUIT IN ACCORDANCE WITH THE LATEST NATIONAL ELECTRICAL CODE (NEC) AND APPLICABLE DEPARTMENT STANDARD SHEETS. PLACE CONDUIT UNDER DRIVEWAYS OR ROADWAYS A MINIMUM OF 24 IN. BELOW THE PAVEMENT SURFACE.

IF USING CASING TO PLACE BORED CONDUIT, THE CASING IS SUBSIDIARY TO THE CONDUIT.

IF PLACING THE CONDUIT UNDER EXISTING PAVEMENT TO REACH THE SERVICE POLES, BORE THE CONDUIT IN PLACE AND EXTEND IT A MINIMUM DISTANCE OF 5 FT. BEYOND THE EDGE OF SHOULDER OR THE BACK OF CURB.

PULL CONDUCTORS IN THE PVC CONDUIT ONLY WITH A NONMETALLIC PULL ROPE.

REMOVE CONDUCTOR AND CONDUIT TO BE ABANDONED TO 1 FT. BELOW THE GROUND LEVEL. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

USE MATERIALS FROM THE PRE-QUALIFIED PRODUCERS LIST AS SHOWN ON THE TXDOT CONSTRUCTION DIVISION (CST) MATERIAL PRODUCERS LIST. THIS LIST IS AVAILABLE ONLINE AT THE FOLLOWING WEBSITE:

http://www.dot.state.tx.us/txdot_library/publications/producer_list.htm.

THE CATEGORY IS "ROADWAY ILLUMINATION AND ELECTRICAL SUPPLIES." THE POLYMER CONCRETE BARRIER BOX IS SUBSIDIARY TO ITEM 618, "CONDUIT."

FURNISH RIGID METAL CONDUIT FOR UNDERGROUND CONDUIT BENDS OF 45 DEGREES OR GREATER IN ALL CONDUIT SYSTEMS, INCLUDING BENDS INTO GROUND BOXES AND FOUNDATIONS. WHERE THE RIGID METAL CONDUIT IS EXPOSED AT ANY POINT AND WHERE RIGID METAL CONDUIT EXTENDS INTO GROUND BOXES, BOND THE METAL CONDUIT TO THE GROUNDING CONDUCTOR WITH GROUNDING TYPE BUSHINGS OR BY OTHER APPROVED, UL-LISTED GROUNDING CONNECTORS APPROVED BY THE ENGINEER. RIGID METAL BENDS ARE SUBSIDIARY TO THE CONDUIT SYSTEM.

### ITEM 620: ITEM ELECTRICAL CONDUCTORS

TEST EACH WIRE OF EACH CABLE OR CONDUCTOR AFTER INSTALLATION. INCOMPLETE CIRCUITS OR DAMAGE TO THE WIRE OR THE CABLE ARE CAUSE FOR IMMEDIATE REJECTION OF THE ENTIRE CABLE BEING TESTED. REMOVE AND REPLACE THE ENTIRE CABLE AT NO EXPENSE TO THE COUNTY. ALSO TEST THE REPLACEMENT CABLE AFTER INSTALLATION.

WHEN PULLING CABLES OR CONDUCTORS THROUGH THE CONDUIT, DO NOT EXCEED THE MANUFACTURER'S RECOMMENDED PULLING TENSIONS. LUBRICATE THE CABLES OR CONDUCTORS WITH A LUBRICANT RECOMMENDED BY THE CABLE MANUFACTURER.

ENSURE THAT CIRCUITS TEST CLEAR OF FAULTS, GROUNDS AND OPEN CIRCUITS.

SPLIT BOLT CONNECTORS ARE ALLOWED ONLY FOR SPLICES ON THE GROUNDING CONDUCTORS.

DO NOT USE NON-CERTIFIED PERSONS TO PERFORM ELECTRICAL WORK.

### ITEM 624: GROUND BOXES

THE GROUND BOX LOCATIONS ARE APPROXIMATE. ALTERNATE GROUND BOX LOCATIONS MAY BE USED AS DIRECTED, TO AVOID PLACING IN SIDEWALKS OR DRIVEWAYS.

DURING CONSTRUCTION AND UNTIL PROJECT COMPLETION, PROVIDE PERSONNEL AND EQUIPMENT NECESSARY TO REMOVE GROUND BOX LIDS FOR INSPECTION. PROVIDE THIS ASSISTANCE WITHIN 24 HOURS AFTER NOTIFICATION.

CONSTRUCT CONCRETE APRONS IN ACCORDANCE WITH THE LATEST STANDARD SHEET ED (3). MAKE THE DEPTH OF THE CONCRETE APRON THE SAME AS THE DEPTH OF THE GROUND BOX, EXCEPT FOR TYPE 1 AND TYPE 2 GROUND BOXES. FOR TYPE 1 OR TYPE 2 GROUND BOXES, CONSTRUCT THE CONCRETE APRON IN ACCORDANCE WITH DETAILS SHOWN ON THE "GROUND BOX DETAILS INSTALLATIONS" STANDARD.

### ITEM 628: ELECTRICAL SERVICES

FURNISH A UL-LISTED METER CAN FOR ALL ELECTRICAL SERVICE POLES. FURNISH A SIZE AND STYLE OF METER CAN IN ACCORDANCE WITH THE REQUIREMENTS OF THE LOCAL ELECTRICAL SERVICE PROVIDER. THIS WORK IS INCIDENTAL TO THE ITEM, "ELECTRICAL SERVICES".

VERIFY AND COORDINATE THE ELECTRICAL SERVICE LOCATION WITH THE ENGINEERING SECTION OF THE APPROPRIATE UTILITY DISTRICT OR COMPANY.

IDENTIFY THE ELECTRICAL SERVICE POLE WITH AN ADDRESS NUMBER ASSIGNED BY THE UTILITY SERVICE PROVIDER. PROVIDE 2-IN. NUMERALS VISIBLE FROM THE HIGHWAY. PROVIDE NUMBERS CUT OUT ALUMINUM FIGURES NAILED TO WOOD POLES OR PAINTED FIGURES ON STEEL POLES OR SERVICE CABINETS.

### ITEM 636: ALUMINUM SIGNS

FURNISH AND INSTALL SIGNS SHOWN ON THE TRAFFIC SIGNAL "SUMMARY OF TRAFFIC SIGNAL MATERIALS" SHEET. ENSURE THAT THE LEGEND ON THESE SIGN PANELS IS IN ACCORDANCE WITH THE LATEST "STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS" MANUAL.

WHEN DESIGN DETAILS ARE NOT SHOWN ON THE PLANS, PROVIDE SIGNS AND ARROWS CONFORMING TO THE LATEST "STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS" MANUAL.

### ITEM 644: SMALL ROADSIDE SIGN ASSEMBLIES

SIGN LOCATIONS ARE APPROXIMATE. BEFORE PLACING THEM, OBTAIN APPROVAL OF AND THEN STAKE THE EXACT LOCATIONS OF THE SIGNS..

USE THE TEXAS UNIVERSAL TRIANGULAR SLIP BASE WITH THE CONCRETE FOUNDATION FOR SMALL GROUND MOUNTED SIGNS, UNLESS OTHERWISE SHOWN IN THE PLANS.

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STATE OF TEXAS
YOHANNES A. TADESSE
107781
LICENSED PROFESSIONAL ENGINEER

Yohannes Tadesse
3/12/2024

FORT BEND COUNTY, TEXAS

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(832) 619-1000

WEST BELLFORT BOULEVARD
AT WESTMOOR DRIVE
AND BINION LANE

GENERAL CONSTRUCTION NOTES

SHEET 1 OF 2

| FED.RD. DIV.NO. | STATE | PROJECT NO. | | | HIGHWAY NO. |
|---|---|---|---|---|---|
| 6 | TEXAS | | | | |
| STATE DISTRICT | COUNTY | CONTROL NO. | SECTION NO. | JOB NO. | SHEET NO. |
| HOUSTON | FORT BEND | | | | 4 |

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DATE:3/12/2024
FILE:pw:\\tedsi-pw.bentley.com:tedsi-pw-01\Documents\Projects\2023\2023-2148-01 - West Bellfort Blvd Traffic Signals\6.0 TEDSI Design\6.08 CADD\6.08.01 Sheet Files\Signal\SHT_NOTE-G

WHEN DESIGN DETAILS ARE NOT SHOWN ON THE PLANS, PROVIDE SIGNS AND ARROWS CONFORMING TO THE LATEST "STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS" MANUAL.

LOCATIONS OF THE RELOCATED SIGNS ARE APPROXIMATE. BEFORE PLACING THEM, OBTAIN APPROVAL OF AND THEN STAKE THE EXACT LOCATIONS FOR THESE SIGNS.

REPLACE EXISTING SIGNS THAT ARE DAMAGED DURING RELOCATION AT NO EXPENSE TO THE COUNTY.

**ITEM 680: INSTALLATION OF HIGHWAY TRAFFIC SIGNALS**

FURNISH LABOR, TOOLS, EQUIPMENT, AND MATERIALS AS SHOWN ON THE PLANS AND SPECIFICATIONS FOR A COMPLETE AND OPERATING SIGNAL INSTALLATION.

SIGNAL CONTROL EQUIPMENT FURNISHED TO THE CONTRACTOR WILL BE SHOP TESTED. CERTIFY IN WRITING THAT THE EQUIPMENT IS WORKING PROPERLY IN ALL MODES BEFORE REMOVING THE EQUIPMENT FROM THE SHOP. INVESTIGATE REPORTED MALFUNCTIONS IN THE TRAFFIC SIGNAL SYSTEM BEFORE FINAL ACCEPTANCE. IF THE MALFUNCTION IS DUE TO COUNTY-FURNISHED EQUIPMENT, RETURN THIS EQUIPMENT TO THE COUNTY FOR REPAIR OR REPLACEMENT. IF THE REPAIR REQUIRES THAT THE SIGNAL FLASHES MORE THAN 6 HOURS, INSTALL AN EMERGENCY REPLACEMENT. INSTALL THIS REPAIRED OR REPLACED EQUIPMENT AND PLACE THE TRAFFIC SIGNAL SYSTEM BACK INTO NORMAL OPERATION. NO EXTRA COMPENSATION IS ALLOWED FOR THIS WORK.

COMPLETE TRAFFIC SIGNAL CONSTRUCTION WORK, INCLUDING CORRECTING DISCREPANCIES SHOWN ON THE COUNTY INSPECTOR'S "TRAFFIC SIGNAL INSTALLATION INSPECTION REPORT" BEFORE THE BEGINNING OF THE TEST PERIOD.

PROVIDE A FULL-TIME QUALIFIED TRAFFIC SIGNAL TECHNICIAN RESPONSIBLE FOR INSTALLING, MAINTAINING, OR REPLACING TRAFFIC SIGNAL DEVICES.

STAKING IN THE FIELD IS SUBJECT TO APPROVAL.

MAKE ADJUSTMENTS IN PROJECT CONSTRUCTION, IF NEEDED, DUE TO CONFLICTS WITH UNDERGROUND UTILITIES.

DO NOT AIM THE LUMINAIRE ARMS MOUNTED ON TRAFFIC SIGNAL POLES INTO THE INTERSECTION. AIM EACH ARM PERPENDICULAR TO THE CENTERLINE OF THE ROADWAY IT IS INTENDED TO COVER, TO DEVELOP THE PROPER ILLUMINATION PATTERN FOR THE INTERSECTION.

ALLOW THE ELECTRICAL WORK TO BE INSPECTED BY THE COUNTY FOR COMPLIANCE WITH THE PLANS AND SPECIFICATIONS.

PROVIDE CONTINUOUS CONDUCTORS WITHOUT SPLICES FROM SIGNAL CONTROLLER TO SIGNAL HEADS. ROUTE THE CONDUCTORS FOR LUMINAIRES TO THE SERVICE ENCLOSURE. SPLICES OR ATTACHMENTS TO THE TERMINAL BLOCK IN THE ACCESS COMPARTMENT OF THE MAST ARM POLE ARE NOT PERMITTED EXCEPT FOR THE LUMINAIRE CABLE.

ABRASIONS TO THE CONDUCTOR INSULATION CAUSED WHILE PULLING CABLE FOR THE TRAFFIC SIGNAL SYSTEM ARE CAUSE FOR IMMEDIATE REJECTION. REMOVE AND REPLACE THE ENTIRE DAMAGED CABLE AT NO EXPENSE TO THE COUNTY.

WHEN PULLING CABLES OR CONDUCTORS THROUGH CONDUIT, DO NOT EXCEED THE MANUFACTURER'S RECOMMENDED PULLING TENSIONS. LUBRICATE THE CABLES OR CONDUCTORS WITH A LUBRICANT AS RECOMMENDED BY THE CABLE MANUFACTURER.

WRAP SIGNAL HEADS WITH DARK PLASTIC OR SUITABLE MATERIAL TO CONCEAL THE SIGNAL FACES FROM THE TIME OF INSTALLATION UNTIL PLACING INTO OPERATION. DO NOT USE BURLAP.

FURNISH SIGNAL HEADS FROM THE SAME MANUFACTURER.

USE HIGH SPECIFIC INTENSITY REFLECTIVE SHEETING FOR SIGNS MOUNTED UNDER OR ADJACENT TO THE SIGNAL HEADS.

FOR A STEEL MAST ARM POLE ASSEMBLY, HOLD THE ANCHOR BOLTS AND CONDUITS RIGIDLY IN PLACE WITH A WELDED STEEL TEMPLATE.

LEAVE A MINIMUM OF ONE FULL DIAMETER THREAD EXPOSED ON EACH ANCHOR BOLT SECURING A SIGNAL POLE.

USE A TEXAS CONE PENETROMETER READING OF 10. THE DRILLED SHAFT LENGTH IS FROM THE SURFACE ELEVATION TO THE BOTTOM OF THE DRILLED SHAFT. PROVIDE AN ADDITIONAL LENGTH OF THE POLE FOUNDATION FROM THE SURFACE LEVEL TO THE ROADWAY LEVEL, IF REQUIRED FOR UNUSUAL LOCATIONS. PROVIDE THE DRILLED SHAFT DEPTH REGARDLESS OF THE LENGTH OF THE POLE FOUNDATION. THE POLE FOUNDATION DEPTH FROM THE SURFACE LEVEL TO THE ROADWAY LEVEL IS A MAXIMUM OF 4 FT., OR AS APPROVED.

LOCATE MAST ARM POLE ASSEMBLIES A MINIMUM OF 4 FT. FROM THE ROADWAY CURB OR PAVEMENT EDGE.

AFTER THE TRAFFIC SIGNAL POLE ASSEMBLY IS PLUMB AND ALL NUTS ARE TIGHT, TACK-WELD EACH ANCHOR BOLT NUT IN TWO PLACES TO ITS WASHER. TACK-WELD EACH WASHER TO THE BASE PLATE IN TWO PLACES. DO NOT WELD COMPONENTS TO THE BOLT. TACK-WELD IN ACCORDANCE WITH ITEM 441, "STEEL STRUCTURES." AFTER TACK-WELDING, REPAIR GALVANIZING DAMAGE ON BOLTS, NUTS, AND WASHERS IN ACCORDANCE WITH SECTION 445.3.D, "REPAIRS."

**ITEM 682: VEHICLE AND PEDESTRIAN SIGNAL HEADS**

INSTALL TWO SET SCREWS ON VEHICLE SIGNAL HEAD MOUNTING HARDWARE FITTINGS.

**ITEM 688: PEDESTRIAN DETECTORS**

PROVIDE PEDESTRIAN PUSH BUTTONS A MINIMUM OF 2 IN. DIAMETER IN THE SMALLEST DIMENSION.

INSTALL A RUBBER GROMMET OR BUSHING BETWEEN THE PUSH BUTTON ASSEMBLY AND THE SIGNAL POLE TO PROTECT THE CONDUCTORS.

**ITEM 6266: VIDEO IMAGING VEHICLE DETECTION SYSTEM**

FURNISH THE CABLE TO OPERATE THE VIDEO IMAGING VEHICLE DETECTION SYSTEM (VIVDS) IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS OR PURCHASE IT FROM THE SAME MANUFACTURER AS THE VIVDS EQUIPMENT.

SUPPLY VIVDS EQUIPMENT THAT CAN PROCESS UP TO A MAXIMUM OF 6 CAMERA INPUTS PER INTERSECTION. ADDITIONAL EQUIPMENT TO ACCOMMODATE UP TO 6 CAMERA INPUTS IS SUBSIDIARY TO THE VARIOUS BID ITEMS. NO EXTRA COMPENSATION WILL BE ALLOWED FOR ADDITIONAL EQUIPMENT NEEDED TO MAKE THE VIVDS EQUIPMENT FULLY OPERATIONAL UNDER THIS ITEM.

DETECTION ZONE VIDEO TAPING FOR THIS PROJECT WILL NOT BE REQUIRED.

**SPECIAL SPECIFICATION 6266: VIDEO IMAGING VEHICLE DETECTION SYSTEM**

| SPECIFICATION ITEMS | DESCRIPTION | NOT REQUIRED | REQUIRED | STATE SUPPLIED |
|---|---|---|---|---|
| | | | | |
| 1 | **VIVDS CONFIGURATION** | | X | |
| | CAMERAS, CONNECTORS AND MOUNTING HARDWARE | | X | |
| | VIVDS PROCESSOR UNIT | | X | |
| | FIELD SETUP COMPUTER (1 REQUIRED) (LAPTOP) | X | | |
| | FIELD SETUP VIDEO MONITOR (1 EA. CONTROLLER) | | X | |
| | FIELD COMMUNICATIONS LINK | | X | |
| | | | | |
| 3 | **FUNCTIONAL CAPABILITIES** | | | |
| | SYSTEM SOFTWARE | | X | |
| | | | | |
| 4 | **VEHICLE DETECTION** | | | |
| | DETECTION ZONE VIDEO TAPING | X | | |
| | | | | |
| 5 | **VIVDS PROCESSOR UNIT** | | | |
| | PROVIDE BOTH TS1 AND TS2 INTERFACES | | X | |
| | 12 VOLT/5 AMP POWER SUPPLY | | X | |
| | | | | |
| 6 | **CAMERA ASSEMBLY** | | | |
| | CAMERA INTERFACE PANEL | | X | |
| | | | | |
| 7 | **FIELD COMMUNICATIONS LINK** | | | |
| | LIGHTNING AND TRANSIENT SURGE SUPPRESSION DEVICES | | X | |
| | | | | |
| 9 | **TEMPORARY USE AND RETESTING** | | X | |
| | | | | |
| 10 | **OPERATION FROM CENTRAL CONTROL** | X | | |
| | TELEPHONE INTERCONNECT | X | | |
| | ISDN INTERCONNECT | X | | |
| | | | | |
| 11 | **INSTALLATION AND TRAINING** | | X | |
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WEST BELLFORT BOULEVARD
AT WESTMOOR DRIVE
AND BINION LANE

GENERAL CONSTRUCTION NOTES

SHEET 2 OF 2

| FED.RD. DIV.NO. | STATE | PROJECT NO. | | | HIGHWAY NO. |
|---|---|---|---|---|---|
| 6 | TEXAS | | | | |
| STATE DISTRICT | COUNTY | CONTROL NO. | SECTION NO. | JOB NO. | SHEET NO. |
| HOUSTON | FORT BEND | | | | 5 |

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DATE:3/12/2024
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## PERMANENT TRAFFIC SIGNAL NOTES:

1. INSTALL SIGNS AND SIGNALS HORIZONTALLY ON MAST ARM, 17 FT.-6 IN. MINIMUM ABOVE THE ROADWAY.
2. FURNISH BLACK HOUSING FOR VEHICLE SIGNALS WITH 12 IN. LENS AND RETROREFLECTIVE BACKPLATES.
3. FURNISH VEHICLE AND COUNTDOWN PEDESTRIAN SIGNALS WITH LIGHT EMITTING DIODE (LED) SIGNAL LAMP UNITS.
4. SYMBOLIC PEDESTRIAN SIGNAL HEAD SHALL BE LED AUDIBLE PEDESTRIAN AND 12-IN. COUNTDOWN.
5. USE DIAMOND GRADE RETROREFLECTIVE SHEEETING FOR SIGNS MOUNTED UNDER OR ADJACENT TO THE SIGNAL HEADS.
6. FURNISH SYMBOL TYPE PEDESTRIAN COUNTDOWN SIGNALS. INSTALL USING MOUNTING HEIGHT IN ACCORDANCE WITH THE LATEST TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
7. FURNISH MATERIALS NECESSARY TO INSTALL ACCESSIBLE PEDESTRIAN SIGNAL UNITS AND SIGNS AS SHOWN IN THE PLANS. INSTALL AT 3 FT.-6 IN. TO 4 FT.-0 IN. ABOVE THE SIDEWALK OR CONCRETE WALKWAY.
8. ROUTE CABLE FOR LUMINAIRES (4/C NO. 12 TRAY CABLE) TO THE SERVICE ENCLOSURE. SEE ELECTRICAL DETAILS SHEETS.
9. INSTALL FULL-ACTUATED, ETHERNET-CAPABLE CONTROLLER WITH INTERNAL TIME BASED COORDINATION UNIT AND COMMUNICATION IN A BASE MOUNTED CABINET. SEE FBC APPROVED TRAFFIC SIGNAL EQUIPEMENT LIST.
10. LOCATE CONTROLLERS, STEEL POLES, DETECTION ZONES AS APPROVED BY FORT BEND COUNTY IN THE FIELD.
11. REPAIR OR REPLACE PAVEMENT AND SIDEWALKS DAMAGED BY THE CONTRACTOR'S FORCES DURING CONSTRUCTION AT NO COST TO THE DEPARTMENT.
12. FURNISH AND INSTALL DUCT SEAL TO ENCLOSE THE ENDS OF EACH CONDUIT CONTAINING SIGNAL CABLE.
13. THE CONTRACTOR SHALL INSTALL A CLOSED NIPPLE WITH LOCK NUT AND BUSHING (SIZE AS REQUIRED) TO PREVENT ABRASION TO SIGNAL CABLE WHERE THE CABLE ENTERS THE UPPER PORTION OF THE SIGNAL POLE.
14. DO NOT PLACE SIGNAL HEADS OVER THE ROADWAY UNTIL ALL NECESSARY MATERIALS ARE ON HAND AS APPROVED.
15. INSTALL TWO SET SCREWS ON ALL VEHICLE SIGNAL HEAD MOUNTING HARDWARE FITTINGS.
16. WRAP SIGNAL HEADS WITH DARK PLASTIC OR SUITABLE MATERIAL TO CONCEAL THE SIGNAL FACES FROM THE TIME OF INSTALLATION UNTIL PLACING INTO OPERATION. DO NOT USE BURLAP.
17. INSTALL A 5/8-IN. (MINIMUM) EYE BOLT FOR THE POINT OF ATTACHMENT BELOW THE SERVICE ENTRANCE WEATHERHEAD FOR THE SERVICE DROP (120/240 VOLT SERVICE) TO STEEL POLE.
18. LUMINAIRES MOUNTED ON TRAFFIC SIGNAL POLES SHALL BE IN COMPLIANCE WITH TXDOT STANDARDS.
19. PROVIDE LIGHT-EMITTING DIODE (LED) LUMINAIRES EQUIVALENT TO "250 WATT HIGH PRESSURE SODIUM" LUMINAIRES, OPERATING AT 240 VOLTS.
20. GROUND STEEL MAST ARM POLE ASSEMBLIES IN ACCORDANCE WITH REQUIREMENTS SHOWN ON THE LATEST TRAFFIC SIGNAL POLE FOUNDATION STANDARD. USE THE GROUNDING LUG ON THE POLE TO GROUND THE POLE TO THE GROUND CONDUCTORS FROM THE CONDUITS.
21. VERIFY THE CORRECT MAST ARM POLE LENGTHS FOR EACH SIGNALIZED INTERSECTION PRIOR TO ORDERING THE EQUIPMENT.
22. ELECTRICAL POWER TO OPERATE THE TRAFFIC SIGNAL INSTALLATION WILL BE PLACED IN THE COUNTY'S NAME. THIS INCLUDES ALL POWER TO OPERATE THE SIGNAL DURING THE VARIOUS PHASES OF CONSTRUCTION AND DURING THE TEST PERIOD PRIOR TO ACCEPTANCE OF THE WORK BY FORT BEND COUNTY.
23. INSTALL PEDESTRIAN SIGNAL POLES WITH SREW-IN ANCHOR FOUNDATION.
24. THE ENGINEER WILLL PROVIDE PHASING AND TIMINGS FOR TEMPORARY AND PERMANENT TRAFFIC SIGNALS.
25. EXISTING STOP SIGNS AND SCHOOL CROSSING ASSEMBLIES AT THE INTERSECTION SHALL BE REMOVED AND RETURNED TO FORT BEND COUNTY.
26. ALL EXISTING EQUIPMENT THAT WILL NOT BE INSTALLED ON THE SIGNAL POLES AND/OR MAST ARMS SHALL BE RETURNED TO FORT BEND COUNTY.
27. ALL TRAFFIC SIGNAL POLE FOUNDATION LOCATIONS SHALL BE APPROVED BY THE ENGINEER OR REPRESENTATIVE IN THE FIELD PRIOR TO DRILLING.
28. FURNISH VIVDS CABLE RECOMMENDED BY MANUFACTURER.
29. ECONOLITE REPRESENTATIVES MUST BE ON SITE AND SUPERVISE THE INSTALLATION, SETUP, AND TESTING OF VIVDS EQUIPMENT. ANY EQUIPMENT REQUIRED FOR SETUP AND OPERATION OF THE VIVDS SYSTEM MUST BE PROVIDED TO THE COUNTY UPON COMPLETION.

| Fort Bend County Engineering - Approved Signal Equipment List | | |
|---|---|---|
| | | |
| **Cabinet and Controller** | | |
| **Equipment** | **Manufacturer** | **Model#** |
| Traffic Signal Cabinet | Bison | P44FTBND-DD-019618 |
| Traffic Signal Controller | Econolite | COB21110110000 COBALT 2100 Traffic Signal Controller |
| Conflict Monitor | Eberle Design | 006-MMU16LEIP Conflict Smart Monitor |
| Uninterruptible Power Supply | Alpha Technologies | FXM-HP-2000, Model AOES-6 Cabinet 030-127-22 (with four 220GXL Alpha batteries) |
| Remote Battery Monitoring System | Alpha Technologies | 2-string |
| Field Monitoring Unit | Applied Information | AI-500-085-02 HSM |
| Emergency Pre-emption | Applied Information | Glance - Included with AI-500-85-02 FMU |
| Pre-emption vehicle unit | Applied Information | 132-AI-500-065 w/ Glance software config |
| | | |
| **Traffic Signals** | | |
| LED Signals | Duralight | JXJ300-07_03 TxDot Arrow LED- Clear Lens |
| | Duralight | JXC300-HFT_03 TxDot Ball LED - Hi-Flux |
| Audible Pedestrian Push Buttons | Polara | 9x15 Navigator (2 Wire) Black/Black (87-EN23TNO-B) ICCU - Shelf Model Including Hardware Kit (87-ICCU-S) |
| Signal and Pedestrian Poles | Pelco | PB-5100 SERIES PED Pole Aluminum |
| Signal and Pedestrian Housing | McCain | M31826 PED Signal Housing; Color shall be black |
| Pedestrian Countdown Modules | Duralight | JXM-400 VIEIL 16" X 18" PED LED |
| PTZ Camera | Axis Communications | P5655-E Mk II w/pole mount hardware |
| Luminaire Fixture | Philips | Lumec RFM 108W48LED4K G2 R2M UNV DMG FAWS RCD7 PH9 SP2 |
| Ground Boxes | TxDOT Approved List | |
| Traffic Signal Cable | TxDOT Approved List | |
| Conduit | TxDOT Approved List | |
| Wind dampers required on all mast arms longer than 44' | | |
| | | |
| **Vehicle Detection** | | |
| VIVDS System | Econolite | Autoscope Vision AVISION (A700-1172 |
| | Econolite | Autoscope Comm Manager AVCM (A700-1166-01) |
| | Econolite | Mini Detection Programming Kit AMINKIT1 (201-1004-501) |
| | | |
| **Pavement Markings** | | |
| Thermoplastic Pavement Marking Materials | Ennis-Flint | |
| Reflectorized Pavement Markings | TxDOT Approved List | |
| Raised Pavement Markings | TxDOT Approved List | |

FORT BEND COUNTY
APPROVED
MAR 19 2024
Valid One Year From Date
ENGINEERING DEPARTMENT

NOT TO SCALE

| NO. | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

STATE OF TEXAS
YOHANNES A. TADESSE
107781
LICENSED PROFESSIONAL ENGINEER
3/12/2024

FORT BEND COUNTY, TEXAS

TEDSI INFRASTRUCTURE GROUP
Consulting Engineers
738 Hwy 6 South, Suite 430
Houston, Texas 77079
(832) 678-1000
TEDSI TBPE F-1640

WEST BELLFORT BOULEVARD
AT WESTMOOR DRIVE
AND BINION LANE

PERMANENT TRAFFIC SIGNAL NOTES

| FED. RD. DIV. NO. | STATE | PROJECT NO. | | | HIGHWAY NO. |
|---|---|---|---|---|---|
| 6 | TEXAS | | | | |
| STATE DISTRICT | COUNTY | CONTROL NO. | SECTION NO. | JOB NO. | SHEET NO. |
| HOUSTON | FORT BEND | | | | 6 |

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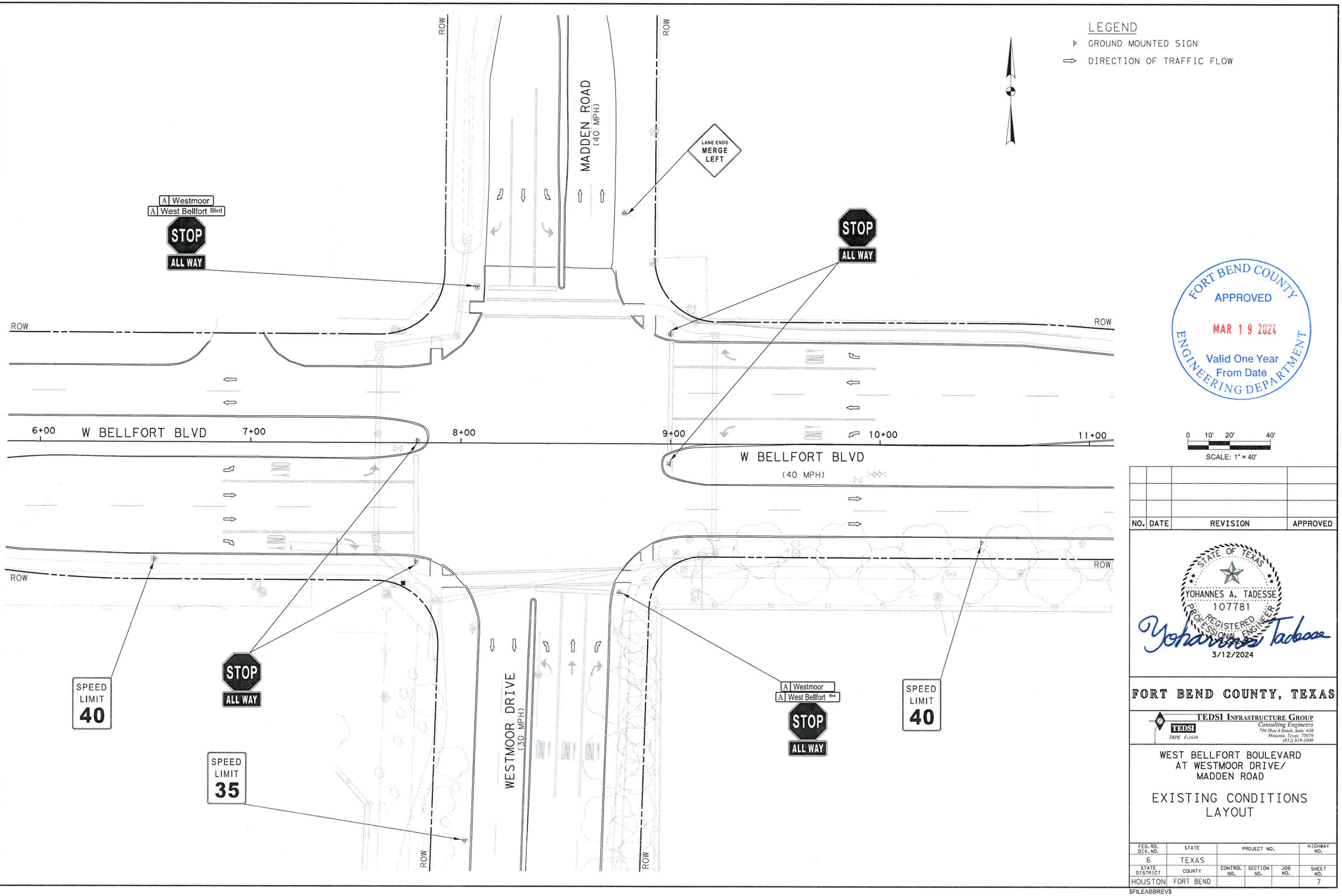


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Houston, Texas 77079
(832) 619-1000

# WEST BELLFORT BOULEVARD AT WESTMOOR DRIVE/ MADDEN ROAD

## EXISTING CONDITIONS LAYOUT

| FED.RD. DIV.NO. | STATE | PROJECT NO. | | | HIGHWAY NO. |
|---|---|---|---|---|---|
| 6 | TEXAS | | | | |
| STATE DISTRICT | COUNTY | CONTROL NO. | SECTION NO. | JOB NO. | SHEET NO. |
| HOUSTON | FORT BEND | | | | 7 |

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## PROPOSED SIGNAL HEAD SCHEDULE

12" R Y G — A, B, D, E, G, H, K, L

12" R Y Y G — SY FY — C, F, J, M

08 — W1 THRU W8

SY = SOLID YELLOW
FY = FLASHING YELLOW

## PROPOSED SIGN SCHEDULE

**West Bellfort** — S2, S4

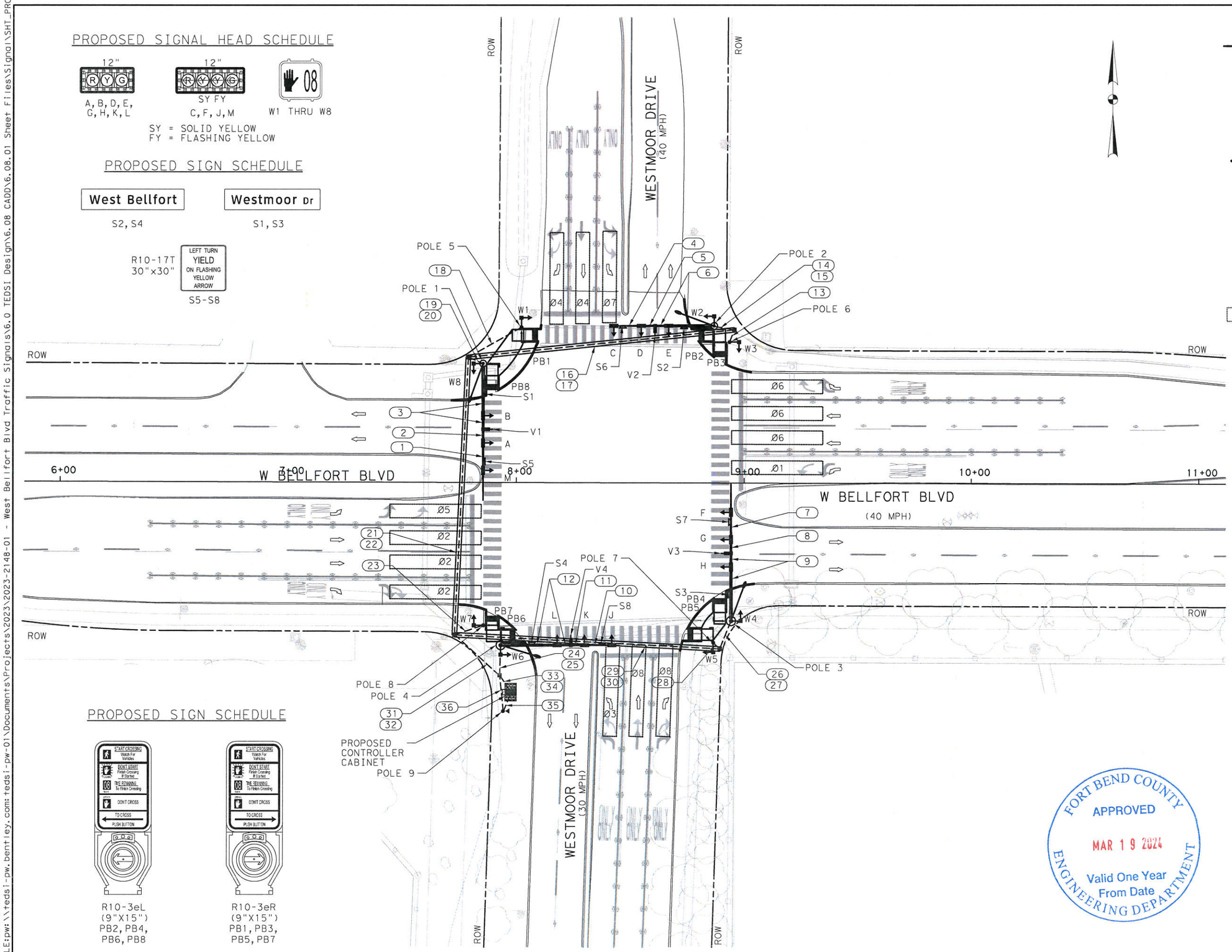
**Westmoor Dr** — S1, S3

R10-17T 30"x30" — LEFT TURN YIELD ON FLASHING YELLOW ARROW — S5-S8

## PROPOSED SIGN SCHEDULE

R10-3eL (9"X15") PB2, PB4, PB6, PB8

R10-3eR (9"X15") PB1, PB3, PB5, PB7




## LEGEND

- STRAIN POLE WITH MAST ARM
- PEDESTAL POLE
- HORIZONTAL SIGNAL HEAD
- VERTICAL SIGNAL HEAD
- PEDESTRIAN SIGNAL HEAD
- PEDESTRIAN SIGNAL PUSH BUTTON
- LUMINAIRE AND ARM
- CONTROLLER CABINET W/ BBU
- OVERHEAD SIGN
- ELECTRICAL SERVICE
- PULL BOX
- CONDUIT (TRENCH)
- CONDUIT (BORE)
- VIVDS CAMERA
- VIDEO DETECTION ZONE
- DIRECTION OF TRAFFIC FLOW

SCALE: 1" = 40'

| NO. | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |

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3/12/2024

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FORT BEND COUNTY
APPROVED
MAR 19 2024
Valid One Year From Date
ENGINEERING DEPARTMENT

WEST BELLFORT BOULEVARD
AT WESTMOOR DRIVE

PROPOSED TRAFFIC SIGNALLAYOUT

| FED. RD. DIV. NO. | STATE | PROJECT NO. | | | HIGHWAY NO. |
|---|---|---|---|---|---|
| 6 | TEXAS | | | | |
| STATE DISTRICT | COUNTY | CONTROL NO. | SECTION NO. | JOB NO. | SHEET NO. |
| HOUSTON | FORT BEND | | | | 8 |

