

SEE SHEET 2 FOR INDEX OF SHEETS

STATE OF TEXAS DEPARTMENT OF TRANSPORTATION PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

STATE AID PROJECT NO: C 2-7-57, ETC
CSJ: 0002-07-057, ETC.

IH-10 HUDSPETH COUNTY

CSJ 0002-07-057:
LIMITS FROM: 2.2 MI W OF RM 1111
LIMITS TO: 0.1 MI E OF RM 1111
CSJ 0002-08-057:
LIMITS FROM: 0.1 MI E OF RM 1111
LIMITS TO: 6.0 MI E OF RM 1111

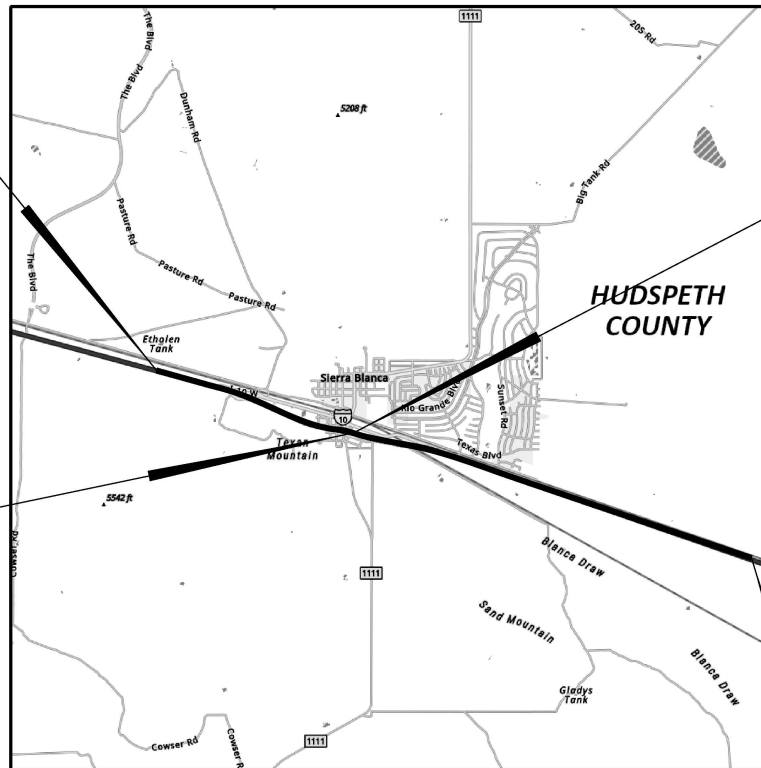
NET LENGTH OF ROADWAY = 38,547 FT. = 7.12 MI.
NET LENGTH OF BRIDGE = 1,050 FT. = 0.19 MI. - NO WORK ON BRIDGE
NET LENGTH OF PROJECT = 38,597 FT. = 7.31 MI.

FOR THE CONSTRUCTION OF: CTM - CORRIDOR TRAFFIC MANAGEMENT

CONSISTING OF: INTELLIGENT TRANSPORTATION SYSTEM WORK

BEGIN PROJECT
CSJ: 0002-07-057
MM: 105.11
LAT: 31.182611
LONG: -105.390425

END PROJECT
CSJ: 0002-07-057
MM: 107.10
LAT: 31.173333
LONG: -105.3579269



BEGIN PROJECT
CSJ: 0002-08-057
MM: 107.10
LAT: 31.173333
LONG: -105.3579269

END PROJECT
CSJ: 0002-08-057
MM: 113.1
LAT: 31.1468884
LONG: -105.2616018

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

TDLR INSPECTION NOT REQUIRED

REQUIRED SIGNS SHALL BE IN ACCORDANCE WITH BC (1)- 21 THRU BC (12)- 21 AND THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".

| | |
|-----------------------|-------------------------------|
| DESIGN SPEED = 80 MPH | |
| 0002-07-057 | |
| A. A. D. T. (2022) | = 16,940 (M.P. 43.133-44.073) |
| A. A. D. T. (2022) | = 16,358 (M.P. 44.073-45.267) |
| A. A. D. T. (2022) | = 16,190 (M.P. 45.267-45.279) |
| A. A. D. T. (2042) | = 23,716 (M.P. 43.133-44.073) |
| A. A. D. T. (2042) | = 23,556 (M.P. 44.073-45.267) |
| A. A. D. T. (2042) | = 23,637 (M.P. 45.267-45.279) |
| 0002-08-057 | |
| A. A. D. T. (2022) | = 16,190 (M.P. 45.369-45.665) |
| A. A. D. T. (2022) | = 17,129 (M.P. 45.665-47.215) |
| A. A. D. T. (2042) | = 23,637 (M.P. 45.369-45.665) |
| A. A. D. T. (2042) | = 28,434 (M.P. 45.665-47.215) |

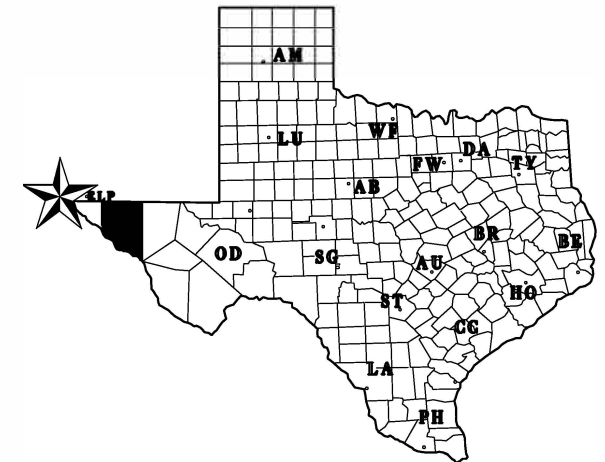
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FINAL PLANS

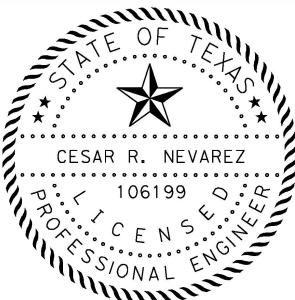
CONTRACTOR: _____
LETTING DATE: _____
TIME CHARGES BEGAN: _____
DATE CONTRACTOR BEGAN WORK: _____
DATE WORK WAS COMPLETED: _____
DATE WORK WAS ACCEPTED: _____
TOTAL DAYS CHARGED: _____
ORIGINAL CONTRACT AMOUNT: \$ _____
AMOUNT OF CONTRACT AMENDMENTS: \$ _____
FINAL CONTRACT COST: \$ _____

_____ 20 _____

AREA ENGINEER



KEY TO COUNTIES



1/4/2024

Cesar R. Nevarez, P.E.

ATKINS

TBPE REG. # F-474

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED SPECIAL LABOR PROVISIONS FOR ALL STATE CONSTRUCTION PROJECTS. (SP000-008)

RECOMMENDED FOR LETTING: 1/5/2024
Eduardo Perales, P.E.
 SAFETY REVIEW COMMITTEE CHAIRMAN

RECOMMENDED FOR LETTING: 1/5/2024
L. Raul Ortega Jr., P.E.
 DISTRICT DIRECTOR OF TRANSPORTATION PLANNING AND DEVELOPMENT

APPROVED FOR LETTING: 1/5/2024
[Signature], P.E.
 DISTRICT ENGINEER

DATE: 1/4/2024 1:37:24 PM
FILE: ELP*WAG*IH10*ITL.dgn

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1/8/2024

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH A "*" HAVE BEEN ISSUED BY ME OR UNDER MY SUPERVISION AND ARE APPLICABLE TO THIS PROJECT.

Cesar R. Nevarez, P.E.

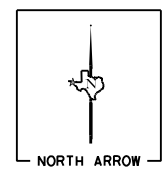
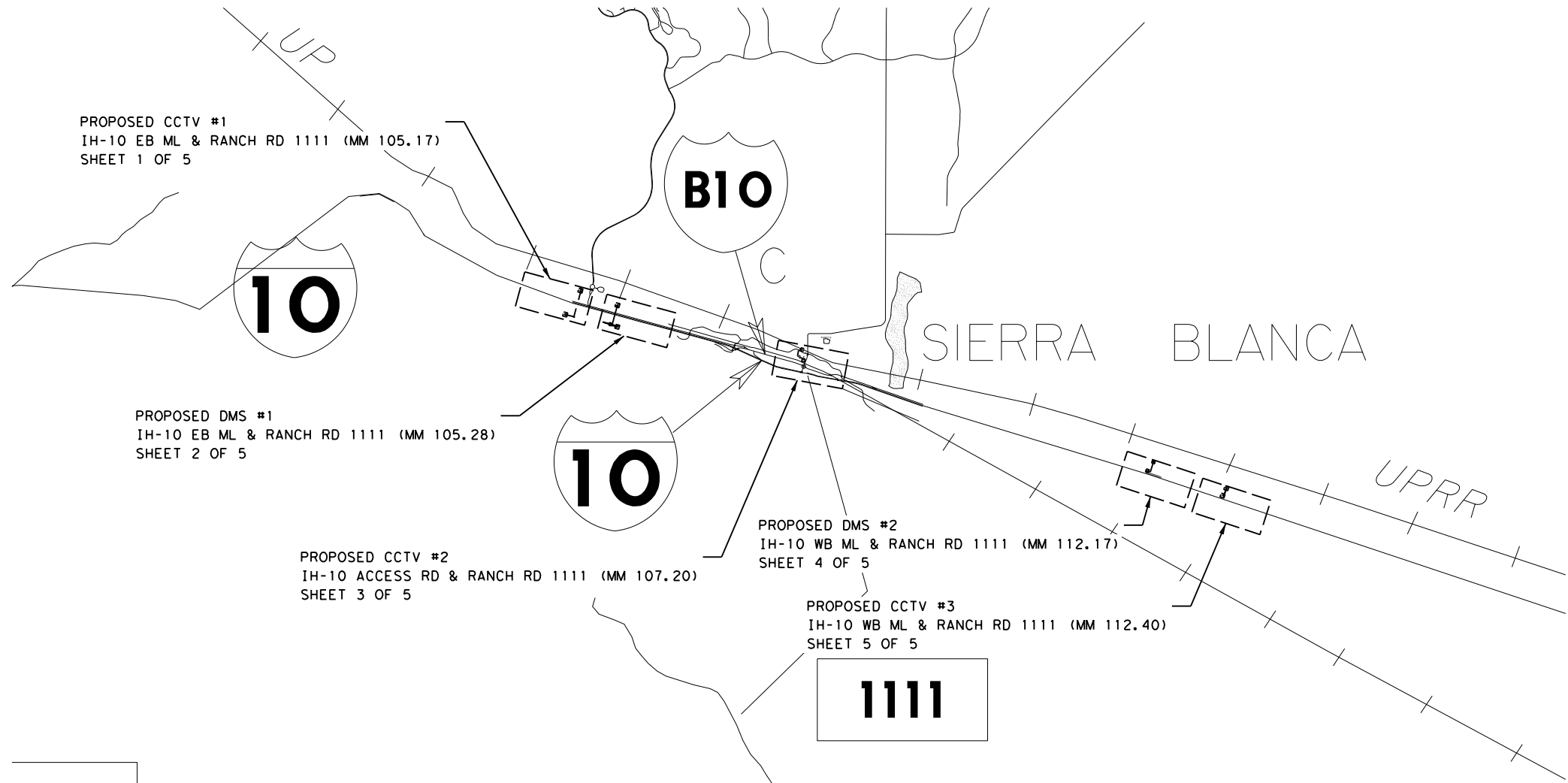
CESAR R. NEVAREZ, P.E.

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| <small>©2024</small> | | | |
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CK:
DW:
CK:
DN:



| PROPOSED DEVICE | ITS LAYOUT SHEET | HIGHWAY | MM | OFFSET (FT)* | LATITUDE*** | LONGITUDE*** |
|-----------------|------------------|---------|--------|--------------|-------------|--------------|
| CCTV #1 | 1 OF 5 | IH-10 | 105.17 | 40' | 31.1820280 | -105.3896110 |
| DMS #1 | 2 OF 5 | | 105.28 | 16' | 31.1816390 | -105.3877970 |
| CCTV #2 | 3 OF 5 | | 107.20 | 20' ** | 31.1735560 | -105.3578750 |
| DMS #2 | 4 OF 5 | | 112.17 | 16' | 31.1517780 | -105.2772780 |
| CCTV #3 | 5 OF 5 | | 112.40 | 43' | 31.1505830 | -105.2772780 |

* OFFSET FROM EDGE OF TRAVEL LANE
 ** OFFSET FROM BACK OF CURB
 *** FOR CONTRACTOR INFORMATION PURPOSES ONLY, DEVICE LOCATION MUST BE FIELD VERIFIED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER.



Cesar R. Nevarez, P.E.

PROJECT KEY MAP

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Texas Department of Transportation

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HIGHWAY: IH-10

General Requirements

Maintain the entire project area in a neat and orderly manner throughout the duration of the work. Remove all construction litter and undesirable vegetation within the right of way inside the project limits. This work will be subsidiary to the various bid items.

General Project Description – This project consists of the installation of DMS, CCTV's, and cellular modems along IH-10 in Hudspeth County, TX.

Traffic

Contact the Engineer or the City when construction operations are within 400 feet of a signalized intersection to determine/verify the location of loop detectors, conduit, ground-boxes, etc. Repair or replace any signal equipment damaged by construction operations. The method of repair or replacement shall be pre-approved and inspected. This work shall be completed at the Contractor's expense.

Inform the Engineer and the respective utility companies, when it becomes apparent that the utility lines will interfere with the work in progress.

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

Alpine Area Office:

Armando Ramirez, P.E.
Alpine Area Engineer
Armando.Ramirez2@txdot.gov

Aldo Madrid, P.E.
Director of Construction
Aldo.Madrid@txdot.gov

Monica Ruiz, P.E.
District Construction Engineer
Monica.Ruiz@txdot.gov

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

<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.

Traffic

Contact the Department's El Paso District Signal Shop at txdotelplocates@txdot.gov to request all Department utility line locates within the project limits. The Signal Shop will locate one time

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only. Record locates for the purpose of refreshing and maintaining all markings throughout the duration of the project.

Furnish all materials on this Contract except for the following that the Department will provide:

- IP Addressable Power Strip
- CCTV Digital
- Cellular Modem
- Full Color Freeway DMS with Pole Mounted Cabinet

Item 4 – Scope of Work

Schedule and perform all work to ensure proper drainage during the course of construction or maintenance operations. All labor, tools, equipment, and supervision required, to ensure drainage, removal, and handling of water shall be considered incidental work.

Item 5 – Control of Work

The Department will furnish horizontal and vertical reference points. Contractor must verify horizontal and vertical reference points with conventional survey methods before proceeding with construction activities. Verification must be submitted for review and approval to the Department's R.P.L.S. prior to start of construction. Any discrepancies not reported will be at no additional cost to the Department.

Plan datum for this project is NAD 83 for horizontal and NAVD 88 for elevation based.

Keep traveled surfaces used in hauling operations clear and free of dirt or other material.

Existing pavement, utilities, structures, etc. damaged as a result of construction operations will be repaired at no additional cost to the Department.

Protect from damage and destruction all areas of the right of way, which are not included in the actual limits of the proposed construction areas. Exercise care to prevent damage to trees, vegetation, irrigation system and other natural features. Protect trees, shrubs, and other landscape features from abuse, marring, or damage within the actual construction and/or fenced protection areas designated for preservation.

Restore any area disturbed or damaged to a condition "as good as" or "better than" prior to start of construction operation. This work will be at the Contractor's expense.

Item 6 – Control of Materials

The Contractor must schedule a pre-ITS installation meeting with the Department Area Office and the Department's El Paso District Signal Shop prior to starting any ITS work.

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The Contractor must coordinate with the Engineer regarding the items to be purchased by the Department. It is the Contractor's responsibility to contact the Department, so that items can be ordered adequately with respect to time. The approximate lead time to receive these items is 120 calendar days (4 months) from the date the charge codes for the ITS items can be generated by the Department. The Contractor must submit shop drawings for all ITS items immediately, so that these materials can be ordered on time and the project can be on schedule.

Traffic/ITS materials to be furnished by the Department shall be picked up at the El Paso District Headquarters. Contact the Engineer forty-eight (48) hours in advance of picking up materials to notify the Traffic Signal Shop.

Item 7 – Legal Relations and Responsibilities

Comply with all requirements of the Environmental Permits Issues and Commitments (EPIC) Sheet.

Do not discharge any liquid pollutant from vehicles onto the roadside. Immediately clean spills and dispose in compliance with local, state, and federal regulations to the satisfaction of the Engineer at no additional cost to the Department.

Occupational Safety & Health Administration (OSHA) regulations prohibit operations that bring people or equipment within 10 ft. of an energized electrical line. Where workers and/or equipment may be close to an energized electrical line, notify the electrical power company and make all necessary adjustments to ensure the safety of workers near the energized line.

No significant traffic generator events identified.

Law Enforcement Personnel

Coordinate with TxDOT Engineer for off-duty Law enforcement assistance when needed to direct traffic during significant closures and detours, as approved unless otherwise directed by the engineer. The officer shall monitor or direct traffic during the closure as directed by the Engineer. Patrol vehicles must be clearly marked to correspond with the officer's agency and equipped with appropriate lights to identify them as law enforcement. For patrol vehicles not owned by a law enforcement agency, markings will be retroreflective and legible from 100 ft. from both sides and the rear of the vehicle. Lights will be high intensity and visible from all angles.

Contractor to submit a written request at least 48 hrs prior to the need for law enforcement to the Engineer. The Engineer will make arrangements with the respective entity to formally request the services.

Fees resulting from contractor-initiated cancellations shall be the Contractor's responsibility.

The method used to direct traffic at signalized intersections shall be as approved. Additional officers and vehicles may be provided when approved or directed.

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

Complete the daily tracking form provided by the department and submit proof of payment such as cancelled checks for the approved invoices that have been billed to the project no later than 30 days from the invoice date. (Note to reviewer: Contractor does not bill TxDOT for the law enforcement services. EPPD bills TxDOT and TxDOT bills the contractor)

No payment will be made for law enforcement personnel needed for moving equipment or payment for drive time to/from the event site.

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

Item 8 – Prosecution and Progress

This project includes 120 days delay start for acquisition of ITS equipment and material.

Working days will be calculated in accordance with Section 8.3.1., "Standard Workweek."

Create and maintain a Bar Chart schedule.

Submit baseline schedule and obtain approval prior to beginning construction. The monthly progress payment will be held if the monthly update is not submitted.

Provide a Project Schedule Summary Report on a monthly basis along with the monthly progress schedule.

Item 9 – Measurement and Payment

Monthly progress payments will be made for items of work completed by the 27th day of each month. Any work completed after the 27th will be included for payment in the subsequent monthly progress payment.

Submit Material on Hand (MOH) payment requests at least **two (2)** working days before the end of the month for payment consideration on that month's estimate.

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Item 100 – Preparing Right of Way

Remove existing vegetation and level ground in an area measuring 50 feet by 50 feet from edge of lane at each location shown in the plans. Cost includes removal of trees, shrubs, rocks, roots, backfill materials, backfilling holes, hauling, disposal, equipment, labor, tools, and incidentals.

This would be used for proposed CCTVs, DMS, and electrical services where ground is not flat and to remove overgrown vegetation.

Item 110 – Excavation (SPECIAL)

Pothole and identify possible utility conflicts at proposed ITS pole drill shaft foundations. When a conflict exists notify the Engineer. Any pothole will be paid under item 110-6003.

Fill the potholes up to the bottom of the pavement surface after excavation with material from the hole. The holes must be patched with a suitable hot mix asphalt concrete material or earthen material as directed by the Engineer. Maintain these patches in good repair until the completion of work. All equipment, labor, and materials associated with this work will be considered subsidiary to the various bid items.

Item 416 – Drilled Shaft Foundations

Construct drilled shaft as per the approved method.

Stake all foundations and locations prior to commencement of drilling operations for verification to ensure no conflicts with utility lines. Approval by Engineer will be required for all non-bridge foundations.

Cover drilled shafts with plywood and delineate with pedestrian fence, to the satisfaction of the Engineer, when no work is being performed and after working hours. This work shall be considered subsidiary to this item.

Remove spoils, daily, out of the drainage areas or as directed.

Survey verify and provide the Engineer finished drilled shaft elevations.

Replace faulty anchor bolts as directed. Do not weld anchor bolts.

Item 432 – Riprap

Wire mesh and fibers for concrete will not be allowed for concrete riprap in accordance with item 432.3.1, "Concrete Riprap" on this project for this Item. Reinforce all concrete riprap using bar reinforcement conforming to Item 440, "Reinforcement for Concrete," as shown on the plans, or as directed.

Finish concrete riprap with a smooth (wood float) finish, unless otherwise directed.

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Obtain approval for all stone riprap material sources.

Item 502 – Barricades, Signs, and Traffic Handling

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

Additional signs and barricades, placed as directed, will be considered subsidiary to this Item.

In accordance with Section 7.2.6.1, designate, in writing, a Contractor Responsible Person (CRP) and a CRP alternate to take full responsibility for the set-up, maintenance, and necessary corrective measures of the traffic control plan. The CRP or CRP alternate must be present at site and implement the initial set up of every traffic control phase/stage, at each location, and/or each call out, for the entire duration of the project.

At the written request of the Engineer, immediately remove the CRP or CRP alternate from the project if, in the opinion of the Engineer, is not competent, not present at initial TCP set-ups, or does not perform in a proper, skillful, or safe manner. These individuals shall not be reinstated without written consent of the Engineer.

CRP and CRP alternate must be trained using Department approved training. Provide a copy of the certificate of completion to the Engineer for project records.

All contractor workers involved with the traffic control implementation and maintenance must participate and complete a department approved training course. Provide a copy of the certificate of completion to the Engineer for project records. Refer to "Traffic Control Training" Material Producer List <https://ftp.txdot.gov/pub/txdot-info/cmd/mpl/tct.pdf> for Department approved training.

Contractor may choose to train workers involved with the traffic control implementation and maintenance with a contractor developed training in lieu of Department approved training. Contractor developed training must be equivalent to the Department approved training. Provide the Engineer a copy of the course curriculum for pre-approval, prior to conducting the contractor developed training. Provide the Engineer a copy of the log of attendees after training completion for project records.

Existing regulatory signs, route marker auxiliaries, guide signs, and warning signs that must be removed due to widening shall be relocated temporarily and erected on approved supports at locations shown in the plans, or as directed. This work will not be paid for directly but considered subsidiary to this Item.

Notify the Department officials when major traffic changes are to be made, such as detours. Coordinate with the Department on all traffic changes. Advance notification for the following week's work must be made by 5 P.M. on Wednesdays.

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If Law Enforcement Personnel is required by the Engineer, coordinate with local law enforcement as directed or agreed. Complete the weekly tracking form provided by the Department and submit invoices with 5% allowance for Law Enforcement payments by Contractor that agree with the tracking form for payment at the end of each month where approved services were provided.

Provide access to intersecting side roads and driveways at all times, unless otherwise directed.

Any approved change to the sequence of work or TCP, must be signed and sealed by a Contractor's Licensed Professional Engineer assuming full responsibility for any additional barricade signs and devices needed.

Use striping operations to channelize traffic into the newly completed roadway, as directed. Maintain shoulders and median areas in a condition capable of serving as emergency paths, as approved. This work will be subsidiary to this Item.

Use portable changeable message signs (PCMS) to alert public of construction two weeks prior to construction.

Use flaggers when directed. Provide two-way radio communication for all flaggers.

Place and maintain sufficient additional warning signs, beacons, delineators, and barricades to warn and guide the public of all hazards through the construction zone at all times, and as directed.

Use flashing arrow boards on all tapers for each lane closure.

Some signs, barricades, and channelization devices may not be shown at the precise or measured position. Place the barricades, devices, or signs, with approval, in positions to meet field conditions.

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

Use Type A flashing warning lights or delineators to mark open excavation, footings, foundations, or other obstructions near lanes that may be open to traffic, as directed.

For additional information pertaining to channelization, signing, spacing details, and flagging procedures required to regulate, warn, and guide traffic through project, refer to the "Barricade and Construction Standards," BC (1)-21 and to the current *Texas Manual on Uniform Traffic Control Devices (TMUTCD)*.

Remove or cover signs that do not apply to current conditions at the end of each day's work.

Repair and/or replace all signs damaged by the public or due to weather events.

All project signs shall be maintained free of litter, debris, or sediment build up at the base supports. This work is subsidiary to this item of work.

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Safety Contingency

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

Item 506 – Temporary Erosion, Sedimentation, and Environmental Controls

Place Best Method Practices (BMP's) in locations as designated in the plans or as directed to meet field conditions.

Place rain gauge(s) at locations as designated.

The total disturbed area for this project is 0.35 acres. Establish the authorization requirements for Storm Water Discharges for soil disturbed area in this project, all project locations in the Contract, and Contractor Project Specific Locations (PSLs), within one mile of the project limits. Both the Department and the Contractor shall obtain an authorization to discharge storm water from TCEQ for the construction activities shown on the plans. Obtain required authorization from the TCEQ for any Contractor PSLs for construction support activities on or off right of way.

Best Method Practices (BMP's) may be adjusted to meet field conditions, or as directed. The Engineer will verify all locations prior to placement of BMPs. Maintain and properly place the erosion control measures to prevent storm water pollution to the Waters of the United States, as directed. Within the project limits, keep all inlets functional as long as possible to accept storm water as part of the Storm Water Pollution Prevention Plan (SWP3), as directed.

Grading operations will be limited to the catch point of the proposed cross-section.

Preserve any vegetation outside these limits.

Item 540 – Metal Beam Guard Fence

Provide composite block-outs for all Metal Beam Guard Fence (MBGF) posts.

Install guardrails in the direction of traffic flow.

Stake the locations for approval prior to beginning the installation of the proposed MBGF.

Verify MBGF post lengths and heights prior to ordering materials.

Protect all untreated, incomplete, MBGF/Rail blunt ends exposed to traffic during construction until the permanent end treatment is installed. All work and incidentals will not be paid for directly but will be considered subsidiary to this Item.

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Item 544 – Guardrail End Treatment

Provide certifications from the approved manufacturer's online training for all personnel installing end treatments prior to beginning work.

Item 618 – Conduit

The location of conduit is diagrammatic and may be varied to meet local conditions upon approval of the Engineer.

When shown on the plans, use underground warning tape in the trench installation of conduit (PVC).

All bore items shall be directional.

For conduit placement in pavement, an earth-saw may be used provided the cut does not exceed 6 in. Backfill as shown on the trench details in the plans.

For all underground conduit bends of 45°, provide rigid metal conduit. Where the rigid metal conduit is exposed at any point and where rigid metal extends into ground boxes, bond the metal conduit to the grounding conductor with grounding type bushings or by other UL-listed grounding connectors, approved by the Engineer. Rigid metal bends will not be paid for directly but will be considered incidental to the PVC conduit system.

Use rigid metal conduit when crossing bridges or culverts. All clamps, expansion joints, bolts and accessories necessary to install the rigid metal will be subsidiary to this Item.

Backfill roadway and driveway trench with cement-stabilized backfill at the end of each working day. Place an ACP patch at the end of the week or as directed by the Engineer.

All conduit elbows and rigid metal extensions required to be installed on PVC conduit systems will not be paid for separately but will be considered subsidiary to the various bid items.

All bore items shall be directional and shall be paid for under this item. Bore quantities include the distance beneath the roadway plus an additional 2 ft. on either side of the curb, sidewalk, or edge of pavement.

For conduits install by open trench method, backfill the trench as shown on the plans.

Place conduit at a minimum depth of 18 in. below existing native soil and 24 in. below pavement surfaces.

Fit both ends of each raceway with a temporary cap to prevent dirt and debris from entering during construction.

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HIGHWAY: IH-10

Install a continuous green insulated copper wire as shown on the plans in every conduit throughout the electrical system in accordance with the electrical detail sheets, and the latest edition of the National Electrical Code.

When conduit is to be installed where riprap presently exists, take care in breaking the existing riprap for placement of the conduit. Do not break out a greater area that is required for placement of the conduit. Replace broken riprap with Class "C" concrete to the exact slope, pattern, color and thickness of the existing riprap. Replacement of riprap will be subsidiary to this Item.

Item 620 – Electrical Conductors

Use NEC type XHHW for all conductors.

Insulate grounding conductors with a green jacket and neutral conductors with a white jacket.

At every accessible point, bond together the grounding conductors which share the same conduit, junction box, ground box or structure in accordance with the electrical detail sheets and the latest edition of the National Electrical Code.

Include extra cable length in each ground box or foundation for each run, to provide adequate slack, as provided in the plans or as directed.

Ensure a properly bonded electrical system by running one wire between foundations and grounding it at each foundation ground-rod.

Bond metal junction boxes and metal conduit to the circuit grounding conductors in accordance with the National Electrical Code.

Refer to Article 7.18, "Electrical Requirements," for electrical certification and electrical licensing requirements.

Item 624 – Ground Boxes

Remove all conductors in ground boxes as shown on the plans to be abandoned. Payment for removal of conductors will be subsidiary to this Item.

The location of all ground boxes is diagrammatic and may be shifted to accommodate field conditions only as approved by the Engineer.

Stake all foundations and locations approved by the Engineer prior to commencement of drilling operations in order to ensure no conflicts with utility lines. Coordinate with the Utility companies for utility location within the project limits. Repair any damage to existing utilities to the satisfaction of the Engineer and the utility owner at no additional cost to the Department.

Ground boxes should be placed outside the path of travel leaving a clear unobstructed walking surface of a least 36" whenever possible.

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Install expansion joint material approved by the Engineer between the ground box and concrete riprap apron. This material and work will be subsidiary to this pay item.

Due to limited availability of record drawings and information on existing conduit, conductors, and ground boxes, the Contractor shall field verify all existing ground boxes, conduit, and conductors.

Item 628 – Electrical Services

Meet at the service locations with representatives of the Department, electrical utility company, at least twelve weeks before electric power is needed to finalize exact service pole placement and resolve any issues.

Any electrical costs for connection, test, and operation will be the responsibility of the government agency that will have the final operational control of the items built.

Coordinate with representatives of the Department and electrical utility company when placing multiple electrical services close together to prevent electrical conductors from touching each other.

When installing electrical services, place electrical services as close to the power source to prevent electrical conductors from touching each other.

Item 650 – Overhead Sign Supports

Provide a minimum clearance of 19 ft. from the high elevation point of the roadway to the bottom of the future lane control signals as shown on the plans, or as directed.

Base column lengths on base plate elevations provided on plans. Verify by field survey that plan dimensions and all base plate elevations mirror field conditions, prior to column fabrication. Furnish corrected column lengths to the Engineer for approval, after placement of the drill shafts.

The DMS sign support structure locations show on the plans may be adjusted to fit field conditions. The tower heights shown on the plans are to be used for bidding purposes only.

Prior to fabrication, the Contractor, in cooperation with the Engineer, will take finished grade elevations at the tower locations and will determine their exact height for fabrication, in accordance with the details show on the plans.

Standard Specifications, increases and decreases in quantities by change in design, after shop drawings are approved, will be measured as specified, and the revised quantities will be the basis of payment.

All towers and trusses will be matched and marked for erection by the fabricator. After the sign supports, with signs attached, have been erected, individual units requiring cleaning will be

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washed with a cleaning solution. The cleaning solution will be capable of removing all grease, oil, dirt smears, streaks, and other foreign particles.

Coating System

Provide a coating system of a polyamide-cured epoxy prime coat, a polyamide-cured epoxy intermediate coat material. All three system coats should be manufactured from the same company to ensure compatibility among coats, from one of the following manufacturers or an approved equal:

Ameron
201 N Berry St.
Brea, California 92821
Local telephone contact: (714) -256-7755
Prime Coat: Amerlock® 400
Top Coat: Amercoat® 450 HS

ICI/DEVOE Coatings
5480 Clover Leaf Pkwy
Valley View, Ohio 44125
Local telephone contact: (216)328-1581
Prime Coat: Devran 4170 Corrosion Resistant Epoxy
Intermediate Coat: Devran 4170 Corrosion Resistant Epoxy
Top Coat: Devthane 4708 Aliphatic Urethane Enamel

Porter Paint Co.
400 South 13th Street
Louisville, KY 40201
Local telephone contact: (502) 588-9679
Prime Coat: Porter Paints MCR 4300
Intermediate Coat: Porter Paints MCR 4300
Top Coat: Porter Paints Hythane

Poly-Carb, Inc.
33095 Bainbridge Road
P.O. Box 39278
Solon, Ohio 44139
Local telephone contact: (419)248-1223
Prime Coat: Mark-60 (ULTRA POX)
Intermediate Coat: Mark-60 (ULTRA POX)
Top Coat: Mark-73 (ULTRAKOTE)

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Sherwin-Williams Company
671 Beta Drive
Mayfield Village, Ohio 44143
Local telephone contact: (440)461-3310
Prime Coat: Tile-Clad II Hi-Build Primer
Intermediate Coat: Hi-Build Aliphatic Polyurethane Enamel

Surface Preparations

New unweathered galvanized support sections will have their surface preparation as well as their protective coating done at the manufacturer of the support sections.

The support sections will be prepared for coating by SSPC SPI followed by SSPC-SP7 (solvent cleaning) followed by a brush-off blast. Blasting abrasives containing more than 1% free silica will not be allowed. Before the prepared surface degrades from the prescribed standards, the prime coat will be applied. In every case, the surfaces will be coated with the epoxy prime coat on the same day of surface preparation. Careful handling and storage will be required to prevent scraping, marring, or other surface damage to the prepared surface.

Coating, Wash Primer 1.5 mils

This coat will consist of one coat of an epoxy primer to support sections. The total dry film thickness of this coat will be between 1.5 and 2.0 mils. If more than one coat is needed, expense will be borne by the Contractor.

In all cases, this coat will be applied by brush over surfaces that were prepared earlier that same day. The thinning of the epoxy material is strictly prohibited. Do not use material that is not capable of being applied as specified.

When the average dry film thickness of this coat over the entire support section is less than the specified 1.5 mils, this item will be reduced in direct proportion to the deficiency of coating if more than 16 2/3%. If the deficiency of coating is more than 16 2/3% (i.e. the average dry film thickness is less than 1.25 mils), the work for this Item will be considered unsatisfactory and will be relocated at the full expense of the Contractor, including all labor.

Coating, Urethane Top Coat, Support Sections

This item will consist of the application of one coat of urethane to support sections. The total dry film thickness of this coat will not be less than 1.5 mils. If more than one pass is necessary to obtain the required thickness that coat expense will be borne by the Contractor.

All coatings are subsidiary to this Item.

Final color will be Patina Green FED #24300.

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All labor, materials, and incidentals required to accomplish all work described above for this item will be considered subsidiary to Item 650.

Item 658 – Delineator and Object Marker Assemblies

Verify all locations with the Engineer prior to installation.

Removal and proper disposal of all existing delineators, object markers, and any non-standard hardware assemblies are not paid directly, but will be considered subsidiary to pertinent items for payment.

Item 6005 – Testing, Training, Documentation, Final Acceptance, and Warranty

The 90-day Final Acceptance Test will begin only when all TMS equipment installation, cabling, wiring testing, field work, TransVista operations center work, etc. for the entire project is completed and acceptable to TxDOT. Partial testing is not allowed.

Item 6010 – Closed Circuit Television Field Equipment (Digital) (Install Only)

Contractor to install CCTV according to the manufacturer's recommendations to achieve the specified accuracy and reliability.

Contractor to configure and integrate the CCTV system to communicate with TransVista through cellular modem and fiber per plans. Contractor to calibrate CCTV field equipment. Contractor to maintain CCTV video feed communication link until project is accepted.

Item 6028 – Dynamic Message Sign System

The Department will provide IP addressable power strip. The contractor will install, configure, and integrate the IP addressable power strip with the TxDOT Traffic Management Center. This work will subsidiary to item 6028-6001.

Item 6064 – Intelligent Transportation System (ITS) Pole w/Cabinet

Furnish equipment compatible with the Department's existing equipment and mounting practices. Submit equipment list and specifications for approval by the Engineer prior to delivery. ITS field device cabinets will be Type 2, Configuration 2 pole mounted cabinets.

Provide cabinets with 0.125" thick aluminum, 5252-H32, mill finish sun shields on top, front, and both sides offset from cabinet shell. A sunshield is not required on the pole mounting side. provide cabinets that are painted white on the interior and left with steel finish on the exterior.

The Department will provide IP addressable power strip. The contractor will install, configure, and integrate the IP addressable power strip with the TxDOT Traffic Management Center. This work is subsidiary to Item 6064-6084.

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HIGHWAY: IH-10

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

All TMA Operators must participate in a TMA workshop to be conducted by the El Paso District Safety Office, on the proper use of TMAs, prior to working on Department Right of Way (ROW). A certificate of completion will be issued to TMA Operators that successfully complete the TMA workshop. The certificate of completion must be carried by TMA Operators at all times while working on Department right of way.

Acquire the TCP and TMA Operator’s certificates of completion prior to the authorization to begin work. No time suspension will be granted, and no traffic control work will be allowed without certificates of completion.

The contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs needed for the project.

The supporting vehicle for the TMA shall have a minimum gross (i.e., ballasted) vehicular weight of 19,000 pounds.

| Basis of Estimate for Stationary TMAs | | | | |
|---------------------------------------|--------------|-------------------------------------|------------|-------|
| | | TMA(Stationary) | | |
| Phase | Standard | Required | Additional | TOTAL |
| | TCP (2-1)-18 | 1 TMA per lane closure per location | | 2 |
| | TCP (5-1)-18 | 1 TMA | | 1 |
| | TCP (6-1)-12 | 1 TMA per lane closure per location | | 2 |

Item 6377 – System Integration

Furnish equipment compatible with the Department’s equipment and mounting facilities. Submit equipment list and specifications for approval prior to delivery. Contractor to program all field equipment provided by the state including cellular modems.

Submit the following data prior to final acceptance during construction of Traffic Management equipment for approval by the Engineer and TransVista:

1. Freeway Management System Geographic Information System (FMSGIS) Data by providing survey information in the following format (NAD 73) and (Lat & Long) of all poles, ground boxes, controller cabinets, and overhead sign structures.
2. Digital photos and serials of all poles, controller cabinets, elements in controller cabinets, and overhead sign structures.
3. Contractor to program all field equipment provided by the state.



Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0002-07-057

DISTRICT El Paso
HIGHWAY IH 10

COUNTY Hudspeth

| CONTROL SECTION JOB | | | | 0002-07-057 | | 0002-08-057 | | TOTAL EST. | TOTAL FINAL |
|---------------------|-----------|--|------|-------------|-------|-------------|-------|------------|-------------|
| PROJECT ID | | | | A00203360 | | A00203363 | | | |
| COUNTY | | | | Hudspeth | | Hudspeth | | | |
| HIGHWAY | | | | IH 10 | | IH 10 | | | |
| ALT | BID CODE | DESCRIPTION | UNIT | EST. | FINAL | EST. | FINAL | | |
| | 100-6001 | PREPARING ROW | AC | 0.360 | | 0.240 | | 0.600 | |
| | 110-6003 | EXCAVATION (SPECIAL) | CY | 0.750 | | 0.500 | | 1.250 | |
| | 416-6005 | DRILL SHAFT (42 IN) | LF | 42.000 | | 21.000 | | 63.000 | |
| | 416-6006 | DRILL SHAFT (48 IN) | LF | 28.000 | | 32.000 | | 60.000 | |
| | 432-6001 | RIPRAP (CONC)(4 IN) | CY | 4.500 | | 3.000 | | 7.500 | |
| | 432-6045 | RIPRAP (MOW STRIP)(4 IN) | CY | 11.000 | | | | 11.000 | |
| | 500-6001 | MOBILIZATION | LS | 1.000 | | | | 1.000 | |
| | 502-6001 | BARRICADES, SIGNS AND TRAFFIC HANDLING | MO | 4.000 | | | | 4.000 | |
| | 506-6040 | BIODEG EROSN CONT LOGS (INSTL) (8") | LF | 10.000 | | 10.000 | | 20.000 | |
| | 506-6043 | BIODEG EROSN CONT LOGS (REMOVE) | LF | 10.000 | | 10.000 | | 20.000 | |
| | 540-6002 | MTL W-BEAM GD FEN (STEEL POST) | LF | 140.000 | | | | 140.000 | |
| | 540-6016 | DOWNSTREAM ANCHOR TERMINAL SECTION | EA | 1.000 | | | | 1.000 | |
| | 544-6001 | GUARDRAIL END TREATMENT (INSTALL) | EA | 1.000 | | | | 1.000 | |
| | 618-6023 | CONDT (PVC) (SCH 40) (2") | LF | 290.000 | | 1,115.000 | | 1,405.000 | |
| | 618-6024 | CONDT (PVC) (SCH 40) (2") (BORE) | LF | 880.000 | | 210.000 | | 1,090.000 | |
| | 620-6012 | ELEC CONDR (NO.4) INSULATED | LF | 810.000 | | 1,875.000 | | 2,685.000 | |
| | 620-6014 | ELEC CONDR (NO.3) INSULATED | LF | 1,635.000 | | | | 1,635.000 | |
| | 620-6018 | ELEC CONDR (NO.1) INSULATED | LF | 1,660.000 | | | | 1,660.000 | |
| | 620-6024 | ELEC CONDR (NO.3/0) INSULATED | LF | | | 2,980.000 | | 2,980.000 | |
| | 624-6002 | GROUND BOX TY A (122311)W/APRON | EA | 10.000 | | 7.000 | | 17.000 | |
| | 628-6225 | ELC SRV TY D 120/240 100(NS)GS(N)GC(O) | EA | 3.000 | | 2.000 | | 5.000 | |
| | 650-6028 | INS OH SN SUP(30 FT BAL TEE) | EA | 1.000 | | 1.000 | | 2.000 | |
| | 658-6062 | INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI) | EA | 5.000 | | | | 5.000 | |
| | 6001-6001 | PORTABLE CHANGEABLE MESSAGE SIGN | DAY | 18.000 | | 12.000 | | 30.000 | |
| | 6010-6011 | CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY) | EA | 2.000 | | 1.000 | | 3.000 | |
| | 6028-6001 | INSTALL DMS (POLE MTD CABINET) | EA | 1.000 | | 1.000 | | 2.000 | |
| | 6064-6046 | ITS POLE (55 FT)(90 MPH) | EA | 2.000 | | 1.000 | | 3.000 | |
| | 6064-6084 | ITS POLE MNT CAB (TY 2)(CONF 2) | EA | 2.000 | | 1.000 | | 3.000 | |
| | 6185-6002 | TMA (STATIONARY) | DAY | 30.000 | | 24.000 | | 54.000 | |
| | 6377-6001 | SYSTEM INTEGRATION | LS | 1.000 | | | | 1.000 | |
| | 6386-6001 | INSTALLATION OF CELLULAR MODEM | EA | 3.000 | | 2.000 | | 5.000 | |
| | 04 | PUBLIC UTILITY FORCE ACCT WORK (NON-PARTICIPATING) | LS | 1.000 | | | | 1.000 | |
| | 06 | MATERIAL FURNISHED BY THE STATE | LS | 1.000 | | | | 1.000 | |
| | 08 | CONTRACTOR FORCE ACCOUNT EROSION CONTROL MAINTENANCE (NON-PARTICIPATING) | LS | 1.000 | | | | 1.000 | |
| | | CONTRACTOR FORCE ACCOUNT SAFETY CONTINGENCY (NON-PARTICIPATING) | LS | 1.000 | | | | 1.000 | |



Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0002-07-057

DISTRICT El Paso

COUNTY Hudspeth

HIGHWAY IH 10

| CONTROL SECTION JOB | | | | 0002-07-057 | | 0002-08-057 | | TOTAL EST. | TOTAL FINAL |
|---------------------|----------|--|------|-------------|-------|-------------|-------|------------|-------------|
| PROJECT ID | | | | A00203360 | | A00203363 | | | |
| COUNTY | | | | Hudspeth | | Hudspeth | | | |
| HIGHWAY | | | | IH 10 | | IH 10 | | | |
| ALT | BID CODE | DESCRIPTION | UNIT | EST. | FINAL | EST. | FINAL | | |
| | 08 | CONTRACTOR FORCE ACCOUNT LAW ENFORCEMENT (NON-PARTICIPATING) | LS | 1.000 | | | | 1.000 | |

CK: DW: CK: DN:

| SUMMARY OF ITS QUANTITIES | | | | | | | | | | | | | | |
|-------------------------------|---------------|----------------------|---------------------|---------------------|----------------------|---------------------------|--------------|--|-------------------------------------|---------------------------------|---------------------------------------|------------------------------------|-----------------------------------|---------------------------|
| ITEM NO. DESC. CODE | 0100 6001 | 0110 6003 | 0416 6005 | 0416 6006 | 0432 6001 | 0432 6045 | 0500 6001 | 0502 6001 | 0506 6040 | 0506 6043 | 0540 6002 | 0540 6016 | 0544 6001 | 0618 6023 |
| CCSJ: 0002-07-057 LOCATION | PREPARING ROW | EXCAVATION (SPECIAL) | DRILL SHAFT (42 IN) | DRILL SHAFT (48 IN) | RIPRAP (CONC) (4 IN) | RIPRAP (MOW STRIP) (4 IN) | MOBILIZATION | BARRICADES, SIGNS AND TRAFFIC HANDLING | BIODEG EROSN CONT LOGS (INSTL) (8") | BIODEG EROSN CONT LOGS (REMOVE) | MTL W-BEAM GD ANCHOR TERMINAL SECTION | DOWNSTREAM ANCHOR TERMINAL SECTION | GUARDRAIL END TREATMENT (INSTALL) | CONDT (PVC) (SCH 40) (2") |
| | AC | CY | LF | LF | CY | CY | LS | MO | LF | LF | LF | EA | EA | LF |
| 1 OF 5 | 0.12 | 0.25 | 21 | | 1.5 | | | | 4 | 4 | | | | 145 |
| 2 OF 5 | 0.12 | 0.25 | | 28 | 1.5 | 11 | | | 2 | 2 | 140 | 1 | 1 | 95 |
| 3 OF 5 | 0.12 | 0.25 | 21 | | 1.5 | | | | 4 | 4 | | | | 50 |
| TOTAL | 0.36 | 0.75 | 42 | 28 | 4.5 | 11 | 1 | 4 | 10 | 10 | 140 | 1 | 1 | 290 |

| SUMMARY OF ITS QUANTITIES | | | | | | | | | | | | | | |
|-------------------------------|----------------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------------|---|-------------------------------|--|----------------------------------|---|--------------------------------|---------------------------|----------------------------------|------------------|
| ITEM NO. DESC. CODE | 0618 6024 | 0620 6012 | 0620 6014 | 0620 6018 | 0624 6002 | 0628 6225 | 0650 6028 | 0658 6062 | 6001 6001 | 6010 6011 | 6028 6001 | 6064 6046 | 6064 6084 | 6185 6002 |
| CCSJ: 0002-07-057 LOCATION | CONDT (PVC) (SCH 40) (2") (BORE) | ELEC CONDR (NO.4) INSULATED | ELEC CONDR (NO.3) INSULATED | ELEC CONDR (NO.1) INSULATED | GROUND BOX TY A (122311) W / APRON | ELC SRV TY D 120/240 100 (NS) GS (N) GC (O) | INS OH SN SUP (30 FT BAL TEE) | INSTL DEL ASSM (D-SW) SZ 1 (BRF) GF 2 (B1) | PORTABLE CHANGEABLE MESSAGE SIGN | CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY) | INSTALL DMS (POLE MTD CABINET) | ITS POLE (55 FT) (90 MPH) | ITS POLE MNT CAB (TY 2) (CONF 2) | TMA (STATIONARY) |
| | LF | LF | LF | LF | EA | EA | EA | EA | DAY | EA | EA | EA | EA | DAY |
| 1 OF 5 | 380 | | 1635 | | 3 | 1 | | | 6 | 1 | | 1 | 1 | 10 |
| 2 OF 5 | 300 | | | 1660 | 3 | 1 | 1 | 5 | 6 | | 1 | | | 10 |
| 3 OF 5 | 200 | 810 | | | 4 | 1 | | | 6 | 1 | | 1 | 1 | 10 |
| TOTAL | 880 | 810 | 1635 | 1660 | 10 | 3 | 1 | 5 | 18 | 2 | 1 | 2 | 2 | 30 |

| SUMMARY OF ITS QUANTITIES | | | | | | |
|-------------------------------|--------------------|--------------------------------|-----------------------------------|-------------------|--|-------------------------------|
| ITEM NO. DESC. CODE | 6377 6001 | 6386 6001 | ** ITEMS PROVIDED BY THE STATE | | | |
| CCSJ: 0002-07-057 LOCATION | SYSTEM INTEGRATION | INSTALLATION OF CELLULAR MODEM | CCTV FIELD EQUIPMENT (DIGITAL) ** | CELLULAR MODEM ** | FULL COLOR FREEWAY DMS (POLE MTD CABINET) ** | IP ADDRESSABLE POWER STRIP ** |
| | LS | EA | EA | EA | EA | EA |
| 1 OF 5 | | 1 | 1 | 1 | | 1 |
| 2 OF 5 | | 1 | | 1 | 1 | 1 |
| 3 OF 5 | | 1 | 1 | 1 | | 1 |
| TOTAL | 1 | 3 | 2 | 3 | 1 | 3 |

| SUMMARY OF ITS QUANTITIES | | | | | | | | | | | | | | |
|------------------------------|---------------|----------------------|---------------------|---------------------|----------------------|-------------------------------------|---------------------------------|---------------------------|----------------------------------|-----------------------------|-------------------------------|------------------------------------|---|-------------------------------|
| ITEM NO. DESC. CODE | 0100 6001 | 0110 6003 | 0416 6005 | 0416 6006 | 0432 6001 | 0506 6040 | 0506 6043 | 0618 6023 | 0618 6024 | 0620 6012 | 0620 6024 | 0624 6002 | 0628 6225 | 0650 6028 |
| CSJ: 0002-08-057 LOCATION | PREPARING ROW | EXCAVATION (SPECIAL) | DRILL SHAFT (42 IN) | DRILL SHAFT (48 IN) | RIPRAP (CONC) (4 IN) | BIODEG EROSN CONT LOGS (INSTL) (8") | BIODEG EROSN CONT LOGS (REMOVE) | CONDT (PVC) (SCH 40) (2") | CONDT (PVC) (SCH 40) (2") (BORE) | ELEC CONDR (NO.4) INSULATED | ELEC CONDR (NO.3/0) INSULATED | GROUND BOX TY A (122311) W / APRON | ELC SRV TY D 120/240 100 (NS) GS (N) GC (O) | INS OH SN SUP (30 FT BAL TEE) |
| | AC | CY | LF | LF | CY | LF | LF | LF | LF | LF | LF | EA | EA | EA |
| 4 OF 5 | 0.12 | 0.25 | | 32 | 1.5 | 5 | 5 | 610 | 110 | | 2980 | 4 | 1 | 1 |
| 5 OF 5 | 0.12 | 0.25 | 21 | | 1.5 | 5 | 5 | 505 | 100 | 1875 | | 3 | 1 | |
| TOTAL | 0.24 | 0.5 | 21 | 32 | 3 | 10 | 10 | 1115 | 210 | 1875 | 2980 | 7 | 2 | 1 |

| SUMMARY OF ITS QUANTITIES | | | | | | | | | | | |
|------------------------------|----------------------------------|---|--------------------------------|---------------------------|----------------------------------|------------------|--------------------------------|-----------------------------------|-------------------|--|-------------------------------|
| ITEM NO. DESC. CODE | 6001 6001 | 6010 6011 | 6028 6001 | 6064 6046 | 6064 6084 | 6185 6002 | 6386 6001 | ** ITEMS PROVIDED BY THE STATE | | | |
| CSJ: 0002-08-057 LOCATION | PORTABLE CHANGEABLE MESSAGE SIGN | CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY) | INSTALL DMS (POLE MTD CABINET) | ITS POLE (55 FT) (90 MPH) | ITS POLE MNT CAB (TY 2) (CONF 2) | TMA (STATIONARY) | INSTALLATION OF CELLULAR MODEM | CCTV FIELD EQUIPMENT (DIGITAL) ** | CELLULAR MODEM ** | FULL COLOR FREEWAY DMS (POLE MTD CABINET) ** | IP ADDRESSABLE POWER STRIP ** |
| | DAY | EA | EA | EA | EA | DAY | EA | EA | EA | EA | EA |
| 4 OF 5 | 6 | | 1 | | | 12 | 1 | | 1 | 1 | 1 |
| 5 OF 5 | 6 | 1 | | 1 | 1 | 12 | 1 | 1 | 1 | | 1 |
| TOTAL | 12 | 1 | 1 | 1 | 1 | 24 | 2 | 1 | 2 | 1 | 2 |

SUMMARY OF QUANTITIES

SHEET 1 OF 1

ATKINS
TYPE REG. # F-474

Texas Department of Transportation

| | | | |
|------|----------|-----------|---------|
| CONT | SECT | JOB | HIGHWAY |
| 0002 | 07 | 057, ETC | IH-10 |
| DIST | COUNTY | SHEET NO. | |
| ELP | HUDSPETH | 6 | |

DATE: 1/4/2024 1:47:08 PM
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DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 1/4/2024
FILE: epic.dgn

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.
2.
 No Action Required Required Action

Action No.

- Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
- Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
- Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
- 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 |
| <input type="checkbox"/> Temporary Vegetation | <input type="checkbox"/> Silt Fence | <input type="checkbox"/> Vegetative Filter Strips |
| <input type="checkbox"/> Blankets/Matting | <input type="checkbox"/> Rock Berm | <input type="checkbox"/> Retention/Irrigation Systems |
| <input type="checkbox"/> Mulch | <input type="checkbox"/> Triangular Filter Dike | <input type="checkbox"/> Extended Detention Basin |
| <input type="checkbox"/> Sodding | <input type="checkbox"/> Sand Bag Berm | <input type="checkbox"/> Constructed Wetlands |
| <input type="checkbox"/> Interceptor Swale | <input type="checkbox"/> Straw Bale Dike | <input type="checkbox"/> Wet Basin |
| <input type="checkbox"/> Diversion Dike | <input type="checkbox"/> Brush Berms | <input type="checkbox"/> Erosion Control Compost |
| <input type="checkbox"/> Erosion Control Compost | <input checked="" type="checkbox"/> Biodegradable Logs | <input type="checkbox"/> Mulch Filter Berm and Socks |
| <input type="checkbox"/> Mulch Filter Berm and Socks | <input type="checkbox"/> Mulch Filter Berm and Socks | <input type="checkbox"/> Compost Filter Berm and Socks |
| <input type="checkbox"/> Compost Filter Berm and Socks | <input type="checkbox"/> Compost Filter Berm and Socks | <input type="checkbox"/> Vegetation Lined Ditches |
| | <input type="checkbox"/> Stone Outlet Sediment Traps | <input type="checkbox"/> Sand Filter Systems |
| | <input type="checkbox"/> Sediment Basins | <input type="checkbox"/> 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 | | <i>Design Division Standard</i> | |
| ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS | | | |
| EPIC | | | |
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| ©TxDOT: February 2015 | CONT | SECT | JOB |
| 12-12-2011 (DS) REVISIONS | 0002 | 07 | 057, ETC |
| 05-07-14 ADDED NOTE SECTION IV. | DIST | COUNTY | SHEET NO. |
| 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES. | ELP | HUDSPETH | 7 |

CK:
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- NOTES:
1. INSTALL MBGF PRIOR TO THE COMMENCEMENT OF DMS WORK.
 2. REFER TO TRAFFIC CONTROL STANDARD SHEETS FOR OTHER REGULATORY AND WARNING SIGNS.
 3. ADHERE AT ALL TIMES TO TXDOT STANDARDS BC(1)-21 THROUGH BC(12)-21, AND TMUCTD FOR SIGN DETAILS, DIMENSIONS, AND PLACEMENT.
 4. APPLY TRAFFIC CONTROL PLAN AS DESCRIBED IN THE TCP SELECTION TABLE, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
 5. COORDINATE WITH ONGOING CONSTRUCTION PROJECTS PRIOR TO SETTING UP SHOULDER CLOSURES AND BEGINNING WORK ON ANY ROADWAY.
 6. DO NOT STORE ANY EQUIPMENT OR STOCKPILE ANY MATERIAL ON THE OPPOSITE DIRECTION OF THE WORK OR ON THE SHOULDER CLOSURE.
 7. COVER DRILL SHAFT HOLES DURING NON-WORKING/OVERNIGHT HOURS.
 8. THE CONTRACTOR SHALL COORDINATE WITH AREA OFFICE ON THE LOCATION AND QUANTITY OF THE PORTABLE CHANGEABLE MESSAGE SIGNS.

TCP SELECTION TABLE (CCSJ: 0002-074-057 & CSJ: 0002-08-057)

| HIGHWAY | TYPE OF WORK | STANDARD SHEET | SHEET DESCRIPTION | SHEET | DIAGRAM DESCRIPTION | SUGGESTED USE |
|---------|---|----------------|---|------------|-------------------------|--|
| IH-10 | DMS SUPPORT & CONDUIT INSTALLATION | TCP (5-1)-18 | TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS/EXPRESSWAYS | TCP (5-1a) | WORK AREA NEAR SHOULDER | APPLY CLOSURE DURING WORK HOURS. TMA REQUIRED |
| IH-10 | DMS INSTALLATION & MBGF | TCP (6-1)-12 | TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURES | TCP (6-1a) | ONE LANE CLOSURE | APPLY CLOSURE DURING WORK HOURS. TMA REQUIRED APPLY CLOSURE TO IH-10 EB FOR THE INSTALLATION OF DMS #1 AND IH-10 WB FOR DMS #2 DURING WORK HOURS. REMOVE CLOSURE DURING NON-WORKING HOURS. |
| IH-10 | CCTV, ELECTRICAL SERVICE & CONDUIT INSTALLATION | TCP (2-1)-18 | TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK | TCP (2-1a) | WORK AREA NEAR SHOULDER | APPLY CLOSURE DURING WORK HOURS. TMA REQUIRED |



Cesar R. Nevarez, P.E.

TRAFFIC CONTROL PLAN

SHEET 1 OF 1

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Texas Department of Transportation

| | | | |
|------|----------|----------|-----------|
| CONT | SECT | JOB | HIGHWAY |
| 0002 | 07 | 057, ETC | IH-10 |
| DIST | COUNTY | | SHEET NO. |
| ELP | HUDSPETH | | 8 |

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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).

| |
|---|
| <p>THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov</p> |
| 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 |

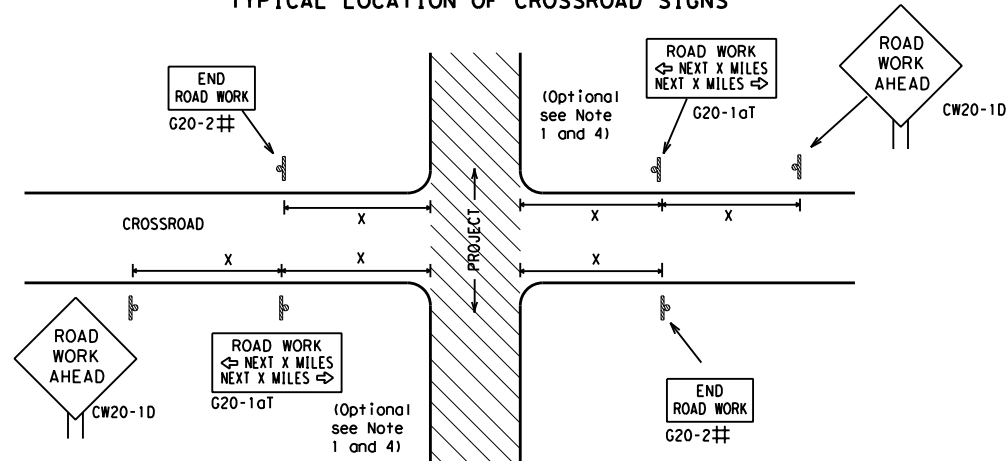
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SHEET 1 OF 12

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|  Texas Department of Transportation | | Traffic Safety Division Standard | |
| <p>BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS</p> <p>BC (1) - 21</p> | | | |
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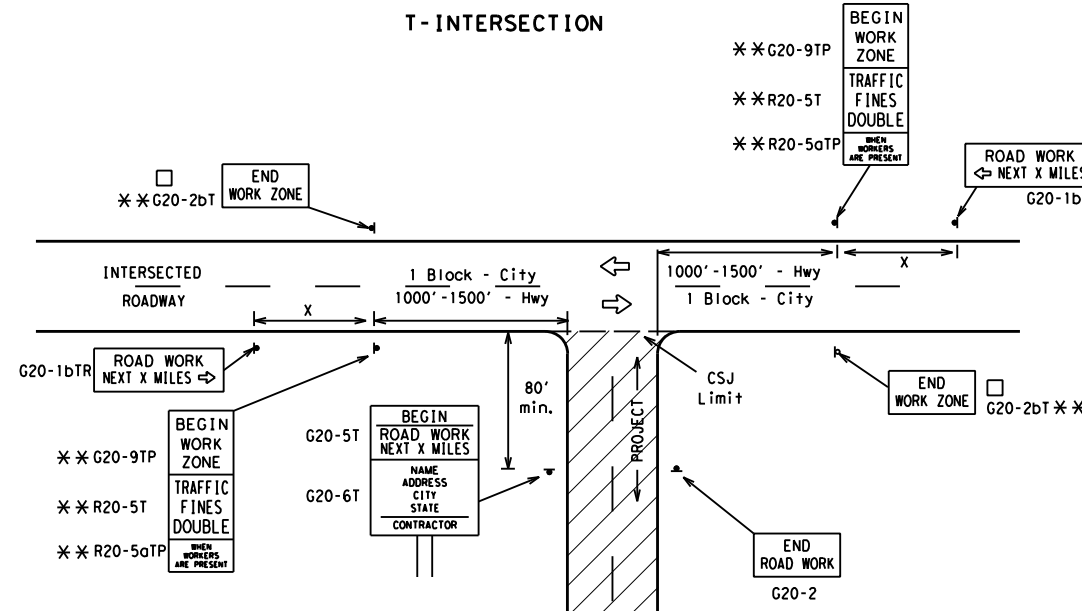
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TYPICAL LOCATION OF CROSSROAD SIGNS



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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

| Sign Number or Series | SIZE | | SPACING | |
|---------------------------------------|-------------------|--------------------|------------------|----------------------------------|
| | Conventional Road | Expressway/Freeway | Posted Speed MPH | Sign Δ Spacing "x" Feet (Apprx.) |
| CW20 ⁴ | 48" x 48" | 48" x 48" | 30 | 120 |
| CW21 | | | 35 | 160 |
| CW22 | | | 40 | 240 |
| CW23 | | | 45 | 320 |
| CW25 | 36" x 36" | 48" x 48" | 50 | 400 |
| CW1, CW2, CW7, CW8, CW9, CW11, CW14 | | | 55 | 500 ² |
| CW3, CW4, CW5, CW6, CW8-3, CW10, CW12 | | | 60 | 600 ² |
| | | | 65 | 700 ² |
| | | | 70 | 800 ² |
| | 75 | 900 ² | | |
| | 80 | 1000 ² | | |
| | * | * | * | * ³ |

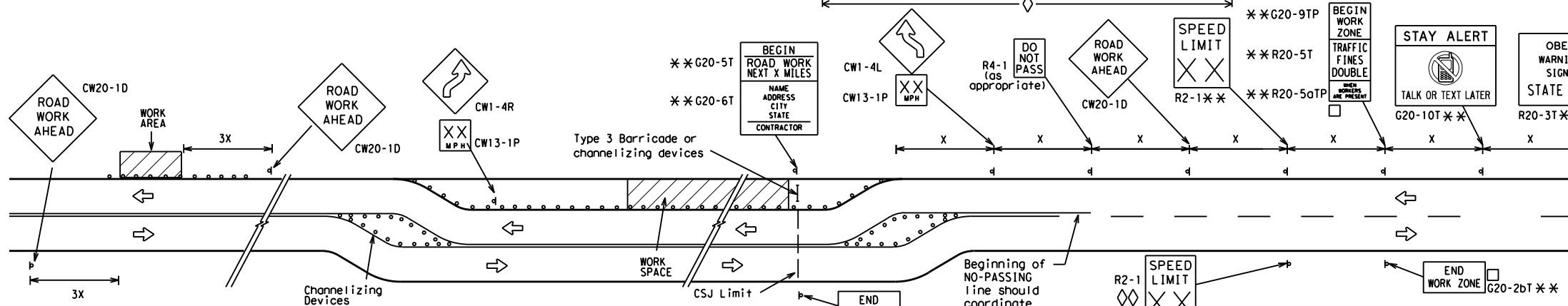
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

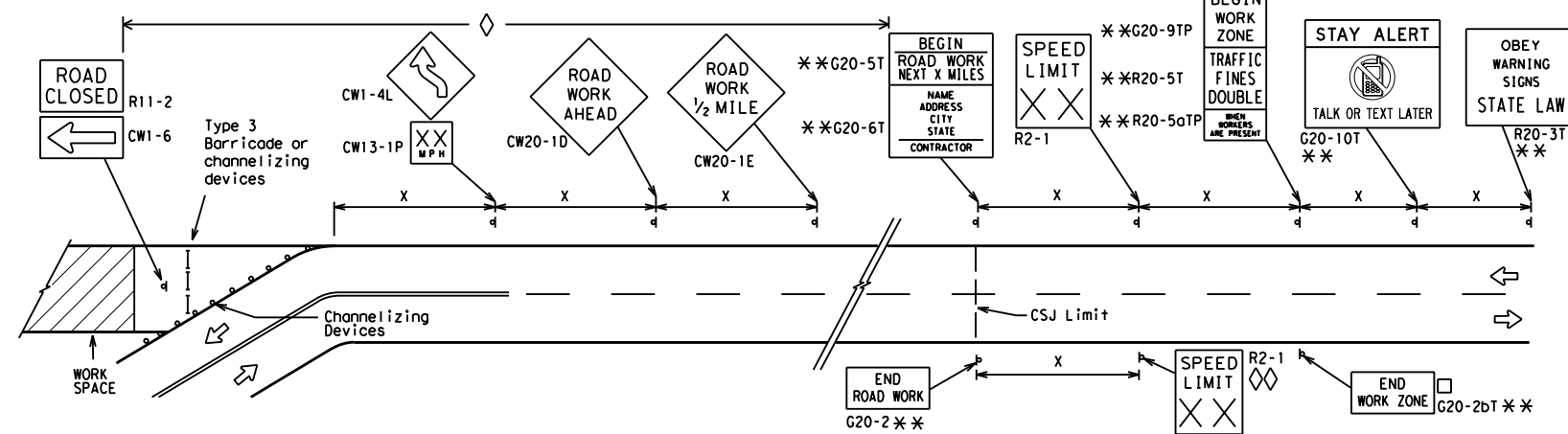
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

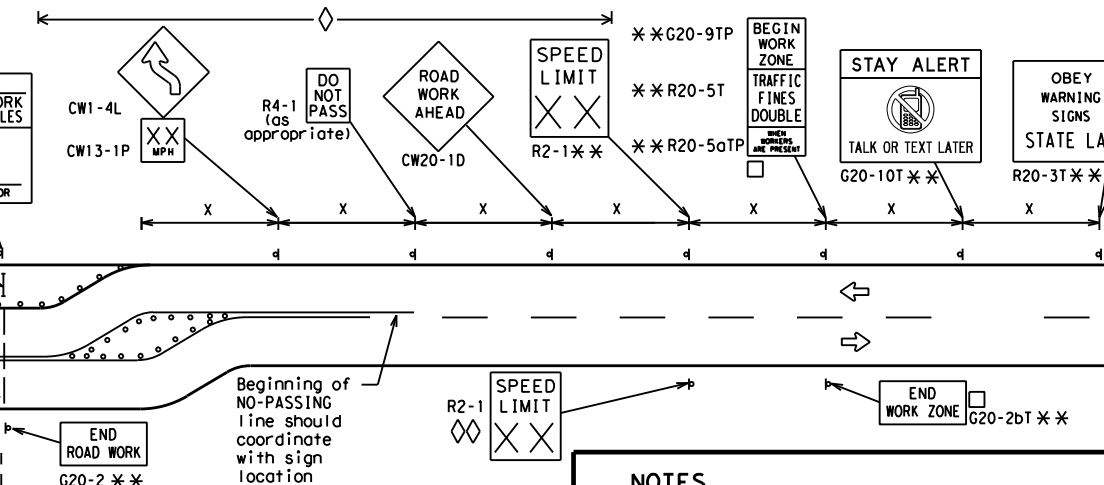


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



NOTES

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

LEGEND

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

SHEET 2 OF 12



BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

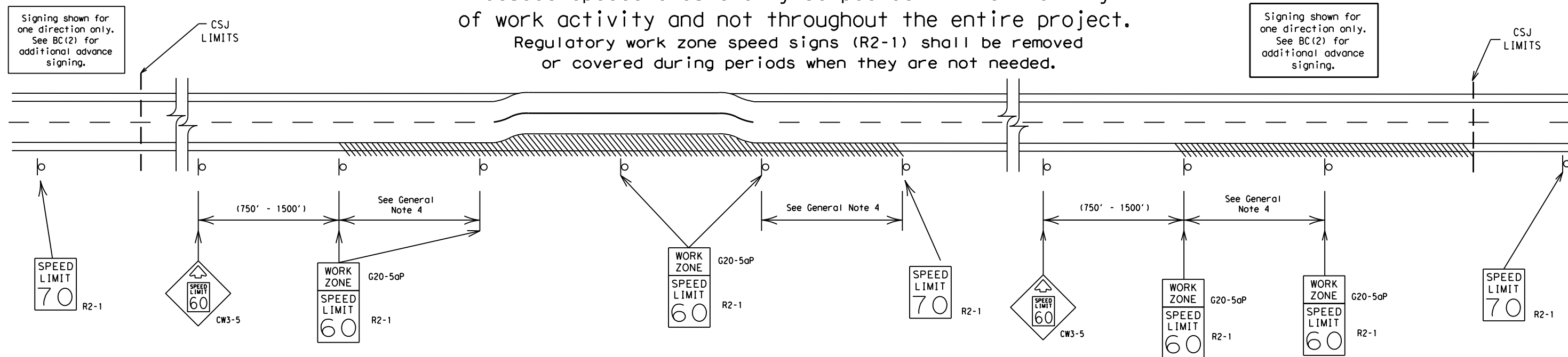
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| 7-13 5-21 | ELP | HUDSPETH | 10 | |

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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:

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

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

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SHEET 3 OF 12



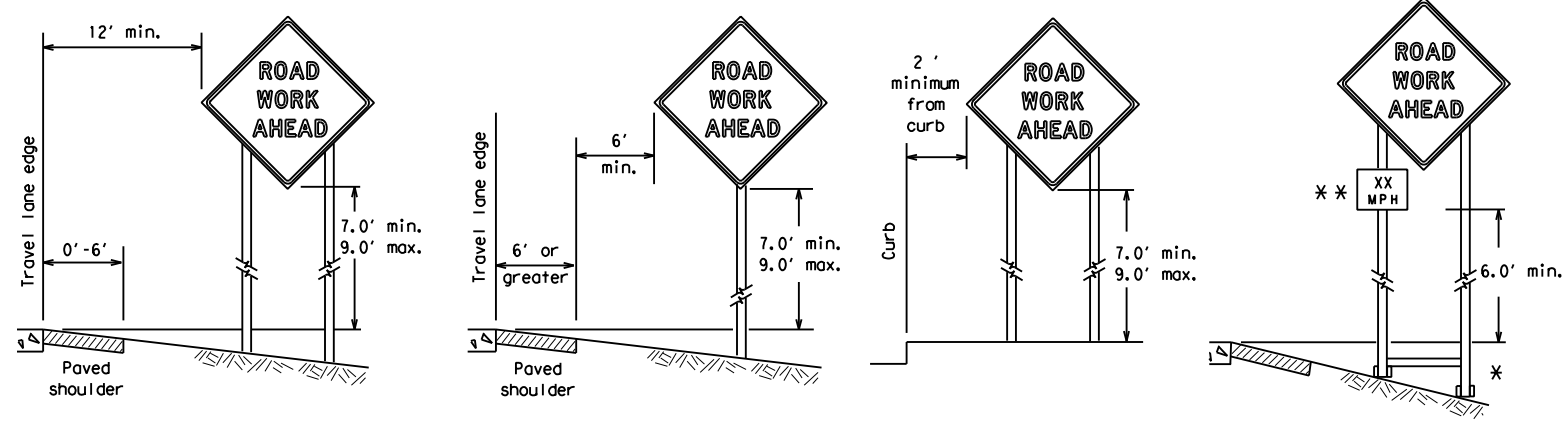
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC (3) - 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 | ELP | HUDSPETH | | 11 | | | | |

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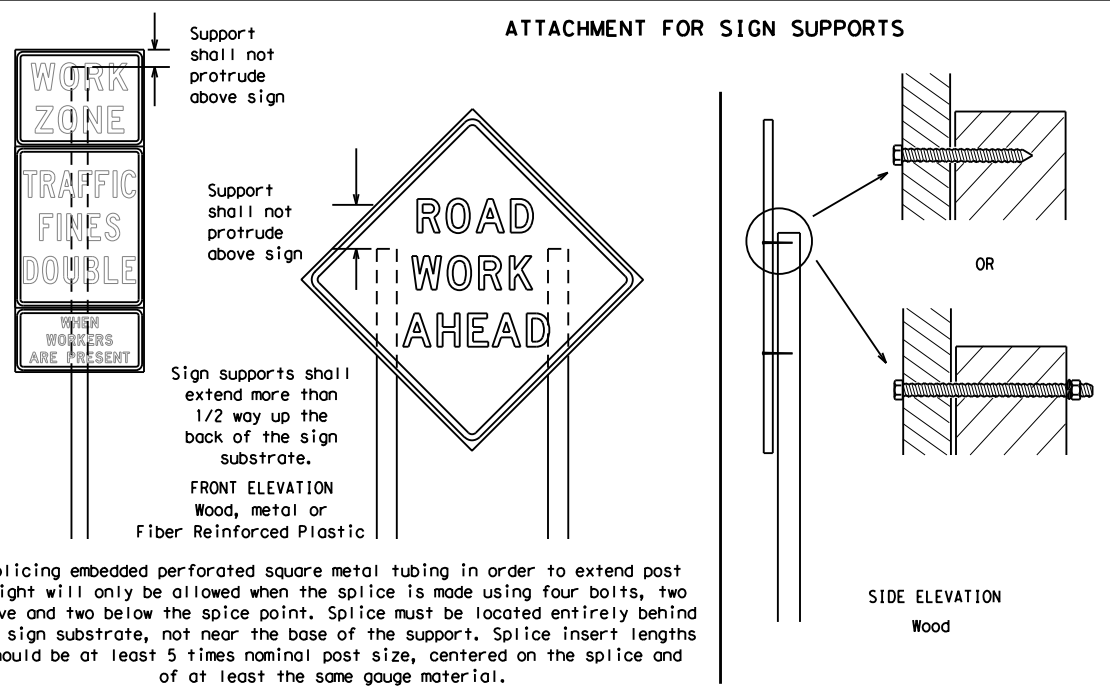
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



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

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

ATTACHMENT FOR SIGN SUPPORTS



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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

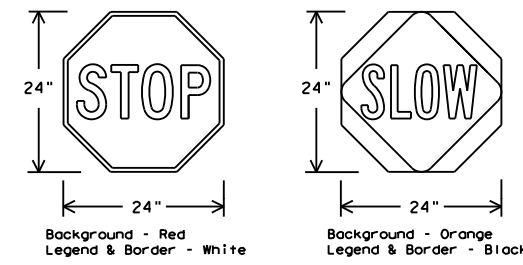
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not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

FLAGS ON SIGNS

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

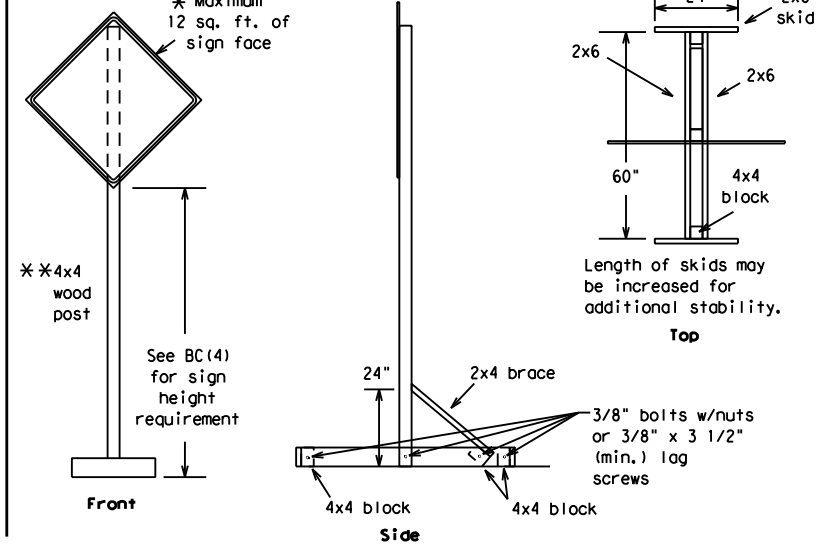
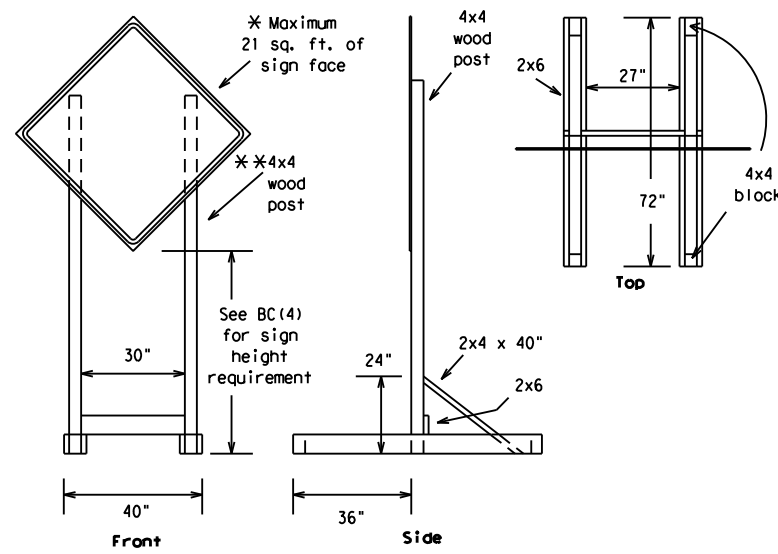


BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC (4) - 21

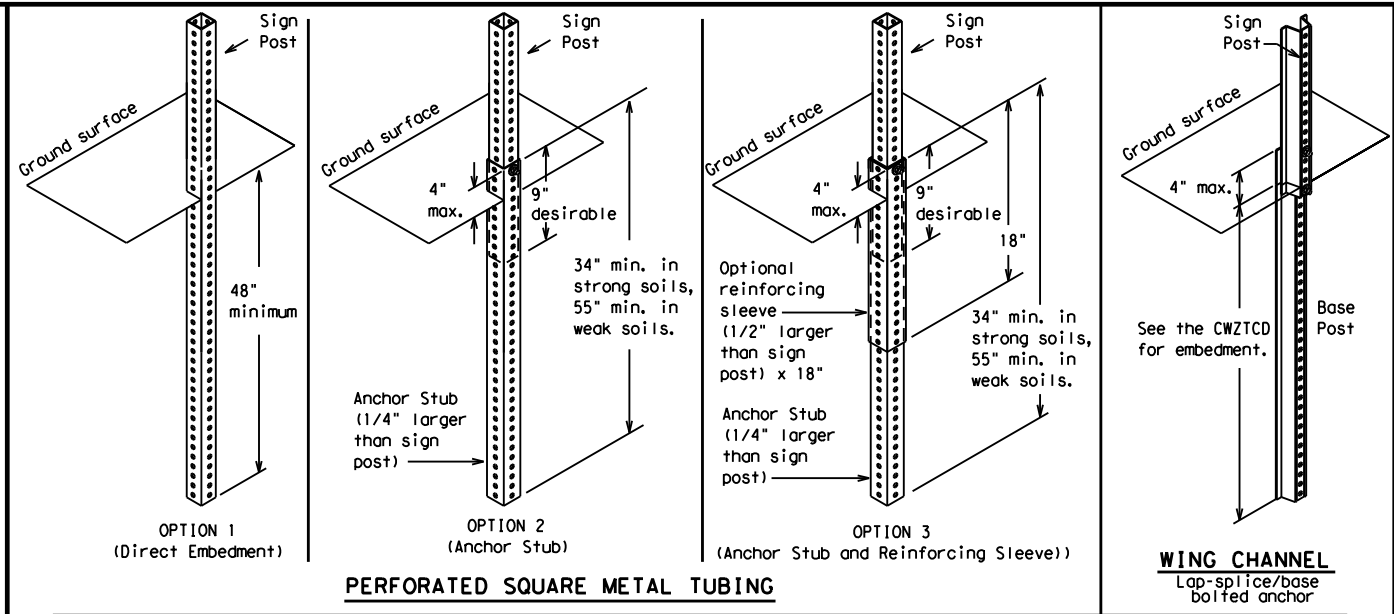
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| 9-07 8-14 | DIST | COUNTY | SHEET NO. | |
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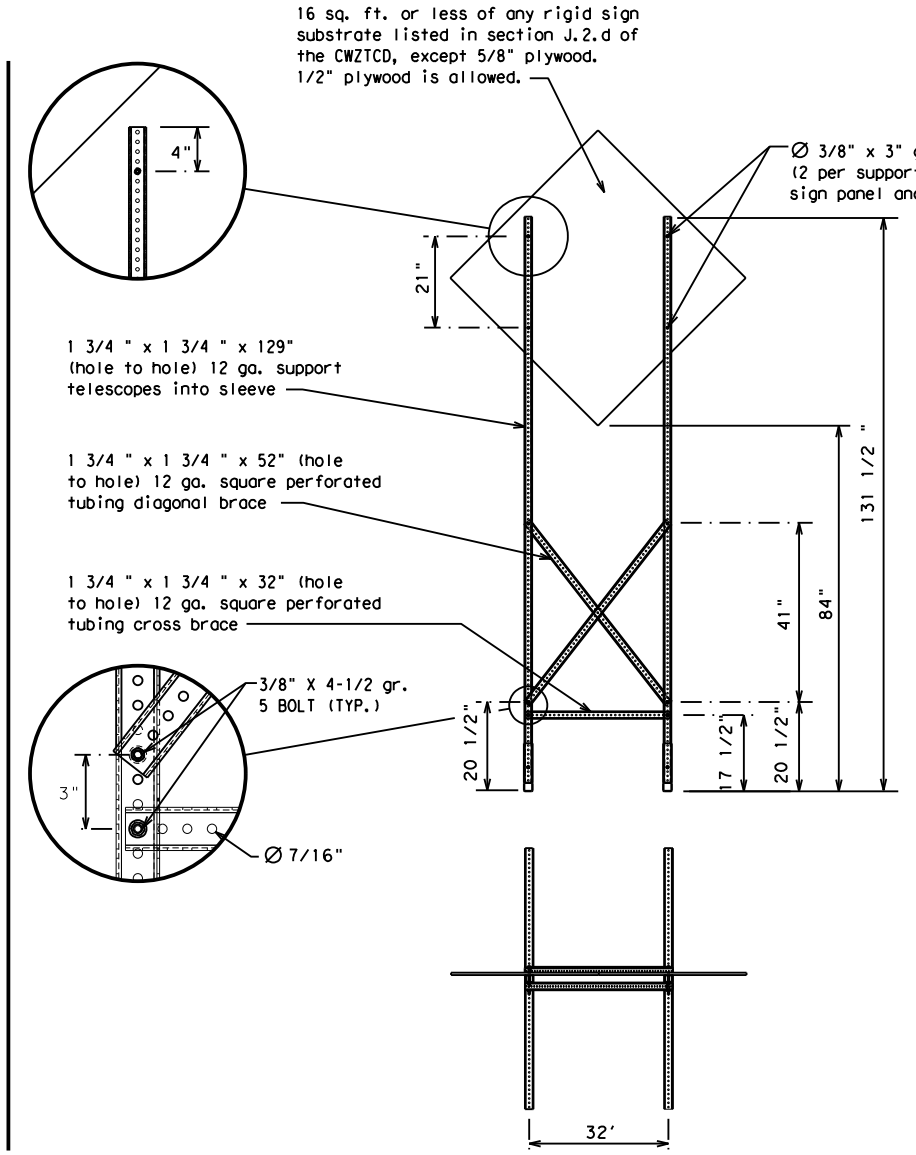
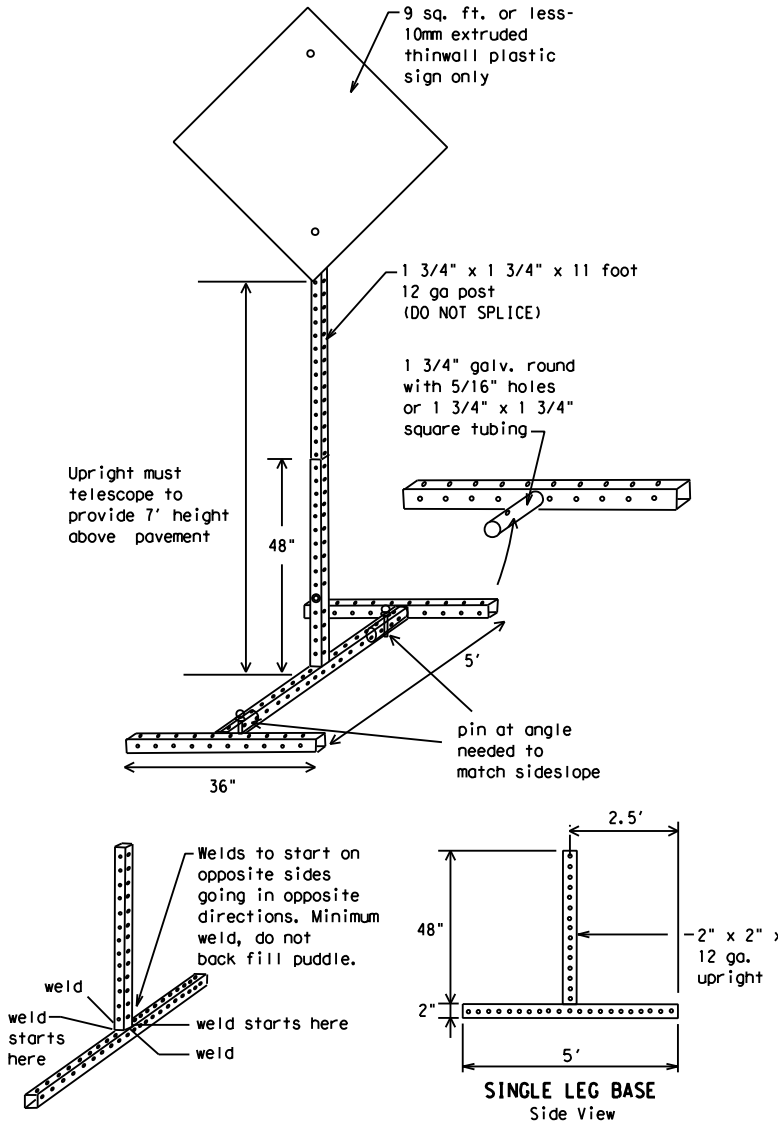
SKID MOUNTED WOOD SIGN SUPPORTS

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



GROUND MOUNTED SIGN SUPPORTS

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



SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

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

SHEET 5 OF 12



BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5) - 21

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| 7-13 5-21 | ELP | HUDSPETH | 13 | |

DATE: 1/4/2024
FILE: bc-21 (1).dgn

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

| |
|--------------------------|
| FRONTAGE ROAD CLOSED |
| SHOULDER CLOSED XXX FT |
| RIGHT LN CLOSED XXX FT |
| RIGHT X LANES OPEN |
| DAYTIME LANE CLOSURES |
| I-XX SOUTH EXIT CLOSED |
| EXIT XXX CLOSED X MILE |
| RIGHT LN TO BE CLOSED |
| X LANES CLOSED TUE - FRI |
| ROADWORK XXX FT |
| FLAGGER XXXX FT |
| RIGHT LN NARROWS XXXX FT |
| MERGING TRAFFIC XXXX FT |
| LOOSE GRAVEL XXXX FT |
| DETOUR X MILE |
| ROADWORK PAST SH XXXX |
| BUMP XXXX FT |
| TRAFFIC SIGNAL XXXX FT |
| ROAD REPAIRS XXXX FT |
| LANE NARROWS XXXX FT |
| TWO-WAY TRAFFIC XX MILE |
| CONST TRAFFIC XXX FT |
| UNEVEN LANES XXXX FT |
| ROUGH ROAD XXXX FT |
| ROADWORK NEXT FRI-SUN |
| US XXX EXIT X MILES |
| LANES SHIFT * |

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

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

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



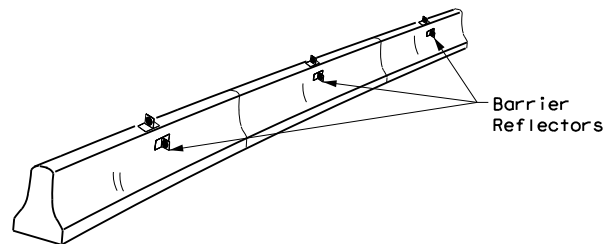
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC (6) - 21

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| FILE: bc-21.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
| © TxDOT November 2002 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0002 | 07 | 057, ETC | IH-10 |
| 9-07 8-14 | DIST | COUNTY | SHEET NO. | |
| 7-13 5-21 | ELP | HUDSPETH | 14 | |

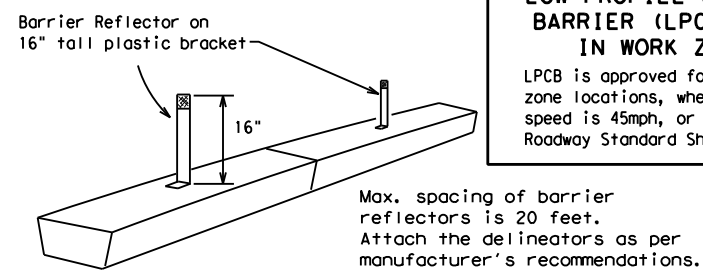
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors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



CONCRETE TRAFFIC BARRIER (CTB)

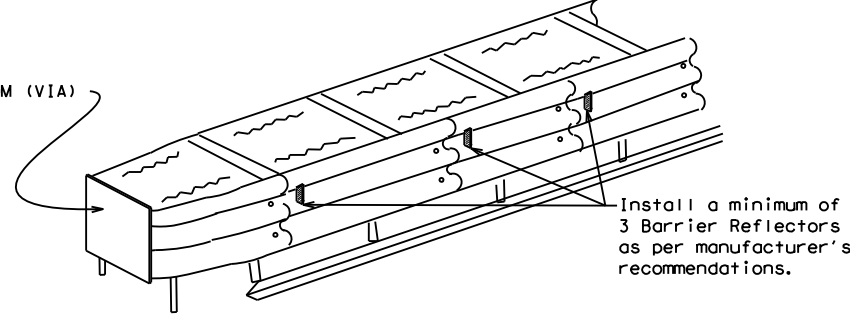
- Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector.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



LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)



DELINEATION OF END TREATMENTS

END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS

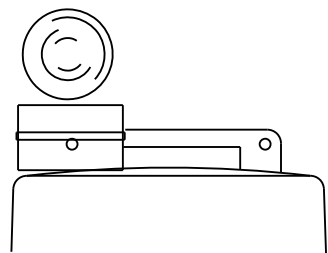
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

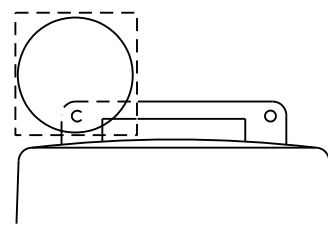
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing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

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

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



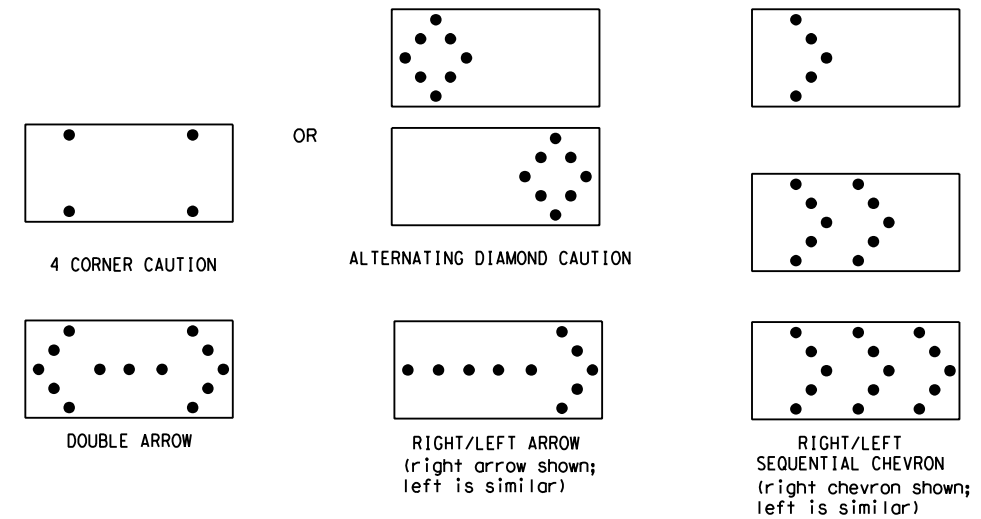
Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



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

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

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



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

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

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

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

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

BC (7) - 21

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

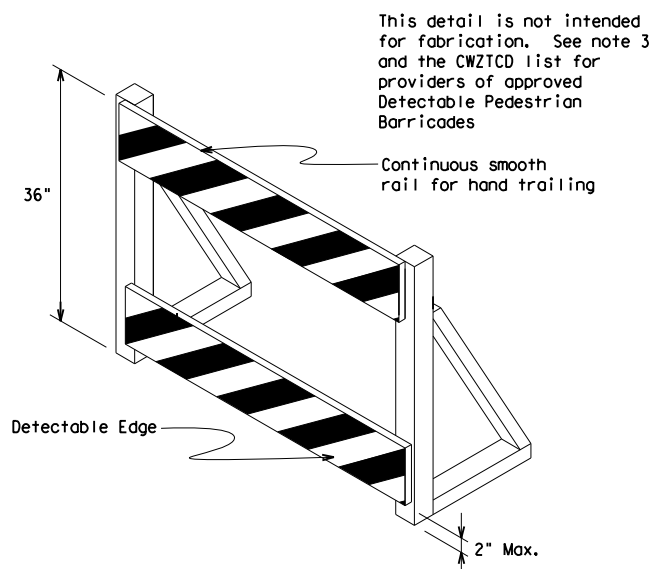
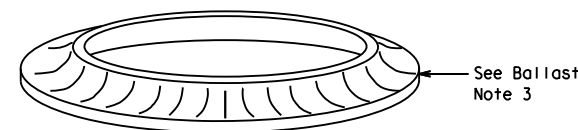
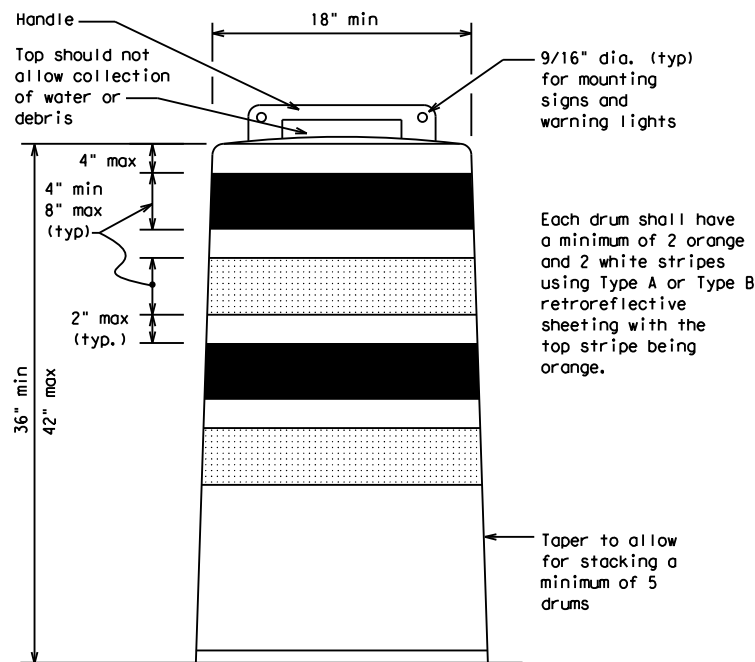
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

RETROREFLECTIVE SHEETING

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

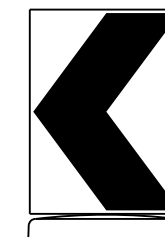
BALLAST

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

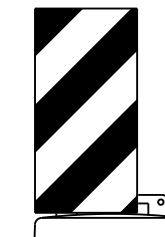


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

SHEET 8 OF 12



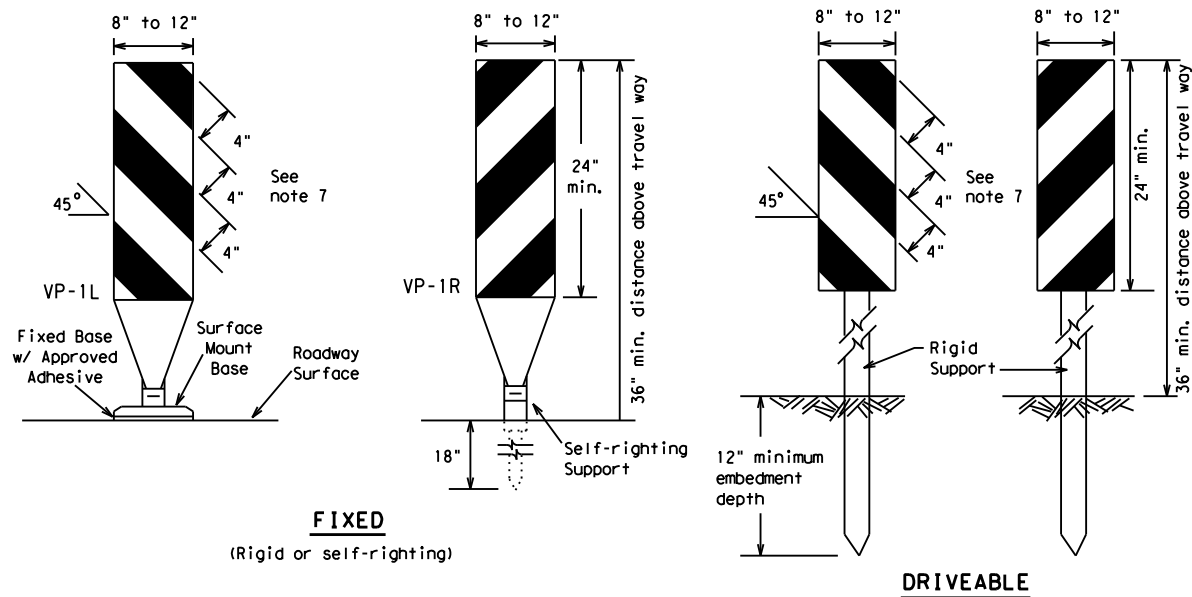
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (8) - 21

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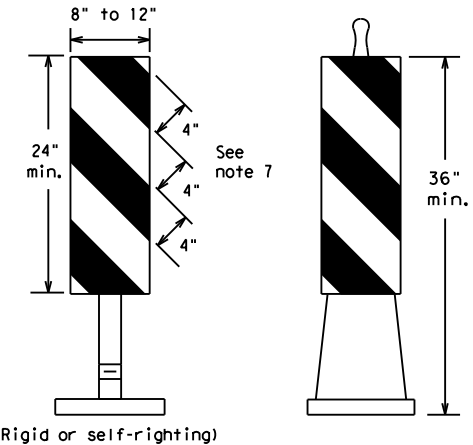
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FIXED
(Rigid or self-righting)

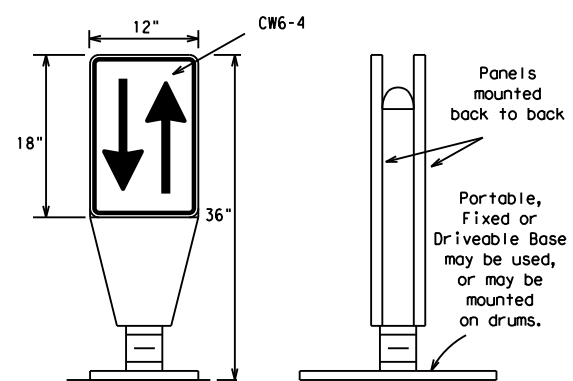
DRIVEABLE



PORTABLE

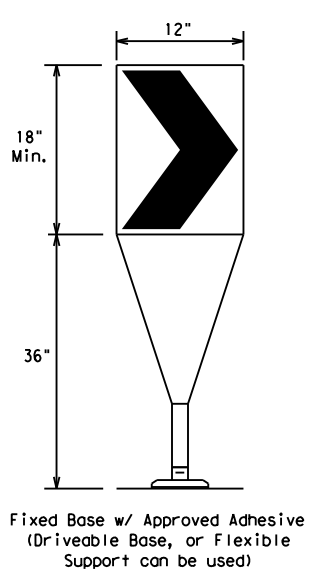
VERTICAL PANELS (VPs)

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



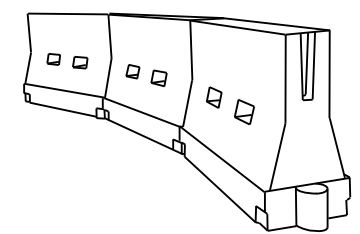
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

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



CHEVRONS

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

GENERAL NOTES

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

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

* **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



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (9) - 21

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| 9-07 8-14 | DIST | COUNTY | SHEET NO. | |
| 7-13 5-21 | ELP | HUDSPETH | 17 | |

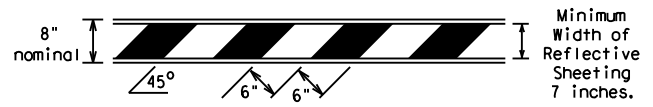
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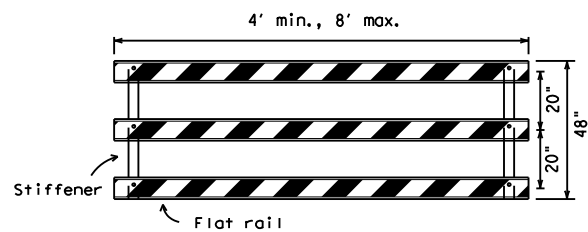
TYPE 3 BARRICADES

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.



