

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.	
6	STP 2023 (535) HESG	1	
STATE	STATE DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0915	12	698,ETC	N/A

STATE OF TEXAS

DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

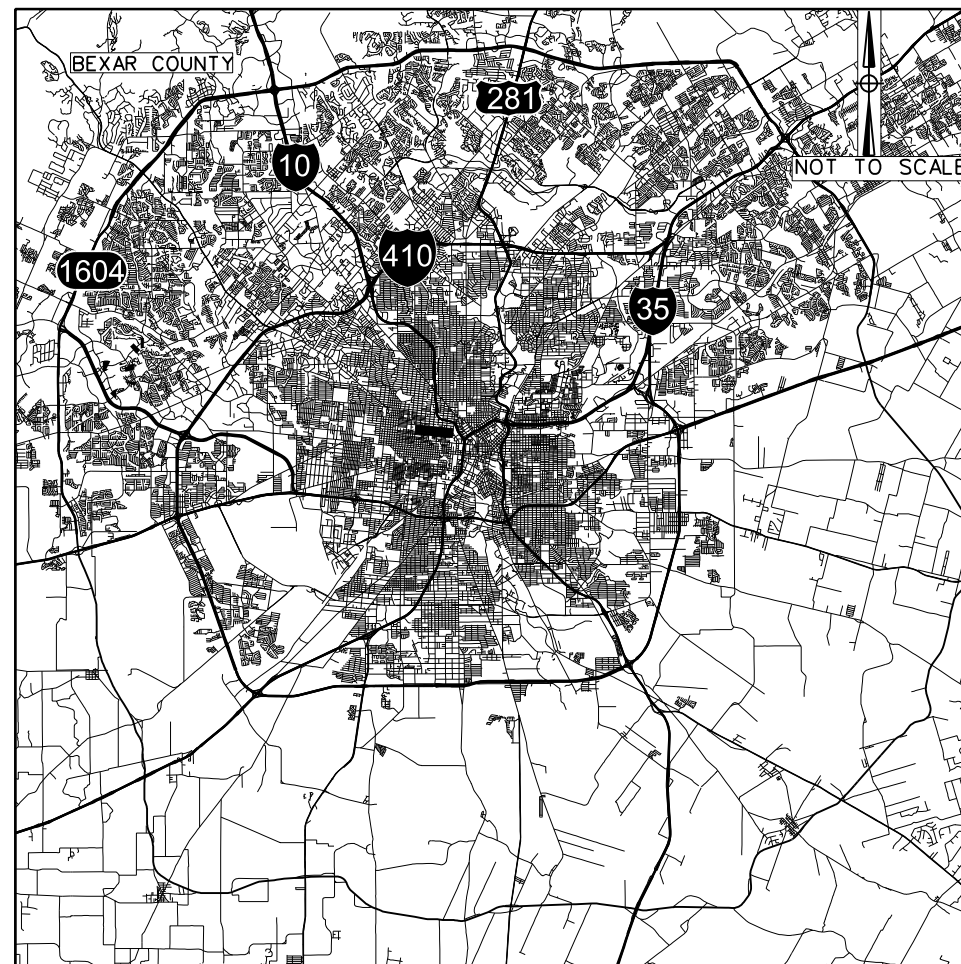
FEDERAL AID PROJECT
PROJECT NO. STP 2023 (535) HESG
CSJ: 0915-12-698, etc.

BEXAR COUNTY SAN PEDRO AVE. AT SARAHA DR.

LIMITS FROM: IN SAN ANTONIO ON SAN PEDRO AVE
LIMITS TO: AT SARAHA DR.

NET LENGTH OF ROADWAY - 1056.00 FT - 0.20 MI
NET LENGTH OF PROJECT - 1056.00 FT - 0.20 MI

FOR WORK CONSISTING OF IMPROVE TRAFFIC SIGNALS, REPLACE SPAN WIRE SIGNAL
WITH MAST ARM AND UPGRADE DETECTION



EXCEPTIONS: NONE
EQUATIONS: NONE
R.R. CROSSINGS: NONE

PLANS PREPARED BY:
rps Texas PE Firm Reg. #F-929
4801 NW Loop 410, Suite 910, San Antonio, Texas 78229
T +1 210 736 0425 E usinfrastructure@rpsgroup.com

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, JULY 5, 2022).

DESIGN SPEED - N/A
AREA OF DISTURBED SOIL - < 1 AC
ADT: N/A
ACCESSIBILITY STANDARDS - PROWAG

REGISTERED ACCESSIBILITY SPECIALIST INSPECTION REQUIRED
TDLR NO.

FINAL PLANS

LETTING DATE: _____
DATE CONTRACTOR BEGAN WORK: _____
DATE WORK WAS ACCEPTED: _____
FINAL CONTRACT COST: \$ _____
CONTRACTOR: _____

FINAL PLANS STATEMENT:

THE CONSTRUCTION WORK WAS PERFORMED
IN ACCORDANCE WITH THE PLANS.

AREA ENGINEER _____ P.E. _____ DATE _____

TEXAS DEPARTMENT OF TRANSPORTATION

COUNTY: BEXAR
PROJ NO: _____
HWY NO: _____
DATE ACCEPTED: _____
LETTING DATE: _____

SUBMITTED FOR 12/29/2022
DocuSigned by: *Eduardo Villalon*
TRANSPORTATION ENGINEER SUPERVISOR
BB683CA7179...

RECOMMENDED FOR 12/30/2022
DocuSigned by: *Clayton Ripps, P.E.*
DIRECTOR OF TRANSPORTATION
74F59ACB58304E6...
PLANNING & DEVELOPMENT

REVIEWED FOR 12/30/2022
DocuSigned by: *DRogers, P.E.*
TRANSPORTATION ENGINEER SUPERVISOR
F29100BA4508499...

APPROVED FOR 12/29/2022
DocuSigned by: *Gina Gallegos*
DISTRICT ENGINEER
124372CCDF804F5...

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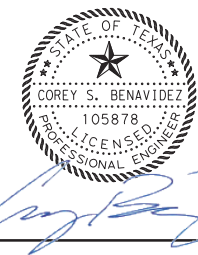
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NO.	DATE	REVISION	APPROV.


Texas PE Firm Reg. #F-929

4801 NW Loop 410, Suite 910, San Antonio, Texas 78229
T +1 210 736 0425 E usinfrastructure@rpsgroup.com

CITY OF SAN ANTONIO
DEPARTMENT OF PUBLIC WORKS



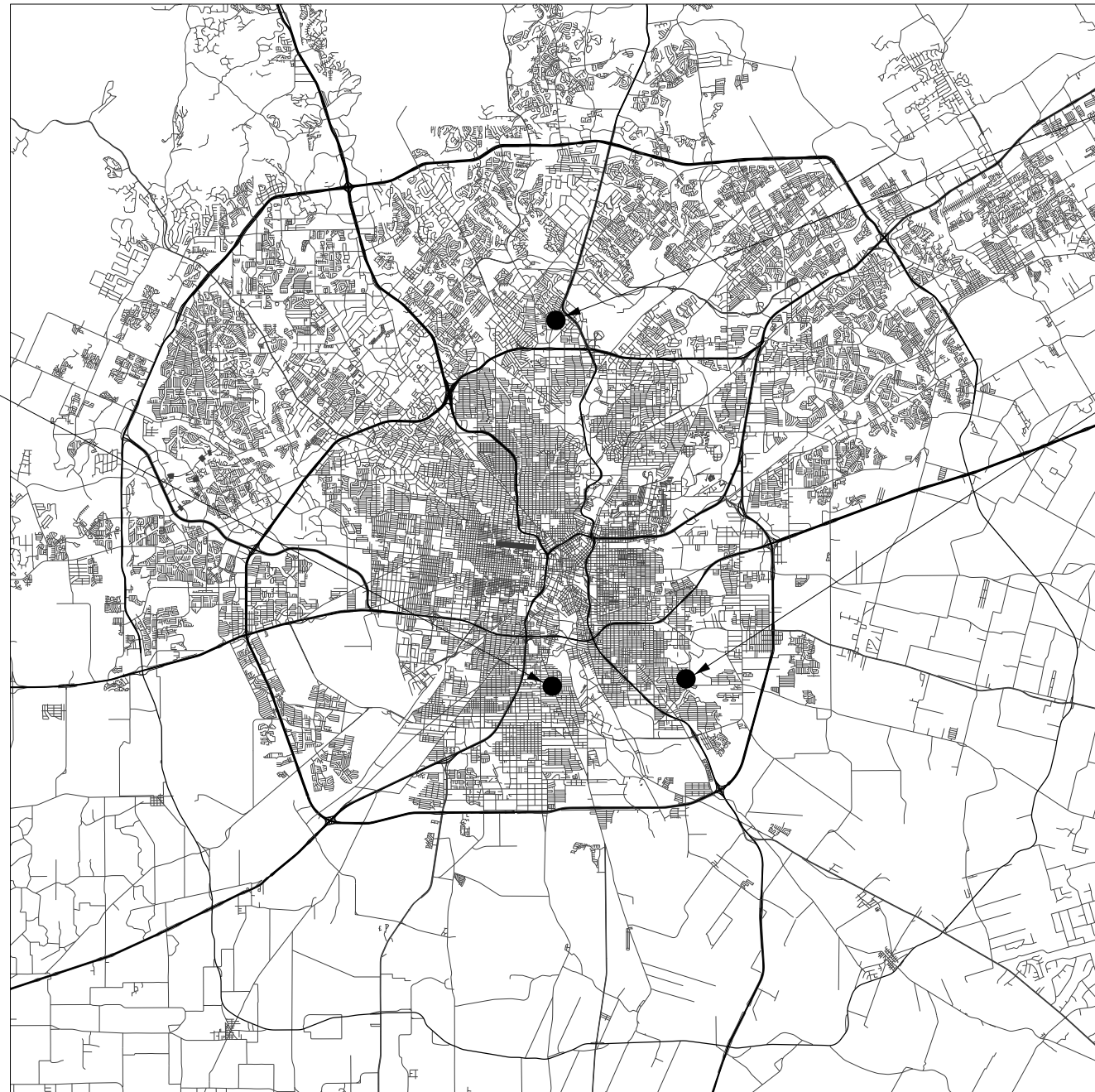
**HIGHWAY SAFETY
IMPROVEMENT PROGRAM
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STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0915	12	698, etc.	VARIOUS

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 _Projects\SAN-NC\008129_COSA TO-03 - Traffic Signal Imp Designs\07.00 CADD\COSA Traffic Signal\02-I General\008129-LOCATION MAP



NOT TO SCALE

SAN PEDRO AVE @ SAHARA DR
 CSJ: 0915-12-698

E SOUTH CROSS BLVD @ PECAN VALLEY DR
 CSJ: 0915-12-708

S FLORES ST @
 E SAYERS AVE /
 W SAYERS AVE
 CSJ: 0915-12-714

11/22/2022

NO.	DATE	REVISION	APPROV.

Texas PE Firm Reg. #F-929

4801 NW Loop 410, Suite 910, San Antonio, Texas 78229
 T +1 210 736 0425 E usinfrastructure@rpsgroup.com

CITY OF SAN ANTONIO
 DEPARTMENT OF PUBLIC WORKS

**HIGHWAY SAFETY
 IMPROVEMENT PROGRAM
 LOCATION MAP**

SHEET 1 OF 1

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.	
	SEE TITLE SHEET	3	
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
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*****GENERAL NOTES*****
2014 Specification Book

--General--

Contact the Engineer or the City when construction operations are within 400 feet of a signalized intersection to determine/verify the location of loop detectors, conduit, ground-boxes, etc. Repair or replace any signal equipment damaged by construction operations. The method of repair or replacement shall be pre-approved and inspected. Depending on the type and extent of the damage, the Engineer reserves the right to perform the repair or replacement work and the Contractor will be billed for this work.

City of San Antonio: (210) 207-8642

Any materials removed and not reused and determined to be salvageable shall be stored within the project limits at an approved location or delivered undamaged to the storage yard as directed. Deface traffic signs so that they will not reappear in public as signs.

Any sign panels that are adjusted or removed and replaced, shall be done the same workday unless otherwise approved. This work shall be considered subsidiary to Item 502.

Notify the Engineer at least two weeks prior to a proposed traffic pattern change(s) that will require a revision to traffic signals.

Locate and reference all manholes and valves within the construction area with station and offset or GPS. Each manhole and valve shall be identified by its owner (SAWS, CPS, etc.). No roadwork will begin until this list has been submitted. All valves and manhole covers have to be accessible at all times, therefore; temp. CTB, material stockpiles, etc. cannot be placed over these valves or covers.

The Contractor has the option to adjust or construct all manholes and valves to final pavement elevations prior to the final mat of HMA or after final mat of HMA. If between the final elevation adjustment and the final mat of HMA, the manholes and valves are going to be exposed to traffic, place temporary asphalt around the manhole and valve to provide a +/- 50:1 taper. The cost of elevation adjustment and the concrete apron around the manhole and valve will be part of the manhole and valve work. The asphalt tapers are part of the HMA work.

Hurricane Evacuation

Hurricane Season is from June 1 thru November 30. As the closest metropolitan city inland from the Texas Coast, the City of San Antonio is a major shelter destination during mandatory hurricane evacuations. As such, planned work zone lane or road closures may be restricted

and/or suspended during mandatory hurricane evacuation operations. The District will coordinate these restrictions at a minimum H-120 from any projected impact to the Texas Coast.

No time charges will be made if the Engineer determines that work on the project was impacted by the hurricane.

The Engineer may order changes in the Traffic Control Plan to accommodate evacuation traffic, and may suspend the work, all or in part, to ensure timely completion of this work. All work to implement changes in the Traffic Control Plan will be paid through existing bid prices or through Item 9.5, Force Account. However, the Department will not entertain any request for delay damages, loss of efficiency that may be attributed to the restriction or suspension of road or lane closures, or to changes in the Traffic Control Plan.

If a sanitary sewer overflow (SSO) occurs:

1. Attempt to eliminate the source of the SSO.
2. Contain sewage from the SSO to the extent possible to prevent contamination of waterways.
3. Call SAWS at (210) 233-2015.

Submit locate request for SAWS water and sewer to TXDOTlocates@saws.org.

In accordance with the Underground Facility Damage Prevention Act (One Call Bill) the phone number for a utility locator is 811. It is the Contractor's responsibility to plan for utility locators as needed.

Underground utilities owned by the Texas Department of Transportation may be present within the Right-Of-Way. Call or email the TxDOT offices listed below for locates a minimum of 48 hours in advance of excavation. If city or town owned irrigation facilities are present, call the appropriate department of the local city or town a minimum of 48 hours in advance of excavation. The Contractor is liable for all damages incurred to the above-mentioned utilities when working without having the utilities located prior to excavation.

For signal and ITS locates call TransGuide at 210-731-5136 or email sat_its_locates@txdot.gov for ITS locates and signal.request@txdot.gov for signal locates.

Contractor questions on this project are to be addressed to the following individual(s):

- Dale Picha, PE, PTOE, Dale.Picha@TxDOT.gov*
Eduardo Villalon, PE, CFM, Eduardo.Villalon@TxDOT.gov
Marc Jacobson, PE, PTOE, Marc.Jacobson@sanantonio.gov

Questions may be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:

Control: 0915-12-698, etc

County: Bexar

Highway: San Pedro Ave

<https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors>

All contractor questions will be reviewed by the Engineer. All questions and any corresponding responses that are generated will be posted through the same Letting Pre-Bid Q&A web page.

The Letting Pre-Bid Q&A web page for each project can be accessed by using the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project you want to view the Q&A for and click on the link in the window that pops up.

The Contractor must measure the vertical clearance at each structure after the final surface of the roadway is completed and provide the vertical clearance measurement to the Engineer.

--Item 5--

Taper ACP placed at curb inlets, traffic inlets and slotted drains.

A horizontal boom or equivalent equipment is required for construction in the vicinity of the CPS Energy electric lines to provide vertical clearance of equipment during construction. Contact CPS Energy Utility Coordination Group sixteen (16) week in anticipation of pole bracing. The estimated duration for pole bracing is 6 to 10 weeks (or longer if temporary construction easements are required) after invoice is paid. For de-energizing or sleeving of the overhead electrical lines depicted on the plans, please contact CPS Energy Utility Coordination Group sixteen (16) week in anticipation of needed de-energization. The estimated duration for de-energizing is approximately 4 to 6 weeks (after invoice is paid) but could vary on system scenario and back feed requirements. De-energizing may not be possible in all instances or may be restricted during specific periods of time due to load demand. Contractor will be reimbursed for the invoice cost for pole bracing and/or de-energizing or sleeving through force account.

Prevention of Migratory Bird Nesting

It is anticipated that migratory birds, a protected group of species, may try to nest on bridges, culverts, vegetation, or gravel substrate, at any time of the year. The preferred nesting season for migratory birds is from February 15 through October 1. When practicable, schedule construction operations outside of the preferred nesting season. Otherwise, nests containing migratory birds must be avoided and no work will be performed in the nesting areas until the young birds have fledged.

Structures

Bridge and culvert construction operations cannot begin until swallow nesting prevention is implemented, until after October 1 if it's determined that swallow nesting is actively occurring, or until it's determined swallow nests have been abandoned. If the State installed nesting deterrent on the bridges and culverts, maintain the existing nesting deterrent to prevent swallow

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nesting until October 1 or completion of the bridge and culvert work, whichever occurs earlier. If new nests are built and occupied after the beginning of the work, do not perform work that can interfere with or discourage swallows from returning to their nests. Prevention of swallow nesting can be performed by one of the following methods:

1. By February 15 begin the removal of any existing mud nests and all other mud placed by swallows for the construction of nests on any portion of the bridge and culverts. The Engineer will inspect the bridges and culverts for nest building activity. If swallows begin nest building, scrape, or wash down all nest sites. Perform these activities daily unless the Engineer determines the need to do this work more frequently. Remove nests and mud through October 1 or until bridge and culvert construction operations are completed.
2. By February 15 place a nesting deterrent (which prevents access to the bridge and culvert by swallows) on the entire bridge (except deck and railing) and culverts. This work is subsidiary to the various bid items.

No extension of time or compensation payment will be granted for a delay or suspension of work caused by nesting swallows.

Provide a non-intrusive back-up alarm system on all heavy equipment used in close proximity to residential areas. This item is subsidiary to various bid items.

When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with "Standard Operating Procedure for Alternate Precast Proposal Submission" found online at <https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design>. Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

Excavation within 5 feet of an existing CPS Energy pole will require pole bracing. Contact CPS Energy utility coordination to request pole bracing (Customer Engineering 210-353-4050). The estimated duration for the pole bracing process is approximately 10 to 15 weeks.

--Item 6--

Show the stockpile lot and/or sub lot numbers on all tickets for all materials.

Steel Wrapped or Asbestos Utility Lines:

Existing steel wrapped natural gas and/or asbestos cement (AC) water lines that will no longer be in service are usually abandoned in place (AIP). However, if any of these lines have to be removed for whatever reason (in the way of other construction, to make tie-ins, etc.), comply with Item 6.

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If removal of AC water lines is included in the construction contract, then notify the Engineer of proposed dates of removal of the AC water lines in accordance to Item 6. Excavate to the top of the AC water line to allow a separate contractor hired by the State to remove the AC water line. The excavation for the AC water line removal is subsidiary to the work that created the need for the removal (excavation for structures, roadway, a new line, tie-ins, etc.).

To comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, the contractor must submit a notarized original of the TxDOT Construction Material Buy America Certification Form for all items classified as construction materials. This form is not required for materials classified as a manufactured product.

Refer to the Buy America Material Classification Sheet for clarification on material categorization.

The Buy America Material Classification Sheet is located at the below link.

<http://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html> for clarification on material categorization.

--Item 7--

The total disturbed area within the project is anticipated at less than one (1) acre. Due to this type of construction, the project qualifies for exclusion under the Construction General Permit (CGP) issued by the Texas Commission on Environmental Quality (TCEQ). However, should the sum of the Engineer's anticipated disturbances and the Contractor's (On ROW and off ROW) PSL's equal or exceed the one (1) acre threshold; both TxDOT and the Contractor have project responsibilities under the CGP that reverts to non-exclusion status. Obtain approval for all non-depicted areas of disturbance that increases the initial soil and vegetation disturbed area estimates before work starts at these locations.

Notify the Engineer of the disturbed acreage within one (1) mile of the project limits. Obtain authorization from the TCEQ for Contractor PSL's for construction support activities on or off ROW.

Roadway closures during the following key dates and/or special event are prohibited. See the general notes under Item 502 for these dates.

--Item 8--

Working days will be computed and charged in accordance with Article 8.3.1.4 Standard-Day work week.

A Special Provision to Item 8 for a delayed authorized date to begin work has been included in the contract. The reason for including the Special Provision is for material processing or contractor mobilization.

Control: 0915-12-698, etc

Sheet 4B

County: Bexar

Highway: San Pedro Ave

Create and maintain a Bar Chart schedule.

--Item 9--

When approved, provide uniformed, off-duty law enforcement officers with marked vehicles during work that requires a lane closure. The officer in marked vehicles shall be located as approved to monitor or direct traffic during the closure. The method used to direct traffic at signalized intersections shall be as approved. Additional officers and vehicles may be provided when approved or directed.

Complete the daily tracking form provided by the department and submit invoices that agree with the tracking form for payment at the end of each month approved services were provided.

Show proof of certification by the Texas Commission on Law Enforcement Standards.

All law enforcement personnel used in Work Zone Traffic Control shall be trained for performing duties in work zones and are required to take "Safe and Effective Use of Law Enforcement Personnel in Work Zones" (Course #133119) which can be found online at the following site: www.nhi.fhwa.dot.gov

Certificates of completion should be available to all who finish the course. These should be kept by the officers to substantiate completion when reporting to the work site.

Minimums, scheduling fees, etc. will not be paid; TxDOT will consider paying cancellation fees on a case-by-case basis.

--Item 162--

Furnish and place Bermuda grass sod.

--Item 168--

Apply vegetative watering as needed to supplement natural rainfall during the vegetation establishment period. Plan quantity of irrigation water is based on the application of a total of 1.3 gal of water each week for each sq. yd. of area that is sodded or seeded. Establishment time is estimated to be 12 weeks for both sod and permanent seed mixes. Temporary seeding will require less time for establishment. Provide a schedule and coordinate watering cycles and rates per cycle with the Engineer. Obtain approval if the quantity of water to be applied is expected to exceed the plan quantity. Adjust the amount of water applied with each cycle and the number of cycles each wk. according to actual site conditions. Drought or other conditions, as determined by the Engineer, may require the application of supplemental irrigation during hours other than normal working hours.

--Item 500--

"Materials on Hand" payments will not be considered in determining percentages for mobilization payments.

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--Item 502--

General

In addition to providing a Contractor's Responsible Person and a phone number for emergency contact, have an employee available to respond on the project for emergencies and for taking corrective measures within 2 hours or within a reasonable time frame as specified by the Engineer.

Treat the pavement drop-offs as shown in the TCP.

Avoid placing stockpiles, equipment, and other construction materials within the roadway's horizontal clear zone or at any location that will constitute a hazard and will endanger traffic. If a stockpile is placed within the clear zone, address in accordance with the TMUTCD.

If Nighttime work is required and work is not behind positive barrier then full Class 3 reflective gear is required to be worn by all workers, hard hat halos are required to be worn by the flaggers at flagging stations, TY III barricades are required to be spaced at 500 ft, and a mandatory night work meeting is required.

The Contractor Force Account "Safety Contingency" that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic Control Plan, that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor's Responsible Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

Mounting and moving the mailbox as needed for the various construction phases is subsidiary to Item 502.

Access to adjoining property must be maintained at all times.

Barricades, Signs, and Traffic Control Devices

When advanced warning flashing arrow panels and/or changeable message sign is specified, have one standby unit in good condition at the job site. Standby time shall be considered subsidiary to the bid item.

After written notification, the time frame is provided on the Form 599 to provide properly maintained signs and barricades before considered in non-compliance with this item.

Moving an existing sign to a temporary location is subsidiary to Item 502. Installations with permanent supports at permanent locations will be paid for under the applicable bid item(s). Cover permanent signs if not used. This is subsidiary to Item 502.

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Sheet 4C

County: Bexar

Highway: San Pedro Ave

Lane and Ramp Closures and Detours

Notify the Engineer in writing 10 business days in advance of any temporary or permanent lane, ramp, connector, etc. closures/detours, restrictions to lane widths, alterations to vertical clearances, or modifications to radii. Any other modifications to the roadway that may adversely affect the mobility of oversized/overweight trucks also require 10 business days advance written notice to the Engineer. At least one lane must always remain open.

For closures not listed in the TCP; the lane closures are limited to between the hours of 9AM and 3 PM, and at least one lane must remain open at all times.

At no time shall two consecutive intersecting roadways be closed at one time during construction.

At no time shall two consecutive ramps be closed at one time during construction or overlay operations.

Unless otherwise noted in the plans and/or as directed by the Engineer, daily lane closures shall be limited according to the following restrictions:

No lane closures will be permitted for the following dates and/or special events:

Between December 15 and January 1

Fiesta Week and Sales Tax Holidays (Bexar County Only)

Wednesday before Thanksgiving thru the Sunday after Thanksgiving

Saturday and Sunday before Memorial Day and Labor Day

Saturday or Sunday when July 4 falls on a Friday or Monday

Election days (Bexar County Only)

During major events at the AT&T Center (Spurs home games, Rodeo, concerts, etc.)

Alamodome, and/or Convention Center (Bexar County Only)

Traffic Signals

There are traffic signals at the intersection of San Pedro Ave at Sahara Dr, S Flores St at W Sayers and E Southcross Blvd at Pecan Valley Dr. Always keep the signals in operation except when necessary for specific installation operations, including any modifications to existing signal heads to always maintain clear visibility. Adjustment of any signal head will be subsidiary to Item 502. When it is necessary for a signal to be turned off, or when left-turn lanes are closed, hire off duty police officers to control the traffic until the signals are back in satisfactory condition.

Moving or adjustment of traffic signal heads, VIVDS, and radar detection for the purpose of alignment with the shifting of lanes in conjunction with the traffic control plan will be subsidiary to various bid items.

Coordinate with the appropriate entity (City of San Antonio, City of New Braunfels, etc.) or TxDOT when left-turn lanes are closed and/or for signal timing revisions as necessary.

Hauling

The use of rubber-tired equipment will be required for moving dirt or other materials along or across pavement surfaces. Where the contractor desires to move any equipment not licensed for operation on public highways, on or across pavement, they shall protect the pavement from damage as directed/approved by the Engineer.

Throughout construction operations, the Contractor will be required to conduct their hauling operations in a manner such that vehicles will not haul over previously recompacted subgrade or compacted base material, except in short sections for dumping manipulations.

The Contractor shall keep the roadway clean and free of dirt or other materials during hauling operations. If the Contractor does not maintain a clean roadway, they shall cease all construction operations, when directed by the Engineer, to clean the roadway to the satisfaction of the Engineer.

--Item 506--

The Storm Water Pollution Prevention Plan (SWP3) consists of temporary erosion control measures needed and provided for under this Item. The disturbed area is less than one acre and use of erosion control measures is not anticipated. If physical conditions encountered at the job site require necessary controls, BMP installation, maintenance, and removal will be paid as extra work on a force account basis per Articles 4.4 and 9.7. An Inspector will perform a regularly scheduled SW3P inspection every 7 calendar days if erosion control measures are installed.

Failure to address items noted on the SW3P inspection report within two report cycles may result in the Department stopping all construction operations, exclusive of time charges, or withholding that month's estimate until the SW3P deficiencies are corrected unless the Engineer determines that the area is too wet to correct SW3P deficiencies.

Failure to correctly maintain daily monitoring reports and submitting to TxDOT on a daily/weekly basis may result in the monthly estimate being withheld.

--Item 529--

Curb inlets and extensions are based on an exposed curb height of 7 inches. The roadway curb height and shape will be transitioned to the inlet's curb with a 40: 1 taper.

--Item 531--

The curb ramp locations shown in the plans have considered the geometric features of the intersection, traffic signals, and the pavement markings. If anything changes during construction, the location of curb ramps must be adjusted to ensure they meet TAS requirements.

--Item 618--

It might be necessary to cut concrete for placement of conduit. Saw cut existing concrete, remove the concrete from the steel reinforcement (bars or fabric) and bend the steel to install the conduit. After the conduit has been placed, bend the steel back to its original position and back-fill the trench with an approved concrete. This work is subsidiary to this Item.

The conduit depth for illumination under the City of San Antonio streets is 36 inches.

--Item 628--

Make all arrangements for electrical service, and compliance with local standards and practices for proper installations.

--Item 644--

The wedge anchor system shown on State Standard Sheet SMD (TWT) is not allowed.

Triangular Slipbase Systems with set screws are not allowed.

--Item 666--

Use TY II markings (vs. an acrylic or epoxy) on asphalt surfaces as the sealer for the TY I markings, unless otherwise approved by the Engineer.

--Item 672--

Place all adhesive material directly from the heated dispenser to the pavement. Do not use portable or non-heated containers. Use adhesive of sufficient thickness so that when the marker is pressed into the adhesive, 1/8" or more adhesive will remain under 100% of the marker. The adhesive should extend not less than 1/2" but not more than 1 1/2" beyond the perimeter of the marker.

--Item 677--

Obtain approval before using the mechanical method for the elimination of existing thermoplastic pavement markings.

--Item 680--

Furnish and install all required materials and equipment necessary for the complete and operating traffic signal installation at the following intersections:

San Pedro Ave at Sahara Dr

S. Flores St at W Sayers Ave

E Southcross Blvd at Pecan Valley Dr.

The locations shown on the plans for signal pole foundations, controller foundations, conduit and other items may be adjusted to better fit field conditions as approved.

Furnish and install a new City of San Antonio type 332 Cabinet and 2070 Controller with Intelight Maxtime software.

Deliver controller cabinet and assembly to the City of San Antonio signal shop for programming and testing two weeks in advance prior to contractor installing equipment in the field.

Connect all field wiring to the controller assembly into the polyphaser. The Signal Shop representative will assist in determining how the detection cables are to be connected, and will also program the controller for operation, hook up the malfunction management unit (MMU) or conflict monitor, detector units, and other equipment, and turn on the controller. Have a qualified technician on the project site to place the traffic signals in operation.

Once final punch list is complete, contractor is allowed to begin flashing signal operations. Signal shall flash for a minimum of 7 days prior to full operation, unless otherwise approved by the Engineer.

Use LED lamps from the prequalified material producer lists as shown on the Texas Department of Transportation (TxDOT) – Construction Division’s (CST) material producer list. Category is “Roadway Illumination and Electrical Supplies.” under item 610. No substitutions will be allowed for materials found on this list.

Demonstrate that the field wiring is properly installed. Install the electrical equipment in a neat and workmanlike manner.

Use the following wiring sequence when connecting signal sections to the cabinet:

Conductor No.	Base Color	Tracer Color	Signal Face
1	Black		Yellow Ball
2	White		Neutral
3	Red		Red Ball
4	Green		Green Ball
5	Orange		Yellow Arrow
6	Blue		Green Arrow
7	White	Black	Spare

Use qualified personnel to respond to and diagnose all trouble calls during the thirty-day test period. Repair any malfunction to Contractor-supplied signal equipment. Provide to the Engineer a local telephone number, not subject to frequent changes and available on a 24-hour basis, for reporting trouble calls. Response time to reported calls must be less than 2 hours. Make appropriate repairs within 24 hours. Place a logbook in the controller cabinet and keep a record of each trouble call reported. Notify the Engineer of each trouble call. Do not clear the error log in the conflict monitor or MMU during the thirty-day test period without approval.

Provide a submittal compliance matrix with all traffic signal submittals.

Field verify the depths of the drill shafts to meet the minimum clearances specified in the plans before ordering materials.

--Item 682--

Pedestrian signals may be by a different manufacturer than the vehicle signal heads.

Cover all signal faces until placed in operation. This work is subsidiary to various bid items.

All mounting attachments shall be constructed of steel pipe and mounted as shown on the plans.

--Item 684--

Provide an extra 10' for each cable terminating in the controller cabinet. All cables must be continuous without splices from terminal point to terminal point. All proposed signal cable must be #12 AWG stranded copper.

--Item 686 & 687--

Provide all signal poles from the same manufacturer. Pedestrian poles may be from a different manufacturer.

--Item 688--

The sealant used for vehicle loop wire must be approved.

The button placement must be coordinated with the concrete pad to access the button according to ADA and TAS. If any mounting modifications are needed (extensions, brackets, etc.) to meet ADA and TAS requirements the adjustment will be subsidiary to Item 688. The concrete pad (if required) will be paid separately.

The pedestrian push button must be wired with a 2/C#14 loop detector cable in lieu of a #12 A.W.G. XHHW wire.

Furnish and install new Polara Enterprises accessible pedestrian signals (APS) push buttons or approved equivalent.

Control: 0915-12-698, etc

Sheet 4F

County: Bexar

Highway: San Pedro Ave

--Item 6185--

1 shadow vehicles with TMA will be required for this project. The TMA's will be measured and paid for by the DAY for each TMA/TA set up and operational on the worksite. The contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMA's needed for the project. See TMA and TA Summary sheet in the plans.

--Item 6292--

Radar presence detection device must utilize true-presence detection. Systems using locking algorithms to attempt presence detection will not be accepted. In addition, radar systems will not be allowed to use extensions/delays or place the controller on locking detection to aid in presence detection.

Radar presence detection device must be able to detect up to 10 lanes with a minimum offset of 6' and have at least 16 zones and channels per unit.

Radar presence detection device must be mounted on the same side of the intersection as the lanes it is set to detect.

Final placement of radar devices must be approved by the engineer.

Furnish and install new Wavetronix SmartSensor Matrix, or approved equivalent, for radar presence detectors and Wavetronix SmartSensor Advance, or approved equivalent, for radar advanced detection devices.



Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0915-12-698

DISTRICT San Antonio
HIGHWAY FLORES ST, SAN PEDRO AVE, SOUTHCROSS BLVD

COUNTY Bexar

CONTROL SECTION JOB				0915-12-698		0915-12-708		0915-12-714		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00177627		A00177856		A00177884			
COUNTY				Bexar		Bexar		Bexar			
HIGHWAY				SAN PEDRO AVE		SOUTHCROSS BLVD		FLORES ST			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	104-6015	REMOVING CONC (SIDEWALKS)	SY	120.000				29.000		149.000	
	104-6021	REMOVING CONC (CURB)	LF	153.000		74.000		60.000		287.000	
	104-6024	REMOVING CONC (RETAINING WALLS)	SY	5.000						5.000	
	105-6013	REMOVING STAB BASE & ASPH PAV (9")	SY			44.000				44.000	
	110-6001	EXCAVATION (ROADWAY)	CY			6.000				6.000	
	162-6002	BLOCK SODDING	SY			84.000				84.000	
	168-6001	VEGETATIVE WATERING	MG			1.300				1.300	
	416-6031	DRILL SHAFT (TRF SIG POLE) (30 IN)	LF					45.200		45.200	
	416-6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	26.400		52.000				78.400	
	416-6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF	43.800						43.800	
	500-6001	MOBILIZATION	LS			0.340		0.660		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO					7.000		7.000	
	529-6001	CONC CURB (TY I)	LF	153.000		61.000		60.000		274.000	
	531-6001	CONC SIDEWALKS (4")	SY	120.000		15.000		29.000		164.000	
	531-6004	CURB RAMPS (TY 1)	EA	4.000						4.000	
	531-6005	CURB RAMPS (TY 2)	EA			6.000		1.000		7.000	
	531-6006	CURB RAMPS (TY 3)	EA	4.000				2.000		6.000	
	536-6002	CONC MEDIAN	SY			10.000				10.000	
	618-6046	CONDT (PVC) (SCH 80) (2")	LF	130.000		205.000		120.000		455.000	
	618-6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	110.000		417.000		220.000		747.000	
	618-6053	CONDT (PVC) (SCH 80) (3")	LF	50.000		110.000		80.000		240.000	
	618-6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	870.000		834.000		430.000		2,134.000	
	620-6007	ELEC CONDR (NO.8) BARE	LF	1,210.000		1,511.000		860.000		3,581.000	
	620-6009	ELEC CONDR (NO.6) BARE	LF	20.000		75.000		20.000		115.000	
	620-6010	ELEC CONDR (NO.6) INSULATED	LF	60.000		160.000		60.000		280.000	
	621-6002	TRAY CABLE (3 CONDR) (12 AWG)	LF	700.000		657.000		670.000		2,027.000	
	624-6009	GROUND BOX TY D (162922)	EA			4.000				4.000	
	624-6010	GROUND BOX TY D (162922)W/APRON	EA	5.000		3.000		5.000		13.000	
	628-6002	REMOVE ELECTRICAL SERVICES	EA	1.000		1.000		1.000		3.000	
	628-6164	ELC SRV TY D 120/240 070(NS)AL(E)PS(U)	EA	1.000		1.000		1.000		3.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA			3.000				3.000	
	644-6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA					2.000		2.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA			4.000				4.000	
	666-6030	REFL PAV MRK TY I (W)8"(DOT)(100MIL)	LF			128.000				128.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	277.000		1,992.000				2,269.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	576.000		777.000		660.000		2,013.000	
	666-6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	6.000		10.000				16.000	

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Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0915-12-698

DISTRICT San Antonio
HIGHWAY FLORES ST, SAN PEDRO AVE, SOUTHCROSS BLVD

COUNTY Bexar

CONTROL SECTION JOB				0915-12-698		0915-12-708		0915-12-714		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00177627		A00177856		A00177884			
COUNTY				Bexar		Bexar		Bexar			
HIGHWAY				SAN PEDRO AVE		SOUTHCROSS BLVD		FLORES ST			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	666-6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	1.000		5.000				6.000	
	666-6105	REFL PAV MRK TY I (W)(BIKE ARW)(100MIL)	EA			3.000				3.000	
	666-6111	REFL PAV MRK TY I(W)(BIKE SYML)(100MIL)	EA			3.000				3.000	
	666-6147	REFL PAV MRK TY I (Y)24"(SLD)(100MIL)	LF			43.000				43.000	
	666-6162	RE PV MRK TY I(BLACK)6"(SHADOW)(100MIL)	LF	1,760.000		2,000.000		1,040.000		4,800.000	
	666-6300	RE PM W/RET REQ TY I (W)4"(BRK)(100MIL)	LF	630.000		410.000		560.000		1,600.000	
	666-6312	RE PM W/RET REQ TY I (Y)4"(BRK)(100MIL)	LF			80.000				80.000	
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	3,365.000		2,668.000		2,800.000		8,833.000	
	672-6007	REFL PAV MRKR TY I-C	EA	34.000		22.000		24.000		80.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	6.000		64.000		36.000		106.000	
	672-6010	REFL PAV MRKR TY II-C-R	EA			45.000				45.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	14.000		10.000		28.000		52.000	
	677-6003	ELIM EXT PAV MRK & MRKS (8")	LF	25.000		4.000				29.000	
	677-6005	ELIM EXT PAV MRK & MRKS (12")	LF	880.000		250.000				1,130.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	575.000		194.000		22.000		791.000	
	677-6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA			2.000				2.000	
	677-6012	ELIM EXT PAV MRK & MRKS (WORD)	EA			1.000				1.000	
	680-6003	INSTALL HWY TRF SIG (SYSTEM)	EA	1.000		1.000		1.000		3.000	
	680-6004	REMOVING TRAFFIC SIGNALS	EA	1.000		1.000		1.000		3.000	
	682-6001	VEH SIG SEC (12")LED(GRN)	EA	10.000		10.000		8.000		28.000	
	682-6002	VEH SIG SEC (12")LED(GRN ARW)	EA	4.000		5.000				9.000	
	682-6003	VEH SIG SEC (12")LED(YEL)	EA	10.000		10.000		8.000		28.000	
	682-6004	VEH SIG SEC (12")LED(YEL ARW)	EA	6.000		7.000				13.000	
	682-6005	VEH SIG SEC (12")LED(RED)	EA	10.000		11.000		8.000		29.000	
	682-6006	VEH SIG SEC (12")LED(RED ARW)	EA	4.000		3.000				7.000	
	682-6018	PED SIG SEC (LED)(COUNTDOWN)	EA	8.000		8.000		8.000		24.000	
	682-6049	BACKPLATE W/REFL BRDR(4 SEC)	EA	2.000		4.000				6.000	
	682-6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA			10.000				10.000	
	682-6060	BACKPLATE W/REFL BRDR(3 SEC)	EA	10.000				8.000		18.000	
	684-6030	TRF SIG CBL (TY A)(14 AWG)(4 CONDR)	LF	640.000		637.000		610.000		1,887.000	
	684-6035	TRF SIG CBL (TY A)(14 AWG)(9 CONDR)	LF	2,890.000		3,035.000		2,040.000		7,965.000	
	684-6049	TRF SIG CBL (TY A)(16 AWG)(3 CONDR)	LF	1,190.000		1,096.000		1,080.000		3,366.000	
	686-6001	INS TRF SIG PL AM (S)ILSN ARM(7')	EA	2.000				4.000		6.000	
	686-6002	INS TRF SIG PL AM (S)ILSN ARM(9')	EA	2.000		4.000				6.000	
	686-6028	INS TRF SIG PL AM(S)1 ARM(24')LUM&ILSN	EA					2.000		2.000	
	686-6032	INS TRF SIG PL AM(S)1 ARM(28')LUM&ILSN	EA					1.000		1.000	
	686-6036	INS TRF SIG PL AM(S)1 ARM(32')LUM&ILSN	EA					1.000		1.000	

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CONTROLLING PROJECT ID 0915-12-698

DISTRICT San Antonio
 HIGHWAY FLORES ST, SAN PEDRO AVE, SOUTHCROSS BLVD

COUNTY Bexar

Estimate & Quantity Sheet

CONTROL SECTION JOB				0915-12-698		0915-12-708		0915-12-714		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00177627		A00177856		A00177884			
COUNTY				Bexar		Bexar		Bexar			
HIGHWAY				SAN PEDRO AVE		SOUTHCROSS BLVD		FLORES ST			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	686-6040	INS TRF SIG PL AM(S)1 ARM(36')LUM&ILSN	EA	2.000						2.000	
	686-6044	INS TRF SIG PL AM(S)1 ARM(40')LUM&ILSN	EA			1.000				1.000	
	686-6052	INS TRF SIG PL AM(S)1 ARM(48')LUM&ILSN	EA			3.000				3.000	
	686-6060	INS TRF SIG PL AM(S)1 ARM(55')LUM&ILSN	EA	2.000						2.000	
	687-6001	PED POLE ASSEMBLY	EA	5.000		6.000		2.000		13.000	
	688-6001	PED DETECT PUSH BUTTON (APS)	EA	8.000		8.000		8.000		24.000	
	688-6003	PED DETECTOR CONTROLLER UNIT	EA	1.000		1.000		1.000		3.000	
	3076-6066	TACK COAT	GAL			9.000				9.000	
	3076-6079	D-GR HMA TY-C PG70-22 (EXEMPT)	TON			23.000				23.000	
	6010-6010	CCTV FIELD EQUIP (ANALOG) (INSTL ONLY)	EA	1.000		1.000				2.000	
	6058-6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1.000		1.000		1.000		3.000	
	6090-6001	ILSN (LED) (6 D)	EA	2.000				4.000		6.000	
	6090-6002	ILSN (LED) (8 D)	EA	2.000		4.000				6.000	
	6185-6002	TMA (STATIONARY)	DAY	30.000		30.000		30.000		90.000	
	6292-6001	RVDS(PRESENCE DETECTION ONLY)	EA	4.000		4.000				8.000	
	6292-6002	RVDS(ADVANCE DETECTION ONLY)	EA	2.000		4.000				6.000	
	6437-6001	FEDS PROCESSOR UNIT	EA					1.000		1.000	
	6437-6002	FEDS FISH EYE CAMERA ASSEMBLY	EA					1.000		1.000	
	6437-6004	LIFETIME FEDS DATA COLLECT & REPORTING	EA					1.000		1.000	
	6437-6005	FEDS ETHERNET REPEATER	EA					1.000		1.000	
	6437-6006	FEDS COMM CABLE (ETHERNET - CAT5E)	LF					60.000		60.000	
18		LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000						1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000						1.000	
		CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000						1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000						1.000	


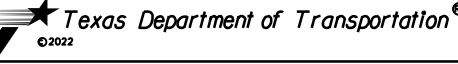


DISTRICT	COUNTY	CCSJ	SHEET
San Antonio	Bexar	0915-12-698	5B

SUMMARY OF TRAFFIC SIGNAL QUANTITIES

ITEM NO.	DESC CODE	DESCRIPTION	UNIT	SAN PEDRO AVE AT SAHARA DR	S FLORES ST AT W SAYERS AVE/E SAYERS AVE	E SOUTHCROSS BLVD AT PECAN VALLEY DR	PROJECT TOTAL
TRAFFIC CONTROL ITEMS							
502	6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	2	2	2	6
6185	6002	TMA (STATIONARY)	DAY	30	30	30	90
TRAFFIC SIGNAL ITEMS							
416	6031	DRILL SHAFT (TRF SIG POLE) (30 IN)	LF		45.2		45.2
416	6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	26.4		52	78.4
416	6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF	43.8			43.8
618	6023	CONDT (PVC) (SCH 40) (2")	LF	130	120	205	455
618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	110	220	417	747
618	6029	CONDT (PVC) (SCH 40) (3")	LF	50	80	110	240
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	870	430	834	2134
620	6007	ELEC CONDR (NO.8) BARE	LF	1,210	860	1511	3581
620	6009	ELEC CONDR (NO.6) BARE	LF	20	20	75	115
620	6010	ELEC CONDR (NO.6) INSULATED	LF	60	60	160	280
621	6002	TRAY CABLE (3 CONDR) (12 AWG)	LF	700	670	657	2027
624	6009	GROUND BOX TY D (162922)	EA			2	2
624	6010	GROUND BOX TY D (162922)W/APRON	EA	5	5	3	13
628	6002	REMOVE ELECTRICAL SERVICES	EA	1	1	1	3
628	6164	ELC SRV TY D 120/240 070(NS)AL(E)PS(U)	EA	1	1	1	3
680	6003	INSTALL HWY TRF SIG (SYSTEM)	EA	1	1	1	3
	**	TRAFFIC SIGNAL CONTROLLER/CABINET (TXDOT)	EA	1	1	1	3
	**	TRAFFIC SIGNAL CONTROLLER FOUNDATION (TXDOT)	EA	1	1	1	3
	**	WIND DAMPENER	EA	2		4	6
	**	MAST ARM, 8' LUMINAIRES	EA	4	4	4	12
	**	POWER SUPPLY	EA	1	1	1	3
	**	EMERGENCY PREEMPTION PHASE SELECTOR	EA	2			2
	**	EMERGENCY PREEMPTION DETECTOR	EA	4			4
	**	EMERGENCY PREEMPTION DETECTOR CABLE	LF	790			790
	**	SIGN, "MOVEMENT PROHIBITION"(R3-4)(24" X 24")	EA			1	1
	**	SIGN, "MANDATORY MOVEMENT LANE CONTROL"(R3-5a)(30" X 36")	EA			1	1
	**	SIGN, "MANDATORY MOVEMENT LANE CONTROL"(R3-5L)(30" X 36")	EA			1	1
	**	SIGN, "MANDATORY MOVEMENT LANE CONTROL"(R3-5R)(30" X 36")	EA			2	2
	**	SIGN, "NO TURN ON RED" (R10-11VAR)(36" X 36")	EA		4		4
	**	SIGN, "LEFT TURN YIELD ON FLASHING YELLOW ARROW" (R10-17T)(30" X 36")	EA	1		2	3
	**	SIGN, "LEFT TURN YIELD ON FLASHING YELLOW ARROW" (R10-17SA)(30" X 36")	EA	2			2
	**	SIGN, "NO TURN ON RED" (R10-11a)(30" X 36")	EA	1			1
	**	SIGN, "SAHARA DR" (72" X 18")(D3-1B)	EA	2			2
	**	SIGN, "SAN PEDRO AVE" (96" X 18") (D3-1B)	EA	2			2
	**	SIGN, "S FLORES ST" (72" X 18")(D3-1B)	EA	2			2
	**	SIGN, "SAYERS AVE" (72" X 18")(D3-1B)	EA	2			2
	**	SIGN, "E SOUTHCROSS BLVD" (96" X 22")(D3-1B)	EA			2	2
	**	SIGN, "PECAN VALLEY DR" (96" X 22")(D3-1B)	EA			2	2
680	6004	REMOVING TRAFFIC SIGNALS	EA	1	1	1	3
682	6001	VEH SIG SEC (12")LED(GRN)	EA	10	8	10	28
682	6002	VEH SIG SEC (12")LED(GRN ARW)	EA	4		5	9
682	6003	VEH SIG SEC (12")LED(YEL)	EA	10	8	10	28
682	6004	VEH SIG SEC (12")LED(YEL ARW)	EA	6		7	13
682	6005	VEH SIG SEC (12")LED(RED)	EA	10	8	11	29
682	6006	VEH SIG SEC (12")LED(RED ARW)	EA	4		3	7
682	6018	PED SIG SEC (LED)(COUNTDOWN)	EA	8	8	8	24
682	6049	BACKPLATE W/REFL BRDR(4 SEC)	EA	2		4	6
682	6060	BACKPLATE W/REFL BRDR(3 SEC)	EA	10	8	10	28
684	6030	TRF SIG CBL (TY A)(14 AWG)(4 CONDR)	LF	640	610	637	1887
684	6035	TRF SIG CBL (TY A)(14 AWG)(9 CONDR)	LF	2,890	2040	3035	7965
684	6049	TRF SIG CBL (TY A)(16 AWG)(3 CONDR)	LF	1,190	1080	1096	3366
686	6001	INS TRF SIG PL AM (S)ILSN ARM(7')	EA	2	4		6
686	6002	INS TRF SIG PL AM (S)ILSN ARM(9')	EA	2		4	6
686	6028	INS TRF SIG PL AM(S)1 ARM(24')LUM&ILSN	EA		2		2
686	6032	INS TRF SIG PL AM(S)1 ARM(28')LUM&ILSN	EA		1		1
686	6036	INS TRF SIG PL AM(S)1 ARM(32')LUM&ILSN	EA		1		1
686	6040	INS TRF SIG PL AM(S)1 ARM(36')LUM&ILSN	EA	2			2
686	6044	INS TRF SIG PL AM(S)1 ARM(40')LUM&ILSN	EA			1	1
686	6052	INS TRF SIG PL AM(S)1 ARM(48')LUM&ILSN	EA			3	3
686	6060	INS TRF SIG PL AM(S)1 ARM(55')LUM&ILSN	EA				2
687	6001	PED POLE ASSEMBLY	EA	5	2	6	13
	**	DRILL SHAFT (TRF SIG POLE) (24 IN)	LF	28.5	11.4	36	75.9
688	6001	PED DETECT PUSH BUTTON (APS)	EA	8	8	8	24
	**	SIGN, PEDESTRIAN PUSH BUTTON (9" X 15") (R10-3eL)	EA	4	4	4	12
	**	SIGN, PEDESTRIAN PUSH BUTTON (9" X 15") (R10-3eR)	EA	4	4	4	12
688	6003	PED DETECTOR CONTROLLER UNIT	EA	1	1	1	3
6010	6010	CCTV FIELD EQUIP (ANALOG) (INSTL ONLY)	EA	1		1	2
	**	CCTV COMM CABLE	LF	290		185	475
6058	6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1	1	1	3
6090	6001	ILSN (LED)(6D)	EA	2	4		6
6090	6002	ILSN (LED)(8D)	EA	2		4	6
6292	6001	RVDS (PRESENCE DETECTION ONLY)	EA	4		4	8
6292	6002	RVDS (ADVANCE DETECTION ONLY)	EA	2		4	6
	**	RVDS COMM CABLE	LF	1060		1069	2129
SS6437	6001	FEDS PROCESSOR UNIT	EA		1		1
SS6437	6002	FEDS FISH EYE CAMERA ASSEMBLY	EA		1		1
SS6437	6004	LIFETIME FEDS DATA COLLECTION & REPORTING	EA		1		1
SS6437	6005	FEDS ETHERNET REPEATER	EA		1		1
SS6437	6006	FEDS COMMUNICATION CABLE	LF		60		60
**		MATERIALS SUBSIDIARY TO PERTINENT ITEMS					

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HIGHWAY SAFETY IMPROVEMENT PROGRAM QUANTITY SUMMARY			
SHEET 1 OF 1			
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
	STP 2023(535)HESG		11
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0915	12	698, etc.	VARIOUS


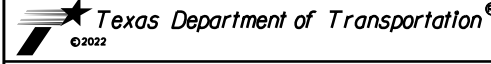
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SUMMARY OF TRAFFIC SIGNAL QUANTITIES

ITEM NO.	DESC CODE	DESCRIPTION	UNIT	SAN PEDRO AVE AT SAHARA DR	S FLORES ST AT W SAYERS AVE/E SAYERS AVE	E SOUTHCROSS BLVD AT PECAN VALLEY DR	PROJECT TOTAL
PEDESTRIAN IMPROVEMENTS							
104	6015	REMOVING CONC (SIDEWALKS)	SY	120	29		149
104	6021	REMOVING CONC (CURB)	LF	153	60	74	287
104	6024	REMOVING CONC (RETAINING WALLS)	SY	5			5
105	6013	REMOVING STAB BASE & ASPH PAV(9")	SY			44	44
110	6001	EXCAVATION (ROADWAY)	CY			6	6
162	6002	BLOCK SODDING	SY			84	84
168	6001	VEGETATIVE WATERING	MG			1.3	1
529	6001	CONC CURB (TY 1)	LF	153	60	61	274
531	6001	CONC SIDEWALKS (4")	SY	120	29	15	164
531	6004	CURB RAMPS (TY 1)	EA	4			4
531	6005	CURB RAMPS (TY 2)	EA		1	6	7
531	6006	CURB RAMPS (TY 3)	EA	4	2		6
536	6002	CONC MEDIAN	SY			10	10
3076	6066	TACK COAT	GAL			9	9
3076	6079	D-GR HMA TY-C PG70-22 (EXEMPT)	TON			23	23
SIGNING AND STRIPING ITEMS							
644	6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA			3	3
644	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA		2		2
644	6076	REMOVE SM RD SN SUP&AM	EA			4	4
666	6030	REFL PAV MRK TY I (W)8"(DOT)(100MIL)	LF			128	128
666	6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	277		1992	2269
666	6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	576	330	777	1683
666	6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	6		10	16
666	6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	1		5	6
666	6105	REFL PAV MRK TY I (W)(BIKE ARW)(100MIL)	EA			3	3
666	6111	REFL PAV MRK TY I (W)(BIKE SYML)(100MIL)	EA			3	3
666	6147	REFL PAV MRK TY I (Y)24"(SLD)(100MIL)	LF			43	43
666	6162	RE PV MRK TY I (BLACK)6"(SHADOW)(100MIL)	LF	1760	1040	2000	4800
666	6300	RE PM W/RET REQ TY I (W)4"(BRK)(100MIL)	LF	630	280		910
666	6300	RE PM W/RET REQ TY I (W)4"(BRK)(100MIL)	LF			410	410
666	6312	RE PM W/RET REQ TY I (Y)4"(BRK)(100MIL)	LF			80	80
666	6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	3365	1400	2668	7433
672	6007	REFL PAV MRKR TY I-C	EA	34	12	22	68
672	6009	REFL PAV MRKR TY II-A-A	EA	6	18	64	88
672	6010	REFL PAV MRKR TY II-C-R	LF			45	45
677	6001	ELIM EXT PAV MRK & MRKS (4")	LF	14	14	10	38
677	6003	ELIM EXT PAV MRK & MRKS (8")	LF	25		4	29
677	6005	ELIM EXT PAV MRK & MRKS (12")	LF	880		250	1130
677	6007	ELIM EXT PAV MRK & MRKS (24")	LF	575	22	194	791
677	6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA			2	2
677	6012	ELIM EXT PAV MRK & MRKS (WORD)	EA			1	1

** MATERIALS SUBSIDIARY TO PERTINENT ITEMS

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HIGHWAY SAFETY IMPROVEMENT PROGRAM QUANTITY SUMMARY			
SHEET - 1 OF 1			
FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.	
	STP 2023(535)HESG	-12	
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0915	12	698, etc.	VARIOUS

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TRAFFIC CONTROL PLAN SEQUENCE OF WORK

- (1) THIS PROJECT WILL BE CONSTRUCTED IN 3 PHASES. BEFORE THE COMMENCEMENT OF EACH PHASE, INSTALL ADVANCE WARNING SIGNS AND BARRICADES AS SHOWN ON THE PLANS AND/OR AS DIRECTED/APPROVED BY THE ENGINEER. DAILY LANE CLOSURES WILL BE USED IN ACCORDANCE WITH STATE TCP STANDARDS. DROP OFF CONDITIONS OF GREATER THAN 2" MUST HAVE A 3:1 SLOPE AT THE END OF EACH DAY, AS WELL AS THROUGHOUT THE PROJECT WHERE ACCESS TO ADJACENT PROPERTIES IS ALLOWED TO DRIVEWAYS AND SIDE STREETS.
- (2) PREPARING ROW / REMOVAL OF EXISTING ITEMS TO BE DONE ONLY IN AREAS WHERE WORK IS OCCURRING, AS PER THE PHASE NOTED BELOW
- (3) PLANING, SURFACE TREATMENTS AND OVERLAYS SHALL BE PERFORMED IN THE DIRECTION OF TRAFFIC. BEGIN SURFACE CONSTRUCTION ON HIGH SIDE OF ROAD TO AVOID WATER PONDING ISSUES.
- (4) THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE REQUIREMENTS OF ITEM 7, "LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC" AND ITEM 502, "BARRICADES, SIGNS, AND TRAFFIC HANDLING", OF THE STANDARD SPECIFICATIONS, AND TO THE GENERAL NOTES
- (5) CONTRACTOR IS NOT PERMITTED TO WORK IN AREAS WITH ONGOING UTILITY RELOCATION OR ROW ACQUISITION.
- (6) A BRIEF DESCRIPTION OF THESE PHASES ARE AS FOLLOWS:

PHASE 1 SOUTHCROSS BLVD AT PECAN VALLEY DR

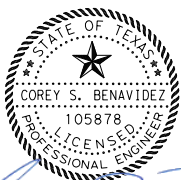
- STEP 1 - INSTALL DRILL SHAFTS, CONDUIT AND CABINET
- STEP 2 - INSTALL MEDIANS AND RAMPS
- STEP 3 - INSTALLATION OF POLES, MAST ARMS AND SIGNALS HEADS
- STEP 4 - INSTALL PAVEMENT MARKINGS AND SIGNS

PHASE 2 SAN PEDRO AVE AT SAHARA DR.

- STEP 1 - INSTALL DRILL SHAFTS, CONDUIT AND CABINET
- STEP 2 - INSTALL SIDEWALKS AND RAMPS
- STEP 3 - INSTALLATION OF POLES, MAST ARMS AND SIGNALS HEADS
- STEP 4 - INSTALL PAVEMENT MARKINGS AND SIGNS


PHASE 3 S. FLORES STREET AND SAYERS DR.

- STEP 1 - INSTALL DRILL SHAFTS, CONDUIT AND CABINET
- STEP 2 - INSTALLATION OF POLES, MAST ARMS AND SIGNALS HEADS
- STEP 3 - INSTALL SIDEWALKS AND RAMPS
- STEP 4 - INSTALL PAVEMENT MARKINGS AND SIGNS



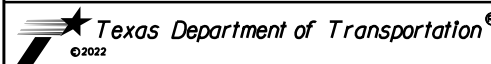
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Texas PE Firm Reg. #F-929
 4801 NW Loop 410, Suite 910, San Antonio, Texas 78229
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**HIGHWAY SAFETY
 IMPROVEMENT PROGRAM
 TRAFFIC CONTROL PLAN
 NARRATIVE**

SHEET - 1 OF 1

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
	STP 2023(535)HESG	13
STATE	DIST.	COUNTY
TEXAS	SAT	BE XAR
CONT.	SECT.	JOB
0915	12	698, etc.
		HIGHWAY NO.
		VARIOUS

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LOCATION NO. AND TCP PHASE REPRESENT THE 3 INTERSECTIONS,
 1. SAN PEDRO AT SAHARA DR
 2. S. FLORES ST AT W SAYERS AVE
 3. E SOUTHCROSS BLVD AT PECAN VALLEY DR

LOC NO.	TCP PHASE	SPECIFIC TCP PLAN SHEET OR TCP STANDARD SHEET SHEET NUMBER	FURNISH TMA/TA	RELOCATE/REUSE TMA/TA	TOTAL TMA/TA PER SET UP	DURATION OF TMA/TA SET UP	6185 6002 TMA (STATIONARY)	6185 6005 TMA (MOBILE OPERATION)
			EA	EA	EA	DAYS PER TMA/TA USE	DAY	DAY
			1	1	WZ (BTS-1)-13	1		1
2	2	WZ (BTS-1)-13		1	1	30	30	
3	3	WZ (BTS-1)-13		1	1	30	30	
TOTALS			1				90	

NOTE.
 FURNISH TMA/TA - THE NUMBER OF ATTENUATORS BEING FURNISHED FOR THE SPECIFIC TCP.
 RELOCATE/REUSE TMA/TA - THE NUMBER OF ATTENUATORS BEING REUSED FROM A PREVIOUS TCP FOR THE SPECIFIC TCP.
 TOTAL TMA/TA PER SET UP = (FURNISH TMA/TA) + (RELOCATE/REUSE TMA/TA)
 DURATION OF TMA/TA SET UP - THE NUMBER OF DAYS THE ATTENUATORS WILL BE USED FOR THE SPECIFIC TCP.
 TMA/TA (STATIONARY) = (TOTAL TMA/TA PER SET UP) X (THE DURATION OF TMA/TA SET UP)
 TMA/TA (MOBILE OPERATION) = (TOTAL TMA/TA PER SET UP) X (THE DURATION OF TMA/TA SET UP)

TRUCK MOUNTED ATTENUATOR (TMA) AND TRAILER ATTENUATOR (TA) SUMMARY SHEET

FILE: tma.dgn	DN: TxDOT	CK:	CK:
© TxDOT	CONT	SECT	JOB
REVISIONS 3/2018	0915	12	698
	DIST	COUNTY	
	SAT	BEXAR	
	FEDERAL AID PROJECT	SHEET NO.	
		13A	

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

WORKER SAFETY NOTES:


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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

1. Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.
2. Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

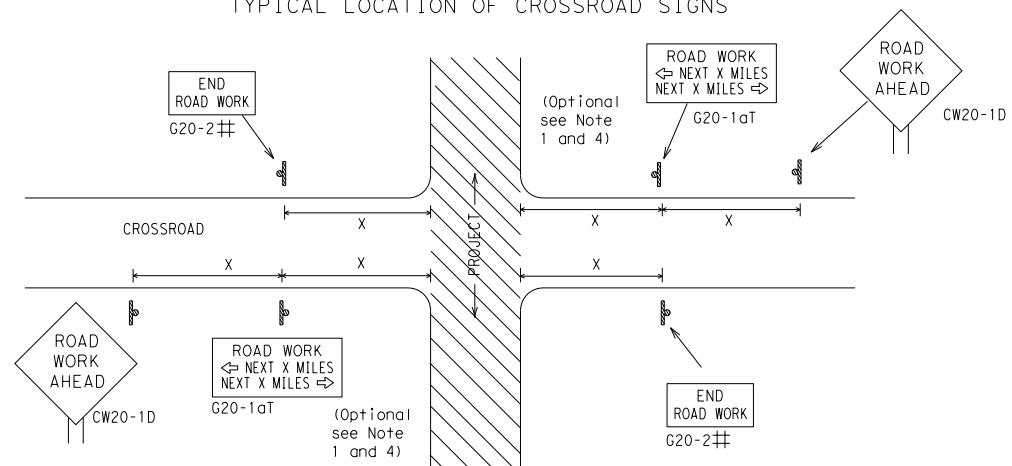
THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS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

SHEET 1 OF 12

 Texas Department of Transportation		Traffic Safety Division Standard	
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS			
BC (1) - 21			
FILE:	bc-21.dgn	DN:	TxDOT
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		DW:	TxDOT
		CK:	TxDOT
CONT	SECT	JOB	HIGHWAY
0915	12	698,etc	Various
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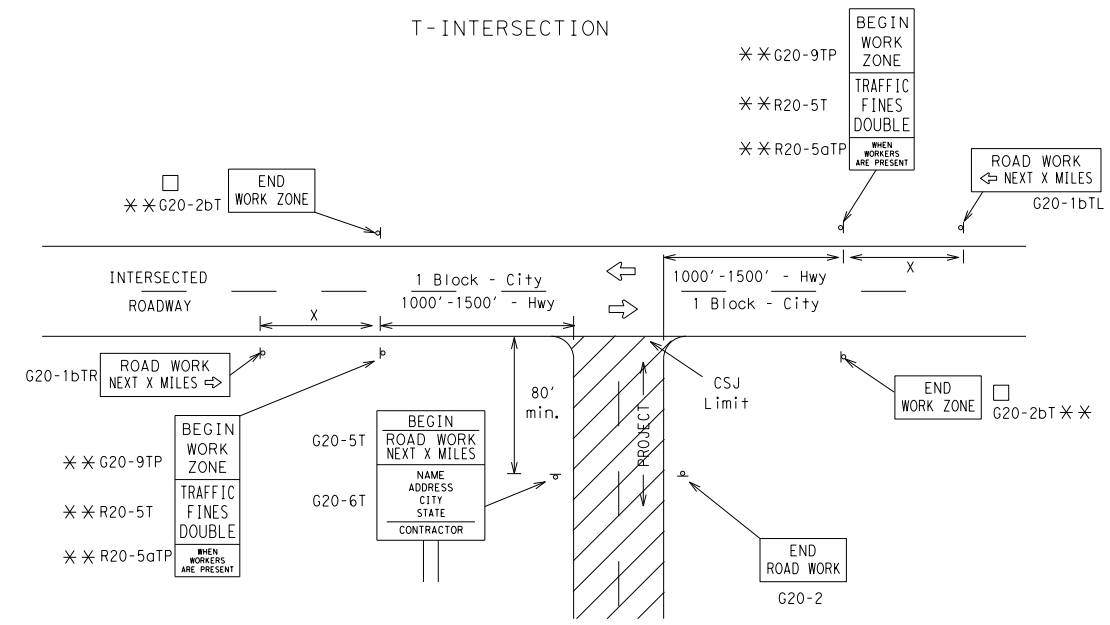
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TYPICAL LOCATION OF CROSSROAD SIGNS



- ## May be mounted on back of "ROAD WORK AHEAD" (CW20-1D) sign with approval of Engineer. (See note 2 below)
- The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D) sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
 - The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK" (G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume as per TMUTCD Part 5. This information shall be shown in the plans.
 - Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
 - The "ROAD WORK NEXT X MILES" (G20-1aT) sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
 - Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
 - When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING^{1,5,6}

Sign Number or Series	SIZE		SPACING	
	Conventional Road	Expressway/Freeway	Posted Speed MPH	Sign Δ Spacing "x" Feet (Apprx.)
CW20 ⁴	48" x 48"	48" x 48"	30	120
CW21			35	160
CW22			40	240
CW23			45	320
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"	50	400
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"	60	600 ²
			65	700 ²
			70	800 ²
			80	1000 ²
*			*	* ³

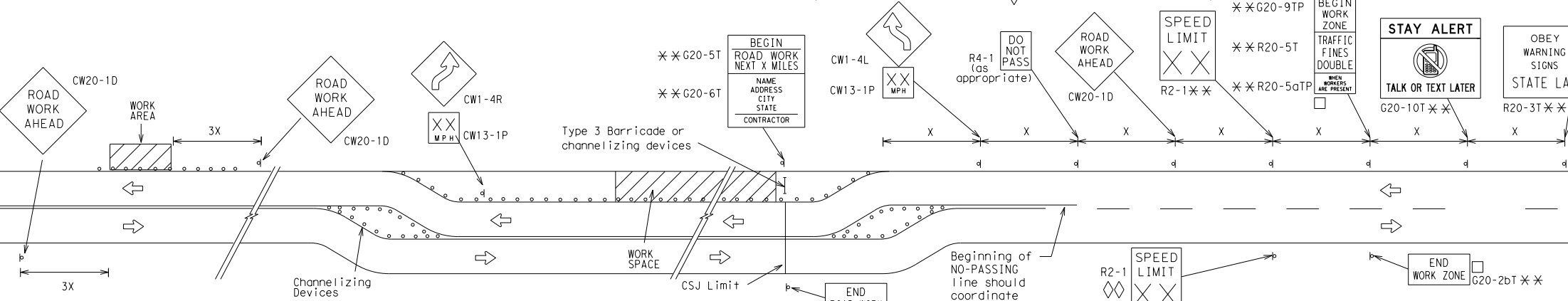
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

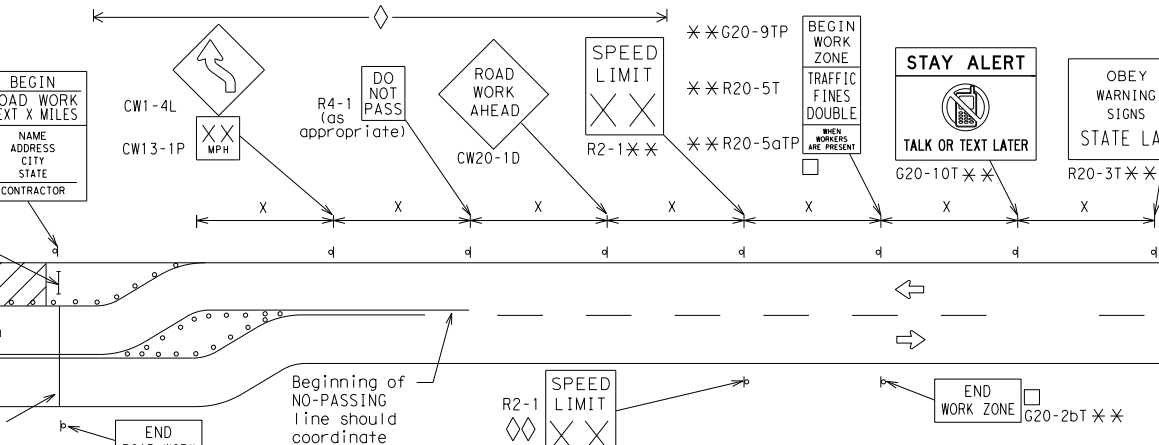
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be used on low volume crossroads at the discretion of the Engineer as per TMUTCD Part 5. See Note 2 under "Typical Location of Crossroad Signs".
- Only diamond shaped warning sign sizes are indicated.
- See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

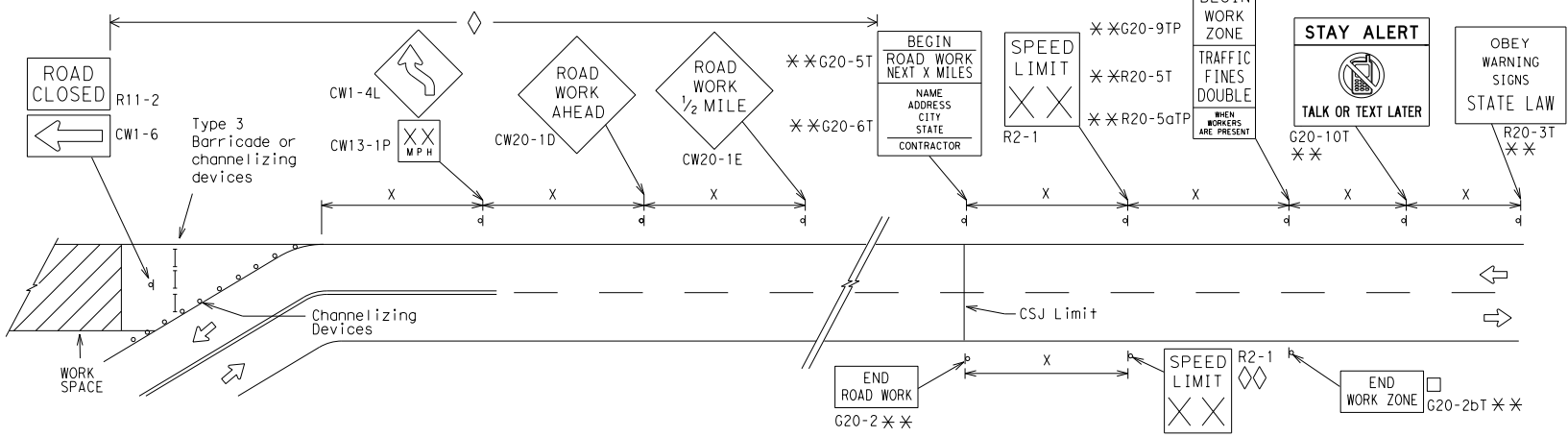


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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



NOTES

- The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-5T) sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.
- The "BEGIN WORK ZONE" (G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.
 - ** CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.
 - ◇ Area for placement of "ROAD WORK AHEAD" (CW20-1D) sign and other signs or devices as called for on the Traffic Control Plan.
 - ◇◇ Contractor will install a regulatory speed limit sign at the end of the work zone.

LEGEND

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

SHEET 2 OF 12



BARRICADE AND CONSTRUCTION PROJECT LIMIT

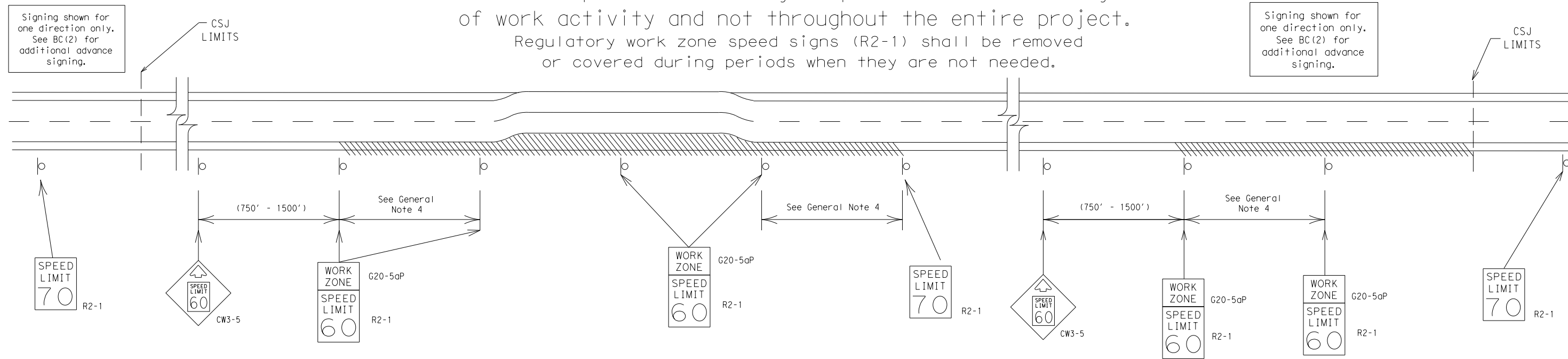
BC (2) - 21

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0915	12	698, etc	Various
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	SAT	BEXAR	15	

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

- Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
- Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- Frequency of work zone speed limit signs should be:

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

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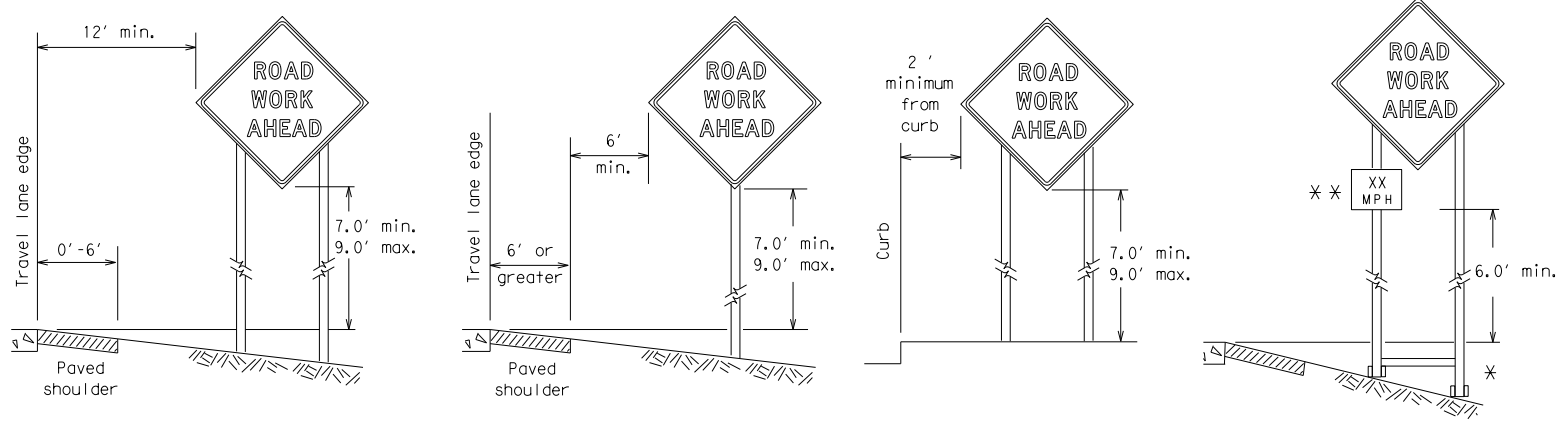
SHEET 3 OF 12

				Traffic Safety Division Standard	
<h2>BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT</h2>					
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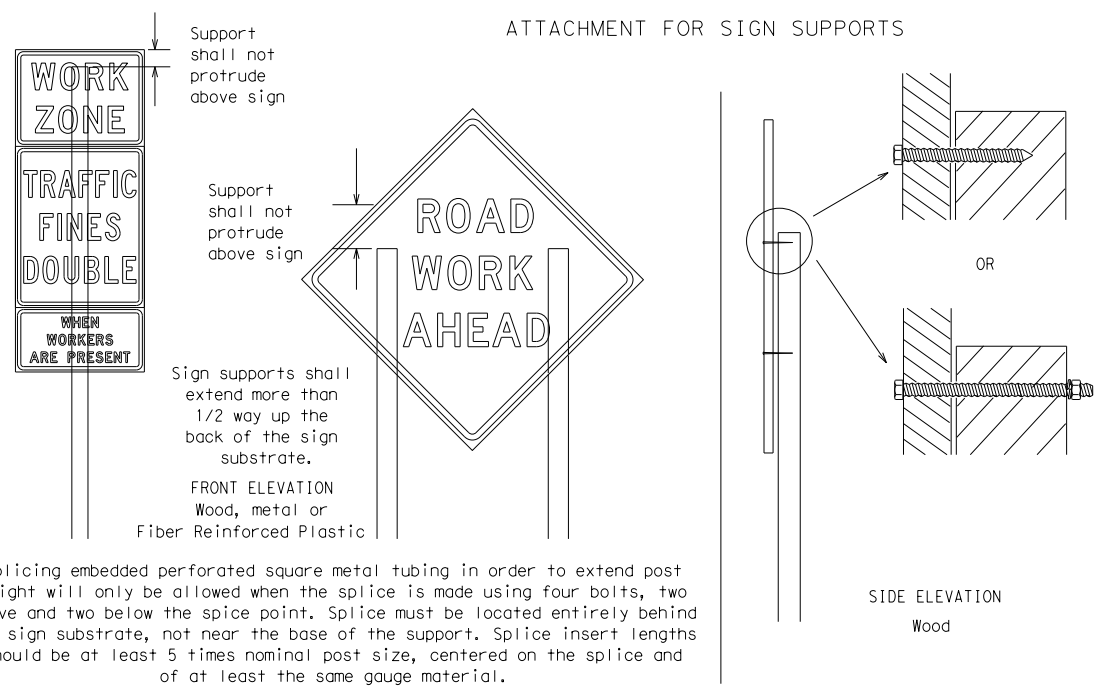
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



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

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

ATTACHMENT FOR SIGN SUPPORTS



Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two above and two below the splice point. Splice must be located entirely behind the sign substrate, not near the base of the support. Splice insert lengths should be at least 5 times nominal post size, centered on the splice and of at least the same gauge material.

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

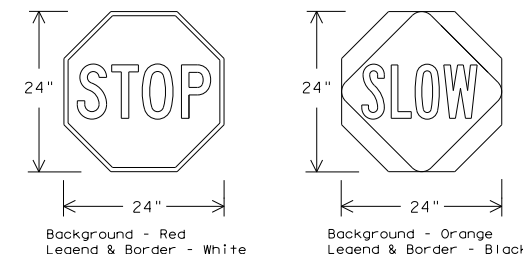
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not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

FLAGS ON SIGNS

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

STOP/SLOW PADDLES

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



SHEETING REQUIREMENTS (WHEN USED AT NIGHT)		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B _{FL} OR C _{FL} SHEETING
LEGEND & BORDER	WHITE	TYPE B OR C SHEETING
LEGEND & BORDER	BLACK	ACRYLIC NON-REFLECTIVE FILM

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

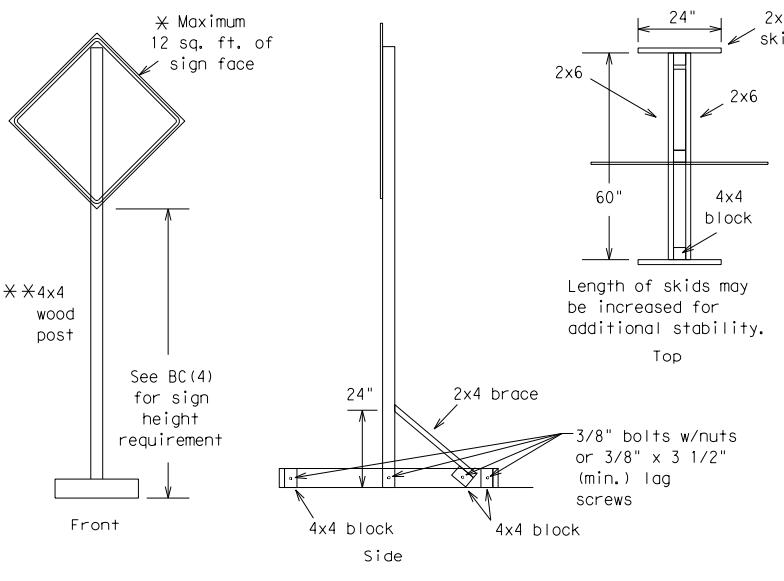
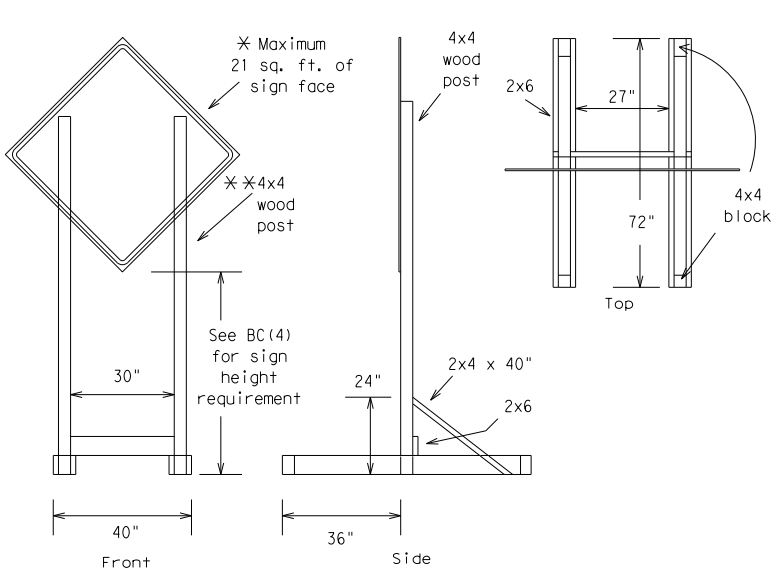
Traffic Safety Division Standard

**BARRICADE AND CONSTRUCTION
 TEMPORARY SIGN NOTES**

BC (4) - 21

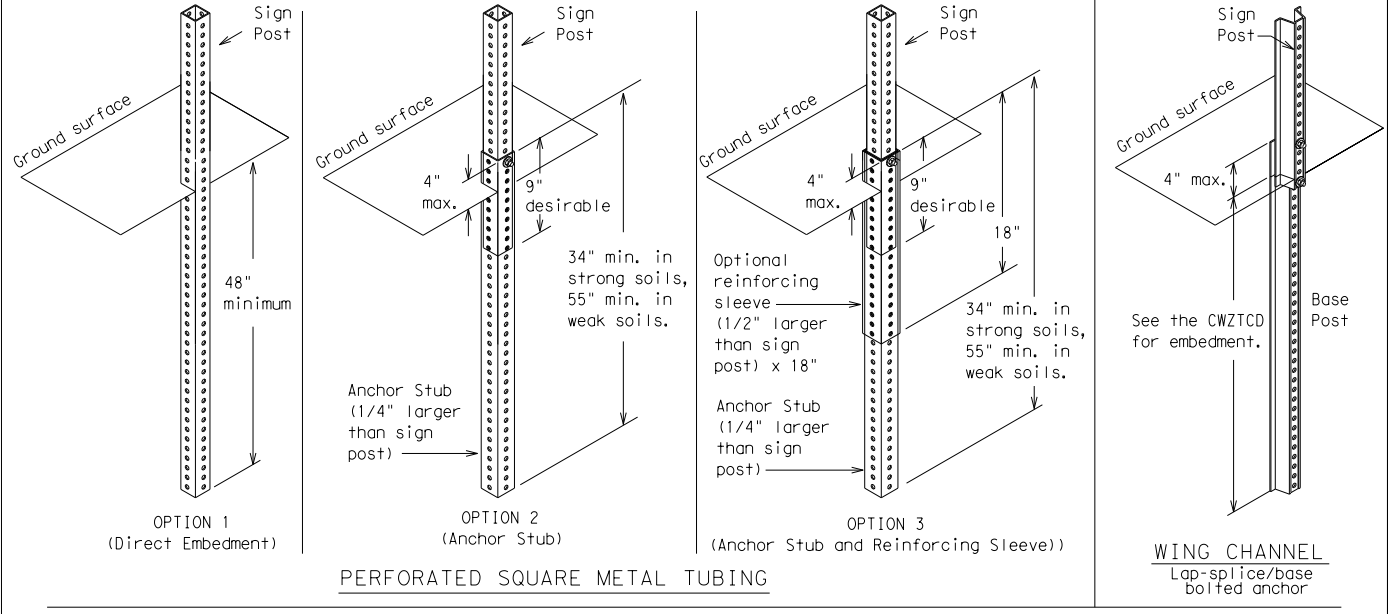
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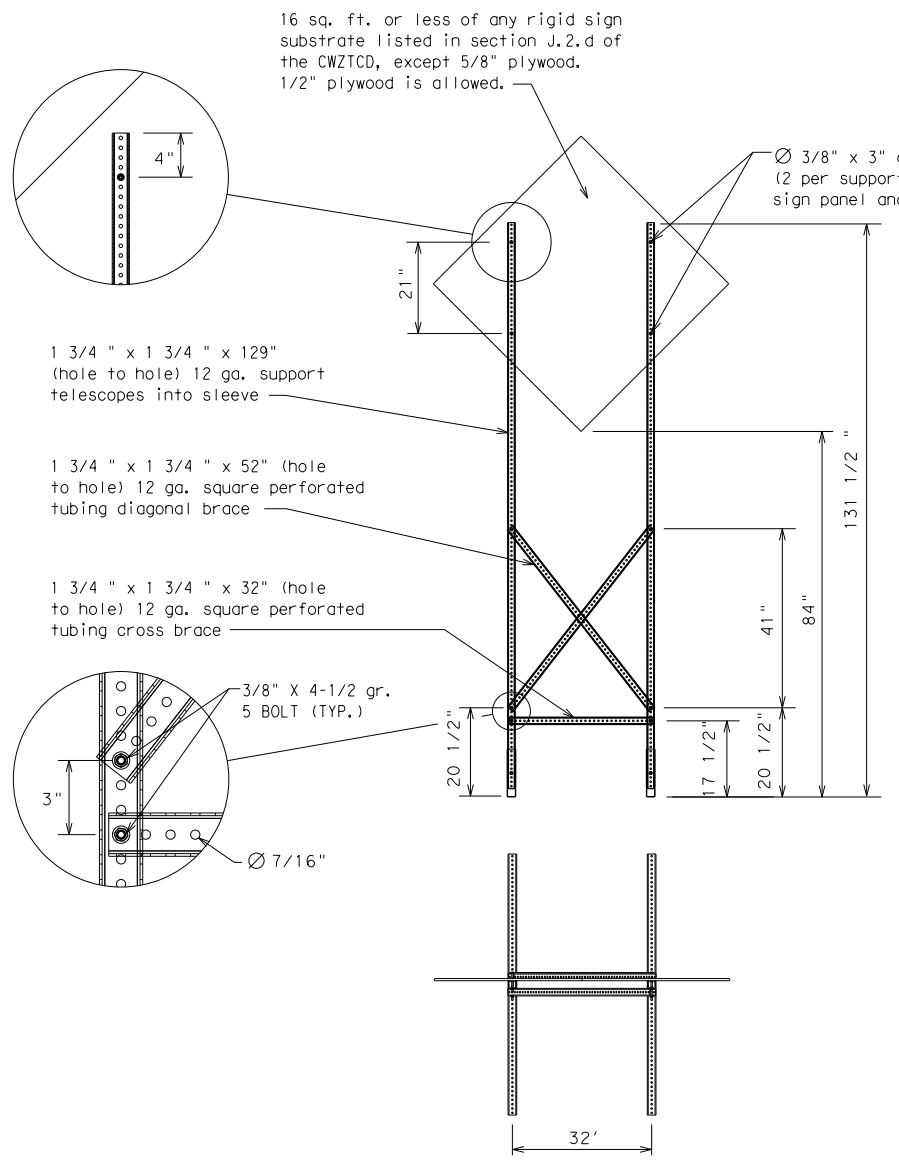
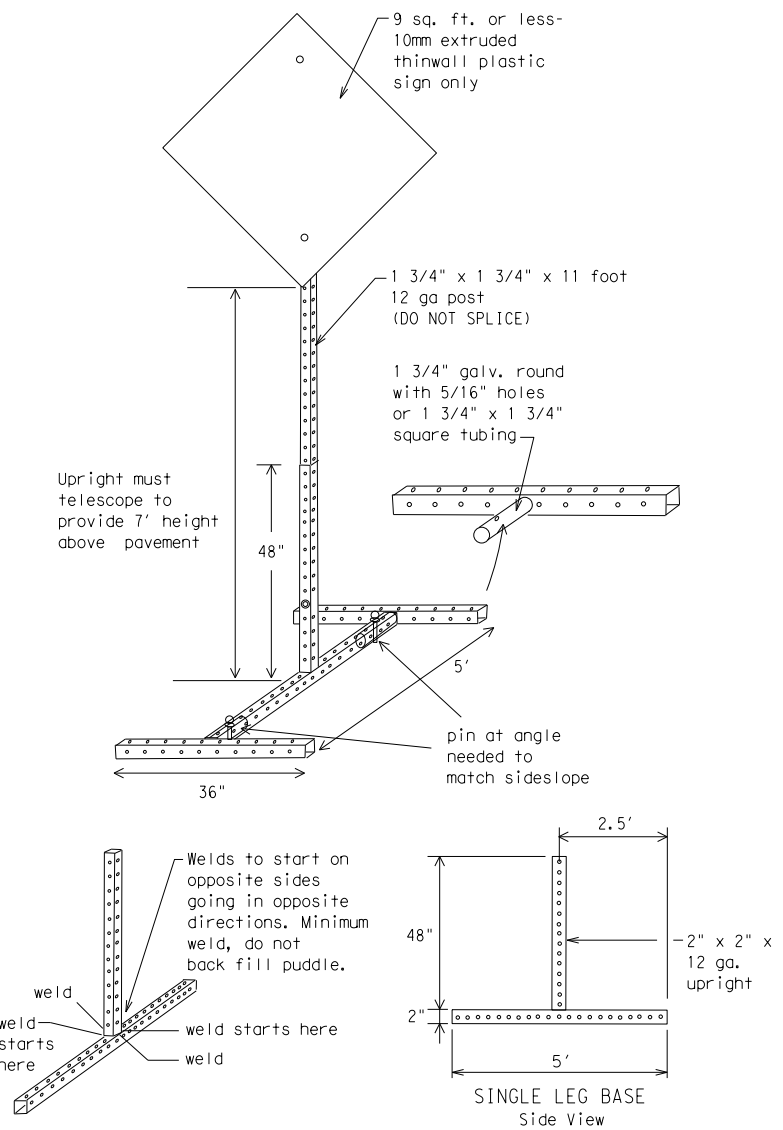
SKID MOUNTED WOOD SIGN SUPPORTS

* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS



GROUND MOUNTED SIGN SUPPORTS

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



SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

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

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

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



BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5) - 21

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9-07	8-14	DIST	COUNTY	SHEET NO.					
7-13	5-21	SAT	BEXAR	18					

WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

(The Engineer may approve other messages not specifically covered here.)

