CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DIST	COUNTY		SHEET NO.
LBB	LUBBOCK, ETC.		001

FUNCTIONAL CLASS = VAR
DESIGN SPEED = VAR
A.D.T. = VAR

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 SPECIAL LABOR PROVISIONS FOR ALL STATE CONSTRUCTION PROJECTS (000-008).

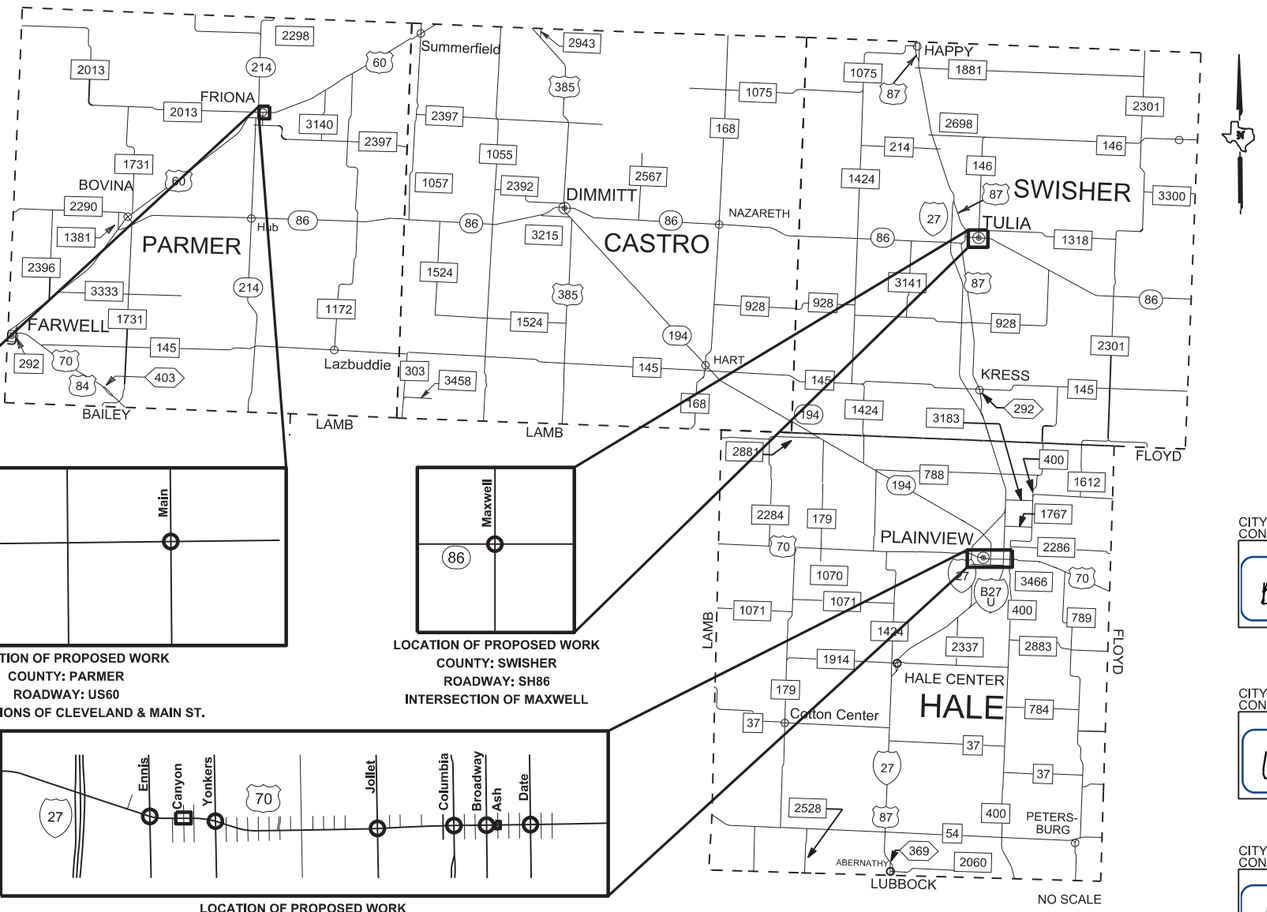
STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

VARIOUS HIGHWAYS
LUBBOCK COUNTY, ETC.

PROJECT NO.: C 905-00-112
NET LENGTH OF PROJECT: 0.001 MI
LIMITS: VARIOUS LOCATIONS IN THE LUBBOCK DISTRICT

FOR THE CONSTRUCTION OF:
TRAFFIC SIGNAL IMPROVEMENTS & ADA UPGRADES



LOCATION OF PROPOSED WORK
COUNTY: PARMER
ROADWAY: US60
INTERSECTIONS OF CLEVELAND & MAIN ST.

LOCATION OF PROPOSED WORK
COUNTY: SWISHER
ROADWAY: SH86
INTERSECTION OF MAXWELL

LOCATION OF PROPOSED WORK
COUNTY: HALE
ROADWAY: US70
INTERSECTIONS OF ENNIS, CANYON, YONKERS, JOLIET, COLUMBIA, BROADWAY, ASH, & DATE ST.

NO EQUATIONS
NO EXCEPTIONS
NO RAILROAD CROSSINGS

REGISTERED ACCESSIBILITY SPECIALIST (RAS) INSPECTION REQUIRED
TDLR NO. TABS2022019916

DATE: 9/23/2022 9:01:48 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\0905001124 - Design\Plan Set\1. General\001 TITLE SHEET.dgn

JEREMY T. DEARING
98218
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

CITY OF TULIA CONCURRENCE — 10/10/2022
DocuSigned by: B.J. Potts — D1A97234EFD340A...
CITY MANAGER

SUBMITTED FOR LETTING: — 10/13/2022
DocuSigned by: Jeremy T. Dearing, P.E. — AB1484D2F6DA4F6...
DISTRICT DIRECTOR OF TRANSPORTATION OPERATIONS

CITY OF FRIONA CONCURRENCE — 9/26/2022
DocuSigned by: Lee Davila — 771408E464A74F1...
CITY MANAGER

RECOMMENDED FOR LETTING: — 10/13/2022
DocuSigned by: Shelley C. Hanis P.E. — F9984108931347C...
DISTRICT DESIGN ENGINEER

CITY OF PLAINVIEW CONCURRENCE — 9/28/2022
DocuSigned by: Jeffery Snyder — D244F63332734C3...
CITY MANAGER

APPROVED FOR LETTING: — 10/13/2022
DocuSigned by: Bobby P. Warren P.E. — 642C665E4DDD46A...
DISTRICT ENGINEER

INDEX OF SHEETS

STATE OF TEXAS
JEREMY T. DEARING
98218
LICENSED
PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

10/13/2022

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE BY A ★ HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

PROJECT INDEX

STATE	DIST.	COUNTY
TEXAS	LBB	VARIOUS

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR

DATE	FILENAME	SHEET NO.
10/13/2022	2022 TRF SIGNAL UPGRADES	002

DATE: 10/13/2022 4:04:53 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\0905001124 - Design\Plan Set\1. General\002 PROJECT INDEX.dgn

General Requirements and Covenants - Items 1 thru 9

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

Jeremy Dearing – Jeremy.Dearing@txdot.gov 806-748-4564
Cody Thomas – Cody.Thomas@txdot.gov 806-748-4376

Contractor questions will be accepted through email, phone, and in person by the above individuals.

All contractor questions will be reviewed by the Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following Address:
https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/

All questions submitted that generate a response will be posted through this site. The site is organized by District, Project Type (Construction or Maintenance), Letting Date, CCSJ/Project Name. Check the FTP site regularly for any updates

An ADA workshop is required for this project.

Item 1 – Abbreviations and Definitions

Contract Prosecution – Each contract awarded by the Department stands on its own and as such, is separate from other contracts. A contractor awarded multiple contracts, must be capable and sufficiently staffed to concurrently process any and all contracts at the same time.

Item 2 – Instructions to Bidders

The construction time determination schedule will be posted on the Contractor Q&A FTP site.

View the plans on-line or download from the web at:
http://www.dot.state.tx.us/business/plansonline/agreement.htm
Choose "I Agree" then, "Click here", then "State-Let-Construction", pick the letting month, then "Plans" and then choose the plans set.

Order plans from any of the plan reproduction companies shown on the web at:
http://www.dot.state.tx.us/business/contractors_consultants/repro_companies.htm

By signing this proposal, a bidder acknowledges that he/she has a copy of the "Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges", adopted by the Texas Department of Transportation, November 1, 2014. This specification book may be purchased from the Department or downloaded at:
https://www.txdot.gov/business/resources/txdot-specifications.html

County: LUBBOCK DISTRICT **Control:** 0905-00-112

Utilities

Overhead and underground utility installations exist within the project limits.

Call One Call to mark the locations of all utilities. Call all appropriate Cities and TxDOT separately to have their respective utilities marked.

Do not begin work on US70 & Broadway intersection until overhead electric utility is clear.

Salvage all removed utility equipment to their respective companies.

Any damage to irrigation systems will be repaired at Contractor's expense.
Contact City of Plainview: Director of Public Works, Tim Crosswhite
tcrosswhite@plainviewtx.org (806) 293-1100

Item 5 – Control of the Work

Perform construction surveying in accordance with Article 5.9.3, "Method C."

When deviation from the plans is requested by the Contractor, but not required for installation, the Contractor will bear any additional costs associated with the deviation.

Alter the location of all ground boxes, foundations and structures shown on the plans only as approved by the Engineer in writing. Contact the Engineer prior to installing ground boxes, foundations, and structures in order that the Inspector may verify and approve the location.

Restore all disturbed areas due to trenching or any construction activity to a condition equivalent to the original condition within 14 working days from the time work began in the area including all necessary stabilization.

The construction, operation, and maintenance of the proposed project will be consistent with the state implementation plan as prepared by the Texas Commission on Environmental Quality.

At the end of each day remove from the ROW, inside or outside the project limits, any excess material and debris resulting from construction.

Correct any deficiencies identified during the final inspection including required paperwork.

Submit all required paperwork within 60 days of project acceptance.

Item 6 – Control of Materials

Transport of department furnished material will be subsidiary to the contract bid items.

Radars, radar cables, controller cabinets, controllers, controller bases, ped buttons and CCU will be furnished by the STATE under a force account and installed by contractor in accordance with the manufacturer's recommendations.

Use materials from pre-qualified producers. A list of material producers pre-qualified by the Construction Division (CST) of the Texas Department of Transportation (TxDOT) can be found at the following website:
https://www.txdot.gov/business/resources/producer-list.html

In addition to the requirements of the plans and specifications, make all material and equipment furnished, installed, modified, tested, or otherwise used on this contract, and becoming the property of TxDOT, fully functional within the manufacturer normal specifications, warranties, and guarantees. Make any additional functions of the material and equipment normally supplied by the manufacturer, but not specified by TxDOT, completely functional.

Store material off TxDOT property or Right of Way unless approved by the project supervisor.

Repair damage to the Right of Way to the satisfaction of the project supervisor.

Salvaged solar panels, batteries, cabinets, and clocks will be returned to the Lubbock District Signal Shop.

Item 7 – Legal Relations and Responsibilities

Coordinate street closures with the local fire, police, and other emergency personnel.

Maintain access to adjacent property at all times.

Notify, in writing, each residence and business 10 days prior to beginning construction of the phase/phases that are expected to affect their ingress and egress. This notice may be hand delivered or mailed.

When applicable, comply with all requirements of the Environmental Permits Issues and Commitments (EPIC) sheets.

Dispose of all waste materials in compliance with local, state, and federal regulations. Submit a list of all approved waste sites to the Engineer for review.

All vehicles in the work zone shall use flashing amber strobe lights visible 360 degrees.

Roadway closures during the following key dates and/or special events are prohibited:"
Tulia Picnic: July 12th – 15th

Concrete trucks operating on interstate highways will not be allowed to carry more than 6 cubic yards (CY) of concrete unless the truck utilizes a lift (third) axle.

County: LUBBOCK DISTRICT **Control:** 0905-00-112

Electrical systems or otherwise not directly related to project shall be returned to original working condition upon disturbance.

Item 8 - Prosecution and Progress

This project is to be complete in 260 days and 16 months of barricades in accordance with the contract documents.

Contractor cannot begin work before the 90-day delay per SP008-003.

Monthly schedule updates are a very important aspect of managing the progress of this project. The Engineer may withhold the monthly estimate if the schedule update has not been received.

A bar chart will be required on this project.

Do not begin work before sunrise or end work after sunset unless authorized by the Engineer and remove all equipment from the roadway before sundown.

Perform any erosion control measures such as seeding or sodding before beginning the next phase, or land, unless otherwise authorized by the Engineer.

Working days will be computed and charged in accordance with Article 8.3.1.4 Standard Workweek.

Shut down operations the working day before the following major traffic generating holidays: January 1st (New Year's); Last Monday in May (Memorial Day); July 4th (Independence Day); First Monday in September (Labor Day); Fourth Thursday in November (Thanksgiving); and December 24th (Christmas Eve).

Payment for final 3% mobilization will be made according to Article 500.3. Timeliness for submittal of required paperwork and correction of deficiencies is a consideration in developing the final contractor evaluation score.

Limit operations such that no more than 12 separate curb ramp locations are under construction and incomplete at any time, unless otherwise authorized by the Engineer. Do not perform work in more than two cities unless otherwise approved by the Engineer. All work shall be completed on each roadway section before construction can begin on more than 12 ramps on the next roadway.

The 90-day delay start time has been allotted for the procurement of traffic signal poles.

Item 9 - Measurement and Payment

Submit material-on-hand payment requests by the monthly estimate cutoff date.

Item 416 – Drilled Shaft Foundations

For large diameter drilled shafts, when water is encountered during drilling and slurry is not used, the shaft needs to be re-worked the next day to achieve proper skin friction capacity.

Item 420 - Concrete Substructures

Tie epoxy-coated reinforcing steel with epoxy-coated tie wire.

Use Grade 3 or Grade 4 coarse aggregate in all concrete structures.

Cold weather protection requirements within 72 hours of a concrete pour as per the following table:

PROJECTED LOW TEMP	PROTECTION REQUIRED
< 20 degrees	DO NOT POUR
20-27 degrees	cover with plastic, then a insulating blanket, and plastic on top
28-35 degrees	cover with plastic, then a insulating blanket
> 35 degrees	no protection required

All projected temperatures will be based on the NOAA website. None of the above actions releases the Contractor from the responsibility for freeze damaged concrete for whatever reason.

Provide TY II curing compound for all curb and gutter, sidewalks, driveways, curb ramps, riprap, and cast-in-place SET's.

When doweling into concrete, clean out the hole, fill completely with epoxy, then place the dowel. Do not dip the dowel into epoxy first and shove it into the hole.

Do not place concrete when the wind gusts get to over 25 miles per hour.

Vibrate all concrete.

Item 421 - Hydraulic Cement Concrete

All Class C concrete will be designed using Option 3.

If fly ash is used, a maximum of 35% will be allowed.

Provide air entrainment in all concrete except for concrete used in drilled shafts and precast concrete members. Target an entrained air content of 4.0% for concrete pavement and 5.5% for all other concrete requiring air entrainment. Ensure the minimum entrained air content is at least 3.0% for all classes of concrete.

The Engineer will perform all concrete job control testing.

County: LUBBOCK DISTRICT **Control:** 0905-00-112

The sulfate soundness of coarse aggregate used in drilled shaft concrete shall not exceed 18 percent.

Supply 2 – 4' x 8' x ¾" sheets of plywood, in order to perform required testing procedures at the location of concrete placements.

Use 4-inch by 8-inch cylinder molds for concrete with Grade 3 or smaller coarse aggregate. Supply new cylinder molds and lids subsidiary to the various bid items.

Item 432 - Riprap

Provide 5-inch-thick concrete riprap, unless otherwise indicated in the plans.

Reinforce with steel reinforcing using either #3 bars on 12"x12" spacing or #4 bars on 18"x18" spacing centered in the slab. Fiber reinforcement will not be allowed.

In large areas of riprap, provide one-half (1/2)-inch thick expansion joint material at approximately 15-foot intervals, or as determined by the Engineer.

Place asphalt expansion joint material between proposed riprap and utility poles, guy wires, vent pipes, standpipes and as directed.

Place felt or filter fabric at open joints as required by the Engineer. This will be considered subsidiary.

Follow cold weather protection requirements listed under Item 420.

Seal between concrete boundaries.

Item 502 - Barricades, Signs And Traffic Handling

Prior to beginning construction, the Engineer shall approve the routing of traffic and sequence of work.

Additional signs and barricades as directed by the Engineer shall be considered subsidiary to Item 502.

Provide flashing portable arrow panels for all lane closures.

Wash the channelizing devices and barricades following each rainfall or snowfall event and at times deemed necessary by the Engineer.

To ensure the safety and convenience of traffic, flaggers may be required when construction machinery is being operated along, across, or adjacent to lanes carrying traffic. If considered necessary by the Engineer, supplemental signs and barricades may be required.

Fill any holes left by barricade or sign supports and restore the area to its original condition.

Barricades, Signs and Traffic Handling is a plan quantity item. If time is suspended, no additional compensation will be made.

Traffic switches will not be permitted on Fridays or any working day preceding a holiday unless authorized by the Engineer.

Cones or chevrons may be used in lieu of vertical panels at the discretion of the Engineer. Cones cannot be used to separate opposing traffic.

Construct temporary ramps to maintain access to driveways and city streets as directed by the Engineer. Temporary ramp construction is subsidiary to Item 502.

The Contractor shall bid the traffic control plan shown in the plans. Any proposed alterations to the TCP (combining work areas / phasing / etc.) shall be submitted to the Engineer at least 10 days prior to anticipated changes.

Even when not explicitly shown in the project TCP, vertical panels shall be used with an opposing lane divider every 5th panel in accordance with BC (9) for all opposing traffic conditions without a positive barrier.

Square tubing sign supports may be used for temporary construction signs. Aluminum and wood signs may be mounted if the vertical supports are embedded into the ground. Square tubing supports on skids which are typically held in place with sandbags can only support signs made of light weight flutted plastic.

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.

Correct all noted deficiencies within 7 calendar days, otherwise, cease all operations until the noted deficiencies are corrected.

Stockpiles that meet the barricade requirements as shown on the BC (10) Standard are required to be erected at the time of material delivery in the Right-of-Way and maintained as long as the stockpile exists. Payment for Material-on-Hand will be withheld from the estimate for inadequate barricades or the failure to maintain barricades on a per stockpile basis as determined by the Engineer.

County: LUBBOCK DISTRICT **Control:** 0905-00-112

Like new traffic control devices will be required at the initial setup for all projects or as approved by the Engineer.

Provide flags on all CW20-1D "ROAD WORK AHEAD" signs except on side roads.

Use only the work zone speed limit and TCP signs that are relevant to the active work area and as directed. Reset signs for subsequent work phases as work progresses and approved by the Engineer. Reset normal speed limit signs at the ends of work zones.

All bid items and work requiring traffic control is the responsibility of the contractor, even when not explicitly detailed in the plans. Consider this work subsidiary to Item 502.

TMAs and Portable Changeable Message Boards will not be used as Arrow Boards.

When the roadway is open to traffic and final striping is completed, any subsequent work shall be done under daytime traffic control.

Item 506 - Temporary Erosion, Sedimentation, and Environmental Controls

No N.O.I. is required for this project.

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.

The soil area disturbed by this project, including all disturbed areas within the limits of this project as described in the Contract and at Contractor project specific locations (PSLs) within one mile of the project limits, contributes to the establishment of the Texas Commission on Environmental Quality (TCEQ) Construction General Permit (CGP) requirements for storm water discharges. The Department will obtain an authorization from the TCEQ to discharge storm water for construction activities shown on the plans. The Contractor shall obtain the required authorization from the TCEQ for Contractor project specific locations (PSLs) for construction support activities off the right-of-way. As directed by the Engineer, the Contractor shall obtain any required authorization from the TCEQ for on-site PSLs. When the total area disturbed within the project limits and at PSLs within one mile of the project limits exceeds five acres, the Contractor shall provide a copy of the Contractor's Notice of Intent (NOI) submission and Construction General Permit for PSLs on the right-of-way to the Engineer (and submit a copy of NOIs to appropriate MS4 operators).

Sediments removed from BMPs shall be paid for by force account. The Contractor shall submit an invoice for the work.

Correct all noted deficiencies within 7 calendar days, otherwise, cease all operations until the noted deficiencies are corrected.

Maintain 100 feet of silt fence, 100 feet of erosion control logs, and 50 sandbags on site at all times for repairs/replacement as needed.

Item 529 - Concrete Curb, Gutter and Combined Curb and Gutter

Place one-half (1/2)-inch pre-molded expansion joint material at 40-foot intervals and at the beginning and end of all radii. Place 3/25-inch grooved or sawed construction joints, as directed by the Engineer, spaced equally, with the spacing not to exceed ten feet between joints.

All concrete curb and gutter shall be reinforced with four #4 bars.

The lip of gutter and back of curb shall be formed. The existing pavement edge shall not be used as the form.

Mortar will not be used to finish curb and gutter.

The joint between the lip of gutter and HMAC shall be sealed.

The Contractor is hereby made aware that the brick pavers are not to be disturbed at the Broadway and Ash intersections in Plainview, Texas.

Item 530 – Intersections, Driveways, and Turnouts

Use Class A Concrete for all concrete driveways.

Reinforce concrete driveways with # 4 bars on 12”x12” grid spacing centered in the slab depth.

Item 531 - Sidewalks

Construct concrete sidewalks at least four inches thick, reinforced with # 3 bars on 18”x18” grid spacing centered in the slab depth. The locations and details shown on the plans may be field modified by the Engineer.

In areas where there is no curb fillet or concrete pavement, saw cut the existing curb and gutter and remove the curb.

Construct curb ramps in conformance with details shown on the plans. The accessibility of the curb ramps shall be according to the "Americans with Disabilities Act (ADA)."

When lack of right of way width or obstructions creates insufficient space, the ramp may be relocated within the right of way when authorized by the Engineer. All deficient ramps will be removed and replaced at the Contractor's expense.

County: LUBBOCK DISTRICT **Control:** 0905-00-112

Highway: VARIOUS

Form tooled joints on each side of the four-foot-wide ramp section, and at each break in ramp slope or geometry, and at four-foot intervals as if it were sidewalk. Place asphalt expansion joint material between proposed ramps and existing concrete.

Form tooled joints in sidewalk at 6’ intervals or as directed.

Place asphalt expansion joint material every 40 ft and between proposed sidewalk and utility poles, guide wires, vent pipes, standpipes and as directed.

All curbs on curb ramps will not be paid for directly but are considered subsidiary to the various bid items.

Construct concrete steps adjacent to ramps, as shown in the plans or as directed by the Engineer, measured by the square yard and paid for as Item 531, “Sidewalks.”

Notify the Engineer 48 hours in advance of beginning operations at a new location.

Schedule work such that two-way traffic is provided through all intersections and intersecting streets at all times, unless otherwise authorized by the Engineer.

Complete construction at curb ramp locations within ten working days. This includes concrete removal, concrete placement, backfilling, surface preparation for pavement markings, prefabricated pavement markings, and repair of existing pavement. Failure to finish within ten working days will result in restricting the number of ramp locations that may be under construction at any given time.

Chicago-brick-red truncated dome brick pavers or an approved equivalent are required for all curb ramps.

Removal and disposal of existing asphaltic concrete is considered subsidiary to this item.

Follow cold weather protection requirements listed under Item 420

Item 618 - Conduit

The location of conduit is diagrammatic and may be varied to meet local conditions upon approval of the Engineer. Ensure all couplings and connectors are made wrench tight. Trenching depths shall provide a minimum of 2.5 feet (30 inches) of cover unless otherwise approved by the Engineer. The Contractor must ensure that conduit is not damaged during trench or bore pit backfilling operations. No conductors shall be pulled through conduit until all backfilling for the conduit run is complete and the template, having a diameter of not less than 75 percent of the inside diameter of the conduit, has been drawn through the conduit. Open ends of all conduits shall be fitted with temporary caps or plugs to prevent entry of dirt or debris during construction operations. A non-metallic pull rope shall be used to pull electrical conductors and traffic signal cables through non-metallic conduit. A flat, high tensile strength polyester fiber pull rope shall be pulled through each conduit run and shall remain in the conduit for future use. A minimum of three feet of pull rope shall be neatly left coiled in the ground boxes at each end of the conduit run. The pull rope will not be paid for directly but shall be considered subsidiary to Item 618, "Conduit." After the work is completed, the Contractor shall restore any curbs, walks, driveways or raised concrete medians which have been damaged or disturbed to an equivalent original condition and to the satisfaction of the Engineer. This work shall not be paid for directly but shall be considered subsidiary to Item 618, "Conduit."

Use Schedule 80 PVC conduit for all traffic and illumination portion of this project. Bored conduit runs placed under driveways and streets or highway approaches shall maintain a minimum of 30 inches below the proposed natural ground elevation or 36 inches below the existing driveway or proposed top of pavement backfill and compact trenches the same day or erect plastic fencing to discourage entry into the trenched area by pedestrians or vehicles.

Due to material availability, use of schedule 80 HDPE conduit will be considered by the Engineer. All HDPE connections shall be threaded.

Furnish additional flat, high-tensile strength, polyester fiber pull tape in all conduit runs for future maintenance and expansion. This work shall be considered subsidiary to Item 618, "Conduit."

Item 620 – Electrical Conductors

Grounding conductors that share the same conduit, junction box, ground box or structure shall be bonded together at every accessible point in accordance with the electrical detail sheets (ED), and the latest edition of the National Electrical Code.

Use certified persons to perform electrical work. See Item 7 Section 18.1.3 "Electrical Requirements" for additional details.

County: LUBBOCK DISTRICT **Control:** 0905-00-112

Item 628 - Electrical Services

The STATE will be responsible for energy consumed and monthly telephone charges occurred by the new electrical service locations. These charges should be billed to the Texas Department of Transportation, 135 Slaton Highway, Lubbock, TX 79404-5201

Silk screening or other acceptable methods are to be used to label the service enclosures indicating that the power provided is for the ITS System. Labeling service enclosures will be considered subsidiary to the bid Item 628: Electrical Services and will not be paid for directly.

Provide circuit breaker and install when additional circuit from existing electrical service is called for in the plans.

Concrete for service pole foundations, when required, will be Class C and will be in accordance with Item 421: Hydraulic Cement Concrete, except that concrete will not be paid for directly but is to be considered subsidiary to Item 628: Electrical Services. Reinforcing steel for service pole foundations, when required, will be in accordance with Item 440: Reinforcing Steel, except that reinforcing steel will not paid for directly but is to be considered subsidiary to Item 628: Electrical Services.

Proceeding 30-day test period, TxDOT Electrical Review Team (ERT) will perform inspection.

On all services, install auxiliary 5/8" x 8' supplemental ground rod from service first point of contact to soil. This work shall be considered subsidiary to Item 628, "Electrical Services."

Item 644 - Small Roadside Sign Assemblies

All signs on this project, new or relocated, will require a retroreflective wrap on the sign support. This wrap shall be 12 inches in height, visible in all directions and shall be placed 3 ft. below the bottom of the sign. The color for YIELD, STOP, WRONG WAY, and DO NOT ENTER signs shall be red. The color for all other signs shall be yellow. This retroreflective wrap will not be paid for directly but considered subsidiary to Item 644.

Stake all sign locations, and receive approval from the Engineer, prior to sign placement.

The triangular slip bases will be the two-bolt clamp type (Southern Plains Fabrication or equivalent). For more information refer to the approved materials producers list: http://www.txdot.gov/business/resources/producer-list.html

New sign studs and new signposts will be necessary for relocating existing signs.
Perform the following work subsidiary to Items 644.
For all signs designated for removal:

- Salvage aluminum signs,
- Palletize and band salvaged aluminum signs,
- Stockpile signs at the following location as directed by the Engineer

Contact Person: *Ruben Ramirez* *(806) 293-5101* *Hale County*
Address: 3900 S BI27 79072
On S BI27 1.4 miles North of IH 27
Plainview, Texas

Contact Person: *Chris Wadlow* *(806) 995-3009* *Swisher County*
Address: 7500 HWY 86 79088
Tulia, Texas

Contact Person: *Paulino Gonzalez* *(806) 238-1312* *Parmer County*
Address: 1101 HWY 86 79009
On SH86 .5MI E of US60
Bovina, Texas

Item 656 - Foundations for Traffic Control Devices

Do not extend traffic signal pole foundations more than two inches above natural ground, medians or other surfaces surrounding the drilled shaft unless approval is obtained from the Engineer.

Use Class "C" concrete for traffic signal pole foundations.

Locate the bases for signal poles a minimum of 4 feet from the face of vertical curbs.

All existing wheelchair ramps, curbs and sidewalks are shown on the plans. If any repairs to these items should be needed after drilling foundations, installing pull boxes, conduit or loop detectors, the repairs shall be made by the Contractor as directed by the Engineer and shall be considered subsidiary to Item 656.

Item 668 - Prefabricated Pavement Markings

Reference the "Standard Highway Sign Designs for Texas" manual for dimensions to words and symbols.

Manufacturer's sealer is subsidiary to this item. Surface preparation will be paid for separately under Item 678.

Item 677 - Eliminating Existing Pavement Markings and Markers

Eliminate existing pavement markings on asphalt surfaces by the Burn, Blasting, or Mechanical Methods at the project limits that get the work zone seal coat and as directed. Otherwise, use the Surface Treatment Method.

Eliminate existing pavement markings on concrete surfaces by the Water Blasting Method.

County: LUBBOCK DISTRICT **Control:** 0905-00-112

Item 678 - Pavement Surface Preparation for Markings

Use dry sandblasting for asphalt surfaces

Use water blasting for concrete surfaces.

Item 680 - Highway Traffic Signals

Provide a schedule and notify the District Traffic Office a minimum of 3 days prior to any signal installation. Contact via email at LBB-TRFOPS@TxDOT.GOV.

Turn all non-operational signal heads down facing the roadway surface, or completely cover the lenses with an opaque material. The location of signal poles, conduit, ground boxes and controllers may be adjusted to accommodate existing utilities or local conditions with prior approval of the Engineer. Verify the location of all existing utilities in the field prior to construction. Provide a technician on call in the city at all times during the required 30-day test period.

Signal Pole Luminaires shall be Light Emitting Diodes (LED).

Item 682 - Vehicle and Pedestrian Signal Heads

Provide pedestrian signal indications using symbol type and astro bracket mounted with CGB or galvanized pipe nipple.

Provide aluminum vehicle and pedestrian signal heads for this project. Furnish ABS formed black plastic back-plates with the vehicle signal heads. Attach back-plates to the vehicle signal heads and with a minimum of ½ inch of material from the edge of mounting holes to the near edge of the back plate. Furnish aluminum visors for vehicle signal heads.

Mount the signal head for horizontally mounted vehicle signal heads, at least 18 feet but no more than 20 feet, above the pavement grade measured from the center of the roadway to the bottom of the signal head.

Item 685 – Roadside Flashing Beacon Assemblies

Provide screw-in foundations.

Provide a schedule and notify the District Traffic Office a minimum of 3 days prior to any flashing beacon installation. Contact via email at LBB-TRFOPS@TxDOT.GOV.

Contractor will install foundations only. Beacons will be installed by STATE forces.

County: LUBBOCK DISTRICT **Control:** 0905-00-112

Highway: VARIOUS 003G

Item 686 - Traffic Signal Pole Assemblies (Steel)

Use bracket assembly Option C of the SMA-100 and DMA-100 Standard Sheets for signal head mounting for both horizontal and vertical mount signal heads. Check foundation elevations to assure compliance with mounting height requirements.

Attach dampening devices to mast arms 36 feet in length and longer. Dampening will not be paid for directly but will be considered subsidiary to Item 686 – "Traffic Signal Pole Assemblies".

Internally wire signal cable for the vehicular signal heads without drip loops. Thread the hole in the mast arm shaft leading into the astro-bracket mount for a CGB connector or a galvanized pipe nipple. Furnish and install CGB connectors or galvanized pipe nipples. The materials and work necessary will not be paid for separately but will be considered subsidiary to Item 686 – "Traffic Signal Pole Assemblies".

Item 688 – Pedestrian Detectors and Vehicle Loop Detectors

Push buttons for pedestrian actuation meeting current ADA requirements will be provided by the STATE and installed by the Contractor. Payment under item 0690-6032.

Item 6185 – Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)

Provide 2 TMAs for stationary use for the duration of the project. Stationary TMAs will be used during the various phases of work required for this project. Payment will be made by the day for each TMA used in stationary operations.

Item 6227 – Solar Powered Light Emitting Diode (LED) Roadside Sign

Provide screw-in foundations.

Provide a schedule and notify the District Traffic Office a minimum of 3 days prior to any LED sign installation. Contact via email at LBB-TRFOPS@TxDOT.GOV.

ESTIMATE SUMMARY

CONTROLLING PROJECT ID: 0905-00-112 **DISTRICT:** LUBBOCK **COUNTY:** LUBBOCK **HIGHWAY:** VARIOUS

			CONTROL SECTION JOB	0905-00-112		TOTAL EST.	TOTAL FINAL
			PROJECT ID	A00128591			
			COUNTY	LUBBOCK			
			HIGHWAY	VARIOUS			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	0104 6015	REMOVING CONC (SIDEWALKS)	SY	377.000		377.000	
	0104 6017	REMOVING CONC (DRIVEWAYS)	SY	84.000		84.000	
	0104 6022	REMOVING CONC (CURB AND GUTTER)	LF	356.000		356.000	
	0104 6024	REMOVING CONC (RETAINING WALLS)	SY	33.000		33.000	
	0104 6026	REMOVE CONC (GUTTER)	LF	27.000		27.000	
	0104 6032	REMOVING CONC (WHEELCHAIR RAMP)	SY	40.000		40.000	
	0416 6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	456.000		456.000	
	0416 6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF	88.000		88.000	
	0432 6002	RIPRAP (CONC)(5 IN)	CY	26.000		26.000	
	0450 6048	RAIL (HANDRAIL)(TY B)	LF	191.000		191.000	
	0500 6001	MOBILIZATION	LS	224,417.000		224,417.000	
	0502 6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	80,000.000		80,000.000	
	0506 6035	SANDBAGS FOR EROSION CONTROL	EA	24.000		24.000	
	0506 6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	240.000		240.000	
	0529 6008	CONC CURB & GUTTER (TY II)	LF	406.000		406.000	
	0529 6011	CONC CURB (DOWEL)	LF	7.000		7.000	
	0530 6004	DRIVEWAYS (CONC)	SY	77.000		77.000	
	0531 6002	CONC SIDEWALKS (5")	SY	431.000		431.000	
	0531 6018	CURB RAMPS (TY 1)	SY	36.000		36.000	
	0531 6022	CURB RAMPS (TY 5)	SY	10.000		10.000	
	0531 6024	CURB RAMPS (TY 7)	SY	3.000		3.000	
	0610 6007	REMOVE RD IL ASM (SHOE-BASE)	EA	2.000		2.000	
	0618 6046	CONDT (PVC) (SCH 80) (2")	LF	435.000		435.000	
	0618 6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	2,591.000		2,591.000	
	0618 6058	CONDT (PVC) (SCH 80) (4")	LF	310.000		310.000	
	0618 6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	2,550.000		2,550.000	
	0620 6004	ELEC CONDR (NO.12) INSULATED	LF	30.000		30.000	
	0620 6008	ELEC CONDR (NO.8) INSULATED	LF	5,445.000		5,445.000	
	0620 6009	ELEC CONDR (NO.6) BARE	LF	2,946.000		2,946.000	
	0620 6016	ELEC CONDR (NO.2) INSULATED	LF	4,620.000		4,620.000	
	0624 6002	GROUND BOX TY A (122311)W/APRON	EA	1.000		1.000	
	0624 6009	GROUND BOX TY D (162922)	EA	41.000		41.000	
	0624 6010	GROUND BOX TY D (162922)W/APRON	EA	7.000		7.000	
	0624 6028	REMOVE GROUND BOX	EA	39.000		39.000	
	0628 6002	REMOVE ELECTRICAL SERVICES	EA	9.000		9.000	
	0628 6165	ELC SRV TY D 120/240 070(NS)AL(E)SP(O)	EA	3.000		3.000	
	0628 6170	ELC SRV TY D 120/240 070(NS)AL(N)SP(O)	EA	6.000		6.000	
	0636 6001	ALUMINUM SIGNS (TY A)	SF	48.000		48.000	
	0644 6040	IN SM RD SN SUP&AM TYS80(1)SB(P-BM)	EA	2.000		2.000	
	0644 6070	RELOCATE SM RD SN SUP&AM TY S80	EA	6.000		6.000	
	0644 6076	REMOVE SM RD SN SUP&AM	EA	2.000		2.000	
	0668 6014	PREFAB PAV MRK TY B (W)(8")(SLD)	LF	530.000		530.000	
	0668 6018	PREFAB PAV MRK TY B (W)(24")(SLD)	LF	543.000		543.000	
	0668 6033	PREFAB PAV MRK TY B (W)(18")(YLD TRI)	EA	10.000		10.000	
	0668 6072	PREFAB PAV MRK TY C (W) (8") (SLD)	LF	2,615.000		2,615.000	
	0668 6075	PREFAB PAV MRK TY C (W) (18") (SLD)	LF	160.000		160.000	
	0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	2,538.000		2,538.000	
	0668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	53.000		53.000	
	0668 6122	PREFAB PAV MRK TY B (W)(ARROW)CNTST	EA	9.000		9.000	
	0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	3,085.000		3,085.000	
	0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	3,336.000		3,336.000	
	0677 6006	ELIM EXT PAV MRK & MRKS (18")	LF	160.000		160.000	
	0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	1,178.000		1,178.000	
	0677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	53.000		53.000	
	0677 6018	ELIM EXT PAV MRK & MRKS (18")(YLD TRI)	EA	10.000		10.000	

Texas Department of Transportation

ESTIMATE & QUANTITY SHEET

STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
10/13/2022	2022 TRF SIGNAL UPGRADES		004

ESTIMATE SUMMARY

CONTROLLING PROJECT ID: 0905-00-112 **DISTRICT:** LUBBOCK **COUNTY:** LUBBOCK **HIGHWAY:** VARIOUS

			CONTROL SECTION JOB	**0905-00-112**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00128591**			
			COUNTY	**LUBBOCK**			
			HIGHWAY	**VARIOUS**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	0680 6002	INSTALL HWY TRF SIG (ISOLATED)	EA	9.000		9.000	
	0680 6004	REMOVING TRAFFIC SIGNALS	EA	11.000		11.000	
	0682 6001	VEH SIG SEC (12")LED(GRN)	EA	86.000		86.000	
	0682 6002	VEH SIG SEC (12")LED(GRN ARW)	EA	31.000		31.000	
	0682 6003	VEH SIG SEC (12")LED(YEL)	EA	90.000		90.000	
	0682 6004	VEH SIG SEC (12")LED(YEL ARW)	EA	58.000		58.000	
	0682 6005	VEH SIG SEC (12")LED(RED)	EA	86.000		86.000	
	0682 6006	VEH SIG SEC (12")LED(RED ARW)	EA	31.000		31.000	
	0682 6018	PED SIG SEC (LED)(COUNTDOWN)	EA	66.000		66.000	
	0682 6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	90.000		90.000	
	0682 6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	27.000		27.000	
	0684 6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	7,162.000		7,162.000	
	0684 6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	3,410.000		3,410.000	
	0684 6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	2,306.000		2,306.000	
	0684 6017	TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	LF	3,810.000		3,810.000	
	0685 6004	INSTL RDSD FLSH BCN ASSM (SOLAR PWRD)	EA	2.000		2.000	
	0686 6025	INS TRF SIG PL AM (S)1 ARM(24')	EA	3.000		3.000	
	0686 6027	INS TRF SIG PL AM(S)1 ARM(24')LUM	EA	2.000		2.000	
	0686 6029	INS TRF SIG PL AM (S)1 ARM(28')	EA	2.000		2.000	
	0686 6035	INS TRF SIG PL AM(S)1 ARM(32')LUM	EA	1.000		1.000	
	0686 6037	INS TRF SIG PL AM(S)1 ARM(36')	EA	3.000		3.000	
	0686 6039	INS TRF SIG PL AM(S)1 ARM(36')LUM	EA	1.000		1.000	
	0686 6041	INS TRF SIG PL AM(S)1 ARM(40')	EA	3.000		3.000	
	0686 6043	INS TRF SIG PL AM(S)1 ARM(40')LUM	EA	3.000		3.000	
	0686 6045	INS TRF SIG PL AM(S)1 ARM(44')	EA	11.000		11.000	
	0686 6047	INS TRF SIG PL AM(S)1 ARM(44')LUM	EA	3.000		3.000	
	0686 6053	INS TRF SIG PL AM(S)1 ARM(50')	EA	2.000		2.000	
	0686 6055	INS TRF SIG PL AM(S)1 ARM(50')LUM	EA	1.000		1.000	
	0686 6059	INS TRF SIG PL AM(S)1 ARM(55')LUM	EA	1.000		1.000	
	0687 6001	PED POLE ASSEMBLY	EA	12.000		12.000	
	0687 6005	REMOVE PED POLE ASSEMBLY	EA	9.000		9.000	
	0690 6032	INSTALL OF PEDESTRIAN PUSH BUTTONS	EA	66.000		66.000	
	6185 6002	TMA (STATIONARY)	DAY	1,040.000		1,040.000	
	6227 6001	SOLAR POWERED LED WARNING SIGN	EA	2.000		2.000	
	01	MATERIAL FURNISHED BY STATE	LS	1.000		1.000	
	06	PUBLIC UTILITY FORCE ACCT WORK (NON-PARTICIPATING)	LS	1.000		1.000	
	08	CONTRACTOR FORCE ACCOUNT WORK	LS	1.000		1.000	
	08	EROSION CONTROL MAINTENANCE (NON-PART)	LS	1.000		1.000	
	08	SAFETY CONTINGENCY (NON-PART)	LS	1.000		1.000	

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Texas Department of Transportation

ESTIMATE & QUANTITY SHEET

STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
10/13/2022	2022 TRF SIGNAL UPGRADES		004A

CONSTRUCTION SEQUENCE

1. PROJECT TIME WAS ESTIMATED TO USE
   2 CREWS TO WORK ON VARIOUS BID ITEMS.

2. THE SCHEDULE SHOULD START WITH CONTRACTOR
   LOCATING & VERIFYING UNDERGROUND & OVERHEAD
   STRUCTURES AND UTILITIES BEFORE EXCAVATING.

3. THE SEQUENCE OF WORK PER TOWN WAS ESTIMATED TO BE THE FOLLOWING:
   a. ALL NEW UNDERGROUND WORK/ITEMS COMPLETED FIRST
   b. INSTALLATION AND ACTIVATION OF NEW SIGNALS
   c. REMOVAL OF EXSITING ITEMS
   d. INSTALLATION OF ADA ITEMS

4. SIGNAL ACTIVATION OF TWO CONSECUTIVE INTERSECTIONS
   WILL NOT BE ALLOWED.

5. DEVISE A SCHEDULE THAT REFLECTS THE BEST METHOD
   TO COMPLETE THE PROJECT IN A TIMELY MANNER.

STATE OF TEXAS
JEREMY T. DEARING
98218
LICENSED
PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

Texas Department of Transportation
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CONSTRUCTION SEQUENCE

STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		005

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PROJECT TOTAL SUMMARY			
ITEM	DESCRIPTION	UNITS	QUANTITY
0104 6015	REMOVING CONC (SIDEWALKS)	SY	377
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	84
0104 6022	REMOVING CONC (CURB AND GUTTER)	LF	356
0104 6024	REMOVING CONC (RETAINING WALLS)	SY	33
0104 6026	REMOVE CONC (GUTTER)	LF	27
0104 6032	REMOVING CONC (WHEELCHAIR RAMP)	SY	40
0416 6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	456
0416 6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF	88
0432 6002	RIPRAP (CONC)(5 IN)	CY	26
0450 6048	RAIL (HANDRAIL)(TY B)	LF	191
0506 6035	SANDBAGS FOR EROSION CONTROL	EA	24
0506 6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	240
0529 6008	CONC CURB & GUTTER (TY II)	LF	406
0529 6011	CONC CURB (DOWEL)	LF	7
0530 6004	DRIVEWAYS (CONC)	SY	77
0531 6002	CONC SIDEWALKS (5")	SY	431
0531 6018	CURB RAMPS (TY 1)	SY	36
0531 6022	CURB RAMPS (TY 5)	SY	10
0531 6024	CURB RAMPS (TY 7)	SY	3
0610 6007	REMOVE RD IL ASM (SHOE-BASE)	EA	2
0618 6046	CONDT (PVC) (SCH 80) (2")	LF	435
0618 6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	2,591
0618 6058	CONDT (PVC) (SCH 80) (4")	LF	310
0618 6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	2,550
0620 6004	ELEC CONDR (NO.12) INSULATED	LF	30
0620 6008	ELEC CONDR (NO.8) INSULATED	LF	5,445
0620 6009	ELEC CONDR (NO.6) BARE	LF	2,946
0620 6016	ELEC CONDR (NO.2) INSULATED	LF	4,620
0624 6002	GROUND BOX TY A (122311)W/APRON	EA	1
0624 6009	GROUND BOX TY D (162922)	EA	41
0624 6010	GROUND BOX TY D (162922)W/APRON	EA	7
0624 6028	REMOVE GROUND BOX	EA	39
0628 6002	REMOVE ELECTRICAL SERVICES	EA	9
0628 6165	ELC SRV TY D 120/240 070(NS)AL(E)SP(O)	EA	3
0628 6170	ELC SRV TY D 120/240 070(NS)AL(N)SP(O)	EA	6
0636 6001	ALUMINUM SIGNS (TY A)	SF	48
0644 6040	IN SM RD SN SUP&AM TYS80(1)SB(P-BM)	EA	2
0644 6070	RELOCATE SM RD SN SUP&AM TY S80	EA	6
0644 6076	REMOVE SM RD SN SUP&AM	EA	2
0668 6014	PREFAB PAV MRK TY B (W)(8")(SLD)	LF	530
0668 6018	PREFAB PAV MRK TY B (W)(24")(SLD)	LF	543
0668 6033	PREFAB PAV MRK TY B (W)(18")(YLD TRI)	EA	10
0668 6072	PREFAB PAV MRK TY C (W) (8") (SLD)	LF	2,615
0668 6075	PREFAB PAV MRK TY C (W) (18") (SLD)	LF	160
0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	2,538
0668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	53
0668 6122	PREFAB PAV MRK TY B (W)(ARROW)CNTST	EA	9
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	3,085
0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	3,336
0677 6006	ELIM EXT PAV MRK & MRKS (18")	LF	160
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	1,178
0677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	53
0677 6018	ELIM EXT PAV MRK & MRKS (18")(YLD TRI)	EA	10
0680 6002	INSTALL HWY TRF SIG (ISOLATED)	EA	9
0680 6004	REMOVING TRAFFIC SIGNALS	EA	11
0682 6001	VEH SIG SEC (12")LED(GRN)	EA	86
0682 6002	VEH SIG SEC (12")LED(GRN ARW)	EA	31
0682 6003	VEH SIG SEC (12")LED(YEL)	EA	90
0682 6004	VEH SIG SEC (12")LED(YEL ARW)	EA	58
0682 6005	VEH SIG SEC (12")LED(RED)	EA	86
0682 6006	VEH SIG SEC (12")LED(RED ARW)	EA	31
0682 6018	PED SIG SEC (LED)(COUNTDOWN)	EA	66
0682 6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	90
0682 6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	27
0684 6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	7,162
0684 6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	3,410
0684 6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	2,306
0684 6017	TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	LF	3,810
0685 6004	INSTL RDSD FLSH BCN ASSM (SOLAR PWRD)	EA	2
0686 6025	INS TRF SIG PL AM (S)1 ARM(24')	EA	3
0686 6027	INS TRF SIG PL AM(S)1 ARM(24')LUM	EA	2
0686 6029	INS TRF SIG PL AM (S)1 ARM(28')	EA	2
0686 6035	INS TRF SIG PL AM(S)1 ARM(32')LUM	EA	1
0686 6037	INS TRF SIG PL AM(S)1 ARM(36')	EA	3
0686 6039	INS TRF SIG PL AM(S)1 ARM(36')LUM	EA	1
0686 6041	INS TRF SIG PL AM(S)1 ARM(40')	EA	3
0686 6043	INS TRF SIG PL AM(S)1 ARM(40')LUM	EA	3
0686 6045	INS TRF SIG PL AM(S)1 ARM(44')	EA	11
0686 6047	INS TRF SIG PL AM(S)1 ARM(44')LUM	EA	3
0686 6053	INS TRF SIG PL AM(S)1 ARM(50')	EA	2
0686 6055	INS TRF SIG PL AM(S)1 ARM(50')LUM	EA	1
0686 6059	INS TRF SIG PL AM(S)1 ARM(55')LUM	EA	1
0687 6001	PED POLE ASSEMBLY	EA	12
0687 6005	REMOVE PED POLE ASSEMBLY	EA	9
0690 6032	INSTALL OF PEDESTRIAN PUSH BUTTONS	EA	66
6227 6001	SOLAR POWERED LED WARNING SIGN	EA	2

SH86 & MAXWELL ST. TOTAL SUMMARY			
ITEM	DESCRIPTION	UNITS	QUANTITY
0104 6015	REMOVING CONC (SIDEWALKS)	SY	334
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	84
0104 6022	REMOVING CONC (CURB AND GUTTER)	LF	305
0104 6024	REMOVING CONC (RETAINING WALLS)	SY	33
0104 6026	REMOVE CONC (GUTTER)	LF	27
0104 6032	REMOVING CONC (WHEELCHAIR RAMP)	SY	28
0416 6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	58
0432 6002	RIPRAP (CONC)(5 IN)	CY	26
0450 6048	RAIL (HANDRAIL)(TY B)	LF	176
0529 6008	CONC CURB & GUTTER (TY II)	LF	337
0530 6004	DRIVEWAYS (CONC)	SY	77
0531 6002	CONC SIDEWALKS (5")	SY	368
0531 6018	CURB RAMPS (TY 1)	SY	30
0531 6022	CURB RAMPS (TY 5)	SY	10
0610 6007	REMOVE RD IL ASM (SHOE-BASE)	EA	1
0618 6046	CONDT (PVC) (SCH 80) (2")	LF	35
0618 6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	716
0618 6058	CONDT (PVC) (SCH 80) (4")	LF	30
0618 6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	300
0620 6008	ELEC CONDR (NO.8) INSULATED	LF	1,965
0620 6009	ELEC CONDR (NO.6) BARE	LF	346
0620 6016	ELEC CONDR (NO.2) INSULATED	LF	780
0624 6009	GROUND BOX TY D (162922)	EA	5
0624 6028	REMOVE GROUND BOX	EA	4
0628 6002	REMOVE ELECTRICAL SERVICES	EA	1
0628 6165	ELC SRV TY D 120/240 070(NS)AL(E)SP(O)	EA	1
0644 6070	RELOCATE SM RD SN SUP&AM TY S80	EA	3
0668 6072	PREFAB PAV MRK TY C (W) (8") (SLD)	LF	150
0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	396
0668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	4
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	150
0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	286
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	153
0680 6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
0680 6004	REMOVING TRAFFIC SIGNALS	EA	1
0682 6001	VEH SIG SEC (12")LED(GRN)	EA	10
0682 6002	VEH SIG SEC (12")LED(GRN ARW)	EA	2
0682 6003	VEH SIG SEC (12")LED(YEL)	EA	10
0682 6004	VEH SIG SEC (12")LED(YEL ARW)	EA	4
0682 6005	VEH SIG SEC (12")LED(RED)	EA	10
0682 6006	VEH SIG SEC (12")LED(RED ARW)	EA	2
0682 6018	PED SIG SEC (LED)(COUNTDOWN)	EA	8
0682 6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	10
0682 6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	2
0684 6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	952
0684 6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	415
0684 6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	176
0684 6017	TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	LF	450
0686 6039	INS TRF SIG PL AM(S)1 ARM(36')LUM	EA	1
0686 6043	INS TRF SIG PL AM(S)1 ARM(40')LUM	EA	1
0686 6047	INS TRF SIG PL AM(S)1 ARM(44')LUM	EA	2
0687 6001	PED POLE ASSEMBLY	EA	1
0690 6032	INSTALL OF PEDESTRIAN PUSH BUTTONS	EA	8

US60 & CLEVELAND AVE. TOTAL SUMMARY			
ITEM	DESCRIPTION	UNITS	QUANTITY
0416 6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	41
0416 6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF	22
0618 6046	CONDT (PVC) (SCH 80) (2")	LF	50
0618 6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	0
0618 6058	CONDT (PVC) (SCH 80) (4")	LF	40
0618 6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	250
0620 6009	ELEC CONDR (NO.6) BARE	LF	300
0620 6016	ELEC CONDR (NO.2) INSULATED	LF	120
0624 6009	GROUND BOX TY D (162922)	EA	3
0624 6010	GROUND BOX TY D (162922)W/APRON	EA	2
0624 6028	REMOVE GROUND BOX	EA	2
0628 6002	REMOVE ELECTRICAL SERVICES	EA	1
0628 6170	ELC SRV TY D 120/240 070(NS)AL(N)SP(O)	EA	1
0668 6014	PREFAB PAV MRK TY B (W)(8")(SLD)	LF	240
0668 6018	PREFAB PAV MRK TY B (W)(24")(SLD)	LF	215
0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	93
0668 6122	PREFAB PAV MRK TY B (W)(ARROW)CNTST	EA	4
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	240
0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	424
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	120
0677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	4
0680 6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
0680 6004	REMOVING TRAFFIC SIGNALS	EA	1
0682 6001	VEH SIG SEC (12")LED(GRN)	EA	10
0682 6002	VEH SIG SEC (12")LED(GRN ARW)	EA	2
0682 6003	VEH SIG SEC (12")LED(YEL)	EA	10
0682 6004	VEH SIG SEC (12")LED(YEL ARW)	EA	4
0682 6005	VEH SIG SEC (12")LED(RED)	EA	10
0682 6006	VEH SIG SEC (12")LED(RED ARW)	EA	2
0682 6018	PED SIG SEC (LED)(COUNTDOWN)	EA	8
0682 6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	10
0682 6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	2
0684 6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	770
0684 6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	370
0684 6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	190
0684 6017	TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	LF	360
0686 6025	INS TRF SIG PL AM (S)1 ARM(24')	EA	2
0686 6045	INS TRF SIG PL AM(S)1 ARM(44')	EA	1
0686 6053	INS TRF SIG PL AM(S)1 ARM(50')	EA	1
0687 6001	PED POLE ASSEMBLY	EA	1
0690 6032	INSTALL OF PEDESTRIAN PUSH BUTTONS	EA	8

PROJECT SUMMARY

SHEET 1 OF 3

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STATE	DIST.	COUNTY
TEXAS	LBB	VARIOUS

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR

DATE	FILENAME	SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES	006

DATE: 9/28/2022 2:03:42 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\09050011\24 - Design\Plan Set\1. General\006-008 PROJECT SUMMARY.dgn

US60 & MAIN ST. TOTAL SUMMARY			
ITEM	DESCRIPTION	UNITS	QUANTITY
0416 6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	56
0618 6046	CONDT (PVC) (SCH 80) (2")	LF	35
0618 6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	135
0618 6058	CONDT (PVC) (SCH 80) (4")	LF	40
0618 6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	285
0620 6009	ELEC CONDR (NO.6) BARE	LF	325
0620 6016	ELEC CONDR (NO.2) INSULATED	LF	510
0624 6009	GROUND BOX TY D (162922)	EA	6
0624 6028	REMOVE GROUND BOX	EA	5
0628 6002	REMOVE ELECTRICAL SERVICES	EA	1
0628 6170	ELC SRV TY D 120/240 070(NS)AL(N)SP(O)	EA	1
0644 6070	RELOCATE SM RD SN SUP&AM TY S80	EA	1
0668 6014	PREFAB PAV MRK TY B (W)(8")(SLD)	LF	290
0668 6018	PREFAB PAV MRK TY B (W)(24")(SLD)	LF	328
0668 6033	PREFAB PAV MRK TY B (W)(18")(YLD TRI)	EA	10
0668 6072	PREFAB PAV MRK TY C (W) (8") (SLD)	LF	70
0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	47
0668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	1
0668 6122	PREFAB PAV MRK TY B (W)(ARROW)CNTST	EA	5
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	300
0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	532
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	131
0677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	5
0677 6018	ELIM EXT PAV MRK & MRKS (18")(YLD TRI)	EA	10
0680 6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
0680 6004	REMOVING TRAFFIC SIGNALS	EA	1
0682 6001	VEH SIG SEC (12")LED(GRN)	EA	10
0682 6002	VEH SIG SEC (12")LED(GRN ARW)	EA	3
0682 6003	VEH SIG SEC (12")LED(YEL)	EA	10
0682 6004	VEH SIG SEC (12")LED(YEL ARW)	EA	6
0682 6005	VEH SIG SEC (12")LED(RED)	EA	10
0682 6006	VEH SIG SEC (12")LED(RED ARW)	EA	3
0682 6018	PED SIG SEC (LED)(COUNTDOWN)	EA	6
0682 6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	10
0682 6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	3
0684 6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	590
0684 6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	380
0684 6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	215
0684 6017	TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	LF	430
0686 6025	INS TRF SIG PL AM (S)1 ARM(24')	EA	1
0686 6037	INS TRF SIG PL AM(S)1 ARM(36')	EA	1
0686 6045	INS TRF SIG PL AM(S)1 ARM(44')	EA	2
0690 6032	INSTALL OF PEDESTRIAN PUSH BUTTONS	EA	8

US70 & ENNIS ST. TOTAL SUMMARY			
ITEM	DESCRIPTION	UNITS	QUANTITY
0104 6015	REMOVING CONC (SIDEWALKS)	SY	15
0104 6022	REMOVING CONC (CURB AND GUTTER)	LF	17
0104 6032	REMOVING CONC (WHEELCHAIR RAMP)	SY	3
0416 6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	58
0529 6008	CONC CURB & GUTTER (TY II)	LF	17
0531 6002	CONC SIDEWALKS (5")	SY	28
0531 6024	CURB RAMPS (TY 7)	SY	3
0618 6046	CONDT (PVC) (SCH 80) (2")	LF	25
0618 6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	15
0618 6058	CONDT (PVC) (SCH 80) (4")	LF	30
0618 6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	320
0620 6009	ELEC CONDR (NO.6) BARE	LF	375
0620 6016	ELEC CONDR (NO.2) INSULATED	LF	45
0624 6009	GROUND BOX TY D (162922)	EA	5
0624 6028	REMOVE GROUND BOX	EA	4
0628 6002	REMOVE ELECTRICAL SERVICES	EA	1
0628 6170	ELC SRV TY D 120/240 070(NS)AL(N)SP(O)	EA	1
0668 6072	PREFAB PAV MRK TY C (W) (8") (SLD)	LF	760
0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	416
0668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	16
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	760
0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	568
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	142
0677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	16
0680 6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
0680 6004	REMOVING TRAFFIC SIGNALS	EA	1
0682 6001	VEH SIG SEC (12")LED(GRN)	EA	8
0682 6002	VEH SIG SEC (12")LED(GRN ARW)	EA	6
0682 6003	VEH SIG SEC (12")LED(YEL)	EA	8
0682 6004	VEH SIG SEC (12")LED(YEL ARW)	EA	10
0682 6005	VEH SIG SEC (12")LED(RED)	EA	8
0682 6006	VEH SIG SEC (12")LED(RED ARW)	EA	6
0682 6018	PED SIG SEC (LED)(COUNTDOWN)	EA	8
0682 6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	10
0682 6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	4
0684 6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	960
0684 6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	375
0684 6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	345
0684 6017	TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	LF	470
0686 6037	INS TRF SIG PL AM(S)1 ARM(36')	EA	1
0686 6045	INS TRF SIG PL AM(S)1 ARM(44')	EA	3
0687 6001	PED POLE ASSEMBLY	EA	3
0687 6005	REMOVE PED POLE ASSEMBLY	EA	4
0690 6032	INSTALL OF PEDESTRIAN PUSH BUTTONS	EA	8

US70 & YONKERS ST. TOTAL SUMMARY			
ITEM	DESCRIPTION	UNITS	QUANTITY
0416 6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	56
0618 6046	CONDT (PVC) (SCH 80) (2")	LF	65
0618 6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	195
0618 6058	CONDT (PVC) (SCH 80) (4")	LF	70
0618 6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	195
0620 6008	ELEC CONDR (NO.8) INSULATED	LF	1,290
0620 6009	ELEC CONDR (NO.6) BARE	LF	265
0620 6016	ELEC CONDR (NO.2) INSULATED	LF	30
0624 6002	GROUND BOX TY A (122311)W/APRON	EA	1
0624 6009	GROUND BOX TY D (162922)	EA	3
0624 6010	GROUND BOX TY D (162922)W/APRON	EA	3
0624 6028	REMOVE GROUND BOX	EA	7
0628 6002	REMOVE ELECTRICAL SERVICES	EA	1
0628 6165	ELC SRV TY D 120/240 070(NS)AL(E)SP(O)	EA	1
0668 6072	PREFAB PAV MRK TY C (W) (8") (SLD)	LF	200
0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	262
0668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	4
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	200
0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	390
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	102
0677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	4
0680 6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
0680 6004	REMOVING TRAFFIC SIGNALS	EA	1
0682 6001	VEH SIG SEC (12")LED(GRN)	EA	10
0682 6002	VEH SIG SEC (12")LED(GRN ARW)	EA	2
0682 6003	VEH SIG SEC (12")LED(YEL)	EA	10
0682 6004	VEH SIG SEC (12")LED(YEL ARW)	EA	4
0682 6005	VEH SIG SEC (12")LED(RED)	EA	10
0682 6006	VEH SIG SEC (12")LED(RED ARW)	EA	2
0682 6018	PED SIG SEC (LED)(COUNTDOWN)	EA	8
0682 6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	10
0682 6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	2
0684 6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	820
0684 6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	340
0684 6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	160
0684 6017	TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	LF	390
0686 6027	INS TRF SIG PL AM(S)1 ARM(24')LUM	EA	2
0686 6043	INS TRF SIG PL AM(S)1 ARM(40')LUM	EA	2
0687 6005	REMOVE PED POLE ASSEMBLY	EA	1
0690 6032	INSTALL OF PEDESTRIAN PUSH BUTTONS	EA	8

PROJECT SUMMARY

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STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		007

DATE: 9/28/2022 2:03:44 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\09050011124 - Design\Plan Set\1. General\006-008 PROJECT SUMMARY.dgn

US70 & JOLIET ST. TOTAL SUMMARY			
ITEM	DESCRIPTION	UNITS	QUANTITY
0104 6015	REMOVING CONC (SIDEWALKS)	SY	28
0104 6022	REMOVING CONC (CURB AND GUTTER)	LF	34
0104 6032	REMOVING CONC (WHEELCHAIR RAMP)	SY	9
0416 6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	54
0529 6008	CONC CURB & GUTTER (TY II)	LF	52
0531 6002	CONC SIDEWALKS (5")	SY	35
0531 6018	CURB RAMPS (TY 1)	SY	6
0618 6046	CONDT (PVC) (SCH 80) (2")	LF	15
0618 6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	80
0618 6058	CONDT (PVC) (SCH 80) (4")	LF	35
0618 6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	240
0620 6009	ELEC CONDR (NO.6) BARE	LF	275
0620 6016	ELEC CONDR (NO.2) INSULATED	LF	285
0624 6009	GROUND BOX TY D (162922)	EA	5
0624 6028	REMOVE GROUND BOX	EA	4
0628 6002	REMOVE ELECTRICAL SERVICES	EA	1
0628 6170	ELC SRV TY D 120/240 070(NS)AL(N)SP(O)	EA	1
0668 6072	PREFAB PAV MRK TY C (W) (8") (SLD)	LF	480
0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	306
0668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	8
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	480
0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	430
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	120
0677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	8
0680 6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
0680 6004	REMOVING TRAFFIC SIGNALS	EA	1
0682 6001	VEH SIG SEC (12")LED(GRN)	EA	10
0682 6002	VEH SIG SEC (12")LED(GRN ARW)	EA	4
0682 6003	VEH SIG SEC (12")LED(YEL)	EA	10
0682 6004	VEH SIG SEC (12")LED(YEL ARW)	EA	8
0682 6005	VEH SIG SEC (12")LED(RED)	EA	10
0682 6006	VEH SIG SEC (12")LED(RED ARW)	EA	4
0682 6018	PED SIG SEC (LED)(COUNTDOWN)	EA	8
0682 6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	10
0682 6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	4
0684 6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	770
0684 6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	325
0684 6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	250
0684 6017	TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	LF	365
0686 6029	INS TRF SIG PL AM (S)1 ARM(28')	EA	2
0686 6037	INS TRF SIG PL AM(S)1 ARM(36')	EA	1
0686 6045	INS TRF SIG PL AM(S)1 ARM(44')	EA	1
0687 6005	REMOVE PED POLE ASSEMBLY	EA	2
0690 6032	INSTALL OF PEDESTRIAN PUSH BUTTONS	EA	8

US70 & COLUMBIA ST. TOTAL SUMMARY			
ITEM	DESCRIPTION	UNITS	QUANTITY
0416 6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	45
0416 6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF	22
0618 6046	CONDT (PVC) (SCH 80) (2")	LF	0
0618 6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	440
0618 6058	CONDT (PVC) (SCH 80) (4")	LF	20
0618 6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	330
0620 6009	ELEC CONDR (NO.6) BARE	LF	385
0620 6016	ELEC CONDR (NO.2) INSULATED	LF	930
0624 6009	GROUND BOX TY D (162922)	EA	5
0624 6028	REMOVE GROUND BOX	EA	4
0628 6002	REMOVE ELECTRICAL SERVICES	EA	1
0628 6170	ELC SRV TY D 120/240 070(NS)AL(N)SP(O)	EA	1
0644 6070	RELOCATE SM RD SN SUP&AM TY S80	EA	2
0668 6072	PREFAB PAV MRK TY C (W) (8") (SLD)	LF	395
0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	346
0668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	8
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	395
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	170
0677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	4
0680 6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
0680 6004	REMOVING TRAFFIC SIGNALS	EA	1
0682 6001	VEH SIG SEC (12")LED(GRN)	EA	9
0682 6002	VEH SIG SEC (12")LED(GRN ARW)	EA	5
0682 6003	VEH SIG SEC (12")LED(YEL)	EA	9
0682 6004	VEH SIG SEC (12")LED(YEL ARW)	EA	9
0682 6005	VEH SIG SEC (12")LED(RED)	EA	9
0682 6006	VEH SIG SEC (12")LED(RED ARW)	EA	5
0682 6018	PED SIG SEC (LED)(COUNTDOWN)	EA	6
0682 6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	10
0682 6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	4
0684 6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	605
0684 6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	390
0684 6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	340
0684 6017	TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	LF	460
0686 6041	INS TRF SIG PL AM(S)1 ARM(40')	EA	1
0686 6045	INS TRF SIG PL AM(S)1 ARM(44')	EA	2
0686 6053	INS TRF SIG PL AM(S)1 ARM(50')	EA	1
0687 6001	PED POLE ASSEMBLY	EA	2
0690 6032	INSTALL OF PEDESTRIAN PUSH BUTTONS	EA	6

US70 & DATE ST. TOTAL SUMMARY			
ITEM	DESCRIPTION	UNITS	QUANTITY
0416 6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	60
0618 6046	CONDT (PVC) (SCH 80) (2")	LF	190
0618 6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	175
0618 6058	CONDT (PVC) (SCH 80) (4")	LF	30
0618 6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	285
0620 6009	ELEC CONDR (NO.6) BARE	LF	315
0620 6016	ELEC CONDR (NO.2) INSULATED	LF	1,080
0624 6009	GROUND BOX TY D (162922)	EA	3
0624 6010	GROUND BOX TY D (162922)W/APRON	EA	2
0624 6028	REMOVE GROUND BOX	EA	4
0628 6002	REMOVE ELECTRICAL SERVICES	EA	1
0628 6170	ELC SRV TY D 120/240 070(NS)AL(N)SP(O)	EA	1
0668 6072	PREFAB PAV MRK TY C (W) (8") (SLD)	LF	340
0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	306
0668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	8
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	340
0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	360
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	140
0677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	8
0680 6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
0680 6004	REMOVING TRAFFIC SIGNALS	EA	1
0682 6001	VEH SIG SEC (12")LED(GRN)	EA	9
0682 6002	VEH SIG SEC (12")LED(GRN ARW)	EA	5
0682 6003	VEH SIG SEC (12")LED(YEL)	EA	9
0682 6004	VEH SIG SEC (12")LED(YEL ARW)	EA	9
0682 6005	VEH SIG SEC (12")LED(RED)	EA	9
0682 6006	VEH SIG SEC (12")LED(RED ARW)	EA	5
0682 6018	PED SIG SEC (LED)(COUNTDOWN)	EA	6
0682 6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	10
0682 6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	4
0684 6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	725
0684 6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	370
0684 6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	305
0684 6017	TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	LF	415
0686 6041	INS TRF SIG PL AM(S)1 ARM(40')	EA	2
0686 6045	INS TRF SIG PL AM(S)1 ARM(44')	EA	2
0687 6001	PED POLE ASSEMBLY	EA	1
0687 6005	REMOVE PED POLE ASSEMBLY	EA	2
0690 6032	INSTALL OF PEDESTRIAN PUSH BUTTONS	EA	6

US70 & BROADWAY ST. TOTAL SUMMARY			
ITEM	DESCRIPTION	UNITS	QUANTITY
0416 6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	28
0416 6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF	44
0450 6048	RAIL (HANDRAIL)(TY B)	LF	15
0506 6035	SANDBAGS FOR EROSION CONTROL	EA	24
0506 6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	240
0529 6011	CONC CURB (DOWEL)	LF	7
0610 6007	REMOVE RD IL ASM (SHOE-BASE)	EA	1
0618 6046	CONDT (PVC) (SCH 80) (2")	LF	20
0618 6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	835
0618 6058	CONDT (PVC) (SCH 80) (4")	LF	15
0618 6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	345
0620 6008	ELEC CONDR (NO.8) INSULATED	LF	2,190
0620 6009	ELEC CONDR (NO.6) BARE	LF	360
0620 6016	ELEC CONDR (NO.2) INSULATED	LF	840
0624 6009	GROUND BOX TY D (162922)	EA	6
0624 6028	REMOVE GROUND BOX	EA	5
0628 6002	REMOVE ELECTRICAL SERVICES	EA	1
0628 6165	ELC SRV TY D 120/240 070(NS)AL(E)SP(O)	EA	1
0668 6072	PREFAB PAV MRK TY C (W) (8") (SLD)	LF	220
0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	294
0668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	4
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	220
0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	160
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	100
0677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	4
0680 6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
0680 6004	REMOVING TRAFFIC SIGNALS	EA	1
0682 6001	VEH SIG SEC (12")LED(GRN)	EA	10
0682 6002	VEH SIG SEC (12")LED(GRN ARW)	EA	2
0682 6003	VEH SIG SEC (12")LED(YEL)	EA	10
0682 6004	VEH SIG SEC (12")LED(YEL ARW)	EA	4
0682 6005	VEH SIG SEC (12")LED(RED)	EA	10
0682 6006	VEH SIG SEC (12")LED(RED ARW)	EA	2
0682 6018	PED SIG SEC (LED)(COUNTDOWN)	EA	8
0682 6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	10
0682 6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	2
0684 6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	970
0684 6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	445
0684 6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	325
0684 6017	TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	LF	470
0686 6035	INS TRF SIG PL AM(S)1 ARM(32')LUM	EA	1
0686 6047	INS TRF SIG PL AM(S)1 ARM(44')LUM	EA	1
0686 6055	INS TRF SIG PL AM(S)1 ARM(50')LUM	EA	1
0686 6059	INS TRF SIG PL AM(S)1 ARM(55')LUM	EA	1
0687 6001	PED POLE ASSEMBLY	EA	4
0690 6032	INSTALL OF PEDESTRIAN PUSH BUTTONS	EA	6

US70 & CANYON & ASH ST. TOTAL SUMMARY			
ITEM	DESCRIPTION	UNITS	QUANTITY
0620 6004	ELEC CONDR (NO.12) INSULATED	LF	30
0636 6001	ALUMINUM SIGNS (TY A)	SF	48
0644 6040	IN SM RD SN SUP&AM TYS80(1)SB(P-BM)	EA	2
0644 6076	REMOVE SM RD SN SUP&AM	EA	2
0668 6075	PREFAB PAV MRK TY C (W) (18") (SLD)	LF	160
0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	72
0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	186
0677 6006	ELIM EXT PAV MRK & MRKS (18")	LF	160
0680 6004	REMOVING TRAFFIC SIGNALS	EA	2
0682 6003	VEH SIG SEC (12")LED(YEL)	EA	4
0685 6004	INSTL RDSD FLSH BCN ASSM (SOLAR PWRD)	EA	2
6227 6001	SOLAR POWERED LED WARNING SIGN	EA	2

PROJECT SUMMARY

SHEET 3 OF 3

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Texas Department of Transportation

STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		008

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FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\09056001124 - Design\Plan Set\1. General\006-008 PROJECT SUMMARY.dgn

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FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\0905001124 - Design\Plan Set\2. TCP\009-020 BC (1-12)-21.dgn

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	00	112	VAR
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	LBB	VARIOUS		009
5-10 5-21				

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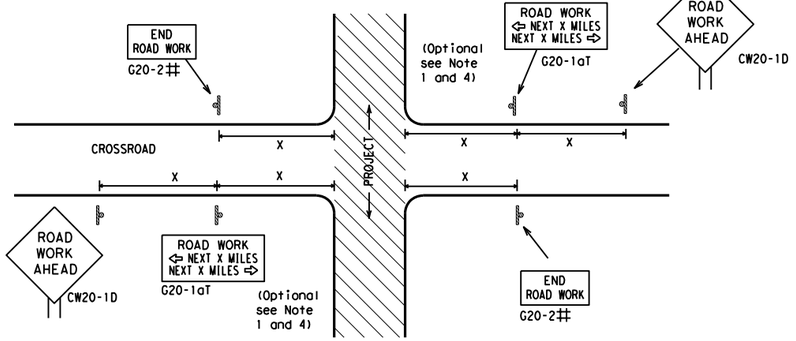
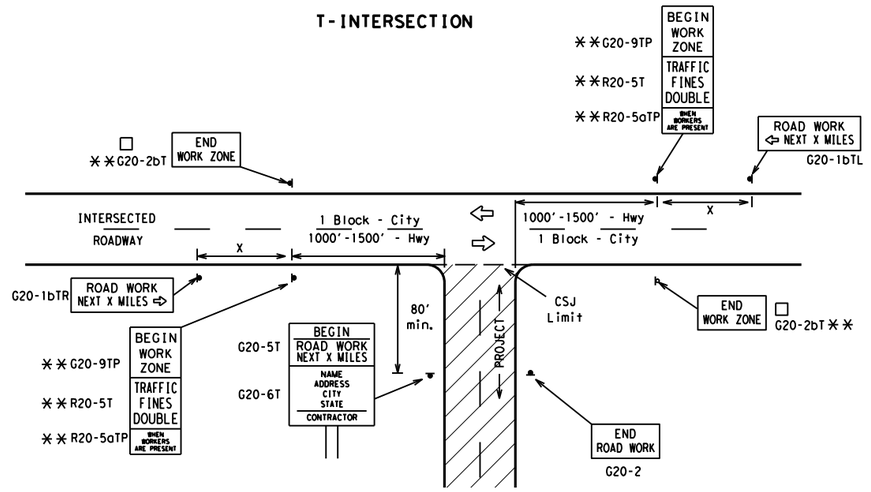
TYPICAL LOCATION OF CROSSROAD SIGNS



May be mounted on back of "ROAD WORK AHEAD"(CW20-1D) sign with approval of Engineer. (See note 2 below)

1. 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.
2. 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.
3. 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.
4. 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.
5. Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
6. 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

1. 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.
2. 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]

SIZE

Sign Number or Series	Conventional Road	Expressway/ Freeway
CW20[4] CW21 CW22 CW23 CW25	48" x 48"	48" x 48"
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"

SPACING

Posted Speed	Sign △ Spacing "X"
MPH	Feet (Apprx.)
30	120
35	160
40	240
45	320
50	400
55	500[2]
60	600[2]
65	700[2]
70	800[2]
75	900[2]
80	1000[2]
*	*[3]

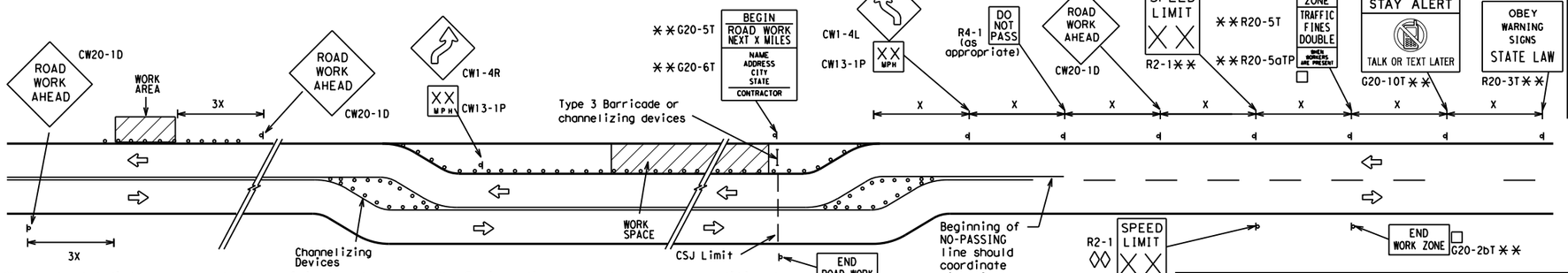
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

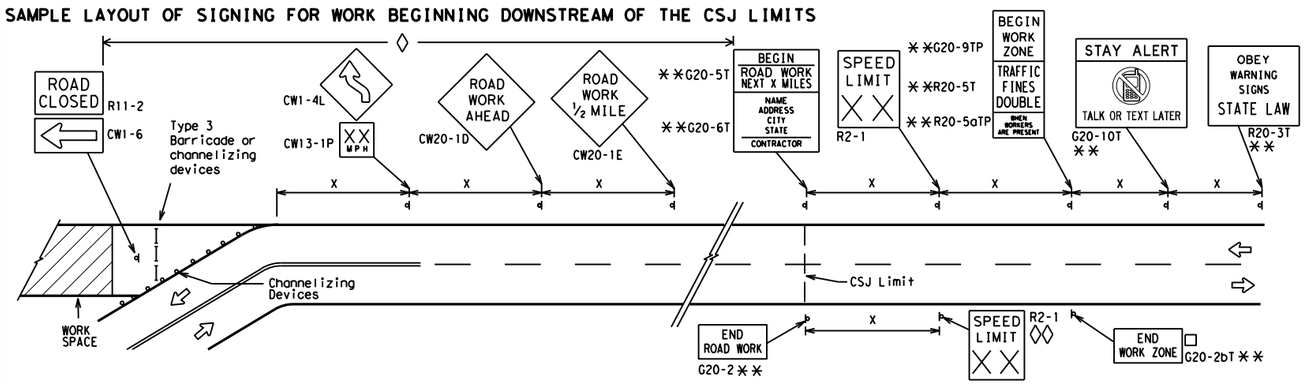
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may 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".
5. Only diamond shaped warning sign sizes are indicated.
6. 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 DOWNSTREAM OF THE CSJ LIMITS



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

NOTES

The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES"(G20-5T)sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.

□ The "BEGIN WORK ZONE"(G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.

** 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.

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Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

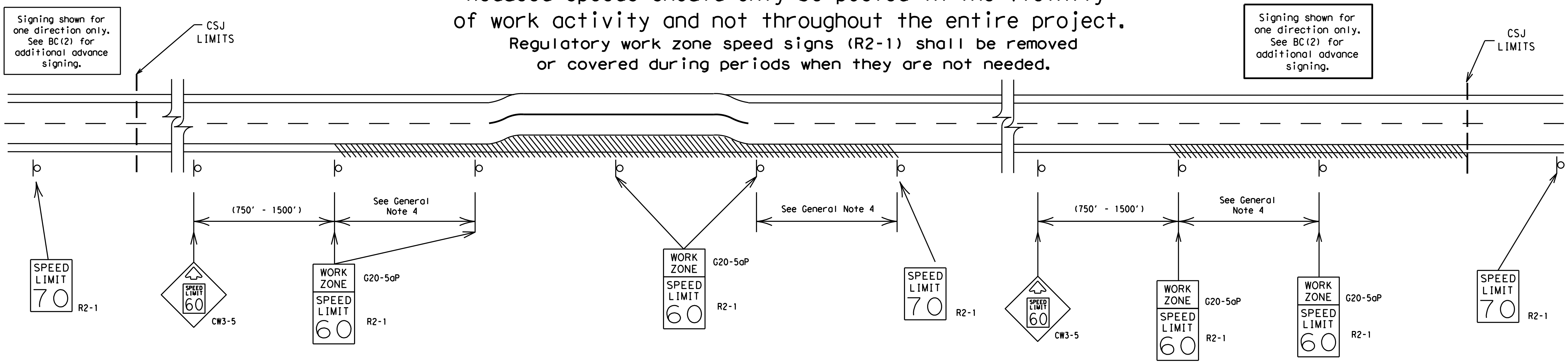
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	00	112	VAR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	VARIOUS		010

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:

a) rough road or damaged pavement surface
b) substantial alteration of roadway geometrics (diversions)
c) construction detours
d) grade
e) width
f) 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

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. 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
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. 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.
7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Techniques that may help reduce traffic speeds include but are not limited to:
   A. Law enforcement.
   B. Flagger stationed next to sign.
   C. Portable changeable message sign (PCMS).
   D. Low-power (drone) radar transmitter.
   E. Speed monitor trailers or signs.
9. Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
10. 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.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13 5-21	0905	00	112	VAR
	DIST		COUNTY	SHEET NO.
	LBB		VARIOUS	011

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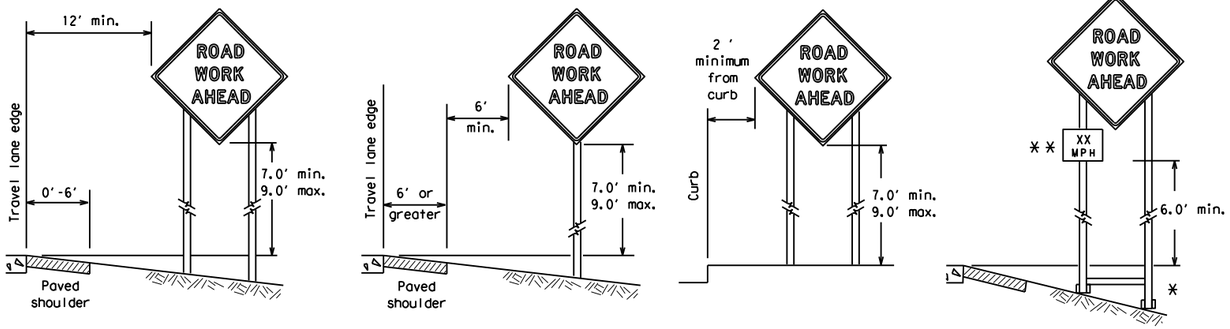
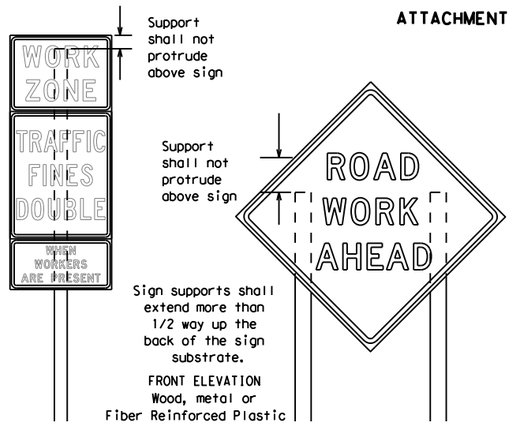
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

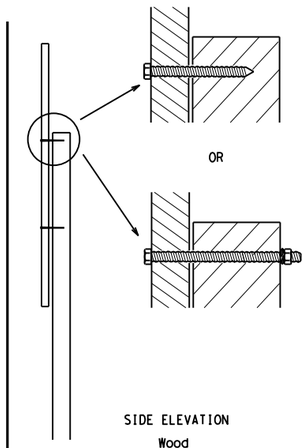


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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





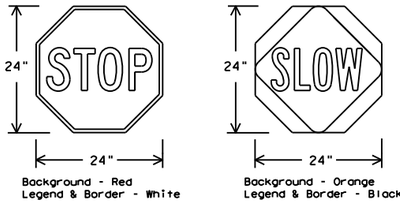
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

Nails shall NOT be allowed. Each sign shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.

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 spice 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.

STOP/SLOW PADDLES

1. STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
2. STOP/SLOW paddles shall be retroreflectorized when used at night.
3. STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
4. 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

1. 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.
2. 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.
3. When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
4. 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.
5. 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.
6. 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.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. 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.
5. 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.
6. 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.
7. 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.
8. 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.
9. 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)

1. 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.
   a. Long-term stationary - work that occupies a location more than 3 days.
   b. 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.
   c. Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
   d. Short, duration - work that occupies a location up to 1 hour.
   e. Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

1. 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.
2. 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.
3. Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
4. 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.
5. 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

1. 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

1. 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.
2. "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
3. 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

1. 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).
2. White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
3. 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

1. 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

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
2. 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.
3. 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.
4. 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.
5. Burlap shall NOT be used to cover signs.
6. Duct tape or other adhesive material shall NOT be affixed to a sign face.
7. Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

1. Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
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 shall 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.

FLAGS ON SIGNS

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

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BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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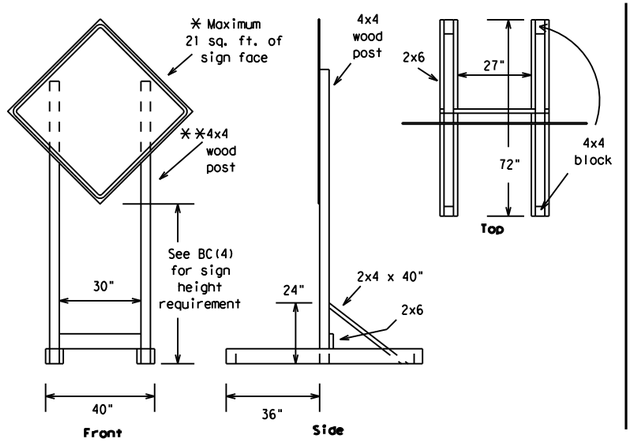
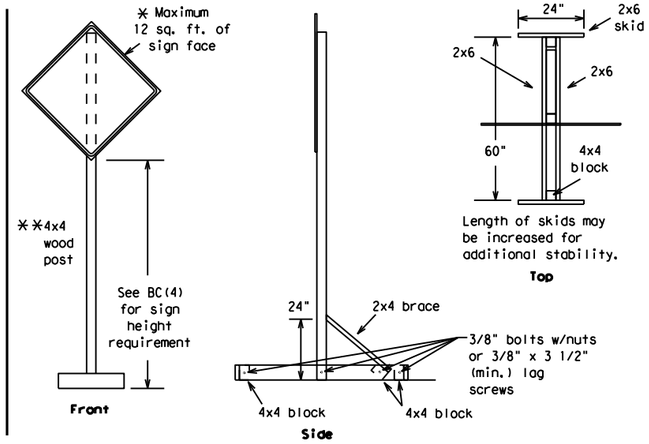
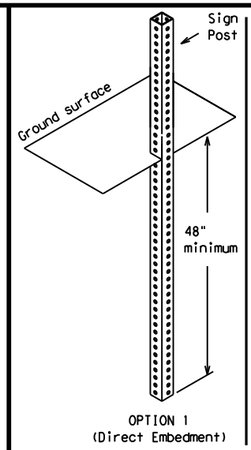
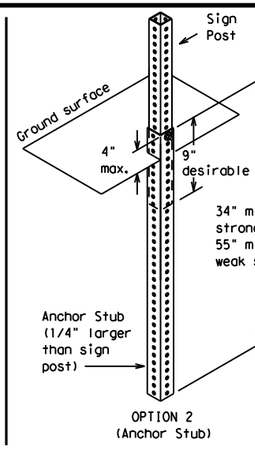


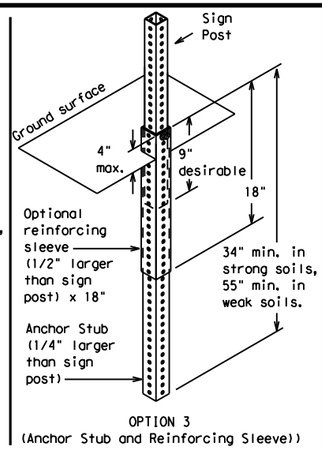


SKID MOUNTED WOOD SIGN SUPPORTS

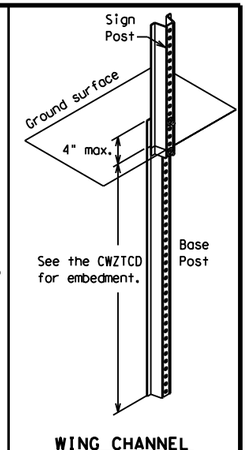
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







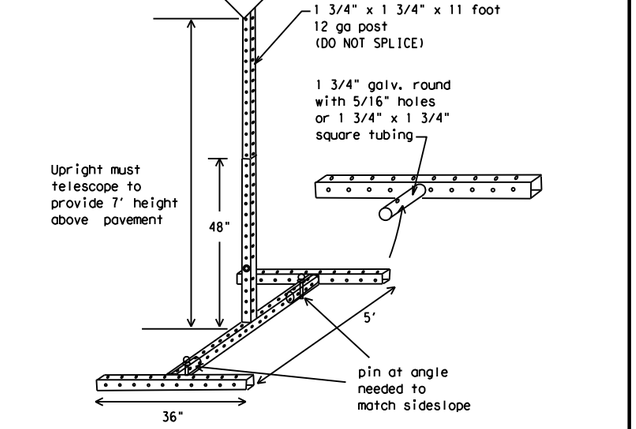
PERFORATED SQUARE METAL TUBING

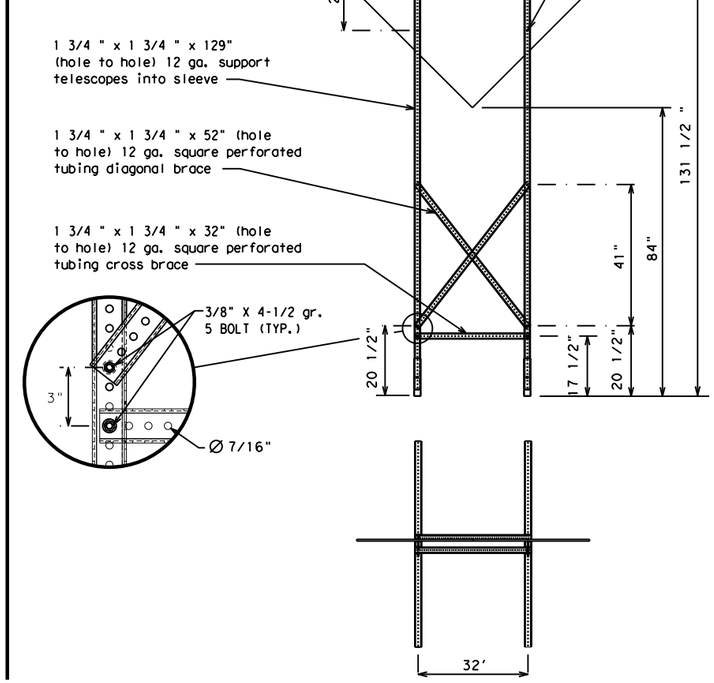


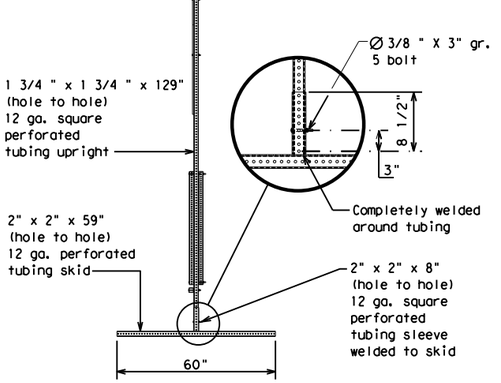
WING CHANNEL
Lap-splice/base bolted anchor

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

1. 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.
2. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
3. 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.

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BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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7-13 5-21	LBB	VARIOUS		013

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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

PORTABLE CHANGEABLE MESSAGE SIGNS

1. The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
2. 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.
3. 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.
4. Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
5. Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
6. When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
7. 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.
8. 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.
9. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
10. 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.
11. Do not use the word "Danger" in message.
12. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
13. Do not display messages that scroll horizontally or vertically across the face of the sign.
14. 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.
15. 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.
16. Each line of text should be centered on the message board rather than left or right justified.
17. 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.

WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD
Alternate	ALT
Avenue	AVE
Best Route	BEST RTE
Boulevard	BLVD
Bridge	BRDG
Cannot	CANT
Center	CTR
Construction Ahead	CONST AHD
CROSSING	XING
Detour Route	DETOUR RTE
Do Not	DONT
East	E
Eastbound	(route) E
Emergency	EMER
Emergency Vehicle	EMER VEH
Entrance, Enter	ENT
Express Lane	EXP LN
Expressway	EXPWY
XXXX Feet	XXXX FT
Fog Ahead	FOG AHD
Freeway	FRWY, FWY
Freeway Blocked	FWY BLKD
Friday	FRI
Hazardous Driving	HAZ DRIVING
Hazardous Material	HAZMAT
High-Occupancy	HOV
Vehicle Highway	HWY
Hour(s)	HR, HRS
Information	INFO
It Is	ITS
Junction	JCT
Left	LFT
Left Lane	LFT LN
Lane Closed	LN CLOSED
Lower Level	LWR LEVEL
Maintenance	MAINT

WORD OR PHRASE	ABBREVIATION
Major	MAJ
Miles	MI
Miles Per Hour	MPH
Minor	MNR
Monday	MON
Normal	NORM
North	N
Northbound	(route) N
Parking	PKING
Road	RD
Right Lane	RT LN
Saturday	SAT
Service Road	SERV RD
Shoulder	SHLDR
Slippery	SLIP
South	S
Southbound	(route) S
Speed	SPD
Street	ST
Sunday	SUN
Telephone	PHONE
Temporary	TEMP
Thursday	THURS
To Downtown	TO DWNTN
Traffic	TRAF
Travelers	TRVLRS
Tuesday	TUES
Time Minutes	TIME MIN
Upper Level	UPR LEVEL
Vehicles (s)	VEH, VEHS
Warning	WARN
Wednesday	WED
Weight Limit	WT LIMIT
West	W
Westbound	(route) W
Wet Pavement	WET PVMT
Will Not	WONT

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

- FREEWAY CLOSED X MILE
- FRONTAGE ROAD CLOSED
- ROAD CLOSED AT SH XXX
- SHOULDER CLOSED XXX FT
- ROAD CLSD AT FM XXXX
- RIGHT LN CLOSED XXX FT
- RIGHT X LANES CLOSED
- RIGHT X LANES OPEN
- CENTER LANE CLOSED
- DAYTIME LANE CLOSURES
- NIGHT LANE CLOSURES
- I-XX SOUTH EXIT CLOSED
- VARIOUS LANES CLOSED
- EXIT XXX CLOSED X MILE
- EXIT CLOSED
- RIGHT LN TO BE CLOSED
- MALL DRIVEWAY CLOSED
- X LANES CLOSED TUE - FRI
- XXXXXXXX BLVD CLOSED

Other Condition List

- ROADWORK XXX FT
- ROAD REPAIRS XXXX FT
- FLAGGER XXXX FT
- LANE NARROWS XXXX FT
- RIGHT LN NARROWS XXXX FT
- TWO-WAY TRAFFIC XX MILE
- MERGING TRAFFIC XXXX FT
- CONST TRAFFIC XXX FT
- LOOSE GRAVEL XXXX FT
- UNEVEN LANES XXXX FT
- DETOUR X MILE
- ROUGH ROAD XXXX FT
- ROADWORK PAST SH XXXX
- ROADWORK NEXT FRI-SUN
- BUMP XXXX FT
- US XXX EXIT X MILES
- TRAFFIC SIGNAL XXXX FT
- 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
- FORM X LINES RIGHT
- DETOUR NEXT X EXITS
- USE XXXXX RD EXIT
- USE EXIT XXX
- USE EXIT I-XX NORTH
- STAY ON US XXX SOUTH
- USE I-XX E TO I-XX N
- TRUCKS USE US XXX N
- WATCH FOR TRUCKS
- WATCH FOR TRUCKS
- EXPECT DELAYS
- EXPECT DELAYS
- PREPARE TO STOP
- REDUCE SPEED XXX FT
- END SHOULDER USE
- USE OTHER ROUTES
- WATCH FOR WORKERS
- STAY IN LANE *

Location List

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

1. Only 1 or 2 phases are to be used on a PCMS.
2. The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
4. A Location Phase is necessary only if a distance or location is not included in the first phase selected.
5. 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.
6. 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

1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
2. Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
3. EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
4. Highway names and numbers replaced as appropriate.
5. ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
6. AHEAD may be used instead of distances if necessary.
7. FT and MI, MILE and MILES interchanged as appropriate.
8. AT, BEFORE and PAST interchanged as needed.
9. 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

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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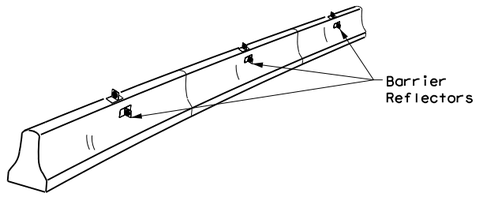
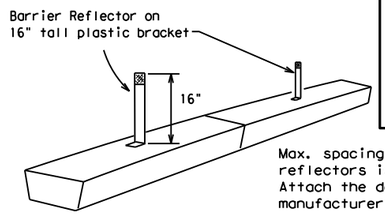
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



CONCRETE TRAFFIC BARRIER (CTB)

3. 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.
4. 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.
5. When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
6. Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
7. Maximum spacing of Barrier Reflectors is forty (40) feet.
8. Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
9. Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
10. Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
11. Single slope barriers shall be delineated as shown on the above detail.

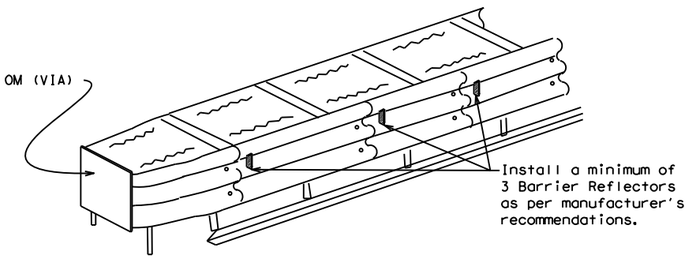


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

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.

LOW PROFILE CONCRETE BARRIER (LPCB)

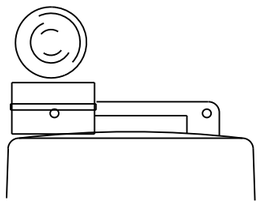


DELINEATION OF END TREATMENTS

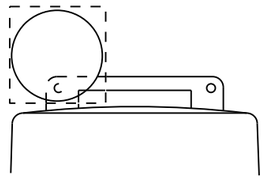
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet the apppropriate 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

1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. 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.
4. 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".
5. The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
6. 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.
7. 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.
8. The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

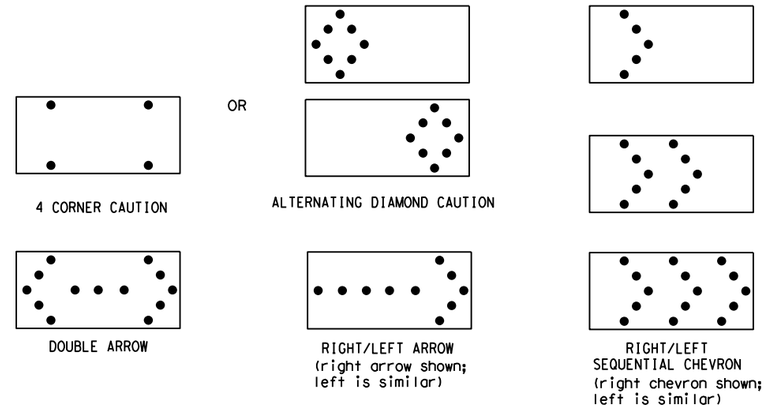
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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.
4. 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.
5. Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
6. Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
7. 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

1. 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.
2. 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.
3. The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
4. Round reflectors shall be fully reflectorized, including the area where attached to the drum.
5. 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.
6. 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.
7. When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
8. The warning reflector should be mounted on the side of the handle nearest approaching traffic.
9. 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.