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# CONDUIT AND CONDUCTOR RUNS

| RUN NO. | CONDUIT (618) PVC 2" (SCHD 80) (6046) NO. EA | 2" (6046) TRENCH LF | 2" (SCHD 80) (6047) NO. EA | 2" (6047) BORE LF | 3" (SCHD 80) (6053) NO. EA | 3" (6053) TRENCH LF | 3" (SCHD 80) (6054) NO. EA | 3" (6054) BORE LF | 4" (SCHD 80) (6058) NO. EA | 4" (6058) TRENCH LF | 4" (SCHD 80) (6059) NO. EA | 4" (6059) BORE LF | CONDUCTORS (620) GROUND #6 BARE (6009) NO. EA | #6 BARE (6009) LENGTH LF | GROUND #4 BARE (6011) NO. EA | #4 BARE (6011) LENGTH LF | POWER #4 INSULATED (6012) NO. EA | #4 INSULATED (6012) LENGTH LF | TRAY CABLE (621) LUMINAIRE #12/4C TRAY CABLE (6005) NO. EA | #12/4C TRAY CABLE (6005) LENGTH LF | CABLES (684) PEDESTRIAN #12/2C (6007) NO. EA | #12/2C (6007) LENGTH LF | PEDESTRIAN #12/4C (6009) NO. EA | #12/4C (6009) LENGTH LF | SIGNAL #12/7C (6012) NO. EA | #12/7C (6012) LENGTH LF | VIVDS (6306) CAMERA COMM. CABLE (6005) NO. EA | COMM. CABLE (6005) LENGTH LF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 12 | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 6 | | |
| 3 | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 30 | 1 | 30 |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 12 | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 6 | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 25 | 1 | 25 |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 12 | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 6 | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 30 | 1 | 30 |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 12 | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 6 | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 30 | 1 | 30 |
| 13 | 1 | 5 | | | | | | | | | | | 1 | 5 | | | | | | | 1 | 5 | 1 | 5 | | | | |
| 14 | | | | | 1 | 10 | | | | | | | 1 | 10 | | | | | 1 | 10 | 1 | 10 | 1 | 10 | 2 | 10 | | |
| 15 | 1 | 10 | | | | | | | | | | | 1 | 10 | | | | | | | | | | | | | 1 | 10 |
| 16 | | | | | | | 1 | 118 | | | | | 1 | 118 | | | | | 1 | 118 | 2 | 118 | 2 | 118 | 2 | 118 | | |
| 17 | | | 1 | 118 | | | | | | | | | 1 | 118 | | | | | | | | | | | | | 1 | 118 |
| 18 | 1 | 25 | | | | | | | | | | | 1 | 25 | | | | | | | 1 | 25 | 1 | 25 | | | | |
| 19 | | | | | 1 | 8 | | | | | | | 1 | 8 | | | | | 1 | 8 | 1 | 8 | 1 | 8 | 2 | 8 | | |
| 20 | 1 | 8 | | | | | | | | | | | 1 | 8 | | | | | | | | | | | | | 1 | 8 |
| 21 | | | | | | | | | | | 1 | 120 | 1 | 120 | | | | | 2 | 120 | 4 | 120 | 4 | 120 | 4 | 120 | | |
| 22 | | | 1 | 120 | | | | | | | | | 1 | 120 | | | | | | | | | | | | | 2 | 120 |
| 23 | 1 | 15 | | | | | | | | | | | 1 | 15 | | | | | | | 1 | 15 | 1 | 15 | | | | |
| 24 | | | | | 1 | 15 | | | | | | | 1 | 15 | | | | | 1 | 15 | 1 | 15 | 1 | 15 | 2 | 15 | | |
| 25 | 1 | 15 | | | | | | | | | | | 1 | 15 | | | | | | | | | | | | | 1 | 15 |
| 26 | | | | | 1 | 15 | | | | | | | 1 | 15 | | | | | 1 | 15 | 1 | 15 | 1 | 15 | 2 | 15 | | |
| 27 | 1 | 15 | | | | | | | | | | | 1 | 15 | | | | | | | | | | | | | 1 | 15 |
| 28 | 1 | 5 | | | | | | | | | | | 1 | 5 | | | | | | | 1 | 5 | 1 | 5 | | | | |
| 29 | | | | | | | 1 | 117 | | | | | 1 | 117 | | | | | 1 | 117 | 2 | 117 | 2 | 117 | 2 | 117 | | |
| 30 | | | 1 | 117 | | | | | | | | | 1 | 117 | | | | | | | | | | | | | 1 | 117 |
| 31 | | | | | | | | | 1 | 25 | | | 1 | 25 | | | | | 3 | 25 | 7 | 25 | 7 | 25 | 6 | 25 | | |
| 32 | 1 | 25 | | | | | | | | | | | 1 | 25 | | | | | | | | | | | | | 3 | 25 |
| 33 | | | | | | | | | 2* | 10 | | | 1 | 10 | | | | | | | 8 | 10 | 8 | 10 | 8 | 10 | | |
| 34 | 2* | 10 | | | | | | | | | | | 1 | 10 | | | | | | | | | | | | | 4 | 10 |
| 35 | 1 | 10 | | | | | | | | | | | | | 1 | 10 | 2 | 10 | | | | | | | | | | |
| 36 | 1 | 15 | | | | | | | | | | | 1 | 15 | | | | | 4 | 15 | | | | | | | | |
| POLE 1 | | | | | | | | | | | | | | | | | | | 1 | 35 | 1 | 5 | 1 | 10 | 2 | 20 | 1 | 20 |
| POLE 2 | | | | | | | | | | | | | | | | | | | | | 1 | 5 | 1 | 10 | 2 | 20 | 1 | 20 |
| POLE 3 | | | | | | | | | | | | | | | | | | | | | 1 | 5 | 1 | 10 | 2 | 20 | 1 | 20 |
| POLE 4 | | | | | | | | | | | | | | | | | | | | | 1 | 5 | 1 | 10 | 2 | 20 | 1 | 20 |
| POLE 5 | | | | | | | | | | | | | | | | | | | | | 1 | 5 | 1 | 10 | | | | |
| POLE 6 | | | | | | | | | | | | | | | | | | | | | 1 | 5 | 1 | 10 | | | | |
| POLE 7 | | | | | | | | | | | | | | | | | | | | | 1 | 5 | 1 | 10 | | | | |
| POLE 8 | | | | | | | | | | | | | | | | | | | | | 1 | 5 | 1 | 10 | | | | |
| TOTAL (LF) | | 168 | | 355 | | 48 | | 235 | | 45 | | 120 | | 941 | | 10 | | 20 | | 693 | | 1343 | | 1383 | | 1762 | | 833 |
| EST. TOTAL | | 184 | | 395 | | 53 | | 260 | | 49 | | 132 | | 1035 | | 11 | | 22 | | 762 | | 1477 | | 1521 | | 1938 | | 916 |

* INCLUDES SPARE

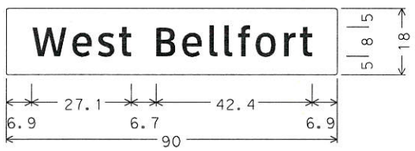
## PROPOSED TRAFFIC SIGNAL POLES

| POLE NO. | SIGNAL POLE DESIGNATION | FOUNDATION TYPE/DEPTH |
|---|---|---|
| 1 | LMA 60L | 48-A/22' |
| 2 | SMA 44L-100 | 36-B/15' |
| 3 | LMA 60L | 48-A/22' |
| 4 | LMA 50L | 48-A/22' |
| 5 | PEDESTAL | SCREW-IN |
| 6 | PEDESTAL | SCREW-IN |
| 7 | PEDESTAL | SCREW-IN |
| 8 | PEDESTAL | SCREW-IN |
| 9 | ELEC SRV TYPE D | N/A |
| N/A | CONTROLLER CABINET | N/A |

## VEHICLE DETECTION CHART

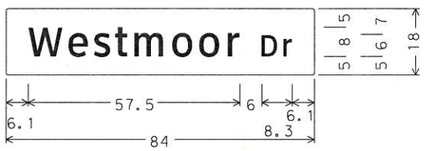
| CAMERA | SETTING |
|---|---|
| V1 | PRESENCE WB |
| V2 | PRESENCE NB |
| V3 | PRESENCE EB |
| V4 | PRESENCE SB |

## PROPOSED SIGN SCHEDULE




D1-1 2in 45 LT;
0.5" Radius, No border, None on, Green;
"West Bellfort" White, ClearviewHwy-3-W;

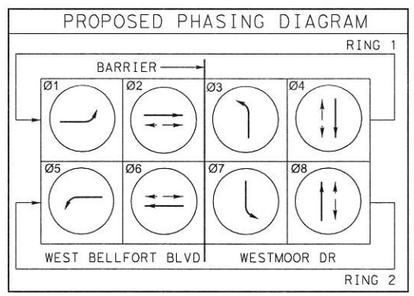
S2, S4




D1-1 2in 45 LT;
0.5" Radius, No border, None on, Green;
"Westmoor" White, ClearviewHwy-3-W;
"Dr" White, ClearviewHwy-3-W;

S1, S3

## PROPOSED PHASING DIAGRAM




| INTERSECTION | ELECTRICAL SERVICE DESCRIPTION (SEE ED (5,6&7)-14) | SERVICE CONDUIT SIZE | SERVICE CONDUCTORS NO./SIZE | SAFETY SWITCH AMPS | MAIN CKT. BKR. POLE/AMP | TWO-POLE CONTACTOR AMPS | PANELBD/ LOADCENTER AMP RATING | CIRCUIT NO. | BRANCH CKT. BKR. POLE/AMPS | BRANCH CIRCUIT AMPS | KVA LOAD |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W BELLFORT BLVD AT WESTMOOR DR | ELEC SERV TY D 120/240 060(NS)SS(E)SP(O) | 1 1/4" | 3/#6 | N/A | 2P/60 | 30 | 100 | A (LUMINAIRE) | 2P/20 | 6 | <7.1 |
| | | | | | | N/A | | B (SIGNAL) | 1P/50 | 40 | |

FORT BEND COUNTY
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STATE OF TEXAS
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107781
LICENSED PROFESSIONAL ENGINEER
3/12/2024

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WEST BELLFORT BOULEVARD
AT WESTMOOR DRIVE/
MADDEN ROAD

PROPOSED TRAFFIC
SIGNAL LAYOUT

| FED.RD. DIV.NO. | STATE | PROJECT NO. | | | HIGHWAY NO. |
|---|---|---|---|---|---|
| 6 | TEXAS | | | | |
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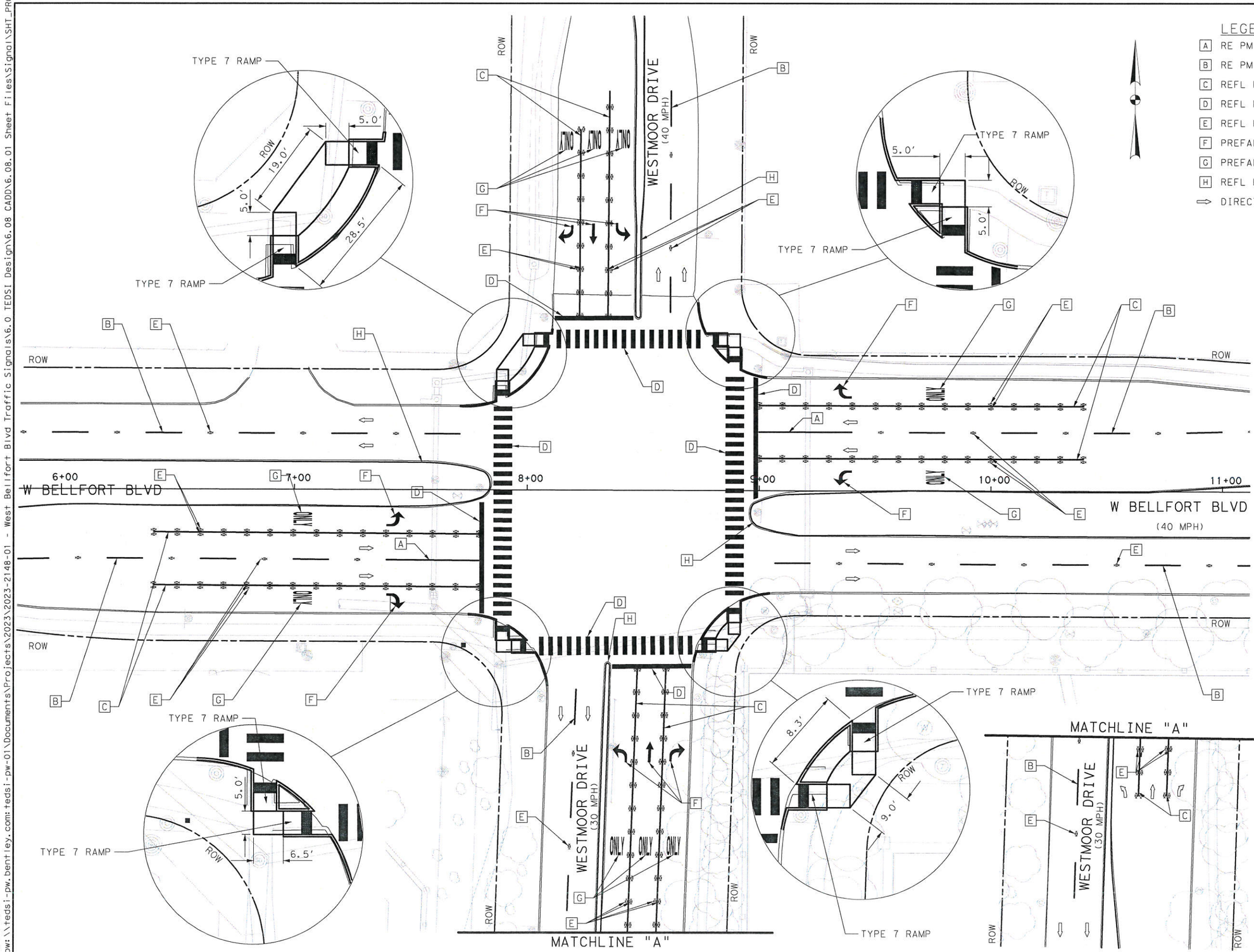


FORT BEND COUNTY
APPROVED
MAR 19 2024
Valid One Year From Date
ENGINEERING DEPARTMENT

SCALE: 1" = 40'

| NO. | DATE | REVISION | APPROVED |
|---|---|---|---|
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STATE OF TEXAS
YOHANNES A. TADESSE
107781
REGISTERED PROFESSIONAL ENGINEER
Yohannes Tadesse
3/12/2024

**FORT BEND COUNTY, TEXAS**

TEDSI INFRASTRUCTURE GROUP
Consulting Engineers
738 Hwy 6 South, Suite 430
Houston, Texas 77079
(832) 619-1000
TBPE F-1640

WEST BELLFORT BOULEVARD
AT WESTMOOR DRIVE

PROPOSED STRIPING AND
PAVEMENT MARKINGS LAYOUT

| FED. RD. DIV. NO. | STATE | PROJECT NO. | | | HIGHWAY NO. |
|---|---|---|---|---|---|
| 6 | TEXAS | | | | |
| STATE DISTRICT | COUNTY | CONTROL NO. | SECTION NO. | JOB NO. | SHEET NO. |
| HOUSTON | FORT BEND | | | | 10 |

$FILEABBREV$

DATE:3/12/2024
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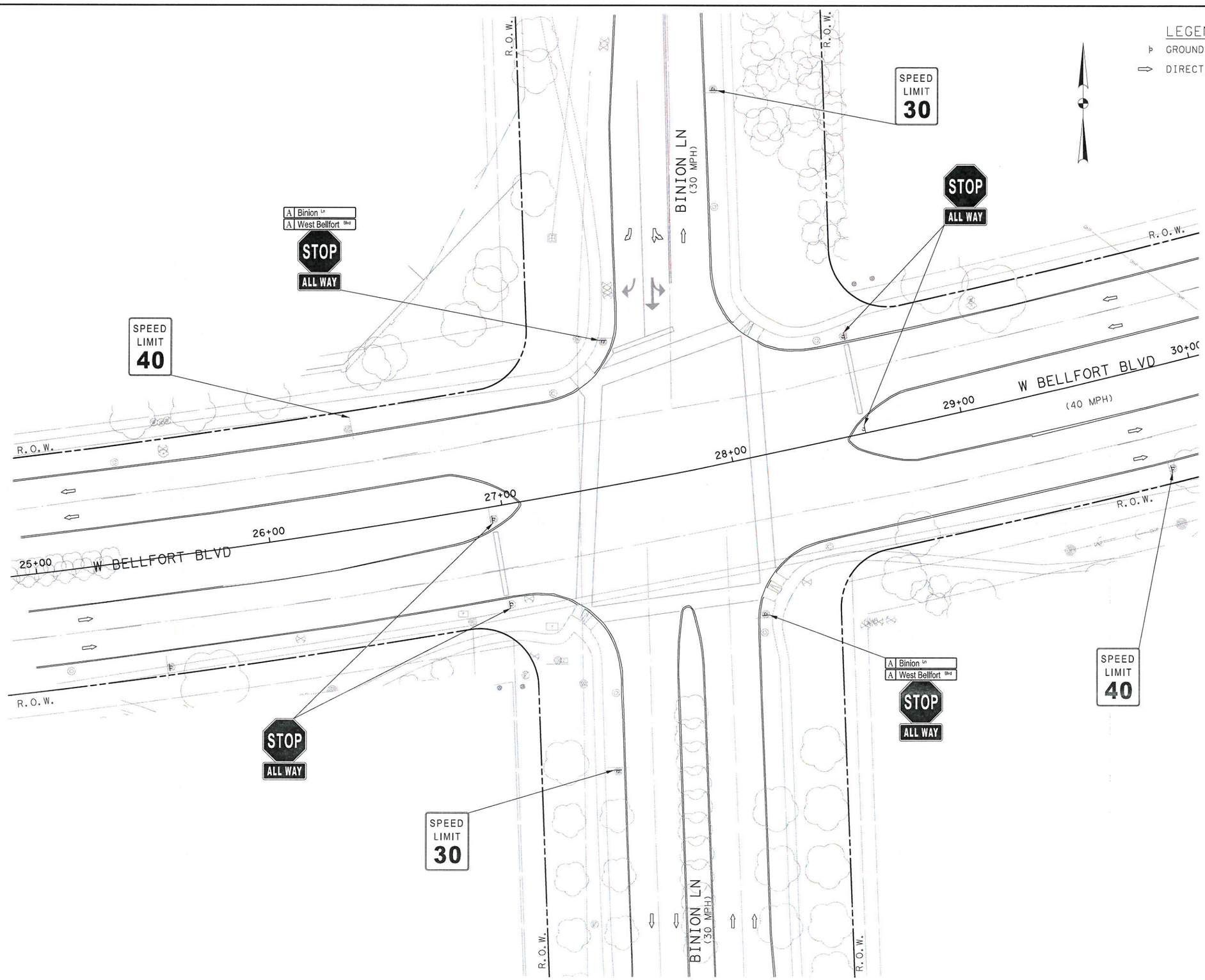


FORT BEND COUNTY
APPROVED
MAR 19 2024
Valid One Year From Date
ENGINEERING DEPARTMENT

0 10' 20' 40'
SCALE: 1" = 40'

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Houston, Texas 77079
(832) 619-1000

WEST BELLFORT BOULEVARD
AT BINION LANE

EXISTING CONDITIONS
LAYOUT

| FED. RD. DIV. NO. | STATE | PROJECT NO. | | | HIGHWAY NO. |
|---|---|---|---|---|---|
| 6 | TEXAS | | | | |
| STATE DISTRICT | COUNTY | CONTROL NO. | SECTION NO. | JOB NO. | SHEET NO. |
| HOUSTON | FORT BEND | | | | 11 |

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## PROPOSED SIGNAL HEAD SCHEDULE

| 12" (R Y G) | 12" (R Y Y G) SY FY | 08 |
|---|---|---|
| B, C, E, F, H, J, L, M | A, D, G, K | W1 THRU W8 |

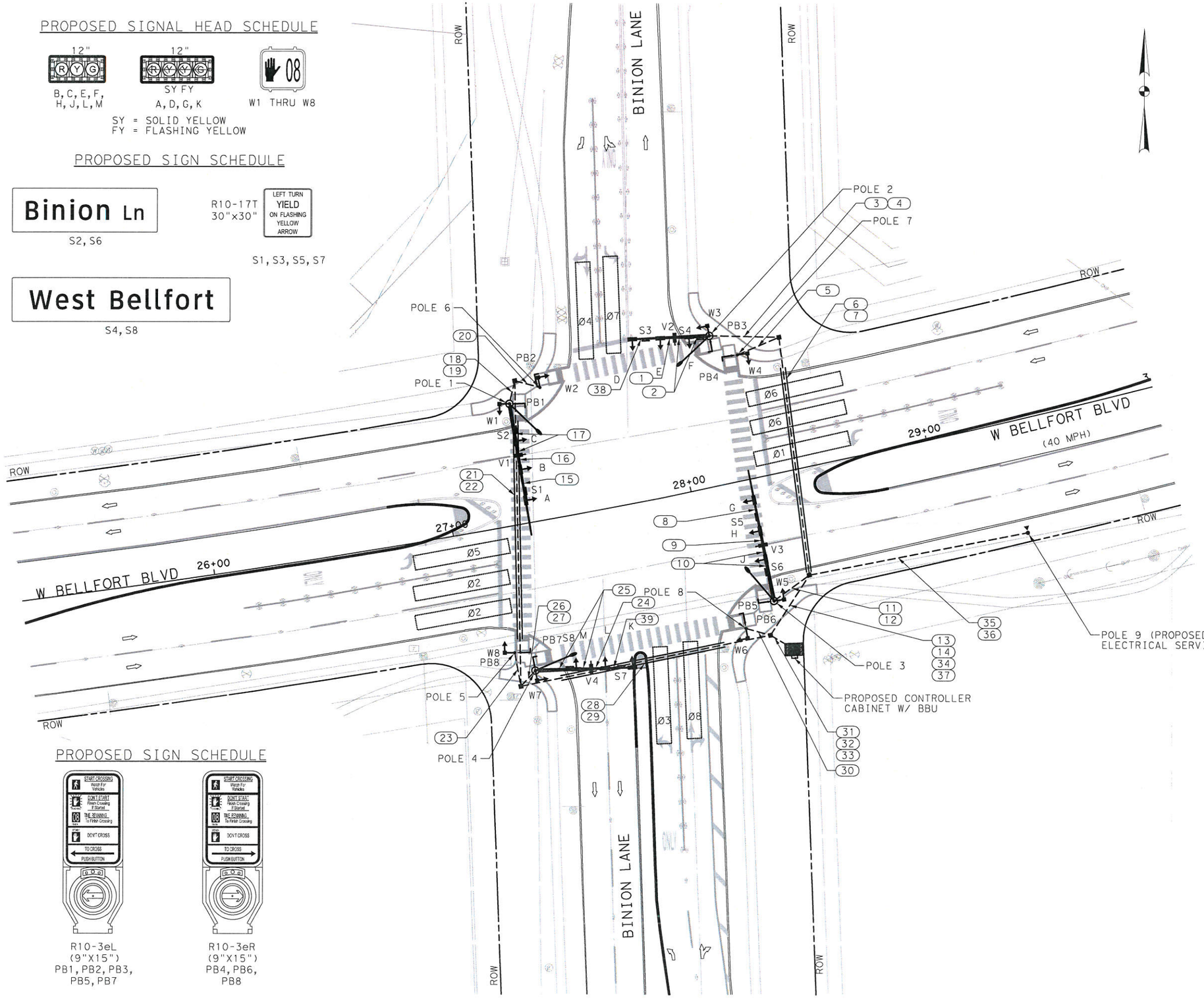
SY = SOLID YELLOW
FY = FLASHING YELLOW

## PROPOSED SIGN SCHEDULE

**Binion Ln**
S2, S6

R10-17T 30"x30" — LEFT TURN YIELD ON FLASHING YELLOW ARROW
S1, S3, S5, S7

**West Bellfort**
S4, S8




## PROPOSED SIGN SCHEDULE




R10-3eL
(9"X15")
PB1, PB2, PB3,
PB5, PB7




R10-3eR
(9"X15")
PB4, PB6,
PB8

## LEGEND

- STRAIN POLE WITH MAST ARM
- PEDESTAL POLE
- HORIZONTAL SIGNAL HEAD
- VERTICAL SIGNAL HEAD
- PEDESTRIAN SIGNAL HEAD
- PEDESTRIAN SIGNAL PUSH BUTTON
- LUMINAIRE AND ARM
- CONTROLLER CABINET W/ BBU
- OVERHEAD SIGN
- ELECTRICAL SERVICE
- PULL BOX
- CONDUIT (TRENCH)
- CONDUIT (BORE)
- VIVDS CAMERA
- VIDEO DETECTION ZONE
- DIRECTION OF TRAFFIC FLOW

FORT BEND COUNTY
APPROVED
MAR 19 2024
Valid One Year From Date
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0 10' 20' 40'
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(832) 619-1000


WEST BELLFORT BOULEVARD
AT BINION LANE

PROPOSED TRAFFIC SIGNALLAYOUT

| FED. RD. DIV. NO. | STATE | PROJECT NO. | | | HIGHWAY NO. |
|---|---|---|---|---|---|
| 6 | TEXAS | | | | |
| STATE DISTRICT | COUNTY | CONTROL NO. | SECTION NO. | JOB NO. | SHEET NO. |
| HOUSTON | FORT BEND | | | | 12 |

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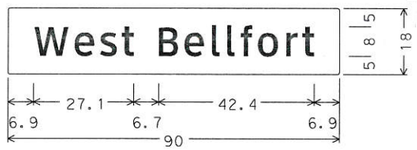
# CONDUIT AND CONDUCTOR RUNS

| RUN NO. | CONDUIT (618) PVC 2" (SCHD 80) (6046) NO. EA | (6046) TRENCH LF | 2" (SCHD 80) (6047) NO. EA | (6047) BORE LF | 3" (SCHD 80) (6053) NO. EA | (6053) TRENCH LF | 3" (SCHD 80) (6054) NO. EA | (6054) BORE LF | 4" (SCHD 80) (6058) NO. EA | (6058) TRENCH LF | 4" (SCHD 80) (6059) NO. EA | (6059) BORE LF | CONDUCTORS (620) GROUND #6 BARE (6009) NO. EA | (6009) LENGTH LF | #4 BARE (6011) NO. EA | (6011) LENGTH LF | POWER #4 INSULATED (6012) NO. EA | (6012) LENGTH LF | TRAY CABLE (621) LUMINAIRE #12/4C TRAY CABLE (6005) NO. EA | (6005) LENGTH LF | CABLES (684) PEDESTRIAN #12/2C (6007) NO. EA | (6007) LENGTH LF | PEDESTRIAN #12/4C (6009) NO. EA | (6009) LENGTH LF | SIGNAL #12/7C (6012) NO. EA | (6012) LENGTH LF | VIVDS (6306) CAMERA COMM. CABLE (6005) NO. EA | (6005) LENGTH LF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 6 | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 15 | 1 | 15 |
| 3 | | | | | 1 | 30 | | | | | | | 1 | 30 | | | | | 1 | 30 | 1 | 30 | 1 | 30 | 1 | 30 | | | |
| 4 | 1 | 30 | | | | | | | | | | | 1 | 30 | | | | | | | | | | | | | 1 | 30 |
| 5 | 1 | 20 | | | | | | | | | | | 1 | 20 | | | | | | | 1 | 20 | 1 | 20 | | | | |
| 6 | | | | | | | | | | | 1 | 100 | 1 | 100 | | | | | 1 | 100 | 2 | 100 | 2 | 100 | 2 | 100 | | |
| 7 | | | 1 | 100 | | | | | | | | | 1 | 100 | | | | | | | | | | | | | 1 | 100 |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 13 | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 6 | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 24 | 1 | 24 |
| 11 | | | | | 1 | 20 | | | | | | | 1 | 20 | | | | | 1 | 20 | 1 | 20 | 1 | 20 | 2 | 20 | | |
| 12 | 1 | 20 | | | | | | | | | | | 1 | 20 | | | | | | | | | | | | | 1 | 20 |
| 13 | | | | | 1 | 30 | | | | | | | 1 | 30 | | | | | 2 | 30 | 3 | 30 | 3 | 30 | 4 | 30 | | |
| 14 | 1 | 30 | | | | | | | | | | | 1 | 30 | | | | | | | | | | | | | 2 | 30 |
| 15 | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 13 | | |
| 16 | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 6 | | |
| 17 | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 22 | 1 | 22 |
| 18 | | | | | 1 | 10 | | | | | | | 1 | 10 | | | | | 1 | 10 | 1 | 10 | 1 | 10 | 2 | 10 | | |
| 19 | 1 | 10 | | | | | | | | | | | 1 | 10 | | | | | | | | | | | | | 1 | 10 |
| 20 | 1 | 10 | | | | | | | | | | | 1 | 10 | | | | | | | 1 | 10 | 1 | 10 | | | | |
| 21 | | | | | | | | | | | 1 | 130 | 1 | 130 | | | | | 1 | 130 | 2 | 130 | 2 | 130 | 2 | 130 | | |
| 22 | | | 1 | 130 | | | | | | | | | 1 | 130 | | | | | | | | | | | | | 1 | 130 |
| 23 | 1 | 15 | | | | | | | | | | | 1 | 15 | | | | | | | 1 | 15 | 1 | 15 | | | | |
| 24 | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 6 | | |
| 25 | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 32 | 1 | 32 |
| 26 | | | | | 1 | 10 | | | | | | | 1 | 10 | | | | | 1 | 10 | 1 | 10 | 1 | 10 | 2 | 10 | | |
| 27 | 1 | 10 | | | | | | | | | | | 1 | 10 | | | | | | | | | | | | | 1 | 10 |
| 28 | | | | | | | | | | | 1 | 105 | 1 | 105 | | | | | 2 | 105 | 4 | 105 | 4 | 105 | 4 | 105 | | |
| 29 | | | 1 | 105 | | | | | | | | | 1 | 105 | | | | | | | | | | | | | 2 | 105 |
| 30 | 1 | 10 | | | | | | | | | | | 1 | 10 | | | | | | | 1 | 10 | 1 | 10 | | | | |
| 31 | | | | | | | | | *2 | 15 | | | 1 | 15 | | | | | | | 8 | 15 | 8 | 15 | 8 | 15 | | |
| 32 | *2 | 15 | | | | | | | | | | | 1 | 15 | | | | | | | | | | | | | 4 | 15 |
| 33 | 1 | 15 | | | | | | | | | | | | | 1 | 15 | 2 | 15 | | | | | | | | | | |
| 34 | 1 | 30 | | | | | | | | | | | | | 1 | 30 | 2 | 30 | | | | | | | | | | |
| 35 | 1 | 95 | | | | | | | | | | | | | 1 | 95 | 2 | 95 | | | | | | | | | | |
| 36 | 1 | 95 | | | | | | | | | | | 1 | 95 | | | | | 4 | 95 | | | | | | | | |
| 37 | 1 | 30 | | | | | | | | | | | 1 | 30 | | | | | 2 | 30 | | | | | | | | |
| 38 | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 13 | | |
| 39 | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 13 | | |
| POLE 1 | | | | | | | | | | | | | | | | | | | 1 | 35 | 1 | 5 | 1 | 10 | 2 | 20 | 1 | 20 |
| POLE 2 | | | | | | | | | | | | | | | | | | | 1 | 35 | 1 | 5 | 1 | 10 | 2 | 20 | 1 | 20 |
| POLE 3 | | | | | | | | | | | | | | | | | | | 1 | 35 | 1 | 5 | 1 | 10 | 2 | 20 | 1 | 20 |
| POLE 4 | | | | | | | | | | | | | | | | | | | 1 | 35 | 1 | 5 | 1 | 10 | 2 | 20 | 1 | 20 |
| POLE 5 | | | | | | | | | | | | | | | | | | | | | 1 | 5 | 1 | 10 | | | | |
| POLE 6 | | | | | | | | | | | | | | | | | | | | | 1 | 5 | 1 | 10 | | | | |
| POLE 7 | | | | | | | | | | | | | | | | | | | | | 1 | 5 | 1 | 10 | | | | |
| POLE 8 | | | | | | | | | | | | | | | | | | | | | 1 | 5 | 1 | 10 | | | | |
| TOTAL (LF) | | 450 | | 230 | | 100 | | | | 30 | | 335 | | 1080 | | 140 | | 280 | | 1150 | | 1255 | | 1295 | | 1636 | | 803 |
| EST. TOTAL | | 495 | | 253 | | 115 | | | | 35 | | 370 | | 1188 | | 155 | | 310 | | 1265 | | 1385 | | 1425 | | 1800 | | 885 |

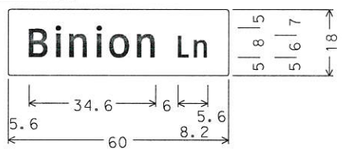
* INCLUDES SPARE

## PROPOSED SIGN SCHEDULE




D1-1 2in 45 LT;
0.5" Radius, No border, None on, Green;
"West Bellfort" White, ClearviewHwy-3-W;

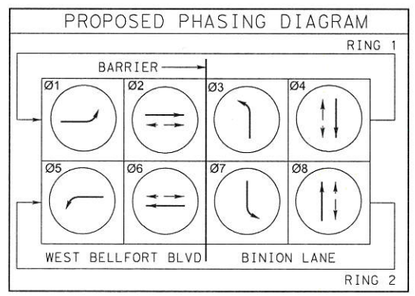
S3, S6




D1-1 2in 45 LT;
0.5" Radius, No border, None on, Green;
"Binion" White, ClearviewHwy-3-W;
"Ln" White, ClearviewHwy-3-W;

S2, S5

## PROPOSED PHASING DIAGRAM




## PROPOSED TRAFFIC SIGNAL POLES

| POLE NO. | SIGNAL POLE DESIGNATION | FOUNDATION TYPE/DEPTH |
|---|---|---|
| 1 | LMA 55L-100 | 48-A/22' |
| 2 | SMA 32L-100 | 36-A/13' |
| 3 | LMA 55L-100 | 48-A/22' |
| 4 | SMA 40L-100 | 36-B/15' |
| 5 | PEDESTAL | SCREW-IN |
| 6 | PEDESTAL | SCREW-IN |
| 7 | PEDESTAL | SCREW-IN |
| 8 | PEDESTAL | SCREW-IN |
| 9 | ELEC SRV TYPE D | N/A |
| N/A | CONTROLLER CABINET | N/A |

## VEHICLE DETECTION CHART

| CAMERA | SETTING |
|---|---|
| V1 | PRESENCE WB |
| V2 | PRESENCE NB |
| V3 | PRESENCE EB |
| V4 | PRESENCE SB |

| INTERSECTION | ELECTRICAL SERVICE DESCRIPTION (SEE ED (5,6&7)-14) | SERVICE CONDUIT SIZE | SERVICE CONDUCTORS NO./SIZE | SAFETY SWITCH AMPS | MAIN CKT. BKR. POLE/AMP | TWO-POLE CONTACTOR AMPS | PANELBD/ LOADCENTER AMP RATING | CIRCUIT NO. | BRANCH CKT. BKR. POLE/AMPS | BRANCH CIRCUIT AMPS | KVA LOAD |
|---|---|---|---|---|---|---|---|---|---|---|---|
| WEST BELLFORT BOULEVARD AT BINION LANE | ELEC SERV TY D 120/240 060(NS)SS(E)SP(O) | 1 1/4" | 3/#6 | N/A | 2P/60 | 30 | 100 | A (LUMINAIRE) | 2P/20 | 6 | <7.1 |
| | | | | | | N/A | | B (SIGNAL) | 1P/50 | 40 | |

| NO. | DATE | REVISION | APPROVED |
|---|---|---|---|
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FORT BEND COUNTY
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ENGINEERING DEPARTMENT

STATE OF TEXAS
YOHANNES A. TADESSE
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3/12/2024

FORT BEND COUNTY, TEXAS

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WEST BELLFORT BOULEVARD
AT BINION LANE

PROPOSED TRAFFIC
SIGNAL LAYOUT

| FED.RD. DIV.NO. | STATE | PROJECT NO. | | | HIGHWAY NO. |
|---|---|---|---|---|---|
| 6 | TEXAS | | | | |
| STATE DISTRICT | COUNTY | CONTROL NO. | SECTION NO. | JOB NO. | SHEET NO. |
| HOUSTON | FORT BEND | | | | 13 |

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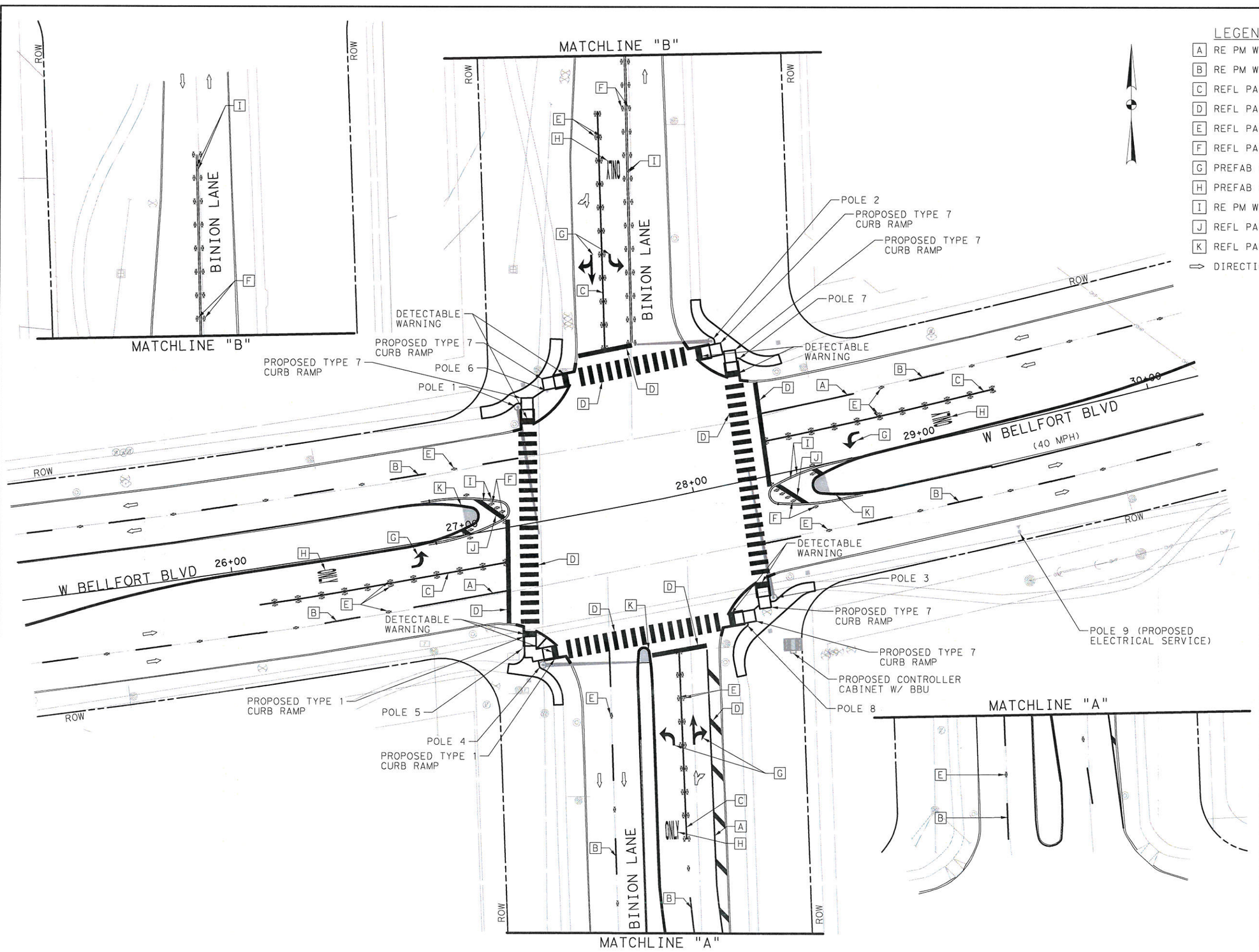


## LEGEND

- [A] RE PM W/RET REQ TY I(W)(4")(SLD)(100 MIL)
- [B] RE PM W/RET REQ TY I(W)(4")(BRK)(100 MIL)
- [C] REFL PAV MRK TY I(W)(8")(SLD)(100 MIL)
- [D] REFL PAV MRK TY I(W)(24")(SLD)(100 MIL)
- [E] REFL PAV MRKR TY II C-R
- [F] REFL PAV MRKR TY II A-A
- [G] PREFAB PAV MRK TY A (W)(ARROW)
- [H] PREFAB PAV MRK TY A (W)(WORD)
- [I] RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)
- [J] REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
- [K] REFL PAV MRK TY I (Y)(MED NOSE)(100 MIL)
- ⇨ DIRECTION OF TRAFFIC FLOW