PORTABLE CHANGEABLE MESSAGE SIGNS

- The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
- Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR," "AT," etc.
- Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by itself.
- Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
- Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
- When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
- The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
- The Engineer/Inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
- Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
- Do not present redundant information on a two-phase message; i.e., keeping two lines of the message the same and changing the third line.
- Do not use the word "Danger" in message.
- Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
- Do not display messages that scroll horizontally or vertically across the face of the sign.
- The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMUTCD.
- PCMS character height should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
- Each line of text should be centered on the message board rather than left or right justified.
- If disabled, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE
ROAD CLOSED AT SH XXX
ROAD CLSD AT FM XXXX
RIGHT X LANES CLOSED
CENTER LANE CLOSED
NIGHT LANE CLOSURES
VARIOUS LANES CLOSED
EXIT CLOSED
MALL DRIVEWAY CLOSED
XXXXXXXX BLVD CLOSED

Other Condition List

FRONTAGE ROAD CLOSED
SHOULDER CLOSED XXX FT
RIGHT LN CLOSED XXX FT
RIGHT X LANES OPEN
DAYTIME LANE CLOSURES
I-XX SOUTH EXIT CLOSED
EXIT XXX CLOSED X MILE
RIGHT LN TO BE CLOSED
X LANES CLOSED TUE - FRI
ROADWORK XXX FT
FLAGGER XXXX FT
RIGHT LN NARROWS XXXX FT
MERGING TRAFFIC XXXX FT
LOOSE GRAVEL XXXX FT
DETOUR X MILE
ROADWORK PAST SH XXXX
BUMP XXXX FT
TRAFFIC SIGNAL XXXX FT

ROAD REPAIRS XXXX FT
LANE NARROWS XXXX FT
TWO-WAY TRAFFIC XX MILE
CONST TRAFFIC XXX FT
UNEVEN LANES XXXX FT
ROUGH ROAD XXXX FT
ROADWORK NEXT FRI-SUN
US XXX EXIT X MILES
LANES SHIFT *

* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

MERGE RIGHT
DETOUR NEXT X EXITS
USE EXIT XXX
STAY ON US XXX SOUTH
TRUCKS USE US XXX N
WATCH FOR TRUCKS
EXPECT DELAYS
REDUCE SPEED XXX FT
USE OTHER ROUTES
STAY IN LANE *

Location List

AT FM XXXX
BEFORE RAILROAD CROSSING
NEXT X MILES
PAST US XXX EXIT
XXXXXXXX TO XXXXXXX
US XXX TO FM XXXX

Warning List

SPEED LIMIT XX MPH
MAXIMUM SPEED XX MPH
MINIMUM SPEED XX MPH
ADVISORY SPEED XX MPH
RIGHT LANE EXIT
USE CAUTION
DRIVE SAFELY
DRIVE WITH CARE

** Advance Notice List

TUE-FRI XX AM-X PM
APR XX-XX X PM-X AM
BEGINS MONDAY
BEGINS MAY XX
MAY X-X XX PM - XX AM
NEXT FRI-SUN
XX AM TO XX PM
NEXT TUE AUG XX
TONIGHT XX PM-XX AM

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

- Only 1 or 2 phases are to be used on a PCMS.
- The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
- A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
- A Location Phase is necessary only if a distance or location is not included in the first phase selected.
- If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS shall be limited to two phases, and should be understandable by themselves.
- For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

WORDING ALTERNATIVES

- The words RIGHT, LEFT and ALL can be interchanged as appropriate.
- Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
- EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
- Highway names and numbers replaced as appropriate.
- ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
- AHEAD may be used instead of distances if necessary.
- FT and MI, MILE and MILES interchanged as appropriate.
- AT, BEFORE and PAST interchanged as needed.
- Distances or AHEAD can be eliminated from the message if a location phase is used.

PCMS SIGNS WITHIN THE R.O.W. SHALL BE BEHIND GUARDRAIL OR CONCRETE BARRIER OR SHALL HAVE A MINIMUM OF FOUR (4) PLASTIC DRUMS PLACED PERPENDICULAR TO TRAFFIC ON THE UPSTREAM SIDE OF THE PCMS, WHEN EXPOSED TO ONE DIRECTION OF TRAFFIC. WHEN EXPOSED TO TWO WAY TRAFFIC, THE FOUR DRUMS SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

FULL MATRIX PCMS SIGNS

- When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
- When symbol signs, such as the "Flagger Symbol" (CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
- When symbol signs are represented graphically on the Full Matrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute for, or replace that sign.
- A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

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WORD OR PHRASE	ABBREVIATION	WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD	Major	MAJ
Alternate	ALT	Miles	MI
Avenue	AVE	Miles Per Hour	MPH
Best Route	BEST RTE	Minor	MNR
Boulevard	BLVD	Monday	MON
Bridge	BRDG	Normal	NORM
Cannot	CANT	North	N
Center	CTR	Northbound	(route) N
Construction Ahead	CONST AHD	Parking	PKING
CROSSING	XING	Road	RD
Detour Route	DETOUR RTE	Right Lane	RT LN
Do Not	DONT	Saturday	SAT
East	E	Service Road	SERV RD
Eastbound	(route) E	Shoulder	SHLDR
Emergency	EMER	Slippery	SLIP
Emergency Vehicle	EMER VEH	South	S
Entrance, Enter	ENT	Southbound	(route) S
Express Lane	EXP LN	Speed	SPD
Expressway	EXPWY	Street	ST
XXXX Feet	XXXX FT	Sunday	SUN
Fog Ahead	FOG AHD	Telephone	PHONE
Freeway	FRWY, FWY	Temporary	TEMP
Freeway Blocked	FWY BLKD	Thursday	THURS
Friday	FRI	To Downtown	TO DWNTN
Hazardous Driving	HAZ DRIVING	Traffic	TRAF
Hazardous Material	HAZMAT	Travelers	TRVLR
High-Occupancy Vehicle	HOV	Tuesday	TUES
Highway	Hwy	Time Minutes	TIME MIN
Hour(s)	HR, HRS	Upper Level	UPR LEVEL
Information	INFO	Vehicles (s)	VEH, VEHS
It Is	ITS	Warning	WARN
Junction	JCT	Wednesday	WED
Left	LFT	Weight Limit	WT LIMIT
Left Lane	LFT LN	West	W
Lane Closed	LN CLOSED	Westbound	(route) W
Lower Level	LWR LEVEL	Wet Pavement	WET PVMT
Maintenance	MAINT	Will Not	WONT

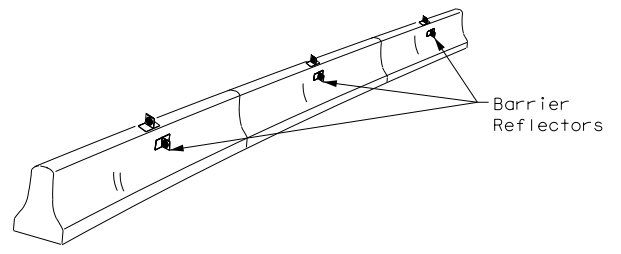
Roadway designation # IH-number, US-number, SH-number, FM-number

<h3>BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)</h3>			
<h2>BC (6) - 21</h2>			
FILE:	bc-21.dgn	DN:	TxDOT
© TxDOT	November 2002	CONT:	SECT:
REVISIONS		0915	12
9-07	8-14	JOB: 698, etc	
7-13	5-21	DIST:	COUNTY: BEXAR
		SHEET NO.: 19	

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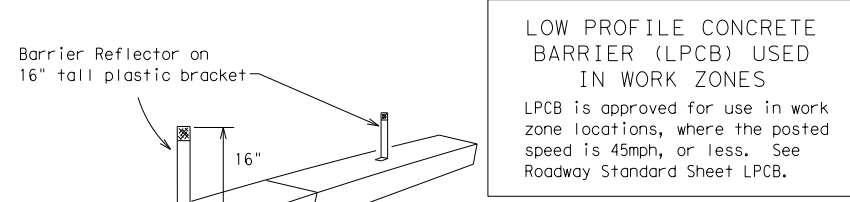
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.



CONCRETE TRAFFIC BARRIER (CTB)

- Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector. The Barrier Reflector mounted on the side of the CTB shall be located directly below the reflector mounted on top of the barrier, as shown in the detail above.
- Where CTB separates two-way traffic, three barrier reflectors shall be mounted on each section of CTB. The reflector unit on top shall have two yellow reflective faces (Bi-Directional) while the reflectors on each side of the barrier shall have one yellow reflective face, as shown in the detail above.
- When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
- Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
- Maximum spacing of Barrier Reflectors is forty (40) feet.
- Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
- Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
- Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
- Single slope barriers shall be delineated as shown on the above detail.



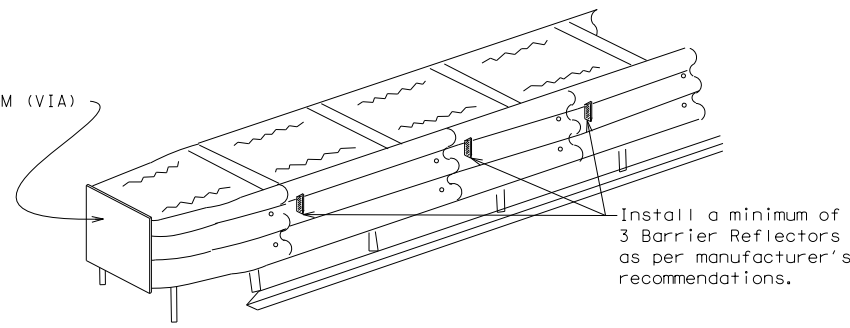
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

Barrier Reflector on 16" tall plastic bracket

Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)

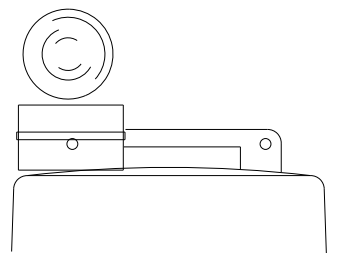


DELINEATION OF END TREATMENTS

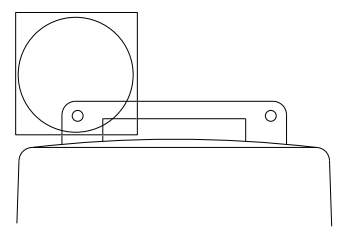
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet the appropriate crashworthy standards as defined in the Manual for Assessing Safety Hardware (MASH). Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

WARNING LIGHTS

- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B_{FL} or C_{FL} Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
- Type-C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control devices. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "SB".
- The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
- When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.
- When used to delineate curves, Type-C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
- The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

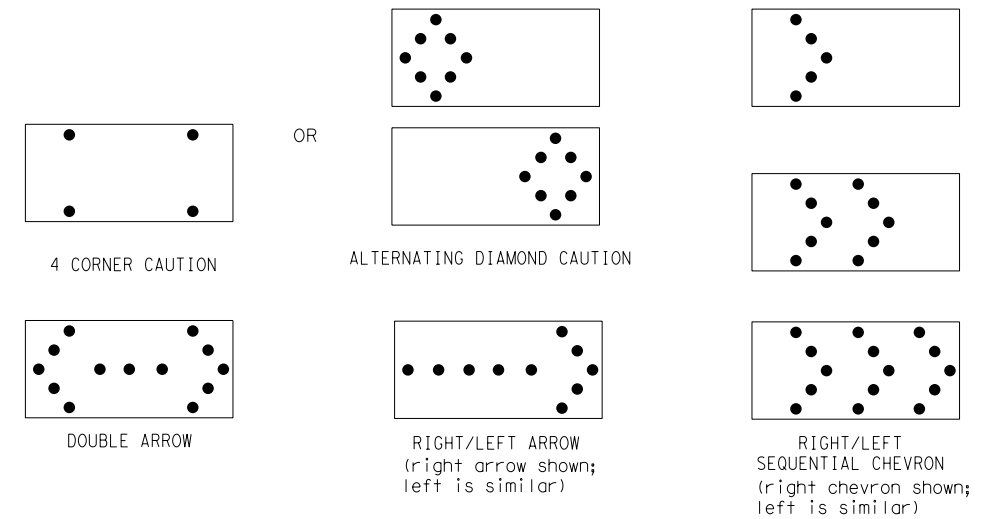
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing devices to form a merging taper may be used for delineation. If used, the successive flashing of the sequential warning lights should occur from the beginning of the taper to the end of the merging taper in order to identify the desired vehicle path. The rate of flashing for each light shall be 65 flashes per minute, plus or minus 10 flashes.
- Type C and D steady-burn warning lights are intended to be used in a series to delineate the edge of the travel lane on detours, on lane changes, on lane closures, and on other similar conditions.
- Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
- Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
- The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.

WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C (STEADY BURN) WARNING LIGHTS

- A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
- The warning reflector shall be yellow in color and shall be manufactured using a sign substrate approved for use with plastic drums listed on the CWZTCD.
- The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
- Round reflectors shall be fully reflectorized, including the area where attached to the drum.
- Square substrates must have a minimum of 30 square inches of reflectorized sheeting. They do not have to be reflectorized where it attaches to the drum.
- The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300-Type B or Type C.
- When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
- The warning reflector should be mounted on the side of the handle nearest approaching traffic.
- The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.

Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

- The Flashing Arrow Board should be used for all lane closures on multi-lane roadways, or slow moving maintenance or construction activities on the travel lanes.
- Flashing Arrow Boards should not be used on two-lane, two-way roadways, detours, diversions or work on shoulders unless the "CAUTION" display (see detail below) is used.
- The Engineer/Inspector shall choose all appropriate signs, barricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Board.
- The Flashing Arrow Board should be able to display the following symbols:



- The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
- The straight line caution display is NOT ALLOWED.
- The Flashing Arrow Board shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
- Minimum lamp "on time" shall be approximately 50 percent for the flashing arrow and equal intervals of 25 percent for each sequential phase of the flashing chevron.
- The sequential arrow display is NOT ALLOWED.
- The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
- The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
- A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
- A full matrix PCMS may be used to simulate a Flashing Arrow Board provided it meets visibility, flash rate and dimming requirements on this sheet for the same size arrow.
- Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

REQUIREMENTS			
TYPE	MINIMUM SIZE	MINIMUM NUMBER OF PANEL LAMPS	MINIMUM VISIBILITY DISTANCE
B	30 x 60	13	3/4 mile
C	48 x 96	15	1 mile

ATTENTION
Flashing Arrow Boards shall be equipped with automatic dimming devices.

WHEN NOT IN USE, REMOVE THE ARROW BOARD FROM THE RIGHT-OF-WAY OR PLACE THE ARROW BOARD BEHIND CONCRETE TRAFFIC BARRIER OR GUARDRAIL.

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

- Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
- Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
- Refer to the CWZTCD for a list of approved TMAs.
- TMAs are required on freeways unless otherwise noted in the plans.
- A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
- The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR

BC(7)-21

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©TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0915	12	698,etc	Various				
9-07	8-14	DIST		COUNTY	SHEET NO.				
7-13	5-21	SAT		BEXAR	20				

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

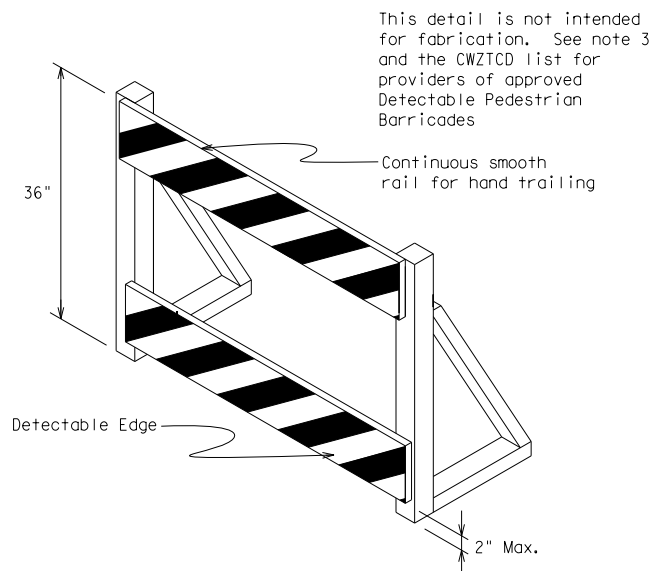
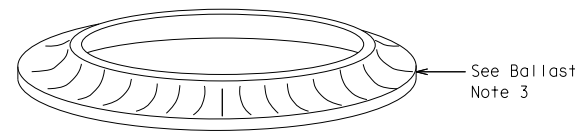
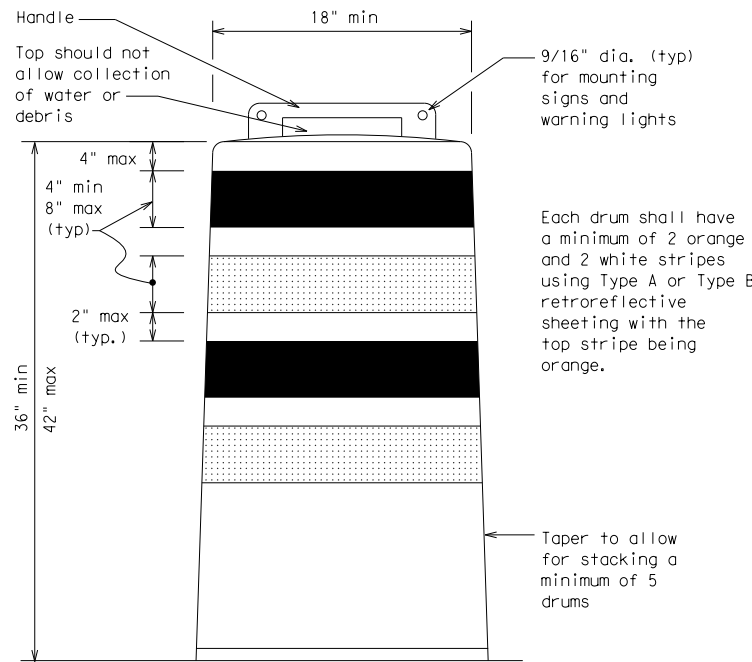
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

RETROREFLECTIVE SHEETING

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

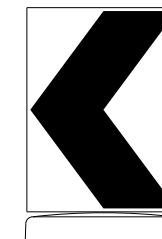
BALLAST

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

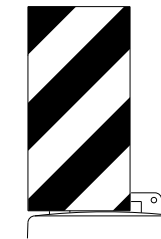


DETECTABLE PEDESTRIAN BARRICADES

- When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility. Refer to WZ(BTS-2) for Pedestrian Control requirements for Sidewalk Diversions, Sidewalk Detours and Crosswalk Closures.
- Where pedestrians with visual disabilities normally use the closed sidewalk, a Detectable Pedestrian Barricade shall be placed across the full width of the closed sidewalk instead of a Type 3 Barricade.
- Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
- Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines (ADAAG)" and should not be used as a control for pedestrian movements.
- Warning lights shall not be attached to detectable pedestrian barricades.
- Detectable pedestrian barricades should use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

SHEET 8 OF 12



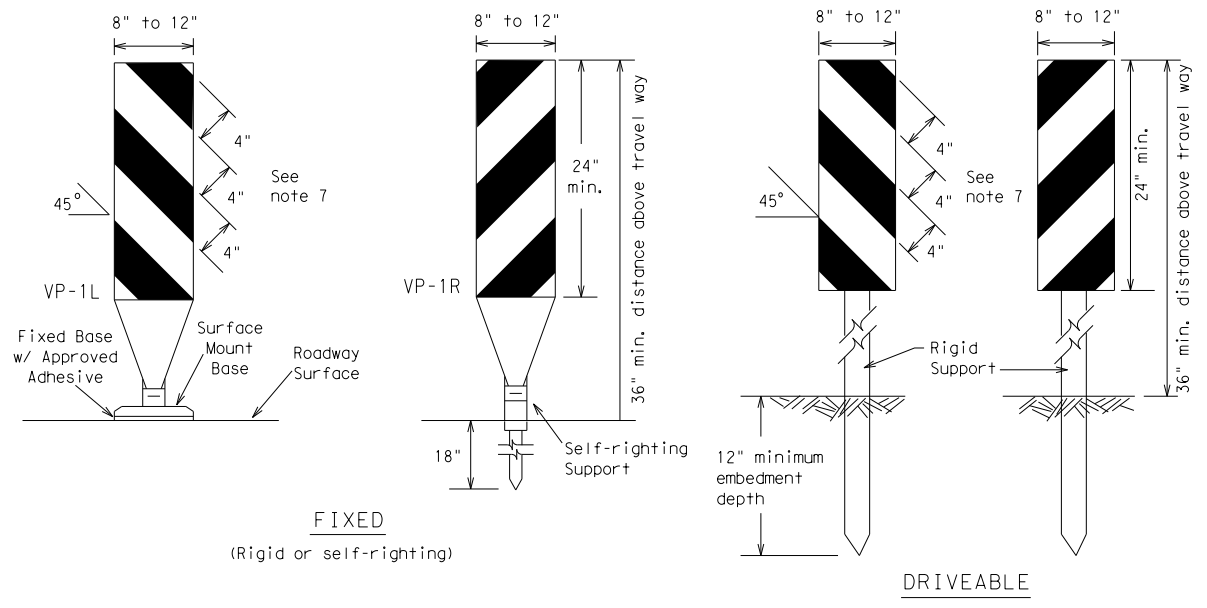
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (8) - 21

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© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0915	12	698, etc		Various			
4-03	8-14	DIST	COUNTY	SHEET NO.					
9-07	5-21	SAT	BEXAR	21					
7-13									

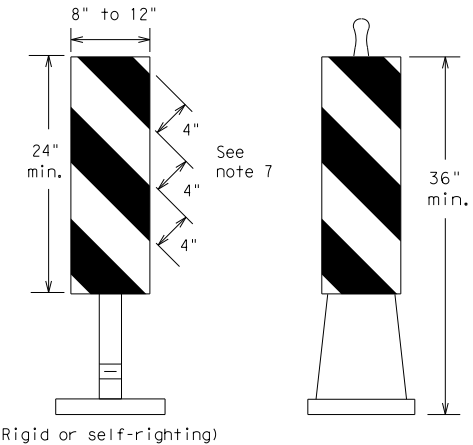
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(Rigid or self-righting)

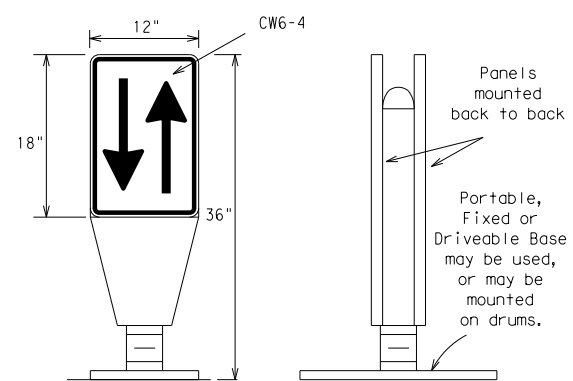
DRIVEABLE



PORTABLE

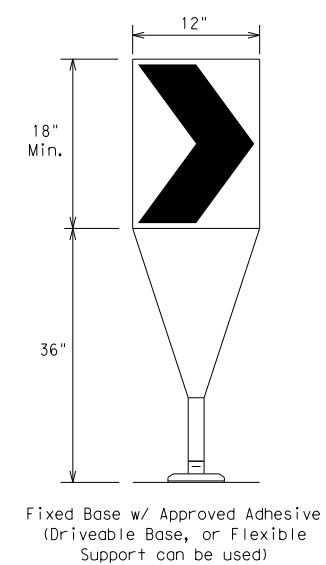
VERTICAL PANELS (VPs)

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



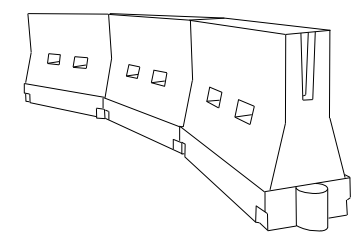
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

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



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

CHEVRONS



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

GENERAL NOTES

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0915	12	698,etc		Various			
9-07	8-14	DIST		COUNTY	SHEET NO.				
7-13	5-21	SAT		BEXAR	22				

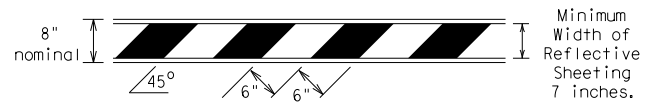
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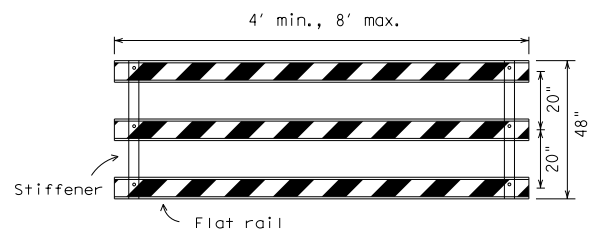
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.

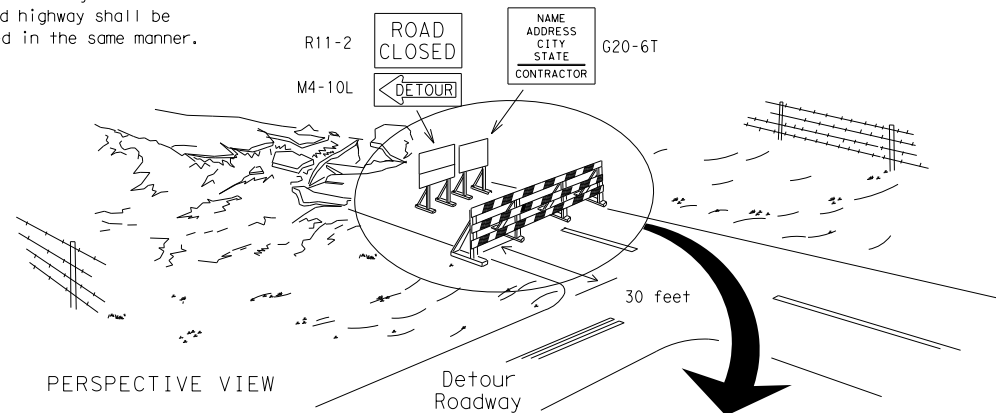


TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



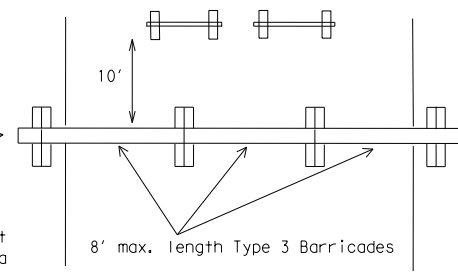
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

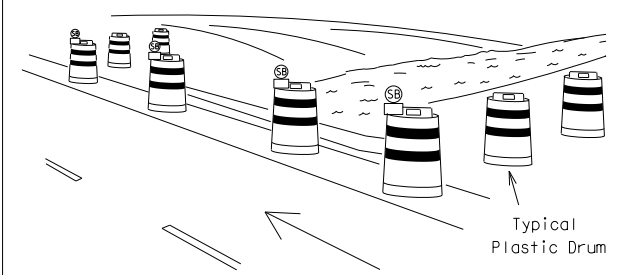
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



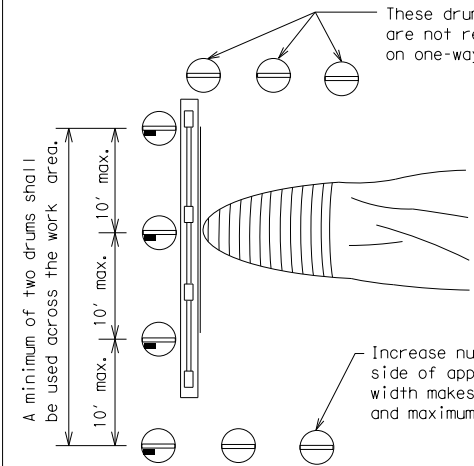
PLAN VIEW

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

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

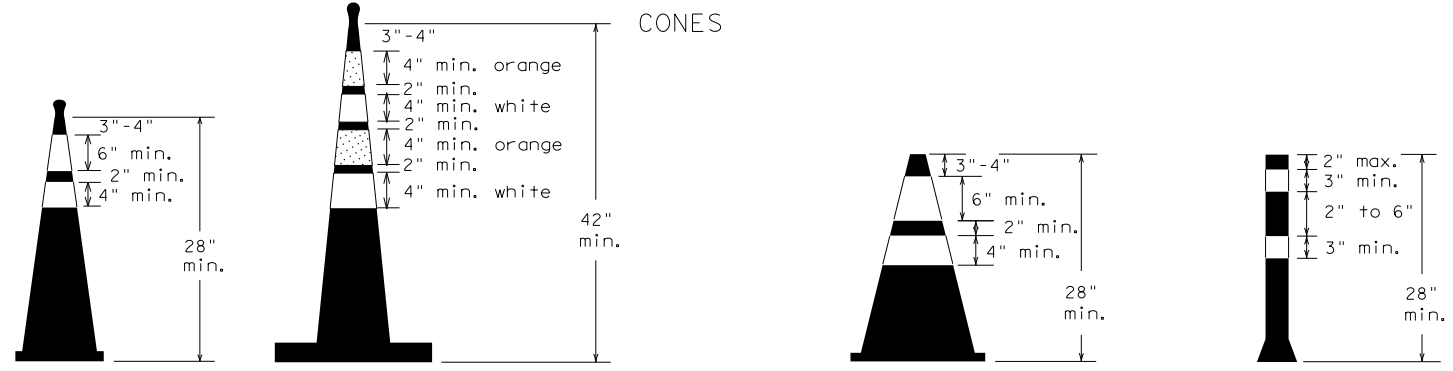


PLAN VIEW

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

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

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



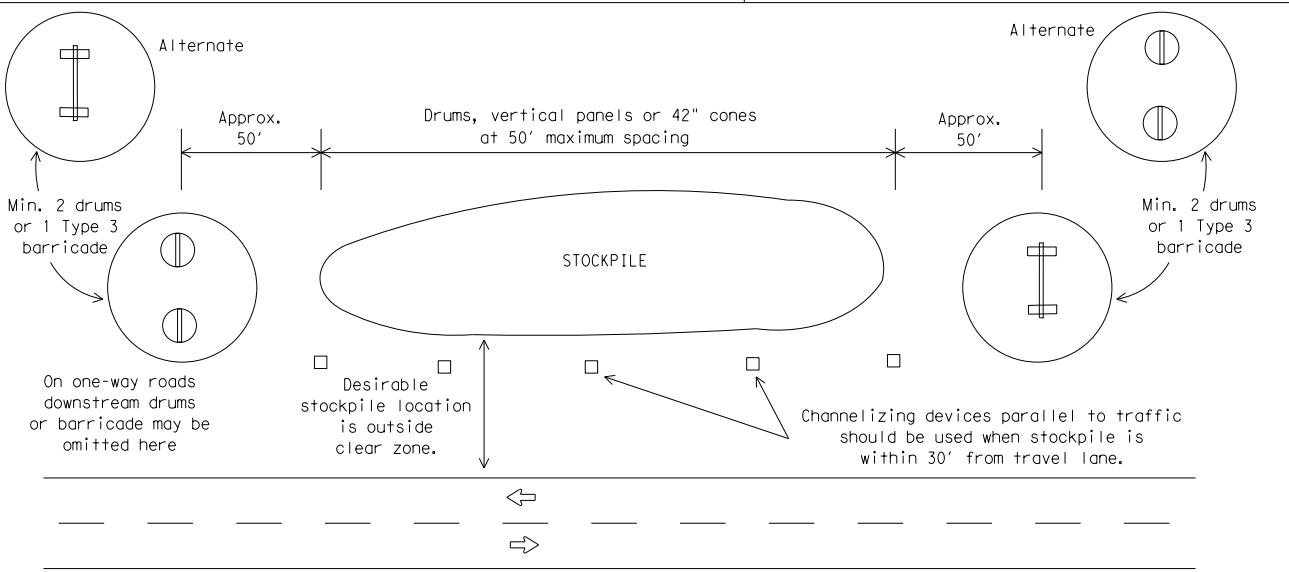
Two-Piece cones

One-Piece cones

Tubular Marker

28" Cones shall have a minimum weight of 9 1/2 lbs.
 42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A or Type B.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (10) - 21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0915	12	698, etc	Various
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	SAT	BEXAR	23	

WORK ZONE PAVEMENT MARKINGS

GENERAL

- The Contractor shall be responsible for maintaining work zone and existing pavement markings, in accordance with the standard specifications and special provisions, on all roadways open to traffic within the CSJ limits unless otherwise stated in the plans.
- Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- Additional supplemental pavement marking details may be found in the plans or specifications.
- Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
- When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet WZ(STPM).
- When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS WITH CARE signs at the beginning of sections where passing is permitted.
- All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

- Raised pavement markers are to be placed according to the patterns on BC(12).
- All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

PREFABRICATED PAVEMENT MARKINGS

- Removable prefabricated pavement markings shall meet the requirements of DMS-8241.
- Non-removable prefabricated pavement markings (foil back) shall meet the requirements of DMS-8240.

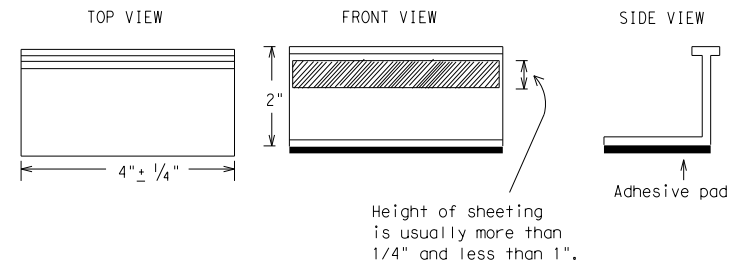
MAINTAINING WORK ZONE PAVEMENT MARKINGS

- The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
- Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 599.
- The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 160 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
- Markings failing to meet this criteria within the first 30 days after placement shall be replaced at the expense of the Contractor as per Specification Item 662.

REMOVAL OF PAVEMENT MARKINGS

- Pavement markings that are no longer applicable, could create confusion or direct a motorist toward or into the closed portion of the roadway shall be removed or obliterated before the roadway is opened to traffic.
- The above shall not apply to detours in place for less than three days, where flaggers and/or sufficient channelizing devices are used in lieu of markings to outline the detour route.
- Pavement markings shall be removed to the fullest extent possible, so as not to leave a discernable marking. This shall be by any method approved by TxDOT Specification Item 677 for "Eliminating Existing Pavement Markings and Markers".
- The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
- Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
- Blast cleaning may be used but will not be required unless specifically shown in the plans.
- Over-painting of the markings SHALL NOT BE permitted.
- Removal of raised pavement markers shall be as directed by the Engineer.
- Removal of existing pavement markings and markers will be paid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.
- Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

Temporary Flexible-Reflective Roadway Marker Tabs



STAPLES OR NAILS SHALL NOT BE USED TO SECURE
TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER
TABS TO THE PAVEMENT SURFACE

- Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
- Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
 - Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
 - Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic pavement in a straight line. Using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 35 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
- Small design variances may be noted between tab manufacturers.
- See Standard Sheet WZ(STPM) for tab placement on new pavements. See Standard Sheet TCP(7-1) for tab placement on seal coat work.

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

- Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
- All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
- Adhesive for guidemarks shall be bituminous material hot applied or butyl rubber pad for all surfaces, or thermoplastic for concrete surfaces.

Guidemarks shall be designated as:
 YELLOW - (two amber reflective surfaces with yellow body).
 WHITE - (one silver reflective surface with white body).

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
TRAFFIC BUTTONS	DMS-4300
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY REMOVABLE, PREFABRICATED PAVEMENT MARKINGS	DMS-8241
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS	DMS-8242

A list of prequalified reflective raised pavement markers, non-reflective traffic buttons, roadway marker tabs and other pavement markings can be found at the Material Producer List web address shown on BC(1).

SHEET 11 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

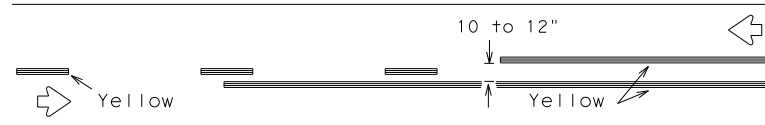
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2-98	9-07	5-21							
1-02	7-13			DIST	COUNTY			SHEET NO.	
11-02	8-14			SAT	BEXAR			24	

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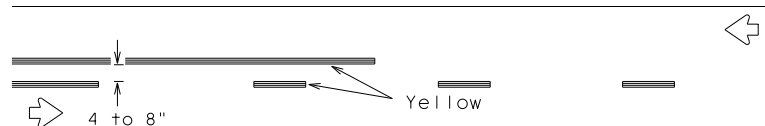
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PAVEMENT MARKING PATTERNS

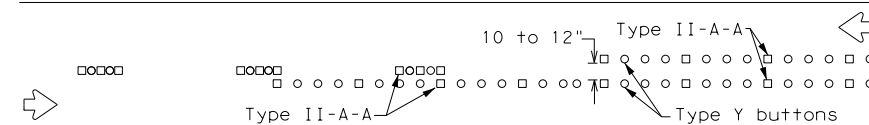


REFLECTORIZED PAVEMENT MARKINGS - PATTERN A

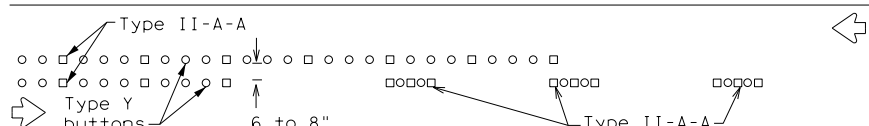


REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer. Prefabricated markings may be substituted for reflectORIZED pavement markings.

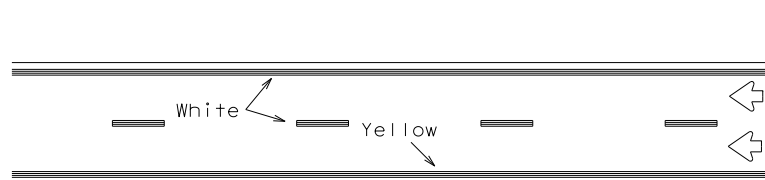


RAISED PAVEMENT MARKERS - PATTERN A



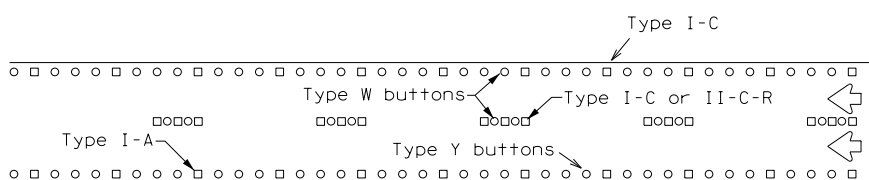
RAISED PAVEMENT MARKERS - PATTERN B

CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS



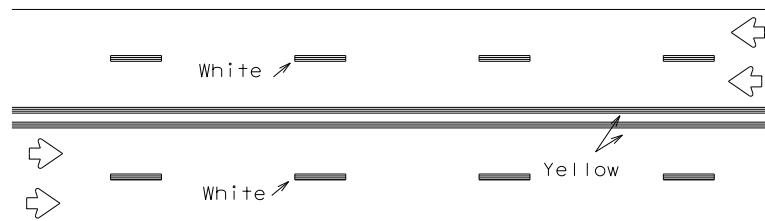
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



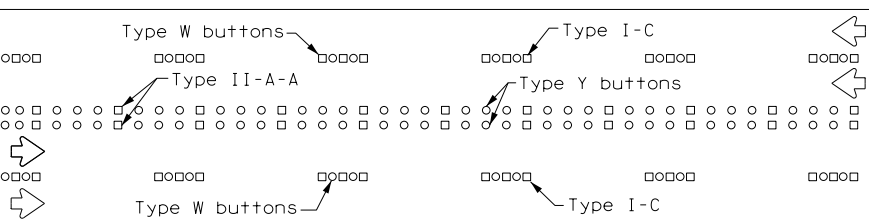
RAISED PAVEMENT MARKERS

EDGE & LANE LINES FOR DIVIDED HIGHWAY



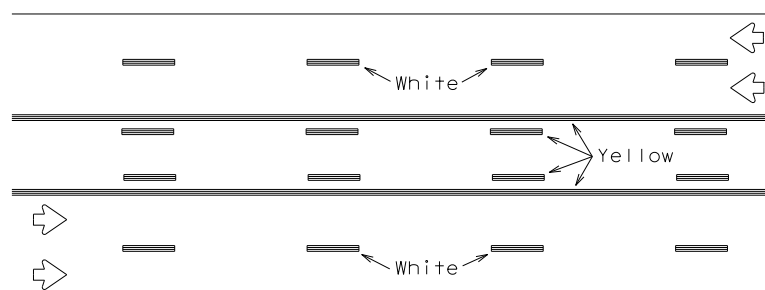
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



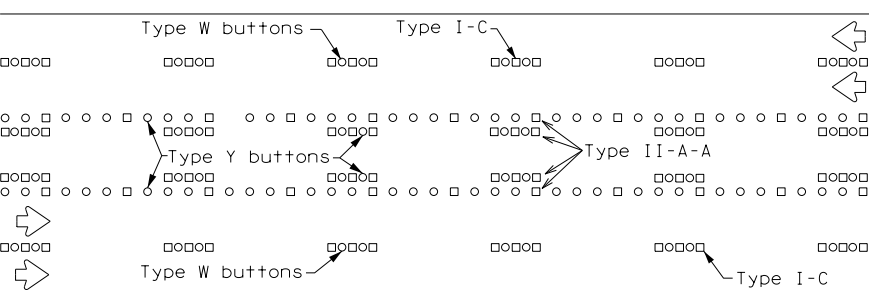
RAISED PAVEMENT MARKERS

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

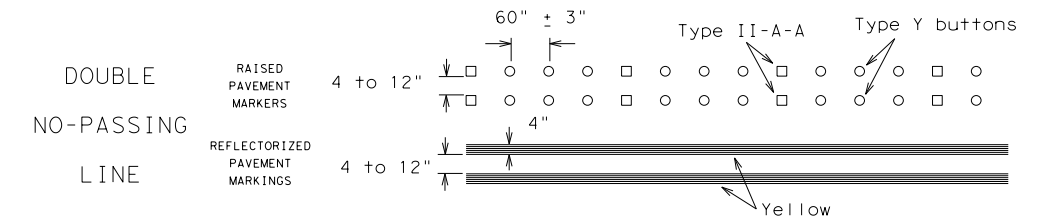
Prefabricated markings may be substituted for reflectORIZED pavement markings.



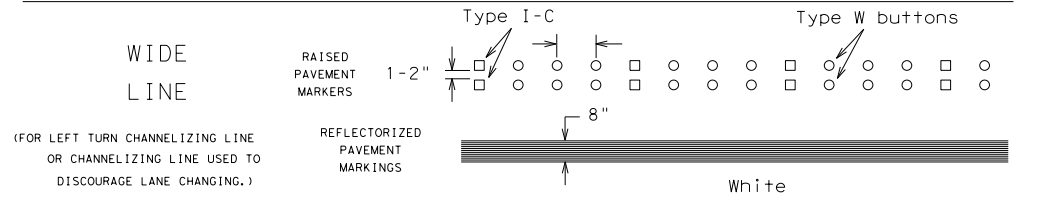
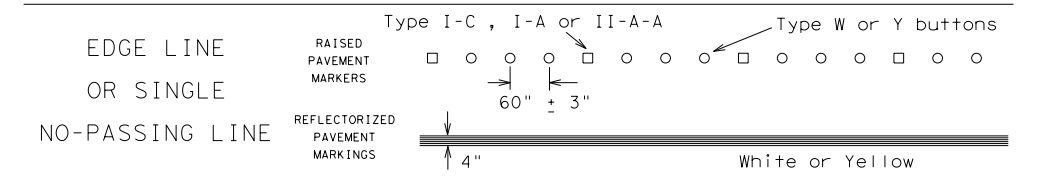
RAISED PAVEMENT MARKERS

TWO-WAY LEFT TURN LANE

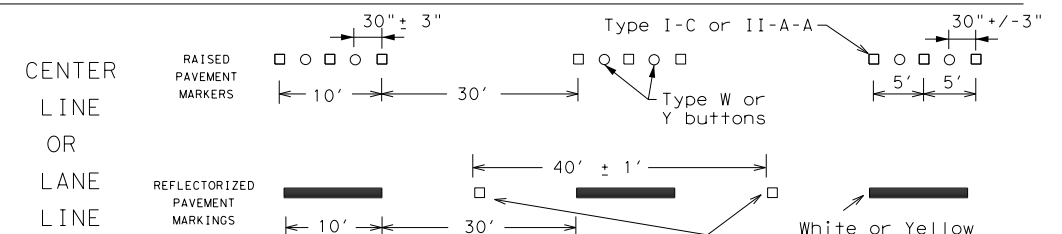
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



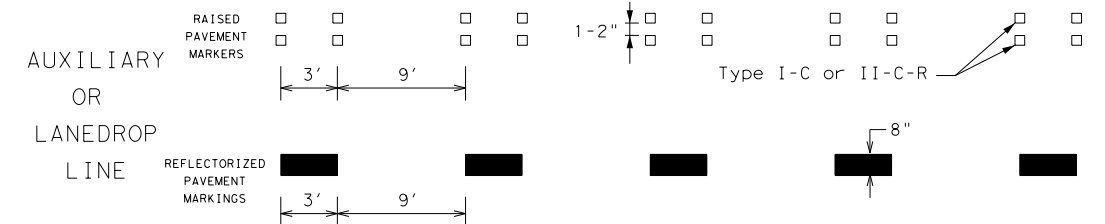
SOLID LINES



(FOR LEFT TURN CHANNELIZING LINE OR CHANNELIZING LINE USED TO DISCOURAGE LANE CHANGING.)

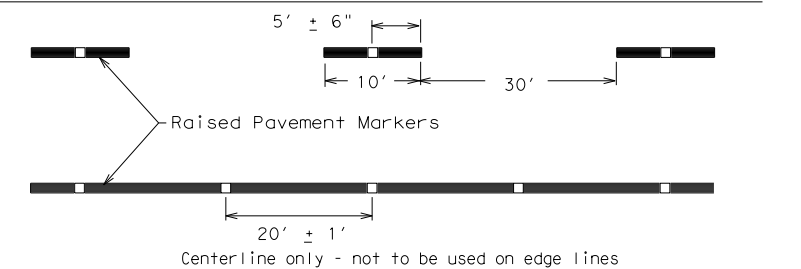


BROKEN LINES



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

If raised pavement markers are used to supplement REMOVABLE markings, the markers shall be applied to the top of the tape at the approximate mid length of tape used for broken lines or at 20 foot spacing for solid lines. This allows an easier removal of raised pavement markers and tape.



SHEET 12 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

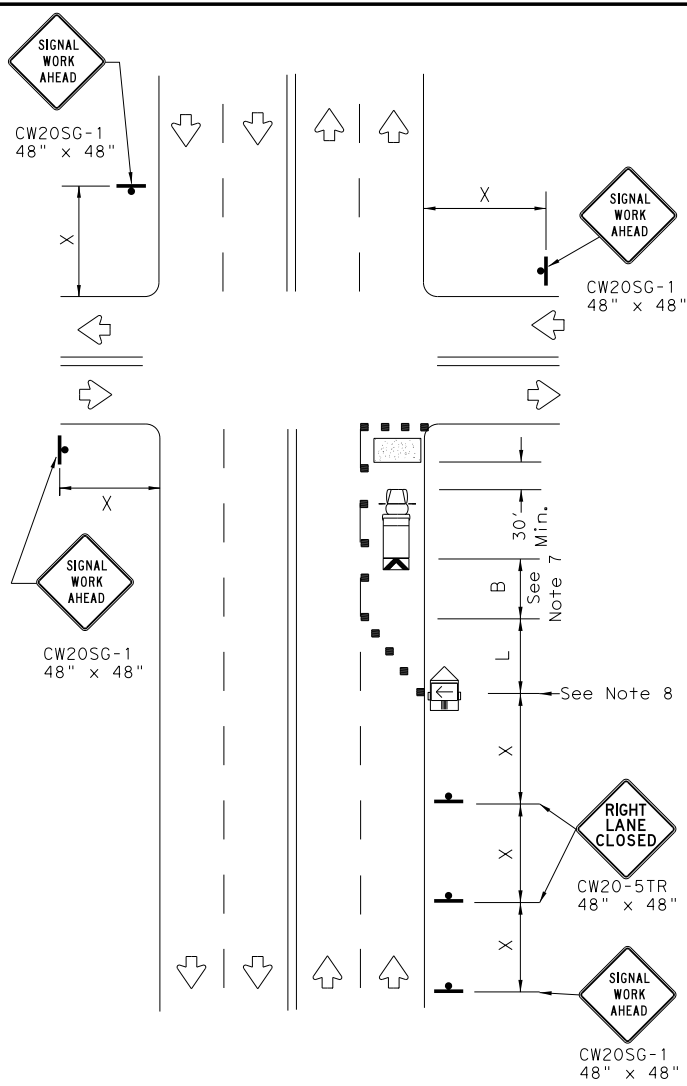
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2-98 7-13				
11-02 8-14	DIST	COUNTY	SHEET NO.	
	SAT	BEXAR	25	

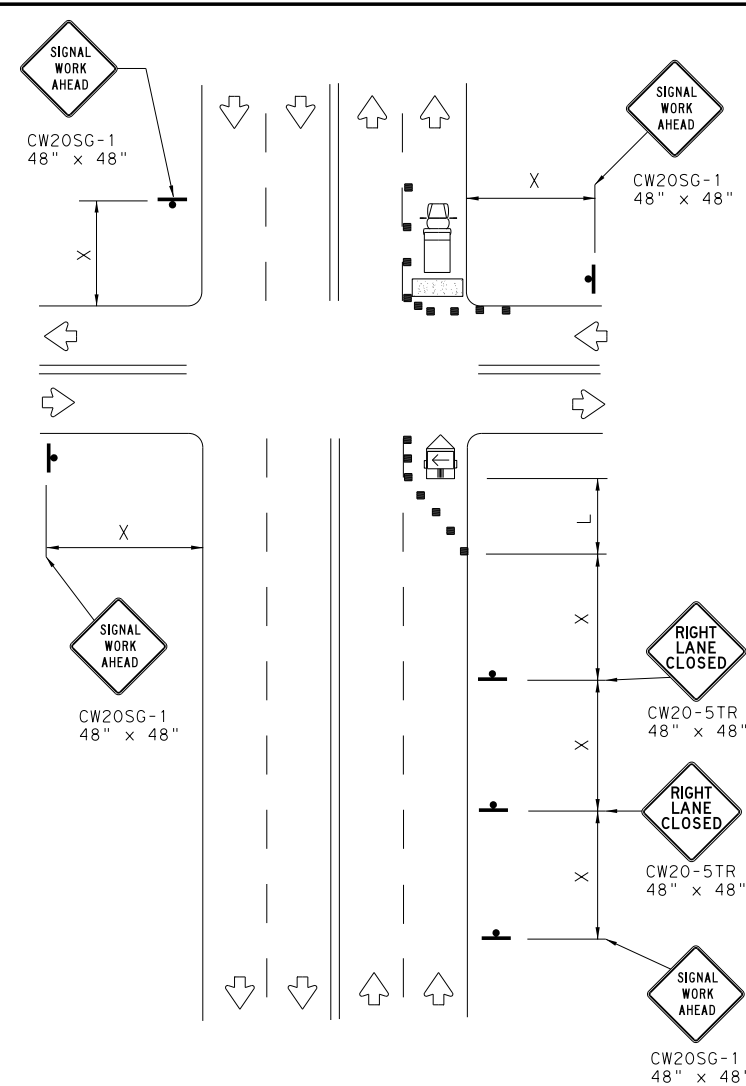
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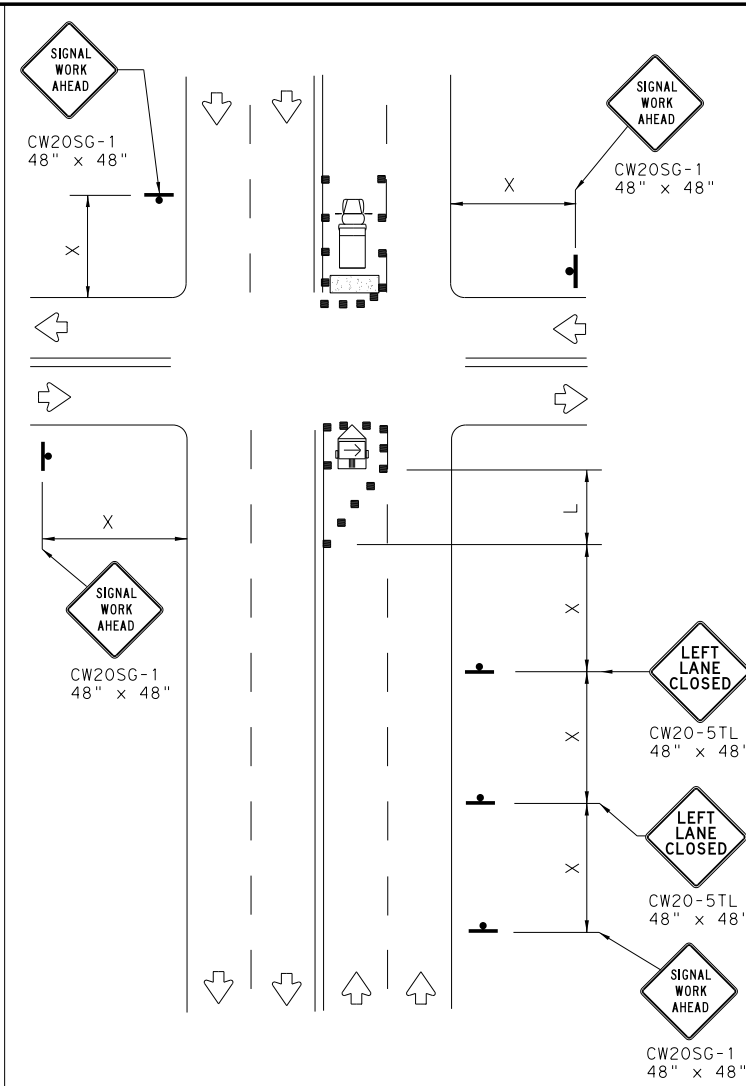
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NEAR SIDE LANE CLOSURE
 SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE RIGHT LANE CLOSURE
 SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE LEFT LANE CLOSURE
 SHORT DURATION OR SHORT TERM STATIONARY

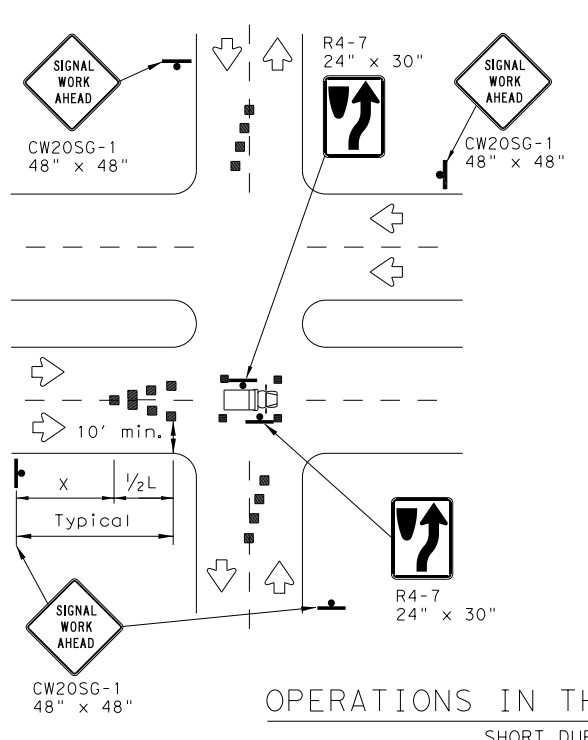
LEGEND

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

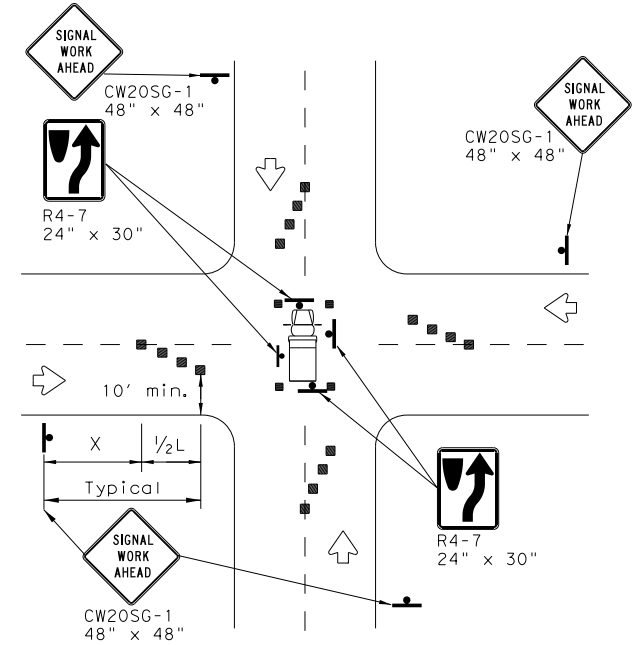
Posted Speed *	Formula	Minimum Desirable Taper Lengths * X			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
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.



OPERATIONS IN THE INTERSECTION
 SHORT DURATION



GENERAL NOTES

- 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.
- Obstructions or hazards at the work area shall be clearly marked and delineated at all times.
- Flaggers and Flagger Symbol (CW20-7) signs may be required according to field conditions.
- Vehicles parked in roadway shall be equipped with at least two high intensity rotating, flashing, oscillating or strobe type lights.
- High level warning devices (flag trees) may be used at corners of the vehicle.
- 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.
- 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.
- 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.
- 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.

SHEET 1 OF 2



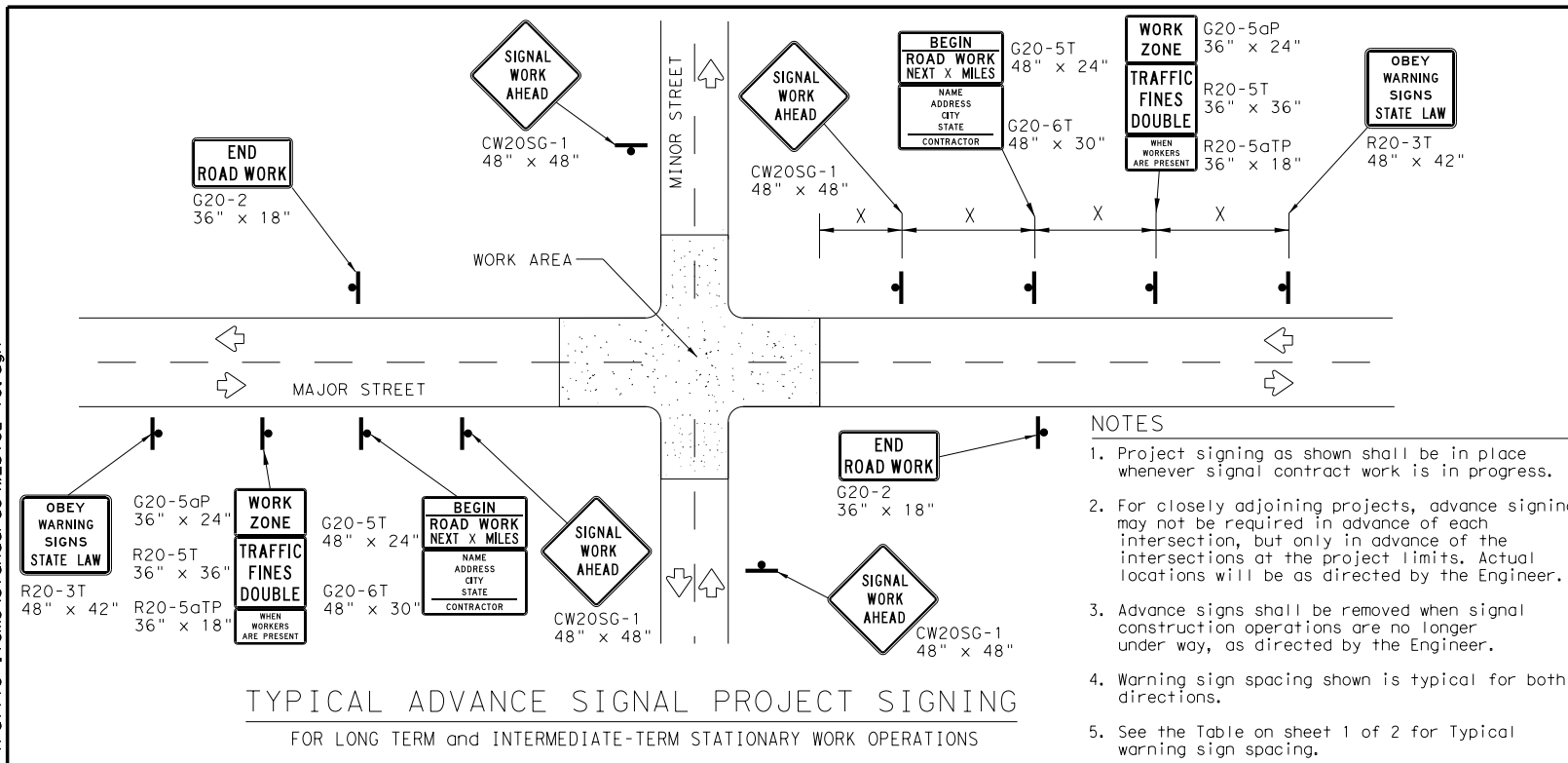
TRAFFIC SIGNAL WORK
 TYPICAL DETAILS

WZ(BTS-1)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0915	12	698, etc	Various
2-98 10-99 7-13	DIST	COUNTY	SHEET NO.	
4-98 3-03	SAT	BEXAR	26	

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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 66.02 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

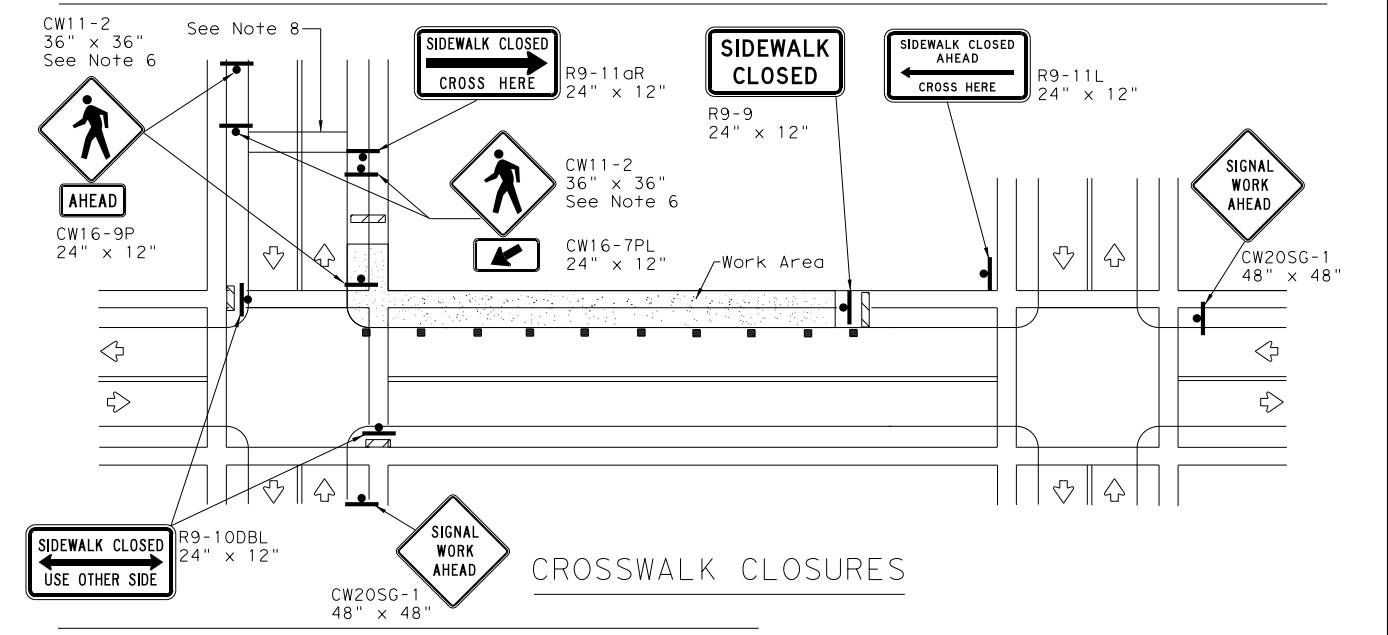
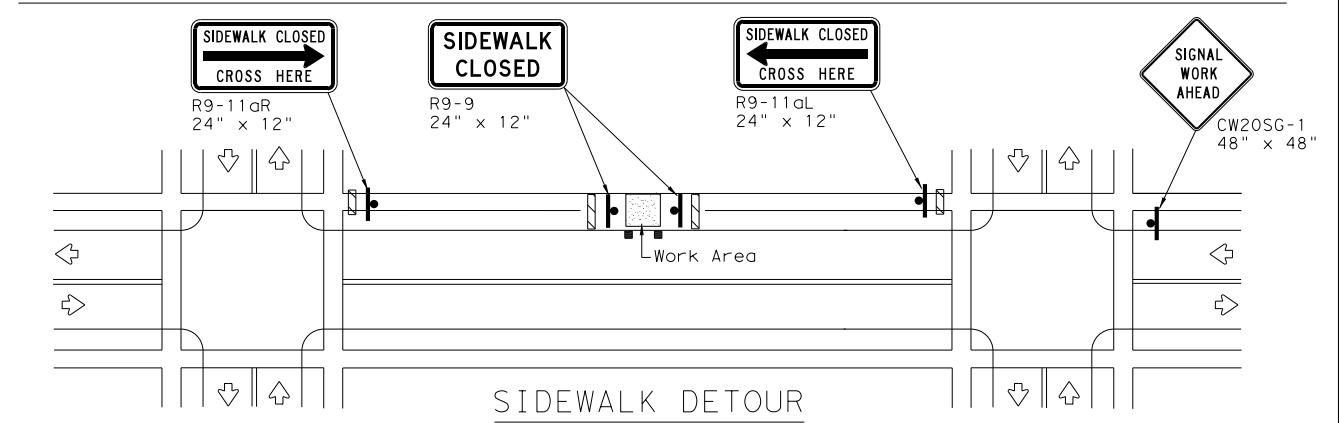
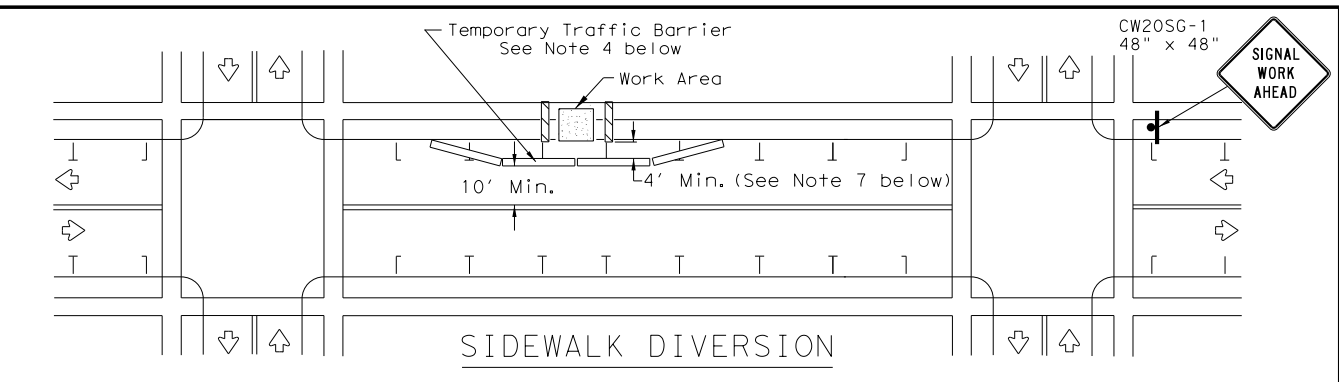
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support 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 fasteners. 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



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.

SHEET 2 OF 2



TRAFFIC SIGNAL WORK BARRICADES AND SIGNS


WZ(BTS-2) - 13

FILE:	wzBts-13.dgn	DN:	TxDOT	CK:	TxDOT	DN:	TxDOT	CK:	TxDOT
©TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0915	12	698,etc	Various				
2-98	10-99	7-13	DIST		COUNTY	SHEET NO.			
4-98	3-03	SAT		BEXAR		27			

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TRAFFIC SIGNAL NOTES:

1. INSTALL SIGNAL HEADS VERTICALLY ON MAST ARM WITH MINIMUM OF 18.5 FT. CLEARANCE ABOVE THE ROADWAY SURFACE. INSTALL WIND DAMPENING PLATES ON MAST ARMS 40" OR LONGER.
2. FURNISH YELLOW HOUSING FOR VEHICLE AND PEDESTRIAN SIGNALS. FURNISH BLACK VEHICLE SIGNAL HEAD BACK PLATES.
3. FURNISH VEHICLE AND PEDESTRIAN SIGNALS WITH LIGHT EMITTING DIODE (LED) SIGNAL LAMP UNITS.
4. FURNISH MOUNTING HARDWARE REQUIRED FOR ATTACHING VEHICLE SIGNAL HEADS TO THE TOP AND BOTTOM SWAY CABLES.
5. USE HIGH SPECIFIC INTENSITY REFLECTIVE SHEETING FOR SIGNS MOUNTED UNDER OR ADJACENT TO THE SIGNAL HEADS.
6. CONTRACTOR SHALL REMOVE AND DELIVER ANY EQUIPMENT DEEMED SALVAGEABLE TO TXDOT SIGNAL SHOP LOCATED AT 4615 NW LOOP 410 SAN ANTONIO TEXAS 78229. CONTACT CRAIG WILLIAMS AT 210-731-5143.
7. CONTRACTOR SHALL FURNISH AND DELIVER TS 2 TYPE 2 CONTROLLER CABINET AND ASSEMBLY TO TXDOT SIGNAL SHOP FOR PROGRAMMING AND TESTING TWO WEEKS IN ADVANCE PRIOR TO CONTRACTOR INSTALLING EQUIPMENT IN THE FIELD. COORDINATE DROP OFF AND PICK UP WITH CRAIG WILLIAMS AT 210-731-5143.
8. ROUTE CABLE FOR LUMINAIRES (#12/4C TRAY) TO THE SERVICE ENCLOSURE. SEE ELECTRICAL DETAIL SHEETS. TRAY CABLE SHALL BE RUN IN 2" CONDUIT SEPARATE FROM THE SIGNAL CABLE.
9. LOCATION OF SIGNAL POLES, CABINET AND ELECTRICAL SERVICE SHALL BE VERIFIED AND APPROVED BY TXDOT PRIOR TO CONSTRUCTION.
10. FURNISH AND INSTALL URETHANE FOAM TO ENCLOSE THE ENDS OF EACH CONDUIT IMMEDIATELY AFTER INSTALLATION OF ALL SIGNAL AND ELECTRICAL CONDUCTORS.
11. CAP SPARE CONDUITS INSTALLED IN POLE FOUNDATIONS AND GROUND BOXES USING APPROVED CAPPING DEVICES.
12. DO NOT PLACE SIGNAL HEADS OVER THE ROADWAY UNTIL ALL NECESSARY MATERIALS ARE ON HAND AS APPROVED.
13. INSTALL TWO SET SCREWS ON ALL VEHICLE SIGNAL HEAD MOUNTING HARDWARE FITTINGS.
14. INSTALL A 5/8-IN. (MINIMUM) EYE BOLT FOR THE POINT OF ATTACHMENT BELOW THE SERVICE ENTRANCE WEATHERHEAD FOR THE SERVICE DROP TO STEEL OR WOOD POLE.
15. AIM LUMINAIRE ARMS MOUNTED ON TRAFFIC SIGNAL POLES PERPENDICULAR TO THE CENTERLINE OF THE ROADWAY IT IS INTENDED TO COVER, TO DEVELOP THE PROPER ILLUMINATION PATTERN FOR THE INTERSECTION.
16. PROVIDE 250 WATT (EQ) LED LUMINAIRES OPERATING AT 240 VOLTS.
17. WRAP SIGNAL HEADS WITH DARK PLASTIC OR SUITABLE MATERIAL TO CONCEAL THE SIGNAL FACES FROM THE TIME OF INSTALLATION UNTIL PLACING INTO OPERATION.
18. 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.
19. VERIFY THE CORRECT MAST ARM POLE LENGTHS FOR EACH SIGNALIZED INTERSECTION PRIOR TO ORDERING THE EQUIPMENT.
20. INSTALL A CLOSE NIPPLE WITH LOCK NUT AND BUSHING (SIZE AS REQUIRED) WHERE THE CABLE ENTERS THE UPPER PORTION OF THE SIGNAL POLE.
21. FURNISH FEDS (FISH EYE DETECTION SYSTEM) CABLE RECOMMENDED BY MANUFACTURER OR PURCHASE CABLE FROM THE SAME MANUFACTURER THAT SUPPLIED/PROVIDED THE FEDS EQUIPMENT.
22. CLAMP ALL CONDUITS ATTACHED TO SIGNAL POLE FOUNDATIONS OR WOOD POLES WITH CONDUIT STRAPS AND CLAMPS BACKS (MALLEABLE IRON) AT A MAXIMUM SPACING OF 5 FT. CENTER TO CENTER.
23. ELECTRICAL POWER TO OPERATE THE TRAFFIC SIGNAL INSTALLATION(S) WILL BE PLACED IN CITY OF SAN ANTONIO'S NAME. THIS INCLUDES ALL POWER TO OPERATE THE SIGNAL(S) DURING THE VARIOUS PHASES OF CONSTRUCTION AND DURING THE TEST PERIOD PRIOR TO ACCEPTANCE OF THE WORK BY TXDOT.
24. CONTRACTOR SHALL POTHOLE SIGNAL POLE FOUNDATION LOCATIONS NEAR UNDERGROUND UTILITIES PRIOR TO INSTALLING POLE FOUNDATION.
25. CONTRACTOR SHALL CALL FOR LOCATES PRIOR TO COMMENCING EXCAVATION. ALL UTILITY LOCATIONS SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR.
26. FURNISH SYMBOL TYPE PEDESTRIAN COUNTDOWN SIGNALS. INSTALL USING MOUNTING HEIGHT IN ACCORDANCE WITH THE LATEST TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
27. FURNISH MATERIALS NECESSARY TO INSTALL PUSH BOTTON 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.
28. INSTALL A CONCRETE WALKWAY FROM THE END OF THE CURB RAMP OR EDGE OF PAVEMENT TO THE TRAFFIC SIGNAL POLE FOUNDATION TO PROVIDE ACCESS TO THE PEDESTRIAN PUSH BUTTON(S). PERFORM THIS WORK IN ACCORDANCE WITH ITEM 531, "SIDEWALKS".
29. REFER TO TXDOT'S WEBSITE FOR PREQUALIFIED PRODUCTS LIST REGARDING RADAR DETECTORS, VEHICLE LED TRAFFIC SIGNAL LAMP UNIT, SYMBOLIC PEDESTRIAN SIGNAL HEAD, SYMBOLIC PEDESTRIAN SIGNAL LAMP, CONDUIT, CONDUCTORS, GROUND BOXES, AND ELECTRIC SERVICE. CHECK WEBSITE PERIODICALLY FOR CURRENT UPDATES.
30. THE CONTRACTOR IS RESPONSIBLE FOR THE SIGNAL CARRYING CAPABILITY AND PERFORMANCE OF THE CABLE. INSTALL EACH WIRE WITH A LIGHTING PROTECTION DEVICE UNLESS OTHERWISE NOTED.



11/22/2022


NO.	DATE	REVISION	APPROV.



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 T +1 210 736 0425 E usinfrastructure@rpsgroup.com

CITY OF SAN ANTONIO
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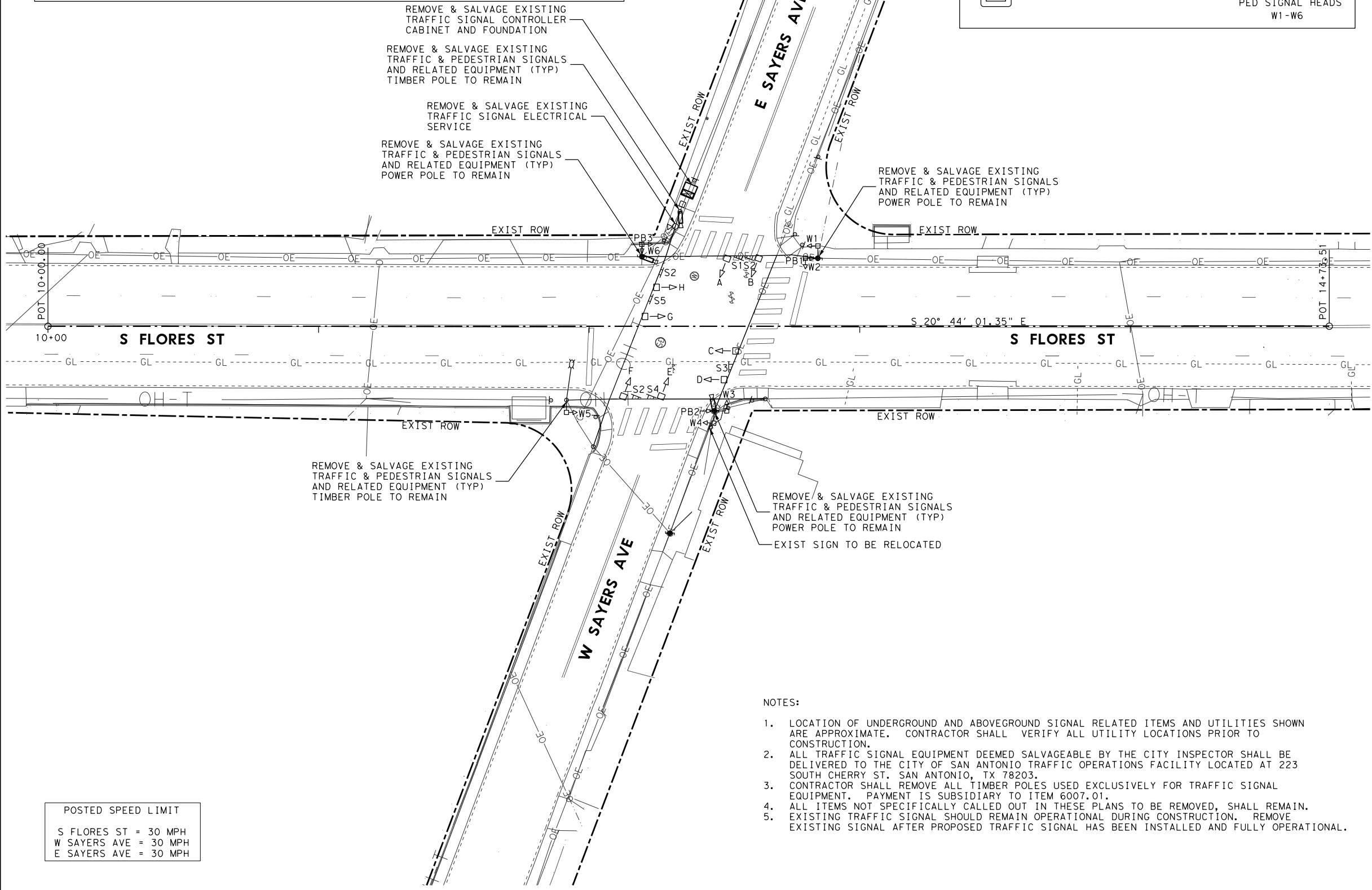
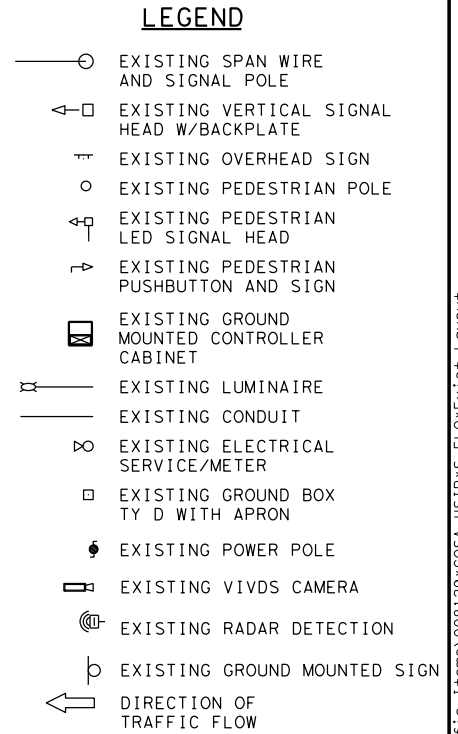
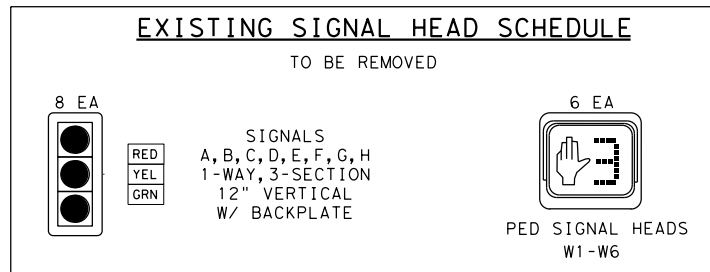
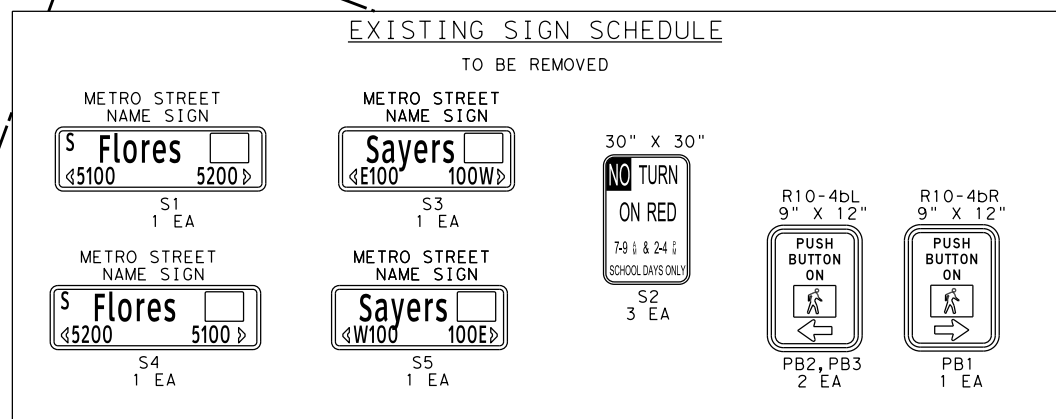


**HIGHWAY SAFETY
 IMPROVEMENT PROGRAM**
 TRAFFIC SIGNAL NOTES

SHEET 1 OF 1		FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
				28
STATE	DIST.	COUNTY	SEE TITLE SHEET	
TEXAS	SAT	BEXAR		
CONT.	SECT.	JOB	HIGHWAY NO.	
0915	12	698, etc.	VARIOUS	

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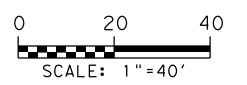
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POSTED SPEED LIMIT

S FLORES ST = 30 MPH
 W SAYERS AVE = 30 MPH
 E SAYERS AVE = 30 MPH

- NOTES:
- LOCATION OF UNDERGROUND AND ABOVEGROUND SIGNAL RELATED ITEMS AND UTILITIES SHOWN ARE APPROXIMATE. CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
 - ALL TRAFFIC SIGNAL EQUIPMENT DEEMED SALVAGEABLE BY THE CITY INSPECTOR SHALL BE DELIVERED TO THE CITY OF SAN ANTONIO TRAFFIC OPERATIONS FACILITY LOCATED AT 223 SOUTH CHERRY ST. SAN ANTONIO, TX 78203.
 - CONTRACTOR SHALL REMOVE ALL TIMBER POLES USED EXCLUSIVELY FOR TRAFFIC SIGNAL EQUIPMENT. PAYMENT IS SUBSIDIARY TO ITEM 6007.01.
 - ALL ITEMS NOT SPECIFICALLY CALLED OUT IN THESE PLANS TO BE REMOVED, SHALL REMAIN.
 - EXISTING TRAFFIC SIGNAL SHOULD REMAIN OPERATIONAL DURING CONSTRUCTION. REMOVE EXISTING SIGNAL AFTER PROPOSED TRAFFIC SIGNAL HAS BEEN INSTALLED AND FULLY OPERATIONAL.



11/22/2022

NO.	DATE	REVISION	APPROV.

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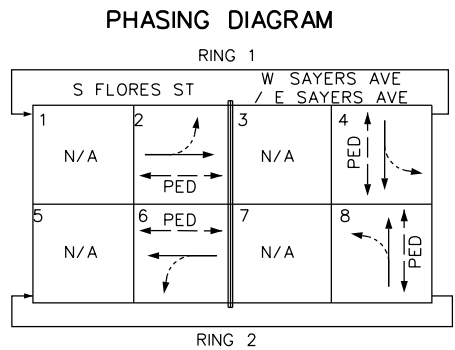
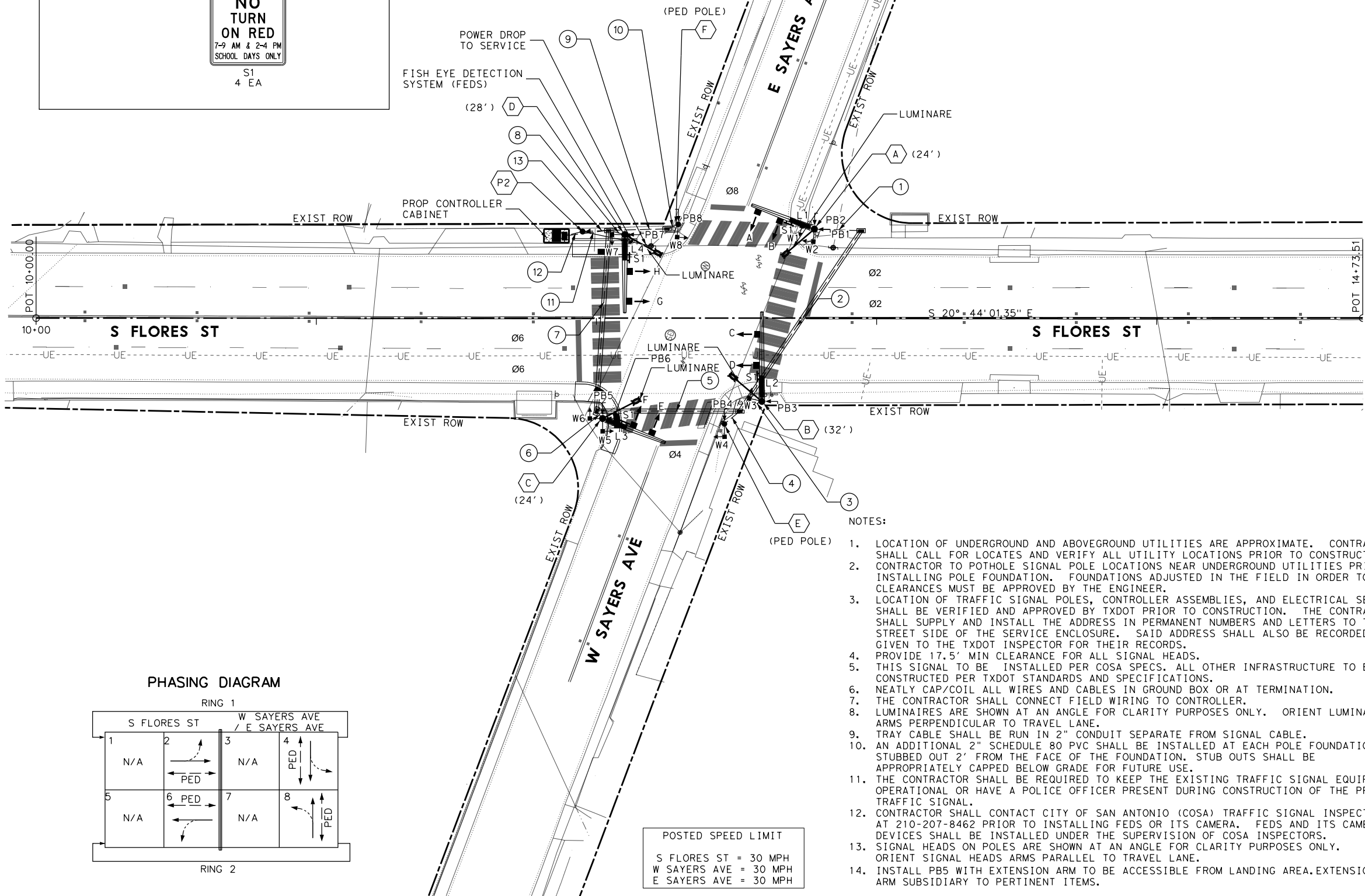
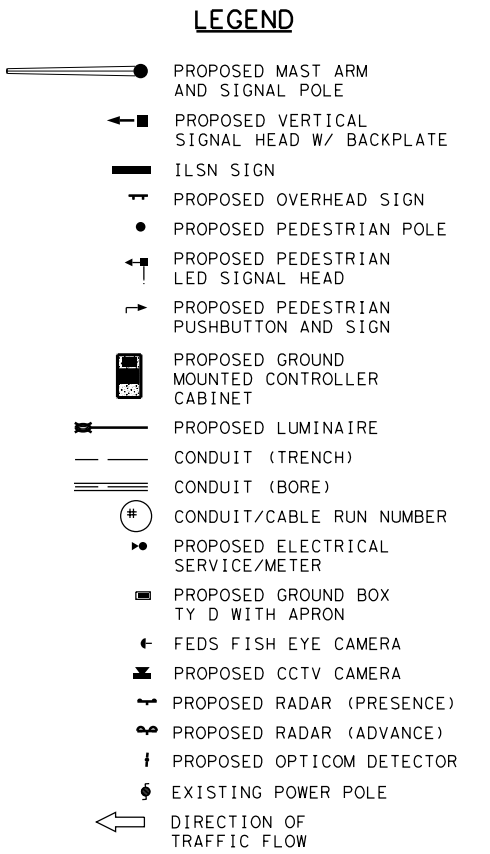
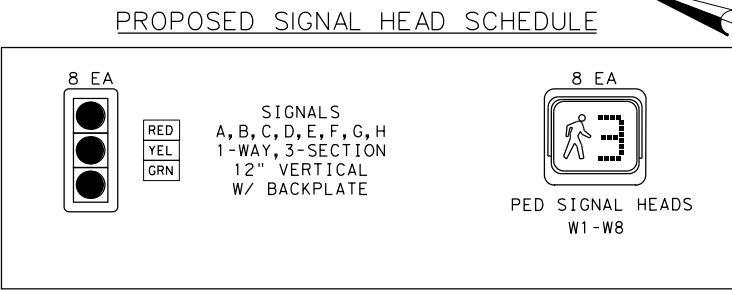
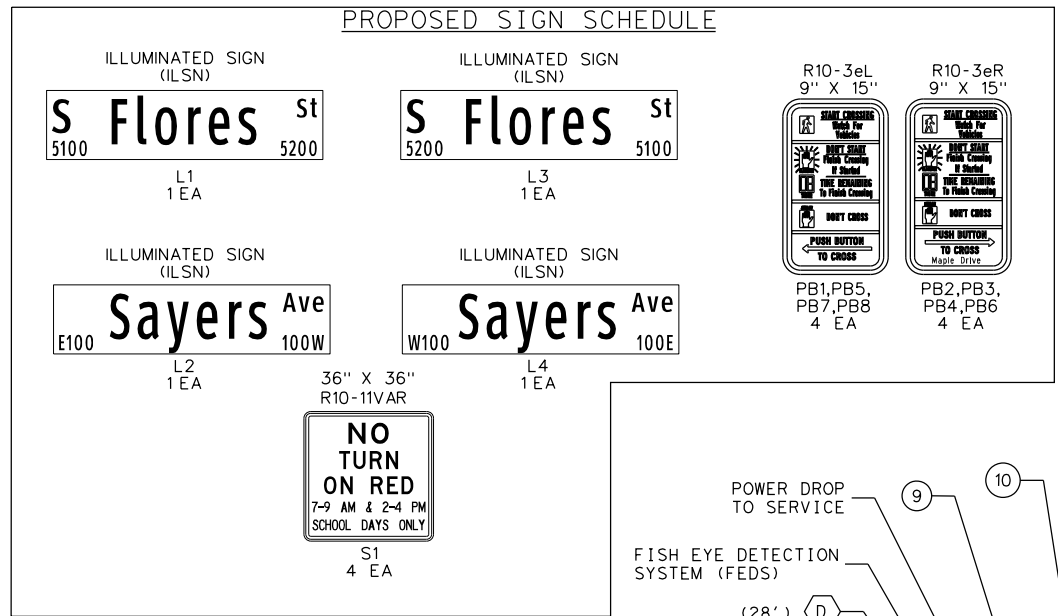
CITY OF SAN ANTONIO
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HIGHWAY SAFETY IMPROVEMENT PROGRAM
 EXISTING SIGNAL LAYOUT
 S FLORES ST
 AT W SAYERS AVE
 / E SAYERS AVE

SHEET 1 OF 1		FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
SEE TITLE SHEET				29
STATE	DIST.	COUNTY		
TEXAS	SAT	BEXAR		
CONT.	SECT.	JOB	HIGHWAY NO.	
0915	12	698, etc.	VARIOUS	

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- ### NOTES:
- LOCATION OF UNDERGROUND AND ABOVEGROUND UTILITIES ARE APPROXIMATE. CONTRACTOR SHALL CALL FOR LOCATES AND VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
 - CONTRACTOR TO POTHOLE SIGNAL POLE LOCATIONS NEAR UNDERGROUND UTILITIES PRIOR TO INSTALLING POLE FOUNDATION. FOUNDATIONS ADJUSTED IN THE FIELD IN ORDER TO MEET CLEARANCES MUST BE APPROVED BY THE ENGINEER.
 - LOCATION OF TRAFFIC SIGNAL POLES, CONTROLLER ASSEMBLIES, AND ELECTRICAL SERVICE SHALL BE VERIFIED AND APPROVED BY TXDOT PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL SUPPLY AND INSTALL THE ADDRESS IN PERMANENT NUMBERS AND LETTERS TO THE STREET SIDE OF THE SERVICE ENCLOSURE. SAID ADDRESS SHALL ALSO BE RECORDED AND GIVEN TO THE TXDOT INSPECTOR FOR THEIR RECORDS.
 - PROVIDE 17.5' MIN CLEARANCE FOR ALL SIGNAL HEADS.
 - THIS SIGNAL TO BE INSTALLED PER COSA SPECS. ALL OTHER INFRASTRUCTURE TO BE CONSTRUCTED PER TXDOT STANDARDS AND SPECIFICATIONS.
 - NEATLY CAP/COIL ALL WIRES AND CABLES IN GROUND BOX OR AT TERMINATION.
 - THE CONTRACTOR SHALL CONNECT FIELD WIRING TO CONTROLLER.
 - LUMINAIRES ARE SHOWN AT AN ANGLE FOR CLARITY PURPOSES ONLY. ORIENT LUMINAIRE ARMS PERPENDICULAR TO TRAVEL LANE.
 - TRAY CABLE SHALL BE RUN IN 2" CONDUIT SEPARATE FROM SIGNAL CABLE.
 - AN ADDITIONAL 2" SCHEDULE 80 PVC SHALL BE INSTALLED AT EACH POLE FOUNDATION STUBBED OUT 2' FROM THE FACE OF THE FOUNDATION. STUB OUTS SHALL BE APPROPRIATELY CAPPED BELOW GRADE FOR FUTURE USE.
 - THE CONTRACTOR SHALL BE REQUIRED TO KEEP THE EXISTING TRAFFIC SIGNAL EQUIPMENT OPERATIONAL OR HAVE A POLICE OFFICER PRESENT DURING CONSTRUCTION OF THE PROPOSED TRAFFIC SIGNAL.
 - CONTRACTOR SHALL CONTACT CITY OF SAN ANTONIO (COSA) TRAFFIC SIGNAL INSPECTORS AT 210-207-8462 PRIOR TO INSTALLING FEDS OR ITS CAMERA. FEDS AND ITS CAMERA DEVICES SHALL BE INSTALLED UNDER THE SUPERVISION OF COSA INSPECTORS.
 - SIGNAL HEADS ON POLES ARE SHOWN AT AN ANGLE FOR CLARITY PURPOSES ONLY. ORIENT SIGNAL HEADS ARMS PARALLEL TO TRAVEL LANE.
 - INSTALL PB5 WITH EXTENSION ARM TO BE ACCESSIBLE FROM LANDING AREA. EXTENSION ARM SUBSIDIARY TO PERTINENT ITEMS.



