FED. RD. DIV. NO.	STATE	FEDERAL PROJECT NO.			HIGHWAY NO.
6	TEXAS	STP 2B23(073)HES			FM1314
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
HOU	MONTGOMERY	1986	01	070	001

DESIGN SPEED: 50 MPH
ADT(2023): = 26,000
ADT(2043): =36,600

Functional Class: MINOR ARTERIAL

STATE OF TEXAS
TEXAS DEPARTMENT OF TRANSPORTATION

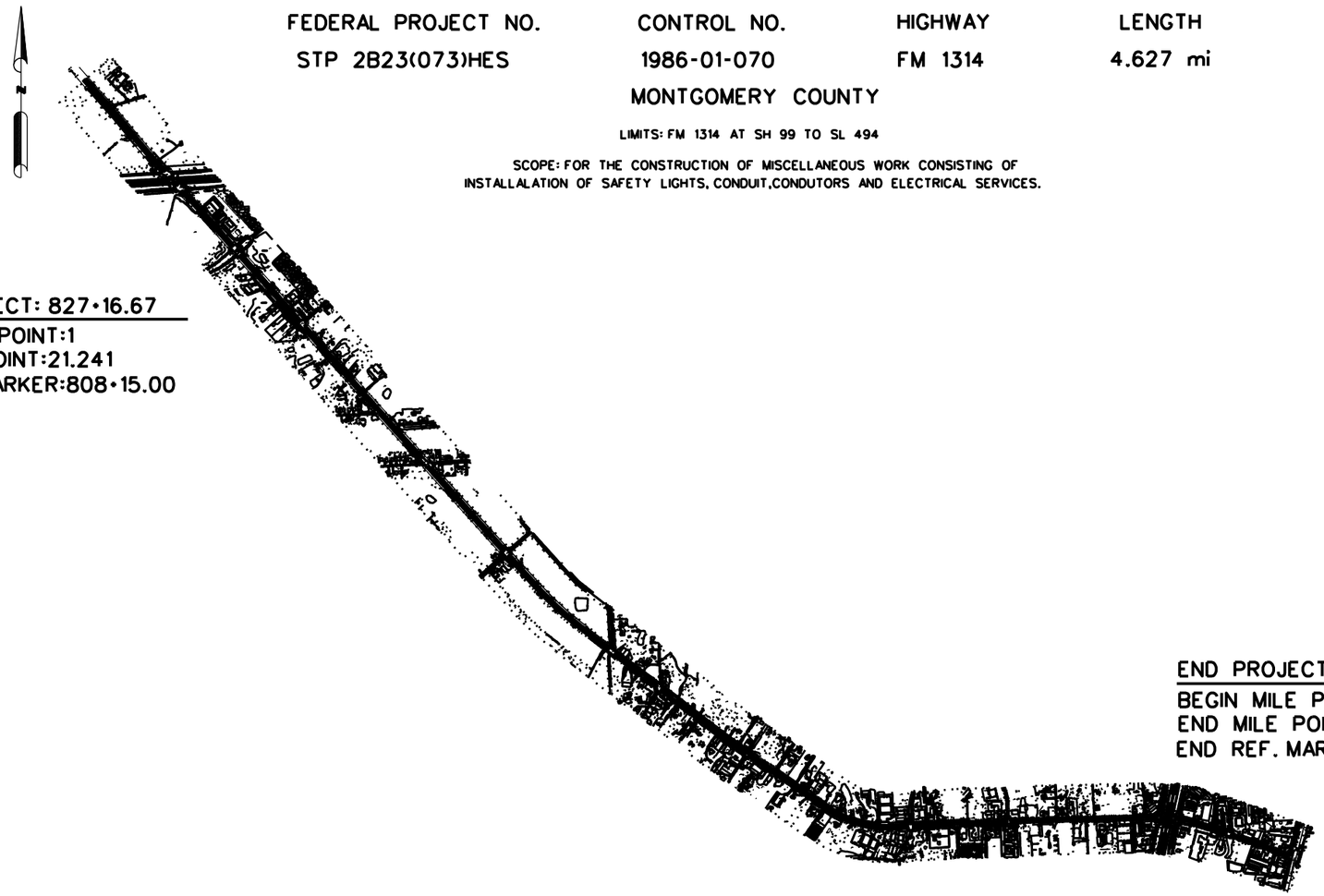
PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL PROJECT NO.	CONTROL NO.	HIGHWAY	LENGTH
STP 2B23(073)HES	1986-01-070	FM 1314	4.627 mi

MONTGOMERY COUNTY

LIMITS: FM 1314 AT SH 99 TO SL 494

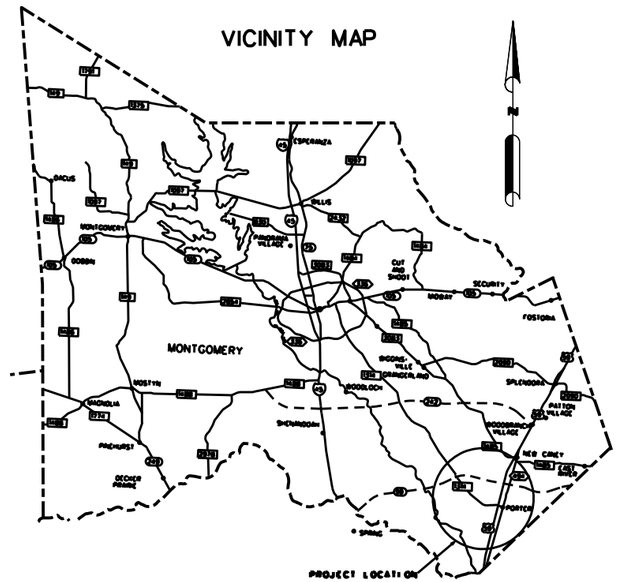
SCOPE: FOR THE CONSTRUCTION OF MISCELLANEOUS WORK CONSISTING OF INSTALLALATION OF SAFETY LIGHTS, CONDUIT,CONDUTORS AND ELECTRICAL SERVICES.



BEGIN PROJECT: 827+16.67
BEGIN MILE POINT:1
END MILE POINT:21.241
BEG REF. MARKER:808+15.00

END PROJECT: 140+09.27
BEGIN MILE POINT:27.947
END MILE POINT:36.707
END REF. MARKER:142+74.47

VICINITY MAP



RAILROAD CROSSINGS: NONE
EXCEPTIONS: NONE
EQUATIONS: NONE

SCALE : 1" = 100'

COUNTY MONTGOMERY PROJ. NO. STP 2B23(073)HES
HWY. NO. FM 1314 LETTING DATE AUGUST 02, 2023
DATE ACCEPTED

MUNICIPALITIES, DATED JUNE 5,1963. THE CITY-STATE CONSTRUCTION, MAINTENANCE, AND OPERATION RESPONSIBILITIES SHALL BE AS HERETOFORE AGREED TO, ACCEPTED, AND SPECIFIED IN THE AGREEMENT TO WHICH THESE PLANS ARE MADE APART.

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

TEXAS DEPARTMENT OF TRANSPORTATION

SUBMITTED FOR LETTING 05/22/2023

For DISTRICT TRAFFIC ENGINEER

APPROVED FOR LETTING 5/30/2023

DocuSigned by:
Larry W. Blackburn, P.E.
FOR DISTRICT ENGINEER

$TIME$ $DATE$ $FILE$

INDEX OF SHEETS

1. GENERAL

SHEET NO.	DESCRIPTION
001	TITLE SHEET
002	INDEX SHEET
003, 003A - 003G	GENERAL NOTES & SPECIFICATION DATA
004	ESTIMATE & QUANITY SHEET
005	SUMMARY OF ILLUMINATION QUANTITIES & NOTES
006	ELECTRICAL SERVICE DATA SHEET & NOTES

2. TRAFFIC CONTROL STANDARDS

007 - 018	* BC(1)-21 THRU BC(12)-21
019 - 021	* TCP(1-1)-18 THRU TCP(1-3)-18

3. TRAFFIC LAYOUTS/DETAILS

022 - 042	* LIGHTING LAYOUT FM 1314
043 - 047	* CIRCUIT DIAGRAMS FM 1314 SH-99 TO LOOP 494
048	* MOWING PAD FM 1314

4. TRAFFIC STANDARDS

049	* ED(1)-14
050	* ED(2)-14
051	* ED(3)-14
052	* ED(4)-14
053	* ED(5)-14
054	* ED(6)-14
055	* ED(10)-14
056	* RID(1)-20
057	* RID(2)-20
058	* RIP(1)-19
059	* RIP(2)-19
060	* RIP(3)-19
061	* RIP(4)-19

5. ENVIROMENTAL ISSUES

062	* EC(1)-16
063	* ENVIROMENTAL PERMITS ISSUES & COMMITMENTS (EPIC) (HOU DIST)
064	* ECL-12 (HOU DIST)
065	* STORMWATER POLLUTION PREVENTION PLAN (SWP3) (LESS THAN 1 ACRE) (SHEET 1 OF 2)
066	* STORMWATER POLLUTION PREVENTION PLAN (SWP3) (LESS THAN 1 ACRE) (SHEET 2 OF 2)
067	* EC(9)-16 (SHEET 1 OF 3)
068	* EC(9)-16 (SHEET 2 OF 3)
069	* EC(9)-16 (SHEET 3 OF 3)

The standard sheets specifically identified with an asterisk (*) have been selected by me under my reasonable supervision as being applicable to this project

P.E. 5/25/2023

DATE

STATE OF TEXAS
MOHAMMEDREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

TEXAS DEPARTMENT OF TRANSPORTATION

INDEX OF SHEETS

ORIGINAL DRAWING DATE:		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN.: - CK.: - DW.: - CK.: -	REVISIONS	12	6		002
		COUNTY	CONTROL	SECTION	JOB	HIGHWAY
		MONTEGOMERY	1986	01	070	FM 1314

$TIME$ $DATE$ $FILE$

$FILE$ $TIME$ $DATE$

County: Montgomery **Control:** 1986-01-070

Highway: FM 1314

General Notes:

General:

Area Engineer contact information for this project follows:

Area Engineer: Abraham M Guzman, 936-538-3301, Abe.Guzman@txdot.gov
Assistant Area Engineer: Matthew M Connelly, 936-538-3302, Matthew.Connelly@txdot.gov

Submit any questions about this project via the Letting Pre-Bid Q&A web page, located at:

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

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

All relevant project documentation, including Contract Time Determinations and cross-sections will continue to be provided on the following FTP site:

Index of /pub/txdot-info/Pre-Letting Responses/Houston District (state.tx.us) or

https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/Houston%20District/

Unless otherwise shown on the plans, RAP generated by this project will become the property of the Contractor for use in the current construction project or in future projects.

If fixed features require, the governing slopes shown may vary between the limits shown and to the extent determined by the Engineer.

Superelevate the curves to match the existing surface.

Notify the Engineer immediately if discrepancies are discovered in the horizontal control or the benchmark data.

General: Roadway Illumination and Electrical

For roadway illumination and electrical items, use materials from pre-qualified producers as shown on the Construction Division (CST) of the Department's material producers list. Check the latest link on the Department's website for this list. The category/item is "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials found on this list.

Perform electrical work in conformance with the National Electrical Code (NEC) and the Department's standard sheets.

County: Montgomery **Control:** 1986-01-070

Highway: FM 1314

The Contractor may make the electrical grounding connections and permissible splices using the thermal fusion process, Cadweld, ThermOweld, or approved equal, instead of bolted connections and splices.

The Area Engineer will arrange with the Contractor, an inspection of the completed electrical systems for the highway lighting systems before final acceptance for compliance with plans and specifications. The inspection will be made with personnel from the electrical section of the Department's District Transportation Operations Office. The city's electrical division personnel will also inspect lighting systems within the city limits. Portions of the work found to be deficient during this inspection will not be accepted.

General: Traffic Control and Construction

Schedule construction operations such that preparing individual items of work follows in close sequence to constructing storm drains in order to provide as little inconvenience as practical to the businesses and residents along the project.

Schedule work so that the base placement operations follow the subgrade work as closely as practical to reduce the hazard to the traveling public and to prevent undue delay caused by wet weather.

This project requires extensive grading operations in an environmentally sensitive area.

If relocating mailboxes, place them with the post firmly in the ground at nearby locations. Upon completing the project, the Engineer will locate the final mailbox placement. Perform this work in accordance with the requirements of the Item, "Mailbox Assemblies," except for measurement and payment. This work is subsidiary to the various bid items.

If fences cross construction easements shown on the plans and work is required beyond the fences, remove and replace the fences as directed. This work and the materials are subsidiary to the various bid items.

When design details are not shown on the plans, provide signs and arrows conforming to the latest "Standard Highway Sign Designs for Texas" manual.

General: Utilities

Consider the locations of underground utilities depicted in the plans as approximate and employ responsible care to avoid damaging utility facilities. Depending upon scope and magnitude of planned construction activities, advanced field confirmation by the utility owner or operator may be prudent. Where possible, protect and preserve permanent signs, markers, and designations of underground facilities.

If the Contractor damages or causes damage (breaks, leaks, nicks, dents, gouges, etc.) to the utility, contact the utility facility owner or operator immediately.

At least 72 hours before starting work, make arrangements for locating existing Department-owned above ground and underground fiber optic, communications, power, illumination, and traffic signal cabling and conduit. Do this by calling the Department's Houston District Traffic Signal Operations Office at 713-802-5662, or by e-mailing the Department's Houston District Traffic Signal Operations Office at: HOU-LocateRequest@txdot.gov, to schedule marking of underground lines on the ground. Use caution if working in these areas to avoid damaging or interfering with existing facilities.

Notify the Engineer at least 48 hours before constructing junction boxes at storm drain and utility intersections.

Install or remove poles and luminaires located near overhead or underground electrical lines using established industry and utility safety practices. Consult the appropriate utility company before beginning such work.

If overhead or underground power lines need to be de-energized, contact the electrical service provider to perform this work. Costs associated with de-energizing the power lines or other protective measures required are at no expense to the Department.

If working near power lines, comply with the appropriate sections of Texas State Law and Federal Regulations relating to the type of work involved.

Perform electrical work in conformance with the National Electrical Code (NEC) and Department's standard sheets.

Before beginning any underground work, notify the City of Houston's Chief Inspector, Public Works and Engineering, to establish the locations of any existing electrical systems for lighting facilities within the limits of this project.

Item 5: Control of Work

Before contract letting, cross-section data for this project will be available to the prospective bidders in PDF format on the Department's Houston District website located at:

https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/Houston%20District/Construction%20Projects/

The cross-section data provided above is for non-construction purposes only and it is the responsibility of the prospective bidder to validate the data with the appropriate plans, specifications, and estimates for the projects.

County: Montgomery **Control:** 1986-01-070

Highway: FM 1314

Submit shop drawings electronically for the fabrication of items as documented in Table 1 or Table 2 below. Information and requirements for electronic submittals can be viewed in the "Guide to Electronic Shop Drawing Submittal" which can be accessed through the following web link, ftp://ftp.dot.state.tx.us/pub/txdot-info/library/pubs/bus/bridge/e_submit_guide.pdf. References to 11 in. x 17 in. sheets in individual specifications for structural items imply electronic CAD sheets.

Table 1

2014 Construction Specification Required Shop/Working Drawing Submittals - TxDOT Generated Plans

Spec Item No.'s	Product	Submittal Required	Approval Required (Y/N)	Contractor/ Fabricator P.E. Seal Required	Reviewing Party	Shop or Working Drawing (Note 1)
7.16.1&.2	Construction Load Analyses	Y	Y	Y	B	WD
400	Excavation and Backfill for Structures (cofferdams)	Y	N	Y	A	WD
403	Temporary Special Shoring	Y	N	Y	C	WD
420	Formwork/Falsework	Y	N	Y	A	WD
423	Retaining Walls, (calcs req'd.)	Y	Y	Y	C	SD
425	Optional Design Calculations (Prstrs Bms)	Y	Y	Y	B	SD
425	Prestr Concr Sheet Piling	Y	Y	N	B	SD
425	Prestr Concr Beams	Y	Y	N	B	SD
425	Prestr Concr Bent	Y	Y	N	B	SD
426	Post Tension Details	Y	Y	N	B	SD
434	Elastomeric Bearing Pads (All)	Y	Y	N	B	SD
441	Bridge Protective Assembly	Y	Y	N	B	SD
441	Misc Steel (various steel assemblies)	Y	Y	N	B	SD
441	Steel Pedestals (bridge raising)	Y	Y	N	B	SD
441	Steel Bearings	Y	Y	N	B	SD
441	Steel Bent	Y	Y	N	B	SD
441	Steel Diaphragms	Y	Y	N	B	SD
441	Steel Finger Joint	Y	Y	N	B	SD
441	Steel Plate Girder	Y	Y	N	B	SD
441	Steel Tub-Girders	Y	Y	N	B	SD
441	Erection Plans, including Falsework	Y	N	Y	A	WD
449	Sign Structure Anchor Bolts	Y	Y	N	T	SD
450	Railing	Y	Y	N	A	SD
462	Concrete Box Culvert	Y	Y	N	C	SD
462	Concrete Box Culvert (Alternate Designs Only,calcs reqd.)	Y	Y	Y	B	SD
464	Reinforced Concrete Pipe (Jack and Bore only; ONLY when requested)	Y	Y	Y	A	SD
465	Pre-cast Junction Boxes, Grates, and Inlets	Y	Y	N	A	SD
465	Pre-cast Junction Boxes, Grates, and Inlets (Alternate Designs Only, calcs req'd.)	Y	Y	Y	B	SD
466	Pre-cast Headwalls and Wingwalls	Y	Y	N	A	SD

467	Pre-cast Safety End Treatments	Y	Y	N	A	SD
495	Raising Existing Structure (calcs reqd.)	Y	Y	Y	B	SD
610	Roadway Illumination Supports (Non-Standard only, calcs reqd.)	Y	Y	Y	BRG	SD
613	High Mast Illumination Poles (Non-standard only, calcs reqd.)	Y	Y	Y	BRG	SD
627	Treated Timber Poles	Y	Y	N	T	SD
644	Special Non-Standard Supports (Bridge Mounts, Barrier Mounts, Etc.)	Y	Y	Y	T	SD
647	Large Roadside Sign Supports	Y	Y	Y	T	SD
650	Cantilever Sign Structure Supports - Alternate Design Calcs.	Y	Y	Y	T	SD
650	Sign Structures	Y	Y	N	T	SD
680	Installation of Highway Traffic Signals	Y	Y	N	T	SD
682	Vehicle and Pedestrian Signal Heads	Y	Y	N	T	SD
684	Traffic Signal Cables	Y	Y	N	T	SD
685	Roadside Flashing Beacon Assemblies	Y	Y	N	T	SD
686	Traffic Signal Pole Assemblies (Steel) (Non-Standard only)	Y	Y	Y	T	SD
687	Pedestal Pole Assemblies	Y	Y	N	T	SD
688	Detectors	Y	Y	N	A	SD
784	Repairing Steel Bridge Members	Y	Y	Y	B	WD
SS	Prestr Concr Crown Span	Y	Y	N	B	SD
SS	Sound Barrier Walls	Y	Y	Y	A	SD
SS	Camera Poles	Y	Y	Y	TMS	SD
SS	Pedestrian Bridge (Calcs req'd.)	Y	Y	Y	B	SD
SS	Screw-In Type Anchor Foundations	Y	Y	N	T	SD
SS	Fiber Optic/Communication Cable	Y	Y	N	TMS	SD
SS	Spread Spectrum Radios for Signals	Y	Y	N	T	SD
SS	VIVDS System for Signals	Y	Y	N	T	SD
SS	CTMS Equipment	Y	Y	N	TMS	SD

Notes:

1. Document flow for Working Drawings differs from Shop Drawings in that Working Drawings must be submitted to the Engineer rather than the Engineer of Record and they are for the information of the Engineer only; an approval stamp and distribution to all project offices is not required

County: Montgomery **Control:** 1986-01-070

Highway: FM 1314

Key to Reviewing Party

A - Area Office

Area Office	Email Address
Brazoria Area Office	HOU-BRZAShpDrwgs@txdot.gov
Fort Bend Area Office	HOU-FBAShpDrwgs@txdot.gov
Galveston Area Office	HOU-GALVAShpDrwgs@txdot.gov
Montgomery Area Office	HOU-MONTAShpDrwgs@txdot.gov
North Harris Area Office	HOU-NHAShpDrwgs@txdot.gov
Southeast Area Office	HOU-SEHAShpDrwgs@txdot.gov
Traffic Systems Construction Office	HOU-TSCShpDrwgs@txdot.gov
West/Central Harris Area Office	HOU-WWCHAOShpDrwgs@txdot.gov

B - Houston Bridge Engineer

Bridge Design (Houston TxDOT)	HOU-BrgShpDrwgs@txdot.gov

BRG - Austin Bridge Division

Bridge Design (Austin TxDOT)	BRG_ShopPlanReview@txdot.gov

C - Construction Office

Construction	HOU-ConstrShpDrwgs@txdot.gov
Laboratory	HOU-LabShpDrwgs@txdot.gov

T - Traffic Engineer

Traffic Operations	HOU-TrfShpDrwgs@txdot.gov

TMS – Traffic Management System

Computerized Traffic Management Systems (CTMS)	HOU-CTMSShpDrwgs@txdot.gov

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

Item 6: Control of Materials

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

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

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

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

Item 7: Legal Relations and Responsibilities

Do not initiate activities in a Project Specific Location (PSL), associated with a U.S. Army Corps of Engineers (USACE) permit area, that have not been previously evaluated by the USACE as part of the permit review of this project. Such activities include those pertaining to, but are not limited to, haul roads, equipment staging areas, borrow and disposal sites. Associated defined here means materials are delivered to or from the PSL. The permit area includes the waters of the U.S. or associated wetlands affected by activities associated with this project. Special restrictions may be required for such work. Assume responsibility for consultations with the USACE regarding activities, including PSLs that have not been previously evaluated by the USACE. Provide the Department with a copy of consultations or approvals from the USACE before initiating activities.

The Contractor may proceed with activities in PSLs that do not affect a USACE permit area if a self-determination has been made that the PSL is non-jurisdictional or if proper USACE clearances have been obtained in jurisdictional areas or have been previously evaluated by the USACE as part of the permit review of this project. The Contractor is solely responsible for documenting any determinations that their activities do not affect a USACE permit area. Maintain copies of their determinations for review by the Department or any regulatory agency.

Document and coordinate with the USACE, if required, before hauling any excavation from or hauling any embankment to a USACE permit area by either 1 or 2 below:

a. **Restricted Use of Materials for the Previously Evaluated Permit Areas.** Document both the Project Specific Locations (PSL) and their authorization. Maintain copies for review by the Department or any regulatory agency. When an area within the project limits has been evaluated by the USACE as part of the permit process for this project:
b. Suitable excavation of required material in the areas shown on the plans and cross sections as specified in the Item, “Excavation” is used for permanent or temporary fill (under the Item, “Embankment”) within a USACE permit area.
c. Suitable embankment (under the Item, “Embankment”) from within the USACE permit area is used as fill within a USACE evaluated area.
d. Unsuitable excavation or excess excavation, “Waste” (under the Item, “Excavation”), that is disposed of at a location approved within a USACE evaluated area.

County: Montgomery **Control:** 1986-01-070

Highway: FM 1314

1. **Contractor Materials from Areas Other than Previously Evaluated Areas.** Provide the Department with a copy of USACE coordination or approvals before initiating any activities for an area within the project limits that has not been evaluated by the USACE or for any off right of way locations used for the following, but not limited to, haul roads, equipment staging areas, borrow and disposal sites:
   a. The Item, “Embankment” used for temporary or permanent fill within a USACE permit area.
   b. Unsuitable excavation or excess excavation, “Waste” (under the Item, “Excavation”), that is disposed of outside a USACE evaluated area.

No significant traffic generator events have been identified.

Item 8: Prosecution and Progress

Working days will be computed and charged based on a standard workweek in accordance with Section 8.3.1.4.

The maximum number of days the time charges on this contract may be suspended due to contractor mobilization, and material fabrication/accumulation or processing delays is 90 days. The Engineer and the Contractor may mutually agree, in writing, to decrease this maximum number of days.

The Lane Closure Assessment Fee is $600. This fee applies to the Contractor for closures or obstructions that overlap into restricted hour traffic for each hour or portion thereof, per lane, regardless of the length of lane closure or obstruction. For Restricted Hours subject to Lane Assessment Fee refer to the Item, “Barricades, Signs, and Traffic Handling.” The time increment for the Lane Closure Assessment fee for this project is one hour.

Item 100: Preparing Right of Way

Obtain a City of Houston plumbing permit and a demolishing permit or removing permit before demolishing or removing existing houses or commercial buildings.

Clean existing ditches under fill sections of undesirable materials including grass, muck, and trash. Perform this work in accordance with the Construction section of the Item, “Preparing Right of Way.” This work is subsidiary to this bid Item.

The Item, “Preparing Right of Way” will be measured for payment only in those designated areas shown on the plans. Preparing right of way necessary to perform construction that is outside designated areas is subsidiary to this bid Item.

Remove abandoned utilities that are in conflict with the new utilities, at no expense to the Department. Reestablish and maintain right of way stakes after completing the right of way preparation activities and until the new utilities are in place.

Remove and assume ownership of the existing ground mounted signs within the limits of roadway construction unless otherwise noted or directed. This work is subsidiary to the Item, "Preparing Right of Way."

Item 204: Sprinkling

Perform subsidiary sprinkling as required under various other items in accordance with the Item, "Sprinkling."

Sprinkling for dust control is subsidiary to the various bid items.

Item 416: Drilled Shaft Foundations

Include the cost for furnishing and installing anchor bolts mounted in the drilled shafts in the unit bid price for the various diameter drilled shafts.

The Department may test using ultrasonic methods the anchor bolts for overhead sign supports, light standards, and traffic signal poles after they are installed. Replace faulty anchor bolts as directed. Do not weld the anchor bolts.

Item 432: Riprap

If stone riprap is shown on the plans, use common stone riprap in accordance with Section 432.2.3.3, placed dry in accordance with Section 432.3.2.3. Do not grout. Crushed concrete may also be used.

Item 449: Anchor Bolts

Pipe joint compound, as used in this Item, is an electrically conducting protective thread lubricant compound to be used on the foundation anchor bolts for illuminations poles (Crouse-Hinds TL-2, 0z/Gedney Stl, or Thomas & Betts Kopr-Shield).

Item 502: Barricades, Signs, and Traffic Handling

Use a traffic control plan for handling traffic through the various phases of construction. Follow the phasing sequence unless otherwise agreed upon by the Area Engineer and the Project Manager. Ensure this plan conforms to the latest "Texas Manual on Uniform Traffic Control Devices" and the latest Barricade and Construction (BC) Standard Sheets. The latest versions of Work Zone Standard Sheets WZ (BTS-1) and WZ (BTS-2) are the traffic control plan for the signal installations.

County: Montgomery **Control:** 1986-01-070

Highway: FM 1314

Submit changes to the traffic control plan to the Area Engineer. Provide a layout showing the construction phasing, signs, striping, and signalizations for changes to the original traffic control plan.

Furnish and maintain the barricades and warning signs, including the necessary temporary and portable traffic control devices, during the various phases of construction. Place and construct these barricades and warning signs in accordance with the latest "Texas Manual on Uniform Traffic Control Devices" for typical construction layouts.

Cover work zone signs when work related to the signs is not in progress, or when any hazard related to the signs no longer exists.

Keep the delineation devices, signs, and pavement markings clean. This work is subsidiary to the Item, "Barricades, Signs, and Traffic Handling."

Erect temporary signs when exit ramps are closed or moved to new locations during construction. If a section is not complete before the end of the workday, pull back the base material to the existing pavement edge on a 6H: 1V slope. Edge drop-offs during the hours of darkness are not permitted.

Before detouring traffic onto the mainlane shoulders, remove dirt, debris, vegetation, and other deleterious material from the surface of the shoulders. Appropriately sign the detour in an approved manner. This work is subsidiary to the various bid items.

Coordinate and schedule the work with the appropriate Metro representative if requiring access to the High Occupancy Vehicle lanes.

Cover or remove the permanent signs and construction signs that are incorrect or that do not apply to the current situation for a particular phase.

Replace the overhead signs, informational signs, and exit signs to be removed, with temporary signs providing the correct information to the traveling public. Size the replacement signs and include them in the traffic control plan.

Do not mount signs on drums or barricades, except those listed in the latest Barricades and Construction standard sheets.

Use traffic cones for daytime work only. Replace the cones with plastic drums during nighttime hours.

Place positive barriers to protect drop-off conditions greater than 2 ft. within the clear zone that remain overnight.

Do not reduce the existing number of lanes open to traffic except as shown on the following time schedule:

One Lane Closure

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday	9:00 AM – 3:00 PM	N/A	5:00 AM – 9:00 AM 3:00 PM - 8:00 PM
Tuesday	9:00 AM – 3:00 PM	N/A	5:00 AM – 9:00 AM 3:00 PM - 8:00 PM
Wednesday	9:00 AM – 3:00 PM	N/A	5:00 AM – 9:00 AM 3:00 PM - 8:00 PM
Thursday	9:00 AM – 3:00 PM	N/A	5:00 AM – 9:00 AM 3:00 PM - 8:00 PM
Friday	9:00 AM – 3:00 PM	N/A	5:00 AM – 9:00 AM 3:00 PM - 8:00 PM
Saturday	N/A	N/A	N/A
Sunday	N/A	N/A	N/A

The above times are approved for the traffic control conditions listed. The Area Engineer may approve other closure times if traffic counts warrant. The Area Engineer may reduce the above times for special events.

Law enforcement assistance will be required for this project and is expected to be required for major traffic control changes and lane closures. Coordinate with local law enforcement and arrange for law enforcement as directed or agreed by the Engineer. Before payment will be made, complete the "Daily Report on Law Enforcement Force Account Work" (Form 318), provided by the Department and submit daily invoices that agree with this form for any day during the month in which approved services were provided.

Provide full-time, off-duty, uniformed, certified peace officers, as part of traffic control operations. The peace officers must be able to show proof of certification by the Texas Commission on Law Enforcement Officers Standards. The cost of the officers is paid for on a force account basis.

Before closing any City of Houston sidewalk, one or more city street lanes, or entire city streets during construction, obtain a permit to do so from the City. Obtain the required permit in person at the City of Houston Permit Office or apply online at http://www.gims.houstontx.gov.

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.

Item 506: Temporary Erosion, Sedimentation and Environmental Controls

The use of hay bales is not permitted as Storm Water Pollution Prevention Plan (SWP3) measures.

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. Since the disturbed area is less than 5 acres, a "Notice of Intent" (NOI) is not required.

Item 610: Roadway Illumination Assemblies

The cost of providing the electrical conductor in the pole foundation or in the pole base to make connections is subsidiary to the roadway illumination assembly. The quantity for payment is the surface distance between locations.

Fabricate steel roadway illumination poles in accordance with the latest Department RIP (Roadway Illumination Poles) Standards. Poles manufactured according to the latest RIP Standards require no shop drawings. Alternate designs to the Department's RIP Standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically.

For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25 ft. above the surrounding terrain, provide shop drawings (see ftp://ftp.dot.state.tx.us/pub/txdot-info/library/pubs/bus/bridge/e_submit_guide.pdf) and calculations that are sealed, signed, and dated by a professional engineer registered or licensed in Texas.

Supply anchor bolt assemblies as shown on the RIP standard sheets, unless a larger capacity bolt assembly is required for the 3-second gust wind speed and mounting elevation at the pole installation location.

Item 616: Performance Testing of Lighting Systems

The illumination plans provide for a complete illumination system installed, connected, tested, and ready for operation.

After satisfactory completion of tests, place the new lighting fixtures in operation. Final acceptance will be made after the fixtures operate satisfactorily for a minimum period of 14 days. The 14-day test period is included in the allowed working days.

Assume responsibility for the new lighting fixtures during the test period. Make adjustments or repairs as required and repair defects or damage at no expense to the Department.

Item 618: Conduit
Item 620: Electrical Conductors
Item 628: Electrical Services

If the specifications for electrical items require UL-listed products, this means UL-listed or CSA-listed.

Item 618: Conduit

When backfilling bore pits, ensure that the conduit is not damaged during installation or due to settling backfill material. Compact select backfill in 3 equal lifts to the bottom of the conduit; or if using sand, place it 2 in. above the conduit. Ensure backfill density is equal to that of the existing soil. Prevent material from entering the conduit.

Construct bore pits a minimum of 5 ft. from the edge of the base or pavement. Close the bore pit holes overnight.

Unless otherwise shown on the plans, install underground conduit a minimum of 24 in. deep. Install the conduit in accordance with the latest National Electrical Code (NEC) and applicable Department standard sheets. Place conduit under driveways or roadways a minimum of 24 in. below the pavement surface.

If using casing to place bored conduit, the casing is subsidiary to the conduit.

If placing the conduit under existing pavement to reach the service poles, bore the conduit in place and extend it a minimum distance of 5 ft. beyond the edge of shoulder or the back of curb.

Where PVC, duct cable, and HDPE conduit 1 in. and larger is allowed and installed per Department standards, provide a PVC elbow in place of the galvanized rigid metal elbow required by the Electrical Details standards. Ensure the PVC elbow is of the same schedule rating as the conduit to which it is connected. Use only a flat, high tensile strength polyester fiber pull tape to pull conductors through the PVC conduit system.

Remove conductor and conduit to be abandoned to 1 ft. below the ground level. This work is subsidiary to the various bid items.

Do not use cast iron junction boxes in concrete traffic barriers and single slope traffic barriers. Use polymer concrete junction boxes as shown on standard sheet ED(4)-14. Mount the junction boxes flush (+ 0 in., - 1/2 in.) with the concrete surface of the concrete barrier.

Use materials from pre-qualified producers as shown on the Department's Construction Division (CST) material producers list. Check the latest links on the Department's website for the list. The category is "Roadway Illumination and Electrical Supplies." The polymer concrete barrier box is subsidiary to Item 618, "Conduit."

Item 620: Electrical Conductors

Test each wire of each cable or conductor after installation. Incomplete circuits or damage to the wire or the cable are cause for immediate rejection of the entire cable being tested. Remove and replace the entire cable at no expense to the Department. Also test the replacement cable after installation.

When pulling cables or conductors through the conduit, do not exceed the manufacturer's recommended pulling tensions. Lubricate the cables or conductors with a lubricant recommended by the cable manufacturer. For both transformer and shoe-base type illumination poles, provide double-pole breakaway fuse holders as shown on the Department's Construction Division (CST) material producers list. Check the latest link on the Department's website for this list. The category is "Roadway Illumination and Electrical Supplies." The fuse holder is shown on the list under Items 610 and 620. Provide 10 Amp time delay fuses.

Ensure that circuits test clear of faults, grounds, and open circuits.

Split bolt connectors are allowed only for splices on the grounding conductors.

For electrical licensing and electrical certification requirements for this project, see Item 7 of the Standard Specifications and any applicable special provisions to Item 7.

Item 624: Ground Boxes

The ground box locations are approximate. Alternate ground box locations may be used as directed, to avoid placing in sidewalks or driveways.

Ground metal ground box covers. Bond the ground box cover and ground conductors to a ground rod located in the ground box and to the system ground.

Ground the existing metal ground box covers as shown on the latest standard sheet ED (4)-14.

During construction and until project completion, provide personnel and equipment necessary to remove ground box lids for inspection. Provide this assistance within 24 hours of notification.

County: Montgomery **Control:** 1986-01-070

Highway: FM 1314

Construct concrete aprons in accordance with the latest standard sheet ED (4)-14. Make the depth of the concrete apron the same as the depth of the ground box, except for Type 1 and Type 2 ground boxes. For Type 1 or Type 2 ground boxes, construct the concrete apron in accordance with details shown on the “Ground Box Details Installations” standard.

Item 628: Electrical Services

Verify and coordinate the electrical service location with the engineering section of the appropriate utility district or company.

Identify the electrical service pole with an address number assigned by the Utility Service Provider. Provide 2-in. numerals visible from the highway. Provide numbers cut out aluminum figures nailed to wood poles or painted figures on steel poles or service cabinets.

Item 656: Foundations for Traffic Control Devices

Excavating and disposing of surplus materials for lighting standard foundations are subsidiary to the roadway illumination assembly foundation. Dispose of surplus excavated material. Use rigid metal conduit (RMC) for stub-outs in foundation and concrete structures. These stub-outs are subsidiary to the drilled shaft foundations.

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

A shadow vehicle with Truck Mounted Attenuators (TMAs) or Trailer Attenuators (TAs) is required as shown on the appropriate Traffic Control Plan (TCP) sheets. TMAs/TAs must meet the requirements of the Compliant Work Zone Traffic Control Device List.

Level 3 Compliant TMAs/TAs are required for this project.

A total of one (1) shadow vehicle with a TMA/TA is required for the work apart from Pavement Marking Operations. The Contractor is responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs/Tas needed on the project.

A total of three (3) shadow vehicles with a TMA/TA are required for Pavement Marking Operations. The Contractor is responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMSs/Tas needed on the project.

County: Montgomery **Control:** 1986-01-070

Highway: FM 1314

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1986-01-070 **DISTRICT** Houston **COUNTY** Montgomery
HIGHWAY FM 1314

			CONTROL SECTION JOB		**1986-01-070**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00180576**		
			COUNTY		**Montgomery**		
			HIGHWAY		**FM 1314**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	242.000		242.000	
	416-6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	1,600.000		1,600.000	
	432-6009	RIPRAP (CONC) (CL B) (4")	CY	56.000		56.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	2.000		2.000	
	500-6003	MOBILIZATION (CALLOUT 1)	EA	1.000		1.000	
	502-6026	BARR, SIGNS, TRAFFIC HANDLING (LOC 1)	EA	18.000		18.000	
	610-6288	IN RD IL (TY SA) 50T-10 (400W EQ) LED	EA	160.000		160.000	
	618-6046	CONDT (PVC) (SCH 80) (2")	LF	34,080.000		34,080.000	
	618-6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	8,810.000		8,810.000	
	620-6007	ELEC CONDR (NO.8) BARE	LF	42,838.000		42,838.000	
	620-6008	ELEC CONDR (NO.8) INSULATED	LF	85,676.000		85,676.000	
	624-6010	GROUND BOX TY D (162922)W/APRON	EA	32.000		32.000	
	628-6052	ELC SRV TY A 240/480 060(SS)SS(E)GC(U)	EA	5.000		5.000	
	6185-6002	TMA (STATIONARY)	DAY	258.000		258.000	
	18	LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	

SUMMARY OF ILLUMINATION QUANTITIES

CSJ: 1986-01-070

ROADWAY: FM 1314

ITEM NO.	DESC CODE	DESCRIPTION	UNIT	QTY
0416	6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	1600
0432	6009	RIPRAP (CONC) (CL B) (4")	CY	56
0432	6045	RIPRAP (MOW STRIP) (4IN)	CY	2
0610	6288	IN RD IL (TY SA) 50T-10 (400W EQ) LED	EA	160
0618	6046	CONDT (PVC) (SCH 80) (2")	LF	34,030
0618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	8,810
0620	6007	ELEC CONDR (NO.8) BARE	LF	42,838
0620	6008	ELEC CONDR (NO.8) INSULATED	LF	85,676
0624	6010	GROUND BOX TY D (162922)W/APRON	EA	32
0628	6052	ELC SRV TY A 240/480 060(SS)SS(E)GC(U)	EA	5

NOTES:

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND THE TEXAS DEPARTMENT OF TRANSPORTATION STANDARDS AND SPECIFICATIONS.
2. BORE PIT SHALL BE NO CLOSER THAN 5.0 FEET FROM THE EDGE OF PAVING OR ROAD BASE. BORE PIT HOLES SHALL NOT BE LEFT OPEN OVERNIGHT.
3. LINEAR MEASUREMENT OF CONDUCTORS FOR PAYMENT SHALL BE SURFACE DISTANCE BETWEEN LOCATIONS.
4. VERIFY THE LOCATION OF ALL UNDERGROUND UTILITIES OR OTHER INSTALLATIONS AND PROVIDE ADEQUATE PROTECTION FOR THEM. ANY DAMAGE BY CONTRACTOR SHALL BE PAID FOR BY CONTRACTOR.
5. ALL STUB-OUTS IN FOUNDATION AND CONCRETE STRUCTURES ARE TO BE RIGID METAL CONDUIT (RMC).
6. USE ESTABLISHED INDUSTRY AND UTILITY SAFETY PRACTICES WHEN INSTALLING OR REMOVING POLES OR LUMINAIRES LOCATED NEAR OVERHEAD OR UNDERGROUND UTILITIES. CONSULT WITH THE APPROPRIATE UTILITY COMPANY PRIOR TO BEGINNING OF WORK. PROTECT THE LIGHT POLES WHEN INSIDE THE CLEAR ZONE.
7. COORDINATE AND VERIFY ELECTRICAL SERVICES WITH THE APPROPRIATE UTILITY COMPANY FOR PROVIDING ELECTRICAL SERVICES. CONTACT MR. TERRANCE GEORGE OF THE TXDOT TRAFFIC SYSTEMS CONSTRUCTION AT (713) 802-5405 BEFORE REMOVAL OF ELECTRICAL SERVICE. REMOVE EXISTING ELECTRICAL EQUIPMENTS IN ACCORDANCE WITH ESTABLISHED INDUSTRY, UTILITY PRACTICES AND TXDOT STANDARDS.
8. VERIFY ALL POWERLINE LOCATIONS PRIOR TO DOING WORK. FOLLOW NEC AND LOCAL UTILITY COMPANY REQUIREMENTS WHEN INSTALLING THE ELECTRICAL EQUIPMENT.
9. THE CONTRACTOR WILL NOT BE PERMITTED TO USE ANY EQUIPMENT THAT CAN SWING OR BOOM INTO THE RAILROAD RIGHT OF WAY.
10. CONDUIT PLACED UNDER PAVED AREAS SHALL BE BY BORING. IF PLACED PRIOR TO PAVING, MAY BE TRENCHED.