FORT BEND COUNTY
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0 10' 20' 40'
SCALE: 1" = 40'

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(832) 519-1000

WEST BELLFORT BOULEVARD
AT BINION LANE

PROPOSED STRIPING AND PAVEMENT MARKINGS LAYOUT

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|---|---|---|---|---|---|
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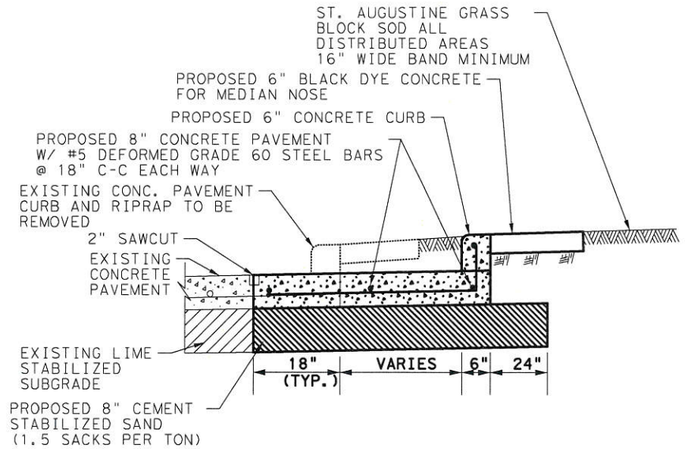
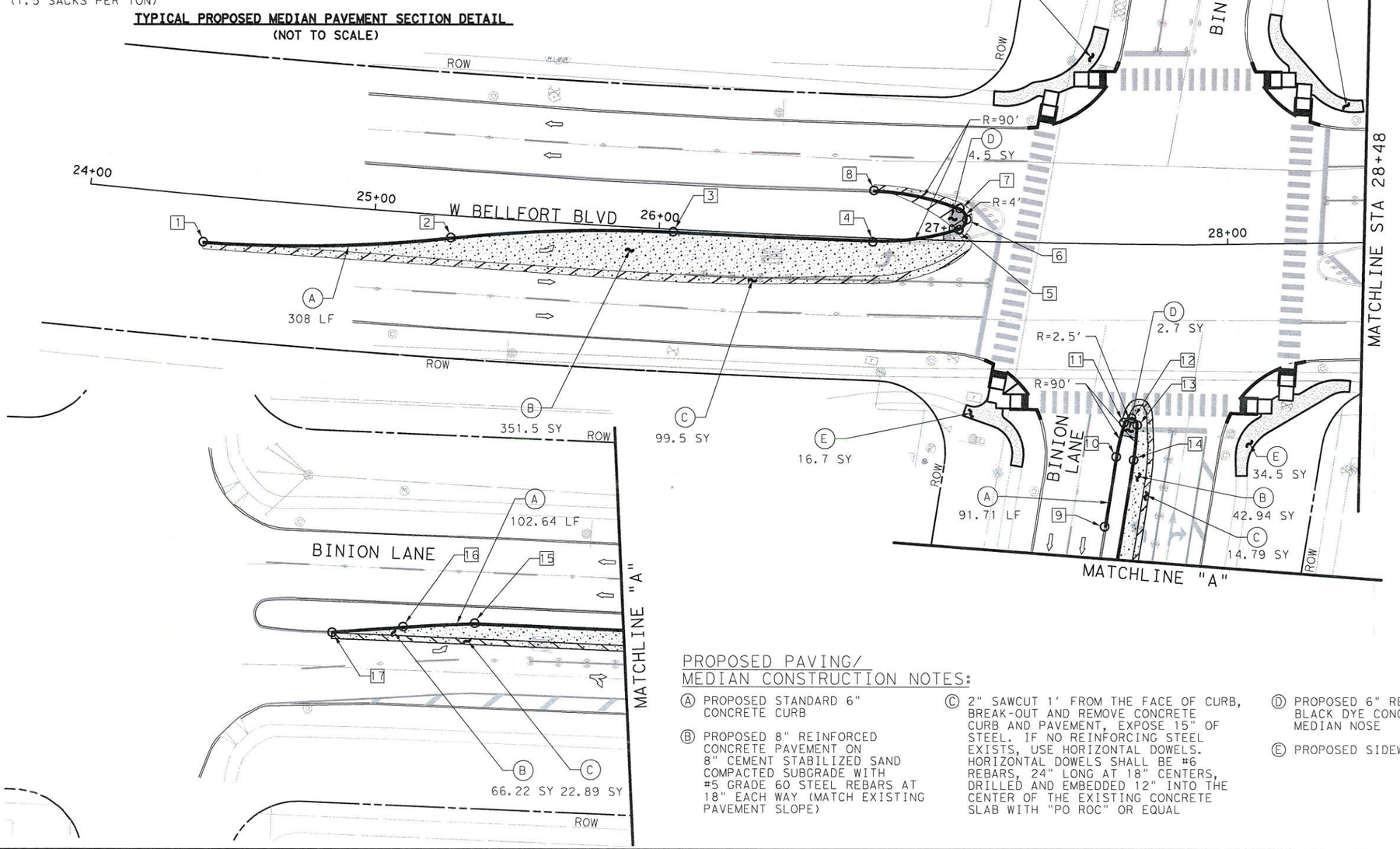



**TYPICAL PROPOSED MEDIAN PAVEMENT SECTION DETAIL**
(NOT TO SCALE)

| MEDIAN/ PAVEMENT STATIONS AND OFFSETS TABLE | | |
|---|---|---|
| POINT | STA. | OFFSET |
| BASE LINE OF WEST BELLFORT BOULEVARD | | |
| 1 | 24+41 | 16.25' RT |
| 2 | 25+27 | 7.70' RT |
| 3 | 26+05 | 1.0' RT |
| 4 | 26+75 | 1.0' RT |
| 5 | 27+05 | 4.30' LT |
| 6 | 27+08 | 7.60' LT |
| 7 | 27+06 | 11.40' LT |
| 8 | 26+75 | 16.75' LT |
| 9 | 27+58 | 99.00' RT |
| 10 | 27+62 | 74.50' RT |
| 11 | 27+64 | 62.20' RT |
| 12 | 27+67 | 60.70' RT |
| 13 | 27+69 | 62.90' RT |
| 14 | 27+68 | 76.00' RT |
| 15 | 27+55 | 162.46' RT |
| 16 | 27+54 | 174.91' RT |
| 17 | 27+53 | 187.45' RT |




## PROPOSED PAVING/ MEDIAN CONSTRUCTION NOTES:

Ⓐ PROPOSED STANDARD 6" CONCRETE CURB

Ⓑ PROPOSED 8" REINFORCED CONCRETE PAVEMENT ON 8" CEMENT STABILIZED SAND COMPACTED SUBGRADE WITH #5 GRADE 60 STEEL REBARS AT 18" EACH WAY (MATCH EXISTING PAVEMENT SLOPE)

Ⓒ 2" SAWCUT 1' FROM THE FACE OF CURB, BREAK-OUT AND REMOVE CONCRETE CURB AND PAVEMENT, EXPOSE 15" OF STEEL. IF NO REINFORCING STEEL EXISTS, USE HORIZONTAL DOWELS. HORIZONTAL DOWELS SHALL BE #6 REBARS, 24" LONG AT 18" CENTERS, DRILLED AND EMBEDDED 12" INTO THE CENTER OF THE EXISTING CONCRETE SLAB WITH "PO ROC" OR EQUAL

Ⓓ PROPOSED 6" REINFORCED BLACK DYE CONCRETE MEDIAN NOSE

Ⓔ PROPOSED SIDEWALK

## LEGEND

- DIRECTION OF TRAFFIC FLOW
- SAWCUT AND REMOVE EXISTING CONCRETE PAVEMENT
- PROPOSED 8" REINFORCED CONCRETE PAVEMENT
- PROPOSED 6" REINFORCED BLACK DYE CONCRETE MEDIAN/ DIRECTIONAL ISLAND
- PROPOSED SIDEWALK

FORT BEND COUNTY
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0 10' 20' 40'
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# PROPOSED INTERSECTION IMPROVEMENTS LAYOUT

SHEET 1 OF 2

| FED.RD. DIV.NO. | STATE | PROJECT NO. | | | HIGHWAY NO. |
|---|---|---|---|---|---|
| 6 | TEXAS | | | | |
| STATE DISTRICT | COUNTY | CONTROL NO. | SECTION NO. | JOB NO. | SHEET NO. |
| HOUSTON | FORT BEND | | | | 15 |

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DATE:3/12/2024
FILE:pw:\\tedsi-pw.bentley.com:tedsi-pw-01\Documents\Projects\2023\2023-2148-01 - West Bellfort Blvd Traffic Signals\6.0 TEDSI Design\6.08 CADD\6.08.01 Sheet Files\Signal\SHT_PROP-M

## PROPOSED PAVING/ MEDIAN CONSTRUCTION NOTES:

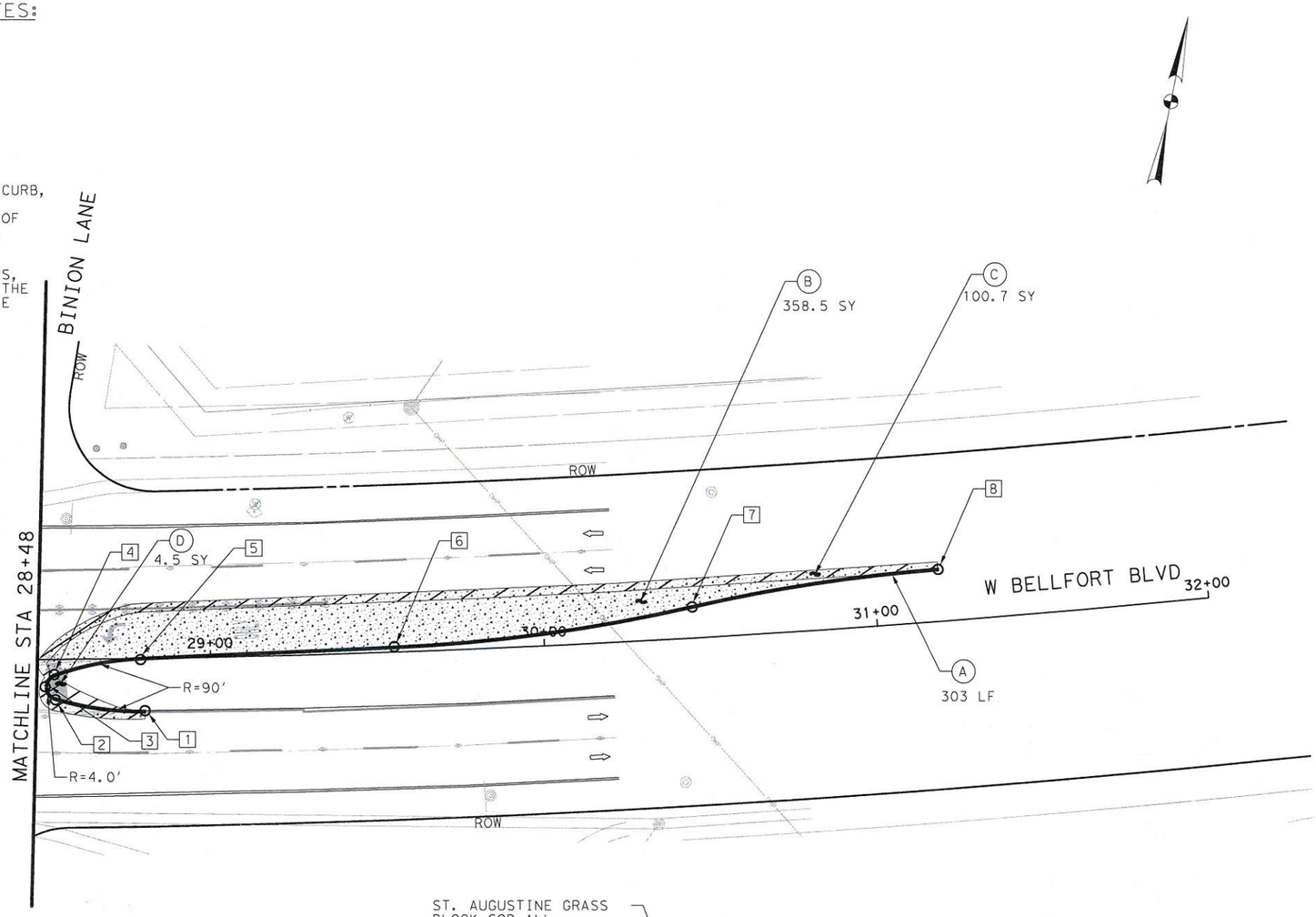
Ⓐ PROPOSED STANDARD 6" CONCRETE CURB

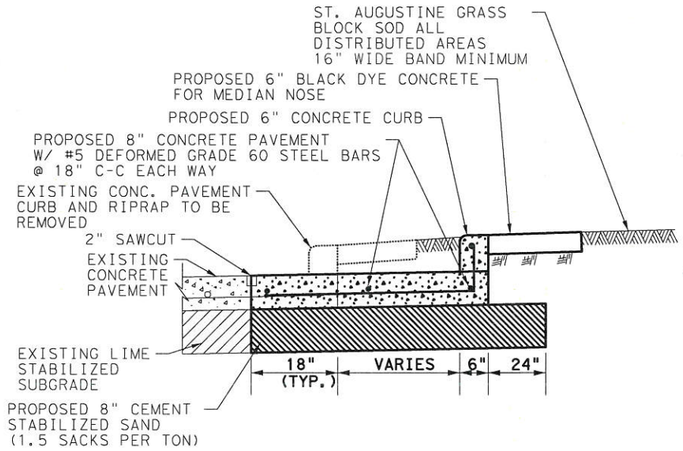
Ⓑ PROPOSED 8" REINFORCED CONCRETE PAVEMENT ON 8" CEMENT STABILIZED SAND COMPACTED SUBGRADE WITH #5 GRADE 60 STEEL REBARS AT 18" EACH WAY (MATCH EXISTING PAVEMENT SLOPE)

Ⓒ 2" SAWCUT 1' FROM THE FACE OF CURB, BREAK-OUT AND REMOVE CONCRETE CURB AND PAVEMENT, EXPOSE 15" OF STEEL. IF NO REINFORCING STEEL EXISTS, USE HORIZONTAL DOWELS. HORIZONTAL DOWELS SHALL BE #6 REBARS, 24" LONG AT 18" CENTERS, DRILLED AND EMBEDDED 12" INTO THE CENTER OF THE EXISTING CONCRETE SLAB WITH "PO ROC" OR EQUAL

Ⓓ PROPOSED 6" REINFORCED BLACK DYE CONCRETE MEDIAN NOSE

Ⓔ PROPOSED SIDEWALK




**TYPICAL PROPOSED MEDIAN PAVEMENT SECTION DETAIL**
(NOT TO SCALE)

| MEDIAN/ PAVEMENT STATIONS AND OFFSETS TABLE | | |
|---|---|---|
| POINT | STA. | OFFSET |
| BASE LINE OF WEST BELLFORT BOULEVARD | | |
| 1 | 28+80 | 15.60' RT |
| 2 | 28+53 | 11.63' RT |
| 3 | 28+50 | 8.33' RT |
| 4 | 28+53 | 4.50' RT |
| 5 | 28+79 | - |
| 6 | 29+55 | 1.00' LT |
| 7 | 30+45 | 9.50' LT |
| 8 | 31+19 | 15.40' LT |

## LEGEND

- DIRECTION OF TRAFFIC FLOW
- SAWCUT AND REMOVE EXISTING CONCRETE PAVEMENT
- PROPOSED 8" REINFORCED CONCRETE PAVEMENT
- PROPOSED 6" REINFORCED BLACK DYE CONCRETE MEDIAN/ DIRECTIONAL ISLAND
- PROPOSED SIDEWALK

FORT BEND COUNTY
APPROVED
MAR 19 2024
Valid One Year From Date
ENGINEERING DEPARTMENT

0 10' 20' 40'
SCALE: 1" = 40'

| NO. | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

STATE OF TEXAS
YOHANNES A. TADESSE
107781
PROFESSIONAL ENGINEER
3/12/2024

**FORT BEND COUNTY, TEXAS**

TEDSI INFRASTRUCTURE GROUP
Consulting Engineers
738 Hwy 6 South, Suite 430
Houston, Texas 77079
(832) 619-1000
TBPE F-1640

WEST BELLFORT BOULEVARD AT BINION LANE

PROPOSED INTERSECTION IMPROVEMENTS LAYOUT

SHEET 2 OF 2

| FED.RD. DIV.NO. | STATE | PROJECT NO. | | | HIGHWAY NO. |
|---|---|---|---|---|---|
| 6 | TEXAS | | | | |
| STATE DISTRICT | COUNTY | CONTROL NO. | SECTION NO. | JOB NO. | SHEET NO. |
| HOUSTON | FORT BEND | | | | 16 |

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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 polyvinyl chloride (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 (or 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 surface 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 or water tight sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end 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

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| © TxDOT October 2014 | CONT | SECT | JOB | HIGHWAY |
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| | DIST | COUNTY | | SHEET NO. |
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## 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 8 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 a 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.

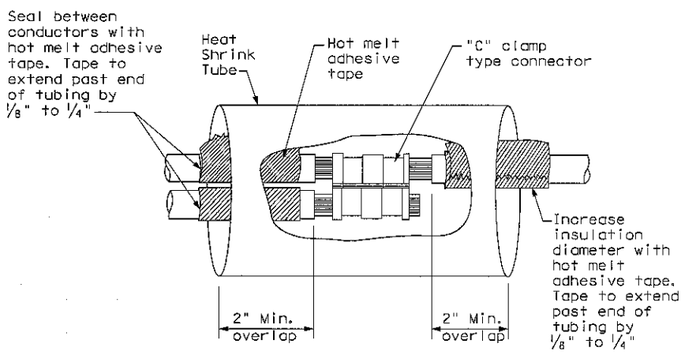
3. Install ground rods so the imprinted part number is at the upper end of the rod.

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

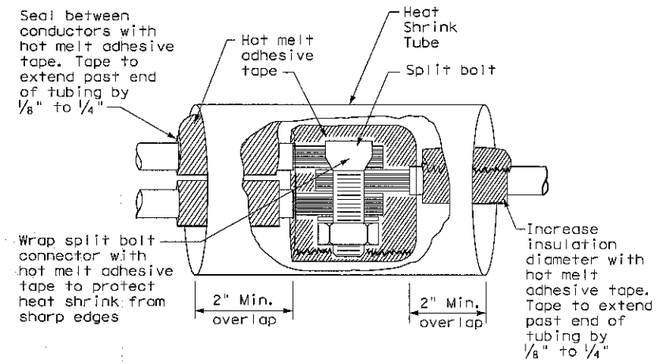
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

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 a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.

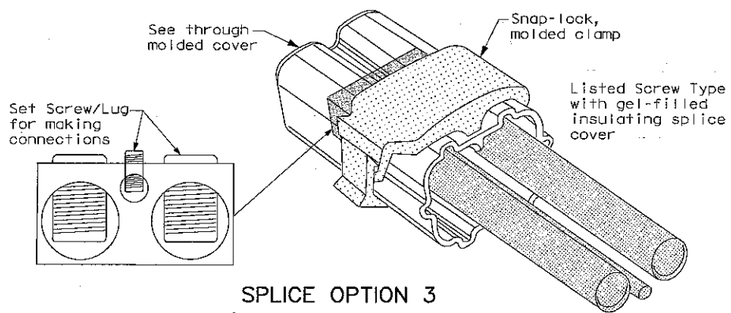
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.




SPLICE OPTION 1
Compression Type




SPLICE OPTION 2
Split Bolt Type




SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation | Traffic Operations Division Standard

# ELECTRICAL DETAILS
# CONDUCTORS

## ED(3)-14

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7.1C

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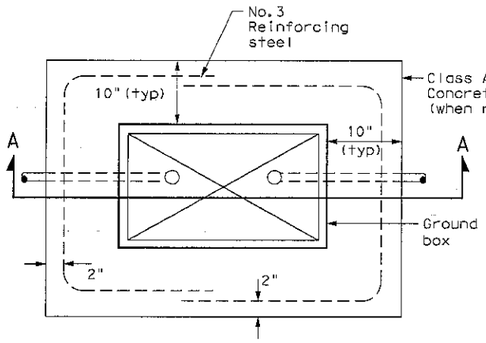
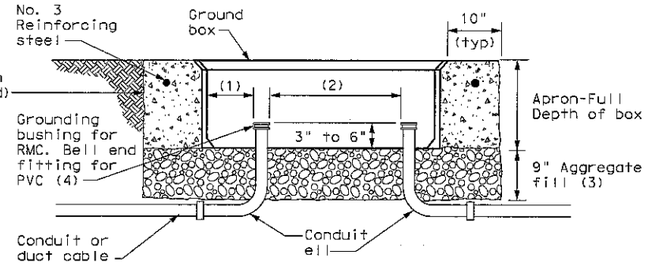



PLAN VIEW




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 a 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

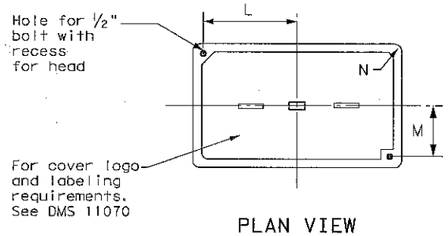
A. MATERIALS

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.

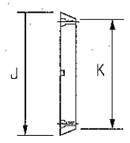
B. CONSTRUCTION METHODS

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

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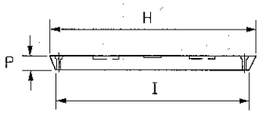


SIDE

GROUND BOX COVER

Texas Department of Transportation

Traffic Operations Division Standard

# ELECTRICAL DETAILS GROUND BOXES

## ED(4)-14

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710

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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 material is 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.

## 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(N)SP(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 | |

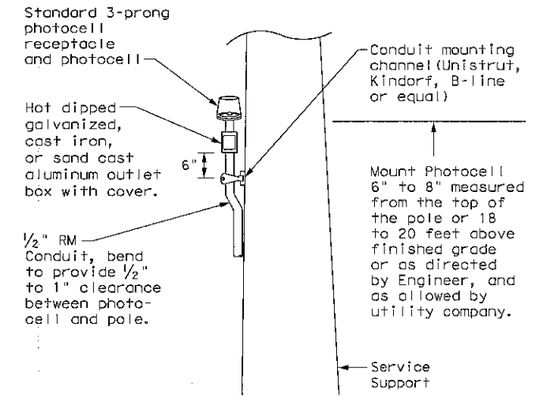
* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** 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 foot maximum spacing between straps supporting conduit.

Texas Department of Transportation

Traffic Operations Division Standard

# ELECTRICAL DETAILS SERVICE NOTES & DATA

# ED(5)-14

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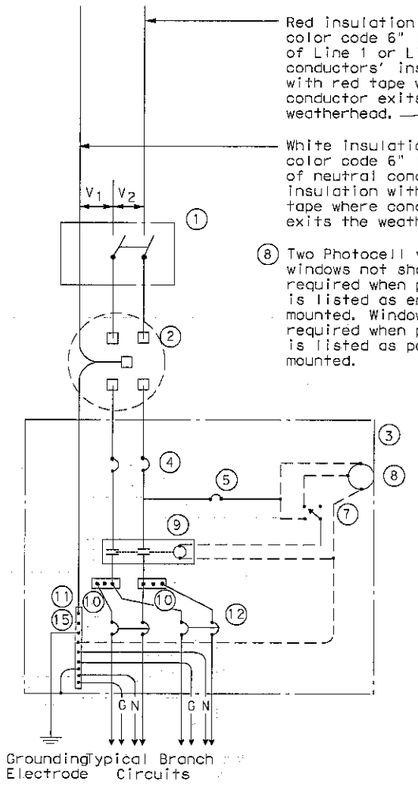
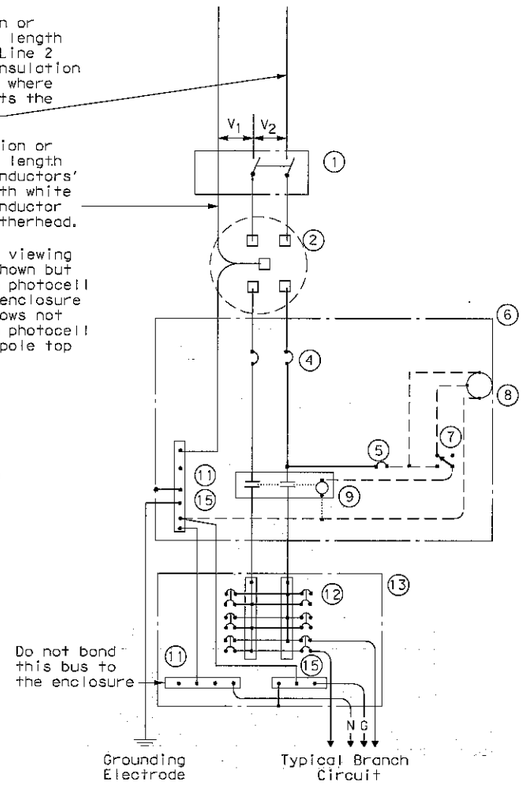
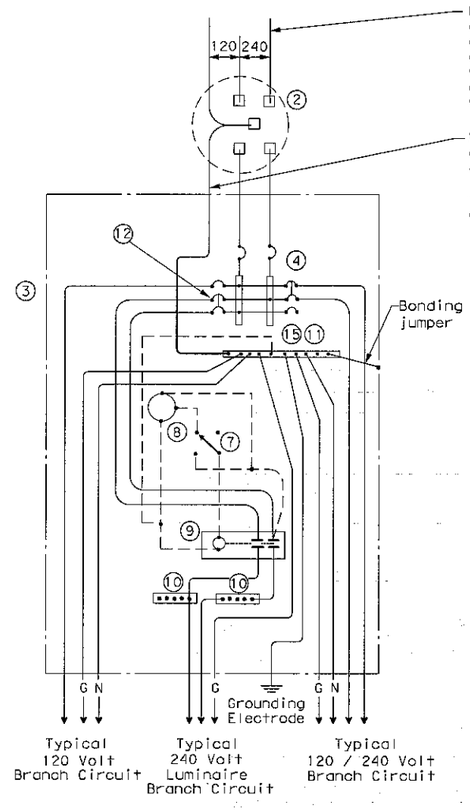


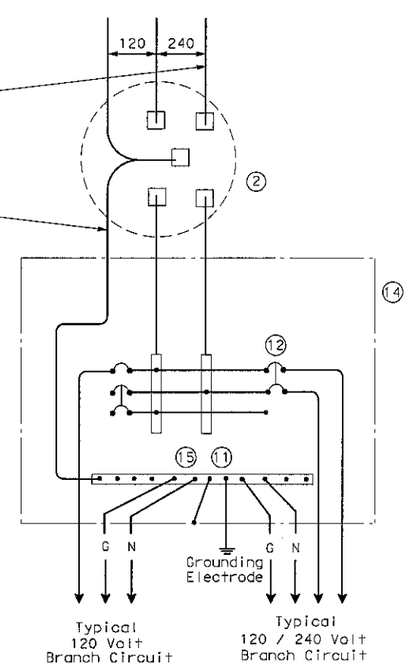

SCHEMATIC TYPE A
THREE WIRE




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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71F

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

1. Provide steel pole and steel frame supports as per TxDOT Departmental Material Specification (DMS)11080 "Electrical Services." Mount all equipment and conduit on 12 gauge galvanized steel or stainless steel channel strut, 1 ½ in. or 1 5/8 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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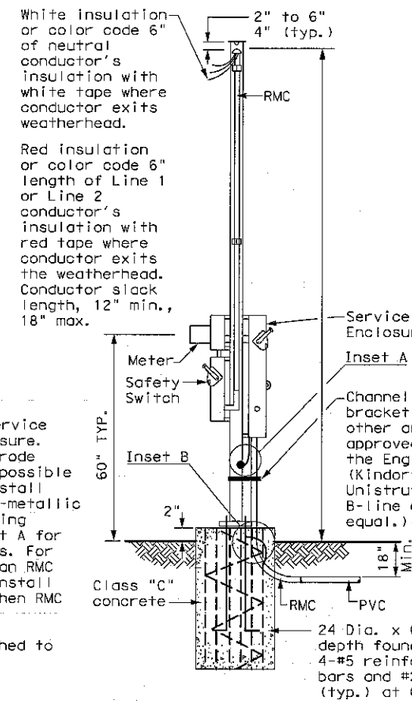
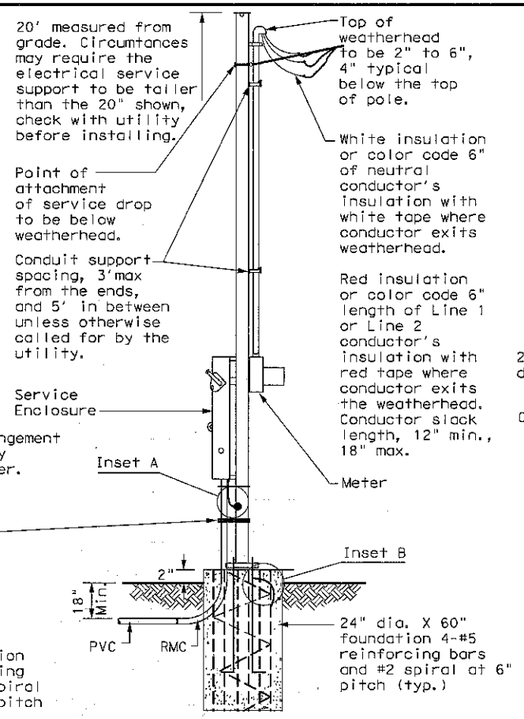
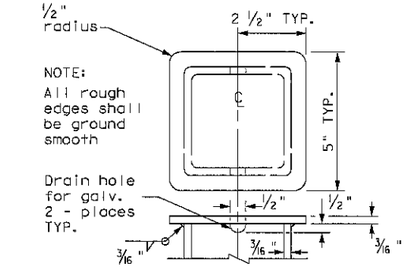



WITH SAFETY SWITCH

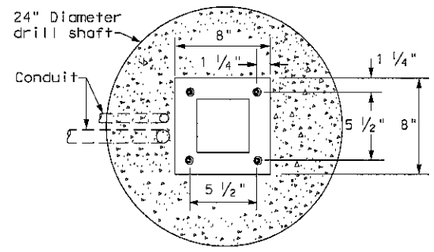



WITHOUT SAFETY SWITCH

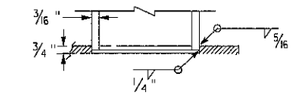
SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE




POLE TOP PLATE

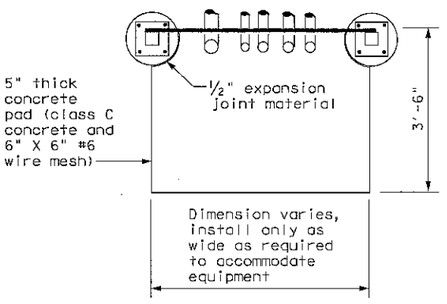



BASE PLATE DETAIL



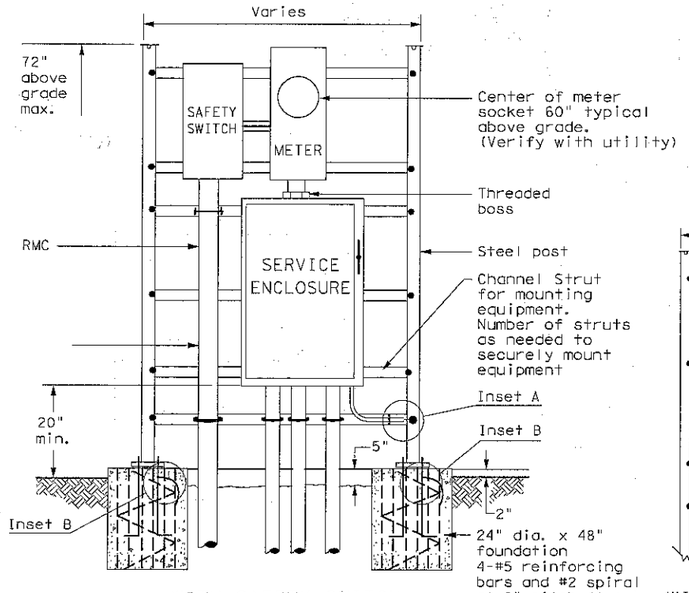

BOTTOM OF POLE

SERVICE SUPPORT TYPE SF & SP



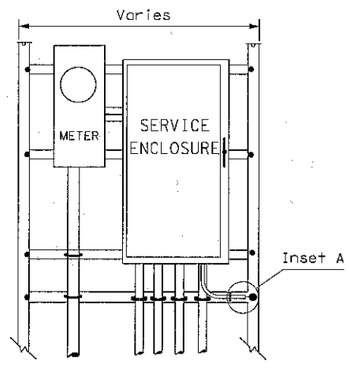

TOP VIEW

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



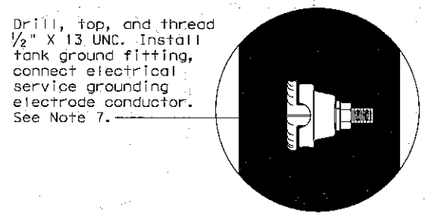

WITH SAFETY SWITCH

FRONT VIEW



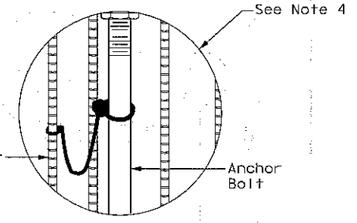

WITHOUT SAFETY SWITCH

SERVICE SUPPORT TYPE SF(U) - UNDERGROUND SERVICE

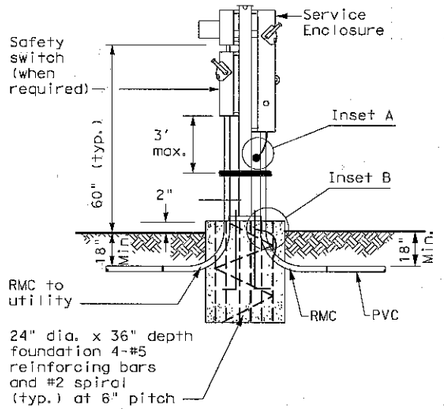



FRONT VIEW

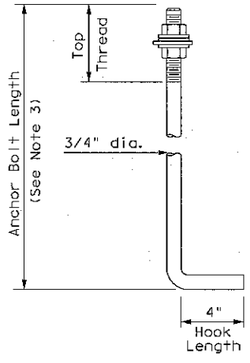
INSET A




INSET B




WITH SAFETY SWITCH




HOOKED ANCHOR DETAIL

SERVICE SUPPORT TYPE SP(U) - UNDERGROUND SERVICE

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Traffic Operations Division Standard

# ELECTRICAL DETAILS SERVICE SUPPORT TYPES SF & SP

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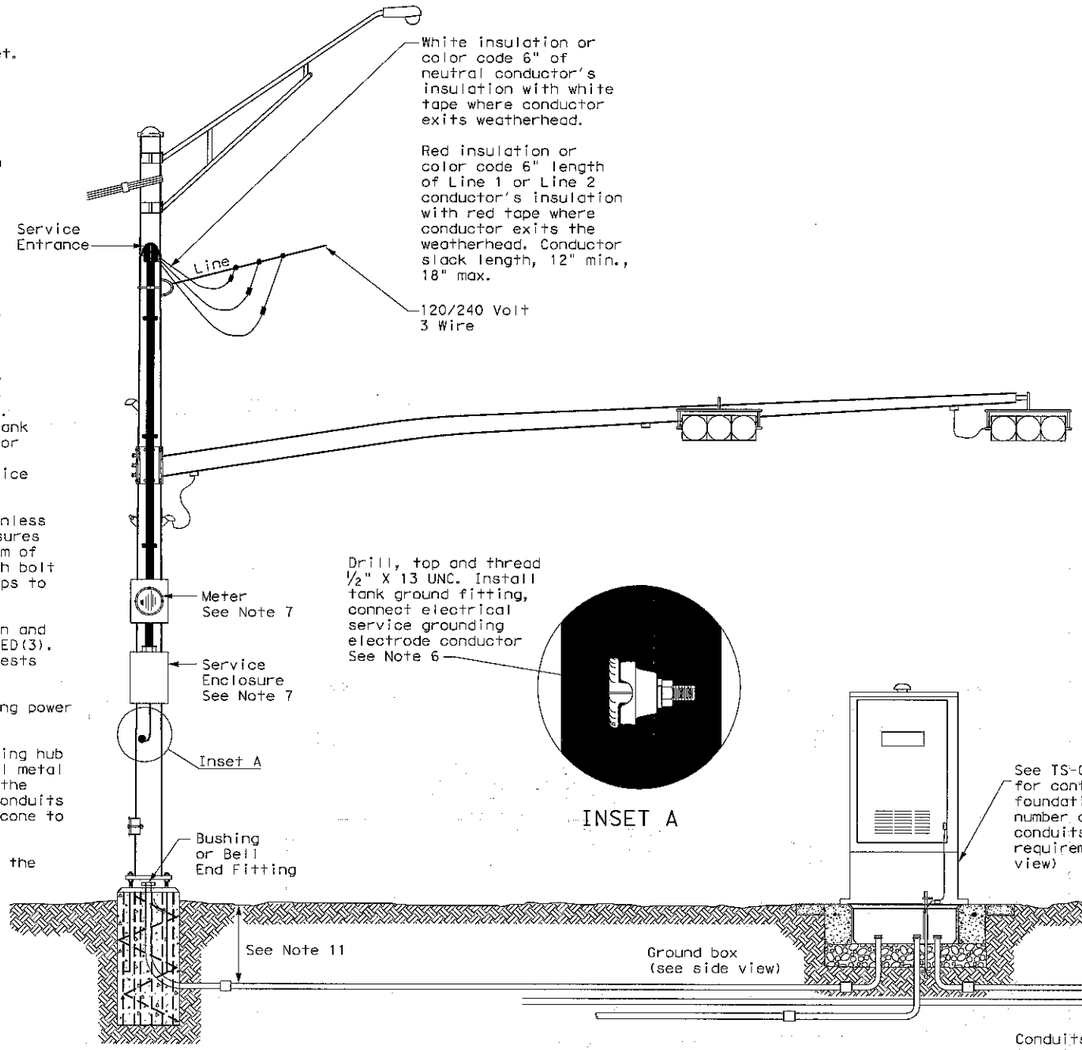
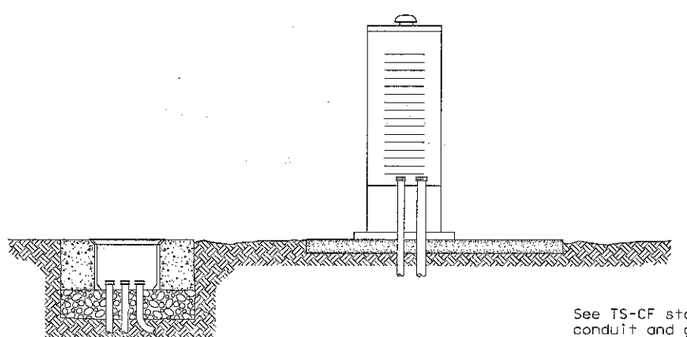
## TRAFFIC SIGNAL NOTES

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 bars 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. Band 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 seal or 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".



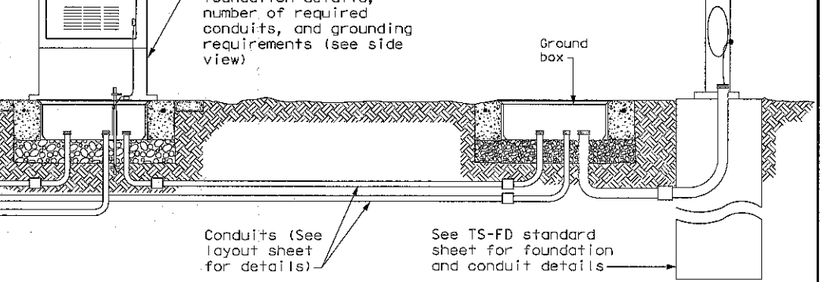

SIGNAL POLE WITH SERVICE

Type T 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 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.