11/22/2022

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Texas PE Firm Reg. #F-929
 4801 NW Loop 410, Suite 910, San Antonio, Texas 78229
 T +1 210 736 0425 E usinfrastructure@rpsgroup.com

CITY OF SAN ANTONIO
 DEPARTMENT OF PUBLIC WORKS

HIGHWAY SAFETY IMPROVEMENT PROGRAM
PROPOSED SIGNAL LAYOUT
S FLORES ST
AT W SAYERS AVE
/ E SAYERS AVE

SHEET 1 OF 1

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.	
	SEE TITLE SHEET	30	
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0915	12	698, etc.	VARIOUS

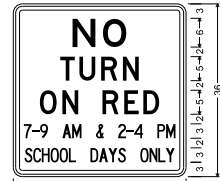
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12/19/2022 9:34:31 PM -Projects\SAN-NC\008129_COSA To-03 - Traffic Signal Imp Designs\07-00 CADD\COSA Traffic Signal\09-VIII Traffic Items\008129_COSA #SIP_S Flores_E Sayers_Elec Schedule
 RPS - Alexis Phillips
 12/19/2022 9:34:31 PM -Projects\SAN-NC\008129_COSA To-03 - Traffic Signal Imp Designs\07-00 CADD\COSA Traffic Signal\09-VIII Traffic Items\008129_COSA #SIP_S Flores_E Sayers_Elec Schedule

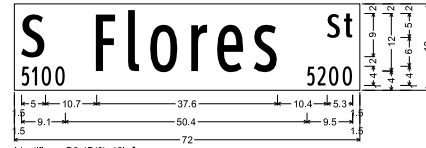
CONDUIT & CONDUIT SCHEDULE													
CONDUIT RUN NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13
NUMBER OF 2" CONDUITS	1	1	1	1	1	1	1	1	1	1	1	1	1
NUMBER OF 3" CONDUITS	1	2	1		2	1	2	1		2			
CONDUIT RUN LENGTH (FT)	17	78	9	8	52	4	65	6	21	5	16	7	10
RUN TYPE	T	B	T	T	B	T	B	T	T	T	T	T	T
AWG	CIRCUIT	NUMBER OF WIRES											
#14 9-COND. TY A STRANDED CABLE	SIGNALS	Ø1											
		Ø2		1		1		1				1	
		Ø3											
		Ø4					1	1				1	
		Ø5											
		Ø6								1		1	
		Ø7											
		Ø8	1	1			1	1				1	
#14 9-COND. TY A STRANDED CABLE	PED. SIGNAL	Ø2			1	1	1	2				2	
		Ø4					1	1	1			2	
		Ø6	1	1			1	1	1		1	2	
		Ø8	1	1	1		2	2				2	
#16 3-COND. TY C STRANDED CABLE	PED. PUSH BUTTON	Ø2			1	1	1	2				2	
		Ø4					1	1	1			2	
		Ø6	1	1			1	1	1		1	2	
		Ø8	1	1	1		2	2				2	
#6 XHHW	120V POWER HOT												1
	120V POWER COMMON												1
BARE BOND	BARE BOND GROUND #6												1
BARE BOND	BARE BOND GROUND #8	2	3	2	1	3	2	3	2	1	1	3	1
#14 4-COND. TY A STRANDED CABLE	ILSN SIGNS	1	1	1		2	1	3	1				4
	ETHERNET										1		1
#12 3-COND. TRAY CABLE	LUMINAIRE TRAY CABLE	1	1	1		2	1	3	1				4

B=BORED CONDUIT (PER LIMITS SHOWN ON SIGNAL LAYOUT) T=TRENCH

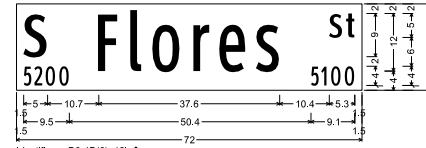
POLE SCHEDULE							
POLE	POLE TYPE	A	B	C	D	E	F
		POLE HEIGHT (FT)	SMA-80	SMA-80	SMA-80	SMA-80	PED
MAST ARM LENGTH (FT)	30	30	30	30	N/A	N/A	
ILSN	24	32	24	28	N/A	N/A	
ILSN ARM LENGTH (FT)	YES	YES	YES	YES	N/A	N/A	
FOUNDATION TYPE	7	7	7	7	N/A	N/A	
FOUNDATION DEPTH (FT)	30-A	30-A	30-A	30-A	24-A	24-A	
	11	11	11	11	6	6	
CABLE	CIRCUIT	NUMBER OF CONDUCTORS					
#8 BARE (SOLID)		1	1	1	1	1	1
#12 9-COND. TY A STRANDED CABLE	TRAFFIC SIGNALS	Ø1					
		Ø2		1			
		Ø3					
		Ø4			1		
		Ø5					
		Ø6				1	
		Ø7					
		Ø8	1				
#12 4-COND. TY A STRANDED CABLE	PED SIGNALS	POLE A					
		POLE B		1			
		POLE C			2		
		POLE D				1	
		POLE E					1
		POLE F					
#16 3-COND. TY C STRANDED CABLE	PED PUSH BUTTON	POLE A	2				
		POLE B		1			
		POLE C			2		
		POLE D				1	
		POLE E					1
		POLE F					
#14 4-COND. TY A STRANDED CABLE	ILSN SIGNS	POLE A	1				
		POLE B		1			
		POLE C			1		
		POLE D				1	
#12 3-COND. TRAY CABLE	LUMINAIRE	POLE A	1				
		POLE B		1			
		POLE C			1		
		POLE D				1	
ETHERNET	FEDS CAMERA	POLE A				1	
		POLE D				1	



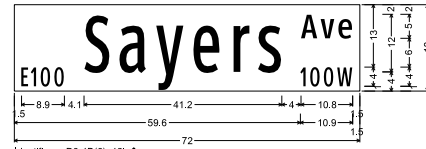
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 1.5" Radius, 0.8" Border, 0.5" Indent, Black on White;
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 "ON RED", "D",
 "7-9 AM & 2-4 PM", "C 30% spacing",
 "SCHOOL DAYS ONLY", "C 30% spacing";



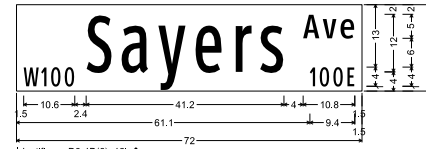
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 No border, Black on Blue;
 [S] White ClearviewHwy-2-W; [5100] White ClearviewHwy-1-W;
 [Flores] White ClearviewHwy-1-W; [S] White ClearviewHwy-2-W;
 [5200] White ClearviewHwy-1-W;



Identifier : D3-1B(6) 12in;
 No border, Black on Blue;
 [S] White ClearviewHwy-2-W; [5200] White ClearviewHwy-1-W;
 [Flores] White ClearviewHwy-1-W; [S] White ClearviewHwy-2-W;
 [5100] White ClearviewHwy-1-W;



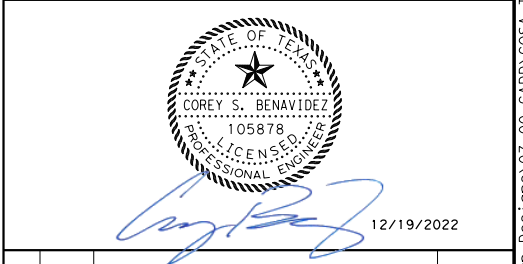
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 No border, Black on Blue;
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 [Ave] White ClearviewHwy-2-W; [100W] White ClearviewHwy-1-W;



Identifier : D3-1B(6) 12in;
 No border, Black on Blue;
 [W100] White ClearviewHwy-1-W; [Sayers] White ClearviewHwy-1-W;
 [Ave] White ClearviewHwy-2-W; [100E] White ClearviewHwy-1-W;

POLE & EQUIPMENT INFORMATION				
POLE	STATION	OFFSET	BASELINE	DESCRIPTION
A	12+77.80	31.82' LT	S FLORES BL	INSTALL 30 FT SMA-80 ON 11 FT DRILLED SHAFT FDN (30-A) W/ 24 FT MAST ARM, ONE LUMINAIRE (LED), ONE 7 FT ILSN MAST ARM W/ SIGN, ONE R10-11VAR SIGN, TWO LED COUNTDOWN PEDESTRIAN SIGNAL HEADS, ONE APS PUSH BUTTON W/ R10-3eL, ONE APS PUSH BUTTON W/ R10-3eR AND TWO VEHICLE SIGNAL HEADS AS ILLUSTRATED
B	12+59.02	29.69' RT	S FLORES BL	INSTALL 30 FT SMA-80 ON 11 FT DRILLED SHAFT FDN (30-A) W/ 32 FT MAST ARM, ONE LUMINAIRE (LED), ONE 7 FT ILSN MAST ARM W/ SIGN, ONE R10-11VAR SIGN, ONE LED COUNTDOWN PEDESTRIAN SIGNAL HEAD, ONE APS PUSH BUTTON W/ R10-3eR AND TWO VEHICLE SIGNAL HEADS AS ILLUSTRATED
C	12+02.20	35.84' RT	S FLORES BL	INSTALL 30 FT SMA-80 ON 11 FT DRILLED SHAFT FDN (30-A) W/ 24 FT MAST ARM, ONE LUMINAIRE (LED), ONE 7 FT ILSN MAST ARM W/ SIGN, TWO LED COUNTDOWN PEDESTRIAN SIGNAL HEADS, ONE APS PUSH BUTTON W/ R10-3eL AND EXTENSION ARM, ONE APS PUSH BUTTON W/ R10-3eR AND TWO VEHICLE SIGNAL HEADS AS ILLUSTRATED
D	12+10.12	29.82' LT	S FLORES BL	INSTALL 30 FT SMA-80 ON 11 FT DRILLED SHAFT FDN (30-A) W/ 28 FT MAST ARM, ONE LUMINAIRE (LED), ONE 7 FT ILSN MAST ARM W/ SIGN, ONE R10-11VAR SIGN, ONE LED COUNTDOWN PEDESTRIAN SIGNAL HEAD, ONE APS PUSH BUTTON W/ R10-3eL, ONE FISH EYE CAMERA AND TWO VEHICLE SIGNAL HEADS AS ILLUSTRATED
E	12+45.69	37.79' RT	S FLORES BL	INSTALL PEDESTAL POLE ON 6 FT DRILLED SHAFT FDN (24-A) W/ ONE LED COUNTDOWN PEDESTRIAN SIGNAL HEAD, ONE APS PUSH BUTTON W/ R10-3eR AS ILLUSTRATED
F	12+29.21	33.46' LT	S FLORES BL	INSTALL PEDESTAL POLE ON 6 FT DRILLED SHAFT FDN (24-A) W/ ONE LED COUNTDOWN PEDESTRIAN SIGNAL HEAD, ONE APS PUSH BUTTON W/ R10-3eR AS ILLUSTRATED
P2	11+95.02	30.90' LT	S FLORES BL	PROPOSED CPS ENERGY STEEL POLE AND METER W/ TXDOT TYPE D SERVICE

ELECTRICAL SERVICE DATA											
ELECTRICAL SERVICE ID	ELECTRICAL SERVICE DESCRIPTION (SEE ED(5)-14)	SERVICE CONDUIT SIZE (RMC)	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN DISCONNECT CKT. BRK. POLE/AMP	TWO-POLE CONTACTOR AMPS	PANELBD/LOADCENTER AMP RATING (MIN)	CIRCUIT NO.	BRANCH CKT. BRK. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
P2	ELC SRV TY D 120/240 070 (NS)AL(E)SP(O)	1 1/4"	3/#4	N/A	2P/70	N/A	100	A (SIGNAL) B (LUM) C (ILSN)	1P/50 2P/15 1P/15	40 3 12	7.0



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 4801 NW Loop 410, Suite 910, San Antonio, Texas 78229
 T +1 210 736 0425 E infrastructure@rpsgroup.com

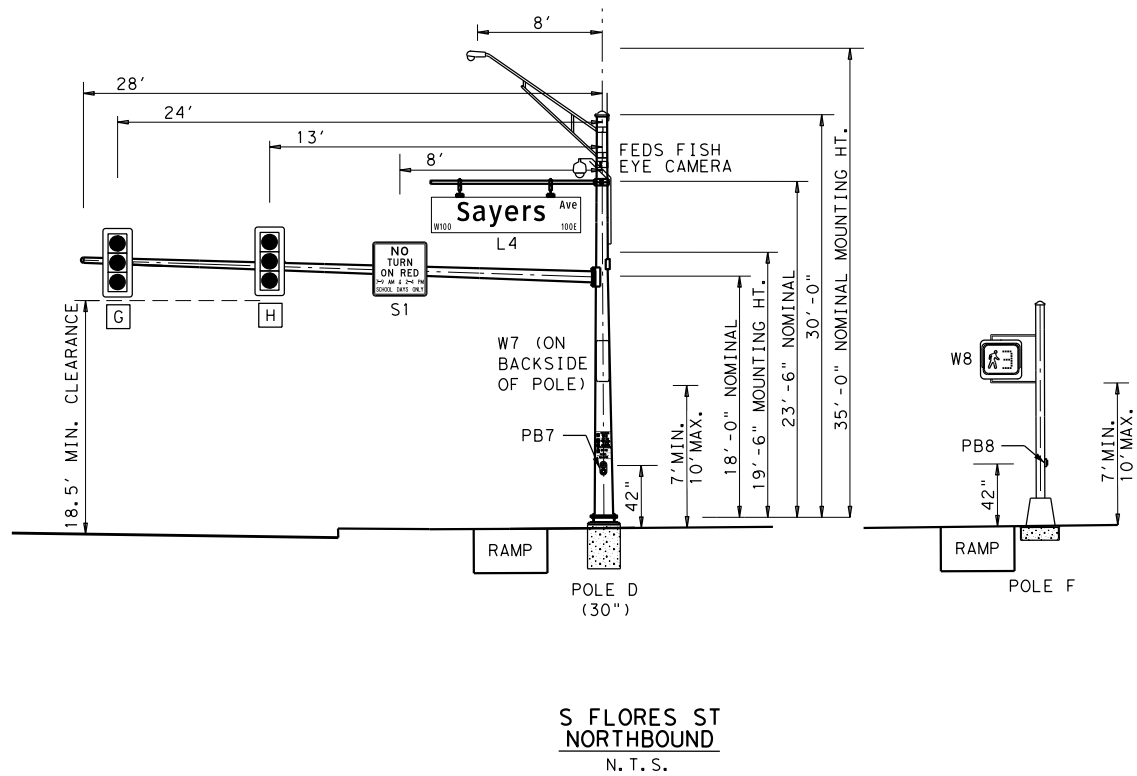
CITY OF SAN ANTONIO
 DEPARTMENT OF PUBLIC WORKS

HIGHWAY SAFETY IMPROVEMENT PROGRAM
 ELECTRICAL SCHEDULE
 S FLORES ST
 AT W SAYERS AVE
 / E SAYERS AVE

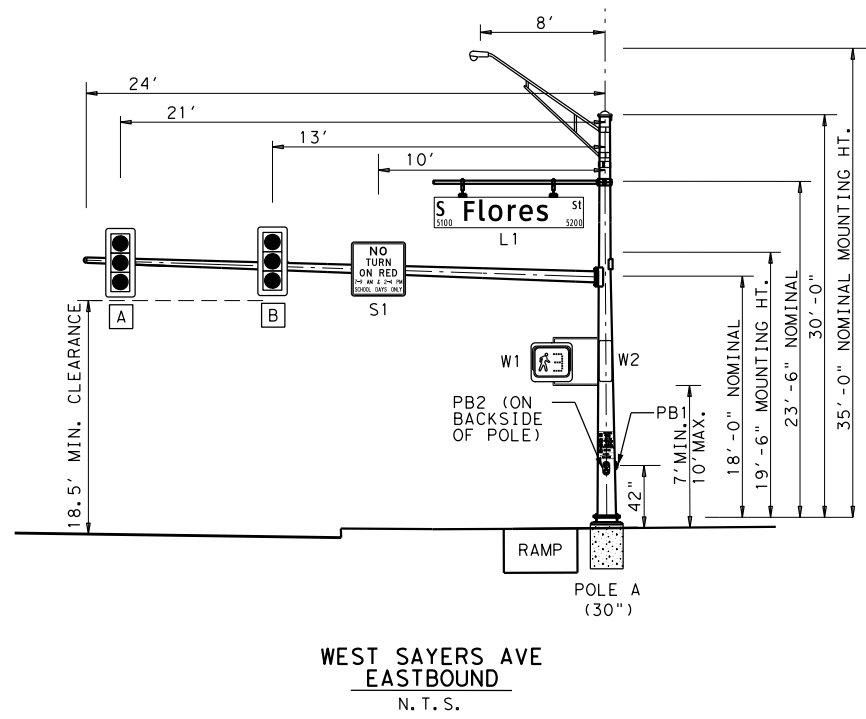
SHEET 1 OF 1

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.	
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STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0915	12	698, etc.	VARIOUS

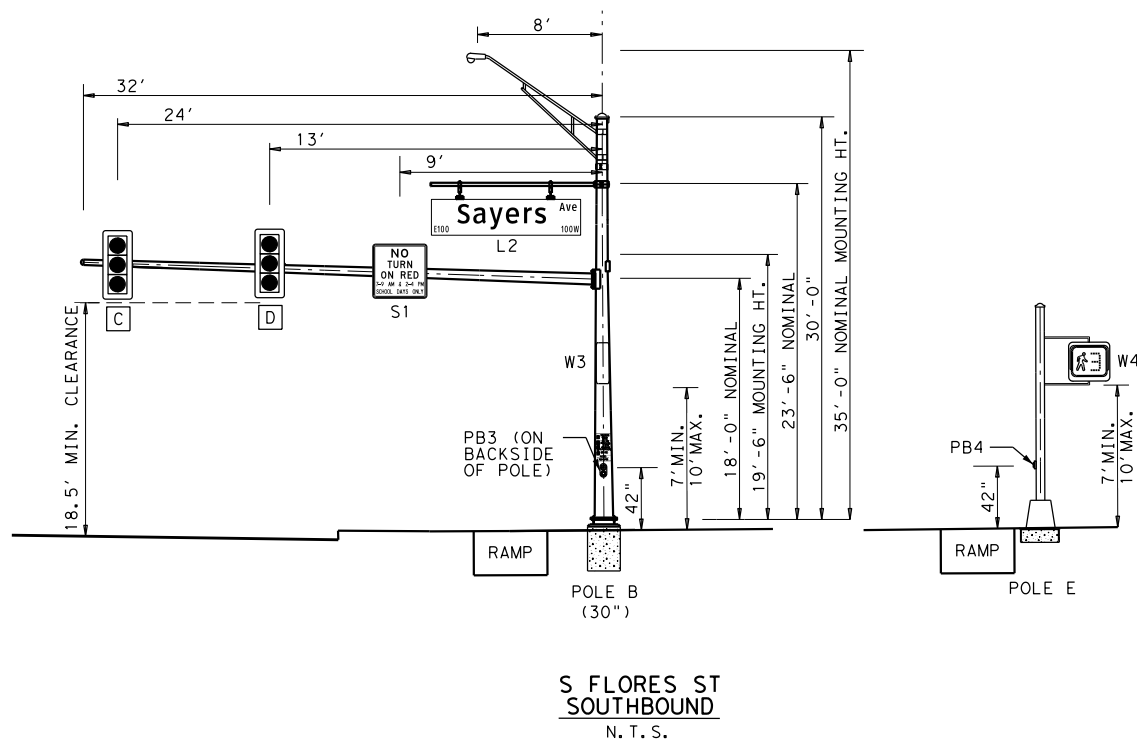
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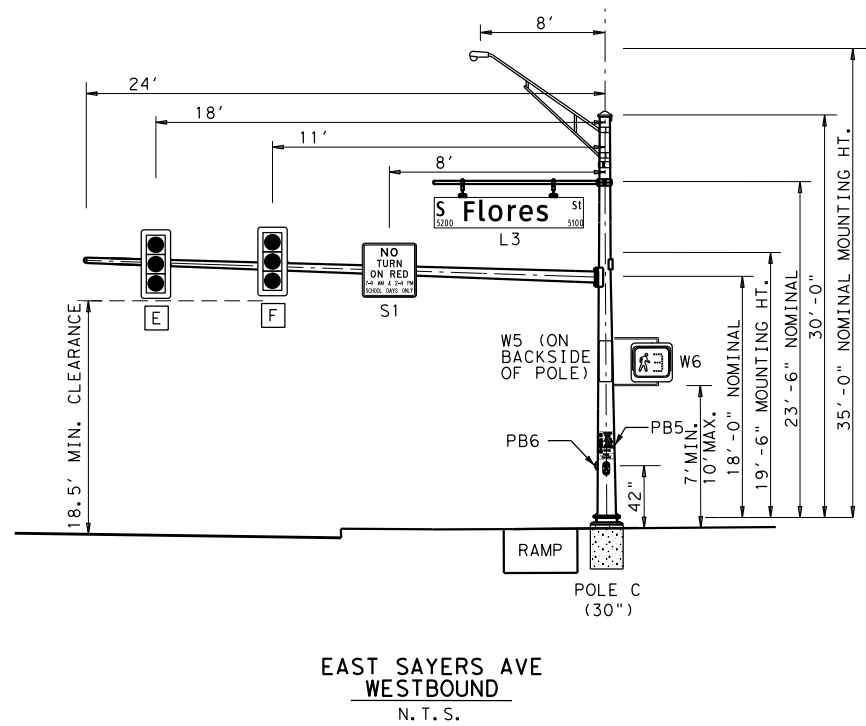
**S FLORES ST
NORTHBOUND**
N. T. S.



**WEST SAYERS AVE
EASTBOUND**
N. T. S.

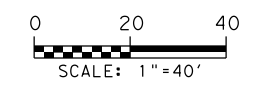


**S FLORES ST
SOUTHBOUND**
N. T. S.



**EAST SAYERS AVE
WESTBOUND**
N. T. S.

- NOTES:**
- HEADS WILL BE INSTALLED PER TXMUTCD 2011.
 - FOUNDATIONS WILL BE ADJUSTED IN THE FIELD IN ORDER TO MEET CLEARANCE.
 - LOCATION OF SIGNAL HEADS ARE APPROXIMATE. ANY CHANGES WILL BE APPROVED BY THE ENGINEER.
 - MAST ARM ATTACHMENT HEIGHT WILL BE CALCULATED BY THE CONTRACTOR IN THE FIELD AND APPROVED BY THE ENGINEER. MAST ARM DAMPING PLATE TO BE INSTALLED ON ARMS 40' OR LONGER.
 - PROVIDE 18.5' MIN. CLEARANCE FOR ALL SIGNAL HEADS.
 - OD-#: OPTICOM DETECTOR.
 - R#-P: PRESENCE RADAR DETECTOR (RPDD).
 - R#-A: ADVANCE RADAR DETECTOR (RADD).



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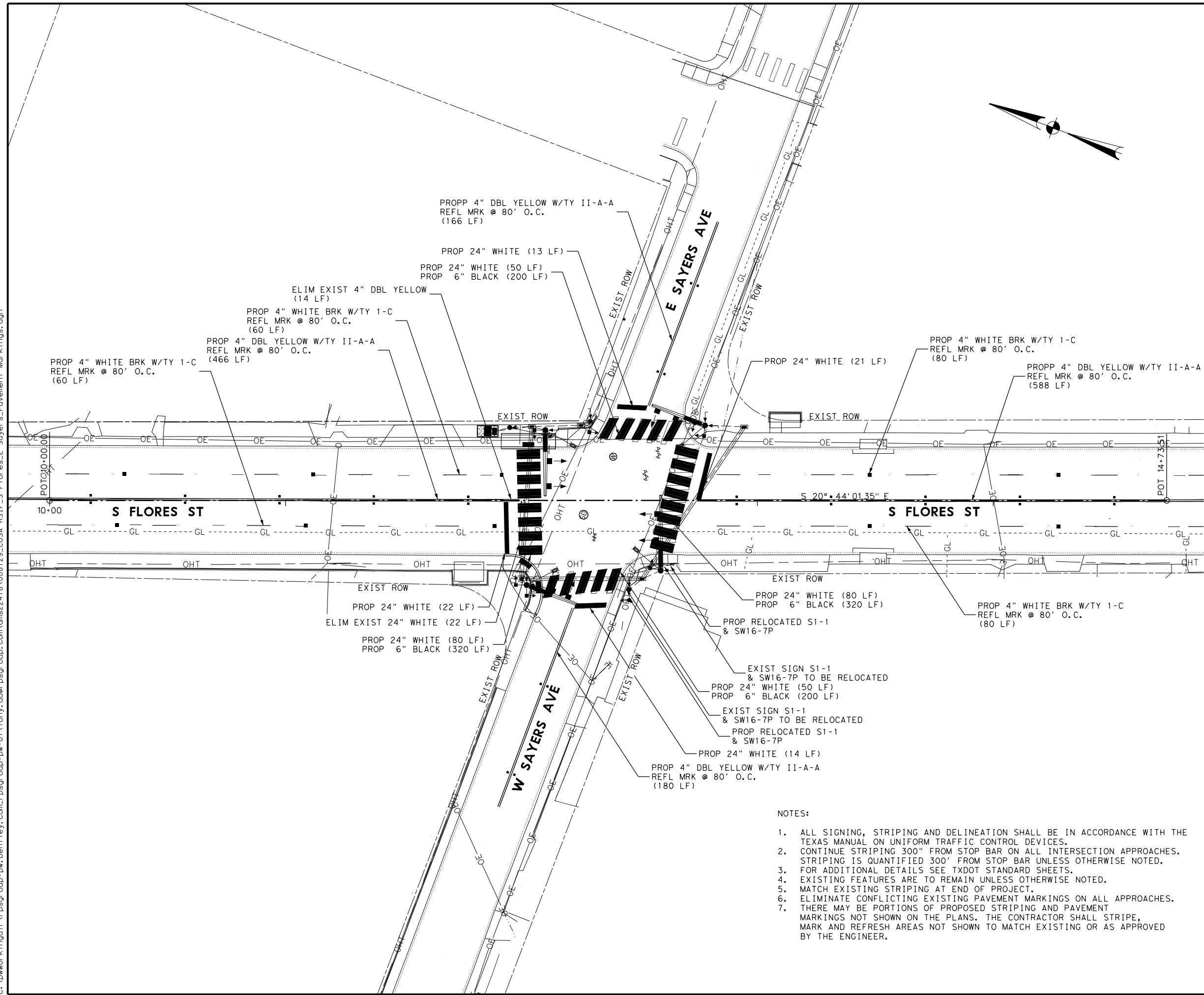
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 4801 NW Loop 410, Suite 910, San Antonio, Texas 78229
 T +1 210 736 0425 E usinfrastructure@rpsgroup.com

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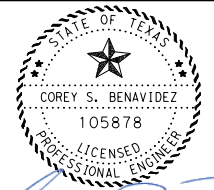
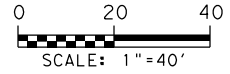
**HIGHWAY SAFETY
IMPROVEMENT PROGRAM**
SIGNAL ELEVATION LAYOUT
S FLORES ST
AT W SAYERS AVE
/ E SAYERS AVE

SHEET 1 OF 1		FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
			SEE TITLE SHEET	32
STATE	DIST.	COUNTY		
TEXAS	SAT	BEXAR		
CONT.	SECT.	JOB	HIGHWAY NO.	
0915	12	698, etc.	VARIOUS	

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QUANTITY SUMMARY			
ITEM	DESCRIPTION	UNIT	QTY
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	2
0666 6003	REFL PAV MRK TY I (W) 4" (BRK) (100MIL)	LF	280
0666 6036	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	LF	
0666 6048	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)	LF	330
0666 6054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	
0666 6078	REFL PAV MRK TY I (W) (WORD) (100MIL)	EA	
0666 6126	REFL PAV MRK TY I (Y) 4" (SLD) (100MIL)	LF	1400
0666 6162	RE PV MRK TY I (BLACK) 6" (SHADOW) (100MIL)	LF	1040
0672 6007	REFL PAV MRKR TY I-C	EA	12
0672 6009	REFL PAV MRKR TY II-A-A	EA	18
0677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	14
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	
0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	22



Corey S. Benavidez 11/3/2022

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rps Texas PE Firm Reg. #F-929
 4801 NW Loop 410, Suite 910, San Antonio, Texas 78229
 T +1 210 736 0425 E usinfrastructure@rpsgroup.com

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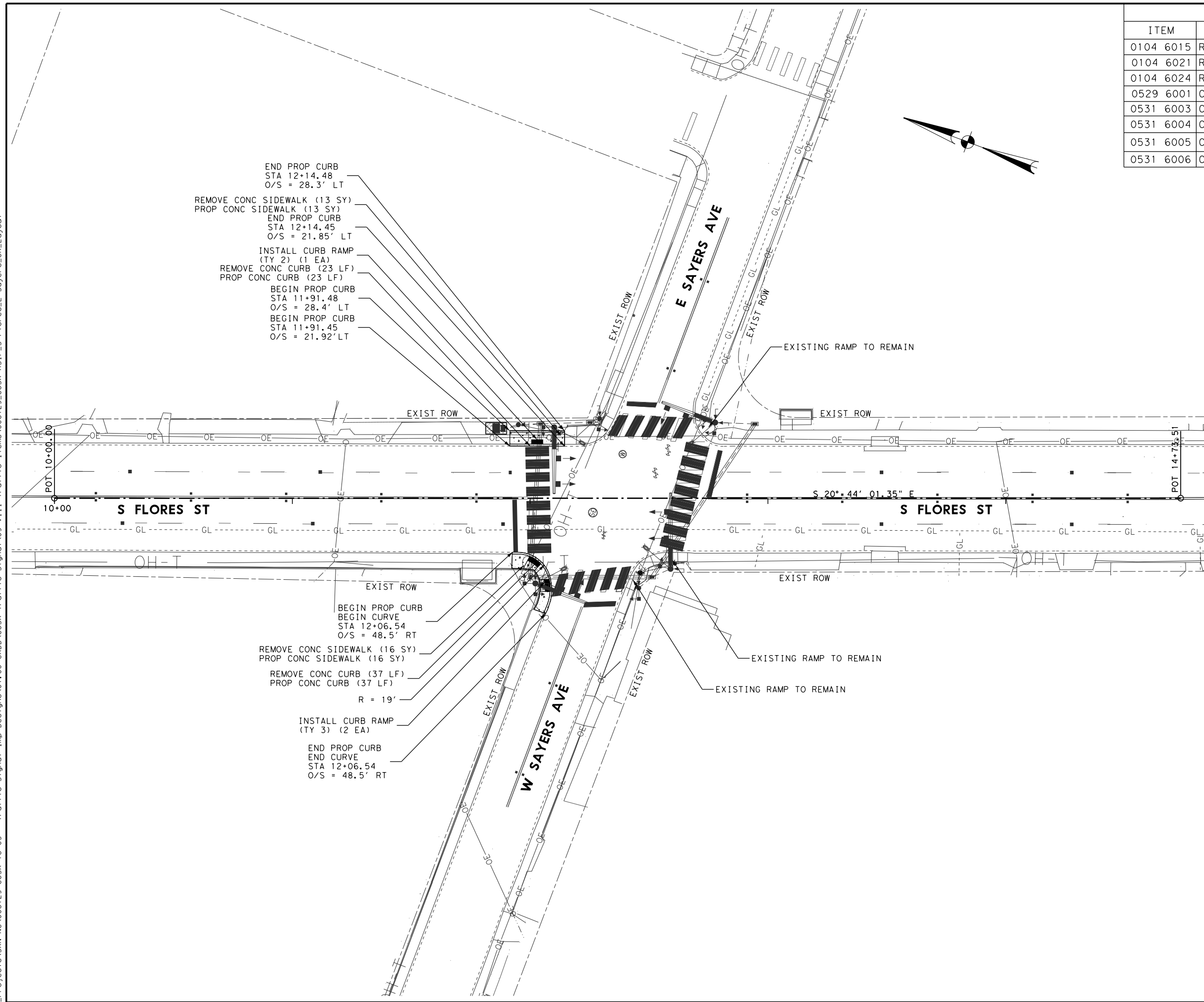
HIGHWAY SAFETY IMPROVEMENT PROGRAM
PROPOSED PAVEMENT MARKINGS LAYOUT
S FLORES ST @ W SAYERS AVE / E SAYERS AVE

SHEET 1 OF 1		FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
			SEE TITLE SHEET	33
STATE	DIST.	COUNTY		
TEXAS	SAT	BEXAR		
CONT.	SECT.	JOB	HIGHWAY NO.	
0915	12	698, etc.	VARIOUS	

- NOTES:
- ALL SIGNING, STRIPING AND DELINEATION SHALL BE IN ACCORDANCE WITH THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
 - CONTINUE STRIPING 300" FROM STOP BAR ON ALL INTERSECTION APPROACHES. STRIPING IS QUANTIFIED 300' FROM STOP BAR UNLESS OTHERWISE NOTED.
 - FOR ADDITIONAL DETAILS SEE TXDOT STANDARD SHEETS.
 - EXISTING FEATURES ARE TO REMAIN UNLESS OTHERWISE NOTED.
 - MATCH EXISTING STRIPING AT END OF PROJECT.
 - ELIMINATE CONFLICTING EXISTING PAVEMENT MARKINGS ON ALL APPROACHES.
 - THERE MAY BE PORTIONS OF PROPOSED STRIPING AND PAVEMENT MARKINGS NOT SHOWN ON THE PLANS. THE CONTRACTOR SHALL STRIPE, MARK AND REFRESH AREAS NOT SHOWN TO MATCH EXISTING OR AS APPROVED BY THE ENGINEER.

11/3/2022 11:33:30 AM c:\pwworkingdir\rpsgroup-pw-bentley.com\rpsgroup-pw-01\tony.doe\rpsgroup.com\dms22418\008129_COSA_HSTP_S Flores_E Sayers_Pavement Markings.dgn

12/19/2022 9:34:34 PM
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 RPS - Alexis Phillips



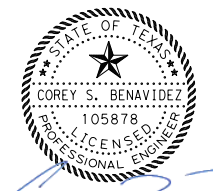
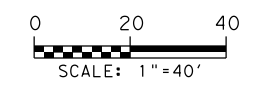
QUANTITY SUMMARY			
ITEM	DESCRIPTION	UNI	QTY
0104 6015	REMOVING CONC (SIDEWALKS)	SY	29
0104 6021	REMOVING CONC (CURB)	LF	60
0104 6024	REMOVING CONC (RETAINING WALLS)	SY	
0529 6001	CONC CURB (TY 1)	LF	60
0531 6003	CONC SIDEWALKS (6")	SY	29
0531 6004	CURB RAMPS (TY 1)	EA	
0531 6005	CURB RAMPS (TY 2)	EA	1
0531 6006	CURB RAMPS (TY 3)	EA	2

LEGEND

- EXIST ROW
- ▬ 6" CONCRETE SIDEWALK
- DETECTABLE WARNING SURFACE

NOTES:

1. LOCATION OF UNDERGROUND AND ABOVEGROUND UTILITIES ARE APPROXIMATE. CONTRACTOR SHALL CALL FOR LOCATES AND VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
2. ENSURE THAT PROTECTIVE BARRIERS (e.g. ORANGE CONSTRUCTION FENCING, CONSTRUCTION BARREL (S) BE PLACED AROUND THE PLANTERS DURING CONSTRUCTION.

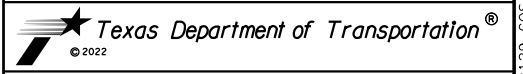


Corey S. Benavidez 12/19/2022

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rps Texas PE Firm Reg. #F-929
 4801 NW Loop 410, Suite 910, San Antonio, Texas 78229
 T +1 210 736 0425 E usinfrastructure@rpsgroup.com

CITY OF SAN ANTONIO
 DEPARTMENT OF PUBLIC WORKS



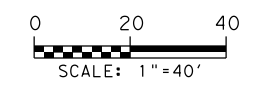
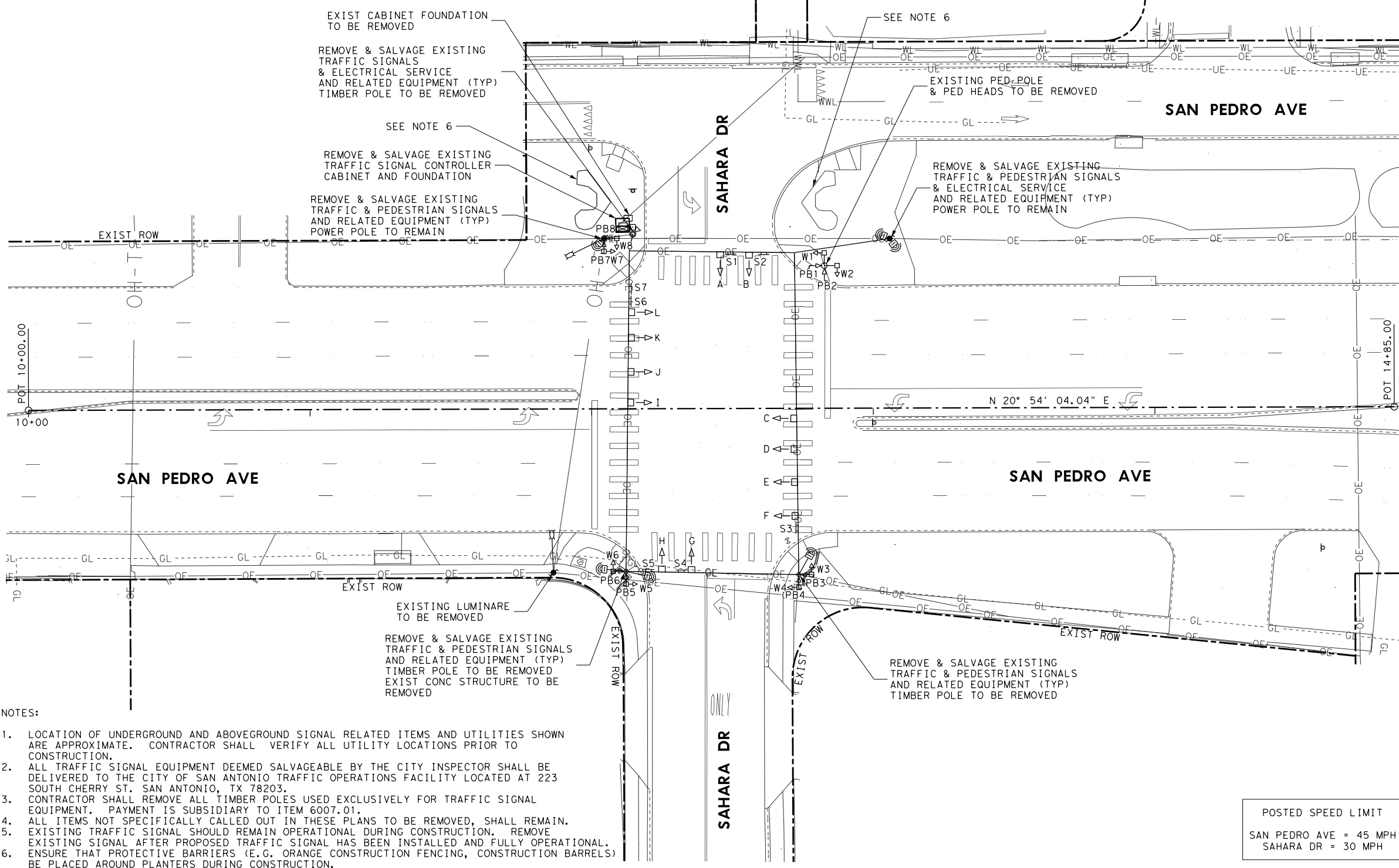
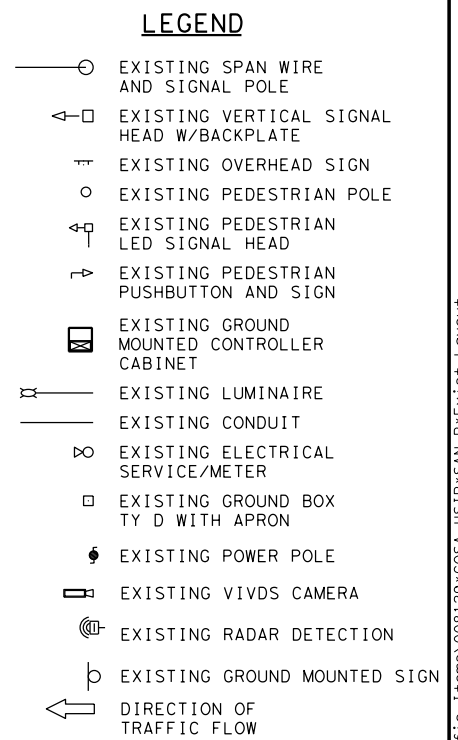
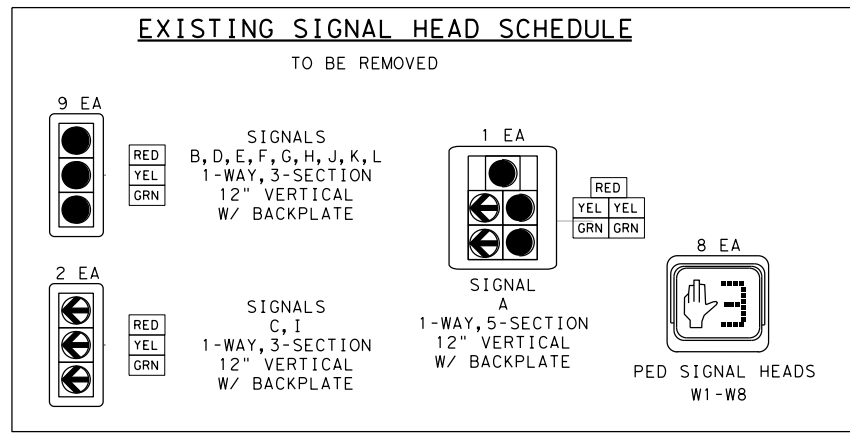
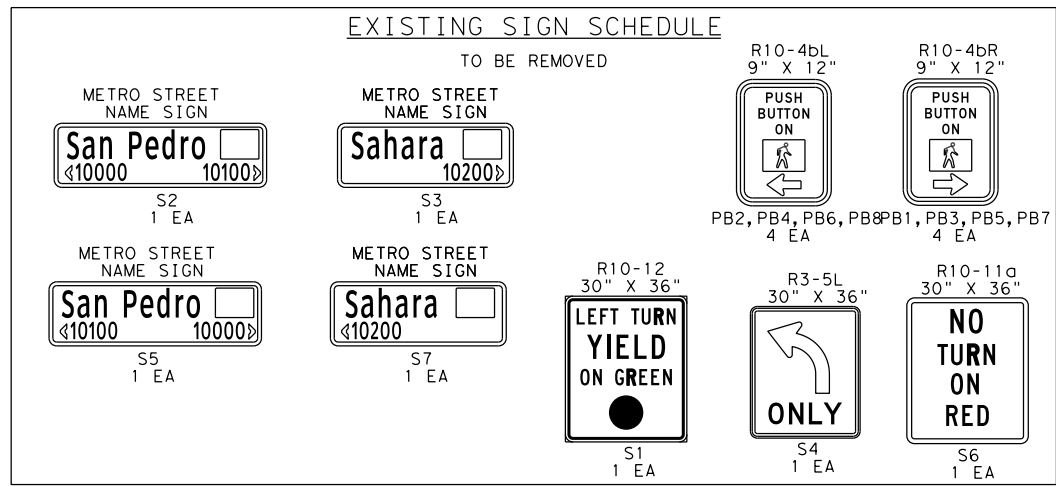
HIGHWAY SAFETY IMPROVEMENT PROGRAM
 PROPOSED CURB RAMP LAYOUT
 S FLORES AVE AT / E SAYERS AVE

SHEET 1 OF 1

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.	
	STP 2023 (535) HESG	34	
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0915	12	698, etc.	VARIOUS

12/19/2022 9:34:34 PM *Projects\SAN-NC\008129_COSA TO-03 - Traffic Signal Imp Designs\07-00 CADD\COSA Traffic Signal\09-VIII Traffic Items\008129_COSA HSIP_S Flores_E Sayers_CR_Layout

12/19/2022 9:33:54 PM -Projects\SAN-NC\008129_COSA TO-03 - Traffic Signal Imp Design\07-00 CADD\COSA Traffic Signal\09-VIII Traffic Items\08129_COSA HSIP_SAN_P_Exist Layout



COREY S. BENAVIDEZ
 LICENSED PROFESSIONAL ENGINEER
 105878
 12/19/2022

NO.	DATE	REVISION	APPROV.

rps Texas PE Firm Reg. #F-929
 4801 NW Loop 410, Suite 910, San Antonio, Texas 78229
 T +1 210 736 0425 E infrastructure@rpsgroup.com

CITY OF SAN ANTONIO
 DEPARTMENT OF PUBLIC WORKS

HIGHWAY SAFETY IMPROVEMENT PROGRAM
 EXISTING SIGNAL LAYOUT
 SAN PEDRO AVE
 AT SAHARA DR

SHEET 1 OF 1

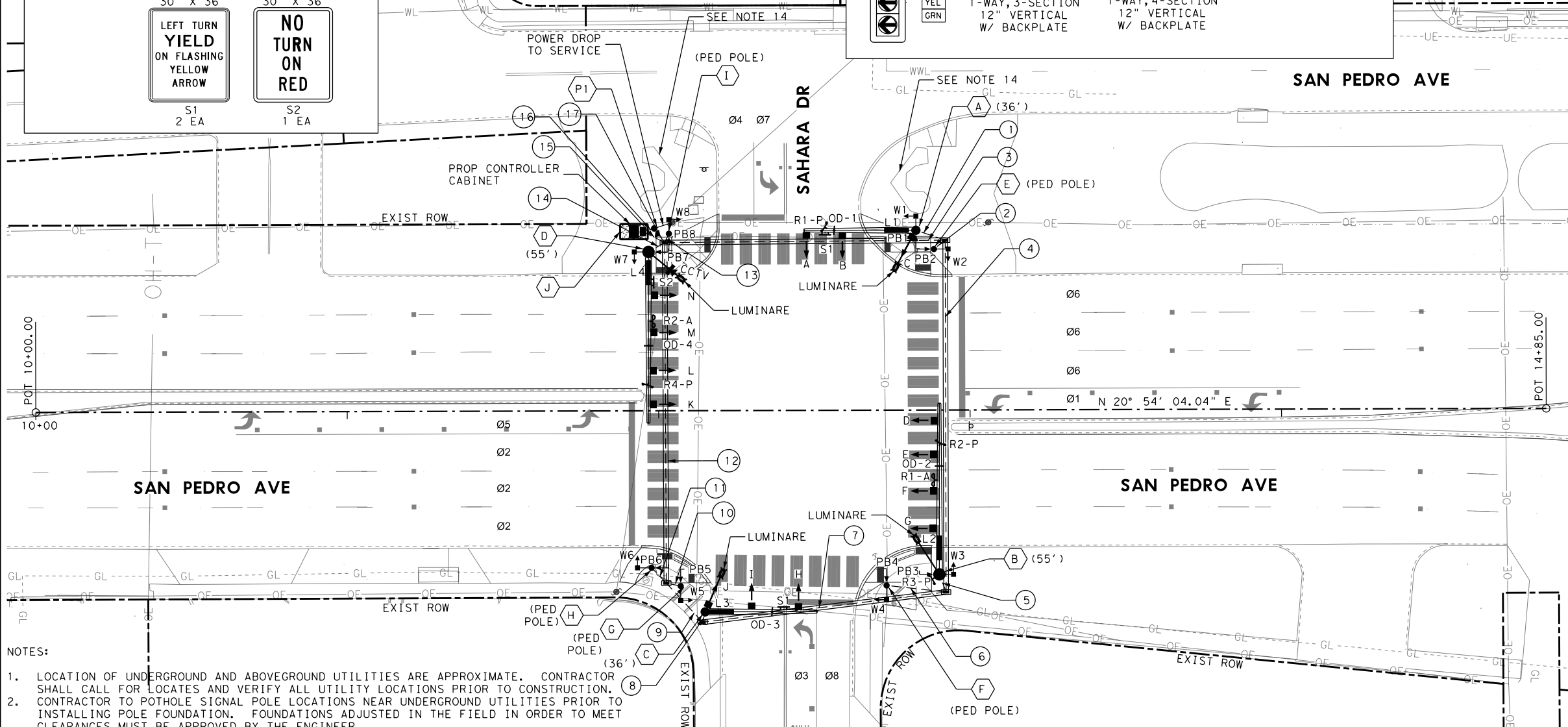
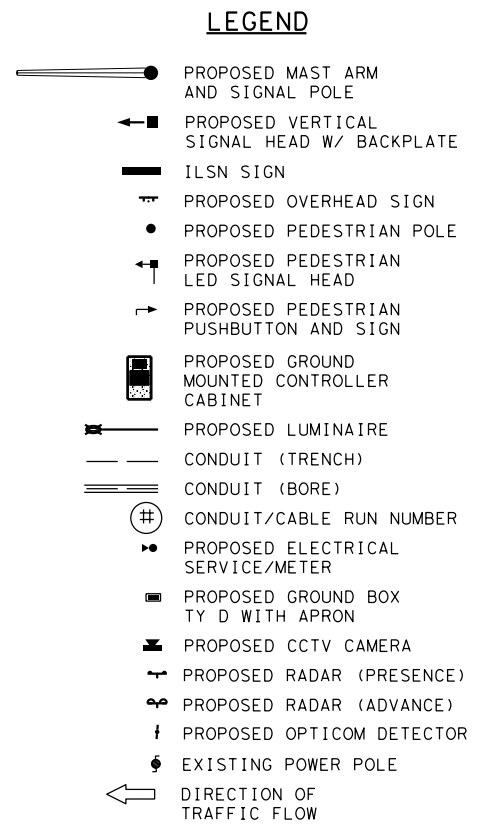
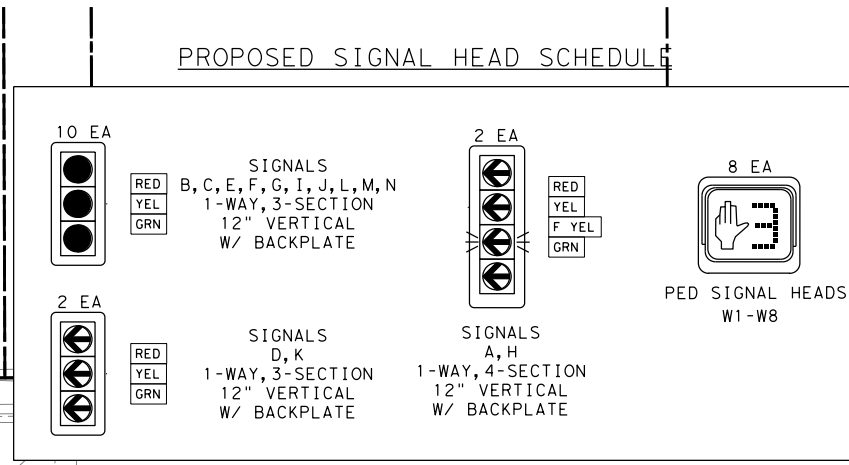
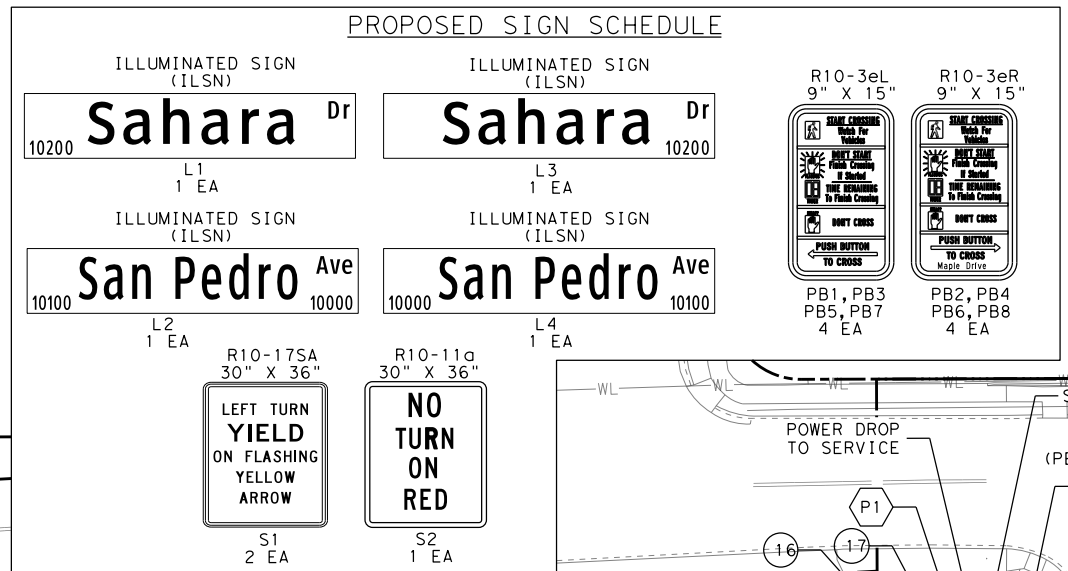
FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.	
	STP 2023 (535) HESG	35	
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0915	12	698, etc.	VARIOUS

POSTED SPEED LIMIT
 SAN PEDRO AVE = 45 MPH
 SAHARA DR = 30 MPH

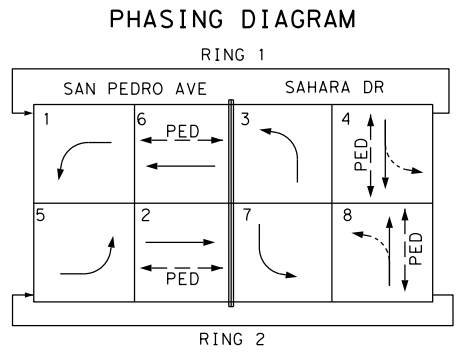
- NOTES:
- LOCATION OF UNDERGROUND AND ABOVEGROUND SIGNAL RELATED ITEMS AND UTILITIES SHOWN ARE APPROXIMATE. CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
 - ALL TRAFFIC SIGNAL EQUIPMENT DEEMED SALVAGEABLE BY THE CITY INSPECTOR SHALL BE DELIVERED TO THE CITY OF SAN ANTONIO TRAFFIC OPERATIONS FACILITY LOCATED AT 223 SOUTH CHERRY ST. SAN ANTONIO, TX 78203.
 - CONTRACTOR SHALL REMOVE ALL TIMBER POLES USED EXCLUSIVELY FOR TRAFFIC SIGNAL EQUIPMENT. PAYMENT IS SUBSIDIARY TO ITEM 6007.01.
 - ALL ITEMS NOT SPECIFICALLY CALLED OUT IN THESE PLANS TO BE REMOVED, SHALL REMAIN.
 - EXISTING TRAFFIC SIGNAL SHOULD REMAIN OPERATIONAL DURING CONSTRUCTION. REMOVE EXISTING SIGNAL AFTER PROPOSED TRAFFIC SIGNAL HAS BEEN INSTALLED AND FULLY OPERATIONAL.
 - ENSURE THAT PROTECTIVE BARRIERS (E.G. ORANGE CONSTRUCTION FENCING, CONSTRUCTION BARRELS) BE PLACED AROUND PLANTERS DURING CONSTRUCTION.

12/19/2022 9:33:54 PM -Projects\SAN-NC\008129_COSA TO-03 - Traffic Signal Imp Design\07-00 CADD\COSA Traffic Signal\09-VIII Traffic Items\08129_COSA HSIP_SAN_P_Exist Layout

12/19/2022 9:33:50 PM Projects\SAN-NC\008129 COSA To-03 - Traffic Signal Imp Designs\07-00 CADD\COSA Traffic Signal\09-VIII Traffic Items\008129_COSA_HSP_San Pedro Ave_Sahara Dr_Prop Layout



- #### NOTES:
- LOCATION OF UNDERGROUND AND ABOVEGROUND UTILITIES ARE APPROXIMATE. CONTRACTOR SHALL CALL FOR LOCATES AND VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
 - CONTRACTOR TO POTHOLE SIGNAL POLE LOCATIONS NEAR UNDERGROUND UTILITIES PRIOR TO INSTALLING POLE FOUNDATION. FOUNDATIONS ADJUSTED IN THE FIELD IN ORDER TO MEET CLEARANCES MUST BE APPROVED BY THE ENGINEER.
 - LOCATION OF TRAFFIC SIGNAL POLES, CONTROLLER ASSEMBLIES, AND ELECTRICAL SERVICE SHALL BE VERIFIED AND APPROVED BY TXDOT PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL SUPPLY AND INSTALL THE ADDRESS IN PERMANENT NUMBERS AND LETTERS TO THE STREET SIDE OF THE SERVICE ENCLOSURE. SAID ADDRESS SHALL ALSO BE RECORDED AND GIVEN TO THE TXDOT INSPECTOR FOR THEIR RECORDS.
 - PROVIDE 17.5' MIN CLEARANCE FOR ALL SIGNAL HEADS.
 - THIS SIGNAL TO BE INSTALLED PER COSA SPECS. ALL OTHER INFRASTRUCTURE TO BE CONSTRUCTED PER TXDOT STANDARDS AND SPECIFICATIONS.
 - NEATLY CAP/COIL ALL WIRES AND CABLES IN GROUND BOX OR AT TERMINATION.
 - THE CONTRACTOR SHALL CONNECT FIELD WIRING TO CONTROLLER.
 - LUMINAIRES ARE SHOWN AT AN ANGLE FOR CLARITY PURPOSES ONLY. ORIENT LUMINAIRE ARMS PERPENDICULAR TO TRAVEL LANE.
 - TRAY CABLE SHALL BE RUN IN 2" CONDUIT SEPARATE FROM SIGNAL CABLE.
 - AN ADDITIONAL 2" SCHEDULE 80 PVC SHALL BE INSTALLED AT EACH POLE FOUNDATION STUBBED OUT 2" FROM THE FACE OF THE FOUNDATION. STUB OUTS SHALL BE APPROPRIATELY CAPPED BELOW GRADE FOR FUTURE USE.
 - THE CONTRACTOR SHALL BE REQUIRED TO KEEP THE EXISTING TRAFFIC SIGNAL EQUIPMENT OPERATIONAL OR HAVE A POLICE OFFICER PRESENT DURING CONSTRUCTION OF THE PROPOSED TRAFFIC SIGNAL.
 - CONTRACTOR SHALL CONTACT CITY OF SAN ANTONIO (COSA) TRAFFIC SIGNAL INSPECTORS AT 210-207-8462 PRIOR TO INSTALLING FEDS OR ITS CAMERA. FEDS AND ITS CAMERA DEVICES SHALL BE INSTALLED UNDER THE SUPERVISION OF COSA INSPECTORS.
 - SIGNAL HEADS ON POLES ARE SHOWN AT AN ANGLE FOR CLARITY PURPOSES ONLY. ORIENT SIGNAL HEADS ARMS PARALLEL TO TRAVEL LANE.
 - ENSURE THAT PROTECTIVE BARRIERS (E.G. ORANGE CONSTRUCTION FENCING, CONSTRUCTION BARRELS) BE PLACED AROUND PLANTERS DURING CONSTRUCTION.



POSTED SPEED LIMIT
 SAN PEDRO AVE = 45 MPH
 SAHARA DR = 30 MPH



NO.	DATE	REVISION	APPROV.

rps Texas PE Firm Reg. #F-929
 4801 NW Loop 410, Suite 910, San Antonio, Texas 78229
 T +1 210 736 0425 E infrastructure@rpsgroup.com

CITY OF SAN ANTONIO
 DEPARTMENT OF PUBLIC WORKS

HIGHWAY SAFETY IMPROVEMENT PROGRAM

PROPOSED SIGNAL LAYOUT

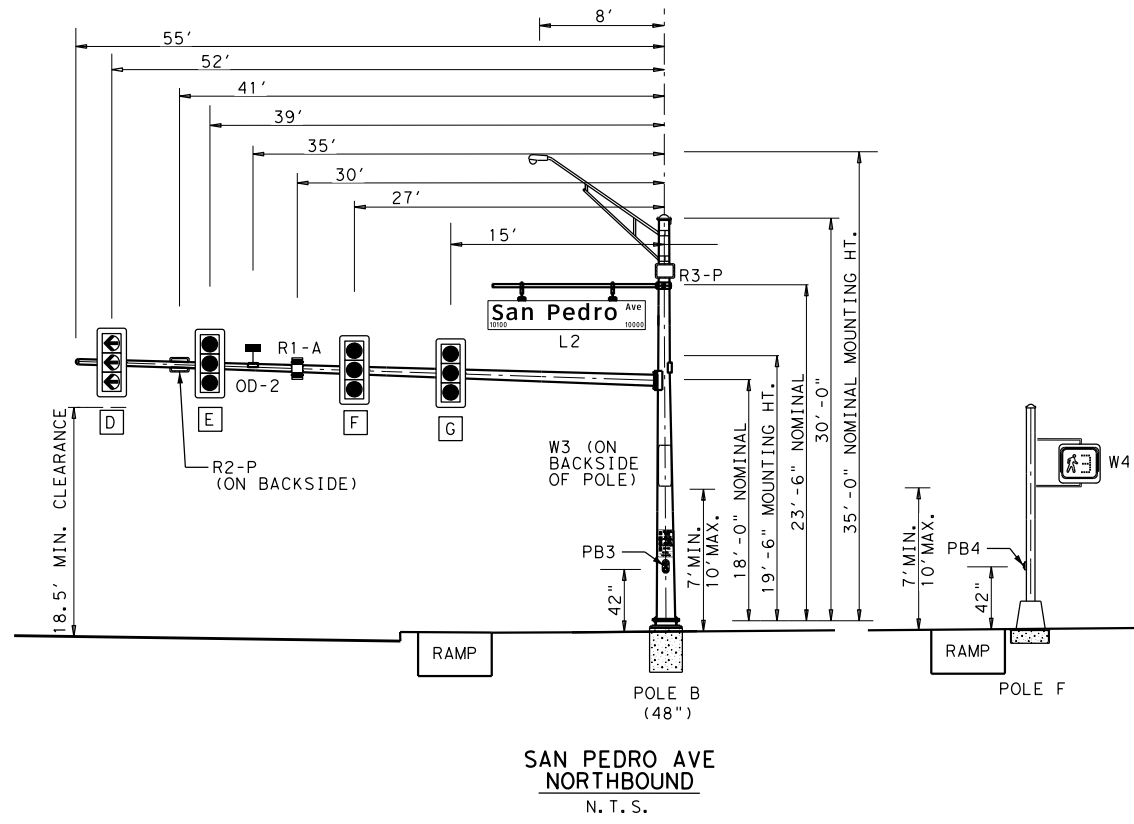
SAN PEDRO AVE AT SAHARA DR

SHEET 1 OF 1

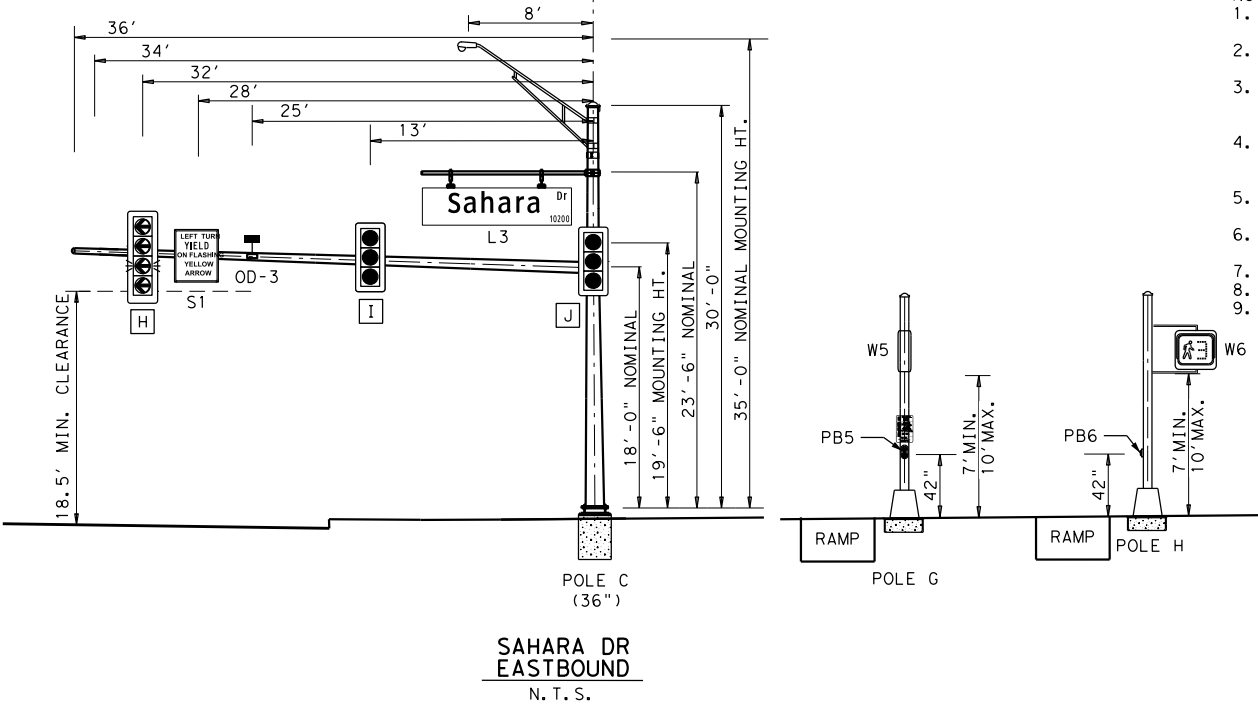
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	STP 2023 (535) HESG	36	
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0915	12	698, etc.	VARIOUS

12/19/2022 9:33:50 PM Projects\SAN-NC\008129 COSA To-03 - Traffic Signal Imp Designs\07-00 CADD\COSA Traffic Signal\09-VIII Traffic Items\008129_COSA_HSP_San Pedro Ave_Sahara Dr_Prop Layout

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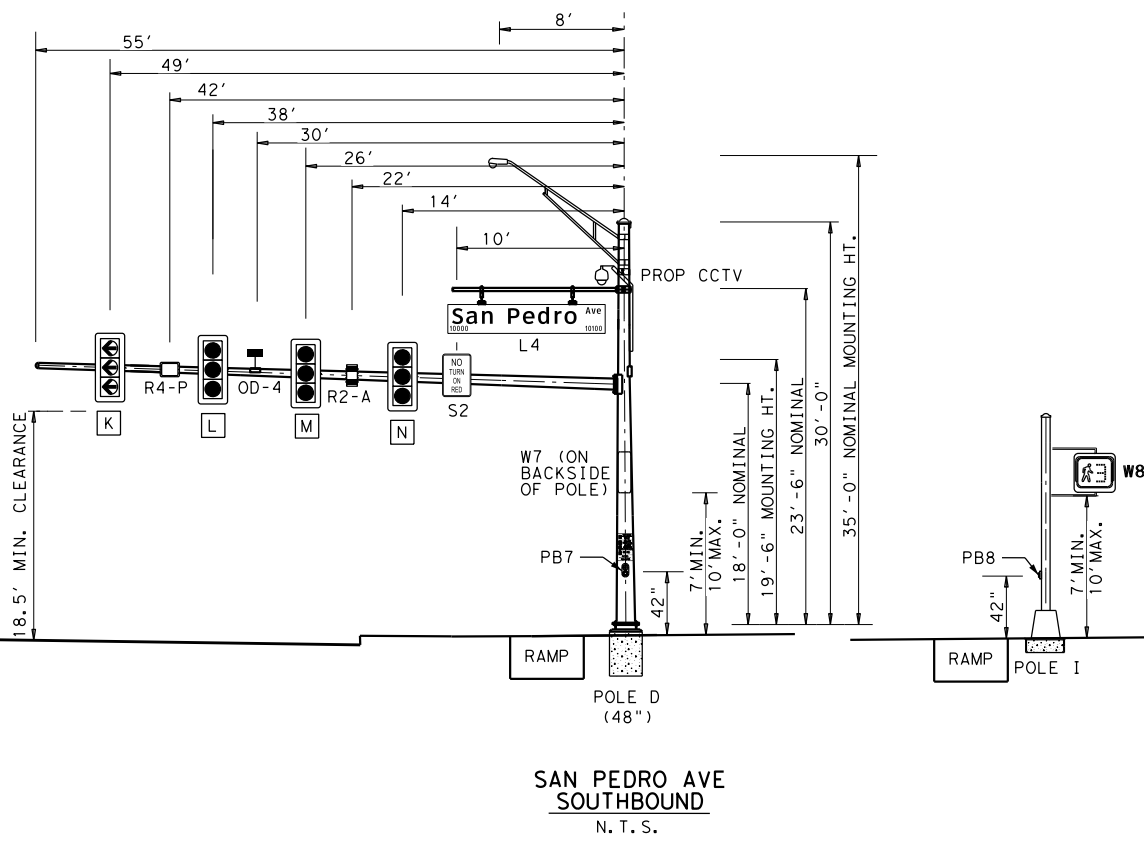
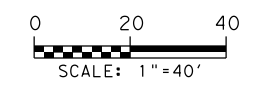


**SAN PEDRO AVE
NORTHBOUND**
N. T. S.

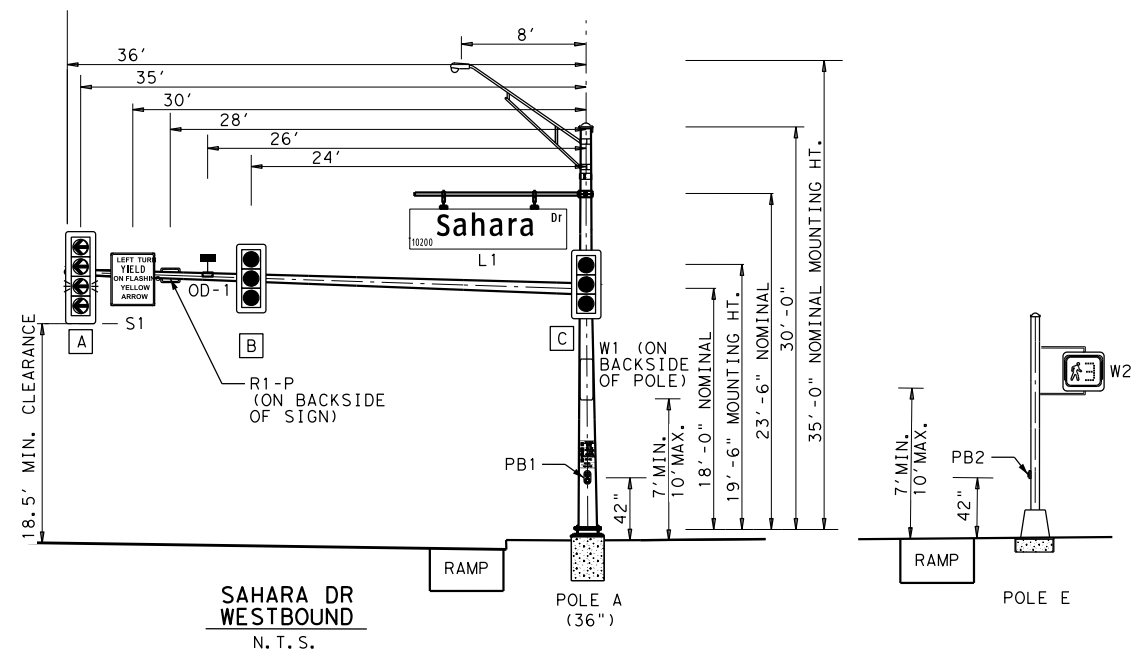


**SAHARA DR
EASTBOUND**
N. T. S.

- NOTES:
- HEADS WILL BE INSTALLED PER TXMUTCD 2011.
 - FOUNDATIONS WILL BE ADJUSTED IN THE FIELD IN ORDER TO MEET CLEARANCE.
 - LOCATION OF SIGNAL HEADS ARE APPROXIMATE. ANY CHANGES WILL BE APPROVED BY THE ENGINEER.
 - MAST ARM ATTACHMENT HEIGHT WILL BE CALCULATED BY THE CONTRACTOR IN THE FIELD AND APPROVED BY THE ENGINEER.
 - MAST ARM DAMPING PLATE TO BE INSTALLED ON ARMS 40' OR LONGER.
 - PROVIDE 18.5' MIN. CLEARANCE FOR ALL SIGNAL HEADS.
 - OD-#: OPTICOM DETECTOR.
 - R#-P: PRESENCE RADAR DETECTOR (RPDD).
 - R#-A: ADVANCE RADAR DETECTOR (RADD).



**SAN PEDRO AVE
SOUTHBOUND**
N. T. S.



**SAHARA DR
WESTBOUND**
N. T. S.

12/19/2022

NO.	DATE	REVISION	APPROV.

Texas PE Firm Reg. #F-929
 4801 NW Loop 410, Suite 910, San Antonio, Texas 78229
 T +1 210 736 0425 E usinfrastructure@rpsgroup.com

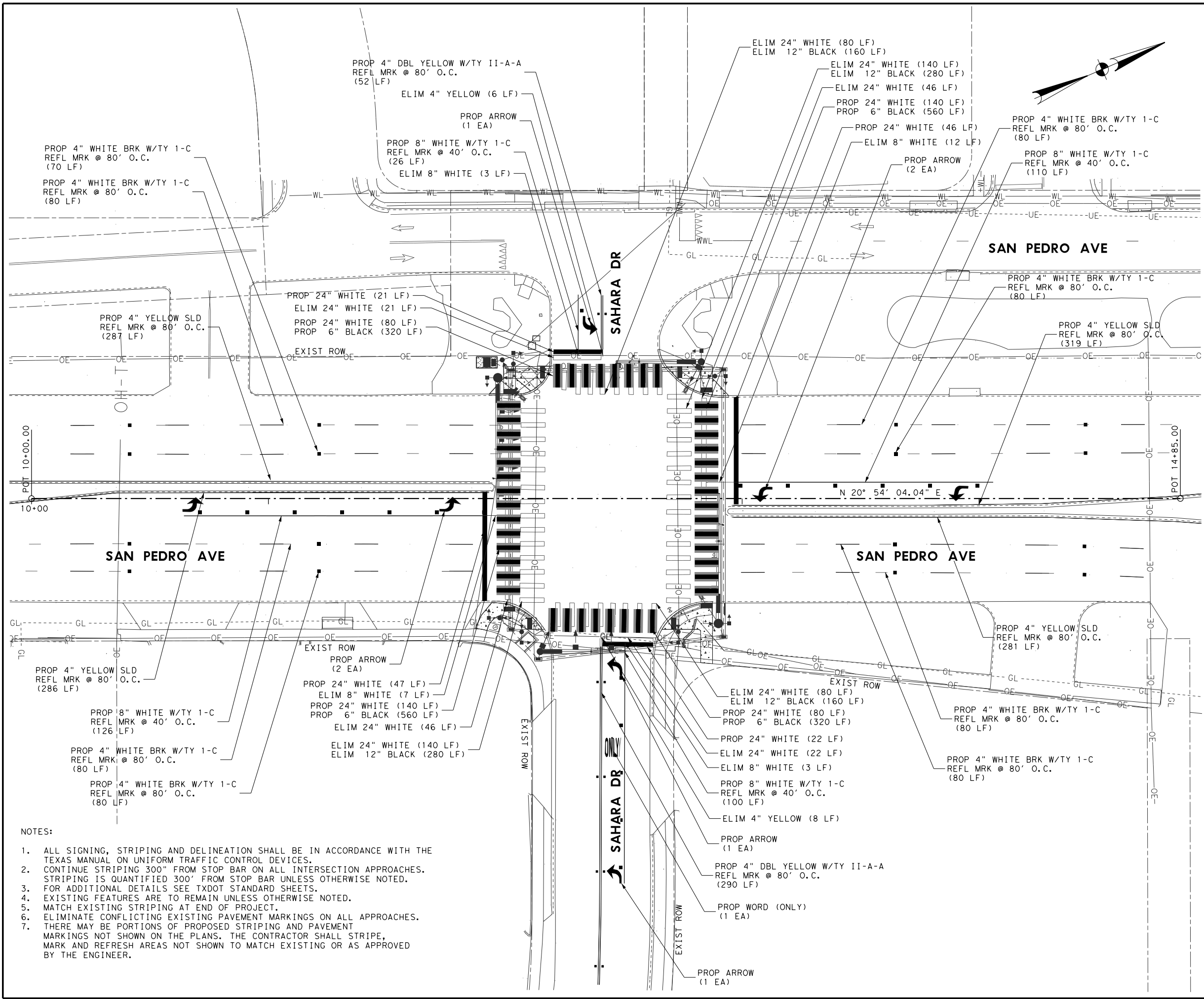
CITY OF SAN ANTONIO
DEPARTMENT OF PUBLIC WORKS

**HIGHWAY SAFETY
IMPROVEMENT PROGRAM**
SIGNAL ELEVATION LAYOUT
SAN PEDRO AVE
AT SAHARA DR

SHEET 1 OF 1		FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
			STP 2023 (535) HESG	38
STATE	DIST.	COUNTY		
TEXAS	SAT	BEXAR		
CONT.	SECT.	JOB	HIGHWAY NO.	
0915	12	698, etc.	VARIOUS	

12/19/2022 9:34:01 PM RPS - Alexis Phillips
 _Projects\SAN-NC\008129_COSA To-03 - Traffic Signal Imp Designs\07-00 CADD\COSA Traffic Signal\09-VIII Traffic Items\008129_COSA HPIP_San Pedro Ave_Sahara Dr_Elevation_Layout

12/19/2022 9:34:47 PM -Projects\SAN-NC\008129_COSA TO-03 - Traffic Signal Imp Designs\07-00 CADD\COSA Traffic Signal\09-VIII Traffic Items\008129_COSA HSIP_San Pedro_Sahara Dr_Pavement Markings



QUANTITY SUMMARY			
ITEM	DESCRIPTION	UNIT	QTY
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	
0666 6003	REFL PAV MRK TY 1 (W)4" (BRK) (100MIL)	LF	630
0666 6036	REFL PAV MRK TY 1 (W)8" (SLD) (100MIL)	LF	352
0666 6048	REFL PAV MRK TY 1 (W)24" (SLD) (100MIL)	LF	576
0666 6054	REFL PAV MRK TY 1 (W) (ARROW) (100MIL)	EA	7
0666 6078	REFL PAV MRK TY 1 (W) (WORD) (100MIL)	EA	1
0666 6126	REFL PAV MRK TY 1 (Y)4" (SLD) (100MIL)	LF	1515
0666 6162	REFL PAV MRK TY 1 (BLACK)6" (SHADOW) (100MIL)	LF	1760
0672 6007	REFL PAV MRKR TY 1-C	EA	38
0672 6009	REFL PAV MRKR TY II-A-A	EA	6
0677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	14
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	25
0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	880
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	575

NO.	DATE	REVISION	APPROV.

12/19/2022

Texas PE Firm Reg. #F-929

4801 NW Loop 410, Suite 910, San Antonio, Texas 78229

 T +1 210 736 0425 E infrastructure@rpsgroup.com

CITY OF SAN ANTONIO

 DEPARTMENT OF PUBLIC WORKS

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HIGHWAY SAFETY IMPROVEMENT PROGRAM

 PROPOSED PAVEMENT MARKINGS LAYOUT

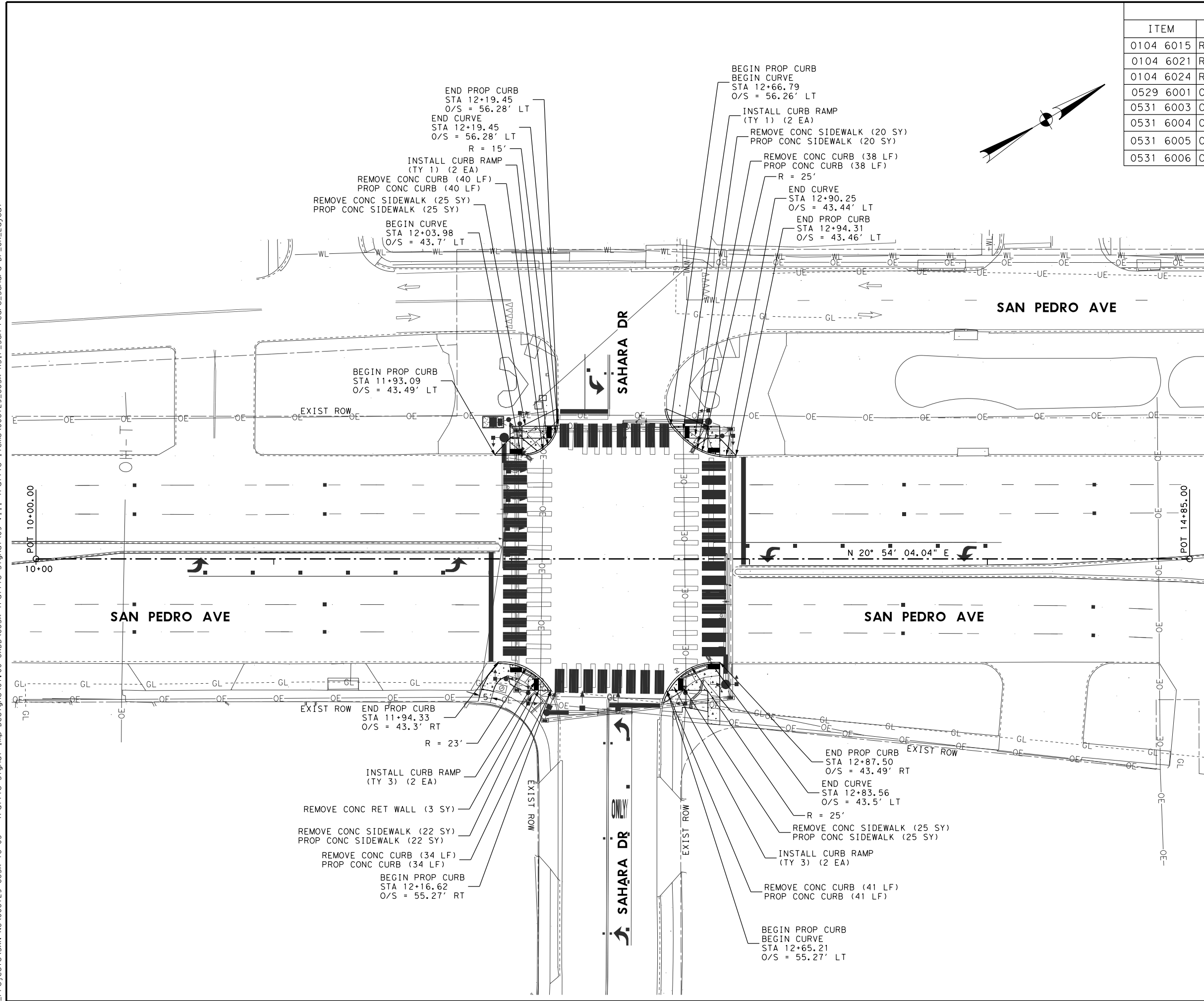
 SAN PEDRO AVE AT SAHARA DR

SHEET 1 OF 1

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.	
	STP 2023 (535) HESG	39	
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0915	12	698, etc.	VARIOUS

- NOTES:
- ALL SIGNING, STRIPING AND DELINEATION SHALL BE IN ACCORDANCE WITH THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
 - CONTINUE STRIPING 300" FROM STOP BAR ON ALL INTERSECTION APPROACHES. STRIPING IS QUANTIFIED 300' FROM STOP BAR UNLESS OTHERWISE NOTED. FOR ADDITIONAL DETAILS SEE TXDOT STANDARD SHEETS.
 - EXISTING FEATURES ARE TO REMAIN UNLESS OTHERWISE NOTED.
 - MATCH EXISTING STRIPING AT END OF PROJECT.
 - ELIMINATE CONFLICTING EXISTING PAVEMENT MARKINGS ON ALL APPROACHES.
 - THERE MAY BE PORTIONS OF PROPOSED STRIPING AND PAVEMENT MARKINGS NOT SHOWN ON THE PLANS. THE CONTRACTOR SHALL STRIPE, MARK AND REFRESH AREAS NOT SHOWN TO MATCH EXISTING OR AS APPROVED BY THE ENGINEER.

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 RPS - Alexis Phillips



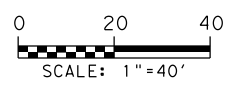
QUANTITY SUMMARY			
ITEM	DESCRIPTION	UNI	QTY
0104 6015	REMOVING CONC (SIDEWALKS)	SY	120
0104 6021	REMOVING CONC (CURB)	LF	153
0104 6024	REMOVING CONC (RETAINING WALLS)	SY	5
0529 6001	CONC CURB (TY 1)	LF	153
0531 6003	CONC SIDEWALKS (6")	SY	120
0531 6004	CURB RAMP (TY 1)	EA	4
0531 6005	CURB RAMP (TY 2)	EA	
0531 6006	CURB RAMP (TY 3)	EA	4

LEGEND

- EXIST ROW
- 6" CONCRETE SIDEWALK
- DETECTABLE WARNING SURFACE

NOTES:

1. LOCATION OF UNDERGROUND AND ABOVEGROUND UTILITIES ARE APPROXIMATE. CONTRACTOR SHALL CALL FOR LOCATES AND VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
2. ENSURE THAT PROTECTIVE BARRIERS (e.g. ORANGE CONSTRUCTION FENCING, CONSTRUCTION BARREL (S) BE PLACED AROUND THE PLANTERS DURING CONSTRUCTION.



12/19/2022

NO.	DATE	REVISION	APPROV.

rps Texas PE Firm Reg. #F-929
 4801 NW Loop 410, Suite 910, San Antonio, Texas 78229
 T +1 210 736 0425 E usinfrastructure@rpsgroup.com

CITY OF SAN ANTONIO
 DEPARTMENT OF PUBLIC WORKS

Texas Department of Transportation

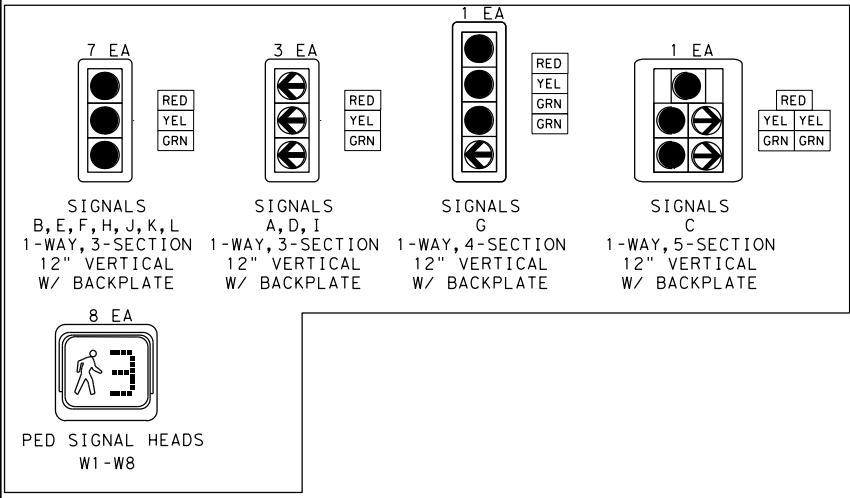
**HIGHWAY SAFETY
 IMPROVEMENT PROGRAM**
 PROPOSED
 CURB RAMP LAYOUT
 SAN PEDRO AVE AT SAHARA DR

SHEET 1 OF 1

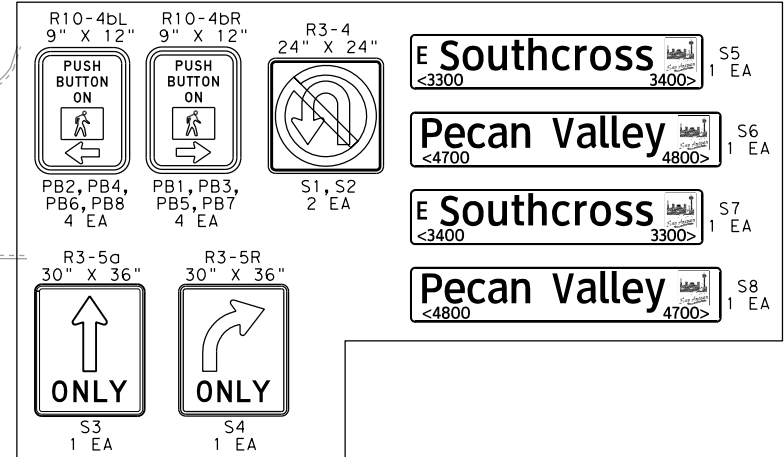
FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.	
	STP 2023 (535) HESG	40	
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0915	12	698, etc.	VARIOUS

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EXISTING SIGNAL HEAD SCHEDULE

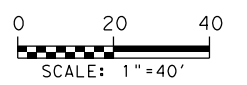
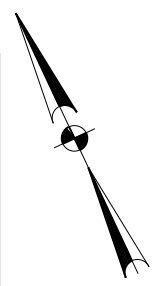


EXISTING SIGN SCHEDULE

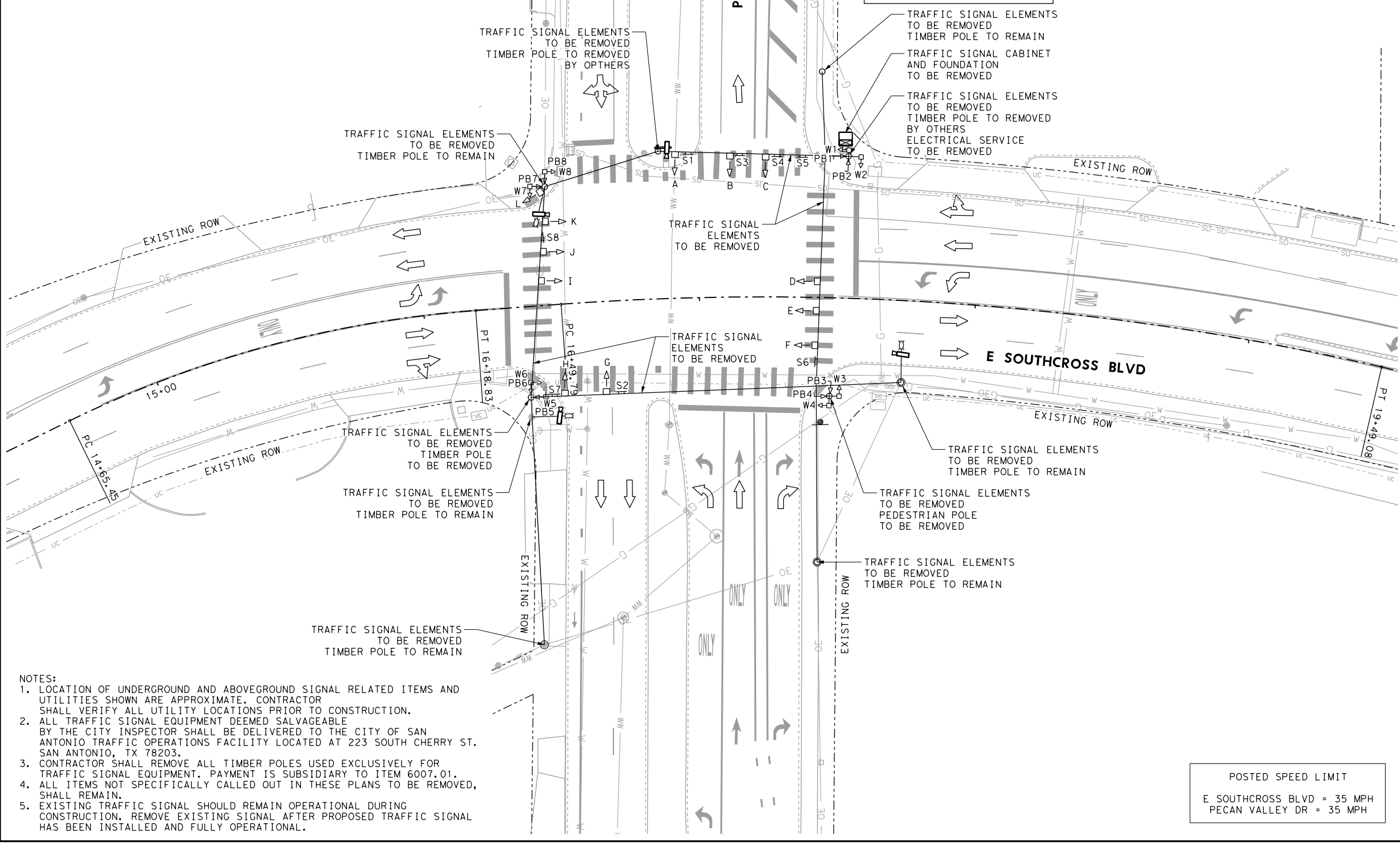


LEGEND

- EXISTING SPAN WIRE AND SIGNAL POLE
- ▽ EXISTING VERTICAL SIGNAL HEAD W/BACKPLATE
- ⊥ EXISTING OVERHEAD SIGN
- EXISTING PEDESTRIAN POLE
- EXISTING PEDESTRIAN LED SIGNAL HEAD
- ⊥ EXISTING PEDESTRIAN PUSHBUTTON AND SIGN
- ⊠ EXISTING GROUND MOUNTED CONTROLLER CABINET
- ⊥ EXISTING LUMINAIRE
- ⊠ EXISTING GROUND BOX TY D WITH APRON
- EXISTING POWER POLE
- ⊠ EXISTING VIVDS CAMERA
- ← DIRECTION OF TRAFFIC FLOW



Legacy Engineering Group
P: Municipalities\Projects\COSA Projects\RPS\Pecan Valley at Southcross4 - Design\Plan Set\8. Traffic\SOUTHCR4_TRF_EX_SIGNAL.dgn
11/2/2022 1:17:16 PM



- NOTES:**
1. LOCATION OF UNDERGROUND AND ABOVEGROUND SIGNAL RELATED ITEMS AND UTILITIES SHOWN ARE APPROXIMATE. CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
 2. ALL TRAFFIC SIGNAL EQUIPMENT DEEMED SALVAGEABLE BY THE CITY INSPECTOR SHALL BE DELIVERED TO THE CITY OF SAN ANTONIO TRAFFIC OPERATIONS FACILITY LOCATED AT 223 SOUTH CHERRY ST. SAN ANTONIO, TX 78203.
 3. CONTRACTOR SHALL REMOVE ALL TIMBER POLES USED EXCLUSIVELY FOR TRAFFIC SIGNAL EQUIPMENT. PAYMENT IS SUBSIDIARY TO ITEM 6007.01.
 4. ALL ITEMS NOT SPECIFICALLY CALLED OUT IN THESE PLANS TO BE REMOVED, SHALL REMAIN.
 5. EXISTING TRAFFIC SIGNAL SHOULD REMAIN OPERATIONAL DURING CONSTRUCTION. REMOVE EXISTING SIGNAL AFTER PROPOSED TRAFFIC SIGNAL HAS BEEN INSTALLED AND FULLY OPERATIONAL.