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

SUMMARY OF ILLUMINATION QUANTITIES AND NOTES FM 1314 SH-99 TO LOOP 494

NTS

SHEET 1 OF 1

ORIGINAL DRAWING DATE:	REVISIONS	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DR.:		12	6		005
CK.:		COUNTY	CONTROL	SECTION	JOB	HIGHWAY
DR.:		MONTGOMERY	1986	01	070	FM 1314
CK.:						

$TIME$ $DATE$ $FILE$

$FILE$

ELECTRICAL SERVICES DATA SHEET

Elec. Service No.	Electrical Service Description (see ED (5) (6) & (10) - 14)	Service Conduit Size	Service Conductor No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amp	Two-Pole Contactor Amps	Panelbd/ loadcenter Amp Rating	Circuit No.	Branch Ckt. Bkr Pole/Amp	Branch Circuit Amps	KVA Load
								A	2P/20	10.4	10
S-1	ELC SRV TY A 240/480 060 (SS)SS(E)GC(U)	2"	3/#6	60	2P/60	60	N/A	B	2P/20	10.4	
S-2	ELC SRV TY A 240/480 060 (SS)SS(E)GC(U)	2"	3/#6	60	2P/60	60	N/A	A	2P/20	10.4	10
								B	2P/20	10.4	
S-3	ELC SRV TY A 240/480 060 (SS)SS(E)GC(U)	2"	3/#6	60	2P/60	60	N/A	A	2P/20	5.2	2.5
								B	2P/20	SPARE	
S-4	ELC SRV TY A 240/480 060 (SS)SS(E)GC(U)	2"	3/#6	60	2P/60	60	N/A	A	2P/20	9.36	8.7
								B	2P/20	8.84	
S-5	ELC SRV TY A 240/480 060 (SS)SS(E)GC(U)	2"	3/#6	60	2P/60	60	N/A	A	2P/20	9.36	8.7
								B	2P/20	8.84	

NOTES:

1. PLACEMENT OF TRANSFORMER BASE POLES SHALL BE AS CLOSE TO THE RIGHT OF WAY (ROW) LINE AS POSSIBLE OR NOT CLOSER THAN 4 FEET FROM LANE EDGE.

2. THE LOCATIONS OF THE POLES ARE DIAGRAMMATIC ONLY AND MAY BE SHIFTED TO SUIT ACTUAL FIELD CONDITIONS. BE AWARE THAT UNDERGROUND UTILITIES EXIST WITHIN THIS PROJECT. VERIFY THE LOCATIONS AND AVOID DAMAGE TO ALL UNDERGROUND UTILITIES OR OTHER INSTALLATIONS. PROVIDE ADEQUATE PROTECTION TO UNDERGROUND UTILITIES IF NECESSARY. THIS WORK WILL NOT BE PAID DIRECTLY BUT WILL BE SUBSIDIARY TO PERTINENT ITEMS. DAMAGE BY CONTRACTOR SHALL BE PAID FOR BY CONTRACTOR.

3. ALL EXPOSED CONDUIT SHALL BE RIGID METAL CONDUIT (RMC). CONDUIT PLACED UNDER PAVED AREAS SHALL BE BY BORING.

4. BORE PIT SHALL BE NO CLOSER THAN 5.0 FEET FROM THE EDGE OF PAVING OR ROAD BASE. BORE PIT HOLES SHALL NOT BE LEFT OPEN OVERNIGHT.

5. COORDINATE WITH THE UTILITY COMPANY THE AVAILABLE TYPE OF SERVICE AND POSSIBLE ELECTRICAL SERVICE LOCATIONS.

6. ALL WORK MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC) AND TXDOT STANDARDS.

7. CONTRACTOR MUST CALL 811 PRIOR TO THE START OF THE EXCAVATION.

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on 5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

FM 1314
ELECTRICAL SERVICES
DATA SHEET AND NOTES

SCALE: N.T.S. SHEET 1 OF 1

ORIGINAL DRAWING DATE:		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT			SHEET
DN.: TxDOT REVISIONS		12	6				006
CK.: MM		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DN.: TxDOT		MONTGOMERY		1986	01	070	FM1314
CK.: MM							

$TIME$ $DATE$ $FILE$

$FILE$ $TIME$ $DATE$

DATE:
FILE:

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

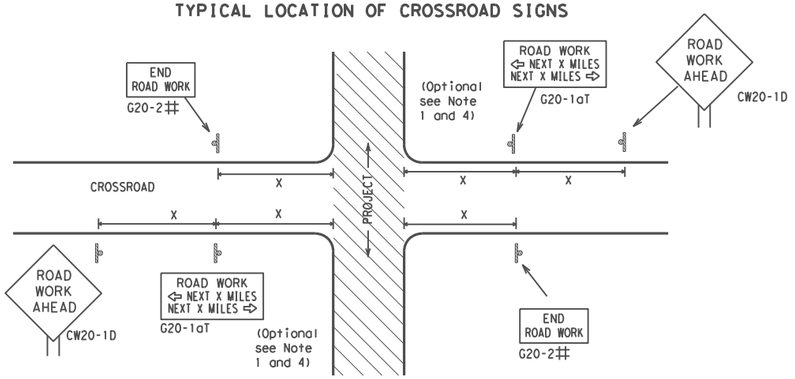
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1986	01	070	FM 1314
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	12	MONTGOMERY		007
5-10 5-21				

DATE:
FILE:

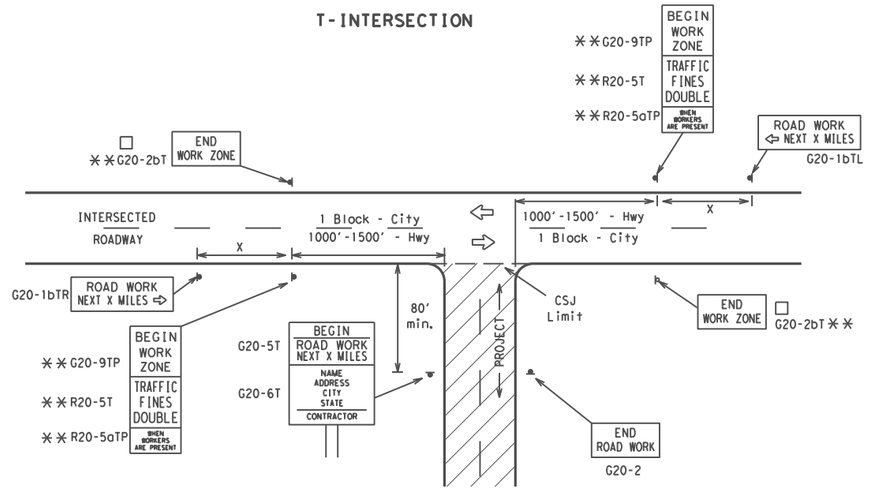
TYPICAL LOCATION OF CROSSROAD SIGNS



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]

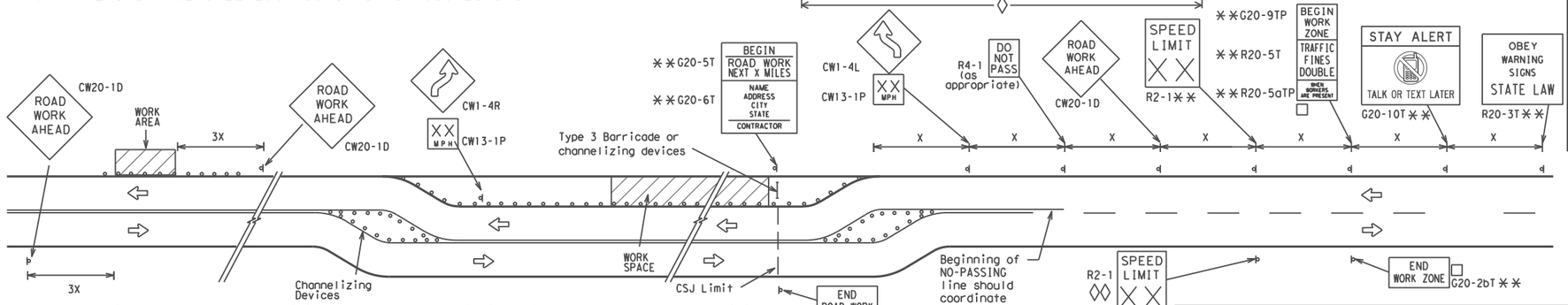
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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.

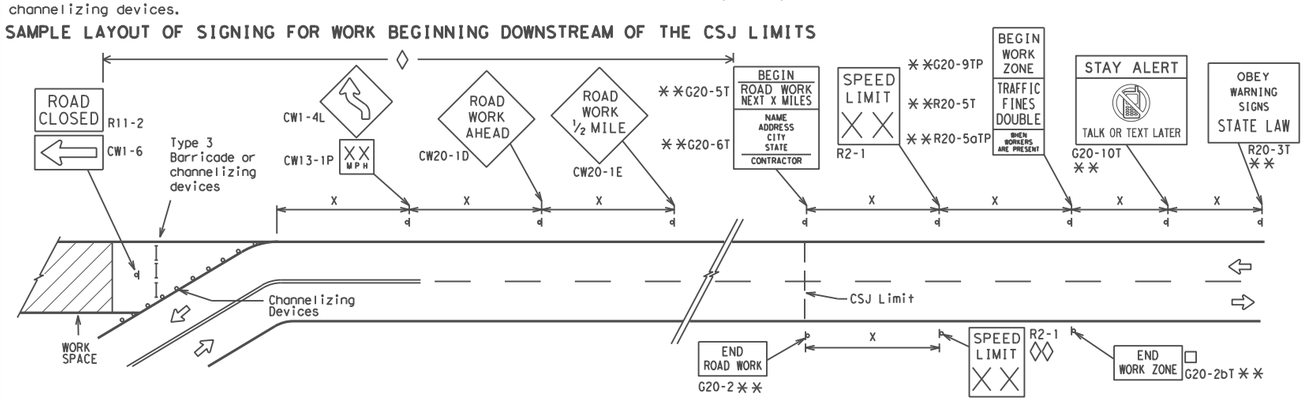
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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 AT THE CSJ LIMITS

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



NOTES

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

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

** CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.

◊ Area for placement of "ROAD WORK AHEAD" (CW20-1D)sign and other signs or devices as called for on the Traffic Control Plan.

◊◊ Contractor will install a regulatory speed limit sign at the end of the work zone.

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

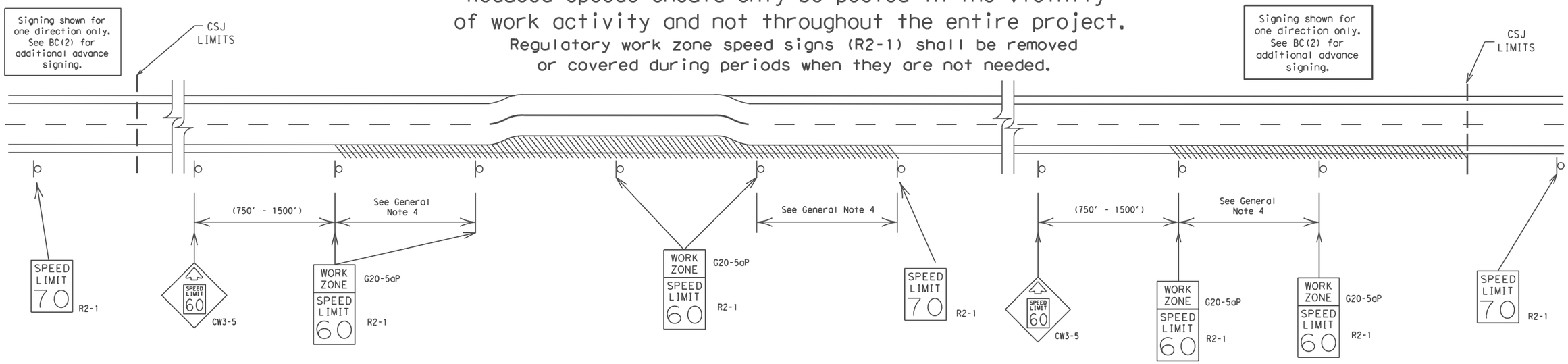
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1986	01	070	FM 1314
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	12	MONTGOMERY		008

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

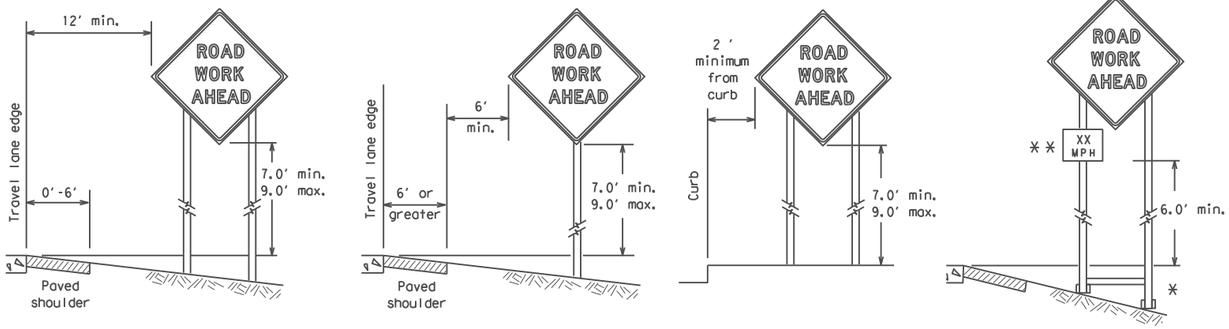
BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13 5-21	1986	01	070	FM 1314
	DIST	COUNTY		SHEET NO.
	12	MONTGOMERY		009

DATE:
FILE:

DATE:
FILE:

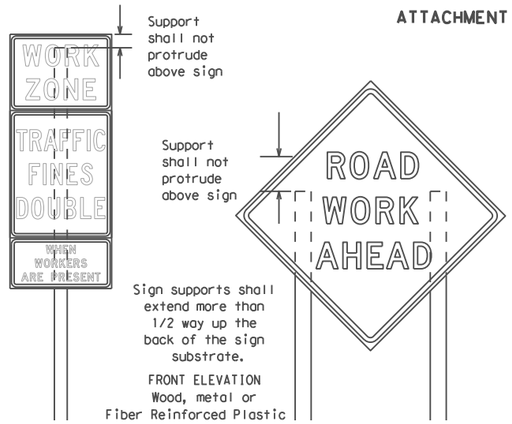
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

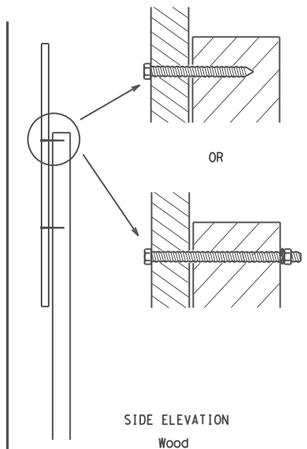


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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





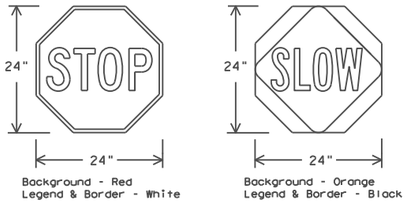
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.

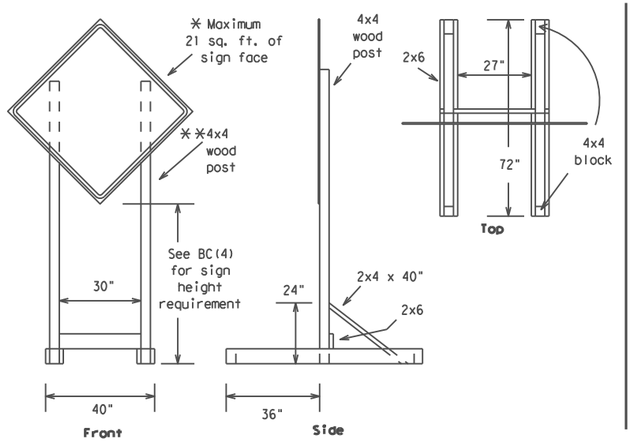
Texas Department of Transportation | Traffic Safety Division Standard

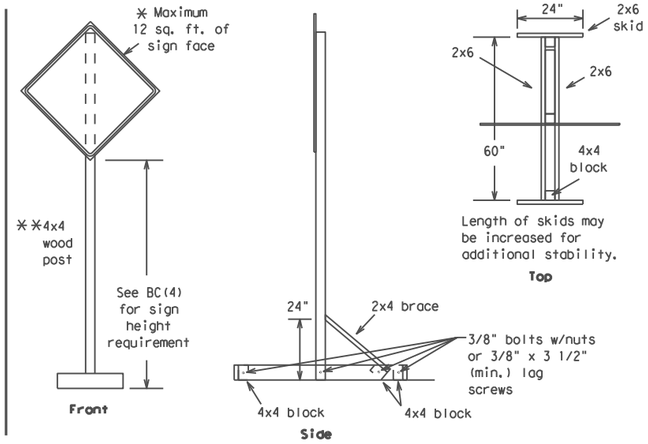
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1986	01	070	FM 1314
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	12	MONTGOMERY		010

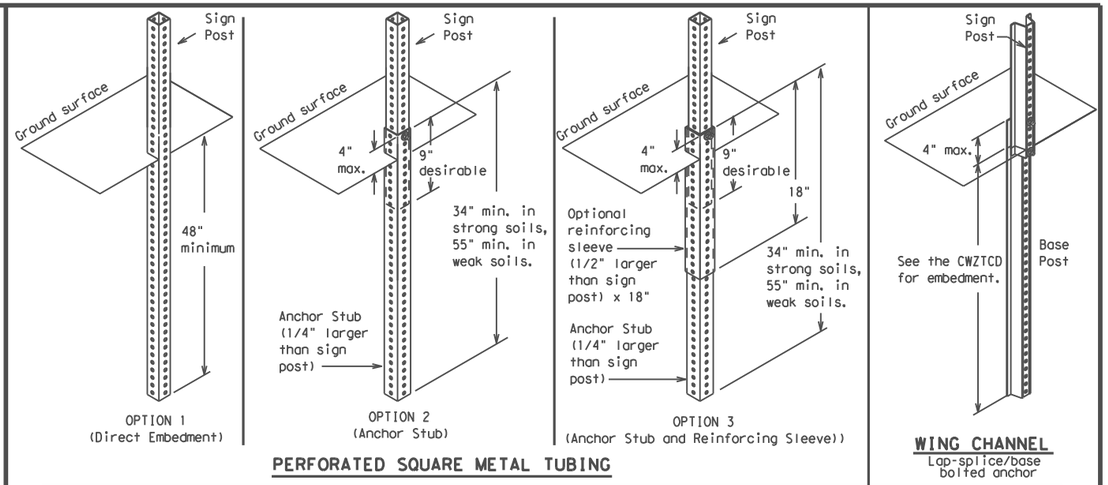
DATE:
FILE:





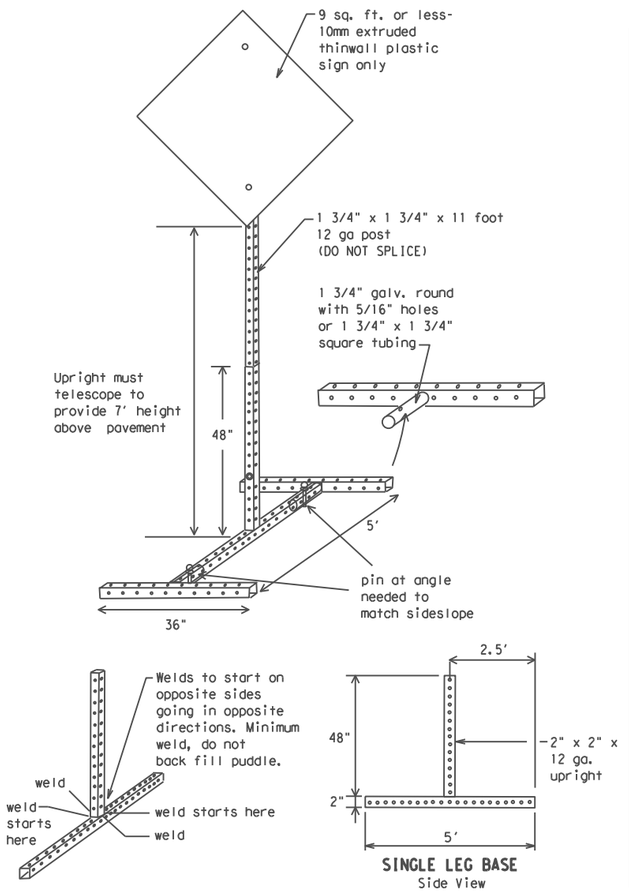
SKID MOUNTED WOOD SIGN SUPPORTS

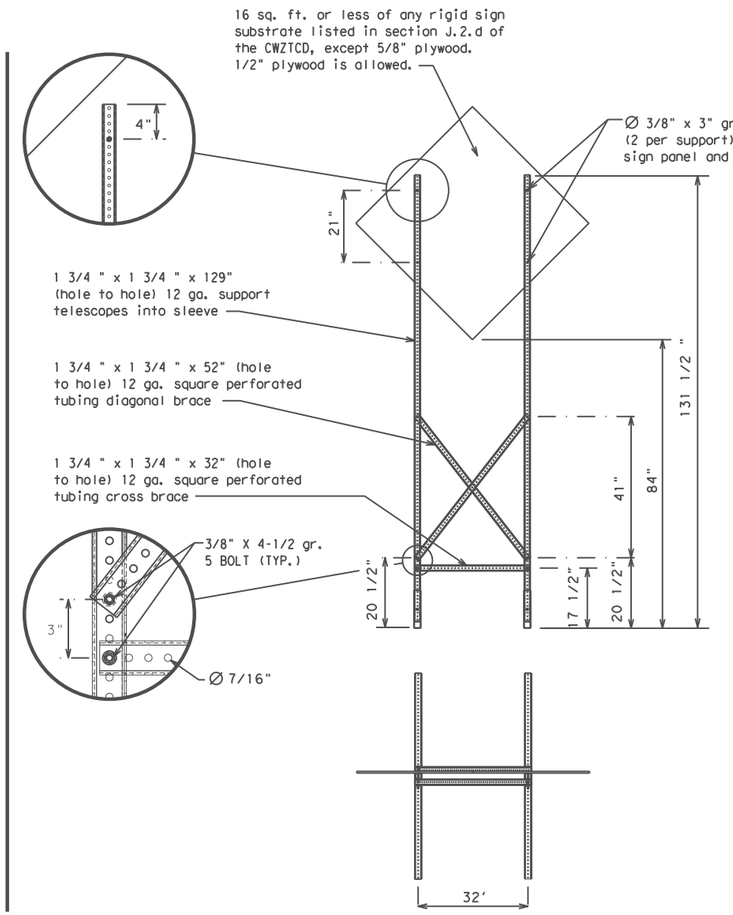
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

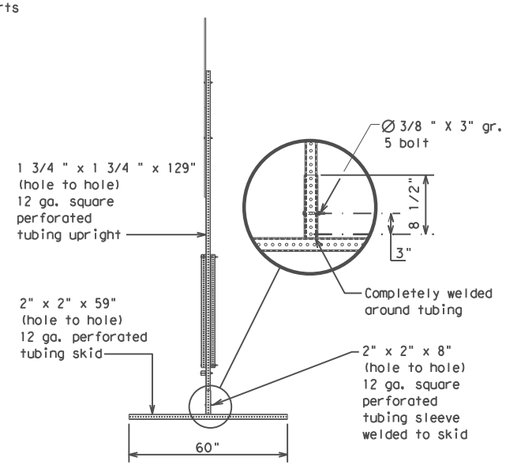


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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.

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1986	01	070	FM 1314
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	12	MONTGOMERY		011

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

DATE:
FILE:

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

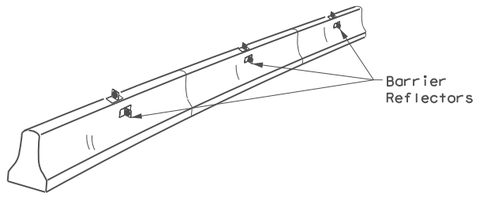
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1986	01	070	FM 1314
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	12	MONTGOMERY		012

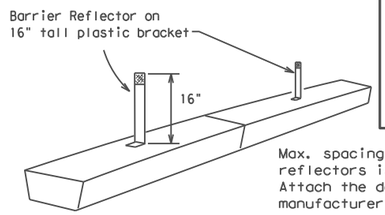
100

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.



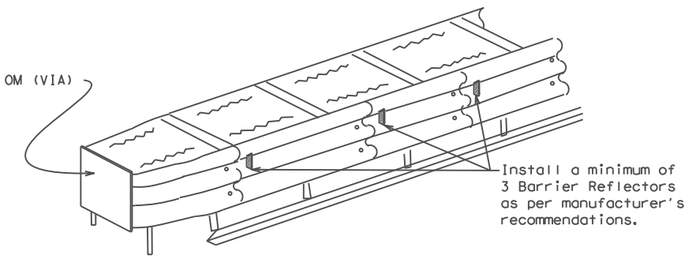
CONCRETE TRAFFIC BARRIER (CTB)

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)



DELINEATION OF END TREATMENTS

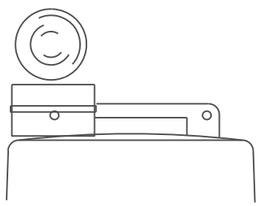
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

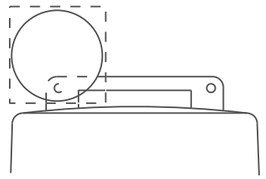
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

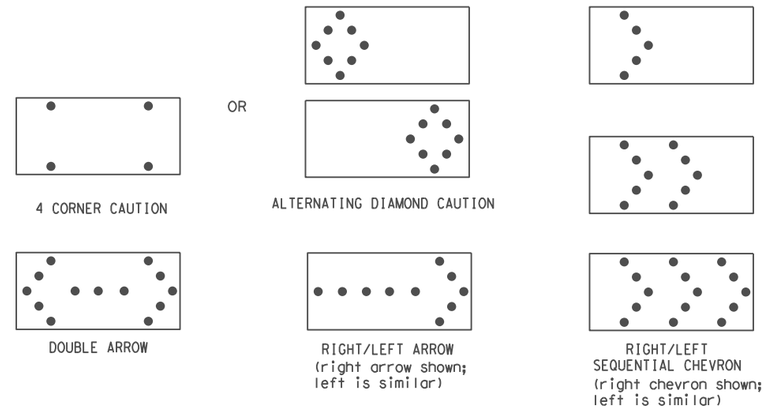
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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

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.

SHEET 7 OF 12

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	1986	01	070	FM 1314
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	12	MONTGOMERY		013

DATE:
FILE:

101

DATE:
FILE:

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:

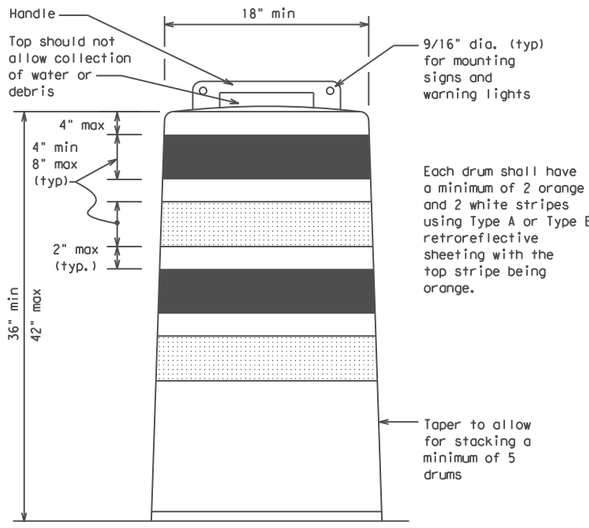
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents 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.

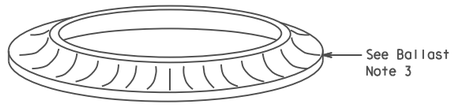
RETROREFLECTIVE SHEETING

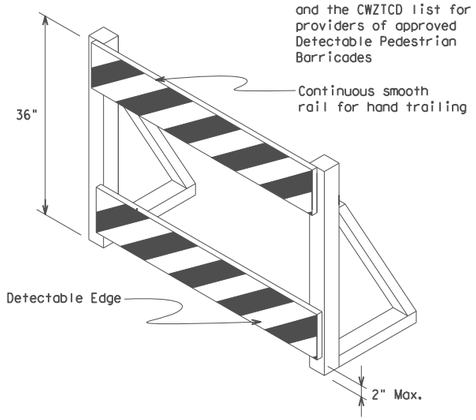
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

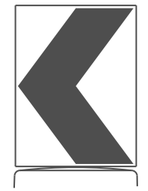




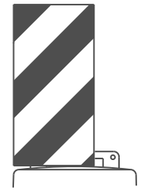


DETECTABLE PEDESTRIAN BARRICADES

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

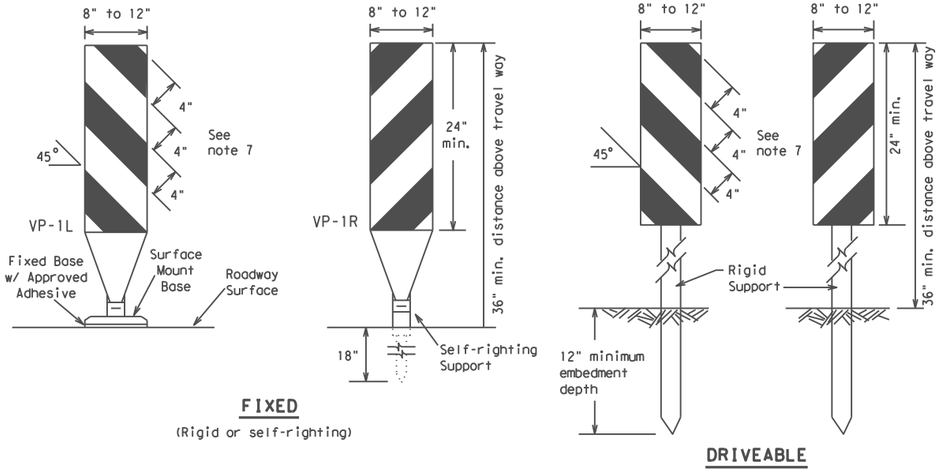
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1986	01	070	FM 1314
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	12	MONTGOMERY		014
7-13				

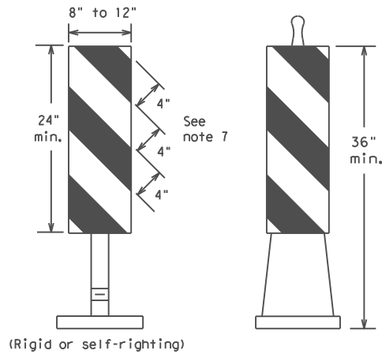
102

DATE:
FILE:



FIXED
(Rigid or self-righting)

DRIVEABLE

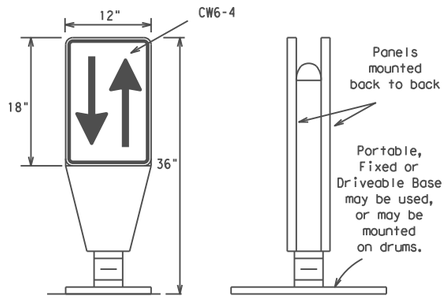


(Rigid or self-righting)

PORTABLE

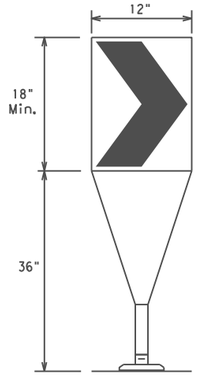
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is 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.

VERTICAL PANELS (VPs)



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)



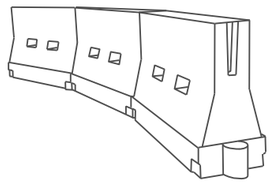
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

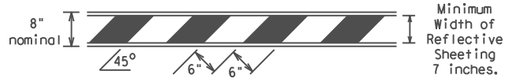
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1986	01	070	FM 1314
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	12	MONTGOMERY		015

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

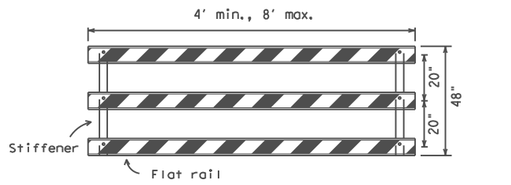
TYPE 3 BARRICADES

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.



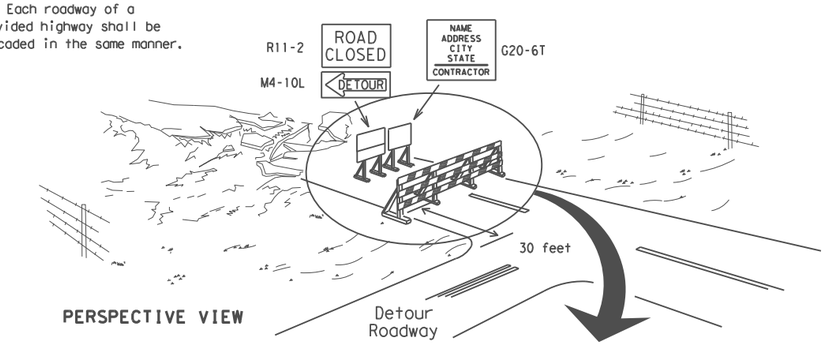
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

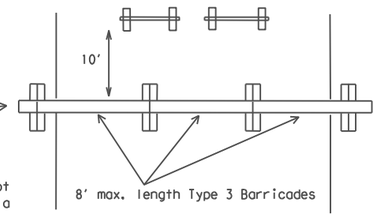
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

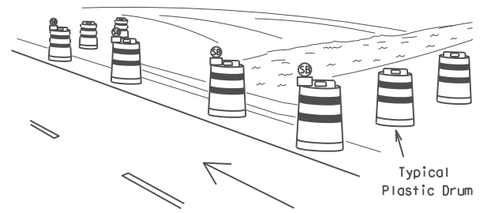
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

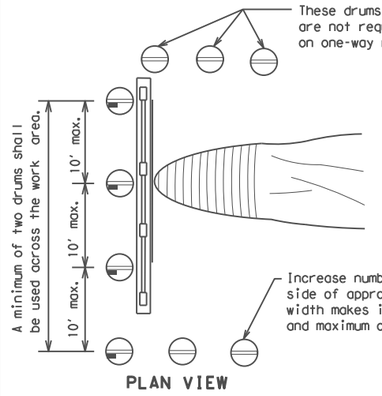
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

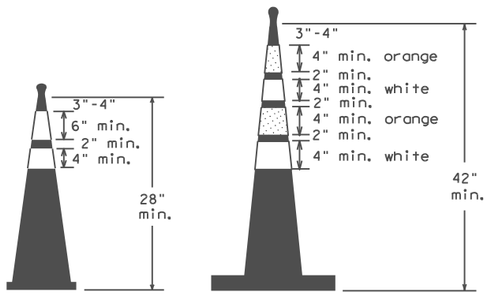
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



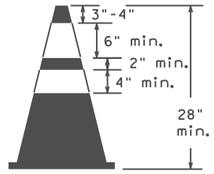
PLAN VIEW

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

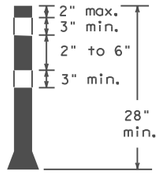
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

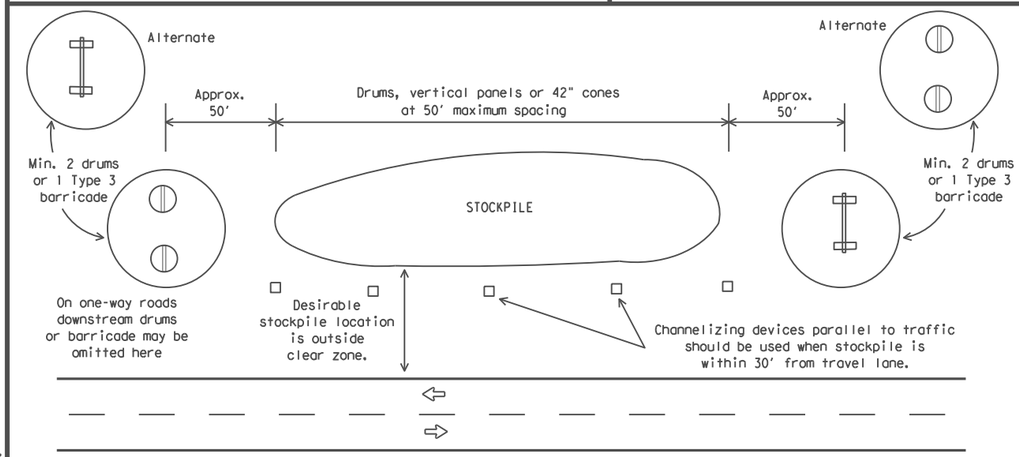


Tubular Marker

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

DATE:
FILE:

SHEET 10 OF 12

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	1986	01	070	FM 1314
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	12	MONTGOMERY		016

104

DATE:
FILE:

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.

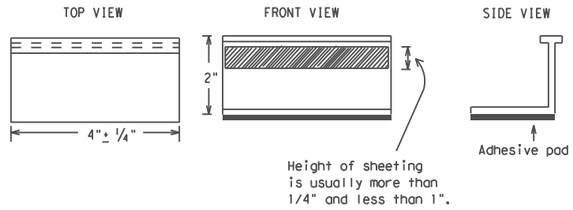
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

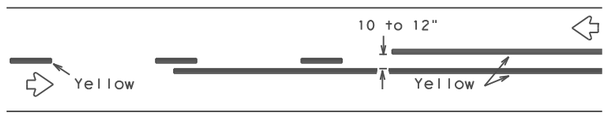
BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

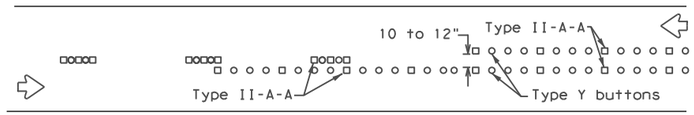
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-98 9-07 5-21 1-02 7-13 11-02 8-14	1986	01	070	FM 1314
	DIST	COUNTY		SHEET NO.
	12	MONTGOMERY		017

DATE:
FILE:

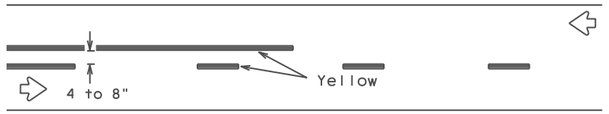
PAVEMENT MARKING PATTERNS



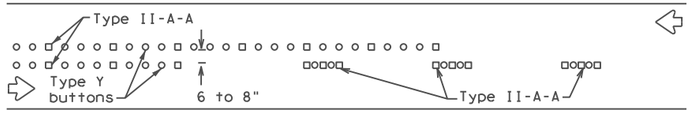
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



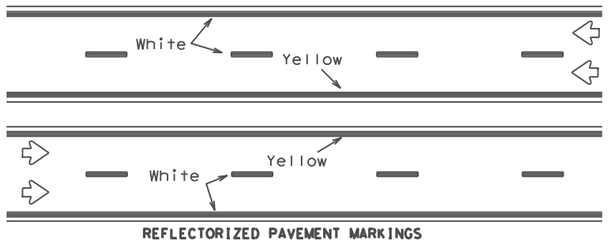
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



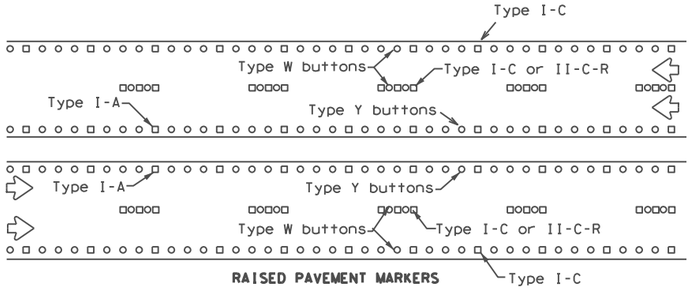
RAISED PAVEMENT MARKERS - PATTERN B

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



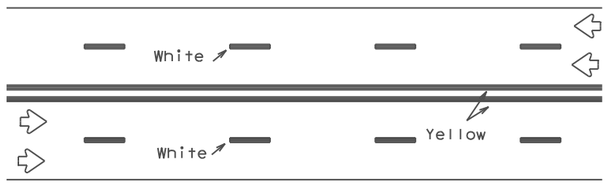
REFLECTORIZED PAVEMENT MARKINGS



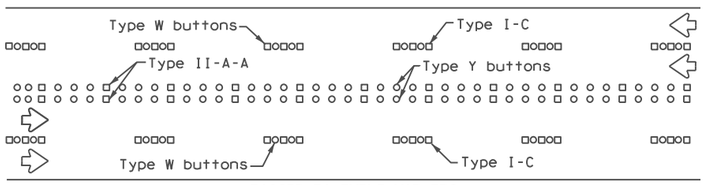
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



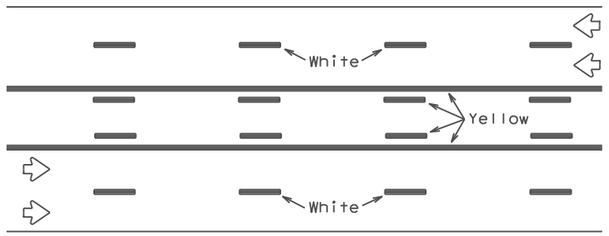
REFLECTORIZED PAVEMENT MARKINGS



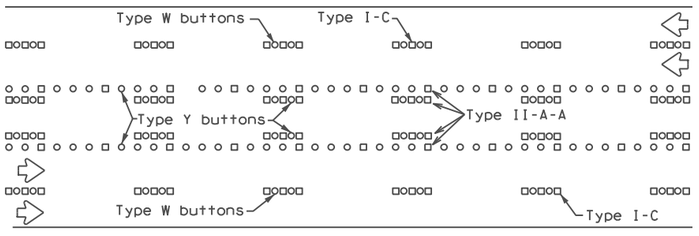
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

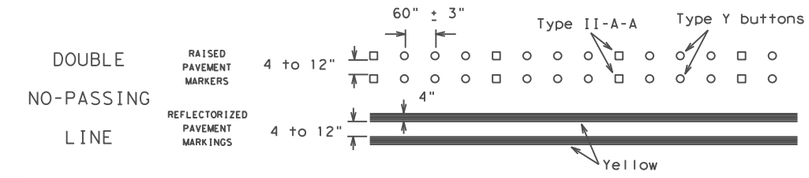
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

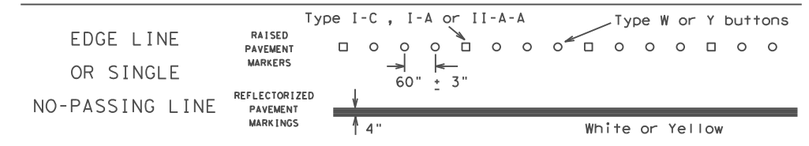
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