SIGNAL CONTROLLER FRONT VIEW




SIGNAL POLE

Texas Department of Transportation

Traffic Operations Division Standard

# ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS

## ED(8)-14

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## TIMBER POLE (TP) SERVICE SUPPORT NOTES

1. Ensure electrical service support is a class 5 treated timber pole as per Item 627 "Treated Timber Poles." Embed timber pole to depth required in Item 627.
2. Conduit and electrical conductors attached to the electrical service pole and underground within 12 in. of service pole are not paid for directly but are subsidiary to the electrial service.
3. Install pole-top mounted photocell (T) on north side of pole, or in service enclosure (E) as required. See Electrical Service Data chart in plan set.
4. Gain pole as required to provide flat surface for each channel. Gain timber pole to 5/8 in. max. depth and 1 7/8 in. max. height. Gain pole in a neat and workmanlike manner.
5. Mount meter and service equipment on stainless steel or galvanized channel (Unistrut, Kindorf, or equal). Provide channel sized 1 in. to 3 3/4 in. maximum depth, and 1 1/2 in. to 1 5/8 in. maximum width. File smooth the cut ends of galvanized channel and paint with zinc rich paint before installing on pole. Secure each channel section to timber pole with two galvanized or SS lag bolts, 1/4 in. minimum diameter by 1 1/2 in. minimum length. Use a galvanized or SS flat washer on each lag bolt. Do not stack channel.
6. When excess length must be trimmed from poles, trim from the top end only.

(1) Class 5 pole, height as required

(2) Service drop from utility company (attached below weatherhead)

(3) Service conduit (RMC) and service entrance conductors - One Red, One Black, One White (See Electrical Service Data)

(4) Safety switch (when required)

(5) Meter (when required)

(6) Service enclosure

(7) 6 AWG bare grounding electrode conductor in 1/2 in. PVC to ground rod - extend 1/2 in. PVC 6 in. underground.

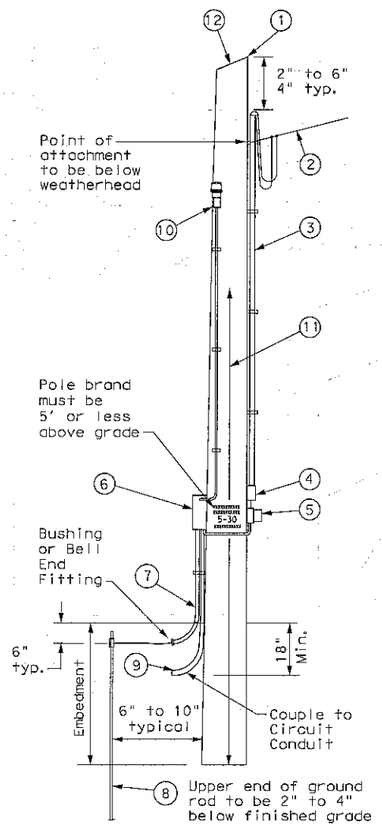
(8) 5/8 in. x 8 ft. Copper clad ground rod - drive ground rod to a depth of 2 in. to 4 in. below grade.

(9) RMC same size as branch circuit conduit.

(10) See pole-top mounted photocell detail on ED(5).

(11) When required by the serving utility provide bare 6 AWG copper conductor. Run wire from pole top to butt wrap or copper butt plate. Protect conductor with non-conductive material to a height of 8 ft. above finished grade.

(12) When required by utility, cut top of pole at an angle to enhance rain run off.

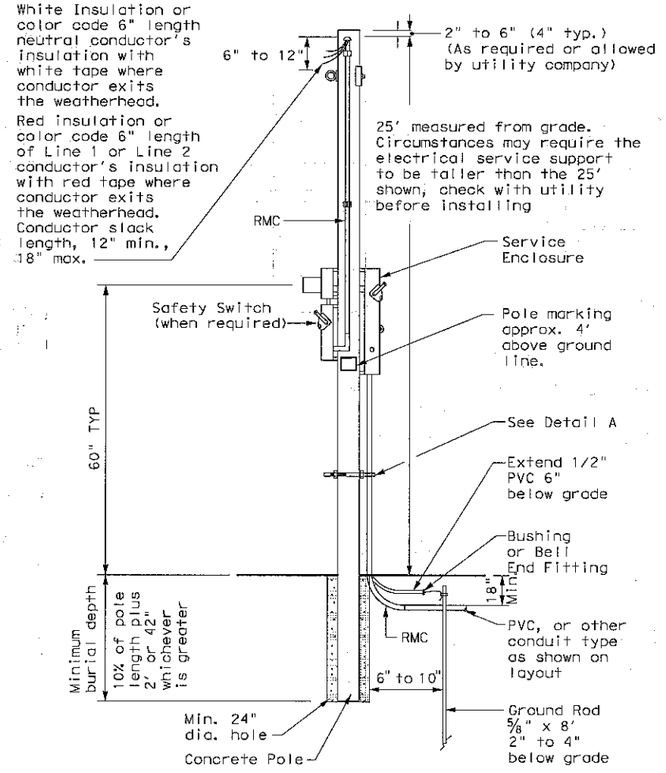



SERVICE SUPPORT TYPE TP (0)

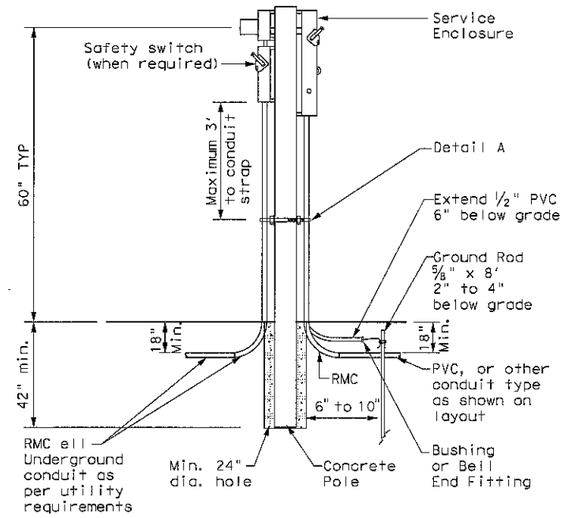
## GRANITE CONCRETE (GC) & OTHER CONCRETE (OC) NOTES

Ensure electrical service support structures bid as type Granite Concrete (GC) or Other Concrete (OC) meet the following requirements.

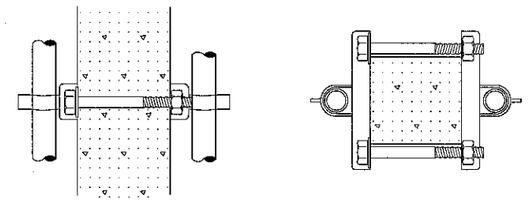
1. Provide GC and OC poles that meet the requirements of DMS 11080 "Electrical Services."
2. Provide prestressed concrete poles suitable for direct embedment into the ground without special foundations.
3. Verify poles are marked as required on DMS 11080. Location of marking should be approximately 4' above final grade. Use the two-point pickup locations when handling pole in horizontal position, and one-point pickup location for use in raising the pole to a vertical position. These marks are small but conspicuous.
4. Embed poles 42 in. or 10% of the length plus 2 ft., whichever is greater.
5. Ensure all installation details of services are in accordance with utility company specifications.
6. Install a one point rack or eye bolt bracket 6 inches to 12 inches below the weatherhead as an overhead service drop anchoring point for the electric utility.
7. Furnish and install galvanized or stainless steel channel strut 1 1/2 in. or 1 5/8 in. wide by 1 in. up to 3 3/4 in. deep (Unistrut, Kindorf, B-line or equal). Attach channel strut with stainless steel concrete anchors (max. 1" depth), square U-bolts or back to back channel strut with long bolts, or other secure mounting as approved by the Engineer. Ensure bolts are galvanized in accordance with ASTM A153. Do not stack channel struts.
8. Backfill the holes thoroughly by tamping in 6 in. lifts. After tamping to grade, place additional backfill material in a 6 inch high cone around the pole to allow for settling. Use material equal in composition and density to the surrounding area. Backfilling will not be paid for directly but is subsidiary to various bid items.




CONCRETE SERVICE SUPPORT
Overhead (0)




CONCRETE SERVICE SUPPORT
Underground (U)




## DETAIL A

See Note 7. Before installing channel that has been cut, file sharp edges and paint with zinc-rich paint. Ensure there is no paint splatter on the pole.

Texas Department of Transportation

Traffic Operations Division Standard

# ELECTRICAL DETAILS SERVICE SUPPORT TYPES GC, OC, & TP

# ED(10)-14

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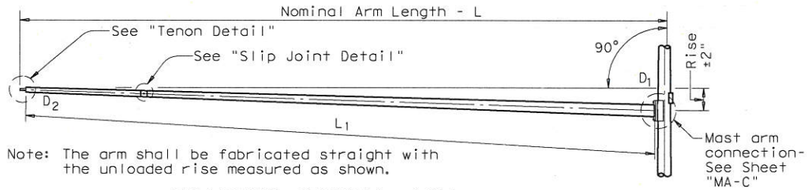
| Arm Length | ROUND POLES | | | | | POLYGONAL POLES | | | | | Foundation Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_B$ | $D_{19}$ | $D_{24}$ | $D_{30}$ | ① thk | $D_B$ | $D_{19}$ | $D_{24}$ | $D_{30}$ | ① thk | |
| ft. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | |
| 20 | 12.0 | 9.3 | 8.6 | 7.8 | .239 | 12.5 | 9.5 | 8.7 | 7.8 | .239 | 36-A |
| 24 | 12.0 | 9.3 | 8.6 | 7.8 | .239 | 13.0 | 10.0 | 9.2 | 8.3 | .239 | 36-A |
| 28 | 12.0 | 9.3 | 8.6 | 7.8 | .239 | 13.5 | 10.5 | 9.7 | 8.8 | .239 | 36-A |
| 32 | 13.0 | 10.3 | 9.6 | 8.8 | .239 | 14.0 | 11.0 | 10.2 | 9.3 | .239 | 36-A |
| 36 | 13.5 | 10.8 | 10.1 | 9.3 | .239 | 15.0 | 12.0 | 11.2 | 10.3 | .239 | 36-A |
| 40 | 14.0 | 11.3 | 10.6 | 9.8 | .239 | 16.0 | 13.0 | 12.2 | 11.3 | .239 | 36-B |
| 44 | 14.5 | 11.8 | 11.1 | 10.3 | .239 | 16.5 | 13.5 | 12.7 | 11.8 | .239 | 36-B |

| 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 | 8.0 | 5.3 | .179 | 1'-8" | 19.1 | 8.0 | 3.5 | .179 | 1'-7" |
| 24 | 23.1 | 9.0 | 5.8 | .179 | 1'-9" | 23.1 | 9.0 | 3.5 | .179 | 1'-8" |
| 28 | 27.1 | 9.5 | 5.7 | .179 | 1'-10" | 27.1 | 10.0 | 3.5 | .179 | 1'-9" |
| 32 | 31.0 | 9.5 | 5.2 | .239 | 1'-11" | 31.0 | 9.5 | 3.5 | .239 | 1'-10" |
| 36 | 35.0 | 10.0 | 5.1 | .239 | 2'-0" | 35.0 | 10.0 | 3.5 | .239 | 1'-11" |
| 40 | 39.0 | 10.5 | 5.1 | .239 | 2'-3" | 39.0 | 11.0 | 3.5 | .239 | 2'-1" |
| 44 | 43.0 | 11.0 | 5.1 | .239 | 2'-8" | 43.0 | 11.5 | 4.0 | .239 | 2'-3" |

$D_B$ = Pole Base O.D.
$D_{19}$ = 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)

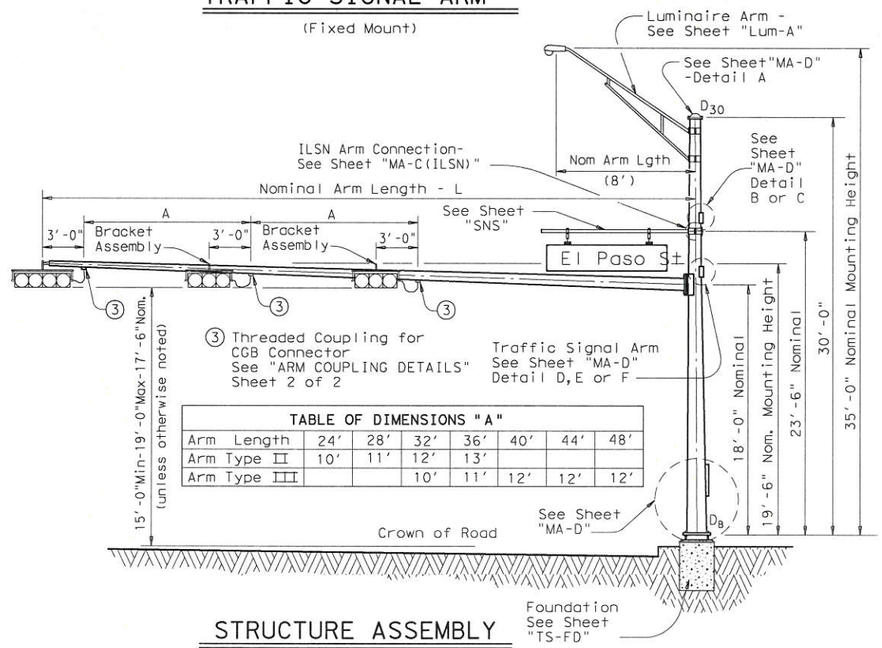



TABLE OF DIMENSIONS "A"

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

## STRUCTURE ASSEMBLY

## 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: Above hardware plus: One (or two if ILSN attached) small hand hole, clamp-on simplex | | 24' Poles With ILSN: Above hardware plus one small hand hole | | 19' Poles With No Luminaire and No ILSN: See note above | |
|---|---|---|---|---|---|---|
| ft | Designation | Quantity | Designation | Quantity | Designation | Quantity |
| 20 | 20L-100 | | 20S-100 | | 20-100 | |
| 24 | 24L-100 | | 24S-100 | | 24-100 | |
| 28 | 28L-100 | | 28S-100 | | 28-100 | |
| 32 | 32L-100 | 1 * | 32S-100 | | 32-100 | |
| 36 | 36L-100 | | 36S-100 | | 36-100 | |
| 40 | 40L-100 | 1 * | 40S-100 | | 40-100 | |
| 44 | 44L-100 | 1 * | 44S-100 | | 44-100 | |

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

| Nominal Arm Length | Type I Arm (1 Signal): 1 CGB connector | | Type II Arm (2 Signals): 1 Bracket Assembly and 2 CGB Connectors | | Type III Arm (3 Signals): 2 Bracket Assemblies and 3 CGB Connectors | |
|---|---|---|---|---|---|---|
| ft | Designation | Quantity | Designation | Quantity | Designation | Quantity |
| 20 | 20I-100 | | | | | |
| 24 | 24I-100 | | 24II-100 | | | |
| 28 | 28I-100 | | 28II-100 | | | |
| 32 | | | 32II-100 | 1 * | 32III-100 | |
| 36 | | | 36II-100 | | 36III-100 | |
| 40 | | | | | 40III-100 | 1 * |
| 44 | | | | | 44III-100 | 1 * |

Luminaire Arms (1 per 30' pole)

| Nominal Arm Length | Quantity |
|---|---|
| 8' Arm | 3 * |
| | |

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 |
|---|---|---|
| 1 1/2" | 3'-4" | |
| 1 3/4" | 3'-10" | 2 * |
| 2" | 4'-3" | 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.

THIS SEAL SUBSTANTIATES THE ITEMS IDENTIFIED WITH AN * ONLY AND DOES NOT CONFIRM THE DESIGN STANDARDS (BY OTHERS) PRESENTED HEREON.

STATE OF TEXAS
YOHANNES A. TADESSE
107781
REGISTERED PROFESSIONAL ENGINEER
3/12/2024

SHEET 1 OF 2

Texas Department of Transportation
Traffic Operations Division

# TRAFFIC SIGNAL SUPPORT STRUCTURES

## SINGLE MAST ARM ASSEMBLY (100 MPH WIND ZONE)

## SMA-100(1)-12

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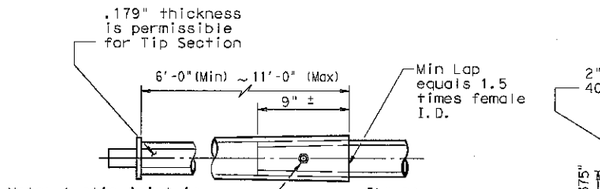
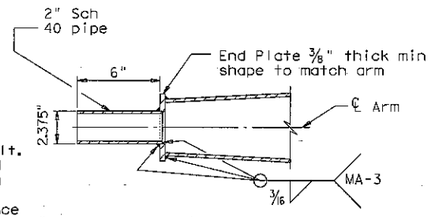


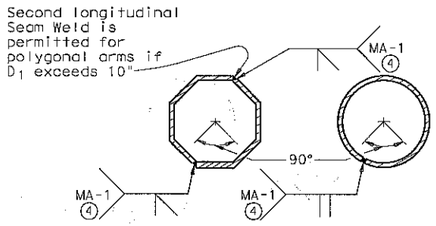

SLIP JOINT DETAIL




TENON DETAIL

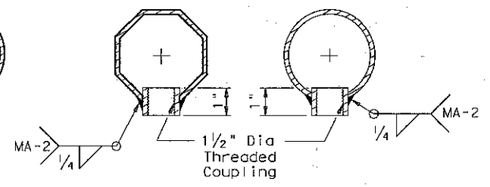
Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY




ARM WELD DETAIL

④ 60% Min. penetration 100% penetration within 6" of circumferential base welds.




ARM COUPLING DETAILS

## 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 signal heads having un-vented 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 signal heads and any attachments, including any required backpates. If vertical movements with a total excursion (maximum upward excursion to maximum downward excursion) of more than approximately 8" 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.

## 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 100 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 11.5 sq ft. The specified signal load applied at the end of the traffic signal arm equals 180 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 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. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and Item 686, "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.



Texas Department of Transportation
Traffic Operations Division

# TRAFFIC SIGNAL SUPPORT STRUCTURES

## SINGLE MAST ARM ASSEMBLY

## (100 MPH WIND ZONE)

## SMA-100(2)-12

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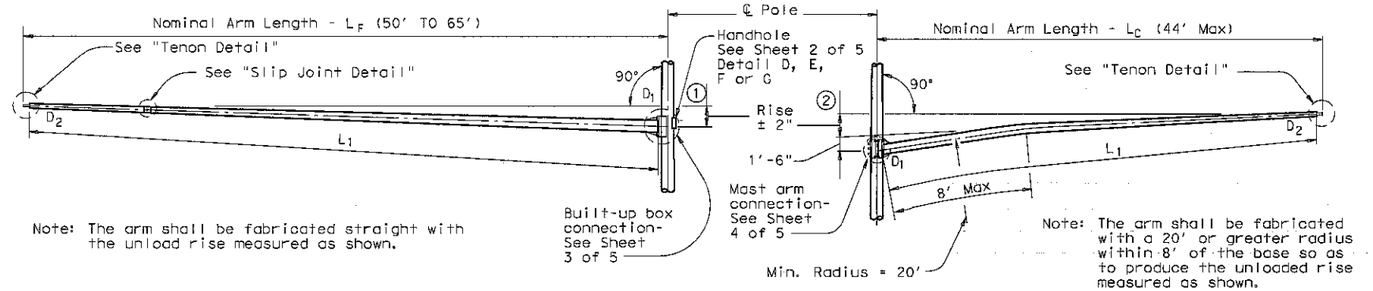
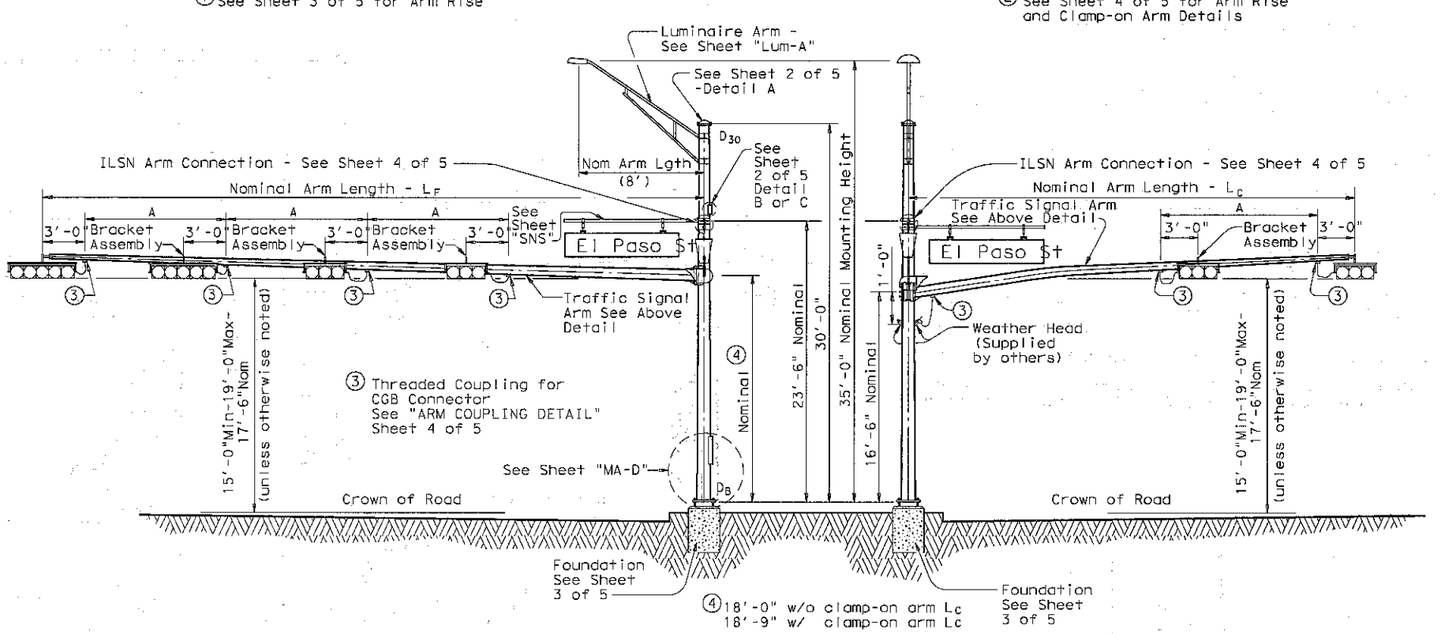



## FIXED MOUNT TRAFFIC SIGNAL ARM

## CLAMP-ON TRAFFIC SIGNAL ARM (IF REQUIRED)

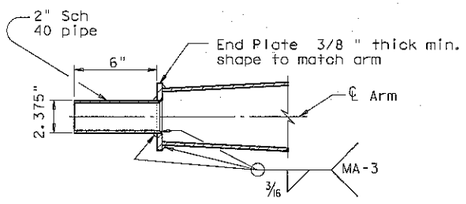



ELEVATION (Showing fixed mount arm)

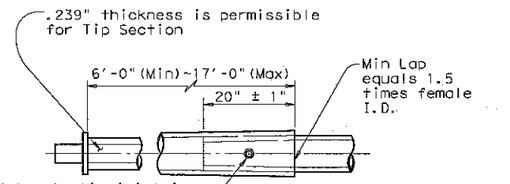
STRUCTURE ASSEMBLY

ELEVATION (Showing clamp-on arm)

| TABLE OF DIMENSIONS "A" | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Arm Length | 24' | 28' | 32' | 36' | 40' | 44' | 50' | 55' | 60' | 65' |
| Arm Type II | 10' | 11' | 12' | 13' | | | | | | |
| Arm Type III | | | 10' | 11' | 12' | 12' | | | | |
| Arm Type IV | | | | | | | 12' | 12' | 12' | 12' |




TENON DETAIL




Note: A slip joint is permissible for arms 50' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

SLIP JOINT DETAIL (FIXED MOUNT ARM)

## 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 can be either 100 mph or 80 mph plus a 1.3 gust factor. If clamp-on traffic signal is required, designs are based on an arm included angle of 90 degrees or more. Angles of less than approximately 75 degrees will require a special design.

Poles are designed to support one 8'-0" luminaire arm, two 9'-0" internally lighted street name (ILSN) signs and two traffic signal arms with limited length combinations.

Each arm with its related attachment is shown below

| Arm | Equivalent DL ⑤ | WL EPA ⑤⑥ |
|---|---|---|
| 8' Luminaire Arm | Luminaire 60 lbs | 1.6 sq ft |
| 9' ILSN Arm | Sign 85 lbs | 11.5 sq ft |
| 50' to 65' Fixed Mount Arm | Signal Loads 310 lbs | 52 sq ft |
| Up to 44' Clamp-on Arm | Signal Loads 180 lbs | 32.4 sq ft |

⑤ Equivalent dead load plus horizontal wind load applied at the end of arm except ILSN arm, which applied 4.5' from the centerline of the pole.

⑥ Effective projected area (actual area times drag coefficient) for the application of horizontal wind load.

Except as noted in Sheet 1 thru 5 of 5, other details not covered shall refer to Standard Sheet "MA-D" for pole 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.

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. Material, fabrication tolerances, and shipping practices shall also meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

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

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

Installation of damping plate for the long mast arm is not recommended.

Provision of the bracket assembly used to support the traffic signal heads shall be under the direction of the Engineer for approval.

Design also conforms to NCHRP Report 412 for fatigue resistance except that there are no stiffeners at the base plate. TxDOT is conducting tests to determine if stiffeners at the base plate will or will not result in optimal performance; depending upon the results of the tests, poles may need a retrofit to ensure optimal fatigue performance.

Texas Department of Transportation
Traffic Operations Division

# TRAFFIC SIGNAL SUPPORT STRUCTURES
## LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

LMA(1)-12

Sheet 1 of 5

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| - | FORT BEND | | 27 |

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131A

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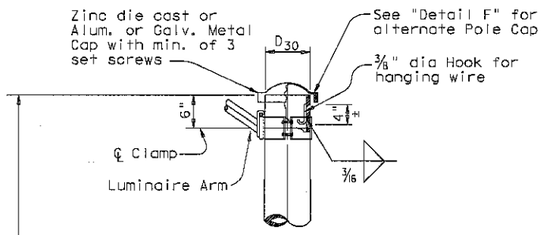
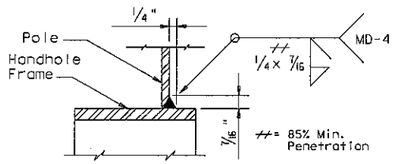
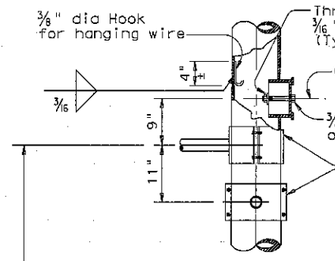



## DETAIL A

(for pole with luminaire)

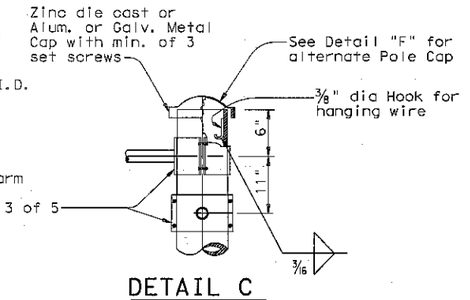



## DETAIL H

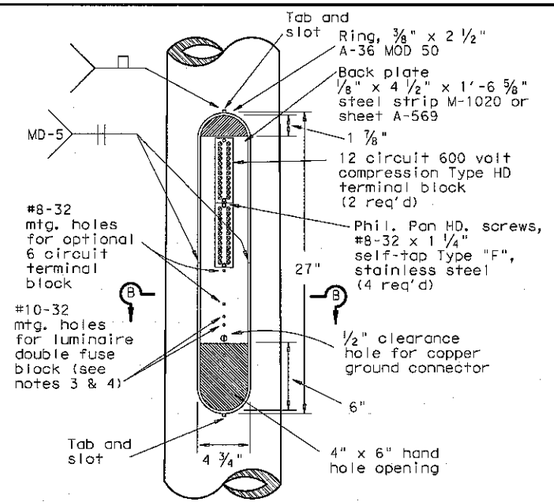



## DETAIL B

(If ILSN applied)




## DETAIL C

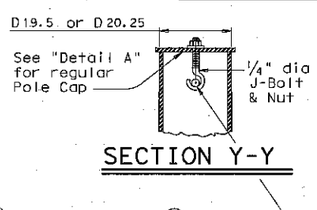



## ACCESS COMPARTMENT

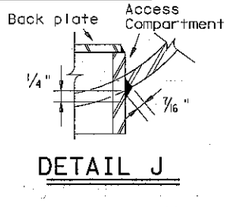
| MATERIALS | |
|---|---|
| Round Shafts or Polygonal Shafts (7) | ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 (8) |
| Plates (7) | ASTM A36, A588, or A572 Gr.50 |
| Connection Bolts | ASTM A325, or A449 except where noted |
| Pin Bolts | ASTM A325 |
| Pipe (7) | 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 |

(7) 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.

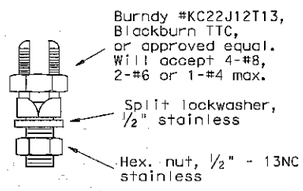
(8) ASTM A1011 SS Gr.50 shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.



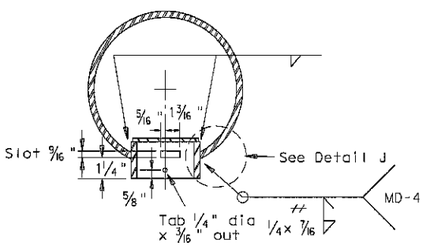

## SECTION Y-Y




## DETAIL J




## COPPER GROUND CONNECTOR

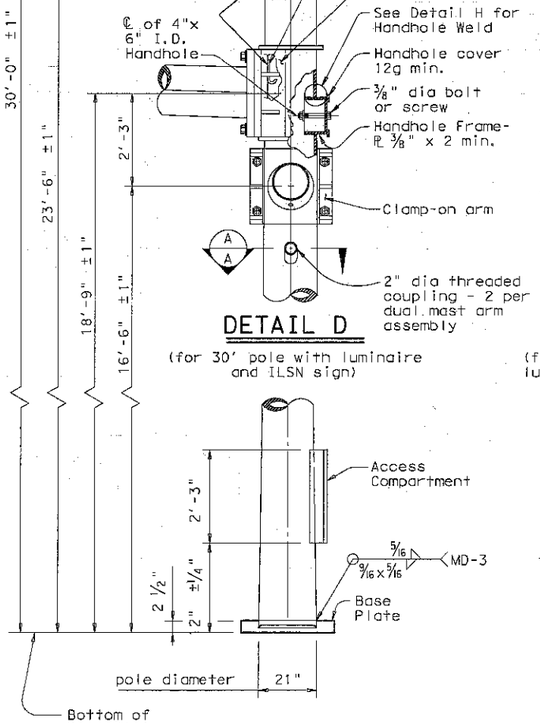



## SECTION B-B

Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.

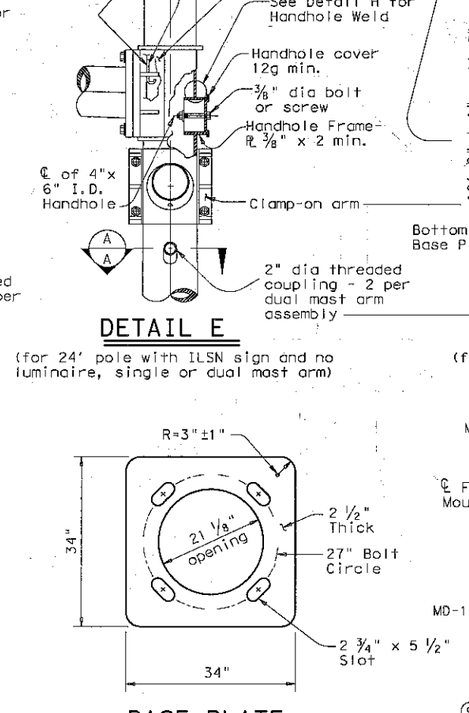
### ACCESS COMPARTMENT NOTES:

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 #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.



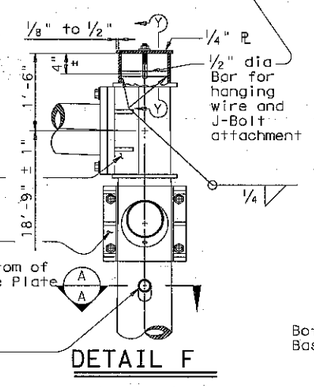

## DETAIL D

(for 30' pole with luminaire and ILSN sign)



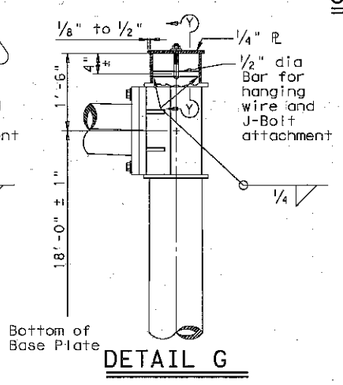

## DETAIL E

(for 24' pole with ILSN sign and no luminaire, single or dual mast arm)




## DETAIL F

(for 20.25' pole with no ILSN sign and no luminaire, dual mast arm)




## DETAIL G

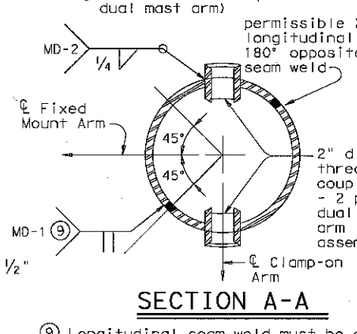
(for 19.5' pole with no ILSN sign and no luminaire, single mast arm)



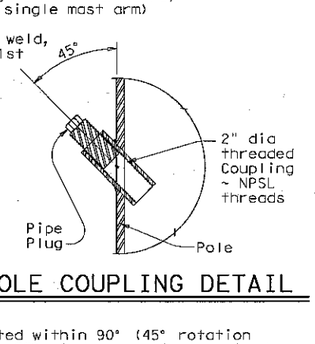

## POLE ELEVATION




## BASE PLATE




## SECTION A-A




## POLE COUPLING DETAIL

(9) Longitudinal seam weld must be oriented within 90° (45° rotation each side) along the fixed mount arm. 60% min penetration required, 100% penetration within 6" of circumferential base weld.

Texas Department of Transportation
Traffic Operations Division

# TRAFFIC SIGNAL SUPPORT STRUCTURES
## LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 2 of 5 LMA(2)-12

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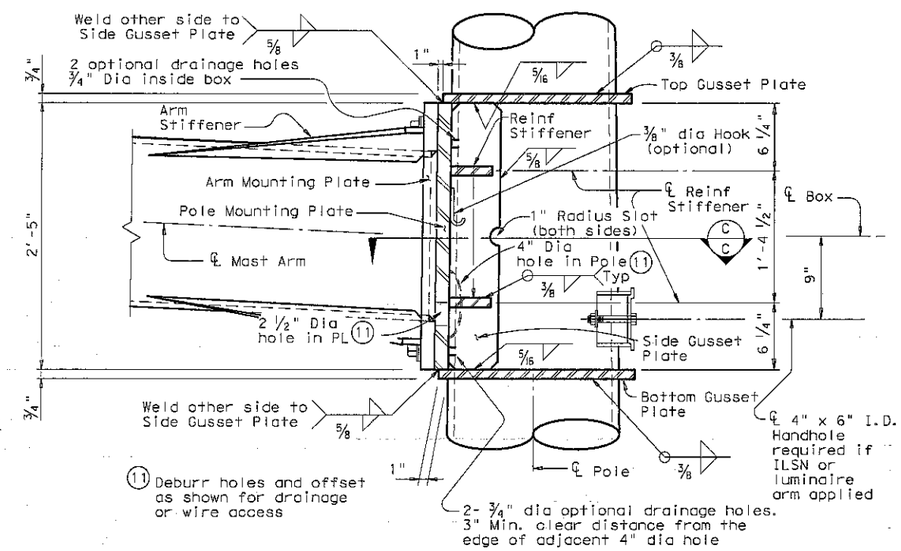
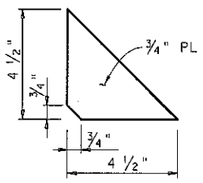
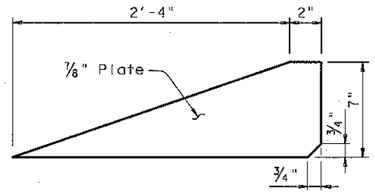


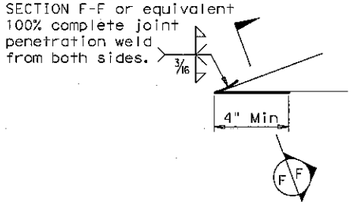

## BUILT-UP BOX CONNECTION




REINFORCING STIFFENER

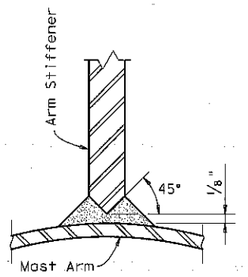



ARM STIFFENER
(Cut to match arm inclination and taper)




Only 4" length at tip of Arm Stiffener requires a complete joint penetration weld. Smooth weld radius to connect Stiffener. Only a fillet weld is required for the remaining weld length.

## DETAIL "K"




## SECTION F-F

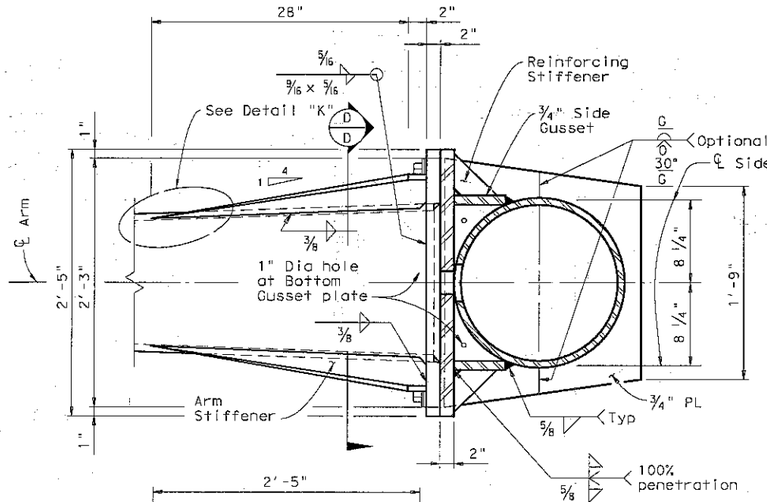
| Fixed Mount Arm LF | ROUND POLES (13) | | | | | Foundation Type |
|---|---|---|---|---|---|---|
| | $D_B$ | $D_{19.5}$ or $D_{20.25}$ | $D_{24}$ | $D_{30}$ | (12) thk | |
| ft. | in. | in. | in. | in. | in. | |
| 50', 55' 60', 65' | 21.0 | 18.2 | 17.6 | 16.8 | .3125 | 48-A |

| Fixed Mount Arm LF | ROUND ARMS (13) | | | | |
|---|---|---|---|---|---|
| | $L_1$ | $D_1$ | $D_2$ | (12) thk | Rise |
| ft. | ft. | in. | in. | in. | |
| 50 | 49 | 18.5 | 11.7 | .3125 | 3'- 3" |
| 55 | 54 | 18.5 | 11.0 | .3125 | 3'- 7" |
| 60 | 59 | 18.5 | 10.3 | .3125 | 3'-11" |
| 65 | 64 | 18.5 | 9.6 | .3125 | 4'- 4" |

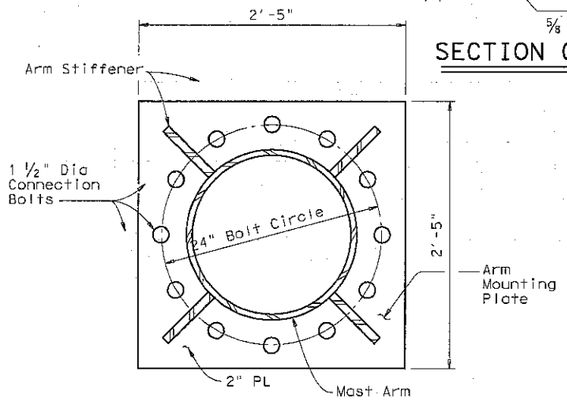
$D_B$ = Pole Base O.D.
$D_{19.5}$ = Pole Top O.D. with no Luminaire and no ILSN (single mast arm)
$D_{20.25}$ = Pole Top O.D. with no Luminaire and no ILSN (dual mast arm)
$D_{24}$ = Pole Top O.D. with ILSN w/out Luminaire
$D_{30}$ = Pole Top O.D. with Luminaire
$D_1$ = Arm Base O.D.
$D_2$ = Arm End O.D.
$L_1$ = Shaft Length
$L_F$ = Fixed Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

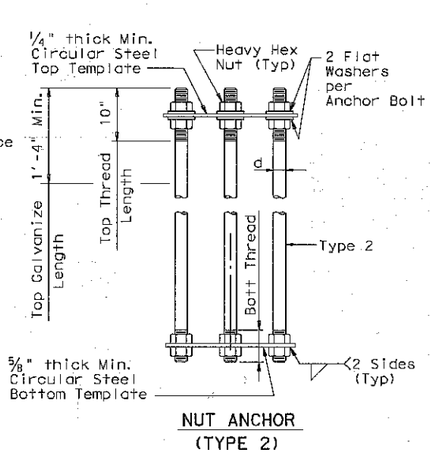
(13) Shaft profile 16-sided or 18-sided is considered to be equivalent to round section.