POSTED SPEED LIMIT
E SOUTHCRSS BLVD = 35 MPH
PECAN VALLEY DR = 35 MPH

NO.	DATE	REVISION	APPROV.

LEGACY ENGINEERING GROUP
TBPE Firm Registration No. 20623

CITY OF SAN ANTONIO
DEPARTMENT OF PUBLIC WORKS

HIGHWAY SAFETY IMPROVEMENT PROGRAM
EXISTING SIGNAL LAYOUT
E SOUTHCRSS BLVD AT
PECAN VALLEY DR

SHEET 1 OF 1		FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
			SEE TITLE SHEET	41
STATE	DIST.	COUNTY		
TEXAS	SAT	BEXAR		
CONT.	SECT.	JOB	HIGHWAY NO.	
0915	12	698. etc.	VARIOUS	

P: Municipalities\Projects\COSA Projects\RPS\Pecan Valley at Southcross4 - Design\Plan Set\8. Traffic\SOUTHCR4_TRF_EX_SIGNAL.dgn

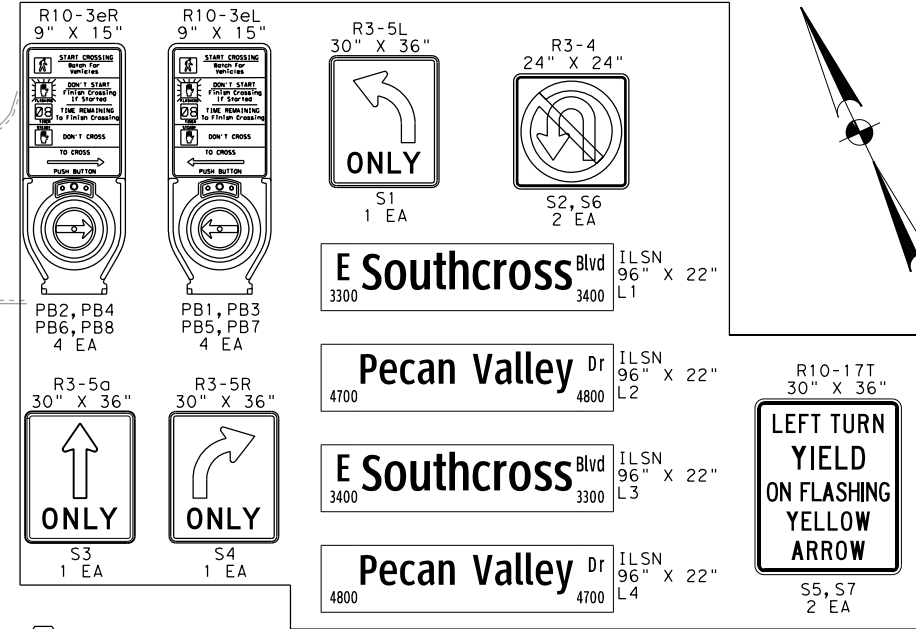
NOTES:

- THE EXISTENCE AND LOCATION OF UTILITIES, EITHER UNDERGROUND OR OVERHEAD, INDICATED ON THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE APPROXIMATE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE ALL UTILITIES (PRIVATE/PUBLIC AND SHOWN/NOT SHOWN) PRIOR TO COMMENCING WORK. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY HIS/HER FAILURE TO LOCATE, PRESERVE, AND PROTECT THESE UTILITIES.
- CONTRACTOR TO POTHOLE SIGNAL POLE LOCATIONS NEAR UNDERGROUND UTILITIES PRIOR TO INSTALLING POLE FOUNDATION. FOUNDATIONS ADJUSTED IN THE FIELD IN ORDER TO MEET CLEARANCES MUST BE APPROVED BY THE ENGINEER.
- LOCATIONS OF TRAFFIC SIGNAL POLES, CONTROLLER ASSEMBLIES, AND ELECTRICAL SHALL BE VERIFIED AND APPROVED BY TXDOT PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL SUPPLY AND INSTALL THE ADDRESS IN PERMANENT NUMBERS AND LETTERS TO THE STREET SIDE OF THE SERVICE ENCLOSURE. SAID ADDRESS SHALL ALSO BE RECORDED AND GIVEN TO THE TXDOT INSPECTOR FOR THEIR RECORDS.
- PROVIDE 18.5' MIN CLEARANCE FOR ALL SIGNAL HEADS.
- THIS SIGNAL TO BE CONSTRUCTED PER TXDOT STANDARDS AND SPECIFICATIONS. HEADS WILL BE INSTALLED PER TXMUTCD 2011.
- NEATLY CAP/COIL ALL WIRES AND CABLES IN GROUND BOX OR AT TERMINATION.
- THE CONTRACTOR SHALL CONNECT FIELD WIRING TO CONTROLLER.
- LUMINAIRES ARE SHOWN AT AN ANGLE FOR CLARITY PURPOSES ONLY. ORIENT LUMINAIRE ARMS PERPENDICULAR TO TRAVEL LANE OR AS DIRECTED BY ENGINEER.
- TRAY CABLE SHALL BE RUN IN 2" CONDUIT SEPARATE FROM THE SIGNAL CABLE.
- AN ADDITIONAL 2" SCHEDULE 80 PVC SHALL BE INSTALLED AT EACH POLE FOUNDATION STUBBED OUT 2' FROM THE FACE OF FOUNDATION. STUB OUTS SHALL BE APPROPRIATELY CAPPED BELOW GRADE FOR FUTURE USE.
- THE CONTRACTOR SHALL BE REQUIRED TO KEEP THE EXISTING TRAFFIC SIGNAL EQUIPMENT OPERATIONAL OR HAVE A POLICE OFFICER PRESENT DURING CONSTRUCTION OF THE PROPOSED TRAFFIC SIGNAL.
- CONTRACTOR SHALL CONTACT CITY OF SAN ANTONIO (COSA) TRAFFIC SIGNAL INSPECTORS AT 210-207-8462 PRIOR TO INSTALLING ITS CAMERA. ITS CAMERA DEVICES SHALL BE INSTALLED UNDER THE SUPERVISION OF COSA INSPECTORS.

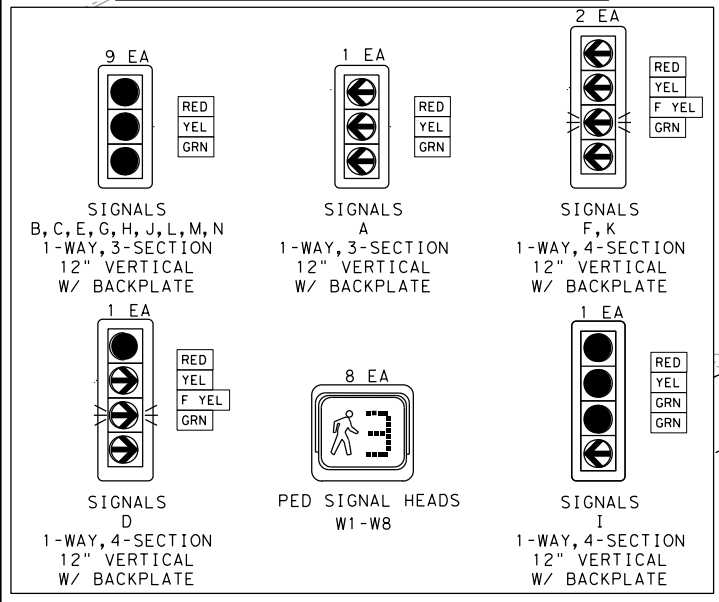
LEGEND

- PROPOSED MAST ARM AND SIGNAL POLE
- PROPOSED VERTICAL SIGNAL HEAD W/BACKPLATE
- PROPOSED ILSN
- PROPOSED OVERHEAD SIGN
- PROPOSED PEDESTRIAN POLE
- PROPOSED PEDESTRIAN LED SIGNAL HEAD
- PROPOSED PEDESTRIAN PUSHBUTTON AND SIGN
- PROPOSED GROUND MOUNTED CONTROLLER CABINET & BBS CABINET
- PROPOSED LUMINAIRE
- CONDUIT (TRENCH)
- CONDUIT (BORE)
- CONDUIT/CABLE RUN NUMBER
- PROPOSED ELECTRICAL SERVICE/METER
- PROPOSED GROUND BOX TY D
- PROPOSED GROUND BOX TY D W/ APRON
- EXISTING POWER POLE
- RADAR PRESENCE DETECTION DEVICE (RPDD)
- RADAR ADVANCE DETECTION DEVICE (RADD)
- DIRECTION OF TRAFFIC FLOW

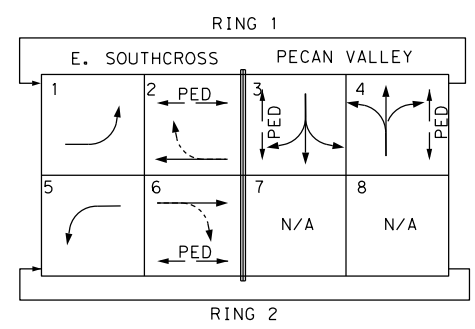
PROPOSED SIGN SCHEDULE



PROPOSED SIGNAL HEAD SCHEDULE



PHASING DIAGRAM



POSTED SPEED LIMIT
 E SOUTH CROSS BLVD = 35 MPH
 PECAN VALLEY DR = 35 MPH

STATE OF TEXAS 11/2/2022
 ERIC HERNANDEZ
 114309
 LICENSED PROFESSIONAL ENGINEER

LEGACY ENGINEERING GROUP
 TBPE Firm Registration No. 20623
 CITY OF SAN ANTONIO
 DEPARTMENT OF PUBLIC WORKS
 Texas Department of Transportation

HIGHWAY SAFETY IMPROVEMENT PROGRAM
 PROPOSED SIGNAL LAYOUT
 E SOUTH CROSS BLVD AT
 PECAN VALLEY DR

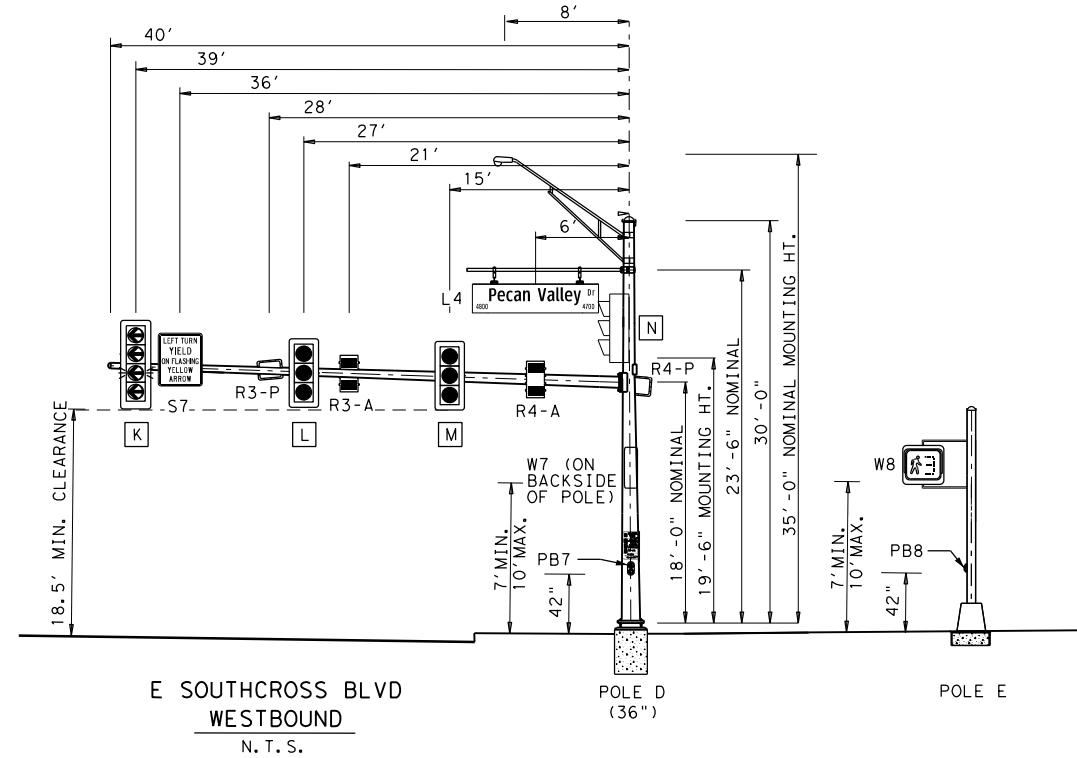
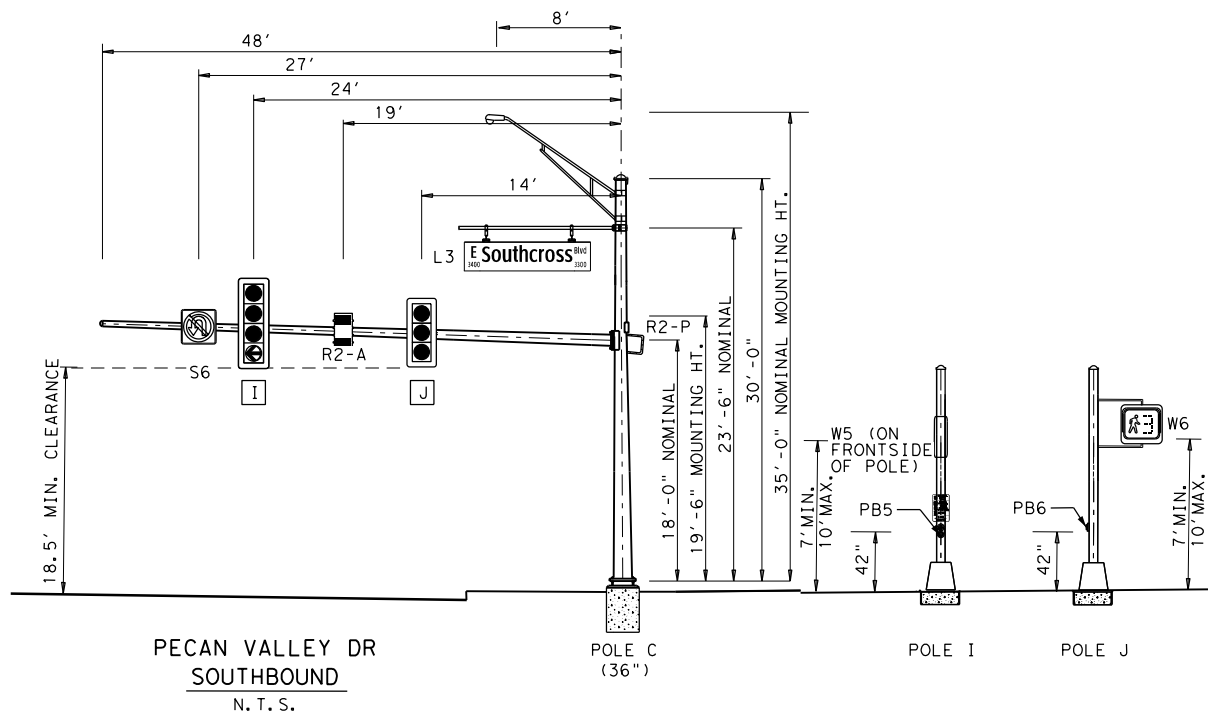
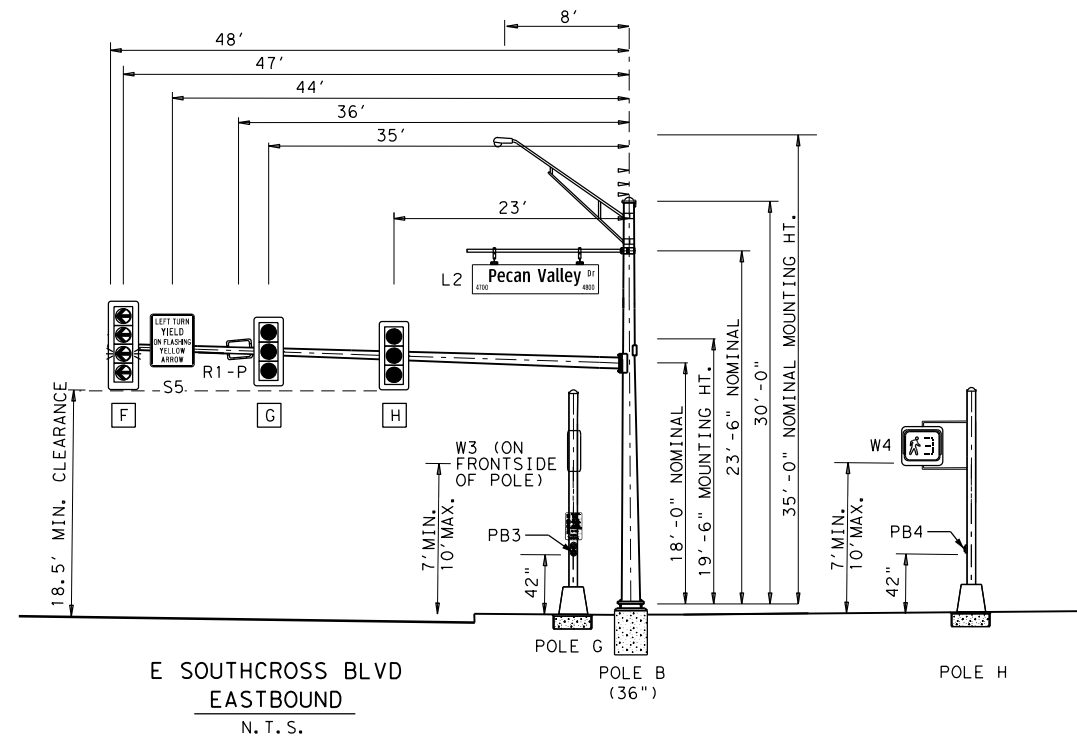
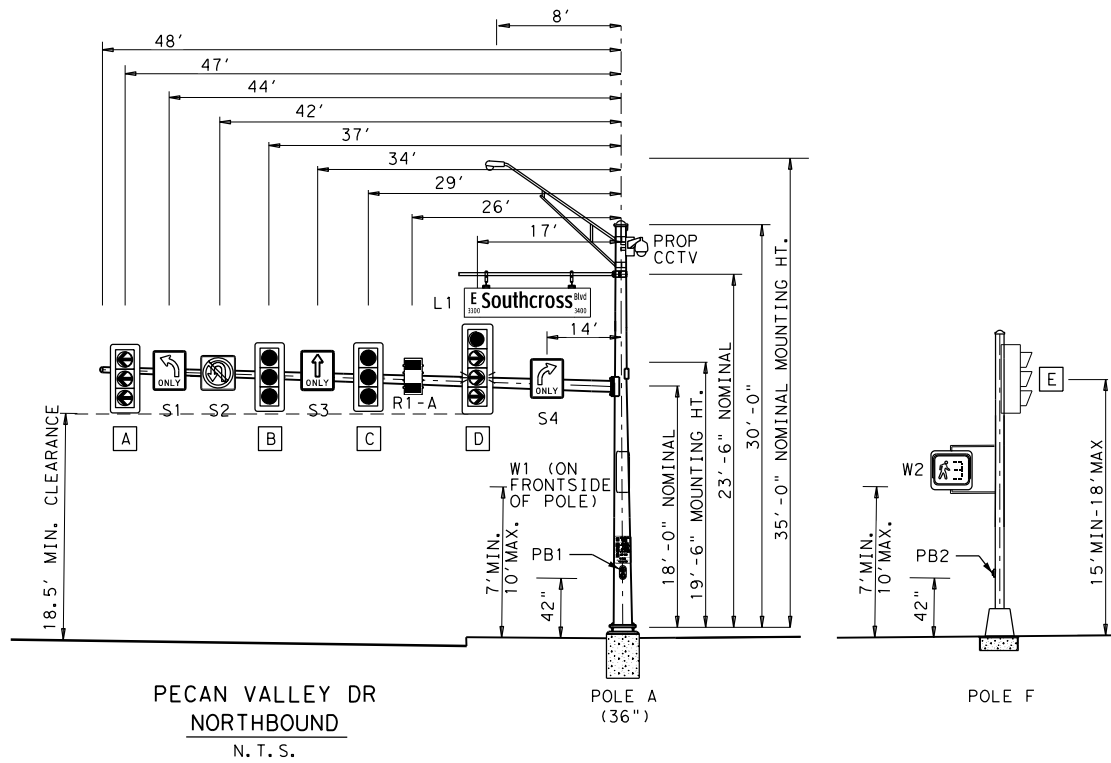
SHEET 1 OF 1

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.	
	SEE TITLE SHEET	42	
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0915	12	698, etc.	VARIOUS

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- NOTES:
- HEADS WILL BE INSTALLED PER TXMUTCD 2011.
 - FOUNDATIONS WILL BE ADJUSTED IN THE FIELD IN ORDER TO MEET CLEARANCE.
 - LOCATION OF SIGNAL HEADS ARE APPROXIMATE. ANY CHANGES WILL BE APPROVED BY THE ENGINEER.
 - MAST ARM ATTACHMENT HEIGHT WILL BE CALCULATED BY THE CONTRACTOR IN THE FIELD AND APPROVED BY THE ENGINEER.
 - MAST ARM DAMPING PLATE TO BE INSTALLED ON ARMS 40' OR LONGER.
 - PROVIDE 18.5' MIN. CLEARANCE FOR ALL SIGNAL HEADS.



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TBPE Firm Registration No. 20623

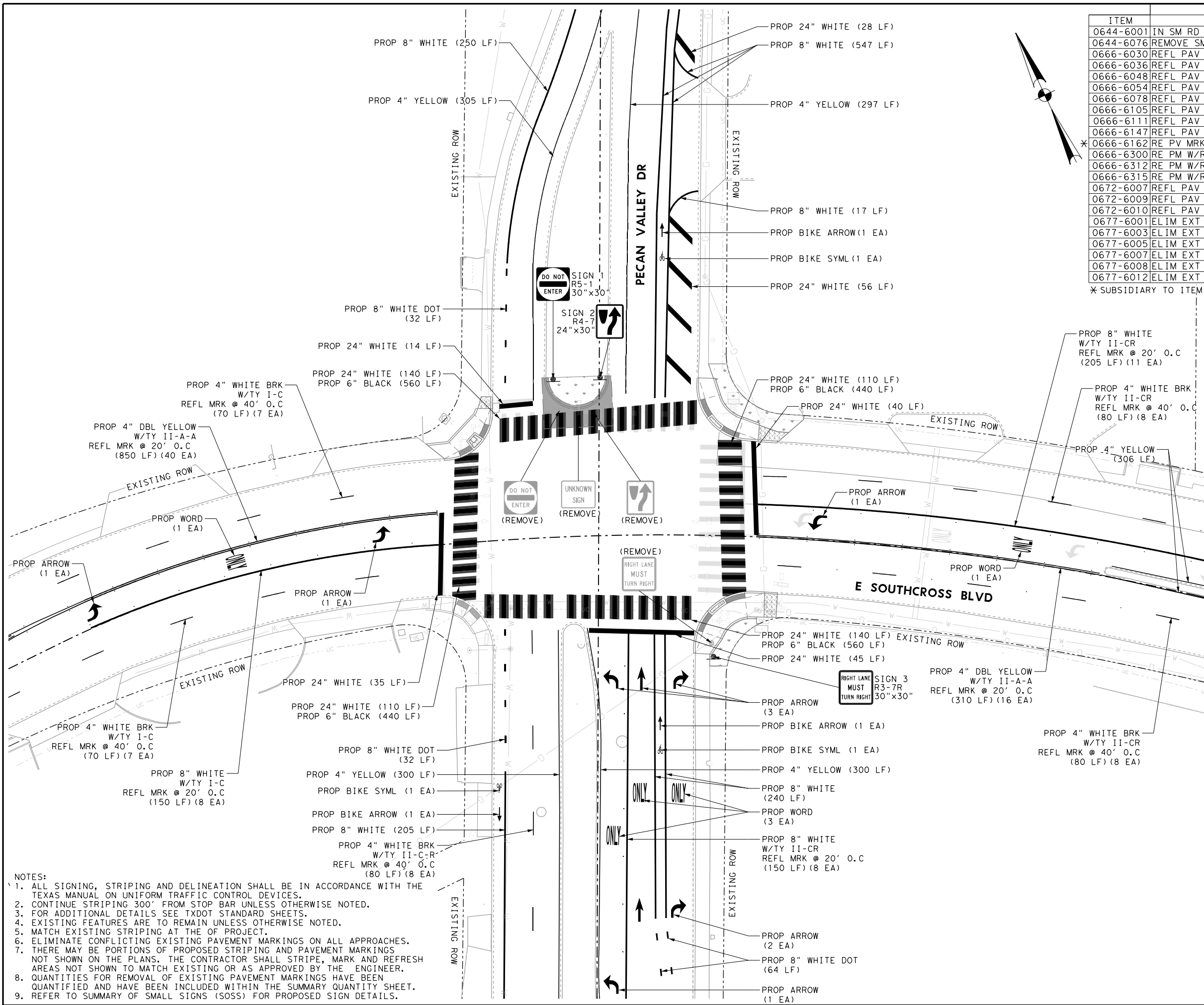
CITY OF SAN ANTONIO
DEPARTMENT OF PUBLIC WORKS

HIGHWAY SAFETY IMPROVEMENT PROGRAM
SIGNAL ELEVATIONS LAYOUT
E SOUTHCRSS BLVD AT
PECAN VALLEY DR

SHEET 1 OF 1

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
	SEE TITLE SHEET	44
STATE	DIST.	COUNTY
TEXAS	SAT	BEXAR
CONT.	SECT.	JOB
0915	12	698. etc.
		HIGHWAY NO.
		VARIOUS

Legacy Engineering Group
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QUANTITY SUMMARY			
ITEM	DESCRIPTION	UNIT	QTY
0644-6001	IN SM RD SN SUP&M TY10BWG(1)SA(P)	EA	3
0644-6076	REMOVE SM RD SN SUP&M	EA	4
0666-6030	REFL PAV MRK TY I (W) 8" (DOT) (100MIL)	LF	128
0666-6036	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	LF	1992
0666-6048	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)	LF	777
0666-6054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	10
0666-6078	REFL PAV MRK TY I (W) (WORD) (100MIL)	EA	5
0666-6105	REFL PAV MRK TY I (W) (BIKE ARW) (100MIL)	EA	3
0666-6111	REFL PAV MRK TY I(W) (BIKE SYML) (100MIL)	EA	3
0666-6147	REFL PAV MRK TY I (Y) 24" (SLD) (100MIL)	LF	43
0666-6162	RE PV MRK TY I (BLACK) 6" (SHADOW) (100MIL)	LF	2000
0666-6300	RE PM W/RET REQ TY I (W) 4" (BRK) (100MIL)	LF	410
0666-6312	RE PM W/RET REQ TY I (Y) 4" (BRK) (100MIL)	LF	80
0666-6315	RE PM W/RET REQ TY I (Y) 4" (SLD) (100MIL)	LF	2668
0672-6007	REFL PAV MRKR TY I-C	EA	22
0672-6009	REFL PAV MRKR TY II-A-A	EA	64
0672-6010	REFL PAV MRKR TY II-C-R	EA	45
0677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	10
0677-6003	ELIM EXT PAV MRK & MRKS (8")	LF	4
0677-6005	ELIM EXT PAV MRK & MRKS (12")	LF	250
0677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	194
0677-6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	2
0677-6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	1

* SUBSIDIARY TO ITEM 666-6048

LEGEND

- EXISTING ROW
- EXISTING SIGN POST
- PROPOSED SIGN POST

0 20 40
SCALE: 1"=40'

11/2/2022

ERIC HERNANDEZ
 114309
 LICENSED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

LEGACY ENGINEERING GROUP
 TBPE Firm Registration No. 20623

CITY OF SAN ANTONIO
 DEPARTMENT OF PUBLIC WORKS

Texas Department of Transportation

HIGHWAY SAFETY IMPROVEMENT PROGRAM
 PAVEMENT MARKINGS LAYOUT
 E SOUTHCROSS BLVD AT
 PECAN VALLEY DR

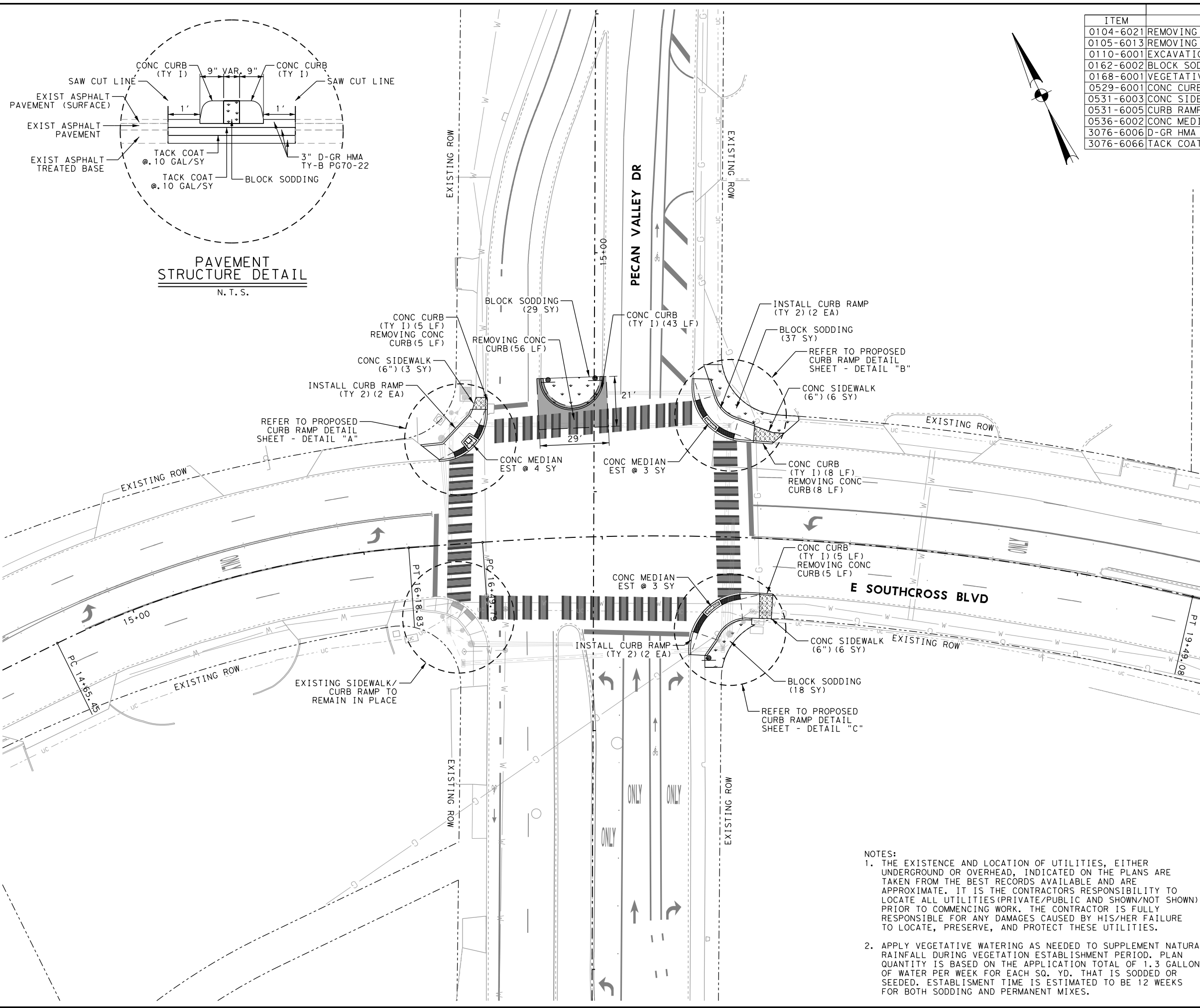
SHEET 1 OF 1

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.	
	SEE TITLE SHEET	45	
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0915	12	698, etc.	VARIOUS

- NOTES:**
- ALL SIGNING, STRIPING AND DELINEATION SHALL BE IN ACCORDANCE WITH THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
 - CONTINUE STRIPING 300' FROM STOP BAR UNLESS OTHERWISE NOTED.
 - FOR ADDITIONAL DETAILS SEE TXDOT STANDARD SHEETS.
 - EXISTING FEATURES ARE TO REMAIN UNLESS OTHERWISE NOTED.
 - MATCH EXISTING STRIPING AT THE OF PROJECT.
 - ELIMINATE CONFLICTING EXISTING PAVEMENT MARKINGS ON ALL APPROACHES.
 - THERE MAY BE PORTIONS OF PROPOSED STRIPING AND PAVEMENT MARKINGS NOT SHOWN ON THE PLANS. THE CONTRACTOR SHALL STRIPE, MARK AND REFRESH AREAS NOT SHOWN TO MATCH EXISTING OR AS APPROVED BY THE ENGINEER.
 - QUANTITIES FOR REMOVAL OF EXISTING PAVEMENT MARKINGS HAVE BEEN QUANTIFIED AND HAVE BEEN INCLUDED WITHIN THE SUMMARY QUANTITY SHEET.
 - REFER TO SUMMARY OF SMALL SIGNS (SOSS) FOR PROPOSED SIGN DETAILS.

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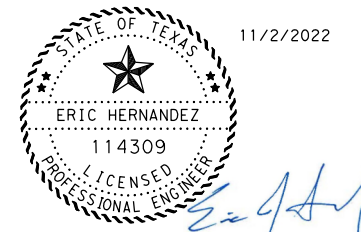
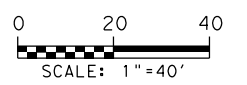
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QUANTITY SUMMARY			
ITEM	DESCRIPTION	UNIT	QTY
0104-6021	REMOVING CONC (CURB)	LF	74
0105-6013	REMOVING STAB BASE & ASPH PAV (9")	SY	44
0110-6001	EXCAVATION (ROADWAY)	CY	6
0162-6002	BLOCK SODDING	SY	84
0168-6001	VEGETATIVE WATERING	MG	1.3
0529-6001	CONC CURB (TY 1)	LF	61
0531-6003	CONC SIDEWALKS (6")	SY	15
0531-6005	CURB RAMPS (TY 2)	EA	6
0536-6002	CONC MEDIAN	SY	10
3076-6006	D-GR HMA TY-B PG70-22	TON	23
3076-6066	TACK COAT	GAL	9

LEGEND

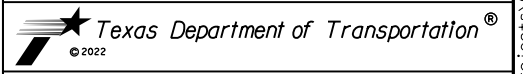
- EXISTING ROW
- ▨ PROPOSED 6" SIDEWALK
- ▩ DETECTABLE WARNING SURFACE
- ▧ PROPOSED ROADWAY WIDENING
- - - SAW CUT LINE
- ▭ PROPOSED BLOCK SODDING



NO.	DATE	REVISION	APPROV.



City of San Antonio
 DEPARTMENT OF PUBLIC WORKS



HIGHWAY SAFETY IMPROVEMENT PROGRAM

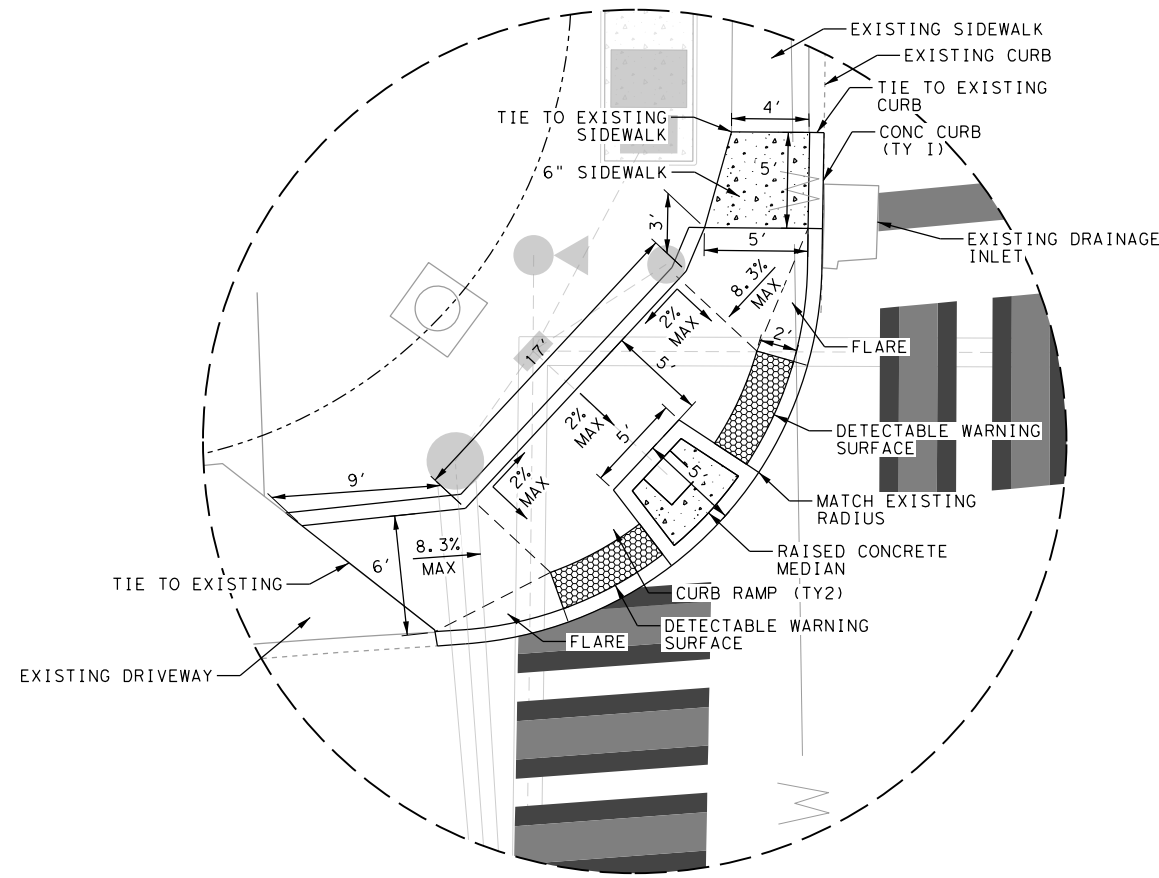
**PROPOSED CURB RAMP LAYOUT
 E SOUTHCROSS BLVD AT
 PECAN VALLEY DR**

SHEET 1 OF 1		FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
			SEE TITLE SHEET	46
STATE	DIST.	COUNTY		
TEXAS	SAT	BEXAR		
CONT.	SECT.	JOB	HIGHWAY NO.	
0915	12	698, etc.	VARIOUS	

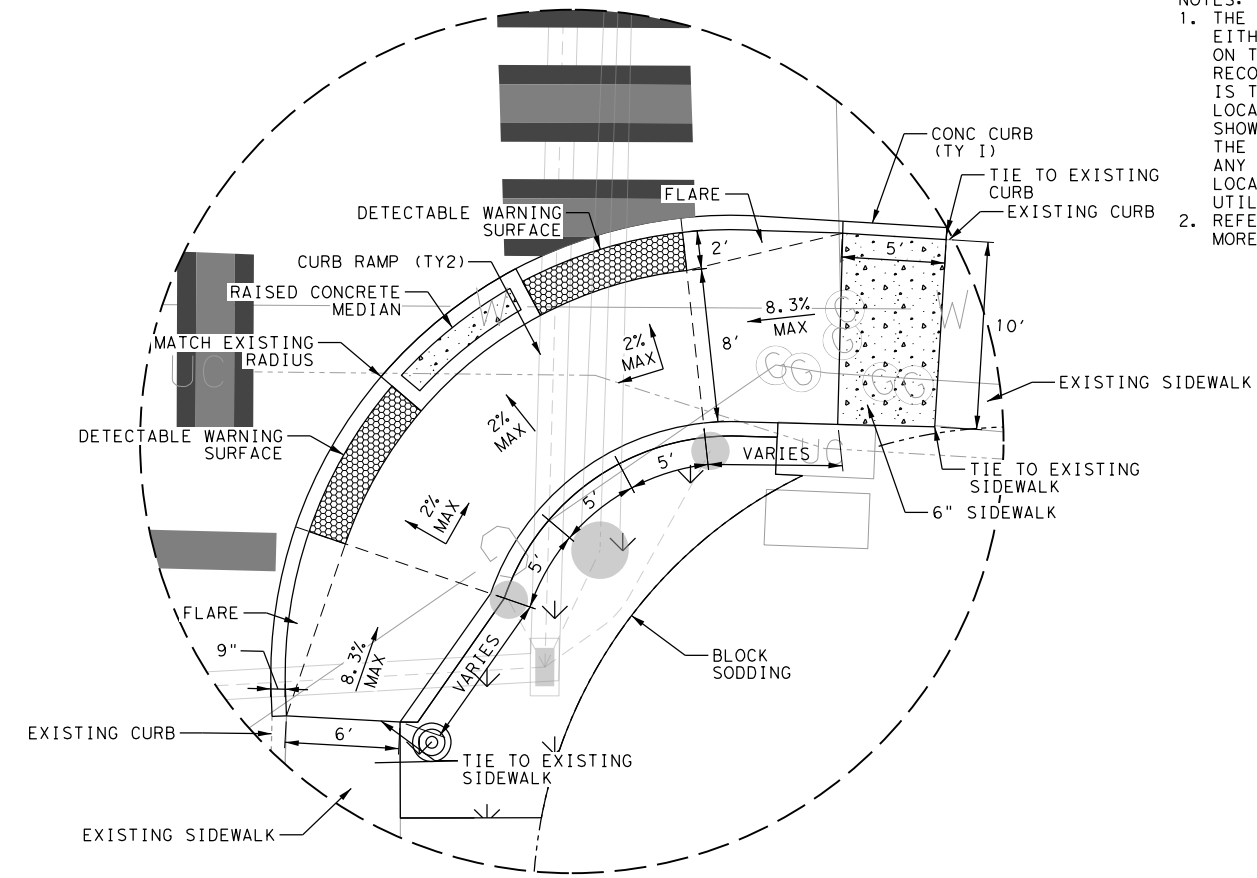
- NOTES:**
- THE EXISTENCE AND LOCATION OF UTILITIES, EITHER UNDERGROUND OR OVERHEAD, INDICATED ON THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE APPROXIMATE. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ALL UTILITIES (PRIVATE/PUBLIC AND SHOWN/NOT SHOWN) PRIOR TO COMMENCING WORK. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY HIS/HER FAILURE TO LOCATE, PRESERVE, AND PROTECT THESE UTILITIES.
 - APPLY VEGETATIVE WATERING AS NEEDED TO SUPPLEMENT NATURAL RAINFALL DURING VEGETATION ESTABLISHMENT PERIOD. PLAN QUANTITY IS BASED ON THE APPLICATION TOTAL OF 1.3 GALLON OF WATER PER WEEK FOR EACH SQ. YD. THAT IS SODDED OR SEEDED. ESTABLISHMENT TIME IS ESTIMATED TO BE 12 WEEKS FOR BOTH SODDING AND PERMANENT MIXES.

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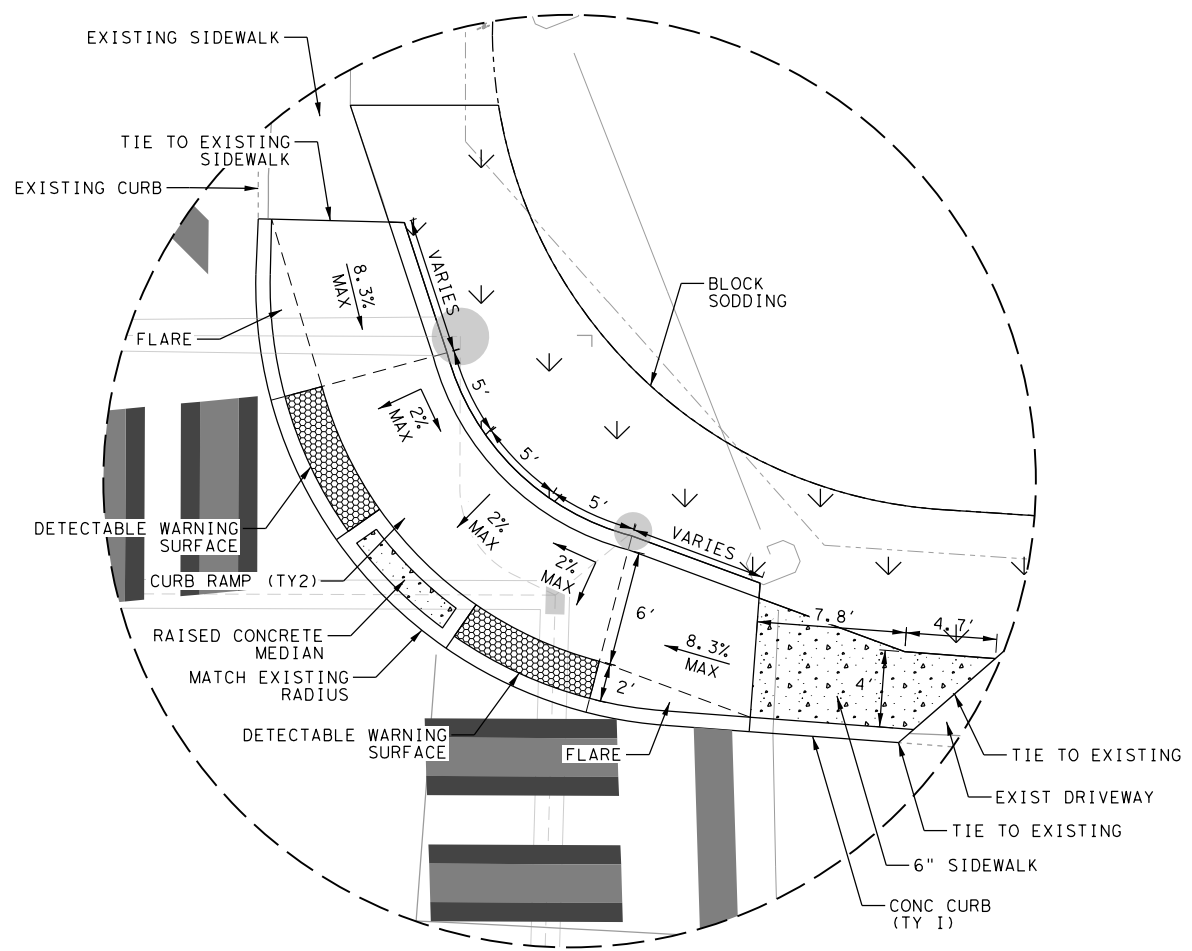
Legacy Engineering Group
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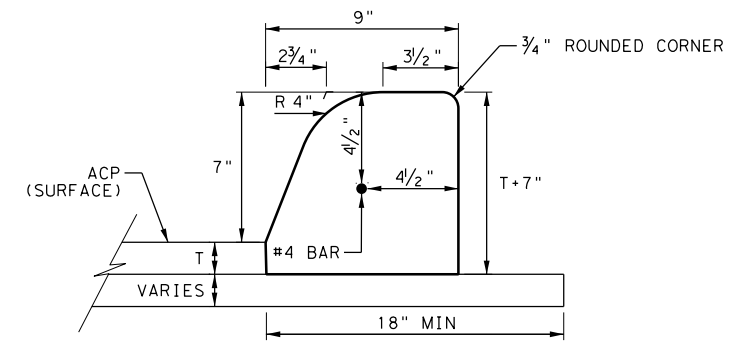
DETAIL "A"
 N. T. S.



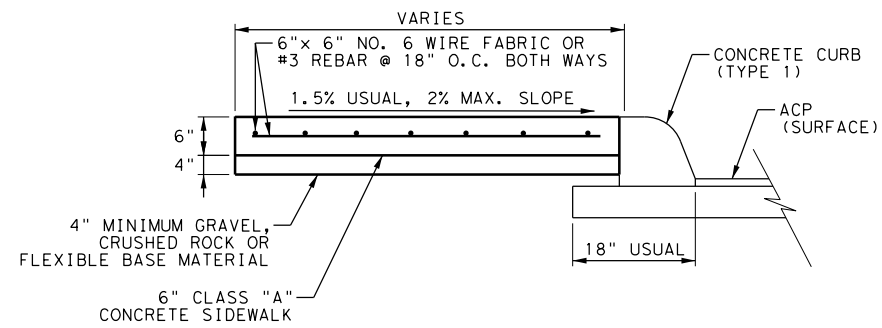
DETAIL "C"
 N. T. S.



DETAIL "B"
 N. T. S.

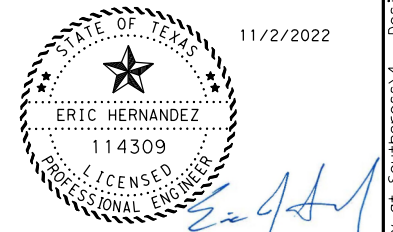


TYPE 1 CURB DETAIL
 N. T. S.



TYPICAL SIDEWALK DETAIL
 N. T. S.

NOTES:
 1. THE EXISTENCE AND LOCATION OF UTILITIES, EITHER UNDERGROUND OR OVERHEAD, INDICATED ON THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE APPROXIMATE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE ALL UTILITIES (PRIVATE/PUBLIC AND SHOWN/NOT SHOWN) PRIOR TO COMMENCING WORK. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY HIS/HER FAILURE TO LOCATE, PRESERVE, AND PROTECT THESE UTILITIES.
 2. REFER TO TxDOT CCCG-22 AND PED-18 FOR MORE DETAILS.



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LEGACY ENGINEERING GROUP
 TBPE Firm Registration No. 20623
CITY OF SAN ANTONIO
 DEPARTMENT OF PUBLIC WORKS
Texas Department of Transportation

HIGHWAY SAFETY IMPROVEMENT PROGRAM
 PROPOSED CURB RAMP DETAIL
 E SOUTH CROSS BLVD AT PECAN VALLEY DR




SHEET 1 OF 1

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.	
	SEE TITLE SHEET	47	
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0915	12	698, etc.	VARIOUS

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SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)					BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)	
							POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION			TY = TYPE
										PREFABRICATED	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel		
45	SIGN 1	R5-1		30"x 30"	✓		10BWG	1	SA	P			
45	SIGN 2	R4-7		24"x 30"	✓		10BWG	1	SA	P			
45	SIGN 3	R3-7R		30"x 30"	✓		10BWG	1	SA	P			


 ERIC HERNANDEZ
 114309
 LICENSED PROFESSIONAL ENGINEER

 11/2/2022

ALUMINUM SIGN BLANKS THICKNESS

Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
<http://www.txdot.gov/>

- NOTE:**
- Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
 - For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS) Standard Sheet.
 - For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD (GEN).



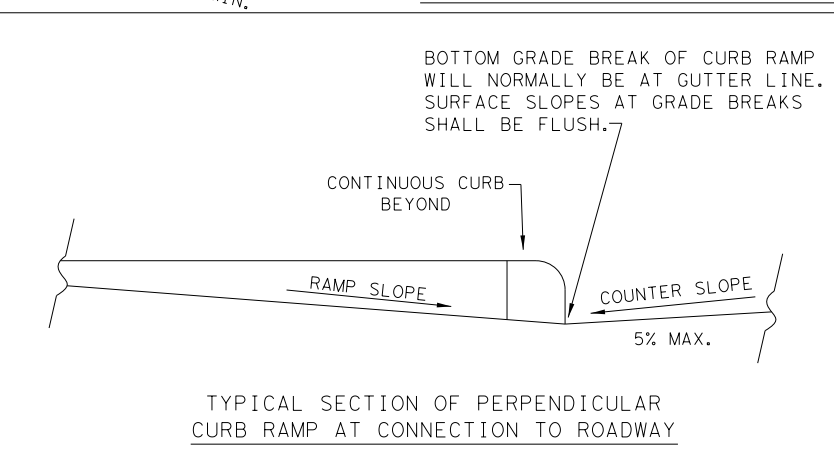
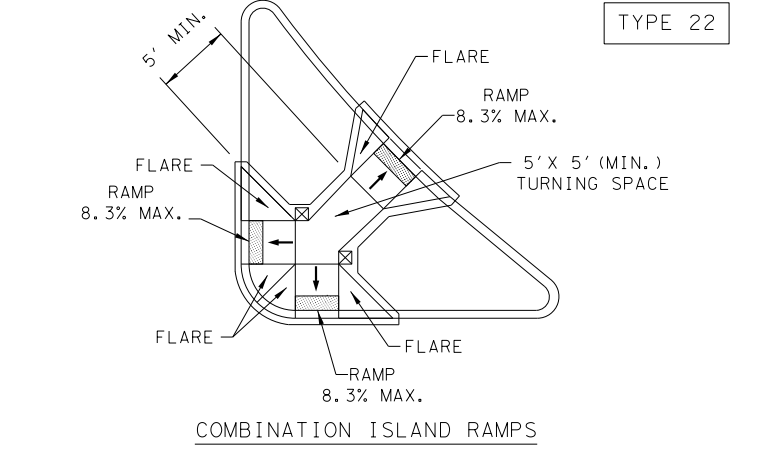
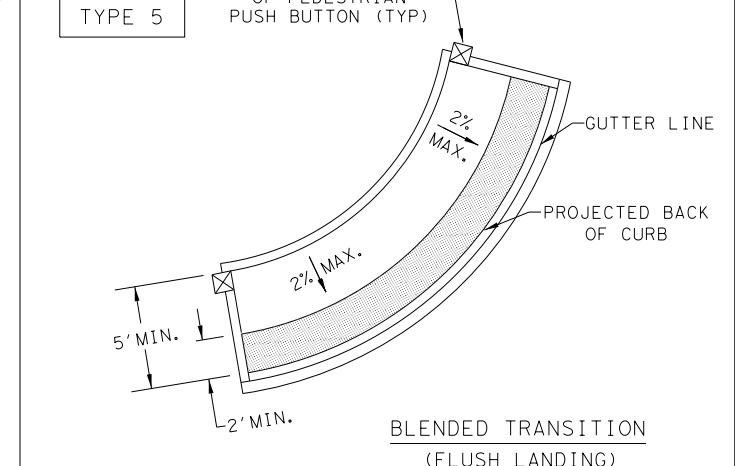
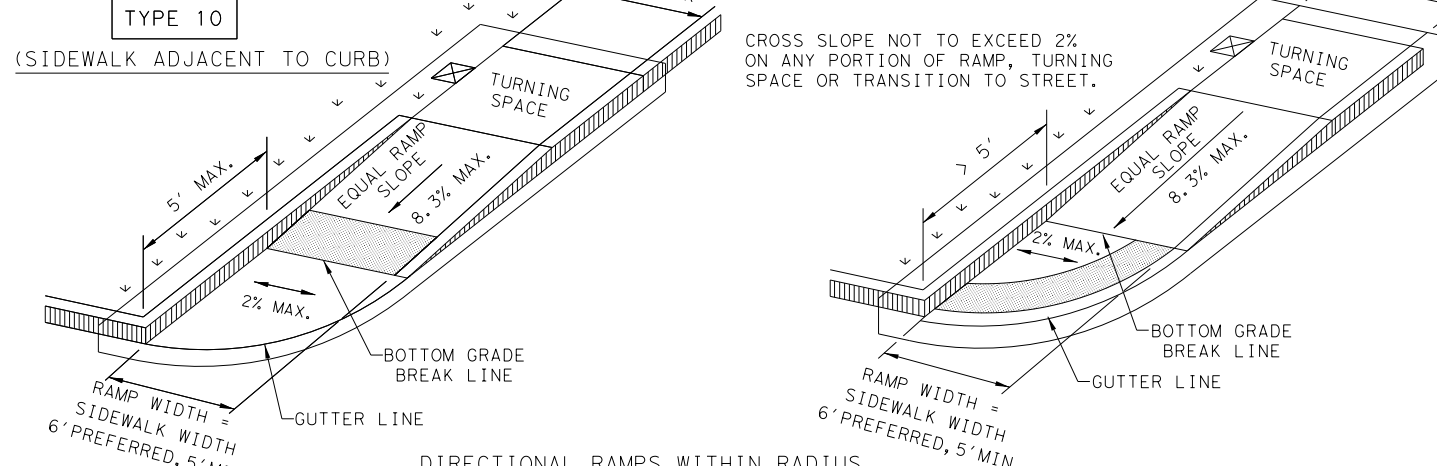
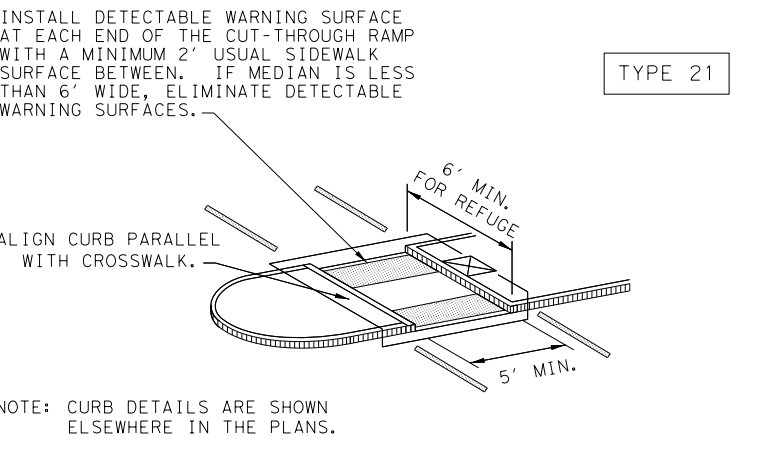
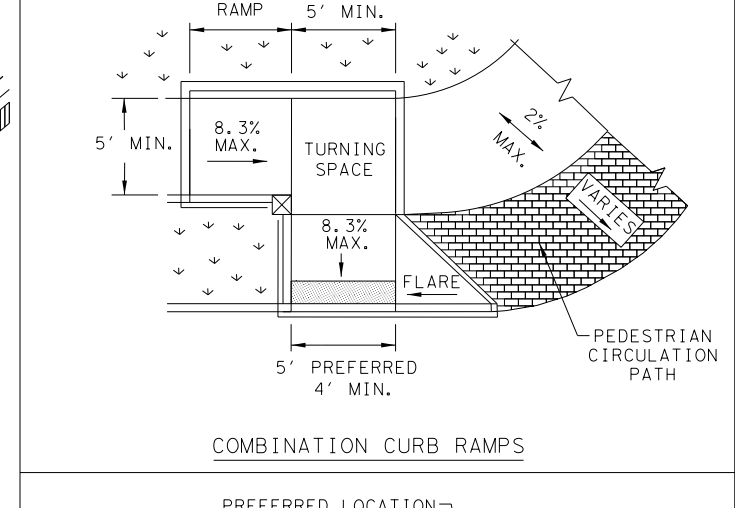
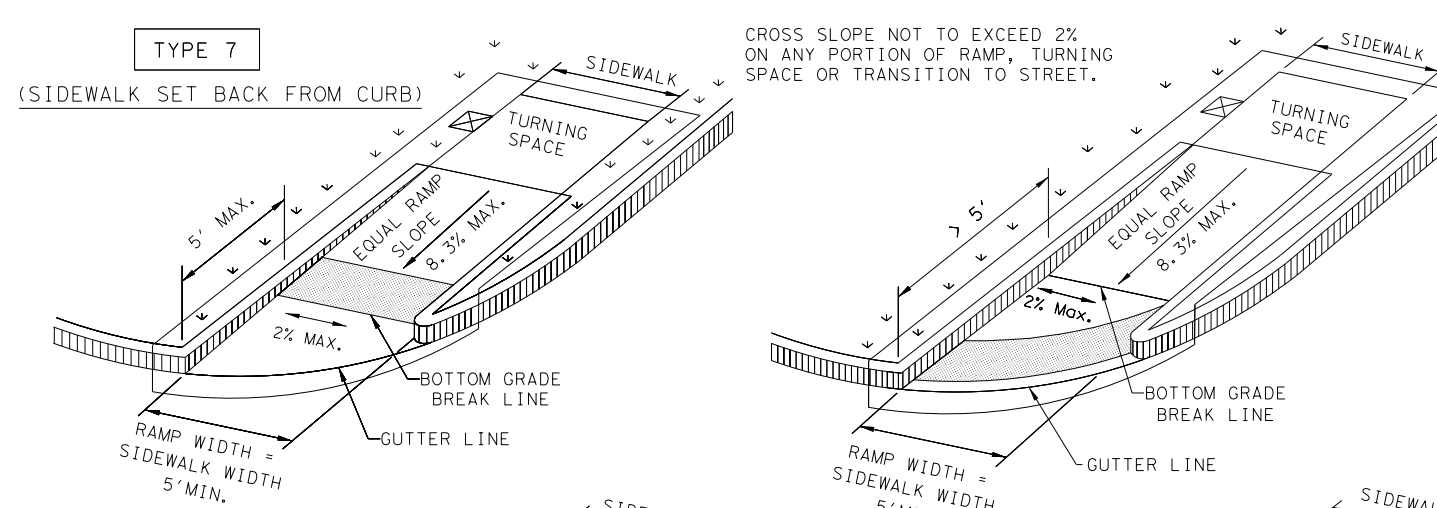
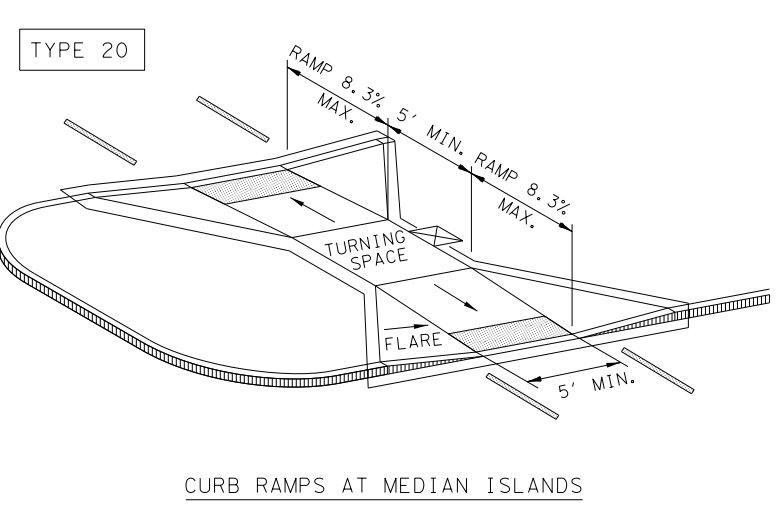
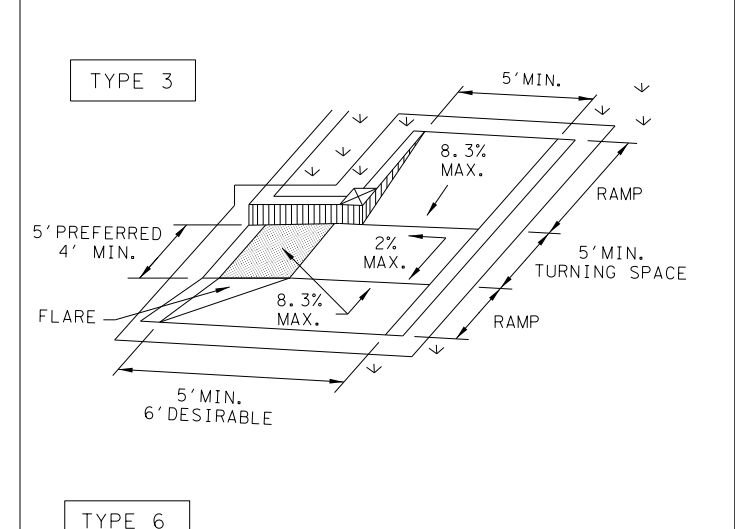
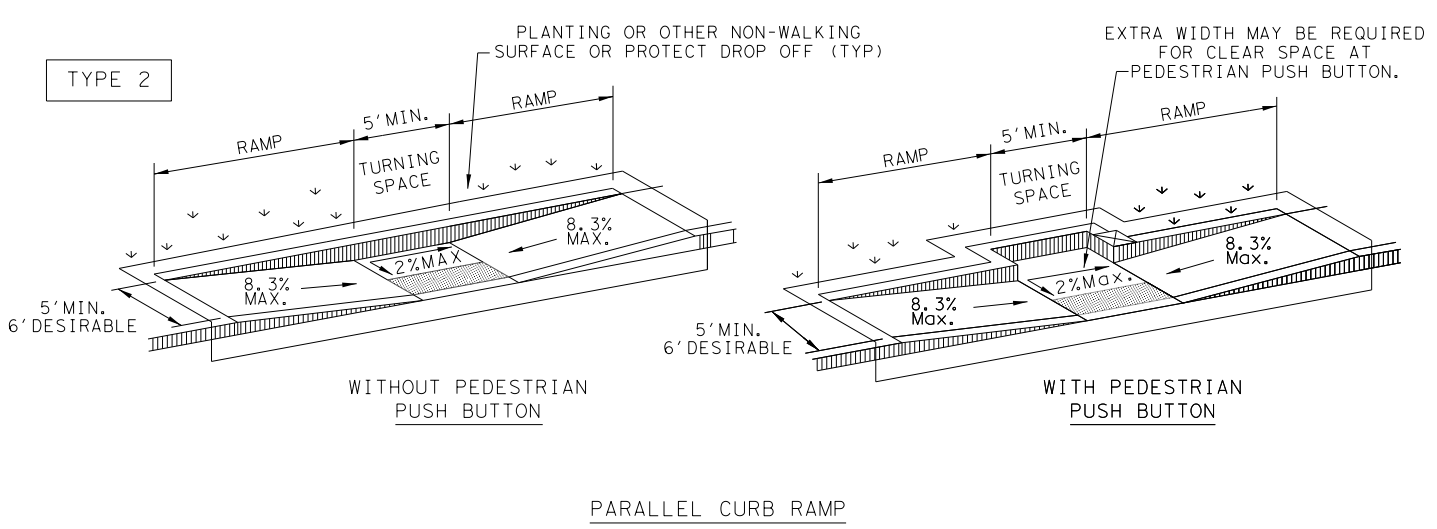
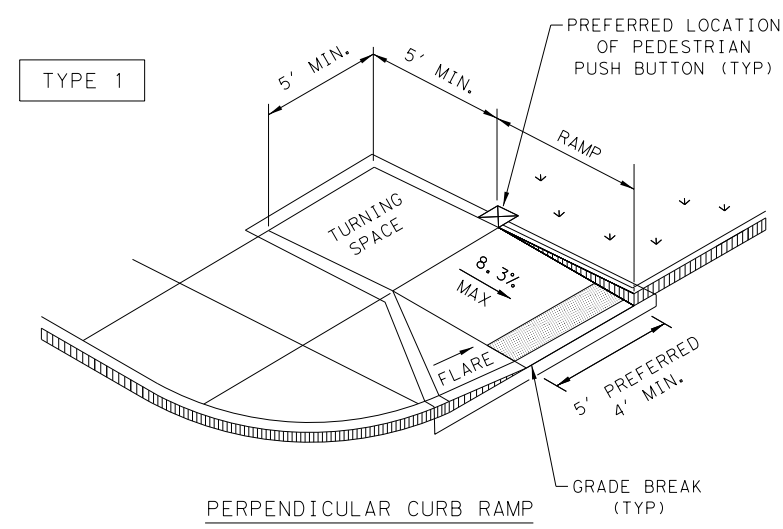
SUMMARY OF SMALL SIGNS

SOSS

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©TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0915	12	624	VARIOUS				
4-16	8-16	DIST	COUNTY	SHEET NO.					
		SAT	BEXAR	47A					

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DATE: 10/25/2022
 FILE: _Projects\SAN-NC\008129_COSA TO-03 - Traffic Signal Imp_Designs\07.00_CADD\COSA Traffic Signal\09-VIII Traffic Items\Standards\ped18_01.dgn



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

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	0915	12	698, etc	Various
REVISED 09, 2005	DIST	COUNTY	SHEET NO.	
REVISED 06, 2012	SAT	BEXAR	48	
REVISED 01, 2018				

DATE: 10/25/2022
 FILE: _Projects\SAN-NC\008129 COSA TO-03 - Traffic Signal Imp_Designs\07.00 CADD\COSA Traffic Signal\09-VIII Traffic Items\Standards\ped18_02.dgn
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GENERAL NOTES

CURB RAMP

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

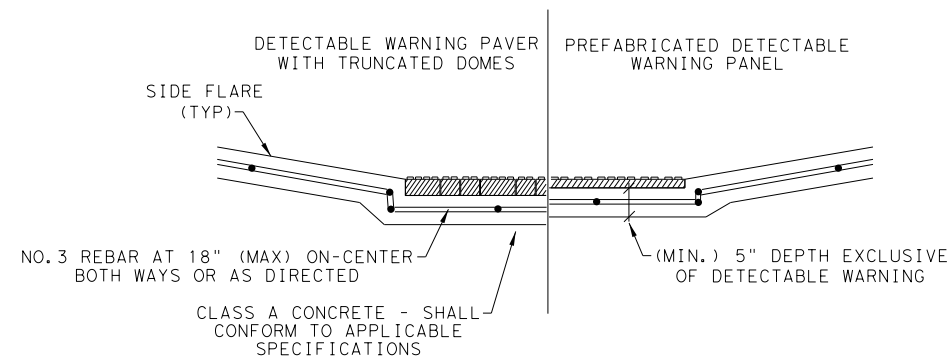
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material 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.

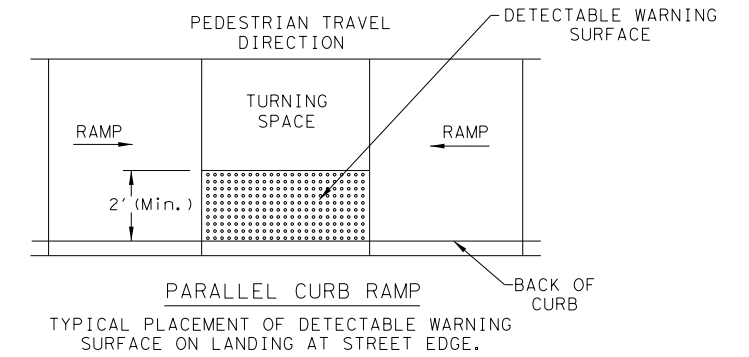
SIDEWALKS

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.

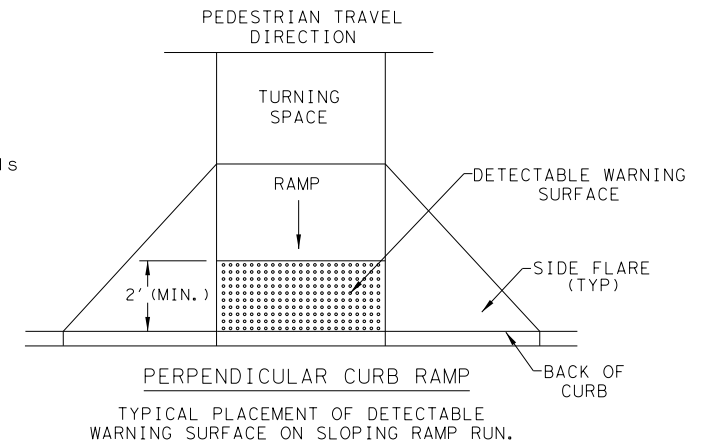


**SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS**

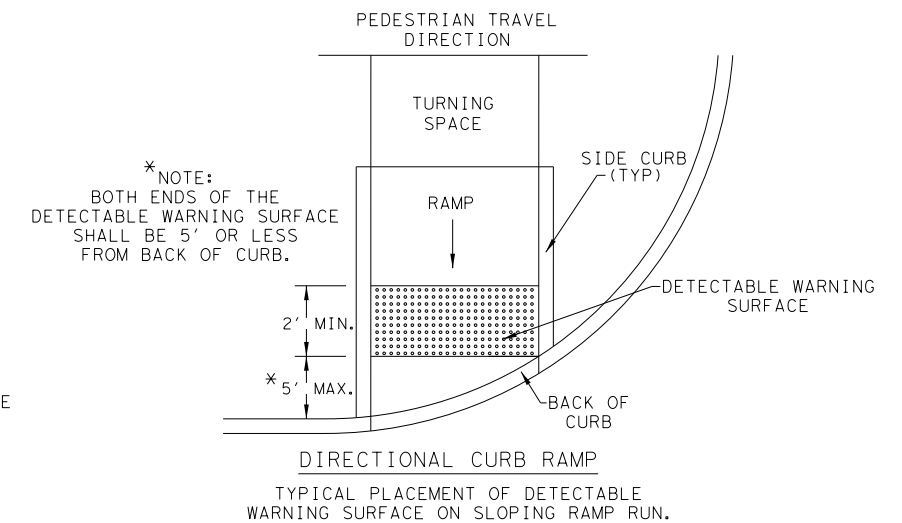
DETECTABLE WARNING SURFACE DETAILS



**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.**



* NOTE:
BOTH ENDS OF THE
DETECTABLE WARNING SURFACE
SHALL BE 5' OR LESS
FROM BACK OF CURB.

**DIRECTIONAL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.**

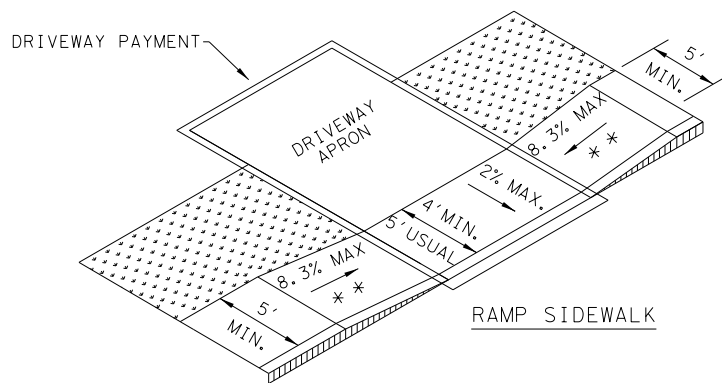
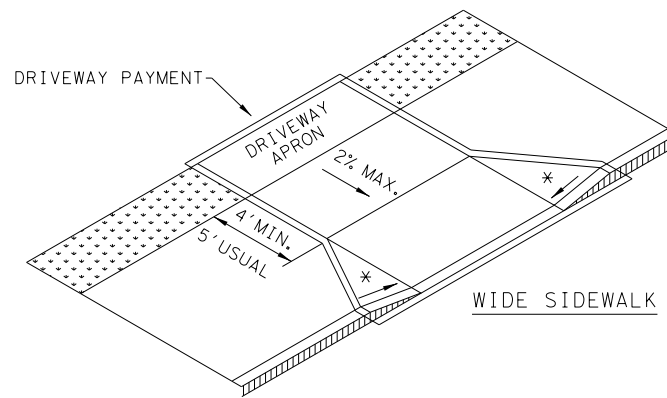
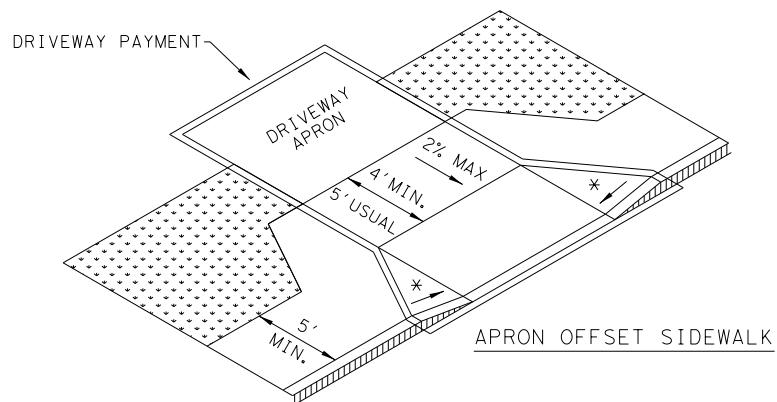
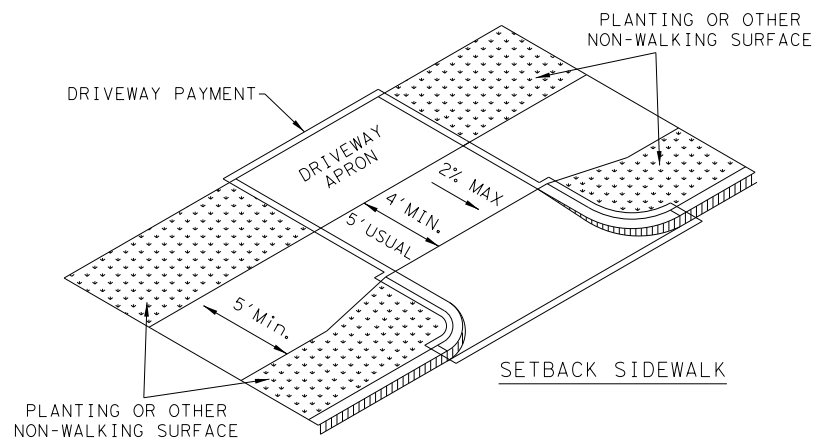
SHEET 2 OF 4

		Design Division Standard	
PEDESTRIAN FACILITIES CURB RAMPS			
PED-18			
FILE: ped18	DN: TxDOT	DW: VP	CK: KM
© TxDOT: MARCH, 2002	CONT	SECT	JOB
REVISIONS	0915	12	698, etc
REVISED 09, 2005	DIST	COUNTY	SHEET NO.
REVISED 06, 2012	SAT	BEXAR	49
REVISED 01, 2018			

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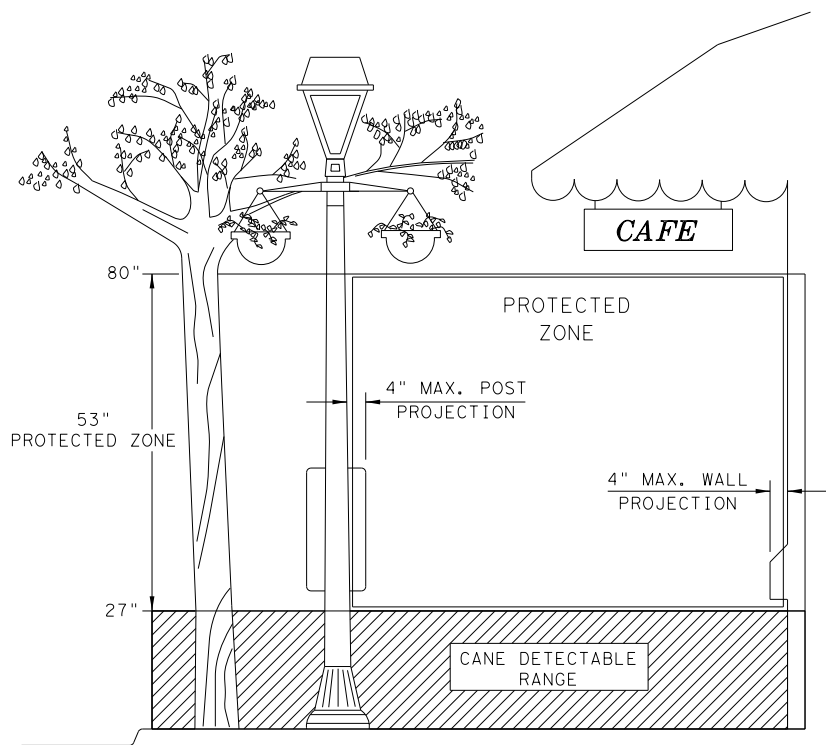
DATE: 10/25/2022
 FILE: _Projects\SAN-NC\008129_COSA_TO-03 - Traffic Signal Imp_Designs\07.00_CADD\COSA Traffic Signal\09-VIII Traffic Items\Standards\ped18_03.dgn

SIDEWALK TREATMENT AT DRIVEWAYS



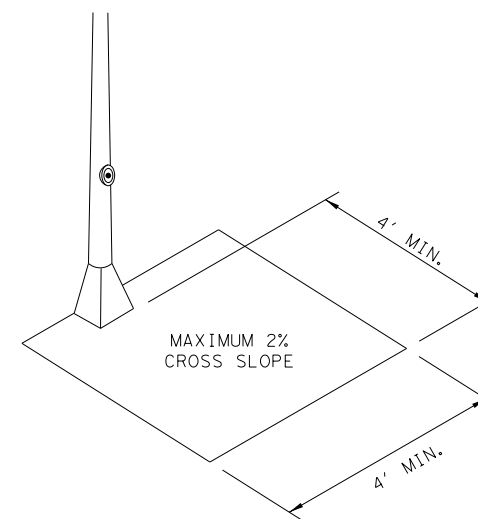
NOTES:

- * 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.

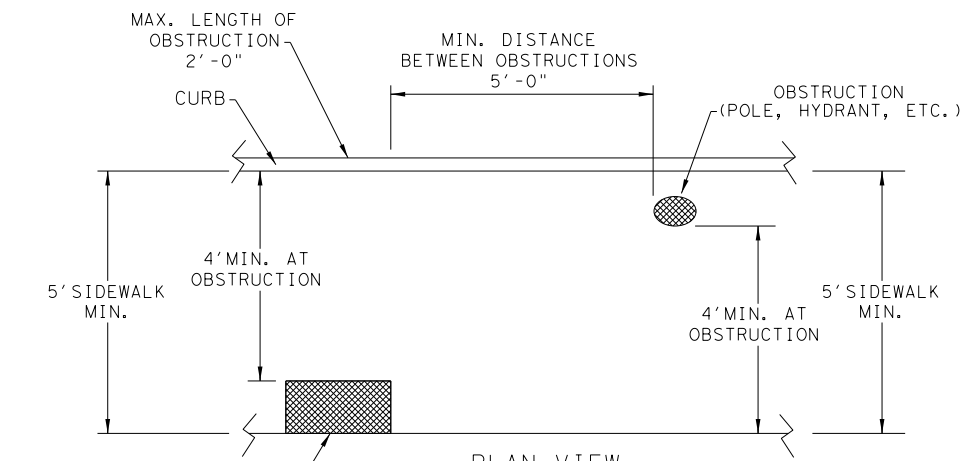


PROTECTED ZONE

NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.

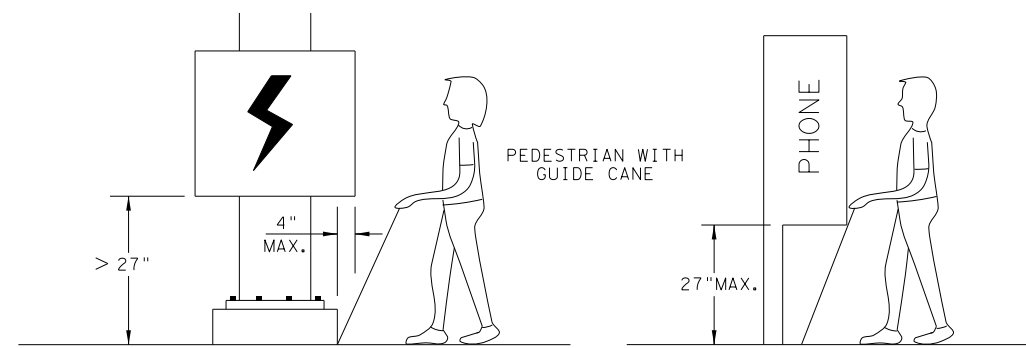


CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



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.



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"

SHEET 3 OF 4



PEDESTRIAN FACILITIES
CURB RAMPS

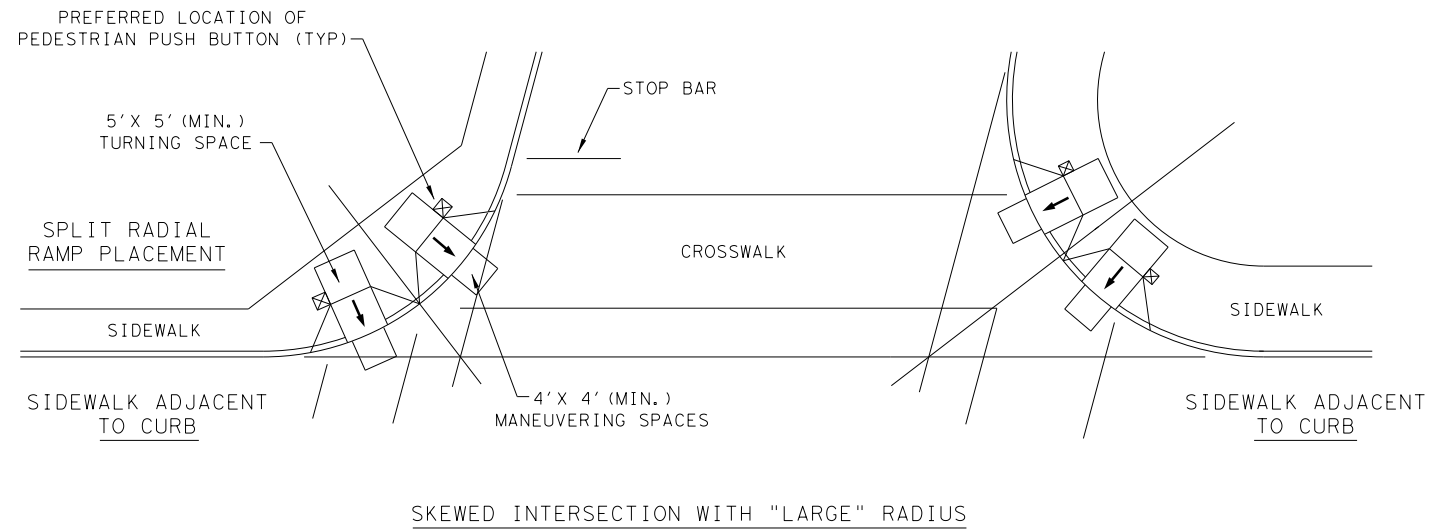
PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0915	12	698, etc	Various
REVISED 08, 2005	DIST	COUNTY	SHEET NO.	
REVISED 06, 2012	SAT	BEXAR	50	
REVISED 01, 2018				

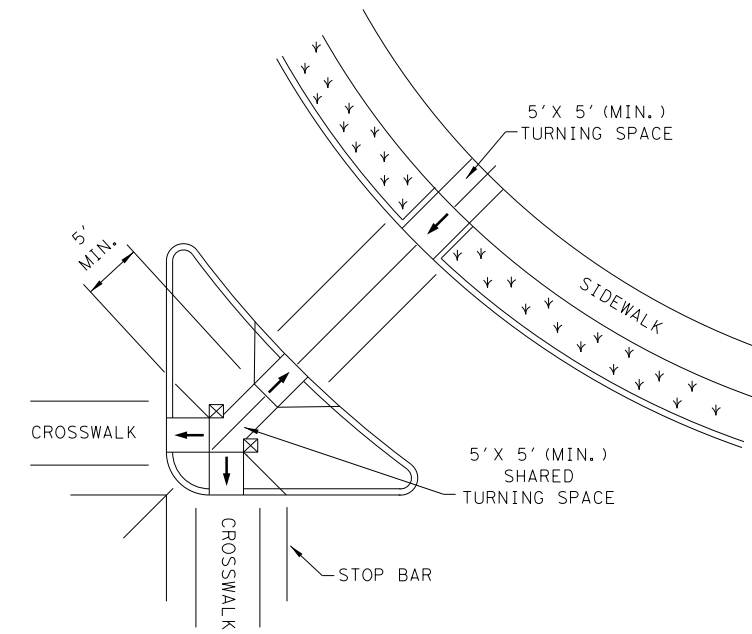
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 10/25/2022
 FILE: _Projects\SAN-NC\008129_COSA_TO-03 - Traffic Signal Imp_Designs\07.00_CADD\COSA_Traffic Signal\09-VIII_Traffic Items\Standards\ped18_04.dgn

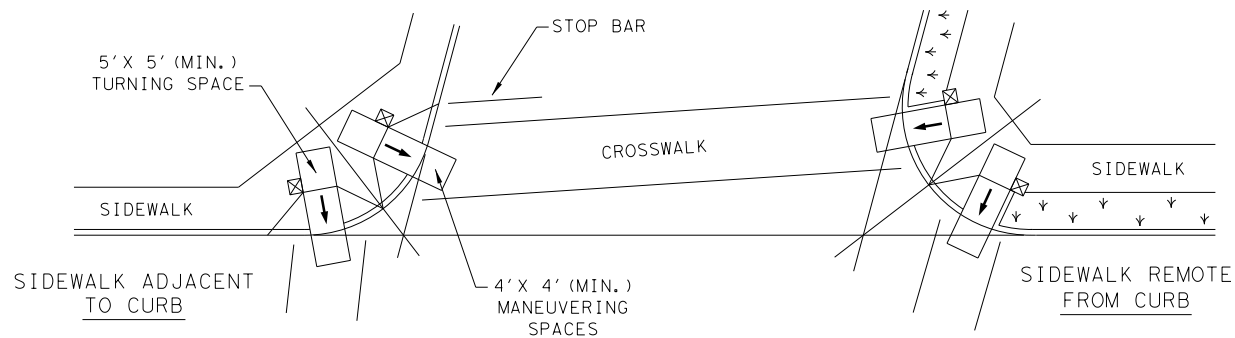
TYPICAL CROSSING LAYOUTS
 SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



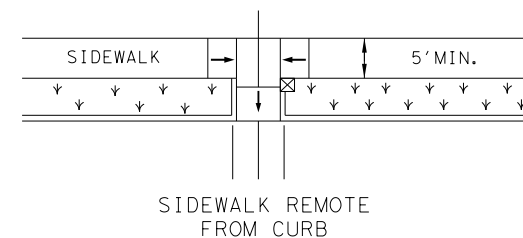
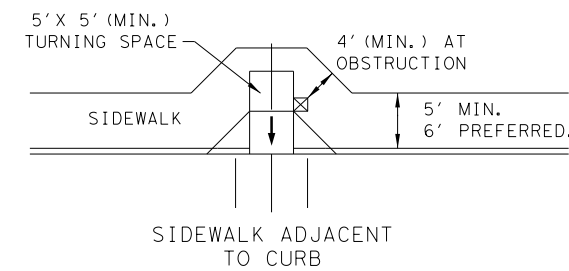
SKewed INTERSECTION WITH "LARGE" RADIUS



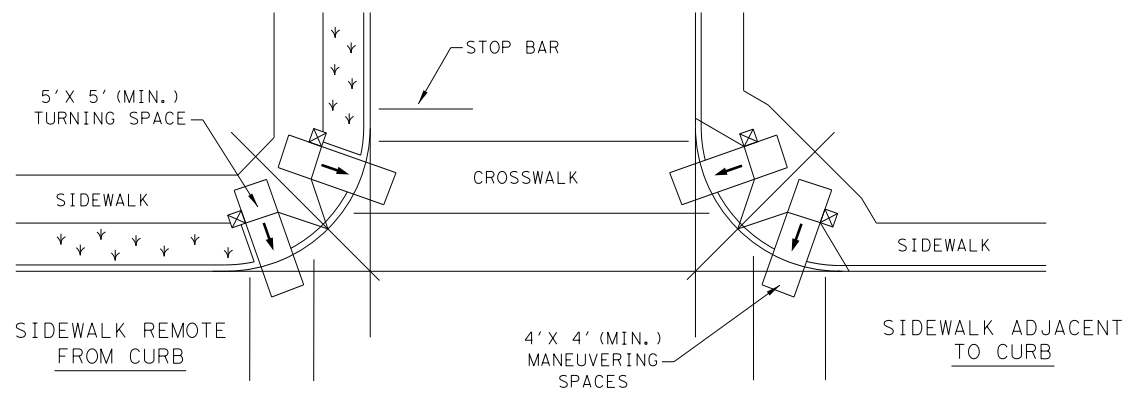
AT INTERSECTION W/FREE RIGHT TURN & ISLAND



SKewed INTERSECTION WITH "SMALL" RADIUS



MID-BLOCK PLACEMENT PERPENDICULAR RAMPS



NORMAL INTERSECTION WITH "SMALL" RADIUS

LEGEND:

SHOWS DOWNWARD SLOPE. →

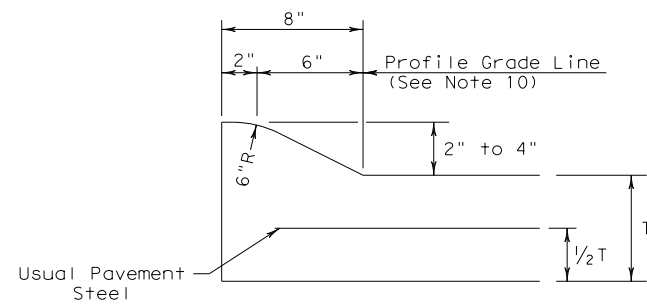
DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (IF APPLICABLE). ☒

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH. ↙ ↘ ↙ ↘ ↙ ↘

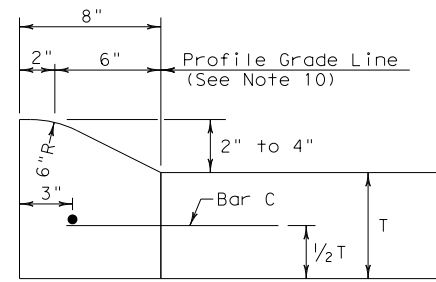
		Design Division Standard	
<h2>PEDESTRIAN FACILITIES</h2> <h3>CURB RAMPS</h3> <h1>PED-18</h1>			
FILE: ped18	DN: TxDOT	DW: VP	CK: KM
© TxDOT: MARCH, 2002	CONT	SECT	JOB
REVISIONS	0915	12	698, etc
REVISOR	DIST	COUNTY	SHEET NO.
REVISOR	SAT	BEXAR	51

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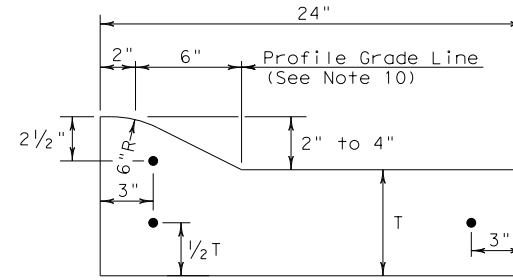
DATE: 10/25/2022
 FILE: _Projects\SAN-NC\008129 COSA IO-03 - Traffic Signal Imp Designs\07.00 CADD\COSA Traffic Signal\09-VIII Traffic Items\Standards\cccg21.dgn



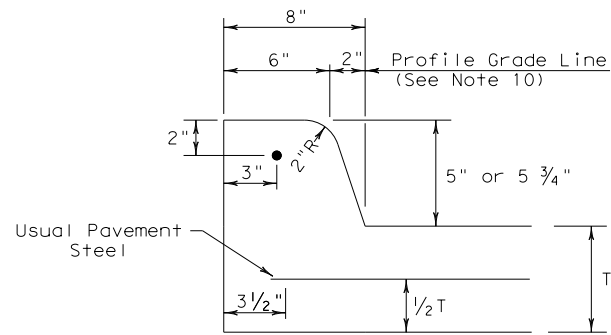
TYPE I CURB (MONOLITHIC)
 2" - 4" HEIGHT



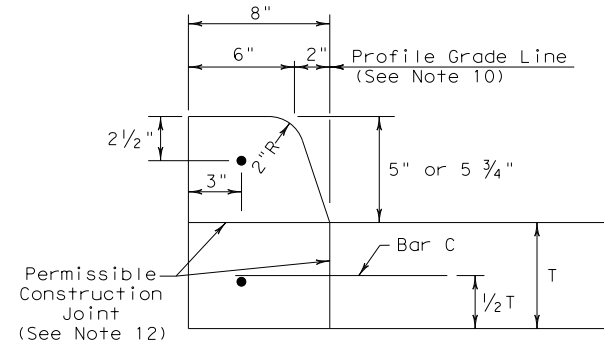
TYPE I CURB
 2" - 4" HEIGHT



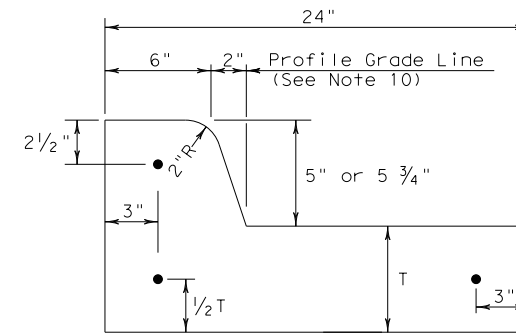
TYPE I CURB AND GUTTER
 2" - 4" HEIGHT



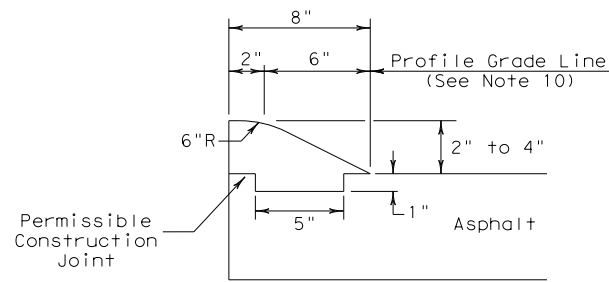
TYPE II CURB (MONOLITHIC)
 5" - 5 3/4" HEIGHT



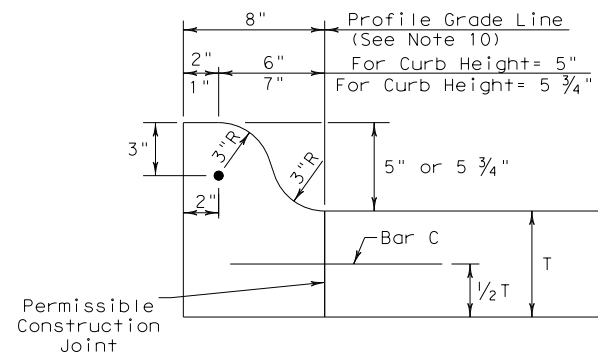
TYPE II CURB
 5" - 5 3/4" HEIGHT



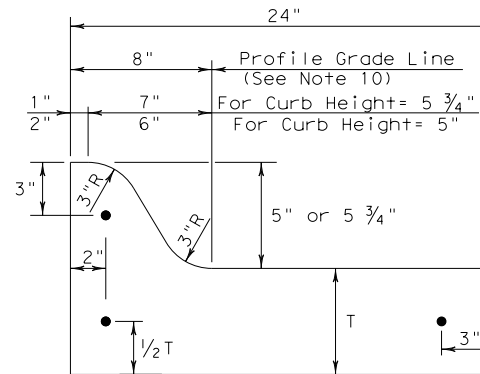
TYPE II CURB AND GUTTER
 5" - 5 3/4" HEIGHT



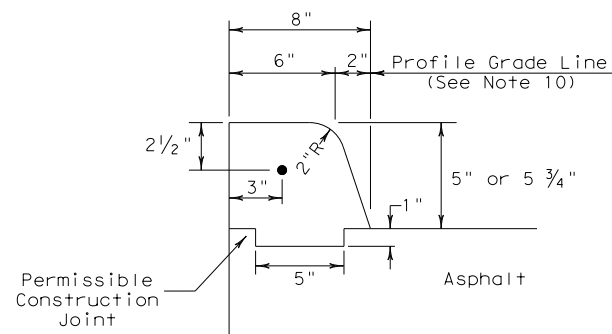
TYPE III CURB (KEYED)
 2" - 4" HEIGHT



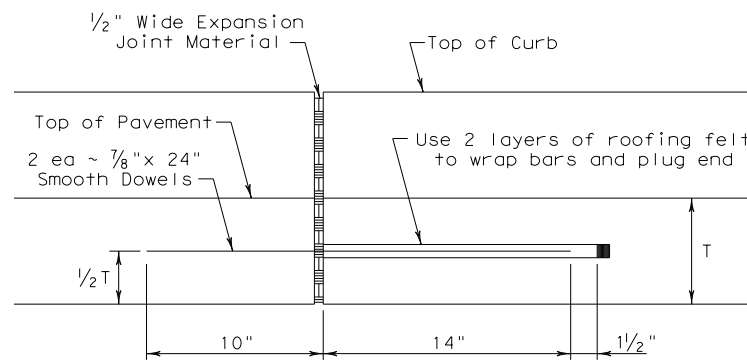
TYPE IIa CURB
 5" - 5 3/4" HEIGHT



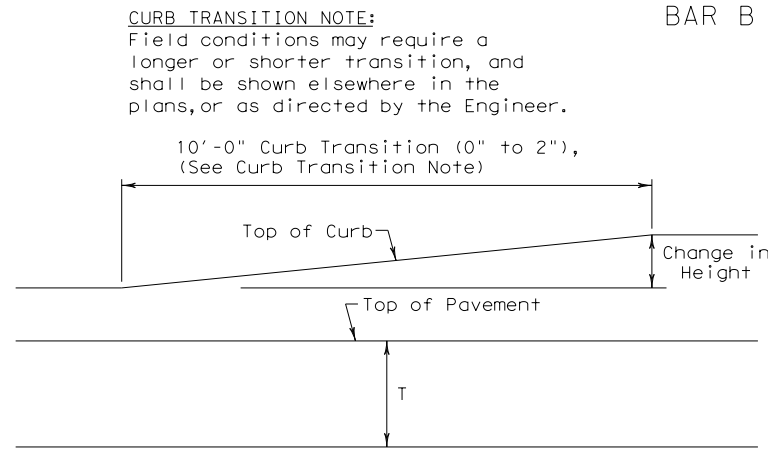
TYPE IIa CURB AND GUTTER
 5" - 5 3/4" HEIGHT



TYPE IV CURB (KEYED)
 5" - 5 3/4" HEIGHT



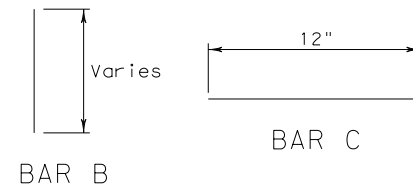
EXPANSION JOINT DETAIL



CURB TRANSITION
 Note: To be paid for as Highest Curb

GENERAL NOTES

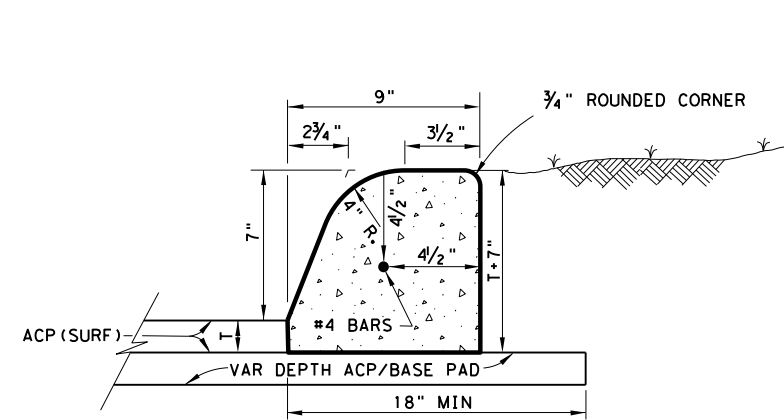
- All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
- Concrete shall be Class A.
- When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of fiber reinforced concrete in lieu of reinforcing steel is acceptable. Use fibers meeting the requirements of DMS 4550, "Fibers for Concrete," and dose fibers in accordance with Material Producers List (MPL) "Fibers for Class A and B Concrete Applications."
- Round exposed sharp edges with a rounding tool, to a minimum radius of 1/4 inch.
- All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
- Where concrete curb is to be placed on existing concrete pavement, Bar B may be drilled and the grouted in place, or may be inserted into fresh concrete.
- Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
- Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C-C.
- Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
- Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
- One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
- When horizontal permissible construction joints are used, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans. Reinforcing steel for curb section shall then conform to that required for concrete curb.
- Bar B used as needed to support curb reinforcing steel during concrete placement.