1. 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.
2. 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.
3. 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.
4. The Flashing Arrow Board should be able to display the following symbols:



5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
6. The straight line caution display is NOT ALLOWED.
7. 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.
8. 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.
9. The sequential arrow display is NOT ALLOWED.
10. The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
11. The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
12. A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
13. 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.
14. 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

SHEET 7 OF 12

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. 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.
6. 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.

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	00	112	VAR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	VARIOUS		015

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GENERAL NOTES

1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
2. 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.
3. 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.
4. 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).
5. 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.
6. 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:

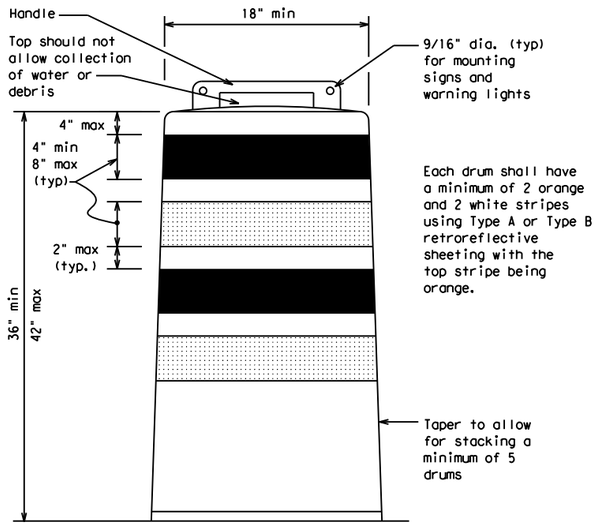
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
3. 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.
4. 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.
5. 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.
6. 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.
7. 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.
8. Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
9. Drum body shall have a maximum unballasted weight of 11 lbs.
10. Drum and base shall be marked with manufacturer's name and model number.

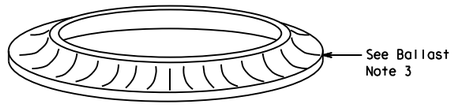
RETROREFLECTIVE SHEETING

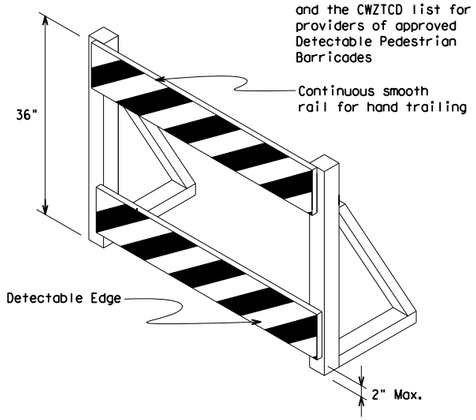
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall 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

1. 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.
2. 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.
3. Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
4. 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.
5. 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.
6. Ballast shall not be placed on top of drums.
7. Adhesives may be used to secure base of drums to pavement.



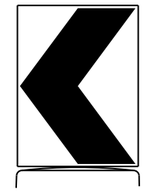




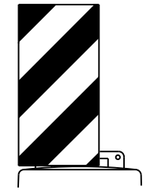
This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

DETECTABLE PEDESTRIAN BARRICADES

1. 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.
2. 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.
3. 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.
4. 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.
5. Warning lights shall not be attached to detectable pedestrian barricades.
6. 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

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. 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.
3. 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.
4. 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.
5. Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
6. Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
7. 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.
8. 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.

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	00	112	VAR
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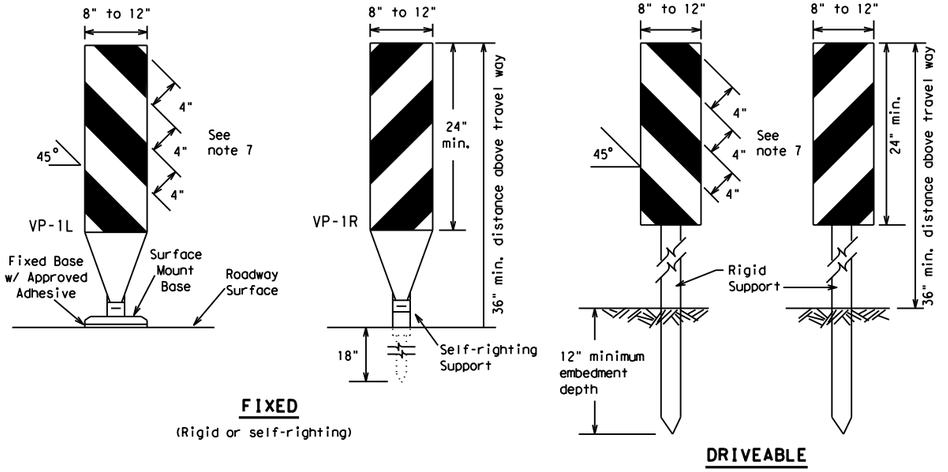
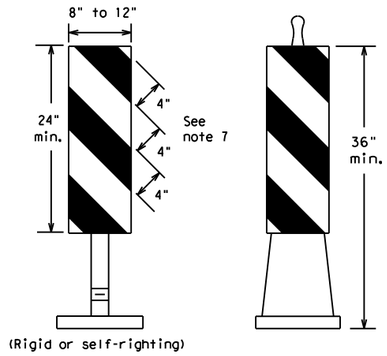


FIXED
(Rigid or self-righting)

DRIVEABLE

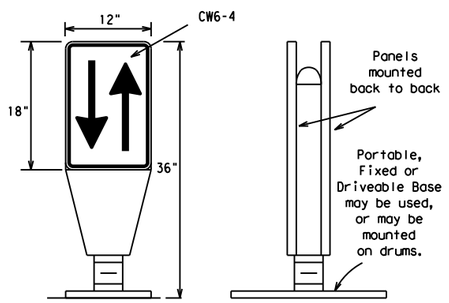


(Rigid or self-righting)

PORTABLE

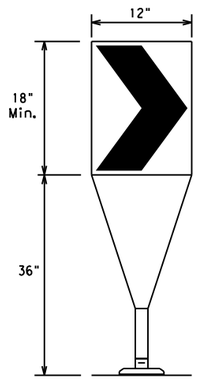
VERTICAL PANELS (VPs)

1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. 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.
3. 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.
4. VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
5. Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
6. Sheeting for the VP's shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.



1. 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.
2. The OTLD may be used in combination with 42" cones or VPs.
3. Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
4. 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.

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



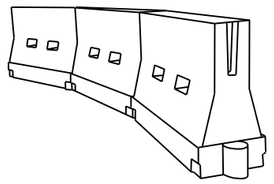
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

1. The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
2. 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.
3. 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.
4. To be effective, the chevron should be visible for at least 500 feet.
5. 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.
6. 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

GENERAL NOTES

1. 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).
2. 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.
3. 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).
4. 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.
5. Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
6. 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.
7. 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.



LONGITUDINAL CHANNELIZING DEVICES (LCD)

1. 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.
2. LCDs may be used instead of a line of cones or drums.
3. LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
5. LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
6. 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

1. 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.
2. 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.
3. 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.
4. 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.
5. 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

Posted Speed	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent
30	$L = \frac{WS^2}{60}$	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'

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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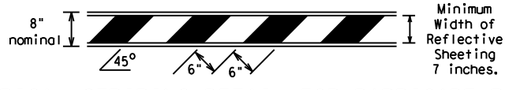
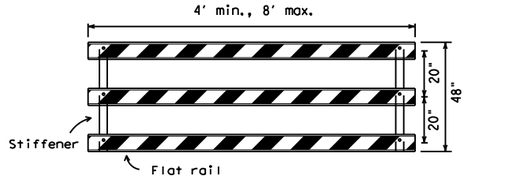
TYPE 3 BARRICADES

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.



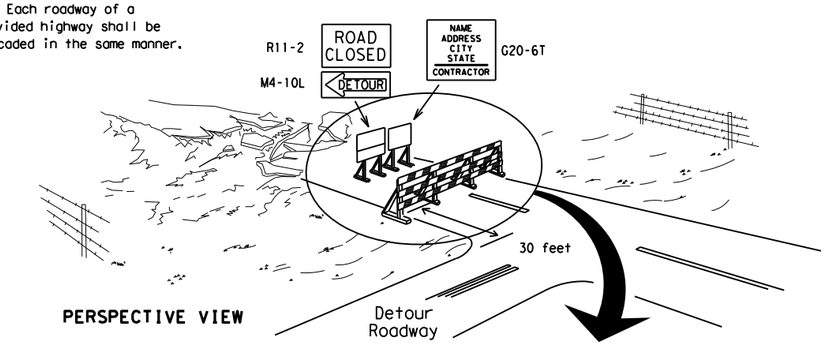
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

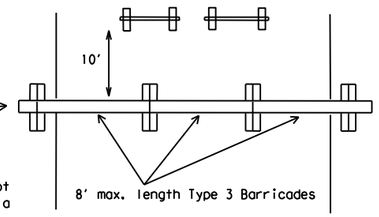
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

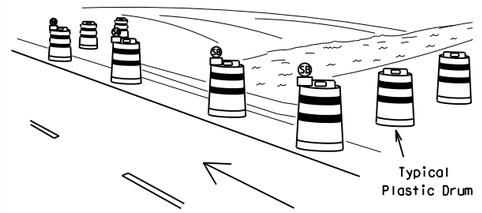
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

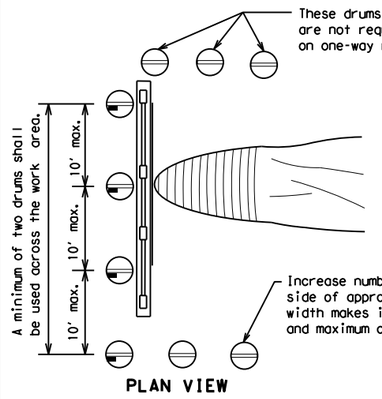
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

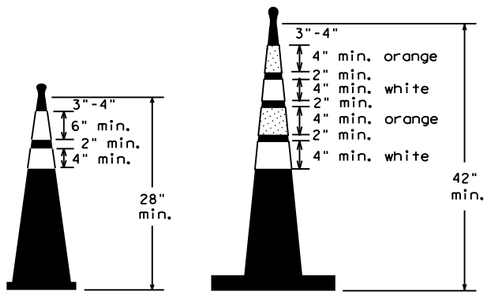
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder 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.



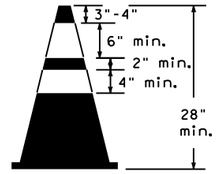
PLAN VIEW

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

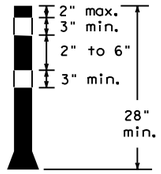
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

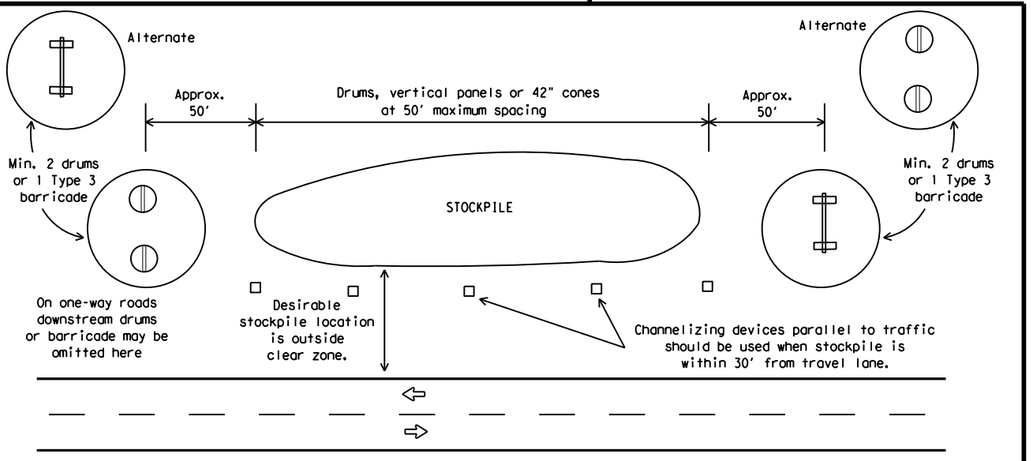


Tubular Marker

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	00	112	VAR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	VARIOUS		018

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WORK ZONE PAVEMENT MARKINGS

GENERAL

1. 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.
2. Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
3. Additional supplemental pavement marking details may be found in the plans or specifications.
4. Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
5. 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).
6. 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.
7. All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

1. Raised pavement markers are to be placed according to the patterns on BC(12).
2. 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

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

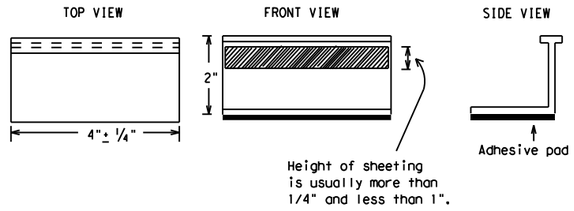
MAINTAINING WORK ZONE PAVEMENT MARKINGS

1. The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
2. 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.
3. 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.
4. 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

1. 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.
2. 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.
3. 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".
4. The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
5. Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
6. Blast cleaning may be used but will not be required unless specifically shown in the plans.
7. Over-painting of the markings SHALL NOT BE permitted.
8. Removal of raised pavement markers shall be as directed by the Engineer.
9. 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.
10. 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

1. Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
2. 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.
   A. 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.
   B. 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.
3. Small design variances may be noted between tab manufacturers.
4. 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

1. Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
2. All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
3. 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).

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	LBB	VARIOUS		019
11-02 8-14				

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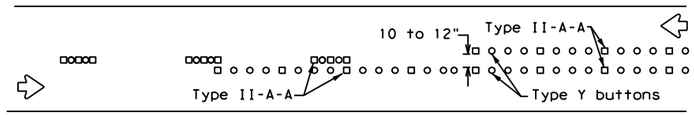
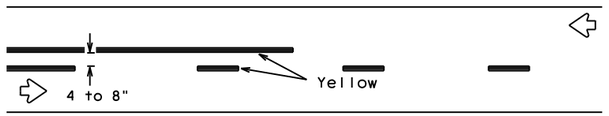
PAVEMENT MARKING PATTERNS

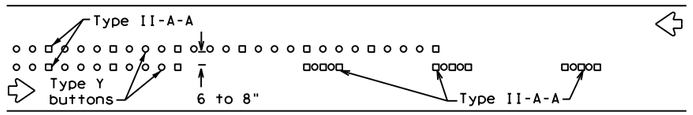
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



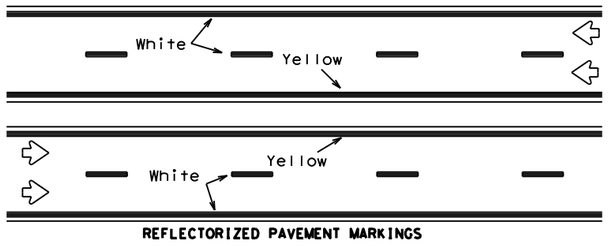
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



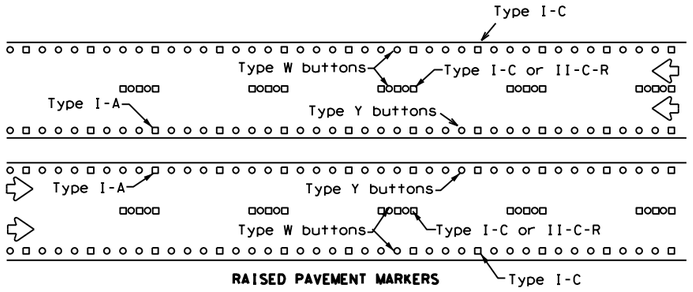
RAISED PAVEMENT MARKERS - PATTERN B

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.

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



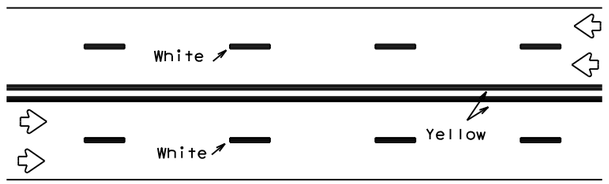
REFLECTORIZED PAVEMENT MARKINGS



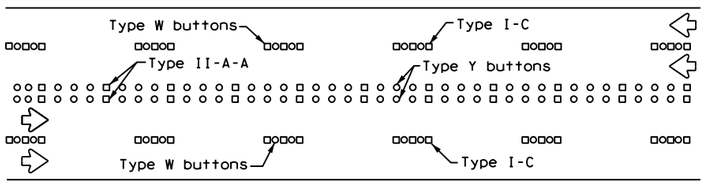
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



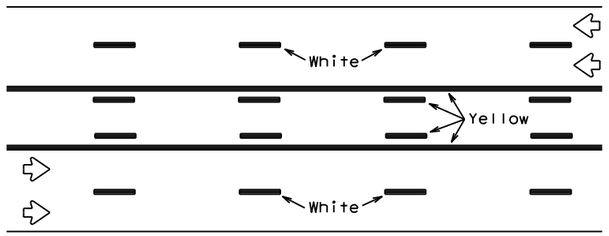
REFLECTORIZED PAVEMENT MARKINGS



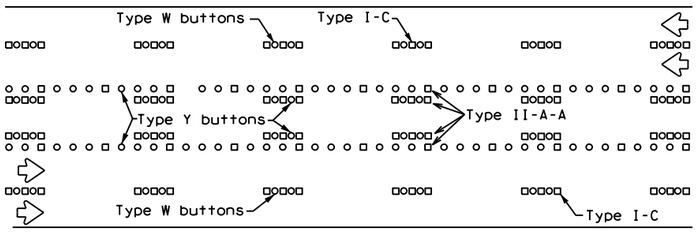
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

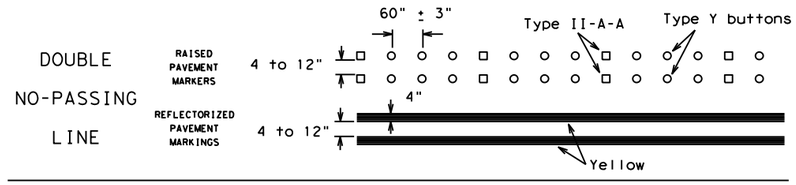
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

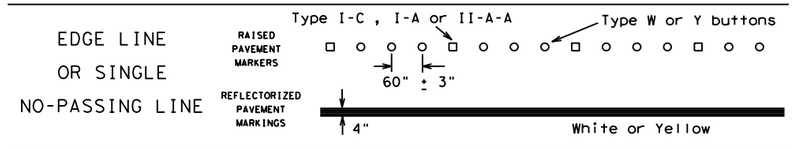
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

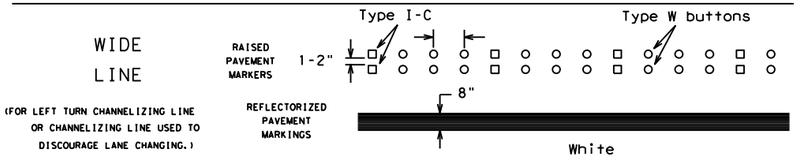


EDGE LINE OR SINGLE NO-PASSING LINE



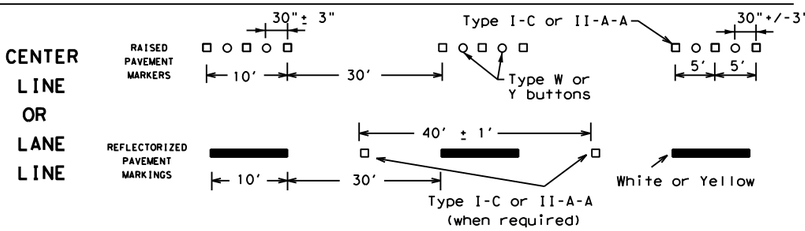
WIDE LINE

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

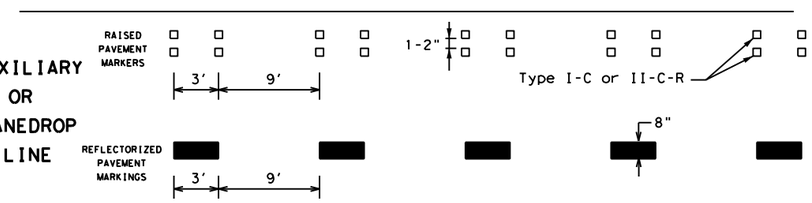


BROKEN LINES

CENTER LINE OR LANE LINE

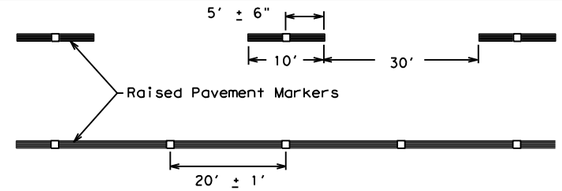


AUXILIARY OR LANEDROP LINE



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.



Centerline only - not to be used on edge lines

Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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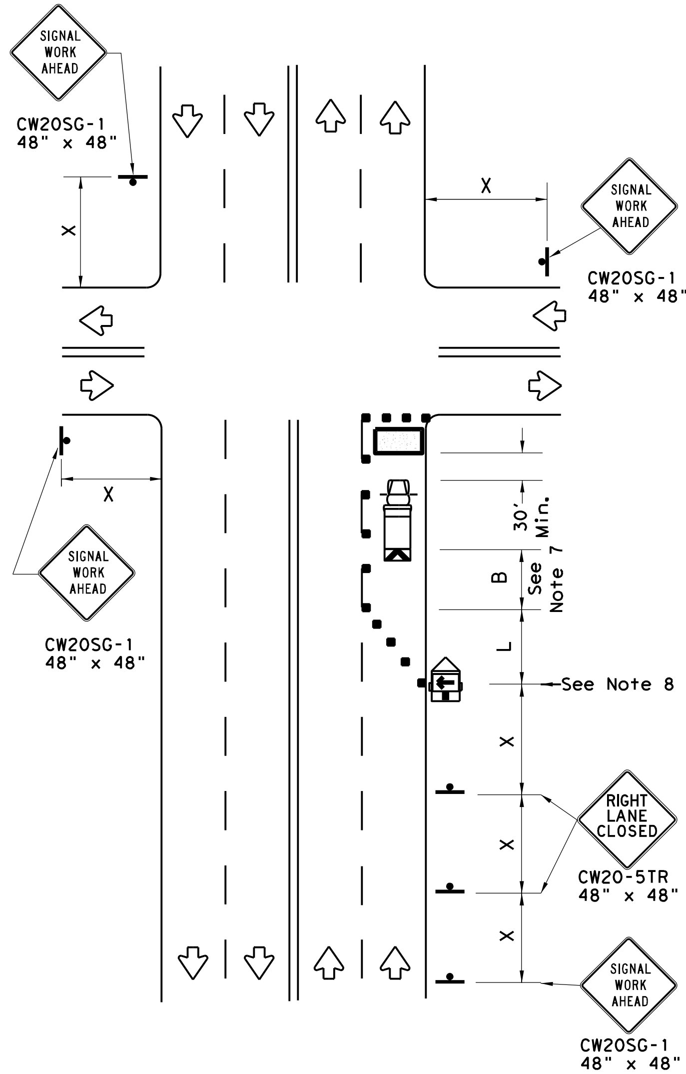
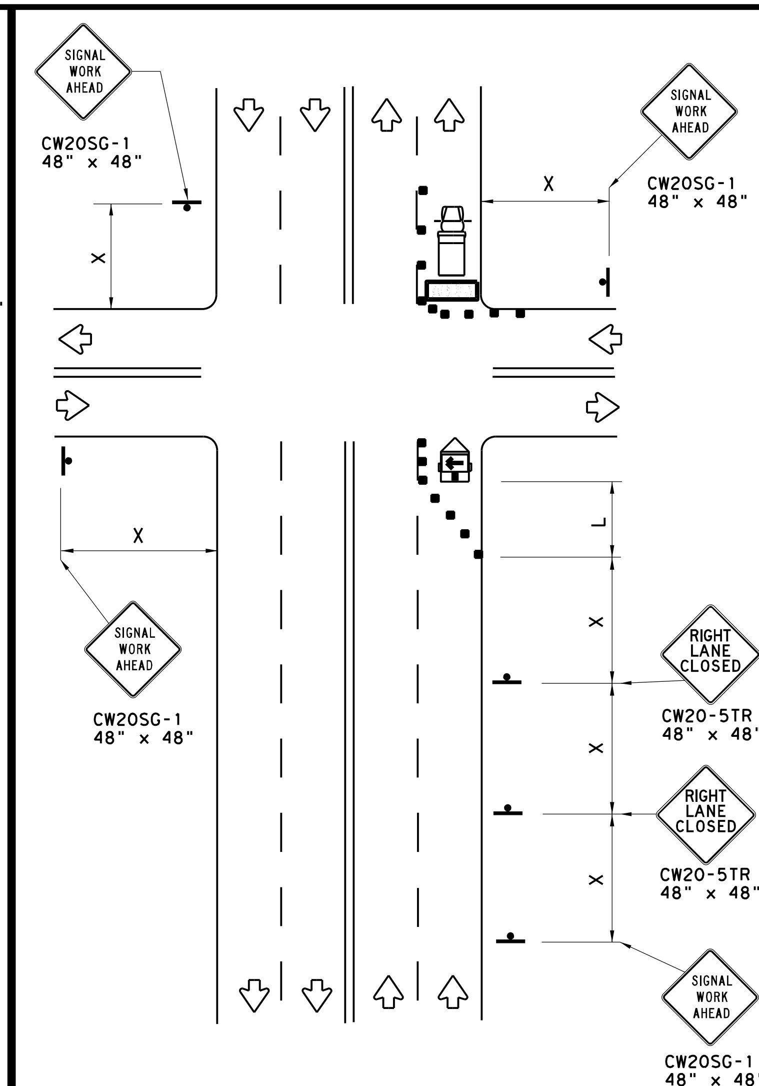


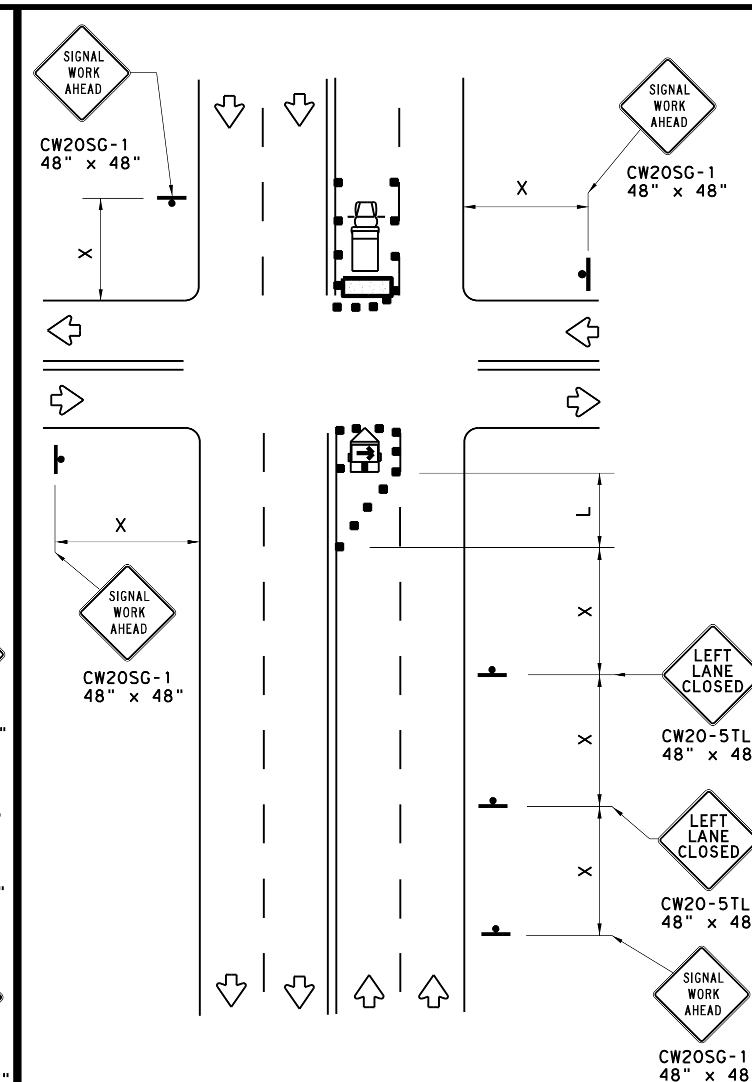
NEAR SIDE LANE CLOSURE

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

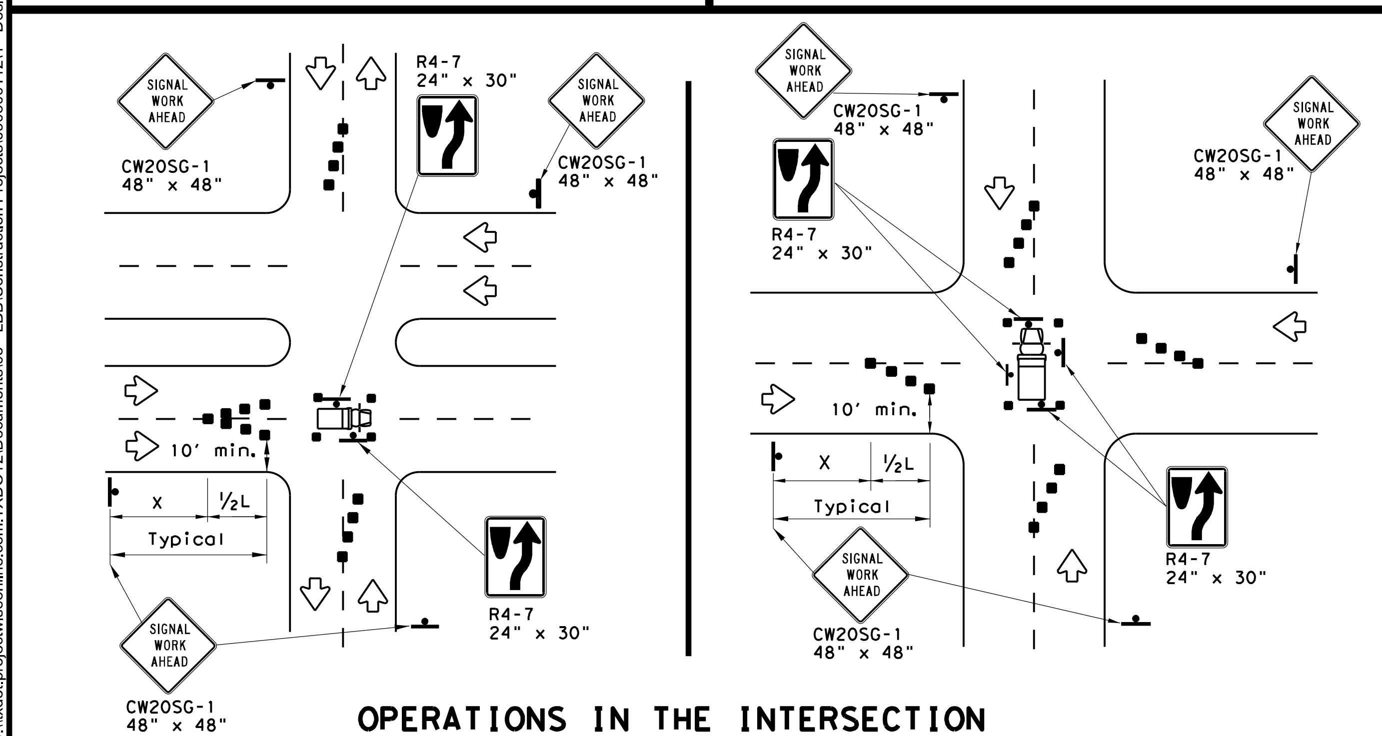
LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			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

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ(BTS-1)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
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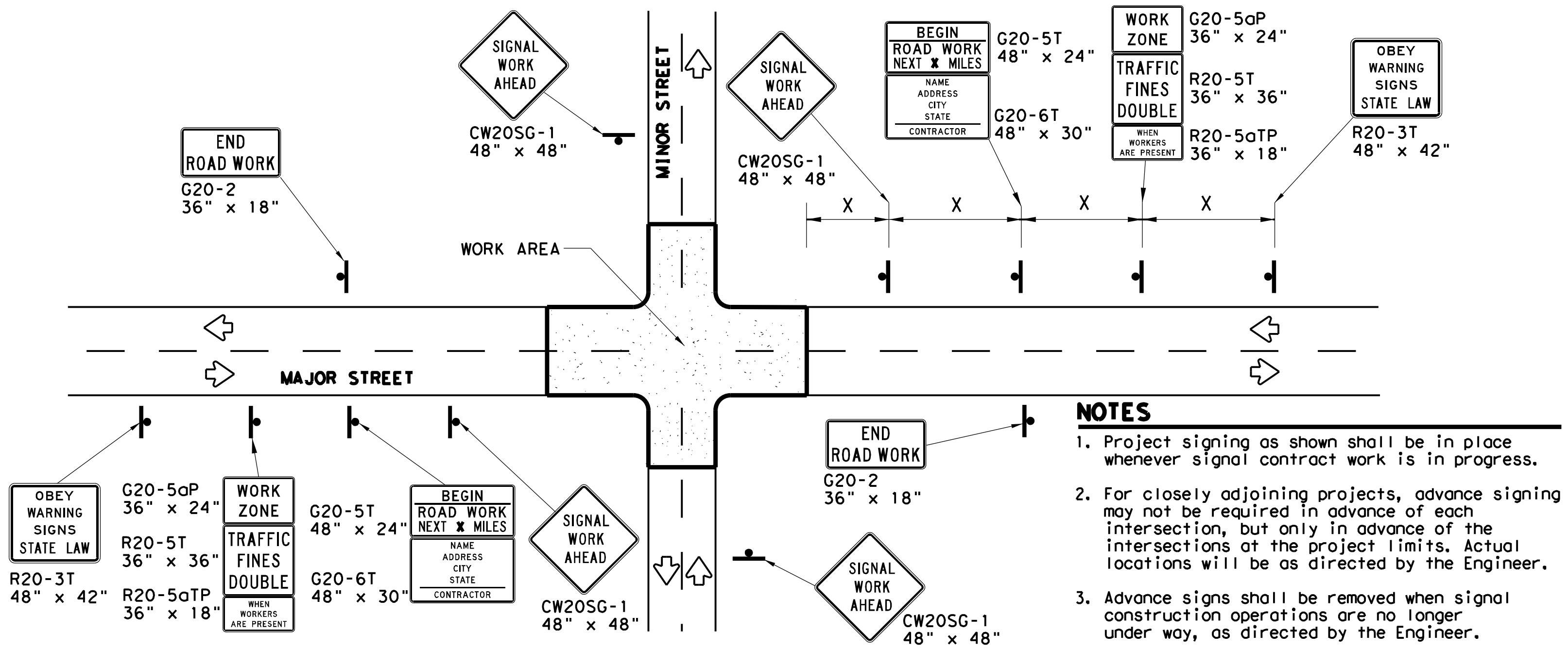


TYPICAL ADVANCE SIGNAL PROJECT SIGNING

FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS

NOTES

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

DURATION OF WORK

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

SIGN MOUNTING HEIGHT

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

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered, unless otherwise approved by the Engineer.
2. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night without damaging the sign sheeting. Burlap, or heavy materials such as plywood or aluminum shall not be used to cover signs.
3. Duct tape or other adhesive material shall NOT be affixed to a sign face.
4. Signs and anchor stubs shall be removed and holes back filled upon completion of the work.

REFLECTIVE SHEETING

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

SIGN SUPPORT WEIGHTS

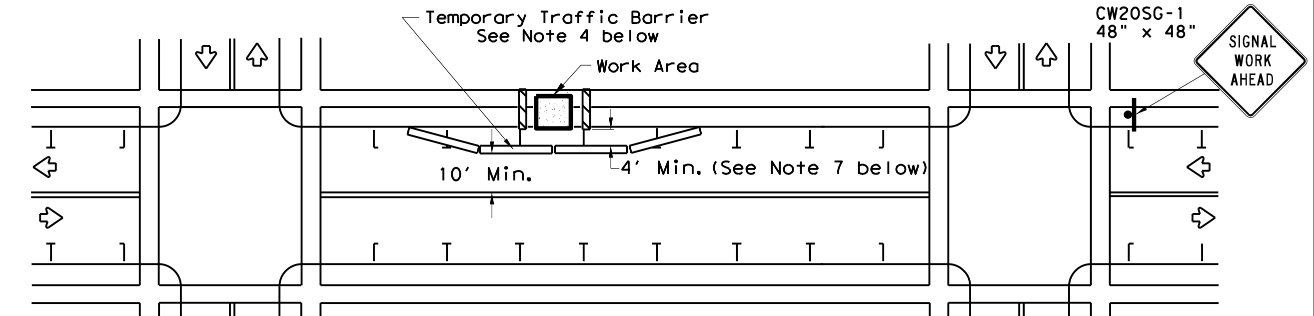
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support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

LEGEND	
(symbol)	Sign
(symbol)	Channelizing Devices
(symbol)	Type 3 Barricade

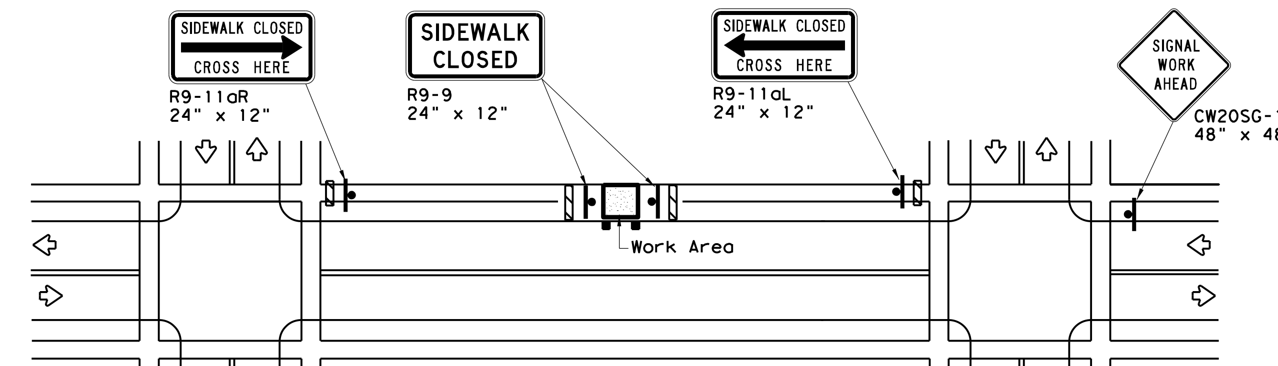
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

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

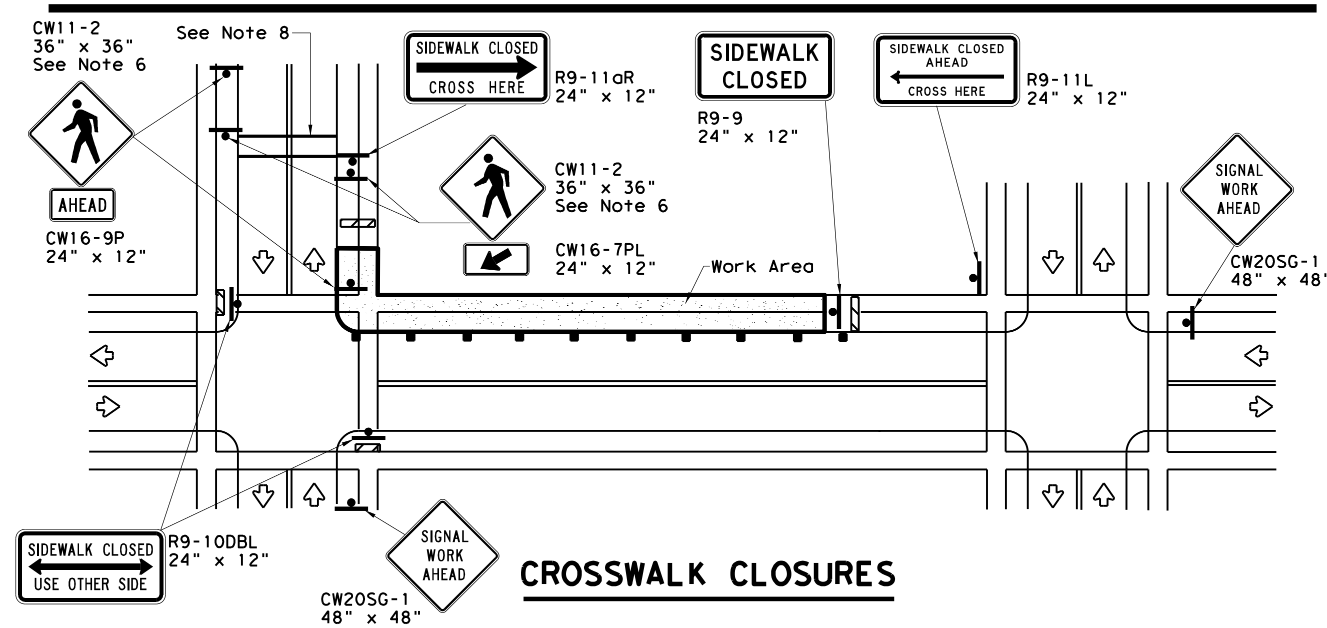
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



SIDEWALK DIVERSION



SIDEWALK DETOUR



CROSSWALK CLOSURES

PEDESTRIAN CONTROL

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

SHEET 2 OF 2

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

WZ(BTS-2)-13

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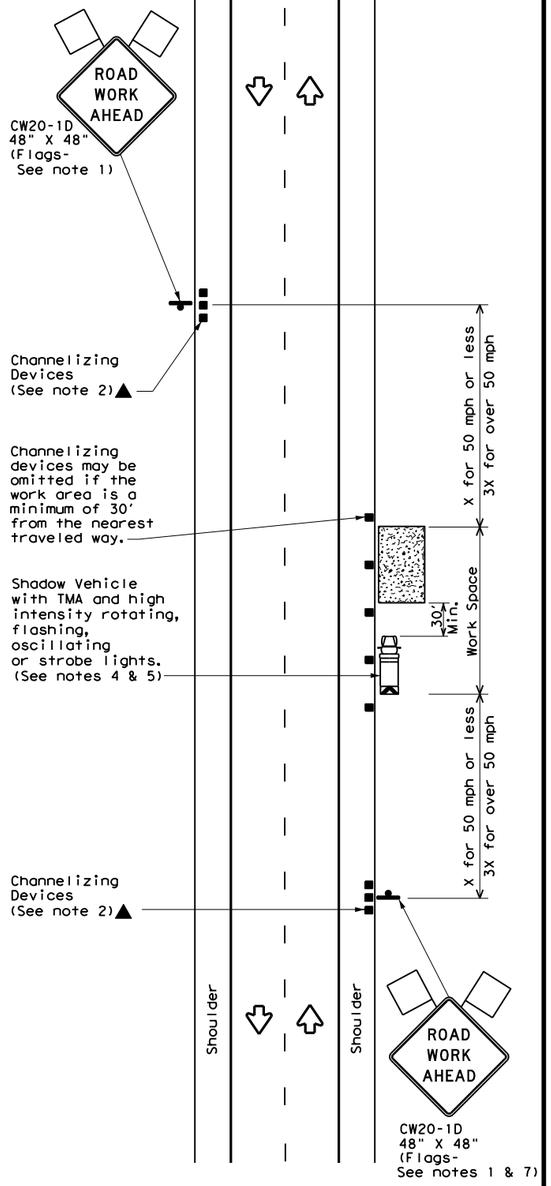
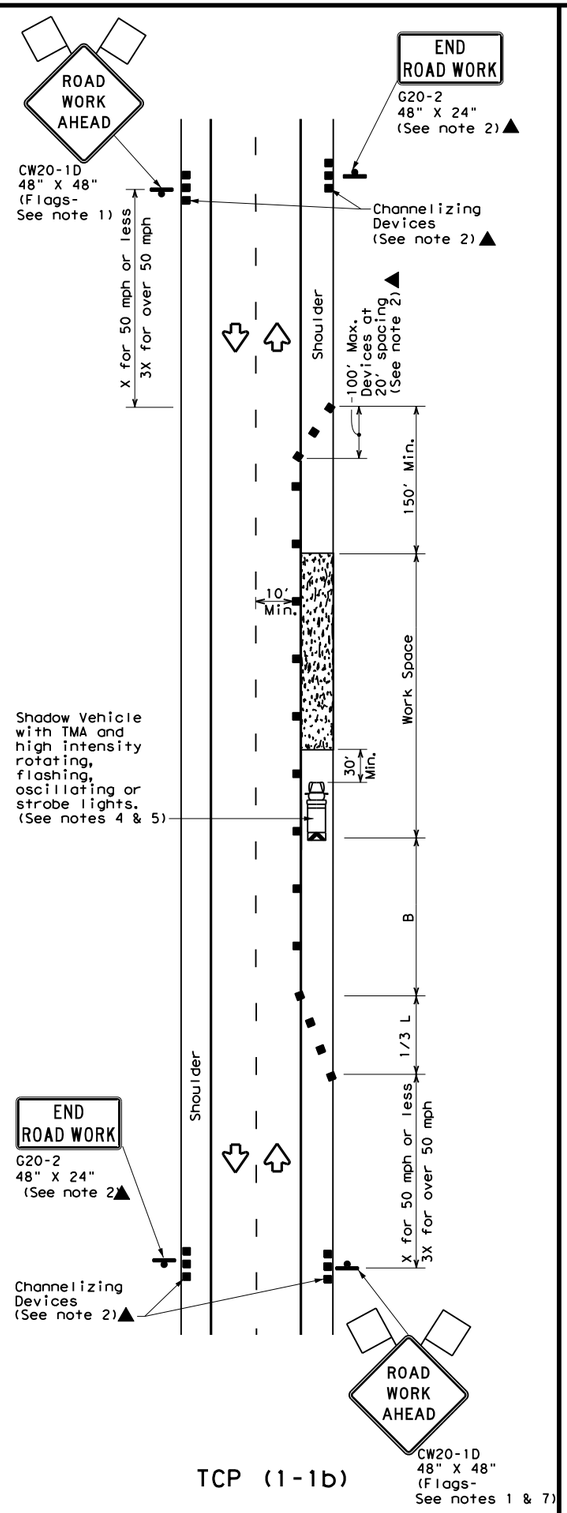


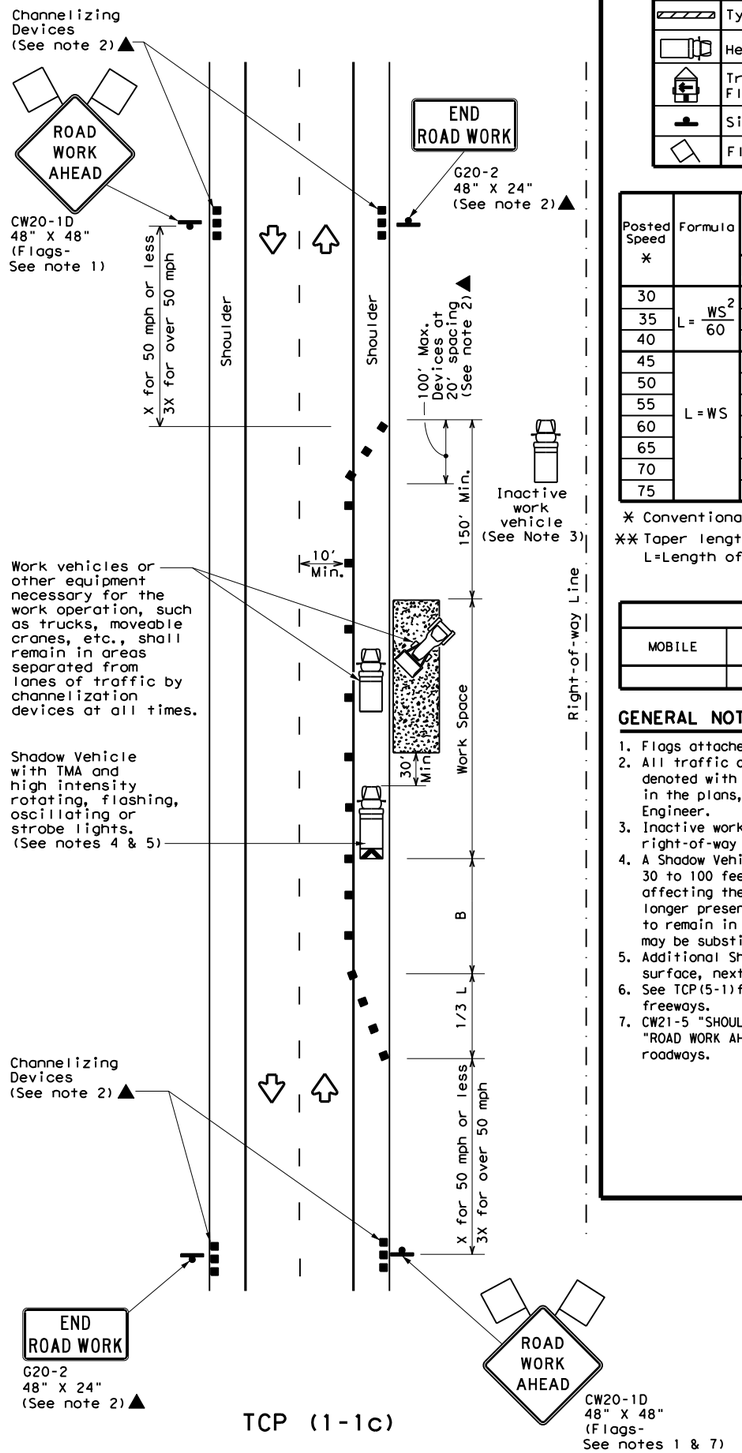
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
4. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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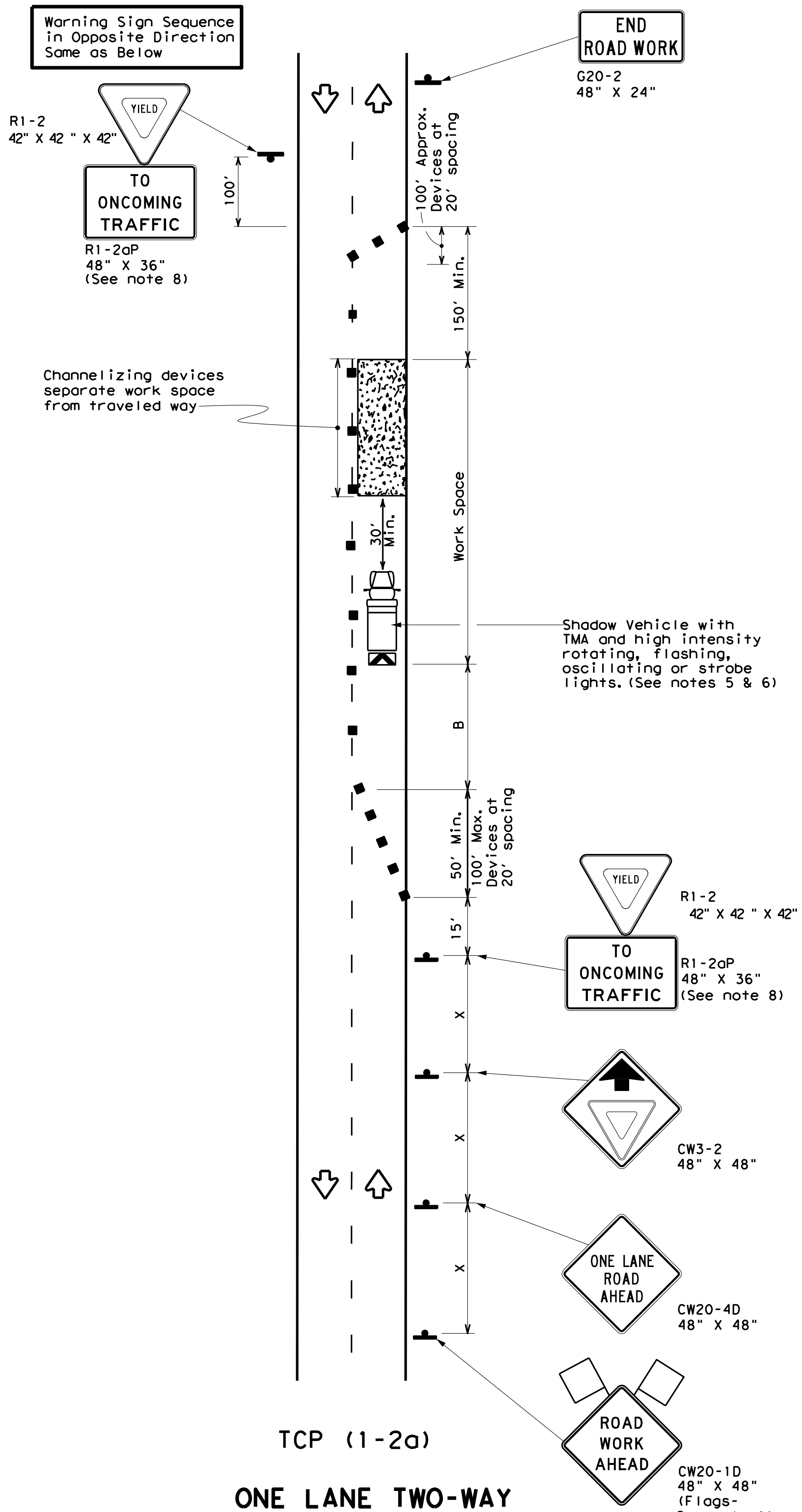
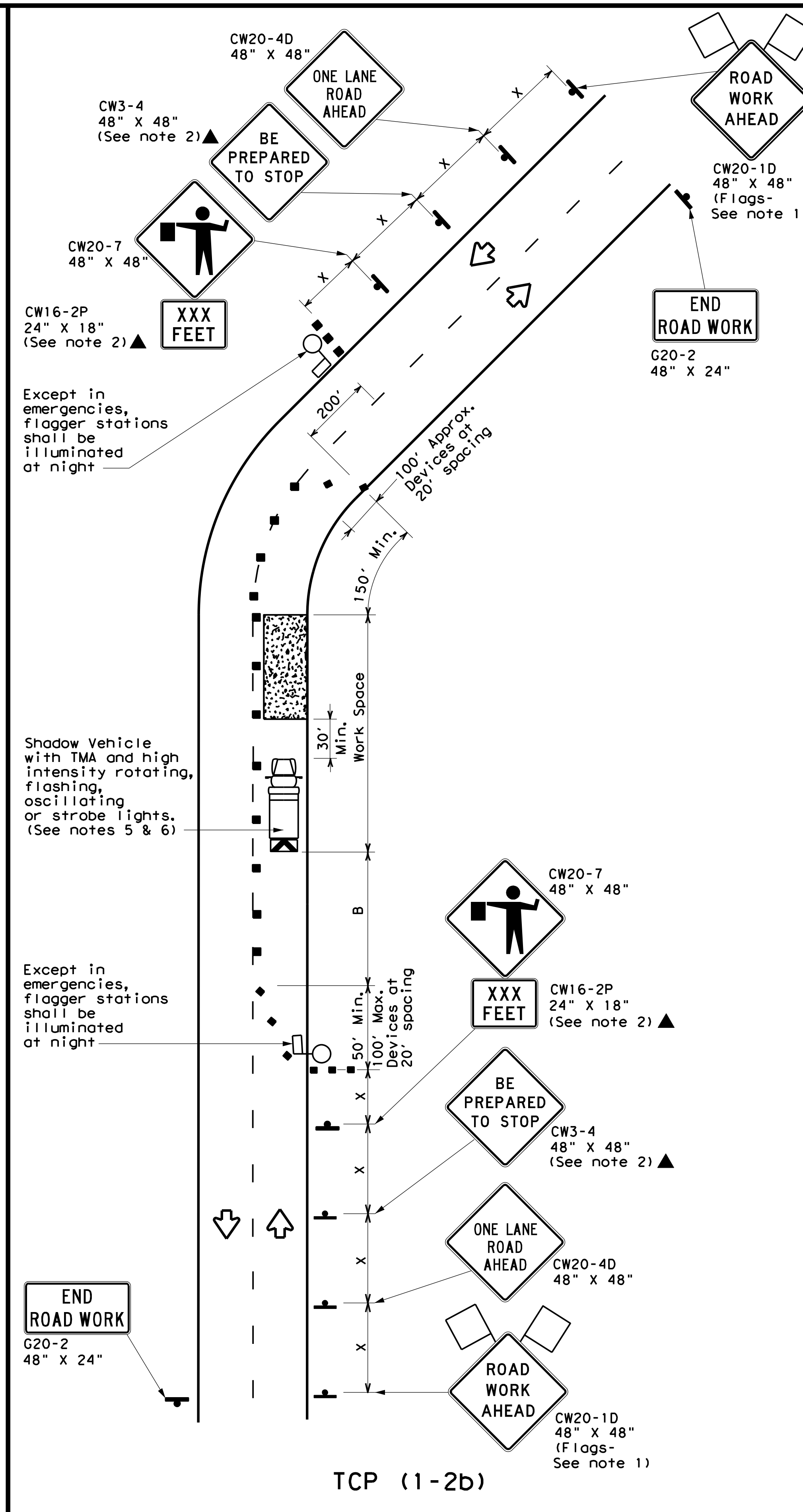


ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See note 7)



ONE LANE TWO-WAY CONTROL WITH FLAGGERS

LEGEND

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
		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'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L = WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* Conventional Roads Only

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

TYPICAL USAGE

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
4. Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-2a)

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

TCP (1-2b)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(1-2)-18

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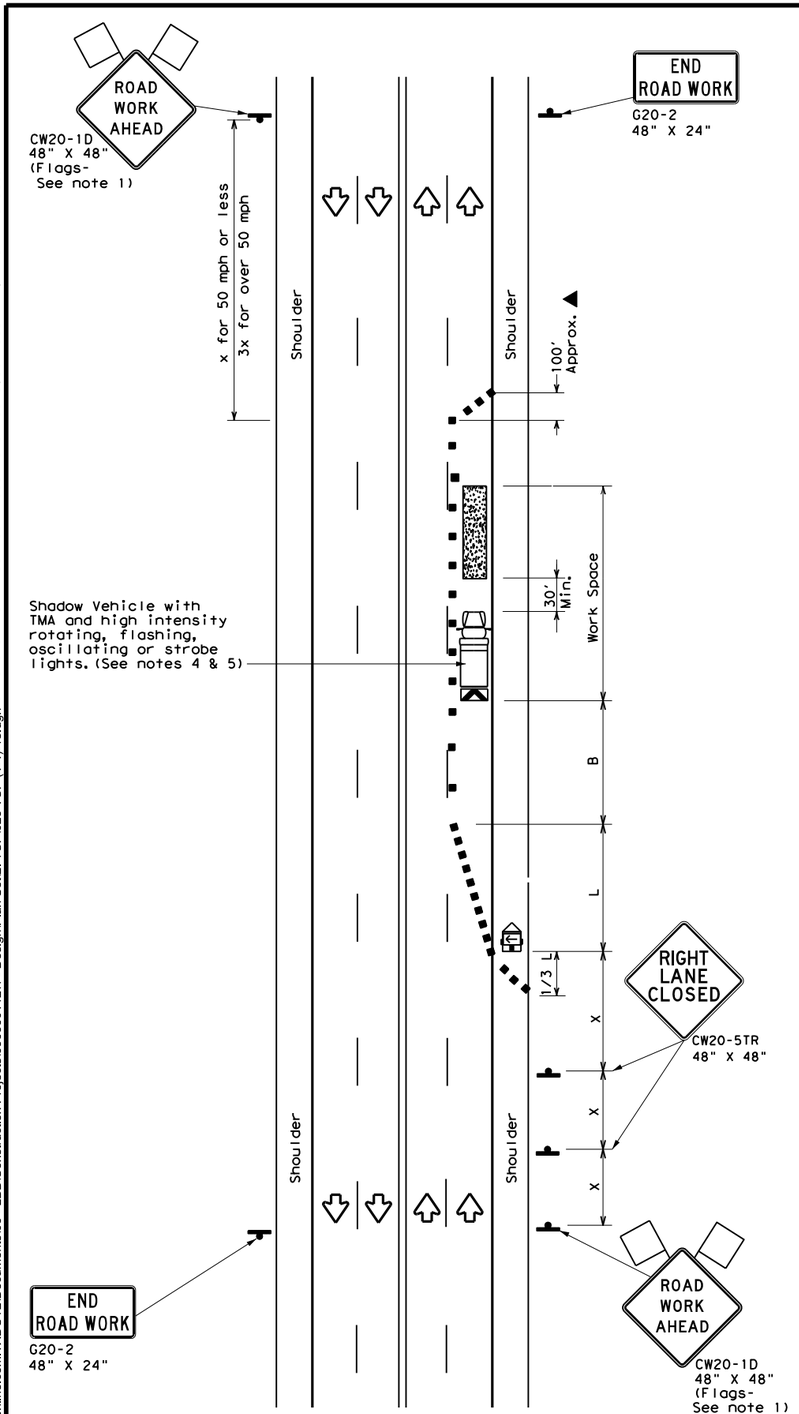
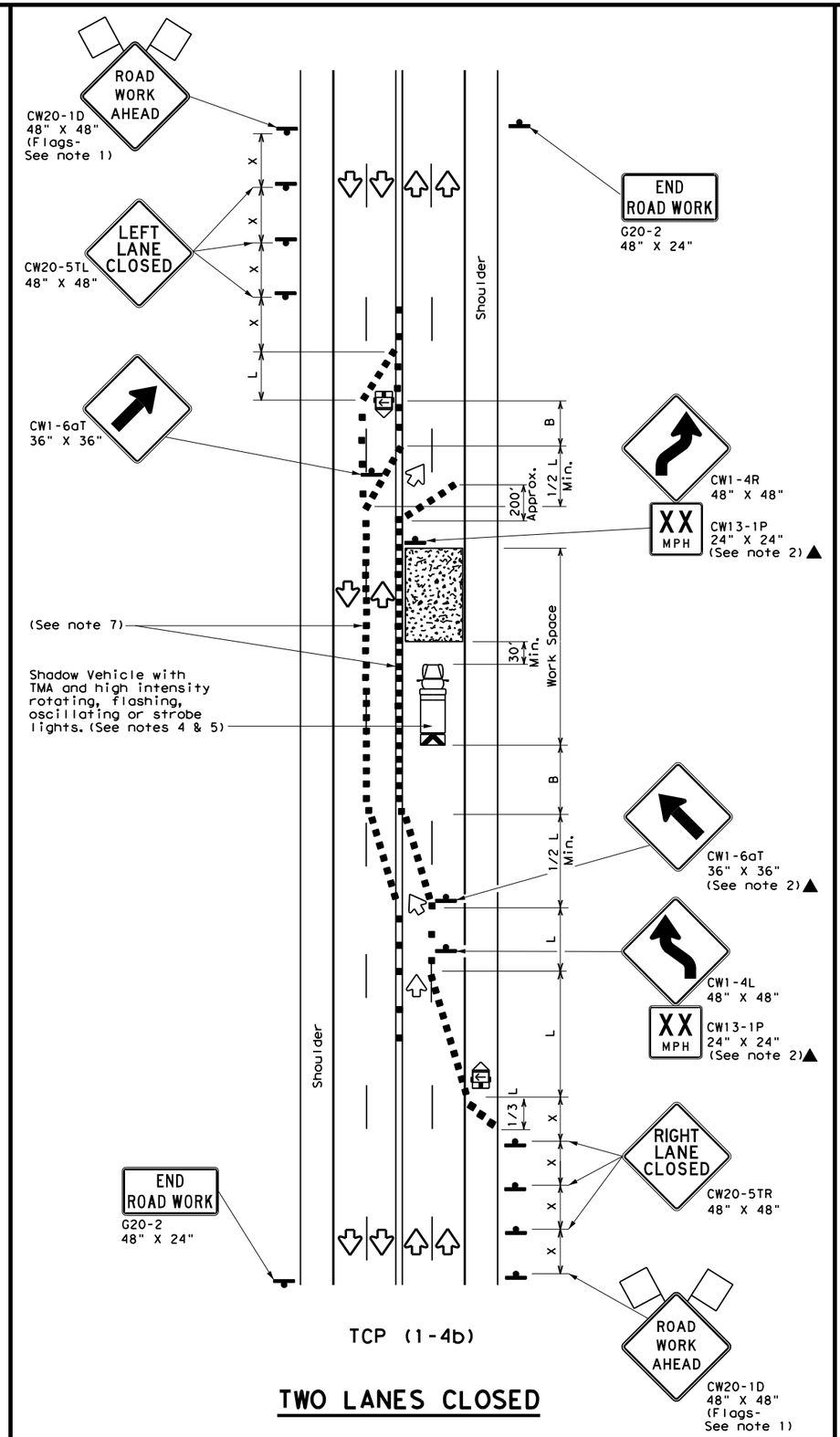


TCP (1-4a)

ONE LANE CLOSED



TCP (1-4b)

TWO LANES CLOSED

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
4. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-4a)

6. If this TCP is used for a left lane closure , CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline where needed to protect the work space from opposing traffic with the arrow panel placed in the closed lane near the end of the merging taper.

TCP (1-4b)

7. Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(1-4)-18

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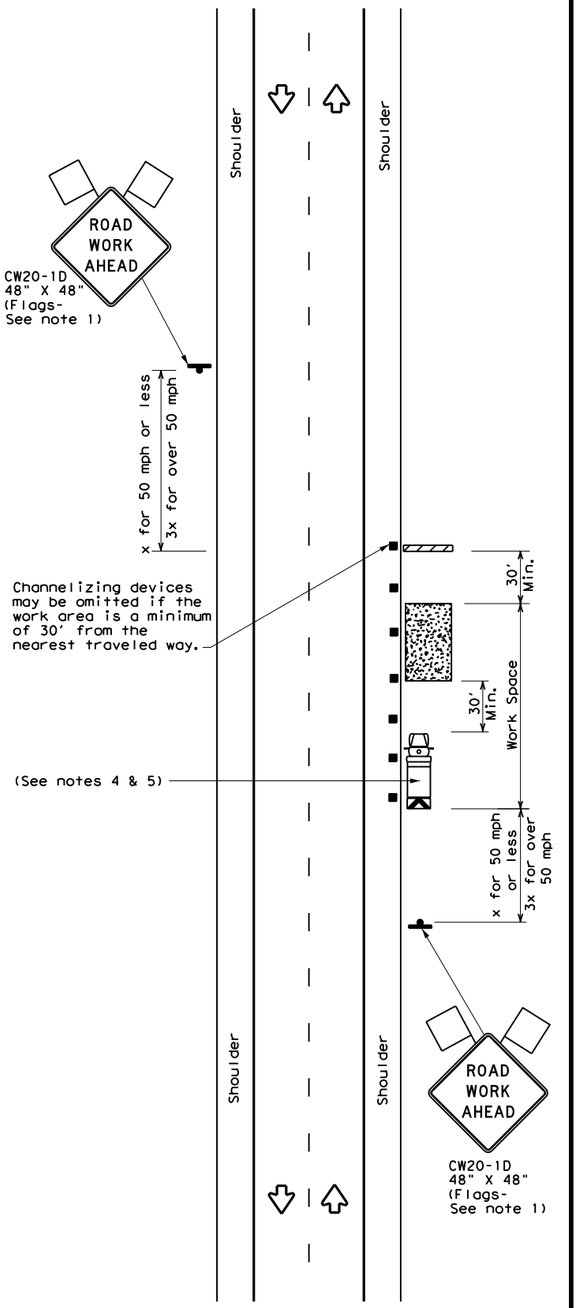
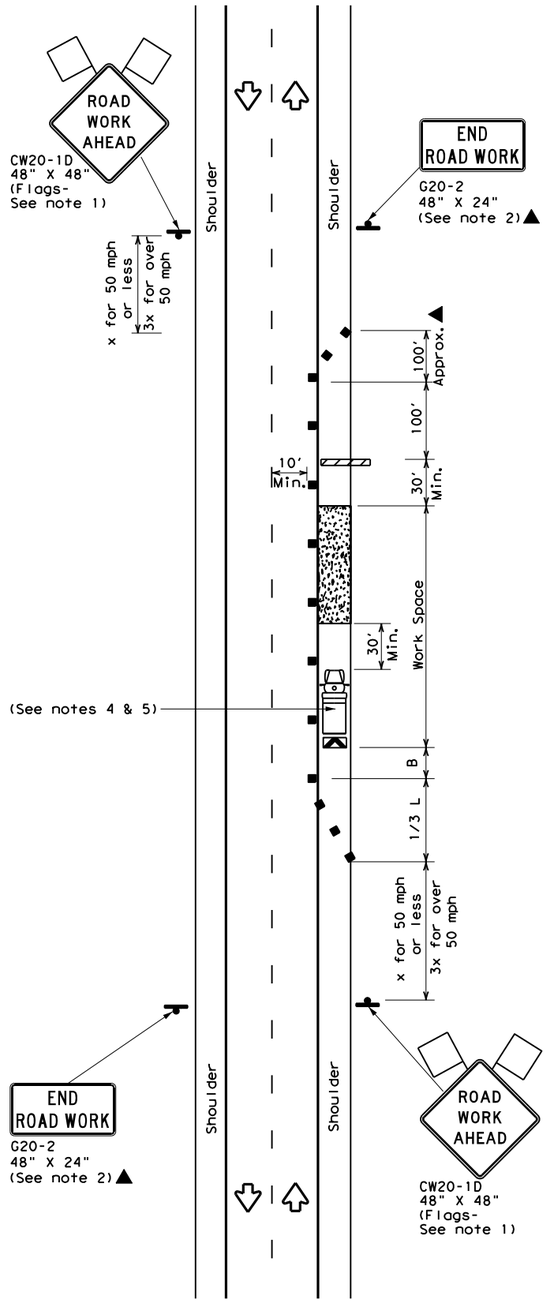


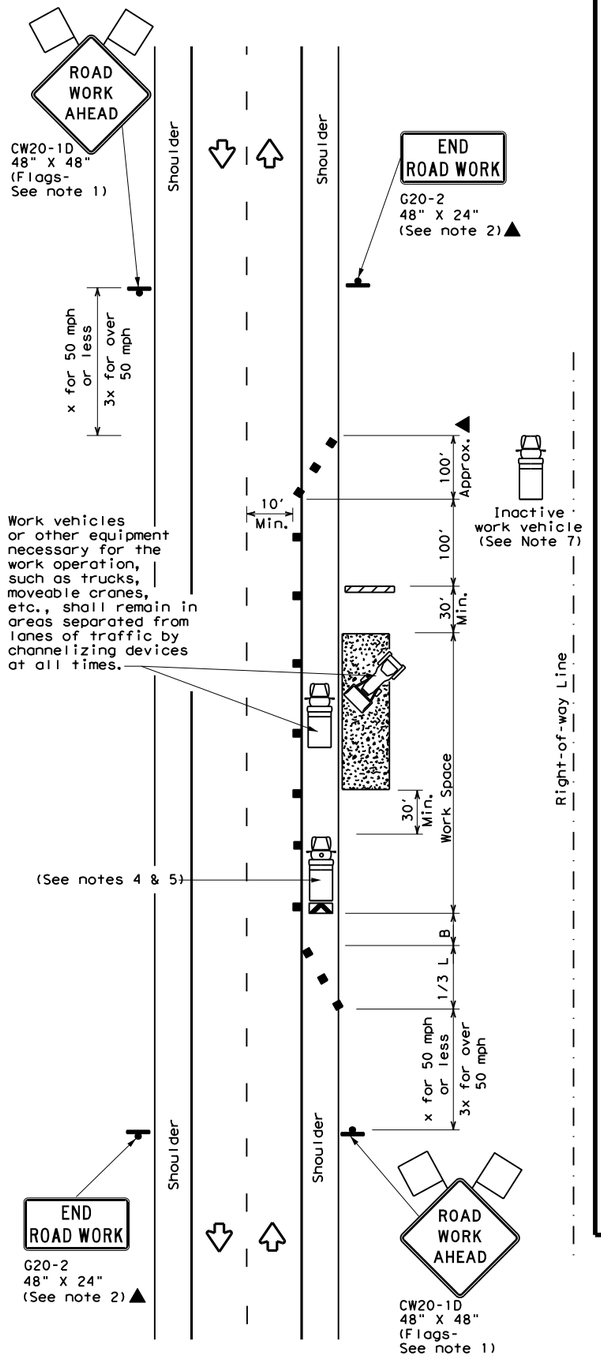
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

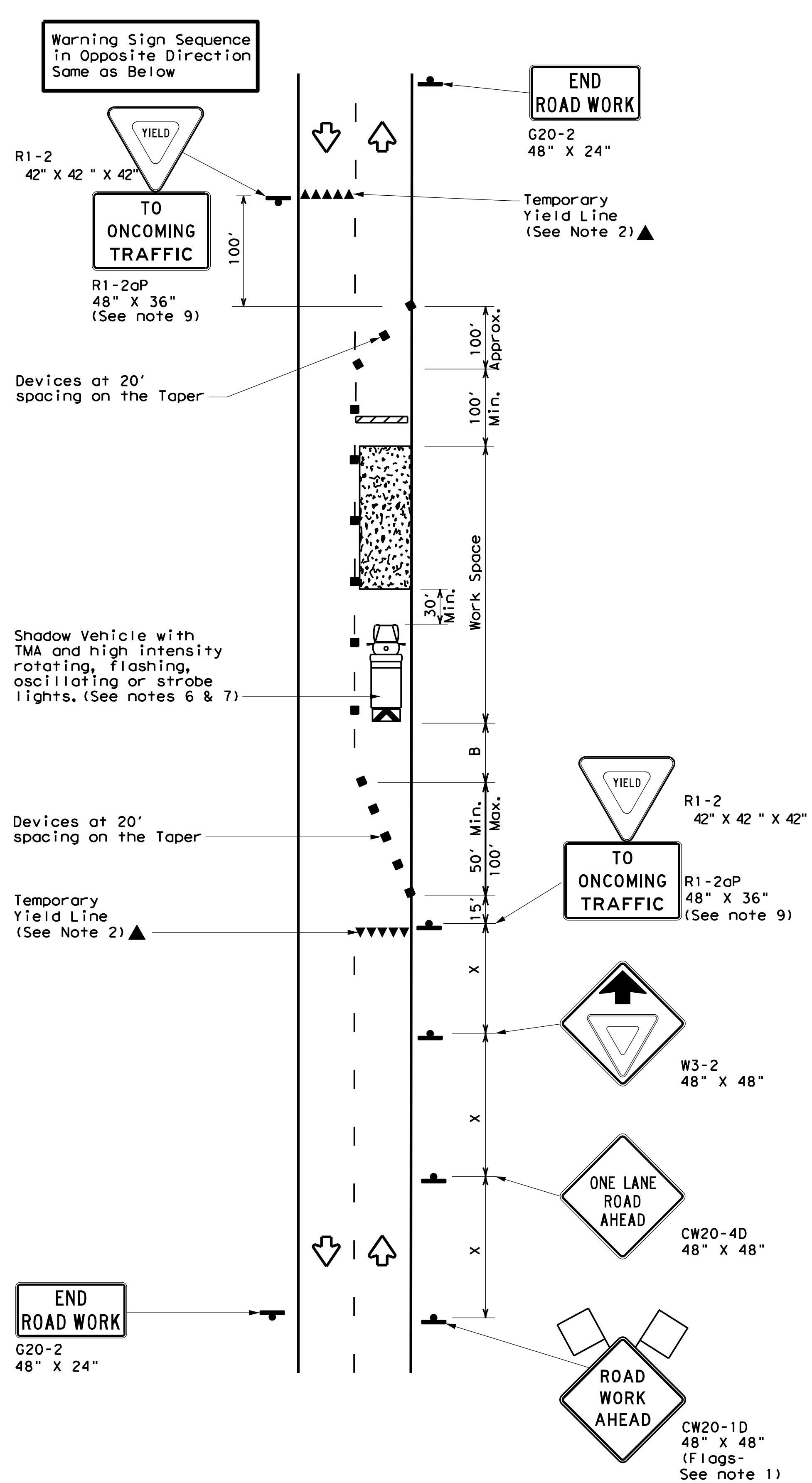
Texas Department of Transportation

Traffic Operations Division Standard

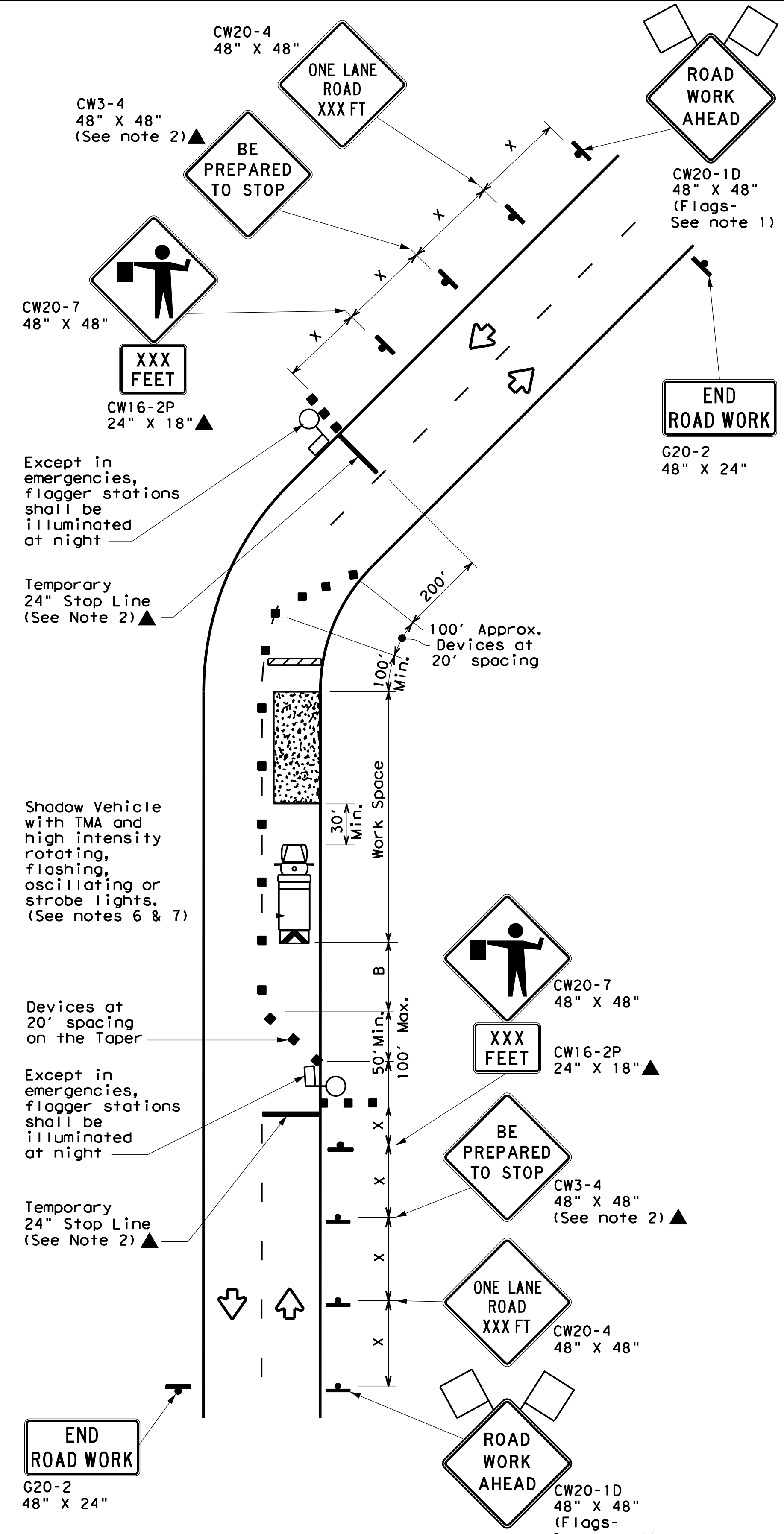
TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	00	112	VAR
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	LBB	VARIOUS		026
1-97 2-18				



TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



TCP (2-2b)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

LEGEND

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
		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'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L = WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
4. Flaggers should use two-way radios or other methods of communication to control traffic.
5. Length of work space should be based on the ability of flaggers to communicate.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-2a)

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

TCP (2-2b)

10. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above).
12. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situtations.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	0905	00	112	VAR
	DIST	COUNTY		SHEET NO.
	LBB	VARIOUS		027

DATE: 9/26/2022 2:04:24 PM
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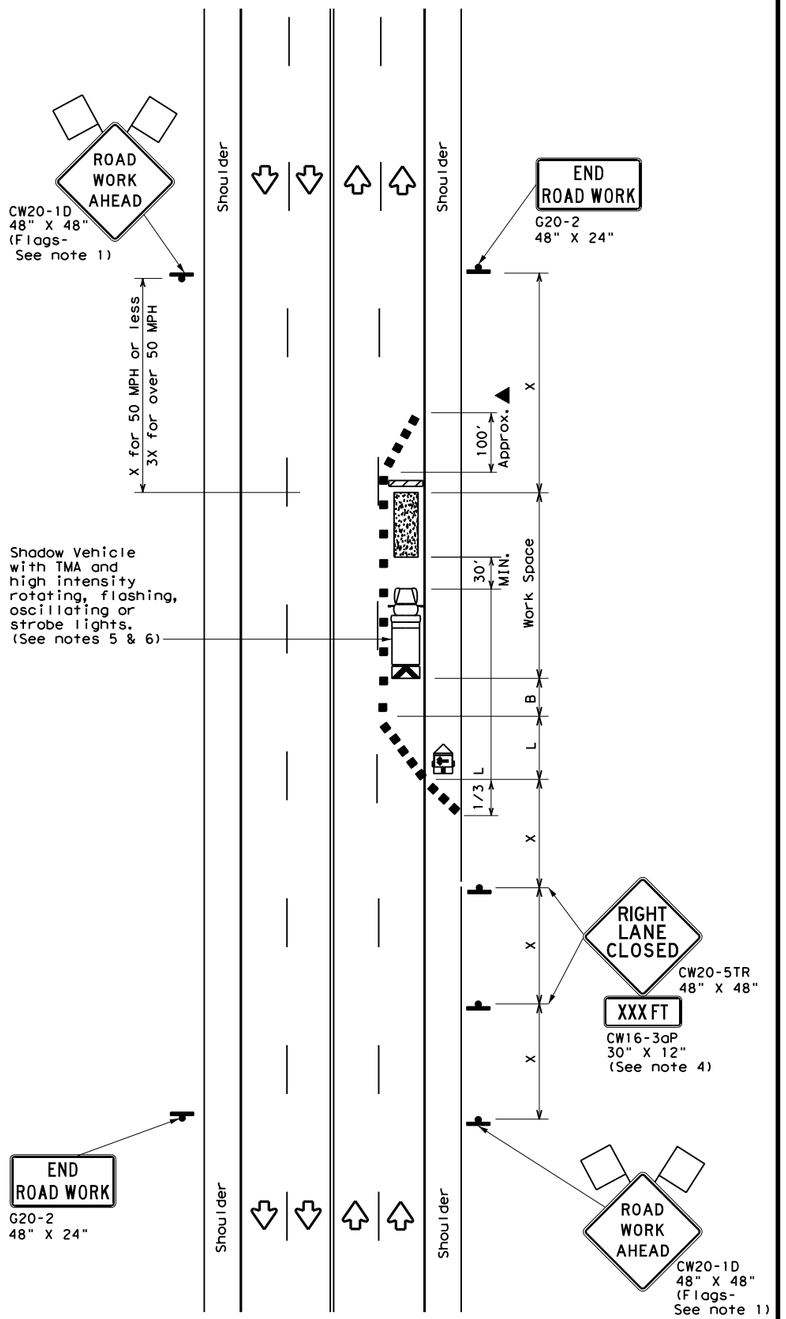
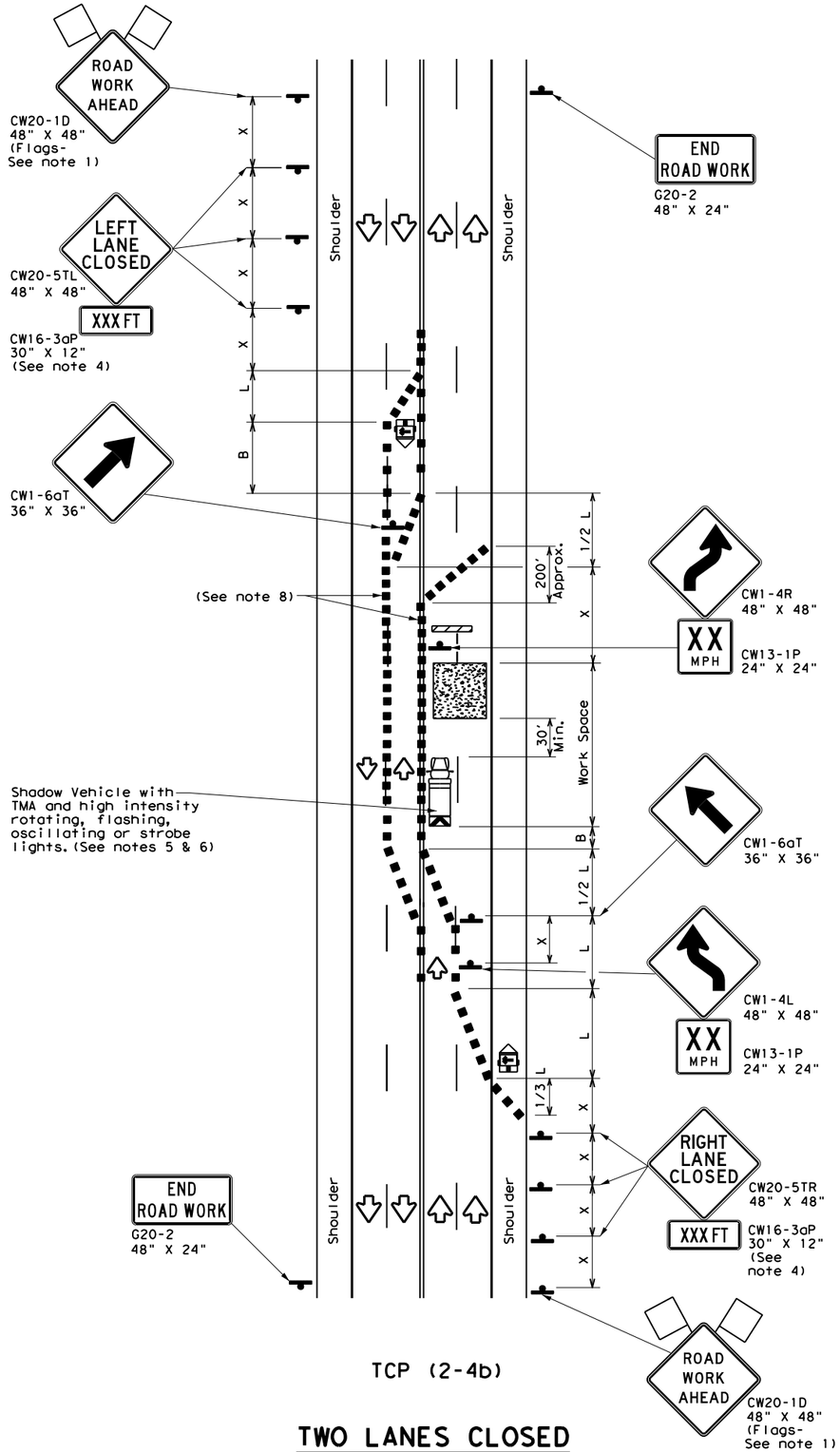


TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
4. For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-4a)

7. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED"signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic with the arrow board placed in the closed lane near the end of the merging taper.

TCP (2-4b)

8. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter devices spacing is intended for the area of conflicting markings, not the entire work zone.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0905	00	112	VAR
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	LBB	VARIOUS		028

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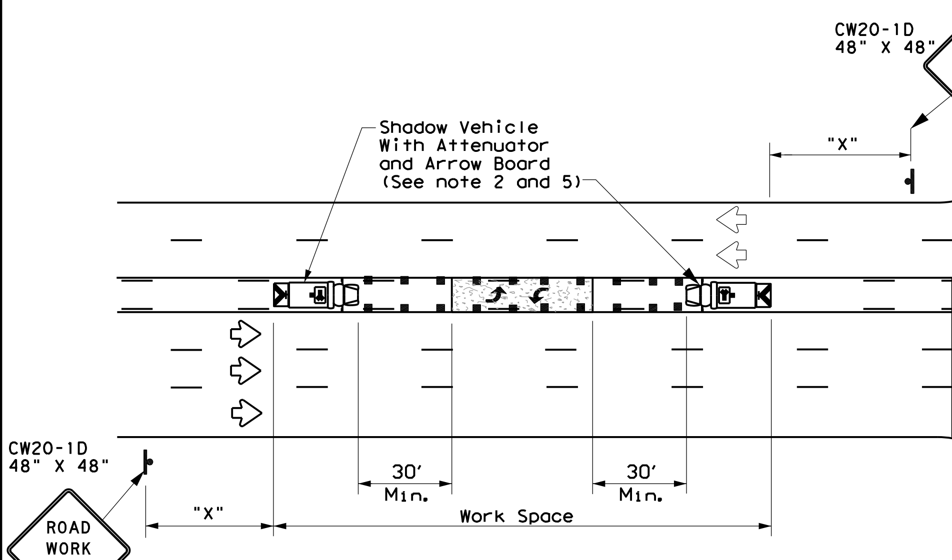
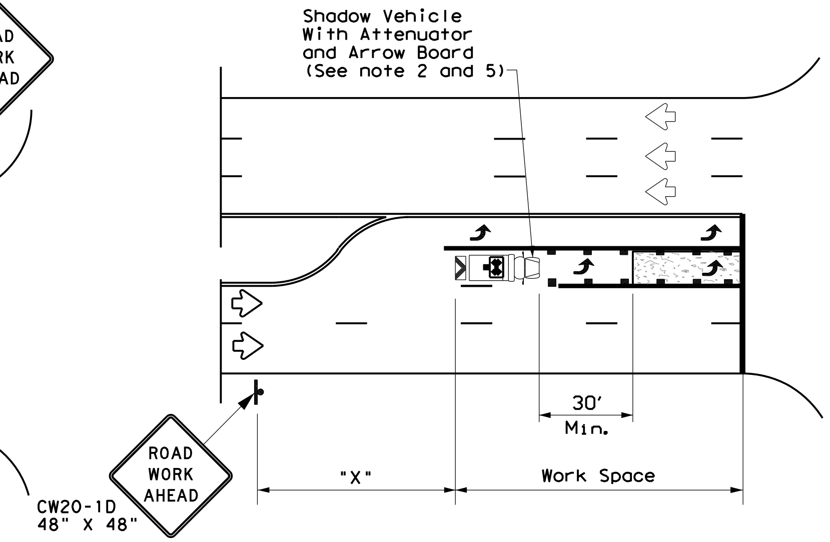
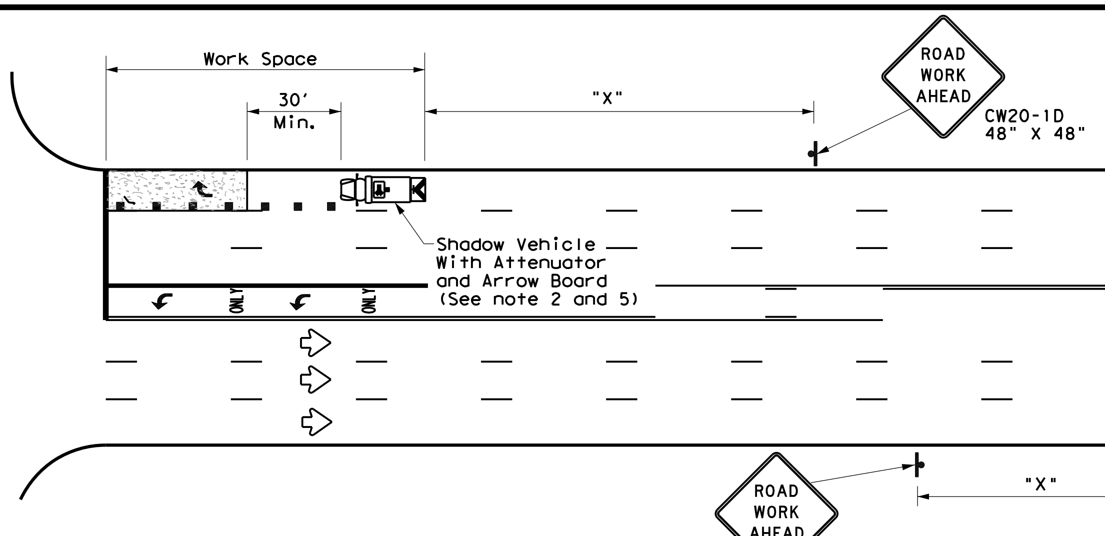


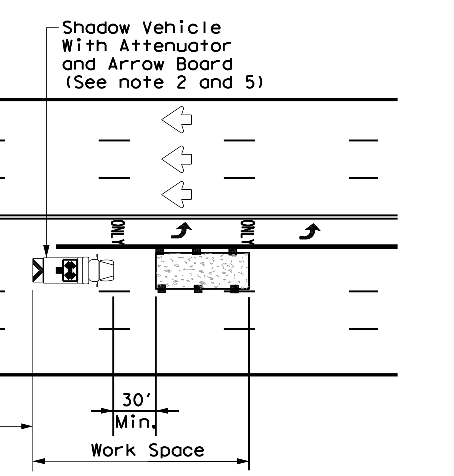
TYPICAL TRAFFIC CONTROL FOR
CONTINUOUS LEFT TURN LANE SYMBOL MARKINGS



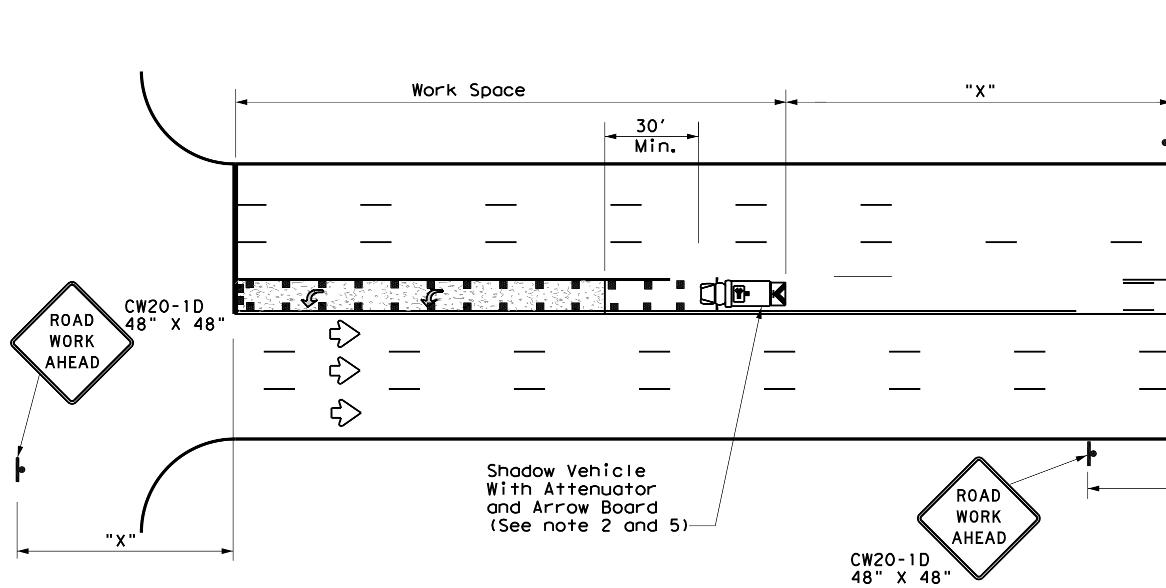
TYPICAL TRAFFIC CONTROL FOR
OUTSIDE DUAL LEFT TURN LANE SYMBOL MARKINGS



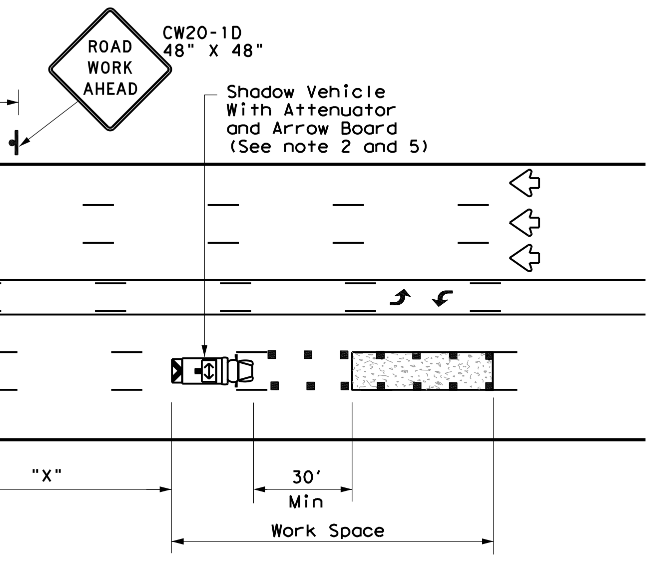
TYPICAL TRAFFIC CONTROL FOR
OUTSIDE LANE MARKINGS



TYPICAL TRAFFIC CONTROL FOR
INSIDE LANE MARKINGS



TYPICAL TRAFFIC CONTROL FOR
LEFT TURN LANE MARKINGS



TYPICAL TRAFFIC CONTROL FOR
CENTER LANE MARKINGS

LEGEND

Symbol	Description	Symbol	ARROW BOARD DISPLAY
*	Trail Vehicle		
* *	Shadow Vehicle		
* * *	Work Vehicle	⇨	RIGHT Directional
	Heavy Work Vehicle	⇦	LEFT Directional
	Truck Mounted Attenuator (TMA)	⇔	Double Arrow
⇦	Traffic Flow	■ ■ ■	Channelizing Devices

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

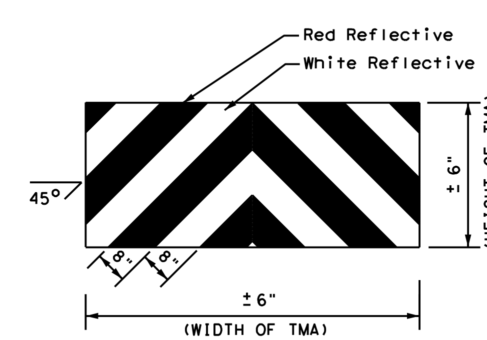
* Conventional Roads Only

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

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

GENERAL NOTES

1. This traffic control plan is for use on conventional roads posted at 45 mph or less and is intended for mobile operations that move continuously or intermittently (stopping up to approximately 15 minutes) such as short-line striping and in-lane rumble strips. When activities are anticipated to take longer amounts of time or traffic conditions warrant, a short duration or short-term stationary traffic control plan should be used.
2. A Truck Mounted Attenuator shall be used on Shadow Vehicle. Striping on the back panel of all truck mounted attenuators shall be 8" red and white reflective sheeting placed in an inverted "V" design. Reflective sheeting shall meet or exceed the reflectivity and color requirements of departmental material specification DMS-8300, Type A.
3. All traffic control devices shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), latest edition.
4. The use of yellow rotating beacons or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the drivers side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
5. Flashing arrow board shall be used on Shadow Vehicle. Flashing arrow board shall be Type B or Type C as per BC Standards. The arrow board operation shall be controlled from inside the truck.