## SECTION C-C

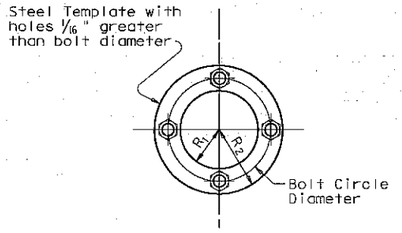



## SECTION D-D




NUT ANCHOR
(TYPE 2)

## ANCHOR BOLT ASSEMBLY




## TEMPLATE DETAIL

| FOUNDATION DESIGN TABLE | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FDN TYPE | DRILLED SHAFT DIA | REINFORCING STEEL | | DRILLED SHAFT LENGTH-ft (16), (17), (18) | | | ANCHOR BOLT DESIGN (14) | | | | FOUNDATION DESIGN LOAD (15) | | TYPICAL APPLICATION |
| | | VERT BARS | SPIRAL & PITCH | TEXAS CONE PENETROMETER N blows/ft | | | ANCHOR BOLT DIA | Fy (ksi) | BOLT CIR DIA | ANCHOR TYPE | MOMENT K-ft | SHEAR Kips | |
| | | | | 10 | 15 | 40 | | | | | | | |
| 48-A | 48" | 20 #9 | #4 at 6" | 21.9 | 19.5 | 14.7 | 2 1/2" | 55 | 27" | 2 | 490 | 10 | 50' to 65' Mast arm assembly. |

SEE SHEET "TS-FD" FOR ADDITIONAL DETAILS.

(14) Anchor bolt design develops the foundation capacity given under Foundation Design Loads.

(15) Foundation Design Loads are the allowable moments and shears at the base of the structure.

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

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

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

## GENERAL NOTES:

Built-up Box Connection: For the welded arm-to-pole connection as a build-up box configuration illustrated here is an example only, fabricators are required to submit a shop drawing of box connection for approval. The drawing shall specify the details of each box element, welds of arm-to-pole connection, arm-to-plate socket connection, and arm rise creation. Specify the proper location of drain holes along the pole. 2 1/2" dia hole in the pole mounting plate and 4" dia hole in the pole need to be aligned for wiring access or drainage. Arm stiffeners cut to match arm inclination and taper shall also be included.

The deviation from flat for either arm or pole mounting plate shall not exceed 1/32 in., which is measured along the center of mounting plate to a radial distance of 13.5 in. The deformed-from-flat connection between arm and pole mounting plates shall not be allowed if the center of both mounting plates cannot contact directly.

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

| ANCHOR BOLT & TEMPLATE SIZE | | | | | | |
|---|---|---|---|---|---|---|
| Bolt Dia in. | Length ‡ | Top Thread | Bottom Thread | Bolt Circle | R2 | R1 |
| 2 1/2" | 5'-2" | 10" | 6 1/2" | 27" | 16" | 11" |

‡ Min dimension given, longer bolts are acceptable.

Texas Department of Transportation
Traffic Operations Division

# TRAFFIC SIGNAL SUPPORT STRUCTURES
## LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 3 of 5 LMA(3)-12

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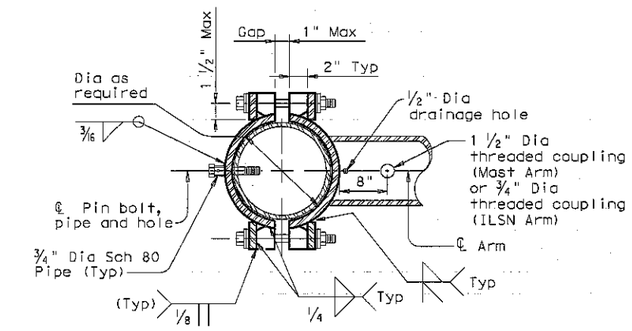
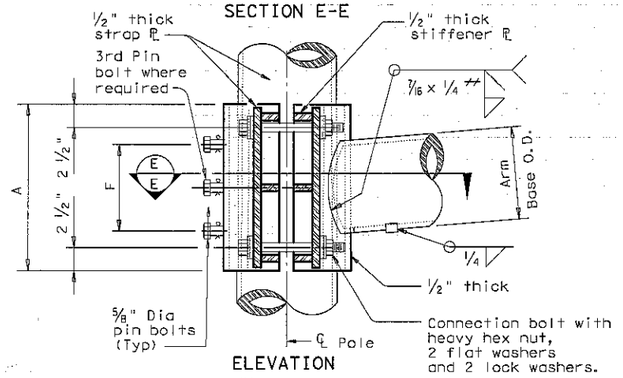



SECTION E-E




ELEVATION
(Mast Arm or ILSN Arm to pole)

## = 85% Min. Penetration

## CLAMP-ON CONNECTION

### 80 MPH WIND

| Clamp-on Arm Lc | ROUND ARMS | | | | | POLYGONAL ARMS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $L_1$ | $D_1$ | $D_2$ | thk (12) | Rise | $L_1$ | $D_1$ | $D_2$ | thk (12) | Rise |
| ft. | ft. | in. | in. | in. | | ft. | in. | in. | in. | |
| 20 | 19.1 | 6.5 | 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 | 1'-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" |

### 100 MPH WIND

| Clamp-on Arm Lc | ROUND ARMS | | | | | POLYGONAL ARMS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $L_1$ | $D_1$ | $D_2$ | thk (12) | Rise | $L_1$ | $D_1$ | $D_2$ | thk (12) | Rise |
| ft. | ft. | in. | in. | in. | | ft. | in. | in. | in. | |
| 20 | 19.1 | 8.0 | 5.3 | .179 | 1'-8" | 19.1 | 8.0 | 3.5 | .179 | 1'-7" |
| 24 | 23.1 | 9.0 | 5.8 | .179 | 1'-9" | 23.1 | 9.0 | 3.5 | .179 | 1'-8" |
| 28 | 27.1 | 9.5 | 5.7 | .179 | 1'-10" | 27.1 | 10.0 | 3.5 | .179 | 1'-9" |
| 32 | 31.0 | 9.5 | 5.2 | .239 | 1'-11" | 31.0 | 9.5 | 3.5 | .239 | 1'-10" |
| 36 | 35.0 | 10.0 | 5.1 | .239 | 2'-0" | 35.0 | 10.0 | 3.5 | .239 | 1'-11" |
| 40 | 39.0 | 10.5 | 5.1 | .239 | 2'-3" | 39.0 | 11.0 | 3.5 | .239 | 2'-1" |
| 44 | 43.0 | 11.0 | 5.1 | .239 | 2'-8" | 43.0 | 11.5 | 4.0 | .239 | 2'-3" |

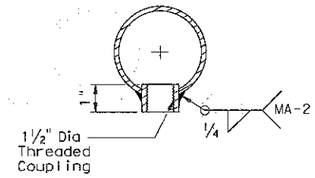
$D_1$ = Arm Base O.D.
$D_2$ = Arm End O.D.
$L_1$ = Shaft Length
Lc = Clamp-on Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

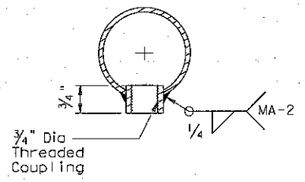
### CLAMP-ON ARM CONNECTION

| ILSN Arm Size | | A | F | 4 Conn. Bolts | 5/8" Dia. Pin Bolts |
|---|---|---|---|---|---|
| Sch 40 pipe Dia | Thick | | | Dia | No. |
| in. | in. | in. | in. | in. | ea |
| 3 | .216 | 10 | 4 | ¾ | 2 |

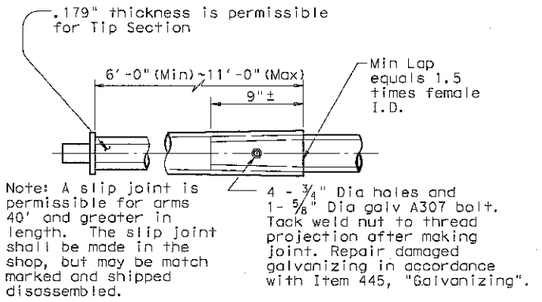
| Mast Arm Size | | A | F | 4 Conn. Bolts | 5/8" Dia. Pin Bolts |
|---|---|---|---|---|---|
| Base Dia | Thick | | | Dia | No. |
| in. | in. | in. | in. | in. | ea |
| 6.5 | .179 | 12 | 6 | 1 | 2 |
| 7.5 | .179 | 14 | 8 | 1 | 2 |
| 8.0 | .179 | 14 | 8 | 1 | 2 |
| 9.0 | .179 | 16 | 10 | 1 | 2 |
| 9.5 | .179 | 18 | 12 | 1 ¼ | 3 |
| 9.5 | .239 | 18 | 12 | 1 ¼ | 3 |
| 10.0 | .239 | 18 | 12 | 1 ¼ | 3 |
| 10.5 | .239 | 18 | 12 | 1 ¼ | 3 |
| 11.0 | .239 | 18 | 12 | 1 ¼ | 3 |
| 11.5 | .239 | 18 | 12 | 1 ¼ | 3 |




## ARM COUPLING DETAIL



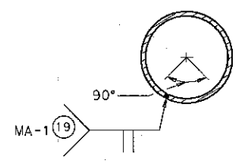

## ILSN ARM COUPLING DETAIL




## SLIP JOINT DETAIL (CLAMP-ON ARM)

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




## ARM WELD DETAIL

(19) Longitudinal Seam Weld must be oriented within the lower 90° of the signal arm.
60% Min penetration
100% penetration within 6" of circumferential base welds.

### GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies or ILSN arm support. For a clamp-on mast arm, a maximum 1 ½" wide vertical slotted hole may 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". For an ILSN arm, a 1 ½" diameter hole shall be cut in the front clamp plate for wire 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 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. Pin bolts shall be ASTM A325 with threads excluded from the shear plane. Pin bolt and ¾" diameter pipe shall have 3/16" diameter holes for a 1/8" diameter galvanized cotter pin. Back clamp plate shall be furnished with a ¾" diameter hole for each pin bolt. An 11/16" diameter hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

Texas Department of Transportation
Traffic Operations Division

# TRAFFIC SIGNAL SUPPORT STRUCTURES
## LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 4 of 5 LMA(4)-12

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| DN: JK | CK: GRB | DW: FDN | CK: CAL |
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1310

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## 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<br>See note above plus: one (or two if ILSN attached) small hand hole, clamp-on simplex | 24′ Poles with ILSN<br>See note above plus one small hand hole | 19.50′ (Single Mast Arm)<br>20.25′ (Dual Mast Arm)<br>Poles with no Luminaire and no ILSN<br>See note above |
|---|---|---|---|

**Single Mast Arm**

| Lf ft. | Designation | Quantity | Designation | Quantity | Designation | Quantity |
|---|---|---|---|---|---|---|
| 50 | 50L | 1 * | 50S | | 50 | |
| 55 | 55L | 2 * | 55S | | 55 | |
| 60 | 60L | 2 * | 60S | | 60 | |
| 65 | 65L | | 65S | | 65 | |

**Dual Mast Arm**

| Lf ft. | Lc ft. | Designation | Quantity | Designation | Quantity | Designation | Quantity |
|---|---|---|---|---|---|---|---|
| 50 | 20 | 5020L | | 5020S | | 5020 | |
| | 24 | 5024L | | 5024S | | 5024 | |
| | 28 | 5028L | | 5028S | | 5028 | |
| | 32 | 5032L | | 5032S | | 5032 | |
| | 36 | 5036L | | 5036S | | 5036 | |
| | 40 | 5040L | | 5040S | | 5040 | |
| | 44 | 5044L | | 5044S | | 5044 | |
| 55 | 20 | 5520L | | 5520S | | 5520 | |
| | 24 | 5524L | | 5524S | | 5524 | |
| | 28 | 5528L | | 5528S | | 5528 | |
| | 32 | 5532L | | 5532S | | 5532 | |
| | 36 | 5536L | | 5536S | | 5536 | |
| | 40 | 5540L | | 5540S | | 5540 | |
| | 44 | 5544L | | 5544S | | 5544 | |
| 60 | 20 | 6020L | | 6020S | | 6020 | |
| | 24 | 6024L | | 6024S | | 6024 | |
| | 28 | 6028L | | 6028S | | 6028 | |
| | 32 | 6032L | | 6032S | | 6032 | |
| | 36 | 6036L | | 6036S | | 6036 | |
| | 40 | 6040L | | 6040S | | 6040 | |
| | 44 | 6044L | | 6044S | | 6044 | |
| 65 | 20 | 6520L | | 6520S | | 6520 | |
| | 24 | 6524L | | 6524S | | 6524 | |
| | 28 | 6528L | | 6528S | | 6528 | |
| | 32 | 6532L | | 6532S | | 6532 | |
| | 36 | 6536L | | 6536S | | 6536 | |
| | 40 | 6540L | | 6540S | | 6540 | |
| | 44 | 6544L | | 6544S | | 6544 | |

Foundation Summary Table **

| | Location Ident. | Avg. N Blow/ft. | No. Each | Drill Shaft *** Length (feet) |
|---|---|---|---|---|
| | | | | 48-A |
| * | WEST BELLFORT AT WESTMOOR DRIVE | | | |
| | POLE 1 | 10 | 1 | 22′ |
| | POLE 3 | 10 | 1 | 22′ |
| | POLE 4 | 10 | 1 | 22′ |
| | | | | |
| * | WEST BELLFORT AT BINION LANE | | | |
| | POLE 1 | 10 | 1 | 22′ |
| | POLE 3 | 10 | 1 | 22′ |
| | | | | |
| | | | | |
| | Total Drill Shaft Length | | | 110 |

Notes

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

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

## Shipping Parts List

Traffic Signal Arms (Fixed Mount) (1 per pole)
Ship each arm with listed equipment attached

| Nominal Arm Length | Type IV Arm (4 Signals) 3 Bracket Assembly and 4 CGB Connectors | |
|---|---|---|
| ft. | Designation | Quantity |
| 50 | 50IV | 1 * |
| 55 | 55IV | 2 * |
| 60 | 60IV | 2 * |
| 65 | 65IV | |

Luminaire Arms (1 per 30′ pole)

| Nominal Arm Length | Quantity |
|---|---|
| 8′ Arm | 5 * |

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

| Nominal Arm Length | Quantity |
|---|---|
| 7′ Arm | |
| 9′ Arm | |

Traffic Signal Arms (80 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached

| Nominal Arm Length | Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers | | Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp w/bolts and washers | | Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp w/bolts and washers | |
|---|---|---|---|---|---|---|
| ft. | Designation | Quantity | Designation | Quantity | Designation | Quantity |
| 20 | 20I-80 | | | | | |
| 24 | 24I-80 | | 24II-80 | | | |
| 28 | 28I-80 | | 28II-80 | | | |
| 32 | | | 32II-80 | | 32III-80 | |
| 36 | | | 36II-80 | | 36III-80 | |
| 40 | | | | | 40III-80 | |
| 44 | | | | | 44III-80 | |

Traffic Signal Arms (100 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached

| Nominal Arm | Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers | | Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp | | Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp | |
|---|---|---|---|---|---|---|
| ft. | Designation | Quantity | Designation | Quantity | Designation | Quantity |
| 20 | 20I-100 | | | | | |
| 24 | 24I-100 | | 24II-100 | | | |
| 28 | 28I-100 | | 28II-100 | | | |
| 32 | | | 32II-100 | | 32III-100 | |
| 36 | | | 36II-100 | | 36III-100 | |
| 40 | | | | | 40III-100 | |
| 44 | | | | | 44III-100 | |

Anchor Bolt Assemblies (1 per pole)

| Anchor Bolt Diameter | Anchor Bolt Length | Quantity |
|---|---|---|
| 2 1/2 " | 5′ - 3" | 5 * |

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.

Abbreviations
Lf= Fixed Arm Length
Lc= Clamp-on Arm Length (44′ Max.)

THIS SEAL SUBSTANTIATES THE ITEMS IDENTIFIED WITH AN * ONLY AND DOES NOT CONFIRM THE DESIGN STANDARDS (BY OTHERS) PRESENTED HEREON.

STATE OF TEXAS
YOHANNES A. TADESSE
107781
REGISTERED PROFESSIONAL ENGINEER
3/12/2024

Texas Department of Transportation
Traffic Operations Division

# LONG MAST ARM ASSEMBLY PARTS LIST

LMA(5)-12

Sheet 5 of 5

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131E

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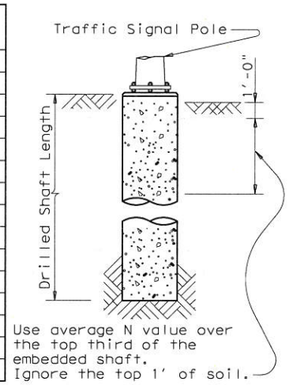
## FOUNDATION DESIGN TABLE

| FDN TYPE | DRILLED SHAFT DIA | REINFORCING STEEL | | EMBEDDED DRILLED SHAFT LENGTH-ft ④, ⑤, ⑥ | | | ANCHOR BOLT DESIGN ① | | | | FOUNDATION DESIGN LOAD ② | | TYPICAL APPLICATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | VERT BARS | SPIRAL & PITCH | TEXAS CONE PENETROMETER N blows/ft | | | ANCHOR BOLT DIA | Fy (ksi) | BOLT CIR DIA | ANCHOR TYPE | MOMENT K-ft | SHEAR Kips | |
| | | | | 10 | 15 | 40 | | | | | | | |
| 24-A | 24" | 4- #5 | #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- #9 | #3 at 6" | 11.3 | 10.3 | 8.0 | 1 ½" | 55 | 17" | 2 | 87 | 3 | Mast arm assembly. (see Selection Table) |
| 36-A | 36" | 10- #9 | #3 at 6" | 13.2 | 12.0 | 9.4 | 1 ¾" | 55 | 19" | 2 | 131 | 5 | Mast arm assembly. (see Selection Table) 30' strain pole with or without luminaire. |
| 36-B | 36" | 12- #9 | #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- #9 | #3 at 6" | 17.4 | 15.6 | 11.9 | 2 ¼" | 55 | 23" | 2 | 271 | 9 | Mast arm assembly. (see Selection Table) |

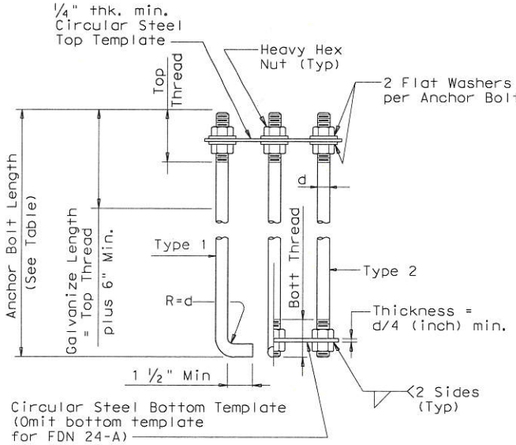
## FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM PLUS ILSN SUPPORT ASSEMBLIES (ft)

| | | 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' |




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

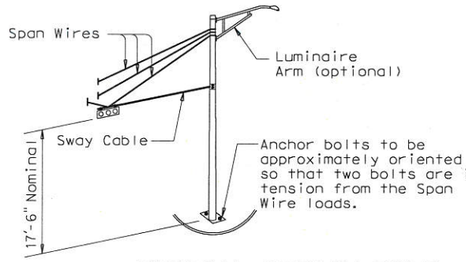
EXAMPLE:
1. For 80mph design wind speed, foundation 30-A can support up to a 32' arm with another arm up to 28'
2. For 100mph design wind speed, foundation 36-A can support a single 36' mast arm.



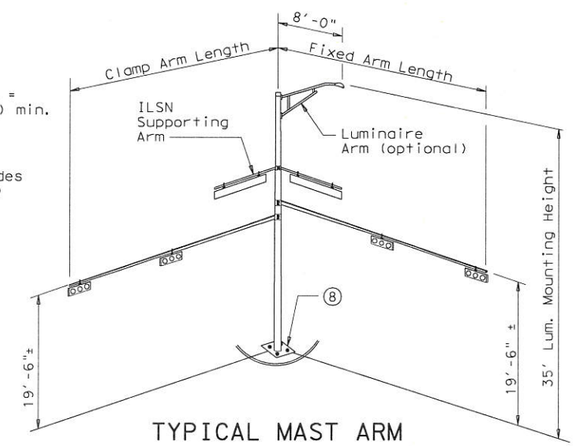

HOOKED ANCHOR (TYPE 1) NUT ANCHOR (TYPE 2)

## ANCHOR BOLT ASSEMBLY

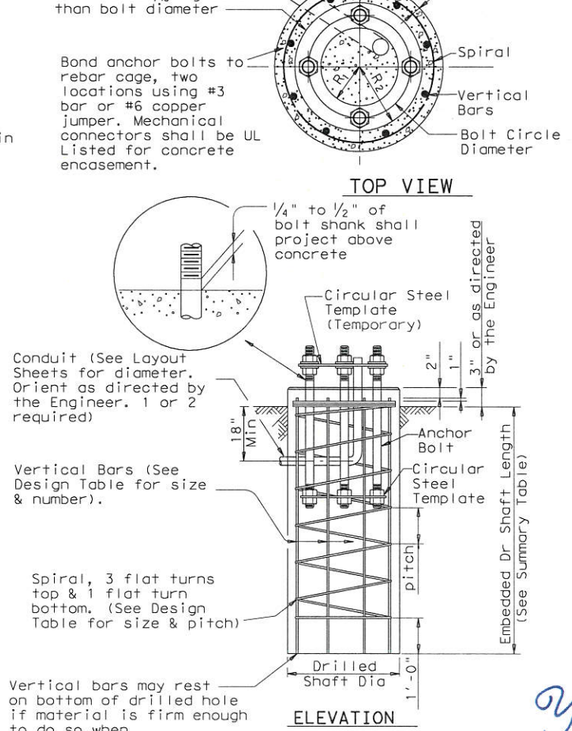
⑧ Orient anchor bolts orthogonal with the fixed arm direction to ensure that two bolts are in tension under dead load.




## TYPICAL STRAIN POLE ASSEMBLY




## TYPICAL MAST ARM ASSEMBLY




## FOUNDATION DETAILS

### 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" |
| 1 ½" | 3'-4" | 6" | 4" | 17" | 10" | 7" |
| 1 ¾" | 3'-10" | 7" | 4 ½" | 19" | 11 ¼" | 7 ¾" |
| 2" | 4'-3" | 8" | 5" | 21" | 12 ½" | 8 ½" |
| 2 ¼" | 4'-9" | 9" | 5 ½" | 23" | 13 ¾" | 9 ¼" |

⑦ Min dimensions given, longer bolts are acceptable.

## 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 SUMMARY TABLE ③

| LOCATION IDENTIFICATION | AVG. N BLOW /ft. | FDN TYPE | NO. EA | DRILLED SHAFT LENGTH ⑥ (FEET) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 24-A | 30-A | 36-A | 36-B | 42-A |
| * WEST BELLFORT AT BINION LANE | | | | | | | | |
| POLE 2 | 10 | 36-A | 1 | | | 13' | | |
| POLE 4 | 10 | 36-B | 1 | | | | 15' | |
| * WEST BELLFORT AT WESTMOOR DRIVE | | | | | | | | |
| POLE 2 | 10 | 36-B | 1 | | | | 15' | |
| TOTAL DRILLED SHAFT LENGTHS | | | | | | 13' | 30' | |

## 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 end 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".

THIS SEAL SUBSTANTIATES THE ITEMS IDENTIFIED WITH AN * ONLY AND DOES NOT CONFIRM THE DESIGN STANDARDS (BY OTHERS) PRESENTED HEREON.

STATE OF TEXAS
YOHANNES A. TADESSE
107781
LICENSED PROFESSIONAL ENGINEER

3/12/2024

Texas Department of Transportation
Traffic Operations Division

# TRAFFIC SIGNAL POLE FOUNDATION

# TS-FD-12

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5-96
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1-12

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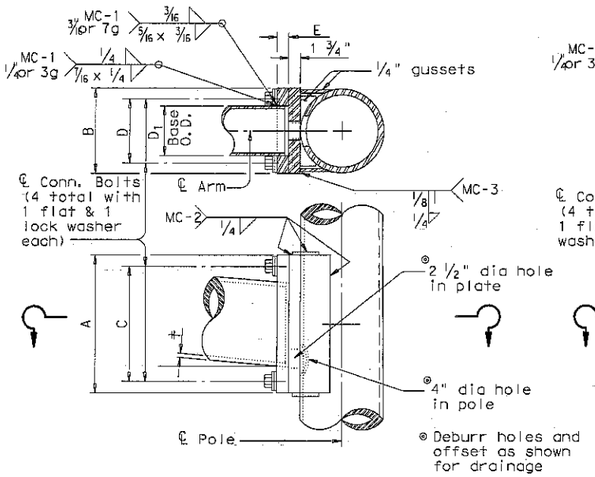
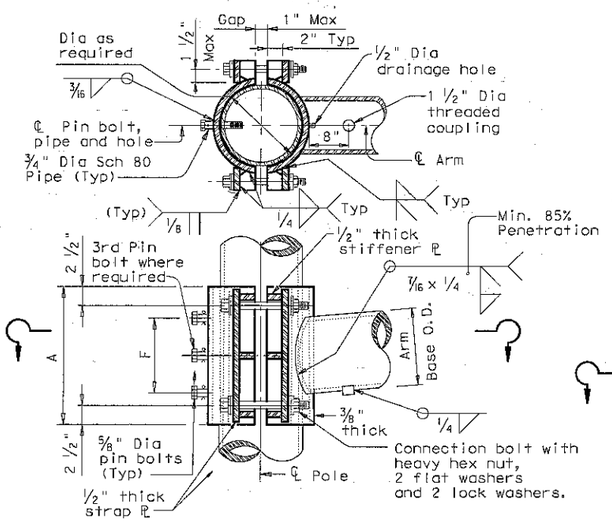
| ARM SIZE $D_1$ | ARM SIZE ϯ | A | B | C | D | E | CONN BOLT DIA |
|---|---|---|---|---|---|---|---|
| in. | in. | in. | in. | in. | in. | in. | in. |
| 6.5 | .179 | 12 | 9 | 9 | 6 | 1 ¾ | 1 |
| 7.5 | .179 | 13 | 9 | 10 | 6 | 1 ¾ | 1 |
| 8.0 | .179 | 14 | 10 | 11 | 7 | 2 | 1 ¼ |
| 9.0 | .179 | 16 | 11 | 13 | 8 | 2 | 1 ¼ |
| 9.5 | .179 | 17 | 12 | 14 | 9 | 2 | 1 ¼ |
| 9.5 | .239 | 18 | 12 | 15 | 9 | 2 | 1 ¼ |
| 10.0 | .239 | 18 | 12 | 15 | 9 | 2 | 1 ¼ |
| 10.5 | .239 | 18 | 13 | 15 | 10 | 3 | 1 ½ |
| 11.0 | .239 | 18 | 13 | 15 | 10 | 3 | 1 ½ |



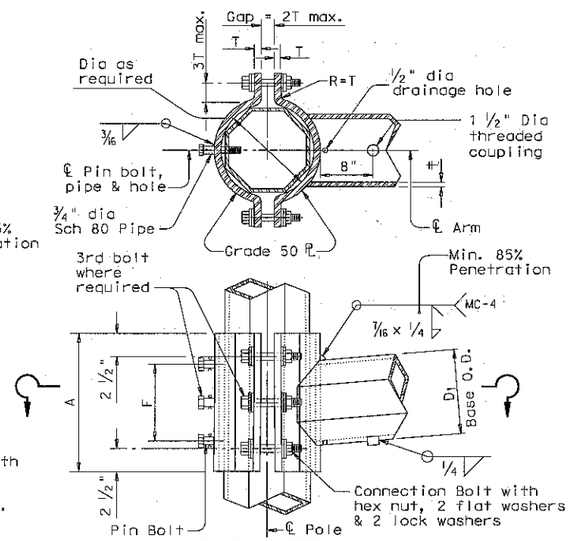

FIXED MOUNT DETAIL 1

| ARM SIZE $D_1$ | ARM SIZE ϯ | 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 | ⅝ |
| 7.5 | .179 | 14 | 8 | 4 | 1 | 2 | ⅝ |
| 8.0 | .179 | 14 | 8 | 4 | 1 | 2 | ⅝ |
| 9.0 | .179 | 16 | 10 | 4 | 1 | 2 | ⅝ |
| 9.5 | .179 | 18 | 12 | 4 | 1 ¼ | 3 | ⅝ |
| 9.5 | .239 | 18 | 12 | 4 | 1 ¼ | 3 | ⅝ |
| 10.0 | .239 | 18 | 12 | 4 | 1 ¼ | 3 | ⅝ |



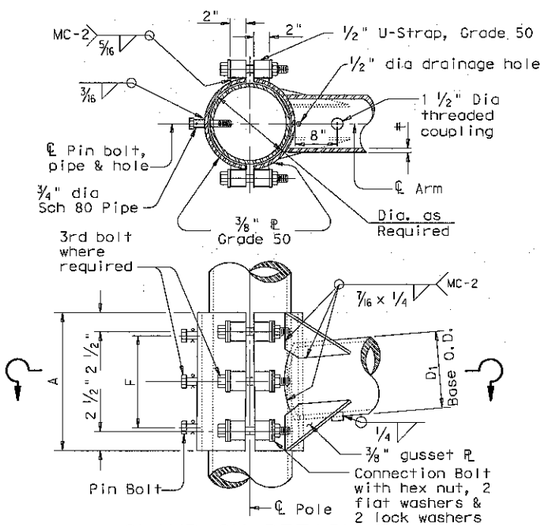

CLAMP-ON DETAIL 1

| ARM SIZE $D_1$ | ARM SIZE ϯ | 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 | ¾ | 4 | ¾ | 2 | ⅝ |
| 7.5 | .179 | 14 | 8 | ¾ | 4 | ¾ | 2 | ⅝ |
| 8.0 | .179 | 14 | 8 | ¾ | 4 | ¾ | 2 | ⅝ |
| 9.0 | .179 | 16 | 10 | ⅞ | 4 | 1 | 2 | ⅝ |
| 10.0 | .179 | 18 | 10 | ⅞ | 4 | 1 | 2 | ⅝ |
| 9.5 | .239 | 18 | 10 | 1 | 6 | 1 | 3 | ⅝ |
| 10.0 | .239 | 18 | 10 | 1 | 6 | 1 | 3 | ⅝ |

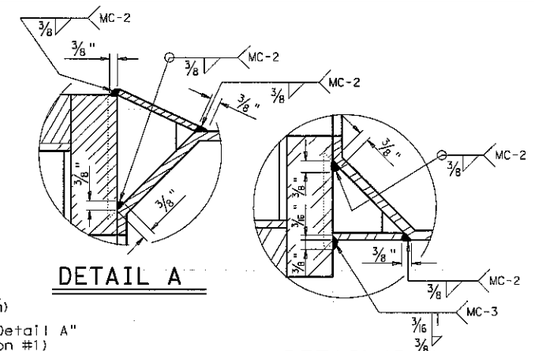



CLAMP-ON DETAIL 2

| ARM SIZE $D_1$ | ARM SIZE ϯ | 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 | ⅝ |
| 7.5 | .179 | 14 | 8 | 4 | 1 | 2 | ⅝ |
| 8.0 | .179 | 14 | 8 | 4 | 1 | 2 | ⅝ |
| 9.0 | .179 | 16 | 10 | 4 | 1 | 2 | ⅝ |
| 9.5 | .179 | 18 | 12 | 6 | 1 | 3 | ⅝ |
| 9.5 | .239 | 18 | 12 | 6 | 1 | 3 | ⅝ |
| 10.0 | .239 | 18 | 12 | 6 | 1 | 3 | ⅝ |




CLAMP-ON DETAIL 3



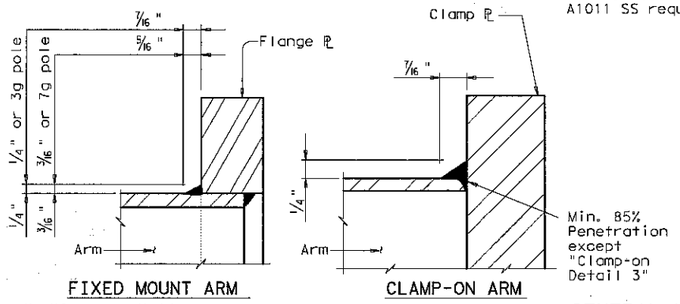

DETAIL A

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.




ARM BASE WELD DETAILS

## GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies. A Maximum 1 ½" 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, welds 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 ¾" dia pipe shall have 3/16" dia holes for a ⅛" dia galvanized cotter pin. Back clamp plate shall be furnished with a ¾" 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.

*Texas Department of Transportation*
*Traffic Operations Division*

# STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

## MAST ARM CONNECTIONS

## MA-C-12

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| DN: MS | CK: JSY | DW: MWF | CK: JSY |
|---|---|---|---|

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5-09
1-12

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
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| DIST | COUNTY | | SHEET NO. |
| - | FORT BEND | | 33 |

126A

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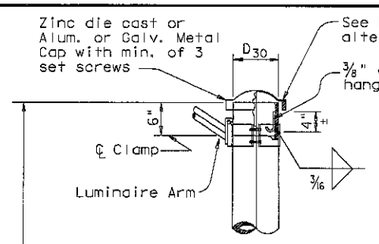
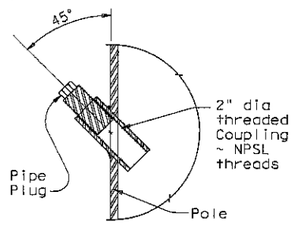
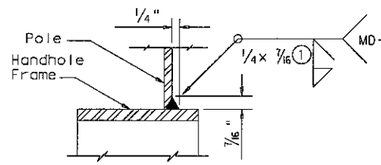


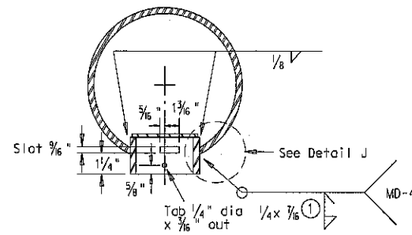

DETAIL A
(for pole with luminaire)




POLE COUPLING DETAIL

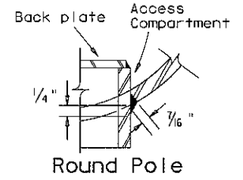


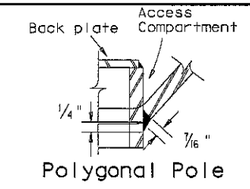

DETAIL G



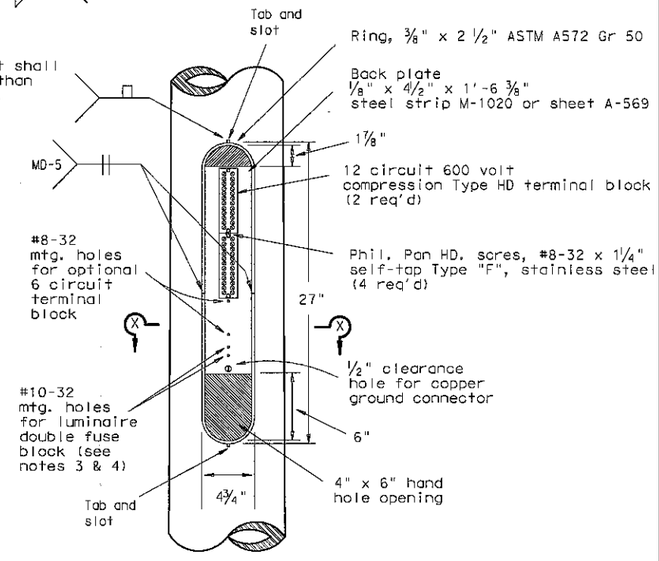

SECTION X-X

Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.