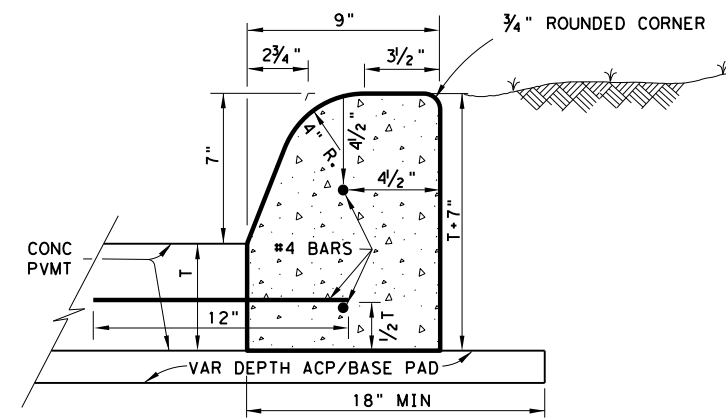
				Design Division Standard	
<h2>CONCRETE CURB AND GUTTER</h2>					
<h3>CCCG-21</h3>					
FILE: cccg21.dgn	DN: TxDOT	CK: AN	DW: SS	CK: KM	
© TxDOT: FEBRUARY 2021	CONT	SECT	JOB	HIGHWAY	
REVISTONS	0915	12	698, etc	Various	
	DIST	COUNTY	SHEET NO.		
	SAT	BEXAR	52		

GENERAL NOTES:

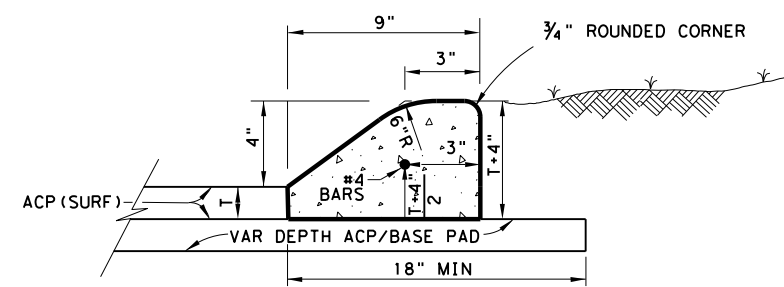
1. CONCRETE CURB TYPE 1 AND 2 SHOWN SHALL MEET THE MINIMUM SPECIFICATION REQUIREMENTS OF CLASS "A" CONCRETE PER ITEM 529 AND 421.
2. ALL REINFORCING STEEL SHALL BE GRADE 60
3. WHERE CONCRETE CURB IS PLACED ON EXISTING CONCRETE PAVEMENT, THE PAVEMENT SHALL BE DRILLED AND THE REINFORCING BARS GROUTED IN PLACE.
4. EXPANSION AND CONTRACTION JOINTS SHALL BE CONSTRUCTED TO MATCH PAVEMENT JOINTS IN ALL CURBS AND CURB AND GUTTER ADJACENT TO JOINTED CONCRETE PAVEMENT. WHERE PLACEMENT OF CURB OR CURB AND GUTTER IS NOT ADJACENT TO CONCRETE PAVEMENT, EXPANSION JOINTS SHALL BE PROVIDED AT STRUCTURES, CURB RETURNS AT STREETS, AND AT LOCATIONS DIRECTED BY THE ENGINEER.
5. VERTICAL AND HORIZONTAL DOWEL BARS AND TRANSVERSE REINFORCING BARS SHALL BE PLACED AT 4 FEET C-C, UNLESS OTHERWISE SHOWN.
6. ONE-HALF INCH EXPANSION JOINT MATERIAL SHALL BE PROVIDED WHERE CURB OR CURB AND GUTTER IS ADJACENT TO SIDEWALK OR RIPRAP. THIS IS SUBSIDIARY TO THE CURB, ITEM 529.
7. LAYDOWN CURB AT DRIVEWAYS WILL BE PAID AS SUBSIDIARY TO ITEM 530.
8. FOR SIDEWALK DETAILS AT DRIVEWAYS, SEE SAN ANTONIO DISTRICT STANDARD "DRIVEWAY DETAILS".
9. SEE PEDESTRIAN HANDRAIL DETAILS STANDARD "PRD" FOR MORE INFORMATION. CONCRETE RAIL FOUNDATION TO BE POURED WITH THE SIDEWALK BUT PAYMENT IS SUBSIDIARY TO ITEM 450 "RAILING".
10. CLEAR SIDEWALK WIDTH EXCLUDING THE PEDESTRIAN RAIL FOUNDATION SHALL BE 6' UNLESS OTHERWISE SPECIFIED IN THE PLANS



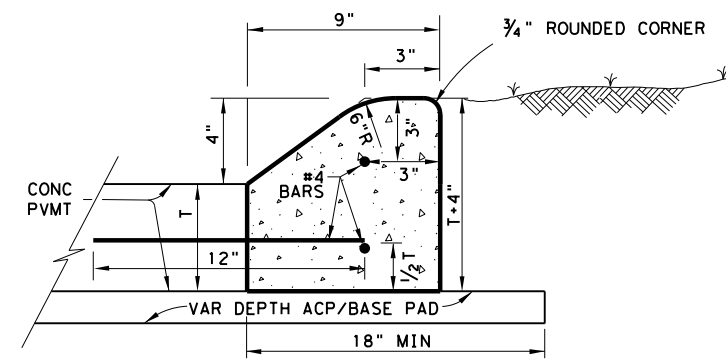
CONCRETE CURB (TYPE 1)
W/ ACP



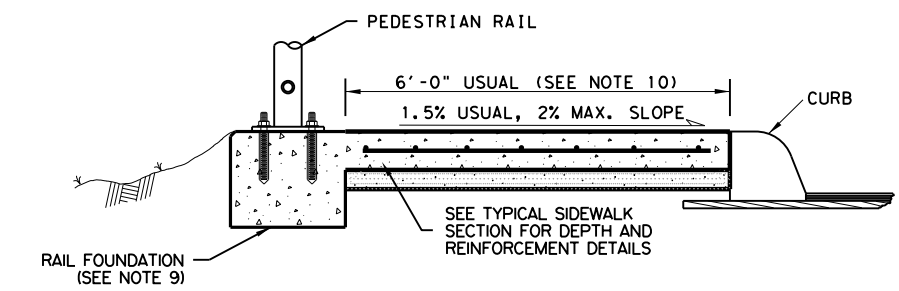
CONCRETE CURB (TYPE 1)
W/ CONC PAVEMENT



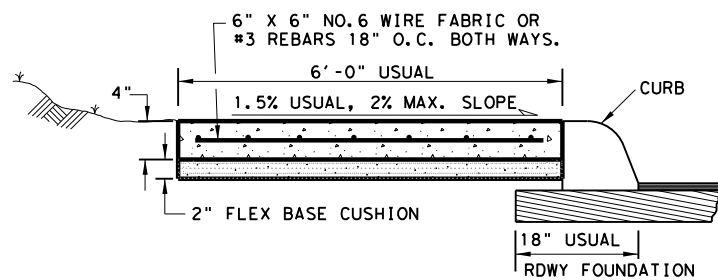
CONCRETE CURB (TYPE 2)
W/ ACP



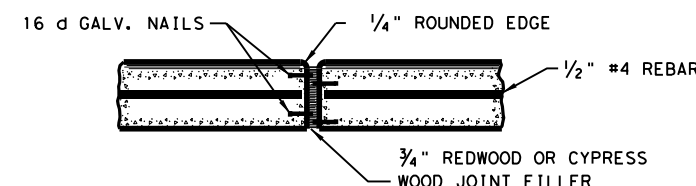
CONCRETE CURB (TYPE 2)
W/ CONC PAVEMENT



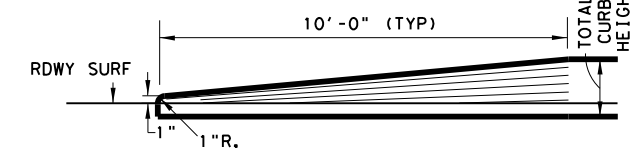
TYPICAL SIDEWALK SECTION
WITH PEDESTRIAN RAIL



TYPICAL SIDEWALK SECTION



TYPICAL CURB EXPANSION JOINT DETAIL



TRANSITION FOR CONCRETE CURB ENDS

SEE CURB DETAIL FOR REINFORCEMENT

GROOVED JOINTS IN THE SIDE WALK SHALL BE AT A MAX. SPACING OF 10 FT. AND SHALL HAVE 3/4" EXPANSION JOINTS AT A MAX. SPACING OF 60' AND TO COINCIDE WITH THE CURB EXP. JOINTS.

EXPANSION JOINTS TO BE PLACED AT BEGINNING AND END OF CURVES, DRIVEWAYS WHEELCHAIR RAMPS, INLETS, ILLUMINATION/ SIGNAL FOUNDATIONS AND OTHER FIXED OBJECTS.

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San Antonio District

MISCELLANEOUS CURB AND SIDEWALK DETAILS

San Antonio District Standard
Sheet (1 of 2)

T:\Engdata\Standards\MiscCurbdetails.dgn	PREPARED BY AND FOR USE OF TxDOT.			
ORIGINAL DRAWING DATE:	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
09-01-08	6	STP 2023 (535) HESG		52A
10-10-17 sidewalk width equals 6' usual	COUNTY	CONTROL SECTION	JOB	HIGHWAY
07-22-20 9" curb + curb w/ conc pvmt det.	BEXAR	0915	12	698

\$ TIMES

\$ DATES

\$ FILES

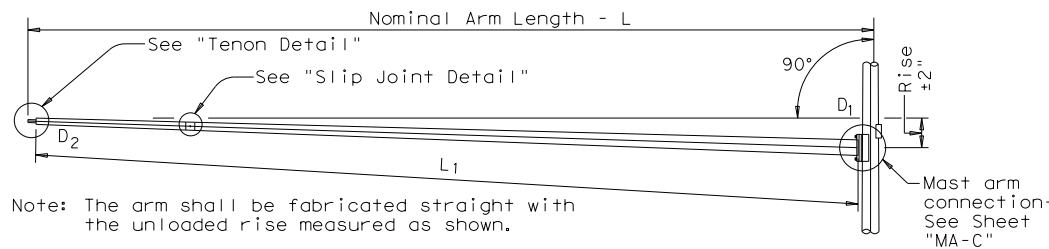
DATE: 10/25/2022 2:17:10 PM
 FILE: _Projects\SAN-NC\008129 COSA TO-03 - Traffic Signal Imp Designs\07.00 CADD\COSA Traffic Signal\09-VIII Traffic Items\Standards\sma-80_1.dgn
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Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D _B	D ₁₉	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	10.5	7.8	7.1	6.3	.179	11.5	8.5	7.7	6.8	.179	30-A
24	11.0	8.3	7.6	6.8	.179	12.0	9.0	8.2	7.3	.179	30-A
28	11.5	8.8	8.1	7.3	.179	12.5	9.5	8.7	7.8	.179	30-A
32	12.5	9.8	9.1	8.3	.179	12.0	9.0	8.2	7.3	.239	30-A
36	12.0	9.3	8.6	7.8	.239	12.5	9.5	8.7	7.8	.239	36-A
40	12.0	9.3	8.6	7.8	.239	13.5	10.5	9.7	8.8	.239	36-A
44	12.5	9.8	9.1	8.3	.239	14.0	11.0	10.2	9.3	.239	36-A
48	13.0	10.3	9.6	8.8	.239	15.0	12.0	11.2	10.3	.239	36-A

Arm Length	ROUND ARMS					POLYGONAL ARMS				
	L ₁	D ₁	D ₂	① thk	Rise	L ₁	D ₁	② D ₂	① thk	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	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"
48	47.0	10.5	4.1	.239	3'-4"	47.0	11.0	3.5	.239	2'-9"

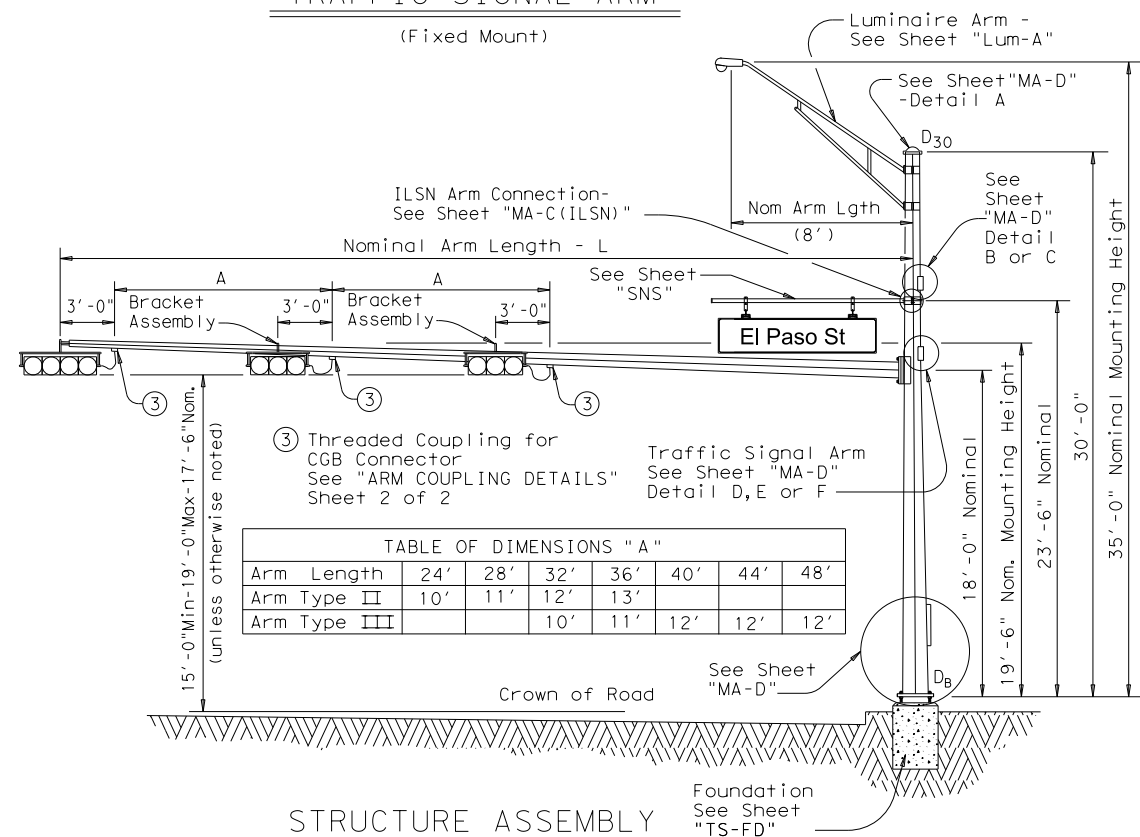
D_B = Pole Base O.D.
 D₁₉ = Pole Top O.D. with no Luminaire and no ILSN
 D₂₄ = Pole Top O.D. with ILSN w/out Luminaire
 D₃₀ = Pole Top O.D. with Luminaire
 D₁ = Arm Base O.D.
 D₂ = Arm End O.D.
 L₁ = Shaft Length
 L = Nominal Arm Length

- ① Thickness shown are minimums, thicker materials may be used.
- ② D₂ 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)



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		24' Poles With ILSN		19' Poles With No Luminaire and No ILSN	
	Above hardware plus: One (or two if ILSN attached) small hand hole, clamp-on simplex		Above hardware plus one small hand hole		See note above	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20L-80		20S-80		20-80	
24	24L-80	2	24S-80		24-80	
28	28L-80	1	28S-80		28-80	
32	32L-80	1	32S-80		32-80	
36	36L-80	3	36S-80		36-80	
40	40L-80	1	40S-80		40-80	
44	44L-80	2	44S-80		44-80	
48	48L-80		48S-80		48-80	

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

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

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	12

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

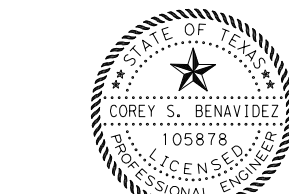
Nominal Arm Length	Quantity
7' Arm	6
9' Arm	6

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
1 1/2"	3'-4"	4
1 3/4"	3'-10"	6

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.



Corey Benavidez 11/22/2022

Texas Department of Transportation
 Traffic Operations Division
TRAFFIC SIGNAL SUPPORT STRUCTURES
 SINGLE MAST ARM ASSEMBLY
 (80 MPH WIND ZONE)
 SMA-80(1)-12

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5-96		0915	12	698, etc	VARIOUS
11-99					
1-12					
		DIST	COUNTY		SHEET NO.
		SAT	BEXAR		53

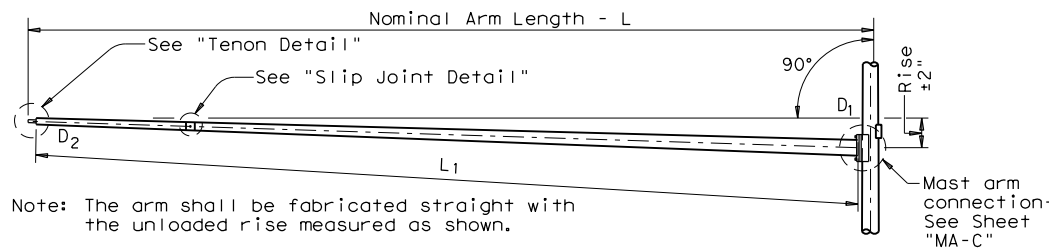
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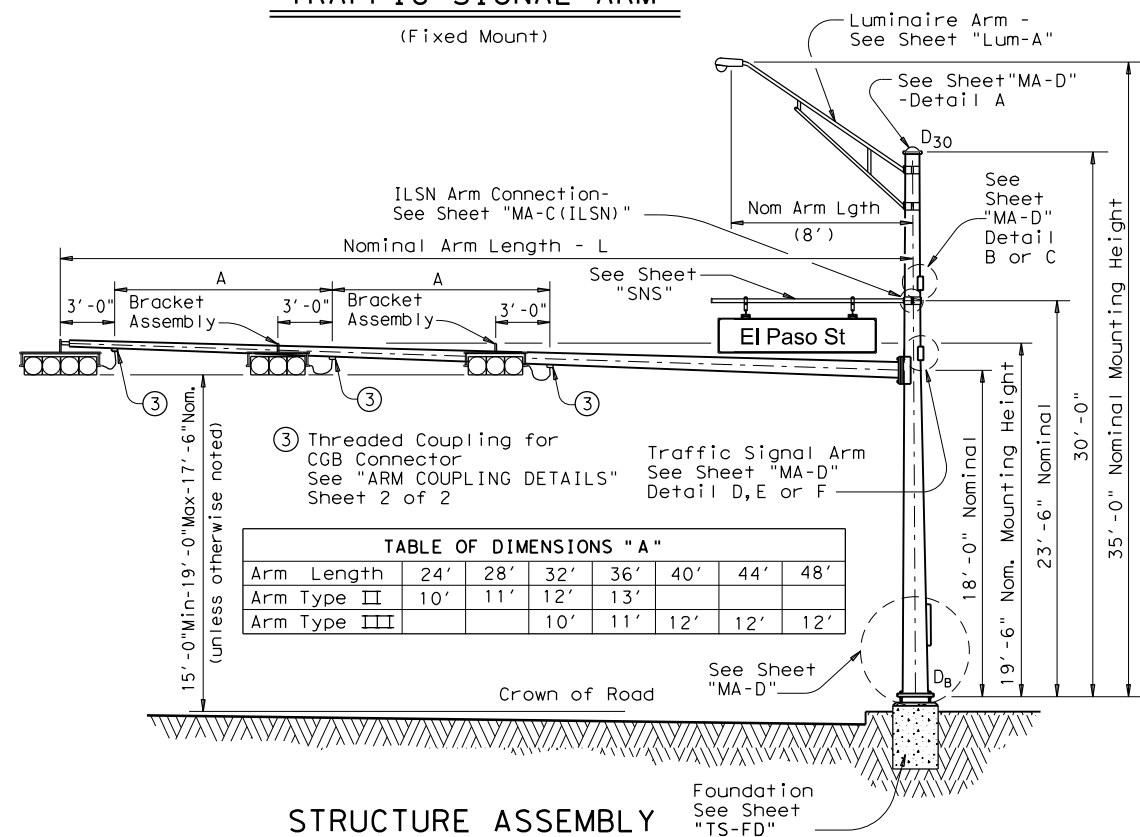
Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D _B	D ₁₉	D ₂₄	D ₃₀	① thk	D _B	D ₁₉	D ₂₄	D ₃₀	① thk	
ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
20	10.5	7.8	7.1	6.3	.179	11.5	8.5	7.7	6.8	.179	30-A
24	11.0	8.3	7.6	6.8	.179	12.0	9.0	8.2	7.3	.179	30-A
28	11.5	8.8	8.1	7.3	.179	12.5	9.5	8.7	7.8	.179	30-A
32	12.5	9.8	9.1	8.3	.179	12.0	9.0	8.2	7.3	.239	30-A
36	12.0	9.3	8.6	7.8	.239	12.5	9.5	8.7	7.8	.239	36-A
40	12.0	9.3	8.6	7.8	.239	13.5	10.5	9.7	8.8	.239	36-A
44	12.5	9.8	9.1	8.3	.239	14.0	11.0	10.2	9.3	.239	36-A
48	13.0	10.3	9.6	8.8	.239	15.0	12.0	11.2	10.3	.239	36-A

Arm Length	ROUND ARMS					POLYGONAL ARMS				
	L ₁	D ₁	D ₂	① thk	Rise	L ₁	D ₁	② D ₂	① thk	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	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"
48	47.0	10.5	4.1	.239	3'-4"	47.0	11.0	3.5	.239	2'-9"

- D_B = Pole Base O.D.
- D₁₉ = Pole Top O.D. with no Luminaire and no ILSN
- D₂₄ = Pole Top O.D. with ILSN w/out Luminaire
- D₃₀ = Pole Top O.D. with Luminaire
- D₁ = Arm Base O.D.
- D₂ = Arm End O.D.
- L₁ = Shaft Length
- L = Nominal Arm Length
- ① Thickness shown are minimums, thicker materials may be used.
- ② D₂ may be increased by up to 1" for polygonal arms.



TRAFFIC SIGNAL ARM
(Fixed Mount)



Arm Length	24'	28'	32'	36'	40'	44'	48'
Arm Type II	10'	11'	12'	13'			
Arm Type III			10'	11'	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		24' Poles With ILSN		19' Poles With No Luminaire and No ILSN	
	Designation	Quantity	Designation	Quantity	Designation	Quantity
ft						
20	20L-80		20S-80		20-80	
24	24L-80		24S-80		24-80	
28	28L-80		28S-80		28-80	
32	32L-80		32S-80		32-80	
36	36L-80		36S-80		36-80	
40	40L-80	1	40S-80		40-80	
44	44L-80		44S-80		44-80	
48	48L-80	3	48S-80		48-80	

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

Nominal Arm Length	Type I Arm (1 Signal)		Type II Arm (2 Signals)		Type III Arm (3 Signals)	
	Designation	Quantity	Designation	Quantity	Designation	Quantity
ft						
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	1
44					44III-80	
48					48III-80	3

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	4

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

Nominal Arm Length	Quantity
7' Arm	
9' Arm	4

Anchor Bolt Assemblies (1 per pole)

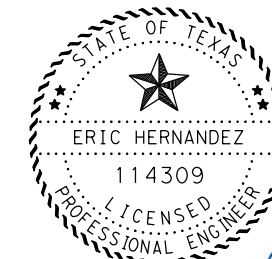
Anchor Bolt Diameter	Anchor Bolt Length	Quantity
1 1/2"	3'-4"	
1 3/4"	3'-10"	4

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.

E SOUTH CROSS BLVD AT PECAN VALLEY DR

SHEET 1 OF 2



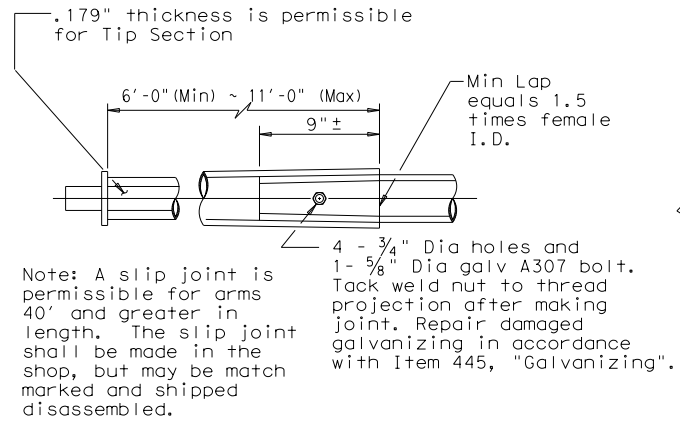
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Texas Department of Transportation
 Traffic Operations Division
TRAFFIC SIGNAL SUPPORT STRUCTURES
 SINGLE MAST ARM ASSEMBLY
 (80 MPH WIND ZONE)
SMA-80(1)-12

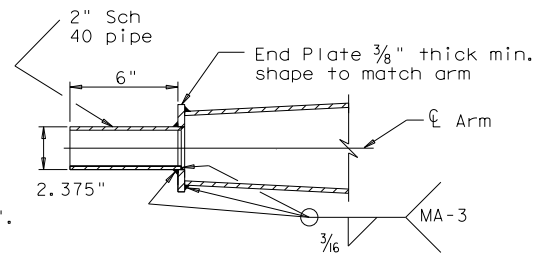
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11-99	DIST	COUNTY		SHEET NO.
1-12	SAT	BEXAR		53A

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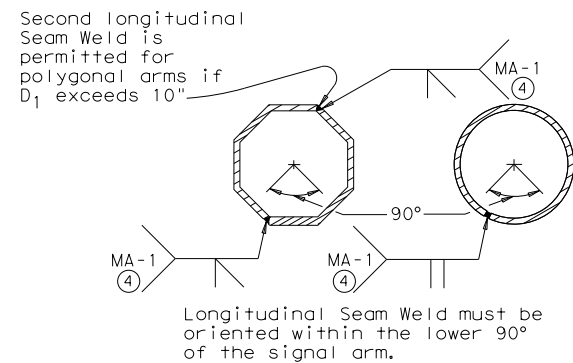
SLIP JOINT DETAIL



TENON DETAIL

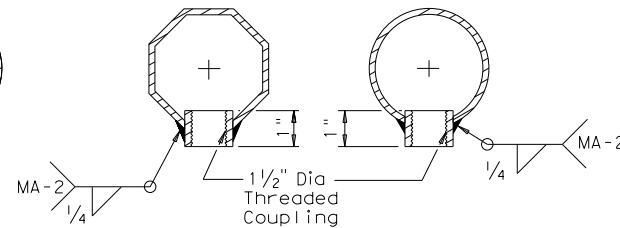
Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 1/2" Dia Threaded Coupling.

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 backplates. 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 80 mph plus a 1.3 gust factor.

Poles are designed to support one 8'-0" luminaire arm, one 9'-0" internally lighted street name sign and one traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 60 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.6 sq ft. The specified internally lighted street name sign load applied 4.5 ft from the centerline of the pole equals 85 lbs vertical dead load plus horizontal wind load on an effective projected area of 11.5 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.



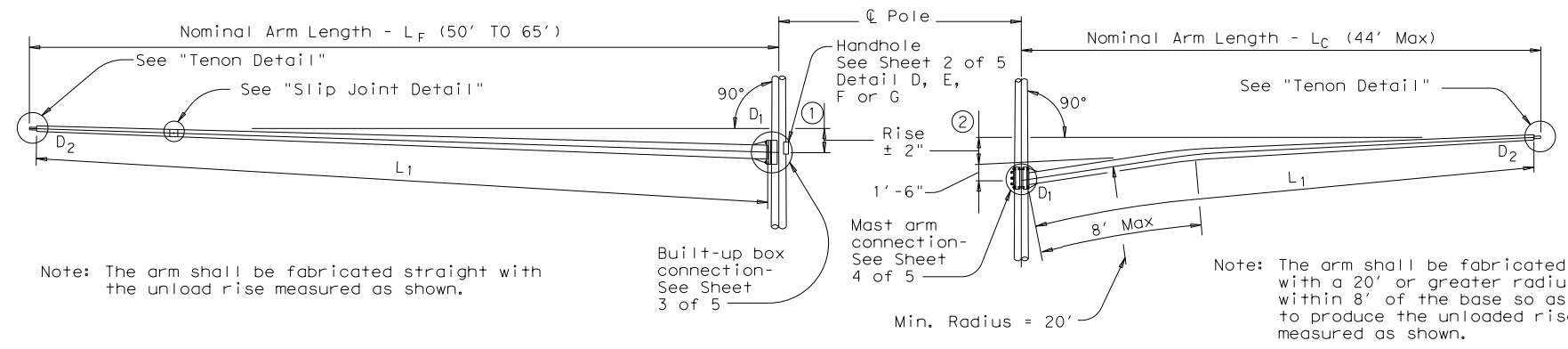
**TRAFFIC SIGNAL
 SUPPORT STRUCTURES
 SINGLE MAST ARM ASSEMBLY**

(80 MPH WIND ZONE)

SMA-80(2)-12

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1-12	DIST	COUNTY		SHEET NO.	
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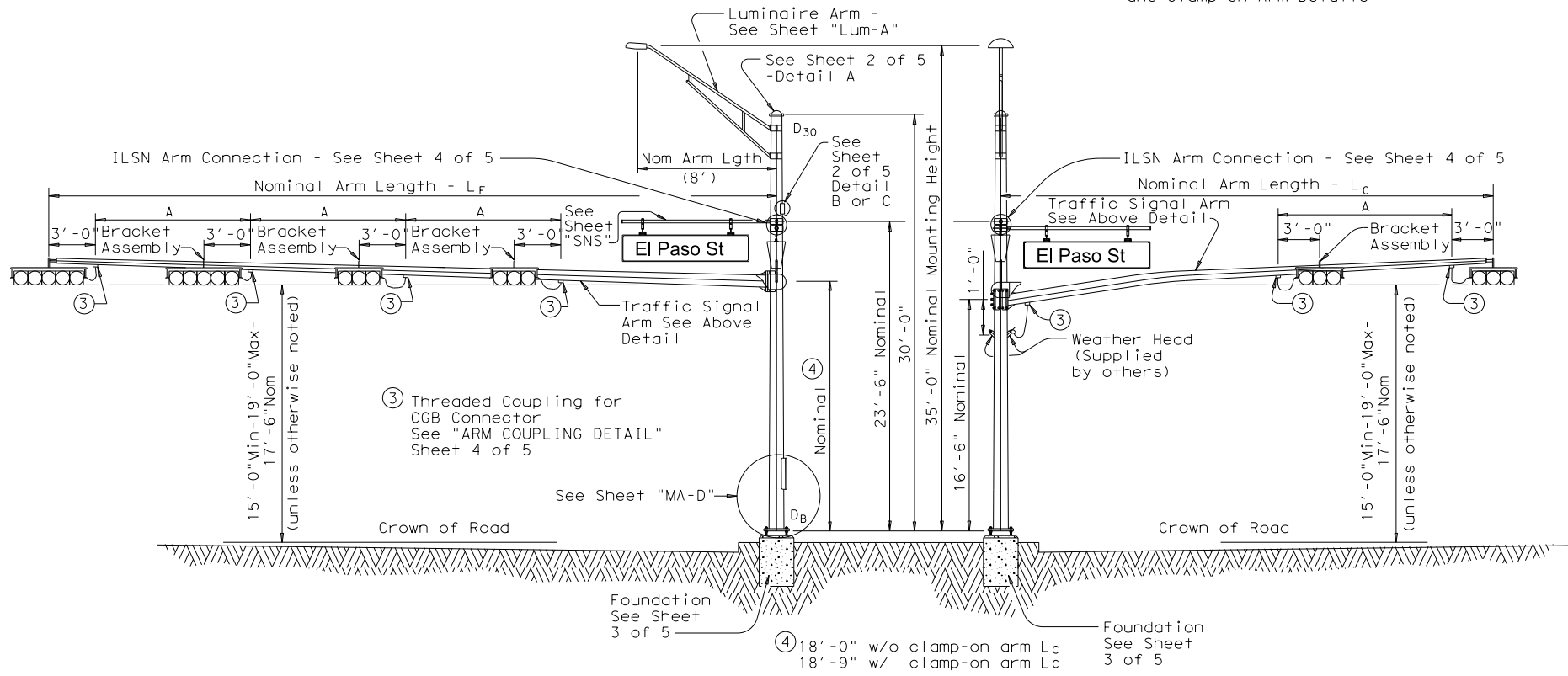


FIXED MOUNT TRAFFIC SIGNAL ARM

① See Sheet 3 of 5 for Arm Rise

CLAMP-ON TRAFFIC SIGNAL ARM (IF REQUIRED)

② See Sheet 4 of 5 for Arm Rise and Clamp-on Arm Details



ELEVATION

(Showing fixed mount arm)

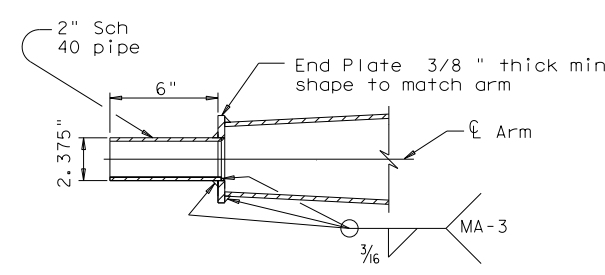
STRUCTURE ASSEMBLY

ELEVATION

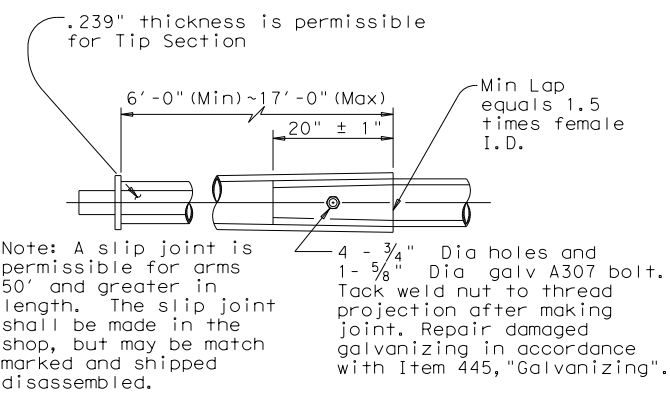
(Showing clamp-on arm)

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



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.

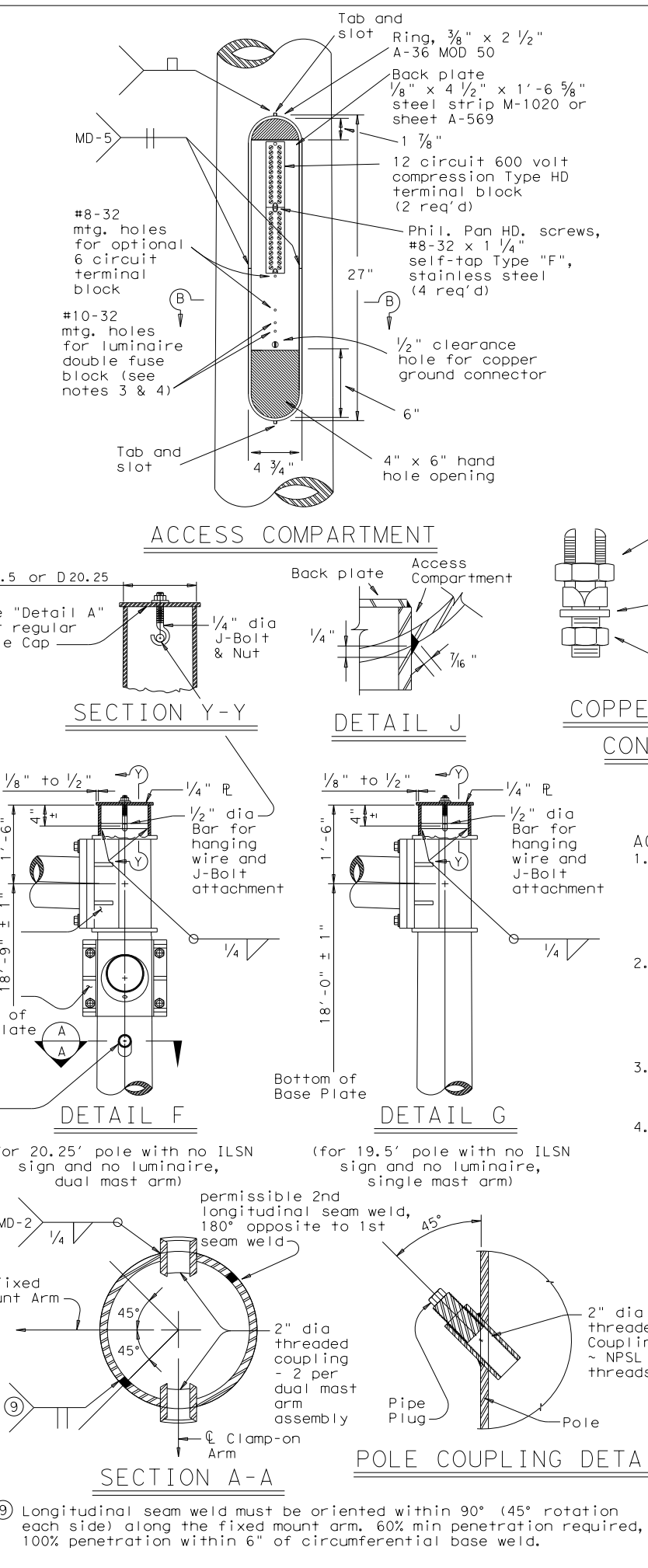
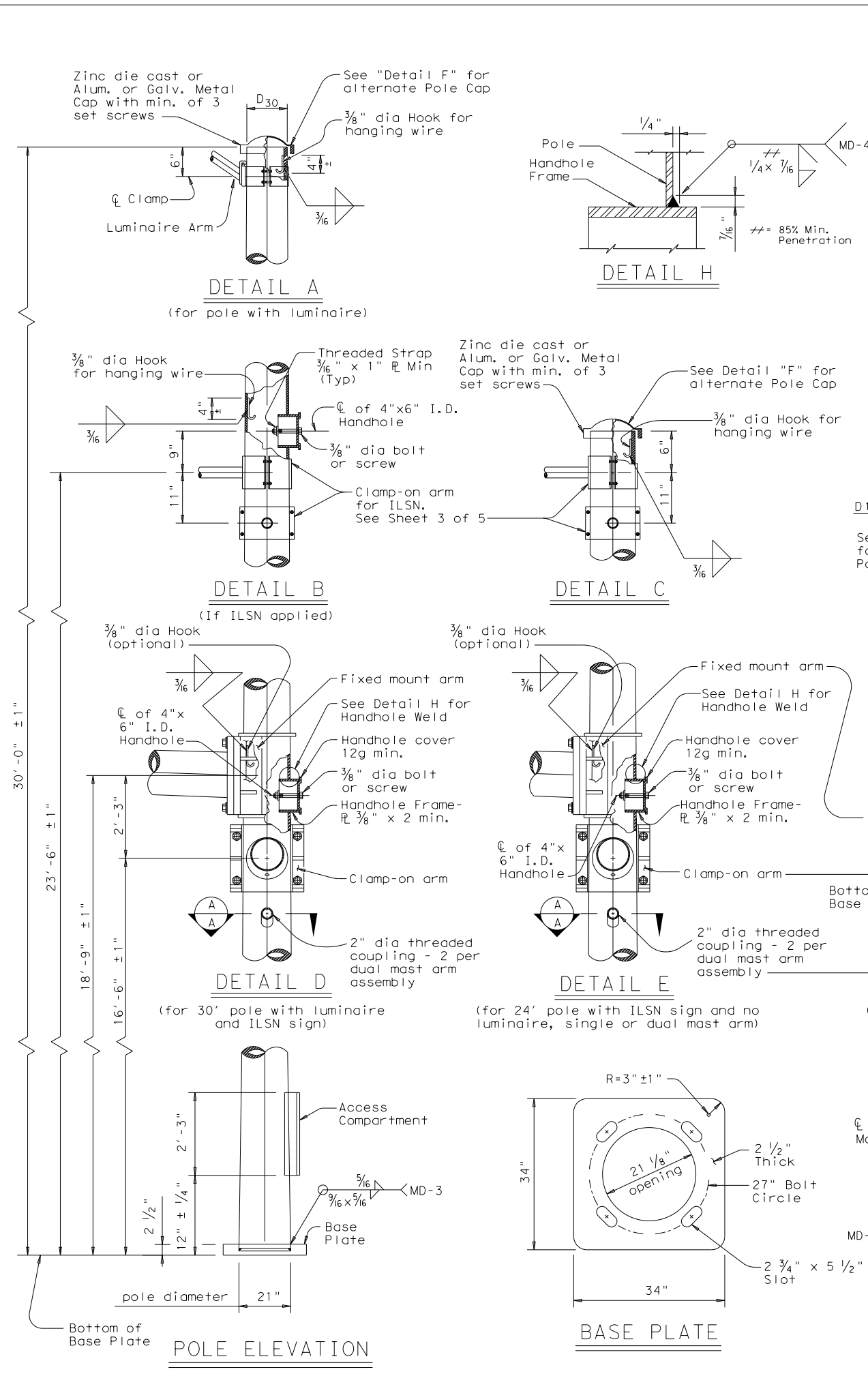


TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY
 (50 TO 65 FT)
 (80 AND 100 MPH WIND ZONE)
 LMA(1)-12

Sheet 1 of 5

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4-20-01 1-12	REVISIONS		CONT	SECT	JOB
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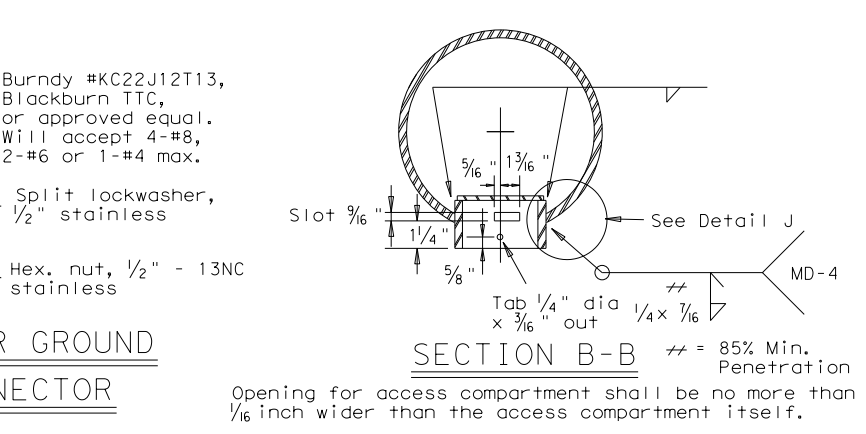
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MATERIALS	
Round Shafts or Polygonal Shafts ⁽⁷⁾	ASTM A595 Gr. A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 ⁽⁸⁾
Plates ⁽⁷⁾	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325, or A449 except where 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.



- ACCESS COMPARTMENT NOTES:**
- 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.
 - The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985G12CU 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 Ilco SSS-5). The traffic signal contractor shall install the kit items in the field.
 - The screw hole spacing on the enclosure back plate shall be for two Marathon #985G12 terminal strips, one Marathon #985G12 terminal strip, and one Bussmann #BM6032B fuse block.
 - 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
 LONG MAST ARM ASSEMBLY
 (50 TO 65 FT)
 (80 AND 100 MPH WIND ZONE)
 LMA(2)-12**

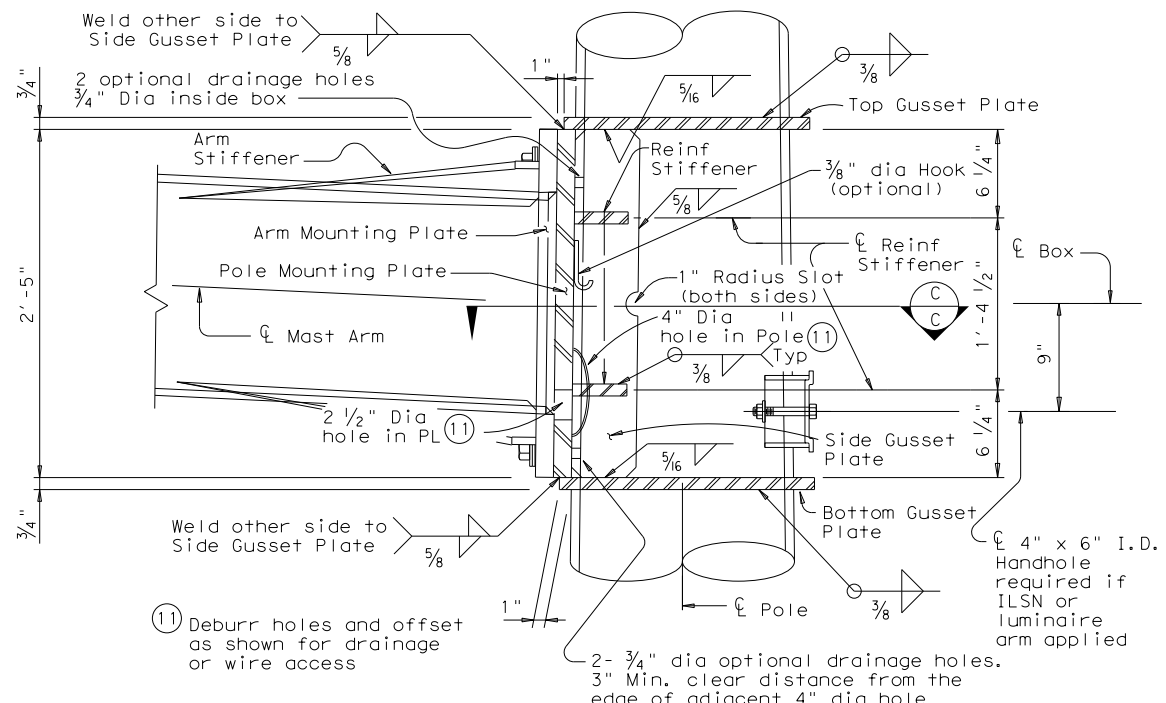
Sheet 2 of 5

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4-20-01 1-12		0915	12	698, etc	VARIOUS
		DIST	COUNTY	SHEET NO.	
		SAT	BEXAR		56

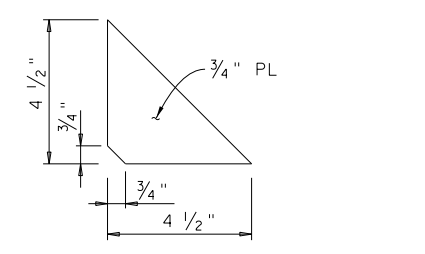
⁽⁹⁾ Longitudinal seam weld must be oriented within 90° (45° rotation each side) along the fixed mount arm. 60% min penetration required, 100% penetration within 6" of circumferential base weld.

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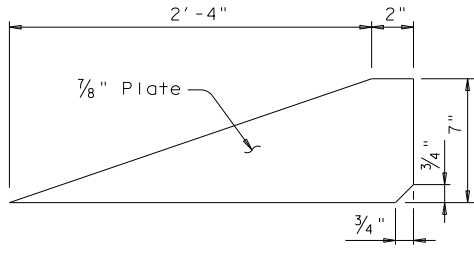
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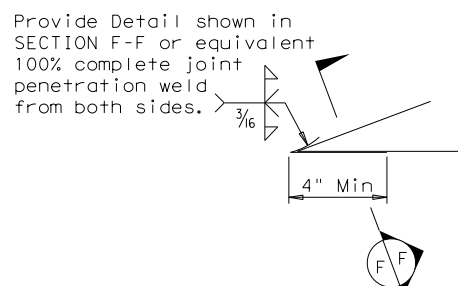
BUILT-UP BOX CONNECTION



REINFORCING STIFFENER

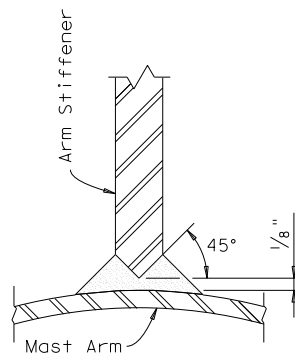


ARM STIFFENER
 (Cut to match arm inclination and taper)

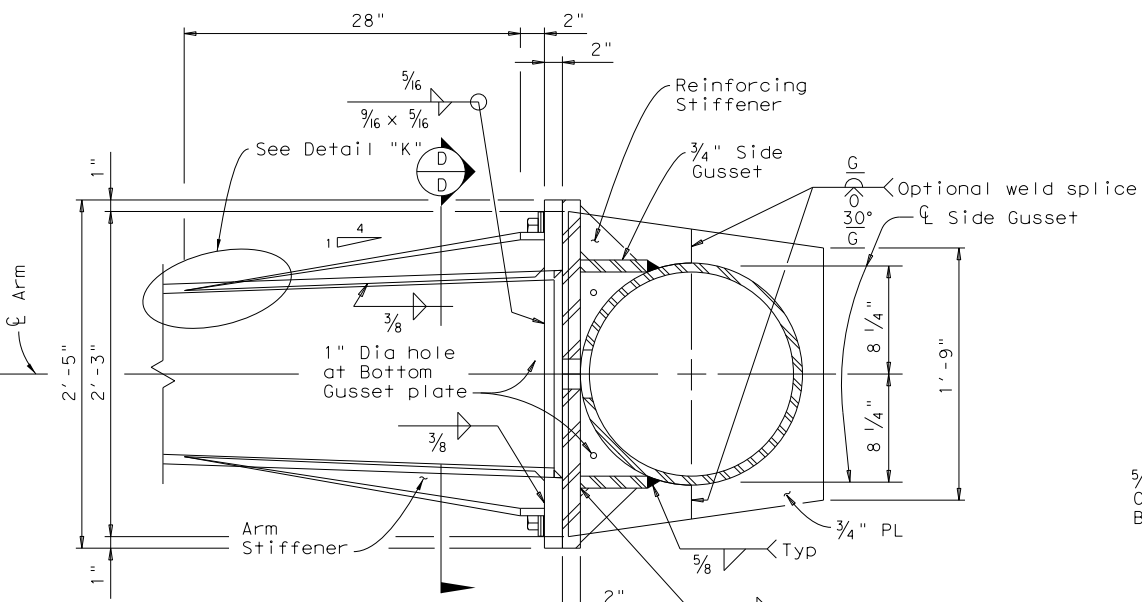


Only 4" length at tip of Arm Stiffener requires a complete joint penetration weld. Smooth weld radius to connect Stiffener. Only a fillet weld is required for the remaining weld length.

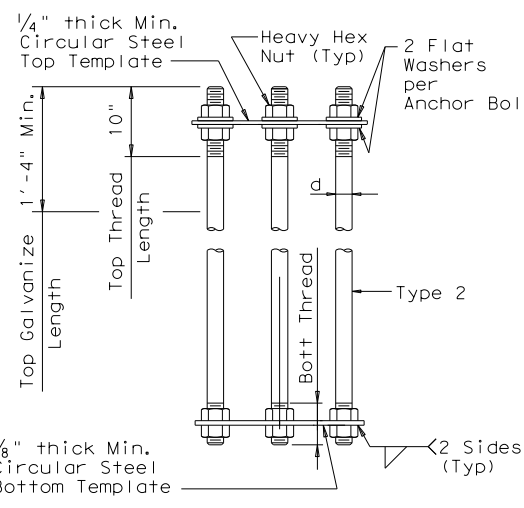
DETAIL "K"



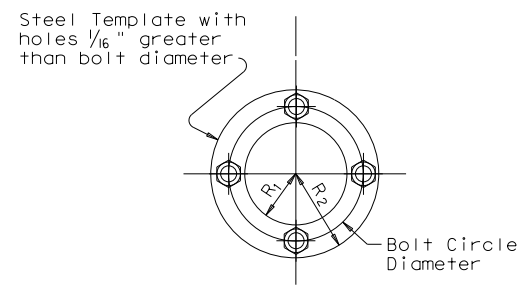
SECTION F-F



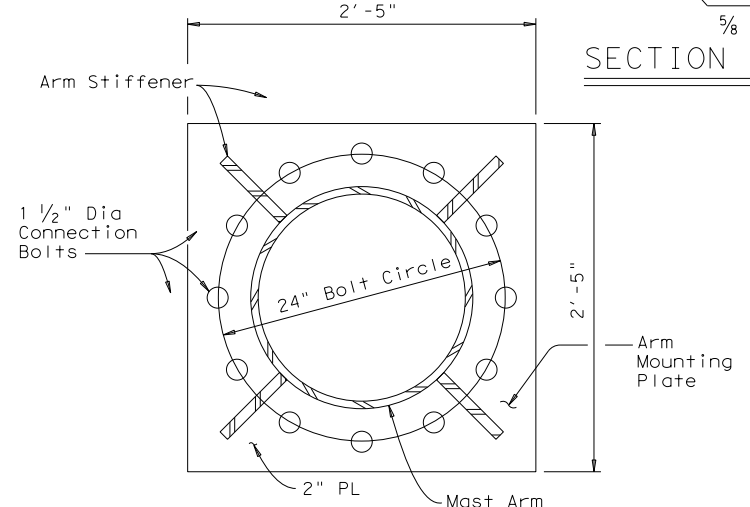
SECTION C-C



NUT ANCHOR (TYPE 2)
ANCHOR BOLT ASSEMBLY



TEMPLATE DETAIL



SECTION D-D

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.

Fixed Mount Arm L F	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 L F	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)
 D₂₄ = Pole Top O.D. with ILSN w/out Luminaire
 D₃₀ = Pole Top O.D. with Luminaire
 D₁ = Arm Base O.D.
 D₂ = Arm End O.D.
 L₁ = 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.

GENERAL NOTES:
 Built-up Box Connection: For the welded arm-to-pole connection as a built-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 3/32 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	R ₂	R ₁
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

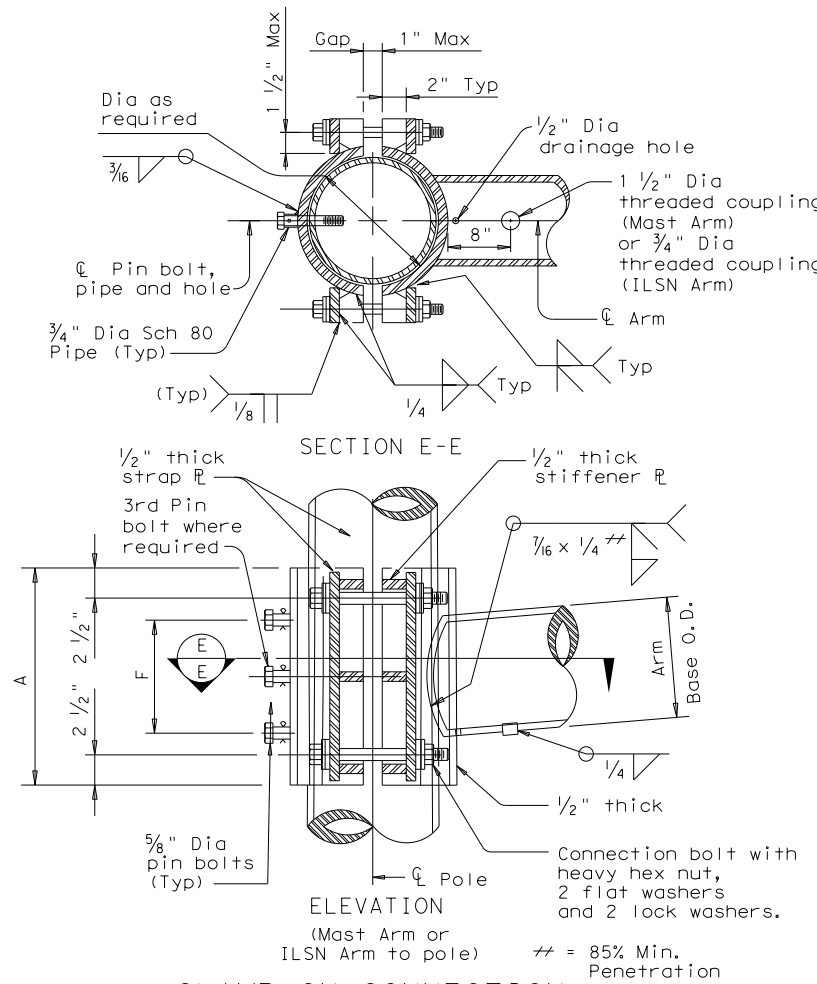
TRAFFIC SIGNAL SUPPORT STRUCTURES LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 3 of 5 LMA (3) -12

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			0915	12	698, etc
			DIST	COUNTY	SHEET NO.
		SAT	BEXAR		57

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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'-0"	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"

D₁ = Arm Base O.D.
 D₂ = Arm End O.D.
 L₁ = 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				
in.	in.	in.	in.	in.	ea
3	.216	10	4	3/4	2

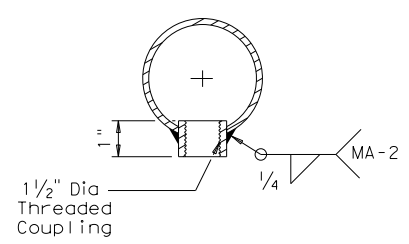
Mast Arm Size					
Mast Arm Size		A	F	4 Conn. Bolts	5/8" Dia. Pin Bolts
Base Dia	Thick				
in.	in.	in.	in.	in.	ea
6.5	.179	12	6	1	2
7.5	.179	14	8	1	2
8.0	.179	14	8	1	2
9.0	.179	16	10	1	2
9.5	.179	18	12	1 1/4	3
9.5	.239	18	12	1 1/4	3
10.0	.239	18	12	1 1/4	3
10.5	.239	18	12	1 1/4	3
11.0	.239	18	12	1 1/4	3
11.5	.239	18	12	1 1/4	3

GENERAL NOTES:

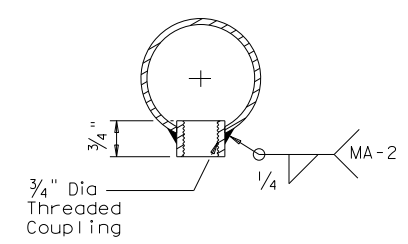
Clamp-on details are used for the second arm on dual mast arm assemblies or ILSN arm support. For a clamp-on mast arm, a maximum 1 1/2" wide vertical slotted hole may be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer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

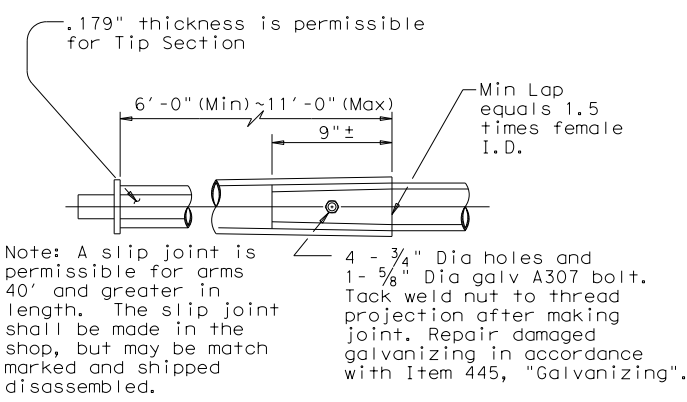
Pin bolts are required to prevent rotation of clamp-on arms under design wind forces. Pin bolts shall be ASTM A325 with threads excluded from the shear plane. Pin bolt and 3/4" diameter pipe shall have 3/16" diameter holes for a 1/8" diameter galvanized cotter pin. Back clamp plate shall be furnished with a 3/4" diameter hole for each pin bolt. An 1/16" diameter hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.



ARM COUPLING DETAIL



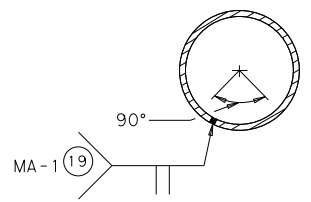
ILSN ARM COUPLING DETAIL



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 1/2" 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.


 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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REVISIONS		CONT	SECT	JOB	HIGHWAY
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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	24' Poles with ILSN	19.50' (Single Mast Arm) 20.25' (Dual Mast Arm) Poles with no Luminaire and no ILSN See note above				
	See note above plus: one (or two if ILSN attached) small hand hole, clamp-on simplex						
Single Mast Arm							
Lf ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity	
50	50L		50S		50		
55	55L	2	55S		55		
60	60L		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	
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	
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	
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)
	10	2	43.8
Total Drill Shaft Length			

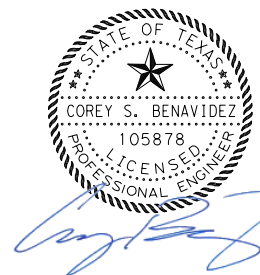
Notes

- ** 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	Luminaire Arms (1 per 30' pole)				
ft.	Designation	Quantity	Nominal Arm Length		Quantity	
50	50IV		8' Arm	2		
55	55IV	2	ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers			
60	60IV		Nominal Arm Length		Quantity	
65	65IV		7' Arm			
			9' Arm	2		
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 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	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) 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.						
Anchor Bolt Diameter	Anchor Bolt Length	Quantity				
2 1/2 "	5' - 3"	2				

Abbreviations

- Lf= Fixed Arm Length
- Lc= Clamp-on Arm Length (44' Max.)



11/22/2022



LONG MAST
ARM ASSEMBLY
PARTS LIST

LMA (5) - 12

Sheet 5 of 5

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REVISIONS		CONT	SECT	JOB	HIGHWAY
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		DIST	COUNTY	SHEET NO.	
		SAT	BEXAR	59	

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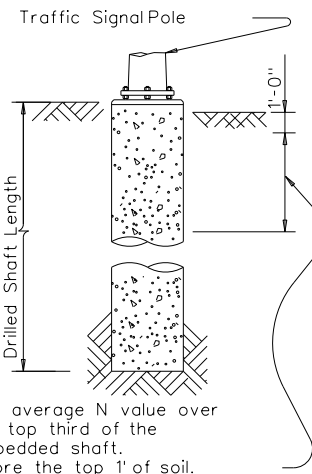
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FOUNDATION DESIGN TABLE

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	F _y (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	3/4"	36	12 3/4"	1	1	Pedestal pole, pedestal mounted controller.	
30-A	30"	8- #9	#3 at 6"	11.3	10.3	8.0	1 1/2"	55	17"	2	3	Mast arm assembly. (see Selection Table)	
36-A	36"	10- #9	#3 at 6"	13.2	12.0	9.4	1 3/4"	55	19"	2	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	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 1/4"	55	23"	2	9	Mast arm assembly. (see Selection Table)	

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

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



NOTES:

- Anchor bolt design develops the foundation capacity given under Foundation Design Loads.
- Foundation Design Loads are the allowable moments and shears at the base of the structure.
- Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.
- Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.
- If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.
- Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

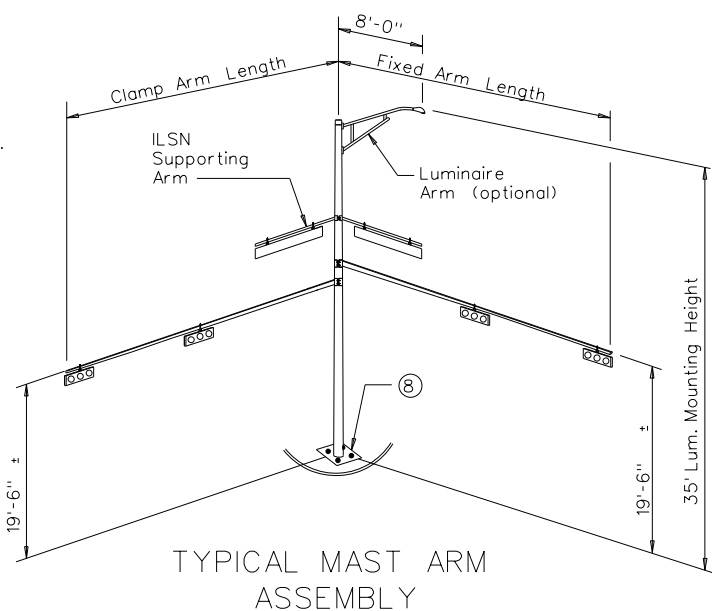
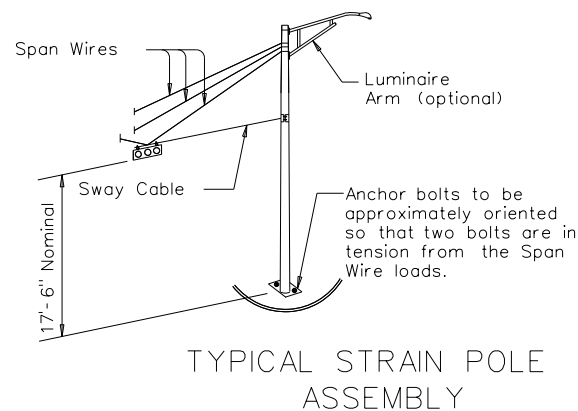
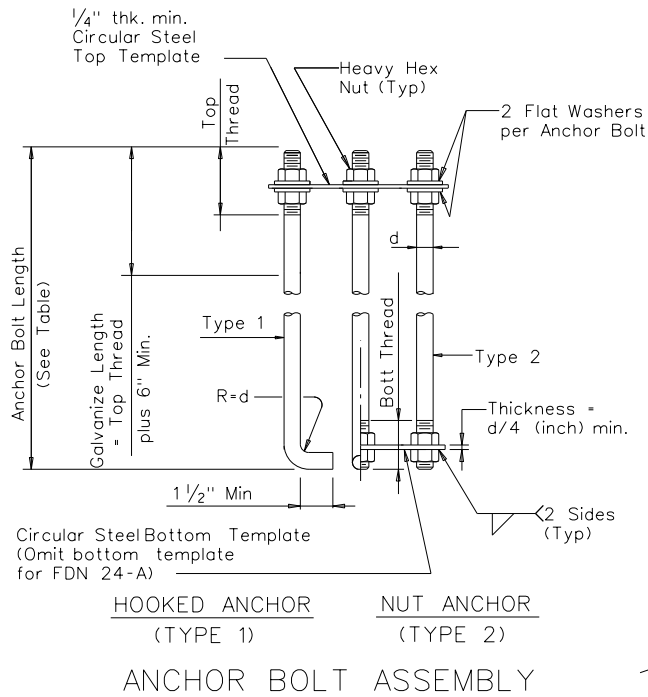
ANCHOR BOLT & TEMPLATE SIZES

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

⑦ Min dimensions given, longer bolts are acceptable.

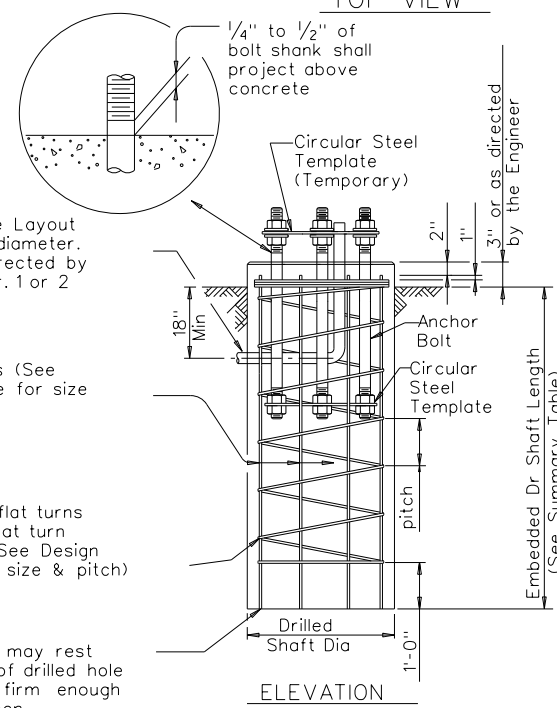
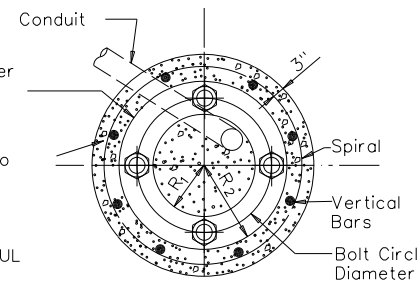
EXAMPLE:

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



Steel Template with holes 1/16" greater than bolt diameter

Bond anchor bolts to rebar cage, two locations using #3 bar or #6 copper jumper. Mechanical connectors shall be UL Listed for concrete encasement.



Conduit (See Layout Sheets for diameter. Orient as directed by the Engineer. 1 or 2 required)

Vertical Bars (See Design Table for size & number).

Spiral, 3 flat turns top & 1 flat turn bottom. (See Design Table for size & pitch)

Vertical bars may rest on bottom of drilled hole if materials firm enough to do so when concrete is placed.

FOUNDATION SUMMARY TABLE ③

LOCATION IDENTIFICATION	AVG. N BLOW /ft.	FDN TYPE	NO. EA	DRILLED SHAFT LENGTH (FEET) ⑥				
				24-A	30-A	36-A	36-B	42-A
S FLORES AT W SAYERS AVE / E SAYERS AVE								
POLE A,B,C,D	10	30-A	4		45.2			
POLE E,F	10	24-A	2	11.4				
SAN PEDRO AT SAHARA DR								
POLE A,C	10	36-A	2			26.4		
POLE E,F,G,H,I	10	24-A	5	28.5				
E SOUTH CROSS BLVD AT PECAN VALLEY								
POLE A,B,C,D	10	36-A	4			52.8		
POLE E,F,G,H	10	24-A	4	22.8				
TOTAL DRILLED SHAFT LENGTHS				62.7	56.5	66.0		

GENERAL NOTES:

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

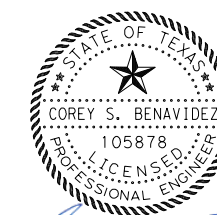
Reinforcing steel shall conform to Item 440, "Reinforcing Steel".

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".



11/22/2022

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL
POLE FOUNDATION

TS-FD-12

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REVISIONS		CONT	SECT	JOB	HIGHWAY
5-96		0915	12	698, etc	VARIOUS
11-99		DIST	COUNTY		SHEET NO.
1-02		SAT	BEXAR		60

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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	3/4"	36	12 3/4"	1	10	1	Pedestal pole, pedestal mounted controller.
30-A	30"	8- #9	#3 at 6"	11.3	10.3	8.0	1 1/2"	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 3/4"	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 1/4"	55	23"	2	271	9	Mast arm assembly. (see Selection Table)

NOTES:

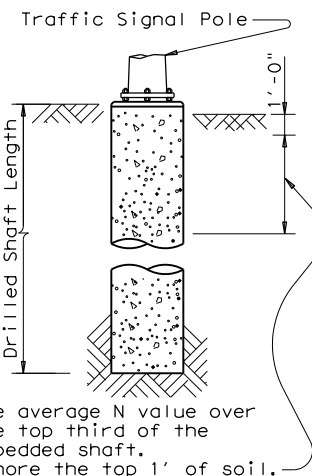
- Anchor bolt design develops the foundation capacity given under Foundation Design Loads.
- Foundation Design Loads are the allowable moments and shears at the base of the structure.
- Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.
- Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.
- If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.
- 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
POLE A	10	36-A	1			13.0		
POLE B	10	36-A	1			13.0		
POLE C	10	36-A	1			13.0		
POLE D	10	36-A	1			13.0		
POLE E	10	24-A	1	6.0				
POLE F	10	24-A	1	6.0				
POLE G	10	24-A	1	6.0				
POLE H	10	24-A	1	6.0				
POLE I	10	24-A	1	6.0				
POLE J	10	24-A	1	6.0				
TOTAL DRILLED SHAFT LENGTHS				36.0		52.0		

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

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

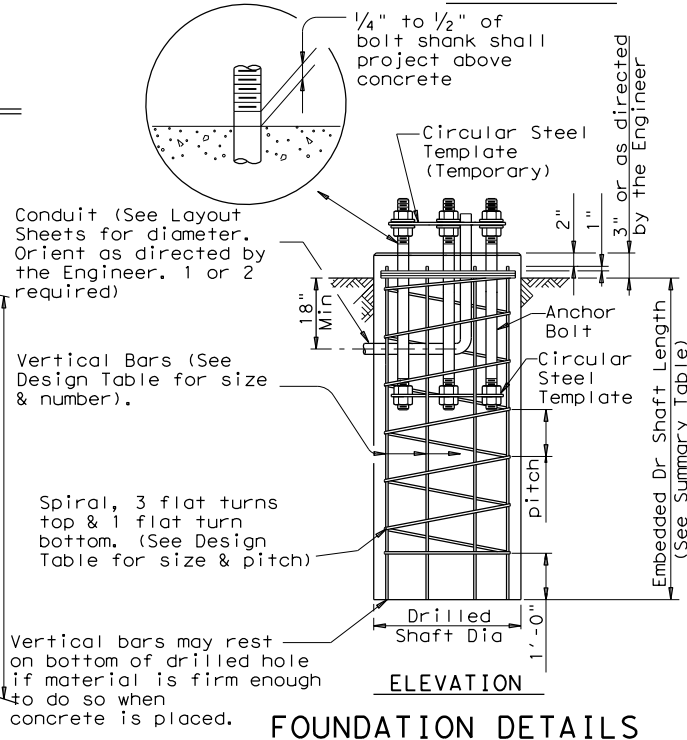
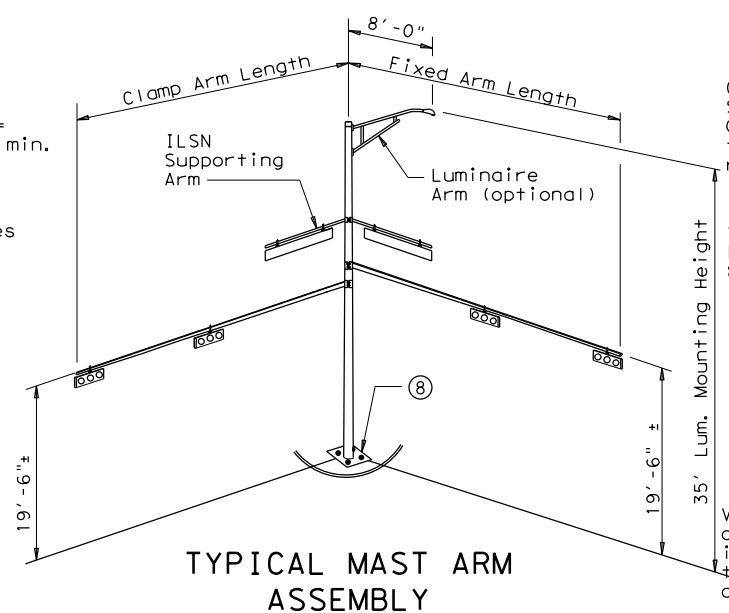
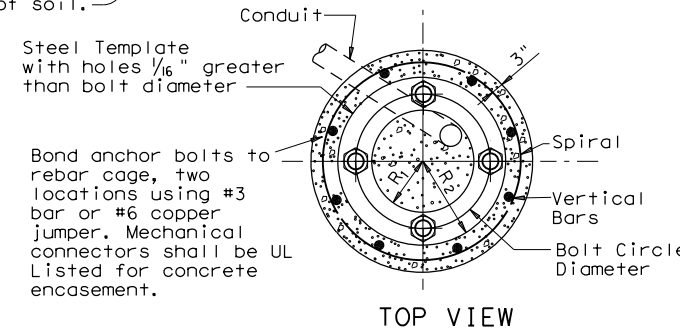
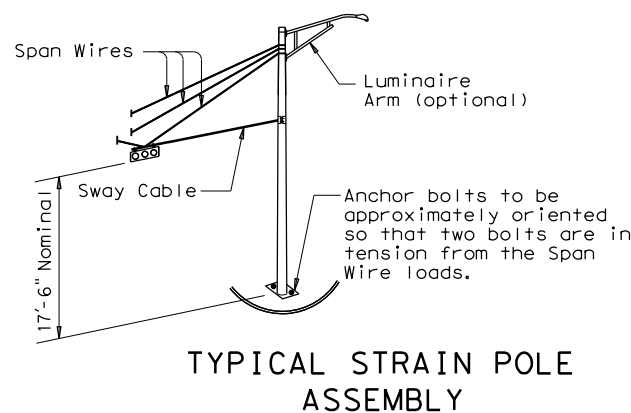
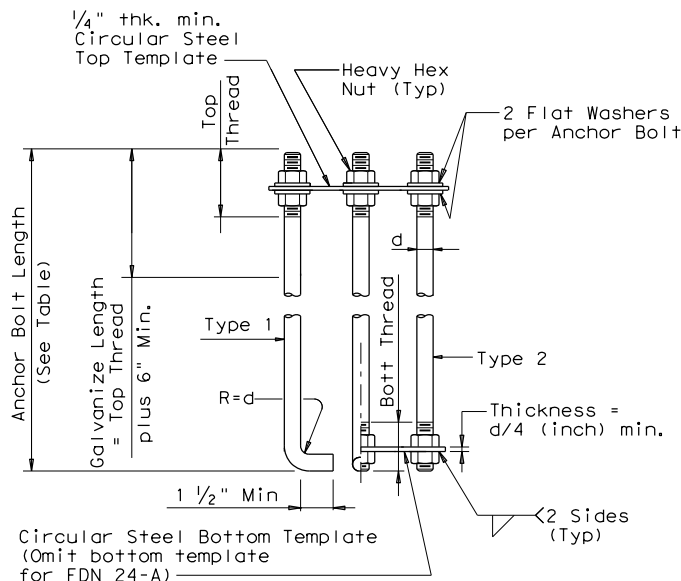


ANCHOR BOLT & TEMPLATE SIZES

BOLT DIA IN.	(7) BOLT LENGTH	TOP THREAD	BOTTOM THREAD	BOLT CIRCLE	R2	R1
3/4"	1'-6"	3"	—	12 3/4"	7 1/8"	5 5/8"
1 1/2"	3'-4"	6"	4"	17"	10"	7"
1 3/4"	3'-10"	7"	4 1/2"	19"	11 1/4"	7 3/4"
2"	4'-3"	8"	5"	21"	12 1/2"	8 1/2"
2 1/4"	4'-9"	9"	5 1/2"	23"	13 3/4"	9 1/4"

(7) Min dimensions given, longer bolts are acceptable.

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



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".

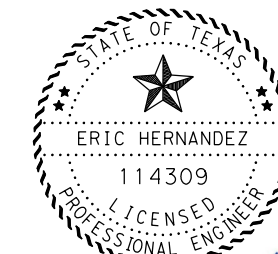
Concrete shall be Class "C".

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.

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

E SOUTH CROSS BLVD AT PECAN VALLEY DR



Texas Department of Transportation
 Traffic Operations Division

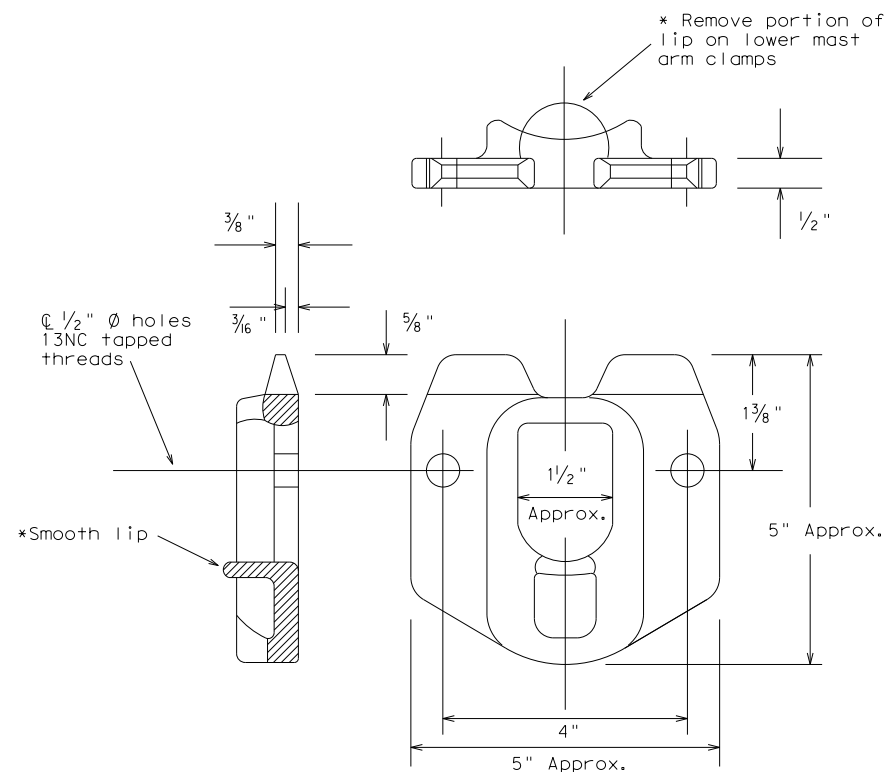
TRAFFIC SIGNAL POLE FOUNDATION

TS-FD-12

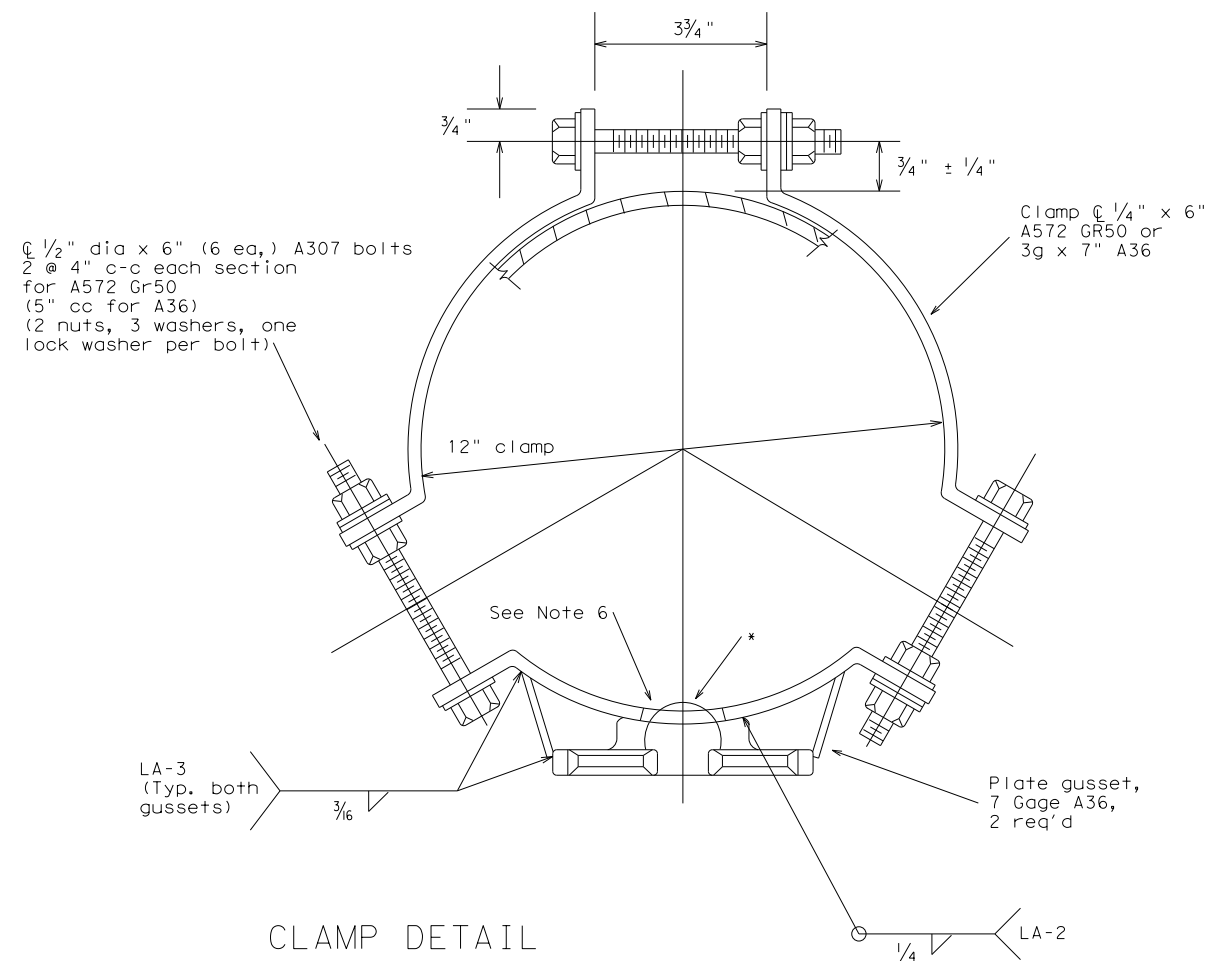
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5-96	0915	12	698.	etc.	VARIOUS
11-99	DIST	COUNTY	SHEET NO.		
1-12	SAT	BEXAR	60A		

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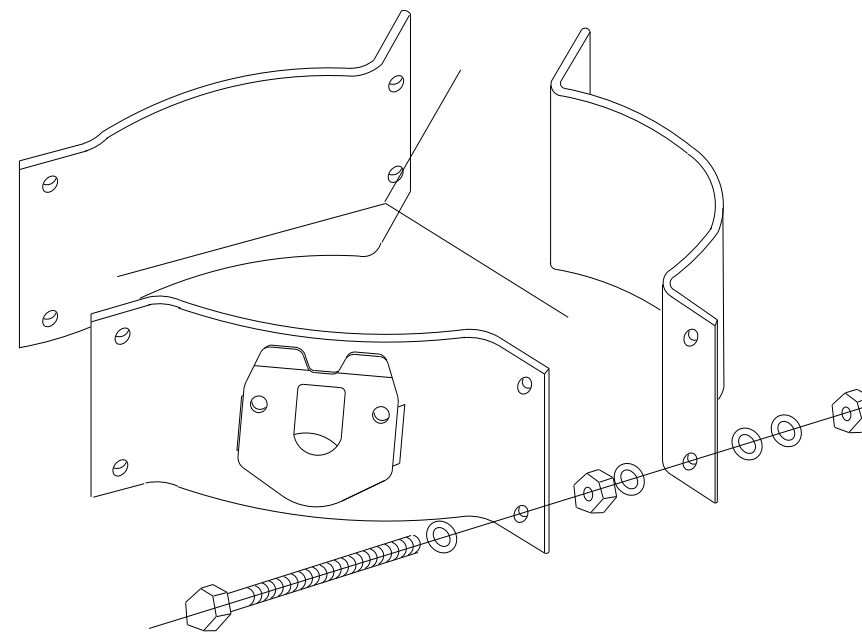
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POLE SIMPLEX DETAILS



CLAMP DETAIL



PROJECTION

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

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.