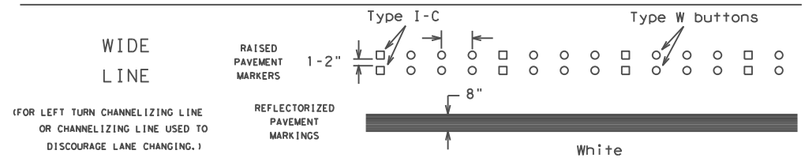


EDGE LINE OR SINGLE NO-PASSING LINE



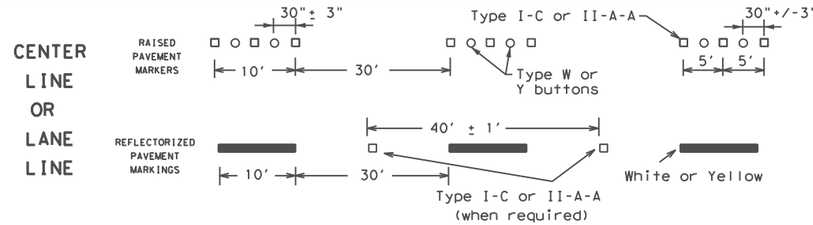
WIDE LINE

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

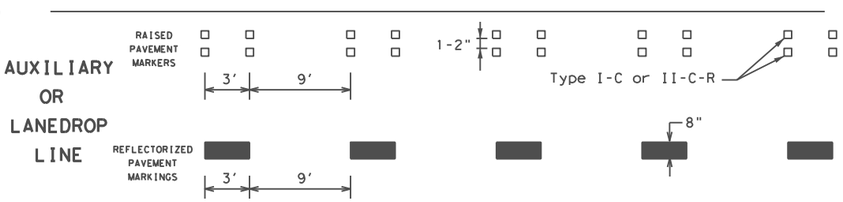


BROKEN LINES

CENTER LINE OR LANE LINE

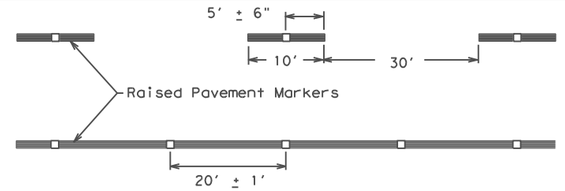


AUXILIARY OR LANEDROP LINE



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

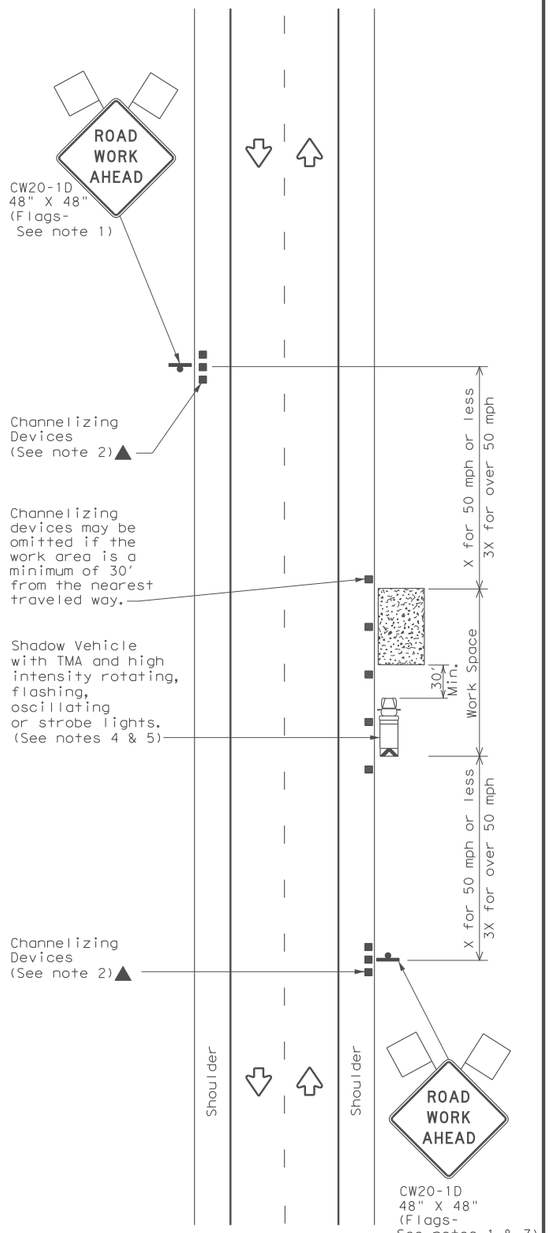
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

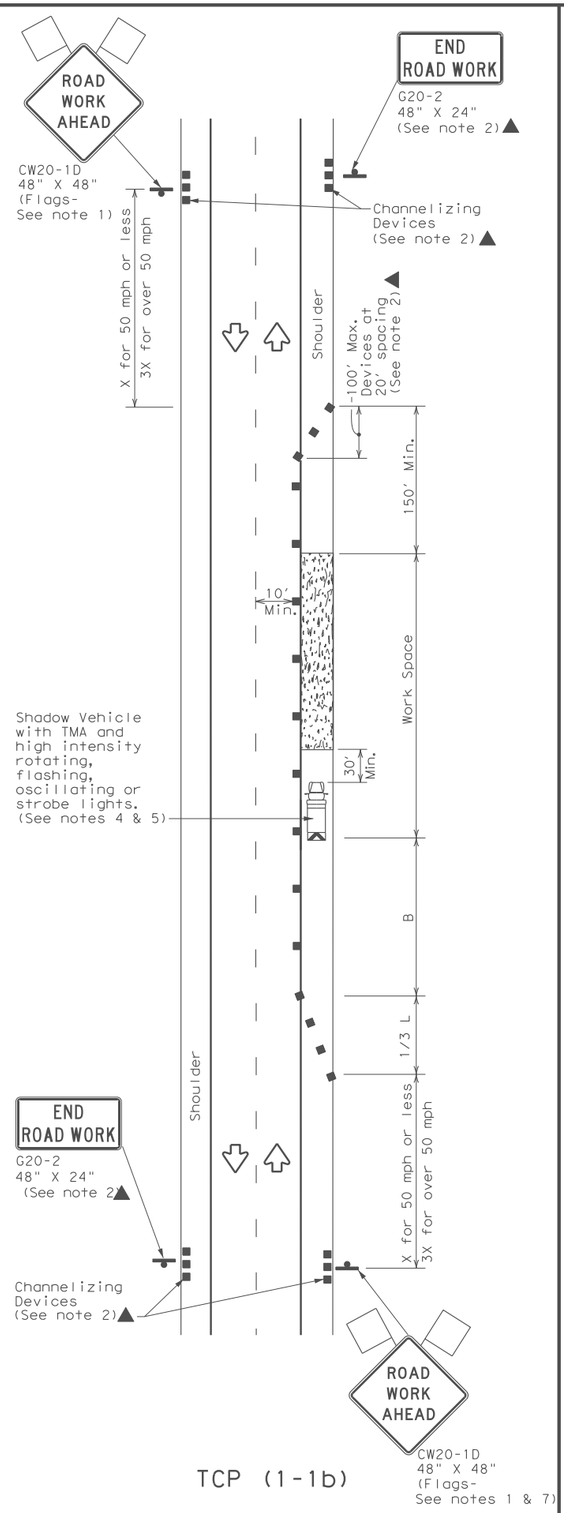
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	1986	01	070	FM 1314
	DIST	COUNTY		SHEET NO.
	12	MONTGOMERY		018

DATE:
FILE:



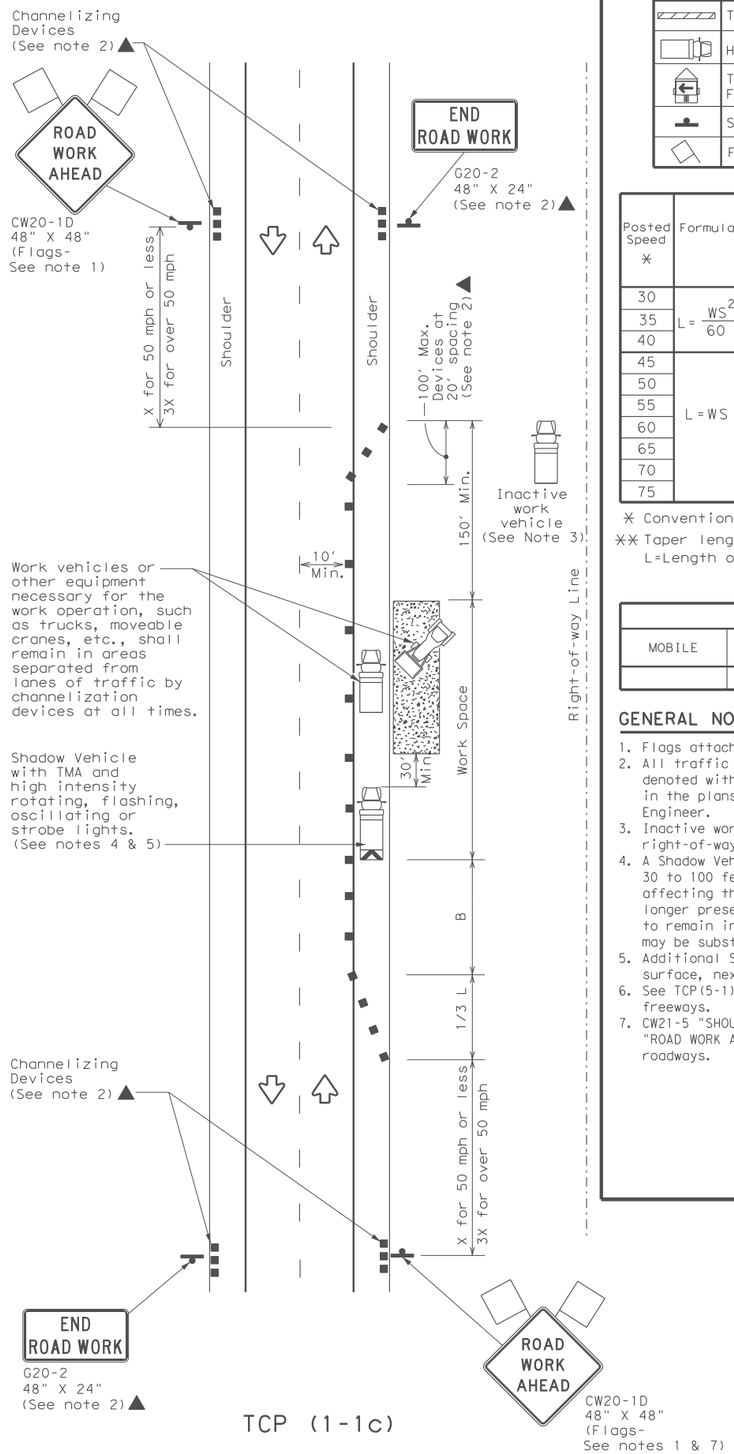
TCP (1-1a)

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

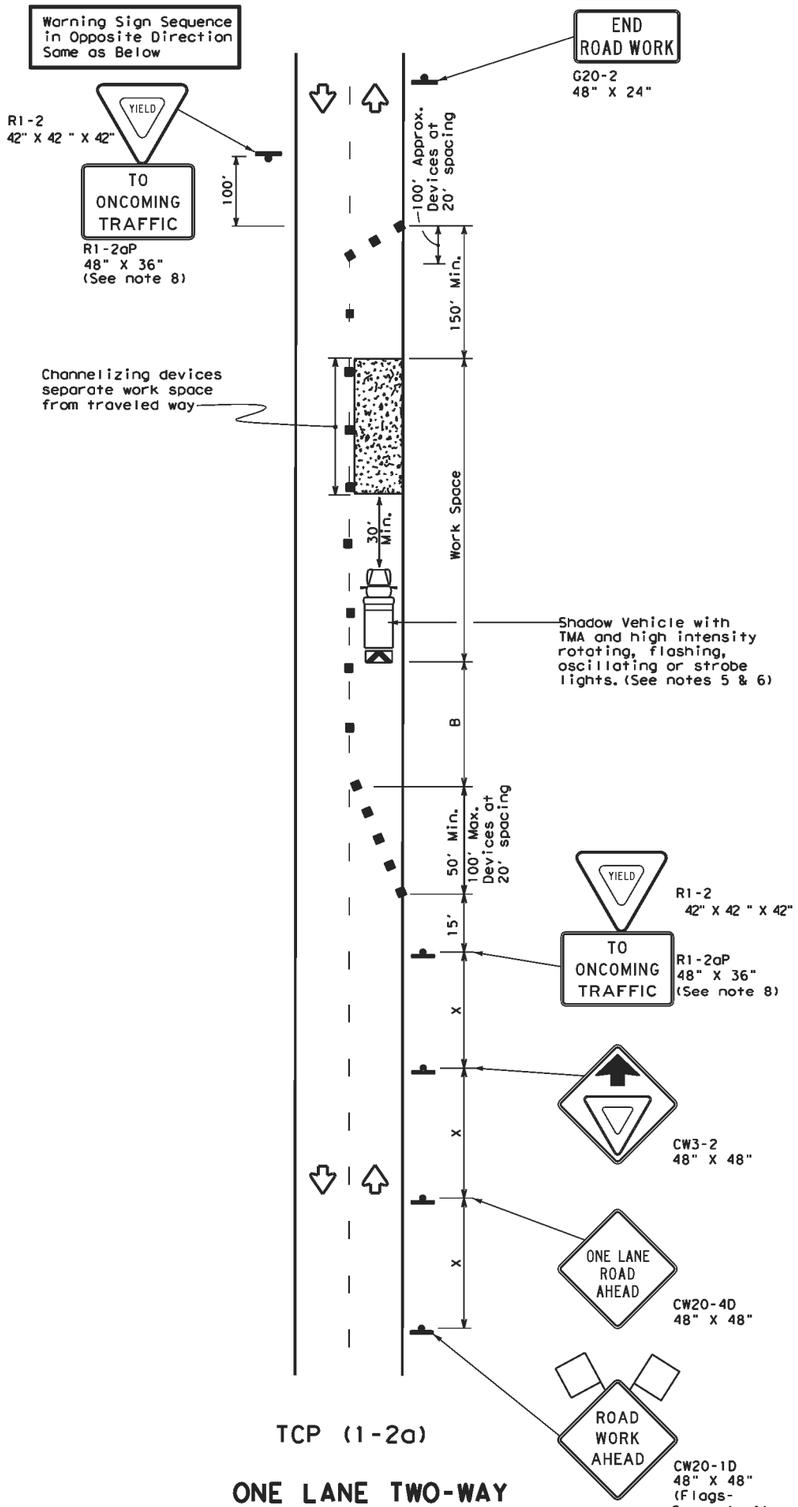
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

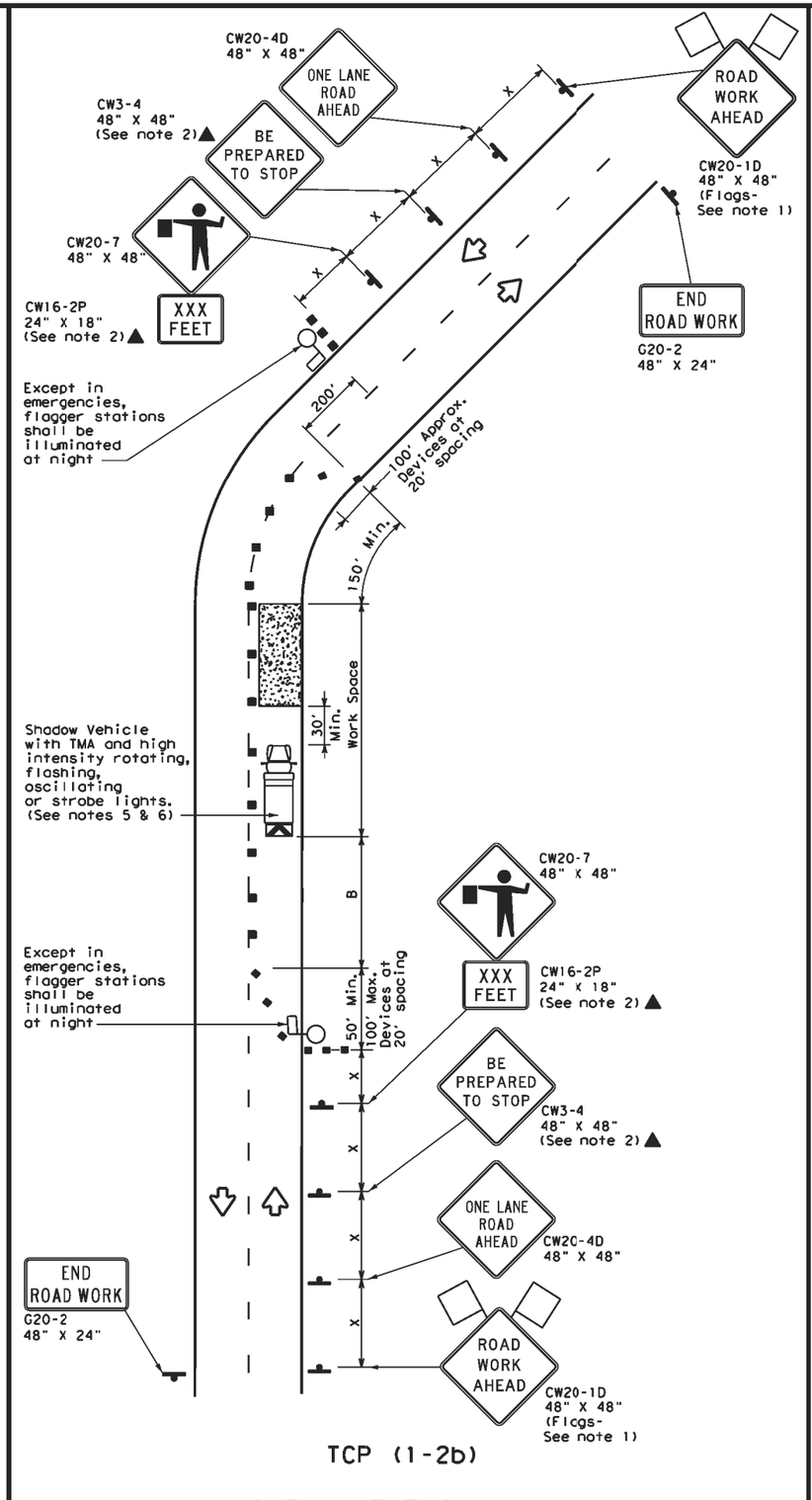
FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	1986	01	070	FM 1314
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	12	MONTGOMERY		019
1-97 2-18				

DATE:
FILE:



TCP (1-2a)

ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See note 7)



TCP (1-2b)

ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	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

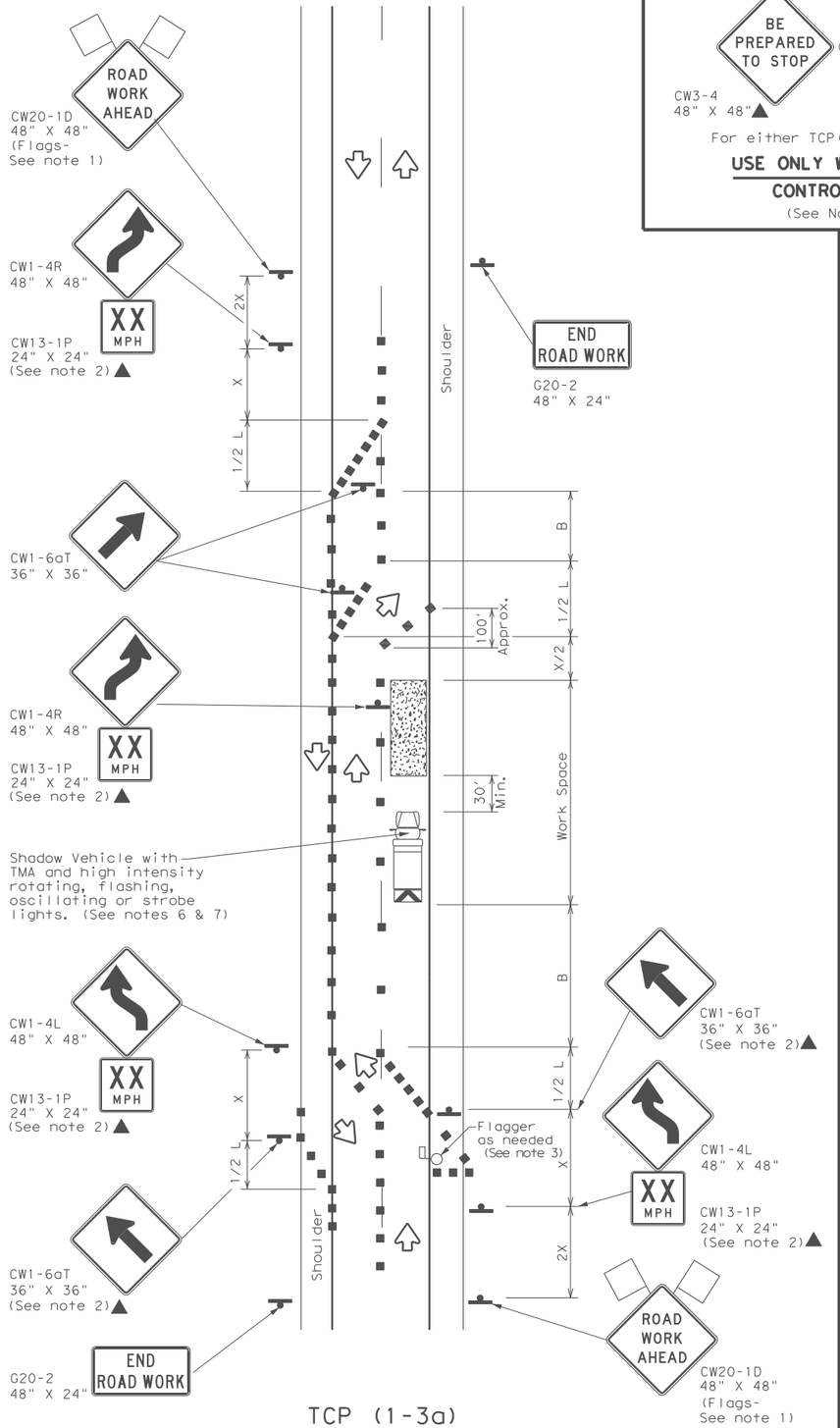
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(1-2)-18

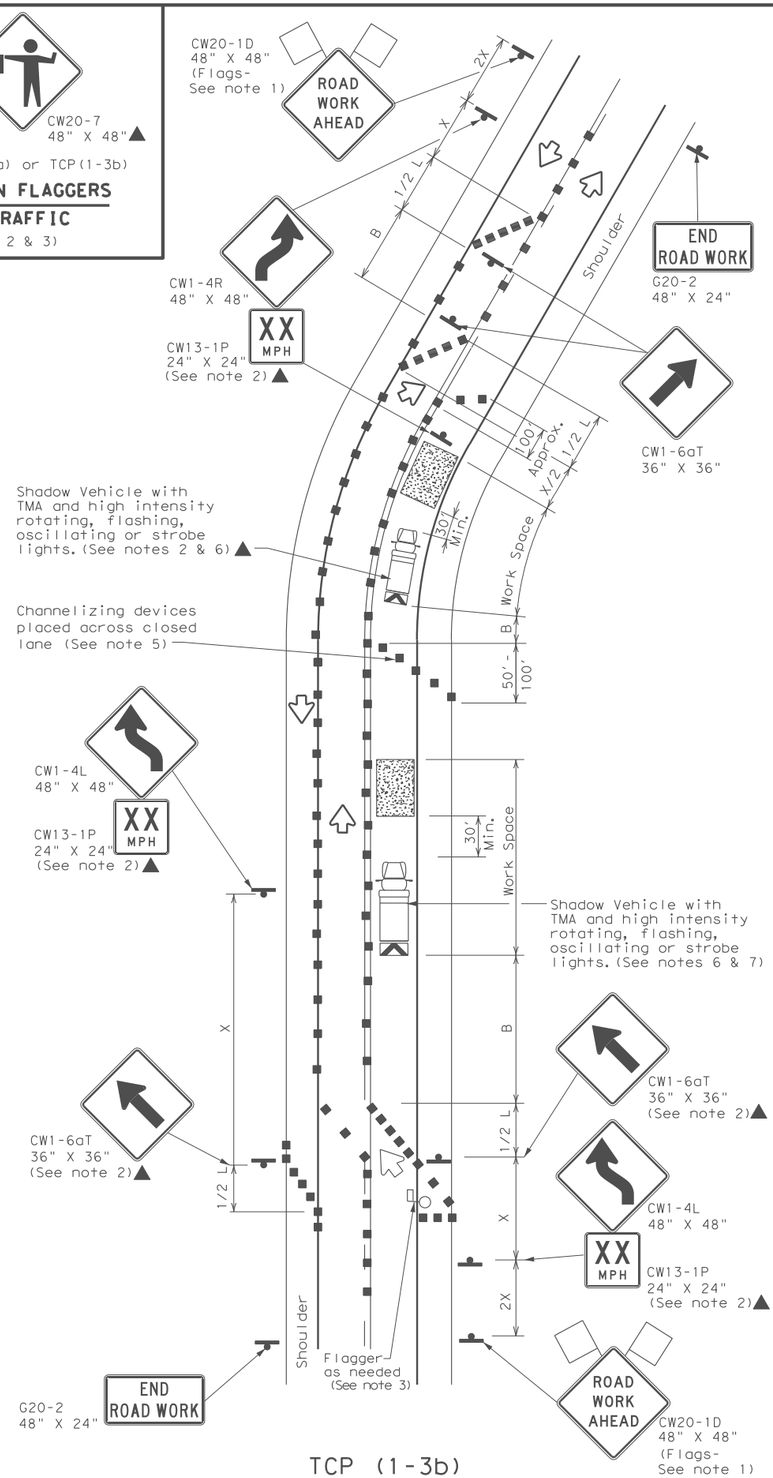
FILE: tcp1-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-90 4-98 2-94 2-12 1-97 2-18	1986	01	070	FM 1314
	DIST	COUNTY		SHEET NO.
	12	MONTGOMERY		020

DATE:
FILE:



TCP (1-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



TCP (1-3b)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

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. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Additional flaggers may be positioned in advance of traffic queues to alert traffic to reduce speed.
4. DO NOT PASS, PASS WITH CARE and construction regulatory speed zone signs may be installed downstream of the ROAD WORK AHEAD signs.
5. When the work zone is made up of several work spaces, channelizing devices should be placed laterally across the closed lane to re-emphasize closure. Laterally placed channelizing devices should be repeated every 500 to 1000 feet in urban areas and every 1/4 to 1/2 mile in rural areas.
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 wider work spaces.
8. 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 speed 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 area of conflicting markings not the entire work zone.

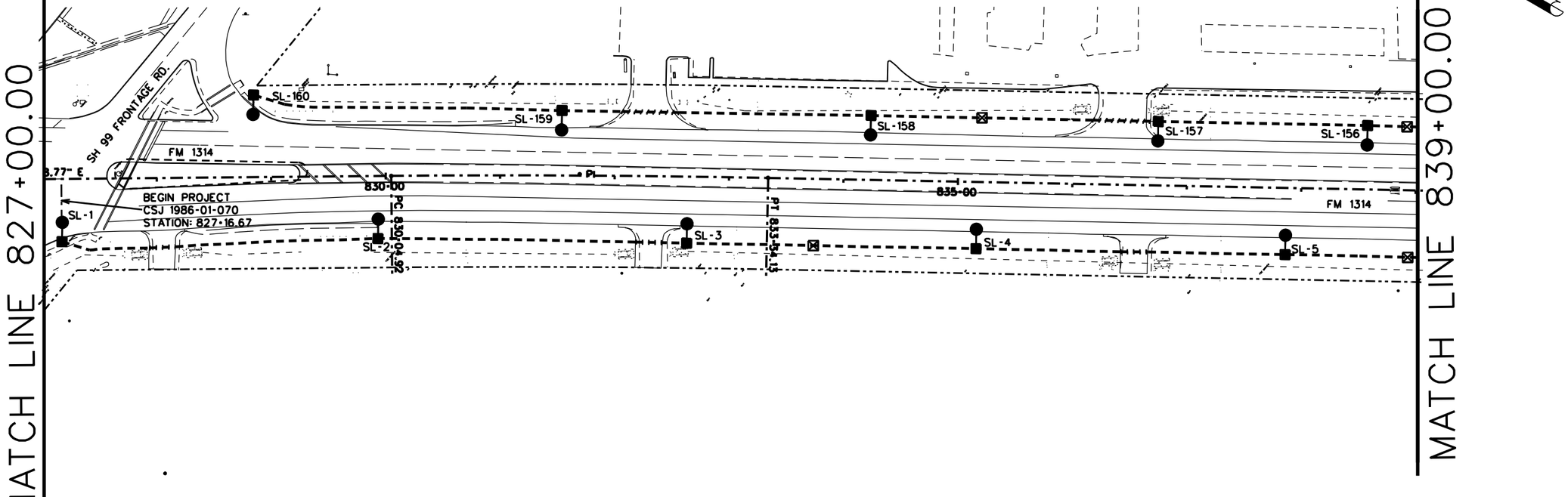
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
TRAFFIC SHIFTS ON TWO LANE ROADS

TCP(1-3)-18

FILE: tcp1-3-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	1986	01	070	FM 1314
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	12	MONTGOMERY		021
1-97 2-18				



	DRILL SHAFT(RD ILL POLE)(30")	RIPRAP (CONC) (CL B) (4")	RD IL ASM (TY SA) 50T-10 (400W EQ)LED	CONDUIT		CONDUCTOR	
				2"PVC SCH 80	2"PVC SCH 80 BORE	#8 BARE	INSULATED #8 XHHW
	0416-6029	0432-6009	0610-6288	0618-6046	0618-6047	0620-6007	0620-6008
	(FT)	(CY)	(EA)	(FT)	(FT)	(FT)	(FT)
TOTAL	100	3.5	10	2034	170	2204	4408

LEGEND

(NOTE: SYMBOLS EXAGGERATED FOR CLARITY)

- NEW ELECTRICAL SERVICE
- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- EXISTING RD IL (STEEL POLE MOUNTED)
- EXISTING RD IL (TIMBER POLE MOUNTED)
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW 2" RIGID METAL CONDUIT
- NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

ASSEMBLY	SERVICE/CIRCUIT	OFFSET FROM EDGE OF TRAVEL LANE	STATION	WATT	DESCRIPTION	HEIGHT
CSJ 1986-01-070						
SL-1	S-1, A	3.2 FT.	827+16.67	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-2	S-1, A	15 FT.	829+92.74	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-3	S-1, A	15 FT.	832+63.75	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-4	S-1, A	15 FT.	835+16.96	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-5	S-1, A	15 FT.	837+87.07	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-156	S-5, A	15 FT.	838+56.93	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-157	S-5, A	15 FT.	836+74.03	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-158	S-5, A	15 FT.	834+23.02	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-159	S-5, A	15 FT.	831+53.90	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-160	S-5, A	10.5 FT.	828+85.23	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

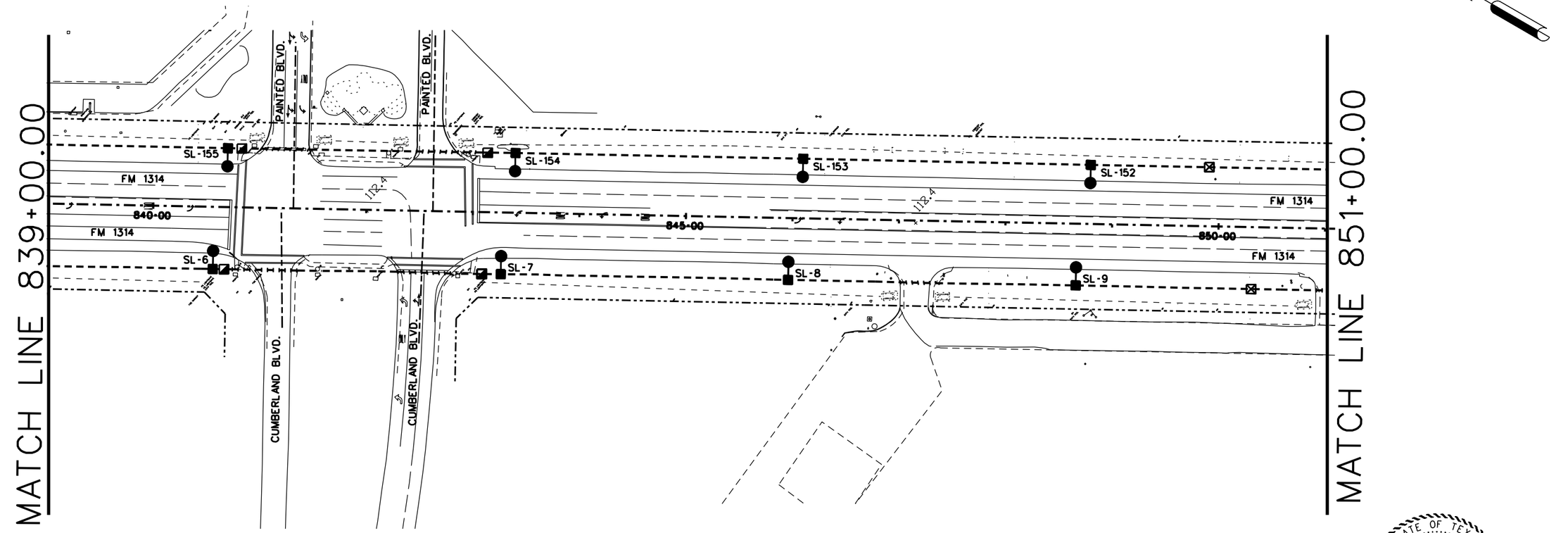
LIGHTING LAYOUT

FM 1314

SCALE: 1"=100'

SHEET 1 OF 21

ORIGINAL DRAWING DATE:	REVISIONS	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN: TxDOT CK: TxDOT DW: TxDOT CK: TxDOT		12	6		022
		COUNTY	CONTROL	SECTION	JOB	HIGHWAY
		MONTGOMERY	1986	01	070	FM1314



	GROUND BOX TY D W/APRON	DRILL SHAFT(RD ILL POLE)(30")	RIPRAP (CONC) (CL B) (4")	RD IL ASM (TY SA) 50T-10 (400W EQ)LED	CONDUIT		CONDUCTOR	
					2"PVC SCH 80	2"PVC SCH 80 BORE	#8 BARE	INSULATED #8 XHHW
	0624-6010	0416-6029	0432-6009	0610-6288	0618-6046	0618-6047	0620-6007	0620-6008
	(EA)	(FT)	(CY)	(EA)	(FT)	(FT)	(FT)	(FT)
TOTAL	4	80	2.8	8	2134	270	2400	4800

LEGEND

(NOTE: SYMBOLS EXAGGERATED FOR CLARITY)

- NEW ELECTRICAL SERVICE
- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- EXISTING RD IL (STEEL POLE MOUNTED)
- EXISTING RD IL (TIMBER POLE MOUNTED)
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW 2" RIGID METAL CONDUIT
- NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

ASSEMBLY	SERVICE/CIRCUIT	OFFSET FROM EDGE OF TRAVEL LANE	STATION	WATT	DESCRIPTION	HEIGHT
CSJ 1986-01-070						
SL-6	S-1, A	15 FT.	840+57.03	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-7	S-1, A	15 FT.	843+27.35	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-8	S-1, A	15 FT.	848+97.04	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-9	S-1, A	15 FT.	848+67.01	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-152	S-5, A	15 FT.	848+78.98	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-153	S-5, A	15 FT.	846+78.98	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-154	S-5, A	15 FT.	843+38.98	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-155	S-5, A	15 FT.	840+69.00	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

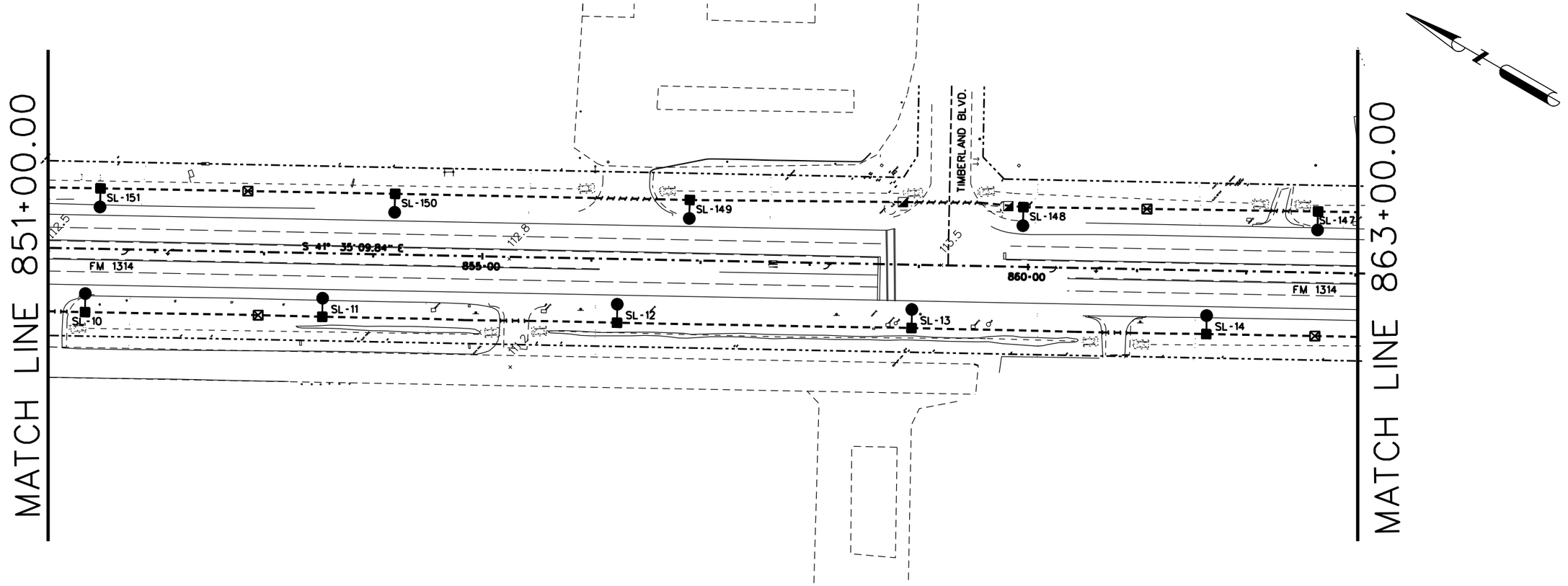
LIGHTING LAYOUT

FM 1314

SCALE: 1"=100'

SHEET 2 OF 21

ORIGINAL DRAWING DATE:	REVISIONS	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DR.: STH		12	6	-	023
CK.: MM		COUNTY	CONTROL	SECTION	JOB	HIGHWAY
DES.: STH		MONTGOMERY	1986	01	070	FM1314
CK.: MM						



	GROUND BOX TY D W/APRON	DRILL SHAFT(RD ILL POLE)(30")	RIPRAP (CONC) (CL B) (4")	RD IL ASM (TY SA) 50T-10 (400W EQ)LED	CONDUIT		CONDUCTOR	
					2"PVC SCH 80	2"PVC SCH 80 BORE	#8 BARE	INSULATED #8 XHHW
	0624-6010	0416-6029	0432-6009	0610-6288	0618-6046	0618-6047	0620-6007	0620-6008
	(EA)	(FT)	(CY)	(EA)	(FT)	(FT)	(FT)	(FT)
TOTAL	2	100	3.5	10	2192	208	2400	4800

LEGEND

(NOTE: SYMBOLS EXAGGERATED FOR CLARITY)

- NEW ELECTRICAL SERVICE
- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- EXISTING RD IL (STEEL POLE MOUNTED)
- EXISTING RD IL (TIMBER POLE MOUNTED)
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW 2" RIGID METAL CONDUIT
- NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

ASSEMBLY	SERVICE/CIRCUIT	OFFSET FROM EDGE OF TRAVEL LANE	STATION	WATT	DESCRIPTION	HEIGHT
CSJ 1986-01-070						
SL-10	S-1, A	15 FT.	851+37.00	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-11	S-1, A	15 FT.	853+54.44	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-12	S-1, A	15 FT.	856+24.47	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-13	S-1, A	15 FT.	858+94.42	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-14	S-1, A	15 FT.	861+65.51	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-147	S-5, A	15 FT.	868+38.64	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-148	S-5, A	13.55 FT.	859+94.70	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-149	S-5, A	15 FT.	856+88.98	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-150	S-5, A	15 FT.	854+18.98	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-151	S-5, A	15 FT.	854+18.98	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

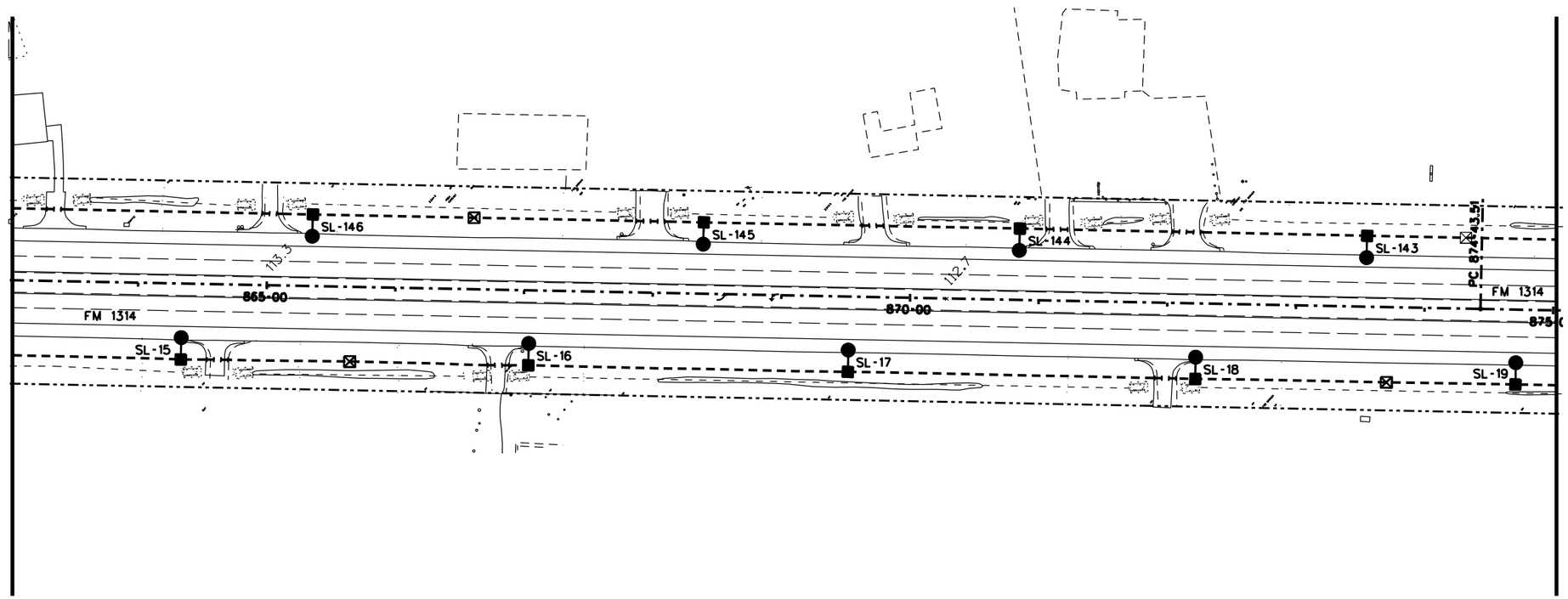
LIGHTING LAYOUT

FM 1314

SCALE: 1"=100'

SHEET 3 OF 21

ORIGINAL DRAWING DATE:	REVISIONS	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT				SHEET
DN: TxDOT		12	6					024
CK: TxDOT		COUNTY		CONTROL	SECTION	JOB	HIGHWAY	
DW: TxDOT		MONTGOMERY		1986	01	070	FM1314	
CK: TxDOT								



	DRILL SHAFT(RD ILL POLE)(30")	RIPRAP (CONC) (CL B) (4")	RD IL ASM (TY SA) 50T-10 (400W EQ)LED	CONDUIT		CONDUCTOR	
				2"PVC SCH 80	2"PVC SCH 80 BORE	#8 BARE	INSULATED #8 XHHW
	0416-6029	0432-6009	0610-6288	0618-6046	0618-6047	0620-6007	0620-6008
	(FT)	(CY)	(EA)	(FT)	(FT)	(FT)	(FT)
TOTAL	90	3.15	9	2226	174	2400	4800

LEGEND

(NOTE: SYMBOLS EXAGGERATED FOR CLARITY)

- NEW ELECTRICAL SERVICE
- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- EXISTING RD IL (STEEL POLE MOUNTED)
- EXISTING RD IL (TIMBER POLE MOUNTED)
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW 2" RIGID METAL CONDUIT
- NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

ASSEMBLY	SERVICE/CIRCUIT	OFFSET FROM EDGE OF TRAVEL LANE	STATION	WATT	DESCRIPTION	HEIGHT
CSJ 1986-01-070						
SL-15	S-1, A	15 FT.	864+34.31	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-16	S-1, A	15 FT.	867+04.44	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-17	S-1, A	15 FT.	869+52.82	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-18	S-1, A	15 FT.	872+22.87	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-19	S-1, A	15 FT.	874+71.75	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-143	S-5, A	15 FT.	873+54.29	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-144	S-5, A	15 FT.	870+84.30	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-145	S-5, A	15 FT.	868+38.64	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-146	S-5, A	15 FT.	865+34.69	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

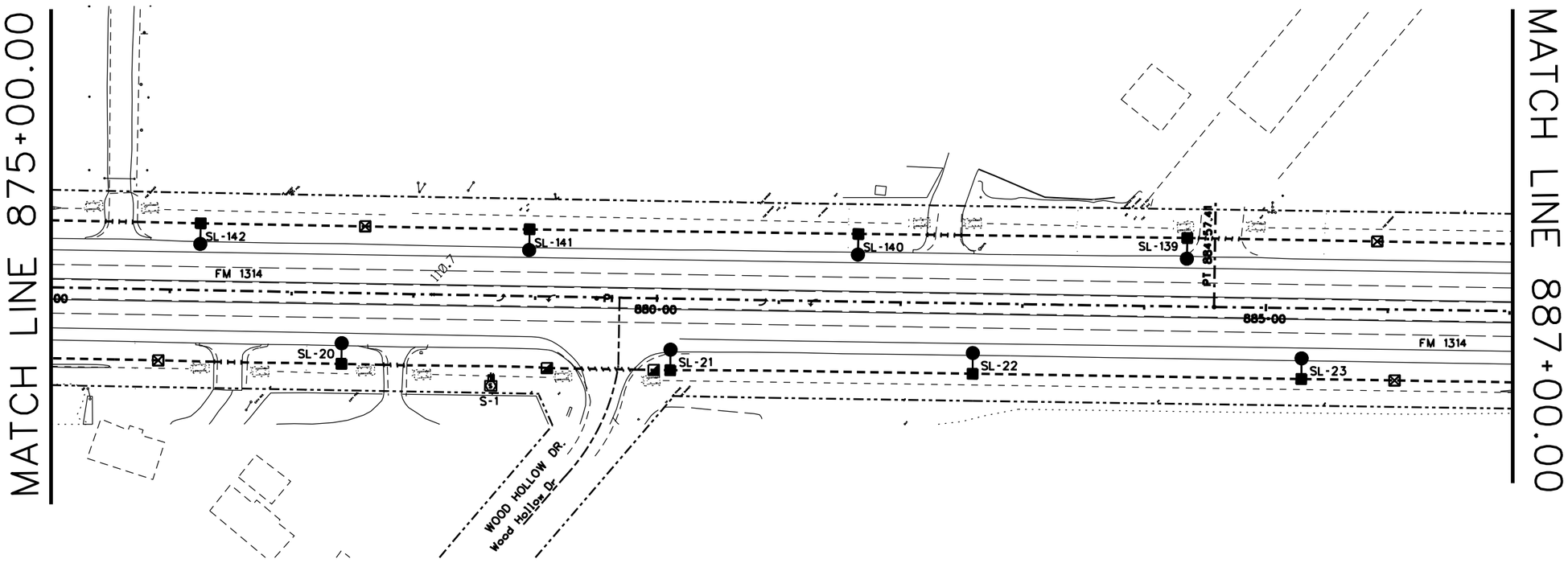
LIGHTING LAYOUT

FM 1314

SCALE:1"=100'

SHEET 4 OF 21

ORIGINAL DRAWING DATE:	REVISIONS	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DR.: STM		12	6	-	025
CK.: MM		COUNTY	CONTROL	SECTION	JOB	HIGHWAY
DES.: STM		MONTGOMERY	1986	01	070	FM1314
CK.: MM						



	ELEC. SERV. TY A 240/480	GROUND BOX TY D W/APRON	DRILL SHAFT(RD ILL POLE)(30")	RIPRAP (CONC) (CL B) (4")	RD IL ASM (TY SA) 50T-10 (400W EQ)LED	CONDUIT		CONDUCTOR	
						2"PVC SCH 80	2"PVC SCH 80 BORE	#8 BARE	INSULATED #8 XHHW
	0628-6052	0624-6010	0416-6029	0432-6009	0610-6288	0618-6046	0618-6047	0620-6007	0620-6008
	(EA)	(EA)	(FT)	(CY)	(EA)	(FT)	(FT)	(FT)	(FT)
TOTAL	1	2	80	2.8	8	2212	188	2400	4800

LEGEND

(NOTE: SYMBOLS EXAGGERATED FOR CLARITY)

- NEW ELECTRICAL SERVICE
- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- EXISTING RD IL (STEEL POLE MOUNTED)
- EXISTING RD IL (TIMBER POLE MOUNTED)
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW 2" RIGID METAL CONDUIT
- NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

ASSEMBLY	SERVICE/CIRCUIT	OFFSET FROM EDGE OF TRAVEL LANE	STATION	WATT	DESCRIPTION	HEIGHT
CSJ 1986-01-070						
SL-20	S-1, A	15 FT.	877+41.94	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
S-1	ELECT. SERVICE	15 FT.	878+65.15			
SL-21	S-1, B	15 FT.	880+11.84	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-22	S-1, B	15 FT.	882+59.94	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-23	S-1, B	15 FT.	885+29.83	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-139	S-5, B	15 FT.	884+34.60	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-140	S-5, B	15 FT.	881+64.49	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-141	S-5, B	15 FT.	878+94.40	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-142	S-5, B	15 FT.	876+24.31	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on 5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

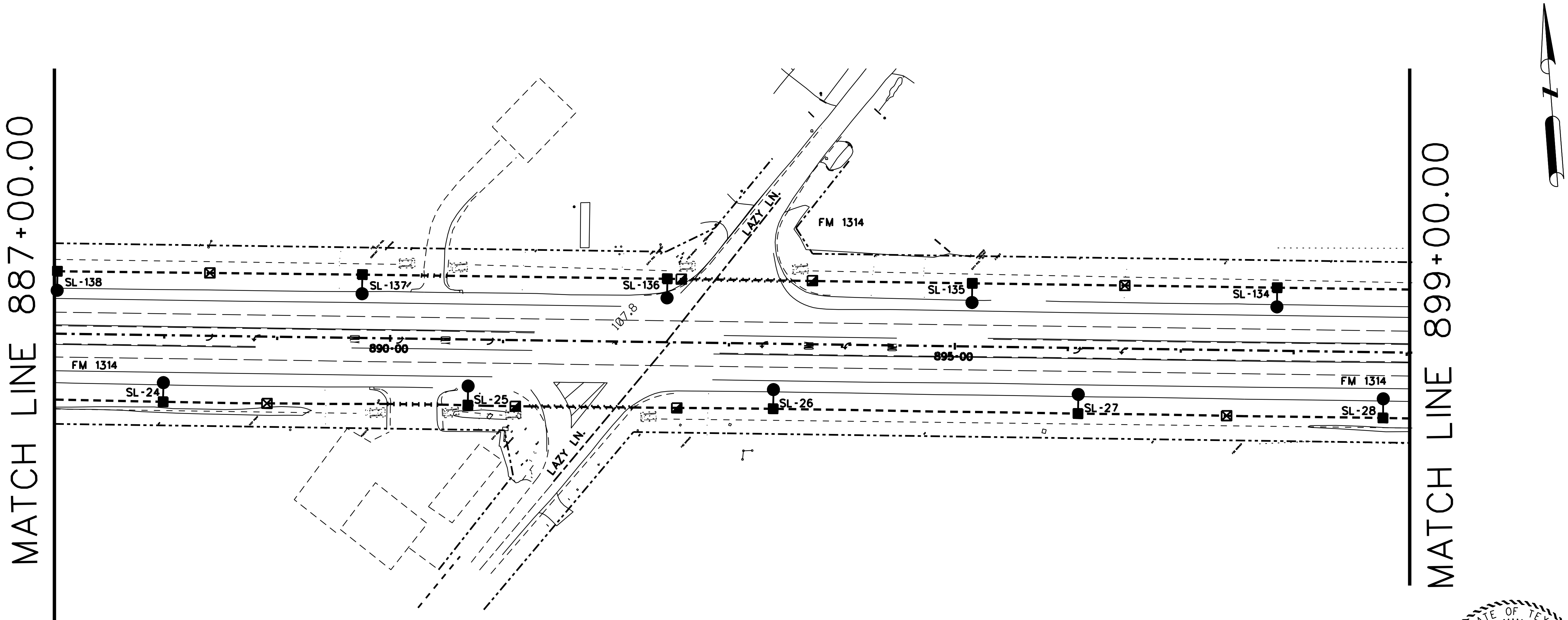
LIGHTING LAYOUT

FM 1314

SCALE: 1"=100'

SHEET 5 OF 21

ORIGINAL DRAWING DATE:	REVISIONS	STATE DISTRICT	REGION	FEDERAL AID PROJECT	SHEET
DN: TxDOT CK: TxDOT DW: TxDOT CK: TxDOT		12	6		026
		COUNTY	CONTROL	SECTION	JOB	HIGHWAY
		MONTGOMERY	1986	01	070	FM1314



		GROUND BOX TY D W/APRON	DRILL SHAFT(RD ILL POLE)(30")	RIPRAP (CONC) (CL B) (4")	RD IL ASM (TY SA) 50T-10 (400W EQ)LED	CONDUIT 2"PVC SCH 80	CONDUIT 2"PVC SCH 80 BORE	CONDUCTOR #8 BARE	CONDUCTOR INSULATED #8 XHHW
		0624-6010	0416-6029	0432-6009	0610-6288	0618-6046	0618-6047	0620-6007	0620-6008
		(EA)	(FT)	(CY)	(EA)	(FT)	(FT)	(FT)	(FT)
TOTAL		4	100	3.5	10	2146	256	2400	4800

LEGEND

(NOTE: SYMBOLS EXAGERATED FOR CLARITY)

- NEW ELECTRICAL SERVICE
- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- EXISTING RD IL (STEEL POLE MOUNTED)
- EXISTING RD IL (TIMBER POLE MOUNTED)
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW 2" RIGID METAL CONDUIT
- NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

ASSEMBLY	SERVICE/CIRCUIT	OFFSET FROM EDGE OF TRAVEL LANE	STATION	WATT	DESCRIPTION	HEIGHT
CSJ 1986-01-070						
SL-24	S-1, B	15 FT.	888+00.00	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-25	S-1, B	15 FT.	890+69.57	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-26	S-1, B	15 FT.	893+39.92	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-27	S-1, B	15 FT.	896+09.84	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-28	S-1, B	15 FT.	898+79.84	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-134	S-5, B	15 FT.	897+84.59	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-135	S-5, B	15 FT.	895+14.59	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-136	S-5, B	11.20 FT.	892+44.60	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-137	S-5, B	15 FT.	889+74.59	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-137	S-5, B	15 FT.	887+04.61	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

LIGHTING LAYOUT

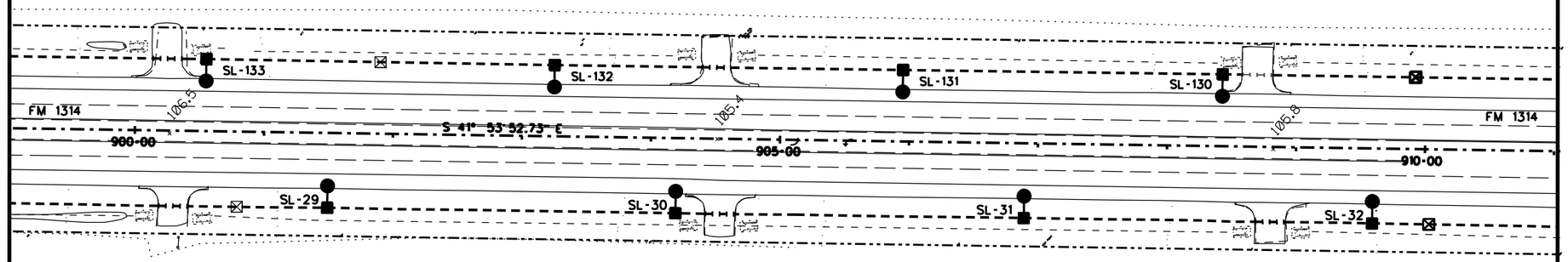
FM 1314

SCALE: 1"=100'

SHEET 6 OF 21

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
12	6		027
COUNTY	CONTROL	SECTION	JOB	HIGHWAY
MONTGOMERY	1986	01	070	FM1314

MATCH LINE 899+00.00



MATCH LINE 911+00.00

	DRILL SHAFT(RD ILL POLE)(30")	RIPRAP (CONC) (CL B) (4")	RD IL ASM (TY SA) 50T-10 (400W EQ)LED	CONDUIT		CONDUCTOR	
				2"PVC SCH 80	2"PVC SCH 80 BORE	#8 BARE	INSULATED #8 XHHW
	0416-6029	0432-6009	0610-6288	0618-6046	0618-6047	0620-6007	0620-6008
	(FT)	(CY)	(EA)	(FT)	(FT)	(FT)	(FT)
TOTAL	80	2.8	8	2254	146	2400	4800

LEGEND

(NOTE: SYMBOLS EXAGGERATED FOR CLARITY)

- NEW ELECTRICAL SERVICE
- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- EXISTING RD IL (STEEL POLE MOUNTED)
- EXISTING RD IL (TIMBER POLE MOUNTED)
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW 2" RIGID METAL CONDUIT
- NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

ASSEMBLY	SERVICE/CIRCUIT	OFFSET FROM EDGE OF TRAVEL LANE	STATION	WATT	DESCRIPTION	HEIGHT
CSJ 1986-01-070						
SL-29	S-1, B	15 FT.	991+49.93	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-30	S-1, B	15 FT.	904+19.81	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-31	S-1, B	15 FT.	906+89.84	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-32	S-1, B	15 FT.	909+59.78	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-130	S-5, B	15 FT.	908+42.39	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-131	S-5, B	15 FT.	905+94.60	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-132	S-5, B	15 FT.	903+24.60	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-133	S-5, B	15 FT.	900+54.60	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

LIGHTING LAYOUT

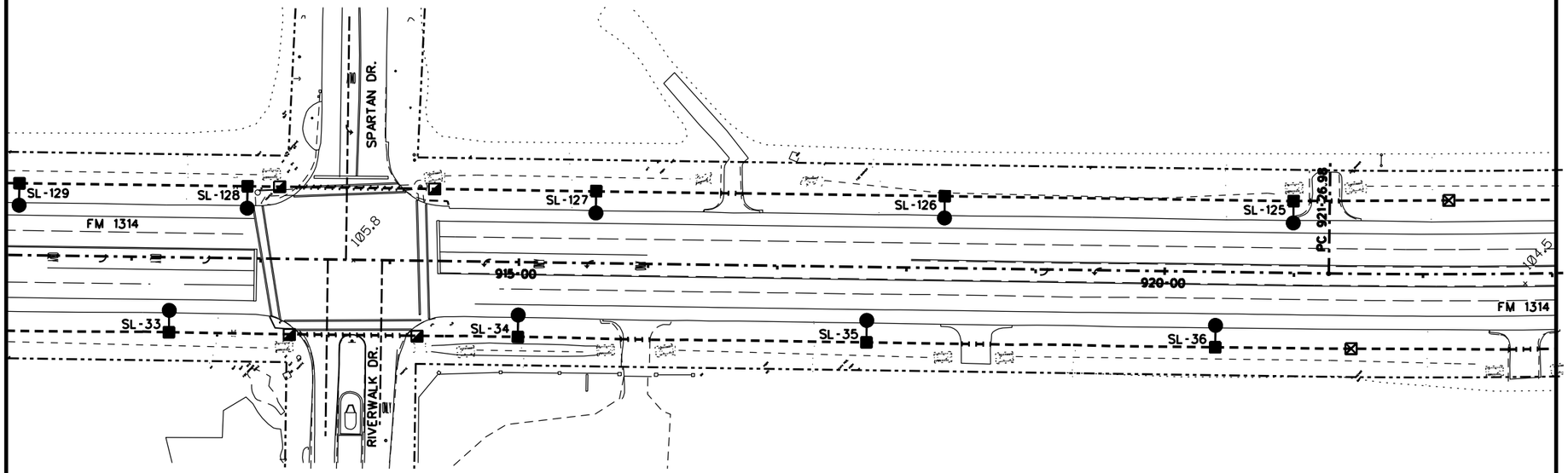
FM 1314

SCALE:1"=100'

SHEET 7 OF 21

ORIGINAL GRADING DATE:		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT			SHEET
DSN: STH	REVISIONS	12	6	-			028
CK: MM		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DRN: STH		MONTGOMERY		1986	01	070	FM1314
CK: MM							

MATCH LINE 911+00.00



MATCH LINE 923+00.00

	GROUND BOX TY D W/APRON	DRILL SHAFT(RD ILL POLE)(30")	RIPRAP (CONC) (CL B) (4")	RD IL ASM (TY SA) 50T-10 (400W EQ)LED	CONDUIT		CONDUCTOR	
					2"PVC SCH 80	2"PVC SCH 80 BORE	#8 BARE	INSULATED #8 XHHW
	0624-6010	0416-6029	0432-6009	0610-6288	0618-6046	0618-6047	0620-6007	0620-6008
	(EA)	(FT)	(CY)	(EA)	(FT)	(FT)	(FT)	(FT)
TOTAL	4	90	3.15	9	2120	280	2400	4800

LEGEND

(NOTE: SYMBOLS EXAGGERATED FOR CLARITY)

- NEW ELECTRICAL SERVICE
- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- EXISTING RD IL (STEEL POLE MOUNTED)
- EXISTING RD IL (TIMBER POLE MOUNTED)
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW 2" RIGID METAL CONDUIT
- NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

ASSEMBLY	SERVICE/CIRCUIT	OFFSET FROM EDGE OF TRAVEL LANE	STATION	WATT	DESCRIPTION	HEIGHT
CSJ 1986-01-070						
SL-33	S-1, B	15 FT.	912+29.75	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-34	S-1, B	15 FT.	915+00.00	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-35	S-1, B	15 FT.	917+69.83	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-36	S-1, B	15 FT.	920+39.86	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-125	S-4, A	15 FT.	920+98.96	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-126	S-5, B	15 FT.	918+28.98	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-127	S-5, B	15 FT.	915+58.97	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-128	S-5, B	15 FT.	912+88.96	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-129	S-5, B	15 FT.	911+12.39	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

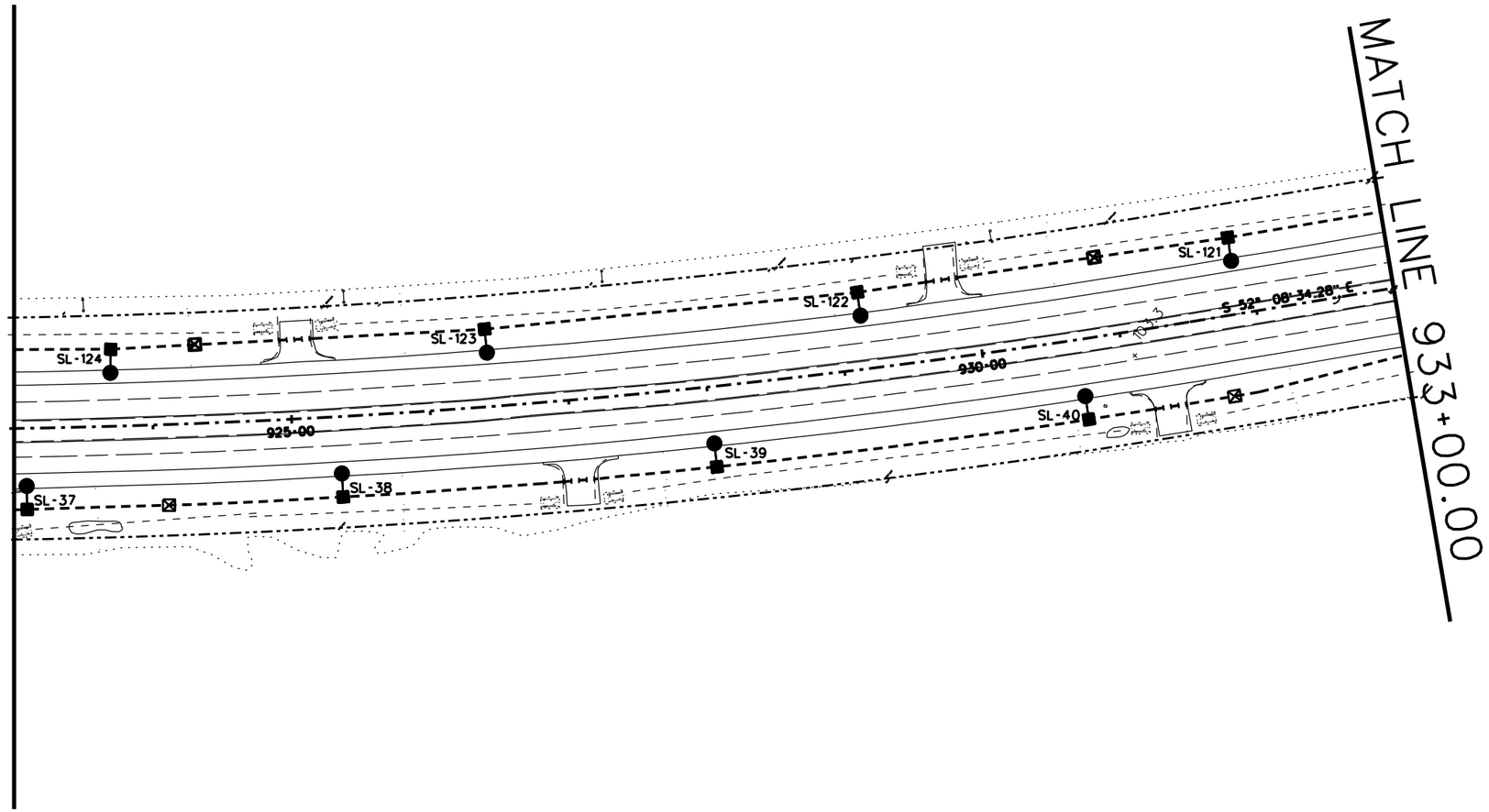
LIGHTING LAYOUT

FM 1314

SCALE: 1"=100'

SHEET 8 OF 21

ORIGINAL DRAWING DATE:	REVISIONS	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT			SHEET
DN: TxDOT		12	6	-			029
CK: TxDOT		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DW: TxDOT		MONTGOMERY		1986	01	070	FM1314
CK: TxDOT							



	DRILL SHAFT(RD ILL POLE)(30")	RIPRAP (CONC) (CL B) (4")	RD IL ASM (TY SA) 50T-10 (400W EQ)LED	CONDUIT		CONDUCTOR	
				2"PVC SCH 80	2"PVC SCH 80 BORE	#8 BARE	INSULATED #8 XHHW
	0416-6029	0432-6009	0610-6288	0618-6046	0618-6047	0620-6007	0620-6008
	(FT)	(CY)	(EA)	(FT)	(FT)	(FT)	(FT)
TOTAL	80	2.8	8	1902	98	2000	4000

LEGEND

(NOTE: SYMBOLS EXAGGERATED FOR CLARITY)

- NEW ELECTRICAL SERVICE
- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- EXISTING RD IL (STEEL POLE MOUNTED)
- EXISTING RD IL (TIMBER POLE MOUNTED)
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW 2" RIGID METAL CONDUIT
- NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

ASSEMBLY	SERVICE/CIRCUIT	OFFSET FROM EDGE OF TRAVEL LANE	STATION	WATT	DESCRIPTION	HEIGHT
CSJ 1986-01-070						
SL-37	S-1, B	15 FT.	923+08.44	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-38	S-1, B	15 FT.	925+33.98	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-39	S-1, B	15 FT.	928+01.35	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-40	S-1, B	15 FT.	930+68.92	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-121	S-4, A	15 FT.	931+88.14	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-122	S-5, B	15 FT.	929+15.96	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-123	S-5, B	15 FT.	926+43.58	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-124	S-5, B	15 FT.	923+49.45	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

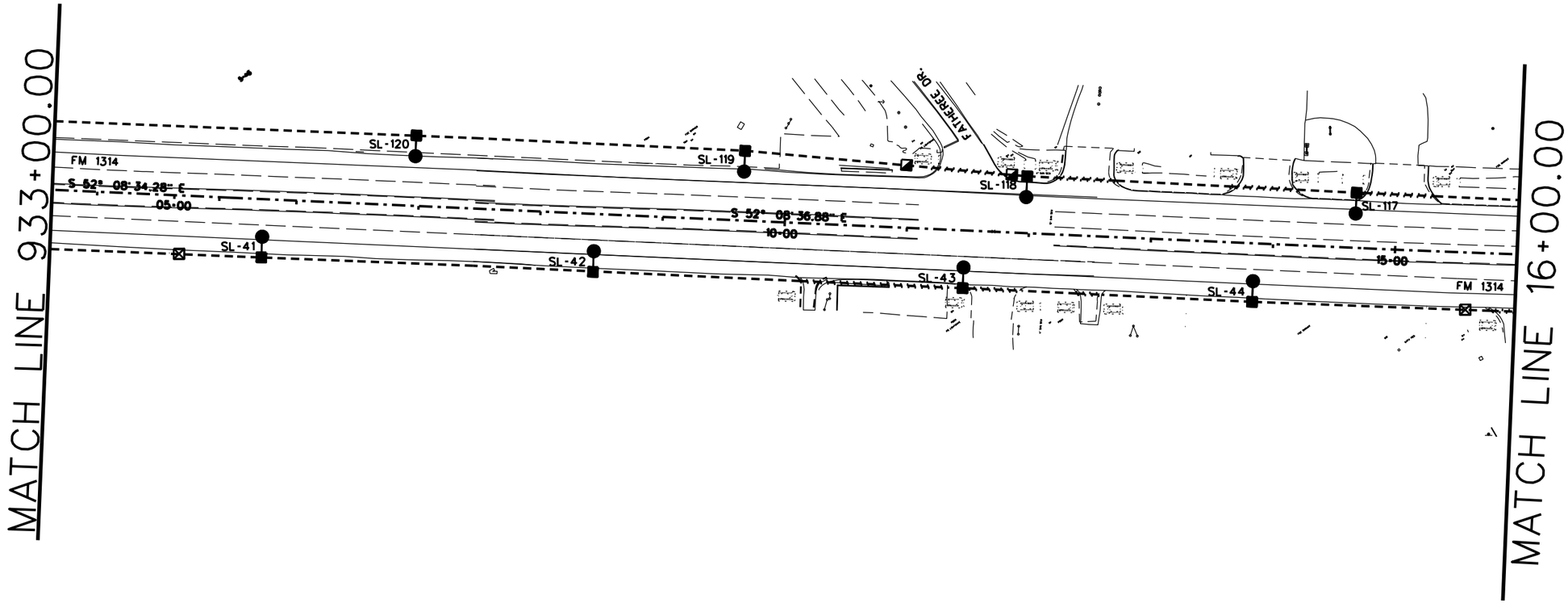
LIGHTING LAYOUT

FM 1314

SCALE: 1"=100'

SHEET 9 OF 21

ORIGINAL DRAWING DATE:	REVISIONS	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DR.: dtm		12	6	-	030
CK.: MM		COUNTY	CONTROL	SECTION	JOB	HIGHWAY
DES.: dtm		MONTGOMERY	1986	01	070	FM1314
CK.: MM						



	GROUND BOX TY D W/APRON	DRILL SHAFT(RD ILL POLE)(30")	RIPRAP (CONC) (CL B) (4")	RD IL ASM (TY SA) 50T-10 (400W EQ)LED	CONDUIT		CONDUCTOR	
					2"PVC SCH 80	2"PVC SCH 80 BORE	#8 BARE	INSULATED #8 XHHW
	0624-6010	0416-6029	0432-6009	0610-6288	0618-6046	0618-6047	0620-6007	0620-6008
	(EA)	(FT)	(CY)	(EA)	(FT)	(FT)	(FT)	(FT)
TOTAL	2	80	2.8	8	1976	424	2400	4800

LEGEND

(NOTE: SYMBOLS EXAGGERATED FOR CLARITY)

- (S) NEW ELECTRICAL SERVICE
- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- EXISTING RD IL (STEEL POLE MOUNTED)
- EXISTING RD IL (TIMBER POLE MOUNTED)
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW 2" RIGID METAL CONDUIT
- NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

ASSEMBLY	SERVICE/CIRCUIT	OFFSET FROM EDGE OF TRAVEL LANE	STATION	WATT	DESCRIPTION	HEIGHT
CSJ 1986-01-070						
SL-41	S-2, A	3 FT.	933+38.20	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-42	S-2, A	3 FT.	08+45.04	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-43	S-2, A	3 FT.	11+47.80	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-44	S-2, A	3 FT.	13+85.03	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-117	S-4, A	6.5 FT.	14+66.52	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-118	S-4, A	4.5 FT.	11+96.53	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-119	S-4, A	15 FT.	09+64.95	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-120	S-4, A	15 FT.	06+94.97	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023 text here

TEXAS DEPARTMENT OF TRANSPORTATION

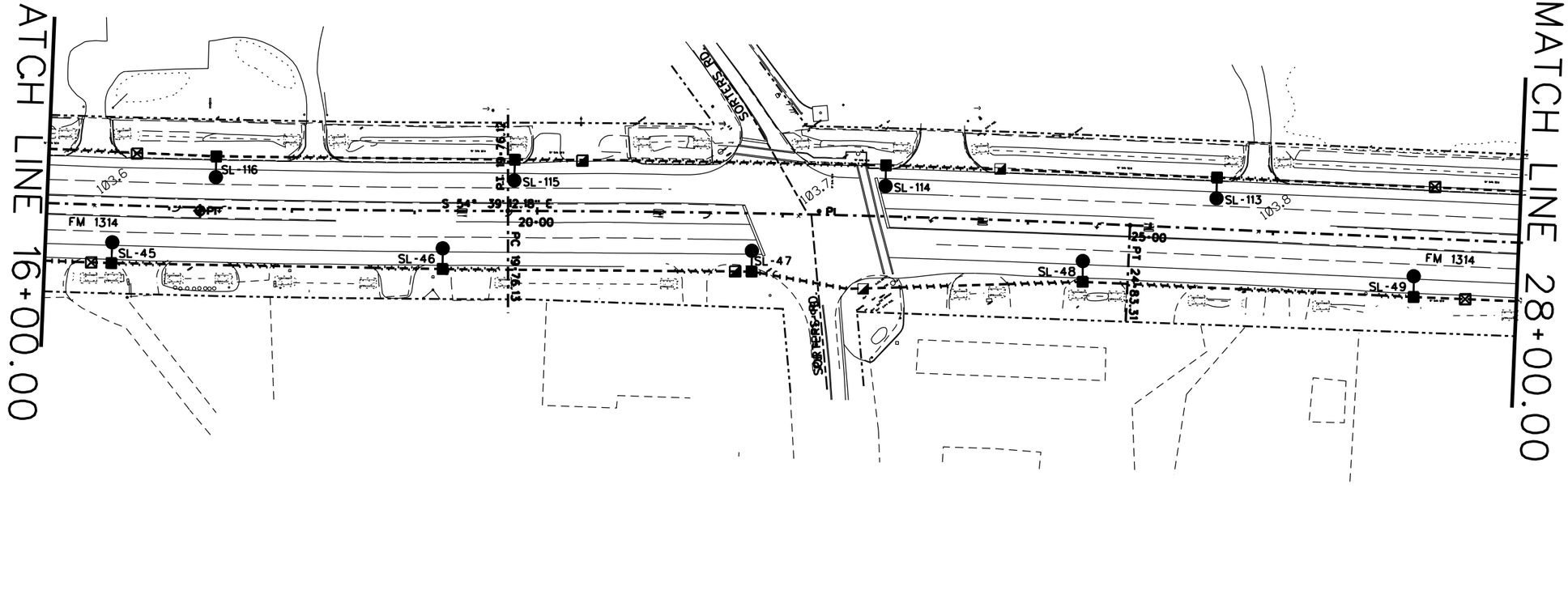
LIGHTING LAYOUT

FM 1314

SCALE: 1"=100'

SHEET 10 OF 21

ORIGINAL DRAWING DATE:		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DSN.: dtn	REVISIONS	12	6		031
CK.: MM		COUNTY	CONTROL	SECTION	JOB	HIGHWAY
DSN.: dtn		MONTGOMERY	1986	01	070	FM1314
CK.: MM						



	GROUND BOX TY D W/APRON	DRILL SHAFT(RD ILL POLE)(30")	RIPRAP (CONC) (CL B) (4")	RD IL ASM (TY SA) 50T-10 (400W EQ)LED	CONDUIT		CONDUCTOR	
					2"PVC SCH 80	2"PVC SCH 80 BORE	#8 BARE	INSULATED #8 XHHW
	0624-6010	0416-6029	0432-6009	0610-6288	0618-6046	0618-6047	0620-6007	0620-6008
	(EA)	(FT)	(CY)	(EA)	(FT)	(FT)	(FT)	(FT)
TOTAL	4	90	3.15	9	944	1456	2400	4800

LEGEND

(NOTE: SYMBOLS EXAGGERATED FOR CLARITY)

🅂	NEW ELECTRICAL SERVICE
●━■	IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
○━□	EXISTING RD IL (STEEL POLE MOUNTED)
○━○	EXISTING RD IL (TIMBER POLE MOUNTED)
◪	NEW GROUND BOX TY D WITH APRON
⊠	NEW JUNCTION BOX
────	NEW 2" RIGID METAL CONDUIT
— — —	NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
HHHHHHH	NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

ASSEMBLY	SERVICE/CIRCUIT	OFFSET FROM EDGE OF TRAVEL LANE	STATION	WATT	DESCRIPTION	HEIGHT
CSJ 1986-01-070						
SL-45	S-2, A	3 FT.	16+54.24	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-46	S-2, A	3 FT.	19+23.07	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-47	S-2, A	3 FT.	21+75.61	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-48	S-2, A	3 FT.	24+46.66	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-49	S-2, A	3 FT.	27+16.81	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-113	S-4, A	3 FT.	25+52.32	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-114	S-4, A	3 FT.	22+83.11	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-115	S-4, A	3 FT.	19+81.62	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-116	S-4, A	3 FT.	17+37.45	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.

MOHAMMADREZA MOLAEI
122197

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

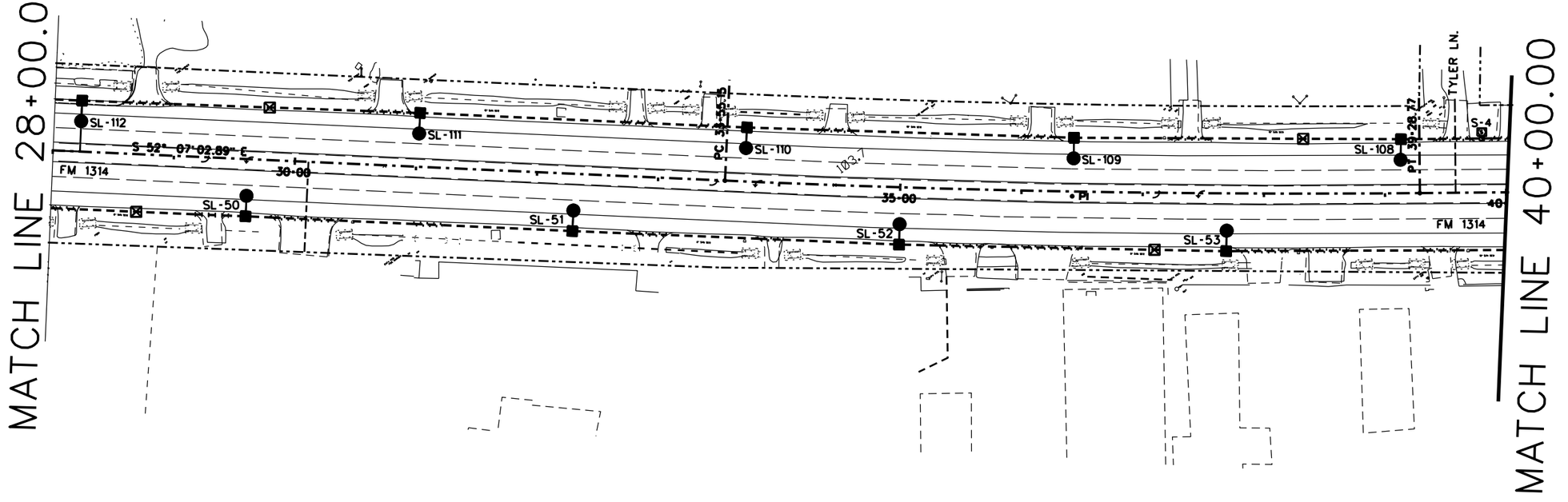
LIGHTING LAYOUT

FM 1314

SCALE: 1"=100'

SHEET 11 OF 21

ORIGINAL DRAWING DATE:	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT			SHEET
DN.: RTM / CK.: MM / DN.: RTM / CK.: MM — REVISIONS	12	6	_			032
	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
	MONTGOMERY		1986	01	070	FM1314



	ELEC. SERV. TY A 240/480	DRILL SHAFT(RD ILL POLE)(30")	RIPRAP (CONC) (CL B) (4")	RD IL ASM (TY SA) 50T-10 (400W EQ)LED	CONDUIT		CONDUCTOR	
					2"PVC SCH 80	2"PVC SCH 80 BORE	#8 BARE	INSULATED #8 XHHW
	0628-6052	0416-6029	0432-6009	0610-6288	0618-6046	0618-6047	0620-6007	0620-6008
	(EA)	(FT)	(CY)	(EA)	(FT)	(FT)	(FT)	(FT)
TOTAL	1	90	3.15	9	1782	618	2400	4800

LEGEND

(NOTE: SYMBOLS EXAGGERATED FOR CLARITY)

- NEW ELECTRICAL SERVICE
- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- EXISTING RD IL (STEEL POLE MOUNTED)
- EXISTING RD IL (TIMBER POLE MOUNTED)
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW 2" RIGID METAL CONDUIT
- NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

ASSEMBLY	SERVICE/CIRCUIT	OFFSET FROM EDGE OF TRAVEL LANE	STATION	WATT	DESCRIPTION	HEIGHT
CSJ 1986-01-070						
SL-50	S-2, A	3 FT.	29+61.29	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-51	S-2, A	3 FT.	32+31.30	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-52	S-2, A	3 FT.	35+00.00	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-53	S-2, A	3 FT.	37+69.28	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
S-4	SERVICE S-4	4.5 FT.	39+80.26	N/A	60AMP MAIN, 2-20 AMP BREAKER, TYPE A, 240/480V	
SL-108	S-4, A	3 FT.	39+13.47	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-109	S-4, A	3 FT.	36+42.54	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-110	S-4, A	3 FT.	33+71.44	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-111	S-4, A	3 FT.	31+01.37	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-112	S-4, A	3 FT.	28+22.04	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

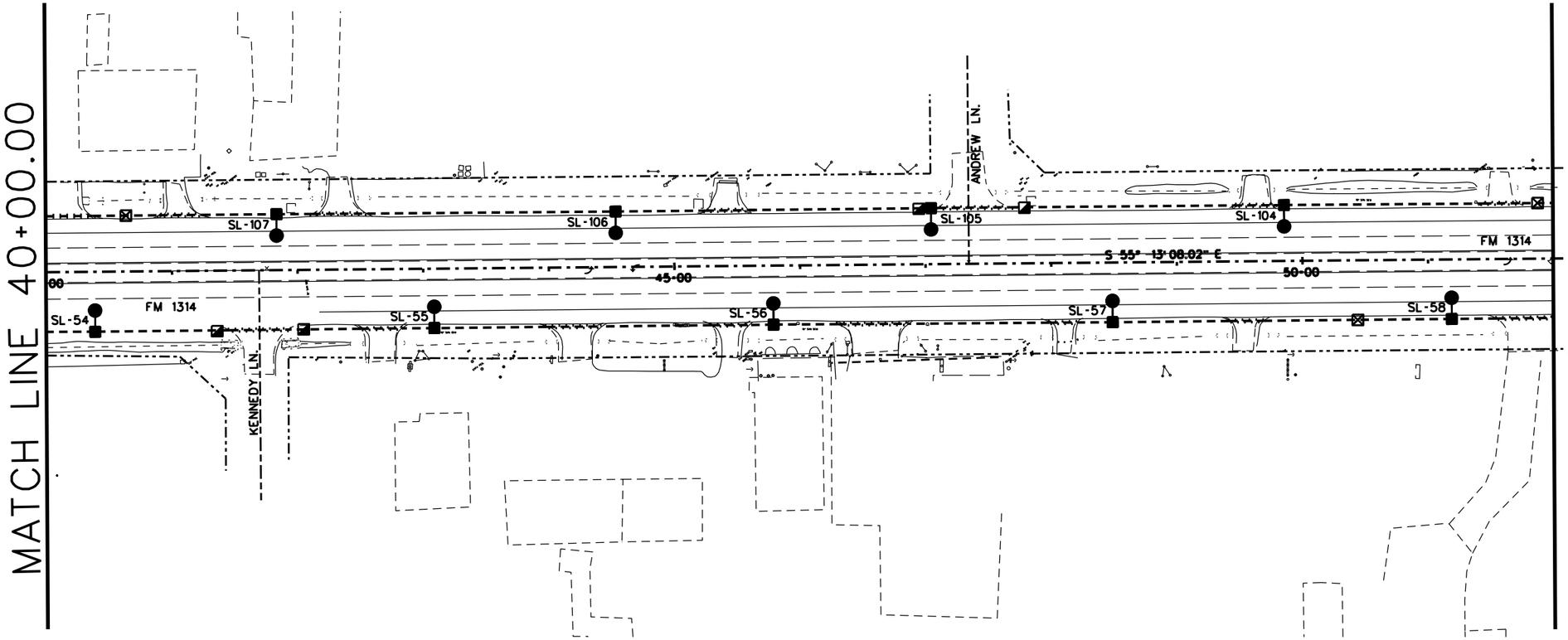
LIGHTING LAYOUT

FM 1314

SCALE: 1"=100'