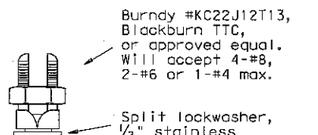



DETAIL J



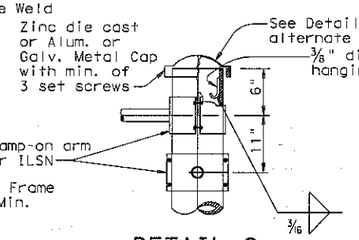

ACCESS COMPARTMENT



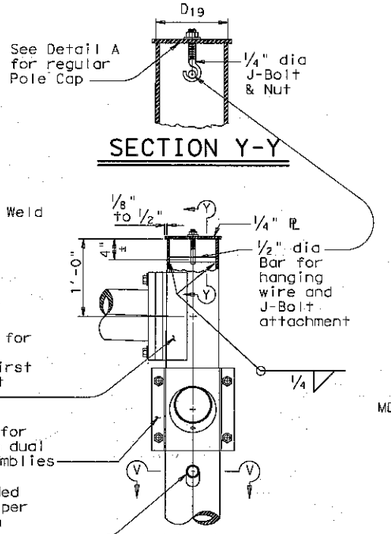

COPPER GROUND CONNECTOR




DETAIL B



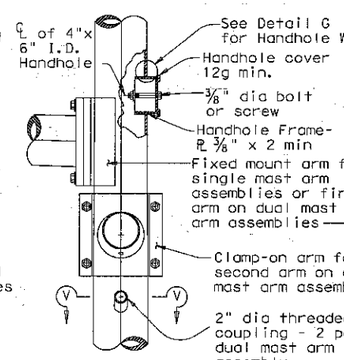

DETAIL C




SECTION Y-Y



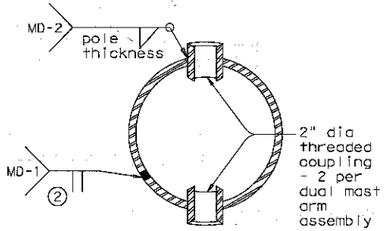

DETAIL D
(for 30' pole with luminaire and ILSN sign)




DETAIL E
(for 24' pole with ILSN sign and no luminaire)

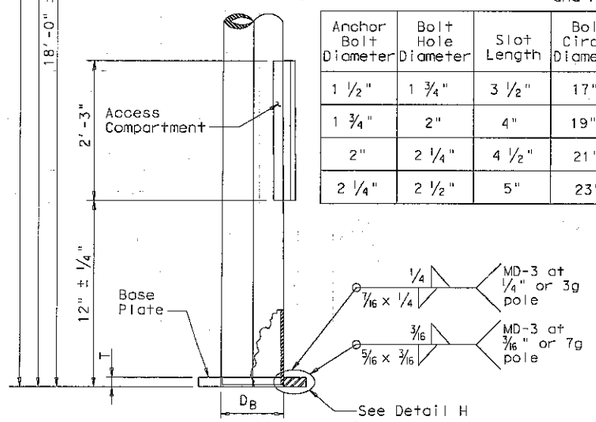



DETAIL F
(for 19' pole with no ILSN sign and no luminaire)

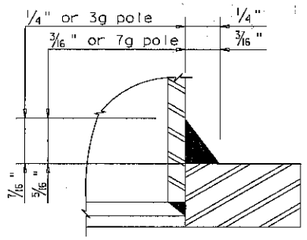



SECTION V-V

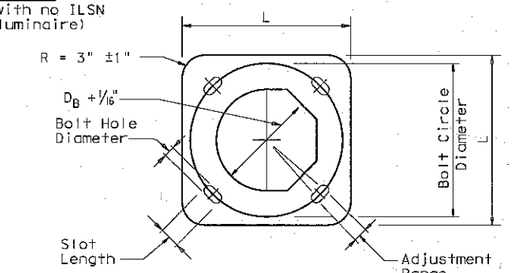
| Anchor Bolt Diameter | Bolt Hole Diameter | Slot Length | Bolt Circle Diameter | Base PL Dim. L x T | Adjust. Range |
|---|---|---|---|---|---|
| 1 1/2" | 1 3/4" | 3 1/2" | 17" | 18" x 1 1/2" | 13.4° |
| 1 3/4" | 2" | 4" | 19" | 20" x 1 3/4" | 13.5° |
| 2" | 2 1/4" | 4 1/2" | 21" | 22" x 2" | 13.6°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




POLE ELEVATION




DETAIL H




BASE PLATE PLAN

① 85% Min. penetration

② 60% Min. penetration
100% pemetration 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 #L60030M-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

©TxDOT August 1995

| DN: MS | CK: JSY | DW: FDN | CK: CAL |
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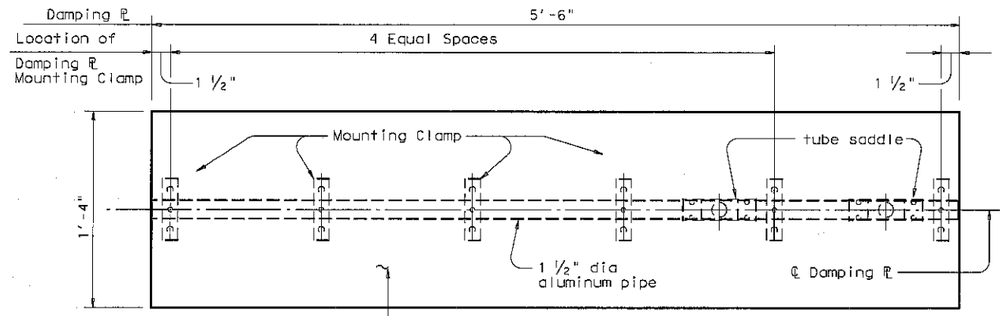
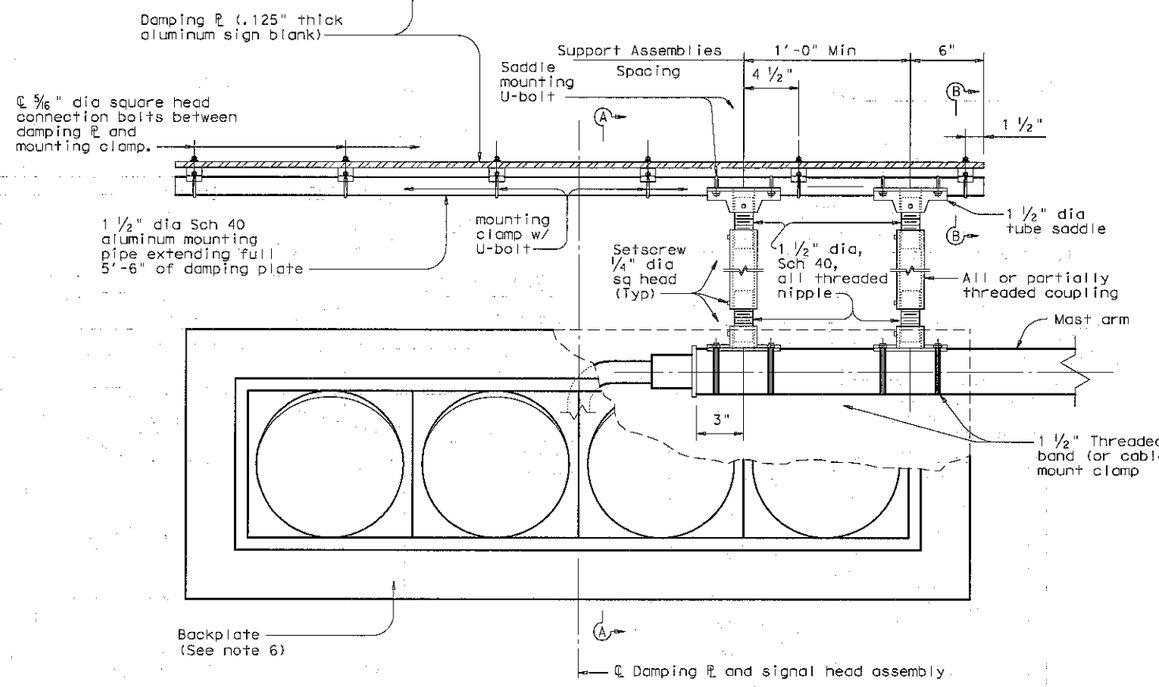


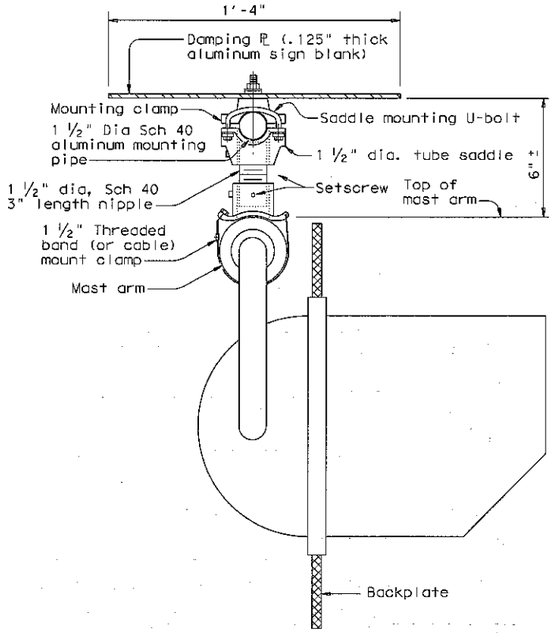

PLAN




ELEVATION

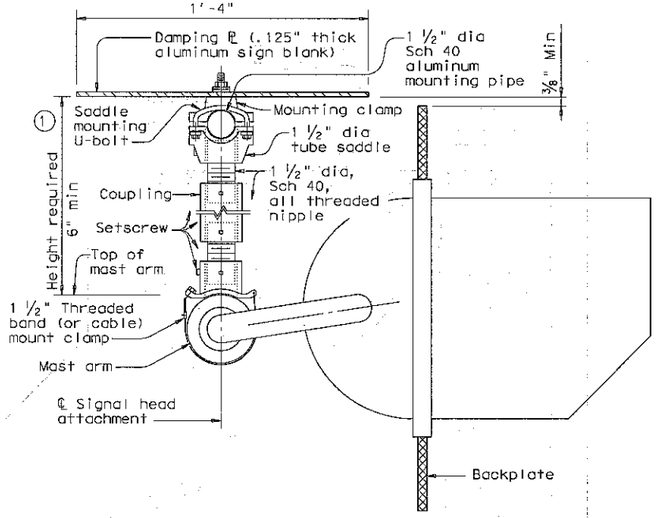
## DAMPING PLATE MOUNTING DETAILS

(Showing alternate placement of signal head)




SECTION A-A

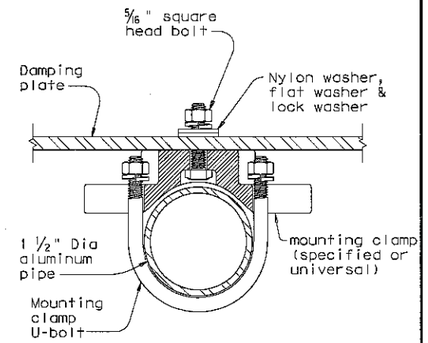
(Showing standard placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)




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 for horizontal section heads | | | |
|---|---|---|---|
| Height required | One nipple each length | Two nipples each length plus | One coupling each length |
| 6"-6 ¾" | 3" | - | - |
| 7"-8 ½" | 4" | - | - |
| 9"-10 ½" | 6" | - | - |
| 11"-15 ½" | - | 4" | 5" |
| 16"-24" | - | 6" | 10" |




SECTION B-B

(Showing damping plate attachment)

## GENERAL NOTES:

1. 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.
2. Aluminum sign blank for damping plate will conform to Departmental Material Specifications DMS-7110. Materials for mast arm mounting clamp and tube saddle will be aluminum castings or aluminum alloys as in accordance with manufacturers' stipulations. Mounting pipe, pipe nipple and coupling will be aluminum alloy 6061-T6 or 6063-T6. Damping plate mounting clamp and u-bolt assemblies will conform to Standard sheet SMD(GEN). U-bolts for saddle mounting will have a minimum yield strength of 36 ksi.
3. Damping plate will be mounted horizontally. Position centerline of damping plate to align with centerline of mast arm or horizontal signal head assembly. Vertical clearance between signal head (with or without backing plate) and bottom of damping plate will 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.
4. Unless stipulated by the manufacturers, all steel parts will be galvanized finish in accordance with Standard Specification Item 445, "Galvanizing".
5. Contractor will verify applicable field dimensions before the installation.
6. Backplates are optional for traffic signals. When backplates are used, Backplates will have a 2-inch fluorescent yellow AASHTO Type $B_{FL}$ or $C_{FL}$ retroreflective border conforming to TxDOT DMS-8300 "Sign Face Materials." See Sheet TS-BP-20 for backplate details.

Texas Department of Transportation

Traffic Safety Division Standard

# MAST ARM DAMPING PLATE DETAILS

## MA-DPD-20

| FILE: ma-dpd-20.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
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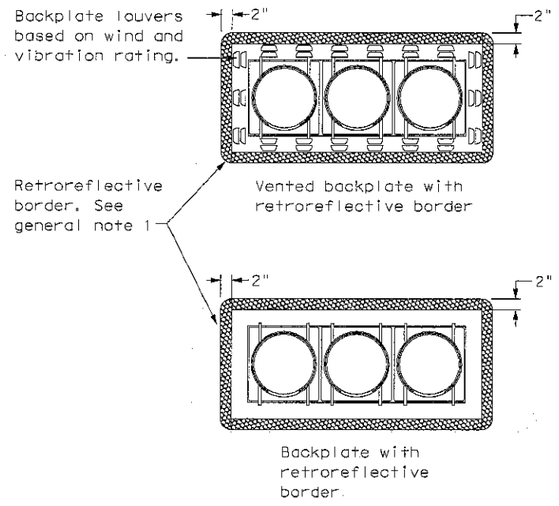
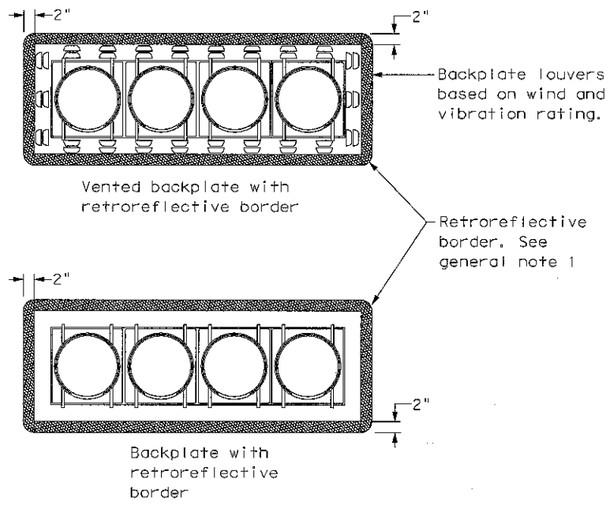
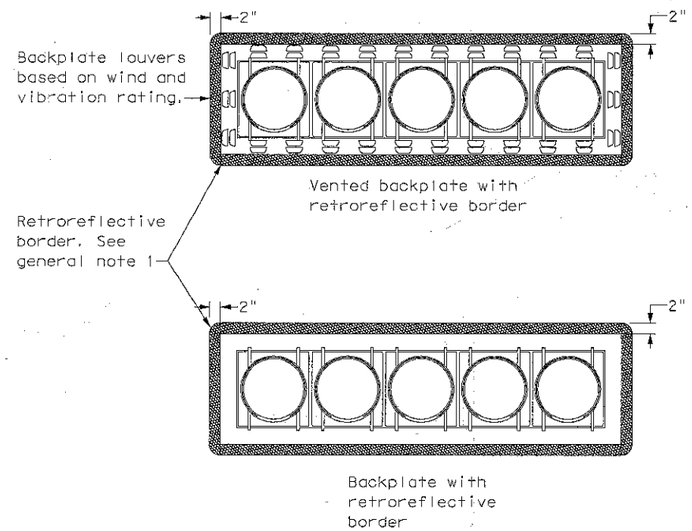


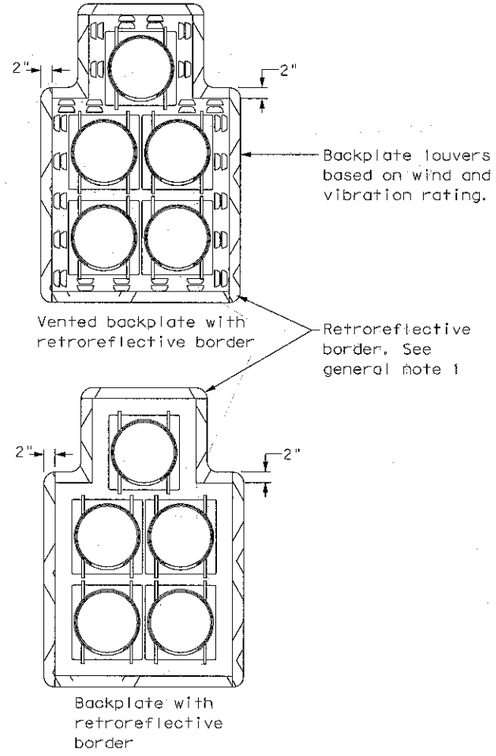

THREE-SECTION HEAD
HORIZONTAL OR VERTICAL



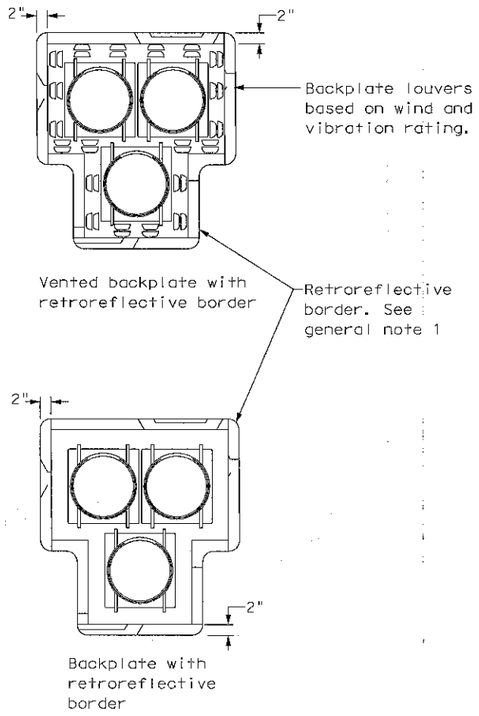

FOUR-SECTION HEAD
HORIZONTAL OR VERTICAL




FIVE-SECTION HEAD
HORIZONTAL OR VERTICAL




FIVE-SECTION HEAD
CLUSTER




PEDESTRIAN HYBRID
BEACON

## GENERAL NOTES:

1. Backplates are optional for traffic signals and pedestrian hybrid beacons. When backplates are used, a 2-inch wide fluorescent yellow AASHTO Type $B_{FL}$ or $C_{FL}$ retroreflective border conforming to TxDOT DMS-8300 is required. Place on all approaches when used.
2. Signal head and backplate compatability must be verified by the contractor prior to installation.
3. When using backplates on signal heads, venting is preferred to reduce cyclic vibration stress.
4. When a vented backplate is used, the retroreflective border must not be placed over the louvers.
5. This standard sheet applies to all signal heads with backplates, including but not limited to:
   - Pole mounted
   - Overhead mounted
   - Span wire mounted
   - Mast arm mounted
   - Vertical signal heads
   - Horizontal signal heads
   - Clustered signal heads
   - Pedestrian hybrid beacons

Texas Department of Transportation

Traffic Safety Division Standard

# TRAFFIC SIGNAL HEAD WITH BACKPLATE

## TS-BP-20

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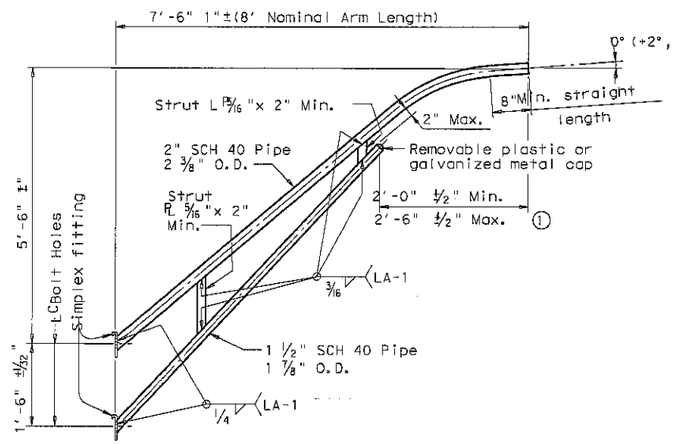
| MATERIALS | |
|---|---|
| Pole or Arm Simplex | ASTM A27 Gr.65-35 or A148 Gr.80-50, A576 Gr.1021 ③, or A36 (Arm only) |
| Arm Pipes | ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50 ④, or A1011 HSLAS-F Gr.50 ④ |
| Arm Strut Plates ② | ASTM A36, A572 Gr.50 ④, or A588 |
| Misc. | ASTM designations as noted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

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.

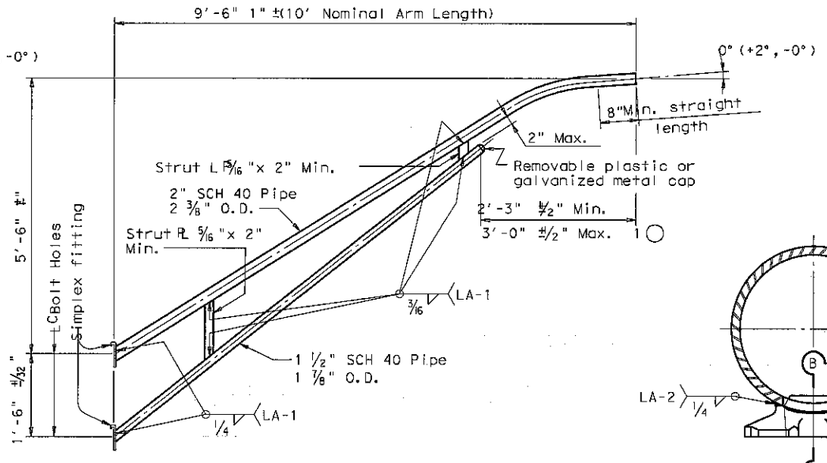
② Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.

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.



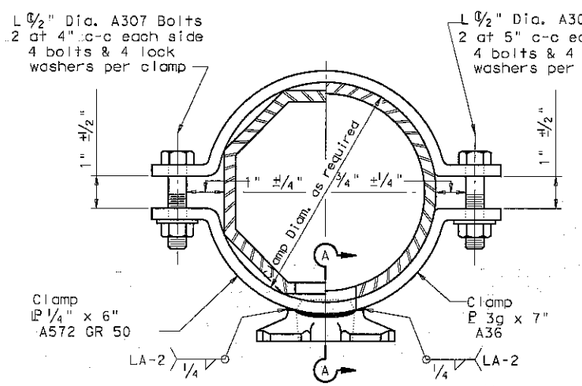

8-FOOT LUMINAIRE ARM




10-FOOT LUMINAIRE ARM

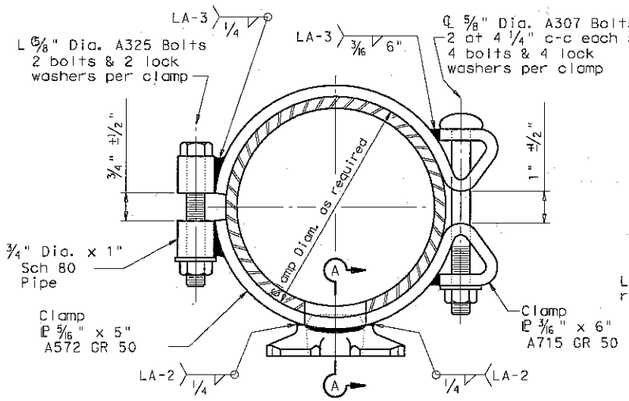



DIRECT ATTACHMENT DETAIL



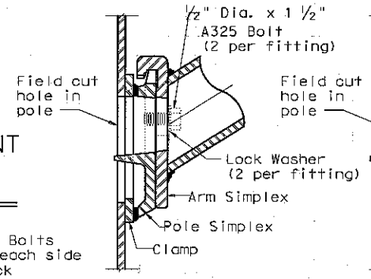

CLAMP ATTACHMENT DETAIL NO. 1 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 2 (HALF SECTION)

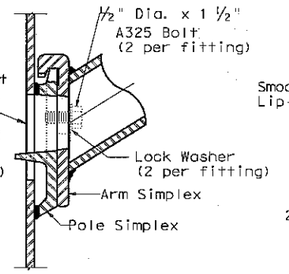



CLAMP ATTACHMENT DETAIL NO. 3 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 4 (HALF SECTION)




UPPER SIMPLEX FITTING

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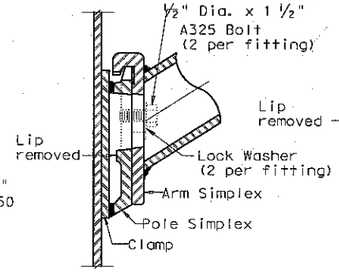
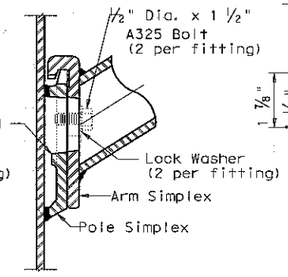


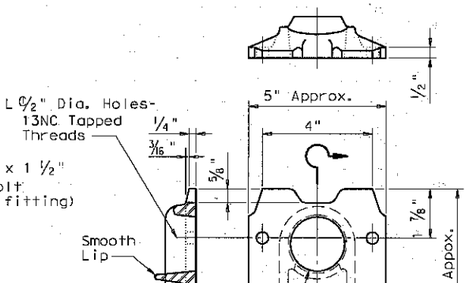

LOWER SIMPLEX FITTING

SECTON A-A

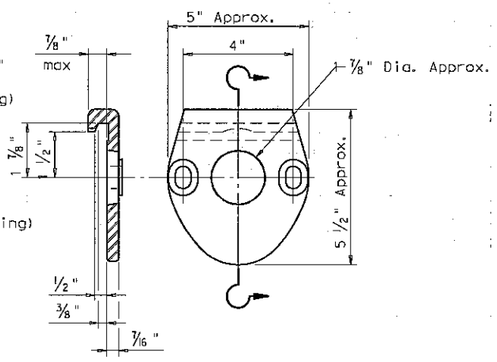



LOWER SIMPLEX FITTING

SECTON B-B




POLE SIMPLEX DETAIL




ARM SIMPLEX DETAIL

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 absense of specified Fabricaton 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 submission 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.

Texas Department of Transportation
Traffic Operations Division

# STANDARD ASSEMBLY DRAWINGS FOR LUMINAIRE SUPPORT STRUCTURES

## ARM DETAILS

## LUM-A-12

©TxDOT August 1995

| DN: LEH | CK: JSV | DW: LTT | CK: TEB |
|---|---|---|---|

REVISIONS
5-95
1-99
1-12

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| - | - | - | - |

| DIST | COUNTY | SHEET NO. |
|---|---|---|
| - | FORT BEND | 37 |

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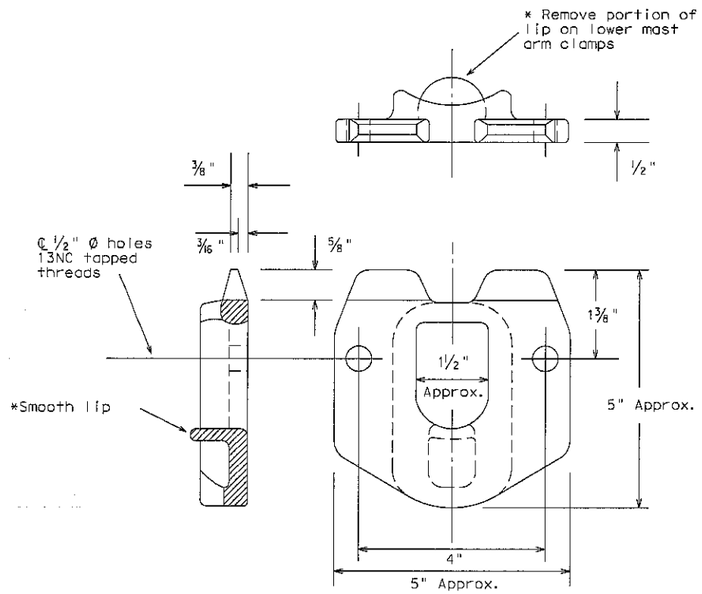
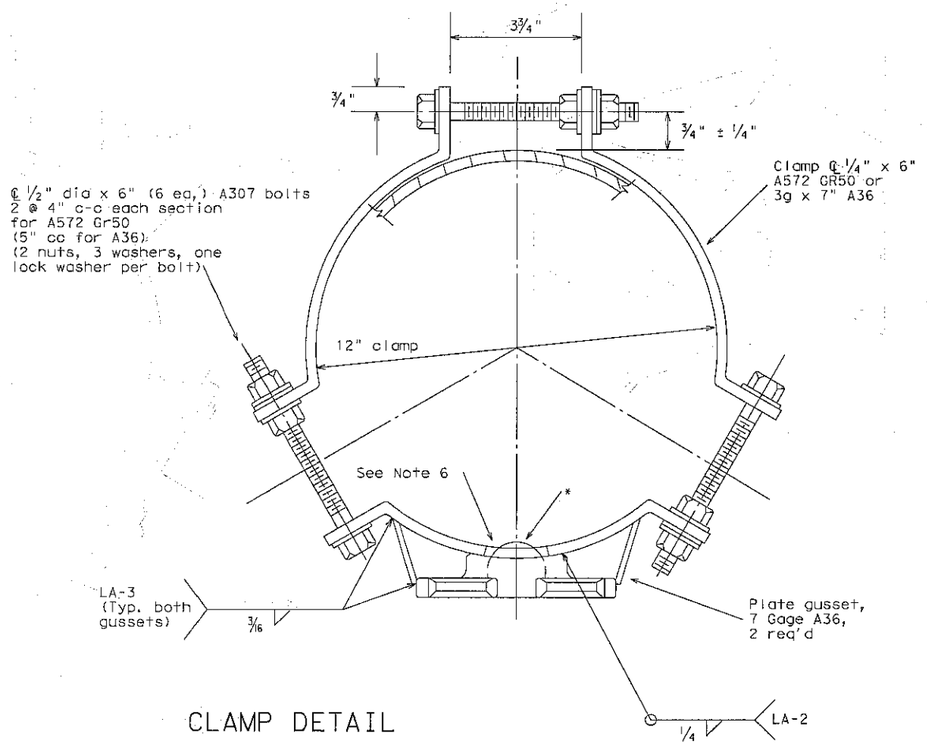
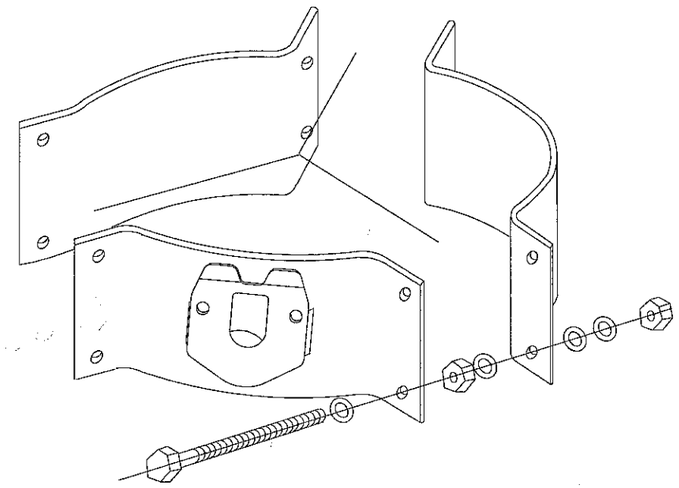
DATE:
FILE:




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 throat of the Simplex shall be made free of all rough 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

© TxDOT

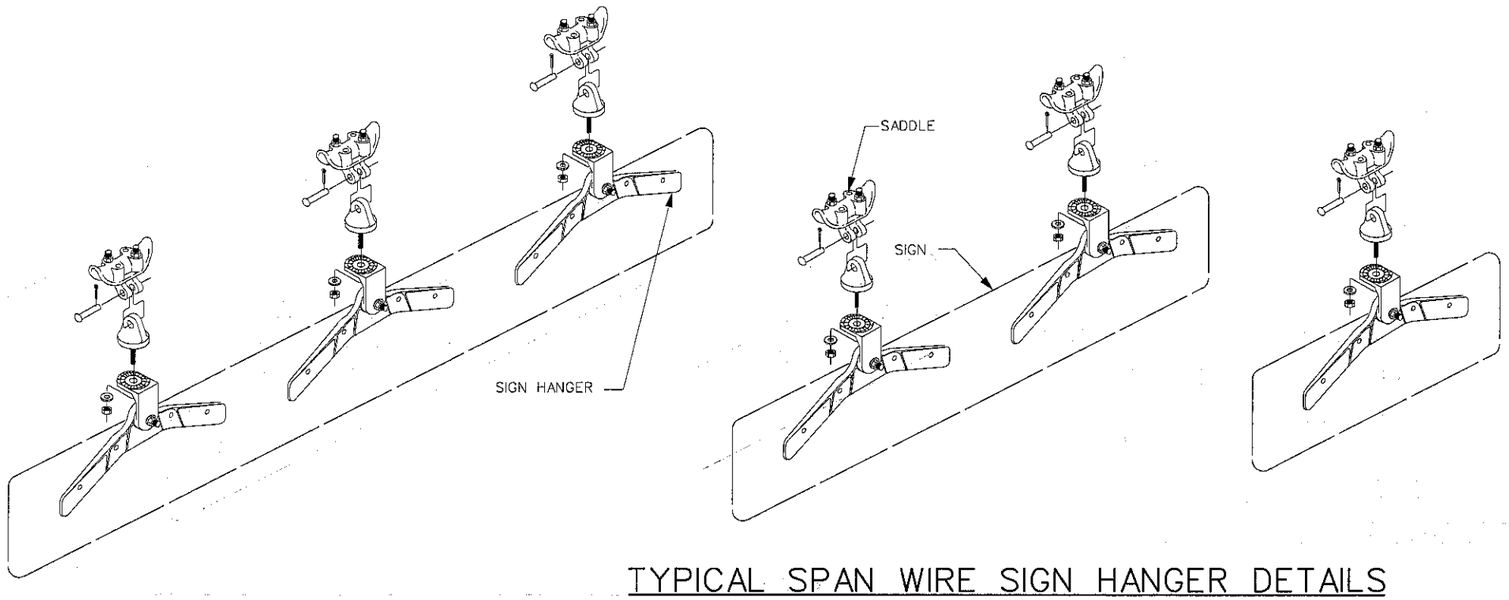
| DN: KAB | CK: RES | DW: FDN | CK: CAL |
|---|---|---|---|

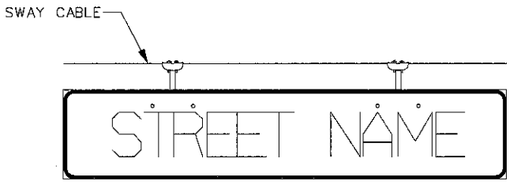
REVISIONS
11-98
1-12

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| - | - | - | - |

| DIST | COUNTY | SHEET NO. |
|---|---|---|
| - | FORT BEND | 38 |

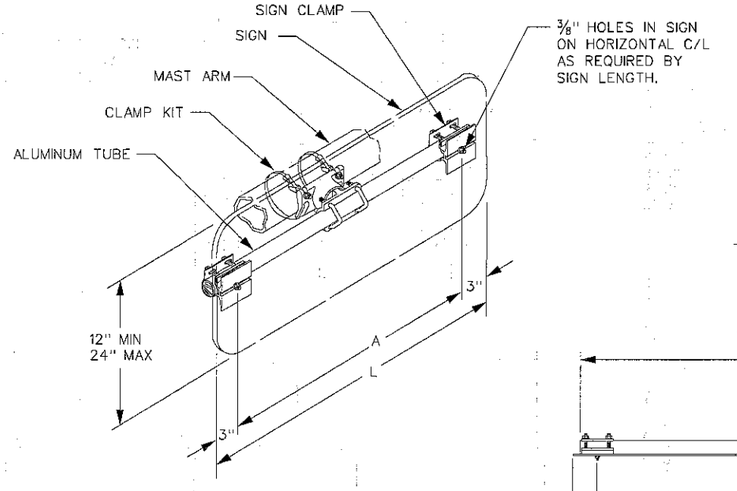
130

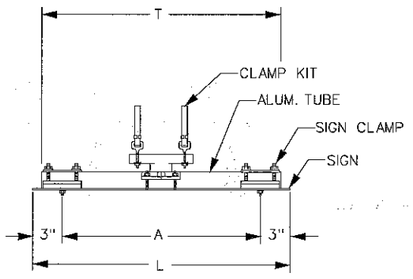


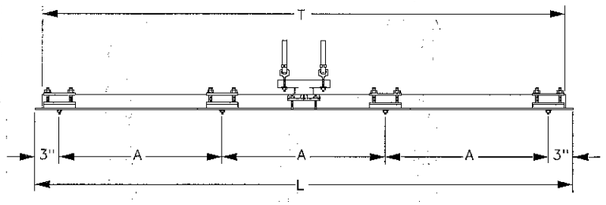



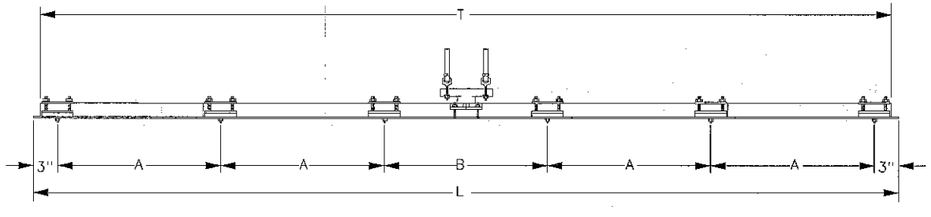

1. USE PELCO PARTS OR APPROVED EQUAL.
2. FURNISH HARDWARE FOR A COMPLETE INSTALLATION.
3. ATTACH THE 90 LB SPAN WIRE CLAMPS (SADDLES) TO TETHERS (SWAY CABLES).
4. FURNISH 1 ADJUSTABLE FREE SWINGING SIGN HANGER PER STREET NAME SIGN SMALLER THAN 3 FT. - 0 IN. SIGNS 3 FT - 0 IN. TO 6 FT.- 0 IN. REQUIRE 2 HANGERS. SIGNS LARGER THAN 6 FT. - 0 IN. REQUIRE 3 HANGERS.