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CLAMP ON
 FITTING ASSEMBLY FOR
 LUMINAIRE MAST ARM

CFA-12

© TxDOT	DN: KAB	CK: RES	DW: FDN	CK: CAL
11-99 1-12	REVISIONS	CONT	SECT	JOB
		0915	12	698, etc
		DIST	COUNTY	SHEET NO.
		SAT	BEXAR	61

GENERAL NOTES FOR ALL ELECTRICAL WORK

- The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.
- 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 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.
- Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is 1/2 in. or less in diameter.
- 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.
- 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.
- 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

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


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

- 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.
- 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.
- 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

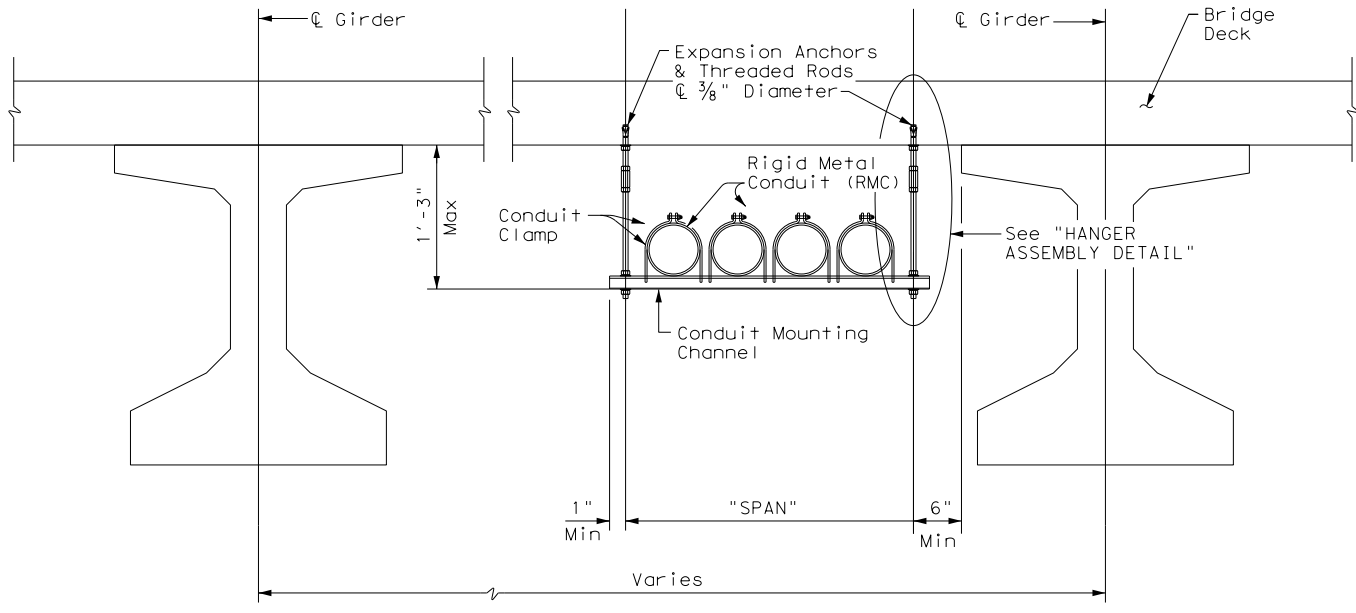
- Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures 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.
- 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.
- Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.
- 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.
- 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."
- Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.
- 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.
- Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.
- 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.
- 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.
- At all electrical services, install a 6 AWG solid copper grounding electrode conductor.
- 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).
- 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.
- 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.

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			Traffic Operations Division Standard		
<h2>ELECTRICAL DETAILS CONDUITS & NOTES</h2>					
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	SAT	BEXAR		62	

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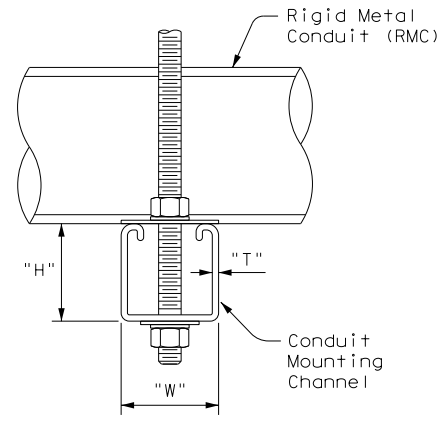
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CONDUIT HANGING DETAIL

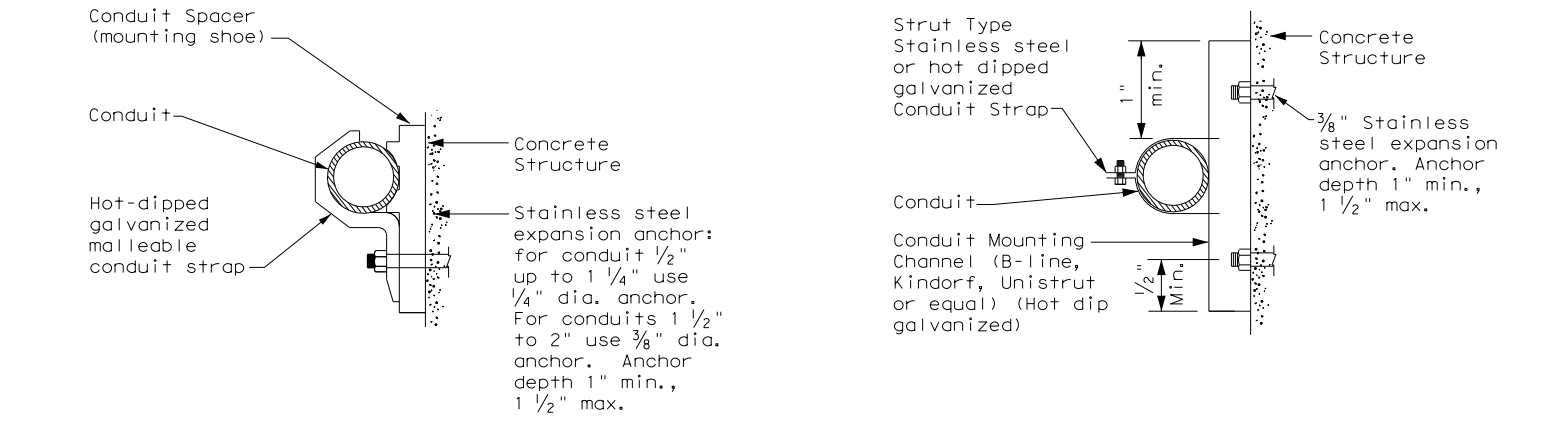
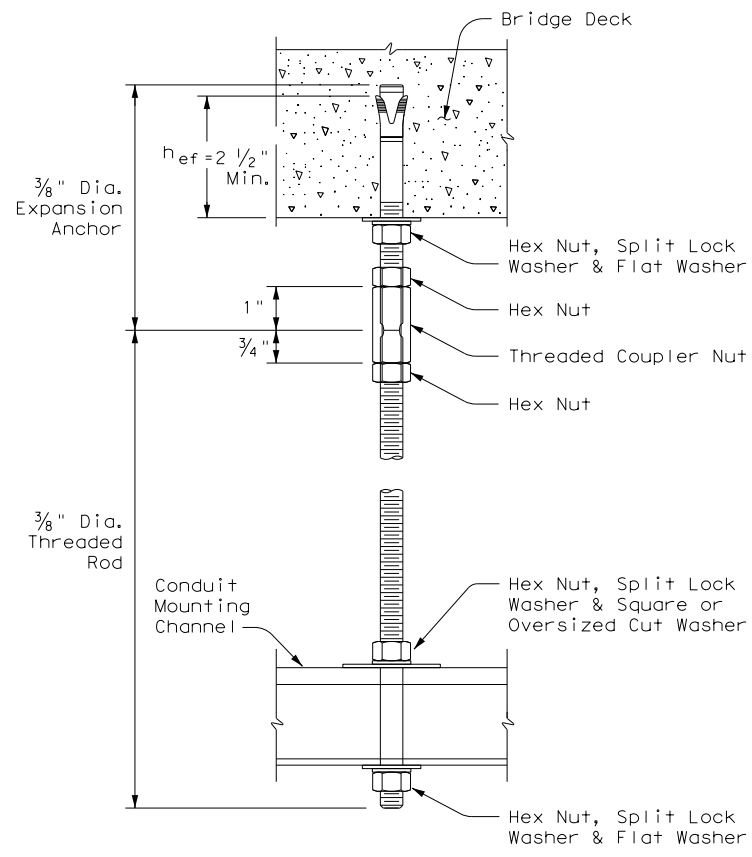
CONDUIT MOUNTING CHANNEL		
"SPAN"	"W" x "H"	"T"
less than 2'	1 5/8" x 1 3/8"	12 Ga.
2'-0" to 2'-6"	1 5/8" x 1 5/8"	12 Ga.
>2'-6" to 3'-0"	1 5/8" x 2 7/16"	12 Ga.

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



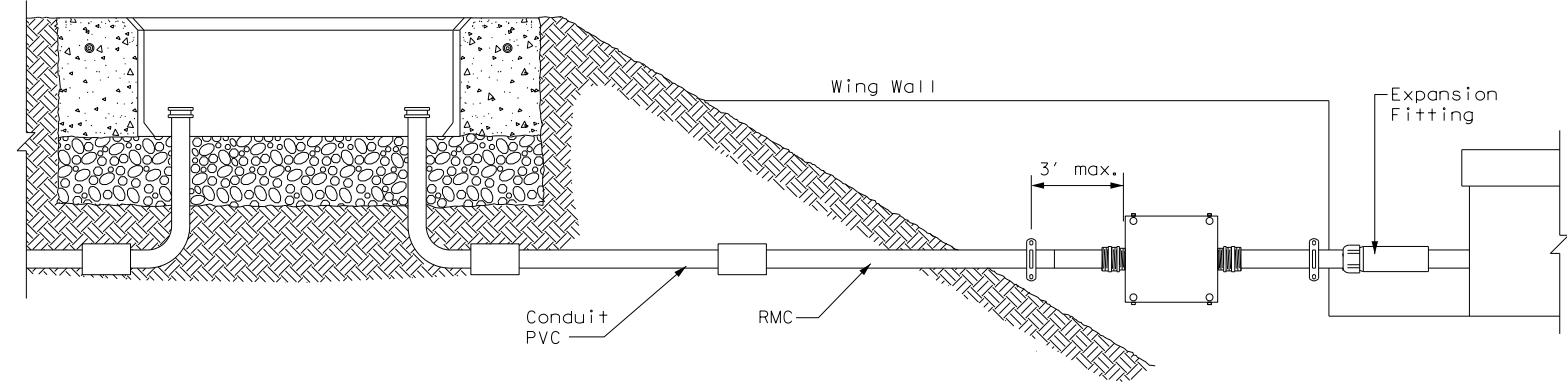
HANGER ASSEMBLY DETAIL

ELECTRIC CONDUIT TO BRIDGE DECK ATTACHMENT



CONDUIT MOUNTING OPTIONS

Attachment to concrete surfaces
 See ED(1)B.2



TYPICAL CONDUIT ENTRY TO BRIDGE STRUCTURE DETAIL

EXPANSION ANCHOR NOTES FOR BRIDGE DECK ATTACHMENT

1. Use torque controlled mechanical expansion anchors that are approved for use in cracked concrete by the International Code Council, Evaluation Service (ICC-ES). The chosen anchor product shall have a designated ICC-ES Evaluation Report number, and its approval status shall be maintained on the ICC-ES website under Division 031600 for Concrete Anchors.
2. Unless otherwise approved by the Engineer: do not use adhesive anchors; do not use expansion anchors that are not included in the ICC-ES approval list; and do not use expansion anchors that are only approved for use in uncracked concrete.
3. Use anchors manufactured with stainless steel expansion wedges. Anchors manufactured with carbon steel expansion wedges are not allowed. Anchor bodies can be either zinc-plated carbon steel or stainless steel. For application in marine environment, both the anchor body and expansion wedge shall be stainless steel.
4. Install anchors as shown on the plans and in accordance with the anchor manufacturer's published installation instructions. Arrange a field demonstration test to evaluate the procedures and tools. The test shall be witnessed and approved by the Engineer prior to furnishing anchors on the structure.
5. Prior to hole drilling, use rebar locator to ensure clearing of existing deck strands or reinforcement. Install anchors to ensure a minimum effective embedment depth, (h_{ef}), as shown. Increase (h_{ef}) as needed to ensure sufficient thread length for proper torqueing and tightening of anchors.
6. Use anchors of minimum 1600 Lbs tensile capacity (minimum of steel, concrete breakout, and concrete pullout strengths as determined by ACI 318 Appendix D) at the required minimum embedment depth (h_{ef}). No lateral loads shall be introduced after conduit installation.

		Traffic Operations Division Standard	
<h2>ELECTRICAL DETAILS CONDUIT SUPPORTS</h2>			
<h3>ED(2) - 14</h3>			
FILE:	ed2-14.dgn	DN:	TxDOT
© TxDOT	October 2014	CK:	TxDOT
REVISIONS		DW:	TxDOT
CONT	SECT	JOB	HIGHWAY
0915	12	698, etc	VARIOUS
DIST	COUNTY	SHEET NO.	
SAT	BEXAR	63	

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.

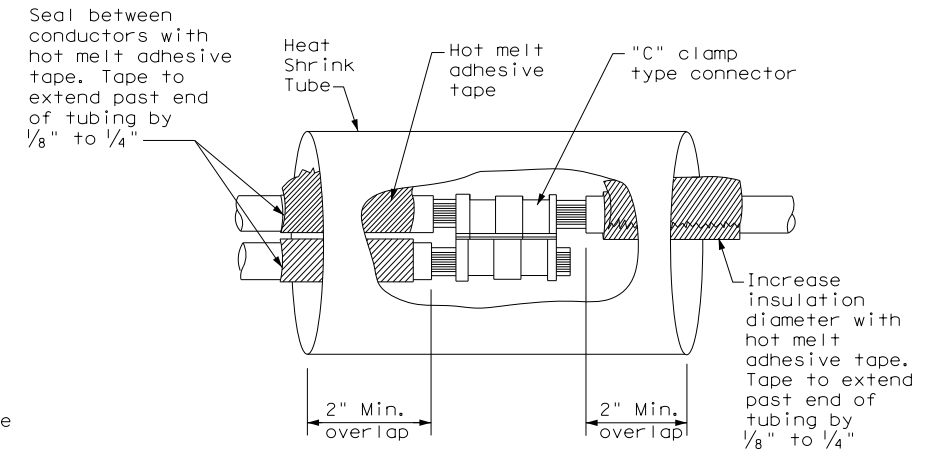
GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

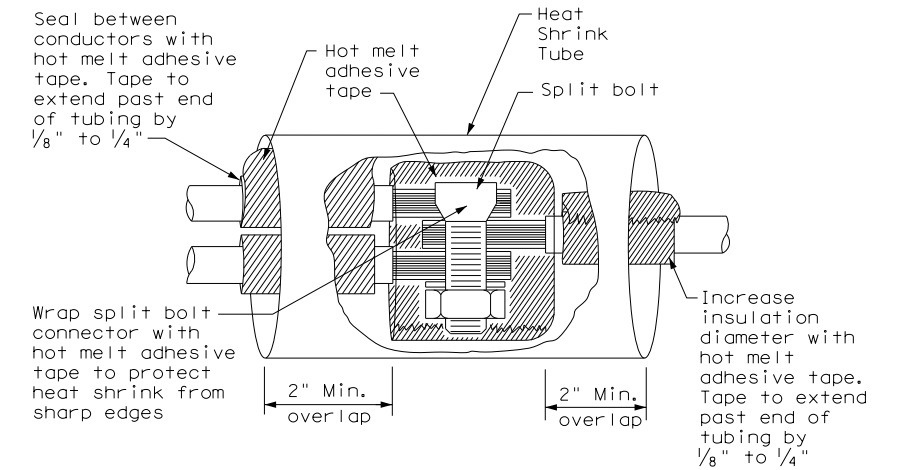
1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in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

B. CONSTRUCTION METHODS

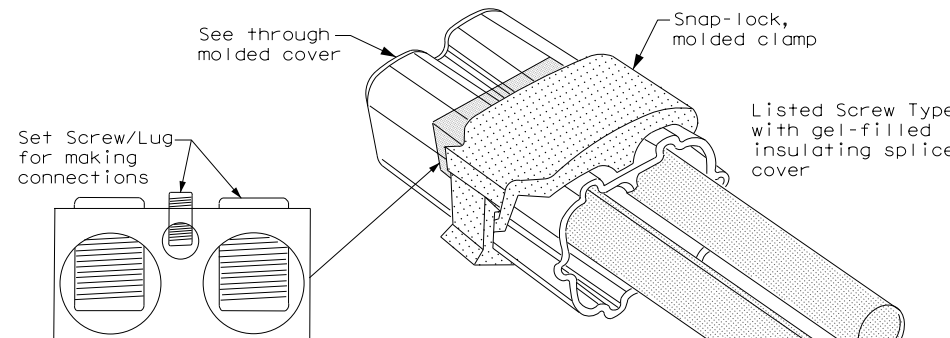
1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, 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

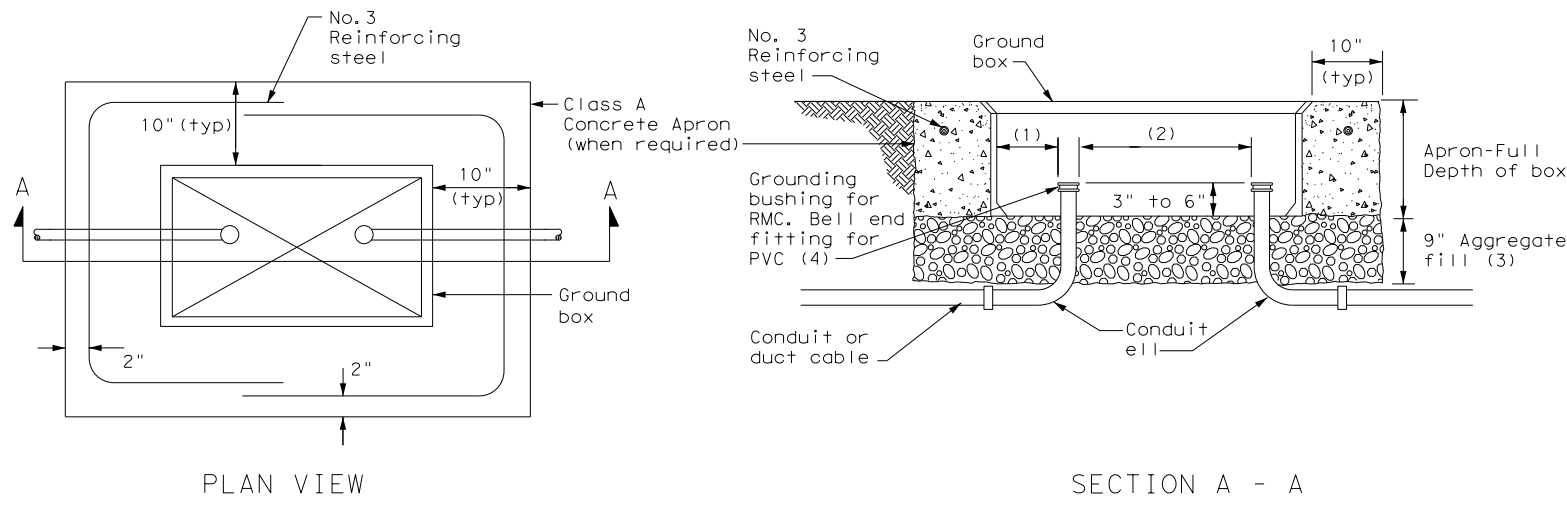


SPLICE OPTION 3
Listed Screw Type

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<h2>ELECTRICAL DETAILS CONDUCTORS</h2>			
<h3>ED(3) - 14</h3>			
FILE:	ed3-14.dgn	DN:	TxDOT
© TxDOT	October 2014	CK:	TxDOT
REVISIONS		DW:	TxDOT
		CK:	TxDOT
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		SECT:	JOB
			698, etc
			VARIOUS
		DIST:	COUNTY
		SAT:	BEXAR
			SHEET NO.
			64

DATE: 10/25/2022 2:15:47 PM
 FILE: _Projects\SAN-NC\008129_COSA TO-03 - Traffic Signal Imp Designs\07.00\CADDs\COSAs\01 - Electrical\01 - Ground Boxes\ED(4)-14.dgn
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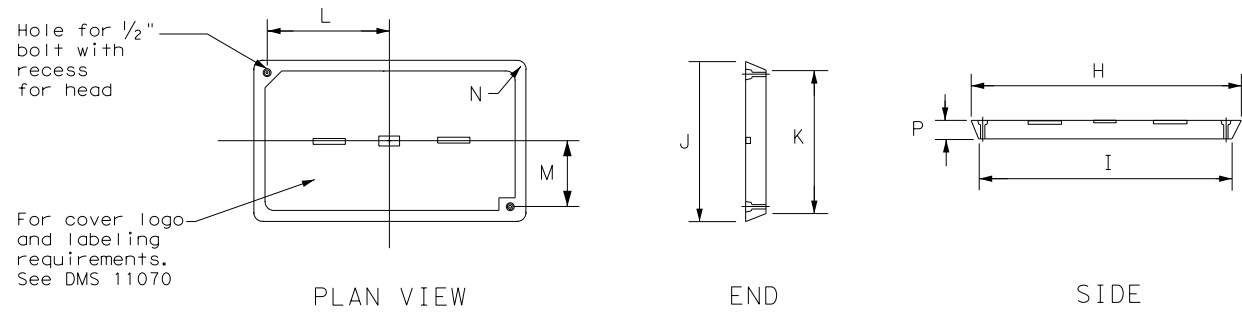


APRON FOR GROUND BOX

- (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 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



GROUND BOX COVER

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.

				Traffic Operations Division Standard	
ELECTRICAL DETAILS GROUND BOXES					
ED(4) - 14					
FILE:	ed4-14.dgn	DN:	TxDOT	CK:	TxDOT
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REVISIONS		JOB		HIGHWAY	
		698, etc		VARIOUS	
DIST:	SAT	COUNTY:	BEXAR	SHEET NO.:	65

ELECTRICAL SERVICES NOTES

- 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.
- 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.
- Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.
- 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.
- 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.
- 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.
- When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.
- 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.
- 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.
- Provide rigid metal conduit (RMC) for all conduits on service, except for the 1/2 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.
- 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.
- Ensure all mounting hardware and installation details of services conform to utility company specifications.
- 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 1/2 in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.
- 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 1/2 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.
- 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

- Provide threaded hub for all conduit entries into the top of enclosure.
- 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 photoceII or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.
- 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.
- 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

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

- 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

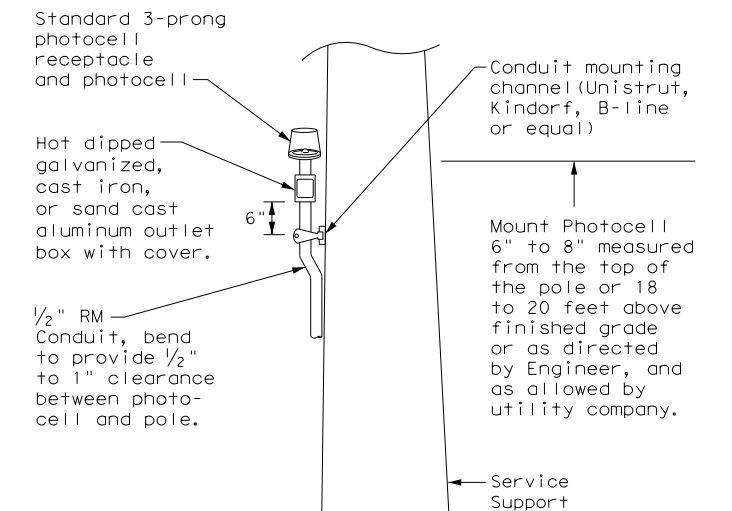
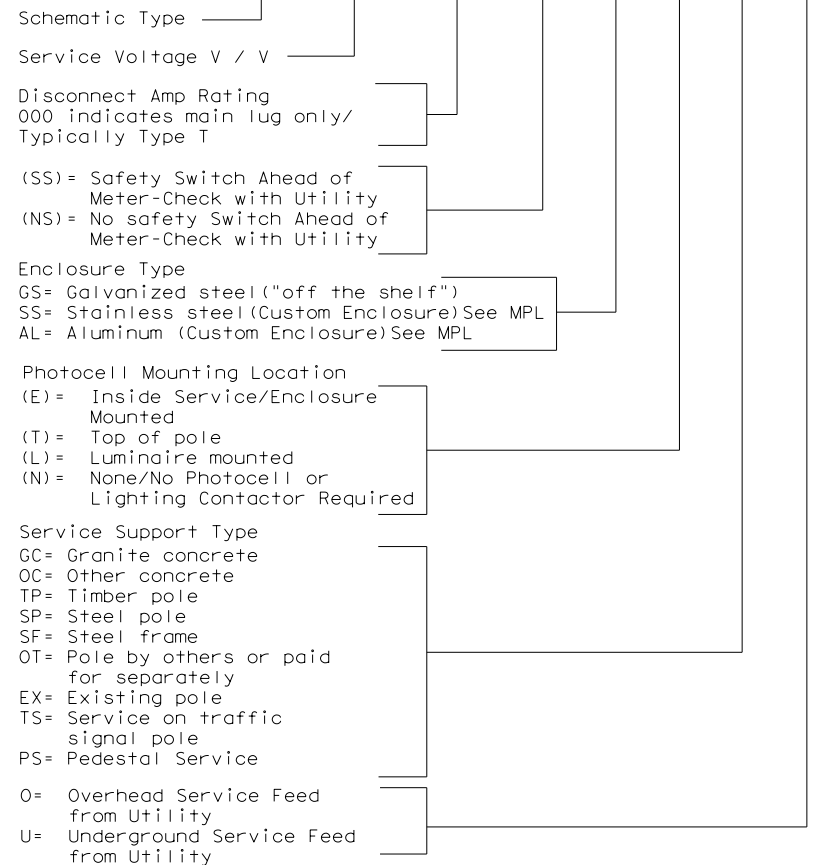
Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit *xSize	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
SB 183	289	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 1/4"	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 1/4"	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)



TOP MOUNTED PHOTOCELL

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

Traffic Operations Division Standard

TEXAS DEPARTMENT OF TRANSPORTATION

ELECTRICAL DETAILS SERVICE NOTES & DATA

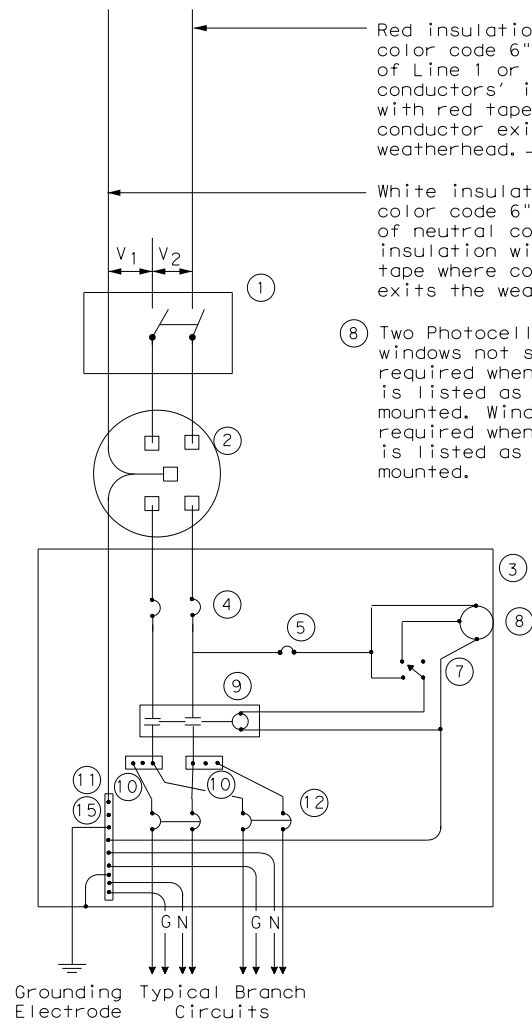
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©TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0915	12	698,etc	VARIOUS				
		DIST	COUNTY	SHEET NO.					
		SAT	BEXAR	66					

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DATE: 10/25/2022 2:16:00 PM
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SCHEMATIC TYPE A
THREE WIRE

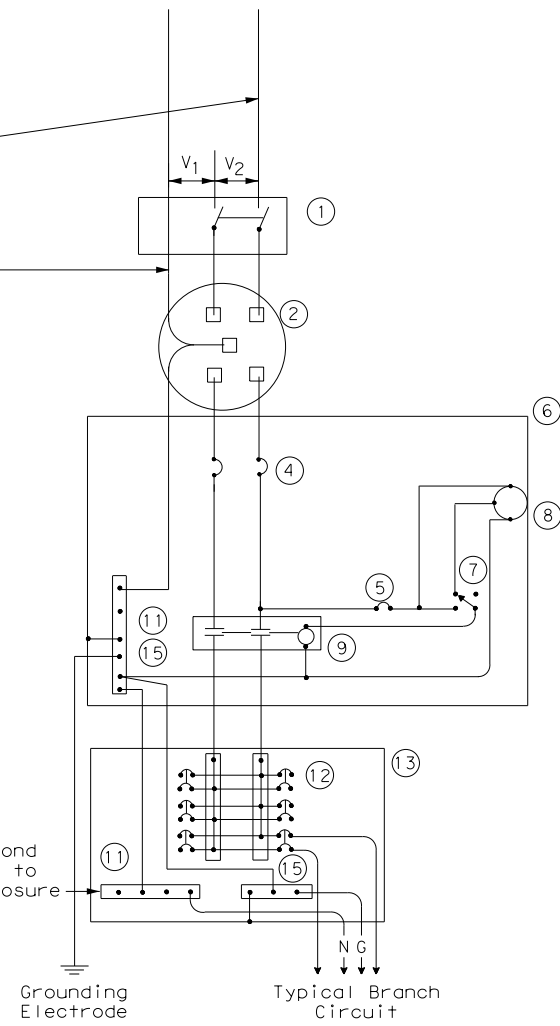
Red insulation or color code 6" length of Line 1 or Line 2 conductors' insulation with red tape where conductor exits the weatherhead.

White insulation or color code 6" length of neutral conductors' insulation with white tape where conductor exits the weatherhead.

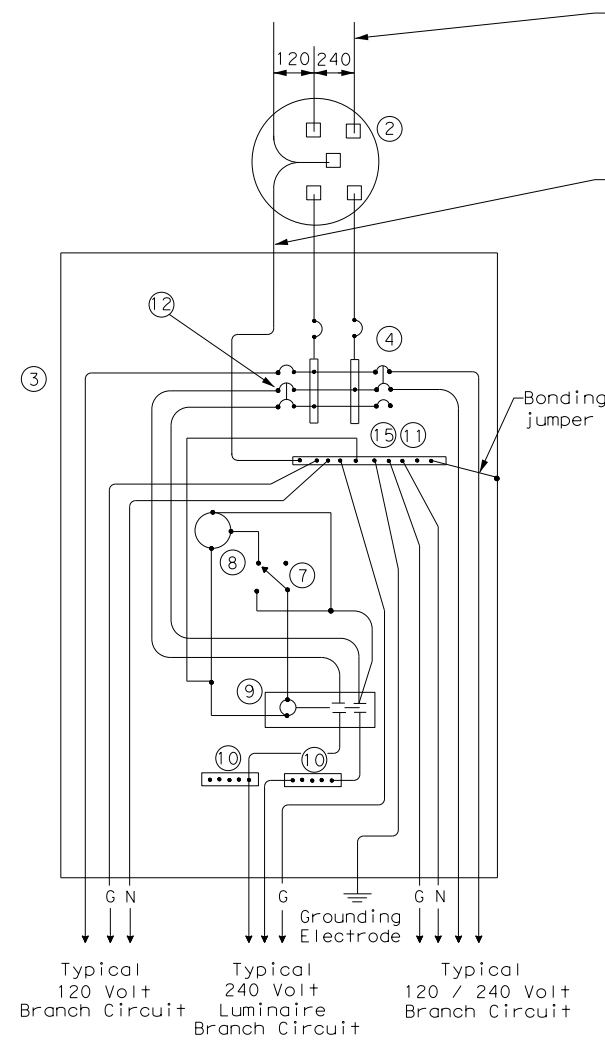
⑧ Two Photocell viewing windows not shown but required when photocell is listed as enclosure mounted. Windows not required when photocell is listed as pole top mounted.

Do not bond this bus to the enclosure

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



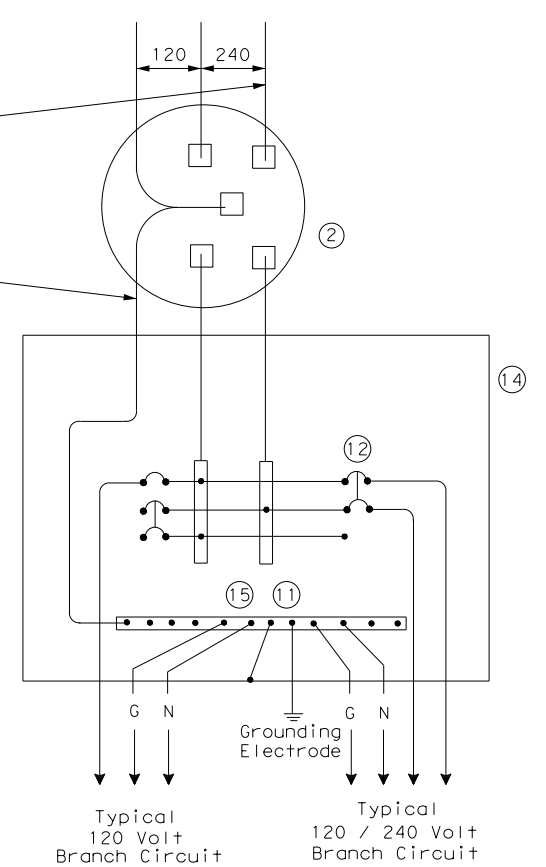
SCHEMATIC TYPE C
THREE WIRE



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

Red insulation or color code 6" length of Line 1 or Line 2 conductors' insulation with red tape where conductor exits the weatherhead.

White insulation or color code 6" length of neutral conductors' insulation with white tape where conductor exits the weatherhead.



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.

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 <i>Traffic Operations Division Standard</i>	
ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES ED(6) - 14					
FILE:	ed6-14.dgn	DN:	TxDOT	CK:	TxDOT
© TxDOT	October 2014	CONT:	0915	SECT:	12
REVISIONS		JOB		HIGHWAY	
		698,etc		VARIOUS	
		DIST:	COUNTY		SHEET NO.
		SAT	BEXAR		67

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

1. Provide steel pole and steel frame supports as per TxDOT Departmental Material Specification (DMS)11080 "Electrical Services." Mount all equipment and conduit on 12 gauge galvanized steel or stainless steel channel strut, 1 1/2 in. or 1 3/8 in. wide by 1 in. up to 3 3/4 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 3/4 in. x 18 in. x 4 in. (dia. x length x hook length) anchor bolts for underground service supports. Provide and install galvanized 3/4 in. x 56 in. x 4 in. anchor bolts for overhead service supports. Ensure anchor bolts have 3 in of thread, with 3 1/4 in. to 3 1/2 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 1/2 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 1/4" - 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.

White insulation or color code 6" of neutral conductor's insulation with white tape where conductor exits weatherhead.

Red insulation or color code 6" length of Line 1 or Line 2 conductor's insulation with red tape where conductor exits the weatherhead. Conductor slack length, 12" min., 18" max.

24 Dia. x 60" depth foundation 4-#5 reinforcing bars and #2 spiral (typ.) at 6" pitch

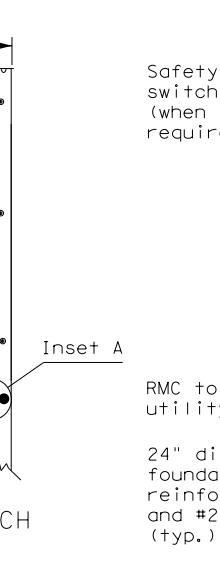
Class "C" concrete

18" Min.

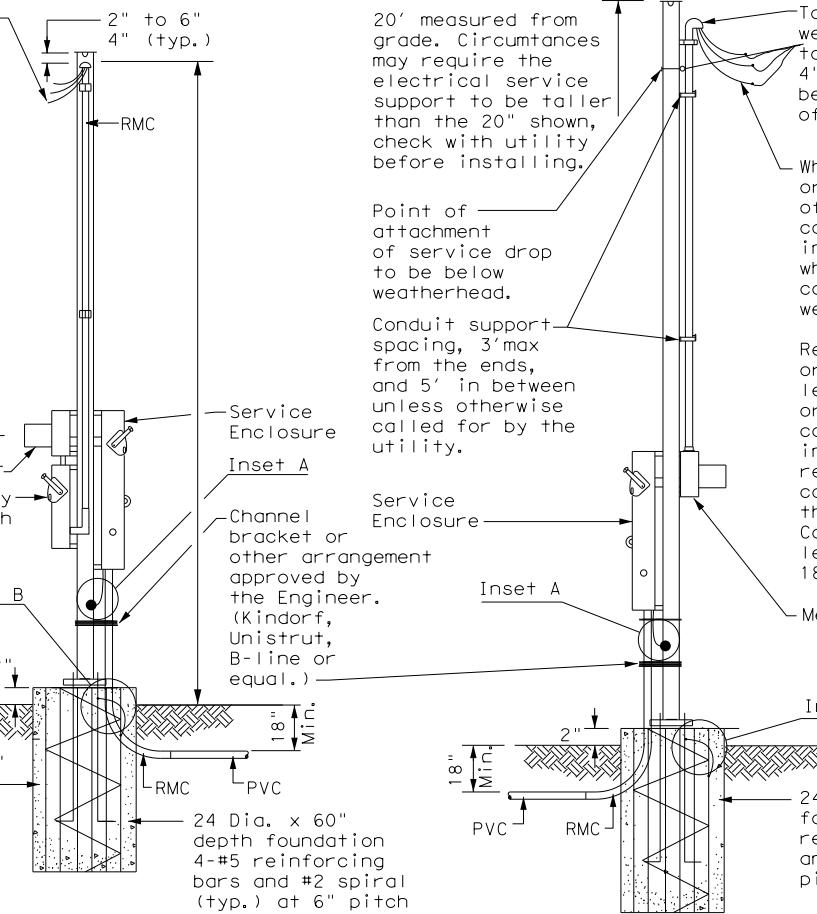
2" Min.

60" TYP.

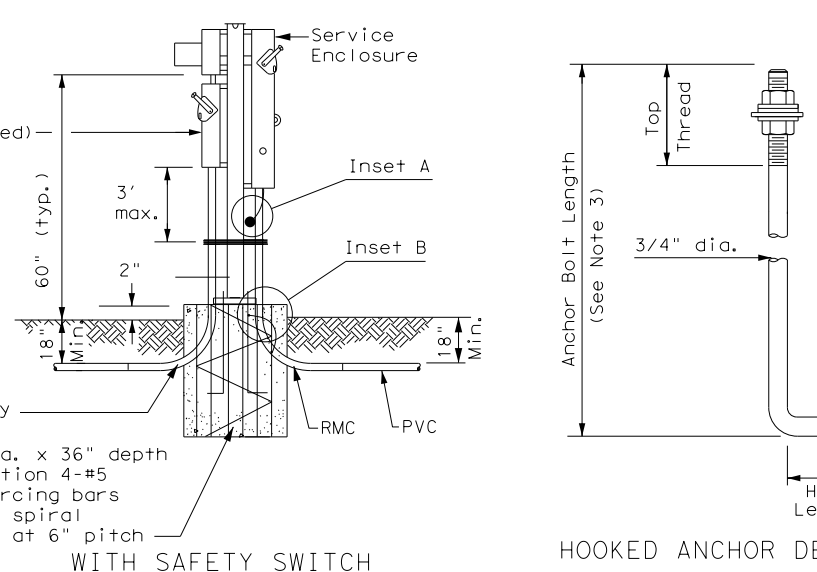
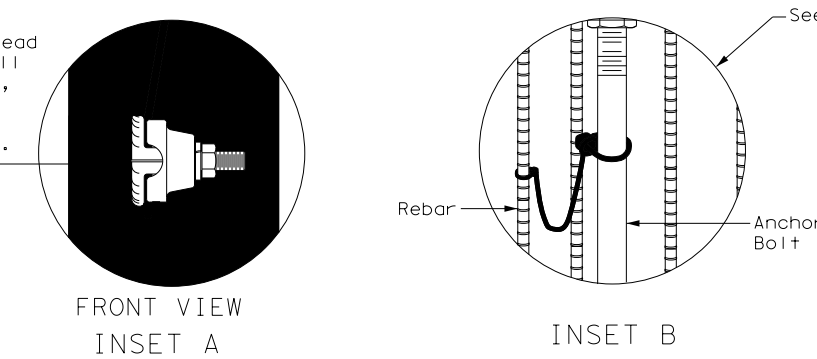
Drill, top, and thread 1/2" X 13 UNC. Install tank ground fitting, connect electrical service grounding electrode conductor. See Note 7.



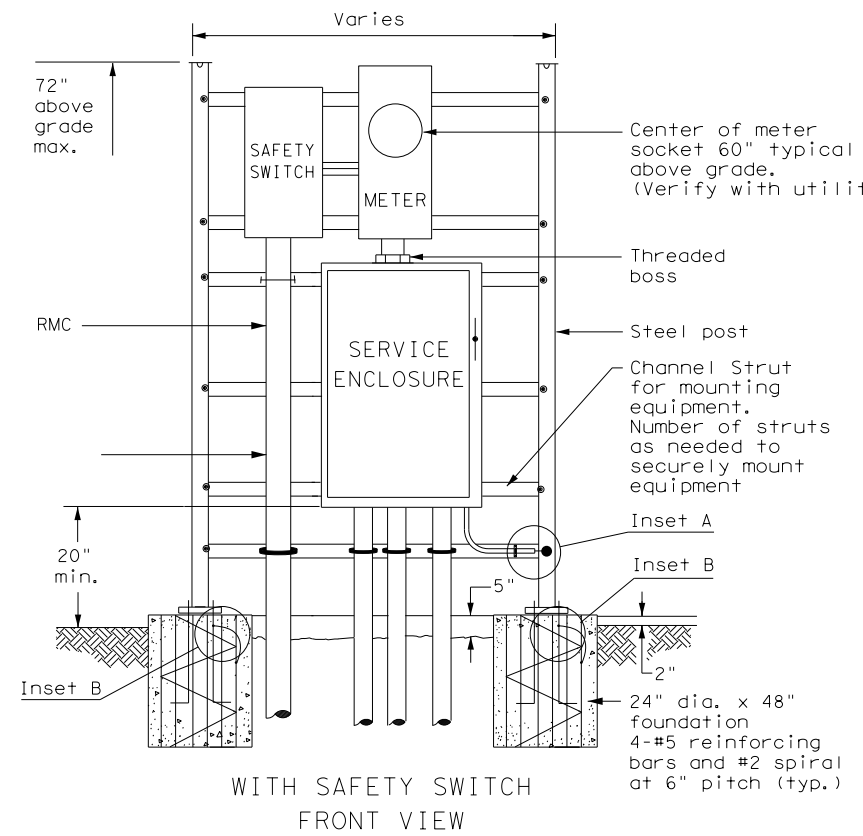
HOOKED ANCHOR DETAIL



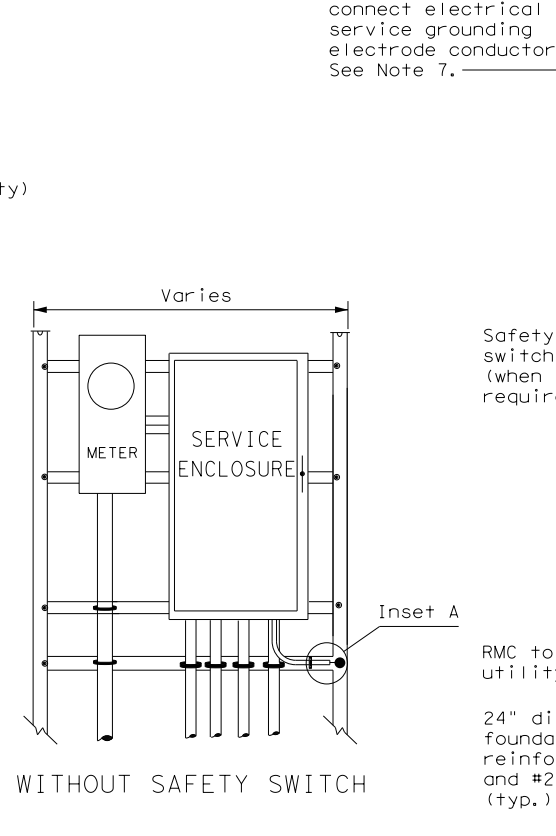
WITH SAFETY SWITCH
WITHOUT SAFETY SWITCH
SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE



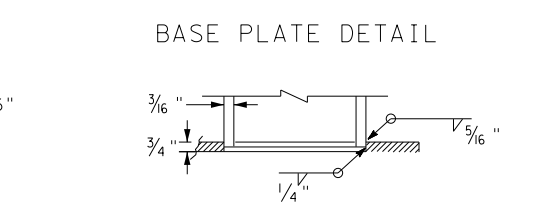
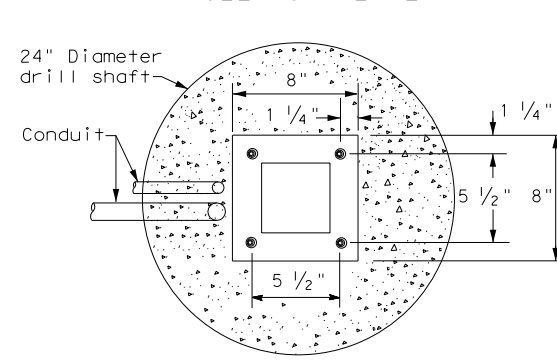
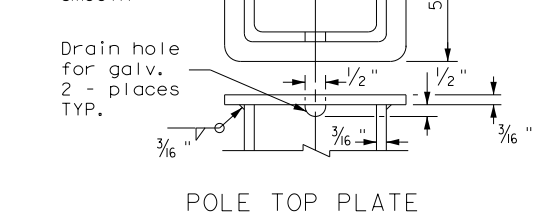
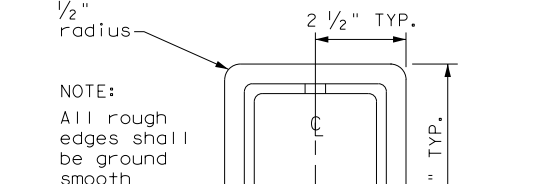
WITH SAFETY SWITCH
WITHOUT SAFETY SWITCH
SERVICE SUPPORT TYPE SF (U) - UNDERGROUND SERVICE



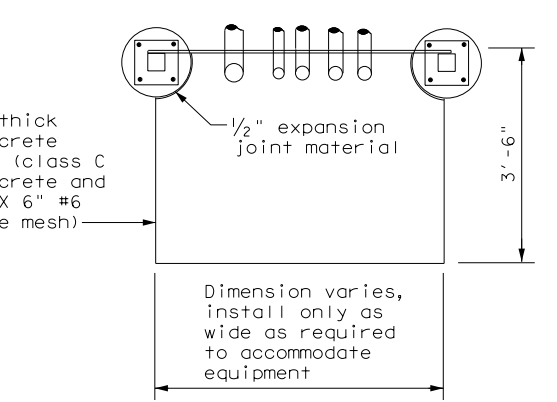
WITH SAFETY SWITCH
FRONT VIEW
SERVICE SUPPORT TYPE SF (U) - UNDERGROUND SERVICE



WITHOUT SAFETY SWITCH
FRONT VIEW
SERVICE SUPPORT TYPE SF (O) - OVERHEAD SERVICE



POLE TOP PLATE
BASE PLATE DETAIL
BOTTOM OF POLE



TOP VIEW
SERVICE SUPPORT TYPE SF (O) & SF (U)



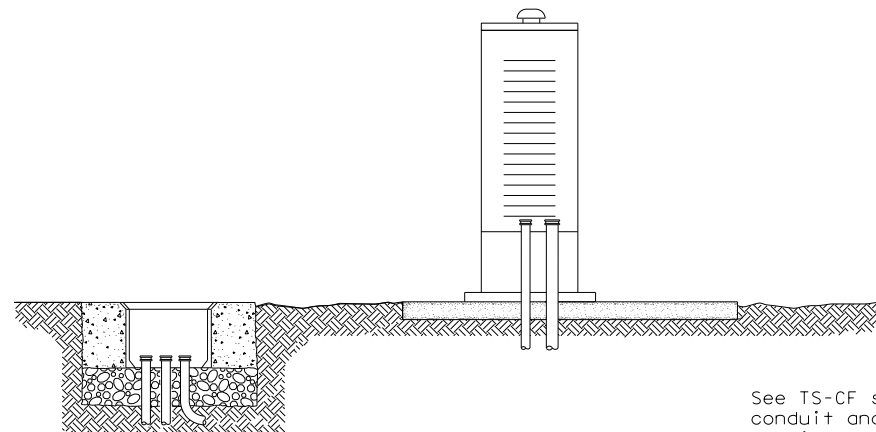
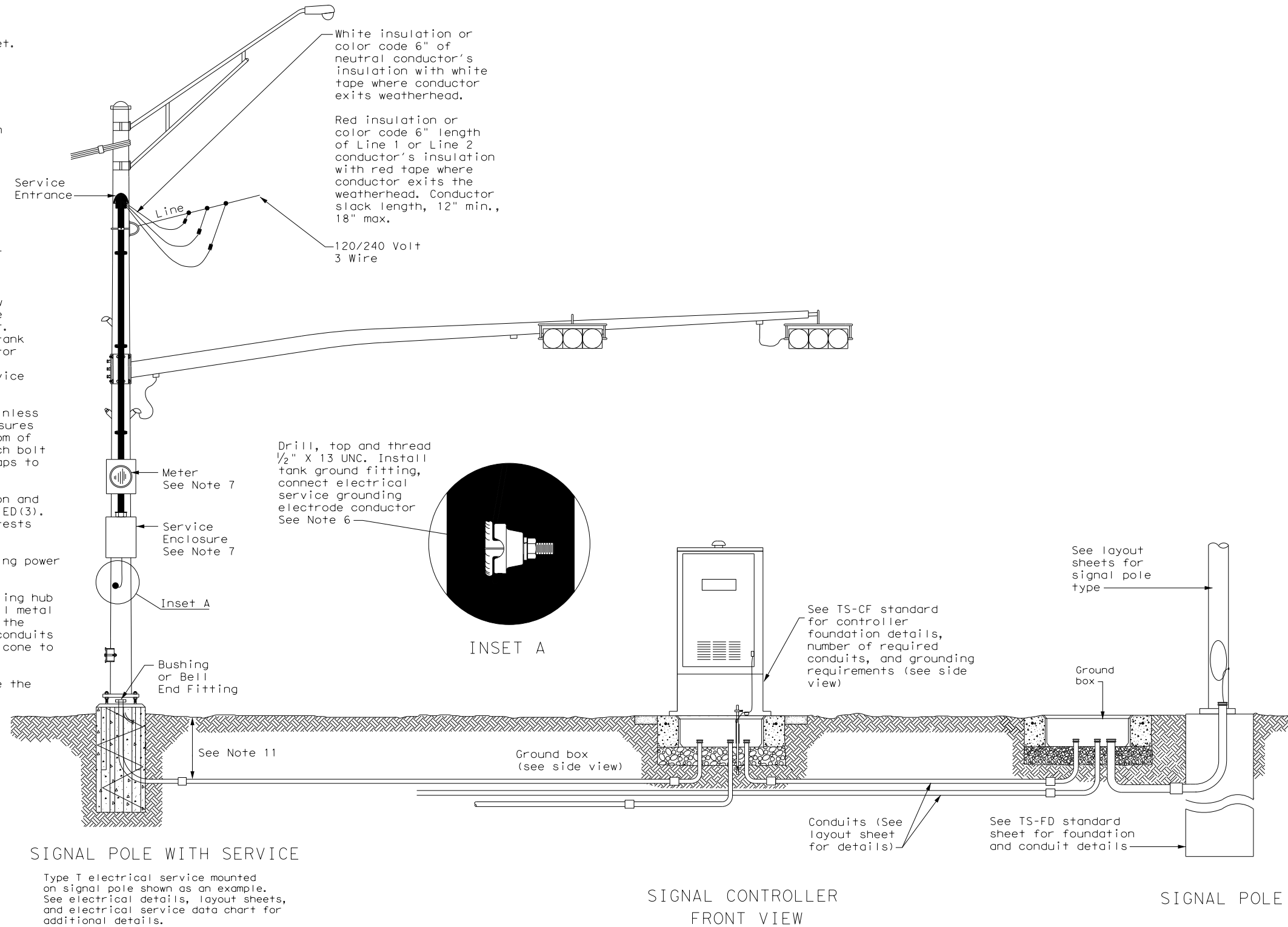
ELECTRICAL DETAILS		SERVICE SUPPORT		TYPES SF & SP	
ED(7)-14					
FILE:	ed7-14.dgn	DN:	TxDOT	CK:	TxDOT
©TxDOT	October 2014	CON:	0915	SECT:	12
REVISIONS		JOB	698,etc	HIGHWAY	VARIOUS
		DIST	BEXAR	COUNTY	
		SAT		SHEET NO.	68

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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 1/2 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 3/4 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".



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

ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS ED(8) - 14

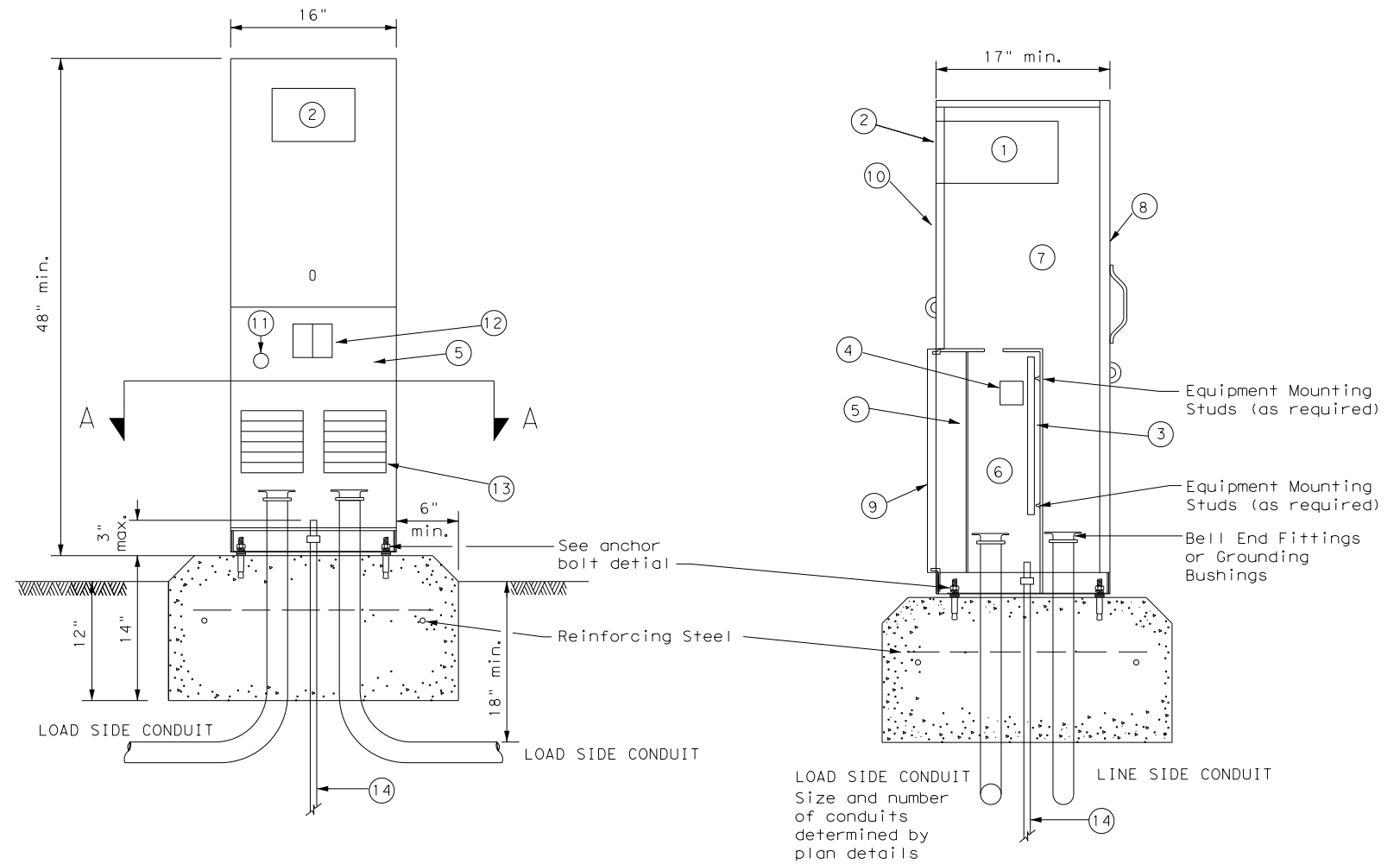
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©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0915	12	698, etc	VARIOUS
DIST	COUNTY			SHEET NO.
SAT	BEXAR			69

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PEDESTAL SERVICE NOTES

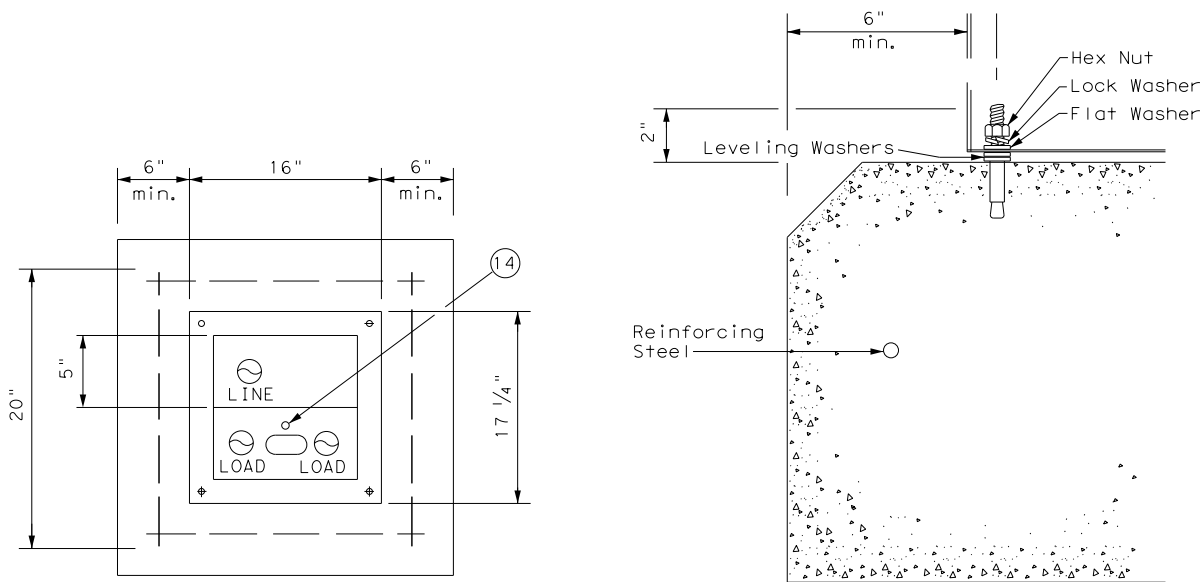
1. Manufacture pedestal electrical services in accordance with Departmental Material Specifications (DMS)11080 "Electrical Services", 11085 "Electrical Services-Pedestal (PS)" and Item 628 "Electrical Services." Provide pedestal electrical services as listed on the Material Producers List (MPL) on the Department's web site under "Roadway Illumination and Electrical Supplies," Item 628. Ensure all mounting hardware and installation details of services meet utility company specifications. Contact the local utility company for approval of pedestal details prior to installing the electrical pedestal service. Submit any changes required by the utility company prior to manufacturing the pedestal enclosure.
2. When a meter socket is required, provide a socket with a minimum 100 amp rating that complies with local utility requirements.
3. Provide Class A or C concrete for pedestal service foundations in accordance with Item 420, "Concrete Substructures," except that concrete will not be paid for directly but is considered subsidiary to Item 628.
4. Provide #4 reinforcing steel for foundations in accordance with Item 440, "Reinforcement for Concrete."
5. Install 1/2 in. X 2 1/6 in. minimum length concrete single expansion type anchors for mounting pedestal enclosure to foundation. Anchor location to match mounting holes in each corner of enclosure. Secure each of the four corners of the pedestal enclosure to the anchors in the foundation with a 1/2 in. galvanized or stainless steel machine thread bolt, a properly sized locknut and a flat washer.
6. Finish top of concrete foundation in a neat and workmanlike manner. If leveling washers are used, ensure no more than 1/8 in. gap at any corner. Do not exceed a maximum dip or rise in the foundation of 1/8 in. per foot. When properly installed, ensure the top of the service enclosure is level front to back and side to side within 1/4 in. Repair rocking or movement of the service enclosure at no additional cost to the department.
7. Do not use liquidtight flexible metal conduit (LFMC) on pedestal type services.
8. Ensure all elbows in the foundation are sized as per utility provider's conduit requirements for underground conduit and feeders. PVC extensions may be installed provided the ends of the rigid metal conduits are more than 2 in. below the top of the concrete foundation. Where extension conduits are metal, grounding bushings must be installed with a bonding jumper properly terminated.



FRONT VIEW

SIDE VIEW

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



SECTION A-A

ANCHOR BOLT DETAIL

LEGEND

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

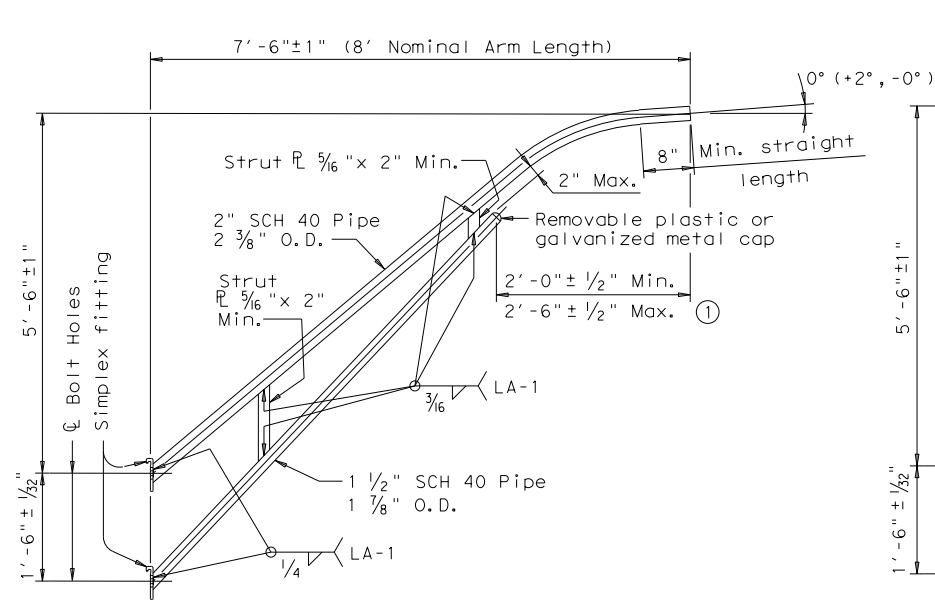


**ELECTRICAL DETAILS
ELECTRICAL SERVICE SUPPORT
PEDESTAL SERVICE TYPE PS**

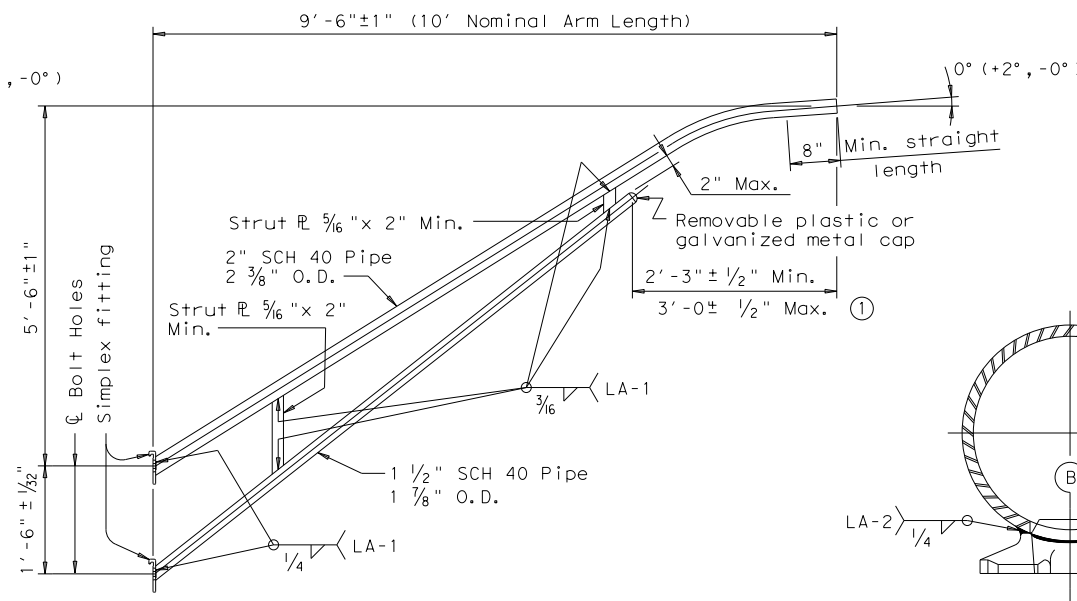
ED(9) - 14

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© TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY				
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DIST	COUNTY	SHEET NO.							
SAT	BEXAR	70							

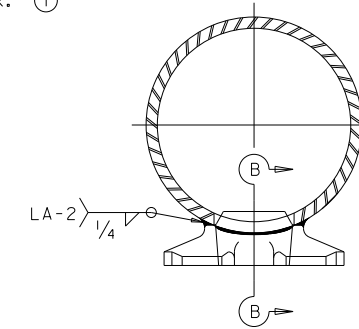
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8-FOOT LUMINAIRE ARM



10-FOOT LUMINAIRE ARM



DIRECT ATTACHMENT DETAIL

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.

GENERAL NOTES:

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

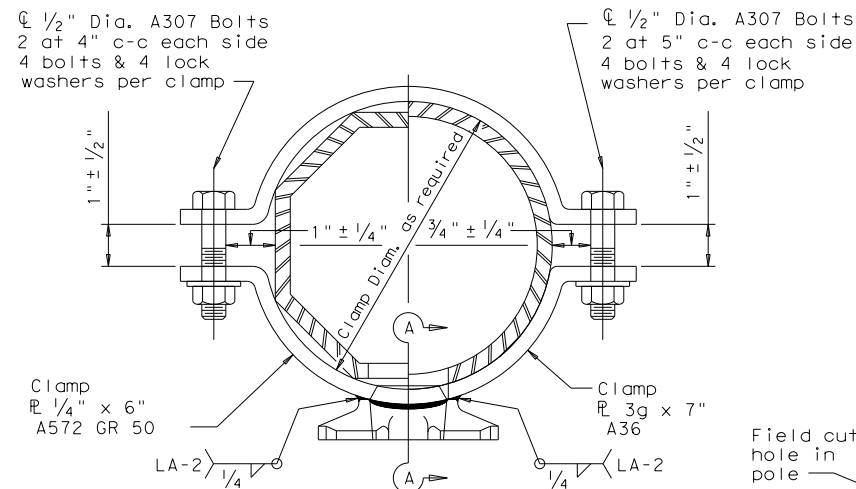
Materials and fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absence of specified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

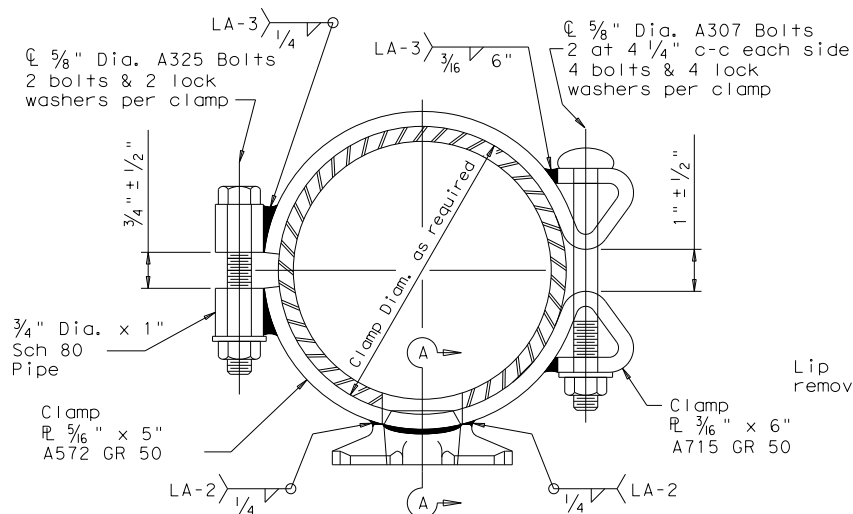
Each pole simplex fitting shall be supplied with 2 ASTM A325 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans. When clamp attachment is specified, the Fabricator shall ship the clamp assembly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



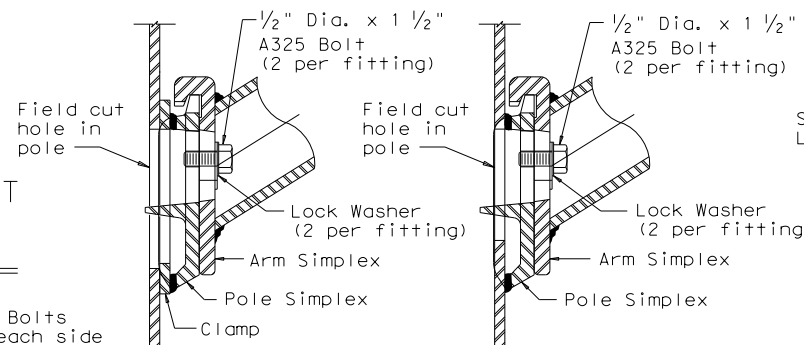
CLAMP ATTACHMENT DETAIL NO. 1 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 2 (HALF SECTION)



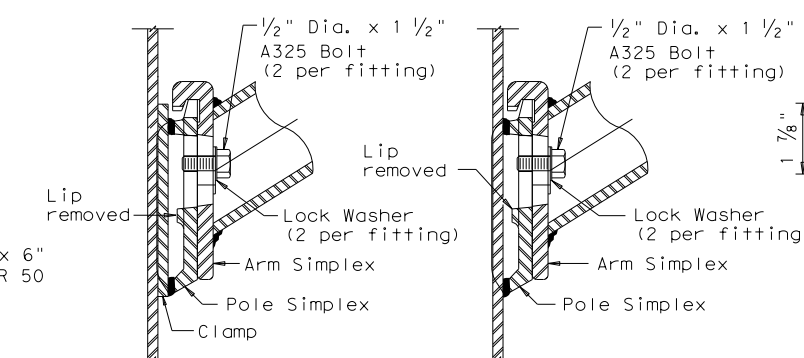
CLAMP ATTACHMENT DETAIL NO. 3 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 4 (HALF SECTION)



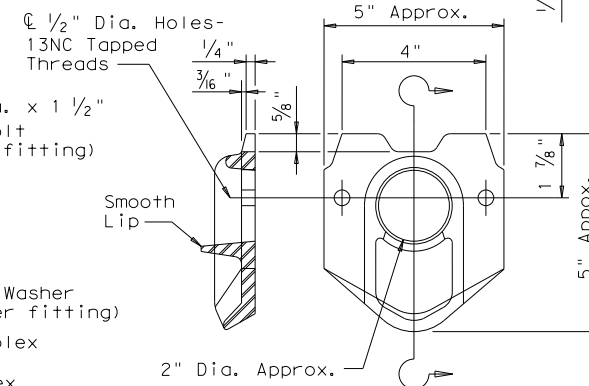
UPPER SIMPLEX FITTING

UPPER SIMPLEX FITTING

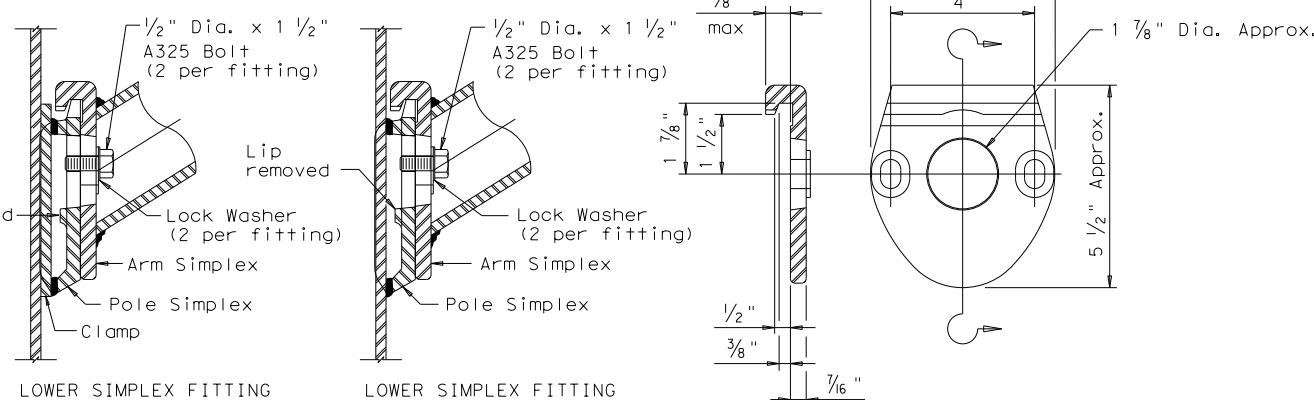


LOWER SIMPLEX FITTING

LOWER SIMPLEX FITTING

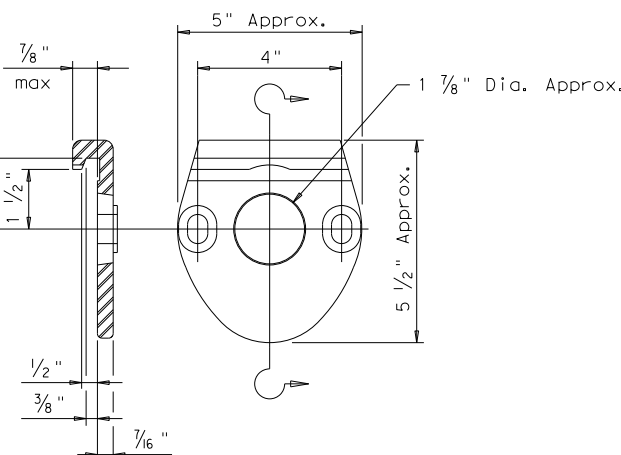


POLE SIMPLEX DETAIL



SECTION A-A

SECTION B-B



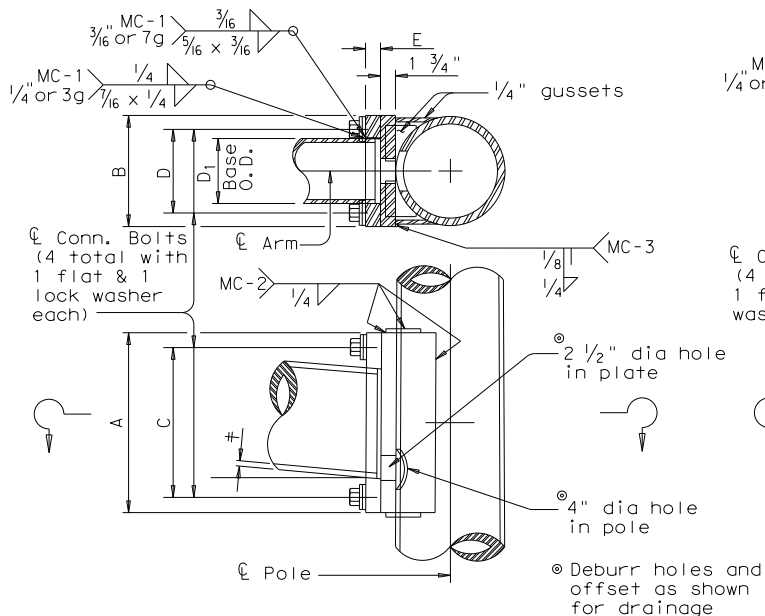
ARM SIMPLEX DETAIL

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: JSY	DW: LTT	CK: TEB
5-96	REVISIONS	CONT	SECT	JOB	HIGHWAY
1-99		0915	12	698, etc	VARIOUS
1-12		DIST	COUNTY	SHEET NO.	
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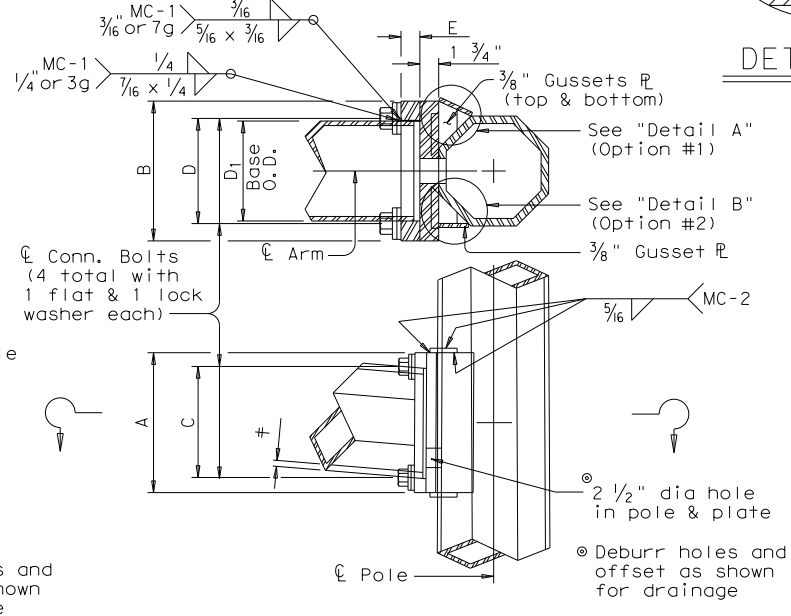
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ARM SIZE		A	B	C	D	E	CONN BOLT DIA
D ₁	Φ	in.	in.	in.	in.	in.	in.
6.5	.179	12	9	9	6	1 3/4	1
7.5	.179	13	9	10	6	1 3/4	1
8.0	.179	14	10	11	7	2	1 1/4
9.0	.179	16	11	13	8	2	1 1/4
9.5	.179	17	12	14	9	2	1 1/4
9.5	.239	18	12	15	9	2	1 1/4
10.0	.239	18	12	15	9	2	1 1/4
10.5	.239	18	13	15	10	3	1 1/2
11.0	.239	18	13	15	10	3	1 1/2

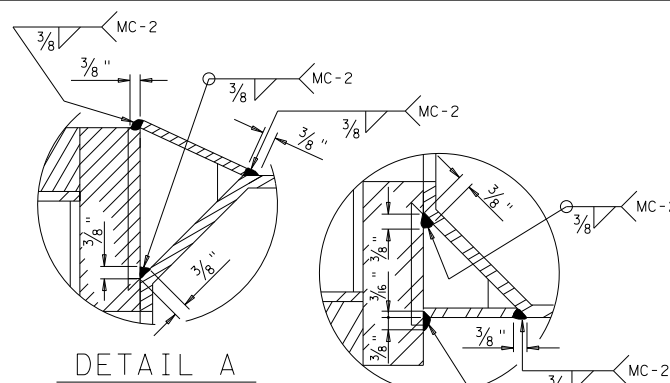


FIXED MOUNT DETAIL 1

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

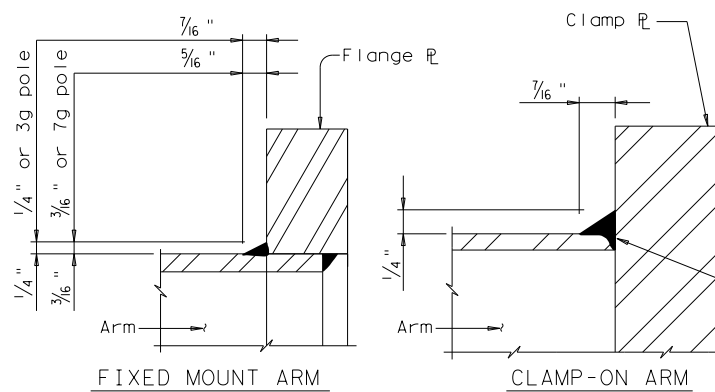


FIXED MOUNT DETAIL 2



DETAIL A

DETAIL B



FIXED MOUNT ARM

CLAMP-ON ARM

ARM BASE WELD DETAILS

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.

GENERAL NOTES:

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

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

Where duplicate parts occur on a detail, 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.

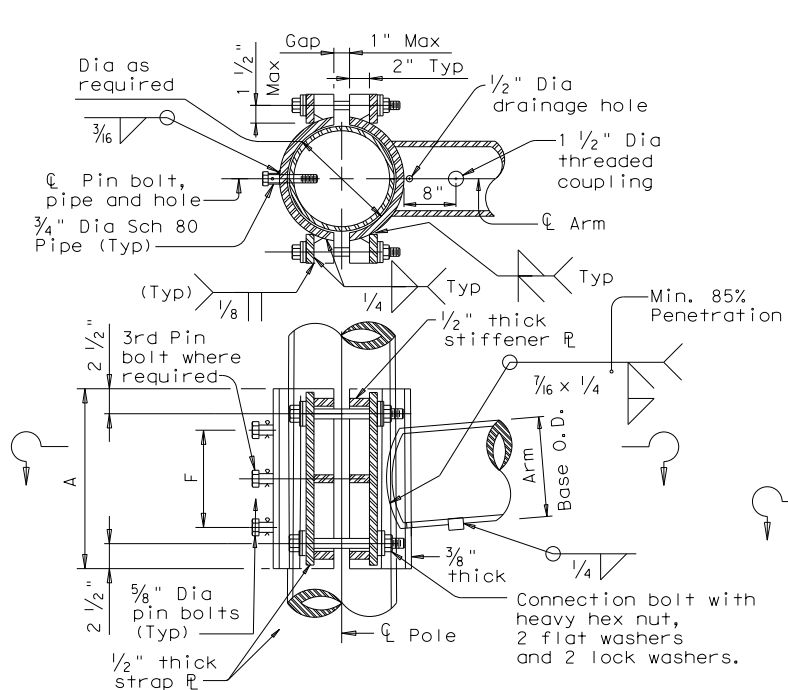
NOTE:

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

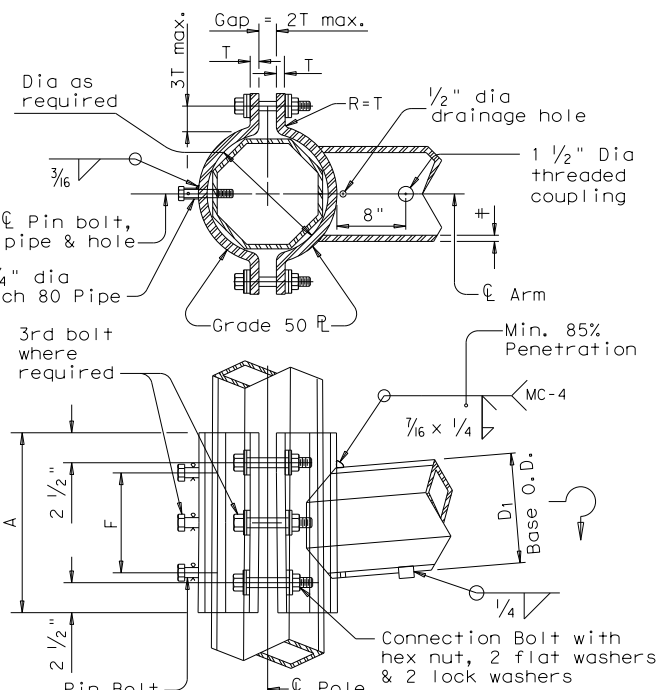
ARM SIZE		A	F	CONN. BOLTS	PIN BOLTS
D ₁	Φ	in.	in.	No. Dia	No. Dia
6.5	.179	12	6	4 1	2 5/8
7.5	.179	14	8	4 1	2 5/8
8.0	.179	14	8	4 1	2 5/8
9.0	.179	16	10	4 1	2 5/8
9.5	.179	18	12	4 1 1/4	3 5/8
9.5	.239	18	12	4 1 1/4	3 5/8
10.0	.239	18	12	4 1 1/4	3 5/8

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

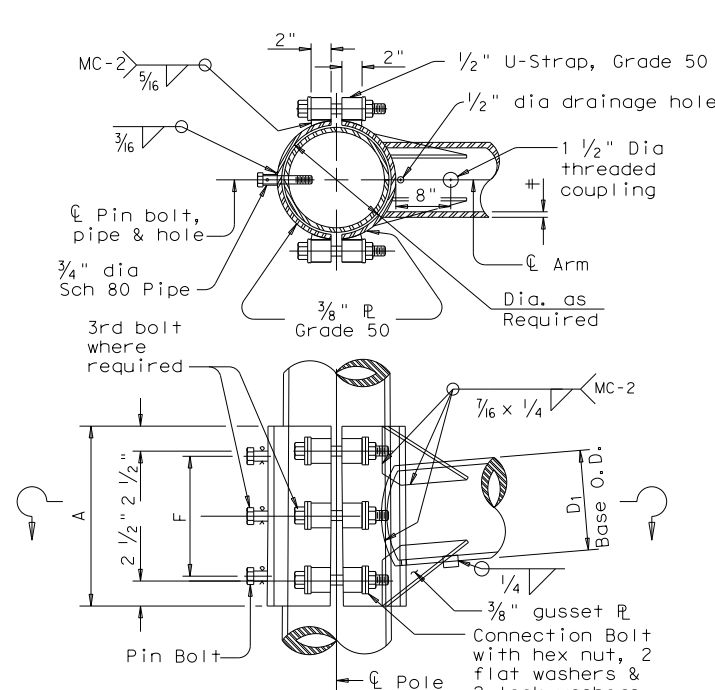
ARM SIZE		A	F	CONN. BOLTS	PIN BOLTS
D ₁	Φ	in.	in.	No. Dia	No. Dia
6.5	.179	12	6	4 1	2 5/8
7.5	.179	14	8	4 1	2 5/8
8.0	.179	14	8	4 1	2 5/8
9.0	.179	16	10	4 1	2 5/8
9.5	.179	18	12	6 1	3 5/8
9.5	.239	18	12	6 1	3 5/8
10.0	.239	18	12	6 1	3 5/8



CLAMP-ON DETAIL 1



CLAMP-ON DETAIL 2



CLAMP-ON DETAIL 3

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY
FOR TRAFFIC SIGNAL
SUPPORT STRUCTURES

MAST ARM CONNECTIONS

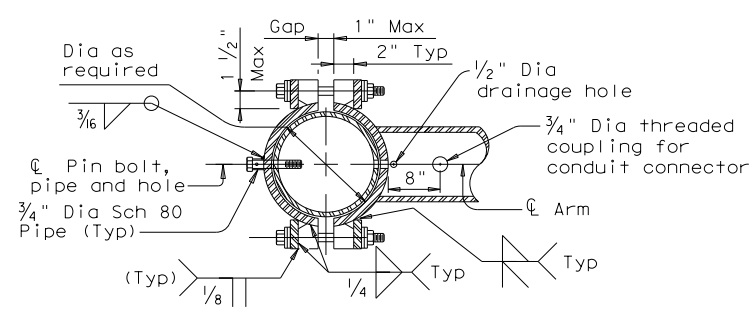
MA-C-12

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1-12		SAT	BEXAR		72

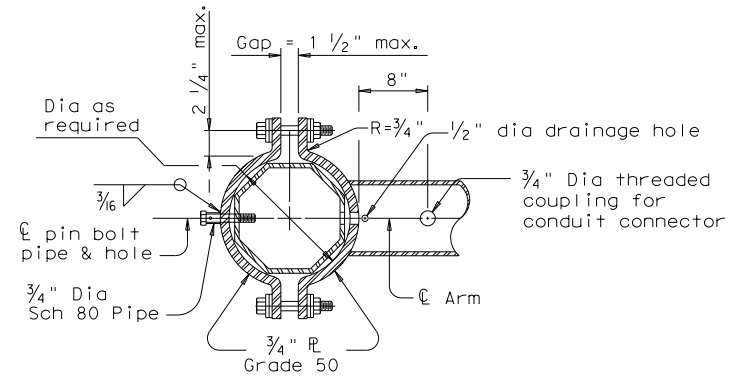
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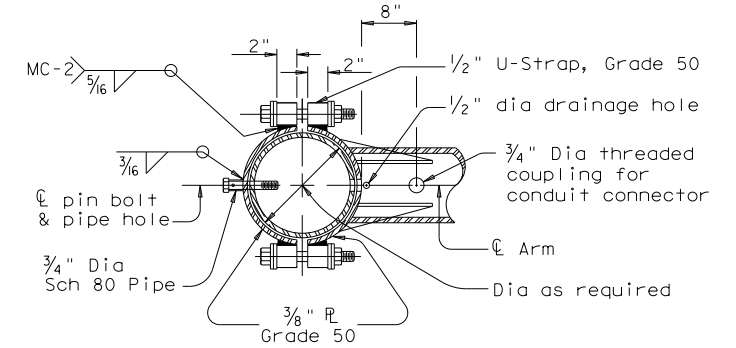
TABLE OF DIMENSIONS for ILSN Support Arm Clamp-on Details 1, 2 and 3						
ILSN ARM SIZE	A		CONN. BOLTS		PIN BOLTS	
	in.	in.	No. ea.	Dia in.	No. ea.	Dia in.
3 in. dia Schedule 40 Pipe	10	4	4	3/4	2	5/8



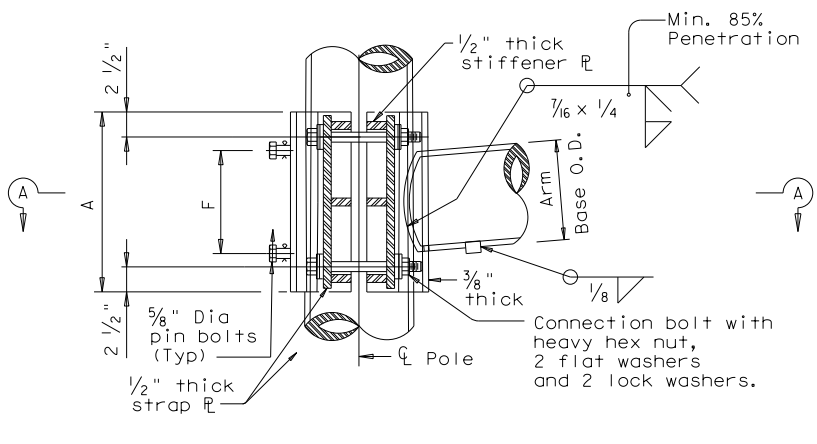
SECTION A-A



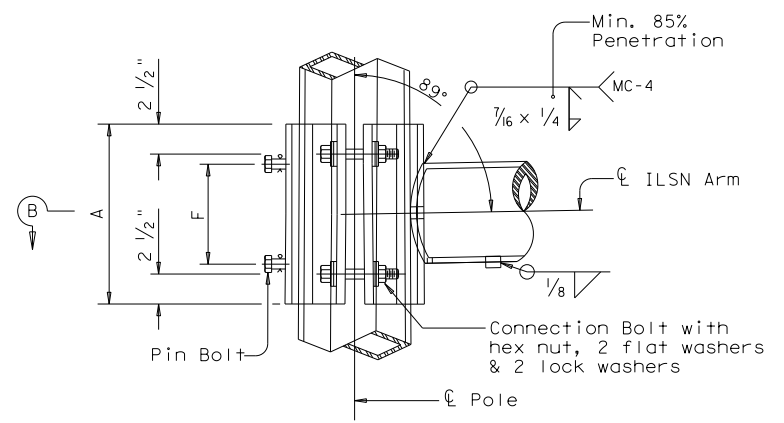
SECTION B-B



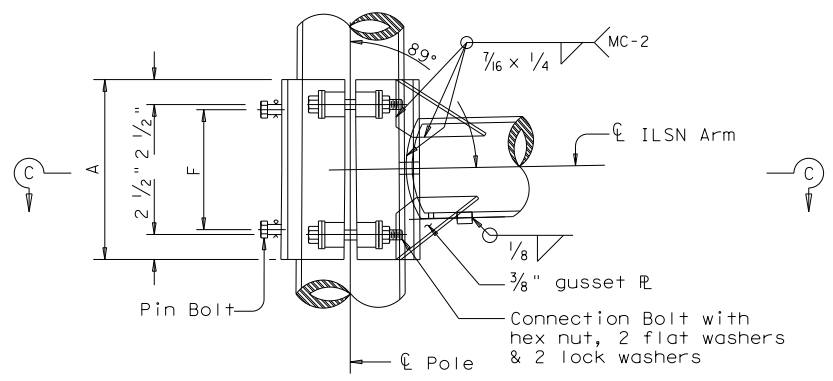
SECTION C-C



ILSN CLAMP-ON DETAIL 1



ILSN CLAMP-ON DETAIL 2



ILSN CLAMP-ON DETAIL 3

GENERAL NOTES:

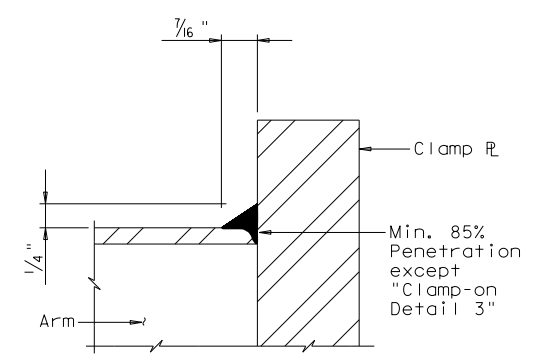
Clamp-on details shall be used for ILSN support arm assemblies. A 1 1/2 inch diameter hole shall be cut in the front clamp plate for wiring access. A matched hole shall be field drilled through the pole to provide wire access after arm is oriented. Deburr both holes.