STRIPING FOR TMA

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS FOR ISOLATED WORK AREAS UNDIVIDED HIGHWAYS

TCP(3-4)-13

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© TxDOT July, 2013	CONT 0905	SECT 00	JOB 112	HIGHWAY VAR
REVISIONS	DIST LBB		COUNTY VARIOUS	SHEET NO. 029

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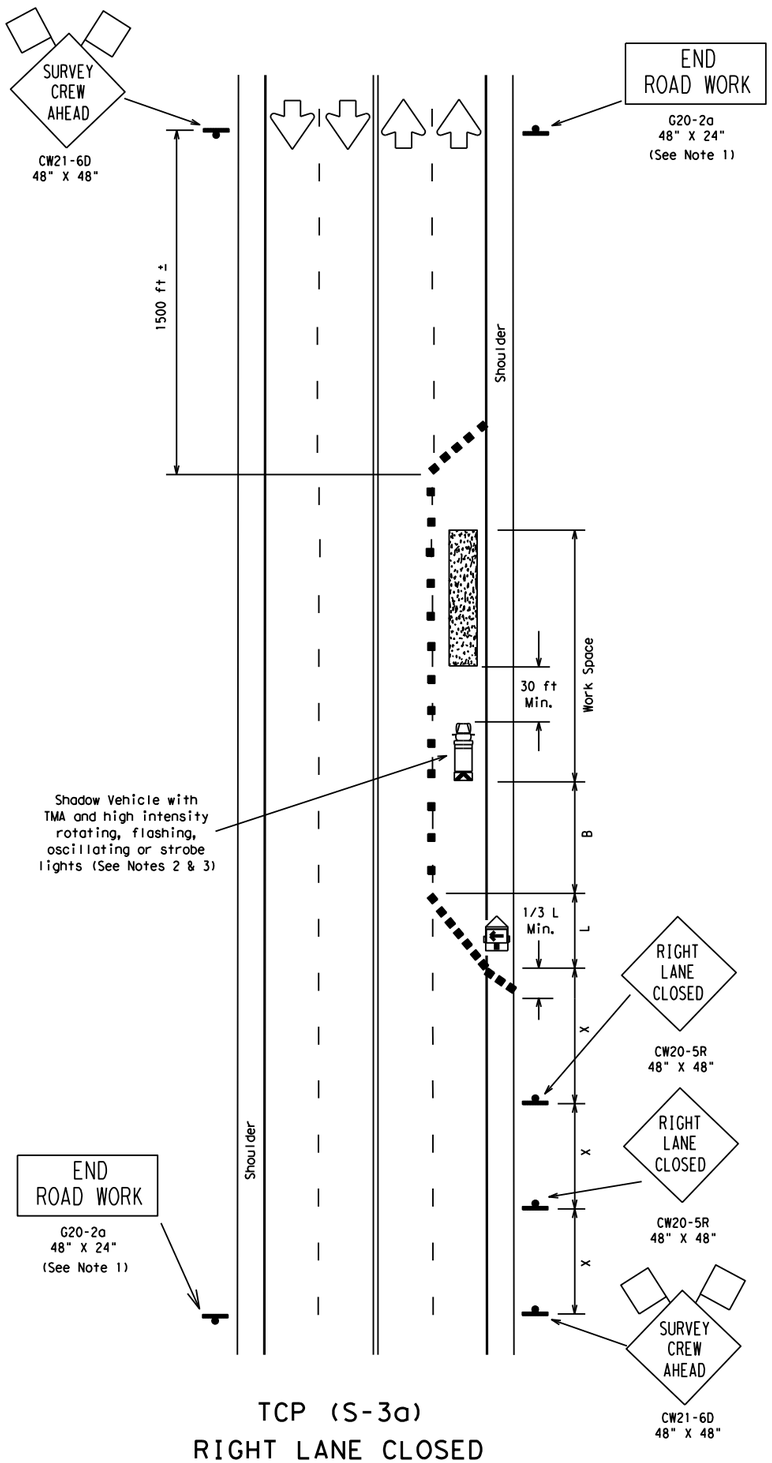
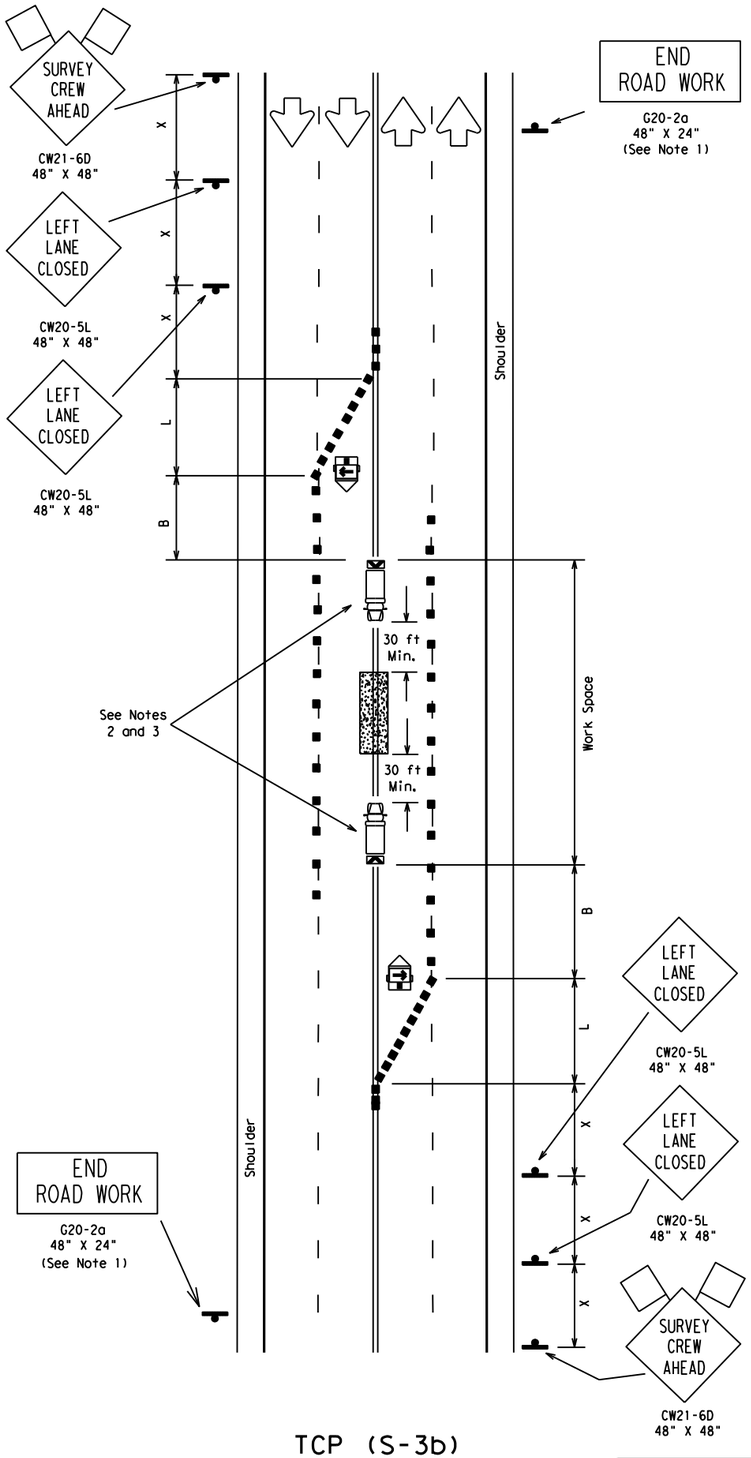


TCP (S-3a)
RIGHT LANE CLOSED
WITH OR WITHOUT SHOULDERS



TCP (S-3b)
WORK ON CENTERLINE

WHENEVER POSSIBLE, SURVEY PARTIES SHOULD AVOID, BY THE USE OF OFFSET LINES, ANY UNNECCESSARY PERIODS OF TIME ON THE ROAD SURFACE.

LEGEND

Type III Barricade ■ ■ Channelizing Devices Flag
Heavy Work Vehicle Truck Mounted Attenuator (TMA)
Trailer Mounted Flashing Arrow Panel Portable Changeable Message Sign (PCMS)
Flagger Sign Post

Posted Speed ✳	Formula	Minimum Desirable Taper Lengths ✳✳ 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'	90'
35		205'	225'	245'	35'	70'-90'	160'	120'
40		265'	295'	320'	40'	80'-100'	240'	155'
45	L=WS	450'	495'	540'	45'	90'-110'	320'	195'
50		500'	550'	600'	50'	100'-125'	400'	240'
55		550'	605'	660'	55'	110'-140'	500'	295'
60		600'	660'	720'	60'	120'-150'	600'	350'
65		650'	715'	780'	65'	130'-165'	700'	410'
70		700'	770'	840'	70'	140'-175'	800'	475'
75		750'	825'	900'	75'	150'-185'	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)

TYPICAL USAGE:				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

DEFINITIONS:
SHORT DURATION - work that occupies a location up to 1 hour.
SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

GENERAL NOTES:
1. The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
2. For short duration work the Shadow Vehicle with TMA may be replaced by another Work Vehicle with high intensity rotating, flashing or strobe lights.
3. Shadow Vehicles with a TMA are desirable when workers or equipment are in the work space. When approved by the engineer, Type III barricades or other channelizing devices may be substituted for the Shadow Vehicle.
4. CW20-1D "ROAD WORK AHEAD" signs may be substituted for CW21-6D "SURVEY CREW AHEAD" signs.
5. The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.

TCP(S-3a)
6. If shoulders are not present, the 1/3L shoulder taper is to be omitted and four channelizing devices shall be placed in front of the arrow panel, perpendicular to traffic.

TCP(S-3b)
7. One CW20-5L "LEFT LANE CLOSED" sign in each direction may be omitted when the posted speed is less than 45mph and volume is less then 2000 ADT.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-3)-08

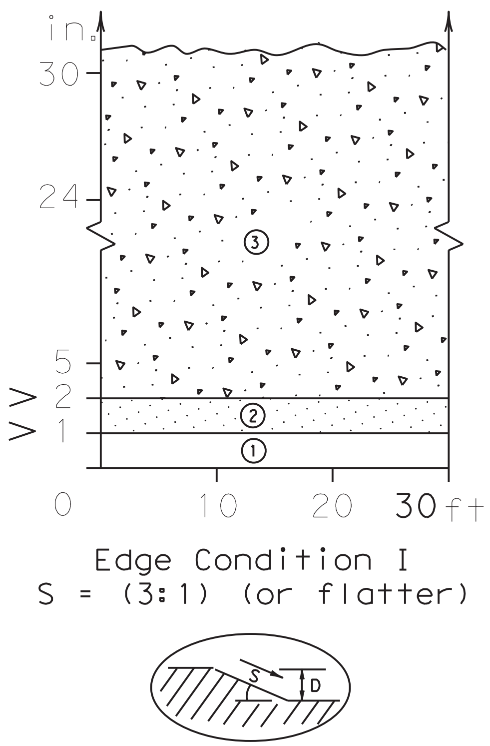
REVISIONS

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

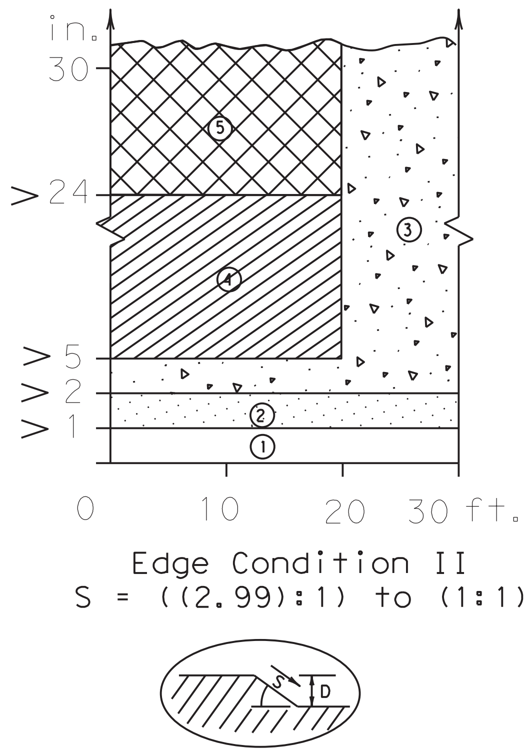
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DIST	COUNTY		SHEET NO.
LBB	VARIOUS		030

DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

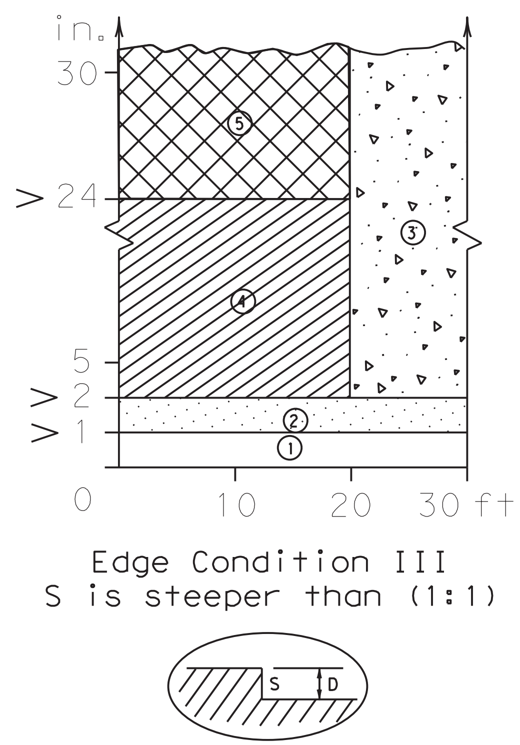
Edge Height (D) in Inches versus Lateral Clearance (Y) in Feet



Edge Condition I
S = (3:1) (or flatter)

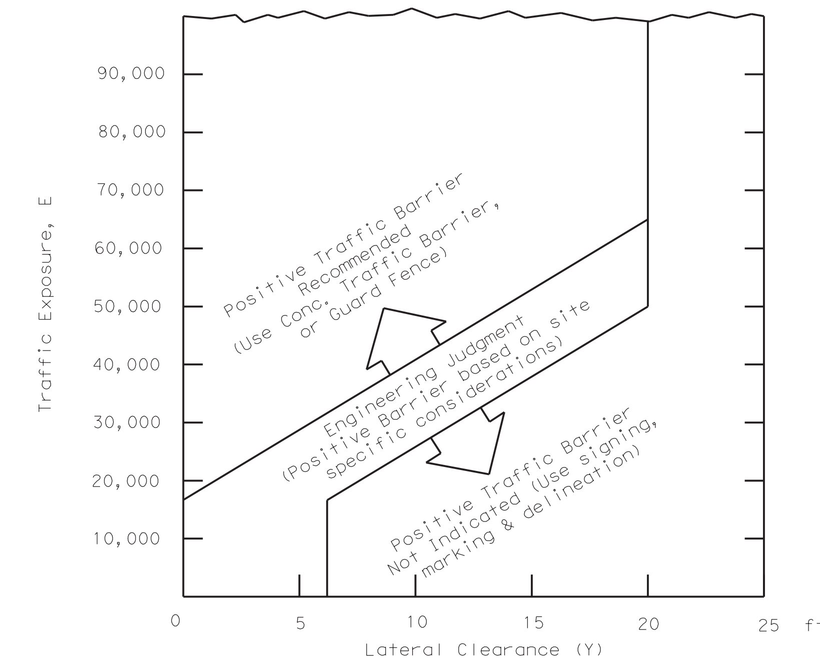


Edge Condition II
S = ((2.99):1) to (1:1)

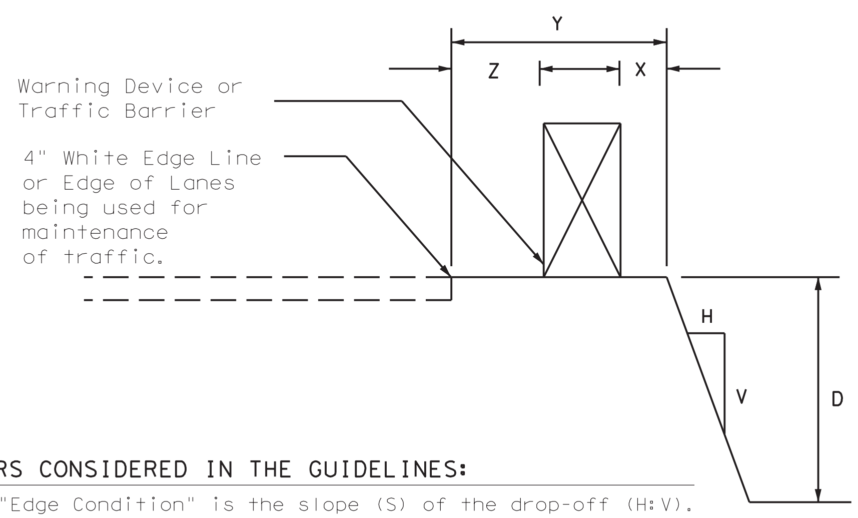


Edge Condition III
S is steeper than (1:1)

FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 (▩)



1. E = ADT x T
   Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the duration time in years of the dropoff condition.
2. Figure-1 provides a practical approach to the use of positive barriers for the protection of vehicles from pavement drop-offs. Other factors, such as the presence of heavy machinery, construction workers, or the mix and volume of traffic may make the use of positive barriers appropriate, even when the edge condition alone may not justify the use of a barrier.
3. An approved end treatment should be provided for any positive barrier end located within the clear zone.



Zone	Treatment Types Guidelines:
①	No treatment
②	CW 8-11 "Uneven Lanes" signs.
③	CW 8-9a Shoulder Drop-Off" or CW 8-11 signs plus vertical panels.
④	CW8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge slope to that of the profered Edge Condition I.
⑤	Check indications (Figure-1) for possitive barrier. Where positive barrier is not indicated, the treatment shown above for Zone-4 may be used after consideration of other applicable factors.

These guidelines apply to temporary traffic control areas or work zones where continuous pavement edges or drop-offs exists parallel and adjacent to a lane used by traffic. The edge conditions may be present between shoulders and travel lanes, between adjacent or opposing travel lanes, or at intermediate points across the width of the paved surface. Due to the variability in construction operations, tolerances in the variables may be allowed by the engineer. These guidelines do not apply to short term operations. These guidelines do not constitute a rigid standard or policy; rather, they are guidance to be used in conjunction with engineering judgement. These guidelines may be updated on the Design Division's on-line manuals.

FACTORS CONSIDERED IN THE GUIDELINES:

1. The "Edge Condition" is the slope (S) of the drop-off (H:V). The "Edge Height is the depth of the drop-off "D".
2. Distance "X" is to be the maximum practical under job conditions. Two feet minimum for high speed conditions. Distance "Y" is the lateral clearance from edge of travel lane to edge of dropoff. Distance "Z" does not have a minimum.
3. In addition to the factors considered in the guidelines, each construction zone drop-off situation should be analyzed individually, taking into account other variables, such as: traffic mix, posted speed in the construction zone, horizontal curvature, and the practicality of the treatment options.
4. The conditions for indicating the use of positive or protective barriers are given by Zone-5 and Figure-1. Traffic barriers are primarily applicable for high speed conditions. Urban areas with speeds of 30 mph or less may have a lesser need for signing, delineation, and barriers. Right-angled edges, however, with "D" greater than 2 inches and located within a lateral offset of 6 feet, may indicate a higher level of treatment.
5. If the distance "Y" must be less than 3 feet, the use of a positive barrier may not be feasible. In such a case, consider either: 1) narrowing the lanes to a desired 11 to 12 feet or 10 foot minimum (see CW20-8 sign), or 2) provide an edge slope such as Edge Condition I.

Edge Condition Notes:

1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.
2. Edge Condition II: Most vehicles are able to traverse an edge condition with a slope between (2.99 to 1) and (1 to 1) so long as "D" does not exceed 5 inches. Under-carriage drag on most automobiles will occur when "D" exceeds 6 inches. As "D" exeeds 24 inches, the possibility for rollover is greater in most vehicles.
3. Edge Condition III: When slopes are greater than (1 to 1) and where "D" is greater than 2 inches, a more difficult control factor may exist for some vehicles, if not properly treated. For example, where "D" is greater than 2 inches and up to 24 inches different types of vehicles may experience different steering control at different edge heights. Automobiles might experience more steering control differential when "D" is greater than 2 inches and up to 5 inches. Trucks, particularly those with high loads, have more steering control differential when "D" is greater than 5 inches and up to 24 inches. When "D" exceeds 24 inches, the possibility of rollover is greater for most vehicles.
4. Milling or overlay operations that result in Edge Condition III should not be in place without appropriate warning treatments, and these conditions should not be left in place for extended periods of time.

Engineer's Seal

STATE OF TEXAS
HEATH C. BOZEMAN
97467
LICENSED
PROFESSIONAL ENGINEER

Date 09/29/2022

Heath C. Bozeman, P.E.

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
©TxDOT August 2000	CONT	SECT	JOB	HIGHWAY
REVISIONS 03-01 08-01 9-21	0905	00	112	VAR
	DIST		COUNTY	SHEET NO.
	LBB		VARIOUS	031

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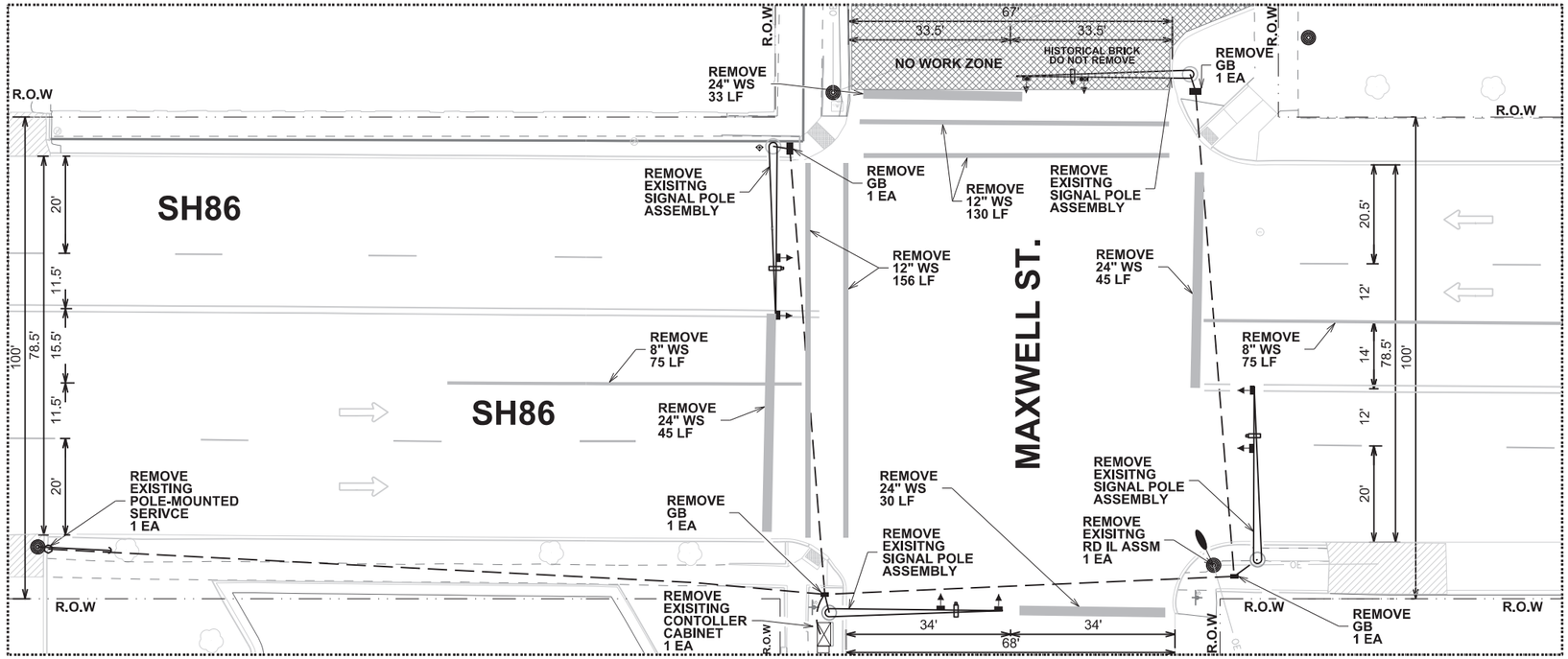

LEGEND

	EXISTING SIGNAL POLE, MAST ARM & FOUNDATION
	EXISTING GROUND BOX
	EXISTING CONDUIT
	CONTROLLER CABINET
	EXISTING SERVICE
	SIGNAL HEAD
	CAMERA
	PED HEADS
	EXISTING POLE
	EXISTING PED POLE
	LUMINAIRE
	EXISTING MAST ARM SIGN
OE — OFOL — OFOL	EXISTING OVERHEAD UTILITIES
GL — GL — UFOL — SS	EXISTING UNDERGROUND UTILITIES

STATE OF TEXAS
JEREMY T. DEARING
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PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

SH86 & MAXWELL ST.
REMOVAL

N.T.S

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STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		032

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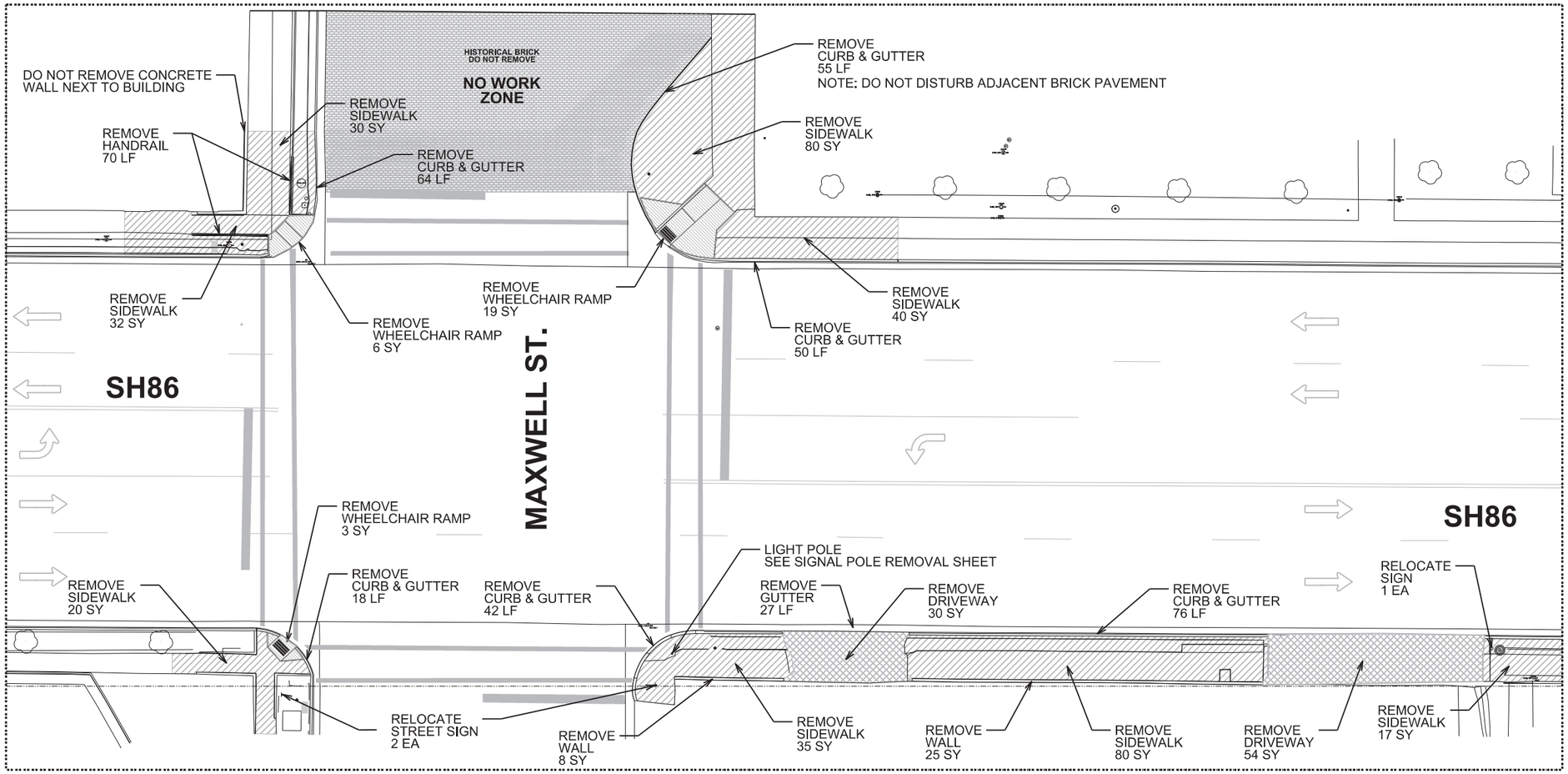

ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0104 6015	REMOVING CONC (SIDEWALKS)	SY	334
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	84
0104 6022	REMOVING CONC (CURB AND GUTTER)	LF	305
0104 6024	REMOVING CONC (RETAINING WALLS)	SY	33
0104 6026	REMOVE CONC (GUTTER)	LF	27
0104 6032	REMOVING CONC (WHEELCHAIR RAMP)	SY	28
0644 6070	RELOCATE SM RD SN SUP&AM TY S80	EA	3

Legend

- REMOVE SIDEWALK
- REMOVE DRIVEWAY
- REMOVE WHEELCHAIR RAMP

STATE OF TEXAS
HEATH C. BOZEMAN
97467
LICENSED PROFESSIONAL ENGINEER

Heath C. Bozeman, P.E.

09/29/2022

Texas Department of Transportation

N.T.S

SH86 & MAXWELL ST.
ADA REMOVAL

STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		033

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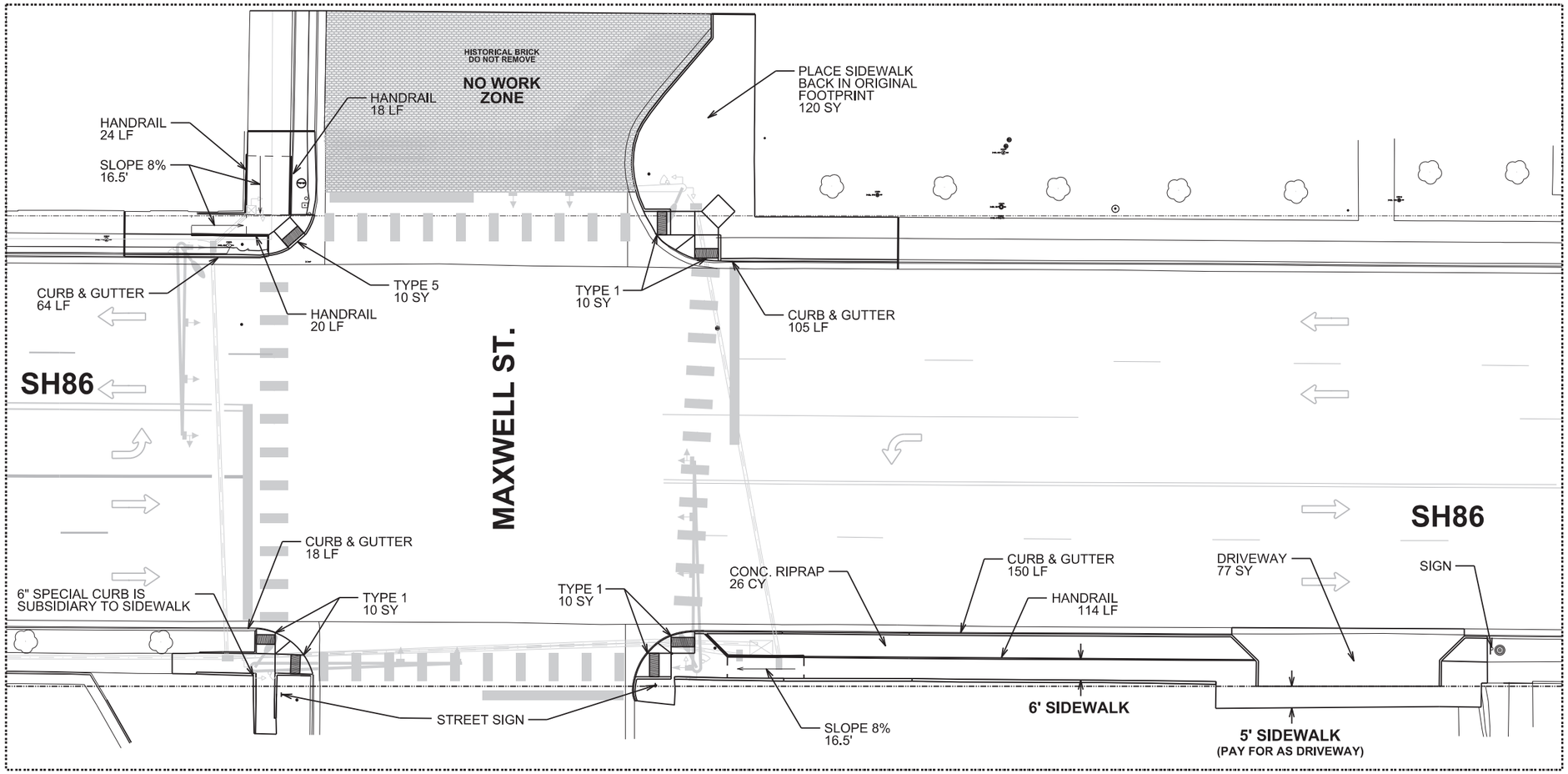

SH86 & MAXWELL ST. ADA INSTALL SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0432 6002	RIPRAP (CONC)(5 IN)	CY	26
0450 6048	RAIL (HANDRAIL)(TY B)	LF	176
0529 6008	CONC CURB & GUTTER (TY II)	LF	337
0530 6004	DRIVEWAYS (CONC)	SY	77
0531 6002	CONC SIDEWALKS (5")	SY	368
0531 6018	CURB RAMPS (TY 1)	SY	30
0531 6022	CURB RAMPS (TY 5)	SY	10

NOTE:
SEE DRIVEWAY DETAIL SHEET
FOR CROSS SECTIONS

STATE OF TEXAS
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PROFESSIONAL ENGINEER

Heath C. Bozeman, P.E.

09/29/2022

SH86 & MAXWELL ST.
ADA LAYOUT

N.T.S

Texas Department of Transportation

STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
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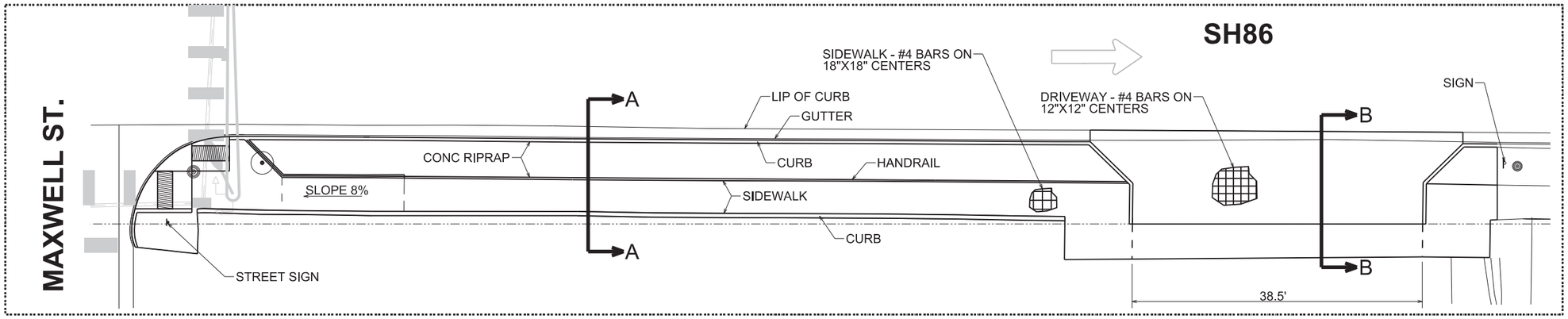
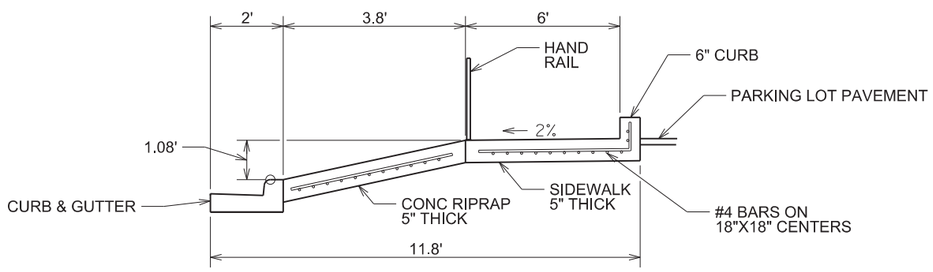
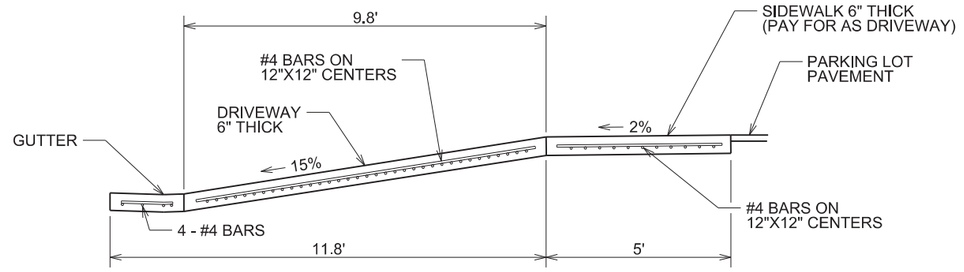




SECTION A-A



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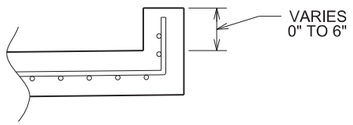

SPECIAL CURB

NOTES:
LAYDOWN C&G SHALL BE REINFORCED AS CONC. GUTTER WITH 3 - #4 LONGITUDINAL BARS PLACED AS DETAILED AND #4 TRANSVERSE BARS SPACED ON 24" CENTERS

PROVIDE #4 TWO-PIECE TIE BARS FROM DRIVEWAY TO LAYDOWN GUTTER.

6" DRIVEWAY ARE REINFORCED WITH #4 BARS ON 12"X12" CENTERS

5" SIDEWALKS ARE REINFORCED WITH #4 BARS ON 18"X18" CENTERS

STATE OF TEXAS
HEATH C. BOZEMAN
97467
LICENSED PROFESSIONAL ENGINEER

Heath C. Bozeman, P.E.

09/29/2022

SH86 & MAXWELL ST.
LOWES DRIVEWAY
DETAIL

Texas Department of Transportation

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STATE	DIST.	COUNTY
TEXAS	LBB	VARIOUS

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR

DATE	FILENAME	SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES	035

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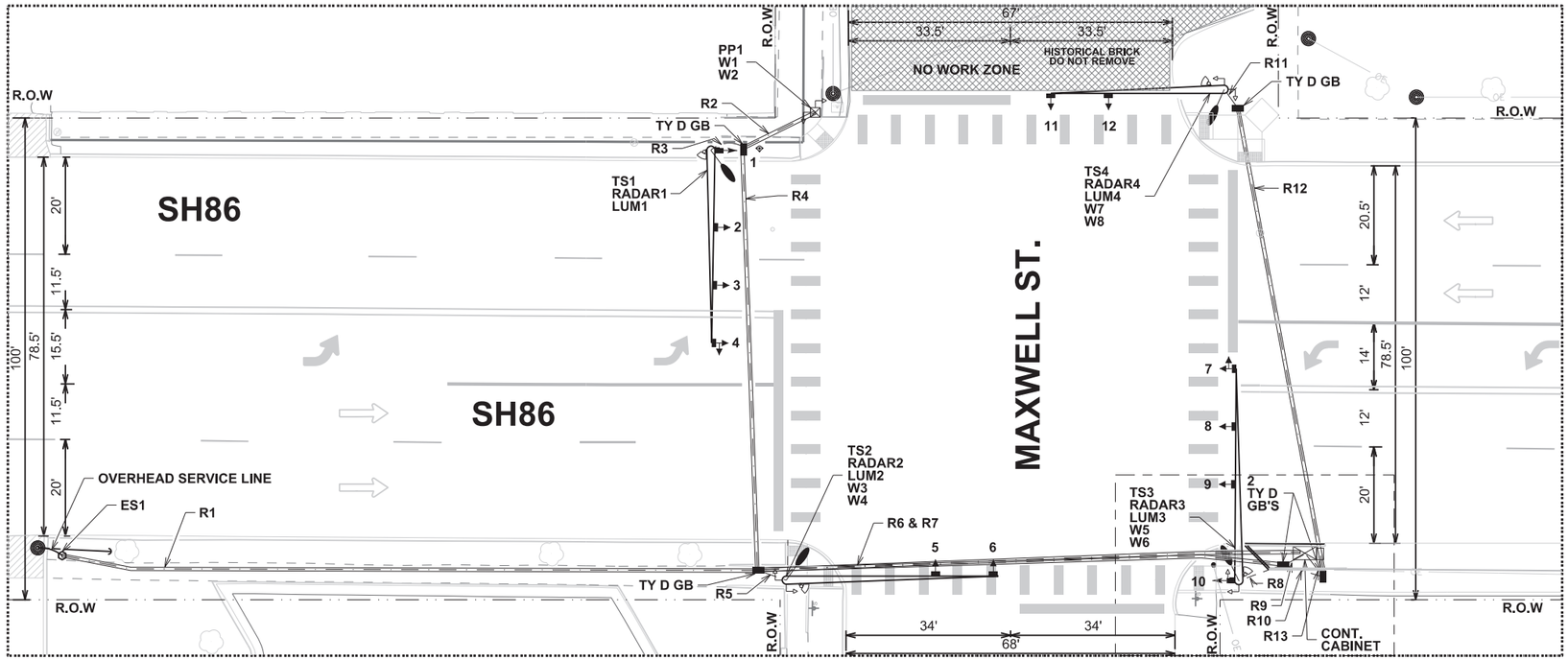
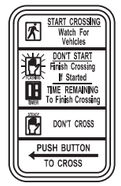
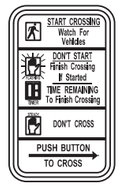


LEGEND

	TYPICAL SIGNAL POLE/ MAST ARM ASSEMBLY
	TYPICAL PED POLE ASSEMBLY
	PROPOSED CONDUIT (TRENCH)
	PROPOSED CONDUIT (BORE)
	PROPOSED SERVICE
	PROPOSED CONTROLLER CABINET
	PROPOSED GROUND BOX
OE OFOL	OVERHEAD UTILITIES
GL UFOL SS	UNDERGROUND UTILITIES



PED SIGN (5 EA)
9" X 15"
With Left Arrow (R10-3e-L)



PED SIGN (3 EA)
9" X 15"
With Right Arrow (R10-3e-R)

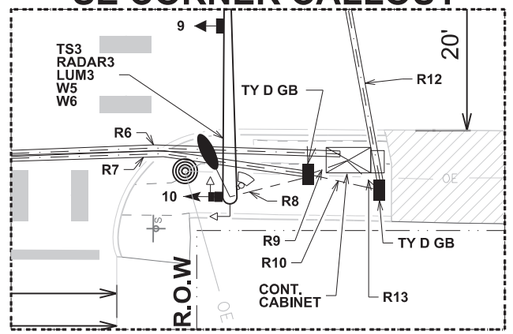
SH86 & MAXWELL ST. CONDUIT AND CABLE SUMMARY

RUN	CONDUIT QUANTITY				LENGTH(LF)	CONDUCTOR QUANTITY						
	2" T(LF)EA	2" B(LF)EA	4"T(LF)EA	4"B(LF)EA		1C#2(EA)	1C#8(EA)	4C#12(EA)	7C#12(EA)	12C#12(EA)	#6 BARE(EA)	RADAR(EA)**
R1		2			145	3	3					
R2		1			16			2	1		1	
R3	1		1		5		3		1	1	1	1
R4		1		1	85		3	2		1	1	1
R5	1		1		5		3	2		1	1	1
R6		1			115	3						
R7		1		1	110		3	4		2	1	2
R8	1		1		10		3	2		1	1	1
R9			1		5			6		3	1	3
R10	1				10		3					
R11	1		1		5		3	2		1	1	1
R12		1		1	100		3	2		1	1	1
R13				1	5			2		1	1	1
*TOTALS	35	716	30	300		780	1,425	922	21	450	346	450

*TOTALS DERIVED FROM LENGTH MULTIPLIED BY QUANTITY

**RADAR CONDUCTOR WILL BE PROVIDED BY THE STATE

SE CORNER CALLOUT



POLE/MAST ARM DETAILS

POLE NUMBER	MAST ARM LENGTH (LF)	FOUNDATION TYPE	FOUNDATION DEPTH (LF)	1C #8 (LF)	4C #12 (LF)	5C #12 (LF)	7C #12 (LF)	RADAR ** (LF)
TS1	40	36-B	15	135		95	60	25
TS2	44	36-B	15	135	10	115	10	25
TS3	44	36-B	15	135	10	105	75	25
TS4	36	36-A	13	135	10	100	10	25
PP1	-	SCREW-IN	-		10		10	
		TOTALS		540	30	415	155	100

**RADAR CONDUCTOR WILL BE PROVIDED BY THE STATE

HEAD SCHEDULE

Signal Head Number	4,7	2,3,8,9	1,10	5,6,11,12	W1 - W8
Signal Indications (12" LED)	R SY FY G	R Y G	R Y G	R Y G	15
Flash Mode	Y			R	
Reset Mode	G			R	

ELECTRICAL SERVICE DATA

ELEC. SERVICE ID	PLAN SHEET NUMBER	ELECTRICAL SERVICE DESCRIPTION	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BKR. POLE/AMPS	LIGHTING CONTACTOR AMPS	PANELBD/ LOADCENTER AMP RATING	BRANCH CIRCUIT ID	BRANCH CKT. BKR. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
ES1	036	ELC SRV TY D 120/240 070 (NS)AL(E)SP(O)	2"	3/#2	N/A	2P/60	N/A	100	SIGNAL	1P/50	24	3.3
									ILLUMINATION	2P/15	1.68	

1. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING & VERIFYING ALL UNDERGROUND STRUCTURES & ANY UTILITIES BEFORE MAKING ANY EXCAVATIONS.
2. POLE & GROUND BOX LOCATIONS ARE DIAGRAMMATIC AND SHALL BE FIELD VERIFIED BY ENGINEER.

STATE OF TEXAS
JEREMY T. DEARING
98218
LICENSED PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

SH86 & MAXWELL ST. SIGNAL LAYOUT

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STATE	DIST.	COUNTY
TEXAS	LBB	VARIOUS

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR

DATE	FILENAME	SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES	036

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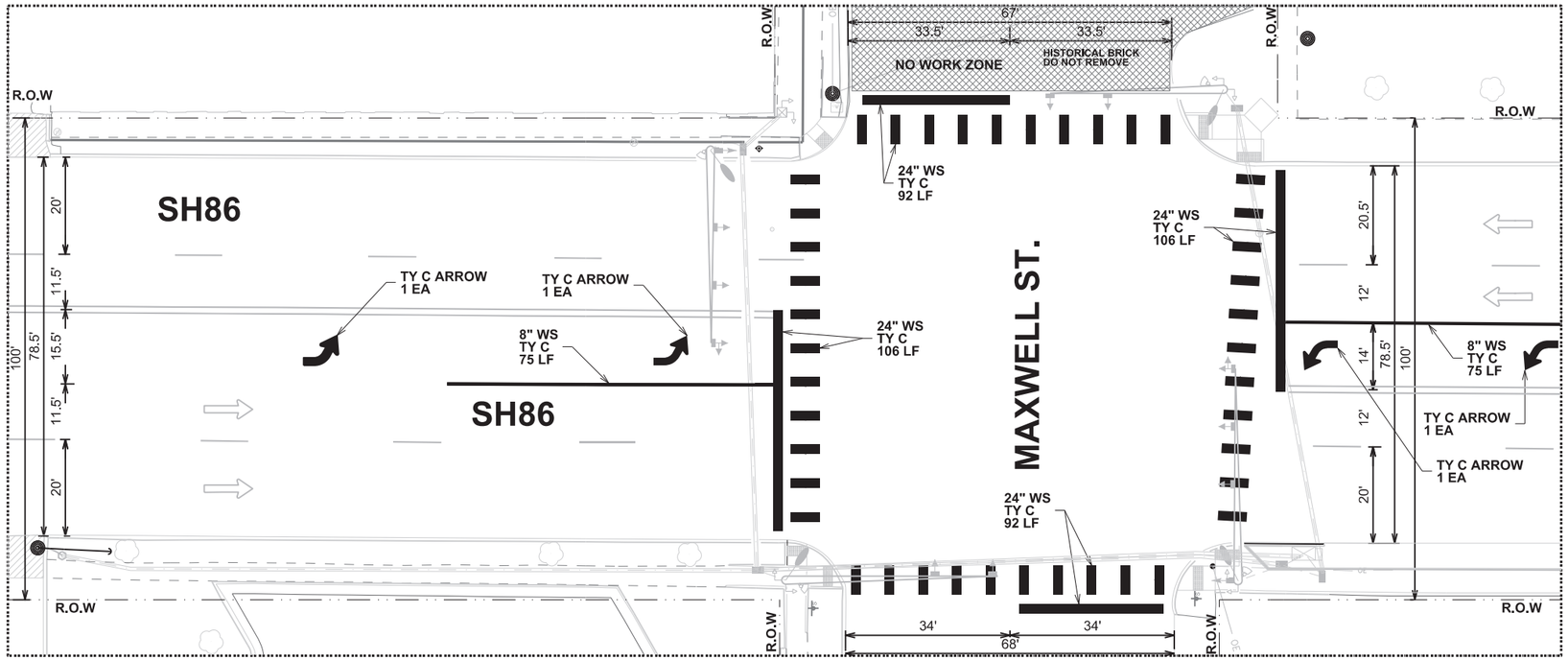

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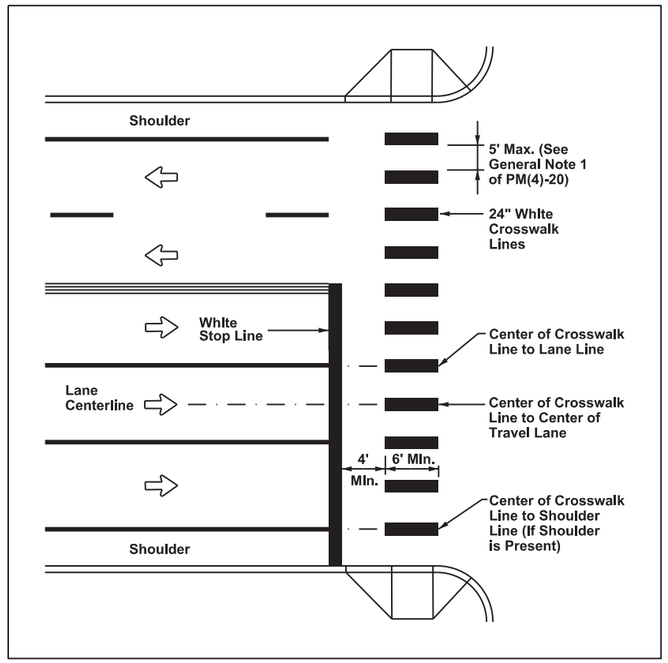

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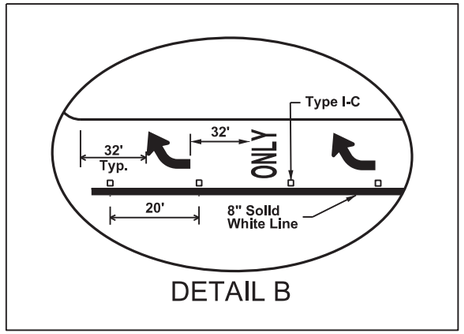

DETAIL B

Jeremy T. Dearing, P.E.

09/30/2022

SH86 & MAXWELL ST.
PAVEMENT MARKINGS

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STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		037

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SH86 & MAXWELL ST. SIGNAL INSTALLATION SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0416 6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	58
0618 6046	CONDT (PVC) (SCH 80) (2")	LF	35
0618 6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	716
0618 6058	CONDT (PVC) (SCH 80) (4")	LF	30
0618 6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	300
0620 6008	ELEC CONDR (NO.8) INSULATED	LF	1,965
0620 6009	ELEC CONDR (NO.6) BARE	LF	346
0620 6016	ELEC CONDR (NO.2) INSULATED	LF	780
0624 6009	GROUND BOX TY D (162922)	EA	5
0628 6165	ELC SRV TY D 120/240 070(NS)AL(E)SP(O)	EA	1
0668 6072	PREFAB PAV MRK TY C (W) (8") (SLD)	LF	150
0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	396
0668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	4
0680 6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
0682 6001	VEH SIG SEC (12")LED(GRN)	EA	10
0682 6002	VEH SIG SEC (12")LED(GRN ARW)	EA	2
0682 6003	VEH SIG SEC (12")LED(YEL)	EA	10
0682 6004	VEH SIG SEC (12")LED(YEL ARW)	EA	4
0682 6005	VEH SIG SEC (12")LED(RED)	EA	10
0682 6006	VEH SIG SEC (12")LED(RED ARW)	EA	2
0682 6018	PED SIG SEC (LED)(COUNTDOWN)	EA	8
0682 6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	10
0682 6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	2
0684 6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	952
0684 6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	415
0684 6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	176
0684 6017	TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	LF	450
0686 6039	INS TRF SIG PL AM(S)1 ARM(36')LUM	EA	1
0686 6043	INS TRF SIG PL AM(S)1 ARM(40')LUM	EA	1
0686 6047	INS TRF SIG PL AM(S)1 ARM(44')LUM	EA	2
0687 6001	PED POLE ASSEMBLY	EA	1
0690 6032	INSTALL OF PEDESTRIAN PUSH BUTTONS	EA	8

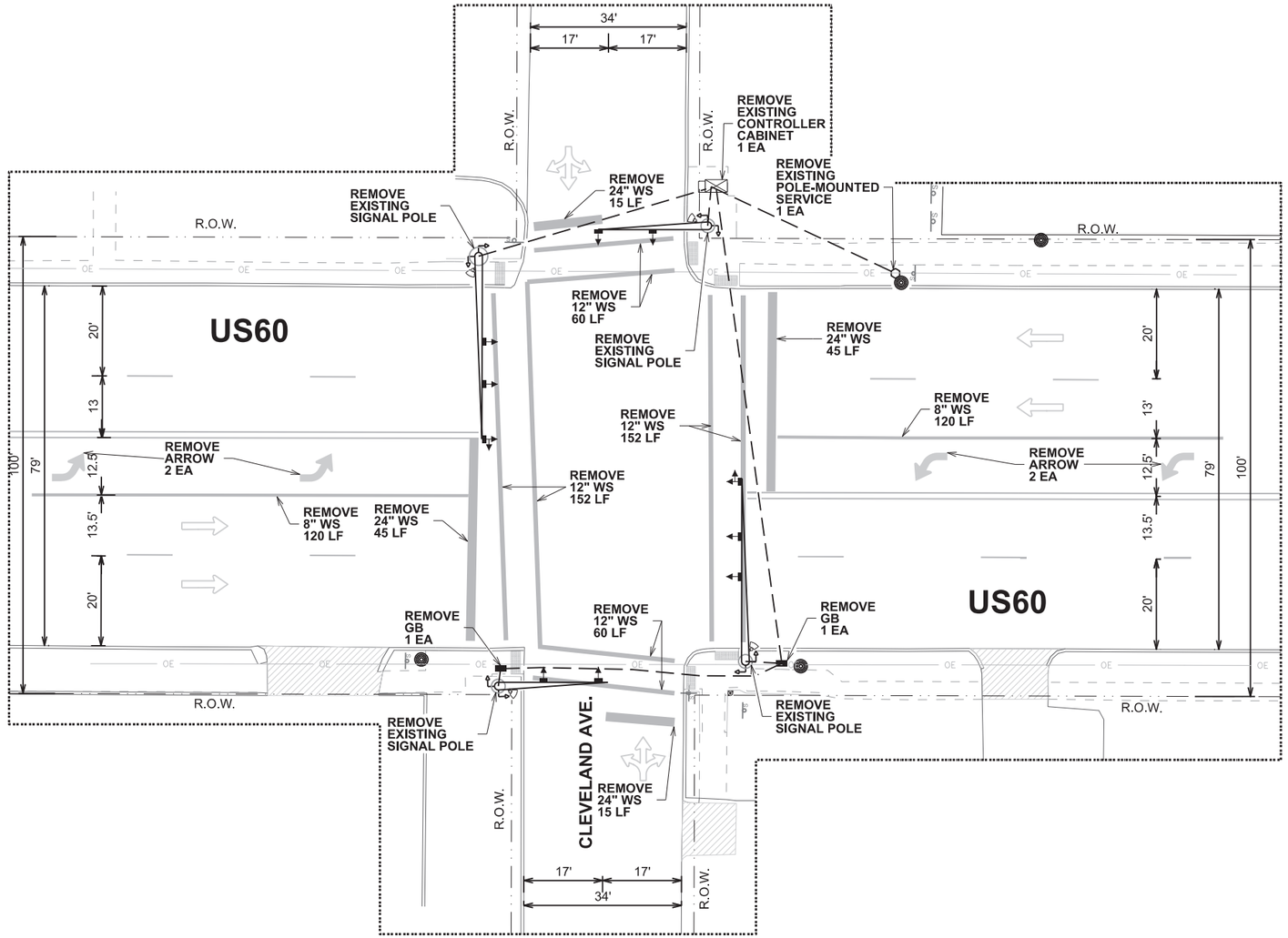
SH86 & MAXWELL ST. SIGNAL REMOVAL SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0610 6007	REMOVE RD IL ASM (SHOE-BASE)	EA	1
0624 6028	REMOVE GROUND BOX	EA	4
0628 6002	REMOVE ELECTRICAL SERVICES	EA	1
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	150
0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	286
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	153
0680 6004	REMOVING TRAFFIC SIGNALS	EA	1

SH86 & MAXWELL ST. SUMMARY

STATE	DIST.	COUNTY
TEXAS	LBB	VARIOUS

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR

DATE	FILENAME	SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES	038



LEGEND

	EXISTING SIGNAL POLE, MAST ARM & FOUNDATION
	EXISTING GROUND BOX
	EXISTING CONDUIT
	CONTROLLER CABINET
	EXISTING SERVICE
	SIGNAL HEAD
	CAMERA
	PED HEADS
	EXISTING POLE
	EXISTING PED POLE
	LUMINAIRE
	EXISTING MAST ARM SIGN
OE / OFOL	EXISTING OVERHEAD UTILITIES
GL / UFOL / SS	EXISTING UNDERGROUND UTILITIES

STATE OF TEXAS
JEREMY T. DEARING
98218
LICENSED PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

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US60 & CLEVELAND AVE. REMOVAL

STATE	DIST.	COUNTY
TEXAS	LBB	VARIOUS

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR

DATE	FILENAME	SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES	039

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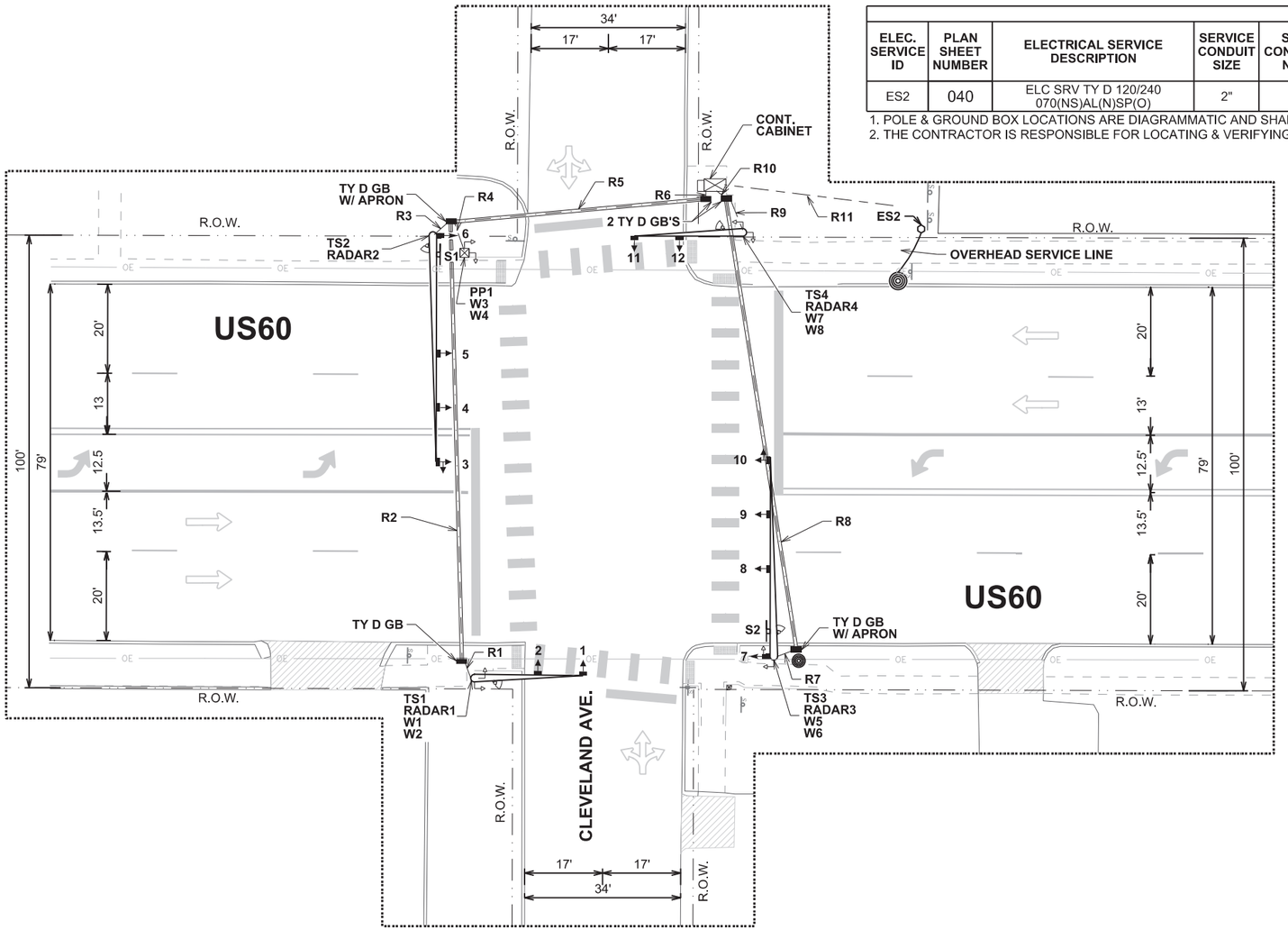
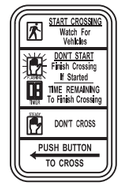
ELECTRICAL SERVICE DATA												
ELEC. SERVICE ID	PLAN SHEET NUMBER	ELECTRICAL SERVICE DESCRIPTION	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BKR. POLE/AMPS	LIGHTING CONTACTOR AMPS	PANELBD/ LOADCENTER AMP RATING	BRANCH CIRCUIT ID	BRANCH CKT. BKR. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
ES2	040	ELC SRV TY D 120/240 070(NS)AL(N)SP(O)	2"	3/#2	N/A	2P/60	N/A	100	SIGNAL	1P/50	24	2.9

1. POLE & GROUND BOX LOCATIONS ARE DIAGRAMMATIC AND SHALL BE FIELD VERIFIED BY ENGINEER.
2. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING & VERIFYING ALL UNDERGROUND STRUCTURES & ANY UTILITIES BEFORE MAKING ANY EXCAVATIONS.

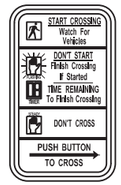


LEGEND

	TYPICAL SIGNAL POLE/ MAST ARM ASSEMBLY
	TYPICAL PED POLE ASSEMBLY
	PROPOSED CONDUIT (TRENCH)
	PROPOSED CONDUIT (BORE)
	PROPOSED SERVICE
	PROPOSED CONTROLLER CABINET
	PROPOSED GROUND BOX
OE OFOL	OVERHEAD UTILITIES
GL UFOL SS	UNDERGROUND UTILITIES



PED SIGN (6 EA)
9" X 15"
With Left Arrow (R10-3e-L)



PED SIGN (2 EA)
9" X 15"
With Right Arrow (R10-3e-R)

POLE/MAST ARM DETAILS							
POLE NUMBER	MAST ARM LENGTH (LF)	FOUNDATION TYPE	FOUNDATION DEPTH (LF)	4C #12 (LF)	5C #12 (LF)	7C #12 (LF)	RADAR ** (LF)
TS1	24	36-A	13	10	75	10	25
TS2	50	48-A	22		115	70	25
TS3	44	36-B	15	10	105	75	25
TS4	24	36-A	13	10	75	10	25
PP1	-	SCREW-IN	-	10		10	
		TOTALS		**40**	**370**	**175**	**100**

**RADAR CONDUCTOR WILL BE PROVIDED BY THE STATE

HEAD SCHEDULE					
Signal Head Number	3,10	4,5,8,9	6,7	1,2,11,12	W1 - W8
Signal Indications (12" LED)	R SY FY G	R Y G	R Y G	R Y G	15
Flash Mode	Y			R	
Reset Mode	G			R	

US 60 & CLEVELAND AVE. CONDUIT AND CABLE SUMMARY											
RUN	CONDUIT QUANTITY				LENGTH(LF)	CONDUCTOR QUANTITY					
	2" T(LF)EA	2" B(LF)EA	4"T(LF)EA	4"B(LF)EA		1C#2(EA)	4C#12(EA)	7C#12(EA)	12C#12(EA)	#6 BARE(EA)	RADAR(EA)**
R1			1		5		2		1	1	1
R2				1	95		2		1	1	1
R3			1		5			1	1	1	1
R4	1				10		2	1		1	
R5				1	55		4		2	1	2
R6			1		5		4		2	1	2
R7			1		5		2		1	1	1
R8				1	100		2		1	1	1
R9			1		10		2		1	1	1
R10			1		10		4		2	1	2
R11	1				40	3					
***TOTALS**	**50**	**0**	**40**	**250**		**120**	**730**	**15**	**360**	**300**	**360**

*TOTALS DERIVED FROM LENGTH MULTIPLIED BY QUANTITY

**RADAR CONDUCTOR WILL BE PROVIDED BY THE STATE

STATE OF TEXAS
JEREMY T. DEARING
98218
LICENSED PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

US60 & CLEVELAND AVE. SIGNAL LAYOUT

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STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		040

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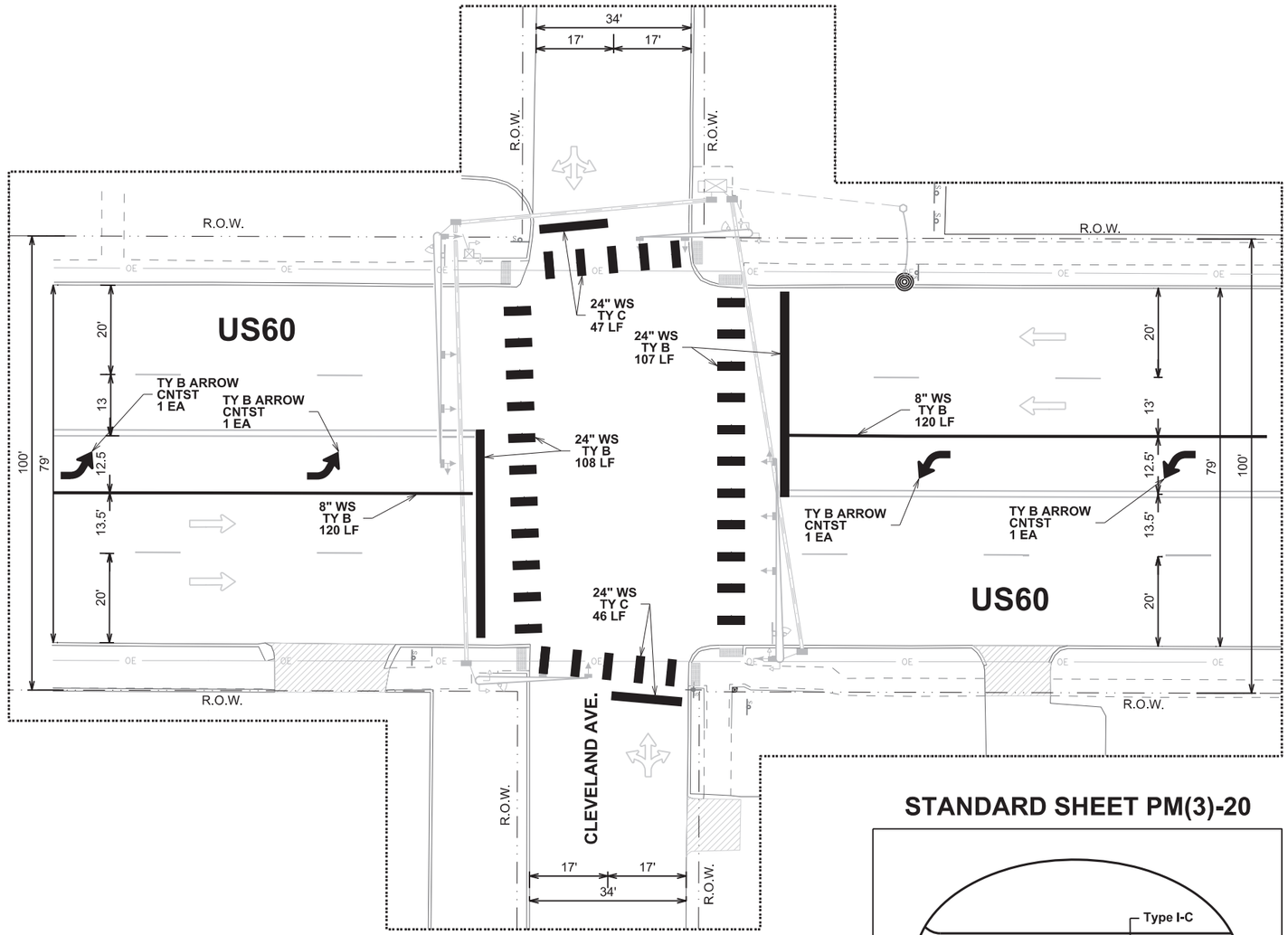
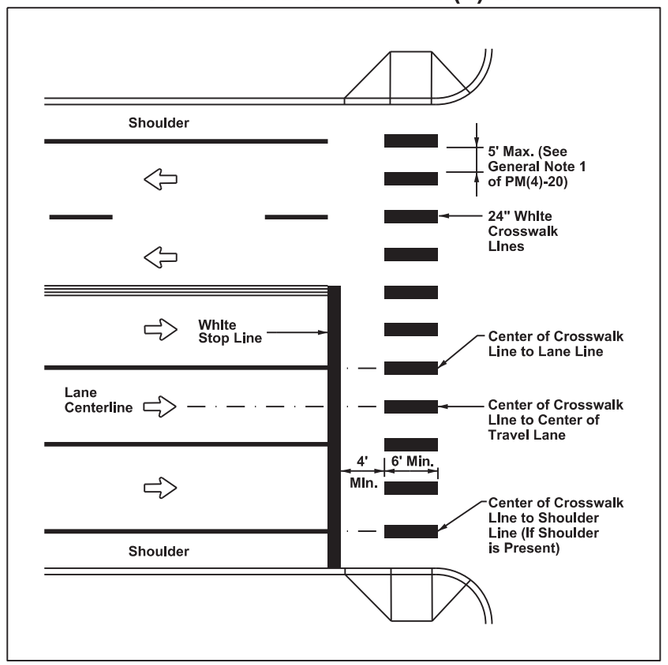


STANDARD SHEET PM(4)-20



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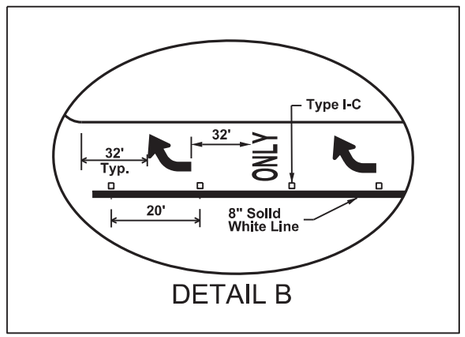

DETAIL B

Jeremy T. Dearing, P.E.

09/30/2022

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Texas Department of Transportation

US60 & CLEVELAND AVE.
PAVEMENT MARKINGS

STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		041

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US 60 & CLEVELAND AVE. SIGNAL INSTALLATION SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0416 6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	41
0416 6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF	22
0618 6046	CONDT (PVC) (SCH 80) (2")	LF	50
0618 6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	0
0618 6058	CONDT (PVC) (SCH 80) (4")	LF	40
0618 6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	250
0620 6009	ELEC CONDR (NO.6) BARE	LF	300
0620 6016	ELEC CONDR (NO.2) INSULATED	LF	120
0624 6009	GROUND BOX TY D (162922)	EA	3
0624 6010	GROUND BOX TY D (162922)W/APRON	EA	2
0628 6170	ELC SRV TY D 120/240 070(NS)AL(N)SP(O)	EA	1
0668 6014	PREFAB PAV MRK TY B (W)(8")(SLD)	LF	240
0668 6018	PREFAB PAV MRK TY B (W)(24")(SLD)	LF	215
0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	93
0668 6122	PREFAB PAV MRK TY B (W)(ARROW)CNTST	EA	4
0680 6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
0682 6001	VEH SIG SEC (12")LED(GRN)	EA	10
0682 6002	VEH SIG SEC (12")LED(GRN ARW)	EA	2
0682 6003	VEH SIG SEC (12")LED(YEL)	EA	10
0682 6004	VEH SIG SEC (12")LED(YEL ARW)	EA	4
0682 6005	VEH SIG SEC (12")LED(RED)	EA	10
0682 6006	VEH SIG SEC (12")LED(RED ARW)	EA	2
0682 6018	PED SIG SEC (LED)(COUNTDOWN)	EA	8
0682 6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	10
0682 6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	2
0684 6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	770
0684 6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	370
0684 6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	190
0684 6017	TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	LF	360
0686 6025	INS TRF SIG PL AM (S)1 ARM(24')	EA	2
0686 6045	INS TRF SIG PL AM(S)1 ARM(44')	EA	1
0686 6053	INS TRF SIG PL AM(S)1 ARM(50')	EA	1
0687 6001	PED POLE ASSEMBLY	EA	1
0690 6032	INSTALL OF PEDESTRIAN PUSH BUTTONS	EA	8

US 60 & CLEVELAND AVE. SIGNAL REMOVAL SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0624 6028	REMOVE GROUND BOX	EA	2
0628 6002	REMOVE ELECTRICAL SERVICES	EA	1
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	240
0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	424
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	120
0677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	4
0680 6004	REMOVING TRAFFIC SIGNALS	EA	1

Texas Department of Transportation
2022

US60 & CLEVELAND AVE. SUMMARY

STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		042

DATE: 9/28/2022 2:05:00 PM
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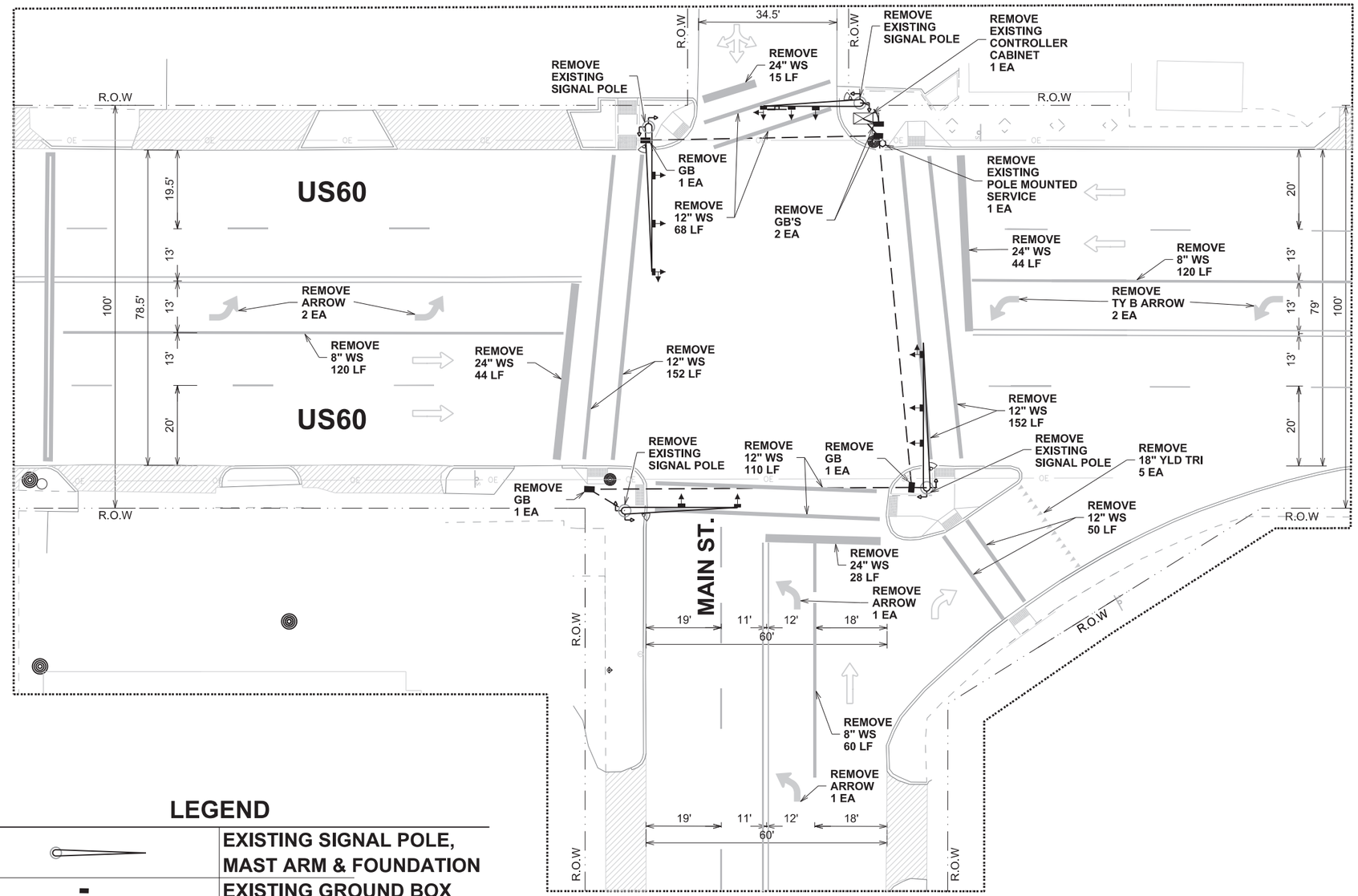

LEGEND

	EXISTING SIGNAL POLE, MAST ARM & FOUNDATION
	EXISTING GROUND BOX
	EXISTING CONDUIT
	CONTROLLER CABINET
	EXISTING SERVICE
	SIGNAL HEAD
	CAMERA
	PED HEADS
	EXISTING POLE
	EXISTING PED POLE
	LUMINAIRE
	EXISTING MAST ARM SIGN
OE / OFOL	EXISTING OVERHEAD UTILITIES
GL / UFOL / SS	EXISTING UNDERGROUND UTILITIES

STATE OF TEXAS
JEREMY T. DEARING
98218
LICENSED PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

US60 & MAIN ST. REMOVAL

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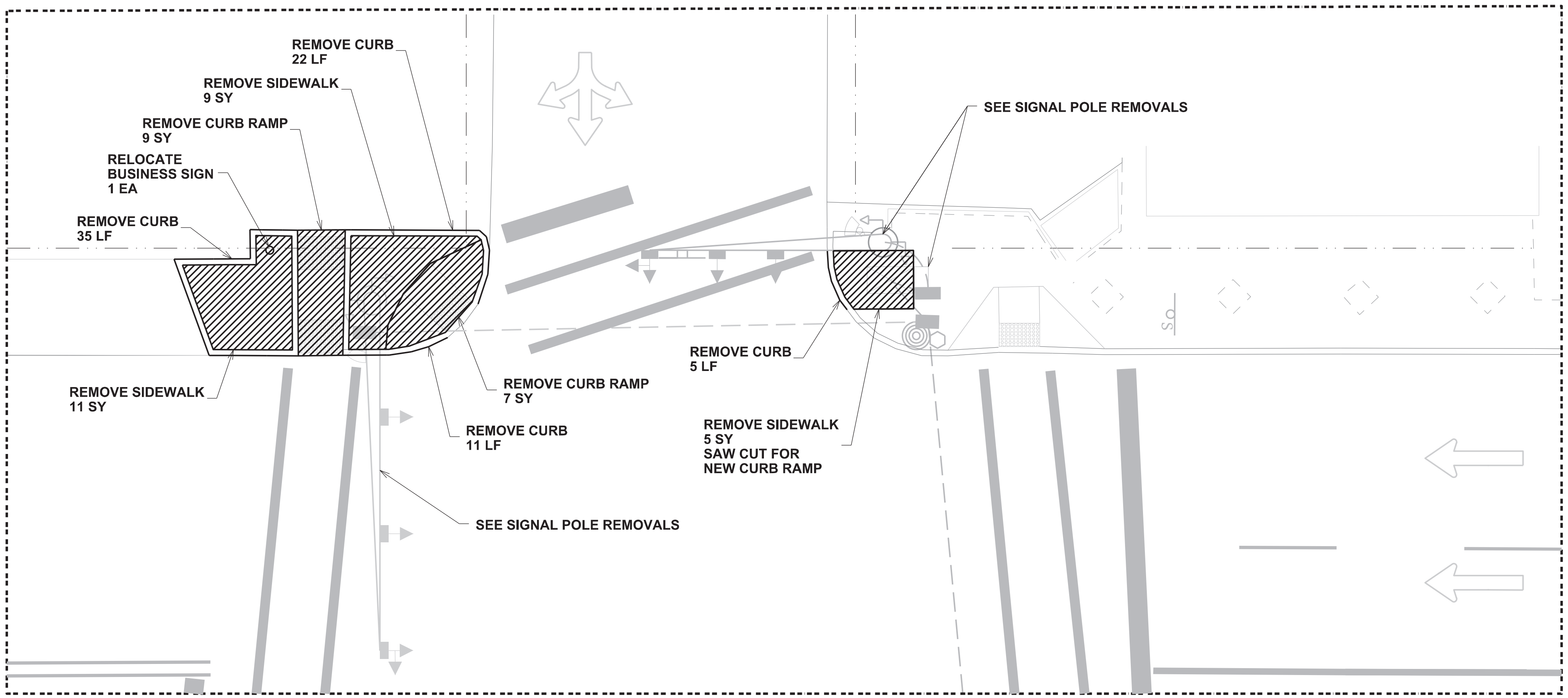
STATE	DIST.	COUNTY
TEXAS	LBB	VARIOUS

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR

DATE	FILENAME	SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES	043

DATE: 9/28/2022 2:05:02 PM
FILE: pw:\\txdot.projectwise.bentley.com:PWDOT2\Documents\05 - LBB\Construction Projects\0905001124 - Design\Plan Set\5. Traffic\3. US60 & MAIN\043.046 US60 & MAIN ST. REMOVAL & SIGNAL LAYOUT.dgn



LEGEND

REMOVAL AREA

US60 & MAIN ST. ADA REMOVAL SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0104 6015	REMOVING CONC (SIDEWALKS)	SY	25
0104 6022	REMOVING CONC (CURB AND GUTTER)	LF	73
0104 6032	REMOVING CONC (WHEELCHAIR RAMP)	SY	16
0644 6070	RELOCATE SM RD SN SUP&AM TY S80	EA	1

STATE OF TEXAS
HEATH C. BOZEMAN
97467
LICENSED
PROFESSIONAL ENGINEER

Heath C. Bozeman, P.E.

09/29/2022

US60 & MAIN ST.
ADA REMOVAL

N.T.S

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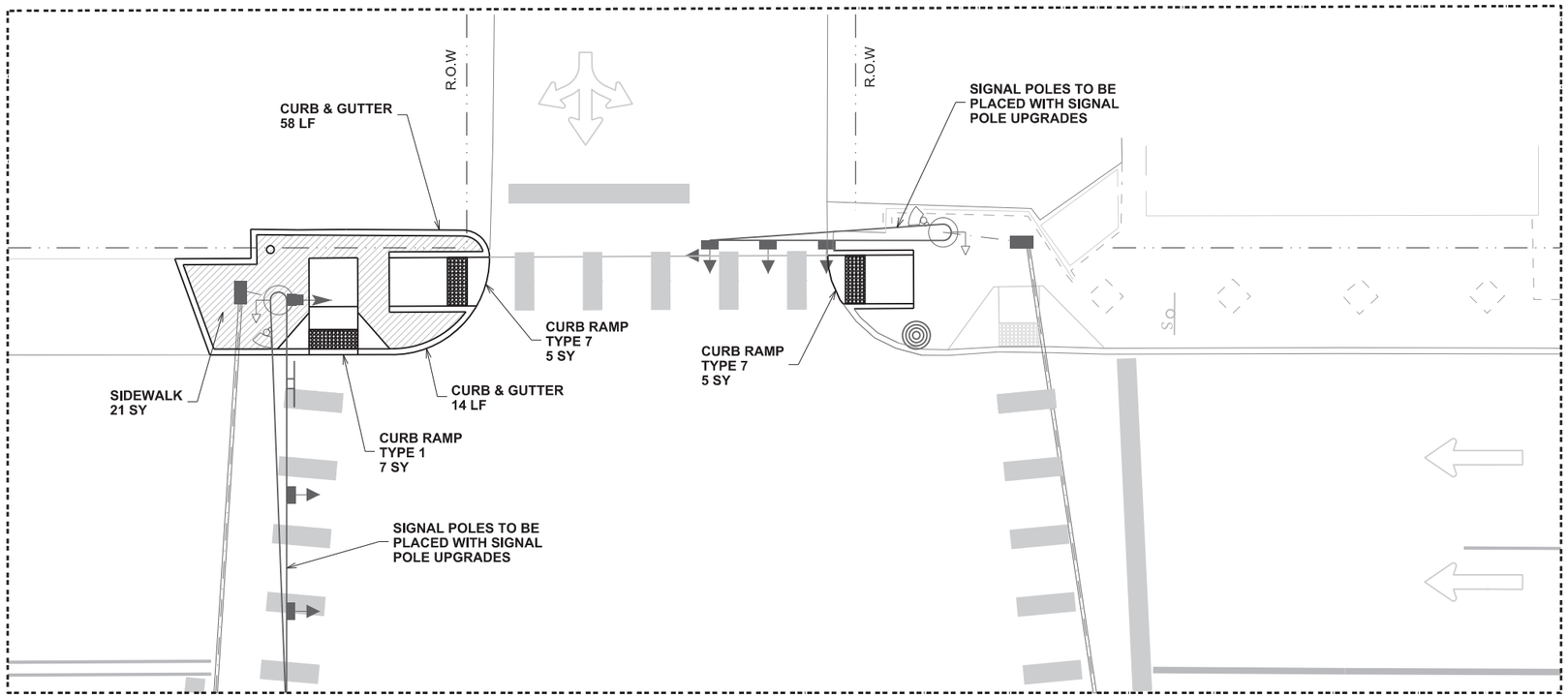
STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		044



US60 & MAIN ST. ADA INSTALL SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0529 6008	CONC CURB & GUTTER (TY II)	LF	72
0531 6002	CONC SIDEWALKS (5")	SY	21
0531 6018	CURB RAMPS (TY 1)	SY	7
0531 6024	CURB RAMPS (TY 7)	SY	10

STATE OF TEXAS
HEATH C. BOZEMAN
97467
LICENSED
PROFESSIONAL ENGINEER

Heath C. Bozeman, P.E.

09/29/2022

US60 & MAIN ST.
ADA LAYOUT

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Texas Department of Transportation

STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		045

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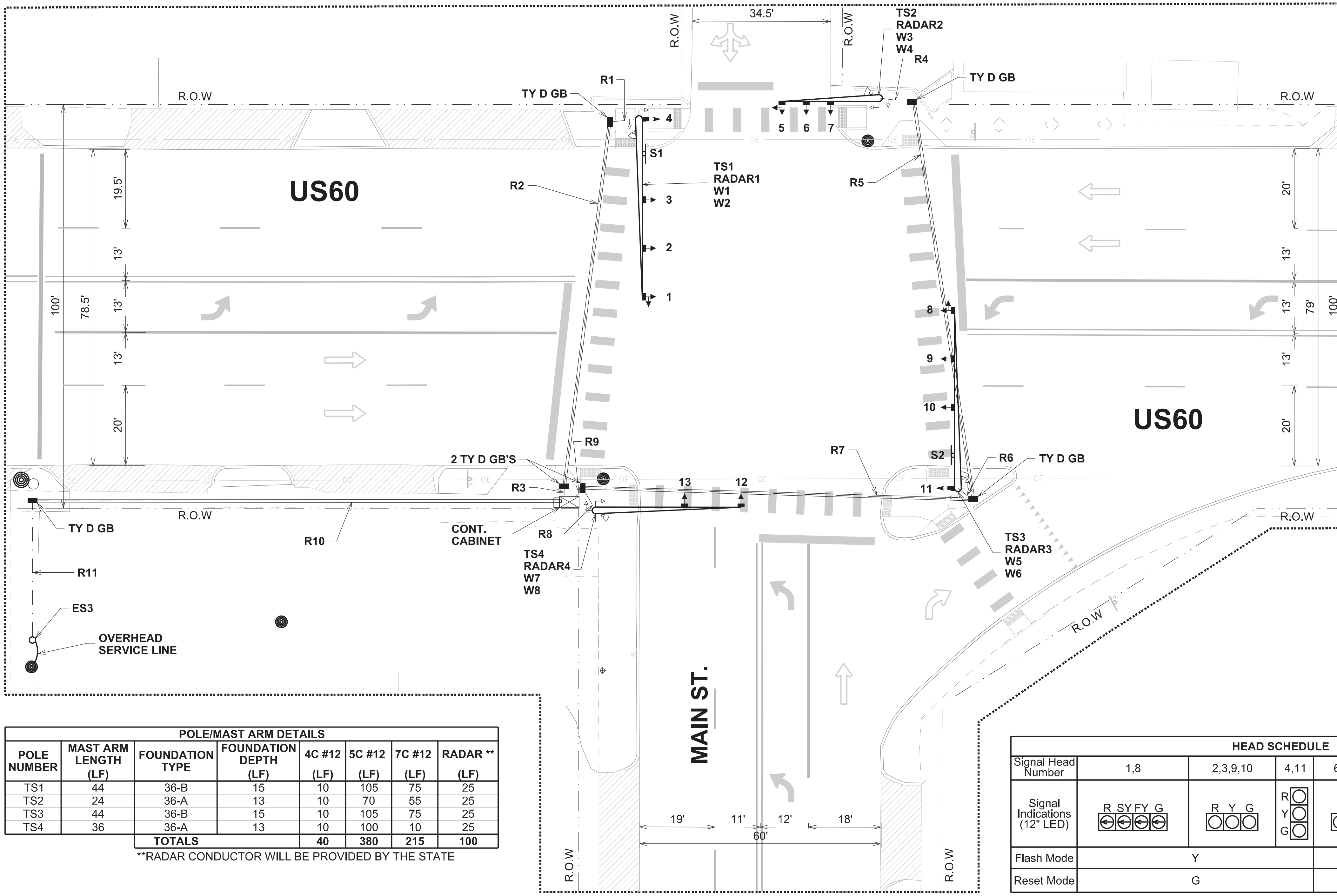
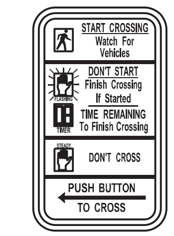
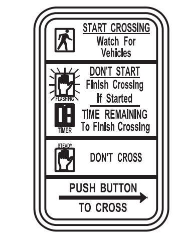


LEGEND

Symbol	Description
	TYPICAL SIGNAL POLE/ MAST ARM ASSEMBLY
	TYPICAL PED POLE ASSEMBLY
	PROPOSED CONDUIT (TRENCH)
	PROPOSED CONDUIT (BORE)
	PROPOSED SERVICE
	PROPOSED CONTROLLER CABINET
	PROPOSED GROUND BOX
OE OFOL	OVERHEAD UTILITIES
GL UFOL SS	UNDERGROUND UTILITIES



PED SIGN (5 EA)
9" X 15"
With Left Arrow (R10-3e-L)



PED SIGN (3 EA)
9" X 15"
With Right Arrow (R10-3e-R)

POLE/MAST ARM DETAILS

POLE NUMBER	MAST ARM LENGTH (LF)	FOUNDATION TYPE	FOUNDATION DEPTH (LF)	4C #12 (LF)	5C #12 (LF)	7C #12 (LF)	RADAR ** (LF)
TS1	44	36-B	15	10	105	75	25
TS2	24	36-A	13	10	70	55	25
TS3	44	36-B	15	10	105	75	25
TS4	36	36-A	13	10	100	10	25
		TOTALS		40	380	215	100

**RADAR CONDUCTOR WILL BE PROVIDED BY THE STATE

HEAD SCHEDULE

Signal Head Number	1,8	2,3,9,10	4,11	6,7,12,13	5	W1 - W8
Signal Indications (12" LED)	R SY FY G	R Y G	R Y G	R Y G	R SY FY G	15
Flash Mode	Y			R		
Reset Mode	G			R		

US 60 & MAIN ST. CONDUIT AND CABLE SUMMARY

RUN	CONDUIT QUANTITY				LENGTH(LF)	CONDUCTOR QUANTITY					
	2" T(LF)EA	2" B(LF)EA	4"T(LF)EA	4"B(LF)EA		1C#2(EA)	4C#12(EA)	7C#12(EA)	12C#12(EA)	#6 BARE(EA)	RADAR(EA)**
R1			1		5		1		1	1	1
R2				1	90		1		1	1	1
R3			1		5		1		1	1	1
R4			1		10		1		1	1	1
R5				1	100		1		1	1	1
R6			1		5		2		1	1	1
R7				1	95		3		2	1	2
R8			1		10		2		1	1	1
R9			1		5		5		3	1	3
R10		1			135	3					
R11	1				35	3					
*TOTALS	35	135	40	285		510	550	0	430	325	430

*TOTALS DERIVED FROM LENGTH MULTIPLIED BY QUANTITY

**RADAR CONDUCTOR WILL BE PROVIDED BY THE STATE

ELECTRICAL SERVICE DATA

ELEC. SERVICE ID	PLAN SHEET NUMBER	ELECTRICAL SERVICE DESCRIPTION	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BKR. POLE/AMPS	LIGHTING CONTACTOR AMPS	PANELBD/ LOADCENTER AMP RATING	BRANCH CIRCUIT ID	BRANCH CKT. BKR. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
ES3	046	ELC SRV TY D 120/240 070(NS)AL(N)SP(O)	2"	3/#2	N/A	2P/60	N/A	100	SIGNAL	1P/50	24	2.9

1. POLE & GROUND BOX LOCATIONS ARE DIAGRAMMATIC AND SHALL BE FIELD VERIFIED BY ENGINEER.
2. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING & VERIFYING ALL UNDERGROUND STRUCTURES & ANY UTILITIES BEFORE MAKING ANY EXCAVATIONS.

STATE OF TEXAS
JEREMY T. DEARING
98218
LICENSED PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

US60 & MAIN ST. SIGNAL LAYOUT

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STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT / SECT		JOB	HIGHWAY
0905 / 00		112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		046

DATE: 9/28/2022 2:05:09 PM
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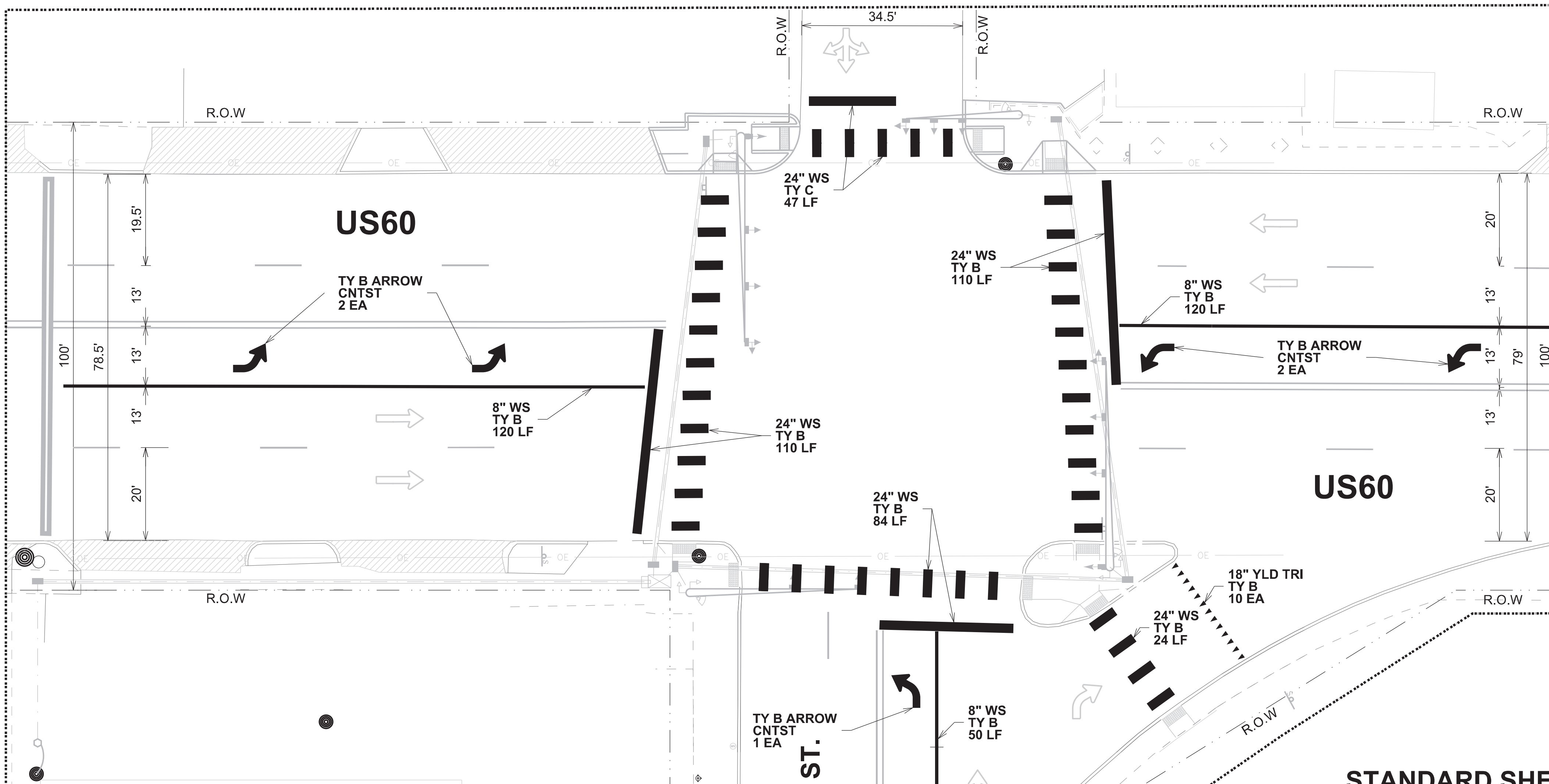
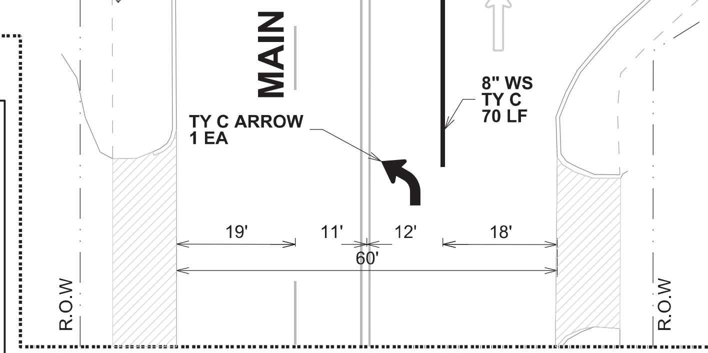
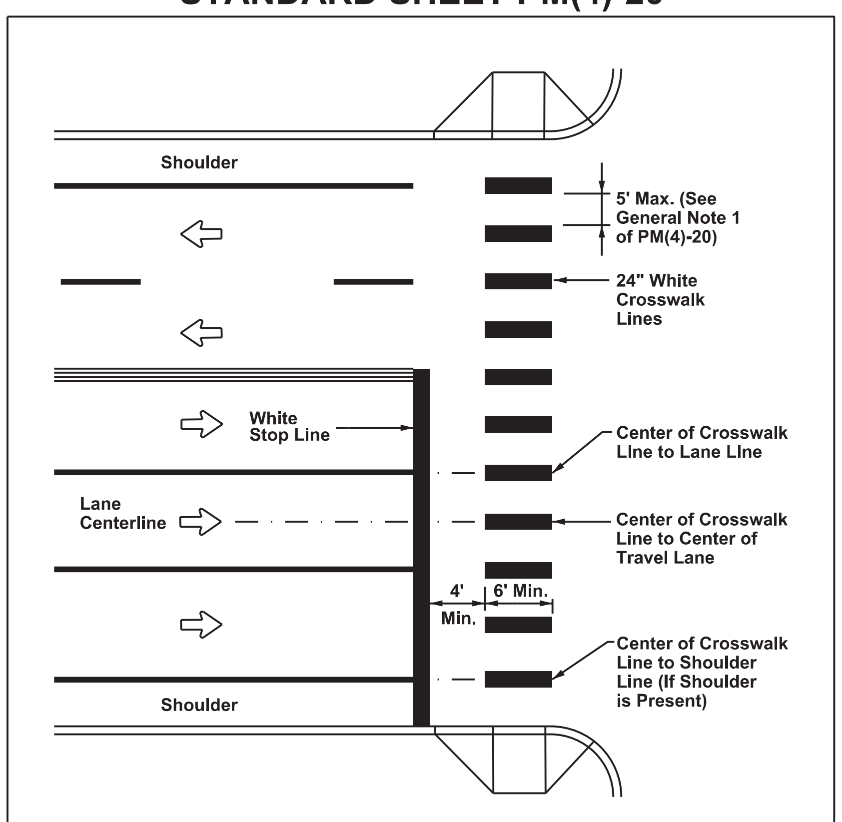
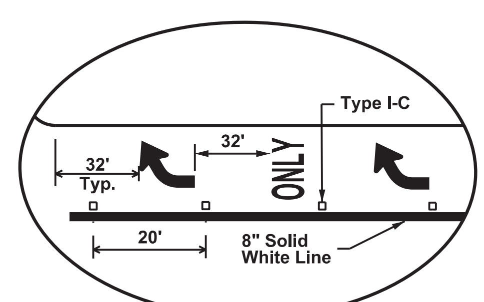




STANDARD SHEET PM(4)-20

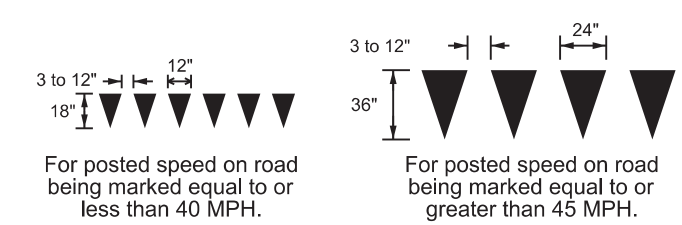


STANDARD SHEET PM(3)-20



DETAIL B

STANDARD SHEET PM(1)-20



YIELD LINES

Jeremy T. Dearing, P.E.

09/30/2022

US60 & MAIN ST.
PAVEMENT MARKINGS

N.T.S

Texas Department of Transportation

STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		047

DATE: 9/28/2022 2:05:11 PM

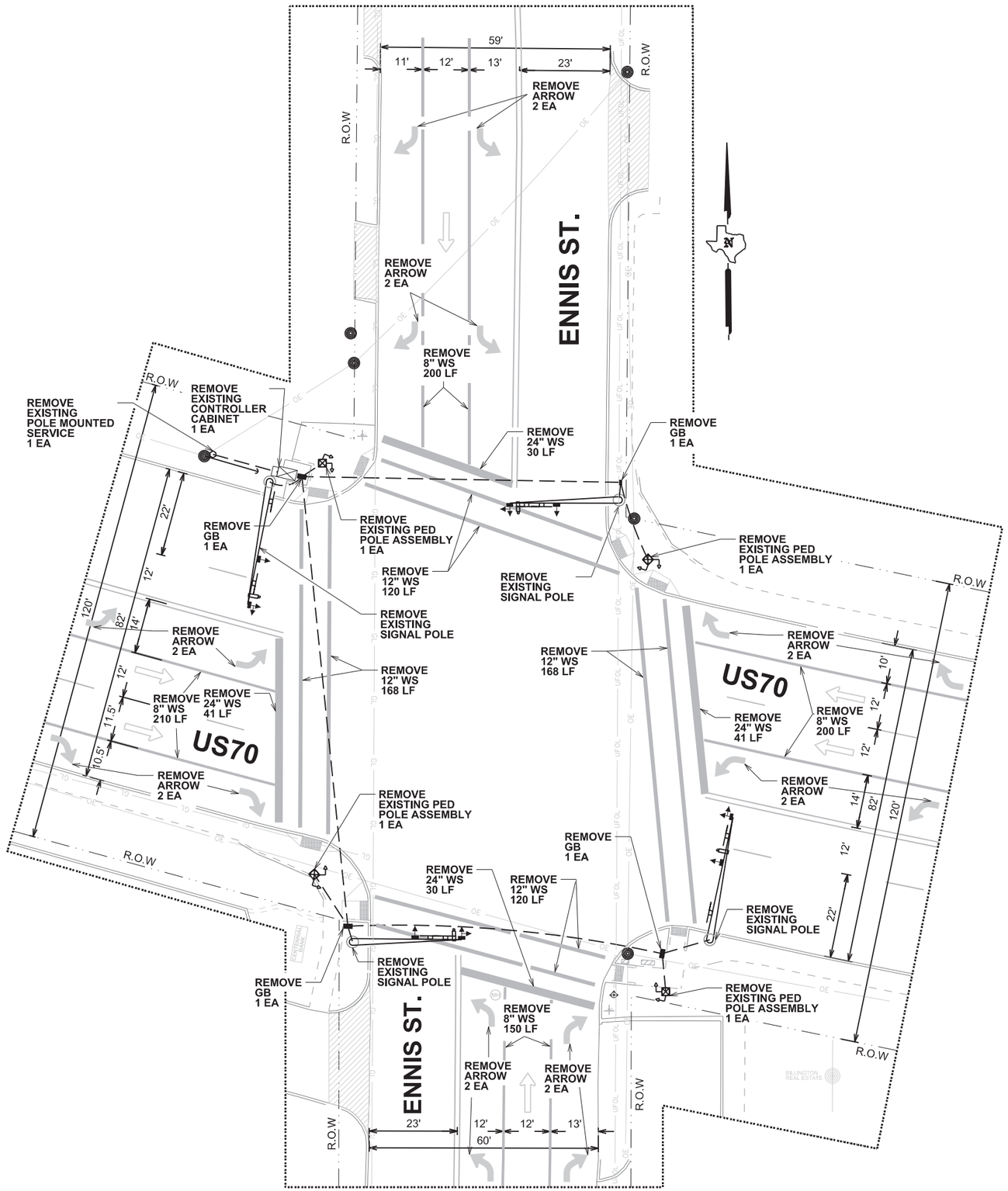
US 60 & MAIN ST. SIGNAL INSTALLATION SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0416 6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	56
0618 6046	CONDT (PVC) (SCH 80) (2")	LF	35
0618 6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	135
0618 6058	CONDT (PVC) (SCH 80) (4")	LF	40
0618 6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	285
0620 6009	ELEC CONDR (NO.6) BARE	LF	325
0620 6016	ELEC CONDR (NO.2) INSULATED	LF	510
0624 6009	GROUND BOX TY D (162922)	EA	6
0628 6170	ELC SRV TY D 120/240 070(NS)AL(N)SP(O)	EA	1
0668 6014	PREFAB PAV MRK TY B (W)(8")(SLD)	LF	290
0668 6018	PREFAB PAV MRK TY B (W)(24")(SLD)	LF	328
0668 6033	PREFAB PAV MRK TY B (W)(18")(YLD TRI)	EA	10
0668 6072	PREFAB PAV MRK TY C (W) (8") (SLD)	LF	70
0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	47
0668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	1
0668 6122	PREFAB PAV MRK TY B (W)(ARROW)CNTST	EA	5
0680 6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
0682 6001	VEH SIG SEC (12")LED(GRN)	EA	10
0682 6002	VEH SIG SEC (12")LED(GRN ARW)	EA	3
0682 6003	VEH SIG SEC (12")LED(YEL)	EA	10
0682 6004	VEH SIG SEC (12")LED(YEL ARW)	EA	6
0682 6005	VEH SIG SEC (12")LED(RED)	EA	10
0682 6006	VEH SIG SEC (12")LED(RED ARW)	EA	3
0682 6018	PED SIG SEC (LED)(COUNTDOWN)	EA	6
0682 6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	10
0682 6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	3
0684 6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	590
0684 6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	380
0684 6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	215
0684 6017	TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	LF	430
0686 6025	INS TRF SIG PL AM (S)1 ARM(24')	EA	1
0686 6037	INS TRF SIG PL AM(S)1 ARM(36')	EA	1
0686 6045	INS TRF SIG PL AM(S)1 ARM(44')	EA	2
0690 6032	INSTALL OF PEDESTRIAN PUSH BUTTONS	EA	8

US 60 & MAIN ST. SIGNAL REMOVAL SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0624 6028	REMOVE GROUND BOX	EA	5
0628 6002	REMOVE ELECTRICAL SERVICES	EA	1
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	300
0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	532
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	131
0677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	5
0677 6018	ELIM EXT PAV MRK & MRKS (18")(YLD TRI)	EA	10
0680 6004	REMOVING TRAFFIC SIGNALS	EA	1

Texas Department of Transportation

US60 & MAIN ST. SUMMARY

STATE	DIST.	COUNTY
TEXAS	LBB	VARIOUS
CONT	SECT	JOB	HIGHWAY
---	---	---	---
0905	00	112	VAR
DATE	FILENAME	SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES	048



LEGEND

	EXISTING SIGNAL POLE, MAST ARM & FOUNDATION
	EXISTING GROUND BOX
	EXISTING CONDUIT
	CONTROLLER CABINET
	EXISTING SERVICE
	SIGNAL HEAD
	CAMERA
	PED HEADS
	EXISTING POLE
	EXISTING PED POLE
	LUMINAIRE
	EXISTING MAST ARM SIGN
OE / OFOL / OFOL	EXISTING OVERHEAD UTILITIES
GL / GL / UFOL / SS	EXISTING UNDERGROUND UTILITIES

STATE OF TEXAS
JEREMY T. DEARING
98218
LICENSED PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

US70 & ENNIS ST.
REMOVAL

N.T.S

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STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		049

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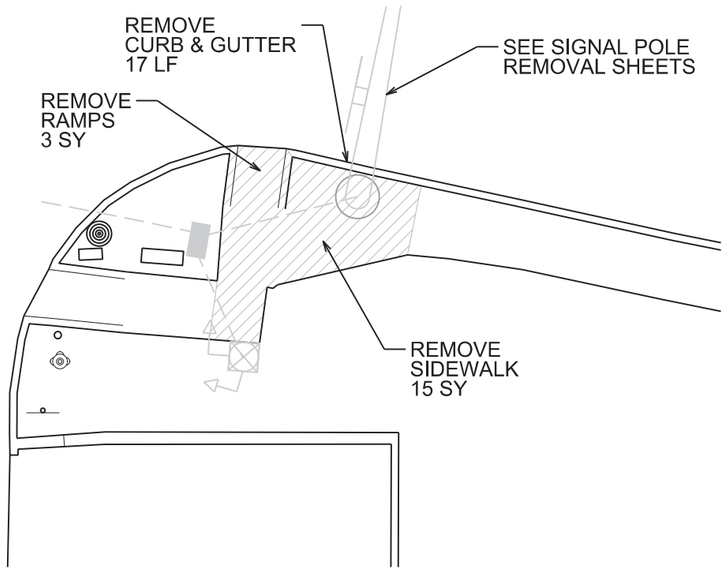
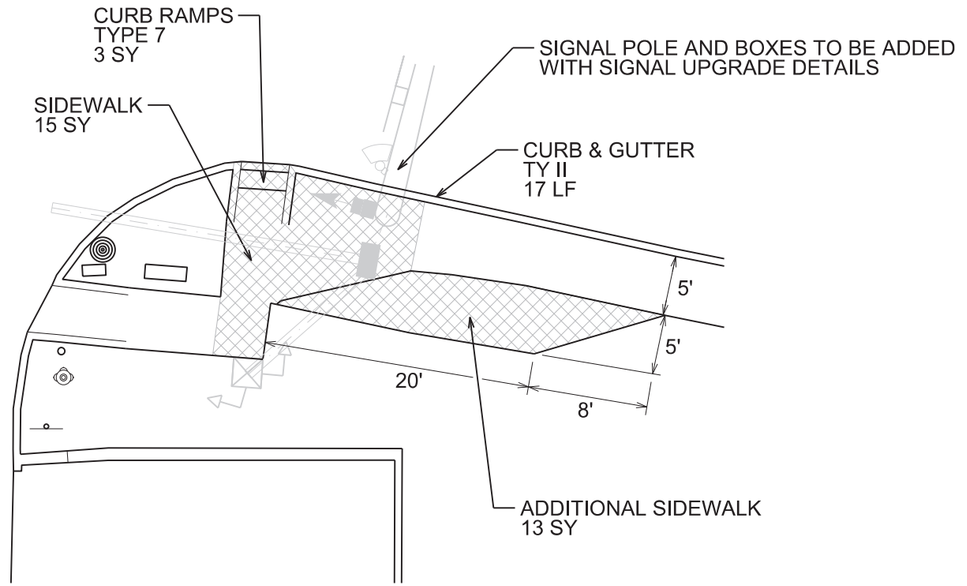


SE CORNER OF US 70 & ENNIS ST.
REMOVAL



SE CORNER OF US 70 & ENNIS ST.
INSTALL

US70 & ENNIS ST. ADA REMOVAL & INSTALL SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0104 6015	REMOVING CONC (SIDEWALKS)	SY	15
0104 6022	REMOVING CONC (CURB AND GUTTER)	LF	17
0104 6032	REMOVING CONC (WHEELCHAIR RAMP)	SY	3
0529 6008	CONC CURB & GUTTER (TY II)	LF	17
0531 6002	CONC SIDEWALKS (5")	SY	28
0531 6024	CURB RAMPS (TY 7)	SY	3

STATE OF TEXAS
HEATH C. BOZEMAN
97467
LICENSED
PROFESSIONAL ENGINEER

Heath C. Bozeman, P.E.

09/29/2022

US70 & ENNIS ST.
ADA

N.T.S

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STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		050

DATE: 9/28/2022 2:05:19 PM
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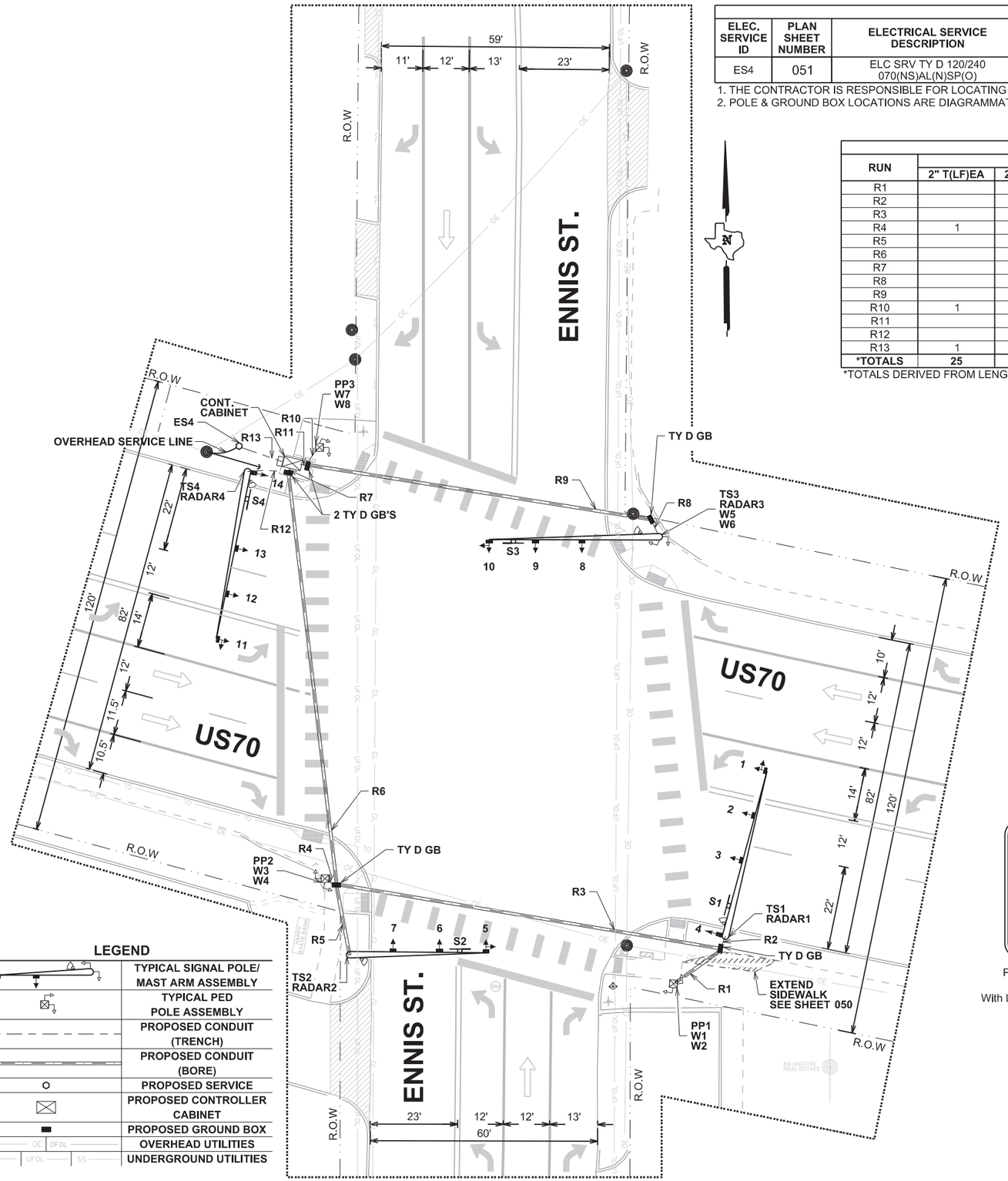


LEGEND

	TYPICAL SIGNAL POLE/ MAST ARM ASSEMBLY
	TYPICAL PED POLE ASSEMBLY
	PROPOSED CONDUIT (TRENCH)
	PROPOSED CONDUIT (BORE)
	PROPOSED SERVICE
	PROPOSED CONTROLLER CABINET
	PROPOSED GROUND BOX
OE OFOL	OVERHEAD UTILITIES
GL UFOL SS	UNDERGROUND UTILITIES

ELECTRICAL SERVICE DATA

ELEC. SERVICE ID	PLAN SHEET NUMBER	ELECTRICAL SERVICE DESCRIPTION	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BKR. POLE/AMPS	LIGHTING CONTACTOR AMPS	PANELBD/ LOADCENTER AMP RATING	BRANCH CIRCUIT ID	BRANCH CKT. BKR. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
ES4	051	ELC SRV TY D 120/240 070(NS)AL(N)SP(O)	2"	3/#2	N/A	2P/60	N/A	100	SIGNAL	1P/50	24	2.9

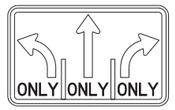
1. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING & VERIFYING ALL UNDERGROUND STRUCTURES & ANY UTILITIES BEFORE MAKING ANY EXCAVATIONS.
2. POLE & GROUND BOX LOCATIONS ARE DIAGRAMMATIC AND SHALL BE FIELD VERIFIED BY ENGINEER.

US 70 & ENNIS ST. CONDUIT AND CABLE SUMMARY

RUN	CONDUIT QUANTITY				LENGTH(LF)	CONDUCTOR QUANTITY					
	2" T(LF)EA	2" B(LF)EA	4"T(LF)EA	4"B(LF)EA		1C#2(EA)	4C#12(EA)	7C#12(EA)	12C#12(EA)	#6 BARE(EA)	RADAR(EA)**
R1		1			15		2	1		1	
R2			1		5			1	1	1	1
R3				1	100		2		1	1	1
R4	1				5		2	1		1	
R5				1	20			1	1	1	1
R6				1	110		4		2	1	2
R7			1		5		4		3	1	3
R8			1		5		2		1	1	1
R9				1	90		2		1	1	1
R10	1				5		2	1		1	
R11			1		5		4	1	1	1	1
R12			1		10				1	1	1
R13	1				15	3					
*TOTALS	25	15	30	320		45	920	55	470	375	470

*TOTALS DERIVED FROM LENGTH MULTIPLIED BY QUANTITY

**RADAR CONDUCTOR WILL BE PROVIDED BY THE STATE



S2,S3
48" x 30"
Lane Control Sign (R3-8b)

S1,S4
78" x 24"
Ennis St Sign (D3-1aG)

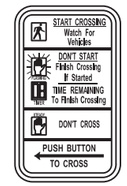
POLE/MAST ARM DETAILS

POLE NUMBER	MAST ARM LENGTH (LF)	FOUNDATION TYPE	FOUNDATION DEPTH (LF)	4C #12 (LF)	5C #12 (LF)	7C #12 (LF)	RADAR ** (LF)
TS1	44	36-B	15		105	65	25
TS2	36	36-A	13		75	55	25
TS3	44	36-B	15	10	90	75	25
TS4	44	36-B	15		105	65	25
PP1	-	SCREW-IN	-	10		10	
PP2	-	SCREW-IN	-	10		10	
PP3	-	SCREW-IN	-	10		10	
		TOTALS		40	375	290	100

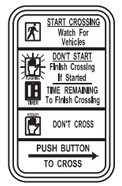
**RADAR CONDUCTOR WILL BE PROVIDED BY THE STATE

HEAD SCHEDULE

Signal Head Number	1,11	2,3,12,13	4,14	6,7,8,9	5,10	W1 - W8
Signal Indications (12" LED)	R SY FY G	R Y G	R Y G	R Y G	R SY FY G	15
Flash Mode	Y			R		
Reset Mode	G			R		



PED SIGN (5 EA)
9" X 15"
With Left Arrow (R10-3e-L)



PED SIGN (3 EA)
9" X 15"
With Right Arrow (R10-3e-R)

Jeremy T. Dearing, P.E.

09/30/2022

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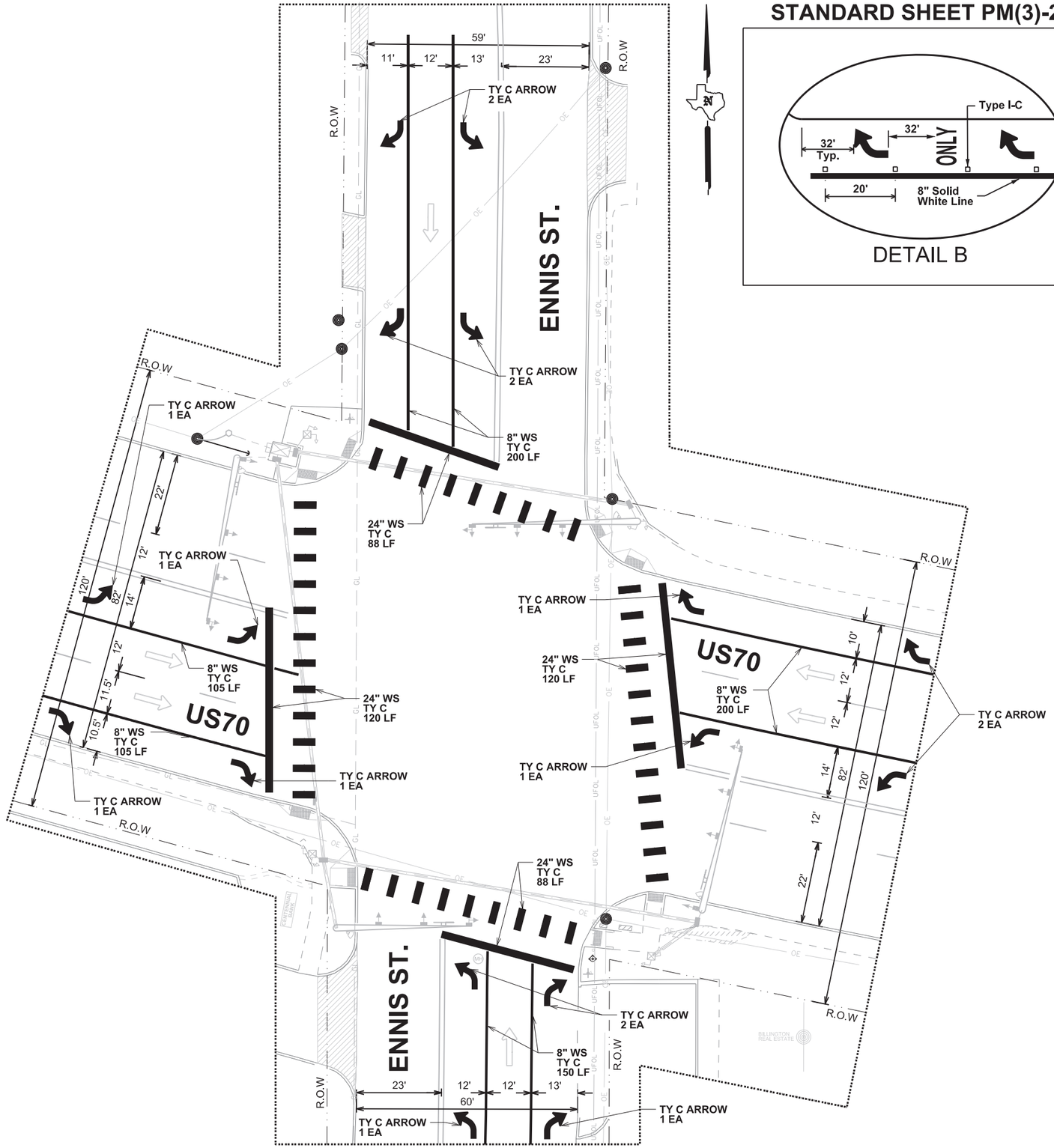
US70 & ENNIS ST. SIGNAL LAYOUT

STATE	DIST.	COUNTY
TEXAS	LBB	VARIOUS

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR

DATE	FILENAME	SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES	051

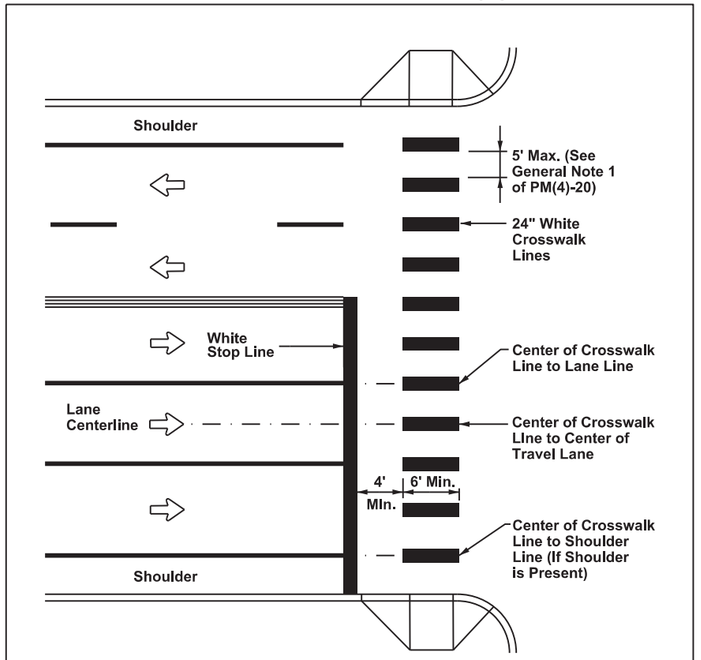
DATE: 9/28/2022 2:05:21 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2Documents\05 - LBB\Construction Projects\0905001124 - Design\Plan Set\8. Traffic\4. US70 & ENNIS\049.051 US70 & ENNIS ST. REMOVAL & SIGNAL LAYOUT.dgn



STANDARD SHEET PM(3)-20

DETAIL B

STANDARD SHEET PM(4)-20



JEREMY T. DEARING
98218
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

Jeremy T. Dearing, P.E.

09/30/2022

US70 & ENNIS ST.
PAVEMENT MARKINGS

Texas Department of Transportation

N.T.S

STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		052

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US 70 & ENNIS ST. SIGNAL INSTALLATION SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0416 6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	58
0618 6046	CONDT (PVC) (SCH 80) (2")	LF	25
0618 6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	15
0618 6058	CONDT (PVC) (SCH 80) (4")	LF	30
0618 6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	320
0620 6009	ELEC CONDR (NO.6) BARE	LF	375
0620 6016	ELEC CONDR (NO.2) INSULATED	LF	45
0624 6009	GROUND BOX TY D (162922)	EA	5
0628 6170	ELC SRV TY D 120/240 070(NS)AL(N)SP(O)	EA	1
0668 6072	PREFAB PAV MRK TY C (W) (8") (SLD)	LF	760
0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	416
0668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	16
0680 6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
0682 6001	VEH SIG SEC (12")LED(GRN)	EA	8
0682 6002	VEH SIG SEC (12")LED(GRN ARW)	EA	6
0682 6003	VEH SIG SEC (12")LED(YEL)	EA	8
0682 6004	VEH SIG SEC (12")LED(YEL ARW)	EA	10
0682 6005	VEH SIG SEC (12")LED(RED)	EA	8
0682 6006	VEH SIG SEC (12")LED(RED ARW)	EA	6
0682 6018	PED SIG SEC (LED)(COUNTDOWN)	EA	8
0682 6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	10
0682 6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	4
0684 6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	960
0684 6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	375
0684 6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	345
0684 6017	TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	LF	470
0686 6037	INS TRF SIG PL AM(S)1 ARM(36')	EA	1
0686 6045	INS TRF SIG PL AM(S)1 ARM(44')	EA	3
0687 6001	PED POLE ASSEMBLY	EA	3
0690 6032	INSTALL OF PEDESTRIAN PUSH BUTTONS	EA	8

US 70 & ENNIS ST. SINGAL REMOVAL SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0624 6028	REMOVE GROUND BOX	EA	4
0628 6002	REMOVE ELECTRICAL SERVICES	EA	1
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	760
0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	568
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	142
0677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	16
0680 6004	REMOVING TRAFFIC SIGNALS	EA	1
0687 6005	REMOVE PED POLE ASSEMBLY	EA	4

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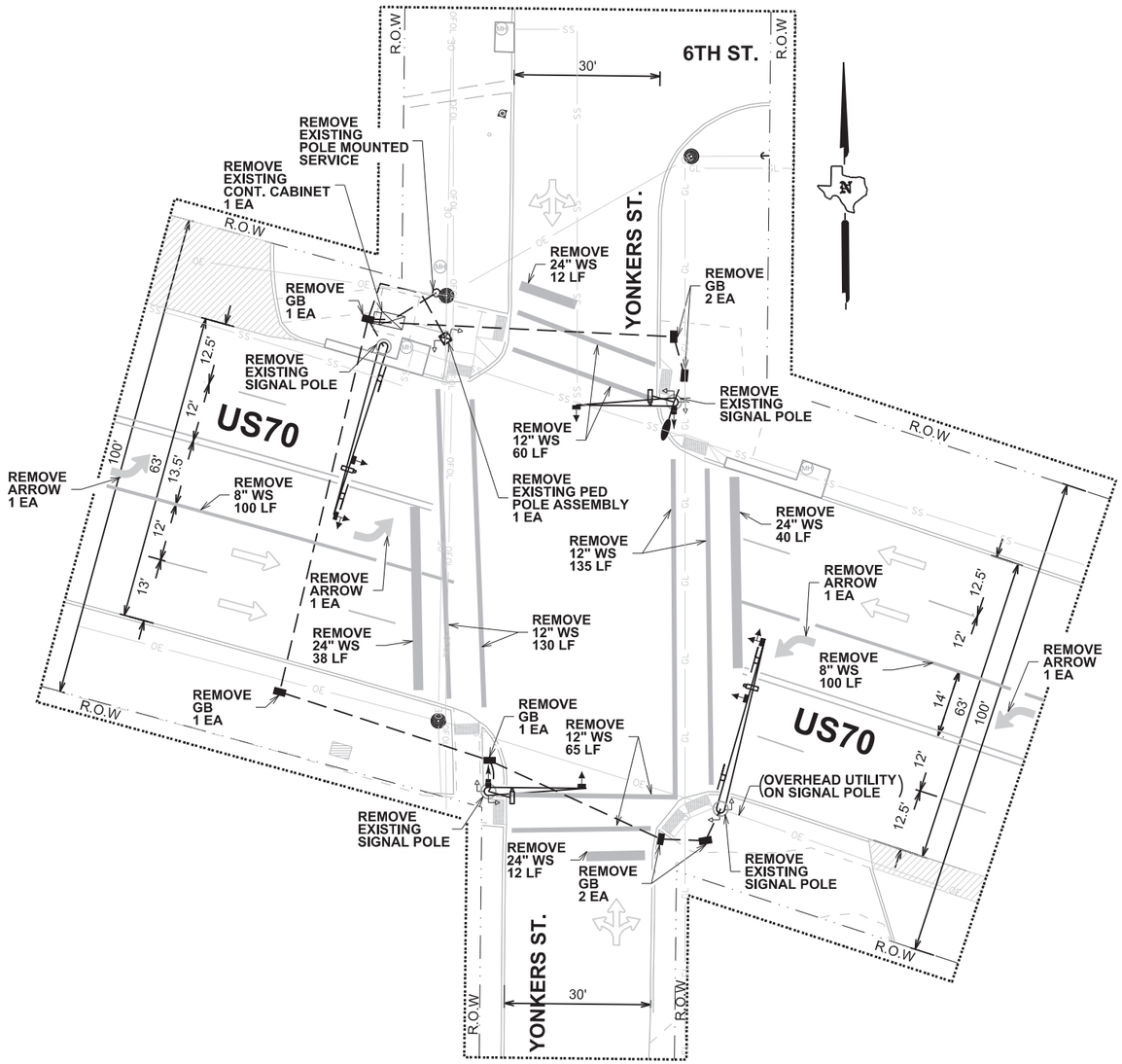
US70 & ENNIS ST. SUMMARY

STATE	DIST.	COUNTY
TEXAS	LBB	VARIOUS

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR

DATE	FILENAME	SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES	053



LEGEND

	EXISTING SIGNAL POLE, MAST ARM & FOUNDATION
	EXISTING GROUND BOX
	EXISTING CONDUIT
	CONTROLLER CABINET
	EXISTING SERVICE
	SIGNAL HEAD
	CAMERA
	PED HEADS
	EXISTING POLE
	EXISTING PED POLE
	LUMINAIRE
	EXISTING MAST ARM SIGN
OE — OFOL — OFOL	EXISTING OVERHEAD UTILITIES
GL — GL - UFOL — SS	EXISTING UNDERGROUND UTILITIES

STATE OF TEXAS
JEREMY T. DEARING
98218
LICENSED PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

US70 & YONKERS ST. REMOVAL

Texas Department of Transportation

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N.T.S

STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		054

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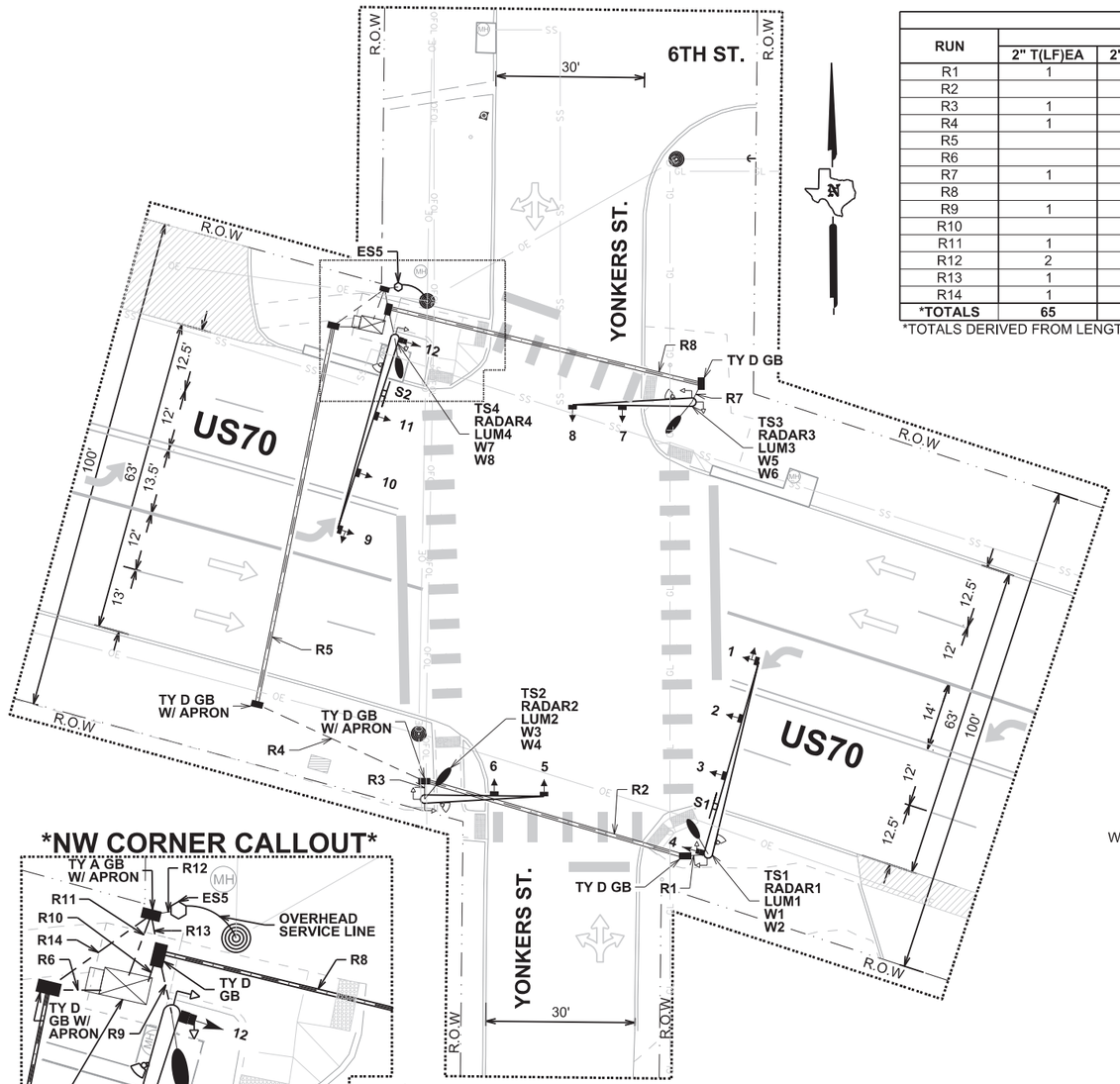


US 70 & YONKERS ST. CONDUIT AND CABLE SUMMARY												
RUN	CONDUIT QUANTITY				LENGTH(LF)	CONDUCTOR QUANTITY						
	2" T(LF)EA	2" B(LF)EA	4"T(LF)EA	4"B(LF)EA		1C#2(EA)	1C#8(EA)	4C#12(EA)	7C#12(EA)	12C#12(EA)	#6 BARE(EA)	RADAR(EA)**
R1	1		1		5		3	2		1	1	1
R2		1		1	55		3	2		1	1	1
R3	1		1		5		3	2		1	1	1
R4	1		1		35		3	4		2	1	2
R5		1		1	75		3	4		2	1	2
R6			1		10			4		2	1	2
R7	1		1		5		3	2		1	1	1
R8		1		1	65		3	2		1	1	1
R9	1		1		5		3	2		1	1	1
R10			1		5			4		2	1	2
R11	1				10	3						
R12	2				5	3	3					
R13	1				5		3					
R14	1				10		3					
*TOTALS	65	195	70	195		30	750	780	0	390	265	390

*TOTALS DERIVED FROM LENGTH MULTIPLIED BY QUANTITY

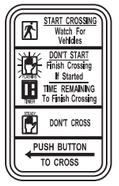
**RADAR CONDUCTOR WILL BE PROVIDED BY THE STATE

Yonkers st

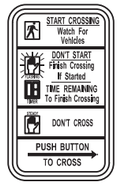
S1,S2
102" x 24"
Yonkers St Sign (D3-1aG)

POLE/MAST ARM DETAILS								
POLE NUMBER	MAST ARM LENGTH (LF)	FOUNDATION TYPE	FOUNDATION DEPTH (LF)	1C #8 (LF)	4C #12 (LF)	5C #12 (LF)	7C #12 (LF)	RADAR ** (LF)
TS1	40	36-B	15	135	10	95	70	25
TS2	24	36-A	13	135	10	75	10	25
TS3	24	36-A	13	135	10	75	10	25
TS4	40	36-B	15	135	10	95	70	25
		TOTALS		540	40	340	160	100

**RADAR CONDUCTOR WILL BE PROVIDED BY THE STATE



PED SIGN (4 EA)
9" X 15"
With Left Arrow (R10-3e-L)



PED SIGN (4 EA)
9" X 15"
With Right Arrow (R10-3e-R)

HEAD SCHEDULE					
Signal Head Number	1,9	2,3,10,11	4,12	5,6,7,8	W1 - W8
Signal Indications (12" LED)	R SY FY G	R Y G	R Y G	R Y G	15
Flash Mode	Y			R	
Reset Mode	G			R	

LEGEND

	TYPICAL SIGNAL POLE/ MAST ARM ASSEMBLY
	TYPICAL PED POLE ASSEMBLY
	PROPOSED CONDUIT (TRENCH)
	PROPOSED CONDUIT (BORE)
	PROPOSED SERVICE
	PROPOSED CONTROLLER CABINET
	PROPOSED GROUND BOX
OE OFOL	OVERHEAD UTILITIES
GL UFOL SS	UNDERGROUND UTILITIES

ELECTRICAL SERVICE DATA												
ELEC. SERVICE ID	PLAN SHEET NUMBER	ELECTRICAL SERVICE DESCRIPTION	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BKR. POLE/AMPS	LIGHTING CONTACTOR AMPS	PANELBD/ LOADCENTER AMP RATING	BRANCH CIRCUIT ID	BRANCH CKT. BKR. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
ES5	055	ELC SRV TY D 120/240 070 (NS)AL(E)SP(O)	2"	3/#2	N/A	2P/60	N/A	100	SIGNAL	1P/50	24	3.3
									ILLUMINATION	2P/15	1.68	

1. POLE & GROUND BOX LOCATIONS ARE DIAGRAMMATIC AND SHALL BE FIELD VERIFIED BY ENGINEER.
2. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING & VERIFYING ALL UNDERGROUND STRUCTURES & ANY UTILITIES BEFORE MAKING ANY EXCAVATIONS.

STATE OF TEXAS
JEREMY T. DEARING
98218
LICENSED
PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

US70 & YONKERS ST.
SIGNAL LAYOUT

N.T.S

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STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		055

DATE: 9/28/2022 2:05:31 PM
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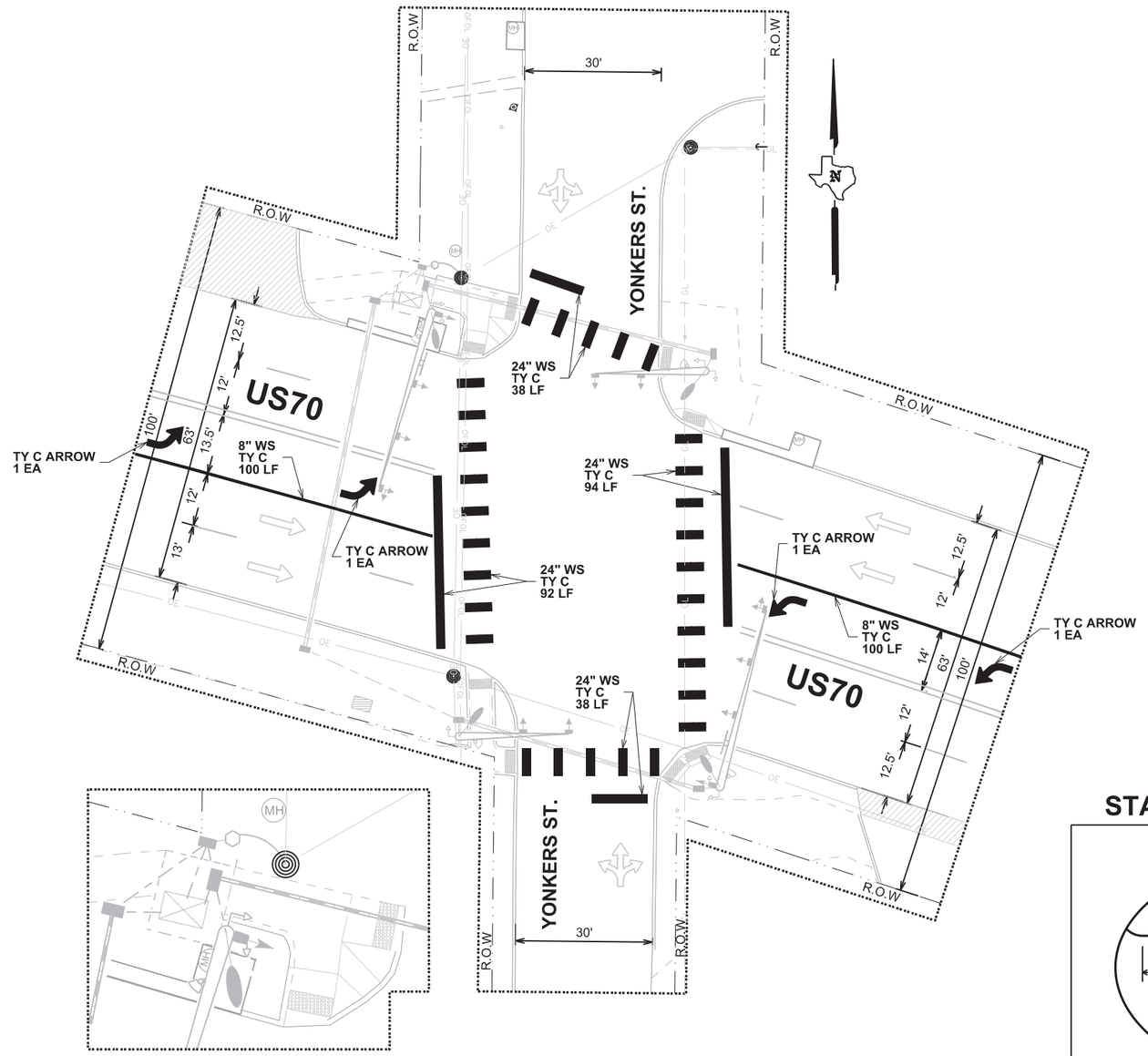
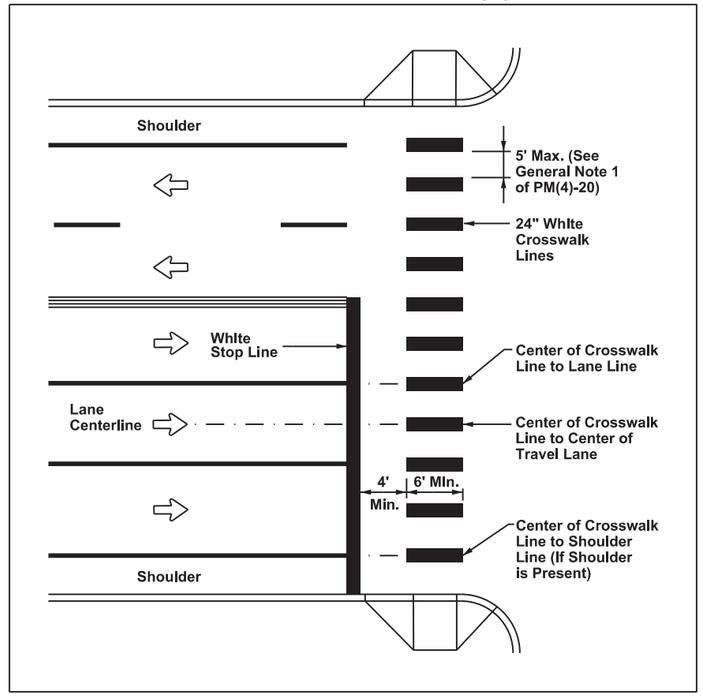
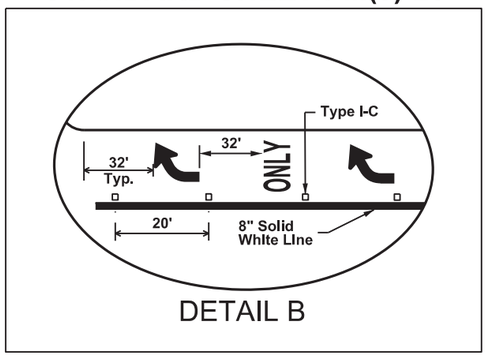


STANDARD SHEET PM(4)-20



STANDARD SHEET PM(3)-20



DETAIL B

STATE OF TEXAS
JEREMY T. DEARING
98218
LICENSED PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

N.T.S

Texas Department of Transportation

US70 & YONKERS ST.
PAVEMENT MARKINGS

STATE	DIST.	COUNTY
TEXAS	LBB	VARIOUS

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR

DATE	FILENAME	SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES	056

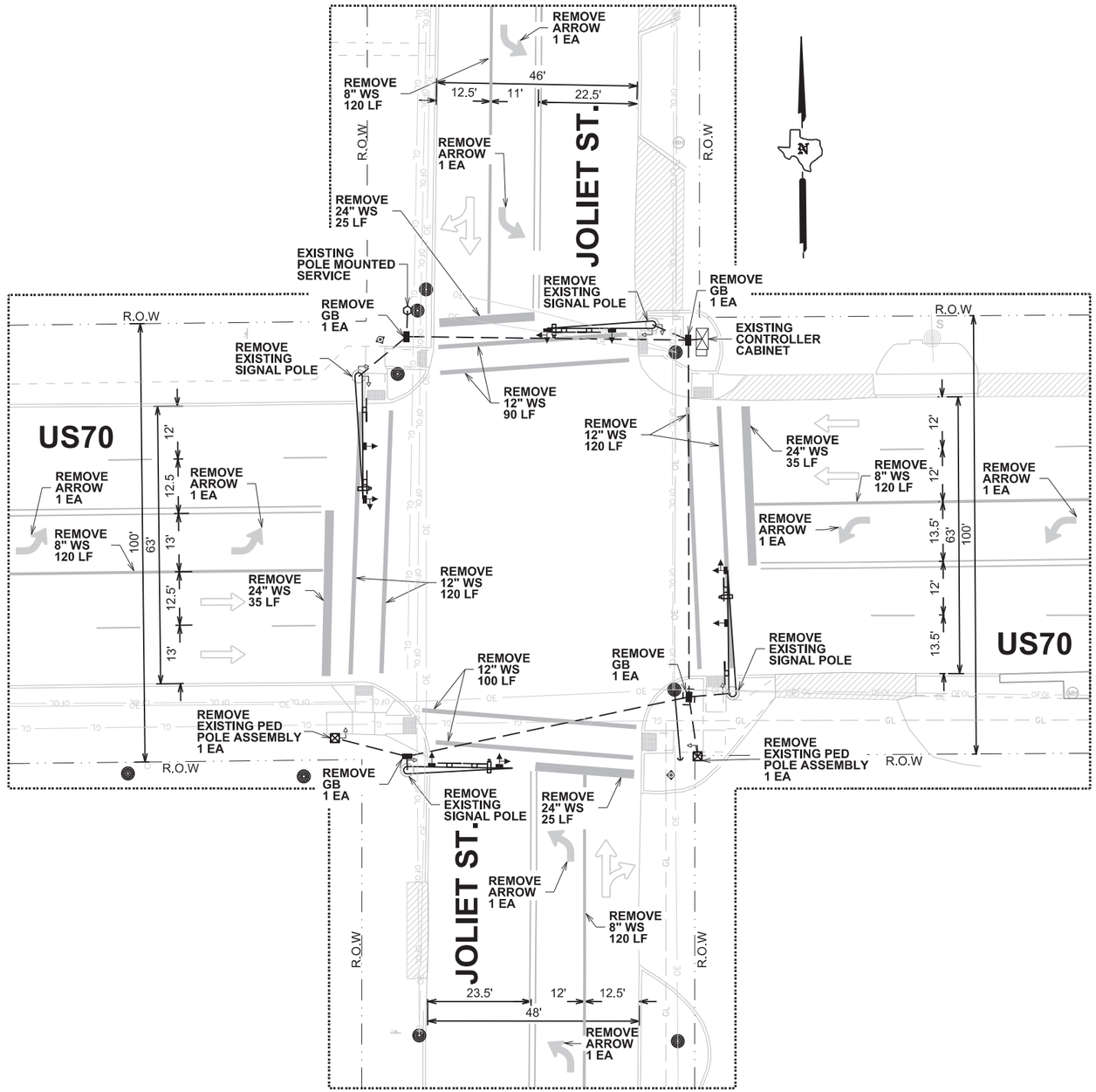
DATE: 9/28/2022 2:05:33 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\0905001124 - Design\Plan Set\8. Traffic\5. US70 & YONKERS ST. PAVEMENT MARKINGS.dgn

US 70 & YONKERS ST. SIGNAL INSTALLATION SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0416 6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	56
0618 6046	CONDT (PVC) (SCH 80) (2")	LF	65
0618 6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	195
0618 6058	CONDT (PVC) (SCH 80) (4")	LF	70
0618 6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	195
0620 6008	ELEC CONDR (NO.8) INSULATED	LF	1,290
0620 6009	ELEC CONDR (NO.6) BARE	LF	265
0620 6016	ELEC CONDR (NO.2) INSULATED	LF	30
0624 6002	GROUND BOX TY A (122311)W/APRON	EA	1
0624 6009	GROUND BOX TY D (162922)	EA	3
0624 6010	GROUND BOX TY D (162922)W/APRON	EA	3
0628 6165	ELC SRV TY D 120/240 070(NS)AL(E)SP(O)	EA	1
0668 6072	PREFAB PAV MRK TY C (W) (8") (SLD)	LF	200
0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	262
0668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	4
0680 6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
0682 6001	VEH SIG SEC (12")LED(GRN)	EA	10
0682 6002	VEH SIG SEC (12")LED(GRN ARW)	EA	2
0682 6003	VEH SIG SEC (12")LED(YEL)	EA	10
0682 6004	VEH SIG SEC (12")LED(YEL ARW)	EA	4
0682 6005	VEH SIG SEC (12")LED(RED)	EA	10
0682 6006	VEH SIG SEC (12")LED(RED ARW)	EA	2
0682 6018	PED SIG SEC (LED)(COUNTDOWN)	EA	8
0682 6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	10
0682 6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	2
0684 6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	820
0684 6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	340
0684 6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	160
0684 6017	TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	LF	390
0686 6027	INS TRF SIG PL AM(S)1 ARM(24')LUM	EA	2
0686 6043	INS TRF SIG PL AM(S)1 ARM(40')LUM	EA	2
0690 6032	INSTALL OF PEDESTRIAN PUSH BUTTONS	EA	8

US 70 & YONKERS ST. SIGNAL REMOVAL SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0624 6028	REMOVE GROUND BOX	EA	7
0628 6002	REMOVE ELECTRICAL SERVICES	EA	1
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	200
0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	390
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	102
0677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	4
0680 6004	REMOVING TRAFFIC SIGNALS	EA	1
0687 6005	REMOVE PED POLE ASSEMBLY	EA	1

US70 & YONKERS ST. SUMMARY

STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		057



LEGEND

	EXISTING SIGNAL POLE, MAST ARM & FOUNDATION
	EXISTING GROUND BOX
	EXISTING CONDUIT
	CONTROLLER CABINET
	EXISTING SERVICE
	SIGNAL HEAD
	CAMERA
	PED HEADS
	EXISTING POLE
	EXISTING PED POLE
	LUMINAIRE
	EXISTING MAST ARM SIGN
OE — OFOL — OFOL	EXISTING OVERHEAD UTILITIES
GL — GL — UFOL — SS	EXISTING UNDERGROUND UTILITIES

STATE OF TEXAS
JEREMY T. DEARING
98218
LICENSED PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

US70 & JOLIET ST. REMOVAL

N.T.S

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STATE	DIST.	COUNTY
TEXAS	LBB	VARIOUS

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR

DATE	FILENAME	SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES	058

DATE: 9/28/2022 2:05:38 PM
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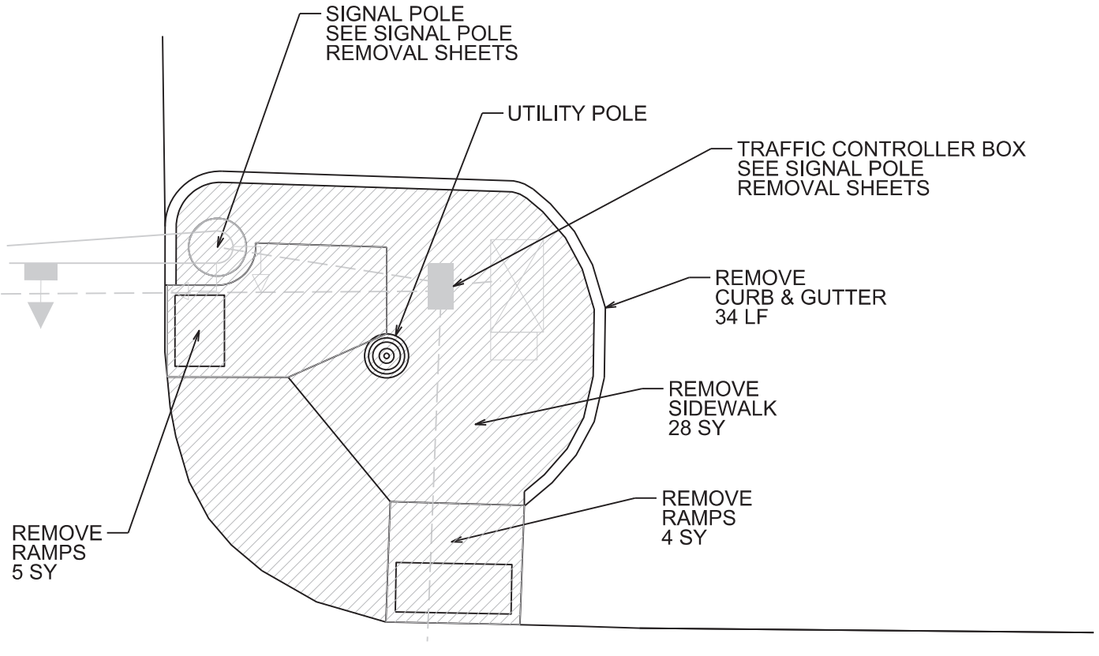
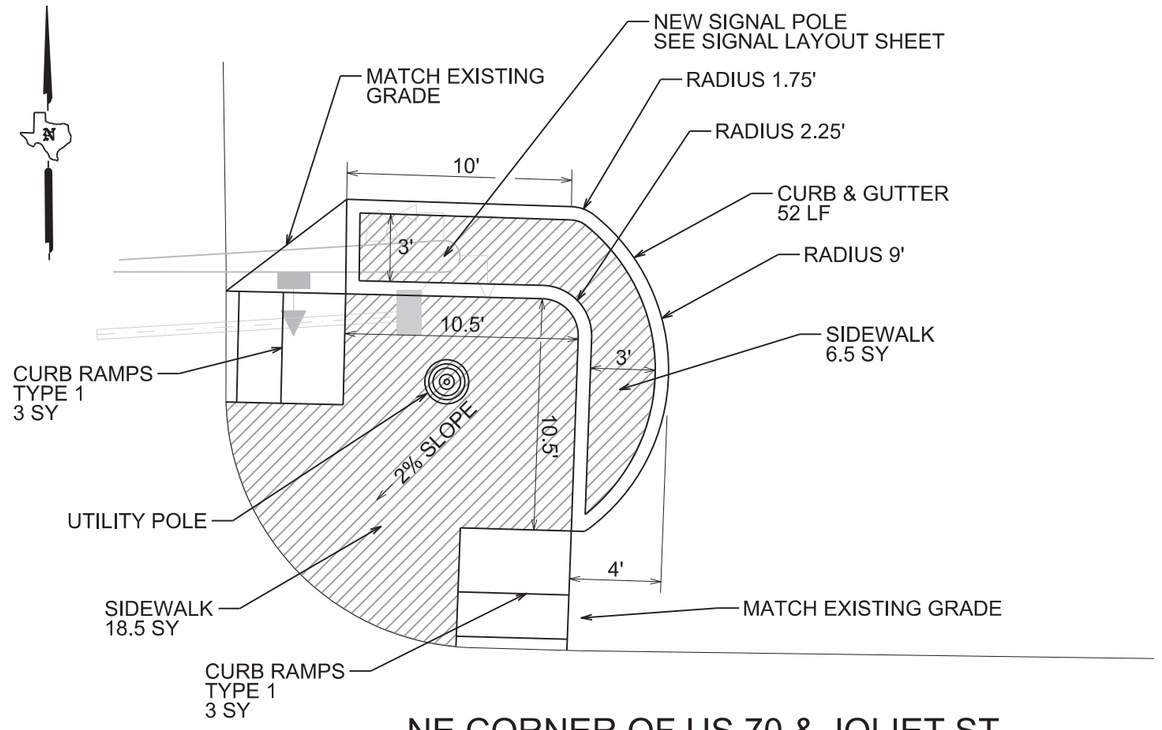


NE CORNER OF US 70 & JOLIET ST.
REMOVALS



NE CORNER OF US 70 & JOLIET ST.
INSTALL

US70 & JOLIET ST. ADA REMOVAL & INSTALL SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0104 6015	REMOVING CONC (SIDEWALKS)	SY	28
0104 6022	REMOVING CONC (CURB AND GUTTER)	LF	34
0104 6032	REMOVING CONC (WHEELCHAIR RAMP)	SY	9
0529 6008	CONC CURB & GUTTER (TY II)	LF	52
0531 6002	CONC SIDEWALKS (5")	SY	25
0531 6018	CURB RAMPS (TY 1)	SY	6

STATE OF TEXAS
HEATH C. BOZEMAN
97467
LICENSED
PROFESSIONAL ENGINEER

Heath C. Bozeman, P.E.

09/29/2022

US70 & JOLIET ST.
ADA

N.T.S

Texas Department of Transportation

STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		059

DATE: 9/28/2022 2:05:40 PM
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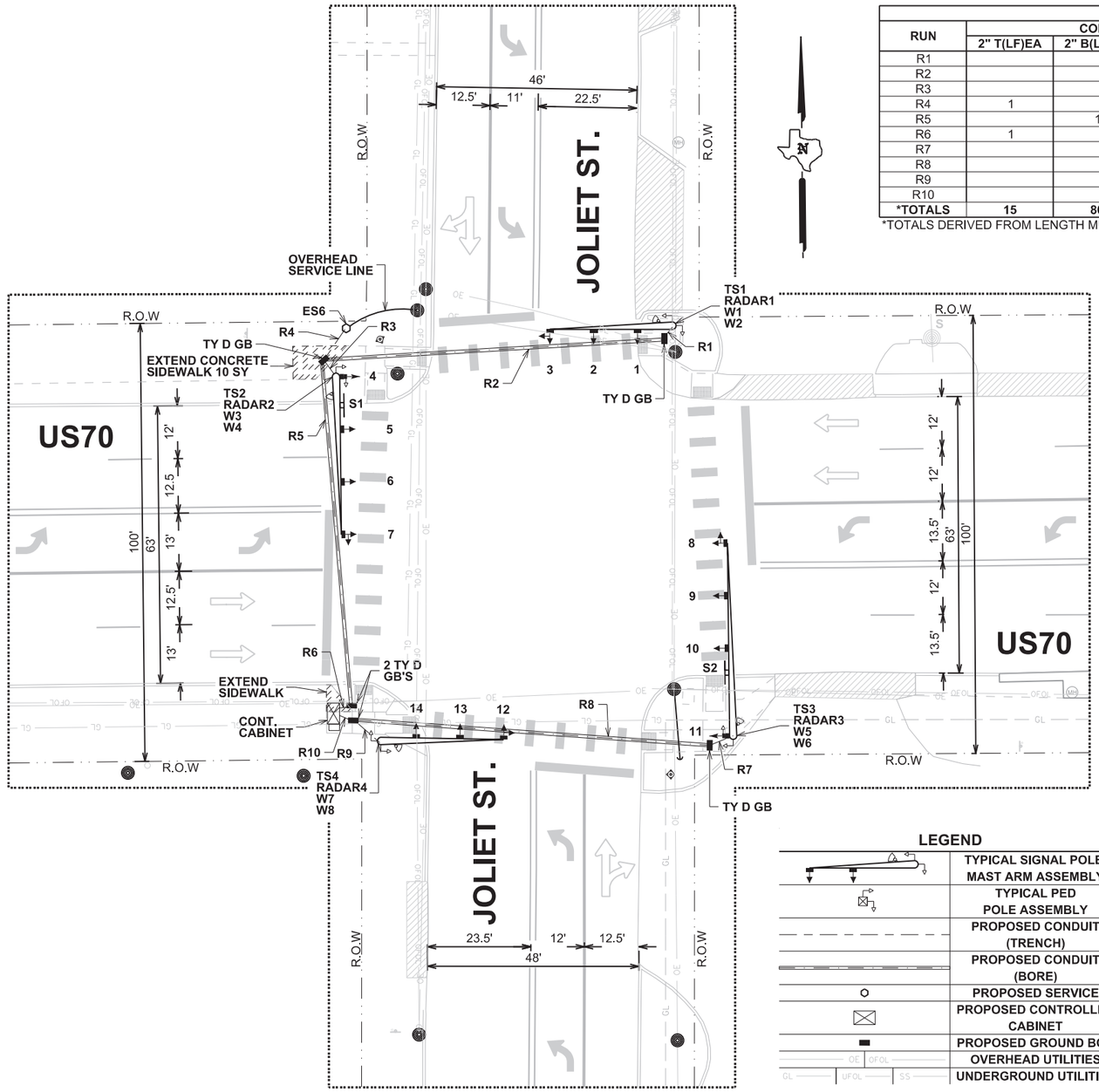


US 70 & JOLIET ST. CONDUIT AND CABLE SUMMARY												
RUN	CONDUIT QUANTITY				LENGTH(LF)	CONDUCTOR QUANTITY						
	2" T(LF)EA	2" B(LF)EA	4"T(LF)EA	4"B(LF)EA		1C#2(EA)	4C#12(EA)	7C#12(EA)	12C#12(EA)	#6 BARE(EA)	RADAR(EA)**
R1			1		5		2		1	1	1
R2				1	75		2		1	1	1
R3			1		5		2		1	1	1
R4	1				10	3					
R5		1		1	80	3	4		2	1	2
R6	1		1		5	3	4		2	1	2
R7			1		5		2		1	1	1
R8				1	85		2		1	1	1
R9			1		10		2		1	1	1
R10			1		5		4		2	1	2
*TOTALS	15	80	35	240		285	730	0	365	275	365

*TOTALS DERIVED FROM LENGTH MULTIPLIED BY QUANTITY

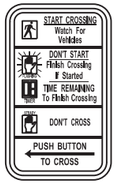
**RADAR CONDUCTOR WILL BE PROVIDED BY THE STATE

Joliet St

S1,S2
78" x 24"
Jollet St Sign (D3-1aG)

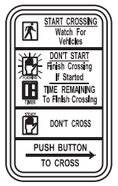
POLE/MAST ARM DETAILS							
POLE NUMBER	MAST ARM LENGTH (LF)	FOUNDATION TYPE	FOUNDATION DEPTH (LF)	4C #12 (LF)	5C #12 (LF)	7C #12 (LF)	RADAR ** (LF)
TS1	28	36-A	13	10	65	55	25
TS2	36	36-A	13	10	90	65	25
TS3	44	36-B	15	10	105	75	25
TS4	28	36-A	13	10	65	55	25
TOTALS				40	325	250	100

**RADAR CONDUCTOR WILL BE PROVIDED BY THE STATE



PED SIGN (6 EA)
9" X 15"
With Left Arrow (R10-3e-L)

HEAD SCHEDULE						
Signal Head Number	7,8	5,6,9,10	4,11	1,2,13,14	3,12	W1 - W8
Signal Indications (12" LED)	R SY FY G	R Y G	R Y G	R Y G	R SY FY G	
Flash Mode	Y		R			
Reset Mode	G		R			



PED SIGN (2 EA)
9" X 15"
With Right Arrow (R10-3e-R)

LEGEND

	TYPICAL SIGNAL POLE/ MAST ARM ASSEMBLY
	TYPICAL PED POLE ASSEMBLY
	PROPOSED CONDUIT (TRENCH)
	PROPOSED CONDUIT (BORE)
	PROPOSED SERVICE
	PROPOSED CONTROLLER CABINET
	PROPOSED GROUND BOX
OE OFOL	OVERHEAD UTILITIES
GL UFOL SS	UNDERGROUND UTILITIES

ELECTRICAL SERVICE DATA												
ELEC. SERVICE ID	PLAN SHEET NUMBER	ELECTRICAL SERVICE DESCRIPTION	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BKR. POLE/AMPS	LIGHTING CONTACTOR AMPS	PANELBD/ LOADCENTER AMP RATING	BRANCH CIRCUIT ID	BRANCH CKT. BKR. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
ES6	060	ELC SRV TY D 120/240 070(NS)AL(N)SP(O)	2"	3/#2	N/A	2P/60	N/A	100	SIGNAL	1P/50	24	2.9

1. POLE & GROUND BOX LOCATIONS ARE DIAGRAMMATIC AND SHALL BE FIELD VERIFIED BY ENGINEER.
2. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING & VERIFYING ALL UNDERGROUND STRUCTURES & ANY UTILITIES BEFORE MAKING ANY EXCAVATIONS.

STATE OF TEXAS
JEREMY T. DEARING
98218
LICENSED PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

Texas Department of Transportation

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US70 & JOLIET ST. SIGNAL LAYOUT

N.T.S

STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		060

DATE: 9/28/2022 2:05:43 PM
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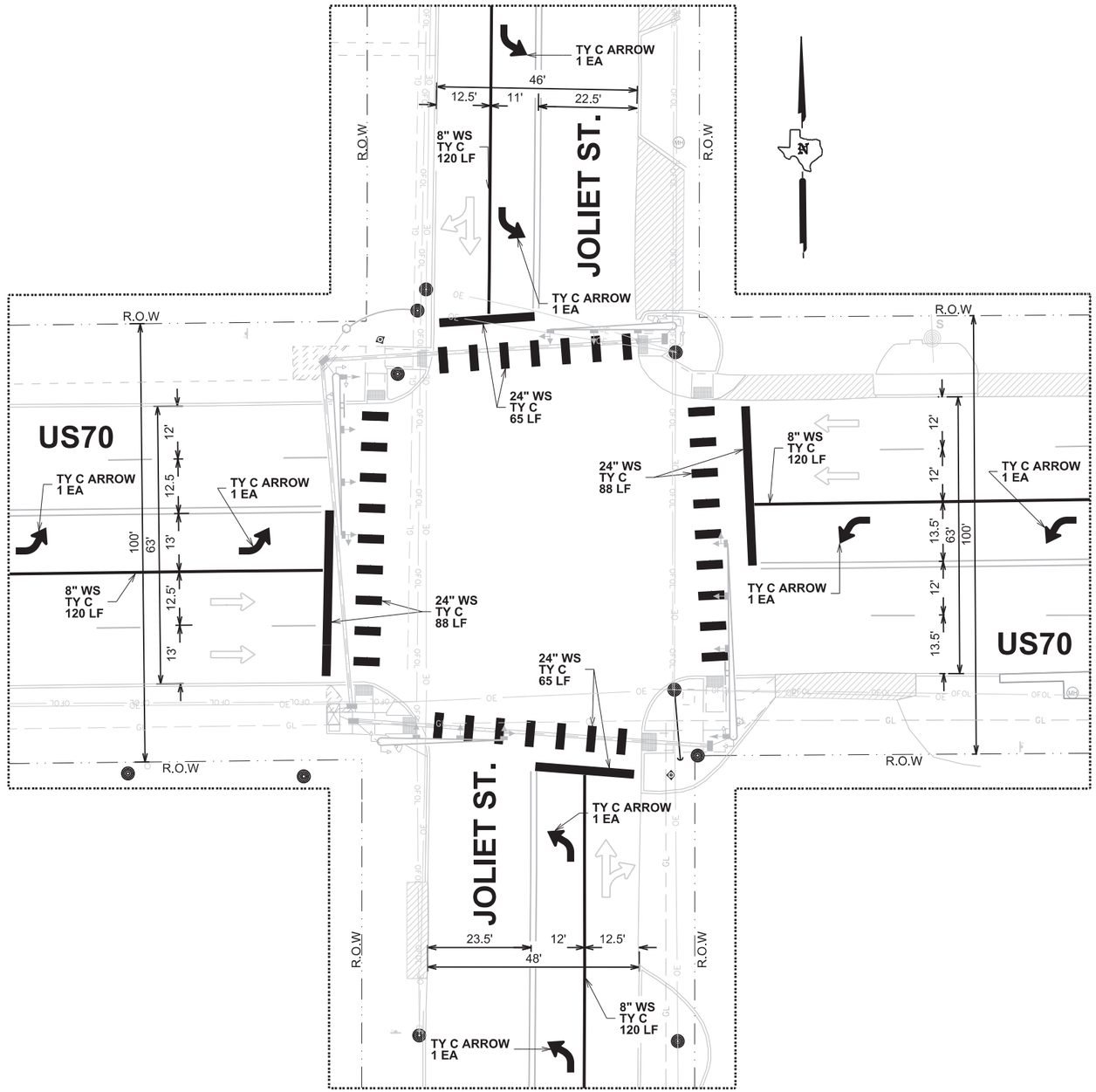
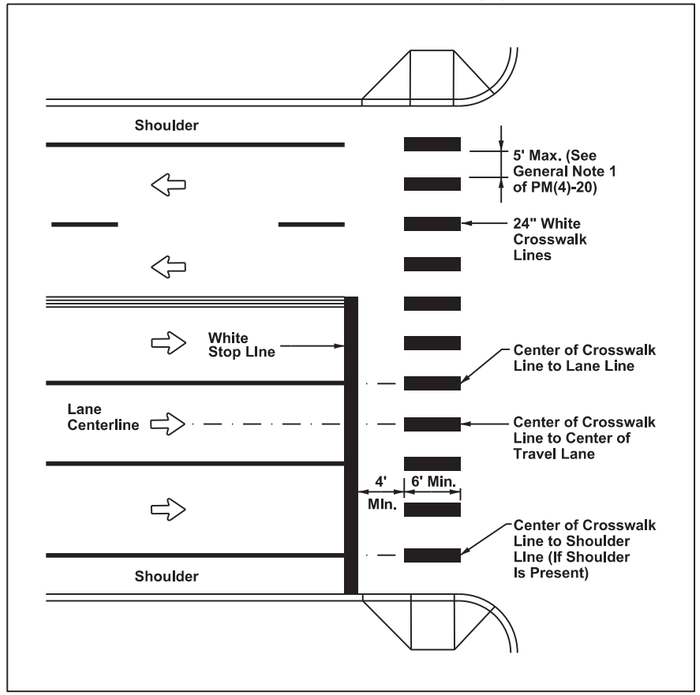


STANDARD SHEET PM(4)-20



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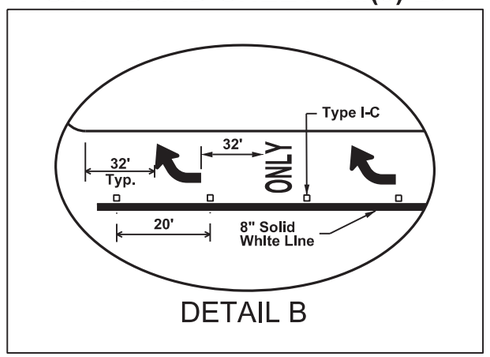

DETAIL B

STATE OF TEXAS
JEREMY T. DEARING
98218
LICENSED
PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

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Texas Department of Transportation

US70 & JOLIET ST.
PAVEMENT MARKINGS

STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		061

DATE: 9/28/2022 2:05:45 PM
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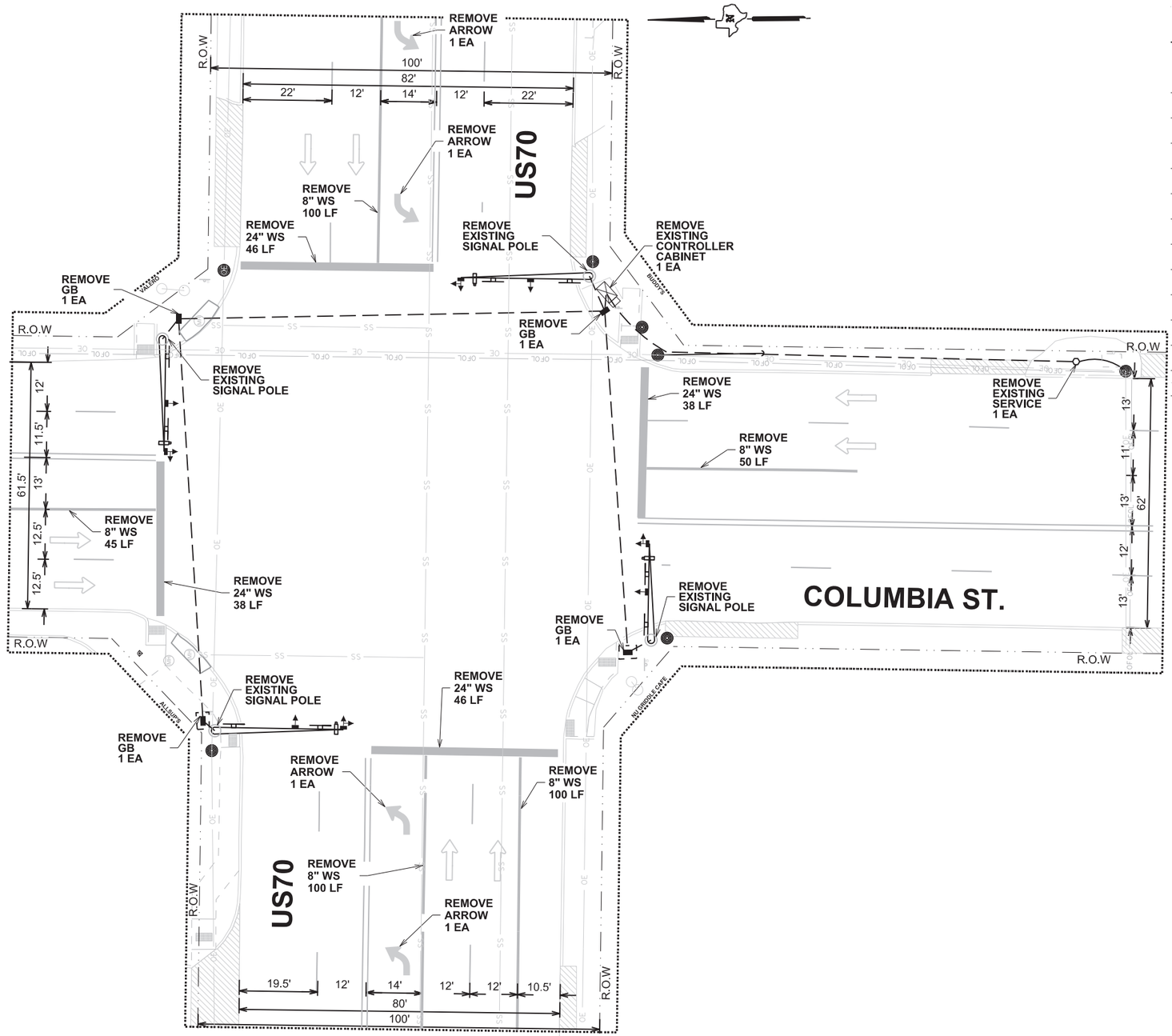
US 70 & JOLIET ST. SIGNAL INSTALLATION SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0416 6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	54
0531 6002	CONC SIDEWALKS (5")	SY	10
0618 6046	CONDT (PVC) (SCH 80) (2")	LF	15
0618 6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	80
0618 6058	CONDT (PVC) (SCH 80) (4")	LF	35
0618 6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	240
0620 6009	ELEC CONDR (NO.6) BARE	LF	275
0620 6016	ELEC CONDR (NO.2) INSULATED	LF	285
0624 6009	GROUND BOX TY D (162922)	EA	5
0628 6170	ELC SRV TY D 120/240 070(NS)AL(N)SP(O)	EA	1
0668 6072	PREFAB PAV MRK TY C (W) (8") (SLD)	LF	480
0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	306
0668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	8
0680 6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
0682 6001	VEH SIG SEC (12")LED(GRN)	EA	10
0682 6002	VEH SIG SEC (12")LED(GRN ARW)	EA	4
0682 6003	VEH SIG SEC (12")LED(YEL)	EA	10
0682 6004	VEH SIG SEC (12")LED(YEL ARW)	EA	8
0682 6005	VEH SIG SEC (12")LED(RED)	EA	10
0682 6006	VEH SIG SEC (12")LED(RED ARW)	EA	4
0682 6018	PED SIG SEC (LED)(COUNTDOWN)	EA	8
0682 6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	10
0682 6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	4
0684 6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	770
0684 6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	325
0684 6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	250
0684 6017	TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	LF	365
0686 6029	INS TRF SIG PL AM (S)1 ARM(28')	EA	2
0686 6037	INS TRF SIG PL AM(S)1 ARM(36')	EA	1
0686 6045	INS TRF SIG PL AM(S)1 ARM(44')	EA	1
0690 6032	INSTALL OF PEDESTRIAN PUSH BUTTONS	EA	8

US 70 & JOLIET ST. SIGNAL REMOVAL SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0624 6028	REMOVE GROUND BOX	EA	4
0628 6002	REMOVE ELECTRICAL SERVICES	EA	1
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	480
0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	430
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	120
0677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	8
0680 6004	REMOVING TRAFFIC SIGNALS	EA	1
0687 6005	REMOVE PED POLE ASSEMBLY	EA	2

US70 & JOLIET ST. SUMMARY

STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		062



LEGEND

	EXISTING SIGNAL POLE, MAST ARM & FOUNDATION
	EXISTING GROUND BOX
	EXISTING CONDUIT
	CONTROLLER CABINET
	EXISTING SERVICE
	SIGNAL HEAD
	CAMERA
	PED HEADS
	EXISTING POLE
	EXISTING PED POLE
	LUMINAIRE
	EXISTING MAST ARM SIGN
OHL OFOL OFOL	EXISTING OVERHEAD UTILITIES
GL GL UFOL SS	EXISTING UNDERGROUND UTILITIES

STATE OF TEXAS
JEREMY T. DEARING
98218
LICENSED PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

US70 & COLUMBIA ST.
(BI27U)
REMOVAL

N.T.S

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STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		063

DATE: 9/28/2022 2:05:50 PM
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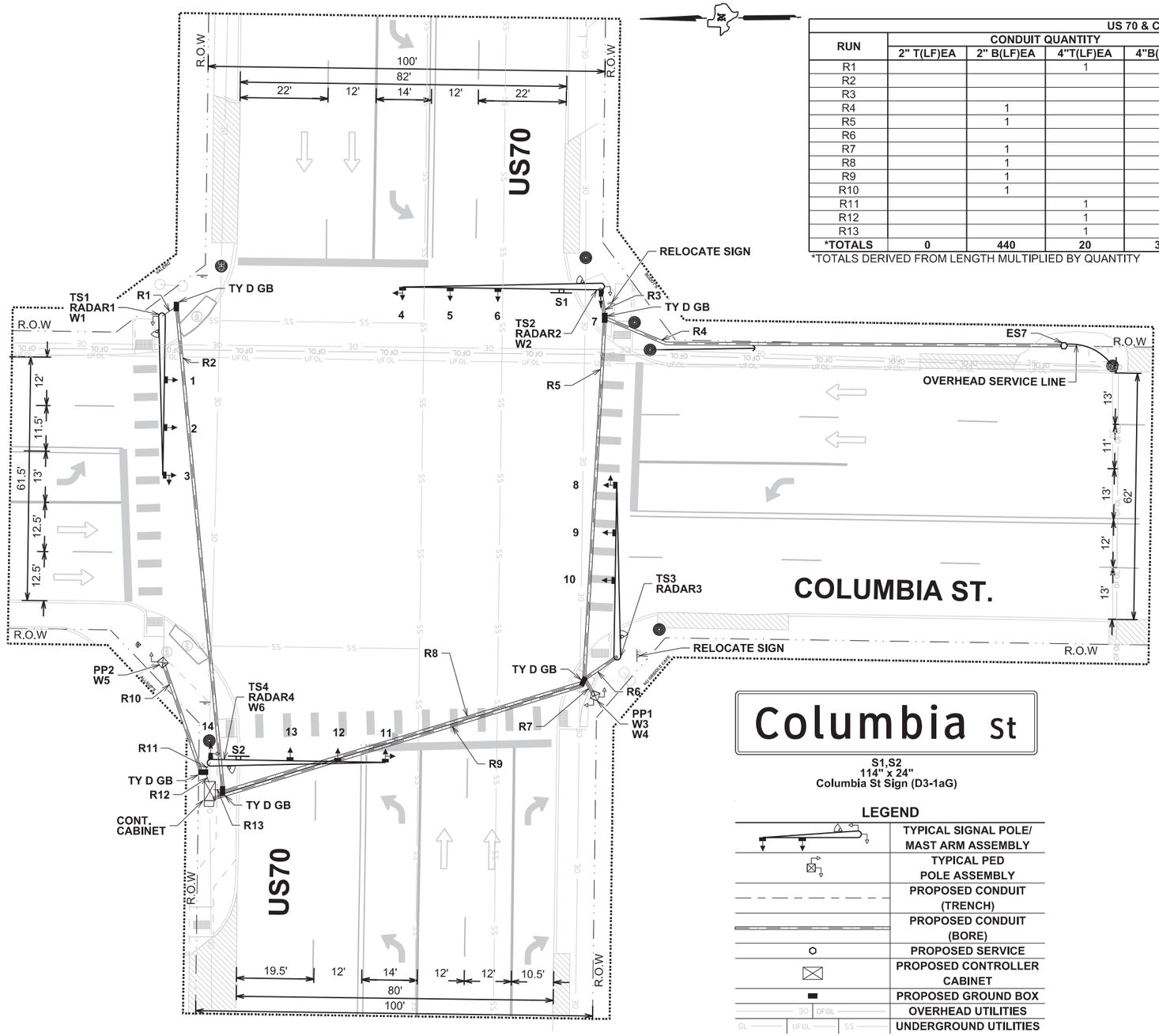


US 70 & COLUMBIA ST. (BI27U) CONDUIT AND CABLE SUMMARY											
RUN	CONDUIT QUANTITY				LENGTH(LF)	CONDUCTOR QUANTITY					
	2" T(LF)EA	2" B(LF)EA	4"T(LF)EA	4"B(LF)EA		1C#2(EA)	4C#12(EA)	7C#12(EA)	12C#12(EA)	#6 BARE(EA)	RADAR(EA)**
R1			1		5		1		1	1	1
R2				1	125		1		1	1	1
R3				1	10		1		1	1	1
R4		1			120	3					
R5		1		1	90	3	1		1	1	1
R6				1	10			1	1	1	1
R7		1			5		2	1		1	
R8		1		1	95		3		2	1	2
R9		1			100	3					
R10		1			30		1	1		1	
R11			1		5		1	1	1	1	1
R12			1		5		2		2	1	1
R13			1		5		4		3	1	3
*TOTALS	0	440	20	330		930	590	50	460	385	455

*TOTALS DERIVED FROM LENGTH MULTIPLIED BY QUANTITY

**RADAR CONDUCTOR WILL BE PROVIDED BY THE STATE

POLE/MAST ARM DETAILS							
POLE NUMBER	MAST ARM LENGTH (LF)	FOUNDATION TYPE	FOUNDATION DEPTH (LF)	4C #12 (LF)	5C #12 (LF)	7C #12 (LF)	RADAR ** (LF)
TS1	40	36-B	15	5	80	70	25
TS2	50	48-A	22	5	115	80	25
TS3	44	36-B	15		90	65	25
TS4	44	36-B	15	5	105	75	25
PP1	-	SCREW-IN	-	10		10	
PP2	-	SCREW-IN	-	5		10	
		TOTALS		15	390	290	100

**RADAR CONDUCTOR WILL BE PROVIDED BY THE STATE

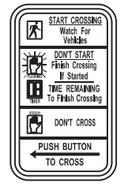
HEAD SCHEDULE						
Signal Head Number	4,11	5,6,12,13	14	7	1,2,9,10	3,8	W1 - W6
Signal Indications (12" LED)	R SY FY G	R Y G	R Y G	R Y G	R Y G	R SY FY G	15
Flash Mode	Y				R		
Reset Mode	G				R		

Columbia st

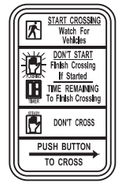
S1,S2
114" x 24"
Columbia St Sign (D3-1aG)

LEGEND

	TYPICAL SIGNAL POLE/ MAST ARM ASSEMBLY
	TYPICAL PED POLE ASSEMBLY
	PROPOSED CONDUIT (TRENCH)
	PROPOSED CONDUIT (BORE)
	PROPOSED SERVICE
	PROPOSED CONTROLLER CABINET
	PROPOSED GROUND BOX
30 OFOL	OVERHEAD UTILITIES
GL UFOL SS	UNDERGROUND UTILITIES



PED SIGN (2 EA)
9" X 15"
With Left Arrow (R10-3e-L)



PED SIGN (4 EA)
9" X 15"
With Right Arrow (R10-3e-R)

Jeremy T. Dearing, P.E.

09/30/2022

ELECTRICAL SERVICE DATA												
ELEC. SERVICE ID	PLAN SHEET NUMBER	ELECTRICAL SERVICE DESCRIPTION	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BKR. POLE/AMPS	LIGHTING CONTACTOR AMPS	PANELBD/ LOADCENTER AMP RATING	BRANCH CIRCUIT ID	BRANCH CKT. BKR. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
ES7	064	ELC SRV TY D 120/240 070(NS)AL(N)SP(O)	2"	3/#2	N/A	2P/60	N/A	100	SIGNAL	1P/50	24	2.9

1. POLE & GROUND BOX LOCATIONS ARE DIAGRAMMATIC AND SHALL BE FIELD VERIFIED BY ENGINEER.
2. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING & VERIFYING ALL UNDERGROUND STRUCTURES & ANY UTILITIES BEFORE MAKING ANY EXCAVATIONS.

US70 & COLUMBIA ST. (BI27U) SIGNAL LAYOUT

N.T.S

Texas Department of Transportation

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STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		064

DATE: 9/28/2022 2:05:52 PM
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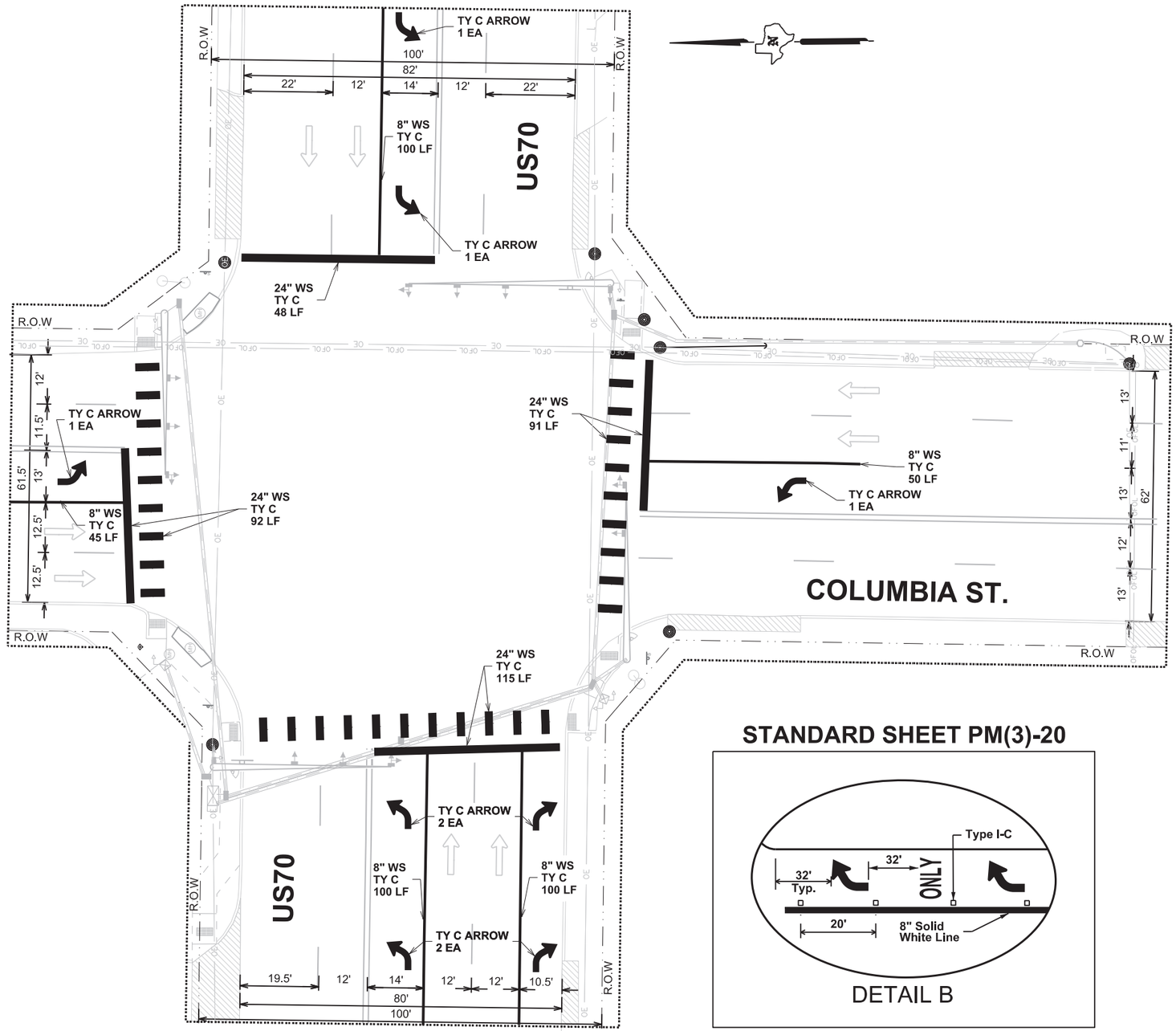
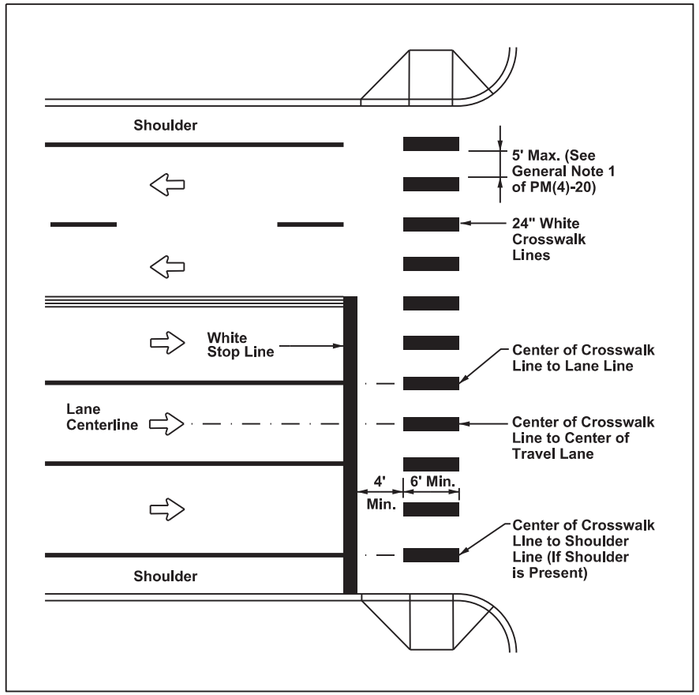


STANDARD SHEET PM(4)-20



STANDARD SHEET PM(3)-20

DETAIL B

STATE OF TEXAS
JEREMY T. DEARING
98218
LICENSED
PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

US70 & COLUMBIA ST.
(BI27U)
PAVEMENT MARKINGS

N.T.S

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STATE	DIST.	COUNTY
TEXAS	LBB	VARIOUS

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR

DATE	FILENAME	SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES	065

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US 70 & COLUMBIA ST. (BI27U) SIGNAL INSTALLATION SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0416 6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	45
0416 6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF	22
0618 6046	CONDT (PVC) (SCH 80) (2")	LF	0
0618 6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	440
0618 6058	CONDT (PVC) (SCH 80) (4")	LF	20
0618 6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	330
0620 6009	ELEC CONDR (NO.6) BARE	LF	385
0620 6016	ELEC CONDR (NO.2) INSULATED	LF	930
0624 6009	GROUND BOX TY D (162922)	EA	5
0628 6170	ELC SRV TY D 120/240 070(NS)AL(N)SP(O)	EA	1
0644 6070	RELOCATE SM RD SN SUP&AM TY S80	EA	2
0668 6072	PREFAB PAV MRK TY C (W) (8") (SLD)	LF	395
0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	346
0668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	8
0680 6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
0682 6001	VEH SIG SEC (12")LED(GRN)	EA	9
0682 6002	VEH SIG SEC (12")LED(GRN ARW)	EA	5
0682 6003	VEH SIG SEC (12")LED(YEL)	EA	9
0682 6004	VEH SIG SEC (12")LED(YEL ARW)	EA	9
0682 6005	VEH SIG SEC (12")LED(RED)	EA	9
0682 6006	VEH SIG SEC (12")LED(RED ARW)	EA	5
0682 6018	PED SIG SEC (LED)(COUNTDOWN)	EA	6
0682 6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	10
0682 6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	4
0684 6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	605
0684 6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	390
0684 6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	340
0684 6017	TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	LF	460
0686 6041	INS TRF SIG PL AM(S)1 ARM(40')	EA	1
0686 6045	INS TRF SIG PL AM(S)1 ARM(44')	EA	2
0686 6053	INS TRF SIG PL AM(S)1 ARM(50')	EA	1
0687 6001	PED POLE ASSEMBLY	EA	2
0690 6032	INSTALL OF PEDESTRIAN PUSH BUTTONS	EA	6

US 70 & COLUMBIA ST. (BI27U) SIGNAL REMOVAL SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0624 6028	REMOVE GROUND BOX	EA	4
0628 6002	REMOVE ELECTRICAL SERVICES	EA	1
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	395
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	170
0677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	4
0680 6004	REMOVING TRAFFIC SIGNALS	EA	1

US70 & COLUMBIA ST. (BI27U) SUMMARY

STATE		DIST.	COUNTY
TEXAS		LBB	VARIOUS
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE		FILENAME	SHEET NO.
9/28/2022		2022 TRF SIGNAL UPGRADES	066

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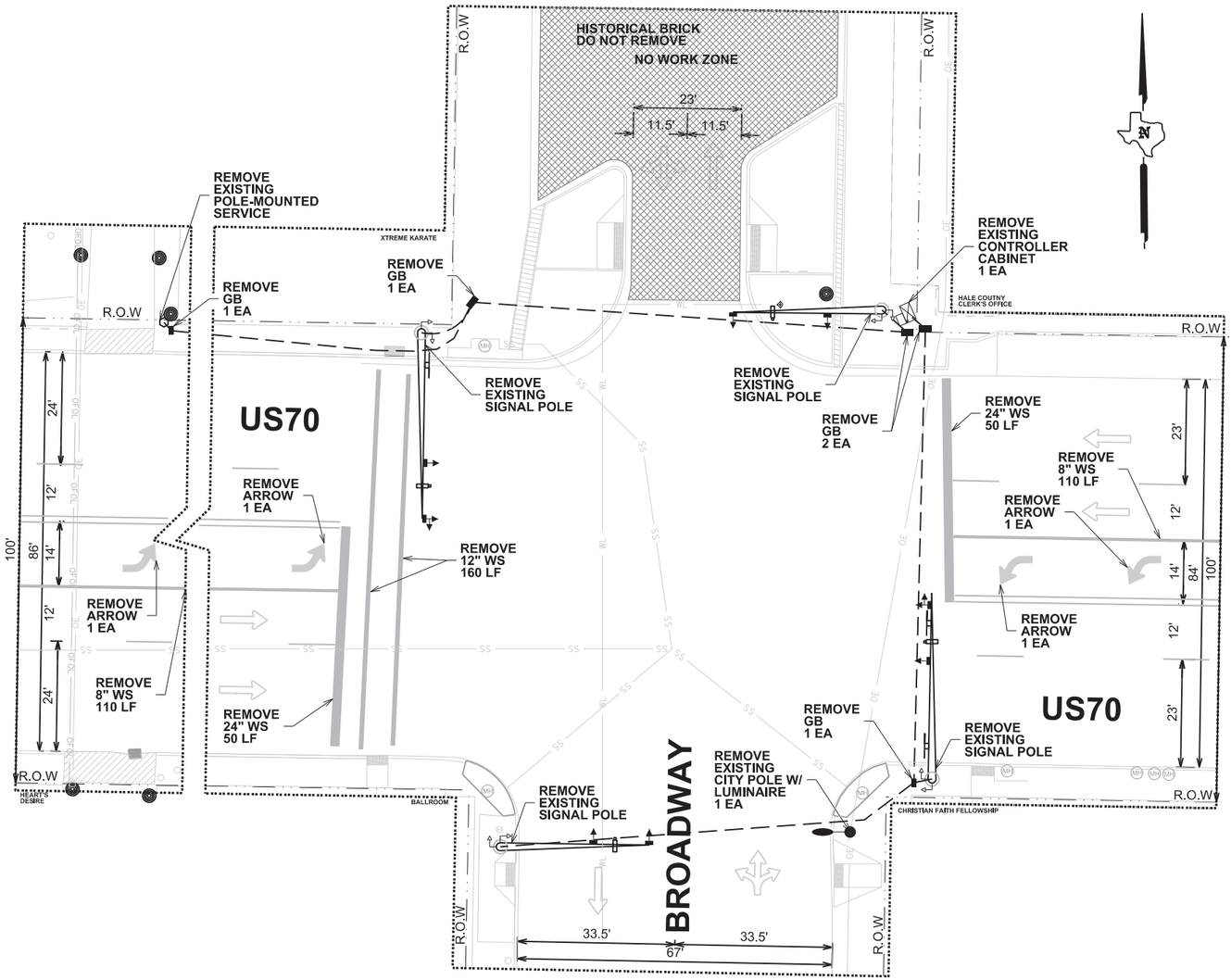

LEGEND

	EXISTING SIGNAL POLE, MAST ARM & FOUNDATION
	EXISTING GROUND BOX
	EXISTING CONDUIT
	CONTROLLER CABINET
	EXISTING SERVICE
	SIGNAL HEAD
	CAMERA
	PED HEADS
	EXISTING POLE
	EXISTING PED POLE
	LUMINAIRE
	EXISTING MAST ARM SIGN
OE — OFOL — OFOL	EXISTING OVERHEAD UTILITIES
WL — UFOL — SS	EXISTING UNDERGROUND UTILITIES

STATE OF TEXAS
JEREMY T. DEARING
98218
LICENSED PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

N.T.S

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Texas Department of Transportation

US70 & BROADWAY REMOVAL

STATE	DIST.	COUNTY
TEXAS	LBB	VARIOUS

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR

DATE	FILENAME	SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES	067

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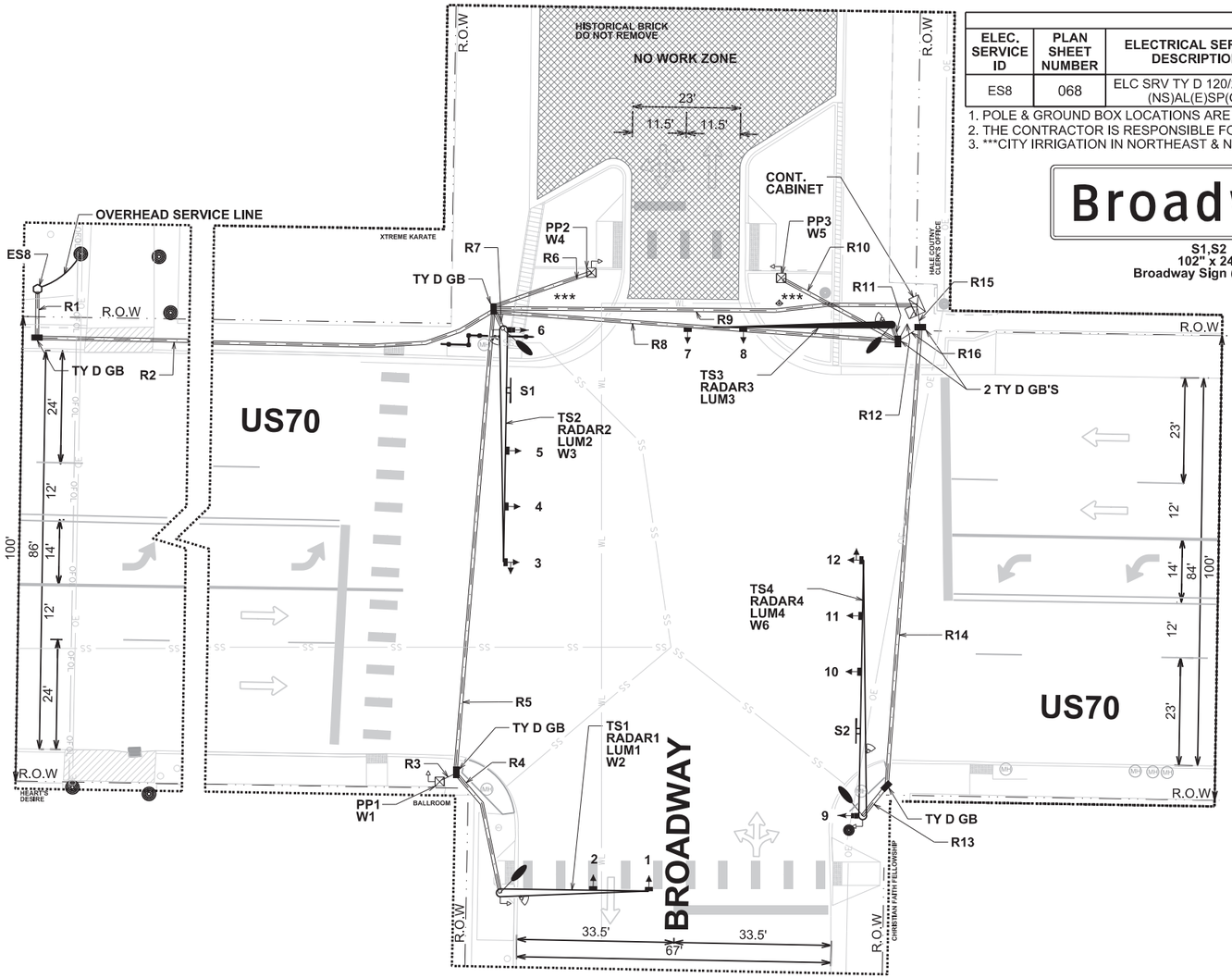


ELECTRICAL SERVICE DATA											
ELEC. SERVICE ID	PLAN SHEET NUMBER	ELECTRICAL SERVICE DESCRIPTION	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BKR. POLE/AMPS	LIGHTING CONTACTOR AMPS	PANELBD/ LOADCENTER AMP RATING	BRANCH CIRCUIT ID	BRANCH CKT. BKR. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
ES8	068	ELC SRV TY D 120/240 070 (NS)AL(E)SP(O)	2"	3/#2	N/A	2P/60	N/A	100	SIGNAL	1P/50	24	3.3
									ILLUMINATION	2P/15	1.68	

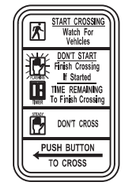
1. POLE & GROUND BOX LOCATIONS ARE DIAGRAMMATIC AND SHALL BE FIELD VERIFIED BY ENGINEER.
2. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING & VERIFYING ALL UNDERGROUND STRUCTURES & ANY UTILITIES BEFORE MAKING ANY EXCAVATIONS.
3. ***CITY IRRIGATION IN NORTHEAST & NORTHWEST CORNER BULBOUTS. CONTACT CITY OF PLAINVIEW FOR APPROXIMATE LOCATIONS.

Broadway

S1,S2
102" x 24"
Broadway Sign (D3-1aG)

POLE/MAST ARM DETAILS								
POLE NUMBER	MAST ARM LENGTH (LF)	FOUNDATION TYPE	FOUNDATION DEPTH (LF)	1C #8 (LF)	4C #12 (LF)	5C #12 (LF)	7C #12 (LF)	RADAR ** (LF)
TS1	32	36-A	13	135	5	90	10	25
TS2	50	48-A	22	135	5	115	80	25
TS3	44	36-B	15	135		115		25
TS4	55	48-A	22	135	5	125	85	25
PP1	-	SCREW-IN	-		5		10	
PP2	-	SCREW-IN	-		5		10	
PP3	-	SCREW-IN	-		5		10	
		TOTALS		540	30	445	205	100

**RADAR CONDUCTOR WILL BE PROVIDED BY THE STATE



PED SIGN (4 EA)
9" X 15"
With Left Arrow (R10-3e-L)

PED SIGN (2 EA)
9" X 15"
With Right Arrow (R10-3e-R)

HEAD SCHEDULE					
Signal Head Number	3,12	4,5,10,11	6,9	1,2,7,8	W1 - W5
Signal Indications (12" LED)	R SY FY G	R Y G	R Y G	R Y G	
Flash Mode	Y			R	
Reset Mode	G			R	

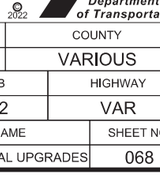
LEGEND

	TYPICAL SIGNAL POLE/ MAST ARM ASSEMBLY
	TYPICAL PED POLE ASSEMBLY
	PROPOSED CONDUIT (TRENCH)
	PROPOSED CONDUIT (BORE)
	PROPOSED SERVICE
	PROPOSED CONTROLLER CABINET
	PROPOSED GROUND BOX
OE OFOL	OVERHEAD UTILITIES
GL UFOL SS WL	UNDERGROUND UTILITIES

US 70 & BROADWAY CONDUIT AND CABLE SUMMARY												
RUN	CONDUIT QUANTITY				LENGTH(LF)	CONDUCTOR QUANTITY						
	2" T(LF)EA	2" B(LF)EA	4"T(LF)EA	4"B(LF)EA		1C#2(EA)	1C#8(EA)	4C#12(EA)	7C#12(EA)	12C#12(EA)	#6 BARE(EA)	RADAR(EA)**
R1		2			10	3	3					
R2		2			180	3	3					
R3	1				5			1	1			
R4				1	30		3	1	1	1	1	1
R5		1		1	100		3	2		1	1	1
R6		1			20			1	1			
R7		1		1	5		3	1	2	1	1	1
R8		1		1	90		3	4		2	1	2
R9		1			90	3						
R10		1			30			1	1			
R11		1		1	5		3		1	1	1	1
R12	1		1		10		3	6		3	1	3
R13		1		1	10		3	1	2	1	1	1
R14		1		1	105		3	2		1	1	1
R15			1		5			2		1	1	1
R16	1				5		3					
***TOTALS**	**20**	**835**	**15**	**345**		**840**	**1,650**	**940**	**120**	**470**	**360**	**470**

*TOTALS DERIVED FROM LENGTH MULTIPLIED BY QUANTITY

**RADAR CONDUCTOR WILL BE PROVIDED BY THE STATE



Jeremy T. Dearing, P.E.

09/30/2022

US70 & BROADWAY SIGNAL LAYOUT

N.T.S

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STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/29/2022	2022 TRF SIGNAL UPGRADES		068

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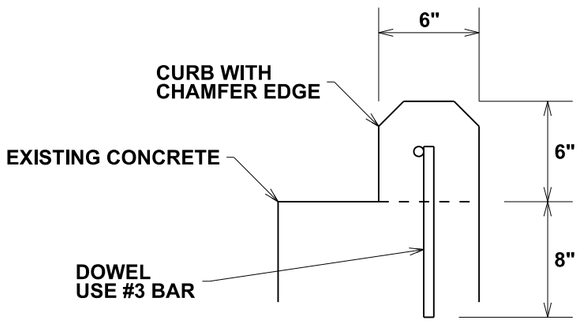

CURB DETAIL

NOTE:
DRILLING FOR DOWELING WILL BE INTO EXISTING SIDEWALK AND POSSIBLY INLET. UTILIZE TXDOT APPROVED TYPE III EPOXIES AS SPECIFIED IN DMS - 6100. DOWELED HOLE MUST BE FILLED WITH EPOXY BEFORE REBAR IS INSERTED. DOWELING WILL BE SUBSIDARY TO ITEM 529 - 6011.

US70 & BROADWAY ADA SUMMARY			
ITEM	DESCRIPTION	UNITS	QUANTITY
0450 6048	RAIL (HANDRAIL)(TY B)	LF	15
0529 6011	CONC CURB (DOWEL)	LF	7

3. ***CITY IRRIGATION IN NORTHEAST & NORTHWEST CORNER BULBOUTS. CONTACT CITY OF PLAINVIEW FOR APPROXIMATE LOCATIONS.

STATE OF TEXAS
HEATH C. BOZEMAN
97467
LICENSED
PROFESSIONAL ENGINEER

Heath C. Bozeman, P.E.

9/29/2022

US70 & BROADWAY
NW CORNER
HANDRAIL DETAIL

N.T.S

Texas Department of Transportation

STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/29/2022	2022 TRF SIGNAL UPGRADES		069

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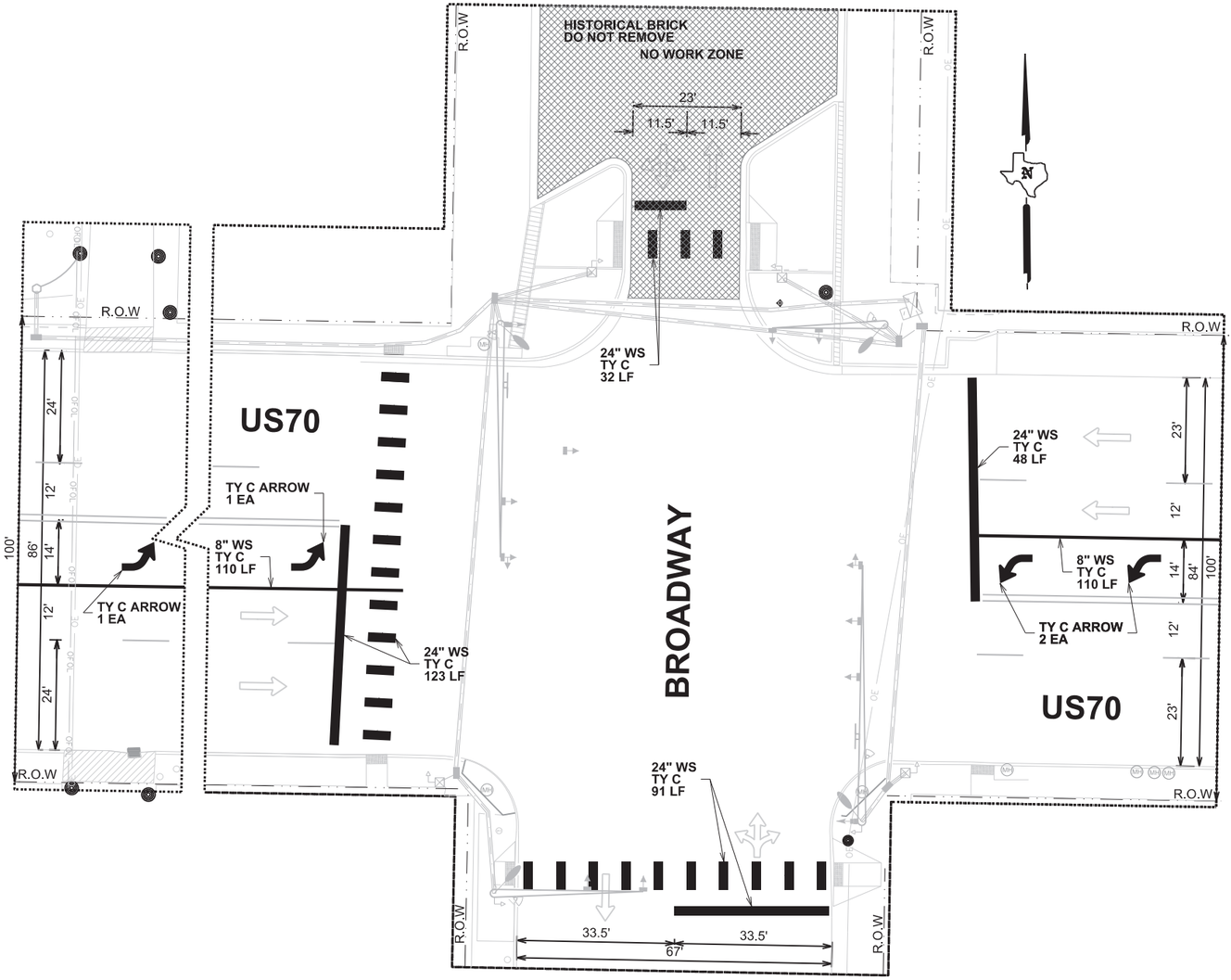
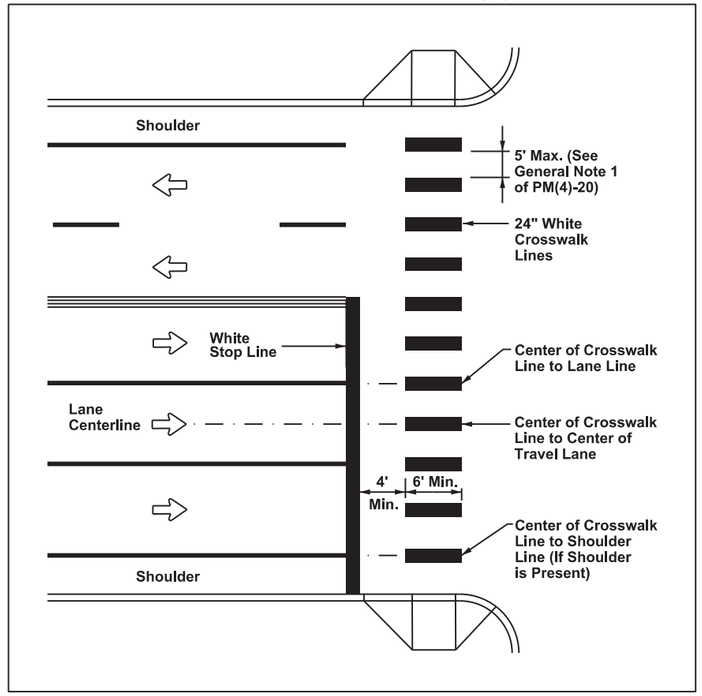
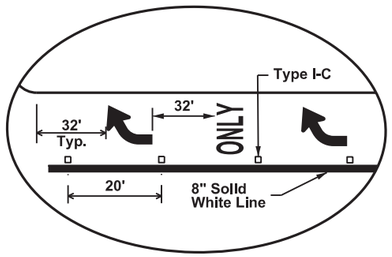


STANDARD SHEET PM(4)-20



STANDARD SHEET PM(3)-20



DETAIL B

STATE OF TEXAS
JEREMY T. DEARING
98218
LICENSED PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

US70 & BROADWAY
PAVEMENT MARKINGS

N.T.S

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STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		070

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US 70 & BROADWAY SIGNAL INSTALLATION SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0416 6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	28
0416 6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF	44
0618 6046	CONDT (PVC) (SCH 80) (2")	LF	20
0618 6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	835
0618 6058	CONDT (PVC) (SCH 80) (4")	LF	15
0618 6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	345
0620 6008	ELEC CONDR (NO.8) INSULATED	LF	2,190
0620 6009	ELEC CONDR (NO.6) BARE	LF	360
0620 6016	ELEC CONDR (NO.2) INSULATED	LF	840
0624 6009	GROUND BOX TY D (162922)	EA	6
0628 6165	ELC SRV TY D 120/240 070(NS)AL(E)SP(O)	EA	1
0668 6072	PREFAB PAV MRK TY C (W) (8") (SLD)	LF	220
0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	294
0668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	4
0680 6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
0682 6001	VEH SIG SEC (12")LED(GRN)	EA	10
0682 6002	VEH SIG SEC (12")LED(GRN ARW)	EA	2
0682 6003	VEH SIG SEC (12")LED(YEL)	EA	10
0682 6004	VEH SIG SEC (12")LED(YEL ARW)	EA	4
0682 6005	VEH SIG SEC (12")LED(RED)	EA	10
0682 6006	VEH SIG SEC (12")LED(RED ARW)	EA	2
0682 6018	PED SIG SEC (LED)(COUNTDOWN)	EA	8
0682 6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	10
0682 6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	2
0684 6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	970
0684 6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	445
0684 6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	325
0684 6017	TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	LF	470
0686 6035	INS TRF SIG PL AM(S)1 ARM(32')LUM	EA	1
0686 6047	INS TRF SIG PL AM(S)1 ARM(44')LUM	EA	1
0686 6055	INS TRF SIG PL AM(S)1 ARM(50')LUM	EA	1
0686 6059	INS TRF SIG PL AM(S)1 ARM(55')LUM	EA	1
0687 6001	PED POLE ASSEMBLY	EA	4
0690 6032	INSTALL OF PEDESTRIAN PUSH BUTTONS	EA	6

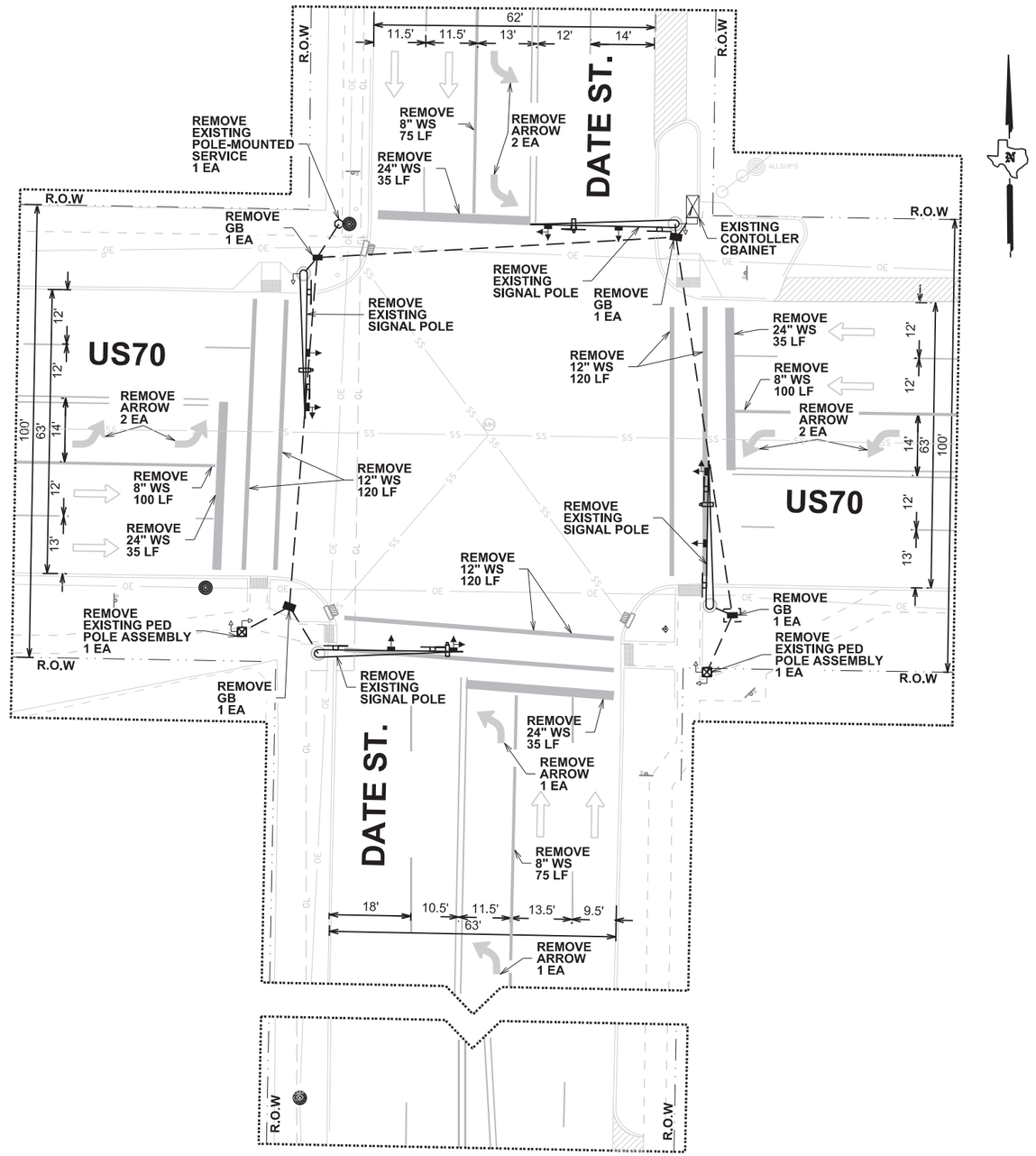
US 70 & BROADWAY SIGNAL REMOVAL SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0610 6007	REMOVE RD IL ASM (SHOE-BASE)	EA	1
0624 6028	REMOVE GROUND BOX	EA	5
0628 6002	REMOVE ELECTRICAL SERVICES	EA	1
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	220
0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	160
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	100
0677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	4
0680 6004	REMOVING TRAFFIC SIGNALS	EA	1

US70 & BROADWAY SUMMARY

STATE	DIST.	COUNTY
TEXAS	LBB	VARIOUS

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR

DATE	FILENAME	SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES	071



LEGEND

	EXISTING SIGNAL POLE, MAST ARM & FOUNDATION
	EXISTING GROUND BOX
	EXISTING CONDUIT
	CONTROLLER CABINET
	EXISTING SERVICE
	SIGNAL HEAD
	CAMERA
	PED HEADS
	EXISTING POLE
	EXISTING PED POLE
	LUMINAIRE
	EXISTING MAST ARM SIGN
OE — OFOL — OFOL	EXISTING OVERHEAD UTILITIES
GL — GL — UFOL — SS	EXISTING UNDERGROUND UTILITIES

STATE OF TEXAS
JEREMY T. DEARING
98218
LICENSED PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

US70 & DATE ST.
(FM400)
REMOVAL

Texas Department of Transportation

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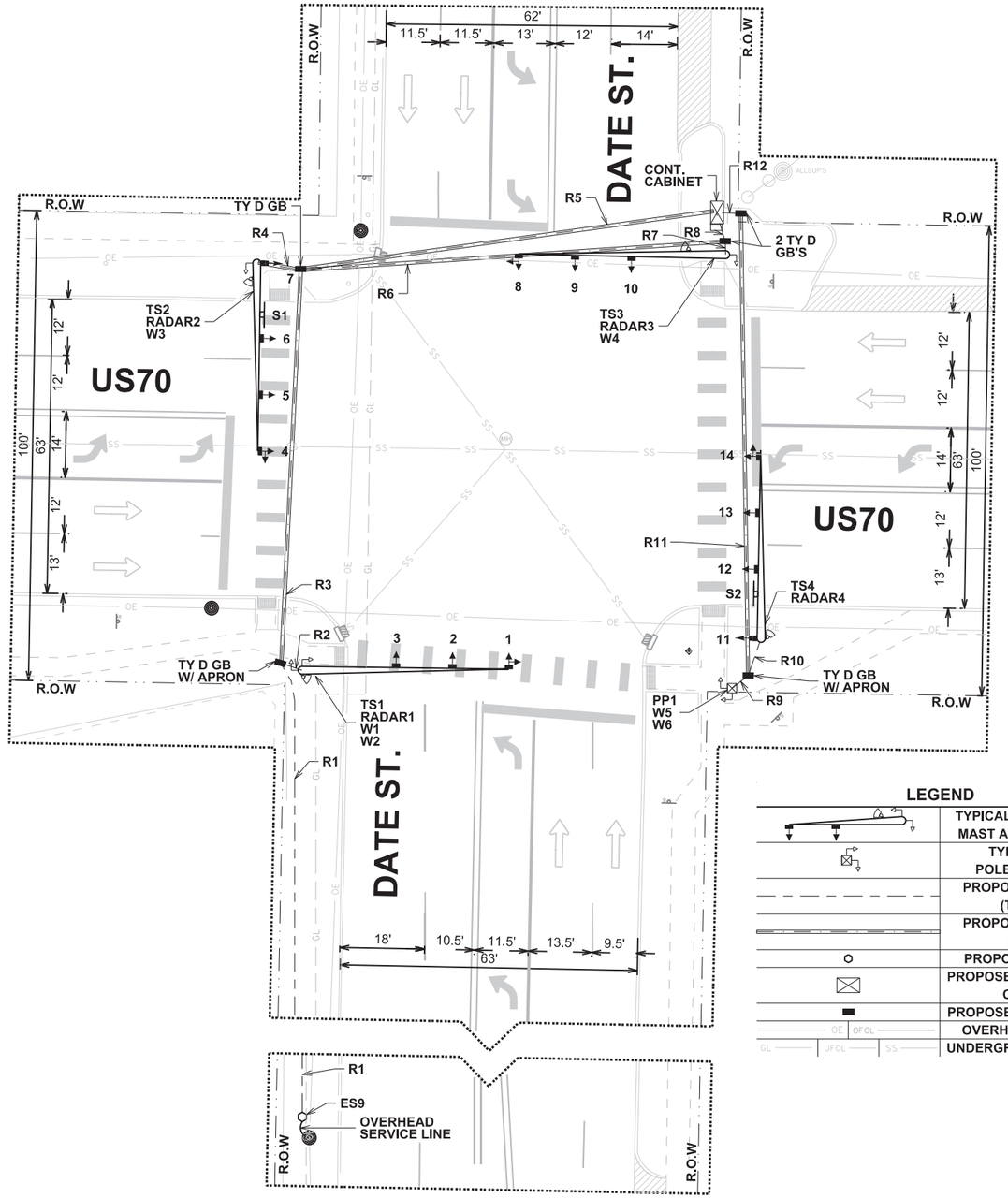
STATE	DIST.	COUNTY
TEXAS	LBB	VARIOUS

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR

DATE	FILENAME	SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES	072

DATE: 9/28/2022 2:06:11 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\090500112\4 - Design\Plan Set\8. Traffic\9. US70 & DATE\072.073 US70 & DATE ST. (FM400) REMOVAL & SIGNAL LAYOUT.dgn



US 70 & DATE ST. (FM400) CONDUIT AND CABLE SUMMARY											
RUN	CONDUIT QUANTITY				LENGTH(LF)	CONDUCTOR QUANTITY					
	2" T(LF)EA	2" B(LF)EA	4"T(LF)EA	4"B(LF)EA		1C#2(EA)	4C#12(EA)	7C#12(EA)	12C#12(EA)	#6 BARE(EA)	RADAR(EA)**
R1	1				185	3					
R2			1		5		2		1	1	1
R3		1		1	85	3	2		1	1	1
R4				1	10		1		1	1	1
R5		1			90	3					
R6				1	90		3		2	1	2
R7			1		5		1		1	1	1
R8			1		5		4		3	1	3
R9	1				5		2	1			
R10			1		10			1	1	1	1
R11				1	100		2		1	1	1
R12			1		5		2		1	1	1
*TOTALS	190	175	30	285		1,080	705	15	415	315	415

*TOTALS DERIVED FROM LENGTH MULTIPLIED BY QUANTITY

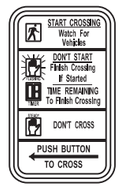
**RADAR CONDUCTOR WILL BE PROVIDED BY THE STATE

Date St

S1,S2
72" x 24"
Date St Sign (D3-1aG)

POLE/MAST ARM DETAILS							
POLE NUMBER	MAST ARM LENGTH (LF)	FOUNDATION TYPE	FOUNDATION DEPTH (LF)	4C #12 (LF)	5C #12 (LF)	7C #12 (LF)	RADAR ** (LF)
TS1	44	36-B	15	10	90	75	25
TS2	40	36-B	15	5	95	70	25
TS3	44	36-B	15	5	90	75	25
TS4	40	36-B	15		95	70	25
PP1	-	SCREW-IN	-	10		10	
		TOTALS		20	370	290	100

**RADAR CONDUCTOR WILL BE PROVIDED BY THE STATE

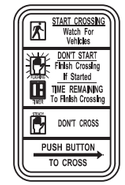


PED SIGN (5 EA)
9" X 15"
With Left Arrow (R10-3e-L)

HEAD SCHEDULE						
Signal Head Number	4,14	5,6,12,13	7,11	1,8	2,3,9,10	W1 - W6
Signal Indications (12" LED)	R SY FY G	R Y G	R Y G	R SY FY G	R Y G	
Flash Mode	Y			R		
Reset Mode	G			R		

LEGEND

	TYPICAL SIGNAL POLE/ MAST ARM ASSEMBLY
	TYPICAL PED POLE ASSEMBLY
	PROPOSED CONDUIT (TRENCH)
	PROPOSED CONDUIT (BORE)
	PROPOSED SERVICE
	PROPOSED CONTROLLER CABINET
	PROPOSED GROUND BOX
OE OFOL	OVERHEAD UTILITIES
GL UFOL SS	UNDERGROUND UTILITIES



PED SIGN (1 EA)
9" X 15"
With Right Arrow (R10-3e-R)

ELECTRICAL SERVICE DATA												
ELEC. SERVICE ID	PLAN SHEET NUMBER	ELECTRICAL SERVICE DESCRIPTION	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO./SIZE	SAFETY SWITCH AMPS	MAIN CKT. BKR. POLE/AMPS	LIGHTING CONTACTOR AMPS	PANELBD/ LOADCENTER AMP RATING	BRANCH CIRCUIT ID	BRANCH CKT. BKR. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
ES9	073	ELC SRV TY D 120/240 070(NS)AL(N)SP(O)	2"	3/#2	N/A	2P/60	N/A	100	SIGNAL	1P/50	24	2.9

1. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING & VERIFYING ALL UNDERGROUND STRUCTURES & ANY UTILITIES BEFORE MAKING ANY EXCAVATIONS.
2. POLE & GROUND BOX LOCATIONS ARE DIAGRAMMATIC AND SHALL BE FIELD VERIFIED BY ENGINEER.

STATE OF TEXAS
JEREMY T. DEARING
98218
LICENSED
PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

US70 & DATE ST.
(FM400)
SIGNAL LAYOUT

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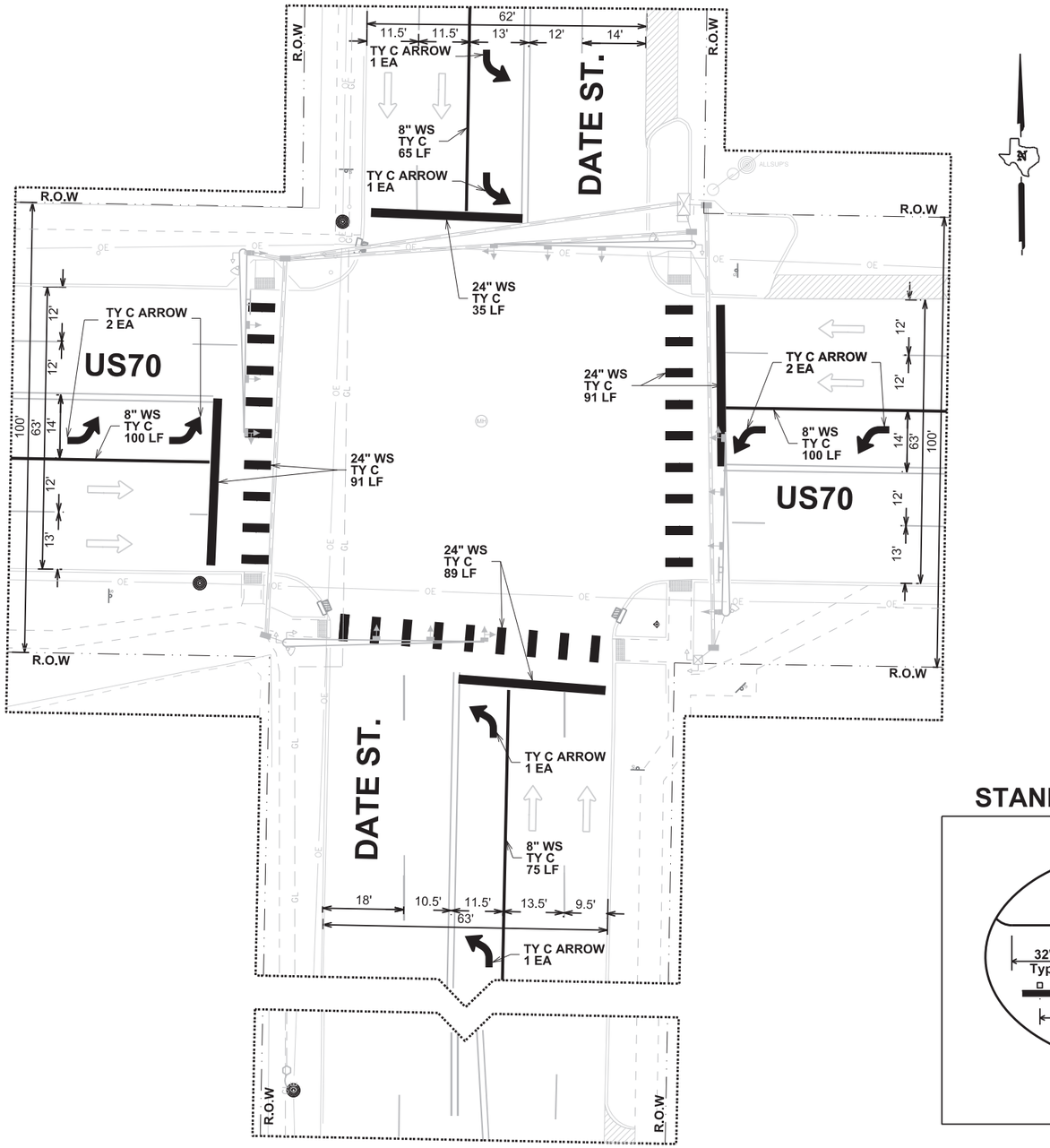
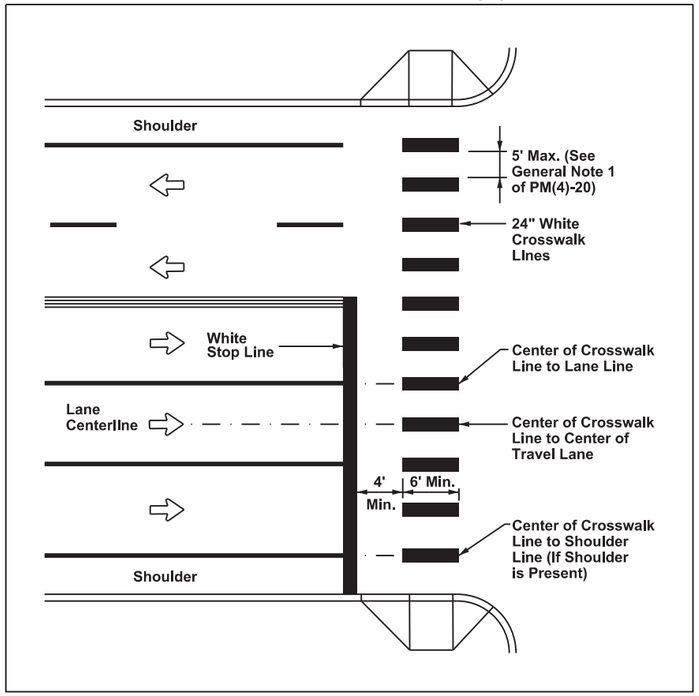
STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		073

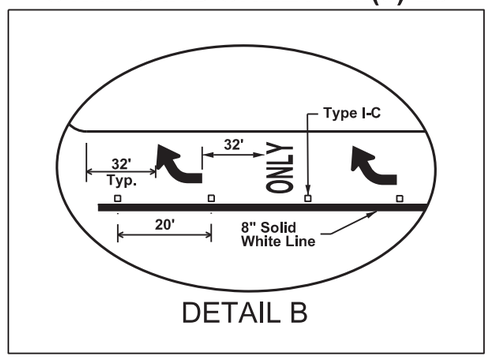
DATE: 9/28/2022 2:06:13 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\0905001\2\4 - Design\Plan Set\8. Traffic\9. US70 & DATE\072,073 US70 & DATE ST. (FM400) REMOVAL & SIGNAL LAYOUT.dgn



STANDARD SHEET PM(4)-20



STANDARD SHEET PM(3)-20



DETAIL B

STATE OF TEXAS
JEREMY T. DEARING
98218
LICENSED PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

US70 & DATE ST.
(FM400)
PAVEMENT MARKINGS

N.T.S

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STATE	DIST.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME		SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES		074

DATE: 9/28/2022 2:06:15 PM
FILE: pw:\\lbxdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\0905001124 - Design\Plan Set\8. Traffic\9. US70 & DATE\074 US70 & DATE ST. (FM400) PAVEMENT PARKINGS.dgn

US 70 & DATE ST. (FM400) SIGNAL INSTALLATION SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0416 6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	60
0618 6046	CONDT (PVC) (SCH 80) (2")	LF	190
0618 6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	175
0618 6058	CONDT (PVC) (SCH 80) (4")	LF	30
0618 6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	285
0620 6009	ELEC CONDR (NO.6) BARE	LF	315
0620 6016	ELEC CONDR (NO.2) INSULATED	LF	1,080
0624 6009	GROUND BOX TY D (162922)	EA	3
0624 6010	GROUND BOX TY D (162922)W/APRON	EA	2
0628 6170	ELC SRV TY D 120/240 070(NS)AL(N)SP(O)	EA	1
0668 6072	PREFAB PAV MRK TY C (W) (8") (SLD)	LF	340
0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	306
0668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	8
0680 6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1
0682 6001	VEH SIG SEC (12")LED(GRN)	EA	9
0682 6002	VEH SIG SEC (12")LED(GRN ARW)	EA	5
0682 6003	VEH SIG SEC (12")LED(YEL)	EA	9
0682 6004	VEH SIG SEC (12")LED(YEL ARW)	EA	9
0682 6005	VEH SIG SEC (12")LED(RED)	EA	9
0682 6006	VEH SIG SEC (12")LED(RED ARW)	EA	5
0682 6018	PED SIG SEC (LED)(COUNTDOWN)	EA	6
0682 6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	10
0682 6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	4
0684 6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	725
0684 6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	370
0684 6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	305
0684 6017	TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	LF	415
0686 6041	INS TRF SIG PL AM(S)1 ARM(40')	EA	2
0686 6045	INS TRF SIG PL AM(S)1 ARM(44')	EA	2
0687 6001	PED POLE ASSEMBLY	EA	1
0690 6032	INSTALL OF PEDESTRIAN PUSH BUTTONS	EA	6

US 70 & DATE ST. (FM400) SIGNAL REMOVAL SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0624 6028	REMOVE GROUND BOX	EA	4
0628 6002	REMOVE ELECTRICAL SERVICES	EA	1
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	340
0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	360
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	140
0677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	8
0680 6004	REMOVING TRAFFIC SIGNALS	EA	1
0687 6005	REMOVE PED POLE ASSEMBLY	EA	2

US70 & DATE ST. (FM400) SUMMARY

STATE	DIST.	COUNTY
TEXAS	LBB	VARIOUS
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DATE	FILENAME	SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES	075

DATE: 9/28/2022 2:06:18 PM
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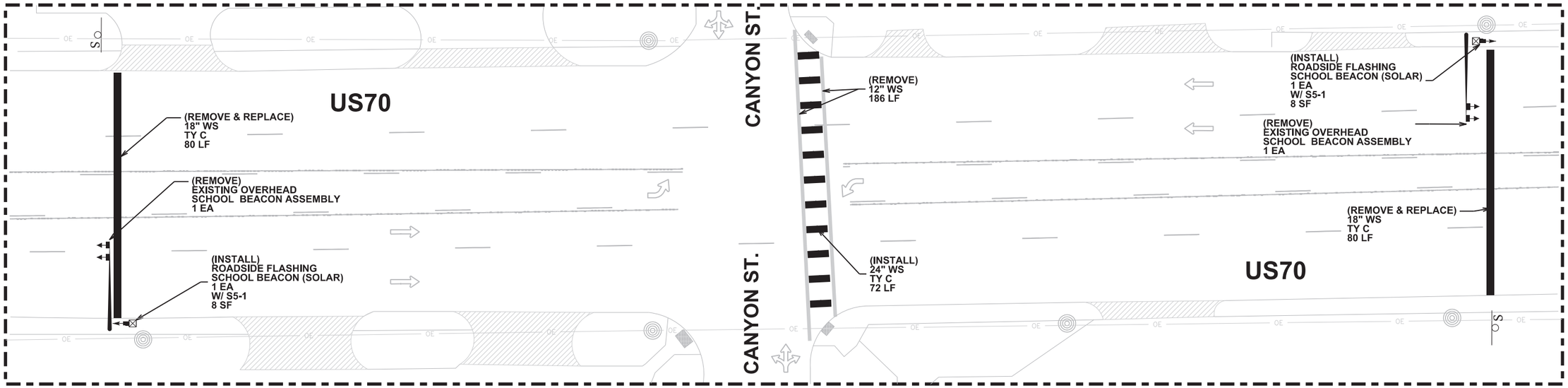
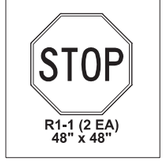
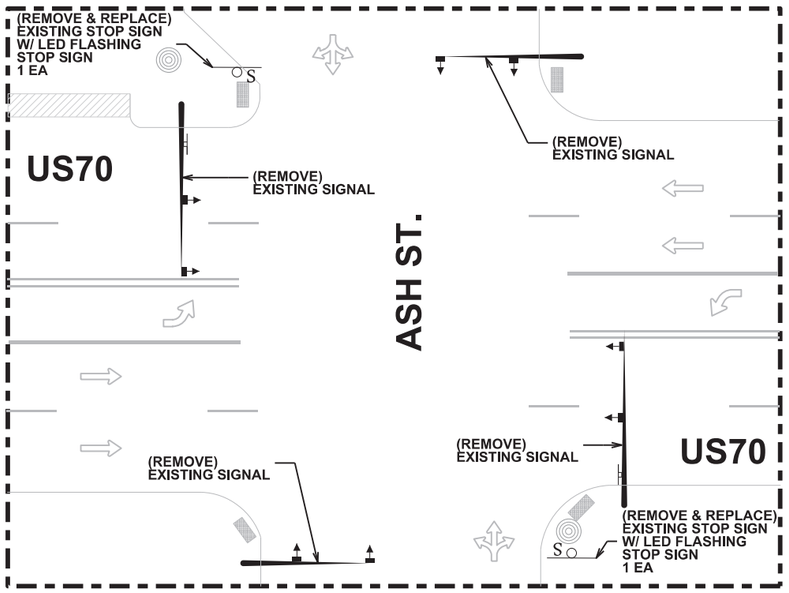


S5-1 (2 EA)
24" x 48"



R1-1 (2 EA)
48" x 48"

US 70 & CANYON ST. SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0620 6004	ELEC CONDR (NO.12) INSULATED	LF	20
0636 6001	ALUMINUM SIGNS (TY A)	SF	16
0668 6075	PREFAB PAV MRK TY C (W) (18") (SLD)	LF	160
0668 6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	72
0677 6005	ELIM EXT PAV MRK & MRKS (12")	LF	186
0677 6006	ELIM EXT PAV MRK & MRKS (18")	LF	160
0680 6004	REMOVING TRAFFIC SIGNALS	EA	1
0682 6003	VEH SIG SEC (12")LED(YEL)	EA	4
0685 6004	INSTL RDSD FLSH BCN ASSM (SOLAR PWRD)	EA	2



LEGEND

	EXISTING SIGNAL POLE/ BEACON ASSEMBLY
OE	EXISTING OVERHEAD UTILITY
	EXISTING POLE
S	EXISTING SIGN
	PROPOSED ROADSIDE FLASHING BEACON ASSEMBLY

US 70 & ASH ST. SUMMARY			
ITEM NO.	DESCRIPTION	UNITS	QUANTITY
0620 6004	ELEC CONDR (NO.12) INSULATED	LF	10
0636 6001	ALUMINUM SIGNS (TY A)	SF	32
0644 6040	IN SM RD SN SUP&AM TYS80(1)SB(P-BM)	EA	2
0644 6076	REMOVE SM RD SN SUP&AM	EA	2
0680 6004	REMOVING TRAFFIC SIGNALS	EA	1
6227 6001	SOLAR POWERED LED WARNING SIGN	EA	2

Jeremy T. Dearing, P.E.

09/30/2022

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US70
CANYON ST. & ASH ST.

STATE	DIST.	COUNTY
TEXAS	LBB	VARIOUS

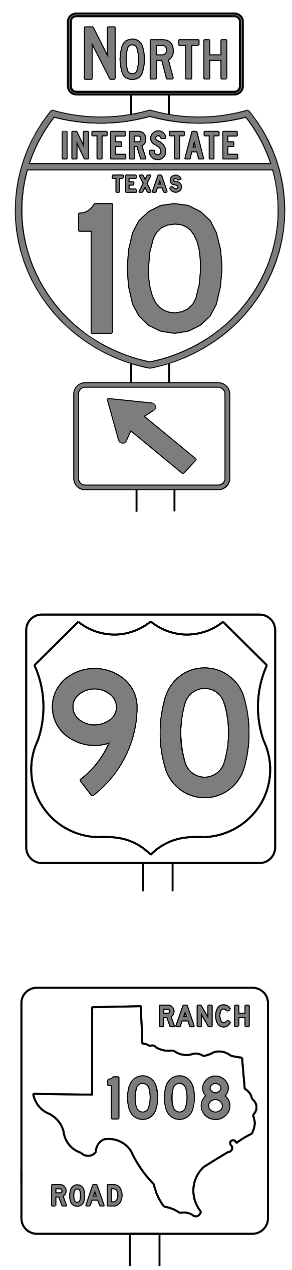
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR

DATE	FILENAME	SHEET NO.
9/28/2022	2022 TRF SIGNAL UPGRADES	076

DATE: 9/28/2022 2:06:22 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\0905001124 - Design\Plan Set\8. Traffic\10. US70 & CANYON & ASH\076 US70 CANYON & ASH.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

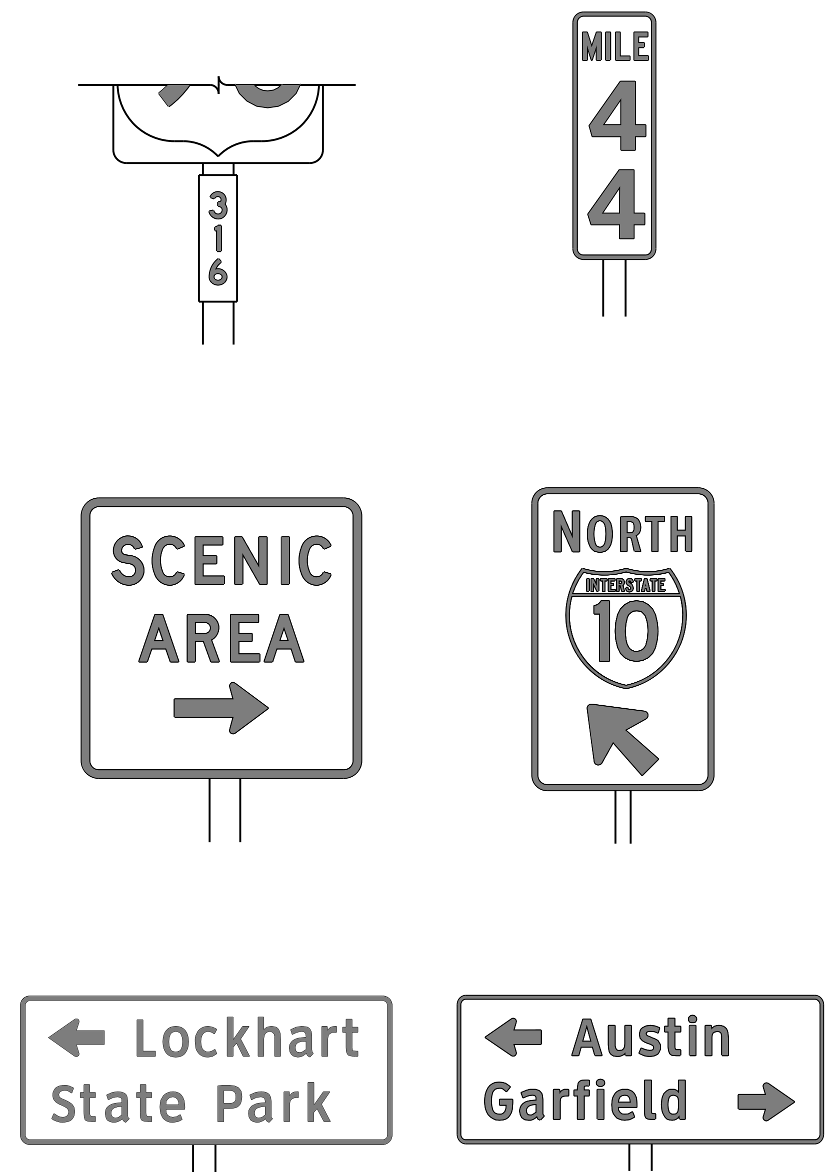
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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/

Texas Department of Transportation

Traffic Operations Division Standard

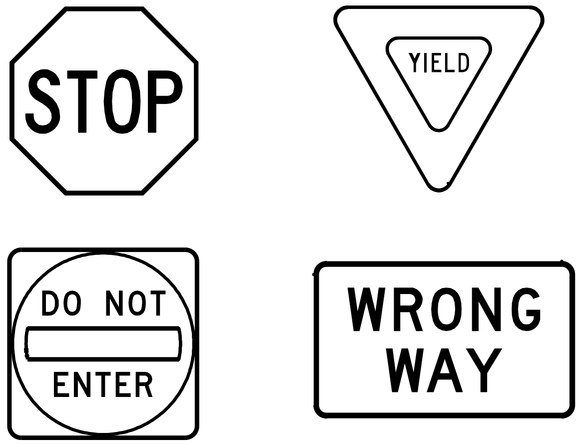
TYPICAL SIGN REQUIREMENTS

TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	00	112	VAR
12-03 7-13 9-08	DIST		COUNTY	SHEET NO.
	LBB		VARIOUS	077

3

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS
(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

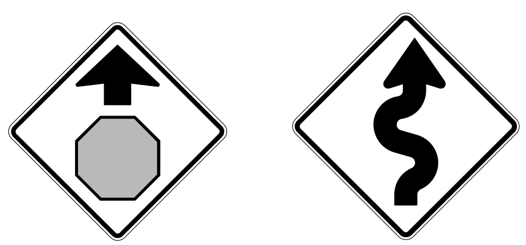
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS
(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

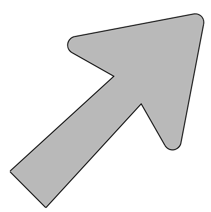
TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-03 7-13 9-08	0905	00	112	VAR
	DIST		COUNTY	SHEET NO.
	LBB		VARIOUS	078

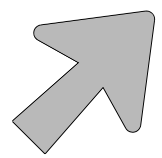
4

ARROW DETAILS

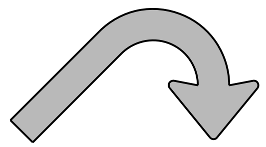
for Large Ground-Mounted and Overhead Guide Signs



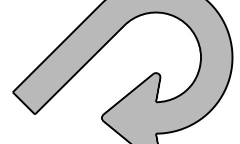
Type A



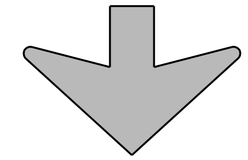
Type B



E-3



E-4



Down Arrow

TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

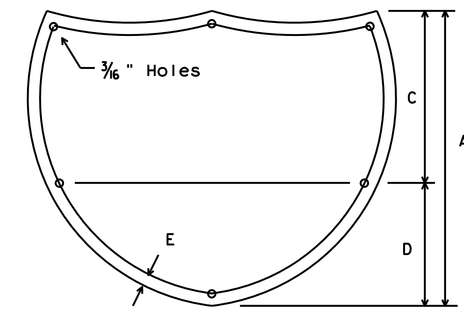
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

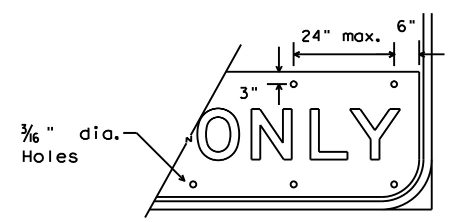
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

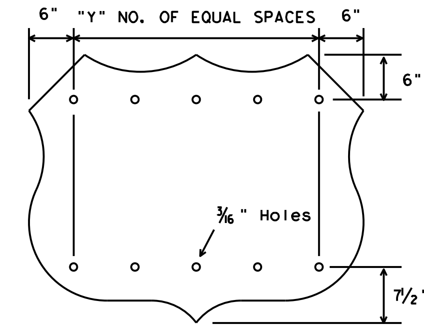


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4

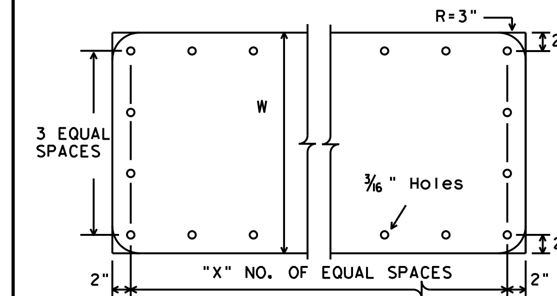


EXIT ONLY PANEL



U.S. ROUTE MARKERS

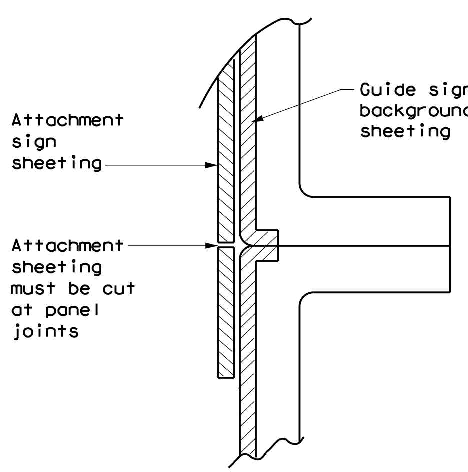
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



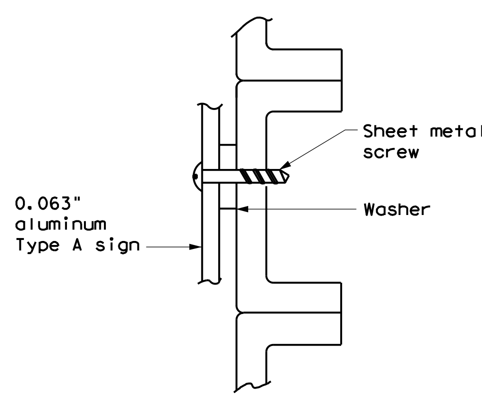
STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

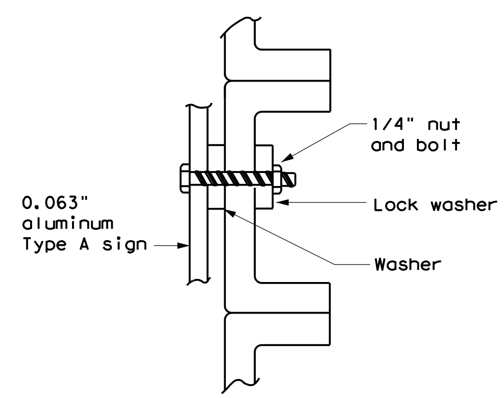
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



DIRECT APPLIED ATTACHMENT



SCREW ATTACHMENT



NUT/BOLT ATTACHMENT

NOTE:

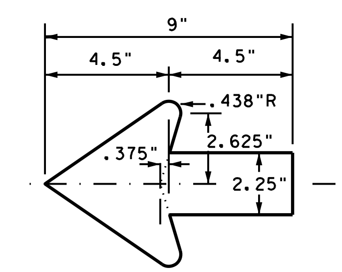
1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".

NOTE:

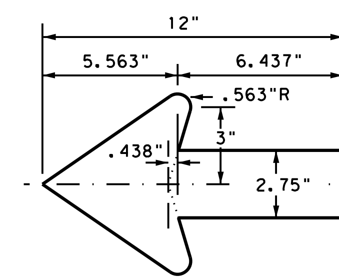
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

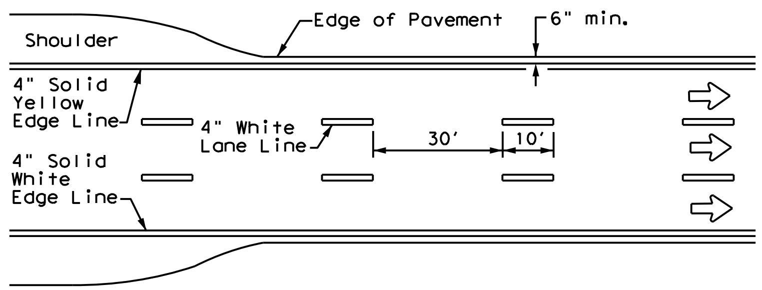
Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

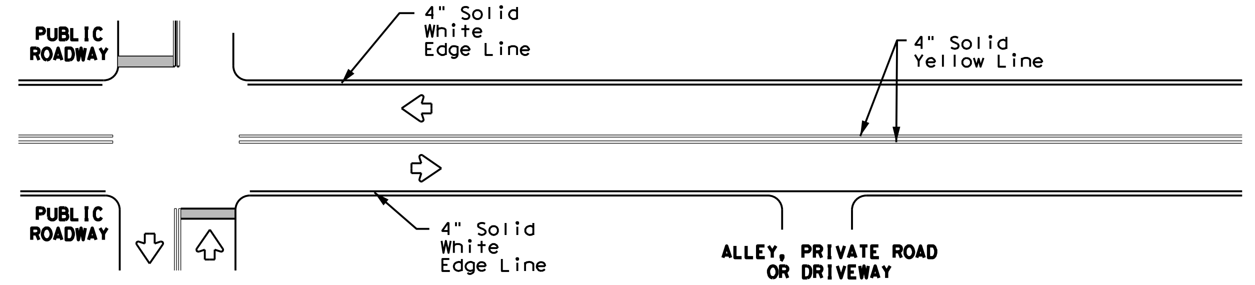
TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	00	112	VAR
12-03 7-13 9-08	DIST		COUNTY	SHEET NO.
	LBB		VARIOUS	079

5



EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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

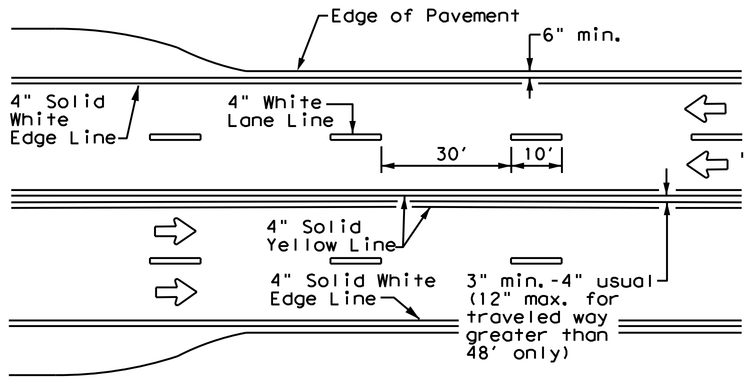
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less 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.

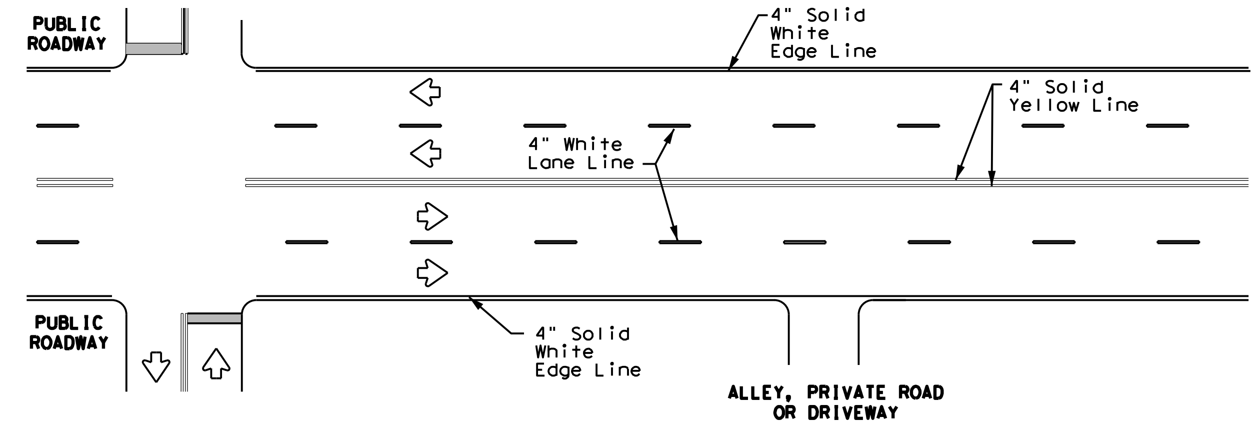
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

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

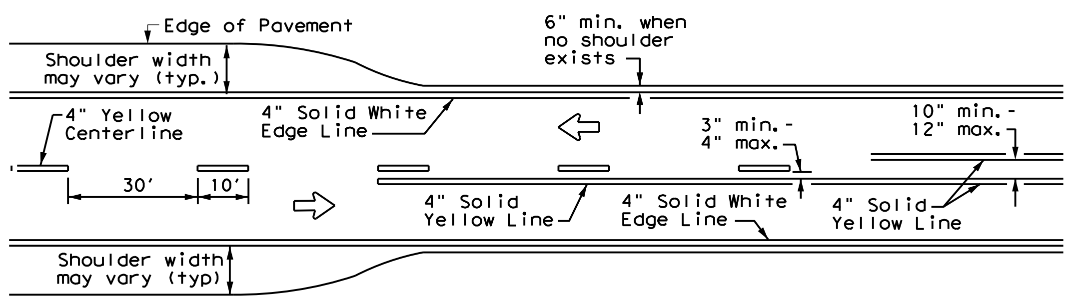
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



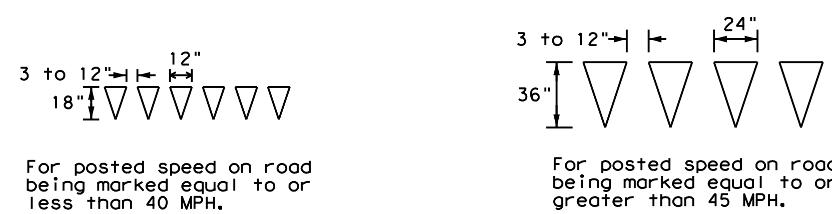
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



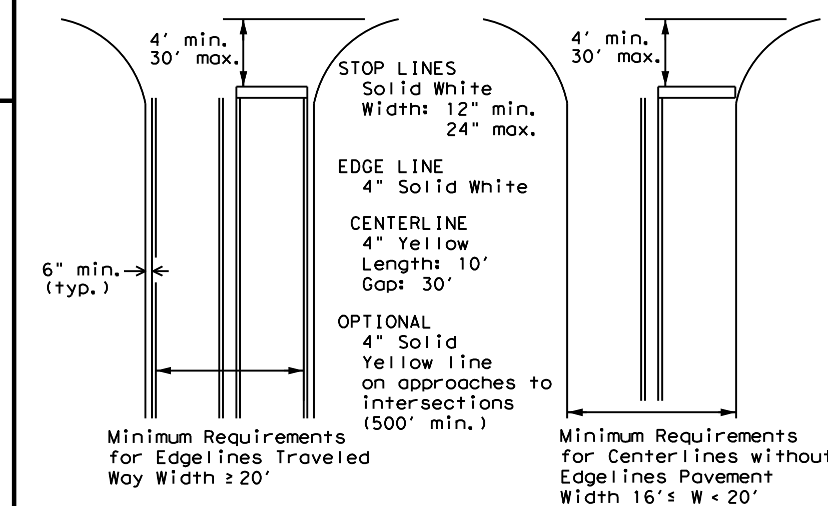
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

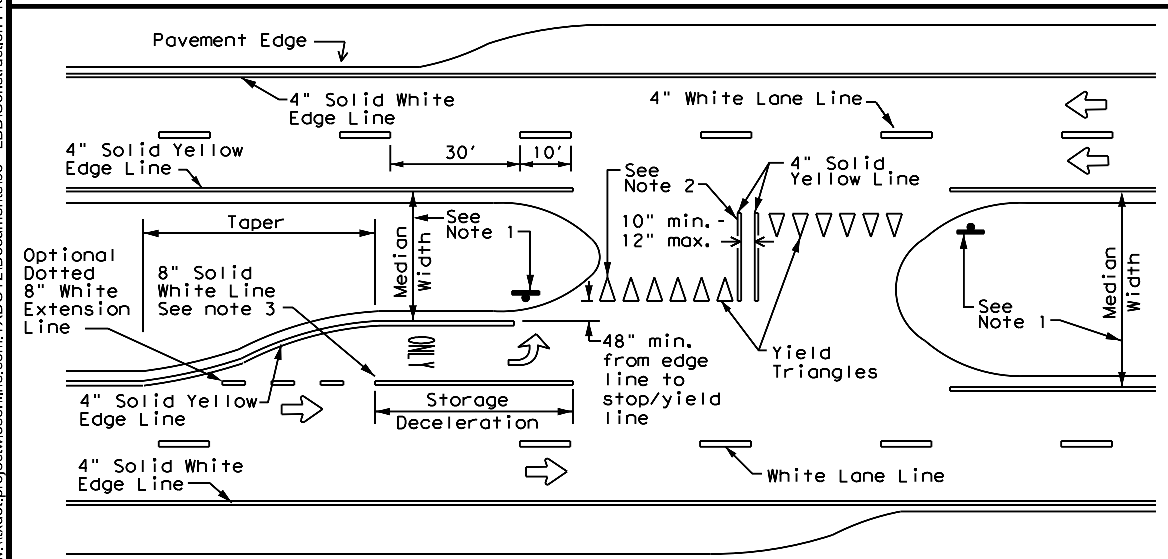


YIELD LINES



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. 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.

2. 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 troingles shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

Texas Department of Transportation — Traffic Safety Division Standard

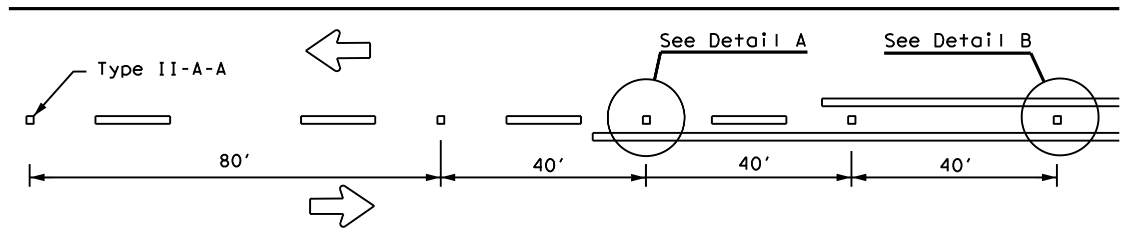
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

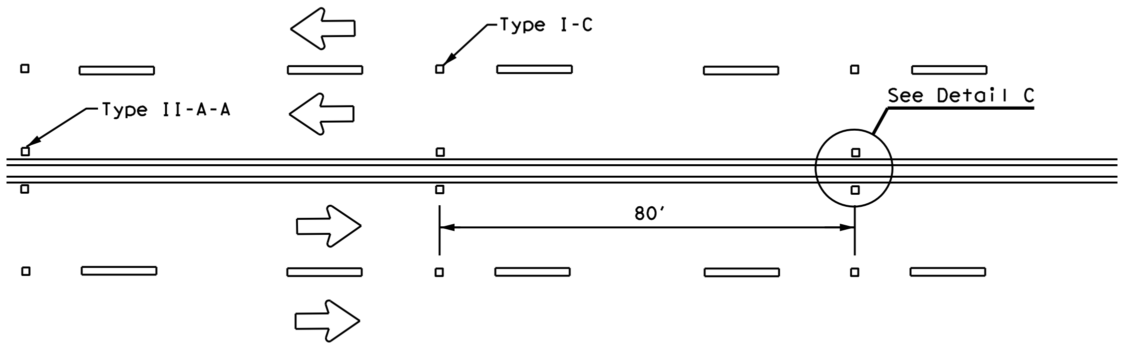
FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 5-00 2-12 8-00 6-20	0905	00	112	VAR
	DIST		COUNTY	SHEET NO.
	LBB		VARIOUS	080

22A

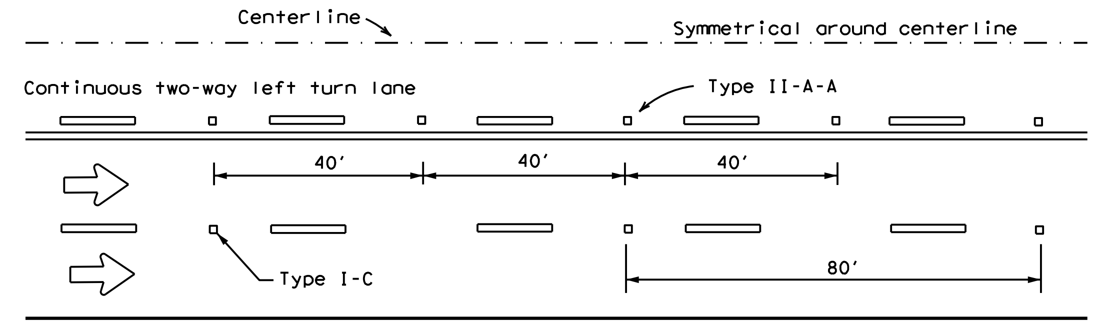
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



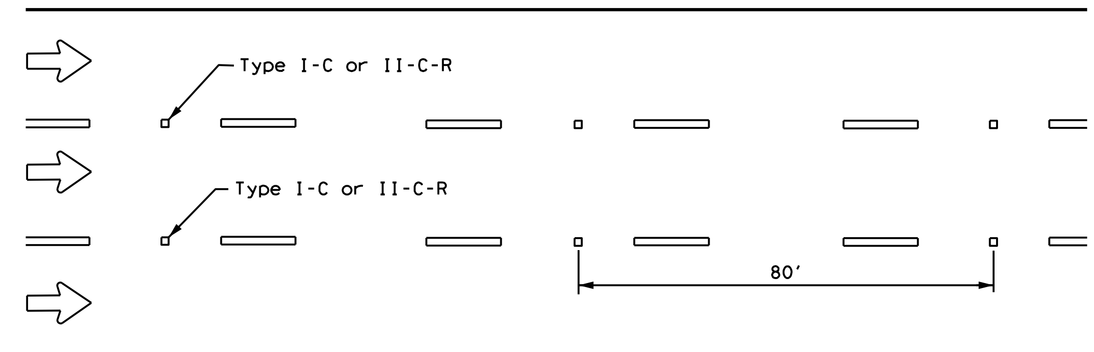
CENTERLINE FOR ALL TWO LANE ROADWAYS



CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS

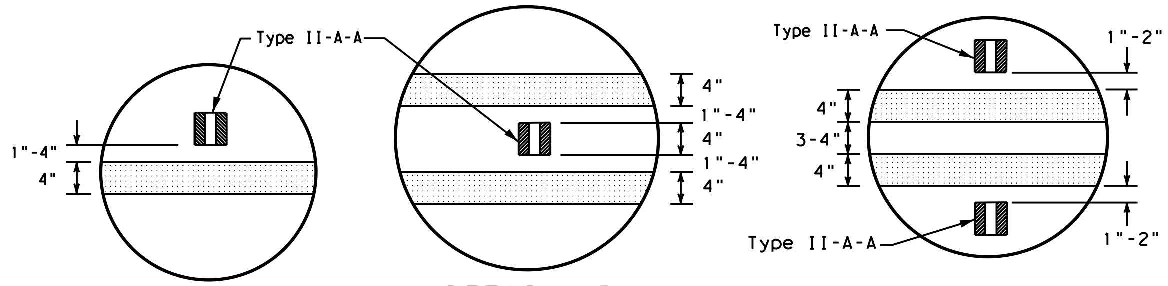


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



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

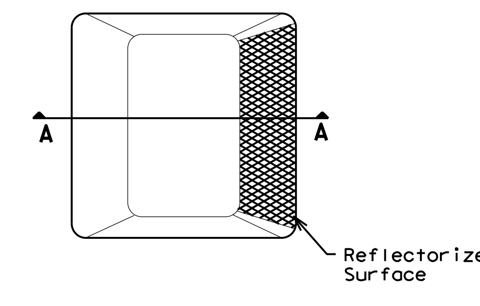
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.



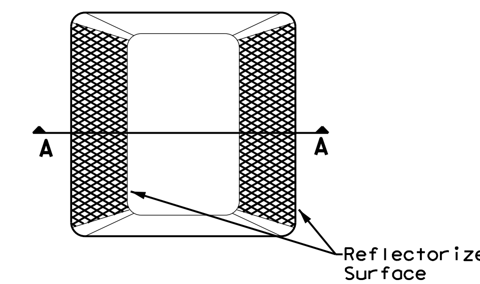
DETAIL "A" DETAIL "B" DETAIL "C"

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

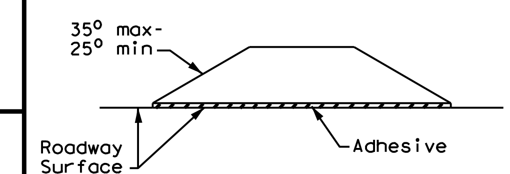
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

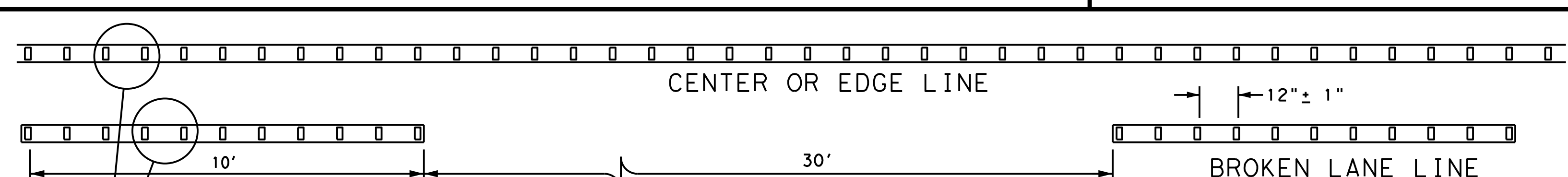


Type II (Top View)



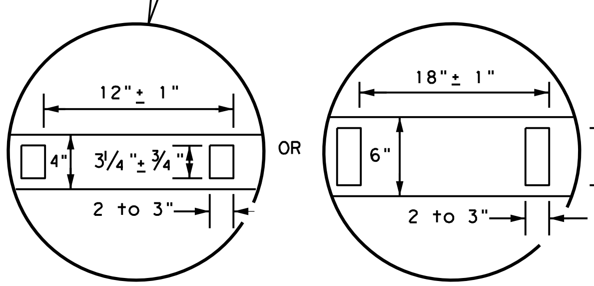
SECTION A

RAISED PAVEMENT MARKERS



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTE

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

GENERAL NOTES

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

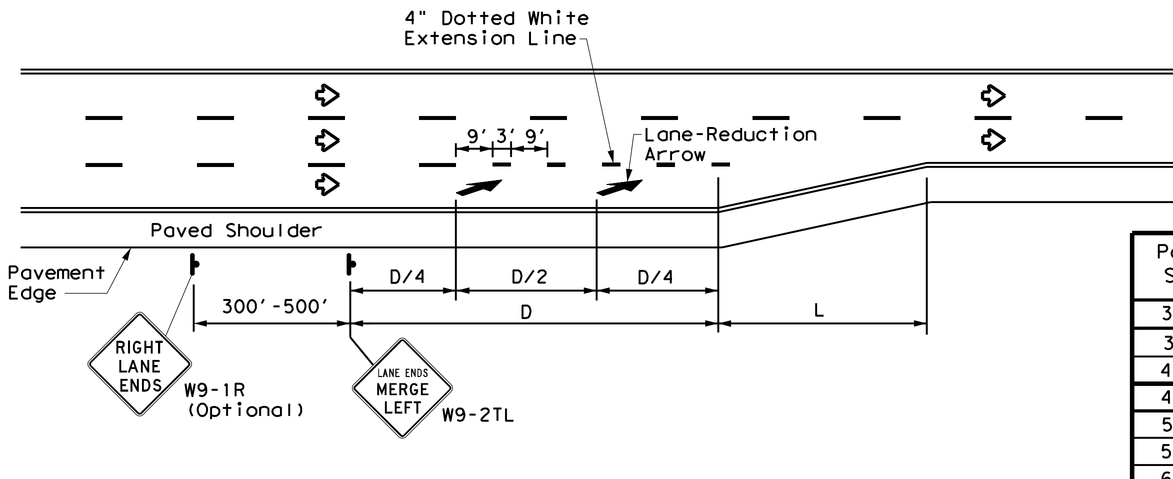
Texas Department of Transportation

Traffic Safety Division Standard

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

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10 5-00 2-12 8-00 6-20	0905	00	112	VAR
	DIST		COUNTY	SHEET NO.
	LBB		VARIOUS	081

22B

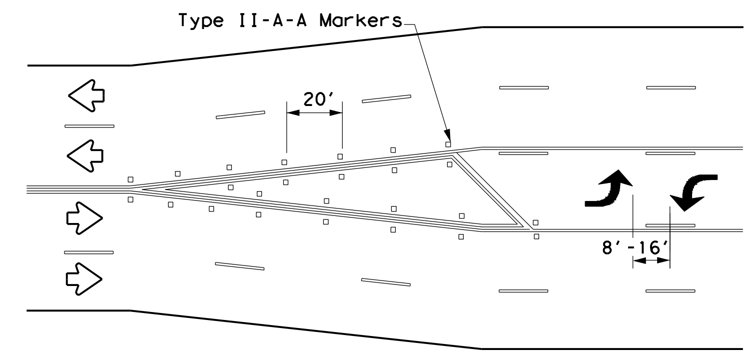


Posted Speed	D (ft)	L (ft)
30 MPH	460	$L = \frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

LANE REDUCTION

NOTES

1. 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.
2. 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.
3. 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.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.



A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

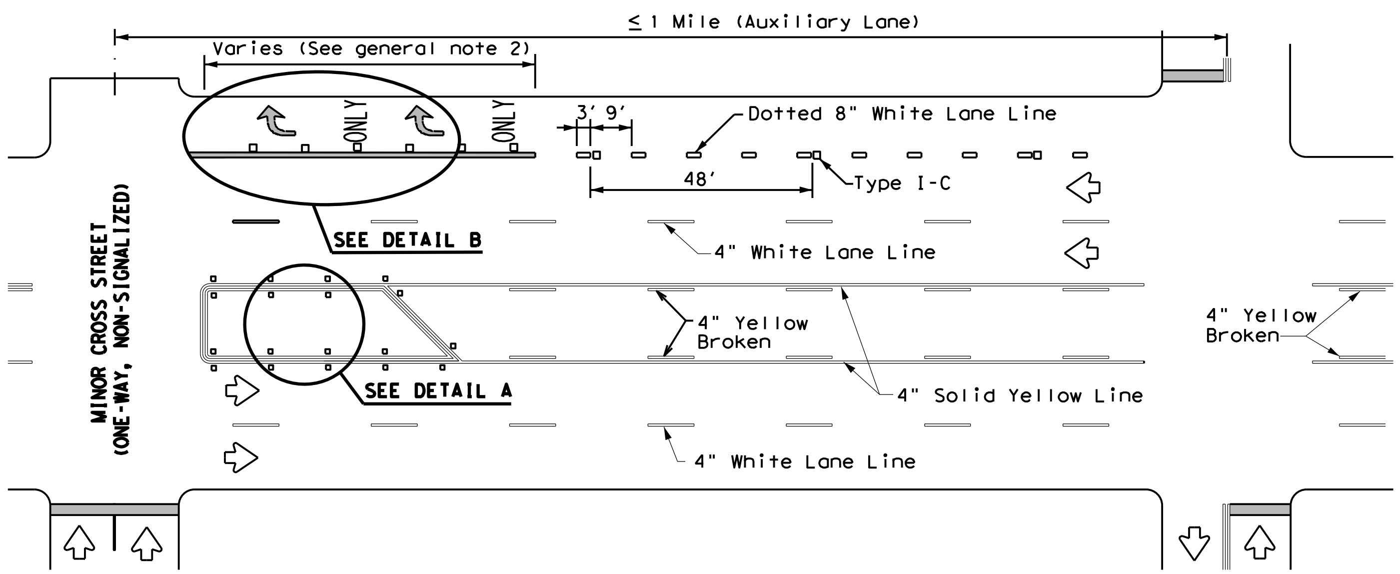
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

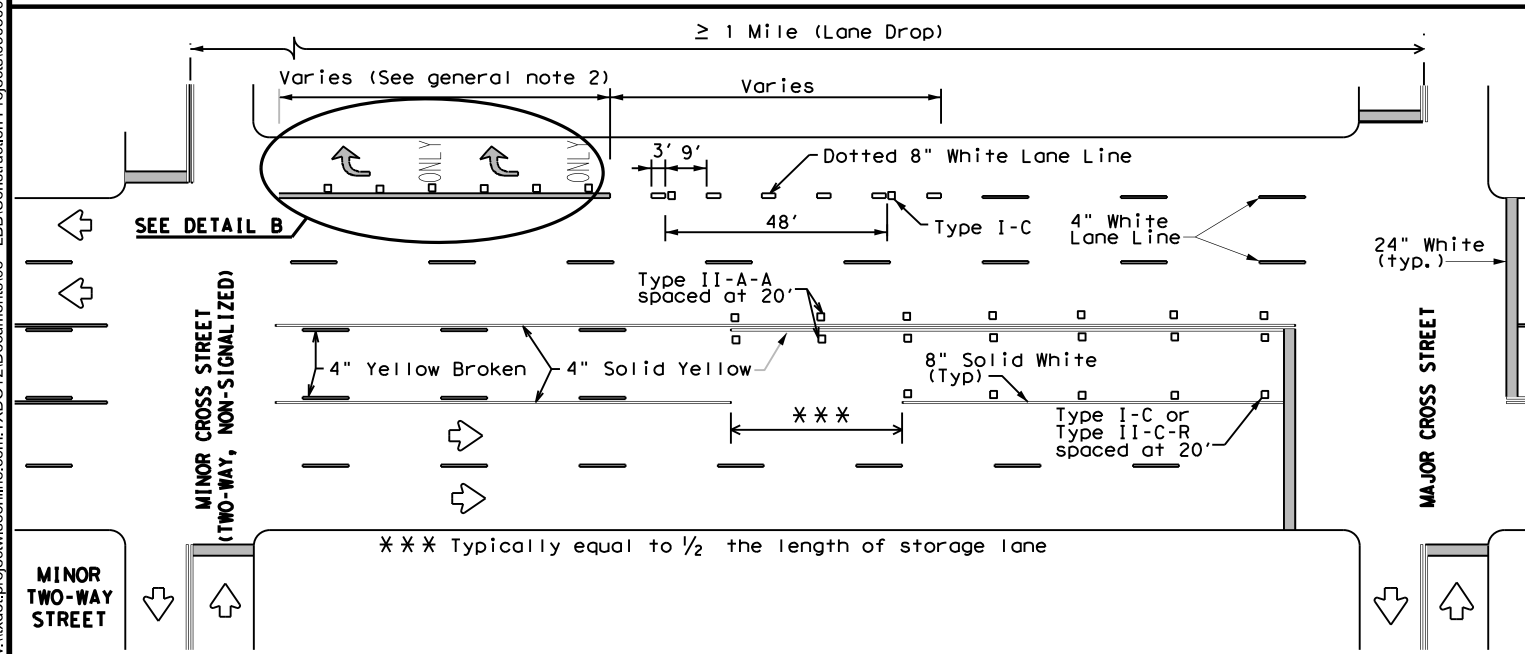
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. 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.
3. 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.
4. 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	
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

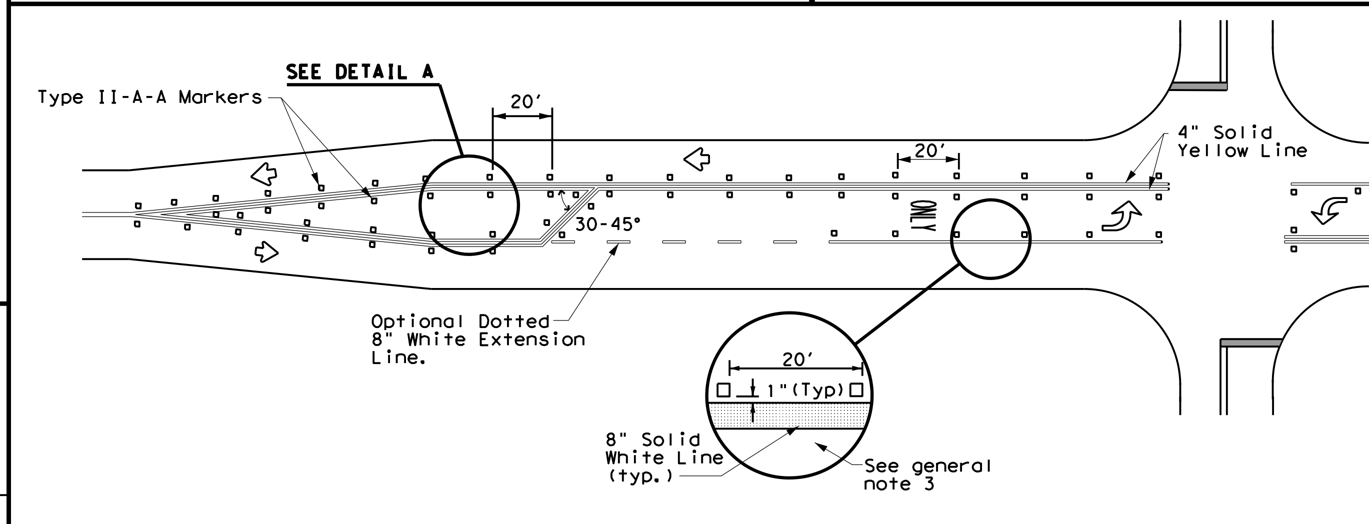
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



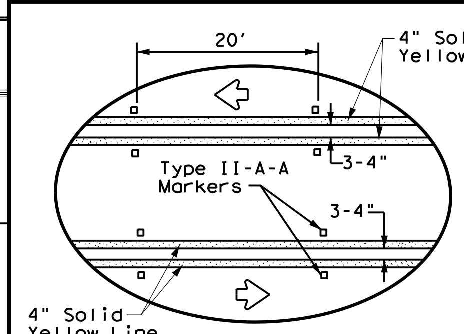
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



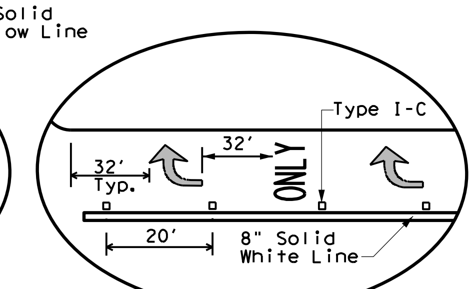
TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS



DETAIL A



DETAIL B

Texas Department of Transportation

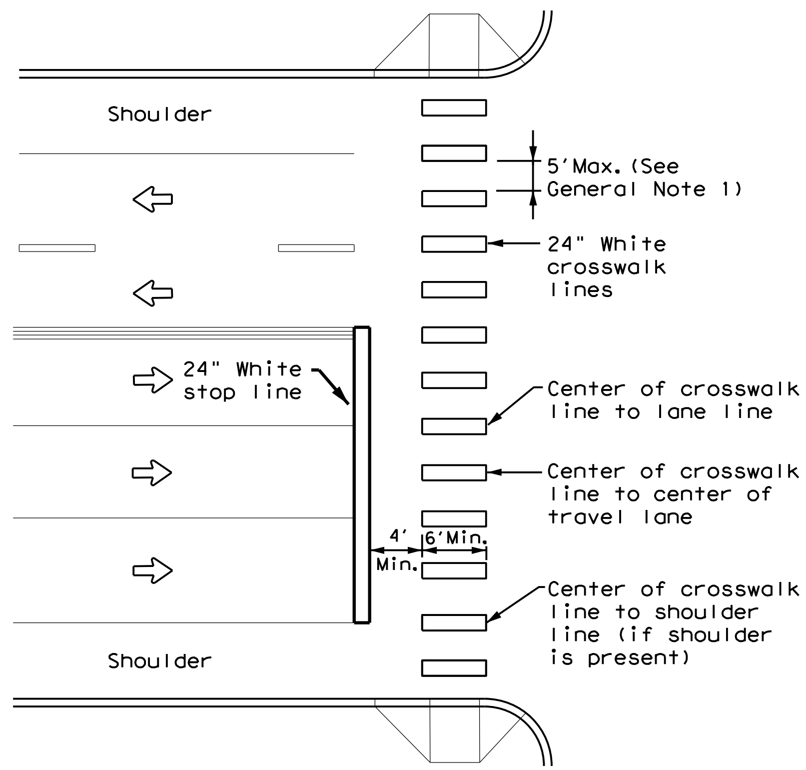
Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

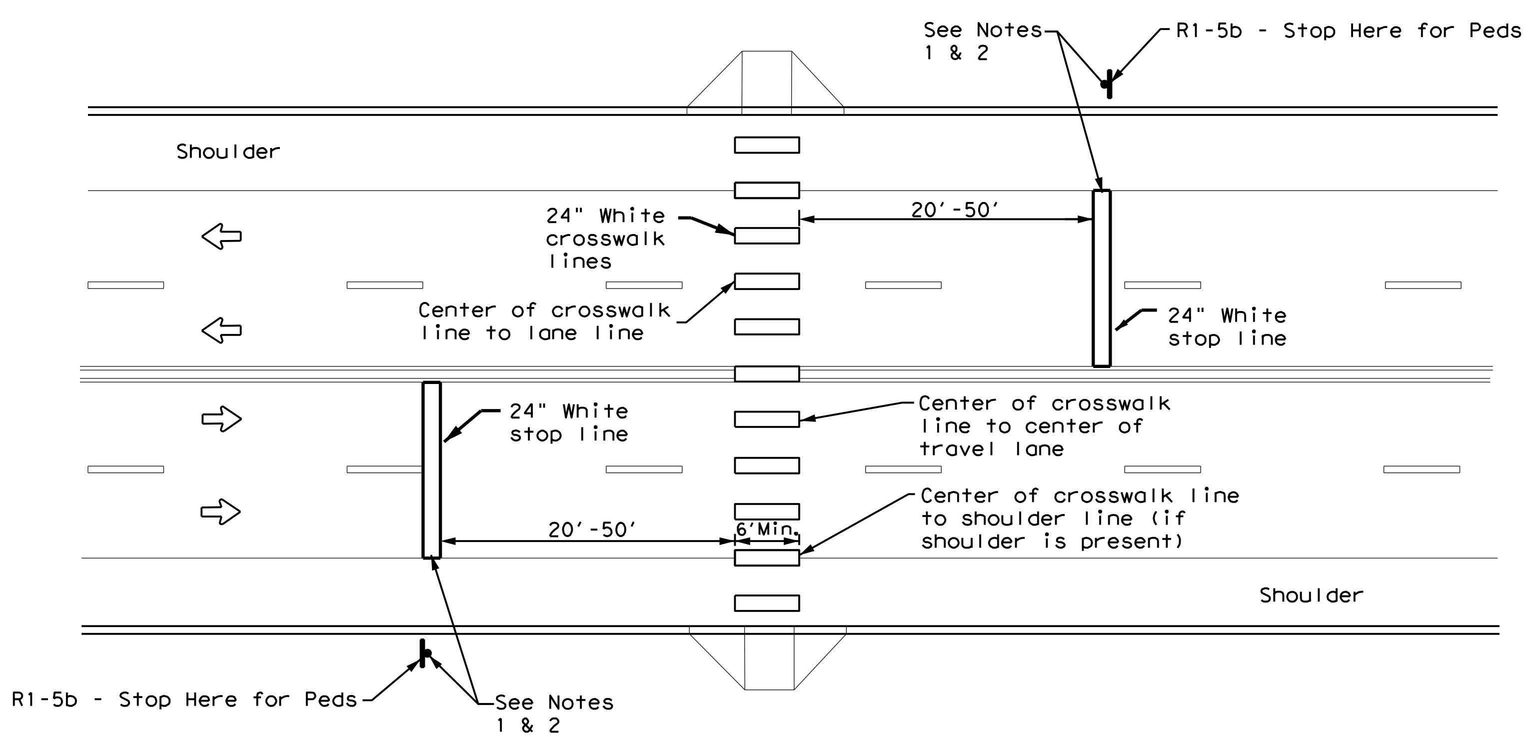
PM(3)-20

FILE: pm3-20.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 5-00 2-10 8-00 2-12 3-03 6-20	0905	00	112	VAR
	DIST		COUNTY	SHEET NO.
	LBB		VARIOUS	082

22C



HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH



UNSIGNALIZED MID BLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

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.

NOTES:

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

Texas Department of Transportation

Traffic Safety Division Standard

CROSSWALK PAVEMENT MARKINGS

PM(4)-22

FILE: pm4-22.dgn	DN:	CK:	DW:	CK:
© TxDOT June 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	00	112	VAR
3-22	DIST	COUNTY		SHEET NO.
	LBB	VARIOUS		083

220

DATE: 9/28/2022 2:06:37 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\0905001124 - Design\Plan Set\8. Traffic\11. STANDARDS\084 SMD(GEN)-08.dgn

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)

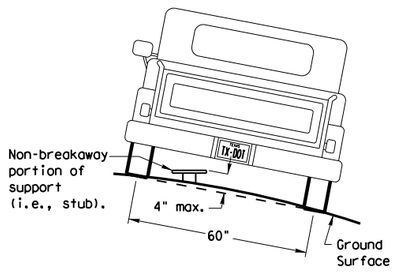
Anchor Type

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-1))

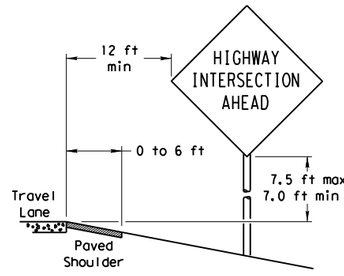
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

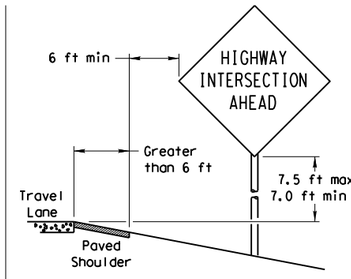
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

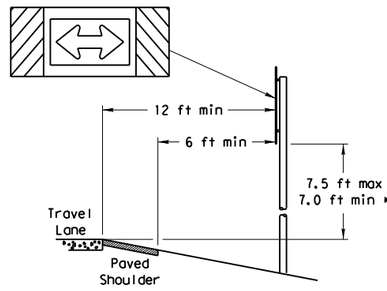
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



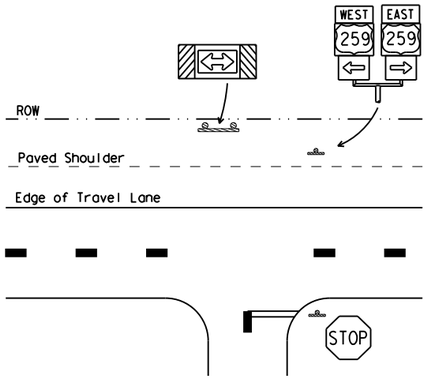
GREATER THAN 6 FT. WIDE

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

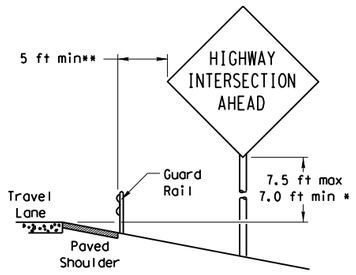
T-INTERSECTION



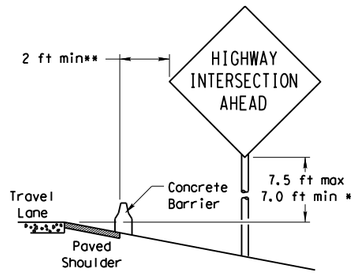
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



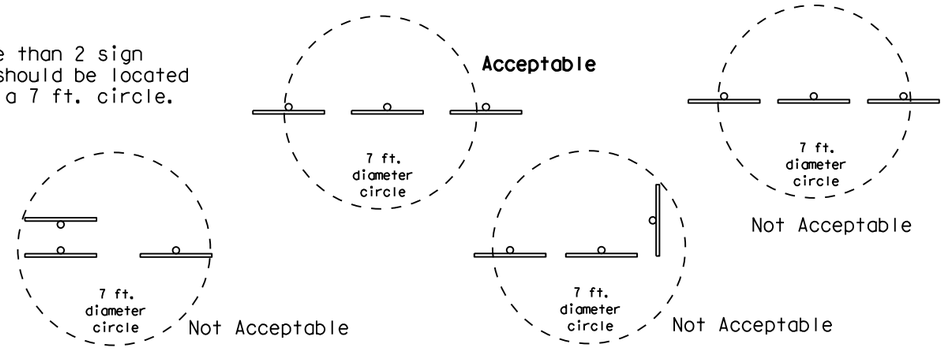
BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

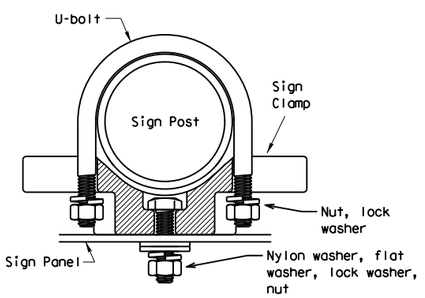
**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

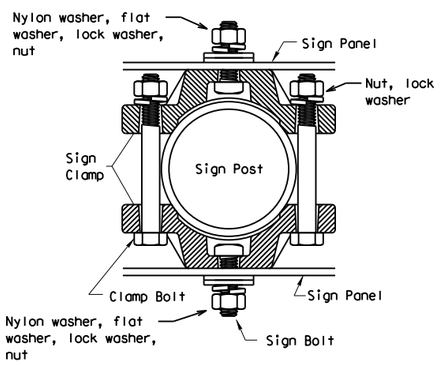


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

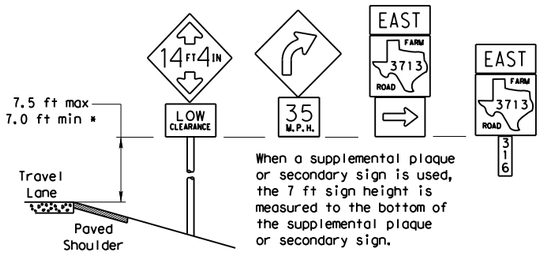
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



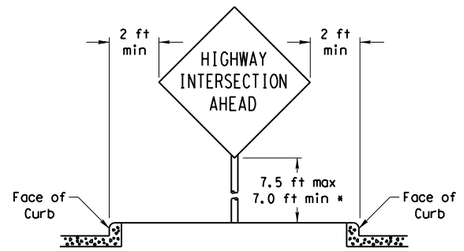
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



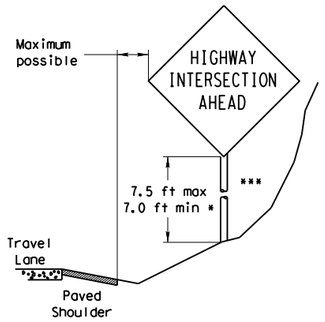
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



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

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the 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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

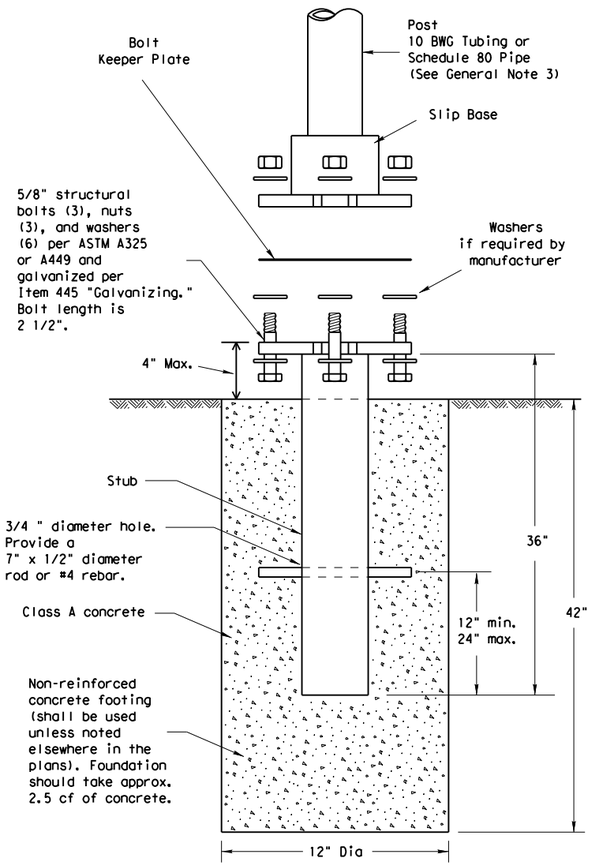
SMD(GEN)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0905	00	112	VAR
	DIST	COUNTY		SHEET NO.
	LBB	VARIOUS		084

DATE: 9/28/2022 2:06:39 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\0905001124 - Design\Plan Set\8. Traffic\11. STANDARDS\085 SMD(SLIP-1)-08.dgn

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

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

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

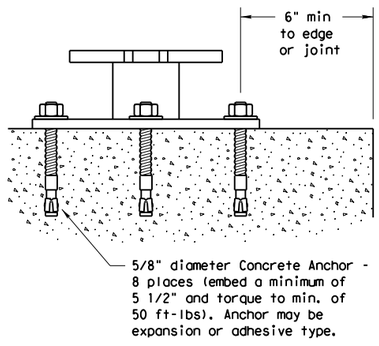
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum 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
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

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

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the 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.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



SM RD SGN ASSM TY 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, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

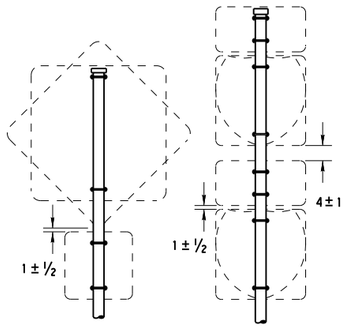
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
9-08

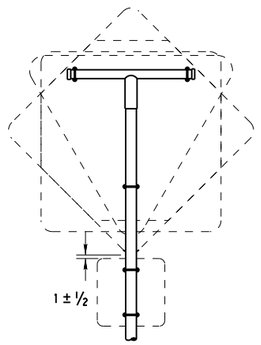
CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR

DIST	COUNTY	SHEET NO.
LBB	VARIOUS	085

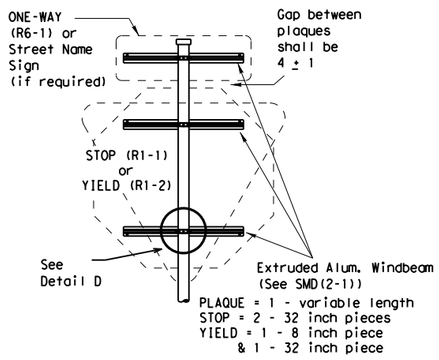
DATE: 9/28/2022 2:06:41 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\090500112\4 - DesignPlan Set\8. Traffic\11. STANDARDS\086 SMD(SLIP-2)-08.dgn



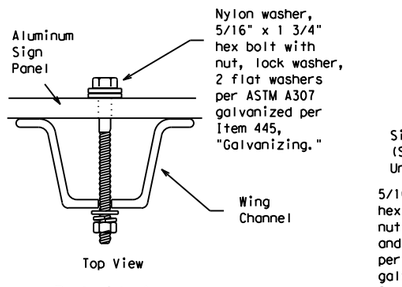
SM RD SGN ASSM TY XXXXX(1)XX(P)



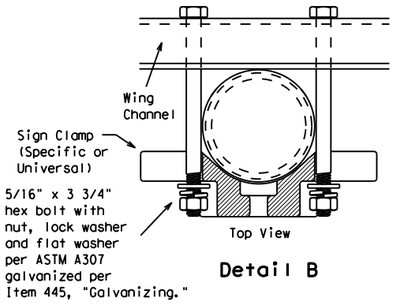
SM RD SGN ASSM TY XXXXX(1)XX(T)



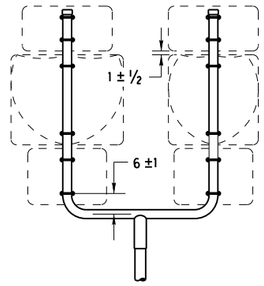
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



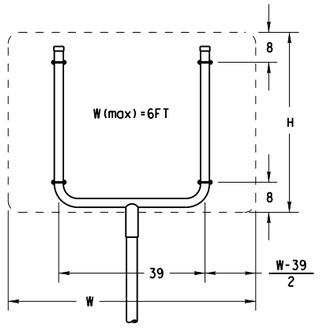
Detail A



Detail B



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



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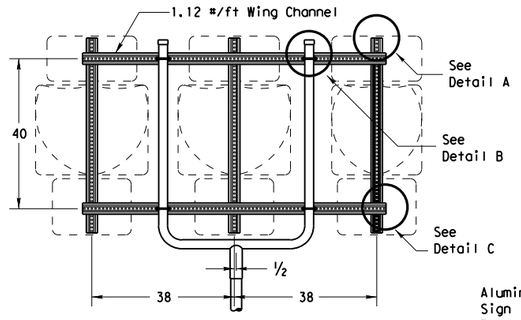
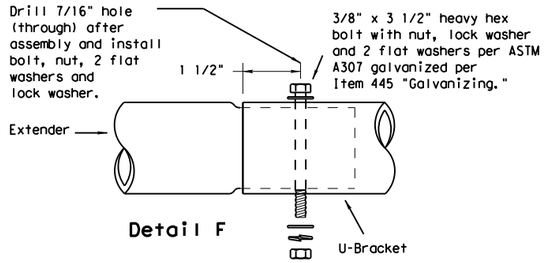
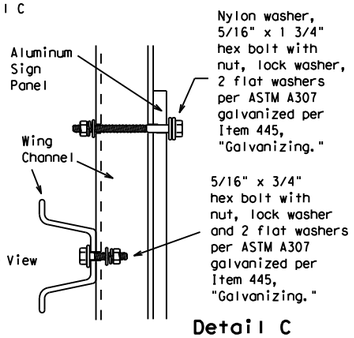


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

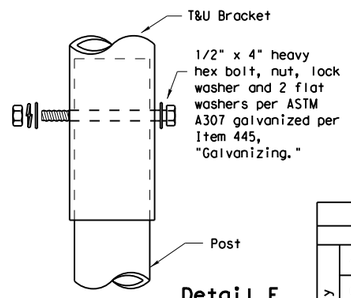


Detail F

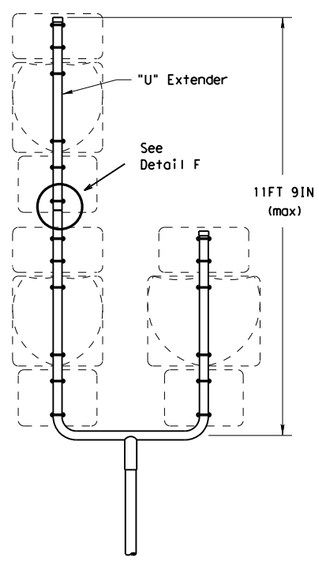
Splices shall only be allowed behind the sign substrate.



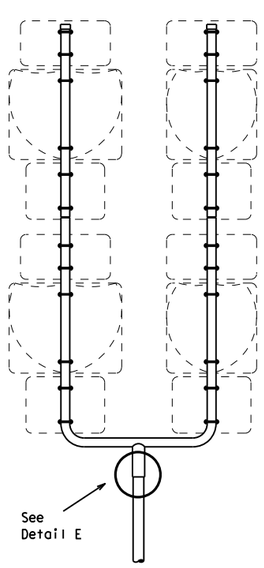
Detail C



Detail E



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



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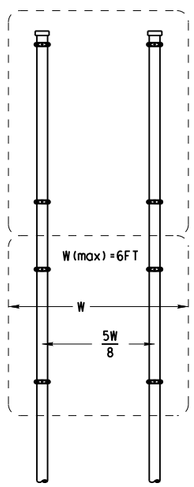
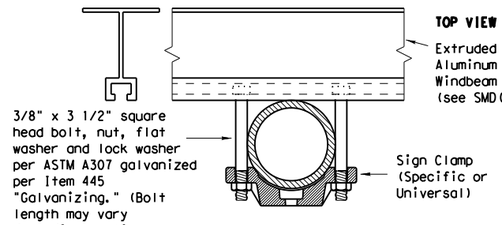
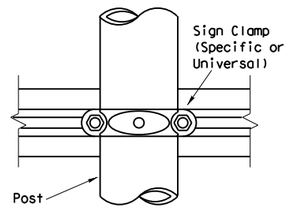


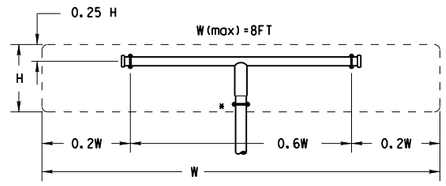
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW





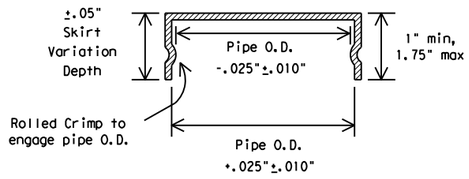
Detail D



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

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



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

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

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

GENERAL NOTES:

1.

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

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

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)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR

DIST	COUNTY	SHEET NO.
LBB	VARIOUS	086

9-08 REVISIONS

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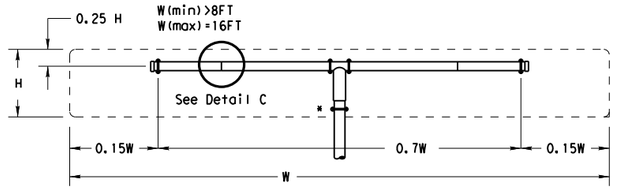
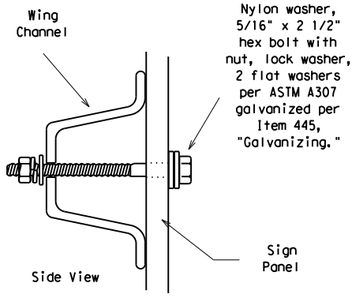
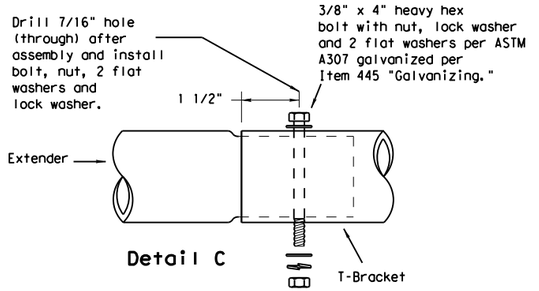


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



Detail B



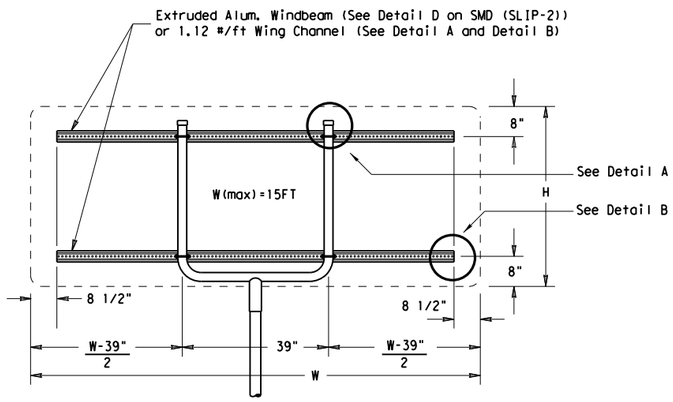
Detail C

Splices shall only be allowed behind the sign substrate.

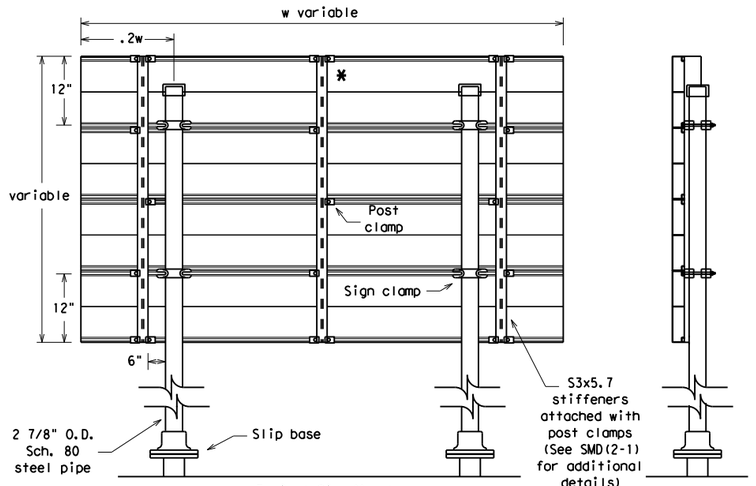
GENERAL NOTES:

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

1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. 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.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
6. When two triangular slipbase supports are used to support a single sign, they 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.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. 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."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. 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.
11. Post open ends shall be fitted with Friction Caps.



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

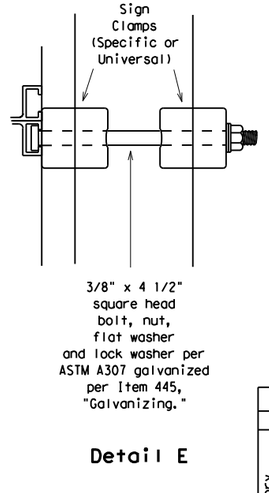


Typical Sign Mount

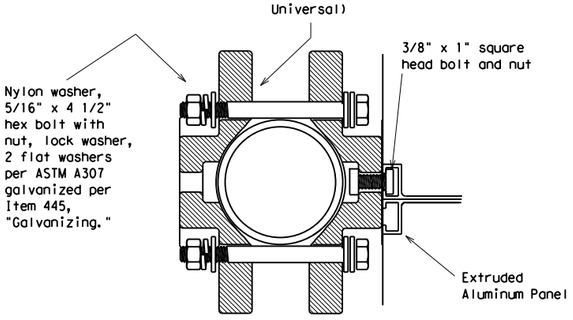
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

See Detail E
for clamp installation

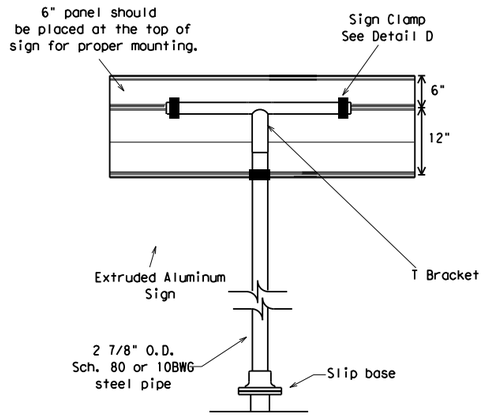


Detail E

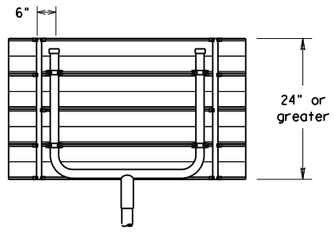


Detail A

Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET



Extruded Aluminum Sign
With T Bracket



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

See Detail E
for clamp installation

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)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

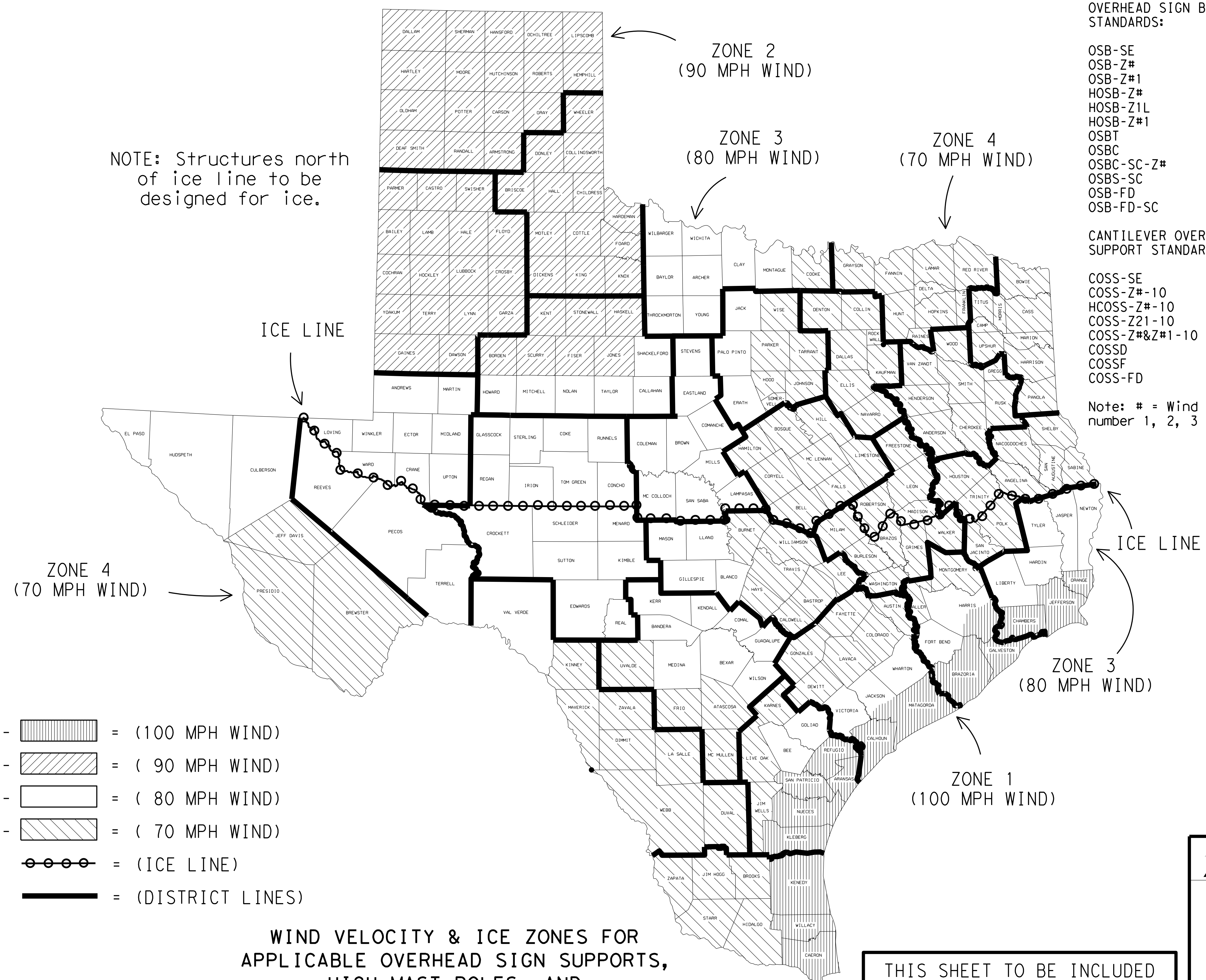
SMD(SLIP-3)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DIST	COUNTY		SHEET NO.
LBB	VARIOUS		087

DATE: 9/28/2022 2:06:45 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction\Projects\0905-00-112\Design\Traffic\STANDARDS\088 WV & IZ-14.dgn



APPLICABLE STANDARDS SHEETS

OVERHEAD SIGN BRIDGE STANDARDS:

OSB-SE
OSB-Z#
OSB-Z#1
HOSB-Z#
HOSB-Z1L
HOSB-Z#1
OSBT
OSBC
OSBC-SC-Z#
OSBS-SC
OSB-FD
OSB-FD-SC

CANTILEVER OVERHEAD SIGN SUPPORT STANDARDS:

COSS-SE
COSS-Z#-10
HCOSS-Z#-10
COSS-Z21-10
COSS-Z#&Z#1-10
COSSD
COSSF
COSS-FD

Note: # = Wind Zone number 1, 2, 3 or 4

HIGH MAST ILLUMINATION POLE STANDARDS:

HMIP-98
HMIF-98

WALKWAYS AND BRACKETS STANDARDS:

SWW
SB(SWL-1)

TRAFFIC SIGNAL POLE STANDARDS:

SP-80
SP-100
SMA-80
SMA-100
DMA-80
DMA-100
MA-C
MAC(ILSN)
MAD-D
TS-FD
LUM-A
CFA
LMA
TS-C
MA-DPD

FOR HARRIS CO. ONLY
Zone line is just North of US 90, around on the North, West and South sides of IH 610 and down the West side of SH 288.

FOR JACKSON CO. ONLY
Zone line is just North of SH 616.

LEGEND

ZONE 1 - = (100 MPH WIND)
ZONE 2 - = (90 MPH WIND)
ZONE 3 - = (80 MPH WIND)
ZONE 4 - = (70 MPH WIND)
= (ICE LINE)
= (DISTRICT LINES)

WIND VELOCITY & ICE ZONES FOR APPLICABLE OVERHEAD SIGN SUPPORTS, HIGH MAST POLES, AND TRAFFIC SIGNAL POLES

Based on 50 Year Mean Recurrence Interval of Fastest Mile Wind Velocity at 33 feet height.

THIS SHEET TO BE INCLUDED IN ALL P.S.&E. PACKAGES CONTAINING ONE OR MORE OF THE APPLICABLE STANDARD SHEETS LISTED HEREON

Texas Department of Transportation

Traffic Operations Division Standard

WIND VELOCITY AND ICE ZONES

WV & IZ-14

FILE: windice.dgn		DN: TxDOT		CK: TxDOT	DW: TxDOT		CK: TxDOT
© TxDOT April 1996		CONT	SECT	JOB		HIGHWAY	
REVISIONS 8-14-Added list of applicable standards, restricting use to structures designed for Fastest Mile wind speeds.		0905	00	112		VAR	
		DIST	COUNTY			SHEET NO.	
		LBB	VARIOUS			088	

30

GENERAL NOTES FOR ALL ELECTRICAL WORK

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

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

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

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

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

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

CONDUIT

A. MATERIALS

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

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

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

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

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

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

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

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

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

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

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

B. CONSTRUCTION METHODS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

FILE: ed1-14.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	00	112	VAR
	DIST		COUNTY	SHEET NO.
	LBB		VARIOUS	089

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DATE: 9/28/2022 2:06:47 PM
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ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

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

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

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

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

B. CONSTRUCTION METHODS

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

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

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

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

5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.

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

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

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

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

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

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

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

C. TEMPORARY WIRING

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

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

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

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

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

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

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

B. CONSTRUCTION METHODS

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

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

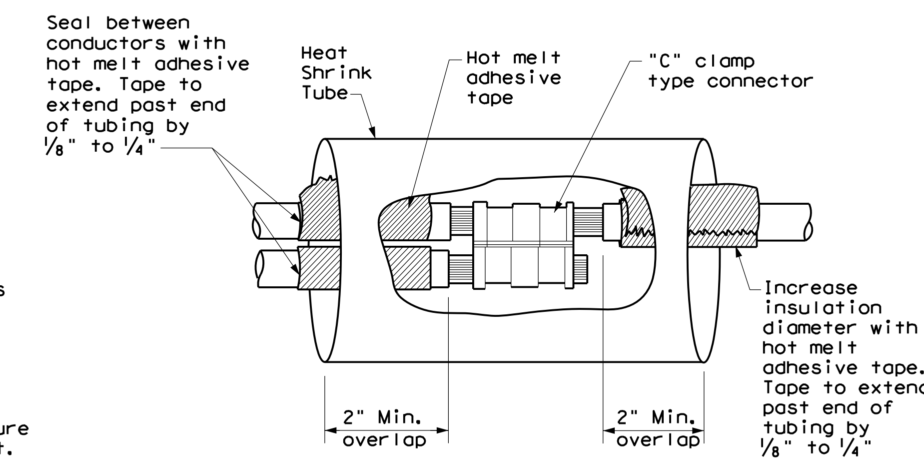
3. Install ground rods so the imprinted part number is at the upper end of the rod.

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

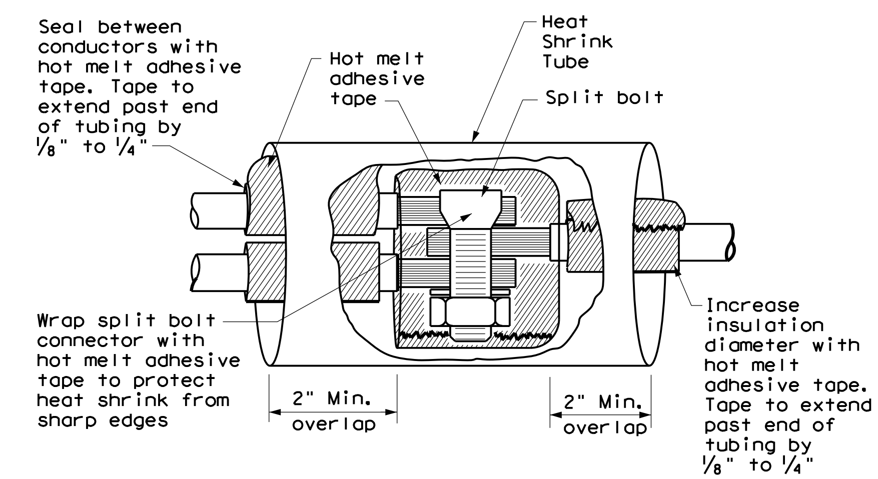
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

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

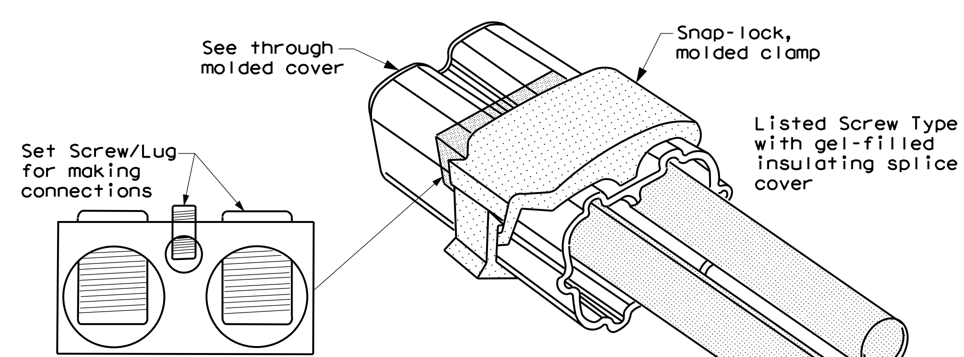
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation — Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

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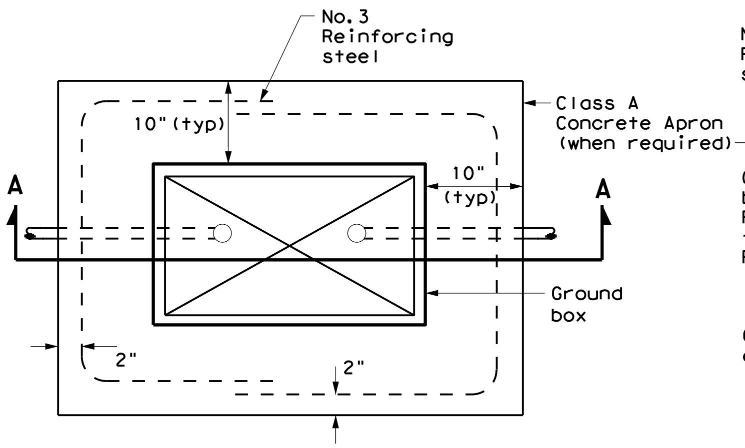
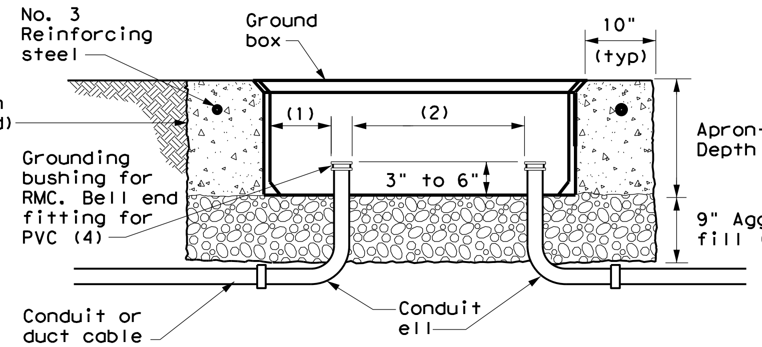


PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

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

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

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

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

GROUND BOXES

A. MATERIALS

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

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

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

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

B. CONSTRUCTION METHODS

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

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

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

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

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

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

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

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

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

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

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

GROUND BOX DIMENSIONS

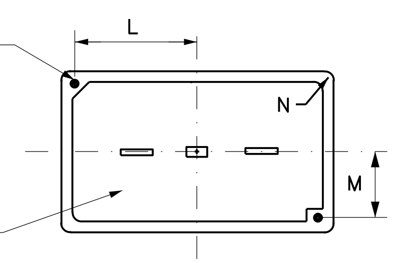
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

GROUND BOX COVER DIMENSIONS

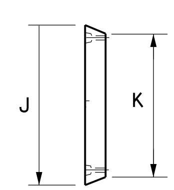
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2

Hole for 1/2" bolt with recess for head

For cover logo and labeling requirements. See DMS 11070



PLAN VIEW



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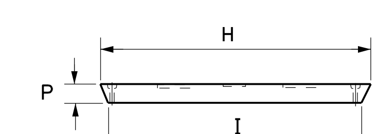

SIDE

GROUND BOX COVER

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS GROUND BOXES

ED(4)-14

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ELECTRICAL SERVICES NOTES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SERVICE ASSEMBLY ENCLOSURE

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

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

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

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

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

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

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

PHOTOELECTRIC CONTROL

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

* ELECTRICAL SERVICE DATA

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

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

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

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

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

Schematic Type

Service Voltage V / V

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

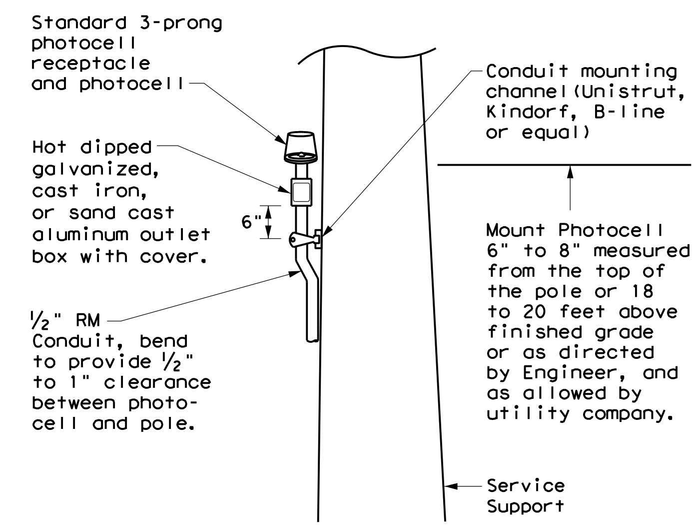
(SS)= Safety Switch Ahead of Meter-Check with Utility
(NS)= No safety Switch Ahead of Meter-Check with Utility

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

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

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

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



TOP MOUNTED PHOTOCELL

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

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Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

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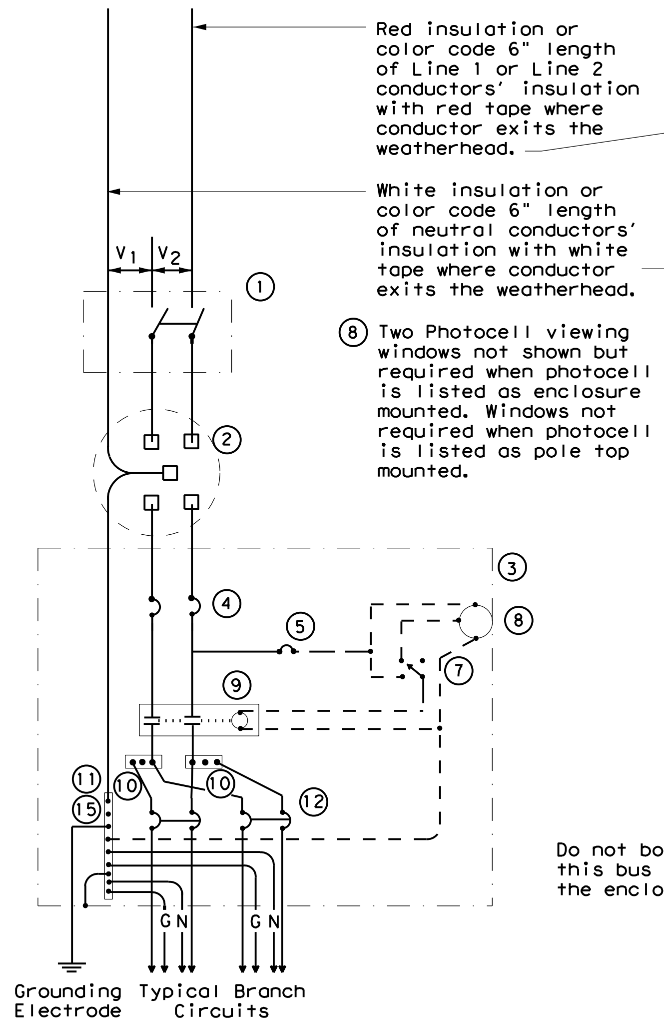
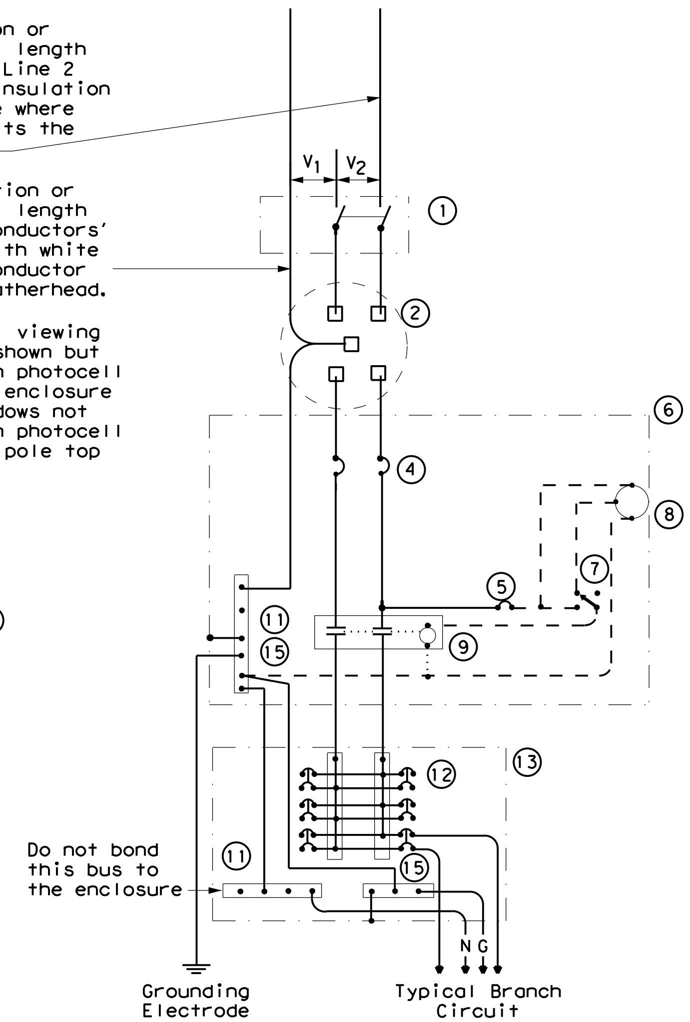
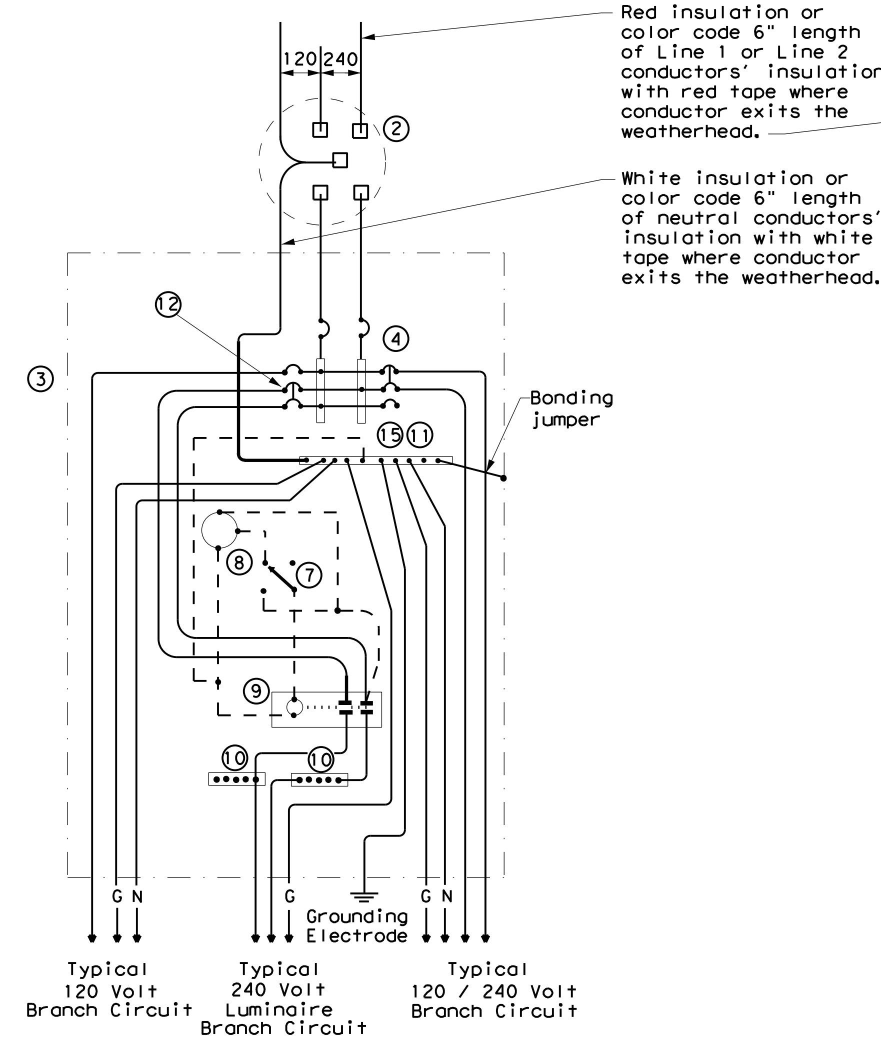


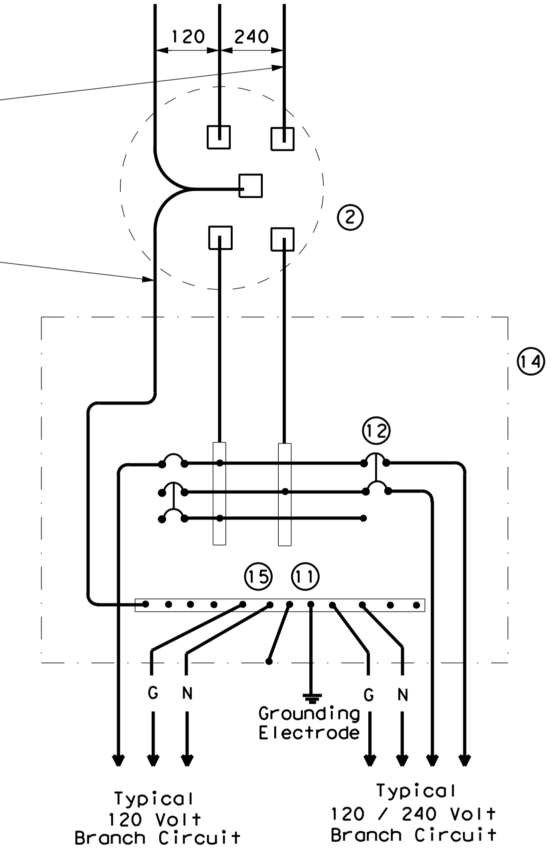
SCHEMATIC TYPE A
THREE WIRE



SCHEMATIC TYPE C
THREE WIRE



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



SCHEMATIC TYPE T

120/240 VOLTS - THREE WIRE

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

WIRING LEGEND

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

SCHEMATIC LEGEND

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

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

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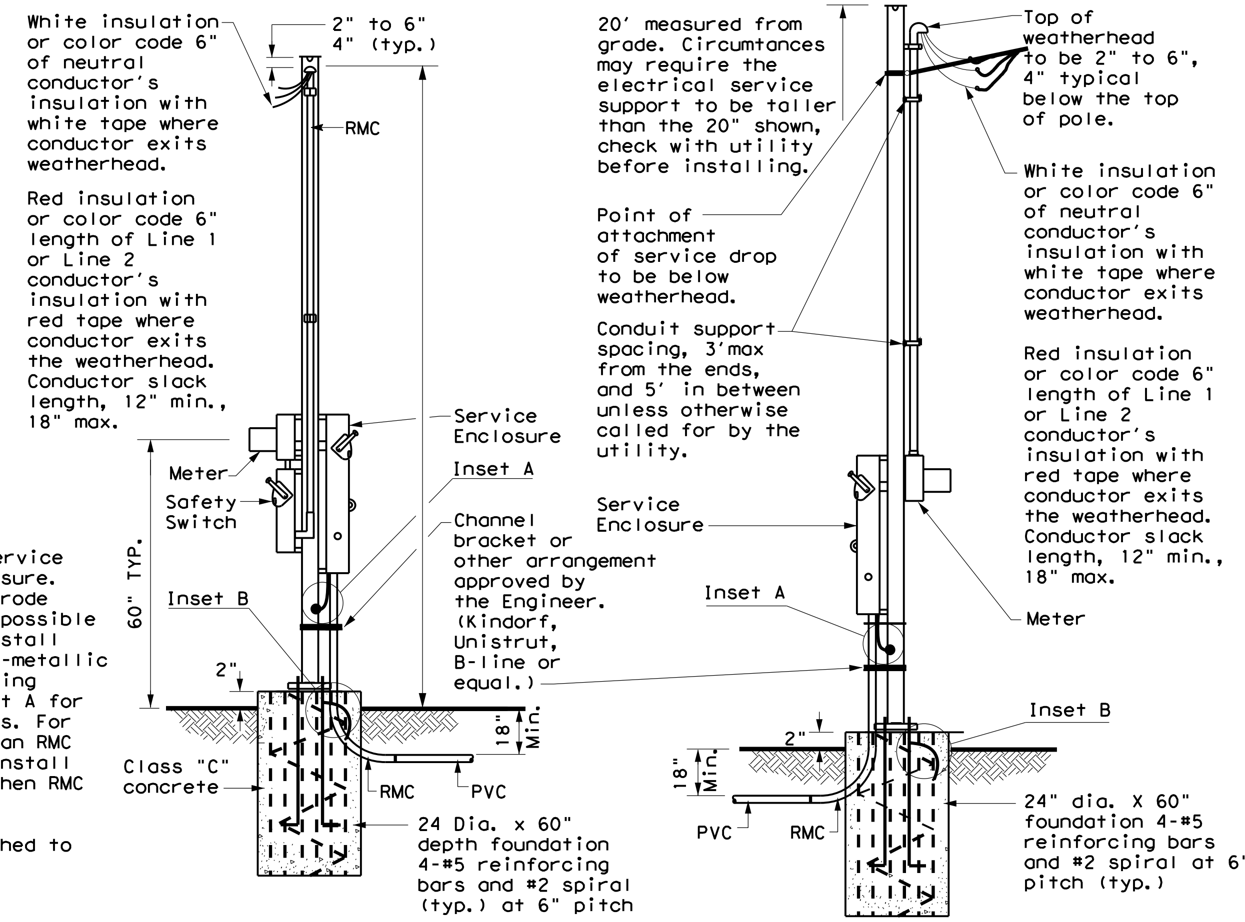
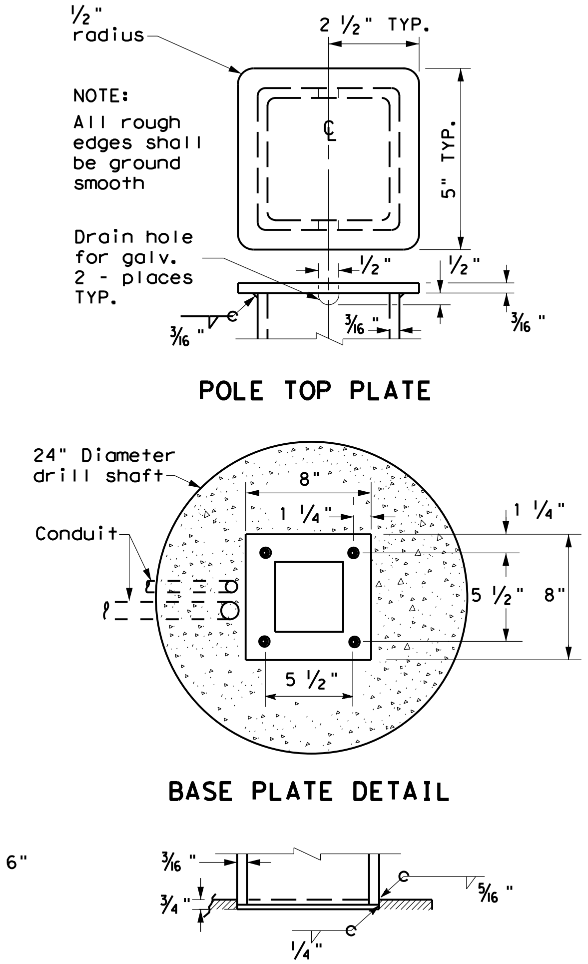
SUPPORT TYPE STEEL POLE (SP) AND STEEL FRAME (SF)

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 5/8 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.

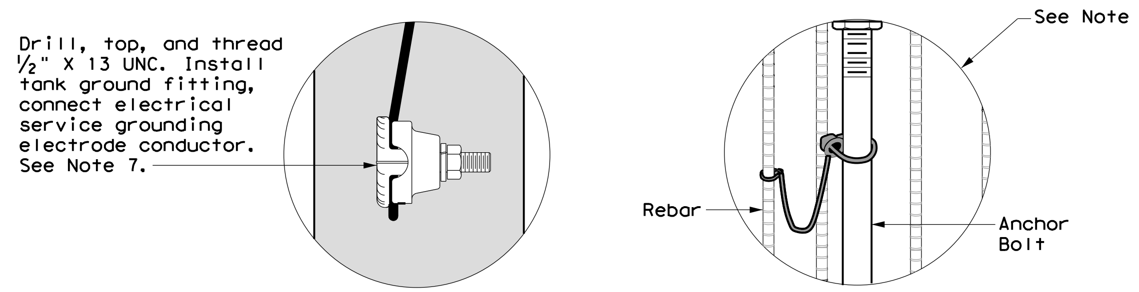


WITH SAFETY SWITCH — WITHOUT SAFETY SWITCH

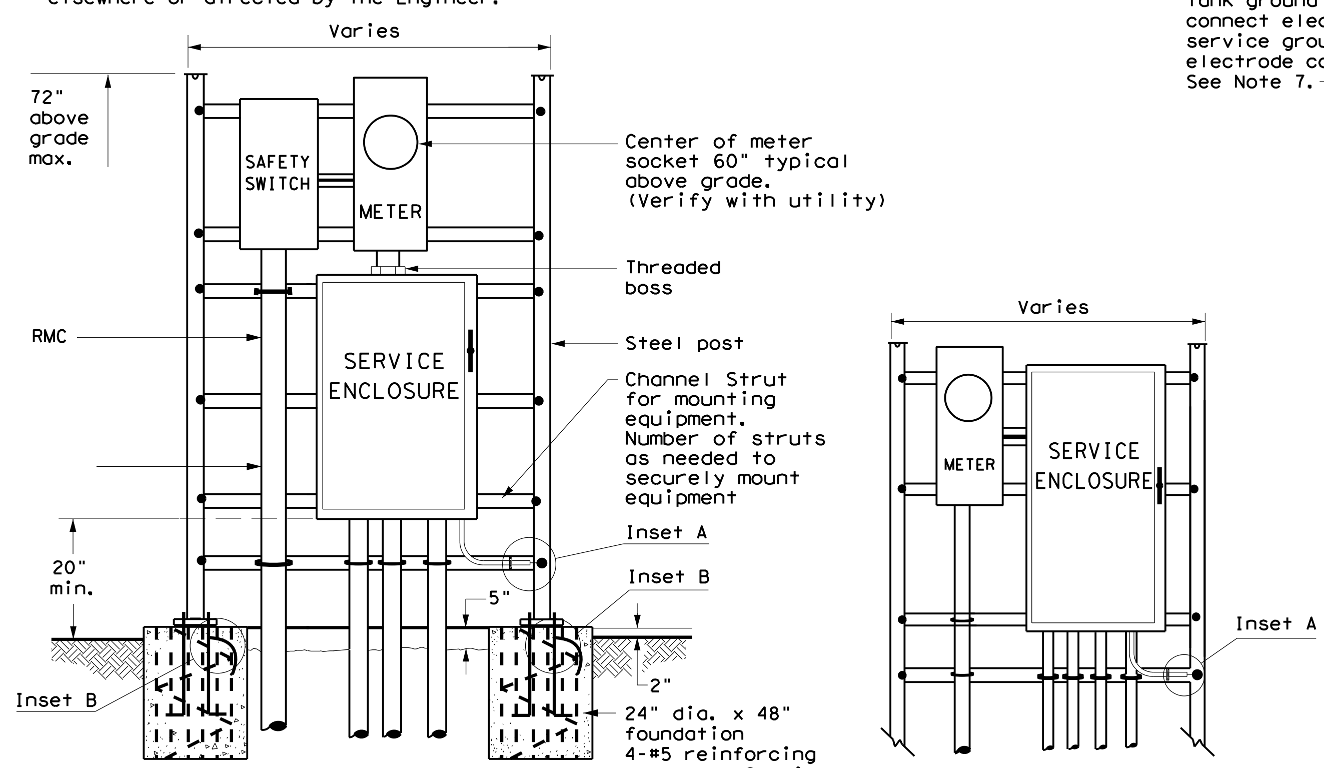
SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE



SERVICE SUPPORT TYPE SF & SP



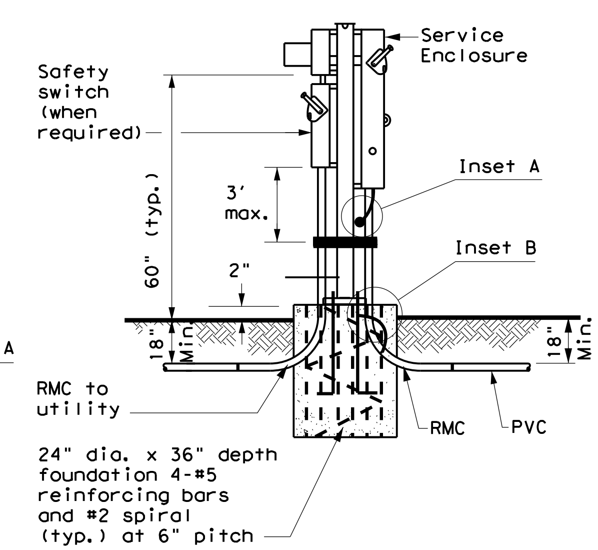
INSET A — INSET B



WITH SAFETY SWITCH — WITHOUT SAFETY SWITCH

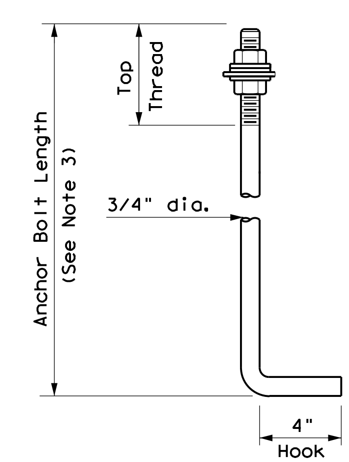
FRONT VIEW

SERVICE SUPPORT TYPE SF(U) - UNDERGROUND SERVICE



WITH SAFETY SWITCH

SERVICE SUPPORT TYPE SP(U) - UNDERGROUND SERVICE



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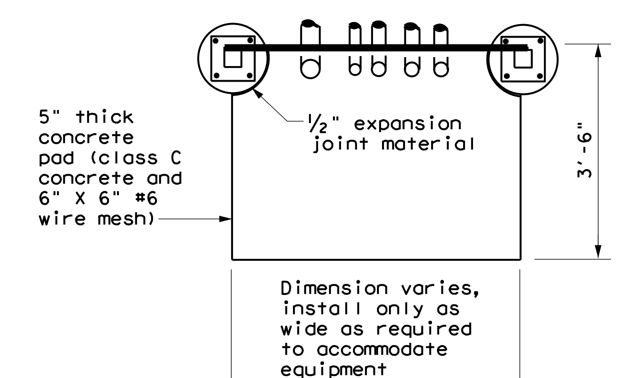

TOP VIEW

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

Texas Department of Transportation — Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES SF & SP

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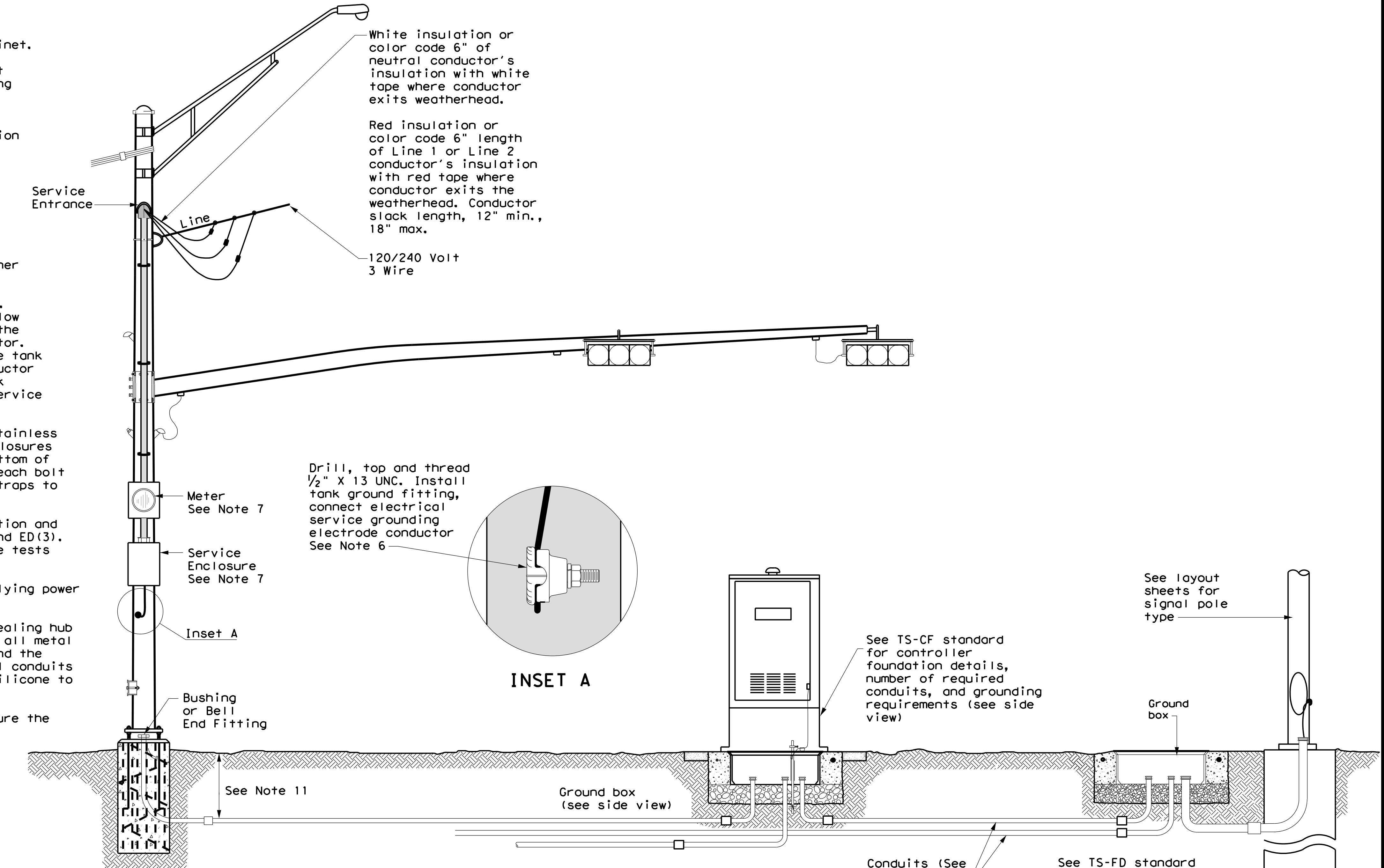
TRAFFIC SIGNAL NOTES

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

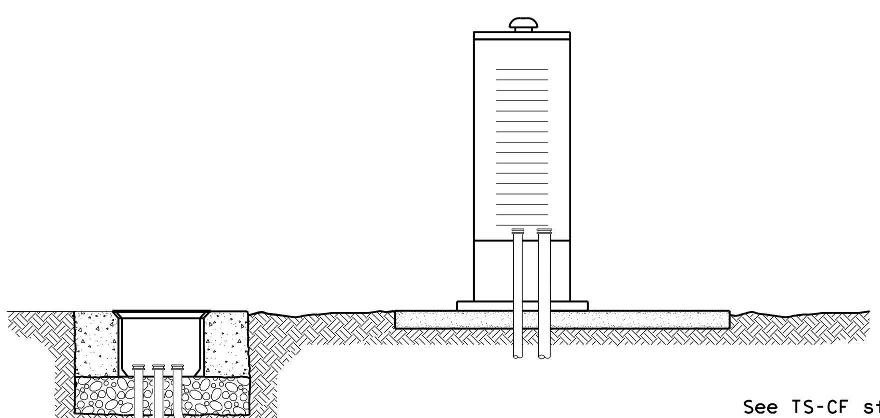


SIGNAL POLE WITH SERVICE

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

SIGNAL CONTROLLER FRONT VIEW

SIGNAL POLE



SIGNAL CONTROLLER SIDE VIEW

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

Texas Department of Transportation — Traffic Operations Division Standard

ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS

ED(8)-14

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TIMBER POLE (TP) SERVICE SUPPORT NOTES

1. Ensure electrical service support is a class 5 treated timber pole as per Item 627 "Treated Timber Poles." Embed timber pole to depth required in Item 627.
2. Conduit and electrical conductors attached to the electrical service pole and underground within 12 in. of service pole are not paid for directly but are subsidiary to the electrical service.
3. Install pole-top mounted photocell (T) on north side of pole, or in service enclosure (E) as required. See Electrical Service Data chart in plan set.
4. Gain pole as required to provide flat surface for each channel. Gain timber pole to ⅝ in. max. depth and 1 ⅞ in. max. height. Gain pole in a neat and workmanlike manner.
5. Mount meter and service equipment on stainless steel or galvanized channel (Unistrut, Kindorf, or equal). Provide channel sized 1 in. to 3 ¾ in. maximum depth, and 1½ in. to 1⅝ in. maximum width. File smooth the cut ends of galvanized channel and paint with zinc rich paint before installing on pole. Secure each channel section to timber pole with two galvanized or SS lag bolts, ¼ in. minimum diameter by 1½ in. minimum length. Use a galvanized or SS flat washer on each lag bolt. Do not stack channel.
6. When excess length must be trimmed from poles, trim from the top end only.

(1) Class 5 pole, height as required

(2) Service drop from utility company (attached below weatherhead)

(3) Service conduit (RMC) and service entrance conductors - One Red, One Black, One White (See Electrical Service Data)

(4) Safety switch (when required)

(5) Meter (when required)

(6) Service enclosure

(7) 6 AWG bare grounding electrode conductor in ½ in. PVC to ground rod - extend ½ in. PVC 6 in. underground.

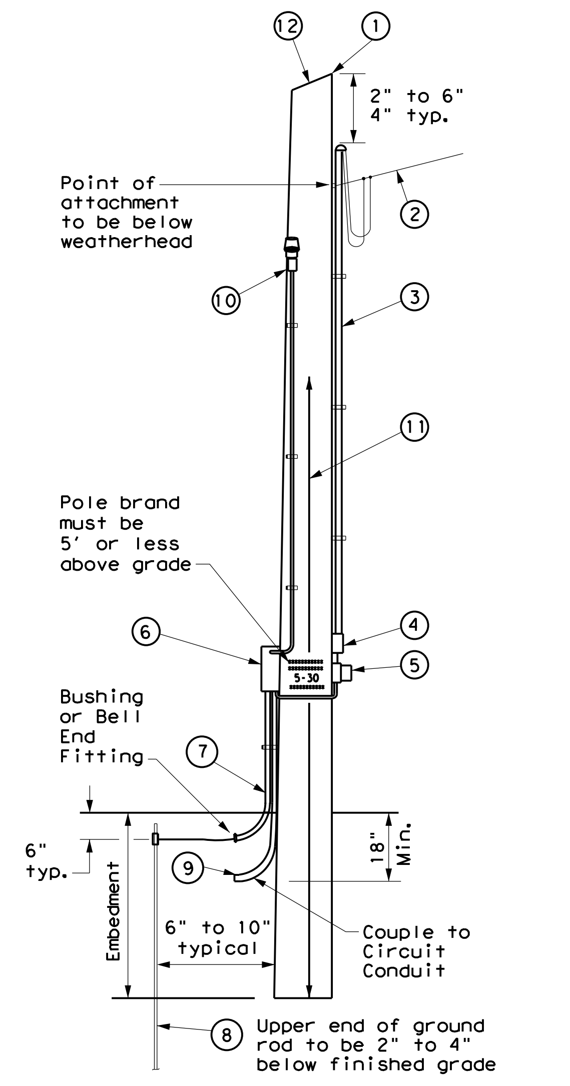
(8) ⅝ in. x 8 ft. Copper clad ground rod - drive ground rod to a depth of 2 in. to 4 in. below grade.

(9) RMC same size as branch circuit conduit.

(10) See pole-top mounted photocell detail on ED(5).

(11) When required by the serving utility provide bare 6 AWG copper conductor. Run wire from pole top to butt wrap or copper butt plate. Protect conductor with non-conductive material to a height of 8 ft. above finished grade.

(12) When required by utility, cut top of pole at an angle to enhance rain run off.

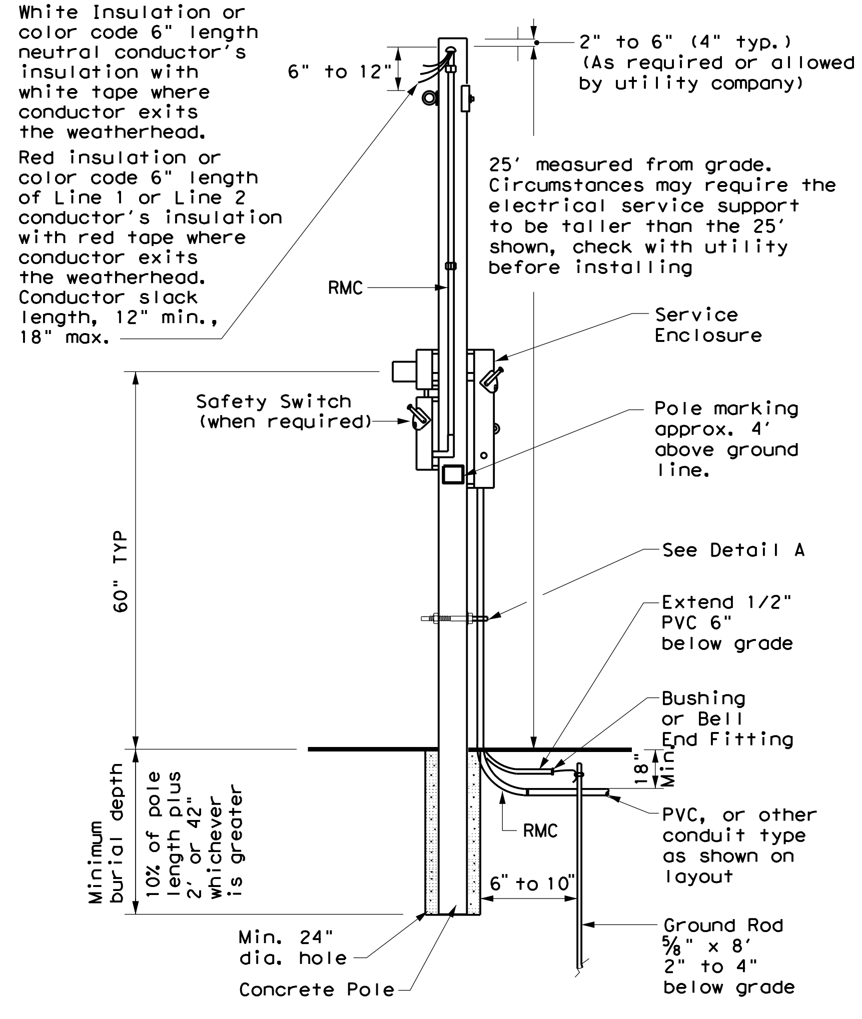


SERVICE SUPPORT TYPE TP (O)

GRANITE CONCRETE (GC) & OTHER CONCRETE (OC) NOTES

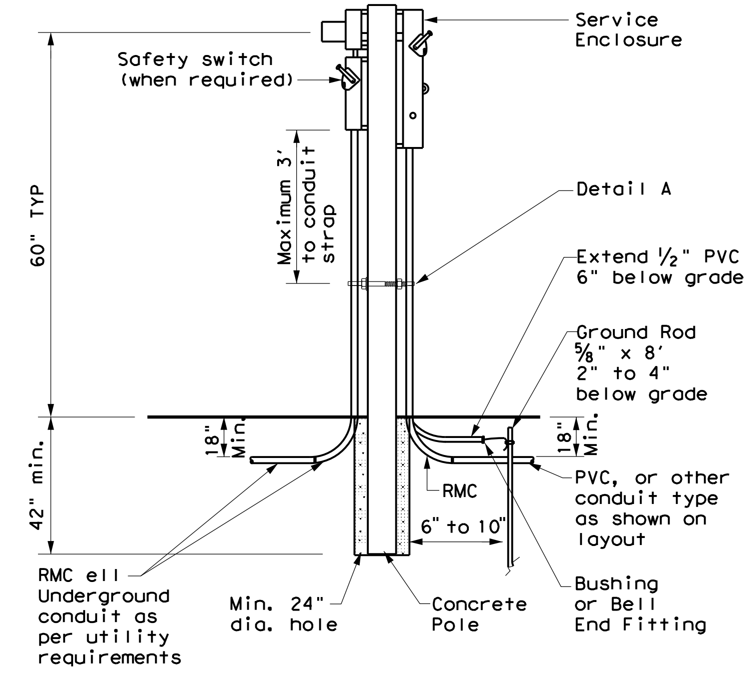
Ensure electrical service support structures bid as type Granite Concrete (GC) or Other Concrete (OC) meet the following requirements.

1. Provide GC and OC poles that meet the requirements of DMS 11080 "Electrical Services."
2. Provide prestressed concrete poles suitable for direct embedment into the ground without special foundations.
3. Verify poles are marked as required on DMS 11080. Location of marking should be approximately 4' above final grade. Use the two-point pickup locations when handling pole in horizontal position, and one-point pickup location for use in raising the pole to a vertical position. These marks are small but conspicuous.
4. Embed poles 42 in. or 10% of the length plus 2 ft., whichever is greater.
5. Ensure all installation details of services are in accordance with utility company specifications.
6. Install a one point rack or eye bolt bracket 6 inches to 12 inches below the weatherhead as an overhead service drop anchoring point for the electric utility.
7. Furnish and install galvanized or stainless steel channel strut 1 ½ in. or 1 ⅝ in. wide by 1 in. up to 3 ¾ in. deep (Unistrut, Kindorf, B-line or equal). Attach channel strut with stainless steel concrete anchors (max. 1" depth), square U-bolts or back to back channel strut with long bolts, or other secure mounting as approved by the Engineer. Ensure bolts are galvanized in accordance with ASTM A153. Do not stack channel struts.
8. Backfill the holes thoroughly by tamping in 6 in. lifts. After tamping to grade, place additional backfill material in a 6 inch high cone around the pole to allow for settling. Use material equal in composition and density to the surrounding area. Backfilling will not be paid for directly but is subsidiary to various bid items.



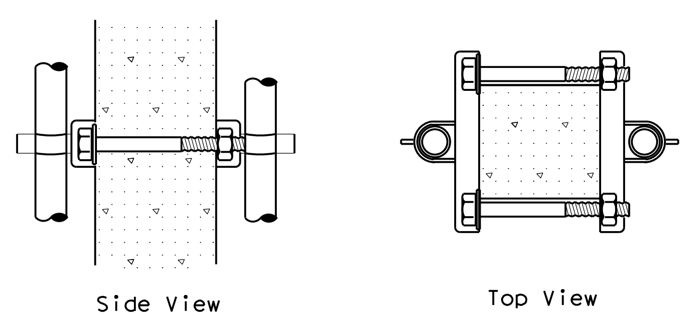
CONCRETE SERVICE SUPPORT

Overhead (O)



CONCRETE SERVICE SUPPORT

Underground (U)



DETAIL A

See Note 7. Before installing channel that has been cut, file sharp edges and paint with zinc-rich paint. Ensure there is no paint splatter on the pole.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES GC, OC, & TP

ED(10)-14

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DUCT CABLE & HDPE CONDUIT NOTES

1. Provide duct cable in accordance with Departmental Material Specification (DMS) 11060 "Duct Cable" and Item 622 "Duct Cable." Provide duct cable as listed on the Material Producer List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 622.

2. Provide High-Density Polyethylene (HDPE) conduit in accordance with DMS 11060 and Item 618, "Conduit." Provide HDPE as listed on the MPL on the Department web site under "Roadway Illumination and Electrical Supplies," Item 618.

3. Supply duct cable with a minimum 2 in. diameter, unless otherwise shown in the plans. Provide duct cable and HDPE conduit as shown by descriptive code or on the plans. Bend duct cable and HDPE conduit as recommended by the manufacturer, with a minimum bending radius of 26 in. for 2 in. duct. Follow manufacturers' recommendations when handling duct cable and HDPE conduit reels and during installation of duct cable and HDPE conduit.

4. Do not splice conductors within duct cable or HDPE conduit. Couple duct cable and HDPE entering a ground box or foundation to a PVC elbow. When galvanized steel RMC elbows are called for in the plans and any portion of the RMC elbow is buried less than 18" from possible contact, ground the RMC elbow.

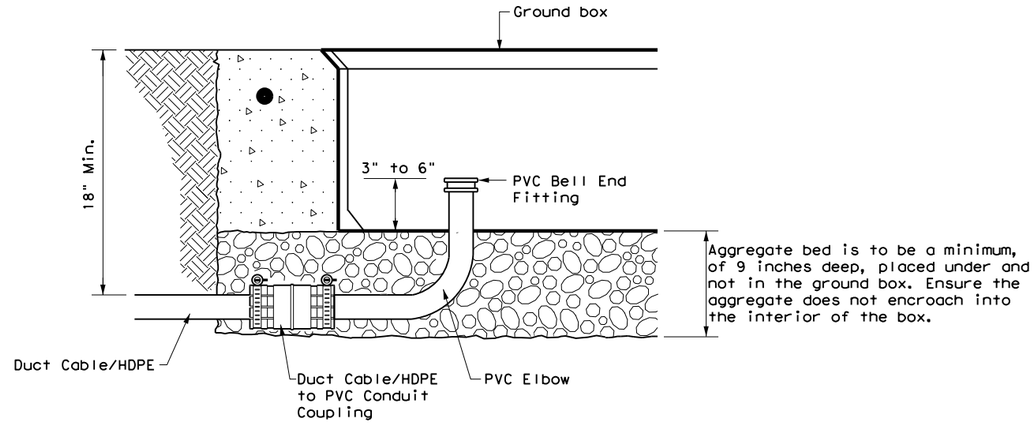
5. Furnish and install duct cable with factory installed conductors, sized as shown in the plans and as required by the National Electrical Code (NEC). The NEC contains specific requirements for duct cable in Article, "Nonmetallic Underground Conduit with Conductors: Type NUCC."

6. When conduit casing is called for in the plans, extend duct cable or HDPE conduit through the conduit casing in one continuous length without connection to the casing.

7. Seal the ends of duct cable or HDPE conduit with duct seal, expandable foam, or other approved method after completing the pull tests required by Item 622.

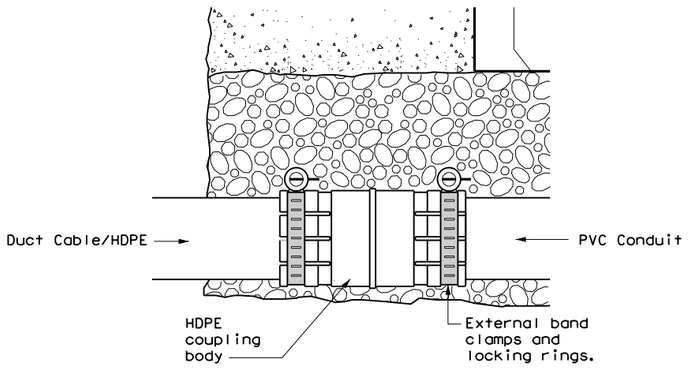
8. Provide minimum cover of 24 in. under roadways, 18 in. in other locations, or as shown on the plans.

9. Furnish and install listed fittings to couple duct cable or HDPE conduit to other types of conduit. Duct cable and HDPE conduit may be field-threaded and spliced with PVC or RMC threaded couplings; connected with listed tie-wrap fittings; connected using listed coupling made of HDPE with stainless steel external banding clamps and locking rings; connected with approved electrofusion conduit couplings; or connected using an approved chemical fusion method using an epoxy or adhesive specifically designed for HDPE couplings and connectors all installed in accordance with their manufacturer's instructions. Do not use PVC glue on HDPE. Do not use water pipe fittings, or connect conduit with heat shrink tubing.

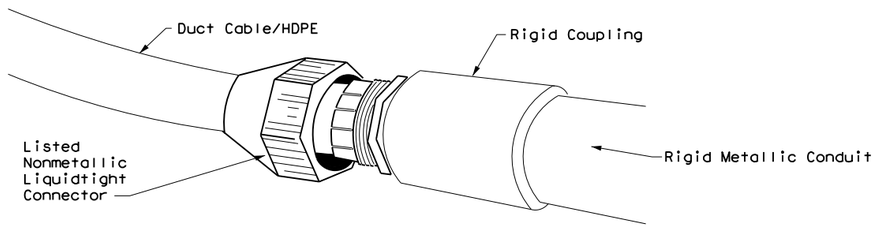


DUCT CABLE/HDPE AT GROUND BOX

When the upper end of an RMC Ell does not enter the ground box, it may be extended with a SCH-40 PVC conduit nipple and bell end, provided there is a minimum of 18" of cover over all parts of the elbow. If not, a rigid extension and ground bushing is required.

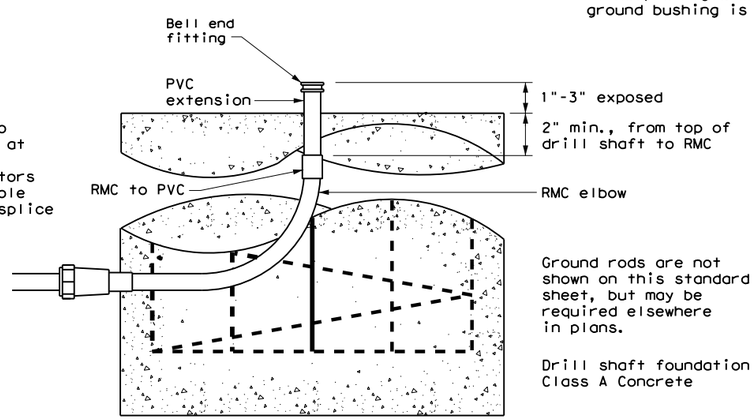


DUCT CABLE/HDPE TO PVC

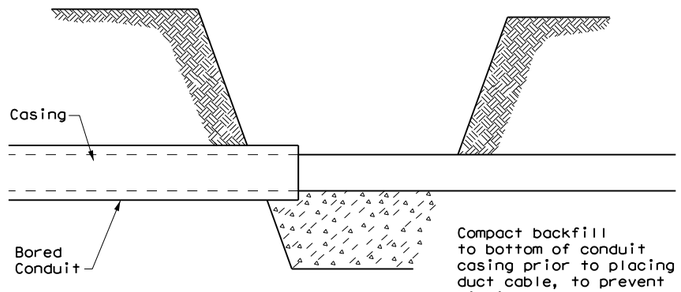


DUCT CABLE/HDPE TO RMC

Couple duct to conduit elbow at foundations. Ensure conductors extend into pole base. Do not splice conductors in conduit.



DUCT CABLE / HDPE AT FOUNDATION



BORE PIT DETAIL

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
DUCT CABLE/ HDPE CONDUIT

ED(11)-14

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ROADWAY ILLUMINATION ASSEMBLY NOTES

1. Details apply to roadway lighting installations bid or referenced under Item 610, "Roadway Illumination Assemblies." Provide, furnish, and install all other materials not shown on the plans which may be necessary for complete and proper construction. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the State such warranties or guarantees.

2. The locations of poles and fixtures may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. 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, Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection.

4. Provide Roadway Illumination Light Fixtures as per TxDOT Departmental Material Specification (DMS) 11010, Item 610, and as shown on the Material Producers List (MPL) for Roadway Illumination and Electrical Supplies.

5. Fabricate steel roadway illumination poles in accordance with Roadway Illumination Poles (RIP) standards and Item 610. Poles fabricated according to RIP standards do not require shop drawing submittals.

   a. Alternate designs to RIP standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically. For instructions on submitting shop drawings electronically see "Guide to Electronic Shop Drawing Submittal" on the TxDOT web site.

   b. Limitations on use of the RIP standard: The RIP standard details were developed for installations in locations where the 3-second gust basic maximum wind speed is 110 mph, and where the elevation of the base of the pole is less than (i.e. not more than) 25' above the elevation of the surrounding terrain, in accordance with the "AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," 6th Edition (2013) of the AASHTO Design Specifications. For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25' above the surrounding terrain, provide poles meeting the following requirements:

      i. Submittals. Following the electronic shop drawing submittal process (see Guide to Electronic Shop Drawing Submittal on the TxDOT web site), submit to the Engineer for approval fabrication drawings and calculations for the poles, sealed by a Texas licensed professional engineer (P.E.).

      ii. Luminaire Structural Support Requirements. Provide light poles, arms, and anchor bolt assemblies with a 25 year design life to safely resist dead loads, ice loads and the required basic wind speeds at the location of installation in accordance with the 6th edition (2013) of the AASHTO Design Specifications. For transformer base poles, include transformer base and connecting hardware in calculations and shop drawing submittals. Structurally test all transformer bases to resist the theoretical plastic moment capacity of the pole. Submit certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished with the shop drawings. Show breakaway base model number, manufacturer's name, and logo on shop drawings. Include on manufacturer's shop drawings the ASTM designations for all materials to be used.

6. For both transformer and shoe-base type illumination poles, provide and install double-pole breakaway fuse holders as specified by DMS-11040. Breakaway fuse holders are listed on the MPL for Roadway Illumination and Electrical Supplies under Items 610 & 620. Provide 10 amp time delay fuses for breakaway connectors in light poles, or inside the light fixture for underpass luminaires. In each pole, connect luminaires to the breakaway connector with continuous stranded 12 AWG copper conductors as listed on the MPL. Bond all equipment grounding conductors together and to the ground lug in the transformer base or hand hole.

7. Tighten anchor bolts for shoe base, concrete traffic barrier base, and bridge mount roadway illumination poles, in accordance with Item 449.

8. Install T-Base with following procedure:

   a. Anchor Bolt Tightening.

      i. Coat the threads of the anchor bolts with electrically conductive lubricant.

      ii. Place the T-base over the anchor bolts. Foundation must be level and flat. The maximum permissible gap under any one corner of the t-base is 1/8" before nuts are tightened.

      iii. Coat the bearing surfaces of the nuts and washers with electrically conductive lubricant. Install (1) 1/2" hold down washer, (1) lock washer, and (1) nut on each anchor bolt. Turn the nuts onto the bolts so that each is hand-tight against the washer.

      iv. Using a torque wrench, tighten each nut to 150 ft-lb. Uniform contact is required between the foundation and the T-base in the corner regions of the T-base, and all corner gaps must be closed after applying torque. If a gap still exists after torquing to 150 ft-lbs, continue torquing each bolt incrementally until gap is closed or maximum allowable torque of 250 ft. pound is reached, whichever comes first. If 250 ft-lbs is not enough to close the gap the foundation must be leveled. Gaps along the straight sides of the T-bases and the foundation are permissible. Ensure that no high point of contact occurs between the straight sides of the T-base and the foundation.

      v. Check top of T-base for level. If not level then foundation must be leveled.

   b. Top Bolt Procedure

      i. Erect pole over T-base with crane. Coat bolts, nuts, washers, and lock washers with electrically conductive lubricant.

      ii. Install bolts and 1/2" connecting washers from the inside of the T-base, thread up through the pole base. Install flat washers, lock washers and nuts snug tight according to Item 447, "Structural Bolting."

      iii. Tighten each nut to 150 ft-lb. using a torque wrench.

   c. Level and Plumb

      i. Ensure pole is plumb and mast arm is perpendicular to the roadway according to plans to within 5 degrees.

9. Construct luminaire pole foundations in accordance with Item 416, "Drilled Shaft Foundations," and TxDOT standard sheet RID(2).

10. Provide and install underpass luminaires in accordance with Item 610, DMS-11010, and TxDOT standard sheet RID(3). Typical luminaire size for underpass luminaires is 150W HPS or 150W EQ LED.

11. Mount luminaires on arms level as shown by the luminaire level indicator.

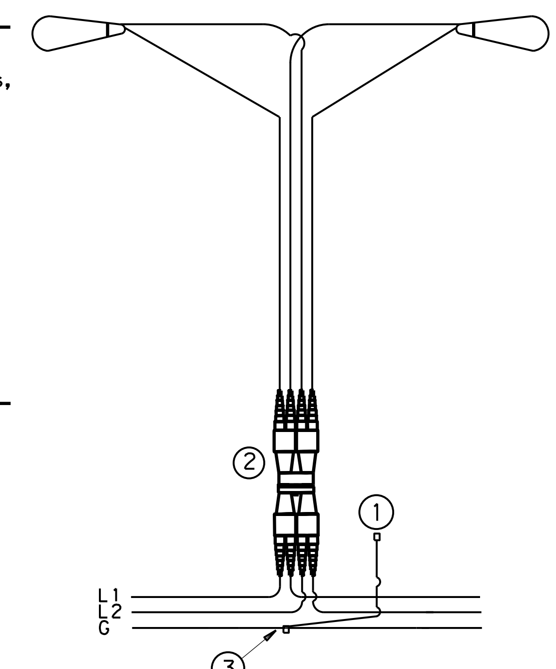
12. Orient luminaires perpendicular to the roadway intended to be lit unless otherwise shown on the plans.

Wiring Diagram Notes:

① Use 1/2 in.-13 UNC threaded, copper or tin-plated copper, pole bonding connector, sized appropriately for conductors, bonded to T-base, or use ground lug in handhole as available.

② Use pre-qualified two-pole breakaway connectors for all luminaire pole installations. For luminaires fed by a circuit with a neutral conductor, use double pole breakaway connectors with the neutral side unfused and marked white.

③ Split Bolt or other connector.



L1,L2 = Hot Conductors
G = Grounding Conductor

TYPICAL WIRING DIAGRAM

LUMINAIRES SERVED AT 480V ON 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR 120/240 VOLT SERVICE.

Decorative LED Lighting Notes:

1. LED Drivers in Remote Outdoor enclosures (for drivers that do not include an enclosure as part of a factory assembly):

   a. Provide NEMA 3R outdoor enclosure or as approved.

   b. Install enclosure at least 12" above ground or other horizontal surface. Mount vertically or on ceiling, and avoid direct sun where possible.

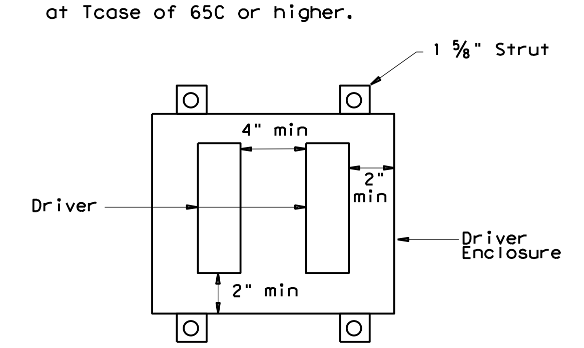
   c. Install drivers with at least 2 inches of space from enclosure walls.

   d. For multiple drivers in an enclosure, provide at least 4 inches side to side and 1 inch end to end from other drivers or electronic equipment

   e. For drivers mounted on back wall of enclosure, mount enclosure on 1 5/8" strut or other standoff to dissipate heat, or mount driver to side of the enclosure or to the metal cover.

   f. Provide remote drivers with a maximum of 100 watts

   g. Provide drivers with documentation of 100,000 hr lifetime at Tcase of 65C or higher.



Driver Spacing In Remote Enclosure

Texas Department of Transportation | Traffic Safety Division Standard

ROADWAY ILLUMINATION DETAILS

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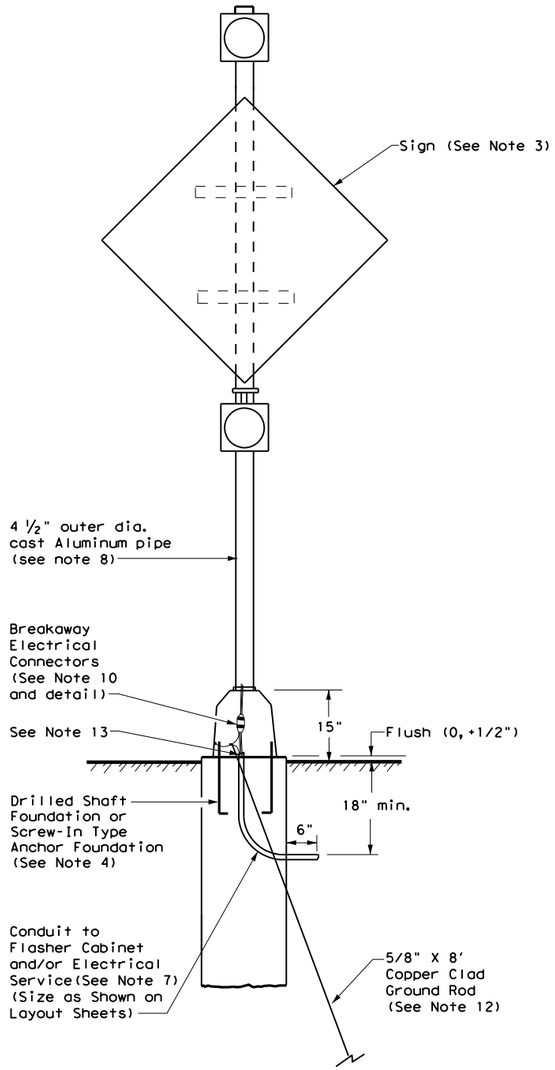
GENERAL NOTES:

1. Details show a typical warning sign with two flashing beacon heads, other arrangements are possible. When only one beacon is required, install the upper beacon.
2. See Item 685, "Roadside Flashing Beacon Assemblies" for further requirements.
3. See SMD standard sheets for lateral and vertical clearances and sign mounting details. Install signs as shown on the sign layout sheets.
4. Use either a Screw-In Type Anchor Foundation or a Drilled Shaft Foundation as shown elsewhere in the plans. When plans require a Drilled Shaft Foundation, see standard sheet TS-FD. Install the Screw-In Type Anchor Foundation as per manufacturer's recommendations. On a slope, install one edge at ground level. Screw-In/Drilled Shaft Foundation is subsidiary to Item 685. Installation of a ground rod is not required for solar powered flashing beacon assemblies.
5. When used, provide Screw-In Type Anchor Foundations as shown on TxDOT's Material Producer List (MPL) in the file "Highway Traffic Signals".
6. Install beacon heads as shown here, as shown elsewhere on the plans, or as directed. Use hardware specifically designed for mounting beacon heads on poles.
7. Conduit in foundation and within 6 in. of foundation is subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies."
8. Unless otherwise shown on the plans, pole shaft shall be one piece, Schedule 40 Aluminum pipe, ASTM B429 or B221 (Alloy 6061-T6 only). Aluminum conduit will not develop the necessary strength and will not be allowed.
9. Per manufacturer's recommendations, engage all threads on the pedestal pole base and pipe unless the pipe is fully seated into base. In high winds, use a pole and base collar assembly to add strength and prevent loosening of connection.
10. Provide single pole non-fused watertight breakaway electrical connectors for frangible pedestal pole bases, as shown on TxDOT's MPL in the file "Roadway Illumination and Electrical Supplies." Approved models are listed under Item 685. For ungrounded (hot) conductors, install a breakaway connector with a dummy fuse slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).
11. Provide clearance as shown above the sidewalk or pavement grade at the edge of the road. When a bottom beacon is not used, mount the bottom of the sign at least 7 ft. above the sidewalk or pavement grade at the edge of the road.
12. Make connections to ground rods according to NEC. Ground rod clamps shall be listed for their intended purpose.
13. Ensure height of conduit and ground rod is below top of anchor bolts.



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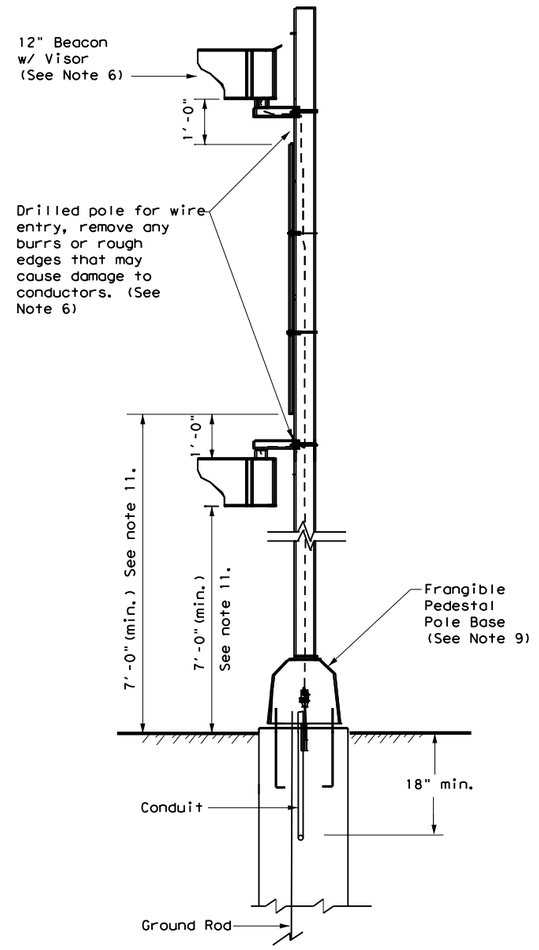

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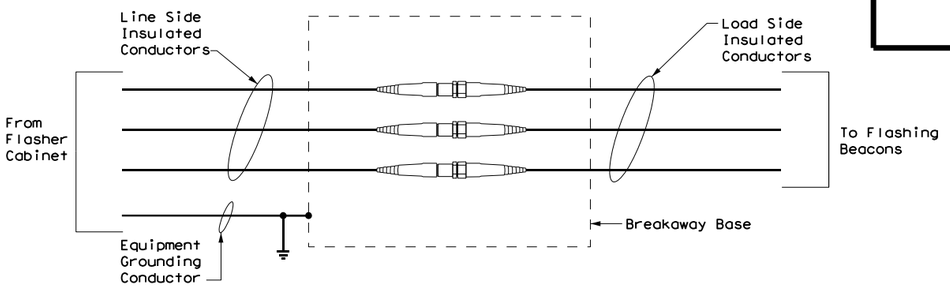
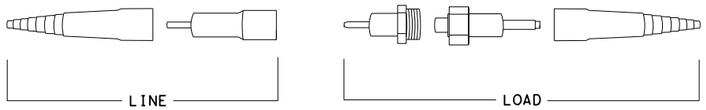


NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS
EXPLODED VIEW

Texas Department of Transportation

Traffic Operations Division Standard

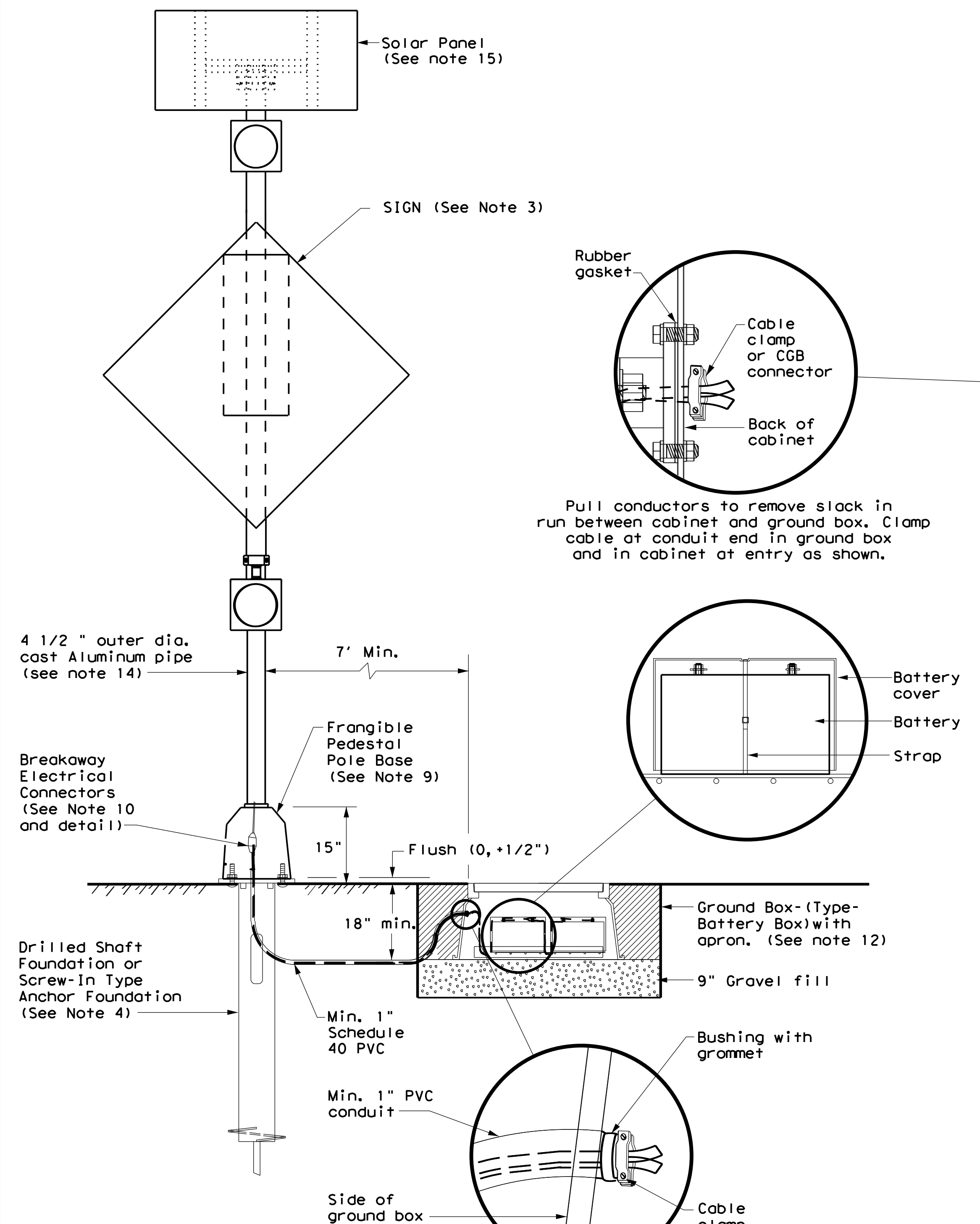
ROADSIDE FLASHING BEACON ASSEMBLY

RFBA-13

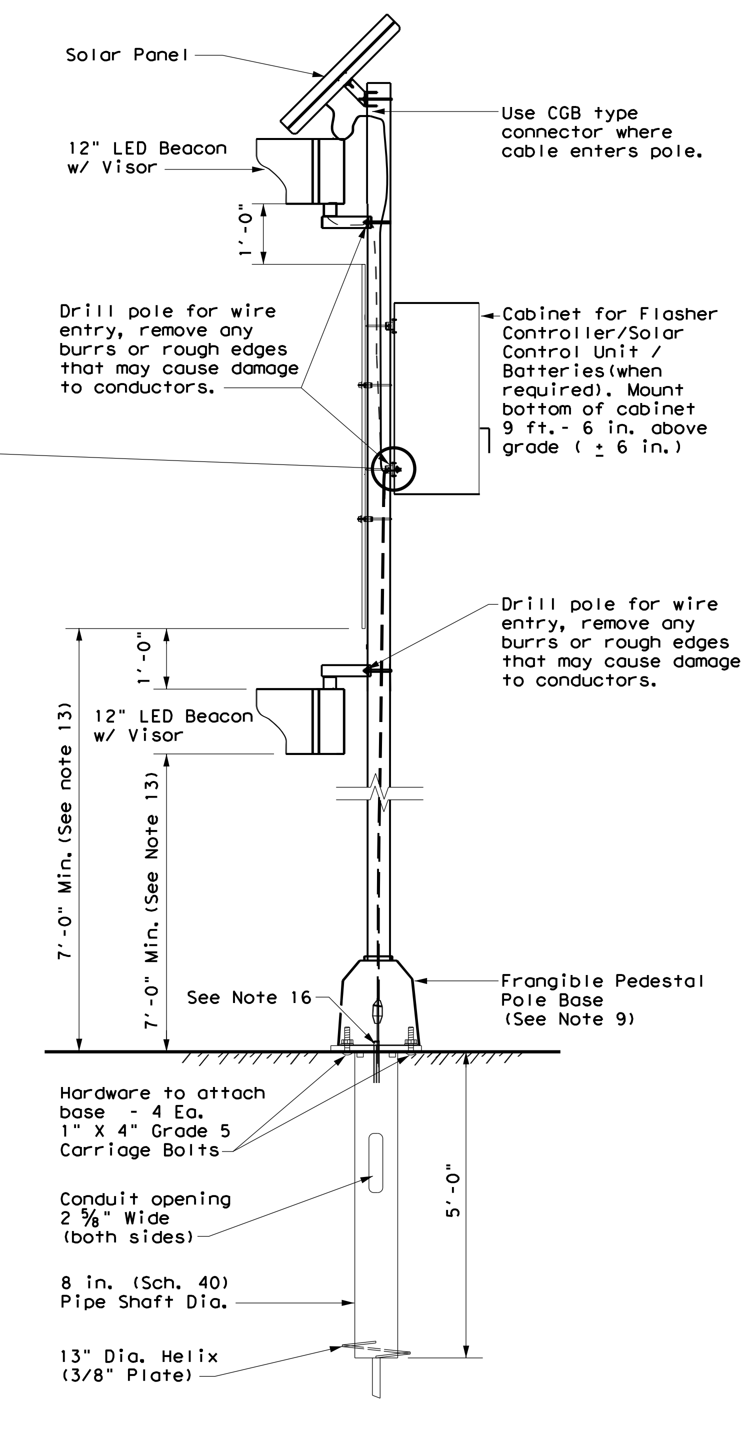
FILE: rfba-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT January 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	00	112	VAR
5-93 12-04	DIST	COUNTY		SHEET NO.
10-93 3-13	LBB	VARIOUS		099
4-98				

GENERAL NOTES:

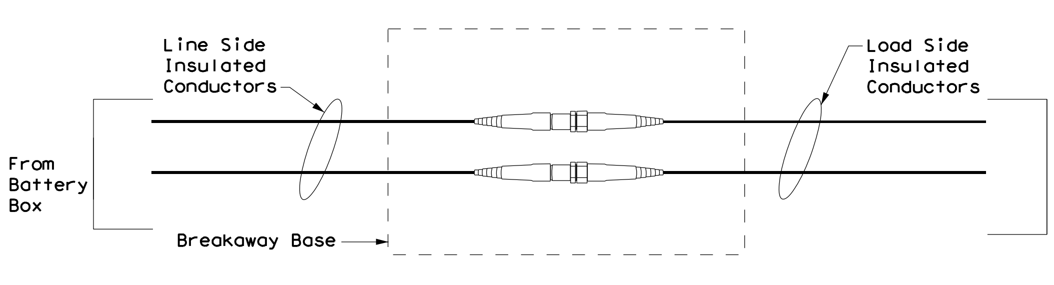
1. Details show a typical warning sign with two flashing beacon heads, other arrangements are possible. When only one beacon is required, install the upper beacon.
2. See Item 685, "Roadside Flashing Beacon Assemblies" for further requirements.
3. See SMD standard sheets for lateral and vertical clearances and sign mounting details. Install signs as shown on the sign layout sheets.
4. Use either a Screw-In Type Anchor Foundation or a Drilled Shaft Foundation as shown elsewhere in the plans. When plans require a Drilled Shaft Foundation, see standard sheet TS-FD. Install the Screw-In Type Anchor Foundation as per manufacturer's recommendations. On a slope, install one edge at ground level. Screw-In/Drilled Shaft Foundation is subsidiary to Item 685. Installation of a ground rod is not required for solar powered flashing beacon assemblies.
5. When used, provide Screw-In Type Anchor Foundations as shown on TxDOT's Material Producer List (MPL) in the file "Highway Traffic Signals".
6. Use materials specifically designed for attaching cabinets, beacon heads, solar panels, etc., to poles.
7. Install beacon heads as shown here, as shown elsewhere on the plans, or as directed. Use hardware specifically designed for mounting beacon heads on poles.
8. Conduit in foundation and within 6 in. of foundation is subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies."
9. Per manufacturer's recommendations, engage all threads on the pedestal pole base and pipe unless the pipe is fully seated into base. In high winds, use a pole and base collar assembly to add strength and prevent loosening on connection.
10. Provide single pole non-fused watertight breakaway electrical connectors for frangible pedestal pole bases, as shown on TxDOT's MPL in the file "Roadway Illumination and Electrical Supplies." Approved models are listed under Item 685. For ungrounded (hot) conductors, install a breakaway connector with a dummy fuse slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).
11. Install the batteries in a battery box. Place the batteries on a 3/16" thick plastic sheet and connect together. Place a plastic cover (battery bell jar) over the top of each battery and secure the battery bell jar to the battery with a strap. The batteries, bell jars, straps and 3/16" plastic sheet are subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies." When required, install batteries in the flasher cabinet. Wire batteries according to manufacturers recommendations. Provide the number of batteries as required by the manufacturer.
12. See standard sheet Electrical Details (ED) for additional requirements regarding the installation of ground boxes/battery boxes, conduit, and cabinets.
13. Provide clearance as shown above the sidewalk or pavement grade at the edge of the road. When a bottom beacon is not used, mount the bottom of the sign at least 7 ft. above the sidewalk or pavement grade at the edge of the road.
14. Unless otherwise shown on the plans, pole shaft shall be one piece, Schedule 40 Aluminum pipe, ASTM B429 or B221 (Alloy 6061-T6 only). Aluminum conduit will not develop the necessary strength and will not be allowed.
15. Orient solar panel for optimum exposure to sunlight (face to the south). Prior to installation, check the location to ensure there is no overhead obstruction that would block the solar panel from receiving full sunlight. Unless specified elsewhere, mount a minimum of 14' above grade.
16. Ensure height of conduit is below top of anchor bolts.



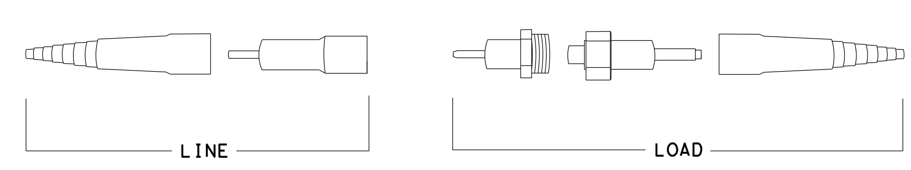
FRONT



SIDE



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS
EXPLODED VIEW

Texas Department of Transportation

Traffic Operations Division Standard

SOLAR POWERED ROADSIDE FLASHING BEACON ASSEMBLY DETAILS

SPRFBA(1)-13

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©TxDOT May 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	00	112	VAR
12-04 3-13	DIST		COUNTY	SHEET NO.
	LBB		VARIOUS	100

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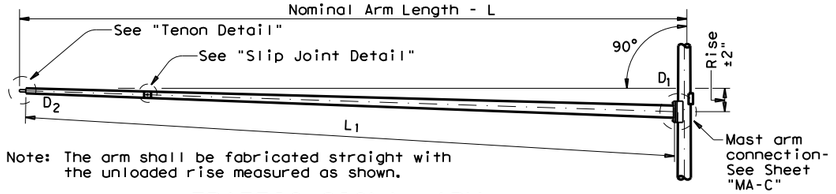
Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D_B	D_{19}	D_{24}	D_{30}	① thk	D_B	D_{19}	D_{24}	D_{30}	① thk	
ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
20	12.0	9.3	8.6	7.8	.239	12.5	9.5	8.7	7.8	.239	36-A
24	12.0	9.3	8.6	7.8	.239	13.0	10.0	9.2	8.3	.239	36-A
28	12.0	9.3	8.6	7.8	.239	13.5	10.5	9.7	8.8	.239	36-A
32	13.0	10.3	9.6	8.8	.239	14.0	11.0	10.2	9.3	.239	36-A
36	13.5	10.8	10.1	9.3	.239	15.0	12.0	11.2	10.3	.239	36-A
40	14.0	11.3	10.6	9.8	.239	16.0	13.0	12.2	11.3	.239	36-B
44	14.5	11.8	11.1	10.3	.239	16.5	13.5	12.7	11.8	.239	36-B

Arm Length	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	① thk	Rise	L_1	D_1	② D_2	① thk	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	8.0	5.3	.179	1'-8"	19.1	8.0	3.5	.179	1'-7"
24	23.1	9.0	5.8	.179	1'-9"	23.1	9.0	3.5	.179	1'-8"
28	27.1	9.5	5.7	.179	1'-10"	27.1	10.0	3.5	.179	1'-9"
32	31.0	9.5	5.2	.239	1'-11"	31.0	9.5	3.5	.239	1'-10"
36	35.0	10.0	5.1	.239	2'-0"	35.0	10.0	3.5	.239	1'-11"
40	39.0	10.5	5.1	.239	2'-3"	39.0	11.0	3.5	.239	2'-1"
44	43.0	11.0	5.1	.239	2'-8"	43.0	11.5	4.0	.239	2'-3"

D_B = Pole Base O.D.
D_{19} = Pole Top O.D. with no Luminaire and no ILSN
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L = Nominal Arm Length

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

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



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

TRAFFIC SIGNAL ARM

(Fixed Mount)

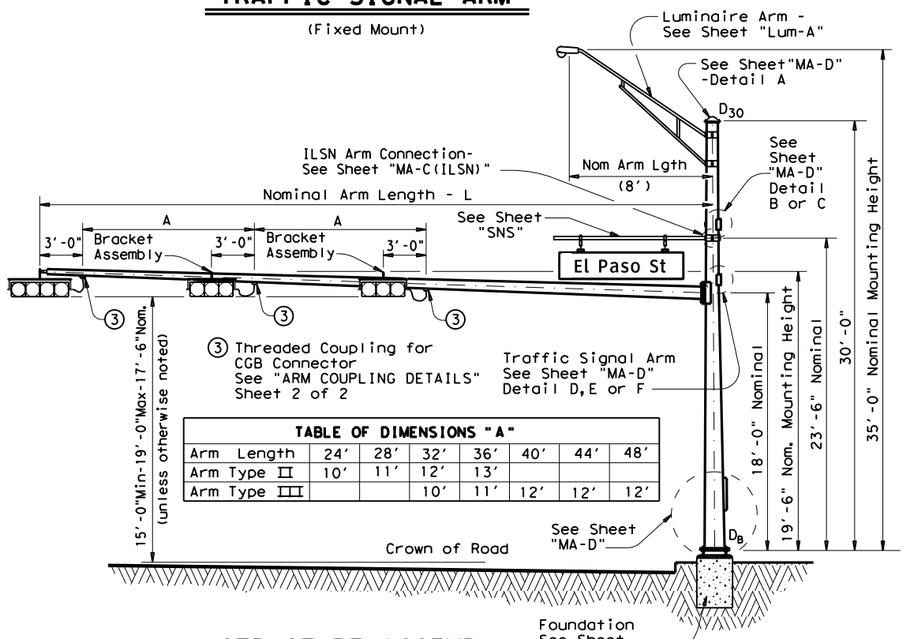


TABLE OF DIMENSIONS "A"

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

STRUCTURE ASSEMBLY

SHIPPING PARTS LIST

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

Nominal Arm Length	30' Poles With Luminaire		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-100		20S-100		20-100	
24	24L-100	**2**	24S-100		24-100	**3**
28	28L-100		28S-100		28-100	**2**
32	32L-100	**1**	32S-100		32-100	
36	36L-100	**1**	36S-100		36-100	**3**
40	40L-100	**3**	40S-100		40-100	**3**
44	44L-100	**3**	44S-100		44-100	**11**

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-100					
24	24I-100		24II-100	**5**		
28	28I-100		28II-100	**2**		
32			32II-100	**1**	32III-100	
36			36II-100	**3**	36III-100	**1**
40					40III-100	**6**
44					44III-100	**14**

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	**10**

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

Nominal Arm Length	Quantity
7' Arm	
9' Arm	

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
1 ½"	3'-4"	
1 ¾"	3'-10"	**12**
2"	4'-3"	**20**

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.

SHEET 1 OF 2

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(100 MPH WIND ZONE)

SMA-100(1)-12

DN: MS	CK: JSY	DW: MMF	CK: JSY

REVISIONS
5-96
11-99
1-12

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DIST	COUNTY		SHEET NO.
LBB	VARIOUS		101

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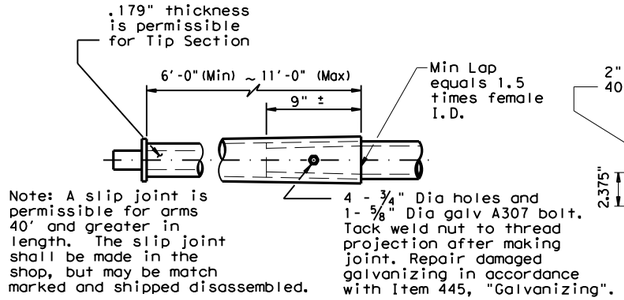
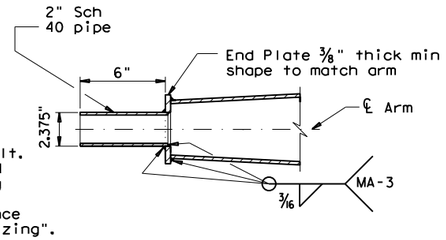


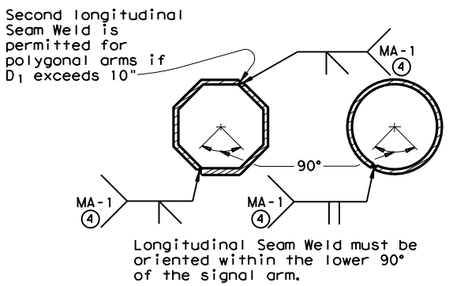
SLIP JOINT DETAIL



TENON DETAIL

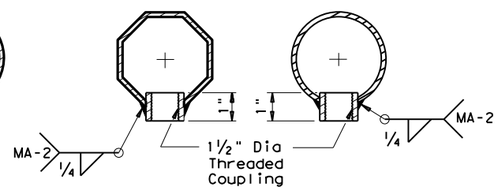
Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

④ 60% Min. penetration
100% pemetration within 6" of circumferential base welds.



ARM COUPLING DETAILS

VIBRATION WARNING

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

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

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

The traffic signal mast arms shall be visually inspected in 5 to 20 mph wind conditions after installation of signal heads and any attachments, including any required backpates. If vertical movements with a total excursion (maximum upward excursion to maximum downward excursion) of more than approximately 8" are observed at the arm tip, a damping plate shall be fitted to the arm. See "Damping Plate Mounting Details" on standard sheet, MA-DPD-10.

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

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 100 mph plus a 1.3 gust factor.

Poles are designed to support one 8'-0" luminaire arm, one 9'-0" internally lighted street name sign and one traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 60 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.6 sq ft. The specified internally lighted street name sign load applied 4.5 ft from the centerline of the pole equals 85 lbs vertical dead load plus horizontal wind load on an effective projected area of 11.5 sq ft. The specified signal load applied at the end of the traffic signal arm equals 180 lbs vertical dead load plus the horizontal wind load on an effective projected area of 32.4 sq ft (actual area times drag coefficient).

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

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

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

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

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(100 MPH WIND ZONE)

SMA-100(2)-12

DN: MS	CK: JSY	DW: MMF	CK: JSY

REVISIONS
5-96
1-12

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DIST	COUNTY		SHEET NO.
LBB	VARIOUS		102

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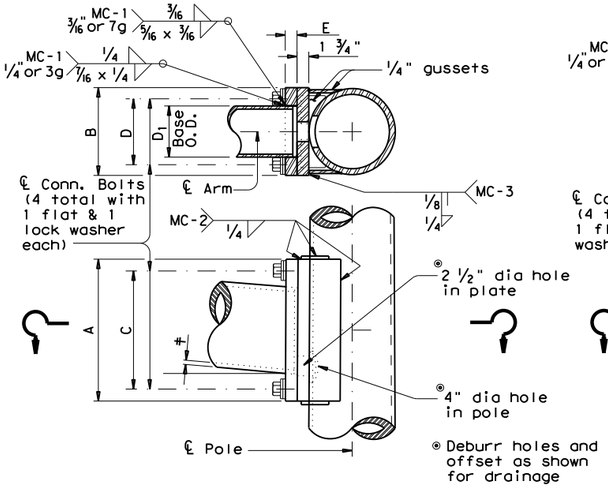
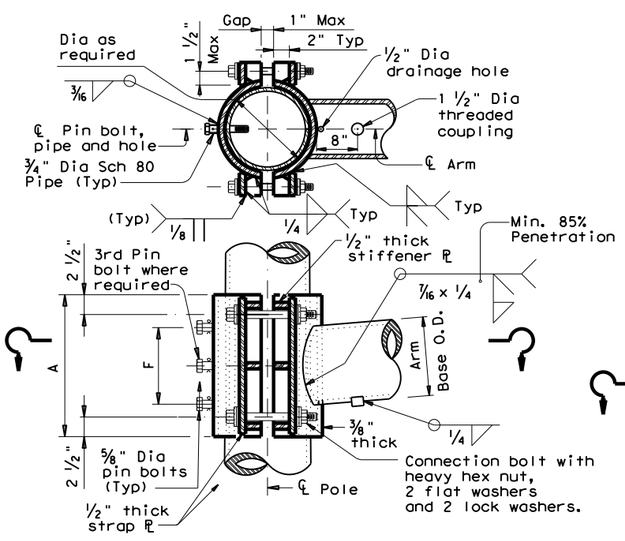
ARM SIZE D_1	ARM SIZE ǂ	A	B	C	D	E	CONN BOLT DIA
in.	in.	in.	in.	in.	in.	in.	in.
6.5	.179	12	9	9	6	1 ¾	1
7.5	.179	13	9	10	6	1 ¾	1
8.0	.179	14	10	11	7	2	1 ¼
9.0	.179	16	11	13	8	2	1 ¼
9.5	.179	17	12	14	9	2	1 ¼
9.5	.239	18	12	15	9	2	1 ¼
10.0	.239	18	12	15	9	2	1 ¼
10.5	.239	18	13	15	10	3	1 ½
11.0	.239	18	13	15	10	3	1 ½



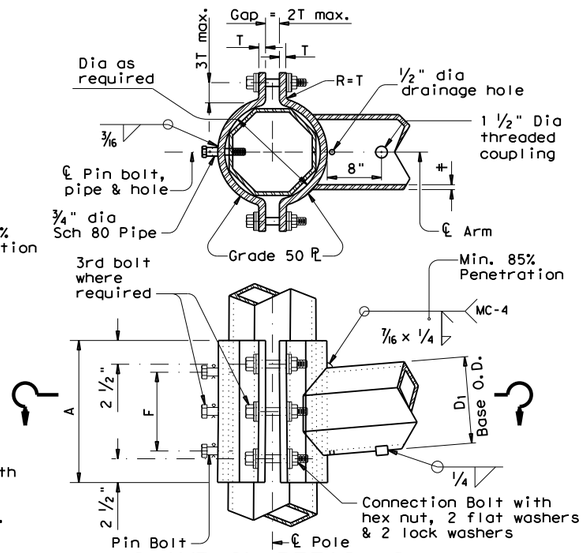
FIXED MOUNT DETAIL 1

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



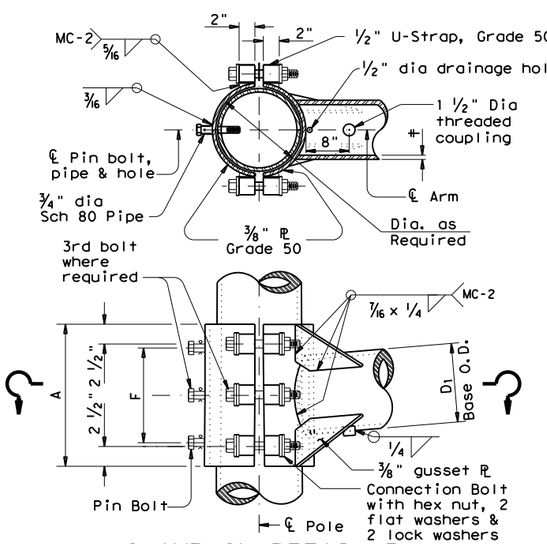
CLAMP-ON DETAIL 1

ARM SIZE D_1	ARM SIZE ǂ	A	F	T	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	in.	ea.	in.	ea.	in.
7.0	.179	12	6	¾	4	¾	2	5/8
7.5	.179	14	8	¾	4	¾	2	5/8
8.0	.179	14	8	¾	4	¾	2	5/8
9.0	.179	16	10	⅞	4	1	2	5/8
10.0	.179	18	10	⅞	4	1	2	5/8
9.5	.239	18	10	1	6	1	3	5/8
10.0	.239	18	10	1	6	1	3	5/8

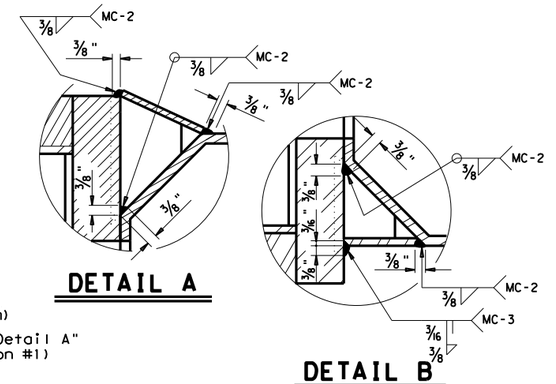


CLAMP-ON DETAIL 2

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

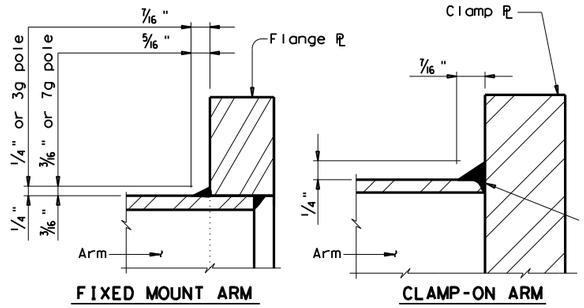


CLAMP-ON DETAIL 3



DETAIL A

DETAIL B



ARM BASE WELD DETAILS

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

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 ½" wide vertical slotted hole shall be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1"

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

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

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

NOTE:

Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and ¾" dia pipe shall have 5/16" dia holes for a 1/8" dia galvanized cotter pin. Back clamp plate shall be furnished with a ¾" dia hole for each pin bolt. An 11/16" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

MAST ARM CONNECTIONS

MA-C-12

DN: MS	CK: JSY	DW: MMF	CK: JSY
REVISIONS	CONT	SECT	JOB	HIGHWAY
5-96	0905	00	112	VAR
5-09	DIST	COUNTY		SHEET NO.
1-12	LBB	VARIOUS		103

126A

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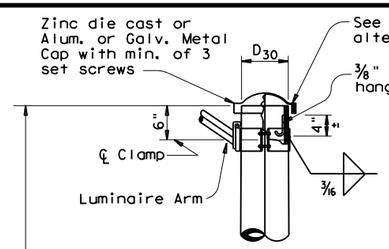
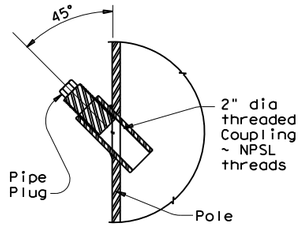
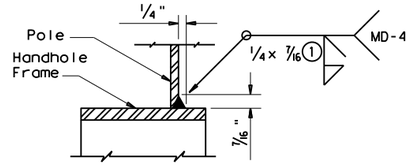


DETAIL A

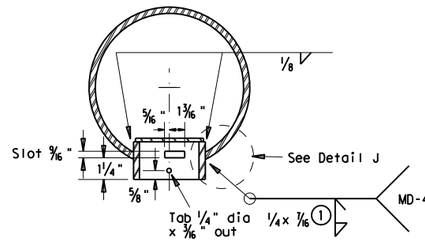
(for pole with luminaire)



POLE COUPLING DETAIL

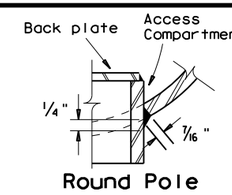


DETAIL G

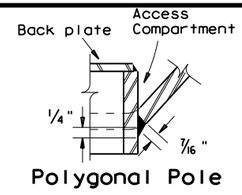


SECTION X-X

Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.

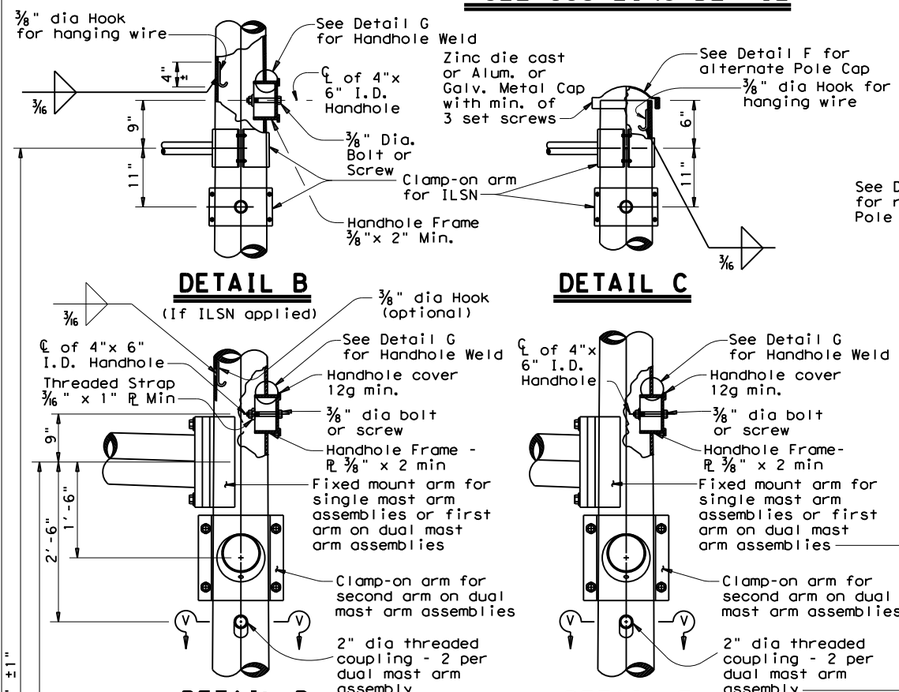


Round Pole



Polygonal Pole

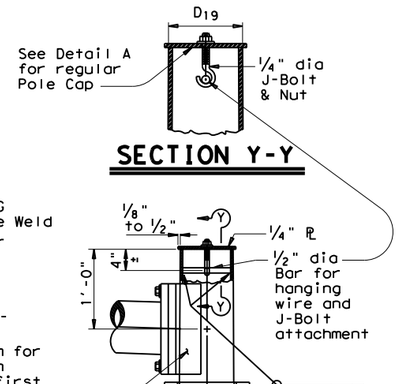
DETAIL J



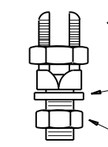
DETAIL B

(If ILSN applied)

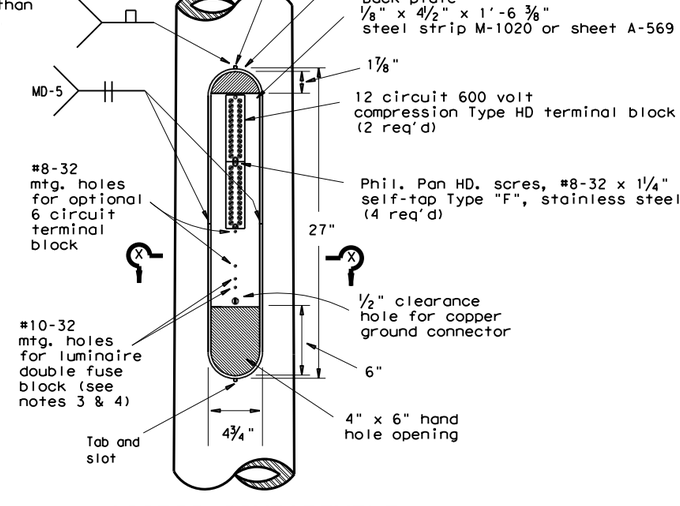
DETAIL C



SECTION Y-Y



COPPER GROUND CONNECTOR



ACCESS COMPARTMENT

DETAIL D

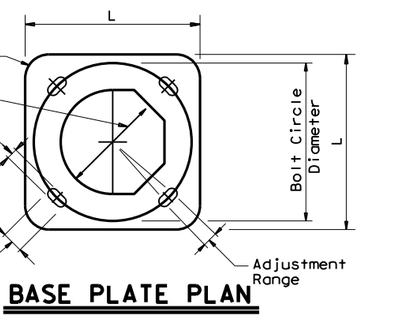
(for 30' pole with luminaire and ILSN sign)

DETAIL E

(for 24' pole with ILSN sign and no luminaire)

DETAIL F

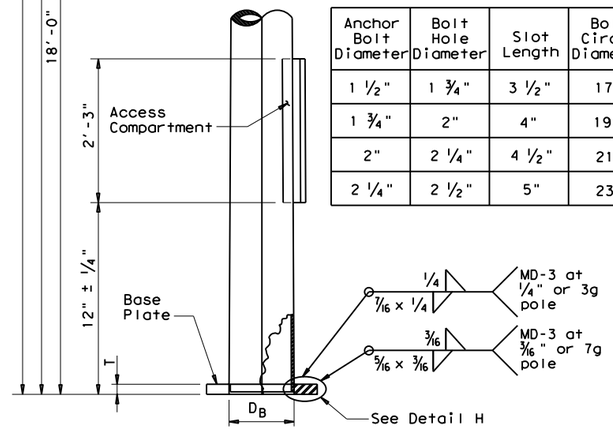
(for 19' pole with no ILSN sign and no luminaire)



SECTION V-V

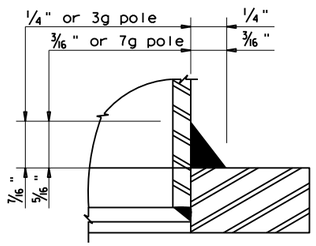
NOTES:

1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.



POLE ELEVATION

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



DETAIL H

BASE PLATE PLAN

(1) 85% Min. penetration

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

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM POLE DETAILS

MA-D-12

REVISIONS
8-99
1-12

DN: MS	CK: JSY	DW: FDN	CK: CAL

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
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FOUNDATION DESIGN TABLE

FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		EMBEDDED DRILLED SHAFT LENGTH-ft ④, ⑤, ⑥			ANCHOR BOLT DESIGN ①				FOUNDATION DESIGN LOAD ②		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
				10	15	40							
24-A	24"	4- #5	#2 at 12"	5.7	5.3	4.5	¾"	36	12 ¾"	1	10	1	Pedestal pole, pedestal mounted controller.
30-A	30"	8- #9	#3 at 6"	11.3	10.3	8.0	1 ½"	55	17"	2	87	3	Mast arm assembly. (see Selection Table)
36-A	36"	10- #9	#3 at 6"	13.2	12.0	9.4	1 ¾"	55	19"	2	131	5	Mast arm assembly. (see Selection Table) 30' strain pole with or without luminaire.
36-B	36"	12- #9	#3 at 6"	15.2	13.6	10.4	2"	55	21"	2	190	7	Mast arm assembly. (see Selection Table) Strain pole taller than 30' & strain pole with mast arm
42-A	42"	14- #9	#3 at 6"	17.4	15.6	11.9	2 ¼"	55	23"	2	271	9	Mast arm assembly. (see Selection Table)

NOTES:

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

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

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

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

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

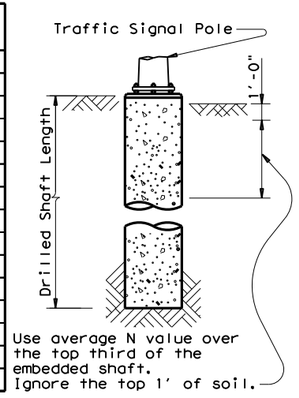
⑥ Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

FOUNDATION SUMMARY TABLE ③

LOCATION IDENTIFICATION	AVG. N BLOW /ft.	FDN TYPE	NO. EA	DRILLED SHAFT LENGTH ⑥ (FEET)				
				24-A	30-A	36-A	36-B	42-A
SH86_MAX - TS1	10	36-B	1				15	
TS2 & TS3	10	36-B	2				30	
TS4	10	36-A	1			13		
US60_CLV - TS1&4	10	36-A	2			26		
TS3	10	36-B	1				15	
US60_MAIN - TS1&3	10	36-B	2				30	
TS2 & TS4	10	36-A	2			26		
US70_ENNIS - TS1,2,3	10	36-B	3				45	
TS4	10	36-A	1			13		
US70_YONK - TS1&4	10	36-B	2				30	
TS2 & TS3	10	36-A	2			26		
US70_JOLIET - TS1,2,4	10	36-A	3			39		
TS3	10	36-B	1				15	
US70_CMBIA - TS1,3,4	10	36-B	3				45	
US70_BRDWY - TS1	10	36-A	1			13		
US70_BRDWY - TS3	10	36-B	1				15	
US70_DATE - TS1,2,3,4	10	36-B	4				60	
TOTAL DRILLED SHAFT LENGTHS						156	300	

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

		FDN 30-A	FDN 36-A	FDN 36-B	FDN 42-A
80 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH	32'	48'		
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS	24' X 24'			
		28' X 28'			
		32' X 28'	32' X 32'		
			36' X 36'		
			40' X 36'		
			44' X 28'	44' X 36'	
100 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH		36'	44'	
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS		24' X 24'		
			28' X 28'		
			32' X 24'	32' X 32'	
				36' X 36'	
				40' x24'	40' X 36'
					44' x 36'



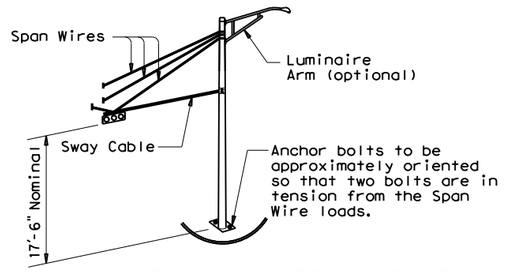
Use average N value over the top third of the embedded shaft. Ignore the top 1' of soil.

ANCHOR BOLT & TEMPLATE SIZES

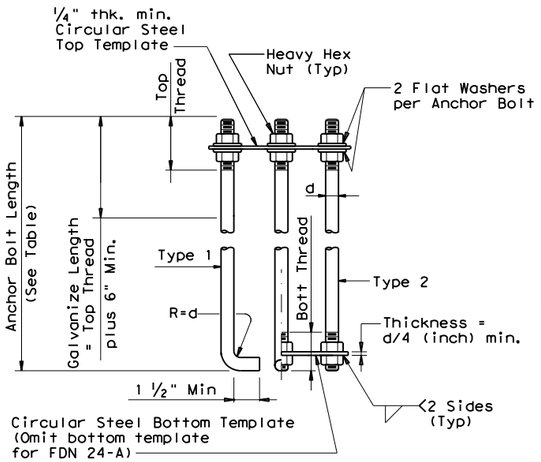
BOLT DIA IN.	⑦ BOLT LENGTH	TOP THREAD	BOTTOM THREAD	BOLT CIRCLE	R2	R1
¾"	1'-6"	3"	—	12 ¾"	7 ⅛"	5 ⅝"
1 ½"	3'-4"	6"	4"	17"	10"	7"
1 ¾"	3'-10"	7"	4 ½"	19"	11 ¼"	7 ¾"
2"	4'-3"	8"	5"	21"	12 ½"	8 ½"
2 ¼"	4'-9"	9"	5 ½"	23"	13 ¾"	9 ¼"

⑦ Min dimensions given, longer bolts are acceptable.

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



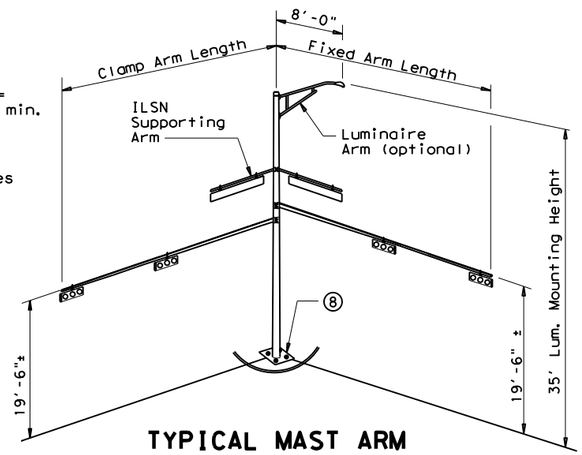
TYPICAL STRAIN POLE ASSEMBLY



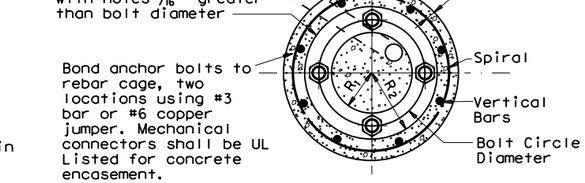
HOOKED ANCHOR (TYPE 1) NUT ANCHOR (TYPE 2)

ANCHOR BOLT ASSEMBLY

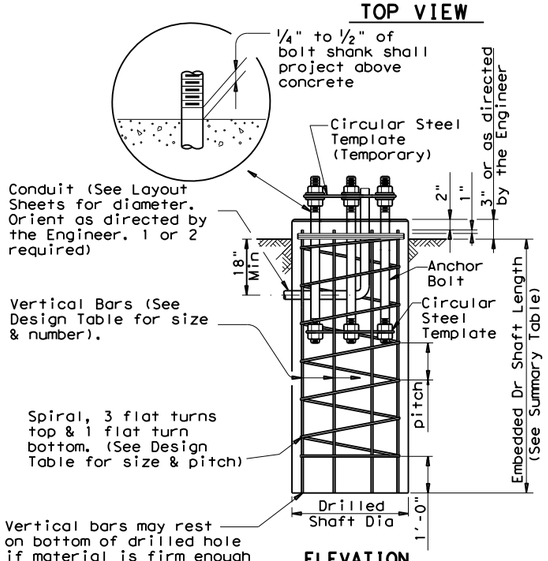
⑧ Orient anchor bolts orthogonal with the fixed arm direction to ensure that two bolts are in tension under dead load.



TYPICAL MAST ARM ASSEMBLY



TOP VIEW



ELEVATION

FOUNDATION DETAILS

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".

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL POLE FOUNDATION

TS-FD-12

DN: MS	CK: JSY	DW: MAQ/MMF	CK: JSY/TEB

REVISIONS
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CONT	SECT	JOB	HIGHWAY
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LBB	VARIOUS		105

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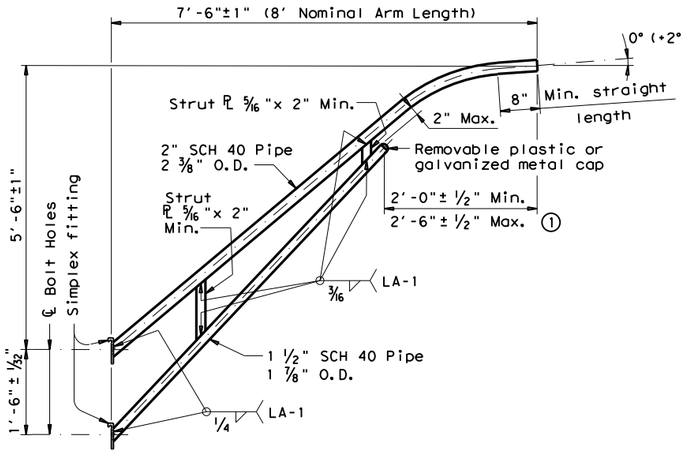
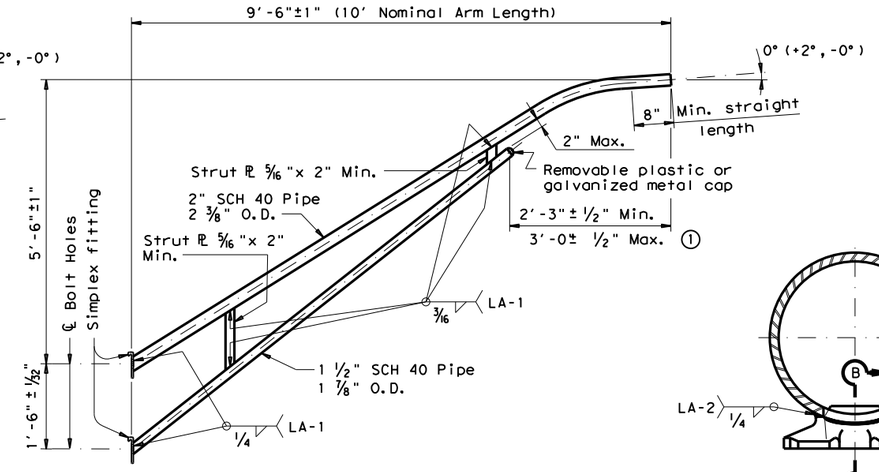


8-FOOT LUMINAIRE ARM



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.

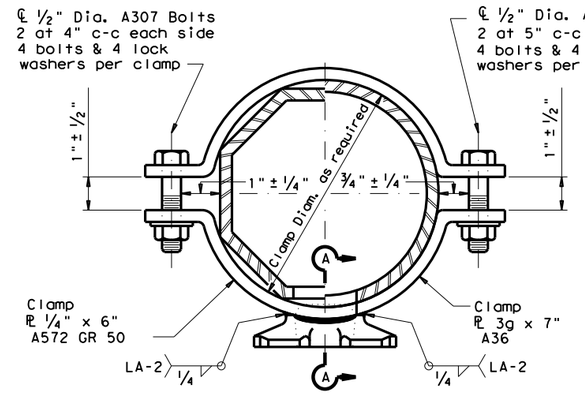
Materials and fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absense of specified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

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

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

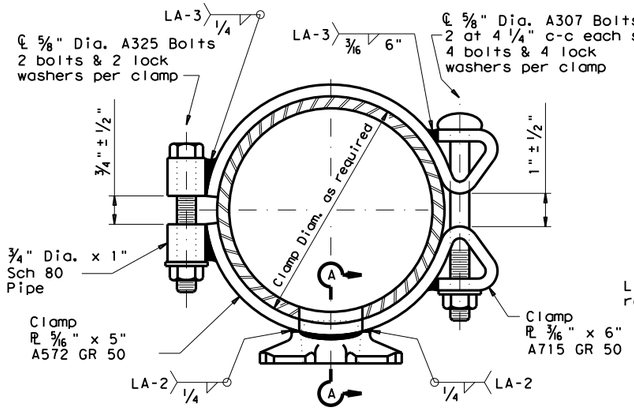
Each pole simplex fitting shall be supplied with 2 ASTM A325 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans. When clamp attachment is specified, the Fabricator shall ship the clamp assembly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

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



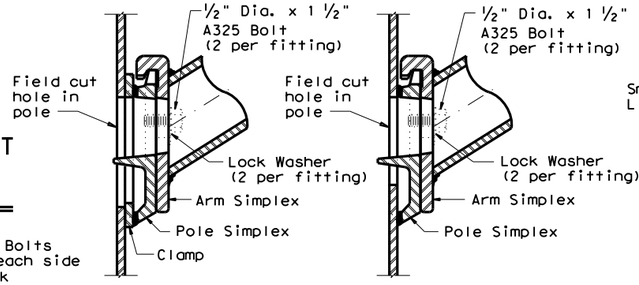
CLAMP ATTACHMENT DETAIL NO. 1 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 2 (HALF SECTION)



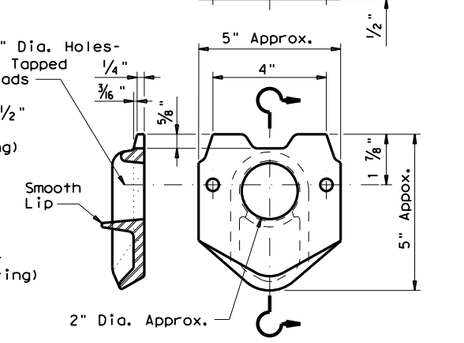
CLAMP ATTACHMENT DETAIL NO. 3 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 4 (HALF SECTION)

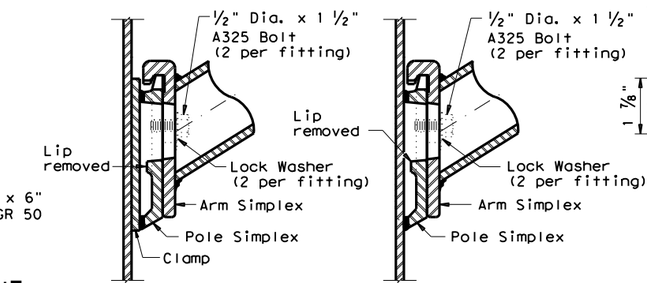


UPPER SIMPLEX FITTING

UPPER SIMPLEX FITTING



POLE SIMPLEX DETAIL

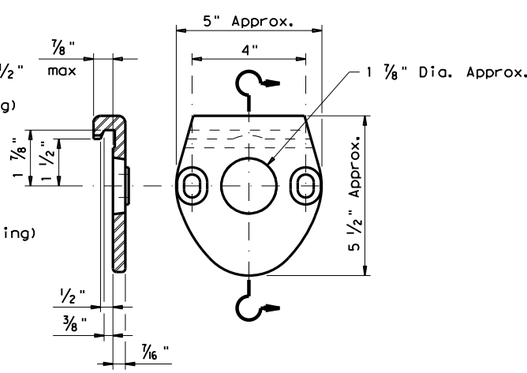


LOWER SIMPLEX FITTING

LOWER SIMPLEX FITTING

SECTON A-A

SECTON B-B



ARM SIMPLEX DETAIL

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY DRAWINGS FOR LUMINAIRE SUPPORT STRUCTURES

ARM DETAILS

LUM-A-12

DN: LEH	CK: JSY	DW: LTT	CK: TEB

REVISIONS
5-96
1-99
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CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
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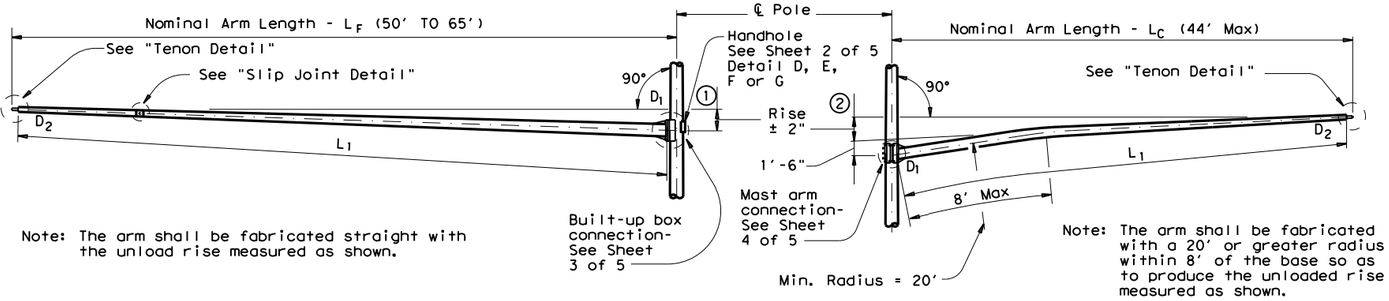


Note: The arm shall be fabricated straight with the unload rise measured as shown.

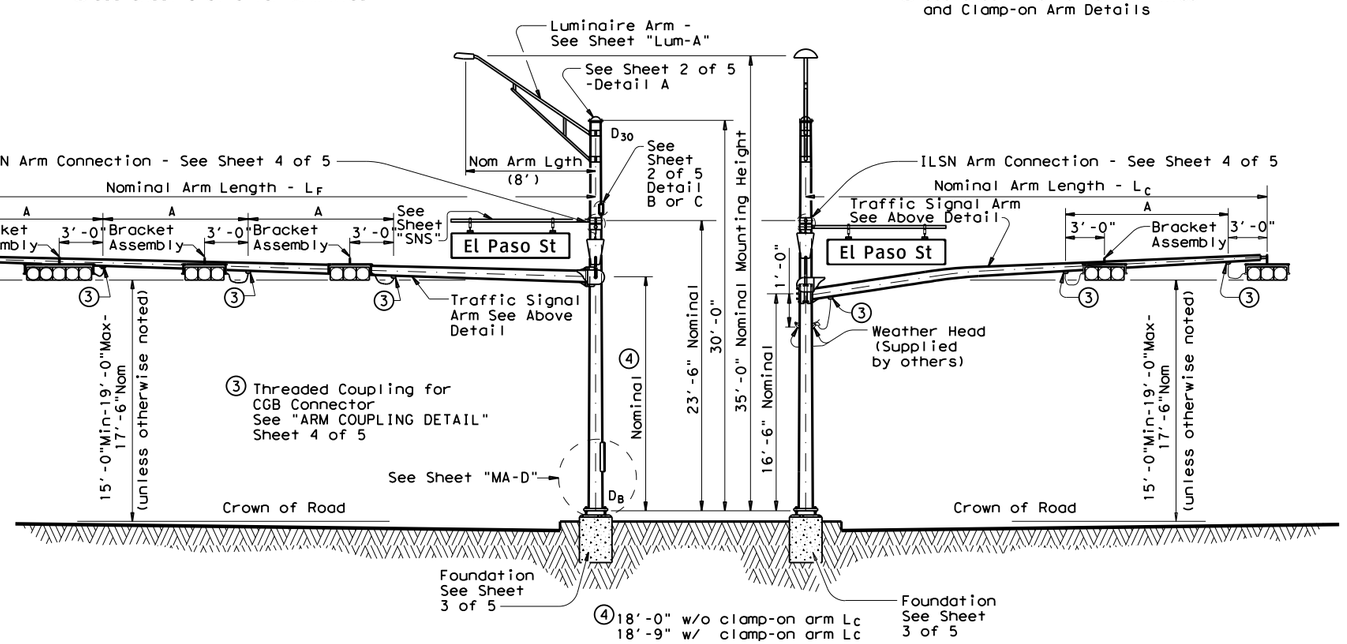
Note: The arm shall be fabricated with a 20' or greater radius within 8' of the base so as to produce the unloaded rise measured as shown.

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

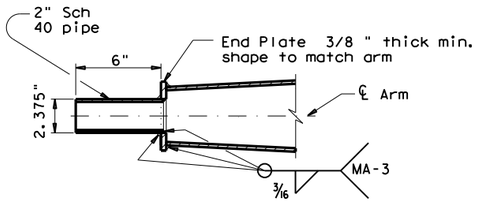
(Showing fixed mount arm)

STRUCTURE ASSEMBLY

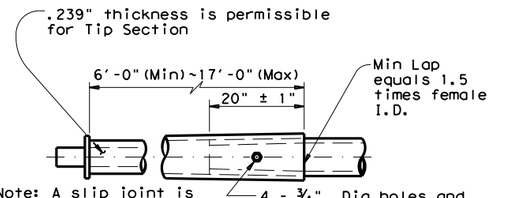
ELEVATION

(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



Note: A slip joint is permissible for arms 50' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

Tack weld nut to thread projection after making joint. Repair damaged galvanizing in accordance with Item 445, "Galvanizing".

SLIP JOINT DETAIL (FIXED MOUNT ARM)

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed can be either 100 mph or 80 mph plus a 1.3 gust factor. If clamp-on traffic signal is required, designs are based on an arm included angle of 90 degrees or more. Angles of less than approximately 75 degrees will require a special design.

Poles are designed to support one 8'-0" luminaire arm, two 9'-0" internally lighted street name (ILSN) signs and two traffic signal arms with limited length combinations.

Each arm with its related attachment is shown below

Arm	Equivalent DL ⑤	WL EPA ⑤⑥
8' Luminaire Arm	Luminaire 60 lbs	1.6 sq ft
9' ILSN Arm	Sign 85 lbs	11.5 sq ft
50' to 65' Fixed Mount Arm	Signal Loads 310 lbs	52 sq ft
Up to 44' Clamp-on Arm	Signal Loads 180 lbs	32.4 sq ft

⑤ Equivalent dead load plus horizontal wind load applied at the end of arm except ILSN arm, which applied 4.5' from the centerline of the pole.

⑥ Effective projected area (actual area times drag coefficient) for the application of horizontal wind load.

Except as noted in Sheet 1 thru 5 of 5, other details not covered shall refer to Standard Sheet "MA-D" for pole details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Material, fabrication tolerances, and shipping practices shall also meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

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

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

Installation of damping plate for the long mast arm is not recommended.

Provision of the bracket assembly used to support the traffic signal heads shall be under the direction of the Engineer for approval.

Design also conforms to NCHRP Report 412 for fatigue resistance except that there are no stiffeners at the base plate. TxDOT is conducting tests to determine if stiffeners at the base plate will or will not result in optimal performance; depending upon the results of the tests, poles may need a retrofit to ensure optimal fatigue performance.

Texas Department of Transportation
Traffic Operations Division

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

Sheet 1 of 5

DN: JSY	CK: ARC	DW: TGG	CK: JSY

REVISIONS
4-20-01
1-12

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DIST	COUNTY		SHEET NO.
LBB	VARIOUS		107

131A

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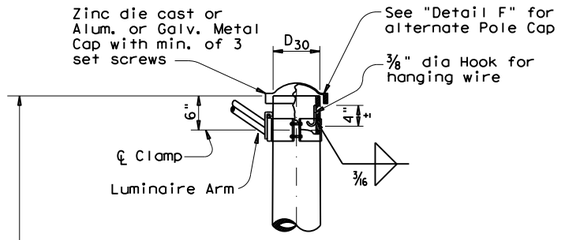
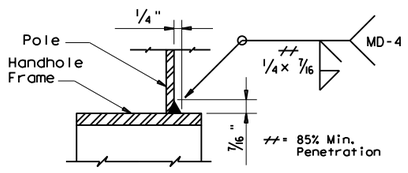
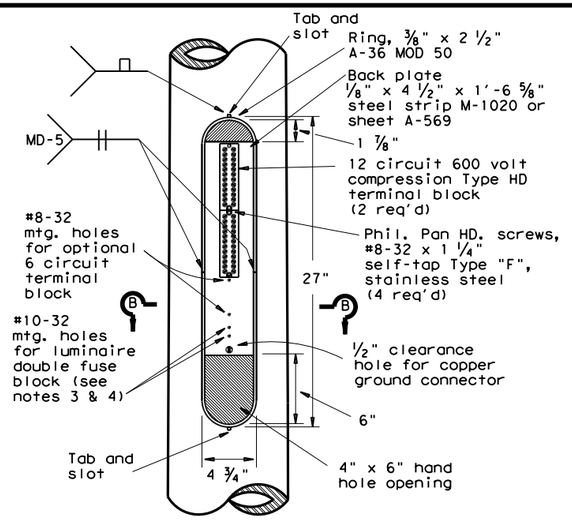


DETAIL A

(for pole with luminaire)



DETAIL H

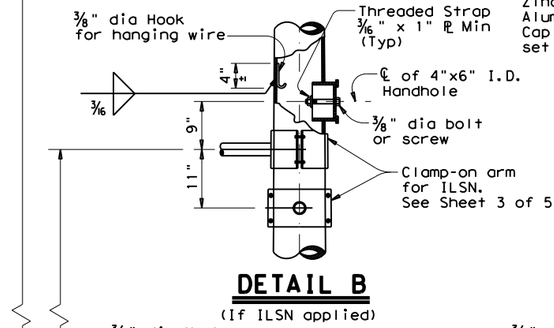


ACCESS COMPARTMENT

MATERIALS	
Round Shafts or Polygonal Shafts (7)	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 (8)
Plates (7)	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325, or A449 except where noted
Pin Bolts	ASTM A325
Pipe (7)	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

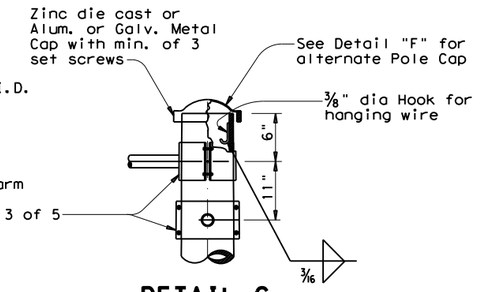
(7) ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F, or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

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

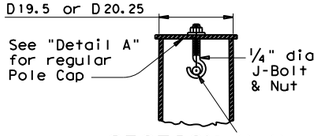


DETAIL B

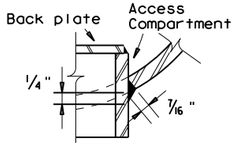
(If ILSN applied)



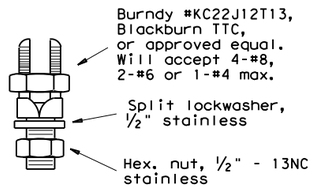
DETAIL C



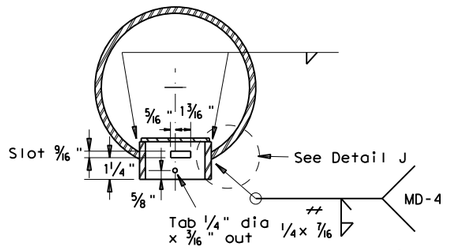
SECTION Y-Y



DETAIL J



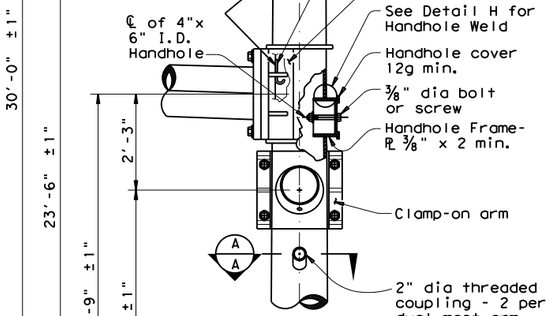
COPPER GROUND CONNECTOR



SECTION B-B

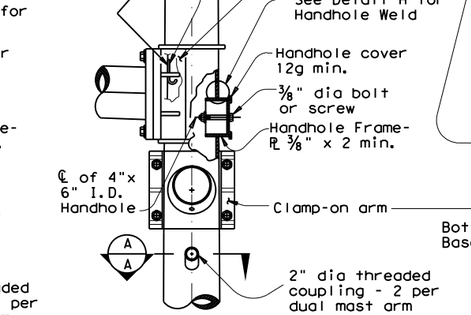
= 85% Min. Penetration

Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.



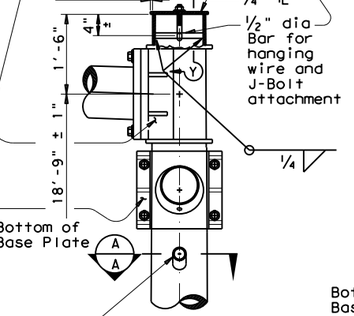
DETAIL D

(for 30' pole with luminaire and ILSN sign)



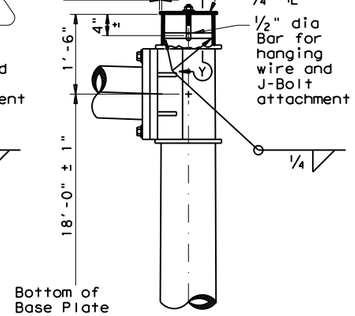
DETAIL E

(for 24' pole with ILSN sign and no luminaire, single or dual mast arm)



DETAIL F

(for 20.25' pole with no ILSN sign and no luminaire, dual mast arm)

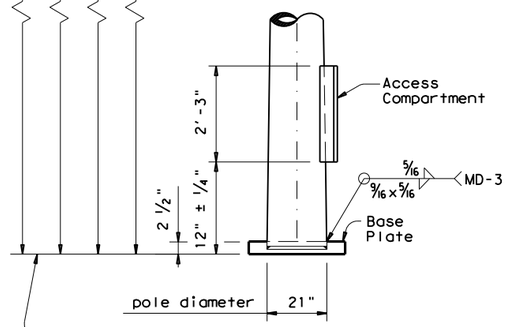


DETAIL G

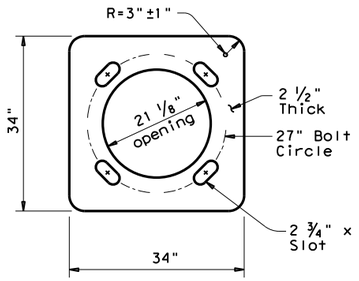
(for 19.5' pole with no ILSN sign and no luminaire, single mast arm)

ACCESS COMPARTMENT NOTES:

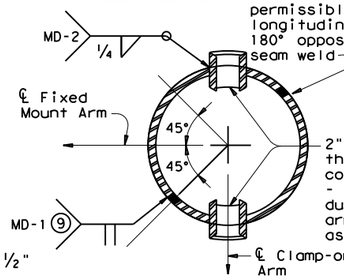
1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.



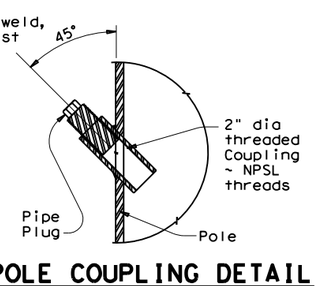
POLE ELEVATION



BASE PLATE



SECTION A-A



POLE COUPLING DETAIL

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

Texas Department of Transportation
Traffic Operations Division

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

Sheet 2 of 5

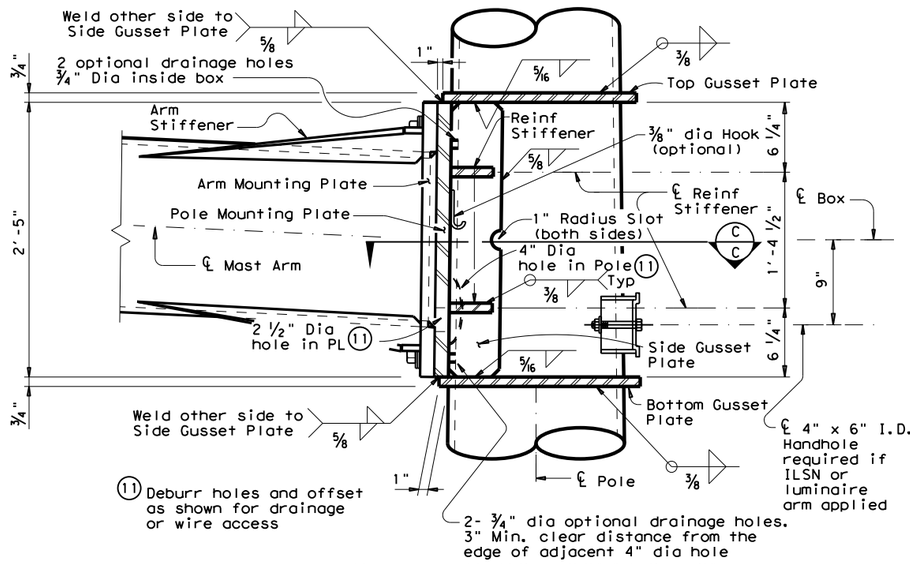
LMA(2)-12

DN: JSY	CK: ARC	DW: TGG	CK: JSY

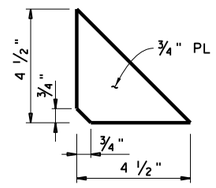
REVISIONS
4-20-01
1-12

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DIST	COUNTY		SHEET NO.
LBB	VARIOUS		108

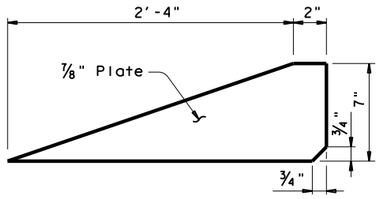
131B



BUILT-UP BOX CONNECTION

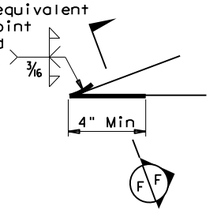


REINFORCING STIFFENER



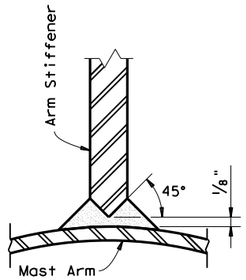
ARM STIFFENER
(Cut to match arm inclination and taper)

Provide Detail shown in SECTION F-F or equivalent 100% complete joint penetration weld from both sides.



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

DETAIL "K"



SECTION F-F

Fixed Mount Arm 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)
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L_F = Fixed Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

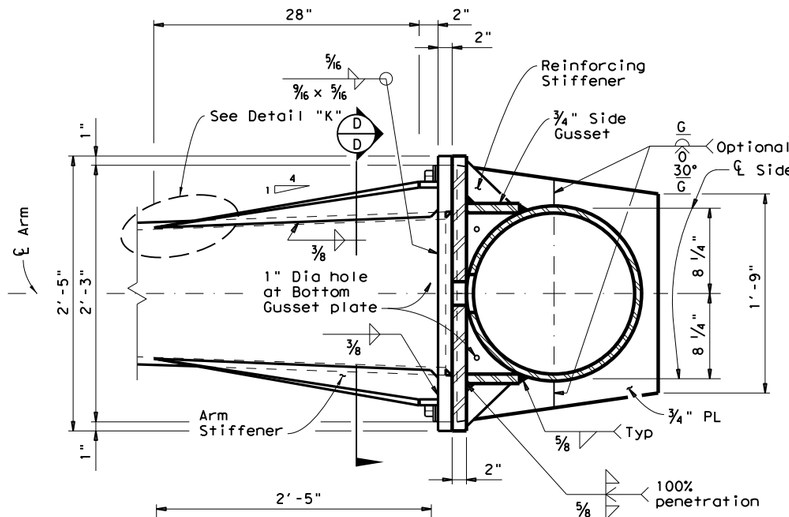
(13) Shaft profile 16-sided or 18-sided is considered to be equivalent to round section.

GENERAL NOTES:

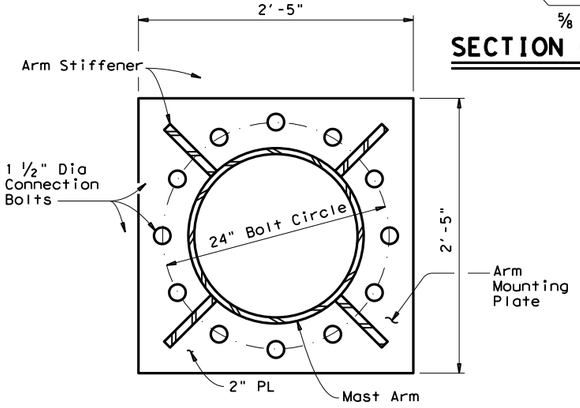
Built-up Box Connection: For the welded arm-to-pole connection as a build-up box configuration illustrated here is an example only, fabricators are required to submit a shop drawing of box connection for approval. The drawing shall specify the details of each box element, welds of arm-to-pole connection, arm-to-plate socket connection, and arm rise creation. Specify the proper location of drain holes along the pole. 2 1/2" dia hole in the pole mounting plate and 4" dia hole in the pole need to be aligned for wiring access or drainage. Arm stiffeners cut to match arm inclination and taper shall also be included.

The deviation from flat for either arm or pole mounting plate shall not exceed 1/32 in., which is measured along the center of mounting plate to a radial distance of 13.5 in. The deformed-from-flat connection between arm and pole mounting plates shall not be allowed if the center of both mounting plates cannot contact directly.

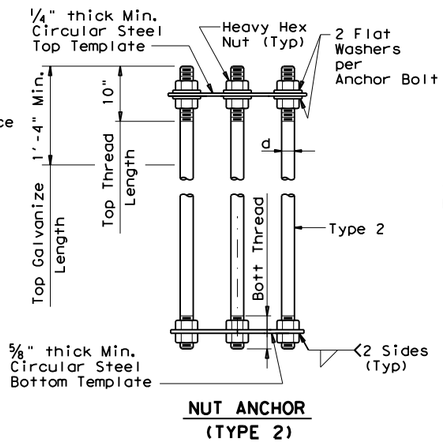
Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.



SECTION C-C

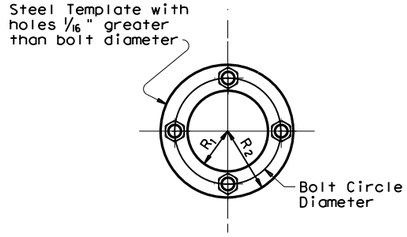


SECTION D-D



NUT ANCHOR
(TYPE 2)

ANCHOR BOLT ASSEMBLY



TEMPLATE DETAIL

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.

FOUNDATION DESIGN TABLE													
FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		DRILLED SHAFT LENGTH-ft (16), (17), (18)			ANCHOR BOLT DESIGN (14)				FOUNDATION DESIGN LOAD (15)		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
				10	15	40							
48-A	48"	20 #9	#4 at 6"	21.9	19.5	14.7	2 1/2"	55	27"	2	490	10	50' to 65' Mast arm assembly.

SEE SHEET "TS-FD" FOR ADDITIONAL DETAILS.

(14) Anchor bolt design develops the foundation capacity given under Foundation Design Loads.

(15) Foundation Design Loads are the allowable moments and shears at the base of the structure.

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

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

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

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

DN: JSY	CK: ARC	DW: TGG	CK: JSY

REVISIONS
4-20-01
1-12

CONT	SECT	JOB	HIGHWAY
0905	00	112	VAR
DIST	COUNTY		SHEET NO.
LBB	VARIOUS		109

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DATE: 9/28/2022 2:07:40 PM
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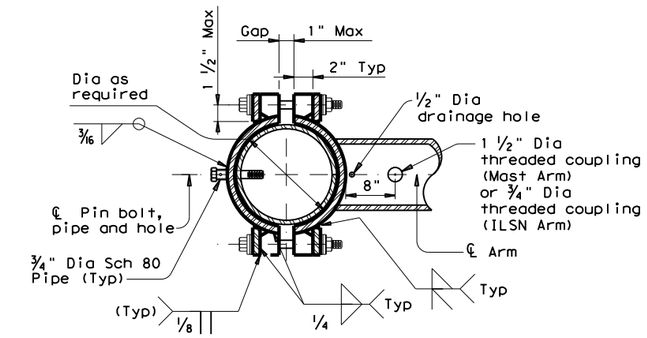
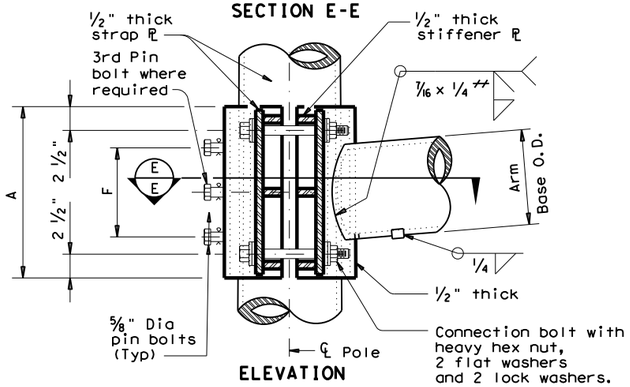


SECTION E-E



ELEVATION
(Mast Arm or ILSN Arm to pole)

= 85% Min. Penetration

CLAMP-ON CONNECTION

80 MPH WIND

Clamp-on Arm Lc	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	thk (12)	Rise	L_1	D_1	D_2	thk (12)	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	6.5	3.8	.179	1'-9"	19.1	7.0	3.5	.179	1'-8"
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	3.5	.179	1'-9"
28	27.1	8.0	4.2	.179	1'-11"	27.1	8.0	3.5	.179	1'-10"
32	31.0	9.0	4.7	.179	2'-1"	31.0	9.0	3.5	.179	2'-0"
36	35.0	9.5	4.6	.179	2'-4"	35.0	10.0	3.5	.179	2'-1"
40	39.0	9.5	4.1	.239	2'-8"	39.0	9.5	3.5	.239	2'-3"
44	43.0	10.0	4.1	.239	2'-11"	43.0	10.0	3.5	.239	2'-6"

100 MPH WIND

Clamp-on Arm Lc	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	thk (12)	Rise	L_1	D_1	D_2	thk (12)	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	8.0	5.3	.179	1'-8"	19.1	8.0	3.5	.179	1'-7"
24	23.1	9.0	5.8	.179	1'-9"	23.1	9.0	3.5	.179	1'-8"
28	27.1	9.5	5.7	.179	1'-10"	27.1	10.0	3.5	.179	1'-9"
32	31.0	9.5	5.2	.239	1'-11"	31.0	9.5	3.5	.239	1'-10"
36	35.0	10.0	5.1	.239	2'-0"	35.0	10.0	3.5	.239	1'-11"
40	39.0	10.5	5.1	.239	2'-3"	39.0	11.0	3.5	.239	2'-1"
44	43.0	11.0	5.1	.239	2'-8"	43.0	11.5	4.0	.239	2'-3"

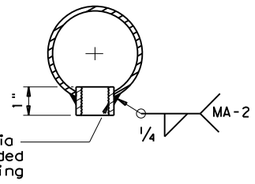
D1 = Arm Base O.D.
D2 = Arm End O.D.
L1 = Shaft Length
Lc = Clamp-on Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

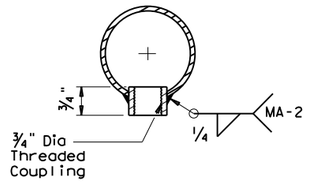
CLAMP-ON ARM CONNECTION

ILSN Arm Size		A	F	4 Conn. Bolts	⅝" Dia. Pin Bolts
Sch 40 pipe Dia	Thick			Dia	No.
in.	in.	in.	in.	in.	ea
3	.216	10	4	¾	2

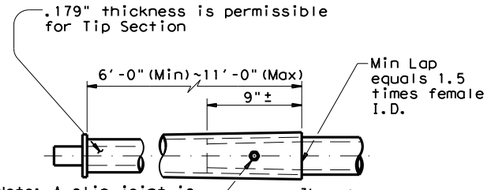
Mast Arm Size		A	F	4 Conn. Bolts	⅝" Dia. Pin Bolts
Base Dia	Thick			Dia	No.
in.	in.	in.	in.	in.	ea
6.5	.179	12	6	1	2
7.5	.179	14	8	1	2
8.0	.179	14	8	1	2
9.0	.179	16	10	1	2
9.5	.179	18	12	1 ¼	3
9.5	.239	18	12	1 ¼	3
10.0	.239	18	12	1 ¼	3
10.5	.239	18	12	1 ¼	3
11.0	.239	18	12	1 ¼	3
11.5	.239	18	12	1 ¼	3



ARM COUPLING DETAIL



ILSN ARM COUPLING DETAIL

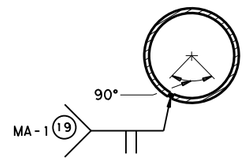


Note: A slip joint is permissible for arms 40' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

SLIP JOINT DETAIL (CLAMP-ON ARM)

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

BRACKET ASSEMBLY



ARM WELD DETAIL

(19) Longitudinal Seam Weld must be oriented within the lower 90° of the signal arm.
60% Min penetration
100% penetration within 6" of circumferential base welds.

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies or ILSN arm support. For a clamp-on mast arm, a maximum 1 ½" wide vertical slotted hole may be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1". For an ILSN arm, a 1 ½" diameter hole shall be cut in the front clamp plate for wire access. A matched hole shall be field drilled through the pole to provide wire access after arm is oriented. Deburr both holes.

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

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces. Pin bolts shall be ASTM A325 with threads excluded from the shear plane. Pin bolt and ¾" diameter pipe shall have 3/16" diameter holes for a ⅛" diameter galvanized cotter pin. Back clamp plate shall be furnished with a ¾" diameter hole for each pin bolt. An 11/16" diameter hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

Texas Department of Transportation
Traffic Operations Division

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

Sheet 4 of 5 — LMA(4)-12

DN: JK	CK: GRB	DW: FDN	CK: CAL

REVISIONS
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1-12

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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: See note above plus: one (or two if ILSN attached) small hand hole, clamp-on simplex		24' Poles with ILSN: See note above plus one small hand hole		19.50' (Single Mast Arm) 20.25' (Dual Mast Arm) Poles with no Luminaire and no ILSN: See note above	
Single Mast Arm						
Lf ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
50	50L	1	50S		50	2
55	55L	1	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	
	44	5044L		5044S		5044	
55	20	5520L		5520S		5520	
	24	5524L		5524S		5524	
	28	5528L		5528S		5528	
	32	5532L		5532S		5532	
	36	5536L		5536S		5536	
	40	5540L		5540S		5540	
	44	5544L		5544S		5544	
60	20	6020L		6020S		6020	
	24	6024L		6024S		6024	
	28	6028L		6028S		6028	
	32	6032L		6032S		6032	
	36	6036L		6036S		6036	
	40	6040L		6040S		6040	
	44	6044L		6044S		6044	
65	20	6520L		6520S		6520	
	24	6524L		6524S		6524	
	28	6528L		6528S		6528	
	32	6532L		6532S		6532	
	36	6536L		6536S		6536	
	40	6540L		6540S		6540	
	44	6544L		6544S		6544	

Foundation Summary Table **

Location Ident.	Avg. N Blow/ft.	No. Each	Drill Shaft *** Length (feet) 48-A
US60_CLV - TS2	**10**	**1**	**22**
US70_CMBIA - TS2	**10**	**1**	**22**
US70_BRDWY - TS2&4	**10**	**2**	**44**
Total Drill Shaft Length			**88**

Notes

** Foundations may be listed separately

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

Shipping Parts List

Traffic Signal Arms (Fixed Mount) (1 per pole)
Ship each arm with listed equipment attached

Nominal Arm Length	Type IV Arm (4 Signals) 3 Bracket Assembly and 4 CGB Connectors	
ft.	Designation	Quantity
50	50IV	3
55	55IV	1
60	60IV	
65	65IV	

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	2

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

Nominal Arm Length	Quantity
7' Arm	
9' Arm	

Traffic Signal Arms (80 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers		Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp w/bolts and washers		Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp w/bolts and washers	
ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-80					
24	24I-80		24II-80			
28	28I-80		28II-80			
32			32II-80		32III-80	
36			36II-80		36III-80	
40					40III-80	
44					44III-80	

Traffic Signal Arms (100 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached

Nominal Arm	Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers		Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp		Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp	
ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-100					
24	24I-100		24II-100			
28	28I-100		28II-100			
32			32II-100		32III-100	
36			36II-100		36III-100	
40					40III-100	
44					44III-100	

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
2 1/2 "	5' - 3"	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.

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

Texas Department of Transportation
Traffic Operations Division

LONG MAST ARM ASSEMBLY PARTS LIST

LMA(5)-12

Sheet 5 of 5

DN: JK	CK: GRB	DW: FDN	CK: CAL

REVISIONS
4-20-01
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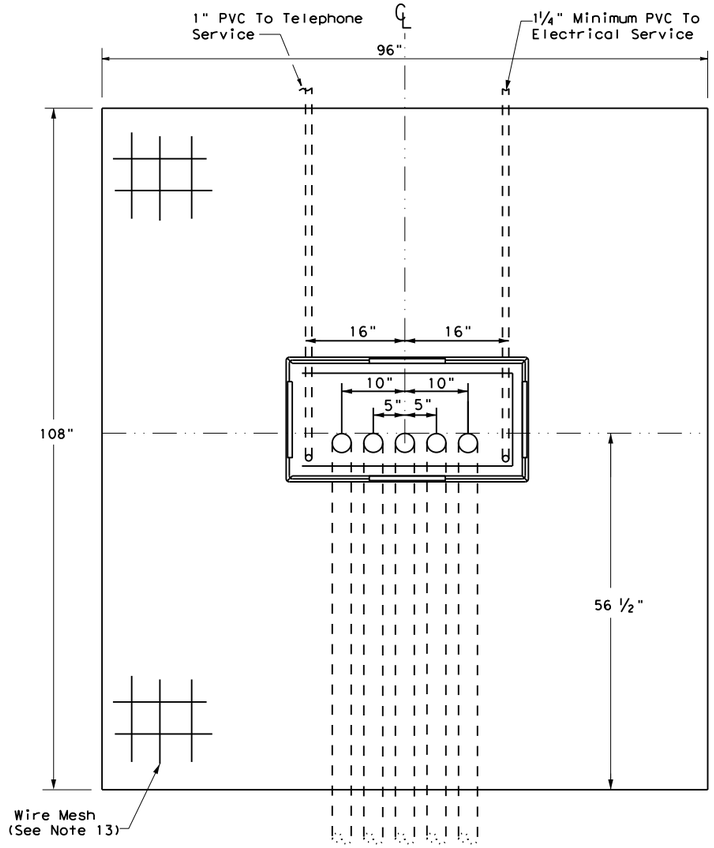
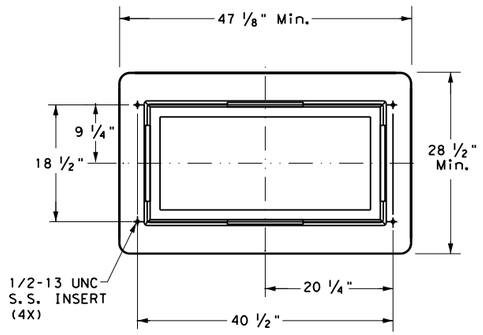
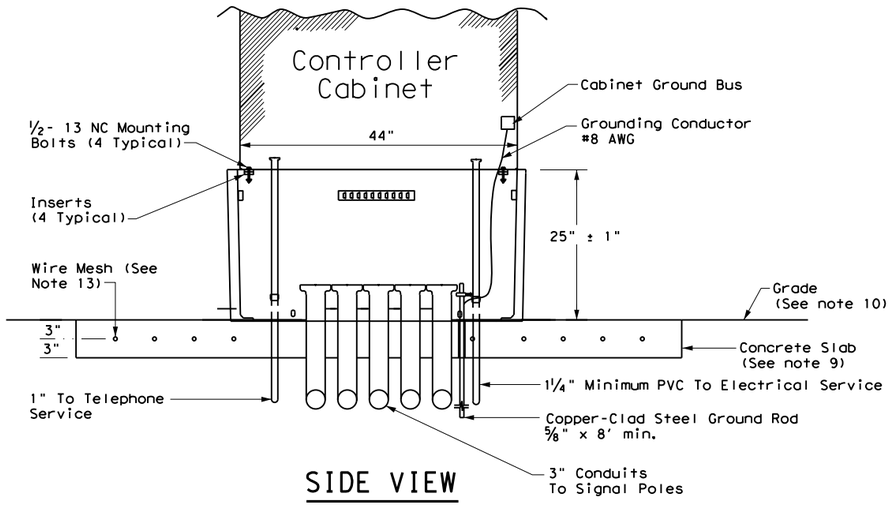


TOP VIEW



CABINET BASE



SIDE VIEW

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

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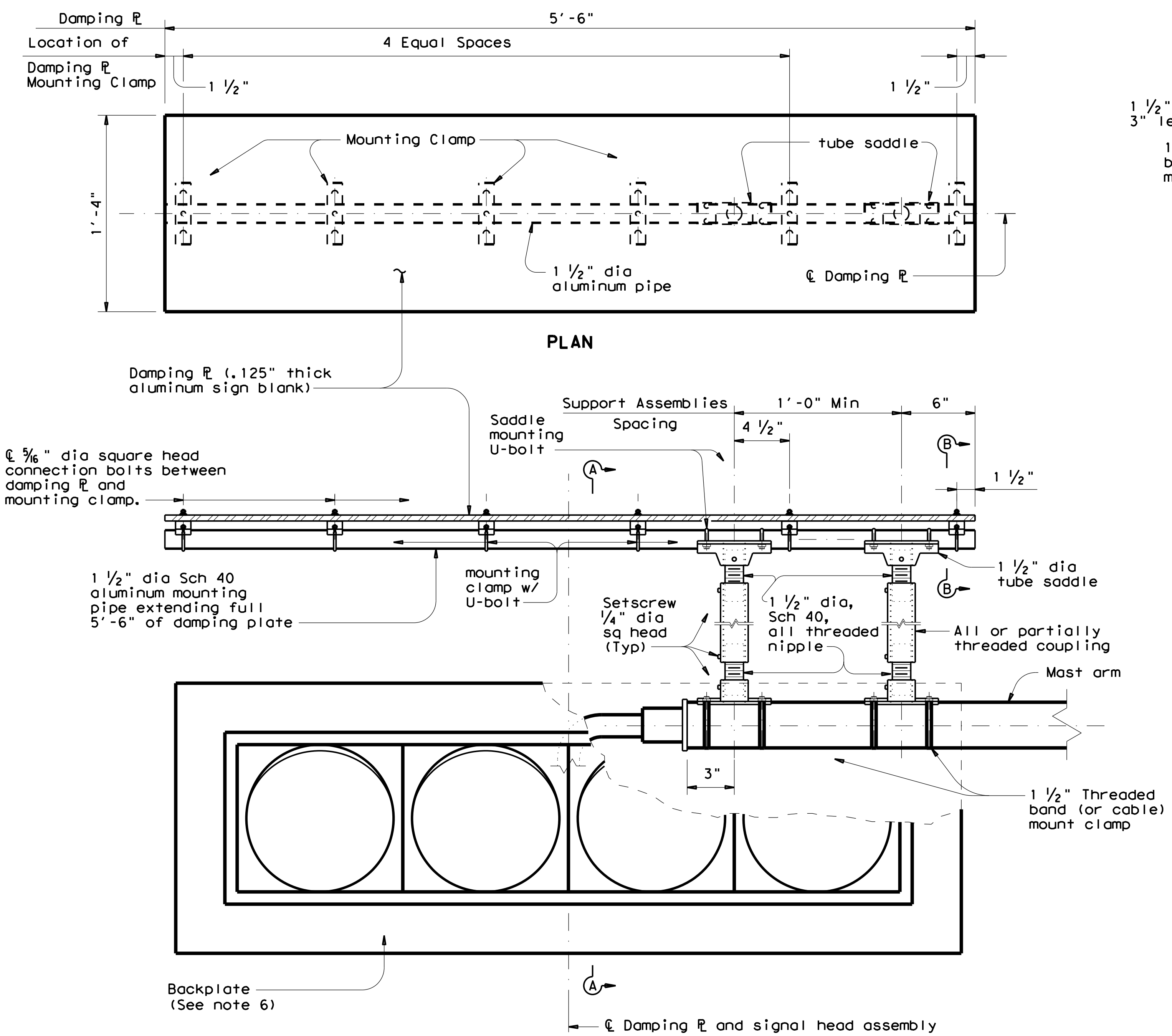
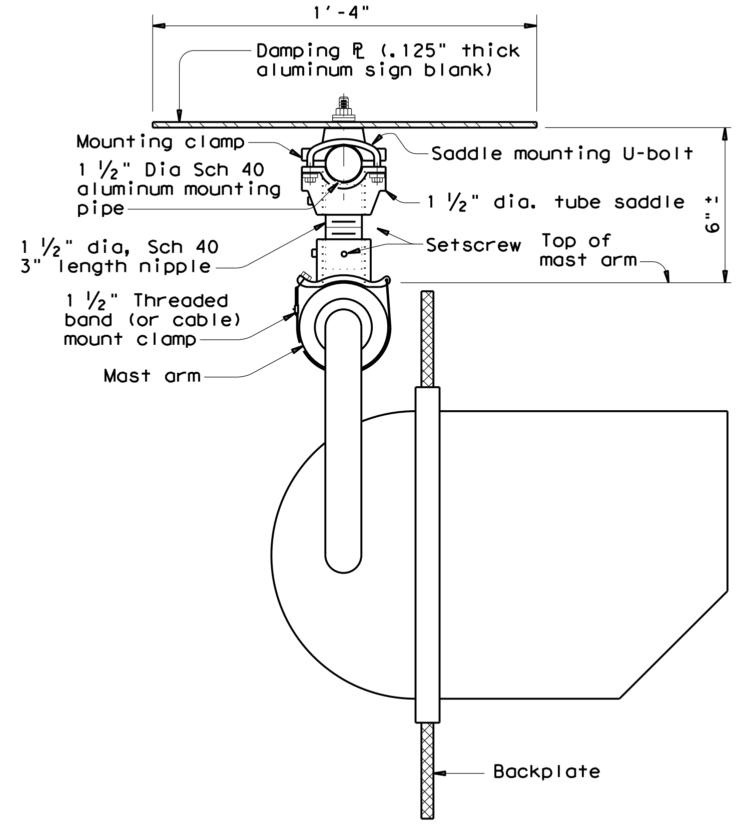


PLAN

ELEVATION

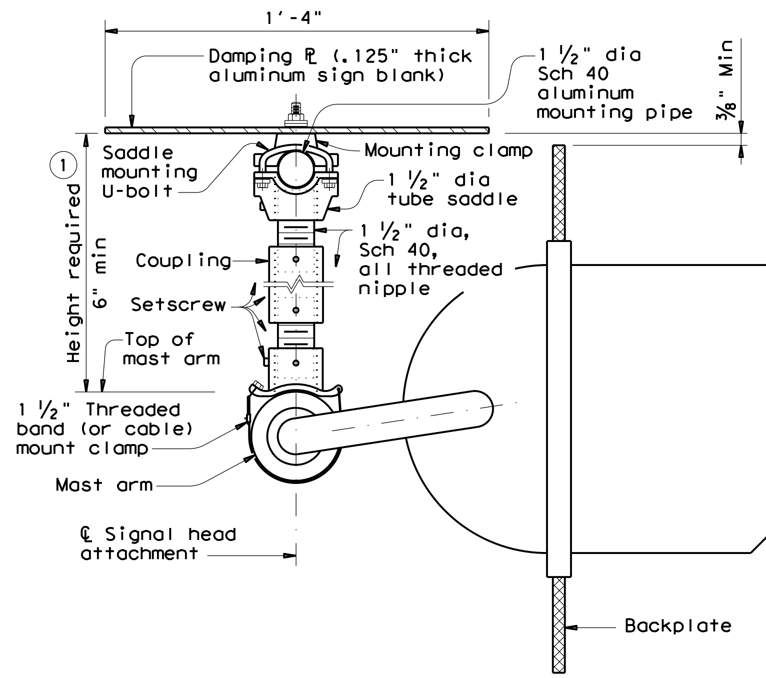
DAMPING PLATE MOUNTING DETAILS

(Showing alternate placement of signal head)



SECTION A-A

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

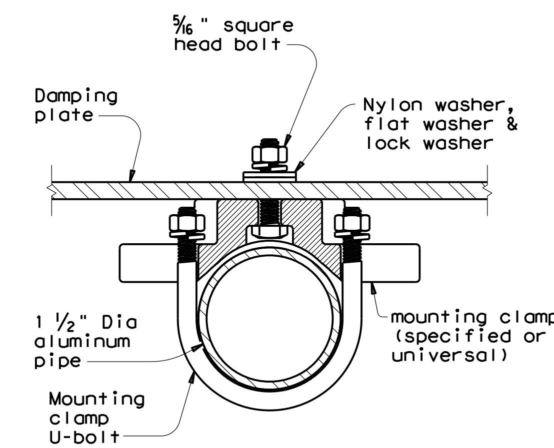


SECTION A-A

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

GENERAL NOTES:

1. In accordance with the findings of TxDOT sponsored research, the installation of a damping plate in accordance with the details shown here at the end of signal mast arms of SMA and DMA standard structures reduces excessive harmonic vertical vibration, and thus fatigue damage. Any deviation from these details may reduce the effectiveness of this damping device.
2. Aluminum sign blank for damping plate will conform to Departmental Material Specifications DMS-7110. Materials for mast arm mounting clamp and tube saddle will be aluminum castings or aluminum alloys as in accordance with manufacturers' stipulations. Mounting pipe, pipe nipple and coupling will be aluminum alloy 6061-T6 or 6063-T6. Damping plate mounting clamp and u-bolt assemblies will conform to Standard sheet SMD(GEN). U-bolts for saddle mounting will have a minimum yield strength of 36 ksi.
3. Damping plate will be mounted horizontally. Position centerline of damping plate to align with centerline of mast arm or horizontal signal head assembly. Vertical clearance between signal head (with or without backing plate)and bottom of damping plate will be maintained as shown. The attachments shown here are examples only, other supporting details which meet both alignment and vertical clearance requirements are also acceptable.
4. Unless stipulated by the manufacturers, all steel parts will be galvanized finish in accordance with Standard Specification Item 445, "Galvanizing".
5. Contractor will verify applicable field dimensions before the installation.
6. Backplates are optional for traffic signals. When backplates are used, Backplates will have a 2-inch fluorescent yellow AASHTO Type B_{FL} or C_{FL} retroreflective border conforming to TxDOT DMS-8300 "Sign Face Materials." See Sheet TS-BP-20 for backplate details.



SECTION B-B

(Showing damping plate attachment)

(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"

Texas Department of Transportation — Traffic Safety Division Standard

MAST ARM DAMPING PLATE DETAILS

MA-DPD-20

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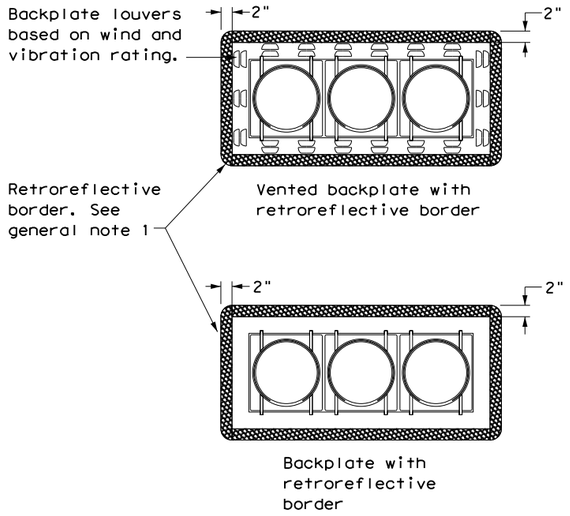
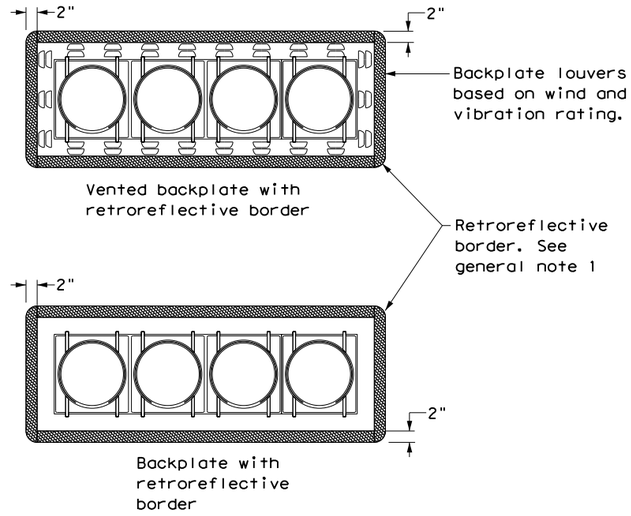
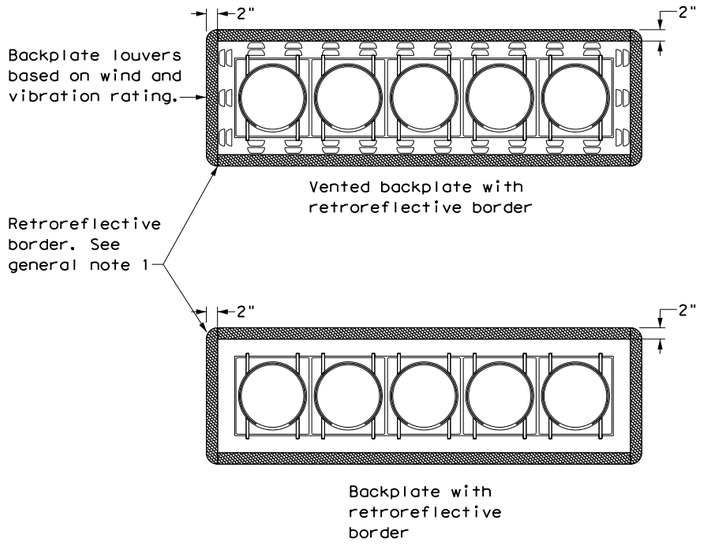


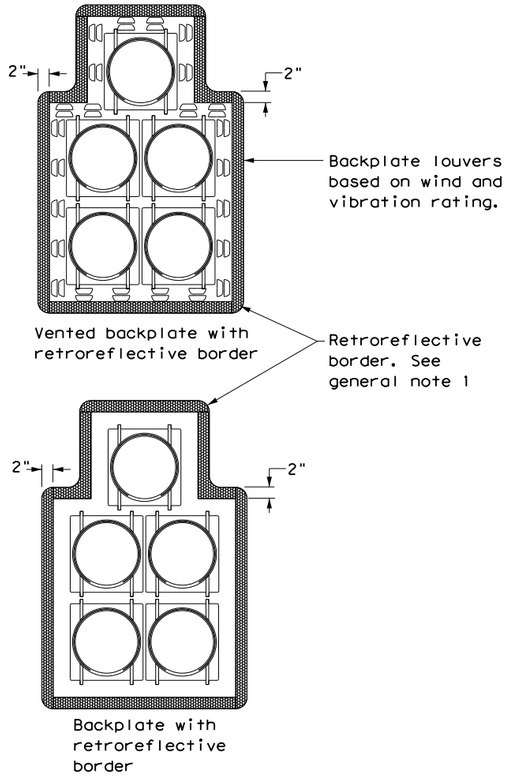
THREE-SECTION HEAD
HORIZONTAL OR VERTICAL



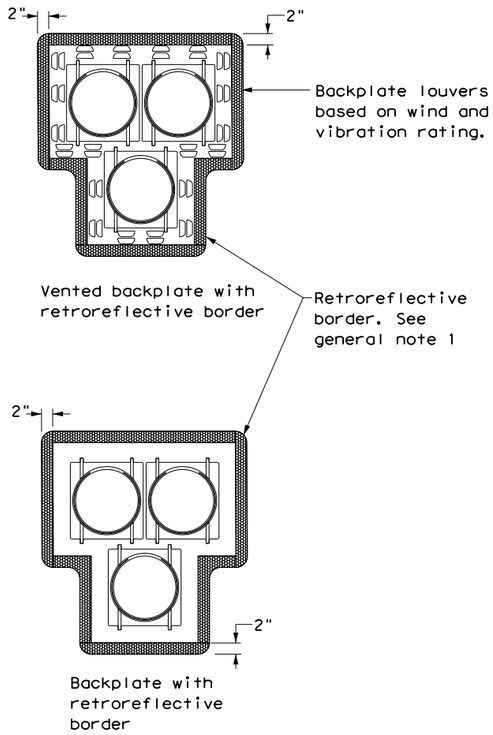
FOUR-SECTION HEAD
HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
CLUSTER



PEDESTRIAN HYBRID
BEACON

GENERAL NOTES:

1. Backplates are optional for traffic signals and pedestrian hybrid beacons. When backplates are used, a 2-inch wide fluorescent yellow AASHTO Type B_{FL} or C_{FL} retroreflective border conforming to TxDOT DMS-8300 is required. Place on all approaches when used.
2. Signal head and backplate compatability must be verified by the contractor prior to installation.
3. When using backplates on signal heads, venting is preferred to reduce cyclic vibration stress.
4. When a vented backplate is used, the retroreflective border must not be placed over the louvers.
5. This standard sheet applies to all signal heads with backplates, including but not limited to:
   - Pole mounted
   - Overhead mounted
   - Span wire mounted
   - Mast arm mounted
   - Vertical signal heads
   - Horizontal signal heads
   - Clustered signal heads
   - Pedestrian hybrid beacons

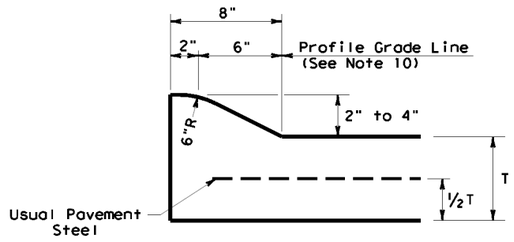
Texas Department of Transportation

Traffic Safety Division Standard

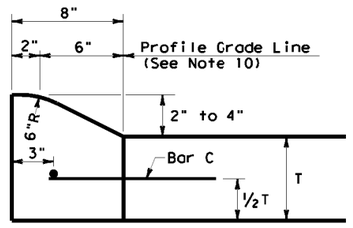
TRAFFIC SIGNAL HEAD WITH BACKPLATE
TS-BP-20

FILE: ts-bp-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT June 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	00	112	VAR
	DIST	COUNTY		SHEET NO.
	LBB	VARIOUS		114

DATE:
FILE:



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



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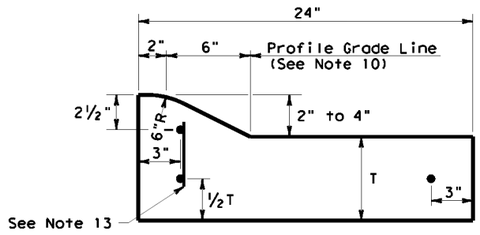
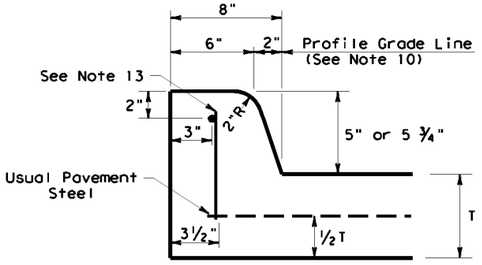
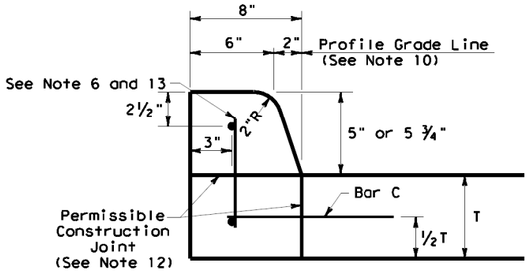
2" - 4" HEIGHT



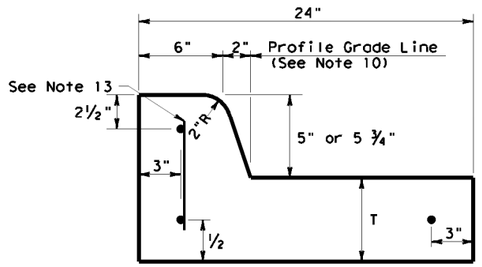
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



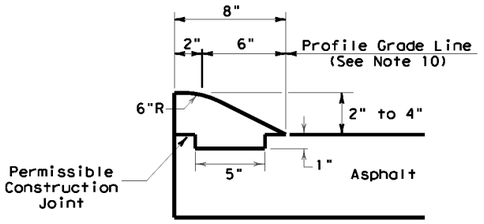
TYPE II CURB (MONOLITHIC)
5" - 5 ¾" HEIGHT



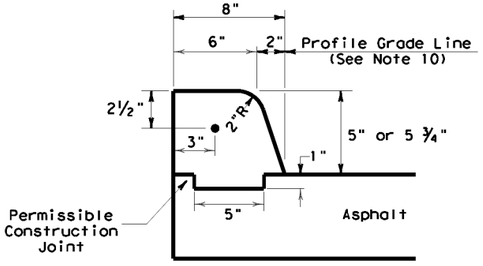
TYPE II CURB
5" - 5 ¾" HEIGHT



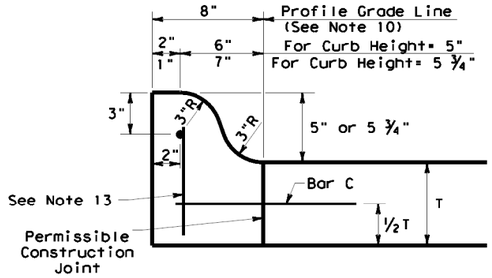
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



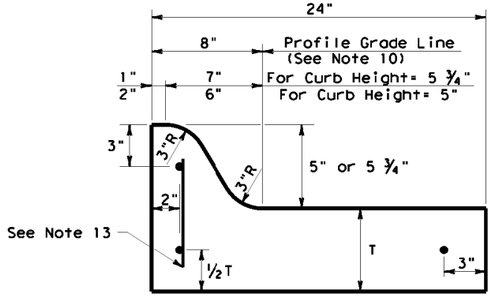
TYPE III CURB (KEYED)
2" - 4" HEIGHT



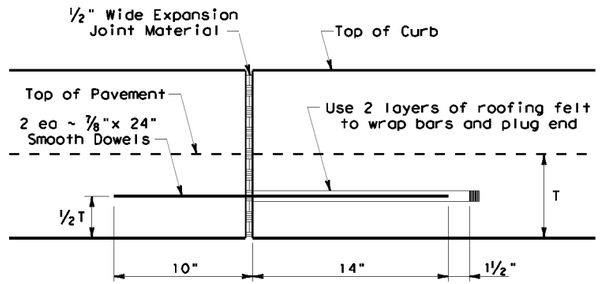
TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



TYPE IIa CURB
5" - 5 ¾" HEIGHT

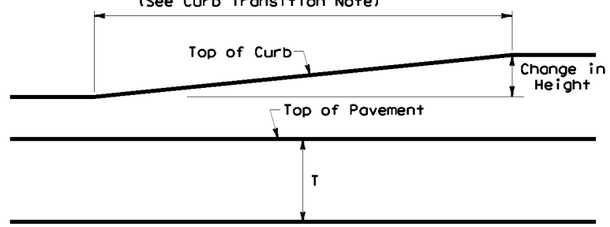


TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

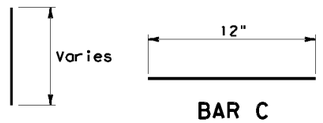
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



CURB TRANSITION
Note: To be paid for as Highest Curb

GENERAL NOTES

1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
2. Concrete shall be Class A.
3. 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."
4. Round exposed sharp edges with a rounding tool, to a minimum radius of ¼ inch.
5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
6. Where concrete curb is to be placed on existing concrete pavement, Bar B may be drilled and grouted in place, or may be inserted into fresh concrete.
7. 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.
8. Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C-C.
9. Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
10. Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
12. 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.
13. Bar B placement as needed (typically at four ft. C-C) to support curb reinforcing steel during concrete placement.



BAR B

BAR C

Texas Department of Transportation

Design Division Standard

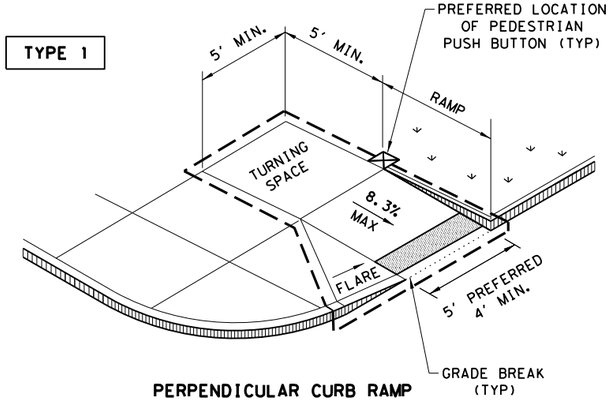
CONCRETE CURB AND CURB AND GUTTER

CCCG-22

FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: CS	CK: KM
© TxDOT: JUNE 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	00	112	VAR
	DIST	COUNTY		SHEET NO.
	LBB	VARIOUS		115

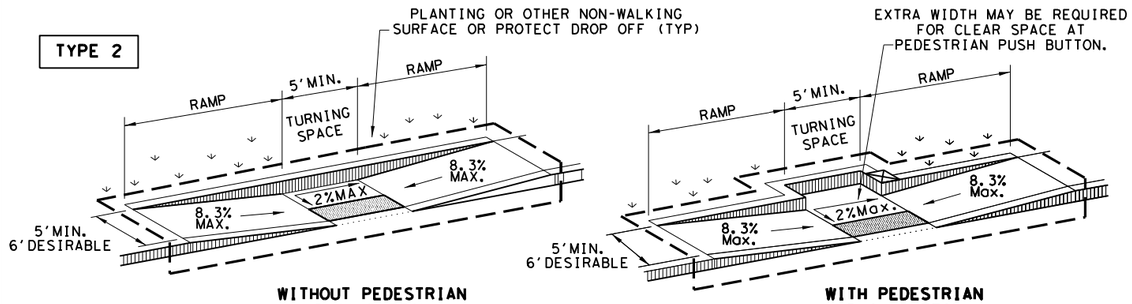
DATE: 9/28/2022
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\090500112\4 - Design\Plan Set\6. Traffic\11. STANDARDS\116-119 PED-18.dgn

TYPE 1



PERPENDICULAR CURB RAMP

TYPE 2

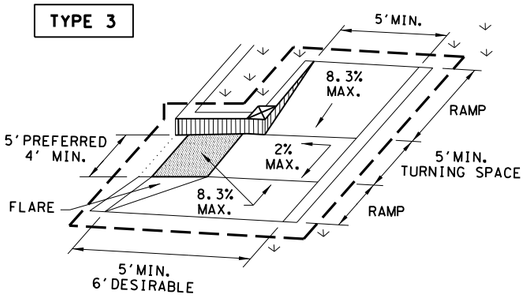


WITHOUT PEDESTRIAN PUSH BUTTON

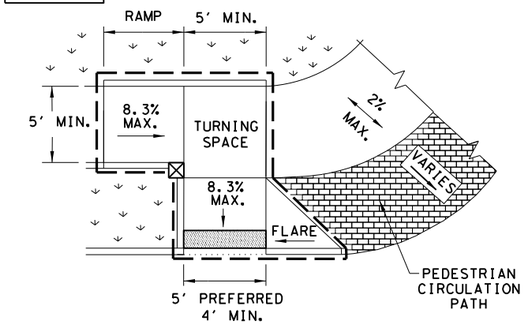
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3

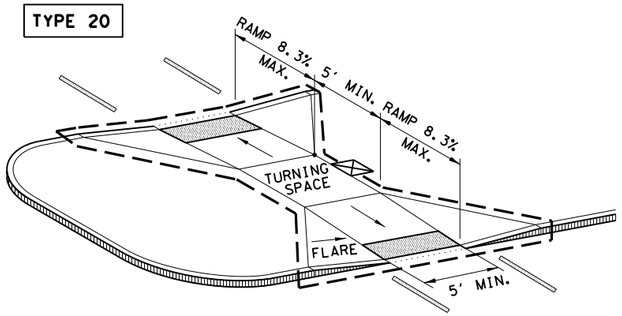


TYPE 6



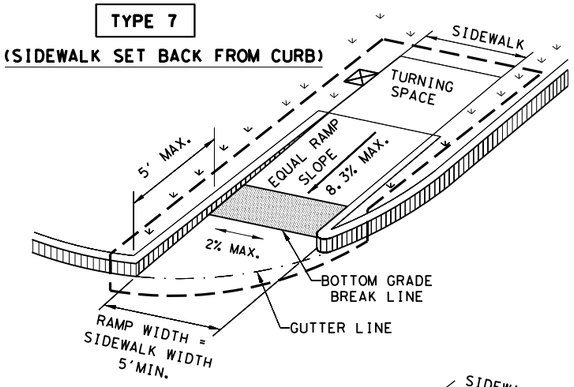
COMBINATION CURB RAMPS

TYPE 20

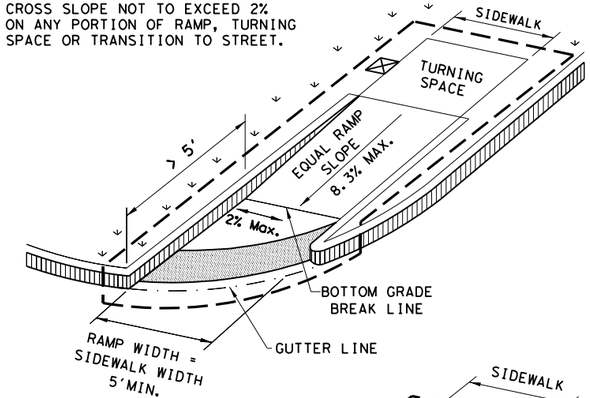


CURB RAMPS AT MEDIAN ISLANDS

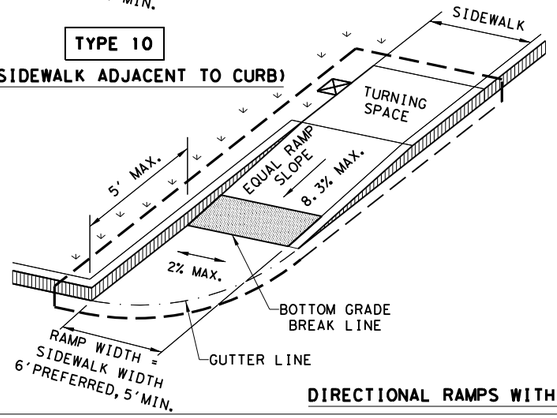
TYPE 7
(SIDEWALK SET BACK FROM CURB)



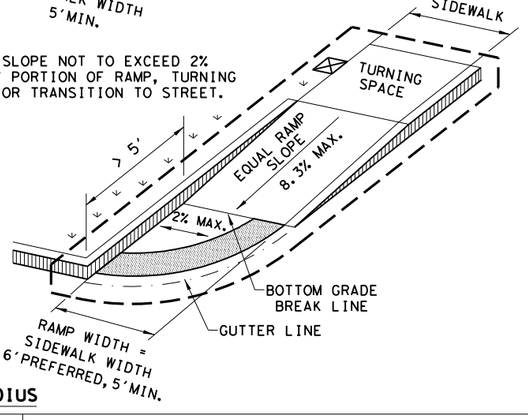
CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



TYPE 10
(SIDEWALK ADJACENT TO CURB)

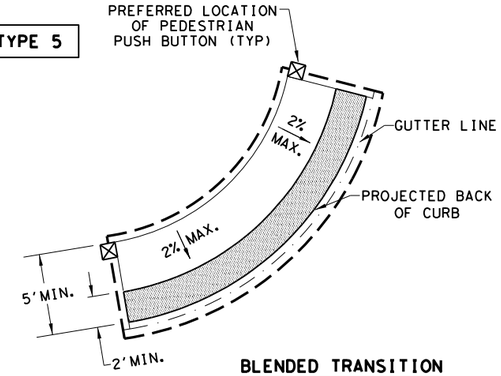


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



DIRECTIONAL RAMPS WITHIN RADIUS

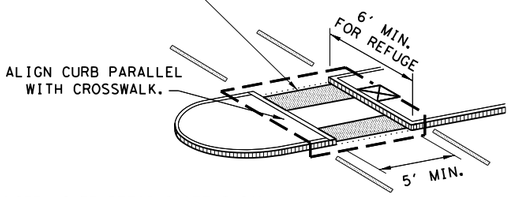
TYPE 5



BLENDED TRANSITION
(FLUSH LANDING)

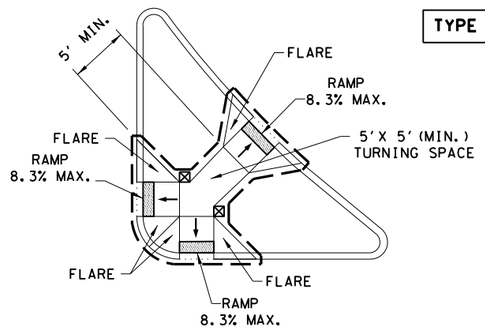
TYPE 21

INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.



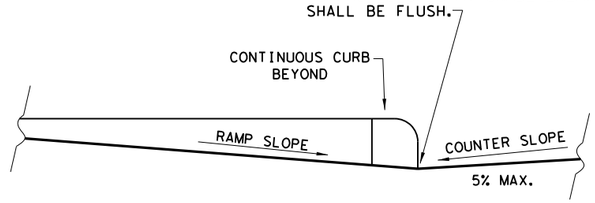
NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

TYPE 22



COMBINATION ISLAND RAMPS

BOTTOM GRADE BREAK OF CURB RAMP WILL NORMALLY BE AT GUTTER LINE. SURFACE SLOPES AT GRADE BREAKS SHALL BE FLUSH.



TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY

NOTES / LEGEND:

SEE GENERAL NOTES ON SHEET 2 OF 4 FOR MORE INFORMATION.

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

DETECTABLE WARNING SURFACE

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

GUTTER LINE

GRADE BREAK

RAMP LIMITS OF PAYMENT

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	00	112	VAR
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.
	LBB	VARIOUS		116

DATE: 9/28/2022
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\0905001124 - Design\Plan Set\8. Traffic\11. STANDARDS\116-119 PED-18.dgn

GENERAL NOTES

CURB RAMPS

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
4. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5'x 5' passing areas at intervals not to exceed 200' are required.
5. Turning Spaces shall be 5'x 5' minimum. Cross slope shall be maximum 2%.
6. Clear space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
9. To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5'x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
16. Provide a smooth transition where the curb ramps connect to the street.
17. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
18. Existing features that comply with applicalble standards may remain in place unless otherwise shown on the plans.

DETECTABLE WARNING MATERIAL

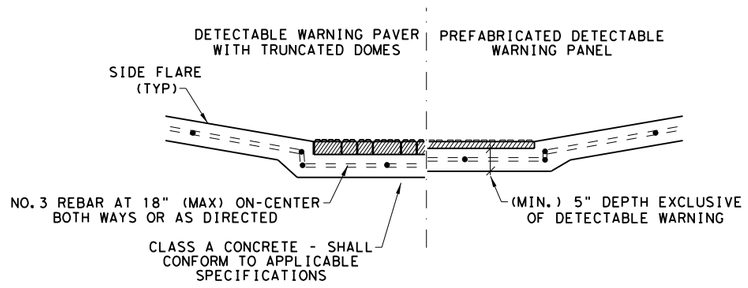
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
20. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
21. Detectable warning surfaces must be firm, stable and slip resistant.
22. Detectable warning surfaces shall be a minimum of 24 inches in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

DETECTABLE WARNING PAVERS (IF USED)

25. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

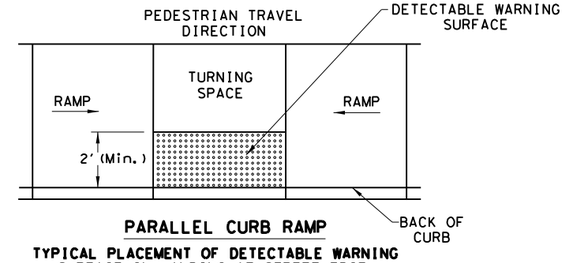
SIDEWALKS

27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
28. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
29. Street grades and cross slopes shall be as shown elsewhere in the plans.
30. Changes in level greater than 1/4 inch are not permitted.
31. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than five percent (5%) must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with PROWAG R409.
32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
33. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
34. Sidewalk details are shown elsewhere in the plans.

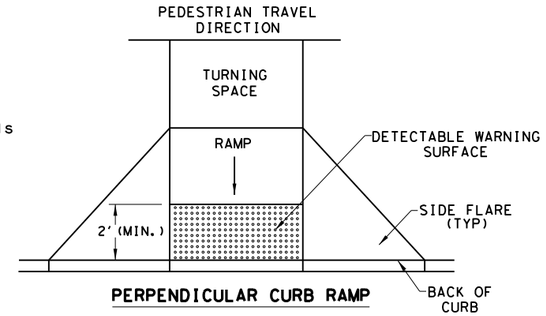


SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

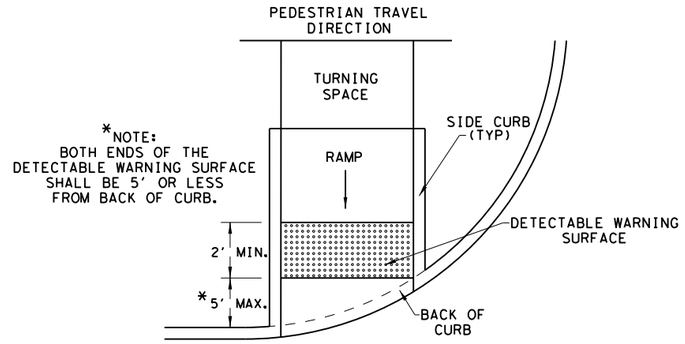
DETECTABLE WARNING SURFACE DETAILS



PARALLEL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING AT STREET EDGE.



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



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

SHEET 2 OF 4

Texas Department of Transportation | Design Division Standard

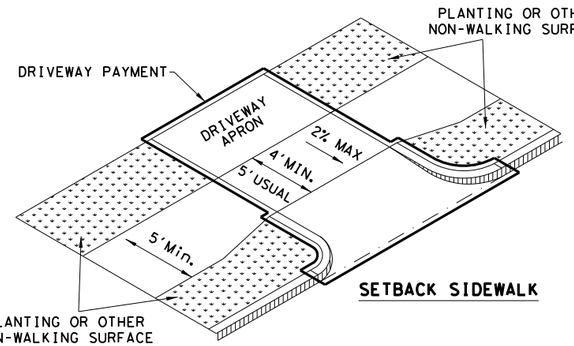
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

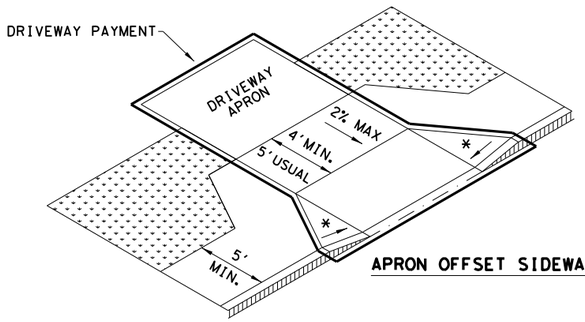
FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT.	SECT	JOB		HIGHWAY
REVISIONS	0905	00	112		VAR
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY			SHEET NO.
	LBB	VARIOUS			117

DATE: 9/28/2022
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\0905001124 - Design\Plan Set\8. Traffic\11. STANDARDS\116-119 PED-18.dgn

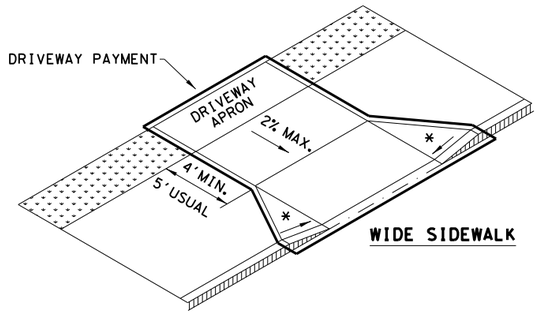
SIDEWALK TREATMENT AT DRIVEWAYS



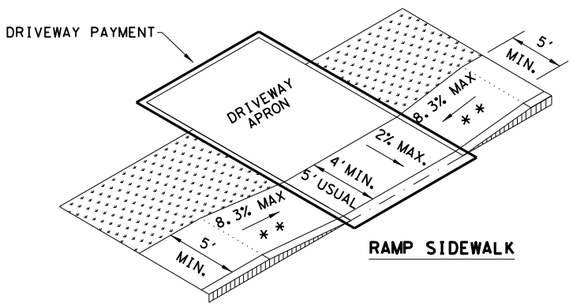
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

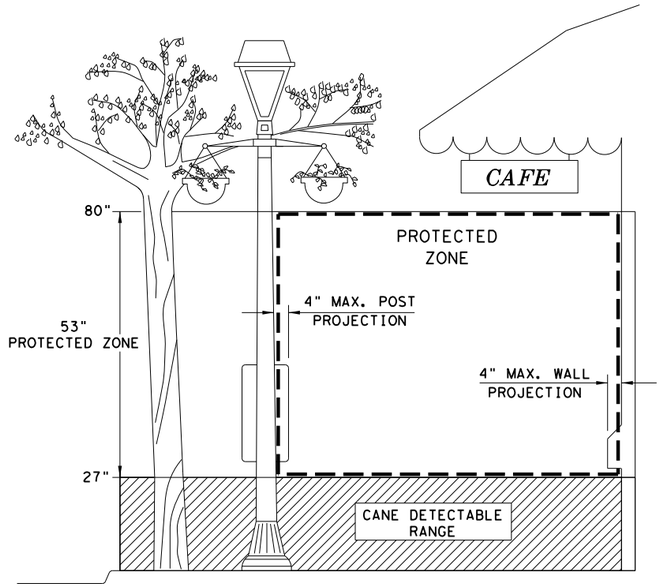


RAMP SIDEWALK

NOTES:

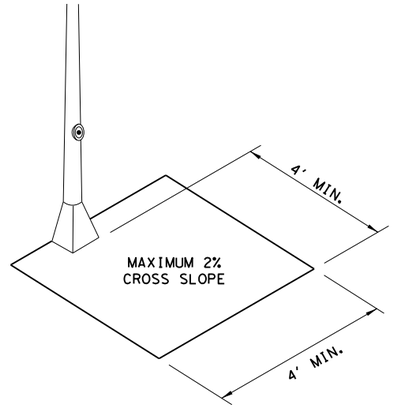
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

* * IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.

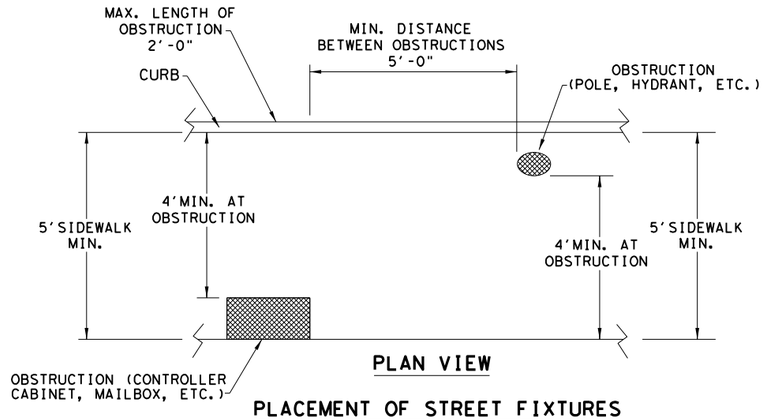


PROTECTED ZONE

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



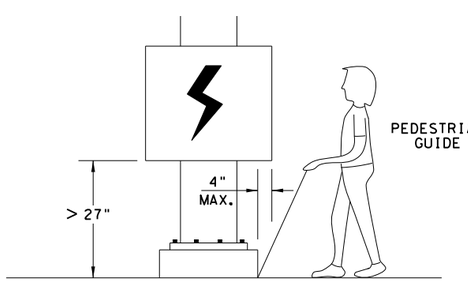
CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



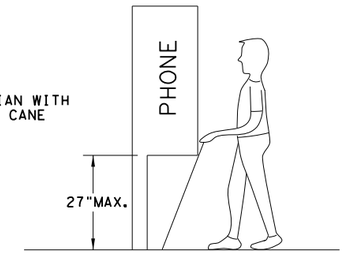
PLAN VIEW

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"

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

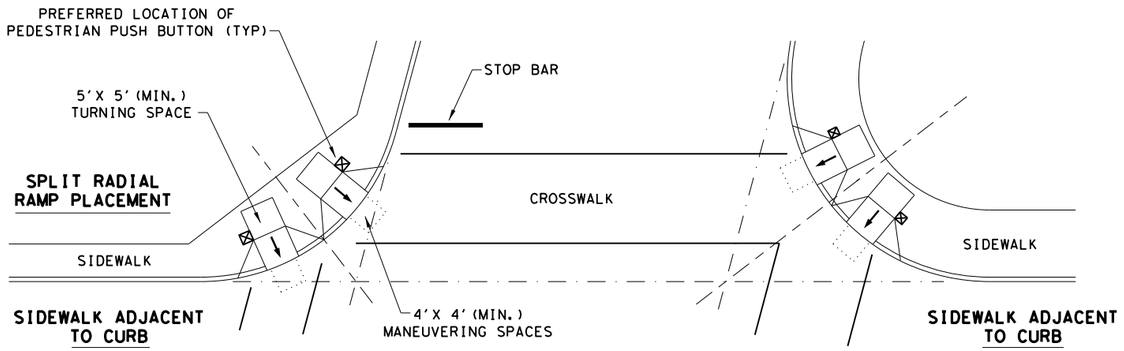
PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG	
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0905	00	112	VAR	
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.	
	LBB	VARIOUS		118	

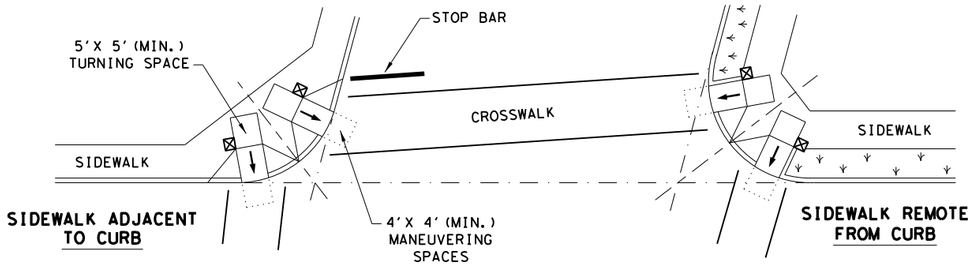
DATE: 9/28/2022
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\0905001124 - Design\Plan Set\6. Traffic\11. STANDARDS\116-119 PED-18.dgn

TYPICAL CROSSING LAYOUTS

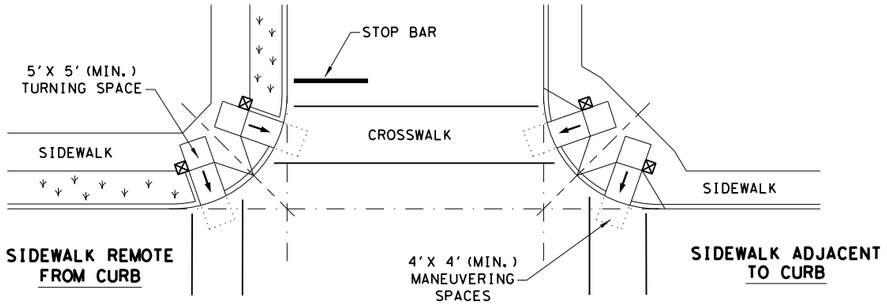
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



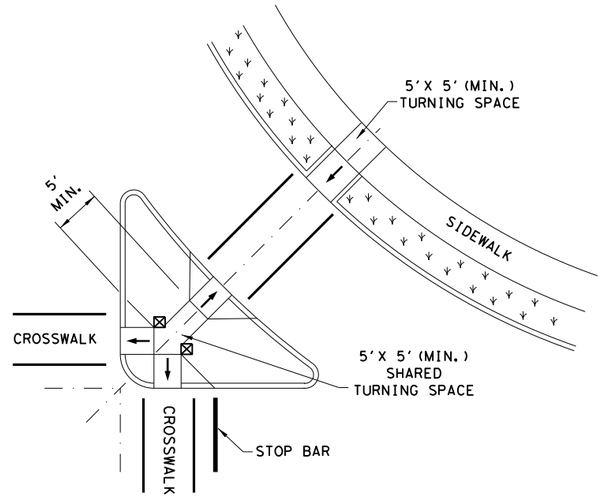
SKEWED INTERSECTION WITH "LARGE" RADIUS



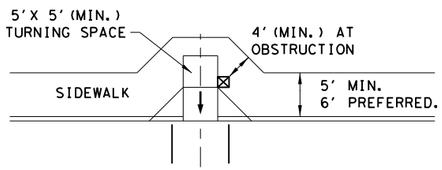
SKEWED INTERSECTION WITH "SMALL" RADIUS

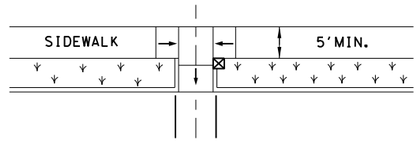


NORMAL INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION
W/FREE RIGHT TURN & ISLAND





MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

LEGEND:

SHOWS DOWNWARD SLOPE. →

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

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

Texas Department of Transportation

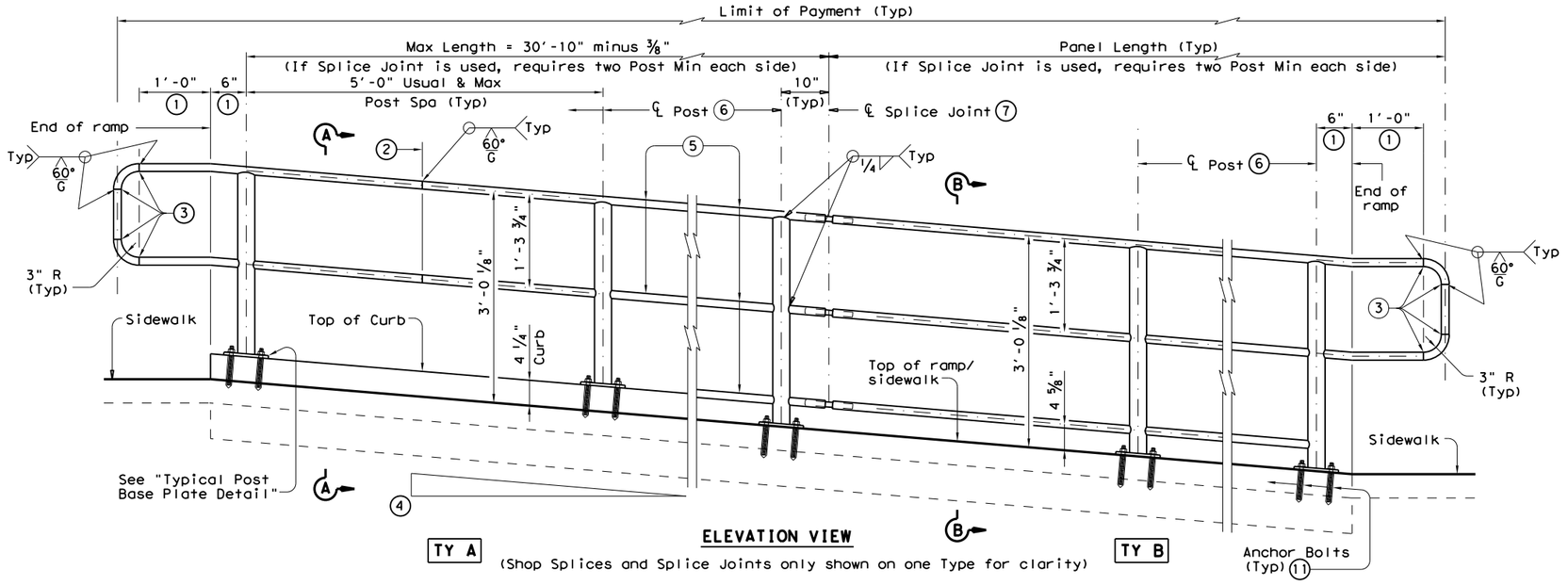
Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0905	00	112		VAR
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY			SHEET NO.
	LBB	VARIOUS			119

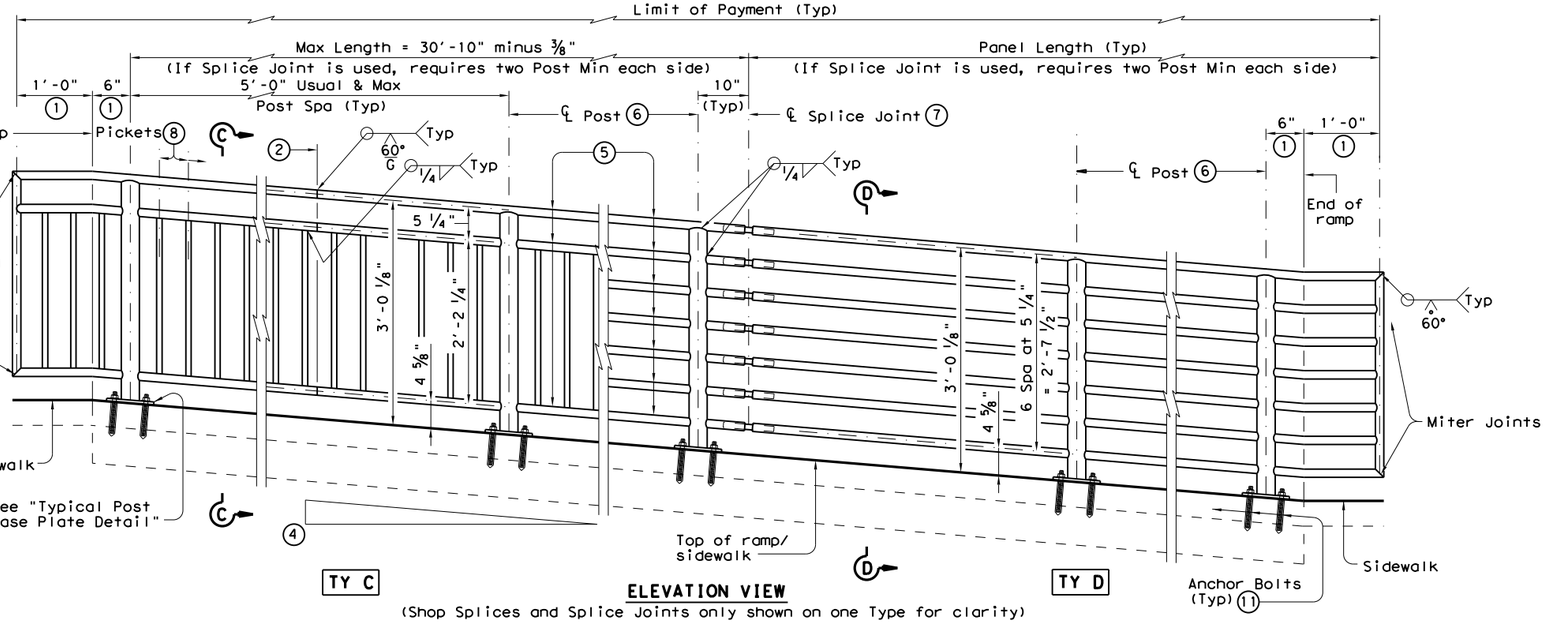
DATE: 9/28/2022
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2Documents\05 - LBB\Construction Projects\090500112\4 - DesignPlan Set\8. Traffic\11. STANDARDS\120-122 PRD-13.dgn



TY A TY B

ELEVATION VIEW

(Shop Splices and Splice Joints only shown on one Type for clarity)

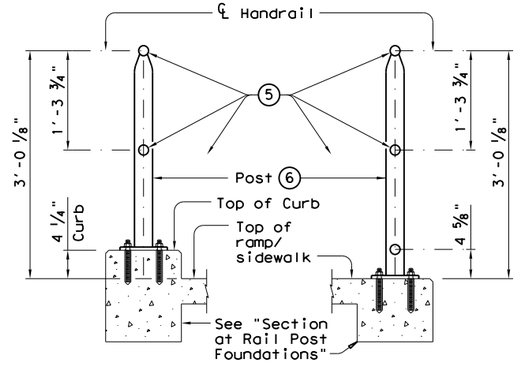


TY C TY D

ELEVATION VIEW

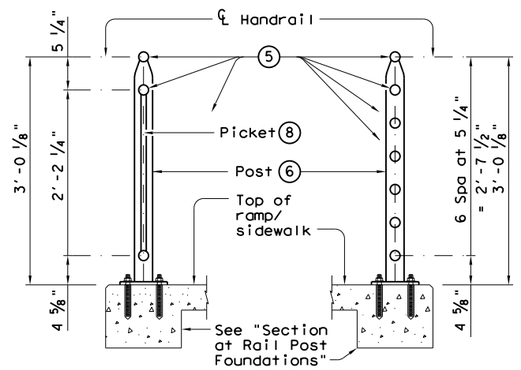
(Shop Splices and Splice Joints only shown on one Type for clarity)

RECOMMENDED USAGE ⑨⑩	
Dropoff Height/ Condition	Recommended Rail Options
<30" dropoff	TY A, TY B, TY C, or TY D
≥ 30" dropoff, or along Bike Path	TY E or TY F



SECTION A-A
(Showing Handrail **TY A**)

SECTION B-B
(Showing Handrail **TY B**)



SECTION C-C
(Showing Handrail **TY C**)

SECTION D-D
(Showing Handrail **TY D**)

1. Parallel to ground.
2. One shop splice per panel is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
3. Shop splice is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
4. See Ramp Details located elsewhere in plans for ramp slope and dimensions. Maximum ramp slope will not exceed 8.3 percent. Level landing required for each 30" rise if grade exceeds 5 percent.
5. 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp / sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.
6. 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). See "Post Mount Detail" for crimping and trimming post to fit Dia. of top rail. Provide holes as needed in post for galvanizing drainage and venting. Plumb all posts.
7. See "Handrail Fabrication Details" for Splice Joints.
8. ℄ ⅝" Dia. Round Bar equal spacing at 4 ½" Max. Plumb all pickets.
9. When needed for accessibility (grade > 5 percent) or as needed for pedestrian safety.
10. Not to be used on bridges.
11. See "General Notes" for anchor bolt information.

SHEET 1 OF 3

Texas Department of Transportation

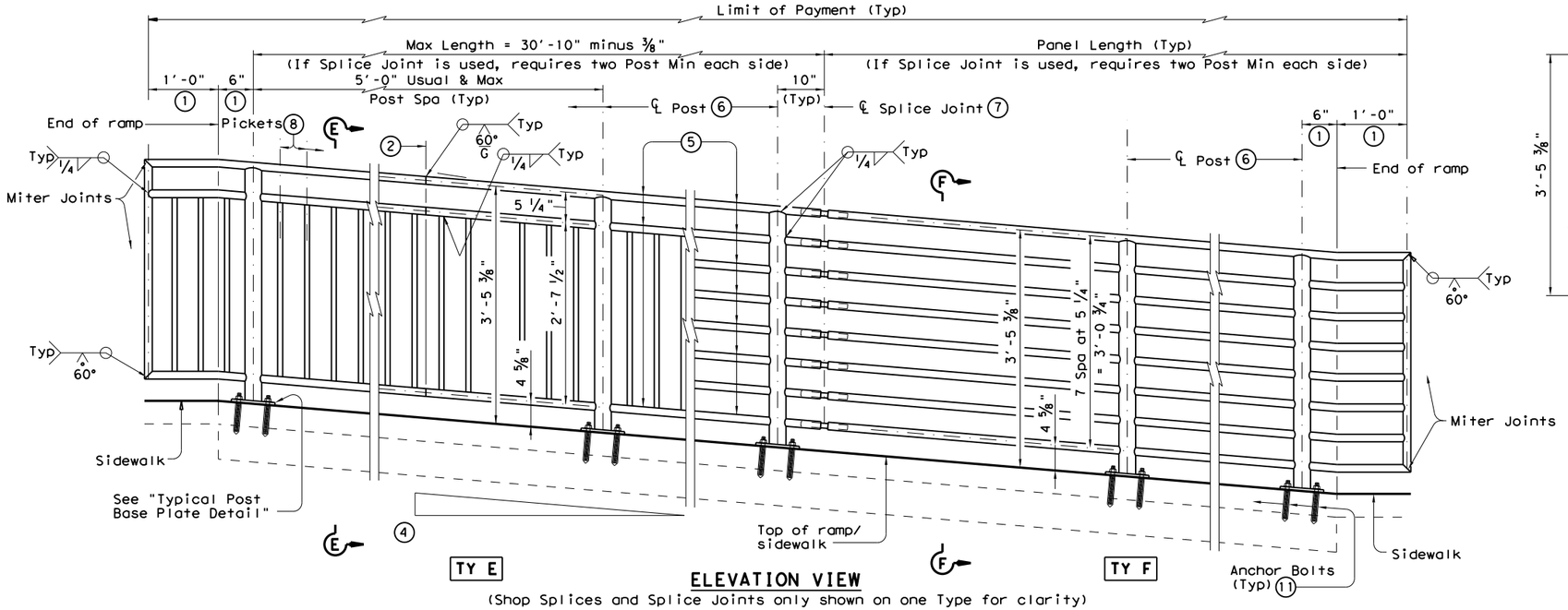
Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

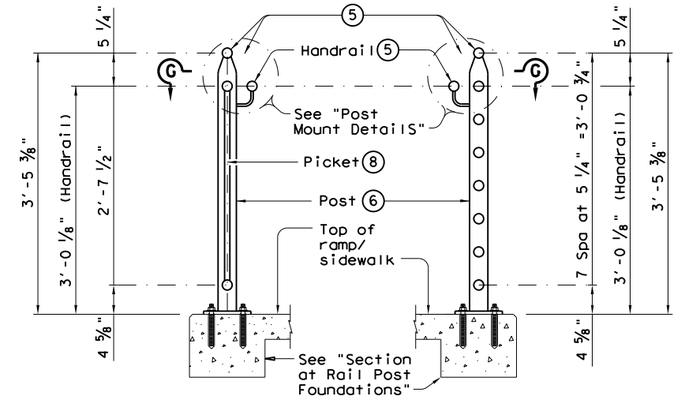
FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED MAY, 2013 (VP)	0905	00	112	VAR
	DIST	COUNTY		SHEET NO.
	LBB	VARIOUS		120

DATE: 9/28/2022
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\0905001124 - Design\Plan Set\8. Traffic\11. STANDARDS\120-122 PRD-13.dgn



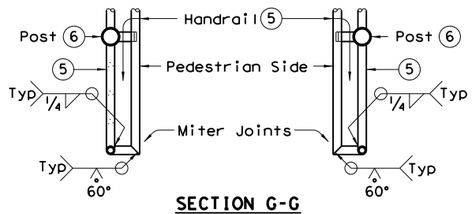
ELEVATION VIEW

(Shop Splices and Splice Joints only shown on one Type for clarity)

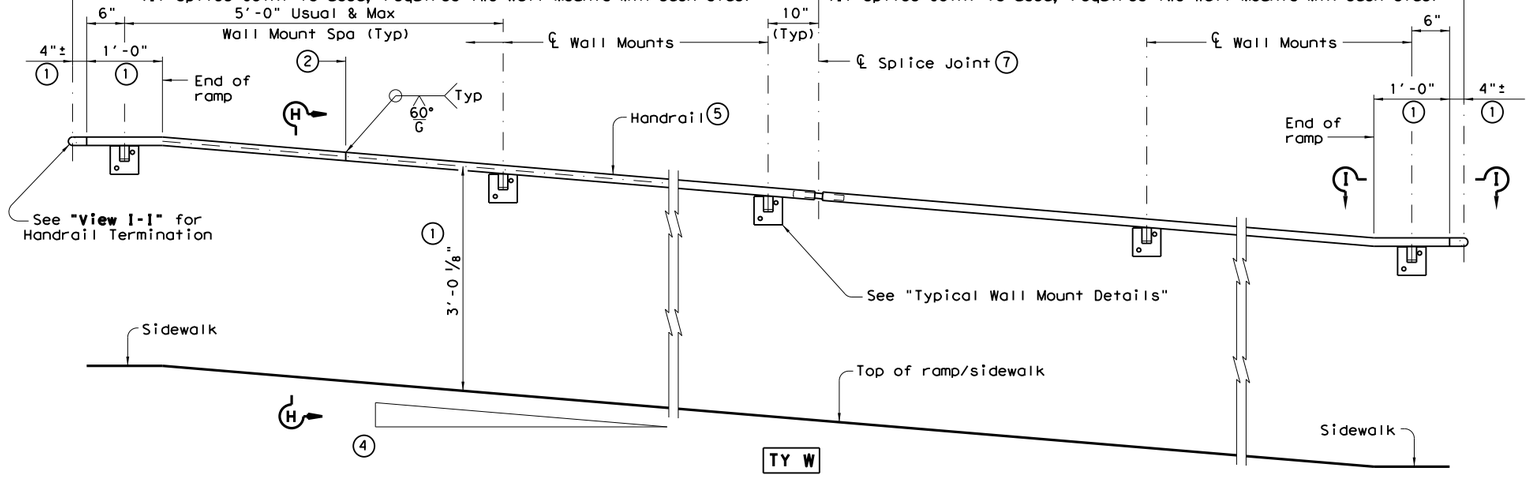


SECTION E-E
(Showing Handrail TY E)

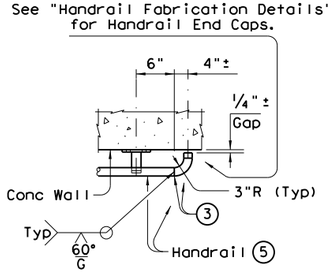
SECTION F-F
(Showing Handrail TY F)



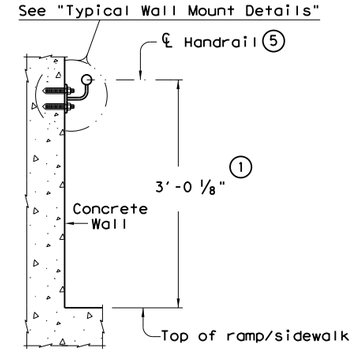
SECTION G-G
(Showing Handrail Termination)



ELEVATION VIEW



VIEW I-I
(Showing Handrail Termination)



SECTION H-H
(Showing Handrail TY W)

1. Parallel to ground.
2. One shop splice per panel is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
3. Shop splice is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
4. See Ramp Details located elsewhere in plans for ramp slope and dimensions. Maximum ramp slope will not exceed 8.3 percent. Level landing required for each 30" rise if grade exceeds 5 percent.
5. 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp / sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.
6. 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). See "Post Mount Detail" for crimping and trimming post to fit Dia. of top rail. Provide holes as needed in post for galvanizing drainage and venting. Plumb all posts.
7. See "Handrail Fabrication Details" for Splice Joints.
8. ℄ ⅝" Dia. Round Bar equal spacing at 4 ½" Max. Plumb all pickets.
11. See "General Notes" for anchor bolt information.

Texas Department of Transportation

Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED MAY, 2013 (VP)	0905	00	112	VAR
	DIST	COUNTY		SHEET NO.
	LBB	VARIOUS		121

DATE: 9/28/2022
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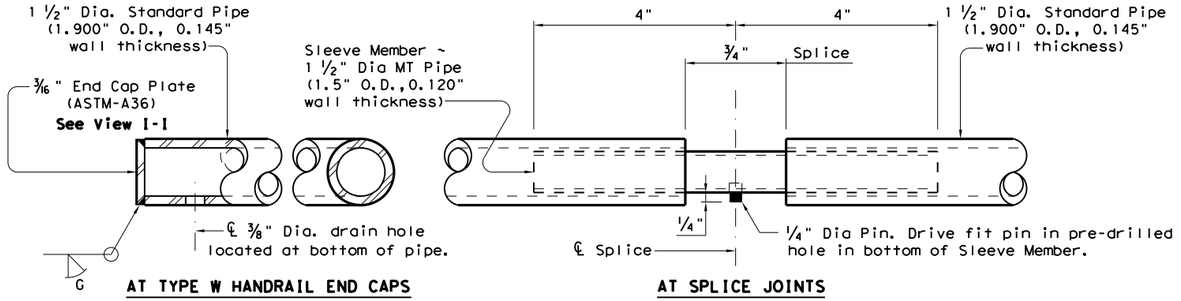
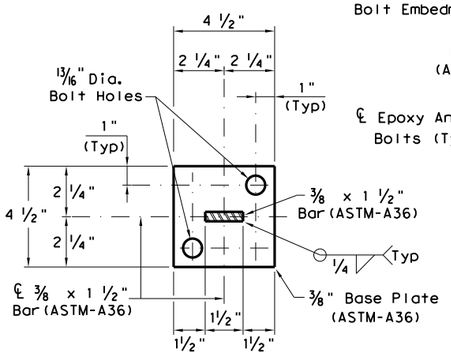


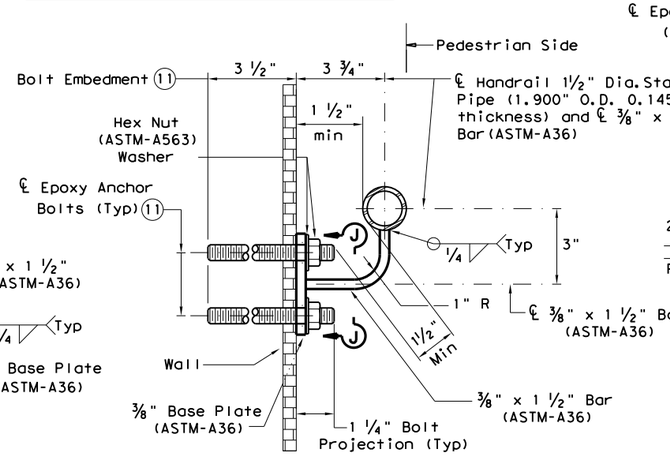
AT TYPE W HANDRAIL END CAPS

AT SPLICE JOINTS

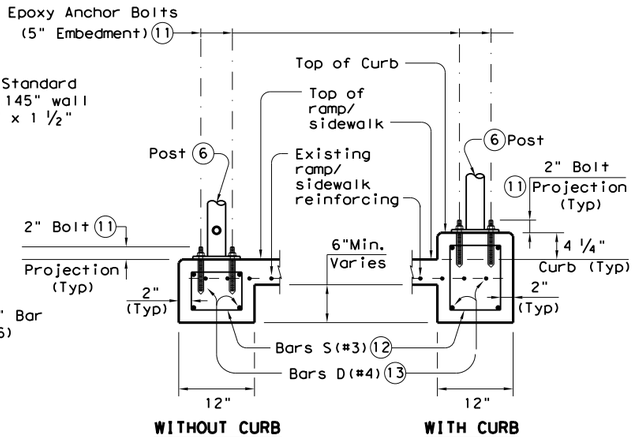
HANDRAIL FABRICATION DETAILS



SECTION J-J
(Anchor Bolts not shown for clarity)



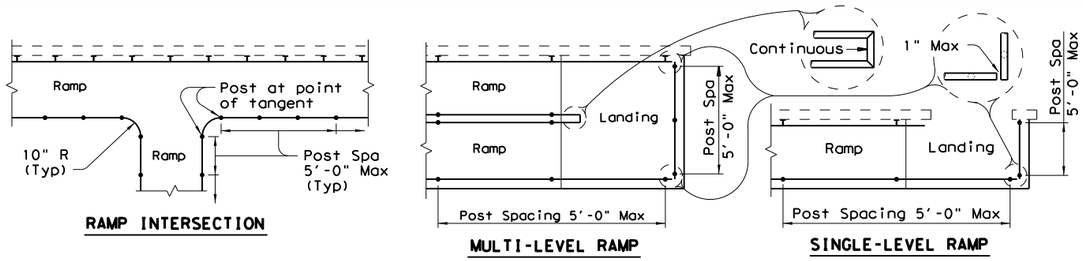
SECTION AT WALL MOUNT



WITHOUT CURB

WITH CURB

SECTION AT RAIL POST FOUNDATIONS



RAMP INTERSECTION

MULTI-LEVEL RAMP

SINGLE-LEVEL RAMP

PLAN SHOWING RAIL AT RAMP CONDITIONS

GENERAL NOTES

Designed according to ADAAG, Texas Accessibility Standards, Uniform Building Code, and AASHTO LRFD Specifications.

Handrail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Pipe will conform to ASTM-A53 Grade B or A500 Grade B. Steel plates and steel bars will conform to ASTM-A36. Mechanical tubing (MT) will conform to ASTM A513 Grade 1015 or higher. Galvanize all steel components except reinforcing steel unless noted otherwise.

Concrete for foundations will be in accordance with Item 531 "Sidewalks". All reinforcing steel must be Grade 60. Bar laps, where required, will be as follows: Uncoated ~ #4 = 1'-5" Epoxy coated ~ #4 = 2'-1"

When the plans require painted steel, follow the requirements for painting galvanized steel in Item 446, "Cleaning and Painting Steel". Sleeve Members will receive galvanization and only get field painted after installation unless directed otherwise by Engineer.

Epoxy Anchor bolts for wall mount and post base plate will be ⅝" Dia. ASTM A36 threaded rods with one hex nut and one hardened steel washer at each bolt. ⅝" Dia. threaded rod embedment depth for wall mounts is 3 ½" and embedment depth for post base plate is 5".

Embed threaded rods into concrete with a Type III (Class C) epoxy meeting the requirements of DMS-6100, "Epoxies and Adhesives". Mix and dispense adhesive with the manufacturer's static mixing nozzle/dual cartridge system. Core drill holes (percussion drilling not permitted).

At the contractor's option the post base plate anchor bolts may be cast with the Ramp/Sidewalk (See Cast-in-Place Anchor Bolt Options).

Optional cast-in-place anchor bolts will be ⅝" Dia ASTM A307 Grade A bolts (or A36 threaded rods with one tack welded hex nut each) with one hex nut and one hardened steel washer at each bolt. Embedment depth of cast-in-place bolt will be 8" for post base plate.

Handrails and any wall or other surface adjacent to them will be free of any sharp or abrasive elements.

Submit shop drawings to the Engineer unless otherwise noted. For curved handrail applications, fabricate the handrail to the curve if radius is less than 600 ft. Shop drawings are required when rail is fabricated to the curve.

For all handrails, erection drawings will be submitted to the Engineer for approval to ensure proper installation.

Drawings will show handrail mount locations with bolts setting, spacing, ramp slope, and/or splice joint locations, and handrail lengths with identification showing where each handrail goes on the layout.

Payment for concrete sidewalks or curb ramps will be paid for in accordance with Item 531 "Sidewalks".

Payment for all items shown is to be included in unit price bid in accordance with Item 450 "Railing" of the type specified.

All exposed edges will be rounded or chamfered to approximately ⅛" by grinding.

TYPICAL WALL MOUNT DETAILS

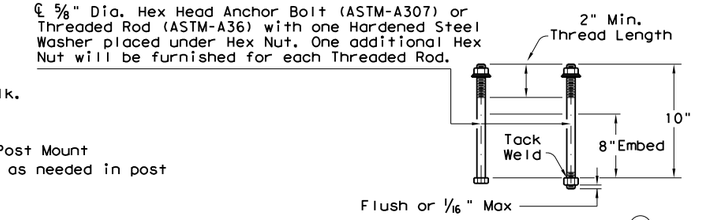
(5) 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp/sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.

(6) 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). Plumb all posts. See "Post Mount Detail" for crimping and trimming post to fit the diamenter of top rail. Provide holes as needed in post for galvanizing drainage and venting.

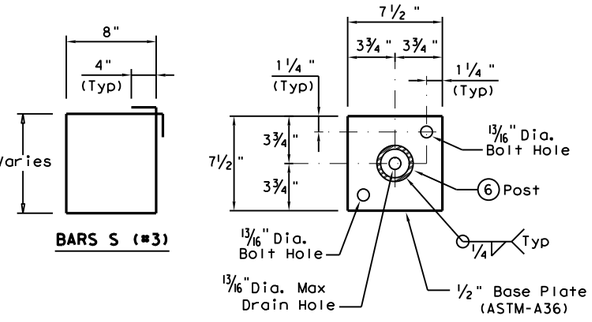
(11) See "General Notes" for anchor bolt information.

(12) Bars S(#3) spaced at 12" Max (Spaced 3" from outside edge of overall length of Ramp/Sidewalk).

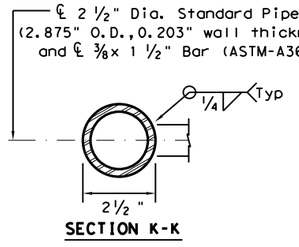
(13) Provide 1 ½" end cover to Bars D(#4) from outside edge of overall length of Ramp/Sidewalk.



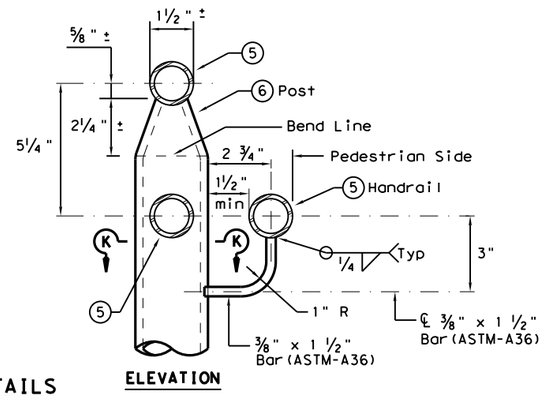
CAST-IN-PLACE ANCHOR BOLT OPTIONS
(Used for Post Base Plate only)



TYPICAL POST BASE PLATE DETAIL



SECTION K-K



ELEVATION

POST MOUNT DETAILS

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	00	112	VAR
REVISED MAY, 2013 (VP)	DIST	COUNTY		SHEET NO.
	LBB	VARIOUS		122

STORM WATER POLLUTION PREVENTION PLAN (SW3P):

This SW3P has been developed in accordance with TPDES General Permit TXR150000. The operator, the Texas Department of Transportation, provides project specifications for the development of adequate BMPs. The contractor shares responsibility for implementing the BMPs described herein. The contactor shall implement changes approved by the Project Engineer to the SW3P within the time specified in the SW3P or in the TPDES Construction General Permit. See EPIC sheet for a list of the MS4 Operators.

1. SITE OR PROJECT DESCRIPTION:

a. NATURE OF THE CONSTRUCTION ACTIVITY:
TXDOT (LUBBOCK DISTRICT) SIGNAL UPGRADES & ADA IMPROVEMENTS AT VARIOUS INTERSECTIONS.

b. POTENTIAL POLLUTANTS AND SOURCES:

Sediment laden storm water	Storm water conveyance over disturbed areas
Fuels, oils, and lubricants	Construction vehicles and storage areas
Construction debris and waste	Various construction activities
Sanitary waste	Restroom facilities
Trash	Construction site and receptacles
Concrete Washout Water	Concrete Trucks, Concrete Pump Trucks, Paving Equipment

Potential pollutants will primarily be from sediments leaving the right-of-way and petroleum products. Principle sources of pollutants will be: disturbed soil from grading, excavation, embankment, and other roadway construction activities; litter and debris from construction activities; gasoline, oil, and grease from asphalt distributor vehicles, scrappers, trucks, rollers, compactors, and fuel trucks during daily, routine operations.

c. SEQUENCE OF ACTIVITIES THAT WILL DISTURB SOILS:
1. INSTALLING DRILL SHAFTS & ADA RAMPS

d. AREAS:

TOTAL AREA OF PROJECT:	3.37 ACRES
TOTAL AREA OF SOIL DISTURBANCE:	0.17 ACRES
TOTAL AREA OF OFF-SITE PSL:	To be determined when construction begins.

e. DATA DESCRIBING THE SOIL:
VARIOUS SOILS

WATER QUALITY ASSESSMENT: A site (visual & odor) assessment of water quality will be performed once construction begins.

f. GENERAL LOCATION MAP: SEE TITLE SHEET TO PROJECT PLANS.

g. DETAILED SITE MAP: SEE SW3P PLAN SHEET AND/OR TYPICAL SECTIONS, PLAN SHEETS, AND DRAINAGE AREA MAP

h. THE LOCATION AND DESCRIPTIONS OF SUPPORT ACTIVITIES AUTHORIZED UNDER THE PERMITEE'S NOI: There are no asphalt or concrete batch plants providing support to the project authorized under the Lubbock District's (TxDOT) NOI.

i. NAME OF RECEIVING WATERS: BLACKWATER DRAW

j. A COPY OF TPDES CGP TXR150000 IS INCLUDED IN THE SW3P FILE.

k. A COPY OF THE NOI, ACKNOWLEDGEMENT CERTIFICATE AND/OR CONSTRUCTION SITE NOTICE IS IN THE PROJECT SW3P FILE

2. DESCRIPTION OF BMPs USED TO MINIMIZE POLLUTION IN RUNOFF:

EROSION AND SEDIMENT CONTROLS: If it is necessary to pump water, BMP's shall be used to reduce the off-site transport of sediment. BMP's shall be installed per the manufacturer specifications or as directed by the Engineer.

GENERAL SCHEDULE FOR IMPLEMENTATION OF SW3P CONTROLS

CONTROL	IMPLEMENTATION SCHEDULE AND DESCRIPTION	REMOVAL SCHEDULE
general, various controls	control measures are to be provided at a time and in a manner that will minimize impacts to receiving waters	at final stabilization; at the resumption of construction (temporary measures); at the direction of the SW3P plan; at the direction of the project manager
rock filter dams	to be installed prior to soil disturbing activities in the surrounding areas	at final stabilization or as directed by the project engineer
sandbag berms	to be installed prior to the start of construction; sandbag berms are to serve as water velocity dissipaters, as ditch blocks, as sedimentation basins, in support of other control devices, and as a final multiple control for water leaving the construction zone	at final stabilization or as directed by the project engineer
silt fence	silt fence will be installed prior to the start of construction along right-of-way lines silt fence will be installed as quickly as feasible (where it is reasonable to do so) at the toe of header bank and other slopes silt fence may be installed at the start of construction, during construction as appropriate, and during construction to support other controls as needed	at final stabilization or as directed by the project engineer at final stabilization or as directed by the project engineer at the removal of the construction exit, at final stabilization, or as directed by the project engineer
tackifiers	soil tackifiers may be used to control dust	erosion controls that are designed to remain in-place for a indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal (CGP, page 23)
water	to be used to suppress dust and compact dirt on an as needed schedule	erosion controls that are designed to remain in-place for a indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal (CGP, page 23)
seed, temporary	to be installed, when apprpropriate, in disturbed areas where construction has temporarily ceased for 21 days	erosion controls that are designed to remain in-place for a indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal (CGP, page 23)
seed, permanent	to be installed as a final stabilization measure where construction is complete or as directed by the Engineer	erosion controls that are designed to remain in-place for a indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal (CGP, page 23)
construction exits	to be installed at all construction vehicle exit points to publicly traveled ways prior to the use of these exits by construction vehicles	as directed by construction conditions or by the Engineer
erosion control logs	to be installed prior to the start of construction; erosion control logs are to serve as water velocity dissipaters, as ditchblocks, as sedimentation basins, and in support of other control devices.	as directed by construction conditions or by the Engineer
soil retention blankets	to be installed as a final stabilization measure where construction is complete or as directed by the Engineer	erosion controls that are designed to remain in-place for a indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal (CGP, page 23)
inlet protectors	to be installed to cover curb inlets with support from sandbags or as directed by the Engineer	as directed by construction conditions or by the Engineer
compost socks	to be installed as channel blocks, inlet protectors, and to support sandbag berms, silt fences or as directed by the Engineer	as directed by construction conditions or by the Engineer

Note: this is a general schedule for the installation of and removal of SW3P best management practice controls, the final determination of the implementation and removal of controls is at the discretion of the project engineer.

Note: control measures must be properly selected, installed, and maintained according to the manufacturer's or designer's specifications. If periodic inspections or other information indicates control has been used incorrectly, or that the control is performing inadequately, the operator must replace or modify the control as soon as practicable after the discovery that the control has been used incorrectly, is performing inadequately, or is damaged.

Note: sediment must be removed from traps and sedimentation ponds no later than the time that design capacity has been reduced by 50 percent.

Note: If sediment escapes the site, accumulations must be removed at a frequency to minimize further negative effects, and whenever feasible, prior to the next rain event.

Note: controls must be developed to limit, to the extent practicable, the off-site transport of litter, construction debris, and construction materials.

Note: erosion and sediment controls must be designed to retain sediment on-site to the extent practicable with consideration for local topography, soil type, and rainfall. Controls must also be designed and utilized to reduce the off-site transport of suspended sediments and other pollutants if it is necessary to pump or channel standing water.

STABILIZATION PRACTICES: The SW3P must include a description of interim and permanent stabilization practices, including a schedule describing when these practices will be implemented.
1. Water: water will be used to temporarily suppress dust and compact dirt.
2. Tackifiers: tackifiers such as asphalt emulsion, guar, (and other natural tackifiers), and synthetic tackifiers will be used to control air (dust) & water erosion.
3. Existing Vegetation & Vegetative Buffers: to the extent practicable, existing vegetation will not be disturbed by construction activities; where feasible (especially at storm water discharge sites) existing vegetation will remain undisturbed to form a vegetative buffer between construction areas and areas undisturbed by construction.
4. Riprap: concrete riprap can be installed as a permanent stabilization measure at locations where construction is complete and permanent stabilization is required.

Site Manager and CPM Sheet incorporation into the SW3P

The Lubbock District of the Texas Department of Transportation uses Site Manager, a computer based construction record-keeping system. Documentation describing major grading activities, temporary or permanent cessation of construction, and temporary and permanent stabilization measures is a part of this system and is incorporated by reference into this SW3P.

Storm Water Pollution Plans (SW3P) are a part of a highway project's construction plans, and construction plans contain information that supplement a project's SW3P. Project plans provide information on changes in elevations, on the locations where dirt has been removed and the locations where dirt has been added; on construction sequencing and scheduling and other data that might be important to a full understanding of TCEQ storm water pollution prevention requirements and a project's SW3P.

Contactor's Critical Path Model (CPM) schedule is incorporated into the project's SW3P by reference.

Erosion control and stabilization measures must be initiated immediately in portions of the site where construcion activities have ceased and will not resume for a period exceeding 14 calendar days. Stabilization measures that provide a protective cover must be initiated immediately in portions of the site where construction activities have permanently ceased (CGP Part III Sect. F2(b)III page 33)

SEDIMENT CONTROL PRACTICES:
1. Sandbags: the purpose of a sandbag is to intercept sediment laden storm water from disturbed areas, create a detention pond, detain sediment and release water in a sheet flow. Sandbag berms are a general purpose sediment control device and will be used throughout the project to detain sediment on site. Sandbags will be placed in ditches and channels to form sedimentation basins. Sandbags will also be used where runoff exits the construction site to enter receiving waters and to support other storm water controls.
2. Silt fence: silt fence is to be installed with construction near the perimeter of a disturbed area to intercept sediment while allowing water to percolate through. This is a general use control that will be used to create detention basins that retain sediment on-site; they will also be used in support of other controls such as construction exits and rock filter dams.
Silt fence will be used along playa lakes to reduce the loss of sediment from roadway front slopes; it may be used in ditches, channels, discharge points to support sandbag berms; may be used to support stabilized construction exits.
3. Rock Filter Dams: the purpose of a rock filter dam is to intercept and slow sediment laden water runoff from disturbed areas, retain the sediment and release the water in sheet flow. Rock filter dams will generally be used in high water velocity flow channels.
4. Stabilized Construction Exit: the purpose of the stabilized exit is to reduce the tracking of sediment and dirt onto public roadways beyond the construction zone. Stabilized Construction Exits are to be in-place at exit points to streets and thoroughfares in urban areas and are to be used by all construction vehicles regardless of size. They are to be supported where appropriate with silt fence and mechanized brooms.

Sediment basins are required where feasible for common drainage locations that serve an area with 10 or more acres disturbed at one time. Temporary or permanent sediment basins that provide water storage capacity are located on the project; the following controls provide, where feasible, structural controls / sediment basins:
1. Sandbag Berm as a Sediment Basin: a temporary basin designed to intercept sediment-laden storm water runoff and to trap sediment on-site.
2. Vegetative Buffer Strip: vegetative buffer strips reduce water velocity which reduces the potential of water erosion and allows sediments to fall out of the storm water.
3. Silt Fence will be used to reduce the loss of sediment from roadway front slopes adjacent to playa lakes by filtering out silt laden storm water from construction area.

STATE OF TEXAS
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PROFESSIONAL ENGINEER

09/30/2022

Jeremy T. Dearing, P.E.

SHEET 1 OF 3

SW3P

FED.RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			123
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT.	SECT.	JOB	HIGHWAY NO.
0905	00	112	VAR
FILENAME	SW3Pnarrative.dgn		

3. DESCRIPTION OF PERMANENT STORM WATER CONTROLS

PERMANENT STORM WATER CONTROLS: A description of controls that will stay in-place after construction is completed must be included in the SW3P.

1. Riprap: concrete riprap can be installed as a permanent stabilization measure at locations where construction is completed must be included in SW3P.
2. Existing Vegetation & Vegetative Buffers: to the extent practicable, existing vegetation will not be disturbed by construction activities; and, where feasible (especially at storm water discharge sites), existing vegetation will remain undisturbed to form a vegetative buffer between construction areas and areas undisturbed by construction.
3. Permanent Sodding/Seeding & Plantings: this is the establishment of permanent perennial vegetation. Permanent vegetation stabilizes soil by holding soil particles in-place. Vegetation filters sediments, helps soil absorb water, improves wildlife habitat, and enhances aesthetics of the site. Permanent vegetation will remain in vegetated channels.

4. OTHER REQUIRED CONTROLS AND BMPs

(a) Tracking and Dust: Off-site tracking and generation of dust must be minimized.
1. Stabilized Construction Exit: a stabilized pad of stone, timber, or other stabilized surface located at points where construction traffic will leave the construction zone to enter a public roadway. The purpose of the stabilized exit is to reduce the tracking of sediment and dirt onto public roadways beyond the construction zone. Stabilized Construction Exits will be placed as needed.
2. Water: water will be used to temporarily suppress dust and compact dirt.
3. Tackifiers: tackifiers such as asphalt emulsion, guar, (and other natural tackifiers), and synthetic tackifiers will be used to control air (dust) & water erosion.
4. Existing Vegetation & Vegetative Buffers: to the extent practicable, existing vegetation will not be disturbed by construction activities; where feasible (especially at storm water discharge sites), existing vegetation will remain undisturbed to form a vegetative buffer between construction areas and areas undisturbed by construction.
5. Cleaning and Sweeping: clean and sweep curb and gutter sections twice a month to reduce dirt and trash or as directed.

(b) On-Site Storage of Construction and Waste Materials:
Storage of construction and waste materials on-site shall be temporary; the contractor shall maintain a clean and orderly construction site; and construction waste such as trash, rubble, litter, scrap, and vegetation shall be stored / disposed of in lidded dumpsters or in a manner approved by the project engineer. Disposal methods must meet federal, state, and local waste management requirements. No construction waste shall be buried or burned on-site. Spoils of disposal, material storage, and waste materials from the demolition of existing roads and structures shall be stored in areas designated by the project engineer, and prevented from becoming a pollutant source with appropriate BMPs. Construction and waste materials that might be temporarily stored on-site include concrete and steel pipe; steel reinforcing bar, forms and frames; sand and gravel; wire, concrete and steel beams; wood and steel building units; and controls, construction signs and barricades. A list of construction and waste materials stored on site and controls will be presented to the Project Engineer.

Contractor shall design and utilize appropriate controls to minimize the offsite transport of suspended sediments and other pollutants, if it is necessary to pump or channel standing water from the site.

Litter, construction debris, and construction material exposed to stormwater shall be managed in a manner that prevents this material from becoming a pollutant. A regular sweep of the project shall be made to pick up litter. No construction material of any kind (including dirt) shall be discharged to a water of the United States (ephemeral streams and playa lakes) without a permit from the Corps of Engineers.

Oil, gasoline, grease, solvents, and other petroleum products are not to be stored on-site. Major vehicle maintenance shall occur on-site only under emergency conditions, and when this maintenance type is necessary, a plastic cover shall be used (and properly disposed of) to prevent petroleum products from contaminating the surrounding soil.

(c) Potential Pollutant Sources from Areas Other than Construction:

oil, grease, and other petroleum fluids construction traffic at concrete plant and field office
sediment laden stormwater disturbed soil from concrete batch plant and field office
litter, motorists driving through the project

All best management practices available to this construction project are available to control non-construction generated pollutants including sand bag berms, silt fence, stabilized construction exits, sedimentation basins, and litter management programs among other controls listed in this document.

Storage tanks that are above ground, regardless of whether they are used to store petroleum products, hazardous waste, or other hazardous material must follow the Summary of Federal Requirements.

Aboveground storage tanks (ASTs) used for the storage of petroleum products is regulated primarily under 40 CFR 112. These containers are used for purposes including, but not limited to, the storage of oil prior to use, while being used, or prior to further distribution in commerce.

A bulk storage container is 55 gal. or greater and may be aboveground, partially buried, bunkered, or completely buried. AST's include mobile storage containers such as trailers and tanked vehicles. Oil-filled electrical, operating, or manufacturing equipment is not a bulk storage container.

All bulk storage container installations must be constructed so a secondary means of containment is provided for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. Diked areas must be sufficiently impervious to contain discharged oil.

Mobile/Portable AST:

Mobile or portable oil bulk storage containers must be positioned or located to prevent a discharge and furnished with a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation.

5. DOCUMENTATION OF COMPLIANCE WITH APPROVED STATE AND LOCAL PLANS:

SW3P must comply with Part III.F.5 of Construction General Permit.

6. MAINTENANCE REQUIREMENTS

Control measures shall be properly installed and maintained according to the manufacturer's specifications. Sediment must be removed from BMP's as directed by the SW3P plan requirements, and as directed by the manufacturer's recommendations, but no later than the time at which the capacity of the BMP has been reduced by 50 percent. If sediment or other pollutants escape the site, accumulations will be removed to reduce further negative effects. If inspections or other information indicates a control has been installed, used, or is performing inadequately, the contractor must modify or replace the control as soon as practicable after the problem is discovered. Controls shall be maintained in effective operating condition. If inspections determine that BMPs are not operating effectively, maintenance shall be performed as necessary to continue the effectiveness of the controls. Controls that have been intentionally disabled, run over, removed, or otherwise made ineffective, must be corrected or replaced at discovery.

7. INSPECTION OF CONTROLS

Lubbock District: an informal inspection of controls shall occur every work day; a formal inspection of controls accompanied by an inspection report using Form 2118 shall occur every seven calendar days.

Inspectors must inspect disturbed areas that have not been finally stabilized, areas that are used for storage of materials and that are exposed to rain, discharge locations and structural controls for evidence of, or the potential for, pollutants entering the drainage system.

The SW3P must be modified based on the results of inspections to better control pollutants in runoff. Revisions to the SW3P must be completed within seven calendar days following inspection. If existing BMPs are modified or if additional BMPs are necessary, an implementation schedule must be described in the SW3P and wherever possible those changes implemented before the next storm event.

Determination of Reportable Quantities

A list of each substance designated as hazardous in 40 CFR Part 116 is found in the project's SW3P folder. The 40 CFR 116 registration applies to quantities, when discharged into or upon the Waters of the United States, adjoining shorelines, into or upon the contiguous zone, or beyond the contiguous zone as provided in the Act.

Litter and Construction Debris

The project contractor shall establish a schedule for the regular removal of litter and construction debris; this schedule shall be approved by the project engineer; and, once approved, implemented by the contractor. As needed, the project engineer shall direct the contractor to establish good housekeeping measures consistent with the TCEQ's Construction General Permit.

Concrete Truck Wash-Outs

Concrete truck wash-out is allowed provided:
(a) wash-out of concrete trucks to surface waters in the state, including storm sewer drains and inlets, is prohibited;
(b) wash-out shall be to a structural control;
(c) the direct discharge of wash-out water is prohibited at all times;
(d) the discharge shall not contribute to groundwater contamination;
(e) wash-out areas must be shown on the site map.
(f) wash-out pits shall be bermed and lined with plastic.

404 PERMIT REQUIRED: ___YES _X_NO
401 WATER QUALITY CERTIFICATION AND BMPs REQUIRED: ___YES _X_NO
401 (401) BMPs - INTERIM (ITM) BMPs - PERMANENT (PER) BMPs

EROSION CONTROLS	401	ITM	PER
* temporary vegetation	____	____	____
* blankets / matting	____	____	____
* mulch	____	____	____
* sod	____	____	____
* interceptor swales	____	____	____
* diversion dikes	____	____	____
* erosion control compost	____	____	____
* mulch filter berms & socks	____	____	____
* compost filter berms & socks	____	____	____
* 401 BMP not required	_X__	_X__	_X__

SEDIMENT CONTROLS	401	ITM	PER
* sandbag berm	____	____	____
* silt fence	____	____	____
* triangular filter dikes	____	____	____
* rock berms	____	____	____
* hay bale dikes	____	____	____
* brush berms	____	____	____
* stone outlet sediment trap	____	____	____
* sediment basins	____	____	____
* erosion control compost	____	____	____
* mulch filter berms & socks	____	____	____
* compost filter berms & socks	_X__	_X__	_X__
* 401 BMP not required	____	____	____

POST - CONTSTRUCTION TOTAL SUSPENDED SOLIDS (TSS)

	401	ITM	PER
* retention / irrigation	____	____	____
* vegetation filter strips	____	____	____
* wet basin	____	____	____
* grassy swale	____	____	____
* extended detention basin	____	____	____
* erosion control compost	____	____	____
* 401 BMP not required	_X__	_X__	_X__

	401	ITM	PER
* detention basin	____	____	____
* constructed wetland	____	____	____
* vegetation lined drainage ditch	____	____	____
* sand filter system	____	____	____
* mulch filter berms & socks	____	____	____
* compost filter berms & socks	____	____	____

Note: The best management practices listed in the SW3P may or may not be incorporated into the project design depending on the demands placed by weather and project construction. Should any best management practice not currently listed above be incorporated into the project SW3P design, a description of that best best management practice will be added to the Project SW3P File.

STATE OF TEXAS
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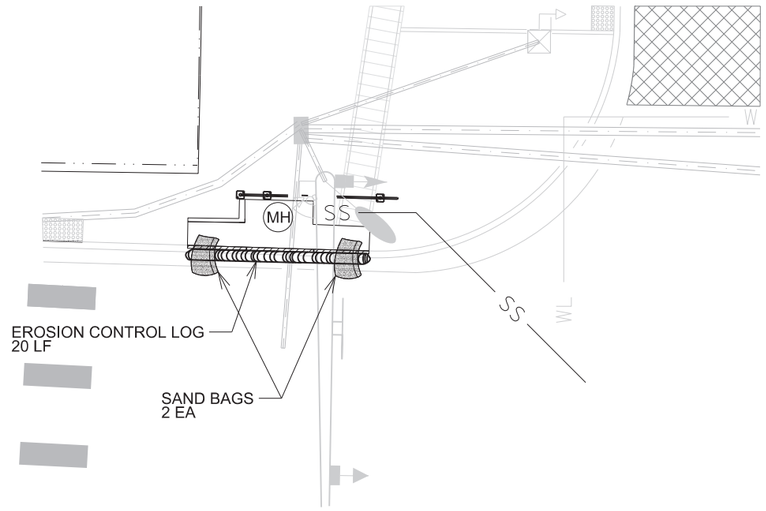
LICENSED PROFESSIONAL ENGINEER

Jeremy T. Dearing, P.E.

09/30/2022

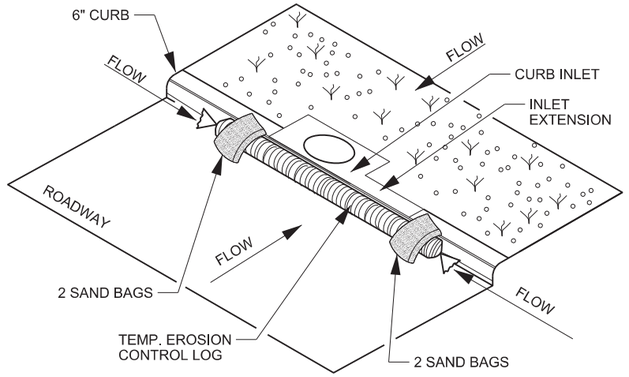
SW3P

FED.RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			124
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT.	SECT.	JOB	HIGHWAY NO.
0905	00	112	VAR
FILENAME	SW3Pnarrative.dgn		



US70 & BROADWAY NW CORNER

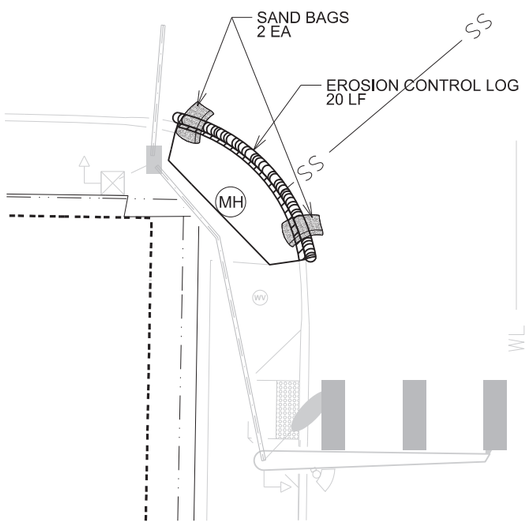
	DATE INSTALLED	DATE REMOVED
BMP #1		



EROSION CONTROL LOG AT CURB INLET

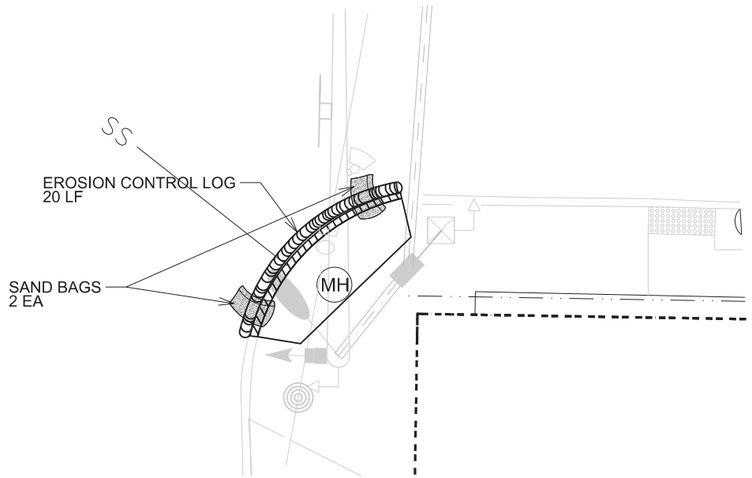
CL-CI

SEE EC (9)-16



US70 & BROADWAY SW CORNER

	DATE INSTALLED	DATE REMOVED
BMP #2		



US70 & BROADWAY SE CORNER

	DATE INSTALLED	DATE REMOVED
BMP #3		

US70 & BROADWAY EROSION CONTROL SUMMARY			
ITEM	**DESCRIPTION**	**UNITS**	**QUANTITY**
0506 6035	SANDBAGS FOR EROSION CONTROL	EA	24
0506 6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	240

* EXTRA QUANTITY INCLUDED FOR REPLACEMENT EROSION CONTROL

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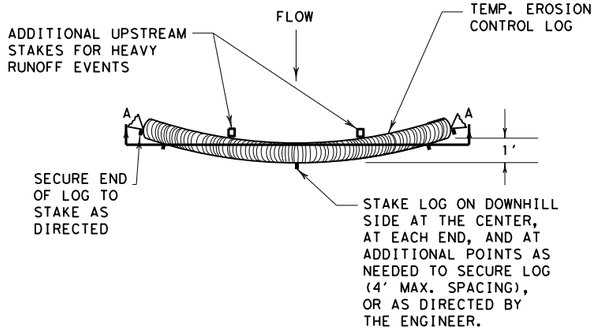
09/30/2022

SHEET 3 OF 3

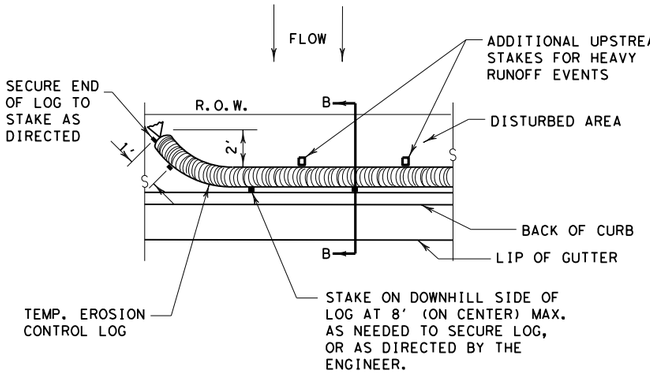
SW3P

FED.RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			125
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LBB	VARIOUS	
CONT.	SECT.	JOB	HIGHWAY NO.
0905	00	112	VAR
FILENAME	SW3Pnarrative.dgn		

DATE: 9/28/2022
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\0905001124 - Design\Plan Set\9. Environmental\126-128 EC (9)-16.dgn



PLAN VIEW



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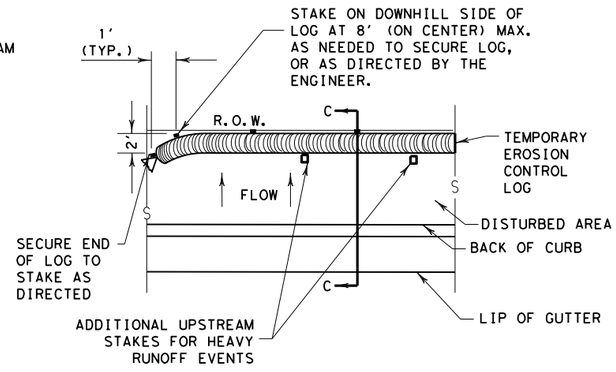
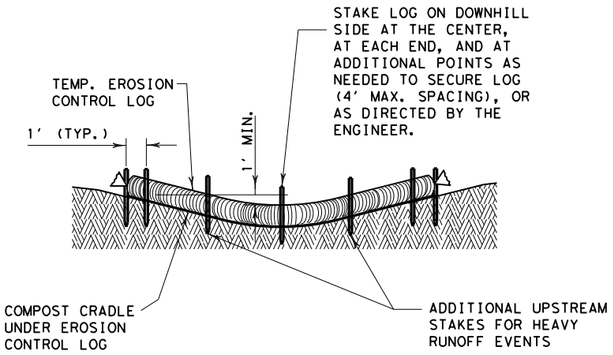


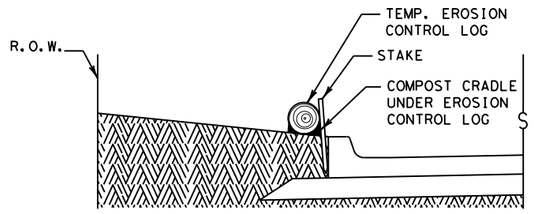
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

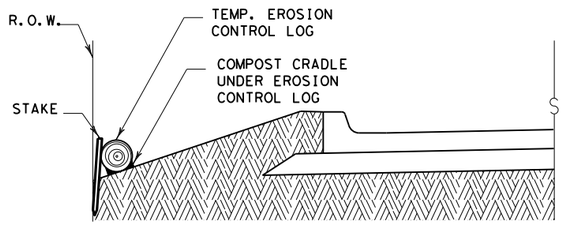
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

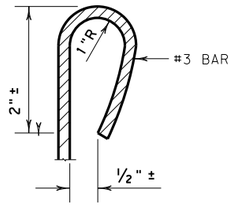
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



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

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.

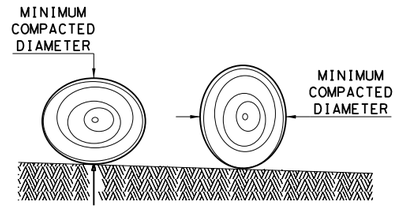
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

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.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation — Design Division Standard

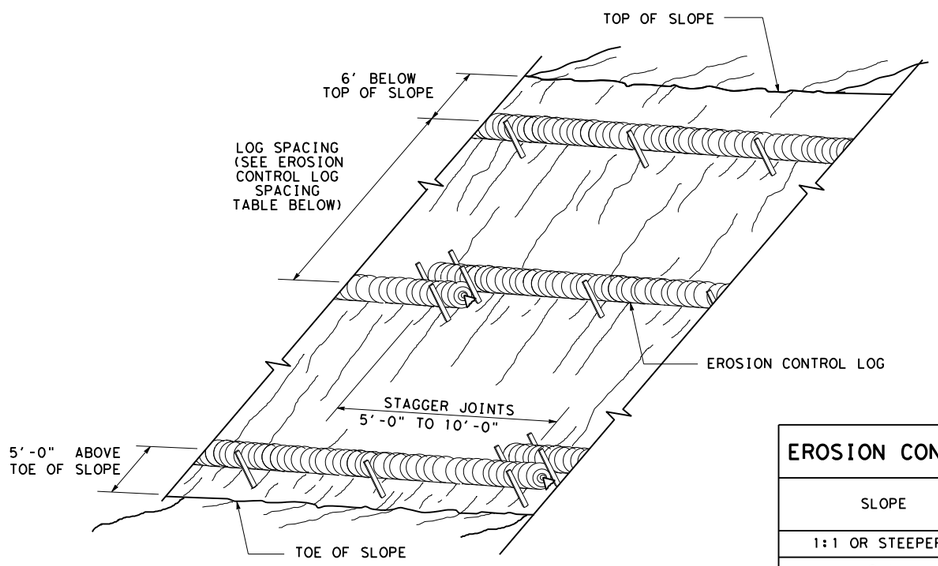
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

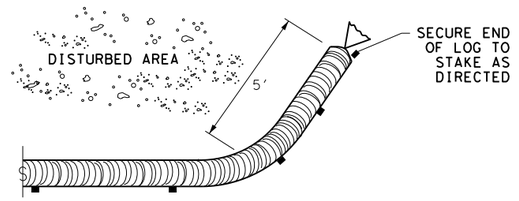
FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0905	00	112		VAR	
	DIST	COUNTY			SHEET NO.	
	LBB	VARIOUS			126	

DATE: 9/28/2022
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\0905001124 - Design\Plan Set\9. Environmental\126-128 EC (9)-16.dgn



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

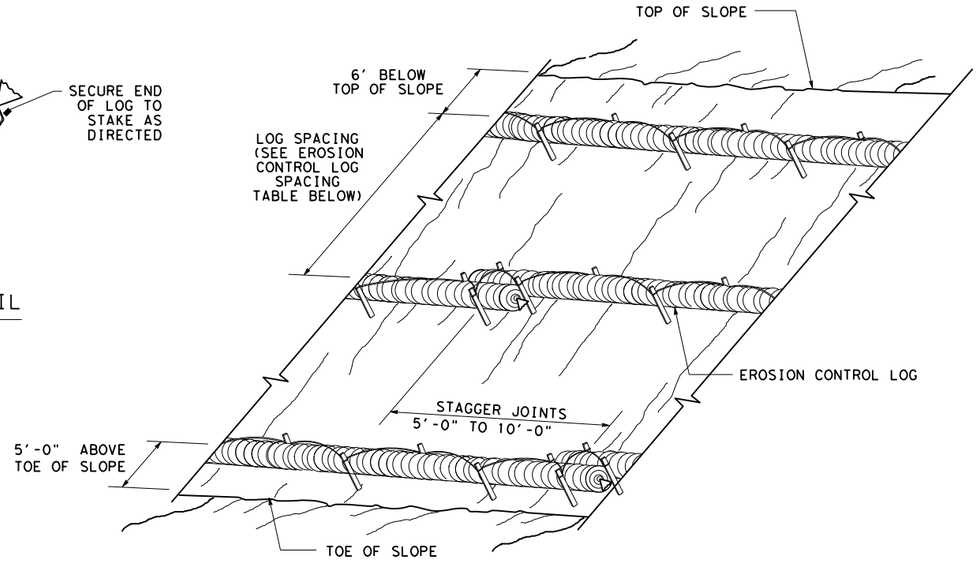
CL-SST



END SECTION RAP DETAIL

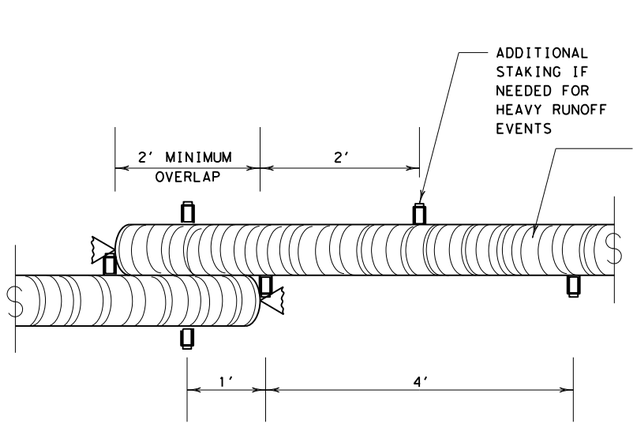
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

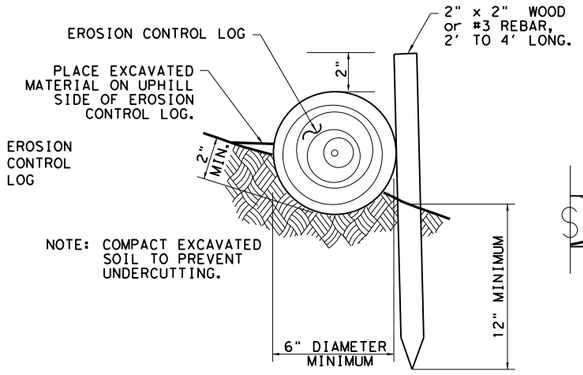
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

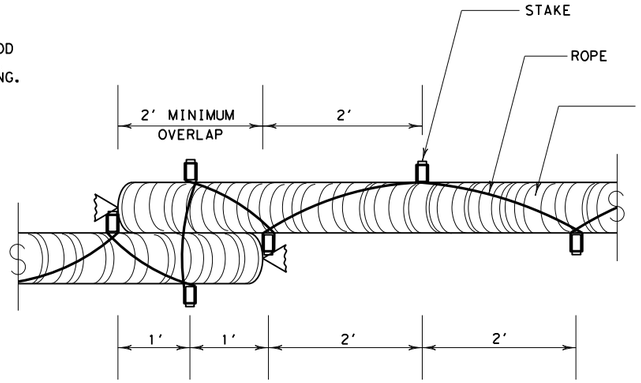


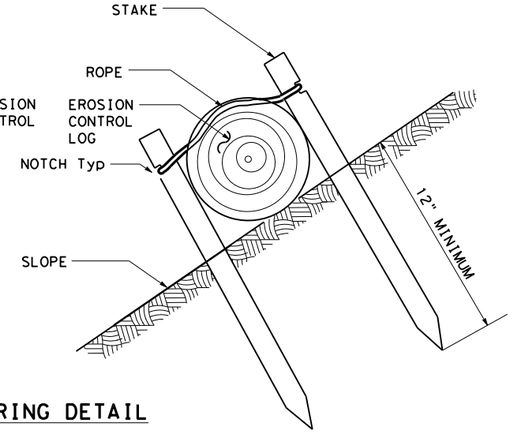


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

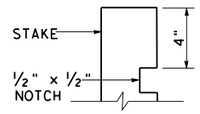
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

SHEET 2 OF 3

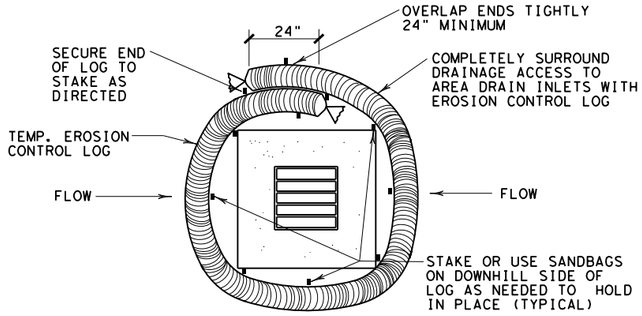
Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

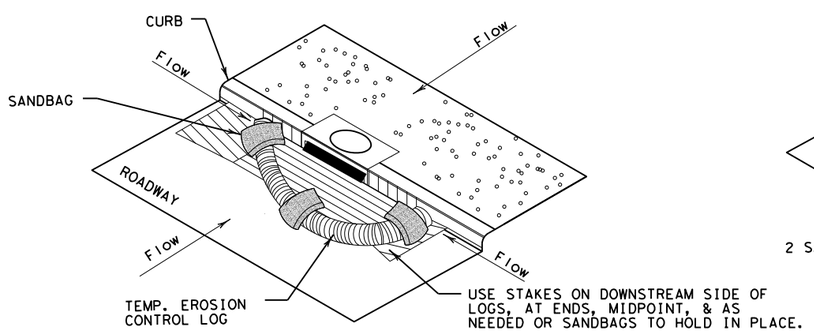
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	00	112	VAR
	DIST	COUNTY		SHEET NO.
	LBB	VARIOUS		127

DATE: 9/28/2022
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\0905001124 - Design\Plan Set\9. Environmental\126-128 EC (9)-16.dgn



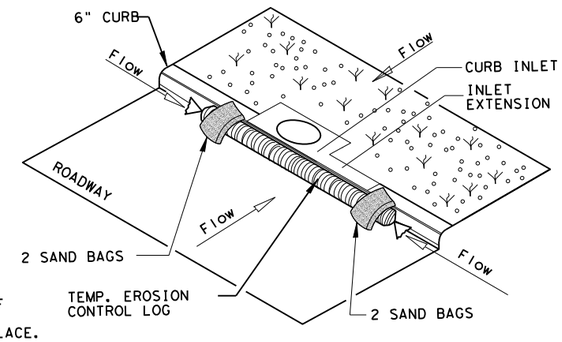
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

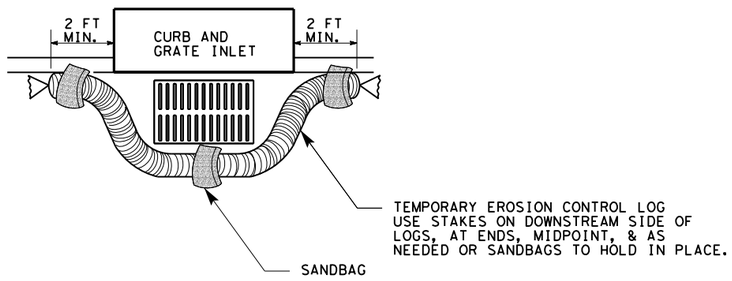
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

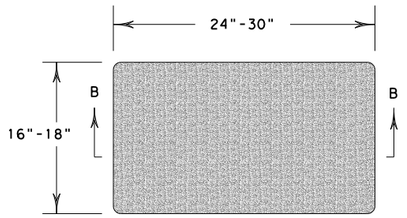
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	00	112	VAR
	DIST	COUNTY		SHEET NO.
	LBB	VARIOUS		128

DATE: 9/28/2022
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Construction Projects\09050011124 - Design\Plan Set\9. Environmental\129 EPIC.dgn

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit 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.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1. NONE

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000.
2. This project disturbs less than one acre of surface area. The contractor is responsible for any PSL's as defined in the Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges (2014 Edition, Item 7, Section 7.7, Page 43). The total disturbed acreage is the combined acreage to be disturbed on the project and any contractor PSL's. This EPIC must be updated if the disturbed area increases to one or more acres during the course of construction. It may become necessary to post a site notice and/or NOI for the project and/or PSL's.

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

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

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

☒ No Permit Required
☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
☐ 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 planned to control erosion, sedimentation and post-project TSS.

1. NONE
2.
3.
4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

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

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. Comply with Executive Order 13112 on Invasive Plant Species.
2. Comply with TxDOT Executive Memorandum on beneficial landscaping.
3. Comply with temporary and permanent vegetation stabilization protocols of the SW3P.

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. Do not handle or harm Texas horned lizards, prairie dogs, barn swallows or burrowing owls.
2. No prairie dog towns can be damaged or crossed with equipment without approval of the Engineer.
3. No nests of burrowing owls (in prairie dog holes) can be disturbed or damaged (See General Notes).
4. No nests of barn swallows (likely on structures such as bridges) can be disturbed or damaged (See General Notes).

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.

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 appropiate 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.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ☒ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☐ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notifiy DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discoverd on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

VII. OTHER ENVIRONMENTAL ISSUES

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

☐ No Action Required ☒ Required Action

Action No.

1. Maintain equipment muffler systems and work hour restrictions to reduce traffic noise.
2. No PSL's may be located in the prairie dog towns, playa lakes (wet or dry) or stream beds (wet or dry).
3. No dumping of construction material in playa lakes or stream beds regardless of property owner requests.
4. Contractor must obtain historical and archaeological clearances for off-site PSL's.
5. Contractor is responsible for air quality permits for concrete and asphalt batch and similar plants.
6. Contractor is responsible for water appropriation or impoundment TCEQ permits.
7. Contractor will protect environmentally sensitive areas with fencing, work sequencing or scheduling as directed.
8. PSL's beyond the project right-of-way have "individual operator" status under the TPDES Construction General Permit and the Contractor is responsible for the SW3P and any TCEQ permits.
9. No waste material of any type may be placed at any location where it could be washed into a water of the U.S. or a surface water of Texas.
10. Flood elevations will not be increased to a level that would violate flood plain regulations or ordinances.

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0905	00	112	VAR
	DIST	COUNTY		SHEET NO.
	LBB	VARIOUS		129