## TYPICAL SPAN WIRE SIGN HANGER DETAILS




### SIGNS (1'-6" to 3'-0" Long)

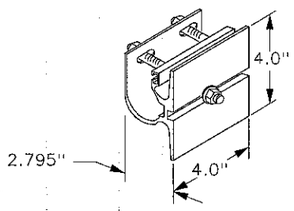
| SIGN LENGTH (L) | TUBE LENGTH (T) | A ___ |
|---|---|---|
| 1'-6" | 16" | 12" |
| 2'-0" | 22" | 18" |
| 2'-6" | 28" | 24" |
| 3'-0" | 34" | 30" |

### SIGNS (3'-6" to 8'-0" Long)

| SIGN LENGTH (L) | TUBE LENGTH (T) | A ___ |
|---|---|---|
| 3'-6" | 40" | 12" |
| 4'-0" | 46" | 14" |
| 4'-6" | 52" | 16" |
| 5'-0" | 58" | 18" |
| 5'-6" | 64" | 20" |
| 6'-0" | 70" | 22" |
| 6'-6" | 76" | 24" |
| 7'-0" | 82" | 26" |
| 7'-6" | 88" | 28" |
| 8'-0" | 94" | 30" |

### SIGNS (8'-6" to 10'-0" Long)

| SIGN LENGTH (L) | TUBE LENGTH (T) | A ___ | B ___ |
|---|---|---|---|
| 8'-6" | 100" | 19" | 20" |
| 9'-0" | 106" | 20" | 22" |
| 9'-6" | 112" | 21" | 24" |
| 10'-0" | 118" | 22" | 26" |




SIGN CLAMP DETAIL

GUSSETED TUBE CROSS SECTION

## TYPICAL MAST ARM SIGN MOUNT DETAILS

Texas Department of Transportation
Houston District

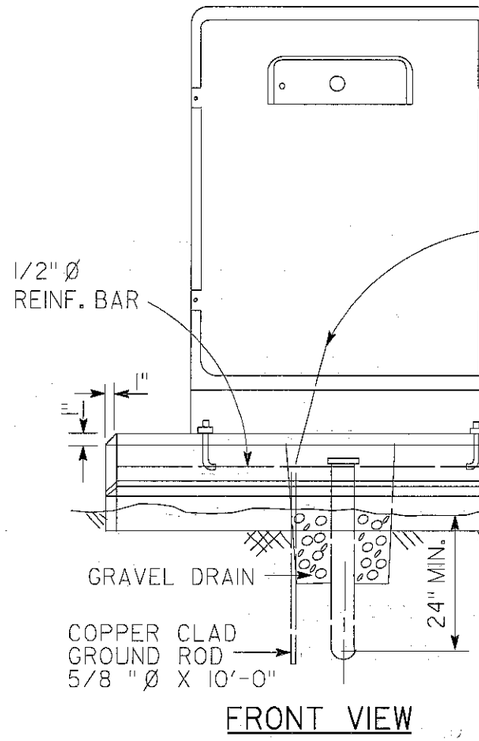
SIGNAL DETAILS/STANDARDS
OVERHEAD STREET NAME SIGN MOUNTING DETAILS

OSNS/MD

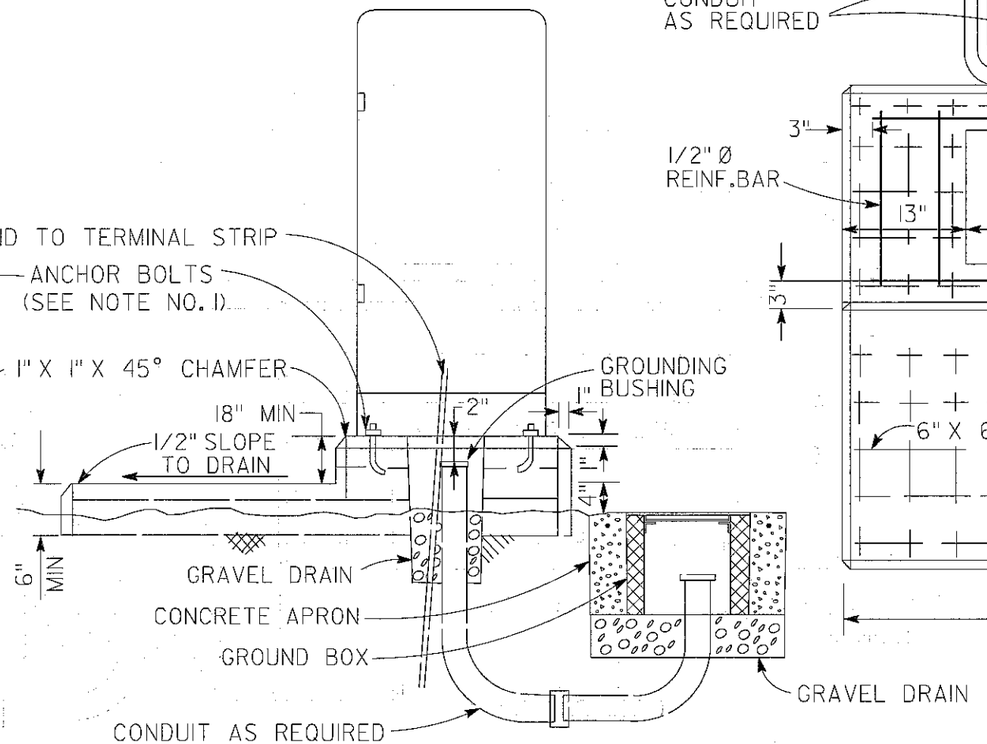
| | DN: | CK: | DW: | CK: | |
|---|---|---|---|---|---|
| © TxDOT 2004 | DIST | FED REG | PROJECT NO. | | SHEET |
| | HOU | 6 | | | 39 |
| | COUNTY | | CONTROL | SECT | JOB | HIGHWAY |
| | FORT BEND | | | | | |

FILE: Overhead-Sign-mount-det-sp04.dgn

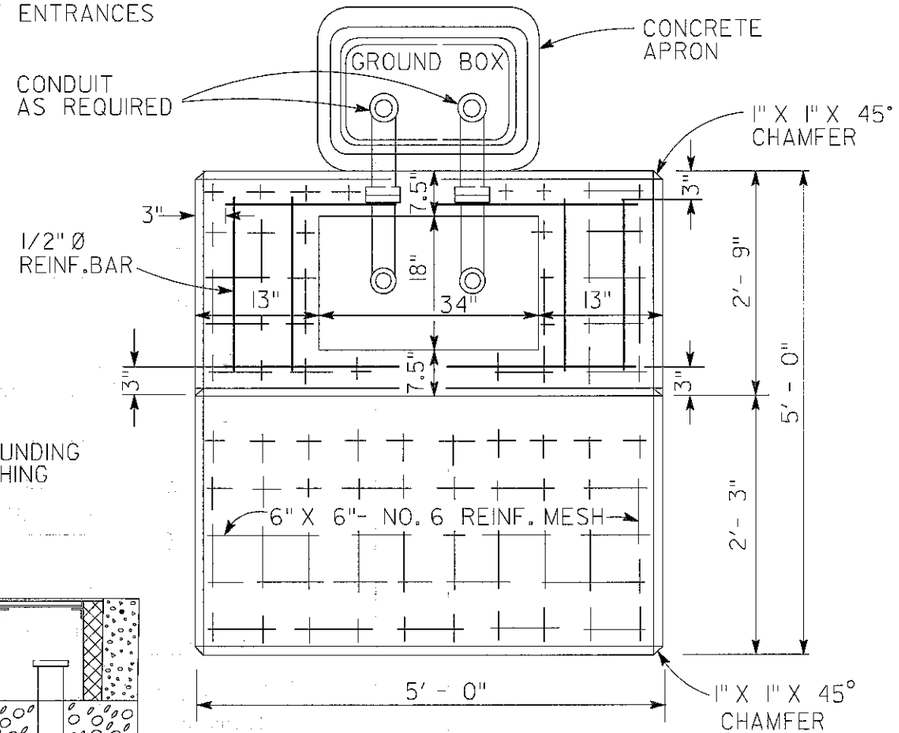
STD-M12




FRONT VIEW




SIDE VIEW




TOP VIEW
( LESS CABINET )

NOTES:

1. CABINET MANUFACTURER TO PROVIDE DETAILS OF ANCHOR BOLT LOCATION.
2. MODIFY DIMENSIONS FOR CONCRETE BASE TO FIT EQUIPMENT FURNISHED, IF NECESSARY.
3. PROVIDE GRAVEL DRAIN FOR CONTROLLER AND ALL GROUND BOXES.
4. FURNISH CLASS "B" OR CLASS "C" CONCRETE.
5. SET CONTROLLER FOUNDATION LEVEL WITH THE PAVEMENT SURFACE OR AS APPROVED BY THE ENGINEER.
6. FURNISH AT NO COST TO THE DEPARTMENT ANY ADDITIONAL CONCRETE WHICH MAY BE NECESSARY TO STABILIZE THE FOUNDATION AT UNUSUAL LOCATIONS.
7. PLACE REINFORCING BARS AS DIRECTED.
8. UPON INSTALLING THE CONTROLLER CABINET, APPLY A SILICON-BASED CAULKING COMPOUND AROUND THE BASE OF THE CONTROLLER CABINET.

*Texas Department of Transportation*
*Houston District*

# SIGNAL DETAILS/STANDARDS CONTROLLER FOUNDATION DETAIL

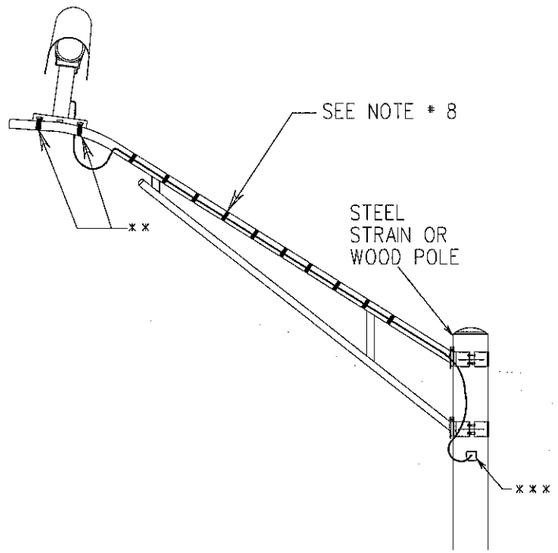
SD/SCFD

| FILE: | DN: | CK: | DW: | CK: |
|---|---|---|---|---|
| © TxDOT 2007 | DIST | FED REG | PROJECT NO. | SHEET |
| REVISIONS 08-04 03-07 | HOU | 6 | | 40 |
| | COUNTY | CONTROL | SECT | JOB | HIGHWAY |
| | FORT BEND | | | | |

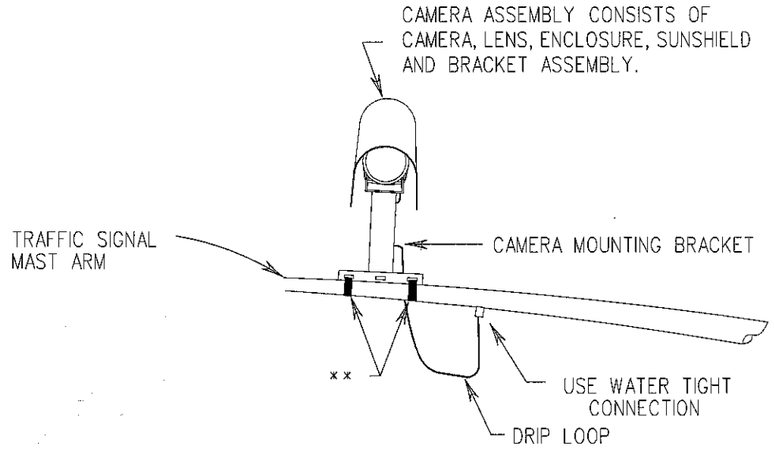
STD-M1

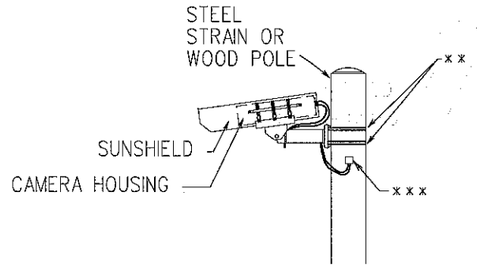
NOTES FOR VIDEO DETECTION:

1. INSTALL VIDEO DETECTION PROCESSOR UNIT INSIDE CONTROLLER CABINET.
2. INSTALL VIDEO DETECTION CAMERA & BRACKET AS DETAILED OR AS DIRECTED BY THE VIDEO DETECTION SUPPLIER.
3. MOUNT CAMERAS AS FAR OVER THE ROADWAY AS POSSIBLE.
4. USE ¾IN. STAINLESS STEEL BANDING MATERIAL TO INSTALL CAMERA MOUNTS.
5. AIM CAMERA SO THAT HORIZON IS NOT VISIBLE IN THE FIELD OF VIEW.
6. INSTALL CAMERA ENCLOSURE ASSEMBLY SO THAT IT CAN ROTATE AFTER INSTALLATION TO PROVIDE PROPER ALIGNMENT.
7. PROVIDE WATER TIGHT CABLE ENTRY AND EXIT POINTS IN THE MAST ARM AND/OR POLES.
8. FOR VIVDS COAX AND POWER CABLES ATTACHED TO LUMINAIRE ARM, PROVIDE A METAL CABLE STRAP (ALUMINUM OR STAINLESS STEEL), 3/4-IN MINIMUM WIDTH AND TWO WRAPS AT 8 IN. MAXIMUM SPACING.

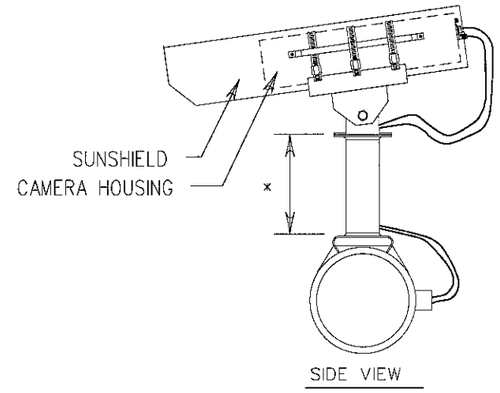



LUMINAIRE ARM MOUNT




POLE MOUNT

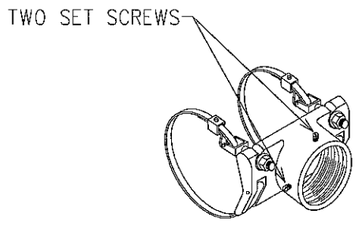



SIDE VIEW

* 4 FT. PIPE EXTENSION WHEN MOUNTED ON TRAFFIC SIGNAL MAST ARM.

** ¾IN. (MIN) STAINLESS STEEL BANDING 2 PLACES MIN.

*** ENTRY INTO STEEL POLE OR CONDUIT WEATHERHEAD ON WOOD POLE




BAND MOUNT BRACKET DETAIL

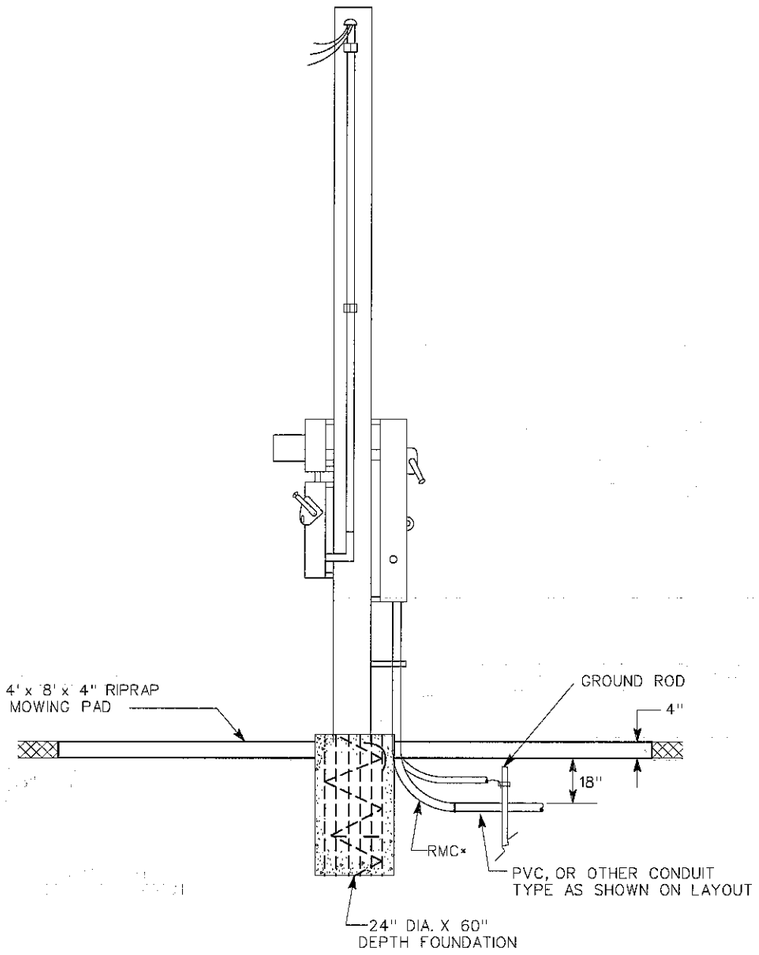
Texas Department of Transportation
Houston District

# SIGNAL DETAILS/STANDARDS VIVDS CAMERA MOUNTING DETAILS

VC/MD

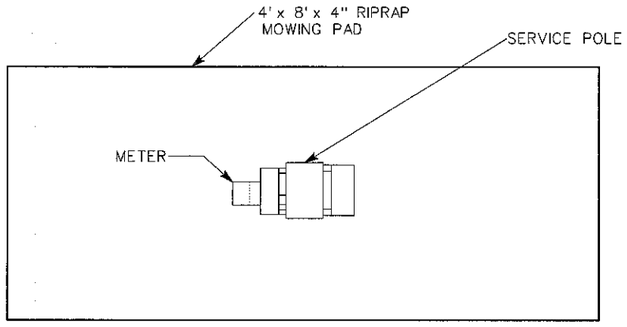
| FILE: | DN: | CK: | DW: | CK: | |
|---|---|---|---|---|---|
| © TxDOT 2010 | DIST | FED REG | PROJECT NO. | | SHEET |
| REVISIONS | HOU | 6 | | | 41 |
| 02/2004<br>03/16/2006<br>09/2010 | COUNTY | | CONTROL | SECT | JOB | HIGHWAY |
| | FORT BEND | | | | | |

STD-M13




# SERVICE SUPPORT WITH RIPRAP MOWING PAD

ELEVATION




# SERVICE SUPPORT WITH RIPRAP MOWING PAD

PLAN

NOTE:

1. CONCRETE FOR RIPRAP SHALL BE CLASS "B" IN ACCORDANCE WITH THE ITEM 421, "PORTLAND CEMENT CONCRETE"
2. BLOCK-OUT SHALL BE LARGE ENOUGH TO ACCOMODATE THE SERVICE POLE, CONDUITS AND GROUND ROD OR AS DIRECTED BY THE ENGINEER.
3. RIPRAP MOWING PAD WILL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED INCIDENTAL TO ITEM 628 "ELECTRICAL SERVICES"

DN:
CK:
DW:
CK:

DATE:
ACC:
FILE:

LEVELS DISPLAYED

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 |
| 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |
| 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | |

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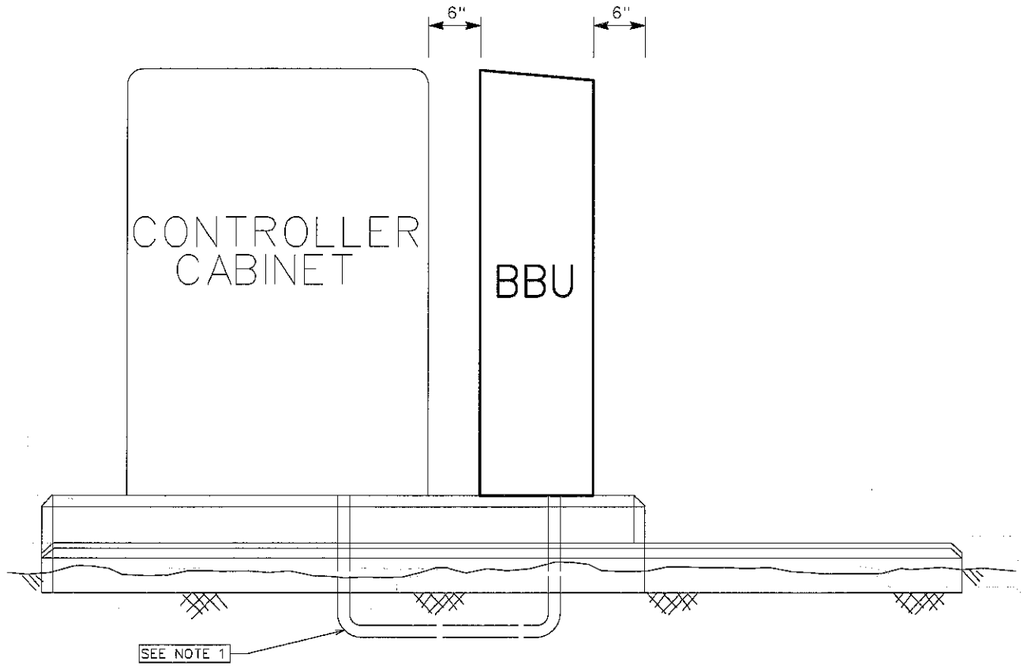
TEXAS DEPARTMENT OF TRANSPORTATION
*Houston District Lighting Section*

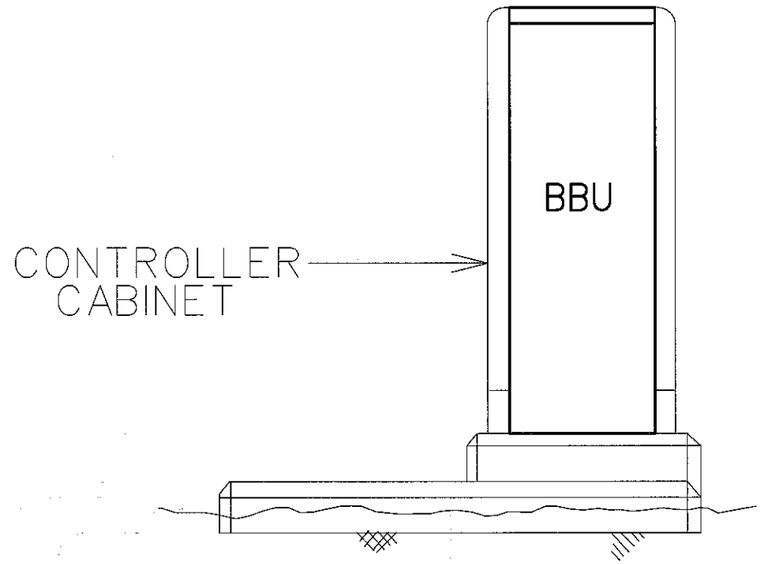
## MOWING PAD DETAILS
FOR ELECTRICAL SERVICES

SHEET 1 OF 1 NOT TO SCALE

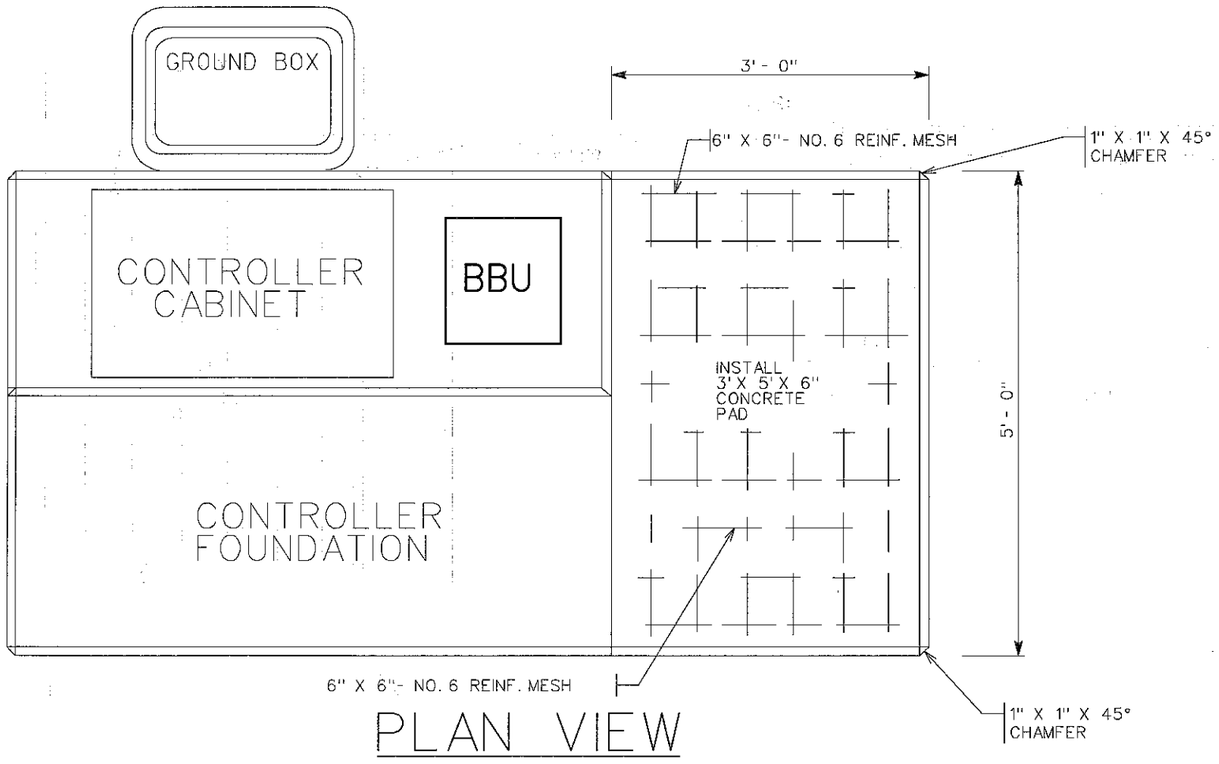
| DATE: | | REVISIONS | | | | | |
|---|---|---|---|---|---|---|---|
| DW: SMW | STATE DISTRICT | FEDERAL REGION | PROJECT NO. | | | | SHEET |
| CK: | HOU | 6 | | | | | 43 |
| DW: SMW | COUNTY | | CONTROL | SECTION | JOB | | HIGHWAY |
| CK: | FORT BEND | | | | | | |




ELEVATION VIEW




SIDE VIEW




PLAN VIEW

NOTES:

1. INSTALL 1 1/2 " PVC CONDUIT WITH FIVE #6 AWG CONDUCTORS, TWO #18 AWG CONDUCTORS AND ONE CAT 5 CABLE WITH CONNECTOR BETWEEN THE TWO CABINETS.
2. EXTEND THE CONCRETE CONTROLLER PAD (REFER TO SD/SCFD, 6" SLAB) UNDER THE BBU AS SHOWN BELOW.
3. THE ABOVE WORK PERFORMED AND MATERIALS FURNISHED WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO THE BBU ASSEMBLY.
4. IF APPLICABLE, MODIFY THE CITY OF HOUSTON FOUNDATION TO SUPPORT THE BBU AS SHOWN.

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TEXAS DEPARTMENT OF TRANSPORTATION
HOUSTON DISTRICT

# SIGNAL DETAILS/STANDARDS
# INSTALLATION OF BBU EXTERNAL BATTERY CABINET (SIDE MOUNT)

| SCALE | FED.RD. DIV.NO. | STATE | PROJECT NO. | | | | HIGHWAY |
|---|---|---|---|---|---|---|---|
| N.T.S. | 6 | TEXAS | | | | | |
| REVISIONS | STATE DISTRICT | COUNTY | CONTROL | SECTION | JOB | | SHEET NO. |
| | | FORT BEND | | | | | 44 |

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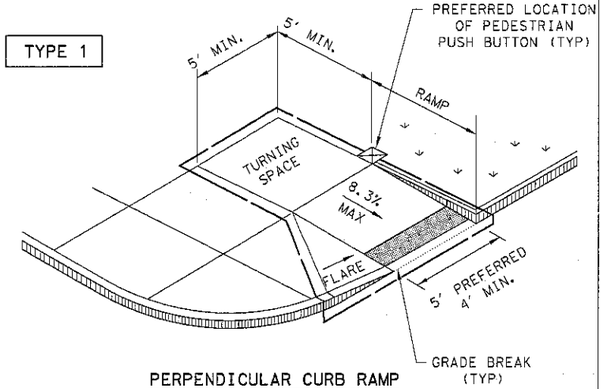
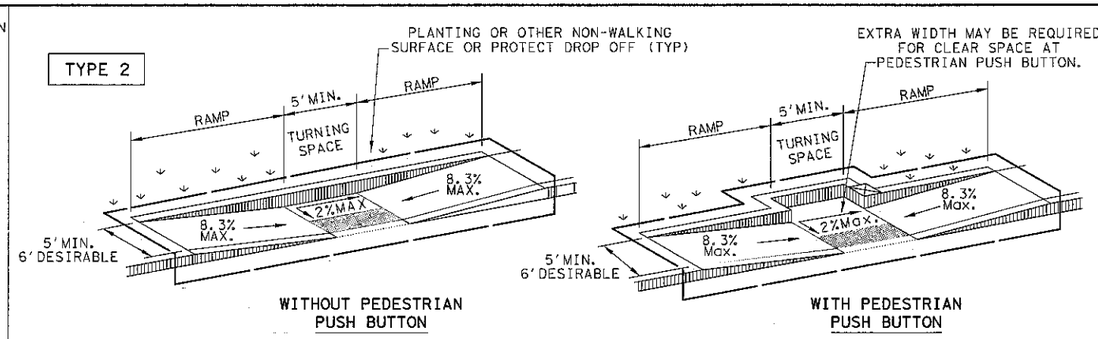
DATE:
FILE:

TYPE 1



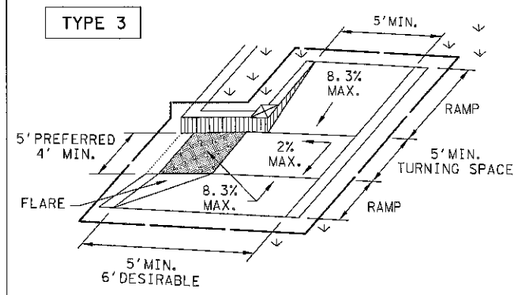

PERPENDICULAR CURB RAMP

TYPE 2

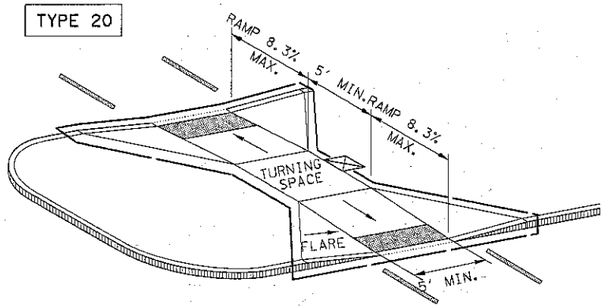



PARALLEL CURB RAMP

TYPE 3

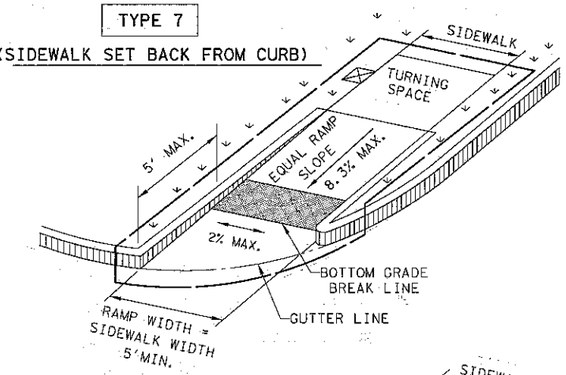



TYPE 20

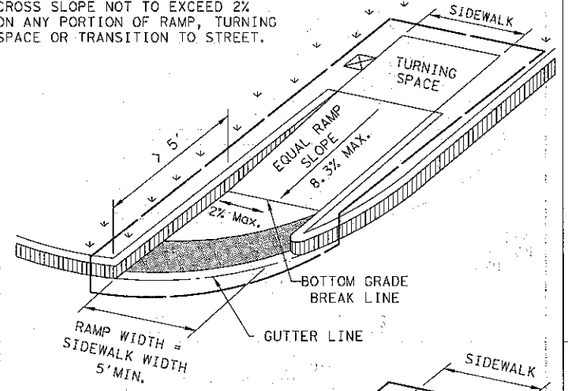



CURB RAMPS AT MEDIAN ISLANDS

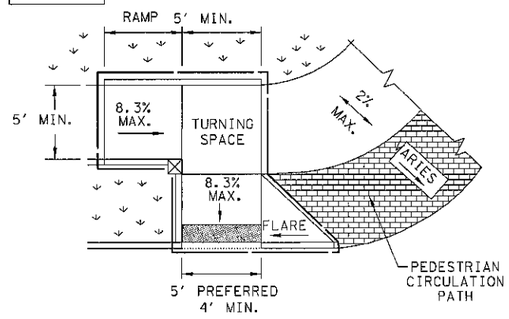
TYPE 7
(SIDEWALK SET BACK FROM CURB)




CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.

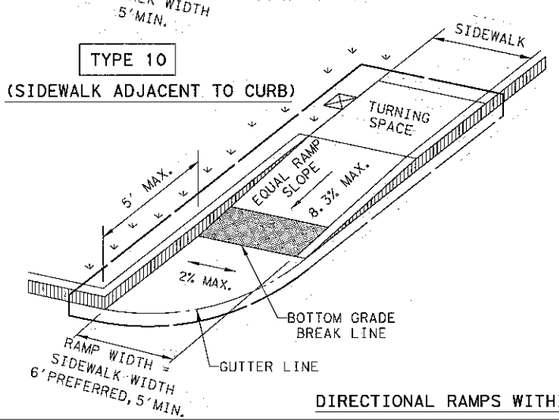



TYPE 6

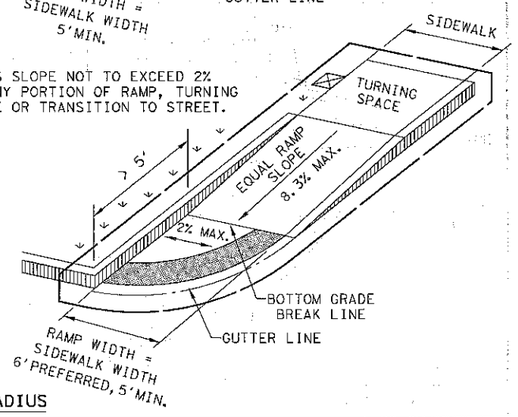



COMBINATION CURB RAMPS

TYPE 10
(SIDEWALK ADJACENT TO CURB)

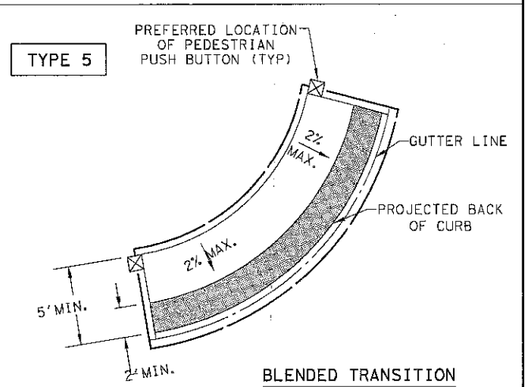



CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.




DIRECTIONAL RAMPS WITHIN RADIUS

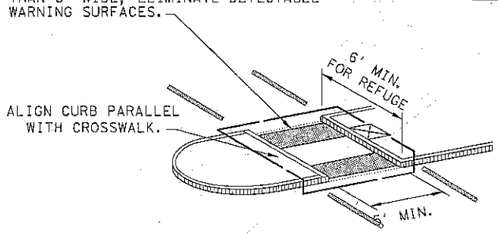
TYPE 5




BLENDED TRANSITION
(FLUSH LANDING)

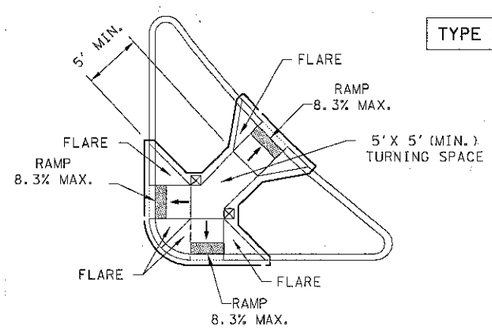
INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.

TYPE 21

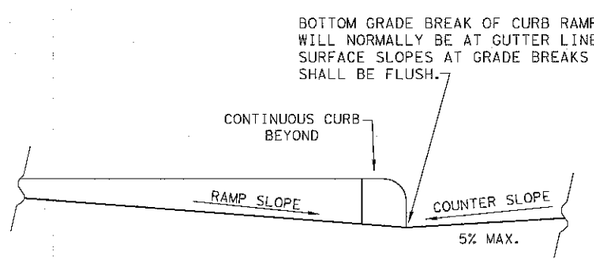



NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

TYPE 22




COMBINATION ISLAND RAMPS




TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY

NOTES / LEGEND:

SEE GENERAL NOTES ON SHEET 2 OF 4 FOR MORE INFORMATION.

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

DETECTABLE WARNING SURFACE

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

GUTTER LINE

GRADE BREAK

RAMP LIMITS OF PAYMENT

SHEET 1 OF 4

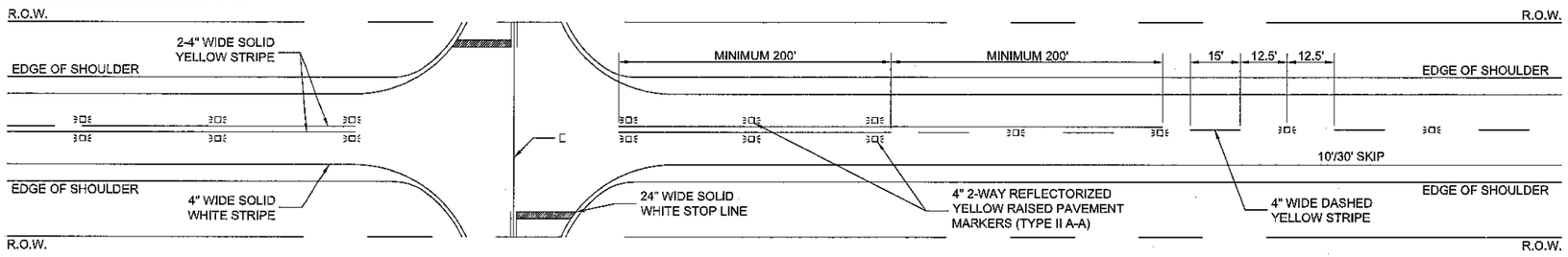
Texas Department of Transportation

Design Division Standard

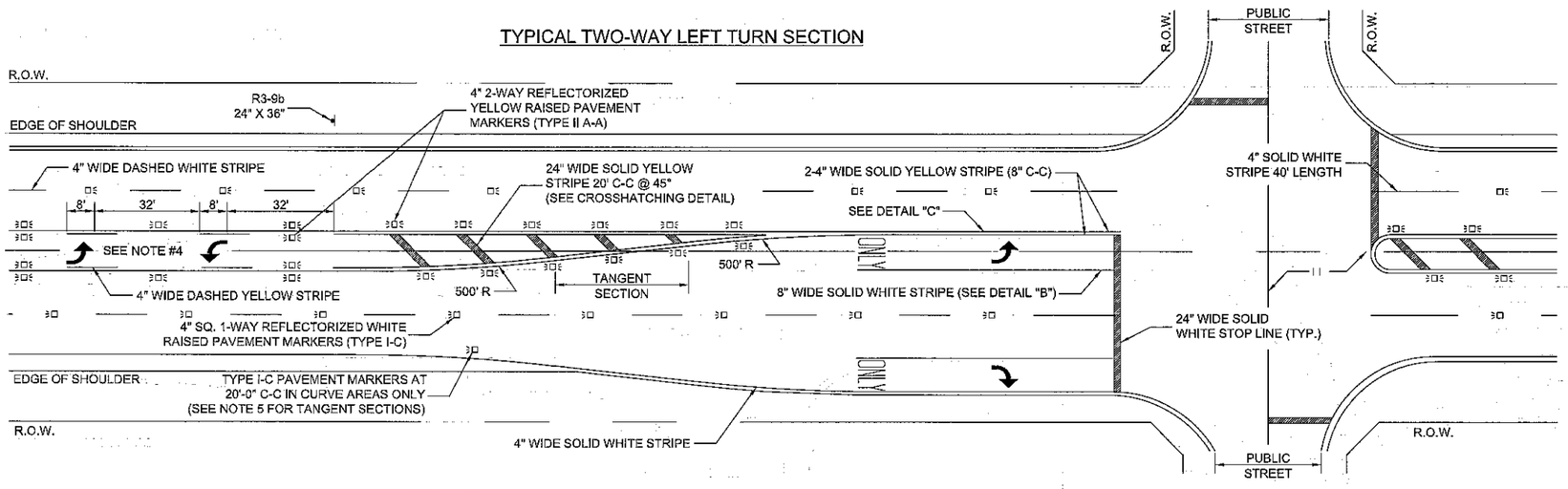
# PEDESTRIAN FACILITIES CURB RAMPS

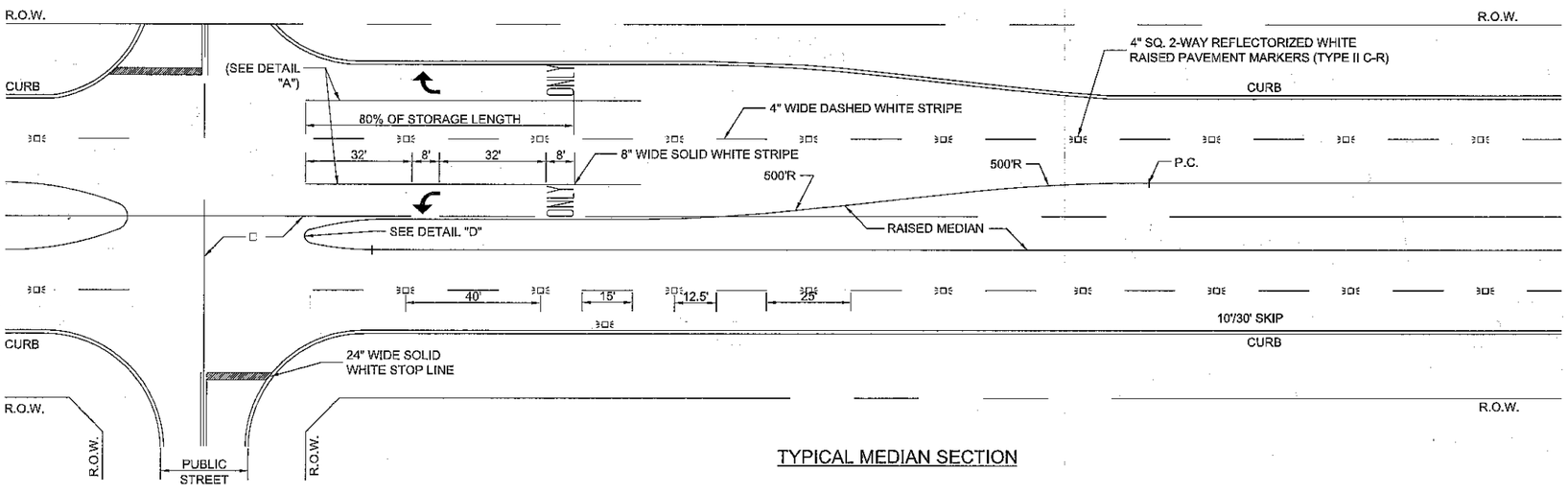
# PED-18

| | | | | |
|---|---|---|---|---|
| FILE: ped18 | DN: TxDOT | DW: VP | CK: KM | CK: PK & JG |
| © TxDOT: MARCH, 2002 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | - | - | - | - |
| REVISED 08, 2005<br>REVISED 06, 2012<br>REVISED 01, 2018 | DIST | COUNTY | | SHEET NO. |
| | - | FORT BEND | | 45 |




TYPICAL TWO LANE TWO-WAY ROAD



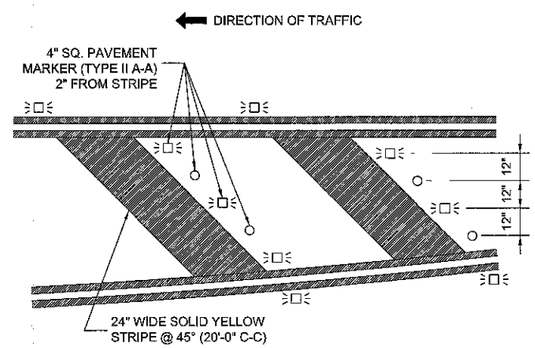




TYPICAL MEDIAN SECTION

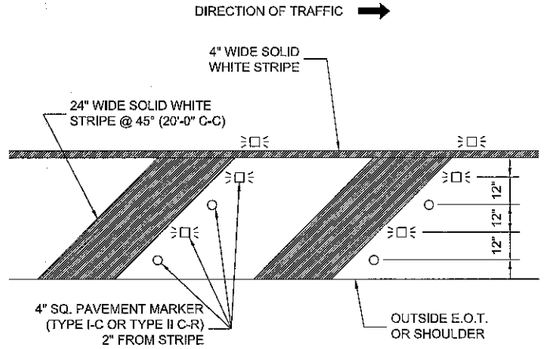
## NOTES:

1. ALL PAVEMENT MARKINGS SHALL CONFORM TO THE LATEST EDITION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS (TMUTCD).
2. ALL TRAFFIC BUTTONS AND MARKERS SHALL BE INSTALLED ADJACENT TO STRIPES (APPROXIMATELY 2").
3. REPEAT ARROWS AT APPROXIMATELY 1000' INTERVALS WITHIN TWO-WAY LEFT TURN SECTION.
4. WITHIN A TANGENT SECTION THE TYPE I-C PAVEMENT MARKERS SHALL BE PLACED AT 40' C-C ON ROADWAYS WITHOUT CURB AND GUTTERS.
5. WHEN PAVEMENT MARKINGS EXTEND INTO OR CONTINUE THROUGH AN INTERSECTION AREA, THEY SHALL BE THE SAME COLOR AND AT LEAST THE SAME WIDTH AS THE LINE MARKINGS THEY EXTEND.
6. WHEN CROSSWALK MARKINGS ARE USED WITHIN AN ESTABLISHED SCHOOL ZONE AREA, CONTINENTAL TYPE MARKINGS SHALL BE USED.
7. ADDITIONAL SET OF "WORD" AND "ARROW" PAVEMENT MARKINGS SHALL BE USED WHEN TURN LANE STORAGE LENGTH IS 160 FEET OR GREATER.