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

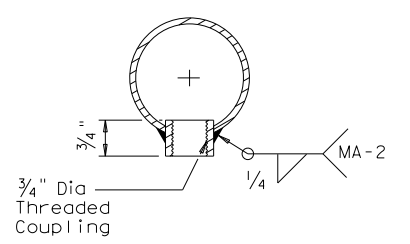
Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

NOTE:

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



CLAMP-ON ARM
 ARM BASE WELD DETAILS



ILSN ARM COUPLING DETAIL

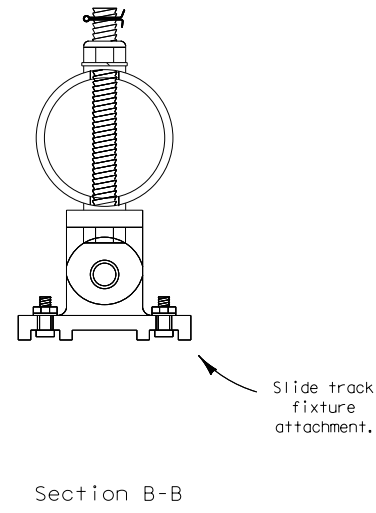
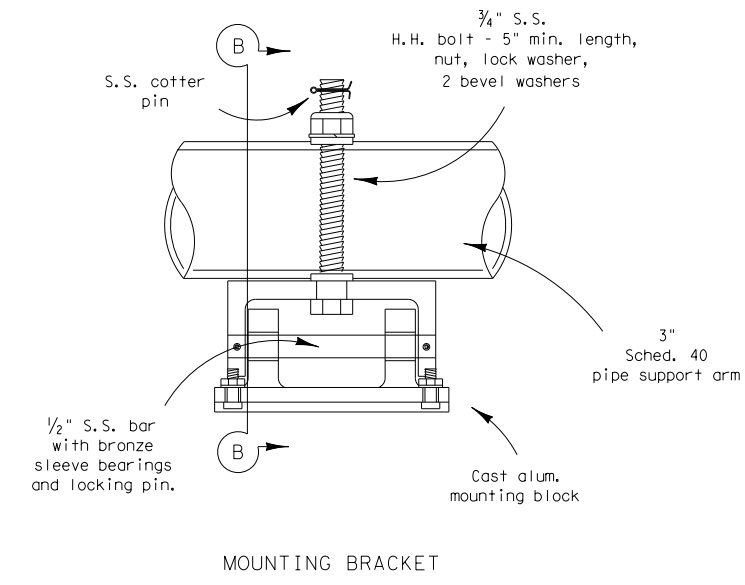
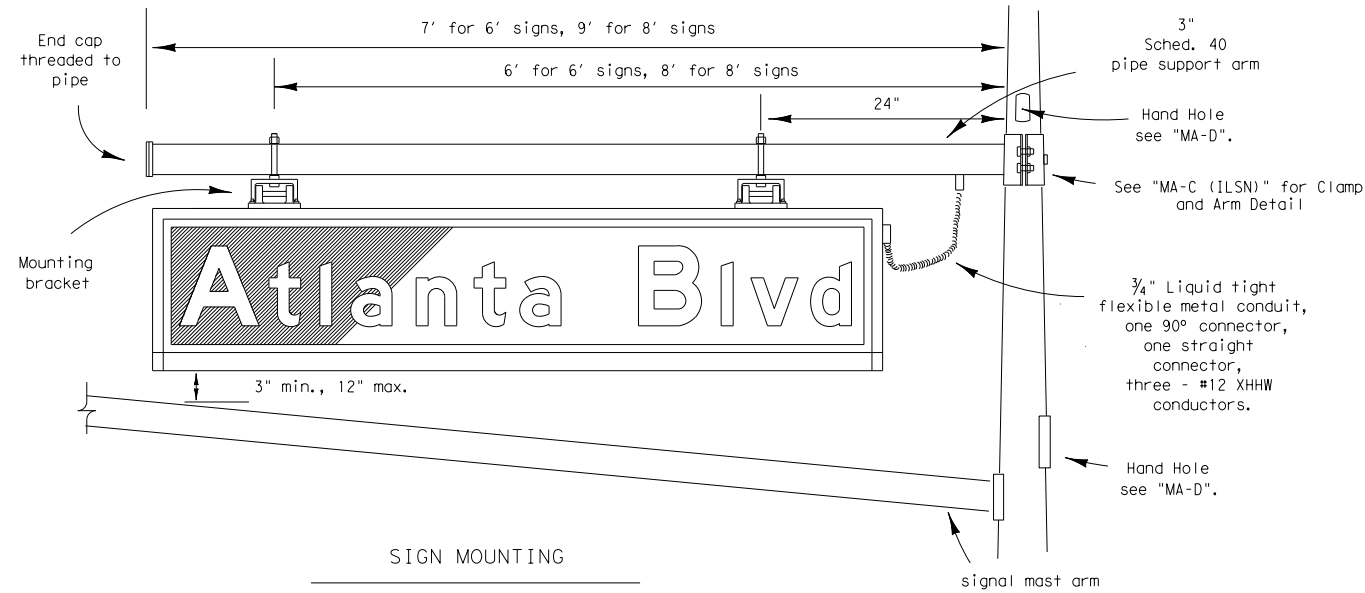
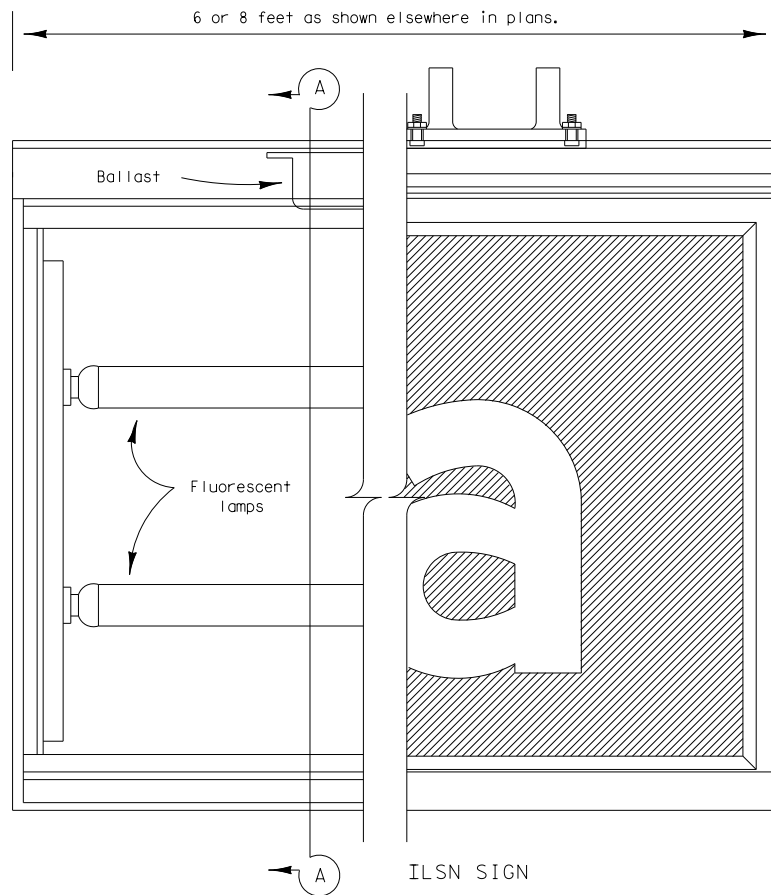
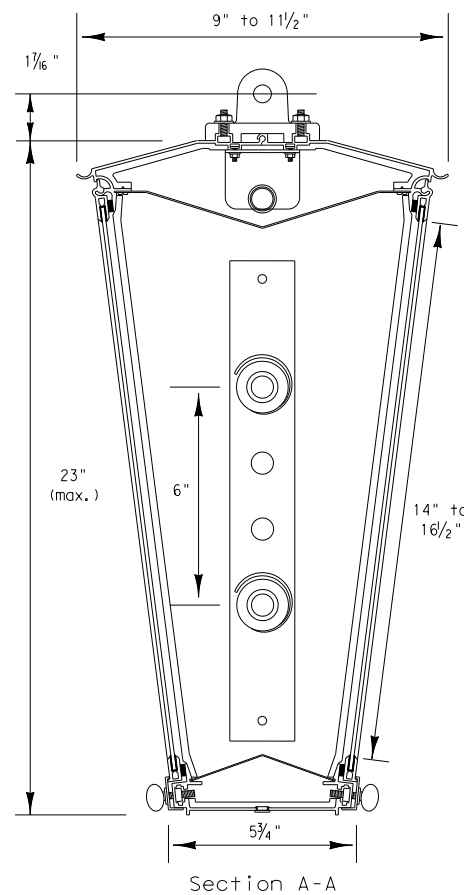
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 Traffic Operations Division
**STANDARD ASSEMBLY
 FOR TRAFFIC SIGNAL
 SUPPORT STRUCTURES**
 MAST-ARM CONNECTIONS
 MA-C (ILSN) - 12

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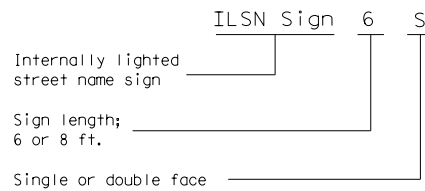
INTERNALLY LIGHTED STREET NAME SIGN DETAILS



ILSN SIGN NOTES:

1. Eight foot ILSN sign shall not exceed 11.5 sq.ft. effective projected area (EPA) and shall not exceed a weight of 85 lbs.
 Six foot ILSN sign shall not exceed 8.7 sq.ft. EPA and shall not exceed a weight of 70 lbs.
2. Sign message shall be as shown elsewhere in the plans.
3. See Special Specification, "Internally Lighted Street Name Signs" for additional details.

EXPLANATION OF DESCRIPTION



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 Traffic Operations Division

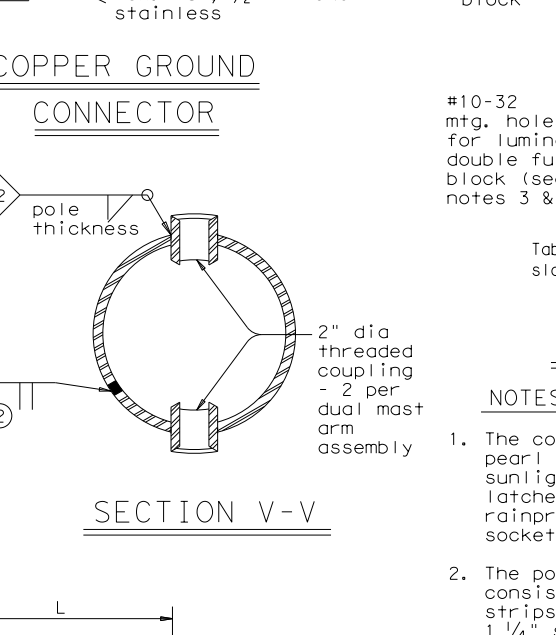
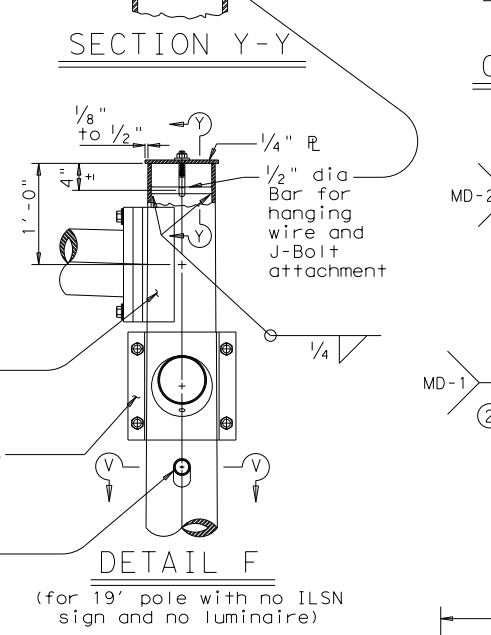
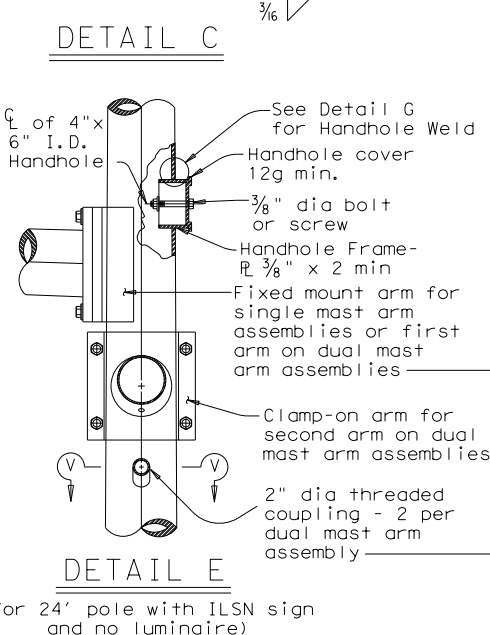
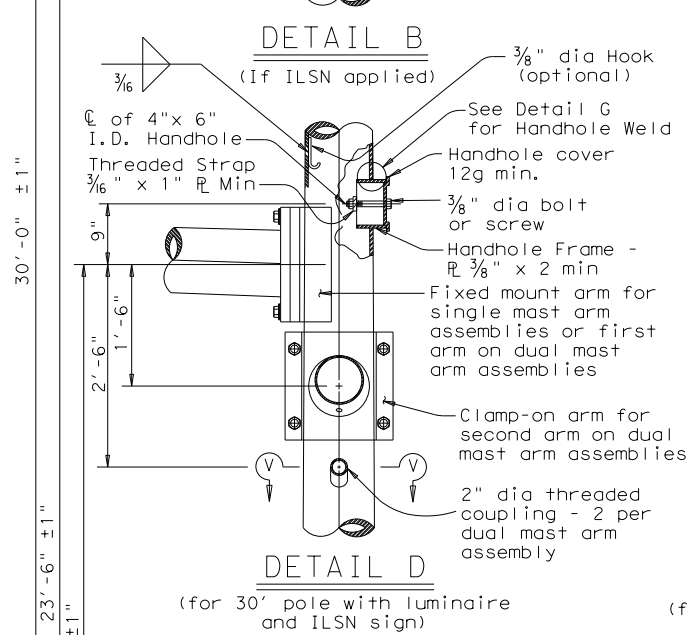
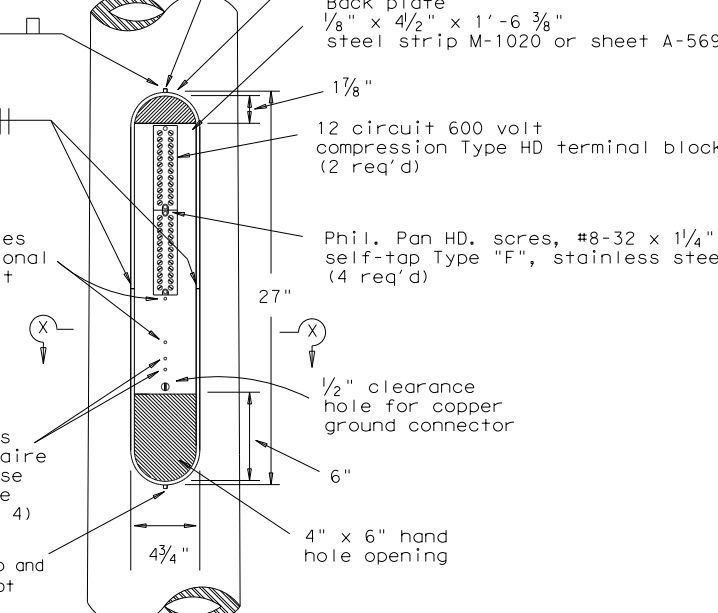
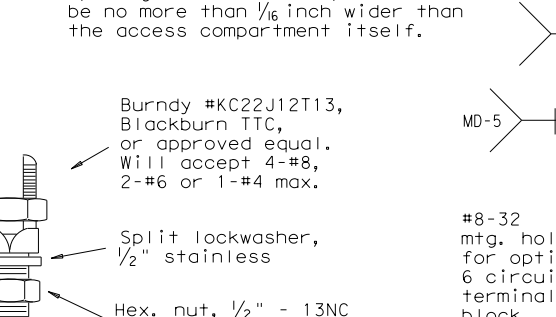
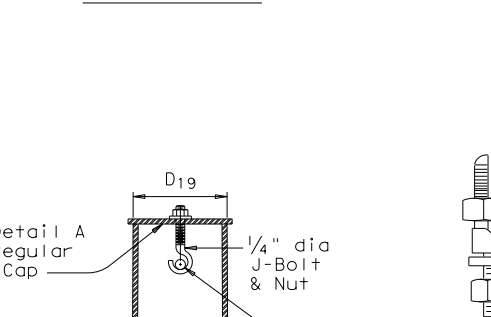
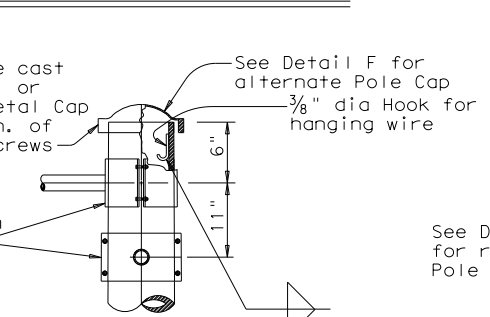
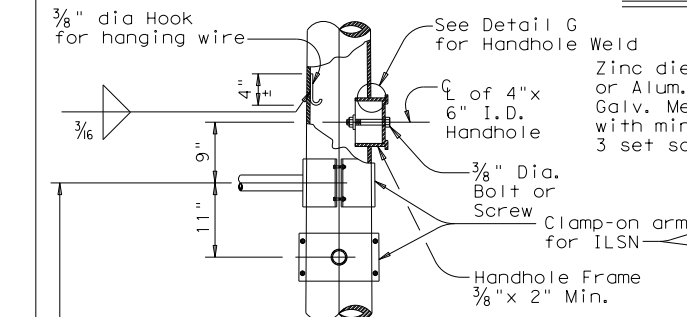
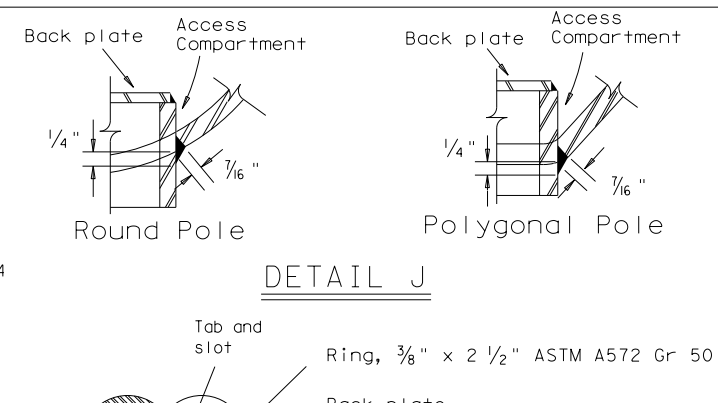
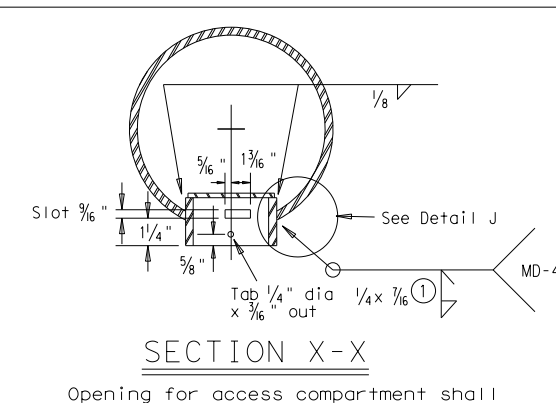
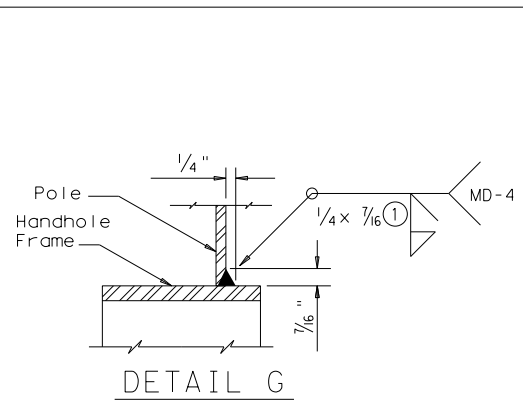
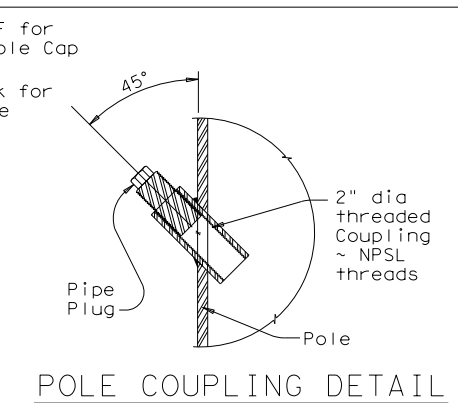
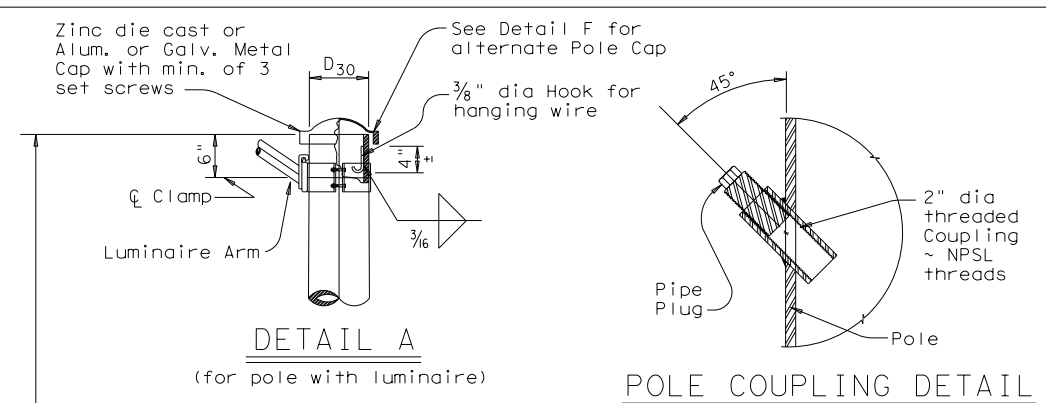
STREET NAME
 SIGN DETAILS
 (ILLUMINATED)

SNS-95

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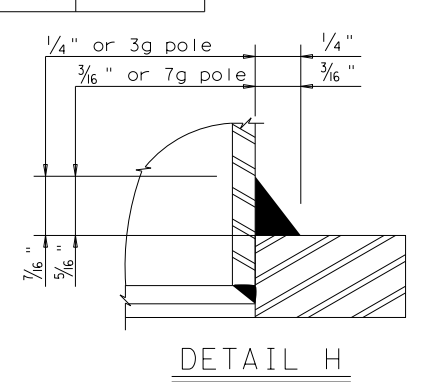
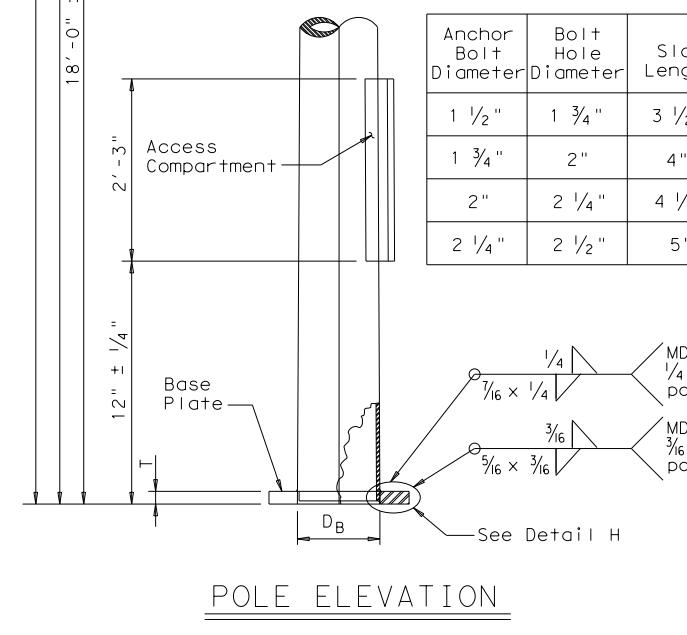
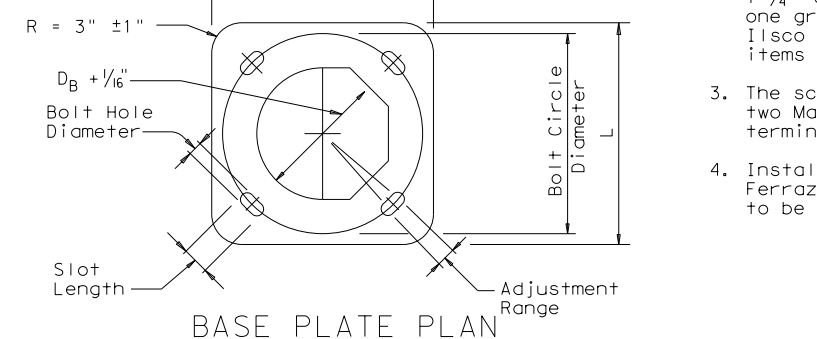
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- NOTES:**
- The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
 - 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 Ilco SSS-5). The traffic signal contractor shall install the kit items in the field.
 - 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.
 - Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

Anchor Bolt Diameter	Bolt Hole Diameter	Slot Length	Bolt Circle Diameter	Base R 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°



- 85% Min. penetration
- 60% Min. penetration
100% penetration within 6" of circumferential base welds.

Texas Department of Transportation
 Traffic Operations Division

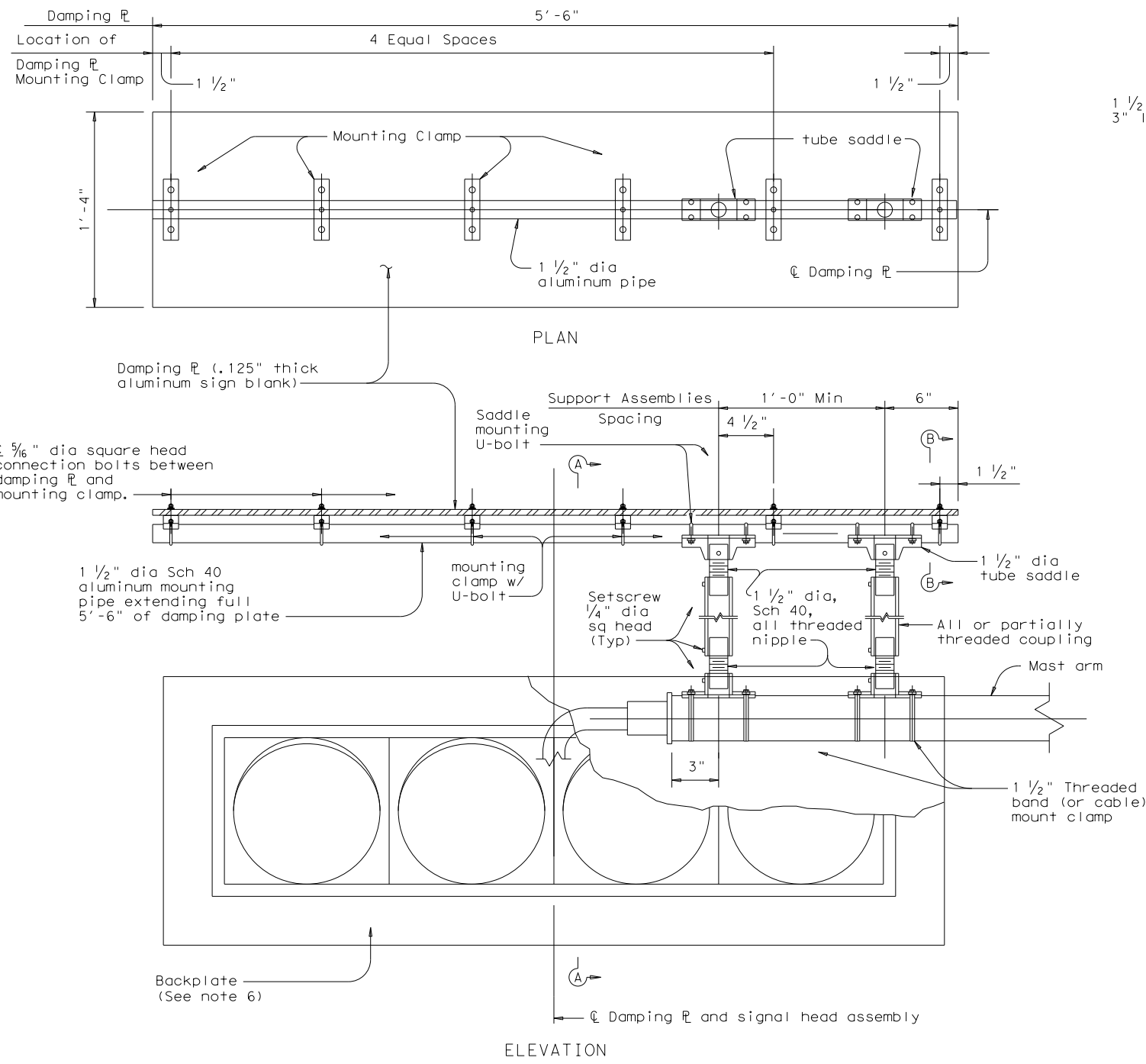
**TRAFFIC SIGNAL
 SUPPORT STRUCTURES
 MAST ARM POLE DETAILS**

MA-D-12

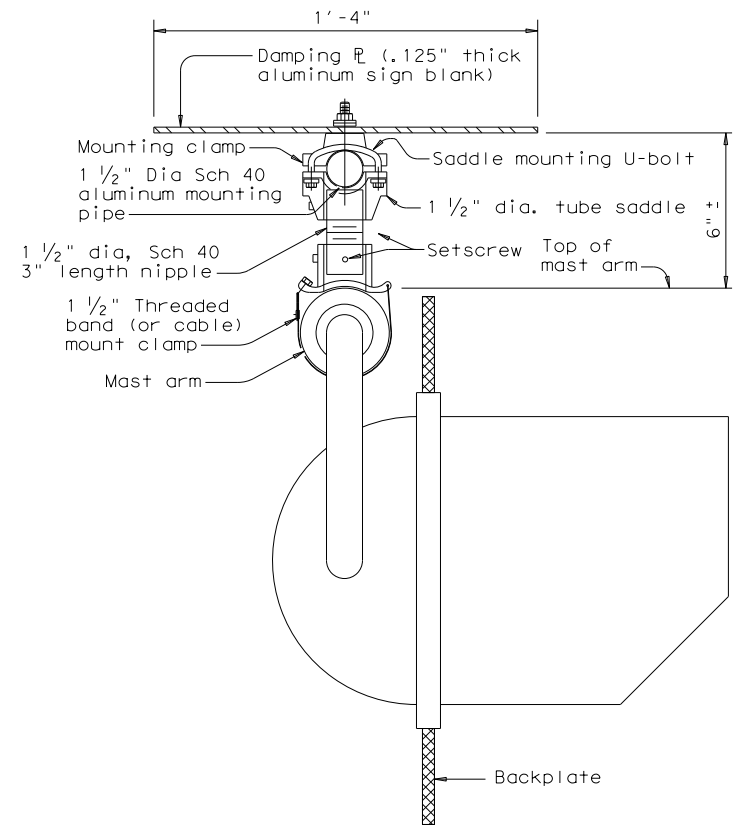
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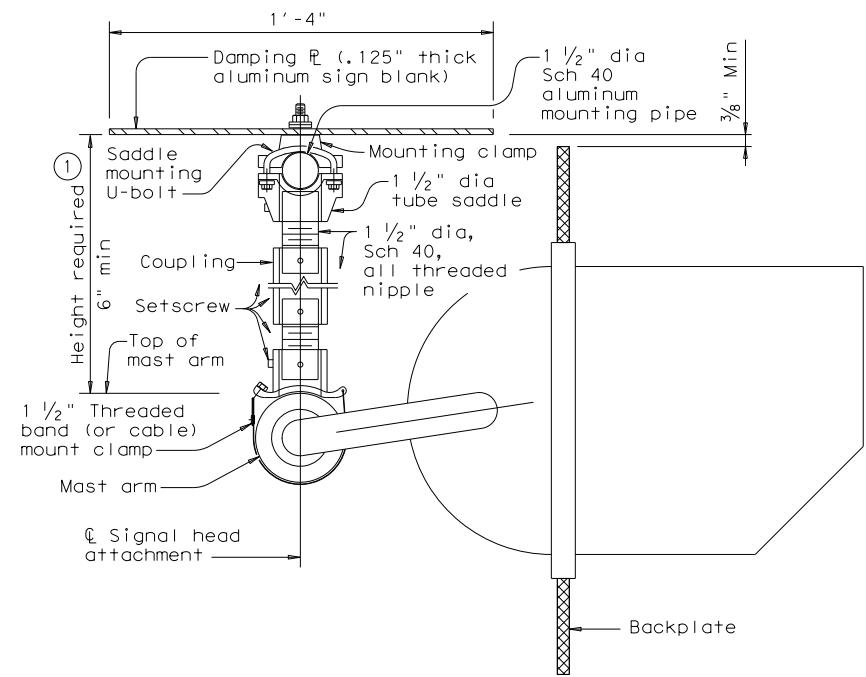
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DAMPING PLATE MOUNTING DETAILS
 (Showing alternate placement of signal head)



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



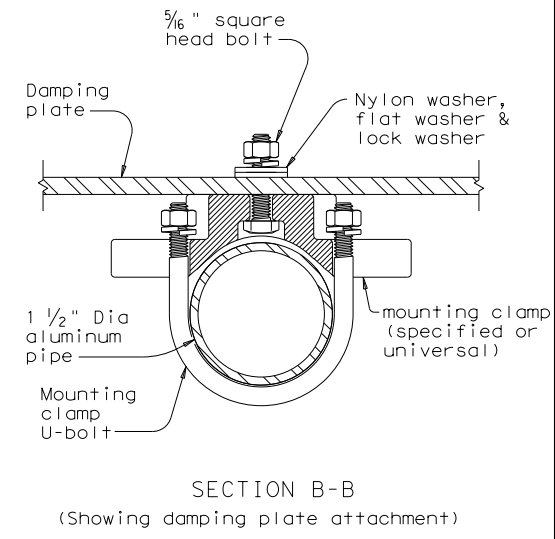
SECTION A-A
 (Showing alternate placement of signal head)
 (Mounting clamp U-bolt is not shown for clarity)

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 3/4"	3"	-	-
7"-8 1/2"	4"	-	-
9"-10 1/2"	6"	-	-
11"-15 1/2"	-	4"	5"
16"-24"	-	6"	10"

GENERAL NOTES:

- In accordance with the findings of TxDOT sponsored research, the installation of a damping plate in accordance with the details shown here at the end of signal mast arms of SMA and DMA standard structures reduces excessive harmonic vertical vibration, and thus fatigue damage. Any deviation from these details may reduce the effectiveness of this damping device.
- Aluminum sign blank for damping plate 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.
- 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.
- Unless stipulated by the manufacturers, all steel parts will be galvanized finish in accordance with Standard Specification Item 445, "Galvanizing".
- Contractor will verify applicable field dimensions before the installation.
- Backplates are optional for traffic signals. When backplates are used, Backplates will have a 2-inch fluorescent yellow AASHTO Type BFL or CFL retroreflective border conforming to TxDOT DMS-8300 "Sign Face Materials." See Sheet TS-BP-20 for backplate details.



SECTION B-B
 (Showing damping plate attachment)

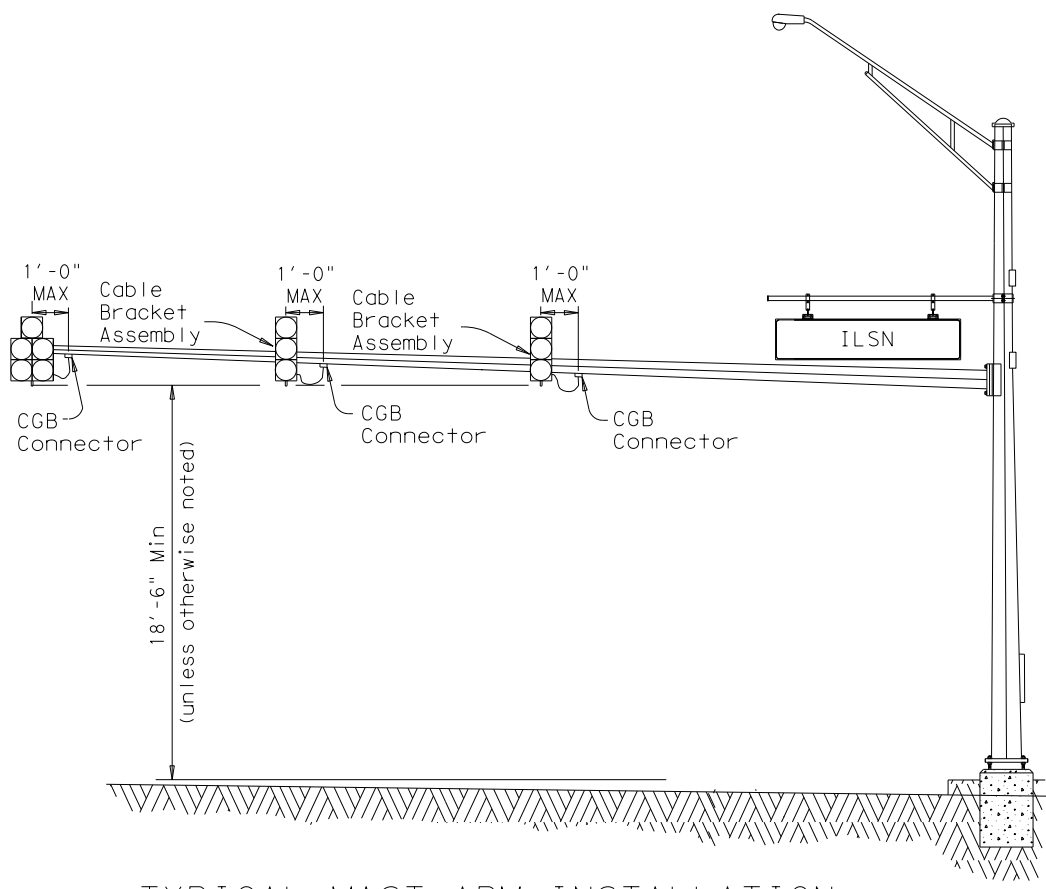
Texas Department of Transportation Traffic Safety Division Standard

MAST ARM DAMPING PLATE DETAILS

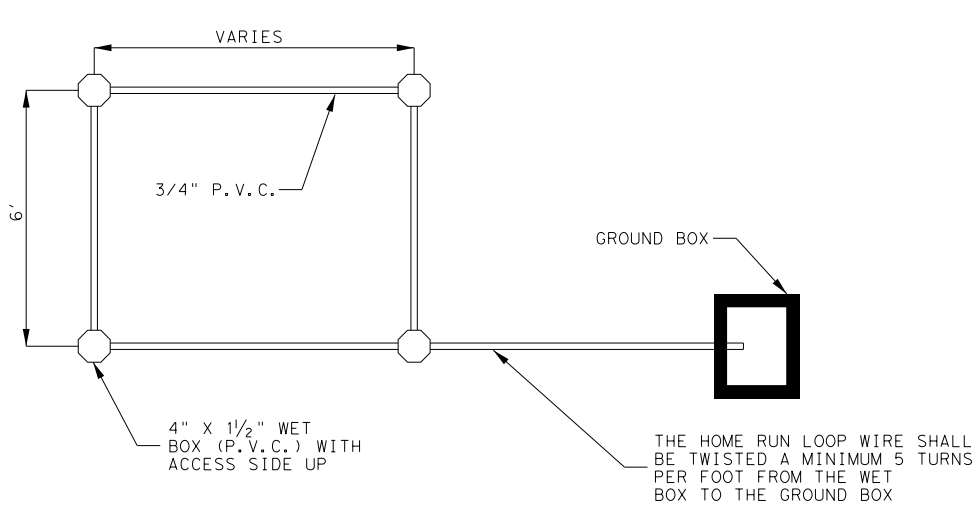
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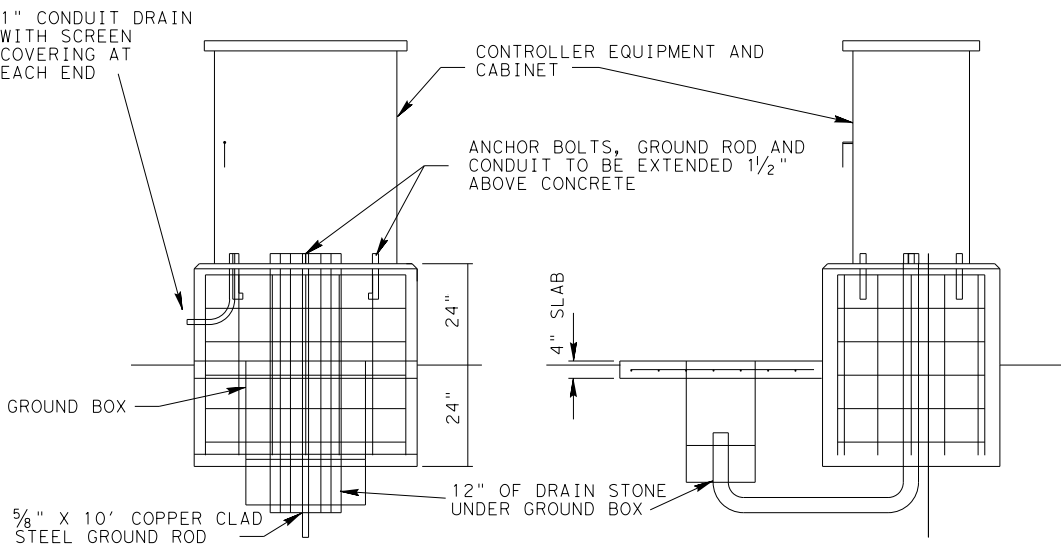
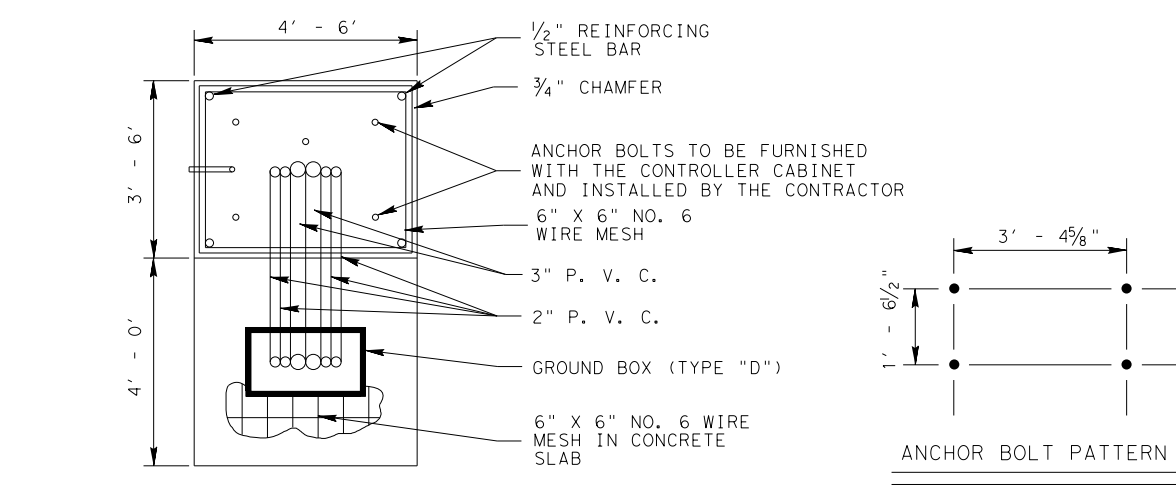


TYPICAL MAST ARM INSTALLATION
 BACKPLATES ARE NOT SHOWN FOR CLARITY



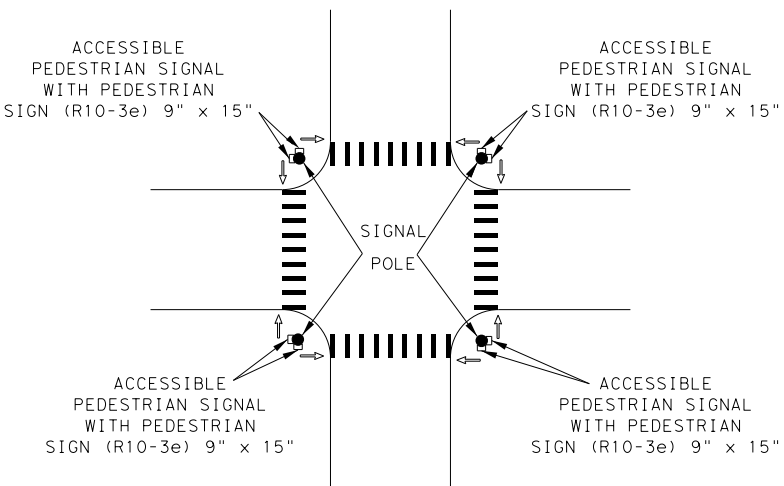
NOTES:
 SHALL INSTALL CONDUIT ENCASED LOOPS AT THE LOCATIONS SHOWN ON THE PLANS USING 3/4" DIAMETER PVC SCHEDULE 40 OR AT NO ADDITIONAL COST 1" DIAMETER PVC SCHEDULE 80.
 LOOP LOCATIONS MAY BE STAGGERED SLIGHTLY (6") TO ACCOMMODATE HOME RUN PLACEMENT.
 INDIVIDUAL HOME RUN CONDUITS SHALL BE EXTENDED TO THE GROUND BOX SHOWN ON THE PLANS FOR EACH LOOP INSTALLED.
 THE NUMBER OF LOOP WIRE TURNS SHALL BE AS SHOWN ON THE TYPICAL LOOP DETECTOR DETAILS.

CONDUIT ENCASED LOOPS



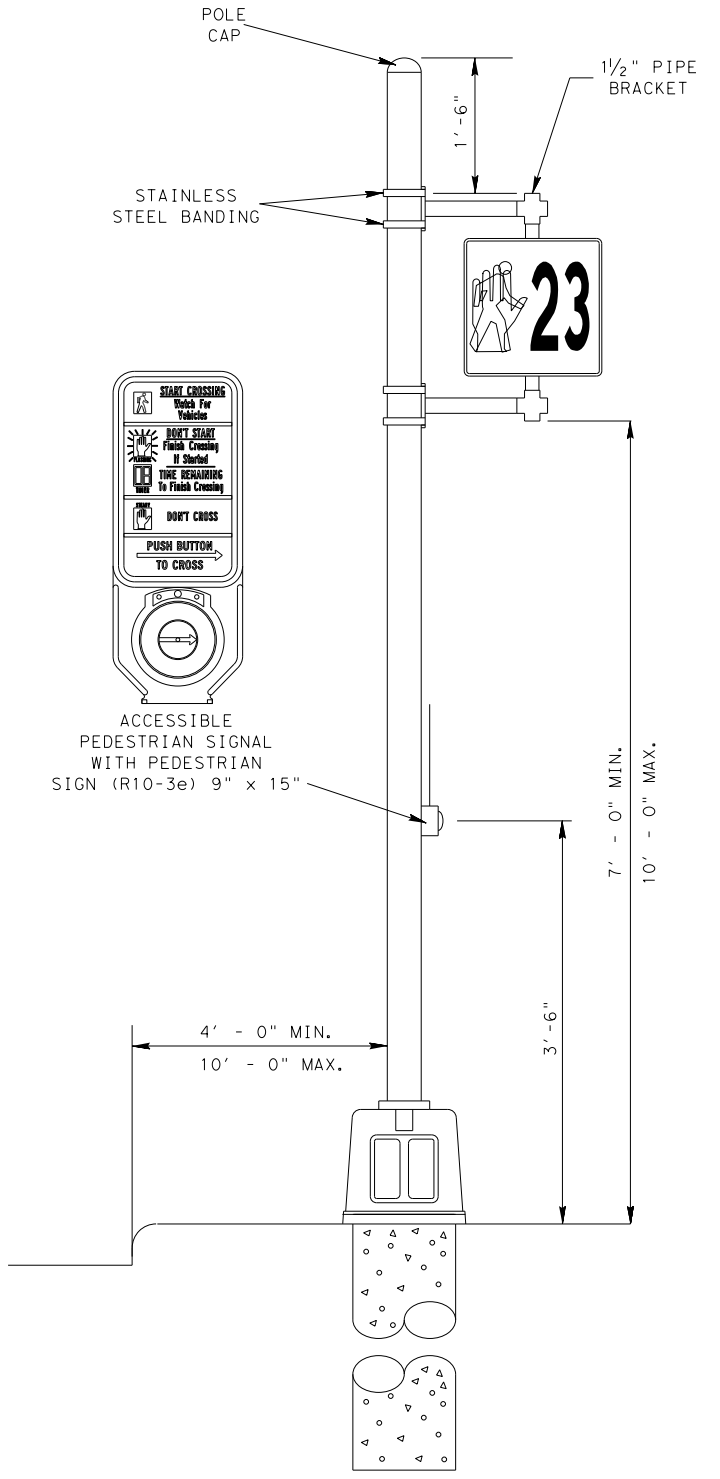
CONTROLLER MOUNT NOTES :
 ALL WIRING TERMINATING IN THE CONTROLLER SHALL BE LABELED IN A MANNER THAT CAN BE IDENTIFIED WHEN THE CONTROLLER IS INSTALLED THE CONTRACTOR SHALL CONNECT THE FIELD WIRING TO THE CONTROLLER
 ONE 2" PVC SHALL REMAIN EMPTY FOR FUTURE USE
 CONCRETE SHALL BE TESTED AS MISCELLANEOUS CONCRETE
 ALL MATERIALS SHOWN AND LABOR TO INSTALL THE CONTROLLER FOUNDATION SHALL BE CONSIDERED SUBSIDIARY TO PERTINENT ITEMS
 CONTROLLER FOUNDATION SHALL BE AS SHOWN ON THE PLANS, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

TYPICAL CONTROLLER MOUNT DETAILS



TYPICAL PED PUSH BUTTON LOCATION

THE ENGINEER SHALL VERIFY ALL PEDESTRIAN SIGNAL AND PEDESTRIAN PUSH BUTTON LOCATIONS PRIOR TO INSTALLATION.



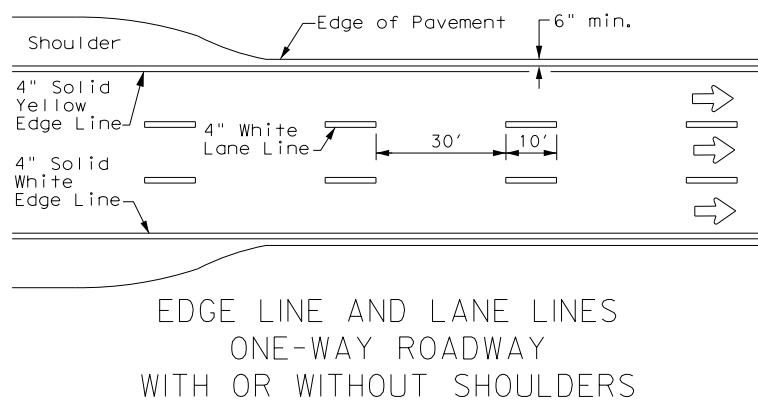
TYPICAL PEDESTAL POLE ASSEMBLY

Texas Department of Transportation
 © 2018

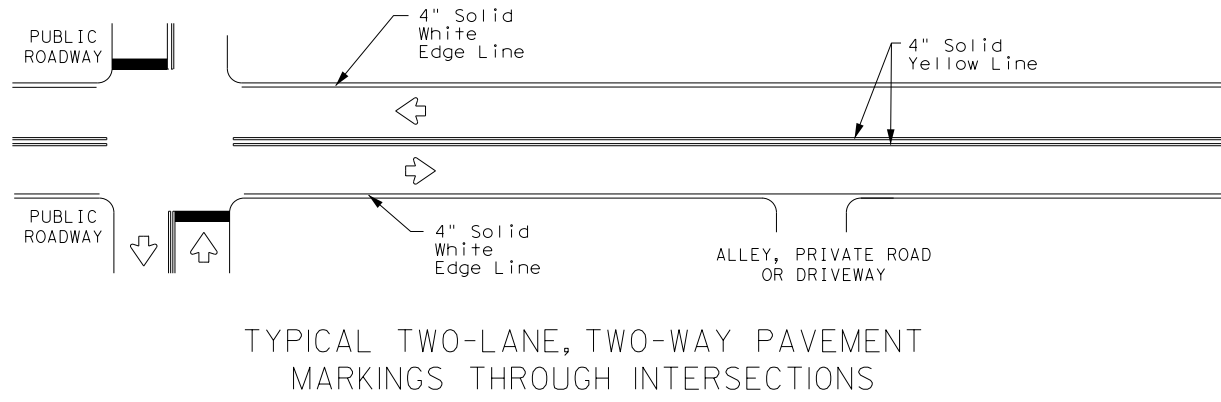
San Antonio District Standard
MISCELLANEOUS TRAFFIC SIGNAL DETAILS

SCALE: NS		MTS-18	
REVISIONS	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	
FEB 2006			
OCT 2007			
MAR 2017	STATE	DIST.	COUNTY
MAY 2018	TX	SAT	BEXAR
	CONT.	SECT.	JOB
	0915	12	698
			HIGHWAY NO.
			VARIOUS
			SHEET NO. 77

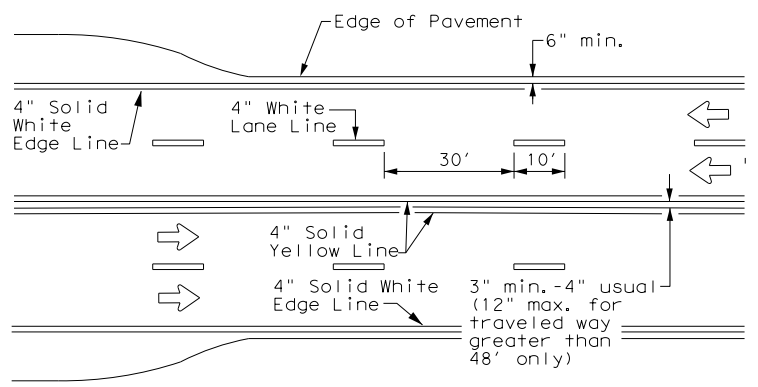
DATE: 10/25/2022 2:16:02 PM
 FILE: _Projects\SAN-NC\008129_COSA TO-03 - Traffic Signal Imp_Designs\07_00\cadd\pml-20.dgn
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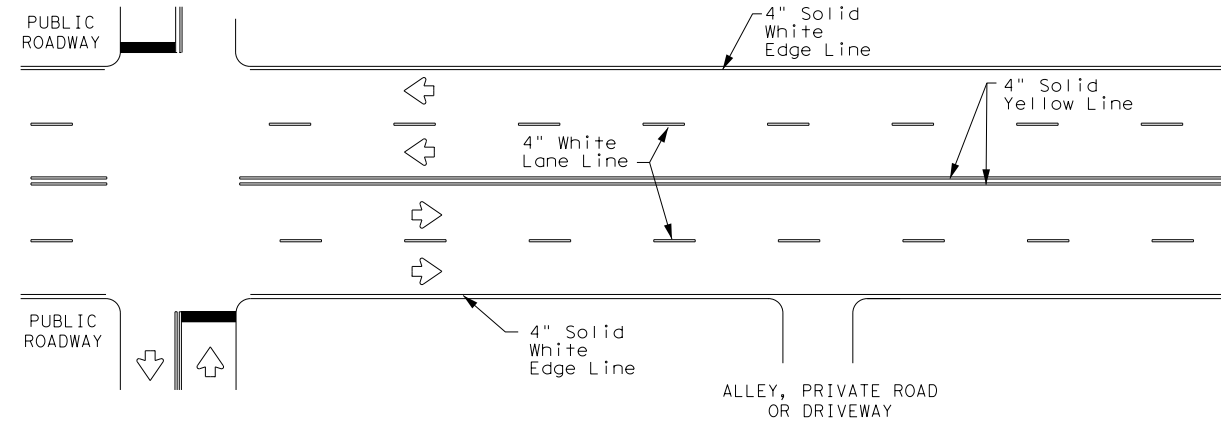
EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



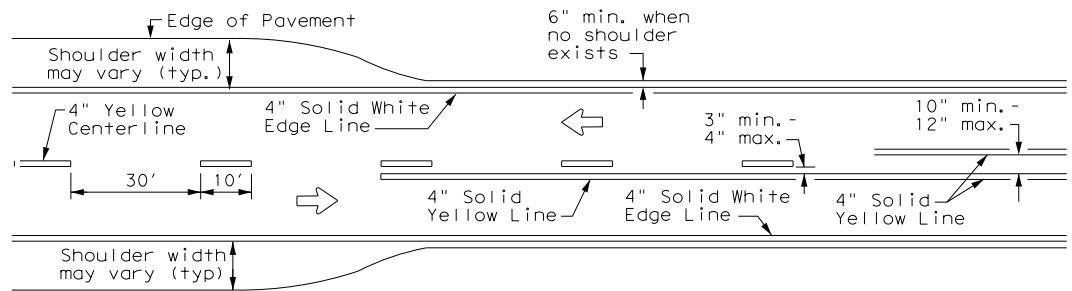
TYPICAL TWO-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS



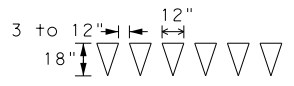
CENTERLINE AND LANE LINES
FOUR LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



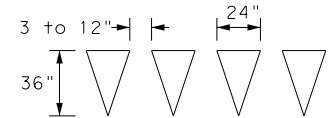
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS

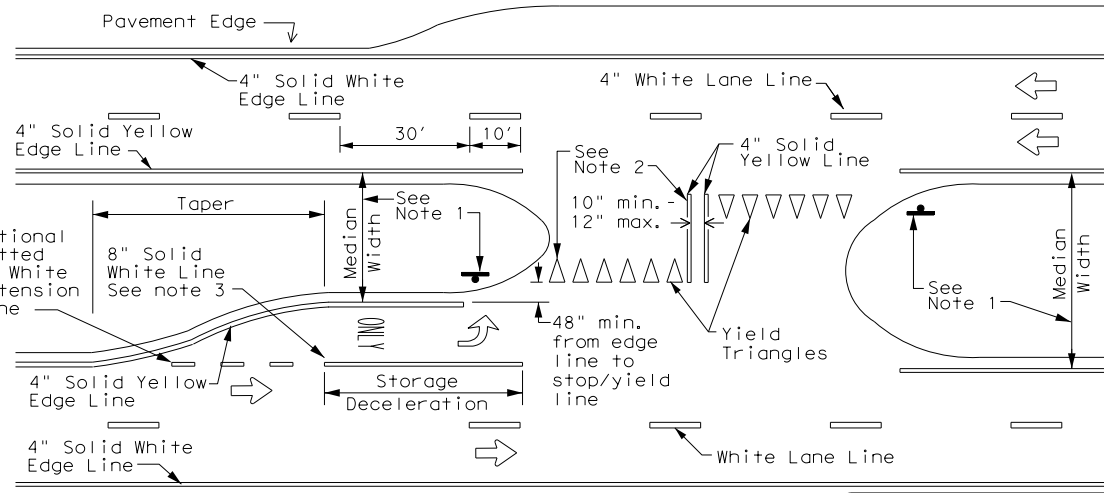


For posted speed on road being marked equal to or less than 40 MPH.



For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

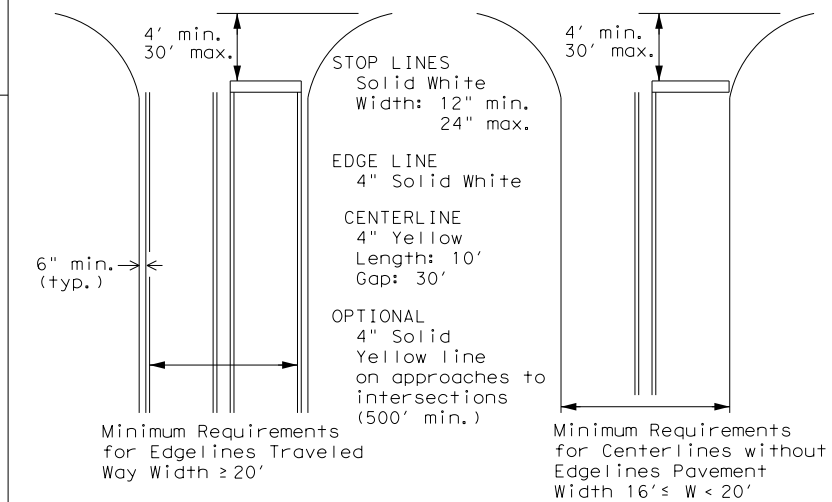
- Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.
- Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield triangles shall only be used with yield signs.
- Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

- Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.
- The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

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

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



GUIDE FOR PLACEMENT OF STOP LINES,
EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths
for Undivided Highways



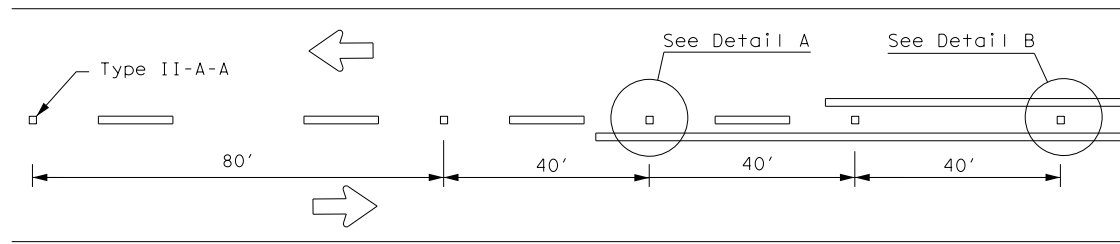
TYPICAL STANDARD
PAVEMENT MARKINGS

PM(1) - 20

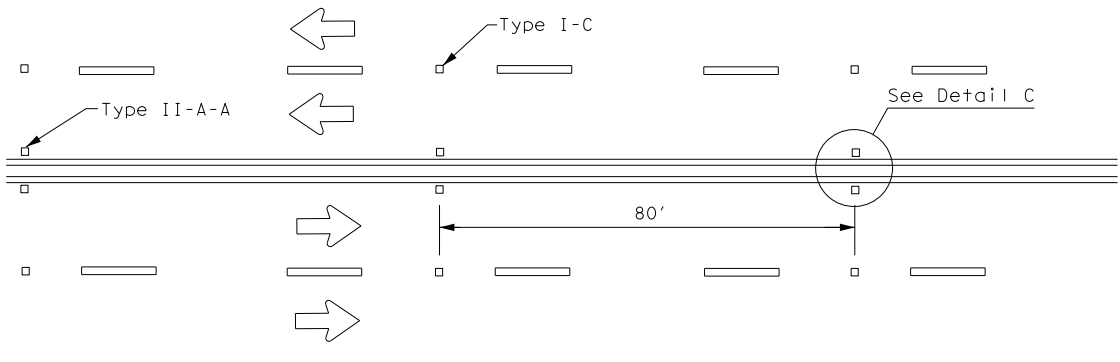
FILE: pml-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
8-95 3-03 REVISIONS	0915	12	698, etc	VARIOUS
5-00 2-12	DIST	COUNTY	SHEET NO.	
8-00 6-20	SAT	BEXAR	78	

REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

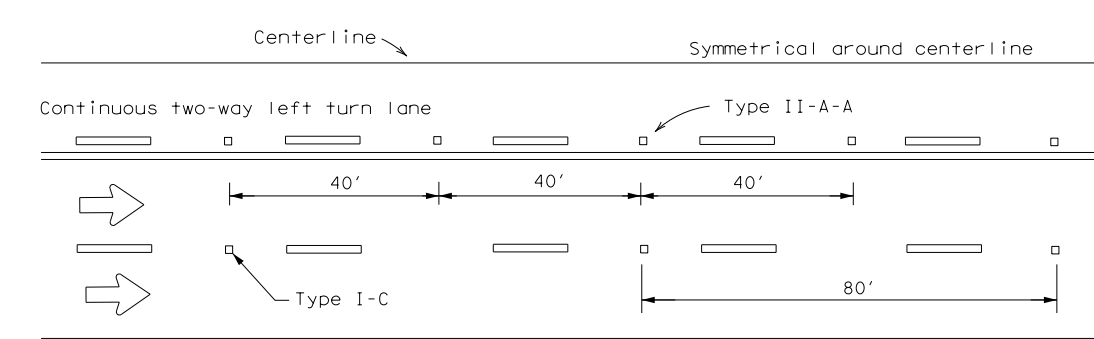
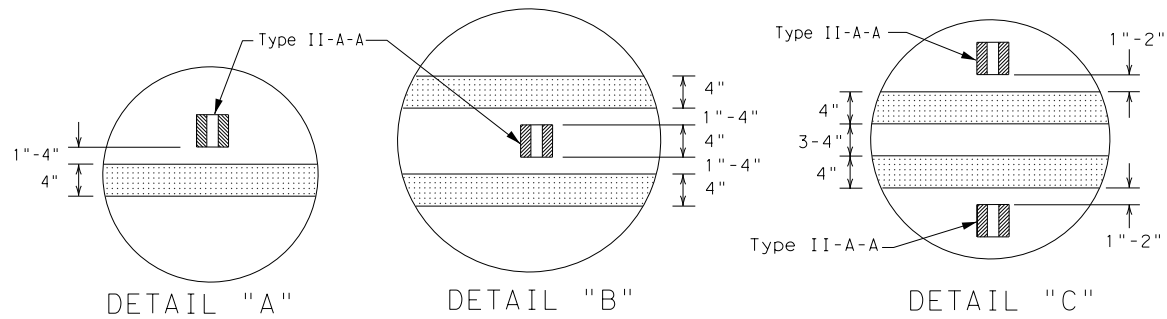
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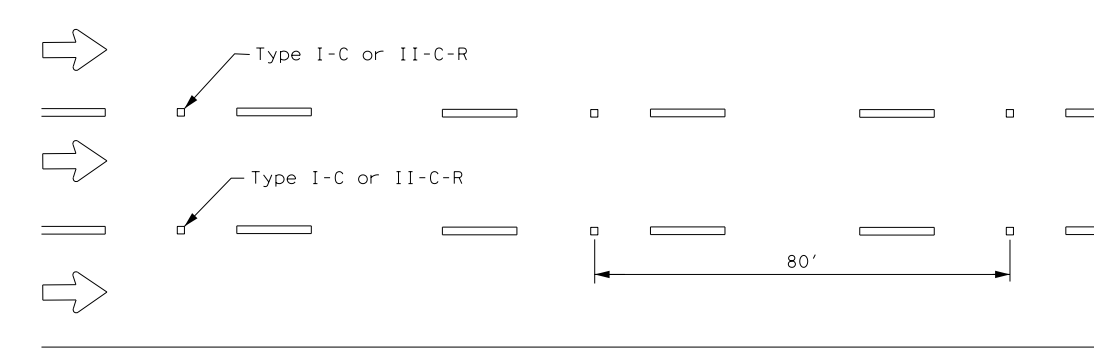
CENTERLINE FOR ALL TWO LANE ROADWAYS



CENTERLINE & LANE LINES
FOR FOUR LANE TWO-WAY HIGHWAYS

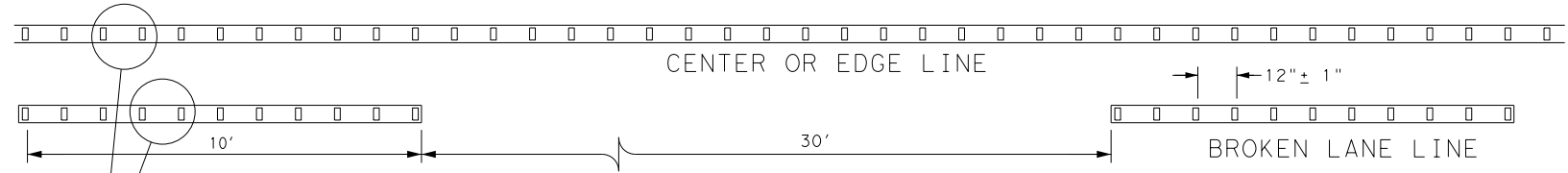


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE

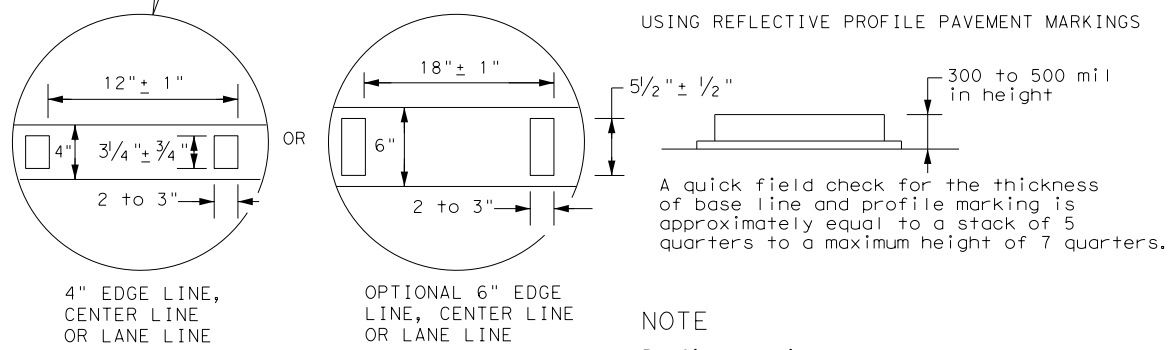


LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.



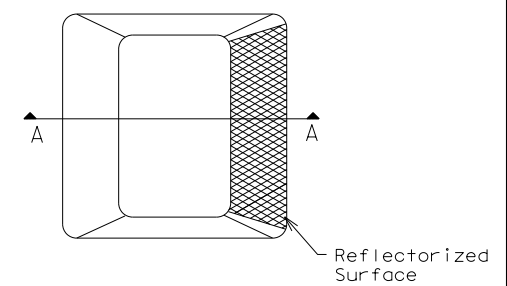
REFLECTORIZED PROFILE
PATTERN DETAIL
USING REFLECTIVE PROFILE PAVEMENT MARKINGS



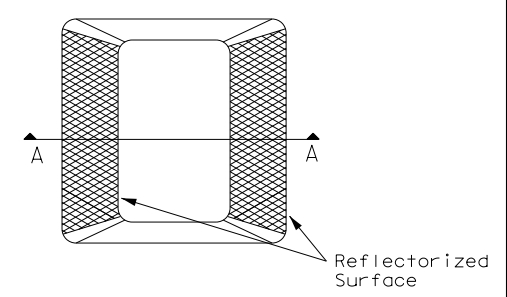
NOTE
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

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

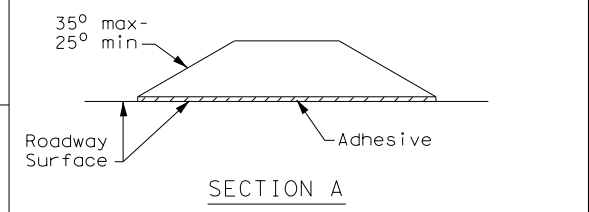
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



RAISED PAVEMENT MARKERS

GENERAL NOTES

- All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
- On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

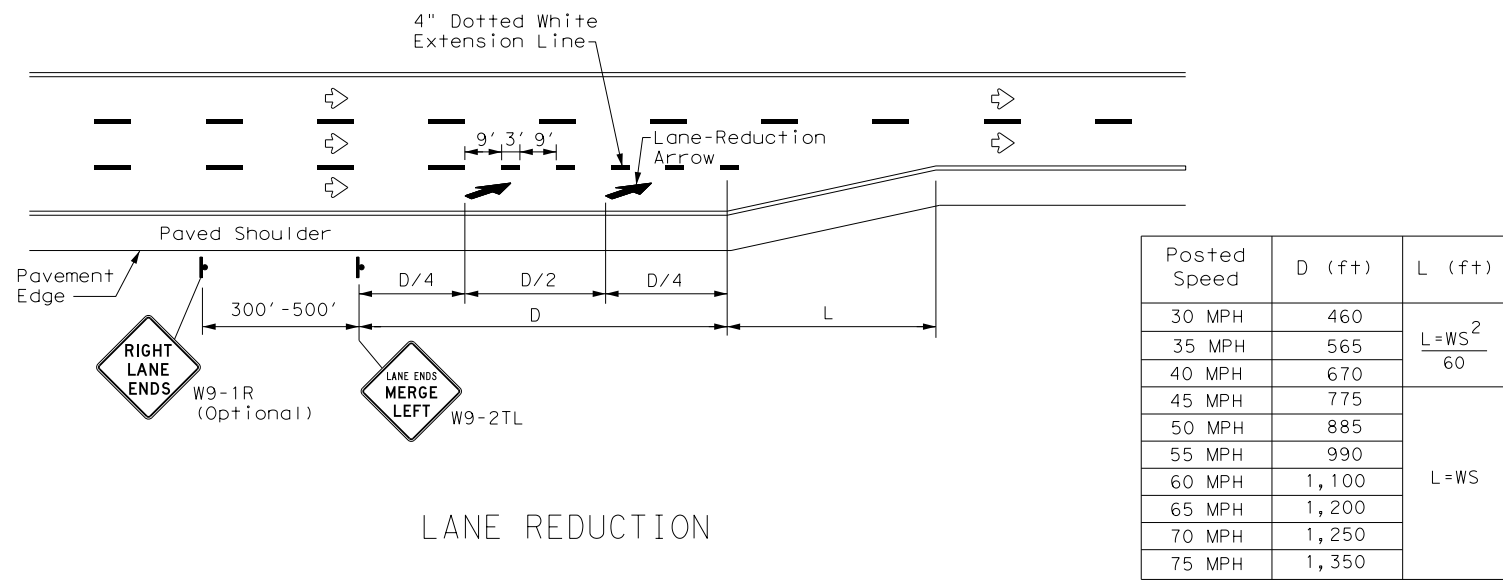


POSITION GUIDANCE USING RAISED MARKERS REFLECTORIZED PROFILE MARKINGS PM(2) - 20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
4-92 2-10	0915	12	698, etc	VARIOUS
5-00 2-12	DIST	COUNTY	SHEET NO.	
8-00 6-20	SAT	BEXAR	79	

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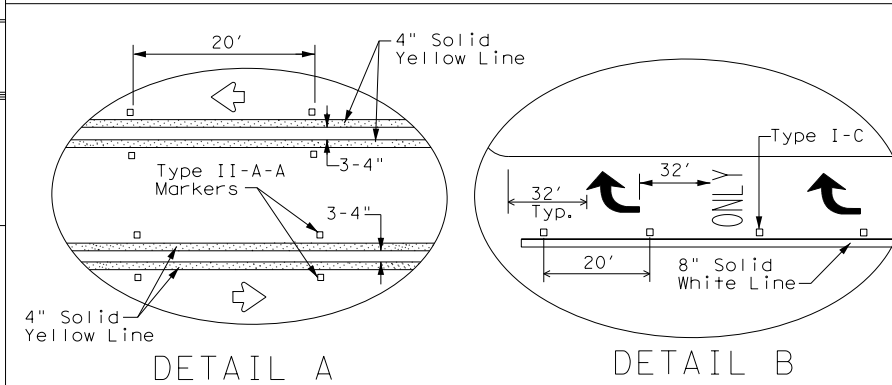
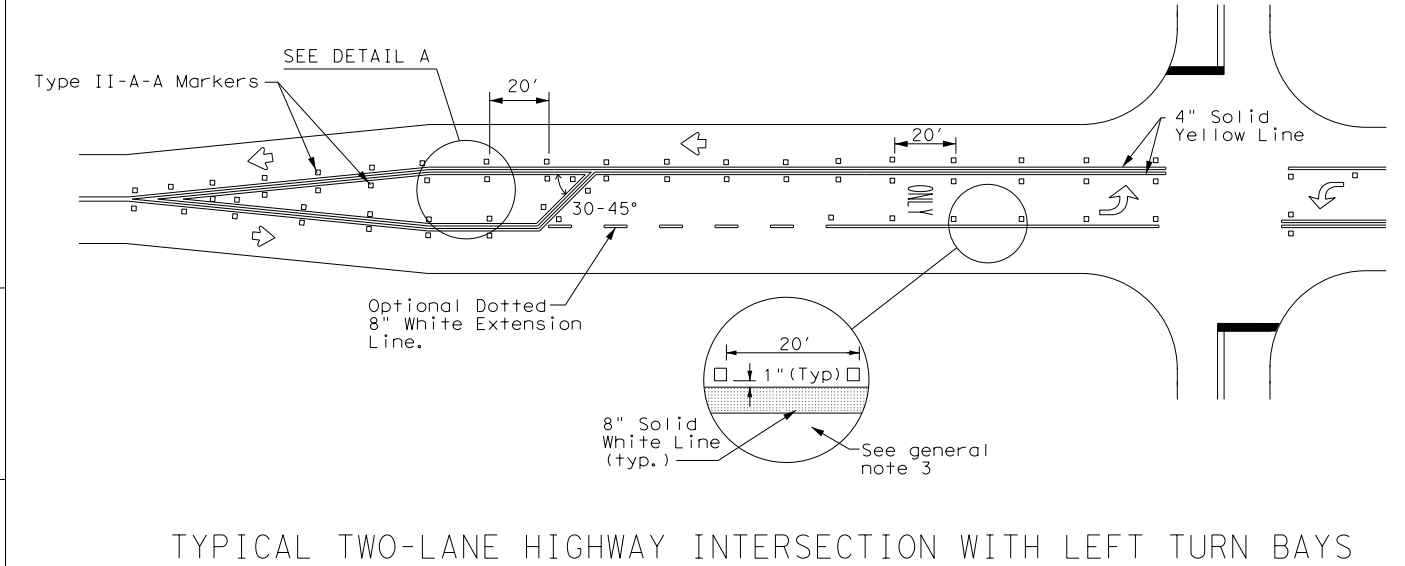
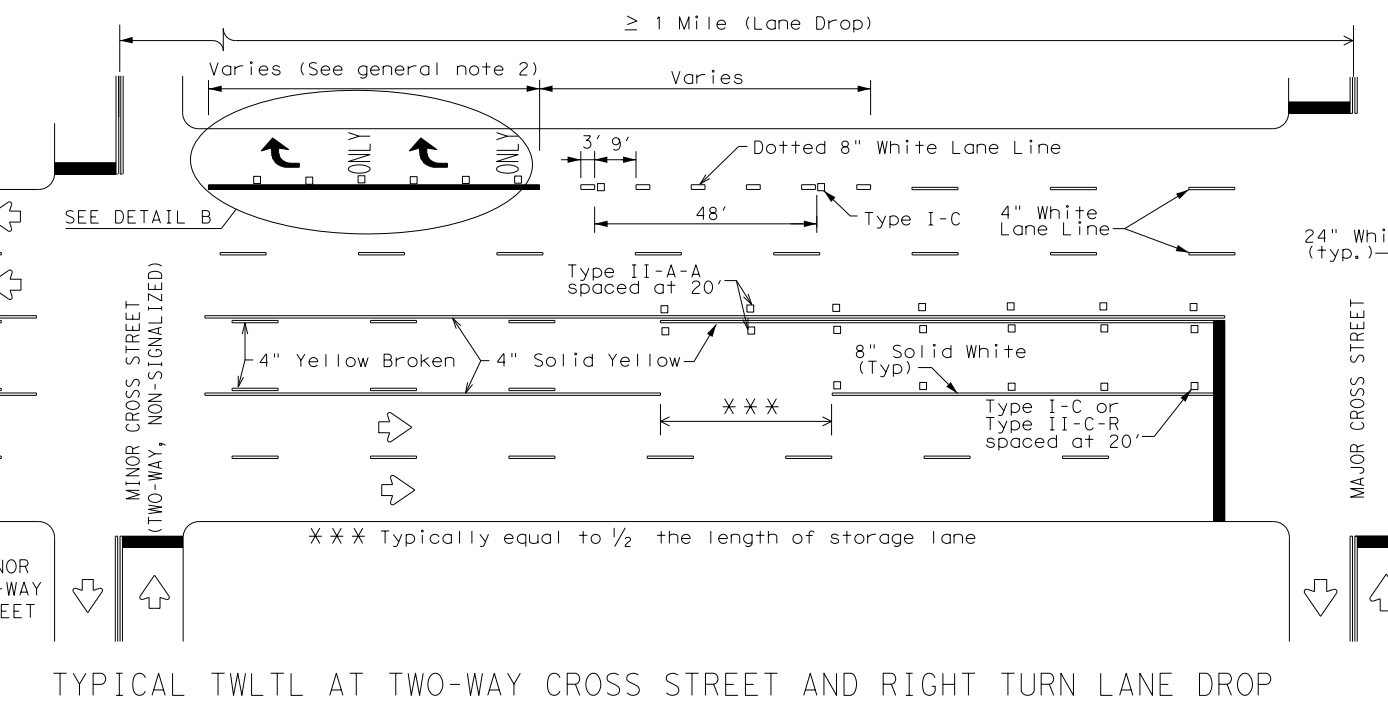
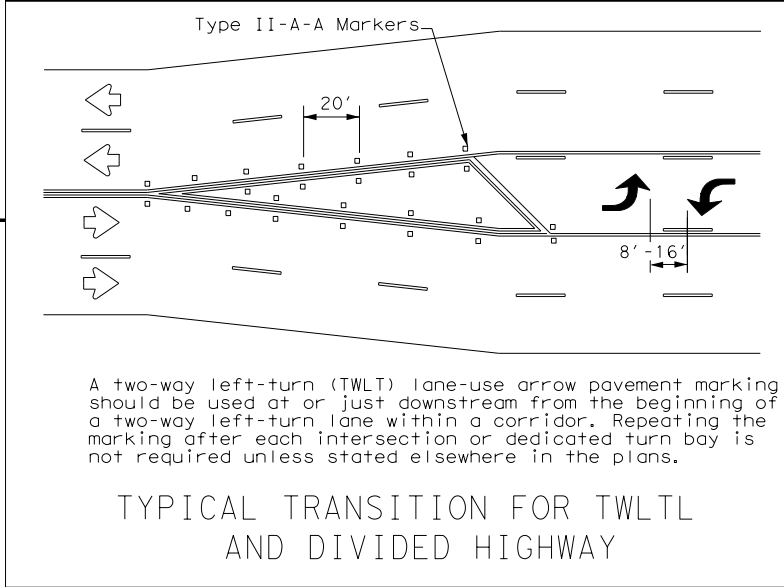
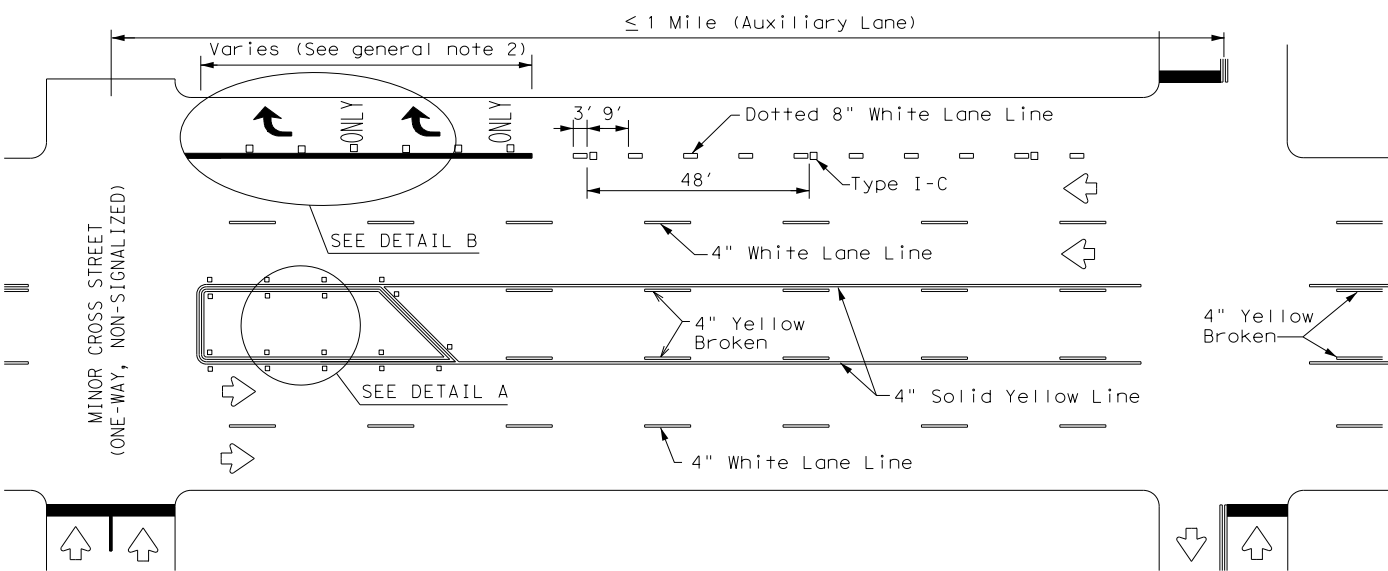


NOTES

- Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
- On divided highways, an additional W9-1R "RIGHT LANE ENDS" sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
- Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
- For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

GENERAL NOTES

- Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
- When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
- Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
- Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.



MATERIAL SPECIFICATIONS

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

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

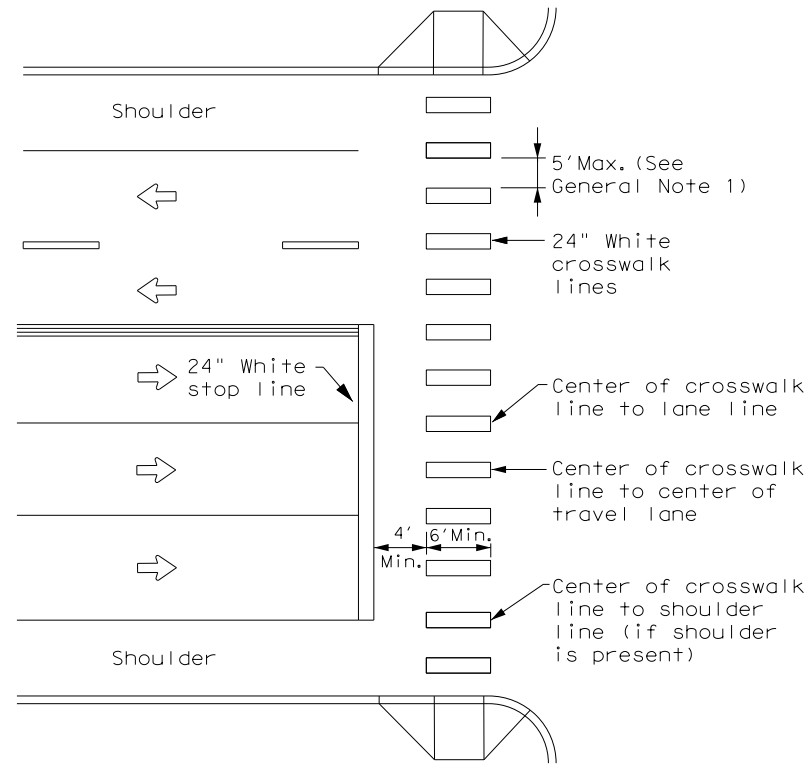
Texas Department of Transportation
 Traffic Safety Division Standard

**TWO-WAY LEFT TURN LANES,
 RURAL LEFT TURN BAYS,
 AND LANE REDUCTION
 PAVEMENT MARKINGS
 PM(3) - 20**

FILE:	pm3-20.dgn	DN:	CK:	DW:	CK:
© TxDOT	April 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS		0915	12	698, etc	VARIOUS
5-00	2-10	DIST	COUNTY	SHEET NO.	
8-00	2-12	SAT	BEXAR	80	
3-03	6-20				

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DATE: 10/25/2022 2:14:03 PM
 FILE: _Projects\SAN-NC\008129_COSA 10-03 - Traffic Signal Imp_Designs\07.00\CAD\18_Crosswalks.dwg



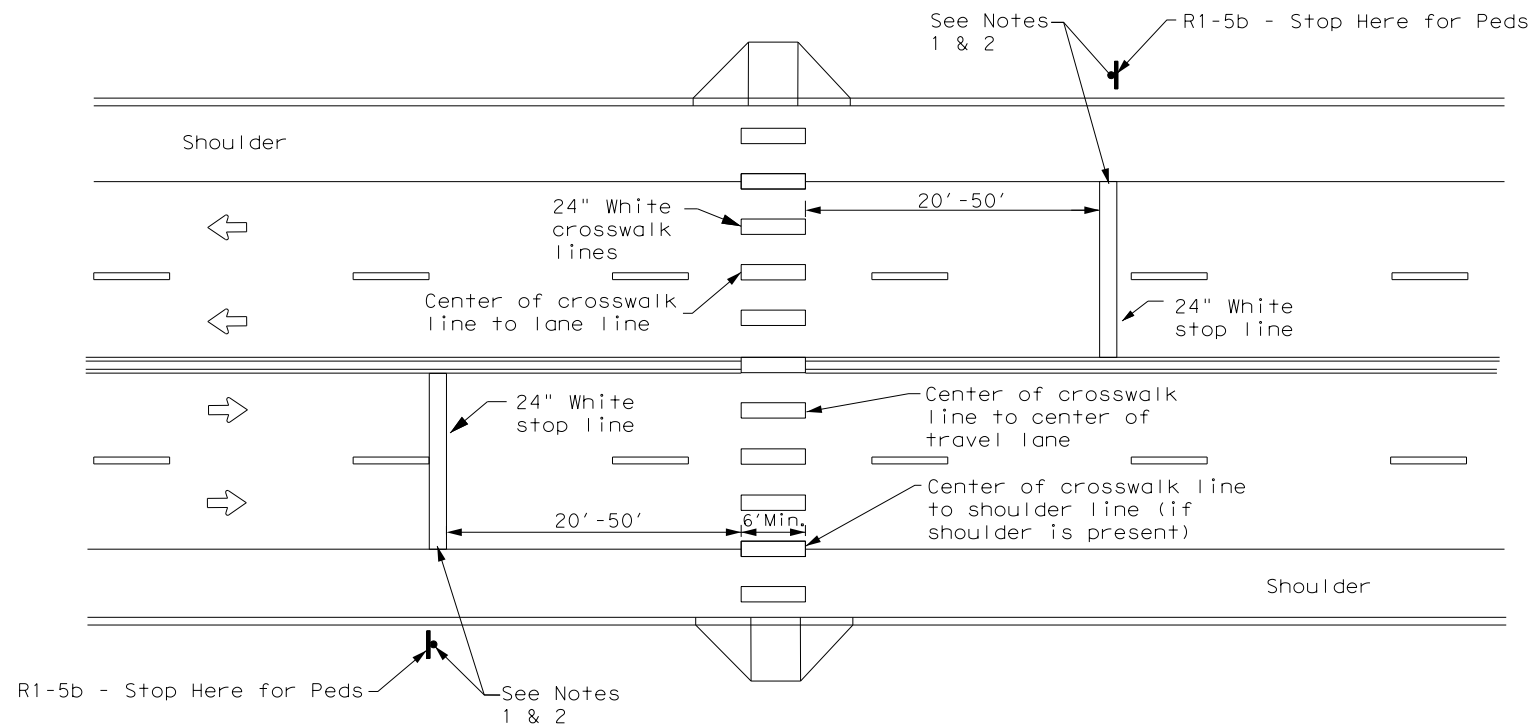
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

GENERAL NOTES

1. Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
2. A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
3. For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
5. Each crosswalk shall be a minimum of 6' wide.
6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
7. Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

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

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



UNSIGNALIZED MID BLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

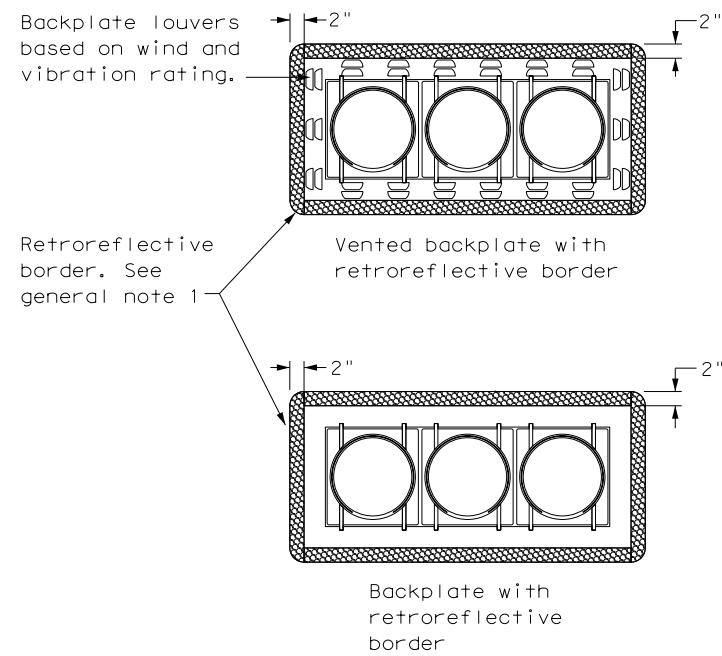
NOTES:

1. Use stop bars with "Stop Here for Pedestrians" signs at unsignalized mid block crosswalks.
2. Use stop bars with "Stop Here on Red" signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.