SHEET 12 OF 21

ORIGINAL DRAWING DATE:		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT		SHEET
DR.: dtn	REVISIONS	12	6	-		033
CK.: MM		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DR.: dtn		MONTGOMERY		1986	01	070	FM1314
CK.: MM							



	GROUND BOX TY D W/APRON	DRILL SHAFT(RD ILL POLE)(30")	RIPRAP (CONC) (CL B) (4")	RD IL ASM (TY SA) 50T-10 (400W EQ)LED	CONDUIT		CONDUCTOR	
					2"PVC SCH 80	2"PVC SCH 80 BORE	#8 BARE	INSULATED #8 XHHW
	0624-6010	0416-6029	0432-6009	0610-6288	0618-6046	0618-6047	0620-6007	0620-6008
	(EA)	(FT)	(CY)	(EA)	(FT)	(FT)	(FT)	(FT)
TOTAL	4	90	3.15	9	1818	582	2400	4800

LEGEND

(NOTE: SYMBOLS EXAGGERATED FOR CLARITY)

- NEW ELECTRICAL SERVICE
- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- EXISTING RD IL (STEEL POLE MOUNTED)
- EXISTING RD IL (TIMBER POLE MOUNTED)
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW 2" RIGID METAL CONDUIT
- NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

ASSEMBLY	SERVICE/CIRCUIT	OFFSET FROM EDGE OF TRAVEL LANE	STATION	WATT	DESCRIPTION	HEIGHT
CSJ 1986-01-070						
SL-54	S-2, A	3 FT.	40+38.52	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-55	S-2, A	3 FT.	43+08.52	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-56	S-2, A	3 FT.	45+78.52	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-57	S-2, A	3 FT.	48+48.53	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-58	S-2, A	3 FT.	51+18.53	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-104	S-4, B	3 FT.	49+85.65	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-105	S-4, B	3 FT.	47+04.59	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-106	S-4, B	3 FT.	44+53.52	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-107	S-4, B	3 FT.	41+83.52	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by

122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

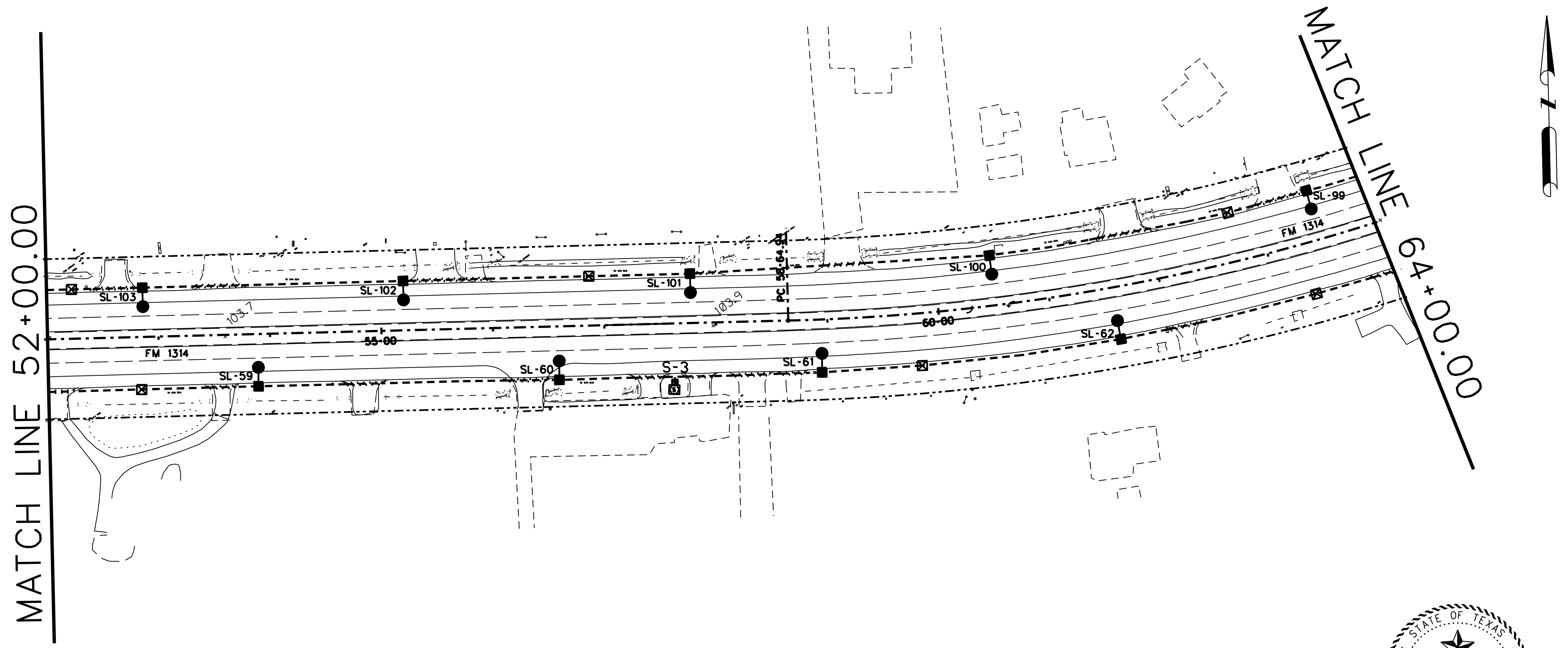
LIGHTING LAYOUT

FM 1314

SCALE: 1" = 100'

SHEET 13 OF 21

ORIGINAL DRAWING DATE:	REVISIONS	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN: TxDOT CK: TxDOT DW: TxDOT CK: TxDOT		12	6	-	034
		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
		MONTGOMERY		1986	01	070	FM1314



STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

	DRILL SHAFT(RD ILL POLE)(30")	RIPRAP (CONC) (CL B) (4")	RD IL ASM (TY SA) 50T-10 (400W EQ)LED	CONDUIT 2"PVC SCH 80	CONDUIT 2"PVC SCH 80 BORE	CONDUCTOR #8 BARE	CONDUCTOR INSULATED #8 XHHW
	0416-6029	0432-6009	0610-6288	0618-6046	0618-6047	0620-6007	0620-6008
	(FT)	(CY)	(EA)	(FT)	(FT)	(FT)	(FT)
TOTAL	90	3.15	9	1820	580	2400	4800

LEGEND

(NOTE: SYMBOLS EXAGGEREATED FOR CLARITY)

- NEW ELECTRICAL SERVICE
- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- EXISTING RD IL (STEEL POLE MOUNTED)
- EXISTING RD IL (TIMBER POLE MOUNTED)
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW 2" RIGID METAL CONDUIT
- NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

ASSEMBLY	SERVICE/CIRCUIT	OFFSET FROM EDGE OF TRAVEL LANE	STATION	WATT	DESCRIPTION	HEIGHT
CSJ 1986-01-070						
SL-59	S-2, A	3 FT.	53+88.54	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-60	S-2, A	3 FT.	56+58.46	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-61	S-2, B	3 FT.	58+93.48	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
S-3	SERVICE S-3	10.25 FT.	57+61.97	N/A	60AMP MAIN, 2-20 AMP BREAKER, TYPE A, 240/480V	
SL-62	S-2, B	3 FT.	61+55.40	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-99	S-4, B	3 FT.	63+48.83	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-100	S-4, B	3 FT.	60+51.31	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-101	S-4, B	3 FT.	57+77.80	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-102	S-4, B	3 FT.	55+20.43	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-103	S-4, B	3 FT.	52+86.58	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.

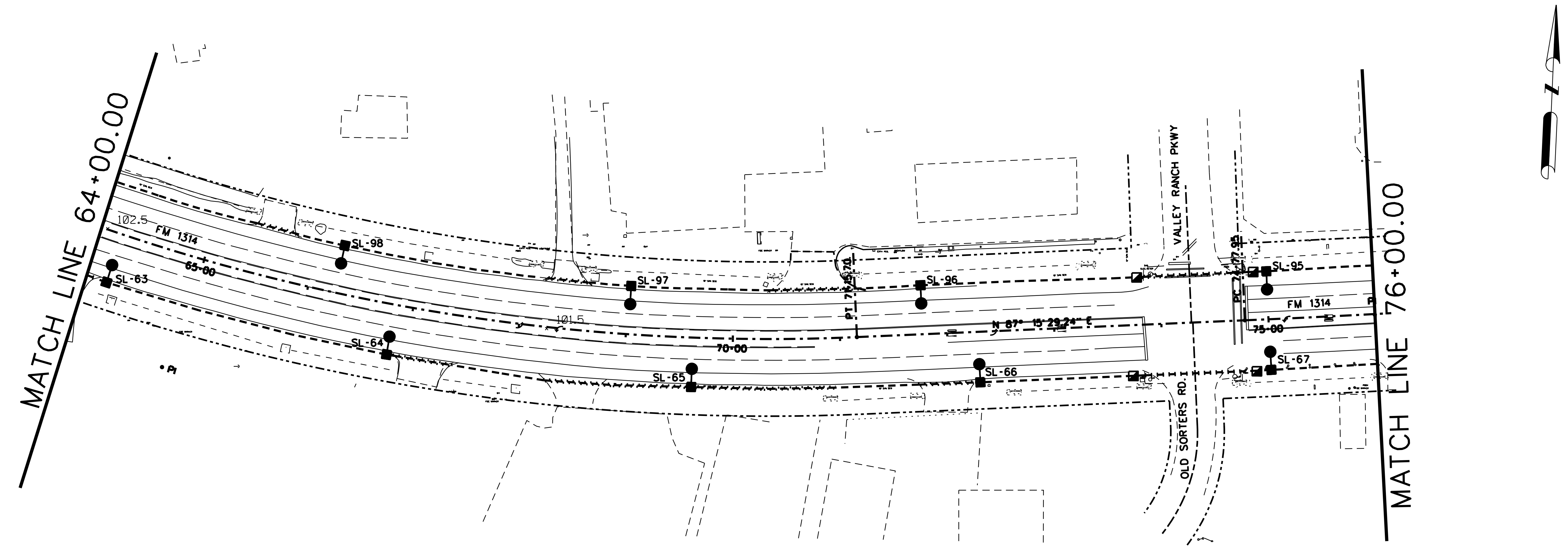
TEXAS DEPARTMENT OF TRANSPORTATION

LIGHTING LAYOUT

FM 1314

SCALE: 1"=100'

ORIGINAL DRAWING DATE:	REVISIONS	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DN: RTM		12	6	_	035
CK: MM		COUNTY	CONTROL	SECTION	JOB	HIGHWAY
DW: RTM		MONTGOMERY	1986	01	070	FM1314
CK: MM						



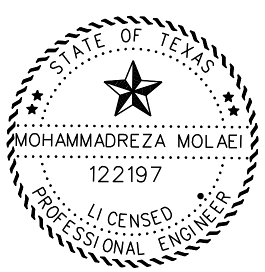
		GROUND BOX TY D W/APRON	DRILL SHAFT(RD ILL POLE)(30")	RIPRAP (CONC) (CL B) (4")	RD IL ASM (TY SA) 50T-10 (400W EQ)LED	CONDUIT		CONDUCTOR	
						2"PVC SCH 80	2"PVC SCH 80 BORE	#8 BARE	INSULATED #8 XHHW
		0624-6010	0416-6029	0432-6009	0610-6288	0618-6046	0618-6047	0620-6007	0620-6008
		(EA)	(FT)	(CY)	(EA)	(FT)	(FT)	(FT)	(FT)
TOTAL		4	90	3.2	9	1750	730	2400	4800

LEGEND

(NOTE: SYMBOLS EXAGGERATED FOR CLARITY)

- (S) NEW ELECTRICAL SERVICE
- ●■ IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- ○□ EXISTING RD IL (STEEL POLE MOUNTED)
- ○○ EXISTING RD IL (TIMBER POLE MOUNTED)
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW 2" RIGID METAL CONDUIT
- NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

ASSEMBLY	SERVICE/CIRCUIT	OFFSET FROM EDGE OF TRAVEL LANE	STATION	WATT	DESCRIPTION	HEIGHT
CSJ 1986-01-070						
SL-63	S-2, B	3 FT.	64+20.11	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-64	S-2, B	3 FT.	66+83.53	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-65	S-2, B	3 FT.	69+62.74	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-66	S-2, B	3 FT.	72+28.99	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-67	S-2, B	3 FT.	75+00.00	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-95	S-4, B	3 FT.	75+00.00	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-96	S-4, B	3 FT.	71+77.08	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-97	S-4, B	3 FT.	69+01.99	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-98	S-4, B	3 FT.	65+20.50	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.



The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

LIGHTING LAYOUT

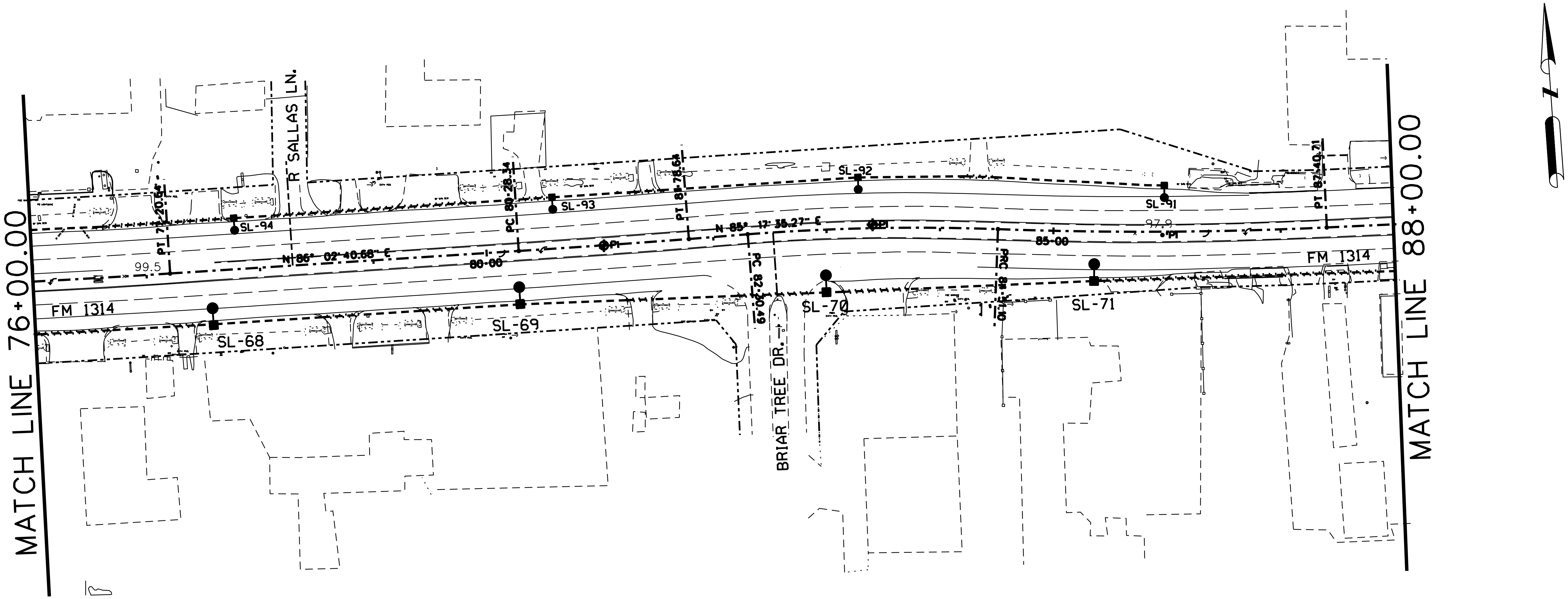
FM 1314

SCALE: 1"=100'-0"

SHEET 15 OF 21

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
12	6		036

COUNTY	CONTROL	SECTION	JOB	HIGHWAY
MONTGOMERY	1986	01	070	FM1314



	DRILL SHAFT(RD ILL POLE)(30")	RIPRAP (CONC) (CL B) (4")	RD IL ASM (TY SA) 50T-10 (400W EQ)LED	CONDUIT 2"PVC SCH 80	CONDUIT 2"PVC SCH 80 BORE	CONDUCTOR #8 BARE	CONDUCTOR INSULATED #8 XHHW
	0416-6029	0432-6009	0610-6288	0618-6046	0618-6047	0620-6007	0620-6008
	(FT)	(CY)	(EA)	(FT)	(FT)	(FT)	(FT)
TOTAL	80	2.8	8	1200	1000	2200	4400

ASSEMBLY	SERVICE/CIRCUIT	OFFSET FROM EDGE OF TRAVEL LANE	STATION	WATT	DESCRIPTION	HEIGHT
CSJ 1986-01-070						
SL-68	S-2, B	3 FT.	77+56.82	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-69	S-2, B	3 FT.	80+26.83	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-70	S-2, B	3 FT.	82+97.92	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-71	S-2, B	3 FT.	85+35.67	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-91	S-4, B	3 FT.	85+97.81	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-92	S-4, B	3 FT.	83+29.92	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-93	S-4, B	3 FT.	80+60.70	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-94	S-4, B	3 FT.	77+79.86	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.

LEGEND

(NOTE: SYMBOLS EXAGGERATED FOR CLARITY)

- (S) NEW ELECTRICAL SERVICE
- ●-■ IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- ○-□ EXISTING RD IL (STEEL POLE MOUNTED)
- ○-○ EXISTING RD IL (TIMBER POLE MOUNTED)
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- ——— NEW 2" RIGID METAL CONDUIT
- — — — NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

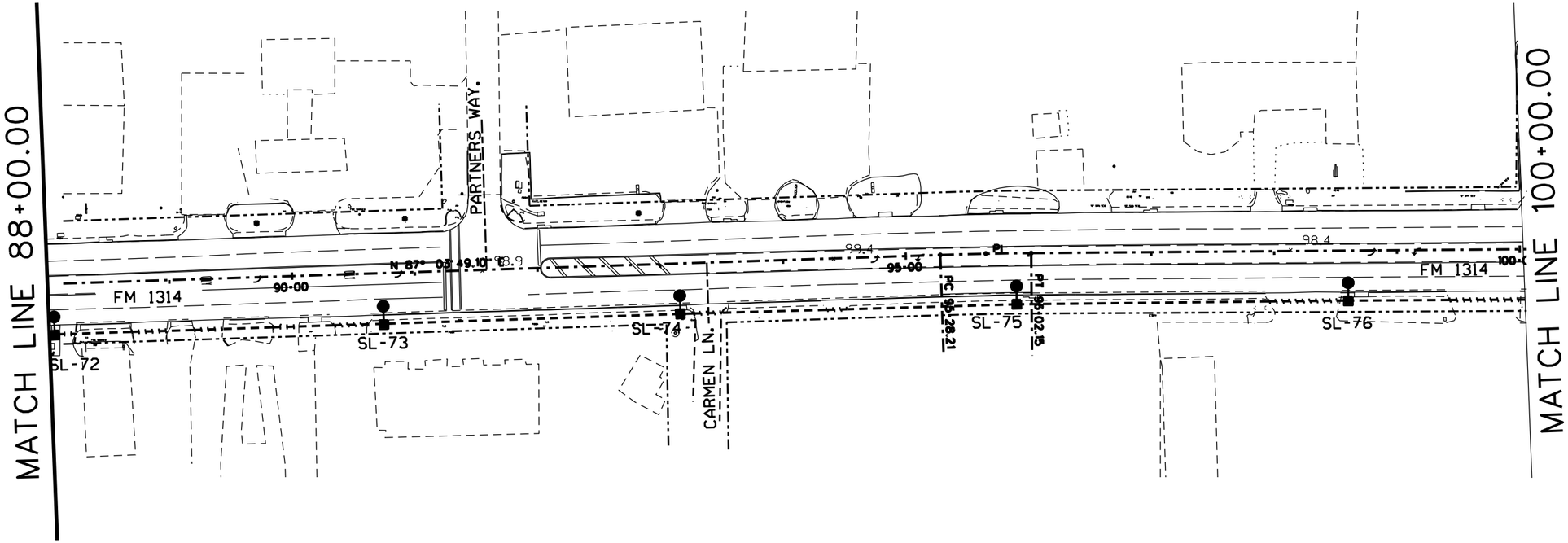
LIGHTING LAYOUT

FM 1314

SCALE: 1"=100'

SHEET 16 OF 21

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
12	6		037
COUNTY	CONTROL	SECTION	JOB	HIGHWAY
MONTGOMERY	1986	01	070	FM1314



	DRILL SHAFT(RD ILL POLE)(30")	RIPRAP (CONC) (CL B) (4")	RD IL ASM (TY SA) 50T-10 (400W EQ)LED	CONDUIT		CONDUCTOR	
				2"PVC SCH 80	2"PVC SCH 80 BORE	#8 BARE	INSULATED #8 XHHW
	0416-6029	0432-6009	0610-6288	0618-6046	0618-6047	0620-6007	0620-6008
	(FT)	(CY)	(EA)	(FT)	(FT)	(FT)	(FT)
TOTAL	50	1.75	5	900	300	1200	2400

LEGEND

(NOTE: SYMBOLS EXAGGERATED FOR CLARITY)

- NEW ELECTRICAL SERVICE
- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- EXISTING RD IL (STEEL POLE MOUNTED)
- EXISTING RD IL (TIMBER POLE MOUNTED)
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW 2" RIGID METAL CONDUIT
- NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

ASSEMBLY	SERVICE/CIRCUIT	OFFSET FROM EDGE OF TRAVEL LANE	STATION	WATT	DESCRIPTION	HEIGHT
CSJ 1986-01-070						
SL-72	S-2, B	3 FT.	88+03.45	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-73	S-2, B	3 FT.	90+73.50	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-74	S-2, B	3 FT.	93+15.09	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-75	S-2, B	3 FT.	95+89.96	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-76	S-2, B	3 FT.	98+60.11	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

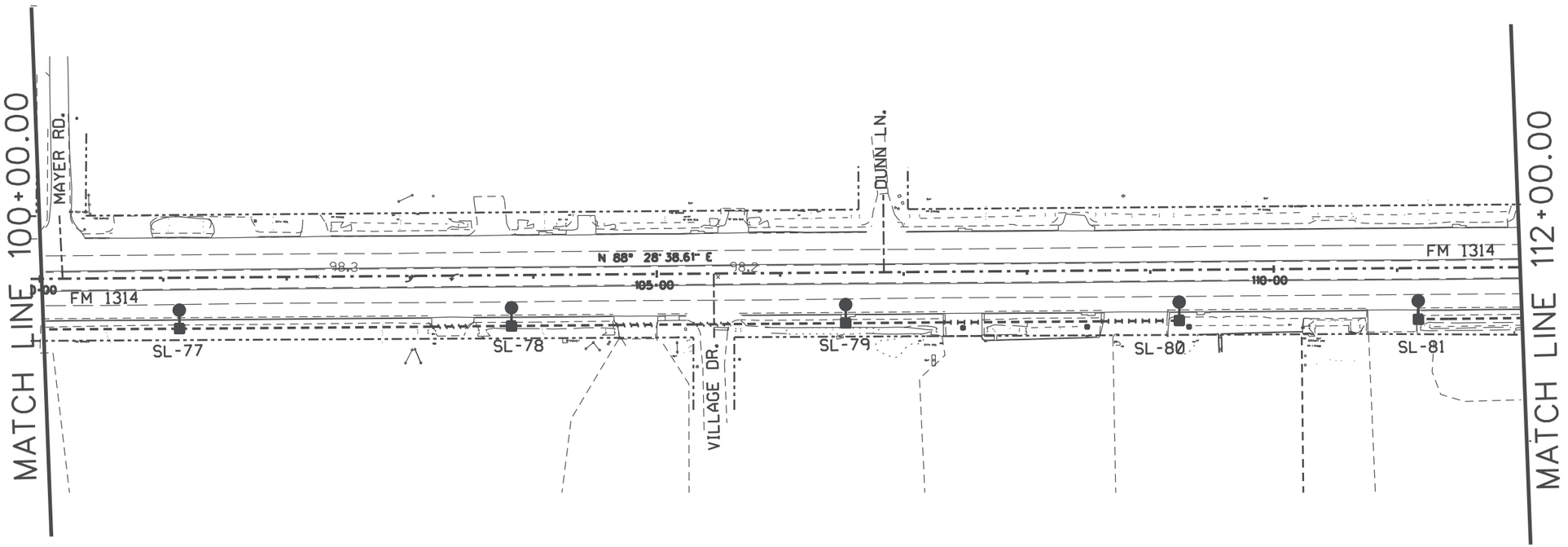
LIGHTING LAYOUT

FM 1314

SCALE: 1"=100'

SHEET 17 OF 21

ORIGINAL DRAWING DATE:		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT		SHEET
DR.: date	REVISIONS	12	6	-		038
CK.: MM		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DR.: date		MONTGOMERY		1986	01	070	FM1314
CK.: MM							



	DRILL SHAFT(RD ILL POLE)(30")	RIPRAP (CONC) (CL B) (4")	RD IL ASM (TY SA) 50T-10 (400W EQ)LED	CONDUIT		CONDUCTOR	
				2"PVC SCH 80	2"PVC SCH 80 BORE	#8 BARE	INSULATION #8 XHHW
	0416-6029	0432-6009	0610-6288	0618-6046	0618-6047	0620-6007	0620-6008
	(FT)	(CY)	(EA)	(FT)	(FT)	(FT)	(FT)
TOTAL	50	1.75	5	800	200	1000	2000

LEGEND

(NOTE: SYMBOLS EXAGGERATED FOR CLARITY)

- NEW ELECTRICAL SERVICE
- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- EXISTING RD IL (STEEL POLE MOUNTED)
- EXISTING RD IL (TIMBER POLE MOUNTED)
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW 2" RIGID METAL CONDUIT
- NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

ASSEMBLY	SERVICE/CIRCUIT	OFFSET FROM EDGE OF TRAVEL LANE	STATION	WATT	DESCRIPTION	HEIGHT
CSJ 1986-01-070						
SL-77	S-2, B	3 FT.	101+13.03	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-78	S-2, B	3 FT.	103+83.01	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-79	S-2, B	3 FT.	106+53.03	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-80	S-2, B	3 FT.	109+23.03	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-81	S-3, A	3 FT.	111+17.37	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on 5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

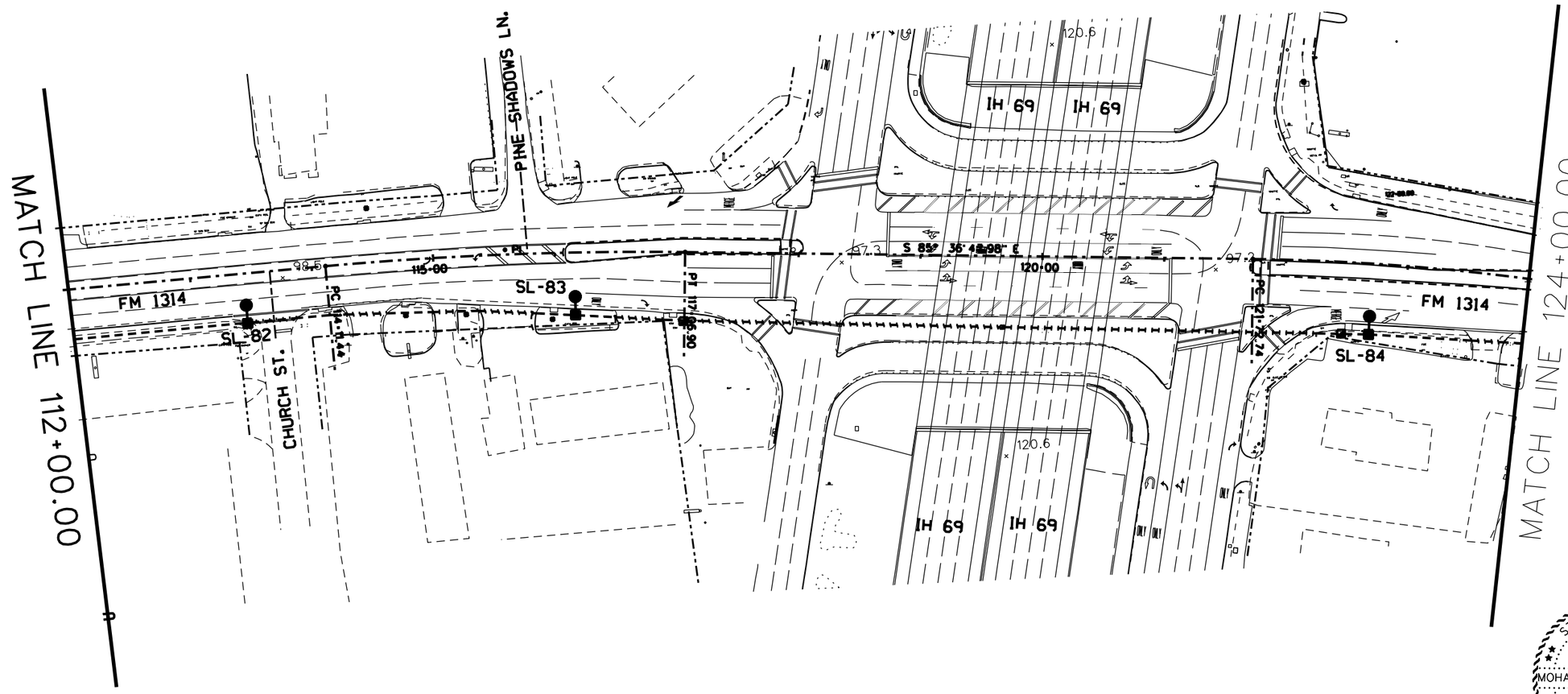
LIGHTING LAYOUT

FM 1314

SCALE: 1" = 100'

SHEET 18 OF 21

ORIGINAL GRADING DATE:		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT		SHEET
DSN: dtm	REVISIONS	12	6	-		039
CK: MM		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DSN: dtm		MONTGOMERY		1986	01	070	FM1314
CK: MM							



	GROUND BOX TY D W/APRON	DRILL SHAFT(RD ILL POLE)(30")	RIPRAP (CONC) (CL B) (4")	RD IL ASM (TY SA) 50T-10 (400W EQ)LED	CONDUIT		CONDUCTOR	
					2"PVC SCH 80	2"PVC SCH 80 BORE	#8 BARE	INSULATED #8 XHHW
	0624-6010	0416-6029	0432-6009	0610-6288	0618-6046	0618-6047	0620-6007	0620-6008
	(EA)	(FT)	(CY)	(EA)	(FT)	(FT)	(FT)	(FT)
TOTAL	2	30	1.05	3	500	700	1200	2400

LEGEND

(NOTE: SYMBOLS EXAGGERATED FOR CLARITY)

- (S) NEW ELECTRICAL SERVICE
- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- EXISTING RD IL (STEEL POLE MOUNTED)
- EXISTING RD IL (TIMBER POLE MOUNTED)
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW 2" RIGID METAL CONDUIT
- NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

ASSEMBLY	SERVICE/CIRCUIT	OFFSET FROM EDGE OF TRAVEL LANE	STATION	WATT	DESCRIPTION	HEIGHT
CSJ 1986-01-070						
SL-82	S-3, A	3 FT.	113+43.65	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-83	S-3, A	3 FT.	116+16.46	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-84	S-3, A	3 FT.	122+71.35	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

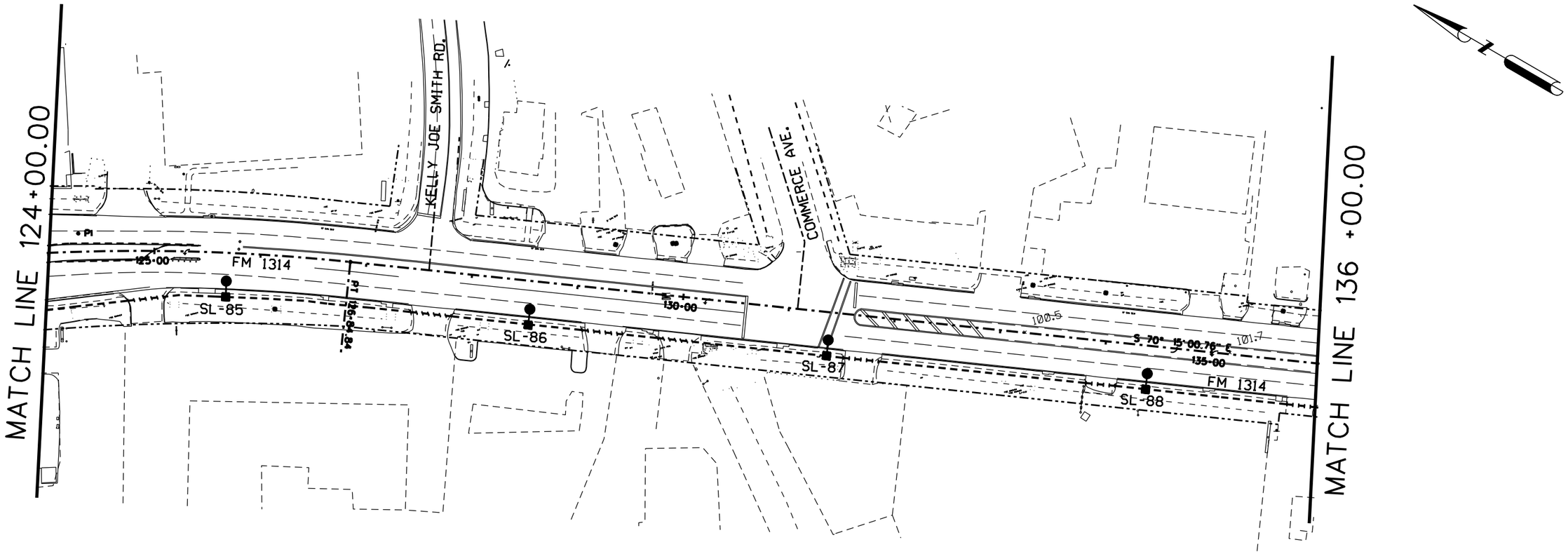
LIGHTING LAYOUT

FM 1314

SCALE: 1"=100'

SHEET 19 OF 21

ORIGINAL DRAWING DATE:	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DSN: dtm	12	6		040
CK: MR	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
DSN: dtm	MONTGOMERY	1986	01	070	FM1314
CK: MR					



	DRILL SHAFT(RD ILL POLE)(30")	RIPRAP (CONC) (CL B) (4")	RD IL ASM (TY SA) 50T-10 (400W EQ)LED	CONDUIT		CONDUCTOR	
				2"PVC SCH 80	2"PVC SCH 80 BORE	#8 BARE	INSULATED #8 XHHW
	0416-6029	0432-6009	0610-6288	0618-6046	0618-6047	0620-6007	0620-6008
	(FT)	(CY)	(EA)	(FT)	(FT)	(FT)	(FT)
TOTAL	40	1.40	4	1000	245	1200	2400

LEGEND

(NOTE: SYMBOLS EXAGGERATED FOR CLARITY)

- NEW ELECTRICAL SERVICE
- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- EXISTING RD IL (STEEL POLE MOUNTED)
- EXISTING RD IL (TIMBER POLE MOUNTED)
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW 2" RIGID METAL CONDUIT
- NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

ASSEMBLY	SERVICE/CIRCUIT	OFFSET FROM EDGE OF TRAVEL LANE	STATION	WATT	DESCRIPTION	HEIGHT
CSJ 1986-01-070						
SL-85	S-3, A	3 FT.	125+69.04	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-86	S-3, A	3 FT.	128+58.10	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-87	S-3, A	3 FT.	131+40.10	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-88	S-3, A	3 FT.	134+41.63	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

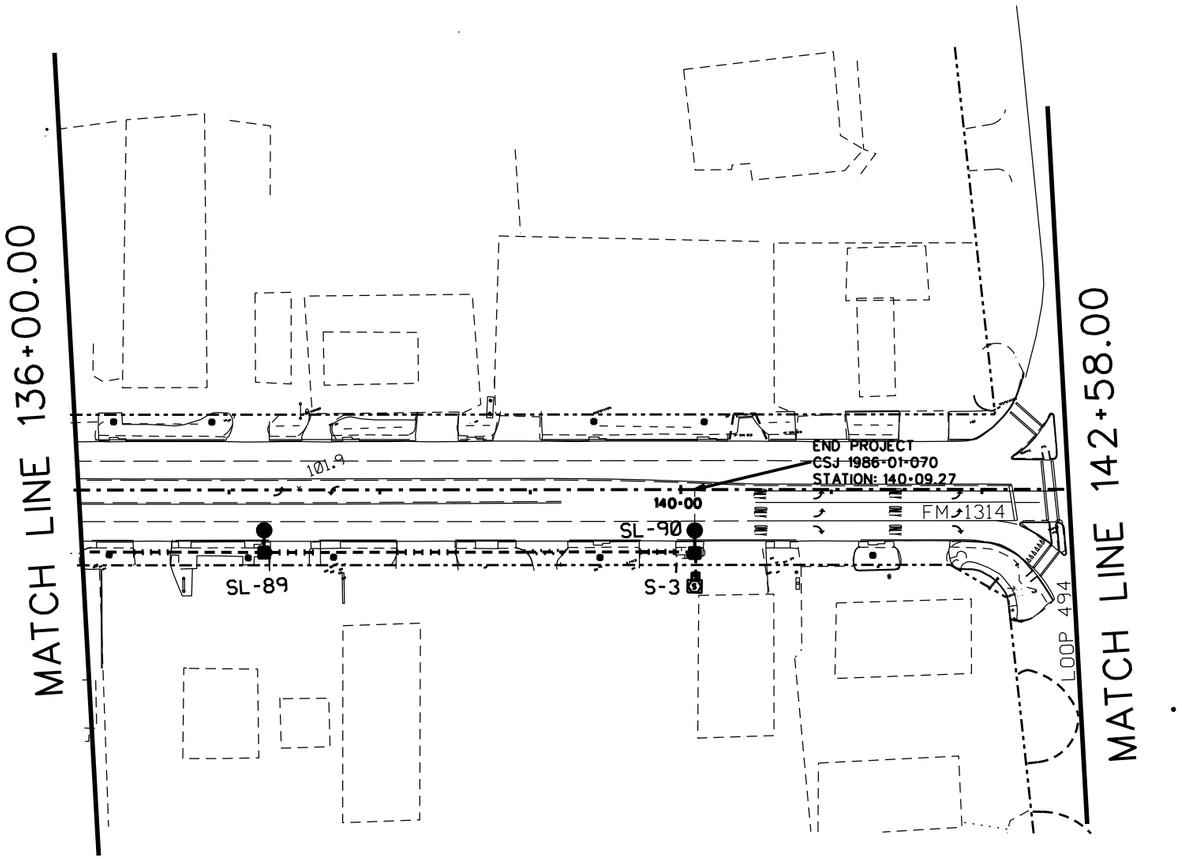
LIGHTING LAYOUT

FM 1314

SCALE: 1"=100'

SHEET 20 OF 21

ORIGINAL DRAWING DATE:		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT			SHEET
DSN.: dtn	REVISIONS	12	6				041
CK.: MM		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DRN.: dtn		MONTGOMERY		1986	01	070	FM1314
CK.: MM							



	DRILL SHAFT(RD ILL POLE)(30")	RIPRAP (CONC) (CL B) (4")	RD IL ASM (TY SA) 50T-10 (400W EQ)LED	CONDUIT		CONDUCTOR	
				2"PVC SCH 80	2"PVC SCH 80 BORE	#8 BARE	INSULATED #8 XHHW
	0416-6029	0432-6009	0610-6288	0618-6046	0618-6047	0620-6007	0620-6008
	(FT)	(CY)	(EA)	(FT)	(FT)	(FT)	(FT)
TOTAL	20	0.7	2	250	200	450	900

LEGEND

(NOTE: SYMBOLS EXAGGERATED FOR CLARITY)

- NEW ELECTRICAL SERVICE
- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- EXISTING RD IL (STEEL POLE MOUNTED)
- EXISTING RD IL (TIMBER POLE MOUNTED)
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW 2" RIGID METAL CONDUIT
- NEW 2" SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED 2" SCHEDULE 80 PVC AND CONDUCTORS

ASSEMBLY	SERVICE/CIRCUIT	OFFSET FROM EDGE OF TRAVEL LANE	STATION	WATT	DESCRIPTION	HEIGHT
CSJ 1986-01-070						
SL-89	S-3, A	3 FT.	137+23.72	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
SL-90	S-3, A	3 FT.	140+09.92	400 EQ	IN RD IL (TY SA) 50T-10 (400 EQ) LED	50 FT.
S-3	SERVICE S-3	26 FT.	140+09.92	N/A	60AMP MAIN, 2-20 AMP BREAKER, TYPE A, 240/480V	

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

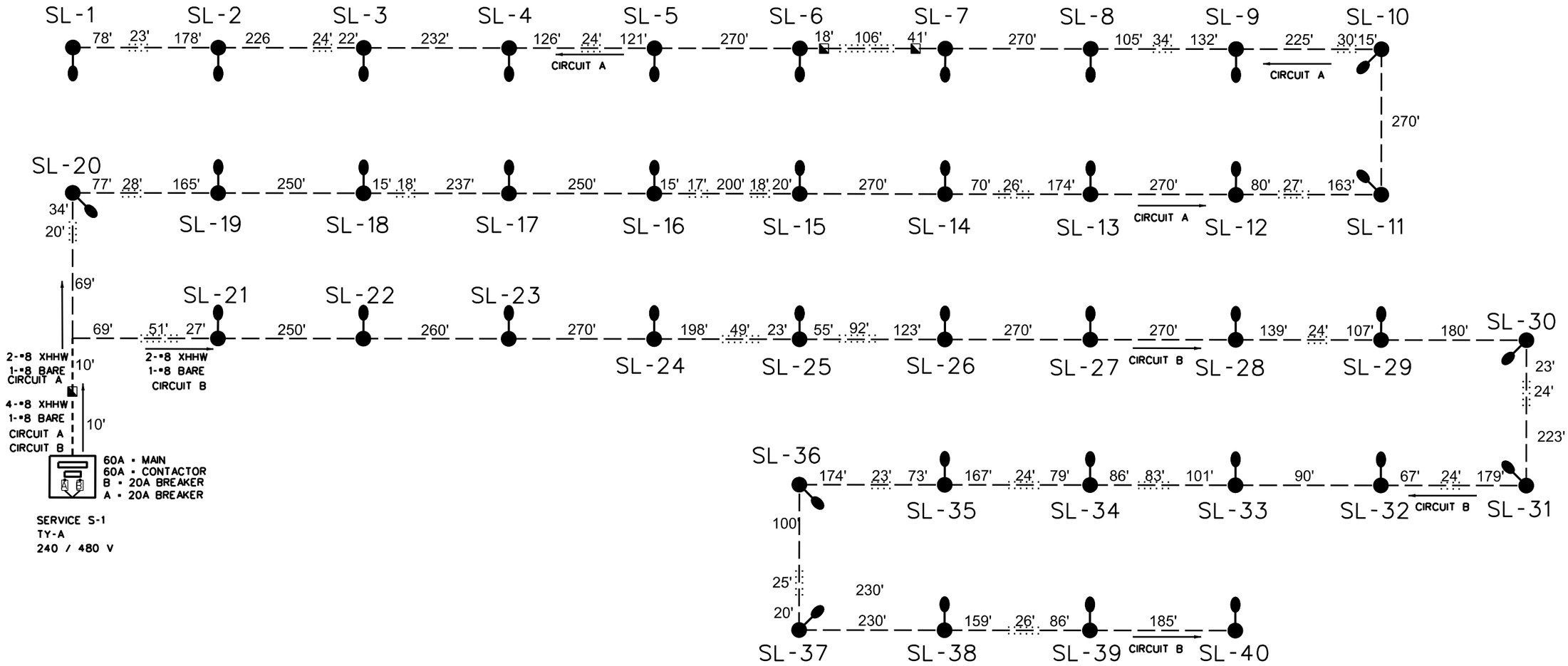
LIGHTING LAYOUT

FM 1314

SCALE: 1"=100'

SHEET 21 OF 21

ORIGINAL DRAWING DATE:		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT		SHEET
DR.: STM	REVISIONS	12	6			042
CK.: MM		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DES.: STM		MONTGOMERY		1986	01	070	FM1314
CK.: MM							



LEGEND

- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- NEW SERVICE
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW EMBEDDED/UNDERGROUND SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED SCHEDULE 80 PVC AND CONDUCTORS
- NEW 2" RIGID METAL CONDUIT

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

CIRCUIT DIAGRAM

FM 1314
SH-99 TO LOOP 494

NOT TO SCALE

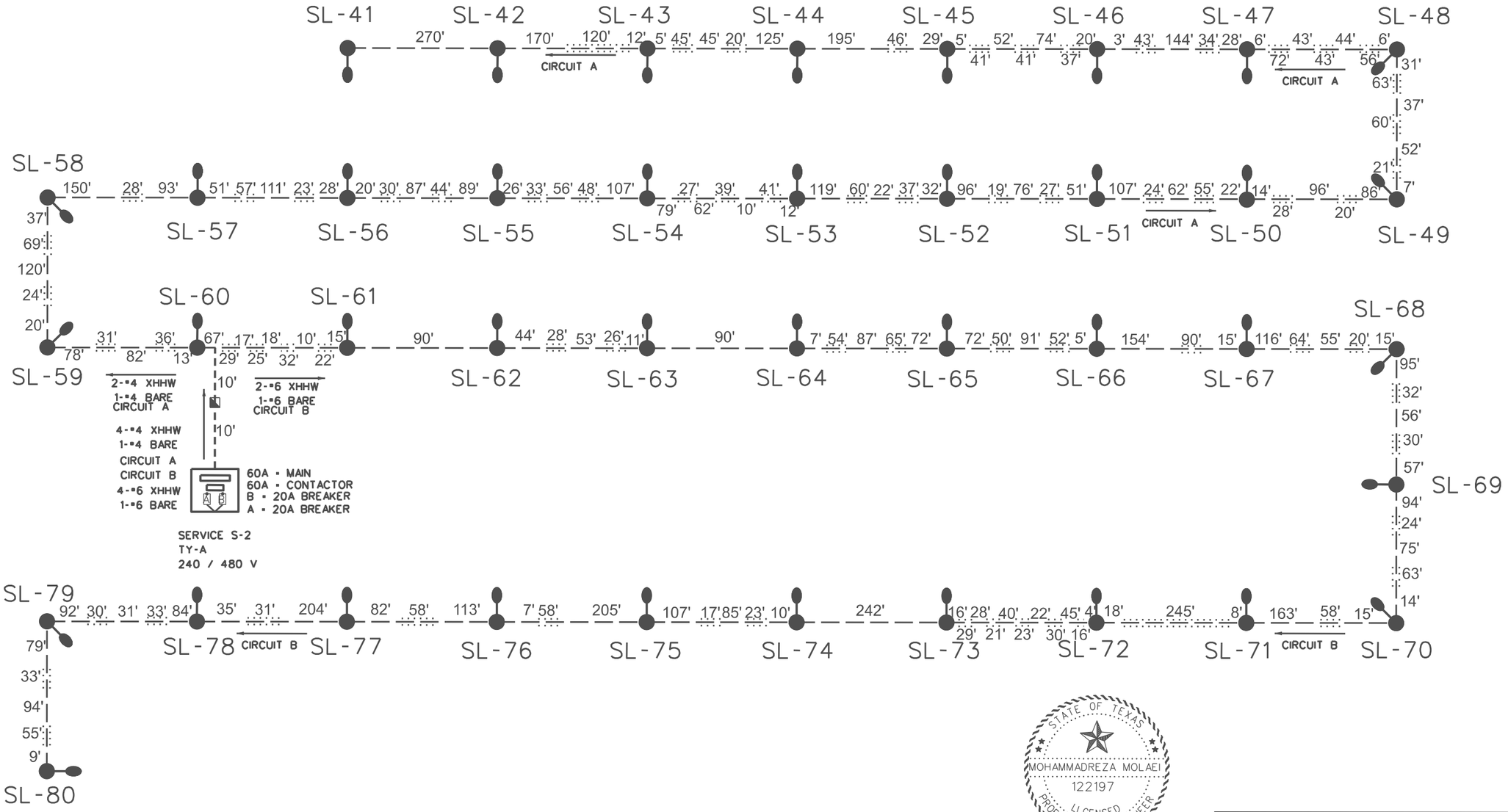
SHEET 1 OF 5

ORIGINAL DRAWING DATE:		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT		SHEET
DN:	REVISIONS	12	6			043
CK: DW:		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DW:		MONTGOMERY		1986	01	070	FM 1314
CK:							

$TIME$ $DATE$ $FILE$

$FILE$

$TIME$ $DATE$



LEGEND

- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- NEW SERVICE
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW EMBEDDED/UNDERGROUND SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED SCHEDULE 80 PVC AND CONDUCTORS
- NEW 2" RIGID METAL CONDUIT

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

CIRCUIT DIAGRAM

FM 1314
SH-99 TO LOOP 494

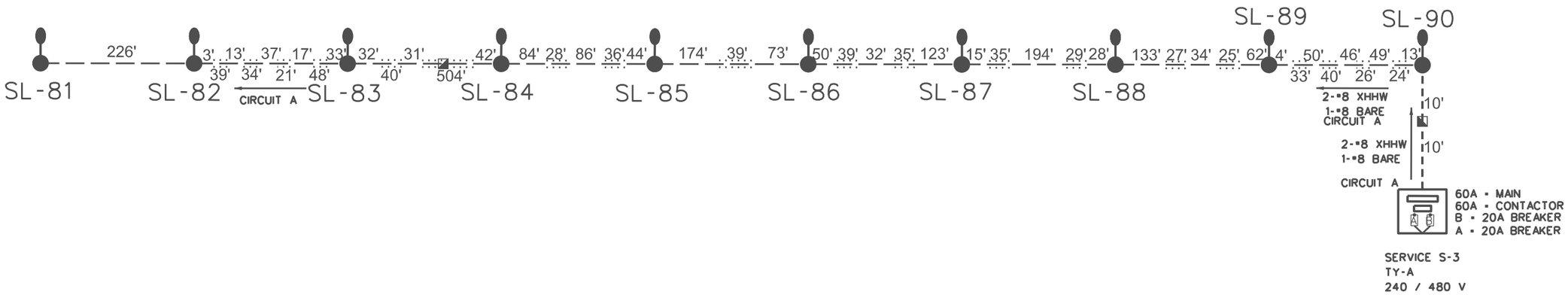
NOT TO SCALE

SHEET 2 OF 5

ORIGINAL DRAWING DATE:	REVISIONS	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
DR.:		12	6	-	044
CK.: SSS		COUNTY	CONTROL	SECTION	JOB	HIGHWAY
DES.:		MONTGOMERY	1986	01	070	FM 1314
CK.:						

$TIME$ $DATE$ $FILE$

$FILE$ $TIME$ $DATE$



LEGEND

- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- NEW SERVICE
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW EMBEDDED/UNDERGROUND SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED SCHEDULE 80 PVC AND CONDUCTORS
- NEW 2" RIGID METAL CONDUIT

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

CIRCUIT DIAGRAM

FM 1314
SH-99 TO LOOP 494

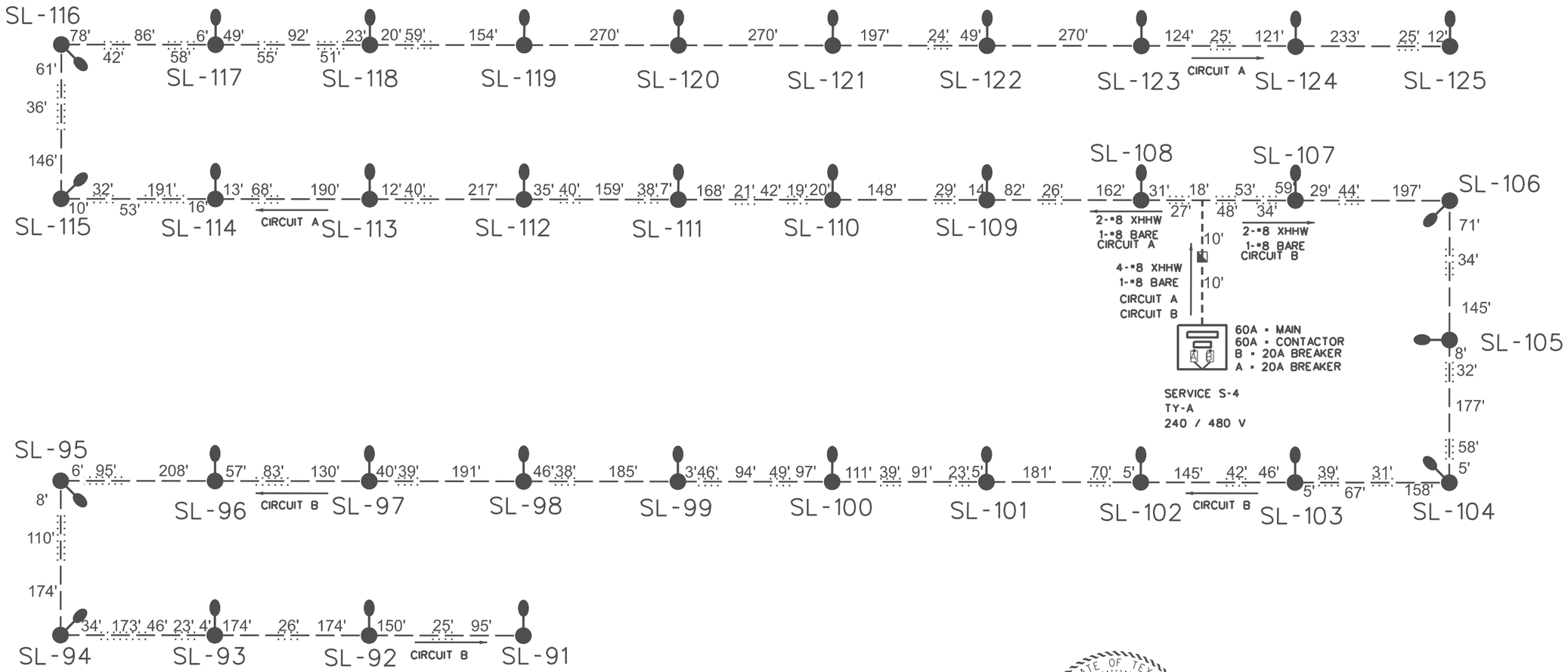
NOT TO SCALE

SHEET 3 OF 5

ORIGINAL DRAWING DATE:		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT			SHEET
CSJ:	REVISIONS	12	6				045
CSJ: 000		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DSN:		MONTGOMERY		1986	01	070	FM 1314
CSJ:							

$TIME$ $DATE$ $FILE$

$FILE$



LEGEND

- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- NEW SERVICE
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW EMBEDDED/UNDERGROUND SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED SCHEDULE 80 PVC AND CONDUCTORS
- NEW 2" RIGID METAL CONDUIT

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

CIRCUIT DIAGRAM

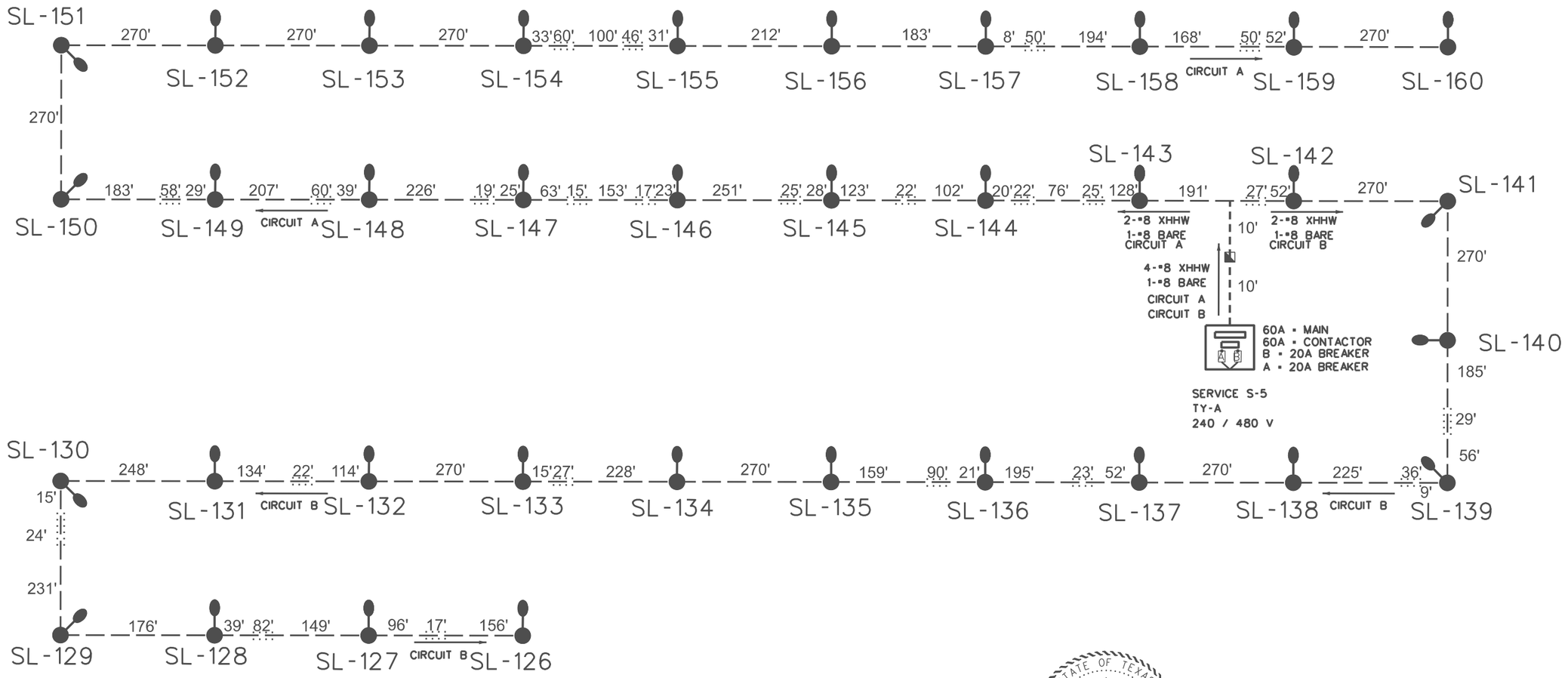
FM 1314
SH-99 TO LOOP 494

NOT TO SCALE

SHEET 4 OF 5

ORIGINAL GRADING DATE:	REVISIONS	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
ON:		12	6		046
CK: 000		COUNTY	CONTROL	SECTION	JOB	HIGHWAY
DES:		MONTGOMERY	1986	01	070	FM 1314
CK:						

$TIME$ $DATE$ $FILE$
$FILE$
$TIME$ $DATE$



LEGEND

- IN RD IL (TY SA) 50T-10 (400W EQ) LED (0610-6288)
- NEW SERVICE
- NEW GROUND BOX TY D WITH APRON
- NEW JUNCTION BOX
- NEW EMBEDDED/UNDERGROUND SCHEDULE 80 PVC AND CONDUCTORS
- NEW BORED SCHEDULE 80 PVC AND CONDUCTORS
- NEW 2" RIGID METAL CONDUIT

STATE OF TEXAS
MOHAMMADREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Mohammadreza Molaei, P.E. 122197, on

5/25/2023

TEXAS DEPARTMENT OF TRANSPORTATION

CIRCUIT DIAGRAM

FM 1314
SH-99 TO LOOP 494

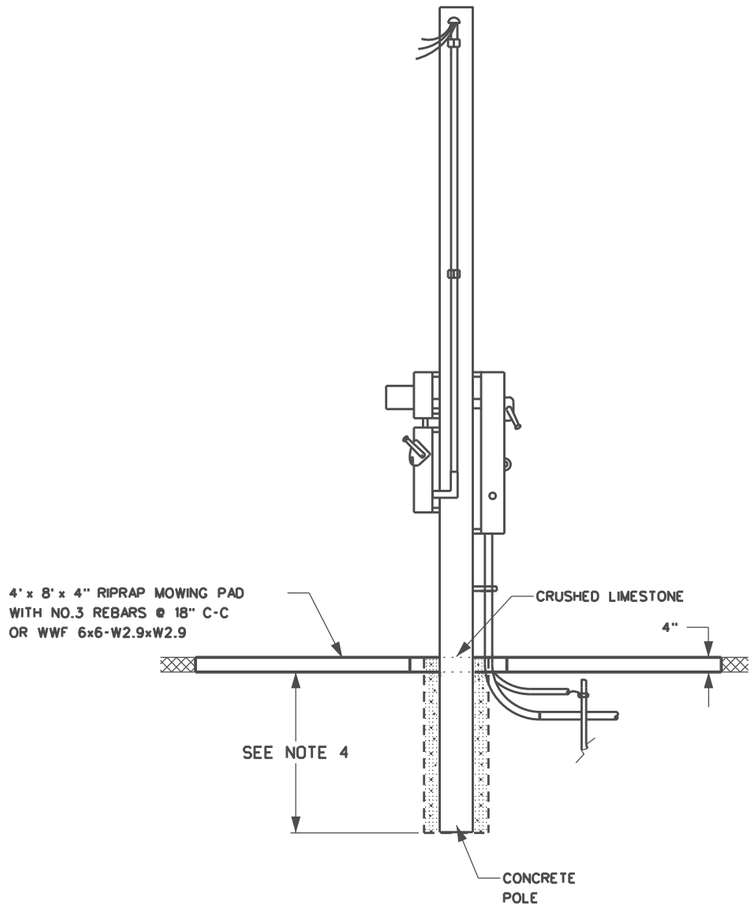
NOT TO SCALE

SHEET 5 OF 5

ORIGINAL DRAWING DATE:		STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT			SHEET
DR.:	REVISIONS	12	6				047
CK.: date		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DES.:		MONTGOMERY		1986	01	070	FM 1314
CK.:							

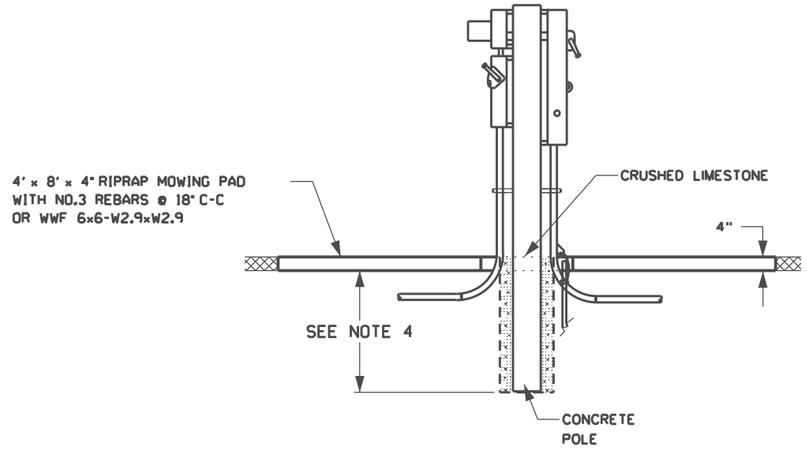
$TIME$ $DATE$ $FILE$

$FILE$



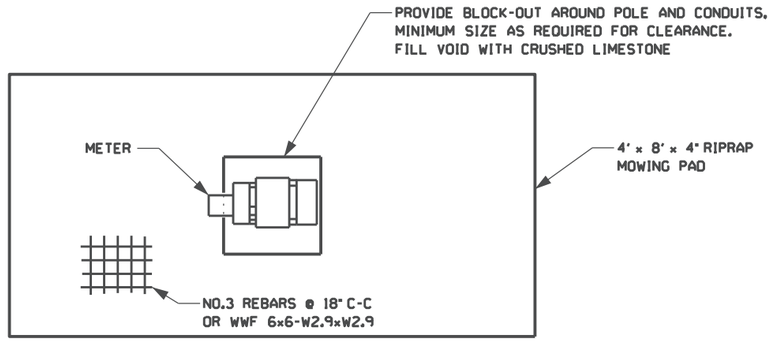
CONCRETE SERVICE SUPPORT
WITH RIPRAP MOWING PAD

(OVERHEAD)
ELEVATION



CONCRETE SERVICE SUPPORT
WITH RIPRAP MOWING PAD

(UNDERGROUND)
ELEVATION



CONCRETE SERVICE SUPPORT
WITH RIPRAP MOWING PAD

PLAN

NOTES:

1. BLOCK-OUT SHALL BE LARGE ENOUGH TO ACCOMMODATE THE SERVICE POLE, CONDUITS AND GROUND ROD OR AS DIRECTED BY THE ENGINEER.

2. CONCRETE RIPRAP WILL NOT BE PAID DIRECTLY BUT WILL BE SUBSIDIARY TO ITEM 628.

3. CONCRETE FOR RIPRAP SHALL BE CLASS "B" IN ACCORDANCE WITH THE ITEM 421, "HYDRAULIC CEMENT CONCRETE".

4. FOR ELECTRICAL SERVICE AND CONCRETE SUPPORT DETAILS SEE TXDOT ELECTRICAL DETAIL STANDARDS.

P.E. 5/25/2023
DATE

STATE OF TEXAS
MOHAMMEDREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

R 2023 TXDOT

TEXAS DEPARTMENT OF TRANSPORTATION
Houston District

MOWING PAD
FM 1314

SHEET 1 OF 1 SCALE: N.T.S.

DATE:		REVISIONS				
DN:	STATE DISTRICT	FEDERAL REGION	PROJECT NO.			SHEET
CK:	HOU	6				048
DW:	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
CK:	MONTGOMERY		1986	01	070	FM 1314

DATE:
FILE:

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.

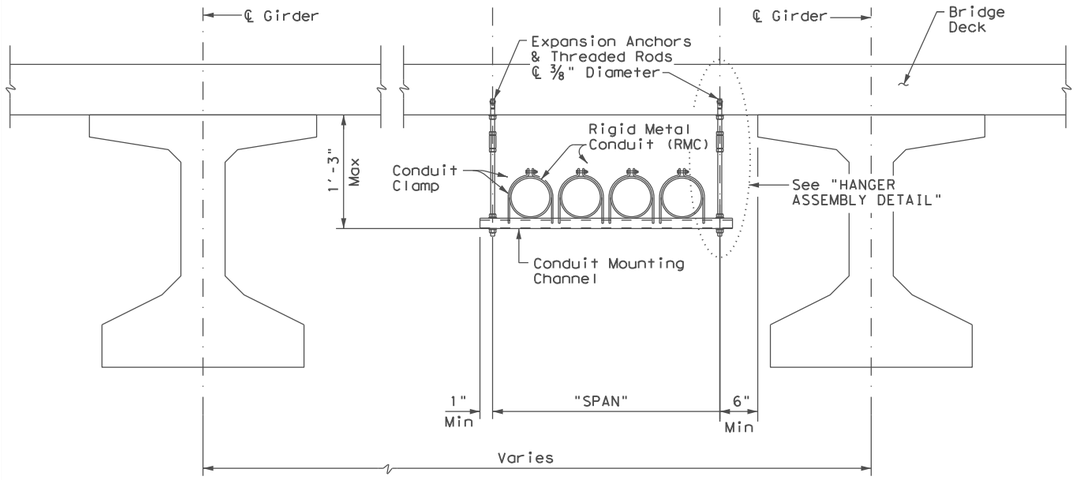
Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

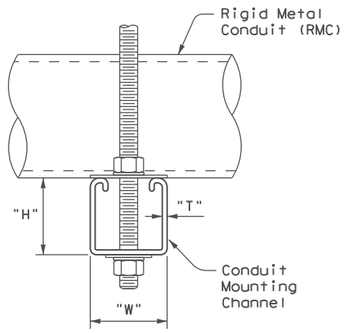
FILE:	ed1-14.dgn	DN:	CK:	DW:	CK:
© TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS		1986	01	070	FM 1314
		DIST	COUNTY		SHEET NO.
		12	MONTGOMERY		049

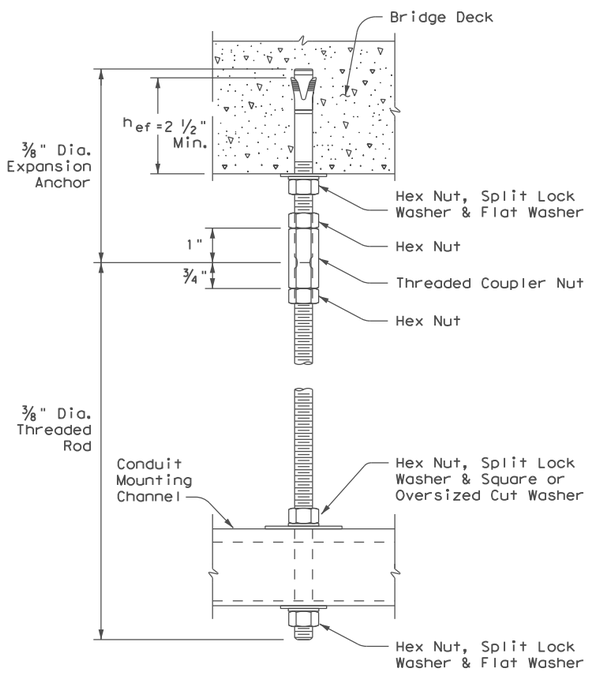


CONDUIT HANGING DETAIL

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

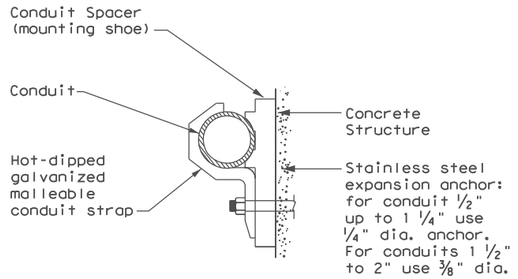
Channels with round or short slotted hole patterns are allowed, if the load carrying capacity is not reduced by more than 15%.

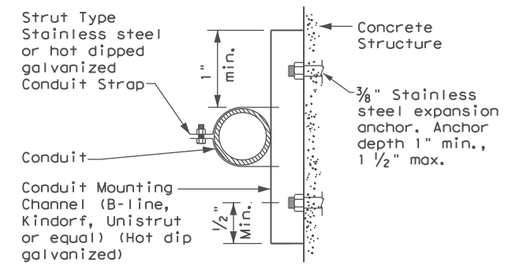




HANGER ASSEMBLY DETAIL

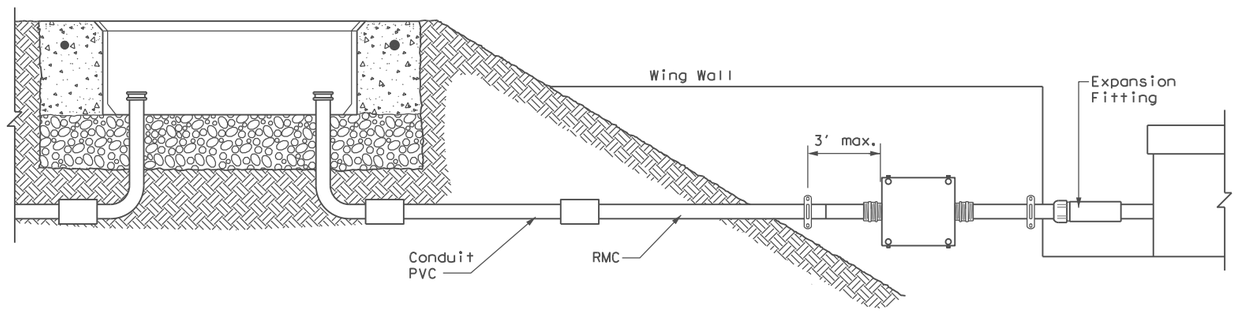
ELECTRIC CONDUIT TO BRIDGE DECK ATTACHMENT





CONDUIT MOUNTING OPTIONS

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



TYPICAL CONDUIT ENTRY TO BRIDGE STRUCTURE DETAIL

EXPANSION ANCHOR NOTES FOR BRIDGE DECK ATTACHMENT

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

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

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

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

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

6. Use anchors of minimum 1600 Lbs tensile capacity (minimum of steel, concrete breakout, and concrete pullout strengths as determined by ACI 318 Appendix D) at the required minimum embedment depth (h_{ef}). No lateral loads shall be introduced after conduit installation.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUIT SUPPORTS

ED(2)-14

FILE: ed2-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	1986	01	070	FM 1314
	DIST	COUNTY		SHEET NO.
	12	MONTGOMERY		050

DATE:
FILE:

71B

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.

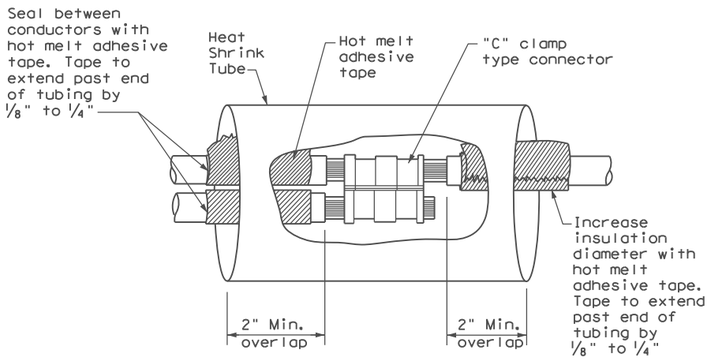
3. Install ground rods so the imprinted part number is at the upper end of the rod.

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

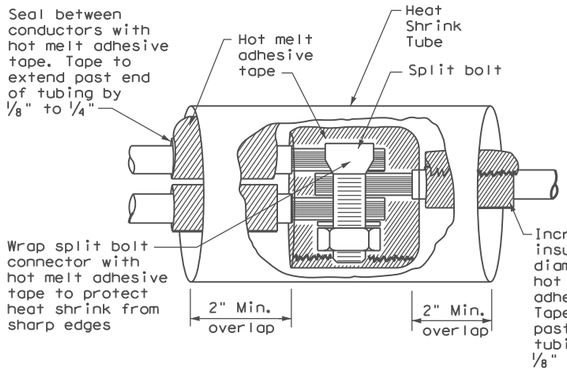
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

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.

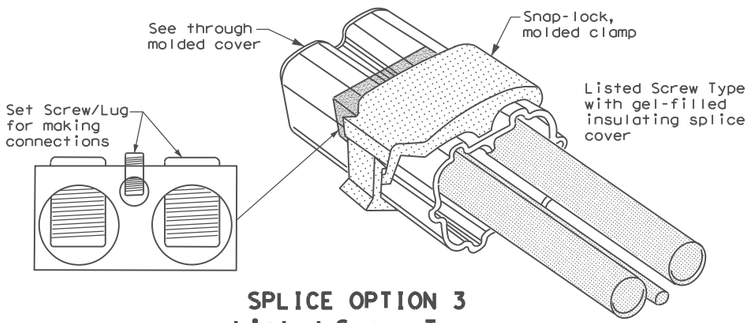
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



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

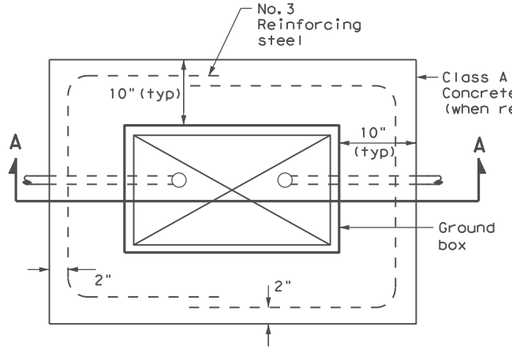
ED(3)-14

FILE:	ed3-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS		1986	01	070	FM 1314
		DIST	COUNTY		SHEET NO.
		12	MONTGOMERY		051

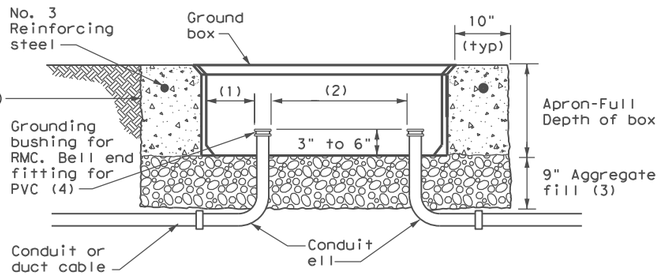
DATE:
FILE:

71C

DATE:
FILE:



PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

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

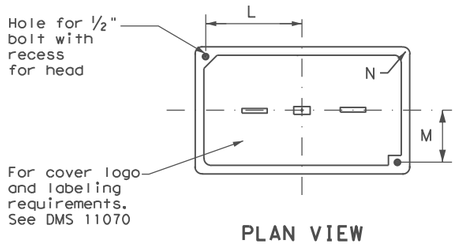
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

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

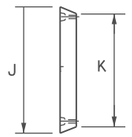
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

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

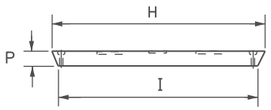
GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



PLAN VIEW



END



SIDE

GROUND BOX COVER

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.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
GROUND BOXES

ED(4)-14

FILE: ed4-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
	CONT	SECT	JOB	HIGHWAY
REVISIONS	1986	01	070	FM 1314
	DIST	COUNTY		SHEET NO.
	12	MONTGOMERY		052

71D

DATE:
FILE:

ELECTRICAL SERVICES NOTES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SERVICE ASSEMBLY ENCLOSURE

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

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

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

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

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

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

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

PHOTOELECTRIC CONTROL

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

*ELECTRICAL SERVICE DATA

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

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

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

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

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

Schematic Type

Service Voltage V / V

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

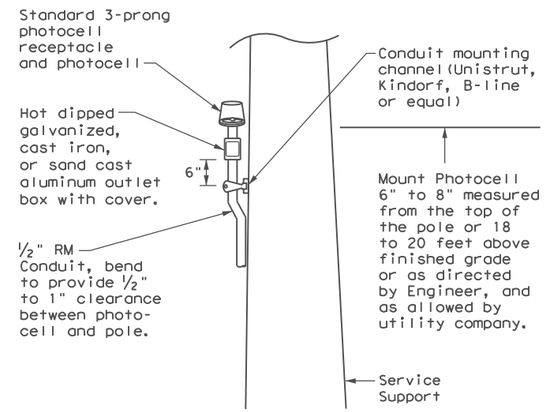
(SS)= Safety Switch Ahead of Meter-Check with Utility
(NS)= No safety Switch Ahead of Meter-Check with Utility

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

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

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

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



TOP MOUNTED PHOTOCELL

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

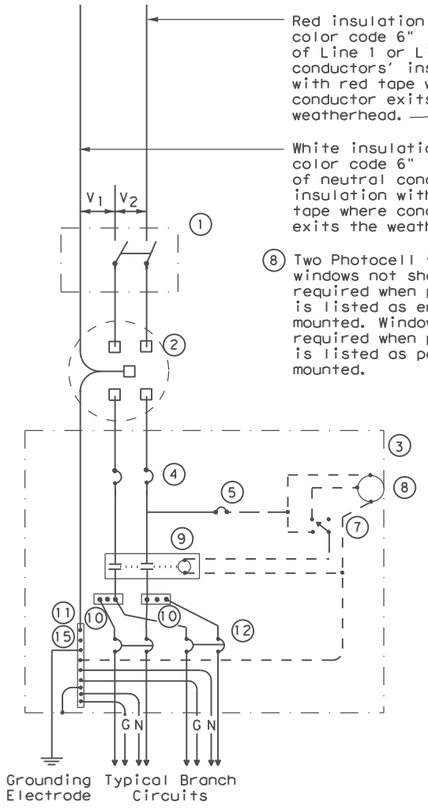
Texas Department of Transportation

Traffic Operations Division Standard

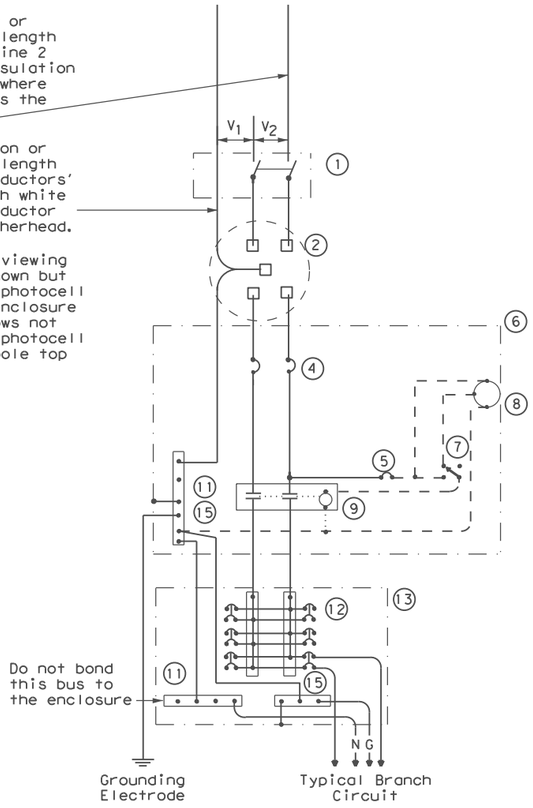
ELECTRICAL DETAILS SERVICE NOTES & DATA

ED(5)-14

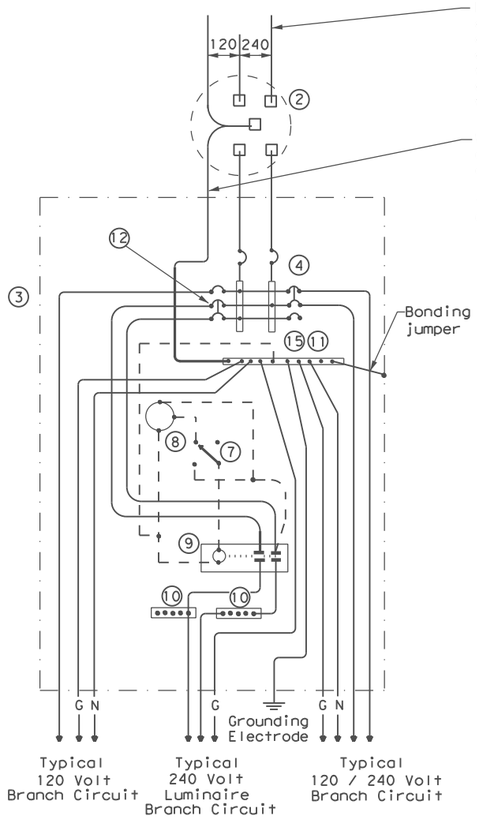
FILE: ed5-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	1986	01	070	FM 1314
	DIST	COUNTY		SHEET NO.
	12	MONTGOMERY		053



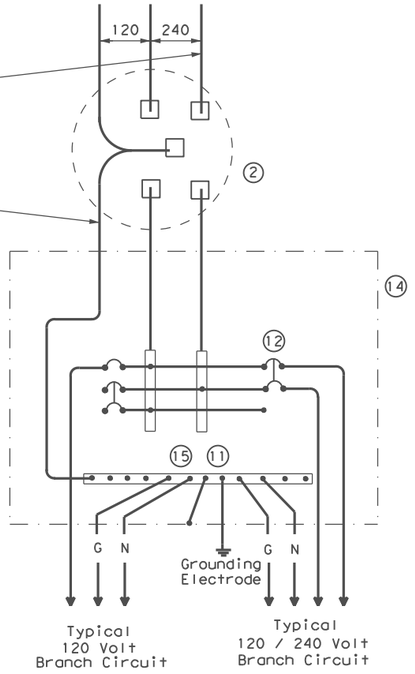
SCHEMATIC TYPE A
THREE WIRE



SCHEMATIC TYPE C
THREE WIRE



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



SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

ED(6)-14

FILE: ed6-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	1986	01	070	FM 1314
	DIST	COUNTY		SHEET NO.
	12	MONTGOMERY		054

DATE:
FILE:

71F

TIMBER POLE (TP) SERVICE SUPPORT NOTES

1. Ensure electrical service support is a class 5 treated timber pole as per Item 627 "Treated Timber Poles." Embed timber pole to depth required in Item 627.
2. Conduit and electrical conductors attached to the electrical service pole and underground within 12 in. of service pole are not paid for directly but are subsidiary to the electrial service.
3. Install pole-top mounted photocell (T) on north side of pole, or in service enclosure (E) as required. See Electrical Service Data chart in plan set.
4. Gain pole as required to provide flat surface for each channel. Gain timber pole to 5/8 in. max. depth and 1 7/8 in. max. height. Gain pole in a neat and workmanlike manner.
5. Mount meter and service equipment on stainless steel or galvanized channel (Unistrut, Kindorf, or equal). Provide channel sized 1 in. to 3 3/4 in. maximum depth, and 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.

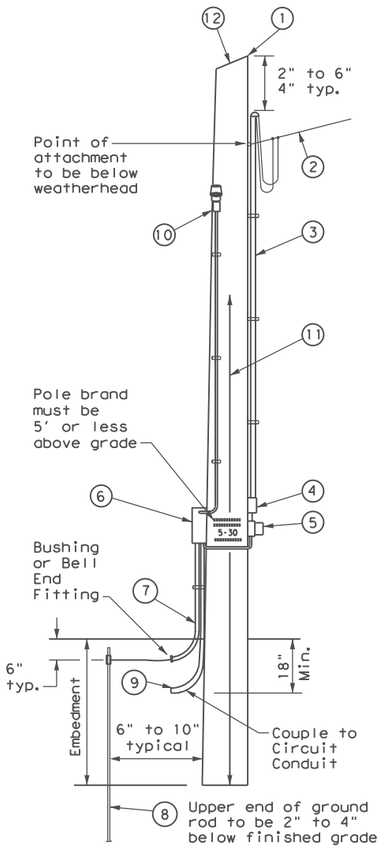
(8) 5/8 in. x 8 ft. Copper clad ground rod - drive ground rod to a depth of 2 in. to 4 in. below grade.

(9) RMC same size as branch circuit conduit.

(10) See pole-top mounted photocell detail on ED(5).

(11) When required by the serving utility provide bare 6 AWG copper conductor. Run wire from pole top to butt wrap or copper butt plate. Protect conductor with non-conductive material to a height of 8 ft. above finished grade.

(12) When required by utility, cut top of pole at an angle to enhance rain run off.

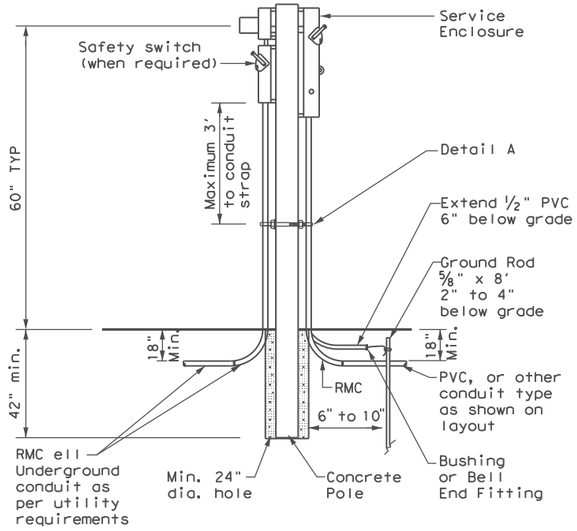


SERVICE SUPPORT TYPE TP (O)

GRANITE CONCRETE (GC) & OTHER CONCRETE (OC) NOTES

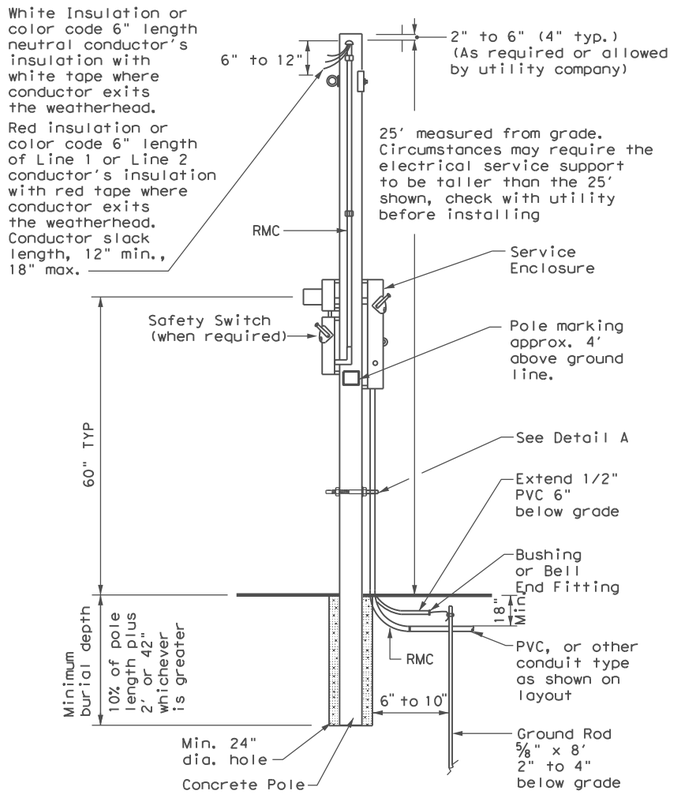
Ensure electrical service support structures bid as type Granite Concrete (GC) or Other Concrete (OC) meet the following requirements.

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.



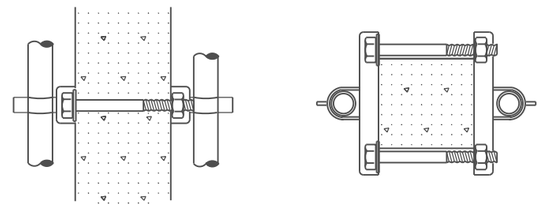
CONCRETE SERVICE SUPPORT

Underground (U)



CONCRETE SERVICE SUPPORT

Overhead (O)



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

FILE: ed10-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	1986	01	070	FM 1314
	DIST	COUNTY		SHEET NO.
	12	MONTGOMERY		055

DATE:
FILE:

71K

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.

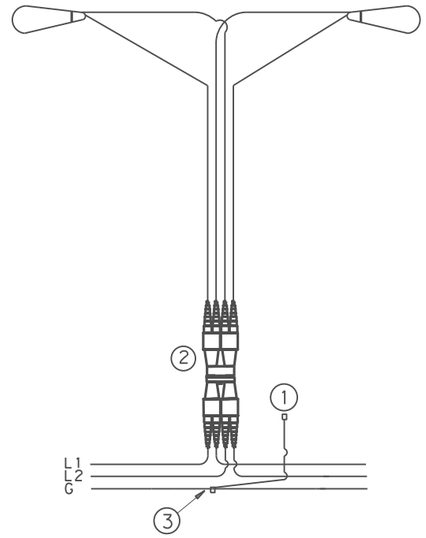
12. Orient luminaires perpendicular to the roadway intended to be lit unless otherwise shown on the plans.

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.

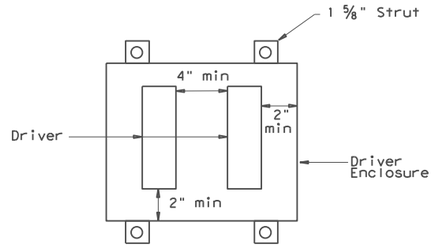
   c. Install drivers with at least 2 inches of space from enclosure walls.

   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

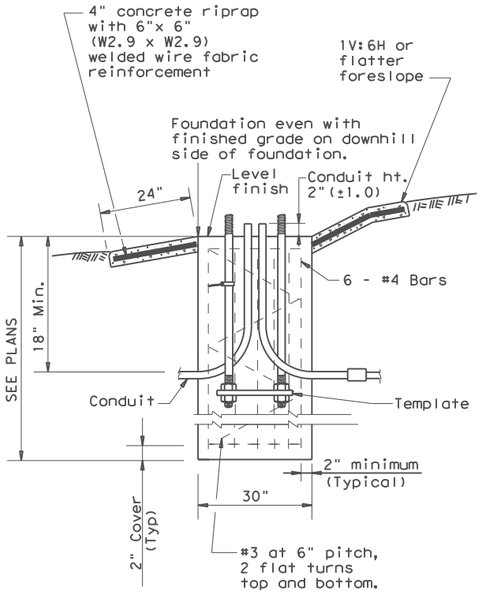
ROADWAY ILLUMINATION DETAILS

RID(1)-20

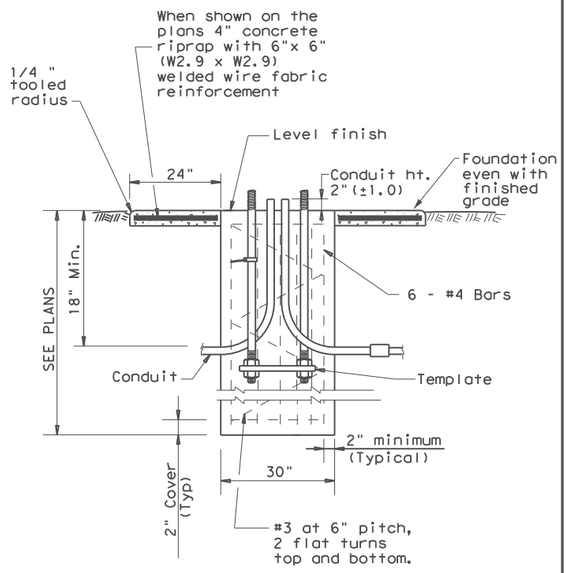
FILE: rid1-20.dgn	DN:	CK:	DW:	CK:
©TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS	1986	01	070	FM 1314
7-17	DIST	COUNTY		SHEET NO.
12-20	12	MONTGOMERY		056

72A

DATE:
FILE:



SECTION A-A
SHOWING SLOPED GRADE



SECTION A-A
SHOWING CONSTANT GRADE

TABLE 1
ANCHOR BOLTS

POLE MOUNTING HEIGHT	BOLT CIRCLE		ANCHOR BOLT SIZE
	Shoe Base	T-Base	
<40 ft.	13 in.	14 in.	1in. x 30in.
40-50 ft.	15 in.	17 ¼in.	1 ¼in. x 30in.

TABLE 2
RECOMMENDED FOUNDATION LENGTHS
(See note 1)

MOUNTING HEIGHT	TEXAS CONE PENETROMETER N Blows/ft		
	10	15	40
≤20 ft.	6′	6′	6′
>20 ft. to 30 ft.	8′	6′	6′
>30 ft. to 40 ft.	8′	8′	6′
>40 ft. to 50 ft.	10′	8′	6′

TABLE 3
PAY QUANTITY OF RIPRAP PER FOUNDATION (Install only when shown on the plans)

Foundation Diameter	RIPRAP DIAMETER	RIPRAP (CONC) (CL B)
30 in.	78 in.	0.35 CY

GENERAL NOTES:

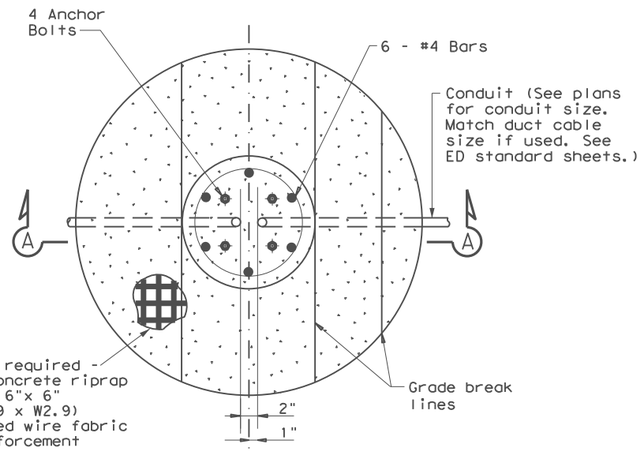
1. "Recommended Foundation Lengths" table is for information purposes only. Foundation lengths shall be as shown on the plans, or as directed by the Engineer. Foundations will be paid for under Item 416, "Drilled Shaft Foundations," unless otherwise shown on the plans.
2. Erect roadway illumination assembly poles plumb and true. Form and level the top 6" of the foundation so the pole will be plumb. Use leveling nuts to plumb shoe base poles. Do not use shims or leveling nuts under transformer bases. Do not grout between baseplate and the foundation.
3. Ensure Class 2A and 2B fit for anchor bolts and nuts. Tap and chase nuts after galvanizing. Anchor bolt body with rolled threads need not be full size.
4. Use appropriate class of concrete as specified in Items 416 and 432. Concrete for riprap may be upgraded to Class C at no extra cost to the Department.
5. Place riprap around the foundation when called for elsewhere in the plans. Riprap will be paid for under Item 432.
6. Locate breakaway roadway illumination assemblies as shown in the placement table, unless otherwise dimensioned on the plans. Protect non-breakaway illumination assemblies from vehicular impact (i.e. 2.5 ft. behind guard rail or mounted on traffic barrier), or located outside the clear zone, except that 2.5 ft. from curb face is minimum desired for light poles on city streets, 45 mph or less. See Roadway Design Manual for further information.
7. Use 4 hold down and 4 connecting washers on transformer base poles as recommended by the manufacturer and supplied with base.
8. Install a minimum of 2 conduits in each foundation. See lighting layout sheets for locations of foundations with more than 2 conduits. Cap unused conduits in foundations on both ends.
9. Conduit location in foundations is critical for breakaway devices. Place conduits 2 in. apart on centerline as shown.
10. Bond anchor bolt to rebar cage with #6 bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. The bonded steel in the foundation creates a concrete encased grounding electrode which replaces the ground rod.
11. Grade earthwork around T-base foundations even with the finished grade as shown in Section A-A to ensure proper function of the breakaway device. Use riprap on T-base foundations that are located on sloped grades, and as shown on the plans for level grades.

TABLE 4
BREAKAWAY POLE PLACEMENT (See note 6)

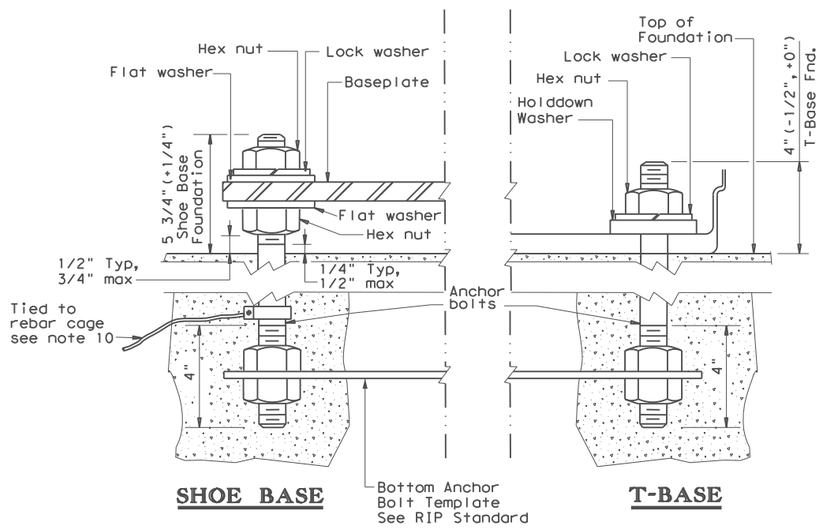
ROADWAY FUNCTIONAL CLASSIFICATION	** POLE OFFSET (DISTANCE TO FACE OF TRANSFORMER BASE)
Freeway Mainlanes (roadway with full control of access)	15 ft. (minimum and typical) from lane edge
All curbed, 45 mph or less design speed	2.5 ft. minimum (15 ft. desirable) from curb face
All others	10 ft. minimum*(15 ft. desirable) from lane edge

* or as close to ROW line as is practical

** provide 2/5 of the luminaire mounting height behind the pole for "falling area" to prevent encroachment on the other travel lanes. See design guidelines.



FOUNDATION DETAIL



ANCHOR BOLT DETAIL

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION DETAILS
(RDWY ILLUM FOUNDATIONS)
RID(2)-20

FILE: rid2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-11 7-17 12-20	1986	01	070	FM 1314
	DIST	COUNTY		SHEET NO.
	12	MONTGOMERY		057

72B

DATE:
FILE:

DATE:
FILE:

SHIPPING PARTS LIST - POLES AND LUMINAIRE ARMS

Nominal Mounting Ht. (ft)	Shoe Base Designation				Quantity	T-Base Designation				Quantity	CSB/SSCB Mounted Designation				Quantity
	Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire	
20	(Type SA 20 S - 4)			(150W EQ) LED		(Type SA 20 T - 4)			(150W EQ) LED						
	(Type SA 20 S - 4 - 4)			(150W EQ) LED		(Type SA 20 T - 4 - 4)			(150W EQ) LED						
30	(Type SA 30 S - 4)			(250W EQ) LED		(Type SA 30 T - 4)			(250W EQ) LED		(Type SP 28 S - 4)			(250W EQ) LED	
	(Type SA 30 S - 4 - 4)			(250W EQ) LED		(Type SA 30 T - 4 - 4)			(250W EQ) LED		(Type SP 28 S - 4 - 4)			(250W EQ) LED	
	(Type SA 30 S - 8)			(250W EQ) LED		(Type SA 30 T - 8)			(250W EQ) LED		(Type SP 28 S - 8)			(250W EQ) LED	
	(Type SA 30 S - 8 - 8)			(250W EQ) LED		(Type SA 30 T - 8 - 8)			(250W EQ) LED		(Type SP 28 S - 8 - 8)			(250W EQ) LED	
40	(Type SA 40 S - 4)			(250W EQ) LED		(Type SA 40 T - 4)			(250W EQ) LED		(Type SP 38 S - 4)			(250W EQ) LED	
	(Type SA 40 S - 4 - 4)			(250W EQ) LED		(Type SA 40 T - 4 - 4)			(250W EQ) LED		(Type SP 38 S - 4 - 4)			(250W EQ) LED	
	(Type SA 40 S - 8)			(250W EQ) LED		(Type SA 40 T - 8)			(250W EQ) LED		(Type SP 38 S - 8)			(250W EQ) LED	
	(Type SA 40 S - 8 - 8)			(250W EQ) LED		(Type SA 40 T - 8 - 8)			(250W EQ) LED		(Type SP 38 S - 8 - 8)			(250W EQ) LED	
	(Type SA 40 S - 10)			(250W EQ) LED		(Type SA 40 T - 10)			(250W EQ) LED		(Type SP 38 S - 10)			(250W EQ) LED	
	(Type SA 40 S - 10 - 10)			(250W EQ) LED		(Type SA 40 T - 10 - 10)			(250W EQ) LED		(Type SP 38 S - 10 - 10)			(250W EQ) LED	
	(Type SA 40 S - 12)			(250W EQ) LED		(Type SA 40 T - 12)			(250W EQ) LED		(Type SP 38 S - 12)			(250W EQ) LED	
	(Type SA 40 S - 12 - 12)			(250W EQ) LED		(Type SA 40 T - 12 - 12)			(250W EQ) LED		(Type SP 38 S - 12 - 12)			(250W EQ) LED	
50	(Type SA 50 S - 4)			(400W EQ) LED		(Type SA 50 T - 4)			(400W EQ) LED		(Type SP 48 S - 4)			(400W EQ) LED	
	(Type SA 50 S - 4 - 4)			(400W EQ) LED		(Type SA 50 T - 4 - 4)			(400W EQ) LED		(Type SP 48 S - 4 - 4)			(400W EQ) LED	
	(Type SA 50 S - 8)			(400W EQ) LED		(Type SA 50 T - 8)			(400W EQ) LED		(Type SP 48 S - 8)			(400W EQ) LED	
	(Type SA 50 S - 8 - 8)			(400W EQ) LED		(Type SA 50 T - 8 - 8)			(400W EQ) LED		(Type SP 48 S - 8 - 8)			(400W EQ) LED	
	(Type SA 50 S - 10)			(400W EQ) LED		(Type SA 50 T - 10)			(400W EQ) LED		(Type SP 48 S - 10)			(400W EQ) LED	
	(Type SA 50 S - 10 - 10)			(400W EQ) LED		(Type SA 50 T - 10 - 10)			(400W EQ) LED		(Type SP 48 S - 10 - 10)			(400W EQ) LED	
	(Type SA 50 S - 12)			(400W EQ) LED		(Type SA 50 T - 12)			(400W EQ) LED		(Type SP 48 S - 12)			(400W EQ) LED	
	(Type SA 50 S - 12 - 12)			(400W EQ) LED		(Type SA 50 T - 12 - 12)			(400W EQ) LED		(Type SP 48 S - 12 - 12)			(400W EQ) LED	

OTHER Designation				Quantity
Pole	A1	A2	Luminaire	

GENERAL NOTES:

1. All work, materials and services not shown on the plans which may be necessary for complete and proper construction shall be performed, furnished and installed by the Contractor. Faulty fabrication or poor workmanship in any material, equipment or installation will be considered justification for rejection. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the Department such warranties or guarantees.

2. The location of poles and fixtures are diagrammatic only and 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. Standard Steel Pole Designs. Steel poles fabricated in accordance with the details and dimensions shown herein, shall be considered standard designs. Submission of shop drawings and design calculations for standard designs is not required.

4. Optional Steel Pole Designs. Multi-sided steel poles may be allowed as optional designs, if steel poles are permitted or required, pending approval by the Department as outlined below.

   a. Shop Drawings. Optional designs require submission of shop drawings and design calculations bearing the seal of an engineer licensed in the State of Texas, in accordance with Item 441, "Steel Structures." The Department may elect to pre-approve some shop drawings for optionally designed poles. Submission of shop drawings and design calculations is not required for structures fabricated in accordance with the details of shop drawings on the pre-approved list maintained by the TxDOT Traffic Operations Division. Any deviation from the pre-approved shop drawings will require submission of shop drawings of the complete assembly and design calculations as described above.
   b. Structural Support Design for Luminaires. Lighting support structures shall be designed for a 25 year design life in accordance with the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto. All poles shall be designed for 110 mph 3-second gust wind speeds. The Gust Factor, G, and Wind Importance Factor, Ir, shall be applied as per the AASHTO Specifications assuming a 25-year design life. The design wind pressure for hurricane wind velocities greater than 100 mph shall not be less than the design wind pressure using 100 mph with the non-hurricane Wind Importance Factor, Ir, value. For transformer base poles, fabricator shall include transformer base and connecting hardware in design calculations and shop drawing submittals. All transformer bases shall have been structurally tested to resist the theoretical plastic moment capacity of the pole. Certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished shall be submitted with the shop drawings. Shop drawings shall show breakaway base model number, and manufacturer's name and logo. Manufacturer's shop drawings shall include the ASTM designations for all materials to be used.
   c. Mast Arm Attachments. All poles and attachments shall be structurally designed to support two 12-foot mast arms and luminaires. Poles shall be supplied with mast arm combinations as shown in the plans. All mast arms shall be designed for a 60-pound luminaire having an effective projected area of 1.6 square feet.
   d. Anchor Bolt Assembly. Anchor bolt assemblies for optionally designed poles shall be the same as those shown herein.

5. Aluminum Pole Designs. Aluminum pole designs may be allowed, if aluminum poles are permitted or required, pending approval by the Department as outlined below.

   a. Meet all of the requirements stated above for optional steel pole designs and the following:
      1. Aluminum poles shall be fabricated in accordance with "Structural Welding Code-Aluminum" AWS D1.2.
      2. Aluminum pole designs shall use the same anchor bolt assembly and be subject to the same geometric restraints and other requirements for steel poles specified herein.
      3. Aluminum poles shall be equipped with vibration mitigation devices, as approved by the engineer.
      4. Pole components shall be constructed using the following material:
         Shaft: ASTM B221 or B241 Alloy 6063-T6, ASTM B209 Alloy 5086-H34, ASTM B221 Alloy 6005-T5.
         Base Flange: ASTM B26 Alloy 356.0-T6 or ASTM B108 Alloy 356.0-T6 (Yield strength test required).
         Mast Arm Fitting: ASTM B209 Alloy 6061-T6 or ASTM B221 Alloy 6005-T5.
         Mast Arms: ASTM B241 Alloy 6061-T6 or Alloy 6063-T6.
         Pole Cap: ASTM B209 Alloy 5086-H32 or ASTM B108 or B26 Alloy 356.0-T6.
         Bolts: Stainless Steel AISI 300 series. Bolts threading into aluminum threads shall be treated with anti-seize compound, Never-Seez Compound, Permatex 133K or equal.

6. Special Designs. Poles with architectural treatments shall meet the requirements shown elsewhere in the plans.

7. Luminaire Mounting Height. Actual luminaire mounting height shall be the nominal mounting height given on RIP(2) for all pole-arm combinations except for poles with 4 ft. luminaire arms, which shall be 3'-0" lower than the nominal height, unless otherwise shown or directed.

EXPLANATION OF ROADWAY ILLUMINATION ASSEMBLY DESIGNATIONS

(TYPE SA 50 T - X - X) (400W EQ) LED

- SA: Pole and mast arm may be steel or aluminum.
- ST: Pole and mast arm must be steel.
- AL: Pole and mast arm must be aluminum.
- SP: Special (ovalized) steel or aluminum pole for installing on CSB or SSCB. See standard sheet CSB (4), or SSCB (4).

Two numerical digits denote nominal mounting height in feet.

Next letter denotes type of base, (S-Shoe Base, T-Transformer Base, or B-Bridge/Ret.Wall Mount)

First number denotes length of mast arm in feet.

Use of second mast arm is indicated by second dashed number which denotes length in feet.

Luminaire rating in watts (i.e. 400W). Equivalent wattage LED fixtures will include EQ (i.e. 400W EQ)

Last letters indicate light source (S - High Pressure Sodium; LED - LED luminaire)

SHEET 1 OF 4

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

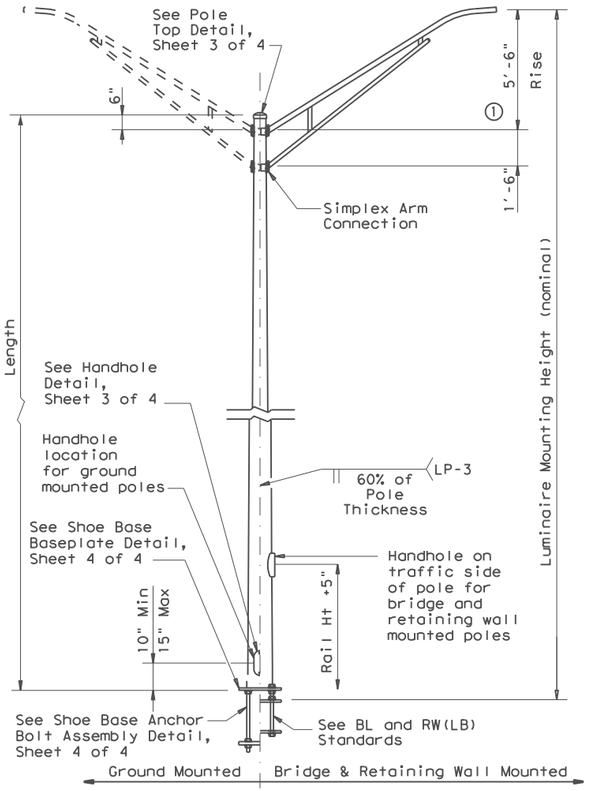
RIP(1)-19

FILE: rip-19.dgn	DN:	CK:	DW:	CK:
© TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS 7-17 12-19	1986	01	070	FM 1314
	DIST	COUNTY		SHEET NO.
	12	MONTGOMERY		058

73A

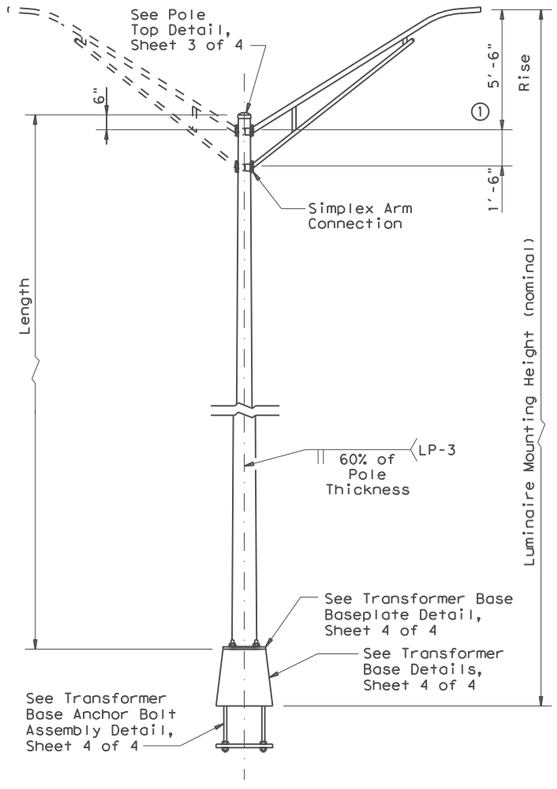
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



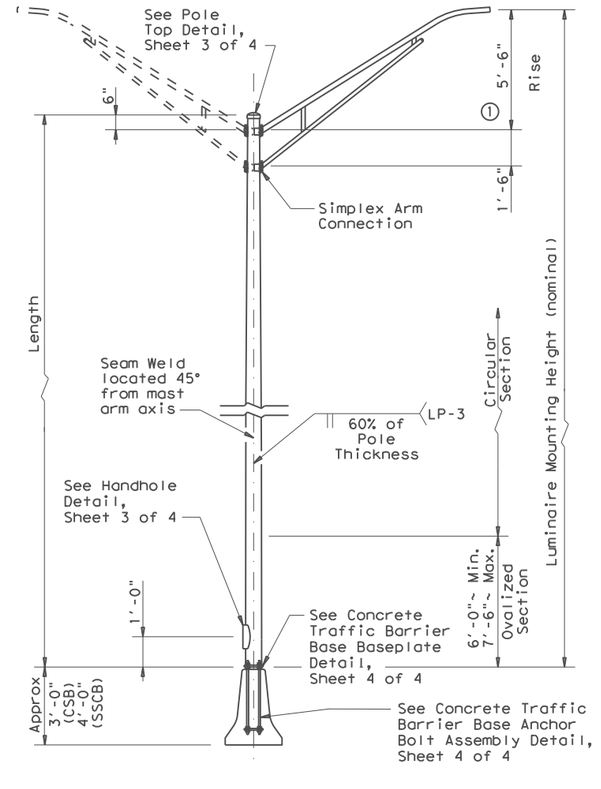
SHOE BASE POLE

SHOE BASE POLE					
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	4.90	15.00	0.1196	7.1
30.00	7.50	4.00	25.00	0.1196	13.2
31.00-39.00	8.00	4.36-3.24	26.00-34.00	0.1196	20.7
40.00	8.50	3.60	35.00	0.1196	20.7
50.00	10.50	4.20	45.00	0.1196	30.3



TRANSFORMER BASE POLE

TRANSFORMER BASE POLE					
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	5.11	13.50	0.1196	7.1
30.00	7.50	4.21	23.50	0.1196	13.2
31.00-39.00	8.00	4.57-3.45	24.50-32.50	0.1196	20.7
40.00	8.50	3.81	33.50	0.1196	20.7
50.00	10.00	3.91	43.50	0.1196	30.3



CONCRETE TRAFFIC BARRIER BASE POLE

CONCRETE TRAFFIC BARRIER BASE POLE (CSB/SSCB)						
Luminaire Mounting Height (Nominal) (ft)	Base ② Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)	
					About ℄ of Rail	Perp. to Rail
28.00	9.00	5.78	23.00	0.1196	10.3	13.2
38.00	9.00	4.38	33.00	0.1196	16.6	20.8
48.00	10.50	4.48	43.00	0.1345	25.1	30.5

MATERIAL DATA		
COMPONENT	ASTM DESIGNATION	MIN. YIELD (ksi)
Pole Shaft (0.14"/ft. Taper)	A572 Gr 50, A595 Gr A, A1011 HSLAS Gr 50 Cl 2 ③, or A1008 HSLAS Gr 50 Cl 2	50
Base Plate and Handhole Frame	A572 Gr.50, or A36	36
T-Base Connecting Bolts	F3125 Gr A325	92
Anchor Bolts	F1554 Gr 55, A193-B7 or A321	55 105
Anchor Bolt Templates	A36	36
Heavy Hex (H.H.) Nuts	A194 Gr 2H, or A563 Gr DH	
Flat Washers	F436	

NOTES:

① 2'-6" rise for 4 ft. luminaire arms.

② Before ovalized as shown on Concrete Traffic Barrier Base Baseplate details, Sheet 4 of 4.

③ A1011 SS Gr 50 may be used instead of HSLAS, provided the material meets the elongation requirements for HSLAS.

POLE ASSEMBLY FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Shaft length	+1"
I.D. of outside piece of slip fitting pieces	+1/8", -1/16"
O.D. of inside piece of slip fitting pieces	+1/32", -1/8"
Shaft diameter: other	+3/16"
Out of "round"	1/4"
Straightness of shaft	±1/4" in 10 ft
Twist in multi-sided shaft	4° in 50 ft
Perpendicular to baseplate	1/8" in 24"
Pole centered on baseplate	±1/4"
Location of Attachments	±1/4"
Bolt hole spacing	±1/16"

GENERAL NOTES:

1. Designs conform to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals , 6th Edition (2013) and Interim Revisions thereto. Design 3-Second Gust Wind Speed equals 110 mph with a 1.14 gust factor. A wind importance factor of 0.80 is applied to adjust the wind speed to a 25 year recurrence interval. Design moments listed in tables assume base of pole is 25' above natural ground level.
2. Structures are designed to support two 12' luminaire mast arms and luminaires. Mast arms are designed to support a 60-pound luminaire having an effective projected area of 1.6 square feet.
3. Fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown herein. Do not submit shop drawings for roadway illumination pole assemblies fabricated in accordance 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 these sheets and the Specifications. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
4. For mounting heights between values shown in the tables, use base diameter and thickness values for the larger height.
5. Unless otherwise noted, all steel parts shall be galvanized in accordance with Item 445, "Galvanizing."
6. Steel poles shall be fabricated in accordance with Item 441, "Steel Structures." Longitudinal seam welds for pole sections shall have 60% minimum penetration. All welding shall be in accordance with AWS D1.1, Structural Welding Code-Steel.
7. Two-section poles joined by circumferential welds will not be permitted, unless otherwise shown on the plans. Poles may be fabricated in two sections and field-assembled by the lap-joint method. The two sections shall telescope together with a lap length of not less than 1-1/2 times the shaft diameter at the lap joint.
8. Alternate material equal to or better than material specified may be substituted with the approval of the Engineer.
9. Lubricate and tighten anchor bolts, when erecting shoe base poles and concrete traffic barrier base poles, in accordance with Item 449, "Anchor Bolts."
10. All poles, except Transformer Base Poles, shall have hand holes with reinforcing frames and covers. For ground mounted shoe base poles, hand holes shall be placed 90 degrees to mast arm unless otherwise noted on the plans. For poles mounted on a concrete traffic barrier with one luminaire arm, hand holes shall be located 180 degrees from luminaire arm. For poles mounted on a concrete traffic barrier with two luminaire arms, all hand holes shall be on the same side of the barrier. For poles mounted on a bridge lighting bracket or a retaining wall lighting bracket, hand hole shall be on traffic side of the pole, at a height that will clear the barrier.
11. The finished pole shall have a smooth, uniform finish free of pits, blisters, or other defects. Scratched, chipped, and other damaged galvanized areas on poles and mast arms shall be repaired in accordance with Item 445, "Galvanizing."
12. Pole length is based on a 5'-6" luminaire arm rise. 4 ft. luminaire arms have a 2'-6" rise. A pole with 4 ft. luminaire arms will have an actual mounting height 3'-0" less than the nominal mounting height. Increasing the pole length to meet the nominal mounting height is allowed, but unnecessary unless otherwise directed by the engineer.
13. Erect transformer base poles in accordance with sheet RID(1).

Texas Department of Transportation

Traffic Safety Division Standard

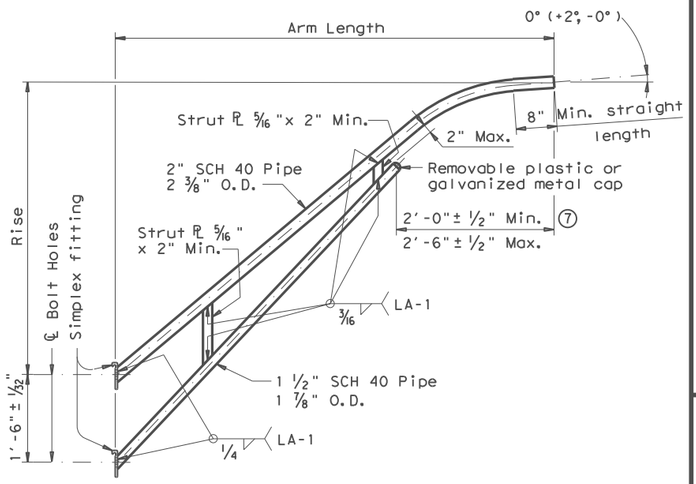
ROADWAY ILLUMINATION POLES

RIP(2)-19

FILE: rip-19.dgn	DN:	CK:	DW:	CK:
©TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS	1986	01	070	FM 1314
7-17	DIST	COUNTY		SHEET NO.
12-19	12	MONTGOMERY		059

73B

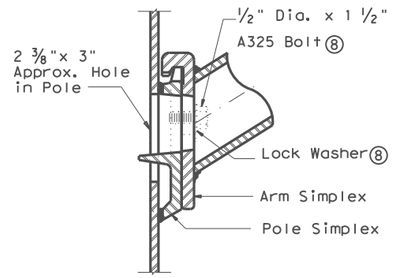
DATE:
FILE:



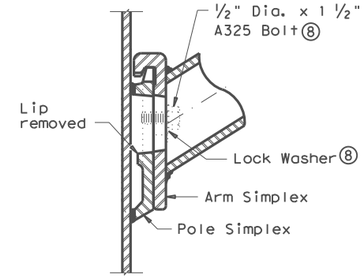
LUMINAIRE ARM

LUMINAIRE ARM DIMENSIONS		
Nominal Arm Length	Arm Length	Rise
4'-0"	3'-6"	2'-6"
6'-0"	5'-6"	5'-6"
8'-0"	7'-6"	5'-6"
10'-0"	9'-6"	5'-6"
12'-0"	11'-6"	5'-6"

ARM ASSEMBLY FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Arm Length	±1"
Arm Rise	±1"
Deviation from flat	1/8" in 12"
Spacing between holes	±1/32"

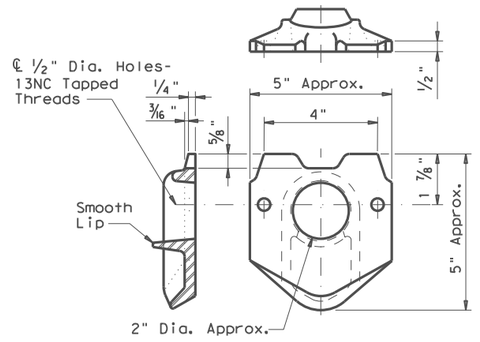


UPPER SIMPLEX FITTING
(Gusset not shown for clarity)

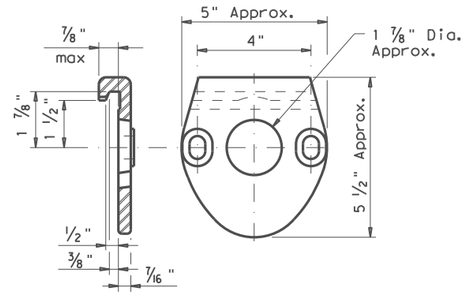


LOWER SIMPLEX FITTING
(Gusset not shown for clarity)

SECTION B-B



POLE SIMPLEX DETAIL ⑨



ARM SIMPLEX DETAIL ⑨

NOTES:

④ Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.

⑤ 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.

⑥ A572, A1008 HSLAS-F, and A1011 HSLAS-F materials may have higher yield strengths but shall not have less elongation than the grade indicated.

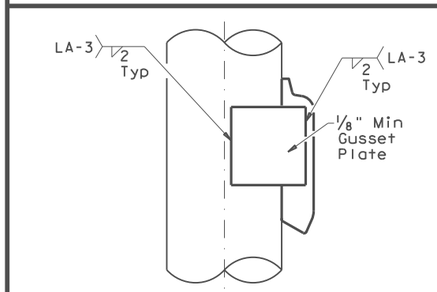
⑦ Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.

⑧ Each pole simplex fitting shall be supplied with 2 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.

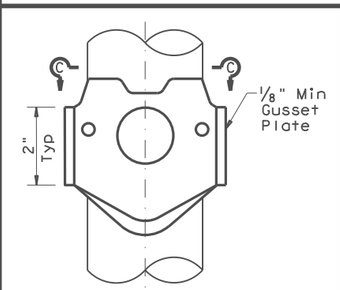
⑨ Proposed deviations in arm simplex dimensions or materials must be submitted to the Department for approval.

⑩ A welded handhole frame is permissible. Maximum of two (2) CJP weld splices is allowed.