## CROSSHATCHING DETAIL




## OUTSIDE EDGE CROSSHATCHING DETAIL

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# FORT BEND COUNTY ENGINEERING DEPARTMENT

THE STATE OF TEXAS · FORT BEND COUNTY

| | |
|---|---|
| PROJECT TITLE: | |
| DRAWN BY: INIT | FBCED STANDARD |
| CK'D BY: INIT | SHEET DESCRIPTION: PAVEMENT MARKING DETAILS |
| SCALE: NONE | SHEET 1 OF 2 |
| DATE: 5/31/17 | APPROVED BY: |
| | SHEET NO: 49 |

3/12/2024
pw:\\tedsl-pw.bentley.com:tedsl-pw-01\Documents\Projects\20231\2023-2148-01 - West Bellfort Blvd Traffic Signals\6.0 TEDSI Design\6.08 CADD\6.08.01 Sheet Files\Standard Details\TXDOT_STD

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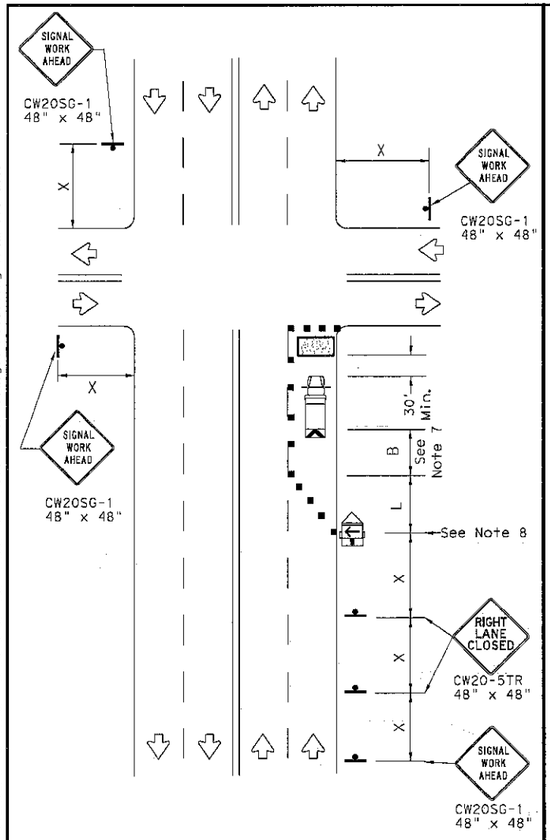
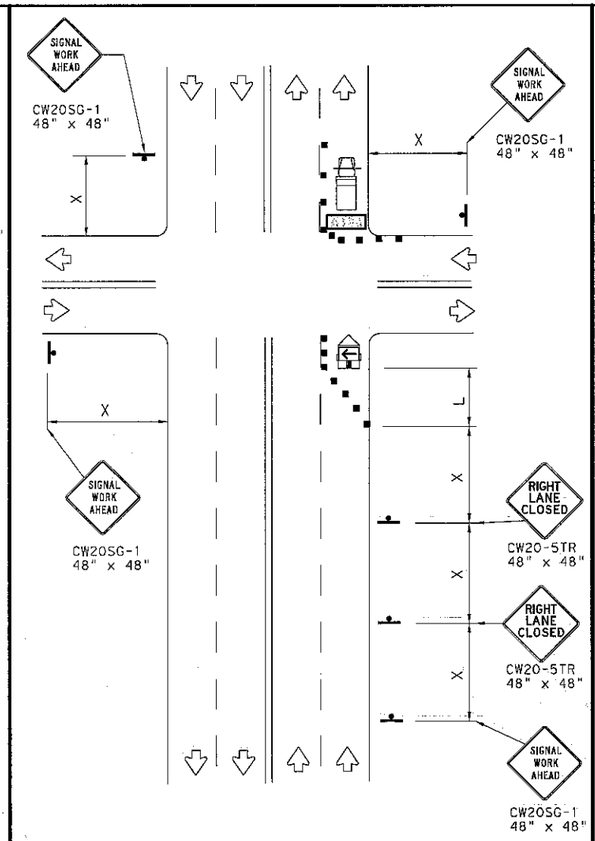


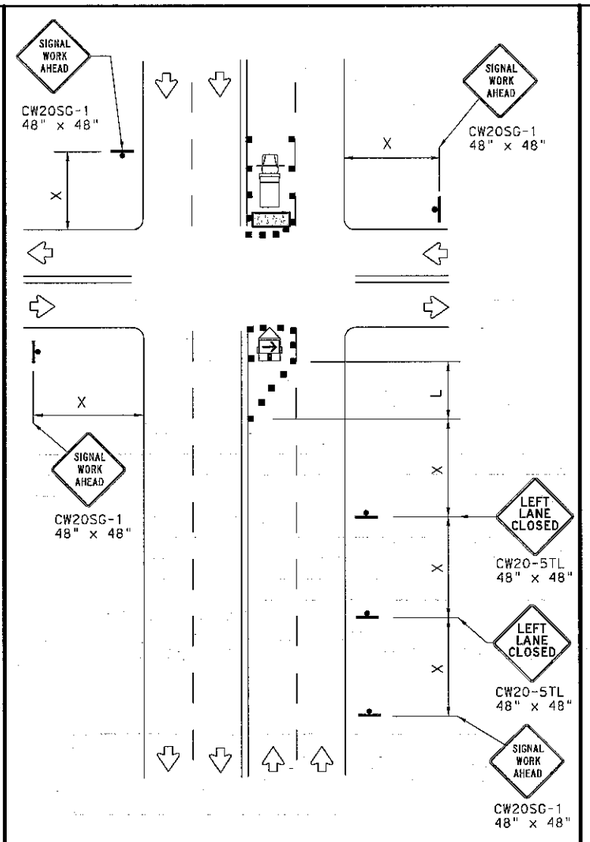

## NEAR SIDE LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



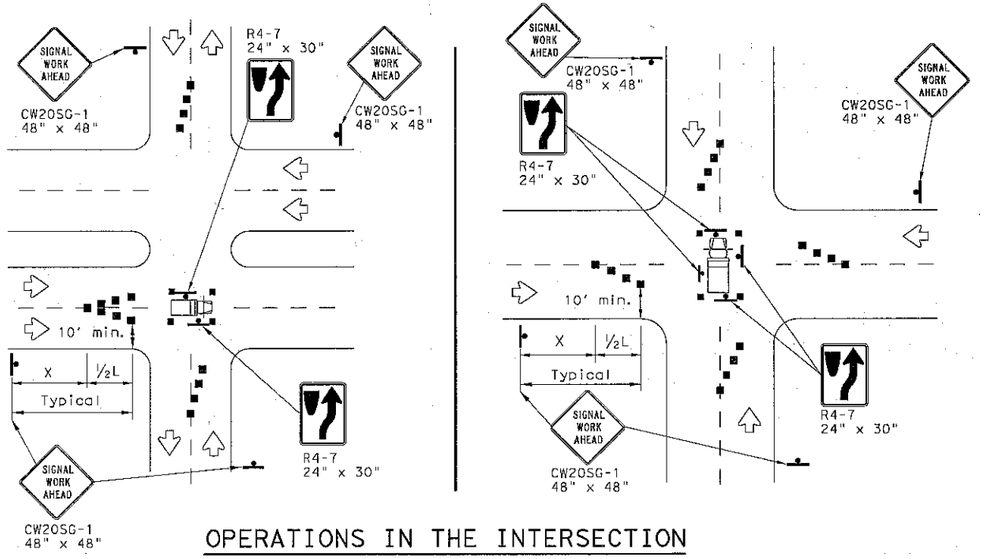

## FAR SIDE RIGHT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY




## FAR SIDE LEFT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY




## OPERATIONS IN THE INTERSECTION

SHORT DURATION

| 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" |
|---|---|---|---|---|---|---|---|---|
| 30 | $L=\frac{WS^2}{60}$ | 150' | 165' | 180' | 30' | 60' | 120' | 90' |
| 35 | | 205' | 225' | 245' | 35' | 70' | 160' | 120' |
| 40 | | 265' | 295' | 320' | 40' | 80' | 240' | 155' |
| 45 | L=WS | 450' | 495' | 540' | 45' | 90' | 320' | 195' |
| 50 | | 500' | 550' | 600' | 50' | 100' | 400' | 240' |
| 55 | | 550' | 605' | 660' | 55' | 110' | 500' | 295' |
| 60 | | 600' | 660' | 720' | 60' | 120' | 600' | 350' |
| 65 | | 650' | 715' | 780' | 65' | 130' | 700' | 410' |
| 70 | | 700' | 770' | 840' | 70' | 140' | 800' | 475' |
| 75 | | 750' | 825' | 900' | 75' | 150' | 900' | 540' |

* Conventional Roads Only

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

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

## 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 opposing traffic.



Texas Department of Transportation | Traffic Operations Division Standard

# TRAFFIC SIGNAL WORK TYPICAL DETAILS

## WZ(BTS-1)-13

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| © TxDOT April 1992 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | - | - | - | - |
| 2-98 10-99 7-13 | DIST | COUNTY | | SHEET NO. |
| 4-98 3-03 | - | FORT BEND | | 51 |

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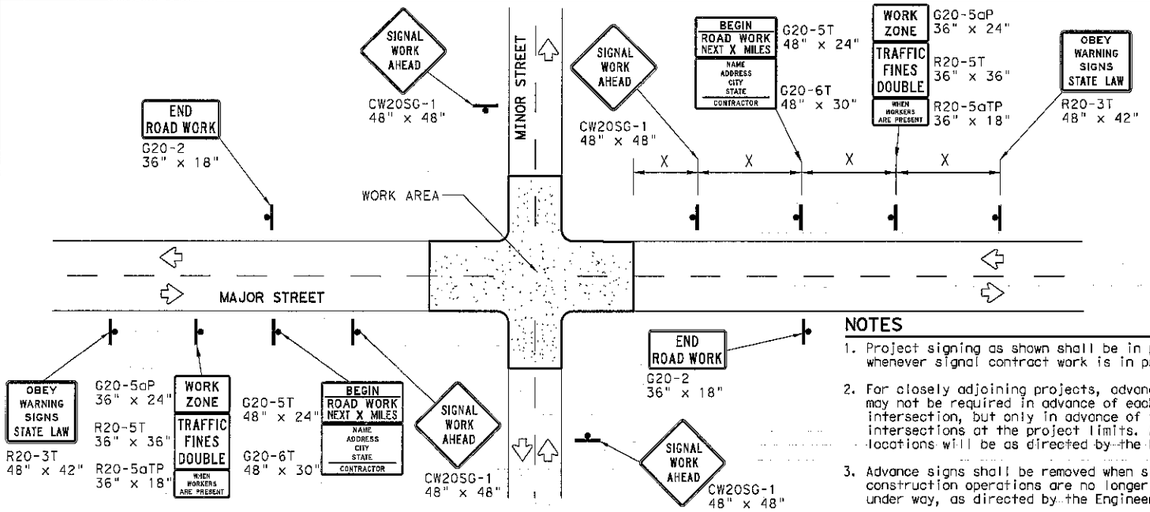



# TYPICAL ADVANCE SIGNAL PROJECT SIGNING

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 at 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 paved 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 mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night without damaging the sign sheeting. Burlap, 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 anchor 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

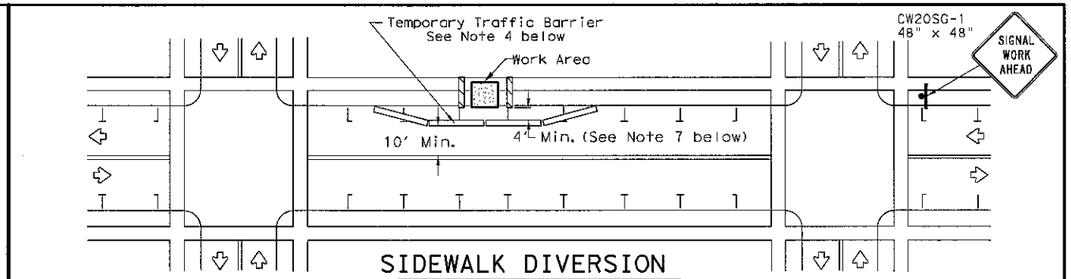
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support 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 fastners. Sandbags shall be placed along the length of the skids 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 |

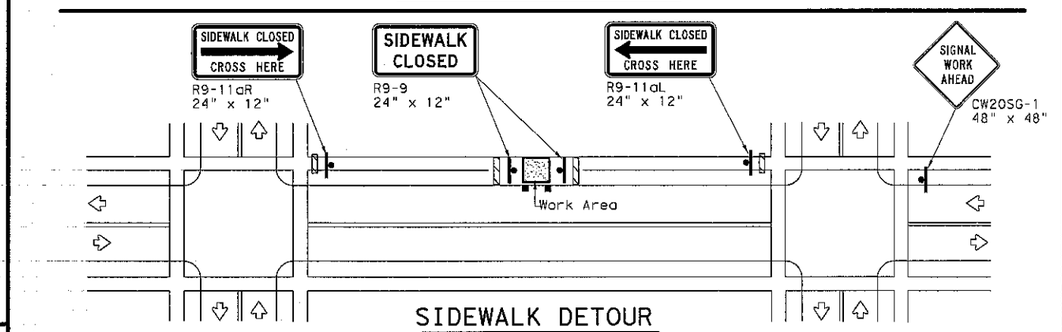
| DEPARTMENTAL MATERIAL SPECIFICATIONS | |
|---|---|
| SIGN FACE MATERIALS | DMS-8300 |
| FLEXIBLE ROLL-UP REFLECTIVE SIGNS | DMS-8310 |

| 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 |

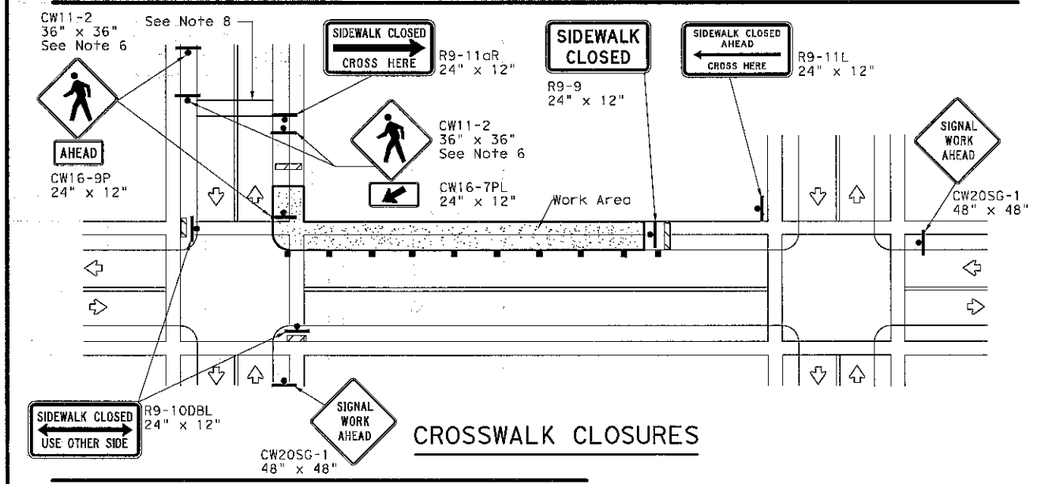
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm




## SIDEWALK DIVERSION




## SIDEWALK DETOUR




## CROSSWALK CLOSURES

## 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 be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.



Texas Department of Transportation

Traffic Operations Division Standard

# TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

# WZ(BTS-2)-13

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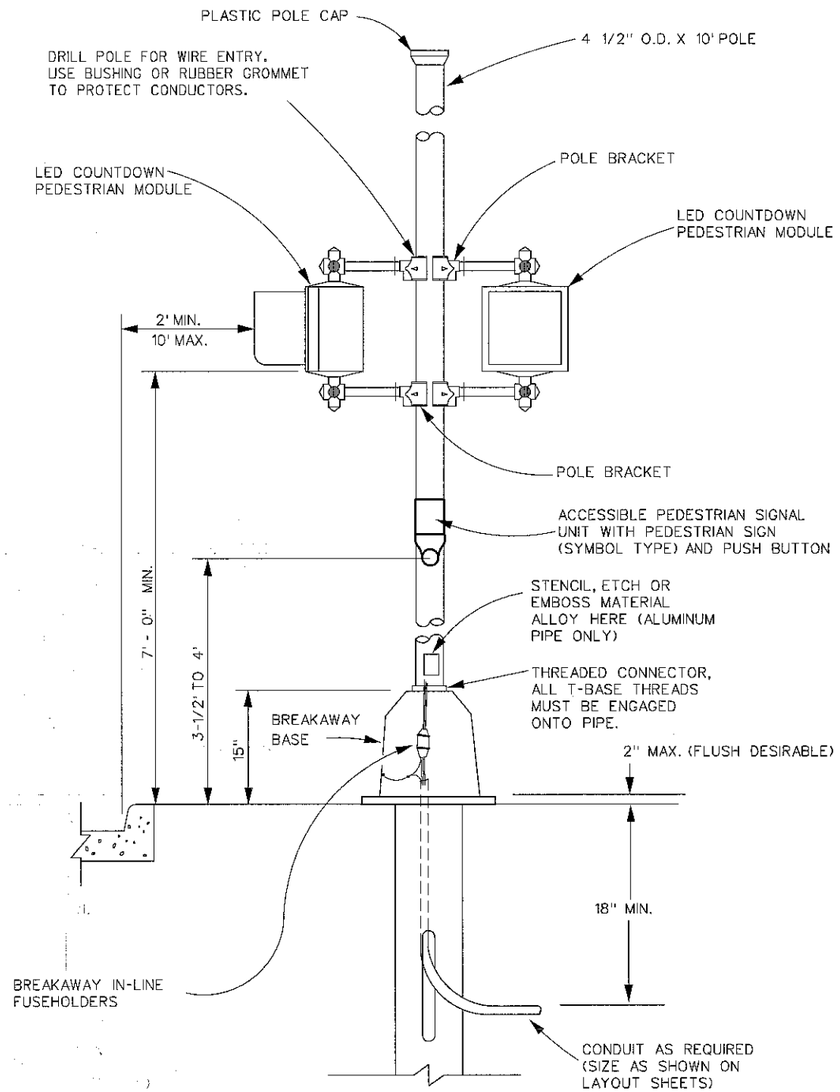
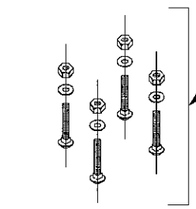
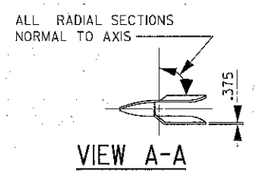
| REVISIONS | - | - | - | - |
| 2-98 10-99 7-13 | DIST | COUNTY | | SHEET NO. |
| 4-98 3-03 | - | FORT BEND | | 52 |

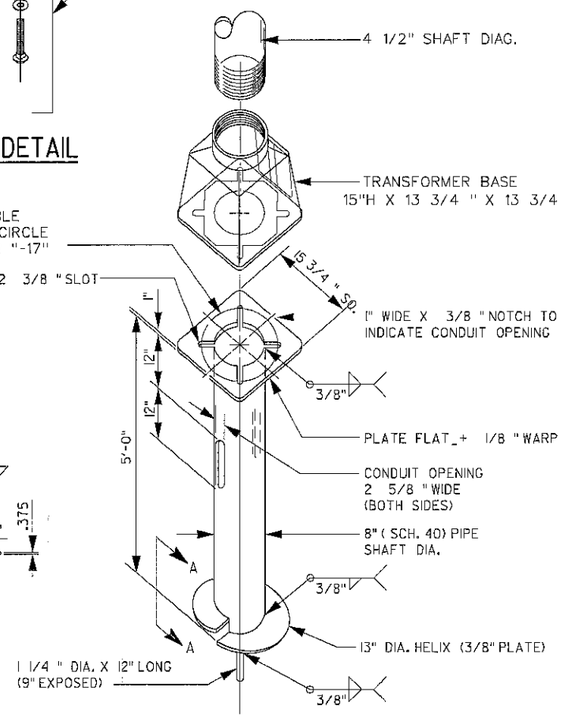



HARDWARE DETAIL




VIEW A-A




SCREW ANCHOR FOUNDATION DETAIL

NOTE:

SEE STANDARD (RFBA - 13) FOR NOTES AND
NON - FUSED BREAKAWAY ELECTRICAL CONNECTOR DETAILS

*Texas Department of Transportation*
*Houston District*

# SIGNAL DETAILS/STANDARDS CONSTRUCTION DETAILS FOR POLE MOUNTED (APS) PEDESTRIAN SIGNALS

CD/PM(APS)PS

| FILE: | DN: | CK: | DW: | CK: |
|---|---|---|---|---|
| © TxDOT 2012 | DIST | FED REG | PROJECT NO. | SHEET |
| REVISIONS 07-14 02-15 | HOU | 6 | | 42 |
| | COUNTY | CONTROL | SECT | JOB | HIGHWAY |
| | FORT BEND | | | | |

STD-M19

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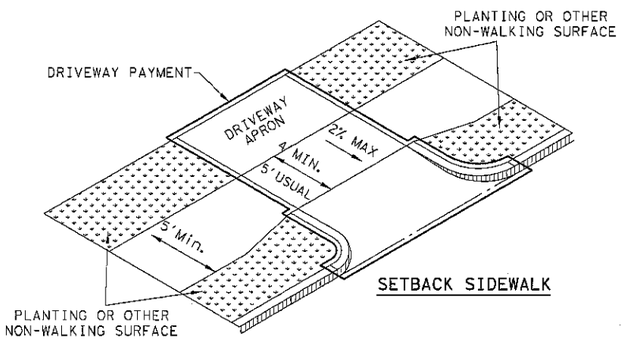
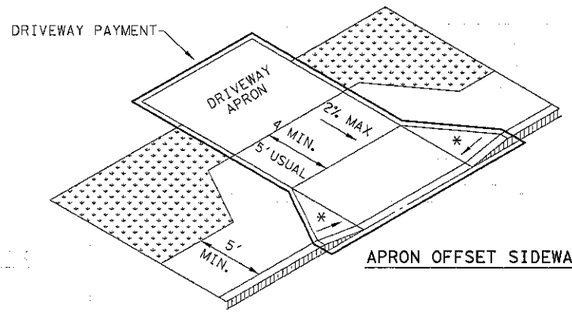
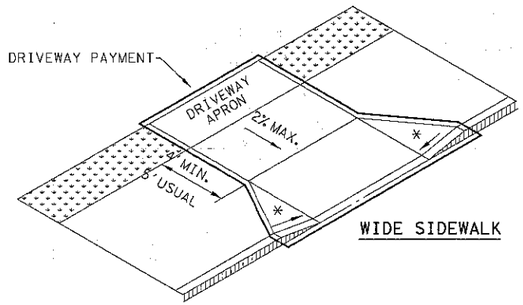
## SIDEWALK TREATMENT AT DRIVEWAYS



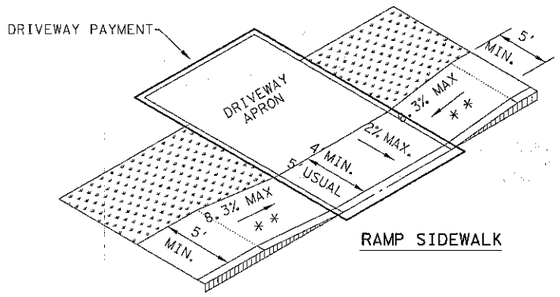

SETBACK SIDEWALK




APRON OFFSET SIDEWALK




WIDE SIDEWALK

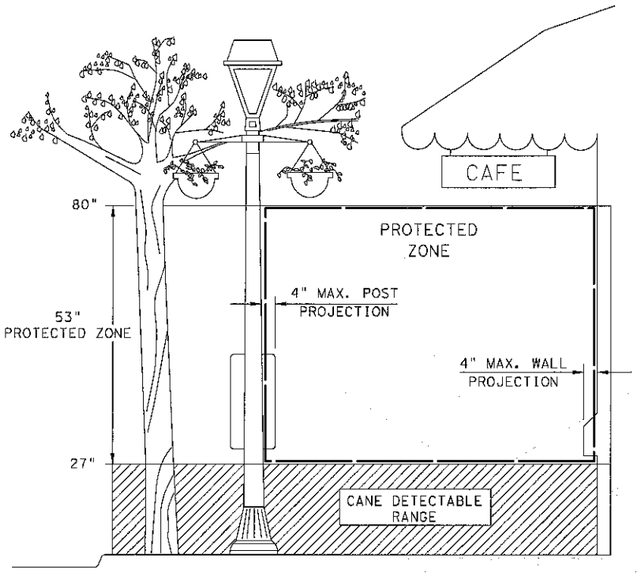



RAMP SIDEWALK

NOTES:

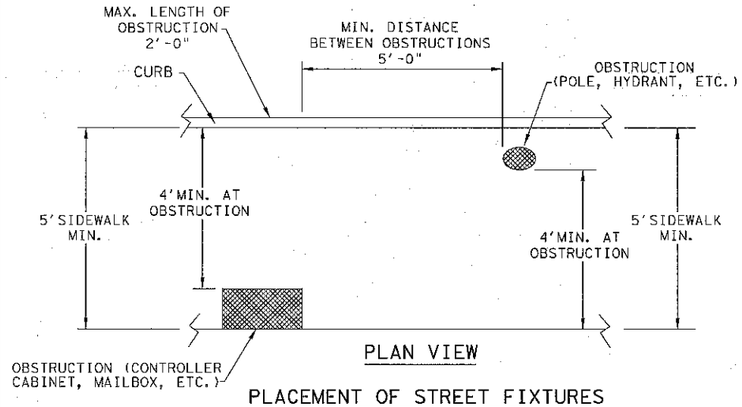
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

* * IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.




PROTECTED ZONE

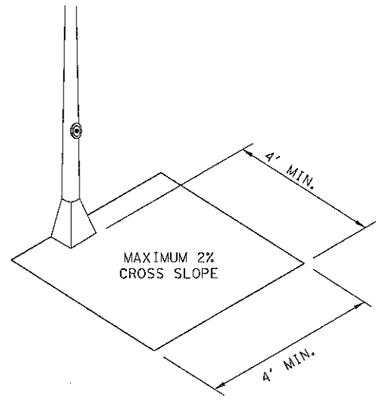
NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



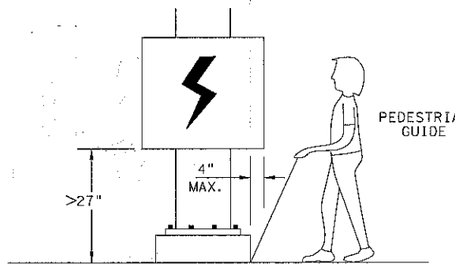

PLAN VIEW

PLACEMENT OF STREET FIXTURES

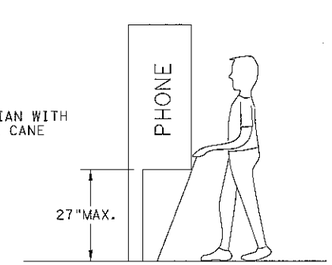
NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' X 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.




CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON




WHEN AN OBSTRUCTION OF A HEIGHT GREATER THAN 27" FROM THE SURFACE WOULD CREATE A PROTRUSION OF MORE THAN 4" INTO THE PEDESTRIAN CIRCULATION AREA, CONSTRUCT ADDITIONAL CURB OR FOUNDATION AT THE BOTTOM TO PROVIDE A MAXIMUM 4" OVERHANG.




PROTRUDING OBJECTS OF A HEIGHT ≤27" ARE DETECTABLE BY CANE AND DO NOT REQUIRE ADDITIONAL TREATMENT.

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"



Texas Department of Transportation

Design Division Standard

# PEDESTRIAN FACILITIES
# CURB RAMPS

# PED-18

| | | | | | |
|---|---|---|---|---|---|
| FILE: ped18 | DN: TxDOT | | DW: VP | CK: XM | CK: PK & JG |
| © TxDOT: MARCH, 2002 | CONT | SECT | JOB | | HIGHWAY |
| REVISIONS | - | - | - | | - |
| REVISED 08,2005<br>REVISED 06,2012<br>REVISED 01,2018 | DIST | COUNTY | | | SHEET NO. |
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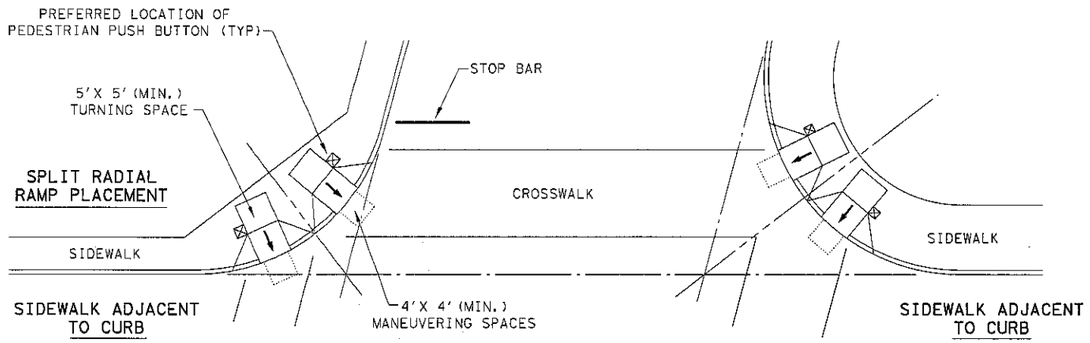
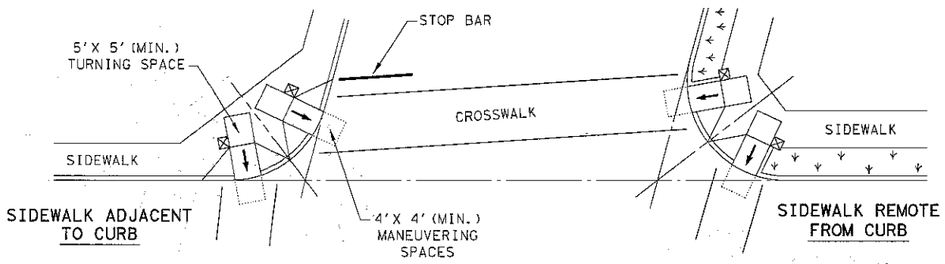
# TYPICAL CROSSING LAYOUTS

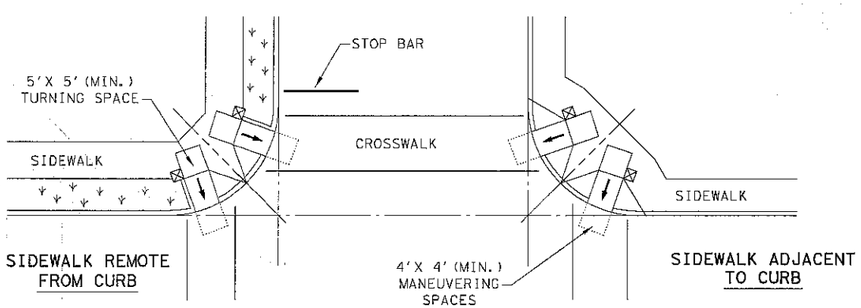
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



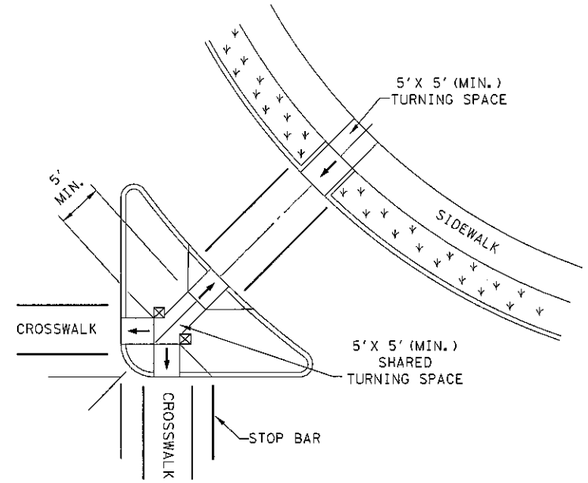

SKEWED INTERSECTION WITH "LARGE" RADIUS



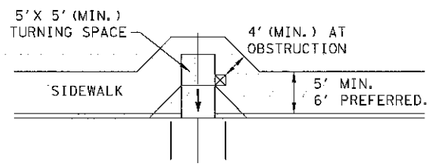

SKEWED INTERSECTION WITH "SMALL" RADIUS

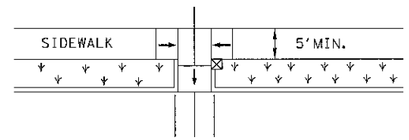



NORMAL INTERSECTION WITH "SMALL" RADIUS




AT INTERSECTION
W/FREE RIGHT TURN & ISLAND




MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

LEGEND:

SHOWS DOWNWARD SLOPE. →

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (IF APPLICABLE). ⊠

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.



Texas Department of Transportation

Design Division Standard

# PEDESTRIAN FACILITIES CURB RAMPS

# PED-18

| | | | | |
|---|---|---|---|---|
| FILE:ped18 | DN: TxDOT | DW: VP | CK: KM | CK: PK & JG |
| © TxDOT: MARCH, 2002 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | - | - | - | - |
| REVISED 08, 2005<br>REVISED 06, 2012<br>REVISED 01, 2018 | DIST | COUNTY | | SHEET NO. |
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# GENERAL NOTES

## CURB RAMPS

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
4. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5'x 5' passing areas at intervals not to exceed 200' are required.
5. Turning Spaces shall be 5'x 5' minimum. Cross slope shall be maximum 2%.
6. Clear space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
9. To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5'x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
16. Provide a smooth transition where the curb ramps connect to the street.
17. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
18. Existing features that comply with applicable standards may remain in place unless otherwise shown on the plans.

## DETECTABLE WARNING MATERIAL

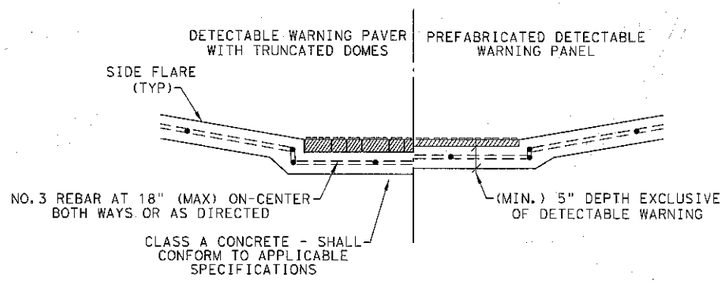
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
20. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
21. Detectable warning surfaces must be firm, stable and slip resistant.
22. Detectable warning surfaces shall be a minimum of 24 inches in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

## DETECTABLE WARNING PAVERS (IF USED)

25. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

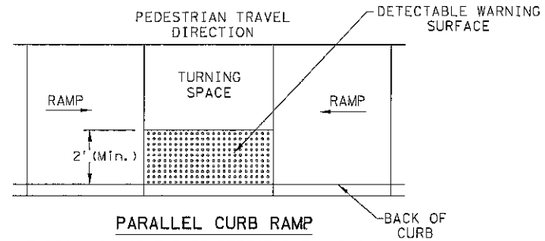
## SIDEWALKS

27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
28. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
29. Street grades and cross slopes shall be as shown elsewhere in the plans.
30. Changes in level greater than 1/4 inch are not permitted.
31. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than five percent (5%) must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with PROWAG R409.
32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
33. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
34. Sidewalk details are shown elsewhere in the plans.

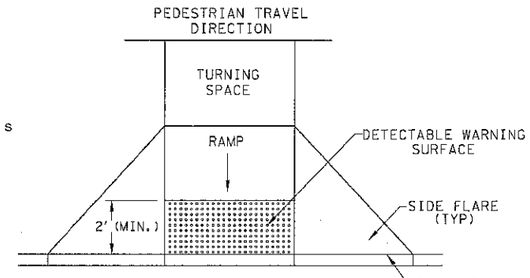



SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

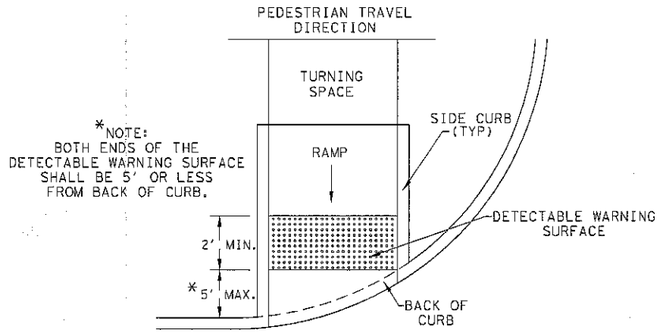
## DETECTABLE WARNING SURFACE DETAILS




PARALLEL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING AT STREET EDGE.




PERPENDICULAR CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.




DIRECTIONAL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.



Texas Department of Transportation | Design Division Standard

# PEDESTRIAN FACILITIES
# CURB RAMPS
# PED-18

| | | | | | |
|---|---|---|---|---|---|
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| © TxDOT: MARCH, 2002 | CONT | SECT | JOB | | HIGHWAY |
| REVISIONS | - | - | - | | - |
| REVISED 08,2009<br>REVISED 08,2012<br>REVISED 01,2018 | DIST | COUNTY | | | SHEET NO. |
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