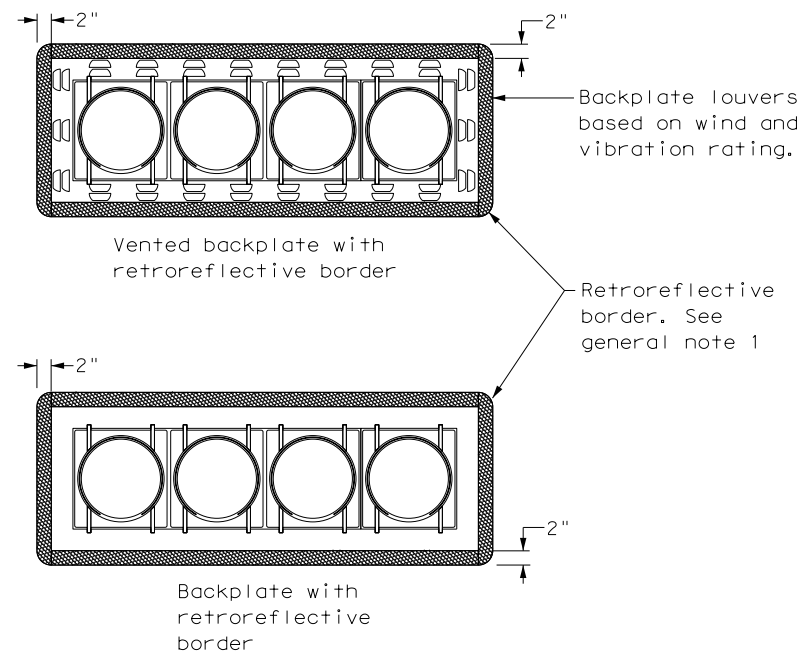
				Traffic Safety Division Standard	
<h2>CROSSWALK PAVEMENT MARKINGS</h2> <h3>PM(4) - 22</h3>					
FILE:	pm4-22.dgn	DN:		CK:	DW:
© TxDOT	June 2020	CONT	SECT	JOB	HIGHWAY
3-22	REVISIONS	0915	12	698, etc	VARIOUS
		DIST	COUNTY	SHEET NO.	
		SAT	BEXAR	81	

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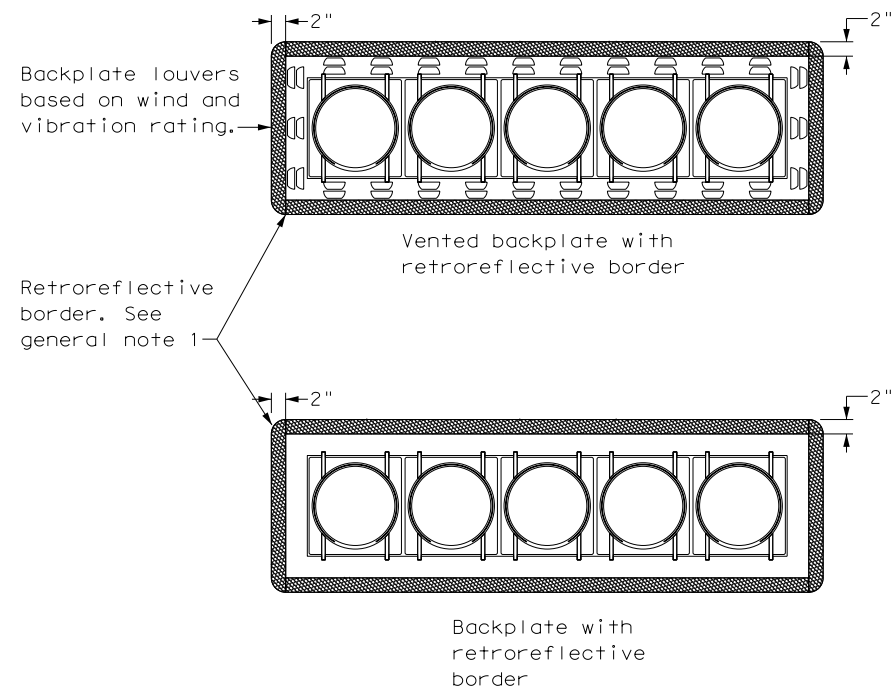
DATE: 10/25/2022 2:15:20 PM
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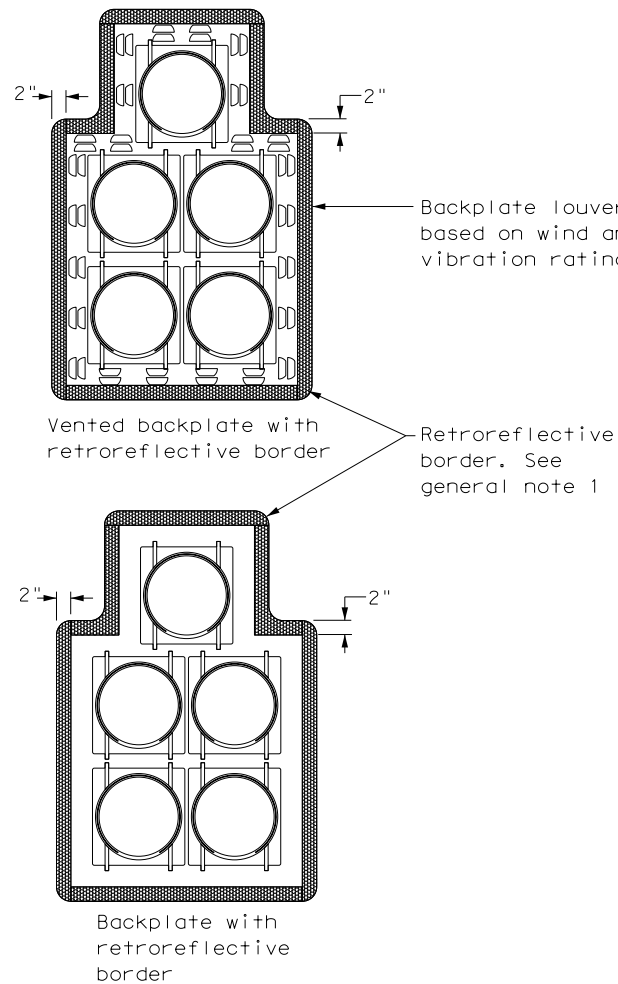
THREE-SECTION HEAD
 HORIZONTAL OR VERTICAL



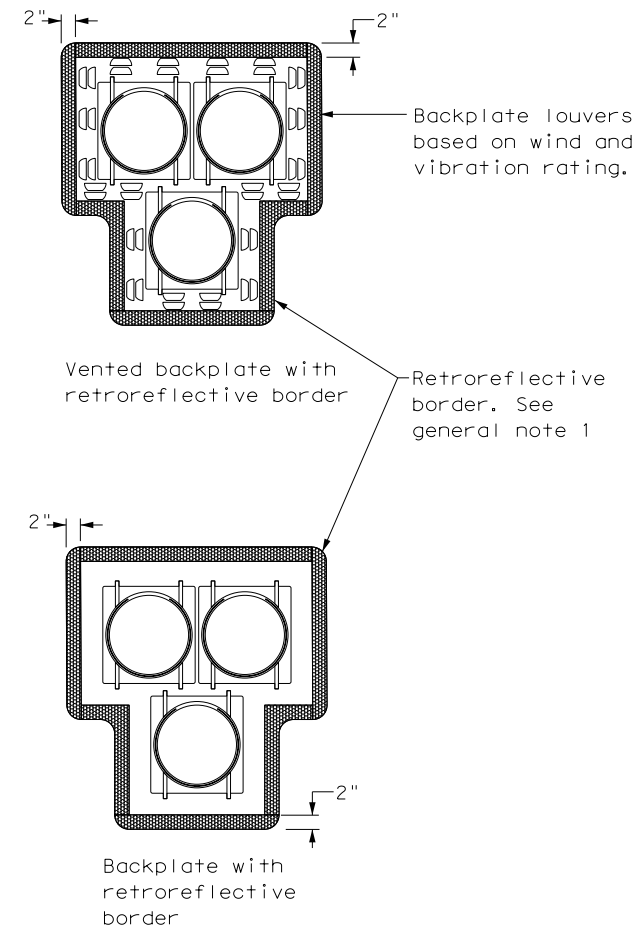
FOUR-SECTION HEAD
 HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
 HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
 CLUSTER



PEDESTRIAN HYBRID
 BEACON

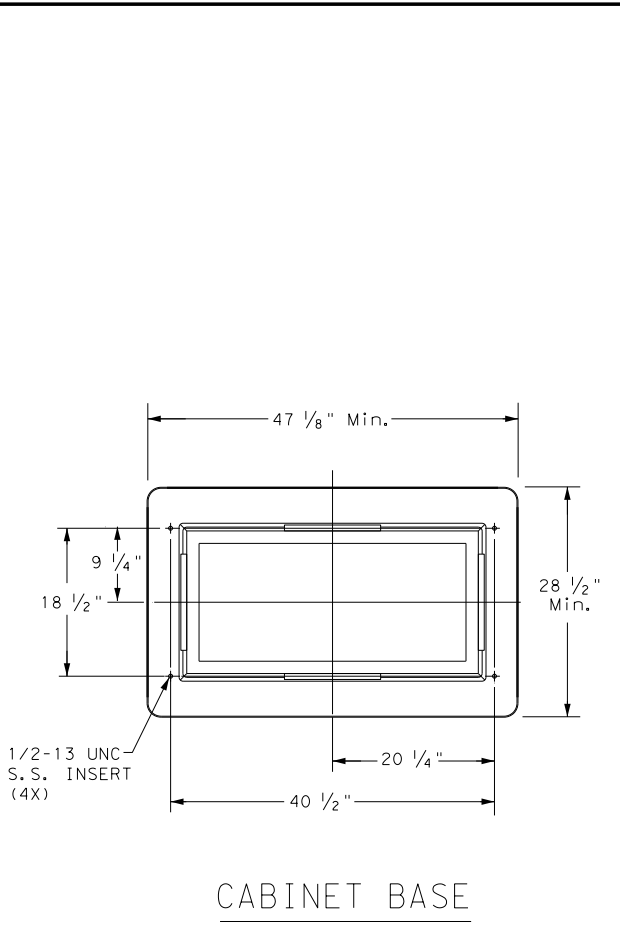
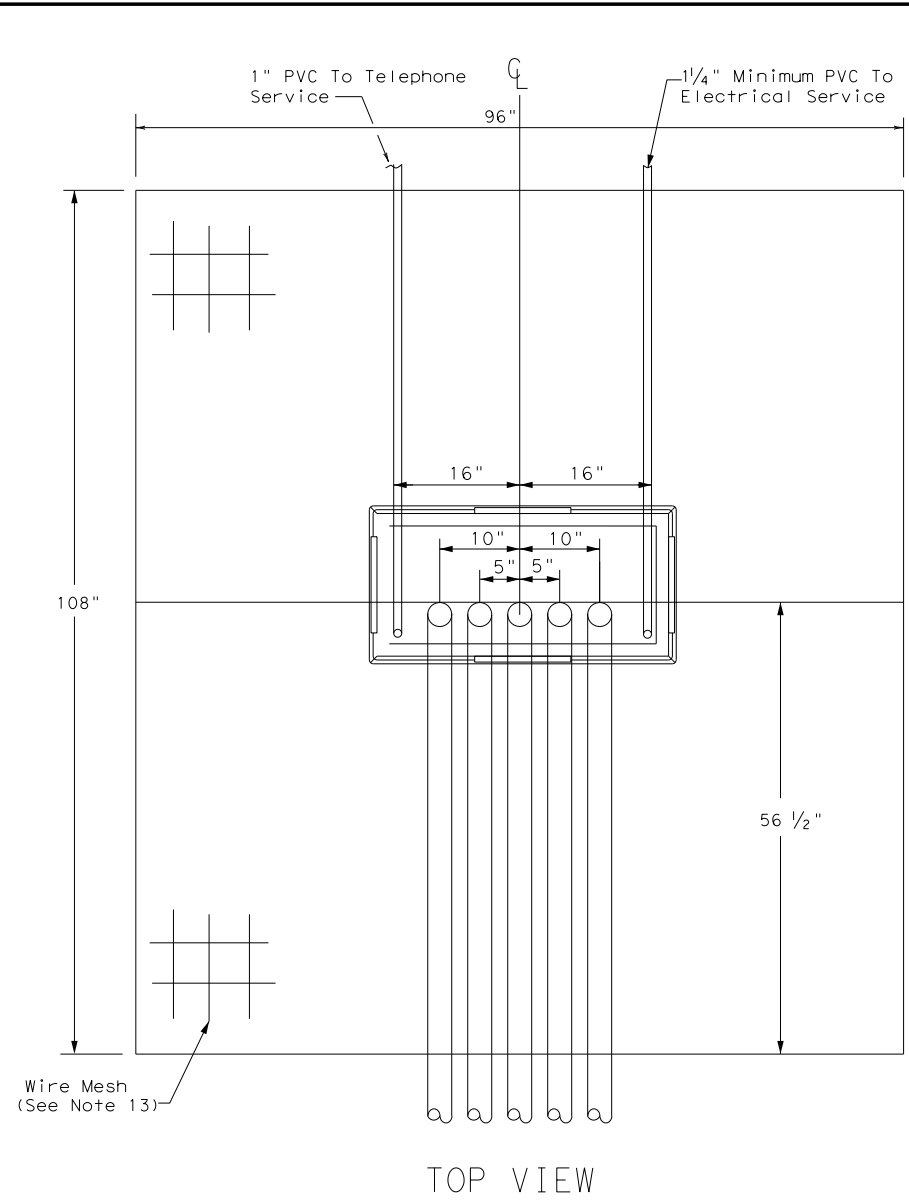
GENERAL NOTES:

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 compatibility 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 <i>Traffic Safety Division Standard</i>	
TRAFFIC SIGNAL HEAD WITH BACKPLATE TS-BP-20					
FILE: ts-bp-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
© TxDOT June 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0915	12	698, etc	VARIOUS	
	DIST	COUNTY	SHEET NO.		
	SAT	BEXAR	82		

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TRAFFIC SIGNAL CONTROLLER BASE:

1. Provide a traffic signal controller base (cabinet base) manufactured of polymer concrete material consisting of calcareous and siliceous stone; glass fibers and thermoset polyester resin. The polymer concrete cabinet base must be reinforced on the inside of the cabinet base with fiberglass matting. Provide one of the following bases: Armorcast Part # A6001848X24, Quazite Model # PG3048Z709, or other as approved by TxDOT Traffic Safety Division.
2. The polymer concrete material must have a minimum compressive strength of 10,300 pounds per square inch (psi), minimum flexural strength of 3600 psi, and minimum shear strength of 3600 psi.
3. The polymer concrete cabinet base must conform to the dimensions shown and must accommodate a standard TxDOT basemount cabinet.
4. Supply the cabinet base with four 1#2"-13 UNC stainless steel inserts for attachment of the cabinet to the base. Inserts must withstand a minimum torque of 50 ft-lb and a minimum straight pull out strength of 750 lbs.
5. Provide the cabinet base with 4 cable racks mounted one on each side of the base 2" to 7" from the top edge of the base. Unless approved otherwise, cable racks must be 1-1/2 x 9#16x 3#16inch steel channel with eight T-slots spaced at 1-1/2 inches. The cable racks must easily accommodate the insertion of tie wraps to attach field wiring to the racks to serve as strain relief. Secure cable racks to the base using 1#2"-13 UNC stainless steel screws and inserts.
6. The cabinet base, when secured to the concrete slab with controller cabinet attached, must withstand a minimum wind load of 125 mph or a 850 lb force applied at 49" above the bottom of the base without causing the base or cabinet to come out of their anchored position or cause any permanent deformation. The manufacturer must supply certification by an independent testing laboratory or sealed by a Texas Licensed Professional Engineer. Provide the cabinet base with hardware for attachment to a concrete slab.
7. The traffic signal base must be permanently marked either by impress or by permanent ink with the manufacturer's model number and name or logo.
8. Seal the base to the concrete with a silicone caulk bead and fastened to the slab per manufacturer's instructions.

CONCRETE SLAB:

9. Traffic signal controller pad must be a portland cement concrete slab poured in place, must conform to the dimensions shown, and must be level.
10. Grade earthwork such that it is flush with the concrete pad on all four sides, unless otherwise shown on the plans. Subsidiary to ITEM 680, four inch rip rap may be used in lieu of earthwork. Slopes shall gradually contour to match plans.
11. Bond a #8 AWG copper ground wire and an 8 ft ground rod bonded to the reinforcing mesh by a suitable UL Listed clamp and terminated to the cabinet grounding bus for the purpose of providing a local ground for the electrical grounding conductor. The electrical grounding conductor specified in Item 680-3.A.4 is required and must be terminated to the cabinet ground bus.
12. Install a PVC sleeve to prevent the ground rod from direct embedment in the slab.
13. Provide welded wire mesh 6X6-W2.9 X W2.9 for reinforcement. Provide joints and splices in the mesh with a minimum 6-inch overlap. Center the mesh between top and bottom and provide a minimum 3 inch cover on the edges.
14. Provide Class B concrete minimum for the slab in accordance with Item 421. Construct the slab in accordance with Item 531.

CONDUITS:

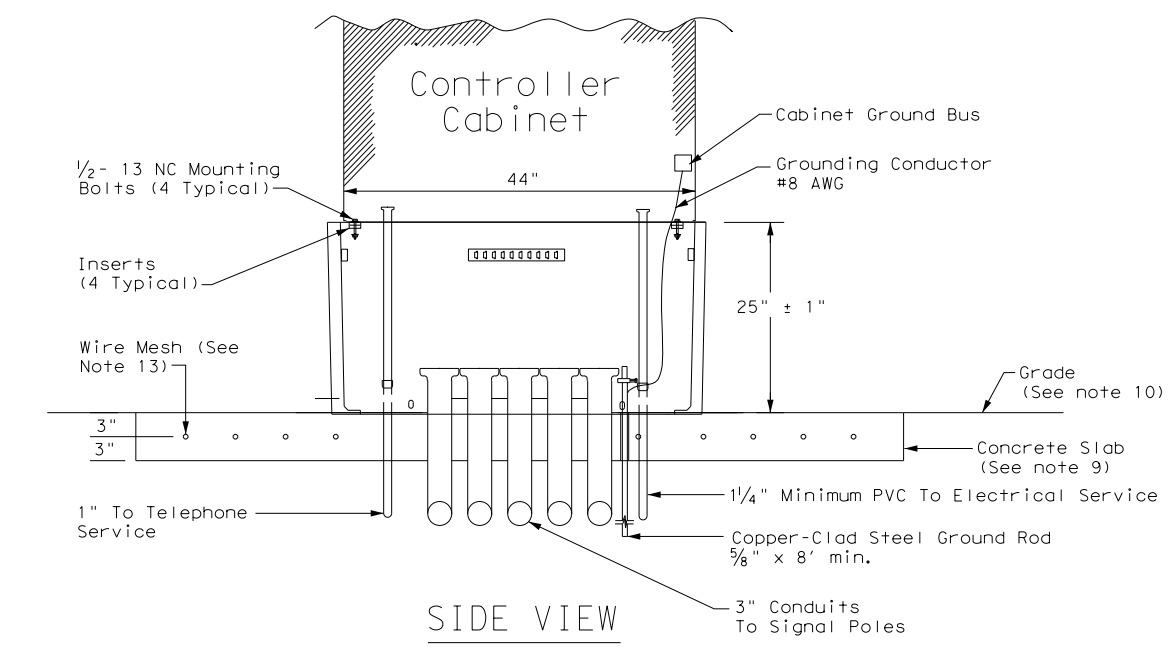
15. Stub up and run 3-inch conduits through the slab to the various traffic signal poles and ground boxes as shown on the layouts. Install the number of conduits as shown on layouts plus two additional 3 inch conduits for future use. Terminate the conduits with a bushing between 2 and 4-inches above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

CONTROLLER CABINET:

19. Anchor the controller cabinet to the base using four stainless steel 1/2-13 NC bolts.
20. The silicone caulk bead specified in Item 680.3.B must be RTV 133.

PAYMENT:

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



		Texas Department of Transportation		Traffic Safety Division Standard	
TRAFFIC SIGNAL CONTROLLER CABINET BASE AND PAD TS-CF-21					
FILE:	ts-cf-21.dgn	DN:	CK:	DW:	CK:
© TxDOT	October 2000	CONT	SECT	JOB	HIGHWAY
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2-21		DIST	COUNTY		SHEET NO.
		SAT	BEXAR		83

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SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type _____

- FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
- TWT = Thin-Walled Tubing (see SMD(TWT))
- 10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
- S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2) _____

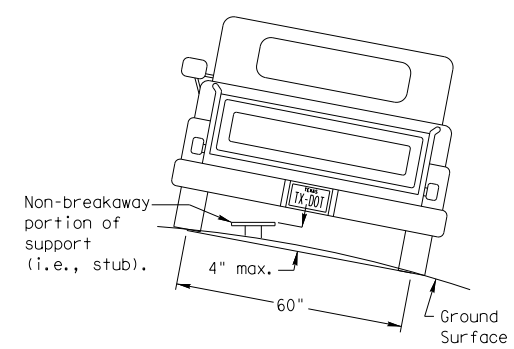
Anchor Type _____

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

Sign Mounting Designation _____

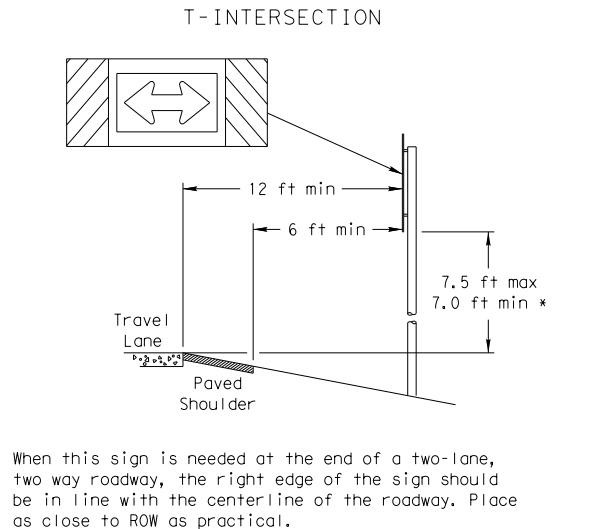
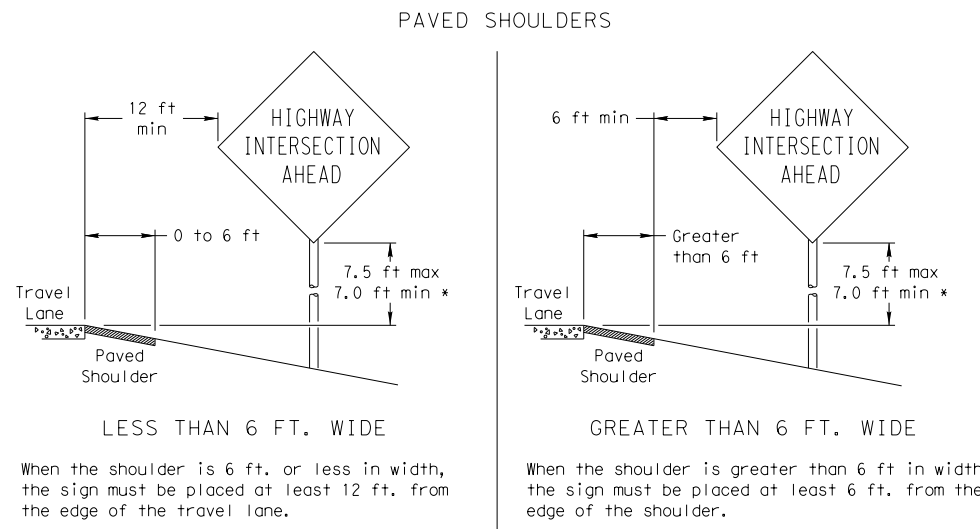
- P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
- T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
- U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
- IF REQUIRED
- 1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
- BM = Extruded Wind Beam (see SMD(SLIP-1)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

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT

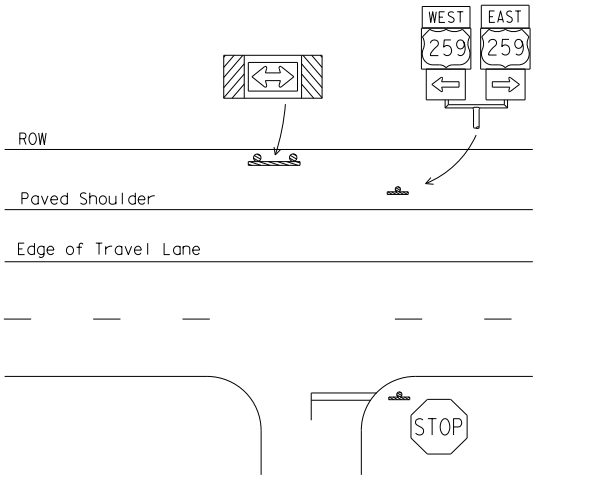
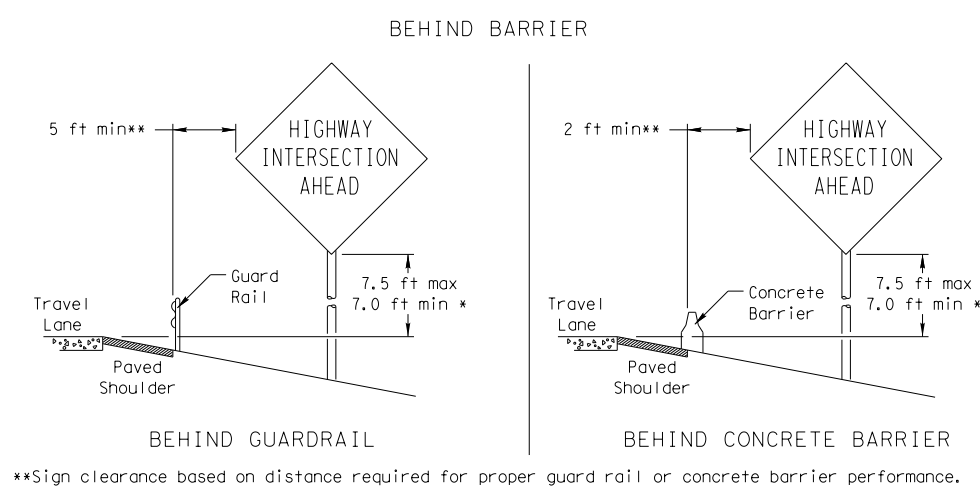
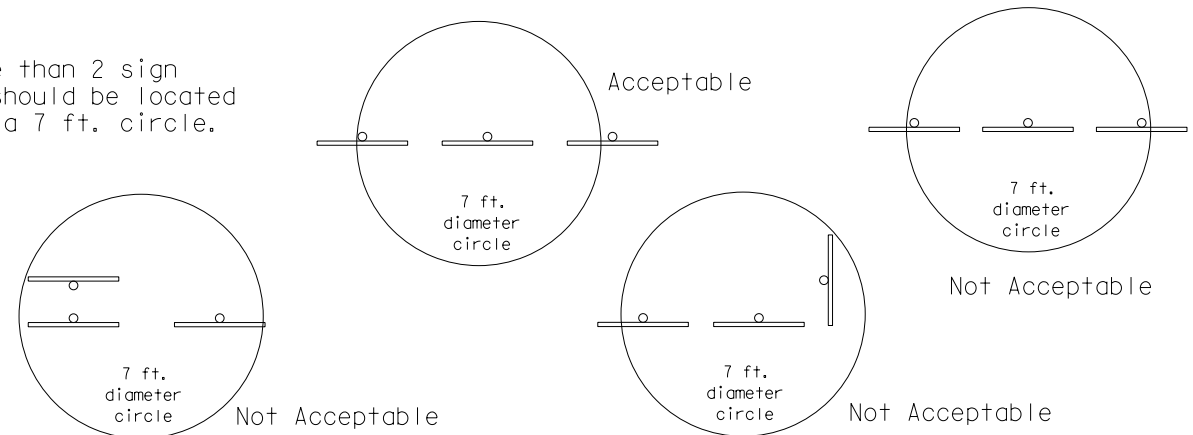


To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

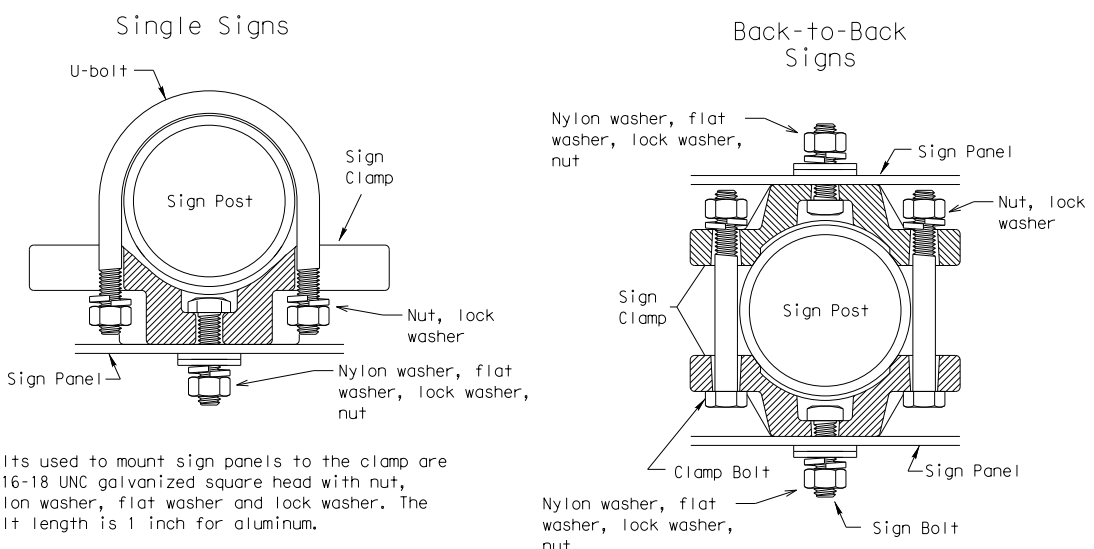
SIGN LOCATION



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



TYPICAL SIGN ATTACHMENT DETAIL



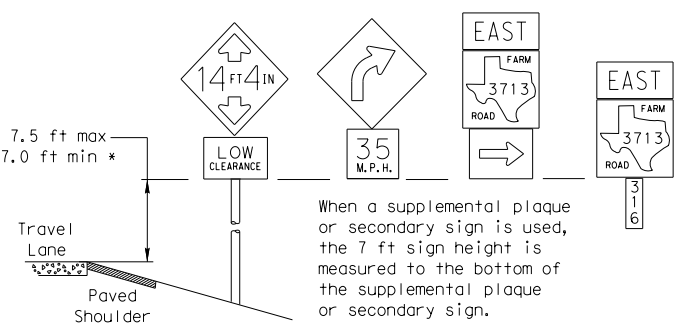
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

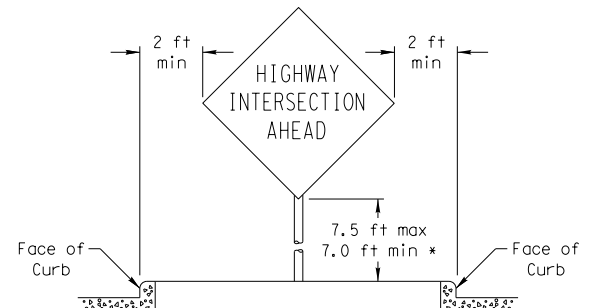
Sign clamps may be either the specific size clamp or the universal clamp.

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

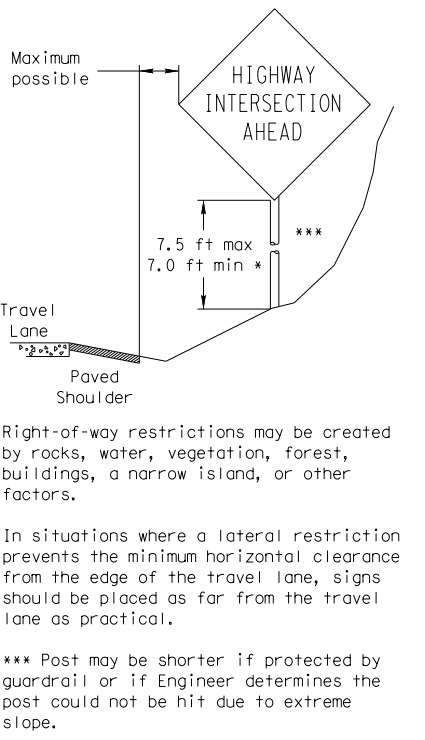
SIGNS WITH PLAQUES



CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

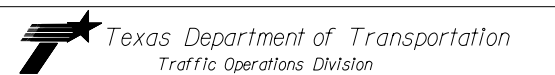


Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

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

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

- * Signs shall be mounted using the following condition that results in the greatest sign elevation:
 - (1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or
 - (2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.
- The maximum values may be increased when directed by the Engineer.
- See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.
- The website address is: <http://www.txdot.gov/publications/traffic.htm>



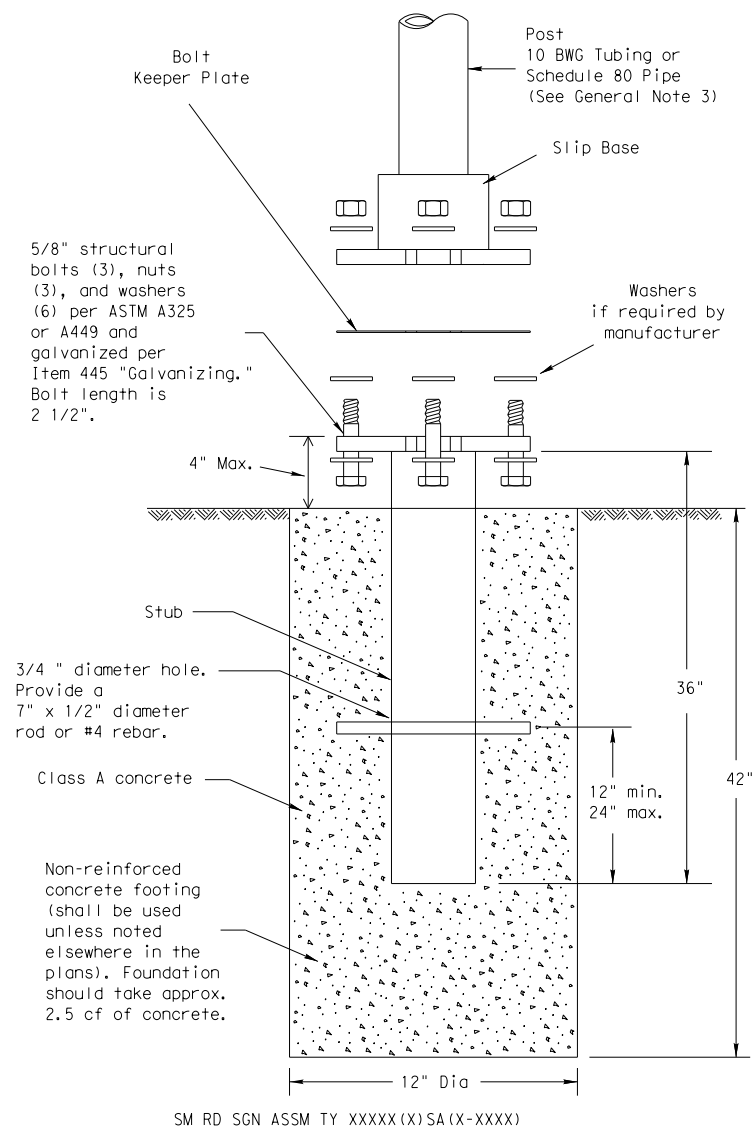
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

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TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



NOTE

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

GENERAL NOTES:

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

ASSEMBLY PROCEDURE

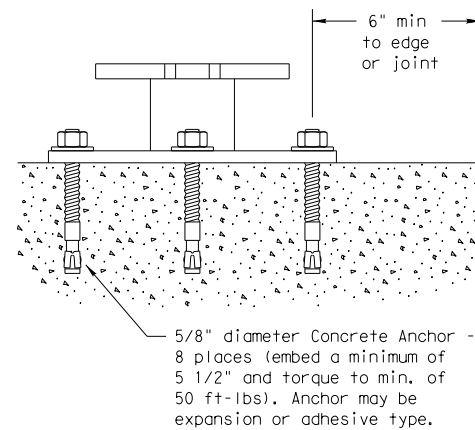
Foundation

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

Support

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

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxyes and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.



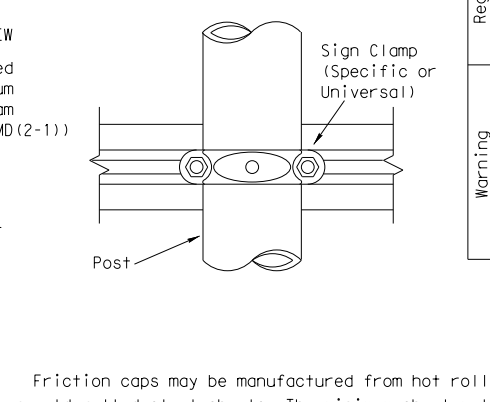
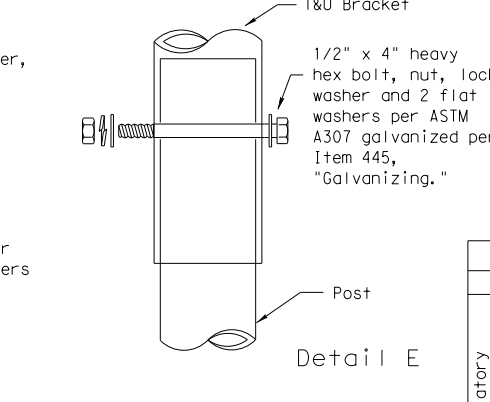
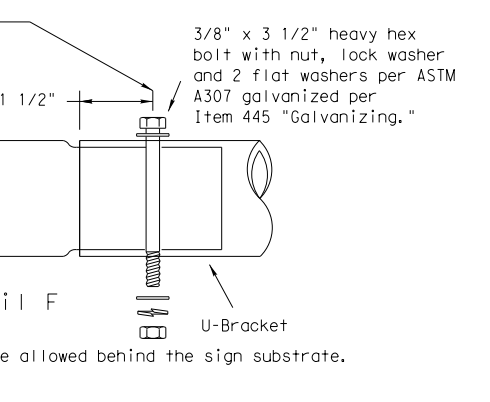
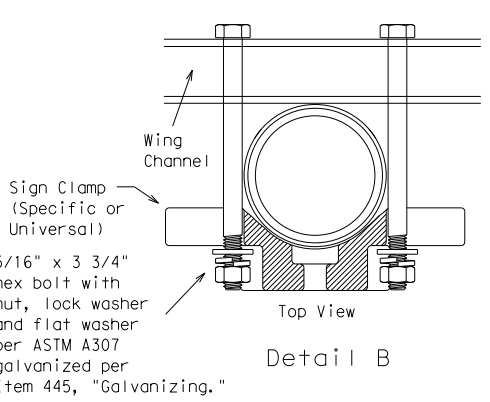
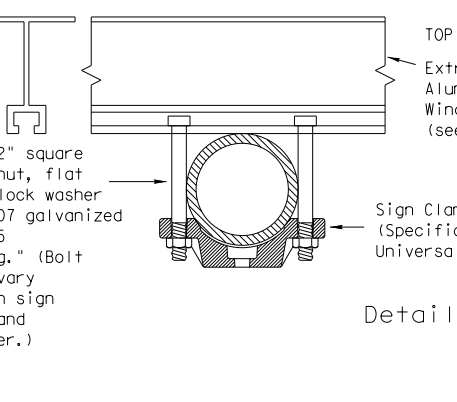
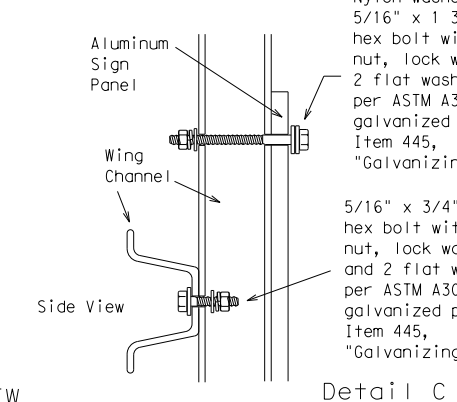
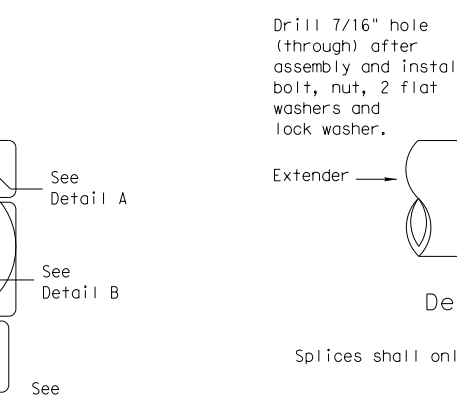
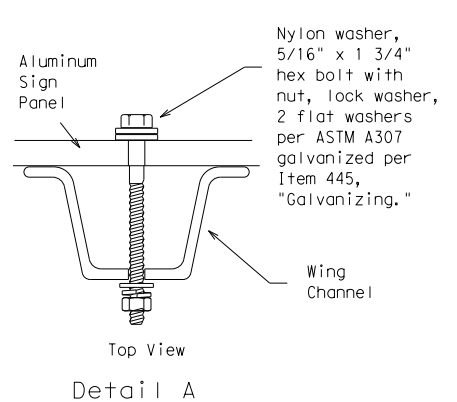
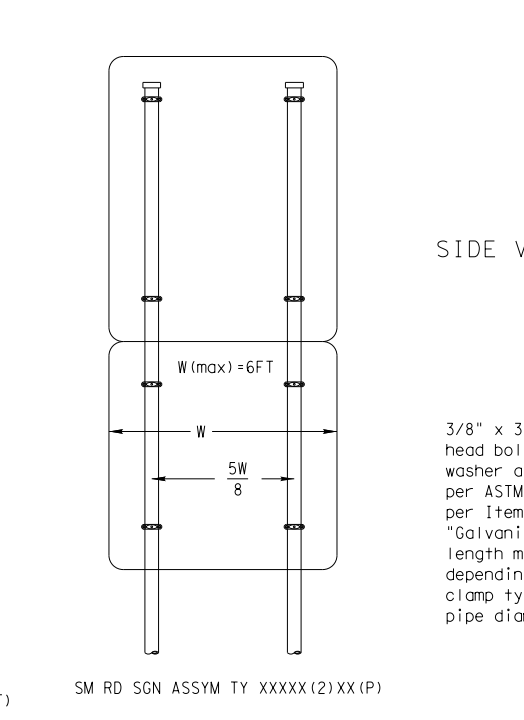
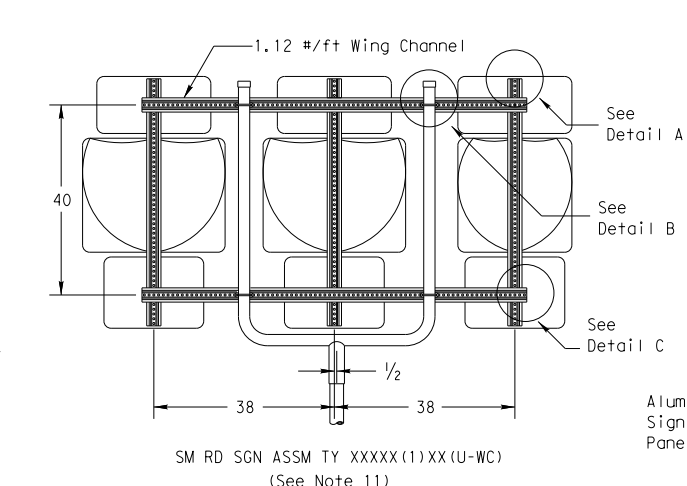
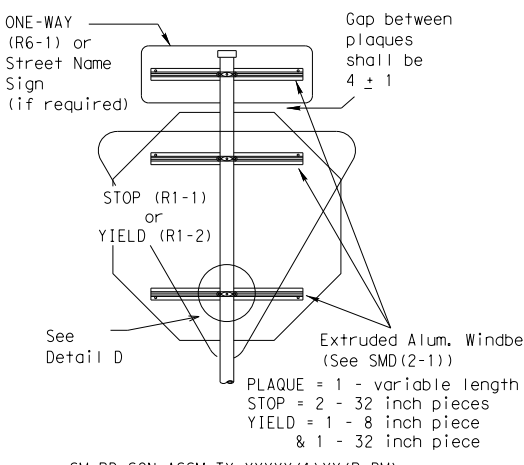
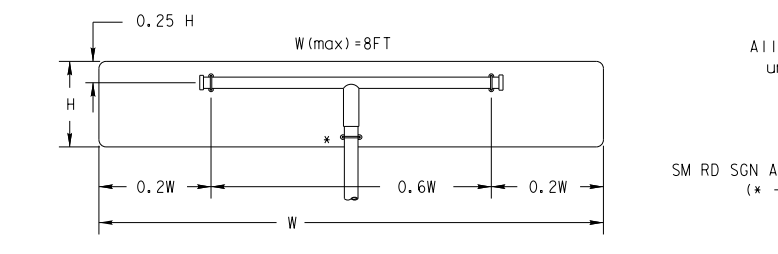
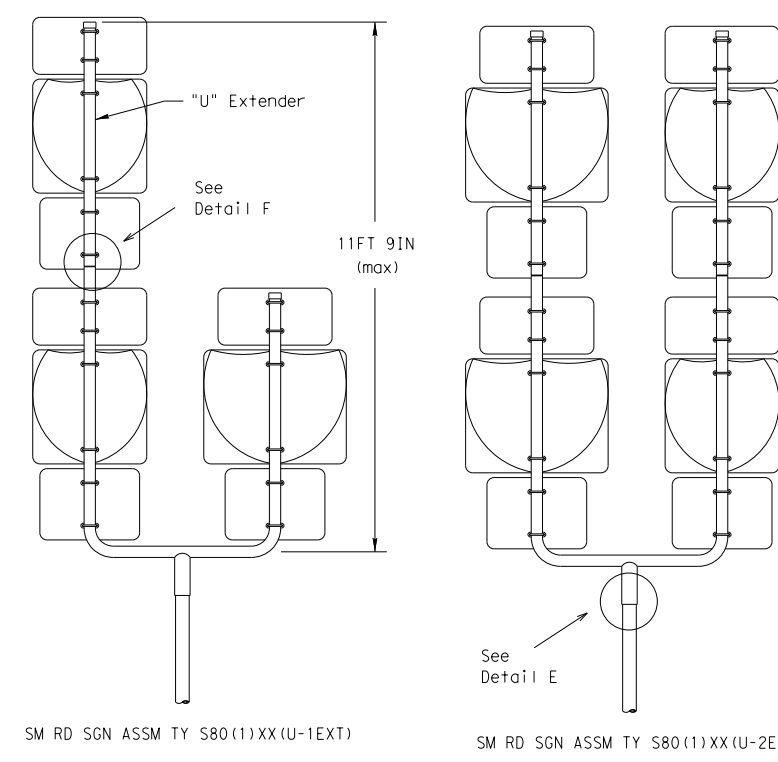
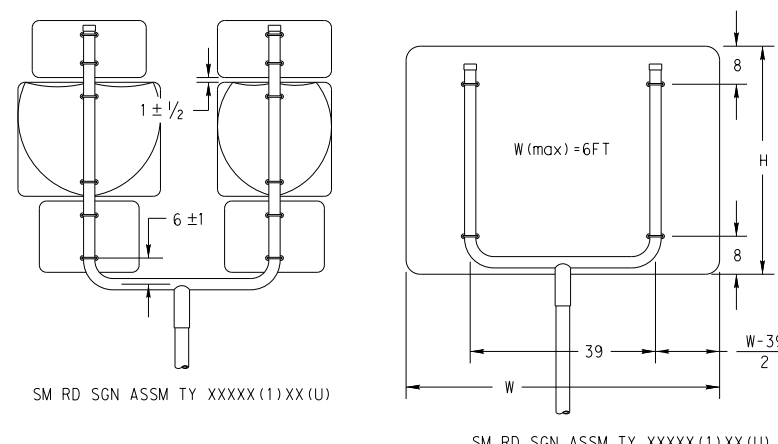
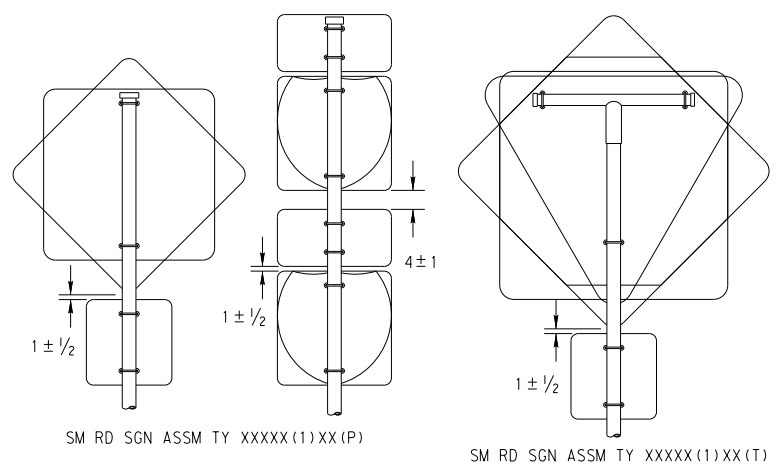
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

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All dimensions are in english unless detailed otherwise.

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

GENERAL NOTES:

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

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM
SMD(SLIP-2)-08

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

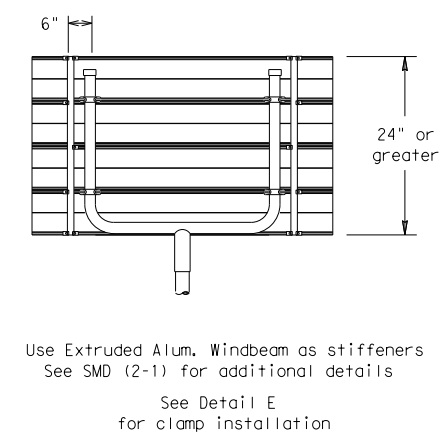
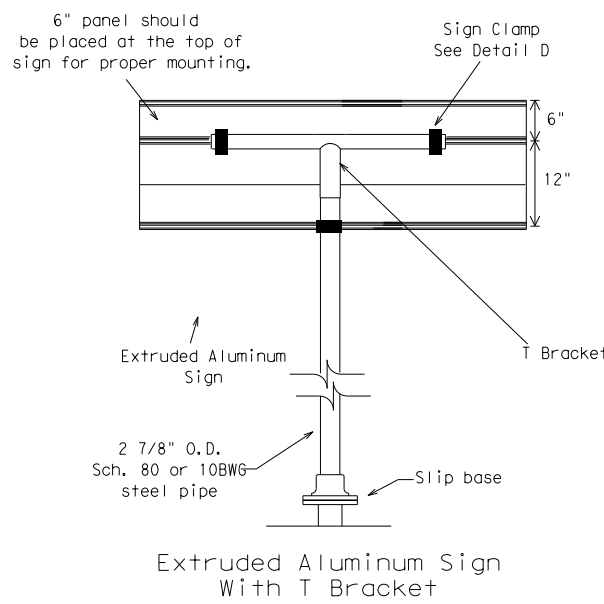
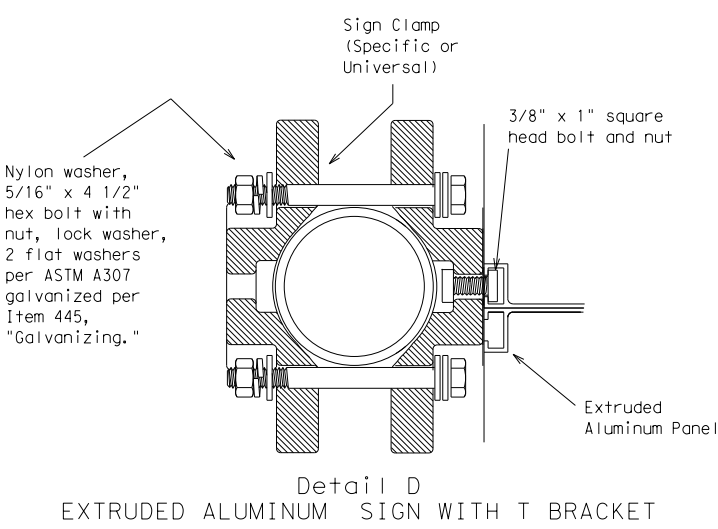
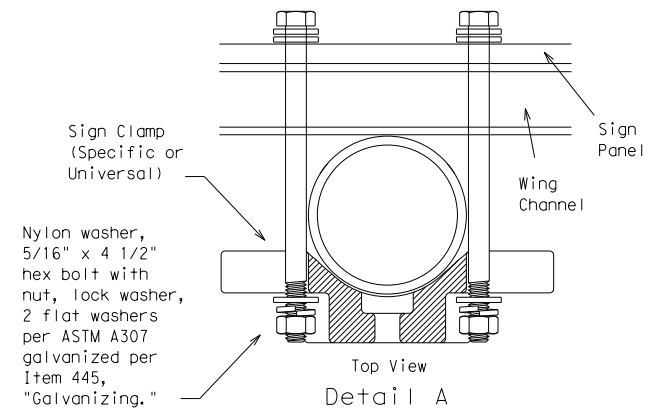
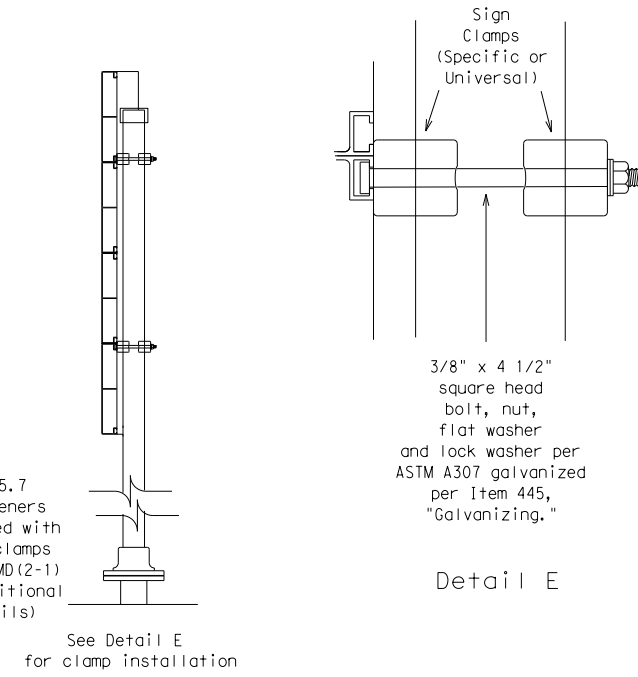
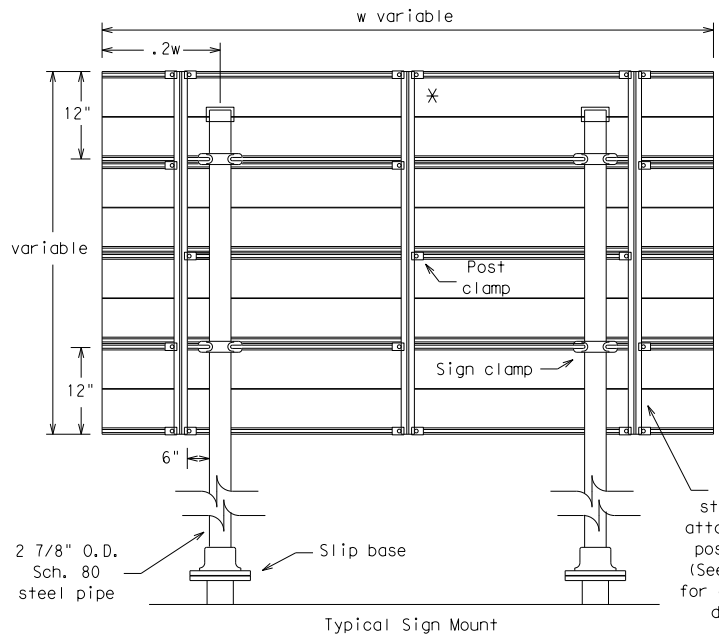
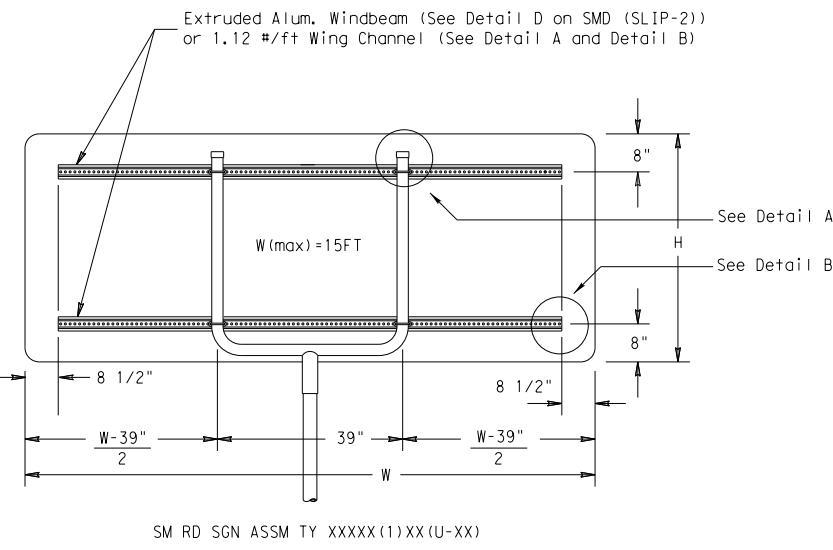
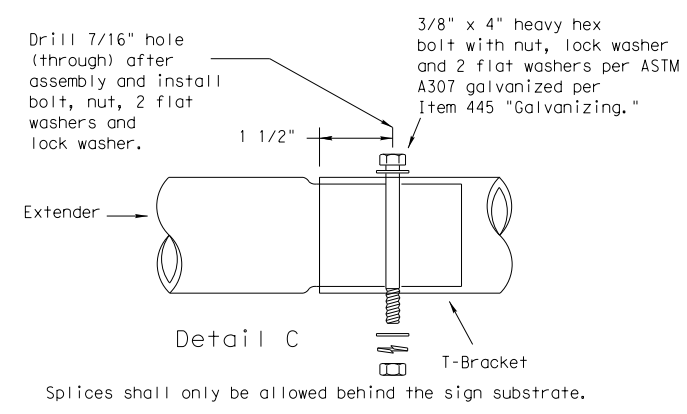
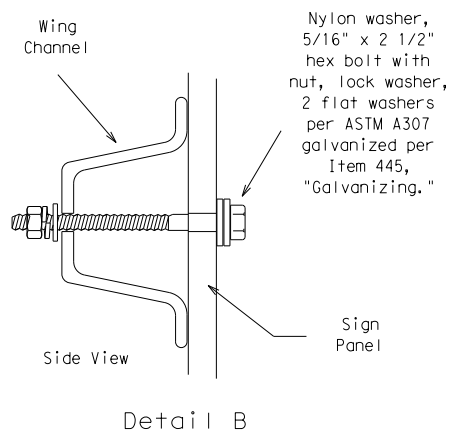
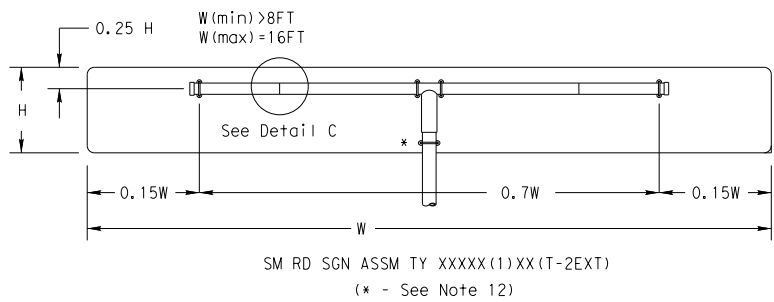
The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free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

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

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GENERAL NOTES:

- | SIGN SUPPORT | # OF POSTS | MAX. SIGN AREA |
|--------------|------------|----------------|
| 10 BWG | 1 | 16 SF |
| 10 BWG | 2 | 32 SF |
| Sch 80 | 1 | 32 SF |
| Sch 80 | 2 | 64 SF |
- The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
- Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
- Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
- For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
- When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
- Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
- Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
- Sign blanks shall be the sizes and shapes shown on the plans.
- Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
- Post open ends shall be fitted with Friction Caps.

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



SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM
SMD(SLIP-3) -08

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9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		0915	12	698, etc	VARIOUS
		DIST	COUNTY		SHEET NO.
		SAT	BEXAR		87

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I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit (CGP) required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

No Action Required Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000.
2. Comply with the Storm Water Pollution Prevention Plan (SW3P) and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and Texas Commission on Environmental Quality (TCEQ), Environmental Protection Agency (EPA) or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, Contractor shall submit Notice of Intent (NOI) to TCEQ and the Engineer.
5. NOI required: Yes No

Note: If amount of soil disturbance changes, permit requirements may change.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

US Army Corps of Engineers (USACE) Permit required for filling, dredging, excavating or other work in any potential USACE jurisdictional water, such as, rivers, creeks, streams, or wetlands.

The Contractor shall adhere to all of the terms and conditions associated with the following permit(s):

- No Permit Required
- Nationwide Permit (NWP) 14 - Pre-construction Notice (PCN) not Required
- Nationwide Permit 14 - PCN Required
- Individual 404 Permit Required
- Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices (BMPs) planned to control erosion, sedimentation and post-project total suspended solids (TSS).

- 1.
- 2.
- 3.
- 4.

401 Best Management Practices: (Not applicable if no USACE permit)

Erosion	Sedimentation	Post-Construction TSS
<input type="checkbox"/> Temporary Vegetation	<input type="checkbox"/> Silt Fence	<input type="checkbox"/> Vegetative Filter Strips
<input type="checkbox"/> Blankets/Matting	<input type="checkbox"/> Rock Berm	<input type="checkbox"/> Retention/Irrigation Systems
<input type="checkbox"/> Mulch	<input type="checkbox"/> Triangular Filter Dike	<input type="checkbox"/> Extended Detention Basin
<input type="checkbox"/> Sodding	<input type="checkbox"/> Sand Bag Berm	<input type="checkbox"/> Constructed Wetlands
<input type="checkbox"/> Interceptor Swale	<input type="checkbox"/> Straw Bale Dike	<input type="checkbox"/> Wet Basin
<input type="checkbox"/> Diversion Dike	<input type="checkbox"/> Brush Berms	<input type="checkbox"/> Erosion Control Compost
<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Mulch Filter Berm and Socks
<input type="checkbox"/> Mulch Filter Berm and Socks	<input type="checkbox"/> Mulch Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks
<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Vegetation Lined Ditches
	<input type="checkbox"/> Stone Outlet Sediment Traps	<input type="checkbox"/> Sand Filter Systems
	<input type="checkbox"/> Sediment Basins	<input type="checkbox"/> Sedimentation Chambers
		<input type="checkbox"/> Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

No Action Required Required Action

Action No.

1. If a historic resource (concrete stamp, carriage block, metal fixture, tile, masonry, etc.) is found that is not in the plans or has not been previously assessed, contact COSA PWD EMD immediately at (210) 207-1454.
2. At the San Pedro-Sahara intersection: Ensure that protective barriers (i.e., orange construction barrel(s)) be placed around the planters during construction.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical. Contractor must adhere to Construction Specification Requirements Specs 162,164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

No Action Required Required Action

Action No.

- 1.
- 2.
- 3.
- 4.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

No Action Required Required Action

Action No.

1. MIGRATORY BIRD NESTS: Schedule construction activities as needed to meet the following requirements:

- A. Do not remove or destroy any active migratory bird nests (nests containing eggs and/or flightless birds) at any time of year. If there are any active nests, they shall not be removed until the nests become inactive.
- B. On/in structures, if there are any active nests, they shall not be removed until all nests become inactive. After inactive nests are removed and/or before nest activity begins, deterrent materials may be applied to the structures to prevent future nest building.

2. See Item 5 in General Notes.
- 3.
- 4.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediated area, and contact the Engineer immediately.

For San Pedro Ave at Sahara Dr: Karst Zone 3:

If any sensitive feature (caves, subsurface voids, etc) is discovered during construction, all construction activities near the sensitive feature must be suspended immediately. The Construction Inspector shall be immediately notified of any sensitive features encountered during construction. The construction activities near the sensitive feature may not proceed until a US Fish and Wildlife Service (USFWS) permitted biologist has assessed the site for evidence of habitat or listed endangered species. If it is determined that endangered species or their habitat is present within the void space, consultations with the USFWS will commence and work within the immediate vicinity of the sensitive feature will not be allowed to proceed until USFWS approval has been received.

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

- * Dead or distressed vegetation (not identified as normal)
- * Trash piles, drums, canister, barrels, etc.
- * Undesirable smells or odors
- * Evidence of leaching or seepage of substances

Hazardous Materials or Contamination Issues Specific to this Project:

No Action Required Required Action

Action No.

- 1.
- 2.
- 3.

Does the project involve the demolition of a span bridge?

Yes No (No further action required)

If "Yes", a pre-demolition notification must be submitted to the Texas Department of State Health Services. The contractor shall contact TxDOT's Project Engineer 25 calendar days prior to the demolition of the bridges(s) on the project to assist with the notification.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

No Action Required Required Action

Action No.

- 1.

PREPARED BY COREY S. BENAVIDEZ, PE

ON 09/01/2022



**ENVIRONMENTAL PERMITS,
ISSUES AND COMMITMENTS
EPIC**

FILE: epic_2015-10-09_SAT.dgn	DN: TxDOT	CK: TxDOT	DW: BW	CK: GAG
© TxDOT OCTOBER 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0915	12	698	VARIOUS
	DIST	COUNTY	SHEET NO.	
	SAT	BEXAR	88	

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept at the appropriate TxDOT Area Office.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0915-12-698, etc

1.2 PROJECT LIMITS:

From: On San Pedro Ave at Sahara Dr, Etc

To: _____

1.3 PROJECT COORDINATES:

BEGIN: (Lat)_____,(Long)_____

END: (Lat)_____,(Long)_____

1.4 TOTAL PROJECT AREA (Acres): 0.1

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.1

1.6 NATURE OF CONSTRUCTION ACTIVITY:

Traffic Signal Improvements

1.7 MAJOR SOIL TYPES:

Soil Type	Description
N/A	

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- PSLs determined during preconstruction meeting
- PSLs determined during construction
- No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:

(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

- Mobilization
- Install sediment and erosion controls
- Blade existing topsoil into windrows, prep ROW, clear and grub
- Remove existing pavement
- Grading operations, excavation, and embankment
- Excavate and prepare subgrade for proposed pavement widening
- Remove existing culverts, safety end treatments (SETs)
- Remove existing metal beam guard fence (MBGF), bridge rail
- Install proposed pavement per plans
- Install culverts, culvert extensions, SETs
- Install mow strip, MBGF, bridge rail
- Place flex base
- Rework slopes, grade ditches
- Blade windrowed material back across slopes
- Revegetation of unpaved areas
- Achieve site stabilization and remove sediment and erosion control measures

Other: _____

Other: _____

Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- Sediment laden stormwater from stormwater conveyance over disturbed area
- Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- Solvents, paints, adhesives, etc. from various construction activities
- Transported soils from offsite vehicle tracking
- Construction debris and waste from various construction activities
- Contaminated water from excavation or dewatering pump-out water
- Sanitary waste from onsite restroom facilities
- Trash from various construction activities/receptacles
- Long-term stockpiles of material and waste
- Other: _____
- Other: _____
- Other: _____

1.11 RECEIVING WATERS:

Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
N/A	

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- Development of plans and specifications
- Perform SWP3 inspections
- Maintain SWP3 records and update to reflect daily operations
- Other: _____
- Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- Day To Day Operational Control
- Maintain schedule of major construction activities
- Install, maintain and modify BMPs
- Other: _____
- Other: _____



STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

FED. RD. DIV. NO.	PROJECT NO.			SHEET NO.
	STP 2023 (535) HESG			89
STATE	STATE DIST.	COUNTY		
TEXAS	SAT	Bexar		
CONT.	SECT.	JOB	HIGHWAY NO.	
0915	12	698, etc	Various	

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- Protection of Existing Vegetation
- Vegetated Buffer Zones
- Soil Retention Blankets
- Geotextiles
- Mulching/ Hydromulching
- Soil Surface Treatments
- Temporary Seeding
- Permanent Planting, Sodding or Seeding
- Biodegradable Erosion Control Logs
- Rock Filter Dams/ Rock Check Dams
- Vertical Tracking
- Interceptor Swale
- Riprap
- Diversion Dike
- Temporary Pipe Slope Drain
- Embankment for Erosion Control
- Paved Flumes
- Other: _____
- Other: _____
- Other: _____
- Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- Biodegradable Erosion Control Logs
- Dewatering Controls
- Inlet Protection
- Rock Filter Dams/ Rock Check Dams
- Sandbag Berms
- Sediment Control Fence
- Stabilized Construction Exit
- Floating Turbidity Barrier
- Vegetated Buffer Zones
- Vegetated Filter Strips
- Other: _____
- Other: _____
- Other: _____
- Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To
N/A		

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- Excess dirt/mud on road removed daily
- Haul roads dampened for dust control
- Loaded haul trucks to be covered with tarpaulin
- Stabilized construction exit
- Other: _____

- Other: _____
- Other: _____
- Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- Chemical Management
- Concrete and Materials Waste Management
- Debris and Trash Management
- Dust Control
- Sanitary Facilities
- Other: _____
- Other: _____
- Other: _____
- Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To
N/A		

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

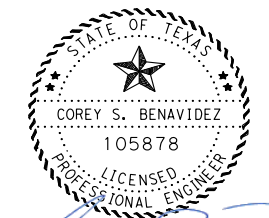
- Fire hydrant flushings
- Irrigation drainage
- Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- Potable water sources
- Springs
- Uncontaminated groundwater
- Water used to wash vehicles or control dust
- Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.

2.9 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.



Corey Benavidez
01/04/2023

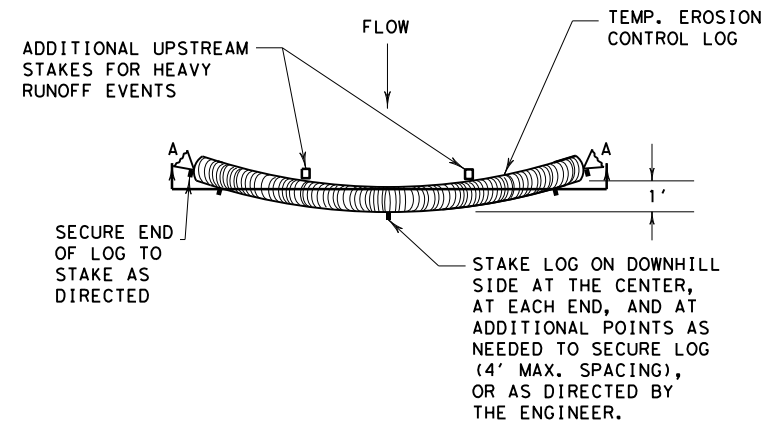
STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)



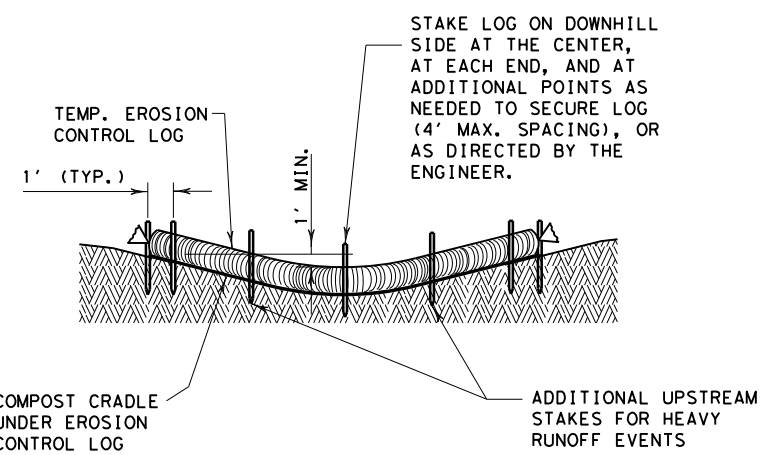
FED. RD. DIV. NO.		PROJECT NO.		SHEET NO.
		STP 2023 (535) HESG		89A
STATE	STATE DIST.	COUNTY		
TEXAS	SAT	Bexar		
CONT.	SECT.	JOB	HIGHWAY NO.	
0915	12	698, etc	Various	

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DATE:
FILE:



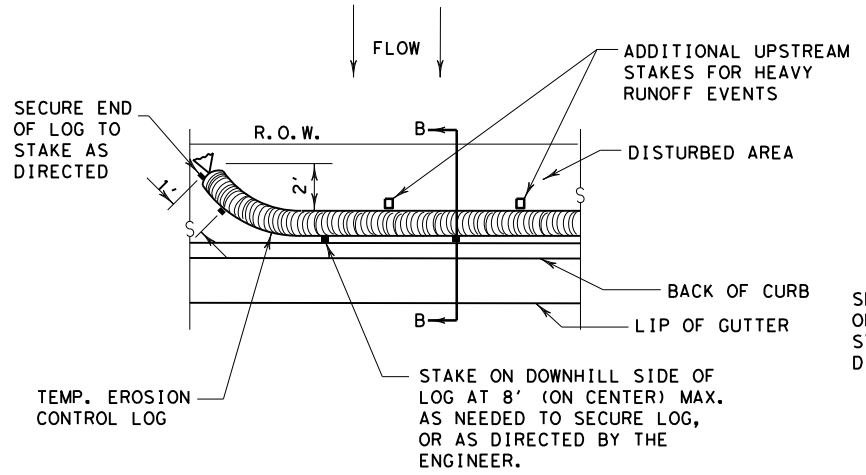
PLAN VIEW



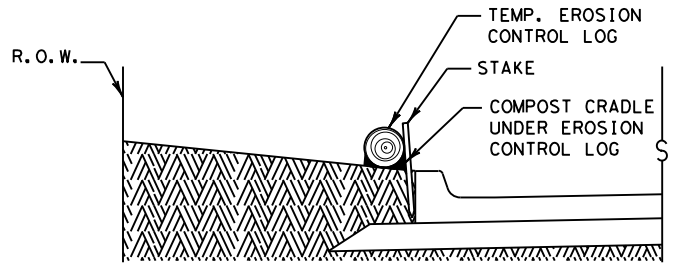
SECTION A-A

EROSION CONTROL LOG DAM

CL-D



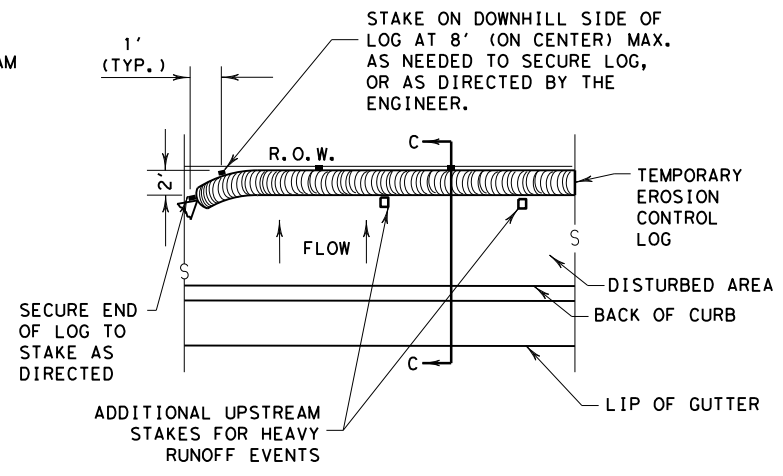
PLAN VIEW



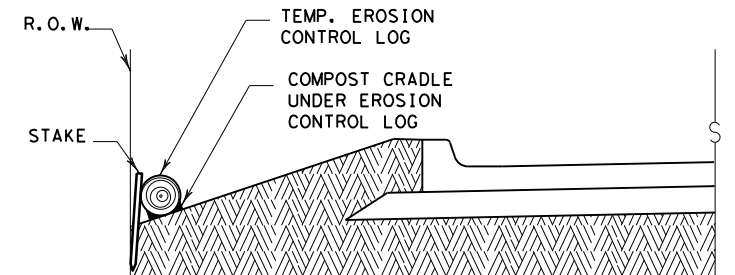
SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



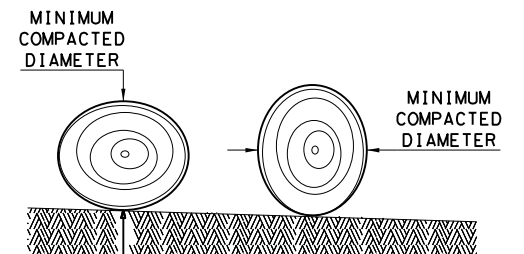
PLAN VIEW



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

SHEET 1 OF 3

		<i>Design Division Standard</i>	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES EROSION CONTROL LOG EC (9) - 16			
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT
© TxDOT: JULY 2016	CONT	SECT	JOB
REVISIONS	0915	12	698
	DIST	COUNTY	SHEET NO.
	SAT	BEXAR	90

SEDIMENT BASIN & TRAP USAGE GUIDELINES

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

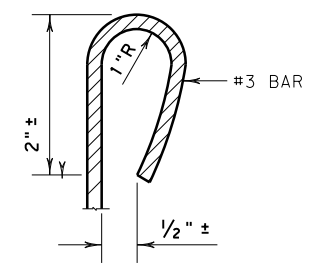
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

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

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

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

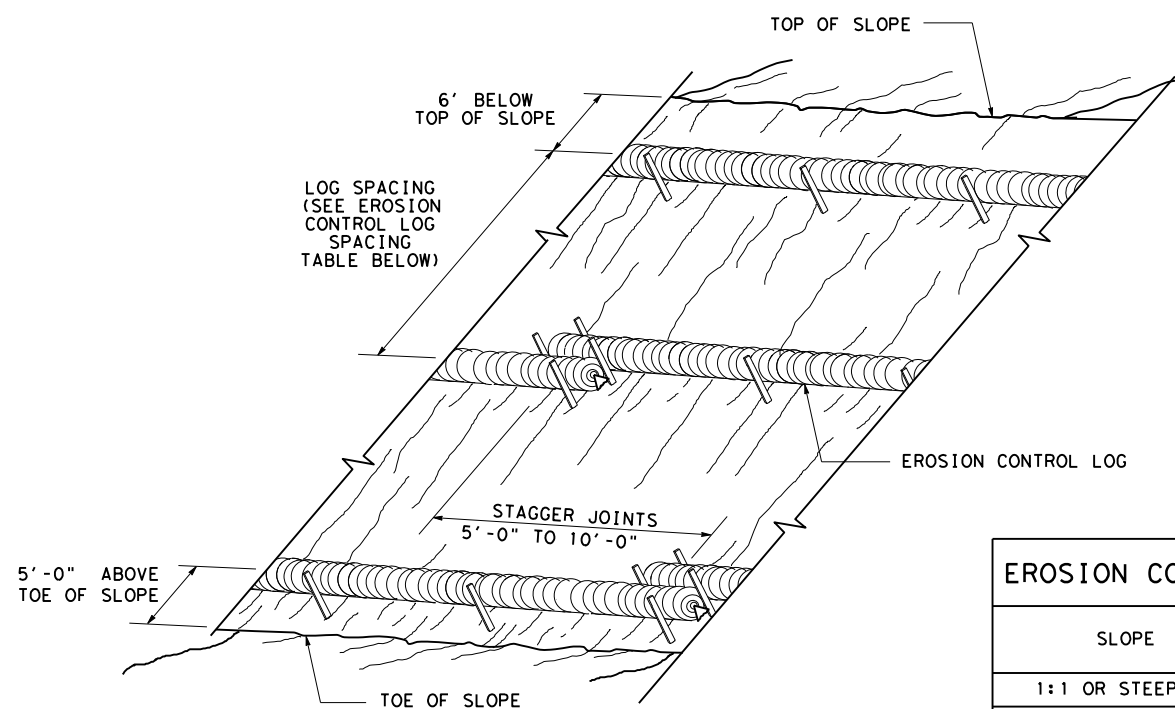


REBAR STAKE DETAIL

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

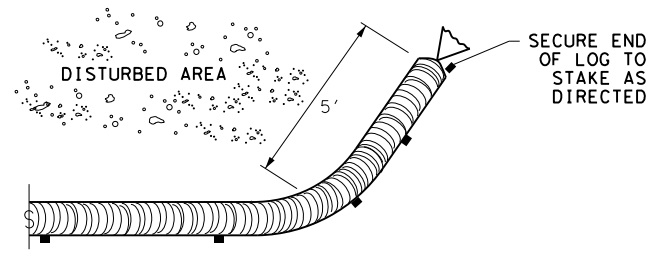
- GENERAL NOTES:**
1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
 2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
 3. UNLESS OTHERWISE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

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**EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING**

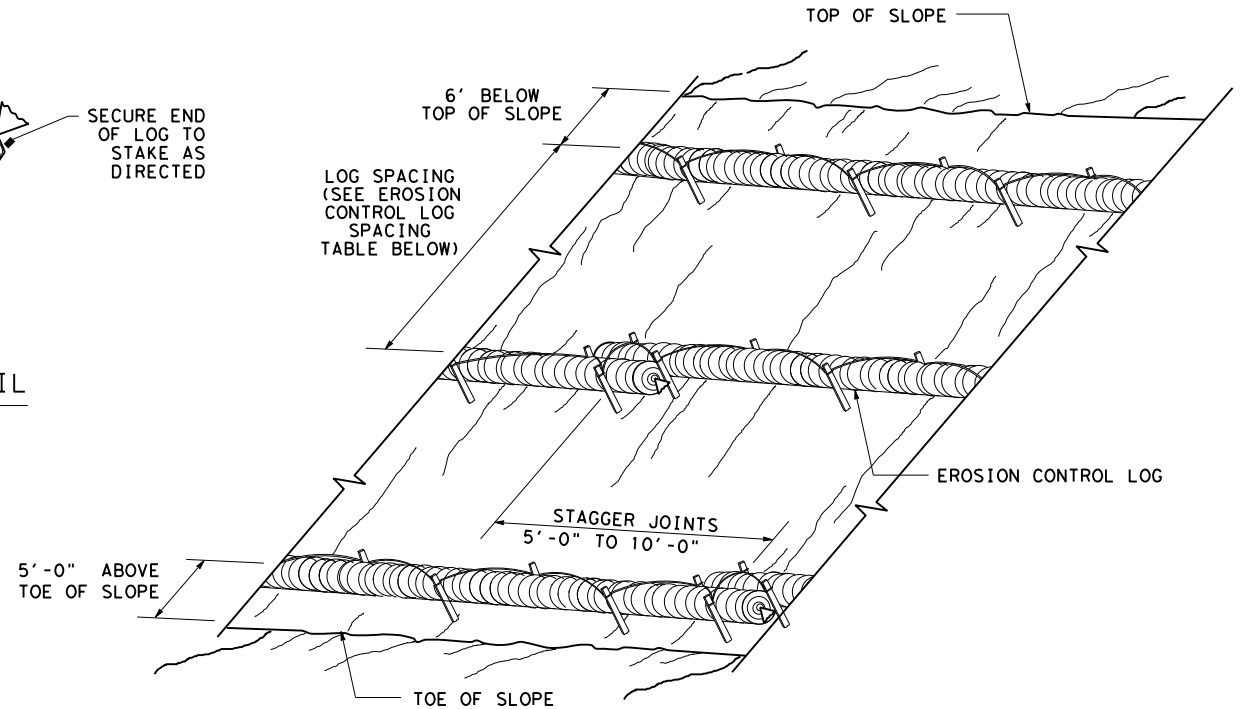
CL-SST



END SECTION RAP DETAIL

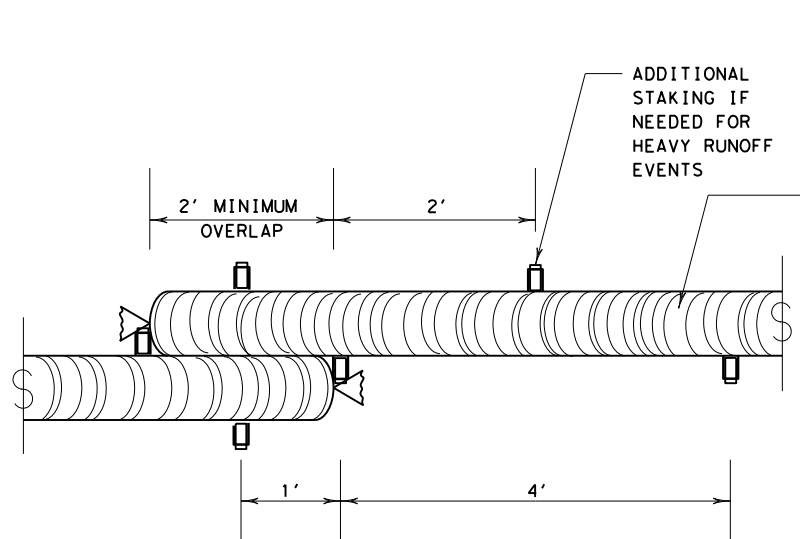
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

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



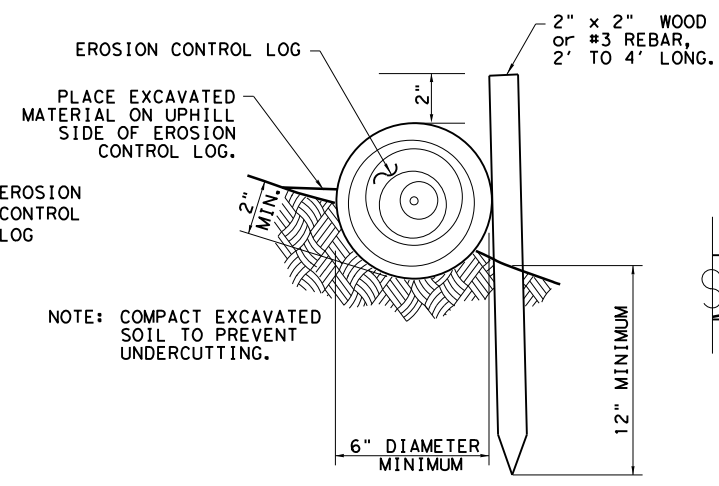
**EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING**

CL-SSL



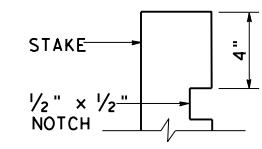
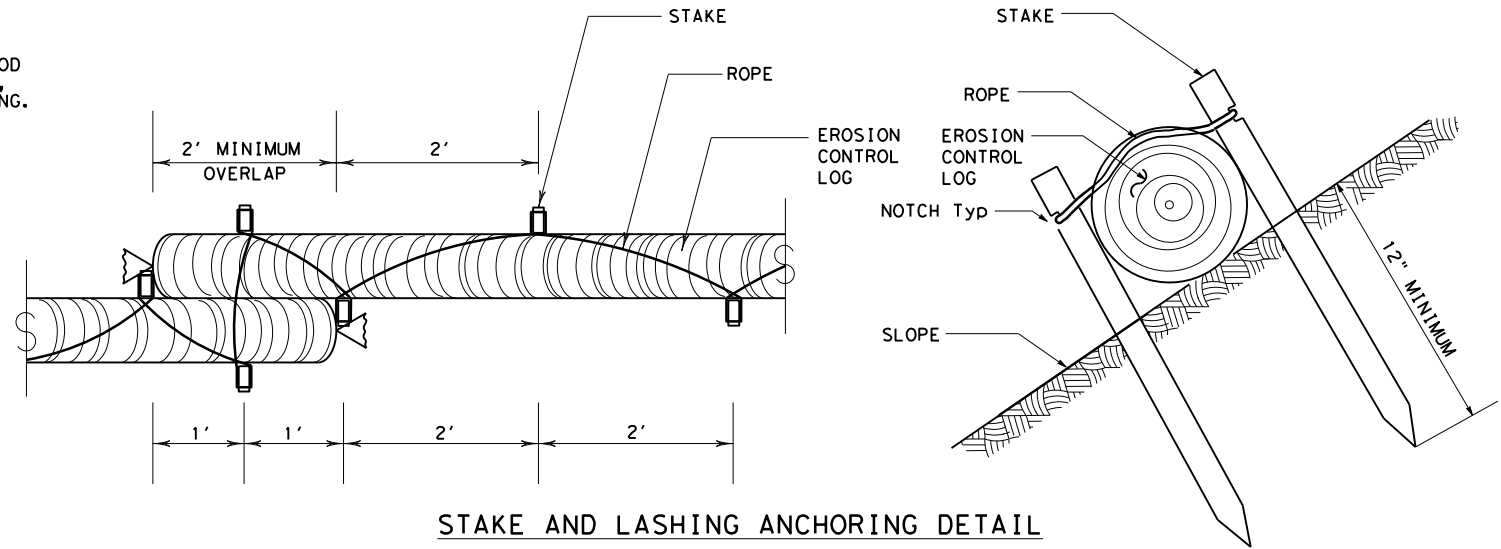
STAKE AND TRENCHING ANCHORING DETAIL

CL-SST



STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

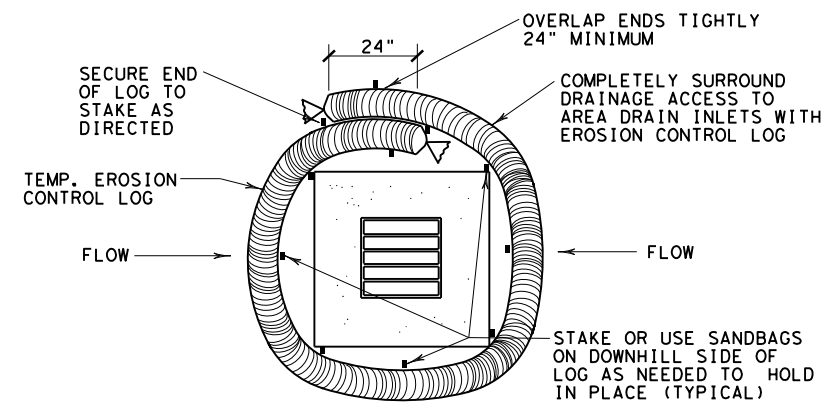
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"

SHEET 2 OF 3

		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES EROSION CONTROL LOG EC (9) - 16			
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT
© TxDOT: JULY 2016	CONT	SECT	JOB
REVISIONS	0915	12	698
DIST	COUNTY	SHEET NO.	
SAT	BEXAR	91	

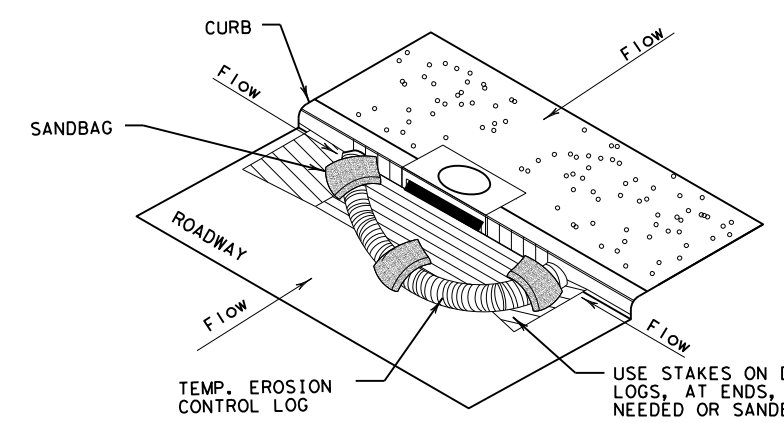
DATE:
FILE:

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



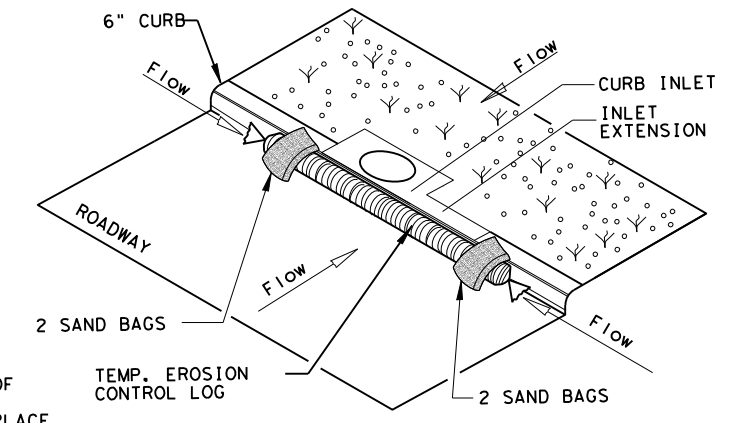
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

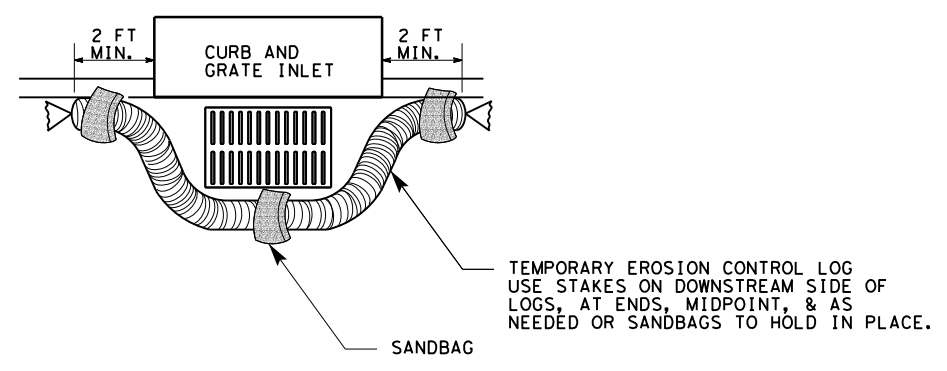
CL-CI



EROSION CONTROL LOG AT CURB INLET

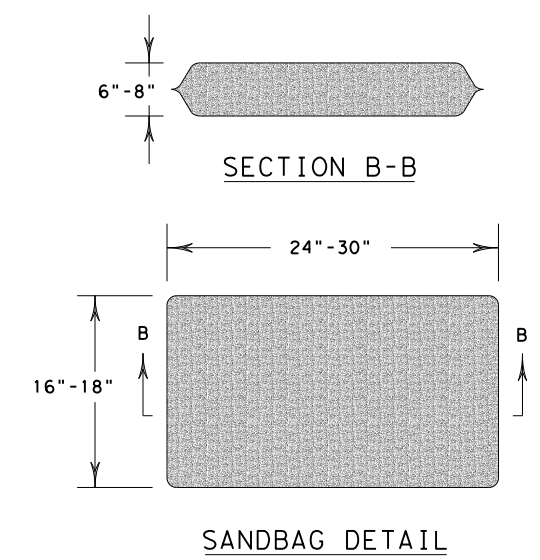
CL-CI

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



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SHEET 3 OF 3

		<i>Design Division Standard</i>		
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES EROSION CONTROL LOG EC (9) - 16				
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0915	12	698	VARIOUS
	DIST	COUNTY	SHEET NO.	
	SAT	BEXAR	92	

DATE:
FILE: