| FED.RD. DIV.NO. | PROJECT NO. | | SHEET NO. |
|---|---|---|---|
| 6 | C535-4-31, ETC. | | 1 |
| STATE | STATE DIST.NO. | COUNTY | |
| TEXAS | YKM | GONZALES, ETC. | |
| CONT. | SECT. | JOB | HIGHWAY NO. |
| 0535 | 04 | 031,ETC | IH 10 |

INDEX OF SHEETS

SEE SHEET NO. 2 FOR INDEX OF SHEETS

CONTRACTOR: _____
DATE OF LETTING: _____
DATE WORK BEGAN: _____
DATE WORK COMPLETED: _____
DATE WORK ACCEPTED: _____
FINAL CONTRACT COST: $ _____
LIST OF APPROVED FIELD CHANGES: _____

# STATE OF TEXAS
## DEPARTMENT OF TRANSPORTATION

## PLANS OF PROPOSED
## STATE HIGHWAY IMPROVEMENT
FOR THE CONSTRUCTION OF DYNAMIC MESSAGE SIGN BOARDS
CONSISTING OF INSTALL DYNAMIC MESSAGE SIGN(DMS)

# IH 10
# GONZALES COUNTY, FAYETTE COUNTY, COLORADO COUNTY
CSJ: 0535-04-031, ETC.
PROJECT NUMBER: C 535-04-031, ETC.

IH 10

FUNCTIONAL CLASSIFICATION: RURAL FREEWAY

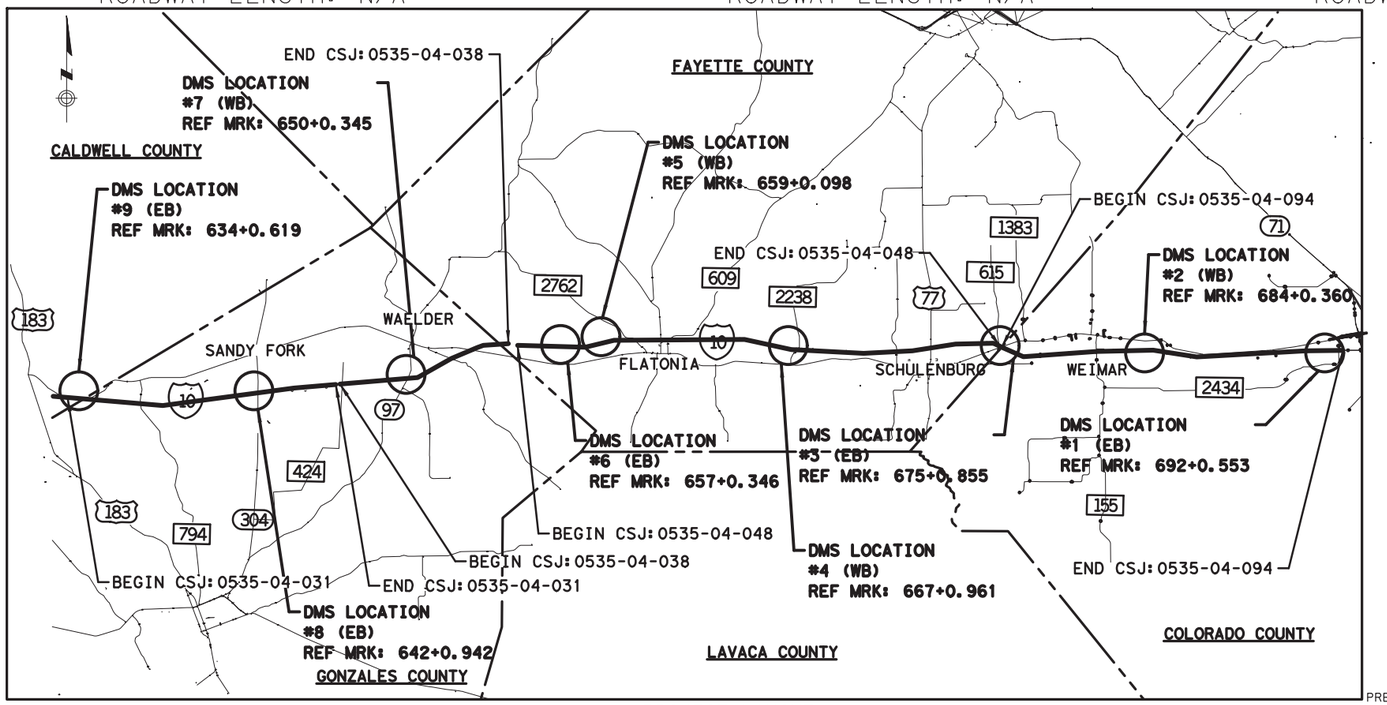
DESIGN SPEED: N/A

CSJ: 0535-04-031
GONZALES CO.
PROJECT NUMBER: C 535-4-31
LIMITS: FROM 0.1 MI EAST OF CALDWELL C/L TO CALDWELL C/L
ADT: VARIOUS
ROADWAY LENGTH: N/A

CSJ: 0535-05-038
GONZALES CO.
PROJECT NUMBER: C 535-5-38
LIMITS: FROM 0.1 MI WEST OF CR 424 TO 0.41 MI WEST OF FAYTTE C/L
ADT: VARIOUS
ROADWAY LENGTH: N/A

CSJ: 0535-06-048
FAYETTE CO.
PROJECT NUMBER: C 535-6-48
LIMITS: FROM 2 MI EAST OF GONZALES C/L TO 0.38 MI WEST FM 2238
ADT: VARIOUS
ROADWAY LENGTH: N/A

CSJ: 0535-08-094
COLORADO CO.
PROJECT NUMBER: C 535-8-94
LIMITS: FROM 0.13 MI EAST OF FAYETTE C/L TO 0.61 MI WEST OF FM 2434
ADT: VARIOUS
ROADWAY LENGTH: N/A




PROJECT LAYOUT
NTS
EQUATIONS - NONE
EXCEPTIONS - NONE
RAILROAD GRADE CROSSINGS - NONE

100% SUBMITTAL

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046


STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER
Hidi M. Criswell
5/19/2023

THIS IS TO CERTIFY THAT THE CONSTRCTION WORK WAS PERFORMED IN ACCORDANCE WITH THE PLANS, CONTRACT, AND LISTED FIELD CHANGES.

P.E.
AREA ENGINEER DATE

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOW, SHALL GOVERN ON THIS PROJECT: SPECIAL LABOR PROVISIONS FOR STATE PROJECTS (000---008)



PREPARED FOR LETTING: _____ 20___
Hidi M. Criswell 5/19/2023
PROJECT ENGINEER

SUBMITTED FOR LETTING: 5/24/2023 20___
DocuSigned by: Jeffery Vinklarek, P.E.
DIRECTOR OF TRANSPORTATION, PLANNING AND DEVELOPMENT
C6D072A712F24F0...

APPROVED FOR LETTING: 5/24/2023 20___
DocuSigned by: Martin C. Horsley PE
DISTRICT ENGINEER
894AD332139E48D...

5/19/2023 1:21:57 PM TxDOT*pdf*grayscale.plt
G:\TXHVProject*s\TxDOT\66776-04-IH10*DMS**YKM\TS\01*CADD\SHEETS\IH10*COVER.dgn

**THE STANDARD SHEETS SPECIFICALLY IDENTIFIED BY # HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.**

Hidi M. Criswell

**HIDI M. CRISWELL, P.E.**

**5/19/2023**
**DATE**

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER

Hidi M. Criswell

5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |



Texas Department of Transportation®

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TBPE Registration No. F-1046



**IH 10**

# INDEX OF SHEETS

SHEET 1 OF 1

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO |
| 0535 | 04 | 031, ETC | 2 |

PEN TABLE: ...\TXH\PCSETUP\Tables\TXDOT.TBL
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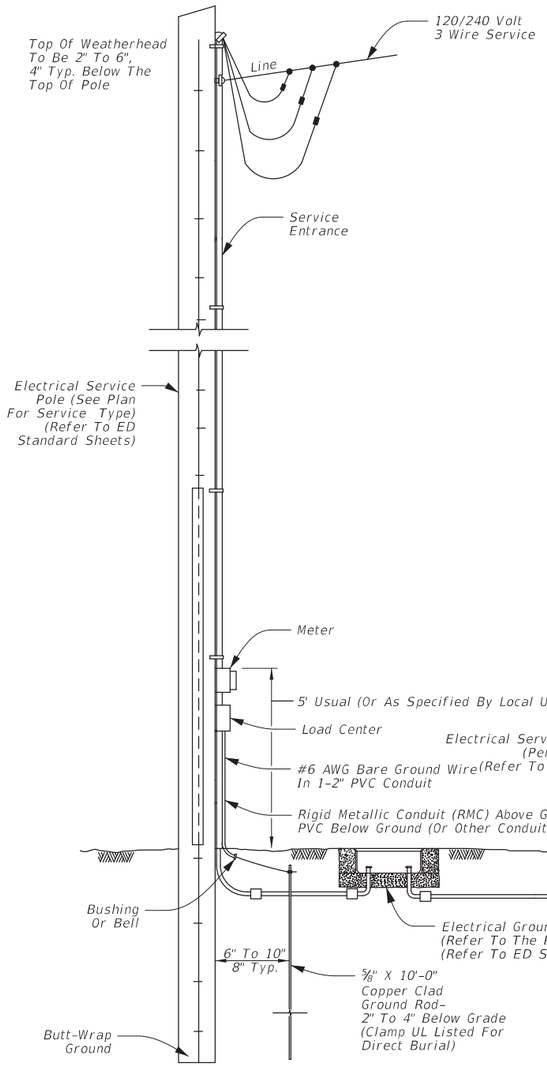
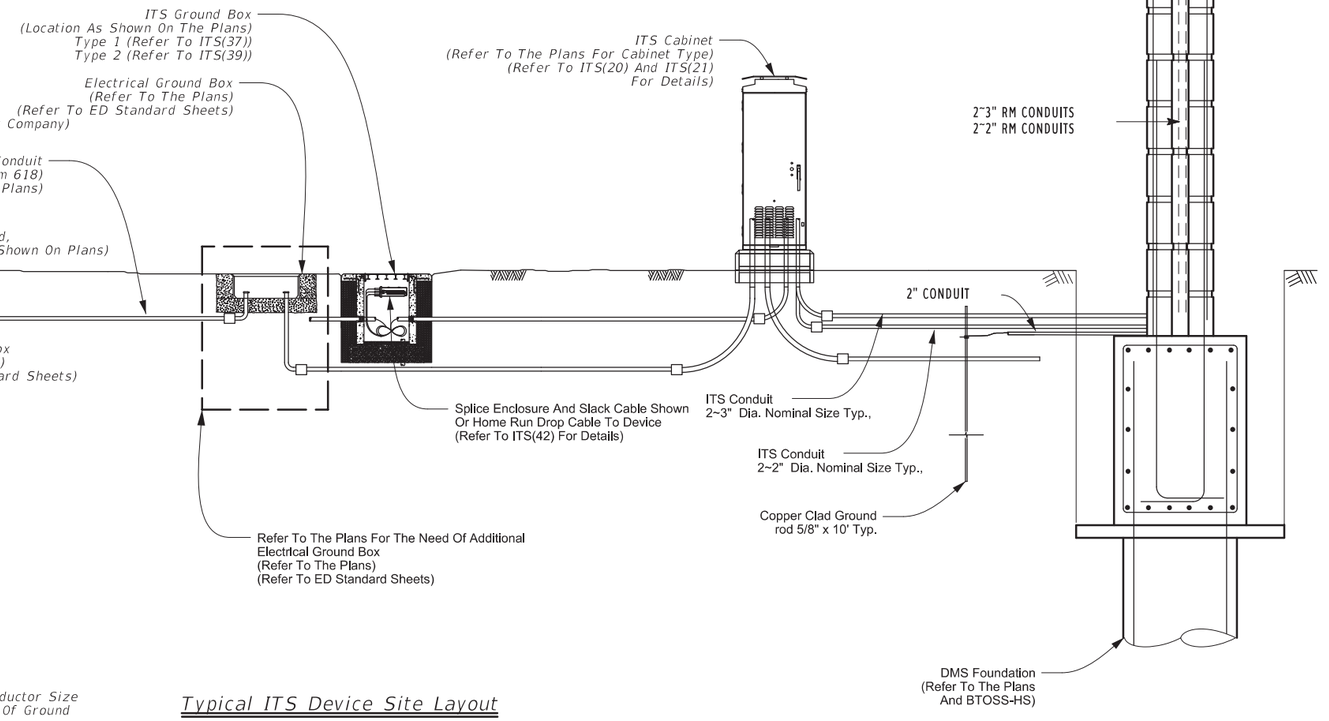
5/19/2023 1:21:58 PM bwa
MODEL: Default
FILE: G:\TXH\Projects\TxDOT\6676-04-IH10_DMS_YKM\TS\01_CADD\SHEETS\IH10_INDEX.dgn
...\01_CADD\SHEETS\IH10_INDEX.dgn

## General Notes:

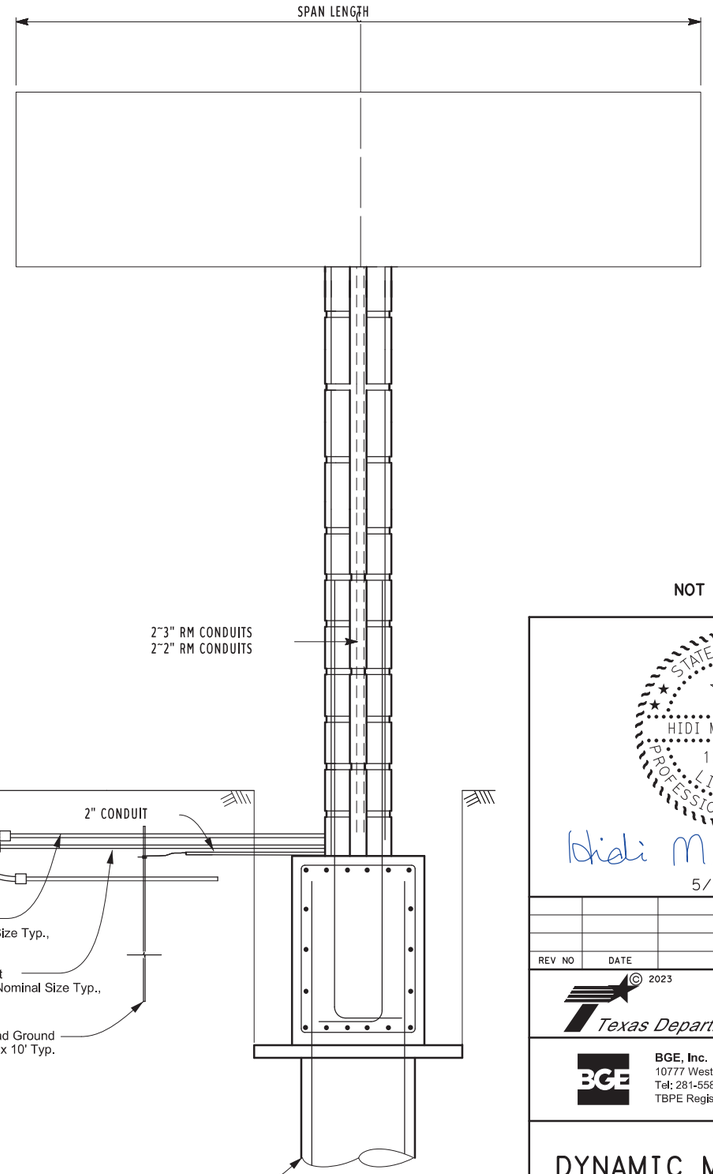
1. Seal all ITS communications conduits with waterproof duct plugs and seals.
2. Seal ends of all conduit entries into ITS cabinets with Oakum or other as approved by the District representative and pack with duct sealant.
3. Locate ground boxes for electrical and ITS communications within 5'-0" of cabinet enclosure, or as directed by the Engineer.
4. Refer to ED standard sheets for additional notes regarding electrical service.
5. Install service pole ground rod at alternate location when directed by the engineer. Maintain a minimum of 8'-0" in contact with the earth.
6. Utilize liquidtight flexible metal conduit (LFMC), as required when meter and service enclosure are mounted 90 to 180 degrees to each other. Refer to ED standard sheets for details on LFMC use.
7. Refer to ITS(21), ITS(37) and ITS(39) for details regarding conduit depth and entry into ITS ground boxes.
8. Lock all enclosures and bolt all ground box covers before power is applied to the circuit. Refer to the ITS cabinet references indicated on this sheet for cabinet lock requirements.
9. The detail shown is diagrammatic and is intended to represent a typical layout from electrical service to ITS devices.
10. A grounding wire is located along the DMS support structure.




Note:
See ITS Plans For Conduit And Conductor Size And Location, And For The Location Of Ground Boxes And Ground Rods.

Typical ITS Device Site Layout




NOT TO SCALE

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER

Hidi M. Criswell

5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |



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IH 10

# DYNAMIC MESSAGE SIGN TYPICAL LAYOUT

SHEET 1 OF 1

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO |
| 0535 | 04 | 031, ETC | 3 |

**GENERAL NOTES:**

**GENERAL:**

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

Covey Morrow IV Covey.Morrow@txdot.gov
Chase Hermes Chase.Hermes@txdot.gov

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

Questions may be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:
https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors

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

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

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

Do not work on the roadway before sunrise or after sunset unless otherwise approved.

No lane or shoulder closures are allowed at night, Fridays, weekends, or holidays unless otherwise approved.

Furnish a certified copy of the legal gross weight of each vehicle hauling materials by weight and certified measurements for all trucks hauling material by volume.

Do not cross the median.



**Project Number:** **Sheet: 4**

**County: Gonzales, ETC.** **Control: 0535-04-031, ETC.**

**Highway: IH 10**

Unless otherwise approved, maintain a minimum safety clearance from the edge of the travelway for material stockpiled in proximity of traffic lanes based on the current average traffic count of the particular highway as follows:

0 - 1500 = 16 feet
Over 1500 = 30 feet

In the event the above requirements cannot be met, make arrangements to stockpile material off the right of way.

Do not store equipment or stockpile material in the median overnight unless otherwise approved.

The Department will provide the cylinder testing machine for this project. Deliver the test specimens to the engineer's curing facilities as directed.

Do not clean out concrete trucks within the right of way.

The contractor shall contact TxDOT Yoakum Area Office at 361-293-4387 to schedule picking up the DMS, Ethernet Switches, and Cell Modem at the following address:
403 Huck Street
Yoakum, TX 77995-0757

DMS, Ethernet Switches, Cell Modems, and Bluetooth readers will be supplied by TxDOT.

Project limit barricades and signs shall be placed at each location in the direction of travel.

**ITEM 6: CONTROL OF MATERIALS**

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

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

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

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

## ITEM 7: LEGAL RELATIONS AND RESPONSIBILITIES

The Department has determined that a USACE Nationwide or Individual Permit is not necessary for the project since all work shall be conducted outside the USACE jurisdictional areas. Any impacts to these jurisdictional areas by the Contractor without a USACE permit will be the responsibility of the Contractor. If the Contractor deems it necessary to impact the USACE jurisdictional areas, then it becomes the Contractor's entire responsibility to consult with the USACE pertaining to the need for a Nationwide or Individual Permit. TXDOT will then hold the Contractor responsible for following all conditions of the approved permit.

No significant traffic generator events identified.

If the contractor proposes work beyond the TxDOT obtained permit limitations, the contractor is responsible for additional costs, delays, and obtaining new or revised permits prior to construction.

## ITEM 8: PROSECUTION AND PROGRESS

Provide progress schedule as a Bar Chart.

## ITEM 132: EMBANKMENT

Furnish Type C embankment consisting of suitable earth material such as loam, clay or other such material that will form a stable embankment and has a plasticity index of at least 15 but not more than 40. Requirements may vary for material excavated under Item 110, "Excavation" as directed.

## ITEM 247: FLEXIBLE BASE

Unless otherwise approved, the delivered material's moisture content at most will be two percent above optimum moisture content, determined by TEX-113-E.

Compact the Type A flex base by ordinary compaction.

## 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.



**Project Number:** **Sheet: 4A**

**County: Gonzales, ETC.** **Control: 0535-04-031, ETC.**

**Highway: IH 10**

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 502: BARRICADES, SIGNS, AND TRAFFIC HANDLING

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.

Law enforcement assistance for this project will be required, as approved, for major traffic control changes and lane closures. Coordinate with local law enforcement and arrange for law enforcement in a marked vehicle as approved by the Engineer. Complete the daily tracking form provided by the department, including all signatures, and submit invoices that agree with the tracking form for payment at the end of each month approved services were provided.

Use WZ(RS)-22 in conjunction with TCP(2-1, 2-2).

Use TCP(2-2b) for one-lane, two-way traffic control.

When using TCP(2-2b), a pilot car is required to lead traffic through the work space with or without channelizing devices on the center line unless otherwise approved.

When using TCP(2-2b), channelizing devices may be omitted during base, subgrade and seal coat operations unless otherwise directed. Flaggers will be required at public intersections when channelizing devices are omitted.

When using TCP(2-2b), arrow boards, displaying the caution mode, may be used to enhance the flagger stations. If used, place the arrow board in advance of the flagger station a distance of ½X, the sign spacing distance shown on BC(2). Use arrow boards as shown on BC(7).

When using TCP(2-2b), the temporary 24" stop line and the CW16-2P plaques may be omitted.

When using TCP(2-2b), an additional "Road Work Ahead" and "Be Prepared To Stop" signs will be required on each end of the lane closure unless otherwise approved.

When using TCP(6-8), the PCMS will be required unless otherwise approved. The PCMS required by TCP(6-8) will be paid for under Item 6001.

Provide suitable warning lights mounted high enough to be visible from all directions on all construction equipment, including pilot vehicles, and operate warning lights when the equipment is within the right of way. Equip other equipment such as trucks, trailers, autos, etc., with emergency flashers and use emergency flashers while within the work area.

## ITEM 506: TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS

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.

## ITEM 540: METAL BEAM GUARD FENCE

Furnish and install only one type of timber post at each location.

Furnish Type II rail elements at all locations.

## ITEMS 540 & 544: METAL BEAM GUARD FENCE AND GUARDRAIL END TREATMENTS

No exposed bridge rail ends or guard fence ends will be allowed after normal working hours. Complete all work at each location during the normal working day.

## ITEM 618: CONDUIT

Locate the underground utilities within the project limits. Provide the equipment necessary for locating these utilities, locate, and mark them before starting any excavation work in the area. This work is subsidiary to the various bid items. If the Contractor damages or cause damage to any existing underground utilities, repair such damage at no cost to the Department.

Trenching will be allowed for conduit placement beneath existing roadways, driveways, and sidewalks.



**Project Number:** **Sheet: 4B**

**County: Gonzales, ETC.** **Control: 0535-04-031, ETC.**

**Highway: IH 10**

Provide as-built or certified as-installed plans, including GPS coordinates, for all conduit to establish the locations, vertical elevations, and horizontal alignments based on the department's survey datum. The plans shall also show the relationship to existing highway facilities and the right of way line. Submit to the engineer on an 11x17 inch scaled plan sheet.

All conduit elbows and rigid metal extensions required when installing PVC conduit systems, are subsidiary to the various bid items.

Repair any pavement damaged by the boring operations. Repair method shall be as approved by the Engineer. This will be considered subsidiary to this item.

Conduit bore pits a minimum of five feet from the edge of the base or pavement. Close the bore pit holes during non-working hours. Consider payment for bored conduit as the width of the roadway plus five (5) feet on each side of roadway.

Unless shown otherwise on the plans, install the underground conduit a minimum of 24 in. deep. Place conduit under driveway or roadways a minimum of 24 in. below the pavement surface.

If using casing to place bored conduit, consider the casing incidental to the conduit. Prior to backfilling conduit trenches, place a detachable underground metalized mylar marking tape above the conduit and concrete encasement. Ensure the marking tape extends continuously into the ground box at each end of all conduit runs. Consider the supplying and installation of the marking tape incidental to the various bid items.

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

Shoring of bore pits and trenches in accordance with OSHA regulations is mandatory.

Use Rigid Metal Conduit (RMC) for exposed 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.

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.



**Project Number:** **Sheet: 4C**

**County: Gonzales, ETC.** **Control: 0535-04-031, ETC.**

**Highway: IH 10**

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 6001: PORTABLE CHANGEABLE MESSAGE SIGN

Provide Portable Changeable Message Signs (PCMS) for the duration of the project. Locations and messages or other miscellaneous uses of PCMS, shall be as approved or directed by the Engineer.

## ITEM 6185: TRUCK MOUNTED ATTENUATOR (TMA) AND TRAILER ATTENUATOR (TA)

Shadow vehicle(s) with TMA are set up for stationary and/or mobile operations. The contractor will be responsible for determining if operations will be ongoing at the same time to determine the total number of TMAs needed for the project.

The TMA/TA used for installation/removal of traffic control for a work area will be subsidiary to the TMA/TA used to perform the work.

# Estimate & Quantity Sheet

**CONTROLLING PROJECT ID** 0535-04-031 **DISTRICT** Yoakum **COUNTY** Colorado, Fayette, Gonzales
**HIGHWAY** IH 10

| | | | | 0535-04-031 | | 0535-05-038 | | 0535-06-048 | | 0535-08-094 | | TOTAL EST. | TOTAL FINAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **CONTROL SECTION JOB** | | | | | | | | | | | |
| | | **PROJECT ID** | | **A00191827** | | **A00191829** | | **A00191832** | | **A00191833** | | | |
| | | **COUNTY** | | **Gonzales** | | **Gonzales** | | **Fayette** | | **Colorado** | | | |
| | | **HIGHWAY** | | **IH 10** | | **IH 10** | | **IH 10** | | **IH 10** | | | |
| **ALT** | **BID CODE** | **DESCRIPTION** | **UNIT** | EST. | FINAL | EST. | FINAL | EST. | FINAL | EST. | FINAL | | |
| | 132-6005 | EMBANKMENT (FINAL)(ORD COMP)(TY C) | CY | 95.500 | | 30.730 | | 67.050 | | 46.470 | | 239.750 | |
| | 247-6366 | FL BS (CMP IN PLC)(TY A GR 5)(FNAL POS) | CY | 74.000 | | 34.000 | | 126.000 | | 68.000 | | 302.000 | |
| | 416-6005 | DRILL SHAFT (42 IN) | LF | 42.000 | | 21.000 | | 84.000 | | 42.000 | | 189.000 | |
| | 416-6006 | DRILL SHAFT (48 IN) | LF | 60.000 | | 30.000 | | 120.000 | | 60.000 | | 270.000 | |
| | 432-6001 | RIPRAP (CONC)(4 IN) | CY | 2.000 | | 1.000 | | 4.000 | | 2.000 | | 9.000 | |
| | 500-6001 | MOBILIZATION | LS | 1.000 | | | | | | | | 1.000 | |
| | 502-6001 | BARRICADES, SIGNS AND TRAFFIC HANDLING | MO | 7.000 | | | | | | | | 7.000 | |
| | 506-6038 | TEMP SEDMT CONT FENCE (INSTALL) | LF | 200.000 | | 100.000 | | 400.000 | | 200.000 | | 900.000 | |
| | 506-6039 | TEMP SEDMT CONT FENCE (REMOVE) | LF | 200.000 | | 100.000 | | 400.000 | | 200.000 | | 900.000 | |
| | 540-6001 | MTL W-BEAM GD FEN (TIM POST) | LF | 600.000 | | 250.000 | | 950.000 | | 700.000 | | 2,500.000 | |
| | 540-6016 | DOWNSTREAM ANCHOR TERMINAL SECTION | EA | 1.000 | | 1.000 | | 4.000 | | 2.000 | | 8.000 | |
| | 540-6021 | MTL THRIE-BEAM GD FEN (TIM POST) | EA | 1.000 | | | | | | | | 1.000 | |
| | 542-6001 | REMOVE METAL BEAM GUARD FENCE | LF | 175.000 | | | | | | | | 175.000 | |
| | 544-6001 | GUARDRAIL END TREATMENT (INSTALL) | EA | 2.000 | | 1.000 | | 4.000 | | 2.000 | | 9.000 | |
| | 544-6003 | GUARDRAIL END TREATMENT (REMOVE) | EA | 1.000 | | | | | | | | 1.000 | |
| | 618-6007 | CONDT (HDPE) (2") (STL ENCSE) | LF | 1,525.000 | | 875.000 | | 3,025.000 | | 1,280.000 | | 6,705.000 | |
| | 618-6070 | CONDT (RM) (2") | LF | 240.000 | | 120.000 | | 480.000 | | 240.000 | | 1,080.000 | |
| | 620-6015 | ELEC CONDR (NO.2) BARE | LF | 1,600.000 | | 1,145.000 | | 3,375.000 | | 1,155.000 | | 7,275.000 | |
| | 620-6016 | ELEC CONDR (NO.2) INSULATED | LF | 3,520.000 | | 2,630.000 | | 7,480.000 | | 2,400.000 | | 16,030.000 | |
| | 624-6002 | GROUND BOX TY A (122311)W/APRON | EA | 4.000 | | 2.000 | | 8.000 | | 4.000 | | 18.000 | |
| | 628-6250 | ELC SRV TY D 120/240 100(NS)SS(N)SP(O) | EA | | | | | 4.000 | | 2.000 | | 6.000 | |
| | 650-6024 | INS OH SN SUP(25 FT BAL TEE)(SPAN ONLY) | EA | 2.000 | | 1.000 | | 4.000 | | 2.000 | | 9.000 | |
| | 6001-6002 | PORTABLE CHANGEABLE MESSAGE SIGN | EA | 3.000 | | | | | | | | 3.000 | |
| | 6007-6010 | FIBER OPTIC CBL (SNGLE-MODE)(6 FIBER) | LF | 475.000 | | 240.000 | | 905.000 | | 500.000 | | 2,120.000 | |
| | 6007-6011 | FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER) | LF | 125.000 | | 30.000 | | 230.000 | | 105.000 | | 490.000 | |
| | 6007-6021 | FIBER OPTIC SPLICE ENCLOSURE | EA | 2.000 | | 1.000 | | 4.000 | | 2.000 | | 9.000 | |
| | 6007-6023 | FIBER OPTIC PATCH PANEL (12 POSITION) | EA | 2.000 | | 1.000 | | 4.000 | | 2.000 | | 9.000 | |
| | 6010-6002 | CCTV FIELD EQUIPMENT (DIGITAL) | EA | 2.000 | | 1.000 | | 4.000 | | 2.000 | | 9.000 | |
| | 6010-6003 | CCTV FIELD CONTROLLER | EA | 2.000 | | 1.000 | | 4.000 | | 2.000 | | 9.000 | |
| | 6028-6002 | INSTALL DMS (FOUNDATION MTD CABINET) | EA | 2.000 | | 1.000 | | 4.000 | | 2.000 | | 9.000 | |
| | 6064-6046 | ITS POLE (55 FT)(90 MPH) | EA | 2.000 | | 1.000 | | 4.000 | | 2.000 | | 9.000 | |
| | 6064-6080 | ITS POLE MNT CAB (TY 2)(CONF 1) | EA | 2.000 | | 1.000 | | 4.000 | | 2.000 | | 9.000 | |
| | 6123-6001 | ETHERNET SWITCH (INSTALL ONLY) | EA | 4.000 | | 2.000 | | 8.000 | | 4.000 | | 18.000 | |
| | 6185-6002 | TMA (STATIONARY) | DAY | 6.000 | | 3.000 | | 12.000 | | 6.000 | | 27.000 | |
| | 6263-6002 | BLUETOOTH DETECTION SYSTEM (INSTALL) | EA | 2.000 | | 1.000 | | 4.000 | | 2.000 | | 9.000 | |
| | 06 | MATERIAL FURNISHED BY THE STATE | LS | 1.000 | | | | | | | | 1.000 | |
| | | BLUETOOTH READER (PARTICIPATING) | LS | 1.000 | | | | | | | | 1.000 | |

# Estimate & Quantity Sheet

**CONTROLLING PROJECT ID** 0535-04-031 **DISTRICT** Yoakum **COUNTY** Colorado, Fayette, Gonzales
**HIGHWAY** IH 10

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **CONTROL SECTION JOB** | **0535-04-031** | | **0535-05-038** | | **0535-06-048** | | **0535-08-094** | | TOTAL EST. | TOTAL FINAL |
| | | | **PROJECT ID** | **A00191827** | | **A00191829** | | **A00191832** | | **A00191833** | | | |
| | | | **COUNTY** | **Gonzales** | | **Gonzales** | | **Fayette** | | **Colorado** | | | |
| | | | **HIGHWAY** | **IH 10** | | **IH 10** | | **IH 10** | | **IH 10** | | | |
| **ALT** | **BID CODE** | **DESCRIPTION** | **UNIT** | EST. | FINAL | EST. | FINAL | EST. | FINAL | EST. | FINAL | | |
| | 08 | CONTRACTOR FORCE ACCOUNT SAFETY CONTINGENCY (NON-PARTICIPATING) | LS | 1.000 | | | | | | | | 1.000 | |
| | | CONTRACTOR FORCE ACCOUNT EROSION CONTROL MAINTENANCE (NON-PARTICIPATING) | LS | 1.000 | | | | | | | | 1.000 | |
| | 18 | LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING) | LS | 24.000 | | | | | | | | 24.000 | |

## SUMMARY OF DMS QUANTITIES

| ITEM | CODE | DESCRIPTION | UNIT | DMS LOCATION NUMBER | | | | | | | | | | | | | PROJECT TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | CSJ: 0535-08-094 | | | CSJ: 0535-06-048 | | | | | CSJ: 0535-05-038 | | CSJ: 0535-04-031 | | | |
| | | | | 1 | 2 | TOTAL | 3 | 4 | 5 | 6 | TOTAL | 7 | TOTAL | 8 | 9 | TOTAL | |
| 132 | 6005 | EMBANKMENT (FINAL)(ORD COMP)(TY C) | CY | 46.45 | 0.02 | **46.47** | 3.57 | 0.07 | 43.08 | 20.33 | **67.05** | 30.73 | **30.73** | 84.23 | 11.27 | **95.5** | **239.75** |
| 247 | 6366 | FL BS (CMP IN PLC) (TY A GR 5) (FNAL POS) | CY | 34 | 34 | **68** | 24 | 34 | 34 | 34 | **126** | 34 | **34** | 40 | 34 | **74** | **302** |
| 416 | 6005 | DRILL SHAFT (42 IN) | LF | 21 | 21 | **42** | 21 | 21 | 21 | 21 | **84** | 21 | **21** | 21 | 21 | **42** | **189** |
| 416 | 6006 | DRILL SHAFT (48 IN) | LF | 30 | 30 | **60** | 30 | 30 | 30 | 30 | **120** | 30 | **30** | 30 | 30 | **60** | **270** |
| 432 | 6001 | RIPRAP (CONC) (4 IN) | CY | 1 | 1 | **2** | 1 | 1 | 1 | 1 | **4** | 1 | **1** | 1 | 1 | **2** | **9** |
| 506 | 6038 | TEMP SEDMT CONT FENCE (INSTALL) | LF | 100 | 100 | **200** | 100 | 100 | 100 | 100 | **400** | 100 | **100** | 100 | 100 | **200** | **900** |
| 506 | 6036 | TEMP SEDMT CONT FENCE (REMOVE) | LF | 100 | 100 | **200** | 100 | 100 | 100 | 100 | **400** | 100 | **100** | 100 | 100 | **200** | **900** |
| 540 | 6001 | MTL W-BEAM GD FEN (TIM POST) | LF | 450 | 250 | **700** | 200 | 250 | 250 | 250 | **950** | 250 | **250** | 350 | 250 | **600** | **2500** |
| 540 | 6021 | MTL THRIE-BEAM GD FEN (TIM POST) | EA | | | **0** | | | | | **0** | | **0** | 1 | | **1** | **1** |
| 540 | 6016 | DOWNSTREAM ANCHOR TERMINAL SECTION | EA | 1 | 1 | **2** | 1 | 1 | 1 | 1 | **4** | 1 | **1** | | 1 | **1** | **8** |
| 542 | 6001 | REMOVE METAL BEAM GUARD FENCE | LF | | | **0** | | | | | **0** | | **0** | 175 | | **175** | **175** |
| 544 | 6001 | GUARDRAIL END TREATMENT (INSTALL) | EA | 1 | 1 | **2** | 1 | 1 | 1 | 1 | **4** | 1 | **1** | 1 | 1 | **2** | **9** |
| 544 | 6003 | GUARDRAIL END TREATMENT (REMOVE) | EA | | | **0** | | | | | **0** | | **0** | 1 | | **1** | **1** |
| 618 | 6007 | CONDT (HDPE) (2") (STL ENCSE) | LF | 595 | 685 | **1280** | 700 | 740 | 685 | 900 | **3025** | 875 | **875** | 730 | 795 | **1525** | **6705** |
| 618 | 6070 | CNDT (RM) (2") (DMS STRUCTURE) | LF | 120 | 120 | **240** | 120 | 120 | 120 | 120 | **480** | 120 | **120** | 120 | 120 | **240** | **1080** |
| 620 | 6015 | ELEC CONDR (NO.2) BARE | LF | 585 | 570 | **1155** | 720 | 815 | 645 | 1195 | **3375** | 1145 | **1145** | 750 | 850 | **1600** | **7275** |
| 620 | 6016 | ELEC CONDR (NO.2) INSULATED | LF | 1245 | 1155 | **2400** | 1570 | 1800 | 1355 | 2755 | **7480** | 2630 | **2630** | 1630 | 1890 | **3520** | **16030** |
| 624 | 6002 | GROUND BOX TY A (122311) W/APRON | EA | 2 | 2 | **4** | 2 | 2 | 2 | 2 | **8** | 2 | **2** | 2 | 2 | **4** | **18** |
| 628 | 6250 | ELC SRV TY D 120/240 100 (NS) SS (N) SP (O) | EA | 1 | 1 | **2** | 1 | 1 | 1 | 1 | **4** | 0 | **0** | 0 | 0 | **0** | **6** |
| 650 | 6024 | INS OH SN SUP (25 FT BAL TEE) (SPAN ONLY) | EA | 1 | 1 | **2** | 1 | 1 | 1 | 1 | **4** | 1 | **1** | 1 | 1 | **2** | **9** |
| 6001 | 6002 | PORTABLE CHANGEABLE MESSAGE SIGN | EA | | | | | | | | | | | | | | **3** |
| 6007 | 6010 | FIBER OPTIC CBL (SINGLE-MODE) (6 FIBER) | LF | 245 | 255 | **500** | 230 | 210 | 225 | 240 | **905** | 240 | **240** | 230 | 245 | **475** | **2120** |
| 6007 | 6011 | FIBER OPTIC CBL (SINGLE-MODE) (12 FIBER) | LF | 35 | 70 | **105** | 55 | 70 | 75 | 30 | **230** | 30 | **30** | 65 | 60 | **125** | **490** |
| 6007 | 6021 | FIBER OPTIC SPLICE ENCLOSURE | EA | 1 | 1 | **2** | 1 | 1 | 1 | 1 | **4** | 1 | **1** | 1 | 1 | **2** | **9** |
| 6007 | 6023 | FIBER OPTIC PATCH PANEL (12 POSITON) | EA | 1 | 1 | **2** | 1 | 1 | 1 | 1 | **4** | 1 | **1** | 1 | 1 | **2** | **9** |
| 6010 | 6002 | CCTV FIELD EQUIPMENT (DIGITAL) | EA | 1 | 1 | **2** | 1 | 1 | 1 | 1 | **4** | 1 | **1** | 1 | 1 | **2** | **9** |
| 6010 | 6003 | CCTV FIELD CONTROLLER | EA | 1 | 1 | **2** | 1 | 1 | 1 | 1 | **4** | 1 | **1** | 1 | 1 | **2** | **9** |
| 6064 | 6046 | ITS POLE (55 FT) (90 MPH) | EA | 1 | 1 | **2** | 1 | 1 | 1 | 1 | **4** | 1 | **1** | 1 | 1 | **2** | **9** |
| 6064 | 6080 | ITS POLE MNT CAB (TY 2) (CONF 1) | EA | 1 | 1 | **2** | 1 | 1 | 1 | 1 | **4** | 1 | **1** | 1 | 1 | **2** | **9** |
| 6028 | 6002 | INSTALL DMS (FOUNDATION MTD CABINET) | EA | 1 | 1 | **2** | 1 | 1 | 1 | 1 | **4** | 1 | **1** | 1 | 1 | **2** | **9** |
| 6123 | 6001 | ETHERNET SWITCH (INSTALL ONLY) | EA | 2 | 2 | **4** | 2 | 2 | 2 | 2 | **8** | 2 | **2** | 2 | 2 | **4** | **18** |
| 6185 | 6002 | TMA (STATIONARY) | DAY | 3 | 3 | **6** | 3 | 3 | 3 | 3 | **12** | 3 | **3** | 3 | 3 | **6** | **27** |
| 6263 | 6002 | BLUETOOTH DETECTION SYSTEM (INSTALL) | EA | 1 | 1 | **2** | 1 | 1 | 1 | 1 | **4** | 1 | **1** | 1 | 1 | **2** | **9** |

## SUMMARY OF DMS QUANTITIES (TO BE PROVIDED BY TXDOT)

| ITEM | CODE | DESCRIPTION | UNIT | DMS LOCATION NUMBER | | | | | | | | | | | | | PROJECT TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | CSJ: 0535-08-094 | | | CSJ: 0535-06-048 | | | | | CSJ: 0535-05-038 | | CSJ: 0535-04-031 | | | |
| | | | | 1 | 2 | TOTAL | 3 | 4 | 5 | 6 | TOTAL | 7 | TOTAL | 8 | 9 | TOTAL | |
| * | * | BLUETOOTH DETECTION SYSTEM | EA | 1 | 1 | **2** | 1 | 1 | 1 | 1 | **4** | 1 | **1** | 1 | 1 | **2** | **9** |
| | ** | ELEC CONDR (NO.8) BARE | LF | 210 | 295 | **505** | 255 | 250 | 270 | 210 | **985** | 210 | **210** | 265 | 275 | **540** | **2240** |
| | ** | ELEC CONDR (NO.8) INSULATED | LF | 420 | 590 | **1010** | 510 | 500 | 540 | 420 | **1970** | 420 | **420** | 530 | 550 | **1080** | **4480** |
| * | * | FULL COLOR MATRIX DMS | EA | 1 | 1 | **2** | 1 | 1 | 1 | 1 | **4** | 1 | **1** | 1 | 1 | **2** | **9** |
| * | * | ETHERNET SWITCHES | EA | 2 | 2 | **4** | 2 | 2 | 2 | 2 | **8** | 2 | **2** | 2 | 2 | **4** | **18** |
| * | * | POLICE PROTECTION | EA | 1 | 1 | **2** | 1 | 1 | 1 | 1 | **4** | 1 | **1** | 1 | 1 | **2** | **9** |
| * | * | CELL MODEM | EA | 1 | 1 | **2** | 1 | 1 | 1 | 1 | **4** | 1 | **1** | 1 | 1 | **2** | **9** |

*TO BE PROVIDED BY TXDOT

**SUBSIDIARY ITEM TO THE BLUETOOTH DETECTION SYSTEM

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER

Hidi M. Criswell

5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |



Texas Department of Transportation®

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046



IH 10

# SUMMARY OF QUANTITIES

SHEET 1 OF 1

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO |
| 0535 | 04 | 031, ETC | 6 |


## LEGEND

- PROP DYNAMIC MESSAGE SIGN
- PROP DMS CABINET FOUNDATION W/ TYPE 1 CABINET
- PROP SERVICE POLE
- PROPOSED CONDUIT (BORED)
- PROPOSED CONDUIT
- PROPOSED ELECTRICAL GROUNDBOX
- EXISTING POWER UTILITY POLE
- TRAFFIC FLOW
- PROPOSED CCTV CAMERA
- PROPOSED METAL BEAM GUARD FENCE
- (#) RUN NUMBER
- (SCF) SEDIMENT CONTROL FENCE
- BLUETOOTH READER

0 20 40

SCALE: 1" = 40'

SILT FENCE LOCATION WILL BE DETERMINED IN THE FIELD.
5' X 5' RIPRAP AT THE BASE OF CCTV POLE
AND THE DMS POLE.

**NOTES:**

1. INSTALL ELECTRIC POWER SERVICE
1-ELECTRIC SERVICE POLE
1-2" HDPE (BORE) TO ELEC GROUND BOX
IN COND. #1-3-#2 XHHW, 1-#2 BARE (DMS)
IN COND. #2-2-#2 XHHW, 1-#2 BARE (CCTV)

2. INSTALL CONDUIT ELEC GROUND BOX TO ELEC GROUND BOX
1-2" HDPE STL ENCSE TO ELEC GROUND BOX
1-3-#2 XHHW, 1#2 BARE (DMS POWER)
1-2-#2 XHHW, 1#2 BARE (CCTV POWER)

3. INSTALL DMS STRUCTURE, CABINET FOUNDATION & CABINET
COORDINATES LAT,LONG: 29.6931955°, -096.6025606°
1-BLUETOOTH READER (MOUNTED ON DMS POLE)
1-SIGN STRUCTURE DMS
1-TYPE 4 CONTROLLER CABINET FOUNDATION
1-CONTROL CABINET
1-CELLULAR MODEM TO BE PROVIDED BY TXDOT
1-ETHERNET SWITCH TO BE PROVIDED BY TXDOT
1-FULL COLOR MATRIX DMS SIGN TO BE PROVIDED BY TXDOT
2-2" HDPE CONTROLLER CABINET TO STRUCTURE
2-3-#2 XHHW, 1#2 BARE (DMS POWER)

4. INSTALL CCTV PTZ CAMERA
COORDINATES LAT,LONG: 29.6932225°, -096.6031682°
1-CCTV CAMERA MOUNTED ON 55' POLE
1-CCTV CABINET
1-VIDEO ENCODER

5. FLEX BASE MOW STRIP PAID UNDER ITEM 247

QUANTITIES DMS #1

| ITEM | CODE | DESCRIPTION | UNIT | RUN NO. | | | | | | | SHEET TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| 132 | 6005 | EMBANKMENT (FINAL)(ORD COMP)(TY C) | CY | 46.45 | | | | | | | 46.45 |
| 247 | 6366 | FL BS (CMP IN PLC) (TY A GR 5) (FNAL POS) | CY | 34 | | | | | | | 34 |
| 416 | 6005 | DRILL SHAFT (42 IN) | LF | 21 | | | | | | | 21 |
| 416 | 6006 | DRILL SHAFT (48 IN) | LF | 30 | | | | | | | 30 |
| 432 | 6001 | RIPRAP (CONC) (4 IN) | CY | 1 | | | | | | | 1 |
| 506 | 6038 | TEMP SEDMT CONT FENCE (INSTALL) | LF | 100 | | | | | | | 100 |
| 506 | 6039 | TEMP SEDMT CONT FENCE (REMOVE) | LF | 100 | | | | | | | 100 |
| 540 | 6001 | MTL W-BEAM GD FEN (TIM POST) | LF | 450 | | | | | | | 450 |
| 540 | 6016 | DOWNSTREAM ANCHOR TERMINAL SECTION | EA | 1 | | | | | | | 1 |
| 544 | 6001 | GUARDRAIL END TREATMENT (INSTALL) | EA | 1 | | | | | | | 1 |
| 618 | 6007 | CONDT (HDPE) (2") (STL ENCSE) | LF | 40 | 70 | 10 | 20 | 210 | 210 | 35 | 595 |
| 618 | 6070 | CNDT (RM) (2") (DMS STRUCTURE) | LF | | | | 120 | | | | 120 |
| 620 | 6015 | ELEC CONDR (NO.2) BARE | LF | 80 | 140 | 20 | 135 | 210 | | | 585 |
| 620 | 6016 | ELEC CONDR (NO.2) INSULATED | LF | 200 | 350 | 50 | 225 | 420 | | | 1245 |
| 624 | 6002 | GROUND BOX TY A (122311) W/APRON | EA | 2 | | | | | | | 2 |
| 628 | 6250 | ELC SERVICE TY D 120/240 100 (NS) SS (N) SP (O) | EA | 1 | | | | | | | 1 |
| 650 | 6024 | INS OH SN SUP (25 FT BAL TEE) (SPAN ONLY) | EA | 1 | | | | | | | 1 |
| 6007 | 6010 | FIBER OPTIC CBL (SINGLE-MODE) (6 FIBER) | LF | | | | | | 210 | 35 | 245 |
| 6007 | 6011 | FIBER OPTIC CBL (SINGLE-MODE) (12 FIBER) | LF | | | | | | | 35 | 35 |
| 6010 | 6002 | CCTV FIELD EQUIPMENT (DIGITAL) | EA | 1 | | | | | | | 1 |
| 6010 | 6003 | CCTV FIELD CONTROLLER | EA | 1 | | | | | | | 1 |
| 6064 | 6046 | ITS POLE (55 FT) (90 MPH) | EA | 1 | | | | | | | 1 |
| 6064 | 6080 | ITS POLE MNT CAB (TY 2) (CONF 1) | EA | 1 | | | | | | | 1 |
| 6028 | 6028 | INSTALL DMS (FOUNDATION MTD CABINET) | EA | 1 | | | | | | | 1 |
| 6123 | 6001 | ETHERNET SWITCH (INSTALL ONLY) | EA | 2 | | | | | | | 2 |
| 6263 | 6002 | BLUETOOTH DETECTION SYSTEM (INSTALL) | EA | 1 | | | | | | | 1 |
| | * | ELEC CONDR (NO.8) BARE | LF | | | | | 210 | | | 210 |
| | * | ELEC CONDR (NO.8) INSULATED | LF | | | | | 420 | | | 420 |

*SUBSIDIARY ITEM

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER

Hidi M. Criswell

5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |



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TBPE Registration No. F-1046



IH 10

# DMS LOCATION #1
# IH 10 EB AND FM 2434

CSJ: 0535-08-094

SHEET 1 OF 1

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO |
| 0535 | 04 | 031, ETC | 7 |

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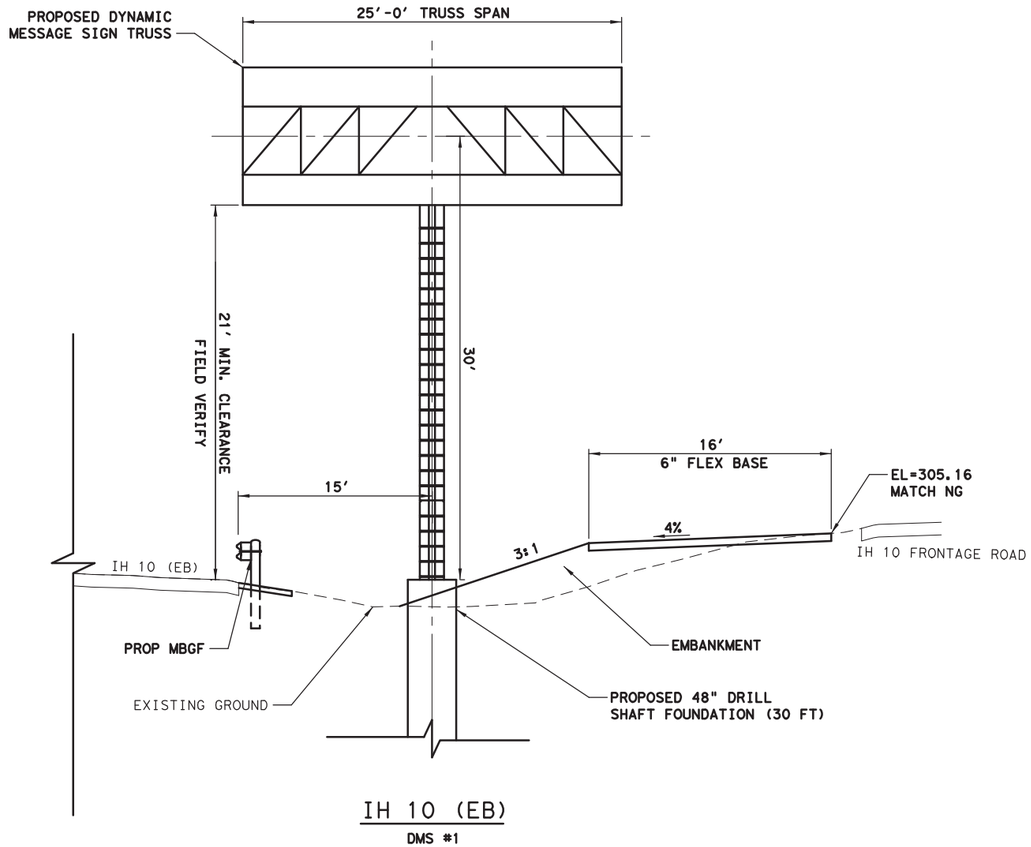



IH 10 (EB)

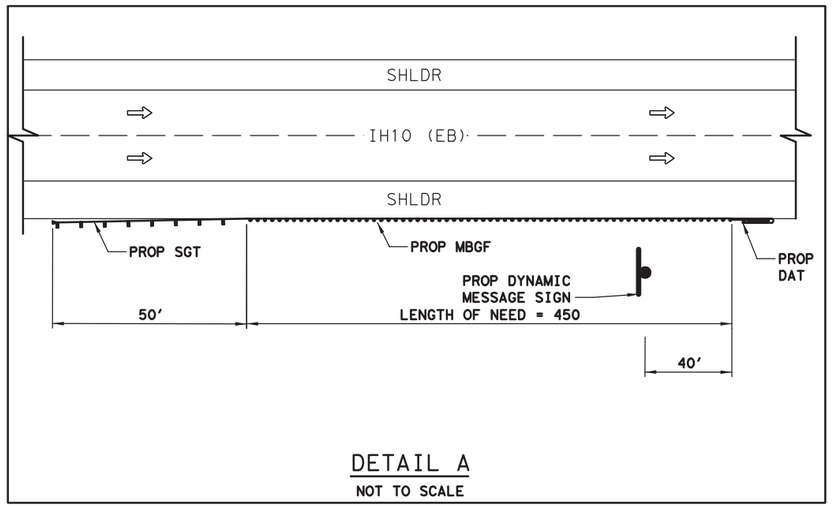
DMS #1

## COSS STRUCTURE

| | | |
|---|---|---|
| | DESIGN WIND HEIGHT, Hd | 37 FT |
| TRUSS DETAILS | LENGTH OF SPAN | Span A = 12.5 FT, Span B = 12.5 FT |
| | W x D = WIDTH x DEPTH | 4.5 FT x 4.5 FT |
| | CHORD | L3x3x1/4 |
| | DEAD LOAD DIAGONAL | L2x2x3/16 |
| | WIND LOAD DIAGONAL | L3x3x3/16 |
| | DEAD LOAD VERTICAL | L2x2x3/16 |
| | WIND LOAD STRUT | L2x2x3/16 |
| | TRUSS DEAD LOAD | 47 LB/FT |
| | SIZE H.S. BOLTS IN CONNECTION | 5/8" DIA |
| | | |
| TOWER DETAILS | TOWER HEIGHT AT TRUSS CENTER | 30 FT |
| | TOWER PIPE DIA & WALL THICKNESS | 24 IN, 0.562 IN |
| | TOWER PIPE DEFLECTION | 0.659 IN |
| | NO. & SIZE OF ANCHOR BOLTS | 8, 2-1/2" DIA |
| | ANCHOR BOLT CIRCLE DIA | 30.5 IN |
| | BASE PLATE SIZE | 36 IN x 2-1/2 IN |
| | TRUSS DEFLECTION | 1.0 IN |
| | | |
| DESIGN LOADS | SHEAR | 16.88 KIPS |
| | TORSION | 40.52 KIP-FT |
| | MOMENT | 490.76 KIP-FT |
| | | |
| | | |
| FOUNDATION | SOIL & "N" | CLAY, "N"=10 |
| | SIZE & LENGTH OF DRILLED SHAFT | 48" DIA, 30 FT |
| | DRILLED SHAFT REINFORCING | 16-#11 |
| | SPIRAL REINFORCING | #4 PLAIN SPIRAL AT 6" PITCH (GRADE 60) |
| | ANCHOR BOLT SIZE | 2-1/2" DIA x 5'-2" |

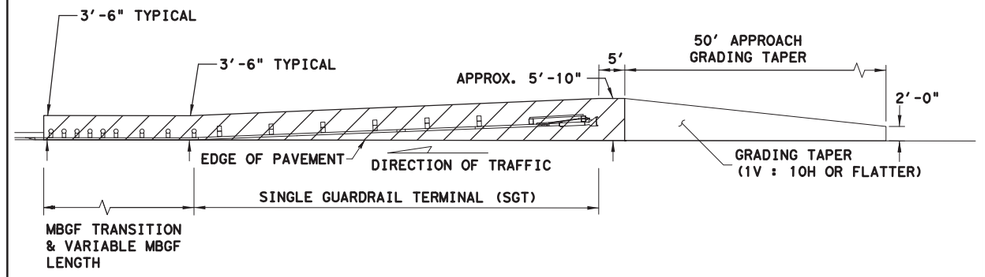
0 5 10

SCALE: 1" = 10'




DETAIL A

NOT TO SCALE




MOW STRIP DETAIL

NOT TO SCALE

*SEE APPLICABLE STANDARDS FOR DETAILS NOT SHOWN.

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED PROFESSIONAL ENGINEER

Hidi M. Criswell

5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |



Texas Department of Transportation

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TBPE Registration No. F-1046



IH 10

# DMS #1 ELEVATION IH 10 EB AND FM 2434

CSJ: 0535-08-094

SHEET 1 OF 1

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO |
| 0535 | 04 | 031, ETC | 8 |

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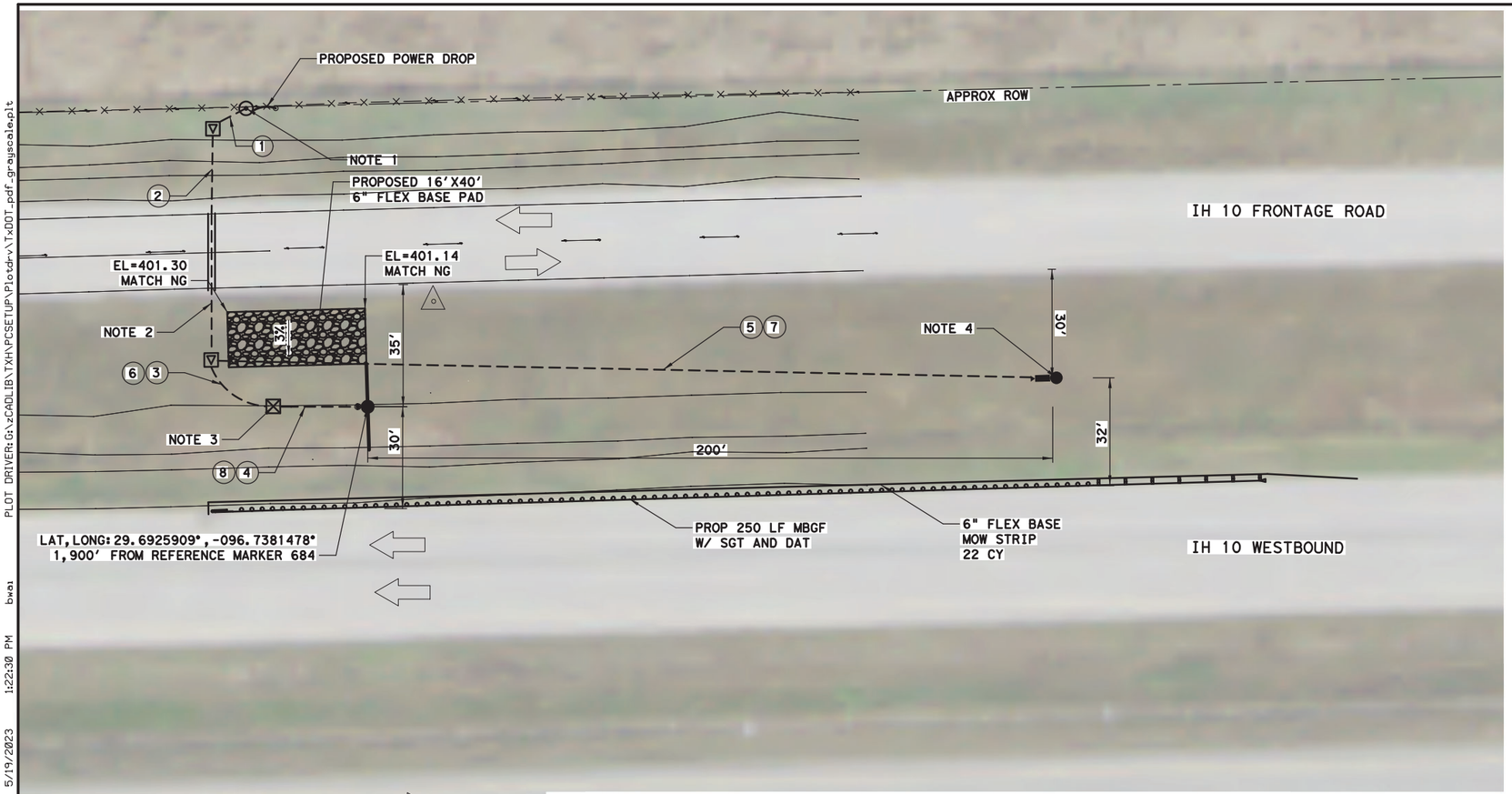


## LEGEND

- PROP DYNAMIC MESSAGE SIGN
- PROP DMS CABINET FOUNDATION W/ TYPE 1 CABINET
- PROP SERVICE POLE
- PROPOSED CONDUIT (BORED)
- PROPOSED CONDUIT
- PROPOSED ELECTRICAL GROUNDBOX
- EXISTING POWER UTILITY POLE
- TRAFFIC FLOW
- PROPOSED CCTV CAMERA
- RUN NUMBER
- SCF — SEDIMENT CONTROL FENCE
- BLUETOOTH READER
- FLEX BASE PAD

N

0 20 40

SCALE: 1" = 40'

**SILT FENCE LOCATION WILL BE DETERMINED IN THE FIELD.**
**5' X 5' RIPRAP AT THE BASE OF CCTV POLE AND THE DMS POLE.**

**NOTES:**

**1. INSTALL ELECTRIC POWER SERVICE**
**1-ELECTRIC SERVICE POLE**
**1-2" HDPE (BORE) TO ELEC GROUND BOX**
**IN COND. #1-3-#2 XHHW, 1-#2 BARE (DMS)**
**IN COND. #2-2-#2 XHHW, 1-#2 BARE (CCTV)**

**2. INSTALL CONDUIT ELEC GROUND BOX TO ELEC GROUND BOX**
**1-2" HDPE STL ENCSE TO ELEC GROUND BOX**
**1-3-#2 XHHW, 1#2 BARE (DMS POWER)**
**1-2-#2 XHHW, 1#2 BARE (CCTV POWER)**

**3. INSTALL DMS STRUCTURE, CABINET FOUNDATION & CABINET**
**COORDINATES LAT, LONG: 29.6932050°, -096.6024601°**
**1-BLUETOOTH READER (MOUNTED ON DMS POLE)**
**1-SIGN STRUCTURE DMS**
**1-TYPE 4 CONTROLLER CABINET FOUNDATION**
**1-CONTROL CABINET**
**1-CELLULAR MODEM TO BE PROVIDED BY TXDOT**
**1-ETHERNET SWITCH TO BE PROVIDED BY TXDOT**
**1-FULL COLOR MATRIX DMS SIGN TO BE PROVIDED BY TXDOT**
**2-2" HDPE CONTROLLER CABINET TO STRUCTURE**
**2-3-#2 XHHW, 1#2 BARE (DMS POWER)**

**4. INSTALL CCTV PTZ CAMERA**
**COORDINATES LAT, LONG: 29.6926035°, -096.7375175°**
**1-CCTV CAMERA MOUNTED ON 55' POLE**
**1-CCTV CABINET**
**1-VIDEO ENCODER**

**5. FLEX BASE MOW STRIP PAID UNDER ITEM 247**

QUANTITIES DMS #2

| ITEM | CODE | DESCRIPTION | UNIT | RUN NO. 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | SHEET TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 132 | 6005 | EMBANKMENT (FINAL) (ORD COMP) (TY C) | CY | 0.02 | | | | | | | | 0.02 |
| 247 | 6366 | FL BS (CMP IN PLC) (TY A GR 5) (FNAL POS) | CY | 34 | | | | | | | | 34 |
| 416 | 6005 | DRILL SHAFT (42 IN) | LF | 21 | | | | | | | | 21 |
| 416 | 6006 | DRILL SHAFT (48 IN) | LF | 30 | | | | | | | | 30 |
| 432 | 6001 | RIPRAP (CONC) (4 IN) | CY | 1 | | | | | | | | 1 |
| 506 | 6038 | TEMP SEDMT CONT FENCE (INSTALL) | LF | 100 | | | | | | | | 100 |
| 506 | 6039 | TEMP SEDMT CONT FENCE (REMOVE) | LF | 100 | | | | | | | | 100 |
| 540 | 6001 | MTL W-BEAM GD FEN (TIM POST) | LF | 250 | | | | | | | | 250 |
| 540 | 6016 | DOWNSTREAM ANCHOR TERMINAL SECTION | EA | 1 | | | | | | | | 1 |
| 544 | 6001 | GUARDRAIL END TREATMENT (INSTALL) | EA | 1 | | | | | | | | 1 |
| 618 | 6007 | CONDT (HDPE) (2") (STL ENCSE) | LF | 20 | 75 | 15 | 40 | 240 | 15 | 240 | 40 | 685 |
| 618 | 6070 | CNDT (RM) (2") (DMS STRUCTURE) | LF | | | | 120 | | | | | 120 |
| 620 | 6015 | ELEC CONDR (NO.2) BARE | LF | 40 | 150 | 15 | 125 | 240 | | | | 570 |
| 620 | 6016 | ELEC CONDR (NO.2) INSULATED | LF | 100 | 375 | 45 | 155 | 480 | | | | 1155 |
| 624 | 6002 | GROUND BOX TY A (122311) W/APRON | EA | 2 | | | | | | | | 2 |
| 628 | 6250 | ELC SERVICE TY D 120/240 100 (NS) SS (N) SP (O) | EA | 1 | | | | | | | | 1 |
| 650 | 6024 | INS OH SN SUP (25 FT BAL TEE) (SPAN ONLY) | EA | 1 | | | | | | | | 1 |
| 6007 | 6010 | FIBER OPTIC CBL (SINGLE-MODE) (6 FIBER) | LF | | | | | | 15 | 240 | | 255 |
| 6007 | 6011 | FIBER OPTIC CBL (SINGLE-MODE) (12 FIBER) | LF | | | | | | | | 70 | 70 |
| 6010 | 6002 | CCTV FIELD EQUIPMENT (DIGITAL) | EA | 1 | | | | | | | | 1 |
| 6010 | 6003 | CCTV FIELD CONTROLLER | EA | 1 | | | | | | | | 1 |
| 6064 | 6046 | ITS POLE (55 FT) (90 MPH) | EA | 1 | | | | | | | | 1 |
| 6064 | 6080 | ITS POLE MNT CAB (TY 2) (CONF 1) | EA | 1 | | | | | | | | 1 |
| 6028 | 6028 | INSTALL DMS (FOUNDATION MTD CABINET) | EA | 1 | | | | | | | | 1 |
| 6123 | 6001 | ETHERNET SWITCH (INSTALL ONLY) | EA | 2 | | | | | | | | 2 |
| 6263 | 6002 | BLUETOOTH DETECTION SYSTEM (INSTALL) | EA | 1 | | | | | | | | 1 |
| | * | ELEC CONDR (NO.8) BARE | LF | | | 15 | 40 | 240 | | | | 295 |
| | * | ELEC CONDR (NO.8) INSULATED | LF | | | 30 | 80 | 480 | | | | 590 |

*SUBSIDIARY ITEM

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER

Hidi M. Criswell
5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |



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IH 10

# DMS LOCATION #2
# IH 10 WB AND FM 155

**CSJ: 0535-08-094**

SHEET 1 OF 1

| FED RD DIV NO | PROJECT NO | HIGHWAY NO |
|---|---|---|
| 6 | | IH 10 |

| STATE | DIST | COUNTY |
|---|---|---|
| TEXAS | YKM | GONZALES, ETC |

| CONT | SECT | JOB | SHEET NO |
|---|---|---|---|
| 0535 | 04 | 031, ETC | 9 |

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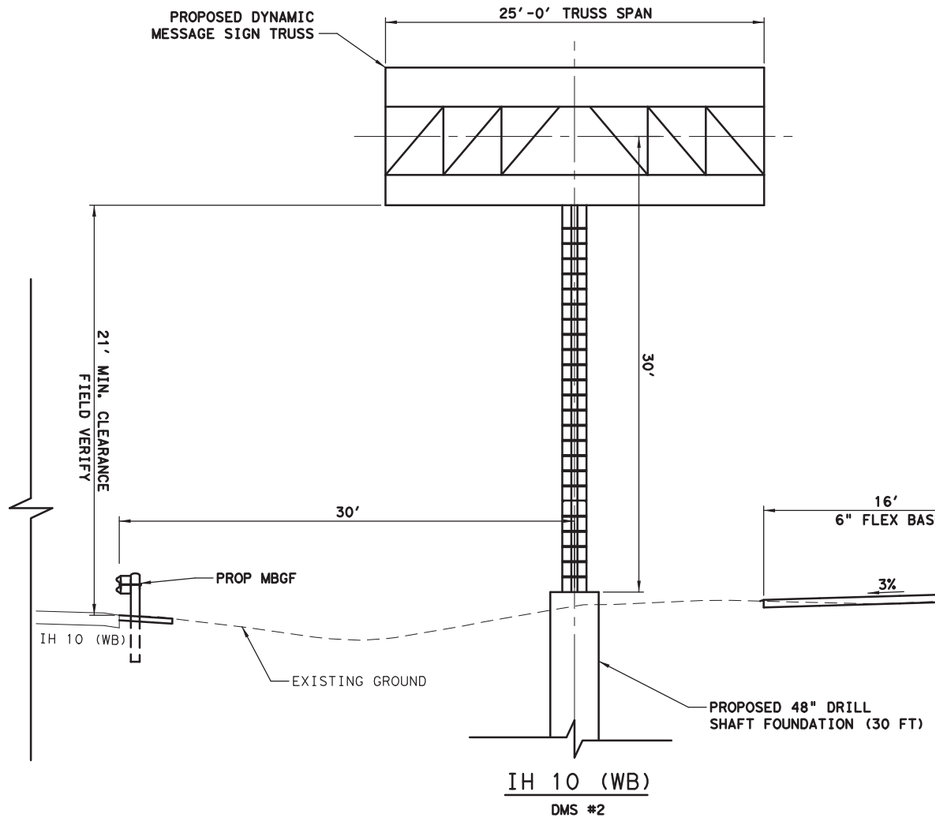



IH 10 (WB)

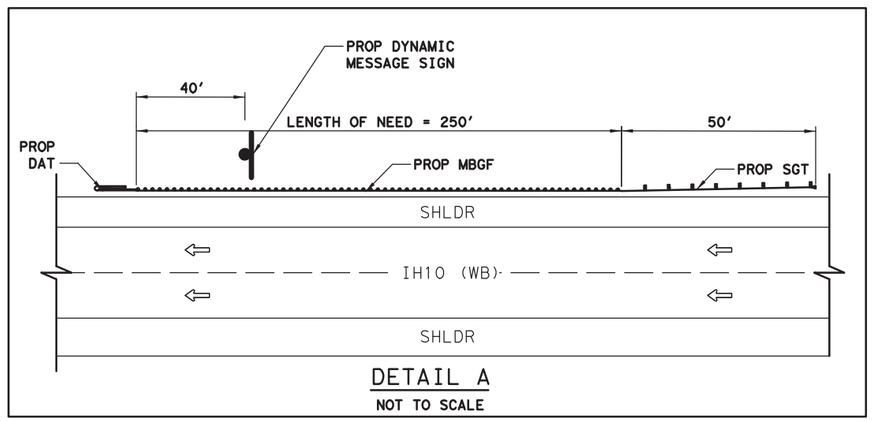
DMS #2

## COSS STRUCTURE

| | | |
|---|---|---|
| | DESIGN WIND HEIGHT, Hd | 37 FT |
| TRUSS DETAILS | LENGTH OF SPAN | Span A = 12.5 FT, Span B = 12.5 FT |
| | W x D = WIDTH x DEPTH | 4.5 FT x 4.5 FT |
| | CHORD | L3x3x1/4 |
| | DEAD LOAD DIAGONAL | L2x2x3/16 |
| | WIND LOAD DIAGONAL | L3x3x3/16 |
| | DEAD LOAD VERTICAL | L2x2x3/16 |
| | WIND LOAD STRUT | L2x2x3/16 |
| | TRUSS DEAD LOAD | 47 LB/FT |
| | SIZE H.S. BOLTS IN CONNECTION | 5/8" DIA |
| | | |
| TOWER DETAILS | TOWER HEIGHT AT TRUSS CENTER | 30 FT |
| | TOWER PIPE DIA & WALL THICKNESS | 24 IN, 0.562 IN |
| | TOWER PIPE DEFLECTION | 0.659 IN |
| | NO. & SIZE OF ANCHOR BOLTS | 8, 2-1/2" DIA |
| | ANCHOR BOLT CIRCLE DIA | 30.5 IN |
| | BASE PLATE SIZE | 36 IN x 2-1/2 IN |
| | TRUSS DEFLECTION | 1.0 IN |
| | | |
| DESIGN LOADS | SHEAR | 16.88 KIPS |
| | TORSION | 40.52 KIP-FT |
| | MOMENT | 490.76 KIP-FT |
| | | |
| | | |
| FOUNDATION | SOIL & "N" | CLAY, "N"=10 |
| | SIZE & LENGTH OF DRILLED SHAFT | 48" DIA, 30 FT |
| | DRILLED SHAFT REINFORCING | 16-#11 |
| | SPIRAL REINFORCING | #4 PLAIN SPIRAL AT 6" PITCH (GRADE 60) |
| | ANCHOR BOLT SIZE | 2-1/2" DIA x 5'-2" |

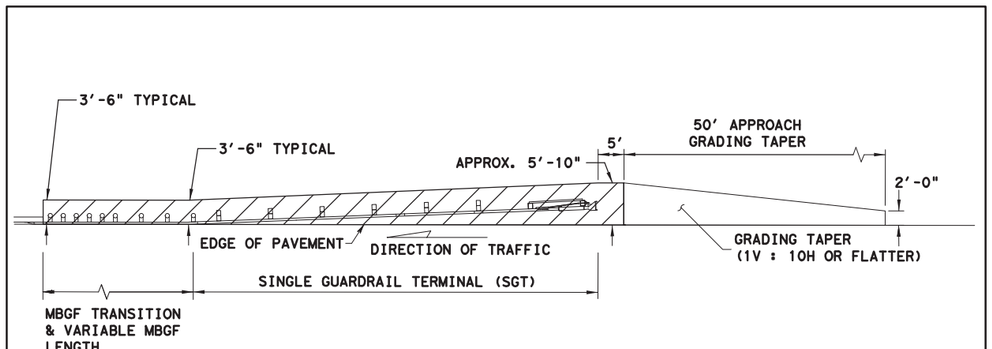
0 5 10

SCALE: 1" = 10'




DETAIL A

NOT TO SCALE




MOW STRIP DETAIL

NOT TO SCALE

*SEE APPLICABLE STANDARDS FOR DETAILS NOT SHOWN.

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED PROFESSIONAL ENGINEER

Hidi M. Criswell

5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |



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IH 10

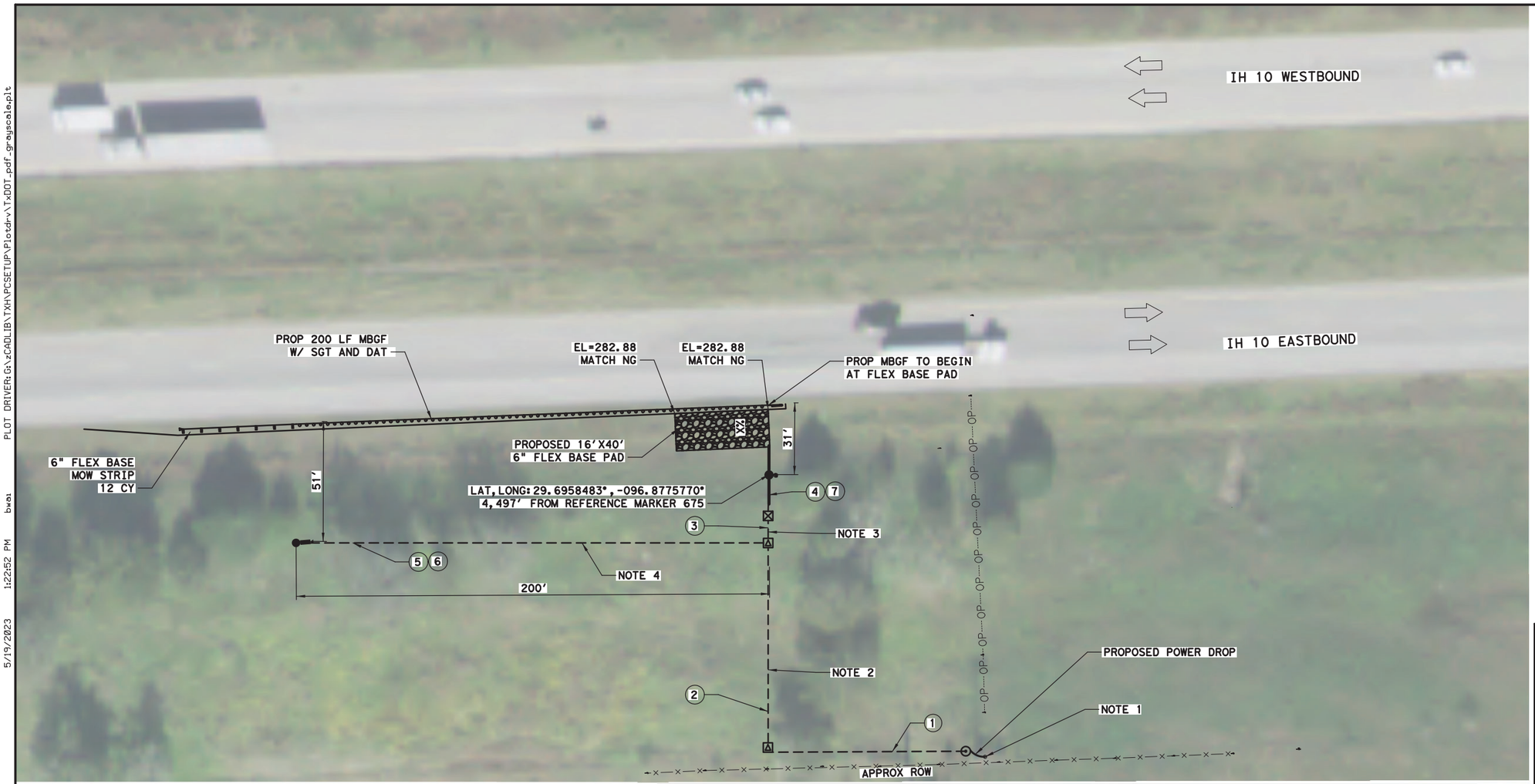
# DMS #2 ELEVATION IH 10 WB AND FM 155

CSJ: 0535-08-094

SHEET 1 OF 1

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO |
| 0535 | 04 | 031, ETC | 10 |

...\SHEETS\IHI0_ELEVATION 8.dgn




## LEGEND

- PROP DYNAMIC MESSAGE SIGN
- PROP DMS CABINET FOUNDATION W/ TYPE 1 CABINET
- PROP SERVICE POLE
- PROPOSED CONDUIT (BORED)
- PROPOSED CONDUIT
- PROPOSED ELECTRICAL GROUNDBOX
- EXISTING POWER UTILITY POLE
- TRAFFIC FLOW
- PROPOSED CCTV CAMERA
- RUN NUMBER
- SEDIMENT CONTROL FENCE
- BLUETOOTH READER

0 25 50

SCALE: 1" = 50'

SILT FENCE LOCATION WILL BE DETERMINED IN THE FIELD.
5' X 5' RIPRAP AT THE BASE OF CCTV POLE
AND THE DMS POLE.

NOTES:

1. INSTALL ELECTRIC POWER SERVICE
1-ELECTRIC SERVICE POLE
1-2" HDPE (BORE) TO ELEC GROUND BOX
IN COND. #1-3-#2 XHHW, 1-#2 BARE (DMS)
IN COND. #2-2-#2 XHHW, 1-#2 BARE (CCTV)

2. INSTALL CONDUIT ELEC GROUND BOX TO ELEC GROUND BOX
1-2" HDPE STL ENCSE TO ELEC GROUND BOX
1-3-#2 XHHW, 1#2 BARE (DMS POWER)
1-2-#2 XHHW, 1#2 BARE (CCTV POWER)

3. INSTALL DMS STRUCTURE, CABINET FOUNDATION & CABINET
COORDINATES LAT,LONG: 29.6958002°,-096.8775792°
1-BLUETOOTH READER (MOUNTED ON DMS POLE)
1-SIGN STRUCTURE DMS
1-TYPE 4 CONTROLLER CABINET FOUNDATION
1-CONTROL CABINET
1-CELLULAR MODEM TO BE PROVIDED BY TXDOT
1-ETHERNET SWITCH TO BE PROVIDED BY TXDOT
1-FULL COLOR MATRIX DMS SIGN TO BE PROVIDED BY TXDOT
2-2" HDPE CONTROLLER CABINET TO STRUCTURE
2-3-#2 XHHW, 1#2 BARE (DMS POWER)

4. INSTALL CCTV PTZ CAMERA
COORDINATES LAT,LONG: 29.6957783°, -096.8782159°
1-CCTV CAMERA MOUNTED ON 55' POLE
1-CCTV CABINET
1-VIDEO ENCODER

5. FLEX BASE MOW STRIP PAID UNDER ITEM 247

QUANTITIES DMS #3

| ITEM | CODE | DESCRIPTION | UNIT | RUN NO. | | | | | | | | SHEET TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| 132 | 6005 | EMBANKMENT (FINAL)(ORD COMP)(TY C) | CY | 3.57 | | | | | | | | 3.57 |
| 247 | 6366 | FL BS (CMP IN PLC) (TY A GR 5) (FNAL POS) | CY | 24 | | | | | | | | 24 |
| 416 | 6005 | DRILL SHAFT (42 IN) | LF | 21 | | | | | | | | 21 |
| 416 | 6006 | DRILL SHAFT (48 IN) | LF | 30 | | | | | | | | 30 |
| 432 | 6001 | RIPRAP (CONC) (4 IN) | CY | 1 | | | | | | | | 1 |
| 506 | 6038 | TEMP SEDMT CONT FENCE (INSTALL) | LF | 100 | | | | | | | | 100 |
| 506 | 6039 | TEMP SEDMT CONT FENCE (REMOVE) | LF | 100 | | | | | | | | 100 |
| 540 | 6001 | MTL W-BEAM GD FEN (TIM POST) | LF | 200 | | | | | | | | 200 |
| 540 | 6016 | DOWNSTREAM ANCHOR TERMINAL SECTION | EA | 1 | | | | | | | | 1 |
| 544 | 6001 | GUARDRAIL END TREATMENT (INSTALL) | EA | 1 | | | | | | | | 1 |
| 618 | 6007 | CONDT (HDPE) (2") (STL ENCSE) | LF | 95 | 95 | 20 | 25 | 210 | 20 | 210 | 25 | 700 |
| 618 | 6070 | CNDT (RM) (2") (DMS STRUCTURE) | LF | | | | 120 | | | | | 120 |
| 620 | 6015 | ELEC CONDR (NO.2) BARE | LF | 190 | 190 | 20 | 110 | 210 | | | | 720 |
| 620 | 6016 | ELEC CONDR (NO.2) INSULATED | LF | 475 | 475 | 60 | 140 | 420 | | | | 1570 |
| 624 | 6002 | GROUND BOX TY A (122311) W/APRON | EA | 2 | | | | | | | | 2 |
| 628 | 6250 | ELC SERVICE TY D 120/240 100 (NS) SS (N) SP (O) | EA | 1 | | | | | | | | 1 |
| 650 | 6024 | INS OH SN SUP (25 FT BAL TEE) (SPAN ONLY) | EA | 1 | | | | | | | | 1 |
| 6007 | 6010 | FIBER OPTIC CBL (SINGLE-MODE) (6 FIBER) | LF | | | | | | 20 | 210 | | 230 |
| 6007 | 6011 | FIBER OPTIC CBL (SINGLE-MODE) (12 FIBER) | LF | | | | | | | | 55 | 55 |
| 6010 | 6002 | CCTV FIELD EQUIPMENT (DIGITAL) | EA | 1 | | | | | | | | 1 |
| 6010 | 6003 | CCTV FIELD CONTROLLER | EA | 1 | | | | | | | | 1 |
| 6064 | 6046 | ITS POLE (55 FT) (90 MPH) | EA | 1 | | | | | | | | 1 |
| 6064 | 6080 | ITS POLE MNT CAB (TY 2) (CONF 1) | EA | 1 | | | | | | | | 1 |
| 6028 | 6028 | INSTALL DMS (FOUNDATION MTD CABINET) | EA | 1 | | | | | | | | 1 |
| 6123 | 6001 | ETHERNET SWITCH (INSTALL ONLY) | EA | 2 | | | | | | | | 2 |
| 6263 | 6002 | BLUETOOTH DETECTION SYSTEM (INSTALL) | EA | 1 | | | | | | | | 1 |
| | * | ELEC CONDR (NO.8) BARE | LF | | | 20 | 25 | 210 | | | | 255 |
| | * | ELEC CONDR (NO.8) INSULATED | LF | | | 40 | 50 | 420 | | | | 510 |

*SUBSIDIARY ITEM

HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

Hidi M. Criswell

5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |
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IH 10

# DMS LOCATION #3
# IH 10 EB AND US 90

CSJ: 0535-06-048

SHEET 1 OF 1

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO |
| 0535 | 04 | 031, ETC | 11 |

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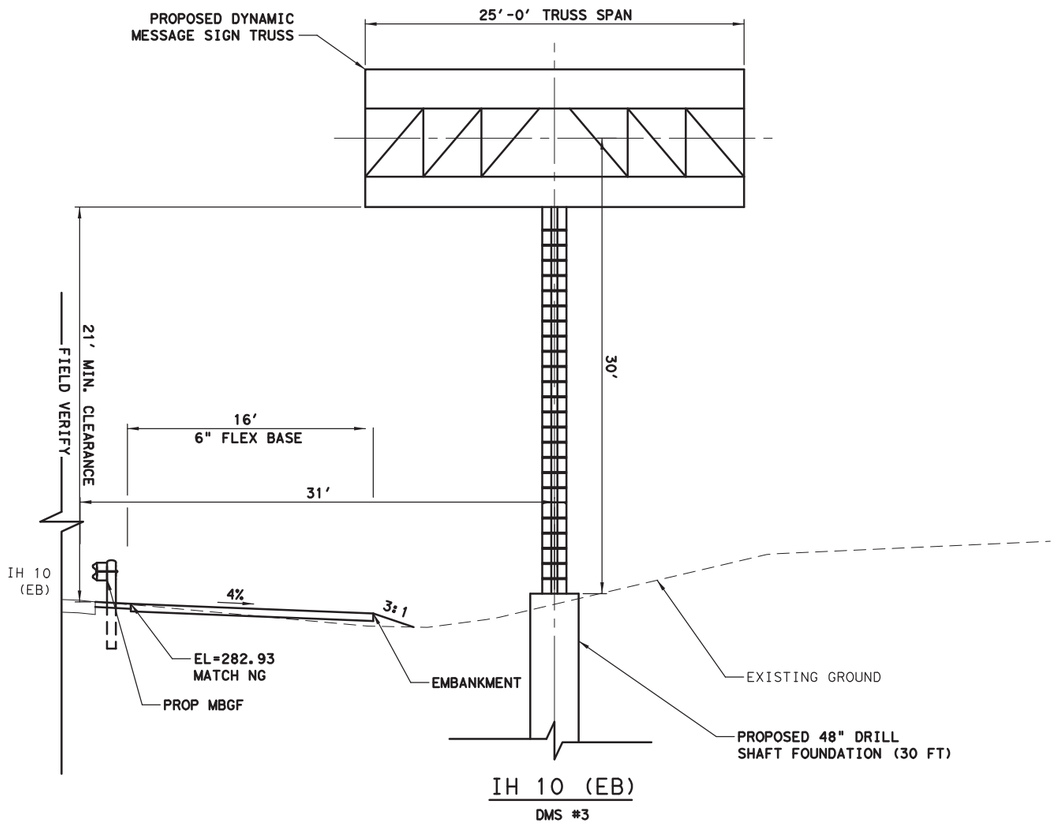



IH 10 (EB)

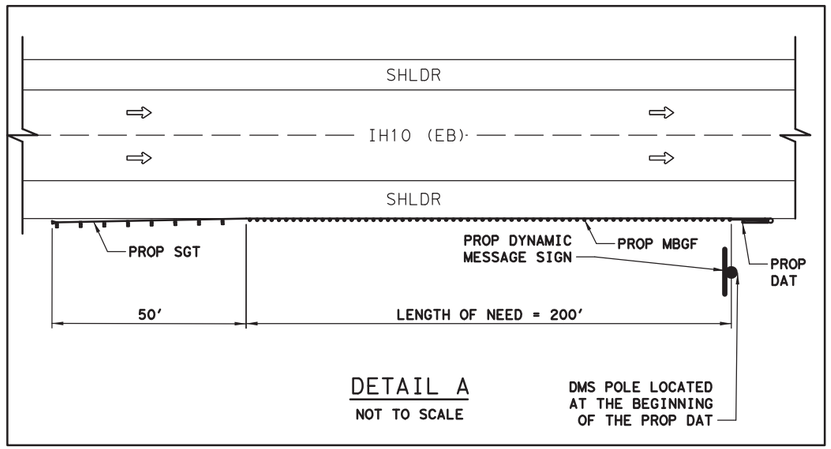
DMS #3

## COSS STRUCTURE

| | | |
|---|---|---|
| | DESIGN WIND HEIGHT, Hd | 37 FT |
| TRUSS DETAILS | LENGTH OF SPAN | Span A = 12.5 FT, Span B = 12.5 FT |
| | W x D = WIDTH x DEPTH | 4.5 FT x 4.5 FT |
| | CHORD | L3x3x1/4 |
| | DEAD LOAD DIAGONAL | L2x2x3/16 |
| | WIND LOAD DIAGONAL | L3x3x3/16 |
| | DEAD LOAD VERTICAL | L2x2x3/16 |
| | WIND LOAD STRUT | L2x2x3/16 |
| | TRUSS DEAD LOAD | 47 LB/FT |
| | SIZE H.S. BOLTS IN CONNECTION | 5/8" DIA |
| | | |
| TOWER DETAILS | TOWER HEIGHT AT TRUSS CENTER | 30 FT |
| | TOWER PIPE DIA & WALL THICKNESS | 24 IN, 0.562 IN |
| | TOWER PIPE DEFLECTION | 0.659 IN |
| | NO. & SIZE OF ANCHOR BOLTS | 8, 2-1/2" DIA |
| | ANCHOR BOLT CIRCLE DIA | 30.5 IN |
| | BASE PLATE SIZE | 36 IN x 2-1/2 IN |
| | TRUSS DEFLECTION | 1.0 IN |
| | | |
| DESIGN LOADS | SHEAR | 16.88 KIPS |
| | TORSION | 40.52 KIP-FT |
| | MOMENT | 490.76 KIP-FT |
| | | |
| | | |
| FOUNDATION | SOIL & "N" | CLAY, "N"=10 |
| | SIZE & LENGTH OF DRILLED SHAFT | 48" DIA, 30 FT |
| | DRILLED SHAFT REINFORCING | 16-#11 |
| | SPIRAL REINFORCING | #4 PLAIN SPIRAL AT 6" PITCH (GRADE 60) |
| | ANCHOR BOLT SIZE | 2-1/2" DIA x 5'-2" |

0 5 10

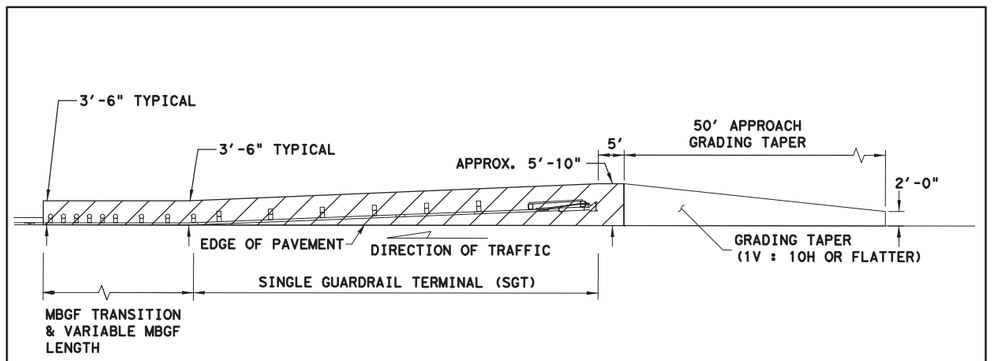
SCALE: 1" = 10'




DETAIL A

NOT TO SCALE

DMS POLE LOCATED AT THE BEGINNING OF THE PROP DAT




MOW STRIP DETAIL

NOT TO SCALE

*SEE APPLICABLE STANDARDS FOR DETAILS NOT SHOWN.

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER

Hidi M. Criswell

5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
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TBPE Registration No. F-1046



IH 10

# DMS #3 ELEVATION IH 10 EB AND US 90

CSJ: 0535-06-048

SHEET 1 OF 1

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO |
| 0535 | 04 | 031, ETC | 12 |

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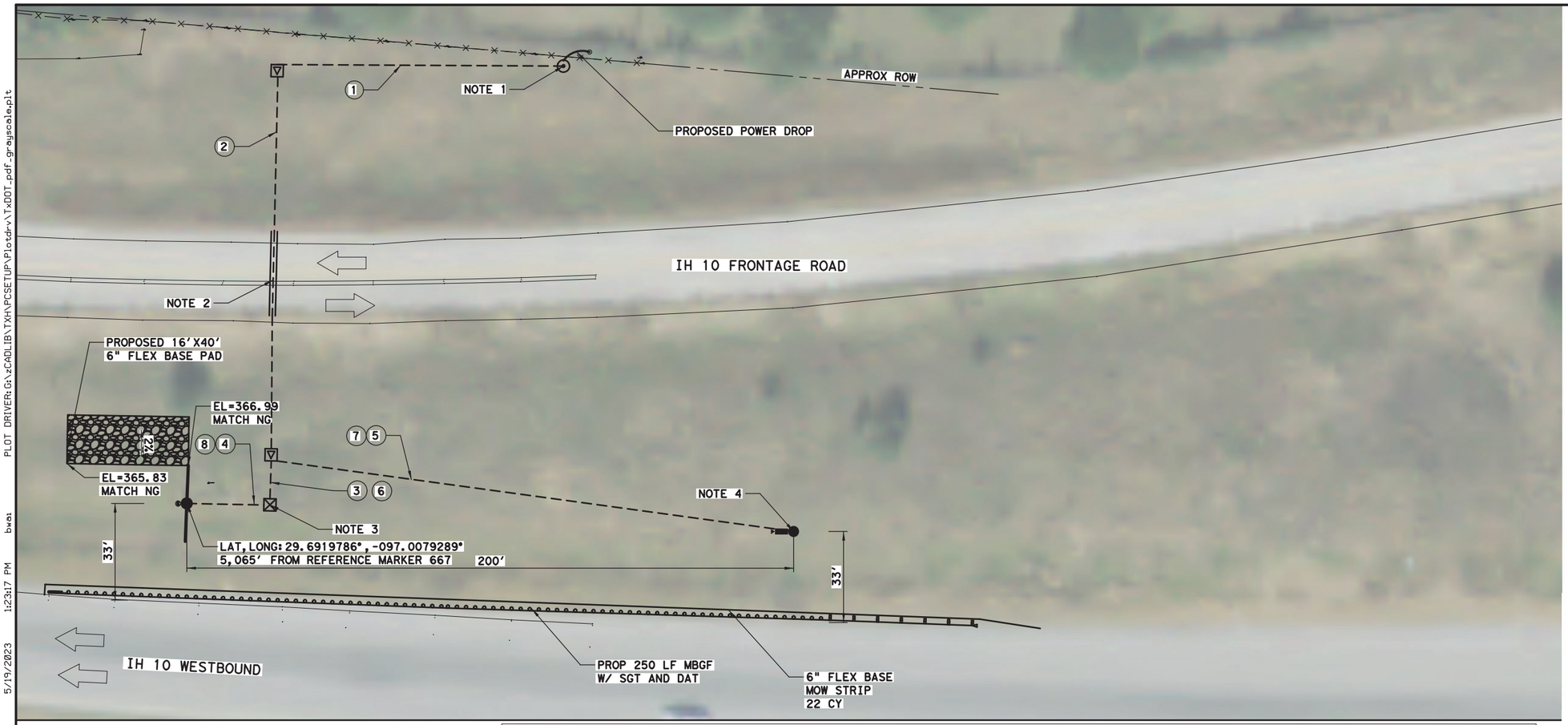


## LEGEND

- PROP DYNAMIC MESSAGE SIGN
- PROP DMS CABINET FOUNDATION W/ TYPE 1 CABINET
- PROP SERVICE POLE
- PROPOSED CONDUIT (BORED)
- PROPOSED CONDUIT
- PROPOSED ELECTRICAL GROUNDBOX
- EXISTING POWER UTILITY POLE
- TRAFFIC FLOW
- PROPOSED CCTV CAMERA
- (#) RUN NUMBER
- (SCF) SEDIMENT CONTROL FENCE
- BLUETOOTH READER

N

0 20 40

SCALE: 1" = 40'

**SILT FENCE LOCATION WILL BE DETERMINED IN THE FIELD.**
**5' X 5' RIPRAP AT THE BASE OF CCTV POLE**
**AND THE DMS POLE.**

**NOTES:**

**1. INSTALL ELECTRIC POWER SERVICE**
**1-ELECTRIC SERVICE POLE**
**1-2" HDPE (BORE) TO ELEC GROUND BOX**
**IN COND. #1-3-#2 XHHW, 1-#2 BARE (DMS)**
**IN COND. #2-2-#2 XHHW, 1-#2 BARE (CCTV)**

**2. INSTALL CONDUIT ELEC GROUND BOX TO ELEC GROUND BOX**
**1-2" HDPE STL ENCSE TO ELEC GROUND BOX**
**1-3-#2 XHHW, 1#2 BARE (DMS POWER)**
**1-2-#2 XHHW, 1#2 BARE (CCTV POWER)**

**3. INSTALL DMS STRUCTURE, CABINET FOUNDATION & CABINET**
**COORDINATES LAT, LONG: 29.6932050°, -096.6024601°**
**1-BLUETOOTH READER (MOUNTED ON DMS POLE)**
**1-SIGN STRUCTURE DMS**
**1-TYPE 4 CONTROLLER CABINET FOUNDATION**
**1-CONTROL CABINET**
**1-CELLULAR MODEM TO BE PROVIDED BY TXDOT**
**1-ETHERNET SWITCH TO BE PROVIDED BY TXDOT**
**1-FULL COLOR MATRIX DMS SIGN TO BE PROVIDED BY TXDOT**
**2-2" HDPE CONTROLLER CABINET TO STRUCTURE**
**2-3-#2 XHHW, 1#2 BARE (DMS POWER)**

**4. INSTALL CCTV PTZ CAMERA**
**COORDINATES LAT, LONG: 29.6919440°, -097.0072996°**
**1-CCTV CAMERA MOUNTED ON 55' POLE**
**1-CCTV CABINET**
**1-VIDEO ENCODER**

**5. FLEX BASE MOW STRIP PAID UNDER ITEM 247**

QUANTITIES DMS #4

| ITEM | CODE | DESCRIPTION | UNIT | RUN NO. 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | SHEET TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 132 | 6005 | EMBANKMENT (FINAL) (ORD COMP) (TY C) | CY | 0.07 | | | | | | | | 0.07 |
| 247 | 6366 | FL BS (CMP IN PLC) (TY A GR 5) (FNAL POS) | CY | 34 | | | | | | | | 34 |
| 416 | 6005 | DRILL SHAFT (42 IN) | LF | 21 | | | | | | | | 21 |
| 416 | 6006 | DRILL SHAFT (48 IN) | LF | 30 | | | | | | | | 30 |
| 432 | 6001 | RIPRAP (CONC) (4 IN) | CY | 1 | | | | | | | | 1 |
| 506 | 6038 | TEMP SEDMT CONT FENCE (INSTALL) | LF | 100 | | | | | | | | 100 |
| 506 | 6039 | TEMP SEDMT CONT FENCE (REMOVE) | LF | 100 | | | | | | | | 100 |
| 540 | 6001 | MTL W-BEAM GD FEN (TIM POST) | LF | 250 | | | | | | | | 250 |
| 540 | 6016 | DOWNSTREAM ANCHOR TERMINAL SECTION | EA | 1 | | | | | | | | 1 |
| 544 | 6001 | GUARDRAIL END TREATMENT (INSTALL) | EA | 1 | | | | | | | | 1 |
| 618 | 6007 | CONDT (HDPE) (2") (STL ENCSE) | LF | 105 | 135 | 25 | 40 | 185 | 25 | 185 | 40 | 740 |
| 618 | 6070 | CNDT (RM) (2") (DMS STRUCTURE) | LF | | | | 120 | | | | | 120 |
| 620 | 6015 | ELEC CONDR (NO. 2) BARE | LF | 210 | 270 | 25 | 125 | 185 | | | | 815 |
| 620 | 6016 | ELEC CONDR (NO. 2) INSULATED | LF | 525 | 675 | 75 | 155 | 370 | | | | 1800 |
| 624 | 6002 | GROUND BOX TY A (122311) W/APRON | EA | 2 | | | | | | | | 2 |
| 628 | 6250 | ELC SERVICE TY D 120/240 100 (NS) SS (N) SP (O) | EA | 1 | | | | | | | | 1 |
| 650 | 6024 | INS OH SN SUP (25 FT BAL TEE) (SPAN ONLY) | EA | 1 | | | | | | | | 1 |
| 6007 | 6010 | FIBER OPTIC CBL (SINGLE-MODE) (6 FIBER) | LF | | | | | | 25 | 185 | | 210 |
| 6007 | 6011 | FIBER OPTIC CBL (SINGLE-MODE) (12 FIBER) | LF | | | | | | | | 70 | 70 |
| 6010 | 6002 | CCTV FIELD EQUIPMENT (DIGITAL) | EA | 1 | | | | | | | | 1 |
| 6010 | 6003 | CCTV FIELD CONTROLLER | EA | 1 | | | | | | | | 1 |
| 6064 | 6046 | ITS POLE (55 FT) (90 MPH) | EA | 1 | | | | | | | | 1 |
| 6064 | 6080 | ITS POLE MNT CAB (TY 2) (CONF 1) | EA | 1 | | | | | | | | 1 |
| 6028 | 6028 | INSTALL DMS (FOUNDATION MTD CABINET) | EA | 1 | | | | | | | | 1 |
| 6123 | 6001 | ETHERNET SWITCH (INSTALL ONLY) | EA | 2 | | | | | | | | 2 |
| 6263 | 6002 | BLUETOOTH DETECTION SYSTEM (INSTALL) | EA | 1 | | | | | | | | 1 |
| | * | ELEC CONDR (NO. 8) BARE | LF | | | 25 | 40 | 185 | | | | 250 |
| | * | ELEC CONDR (NO. 8) INSULATED | LF | | | 50 | 80 | 370 | | | | 500 |

*SUBSIDIARY ITEM

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER

Hidi M. Criswell

5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
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IH 10

# DMS LOCATION #4
# IH 10 WB AND FM 2238

CSJ: 0535-06-048

SHEET 1 OF 1

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO |
| 0535 | 04 | 031, ETC | 13 |

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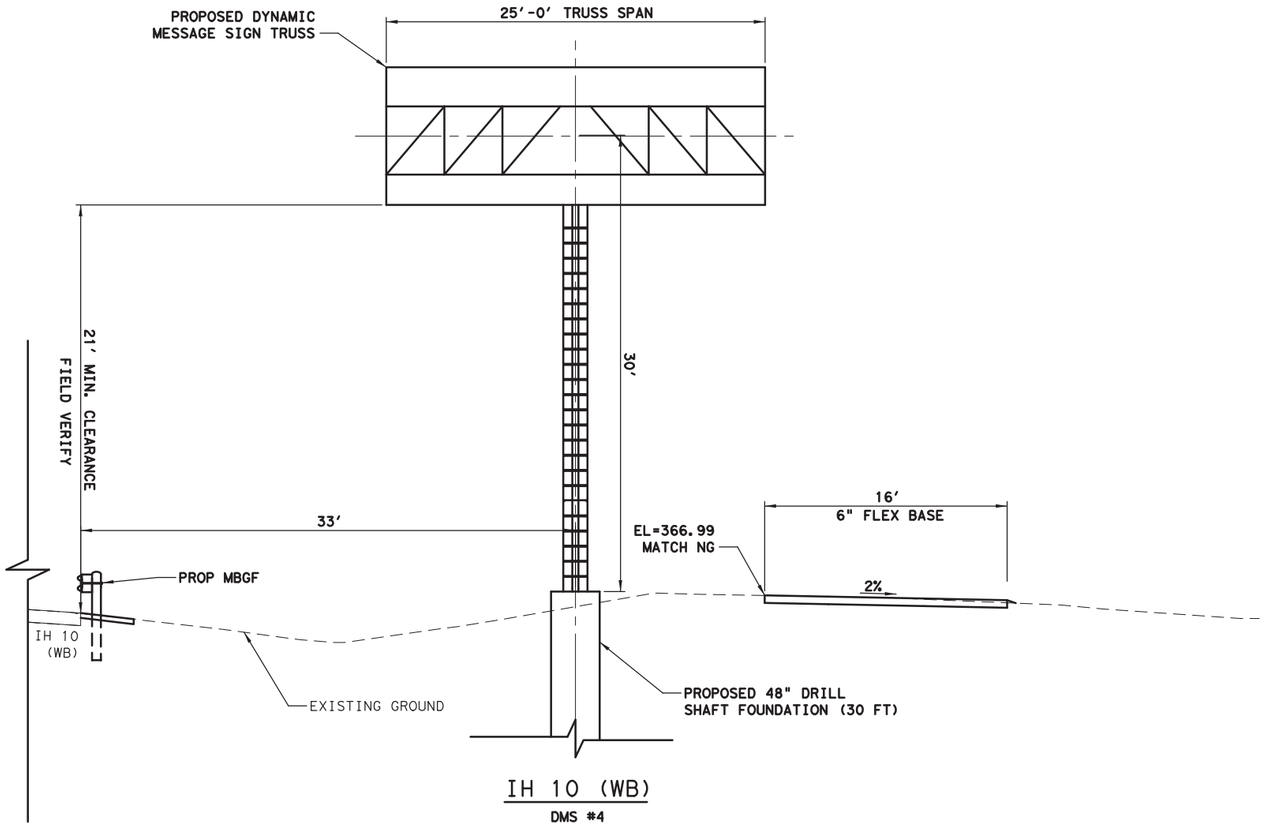



IH 10 (WB)

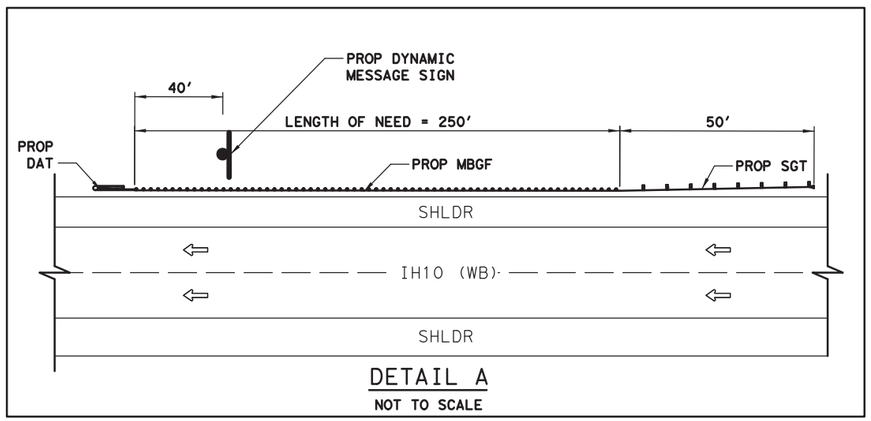
DMS #4

## COSS STRUCTURE

| | | |
|---|---|---|
| | DESIGN WIND HEIGHT, Hd | 37 FT |
| TRUSS DETAILS | LENGTH OF SPAN | Span A = 12.5 FT, Span B = 12.5 FT |
| | W x D = WIDTH x DEPTH | 4.5 FT x 4.5 FT |
| | CHORD | L3x3x1/4 |
| | DEAD LOAD DIAGONAL | L2x2x3/16 |
| | WIND LOAD DIAGONAL | L3x3x3/16 |
| | DEAD LOAD VERTICAL | L2x2x3/16 |
| | WIND LOAD STRUT | L2x2x3/16 |
| | TRUSS DEAD LOAD | 47 LB/FT |
| | SIZE H.S. BOLTS IN CONNECTION | 5/8" DIA |
| | | |
| TOWER DETAILS | TOWER HEIGHT AT TRUSS CENTER | 30 FT |
| | TOWER PIPE DIA & WALL THICKNESS | 24 IN, 0.562 IN |
| | TOWER PIPE DEFLECTION | 0.659 IN |
| | NO. & SIZE OF ANCHOR BOLTS | 8, 2-1/2" DIA |
| | ANCHOR BOLT CIRCLE DIA | 30.5 IN |
| | BASE PLATE SIZE | 36 IN x 2-1/2 IN |
| | TRUSS DEFLECTION | 1.0 IN |
| | | |
| DESIGN LOADS | SHEAR | 16.88 KIPS |
| | TORSION | 40.52 KIP-FT |
| | MOMENT | 490.76 KIP-FT |
| | | |
| | | |
| FOUNDATION | SOIL & "N" | CLAY, "N"=10 |
| | SIZE & LENGTH OF DRILLED SHAFT | 48" DIA, 30 FT |
| | DRILLED SHAFT REINFORCING | 16-#11 |
| | SPIRAL REINFORCING | #4 PLAIN SPIRAL AT 6" PITCH (GRADE 60) |
| | ANCHOR BOLT SIZE | 2-1/2" DIA x 5'-2" |

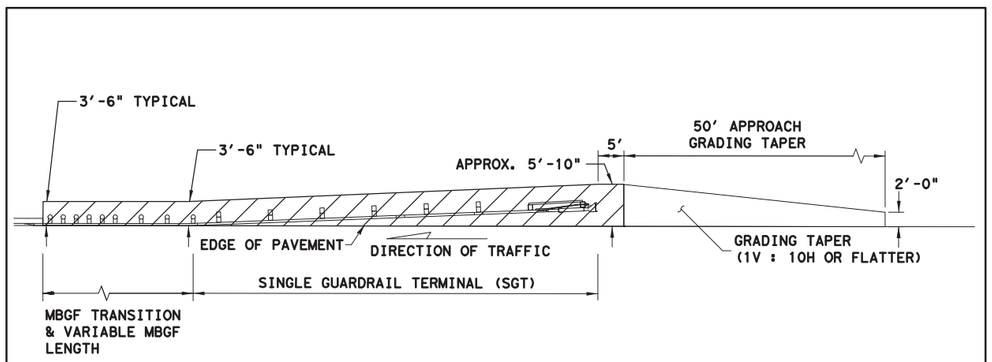
0 5 10

SCALE: 1" = 10'




DETAIL A

NOT TO SCALE




MOW STRIP DETAIL

NOT TO SCALE

*SEE APPLICABLE STANDARDS FOR DETAILS NOT SHOWN.

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER

Hidi M. Criswell

5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |



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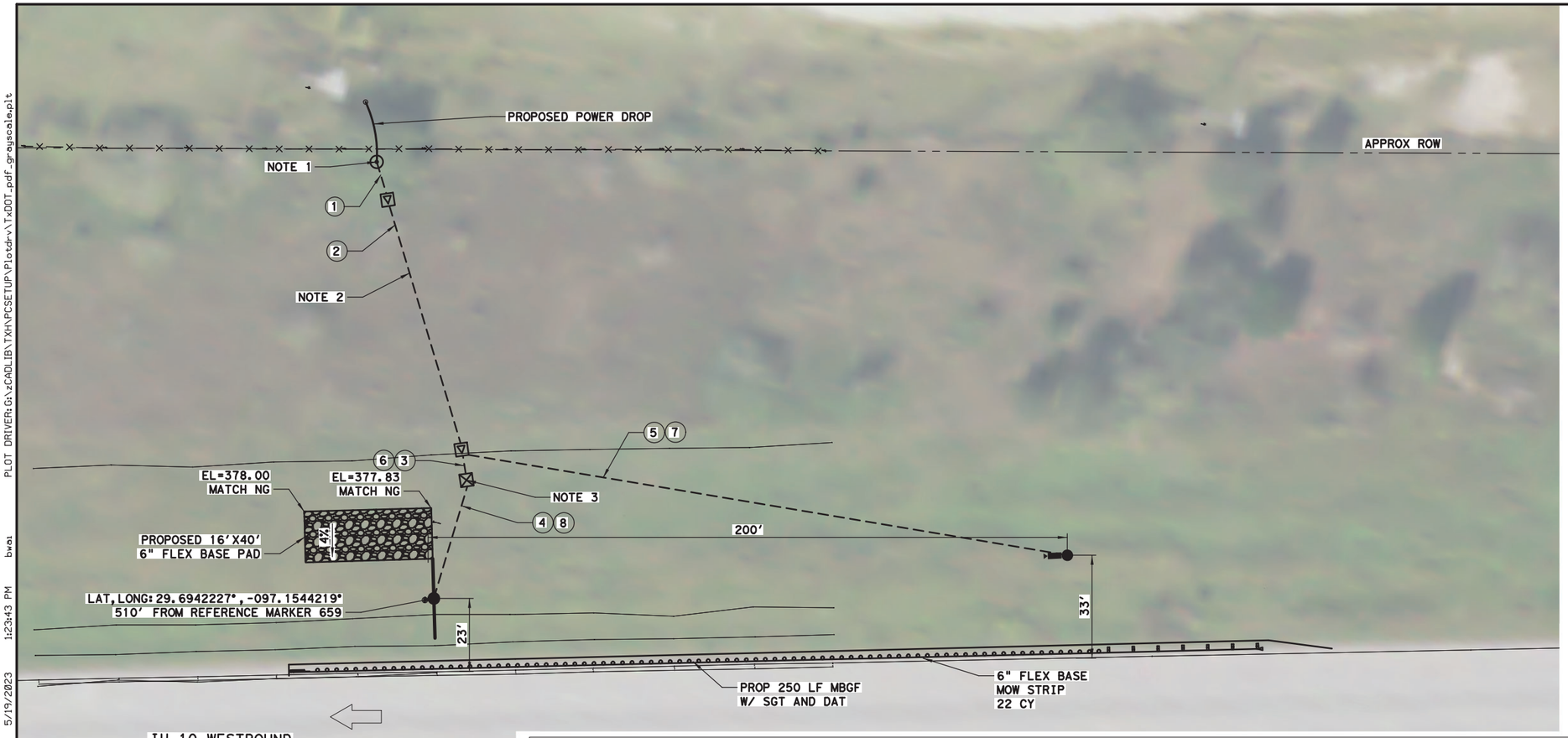
IH 10

# DMS #4 ELEVATION IH 10 WB AND FM 2238

CSJ: 0535-06-048

SHEET 1 OF 1

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO |
| 0535 | 04 | 031, ETC | 14 |




## LEGEND

- PROP DYNAMIC MESSAGE SIGN
- PROP DMS CABINET FOUNDATION W/ TYPE 1 CABINET
- PROP SERVICE POLE
- PROPOSED CONDUIT (BORED)
- PROPOSED CONDUIT
- PROPOSED ELECTRICAL GROUNDBOX
- EXISTING POWER UTILITY POLE
- TRAFFIC FLOW
- PROPOSED CCTV CAMERA
- RUN NUMBER
- SCF — SEDIMENT CONTROL FENCE
- BLUETOOTH READER

0 20 40

SCALE: 1" = 40'

**SILT FENCE LOCATION WILL BE DETERMINED IN THE FIELD.**
**5' X 5' RIPRAP AT THE BASE OF CCTV POLE**
**AND THE DMS POLE.**

**NOTES:**

**1. INSTALL ELECTRIC POWER SERVICE**
**1-ELECTRIC SERVICE POLE**
**1-2" HDPE (BORE) TO ELEC GROUND BOX**
**IN COND. #1-3-#2 XHHW, 1-#2 BARE (DMS)**
**IN COND. #2-2-#2 XHHW, 1-#2 BARE (CCTV)**

**2. INSTALL CONDUIT ELEC GROUND BOX TO ELEC GROUND BOX**
**1-2" HDPE STL ENCSE TO ELEC GROUND BOX**
**1-3-#2 XHHW, 1#2 BARE (DMS POWER)**
**1-2-#2 XHHW, 1#2 BARE (CCTV POWER)**

**3. INSTALL DMS STRUCTURE, CABINET FOUNDATION & CABINET**
**COORDINATES LAT, LONG: 29.6932050°, -096.6024601°**
**1-BLUETOOTH READER (MOUNTED ON DMS POLE)**
**1-SIGN STRUCTURE DMS**
**1-TYPE 4 CONTROLLER CABINET FOUNDATION**
**1-CONTROL CABINET**
**1-CELLULAR MODEM TO BE PROVIDED BY TXDOT**
**1-ETHERNET SWITCH TO BE PROVIDED BY TXDOT**
**1-FULL COLOR MATRIX DMS SIGN TO BE PROVIDED BY TXDOT**
**2-2" HDPE CONTROLLER CABINET TO STRUCTURE**
**2-3-#2 XHHW, 1#2 BARE (DMS POWER)**

**4. INSTALL CCTV PTZ CAMERA**
**COORDINATES LAT, LONG: 29.6943935°, -097.1538236°**
**1-CCTV CAMERA MOUNTED ON 55' POLE**
**1-CCTV CABINET**
**1-VIDEO ENCODER**

**5. FLEX BASE MOW STRIP PAID UNDER ITEM 247**

QUANTITIES DMS #5

| ITEM | CODE | DESCRIPTION | UNIT | RUN NO. 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | SHEET TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 132 | 6005 | EMBANKMENT (FINAL) (ORD COMP) (TY C) | CY | 43.08 | | | | | | | | 43.08 |
| 247 | 6366 | FL BS (CMP IN PLC) (TY A GR 5) (FNAL POS) | CY | 34 | | | | | | | | 34 |
| 416 | 6005 | DRILL SHAFT (42 IN) | LF | 21 | | | | | | | | 21 |
| 416 | 6006 | DRILL SHAFT (48 IN) | LF | 30 | | | | | | | | 30 |
| 432 | 6001 | RIPRAP (CONC) (4 IN) | CY | 1 | | | | | | | | 1 |
| 506 | 6038 | TEMP SEDMT CONT FENCE (INSTALL) | LF | 100 | | | | | | | | 100 |
| 506 | 6039 | TEMP SEDMT CONT FENCE (REMOVE) | LF | 100 | | | | | | | | 100 |
| 540 | 6001 | MTL W-BEAM GD FEN (TIM POST) | LF | 250 | | | | | | | | 250 |
| 540 | 6016 | DOWNSTREAM ANCHOR TERMINAL SECTION | EA | 1 | | | | | | | | 1 |
| 544 | 6001 | GUARDRAIL END TREATMENT (INSTALL) | EA | 1 | | | | | | | | 1 |
| 618 | 6007 | CONDT (HDPE) (2") (STL ENCSE) | LF | 25 | 120 | 20 | 45 | 205 | 20 | 205 | 45 | 685 |
| 618 | 6070 | CNDT (RM) (2") (DMS STRUCTURE) | LF | | | | 120 | | | | | 120 |
| 620 | 6015 | ELEC CONDR (NO.2) BARE | LF | 50 | 240 | 20 | 130 | 205 | | | | 645 |
| 620 | 6016 | ELEC CONDR (NO.2) INSULATED | LF | 125 | 600 | 60 | 160 | 410 | | | | 1355 |
| 624 | 6002 | GROUND BOX TY A (122311) W/APRON | EA | 2 | | | | | | | | 2 |
| 628 | 6250 | ELC SERVICE TY D 120/240 100 (NS) SS (N) SP (O) | EA | 1 | | | | | | | | 1 |
| 650 | 6024 | INS OH SN SUP (25 FT BAL TEE) (SPAN ONLY) | EA | 1 | | | | | | | | 1 |
| 6007 | 6010 | FIBER OPTIC CBL (SINGLE-MODE) (6 FIBER) | LF | | | | | | 20 | 205 | | 225 |
| 6007 | 6011 | FIBER OPTIC CBL (SINGLE-MODE) (12 FIBER) | LF | | | | | | | | 75 | 75 |
| 6010 | 6002 | CCTV FIELD EQUIPMENT (DIGITAL) | EA | 1 | | | | | | | | 1 |
| 6010 | 6003 | CCTV FIELD CONTROLLER | EA | 1 | | | | | | | | 1 |
| 6064 | 6046 | ITS POLE (55 FT) (90 MPH) | EA | 1 | | | | | | | | 1 |
| 6064 | 6080 | ITS POLE MNT CAB (TY 2) (CONF 1) | EA | 1 | | | | | | | | 1 |
| 6028 | 6028 | INSTALL DMS (FOUNDATION MTD CABINET) | EA | 1 | | | | | | | | 1 |
| 6123 | 6001 | ETHERNET SWITCH (INSTALL ONLY) | EA | 2 | | | | | | | | 2 |
| 6263 | 6002 | BLUETOOTH DETECTION SYSTEM (INSTALL) | EA | 1 | | | | | | | | 1 |
| | * | ELEC CONDR (NO.8) BARE | LF | | | 20 | 45 | 205 | | | | 270 |
| | * | ELEC CONDR (NO.8) INSULATED | LF | | | 40 | 90 | 410 | | | | 540 |

*SUBSIDIARY ITEM

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER

Hidi M. Criswell

5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |



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IH 10

# DMS LOCATION #5
# IH 10 WB AND FM 2762

CSJ: 0535-06-048

SHEET 1 OF 1

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO |
| 0535 | 04 | 031, ETC | 15 |

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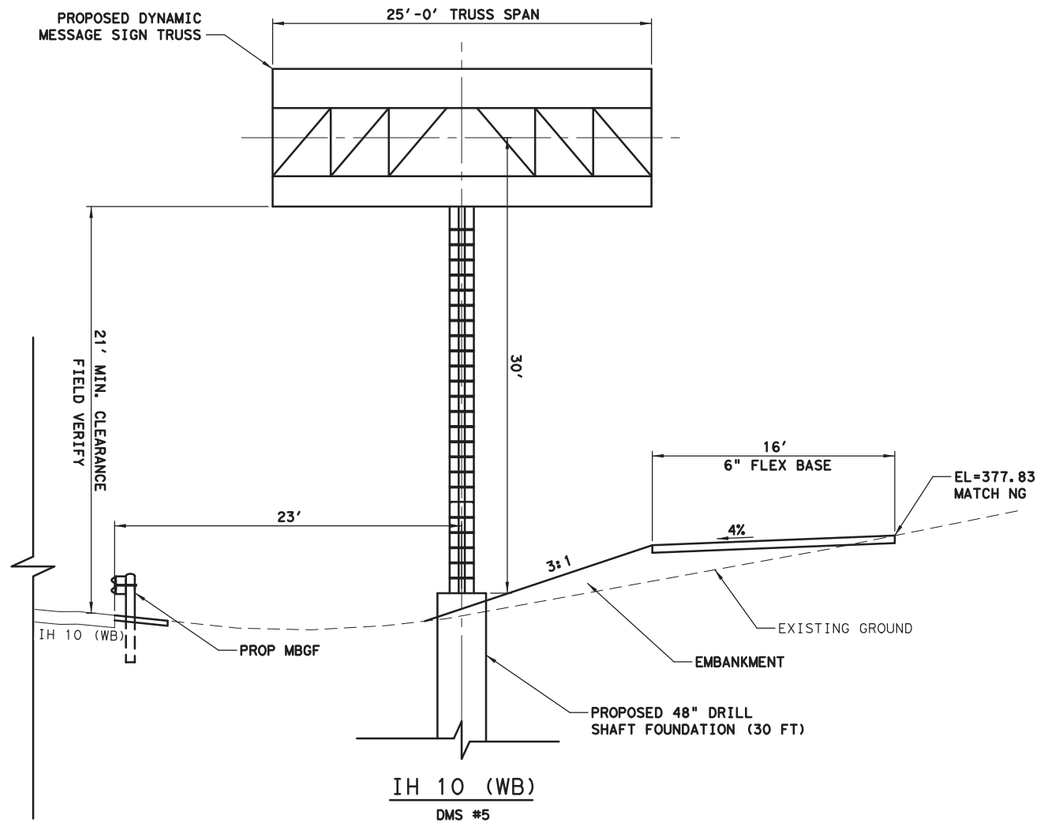
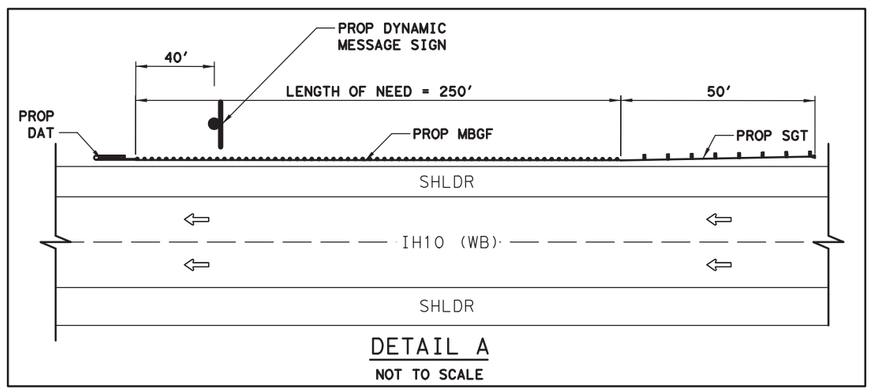



IH 10 (WB)
DMS #5

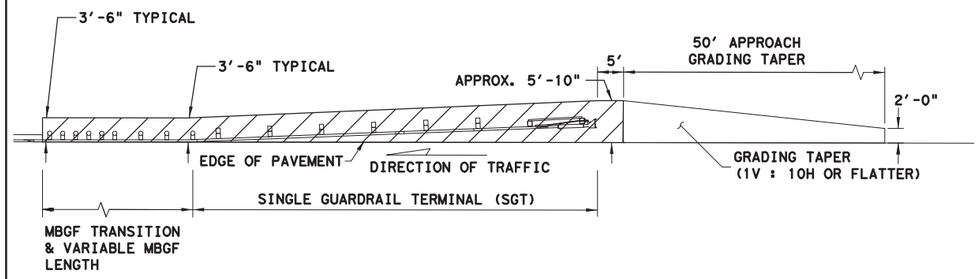
## COSS STRUCTURE

| | | |
|---|---|---|
| | DESIGN WIND HEIGHT, Hd | 37 FT |
| TRUSS DETAILS | LENGTH OF SPAN | Span A = 12.5 FT, Span B = 12.5 FT |
| | W x D = WIDTH x DEPTH | 4.5 FT x 4.5 FT |
| | CHORD | L3x3x1/4 |
| | DEAD LOAD DIAGONAL | L2x2x3/16 |
| | WIND LOAD DIAGONAL | L3x3x3/16 |
| | DEAD LOAD VERTICAL | L2x2x3/16 |
| | WIND LOAD STRUT | L2x2x3/16 |
| | TRUSS DEAD LOAD | 47 LB/FT |
| | SIZE H.S. BOLTS IN CONNECTION | 5/8" DIA |
| | | |
| TOWER DETAILS | TOWER HEIGHT AT TRUSS CENTER | 30 FT |
| | TOWER PIPE DIA & WALL THICKNESS | 24 IN, 0.562 IN |
| | TOWER PIPE DEFLECTION | 0.659 IN |
| | NO. & SIZE OF ANCHOR BOLTS | 8, 2-1/2" DIA |
| | ANCHOR BOLT CIRCLE DIA | 30.5 IN |
| | BASE PLATE SIZE | 36 IN x 2-1/2 IN |
| | TRUSS DEFLECTION | 1.0 IN |
| | | |
| DESIGN LOADS | SHEAR | 16.88 KIPS |
| | TORSION | 40.52 KIP-FT |
| | MOMENT | 490.76 KIP-FT |
| | | |
| | | |
| FOUNDATION | SOIL & "N" | CLAY, "N"=10 |
| | SIZE & LENGTH OF DRILLED SHAFT | 48" DIA, 30 FT |
| | DRILLED SHAFT REINFORCING | 16-#11 |
| | SPIRAL REINFORCING | #4 PLAIN SPIRAL AT 6" PITCH (GRADE 60) |
| | ANCHOR BOLT SIZE | 2-1/2" DIA x 5'-2" |

0 5 10
SCALE: 1" = 10'




DETAIL A
NOT TO SCALE




MOW STRIP DETAIL
NOT TO SCALE
*SEE APPLICABLE STANDARDS FOR DETAILS NOT SHOWN.

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER
Hidi M. Criswell
5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |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TBPE Registration No. F-1046


IH 10

# DMS #5 ELEVATION IH 10 WB AND FM 2762

CSJ: 0535-06-048

SHEET 1 OF 1

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO |
| 0535 | 04 | 031, ETC | 16 |

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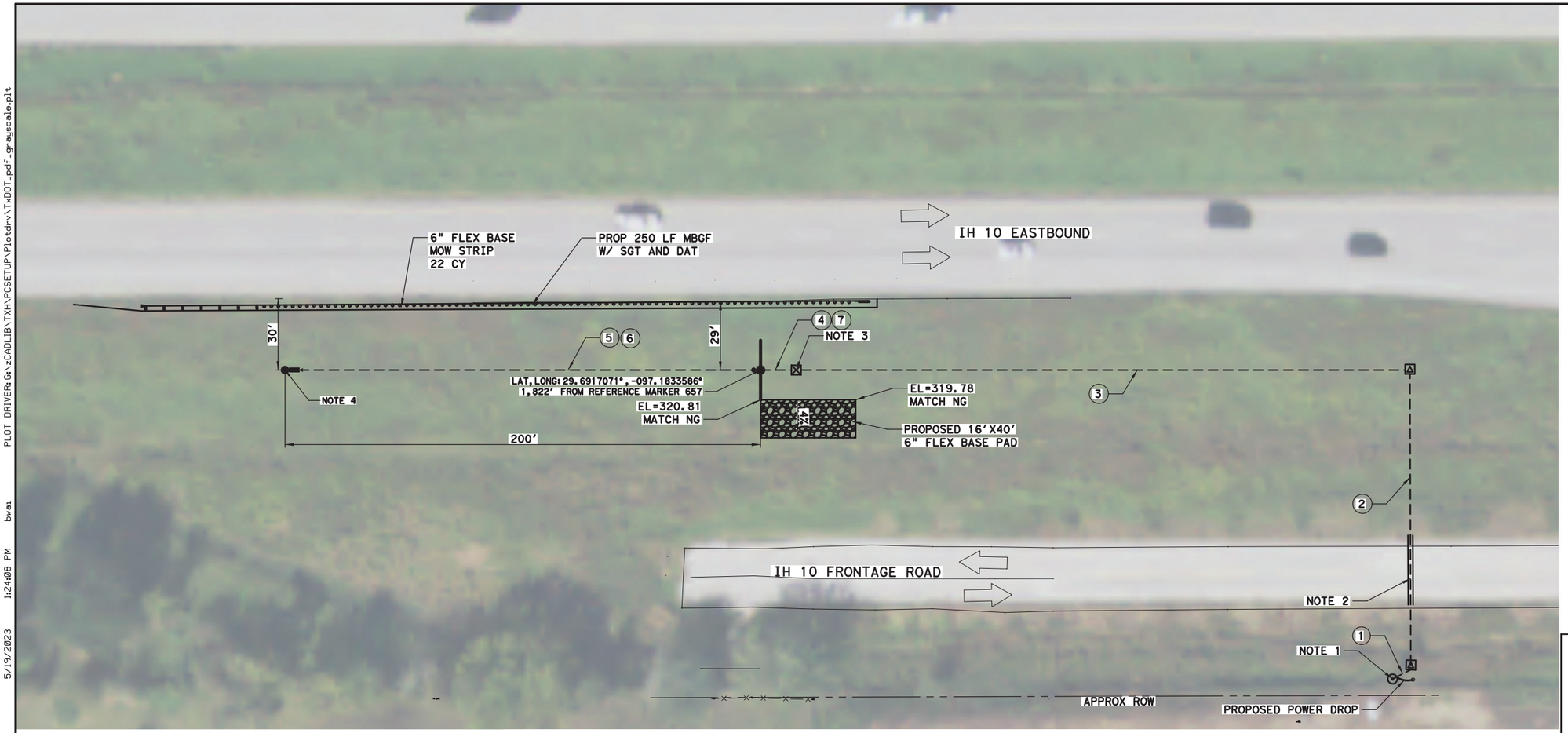


## LEGEND

- PROP DYNAMIC MESSAGE SIGN
- PROP DMS CABINET FOUNDATION W/ TYPE 1 CABINET
- PROP SERVICE POLE
- PROPOSED CONDUIT (BORED)
- PROPOSED CONDUIT
- PROPOSED ELECTRICAL GROUNDBOX
- EXISTING POWER UTILITY POLE
- TRAFFIC FLOW
- PROPOSED CCTV CAMERA
- RUN NUMBER
- SCF — SEDIMENT CONTROL FENCE
- BLUETOOTH READER

N

0 25 50

SCALE: 1" = 50'

SILT FENCE LOCATION WILL BE DETERMINED IN THE FIELD.
5' X 5' RIPRAP AT THE BASE OF CCTV POLE
AND THE DMS POLE.

NOTES:

1. INSTALL ELECTRIC POWER SERVICE
1-ELECTRIC SERVICE POLE
1-2" HDPE (BORE) TO ELEC GROUND BOX
IN COND. #1-3-#2 XHHW, 1-#2 BARE (DMS)
IN COND. #2-2-#2 XHHW, 1-#2 BARE (CCTV)

2. INSTALL CONDUIT ELEC GROUND BOX TO ELEC GROUND BOX
1-2" HDPE STL ENCSE TO ELEC GROUND BOX
1-3-#2 XHHW, 1#2 BARE (DMS POWER)
1-2-#2 XHHW, 1#2 BARE (CCTV POWER)

3. INSTALL DMS STRUCTURE, CABINET FOUNDATION & CABINET
COORDINATES LAT, LONG: 29.6917064°, -097.1833114°
1-BLUETOOTH READER (MOUNTED ON DMS POLE)
1-SIGN STRUCTURE DMS
1-TYPE 4 CONTROLLER CABINET FOUNDATION
1-CONTROL CABINET
1-CELLULAR MODEM TO BE PROVIDED BY TXDOT
1-ETHERNET SWITCH TO BE PROVIDED BY TXDOT
1-FULL COLOR MATRIX DMS SIGN TO BE PROVIDED BY TXDOT
2-2" HDPE CONTROLLER CABINET TO STRUCTURE
2-3-#2 XHHW, 1#2 BARE (DMS POWER)

4. INSTALL CCTV PTZ CAMERA
COORDINATES LAT, LONG: 29.6917156°, -097.1839884°
1-CCTV CAMERA MOUNTED ON 55' POLE
1-CCTV CABINET
1-VIDEO ENCODER

5. FLEX BASE MOW STRIP PAID UNDER ITEM 247

QUANTITIES DMS #6

| ITEM | CODE | DESCRIPTION | UNIT | RUN NO. | | | | | | | SHEET TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| 132 | 6005 | EMBANKMENT (FINAL) (ORD COMP) (TY C) | CY | 20.33 | | | | | | | 20.33 |
| 247 | 6366 | FL BS (CMP IN PLC) (TY A GR 5) (FNAL POS) | CY | 34 | | | | | | | 34 |
| 416 | 6005 | DRILL SHAFT (42 IN) | LF | 21 | | | | | | | 21 |
| 416 | 6006 | DRILL SHAFT (48 IN) | LF | 30 | | | | | | | 30 |
| 432 | 6001 | RIPRAP (CONC) (4 IN) | CY | 1 | | | | | | | 1 |
| 506 | 6038 | TEMP SEDMT CONT FENCE (INSTALL) | LF | 100 | | | | | | | 100 |
| 506 | 6039 | TEMP SEDMT CONT FENCE (REMOVE) | LF | 100 | | | | | | | 100 |
| 540 | 6001 | MTL W-BEAM GD FEN (TIM POST) | LF | 250 | | | | | | | 250 |
| 540 | 6016 | DOWNSTREAM ANCHOR TERMINAL SECTION | EA | 1 | | | | | | | 1 |
| 544 | 6001 | GUARDRAIL END TREATMENT (INSTALL) | EA | 1 | | | | | | | 1 |
| 618 | 6007 | CONDT (HDPE) (2") (STL ENCSE) | LF | 20 | 135 | 265 | 30 | 210 | 210 | 30 | 900 |
| 618 | 6070 | CNDT (RM) (2") (DMS STRUCTURE) | LF | | | | 120 | | | | 120 |
| 620 | 6015 | ELEC CONDR (NO.2) BARE | LF | 40 | 270 | 530 | 145 | 210 | | | 1195 |
| 620 | 6016 | ELEC CONDR (NO.2) INSULATED | LF | 100 | 675 | 1325 | 235 | 420 | | | 2755 |
| 624 | 6002 | GROUND BOX TY A (122311) W/APRON | EA | 2 | | | | | | | 2 |
| 628 | 6250 | ELC SERVICE TY D 120/240 100 (NS) SS (N) SP (O) | EA | 1 | | | | | | | 1 |
| 650 | 6024 | INS OH SN SUP (25 FT BAL TEE) (SPAN ONLY) | EA | 1 | | | | | | | 1 |
| 6007 | 6010 | FIBER OPTIC CBL (SINGLE-MODE) (6 FIBER) | LF | | | | | | 210 | 30 | 240 |
| 6007 | 6011 | FIBER OPTIC CBL (SINGLE-MODE) (12 FIBER) | LF | | | | | | | 30 | 30 |
| 6010 | 6002 | CCTV FIELD EQUIPMENT (DIGITAL) | EA | 1 | | | | | | | 1 |
| 6010 | 6003 | CCTV FIELD CONTROLLER | EA | 1 | | | | | | | 1 |
| 6064 | 6046 | ITS POLE (55 FT) (90 MPH) | EA | 1 | | | | | | | 1 |
| 6064 | 6080 | ITS POLE MNT CAB (TY 2) (CONF 1) | EA | 1 | | | | | | | 1 |
| 6028 | 6028 | INSTALL DMS (FOUNDATION MTD CABINET) | EA | 1 | | | | | | | 1 |
| 6123 | 6001 | ETHERNET SWITCH (INSTALL ONLY) | EA | 2 | | | | | | | 2 |
| 6263 | 6002 | BLUETOOTH DETECTION SYSTEM (INSTALL) | EA | 1 | | | | | | | 1 |
| | * | ELEC CONDR (NO.8) BARE | LF | | | | | 210 | | | 210 |
| | * | ELEC CONDR (NO.8) INSULATED | LF | | | | | 420 | | | 420 |

*SUBSIDIARY ITEM

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER

Hidi M. Criswell

5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |



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IH 10

# DMS LOCATION #6
# IH 10 EB AND FM 2762

CSJ: 0535-06-048

SHEET 1 OF 1

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO |
| 0535 | 04 | 031, ETC | 17 |

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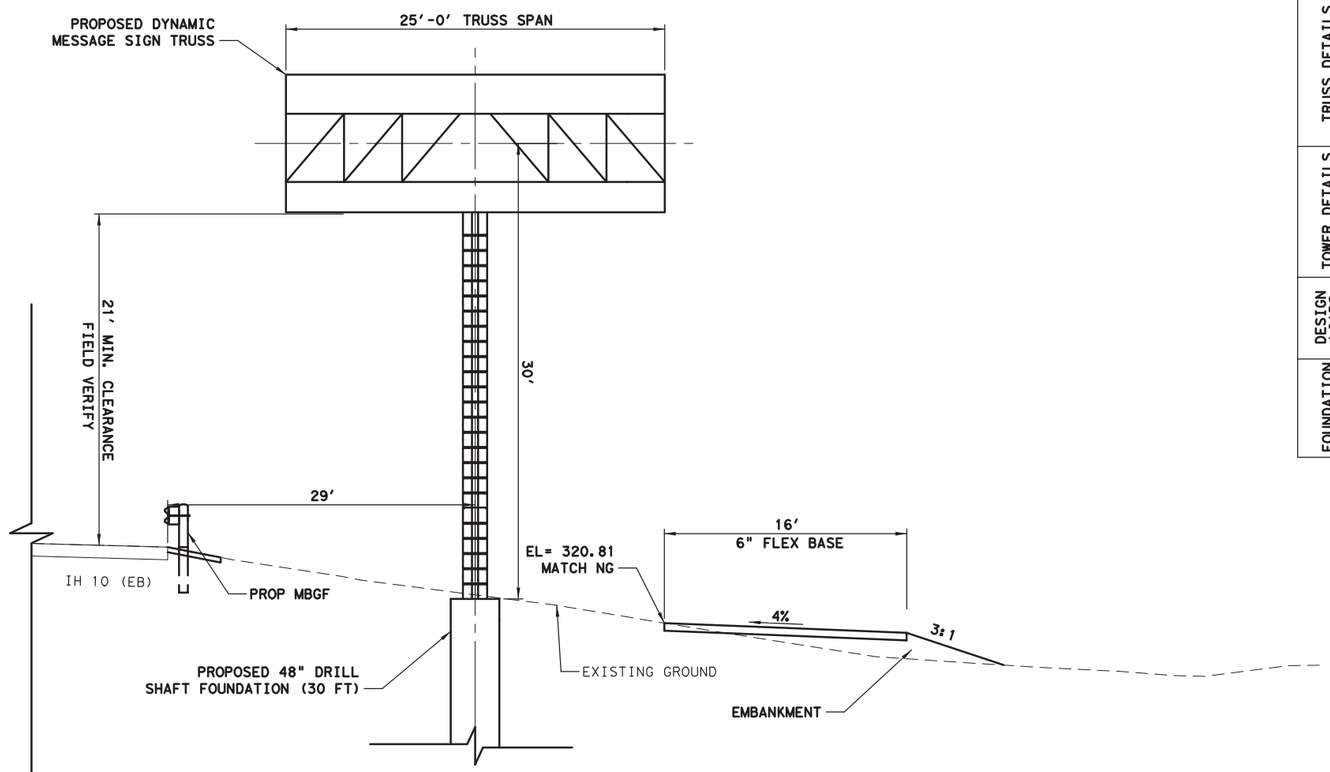



## IH 10 (EB)

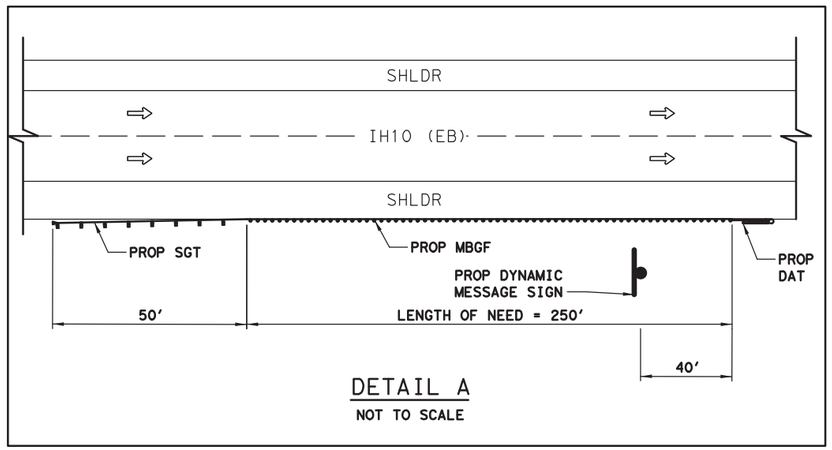
DMS #6

## COSS STRUCTURE

| | | |
|---|---|---|
| | DESIGN WIND HEIGHT, Hd | 37 FT |
| TRUSS DETAILS | LENGTH OF SPAN | Span A = 12.5 FT, Span B = 12.5 FT |
| | W x D = WIDTH x DEPTH | 4.5 FT x 4.5 FT |
| | CHORD | L3x3x1/4 |
| | DEAD LOAD DIAGONAL | L2x2x3/16 |
| | WIND LOAD DIAGONAL | L3x3x3/16 |
| | DEAD LOAD VERTICAL | L2x2x3/16 |
| | WIND LOAD STRUT | L2x2x3/16 |
| | TRUSS DEAD LOAD | 47 LB/FT |
| | SIZE H.S. BOLTS IN CONNECTION | 5/8" DIA |
| | | |
| TOWER DETAILS | TOWER HEIGHT AT TRUSS CENTER | 30 FT |
| | TOWER PIPE DIA & WALL THICKNESS | 24 IN, 0.562 IN |
| | TOWER PIPE DEFLECTION | 0.659 IN |
| | NO. & SIZE OF ANCHOR BOLTS | 8, 2-1/2" DIA |
| | ANCHOR BOLT CIRCLE DIA | 30.5 IN |
| | BASE PLATE SIZE | 36 IN x 2-1/2 IN |
| | TRUSS DEFLECTION | 1.0 IN |
| | | |
| DESIGN LOADS | SHEAR | 16.88 KIPS |
| | TORSION | 40.52 KIP-FT |
| | MOMENT | 490.76 KIP-FT |
| | | |
| | | |
| FOUNDATION | SOIL & "N" | CLAY, "N"=10 |
| | SIZE & LENGTH OF DRILLED SHAFT | 48" DIA, 30 FT |
| | DRILLED SHAFT REINFORCING | 16-#11 |
| | SPIRAL REINFORCING | #4 PLAIN SPIRAL AT 6" PITCH (GRADE 60) |
| | ANCHOR BOLT SIZE | 2-1/2" DIA x 5'-2" |

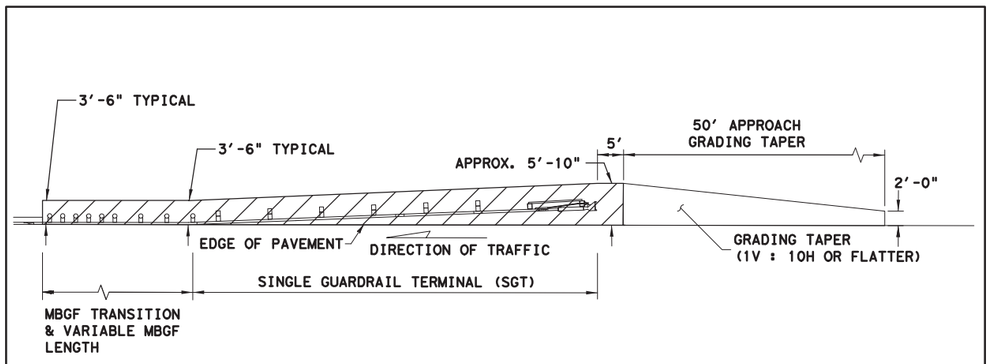
0 5 10

SCALE: 1" = 10'




## DETAIL A

NOT TO SCALE




## MOW STRIP DETAIL

NOT TO SCALE

*SEE APPLICABLE STANDARDS FOR DETAILS NOT SHOWN.

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER

Hidi M. Criswell

5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |



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IH 10

# DMS #6 ELEVATION
# IH 10 EB AND FM 2762

CSJ: 0535-06-048

SHEET 1 OF 1

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO. |
| 0535 | 04 | 031, ETC | 18 |

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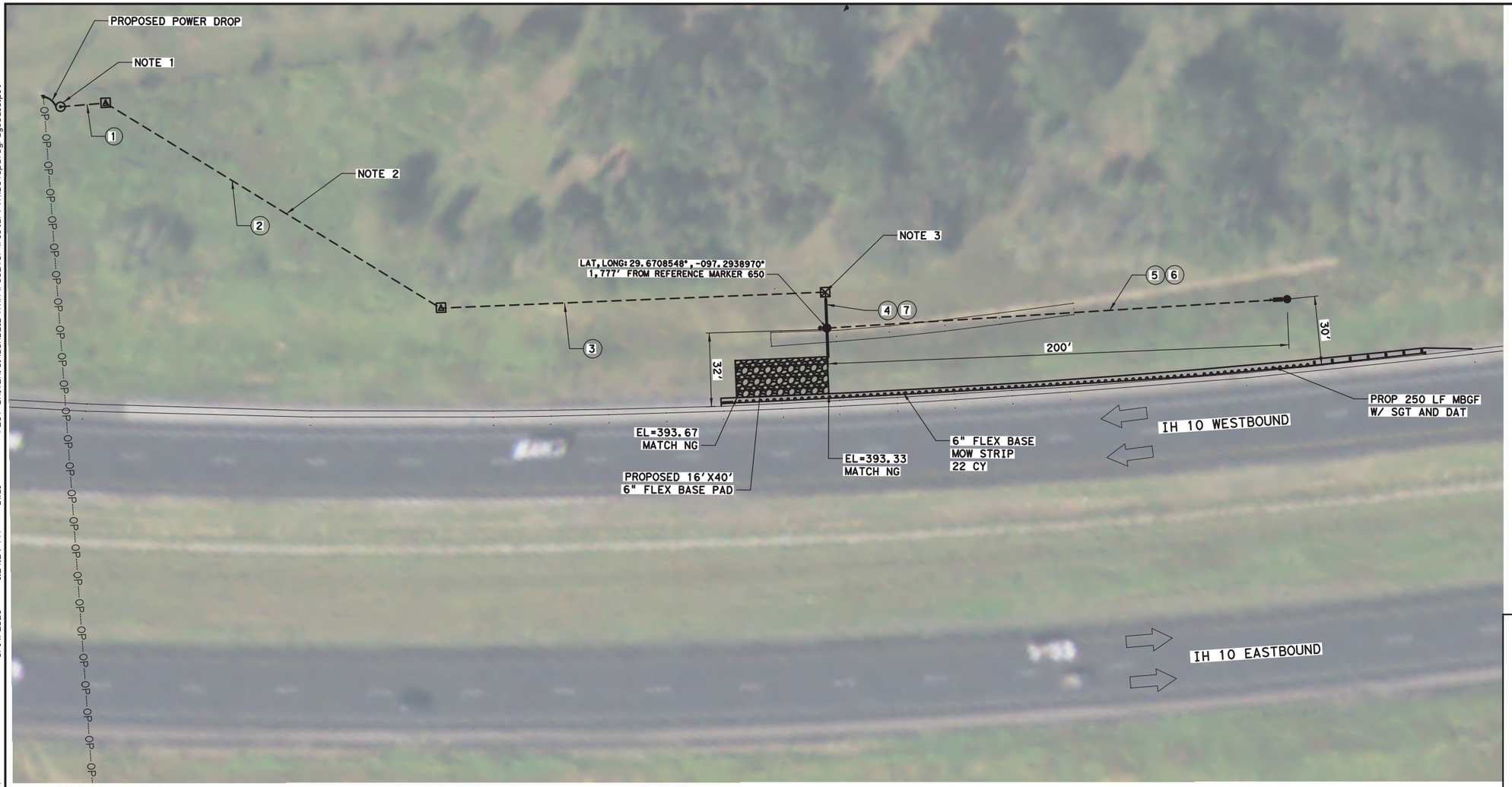


SILT FENCE LOCATION WILL BE DETERMINED IN THE FIELD.
5' X 5' RIPRAP AT THE BASE OF CCTV POLE
AND THE DMS POLE.

NOTES:

1. INSTALL ELECTRIC POWER SERVICE
1-ELECTRIC SERVICE POLE (BY OTHERS)
1-2" HDPE (BORE) TO ELEC GROUND BOX
IN COND. #1-3-#2 XHHW, 1-#2 BARE (DMS)
IN COND. #2-2-#2 XHHW, 1-#2 BARE (CCTV)

2. INSTALL CONDUIT ELEC GROUND BOX TO ELEC GROUND BOX
1-2" HDPE STL ENCSE TO ELEC GROUND BOX
1-3-#2 XHHW, 1#2 BARE (DMS POWER)
1-2-#2 XHHW, 1#2 BARE (CCTV POWER)

3. INSTALL DMS STRUCTURE, CABINET FOUNDATION & CABINET
COORDINATES LAT, LONG: 29.6708937°, -097.2939179°
1-BLUETOOTH READER (MOUNTED ON DMS POLE)
1-SIGN STRUCTURE DMS
1-TYPE 4 CONTROLLER CABINET FOUNDATION
1-CONTROL CABINET
1-CELLULAR MODEM TO BE PROVIDED BY TXDOT
1-ETHERNET SWITCH TO BE PROVIDED BY TXDOT
1-FULL COLOR MATRIX DMS SIGN TO BE PROVIDED BY TXDOT
2-2" HDPE CONTROLLER CABINET TO STRUCTURE
2-3-#2 XHHW, 1#2 BARE (DMS POWER)

4. INSTALL CCTV PTZ CAMERA
COORDINATES LAT, LONG: 29.6698057°, -097.2993806°
1-CCTV CAMERA MOUNTED ON 55' POLE
1-CCTV CABINET
1-VIDEO ENCODER

5. FLEX BASE MOW STRIP PAID UNDER ITEM 247

## LEGEND

- PROP DYNAMIC MESSAGE SIGN
- PROP DMS CABINET FOUNDATION W/ TYPE 1 CABINET
- PROP SERVICE POLE
- PROPOSED CONDUIT (BORED)
- PROPOSED CONDUIT
- PROPOSED ELECTRICAL GROUNDBOX
- EXISTING POWER UTILITY POLE
- TRAFFIC FLOW
- PROPOSED CCTV CAMERA
- RUN NUMBER
- SEDIMENT CONTROL FENCE
- BLUETOOTH READER

0 25 50
SCALE: 1" = 50'

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER

Hidi M. Criswell
5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
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IH 10

# DMS LOCATION #7
# IH 10 WB AND TX 97

CSJ: 0535-05-038

SHEET 1 OF 2

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO |
| 0535 | 04 | 031, ETC | 19 |

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| QUANTITIES DMS #7 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ITEM | CODE | DESCRIPTION | UNIT | RUN NO. | | | | | | | SHEET TOTAL |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| 132 | 6005 | EMBANKMENT (FINAL)(ORD COMP)(TY C) | CY | 30.73 | | | | | | | 30.73 |
| 247 | 6366 | FL BS (CMP IN PLC) (TY A GR 5) (FNAL POS) | CY | 34 | | | | | | | 34 |
| 416 | 6005 | DRILL SHAFT (42 IN) | LF | 21 | | | | | | | 21 |
| 416 | 6006 | DRILL SHAFT (48 IN) | LF | 30 | | | | | | | 30 |
| 432 | 6001 | RIPRAP (CONC) (4 IN) | CY | 1 | | | | | | | 1 |
| 506 | 6038 | TEMP SEDMT CONT FENCE (INSTALL) | LF | 100 | | | | | | | 100 |
| 506 | 6039 | TEMP SEDMT CONT FENCE (REMOVE) | LF | 100 | | | | | | | 100 |
| 540 | 6001 | MTL W-BEAM GD FEN (TIM POST) | LF | 250 | | | | | | | 250 |
| 540 | 6016 | DOWNSTREAM ANCHOR TERMINAL SECTION | EA | 1 | | | | | | | 1 |
| 544 | 6001 | GUARDRAIL END TREATMENT (INSTALL) | EA | 1 | | | | | | | 1 |
| 618 | 6007 | CONDT (HDPE) (2") (STL ENCSE) | LF | 30 | 185 | 180 | 30 | 210 | 210 | 30 | 875 |
| 618 | 6070 | CNDT (RM) (2") (DMS STRUCTURE) | LF | | | | 120 | | | | 120 |
| 620 | 6015 | ELEC CONDR (NO.2) BARE | LF | 60 | 370 | 360 | 145 | 210 | | | 1145 |
| 620 | 6016 | ELEC CONDR (NO.2) INSULATED | LF | 150 | 925 | 900 | 235 | 420 | | | 2630 |
| 624 | 6002 | GROUND BOX TY A (122311) W/APRON | EA | 2 | | | | | | | 2 |
| 628 | 6250 | ELC SERVICE TY D 120/240 100 (NS) SS (N) SP (O) | EA | 0 | | | | | | | 0 |
| 650 | 6024 | INS OH SN SUP (25 FT BAL TEE) (SPAN ONLY) | EA | 1 | | | | | | | 1 |
| 6007 | 6010 | FIBER OPTIC CBL (SINGLE-MODE) (6 FIBER) | LF | | | | | | 210 | 30 | 240 |
| 6007 | 6011 | FIBER OPTIC CBL (SINGLE-MODE) (12 FIBER) | LF | | | | | | | 30 | 30 |
| 6010 | 6002 | CCTV FIELD EQUIPMENT (DIGITAL) | EA | 1 | | | | | | | 1 |
| 6010 | 6003 | CCTV FIELD CONTROLLER | EA | 1 | | | | | | | 1 |
| 6064 | 6046 | ITS POLE (55 FT) (90 MPH) | EA | 1 | | | | | | | 1 |
| 6064 | 6080 | ITS POLE MNT CAB (TY 2) (CONF 1) | EA | 1 | | | | | | | 1 |
| 6028 | 6028 | INSTALL DMS (FOUNDATION MTD CABINET) | EA | 1 | | | | | | | 1 |
| 6123 | 6001 | ETHERNET SWITCH (INSTALL ONLY) | EA | 2 | | | | | | | 2 |
| 6263 | 6002 | BLUETOOTH DETECTION SYSTEM (INSTALL) | EA | 1 | | | | | | | 1 |
| | * | ELEC CONDR (NO.8) BARE | LF | | | | | 210 | | | 210 |
| | * | ELEC CONDR (NO.8) INSULATED | LF | | | | | 420 | | | 420 |

*SUBSIDIARY ITEM

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER

Hidi M. Criswell

5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
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IH 10

# DMS LOCATION #7
# IH 10 WB AND TX 97

**CSJ: 0535-05-038**

SHEET 2 OF 2

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO |
| 0535 | 04 | 031, ETC | 20 |

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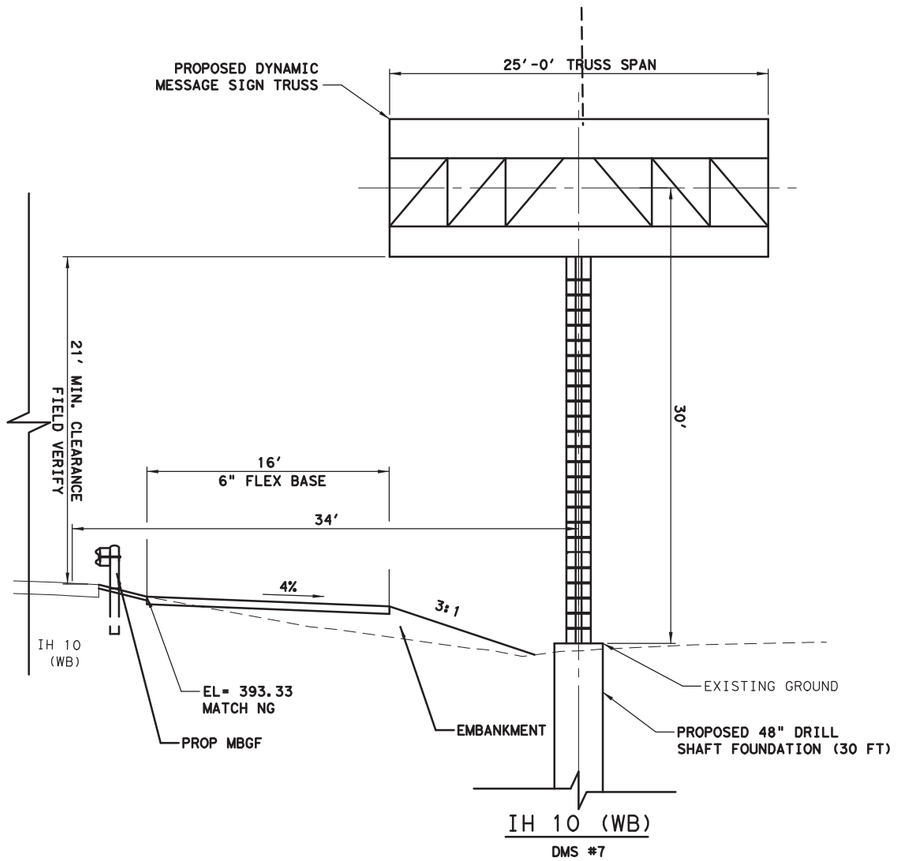



IH 10 (WB)

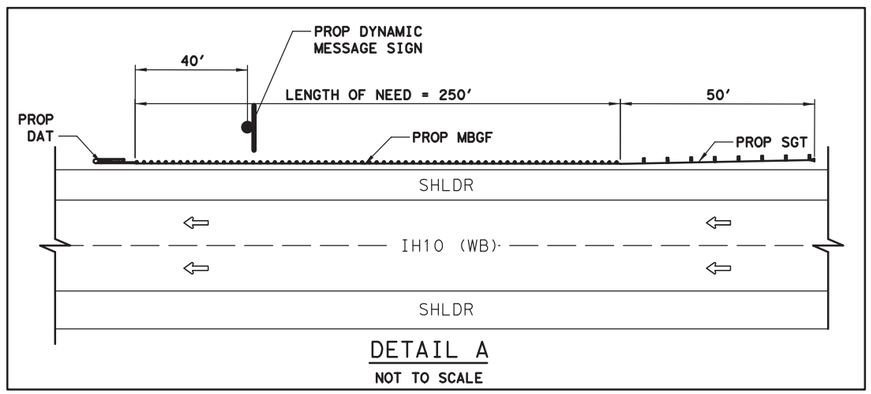
DMS #7

## COSS STRUCTURE

| | | |
|---|---|---|
| | DESIGN WIND HEIGHT, Hd | 37 FT |
| TRUSS DETAILS | LENGTH OF SPAN | Span A = 12.5 FT, Span B = 12.5 FT |
| | W x D = WIDTH x DEPTH | 4.5 FT x 4.5 FT |
| | CHORD | L3x3x1/4 |
| | DEAD LOAD DIAGONAL | L2x2x3/16 |
| | WIND LOAD DIAGONAL | L3x3x3/16 |
| | DEAD LOAD VERTICAL | L2x2x3/16 |
| | WIND LOAD STRUT | L2x2x3/16 |
| | TRUSS DEAD LOAD | 47 LB/FT |
| | SIZE H.S. BOLTS IN CONNECTION | 5/8" DIA |
| | | |
| TOWER DETAILS | TOWER HEIGHT AT TRUSS CENTER | 30 FT |
| | TOWER PIPE DIA & WALL THICKNESS | 24 IN, 0.562 IN |
| | TOWER PIPE DEFLECTION | 0.659 IN |
| | NO. & SIZE OF ANCHOR BOLTS | 8, 2-1/2" DIA |
| | ANCHOR BOLT CIRCLE DIA | 30.5 IN |
| | BASE PLATE SIZE | 36 IN x 2-1/2 IN |
| | TRUSS DEFLECTION | 1.0 IN |
| | | |
| DESIGN LOADS | SHEAR | 16.88 KIPS |
| | TORSION | 40.52 KIP-FT |
| | MOMENT | 490.76 KIP-FT |
| | | |
| | | |
| FOUNDATION | SOIL & "N" | CLAY, "N"=10 |
| | SIZE & LENGTH OF DRILLED SHAFT | 48" DIA, 30 FT |
| | DRILLED SHAFT REINFORCING | 16-#11 |
| | SPIRAL REINFORCING | #4 PLAIN SPIRAL AT 6" PITCH (GRADE 60) |
| | ANCHOR BOLT SIZE | 2-1/2" DIA x 5'-2" |

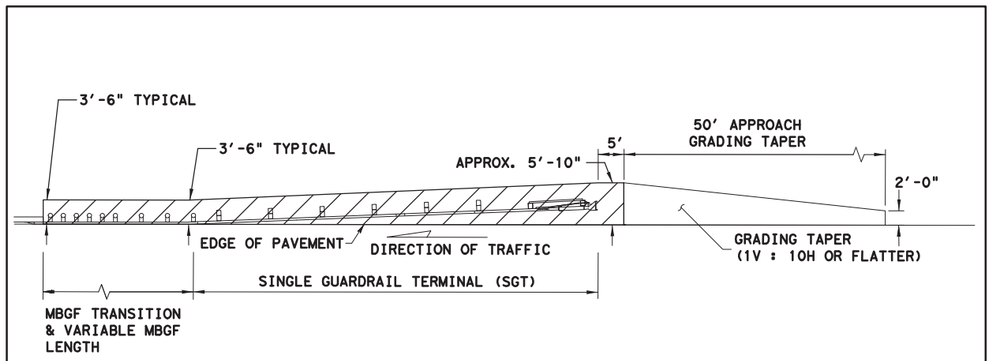
0 5 10

SCALE: 1" = 10'




DETAIL A

NOT TO SCALE




MOW STRIP DETAIL

NOT TO SCALE

*SEE APPLICABLE STANDARDS FOR DETAILS NOT SHOWN.

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER

Hidi M. Criswell

5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |



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TBPE Registration No. F-1046



IH 10

# DMS #7 ELEVATION IH 10 WB AND TX 97

CSJ: 0535-05-038

SHEET 1 OF 1

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO |
| 0535 | 04 | 031, ETC | 21 |

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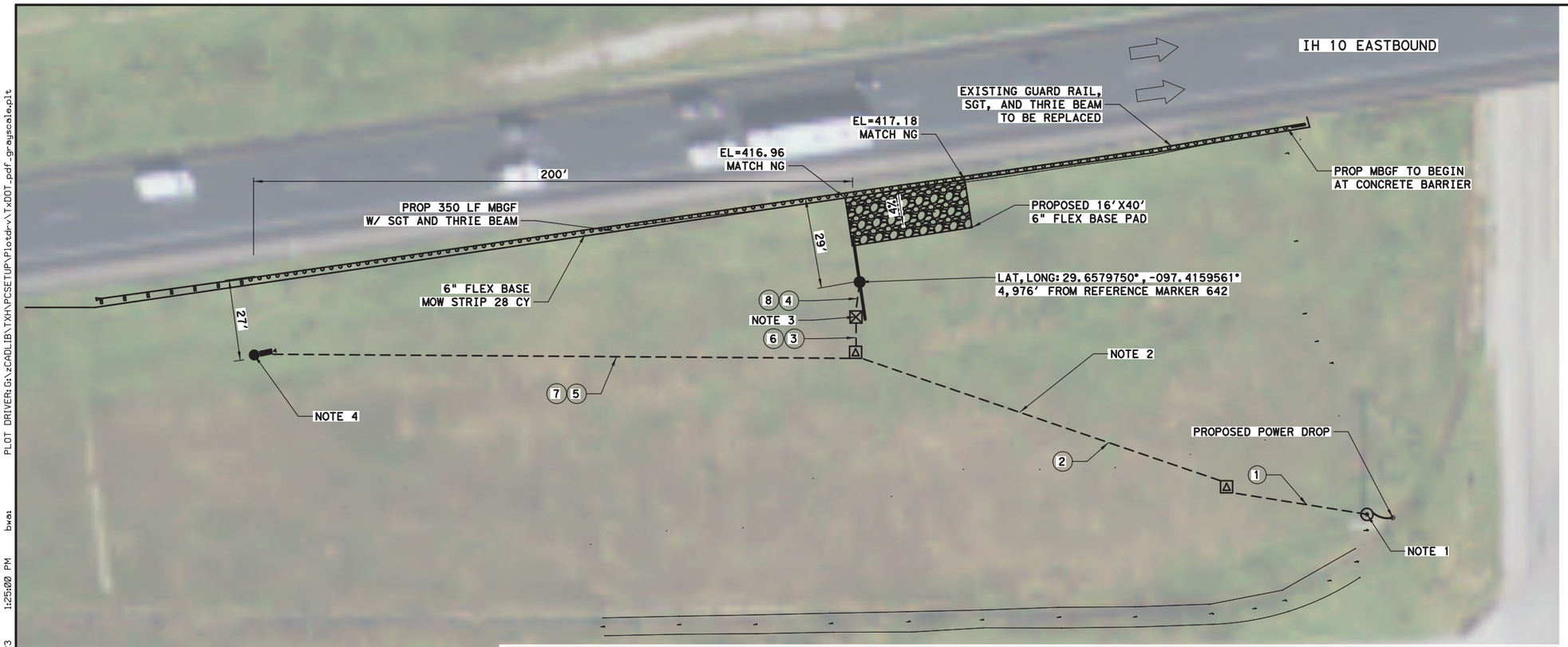


SILT FENCE LOCATION WILL BE DETERMINED IN THE FIELD.
5' X 5' RIPRAP AT THE BASE OF CCTV POLE
AND THE DMS POLE.

NOTES:
1. INSTALL ELECTRIC POWER SERVICE
1-ELECTRIC SERVICE POLE (BY OTHERS)
1-2" HDPE (BORE) TO ELEC GROUND BOX
IN COND. #1-3-#2 XHHW, 1-#2 BARE (DMS)
IN COND. #2-2-#2 XHHW, 1-#2 BARE (CCTV)

2. INSTALL CONDUIT ELEC GROUND BOX TO ELEC GROUND BOX
1-2" HDPE STL ENCSE TO ELEC GROUND BOX
1-3-#2 XHHW, 1#2 BARE (DMS POWER)
1-2-#2 XHHW, 1#2 BARE (CCTV POWER)

3. INSTALL DMS STRUCTURE, CABINET FOUNDATION & CABINET
COORDINATES LAT, LONG: 29.6932050°, -096.6024601°
1-BLUETOOTH READER (MOUNTED ON DMS POLE)
1-SIGN STRUCTURE DMS
1-TYPE 4 CONTROLLER CABINET FOUNDATION
1-CONTROL CABINET
1-CELLULAR MODEM TO BE PROVIDED BY TXDOT
1-ETHERNET SWITCH TO BE PROVIDED BY TXDOT
1-FULL COLOR MATRIX DMS SIGN TO BE PROVIDED BY TXDOT
2-2" HDPE CONTROLLER CABINET TO STRUCTURE
2-3-#2 XHHW, 1#2 BARE (DMS POWER)

4. INSTALL CCTV PTV CAMERA
COORDINATES LAT, LONG: 29.6579161°, -097.4165878°
1-CCTV CAMERA MOUNTED ON 55' POLE
1-CCTV CABINET
1-VIDEO ENCODER

5. FLEX BASE MOW STRIP PAID UNDER ITEM 247

QUANTITIES DMS #8

| ITEM | CODE | DESCRIPTION | UNIT | RUN NO. 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | SHEET TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 132 | 6005 | EMBANKMENT (FINAL) (ORD COMP) (TY C) | CY | 84.23 | | | | | | | | 84.23 |
| 247 | 6366 | FL BS (CMP IN PLC) (TY A GR 5) (FNAL POS) | CY | 40 | | | | | | | | 40 |
| 416 | 6005 | DRILL SHAFT (42 IN) | LF | 21 | | | | | | | | 21 |
| 416 | 6006 | DRILL SHAFT (48 IN) | LF | 30 | | | | | | | | 30 |
| 432 | 6001 | RIPRAP (CONC) (4 IN) | CY | 1 | | | | | | | | 1 |
| 506 | 6038 | TEMP SEDMT CONT FENCE (INSTALL) | LF | 100 | | | | | | | | 100 |
| 506 | 6039 | TEMP SEDMT CONT FENCE (REMOVE) | LF | 100 | | | | | | | | 100 |
| 540 | 6001 | MTL W-BEAM GD FEN (TIM POST) | LF | 350 | | | | | | | | 350 |
| 540 | 6021 | MTL THRIE-BEAM GD FEN (TIM POST) | EA | 1 | | | | | | | | 1 |
| 540 | 6016 | DOWNSTREAM ANCHOR TERMINAL SECTION | EA | | | | | | | | | 0 |
| 542 | 6001 | REMOVE METAL BEAM GUARD FENCE | LF | 175 | | | | | | | | 175 |
| 544 | 6001 | GUARDRAIL END TREATMENT (INSTALL) | EA | 1 | | | | | | | | 1 |
| 544 | 6003 | GUARDRAIL END TREATMENT (REMOVE) | EA | 1 | | | | | | | | 1 |
| 618 | 6007 | CONDT (HDPE) (2") (STL ENCSE) | LF | 60 | 140 | 20 | 35 | 210 | 20 | 210 | 35 | 730 |
| 618 | 6070 | CNDT (RM) (2") (DMS STRUCTURE) | LF | | | | 120 | | | | | 120 |
| 620 | 6015 | ELEC CONDR (NO. 2) BARE | LF | 120 | 280 | 20 | 120 | 210 | | | | 750 |
| 620 | 6016 | ELEC CONDR (NO. 2) INSULATED | LF | 300 | 700 | 60 | 150 | 420 | | | | 1630 |
| 624 | 6002 | GROUND BOX TY A (122311) W/APRON | EA | 2 | | | | | | | | 2 |
| 628 | 6250 | ELC SERVICE TY D 120/240 100 (NS) SS (N) SP (O) | EA | 0 | | | | | | | | 0 |
| 650 | 6024 | INS OH SN SUP (25 FT BAL TEE) (SPAN ONLY) | EA | 1 | | | | | | | | 1 |
| 6007 | 6010 | FIBER OPTIC CBL (SINGLE-MODE) (6 FIBER) | LF | | | | | | 20 | 210 | | 230 |
| 6007 | 6011 | FIBER OPTIC CBL (SINGLE-MODE) (12 FIBER) | LF | | | | | | | | 65 | 65 |
| 6010 | 6002 | CCTV FIELD EQUIPMENT (DIGITAL) | EA | 1 | | | | | | | | 1 |
| 6010 | 6003 | CCTV FIELD CONTROLLER | EA | 1 | | | | | | | | 1 |
| 6064 | 6046 | ITS POLE (55 FT) (90 MPH) | EA | 1 | | | | | | | | 1 |
| 6064 | 6080 | ITS POLE MNT CAB (TY 2) (CONF 1) | EA | 1 | | | | | | | | 1 |
| 6028 | 6028 | INSTALL DMS (FOUNDATION MTD CABINET) | EA | 1 | | | | | | | | 1 |
| 6123 | 6001 | ETHERNET SWITCH (INSTALL ONLY) | EA | 2 | | | | | | | | 2 |
| 6263 | 6002 | BLUETOOTH DETECTION SYSTEM (INSTALL) | EA | 1 | | | | | | | | 1 |
| | * | ELEC CONDR (NO. 8) BARE | LF | | | 20 | 35 | 210 | | | | 265 |
| | * | ELEC CONDR (NO. 8) INSULATED | LF | | | 40 | 70 | 420 | | | | 530 |

*SUBSIDIARY ITEM

## LEGEND

- PROP DYNAMIC MESSAGE SIGN
- PROP DMS CABINET FOUNDATION W/ TYPE 1 CABINET
- PROP SERVICE POLE
- PROPOSED CONDUIT (BORED)
- PROPOSED CONDUIT
- PROPOSED ELECTRICAL GROUNDBOX
- EXISTING POWER UTILITY POLE
- TRAFFIC FLOW
- PROPOSED CCTV CAMERA
- RUN NUMBER
- SCF — SEDIMENT CONTROL FENCE
- BLUETOOTH READER

N

0 20 40
SCALE: 1" = 40'

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER
Hidi M. Criswell
5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |


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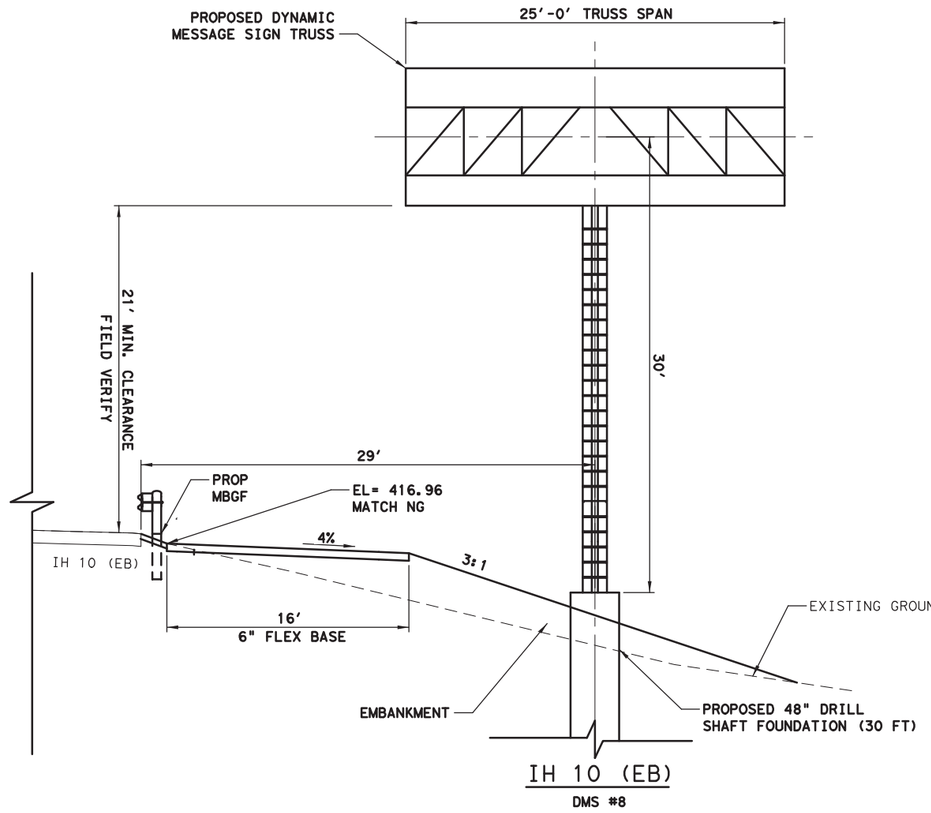
IH 10

# DMS LOCATION #8
# IH 10 EB AND TX 304

CSJ: 0535-04-031

SHEET 1 OF 1

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO |
| 0535 | 04 | 031, ETC | 22 |

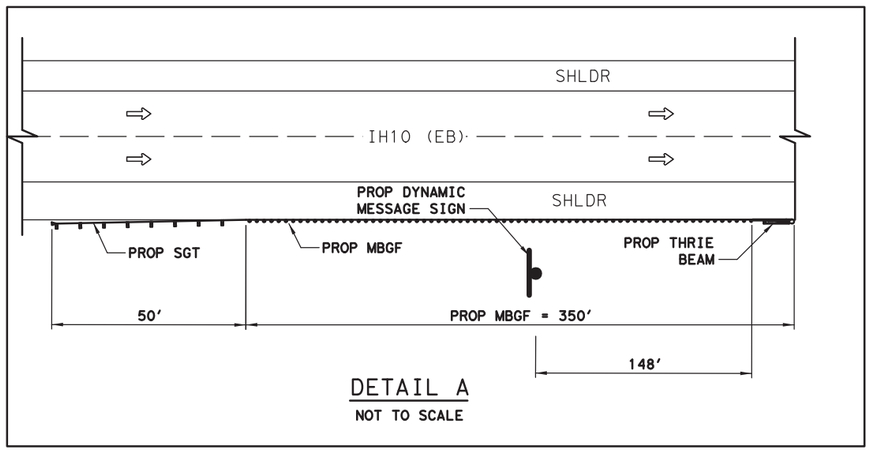



IH 10 (EB)
DMS #8

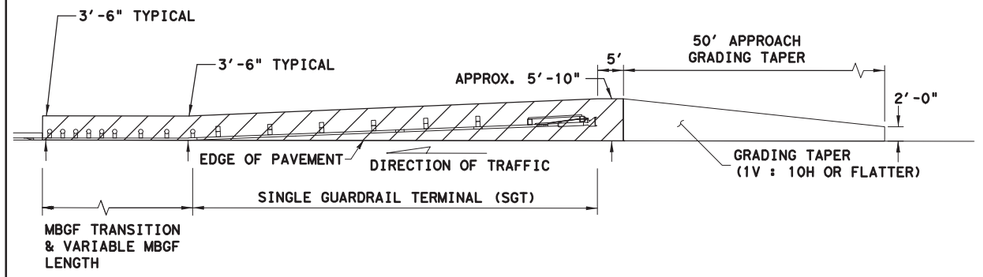
## COSS STRUCTURE

| | | |
|---|---|---|
| | DESIGN WIND HEIGHT, Hd | 37 FT |
| TRUSS DETAILS | LENGTH OF SPAN | Span A = 12.5 FT, Span B = 12.5 FT |
| | W x D = WIDTH x DEPTH | 4.5 FT x 4.5 FT |
| | CHORD | L3x3x1/4 |
| | DEAD LOAD DIAGONAL | L2x2x3/16 |
| | WIND LOAD DIAGONAL | L3x3x3/16 |
| | DEAD LOAD VERTICAL | L2x2x3/16 |
| | WIND LOAD STRUT | L2x2x3/16 |
| | TRUSS DEAD LOAD | 47 LB/FT |
| | SIZE H.S. BOLTS IN CONNECTION | 5/8" DIA |
| TOWER DETAILS | TOWER HEIGHT AT TRUSS CENTER | 30 FT |
| | TOWER PIPE DIA & WALL THICKNESS | 24 IN, 0.562 IN |
| | TOWER PIPE DEFLECTION | 0.659 IN |
| | NO. & SIZE OF ANCHOR BOLTS | 8, 2-1/2" DIA |
| | ANCHOR BOLT CIRCLE DIA | 30.5 IN |
| | BASE PLATE SIZE | 36 IN x 2-1/2 IN |
| | TRUSS DEFLECTION | 1.0 IN |
| DESIGN LOADS | SHEAR | 16.88 KIPS |
| | TORSION | 40.52 KIP-FT |
| | MOMENT | 490.76 KIP-FT |
| FOUNDATION | SOIL & "N" | CLAY, "N"=10 |
| | SIZE & LENGTH OF DRILLED SHAFT | 48" DIA, 30 FT |
| | DRILLED SHAFT REINFORCING | 16-#11 |
| | SPIRAL REINFORCING | #4 PLAIN SPIRAL AT 6" PITCH (GRADE 60) |
| | ANCHOR BOLT SIZE | 2-1/2" DIA x 5'-2" |

0 5 10
SCALE: 1" = 10'




DETAIL A
NOT TO SCALE




MOW STRIP DETAIL
NOT TO SCALE

*SEE APPLICABLE STANDARDS FOR DETAILS NOT SHOWN.

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED PROFESSIONAL ENGINEER
Hidi M. Criswell
5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
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IH 10

# DMS #8 ELEVATION IH 10 EB AND TX 304

CSJ: 0535-04-031

SHEET 1 OF 1

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO |
| 0535 | 04 | 031, ETC | 23 |

...\SHEETS\IH10_ELEVATION 2.dgn


SILT FENCE LOCATION WILL BE DETERMINED IN THE FIELD.
5' X 5' RIPRAP AT THE BASE OF CCTV POLE
AND THE DMS POLE.

NOTES:

1. INSTALL ELECTRIC POWER SERVICE
1-ELECTRIC SERVICE POLE (BY OTHERS)
1-2" HDPE (BORE) TO ELEC GROUND BOX
IN COND. #1-3-#2 XHHW, 1-#2 BARE (DMS)
IN COND. #2-2-#2 XHHW, 1-#2 BARE (CCTV)

2. INSTALL CONDUIT ELEC GROUND BOX TO ELEC GROUND BOX
1-2" HDPE STL ENCSE TO ELEC GROUND BOX
1-3-#2 XHHW, 1#2 BARE (DMS POWER)
1-2-#2 XHHW, 1#2 BARE (CCTV POWER)

3. INSTALL DMS STRUCTURE, CABINET FOUNDATION & CABINET
COORDINATES LAT, LONG: 29.6529599°, -097.5539290°
1-BLUETOOTH READER (MOUNTED ON DMS POLE)
1-SIGN STRUCTURE DMS
1-TYPE 4 CONTROLLER CABINET FOUNDATION
1-CONTROL CABINET
1-CELLULAR MODEM TO BE PROVIDED BY TXDOT
1-ETHERNET SWITCH TO BE PROVIDED BY TXDOT
1-FULL COLOR MATRIX DMS SIGN TO BE PROVIDED BY TXDOT
2-2" HDPE CONTROLLER CABINET TO STRUCTURE
2-3-#2 XHHW, 1#2 BARE (DMS POWER)

4. INSTALL CCTV PTZ CAMERA
COORDINATES LAT, LONG: 29.6530158°, -097.5545580°
1-CCTV CAMERA MOUNTED ON 55' POLE
1-CCTV CABINET
1-VIDEO ENCODER

5. FLEX BASE MOW STRIP PAID UNDER ITEM 247

## LEGEND

- PROP DYNAMIC MESSAGE SIGN
- PROP DMS CABINET FOUNDATION W/ TYPE 1 CABINET
- PROP SERVICE POLE
- PROPOSED CONDUIT (BORED)
- PROPOSED CONDUIT
- PROPOSED ELECTRICAL GROUNDBOX
- EXISTING POWER UTILITY POLE
- TRAFFIC FLOW
- PROPOSED CCTV CAMERA
- RUN NUMBER
- SCF — SEDIMENT CONTROL FENCE
- BLUETOOTH READER

N

0 20 40

SCALE: 1" = 40'

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER

Hidi M. Criswell

5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
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IH 10

# DMS LOCATION #9
# IH 10 EB AND US 183

CSJ: 0535-04-031

SHEET 1 OF 2

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO |
| 0535 | 04 | 031, ETC | 24 |

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QUANTITIES DMS #9

| ITEM | CODE | DESCRIPTION | UNIT | RUN NO. | | | | | | | | SHEET TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| 132 | 6005 | EMBANKMENT (FINAL)(ORD COMP)(TY C) | CY | 11.27 | | | | | | | | 11.27 |
| 247 | 6366 | FL BS (CMP IN PLC) (TY A GR 5) (FNAL POS) | CY | 34 | | | | | | | | 34 |
| 416 | 6005 | DRILL SHAFT (42 IN) | LF | 21 | | | | | | | | 21 |
| 416 | 6006 | DRILL SHAFT (48 IN) | LF | 30 | | | | | | | | 30 |
| 432 | 6001 | RIPRAP (CONC) (4 IN) | CY | 1 | | | | | | | | 1 |
| 506 | 6038 | TEMP SEDMT CONT FENCE (INSTALL) | LF | 100 | | | | | | | | 100 |
| 506 | 6039 | TEMP SEDMT CONT FENCE (REMOVE) | LF | 100 | | | | | | | | 100 |
| 540 | 6001 | MTL W-BEAM GD FEN (TIM POST) | LF | 250 | | | | | | | | 250 |
| 540 | 6016 | DOWNSTREAM ANCHOR TERMINAL SECTION | EA | 1 | | | | | | | | 1 |
| 544 | 6001 | GUARDRAIL END TREATMENT (INSTALL) | EA | 1 | | | | | | | | 1 |
| 618 | 6007 | CONDT (HDPE) (2") (STL ENCSE) | LF | 30 | 215 | 30 | 30 | 215 | 30 | 215 | 30 | 795 |
| 618 | 6070 | CNDT (RM) (2") (DMS STRUCTURE) | LF | | | | 120 | | | | | 120 |
| 620 | 6015 | ELEC CONDR (NO.2) BARE | LF | 60 | 430 | 30 | 115 | 215 | | | | 850 |
| 620 | 6016 | ELEC CONDR (NO.2) INSULATED | LF | 150 | 1075 | 90 | 145 | 430 | | | | 1890 |
| 624 | 6002 | GROUND BOX TY A (122311) W/APRON | EA | 2 | | | | | | | | 2 |
| 628 | 6250 | ELC SERVICE TY D 120/240 100 (NS) SS (N) SP (O) | EA | 0 | | | | | | | | 0 |
| 650 | 6024 | INS OH SN SUP (25 FT BAL TEE) (SPAN ONLY) | EA | 1 | | | | | | | | 1 |
| 6007 | 6010 | FIBER OPTIC CBL (SINGLE-MODE) (6 FIBER) | LF | | | | | | 30 | 215 | | 245 |
| 6007 | 6011 | FIBER OPTIC CBL (SINGLE-MODE) (12 FIBER) | LF | | | | | | | | 60 | 60 |
| 6010 | 6002 | CCTV FIELD EQUIPMENT (DIGITAL) | EA | 1 | | | | | | | | 1 |
| 6010 | 6003 | CCTV FIELD CONTROLLER | EA | 1 | | | | | | | | 1 |
| 6064 | 6046 | ITS POLE (55 FT) (90 MPH) | EA | 1 | | | | | | | | 1 |
| 6064 | 6080 | ITS POLE MNT CAB (TY 2) (CONF 1) | EA | 1 | | | | | | | | 1 |
| 6028 | 6028 | INSTALL DMS (FOUNDATION MTD CABINET) | EA | 1 | | | | | | | | 1 |
| 6123 | 6001 | ETHERNET SWITCH (INSTALL ONLY) | EA | 2 | | | | | | | | 2 |
| 6263 | 6002 | BLUETOOTH DETECTION SYSTEM (INSTALL) | EA | 1 | | | | | | | | 1 |
| | * | ELEC CONDR (NO.8) BARE | LF | | | 30 | 30 | 215 | | | | 275 |
| | * | ELEC CONDR (NO.8) INSULATED | LF | | | 60 | 60 | 430 | | | | 550 |

*SUBSIDIARY ITEM

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER

Hidi M. Criswell

5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
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IH 10

# DMS LOCATION #9
# IH 10 EB AND US 183

CSJ: 0535-04-031

SHEET 2 OF 2

| FED RD DIV NO | PROJECT NO | HIGHWAY NO |
|---|---|---|
| 6 | | IH 10 |

| STATE | DIST | COUNTY |
|---|---|---|
| TEXAS | YKM | GONZALES, ETC |

| CONT | SECT | JOB | SHEET NO |
|---|---|---|---|
| 0535 | 04 | 031, ETC | 25 |

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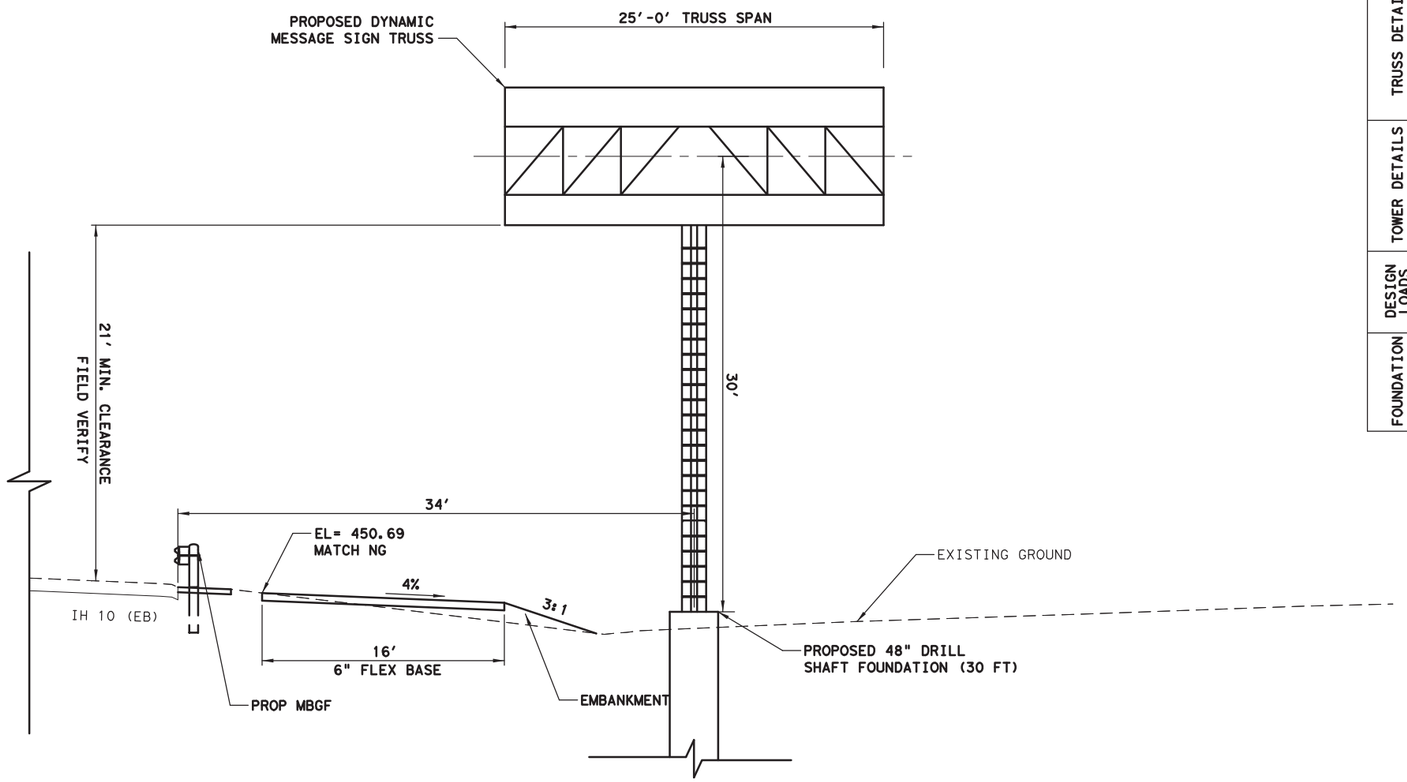


IH 10 (EB)
DMS #9

## COSS STRUCTURE

| | | |
|---|---|---|
| | DESIGN WIND HEIGHT, Hd | 37 FT |
| TRUSS DETAILS | LENGTH OF SPAN | Span A = 12.5 FT, Span B = 12.5 FT |
| | W x D = WIDTH x DEPTH | 4.5 FT x 4.5 FT |
| | CHORD | L3x3x1/4 |
| | DEAD LOAD DIAGONAL | L2x2x3/16 |
| | WIND LOAD DIAGONAL | L3x3x3/16 |
| | DEAD LOAD VERTICAL | L2x2x3/16 |
| | WIND LOAD STRUT | L2x2x3/16 |
| | TRUSS DEAD LOAD | 47 LB/FT |
| | SIZE H.S. BOLTS IN CONNECTION | 5/8" DIA |
| TOWER DETAILS | TOWER HEIGHT AT TRUSS CENTER | 30 FT |
| | TOWER PIPE DIA & WALL THICKNESS | 24 IN, 0.562 IN |
| | TOWER PIPE DEFLECTION | 0.659 IN |
| | NO. & SIZE OF ANCHOR BOLTS | 8, 2-1/2" DIA |
| | ANCHOR BOLT CIRCLE DIA | 30.5 IN |
| | BASE PLATE SIZE | 36 IN x 2-1/2 IN |
| | TRUSS DEFLECTION | 1.0 IN |
| DESIGN LOADS | SHEAR | 16.88 KIPS |
| | TORSION | 40.52 KIP-FT |
| | MOMENT | 490.76 KIP-FT |
| FOUNDATION | SOIL & "N" | CLAY, "N"=10 |
| | SIZE & LENGTH OF DRILLED SHAFT | 48" DIA, 30 FT |
| | DRILLED SHAFT REINFORCING | 16-#11 |
| | SPIRAL REINFORCING | #4 PLAIN SPIRAL AT 6" PITCH (GRADE 60) |
| | ANCHOR BOLT SIZE | 2-1/2" DIA x 5'-2" |

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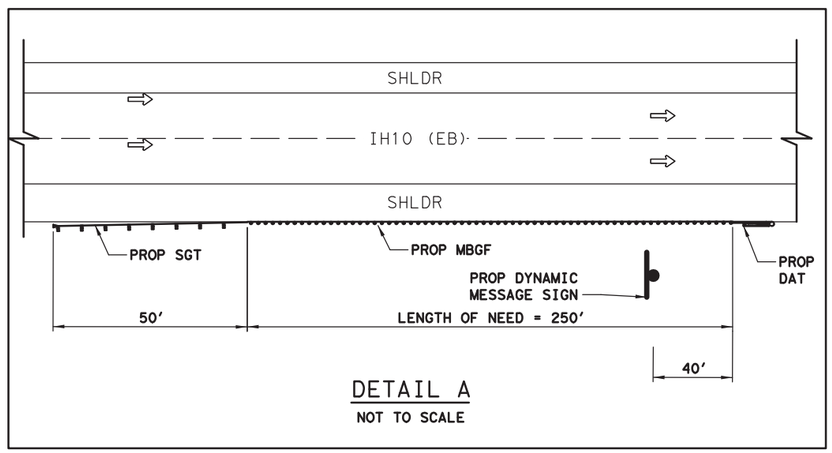
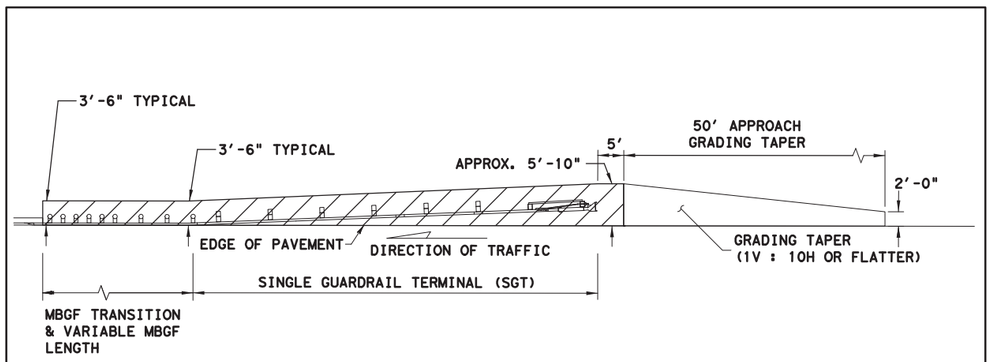
SCALE: 1" = 10'




DETAIL A
NOT TO SCALE




MOW STRIP DETAIL
NOT TO SCALE

*SEE APPLICABLE STANDARDS FOR DETAILS NOT SHOWN.

STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER

Hidi M. Criswell
5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
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IH 10

# DMS #9 ELEVATION
# IH 10 EB AND US 183

CSJ: 0535-04-031

SHEET 1 OF 1

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO |
| 0535 | 04 | 031, ETC | 26 |

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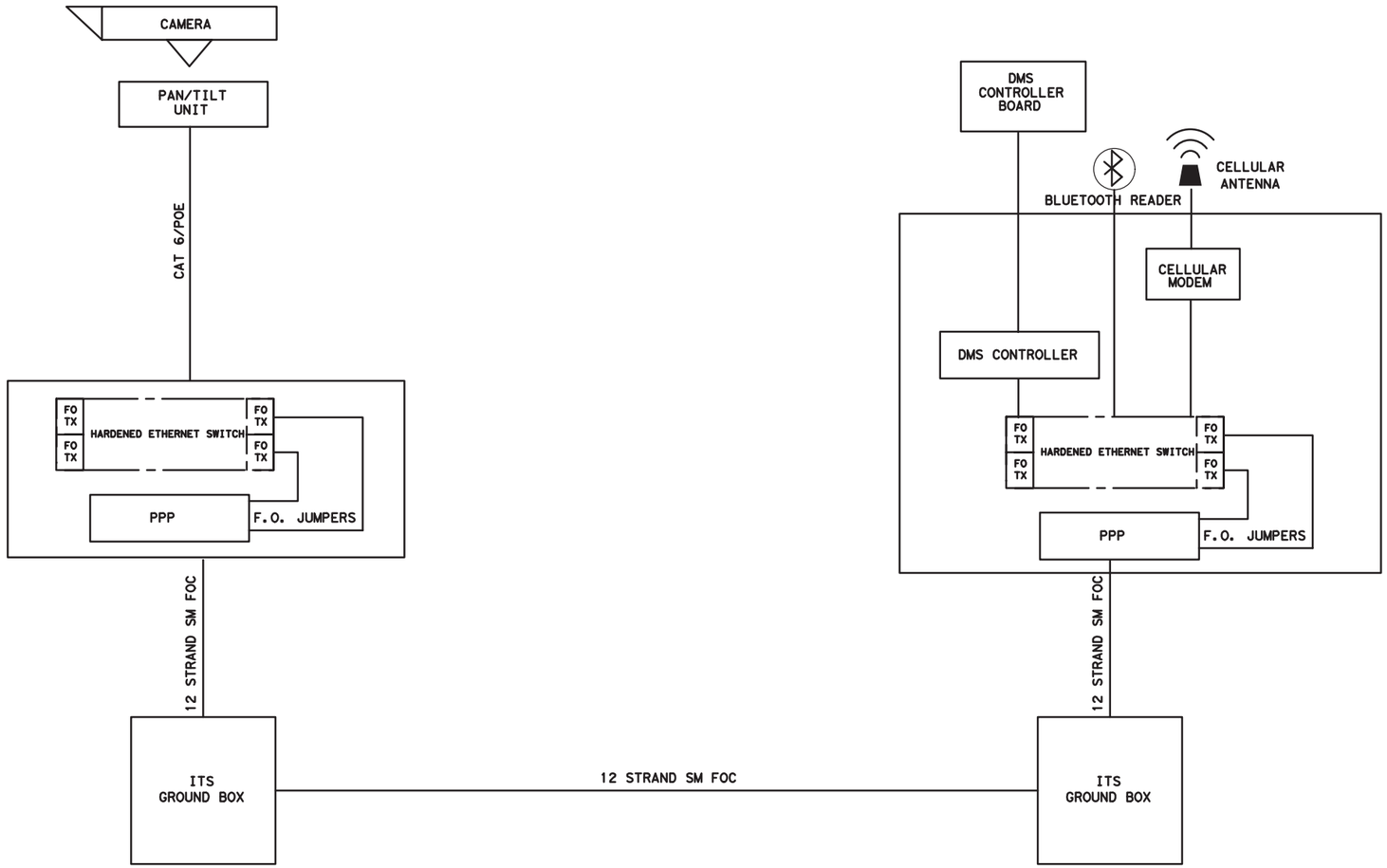


STATE OF TEXAS
HIDI M. CRISWELL
124831
LICENSED
PROFESSIONAL ENGINEER

Hidi M. Criswell

5/19/2023

| REV NO | DATE | DESCRIPTION | BY |
|---|---|---|---|
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IH 10

# ONE LINE DIAGRAM

SHEET 1 OF 1

| FED RD DIV NO | PROJECT NO | | HIGHWAY NO |
|---|---|---|---|
| 6 | | | IH 10 |
| STATE | DIST | COUNTY | |
| TEXAS | YKM | GONZALES, ETC | |
| CONT | SECT | JOB | SHEET NO |
| 0535 | 04 | 031, ETC | 27 |

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## BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).

2. The development and design of the Traffic Control Plan (TCP)is the responsibility of the Engineer.

3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.

4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.

5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.

6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.

7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.

8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.

10. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.

11. Traffic control devices should be in place only while work is actually in progress or a definite need exists.

12. The Engineer has the final decision on the location of all traffic control devices.

13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

## WORKER SAFETY NOTES:

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

2. Except in emergency situations, flagger stations shall be illuminated when flagging is used at night.

## COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

1. Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.

2. Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

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

SHEET 1 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

# BC(1)-21

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|---|---|---|---|---|
| ©TxDOT November 2002 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21 | 0535 | 04 | 031,ETC | IH 10 |
| | DIST | COUNTY | | SHEET NO. |
| | YKM | GONZALES,ETC | | 28 |

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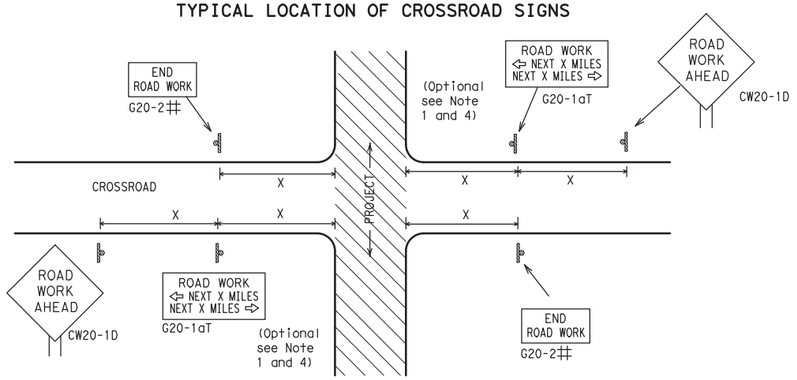
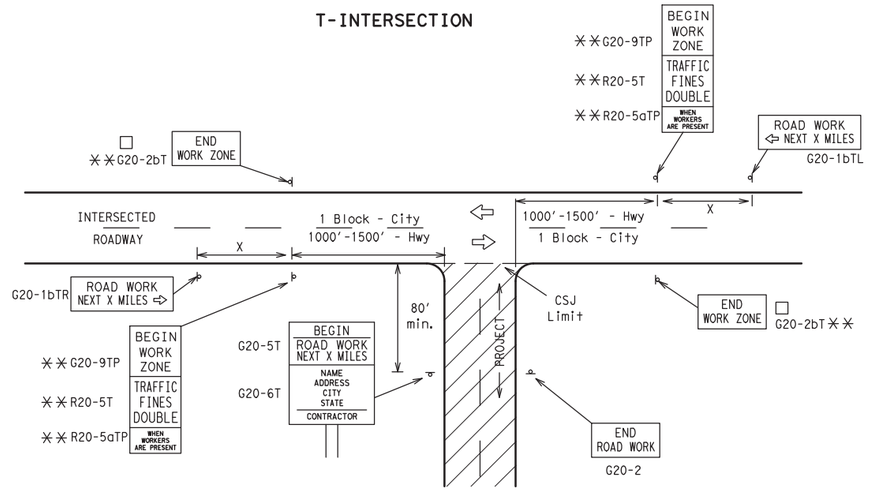
## TYPICAL LOCATION OF CROSSROAD SIGNS




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

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

## T-INTERSECTION




## CSJ LIMITS AT T-INTERSECTION

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

## TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING[1,5,6]

### SIZE

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

### SPACING

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

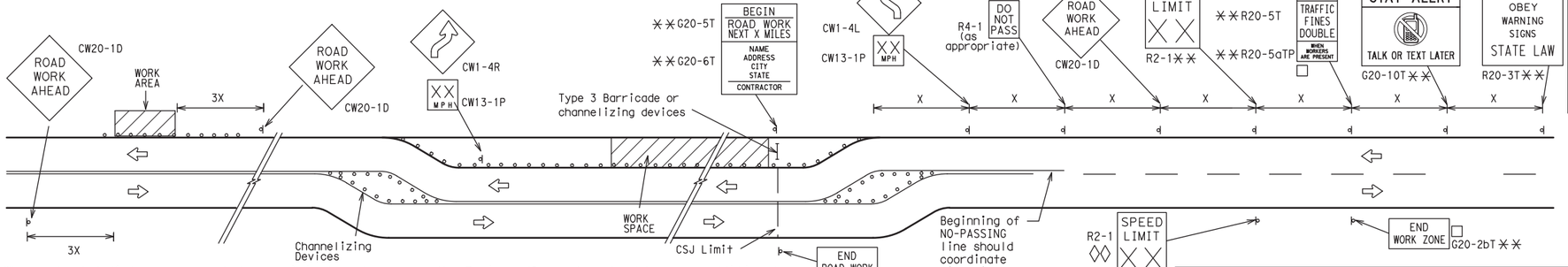
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

## GENERAL NOTES

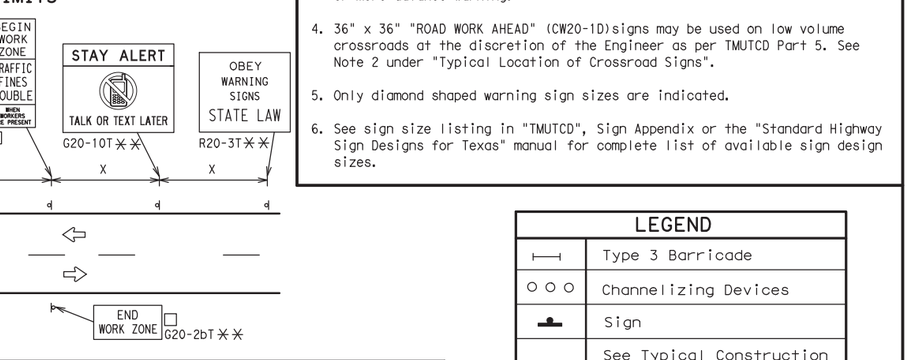
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may be used on low volume crossroads at the discretion of the Engineer as per TMUTCD Part 5. See Note 2 under "Typical Location of Crossroad Signs".
5. Only diamond shaped warning sign sizes are indicated.
6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

## WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

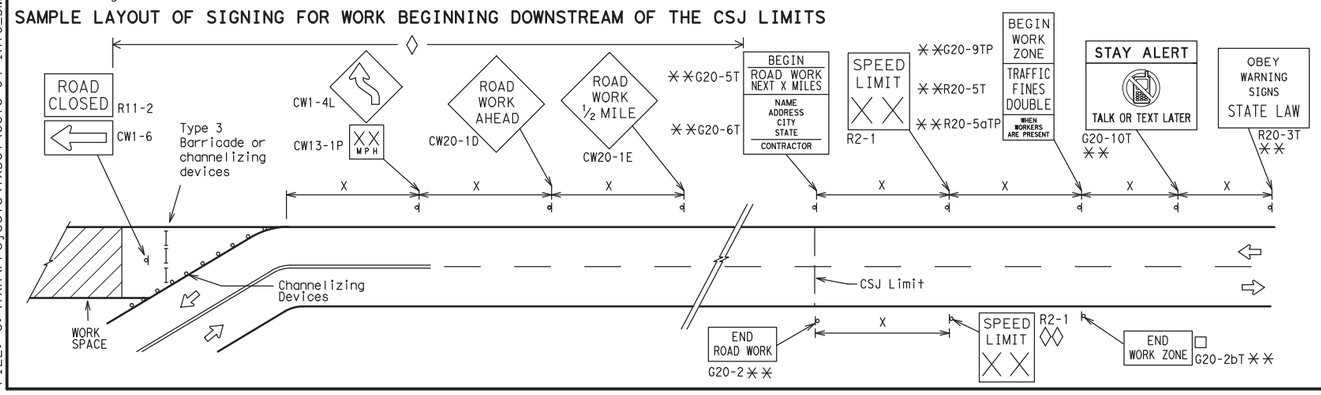



When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

## SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING 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

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|---|---|---|---|---|
| ©TxDOT November 2002 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031,ETC | IH 10 |
| 9-07 8-14 | DIST | COUNTY | | SHEET NO. |
| 7-13 5-21 | YKM | GONZALES,ETC | | 29 |

DATE: 5/19/2023 1:25:52 PM
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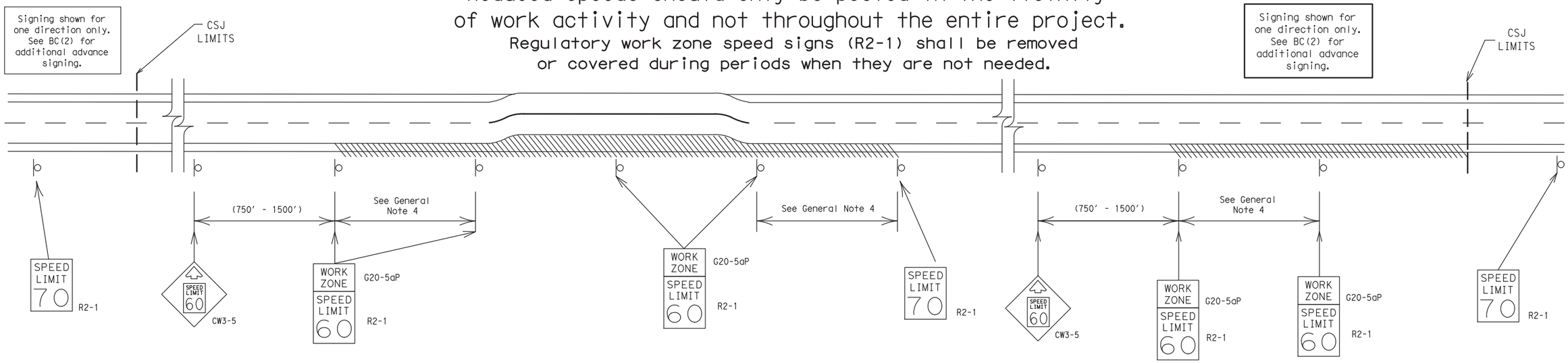
# TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.

Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.




## GUIDANCE FOR USE:

### LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

a) rough road or damaged pavement surface
b) substantial alteration of roadway geometrics (diversions)
c) construction detours
d) grade
e) width
f) other conditions readily apparent to the driver

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

### SHORT TERM WORK ZONE SPEED LIMITS

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

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

### GENERAL NOTES

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. Frequency of work zone speed limit signs should be:
   40 mph and greater 0.2 to 2 miles
   35 mph and less 0.2 to 1 mile
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. Fabrication, erection and maintenance of the"ADVANCE SPEED LIMIT"(CW3-5)sign, "WORK ZONE"(G20-5aP) plaque and the "SPEED LIMIT"(R2-1)signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Techniques that may help reduce traffic speeds include but are not limited to:
   A. Law enforcement.
   B. Flagger stationed next to sign.
   C. Portable changeable message sign (PCMS).
   D. Low-power (drone) radar transmitter.
   E. Speed monitor trailers or signs.
9. Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
10. For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.



Texas Department of Transportation

Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

## BC(3)-21

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|---|---|---|---|---|
| ©TxDOT November 2002 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031,ETC | IH 10 |
| 9-07 8-14 | DIST | COUNTY | | SHEET NO. |
| 7-13 5-21 | YKM | GONZALES,ETC | | 30 |

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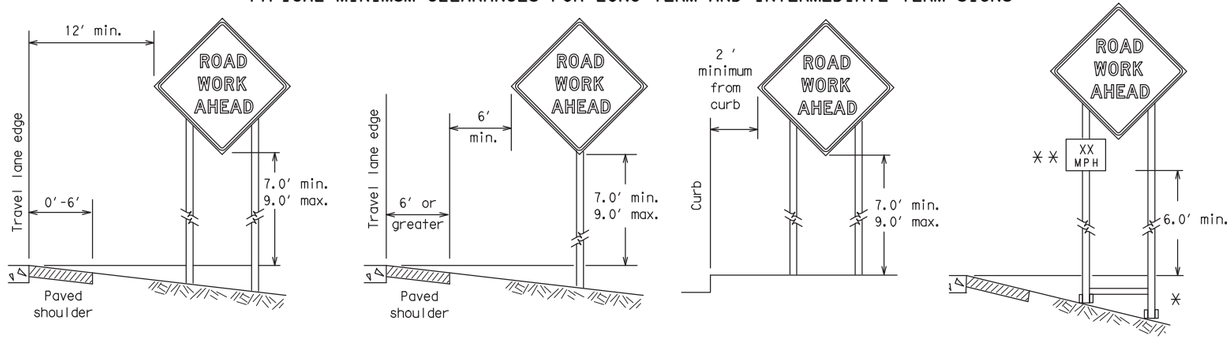
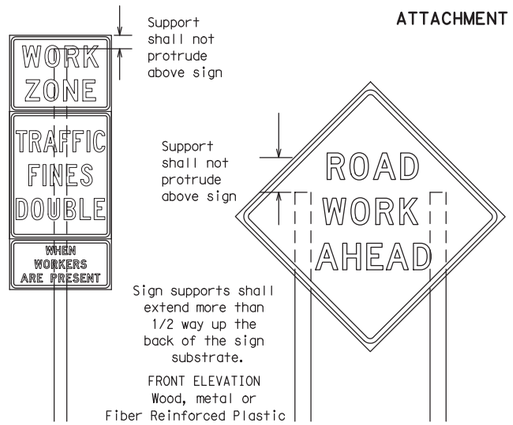
## TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

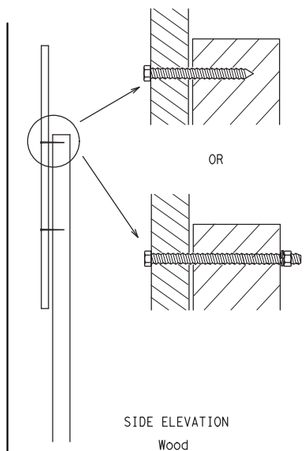



⚹ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

## ATTACHMENT FOR SIGN SUPPORTS



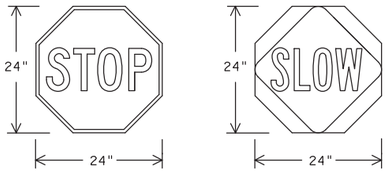

Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

## STOP/SLOW PADDLES

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




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

## CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

## GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

## SIGN MOUNTING HEIGHT

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

## SIZE OF SIGNS

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

## SIGN SUBSTRATES

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

## REFLECTIVE SHEETING

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

## SIGN LETTERS

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

## REMOVING OR COVERING

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

## SIGN SUPPORT WEIGHTS

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

## FLAGS ON SIGNS

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



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 | 0535 | 04 | 031,ETC | IH 10 |
| 9-07 8-14 | DIST | COUNTY | | SHEET NO. |
| 7-13 5-21 | YKM | GONZALES,ETC | | 31 |

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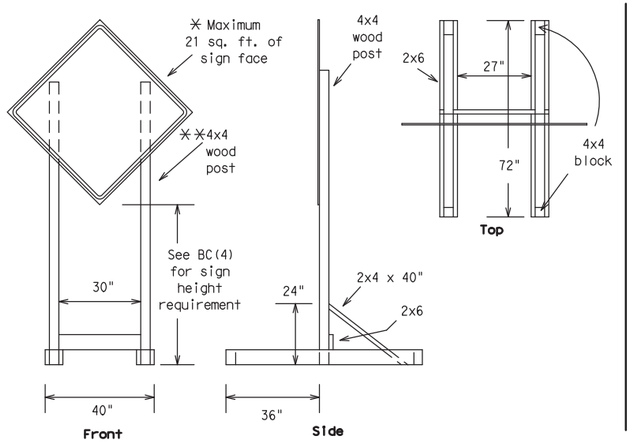
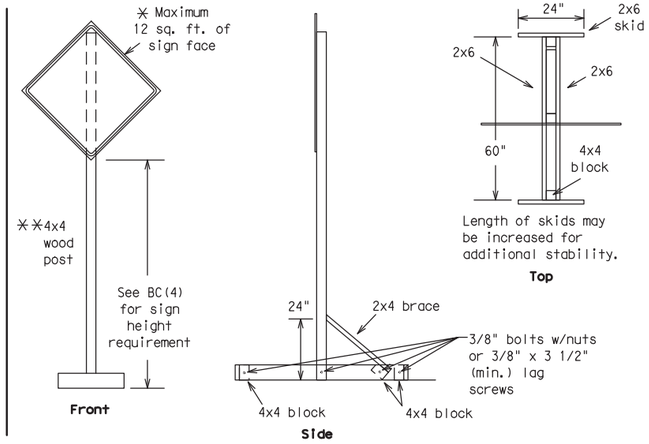
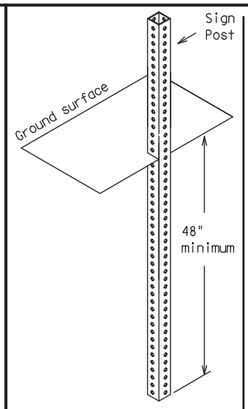
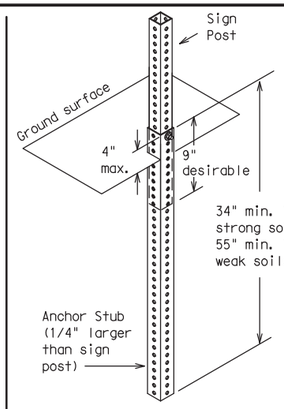


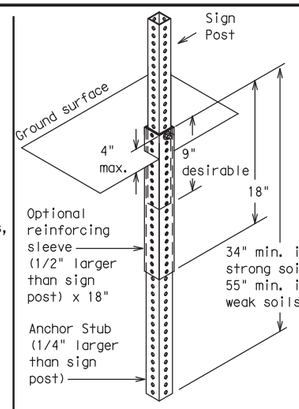




# SKID MOUNTED WOOD SIGN SUPPORTS

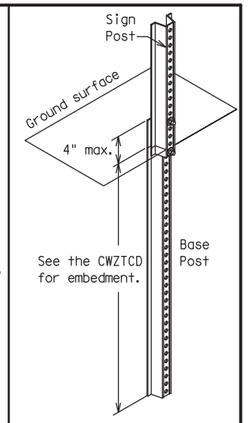
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS



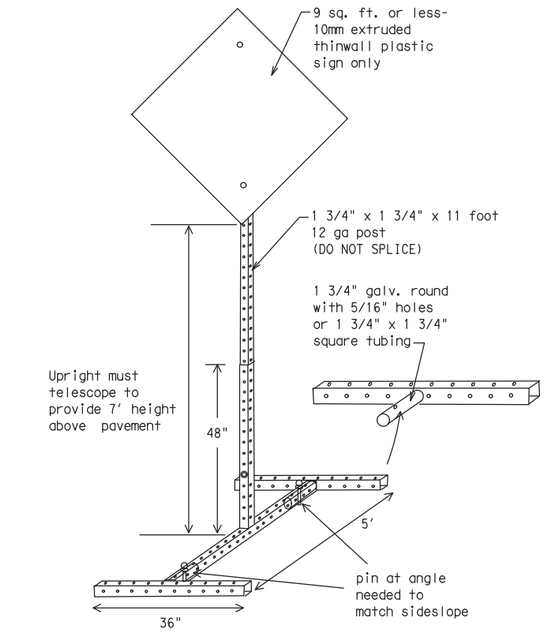

PERFORATED SQUARE METAL TUBING

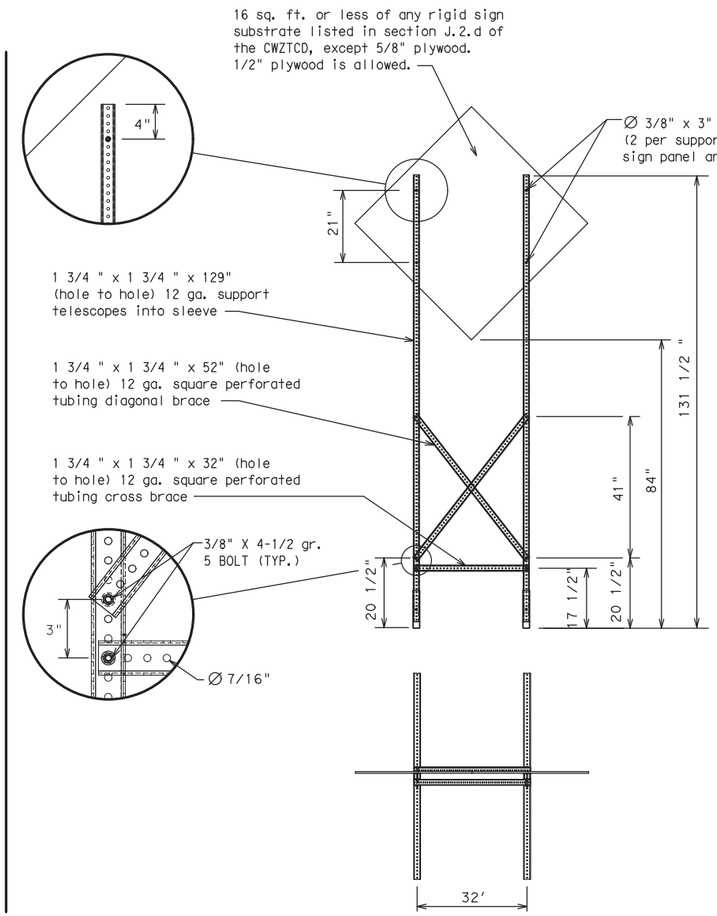


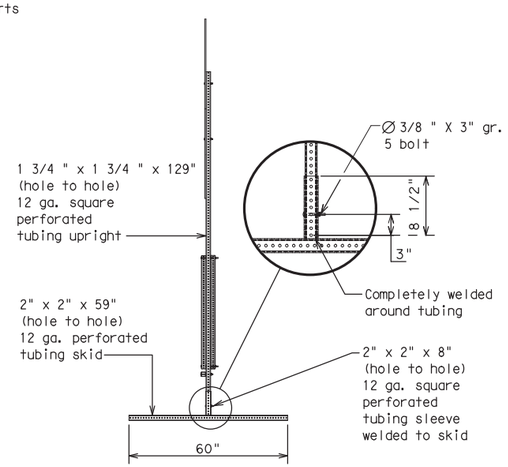

WING CHANNEL
Lap-splice/base bolted anchor

# GROUND MOUNTED SIGN SUPPORTS

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


# SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

## WEDGE ANCHORS

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

## OTHER DESIGNS

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

## GENERAL NOTES

1. Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
2. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
3. When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.

* See BC(4) for definition of "Work Duration."

** Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.

□ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.



Texas Department of Transportation | Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

# BC(5)-21

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

## PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

# RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

## Phase 1: Condition Lists

### Road/Lane/Ramp Closure List

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

### Other Condition List

- ROADWORK XXX FT
- ROAD REPAIRS XXXX FT
- FLAGGER XXXX FT
- LANE NARROWS XXXX FT
- RIGHT LN NARROWS XXXX FT
- TWO-WAY TRAFFIC XX MILE
- MERGING TRAFFIC XXXX FT
- CONST TRAFFIC XXX FT
- LOOSE GRAVEL XXXX FT
- UNEVEN LANES XXXX FT
- DETOUR X MILE
- ROUGH ROAD XXXX FT
- ROADWORK PAST SH XXXX
- ROADWORK NEXT FRI-SUN
- BUMP XXXX FT
- US XXX EXIT X MILES
- TRAFFIC SIGNAL XXXX FT
- LANES SHIFT ✳

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

## Phase 2: Possible Component Lists

### Action to Take/Effect on Travel List

- MERGE RIGHT
- FORM X LINES RIGHT
- DETOUR NEXT X EXITS
- USE XXXXX RD EXIT
- USE EXIT XXX
- USE EXIT I-XX NORTH
- STAY ON US XXX SOUTH
- USE I-XX E TO I-XX N
- TRUCKS USE US XXX N
- WATCH FOR TRUCKS
- WATCH FOR TRUCKS
- EXPECT DELAYS
- EXPECT DELAYS
- PREPARE TO STOP
- REDUCE SPEED XXX FT
- END SHOULDER USE
- USE OTHER ROUTES
- WATCH FOR WORKERS
- STAY IN LANE ✳

### Location List

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

### Warning List

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

### ✳✳ Advance Notice List

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

✳✳ See Application Guidelines Note 6.

### APPLICATION GUIDELINES

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

### WORDING ALTERNATIVES

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

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

### FULL MATRIX PCMS SIGNS

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



Texas Department of Transportation

Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

# BC(6)-21

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| ©TxDOT November 2002 | CONT | SECT | JOB | HIGHWAY |
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| 9-07 8-14 | DIST | COUNTY | | SHEET NO. |
| 7-13 5-21 | YKM | GONZALES,ETC | | 33 |

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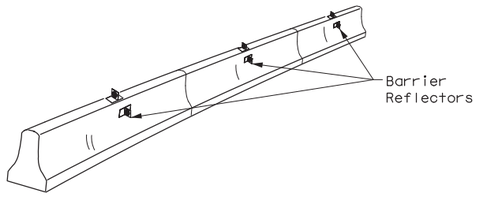
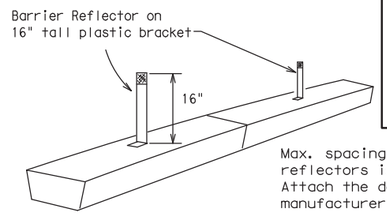
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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




## CONCRETE TRAFFIC BARRIER (CTB)

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

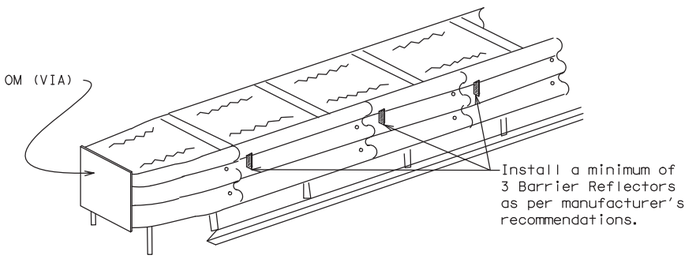



Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

## LOW PROFILE CONCRETE BARRIER (LPCB)

**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.

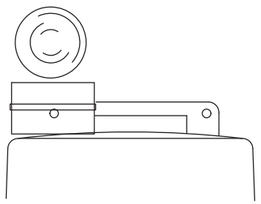



## DELINEATION OF END TREATMENTS

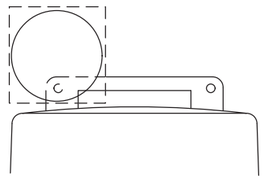
**END TREATMENTS FOR CTB'S USED IN WORK ZONES**

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

# BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

## WARNING LIGHTS

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

## WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

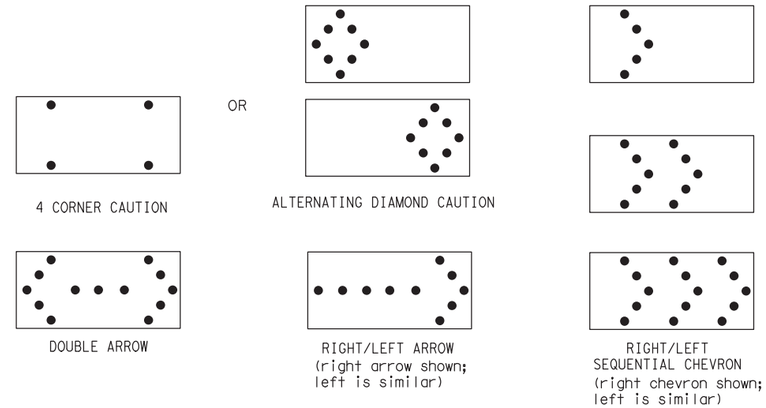
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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




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

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

**ATTENTION**

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

# FLASHING ARROW BOARDS

## TRUCK-MOUNTED ATTENUATORS

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



Texas Department of Transportation

Traffic Safety Division Standard

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

# BC(7)-21

| FILE: bc-21.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
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| ©TxDOT November 2002 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031,ETC | IH 10 |
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## GENERAL NOTES

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

## GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

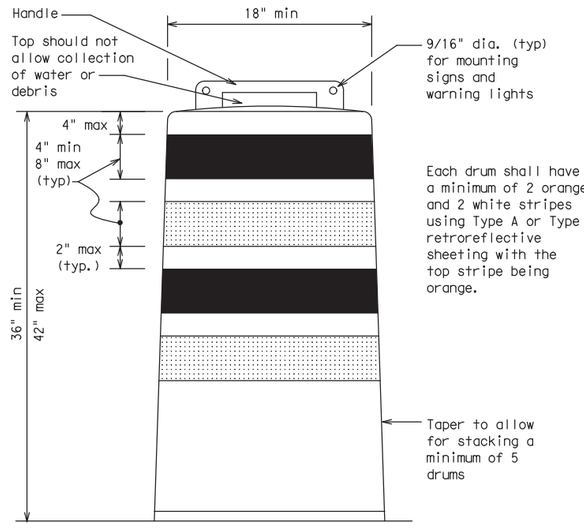
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

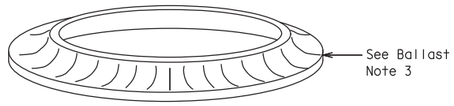
## RETROREFLECTIVE SHEETING

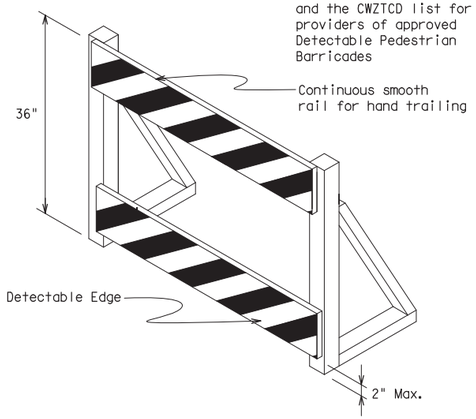
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

## BALLAST

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



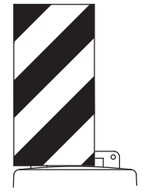




## DETECTABLE PEDESTRIAN BARRICADES

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

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| REVISIONS | 0535 | 04 | 031,ETC | IH 10 |
| 4-03 8-14 | DIST | COUNTY | | SHEET NO. |
| 9-07 5-21 | YKM | GONZALES,ETC | | 35 |
| 7-13 | | | | |

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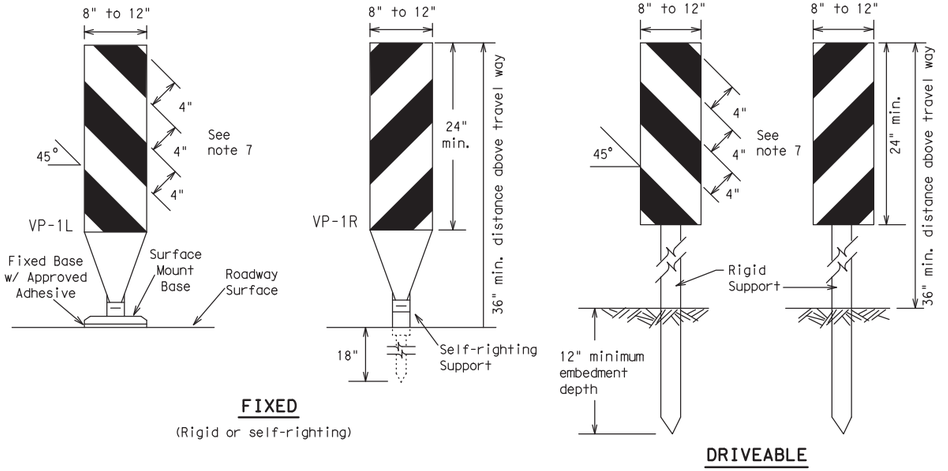
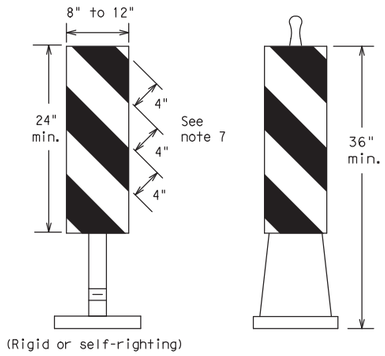



FIXED

(Rigid or self-righting)

DRIVEABLE

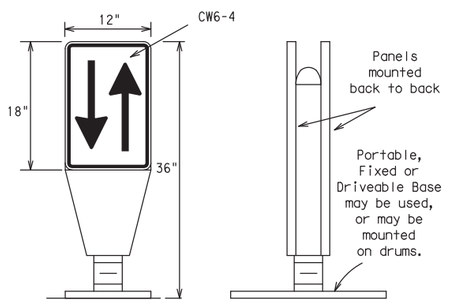



(Rigid or self-righting)

PORTABLE

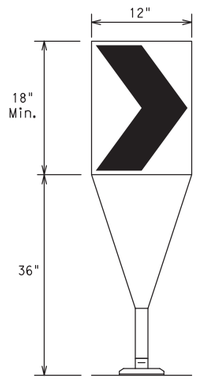
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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



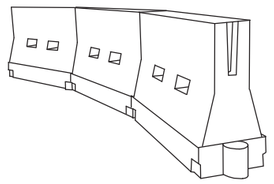

Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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 ✻✻ | | | Suggested Maximum Spacing of Channelizing Devices | |
|---|---|---|---|---|---|---|
| | | 10′ Offset | 11′ Offset | 12′ Offset | On a Taper | On a Tangent |
| 30 | $L=\frac{WS^2}{60}$ | 150′ | 165′ | 180′ | 30′ | 60′ |
| 35 | | 205′ | 225′ | 245′ | 35′ | 70′ |
| 40 | | 265′ | 295′ | 320′ | 40′ | 80′ |
| 45 | L = WS | 450′ | 495′ | 540′ | 45′ | 90′ |
| 50 | | 500′ | 550′ | 600′ | 50′ | 100′ |
| 55 | | 550′ | 605′ | 660′ | 55′ | 110′ |
| 60 | | 600′ | 660′ | 720′ | 60′ | 120′ |
| 65 | | 650′ | 715′ | 780′ | 65′ | 130′ |
| 70 | | 700′ | 770′ | 840′ | 70′ | 140′ |
| 75 | | 750′ | 825′ | 900′ | 75′ | 150′ |
| 80 | | 800′ | 880′ | 960′ | 80′ | 160′ |

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

## SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

# BC(9)-21

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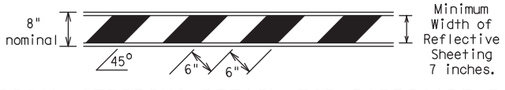
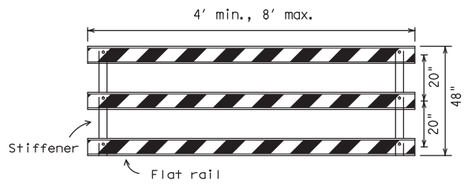
## TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



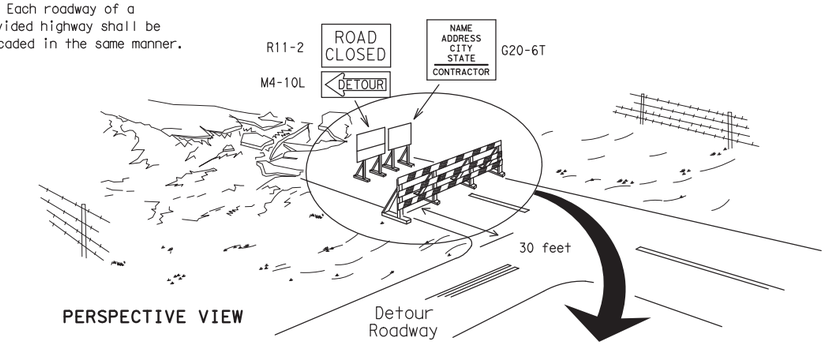

TYPICAL STRIPING DETAIL FOR BARRICADE RAIL




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

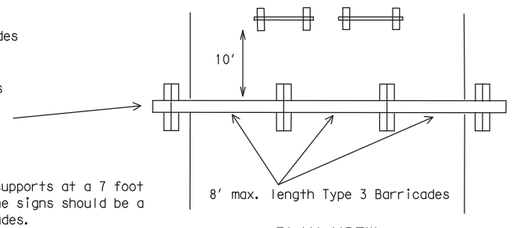
TYPICAL PANEL DETAIL
FOR SKID OR POST TYPE BARRICADES

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




PERSPECTIVE VIEW

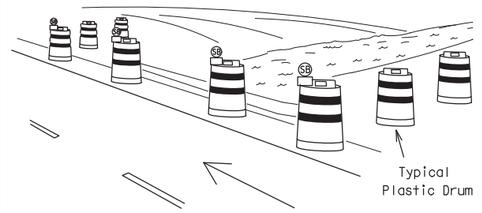
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.




PLAN VIEW

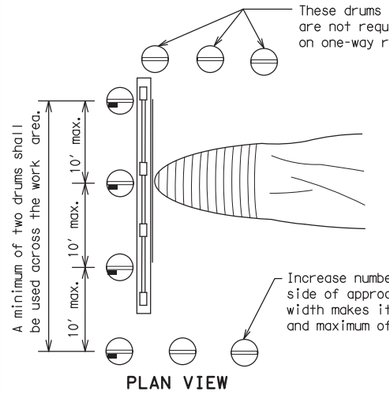
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION




PERSPECTIVE VIEW

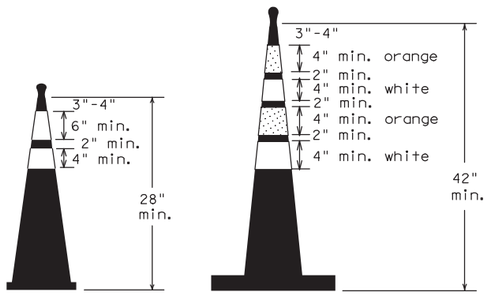
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



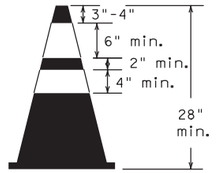

PLAN VIEW

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

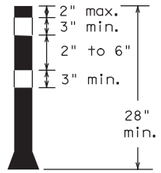
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS




Two-Piece cones




One-Piece cones

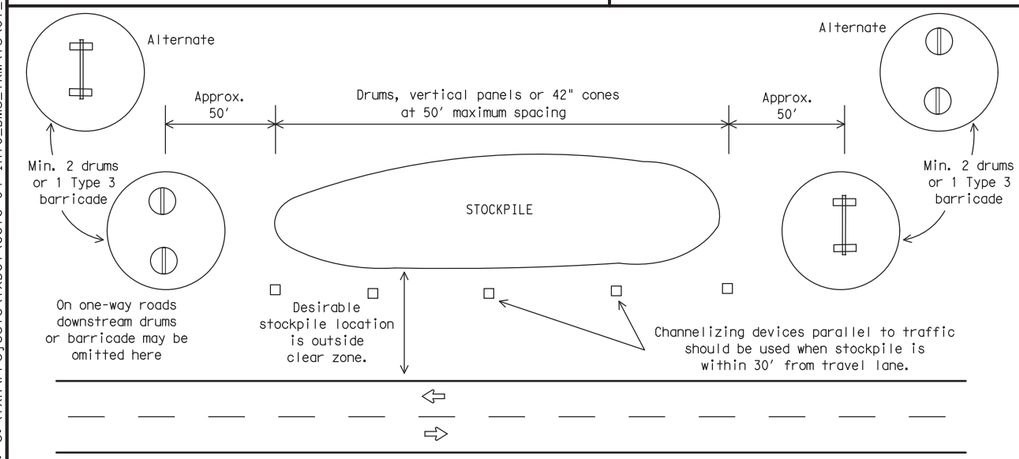



Tubular Marker

28" Cones shall have a minimum weight of 9 1/2 lbs.

42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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




TRAFFIC CONTROL FOR MATERIAL STOCKPILES



Texas Department of Transportation — Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

## BC(10)-21

| FILE: bc-21.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| © TxDOT November 2002 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031,ETC | IH 10 |
| 9-07 8-14 | DIST | COUNTY | | SHEET NO. |
| 7-13 5-21 | YKM | GONZALES,ETC | | 37 |

DATE: 5/19/2023 1:25:55 PM
FILE: G:\TXH\Projects\TxDOT\6676-04-IH10_DMS_YKM\TS\01_CADD\SHEETS\Standards\1-bc-21.dgn

# 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.

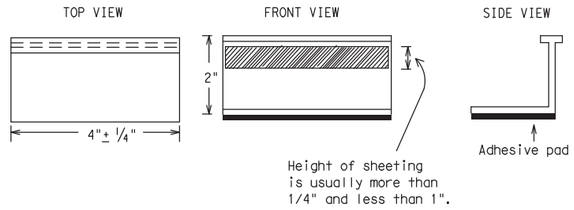
## MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

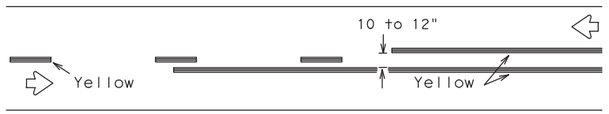
# BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

## BC(11)-21

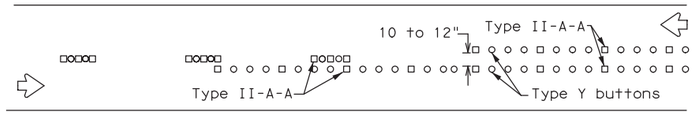
| FILE: bc-21.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT February 1998 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS 2-98 9-07 5-21 | 0535 | 04 | 031,ETC | IH 10 |
| 1-02 7-13 | DIST | COUNTY | | SHEET NO. |
| 11-02 8-14 | YKM | GONZALES,ETC | | 38 |

DATE: 5/19/2023 1:25:55 PM
FILE: G:\TXHV\Projects\TxDOT\6676-04-IH10_DMS_YKM\TS\01_CADD\SHEETS\Standards\1-bc-21.dgn

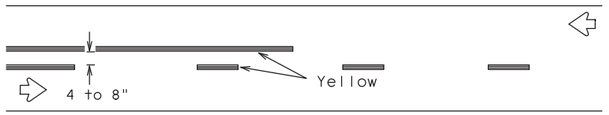
# PAVEMENT MARKING PATTERNS



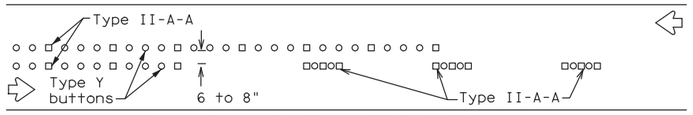

REFLECTORIZED PAVEMENT MARKINGS - PATTERN A




RAISED PAVEMENT MARKERS - PATTERN A



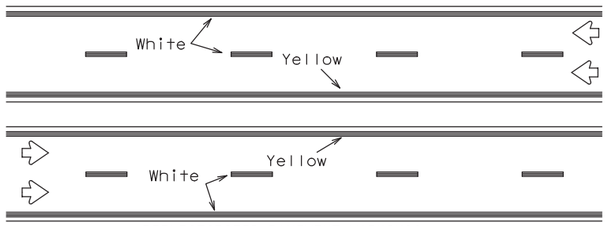

REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



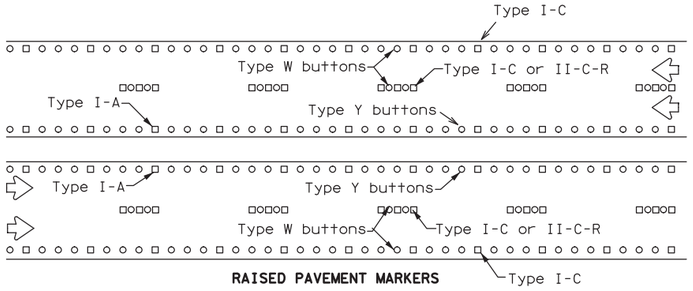

RAISED PAVEMENT MARKERS - PATTERN B

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



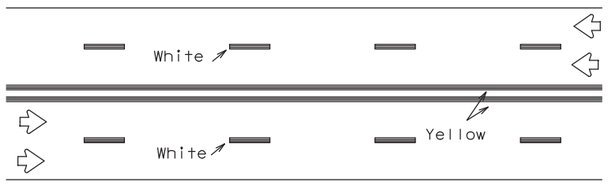

REFLECTORIZED PAVEMENT MARKINGS



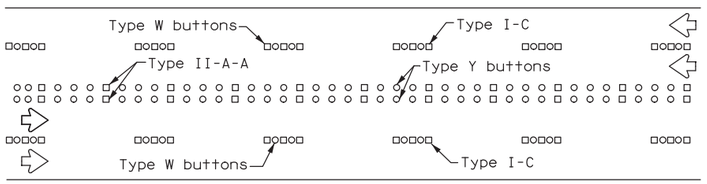

RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

## EDGE & LANE LINES FOR DIVIDED HIGHWAY



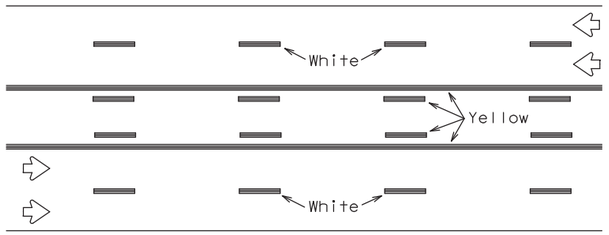

REFLECTORIZED PAVEMENT MARKINGS



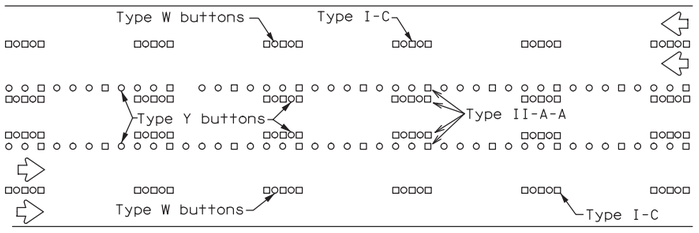

RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

## LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS




REFLECTORIZED PAVEMENT MARKINGS




RAISED PAVEMENT MARKERS

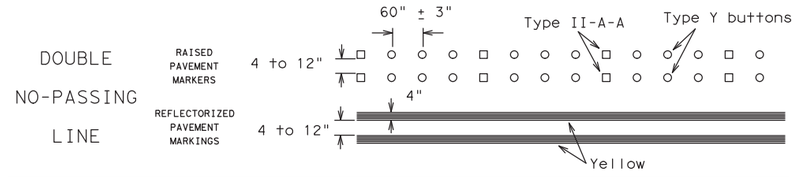
Prefabricated markings may be substituted for reflectorized pavement markings.

## TWO-WAY LEFT TURN LANE

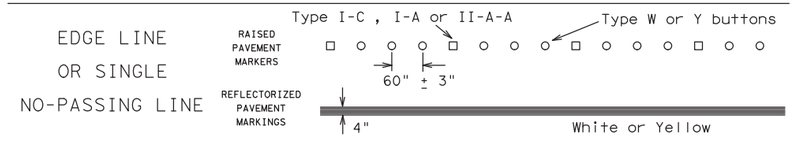
# STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

## SOLID LINES

### DOUBLE NO-PASSING LINE

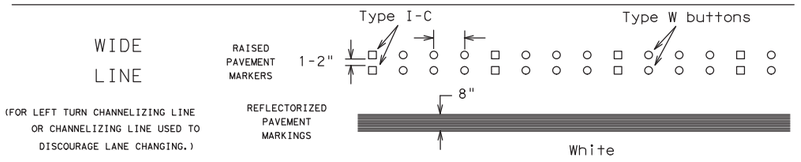



### EDGE LINE OR SINGLE NO-PASSING LINE



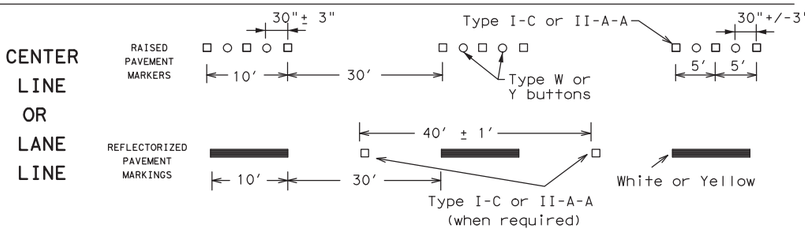

### WIDE LINE

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

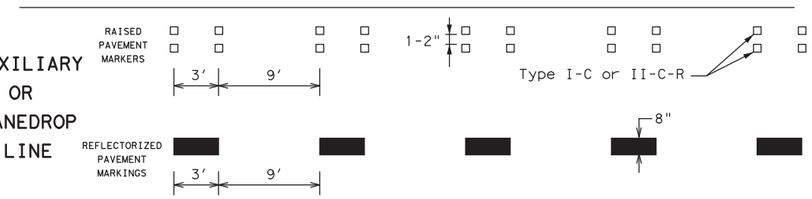



## BROKEN LINES

### CENTER LINE OR LANE LINE

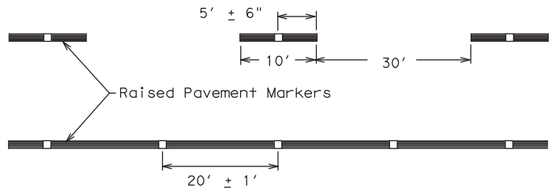



### AUXILIARY OR LANEDROP LINE




### 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

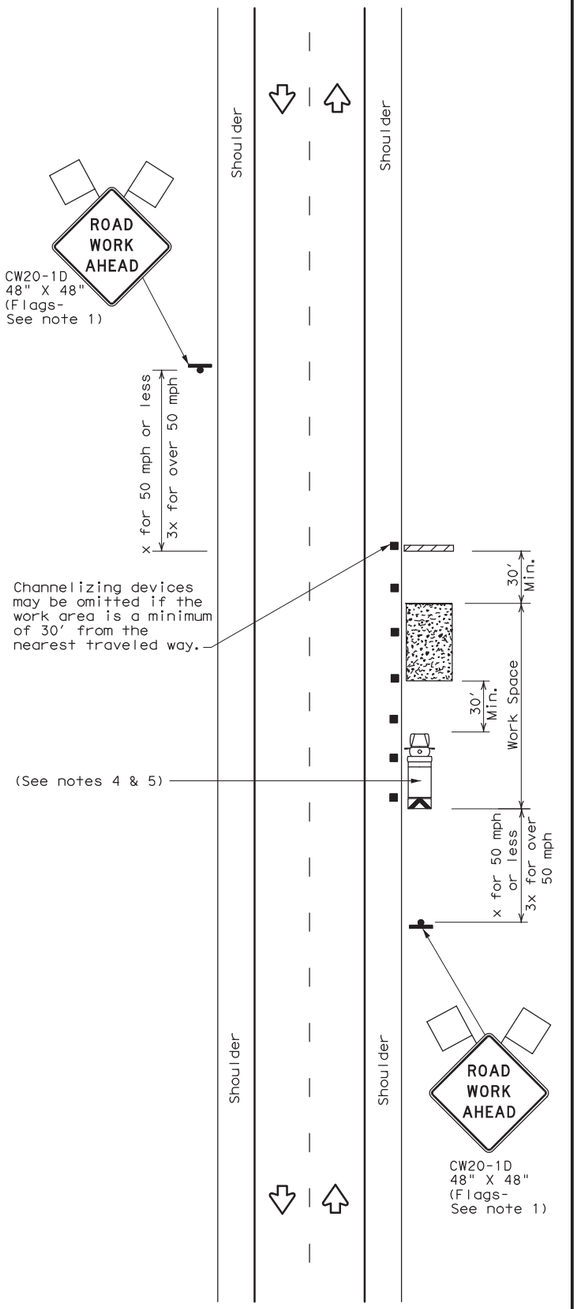
Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

## BC(12)-21

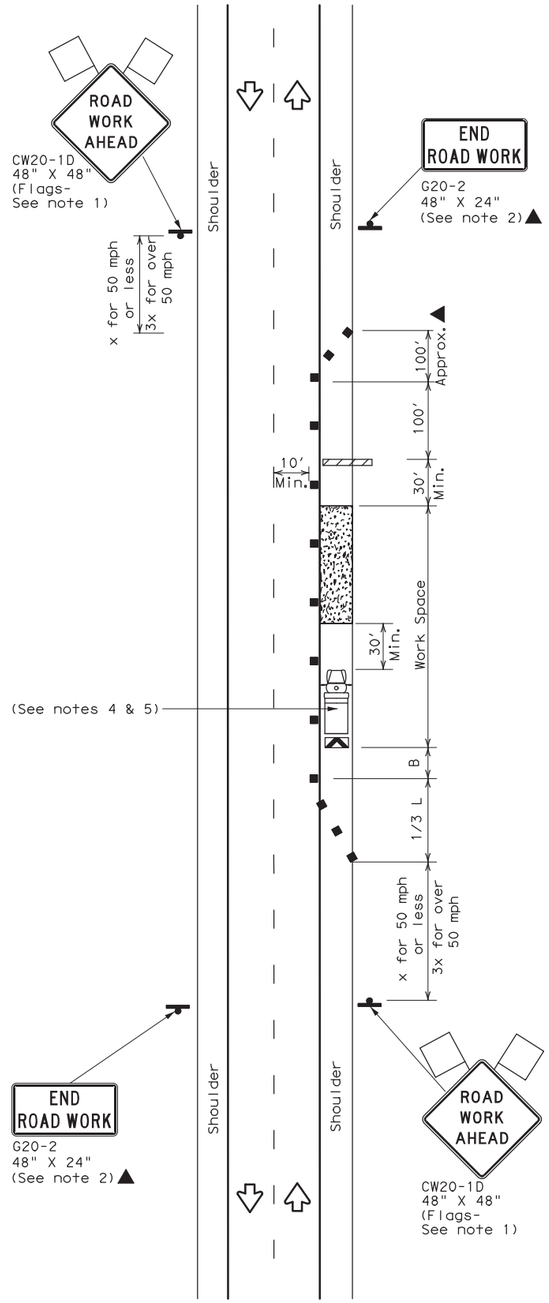
| FILE: bc-21.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT February 1998 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14 | 0535 | 04 | 031,ETC | IH 10 |
| | DIST | COUNTY | | SHEET NO. |
| | YKM | GONZALES,ETC | | 39 |

DATE: 5/19/2023 1:25:55 PM
FILE: G:\TXH\Projects\TxDOT\6676-04-IH10_DMS_YKM\TS\01_CADD\SHEETS\Standard\tcp2-1-18.dgn



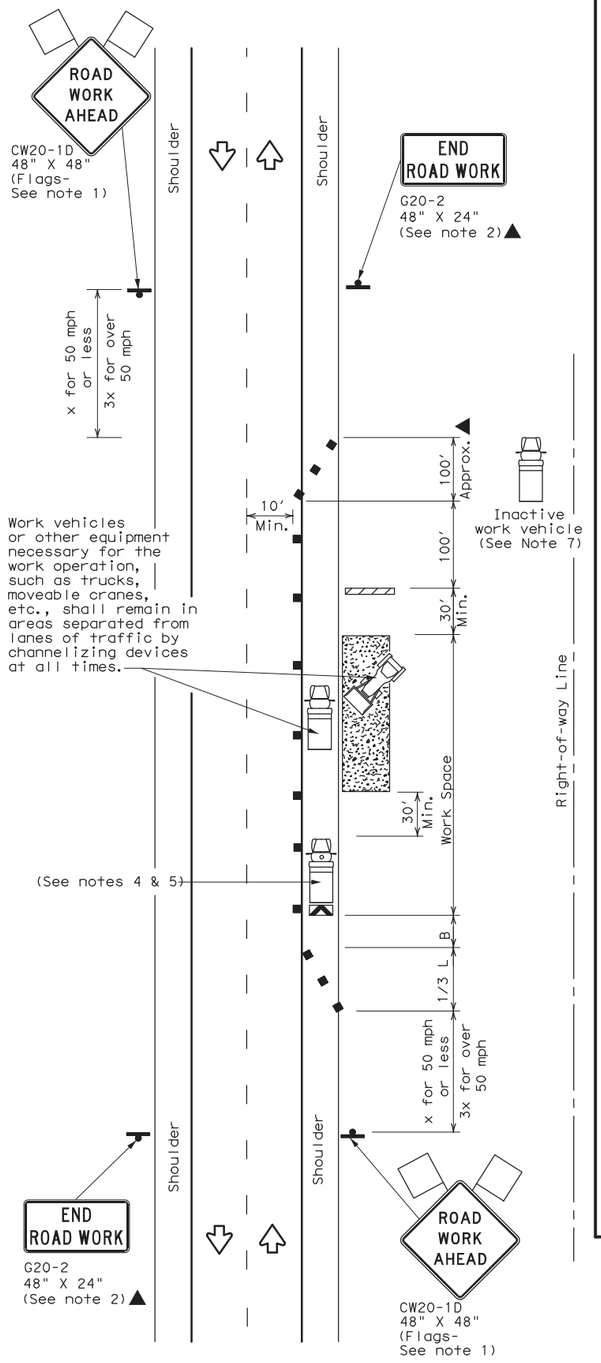

TCP (2-1a)

## WORK SPACE NEAR SHOULDER
Conventional Roads




TCP (2-1b)

## WORK SPACE ON SHOULDER
Conventional Roads




TCP (2-1c)

## WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

## GENERAL NOTES

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

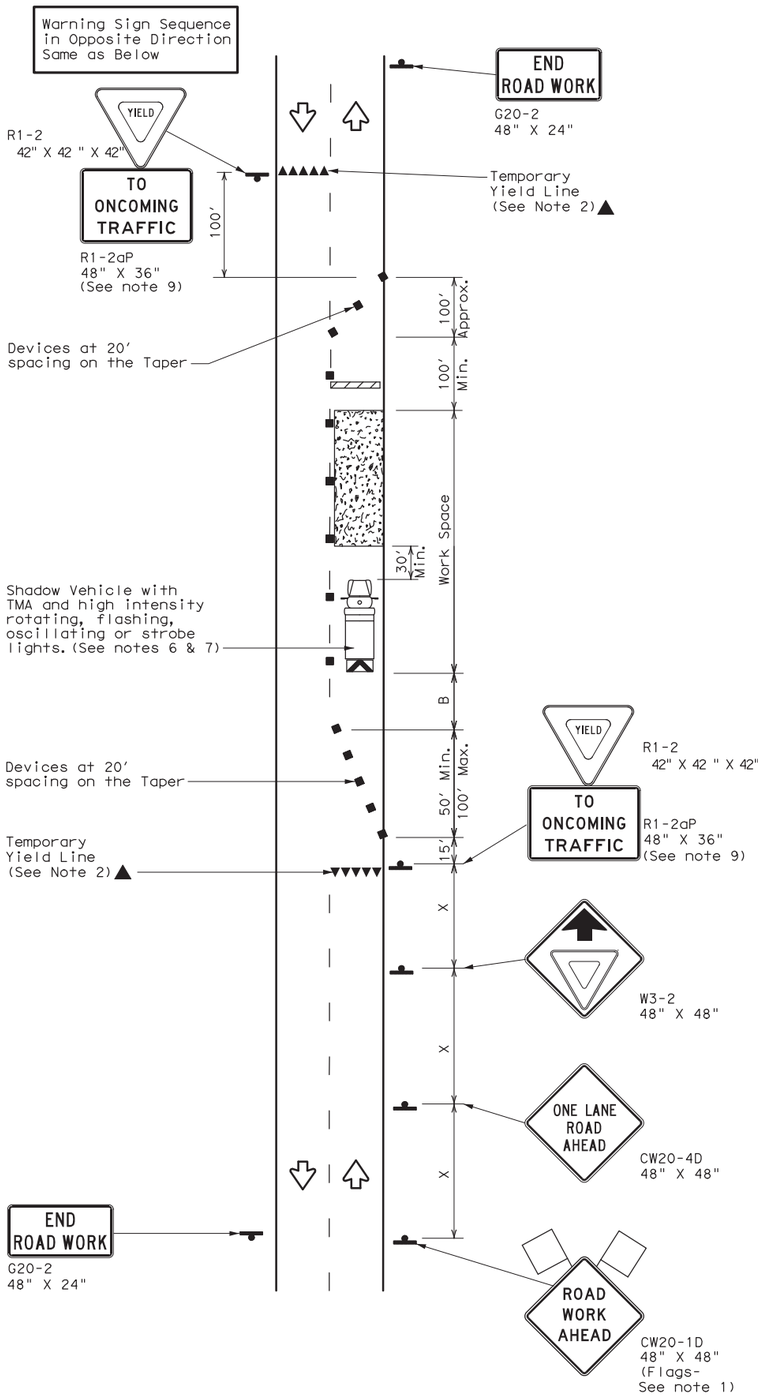
Texas Department of Transportation

Traffic Operations Division Standard

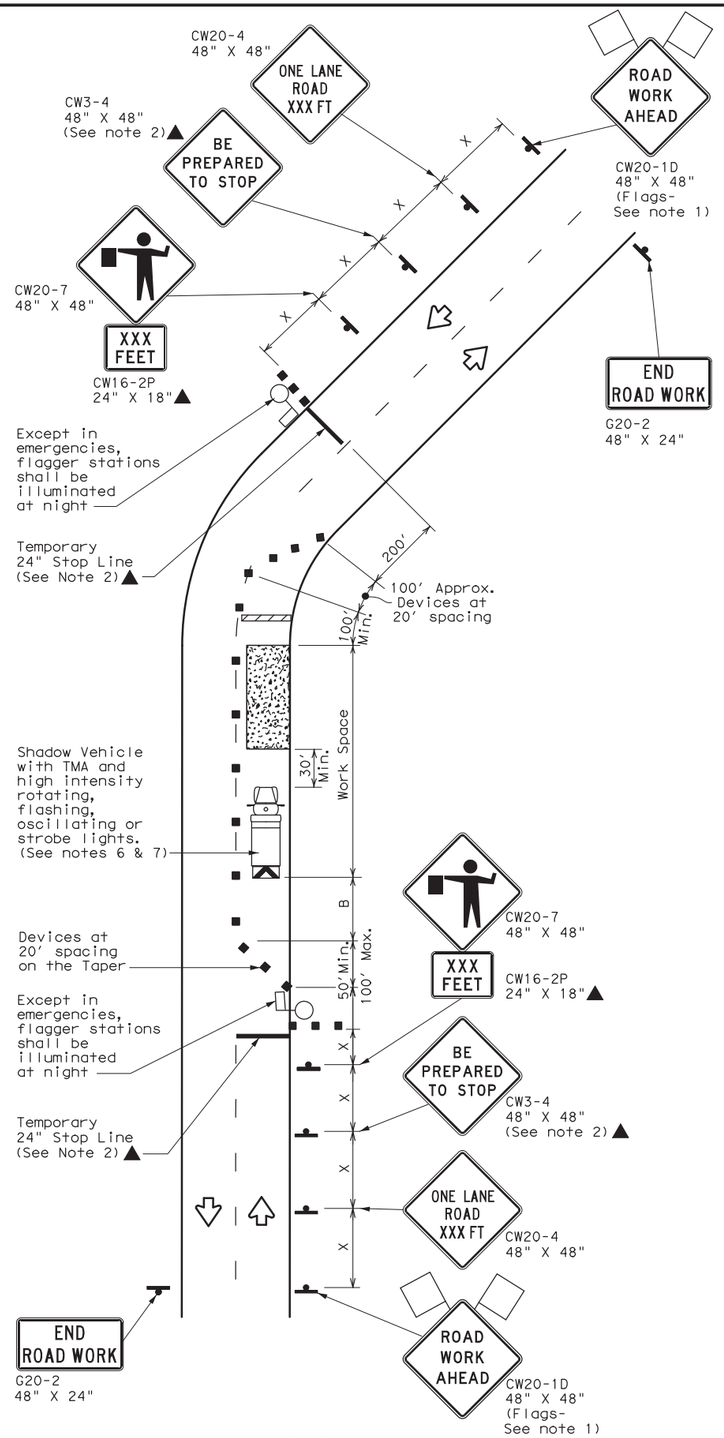
# TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

# TCP(2-1)-18

| FILE: tcp2-1-18.dgn | DN: | CK: | DW: | CK: |
|---|---|---|---|---|
| ©TxDOT December 1985 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031,ETC | IH 10 |
| 2-94 4-98 | DIST | COUNTY | | SHEET NO. |
| 8-95 2-12 | YKM | GONZALES,ETC | | 40 |
| 1-97 2-18 | | | | |




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




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

| LEGEND | | | |
|---|---|---|---|
| | Type 3 Barricade | | Channelizing Devices |
| | Heavy Work Vehicle | | Truck Mounted Attenuator (TMA) |
| | Trailer Mounted Flashing Arrow Board | 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 CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
4. Flaggers should use two-way radios or other methods of communication to control traffic.
5. Length of work space should be based on the ability of flaggers to communicate.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

### TCP (2-2a)

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

### TCP (2-2b)

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

Texas Department of Transportation
Traffic Operations Division Standard

# TRAFFIC CONTROL PLAN
# ONE-LANE TWO-WAY
# TRAFFIC CONTROL

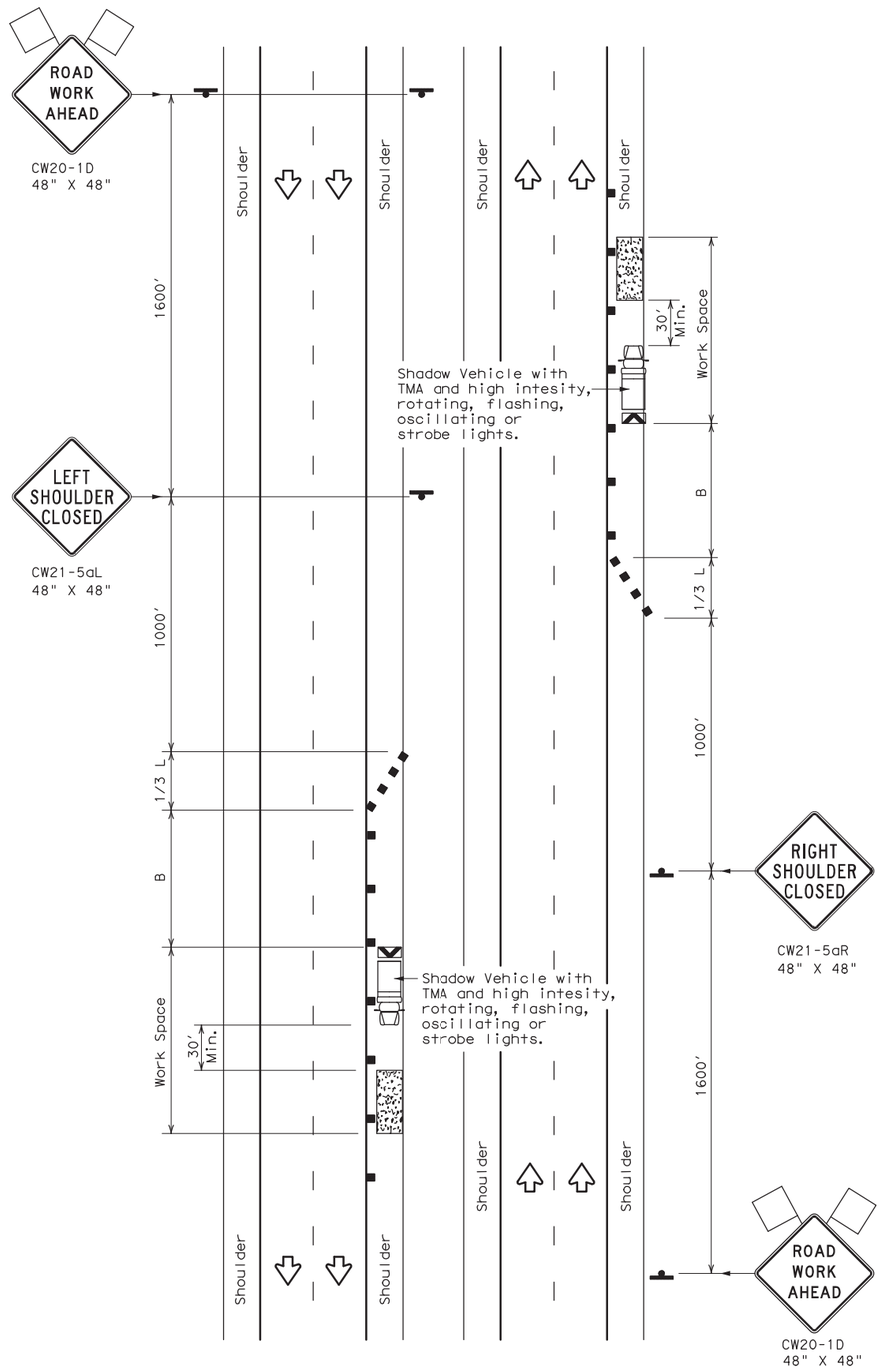
## TCP(2-2)-18

| FILE: tcp2-2-18.dgn | DN: | CK: | DW: | CK: |
|---|---|---|---|---|
| ©TxDOT December 1985 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS 8-95 3-03 | 0535 | 04 | 031,ETC | IH 10 |
| 1-97 2-12 | DIST | COUNTY | | SHEET NO. |
| 4-98 2-18 | YKM | GONZALES,ETC | | 41 |



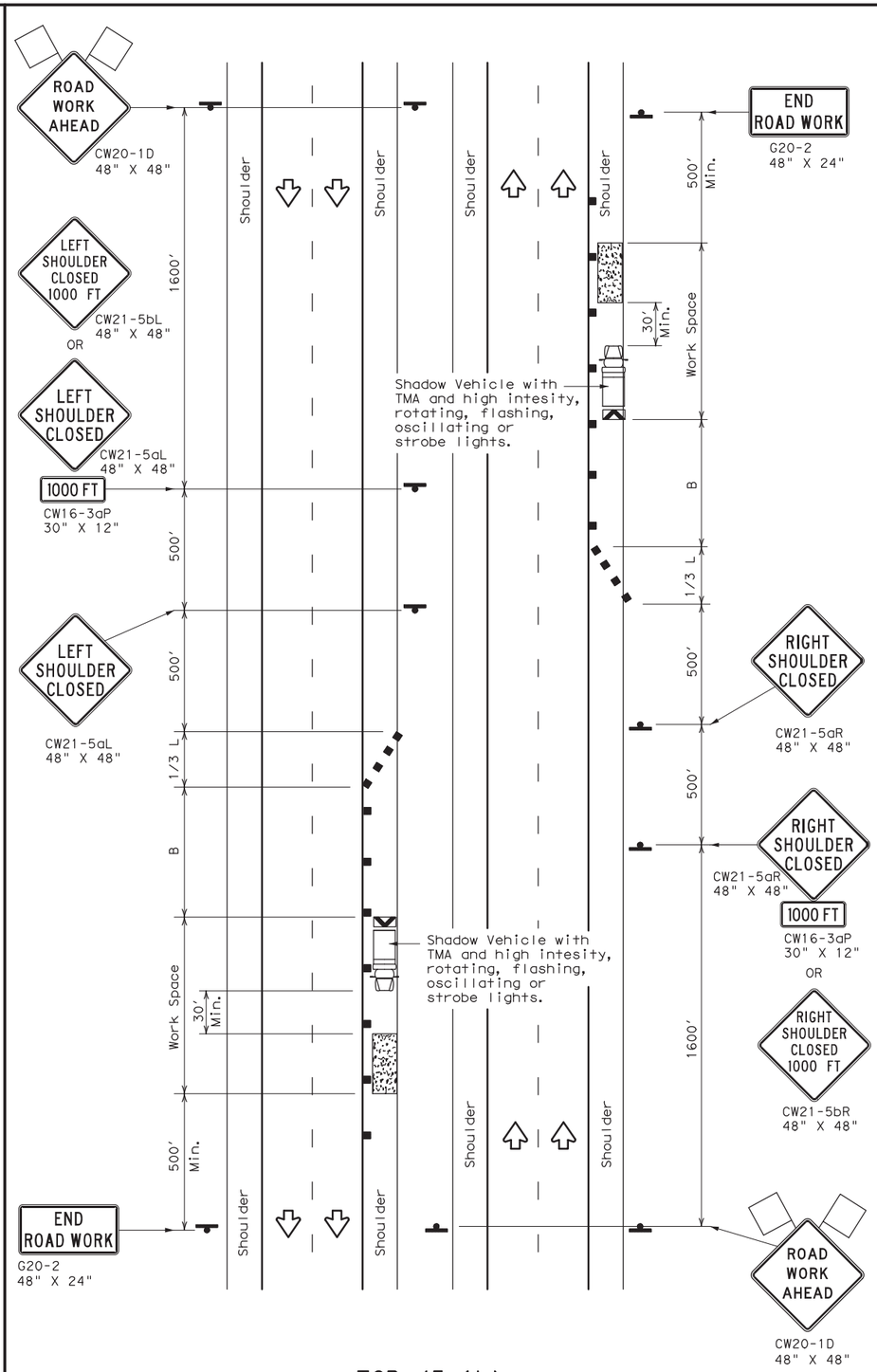
DATE: 5/19/2023 1:25:56 PM
FILE: G:\TXH\Projects\TxDOT\6676-04-IH10_DMS_YKM\TS\01_CADD\SHEETS\Standards\tcp2-2-18.dgn

DATE: 5/19/2023 1:25:57 PM
FILE: G:\TXH\Projects\TxDOT\6676-04-IH10_DMS_YKM\TS\01_CADD\SHEETS\Standards\tcp5-1-18.dgn




TCP (5-1a)

## WORK AREA ON SHOULDER




TCP (5-1b)

## WORK AREA ON SHOULDER

### 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 | Suggested Longitudinal Buffer Space "B" |
|---|---|---|---|---|---|---|---|
| 30 | $L=\frac{WS^2}{60}$ | 150' | 165' | 180' | 30' | 60' | 90' |
| 35 | | 205' | 225' | 245' | 35' | 70' | 120' |
| 40 | | 265' | 295' | 320' | 40' | 80' | 155' |
| 45 | L=WS | 450' | 495' | 540' | 45' | 90' | 195' |
| 50 | | 500' | 550' | 600' | 50' | 100' | 240' |
| 55 | | 550' | 605' | 660' | 55' | 110' | 295' |
| 60 | | 600' | 660' | 720' | 60' | 120' | 350' |
| 65 | | 650' | 715' | 780' | 65' | 130' | 410' |
| 70 | | 700' | 770' | 840' | 70' | 140' | 475' |
| 75 | | 750' | 825' | 900' | 75' | 150' | 540' |
| 80 | | 800' | 880' | 960' | 80' | 160' | 615' |

* 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 |
|---|---|---|---|---|
| | TCP(5-1a) | TCP(5-1b) | TCP(5-1b) | |

### GENERAL NOTES

1. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30' to 100' in advance of the area of crew exposure without adversely effecting the performance or quality of the work. Type 3 barricades or drums may be substituted when workers on foot are no longer present when approved by the Engineer.
2. 28" tall or taller one-piece cones will be allowed only for Short Duration or Short Term stationary operations when workers are present to maintain the devices upright and in proper location. Intermediate Term stationary work areas should use Drums, Vertical Panels or 42" tall two-piece cones.

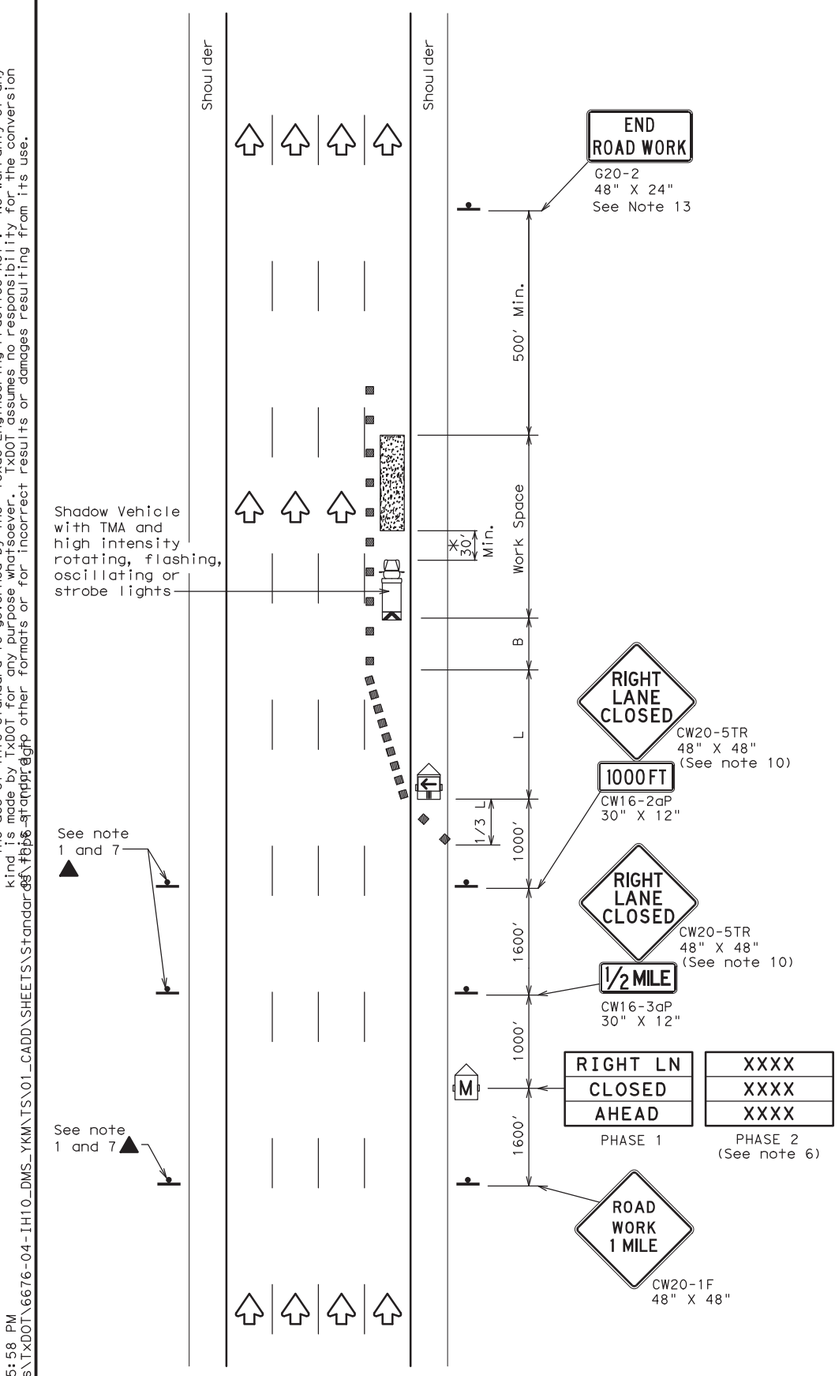
Texas Department of Transportation

Traffic Operations Division Standard

# TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

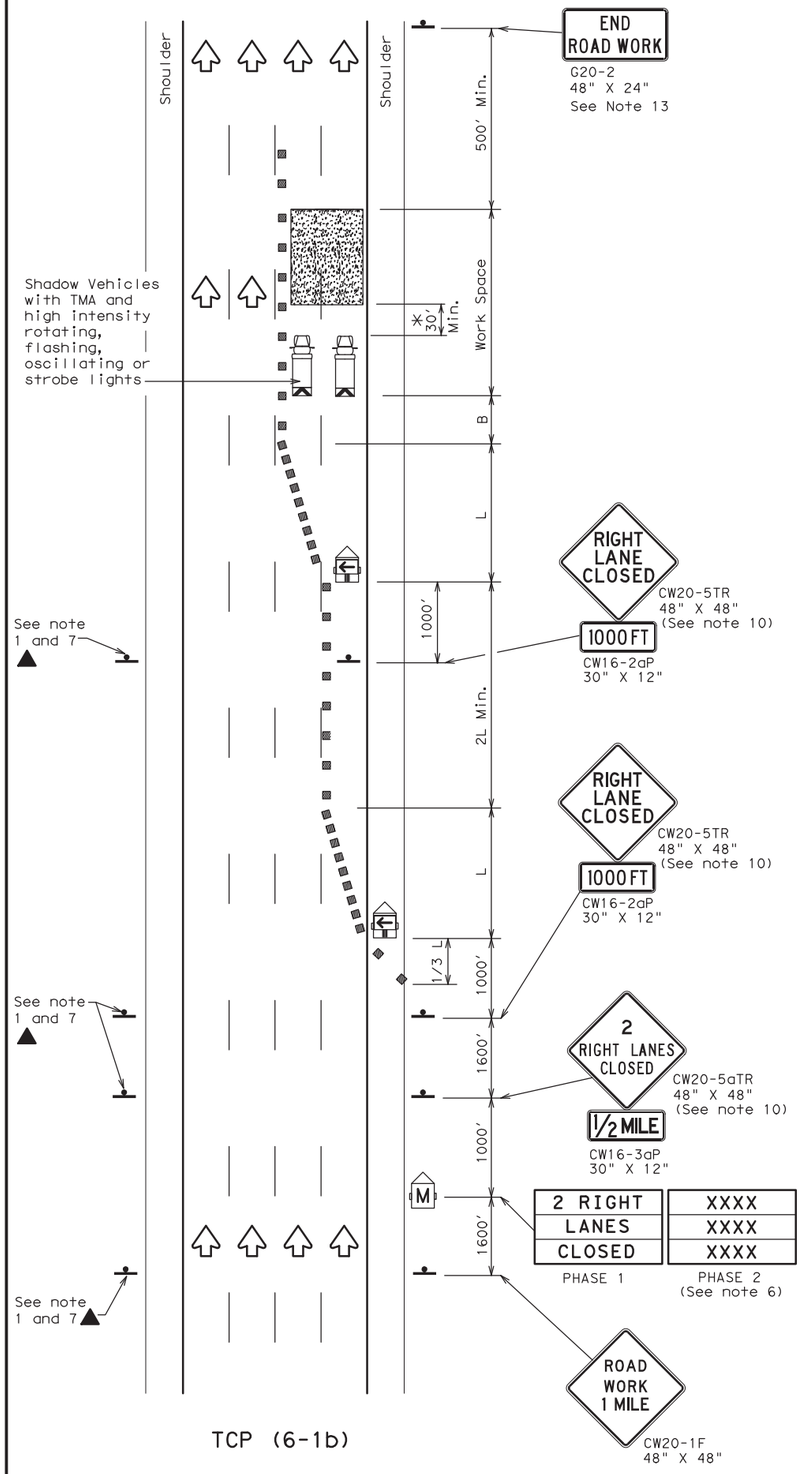
## TCP(5-1)-18

| FILE: tcp5-1-18.dgn | DN: | CK: | DW: | CK: |
|---|---|---|---|---|
| ©TxDOT February 2012 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031, ETC | IH 10 |
| 2-18 | DIST | COUNTY | | SHEET NO. |
| | YKM | GONZALES, ETC | | 42 |




TCP (6-1a)

## TYPICAL FREEWAY ONE LANE CLOSURE




TCP (6-1b)

## TYPICAL FREEWAY TWO LANE CLOSURE

| 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 "L" ✳✳ 10′ Offset | 11′ Offset | 12′ Offset | Suggested Maximum Spacing of Channelizing Devices On a Taper | On a Tangent | Suggested Longitudinal Buffer Space "B" |
|---|---|---|---|---|---|---|---|
| 45 | L=WS | 450′ | 495′ | 540′ | 45′ | 90′ | 195′ |
| 50 | | 500′ | 550′ | 600′ | 50′ | 100′ | 240′ |
| 55 | | 550′ | 605′ | 660′ | 55′ | 110′ | 295′ |
| 60 | | 600′ | 660′ | 720′ | 60′ | 120′ | 350′ |
| 65 | | 650′ | 715′ | 780′ | 65′ | 130′ | 410′ |
| 70 | | 700′ | 770′ | 840′ | 70′ | 140′ | 475′ |
| 75 | | 750′ | 825′ | 900′ | 75′ | 150′ | 540′ |
| 80 | | 800′ | 880′ | 960′ | 80′ | 160′ | 615′ |

✳✳ 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. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. Drums or 42"cones are the typical channelizing devices. For Intermediate Term Stationary work, drums shall be used on tapers with drums or 42" cones used on tangent sections. Other channelizing devices may be used as directed by the Engineer.
3. All construction signs and barricades placed during any phase of work shall remain in place until removal is approved by the Engineer.
4. The Engineer may direct the Contractor to furnish additional signs and barricades as required to maintain traffic flow, detours and motorist safety during construction.
5. Static message boards or changeable message signs stating the date and duration of ramp or freeway lane closures shall be placed a minimum of seven (7) calendar days in advance of the actual closure.
6. Phase 2 of the PCMS message should include appropriate information formatted as shown on BC(6), such as "MERGE LEFT," recommended advisory speed, delay information, or other specific warnings.
7. Duplicate construction warning signs should be erected on the medians side of freeways where median width will permit and traffic volume justifies the signing.
8. The number of closed lanes may be increased provided the spacing of traffic control devices, taper lengths and tangent lengths meet the requirements of the TMUTCD.
9. Warning signs for intermediate term stationary work should be mounted at 7′ to the bottom of the sign.
10. Warning signs shown shall be appropriately altered for left lane closures. When signs are mounted at 1′ height for short term stationary or short duration work, sign versions shown in the SHSD for Texas with distances on the sign face rather than mounted on a plaque below the sign may be used.
11. When possible, PCMS units should be located in advance of the last available exit ramp prior to the lane closure to allow motorists an alternate route. They may also be relocated to improve advance warning in case of unanticipated queuing or congestion.
12. For Intermediate Term Stationary work at night, floodlights should be used to illuminate the work area and equipment crossings. Floodlights shall not produce a disabling glare condition for road users or workers.
13. The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

✳A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30′ to 100′ in advance of the area of crew exposure without adversely affecting the work performance.

*Texas Department of Transportation*
*Traffic Operations Division Standard*

# TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURES

## TCP(6-1)-12

| FILE: tcp6-1.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT February 1998 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS 8-12 | 0535 | 04 | 031,ETC | IH 10 |
| | DIST | COUNTY | | SHEET NO. |
| | YKM | GONZALES,ETC | | 43 |

201

DATE: 5/19/2023 1:25:58 PM
FILE: G:\TXH\Projects\TxDOT\66776-04-IH10_DMS_YKM\TS\01_CADD\SHEETS\Standard Sheets\tcp6-1.dgn

DATE: 5/19/2023 1:25:58 PM
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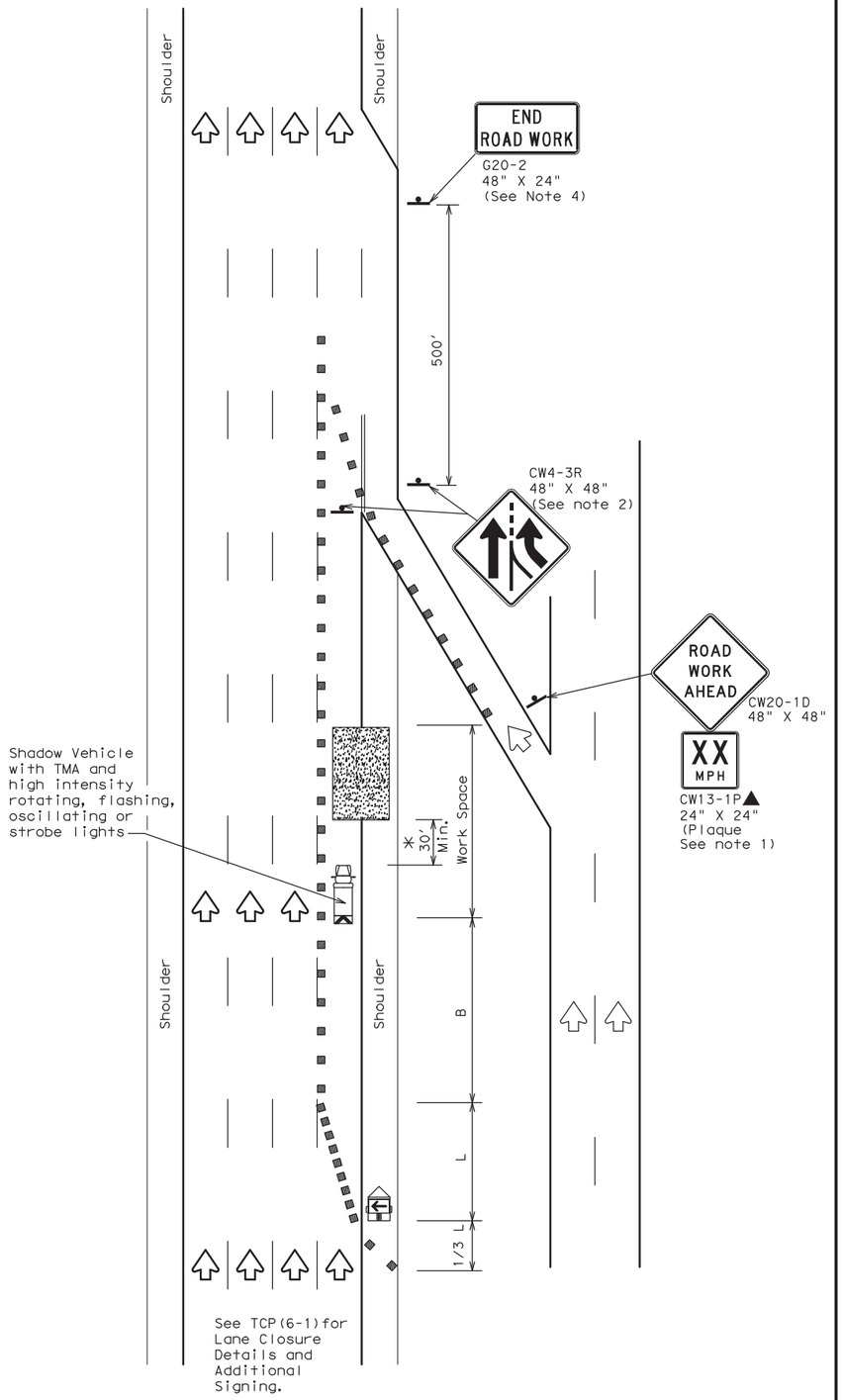
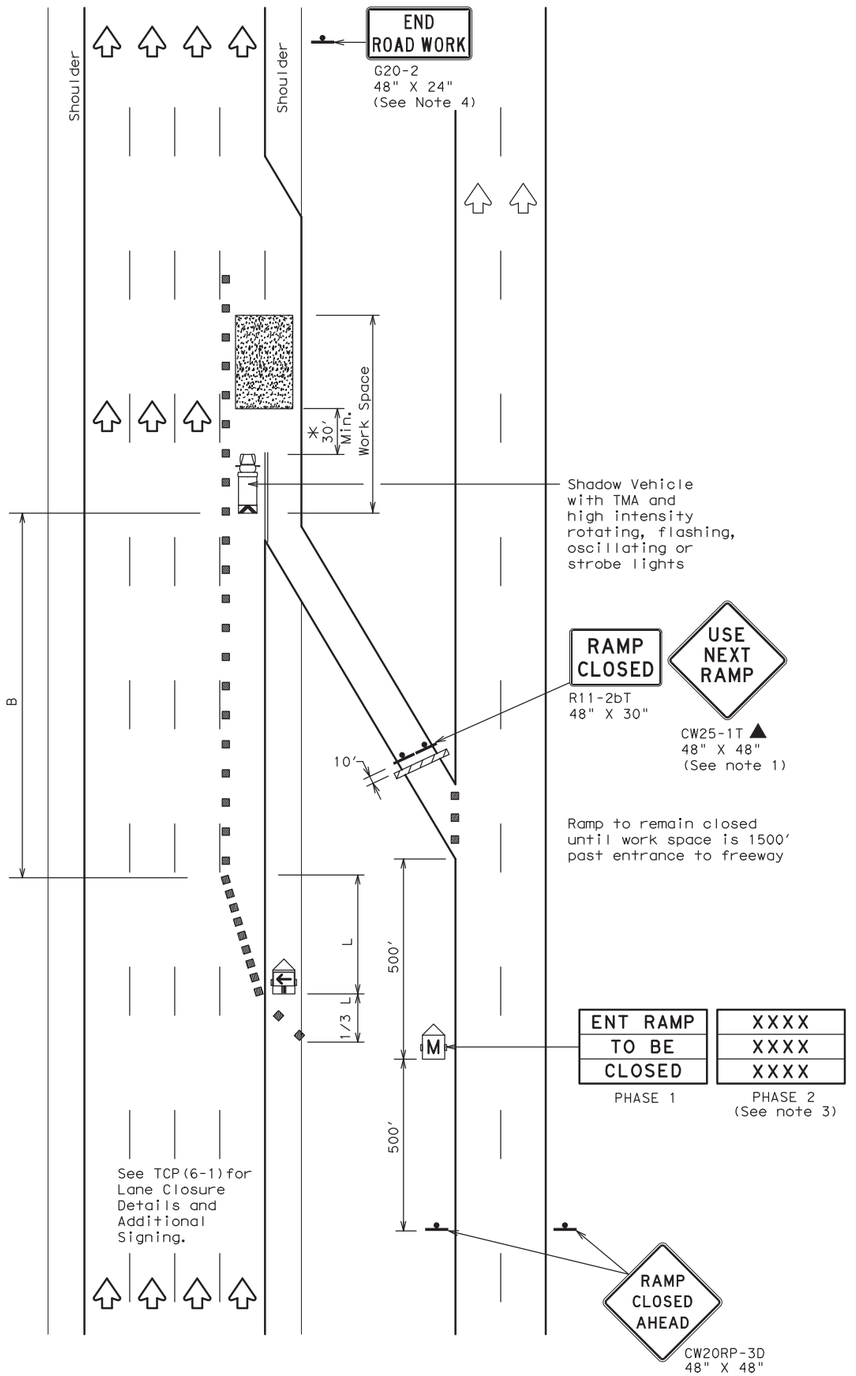



TCP (6-2a)

## ENTRANCE RAMP OPEN
## WORK WITHIN 500' OF RAMP




TCP (6-2b)

## ENTRANCE RAMP CLOSED

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

| Posted Speed | Formula | Minimum Desirable Taper Lengths "L" ** 10' Offset | 11' Offset | 12' Offset | Suggested Maximum Spacing of Channelizing Devices: On a Taper | On a Tangent | Suggested Longitudinal Buffer Space "B" |
|---|---|---|---|---|---|---|---|
| 45 | L=WS | 450' | 495' | 540' | 45' | 90' | 195' |
| 50 | | 500' | 550' | 600' | 50' | 100' | 240' |
| 55 | | 550' | 605' | 660' | 55' | 110' | 295' |
| 60 | | 600' | 660' | 720' | 60' | 120' | 350' |
| 65 | | 650' | 715' | 780' | 65' | 130' | 410' |
| 70 | | 700' | 770' | 840' | 70' | 140' | 475' |
| 75 | | 750' | 825' | 900' | 75' | 150' | 540' |
| 80 | | 800' | 880' | 960' | 80' | 160' | 615' |

** 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. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. ADDED LANE Symbol (CW4-3) sign may be omitted when sign between ramp and mainlane can be seen from both roadways.
3. See "Advance Notice List" on BC(6) for recommended date and time formatting options for PCMS Phase 2 message.
4. The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

*A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

*Texas Department of Transportation*
*Traffic Operations Division Standard*

# TRAFFIC CONTROL PLAN
# WORK AREA NEAR RAMP

## TCP(6-2)-12

| FILE: tcp6-2.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT February 1994 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031,ETC | IH 10 |
| 1-97 8-98 | DIST | COUNTY | | SHEET NO. |
| 4-98 8-12 | YKM | GONZALES,ETC | | 44 |

202

DATE: 5/19/2023 1:25:59 PM
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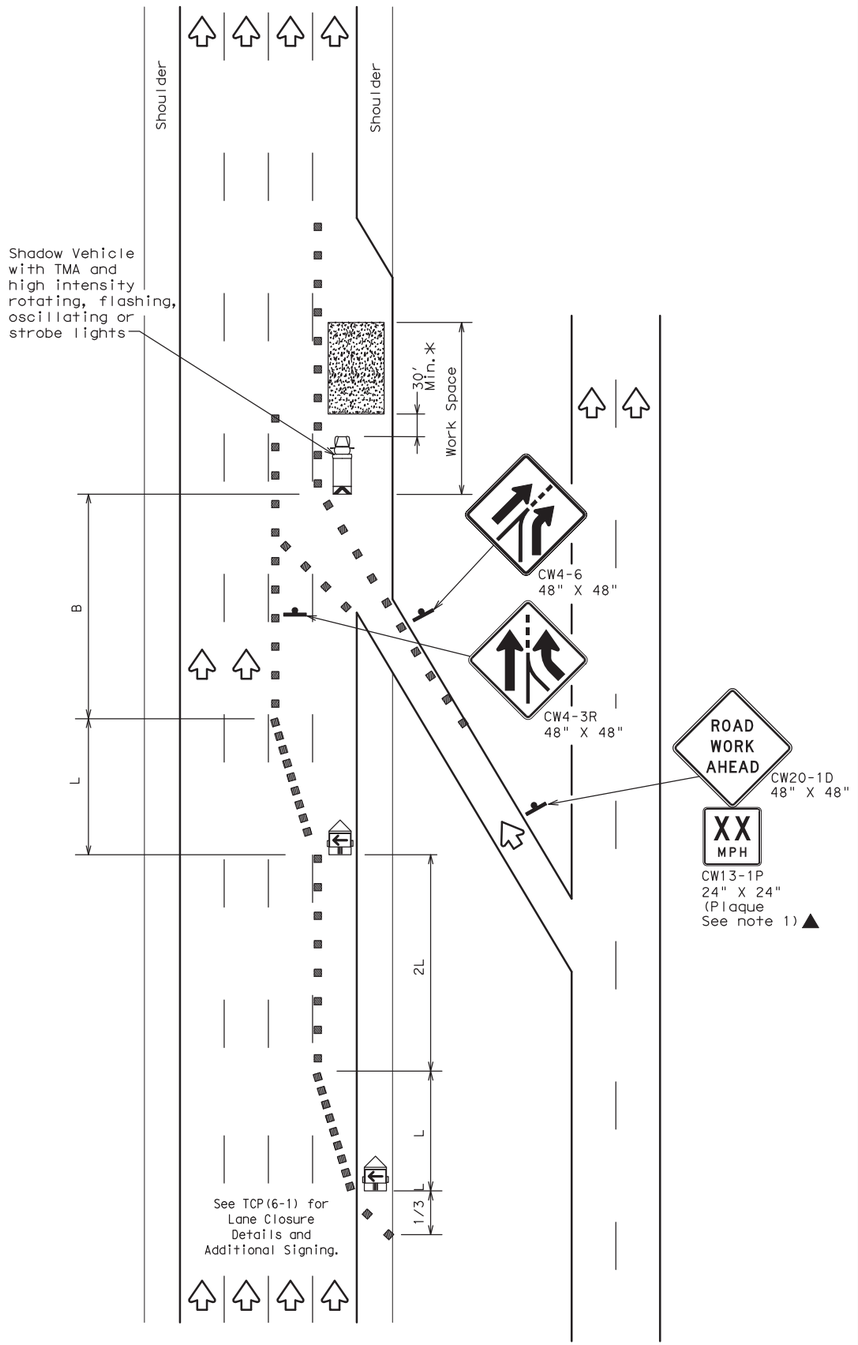
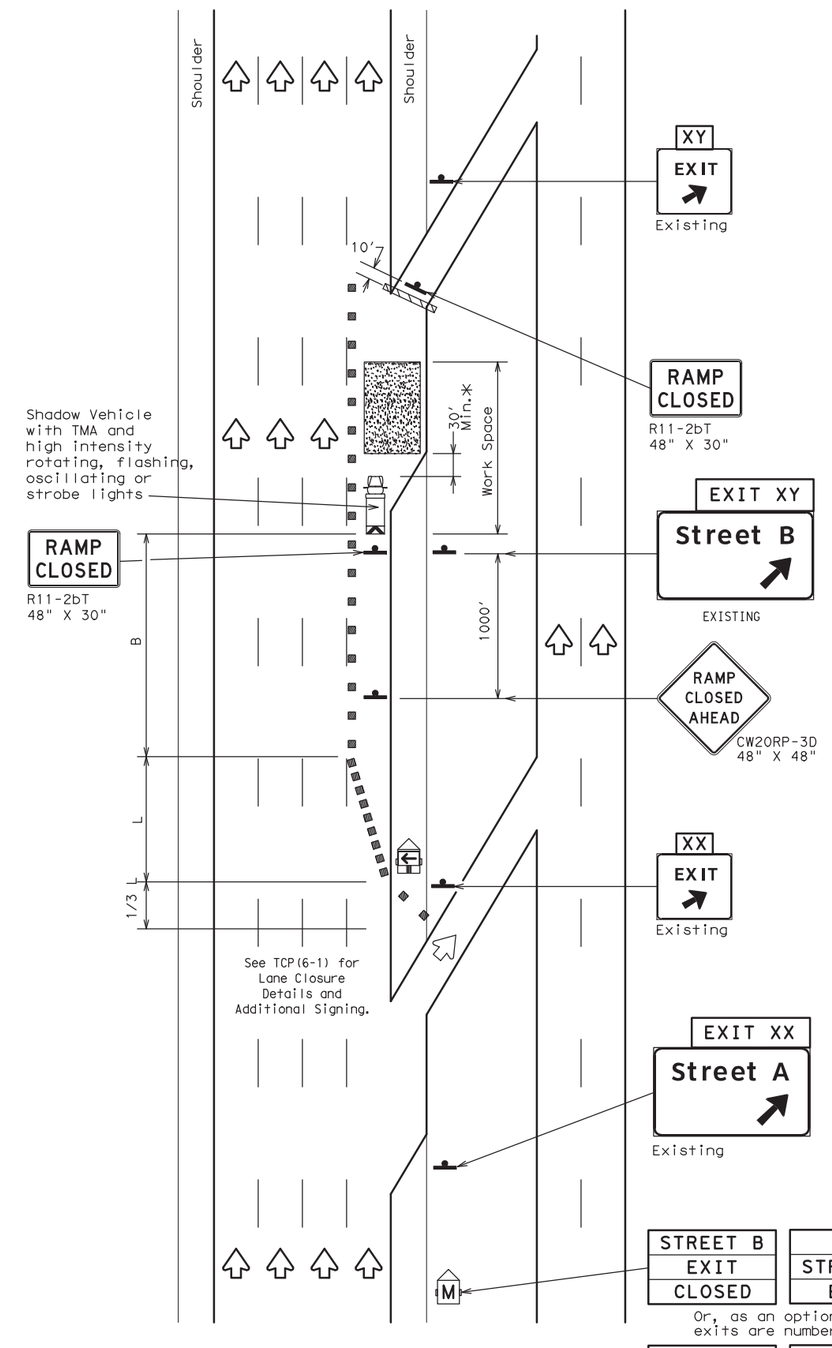



TCP (6-3a)

ENTRANCE RAMP OPEN




TCP (6-3b)

EXIT RAMP CLOSED

TRAFFIC EXITS PRIOR TO CLOSED RAMP

| 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 "L" ✳✳ | | | Suggested Maximum Spacing of Channelizing Devices | | Suggested Longitudinal Buffer Space "B" |
|---|---|---|---|---|---|---|---|
| | | 10' Offset | 11' Offset | 12' Offset | On a Taper | On a Tangent | |
| 45 | L=WS | 450' | 495' | 540' | 45' | 90' | 195' |
| 50 | | 500' | 550' | 600' | 50' | 100' | 240' |
| 55 | | 550' | 605' | 660' | 55' | 110' | 295' |
| 60 | | 600' | 660' | 720' | 60' | 120' | 350' |
| 65 | | 650' | 715' | 780' | 65' | 130' | 410' |
| 70 | | 700' | 770' | 840' | 70' | 140' | 475' |
| 75 | | 750' | 825' | 900' | 75' | 150' | 540' |
| 80 | | 800' | 880' | 960' | 80' | 160' | 615' |

✳✳ 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. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.

✳A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

*Texas Department of Transportation*
*Traffic Operations Division Standard*

# TRAFFIC CONTROL PLAN
# WORK AREA BEYOND RAMP

## TCP(6-3)-12

| FILE: tcp6-3.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT February 1994 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031,ETC | IH 10 |
| 1-97 8-98 | DIST | COUNTY | | SHEET NO. |
| 4-98 8-12 | YKM | GONZALES,ETC | | 45 |

203

DATE: 5/19/2023 1:25:59 PM
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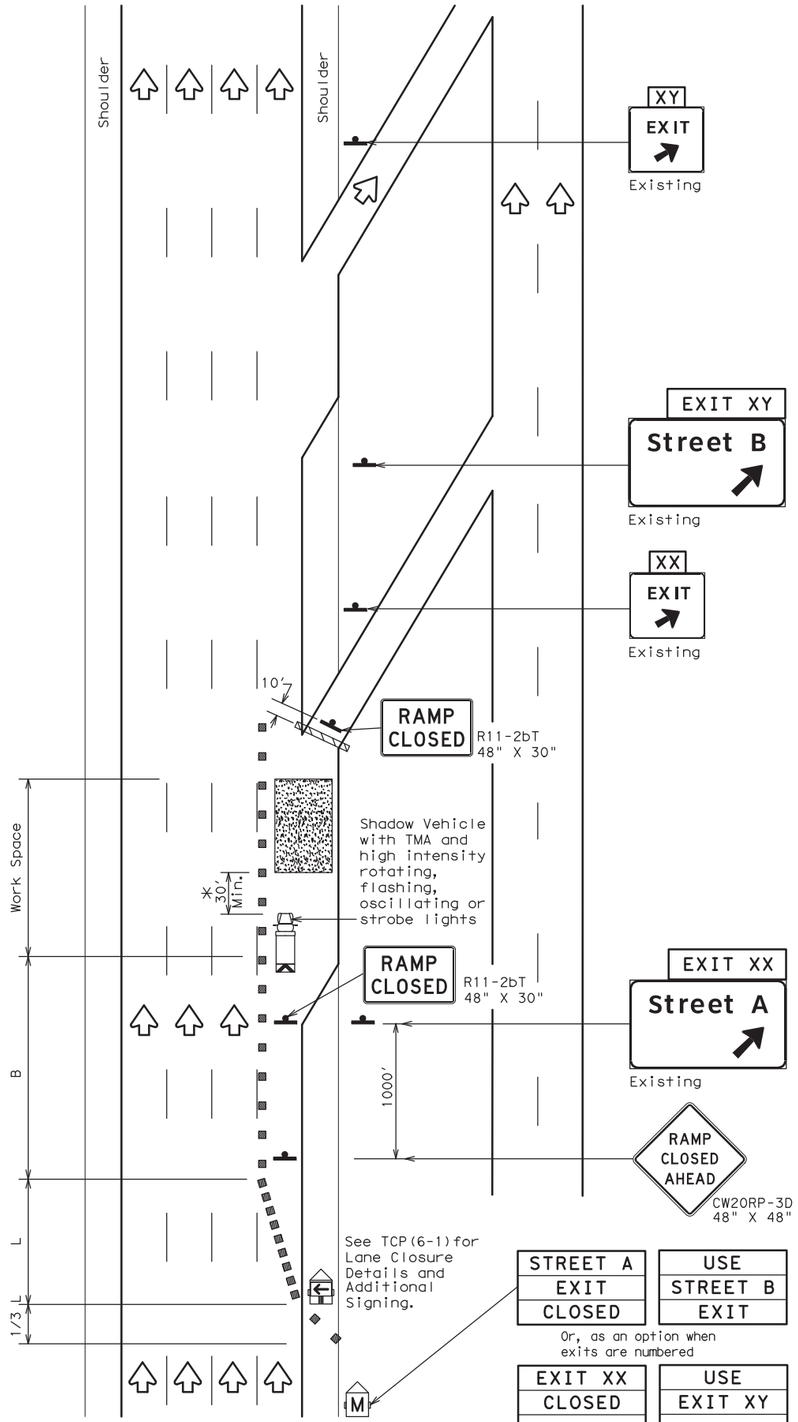
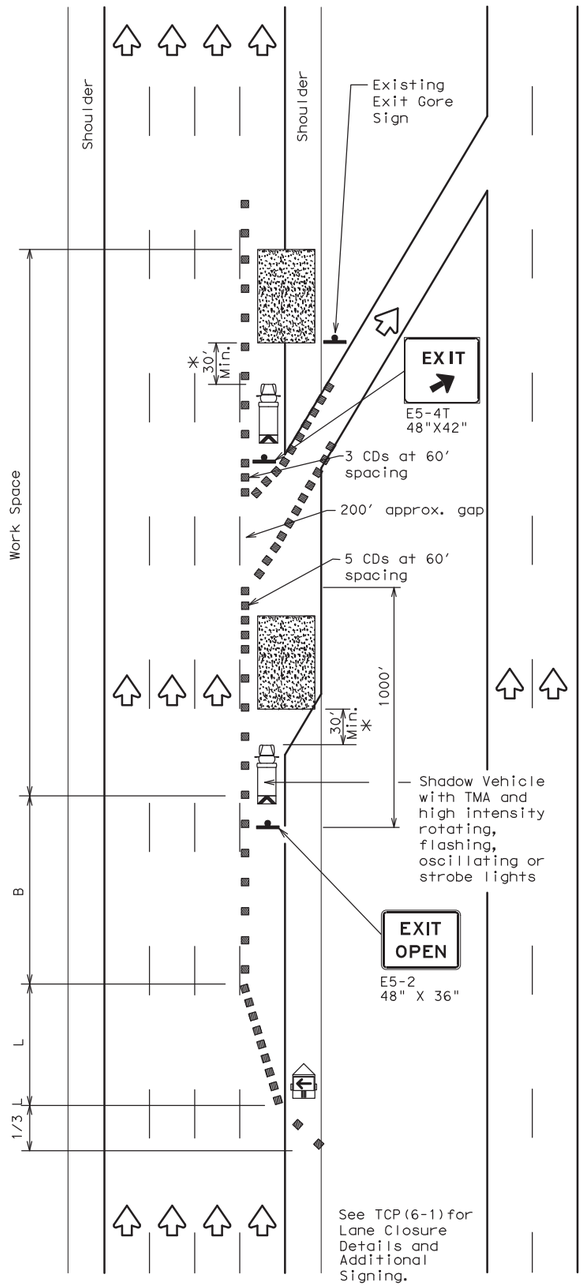



TCP (6-4a)

## EXIT RAMP CLOSED
## TRAFFIC EXITS PAST CLOSED RAMP




TCP (6-4b)

## EXIT RAMP OPEN

| LEGEND | | | |
|---|---|---|---|
| | Type 3 Barricade | | Channelizing Devices (CDs) |
| | 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 "L" ** 10' Offset | 11' Offset | 12' Offset | Suggested Maximum Spacing of Channelizing Devices: On a Taper | On a Tangent | Suggested Longitudinal Buffer Space "B" |
|---|---|---|---|---|---|---|---|
| 45 | L=WS | 450' | 495' | 540' | 45' | 90' | 195' |
| 50 | | 500' | 550' | 600' | 50' | 100' | 240' |
| 55 | | 550' | 605' | 660' | 55' | 110' | 295' |
| 60 | | 600' | 660' | 720' | 60' | 120' | 350' |
| 65 | | 650' | 715' | 780' | 65' | 130' | 410' |
| 70 | | 700' | 770' | 840' | 70' | 140' | 475' |
| 75 | | 750' | 825' | 900' | 75' | 150' | 540' |
| 80 | | 800' | 880' | 960' | 80' | 160' | 615' |

** 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. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. See BC Standards for sign details.

*A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

*Texas Department of Transportation*
*Traffic Operations Division Standard*

# TRAFFIC CONTROL PLAN
# WORK AREA AT EXIT RAMP

## TCP(6-4)-12

| FILE: tcp6-4.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT Feburary 1994 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031,ETC | IH 10 |
| 1-97 8-98 | DIST | COUNTY | | SHEET NO. |
| 4-98 8-12 | YKM | GONZALES,ETC | | 46 |

DATE: 5/19/2023 1:26:00 PM
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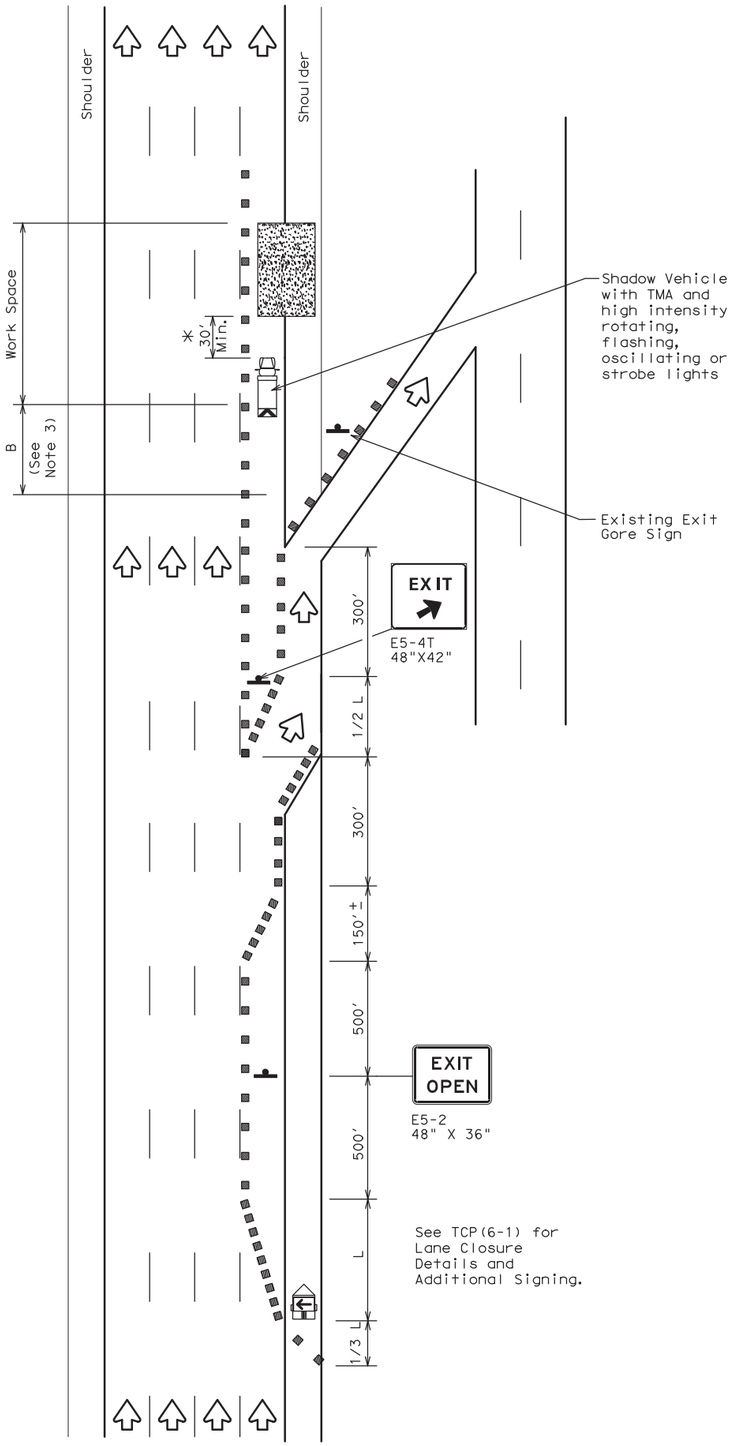
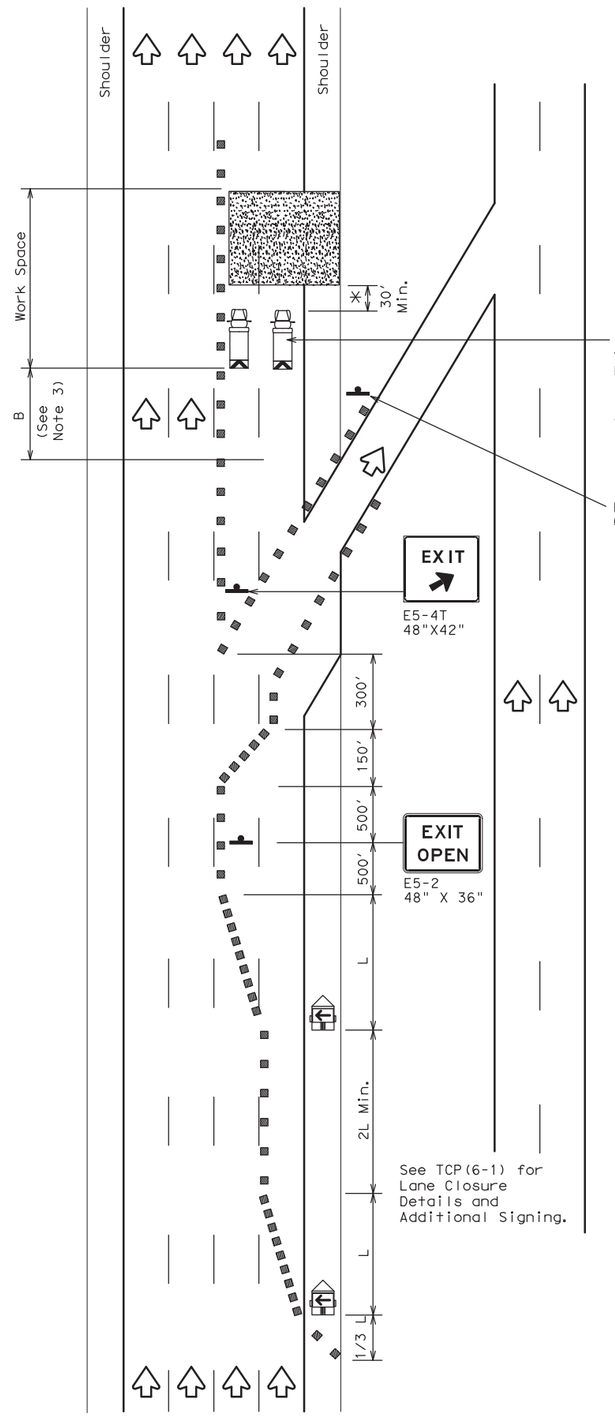



TCP (6-5a)

## EXIT RAMP OPEN




TCP (6-5b)

## EXIT RAMP OPEN
## TWO LANE CLOSURE WITHIN 1500' PAST EXIT RAMP

| 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 "L" ** 10' Offset | 11' Offset | 12' Offset | Suggested Maximum Spacing of Channelizing Devices On a Taper | On a Tangent | Suggested Longitudinal Buffer Space "B" |
|---|---|---|---|---|---|---|---|
| 45 | L=WS | 450' | 495' | 540' | 45' | 90' | 195' |
| 50 | | 500' | 550' | 600' | 50' | 100' | 240' |
| 55 | | 550' | 605' | 660' | 55' | 110' | 295' |
| 60 | | 600' | 660' | 720' | 60' | 120' | 350' |
| 65 | | 650' | 715' | 780' | 65' | 130' | 410' |
| 70 | | 700' | 770' | 840' | 70' | 140' | 475' |
| 75 | | 750' | 825' | 900' | 75' | 150' | 540' |
| 80 | | 800' | 880' | 960' | 80' | 160' | 615' |

** 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. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. See BC standards for sign details.
3. If adequate longitudinal buffer length "B" does not exist between the work space and the exit ramp, consideration should be given to closing the ramp.

*A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

*Texas Department of Transportation*
*Traffic Operations Division Standard*

# TRAFFIC CONTROL PLAN
# WORK AREA BEYOND EXIT RAMP

## TCP(6-5)-12

| FILE: tcp6-5.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT Feburary 1998 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031,ETC | IH 10 |
| 1-97 8-98 | DIST | COUNTY | | SHEET NO. |
| 4-98 8-12 | YKM | GONZALES,ETC | | 47 |

DATE: 5/19/2023 1:26:00 PM
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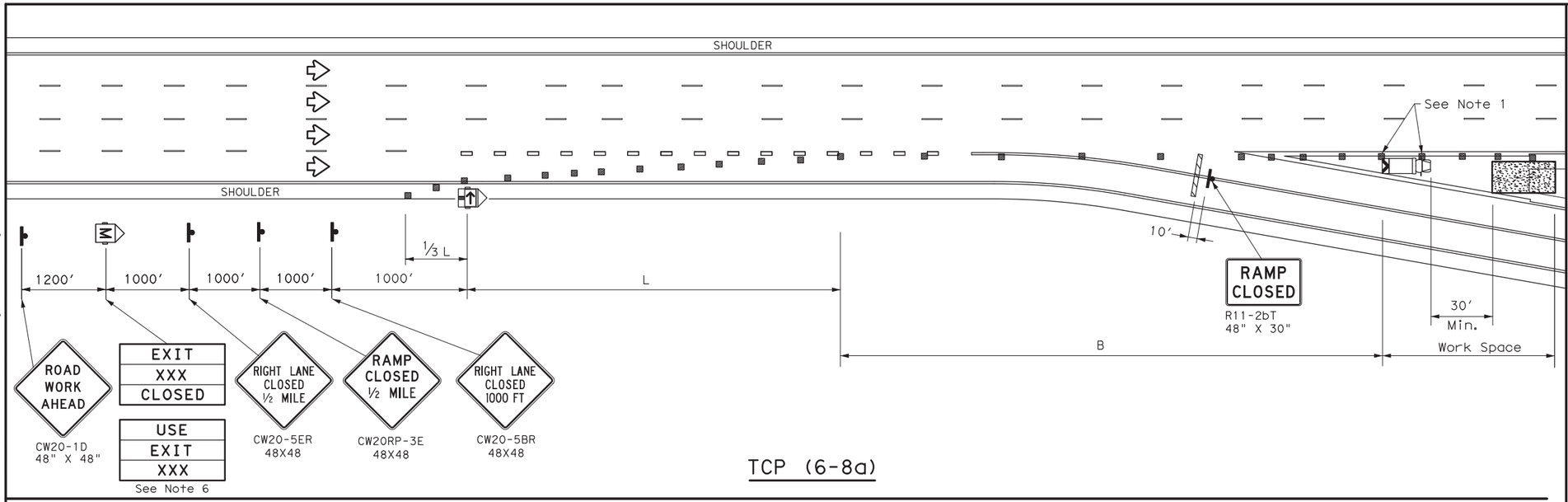
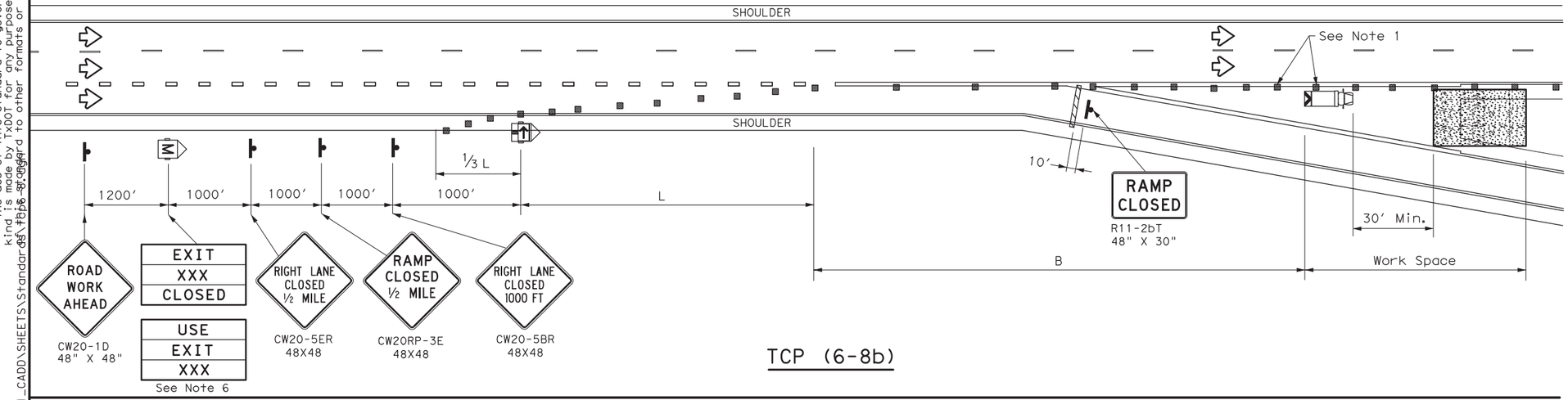
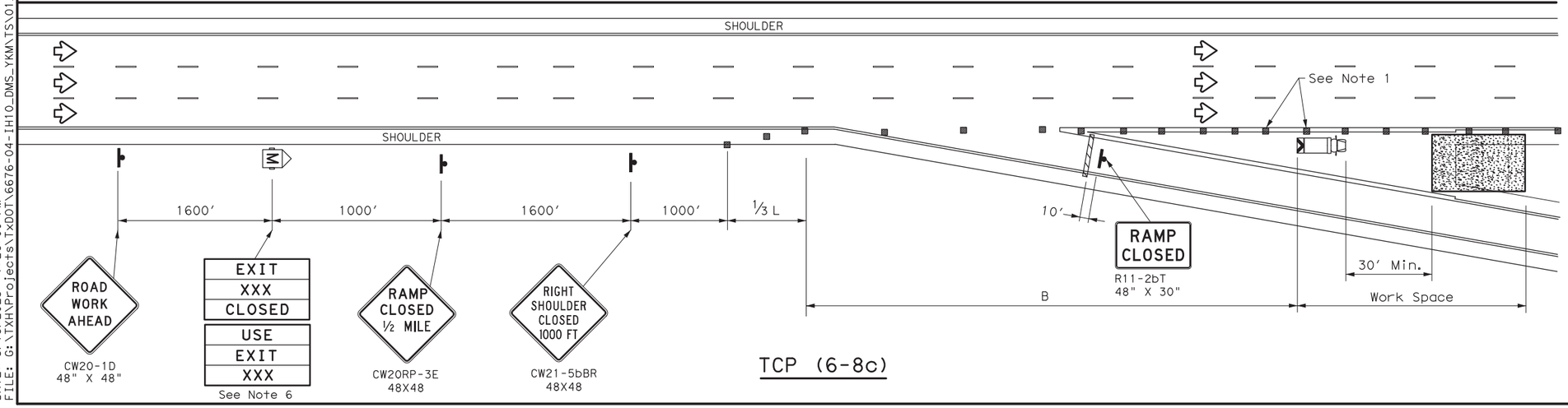



TCP (6-8a)




TCP (6-8b)




TCP (6-8c)

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

| Posted Speed | Formula | Minimum Desirable Taper Lengths "L" ** 10′ Offset | 11′ Offset | 12′ Offset | Suggested Maximum Spacing of Channelizing Devices On a Taper | On a Tangent | Suggested Longitudinal Buffer Space "B" |
|---|---|---|---|---|---|---|---|
| 45 | L=WS | 450′ | 495′ | 540′ | 45′ | 90′ | 195′ |
| 50 | | 500′ | 550′ | 600′ | 50′ | 100′ | 240′ |
| 55 | | 550′ | 605′ | 660′ | 55′ | 110′ | 295′ |
| 60 | | 600′ | 660′ | 720′ | 60′ | 120′ | 350′ |
| 65 | | 650′ | 715′ | 780′ | 65′ | 130′ | 410′ |
| 70 | | 700′ | 770′ | 840′ | 70′ | 140′ | 475′ |
| 75 | | 750′ | 825′ | 900′ | 75′ | 150′ | 540′ |
| 80 | | 800′ | 880′ | 960′ | 80′ | 160′ | 615′ |

** 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. Place channelizing devices in the gore at 20′ spacing.
2. See the Standard Highway Sign Design for Texas (SHSD) for sign details.
3. The PCMS may be omitted when a permanent DMS sign is available in an appropriate location to display a similar message as called for on the PCMS.
4. When it is determined that a through lane should be closed in addition to the exit ramp, refer to TCP(6-4) for traffic control details.
5. Truck mounted attenuator is required.
6. The PCMS may be omitted if replaced with a "RAMP CLOSED" AHEAD (CW20RP-3D) Sign.
7. Roadway ADT should be greater than 10,000.

Texas Department of Transportation

Traffic Operations Division Standard

# WORK IN EXIT GORE FOR ADT GREATER THAN 10,000

## TCP(6-8)-14

| FILE: tcp6-8.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT February 2014 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031,ETC | IH 10 |
| | DIST | COUNTY | | SHEET NO. |
| | YKM | GONZALES,ETC | | 48 |

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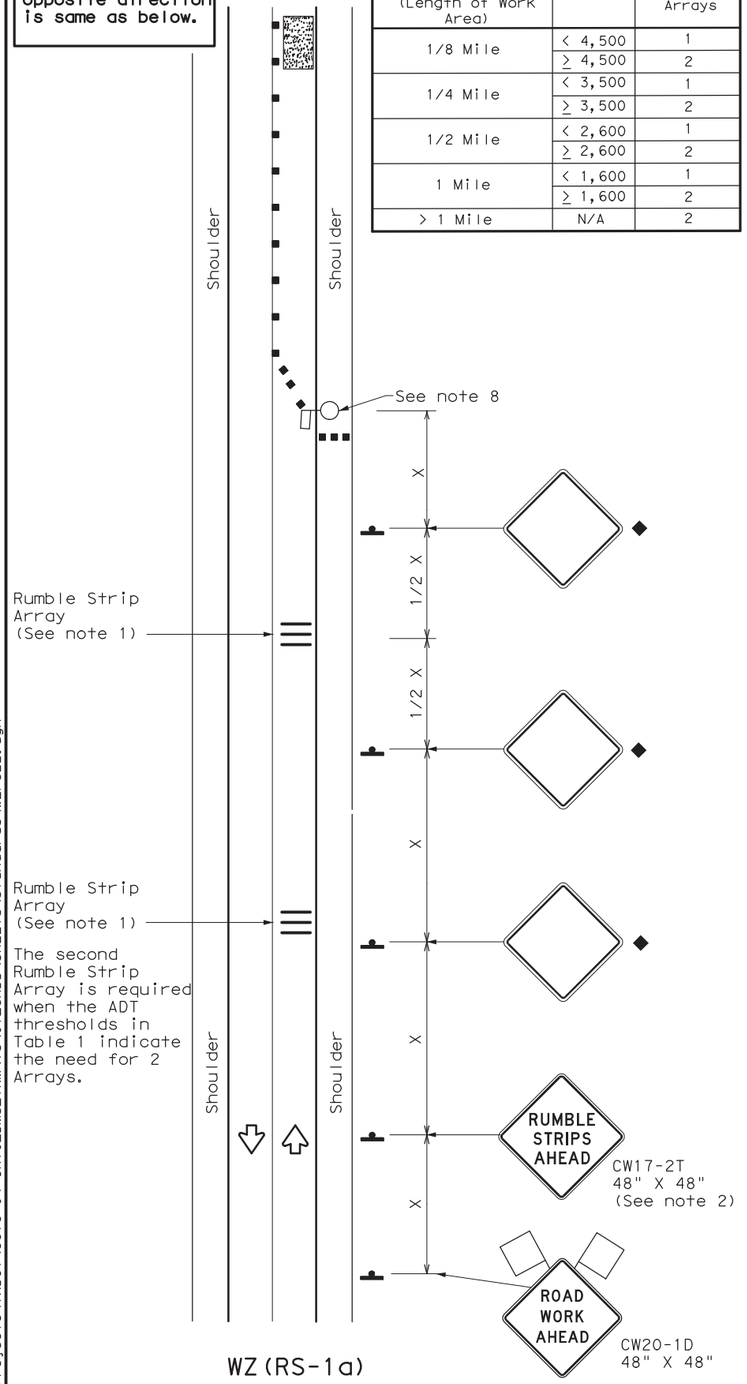
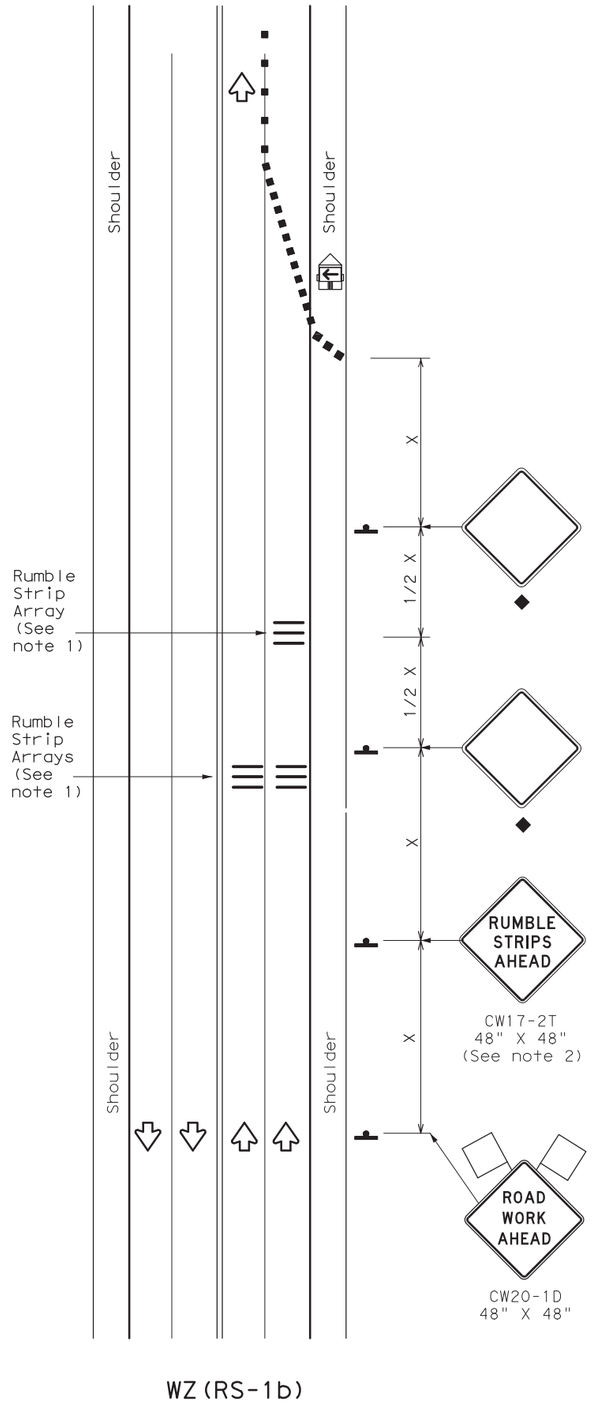
**Warning sign and rumble strip sequence in opposite direction is same as below.**

| TABLE 1 | | |
|---|---|---|
| Flagger to Flagger (Length of Work Area) | ADT | # of Rumble Strip Arrays |
| 1/8 Mile | < 4,500 | 1 |
| | ≥ 4,500 | 2 |
| 1/4 Mile | < 3,500 | 1 |
| | ≥ 3,500 | 2 |
| 1/2 Mile | < 2,600 | 1 |
| | ≥ 2,600 | 2 |
| 1 Mile | < 1,600 | 1 |
| | ≥ 1,600 | 2 |
| > 1 Mile | N/A | 2 |




WZ(RS-1a)

## RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION




WZ(RS-1b)

## RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

## GENERAL NOTES

1. Each Rumble Strip Array should consist of three rumble strips spaced center to center at the spacing shown in Table 2, placed transverse across the lane at locations shown.
2. The CW17-2T "RUMBLE STRIPS AHEAD" sign should be located after the CW20-1D "ROAD WORK AHEAD sign and spaced as shown. If traffic is observed to be queuing, or is expected to queue beyond the Rumble Strips, the CW17-2T sign and the first Rumble Strip Array may be located upstream of the CW20-1D sign as necessary to provide needed warning.
3. Temporary Rumble Strips will be considered subsidiary to Item 502, and shall be a product listed on the Compliant Work Zone Traffic Control Devices.
4. Remove Temporary Rumble Strips before removing the advanced warning signs.
5. Temporary Rumble Strips should not be used on horizontal curves, loose gravel, soft or bleeding asphalt, heavily rutted pavements or unpaved surfaces.
6. Temporary Rumble Strips shall be installed and maintained as per manufacturer's recommendations.
7. This standard sheet shall be used in conjunction with other appropriate TCP standard, TMUTCD typical application or project specific detail for the project.
8. The one-lane two-way application may utilize a flagger, an Automated Flagger Assistance Device (AFAD) or a Portable Traffic Signal (PTS).
9. Replace defective Temporary Rumble Strips as directed by the Engineer.
10. Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment and written direction from the Engineer.

| LEGEND | | | |
|---|---|---|---|
| | Type 3 Barricade | | Channelizing Devices |
| | Heavy Work Vehicle | | Truck Mounted Attenuator (TMA) |
| | Trailer Mounted Flashing Arrow Panel | 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 |
| | ✓ | ✓ | | |

◆ Signs are for illustrative purposes only. Signs required may vary depending on the TCP, TMUTCD Typical Application, or project specific details for the project.

* For posted speeds in excess of 65 MPH, it is recommended that spacing is increased as speed limits increase. Increasing space between rumble strips will improve effectiveness.

| TABLE 2 | |
|---|---|
| Speed | Approximate distance between strips in an array |
| ≤ 40 MPH | 10' |
| > 40 MPH & ≤ 55 MPH | 15' |
| = 60 MPH | 20' |
| ≥ 65 MPH | * 35' + |

Texas Department of Transportation — Traffic Safety Division Standard

# TEMPORARY RUMBLE STRIPS

## WZ(RS)-22

| FILE: wzrs22.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT November 2012 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS 2-14 1-22 4-16 | 0535 | 04 | 031,ETC | IH 10 |
| | DIST | COUNTY | | SHEET NO. |
| | YKM | GONZALES,ETC | | 49 |

DATE: 5/19/2023
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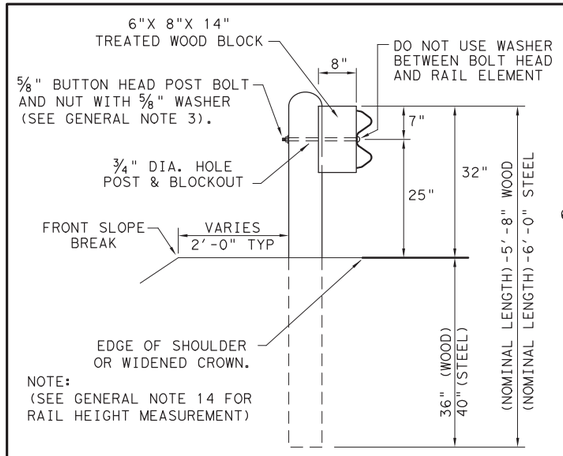
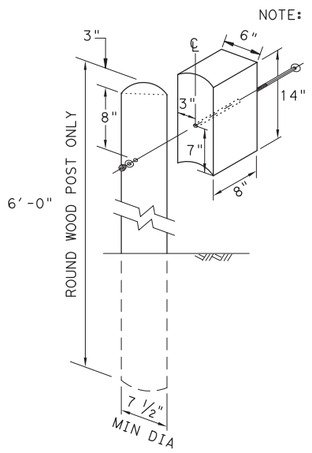
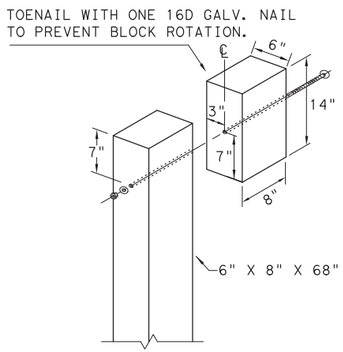


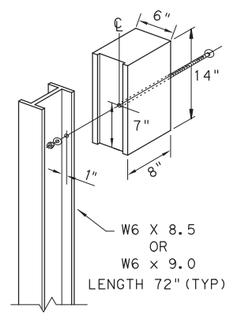

**TYPICAL POST PLACEMENT**




**WOOD BLOCK TO ROUND WOOD POST**

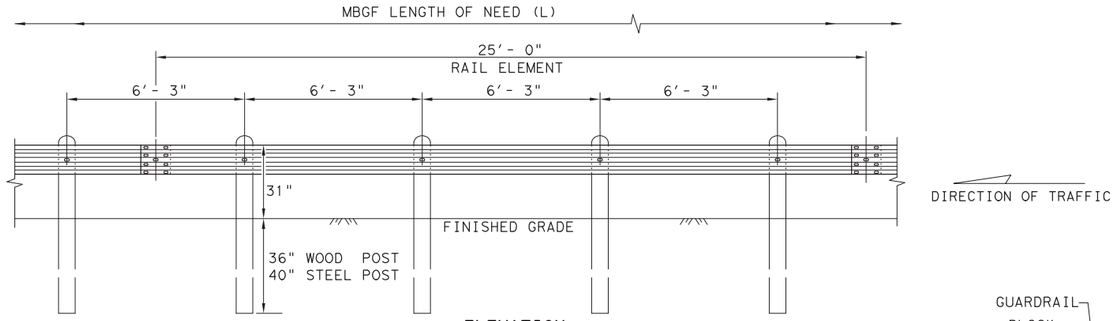



**WOOD BLOCK TO RECTANGULAR WOOD POST**



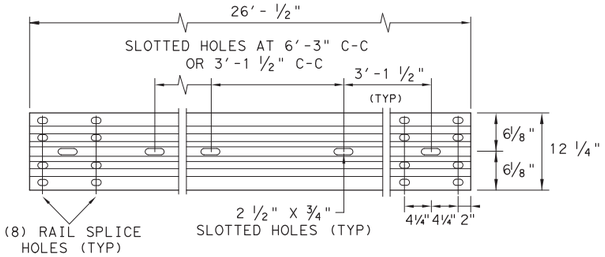

**ROUTED WOOD BLOCK TO I-BEAM STEEL POST**

NOTE: ✳✳ "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.




**ELEVATION**
**MID-SPAN RAIL SPLICE**

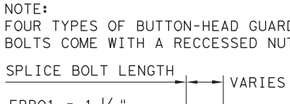
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)




**ELEVATION 25'- 0"(NOM.) W-BEAM SECTION**

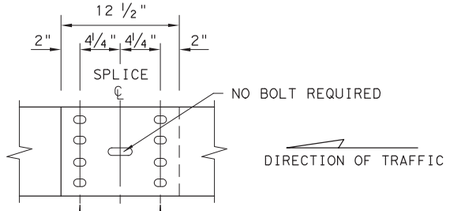
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

NOTE:
FOUR TYPES OF BUTTON-HEAD GUARD RAIL
BOLTS COME WITH A RECCESSED NUT.



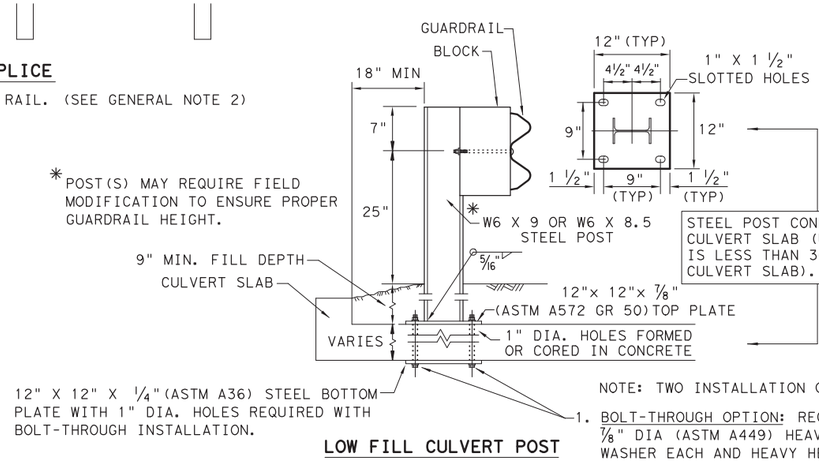

**BUTTON HEAD BOLT**

NOTE: SEE GENERAL NOTE 3 FOR SPLICE & POST BOLT DETAILS.




**MID-SPAN RAIL SPLICE DETAIL**

NOTE: GF(31), MID-SPAN RAIL SPLICES ARE REQUIRED WITH 6'-3" POST SPACINGS.




**LOW FILL CULVERT POST**

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. ⅞" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 ¼" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE ⅞" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS ¼" MIN. BEYOND NUT.

NOTE: CULVERTS OF 25 FT. OR LESS, SEE GF(31)LS STANDARD FOR "LONG SPAN" OPTION.

## GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 ½" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210,"COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.

NOTE: TRANSISTIONS TO BRIDGE RAILS OR TRAFFIC BARRIERS.
SEE GF(31)TL3 TR STANDARD FOR HIGH-SPEED TL-3 TRANSITIONS.
SEE GF(31)TL2 TR STANDARD FOR LOW-SPEED TL-2 TRANSITIONS.

Texas Department of Transportation

Design Division Standard

# METAL BEAM GUARD FENCE
# TL-3 MASH COMPLIANT
# GF(31)-19

| FILE: gf3119.dgn | DN: TxDOT | CK: KM | DW: VP | CK: CGL/AG |
|---|---|---|---|---|
| ©TxDOT: NOVEMBER 2019 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031,ETC | IH 10 |
| | DIST | COUNTY | | SHEET NO. |
| | YKM | GONZALES,ETC | | 50 |

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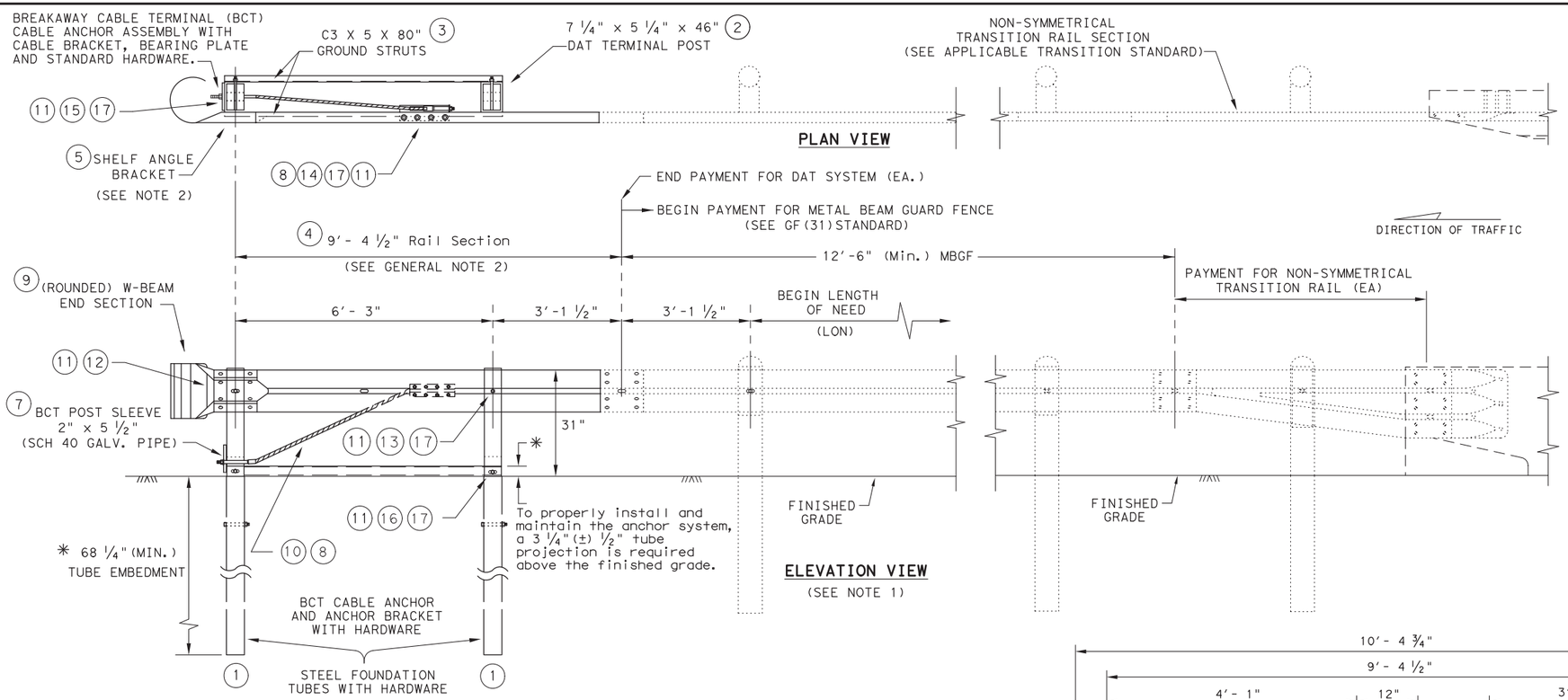



## DOWNSTREAM ANCHOR TERMINAL (DAT)

NOTE: ONLY FOR DOWNSTREAM USE, WHEN LOCATED OUTSIDE THE HORIZONTAL CLEARANCE AREA OF OPPOSING TRAFFIC.

## GENERAL NOTES

1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN 3 3/4" ABOVE THE FINISHED GRADE.
4. ALL HARDWARE FOR DAT SHALL BE ASTM A307 UNLESS OTHERWISE SHOWN.
5. REFER TO GF(31) SHEET FOR TERMINAL CONNECTION DETAILS.

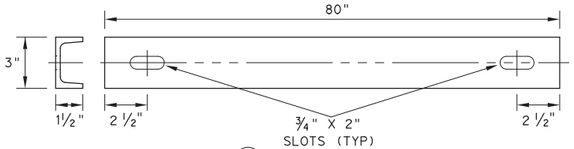
## MOW STRIP INSTALLATION

IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

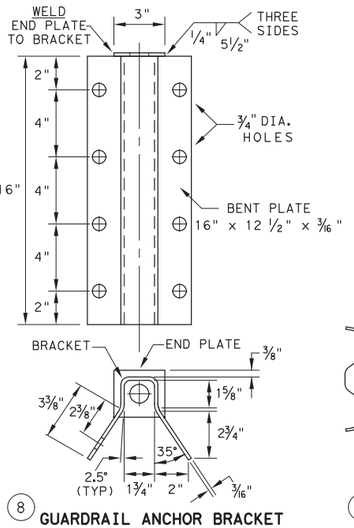
| # | (DAT) PARTS LIST | QTY |
|---|---|---|
| (1) | STEEL FOUNDATION TUBE | 2 |
| (2) | DAT TERMINAL POST | 2 |
| (3) | CHANNEL STRUT | 2 |
| (4) | TERMINAL RAIL ELEMENT | 1 |
| (5) | SHELF ANGLE BRACKET | 1 |
| (6) | BCT BEARING PLATE | 1 |
| (7) | BCT POST SLEEVE | 1 |
| (8) | GUARDRAIL ANCHOR BRACKET | 1 |
| (9) | (ROUNDED) W-BEAM END SECTION | 1 |
| (10) | BCT CABLE ANCHOR | 1 |
| (11) | RECESSED NUT, GUARDRAIL | 20 |
| (12) | 1 1/4" BUTTON HEAD BOLT | 4 |
| (13) | 10" BUTTON HEAD BOLT | 2 |
| (14) | 5/8" X 2" HEX HEAD BOLT | 8 |
| (15) | 5/8" X 8" HEX HEAD BOLT | 4 |
| (16) | 5/8" X 10" HEX HEAD BOLT | 2 |
| (17) | 5/8" FLAT WASHER | 18 |



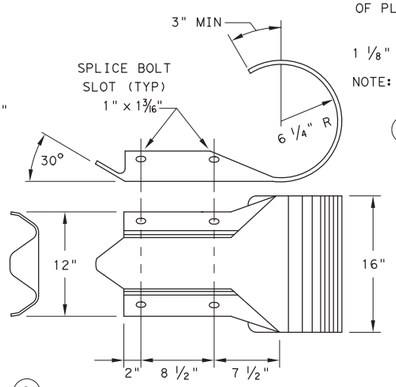

(4) **TERMINAL RAIL ELEMENT FOR DAT**



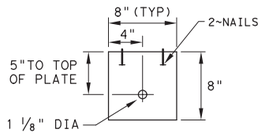

(3) **CHANNEL STRUT**
C3 X 5 X 80", GRADE A36




(8) **GUARDRAIL ANCHOR BRACKET**

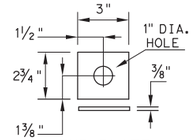



(9) **W-BEAM END SECTION (ROUNDED) (12 GA.)**

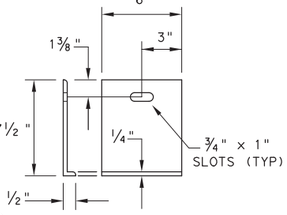



NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

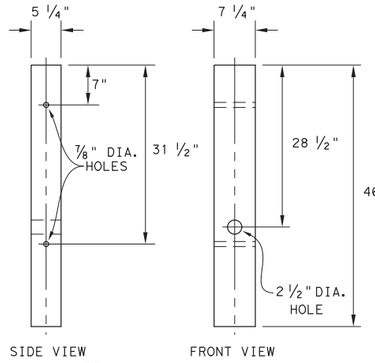
(6) **BEARING PLATE**
8"x 8"x 5/8" PL



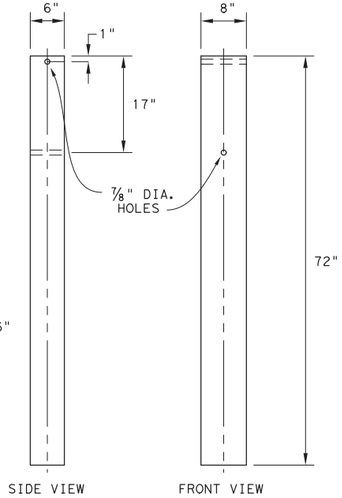

**END PLATE**




(5) **SHELF ANGLE BRACKET**




(2) **TERMINAL POST**
7 1/4"x 5 1/4"x 46" WOOD POST




(1) **STEEL FOUNDATION TUBE**
6"x 8"x 1/8" x 72" STEEL TUBE

Texas Department of Transportation — Design Division Standard

# METAL BEAM GUARD FENCE
## (DOWNSTREAM ANCHOR TERMINAL)
## TL-3 MASH COMPLIANT

# GF(31)DAT-19

| FILE: gf31dat19.dgn | DN: TxDOT | CK: KM | DW: VP | CK: CGL/AG |
|---|---|---|---|---|
| ©TxDOT: NOVEMBER 2019 REVISIONS | CONT | SECT | JOB | HIGHWAY |
| | 0535 | 04 | 031,ETC | IH 10 |
| | DIST | COUNTY | | SHEET NO. |
| | YKM | GONZALES,ETC | | 51 |

DATE: 5/19/2023
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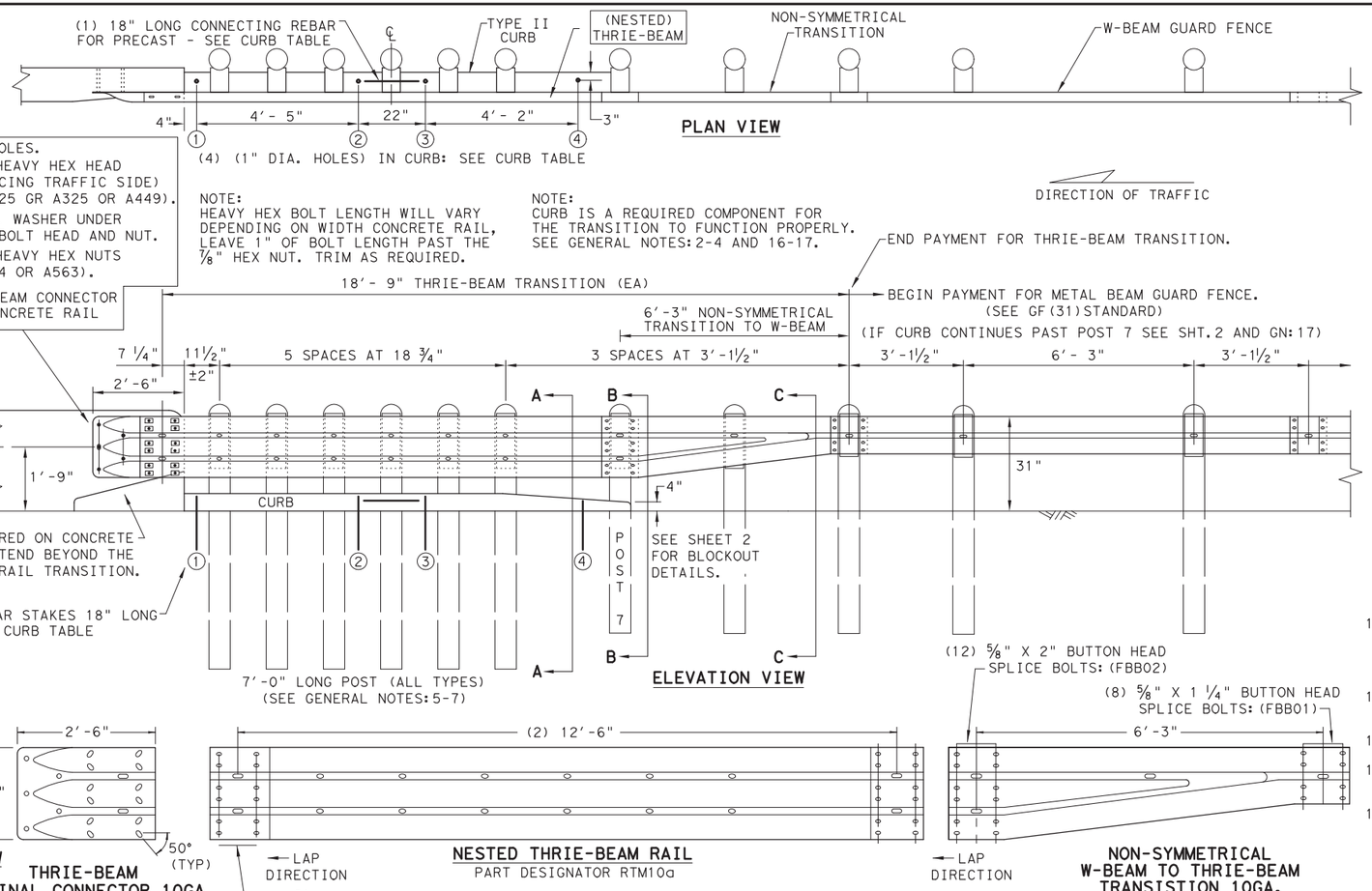
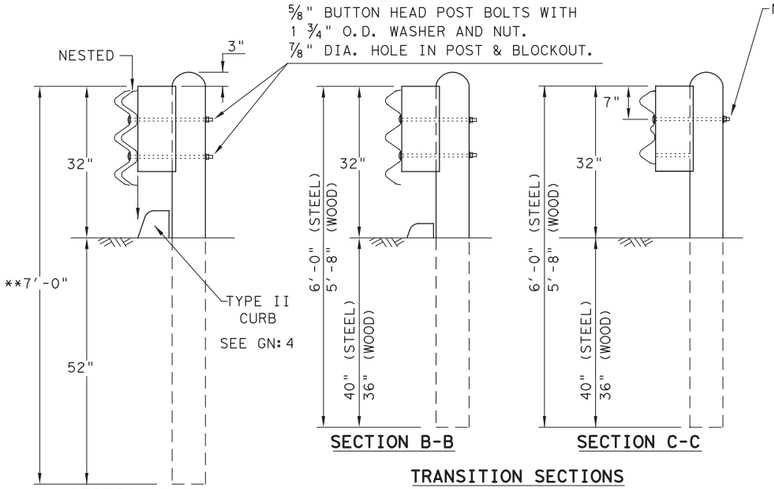
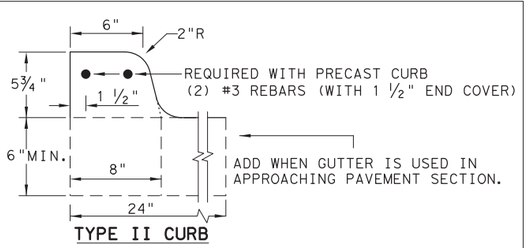



| THRIE-BEAM TERMINAL - CURB TABLE |
|---|
| PRECAST CURB FULL LENGTH EQUALS 12'- 2" THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS. |
| CURB (1) LENGTH 5'- 8" |
| CURB (2) LENGTH 6'- 6" |
| TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7 |
| CONNECTING PRECAST CURB SECTIONS (1) & (2): |
| FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END. USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS. |
| SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *: |
| FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND 1/2" BELOW TOP OF CURB. FILL HOLES WITH APPROVED GROUT MIXTURE. |




TYPE II CURB

NOTE: OPTIONS FOR TYPE II CURB:
1. PRECAST
2. CAST-IN-PLACE

* NOTES: NOT NEEDED FOR CAST-IN-PLACE.
SEE TYPE II CURB DETAIL FOR REBAR AND COVER REQUIREMENTS.
PERCUSSION DRILLING IS NOT PERMITTED WITH:
TYPE II CURB, BRIDGE RAIL OR CONCRETE TRAFFIC RAIL.

TYPE II CURB DETAILS

## GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- 3/4" HEIGHT); SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE: 17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST 5/8" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED)(TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED)(STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

**HIGH-SPEED TRANSITION**

**SHEET 1 OF 2**

Texas Department of Transportation | Design Division Standard

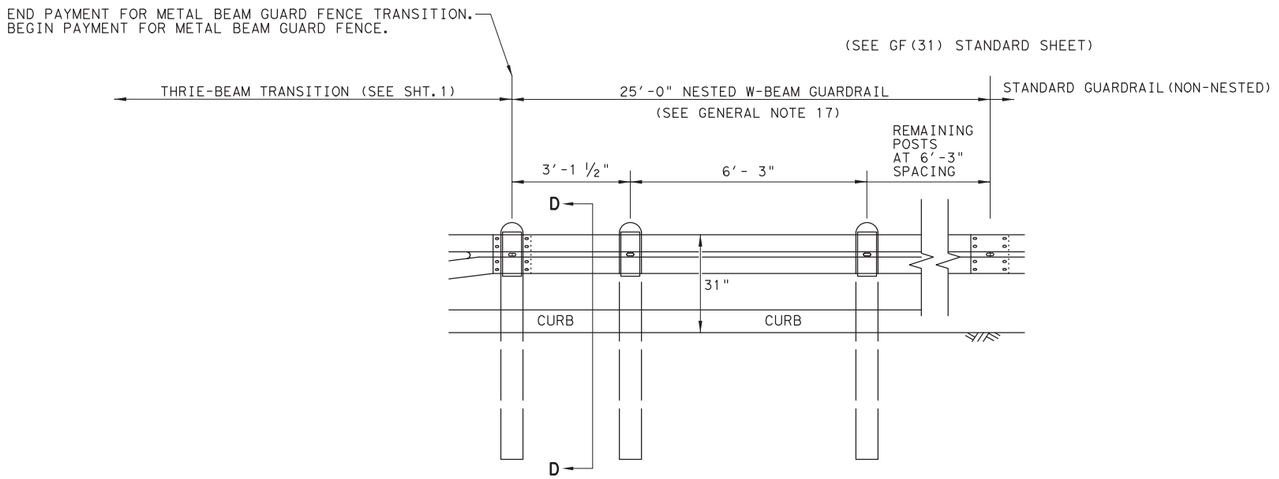
# METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

# GF(31)TR TL3-20

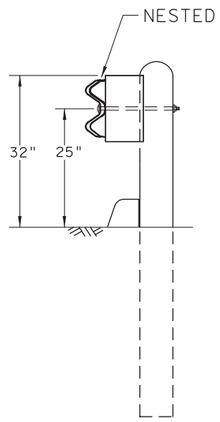
| FILE: gf31tr1320.dgn | DN: TxDOT | CK: KM | DW: VP | CK: CGL/AG |
|---|---|---|---|---|
| ©TxDOT: NOVEMBER 2020 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031, ETC | IH 10 |
| | DIST | COUNTY | | SHEET NO. |
| | YKM | GONZALES, ETC | | 52 |

DATE: 5/19/2023
FILE: G:\TXH\Projects\TxDOT\6676-04-IH10_DMS_YKM\TS\01_CADD\SHEETS\Standards\gf31trt1320.dgn

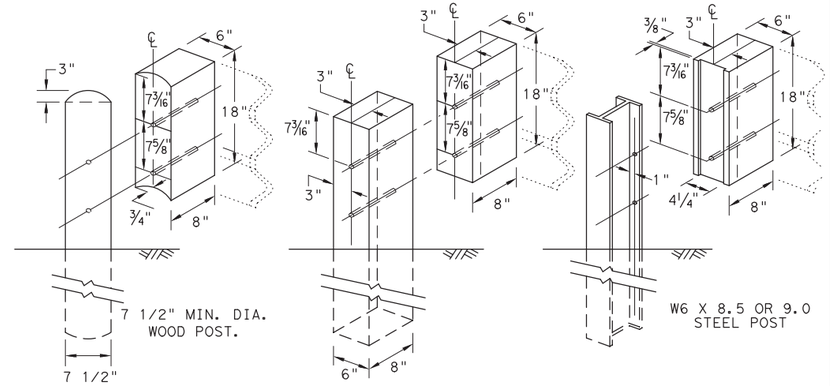
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)




ELEVATION VIEW




SECTION D-D




THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation

Design Division Standard

# METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

## GF(31)TR TL3-20

| | | | | | |
|---|---|---|---|---|---|
| FILE: gf31trt1320.dgn | DN: TxDOT | CK: KM | DW: KM | CK: CGL/AG | |
| ©TxDOT: NOVEMBER 2020 | CONT | SECT | JOB | HIGHWAY | |
| REVISIONS | 0535 | 04 | 031,ETC | IH 10 | |
| | DIST | COUNTY | | SHEET NO. | |
| | YKM | GONZALES,ETC | | 53 | |

DATE: 5/19/2023 1:26:03 PM
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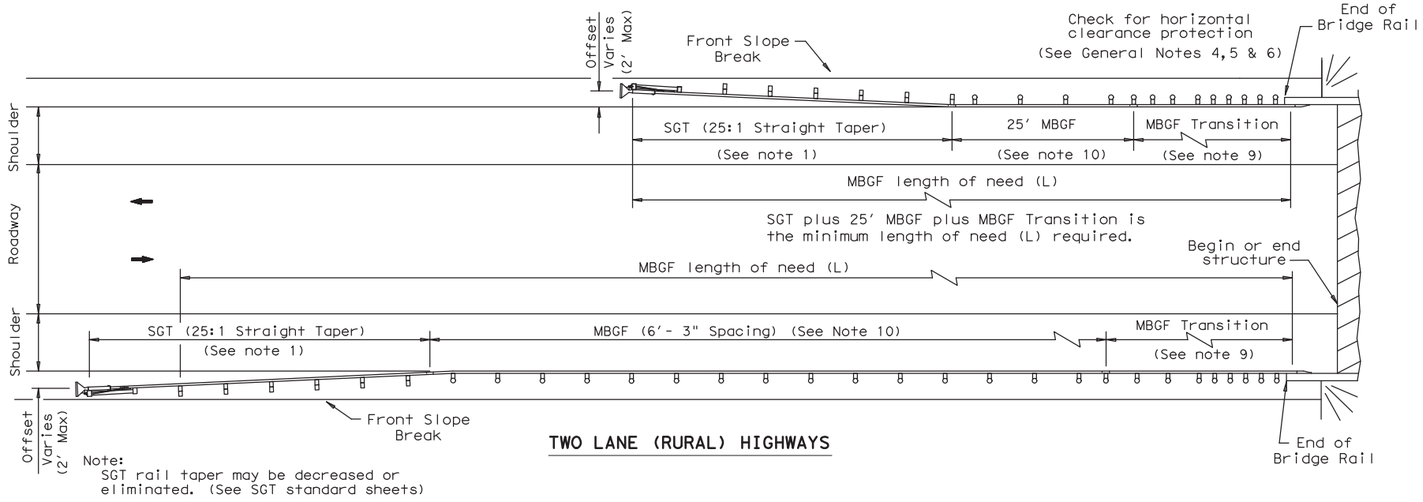
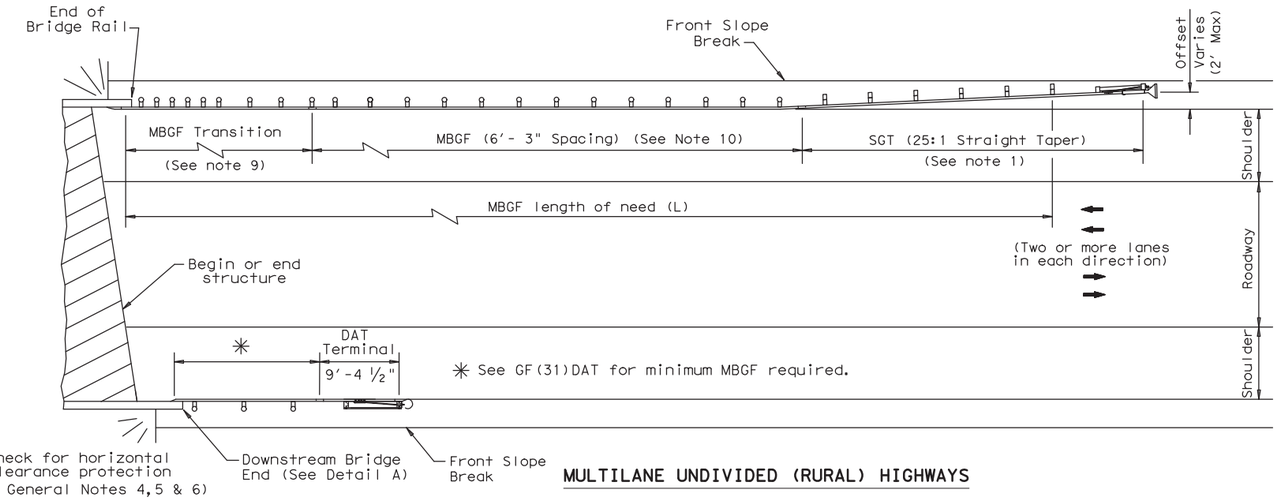
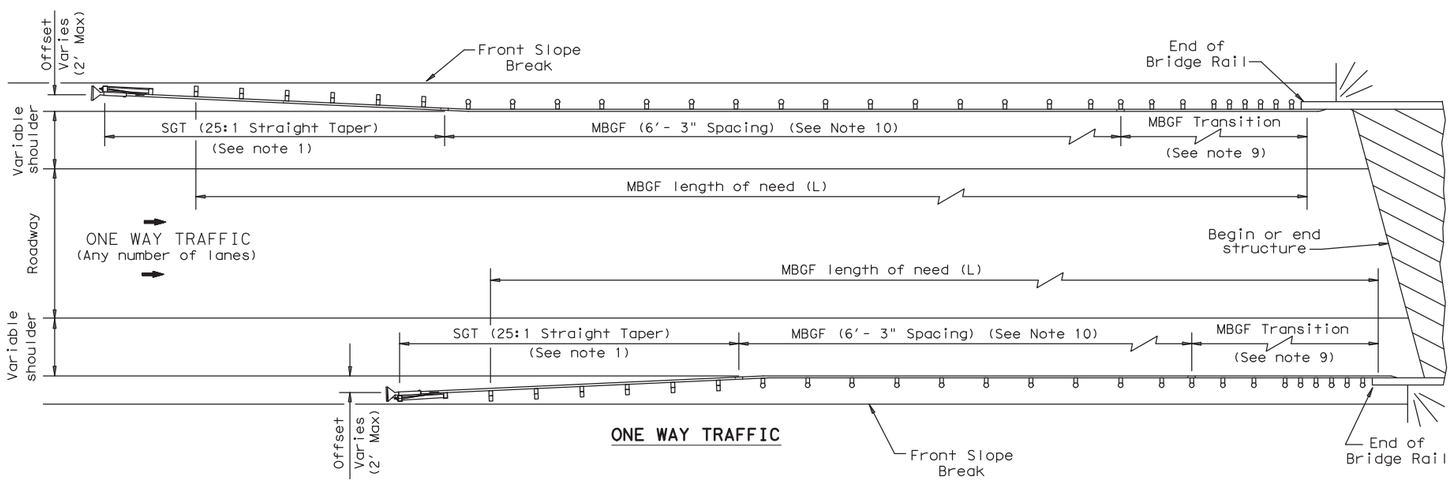



## TWO LANE (RURAL) HIGHWAYS

Note:
SGT rail taper may be decreased or eliminated. (See SGT standard sheets)



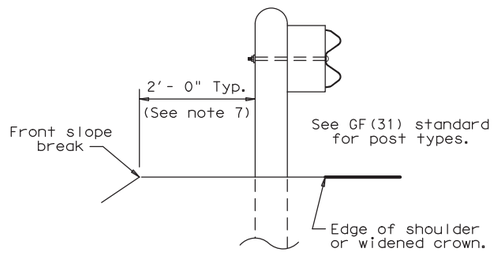

## MULTILANE UNDIVIDED (RURAL) HIGHWAYS




## ONE WAY TRAFFIC

## GENERAL NOTES

1. For more detail: See GF(31), SGT( )31, GF(31)TR, and GF(31)TL2 standard sheets.
2. Quantities of metal beam guard fence (MBGF) at individual bridge ends are as shown in the plans.
3. Use average daily traffic (ADT) for the current year to determine MBGF length of need in accordance with the Roadway Design Manual unless otherwise specified. Where significant traffic volume growth is anticipated on low volume (0-750 ADT) highways, use length determinations for the higher volume category.
4. MBGF may not be required to shield departure end of bridge unless other obstacles within the horizontal clearance limits or opposing traffic indicate a MBGF consideration.
5. Downstream anchor terminals (DAT) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
6. Direct connection of MBGF to concrete rails are only for downstream rail connections outside the horizontal clearance area of opposing traffic. (This requires a minimum of three standard line posts plus the DAT terminal, See Detail A)
7. The crown shall be widened to accommodate MBGF. Typically the "front slope" break should be 2'- 0" from the back of the MBGF post. This applies to new construction on new alignment or where existing roadway cross section is to be widened to increase roadway width. This does not apply to rehabilitation work where existing roadway crown width is to be retained (See Typical Cross Section at MBGF).
8. For restrictive bridge widths: The MBGF should be properly transitioned from the existing bridge rail to the adjoining MBGF (See MBGF Transition Standards). Metal beam guard fence at these bridge location(s) shall be flared at the rate of 25:1 or flatter, and be of the length necessary to locate the terminal end at the 2 ft."maximum" offset from the shoulder edge in the approach direction.
9. Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.
10. A minimum 25' length of MBGF will be required.




## TYPICAL CROSS SECTION AT MBGF




Note:
All rail elements shall be lapped in the direction of adjacent traffic.

## DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

# BRIDGE END DETAILS

## (METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

# BED-14

| FILE: bed14.dgn | DN: TxDOT | CK: AM | DW: BD/VP | CK: CGL |
|---|---|---|---|---|
| © TxDOT: December 2011 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS REVISED APRIL 2014 SEE (MEMO 0414) | 0535 | 04 | 031, ETC | IH 10 |
| | DIST | COUNTY | | SHEET NO. |
| | YKM | GONZALES, ETC | | 54 |

DATE: 5/19/2023
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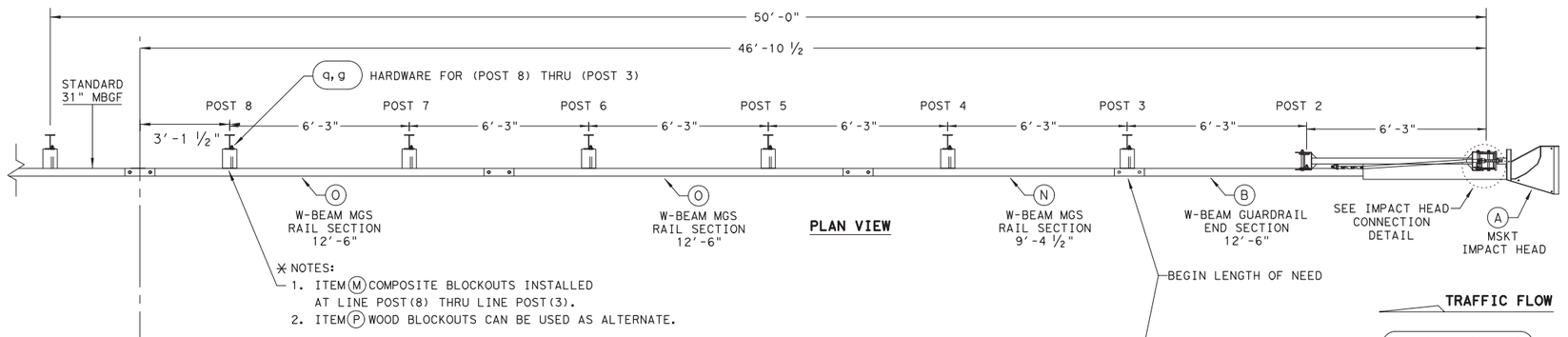



NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

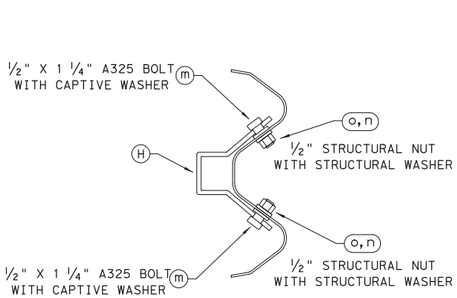
## GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE; MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION~062717).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. SYSTEM SHOWN USING STEEL WIDE FLANGE POSTS WITH COMPOSITE BLOCKOUTS.
7. A COMPOSITE MATERIAL BLOCKOUTS THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
8. IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, & REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
9. POSTS SHALL NOT BE SET IN CONCRETE.
10. SYSTEM MUST BE ATTACHED TO STANDARD 31" MBGF.
11. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
12. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
13. THE SYSTEM IS SHOWN WITH TWO 12'-6" MBGF PANELS, ONE 25'-0" MBGF PANEL IS ALSO ALLOWED IN THEIR PLACE.
14. A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POSTS 3-8 TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST. SPECIAL DRIVING CAP TO BE USED ON LOWER POSTS 1 & 2 TO PREVENT DAMAGE TO THE WELDED PLATES.

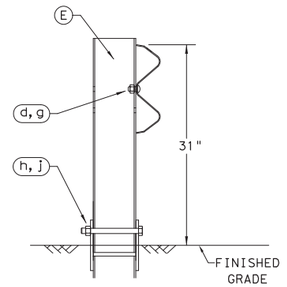
| ITEM | QTY | MAIN SYSTEM COMPONENTS | ITEM NUMBERS |
|---|---|---|---|
| A | 1 | MSKT IMPACT HEAD | MS3000 |
| B | 1 | W-BEAM GUARDRAIL END SECTION, 12 Ga. | SF1303 |
| C | 1 | POST 1 - TOP (6" X 6" X 1/8" TUBE) | MTPHP1A |
| D | 1 | POST 1 - BOTTOM (6' W6X15) | MTPHP1B |
| E | 1 | POST 2 - ASSEMBLY TOP | UHP2A |
| F | 1 | POST 2 - ASSEMBLY BOTTOM (6' W6X9) | HP2B |
| G | 1 | BEARING PLATE | E750 |
| H | 1 | CABLE ANCHOR BOX | S760 |
| J | 1 | BCT CABLE ANCHOR ASSEMBLY | E770 |
| K | 1 | GROUND STRUT | MS785 |
| L | 6 | W6x9 OR W6x8.5 STEEL POST | P621 |
| M | 6 | COMPOSITE BLOCKOUTS | CBSP-14 |
| N | 1 | W-BEAM MGS RAIL SECTION (9'-4 1/2") | G12025 |
| O | 2 | W-BEAM MGS RAIL SECTION (12'-6") | G1203A |
| P | 6 | WOOD BLOCKOUT 6" X 8" X 14" | P675 |
| Q | 1 | W-BEAM MGS RAIL SECTION (25'-0") | G1209 |
| | | **SMALL HARDWARE** | |
| a | 2 | 5/8" x 1" HEX BOLT (GRD 5) | B5160104A |
| b | 4 | 5/8" WASHER | W0516 |
| c | 2 | 5/8" HEX NUT | N0516 |
| d | 25 | 5/8" Dia. x 1 1/4" SPLICE BOLT (POST 2) | B580122 |
| e | 2 | 5/8" Dia. x 9" HEX BOLT (GRD A449) | B580904A |
| f | 3 | 5/8" WASHER | W050 |
| g | 33 | 5/8" Dia. H.G.R NUT | N050 |
| h | 1 | 3/4" Dia. x 8 1/2" HEX BOLT (GRD A449) | B340854A |
| j | 1 | 3/4" Dia. HEX NUT | N030 |
| k | 2 | 1 ANCHOR CABLE HEX NUT | N100 |
| l | 2 | 1 ANCHOR CABLE WASHER | W100 |
| m | 8 | 1/2" x 1 1/4" A325 BOLT WITH CAPTIVE WASHER | SB12A |
| n | 8 | 1/2" STRUCTURAL NUTS | N012A |
| o | 8 | 1 1/16" O.D. x 5/16" I.D. STRUCTURAL WASHERS | W012A |
| p | 1 | BEARING PLATE RETAINER TIE | CT-100ST |
| q | 6 | 5/8" x 10" H.G.R. BOLT | B581002 |
| r | 1 | OBJECT MARKER 18" X 18" | E3151 |

SEE NOTES: ✳

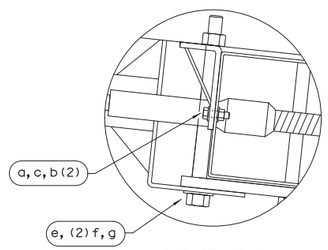
ALTERNATIVE ITEMS NOT SHOWN. ✳✳
✳ ITEM(P) 8" WOOD-BLOCKOUT
✳✳ ITEM(Q) 25'GUARD FENCE PANEL



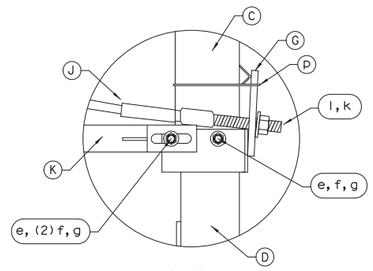

SECTION B-B
ANCHOR BRACKET



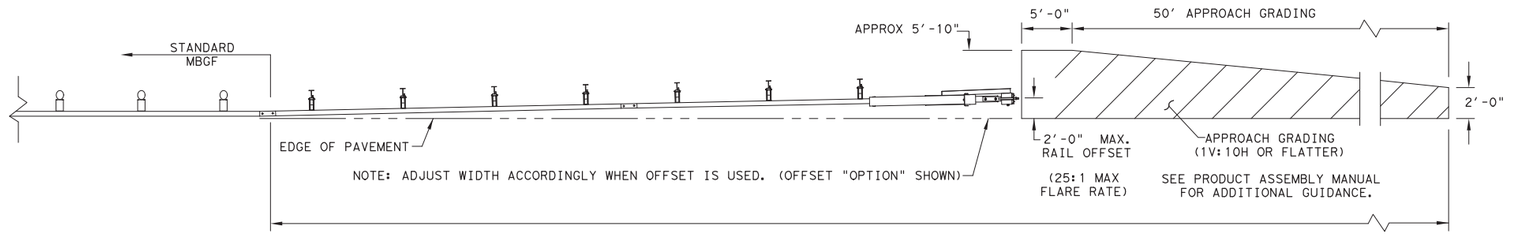

POST 2
SECTION A-A




IMPACT HEAD
CONNECTION DETAIL




POST 1
CONNECTION DETAIL




APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

NOTE: TXDOT GENERIC APPROACH GRADING LAYOUT USED FOR ALL TANGENT TYPE END TREATMENTS.

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE MSKT END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

Texas Department of Transportation

Design Division Standard

# SINGLE GUARDRAIL TERMINAL
# MSKT-MASH-TL-3
# SGT(12S)31-18

| | | | | | | |
|---|---|---|---|---|---|---|
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| © TxDOT: APRIL 2018 | CONT | SECT | JOB | HIGHWAY | | |
| REVISIONS | 0535 | 04 | 031,ETC | IH 10 | | |
| | DIST | COUNTY | | SHEET NO. | | |
| | YKM | GONZALES,ETC | | 55 | | |

DATE: 5/19/2023
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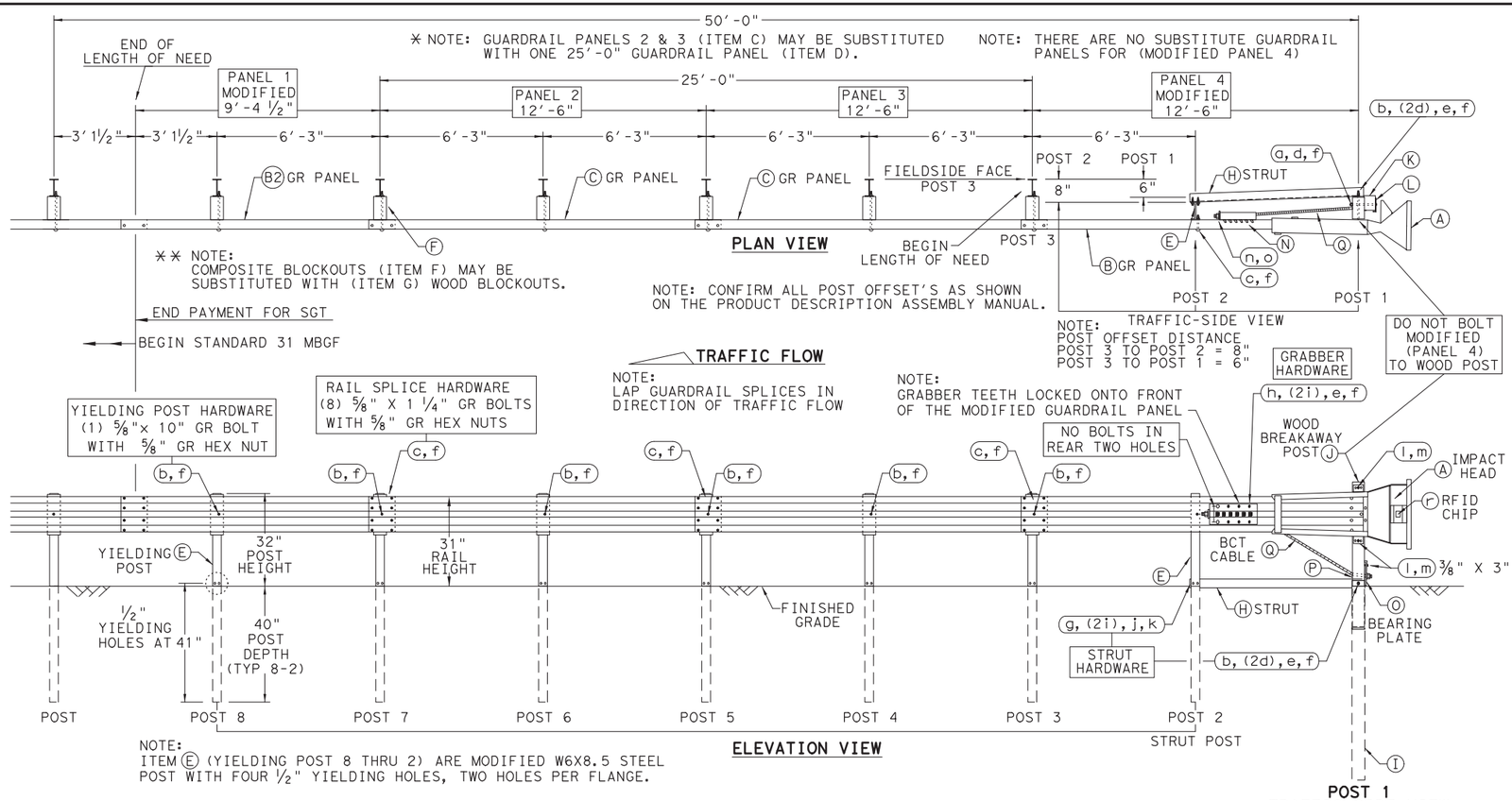
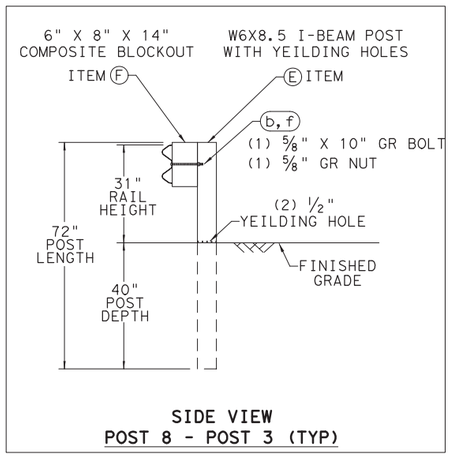



## GENERAL NOTES

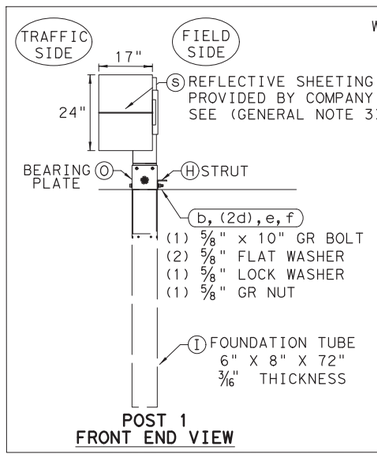
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL.
3. MANUFACTURER WILL APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" TO THE FACE PLATE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. THE OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. THE NOMINAL HEIGHT OF THE GUARDRAIL BEAM IS 31 INCHES WITH A TOLERANCE OF +/- ONE INCH.
5. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
6. (POST 2 THROUGH POST 8) ARE MODIFIED STEEL-YIELDING POSTS WITH YIELDING HOLES AT GROUND LEVEL. THERE ARE NO SUBSTITUTE POSTS.
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. IF SOLID ROCK IS ENCOUNTERED FOR ANY OF THE POSTS IN THE SYSTEM, CONTACT THE MANUFACTURER FOR SPECIFIC INSTALLATION GUIDANCE.
9. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
10. A COMPOSITE MATERIAL BLOCKOUT THAT MEETS DMS-7210 REQUIREMENTS MAY BE SUBSTITUTED FOR AN APPROVED WOOD BLOCKOUT. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
11. THE ENTIRE SYSTEM MUST BE INSTALLED IN A STRAIGHT LINE WITHOUT ANY CURVE. HOWEVER, THE SYSTEM CAN BE OFFSET BY TWO FEET AS SHOWN ON THE APPROACH GRADING DETAIL TO HELP OFF-SET THE IMPACT HEAD FROM SHOULDER OF THE ROAD.

| ITEM | QTY | MAIN SYSTEM COMPONENTS | ITEM # |
|---|---|---|---|
| A | 1 | SGET IMPACT HEAD | SIH1A |
| B | 1 | MODIFIED GUARDRAIL PANEL 12'-6" 12GA | 126SPZGP |
| B2 | 1 | MODIFIED GUARDRAIL PANEL 9'-4 1/2" 12GA | GP94 |
| C | 2 | STANDARD GUARDRAIL PANEL 12'-6" 12GA | GP126 |
| D | 1 | STANDARD GUARDRAIL PANEL 25'-0" 12GA | GP25 |
| E | 7 | MODIFIED YIELDING I-BEAM POST W6x8.5 | YP6MOD |
| F | 6 | COMPOSITE BLOCKOUT 6" X 8" X 14" | CBO8 |
| G | 6 | WOOD BLOCKOUT 6" X 8" X 14" | WBO8 |
| H | 1 | STRUT 3" X 3" X 80" x 1/4" A36 ANGLE | STR80 |
| I | 1 | FOUNDATION TUBE 6" X 8" X 72" x 3/16" | FNDT6 |
| J | 1 | WOOD BREAKAWAY POST 5 1/2" x 7 1/2" x 50" | WBRK50 |
| K | 1 | WOOD STRIKE BLOCK | WSBLK14 |
| L | 1 | STRIKE PLATE 1/4" A36 BENT PLATE | SPLT8 |
| M | 1 | REINFORCEMENT PLATE 12 GA. GR55 | REPLT17 |
| N | 1 | GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2" | GGR17 |
| O | 1 | BEARING PLATE 8" X 8 5/8" X 5/8" A36 | BPLT8 |
| P | 1 | PIPE SLEEVE 4 1/4" X 2 3/8" O.D. (2 1/8" I.D.) | PSLV4 |
| Q | 1 | BCT CABLE 3/4" X 81" LENGTH | CBL81 |
| **SMALL HARDWARE** | | | |
| a | 1 | 5/8" X 12" GUARDRAIL BOLT 307A HDG | 12GRBLT |
| b | 7 | 5/8" X 10" GUARDRAIL BOLT 307A HDG | 10GRBLT |
| c | 33 | 5/8" X 1 1/4" GR SPLICE BOLTS 307A HDG | 1GRBLT |
| d | 3 | 5/8" FLAT WASHER F436 A325 HDG | 58FW436 |
| e | 1 | 5/8" LOCK WASHER HDG | 58LW |
| f | 39 | 5/8" GUARDRAIL HEX NUT HDG | 58HN563 |
| g | 2 | 1/2" X 2" STRUT BOLT A325 HDG | 2BLT |
| h | 6 | 1/2" X 1 1/4" PLATE BOLT A325 HDG | 125BLT |
| i | 16 | 1/2" FLAT WASHER F436 A325 HDG | 12FWF436 |
| j | 8 | 1/2" LOCK WASHER HDG | 12LW |
| k | 8 | 1/2" HEX NUT A563 HDG | 12HN563 |
| l | 4 | 3/8" X 3" HEX LAG SCREW GR5 HDG | 38LS |
| m | 4 | 3/8" FLAT WASHER F436 A325 HDG | 38FW844 |
| n | 2 | 1" FLAT WASHER F436 A325 HDG | 1FWF436 |
| o | 2 | 1" HEX NUT A563DH HDG | 1HN563 |
| p | 1 | 18" TO 24" LONG ZIP TIE RATED 175-200LB | ZPT18 |
| q | 1 | 1 1/2" X 4" SCH-40 PVC PIPE | PSPCR4 |
| r | 1 | RFID CHIP RATED MIL-STD-810F | RFID810F |
| s | 1 | IMPACT HEAD REFLECTIVE SHEETING | RS30M |

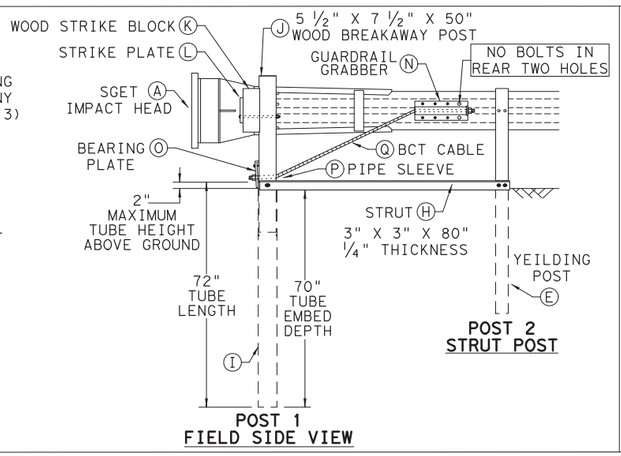
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



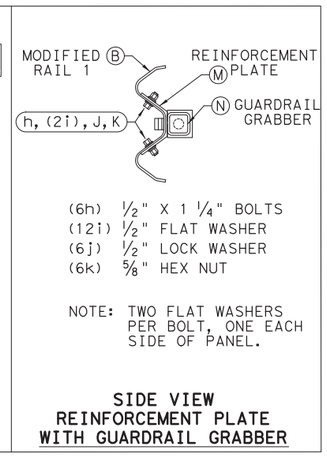

SIDE VIEW
POST 8 - POST 3 (TYP)



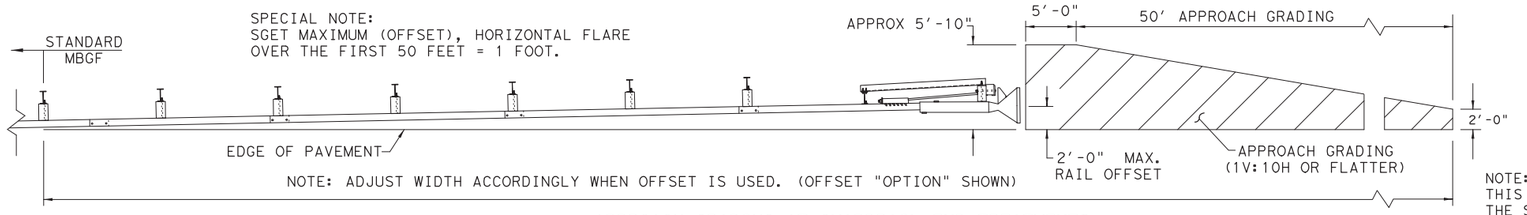

POST 1
FRONT END VIEW




POST 1
FIELD SIDE VIEW




SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER




APPROACH GRADING AT GUARDRAIL END TREATMENTS

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

Texas Department of Transportation
Design Division Standard

# SPIG INDUSTRY, LLC
# SINGLE GUARDRAIL TERMINAL
# SGET - TL-3 - MASH
# SGT(15)31-20

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| | DIST | COUNTY | | SHEET NO. |
| | YKM | GONZALES, ETC | | 56 |

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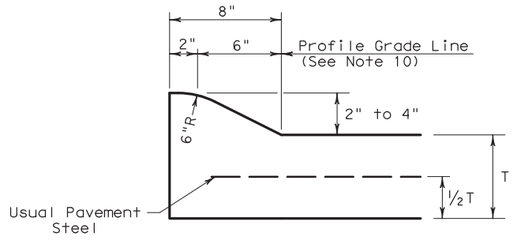


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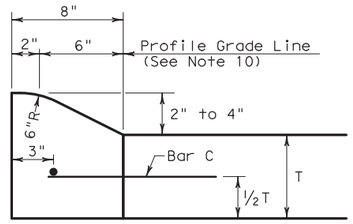
2" - 4" HEIGHT

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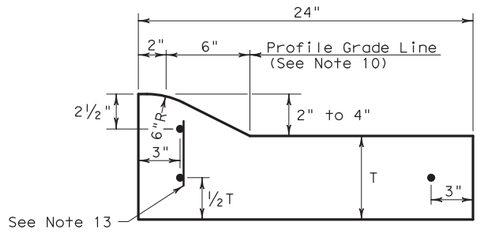
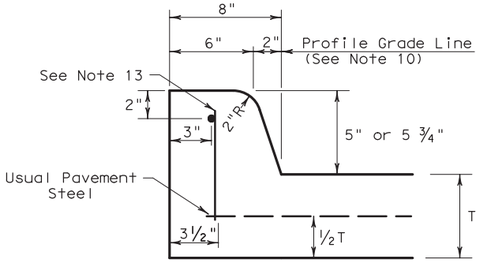



TYPE I CURB AND GUTTER
2" - 4" HEIGHT

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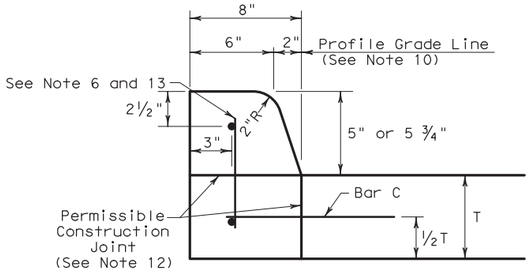


TYPE II CURB
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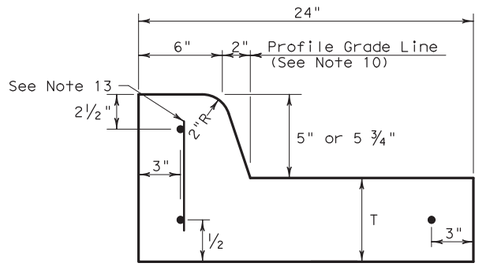
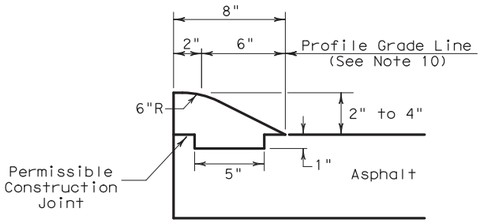



TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT




TYPE III CURB (KEYED)
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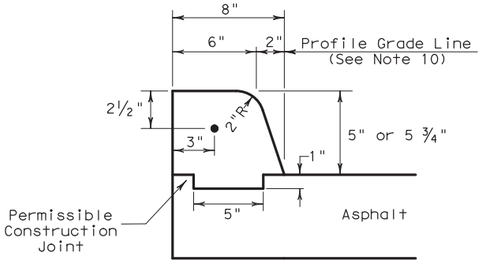


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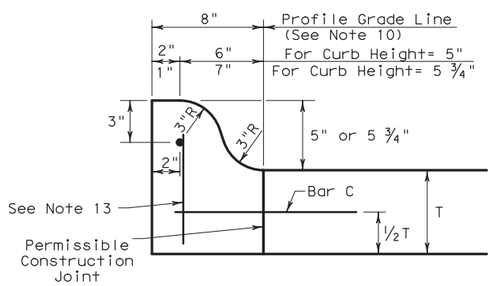
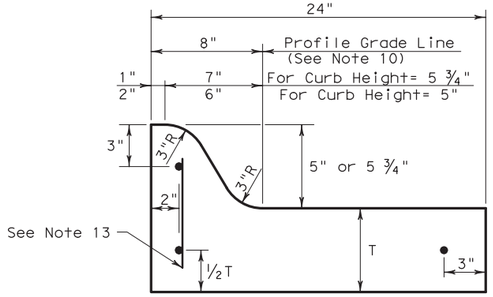
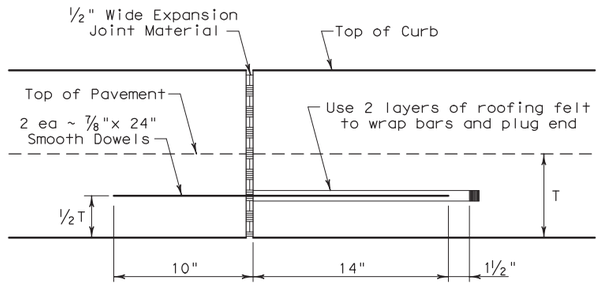



TYPE IIa CURB
5" - 5 ¾" HEIGHT

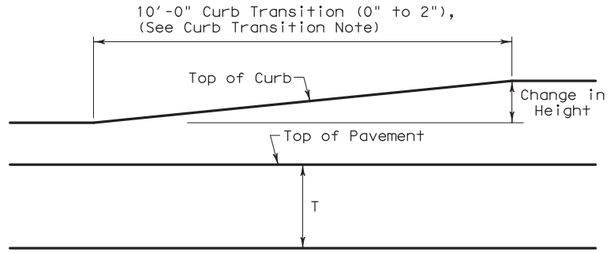



TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT




EXPANSION JOINT DETAIL

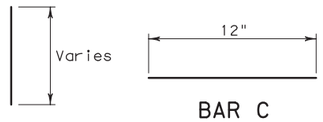
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.




CURB TRANSITION
Note: To be paid for as Highest Curb

## GENERAL NOTES

1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
2. Concrete shall be Class A.
3. When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of fiber reinforced concrete in lieu of reinforcing steel is acceptable. Use fibers meeting the requirements of DMS 4550, "Fibers for Concrete," and dose fibers in accordance with Material Producers List (MPL) "Fibers for Class A and B Concrete Applications."
4. Round exposed sharp edges with a rounding tool, to a minimum radius of ¼ inch.
5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
6. Where concrete curb is to be placed on existing concrete pavement, Bar B may be drilled and grouted in place, or may be inserted into fresh concrete.
7. Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
8. Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C~C.
9. Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
10. Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
12. When horizontal permissible construction joints are used, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans. Reinforcing steel for curb section shall then conform to that required for concrete curb.
13. Bar B placement as needed (typically at four ft. C-C) to support curb reinforcing steel during concrete placement.




BAR B

BAR C

Texas Department of Transportation

Design Division Standard

# CONCRETE CURB AND CURB AND GUTTER

# CCCG-22

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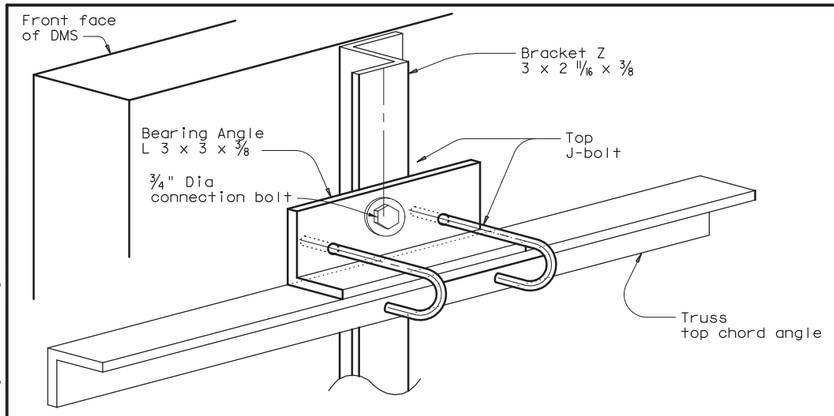
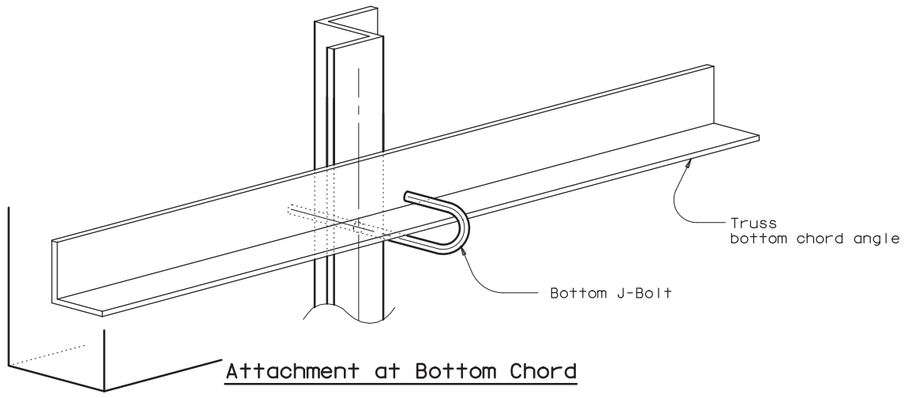
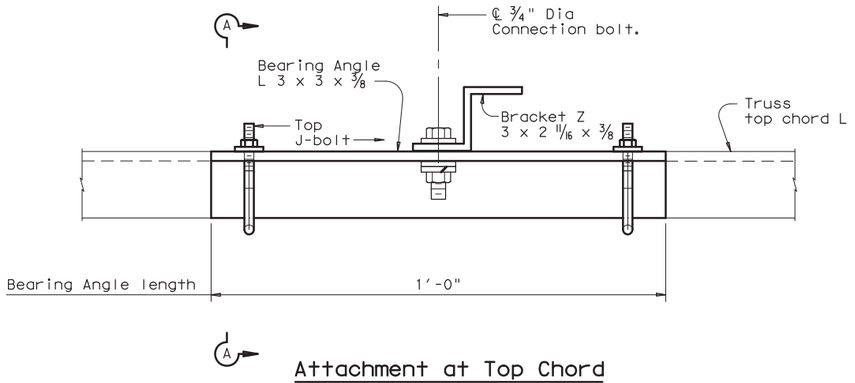



Attachment at Top Chord
(Showing Chord Angle 3")




Attachment at Bottom Chord
ISOMETRIC VIEW

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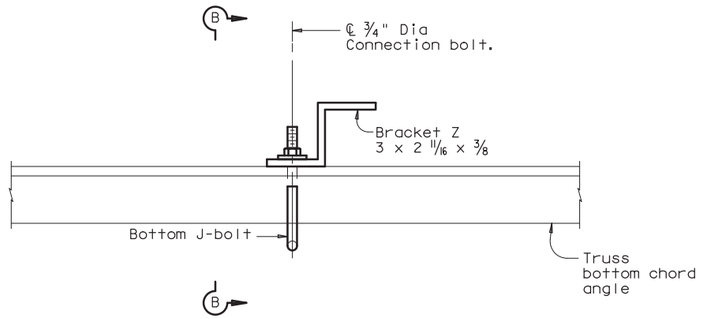


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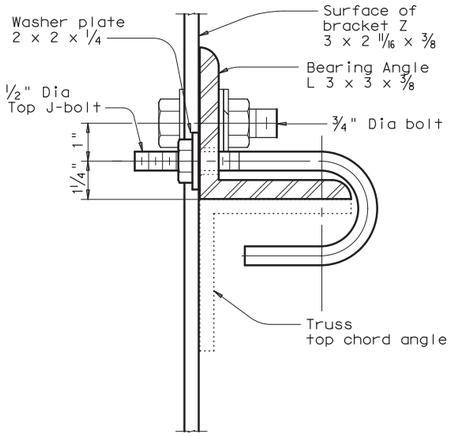
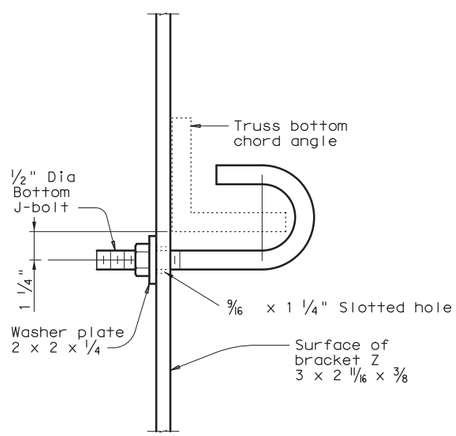
PLAN VIEW



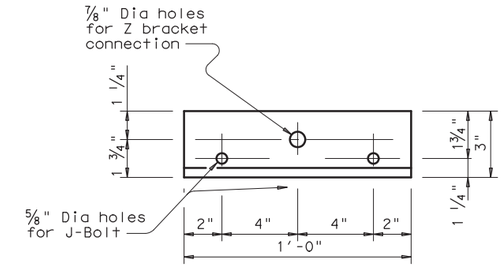

SECTION A-A




SECTION B-B

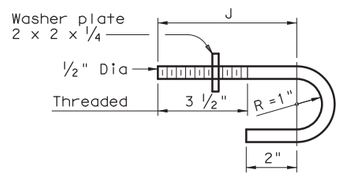
## GENERAL NOTES:

1. Application of the mounting detailed on Sheet 1 of 3 is limited to a dynamic message sign (DMS) attachment that is not in conflict with the truss connection bolts at the point(s) of attachment. The overhead sign structure must have adequate capacity to support the DMS. A determination of adequacy shall be made prior to attaching the DMS supports to the truss.
2. Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Revisions thereto. The Design Sustained Wind Velocity is 100 mph with a gust factor of 1.3. Connections are designed for a DMS weight of 3600 lbs and a design Effective Projected Area (EPA) of 441 sq ft, with the EPA based on a DMS nominal width of 30.5 feet and nominal depth of 8.25 feet plus four top and bottom 1'-8" square flashing beacons. The EPA includes drag coefficients of 1.7 (applied to sign area) and 1.2 (applied to flashing beacon area). A horizontal eccentricity of 1.0 ft from the face of the truss to the center of gravity of the DMS for attachment of DMS is assumed. An even number of Z brackets, spaced at 5 ft max., is assumed to transfer forces through the connection.
3. All structural steel shall conform to ASTM A36, A572 Gr 50 or A588. Connection bolts shall conform to ASTM A325 or A449. Each connection bolt shall be provided with 1 heavy hex nut, 2 flat washers, and 1 lock washer. J bolts and washer plate both shall be Type 304 stainless steel, with bolt minimum yield strength of 50 ksi and an elongation of 16 percent in 2 inches. All parts except stainless steel shall be galvanized.
4. Contractor shall verify applicable field dimensions before fabrication.




BEARING ANGLE 3 x 3 x 3/8

| Chord Angle | J |
|---|---|
| 3", 3 1/2", 4" | 5 1/2" |
| 5" and 6" | 7 1/2" |




TOP & BOTTOM J-BOLT

SHEET 1 OF 3

Texas Department of Transportation
Traffic Operations Division Standard

# DMS-TO-TRUSS MOUNTING AT OVERHEAD SIGN SUPPORTS (NON BUILD-UP)

# DMS(TM-1)-16

| FILE: dms-tm-16.dgn | DN: TxDOT | CK: | DW: TxDOT | CK: |
|---|---|---|---|---|
| ©TxDOT June 2016 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031,ETC | IH 10 |
| | DIST | COUNTY | | SHEET NO. |
| | YKM | GONZALES,ETC | | 58 |

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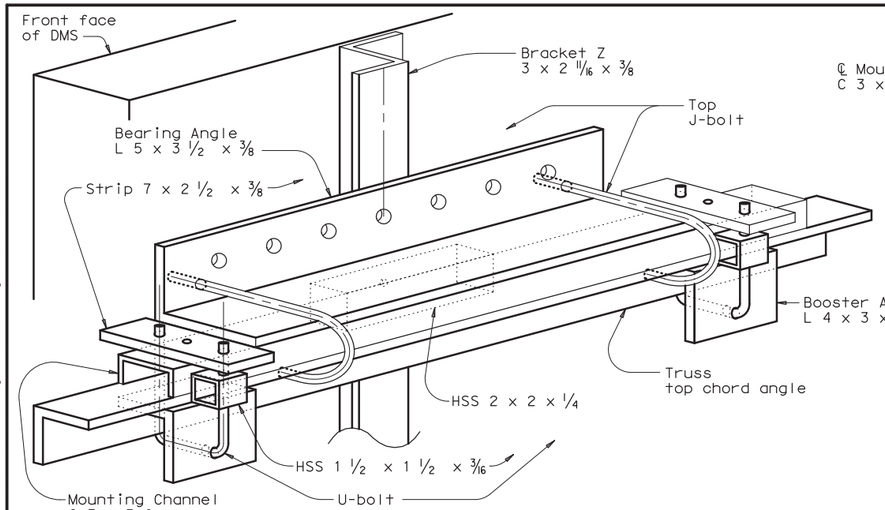
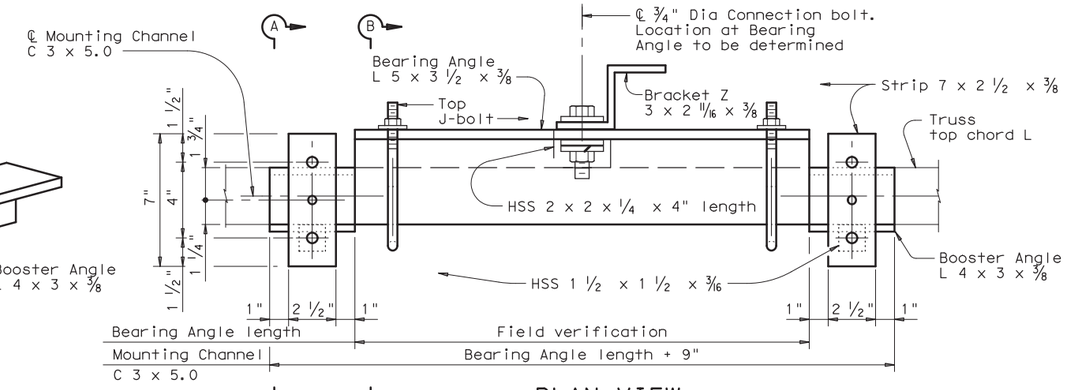
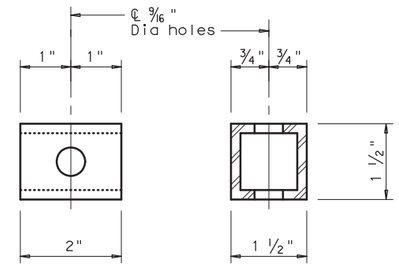



## Built-up Attachment at Top Chord

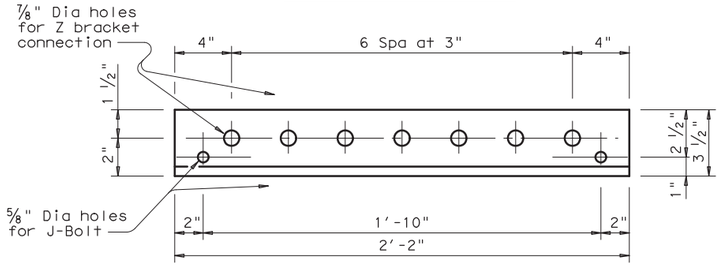
(Showing Chord Angle 3")



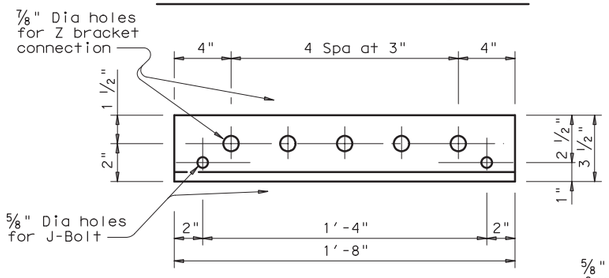




① HSS 1 1/2 x 1 1/2 x 3/16

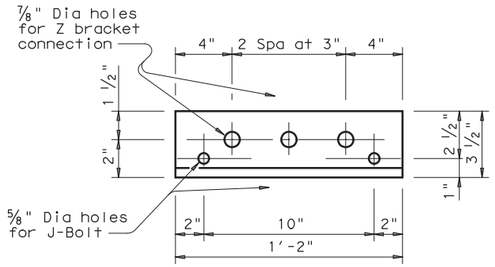
## ISOMETRIC VIEW




## BEARING ANGLE 5 x 3 1/2 x 3/8



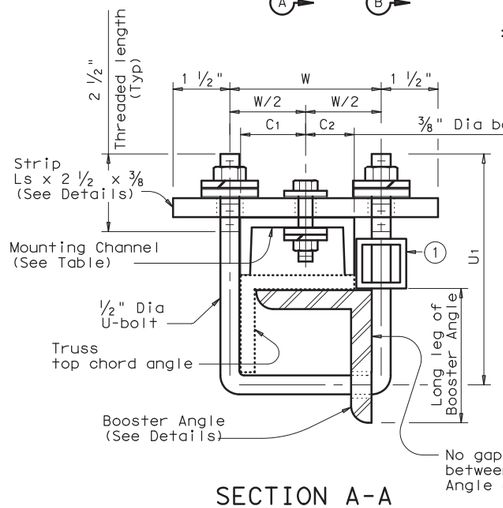

## BEARING ANGLE 5 x 3 1/2 x 3/8




## BEARING ANGLE 5 x 3 1/2 x 3/8

## PLAN VIEW (AT TOP CHORD)

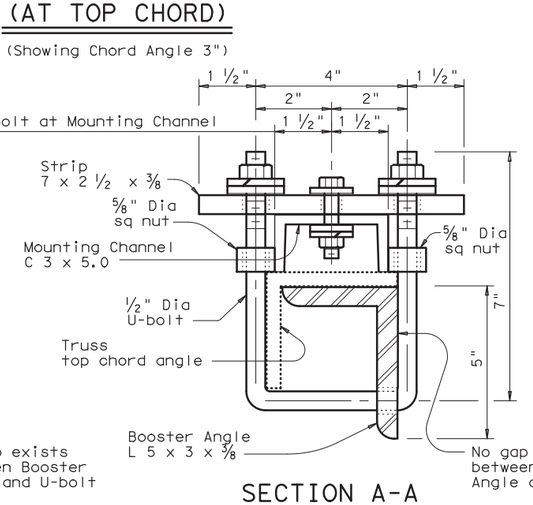
(Showing Chord Angle 3")




## SECTION A-A

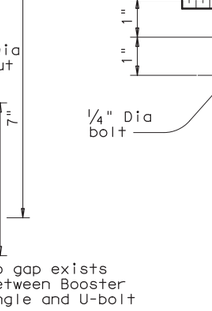
(Showing Chord Angle 3",4",5" & 6")

| Chord Angle | U1 | W | C1 | C2 | Mounting Channel |
|---|---|---|---|---|---|
| 3" | 7" | 4" | 1 3/4" | 1 1/4" | C3 x 5.0 |
| 4" | 8" | 5" | 2 1/4" | 1 3/4" | C4 x 7.25 |
| 5" | 9" | 6" | 2 3/4" | 2 1/4" | C5 x 9.0 |
| 6" | 10 1/2" | 7" | 3 1/4" | 2 3/4" | C6 x 13 |

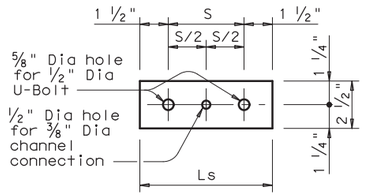



## SECTION A-A

(Showing Chord Angle 3 1/2")

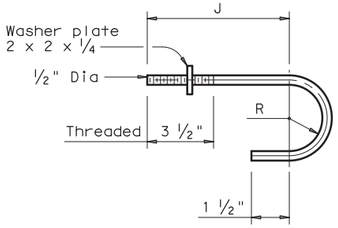



## SECTION B-B



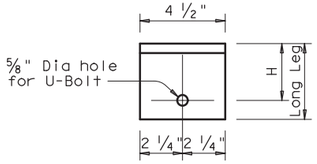

## Strip Ls x 2 1/2 x 3/8

| Chord Angle | S | Ls |
|---|---|---|
| 3" | 4" | 7" |
| 3 1/2" | 4" | 7" |
| 4" | 5" | 8" |
| 5" | 6" | 9" |
| 6" | 7" | 10" |




## TOP J-BOLT

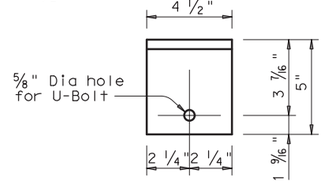
| Chord Angle | J | R |
|---|---|---|
| 3 & 3 1/2" | 7" | 1 3/4" |
| 4 & 5" | 8" | 2" |
| 6" | 9" | 2 1/4" |




## BOOSTER ANGLE

(For Chord Angle 3",4",5" and 6")

| Chord Angle | Booster Angle | H |
|---|---|---|
| 3" | 4 x 3 x 3/8 | 3" |
| 4" | 5 x 3 1/2 x 3/8 | 3 13/16" |
| 5" | 6 x 4 x 3/8 | 4 13/16" |
| 6" | 7 x 4 x 3/8 | 5 5/8" |




## BOOSTER ANGLE 5 x 3 x 3/8

(For Chord Angle 3 1/2")

SHEET 2 OF 3

Texas Department of Transportation

Traffic Operations Division Standard

# DMS-TO-TRUSS MOUNTING AT OVERHEAD SIGN SUPPORTS (WITH BUILD-UP)

# DMS(TM-2)-16

| FILE: dms-tm-16.dgn | DN: TxDOT | CK: | DW: TxDOT | CK: |
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| ©TxDOT JUNE 2016 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031,ETC | IH 10 |
| | DIST | COUNTY | | SHEET NO. |
| | YKM | GONZALES,ETC | | 59 |

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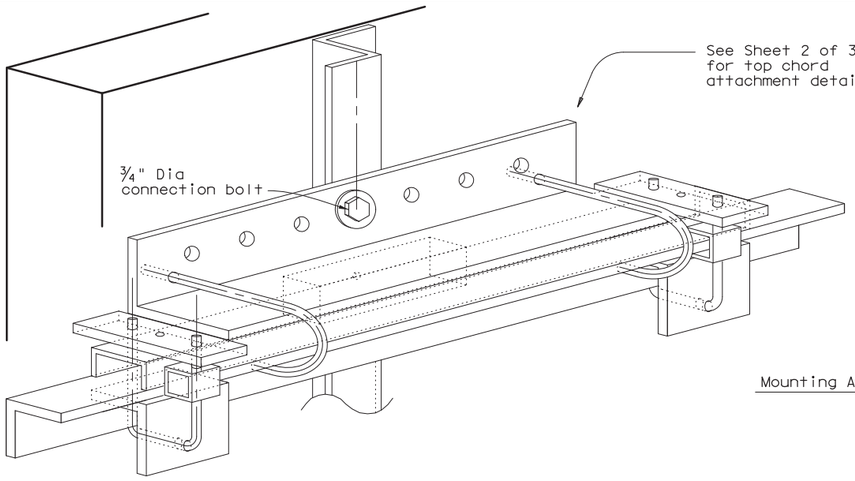
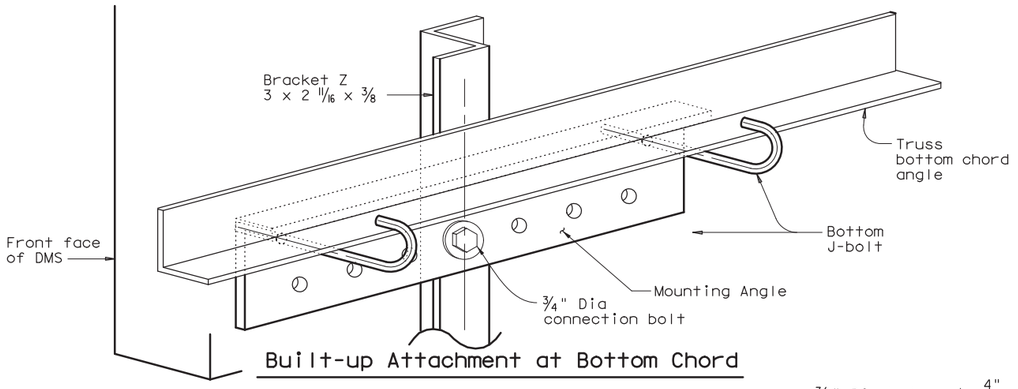
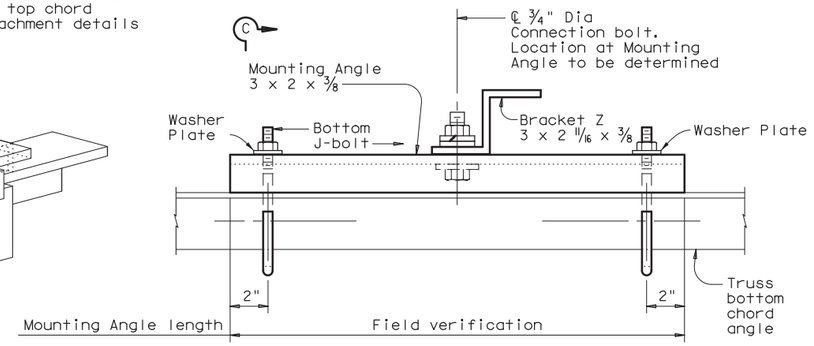



Built-up Attachment at Top Chord




Built-up Attachment at Bottom Chord

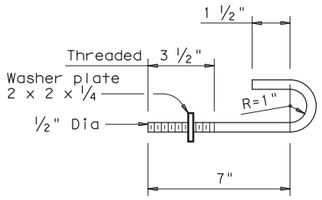
ISOMETRIC VIEW



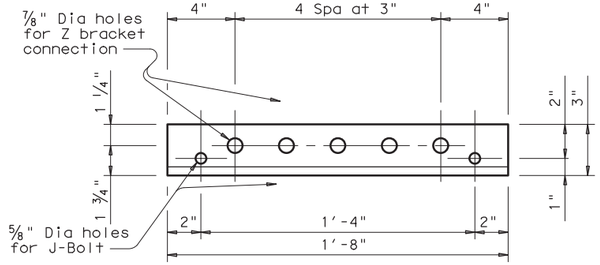




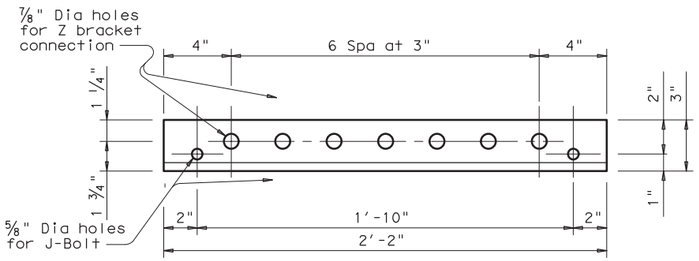
PLAN VIEW
(AT BOTTOM CHORD)



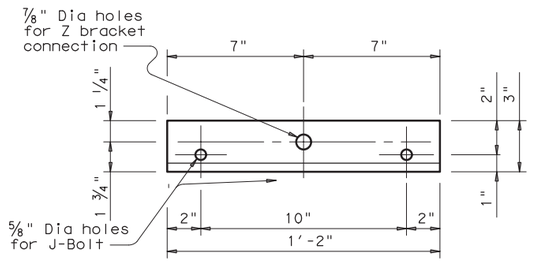

BOTTOM J-BOLT




MOUNTING ANGLE 3 x 2 x ⅜




MOUNTING ANGLE 3 x 2 x ⅜




MOUNTING ANGLE 3 x 2 x ⅜

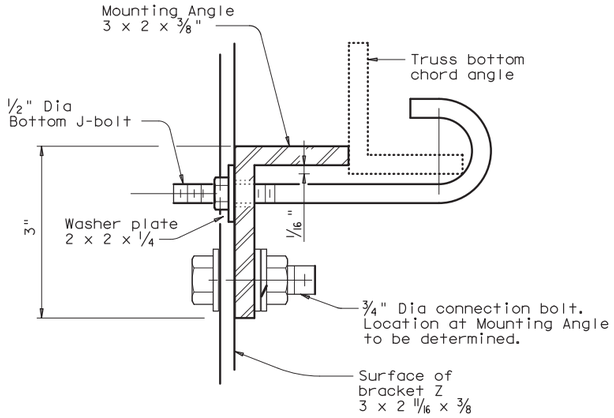
## GENERAL NOTES:

1. Application of the built-up detailed on Sheet 2 and 3 of 3 is limited to the dynamic message sign (DMS) attachment which is in conflict with the truss connection bolts at the point(s) of attachment. The overhead sign structure must have adequate capacity to support the DMS. A determination of adequacy shall be made prior to attaching the DMS supports to the truss.

2. Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Revisions thereto. The Design Sustained Wind Velocity is 100 mph with a gust factor of 1.3. Connections are designed for a DMS weight of 3600 lbs and a design Effective Projected Area (EPA) of 441 sq ft, with the EPA based on a DMS nominal width of 30.5 feet and nominal depth of 8.25 feet plus four top and bottom 1'-8" square flashing beacons. The EPA includes drag coefficients of 1.7 (applied to sign area) and 1.2 (applied to flashing beacon area). A horizontal eccentricity of 1.0 ft from the face of the truss to the center of gravity of the DMS for attachment of DMS is assumed. An even number of Z brackets, spaced at 5 ft max., is assumed to transfer forces through the connection.

3. All structural steel shall conform to ASTM A36, A572 Gr 50 or A588. Connection bolts shall conform to ASTM A325 or A449. Each connection bolt shall be provided with 1 heavy hex nut, 2 flat washers, and 1 lock washer. U bolts shall conform to ASTM A307 with 2 hex nuts, 2 flat washers and 2 lock washers. Hollow structural section (HSS) shall conform to ASTM A500, A501, or A847. J bolts and washer plate both shall be Type 304 stainless steel, with bolt minimum yield strength of 50 ksi and an elongation of 16 percent in 2 inches. All parts, except stainless steel shall be galvanized.

4. Contractor shall verify applicable field dimensions before fabrication. Various lengths of bearing and mounting angle are provided for suitable mounting. Contractor shall determine the proper bearing and mounting angle length, and the connection along the length at Z bracket to accommodate J-bolt hook. Contractor may substitute HSS for the mounting channel as long as the HSS has equal or greater thickness at the mounting channel. Limit HSS height to achieved mounting clearance.




SECTION C-C

SHEET 3 OF 3

*Traffic Operations Division Standard*

# DMS-TO-TRUSS MOUNTING AT OVERHEAD SIGN SUPPORTS (WITH BUILD-UP)

## DMS(TM-3)-16

| | | | | | |
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| ©TxDOT JUNE 2016 | CONT | SECT | JOB | | |
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| | DIST | COUNTY | | | |
| | YKM | GONZALES,ETC | | | 60 |

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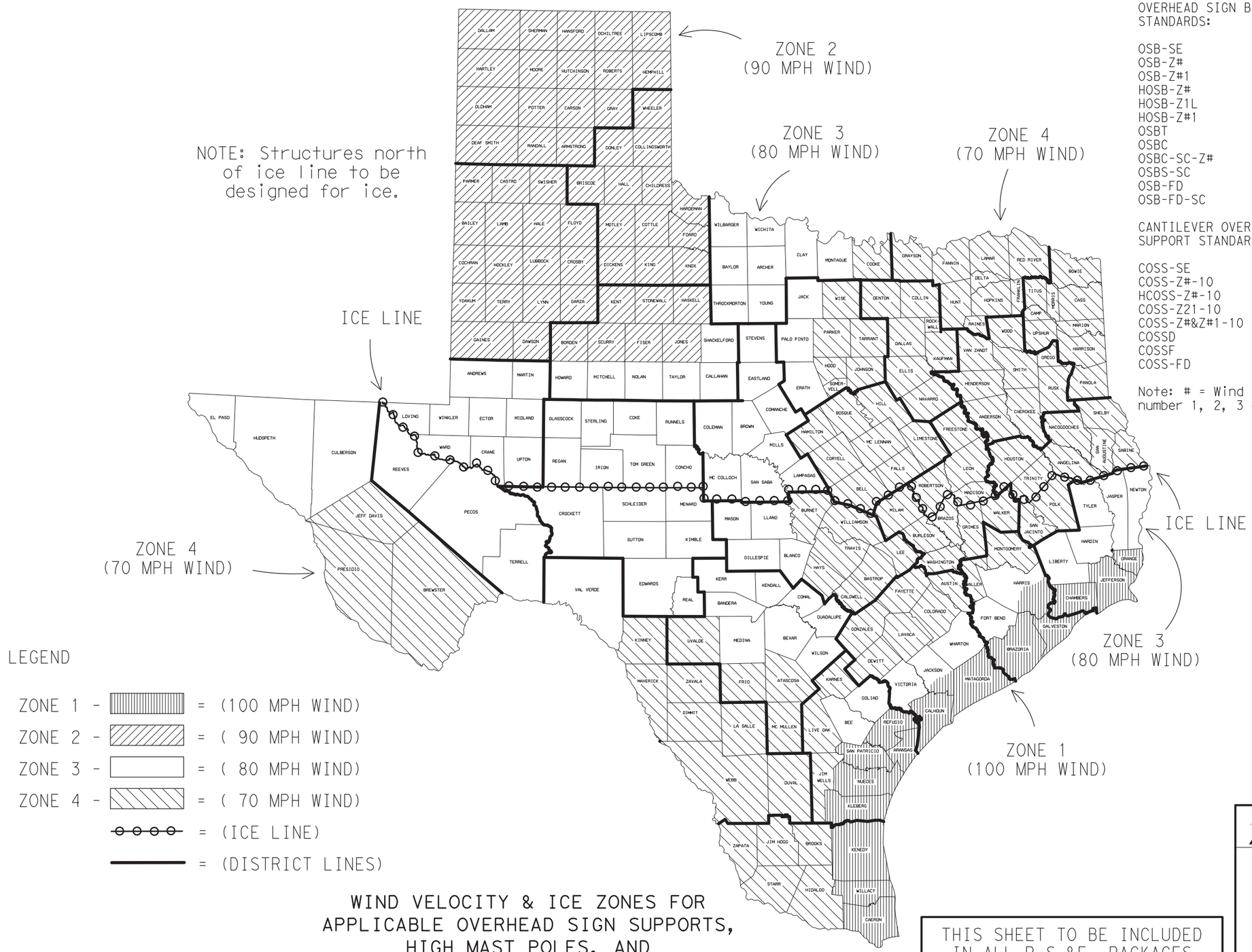


## APPLICABLE STANDARDS SHEETS

OVERHEAD SIGN BRIDGE STANDARDS:

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

CANTILEVER OVERHEAD SIGN SUPPORT STANDARDS:

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

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

HIGH MAST ILLUMINATION POLE STANDARDS:

HMIP-98
HMIF-98

WALKWAYS AND BRACKETS STANDARDS:

SWW
SB(SWL-1)

TRAFFIC SIGNAL POLE STANDARDS:

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

LEGEND

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

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

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

# WIND VELOCITY AND ICE ZONES

## WV & IZ-14

| FILE: windice.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT April 1996 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031,ETC | IH 10 |
| 8-14-Added list of applicable standards, restricting use to structures designed for Fastest Mile wind speeds. | DIST | COUNTY | | SHEET NO. |
| | YKM | GONZALES,ETC | | 61 |

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## GENERAL NOTES FOR ALL ELECTRICAL WORK

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

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

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

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

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

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

## CONDUIT

A. MATERIALS

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

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

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

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

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

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

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

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

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

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

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

B. CONSTRUCTION METHODS

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

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

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

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

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

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

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

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings 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

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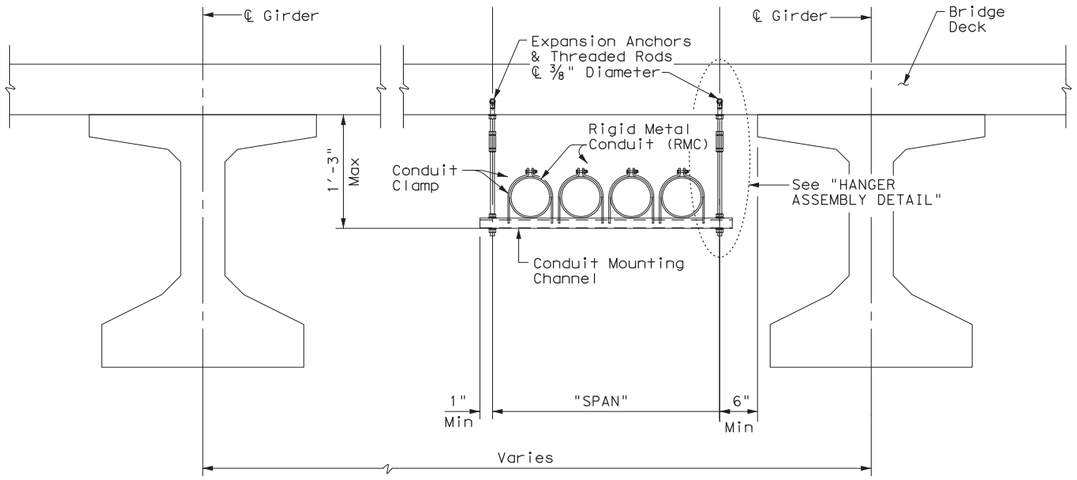
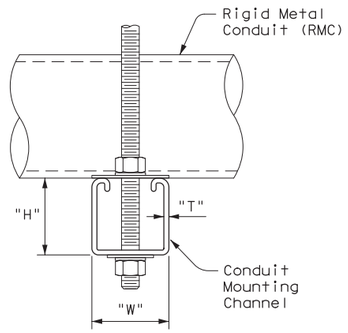
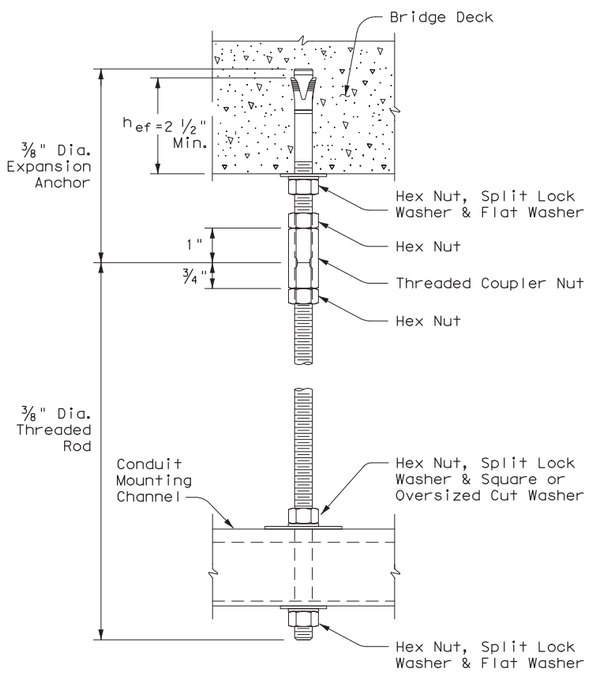



CONDUIT HANGING DETAIL

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

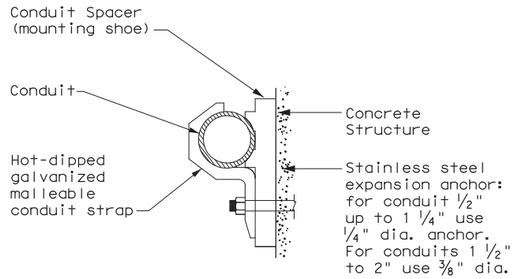
Channels with round or short slotted hole patterns are allowed, if the load carrying capacity is not reduced by more than 15%.

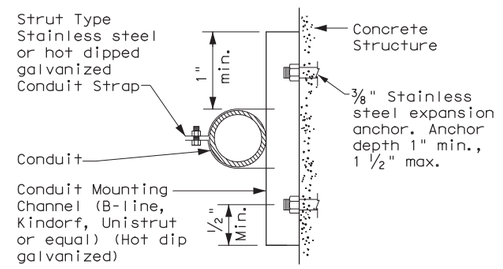



HANGER ASSEMBLY DETAIL

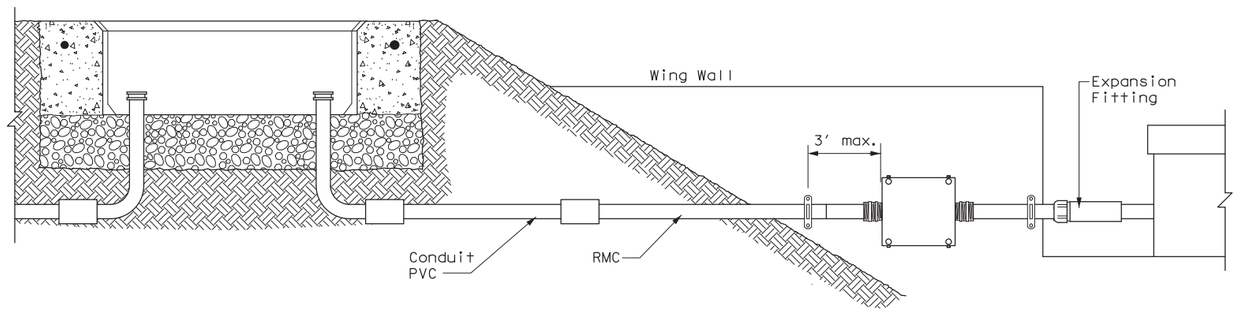
ELECTRIC CONDUIT TO BRIDGE DECK ATTACHMENT




CONDUIT MOUNTING OPTIONS

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




TYPICAL CONDUIT ENTRY TO BRIDGE STRUCTURE DETAIL

## EXPANSION ANCHOR NOTES FOR BRIDGE DECK ATTACHMENT

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

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

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

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

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

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

Texas Department of Transportation

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# ELECTRICAL DETAILS
# CONDUIT SUPPORTS

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## ELECTRICAL CONDUCTORS

### A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.
2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.
3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.
4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

### B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.
2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.
3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.
4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.
5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.
6. Support conductors in illumination poles with a J-hook at the top of the pole.
7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.
8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.
9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.
10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.
11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.
12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

### C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.
2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.
3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.
4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.
5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

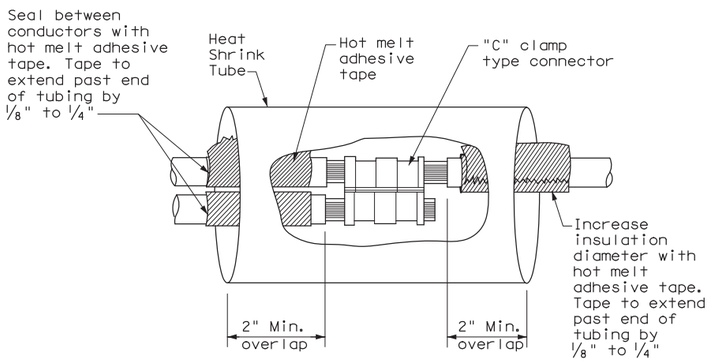
## GROUND RODS & GROUNDING ELECTRODES

### A. MATERIAL INFORMATION

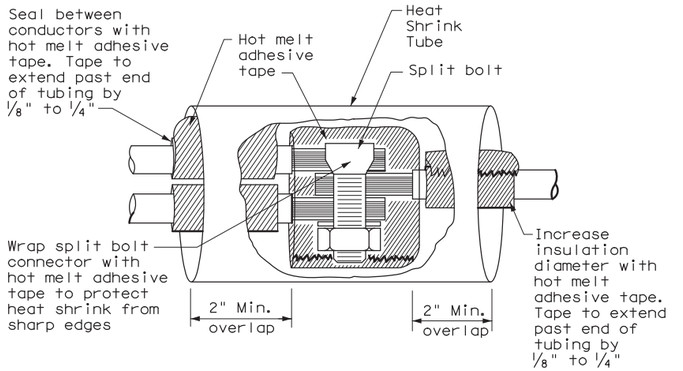
1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in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

### B. CONSTRUCTION METHODS

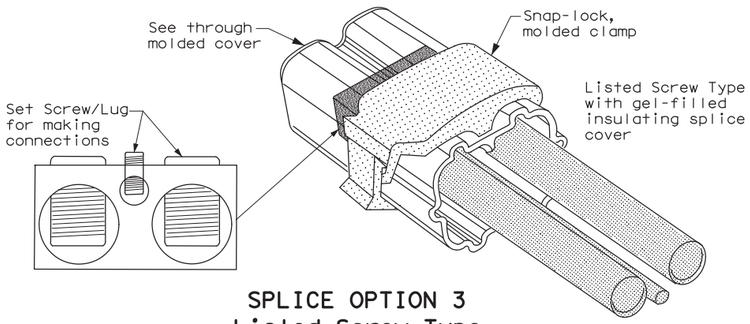
1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.
2. Do not place ground rods in the same drilled hole as a timber pole.
3. Install ground rods so the imprinted part number is at the upper end of the rod.
4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.
6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.




SPLICE OPTION 1
Compression Type




SPLICE OPTION 2
Split Bolt Type




SPLICE OPTION 3
Listed Screw Type

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# ELECTRICAL DETAILS CONDUCTORS

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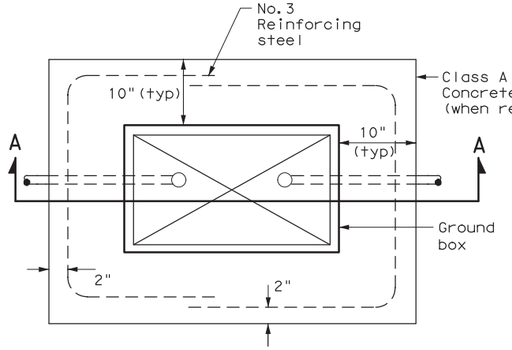
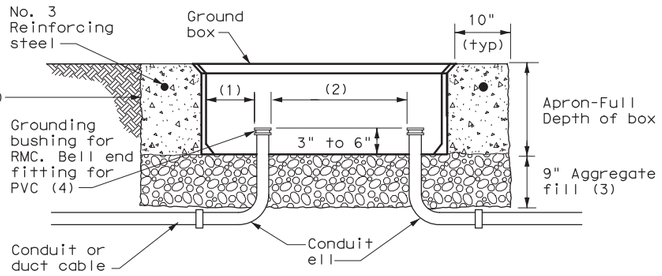



PLAN VIEW




SECTION A - A

## APRON FOR GROUND BOX

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

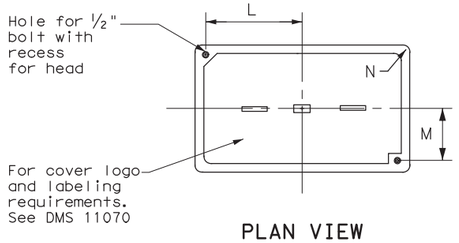
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

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

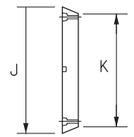
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

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

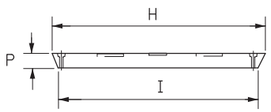
| GROUND BOX COVER DIMENSIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TYPE | DIMENSIONS (INCHES) | | | | | | | |
| | H | I | J | K | L | M | N | P |
| A, B & E | 23 1/4 | 23 | 13 3/4 | 13 1/2 | 9 7/8 | 5 1/8 | 1 3/8 | 2 |
| C & D | 30 1/2 | 30 1/4 | 17 1/2 | 17 1/4 | 13 1/4 | 6 3/4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

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## ELECTRICAL SERVICES NOTES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## SERVICE ASSEMBLY ENCLOSURE

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

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

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

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

## MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

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

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

## PHOTOELECTRIC CONTROL

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

## * ELECTRICAL SERVICE DATA

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

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

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

## EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

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

Schematic Type

Service Voltage V / V

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

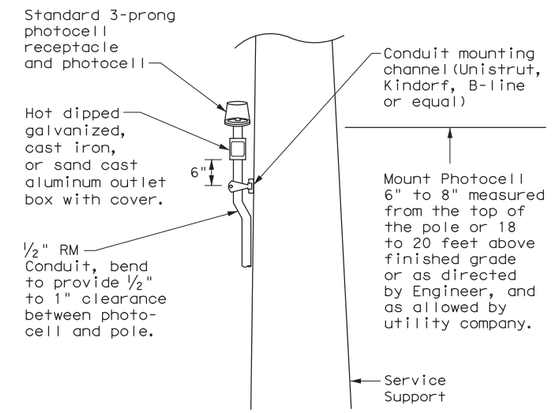
(SS)= Safety Switch Ahead of Meter-Check with Utility
(NS)= No safety Switch Ahead of Meter-Check with Utility

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

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

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

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




## TOP MOUNTED PHOTOCELL

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

Texas Department of Transportation

Traffic Operations Division Standard

# ELECTRICAL DETAILS SERVICE NOTES & DATA

## ED(5)-14

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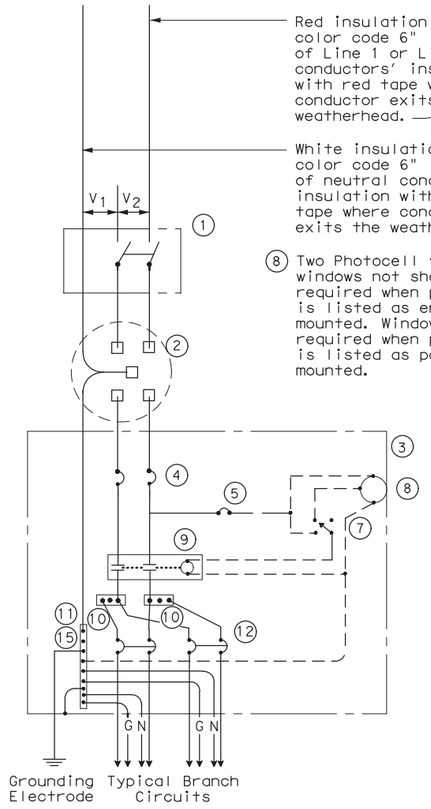
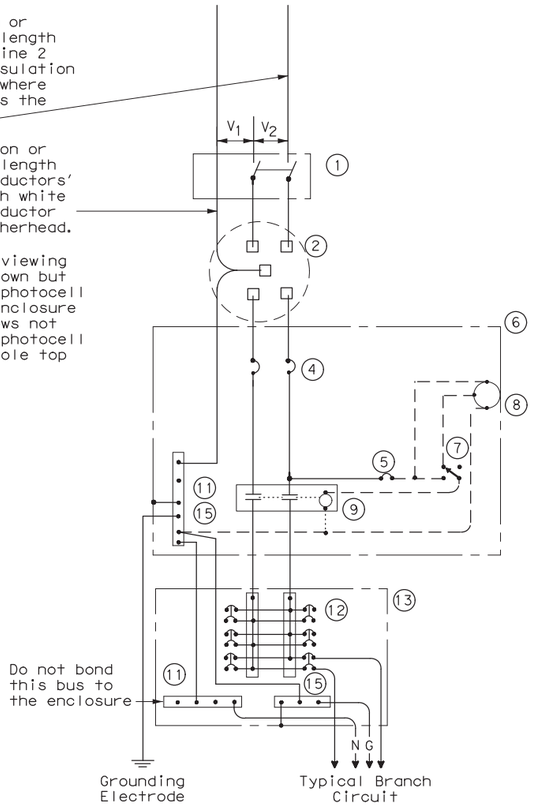
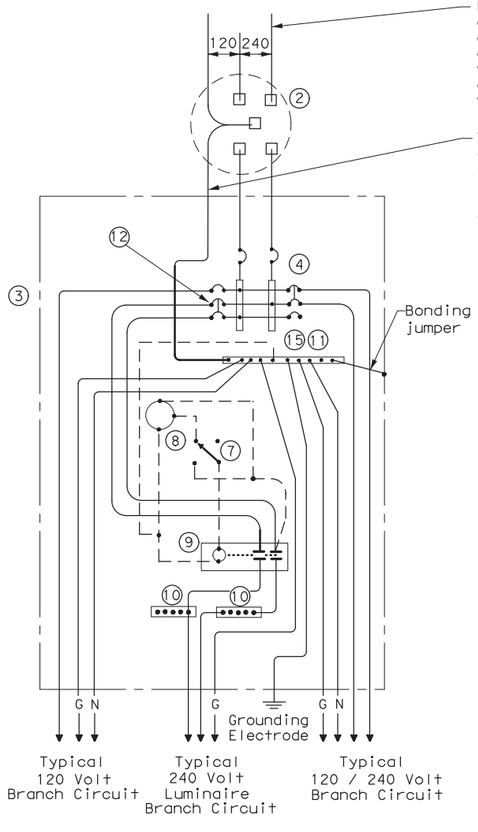


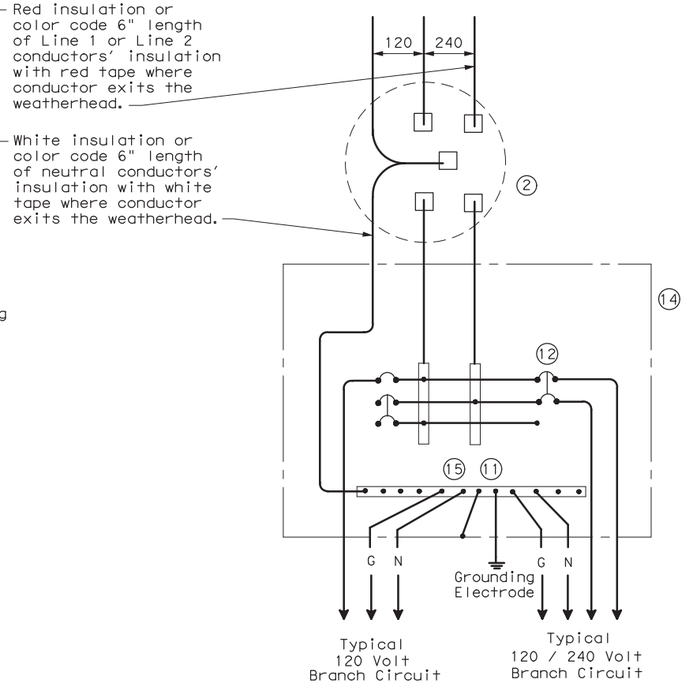

SCHEMATIC TYPE A
THREE WIRE




SCHEMATIC TYPE C
THREE WIRE




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




SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

# ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

## ED(6)-14

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

1. Provide steel pole and steel frame supports as per TxDOT Departmental Material Specification (DMS)11080 "Electrical Services." Mount all equipment and conduit on 12 gauge galvanized steel or stainless steel channel strut, 1 ½ in. or 1 ⅝ in. wide by 1 in. up to 3 ¾ in. deep Unistrut, Kindorf, B-line or equal. Bolt or weld all channel and hardware to vertical members as approved. Do not stack channel. File smooth and paint field cut ends of all channel with zinc-rich paint before installing.

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

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

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

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

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

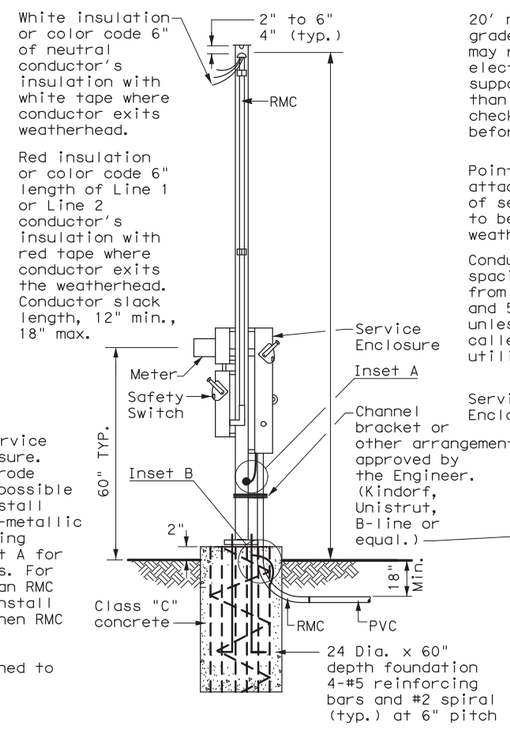
7. Drill and tap steel poles and frames for ½ in. X 13 UNC tank ground fitting. For steel pole service supports, provide and install tank ground fitting 4 in. to 6 in. below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode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

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

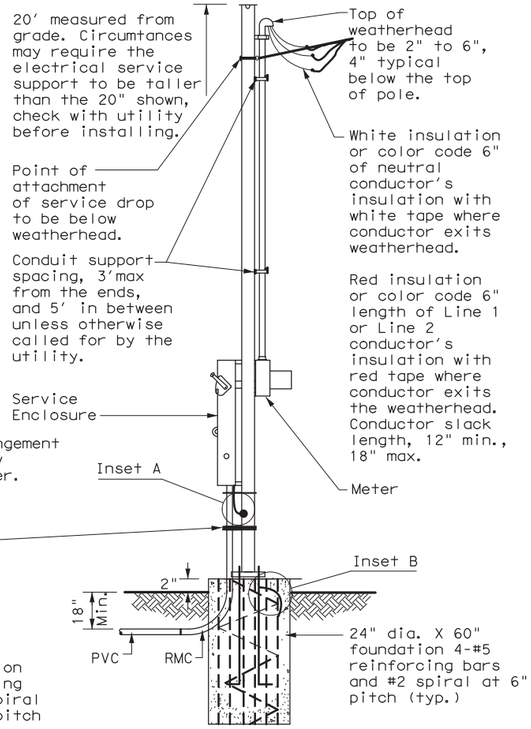
9. Provide ¼" - 20 machine screws for bonding. Do not use sheet metal screws. Remove all non-conductive material at contact points. Terminate bonding jumpers with listed devices. Install minimum size 6 AWG stranded copper bonding jumpers. Make up all threaded bonding connections wrench tight.

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

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

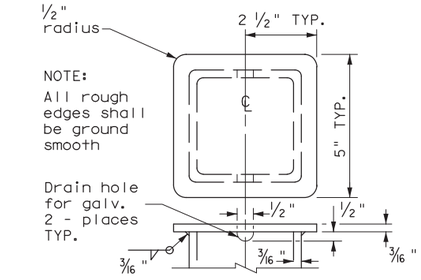



WITH SAFETY SWITCH

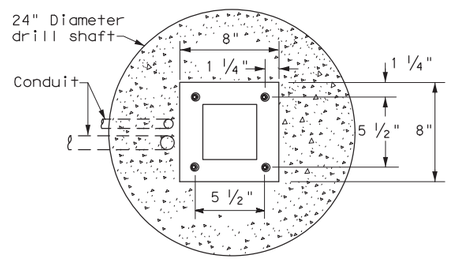



WITHOUT SAFETY SWITCH

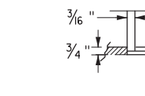
### SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE




POLE TOP PLATE

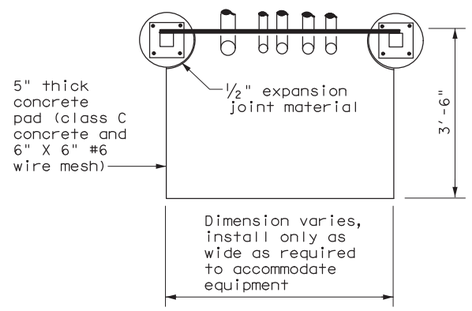



BASE PLATE DETAIL




BOTTOM OF POLE

### SERVICE SUPPORT TYPE SF & SP

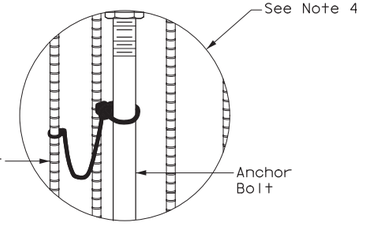



TOP VIEW

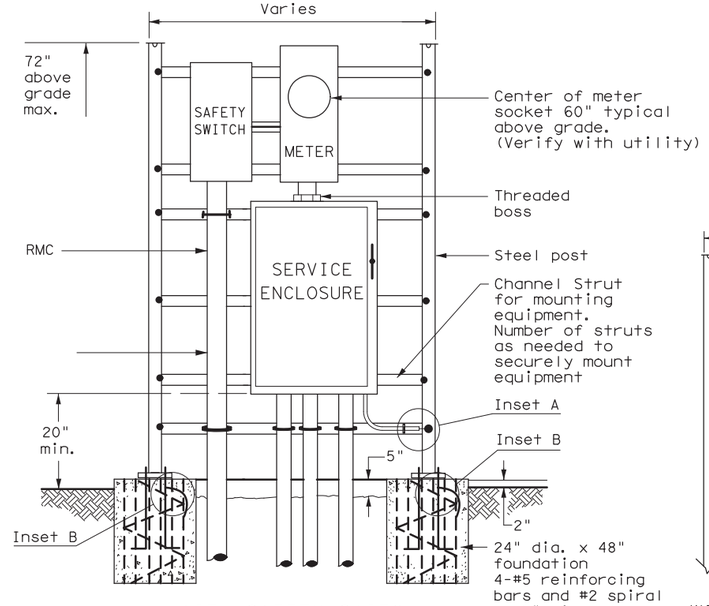
SERVICE SUPPORT TY SF (O) & SF (U)


FRONT VIEW

INSET A

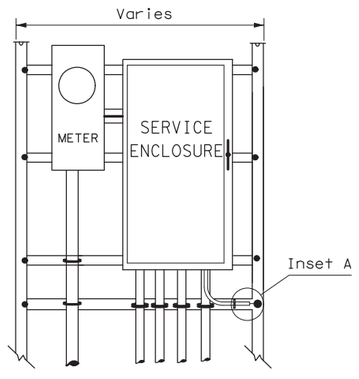



INSET B



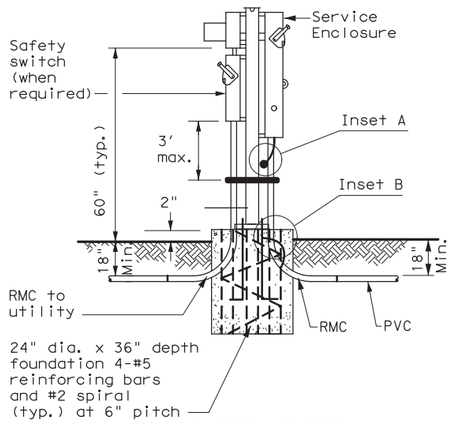

WITH SAFETY SWITCH

FRONT VIEW

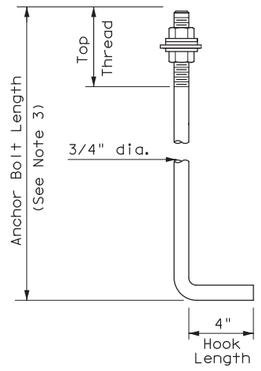



WITHOUT SAFETY SWITCH

### SERVICE SUPPORT TYPE SF(U) - UNDERGROUND SERVICE




WITH SAFETY SWITCH




HOOKED ANCHOR DETAIL

### SERVICE SUPPORT TYPE SP(U) - UNDERGROUND SERVICE

Texas Department of Transportation

Traffic Operations Division Standard

# ELECTRICAL DETAILS SERVICE SUPPORT TYPES SF & SP

# ED(7)-14

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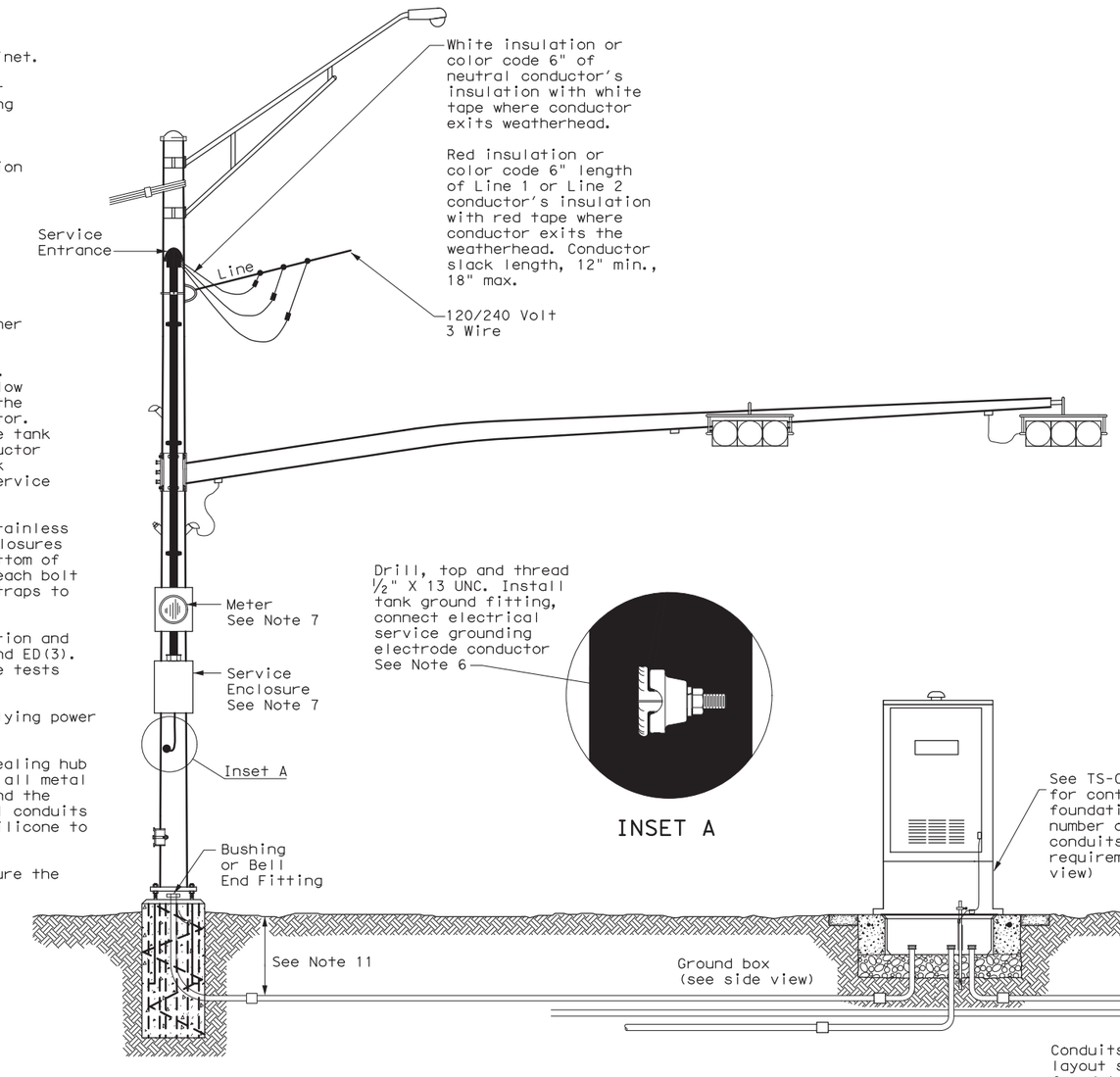
## TRAFFIC SIGNAL NOTES

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

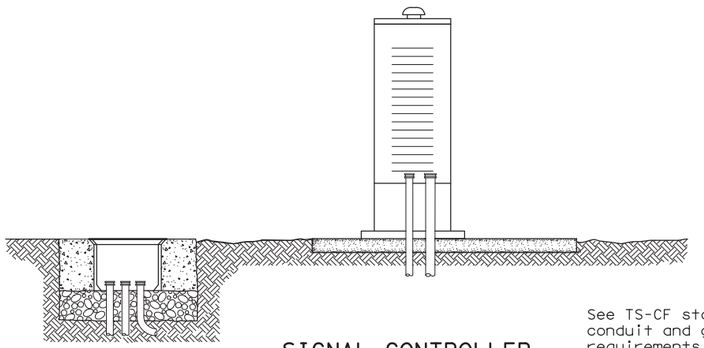



SIGNAL POLE WITH SERVICE

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




INSET A

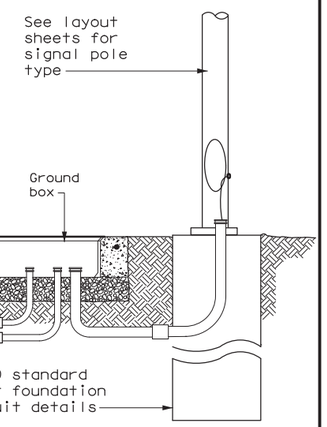


SIGNAL CONTROLLER SIDE VIEW

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




SIGNAL CONTROLLER FRONT VIEW




SIGNAL POLE

Texas Department of Transportation

Traffic Operations Division Standard

# ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS

## ED(8)-14

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## PEDESTAL SERVICE NOTES

1. Manufacture pedestal electrical services in accordance with Departmental Material Specifications (DMS)11080 "Electrical Services", 11085 "Electrical Services-Pedestal (PS)" and Item 628 "Electrical Services. "Provide pedestal electrical services as listed on the Material Producers list (MPL) on the Department's web site under "Roadway Illumination and Electrical Supplies," Item 628. Ensure all mounting hardware and installation details of services meet utility company specifications. Contact the local utility company for approval of pedestal details prior to installing the electrical pedestal service. Submit any changes required by the utility company prior to manufacturing the pedestal enclosure.

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

3. Provide Class A or C concrete for pedestal service foundations in accordance with Item 420, "Concrete Substructures," except that concrete will not be paid for directly but is considered subsidiary to Item 628.

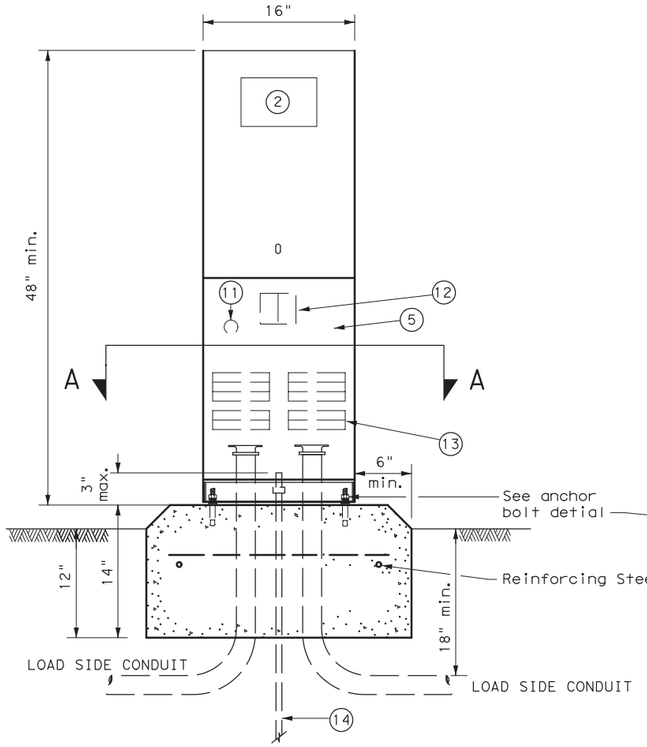
4. Provide #4 reinforcing steel for foundations in accordance with Item 440, "Reinforcement for Concrete."

5. Install ½ in. X 2 1/16 in. minimum length concrete single expansion type anchors for mounting pedestal enclosure to foundation. Anchor location to match mounting holes in each corner of enclosure. Secure each of the four corners of the pedestal enclosure to the anchors in the foundation with a ½ in. galvanized or stainless steel machine thread bolt, a properly sized locknut and a flat washer.

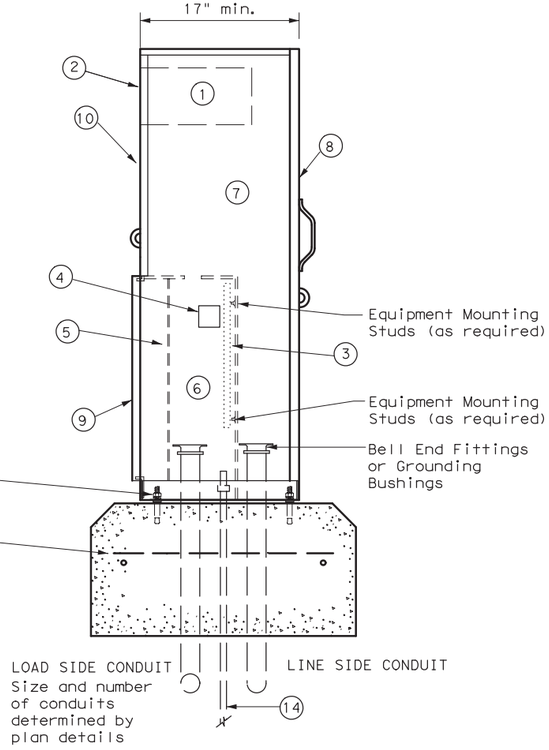
6. Finish top of concrete foundation in a neat and workmanlike manner. If leveling washers are used, ensure no more than ⅛ in. gap at any corner. Do not exceed a maximum dip or rise in the foundation of ⅛ in. per foot. When properly installed, ensure the top of the service enclosure is level front to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

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

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

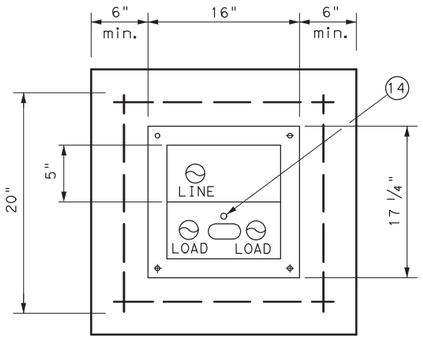



FRONT VIEW

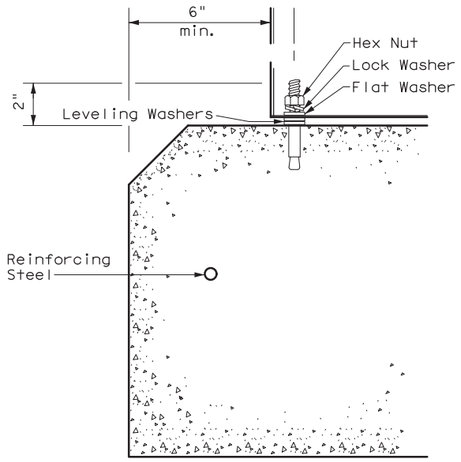



SIDE VIEW

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




SECTION A-A




ANCHOR BOLT DETAIL

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

Texas Department of Transportation

Traffic Operations Division Standard

# ELECTRICAL DETAILS
# ELECTRICAL SERVICE SUPPORT
# PEDESTAL SERVICE TYPE PS

# ED(9)-14

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## TIMBER POLE (TP) SERVICE SUPPORT NOTES

1. Ensure electrical service support is a class 5 treated timber pole as per Item 627 "Treated Timber Poles." Embed timber pole to depth required in Item 627.
2. Conduit and electrical conductors attached to the electrical service pole and underground within 12 in. of service pole are not paid for directly but are subsidiary to the electrial service.
3. Install pole-top mounted photocell (T) on north side of pole, or in service enclosure (E) as required. See Electrical Service Data chart in plan set.
4. Gain pole as required to provide flat surface for each channel. Gain timber pole to 5/8 in. max. depth and 1 7/8 in. max. height. Gain pole in a neat and workmanlike manner.
5. Mount meter and service equipment on stainless steel or galvanized channel (Unistrut, Kindorf, or equal). Provide channel sized 1 in. to 3 3/4 in. maximum depth, and 1½ in. to 1⅝ in. maximum width. File smooth the cut ends of galvanized channel and paint with zinc rich paint before installing on pole. Secure each channel section to timber pole with two galvanized or SS lag bolts, ¼ in. minimum diameter by 1½ in. minimum length. Use a galvanized or SS flat washer on each lag bolt. Do not stack channel.
6. When excess length must be trimmed from poles, trim from the top end only.

(1) Class 5 pole, height as required

(2) Service drop from utility company (attached below weatherhead)

(3) Service conduit (RMC) and service entrance conductors - One Red, One Black, One White (See Electrical Service Data)

(4) Safety switch (when required)

(5) Meter (when required)

(6) Service enclosure

(7) 6 AWG bare grounding electrode conductor in ½ in. PVC to ground rod - extend ½ in. PVC 6 in. underground.

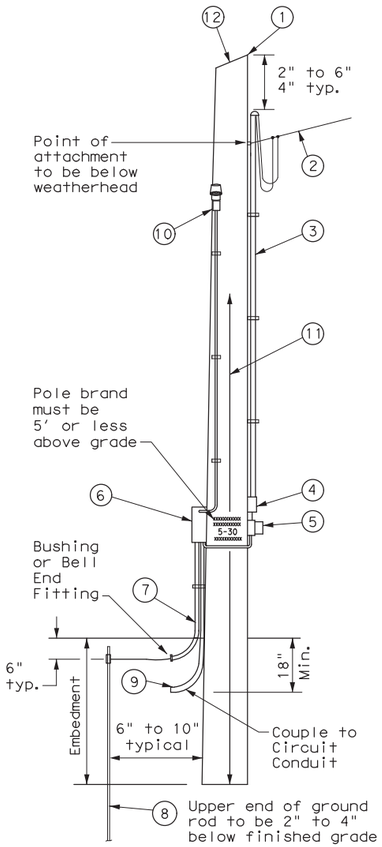
(8) ⅝ in. x 8 ft. Copper clad ground rod - drive ground rod to a depth of 2 in. to 4 in. below grade.

(9) RMC same size as branch circuit conduit.

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

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

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

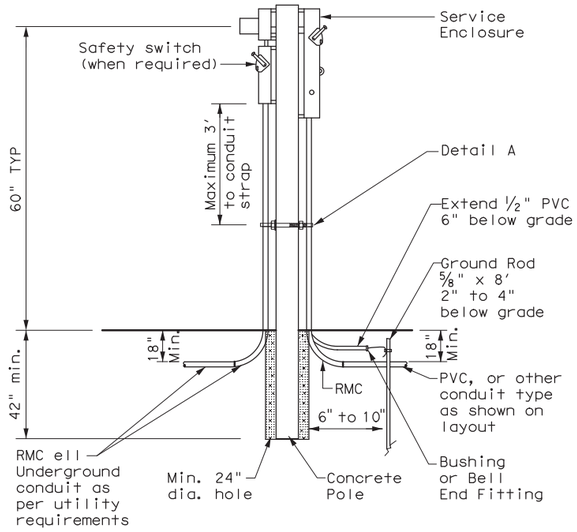



SERVICE SUPPORT TYPE TP (O)

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

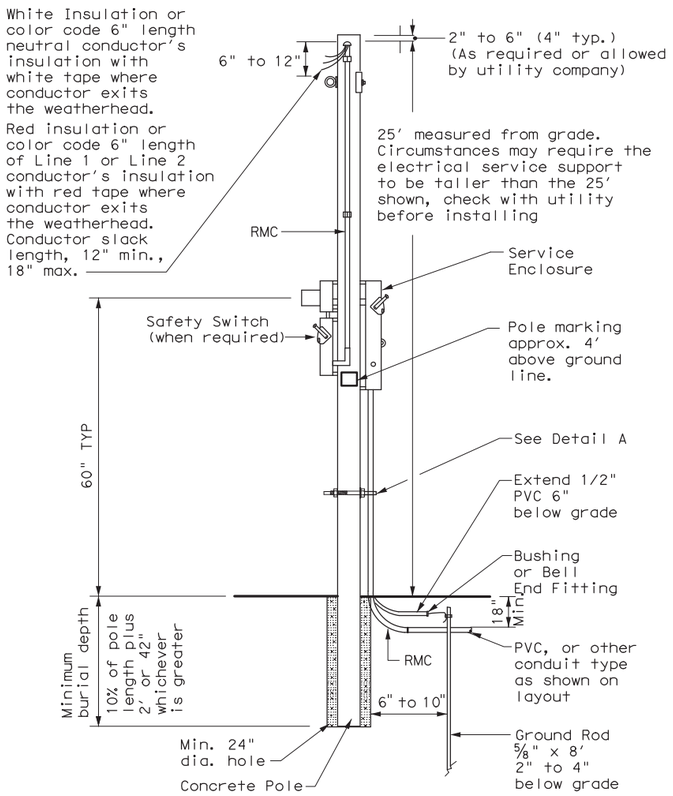
Ensure electrical service support structures bid as type Granite Concrete (GC) or Other Concrete (OC) meet the following requirements.

1. Provide GC and OC poles that meet the requirements of DMS 11080 "Electrical Services."
2. Provide prestressed concrete poles suitable for direct embedment into the ground without special foundations.
3. Verify poles are marked as required on DMS 11080. Location of marking should be approximately 4' above final grade. Use the two-point pickup locations when handling pole in horizontal position, and one-point pickup location for use in raising the pole to a vertical position. These marks are small but conspicuous.
4. Embed poles 42 in. or 10% of the length plus 2 ft., whichever is greater.
5. Ensure all installation details of services are in accordance with utility company specifications.
6. Install a one point rack or eye bolt bracket 6 inches to 12 inches below the weatherhead as an overhead service drop anchoring point for the electric utility.
7. Furnish and install galvanized or stainless steel channel strut 1 ½ in. or 1 ⅝ in. wide by 1 in. up to 3 ¾ in. deep (Unistrut, Kindorf, B-line or equal). Attach channel strut with stainless steel concrete anchors (max. 1" depth), square U-bolts or back to back channel strut with long bolts, or other secure mounting as approved by the Engineer. Ensure bolts are galvanized in accordance with ASTM A153. Do not stack channel struts.
8. Backfill the holes thoroughly by tamping in 6 in. lifts. After tamping to grade, place additional backfill material in a 6 inch high cone around the pole to allow for settling. Use material equal in composition and density to the surrounding area. Backfilling will not be paid for directly but is subsidiary to various bid items.



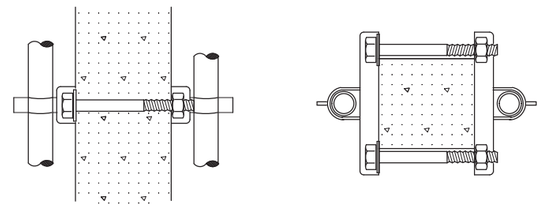

## CONCRETE SERVICE SUPPORT

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

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## DUCT CABLE & HDPE CONDUIT NOTES

1. Provide duct cable in accordance with Departmental Material Specification (DMS) 11060 "Duct Cable" and Item 622 "Duct Cable." Provide duct cable as listed on the Material Producer List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 622.

2. Provide High-Density Polyethylene (HDPE) conduit in accordance with DMS 11060 and Item 618, "Conduit." Provide HDPE as listed on the MPL on the Department web site under "Roadway Illumination and Electrical Supplies," Item 618.

3. Supply duct cable with a minimum 2 in. diameter, unless otherwise shown in the plans. Provide duct cable and HDPE conduit as shown by descriptive code or on the plans. Bend duct cable and HDPE conduit as recommended by the manufacturer, with a minimum bending radius of 26 in. for 2 in. duct. Follow manufacturers' recommendations when handling duct cable and HDPE conduit reels and during installation of duct cable and HDPE conduit.

4. Do not splice conductors within duct cable or HDPE conduit. Couple duct cable and HDPE entering a ground box or foundation to a PVC elbow. When galvanized steel RMC elbows are called for in the plans and any portion of the RMC elbow is buried less than 18" from possible contact, ground the RMC elbow.

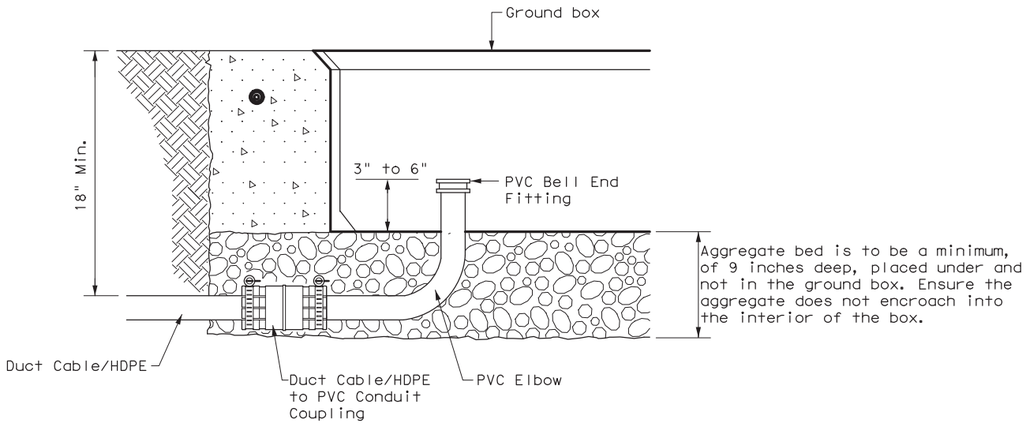
5. Furnish and install duct cable with factory installed conductors, sized as shown in the plans and as required by the National Electrical Code (NEC). The NEC contains specific requirements for duct cable in Article, "Nonmetallic Underground Conduit with Conductors: Type NUCC."

6. When conduit casing is called for in the plans, extend duct cable or HDPE conduit through the conduit casing in one continuous length without connection to the casing.

7. Seal the ends of duct cable or HDPE conduit with duct seal, expandable foam, or other approved method after completing the pull tests required by Item 622.

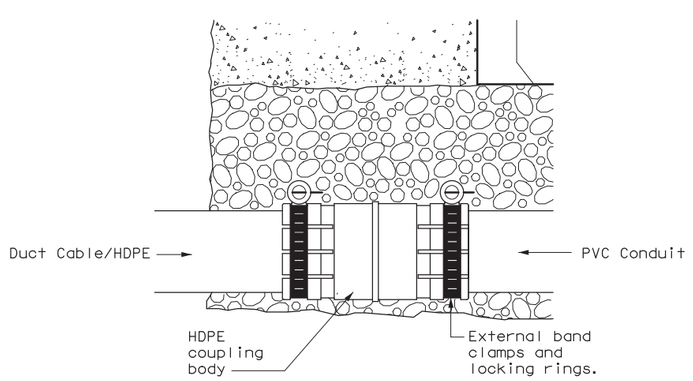
8. Provide minimum cover of 24 in. under roadways, 18 in. in other locations, or as shown on the plans.

9. Furnish and install listed fittings to couple duct cable or HDPE conduit to other types of conduit. Duct cable and HDPE conduit may be field-threaded and spliced with PVC or RMC threaded couplings; connected with listed tie-wrap fittings; connected using listed coupling made of HDPE with stainless steel external banding clamps and locking rings; connected with approved electrofusion conduit couplings; or connected using an approved chemical fusion method using an epoxy or adhesive specifically designed for HDPE couplings and connectors all installed in accordance with their manufacturer's instructions. Do not use PVC glue on HDPE. Do not use water pipe fittings, or connect conduit with heat shrink tubing.

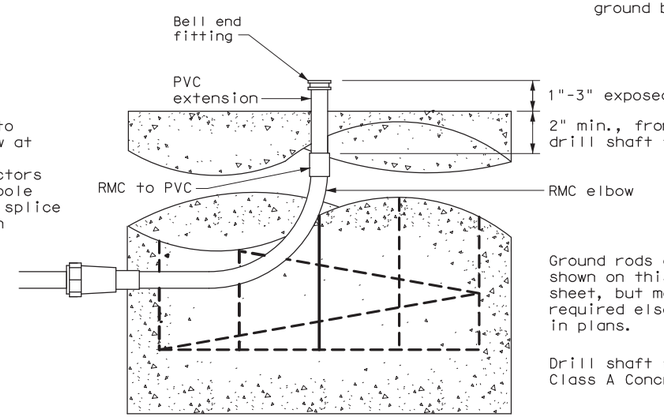



## DUCT CABLE/HDPE AT GROUND BOX

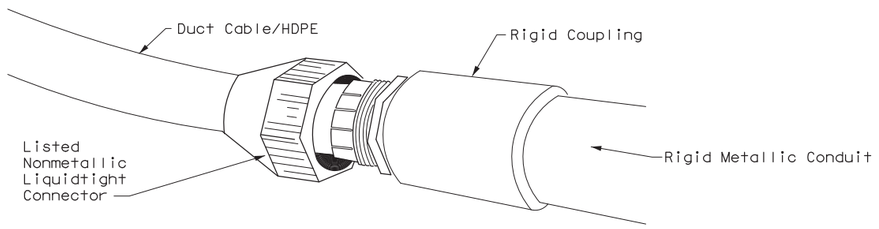
When the upper end of an RMC Ell does not enter the ground box, it may be extended with a SCH-40 PVC conduit nipple and bell end, provided there is a minimum of 18" of cover over all parts of the elbow. If not, a rigid extension and ground bushing is required.



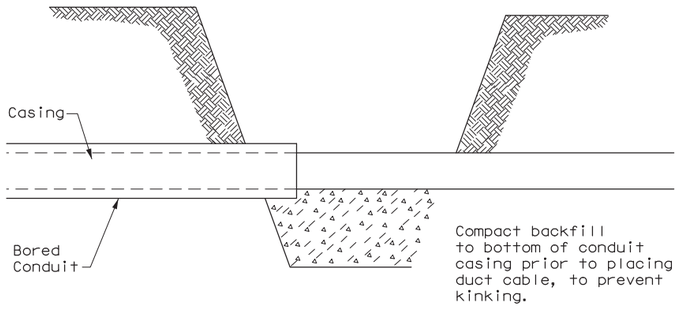

## DUCT CABLE/HDPE TO PVC




## DUCT CABLE / HDPE AT FOUNDATION




## DUCT CABLE/HDPE TO RMC




## BORE PIT DETAIL

Texas Department of Transportation | Traffic Operations Division Standard

# ELECTRICAL DETAILS
# DUCT CABLE/ HDPE CONDUIT

## ED(11)-14

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## BATTERY BOX GROUND BOXES NOTES

A. MATERIALS

1. Provide polymer concrete or fiberglass reinforced plastic (FRP) battery box ground box and cover in accordance with Departmental Material Specification (DMS) 11071 "Battery Box Ground Boxes." Battery box will accommodate up to 4 batteries, each measuring 8 in. x 13.5 in. x 10 in. (W x L x D). Label battery box ground box cover in accordance with DMS 11071.

2. Supply a marine grade batteries with covers. Secure the marine grade batteries with covers to the stainless steel rack in the bottom of the ground box with tie down straps.

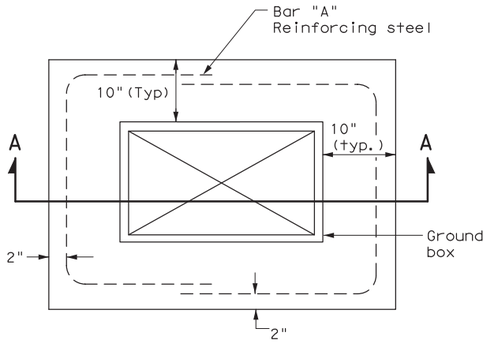
B. CONSTRUCTION METHODS

1. Ensure conduit entry will not interfere with placement of the batteries in the battery box ground box.

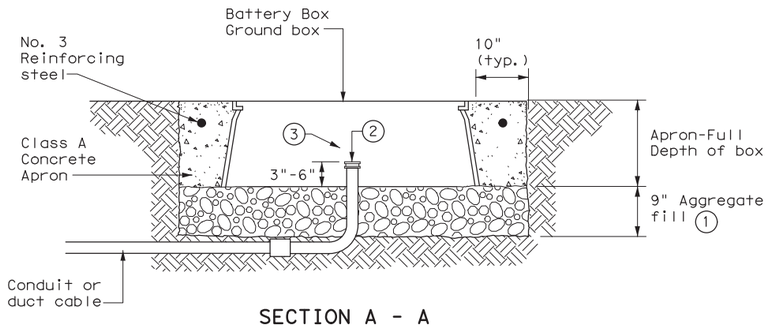
2. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting battery box ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure the aggregate bed is in place and is a minimum of 9 in. deep prior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

3. Cast battery 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. Battery box ground box aprons, including concrete and reinforcing steel, are subsidiary to battery box ground boxes when called for by descriptive code.

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




PLAN VIEW



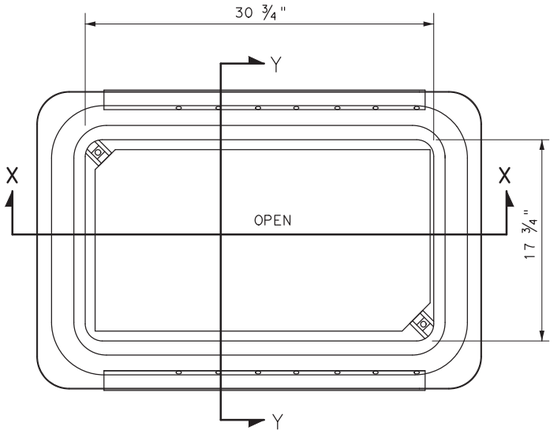

SECTION A - A

APRON FOR BATTERY BOX GROUND BOXES

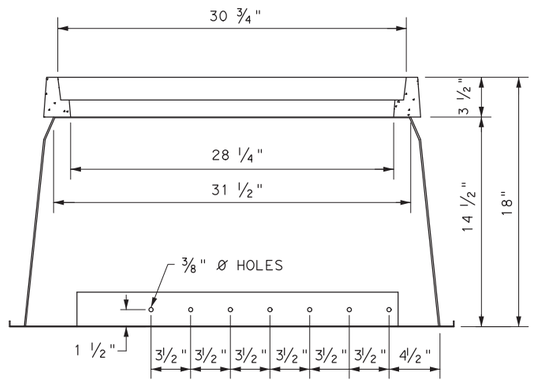
(1) Place aggregate under the box and not in the box. Aggregate should not encroach on the interior volume of the box.

(2) Install bushing or bell end fitting on the upper end of all ells.

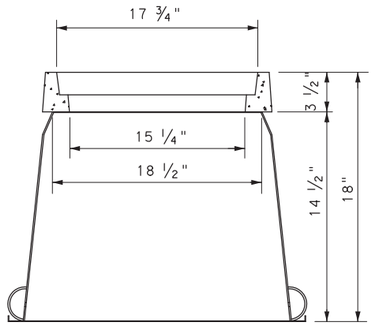
(3) Install all conduits in a neat and workmanlike manner.



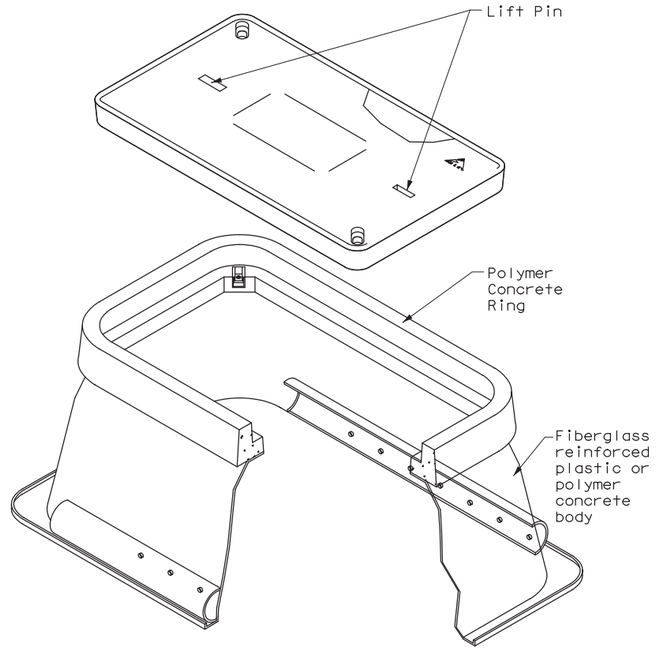

BATTERY BOX TOP VIEW




SECTION X-X




SECTION Y-Y




Texas Department of Transportation

Traffic Operations Division Standard

# ELECTRICAL DETAILS BATTERY BOX GROUND BOXES

## ED(12)-14

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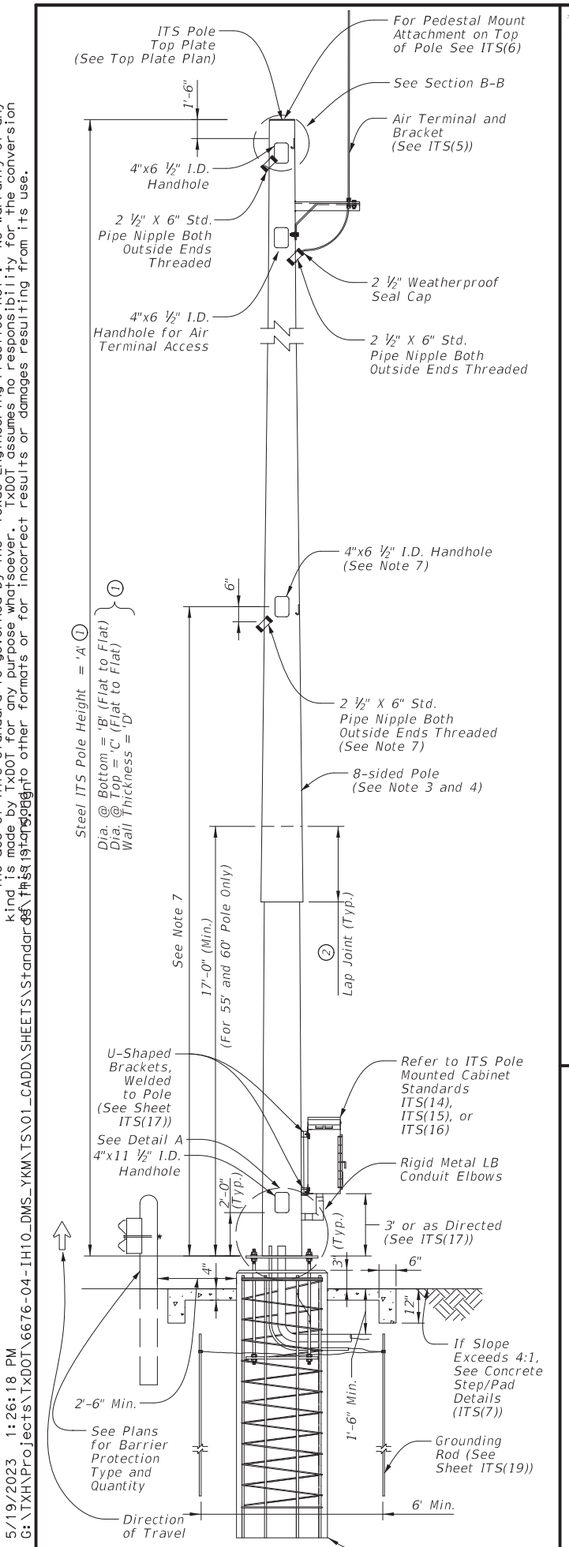
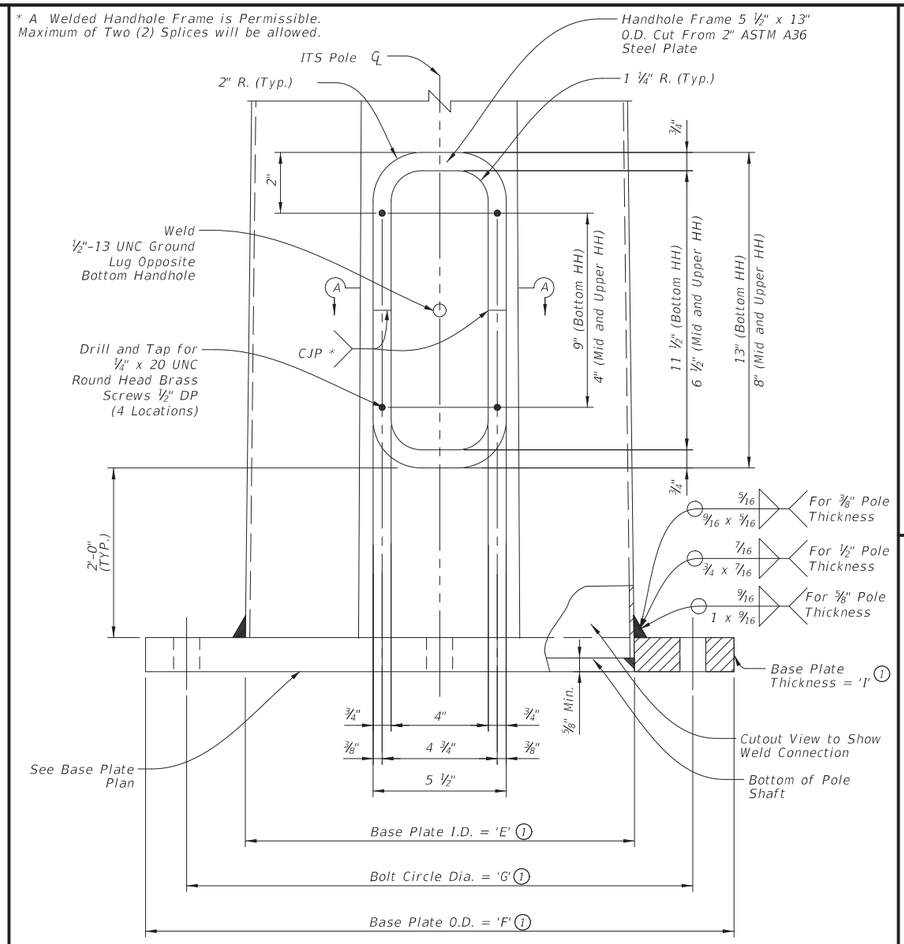
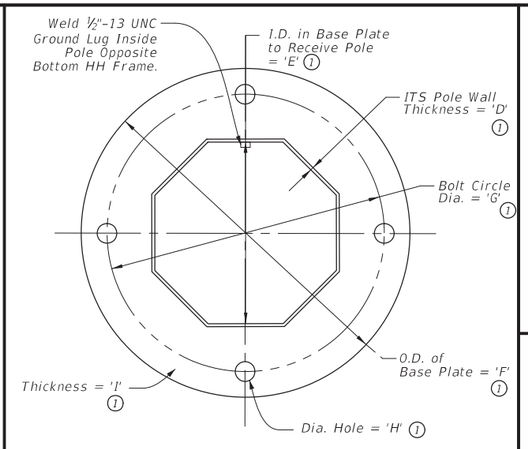



## ITS Pole with Cabinet

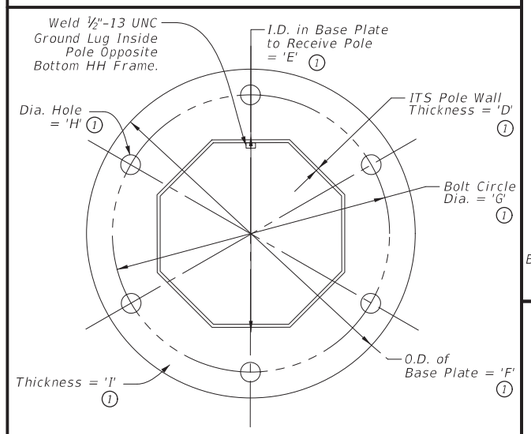



## Detail A



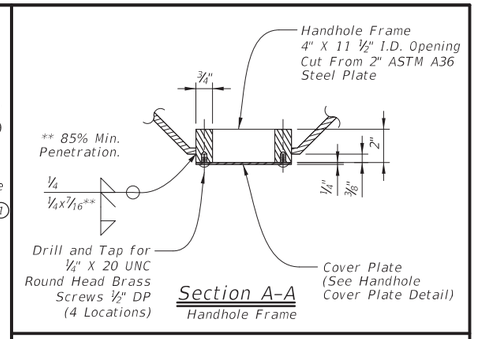

## Base Plate Plan

4 Bolt Base Plate (ASTM A36)



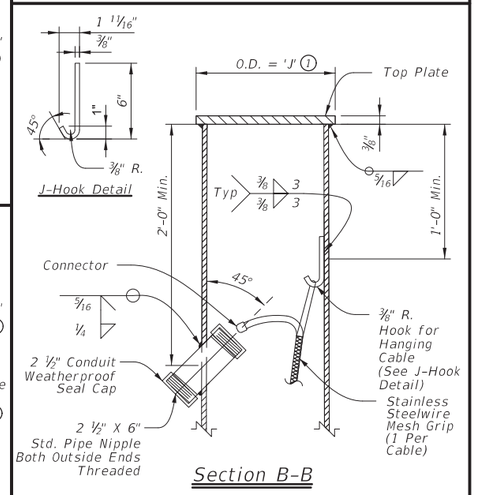

## Base Plate Plan

6 Bolt Base Plate (ASTM A36)




## Section A-A

Handhole Frame




## Section B-B

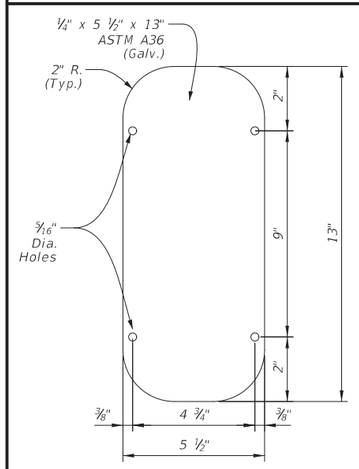
## General Notes

1. Designed according to Sixth Edition 2013 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications.
2. Unless otherwise noted, all parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."
3. Deviation from the design criteria, values, and dimensions shown herein and on ITS(4), constitutes an alternative design and will require submission of shop drawings and calculations for approval, sealed by a Texas Professional Engineer.
4. Direct substitution of twelve sided or round poles, matching the design criteria, values, and dimensions shown herein, require submission of shop drawings for approval to confirm design criteria and values on ITS(4) is met.
5. Locate handholes opposite of the direction of travel.
6. Appropriate number of anchor bolts for base plate determined by height of pole. See 'L' on sheet ITS(4).
7. Location for ITS equipment mount may vary by device. Locate mid span handhole and pipe nipple to accommodate location for ITS equipment as identified in the plans or per manufacturer recommendations. Identify location for mid span handhole and pipe nipple on shop drawings for approval.

## Reference Notes:

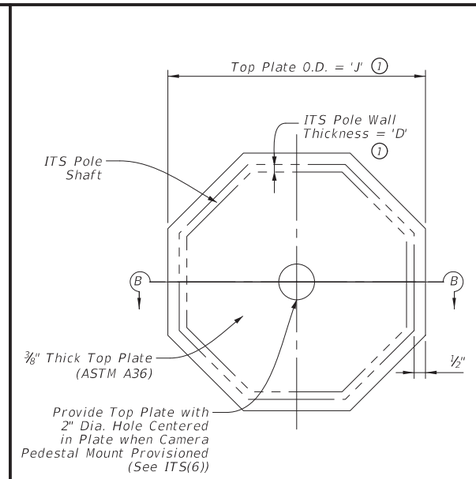
(1) See tables on Sheet ITS(4) for values of dimension variables.

(2) See lap joint note for 55' and 60' pole heights on ITS(4) at the bottom of each table.

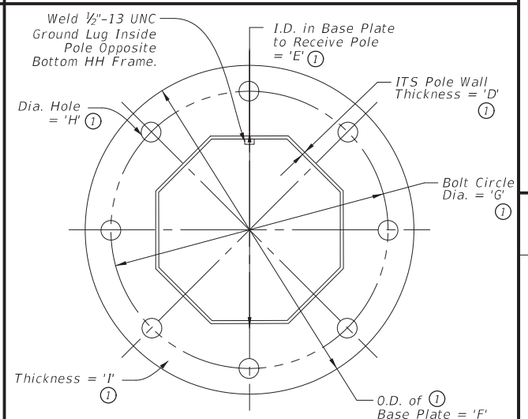



## Handhole Cover Plate Detail

(Bottom Handhold)




## Top Plate Plan




## Base Plate Plan

8 Bolt Base Plate (ASTM A36)

Texas Department of Transportation

**Traffic Operations Division Standard**

# ITS POLE DETAILS OCTAGONAL POLE (EIGHT SIDED POLE)

# ITS(1)-15

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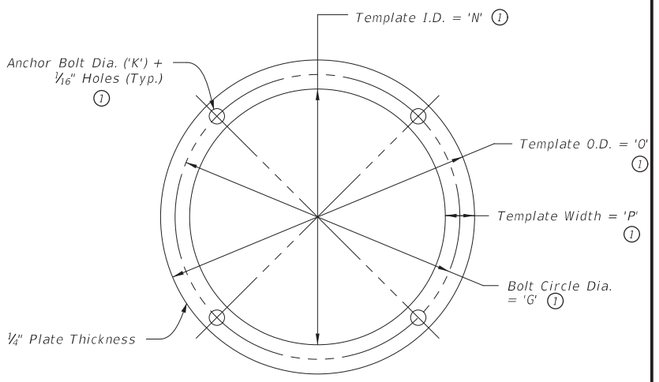
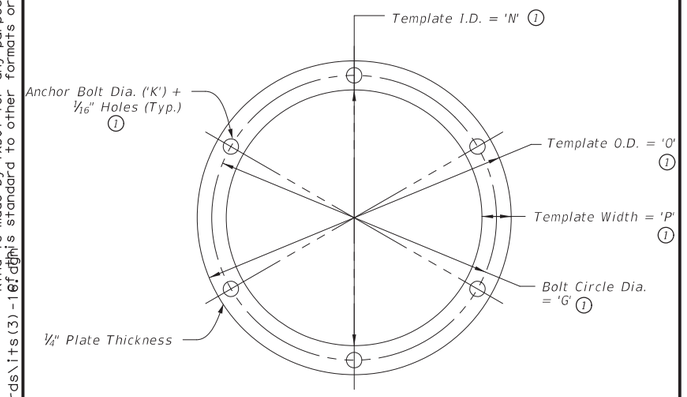
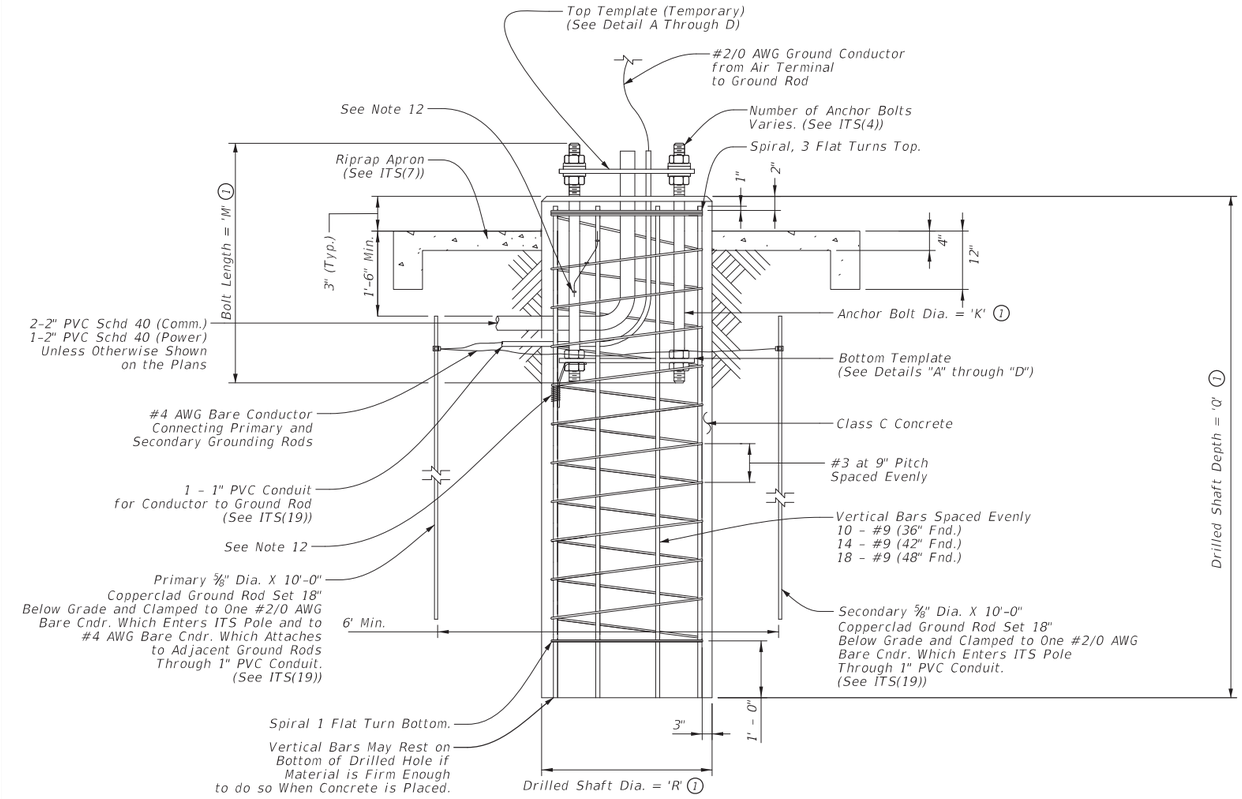



Top and Bottom Template (Four Bolt)
Detail A



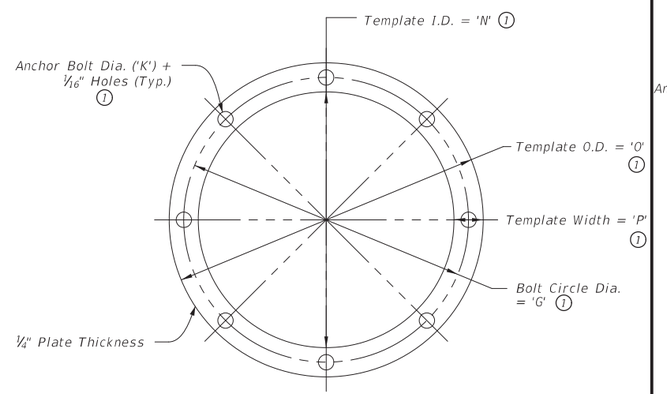

Top and Bottom Template (Six Bolt)
Detail B



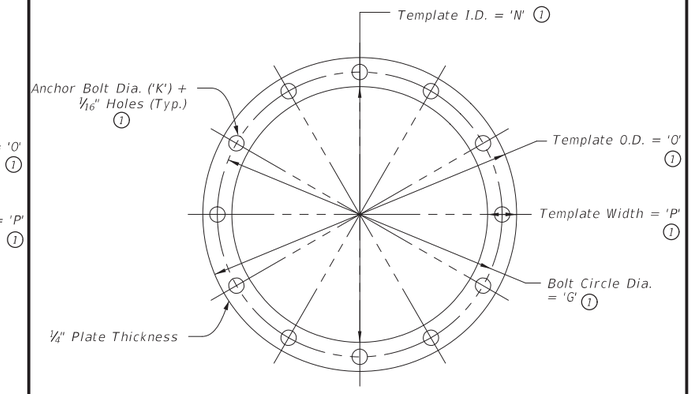

Foundation Details (Typical)
Elevation
Not to Scale

## General Notes:

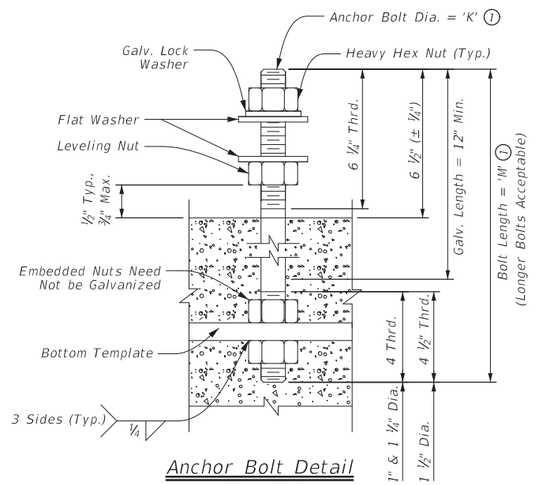
1. Drilled shaft concrete shall be Class "C" (f'c = 3,600 PSI) in accordance with Item 416, "Drilled Shaft Foundations."
2. Reinforcing bars shall be Grade 60 (Fy = 60 KSI) and conform to ASTM A-615. All reinforcing shall conform to Item 440, "Reinforcing Steel."
3. Provide ASTM A-36 steel for templates. Top and bottom templates need not be galvanized.
4. Anchor bolts shall be rigidly held in position during concrete placement using steel templates at the top and bottom. Top templates shall remain in place until the concrete has cured in place beyond initial set time.
5. Lubricate and tighten anchor bolts, when erecting pole, in accordance with Item 449, "Anchor Bolts."
6. Anchor bolts shall conform to ASTM F1554 Grade 55, or ASTM A193 B7 with ASTM A194 Grade 2H or A563 heavy hex nuts with F436 washers. Galvanize a minimum of the top end thread length plus 6 inches for all anchor bolts unless otherwise noted. Exposed washers and exposed nuts shall be galvanized. All galvanizing shall be in accordance with Item 445, "Galvanizing."
7. All vertical reinforcement shall be carried to the bottom of the drilled shaft.
8. Place three flat turns of the spiral bar at the top and one flat turn at the bottom of the drilled shaft.
9. Drilled shaft shall be measured by the linear foot and paid under Item 416, "Drill Shaft Foundations."
10. If rock is encountered, the drilled shaft to extend a minimum of two diameters into solid rock.
11. Location for conduit entering foundation may vary. Orient conduit entering foundation to coincide with location of ground boxes and primary ground rod.
12. Bond anchor bolts to rebar with #2/0 AWG jumper and two mechanical connectors or by bending No. 3 bar on bottom template as shown and wire tightly with ten turns of No. 10 wire or one mechanical connector. Mechanical connectors shall be UL Listed for concrete encasement.




Top and Bottom Template (Eight Bolt)
Detail C




Top and Bottom Template (Twelve Bolt)
Detail D




Anchor Bolt Detail
Detail D

## Reference Notes:

(1) See tables on Sheet ITS(4) for values of dimension variables.

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# ITS POLE FOUNDATION DETAILS

# ITS(3)-16

| FILE: its(3)-16.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
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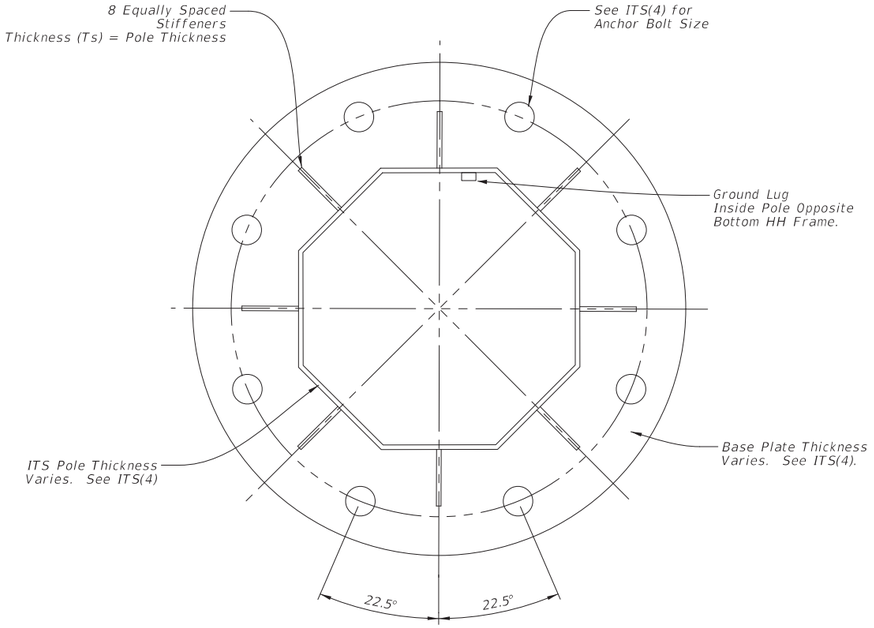
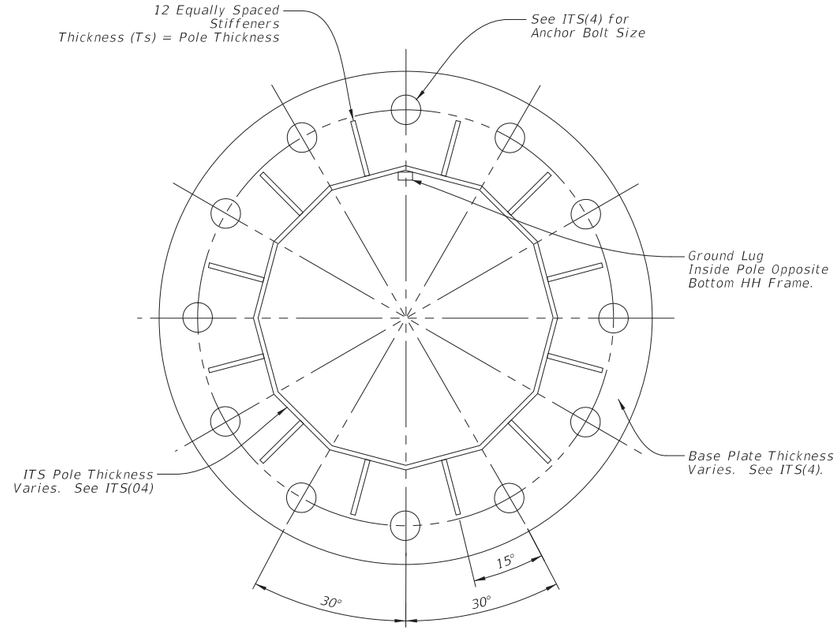



8-sided Pole Base Plate Detail




12-sided Pole Base Plate Detail

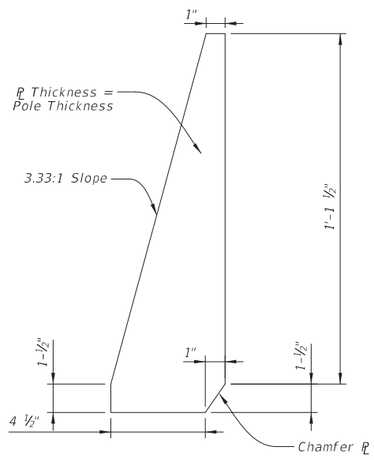
## General Notes:

1. Steel stiffening plates shall conform to ASTM A36.
2. Make all welds conform to Item 441, "Steel Structures."
3. Galvanize in accordance with Item 445, "Galvanizing" unless otherwise noted.
4. Submit shop drawings detailing stiffening plate orientation along with ITS equipment intended for mounting for review and approval prior to fabrication.
5. HH = Handhole
6. $T_s$ = Thickness

## Reference Notes:

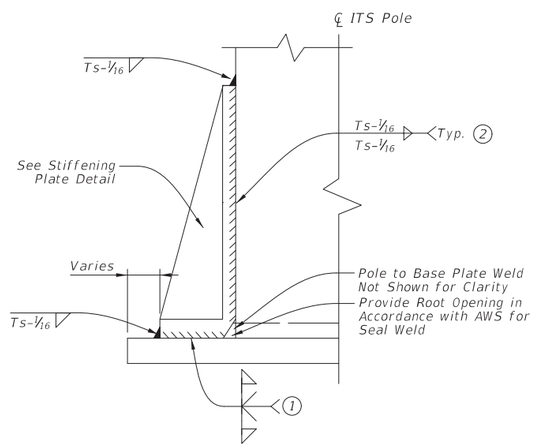
(1) Complete Joint Penetration Weld per AWS

(2) Wrap Fillet Weld Around Tip of Stiffener



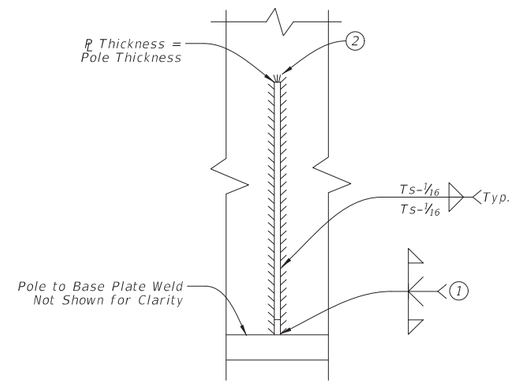

Stiffening Plate Detail

Not to Scale




Stiffening Detail - Elevation View

Not to Scale




Stiffening Detail - Front View

Not to Scale

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# ITS POLE STIFFENER PLATE DETAILS

# ITS(4A)-15

| FILE: its(4A)-15.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
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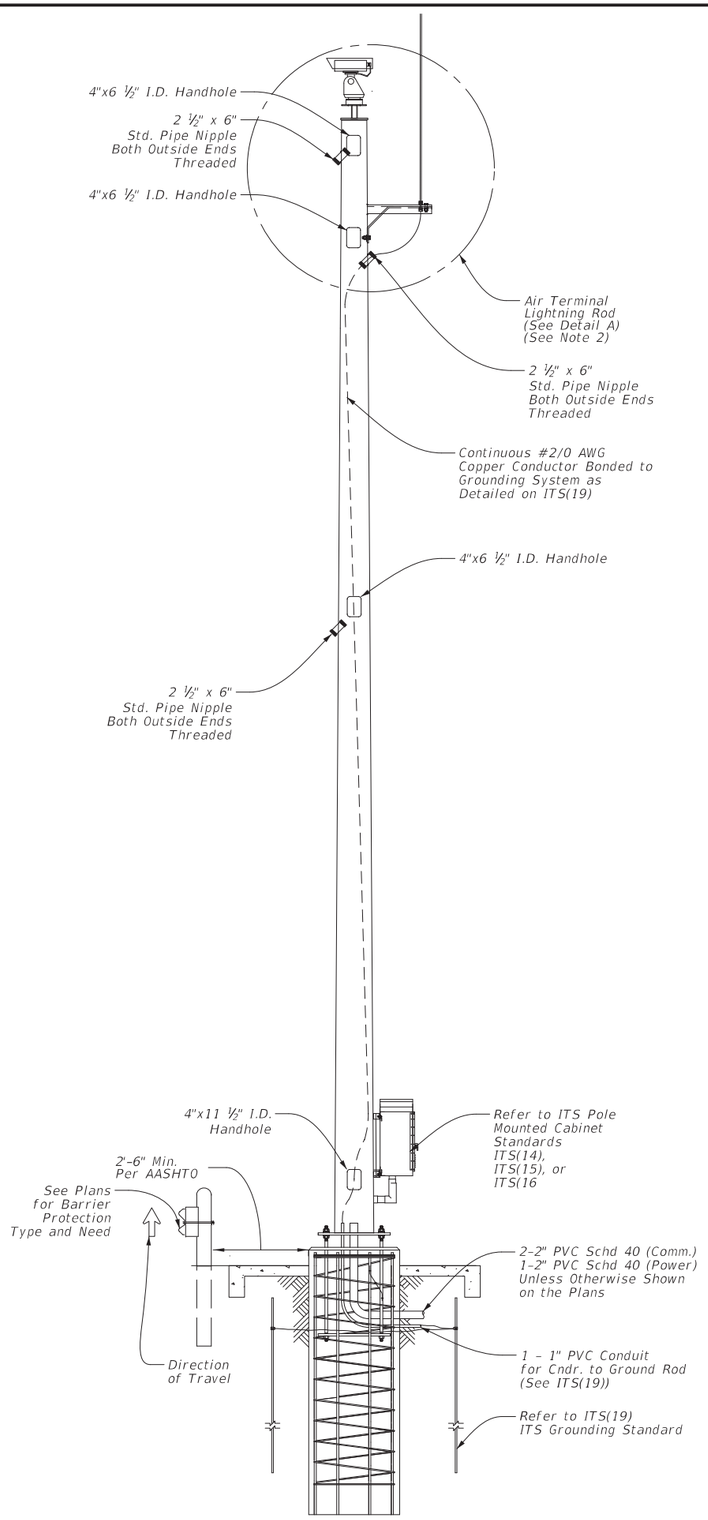
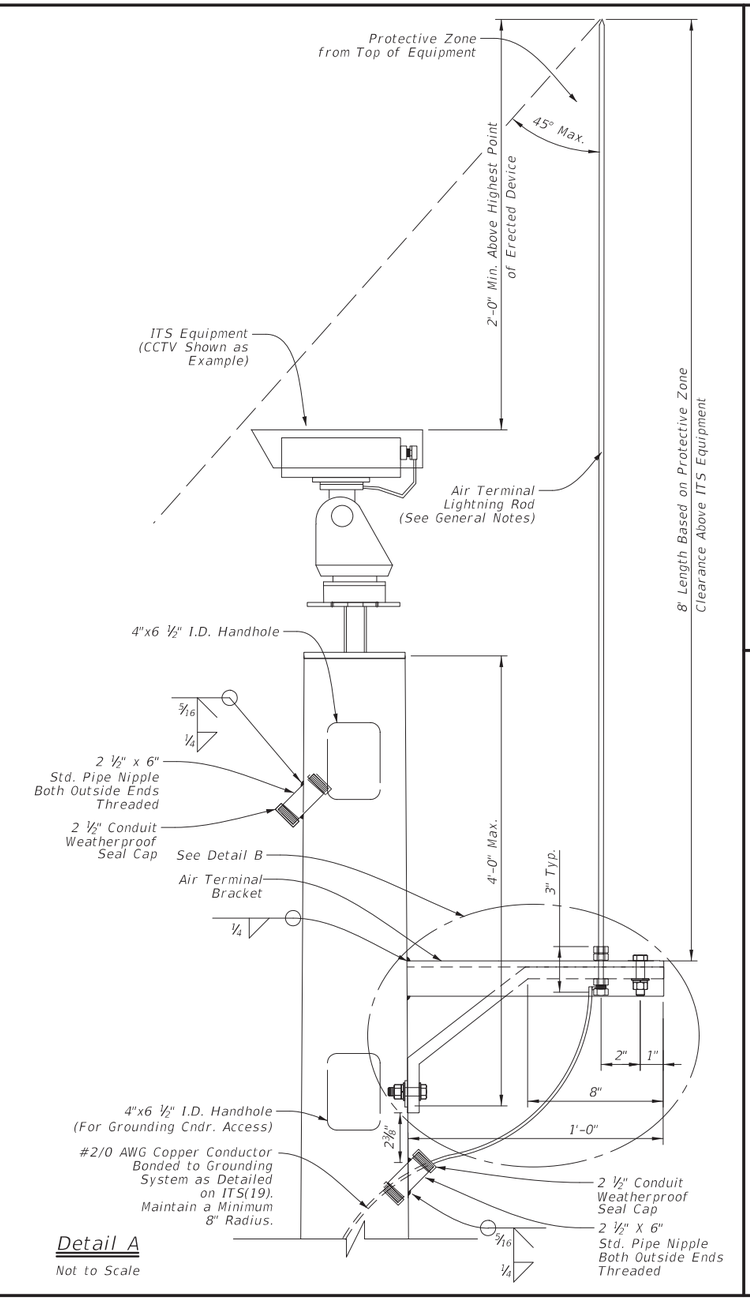
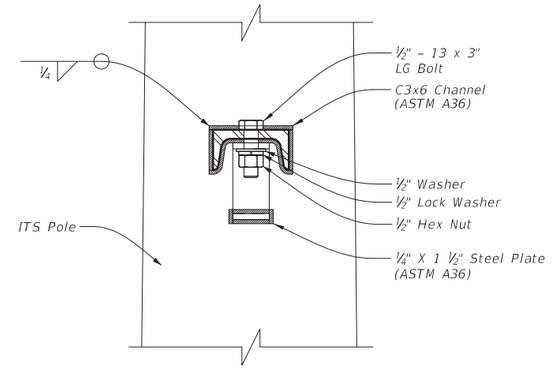



## ITS Pole with Cabinet



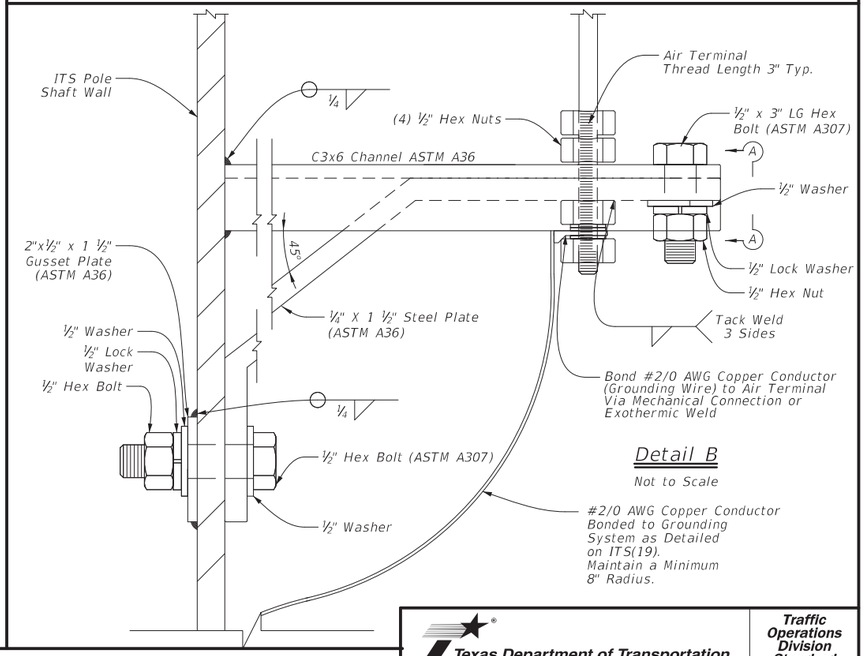

## Detail A

Not to Scale




## Section A-A

Not to Scale




## Detail B

Not to Scale

## General Notes:

1. Provide lightning protection using air terminals on structures utilizing the rolling sphere method. Provide lightning protection system consisting of air terminals, down conductor, and grounding system installed in accordance with NFPA 780 and tested in accordance with IEEE 142. Meet the following requirements:
   - A. Position - in center of least utilized field of view.
   - B. Height - camera equipment to be within 45 degree protective zone of air terminal.
   - C. Material - ½" ETP alloy 110 copper air terminal (Class II)
   - D. Clearance - 24" minimum height above highest point of ITS equipment.
   - E. Bonding - attach air terminal to bracket by exothermic weld or with approved clamping.
   - F. Structure wind rating in accordance with TxDOT WV & IZ (LTS2013).
   - G. Galvanize air terminal bracket in accordance with Item 445, "Galvanizing."
2. Alternative orientation for air terminal and pole mounted cabinet due to project specific needs to be indicated on the plans and detailed in shop drawing submittal for approval.
3. Weld air terminal bracket to ITS pole in accordance with Item 448 "Structural Field Welding." Bracket may be welded by the fabricator in the shop prior to delivery. A bolted connection for the air terminal bracket is acceptable in lieu of a welded connection with approval by the Engineer and detailed in the shop drawings.

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# ITS POLE AIR TERMINAL DETAILS

## ITS(5)-15

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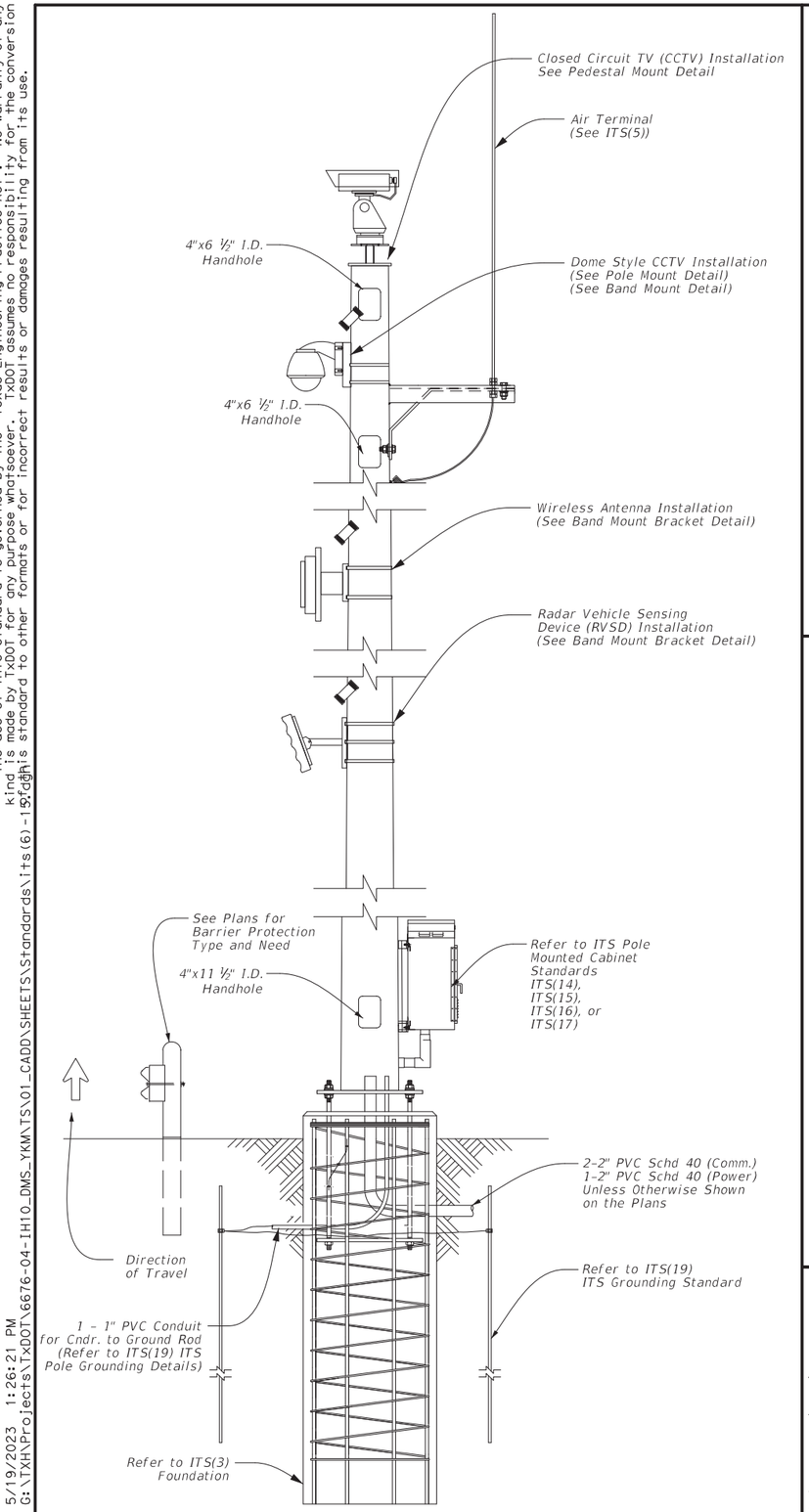
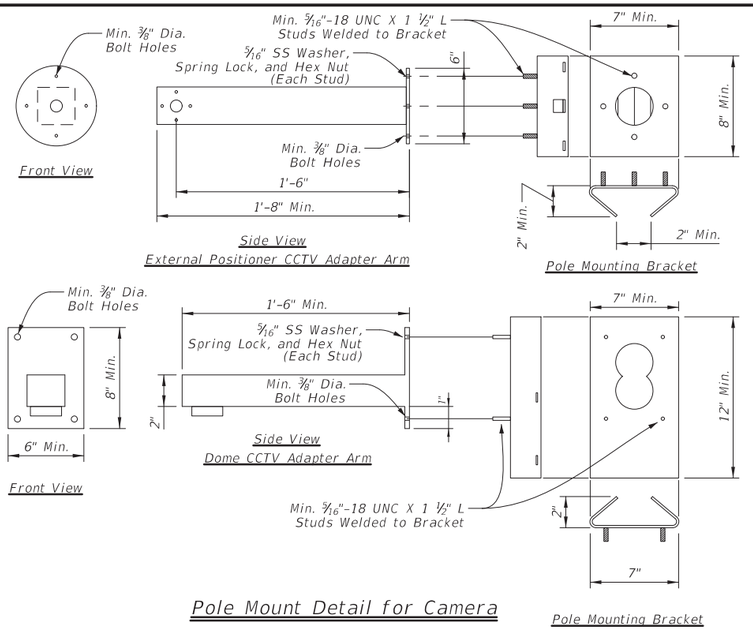
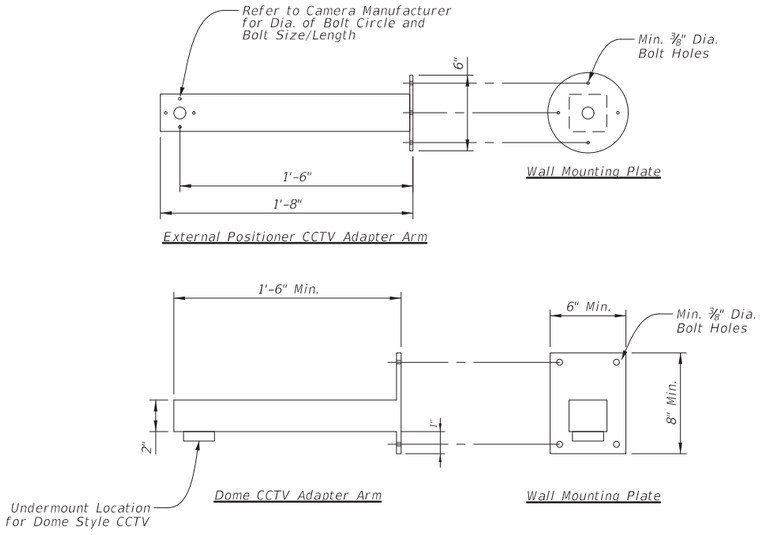


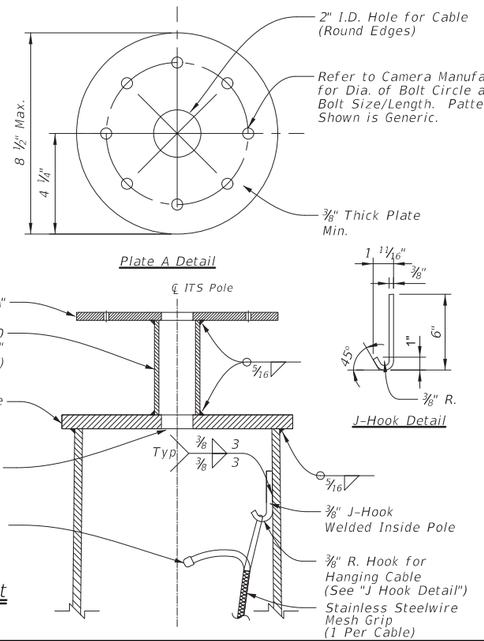

## ITS Pole with Cabinet




## Pole Mount Detail for Camera

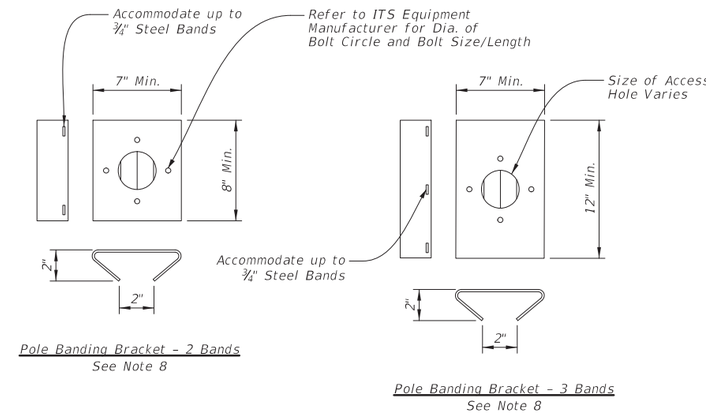



## Wall Mount Detail




## Pedestal Mount

Pole Top Detail




## Band Mount Bracket Details

### General Notes:

1. Designed according to Sixth Edition AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications.
2. Hang all cabling inside ITS pole structure with stainless steel wire mesh grips.
3. Bolt positioning in the pedestal top plate (Plate "A") for the pan/tilt base must be determined in the field per camera manufacturers recommendations. This will allow positioning of the camera to maximize coverage area. The Engineer will determine the camera's blind zone at each location.
4. Provide pedestal top plate and Plate "A" that conform to ASTM A36.
5. Make all welds conform to Item 441 and AWSD 1.1 (Structural Welding). Repair damaged galvanized coating per Item 445, "Galvanizing."
6. Galvanize parts in accordance with Item 445, "Galvanizing" unless otherwise noted.
7. The type of ITS equipment shown to be mounted to the ITS pole is intended to represent the most common ITS equipment applications and should not be treated as all inclusive. Other ITS equipment applications may exist that are project specific.
8. Mounting brackets are intended to be diagrammatic and for information only, and are not all inclusive. Contractor responsible for submitting mounting bracket design for approval by the Engineer prior to fabrication. Mounting bracket designed to support a maximum 35 Lbs. Off-the-shelf mounting brackets are acceptable and shall be submitted by shop drawing for approval.
9. Mounting heights to be determined in the field based on manufacturer recommendations.

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# ITS POLE EQUIPMENT MOUNTING DETAILS

## ITS(6)-15

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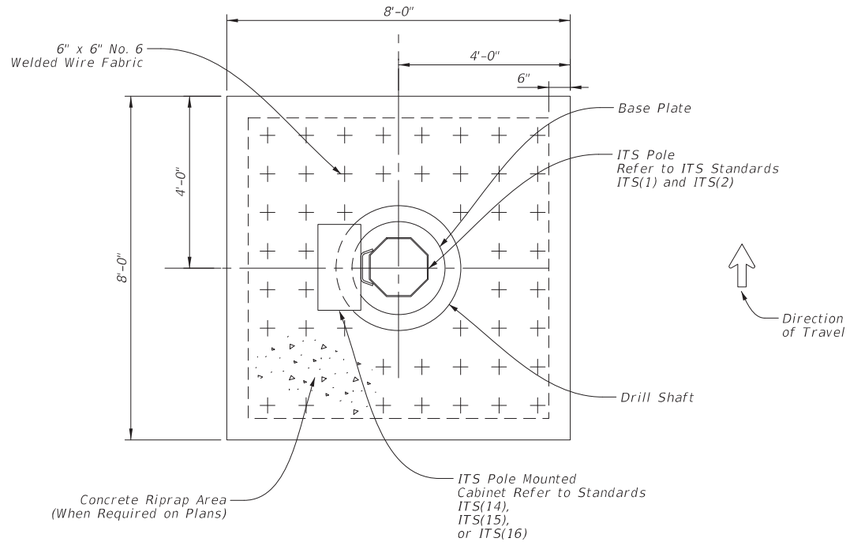
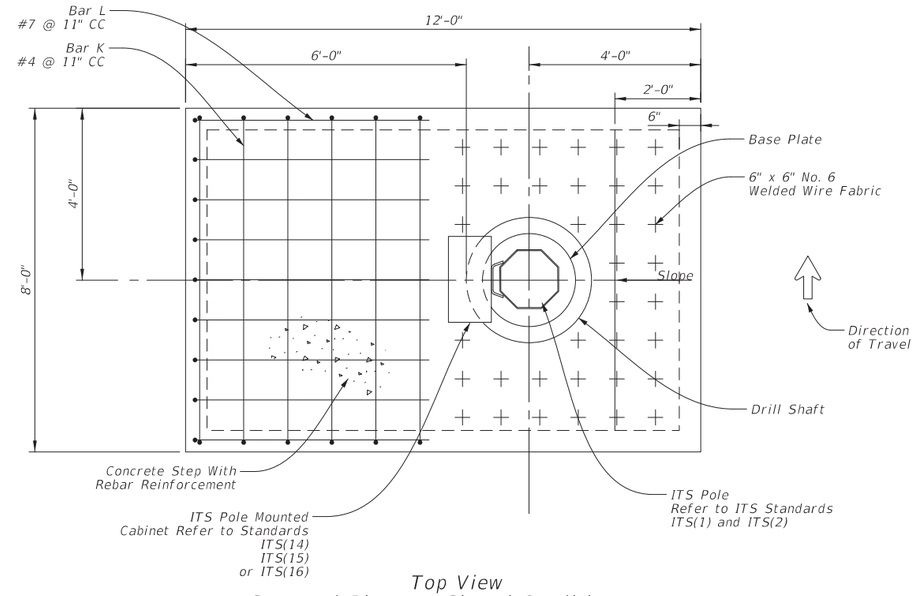
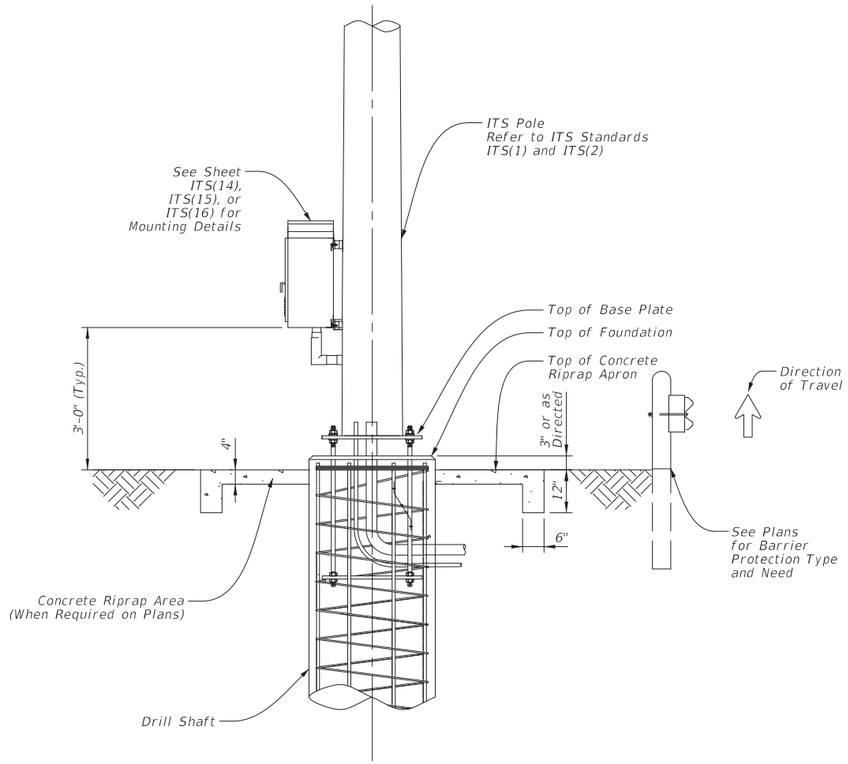


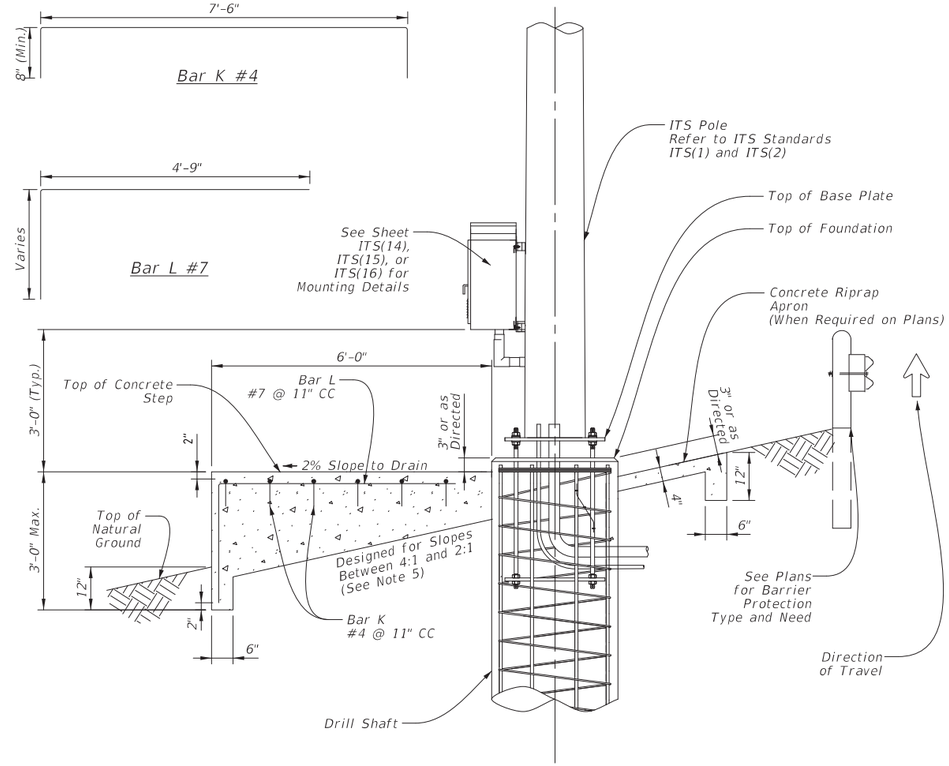

Top View
Riprap – Non-Sloped Conditions




Top View
Step and Riprap – Sloped Conditions




Elevation View
Riprap Apron Detail – Non-Sloped Conditions




Elevation View
Riprap Apron/Step Detail – Sloped Conditions
(Slopes Exceeding 4:1)

## General Notes:

1. For non-sloped grassy areas, an 8' x 8' concrete riprap apron shall be poured around ITS pole foundations (see detail on this sheet), estimated at 1.25 CY per site, paid for under Item 432 "Riprap."
2. For sloped grassy areas, a concrete "step" (for maintenance personnel to access cabinet) shall be poured as part of the riprap apron. The step shall vary in height depending on slope, but shall extend 6' horizontally from ITS pole drilled shaft foundation and be the same width as riprap apron (8'). Step shall be poured at same time as riprap apron (see detail on this sheet). Any additional concrete necessary to fabricate step (over and above the 1.25 CY) shall be considered subsidiary to the various bid items and no direct payment shall be made.
3. For sloped areas where riprap exists, a 6' (horizontal from drilled shaft foundation) x 4' wide step shall be installed (see detail this sheet). Concrete for step shall be considered subsidiary to the various bid items and no direct payment shall be made.
4. Cabinet orientation may vary depending on field conditions or project constraints. Accommodate configuration of platform according to cabinet orientation.
5. Slopes greater than a 2:1 or when 3'-0" Max. step wall height is exceeded, an alternative design with safety railing is required and shall be detailed in the shop drawings for approval.

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# ITS POLE RIPRAP DETAILS

## ITS(7)-15

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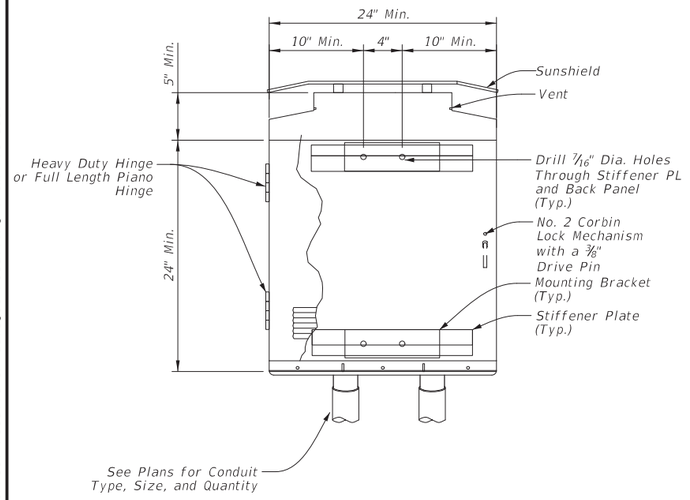
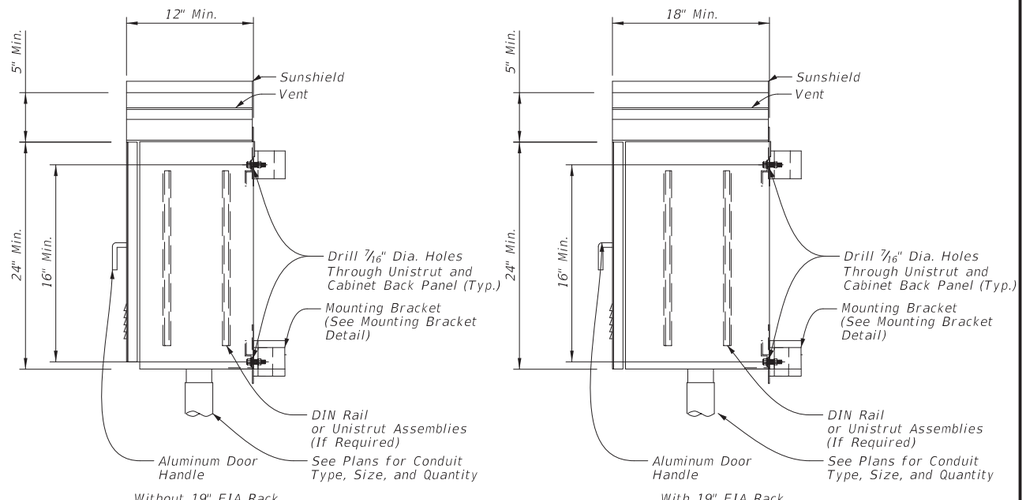


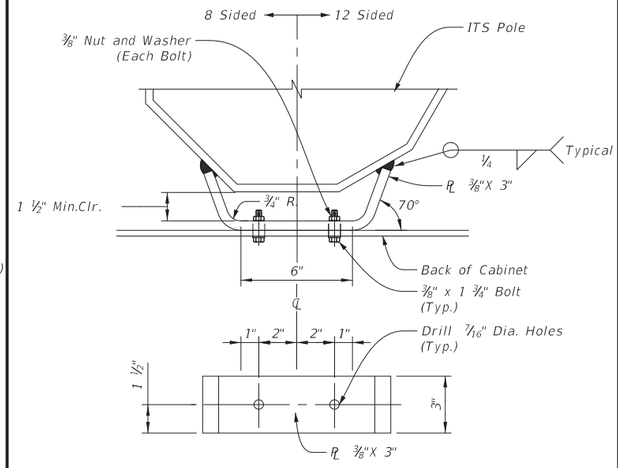

## Pole Mounted Cabinet – Type 1 Front View

Not to Scale




## Pole Mounted Cabinet – Type 1 Side View

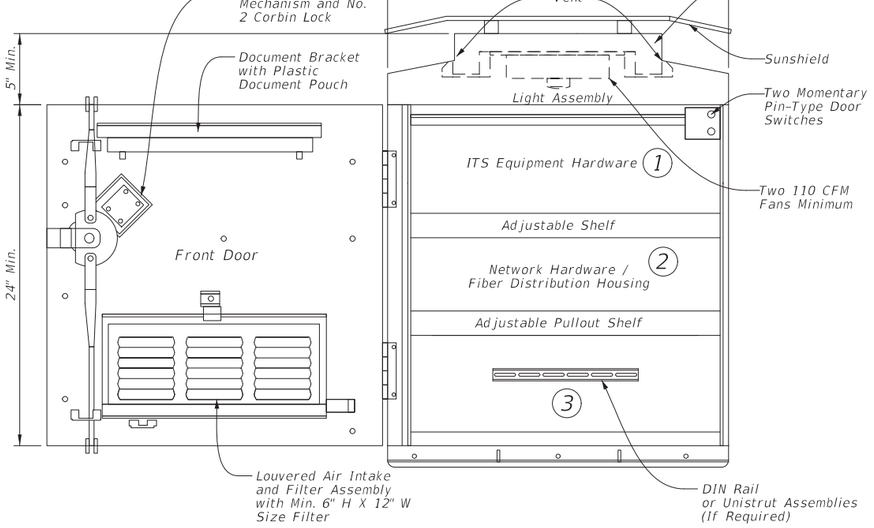
Not to Scale




Note:
ITS Pole May be Round, Octagonal (8 Sided), or Dodecahedron (12 Sided).
See ITS(1), and ITS(2) for Details.

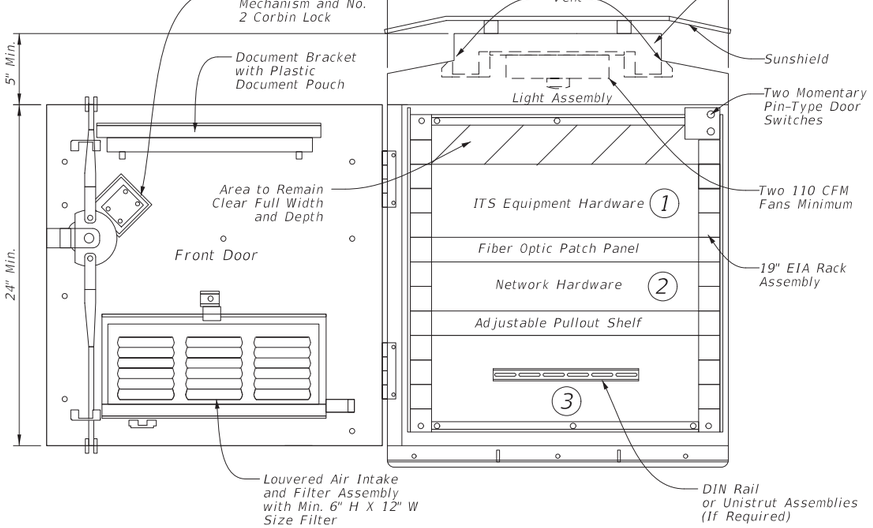
## Mounting Bracket Detail

Not to Scale




## Interior – Type 1 Without 19" EIA Rack – Front View

Not to Scale



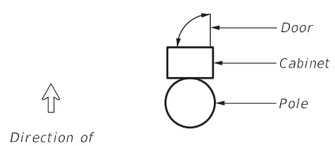

## Interior – Type 1 With 19" EIA Rack – Front View

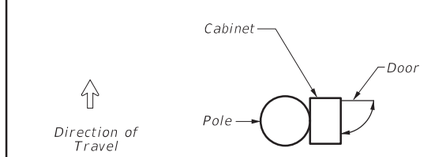
Not to Scale

| Typical Equipment Layout Legend | |
|---|---|
| | Example Equipment |
| 1 | CCTV Interface Panel, Radar Vehicle Sensing Device (RVSD) Equipment, Environmental Sensor Station (ESS) Equipment, Bluetooth Equipment, or ITS Radio Equipment (See General Note 1) |
| 2 | Ethernet Switch, Video Encoder, Terminal Server, Fiber Optic Transceivers, or Media Conversion Equipment (See General Note 1) |
| 3 | Power Distribution Assembly, Service Entrance Breakers, Primary AC Power, Auxiliary Power Strip, Ground Bus Bar Surge Protection Equipment |

## General Notes:

1. Layout of hardware equipment and configuration shown is diagrammatic in nature and intended to represent a preferred Type 1 pole mounted cabinet setup. Hardware needed for each Type 1 cabinet varies and not all cabinet equipment may be shown. The contractor will be responsible for configuring cabinets with all appropriate ITS hardware and power supplies in accordance with the plans and specifications. The contractor may alter the cabinet configuration shown to maximize space and ensure easy access for maintenance.
2. Mount cabinet as detailed on ITS(14) or ITS(17). Orientation of cabinet on ITS pole may vary depending on field conditions. Mount the pole mounted cabinet to the backside of the ITS pole, to allow maintenance personnel to access the cabinet while being able to view oncoming traffic.
3. For ITS pole sites located on slopes greater than 4H:1V, mount the cabinet to the backside of the ITS pole as detailed on ITS(7). Mounting height to accommodate maintenance pad for easy access.
4. All dimensions are approximate and represent minimum cabinet dimensions.
5. Provide conduit entrances at the bottom of the cabinet.
6. Paid under Special Specification "ITS Pole with Cabinet" (Configuration 1) without 19" EIA rack. Paid under Special Specification "ITS Pole with Cabinet" (Configuration 2) with 19" EIA rack.




## Orientation of Type 1 Cabinet on ITS Pole (Typical)

Not to Scale

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# ITS POLE MOUNTED CABINET TYPE 1 DETAILS

# ITS(14)-15

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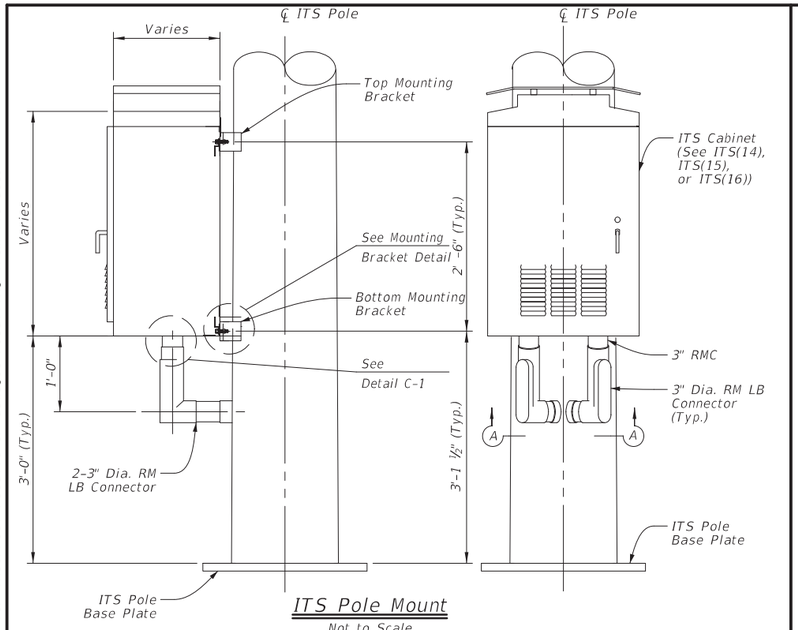
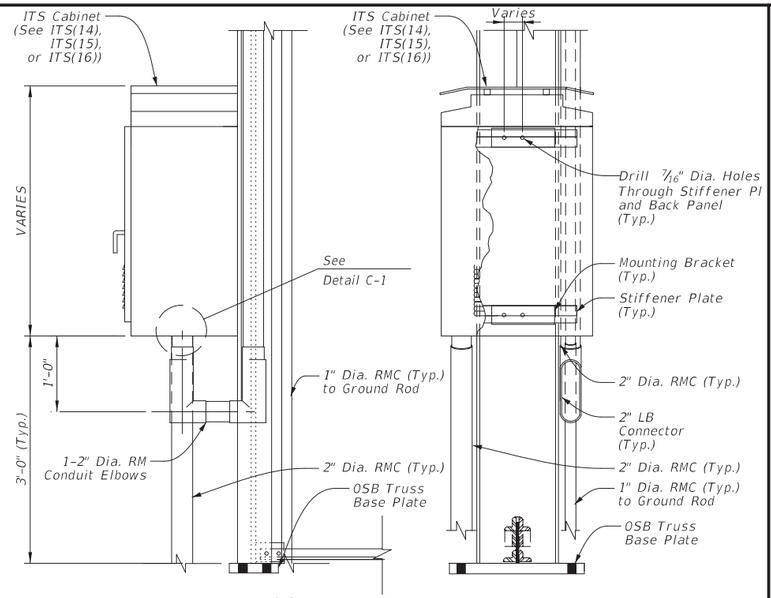


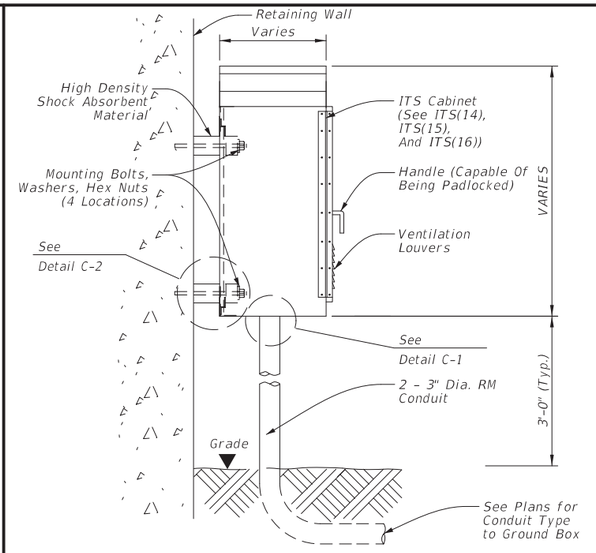

## ITS Pole Mount

Not to Scale



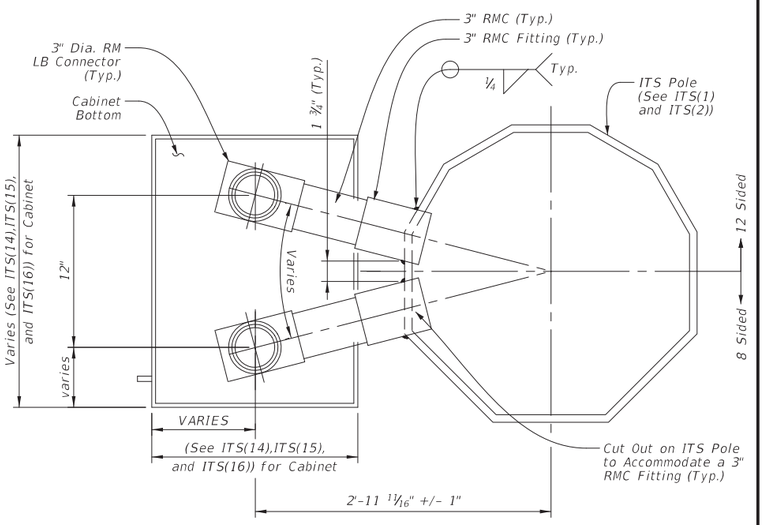

## OSB Truss Mount

Not to Scale




## Retaining Wall Mount

Not to Scale




## Section A-A

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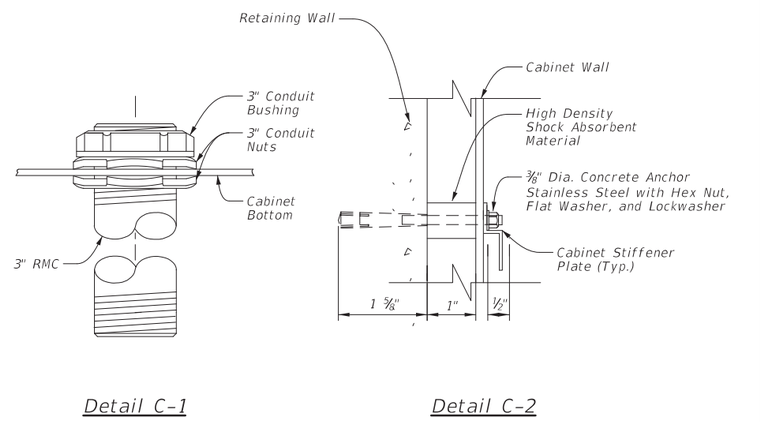
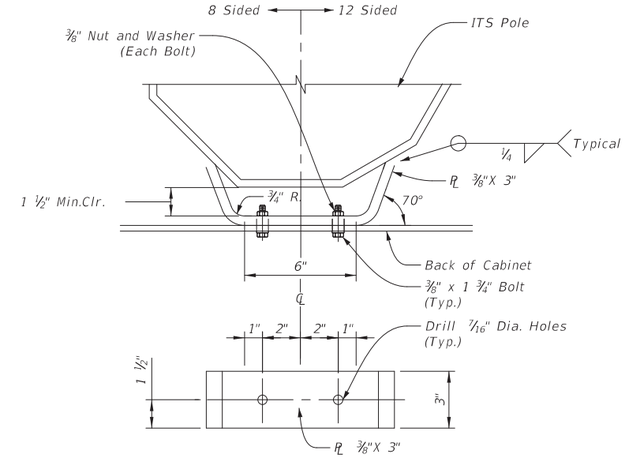



## Detail C-1

## Detail C-2

## Detail C-1 and C-2

Not to Scale




Note:
ITS Pole May be Round, Octagonal (8 Sided), or Dodecahedron (12 Sided).
See ITS(1), and ITS(2) for Details.

## Mounting Bracket Detail

Not to Scale

## General Notes:

1. Mount cabinet as detailed on ITS(14), ITS(15), ITS(16), or ITS(17). Orientation of cabinet on ITS pole may vary depending on field conditions. Mount the pole mounted cabinet to the backside of the ITS pole, to allow maintenance personnel to access the cabinet while being able to view oncoming traffic.
2. For ITS pole sites located on slopes greater than 4V:1H, mount the cabinet to the backside of the ITS pole as detailed on ITS(7). Mounting height to accommodate maintenance pad for easy access.
3. All dimensions are approximate and represent minimum dimensions.
4. Provide conduit entrances at the bottom of the cabinet.

Texas Department of Transportation

Traffic Operations Division Standard

# ITS POLE MOUNTED CABINET MISC. MOUNTING DETAILS

# ITS(17)-15

| FILE: its(17)-15.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
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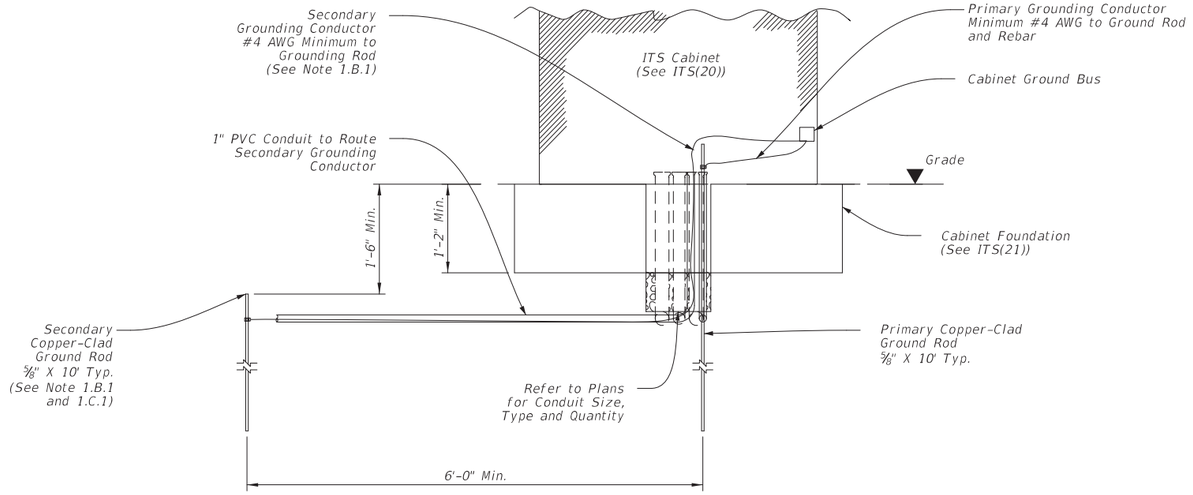
## General Notes:

1. Grounding System:
   - A. Description:
     1. Provide ground system consisting of copper wires, ground rods, and concrete-encased grounding electrodes (Ufers), of the configuration shown to minimize potential gradient irregularities, drain leakage, and fault currents to earth.
   - B. Performance:
     1. Provide a grounding system, consisting of a minimum one ground rod, having a resistance not greater than 5 Ohms to ground. Additional ground rods may be added to the system to achieve less than 5 Ohms resistance.
   - C. Design Criteria:
     1. The combined ground resistance of separate systems bonded together below grade may be used to meet the specified ground resistance, but the minimum number of rods indicated shall still be provided.
     2. Measure the resistance of systems requiring separate ground resistance separately before bonding below grade.
     3. Only provide UL-approved materials listed for grounding systems.
     4. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture, unless moisture is permanently excluded from the junction of such materials.
     5. Submit product data for the materials and products used to perform the work of this section.
   - D. Materials:
     1. Conductors:
        - a. Bare Ground Conductor:
          1) For No. 8 AWG or larger bare ground wire sizes, provide soft drawn copper, Class A or Class B, stranded wire meeting the requirements of ASTM B 8.
     2. Ground Compression Connectors:
        - a. Provide molds, thermite packages, and other material for ground compression connectors that are full-rated to carry 100% of the cable rating and which meet IEEE 837.
          1) Provide the compression materials from a single manufacturer throughout the project.
        - b. Provide the items necessary for connecting cable to ground rods.
     3. Ground Rods:
        - a. Provide copper-clad steel ground rods conforming to the requirements specified in UL 467.
          1) Diameter: ⅝ in.
          2) Length: 10 Ft.

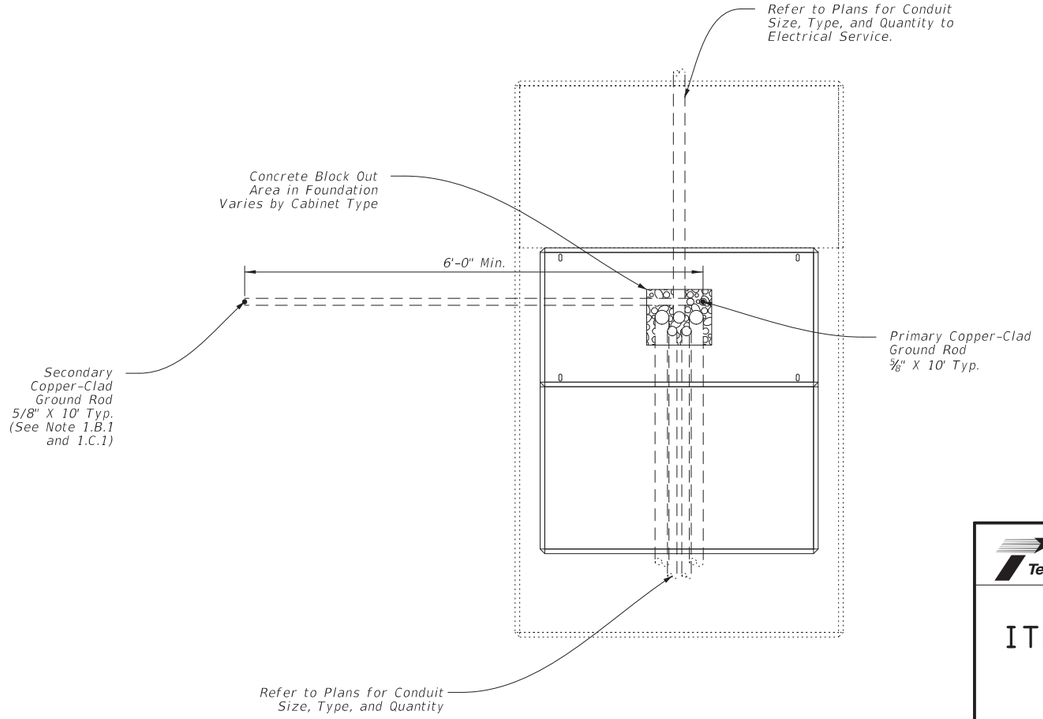
2. Installation:
   - A. Install grounding components and systems in accordance with the requirements specified in UL 467, IEEE 81, and IEEE 142.
   - B. System Grounding:
     1. Ground Rods:
        - a. Drive ground rods into the ground until the tops of the rods are approximately 18 in. below finished grade.
        - b. If multiple ground rods are needed to meet the minimum resistance of 5 Ohms, space ground rods as evenly as possible, at least 6 feet apart, and so conductors will be connected below grade.
     2. Conductors:
        - a. Provide minimum No. 4 AWG ground wire for system and equipment grounding.
        - b. Using suitable fasteners, securely attach exposed ground wires to structural supports at not more than 2 ft. intervals, where applicable.
        - c. Bends in ground wires greater than 45 degrees are unacceptable.
     3. Cable Connections:
        - a. Use approved exothermic-welded connections for conductor splices and connections between conductors and other components.

3. Testing:
   - A. Resistance Test:
     1. Test Procedure:
        - a. The ground-resistance measurements of each ground Rod shall be taken.
          1) The resistance to ground shall be measured in accordance with the fall-of-potential method specified in IEEE 81 and IEEE 142.
          2) Ground-resistance measurements shall be made in normally dry weather, not less than 48 hours after rainfall, and with the ground under test isolated from other grounds.
        - b. Test reports shall be prepared that indicate the location of the ground rod, the grounding system, and the resistance and soil conditions at the time the test was performed.
     2. Acceptance Criteria:
        - a. The grounding system must have a resistance not greater than 5 Ohms.
        - b. Do not energize any part of the electrical distribution system prior to the resistance testing of that system's ground rods and grounding system, and submission of the test results for approval.
     3. Inspections:
        - a. Prepare and submit as-built record drawings of the grounding system as installed and test reports for approval.




Ground Mounted Cabinet – Side View

(Slab & Base)
Not to Scale




Ground Mounted Cabinet - Top View

(Slab & Base)
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Texas Department of Transportation

Traffic Operations Division Standard

# ITS CABINET GROUNDING DETAILS

## ITS(18)-15

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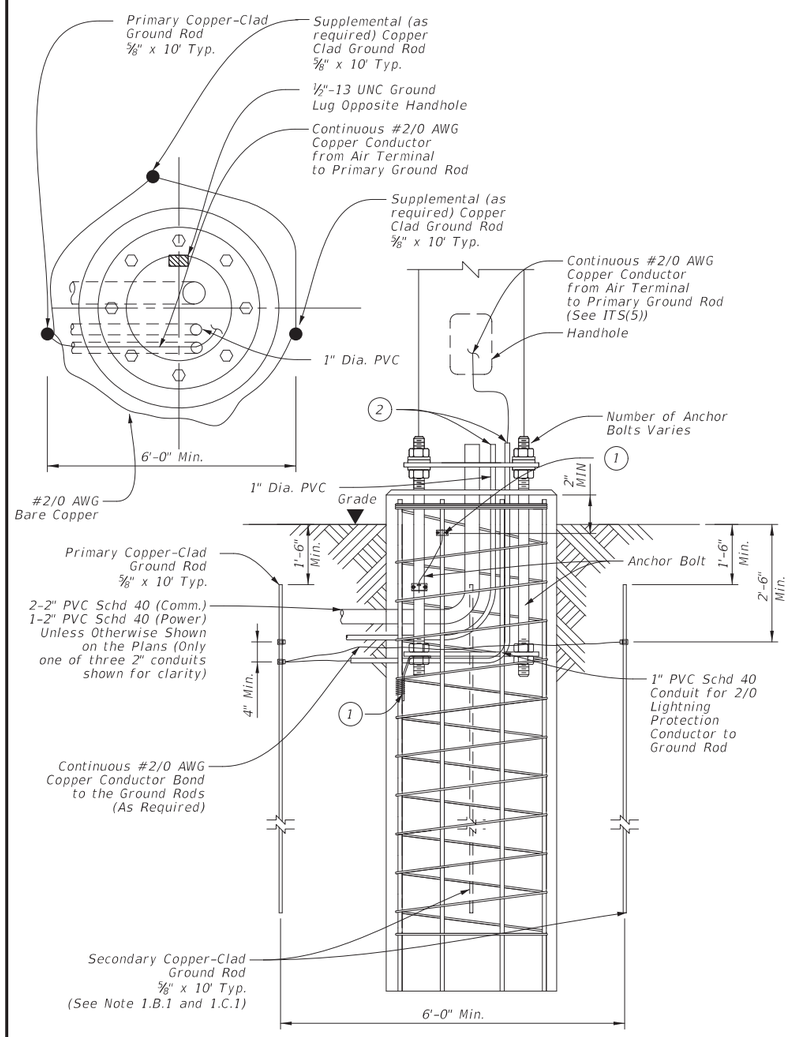
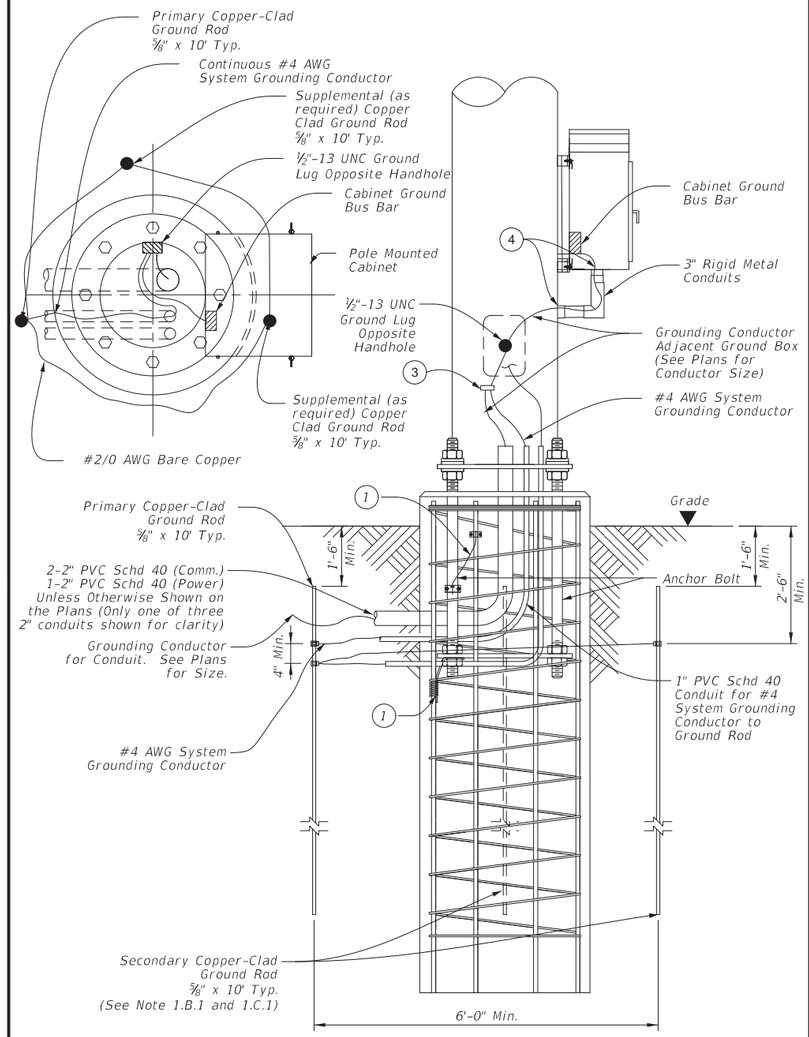
## General Notes:

1. Grounding System:
   - A. Description:
     1. Provide ground system consisting of copper wires, ground rods, and concrete-encased grounding electrodes (Ufers), of the configuration shown to minimize potential gradient irregularities, drain leakage, and fault currents to earth.
   - B. Performance:
     1. Provide a grounding system, consisting of a minimum one ground rod, having a resistance not greater than 5 Ohms to ground. Provide up to 2 additional supplemental ground rods if necessary to achieve a resistance not greater than 5 Ohms to ground. If a total of 3 ground rods is needed then install as as part of a ground ring.
     2. If a ground ring is required, provide a minimum conductor length of 20 ft. placed at a minimum depth of 30 in..
   - C. Design Criteria:
     1. The grounding system of the ITS pole may be bonded below grade to the grounding systems of other nearby equipment to meet the specified grounding resistance. A minimum of one ground rod for the ITS pole is still required.
     2. Separately measure the grounding resistance of each system before bonding together below grade.
     3. Only provide UL-approved materials listed for grounding systems.
     4. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture, unless moisture is permanently excluded from the junction of such materials.
     5. Submit product data for the materials and products used to perform the work of this section.
   - D. Materials:
     1. Conductors:
        - a. Bare Ground Conductor:
          1) Provide prequalified copper conductors appearing on the Material Producers List according to Item 618.
     2. Ground Compression Connectors:
        - a. Provide molds, thermite packages, and other material for exothermic welding of grounding connections.
        - b. Provide listed compression connectors fully rated to carry 100% of the cable rating and that meet IEEE 837. Provide compression materials from a single manufacturer througout the project.
     3. Ground Rods:
        - a. Provide copper-clad steel ground rods conforming to the requirements specified in DMS 11040.
          1) Diameter: ⅝ in.
          2) Length: 10 ft.
2. Installation:
   - A. Install grounding components and systems in accordance with the requirements specified in IEEE 142.
   - B. System Grounding:
     1. Ground Rods:
        - a. Drive ground rods into the ground until the tops of the rods are a minimum of 18 in. below finished grade.
        - b. If multiple ground rods are needed to meet the minimum resistance of 5 Ohms, space ground rods as evenly as possible, at least 6 feet apart, so conductors will be connected below grade.
     2. Conductors:
        - a. Provide minimum No. 2/0 AWG ground wire for lightning protection from air terminal.
        - b. Provide minimum No. 4 AWG ground wire for system and equipment grounding.
        - c. Using suitable fasteners, securely attach exposed ground wires to structural supports at not more than 2 ft. intervals, where applicable.
        - d. Bends in ground wires greater than 45 degrees are unacceptable.
     3. Cable Connections:
        - a. Use exothermic-welded connections or listed compression connectors for conductor splices and connections between conductors and other components.
3. Testing:
   - A. Resistance Test:
     1. Test Procedure:
        - a. The ground-resistance measurements of each ground Rod shall be taken.
          1) The resistance to ground shall be measured in accordance with the fall-of-potential method specified in IEEE 81 and IEEE 142.
          2) Ground-resistance measurements shall be made in normally dry weather, not less than 48 hours after rainfall, and with the ground under test isolated from other grounds.
        - b. Test reports shall be prepared that indicate the location of the ground rod, the grounding system, and the resistance and soil conditions at the time the test was performed.
     2. Acceptance Criteria:
        - a. The grounding system must have a resistance not greater than 5 Ohms.
        - b. Do not energize any part of the electrical distribution system prior to the resistance testing of that system's ground rods and grounding system, and submission of the test results for approval.
     3. Inspections:
        - a. Prepare and submit as-built record drawings of the grounding system as installed and test reports for approval.




Grounding System

Not to Scale




Grounding System with Pole Mounted Cabinet

Not to Scale

## Reference Notes:

1. Bond anchor bolts to rebar with #2/0 AWG jumper and two mechanical connectors or by bending No. 3 bar on bottom template as shown and wire tightly with ten turns of No. 10 wire or one mechanical connector. Mechanical connectors shall be UL Listed for concrete encasement.
2. Cut PVC approximately 1 in. above concrete and install bell or bushing. Align conduit as close as possible to point of attachment to base plate to minimize bends in #2/0 wire.
3. Bond grounding conductors via cadweld or mechanical connector, rated for size and number of conductors.
4. Provide and install a grounding type bushing on metal conduit terminations. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor.

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# ITS POLE GROUNDING DETAILS

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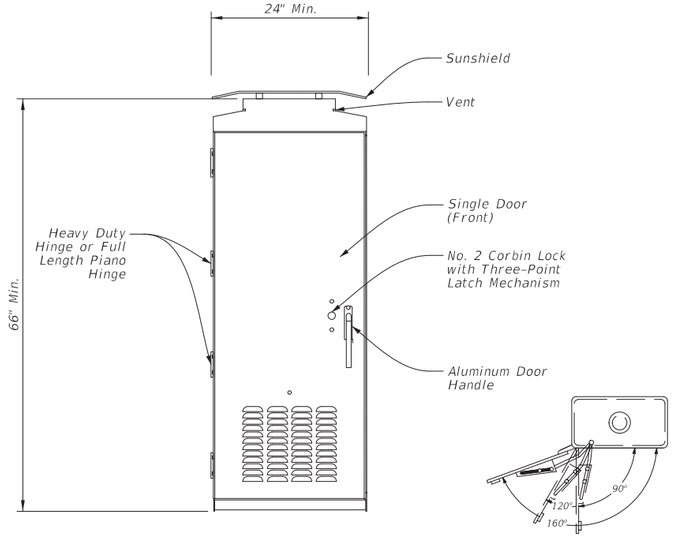
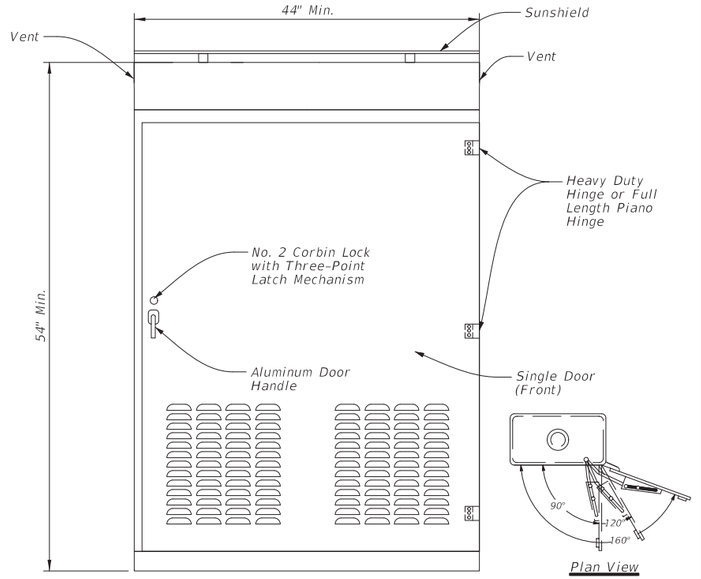



Type 4 (Small) Cabinet
Front View



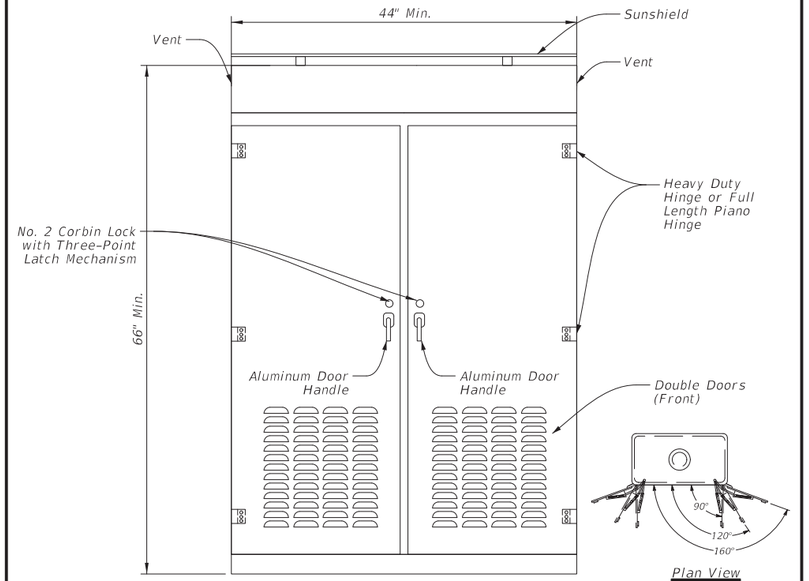

Plan View
Door Stop Detail
(3 Positions)




Type 5 (Medium) Cabinet
Front View



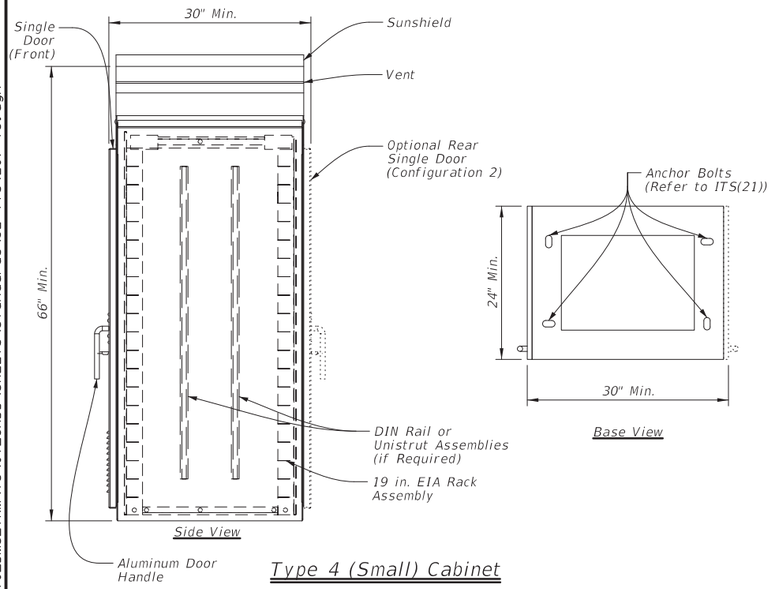

Plan View
Door Stop Detail
(3 Positions)




Type 6 (Large) Cabinet
Front View




Plan View
Door Stop Detail
(3 Positions)

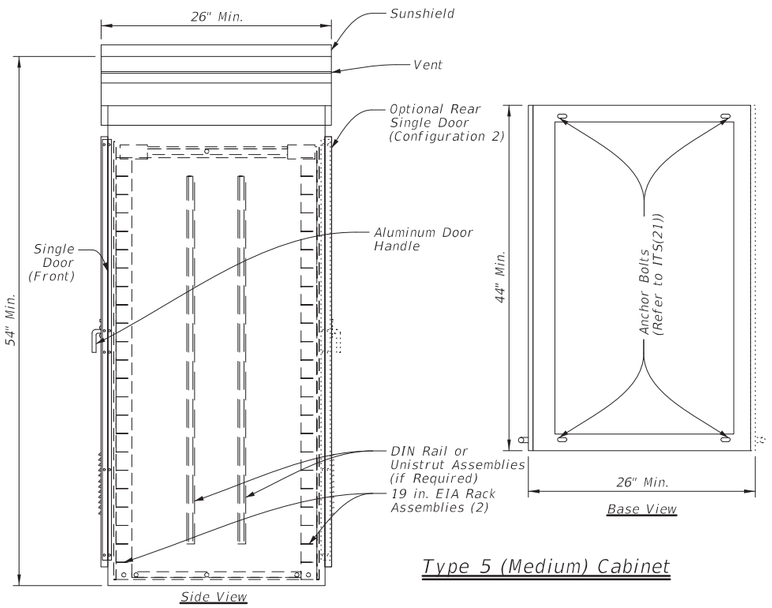



Side View




Base View

Type 4 (Small) Cabinet

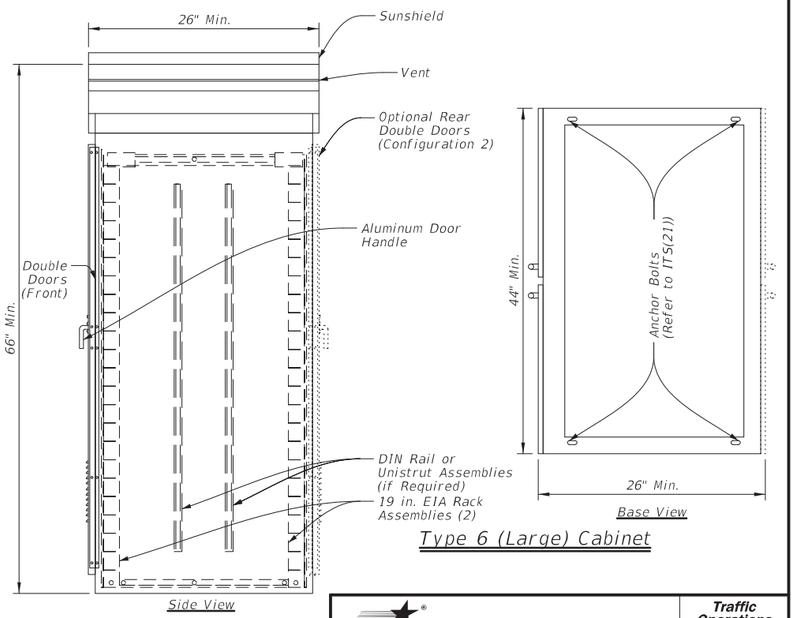



Side View




Base View

Type 5 (Medium) Cabinet




Side View




Base View

Type 6 (Large) Cabinet

## General Notes:

1. Cabinet hardware equipment and door configuration shown is diagrammatic in nature and intended to represent a preferred ground mounted cabinet setup. Door orientation may vary and will be noted in the plans. The contractor will be responsible for configuring cabinets with all appropriate ITS hardware and power supplies in accordance with the plans and specifications. The contractor may alter the cabinet configuration shown to maximize space and ensure easy access for maintenance.
2. All dimensions are approximate and represent minimum dimensions.
3. Provide conduit entrances at the bottom of the cabinet.
4. Paid under Special Specification "ITS Ground Mounted Cabinet" (Configuration 1) with single door. Paid under Special Specification "ITS Ground Mounted Cabinet" (Configuration 2) for rear door option.
5. Sunshield to be mounted to cabinet using nuts, bolts, and spacers. Water proof sealant to be used at cabinet surface/bolt contact points.

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# ITS GROUND MOUNTED CABINET ELEVATION DETAILS

# ITS(20)-15

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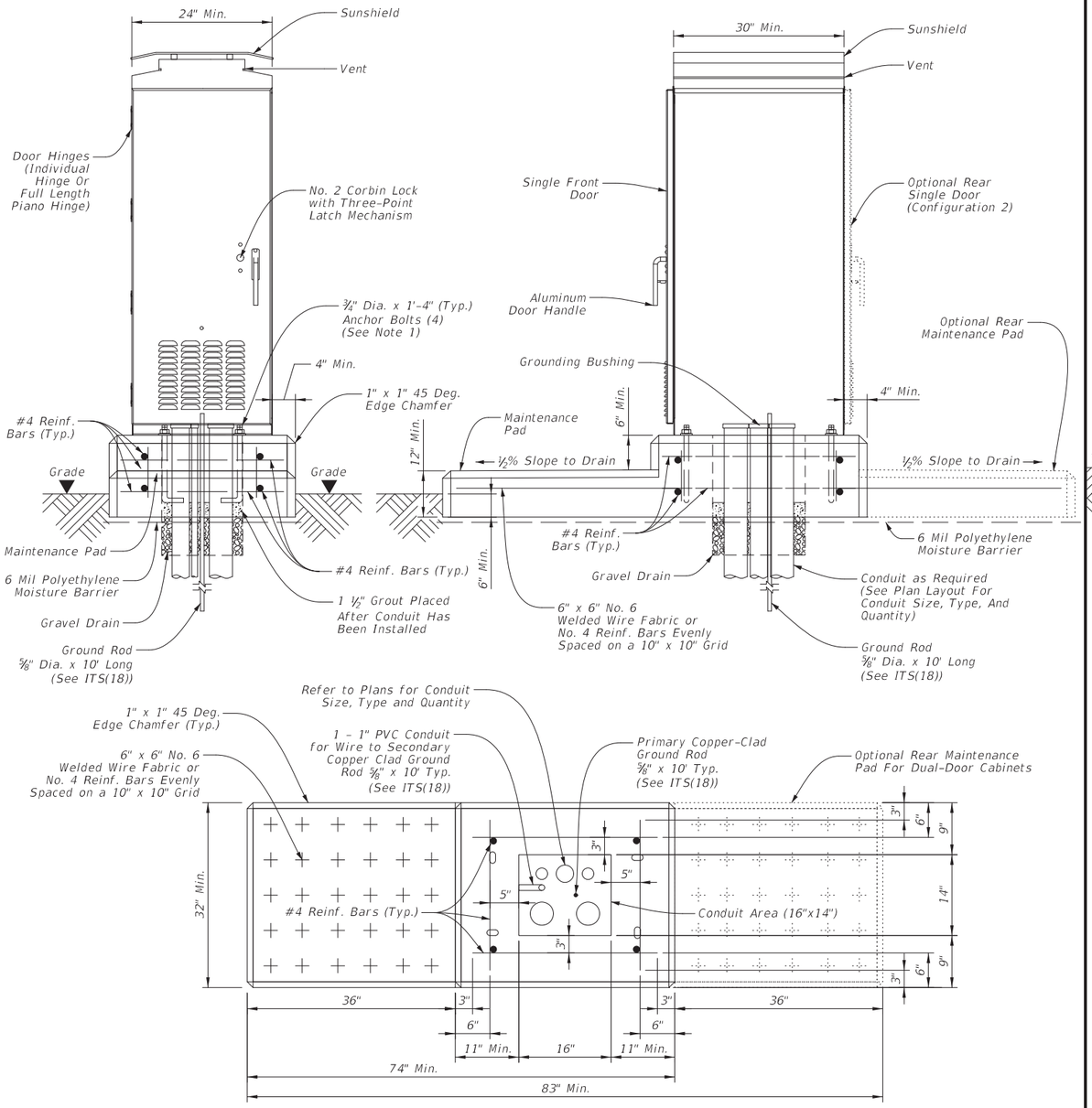
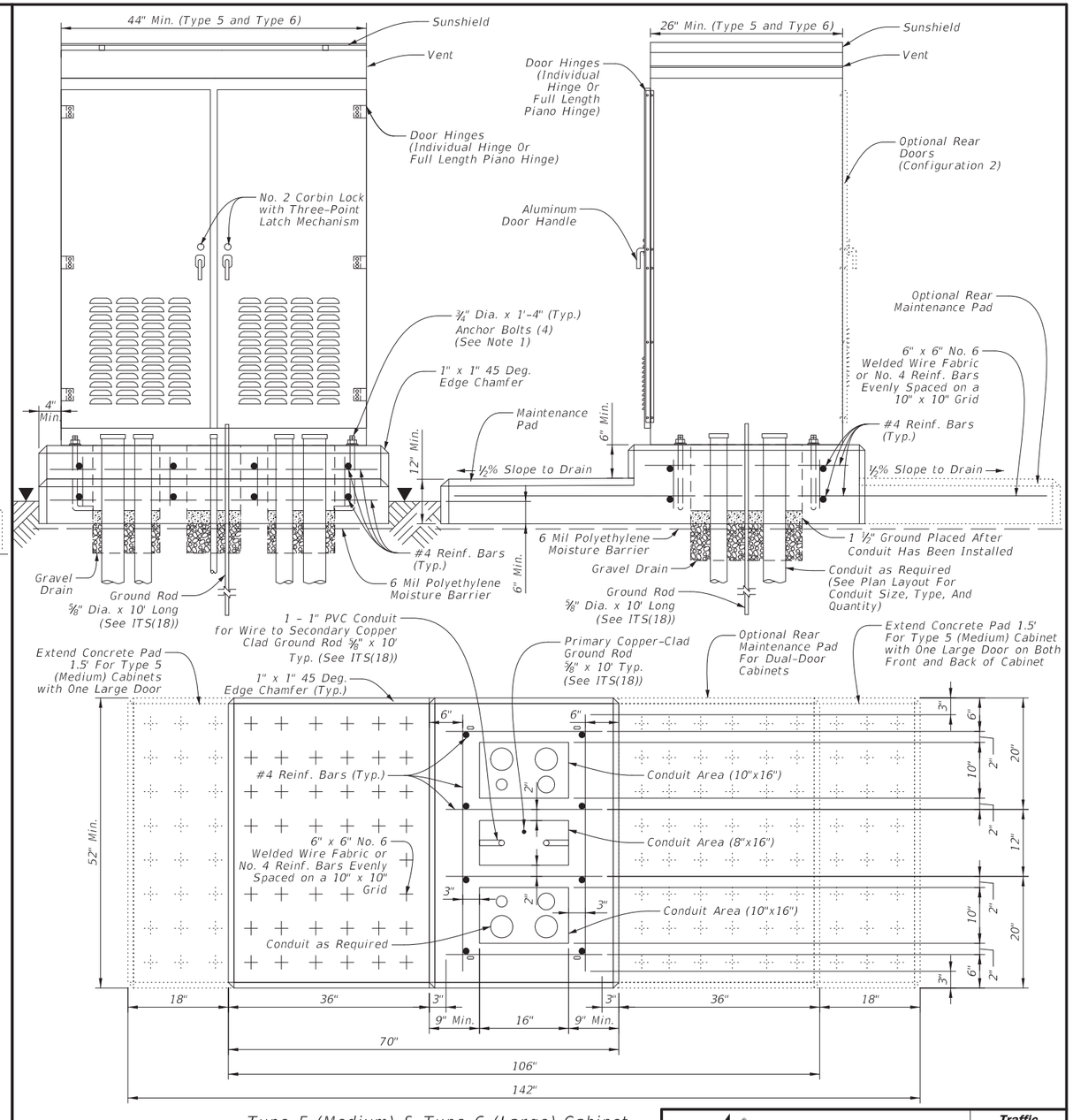






Type 4 (Small) Cabinet




Type 5 (Medium) & Type 6 (Large) Cabinet

## General Notes:

1. Details of anchor bolt location to be furnished by the cabinet manufacturer. Size and length of anchor bolts shown in details may vary by manufacturer.
2. Modify concrete base dimensions to fit required cabinet type.
3. Ensure conduit area has gravel drain, 12" depth, course aggregate, grade No. 1.
4. All concrete to be Class "A" in accordance with Item 421.
5. Set the cabinet foundation level with the pavement surface, in unpaved area. The foundation shall be a minimum of 4" above surrounding grade, or as approved by the Engineer.
6. Furnish any additional concrete which may be necessary to stabilize foundation at unusual locations.
7. Foundation will be subsidiary to Special Specification "ITS Ground Mounted Cabinet.
8. Ground cabinet as required in cabinet specifications and as detailed on ITS(18) in accordance with the National Electric Code (NEC).
9. Treat cabinet foundation with moisture sealant.
10. Type 5 cabinet foundation will have a slightly larger foundation than Type 6. See foundation notes on details.
11. Drain pipe shall be screened for drainage portion below foundation in gravel.

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# ITS GROUND MOUNTED CABINET FOUNDATION DETAILS

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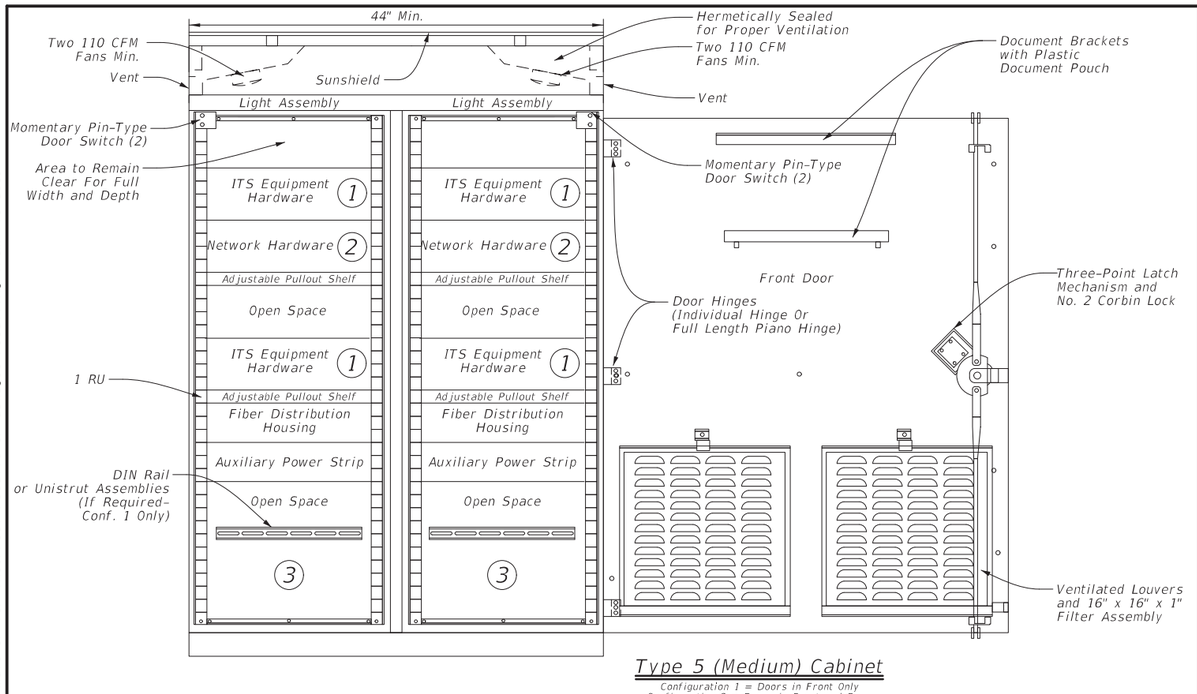
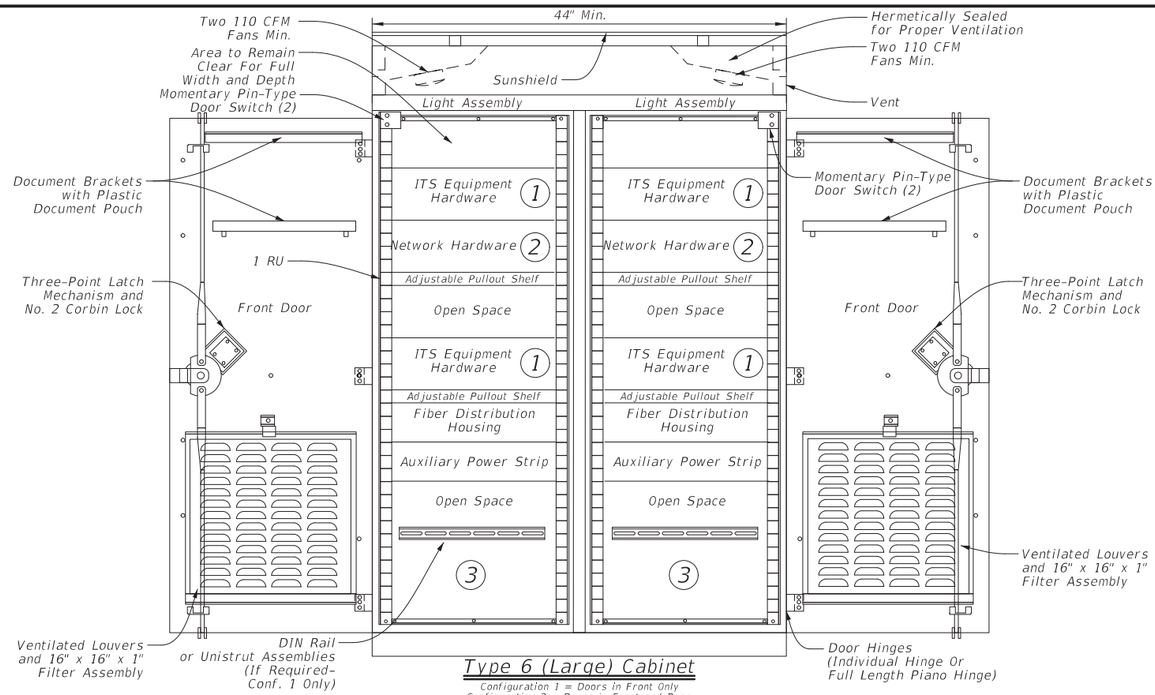


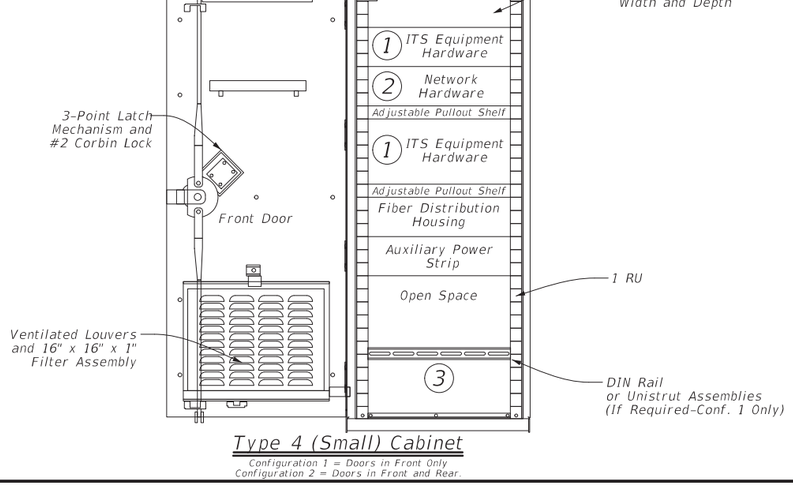

Type 5 (Medium) Cabinet

Configuration 1 = Doors in Front Only
Configuration 2 = Doors in Front and Rear.




Type 6 (Large) Cabinet

Configuration 1 = Doors in Front Only
Configuration 2 = Doors in Front and Rear.




Type 4 (Small) Cabinet

Configuration 1 = Doors in Front Only
Configuration 2 = Doors in Front and Rear.

## Typical Equipment Layout Legend

| | Example Equipment |
|---|---|
| 1 | CCTV Interface Panel, Radar Vehicle Sensing Device (RVSD) Equipment, DMS/LCS Controller Environmental Sensor Station (ESS) Equipment, Bluetooth Equipment, Highway Advisory Radio (HAR), Ramp Meter or Inductive Loop Card Rack, Automatic Vehicle Identification (AVI) Equipment, or ITS Radio Equipment (See General Note 1) |
| 2 | Ethernet Switch, Video Encoder, Terminal Server, Fiber Optic Transceivers, or Media Conversion Equipment (See General Note 1) |
| 3 | Power Distribution Assembly, Service Entrance Breakers, Primary AC Power, Auxiliary Power Strip, Ground Bus Bar Surge Protection Equipment, Solar Power System (If Required) |

## General Notes:

1. Layout of hardware equipment and configuration shown is diagrammatic in nature and intended to represent a preferred ground mounted cabinet setup. Hardware needed for each cabinet varies and not all cabinet equipment may be shown. The contractor will be responsible for configuring cabinets with all appropriate ITS hardware and power supplies in accordance with the plans and specifications. The contractor may alter the cabinet configuration shown to maximize space and ensure easy access for maintenance.
2. All dimensions are approximate and represent minimum dimensions.
3. Provide conduit entrances at the bottom of the cabinet.
4. Paid under Special Specification "ITS Ground Mounted Cabinet" (Configuration 1) with single door. Paid under Special Specification "ITS Ground Mounted Cabinet" (Configuration 2) for rear door option.
5. RU = rack unit.
6. Contractor to remove the cabinet removable center support, which ensures cabinet rigidity during shipping, during installation.

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# ITS GROUND MOUNTED CABINET INTERIOR DETAILS

# ITS(23)-15

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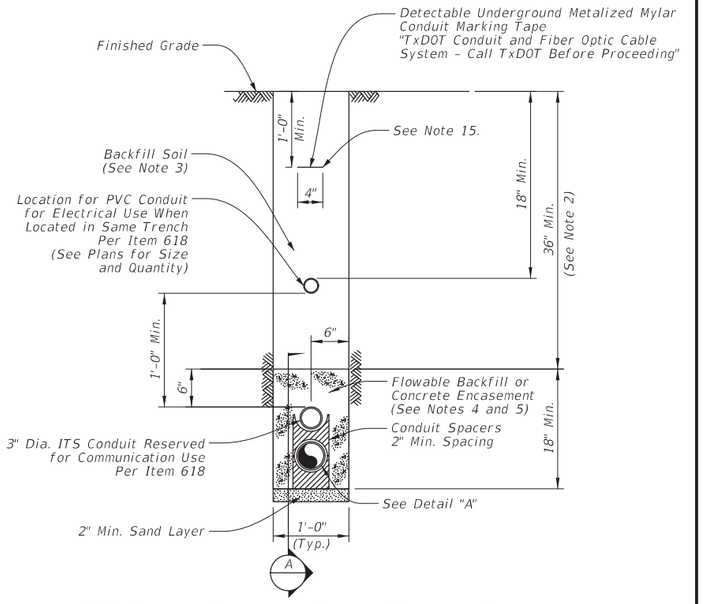
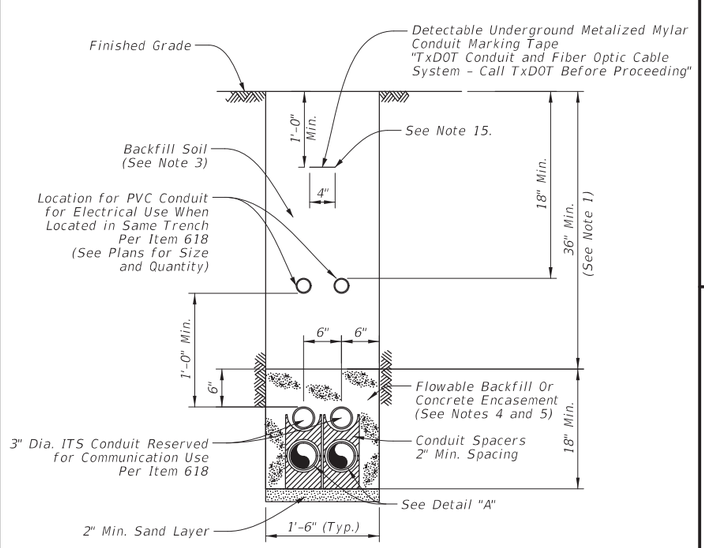


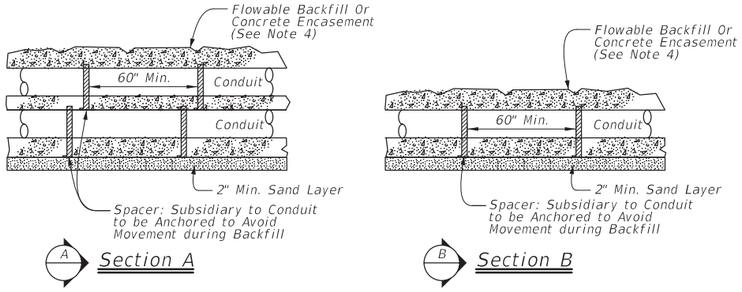

## ITS Conduit Backbone Trench Vertical Spacing

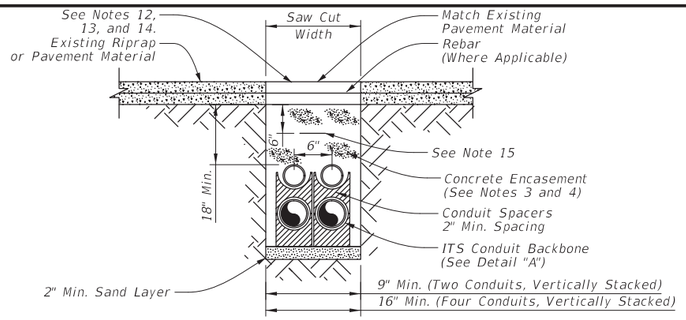
Two Conduit System



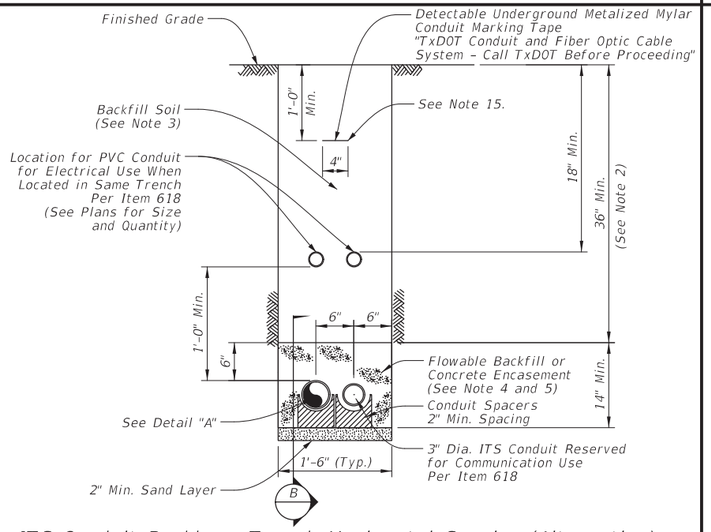

## ITS Conduit Backbone Trench Vertical Spacing

Four Conduit System



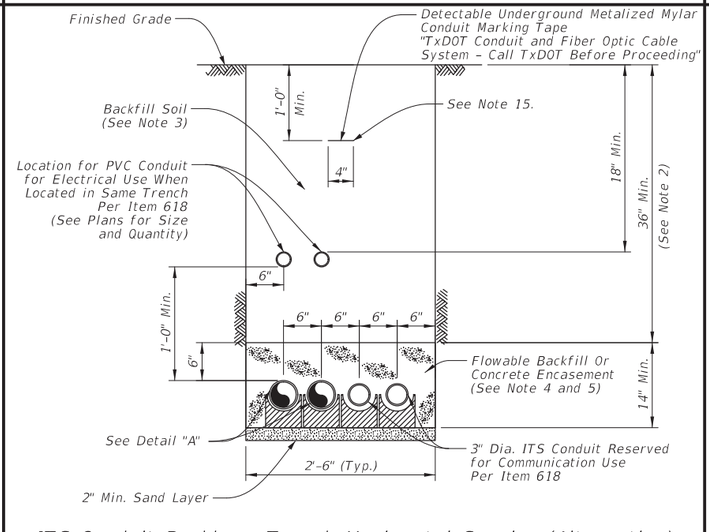




## Open Cut Trenching Details



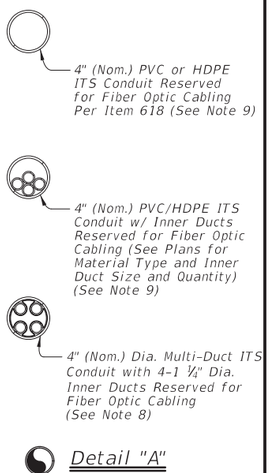

## ITS Conduit Backbone Trench Horizontal Spacing (Alternative)

Two Conduit System



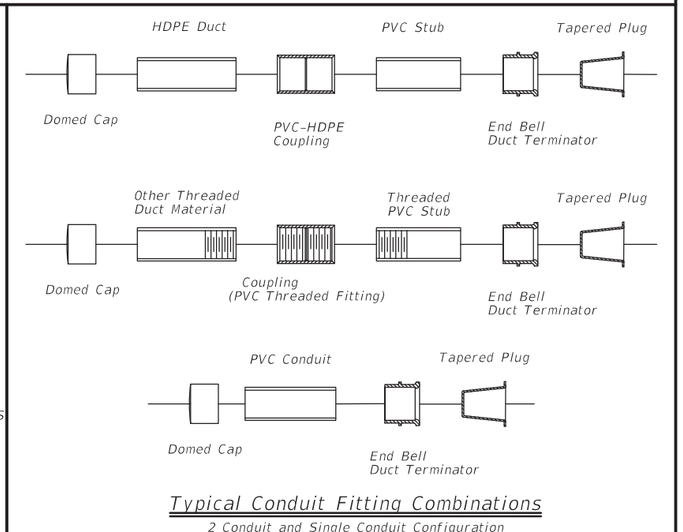

## ITS Conduit Backbone Trench Horizontal Spacing (Alternative)

Four Conduit System




## Detail "A"

Conduit Types
(See Plans for Type and Quantity)




## Typical Conduit Fitting Combinations

2 Conduit and Single Conduit Configuration

SHEET 1 OF 2

## General Notes:

1. Construct the ITS conduit backbone system by vertically spacing conduit, unless field constraints, obstructions, or utility conflicts require horizontal spacing of conduits. Both vertical and horizontal spacing configurations have been detailed for contractor information for construction.
2. Install ITS conduit backbone system a minimum of 42 inches from finished grade to the top of the conduit unless otherwise directed or to avoid conflicts or field conditions such as utilities or obstructions. Vary depth of the trench in order to pass over/under any existing utilities. Refer to ITS Conduit Obstruction Crossing Standard ITS(35) for further detail.
3. Perform trench excavation and backfilling in accordance with Item 400, "Excavation and Backfill for Structures."
4. When a trench depth greater than 24 inches can be achieved from the finished grade to the top of ITS conduit, encase the conduits with flowable backfill in accordance with Item 401, "Flowable Backfill." Use Class B concrete as a substitute in accordance with Item 421, "Hydraulic Cement Concrete" at the discretion of the Engineer.
5. When a trench depth of less than 24 inches is required due to field conditions, encase the conduits in Class B concrete in accordance with Item 421, "Hydraulic Cement Concrete."
6. Concrete encasement will be paid for under Special Specification "ITS Multi-Duct Conduit" or as shown on the plans.
7. Provide ITS PVC conduit identified for electrical and communication use in accordance with Item 618, "Conduit."
8. Provide ITS multi-duct conduit identified for fiber optic communication use in accordance with Special Specification "ITS Multi-Duct Conduit."
9. Conduit per Item 618, "Conduit" (See Plans for Material Type and Quantity).
10. Provide a single 1/C #14 insulated wire in conduit runs which have been identified in the plans to carry fiber optic cable. Provide UL listed solid copper wire with orange color low density polyethylene insulation suitable for conduit installation rated for temperature range -20 C to 60 C and a voltage rating of 600V. This wire will serve as a tracer, or locate, wire for locating underground conduit containing fiber optic cabling and will be paid for under Item 620, "Electrical Conductors."
11. Provide a flat pull cord in all empty conduits and innerducts. Provide a pull cord with a tensile strength of 1,250 Lbs. minimum and have foot markings to determine length installed. Pull cord and installation to be subsidiary to various bid items.
12. Remove saw cut width to accommodate conduit installation.
13. Replace rebar as necessary, lapped and tied a minimum of 3 inches to existing rebar.
14. Replace broken pavement materials with similar materials to exact shape, and thickness of existing.
15. Place marking tape a minimum of 1 foot - 0 inches below grade when no other electrical marking tape required, or 8 inches below electrical marking tape when provisioned under Item 618.
16. Provide a 1/C #8 insulated grounding conductor within one inner duct of a pre-assembled multi-duct when no other grounding conductor is provisioned for in the plans.

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Traffic Operations Division Standard

# ITS CONDUIT TRENCH DETAILS

# ITS(27)-16

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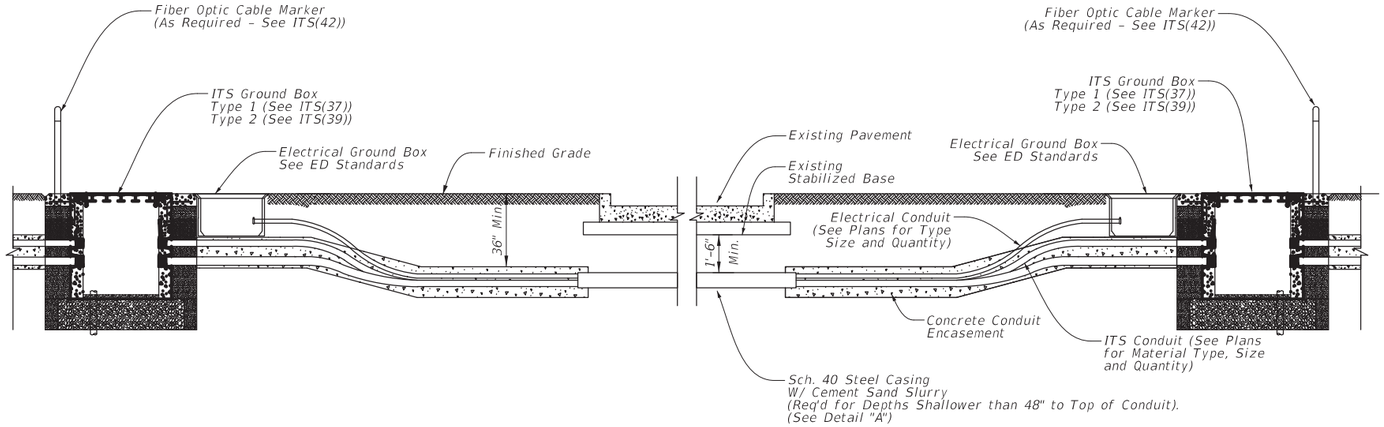
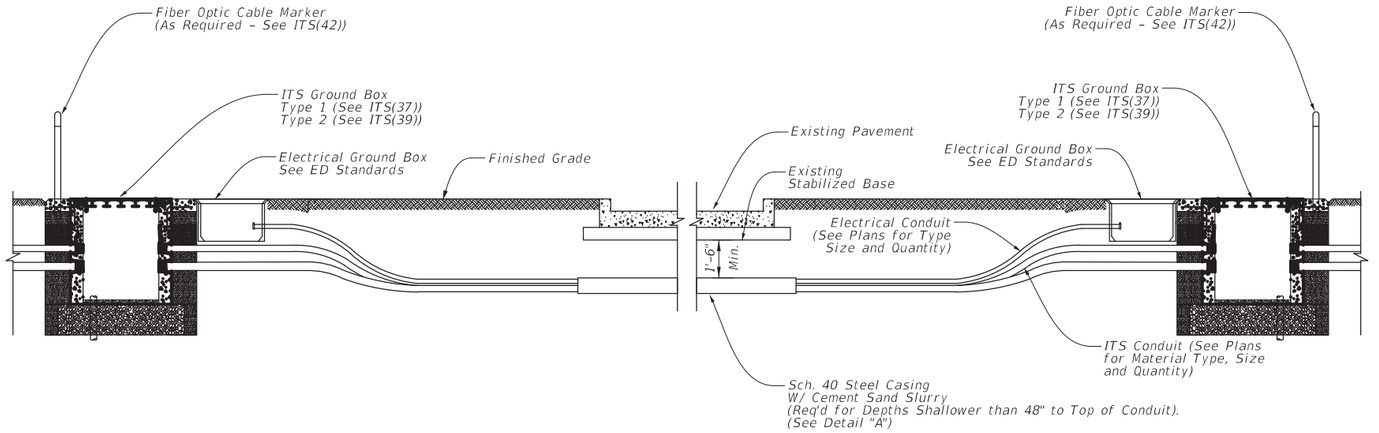
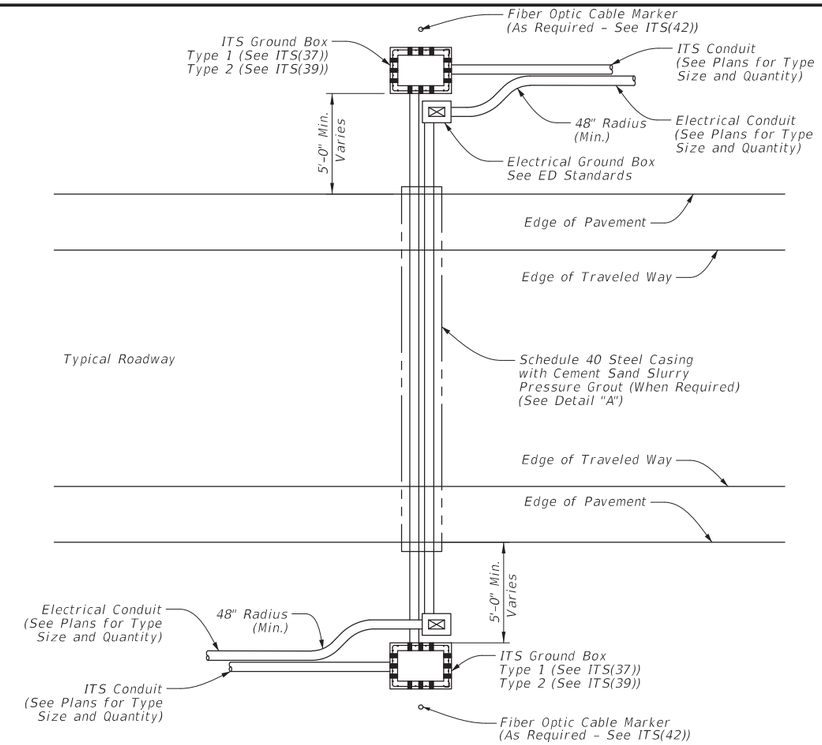


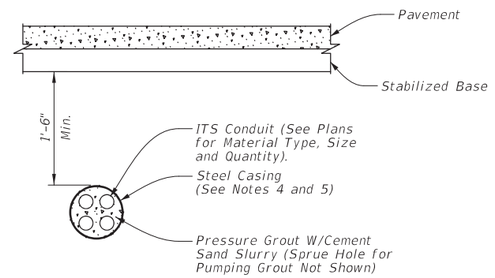

Typical Conduit Installation Jacking
or Boring Beneath Existing Roadway




Typical Conduit Installation Jacking
or Boring Beneath Existing Roadway
(Where Concrete Encasement Not Required)



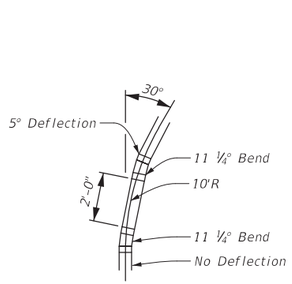

Bore Under Pavement



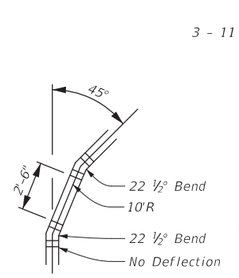

Steel Casing Detail "A"

## General Notes:

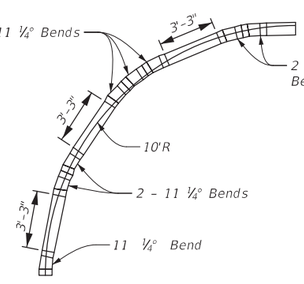
1. Typical conduit installation details for jacking or boring beneath existing roadway is diagrammatic in nature. Roadway cross-slopes may vary for each crossing.
2. Jack or bore in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box" except for measurement and payment.
3. Furnishing and installation of pressure grouting will not be paid for directly but considered incidental to Special Specification "ITS Multi-Duct Conduit" or Item 618, "Conduit."
4. When boring under pavement shallower than 48 inches from finished grade to top of conduit, provide Schedule 40 steel casing under pavement to encase the conduit system. Provide steel casing of a size to accommodate ITS conduit and electrical conduit as shown in the plans. Provide a minimum 20 percent void space around all conduits. Steel casing will not be paid for directly but considered incidental to Special Specification, "ITS Multi-Duct Conduit" or Item 618, "Conduit."
5. When a depth greater than 48 inches can be achieved from finished grade to top of conduit, provide Schedule 80 PVC. No steel casing required unless otherwise directed.
6. Ensure all conduit bends are in conformance with the latest edition of the National Electrical Code.
7. Provide GPS coordinate points to the District for all ground boxes installed, and shifts or deviations of the conduit alignment from the plans required to avoid obstructions or utilities. Take GPS coordinate points at the start of the transition, at the point of curvature, and at the end of the transition at the point of tangency. Document the turnout radius and installed depth. Provide GPS coordinate points in NAD83 coordinate system and be accurate to 5 feet.




30° Turnout Detail




45° Turnout Detail




90° Turnout Detail

Provide this arrangement of conduit and fittings or approved equal at all 30°, 45°, and 90° bends, horizontal and vertical, to achieve a nominal 10' conduit radius for pre-assembled multi-duct conduit. See Note 7.

Sheet Details
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SHEET 2 OF 2

Texas Department of Transportation

Traffic Operations Division Standard

# ITS CONDUIT BORE AND STEEL CASING DETAILS

# ITS(28)-16

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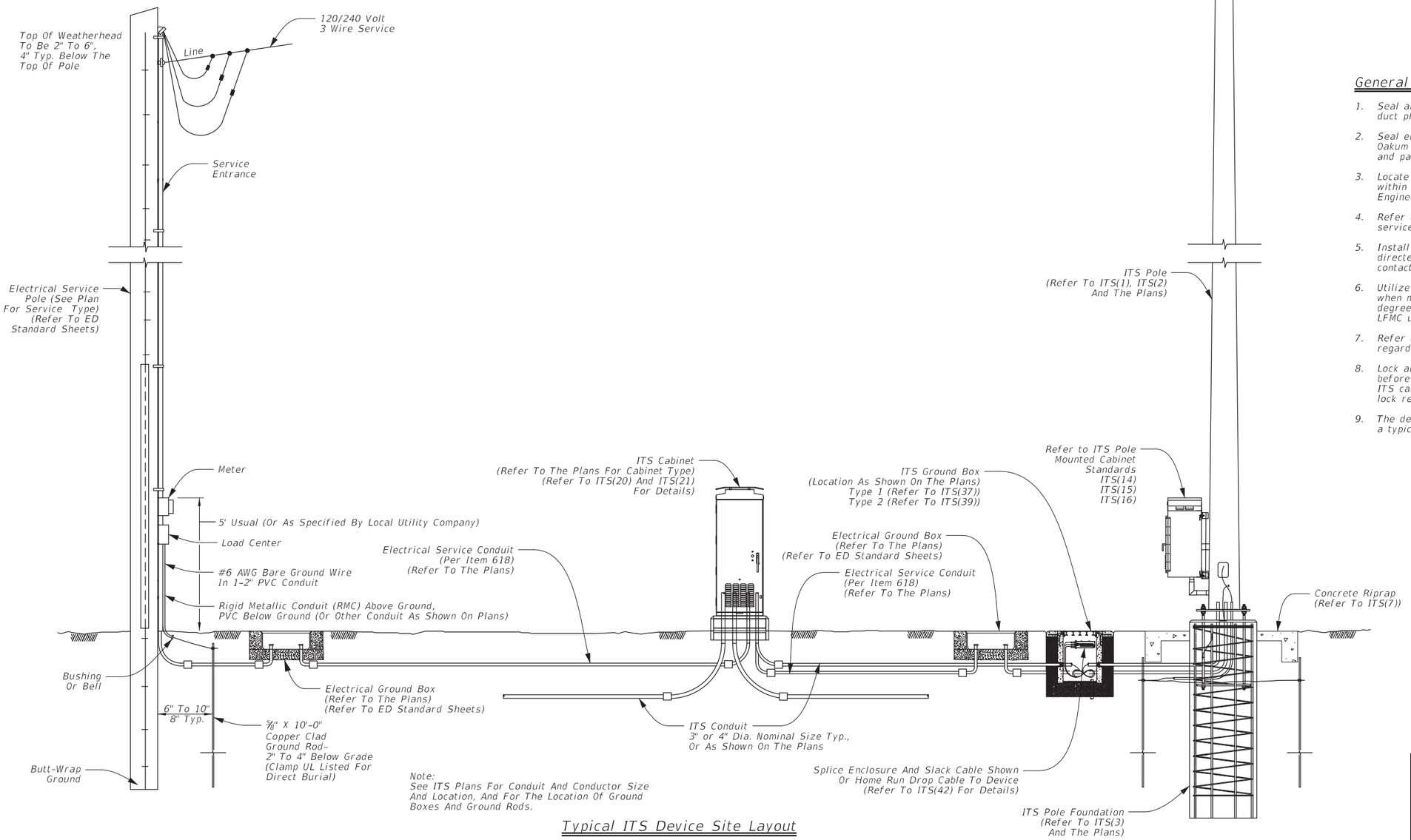


Note:
See ITS Plans For Conduit And Conductor Size And Location, And For The Location Of Ground Boxes And Ground Rods.

## Typical ITS Device Site Layout

## General Notes:

1. Seal all ITS communications conduits with waterproof duct plugs and seals.
2. Seal ends of all conduit entries into ITS cabinets with Oakum or other as approved by the District representative and pack with duct sealant.
3. Locate ground boxes for electrical and ITS communications within 5'-0" of cabinet enclosure, or as directed by the Engineer.
4. Refer to ED standard sheets for additional notes regarding electrical service.
5. Install service pole ground rod at alternate location when directed by the engineer. Maintain a minimum of 8'-0" in contact with the earth.
6. Utilize liquidtight flexible metal conduit (LFMC), as required when meter and service enclosure are mounted 90 to 180 degrees to each other. Refer to ED standard sheets for details on LFMC use.
7. Refer to ITS(21), ITS(37) and ITS(39) for details regarding conduit depth and entry into ITS ground boxes.
8. Lock all enclosures and bolt all ground box covers before power is applied to the circuit. Refer to the ITS cabinet references indicated on this sheet for cabinet lock requirements.
9. The detail shown is diagrammatic and is intended to represent a typical layout from electrical service to ITS devices.

Sheet Details
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# TYPICAL ITS DEVICE SITE LAYOUT

# ITS(36)-16

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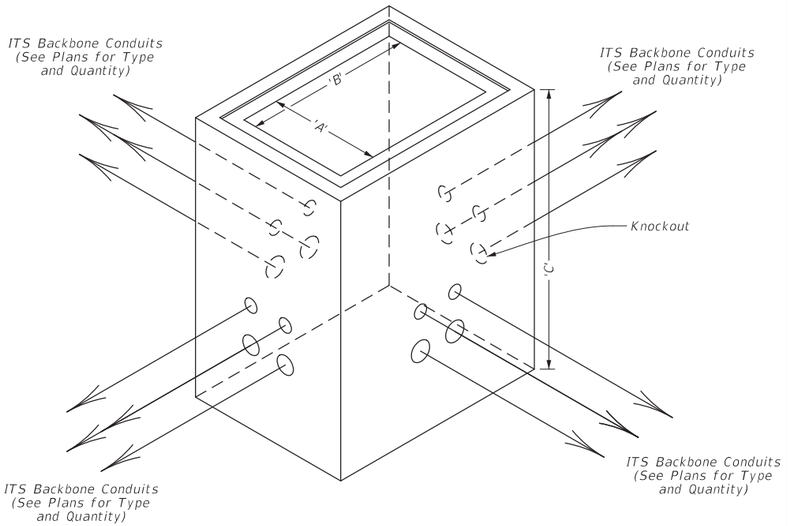
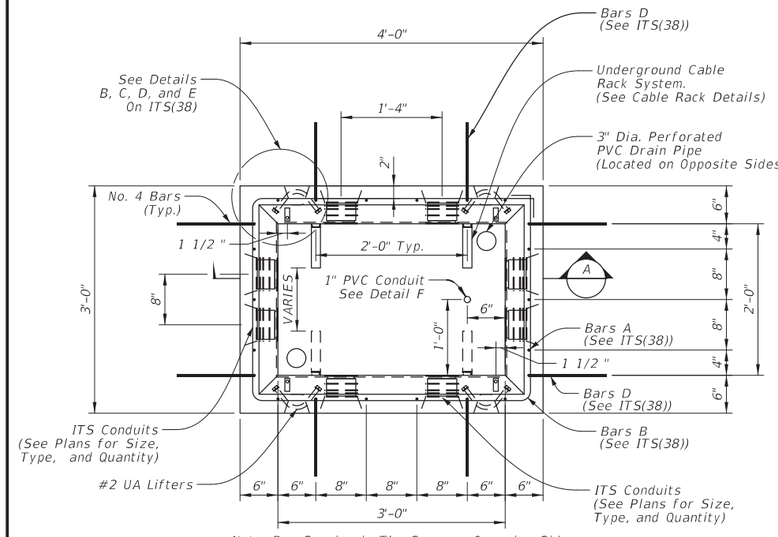


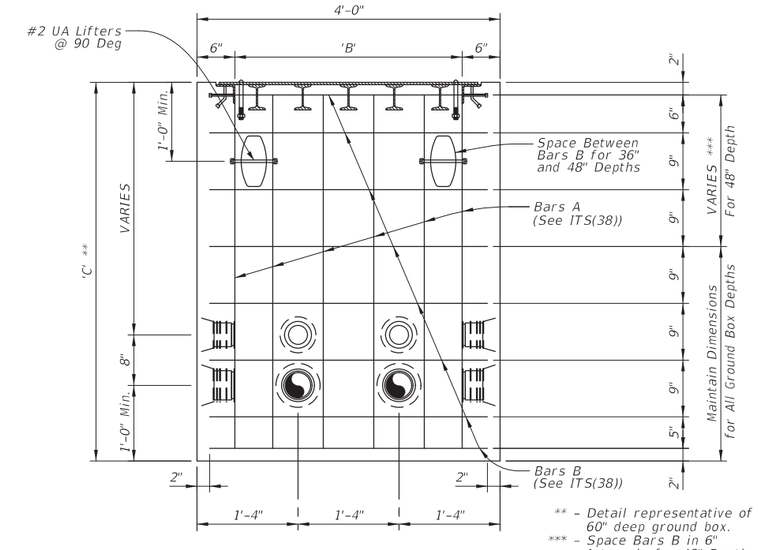

See Ground Box Schedule for A, B, and C Dimensions

Type 1 Ground Box Isometric View

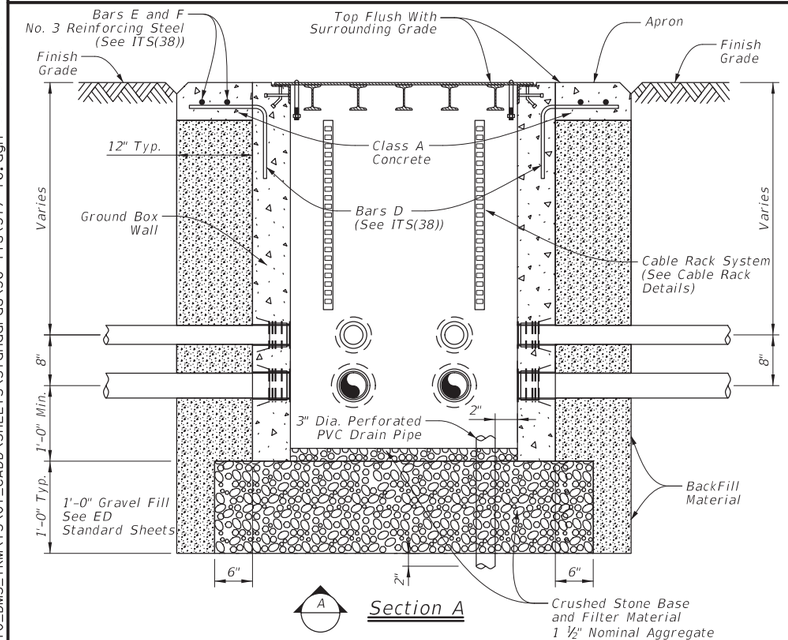



Note: Bar Spacing is The Same on Opposing Sides.

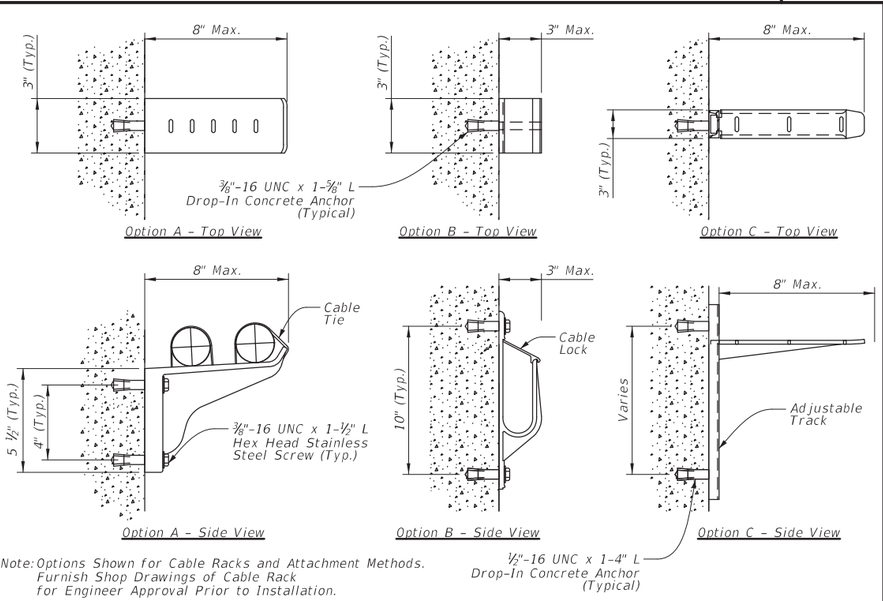
Type 1 Ground Box Plan View




Type 1 Ground Box Elevation View

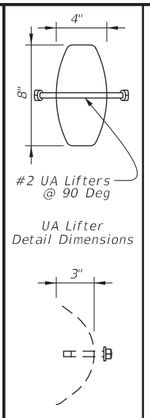



Section A

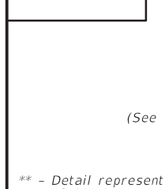


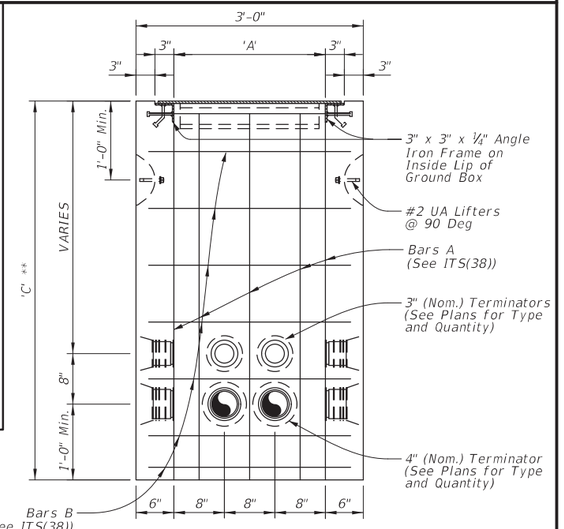

Note: Options Shown for Cable Racks and Attachment Methods. Furnish Shop Drawings of Cable Rack for Engineer Approval Prior to Installation.

Type 1 Cable Rack Details




UA Lifter
Detail Dimensions




Type 1 Ground Box Side View

** - Detail representative of 60" deep ground box.

## General Notes:

1. Conduit entry points shown represent the standard configuration for backbone conduit as detailed on ITS(27). Additional conduits may be required as shown on the plans.
2. Provide Class A concrete for Type "1" ground boxes.
3. Provide terminators for the PVC conduit cast in the walls and placed symmetrically about the centerline of the box at the depths shown, unless otherwise noted, for the number of conduits identified on the plans to enter the box.
4. Provide terminators appropriately sized for the conduits indicated on the plans. Provide terminators with an air tight and water tight connection.
5. Closed bottom Type "1" ground boxes are acceptable in lieu of open bottom boxes. Provide two 3" Dia. perforated PVC drain pipes on opposite corners to optimize water drainage. Provide 12-inch base of crushed stone which extends 6 inches in all directions from the perimeter of the box for closed bottom boxes. Crushed stone will be subsidiary to Special Specification, "ITS Ground Box."
6. Install all open bottom Type "1" ground boxes on a 12-inch base of crushed stone which extends 6 inches in all directions from the perimeter of the box. Crushed stone will be subsidiary to Special Specification, "ITS Ground Box."
7. Cap and seal terminators that do not have conduits attached.
8. When additional conduit entry points are needed to accommodate existing conduit, core drill conduit knockouts in the field of the appropriate number and size of conduit at each location, as directed by the Engineer.
9. Provide a bell fitting on the end of each conduit to ensure a flush fit inside the ground box.
10. Concrete grout around the knockout (inside and out) and around the conduit and bell fitting to ensure a neat watertight fit after the conduit and bell fitting have been placed in a knockout. Ensure all openings in the ground box are sealed prior to grouting operations.
11. Install a nylon string and plug all unused conduits with tug-plugs sized for the particular conduits. Provide split innerduct plugs in conduits or innerducts with cables to seal the innerduct around the cables to prevent water and dirt from entering.
12. Provide steel (ASTM A-153), glass reinforced nylon, or equivalent cable rack assemblies designed to support the amount of cable storage slack identified in the plans. Locate cable rack system on one side only (longer length side) to allow access to the inside of the ground box. Cable racks may be installed at the factory or in the field. When mounting cable racks in the field, seal all penetrations to the concrete side wall to prevent moisture penetration. Ground metallic cable rack systems to grounding system inside ground box in accordance with the National Electrical Code.

### Ground Box Schedule

| Ground Box Type | 'A' Width Inside (Inches) | 'B' Length Inside (Inches) | 'C' Depth Inside (Inches) |
|---|---|---|---|
| Type 1 | 24 | 36 | 36, 48, 60 |

Sheet Details
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SHEET 1 OF 2

Texas Department of Transportation

Traffic Operations Division Standard

# ITS GROUND BOX DETAILS TYPE "1" WITH STEEL COVER

## ITS(37)-16

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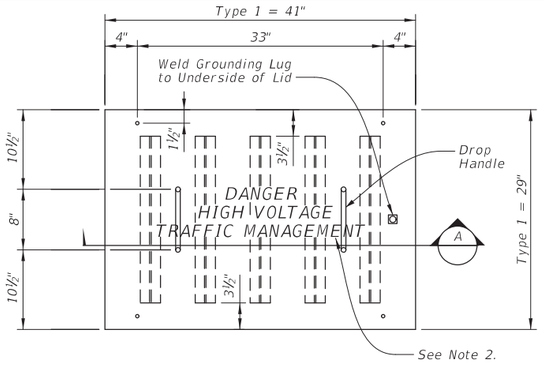
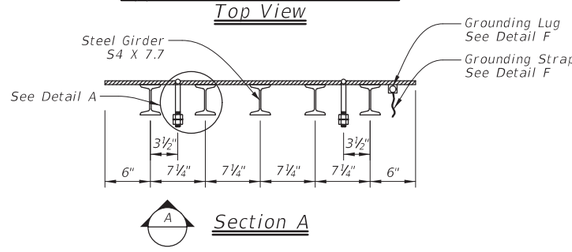
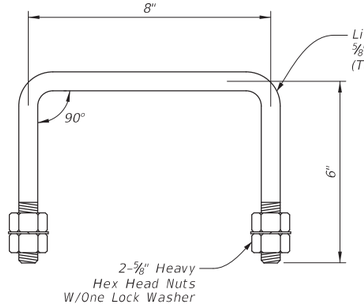


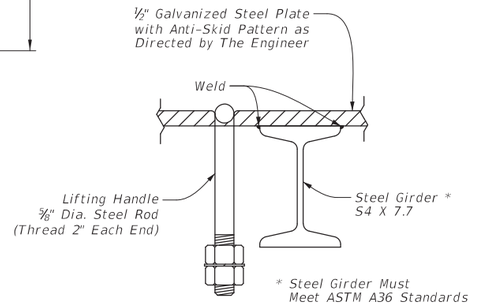

Type 1 Steel Cover Details
Top View



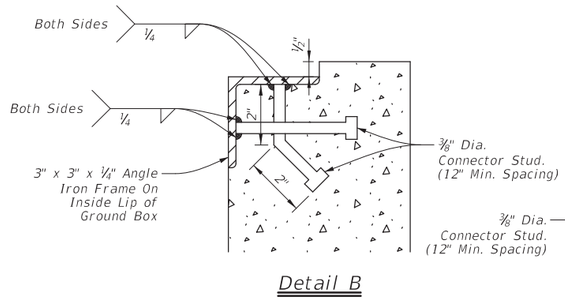

Section A



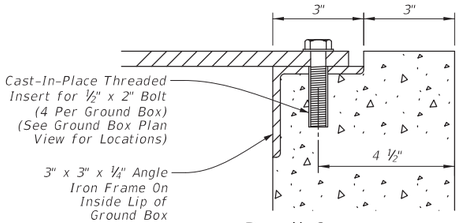

Drop Handle Detail



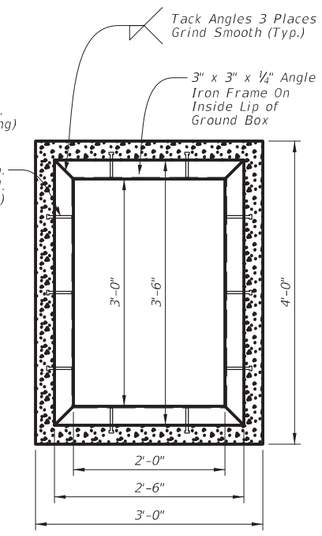

Detail A



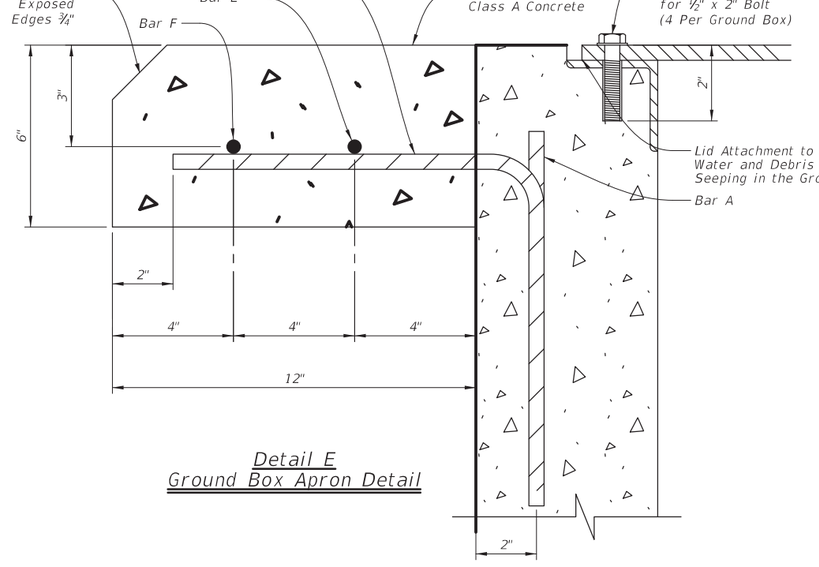

Detail B




Detail C
Lid Attachment Detail



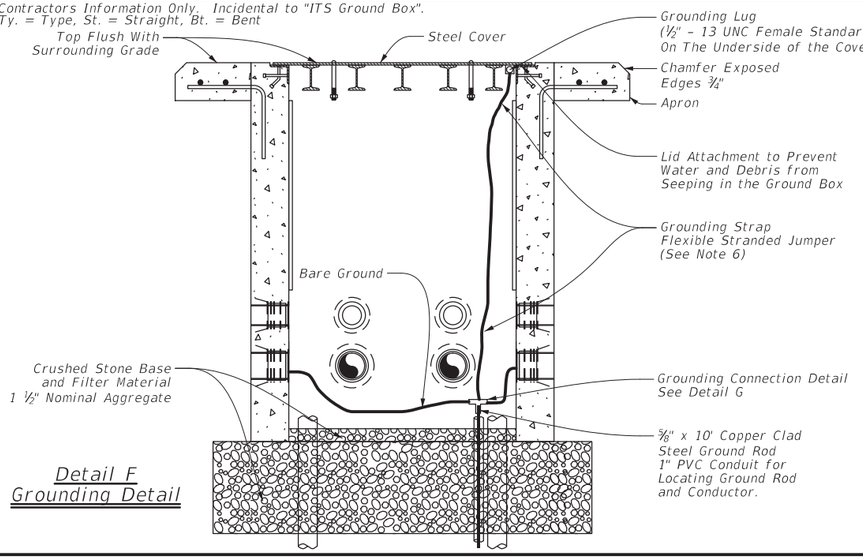

Detail D



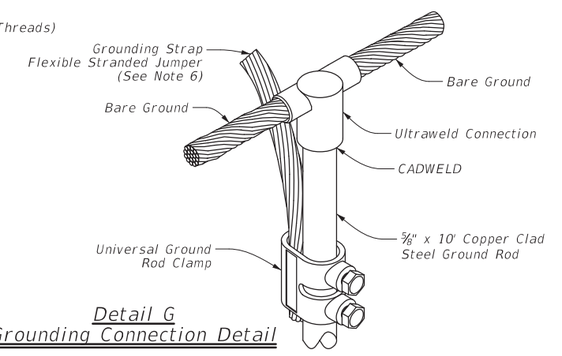

Detail E
Ground Box Apron Detail

| Ground Box Type 1 | BAR A | | | | | BAR B | | | | | BAR D | | | | | BAR E | | | | | BAR F | | | | | TOTALS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Size | Ty. | Length | Weight | No. | Size | Ty. | Length | Weight | No. | Size | Ty. | Length | Weight | No. | Size | Ty. | Length | Weight | No. | Size | Ty. | Length | Weight | Steel * LBS. | Conc. * CY |
| 36" Depth | 22 | #4 | St. | 2'-8" | 39.3 | 5 | #4 | Bt. | 13'-2" | 44.1 | 8 | #4 | Bt. | 2'-0" | 10.7 | 1 | #3 | Bt. | 17'-2" | 6.5 | 1 | #3 | Bt. | 19'-10" | 7.5 | 108.1 | .67 |
| 48" Depth | 22 | #4 | St. | 3'-8" | 54.0 | 7 | #4 | Bt. | 13'-2" | 61.8 | 8 | #4 | Bt. | 2'-0" | 10.7 | 1 | #3 | Bt. | 17'-2" | 6.5 | 1 | #3 | Bt. | 19'-10" | 7.5 | 140.5 | .89 |
| 60" Depth | 22 | #4 | St. | 4'-8" | 68.8 | 8 | #4 | Bt. | 13'-2" | 70.6 | 8 | #4 | Bt. | 2'-0" | 10.7 | 1 | #3 | Bt. | 17'-2" | 6.5 | 1 | #3 | Bt. | 19'-10" | 7.5 | 164.1 | 1.11 |

* - For Contractors Information Only. Incidental to "ITS Ground Box".
Legend: Ty. = Type, St. = Straight, Bt. = Bent




Detail F
Grounding Detail




Detail G
Grounding Connection Detail

Note - All grounding connections to be CADWELD or approved equal. This work will not be paid for directly, but is considered incidental to ITS ground box.

## General Notes:

1. See ITS(37) for additional Type "1" ground box details.
2. Hot-dip galvanized steel covers after all welds are made.
3. Label top of cover with the words "DANGER HIGH VOLTAGE TRAFFIC MANAGEMENT" using template-guided, hand-welded lettering at a height of 2 inches to ensure neatness.
4. Provide all Type "1" ground boxes with a securable, tamper-proof cover equipped with a bolting system that positively secures the cover in place.
5. Ground steel covers in accordance with the National Electrical Code.
6. Ground covers to the grounding cable using a split-bolt kearney clamp, and a minimum 8-foot long flexible stranded jumper the same size as the grounding conductor. Terminate to metal ground box cover with a tank ground type lug as approved and directed by the Engineer.
7. Provide Type "1" ground box and cover designed for heavy duty loading in accordance with AASHTO H20 loading when located where the box may experience deliberate, continuous vehicular traffic, such as near the shoulder or an auxiliary lane, or immediately adjacent to the unprotected edge of pavement.
8. Provide a Type "1" ground box and cover tested by a laboratory independent of the manufacturer certifying loading requirements are met. Provide certification of such tests to the Engineer for approval.
9. Provide a steel or cast iron cover in accordance with Item 471, Article 471.2, "Frames, Grates, Rings, and Covers." Provide covers with the number of drop handles shown. Provide Class "A" concrete for ground box construction and aprons.
10. Fabricate cover so to fits properly on the ground box, and no undue noise results when traffic contacts the cover.

Sheet Details
Not to Scale

SHEET 2 OF 2

Texas Department of Transportation

Traffic Operations Division Standard

# ITS GROUND BOX DETAILS TYPE "1" WITH STEEL COVER

## ITS(38)-17

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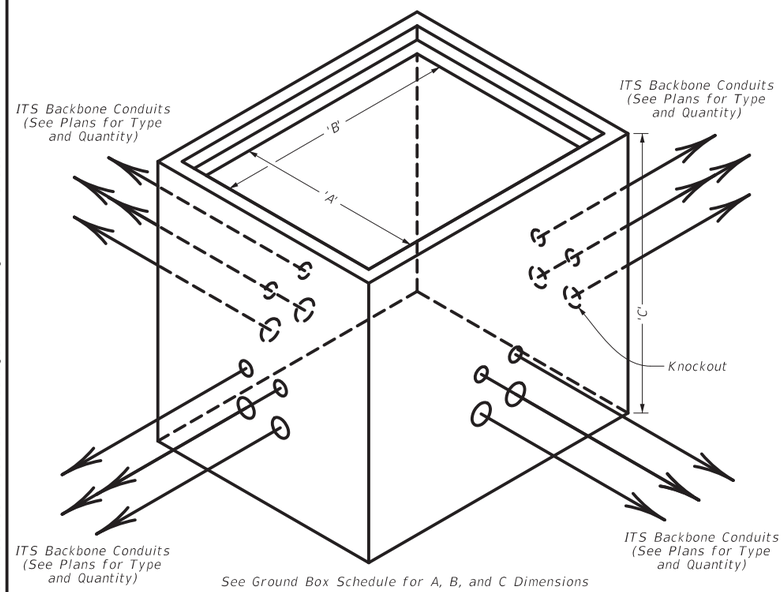
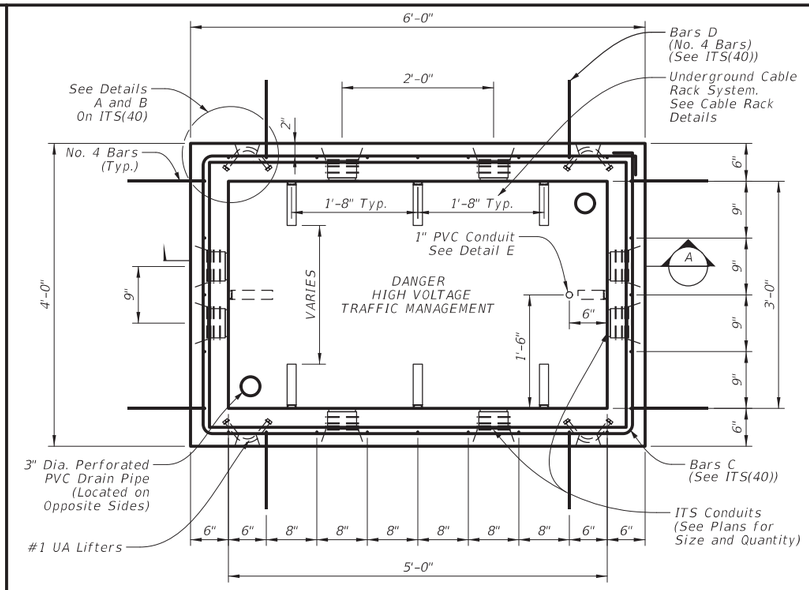


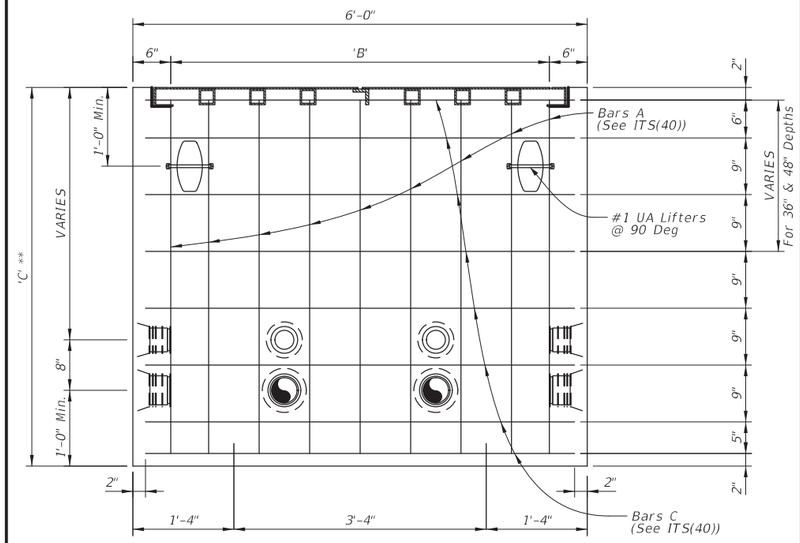

See Ground Box Schedule for A, B, and C Dimensions

## Type 2 Ground Box Isometric View



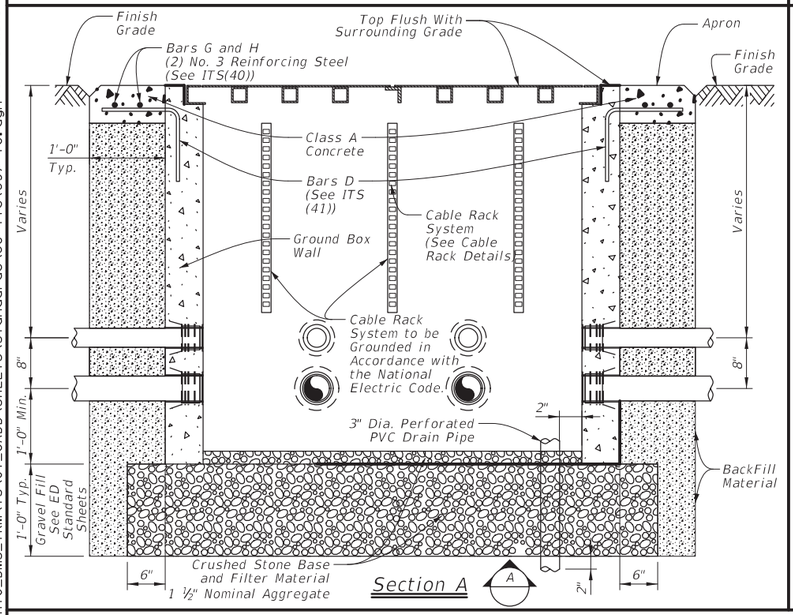

Note: Bar Spacing is The Same on Opposing Sides.

## Type 2 Ground Box Plan View

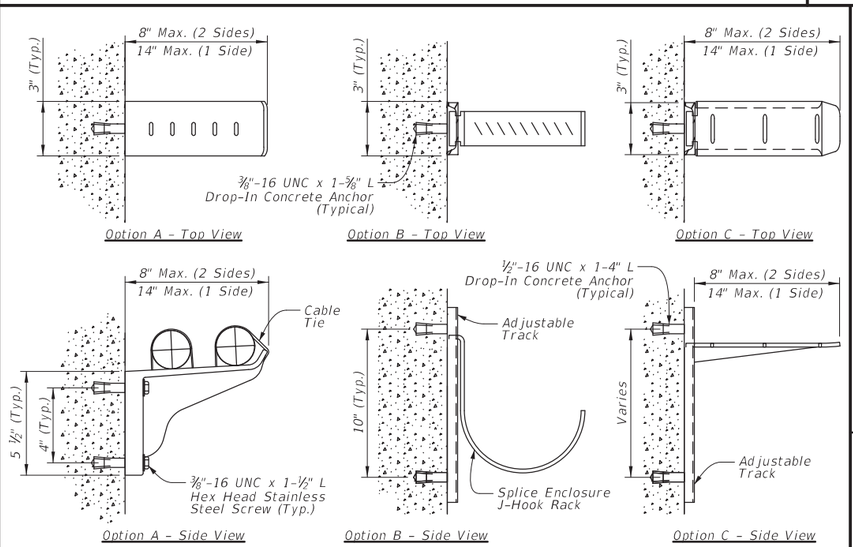



** - Detail representative of 60" deep ground box.

## Type 2 Ground Box Elevation View

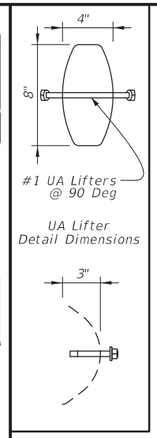


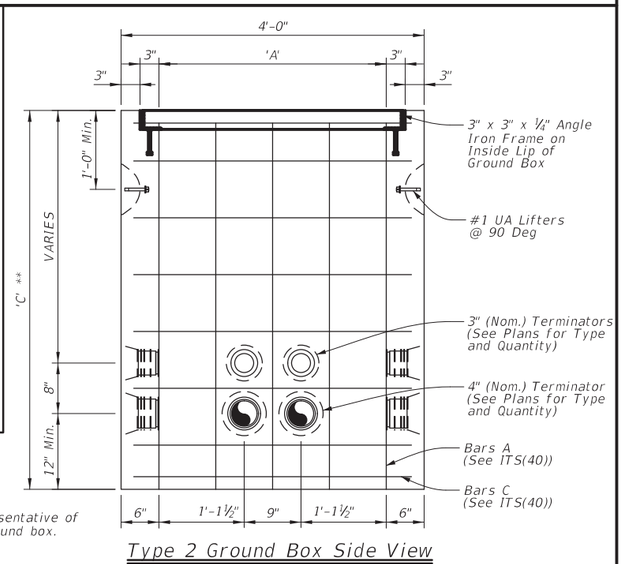

## Section A




Note: Options Shown for Cable Racks and Attachment Methods Contractor to Supply Shop Drawings of Cable Rack and Cable Rack Grounding System (If Applicable) for Engineer Approval Prior to Installation.

## Type 2 Cable Rack Details




** - Detail representative of 60" deep ground box.

## Type 2 Ground Box Side View

SHEET 1 OF 2

### General Notes:

1. Conduit entry points shown represent the standard configuration for backbone conduit as detailed on ITS(27). Additional conduits may be required as shown on the plans.
2. Provide Class "A" concrete for Type "2" ground boxes.
3. Provide terminators for the PVC conduit cast in the walls and placed symmetrically about the centerline of the box at the depths shown, unless otherwise noted, for the number of conduits identified on the plans to enter the box.
4. Provide terminators appropriately sized for the conduits indicated on the plans. Provide terminators with an air tight and water tight connection.
5. Closed bottom Type "2" ground boxes are acceptable in lieu of open bottom boxes. Provide two 3" Dia. perforated PVC drain pipes on opposite corners to optimize water drainage. Provide closed bottom boxes with a 12-inch base of crushed stone which extends 6 inches in all directions from the perimeter of the box. Crushed stone will be subsidiary to Special Specification, "ITS Ground Box."
6. When additional conduit entry points are needed to accommodate existing conduit, core drill conduit knockouts in the field of the appropriate number and size of conduit at each location, as directed by the Engineer.
7. Provide a bell fitting on the end of each conduit to ensure a flush fit inside the ground box.
8. Concrete grout around the knockout (inside and out) and around the conduit and bell fitting to ensure a neat watertight fit after the conduit and bell fitting have been placed in a knockout. Ensure all openings in the ground box are sealed prior to grouting operations.
9. Install a nylon string and plug all unused conduits with tug-plugs sized for the particular conduits. Provide split innerduct plugs in conduits or innerducts with cables to seal the innerduct around the cables to prevent water and dirt from entering.
10. Install all open bottom Type "2" ground boxes on a 12-inch base of crushed stone which extends 6 inches in all directions from the perimeter of the box. Crushed stone will be subsidiary to special specification, "ITS Ground Box."
11. Cap and seal terminators that do not have conduits attached.
12. Backfill in accordance with Item 400, "Excavation and Backfill for Structures."
13. Provide steel (ASTM A-153), glass reinforced nylon, or equivalent cable rack assemblies designed to support the amount of cable storage slack and splice enclosures identified in the plans. Locate cable rack system on any side but allow for sufficient access to the inside of the ground box. Cable racks may be installed at the factory or in the field. When mounting cable racks in the field, seal all penetrations to the concrete side wall to prevent moisture penetration. Ground metallic cable rack systems to grounding system inside ground box in accordance with the National Electrical Code.

### Ground Box Schedule

| Ground Box Type | 'A' Width Inside (Inches) | 'B' Length Inside (Inches) | 'C' Depth Inside (Inches) |
|---|---|---|---|
| Type 2 | 36 | 60 | 36, 48, 60 |

Sheet Details
Not to Scale

Texas Department of Transportation

Traffic Operations Division Standard

# ITS GROUND BOX DETAILS TYPE "2" WITH STEEL COVER

# ITS(39)-16

| FILE: its(39)-16.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
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| ©TxDOT FEBRUARY 2016 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031,ETC | IH 10 |
| | DIST | COUNTY | | SHEET NO. |
| | YKM | GONZALES,ETC | | 92 |

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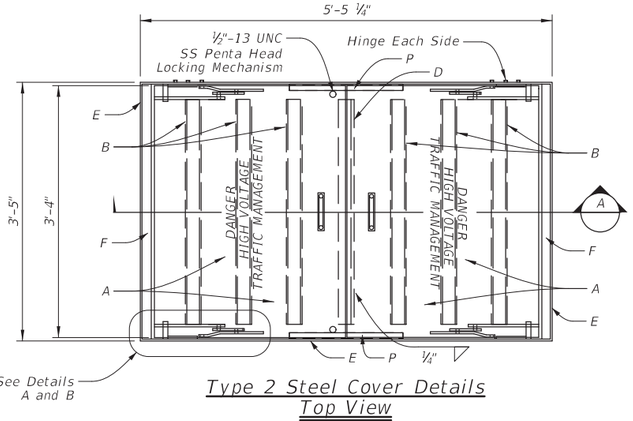
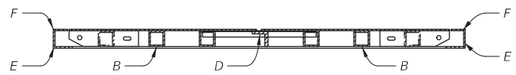
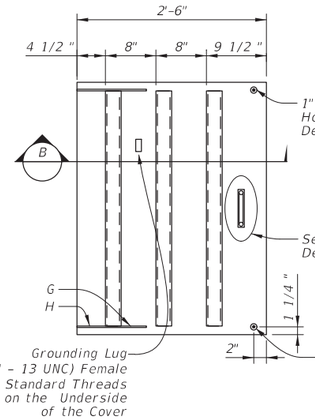


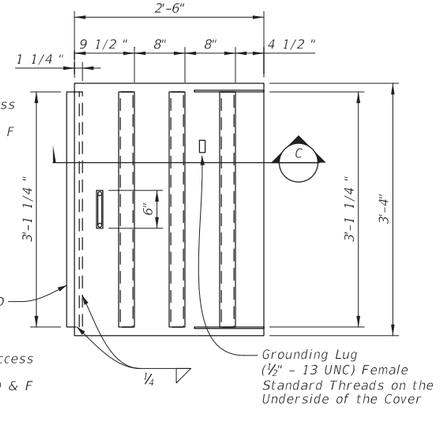

Type 2 Steel Cover Details
Top View



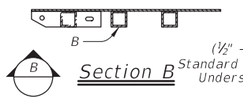

A Section A



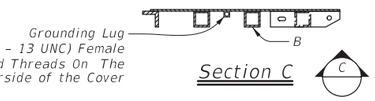

Type 2 Steel Cover Details
Bottom View (Left)



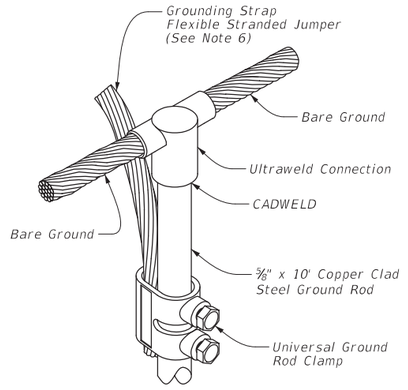

Type 2 Steel Cover Details
Bottom View (Right)




B Section B



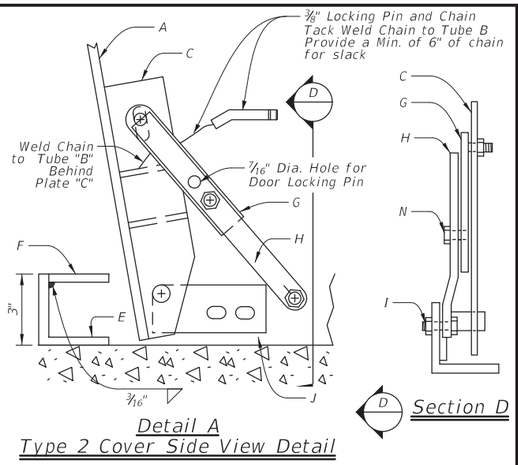

C Section C



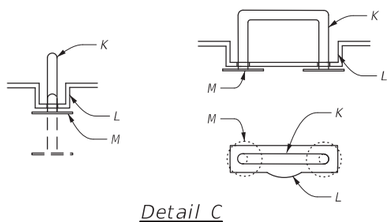

Detail G
Grounding Connection Detail

Note - All grounding connections to be CADWELD or approved equal. This work will not be paid for directly, but is considered incidental to ITS ground box.

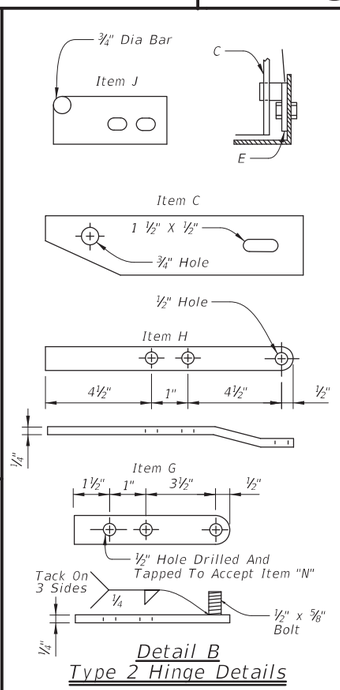
| Item | Qty | Incidental "ITS Ground Box" Material |
|---|---|---|
| A | 2 | ¼" Floor Plate 40" x 30" |
| B | 6 | 2 ½" x 2 ½" x 37 ¼" Tube |
| C | 4 | 11" x 2 ½" x ¼" Plate |
| D | 1 | 2 ½" x 2 ½" x ½" x 37" ¼ Angle |
| E | 4 | 3" x 3" x ¼" Angle |
| F | 2 | 40 ½" x 2" x ¼" Plate |
| G | 4 | 6 ½" x 1 ¼" x ¼" Plate |
| H | 4 | 10 ½" x 1 ¼" x ¼" Plate |
| I | 12 | ½" Bolt/Nut |
| J | 4 | 4 ¾ x 2" x ¾" Plate |
| K | 2 | ⅝" Drop Handle |
| L | 2 | 1 ½" x ⅝" x 3/16" Channel x 7" |
| M | 4 | 1 ½" x ⅛" P Disk |
| N | 8 | ½" x ⅜" Bolt |
| P | 2 | 1" x 1" x ⅛" Angle x 18" |




Detail A
Type 2 Cover Side View Detail



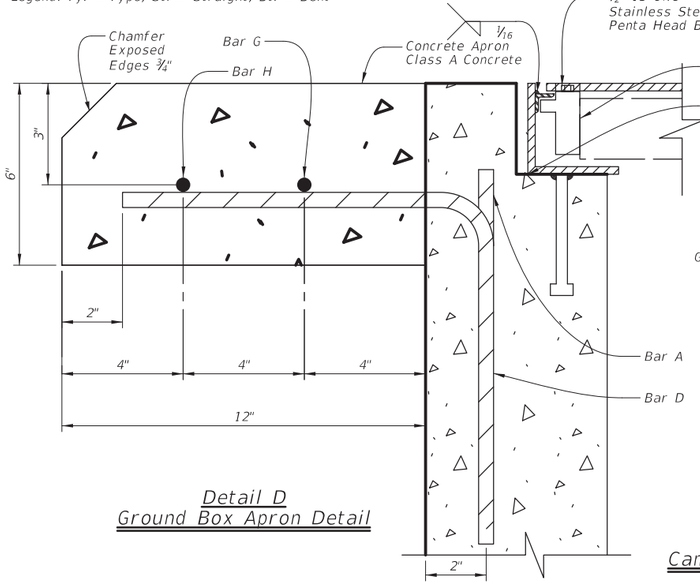

Detail C
Type 2 Drop Handle Details



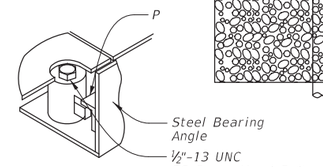

Detail B
Type 2 Hinge Details

| Ground Box Type 2 | BAR A | | | | | BAR C | | | | | BAR D | | | | | BAR G | | | | | BAR H | | | | | TOTALS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Size | Ty. | Length | Weight | No. | Size | Ty. | Length | Weight | No. | Size | Ty. | Length | Weight | No. | Size | Ty. | Length | Weight | No. | Size | Ty. | Length | Weight | Steel * LBS. | Conc. * CY |
| 36" Depth | 28 | #4 | St. | 2'-8" | 50.0 | 5 | #4 | Bt. | 19'-1" | 63.9 | 8 | #4 | Bt. | 2'-0" | 10.7 | 1 | #3 | Bt. | 23'-3" | 8.8 | 1 | #3 | Bt. | 25'-11" | 9.8 | 143.2 | 1.00 |
| 48" Depth | 28 | #4 | St. | 3'-8" | 68.8 | 7 | #4 | Bt. | 19'-1" | 89.5 | 8 | #4 | Bt. | 2'-0" | 10.7 | 1 | #3 | Bt. | 23'-3" | 8.8 | 1 | #3 | Bt. | 25'-11" | 9.8 | 187.6 | 1.33 |
| 60" Depth | 28 | #4 | St. | 4'-8" | 87.5 | 8 | #4 | Bt. | 19'-1" | 102.3 | 8 | #4 | Bt. | 2'-0" | 10.7 | 1 | #3 | Bt. | 23'-3" | 8.8 | 1 | #3 | Bt. | 25'-11" | 9.8 | 219.1 | 1.67 |

* - For Contractors Information Only. Incidental to "ITS Ground Box".
Legend: Ty. = Type, St. = Straight, Bt. = Bent




Detail D
Ground Box Apron Detail




Detail F
Cam Locking Mechanism

Detail E
Grounding Detail

SHEET 2 OF 2

Texas Department of Transportation

Traffic Operations Division Standard

# ITS GROUND BOX DETAILS TYPE "2" WITH STEEL COVER

## ITS(40)-17

| FILE: its(40)-17.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
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| ©TxDOT FEBRUARY 2016 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031, ETC | IH 10 |
| 5-17 | DIST | COUNTY | | SHEET NO. |
| | YKM | GONZALES, ETC | | 93 |

## General Notes:

1. See ITS(39) for additional Type "2" ground box details.
2. Hot-dip galvanized steel covers after all welds are made.
3. Label top of cover with the words "DANGER HIGH VOLTAGE TRAFFIC MANAGEMENT" using template-guided, hand-welded lettering at a height of 2 inches to ensure neatness.
4. Provide all Type "2" ground boxes with a securable, tamper-proof cover equipped with a bolting system that positively secures the cover in place.
5. Ground steel covers in accordance with the National Electrical Code.
6. Ground covers to the grounding cable using a split-bolt kearney clamp, and a minimum 8-foot long flexible stranded jumper the same size as the grounding conductor. Terminate to metal ground box cover with a tank ground type lug as approved and directed by the Engineer.
7. Provide Type "2" ground box and cover designed for heavy duty loading in accordance with AASHTO H20 loading when located where the box may experience deliberate, continuous vehicular traffic, such as near the shoulder or an auxiliary lane, or immediately adjacent to the unprotected edge of pavement.
8. Provide a Type "2" ground box and cover tested by a laboratory independent of the manufacturer certifying loading requirements are met. Provide certification of such tests to the Engineer for approval.
9. Provide a steel or cast iron cover in accordance with Item 471, Article 471.2, "Frames, Grates, Rings, and Covers." Provide covers with the number of drop handles shown. Provide Class "A" concrete for ground box construction and aprons.
10. Fabricate cover so to fits properly on the ground box, and no undue noise results when traffic contacts the cover.

Sheet Details
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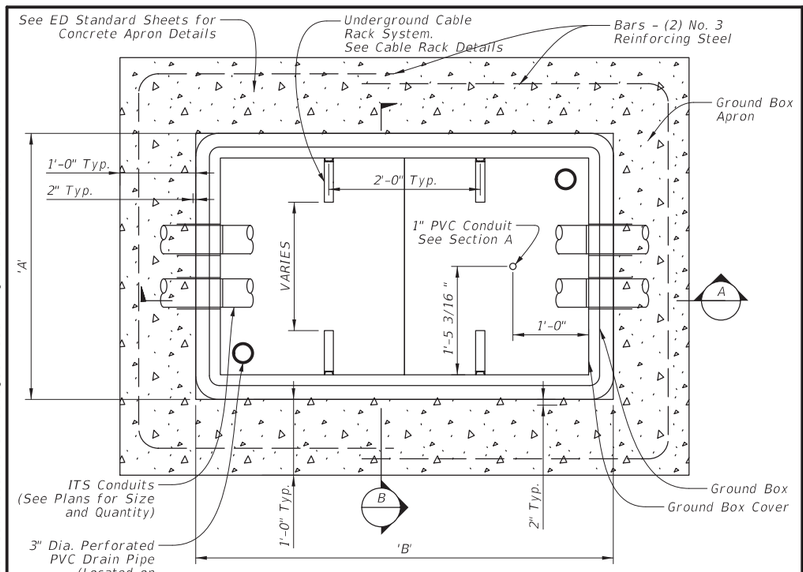
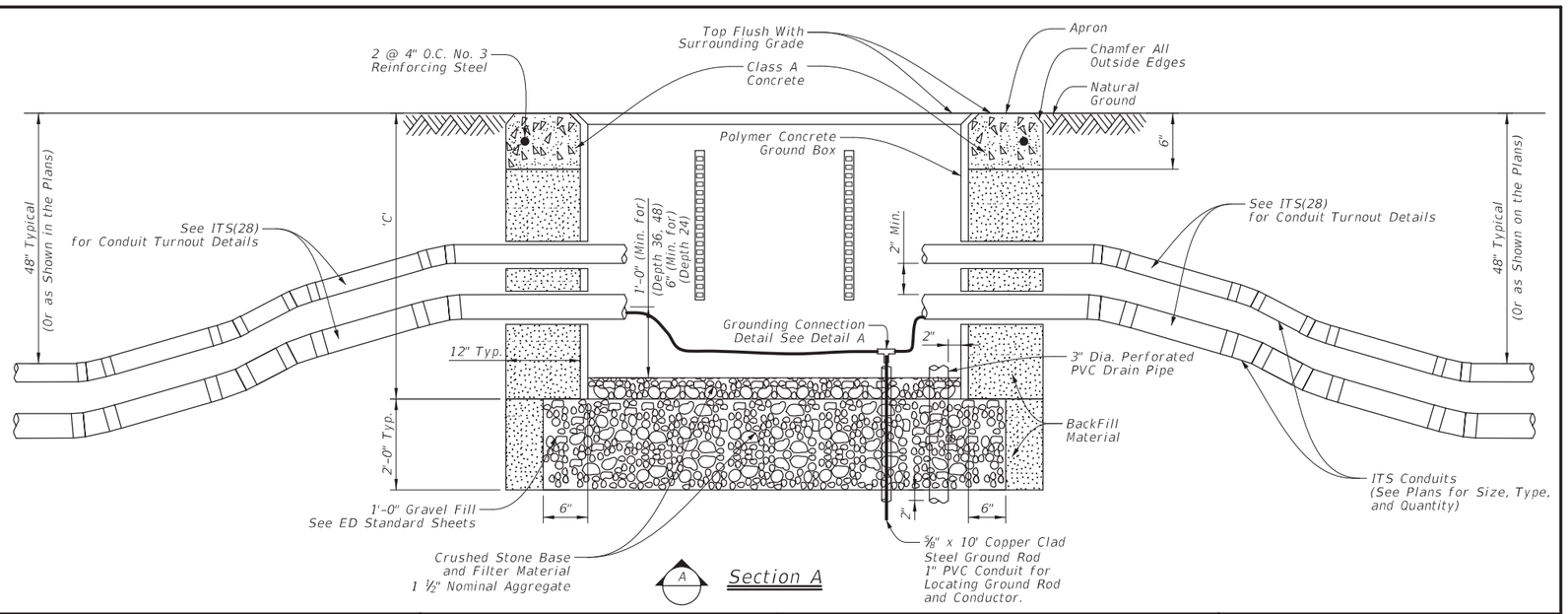
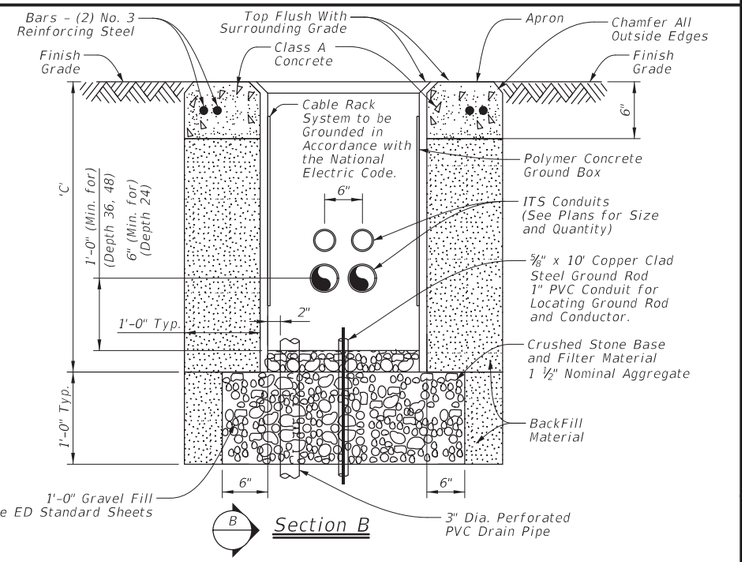


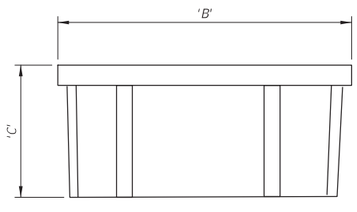

## Top View Polymer Concrete Ground Box




## Section A



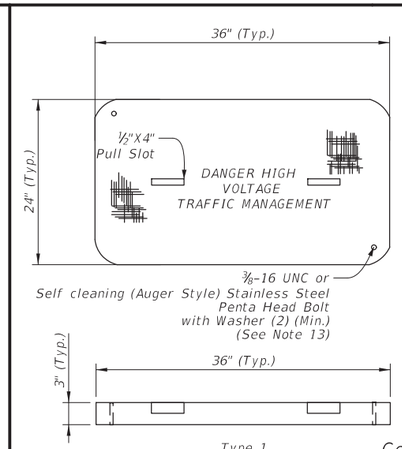

## Section B



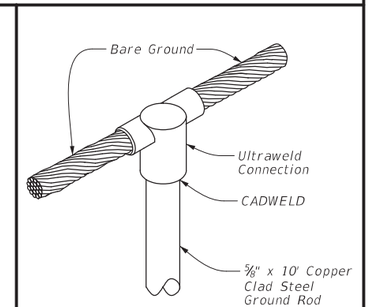

| Ground Box Schedule | | | | | |
|---|---|---|---|---|---|
| Ground Box Type | 'A' * Width (Outside) (Inches) | 'B' * Length (Outside) (Inches) | 'C' Depth (Outside) (Inches) | Size #3 Bars (Apron) | |
| | | | | Length | Weight |
| Type 1 | 26 | 38 | 24, 36, 48 | 24'-0" | 9.12 |
| Type 2 | 40 | 63 | 24, 36, 48 | 32'-8" | 12.45 |

* - Tolerance of +/- 1.5"

## Side View Typical Ground Box



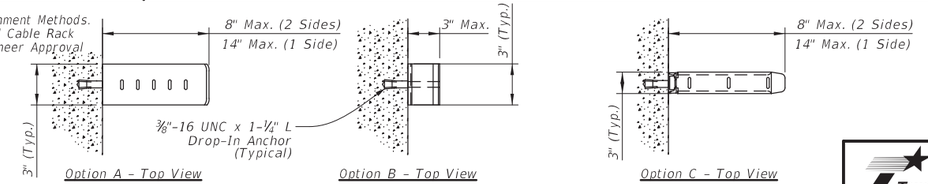

## Cover Top View and Side View




Note - All grounding connections to be CADWELD or approved equal. This work will not be paid for directly, but is considered incidental to ITS ground box.

## Detail A Grounding Connection Detail

Note:
Options Shown for Cable Racks and Attachment Methods. Furnish Shop Drawings of Cable Rack and Cable Rack Grounding System (If Applicable) for Engineer Approval Prior to Installation.




## Cable Rack Details

## General Notes:

1. Conduit shown is for example only. Additional conduits may be required as shown on the plans.
2. Provide polymer concrete ground box and cover.
3. Provide Type "2" ground boxes when splice enclosure is required, as shown on the plans.
4. Terminate conduits through the side of the ground box.
5. Provide terminators for conduits cast in the walls and placed symmetrically about the centerline of the box at the depths shown, unless otherwise noted, for the number of conduits identified on the plans to enter the box.
6. Provide terminators appropriately sized for the conduits indicated on the plans. Provide terminators with an air tight and water tight connection.
7. Provide ground box with open bottom. Provide two 3" Dia. perforated PVC drain pipes on opposite corners and extend 2" below bottom of gravel bed to optimize water drainage.
8. Install ground box on a 12-inch base of crushed stone which extends 6 inches in all directions from the perimeter of the box. Crushed stone will be subsidiary to special specification, "ITS Ground Box."
9. When additional conduit entry points are needed to accommodate existing conduit, core drill conduit knockouts in the field of the appropriate number and size of conduit at each location, as directed by the Engineer.
10. Provide a bell fitting on the end of each conduit to ensure a flush fit inside the ground box.
11. Concrete grout around the knockout (inside and out) and around the conduit and bell fitting to ensure a neat watertight fit after the conduit and bell fitting have been placed in a knockout. Ensure all openings in the ground box are sealed prior to grouting operations.
12. Label top of cover with the words "DANGER HIGH VOLTAGE TRAFFIC MANAGEMENT."
13. Equip all covers with a bolting system that will positively secure the cover in place.
14. Backfill in accordance with Item 400, "Excavation and Backfill for Structures."
15. Provide p
16. Provide steel (ASTM A-153), glass reinforced nylon, or equivalent cable rack assemblies designed to support the amount of cable storage slack and splice enclosures identified in the plans. Locate cable rack system on any side but allow for sufficient access to the inside of the ground box. Cable racks may be installed at the factory or in the field. When mounting cable racks in the field, seal all penetrations to the side wall to prevent moisture penetration. Ground metallic cable rack systems to grounding system inside ground box in accordance with the National Electrical Code.

## Sheet Details

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Texas Department of Transportation

Traffic Operations Division Standard

# ITS GROUND BOX POLYMER CONCRETE

# ITS(41)-16

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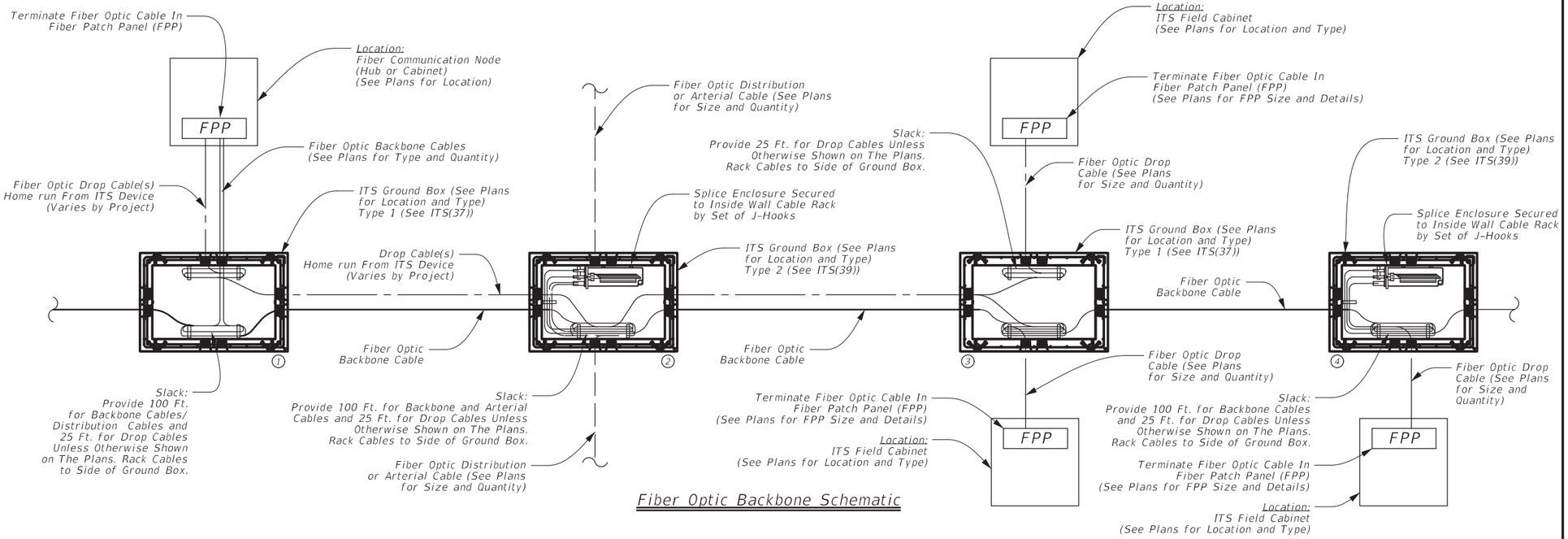
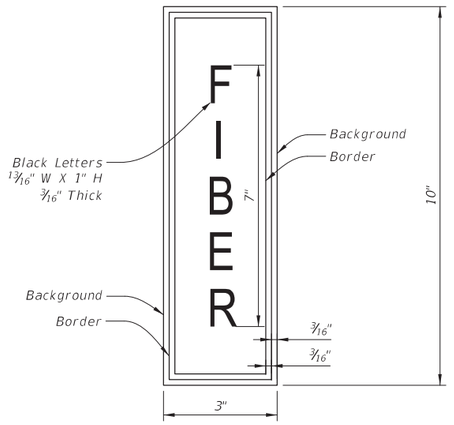
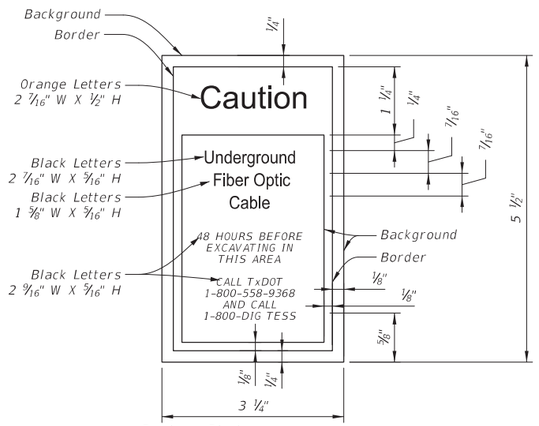



## Fiber Optic Backbone Schematic




Border - Black
Background - Orange Reflective

## Fiber Decal Details

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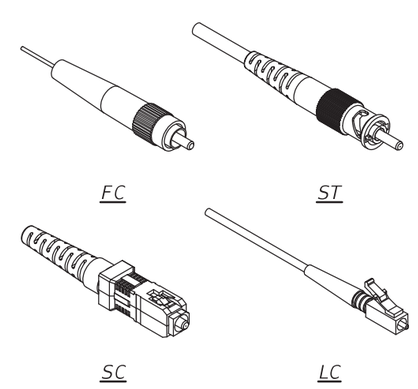
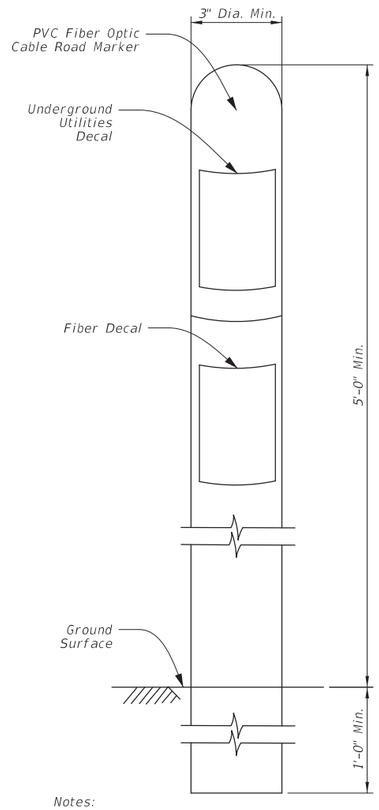
## Underground Utilities Decal Details




## Fiber Optic Connectors

Note - Details are diagrammatic and may vary by manufacturer.




Notes:
1. Space fiber optic cable road markers at maximum 1000' intervals or at significant changes in direction such as a 90 degree turn.
2. Provide all orange fiber optic cable road markers for non-splice locations.
3. Provide orange fiber optic cable road markers with white dome for splice locations.
4. Locate marker within concrete apron of fiber ground box.

## Fiber Optic Cable Road Markers

## General Notes:

1. The fiber optic backbone schematic shown is diagrammatic only and intended to represent the various fiber optic communication architectures seen across the state and may not show all configurations seen. Connection of ITS field equipment to ITS communication nodes or hubs is achieved through home run drop cables or spliced to the backbone in a splice enclosure. Refer to fiber communication schematic details and fiber termination information shown on the plans for further information.
2. Install a flat pull cord in all empty conduits and inner-ducts identified for communication use. The pull cord must have a tensile strength of 1,250 lbs minimum and have foot markings to determine length installed. Furnish and installation of pull cord will be subsidiary to special specification "ITS Fiber Optic Cable".
3. Color code each type of fiber optic cable to identify the cable as a "backbone" (green or blue), "distribution" (red), or "drop" (orange or yellow).
4. Terminate fibers at fiber patch panel (FPP), also referred to as patch panel, with SC connectors for new installations. When connecting to existing FPP, terminate with FC or ST connectors as shown on the plans. Provide connector adaptors as required to accommodate existing equipment if information is not provided in the plans.
5. Provide a list showing cable number assignments and highway or facility that the cable services.
6. Provide a single 1/C #14 insulated wire in conduit runs which have been identified in the plans to carry fiber optic cable. Provide UL listed solid copper wire with orange color low density polyethylene insulation suitable for conduit installation rated for temperature range -20 C to 60 C and a voltage rating of 600V. This wire will serve as a tracer, or locate, wire for locating underground conduit containing fiber optic cabling and will be paid for under Item 620, "Electrical Conductors."
7. Ensure each cable is marked on the outer jacket with a label detailing the manufacturer's name, the date of manufacturer (month/year), the fiber count (Example: 48F SM or 48 SMF), and sequential length markings at maximum 3 FT increments.

## Reference Notes:

1. Fiber architecture at communication node.
2. Fiber architecture for splicing arterial distribution cables.
3. Fiber architecture for home run of drop cables from ITS field equipment cabinets to communication node.
4. Fiber architecture for splicing drop cable from ITS field equipment cabinet.

SHEET 1 OF 2

Texas Department of Transportation

Traffic Operations Division Standard

# ITS FIBER OPTIC CABLE MISCELLANEOUS DETAILS

## ITS(42)-16

| FILE: its(42)-16.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT FEBRUARY 2016 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031,ETC | IH 10 |
| | DIST | COUNTY | | SHEET NO. |
| | YKM | GONZALES,ETC | | 95 |

Sheet Details
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DATE: 5/19/2023 1:26:36 PM
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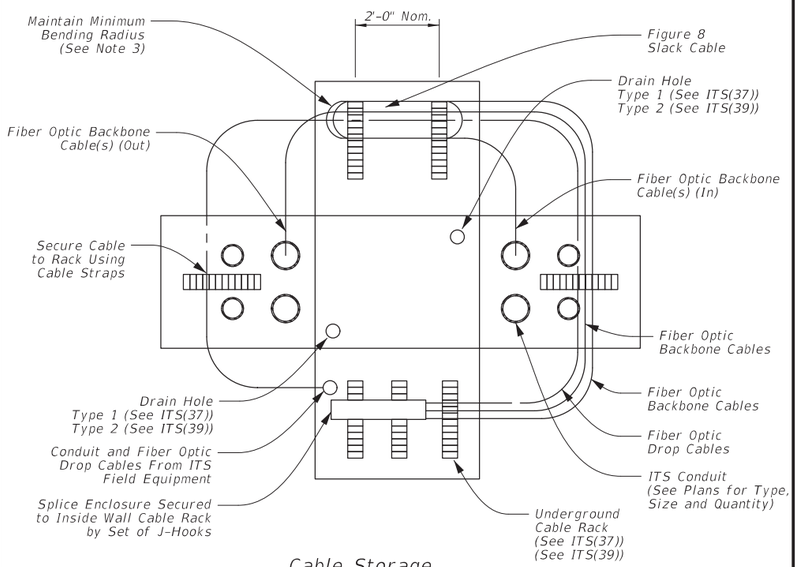
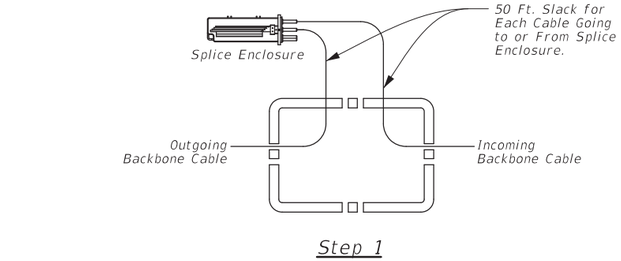
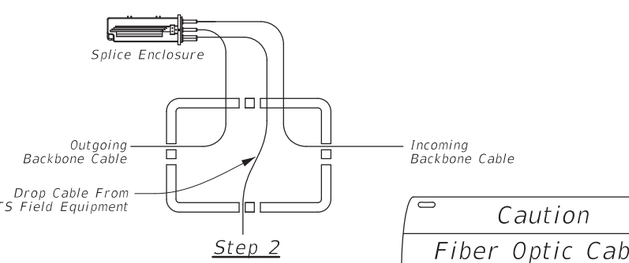



## Cable Storage

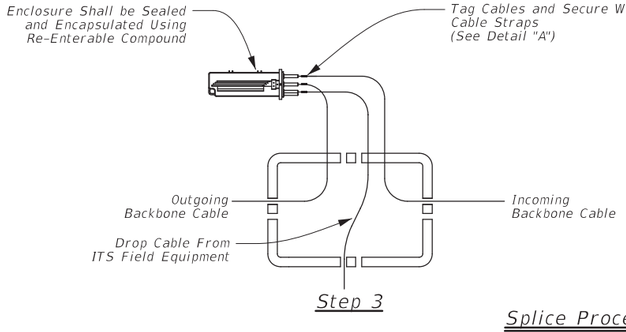
Top View - Ground Box Walls Folded Down for Clarity



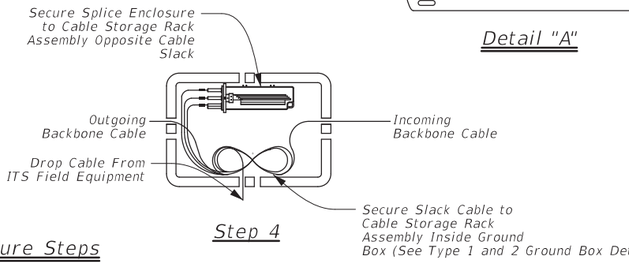

Step 1




Step 2

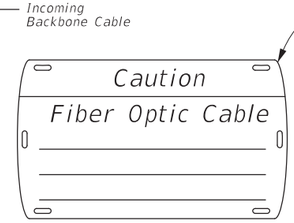



Step 3




Step 4

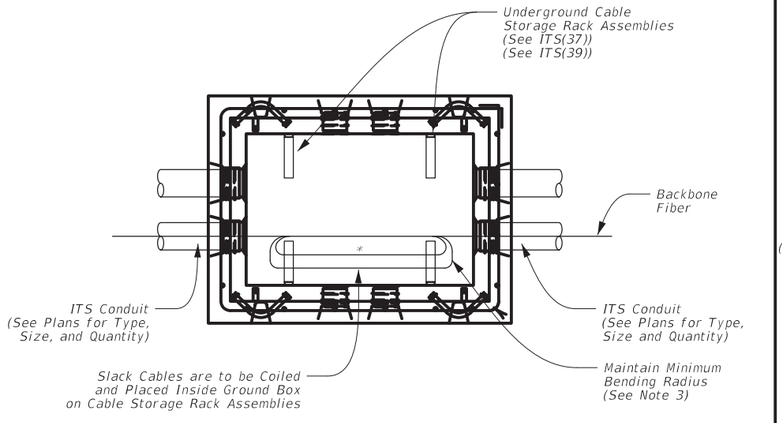
## Splice Procedure Steps




Fiber Optic Cable Tag

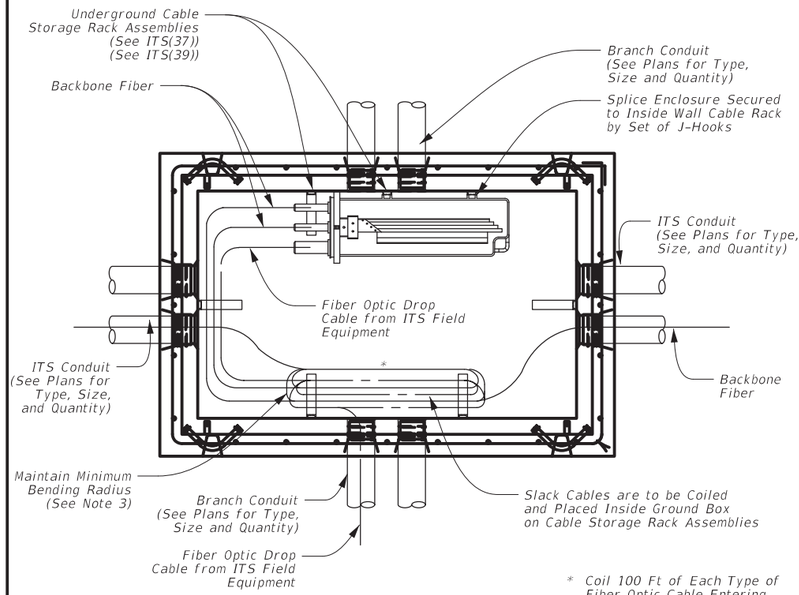
Panduit Inc. No. PST-FO
Hellerman-Tyton No. CST2003x2
Self-Lam Tag or Approved Equal

Detail "A"




## Type "1" Ground Box

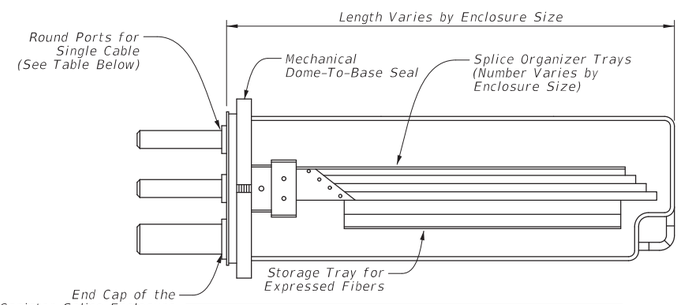
* Coil 25 Ft of Fiber Optic Cable for Slack




## Type "2" Ground Box

with Splice

* Coil 100 Ft of Each Type of Fiber Optic Cable Entering the Ground Box




| Splice Enclosure Sizes | | | |
|---|---|---|---|
| Type | No. of Ports | Port Capacity | Fiber Use |
| 1 | 4 | 2 - Up to 144 Sm | Backbone |
| | | 2 - Up to 48 Sm | Drop |
| 2 | 6 | 4 - Up to 144 Sm | Backbone/Arterial |
| | | 2 - Up to 48 Sm | Drop |
| 3 | 8 | 4 - Up to 144 Sm | Backbone/Arterial |
| | | 4 - Up to 48 Sm | Drop |

## Splice Enclosure Fiber Accommodations

## General Notes:

1. Conduit entry points to the Type 1 and Type 2 ground boxes are diagrammatic. Refer to ITS ground box standards, ITS(37) and ITS(39), for more information. Additional conduits may be required as shown on the plans.
2. Type 2 ground boxes are to be used, as shown on the plans, when splice enclosures are required.
3. Maintain a minimum bend radius of 20 times the fiber optic cable diameter during installation, relocation, and removal and a minimum of 10 times the fiber optic cable diameter when in operation.
4. Caulk all conduit around the top of the cable ducts with an engineer approved caulking compound to seal clearance between the cables and ducts. Place conduit plugs in all vacant conduits or inner-ducts.
5. Provide cable straps that will withstand ultra-violet exposure and do not damage cables when tightening.
6. All incidental equipment necessary for the cable installation and mounting of splice enclosure within the ground box will be incidental to Special Specification, "ITS Fiber Optic Cable."
7. Submit all splice locations to the field engineer for approval before beginning work.
8. Provide splice enclosures designed to seal, bond, anchor, and protect fiber optic cable splices. Provide splice enclosures designed to handle mechanical and fusion type splices. Provide splice enclosures with port configurations for the sizes detailed above.
9. Provide splice enclosures designed for underground placement with a sealing system preventing water penetration when submerged under 10 ft. of water.
10. Furnish, install, and secure fiber optic cable tags for each fiber optic cable entering a ground box, ITS field equipment cabinet (ground and pole), and hub building or communication node as detailed above. Provide information including fiber optic type, count, origin, and destination on the cable tag. Use UV resistant tie-wraps for securing the tag to the cable. Provide tie-wraps that do not damage fiber when securing to cable.

Sheet Details
Not to Scale



Texas Department of Transportation

Traffic Operations Division Standard

# ITS FIBER OPTIC CABLE MISCELLANEOUS DETAILS

# ITS(43)-16

| FILE: its(43)-16.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT FEBRUARY 2016 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031,ETC | IH 10 |
| | DIST | COUNTY | | SHEET NO. |
| | YKM | GONZALES,ETC | | 96 |

# ZONE 3 WITH AND WITHOUT ICE 80 MPH WIND

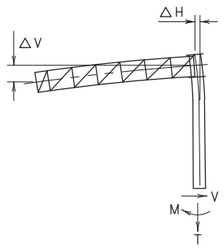
| TOWER HEIGHT | 10′ SPAN | | | | | | | | | | | | 15′ SPAN | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TOWER PIPE | | | ANCHOR BOLTS | | | BASE PLATE | TRUSS | DESIGN LOADS | | | | TOWER PIPE | | | ANCHOR BOLTS | | | BASE PLATE | TRUSS | DESIGN LOADS | | | |
| (ft) | O.D. (in) | WALL THICK (in) | DEFL ΔH (in) | SIZE DIA (in) | NO. | BOLT CIR DIA | SIZE (in) | DEFL ΔV (in) | SHEAR V (Kips) | TORSION T (K-ft) | MOMENT M (K-ft) | | O.D. (in) | WALL THICK (in) | DEFL ΔH (in) | SIZE DIA (in) | NO. | BOLT CIR DIA | SIZE (in) | DEFL ΔV (in) | SHEAR V (Kips) | TORSION T (K-ft) | MOMENT M (K-ft) | |
| 14′ | 16 | 0.250 | 0.105 | 1 ¼ | 6 | 20 ½" | 24 x1¼ | 0.2 | 3.59 | 16.19 | 49.87 | | 16 | 0.250 | 0.235 | 1 ⅜ | 8 | 20 ¾" | 24½x1⅜ | 0.5 | 5.40 | 37.56 | 76.63 | |
| 15′ | | | 0.120 | | | | | | 3.61 | | 53.42 | | | | 0.270 | | | | | 0.6 | 5.41 | | 81.91 | |
| 16′ | | | 0.137 | | | | | | 3.62 | | 57.00 | | | | 0.308 | | | | | 0.6 | 5.43 | | 87.23 | |
| 17′ | | | 0.154 | | | | | | 3.64 | | 60.59 | | | | 0.347 | | | | | 0.7 | 5.45 | | 92.57 | |
| 18′ | | | 0.173 | | | | | | 3.66 | | 64.21 | | | | 0.389 | | | | 24½x1⅜ | 0.7 | 5.46 | | 97.94 | |
| 19′ | | | 0.193 | | 6 | | | | 3.67 | | 67.85 | | | | 0.434 | | | | 24½x1½ | 0.7 | 5.48 | | 103.33 | |
| 20′ | | | 0.214 | | 8 | | | | 3.69 | | 71.51 | | | | 0.481 | | | | | 0.8 | 5.50 | | 108.75 | |
| 21′ | | | 0.235 | | | | | | 3.71 | | 75.18 | | 0.250 | 0.530 | | | | | | | 5.51 | | 114.19 | |
| 22′ | | | 0.258 | | | | | 0.2 | 3.73 | | 78.88 | | 0.281 | 0.521 | 1 ⅜ | | | 20 ¾" | 24½x1½ | | 5.53 | | 119.66 | |
| 23′ | | | 0.282 | | | | | 0.3 | 3.74 | | 82.59 | | 0.281 | 0.569 | 1 ½ | | | 21" | 25 x1⅝ | | 5.55 | | 125.14 | |
| 24′ | | | 0.308 | | | | | | 3.76 | | 86.33 | | 0.281 | 0.620 | | | | | | | 5.56 | | 130.65 | |
| 25′ | | | 0.334 | | | | 24 x1¼ | | 3.78 | | 90.08 | | 0.312 | 0.610 | | | | | | | 5.58 | | 136.18 | |
| 26′ | | | 0.361 | | | | 24 x1⅜ | | 3.79 | | 93.85 | | 0.312 | 0.660 | | | | | 25 x1⅝ | | 5.60 | | 141.73 | |
| 27′ | | | 0.389 | | | | | | 3.81 | | 97.64 | | 0.312 | 0.711 | | | | | 25 x1¾ | | 5.62 | | 147.30 | |
| 28′ | | | 0.419 | | | | | | 3.83 | | 101.44 | | 0.344 | 0.699 | | | | | | | 5.63 | | 152.89 | |
| 29′ | | | 0.449 | | | | | | 3.84 | | 105.26 | | 0.344 | 0.750 | | | | | | | 5.65 | | 158.50 | |
| 30′ | | | 0.481 | | | | | | 3.86 | | 109.11 | | 0.344 | 0.802 | 1 ½ | | | 21" | 25 x1¾ | | 5.67 | | 164.12 | |
| 31′ | | | 0.513 | | | | 24 x1⅜ | | 3.88 | | 112.96 | | 0.375 | 0.791 | 1 ¾ | | | 21 ½" | 26 x1⅞ | | 5.68 | | 169.77 | |
| 32′ | 16 | 0.250 | 0.547 | 1 ¼ | 8 | 20 ½" | 24 x1½ | 0.3 | 3.89 | 16.19 | 116.84 | | 16 | 0.375 | 0.843 | 1 ¾ | 8 | 21 ½" | 26 x1⅞ | 0.8 | 5.70 | 37.56 | 175.43 | |

| TOWER HEIGHT | 20′ SPAN | | | | | | | | | | | | 25′ SPAN | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TOWER PIPE | | | ANCHOR BOLTS | | | BASE PLATE | TRUSS | DESIGN LOADS | | | | TOWER PIPE | | | ANCHOR BOLTS | | | BASE PLATE | TRUSS | DESIGN LOADS | | | |
| (ft) | O.D. (in) | WALL THICK (in) | DEFL ΔH (in) | SIZE DIA (in) | NO. | BOLT CIR DIA | SIZE (in) | DEFL ΔV (in) | SHEAR V (Kips) | TORSION T (K-ft) | MOMENT M (K-ft) | | O.D. (in) | WALL THICK (in) | DEFL ΔH (in) | SIZE DIA (in) | NO. | BOLT CIR DIA | SIZE (in) | DEFL ΔV (in) | SHEAR V (Kips) | TORSION T (K-ft) | MOMENT M (K-ft) | |
| 14′ | 20 | 0.250 | 0.213 | 1 ¼ | 8 | 24 ½" | 28 x1¼ | 0.7 | 7.43 | 69.08 | 107.16 | | 20 | 0.281 | 0.308 | 1 ½ | 8 | 25" | 29 x1½ | 1.3 | 9.14 | 107.68 | 135.49 | |
| 15′ | | | 0.244 | 1 ¼ | | 24 ½" | 28 x1¼ | 0.7 | 7.43 | | 113.96 | | | 0.281 | 0.354 | | | | | 1.4 | 9.17 | | 144.13 | |
| 16′ | | | 0.278 | 1 ⅜ | | 24 ¾" | 28½x1⅜ | 0.8 | 7.45 | | 121.17 | | | 0.281 | 0.403 | | | | | 1.4 | 9.19 | | 152.86 | |
| 17′ | | | 0.314 | | | | | 0.8 | 7.47 | | 128.42 | | | 0.281 | 0.455 | 1 ½ | | 25" | 29 x1½ | 1.5 | 9.21 | | 161.65 | |
| 18′ | | | 0.352 | | | | | 0.9 | 7.49 | | 135.72 | | | 0.312 | 0.460 | 1 ¾ | | 25 ⅜" | 29¾x1⅝ | 1.5 | 9.23 | | 170.51 | |
| 19′ | | | 0.392 | 1 ⅜ | | 24 ¾" | 28½x1⅜ | 0.9 | 7.51 | | 143.06 | | | 0.312 | 0.513 | | | | | 1.5 | 9.25 | | 179.43 | |
| 20′ | | | 0.435 | 1 ½ | | 25" | 29 x1½ | 1.0 | 7.53 | | 150.43 | | | 0.312 | 0.568 | | | | 29¾x1¾ | 1.6 | 9.27 | | 188.39 | |
| 21′ | | | 0.479 | | | | | 1.0 | 7.55 | | 157.84 | | | 0.312 | 0.627 | | | | | 1.6 | 9.29 | | 197.41 | |
| 22′ | | | 0.526 | | | | | 1.1 | 7.57 | | 165.28 | | | 0.344 | 0.628 | | | | | 1.6 | 9.31 | | 206.47 | |
| 23′ | 0.250 | 0.575 | | | | | 29 x1½ | | 7.60 | | 172.75 | | | 0.344 | 0.686 | | | | 29¾x1¾ | 1.7 | 9.34 | | 215.57 | |
| 24′ | 0.281 | 0.560 | | | | | 29 x1⅝ | | 7.62 | | 180.26 | | | 0.344 | 0.747 | | | | 29¾x1⅞ | | 9.36 | | 224.71 | |
| 25′ | 0.281 | 0.607 | 1 ½ | | | 25" | 29 x1⅝ | | 7.64 | | 187.79 | | | 0.375 | 0.748 | | | | 29¾x1⅞ | | 9.38 | | 233.89 | |
| 26′ | 0.281 | 0.657 | 1 ¾ | | | 25 ⅜" | 29¾x1⅝ | | 7.66 | | 195.35 | | | 0.375 | 0.809 | 1 ¾ | | 25 ⅜" | 29¾x1⅞ | 1.7 | 9.40 | | 243.10 | |
| 27′ | 0.310 | 0.640 | | | | | 29¾x1¾ | | 7.68 | | 202.94 | | | 0.375 | 0.872 | 2 | | 25 ¾" | 30½x 2 | 1.8 | 9.42 | | 252.34 | |
| 28′ | 0.310 | 0.688 | | | | | | | 7.70 | | 210.55 | | | 0.406 | 0.870 | | | | | | 9.44 | | 261.62 | |
| 29′ | 0.310 | 0.738 | | | | | | | 7.72 | | 218.20 | | | 0.406 | 0.933 | | | | | | 9.46 | | 270.93 | |
| 30′ | 0.340 | 0.721 | | | | | 29¾x1¾ | | 7.74 | | 225.86 | | | 0.406 | 0.999 | | | | 30½x 2 | | 9.48 | | 280.27 | |
| 31′ | 0.340 | 0.770 | | | | | 29¾x1⅞ | | 7.77 | | 233.56 | | | 0.441 | 0.992 | | | | | | 9.50 | | 289.64 | |
| 32′ | 20 | 0.340 | 0.821 | 1 ¾ | 8 | 25 ⅜" | 29¾x1⅞ | 1.1 | 7.79 | 69.08 | 241.27 | | 20 | 0.441 | 1.057 | 2 | 8 | 25 ¾" | 30½x2¼ | 1.8 | 9.53 | 107.68 | 299.04 | |

# ZONE 3 WITH AND WITHOUT ICE 80 MPH WIND

| TOWER HEIGHT | 30′ SPAN | | | | | | | | | | | | 35′ SPAN | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TOWER PIPE | | | ANCHOR BOLTS | | | BASE PLATE | TRUSS | DESIGN LOADS | | | | TOWER PIPE | | | ANCHOR BOLTS | | | BASE PLATE | TRUSS | DESIGN LOADS | | | |
| (ft) | O.D. (in) | WALL THICK (in) | DEFL ΔH (in) | SIZE DIA (in) | NO. | BOLT CIR DIA | SIZE (in) | DEFL ΔV (in) | SHEAR V (Kips) | TORSION T (K-ft) | MOMENT M (K-ft) | | O.D. (in) | WALL THICK (in) | DEFL ΔH (in) | SIZE DIA (in) | NO. | BOLT CIR DIA | SIZE (in) | DEFL ΔV (in) | SHEAR V (Kips) | TORSION T (K-ft) | MOMENT M (K-ft) | |
| 14′ | 24 | 0.250 | 0.289 | 1 ½ | 8 | 29" | 33 x1½ | 1.6 | 11.00 | 155.44 | 167.11 | | 30 | 0.250 | 0.210 | 1 ¾ | 8 | 35 ⅜" | 39¾x1½ | 1.5 | 12.87 | 211.58 | 202.48 | |
| 15′ | | | 0.331 | | | | | | 11.03 | | 177.27 | | | | 0.241 | | | | | 1.6 | 12.90 | | 213.97 | |
| 16′ | | 0.281 | 0.338 | 1 ¾ | | 29 ⅜" | 33¾x1½ | 1.6 | 11.05 | | 187.54 | | | | 0.275 | | | | | 1.6 | 12.93 | | 225.63 | |
| 17′ | | | 0.381 | | | | 33¾x1½ | 1.7 | 11.08 | | 197.93 | | 0.250 | 0.310 | | | | | | 1.7 | 12.97 | | 237.46 | |
| 18′ | | | 0.428 | | | | 33¾x1½ | 1.8 | 11.10 | | 208.40 | | 0.281 | 0.310 | | | | | | 1.7 | 13.00 | | 249.43 | |
| 19′ | | 0.281 | 0.477 | | | | 33¾x1⅝ | | 11.13 | | 218.97 | | | | 0.346 | | | | | 1.7 | 13.03 | | 261.52 | |
| 20′ | | 0.312 | 0.477 | | | | 33¾x1⅝ | | 11.15 | | 229.60 | | | | 0.383 | | | | | 1.8 | 13.06 | | 273.72 | |
| 21′ | | | 0.526 | | | | 33¾x1⅝ | 1.8 | 11.18 | | 240.31 | | | | 0.422 | | | | | 1.8 | 13.09 | | 286.04 | |
| 22′ | | | 0.577 | | | | 33¾x1¾ | 1.9 | 11.20 | | 251.08 | | | | 0.463 | | | | | 1.9 | 13.12 | | 298.44 | |
| 23′ | | | 0.631 | | | | 33¾x1¾ | 2.0 | 11.23 | | 261.91 | | | 0.507 | 1 ¾ | | | 35 ⅜" | 39¾x1½ | 2.0 | 13.16 | | 310.94 | |
| 24′ | | 0.312 | 0.687 | 1 ¾ | | 29 ⅜" | 33¾x1¾ | | 11.25 | | 272.80 | | | 0.552 | 2 | | | 35 ¾" | 40½x1⅝ | 2.0 | 13.19 | | 323.51 | |
| 25′ | | 0.344 | 0.679 | 2 | | 29 ¾" | 34½x1¾ | | 11.28 | | 283.74 | | | 0.598 | | | | | 40½x1⅝ | 2.1 | 13.22 | | 336.16 | |
| 26′ | | | 0.735 | | | | 34½x 2 | 2.0 | 11.30 | | 294.73 | | | 0.647 | | | | | 40½x1⅝ | 2.2 | 13.25 | | 348.89 | |
| 27′ | | | 0.792 | | | | | 2.1 | 11.33 | | 305.77 | | | 0.698 | | | | | 40½x1¾ | 2.2 | 13.28 | | 361.68 | |
| 28′ | | | 0.852 | | | | | 2.2 | 11.36 | | 316.85 | | 0.281 | 0.751 | | | | | | 2.3 | 13.31 | | 374.53 | |
| 29′ | | 0.344 | 0.914 | | | | | | 11.38 | | 327.97 | | 0.310 | 0.726 | | | | | | 2.2 | 13.35 | | 387.45 | |
| 30′ | | 0.375 | 0.901 | | | | | | 11.41 | | 339.13 | | | 0.777 | | | | | | 2.2 | 13.38 | | 400.42 | |
| 31′ | | 0.375 | 0.962 | | | | | 2.2 | 11.43 | | 350.34 | | | 0.830 | | | | | | 2.3 | 13.41 | | 413.45 | |
| 32′ | 24 | 0.375 | 1.023 | 2 | 8 | 29 ¾" | 34½x 2 | 2.3 | 11.44 | 155.44 | 361.13 | | 30 | 0.310 | 0.884 | 2 | 8 | 35 ¾" | 40½x1¾ | 2.4 | 13.44 | 211.58 | 426.53 | |

| TOWER HEIGHT | 40′ SPAN | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TOWER PIPE | | | ANCHOR BOLTS | | | BASE PLATE | TRUSS | DESIGN LOADS | | | |
| (ft) | O.D. (in) | WALL THICK (in) | DEFL ΔH (in) | SIZE DIA (in) | NO. | BOLT CIR DIA | SIZE (in) | DEFL ΔV (in) | SHEAR V (Kips) | TORSION T (K-ft) | MOMENT M (K-ft) | |
| 14′ | 30 | 0.280 | 0.260 | 1 ¾ | 8 | 35 ⅜" | 39⅞x1½ | 2.1 | 14.65 | 276.72 | 242.20 | |
| 15′ | | | 0.298 | 1 ¾ | | 35 ⅜" | 39⅞x1½ | 2.2 | 14.68 | | 254.69 | |
| 16′ | | | 0.339 | 1 ¾ | | 35 ⅜" | 39⅞x1½ | 2.3 | 14.71 | | 267.44 | |
| 17′ | | | 0.383 | 2 | | 35 ¾" | 40½x1½ | 2.4 | 14.75 | | 280.40 | |
| 18′ | | | 0.429 | | | | 40½x1⅝ | 2.5 | 14.78 | | 293.56 | |
| 19′ | | 0.280 | 0.478 | | | | | 2.6 | 14.81 | | 306.90 | |
| 20′ | | 0.312 | 0.478 | | | | | 2.6 | 14.84 | | 320.39 | |
| 21′ | | | 0.527 | | | | 40½x1⅝ | 2.6 | 14.87 | | 334.02 | |
| 22′ | | | 0.578 | | | | 40½x1¾ | 2.7 | 14.90 | | 347.79 | |
| 23′ | | | 0.632 | | | | | 2.8 | 14.94 | | 361.67 | |
| 24′ | | | 0.688 | | | | | 2.9 | 14.97 | | 375.66 | |
| 25′ | | 0.312 | 0.747 | | | | 40½x1¾ | 3.0 | 15.00 | | 389.75 | |
| 26′ | | 0.340 | 0.736 | | | | 40½x 2 | 3.0 | 15.03 | | 403.94 | |
| 27′ | | | 0.794 | 2 | | 35 ¾" | 40½x 2 | 3.0 | 15.06 | | 418.22 | |
| 28′ | | | 0.854 | 2 ¼ | | 36" | 41 x 2 | 3.1 | 15.09 | | 432.57 | |
| 29′ | | | 0.916 | | | | | 3.2 | 15.13 | | 447.01 | |
| 30′ | | 0.340 | 0.980 | | | | | | 15.16 | | 461.52 | |
| 31′ | | 0.375 | 0.963 | | | | | | 15.19 | | 476.10 | |
| 32′ | 30 | 0.375 | 1.026 | 2 ¼ | 8 | 36" | 41 x 2 | 3.2 | 15.22 | 276.72 | 490.75 | |




ELEVATION

(SHOWING DESIGN LOADS AND DEAD LOAD DEFLECTIONS)

## TRUSS DETAILS

| SPAN | 10′, 15′, & 20′ | 25′ | 30′ | 35′ | 40′ |
|---|---|---|---|---|---|
| W x D = WIDTH x DEPTH | 4.0 x 4.0 | 4.0 x 4.0 | 4.0 x 4.0 | 4.5 x 4.5 | 4.5 x 4.5 |
| CHORD-①, Unless Otherwise Shown | L 3 x 3 x 3/16 ② [3] | L 3 x 3 x ¼ ② [4] | L 3 x 3 x ¼ [6] | L 3 x 3 x 5/16 [7] | L3 ½x3 ½x 5/16 [9] |
| DEAD LOAD DIAGONAL-② | L 2 x 2 x 3/16 [2] | L 2 x 2 x 3/16 [2] | L 2 x 2 x 3/16 [2] | L 2 x 2 x 3/16 [2] | L 2 x 2 x 3/16 [3] |
| WIND LOAD DIAGONAL-② | L2 ½x2 ½x 3/16 [2] | L2 ½x2 ½x 3/16 [2] | L 3 x 3 x ¼ [2] | L 3 x 3 x ¼ [2] | L 3 x 3 x ¼ [3] |
| DEAD LOAD VERTICAL-② | L 2 x 2 x 3/16 [2] | L 2 x 2 x 3/16 [2] | L 2 x 2 x 3/16 [2] | L2 ½x2 ½x 3/16 [2] | L2 ½x2 ½x 3/16 [2] |
| WIND LOAD STRUT-② | L 2 x 2 x 3/16 [1] | L 2 x 2 x 3/16 [1] | L 2 x 2 x 3/16 [1] | L 2 x 2 x 3/16 [1] | L 2 x 2 x 3/16 [1] |
| TRUSS DEAD LOAD | 38 lb/ft | 43 lb/ft | 45 lb/ft | 53 lb/ft | 62 lb/ft |
| SIZE H. S. BOLTS IN CONNECTION | 5/8" DIA | 5/8" DIA | 5/8" DIA | 5/8" DIA | 5/8" DIA |
| NO. & SIZE OF H.S. BOLTS IN CHORD | | 4 ~ 5/8" DIA or | 6 ~ 5/8" DIA or | 7 ~ 5/8" DIA or | 9 ~ 5/8" DIA or |
| ANGLE TO TOWER CONNECTION PLATE | 3 ~ 5/8" DIA ea | 3 ~ ¾" DIA ea | 5 ~ ¾" DIA ea | 5 ~ ¾" DIA ea | 7 ~ ¾" DIA ea |

① "Low-Alloy Steel" for non-bridge structures per Item 442, "Metal For Structures".

② "Carbon Steel" for non-bridge structures per Item 442, "Metal For Structures".

GENERAL NOTES :

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

Steel for tower pipe shall conform to ASTM A53 Grade B or to ASTM A501. Tower pipe wall thickness shown is the minimum allowable. Fabricator may use the wall thickness shown or pipe of the same diameter with greater wall thickness.

All connection bolts shall conform to Item 447, "Structural Bolting". All structural steel, connection bolts, nuts and washers shall be galvanized in accordance with the Specifications.

Compensate for truss deflection at free end by offsetting upper and lower bolt holes at truss-to-tower connection.

For truss details see standard drawing COSSD.

For base and foundation details see standard drawing COSSF.

For cantilever truss lengths falling between those shown use sizes called for in the next longer span.

Truss and towers for cantilever sign supports are designed for the equivalent area of a 10′-0" deep sign panel over 100% of the span length. Design includes 3 pounds per foot squared for sign panel and 20 pounds per foot for lights and 50 pounds per foot for walkways all placed as specified for the design sign panel.

Details called for hereon are applicable for Design Wind Heights up to 30′ inclusive.

Number of High Strength bolts required in truss connection or splice are indicated in brackets, e.g. [3], after the member size.

Deflections shown include the design loads for Truss, Sign Panel, Lights and Walkways.

Texas Department of Transportation
Traffic Operations Division

# CANTILEVER OVERHEAD SIGN SUPPORTS

# COSS-Z3 & Z3I-10



| DN: TXDOT | CK: TXDOT | DW: TXDOT | CK: TXDOT |
|---|---|---|---|

| REVISIONS | CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|---|
| 4-10 | 0535 | 04 | 031,ETC | IH 10 |
| | DIST | COUNTY | | SHEET NO. |
| | YKM | GONZALES,ETC | | 97 |



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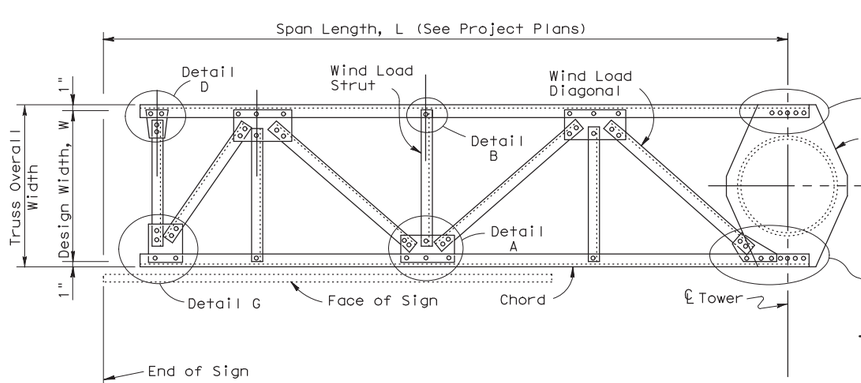
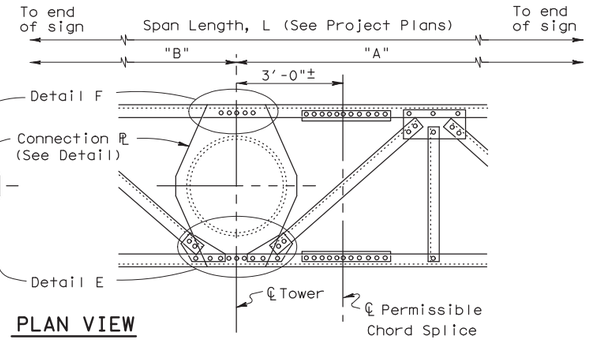


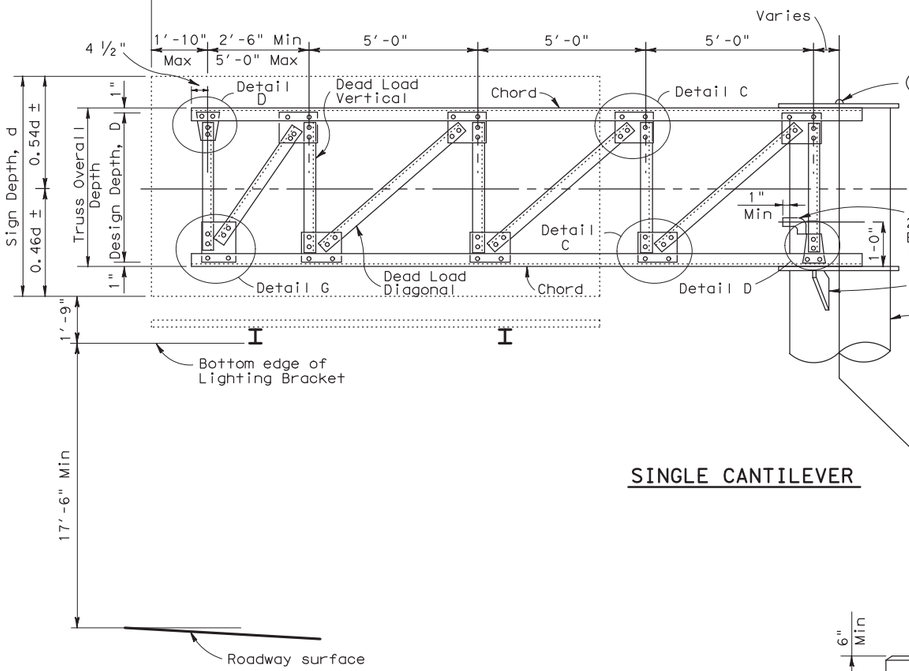




PLAN VIEW

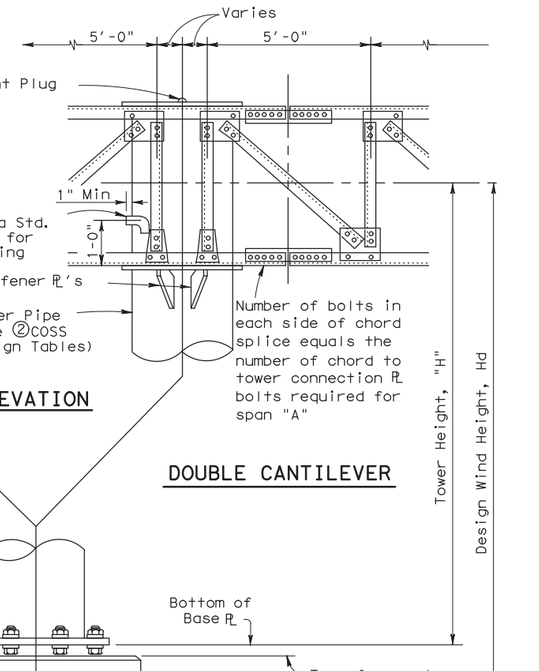
GENERAL NOTES:

Design conforms to 1975 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and Interim revisions thereto. Connection details are typical only. Actual size of member and number of bolts will vary. The details on this sheet are intended as a guide only. See "Cantilever Overhead Sign Supports" or "High Level Cantilever Overhead Sign Supports" sheets for number of bolts and size of members.

Gusset plates to be same thickness as thickest web member in connection.

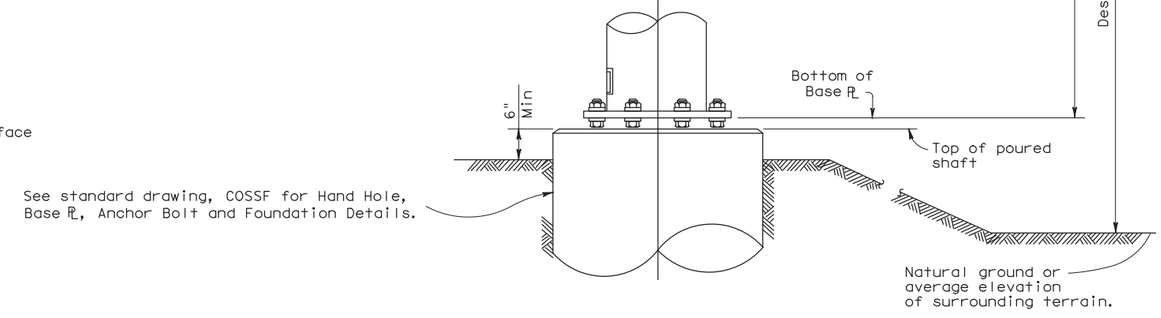



SINGLE CANTILEVER




ELEVATION

DOUBLE CANTILEVER




① Note: Cap shall be solid steel sheet ⅜" nominal thickness. Drill, tap and plug galvanizing vent. Weld plate to pipe with ⅜" weld all around.

② For COSS design tables see standard drawing, "Cantilever Overhead Sign Supports" or "High Level Cantilever Overhead Sign Supports".



Texas Department of Transportation
Traffic Operations Division

# CANTILEVER OVERHEAD SIGN SUPPORT DETAILS

## COSSD



REVISIONS

| DN: TXDOT | CK: TXDOT | DW: TXDOT | CK: TXDOT |
|---|---|---|---|

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 0535 | 04 | 031, ETC | IH 10 |
| DIST | COUNTY | | SHEET NO. |
| YKM | GONZALES, ETC | | 98 |

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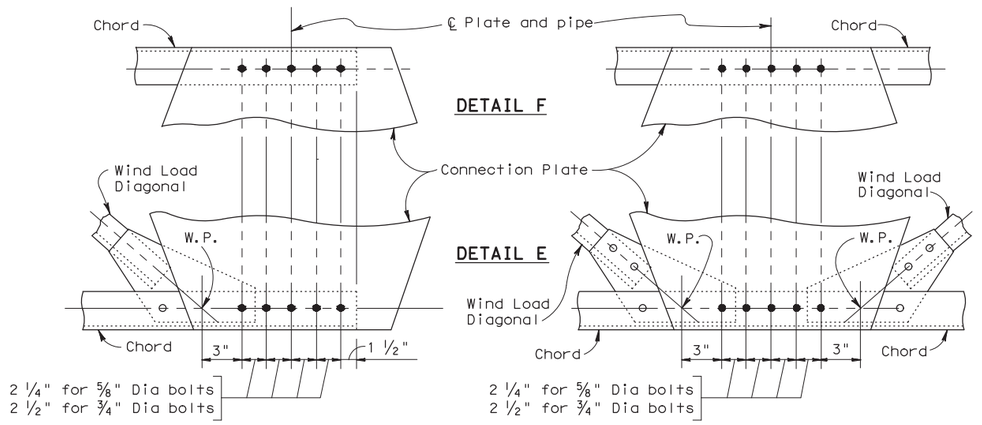
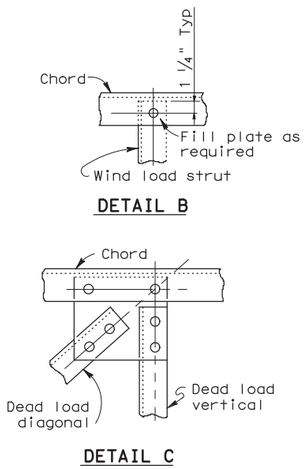
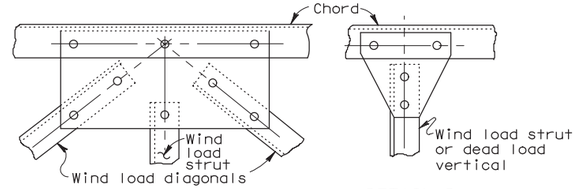


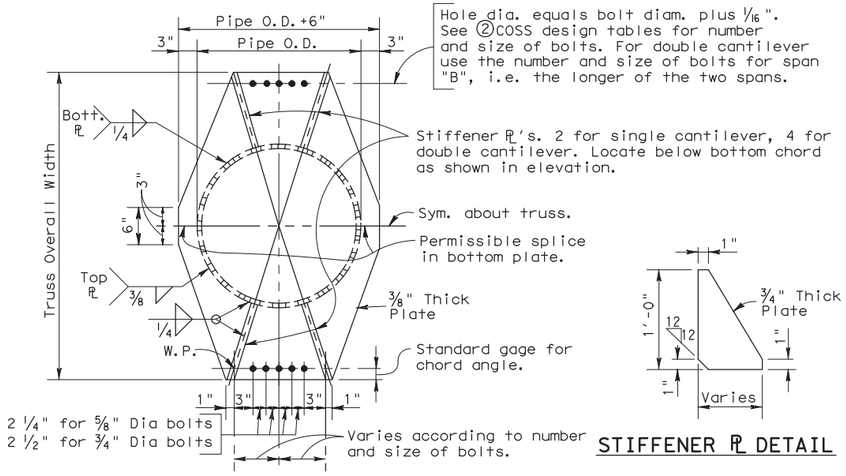

SINGLE CANTILEVER DOUBLE CANTILEVER




CONNECTION DETAILS



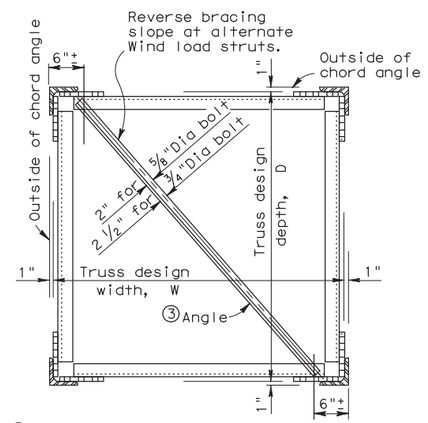

| TOTAL NO. OF BOLTS IN DIAG'S. IN JOINT | NUMBER OF BOLTS REQD. IN GUSSET ℄ TO CHORD CONNECTION |
|---|---|
| 0 | 2 |
| 2 | 2 |
| 3 | 3 |
| 4 | 3 |
| 5 | 4 |
| 6 | 4 |
| 8 | 5 |
| 10 | 6 |




CONNECTION PLATE DETAIL

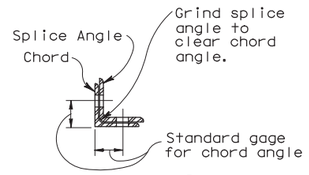



STIFFENER ℄ DETAIL

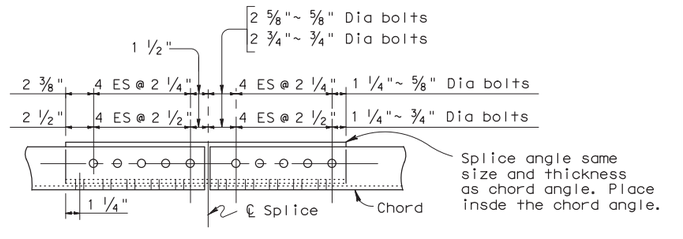



③2" x 2" x 3/16" angle for ⅝" Dia bolts [1]
2½" x 2" x 3/16" angle for ¾" Dia bolts [1]

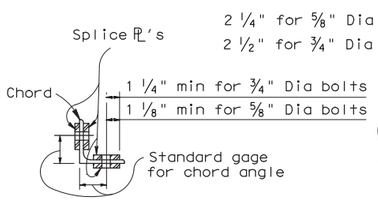
TRUSS SECTION
(DIAGONALS NOT SHOWN)



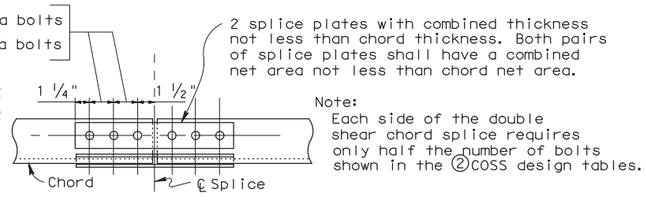

SECTION ON ℄ SPLICE




SINGLE SHEAR CHORD SPLICE



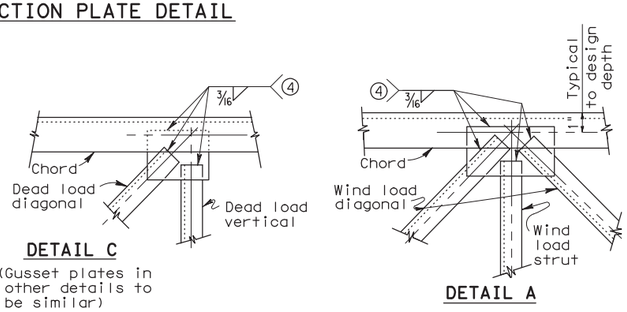

SECTION ON ℄ SPLICE




Note:
Each side of the double shear chord splice requires only half the number of bolts shown in the ②COSS design tables.

DOUBLE SHEAR CHORD SPLICE

SPLICE DETAILS




ALTERNATE WELDED CONNECTION DETAILS

| ④MINIMUM LENGTH OF 3/16" FILLET WELD REQUIRED | | |
|---|---|---|
| NUMBER OF BOLTS | TO REPLACE ⅝" DIA BOLTS | TO REPLACE ¾" DIA BOLTS |
| 1 | 2" | 3" |
| 2 | 4" | 6" |
| 3 | 6" | 9" |
| 4 | 8" | 11 ½" |
| 5 | 10" | 14 ½" |
| 6 | 12" | 17 ½" |
| 7 | 14" | 20" |

SHEET 2 OF 2

Texas Department of Transportation
Traffic Operations Division

# CANTILEVER OVERHEAD SIGN SUPPORT DETAILS

## COSSD


REVISIONS

| DN: TXDOT | CK: TXDOT | DW: TXDOT | CK: TXDOT |
|---|---|---|---|

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 0535 | 04 | 031, ETC | IH 10 |
| DIST | COUNTY | | SHEET NO. |
| YKM | GONZALES, ETC | | 99 |

66B

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Washers shall conform to ASTM F436.

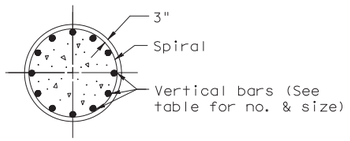
| ANCHOR BOLT DIA. | WASHER DIMENSIONS | | | | HOLE IN BASE PLATE |
|---|---|---|---|---|---|
| | OUTSIDE DIAMETER | HOLE DIAMETER | THICKNESS | | |
| d | | | MIN. | MAX. | |
| 1 ½" or less | 2d | d + ⅛" | 0.136" | 0.177" | d + ¼" |
| 1 ¾" | 2d - ⅛" | d + ⅛" | 0.178" | 0.280" | d + 5/16" |
| 2" | 2d - ¼" | d + ⅛" | 0.178" | 0.280" | d + 5/16" |
| Over 2" | 2d - ½" | d + ⅛" | 0.240" | 0.340" | d + 5/16" |

| ANCHOR BOLT SIZE | | | | |
|---|---|---|---|---|
| DIA | BOLT ① LENGTH | THREAD ① LENGTH | PROJECTION LENGTH | GALVAN. ① LENGTH |
| 1 ¼" | 2'-11" | 5" | 5 ¼" | 11 ¼" |
| 1 ⅜" | 3'-1" | 5 ½" | 5 ¾" | 11 ¾" |
| 1 ½" | 3'-4" | 6" | 6 ¼" | 1'-0 ¼" |
| 1 ¾" | 3'-10" | 7" | 7 ¼" | 1'-1 ¼" |
| 2" | 4'-3" | 8" | 8 ¼" | 1'-2 ¼" |
| 2 ¼" | 4'-9" | 9" | 9 ¼" | 1'-3 ¼" |
| 2 ½" | 5'-2" | 10" | 10 ¼" | 1'-4 ¼" |
| 2 ¾" | 5'-8" | 11" | 11 ¼" | 1'-5 ¼" |
| 3" | 6'-1" | 1'-0" | 1'-0 ¼" | 1'-6 ¼" |
| | | | | |
| | | | | |

① Anchor Bolt Fabrication Tolerances:
Bolt Length ~ ±½"
Thread Length ~ ±½"
Galvanized Length ~ -¼"

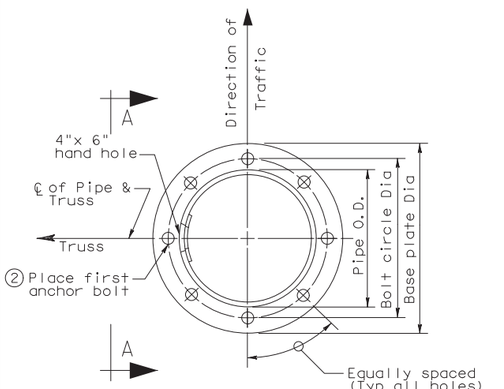
② Thread lenght applies to upper and lower threads

| | PIPE OUTSIDE DIAMETER | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 16" | | | 20" | | | 24" | | | 30" | | |
| ANCHOR BOLT SIZE | BOLT CIRCLE DIA | DRILLED SHAFT SIZE | DRILLED SHAFT REINF | BOLT CIRCLE DIA | DRILLED SHAFT SIZE | DRILLED SHAFT REINF | BOLT CIRCLE DIA | DRILLED SHAFT SIZE | DRILLED SHAFT REINF | BOLT CIRCLE DIA | DRILLED SHAFT SIZE | DRILLED SHAFT REINF |
| 1 ¼"Dia x 2'-11" | 20 ½" | 36" Dia | 14-#8 (A) | 24 ½" | 36" Dia | 14-#8 (A) | | | | | | |
| 1 ⅜"Dia x 3'-1" | 20 ¾" | 36" Dia | 12-#9 (A) | 24 ¾" | 42" Dia | 14-#9 (A) | | | | | | |
| 1 ½"Dia x 3'-4" | 21" | 36" Dia | 12-#9 (A) | 25" | 42" Dia | 14-#9 (A) | 29" | 42" Dia | 14-#9 (C) | | | |
| 1 ¾"Dia x 3'-10" | 21 ½" | 36" Dia | 10-#10(A) | 25 ⅜" | 42" Dia | 12-#10(B) | 29 ⅜" | 48" Dia | 16-#10(C) | 35 ⅜" | 54" Dia | 18-#10(C) |
| 2"Dia x 4'-3" | 22" | 36" Dia | 12-#10(A) | 25 ¾" | 42" Dia | 12-#10(B) | 29 ¾" | 48" Dia | 16-#10(C) | 35 ¾" | 54" Dia | 18-#10(C) |
| 2 ¼"Dia x 4'-9" | 22 ½" | 42" Dia | 12-#11(A) | 26" | 42" Dia | 10-#11(B) | 30" | 48" Dia | 14-#11(C) | 36" | 54" Dia | 14-#11(D) |
| 2 ½"Dia x 5'-2" | | | | 26 ½" | 42" Dia | 12-#11(B) | 30 ½" | 48" Dia | 16-#11(C) | 36 ½" | 54" Dia | 16-#11(D) |
| 2 ¾"Dia x 5'-8" | | | | | | | 31 ½" | 48" Dia | 18-#11(D) | 37" | 54" Dia | 20-#11(D) |
| 3"Dia x 6'-1" | | | | | | | | | | 37 ½" | 54" Dia | 24-#11(D) |
| | | | | | | | | | | | | |



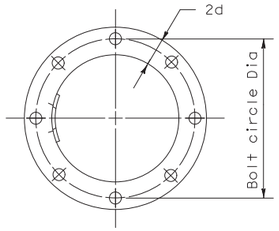

SECTION

A = #3 Plain spiral at 6" pitch (Grade 40)
B = #4 Plain spiral at 6" pitch (Grade 40)
C = #4 Plain spiral at 6" pitch (Grade 60)
D = #4 Plain spiral at 3 ½" pitch (Grade 60)

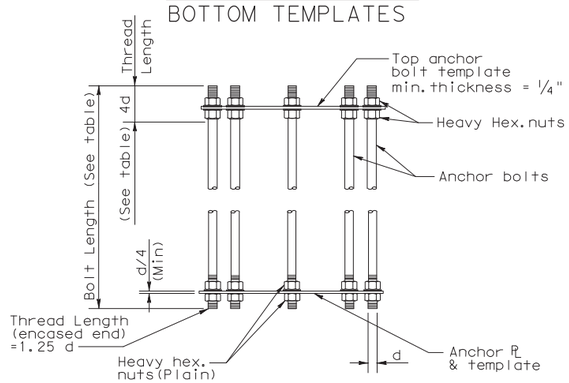



PLAN

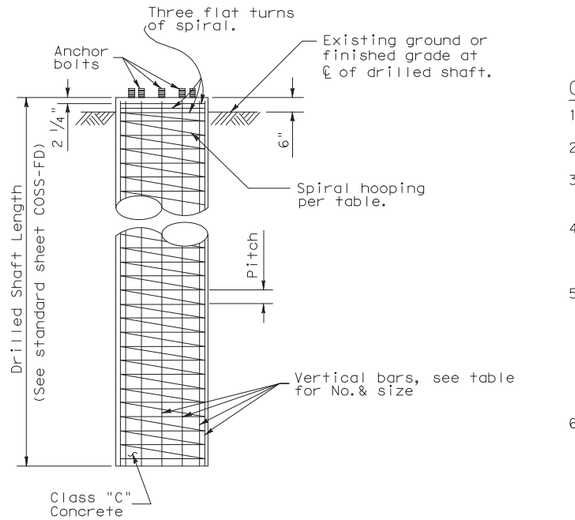
② See "Cantilever Overhead Sign Support" or "High Lever Cantilever Overhead Sign Support" sheets for number and size.




TOP VIEW OF TOP & BOTTOM TEMPLATES




ANCHOR BOLT ASSEMBLY
(PRIOR TO INSTALLATION)




FOUNDATION DETAIL

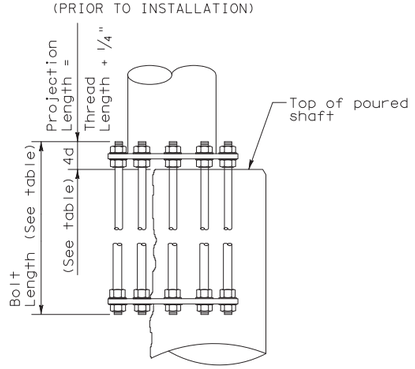



Cut 5" x 7" hole in pipe. Center 4" x 6" hand hole in ⅜" x 8" x 10" back up plate. Provide attachable cover made from section cut from pipe.

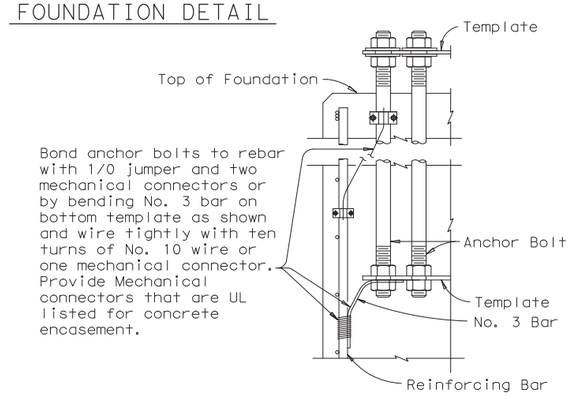
VIEW A-A

③ BASE PLATE & HANDHOLE DETAILS

③ See "Cantilever Overhead Sign Support" or "High Level Cantilever Overhead Sign Support" sheets for Diameter and thickness of base plate.




BEARING SEAT ELEVATION




LIGHTNING PROTECTION SYSTEM

## GENERAL NOTES

1. Concrete shall be Class "C".
2. Reinforcing shall conform to Item 440, "Reinforcing Steel".
3. Anchor bolts and nuts for anchor bolts shall be "Alloy Steel" per Item 449, "Anchor Bolts".
4. Anchor bolts shall be rigidly held in position during concrete placement using steel templates at the top and bottom. The top templates shall be removed after the concrete has set.
5. Lubricate and tighten anchor bolts when erecting the structure per Item 449, "Anchor Bolts". After the structure has been aligned in its final position and the anchor bolts have been properly tightened, tack weld anchor bolt nuts to washer, and tack weld washers to base plate. Galvanizing in tack welded areas shall be repaired in accordance with Item 445, "Galvanizing".
6. All vertical reinforcing shall be carried to the bottom of the Drilled Shaft.

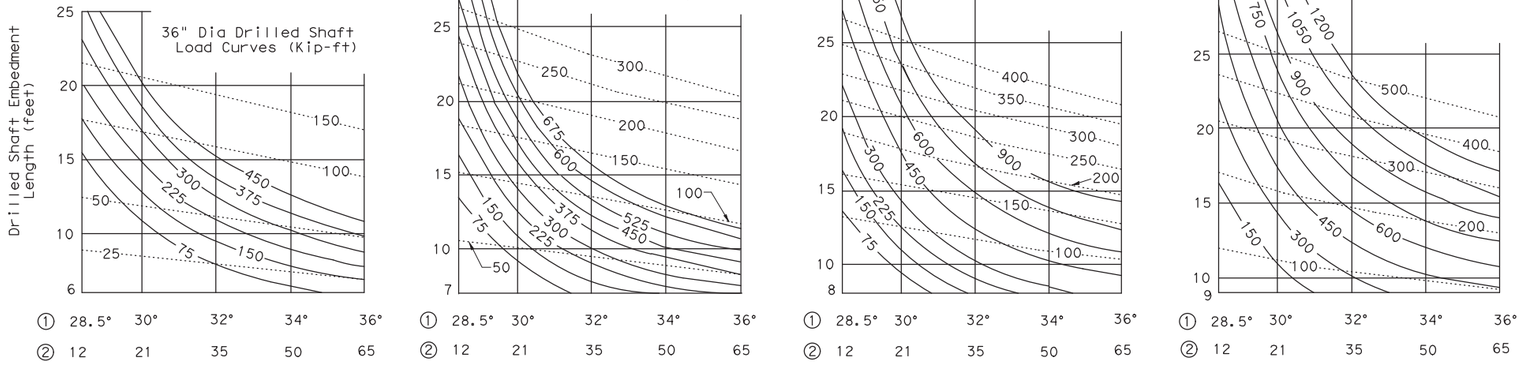
Texas Department of Transportation

Traffic Safety Division Standard

# CANTILEVER OVERHEAD SIGN SUPPORT FOUNDATION

# COSSF-21

| FILE: cossf-21.dgn | DN: | CK: | DW: | CK: |
|---|---|---|---|---|
| ©TxDOT November 2007 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031,ETC | IH 10 |
| 8-21 | DIST | COUNTY | | SHEET NO. |
| | YKM | GONZALES,ETC | | 100 |




① Ø = Angle of internal friction of soil (degrees)

② N = Texas cone penetrometer value (blows per ft)

④ C(psi) = Cohesive shear strength of soil (psi)

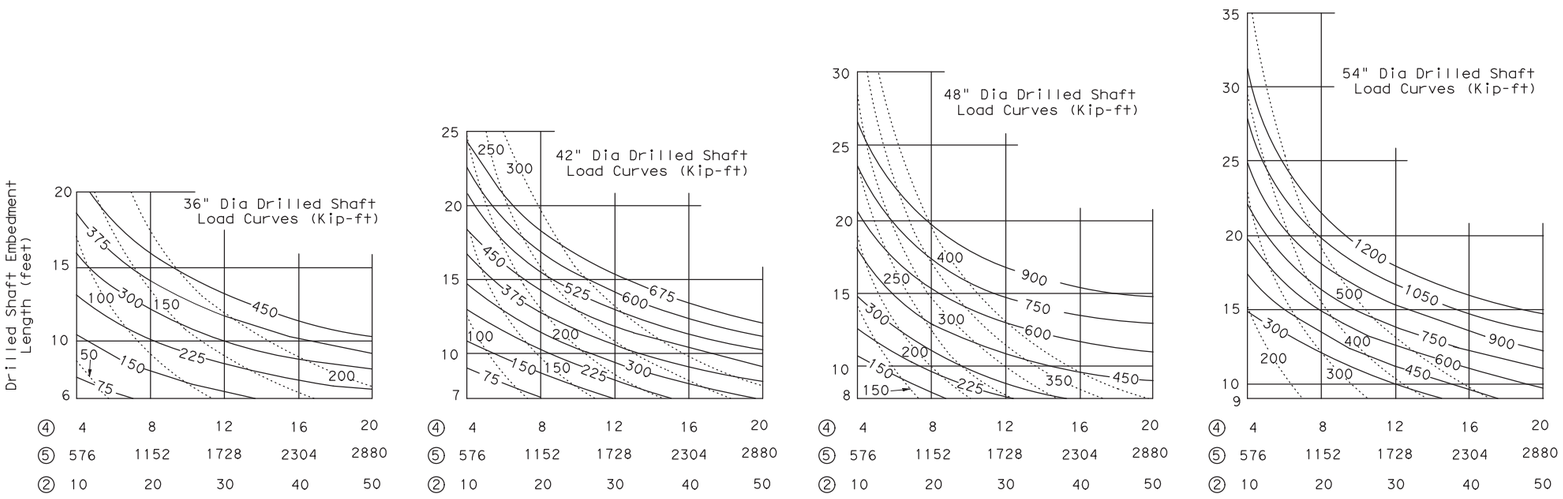
⑤ C(psf) = Cohesive shear strength of soil (psf)

## ③ SUBMERGED SAND SOIL (COHESIONLESS)

Moment ——————

Torsion .....

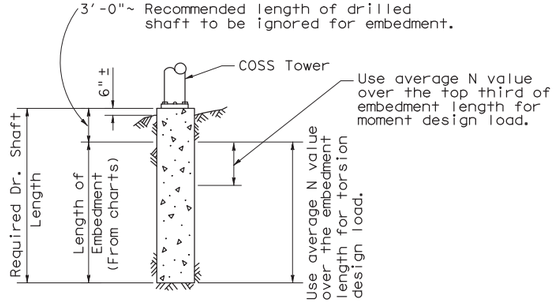
③ Note:
For unsubmerged sands and clayey sands the charts for clay soil will give a conservative foundation design.




## CLAY SOIL (COHESIVE)

Moment ——————

Torsion .....




## PROCEDURE:

1. Determine design moment and torsion, and the required drilled shaft diameter as outlined in the selection example sheet COSS-SE.
2. Make an initial estimate of the required embedment length.
3. From soil exploration data determine type of soil and average N value or soil property along the upper third of the drilled shaft.
4. Enter chart (for the correct shaft diameter and soil type) from the bottom at the average N value or soil property determined in step 3.
5. Proceed vertically into chart and locate intersection with design moment. Interpolate between moment curves (solid lines) as needed.
6. From intersection point turn 90° to left and read embedment length along vertical scale.
7. If embedment length differs significantly from estimated value return to step 3 with the embedment length determined in step 6.
8. From soil exploration data determine average N value or soil property over the entire length of the embedment.
9. Enter chart (for correct shaft diameter and soil type) from the bottom at the average N value or soil property determined in step 8.
10. Proceed vertically into chart and locate intersection with design torsion. Interpolate between torsion curves (dashed lines) as needed.
11. From intersection point turn 90° to left and read embedment length along vertical scale.
12. Compute the required length of drilled shaft by adding 3'-0" to longer embedment length required for moment or torsion.

## GENERAL NOTES:

These charts are for use with Cantilever Overhead Sign Supports with one shaft per tower.

Solid curves are base moment in Kip-ft.

Dash curves are base torsion in Kip-ft.

Minimum embedment of drilled shaft is two diameters.

Add 3'-0" to the required embedment length to determine the required length of drilled shaft.

Texas Department of Transportation
Traffic Operations Division

# FOUNDATION EMBEDMENT SELECTION CHARTS

# COSS-FD



REVISIONS

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| CONT | SECT | JOB | HIGHWAY |
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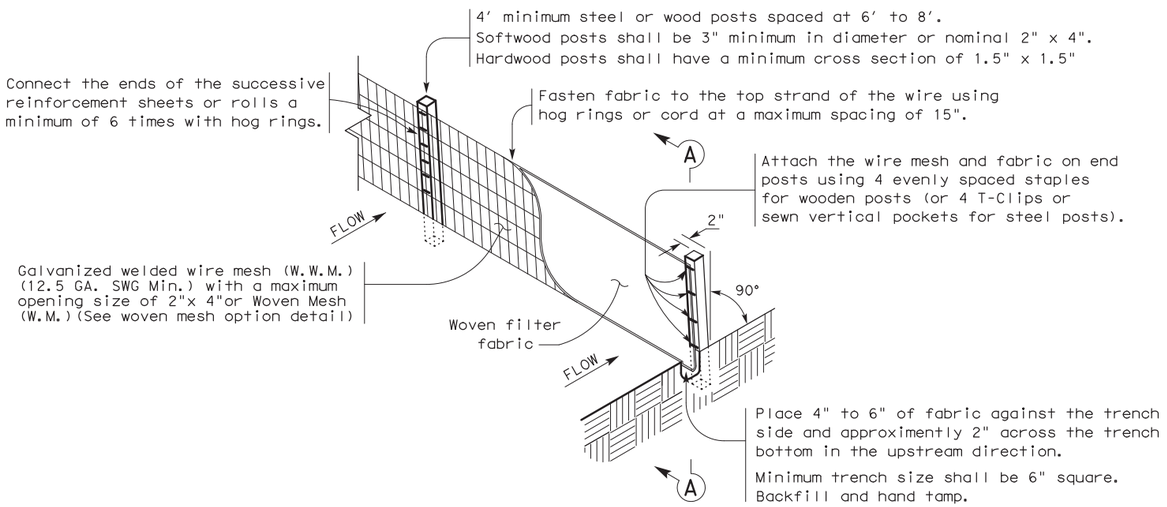
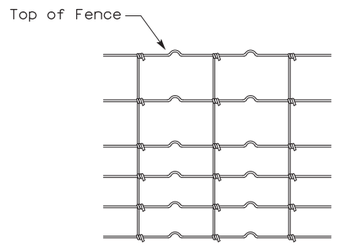
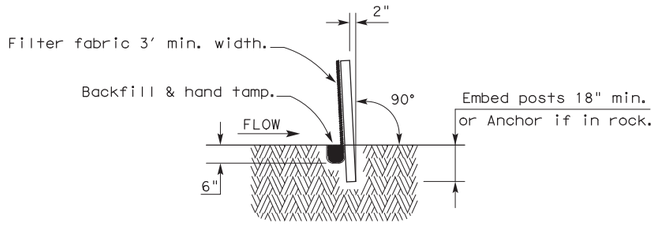



## TEMPORARY SEDIMENT CONTROL FENCE

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$^2$. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

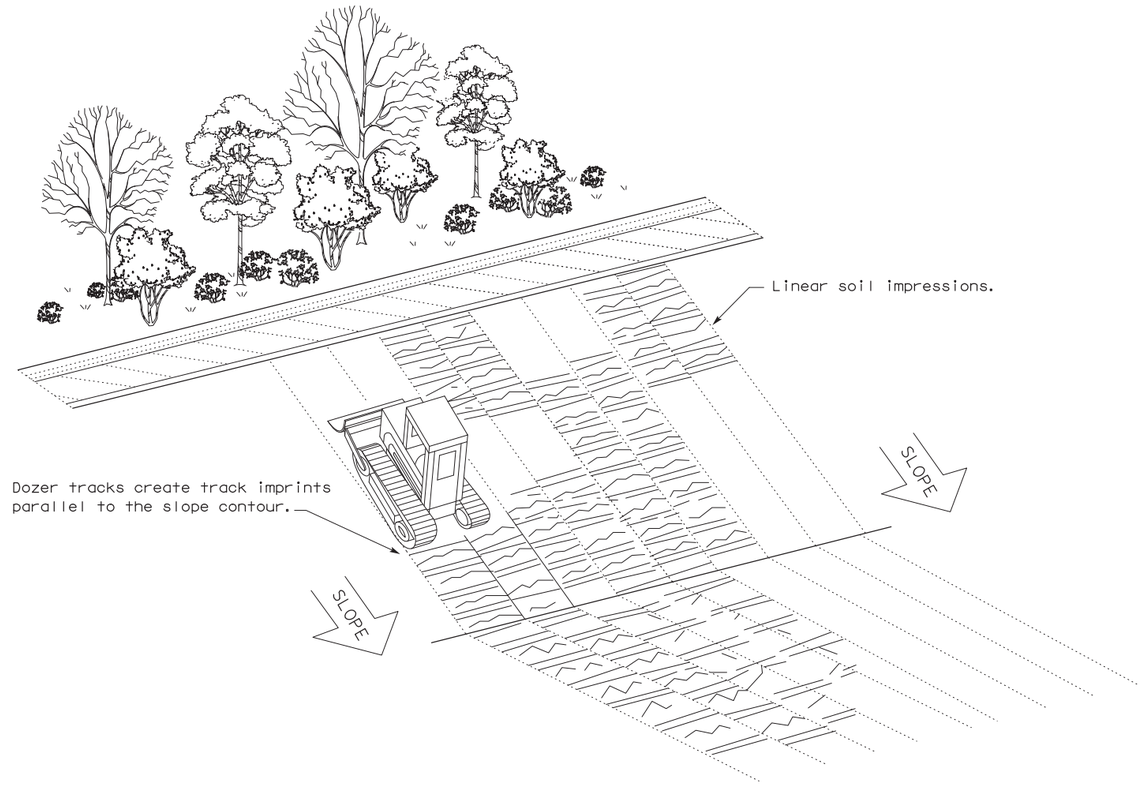
### LEGEND

Sediment Control Fence

SCF

### 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 | 0535 | 04 | 031,ETC | | IH 10 | |
| | DIST | COUNTY | | | SHEET NO. | |
| | YKM | GONZALES,ETC | | | 102 | |

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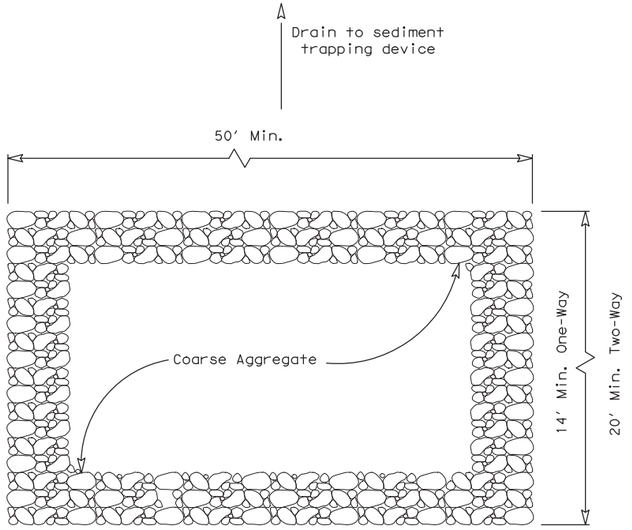
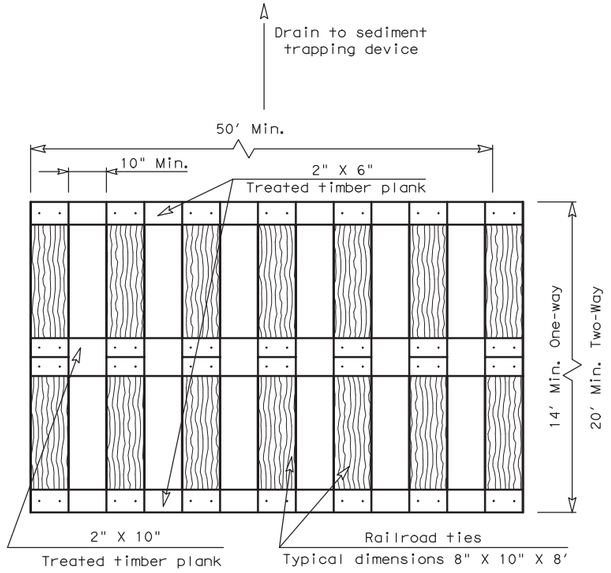
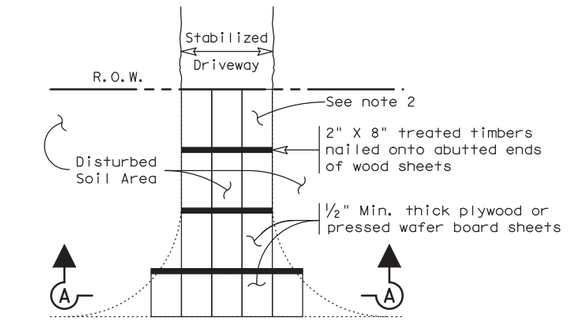


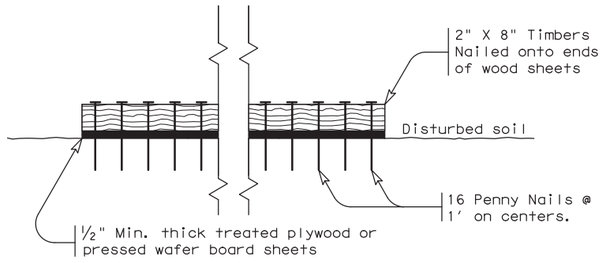

PLAN VIEW




PLAN VIEW



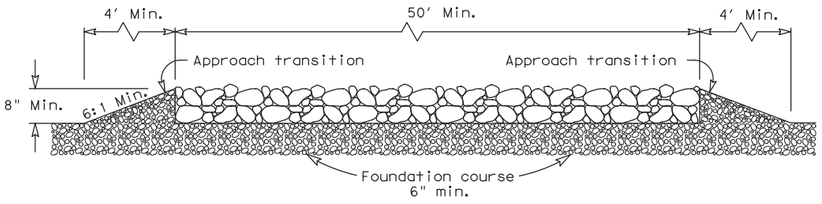

PLAN VIEW




SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

SHORT TERM



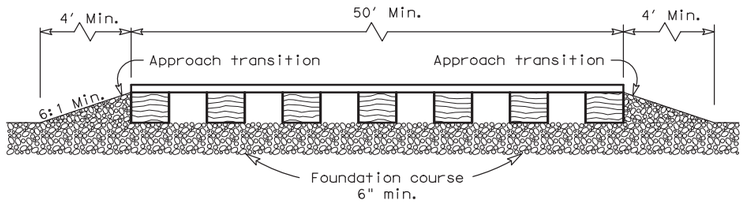

ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50′.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.




ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50′.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

# TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

## CONSTRUCTION EXITS

## EC(3)-16

| FILE: ec316 | DN: TxDOT | CK: KM | DW: VP | DN/CK: LS |
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| ©TxDOT: JULY 2016 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0535 | 04 | 031,ETC | IH 10 |
| | DIST | COUNTY | | SHEET NO. |
| | YKM | GONZALES,ETC | | 103 |

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## I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.

2.

☒ No Action Required ☐ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

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

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

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

☒ No Permit Required
☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
☐ Individual 404 Permit Required
☐ Other Nationwide Permit Required: NWP# _____

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

1.

2.

3.

4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

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

## III. CULTURAL RESOURCES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

## IV. VEGETATION RESOURCES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

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

### LIST OF ABBREVIATIONS

| | | | |
|---|---|---|---|
| BMP: | Best Management Practice | SPCC: | Spill Prevention Control and Countermeasure |
| CGP: | Construction General Permit | SW3P: | Storm Water Pollution Prevention Plan |
| DSHS: | Texas Department of State Health Services | PCN: | Pre-Construction Notification |
| FHWA: | Federal Highway Administration | PSL: | Project Specific Location |
| MOA: | Memorandum of Agreement | TCEQ: | Texas Commission on Environmental Quality |
| MOU: | Memorandum of Understanding | TPDES: | Texas Pollutant Discharge Elimination System |
| MS4: | Municipal Separate Stormwater Sewer System | TPWD: | Texas Parks and Wildlife Department |
| MBTA: | Migratory Bird Treaty Act | TxDOT: | Texas Department of Transportation |
| NOT: | Notice of Termination | T&E: | Threatened and Endangered Species |
| NWP: | Nationwide Permit | USACE: | U.S. Army Corps of Engineers |
| NOI: | Notice of Intent | USFWS: | U.S. Fish and Wildlife Service |

## VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

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

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

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ☒ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☒ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

## VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Texas Department of Transportation — Design Division Standard

# ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

# EPIC

| | | | | | |
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|  | CONT | SECT | JOB | HIGHWAY | |
| REVISIONS<br>12-12-2011 (DS)<br>05-07-14 ADDED NOTE SECTION IV.<br>01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES. | 0535 | 04 | 031, ETC | IH 10 | |
| | DIST | COUNTY | | SHEET NO. | |
| | YKM | GONZALES, ETC | | 104 | |