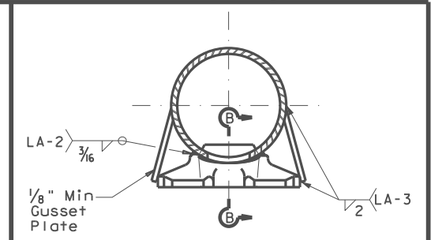
MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr 65-35 or Gr 70-36, A148 Gr 80-50, A576 Gr 1021 ⑤, or A36 (Arm only)
Arm Pipes	ASTM A53 Gr A or B, A500 Gr B, A501, A 1008 HSLAS-F Gr 50 ⑥, or A1011 HSLAS-F Gr 50 ⑥
Arm Struts and Gusset Plates ④	ASTM A36, A572 Gr 50 ⑥, or A588
Misc.	ASTM designations as noted



SIDE

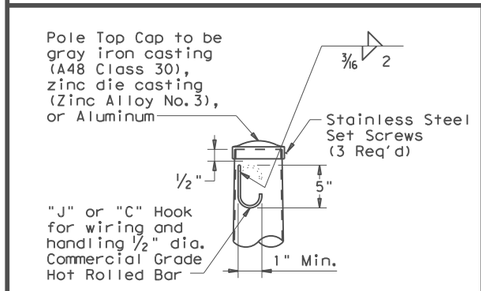


ELEVATION

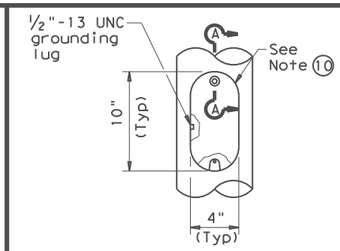


SECTION C-C

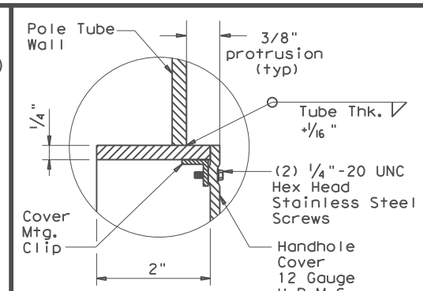
SIMPLEX ATTACHMENT DETAIL



POLE TOP



ELEVATION



SECTION A-A

HANDHOLE

SHEET 3 OF 4

Texas Department of Transportation

Traffic Safety Division Standard

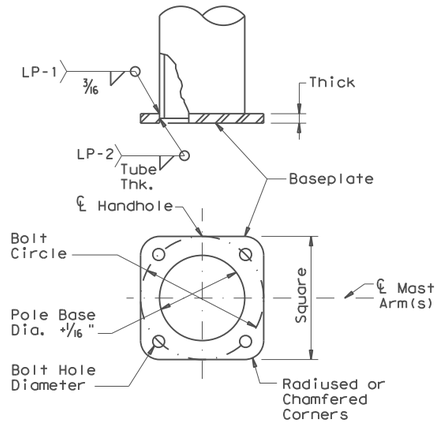
ROADWAY ILLUMINATION POLES

RIP(3)-19

FILE: rip-19.dgn	DN:	CK:	DW:	CK:
©TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS	1986	01	070	FM 1314
7-17	DIST	COUNTY		SHEET NO.
12-19	12	MONTGOMERY		060

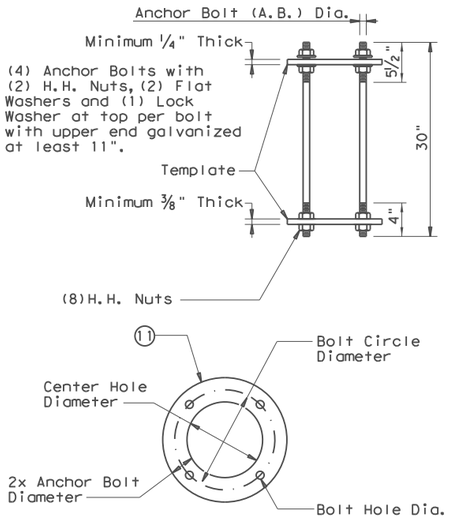
73C

DATE:
FILE:



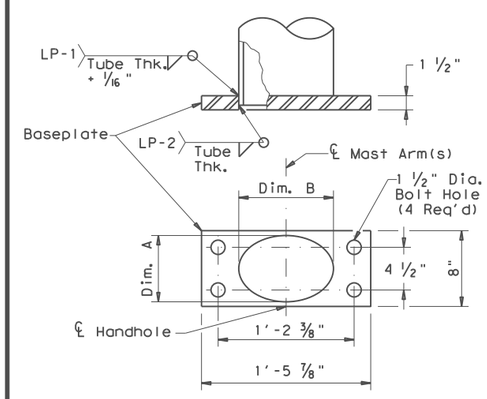
SHOE BASE BASEPLATE

SHOE BASE BASEPLATE TABLE				
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	BOLT HOLE DIAMETER
20' - 39'	13"	13"	1 1/4"	1 1/4"
40'	15"	15"	1 1/4"	1 1/2"
50'	15"	15"	1 1/2"	1 1/2"



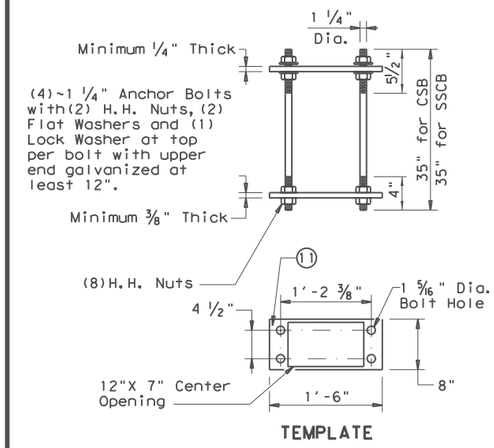
SHOE BASE ANCHOR BOLT ASSEMBLY

SHOE BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20'-39'	1"	13"	11"	1 1/16"
40'-50'	1 1/4"	15"	12 1/2"	1 5/16"



CONCRETE TRAFFIC BARRIER BASE BASEPLATE

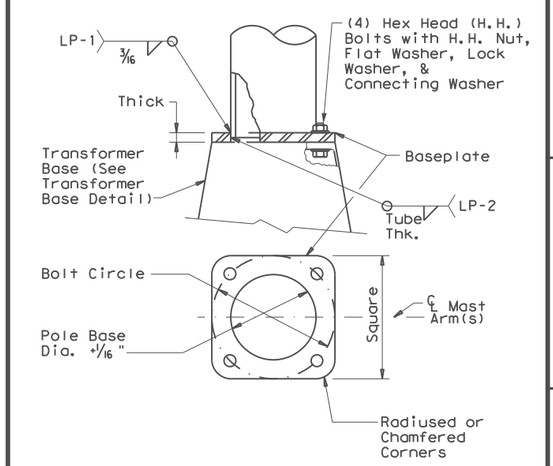
CONCRETE TRAFFIC BARRIER BASE BASEPLATE TABLE			
MOUNTING HEIGHTS (nominal)	POLE DIA.(12)	DIM. A	DIM. B
28' - 38'	9"	7" ± 1/4"	10" ± 1/4"
48'	10 1/2"	7" ± 1/4"	13" ± 1/4"



TEMPLATE

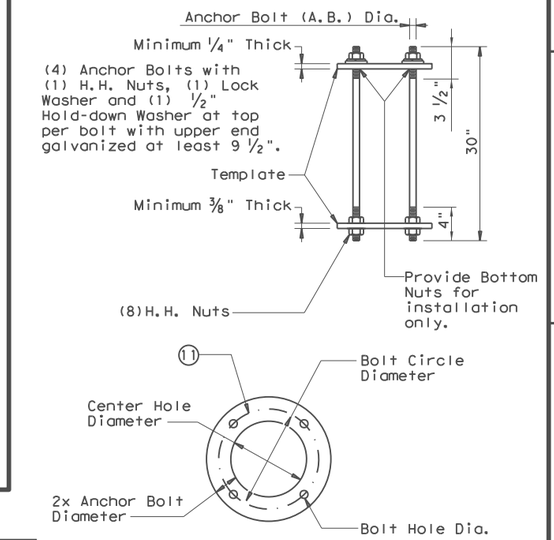
CONCRETE TRAFFIC BARRIER BASE ANCHOR BOLT ASSEMBLY

TRANSFORMER BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20' - 39'	1"	14"	12"	1 1/16"
40' - 50'	1 1/4"	17 1/4"	14 3/4"	1 5/16"



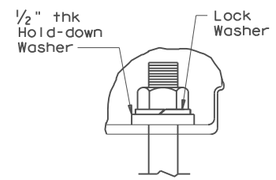
TRANSFORMER BASE BASEPLATE

TRANSFORMER BASE BASEPLATE TABLE						
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	CONNECTING BOLT DIA.	BOLT HOLE DIAMETER	TRANSFOMER BASE TYPE
20' - 39'	13"	13"	1 1/4"	1"	1 1/4"	A
40'	15"	15"	1 1/4"	1 1/4"	1 1/2"	B
50'	15"	15"	1 1/2"	1 1/4"	1 1/2"	B

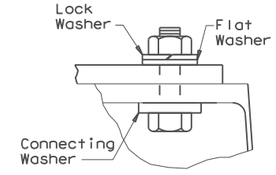


TRANSFORMER BASE ANCHOR BOLT ASSEMBLY

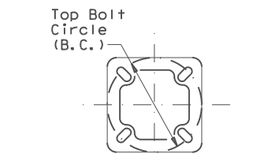
TRANSFORMER BASE TABLE		
TYPE	TOP B.C.	BTM. B.C.
A	13"	14"
B	15"	17 1/4"



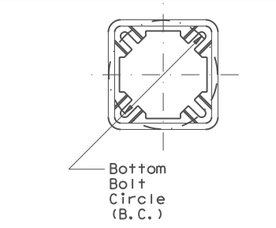
DETAIL A



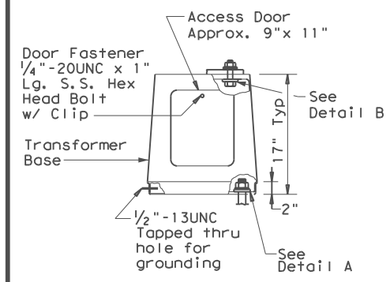
DETAIL B



TOP PLAN



BOTTOM PLAN



ELEVATION

TRANSFORMER BASE DETAILS

GENERAL NOTES:

1. For mounting heights between those shown in the table, use the values in the table for the larger mounting height.
2. All breakaway bases shall meet the breakaway requirements of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto, and shall have been tested by FHWA-approved methods. All bases shall have been structurally tested to resist 150% of the design moment.
3. Transformer bases shall be cast from aluminum, ASTM B108 or B26 Alloy 356.0-T6, or other material approved by the Engineer. Four Hex Head (H.H.) bolts with four H.H. nuts, four lock washers, four flat washers, and connecting and hold-down washers as recommended by the manufacturer, galvanized to ASTM A153 Class C or D, or B695 Class 50, shall be provided with each transformer base for connecting the pole. Bolts shall be ASTM A325 or approved equal. Nuts shall be ASTM A563 grade DH galvanized.
4. Bases shall be stamped, incised or by other approved permanent means, marked to show fabricator's name or logo, and model number. Such information shall be placed in a readily seen location, inside or outside the base, but shall not be placed on the door.
5. Doors for transformer bases shall be made of plastic, fiberglass or other non-metallic material approved by the Engineer and shall be attached with stainless steel screws or bolts. Transformer bases shall be cleaned by grit blast cleaning after heat treatment. Certification by the manufacturer of heat treatment shall be furnished with transformer bases. The certification shall show the metal alloy and temper and that the base meets those requirements, chemical and physical. The certification shall also show the material ASTM specification. Transformer bases shall be cast with a removable tab bar for material testing. Some bars may have been removed by the manufacturer for testing.

NOTES:

(11) Anchor Bolt Templates do not need to be galvanized.

(12) Pole diameter before ovalized.

ANCHOR BOLT FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Length	± 1/2"
Threaded length	± 1/2"
Galvanized length (if required)	- 1/4"

Texas Department of Transportation

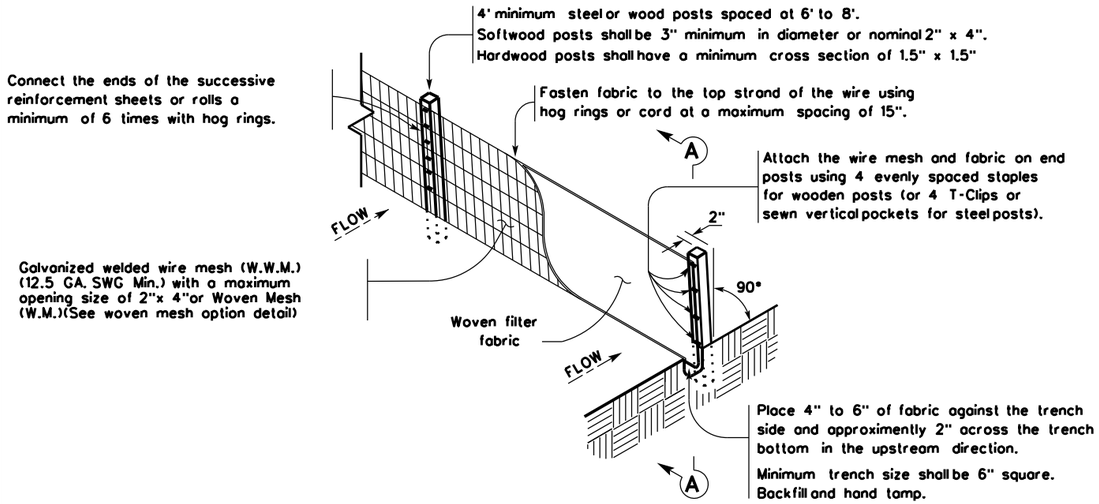
Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(4)-19

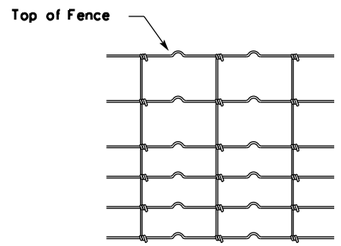
FILE: rip-19.dgn	DN:	CK:	DW:	CK:
©TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS 7-17 12-19	1986	01	070	FM 1314
	DIST	COUNTY		SHEET NO.
	12	MONTGOMERY		061

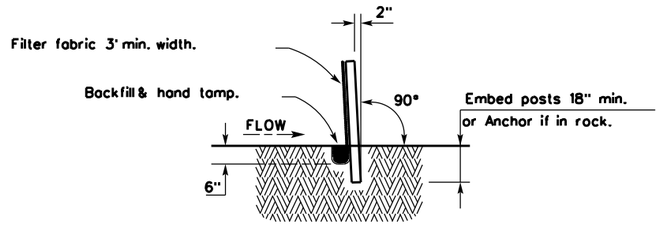
730



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT . Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

LEGEND

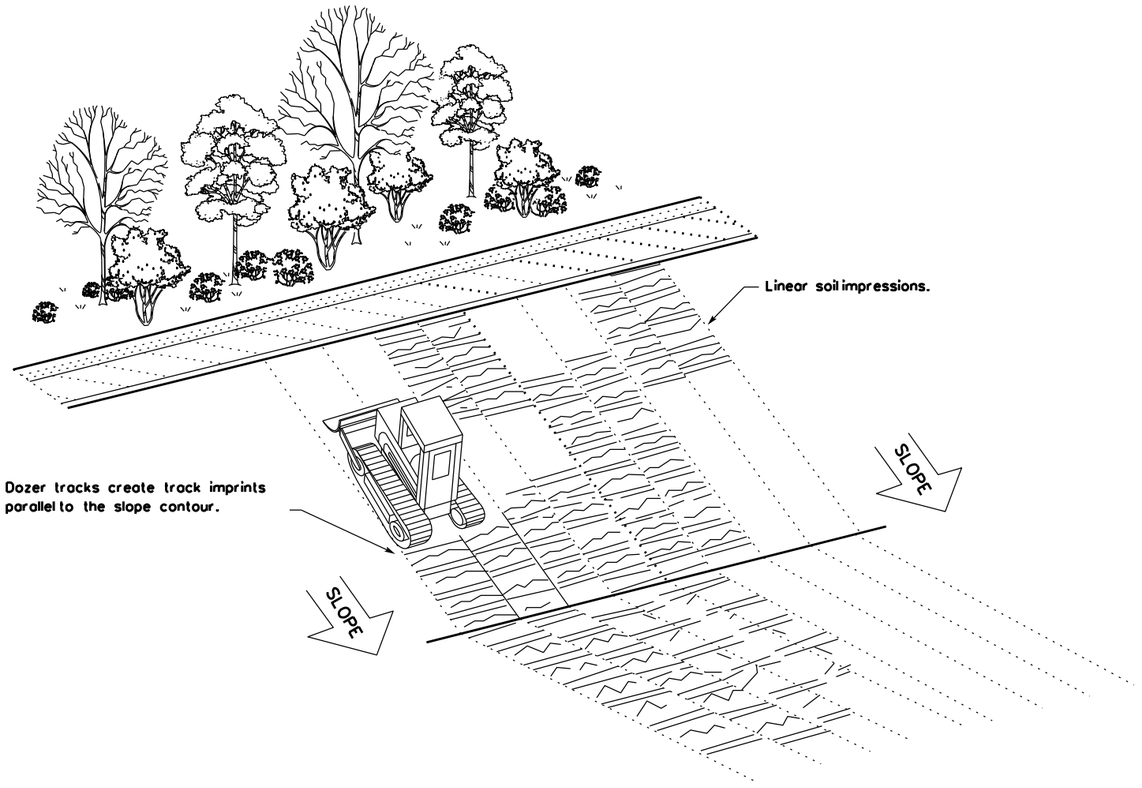
Sediment Control Fence

SCF

DATE
FILE

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS		
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	1986	01	070		FM 1314	
	DIST	COUNTY			SHEET NO.	
	12	MONTGOMERY			062	

I. STORMWATER POLLUTION PREVENTION

Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit is 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. Refer to the TxDOT SWP3 Summary Sheets, SWP3 Binder Template, and Form 2118.

No Additional Comments

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS

United States Army Corps of Engineers (USACE) Permit is required for filling, dredging, excavating or other work in water bodies, rivers, creeks, streams, wetlands or wet areas. The Contractor must adhere to all of the terms and general conditions associated with the following permit(s). If additional work not represented in the plans is required, contact the Engineer immediately.

☒ No United States Army Corps (USACE) Permit Required

☐ Work is authorized by the United States Army Corps of Engineers (USACE) under a Nationwide Permit (NWP) without a Pre-Construction Notification (PCN). Project specific permit was not issued by USACE, therefore is not in the plan set. The USACE general conditions are in the “General Notes."

☐ Work is authorized by the United States Army Corps of Engineers (USACE) under a Nationwide Permit (NWP) with a Pre-Construction Notification (PCN). The project specific permit issued by the United States Army Corps of Engineers (USACE) is included in the plan set. The USACE general conditions are in the “General Notes."

☐ Work is authorized by the United States Army Corps of Engineers (USACE) under a Individual Permit (IP). The project specific permit issued by the United States Army Corps of Engineers (USACE) is included in the plan set.

☐ Work would be authorized by the United States Army Corps of Engineers (USACE) permit. The project specific permit issued by the USACE will be provided to the contractor.

United States Coast Guard (USCG) Permit is required for projects that involve the construction or modification (including changes to lighting) of a bridge or causeway across a water body determined to be navigable by the United States Coast Guard (USCG) under Section 9 of the Rivers and Harbors Act. If additional work not represented in the plans is required, contact the Engineer immediately.

☒ No United States Coast Guard (USCG) Coordination Required

☐ United States Coast Guard (USCG) Permit

☐ United States Coast Guard (USCG) Exemption

1R$GGLWLRQDO &RPPHQWV

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 area and contact the Engineer immediately.

No Additional Comments

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical. Refer to TxDOT Standard Specifications in order to comply with requirements for invasive species, beneficial landscaping and tree/brush removal.

No Additional Comments

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

If any of the listed species below are observed, cease work in the area, do not disturb species or habitat and contact the Engineer immediately.

The work may not remove active nests (from bridges, structures, or vegetation adjacent to the roadway, etc.) during nesting season (February 15 to October 1). If removal of structures or vegetation is necessary during the nesting season, the Contractor shall conduct a bird survey no more than 3 days in advance of the clearing/demolish start date. All bird surveys shall be conducted by a Field Biologist and adhere to the guidance document “Avoiding Migratory Birds and Handling Potential Violations” found in the TxDOT Environmental Compliance Toolkits at the time of the survey. (See below for Field Biologist and Ornithologist qualifications)

No Additional Comments

Field Biologist, Ornithologist – a field biologist is defined as an individual qualified to perform field investigations, presence/absence surveys and habitat surveys for protected avian species or species of concern. A mandatory bachelor’s degree in biology or a related science is required. At a minimum, the Field Biologist, Ornithologist, shall have completed and reported a minimum of three presence/absence and habitat surveys for protected avian species in the past five years. A minimum of three projects must have been conducted in Texas. Surveys shall have been performed for documentation of species in accordance with a protocol approved by USFWS or TPWD, or following generally accepted methodologies.

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

Refer to TxDOT Standard Specifications in the event potentially contaminated materials are observed, such as dead or distressed vegetation, trash disposal areas, drums, canisters, barrels, leaching or seepage of substances, unusual smells or odors, or stained soil, cease work in the area and contact the Engineer immediately.

No Additional Comments

VII. OTHER ENVIRONMENTAL ISSUES

Comments:

DATE: Feb 28, 2023
FILE:

Version 2.2

Texas Department of Transportation

TxDOT Houston District

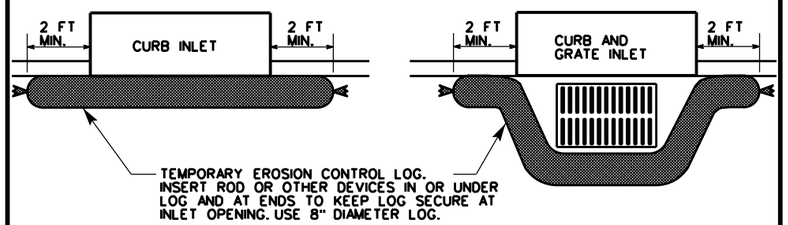
ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	1986	01	070	FM 1314
UPDATED section V. text and added definition (10/17) ADDED USCG and USACE notes in Section VII (04/18)	DIST	COUNTY		SHEET NO.
	HOU	Montgomery		063

CURB INLETS
8" DIAMETER LOGS

ITEM 506-6040 BIODEG EROSN CONT LOGS (INSTL) (8")



MATERIAL REQUIREMENTS

FILL:

Use 100% shredded mulch or other non-compost biodegradable material as fill for logs.
No compost or fines.

DO NOT USE MATERIAL WHICH PROHIBITS WATER INFILTRATION.

LOG MESH:
Use mesh with 1/4" openings or larger. Mesh must allow water infiltration but also hold fill material in place.

SEDIMENT BASIN & TRAP USAGE GUIDELINES

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

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).

Sediment traps should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way

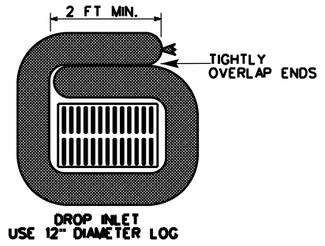
The trap should be cleaned when the capacity has been reduced by 1/2 or the sediment has accumulated to a depth of 1', whichever is less.

REQUIRED ITEMS:

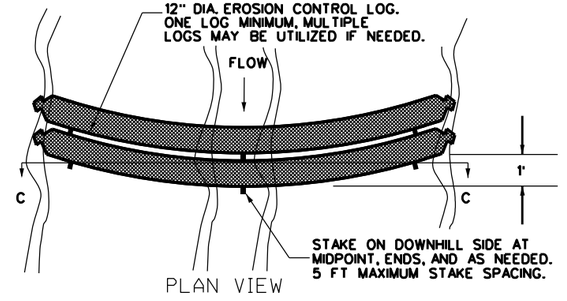
- ITEM 506-6040 BIODEG EROSN CONT LOGS (INSTL) (8") LF
- ITEM 506-6041 BIODEG EROSN CONT LOGS (INSTL) (12") LF
- ITEM 506-6043 BIODEG EROSN CONT LOGS (REMOVE) LF

DROP INLETS AND OTHER LOCATIONS
12" DIAMETER LOGS

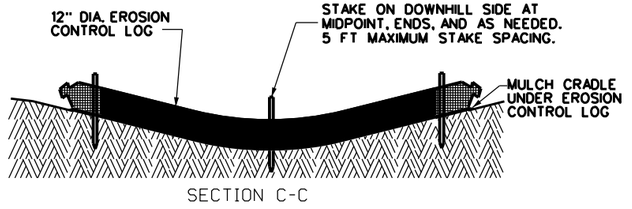
ITEM 506-6041 BIODEG EROSN CONT LOGS (INSTL)(12")



DROP INLETS

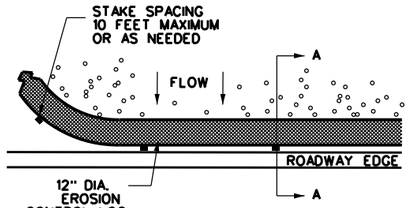


PLAN VIEW

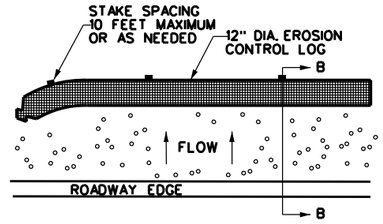


SECTION C-C

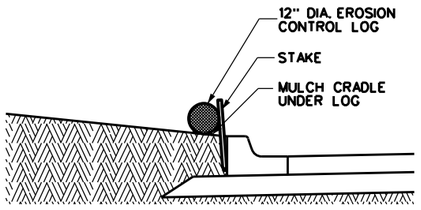
DRAINAGE SWALE OR DITCH



PLAN VIEW

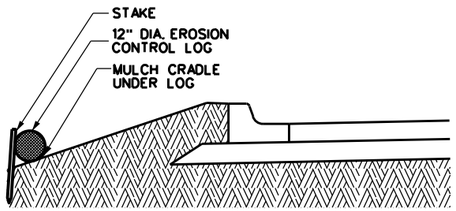


PLAN VIEW



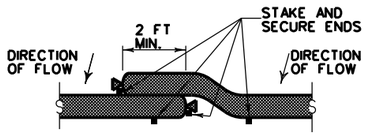
SECTION A-A

SLOPE TO ROADWAY EDGE

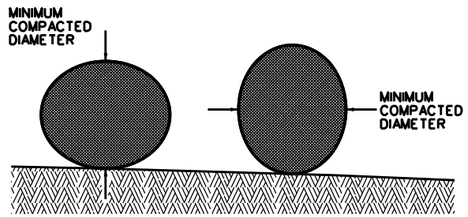


SECTION B-B

SLOPE AWAY FROM ROADWAY EDGE



END OF LOG OVERLAP



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation
Houston District

EROSION CONTROL LOG

ECL-12

FILE: STDG4a.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot			
©TxDOT 2014	DISTRICT	FED REG	PROJECT NUMBER				SHEET
REVISIONS 3/15 MINOR CORRECTIONS	HOU	6					064
	COUNTY			CONTROL	SECT	JOB	HIGHWAY
	MONTGOMERY			1986	01	070	FM 1314

STD G-4A

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

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

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

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

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):

1986-01-070

1.2 PROJECT LIMITS:

From: SH99

To: SL 494

1.3 PROJECT COORDINATES:

BEGIN: (Lat) 30° 8'13.93"N ,(Long) 95°17'24.32"W

END: (Lat) 30° 6'8.50"N ,(Long) 95°13'47.43"W

1.4 TOTAL PROJECT AREA (Acres): 0.04

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.04

1.6 NATURE OF CONSTRUCTION ACTIVITY:

INSTALLATION OF 160 CONVENTIONAL STRET LIGHTING POLES

1.7 MAJOR SOIL TYPES:

Soil Type	Description

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):

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

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

Type	Sheet #s

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

1.9 CONSTRUCTION ACTIVITIES:

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

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

1.10 POTENTIAL POLLUTANTS AND SOURCES:

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

1.11 RECEIVING WATERS:

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

Tributaries	Classified Waterbody

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

1.12 ROLES AND RESPONSIBILITIES: TxDOT

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

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

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

P.E. 5/25/2023 DATE

STATE OF TEXAS
MOHAMMEDREZA MOLAEI
122197
LICENSED PROFESSIONAL ENGINEER

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

Texas Department of Transportation

Sheet 1 of 2

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	1986-01-070		065
STATE	STATE DIST.	COUNTY	
TEXAS	12	MONTGOMERY	
CONT.	SECT.	JOB	HIGHWAY NO.
1986	01	070	FM 1314

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

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

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

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

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

2.2 SEDIMENT CONTROL BMPs:

T / P

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

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

2.3 PERMANENT CONTROLS:

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

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

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

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

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

2.5 POLLUTION PREVENTION MEASURES:

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

2.6 VEGETATED BUFFER ZONES:

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

Type	Stationing	
	From	To

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

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

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

2.8 INSPECTIONS:

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

2.9 MAINTENANCE:

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

P.E. 5/25/2023
DATE

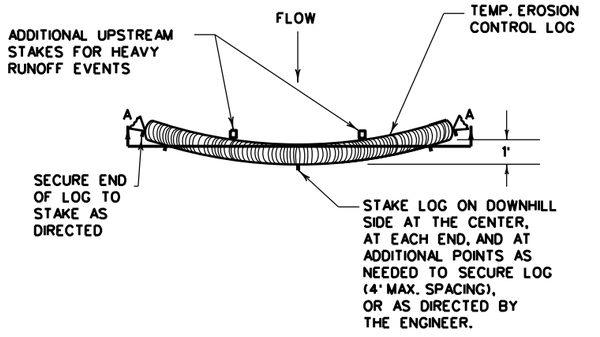
STATE OF TEXAS
MOHAMMEDREZA MOLAEI
122197
LICENSED
PROFESSIONAL ENGINEER

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

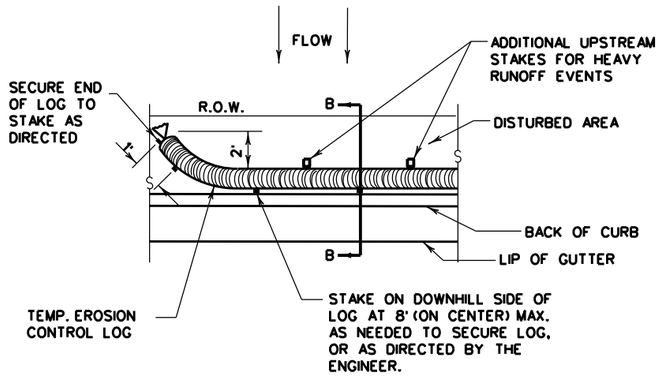
Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	1986-01-070		066
STATE	STATE DIST.	COUNTY	
TEXAS	12	MONTGOMERY	
CONT.	SECT.	JOB	HIGHWAY NO.
1986	01	070	FM 1314

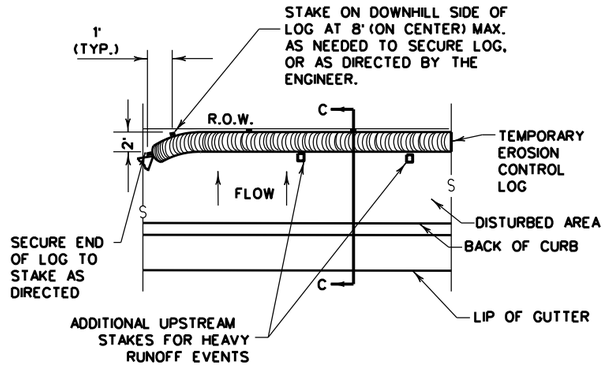
DATE:
FILE:



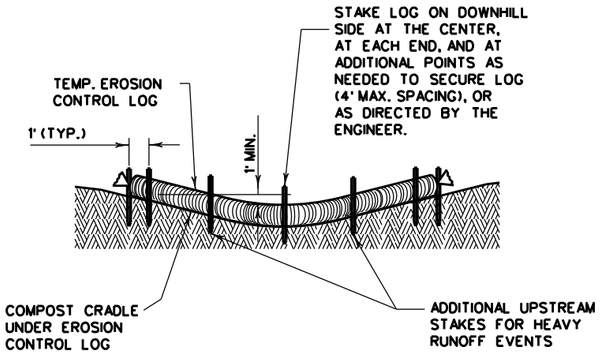
PLAN VIEW



PLAN VIEW



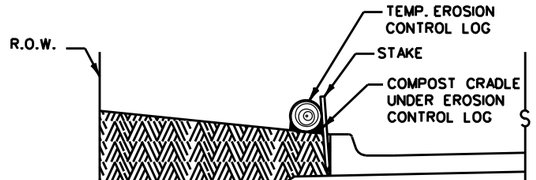
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

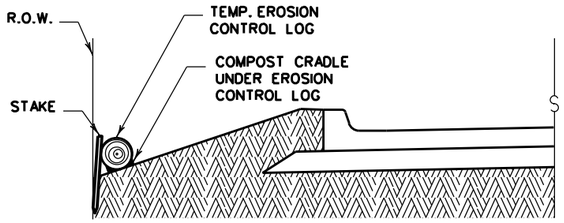
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



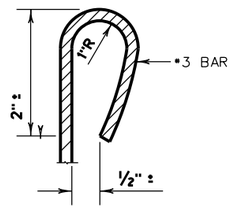
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW

LEGEND

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



REBAR STAKE DETAIL

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion 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:

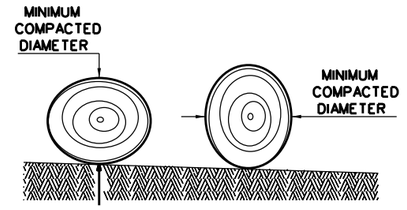
1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows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

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.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation

Design Division Standard

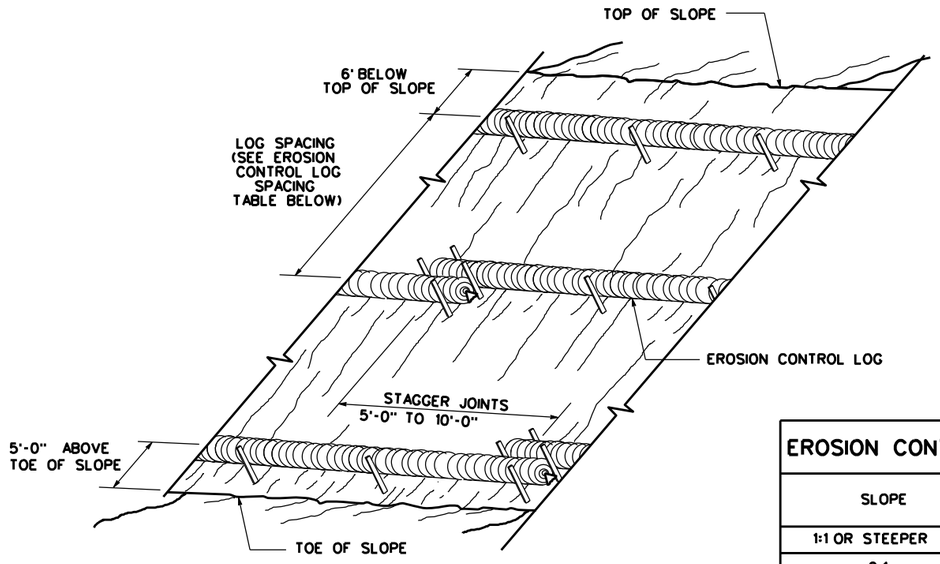
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

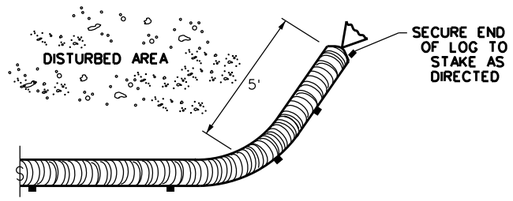
FILE: ec916	DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	1986	01	070		FM 1314	
	DIST	COUNTY				SHEET NO.
	12	MONTGOMERY				067

DATE:
FILE:



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

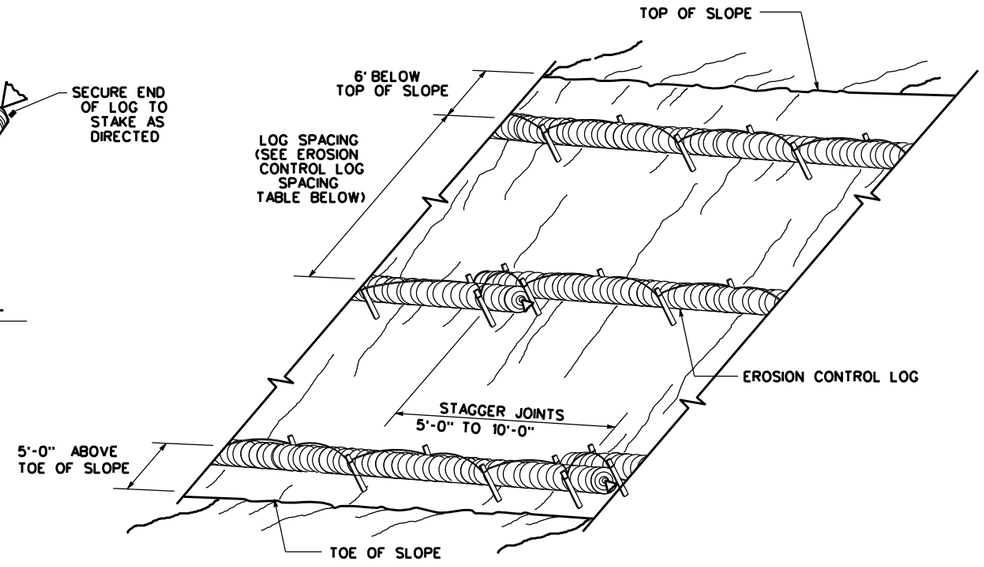
CL-SST



END SECTION RAP DETAIL

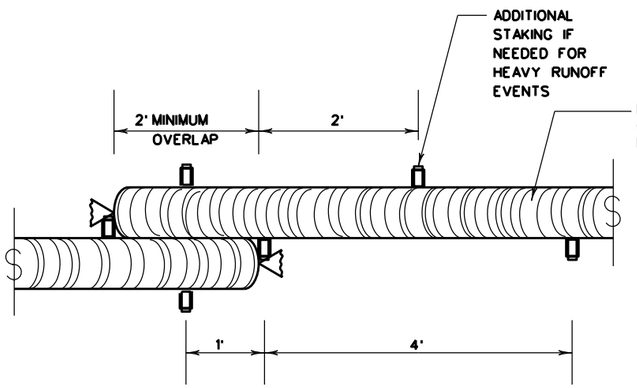
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

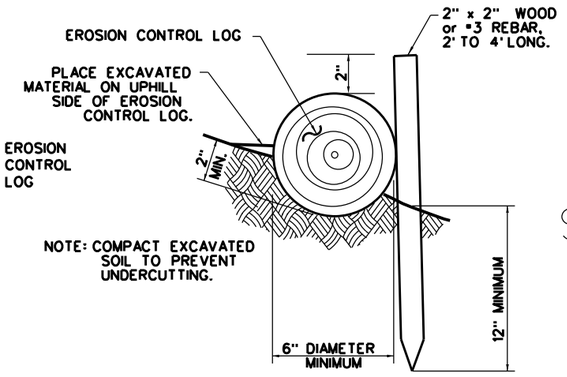
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER:
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

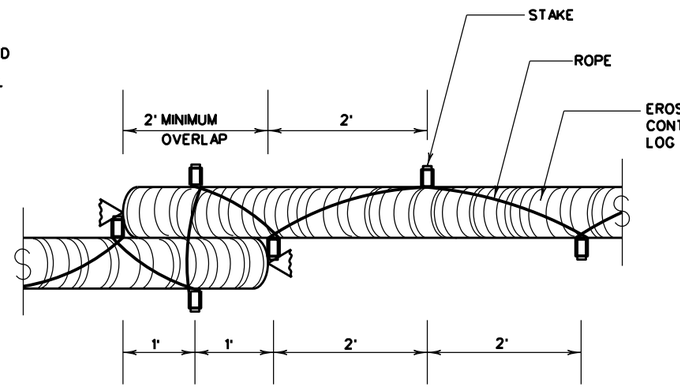


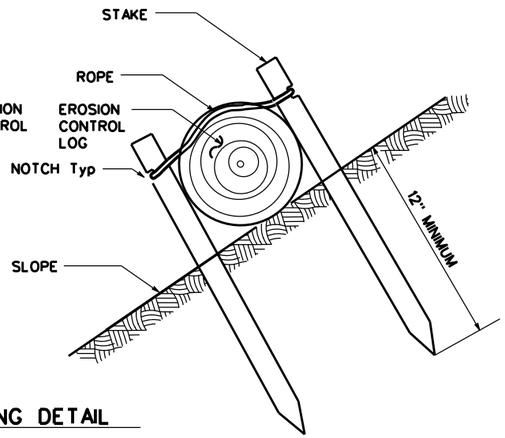


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

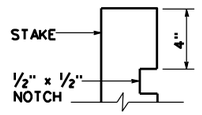
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

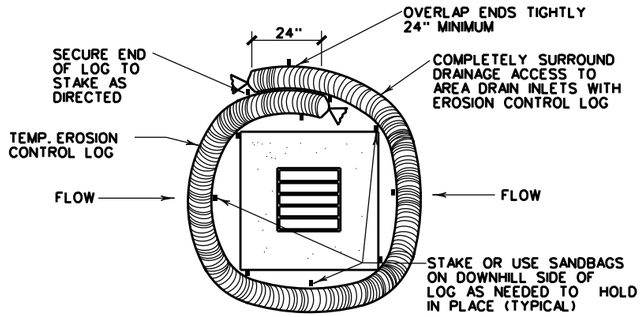
Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

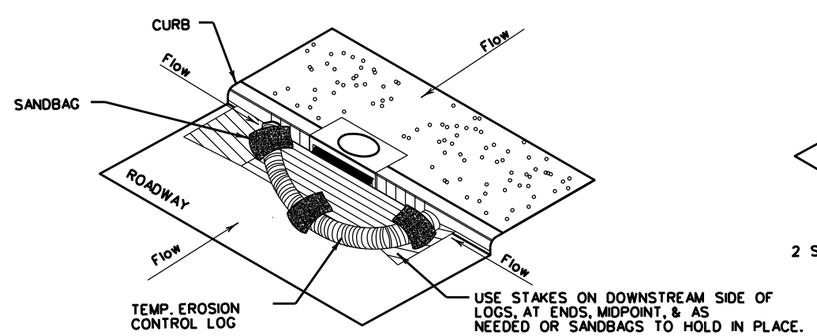
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1986	01	070	FM 1314
	DIST	COUNTY		SHEET NO.
	12	MONTGOMERY		068

DATE:
FILE:



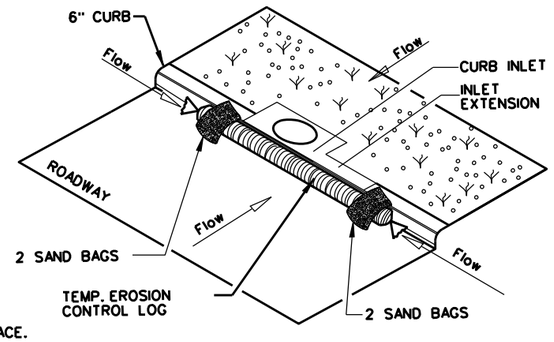
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

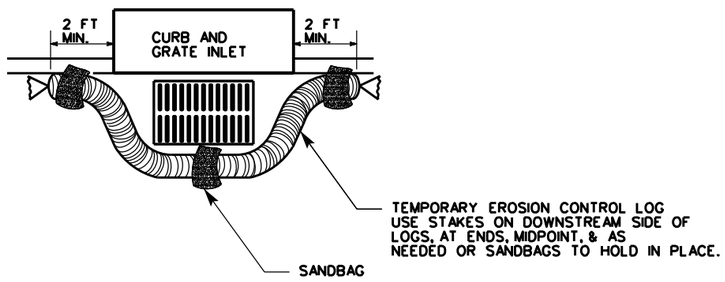
CL-CI



EROSION CONTROL LOG AT CURB INLET

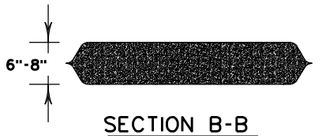
CL-CI

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

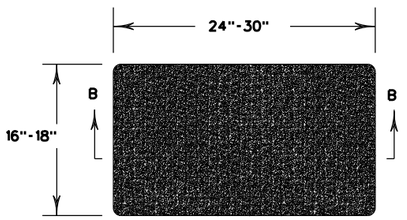


EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	1986	01	070		FM 1314	
	DIST	COUNTY				SHEET NO.
	12	MONTGOMERY				069