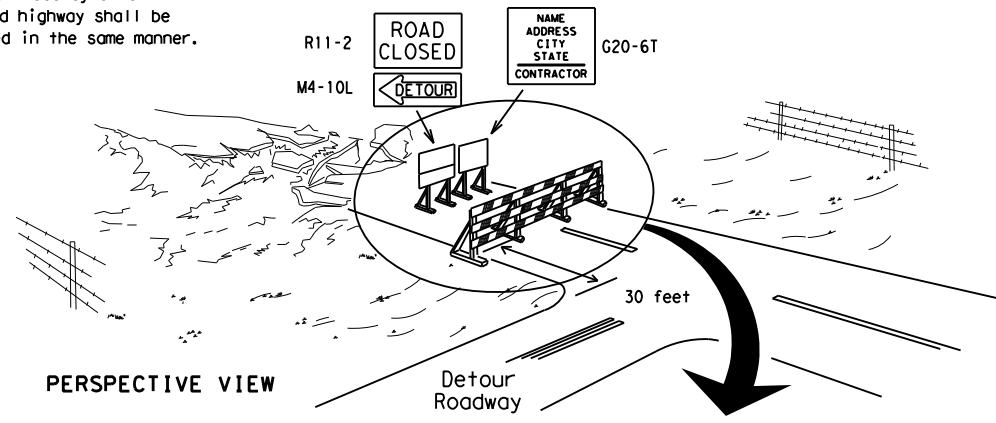
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

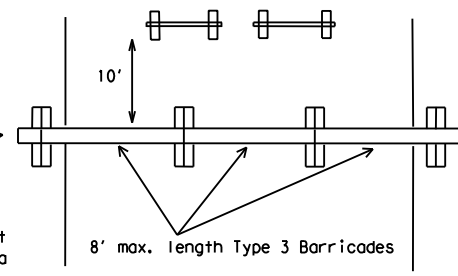
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

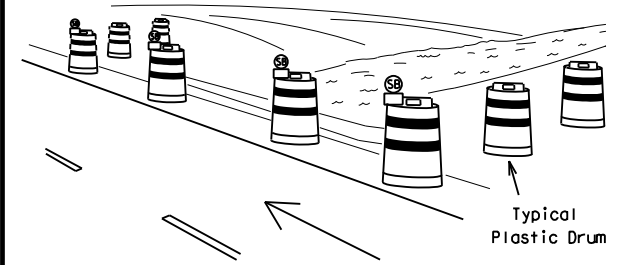
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



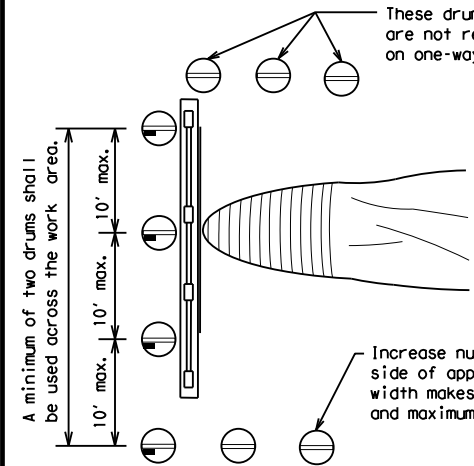
PLAN VIEW

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



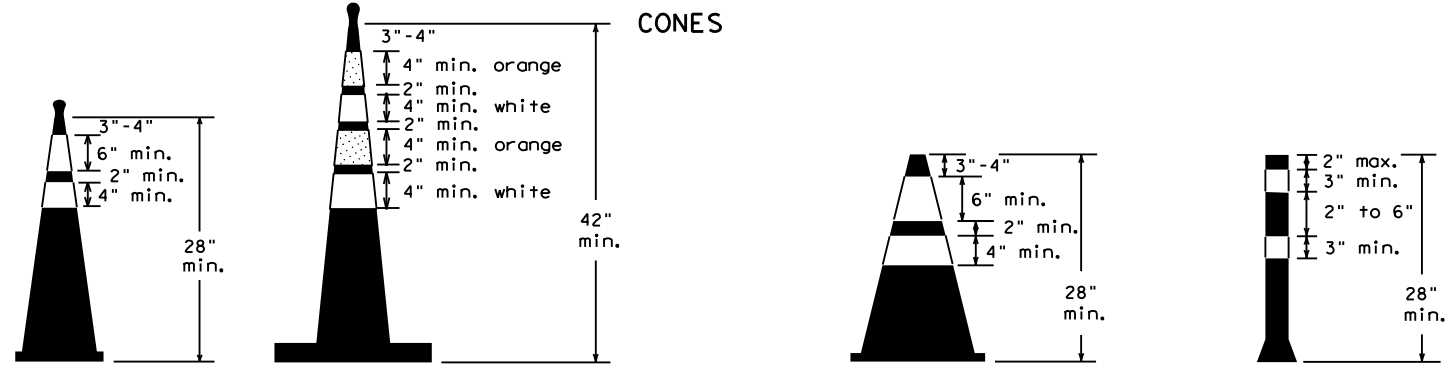
PLAN VIEW

Increase number of plastic drums on the side of approaching traffic if the crown width makes it necessary. (minimum of 2 and maximum of 4 drums)

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

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

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



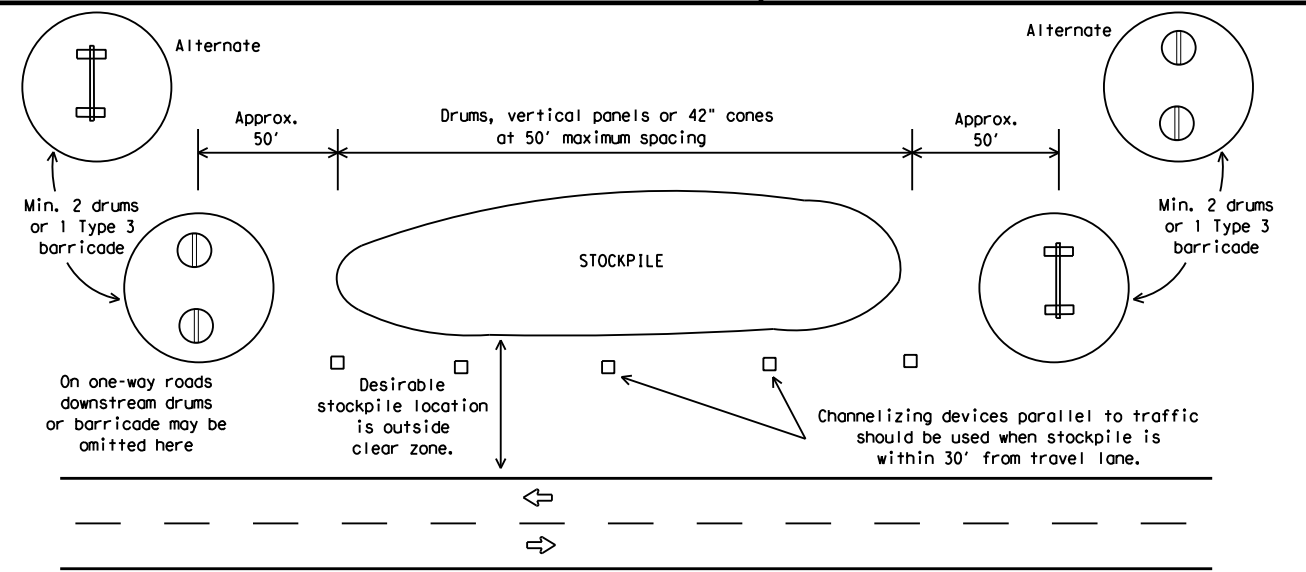
Two-Piece cones

One-Piece cones

Tubular Marker

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (10) - 21

| | | | | |
|-----------------------|-----------|-----------|-----------|-----------|
| FILE: bc-21.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
| © TxDOT November 2002 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0002 | 07 | 057, ETC | IH-10 |
| 9-07 8-14 | DIST | COUNTY | SHEET NO. | |
| 7-13 5-21 | ELP | HUDSPETH | 18 | |

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

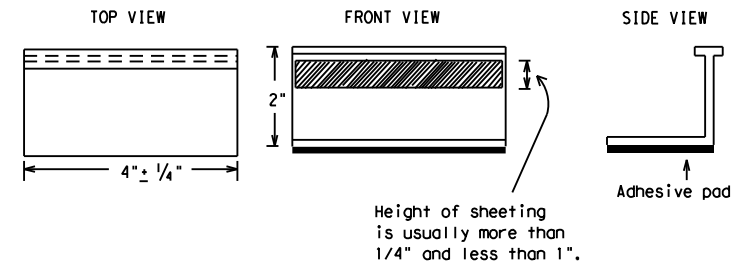
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

SHEET 11 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

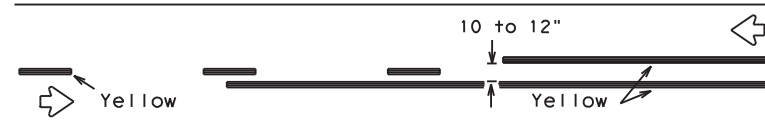
BC(11) - 21

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| FILE: bc-21.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
| © TxDOT February 1998 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | | 0002 | 07 | 057, ETC |
| 2-98 | 9-07 | 5-21 | | |
| 1-02 | 7-13 | | | |
| 11-02 | 8-14 | | | |
| | DIST | COUNTY | | SHEET NO. |
| | ELP | HUDSPETH | | 19 |

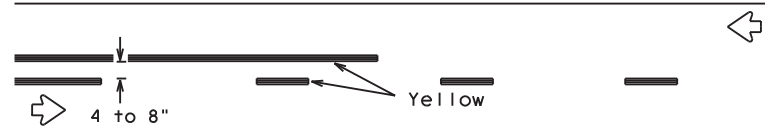
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PAVEMENT MARKING PATTERNS

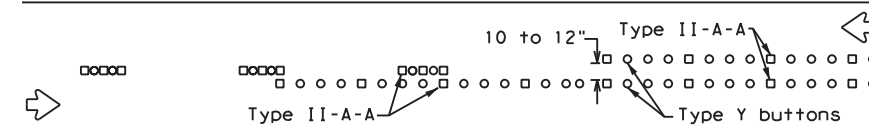


REFLECTORIZED PAVEMENT MARKINGS - PATTERN A

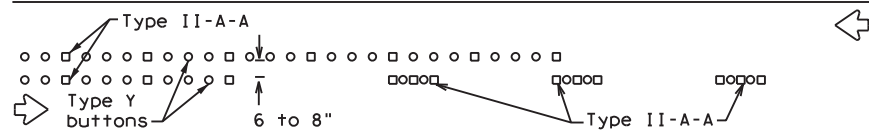


REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

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

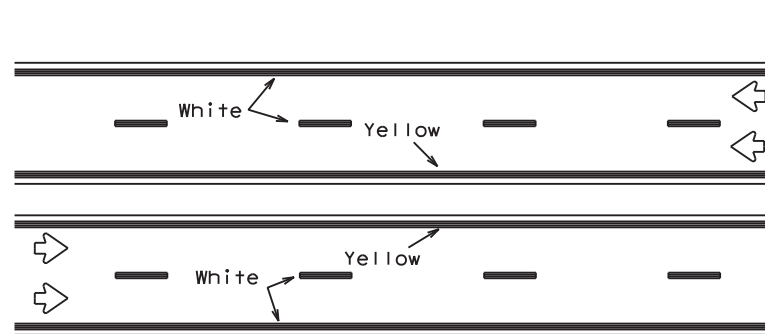


RAISED PAVEMENT MARKERS - PATTERN A



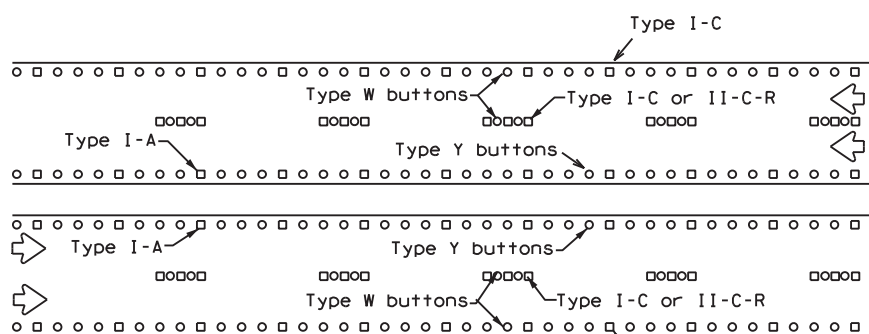
RAISED PAVEMENT MARKERS - PATTERN B

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



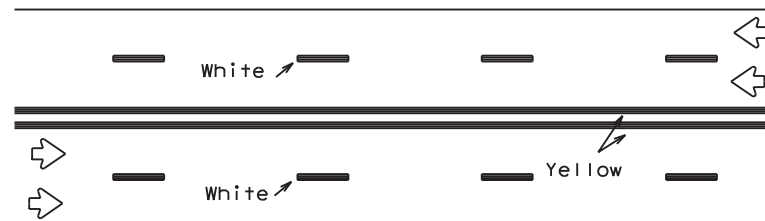
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



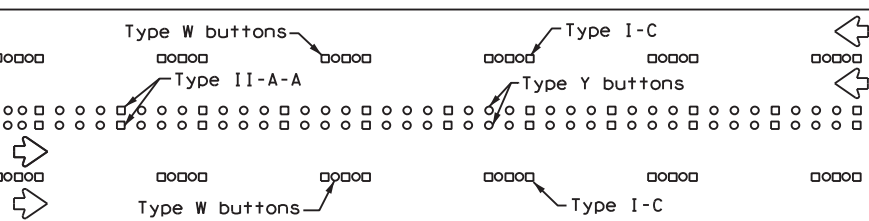
RAISED PAVEMENT MARKERS

EDGE & LANE LINES FOR DIVIDED HIGHWAY



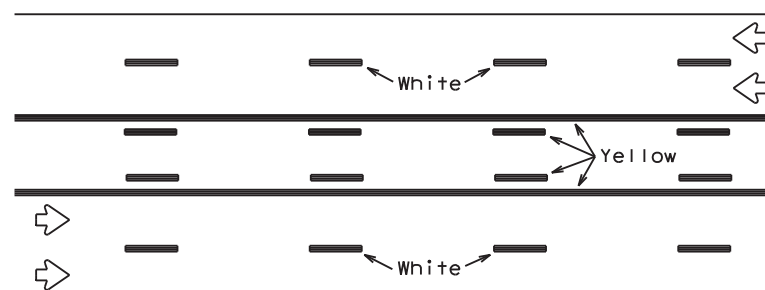
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



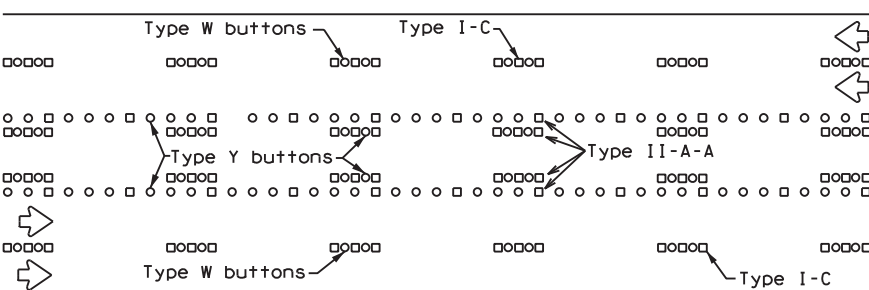
RAISED PAVEMENT MARKERS

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

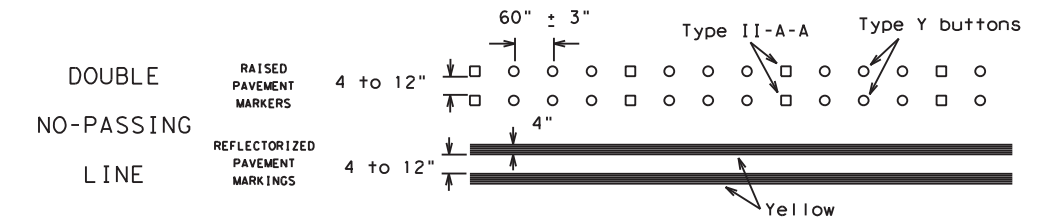
Prefabricated markings may be substituted for reflectORIZED pavement markings.



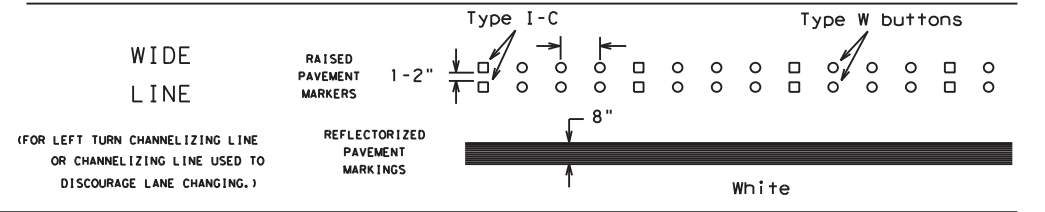
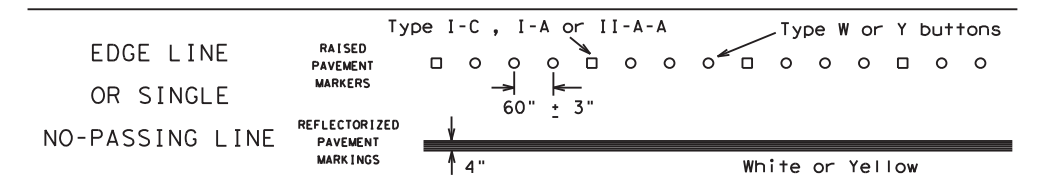
RAISED PAVEMENT MARKERS

TWO-WAY LEFT TURN LANE

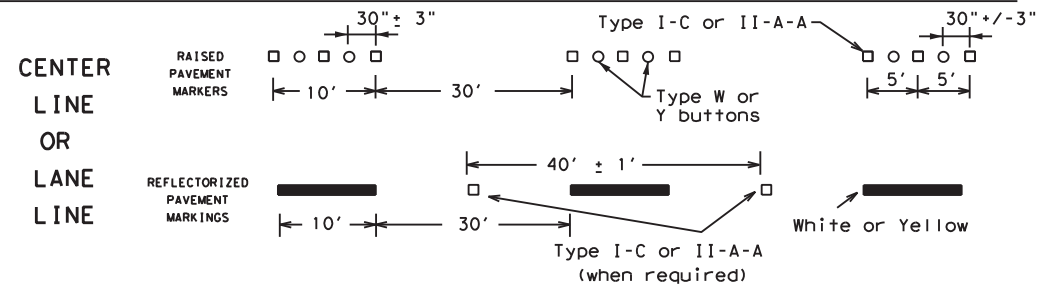
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



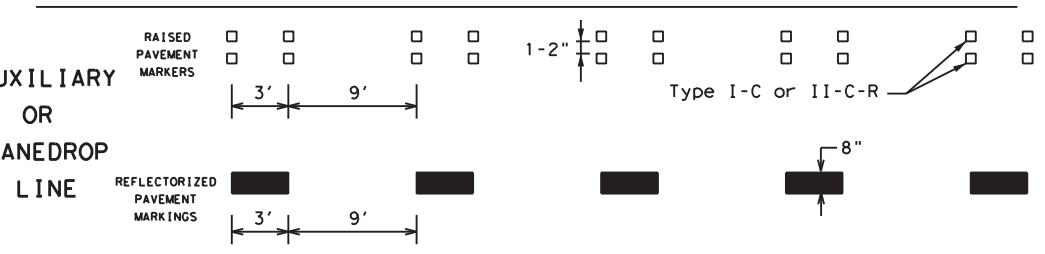
SOLID LINES



BROKEN LINES

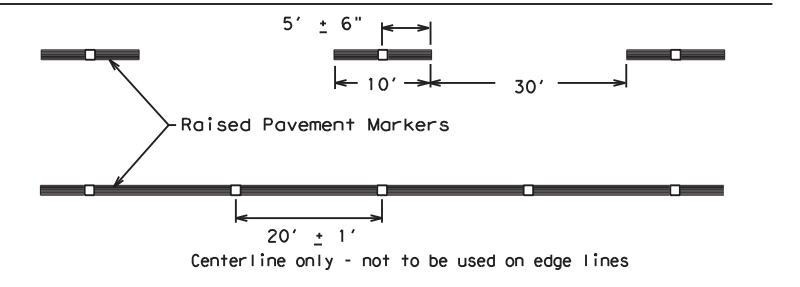


AUXILIARY OR LANEDROP LINE



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.



BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

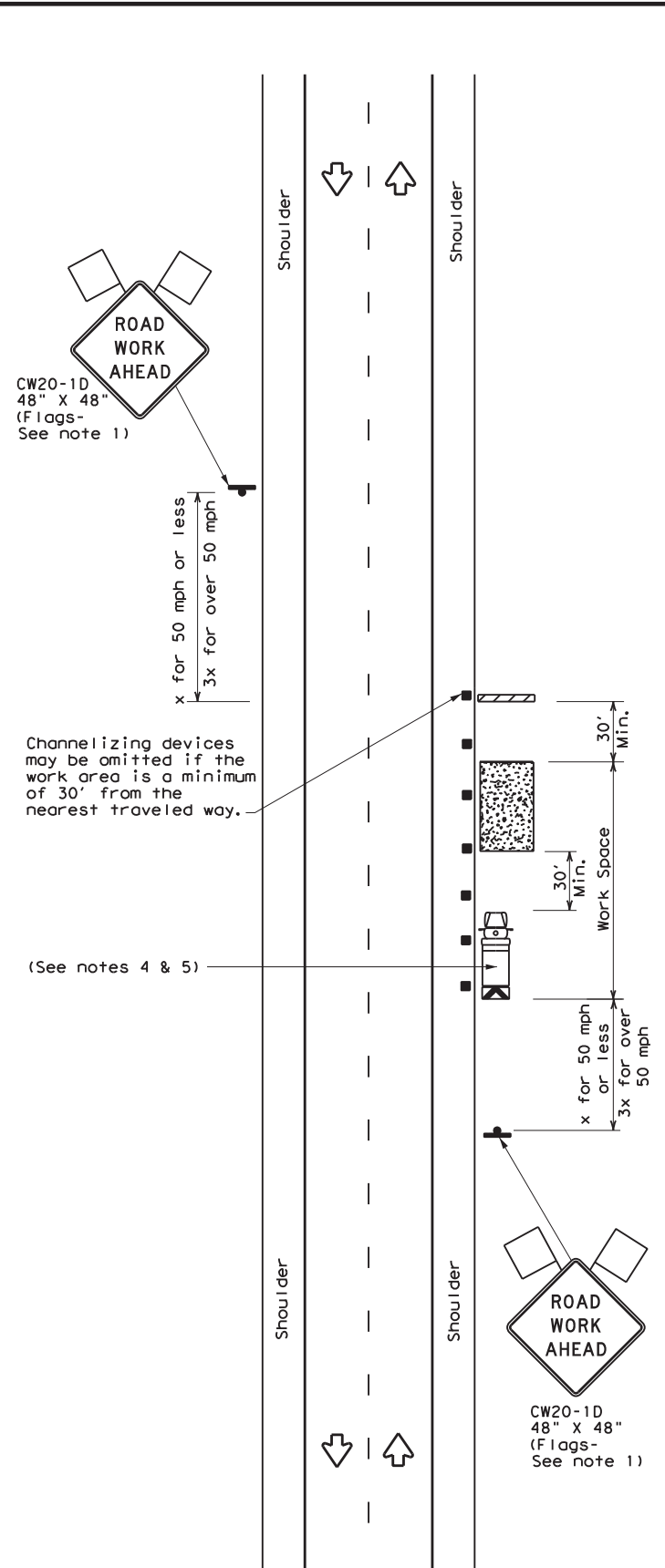
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| FILE: bc-21.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
| ©TxDOT February 1998 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0002 | 07 | 057, ETC | IH-10 |
| 1-97 9-07 5-21 | DIST | COUNTY | SHEET NO. | |
| 2-98 7-13 | ELP | HUDSPETH | 20 | |
| 11-02 8-14 | | | | |

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."

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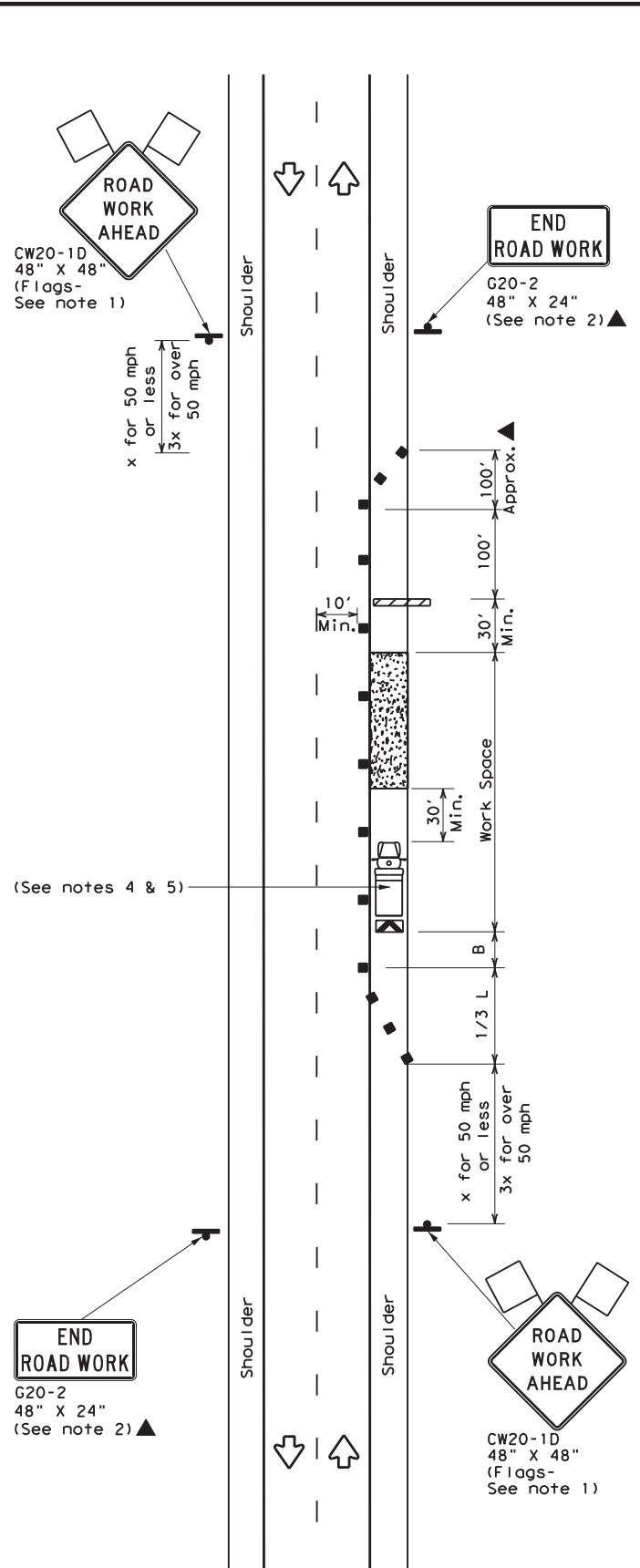
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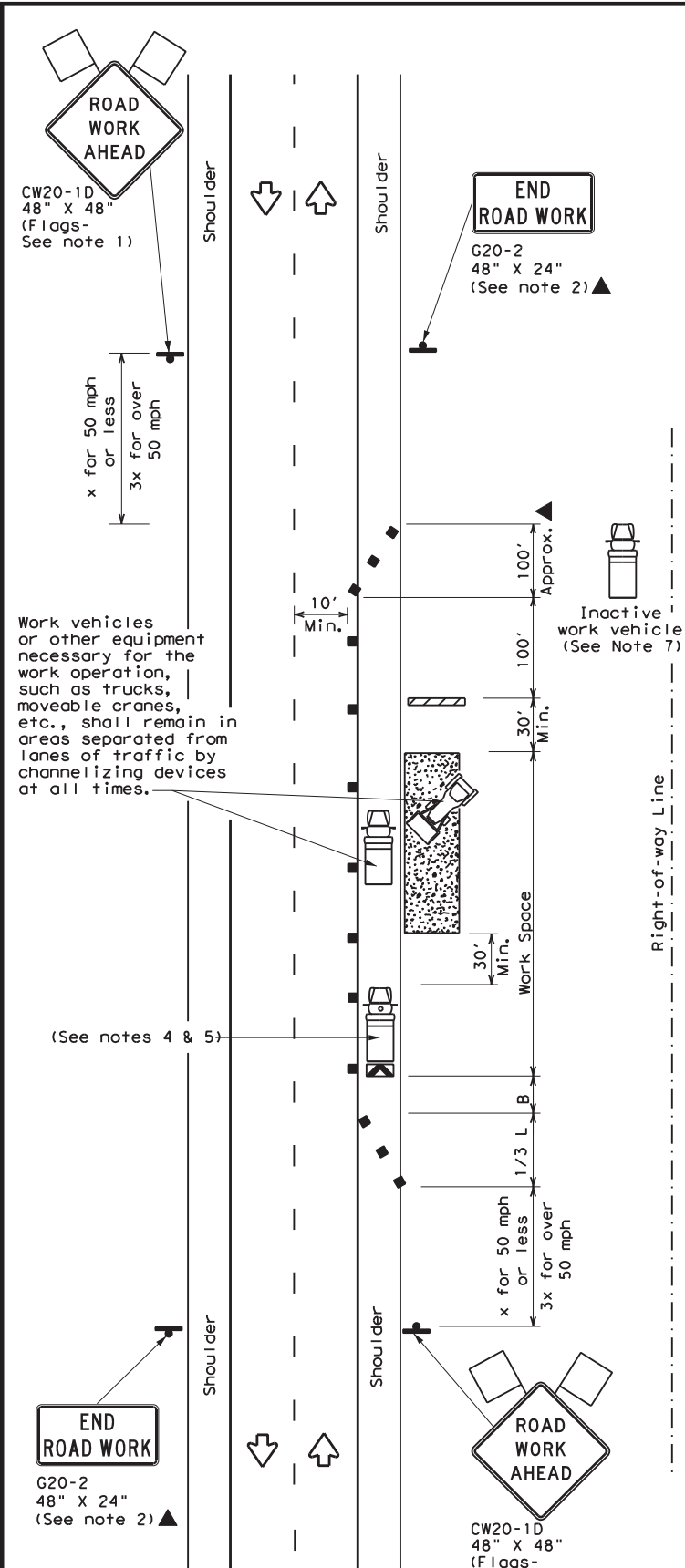
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

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

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

GENERAL NOTES

- Flags attached to signs where shown, are REQUIRED.
- 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.
- Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
- 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.
- Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
- See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
- Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
- CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.



TRAFFIC CONTROL PLAN
CONVENTIONAL ROAD
SHOULDER WORK

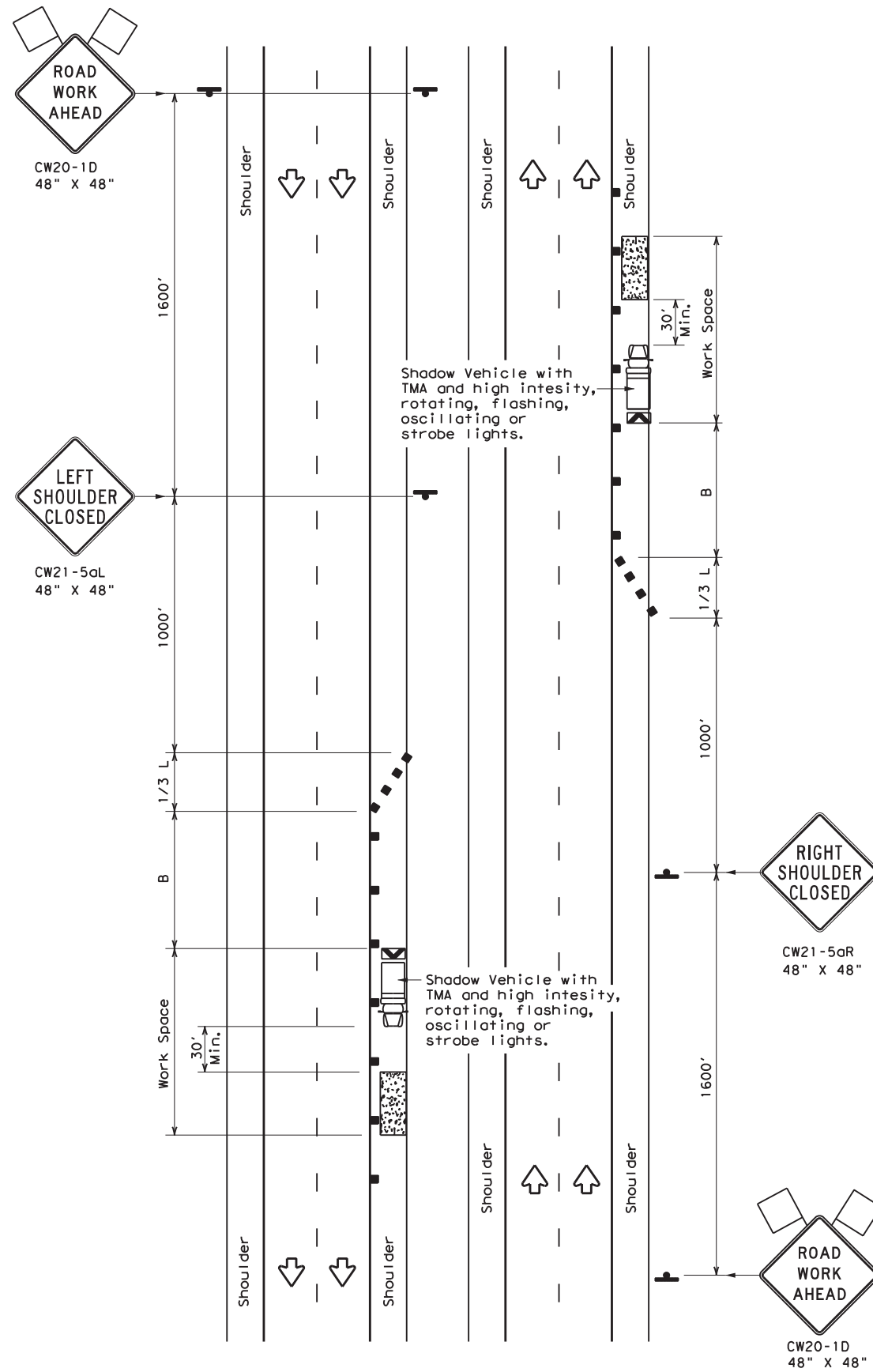
TCP (2-1) - 18

| | | | | |
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| © TxDOT December 1985 | CON: | SECT: | JOB: | HIGHWAY: |
| REVISIONS | 0002 | 07 | 057, ETC | IH-10 |
| 2-94 4-98 | DIST: | COUNTY: | SHEET NO. | |
| 8-95 2-12 | ELP | HUDSPETH | 21 | |
| 1-97 2-18 | | | | |

DATE:
FILE:

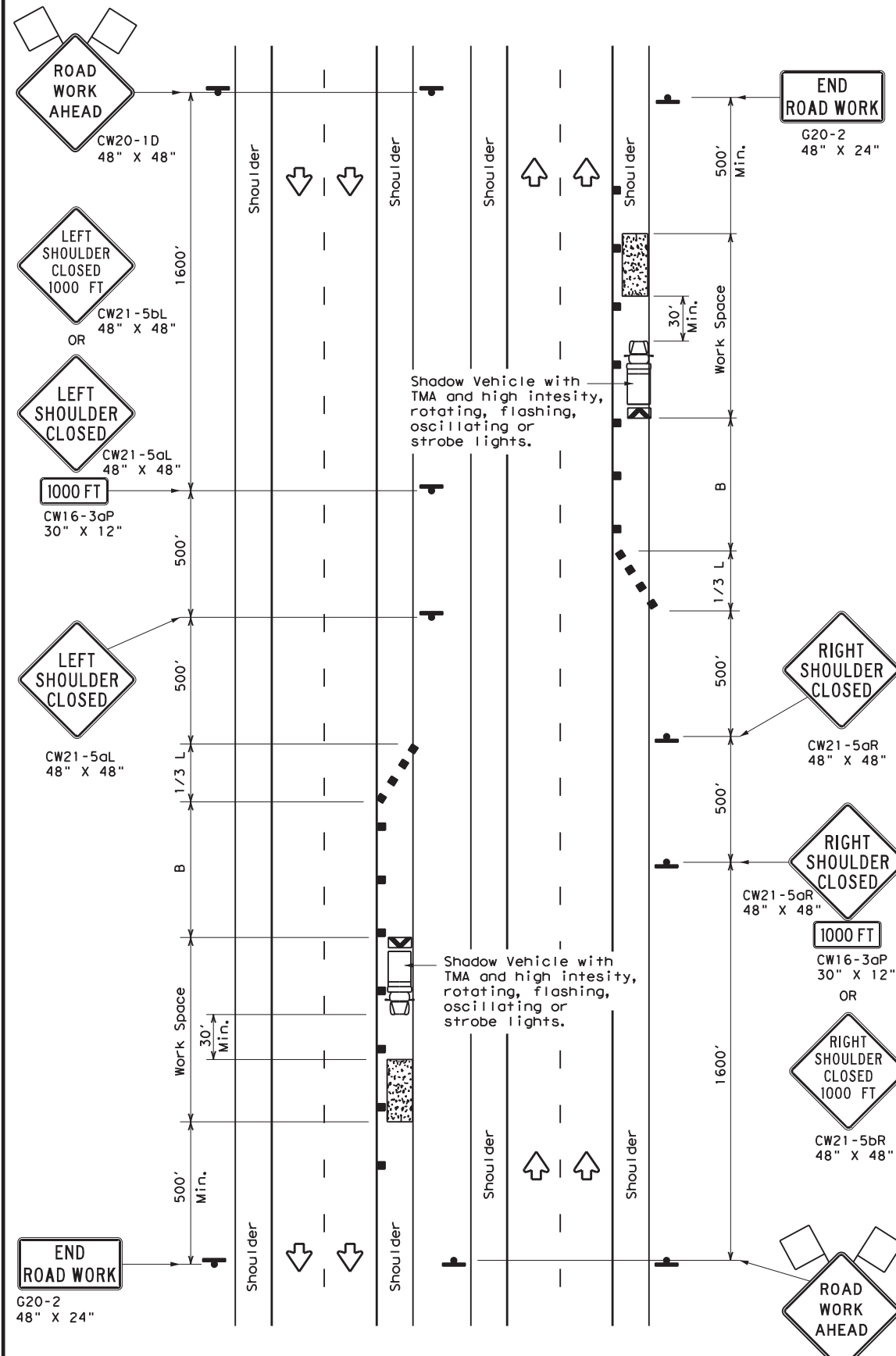
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FILE: tcp5-1-18.dgn



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 | | Portable Changeable Message Sign (PCMS) |
| | Sign | | Traffic Flow |
| | Flag | | Flagger |

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



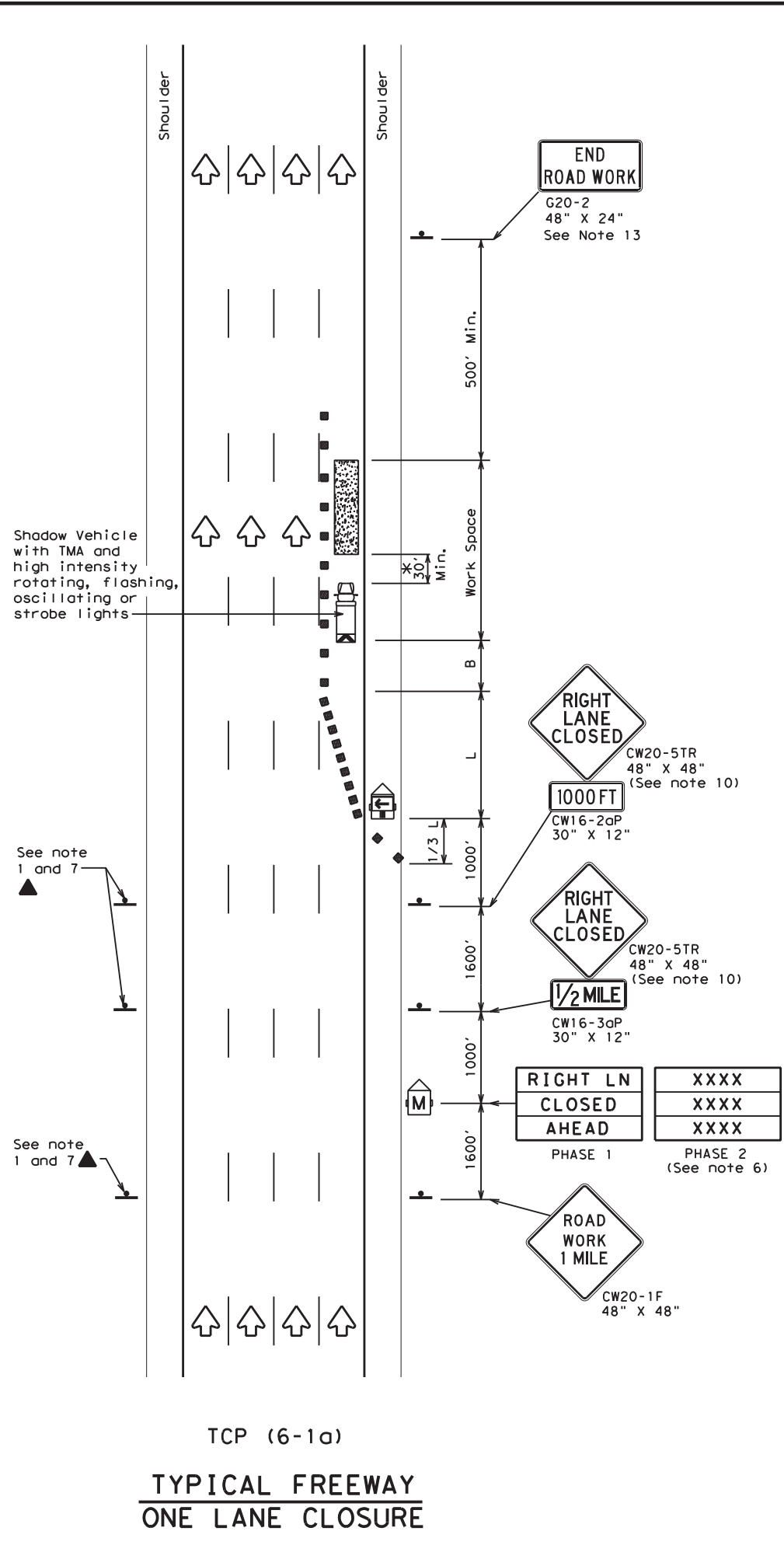
**TRAFFIC CONTROL PLAN
SHOULDER WORK FOR
FREEWAYS / EXPRESSWAYS**

TCP (5-1) - 18

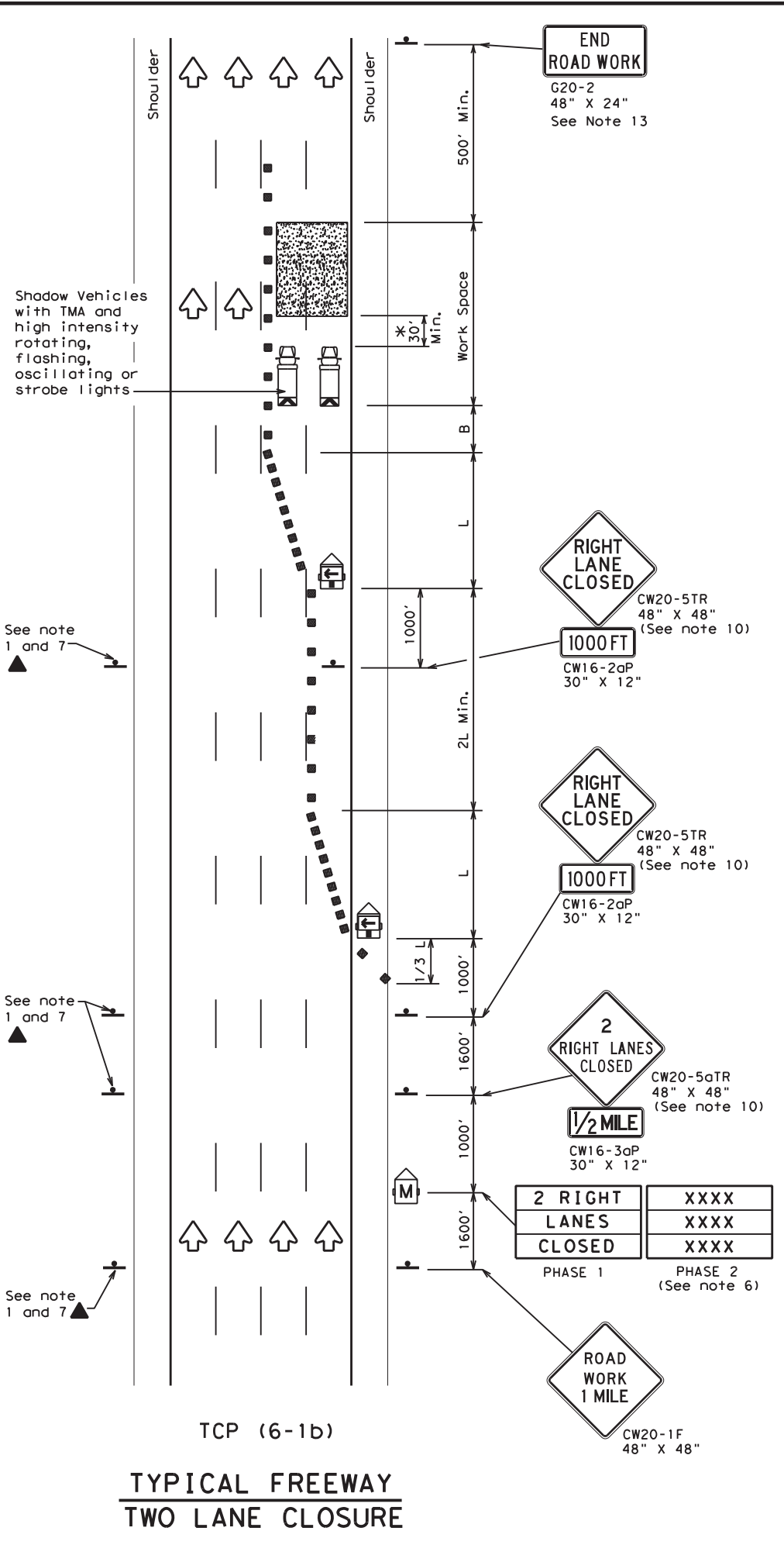
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| 2-18 | REVISIONS: | 0002 07 | 057, ETC | IH-10 |
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TCP (6-1a)
**TYPICAL FREEWAY
ONE LANE CLOSURE**



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 | | 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

- All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
- 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.
- All construction signs and barricades placed during any phase of work shall remain in place until removal is approved by the Engineer.
- The Engineer may direct the Contractor to furnish additional signs and barricades as required to maintain traffic flow, detours and motorist safety during construction.
- 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.
- 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.
- Duplicate construction warning signs should be erected on the medians side of freeways where median width will permit and traffic volume justifies the signing.
- 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.
- Warning signs for intermediate term stationary work should be mounted at 7' to the bottom of the sign.
- 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.
- 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.
- 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.
- 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

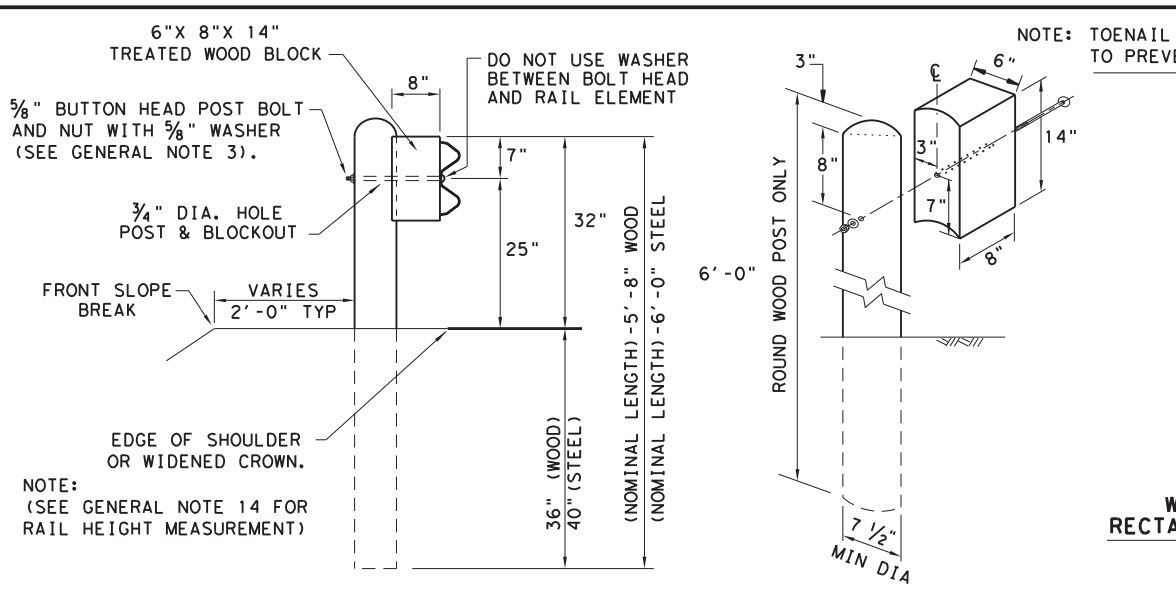
**TRAFFIC CONTROL PLAN
FREEWAY LANE CLOSURES**

TCP (6-1) - 12

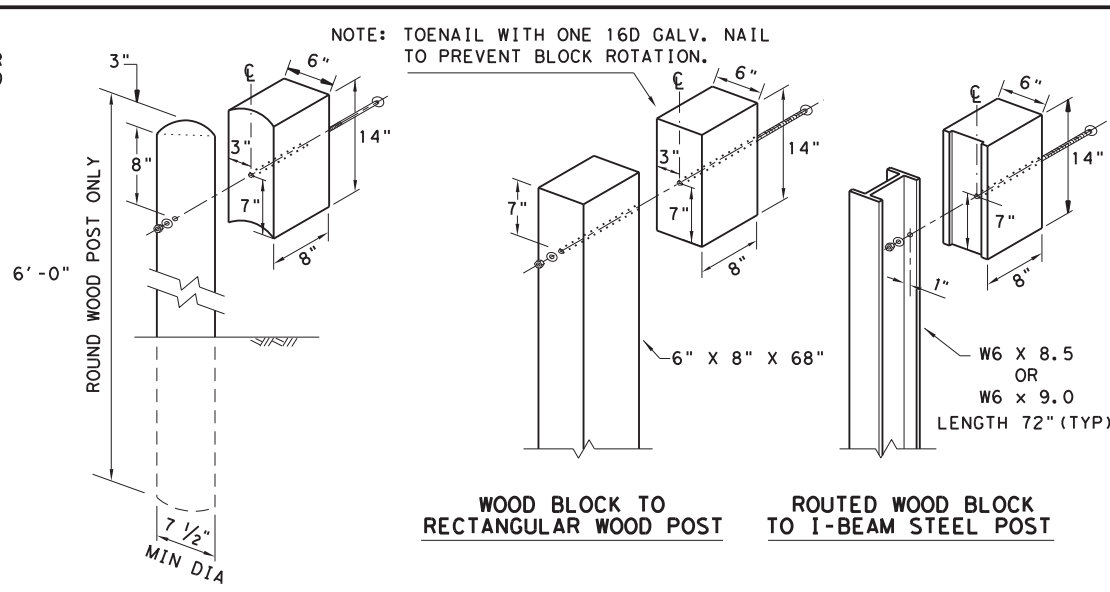
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| © TxDOT | February 1998 | CONT | SECT | JOB | HIGHWAY | | | | |
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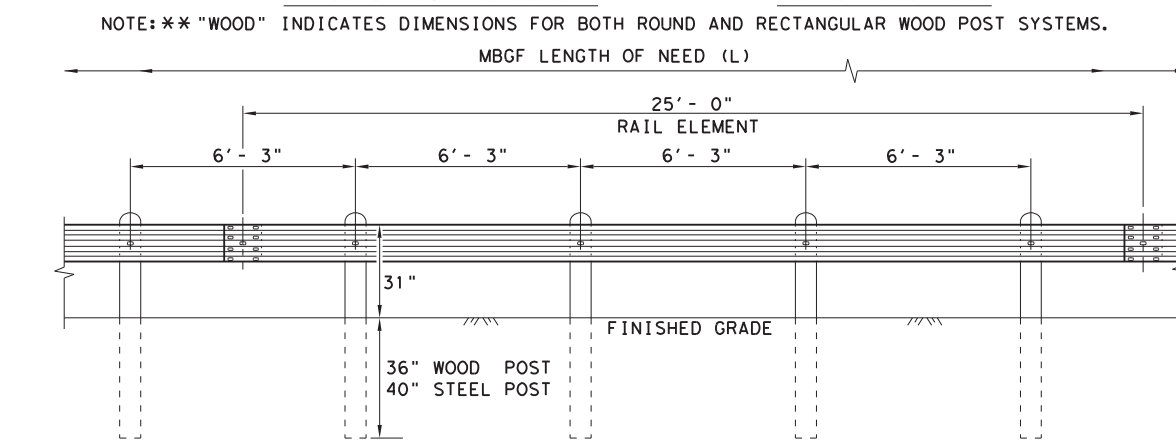


TYPICAL POST PLACEMENT

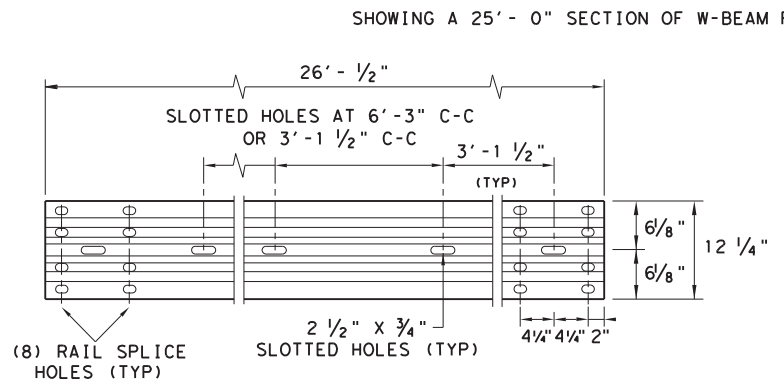


WOOD BLOCK TO ROUND WOOD POST **ROUTED WOOD BLOCK TO I-BEAM STEEL POST**

- 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 1/2" 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 3/8" WASHER (FWC160) 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.

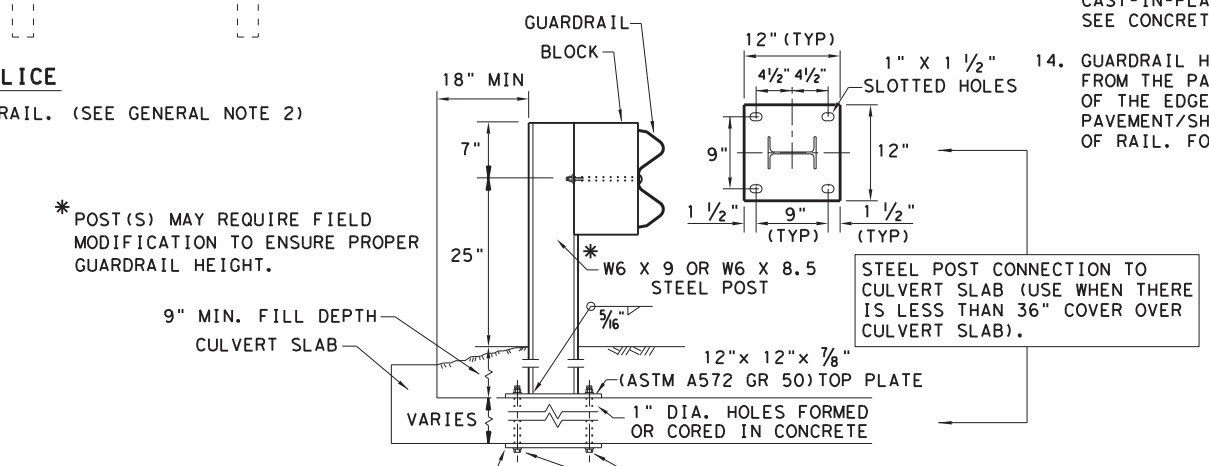


ELEVATION MID-SPAN RAIL SPLICE



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

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

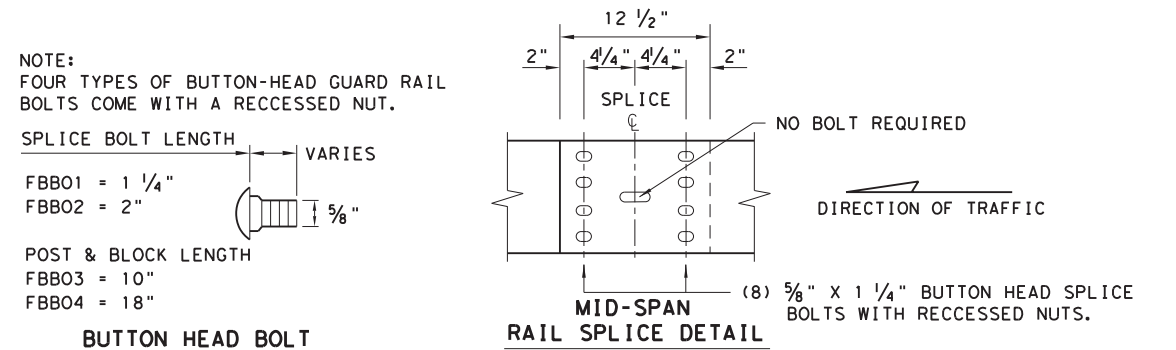


LOW FILL CULVERT POST

12" x 12" x 1/4" (ASTM A36) STEEL BOTTOM PLATE WITH 1" DIA. HOLES REQUIRED WITH BOLT-THROUGH INSTALLATION.

- NOTE: TWO INSTALLATION OPTIONS.
1. **BOLT-THROUGH OPTION:** REQUIRES A 6" MIN. SLAB THICKNESS. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS. NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.
 2. **EPOXY ANCHOR OPTION:** THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE 7/8" 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 1/4" MIN. BEYOND NUT.

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



MID-SPAN RAIL SPLICE DETAIL

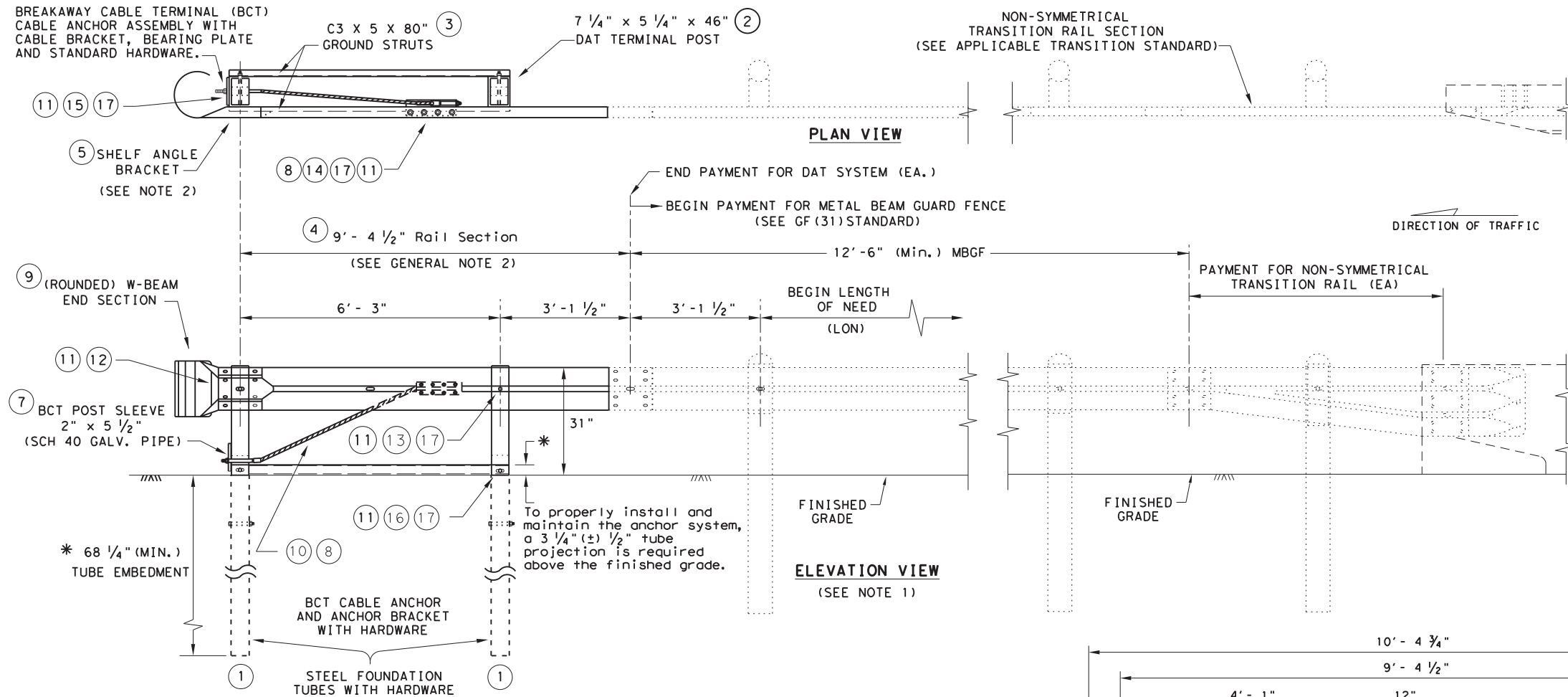
NOTE: SEE GENERAL NOTE 3 FOR SPLICE & POST BOLT DETAILS.

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

| | | | | | |
|---|-----------|----------|-----------|---------------------------------|--|
| | | | | Design Division Standard | |
| METAL BEAM GUARD FENCE TL-3 MASH COMPLIANT GF(31)-19 | | | | | |
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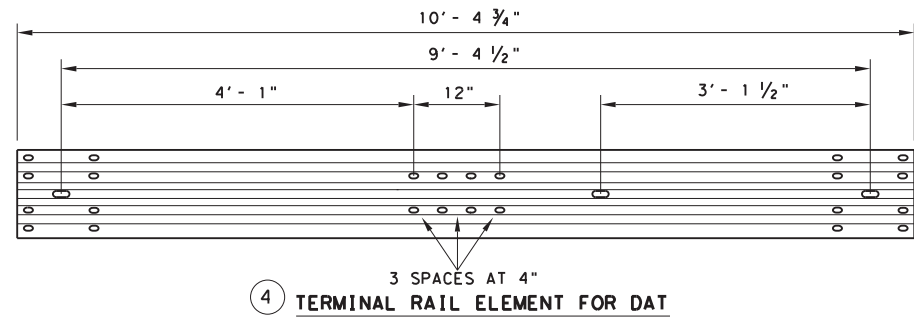
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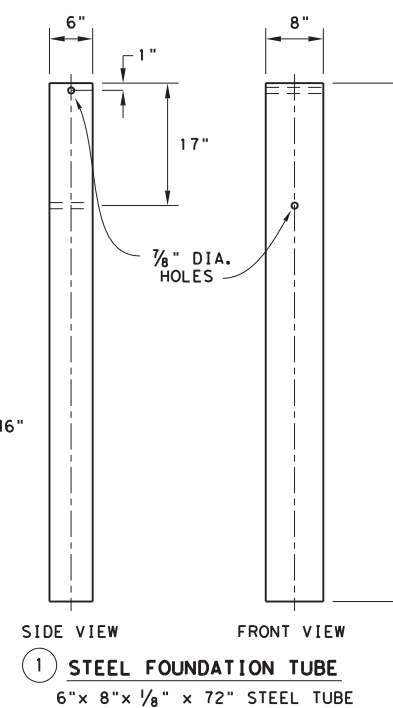
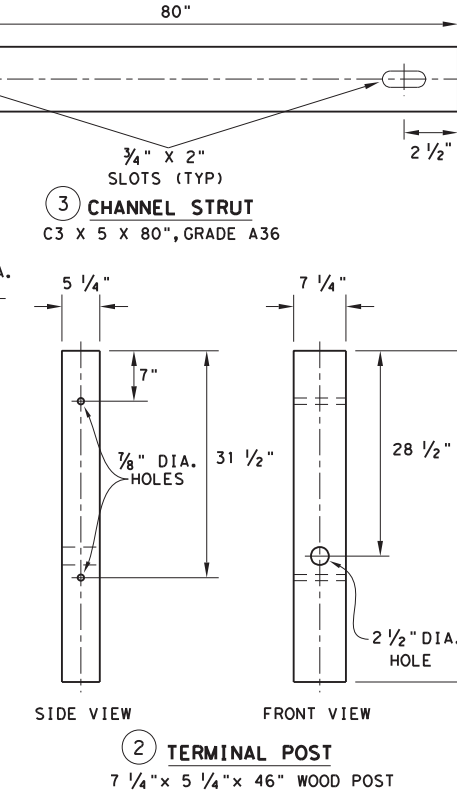
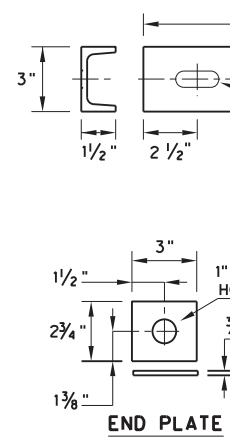
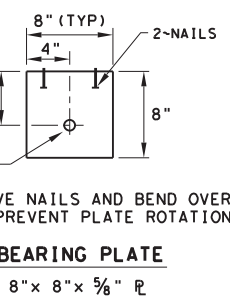
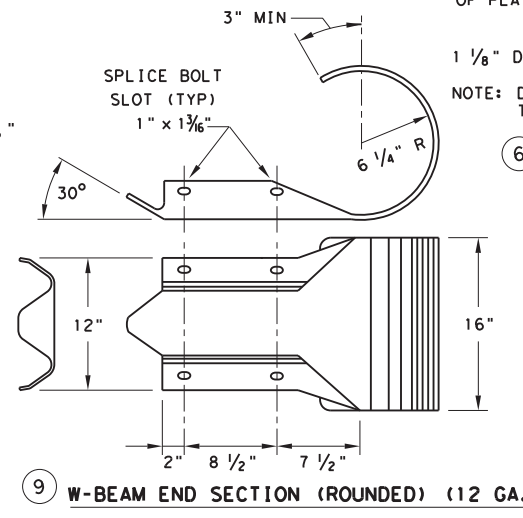
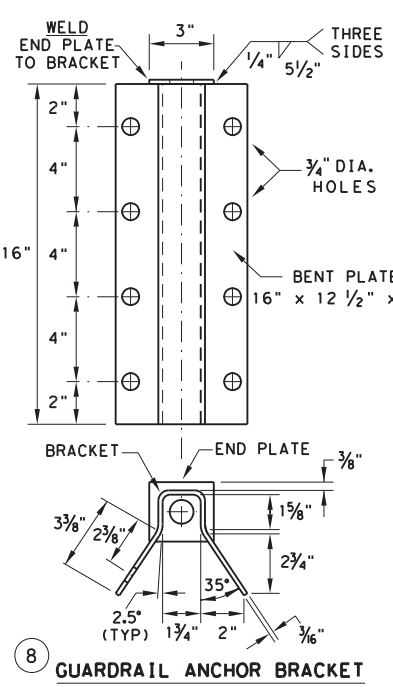
DOWNSTREAM ANCHOR TERMINAL (DAT)
NOTE: ONLY FOR DOWNSTREAM USE, WHEN LOCATED OUTSIDE THE HORIZONTAL CLEARANCE AREA OF OPPOSING TRAFFIC.

- 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\" | 4 |
| 13 | 10\" | 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 |

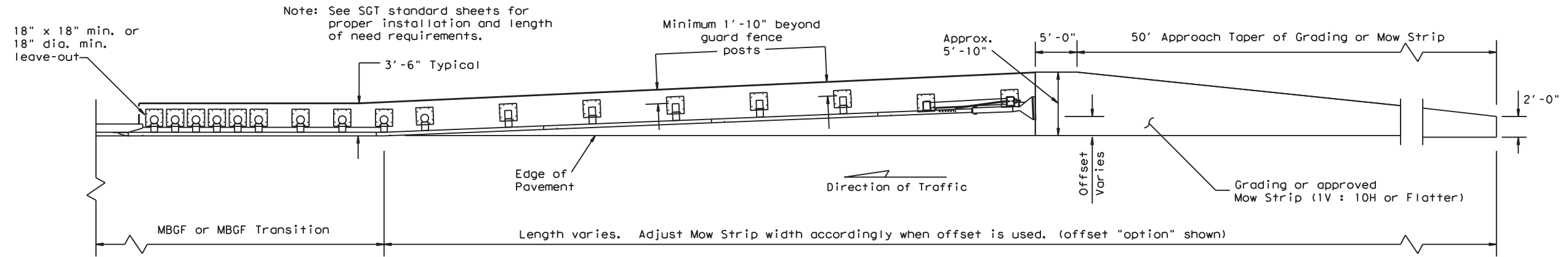


Texas Department of Transportation
Design Division Standard

METAL BEAM GUARD FENCE (DOWNSTREAM ANCHOR TERMINAL) TL-3 MASH COMPLIANT GF (31) DAT-19

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| FILE: gf31dat19.dgn | DN: TXDOT | CK: KM | DW: VP | CK: CGL/AG |
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| | DIST: ELP | COUNTY: HUDSPETH | SHEET NO. 25 | |

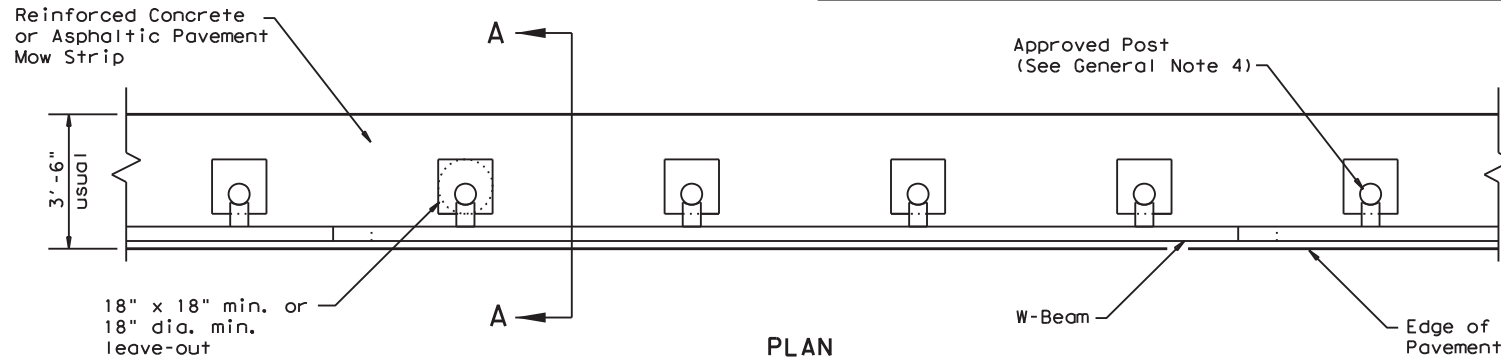
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Note: See SGT standard sheets for proper installation and length of need requirements.

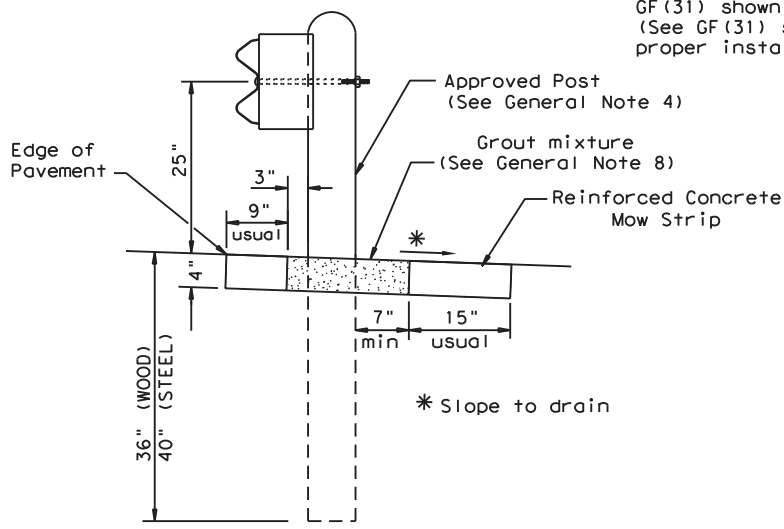
GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS

Note: Site Condition(s)
 Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.
 Approach grading or mow strip may be decreased or eliminated, as directed by the Engineer.



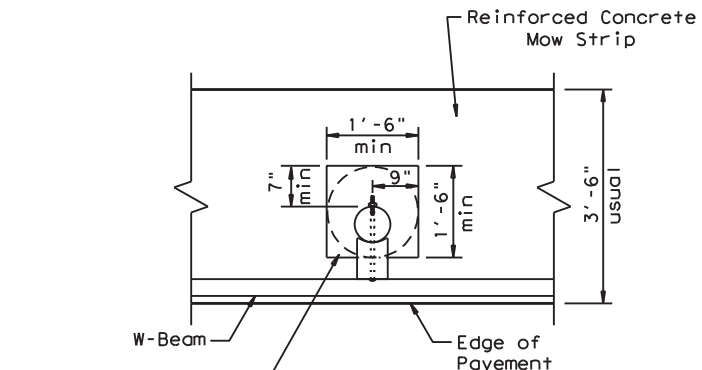
PLAN

GF(31) shown with Mow Strip
 (See GF(31) standard sheet for proper installation)



SECTION A-A

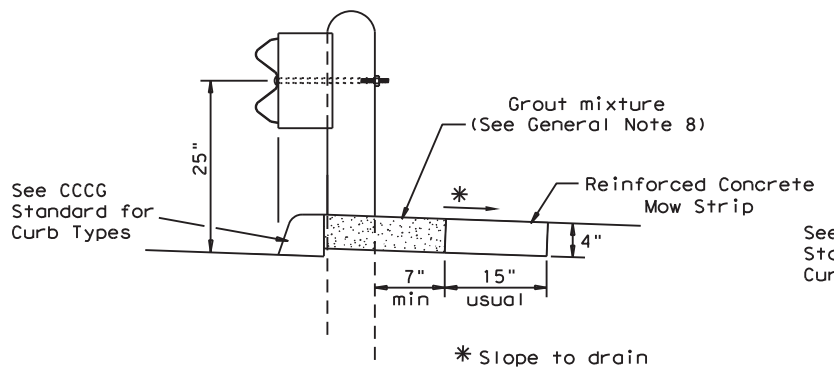
Typical



MOW STRIP DETAIL

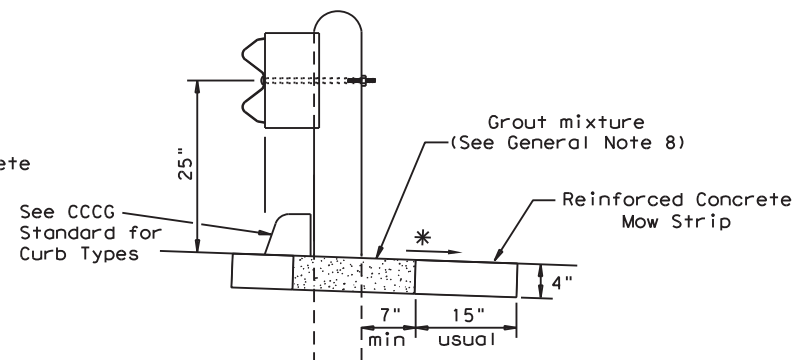
Reinforced Concrete Mow Strip with 18\"/>

- GENERAL NOTES**
1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
 2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
 3. The leave-out behind the post shall be a minimum of 7".
 4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 1/2" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
 5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
 6. Thickness of the mow strip will be 4".
 7. The limits of payment for reinforced concrete will include leave-outs for the posts.
 8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type I or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.



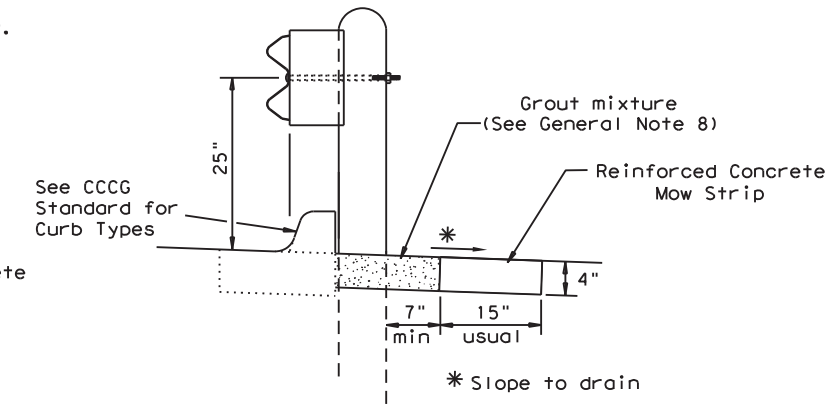
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

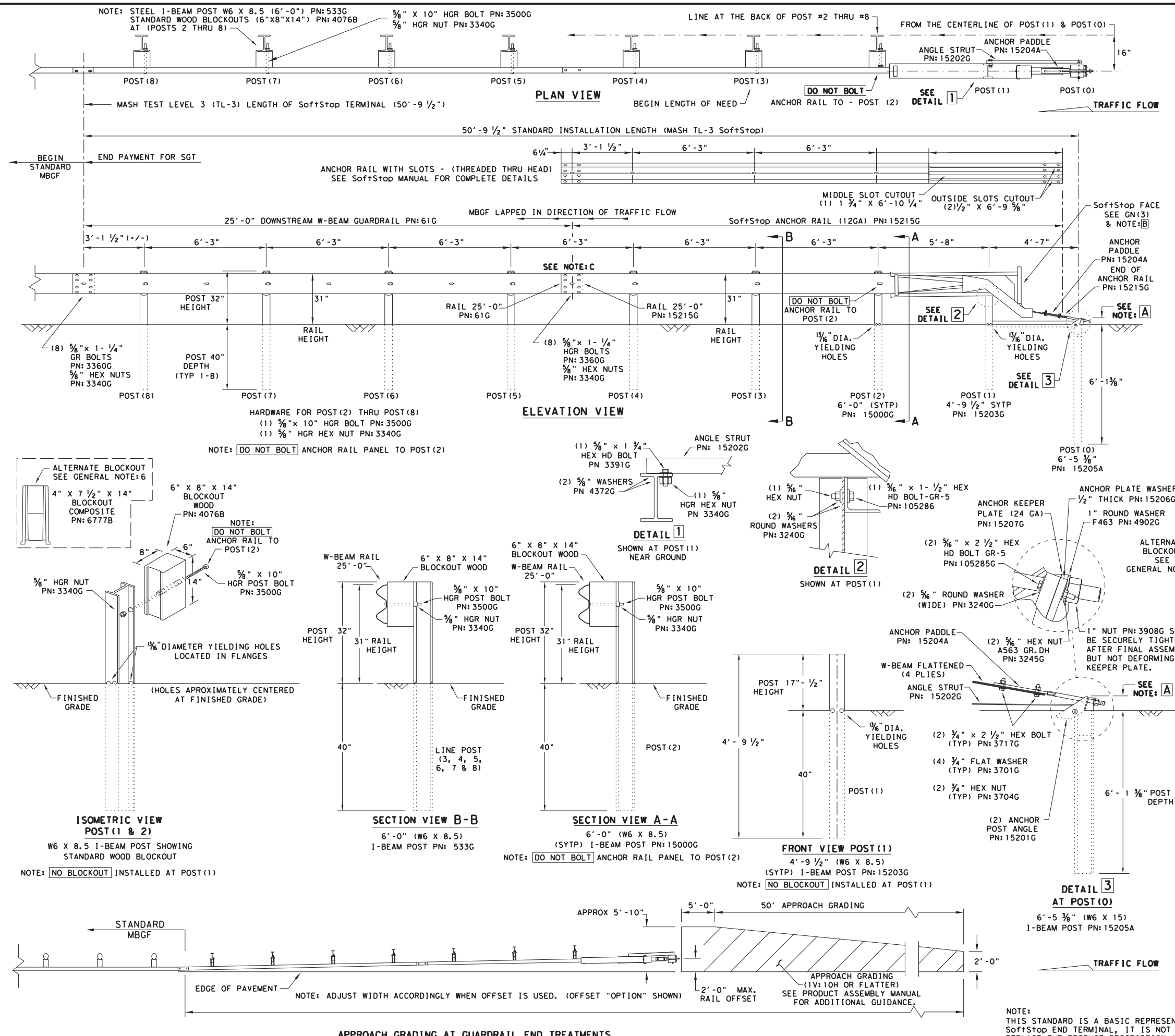
Texas Department of Transportation
 Design Division Standard

METAL BEAM GUARD FENCE (MOW STRIP)
TL-3 MASH COMPLIANT
GF(31)MS-19

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- GENERAL NOTES**
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY AT 1(888)323-6374, 2525 N. STEMMONS FREEWAY, DALLAS, TX 75207
 - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE; SoftStop END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL. PN:620237B
 - 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.
 - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TxDOT'S LATEST ROADWAY MOW STRIP STANDARD.
 - HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
 - A COMPOSITE MATERIAL BLOCKOUT 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.
 - IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL AND REFER TO THE LATEST ROADWAY MGBF STANDARD FOR INSTALLATION GUIDANCE.
 - POSTS SHALL NOT BE SET IN CONCRETE.
 - IT IS ACCEPTABLE TO INSTALL THE SoftStop IMPACT HEAD PARALLEL TO THE GRADE LINE OR WITH AN UPWARD TILT.
 - DO NOT ATTACH THE SoftStop SYSTEM DIRECTLY TO A RIGID BARRIER.
 - UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE SoftStop SYSTEM BE CURVED.
 - 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.


NOTE: A THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-3/4" MIN. TO 4" MAX. ABOVE FINISHED GRADE.

NOTE: B PART PN:5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)
PART PN:5851B LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)

NOTE: C W-BEAM SPLICE LOCATED BETWEEN LINE POST(4) AND LINE POST(5)
GUARDRAIL PANEL 25'-0" PN:61G
ANCHOR RAIL 25'-0" PN:15215G
LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

| PART | QTY | MAIN SYSTEM COMPONENTS |
|---------|-----|--|
| 620237B | 1 | PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.) |
| 15208A | 1 | SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH) |
| 15215G | 1 | SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS |
| 61G | 1 | SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'-0") |
| 15205A | 1 | POST #0 - ANCHOR POST (6'-5 3/8") |
| 15203G | 1 | POST #1 - (SYTP) (4'-9 1/2") |
| 15000G | 1 | POST #2 - (SYTP) (6'-0") |
| 533G | 6 | POST #3 THRU #8 - I-BEAM (W6 X 8.5) (6'-0") |
| 4076B | 7 | BLOCKOUT - WOOD (ROUTED) (6" X 8" X 14") |
| 6777B | 7 | BLOCKOUT - COMPOSITE (4" X 7 1/2" X 14") |
| 15204A | 1 | ANCHOR PADDL E |
| 15207G | 1 | ANCHOR KEEPER PLATE (24 GA) |
| 15206G | 1 | ANCHOR PLATE WASHER (1/2" THICK) |
| 15201G | 2 | ANCHOR POST ANGLE (10" LONG) |
| 15202G | 1 | ANGLE STRUT |

| PART | QTY | HARDWARE |
|---------|-----|--|
| 4902G | 1 | 1" ROUND WASHER F436 |
| 3908G | 1 | 1" HEAVY HEX NUT A563 GR.DH |
| 3717G | 2 | 3/4" X 2 1/2" HEX BOLT A325 |
| 3701G | 4 | 3/4" ROUND WASHER F436 |
| 3704G | 2 | 3/4" HEAVY HEX NUT A563 GR.DH |
| 3360G | 16 | 5/8" X 1 1/4" W-BEAM RAIL SPLICE BOLTS HGR |
| 3340G | 25 | 5/8" W-BEAM RAIL SPLICE NUTS HGR |
| 3500G | 7 | 5/8" X 10" HGR POST BOLT A307 |
| 3391G | 1 | 5/8" X 1 3/4" HEX HD BOLT A325 |
| 4489G | 1 | 5/8" X 9" HEX HD BOLT A325 |
| 4372G | 4 | 5/8" WASHER F436 |
| 105285G | 2 | 5/8" X 2 1/2" HEX HD BOLT GR-5 |
| 105286G | 1 | 5/8" X 1 1/2" HEX HD BOLT GR-5 |
| 3240G | 6 | 5/8" ROUND WASHER (WIDE) |
| 3245G | 3 | 5/8" HEX NUT A563 GR.DH |
| 5852B | 1 | HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE: B |



TRINITY HIGHWAY
SOFTSTOP END TERMINAL
MASH - TL-3
SGT (10S) 31-16

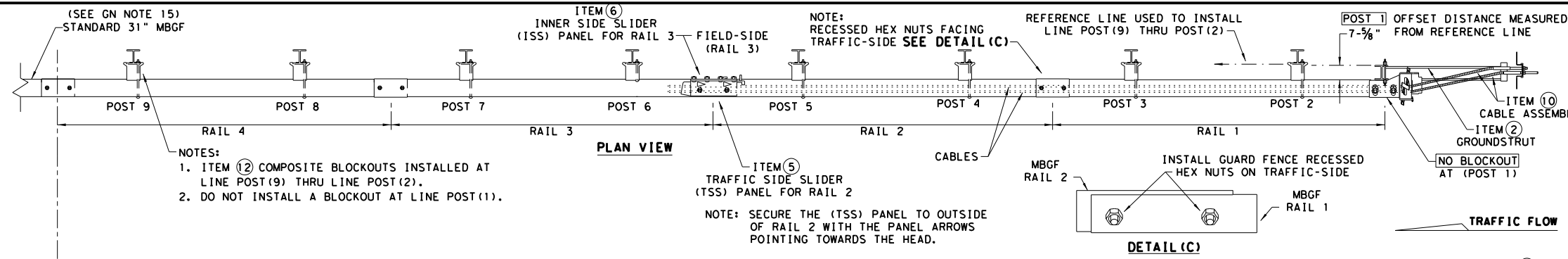
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| REVISIONS | | DIST: COUNTY | SHEET NO. 27 | |

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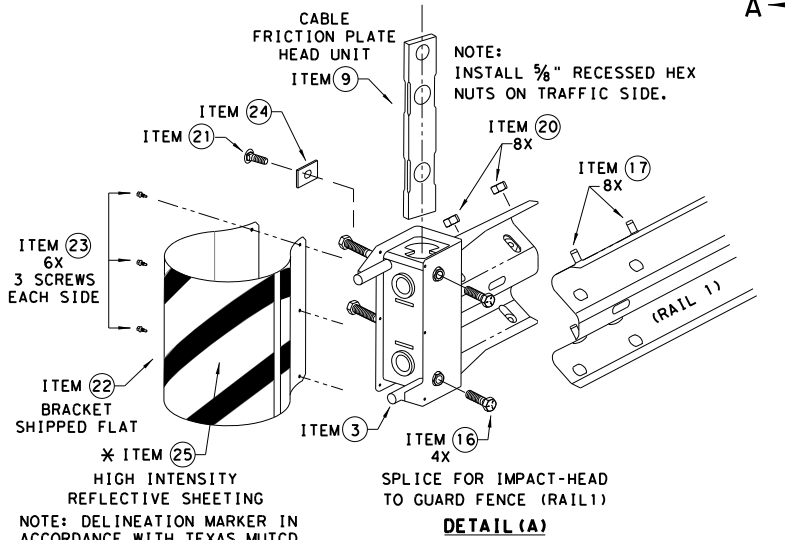
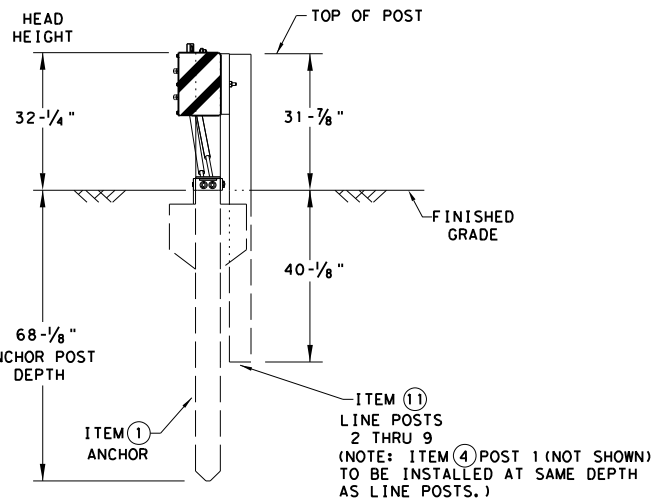
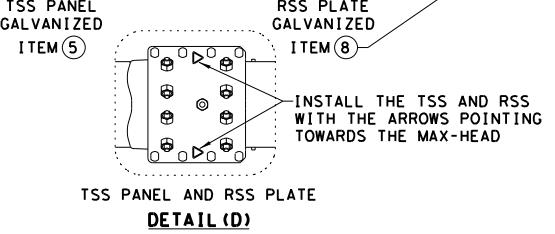
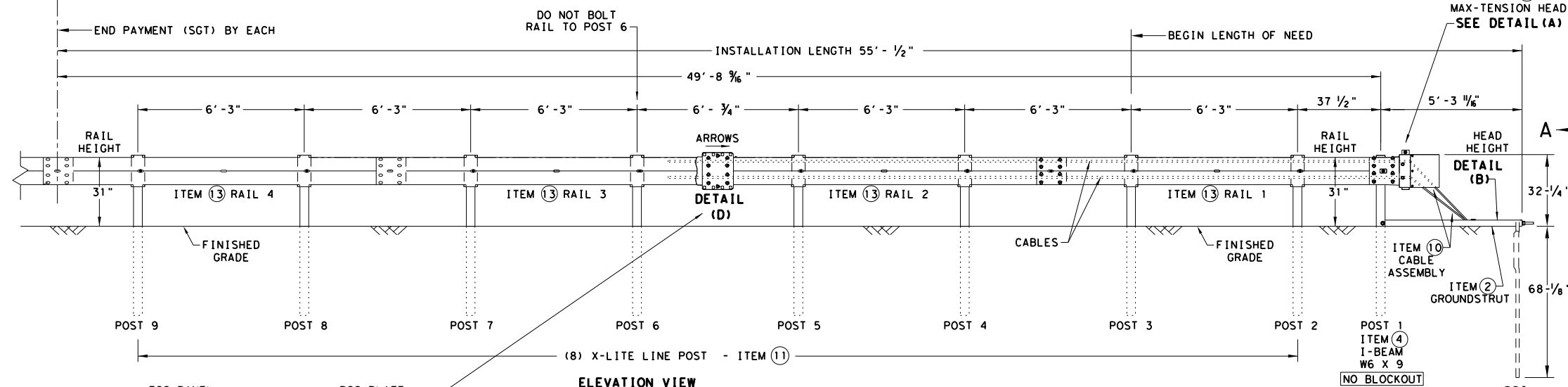
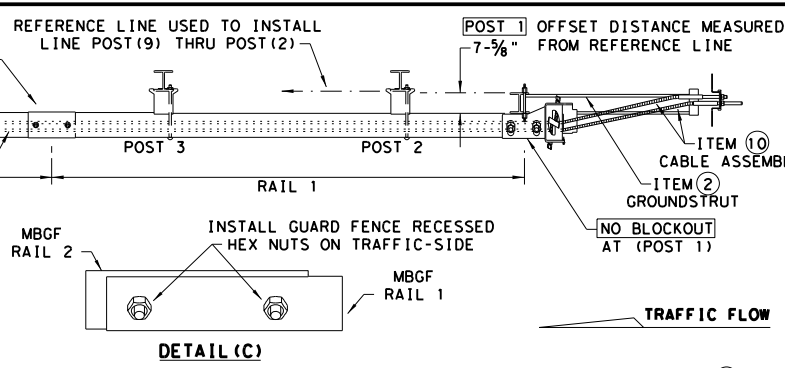
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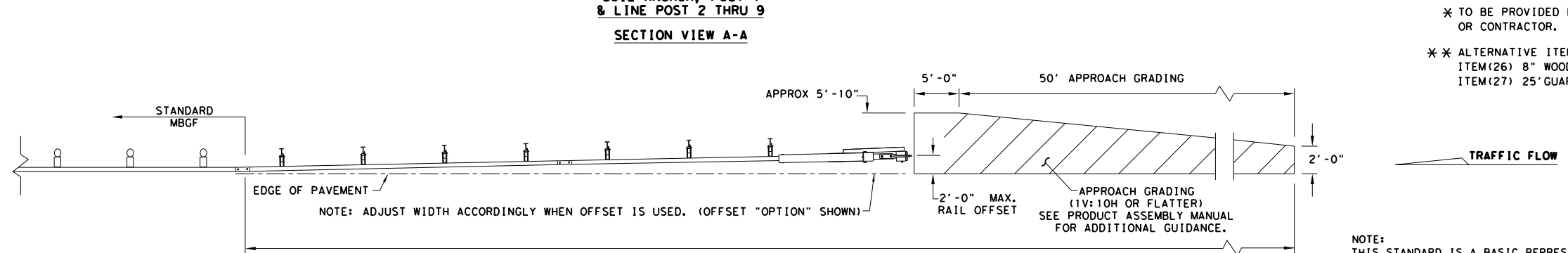
- NOTES:
- ITEM (2) COMPOSITE BLOCKOUTS INSTALLED AT LINE POST (9) THRU LINE POST (2).
 - DO NOT INSTALL A BLOCKOUT AT LINE POST (1).

NOTE: SECURE THE (TSS) PANEL TO OUTSIDE OF RAIL 2 WITH THE PANEL ARROWS POINTING TOWARDS THE HEAD.



- GENERAL NOTES**
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800
 - FOR INSTALLATION, REPAIR, & MAINTENANCE REFER TO THE: MAX-TENSION INSTALLATION INSTRUCTION MANUAL. P/N MANMAX REV D (ECN 3516).
 - APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURE'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
 - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TxDOT'S LATEST ROADWAY MOW STRIP STANDARD.
 - ALL STEEL COMPONENTS ARE GALVANIZED PER ASTM A123 OR EQUIVALENT UNLESS OTHERWISE STATED.
 - SYSTEM SHOWN USING STEEL WIDE FLANGE POST WITH COMPOSITE BLOCKOUTS.
 - COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
 - REFER TO INSTALLATION MANUAL FOR SPECIFIC PANEL LAPPING GUIDANCE.
 - IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL FOR INSTALLATION GUIDANCE.
 - POSTS SHALL NOT BE SET IN CONCRETE.
 - A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POST TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST.
 - MAX-TENSION SYSTEM SHALL NEVER BE INSTALLED WITHIN A CURVED SECTION OF GUARDRAIL.
 - IF A DELINEATION MARKER IS REQUIRED, MARKER SHALL BE IN ACCORDANCE WITH TEXAS MUTCD.
 - THE SYSTEM IS SHOWN WITH 12'-6" MBGF PANELS, 25'-0" MBGF PANELS ARE ALSO ALLOWED.
 - A MINIMUM OF 12'-6" OF 12GA. MBGF IS REQUIRED IMMEDIATELY DOWNSTREAM OF THE MAX-TENSION SYSTEM.

| ITEM# | PART NUMBER | DESCRIPTION | QTY |
|-------|----------------|--|-----|
| 1 | BSI-1610060-00 | SOIL ANCHOR - GALVANIZED | 1 |
| 2 | BSI-1610061-00 | GROUND STRUT - GALVANIZED | 1 |
| 3 | BSI-1610062-00 | MAX-TENSION IMPACT HEAD | 1 |
| 4 | BSI-1610063-00 | W6x9 I-BEAM POST 6FT. -GALVANIZED | 1 |
| 5 | BSI-1610064-00 | TSS PANEL - TRAFFIC SIDE SLIDER | 1 |
| 6 | BSI-1610065-00 | ISS PANEL - INNER SIDE SLIDER | 1 |
| 7 | BSI-1610066-00 | TOOTH - GEOMET | 1 |
| 8 | BSI-1610067-00 | RSS PLATE - REAR SIDE SLIDER | 1 |
| 9 | B061058 | CABLE FRICTION PLATE - HEAD UNIT | 1 |
| 10 | BSI-1610069-00 | CABLE ASSEMBLY - MASH X-TENSION | 2 |
| 11 | BSI-1012078-00 | X-LITE LINE POST-GALVANIZED | 8 |
| 12 | B090534 | 8" W-BEAM COMPOSITE-BLOCKOUT XT110 | 8 |
| 13 | BSI-4004386 | 12'-6" W-BEAM GUARD FENCE PANELS 12GA. | 4 |
| 14 | BSI-1102027-00 | X-LITE SQUARE WASHER | 1 |
| 15 | BSI-2001886 | 3/8" X 7" THREAD BOLT HH (GR.5)GEOMET | 1 |
| 16 | BSI-2001885 | 3/4" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET | 4 |
| 17 | 4001115 | 5/8" X 1 1/4" GUARD FENCE BOLTS (GR.2)MGAL | 48 |
| 18 | 2001840 | 5/8" X 10" GUARD FENCE BOLTS MGAL | 8 |
| 19 | 2001636 | 5/8" WASHER F436 STRUCTURAL MGAL | 2 |
| 20 | 4001116 | 5/8" RECESSED GUARD FENCE NUT (GR.2)MGAL | 59 |
| 21 | BSI-2001888 | 3/8" X 2" ALL THREAD BOLT (GR.5)GEOMET | 1 |
| 22 | BSI-1701063-00 | DELINEATION MOUNTING (BRACKET) | 1 |
| 23 | BSI-2001887 | 1/4" X 3/4" SCREW SD HH 410SS | 7 |
| 24 | 4002051 | GUARDRAIL WASHER RECT AASHTO FWRO3 | 1 |
| 25 | SEE NOTE BELOW | HIGH INTENSITY REFLECTIVE SHEETING | 1 |
| 26 | 4002337 | 8" W-BEAM TIMBER-BLOCKOUT, PDB01B | 8 |
| 27 | BSI-4004431 | 25' W-BEAM GUARDRAIL PANEL, 8-SPACE, 12GA. | 2 |
| 28 | MANMAX Rev-(D) | MAX-TENSION INSTALLATION INSTRUCTIONS | 1 |



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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

- * TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.
- ** ALTERNATIVE ITEMS NOT SHOWN. ITEM(26) 8" WOOD-BLOCKOUTS ITEM(27) 25' GUARD FENCE PANELS

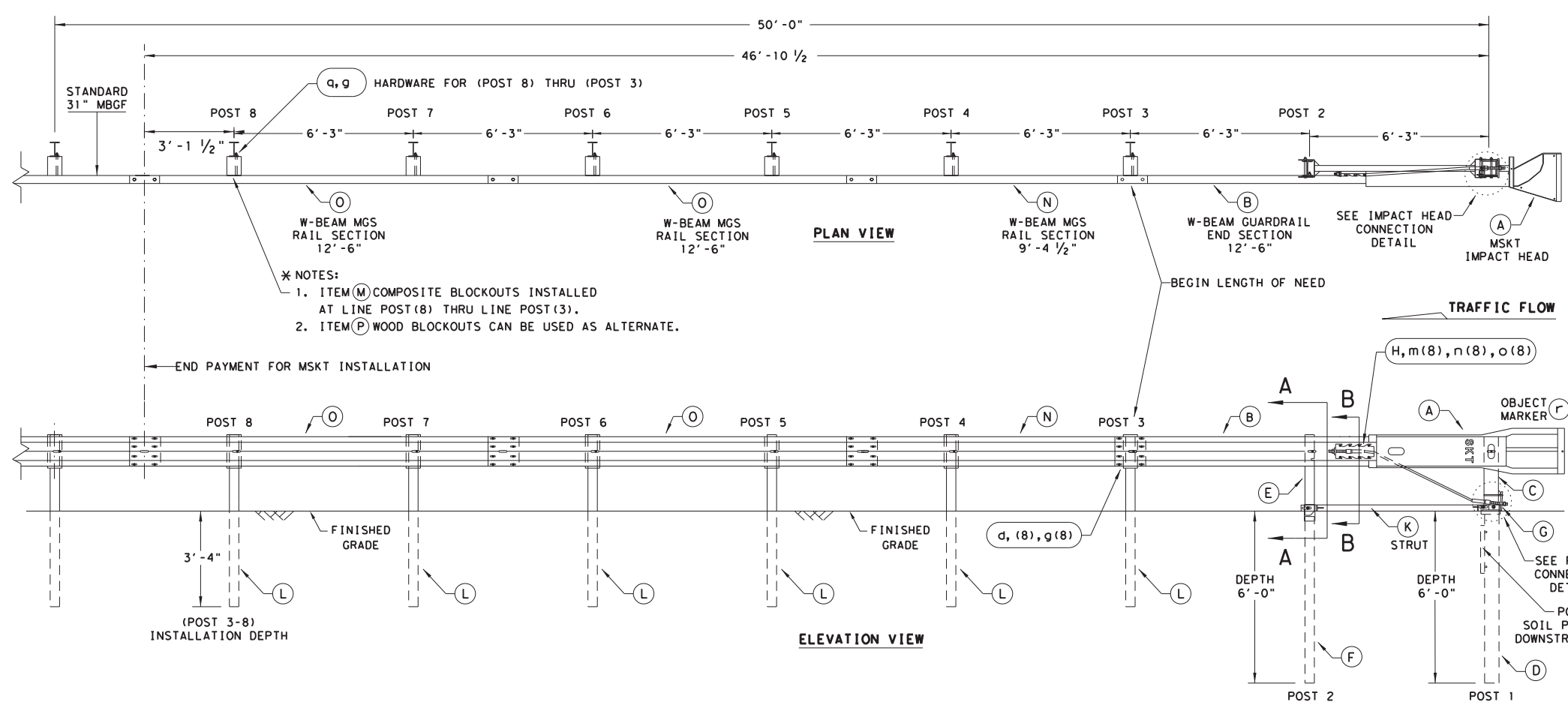
Texas Department of Transportation
Design Division Standard

MAX-TENSION END TERMINAL
MASH - TL-3
SGT (11S) 31-18

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| | DIST | COUNTY | | SHEET NO. |
| | ELP | HUDSPETH | | 28 |

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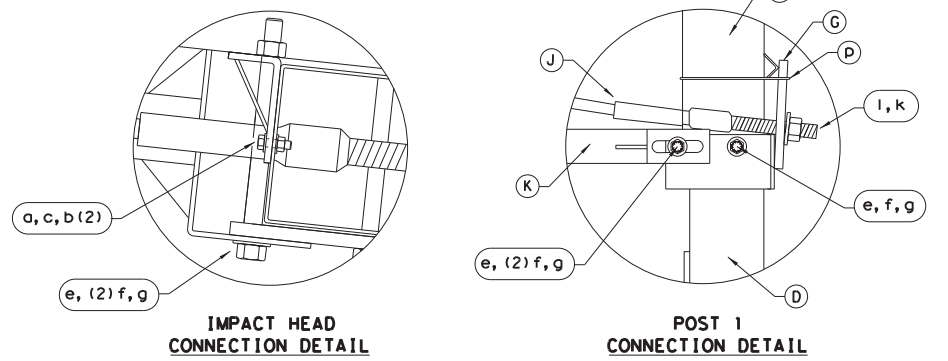
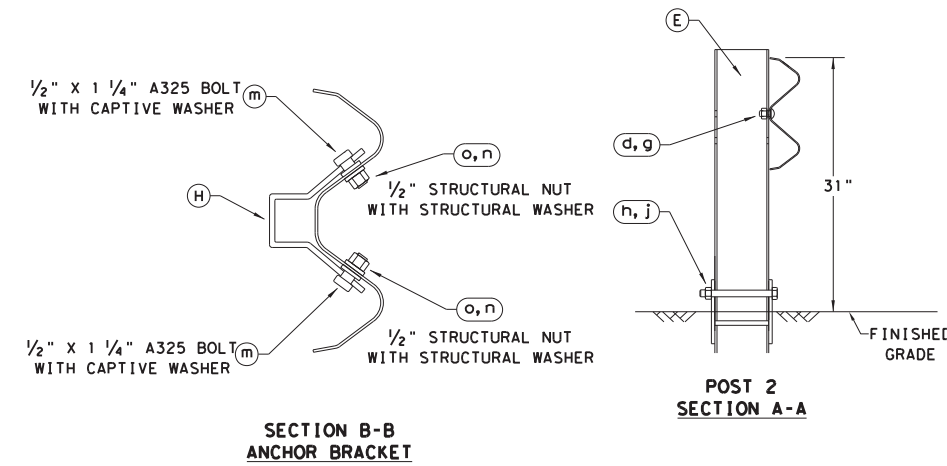
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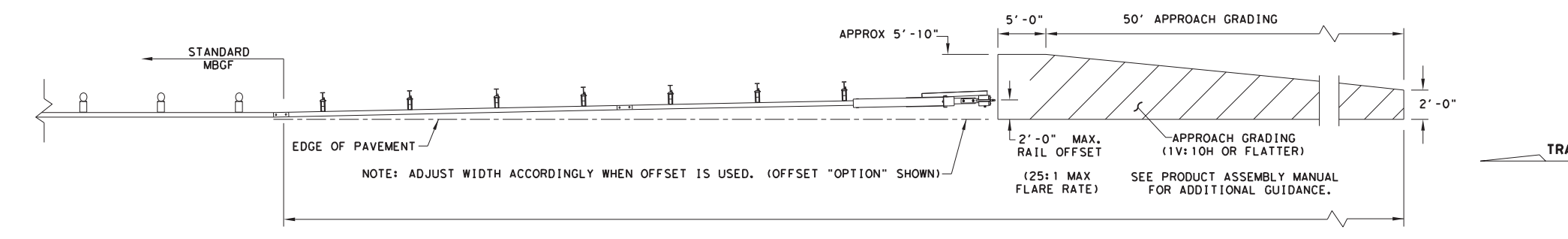
- * NOTES:**
- ITEM (M) COMPOSITE BLOCKOUTS INSTALLED AT LINE POST (8) THRU LINE POST (3).
 - ITEM (P) WOOD BLOCKOUTS CAN BE USED AS ALTERNATE.

- GENERAL NOTES**
- 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
 - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE: MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION-062717).
 - 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.
 - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
 - HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
 - SYSTEM SHOWN USING STEEL WIDE FLANGE POSTS WITH COMPOSITE BLOCKOUTS.
 - 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.
 - IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, & REFER TO THE LATEST ROADWAY MBSGF STANDARD FOR INSTALLATION GUIDANCE.
 - POSTS SHALL NOT BE SET IN CONCRETE.
 - SYSTEM MUST BE ATTACHED TO STANDARD 31" MBSGF.
 - UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
 - A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCRUCHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
 - THE SYSTEM IS SHOWN WITH TWO 12'-6" MBSGF PANELS, ONE 25'-0" MBSGF PANEL IS ALSO ALLOWED IN THEIR PLACE.
 - 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 Go. | 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 | 3/8" x 1" HEX BOLT (GRD 5) | B5160104A |
| b | 4 | 3/8" WASHER | W0516 |
| c | 2 | 3/8" HEX NUT | N0516 |
| d | 25 | 3/8" Dia. x 1 1/4" SPLICE BOLT (POST 2) | B580122 |
| e | 2 | 3/8" Dia. x 9" HEX BOLT (GRD A449) | B580904A |
| f | 3 | 3/8" WASHER | W050 |
| g | 33 | 3/8" 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 1/8" O.D. x 3/8" I.D. STRUCTURAL WASHERS | W012A |
| p | 1 | BEARING PLATE RETAINER TIE | CT-100ST |
| q | 6 | 3/8" x 10" H.G.R. BOLT | B581002 |
| r | 1 | OBJECT MARKER 18" X 18" | E3151 |



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



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

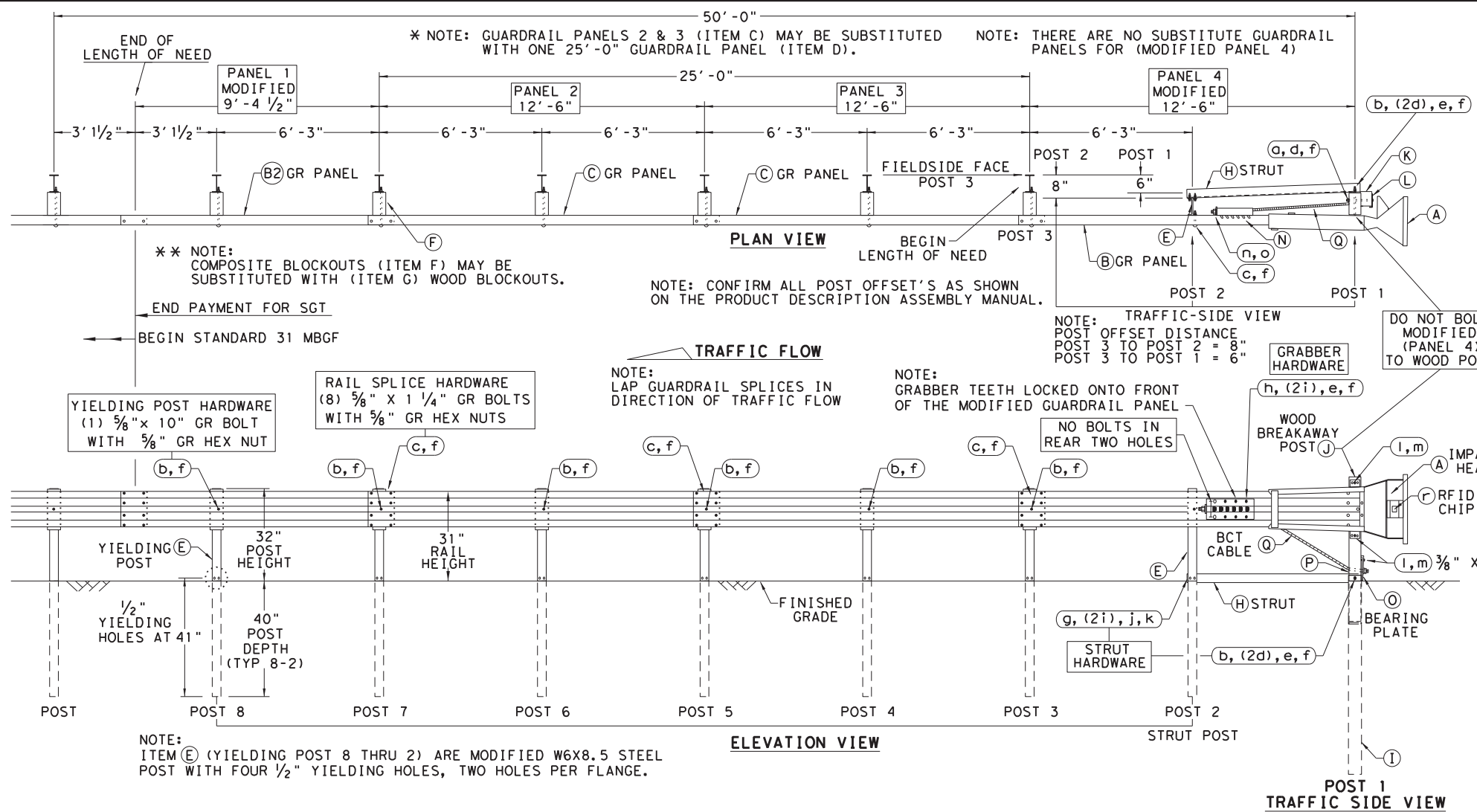
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Design Division Standard

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

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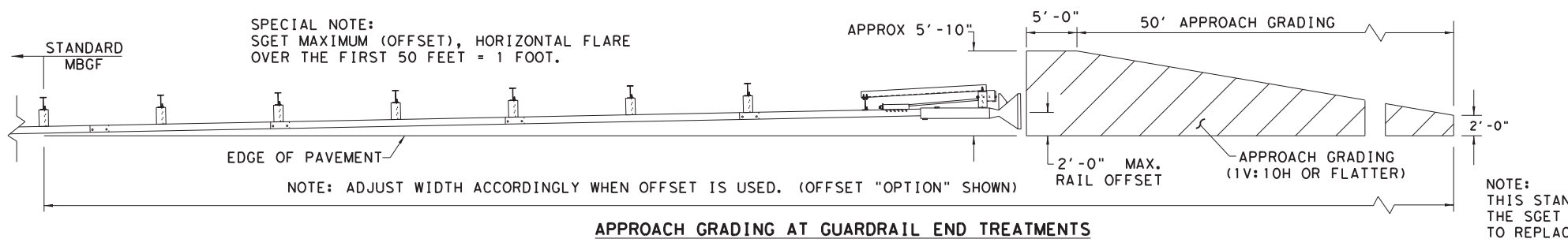
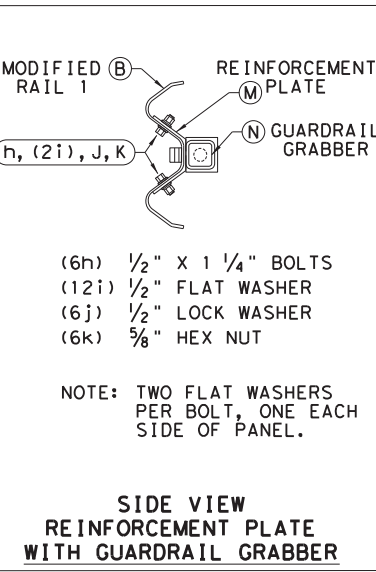
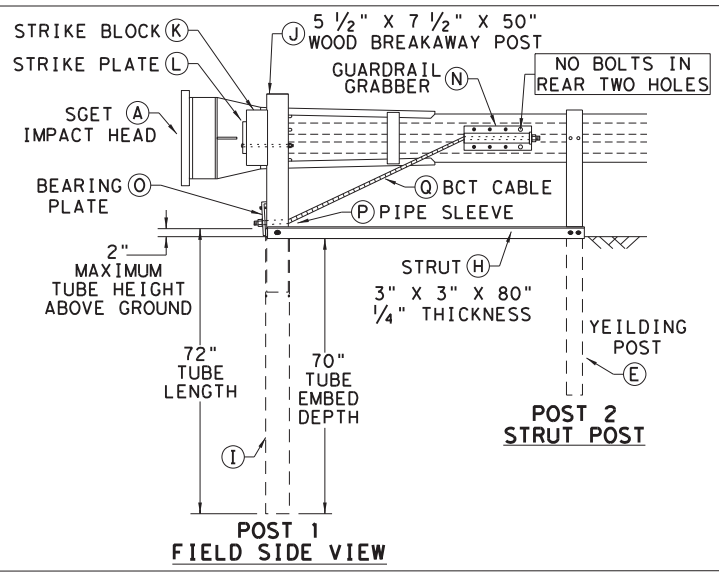
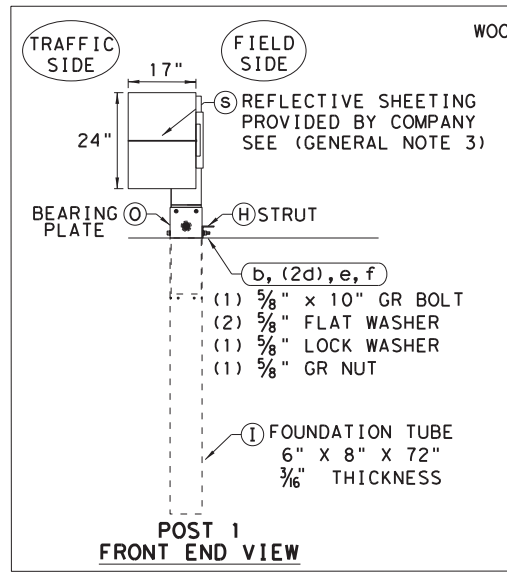
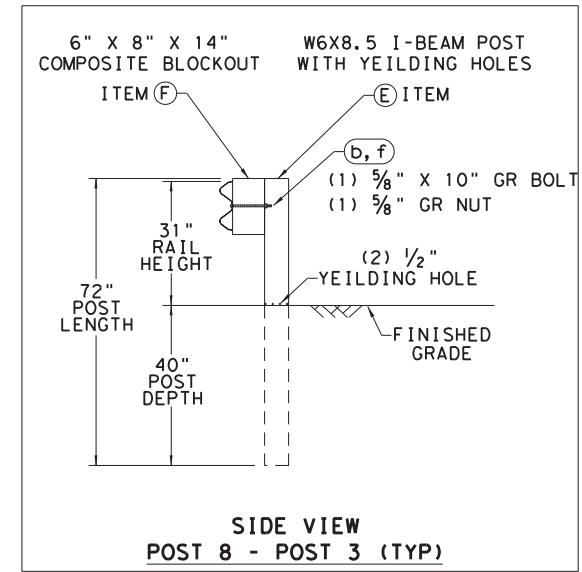
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- ### GENERAL NOTES
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
 - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL.
 - 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.
 - THE NOMINAL HEIGHT OF THE GUARDRAIL BEAM IS 31 INCHES WITH A TOLERANCE OF +/- ONE INCH.
 - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
 - (POST 2 THROUGH POST 8) ARE MODIFIED STEEL-YIELDING POSTS WITH YIELDING HOLES AT GROUND LEVEL. THERE ARE NO SUBSTITUTE POSTS.
 - POSTS SHALL NOT BE SET IN CONCRETE.
 - IF SOLID ROCK IS ENCOUNTERED FOR ANY OF THE POSTS IN THE SYSTEM, CONTACT THE MANUFACTURER FOR SPECIFIC INSTALLATION GUIDANCE.
 - HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
 - 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.
 - 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" | WB08 |
| H | 1 | STRUT 3" X 3" X 80" X 1/4" A36 ANGLE | STR80 |
| I | 1 | FOUNDATION TUBE 6" X 8" X 72" X 3/8" | 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" | GR17 |
| 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 |

| ITEM | QTY | SMALL HARDWARE | ITEM # |
|------|-----|---|----------|
| a | 1 | 5/8" X 12" GUARDRAIL BOLT 307A HDG | 12GRBLT |
| b | 7 | 5/8" X 10" GUARDRAIL BOLT 307A HDG | 10GRBLT |
| c | 33 | 3/8" 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 A563HDG | 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 |



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

| | | | | |
|---------------------|-----------|----------|-----------|---------|
| FILE: sg153120.dgn | DN: TXDOT | CK: KM | DW: VP | CK: VP |
| © TXDOT: APRIL 2020 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0002 | 07 | 057, ETC | IH-10 |
| | DIST | COUNTY | SHEET NO. | |
| | ELP | HUDSPETH | 30 | |

DATE: FILE:

CK:
DW:
CK:
DN:



- ### LEGEND
- EXISTING/PROPOSED DMS
 - EXISTING/PROPOSED ITS POLE
 - EXISTING/PROPOSED CCTV
 - EXISTING/PROPOSED HUB CABINET
 - EXISTING/PROPOSED ELECTRICAL SERVICE
 - EXISTING/PROPOSED POWER SOURCE
 - EXISTING/PROPOSED POWER LINE
 - PROPOSED GROUND BOX (TY A)
 - PROPOSED GROUND BOX (TY 1)
 - PROPOSED GROUND BOX (TY 2)
 - EXISTING GROUND BOX
 - EXISTING CONDUIT
 - PROPOSED CONDUIT TRENCHED
 - PROPOSED CONDUIT BORE
 - PROPOSED METAL BEAM GUARD FENCE
 - EXISTING METAL BEAM GUARD FENCE
 - TRAFFIC FLOW ARROW
 - CONDUIT RUN NUMBER
 - EXISTING CABLE BARRIER
 - EXISTING SIGN (TO REMAIN)

NOTES:
1. REFER TO STANDARD ITS (7)-15 FOR RIPRAP CONC. APRON.

APPROX. LOCATION OF PROPOSED CCTV #1
IH 10 EB ML & RANCH RD 1111 MM 105.17
40' OFFSET FROM EDGE OF TRAVEL LANE

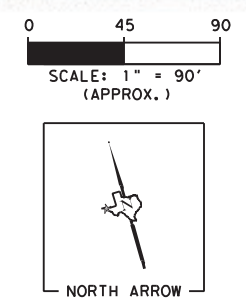
INSTALL:
21' LF - DRILL SHAFT (42 IN)
1.5' CY - RIPRAP (CONC) (4IN)
1 EA - CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)
1 EA - ITS POLE (55 FT) (90 MPH)
1 EA - ITS POLE MNT CAB (TY 2) (CONF 2)
1 EA - INSTALLATION OF CELLULAR MODEM
1 EA - CELLULAR MODEM**
1 EA - CCTV FIELD EQUIP (DIGITAL)**
1 EA - IP ADDRESSABLE POWER STRIP**

| ITS QUANTITIES | | | |
|----------------|---|------|------|
| ITEM | DESCRIPTION | UNIT | QTY |
| 0100 6001 | PREPARING ROW | AC | 0.12 |
| 0110 6003 | EXCAVATION (SPECIAL) | CY | 0.25 |
| 0416 6005 | DRILL SHAFT (42 IN) | LF | 21 |
| 0432 6001 | RIPRAP (CONC) (4 IN) | CY | 1.5 |
| 0618 6023 | CONDT (PVC) (SCH 40) (2") | LF | 145 |
| 0618 6024 | CONDT (PVC) (SCH 40) (2") (BORE) | LF | 380 |
| 0620 6014 | ELEC CONDR (NO. 3) INSULATED | LF | 1635 |
| 0624 6002 | GROUND BOX TY A (122311) W / APRON | EA | 3 |
| 0628 6225 | ELC SRV TY D 120/240 100(NS)GS(N)GC(O) | EA | 1 |
| 6010 6011 | CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY) | EA | 1 |
| 6064 6046 | ITS POLE (55 FT) (90 MPH) | EA | 1 |
| 6064 6084 | ITS POLE MNT CAB (TY 2) (CONF 2) | EA | 1 |
| 6386 6001 | INSTALLATION OF CELLULAR MODEM | EA | 1 |
| | CCTV FIELD EQUIPMENT (DIGITAL)** | EA | 1 |
| | CELLULAR MODEM ** | EA | 1 |
| | IP ADDRESSABLE POWER STRIP ** | EA | 1 |

** ITEMS PROVIDED BY THE STATE

| CONDUIT AND CONDUCTOR RUNS | | | | | | | |
|----------------------------|----------------|--------------------|------|--------------|----------------------------------|------|--------------------|
| RUN NO. | CONDUIT STATUS | ITEM 618 - CONDUIT | | CABLE STATUS | ITEM 620 - ELECTRICAL CONDUCTOR* | | LENGTH OF RUN (FT) |
| | | SCHED 40 PVC (2") | | | NO. 3 | | |
| | | TRENCH | BORE | | GND | PWR | |
| 1 | I | 1 | | I | 1 | 2 | 15 |
| 2 | I | | 1 | I | 1 | 2 | 380 |
| 3 | I | 1 | | I | 1 | 2 | 115 |
| 4 | I | 1 | | I | 1 | 2 | 15 |
| TOTAL | | 145 | 380 | | 545 | 1090 | TOTAL |

STATUS: E=EXISTING, I=INSTALL
* COIL 5 FT OF SLACK IN EACH GB



Cesar R. Nevarez, P.E.

**IH-10
ITS LAYOUT
IH 10 & MM 105.17**

SHEET 1 OF 5

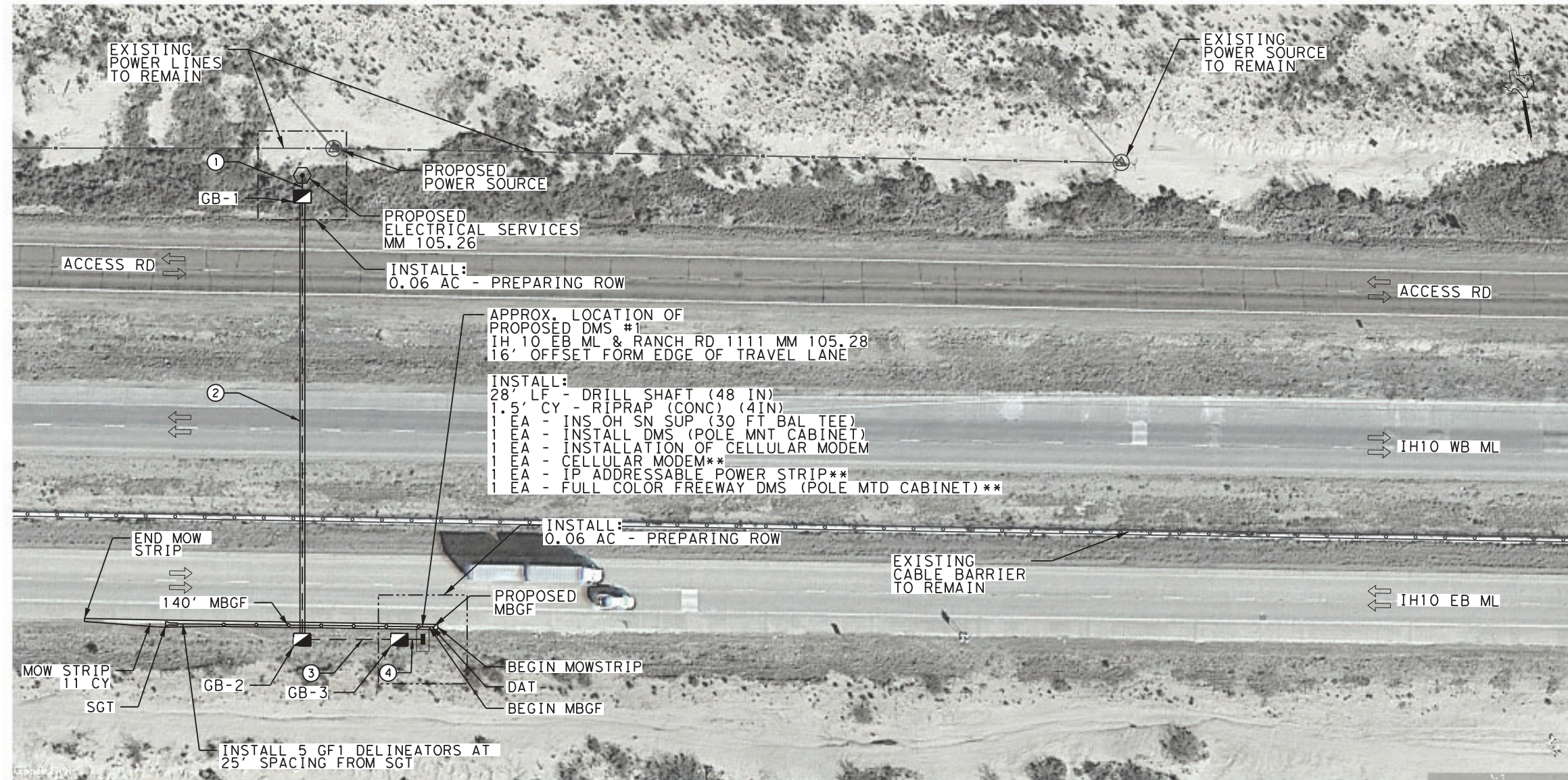
ATKINS
T&E REG. # F-474 ©2023

Texas Department of Transportation

| | | | |
|------|----------|-----------|---------|
| CONT | SECT | JOB | HIGHWAY |
| 0002 | 07 | 057, ETC | IH-10 |
| DIST | COUNTY | SHEET NO. | |
| ELP | HUDSPETH | 31 | |

DATE: 1/4/2024 2:05:02 PM
FILE: ELP*WAG*IH 10*2.1*SHT*01.dgn

DATE: 1/4/2024 2:05:10 PM
 FILE: ELP*WAG*IH 10*2.1*SHT*02.dgn



- ### LEGEND
- EXISTING/PROPOSED DMS
 - EXISTING/PROPOSED ITS POLE
 - EXISTING/PROPOSED CCTV
 - EXISTING/PROPOSED HUB CABINET
 - EXISTING/PROPOSED ELECTRICAL SERVICE
 - EXISTING/PROPOSED POWER SOURCE
 - EXISTING/PROPOSED POWER LINE
 - PROPOSED GROUND BOX (TY A)
 - PROPOSED GROUND BOX (TY 1)
 - PROPOSED GROUND BOX (TY 2)
 - EXISTING GROUND BOX
 - EXISTING CONDUIT
 - PROPOSED CONDUIT TRENCHED
 - PROPOSED CONDUIT BORE
 - PROPOSED METAL BEAM GUARD FENCE
 - EXISTING METAL BEAM GUARD FENCE
 - TRAFFIC FLOW ARROW
 - CONDUIT RUN NUMBER
 - EXISTING CABLE BARRIER
 - EXISTING SIGN (TO REMAIN)

NOTES:

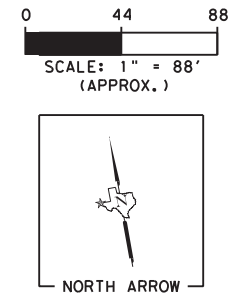
- REFER TO STANDARD ITS (7)-15 FOR RIPRAP CONC. APRON.

| ITS QUANTITIES | | | |
|----------------|---|------|------|
| ITEM | DESCRIPTION | UNIT | QTY |
| 0100 6001 | PREPARING ROW | AC | 0.12 |
| 0110 6003 | EXCAVATION (SPECIAL) | CY | 0.25 |
| 0416 6006 | DRILL SHAFT (48 IN) | LF | 28 |
| 0432 6001 | RIPRAP (CONC) (4 IN) | CY | 1.5 |
| 0432 6045 | RIPRAP (MOW STRIP) (4 IN) | CY | 11 |
| 0540 6002 | MTL W-BEAM GD FEN (STEEL POST) | LF | 140 |
| 0540 6016 | DOWNSTREAM ANCHOR TERMINAL SECTION | EA | 1 |
| 0544 6001 | GUARDRAIL END TREATMENT (INSTALL) | EA | 1 |
| 0618 6023 | CONDT (PVC) (SCH 40) (2") | LF | 95 |
| 0618 6024 | CONDT (PVC) (SCH 40) (2") (BORE) | LF | 300 |
| 0620 6018 | ELEC CONDR (NO.1) INSULATED | LF | 1660 |
| 0624 6002 | GROUND BOX TY A (122311) W / APRON | EA | 3 |
| 0628 6225 | ELC SRV TY D 120/240 100(NS)GS(N)GC(O) | EA | 1 |
| 0650 6028 | INS OH SN SUP (30 FT BAL TEE) | EA | 1 |
| 0658 6062 | INSTL DEL ASSM (D-SW)SZ 1 (BRF)GF2(BI) | EA | 5 |
| 6028 6001 | INSTALL DMS (POLE MTD CABINET) | EA | 1 |
| 6386 6001 | INSTALLATION OF CELLULAR MODEM | EA | 1 |
| | CELLULAR MODEM ** | EA | 1 |
| | FULL COLOR FREEWAY DMS (POLE MTD CABINET)** | EA | 1 |
| | IP ADDRESSABLE POWER STRIP ** | EA | 1 |

** ITEMS PROVIDED BY THE STATE

| CONDUIT AND CONDUCTOR RUNS | | | | | | | |
|----------------------------|----------------|--------------------|------|--------------|----------------------------------|------|--------------------|
| RUN NO. | CONDUIT STATUS | ITEM 618 - CONDUIT | | CABLE STATUS | ITEM 620 - ELECTRICAL CONDUCTOR* | | LENGTH OF RUN (FT) |
| | | SCHED 40 PVC (2") | | | NO. 1 | | |
| | | TRENCH | BORE | | GND | PWR | |
| 1 | I | 1 | | I | 1 | 3 | 15 |
| 2 | I | | 1 | I | 1 | 3 | 300 |
| 3 | I | 1 | | I | 1 | 3 | 65 |
| 4 | I | 1 | | I | 1 | 3 | 15 |
| TOTAL | | 95 | 300 | | 415 | 1245 | TOTAL |

STATUS: E=EXISTING, I=INSTALL
 * COIL 5 FT OF SLACK IN EACH GB



Cesar R. Nevarez, P.E.

**IH-10
 ITS LAYOUT
 IH 10 & MM 105.26**

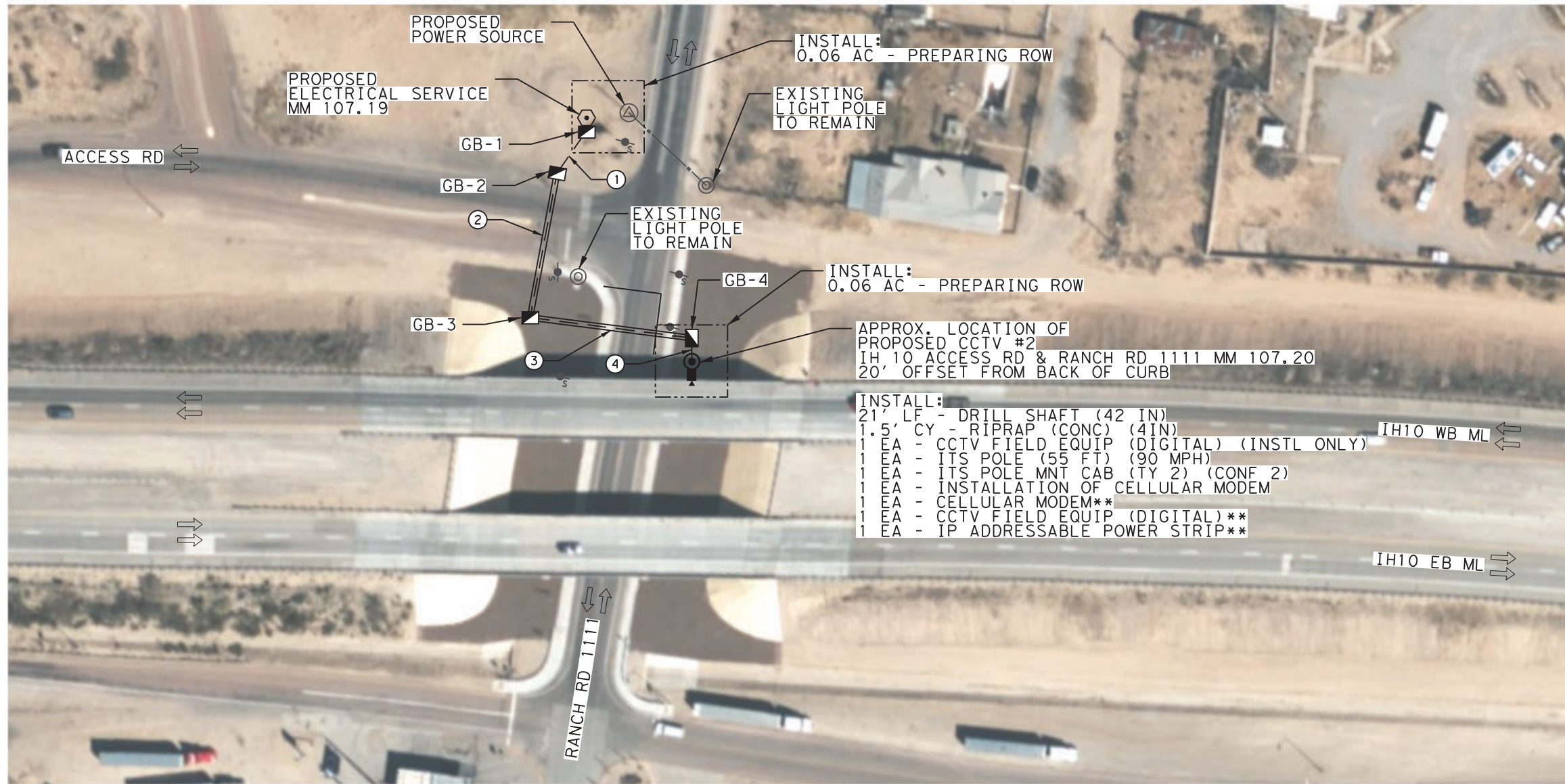
SHEET 2 OF 5

ATKINS
T&E REG. # F-474 ©2023

Texas Department of Transportation

| | | | |
|------|----------|----------|-----------|
| CONT | SECT | JOB | HIGHWAY |
| 0002 | 07 | 057, ETC | IH-10 |
| DIST | COUNTY | | SHEET NO. |
| ELP | HUDSPETH | | 32 |

DATE: 1/4/2024 2:05:18 PM
 FILE: ELP*WAG*IH 10*2.1*SHT*03.dgn



LEGEND

- EXISTING/PROPOSED DMS
- EXISTING/PROPOSED ITS POLE
- EXISTING/PROPOSED CCTV
- EXISTING/PROPOSED HUB CABINET
- EXISTING/PROPOSED ELECTRICAL SERVICE
- EXISTING/PROPOSED POWER SOURCE
- EXISTING/PROPOSED POWER LINE
- PROPOSED GROUND BOX (TY A)
- PROPOSED GROUND BOX (TY 1)
- PROPOSED GROUND BOX (TY 2)
- EXISTING GROUND BOX
- EXISTING CONDUIT
- PROPOSED CONDUIT TRENCHED
- PROPOSED CONDUIT BORE
- PROPOSED METAL BEAM GUARD FENCE
- EXISTING METAL BEAM GUARD FENCE
- TRAFFIC FLOW ARROW
- CONDUIT RUN NUMBER
- EXISTING CABLE BARRIER
- EXISTING SIGN (TO REMAIN)

NOTES:

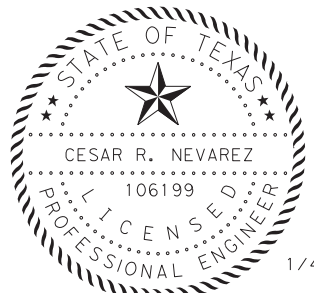
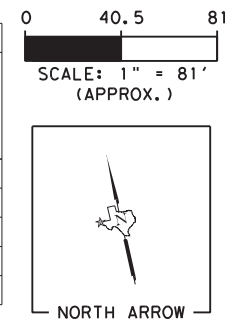
1. REFER TO STANDARD ITS (7)-15 FOR RIPRAP CONC. APRON.

| ITS QUANTITIES | | | |
|----------------|---|------|------|
| ITEM | DESCRIPTION | UNIT | QTY |
| 0100 6001 | PREPARING ROW | AC | 0.12 |
| 0110 6003 | EXCAVATION (SPECIAL) | CY | 0.25 |
| 0416 6005 | DRILL SHAFT (42 IN) | LF | 21 |
| 0432 6001 | RIPRAP (CONC) (4 IN) | CY | 1.5 |
| 0618 6023 | CONDT (PVC) (SCH 40) (2") | LF | 50 |
| 0618 6024 | CONDT (PVC) (SCH 40) (2") (BORE) | LF | 200 |
| 0620 6012 | ELEC CONDR (NO. 4) INSULATED | LF | 810 |
| 0624 6002 | GROUND BOX TY A (122311) W / APRON | EA | 4 |
| 0628 6225 | ELC SRV TY D 120/240 100(NS)GS(N)GC(O) | EA | 1 |
| 6010 6011 | CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY) | EA | 1 |
| 6064 6046 | ITS POLE (55 FT) (90 MPH) | EA | 1 |
| 6064 6084 | ITS POLE MNT CAB (TY 2) (CONF 2) | EA | 1 |
| 6386 6001 | INSTALLATION OF CELLULAR MODEM | EA | 1 |
| | CCTV FIELD EQUIPMENT (DIGITAL)** | EA | 1 |
| | CELLULAR MODEM ** | EA | 1 |
| | IP ADDRESSABLE POWER STRIP ** | EA | 1 |

** ITEMS PROVIDED BY THE STATE

| CONDUIT AND CONDUCTOR RUNS | | | | | | | |
|----------------------------|----------------|--------------------|------|--------------|----------------------------------|-----|--------------------|
| RUN NO. | CONDUIT STATUS | ITEM 618 - CONDUIT | | CABLE STATUS | ITEM 620 - ELECTRICAL CONDUCTOR* | | LENGTH OF RUN (FT) |
| | | SCHD 40 PVC (2") | | | NO. 4 | | |
| | | TRENCH | BORE | | GND | PWR | |
| 1 | I | 1 | | I | 1 | 2 | 35 |
| 2 | I | | 1 | I | 1 | 2 | 95 |
| 3 | I | | 1 | I | 1 | 2 | 105 |
| 4 | I | 1 | | I | 1 | 2 | 15 |
| TOTAL | | 50 | 200 | | 270 | 540 | TOTAL |

STATUS: E=EXISTING, I=INSTALL
 * COIL 5 FT OF SLACK IN EACH GB



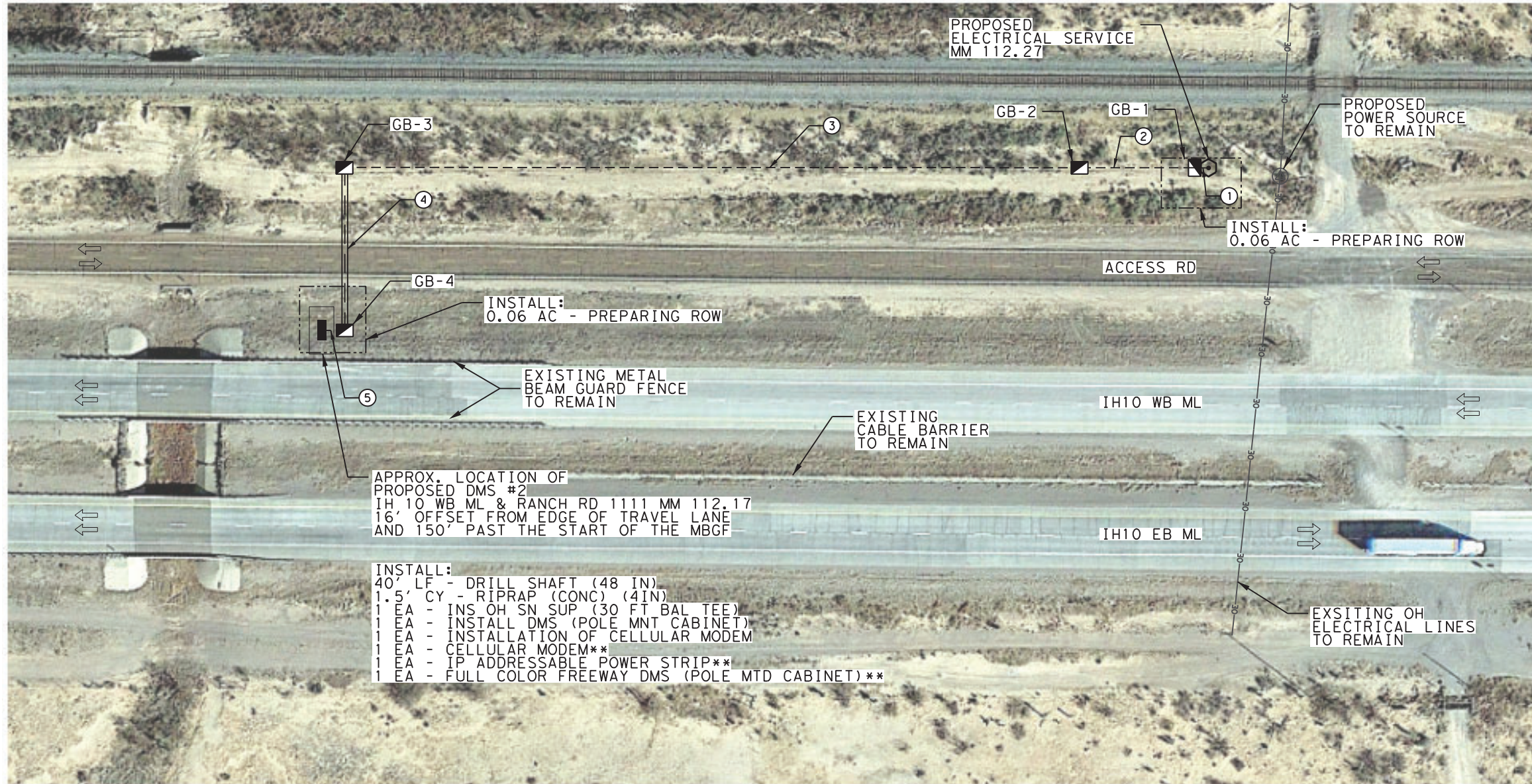
Cesar R. Nevarez, P.E.

**IH-10
 ITS LAYOUT
 IH 10 & MM 107.19**

SHEET 3 OF 5

| | | | |
|---|----------|----------|-----------|
| ATKINS <small>TRANSPORTATION CONSULTANTS INC.</small> | | | |
| <small>TEXAS DEPARTMENT OF TRANSPORTATION</small> | | | |
| CONT | SECT | JOB | HIGHWAY |
| 0002 | 07 | 057, ETC | IH-10 |
| DIST | COUNTY | | SHEET NO. |
| ELP | HUDSPETH | | 33 |

DATE: 1/4/2024 1:40:26 PM
 FILE: ELP*WAG*IH 10*2.1*SHT*04g.dgn



INSTALL:
 0.06 AC - PREPARING ROW
 EXISTING METAL BEAM GUARD FENCE TO REMAIN
 EXISTING CABLE BARRIER TO REMAIN
 APPROX. LOCATION OF PROPOSED DMS #2
 IH 10 WB ML & RANCH RD 1111 MM 112.17
 16' OFFSET FROM EDGE OF TRAVEL LANE
 AND 150' PAST THE START OF THE MGBF
 INSTALL:
 40' LF - DRILL SHAFT (48 IN)
 1.5' CY - RIPRAP (CONC) (4IN)
 1 EA - INS OH SN SUP (30 FT BAL TEE)
 1 EA - INSTALL DMS (POLE MNT CABINET)
 1 EA - INSTALLATION OF CELLULAR MODEM
 1 EA - CELLULAR MODEM**
 1 EA - IP ADDRESSABLE POWER STRIP**
 1 EA - FULL COLOR FREEWAY DMS (POLE MTD CABINET)**

LEGEND

- EXISTING/PROPOSED DMS
- EXISTING/PROPOSED ITS POLE
- EXISTING/PROPOSED CCTV
- EXISTING/PROPOSED HUB CABINET
- EXISTING/PROPOSED ELECTRICAL SERVICE
- EXISTING/PROPOSED POWER SOURCE
- EXISTING/PROPOSED POWER LINE
- PROPOSED GROUND BOX (TY A)
- PROPOSED GROUND BOX (TY 1)
- PROPOSED GROUND BOX (TY 2)
- EXISTING GROUND BOX
- EXISTING CONDUIT
- PROPOSED CONDUIT TRENCHED
- PROPOSED CONDUIT BORE
- PROPOSED METAL BEAM GUARD FENCE
- EXISTING METAL BEAM GUARD FENCE
- TRAFFIC FLOW ARROW
- CONDUIT RUN NUMBER
- EXISTING CABLE BARRIER

0 21 1/2 43 86 172
 APPROX. SCALE: 1" = 86'
 NOTES:
 1. REFER TO STANDARD ITS (7)-15 FOR RIPRAP CONC. APRON.

| ITS QUANTITIES | | | |
|----------------|---|------|------|
| ITEM | DESCRIPTION | UNIT | QTY |
| 0100 6001 | PREPARING ROW | AC | 0.12 |
| 0110 6003 | EXCAVATION (SPECIAL) | CY | 0.25 |
| 0416 6006 | DRILL SHAFT (48 IN) | LF | 32 |
| 0432 6001 | RIPRAP (CONC) (4 IN) | CY | 1.5 |
| 0618 6023 | CONDT (PVC) (SCH 40) (2") | LF | 610 |
| 0618 6024 | CONDT (PVC) (SCH 40) (2") (BORE) | LF | 110 |
| 0620 6024 | ELEC CONDR (NO. 3/0) INSULATED | LF | 2980 |
| 0624 6002 | GROUND BOX TY A (122311) W / APRON | EA | 4 |
| 0628 6225 | ELC SRV TY D 120/240 100(NS)GS(N)GC(O) | EA | 1 |
| 0650 6028 | INS OH SN SUP (30 FT BAL TEE) | EA | 1 |
| 6028 6001 | INSTALL DMS (POLE MTD CABINET) | EA | 1 |
| 6386 6001 | INSTALLATION OF CELLULAR MODEM | EA | 1 |
| | CELLULAR MODEM ** | EA | 1 |
| | FULL COLOR FREEWAY DMS (POLE MTD CABINET)** | EA | 1 |
| | IP ADDRESSABLE POWER STRIP ** | EA | 1 |

** ITEMS PROVIDED BY THE STATE

| CONDUIT AND CONDUCTOR RUNS | | | | | | | |
|----------------------------|----------------|--------------------|------|--------------|----------------------------------|------|--------------------|
| RUN NO. | CONDUIT STATUS | ITEM 618 - CONDUIT | | CABLE STATUS | ITEM 620 - ELECTRICAL CONDUCTOR* | | LENGTH OF RUN (FT) |
| | | SCHD 40 PVC (2") | | | NO. 3/0 | | |
| | | TRENCH | BORE | | GND | PWR | |
| 1 | I | 1 | | I | 1 | 3 | 10 |
| 2 | I | 1 | | I | 1 | 3 | 80 |
| 3 | I | 1 | | I | 1 | 3 | 500 |
| 4 | I | | 1 | I | 1 | 3 | 110 |
| 5 | I | 1 | | I | 1 | 3 | 20 |
| | | SLACK | | | 25 | 75 | SLACK |
| | | TOTAL | 610 | 110 | 745 | 2235 | TOTAL |

STATUS: E=EXISTING, I=INSTALL
 * COIL 5 FT OF SLACK IN EACH GB



Cesar R. Nevarez, P.E.

IH-10
ITS LAYOUT
IH 10 & MM 112.17

SHEET 4 OF 5

| | | | |
|---|----------|----------|-----------|
| ATKINS <small>TFPE REG. # F-474</small> | | | |
| <small>Texas Department of Transportation</small> | | | |
| CONT | SECT | JOB | HIGHWAY |
| 0002 | 07 | 057, ETC | IH-10 |
| DIST | COUNTY | | SHEET NO. |
| ELP | HUDSPETH | | 34 |

CK:
DW:
CK:
DN:



APPROX. LOCATION OF PROPOSED CCTV #3
IH 10 WB ML & RANCH RD 1111 MM 112.40
43' OFFSET FROM EDGE OF TRAVEL LANE

INSTALL:
21' LF - DRILL SHAFT (42 IN)
1.5' CY - RIPRAP (CONC) (4IN)
1 EA - CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)
1 EA - ITS POLE (55 FT) (90 MPH)
1 EA - ITS POLE MNT CAB (TY 2) (CONF 2)
1 EA - INSTALLATION OF CELLULAR MODEM
1 EA - CELLULAR MODEM**
1 EA - CCTV FIELD EQUIP (DIGITAL)**
1 EA - IP ADDRESSABLE POWER STRIP
(POWER SOURCE TO BE INSTALLED BY OTHERS)

END PROJECT (IH 10)
CSJ: 0002-07-057, ETC.
LAT = 31.150206
LONG = -105.273090
MILE MRKR = 112.48

LEGEND

- EXISTING/PROPOSED DMS
- EXISTING/PROPOSED ITS POLE
- EXISTING/PROPOSED CCTV
- EXISTING/PROPOSED HUB CABINET
- EXISTING/PROPOSED ELECTRICAL SERVICE
- EXISTING/PROPOSED POWER SOURCE
- EXISTING/PROPOSED POWER LINE
- PROPOSED GROUND BOX (TY A)
- PROPOSED GROUND BOX (TY 1)
- PROPOSED GROUND BOX (TY 2)
- EXISTING GROUND BOX
- EXISTING CONDUIT
- PROPOSED CONDUIT TRENCHED
- PROPOSED CONDUIT BORE
- PROPOSED METAL BEAM GUARD FENCE
- EXISTING METAL BEAM GUARD FENCE
- TRAFFIC FLOW ARROW
- CONDUIT RUN NUMBER
- EXISTING CABLE BARRIER

0 23 1/2 47 94 188

SCALE: 1" = 94'

NOTES:
1. REFER TO STANDARD ITS (7)-15 FOR RIPRAP CONC. APRON.

| ITS QUANTITIES | | | |
|----------------|---|------|------|
| ITEM | DESCRIPTION | UNIT | QTY |
| 0100 6001 | PREPARING ROW | AC | 0.12 |
| 0110 6003 | EXCAVATION (SPECIAL) | CY | 0.25 |
| 0416 6005 | DRILL SHAFT (42 IN) | LF | 21 |
| 0432 6001 | RIPRAP (CONC) (4 IN) | CY | 1.5 |
| 0618 6023 | CONDT (PVC) (SCH 40) (2") | LF | 505 |
| 0618 6024 | CONDT (PVC) (SCH 40) (2") (BORE) | LF | 100 |
| 0620 6012 | ELEC CONDR (NO. 4) INSULATED | LF | 1875 |
| 0624 6002 | GROUND BOX TY A (122311) W / APRON | EA | 3 |
| 0628 6225 | ELC SRV TY D 120/240 100(NS)GS(N)GC(O) | EA | 1 |
| 6010 6011 | CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY) | EA | 1 |
| 6064 6046 | ITS POLE (55 FT) (90 MPH) | EA | 1 |
| 6064 6084 | ITS POLE MNT CAB (TY 2) (CONF 2) | EA | 1 |
| 6386 6001 | INSTALLATION OF CELLULAR MODEM | EA | 1 |
| | CCTV FIELD EQUIPMENT (DIGITAL)** | EA | 1 |
| | CELLULAR MODEM ** | EA | 1 |
| | IP ADDRESSABLE POWER STRIP ** | EA | 1 |

** ITEMS PROVIDED BY THE STATE

| CONDUIT AND CONDUCTOR RUNS | | | | | | | |
|----------------------------|----------------|--------------------|------|--------------|----------------------------------|------|--------------------|
| RUN NO. | CONDUIT STATUS | ITEM 618 - CONDUIT | | CABLE STATUS | ITEM 620 - ELECTRICAL CONDUCTOR* | | LENGTH OF RUN (FT) |
| | | SCHED 40 PVC (2") | | | NO. 4 | | |
| | | TRENCH | BORE | | GND | PWR | |
| 1 | I | 1 | | I | 1 | 2 | 10 |
| 2 | I | 1 | | I | 1 | 2 | 480 |
| 3 | I | | 1 | I | 1 | 2 | 100 |
| 4 | I | 1 | | I | 1 | 2 | 15 |
| TOTAL | | 505 | 100 | | 625 | 1250 | TOTAL |

STATUS: E=EXISTING, I=INSTALL
* COIL 5 FT OF SLACK IN EACH GB



Cesar R. Nevarez, P.E.

IH-10
ITS LAYOUT
IH 10 & MM 112.40

SHEET 5 OF 5

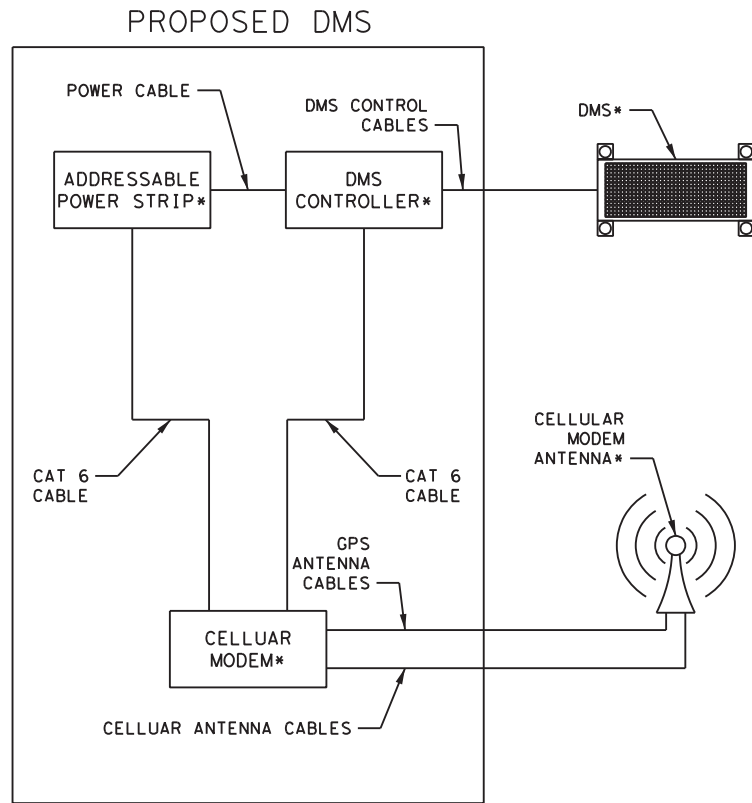
ATKINS
TDP REG. # F-474 ©2023

Texas Department of Transportation

| | | | |
|------|----------|-----------|---------|
| CONT | SECT | JOB | HIGHWAY |
| 0002 | 07 | 057, ETC | IH-10 |
| DIST | COUNTY | SHEET NO. | |
| ELP | HUDSPETH | 35 | |

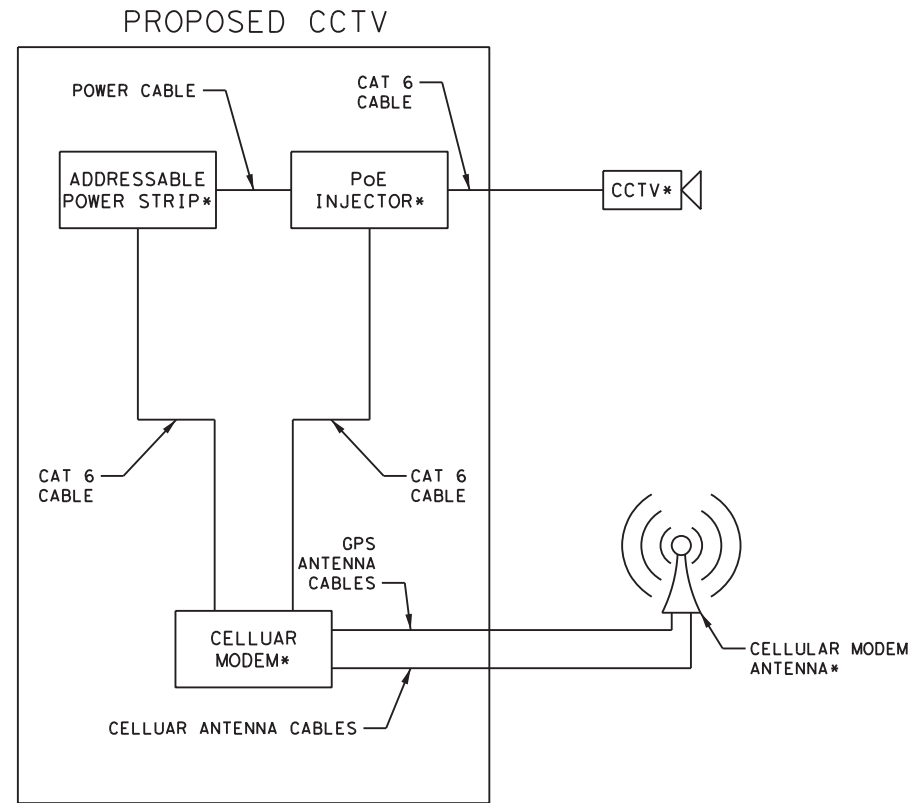
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CK:
DM:
CK:
DN:



DMS#1 CABINET
 IH-10 EB ML & RANCH RD 1111 MM 105.28
 16' OFFSET FROM EDGE OF TRAVEL LANE
 ITS LAYOUT SHEET 2 OF 5

DMS#2 CABINET
 IH-10 WB ML & RANCH RD 1111 MM 112.17
 16' OFFSET FROM EDGE OF TRAVEL LANE
 ITS LAYOUT SHEET 4 OF 5



CCTV#1 CABINET
 IH-10 EB ML & RANCH RD 1111 MM 105.17
 40' OFFSET FROM EDGE OF TRAVEL LANE
 ITS LAYOUT SHEET 1 OF 5

CCTV#2 CABINET
 IH-10 ACCESS ROAD & RANCH RD 1111 MM 107.20
 20' OFFSET FROM BACK OF CURB
 ITS LAYOUT SHEET 3 OF 5

CCTV#3 CABINET
 IH-10 WB ML & RANCH RD 1111 MM 112.40
 43' OFFSET FROM EDGE OF TRAVEL LANE
 ITS LAYOUT SHEET 5 OF 5



Cesar R. Nevarez, P.E.

**IH-10
 COMMUNICATION
 SCHEMATIC**

NOTES:

1. THIS SHEET IS A CONCEPTUAL DESIGN OF THE TRANSPORTATION MANAGEMENT COMMUNICATIONS SYSTEM. ALL EQUIPMENT AND/OR CONNECTIONS REQUIRED MAY NOT BE SHOWN. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT THE SYSTEM IS PROVIDED COMPLETE AND MADE FULLY FUNCTIONAL.

* DENOTES ITEMS PROVIDED BY DEPARTMENT.

SHEET 1 OF 1

| | | | |
|--|----------|----------|-----------|
| ATKINS <small>TRFPE REG. # F-474</small> | | | |
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| <small>Texas Department of Transportation</small> | | | |
| CONT | SECT | JOB | HIGHWAY |
| 0002 | 07 | 057, ETC | IH-10 |
| DIST | COUNTY | | SHEET NO. |
| ELP | HUDSPETH | | 36 |

DATE: 1/4/2024 1:40:46 PM
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DATE: 1/4/2024 1:40:54 PM
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CK:
 DW:
 CK:
 DN:

| ELECTRICAL SERVICES DATA | | | | | | | | | | | | | | |
|---|-----------|-----------|-------------|--|----------------------|----------------------------|--------------------|--------------------------|---------------------------------|---|-------------|-----------------------------|---------------------|----------|
| Elec. Service Name | Sheet No. | LATITUDE | LONGITUDE | Electrical Service Description | Service Conduit Size | Service Conductor No./Size | Safety Switch Amps | Main Ckt. Bkr. Pole/ Amp | Panel bd/ Loadcenter Amp Rating | Branch Circuit ID | Circuit No. | Branch Ckt. Bkr. Pole/ Amps | Branch Circuit Amps | KVA Load |
| IH-10 EB ML & RANCH RD 1111 MM 105.19 | 1 OF 5 | 31.182694 | -105.389000 | ELC SRV TY D 120/240 100(NS)GS(N)GC(O) | 1 1/4" | 3/#2 | N/A | 2P/100 | 100 | PROPOSED CCTV #1 CABINET IH-10 EB ML & RANCH RD 1111 MM 105.19 | A | 1P/20 | 15 | 1.8 |
| IH-10 EB ML & RANCH RD 1111 MM 105.26 | 2 OF 5 | 31.182417 | -105.387806 | ELC SRV TY D 120/240 100(NS)GS(N)GC(O) | 1 1/4" | 3/#2 | N/A | 2P/100 | 100 | PROPOSED DMS#1 CABINET IH-10 EB ML & RANCH RD 1111 MM 105.26 | A | 2P/70 | 50 | 12.0 |
| IH-10 ACCESS RD & RANCH RD 1111 MM 107.19 | 3 OF 5 | 31.174006 | -105.357967 | ELC SRV TY D 120/240 100(NS)GS(N)GC(O) | 1 1/4" | 3/#2 | N/A | 2P/100 | 100 | PROPOSED CCTV #2 CABINET IH-10 ACCESS RD & RANCH RD 1111 MM 107.19 | A | 1P/20 | 15 | 1.8 |
| IH-10 WB ML & RANCH RD 1111 MM 112.27 | 4 OF 5 | 31.151550 | -105.275400 | ELC SRV TY D 120/240 100(NS)GS(N)GC(O) | 1 1/4" | 3/#2 | N/A | 2P/100 | 100 | PROPOSED DMS#2 CABINET IH-10 WB ML & RANCH RD 1111 MM 112.27 | A | 2P/70 | 50 | 12.0 |
| IH-10 WB ML & RANCH RD 1111 MM 112.34 | 5 OF 5 | 31.151400 | -105.274869 | ELC SRV TY D 120/240 100(NS)GS(N)GC(O) | 1 1/4" | 3/#2 | N/A | 2P/100 | 100 | PROPOSED CCTV #3 CABINET IH-10 WB ML & ANCH RD 1111 MM 112.34 | A | 1P/20 | 15 | 1.8 |



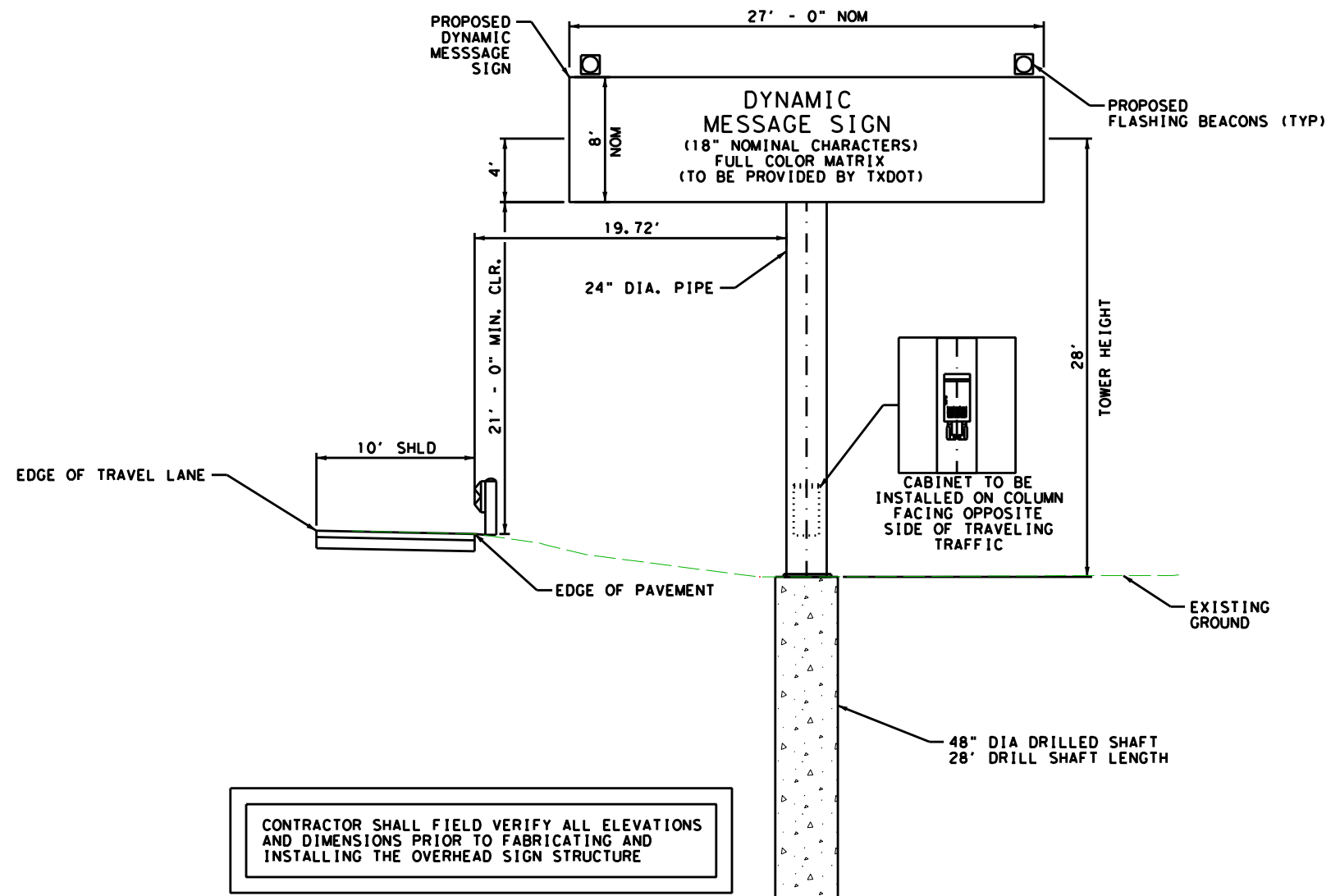
Cesar R. Nevarez, P.E.

IH-10
ELECTRICAL SERVICE DATA

SHEET 1 OF 1

| | | | |
|---|----------|----------|-----------|
| ATKINS <small>TYPE REG. # F-474</small> | | | |
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| Texas Department of Transportation | | | |
| CONT | SECT | JOB | HIGHWAY |
| 0002 | 07 | 057, ETC | IH-10 |
| DIST | COUNTY | | SHEET NO. |
| ELP | HUDSPETH | | 37 |

DATE: 1/4/2024 1:41:31 PM
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CONTRACTOR SHALL FIELD VERIFY ALL ELEVATIONS AND DIMENSIONS PRIOR TO FABRICATING AND INSTALLING THE OVERHEAD SIGN STRUCTURE

NOTES:

1. REFER TO COSS-SE, HCOSS-Z1-21, COSSD, COSSF, AND COSS-FD FOR ADDITIONAL SUPPORT DETAILS.
2. REFER TO ITS(7)-15 FOR RIPRAP APRON/STEP DETAILS.
3. REFER TO ITS LAYOUT FOR OFFSET DIMENSIONS. OFFSET FROM MBGF SHALL NOT BE LESS THAN 5 FEET.
4. THE ACTUAL TRUSS LENGTH SHALL BE 1 FOOT (6 INCHES EACH SIDE) LESS THAN THE ACTUAL DMS LENGTH.
5. CONTROL SHEET INFORMATION CAN BE PROVIDED BY THE ENGINEER AS REQUESTED BY THE CONTRACTOR.

PROPOSED DMS STRUCTURE

DMS #1 IH 10 EB ML & RANCH RD 1111 RM 105.28
 ITS LAYOUT SHEET 2 OF 5

DESIGN DATA

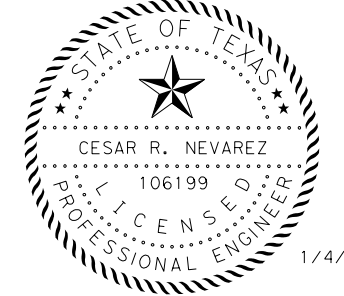
| | |
|---------------------|-------------|
| DESIGN TOWER HEIGHT | 28.00 FT |
| DESIGN SPAN LENGTH | 27.00 FT |
| DESIGN DMS AREA | 216 SF |
| DESIGN LOADS | |
| SHEAR | 18.34 K |
| TORSION | 250.41 K-FT |
| MOMENT | 504.07 K-FT |

STRUCTURE DATA

| | |
|----------------|-------------|
| STRUCTURE CODE | HCOSS-Z1-21 |
| TRUSS SIZE | 4.5' x 4.5' |
| TOWER SIZE | 24" DIA |

SUMMARY OF DRILLED SHAFT

| | |
|---|------|
| 28" OF 48" DIA DRILLED SHAFT PENETROMETER VALUE (N) | N=12 |
|---|------|



Cesar R. Nevarez, P.E.

IH-10
 DMS
 ELEVATION

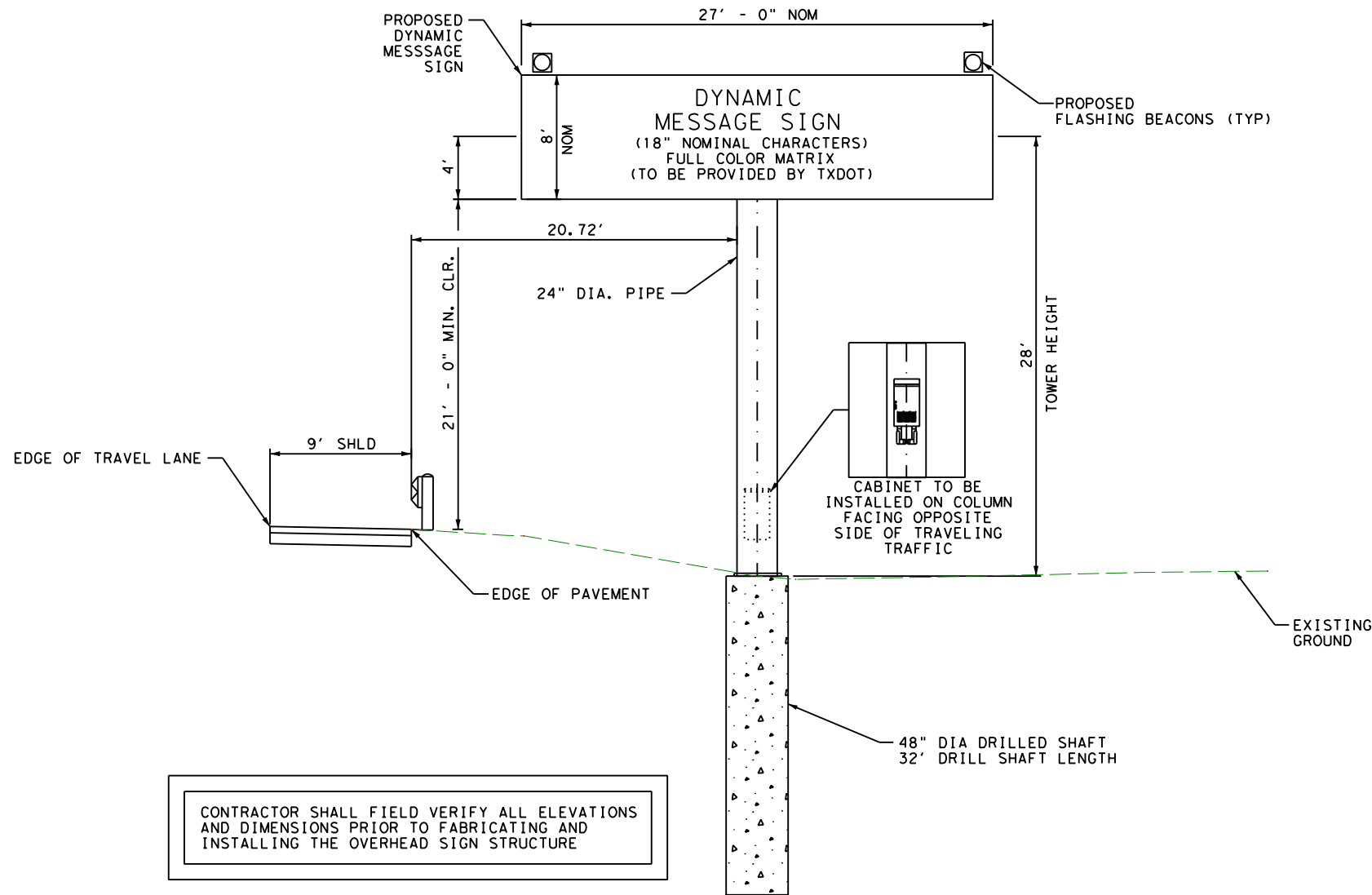
SHEET 1 OF 2

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TEXAS REG. # F-474 ©2023

Texas Department of Transportation

| | | | |
|------|----------|-----------|---------|
| CONT | SECT | JOB | HIGHWAY |
| 0002 | 07 | 057, ETC | IH-10 |
| DIST | COUNTY | SHEET NO. | |
| ELP | HUDSPETH | 38 | |

CK:
DW:
CK:
DN:



CONTRACTOR SHALL FIELD VERIFY ALL ELEVATIONS AND DIMENSIONS PRIOR TO FABRICATING AND INSTALLING THE OVERHEAD SIGN STRUCTURE

PROPOSED DMS STRUCTURE

DMS #2 IH 10 WB ML & RANCH RD 1111 RM 112.17
ITS LAYOUT SHEET 4 OF 5

NOTES:

1. NO BORE LOG DATA WAS AVAILABLE FOR THIS LOCATION. CONTRACTOR TO REQUEST BORE LOG DATA FROM THE DISTRICT BEFORE STARTING CONSTRUCTION.
2. REFER TO COSS-SE, HCOSS-Z1-21, COSSD, COSSF, AND COSS-FD FOR ADDITIONAL SUPPORT DETAILS.
3. REFER TO ITS(7)-15 FOR RIPRAP APRON/STEP DETAILS.
4. REFER TO ITS LAYOUT FOR OFFSET DIMENSIONS. OFFSET FOR MBGF SHALL NOT BE LESS THAN 5 FEET.
5. THE ACTUAL TRUSS LENGTH SHALL BE 1 FOOT (6 INCHES EACH SIDE) LESS THAN THE ACTUAL DMS LENGTH.
6. CONTROL SHEET INFORMATION CAN BE PROVIDED BY THE ENGINEER AS REQUESTED BY THE CONTRACTOR.



Cesar R. Nevarez, P.E.

IH-10

**DMS
ELEVATION**

SHEET 2 OF 2

ATKINS



| | | | |
|------|----------|-----------|---------|
| CONT | SECT | JOB | HIGHWAY |
| 0002 | 07 | 057, ETC | IH-10 |
| DIST | COUNTY | SHEET NO. | |
| ELP | HUDSPETH | 39 | |

DESIGN DATA

| | |
|---------------------|-------------|
| DESIGN TOWER HEIGHT | 28.00 FT |
| DESIGN SPAN LENGTH | 27.00 FT |
| DESIGN DMS AREA | 216 SF |
| DESIGN LOADS | |
| SHEAR | 18.34 K |
| TORSION | 250.41 K-FT |
| MOMENT | 504.07 K-FT |

STRUCTURE DATA

| | |
|----------------|-------------|
| STRUCTURE CODE | HCOSS-Z1-21 |
| TRUSS SIZE | 4.5' X 4.5' |
| TOWER SIZE | 24" DIA |

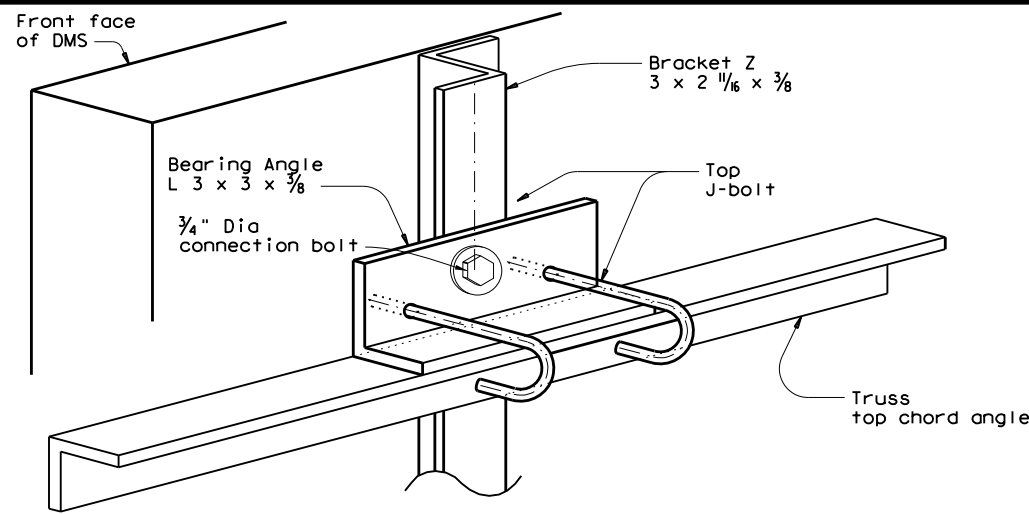
SUMMARY OF DRILLED SHAFT

| | |
|--|------|
| 32' OF 48" DIA DRILLED SHAFT PENETROMETER VALUE (N) | N=10 |
|--|------|

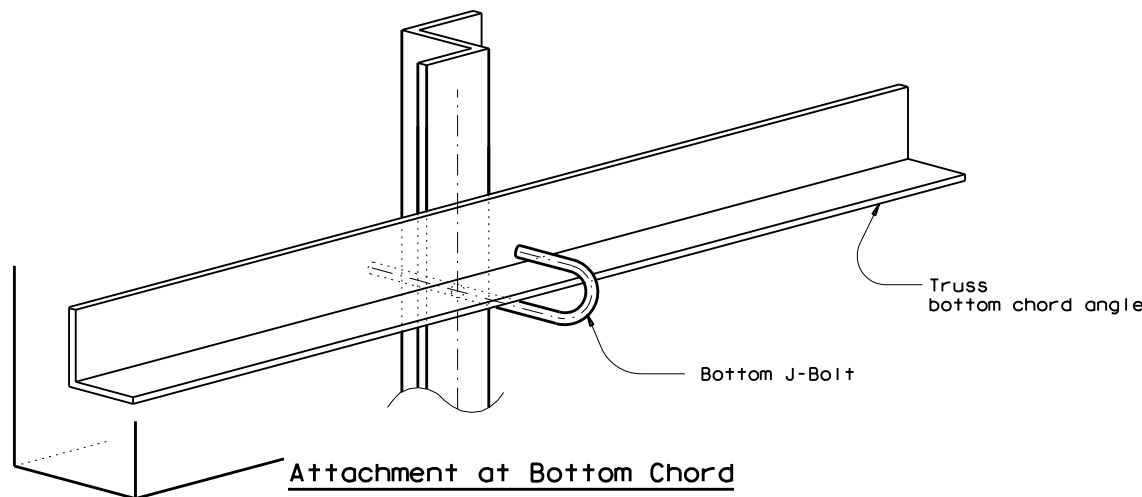
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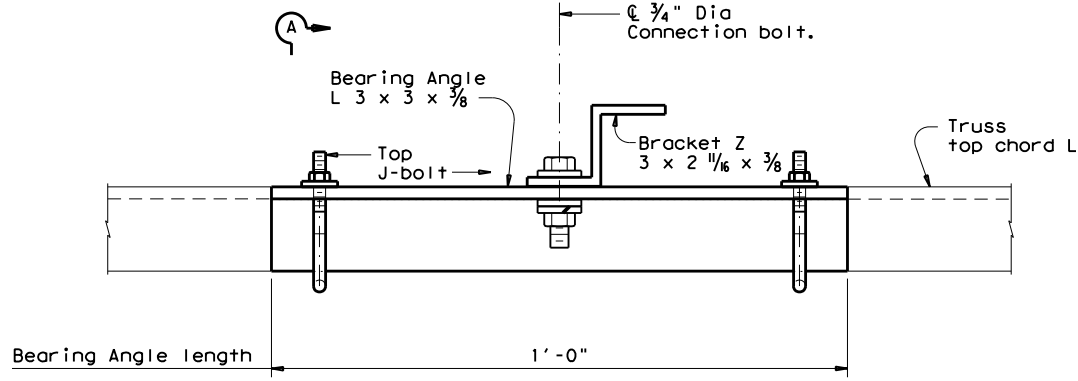
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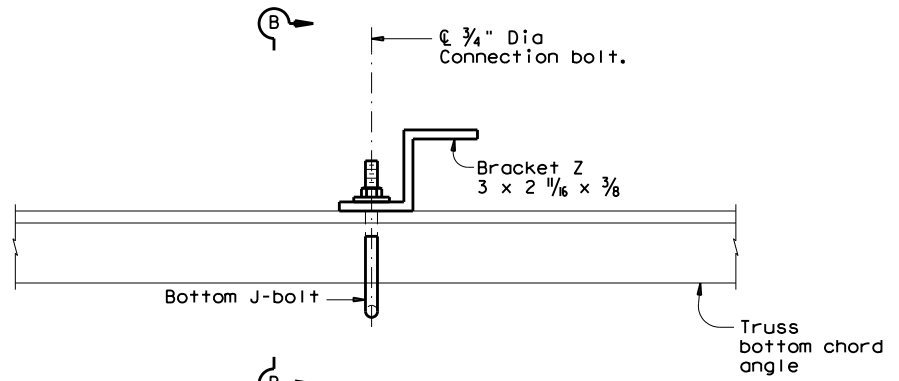
Attachment at Top Chord
(Showing Chord Angle 3")



Attachment at Bottom Chord
ISOMETRIC VIEW



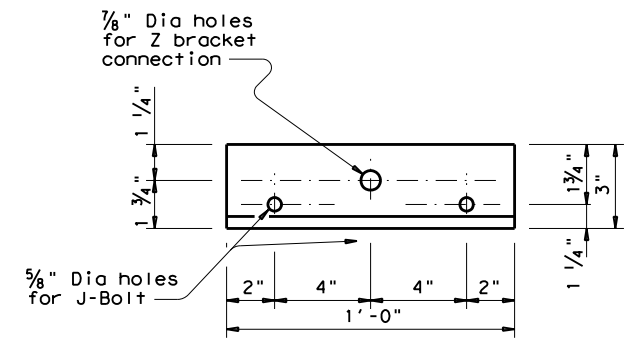
Attachment at Top Chord
(Showing Chord Angle 3")



Attachment at Bottom Chord
PLAN VIEW

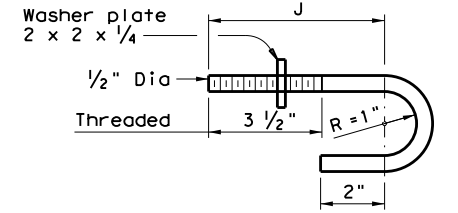
GENERAL NOTES:

- 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.
- 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.
- 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.
- Contractor shall verify applicable field dimensions before fabrication.

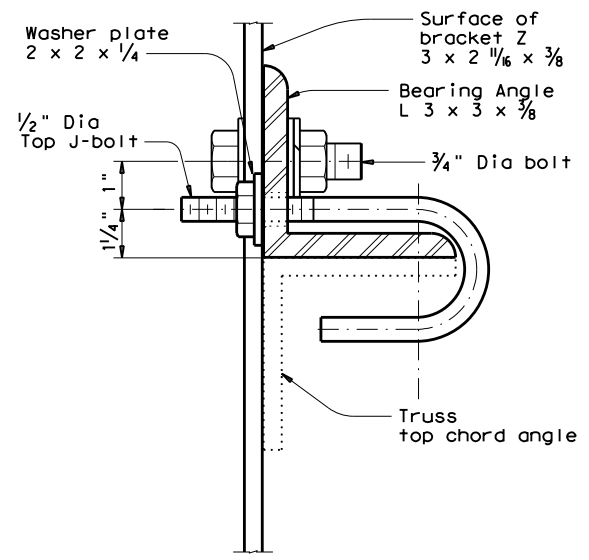


BEARING ANGLE 3 x 3 x 3/8

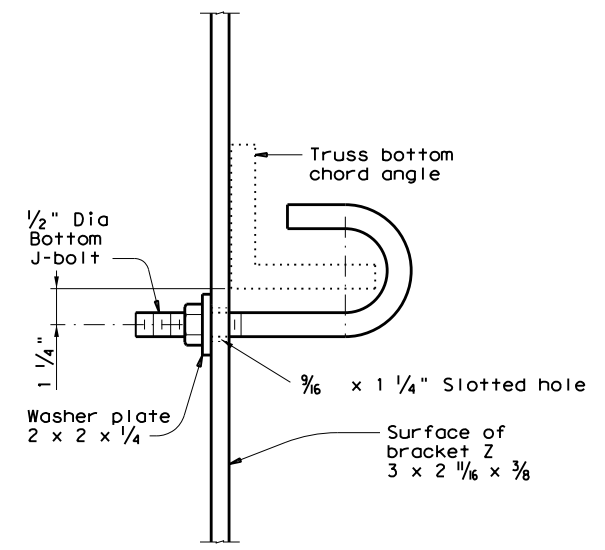
| Chord Angle | J |
|----------------|--------|
| 3", 3 1/2", 4" | 5 1/2" |
| 5" and 6" | 7 1/2" |



TOP & BOTTOM J-BOLT



SECTION A-A



SECTION B-B

SHEET 1 OF 3

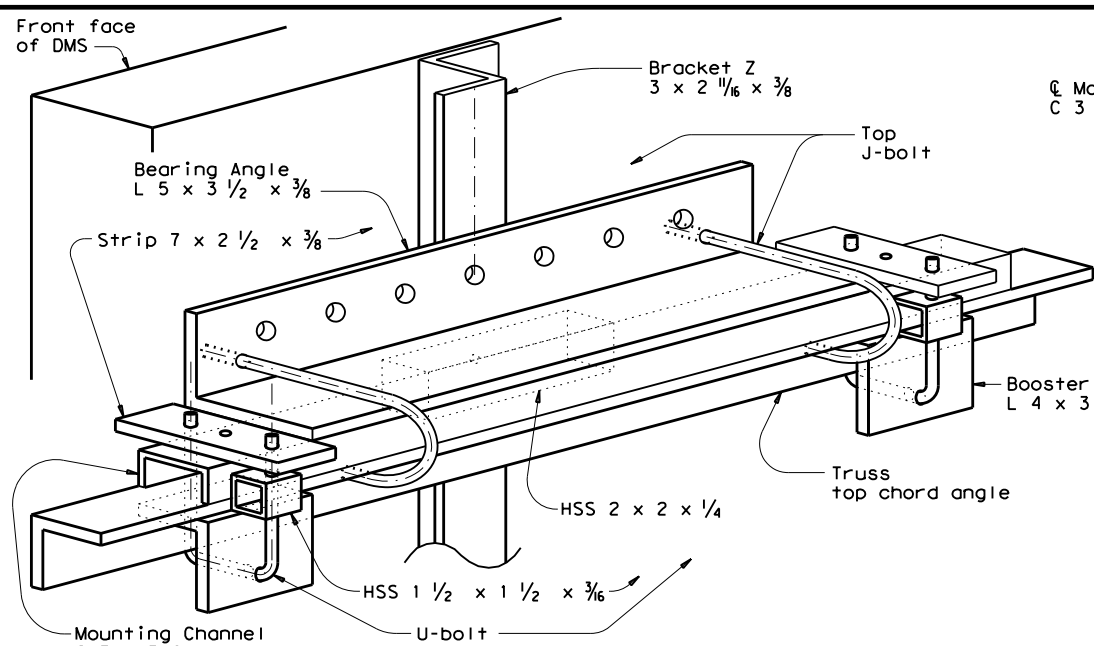


DMS-TO-TRUSS MOUNTING AT OVERHEAD SIGN SUPPORTS (NON BUILD-UP) DMS(TM-1)-16

| | | | |
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| © TxDOT June 2016 | CONT SECT | JOB | HIGHWAY |
| REVISIONS | 0002 07 | 057, ETC | IH-10 |
| | DIST | COUNTY | SHEET NO. |
| | ELP | HUDSPETH | 40 |

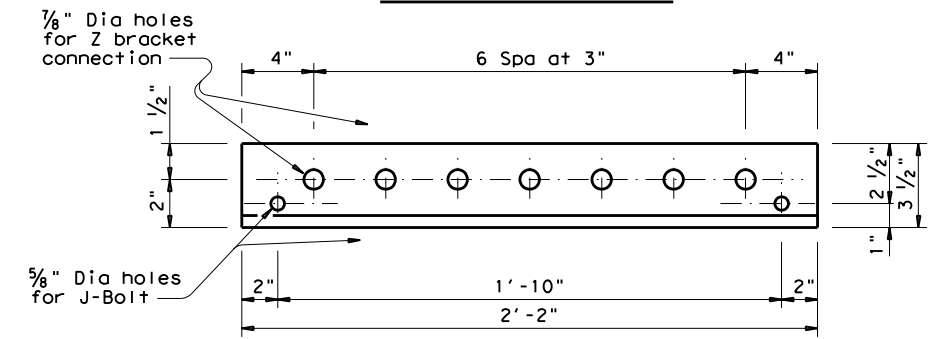
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DATE: 1/4/2024
FILE: dms-tm-16.dgn

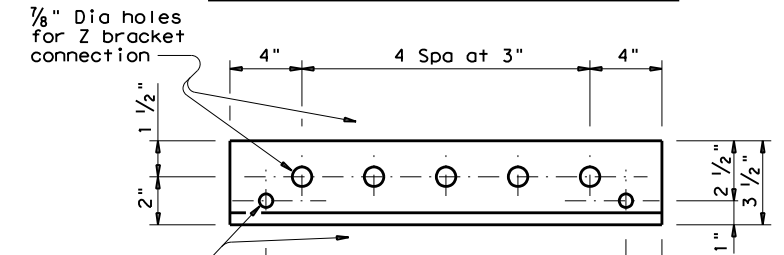


Built-up Attachment at Top Chord
(Showing Chord Angle 3")

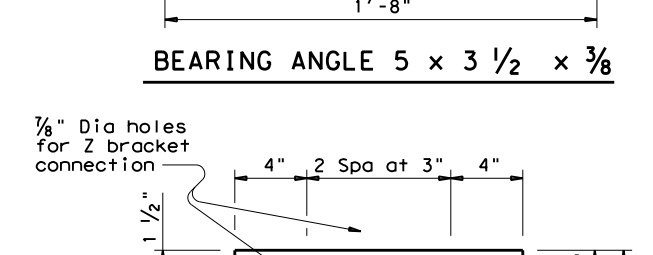
ISOMETRIC VIEW



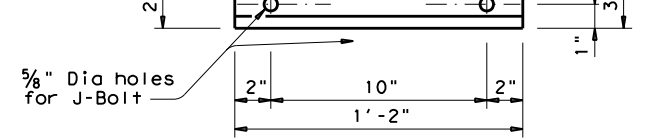
BEARING ANGLE 5 x 3 1/2 x 3/8



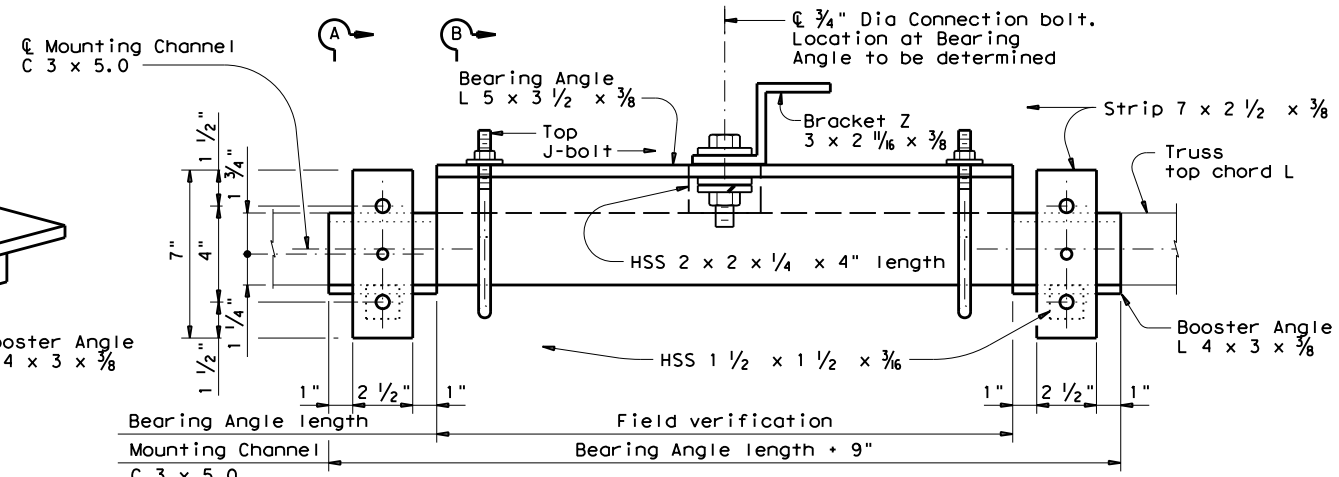
BEARING ANGLE 5 x 3 1/2 x 3/8



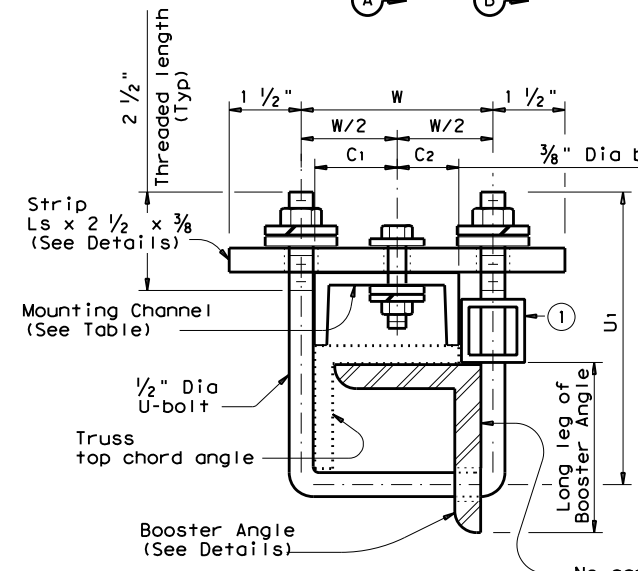
BEARING ANGLE 5 x 3 1/2 x 3/8



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

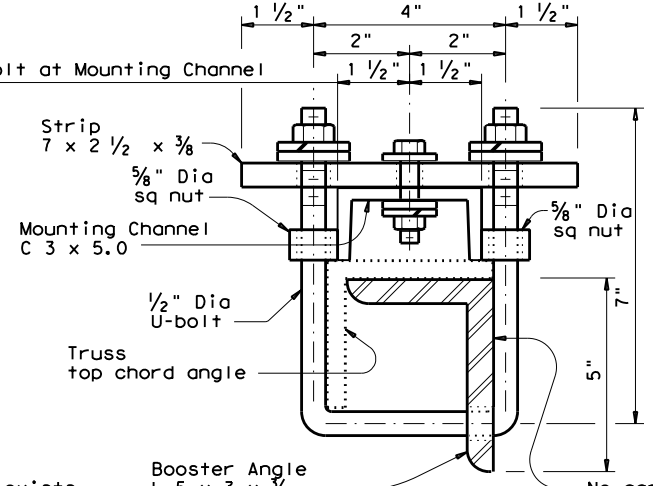


PLAN VIEW (AT TOP CHORD)
(Showing Chord Angle 3")

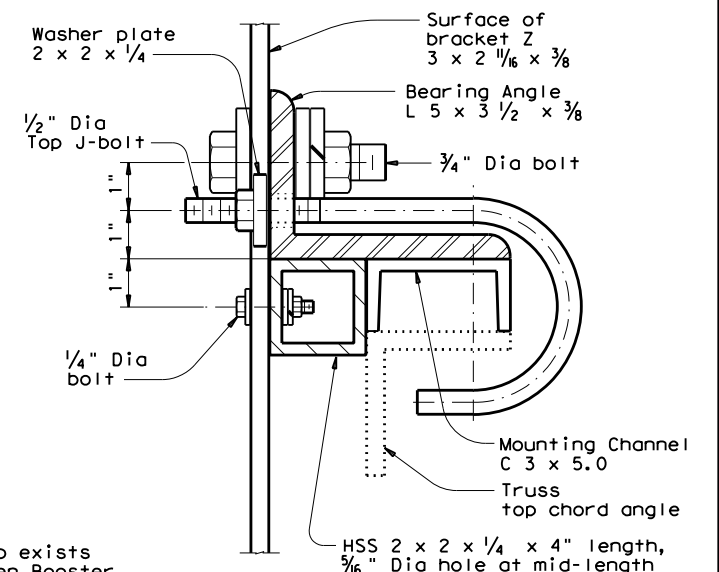


SECTION A-A
(Showing Chord Angle 3", 4", 5" & 6")

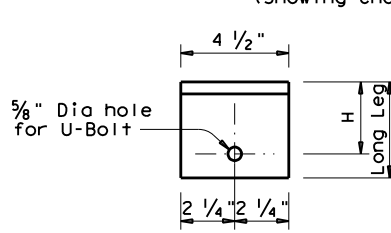
| Chord Angle | U1 | W | C1 | C2 | Mounting Channel |
|-------------|---------|----|--------|--------|------------------|
| 3" | 7" | 4" | 1 3/4" | 1 1/4" | C3 x 5.0 |
| 4" | 8" | 5" | 2 1/4" | 1 3/4" | C4 x 7.25 |
| 5" | 9" | 6" | 2 3/4" | 2 1/4" | C5 x 9.0 |
| 6" | 10 1/2" | 7" | 3 1/4" | 2 3/4" |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



SECTION A-A
(Showing Chord Angle 3 1/2")

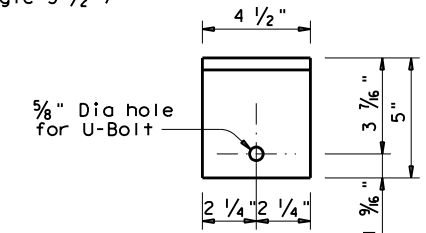


SECTION B-B

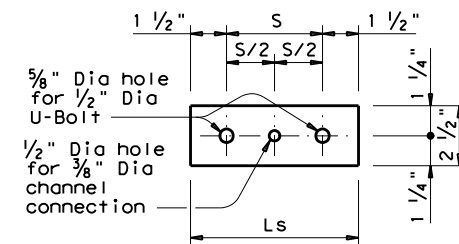


BOOSTER ANGLE
(For Chord Angle 3", 4", 5" and 6")

| 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" |

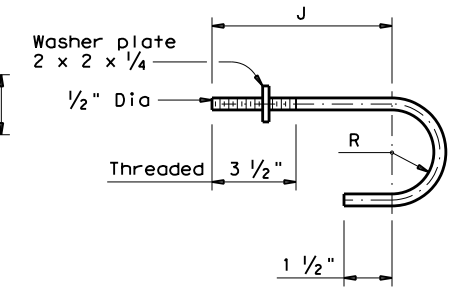


BOOSTER ANGLE 5 x 3 x 3/8
(For Chord Angle 3 1/2")



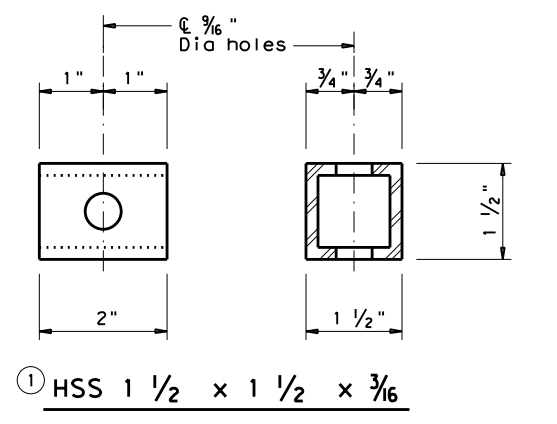
Strip Ls x 2 1/2 x 3/8

| 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" |



HSS 1 1/2 x 1 1/2 x 3/16

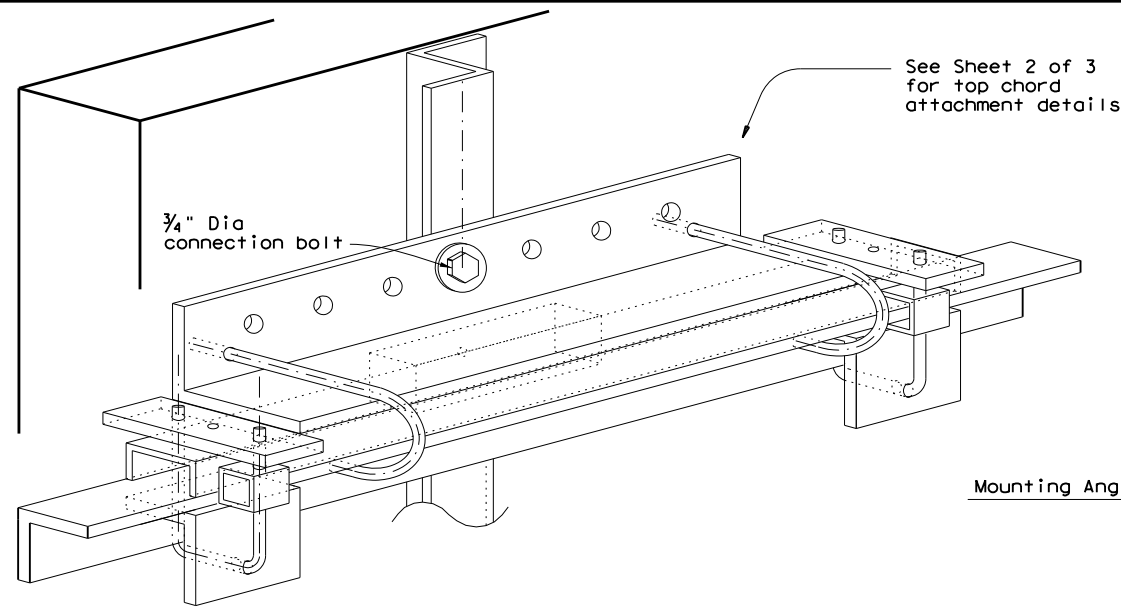
Texas Department of Transportation
Traffic Operations Division Standard

DMS-TO-TRUSS MOUNTING AT OVERHEAD SIGN SUPPORTS (WITH BUILD-UP)
DMS (TM-2) - 16

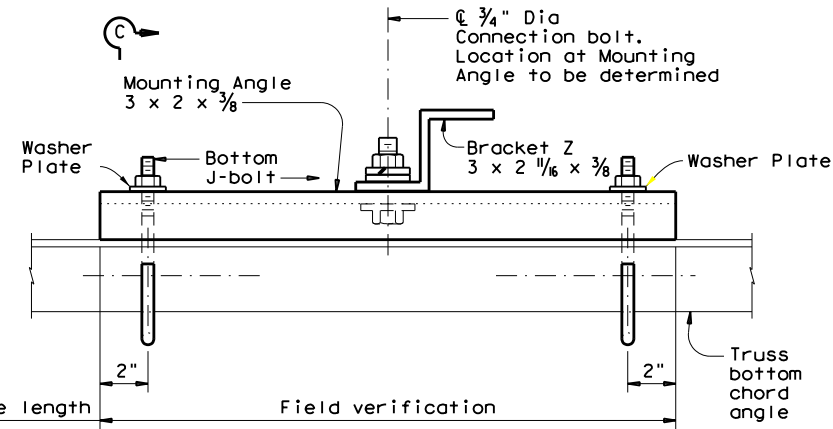
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| © TxDOT JUNE 2016 | CONT SECT | JOB | HIGHWAY |
| REVISIONS | 0002 07 | 057, ETC | IH-10 |
| DIST | COUNTY | SHEET NO. | |
| ELP | HUDSPETH | 41 | |

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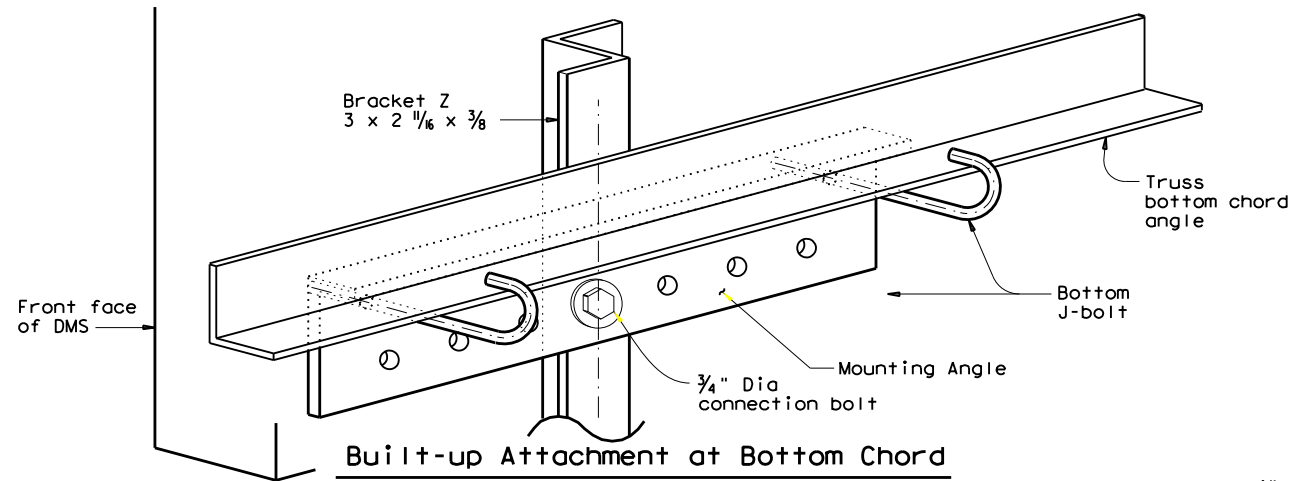
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Built-up Attachment at Top Chord

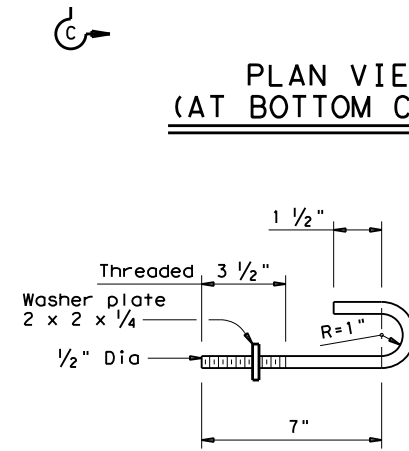


PLAN VIEW (AT BOTTOM CHORD)

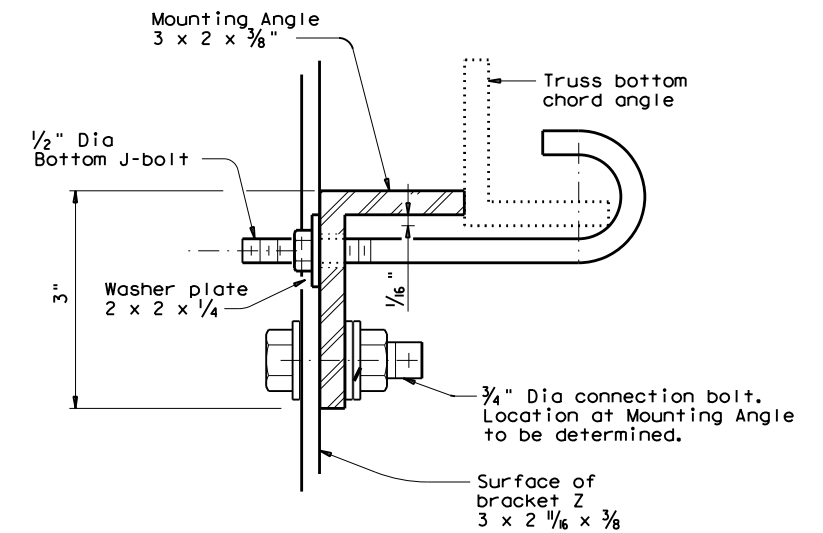


Built-up Attachment at Bottom Chord

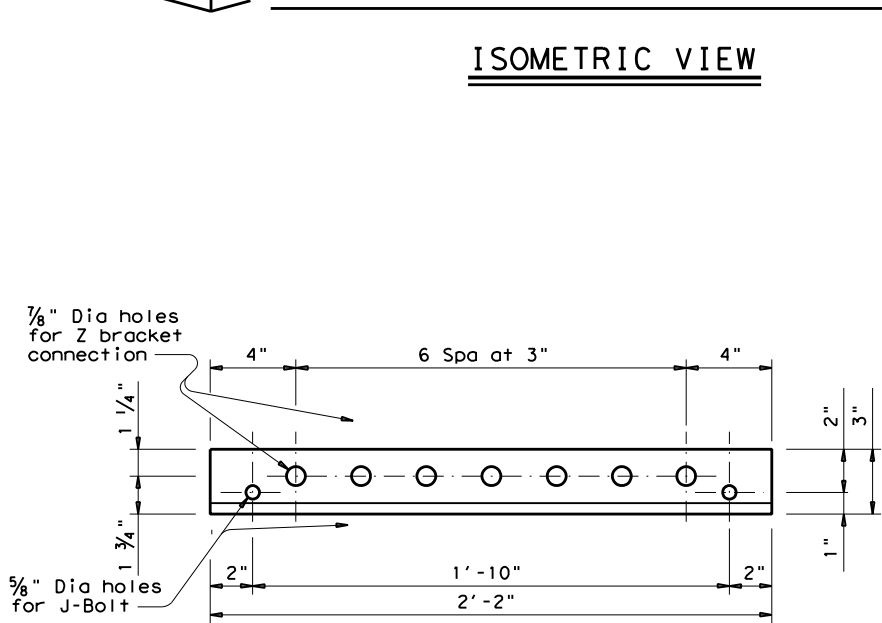
ISOMETRIC VIEW



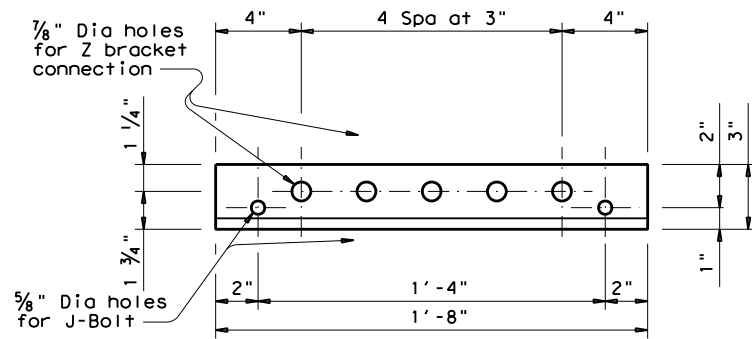
BOTTOM J-BOLT



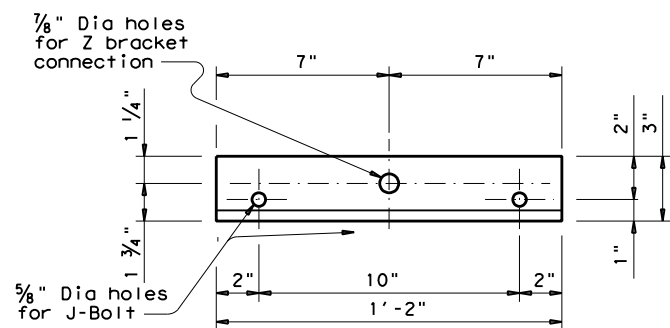
SECTION C-C



MOUNTING ANGLE 3 x 2 x 3/8



MOUNTING ANGLE 3 x 2 x 3/8



MOUNTING ANGLE 3 x 2 x 3/8

GENERAL NOTES:

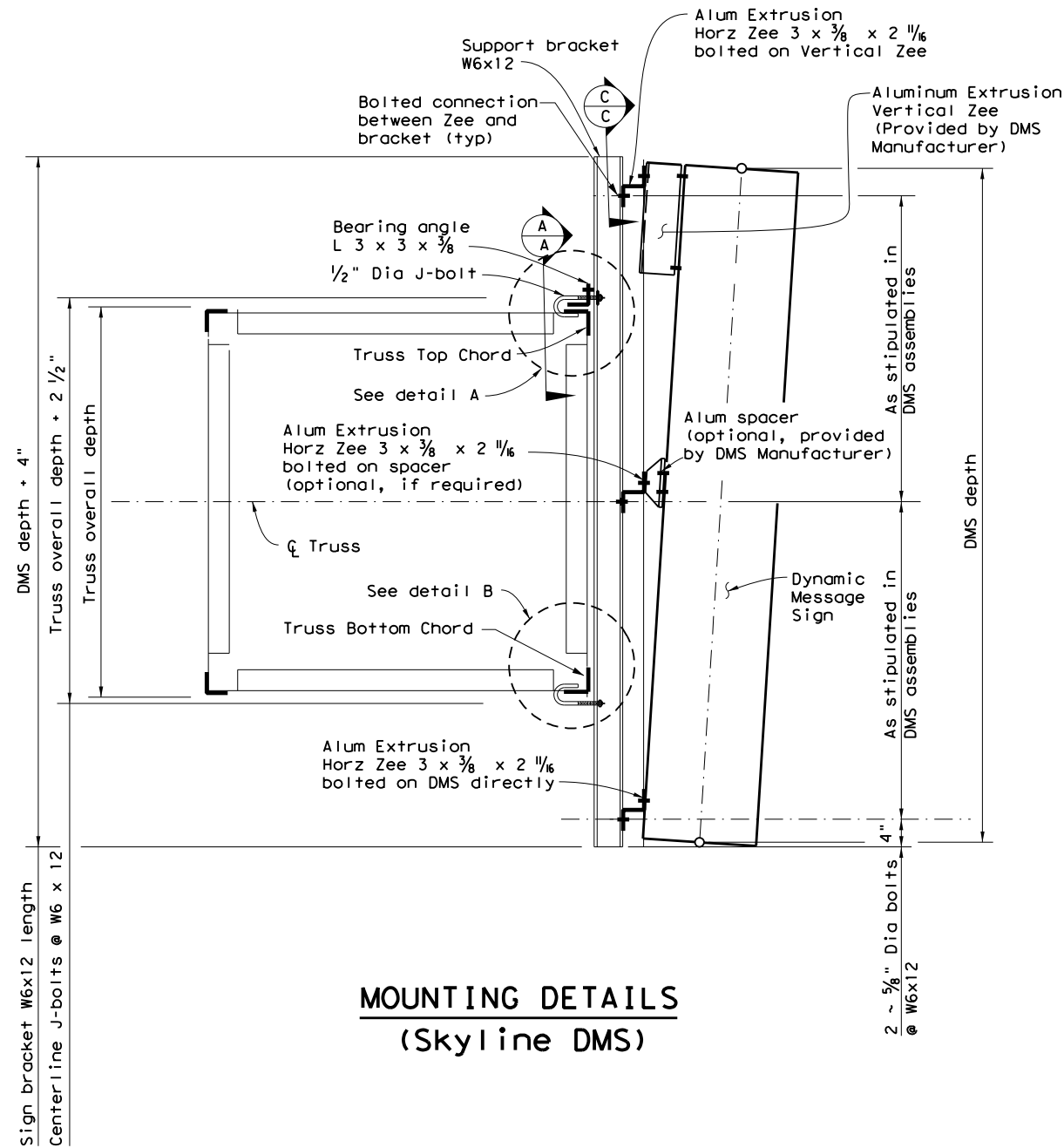
- Application of the built-up detailed on Sheet 2 and 3 of 3 is limited to the dynamic message sign (DMS) attachment which is in conflict with the truss connection bolts at the point(s) of attachment. The overhead sign structure must have adequate capacity to support the DMS. A determination of adequacy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

SHEET 3 OF 3

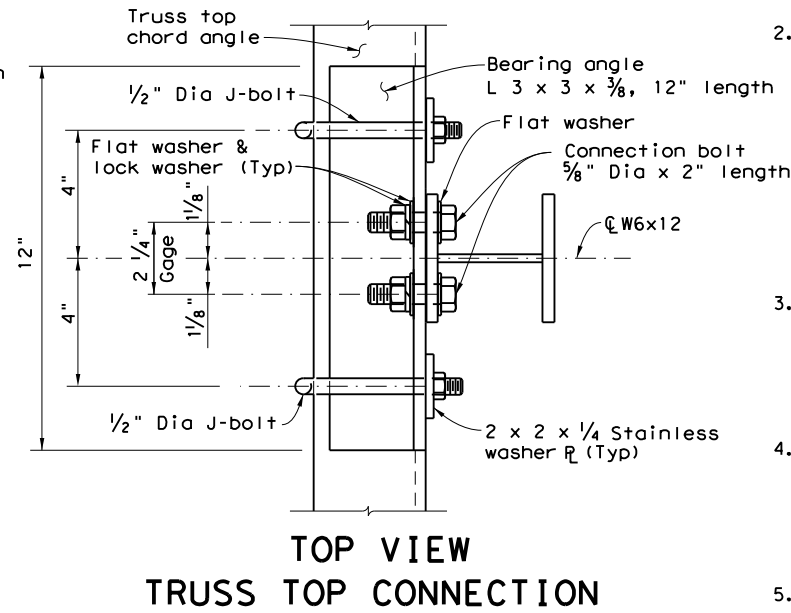
| | | | |
|--|-----------|---|----------|
| | | Traffic Operations Division Standard | |
| DMS-TO-TRUSS MOUNTING AT OVERHEAD SIGN SUPPORTS (WITH BUILD-UP) | | | |
| DMS (TM-3) - 16 | | | |
| FILE: dms-tm-16.dgn | DN: TxDOT | CK: DW: TxDOT | CK: |
| © TxDOT JUNE 2016 | CONT | SECT | JOB |
| REVISIONS | 0002 | 07 | 057, ETC |
| DIST | COUNTY | SHEET NO. | |
| ELP | HUDSPETH | 42 | |

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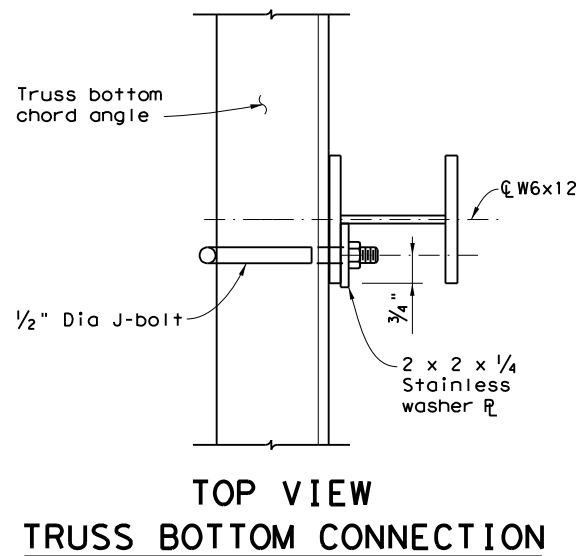
DATE: 1/4/2024
FILE: dms(hz-1)-21.dgn



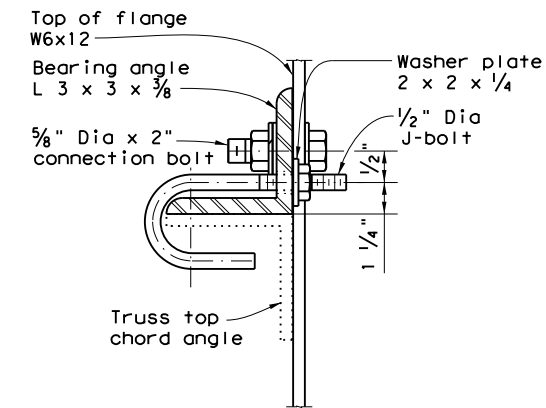
MOUNTING DETAILS
(Skyline DMS)



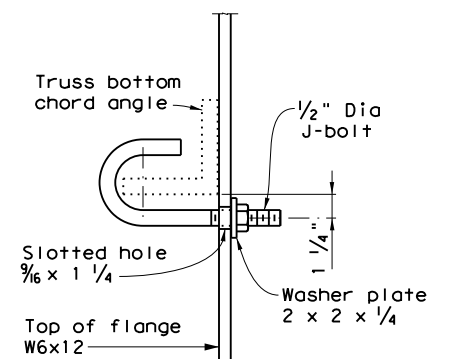
TOP VIEW TRUSS TOP CONNECTION



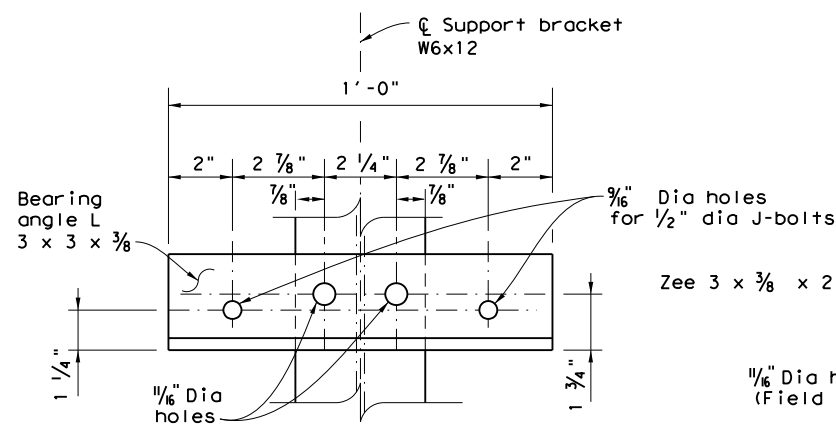
TOP VIEW TRUSS BOTTOM CONNECTION



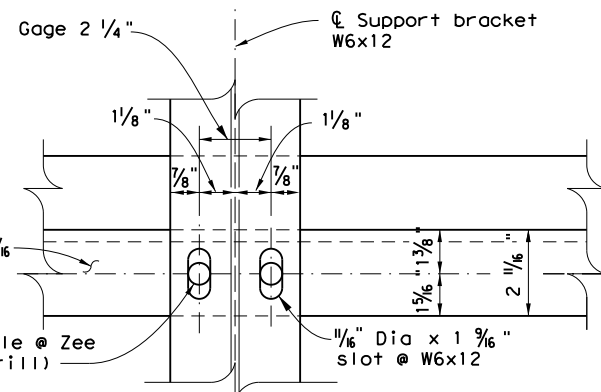
DETAIL A



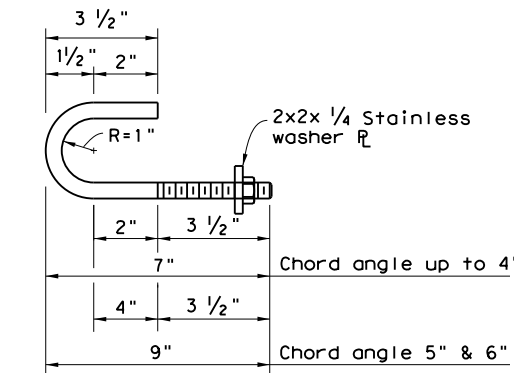
DETAIL B



SECTION A-A
(Truss chord angle not shown)



SECTION C-C



1/2" Dia J-BOLT

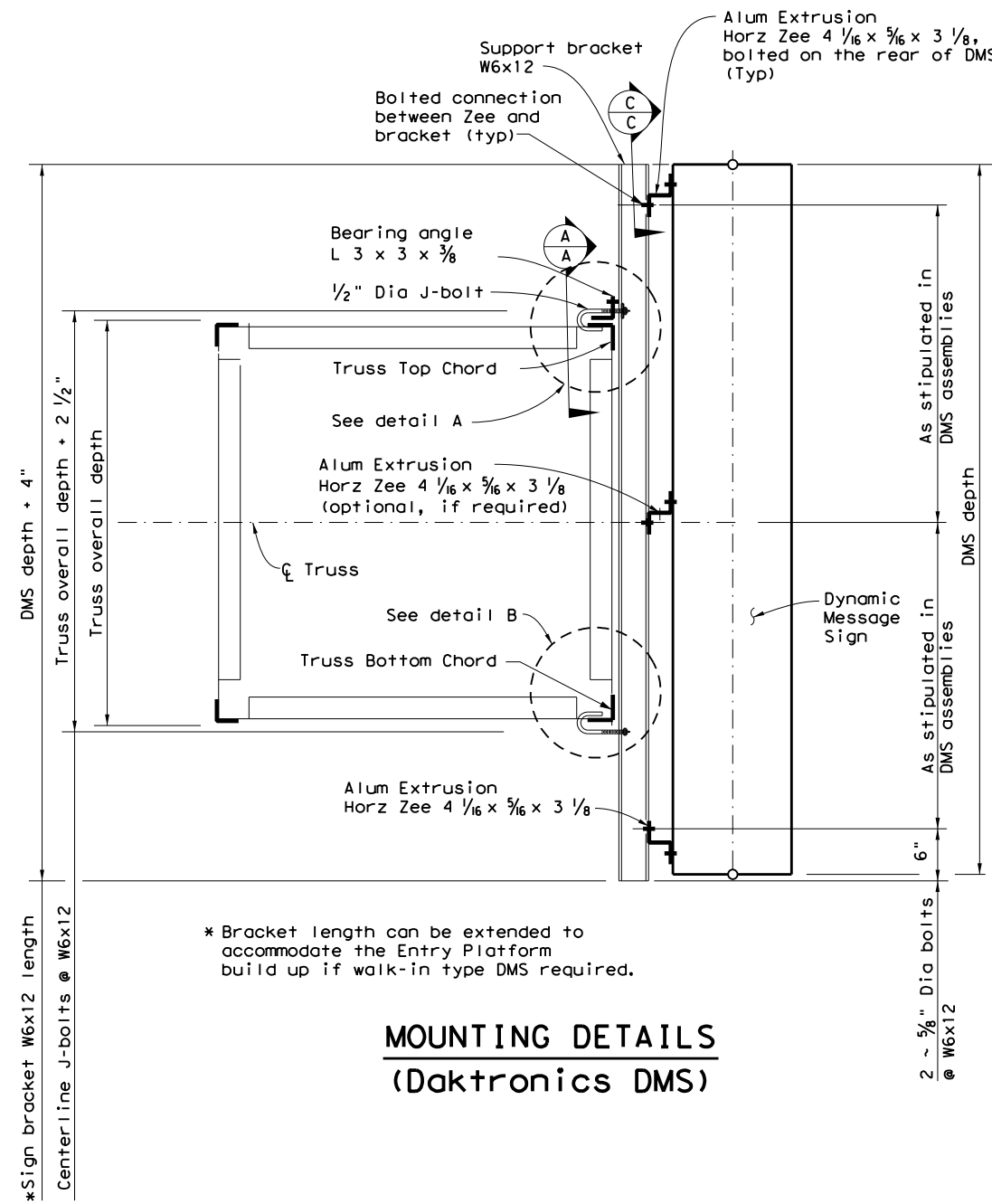
GENERAL NOTES:

- Determine the adequacy of the overhead sign support structure to support the dynamic message sign (DMS) prior to attaching the sign to the truss.
- Designed according to the 1994 edition of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Revisions. Designed for a Sustained (Fastest Mile) Wind Velocity of 100 mph with a gust factor of 1.3. Connections are designed for a DMS weight of 3800 lbs. The structural support is designed for an Effective Projected Area (EPA) of 441 sq. ft. based on a DMS nominal width of 30.5 feet and nominal depth of 8.25 feet, with a drag coefficient of 1.7 applied, plus four 1'-8" square flashing beacons with a drag coefficient of 1.2. DMS attachment is designed for a horizontal eccentricity of 1.3 ft. from the face of the truss to the center of gravity of the DMS. Provide an even number of sign supporting brackets (6 minimum), W6x12, spaced at 5'-6" max. The maximum distance between the sign edge to the nearest supporting bracket is 2'-3".
- Verify applicable field dimensions before fabrication. Determine the required number and spacing of sign support brackets, along with the Aluminum Extrusion Vertical and Horizontal Zees provided by the DMS manufacturer, to connect the DMS to the truss. For the J-bolt connection of DMS to overhead sign structure, align each arranged sign bracket with its bearing angle to avoid conflict with the truss connection bolts at the point of attachment.
- Provide structural steel meeting the requirements of ASTM A36, A572 Gr 50 or A588. Provide connection bolts meeting the requirements of ASTM F3125, Grade A325 or A449 with 1 heavy hex nut, 2 flat washers, and 1 lock washer. Provide Type 304 stainless steel J bolt and washer plate, with bolt minimum yield strength of 50 ksi and an elongation of 16 percent in 2 inches. Galvanize all parts except stainless steel.
- Prior to the initialization of DMS mounting, the DMS manufacturer must provide and install the 6061-T6 Aluminum Extrusion Vertical and Horizontal Zees, 3 x 3/8 x 2 1/16, and the specified Aluminum Spacers (if any) to the back of the DMS.
- The sign support bracket attached to the truss shown here is an example only. Adjust the bracket position along the truss depth to achieve the required vertical clearance to be confirmed by the Engineer.
- When the structure is to be exposed to a highly corrosive environment, provide elastomeric spacer to separate aluminum alloy parts from direct contact with steel.

| | | | | | |
|---|-----------|---|-----------|---|--|
| | | Texas Department of Transportation | | Traffic Safety Division Standard | |
| DMS-TO-TRUSS MOUNTING WITH HORIZONTAL ZEE EXTRUSIONS | | | | | |
| DMS (HZ-1) - 21 | | | | | |
| FILE: dms(hz-1)-21.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CR: TxDOT | |
| © TxDOT February 2021 | CONT | SECT | JOB | HIGHWAY | |
| REVISIONS | 0002 | 07 | 057, ETC | IH-10 | |
| | DIST | COUNTY | SHEET NO. | | |
| | ELP | HUDSPETH | 43 | | |

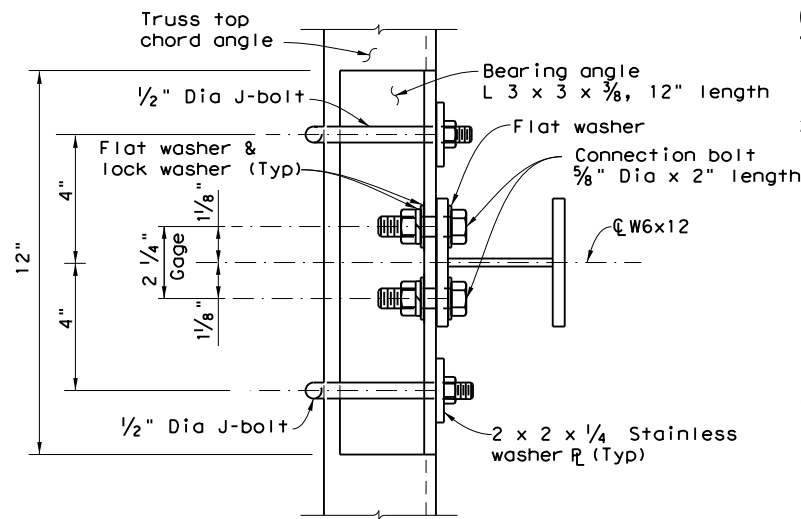
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DATE: 1/4/2024
FILE: dms(hz-2)-21.dgn

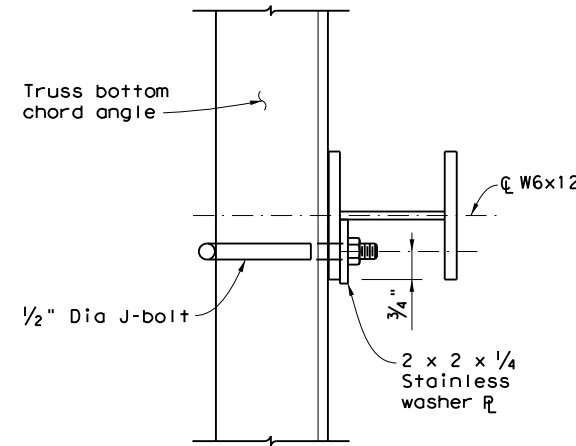


* Bracket length can be extended to accommodate the Entry Platform build up if walk-in type DMS required.

**MOUNTING DETAILS
(Daktronics DMS)**



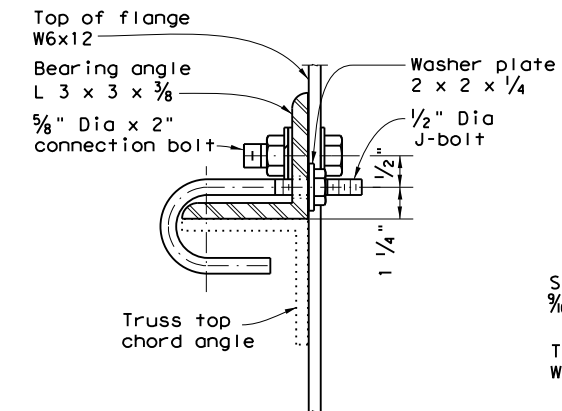
**TOP VIEW
TRUSS TOP CONNECTION**



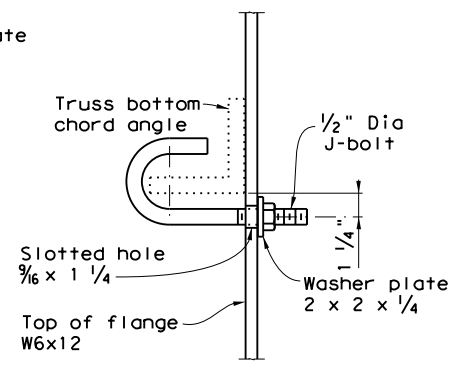
**TOP VIEW
TRUSS BOTTOM CONNECTION**

GENERAL NOTES:

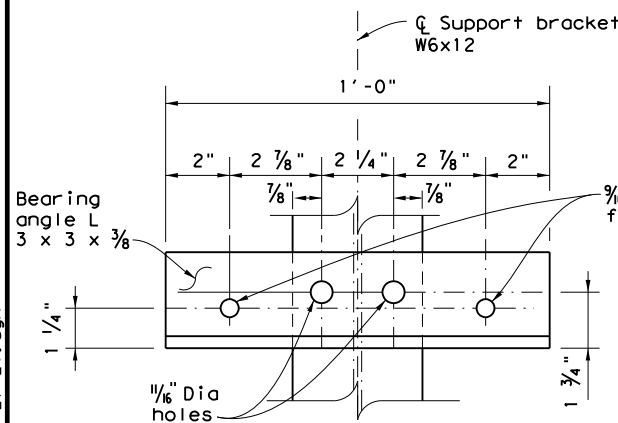
- Determine the adequacy of the overhead sign support structure to support the dynamic message sign (DMS) prior to attaching the sign to the truss.
- Designed according to the 1994 edition of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Revisions. Designed for a Sustained (Fastest Mile) Wind Velocity of 100 mph with a gust factor of 1.3. Connections are designed for a DMS weight of 3800 lbs. The structural support is designed for an Effective Projected Area (EPA) of 399 sq. ft. based on a DMS nominal width of 29.1 feet and nominal depth of 7.8 feet, with a drag coefficient of 1.7 applied, plus four 1'-8" square flashing beacons with a drag coefficient of 1.2. DMS attachment is designed for a horizontal eccentricity of 2.4 ft. from the face of the truss to the center of gravity of the DMS. Provide an even number of sign supporting brackets (6 minimum), W6x12, spaced at 5'-6" max. The maximum distance between the sign edge to the nearest supporting bracket is 2'-3".
- Verify applicable field dimensions before fabrication. Determine the required number and spacing of sign support brackets, along with the Aluminum Extrusion Horizontal Zees provided by the DMS manufacturer, to connect the DMS to the truss. For the J-bolt connection of DMS to overhead sign structure, align each arranged sign bracket with its bearing angle to avoid conflict with the truss connection bolts at the point of attachment.
- Provide structural steel meeting the requirements of ASTM A36, A572 Gr 50 or A588. Provide connection bolts meeting the requirements of ASTM F3125, Grade A325 or A449 with 1 heavy hex nut, 2 flat washers, and 1 lock washer. Provide Type 304 stainless steel J bolt and washer plate, with bolt minimum yield strength of 50 ksi and an elongation of 16 percent in 2 inches. Galvanize all parts except stainless steel.
- Prior to the initialization of DMS mounting, the DMS manufacturer must provide and install the 6061-T6 Aluminum Extrusion Horizontal Zees, 4 1/16 x 5/16 x 3 1/8.
- The sign support bracket attached to the truss shown here is an example only. Adjust the bracket position along the truss depth to achieve the required vertical clearance to be confirmed by the Engineer.
- When the structure is to be exposed to a highly corrosive environment, provide elastomeric spacer to separate aluminum alloy parts from direct contact with steel.



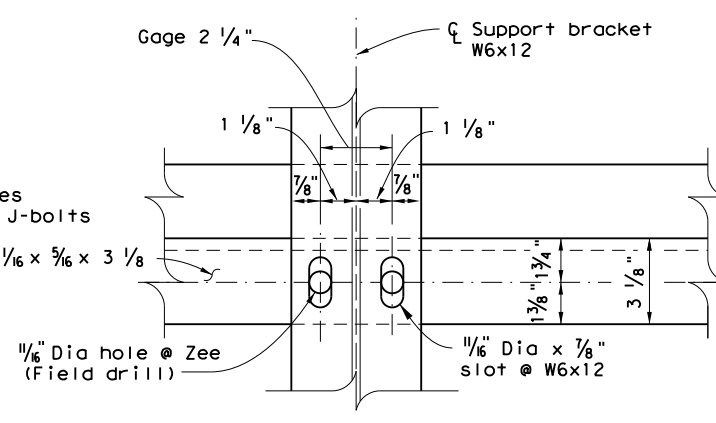
DETAIL A



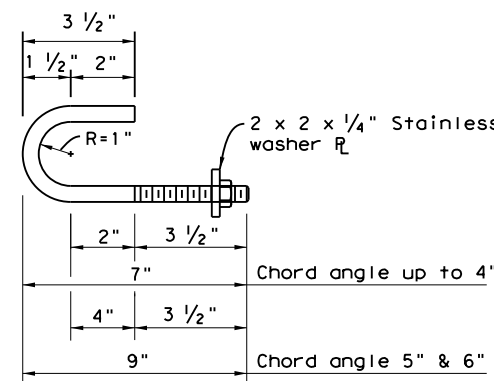
DETAIL B



**SECTION A-A
(Truss chord angle not shown)**



SECTION C-C



1/2" Dia J-BOLT

| | | | | | |
|---|-----------|---|-----------|---|--|
| | | Texas Department of Transportation | | Traffic Safety Division Standard | |
| DMS-TO-TRUSS MOUNTING WITH HORIZONTAL ZEE EXTRUSIONS | | | | | |
| DMS (HZ-2) - 21 | | | | | |
| FILE: dms(hz-2)-21.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT | |
| © TxDOT February 2021 | CONT | SECT | JOB | HIGHWAY | |
| REVISIONS | 0002 | 07 | 057, ETC | IH-10 | |
| | DIST | COUNTY | SHEET NO. | | |
| | ELP | HUDSPETH | 44 | | |

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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

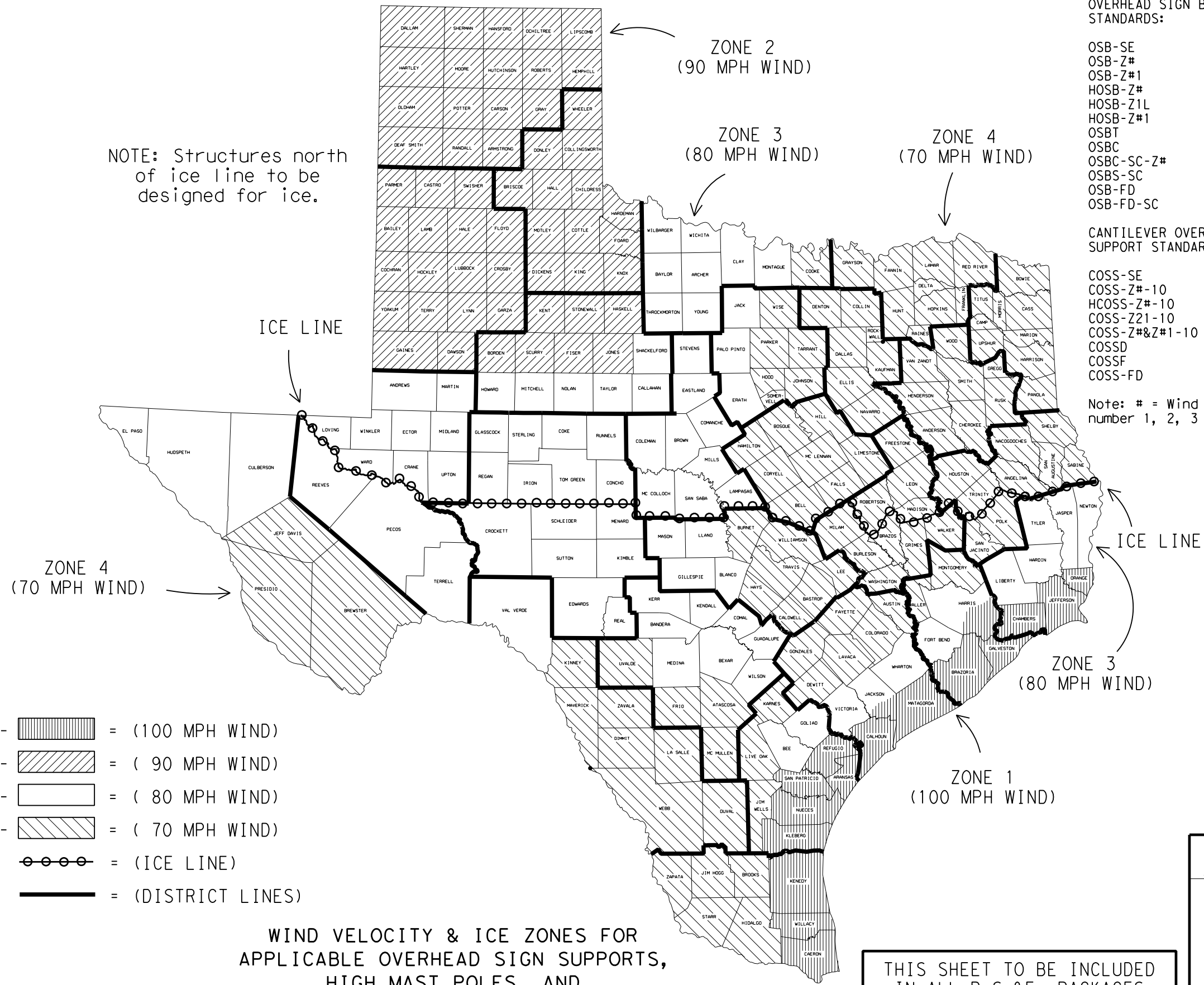
WALKWAYS AND BRACKETS STANDARDS:

- 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

NOTE: Structures north of ice line to be designed for ice.



LEGEND

- ZONE 1 - [diagonal lines] = (100 MPH WIND)
- ZONE 2 - [diagonal lines] = (90 MPH WIND)
- ZONE 3 - [white box] = (80 MPH WIND)
- ZONE 4 - [diagonal lines] = (70 MPH WIND)
- [dashed line with circles] = (ICE LINE)
- [solid black line] = (DISTRICT LINES)

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

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

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

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.

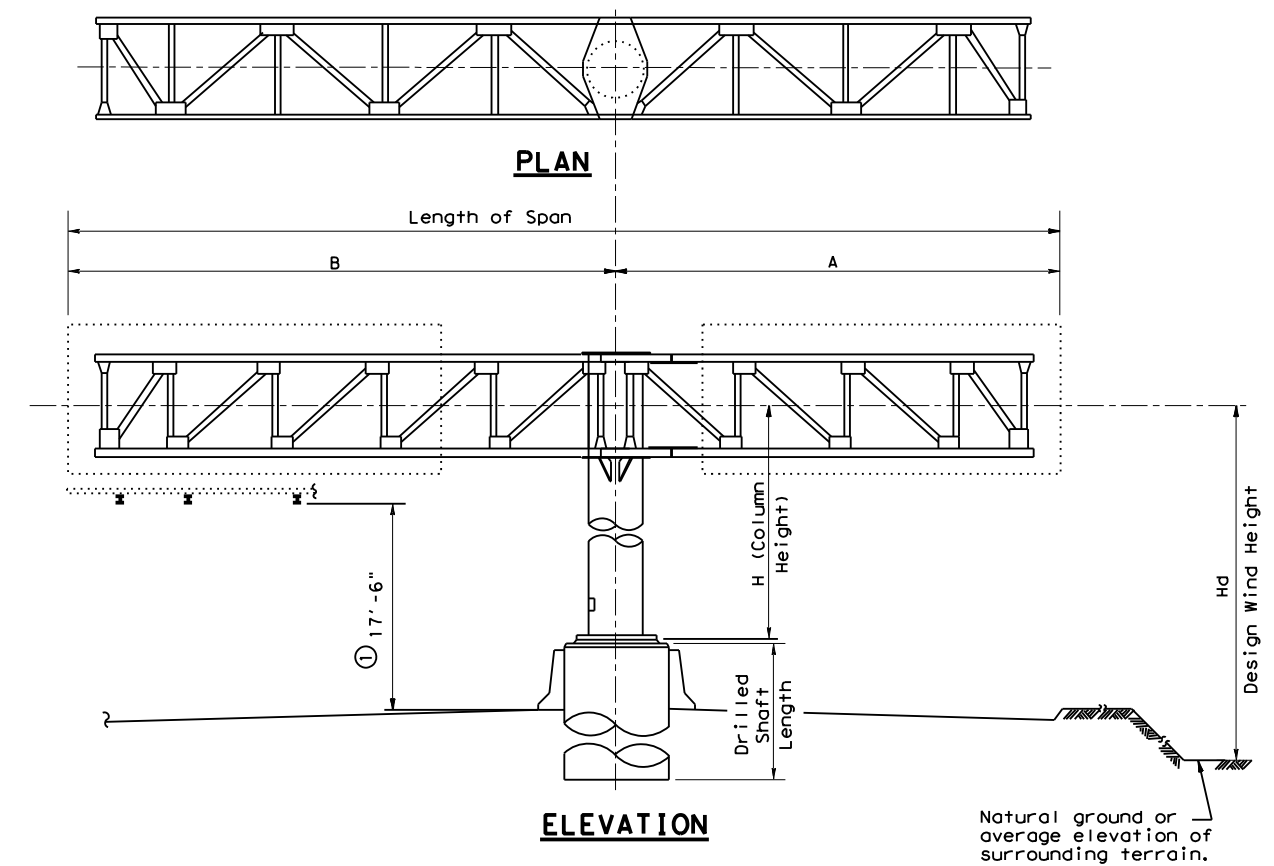
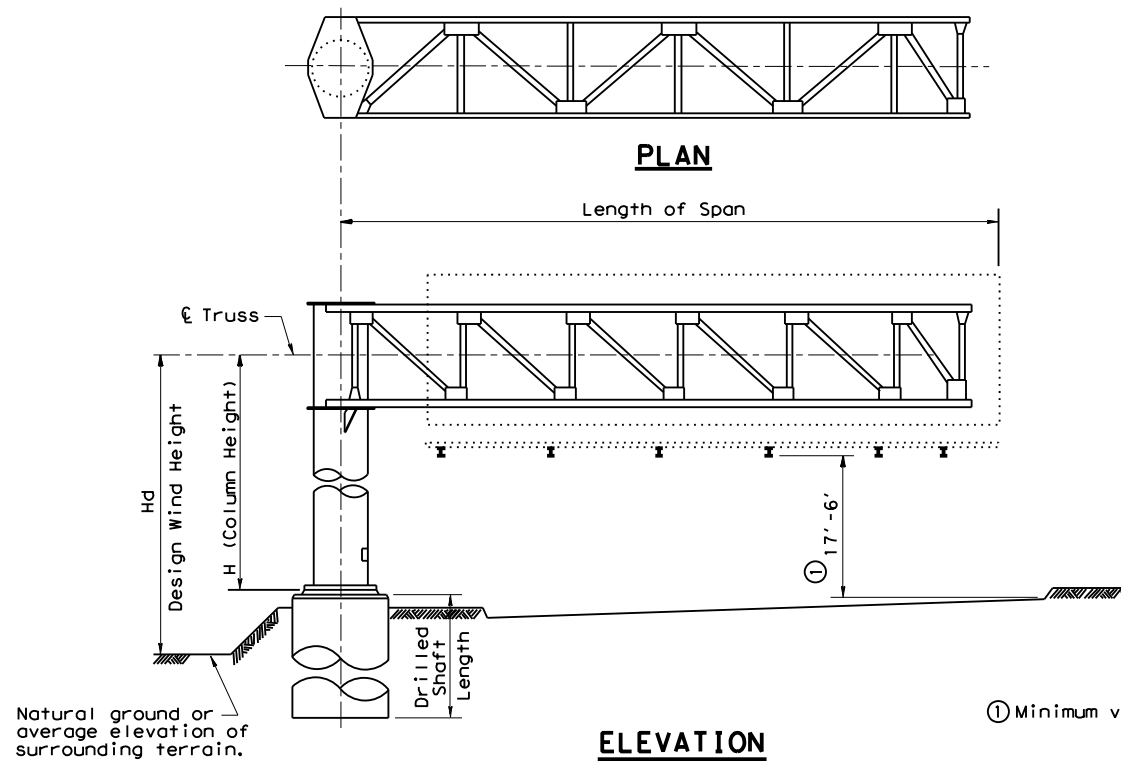


WIND VELOCITY AND ICE ZONES
WV & IZ-14

| | | | | |
|---|-----------|-----------|-----------|-----------|
| FILE: windice.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
| © TxDOT April 1996 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0002 | 07 | 057, ETC | IH-10 |
| 8-14-Added list of applicable standards, restricting use to structures designed for Fastest Mile wind speeds. | DIST | COUNTY | | SHEET NO. |
| | ELP | HUDSPETH | | 45 |

DATE: 1/4/2024
FILE: windice.dgn

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SELECTION EXAMPLE CANTILEVER SPAN

Given: Cantilever Span = 33'; Column Height, H = 23.3'; Design Wind Height, Hd = 27'; Avg. Penetrometer Value, N = 15 (clay type soil); Hill County

Step 1: Select applicable COSS standard. From Wind Velocity and Ice Zone sheet (WV & IZ-96) determine that Hill County is in Zone 4 (70 mph) and is above the ice line. Since Design Wind Height is less than 30', use standard COSS-Z4 & Z4I. If Design Wind Height is more than 30', use COSS-Z3 & Z3I. NOTE: In Zone 1 if Design Wind Height is greater than 30' use HCOSS-Z1.

Step 2: Determine tower details from COSS-Z4 & Z4I. Use column height to nearest tabulated value, i.e., 23'. Round span length up to the nearest tabulated value, i.e., 35'. Tower details are:
 Tower pipe 24" Dia with min. wall thickness = 0.312"
 Base plate 33 3/4" Dia x 1 3/4"
 Anchor bolts 8-1 3/4" Dia on 29 3/8" bolt circle
 Horizontal deflection of tower at C truss = 0.889". During installation, double nuts at base plate may be used to plumb tower to compensate for horizontal deflection.
 Design Moment = 244 Kip-ft
 Design Torsion = 162 Kip-ft

Step 3: Determine truss details from COSS-Z4 & Z4I. Read from small table at bottom of sheet for span = 35'. Truss design width, W and depth, D = 4.0' x 4.0'.
 Chord L 3 x 3 x 3/16 (HYC) with 6 bolt connection at tower
 D.L. Diag. L 2 x 2 x 3/16 (HYC) with 2 bolt connection
 W. L. Diag. L 3 x 3 x 3/16 (HYC) with 2 bolt connection
 D. L. Vert. L 2 x 2 x 3/16 (HYC) with 2 bolt connection
 W. L. Strut. L 2 x 2 x 3/16 (HYC) with 1 bolt connection
 Bolts are 3/8" Dia high strength with 5-3/4" Dia bolt alternate for chord connection at tower.
 D.L. of truss = 50 lb/ft
 Truss deflection at free end = 3.2". The fabricator shall compensate for this deflection by offsetting bolt holes between the upper and lower chords at the truss-to-tower connection.

Step 4: Determine foundation details. Use standard COSSF. From COSSF with 24" Dia pipe and 1 3/4" Dia anchor bolts:
 Anchor Bolts 1 3/4" Dia x 3'-10"
 Drilled Shaft Dia 42"
 Vertical Reinforcing 12 ~ #10 bars
 Spiral C = #4 at 6" pitch Grade 60.
 Misc. handhole, base plate, anchor bolt, and foundation details are shown on COSSF.

Step 5: Determine drilled shaft length from COSS-FD. Enter the appropriate graph (for 42" Dia drilled shaft in clay soil) from the bottom with N = 15. Proceed upward interpolating moment curves (solid lines) to locate 244 Kip-ft. Project to the left side of the graph to determine the required embedment length, i.e., 12'. Repeat the procedure for torsion curves (dashed lines) to locate 162 Kip-ft. The embedment length required to satisfy torsion is 14'. Add 3'-0" to the longer length to obtain a required drilled shaft length of 17'.

① Minimum vertical clearance

SELECTION EXAMPLE DOUBLE CANTILEVER SPAN

Given: Short span, A = 9'; Long Span, B = 25'; Total Cantilever Span = 34'; Column Height, H = 24'; Design Wind Height, Hd = 26'; Avg. Penetrometer Value, N = 20 (clay type soil); Wheeler County.

Step 1: Select applicable COSS standard. From Wind Velocity and Ice Zone sheet determine that Wheeler County is in Zone 2 (90 mph) and is above the ice line. Since Design Wind Height is less than 30' use standard COSS-Z2I. If Design Wind Height is more than 30', use HCOSS-Z1.

Step 2: Determine tower details from COSS-Z2I. Use column height = 24'. Round total span length up to the next longer tabulated length span, i.e., 35'. If total span length is greater than 40', a special design would be required. Tower details are:
 Tower pipe 30" Dia with min. wall thickness = 0.310"
 Base Plate 40 1/2" Dia x 1 3/4"
 Anchor bolts 8 ~ 2" Dia on 35 3/4" bolt circle
 Horizontal deflection of tower at C truss = 0.574-0.316 = 0.26". During installation, double nuts at base plate may be used to plumb tower and compensate for horizontal deflection.
 Design Moment = 403 Kip-ft (use total span = 35')
 Design Torsion = 136 Kip-ft (use long span = 25')

Step 3: Determine truss details from COSS-Z2I. Read from small table at bottom of sheet 2 of 2 for Span A = 9' (use 10'):
 Chord L 3 x 3 x 3/16 (HYC) with 3 bolt connection at splice
 D.L. Diag. L 2 x 2 x 3/16 (HYC) with 2 bolt connection
 W.L. Diag. L 3 x 3 x 3/16 (HYC) with 2 bolt connection
 D.L. Vert. L 2 x 2 x 3/16 (HYC) with 2 bolt connection
 W.L. Strut. L 2 x 2 x 3/16 (HYC) with 1 bolt connection
 Bolts are 3/8" Dia high strength.
 D.L. of truss = 42 lb/ft.
 Span B = 25':
 Chord L 3 x 3 x 1/4 (HYC) with 4 bolt connection at tower
 D.L. Diag. L 2 x 2 x 3/16 (HYC) with 2 bolt connection
 W.L. Diag. L 3 x 3 x 3/16 (HYC) with 2 bolt connection
 D.L. Vert. L 2 x 2 x 3/16 (HYC) with 2 bolt connection
 W.L. Strut. L 2 x 2 x 3/16 (HYC) with 1 bolt connection
 Bolts are 3/8" Dia high strength with 3 ~ 3/4" Dia bolt alternate for chord connection at tower.
 D.L. of truss = 47 lb/ft.
 Truss defl. at free end = 0.2" for Span A, = 1.3" for Span B. The fabricator shall compensate for deflections by offsetting bolt holes between upper and lower chords at splice and at truss-to-tower connection. Top chord shall be shortened between the tower and the splice to achieve the required offset.

Step 4: Determine foundation details. Use standard COSSF. From COSSF with 30" Dia pipe and 2" Dia anchor bolts:
 Anchor bolts 2" Dia x 4'-3"
 Drilled shaft Dia 54"
 Vertical Reinforcing 18 ~ #10 bars
 Spiral C = #4 at 6" pitch Grade 60
 Misc. handhole, base plate, anchor bolt, and foundation details are shown on COSSF.

Step 5: Determine drilled shaft length from COSS-FD. Enter the appropriate graph (for 54" Dia drilled shaft in clay type soil) from the bottom with N = 20. Proceed upward interpolating moment curves (solid lines) to locate 403 Kip-ft. Project to the left side of graph to determine required embedment length, i.e., 13'. Repeat the procedure for the torsion curves (dashed lines) to locate 136 Kip-ft. Embedment length required to satisfy torsion is 9'. Add 3' to the longer length to obtain required drilled shaft length of 16'.



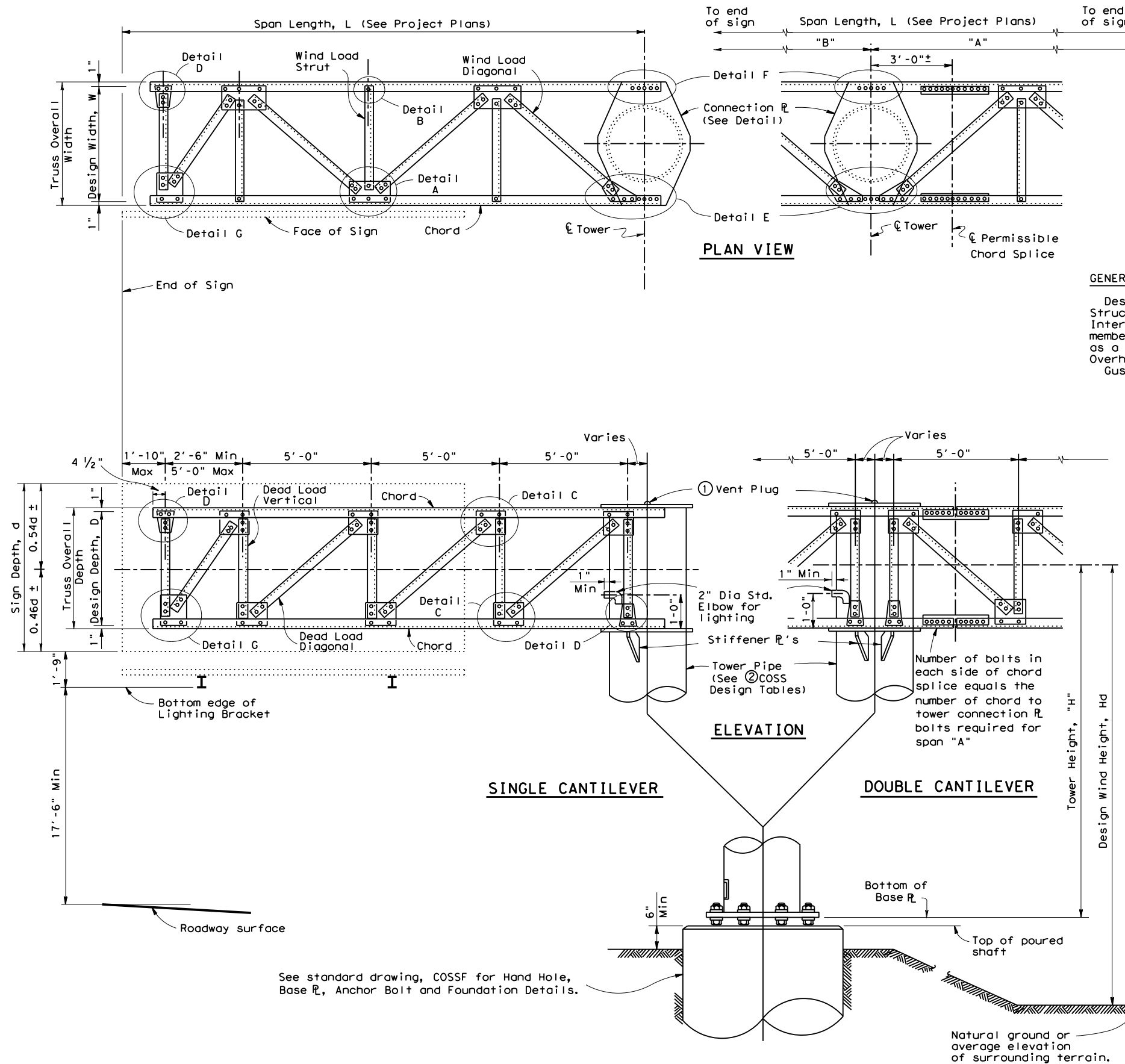
CANTILEVER OVERHEAD SIGN SUPPORTS SELECTION EXAMPLES

COSS-SE

| | | | | | |
|-----------------------|------|-----------|-----------|-----------|-----------|
| © TxDOT November 2007 | | DN: TXDOT | CK: TXDOT | DW: TXDOT | CK: TXDOT |
| REVISIONS | | | | | |
| CONT | SECT | JOB | | HIGHWAY | |
| 0002 | 07 | 057, ETC | | IH-10 | |
| DIST | | COUNTY | | SHEET NO. | |
| ELP | | HUDSPETH | | 46 | |

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DATE: 1/4/2024
FILE: stds66.dgn



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.

- ① Note: Cap shall be solid steel sheet $\frac{3}{8}$ " nominal thickness. Drill, tap and plug galvanizing vent. Weld plate to pipe with $\frac{3}{8}$ " weld all around.
- ② For COSS design tables see standard drawing, "Cantilever Overhead Sign Supports" or "High Level Cantilever Overhead Sign Supports".

SHEET 1 OF 2

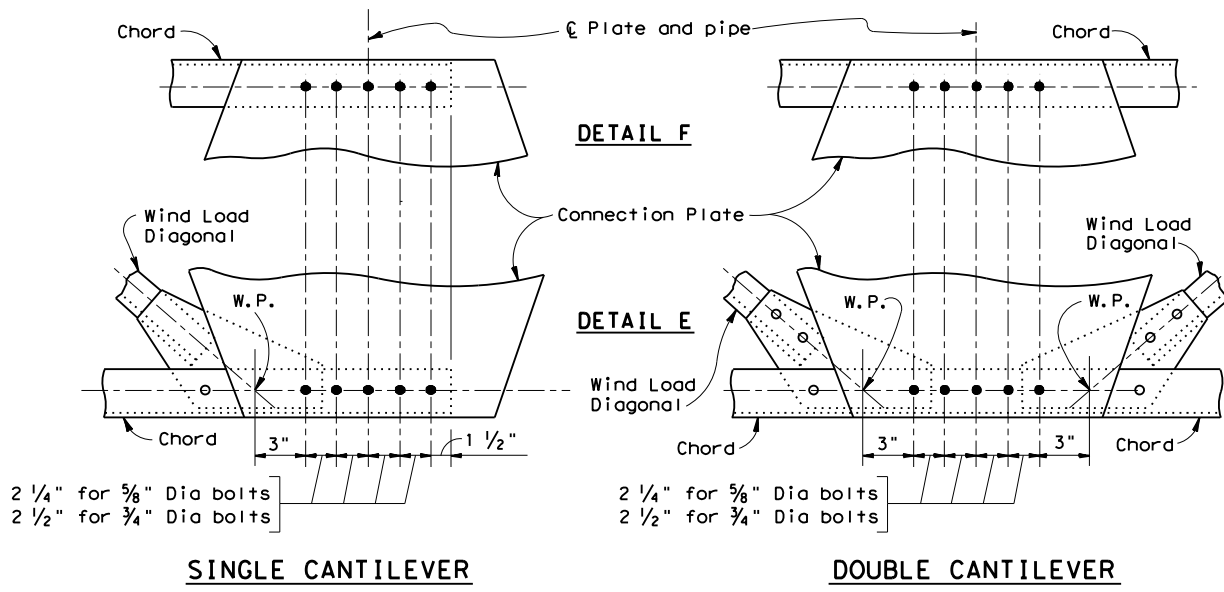
Texas Department of Transportation
Traffic Operations Division

**CANTILEVER OVERHEAD
SIGN SUPPORT DETAILS**

COSSD

| | | | | | |
|-----------------------|------|-----------|-----------|-----------|-----------|
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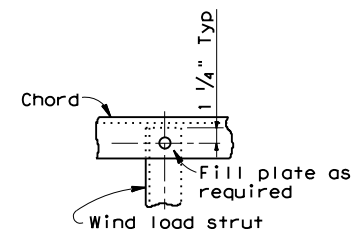


2 1/4" for 5/8" Dia bolts
2 1/2" for 3/4" Dia bolts

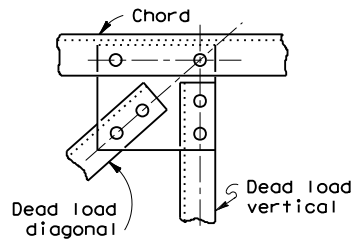
SINGLE CANTILEVER

DOUBLE CANTILEVER

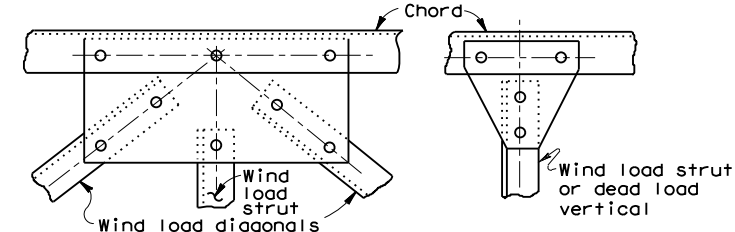
CONNECTION DETAILS



DETAIL B

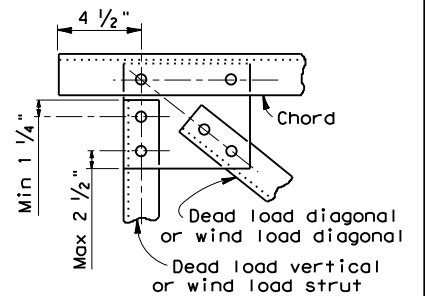


DETAIL C



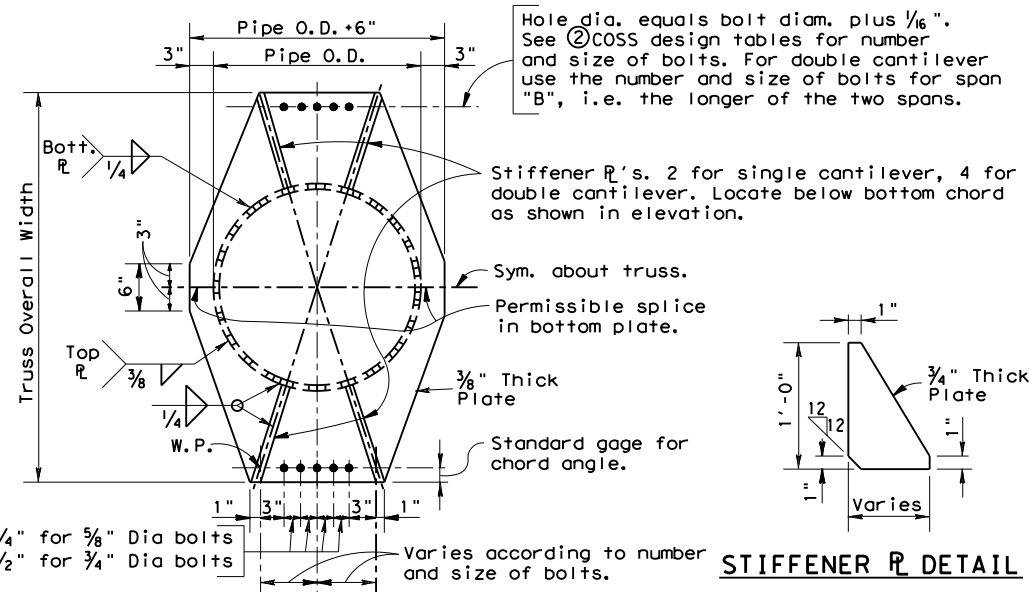
DETAIL A

DETAIL D

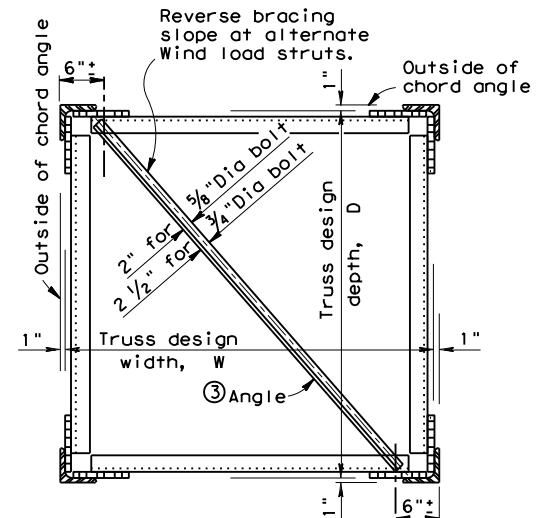


DETAIL G

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

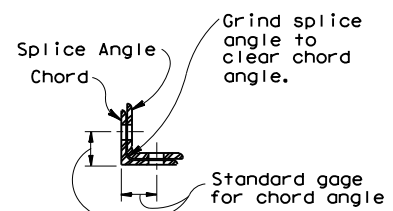


STIFFENER PLATE DETAIL

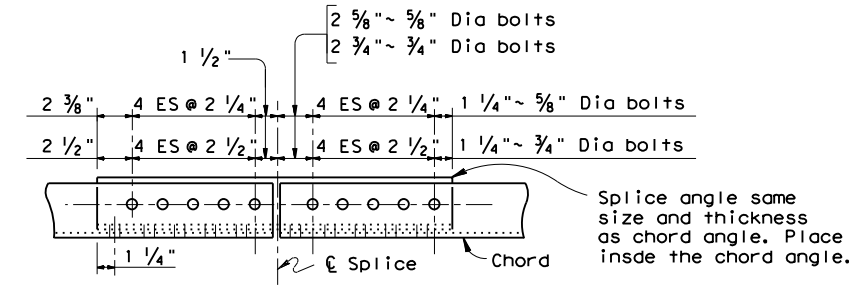


TRUSS SECTION

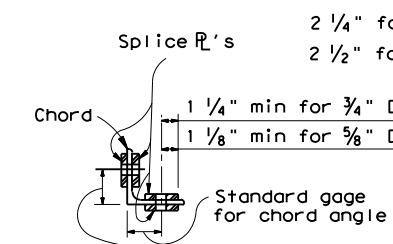
(DIAGONALS NOT SHOWN)



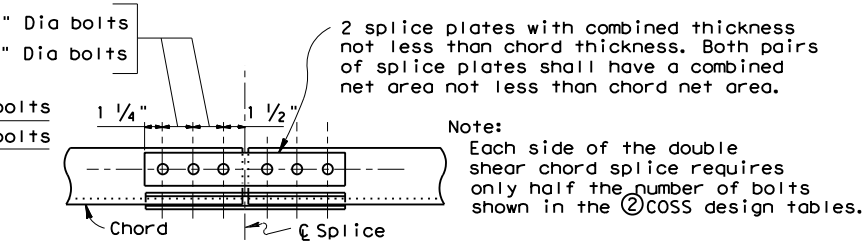
SECTION ON CHORD SPLICE



SINGLE SHEAR CHORD SPLICE



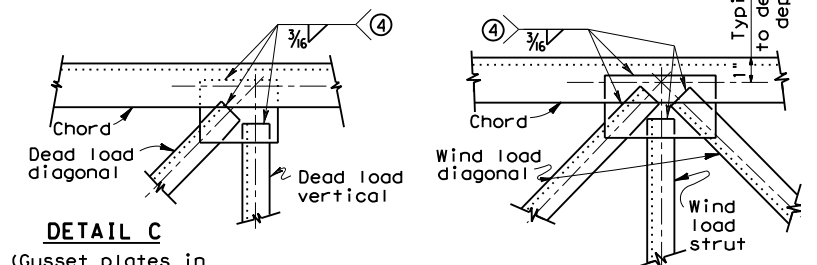
SECTION ON CHORD SPLICE



DOUBLE SHEAR CHORD SPLICE

SPLICE DETAILS

CONNECTION PLATE DETAIL



DETAIL C

DETAIL A

ALTERNATE WELDED CONNECTION DETAILS

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

**CANTILEVER OVERHEAD
SIGN SUPPORT DETAILS**

COSSD

| | | | | | |
|-----------------------|------|-----------|-----------|-----------|-----------|
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| DIST | | COUNTY | | SHEET NO. | |
| ELP | | HUDSPETH | | 49 | |

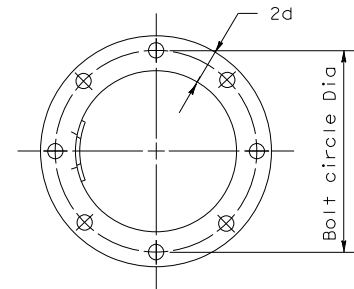
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Washers shall conform to ASTM F436.

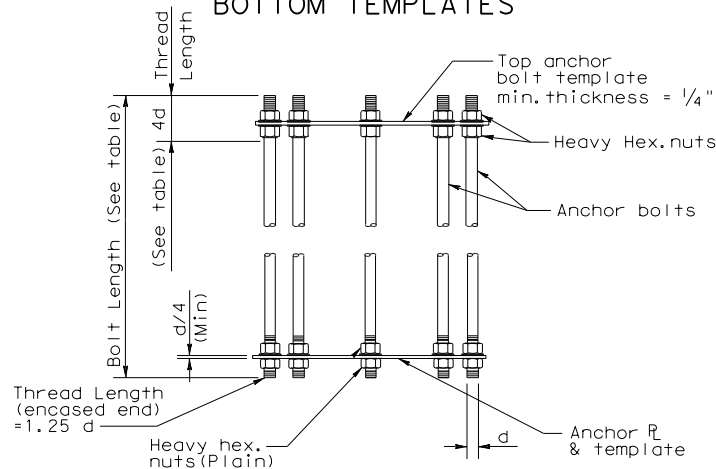
| ANCHOR BOLT DIA. d | WASHER DIMENSIONS | | | HOLE IN BASE PLATE | |
|-----------------------|-------------------|---------------|-----------|--------------------|-----------|
| | OUTSIDE DIAMETER | HOLE DIAMETER | THICKNESS | | |
| | | | MIN. | | MAX. |
| 1 1/2" or less | 2d | d + 1/8" | 0.136" | 0.177" | d + 1/4" |
| 1 3/4" | 2d - 1/8" | d + 1/8" | 0.178" | 0.280" | d + 5/16" |
| 2" | 2d - 1/4" | d + 1/8" | 0.178" | 0.280" | d + 5/16" |
| Over 2" | 2d - 1/2" | d + 1/8" | 0.240" | 0.340" | d + 5/16" |

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

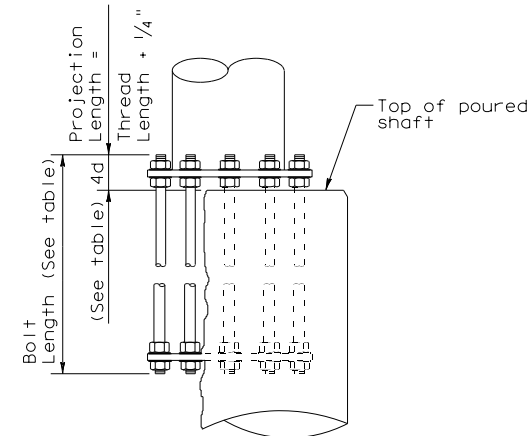
- ① Anchor Bolt Fabrication Tolerances:
 Bolt Length ~ ±1/2"
 Thread Length ~ ±1/2"
 Galvanized Length ~ -1/4"
- ② Thread length applies to upper and lower threads



TOP VIEW OF TOP & BOTTOM TEMPLATES

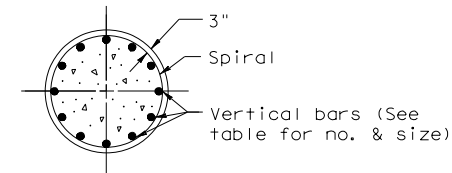


ANCHOR BOLT ASSEMBLY (PRIOR TO INSTALLATION)

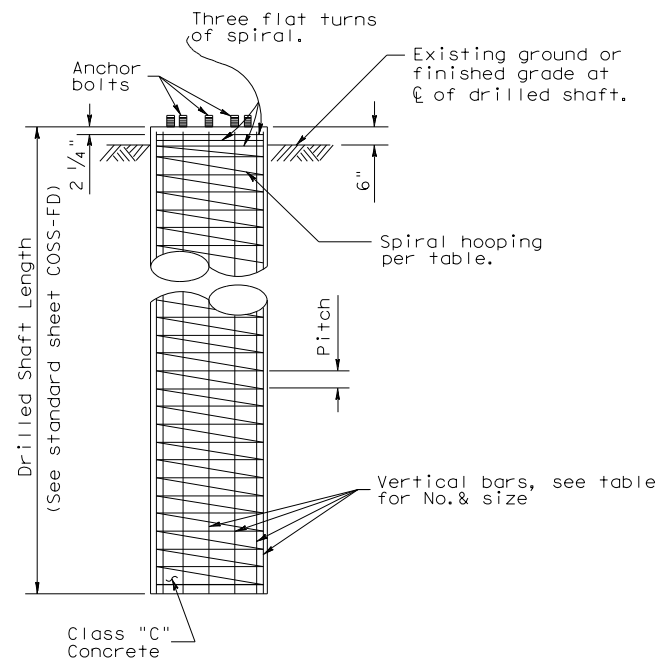


BEARING SEAT ELEVATION

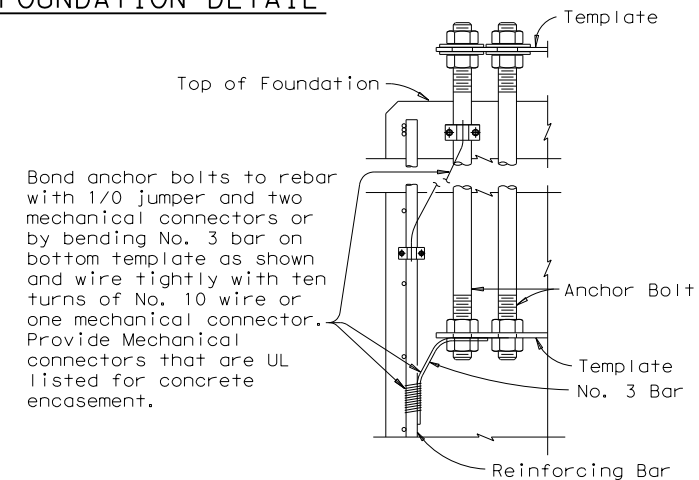
| ANCHOR BOLT SIZE | PIPE OUTSIDE DIAMETER | | | | | | | | | | | |
|---------------------|-----------------------|--------------------|---------------------|-----------------|--------------------|---------------------|-----------------|--------------------|---------------------|-----------------|--------------------|---------------------|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



SECTION



FOUNDATION DETAIL

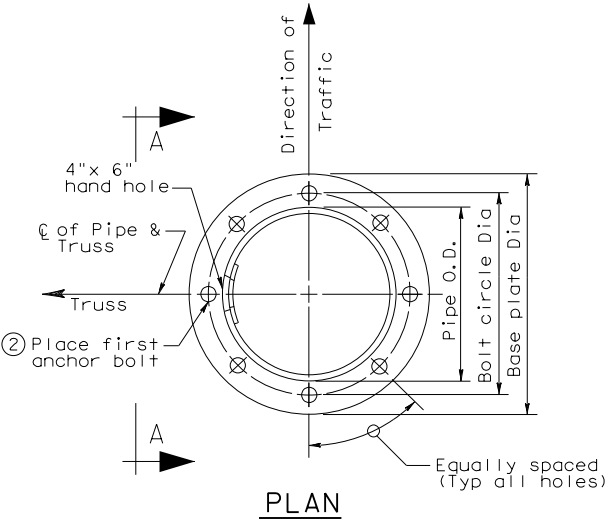


LIGHTNING PROTECTION SYSTEM

- 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 1/2" pitch (Grade 60)

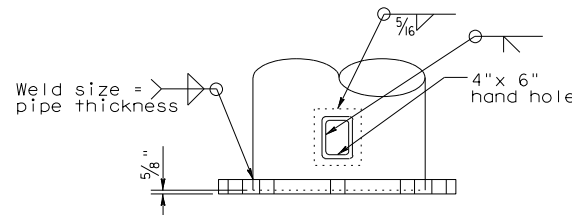
GENERAL NOTES

- Concrete shall be Class "C".
- Reinforcing shall conform to Item 440, "Reinforcing Steel".
- Anchor bolts and nuts for anchor bolts shall be "Alloy Steel" per Item 449, "Anchor Bolts".
- 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.
- 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".
- All vertical reinforcing shall be carried to the bottom of the Drilled Shaft.



PLAN

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



VIEW A-A

③ BASE PLATE & HANDHOLE DETAILS

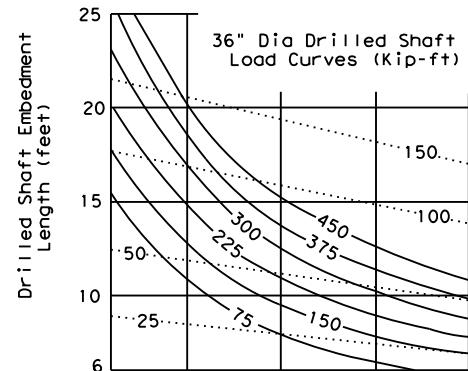
- ③ See "Cantilever Overhead Sign Support" or "High Level Cantilever Overhead Sign Support" sheets for Diameter and thickness of base plate.

DATE: 1/4/2024
 FILE: cossf-21.dgn

| | | | | | |
|--|-----------|----------|-----------|---|--|
| | | | | Traffic Safety Division Standard | |
| CANTILEVER OVERHEAD SIGN SUPPORT FOUNDATION | | | | | |
| COSS-F-21 | | | | | |
| FILE: cossf-21.dgn | DN: | CK: | DW: | CK: | |
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| 8-21 | REVISIONS | 0002 07 | 057, ETC | IH-10 | |
| | DIST | COUNTY | SHEET NO. | | |
| | ELP | HUDSPETH | 50 | | |

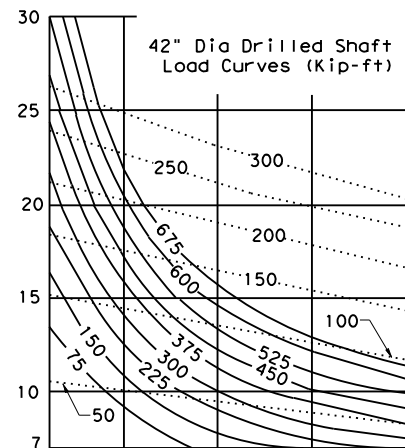
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 FILE: stds68.dgn



| | | | | | |
|---|-------|-----|-----|-----|-----|
| ① | 28.5° | 30° | 32° | 34° | 36° |
| ② | 12 | 21 | 35 | 50 | 65 |

- ① ϕ = 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)

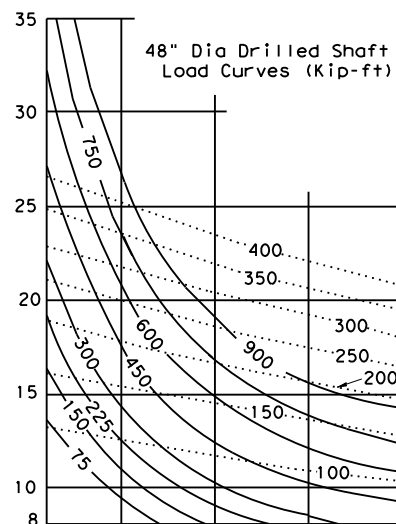


| | | | | | |
|---|-------|-----|-----|-----|-----|
| ① | 28.5° | 30° | 32° | 34° | 36° |
| ② | 12 | 21 | 35 | 50 | 65 |

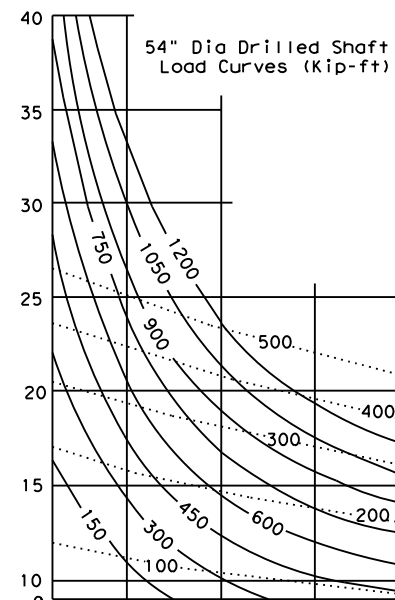
③ SUBMERGED SAND SOIL (COHESIONLESS)

Moment _____
 Torsion

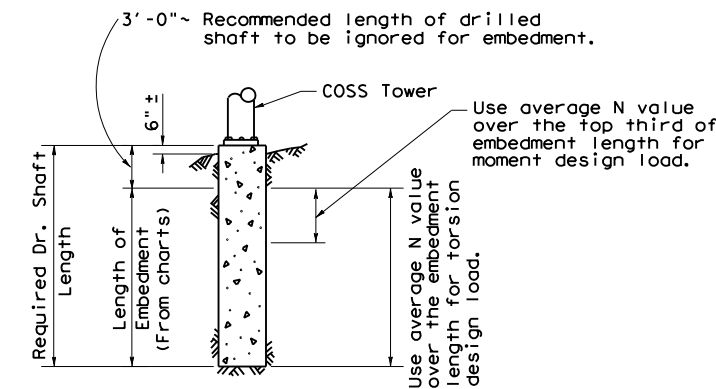
③ Note:
 For unsubmerged sands and clayey sands the charts for clay soil will give a conservative foundation design.



| | | | | | |
|---|-------|-----|-----|-----|-----|
| ① | 28.5° | 30° | 32° | 34° | 36° |
| ② | 12 | 21 | 35 | 50 | 65 |



| | | | | | |
|---|-------|-----|-----|-----|-----|
| ① | 28.5° | 30° | 32° | 34° | 36° |
| ② | 12 | 21 | 35 | 50 | 65 |

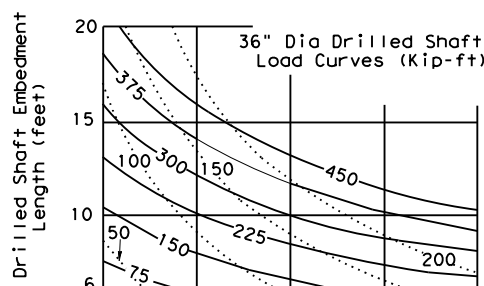


PROCEDURE:

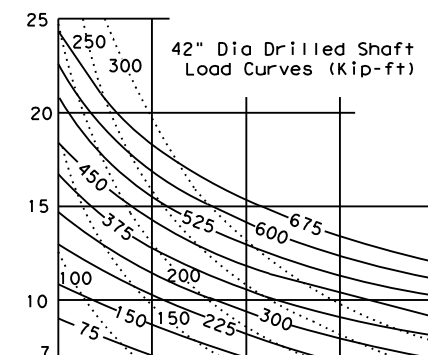
1. Determine design moment and torsion, and the required drilled shaft diameter as outlined in the selection example sheet COSS-SE.
2. Make an initial estimate of the required embedment length.
3. From soil exploration data determine type of soil and average N value or soil property along the upper third 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.



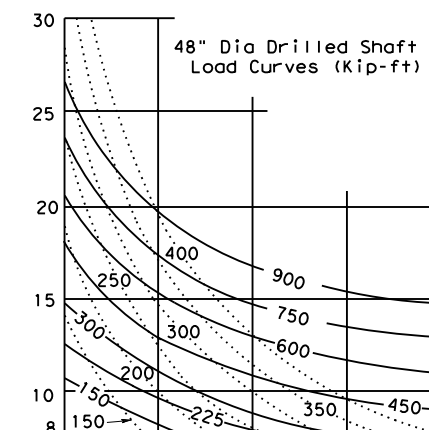
| | | | | | |
|---|-----|------|------|------|------|
| ④ | 4 | 8 | 12 | 16 | 20 |
| ⑤ | 576 | 1152 | 1728 | 2304 | 2880 |
| ② | 10 | 20 | 30 | 40 | 50 |



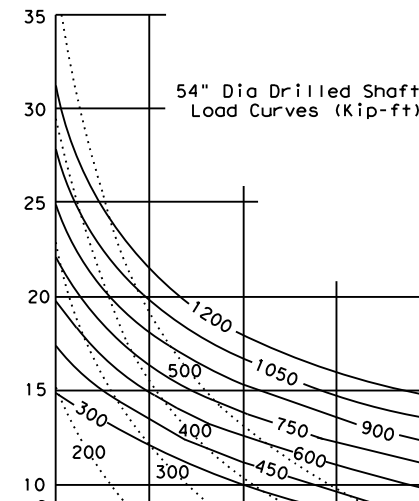
| | | | | | |
|---|-----|------|------|------|------|
| ④ | 4 | 8 | 12 | 16 | 20 |
| ⑤ | 576 | 1152 | 1728 | 2304 | 2880 |
| ② | 10 | 20 | 30 | 40 | 50 |

CLAY SOIL (COHESIVE)

Moment _____
 Torsion



| | | | | | |
|---|-----|------|------|------|------|
| ④ | 4 | 8 | 12 | 16 | 20 |
| ⑤ | 576 | 1152 | 1728 | 2304 | 2880 |
| ② | 10 | 20 | 30 | 40 | 50 |



| | | | | | |
|---|-----|------|------|------|------|
| ④ | 4 | 8 | 12 | 16 | 20 |
| ⑤ | 576 | 1152 | 1728 | 2304 | 2880 |
| ② | 10 | 20 | 30 | 40 | 50 |



FOUNDATION EMBEDMENT SELECTION CHARTS

COSS-FD

| | | | | | |
|-----------------------|--|-----------|-----------|-----------|-----------|
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| | | ELP | HUDSPETH | | 51 |

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 FILE: ed1-14.dgn

GENERAL NOTES FOR ALL ELECTRICAL WORK

- The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.
- Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered 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.
- Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is 1/2 in. or less in diameter.
- Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.
- Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.
- When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

- Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.
- Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.
- Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.


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

- Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.
- Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.
- Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.
- Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

- Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.
- When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.
- Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

- Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.
- Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.
- Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.
- Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.
- When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."
- Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.
- During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.
- Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.
- Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.
- Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.
- At all electrical services, install a 6 AWG solid copper grounding electrode conductor.
- Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).
- Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.
- File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

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|---|--------------|------|----------|---|-----------|
|  | | | | Traffic Operations Division Standard | |
| <h1>ELECTRICAL DETAILS CONDUITS & NOTES</h1> | | | | | |
| <h2>ED(1) - 14</h2> | | | | | |
| FILE: | ed1-14.dgn | DN: | CK: | DW: | CK: |
| © TxDOT | October 2014 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | | 0002 | 07 | 057, ETC | IH-10 |
| | | DIST | COUNTY | | SHEET NO. |
| | | ELP | HUDSPETH | | 52 |

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.

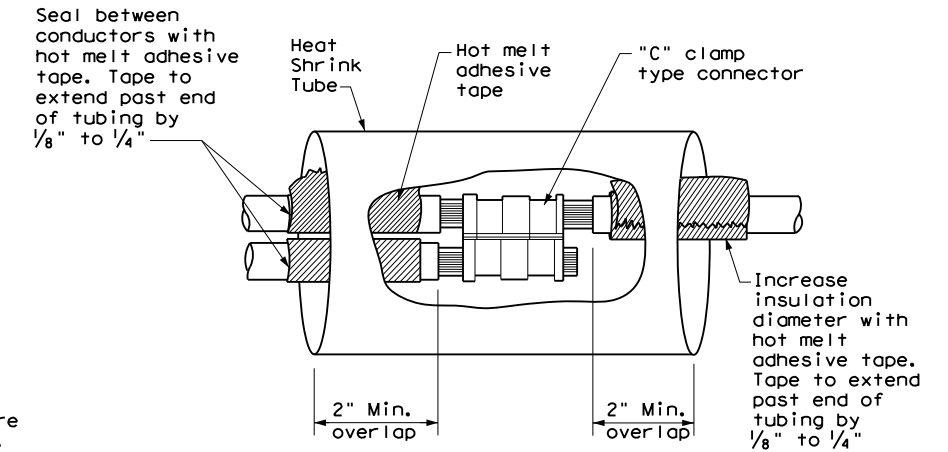
B. CONSTRUCTION METHODS

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.



**SPLICE OPTION 1
Compression Type**

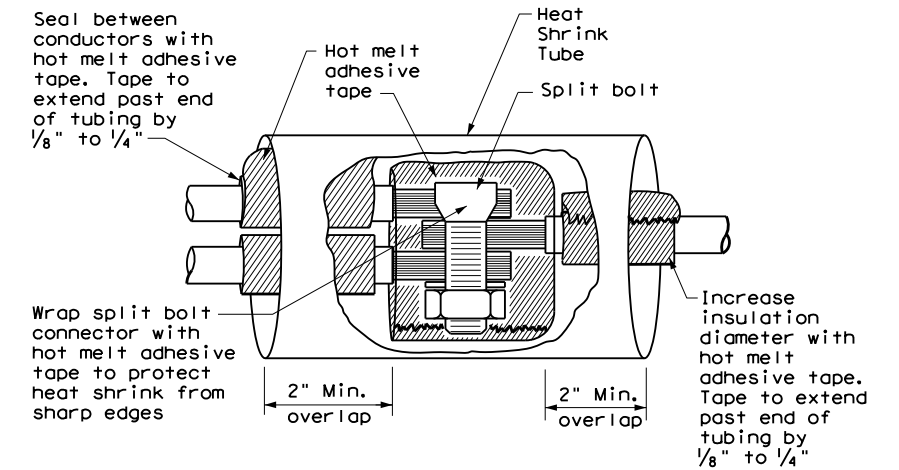
GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

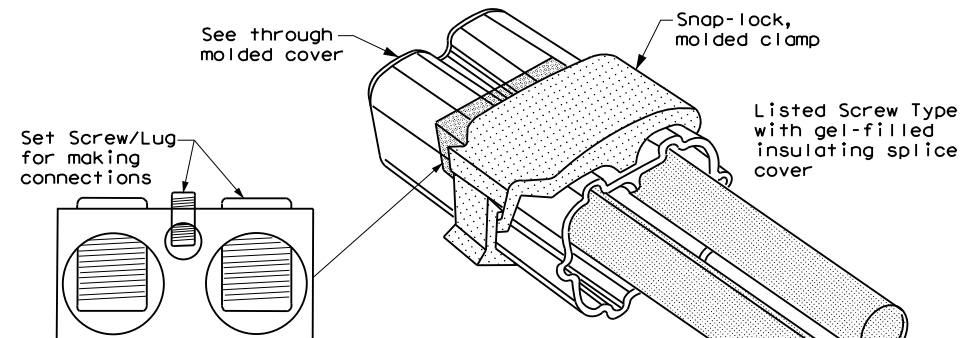
1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in 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 2
Split Bolt Type**



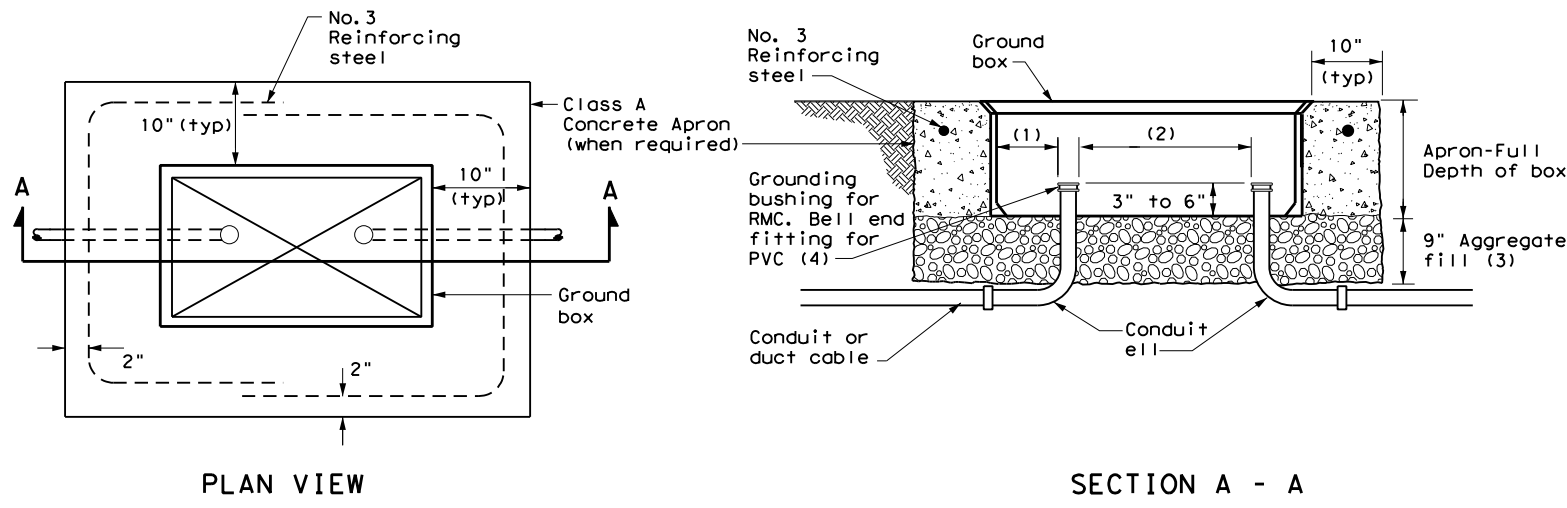
**SPLICE OPTION 3
Listed Screw Type**

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DATE: 1/4/2024
FILE: ed3-14.dgn

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| | | Texas Department of Transportation | | Traffic Operations Division Standard | |
| <h1>ELECTRICAL DETAILS CONDUCTORS</h1> | | | | | |
| <h2>ED(3) - 14</h2> | | | | | |
| FILE: | ed3-14.dgn | DN: | TxDOT | CK: | TxDOT |
| © TxDOT | October 2014 | CON: | 07 | JOB: | 057, ETC |
| REVISIONS | | SECT: | | HIGHWAY: | IH-10 |
| | | DIST: | | COUNTY: | HUDSPETH |
| | | ELP: | | SHEET NO.: | 53 |

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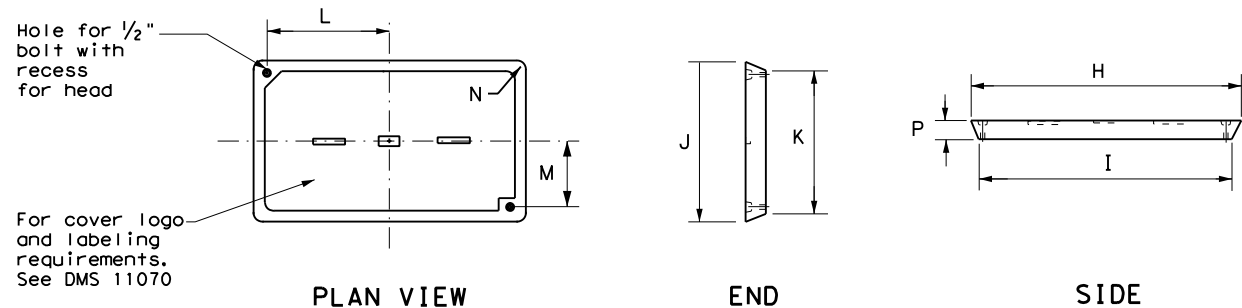


APRON FOR GROUND BOX

- (1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.
- (2) Maintain sufficient space between conduits to allow for proper installation of bushing.
- (3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.
- (4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

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

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



GROUND BOX COVER

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."
2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

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

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

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.
2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.
3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.
4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.
5. Temporarily seal all conduits in the ground box until conductors are installed.
6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.
7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.
8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.
9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.
10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.
11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

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| | | | | Traffic Operations Division Standard | |
| ELECTRICAL DETAILS GROUND BOXES | | | | | |
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| REVISIONS | | 0002 | 07 | 057, ETC | IH-10 |
| DIST: | ELP | COUNTY: | HUDSPETH | SHEET NO.: | 54 |

ELECTRICAL SERVICES NOTES

- Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.
- Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services," DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.
- Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.
- Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.
- The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed #2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock #2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock #2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.
- Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.
- When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.
- Provide wiring and electrical components rated for 75°C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.
- All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.
- Provide rigid metal conduit (RMC) for all conduits on service, except for the 1/2 in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.
- Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.
- Ensure all mounting hardware and installation details of services conform to utility company specifications.
- For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 1/2 in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.
- When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 1/2 in. x 11 in. before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pocket.
- Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

- Provide threaded hub for all conduit entries into the top of enclosure.
- Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photoceII or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.
- Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.
- Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

- Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.
- When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

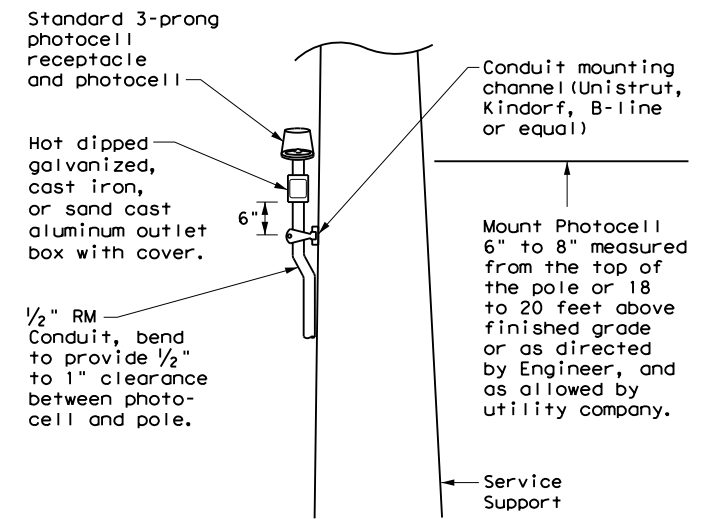
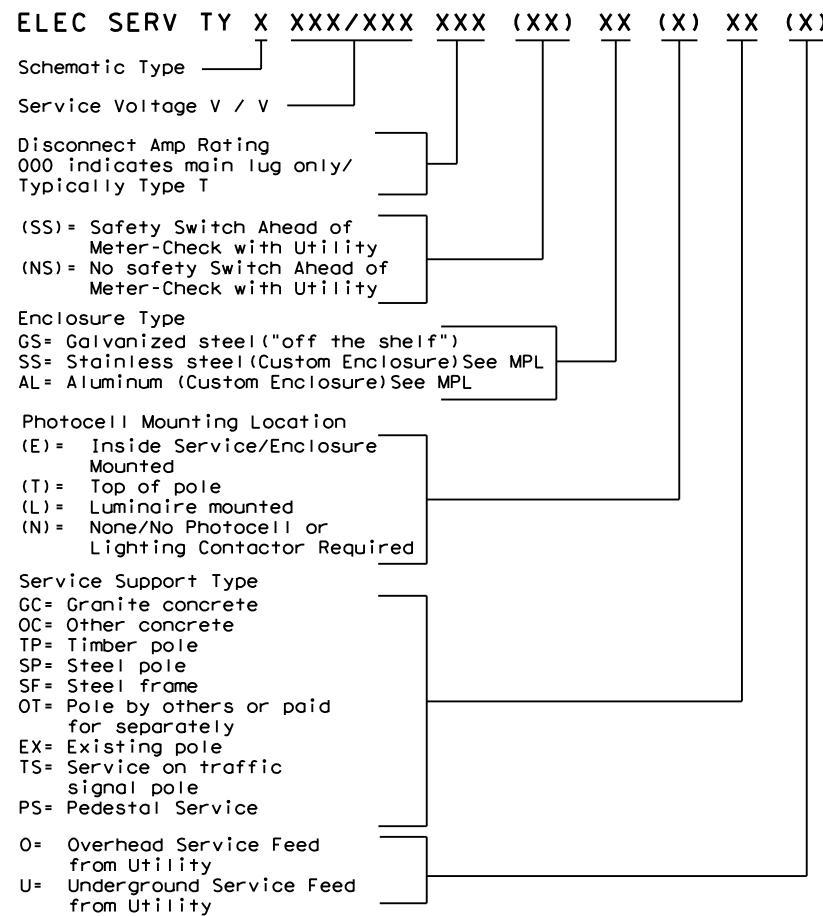
PHOTOELECTRIC CONTROL

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

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

* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.
 ** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National Electrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE



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

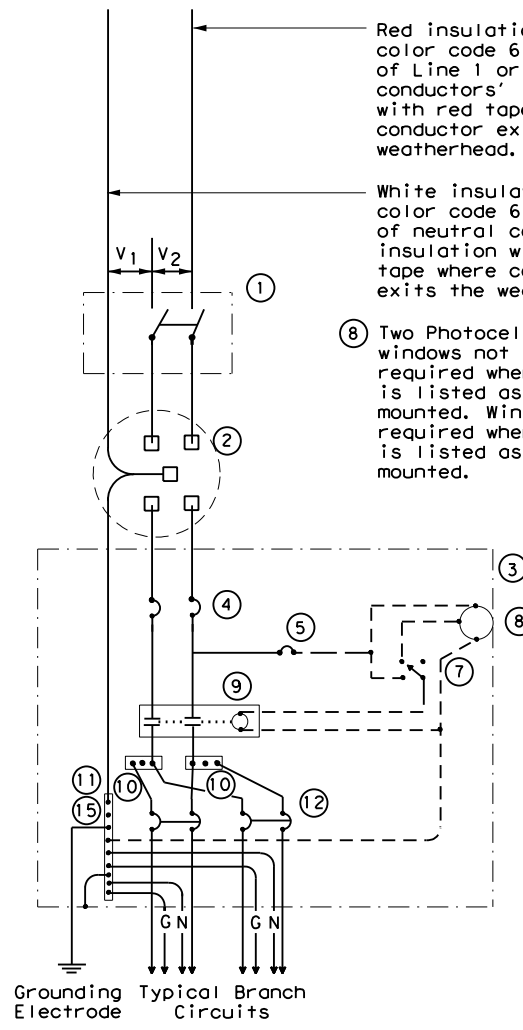
ELECTRICAL DETAILS SERVICE NOTES & DATA

ED(5) - 14

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| FILE: ed5-14.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
| © TxDOT October 2014 | CONT | SECT | JOB | HIGHWAY |
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| DIST | COUNTY | SHEET NO. | | |
| ELP | HUDSPETH | 55 | | |

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**SCHEMATIC TYPE A
THREE WIRE**

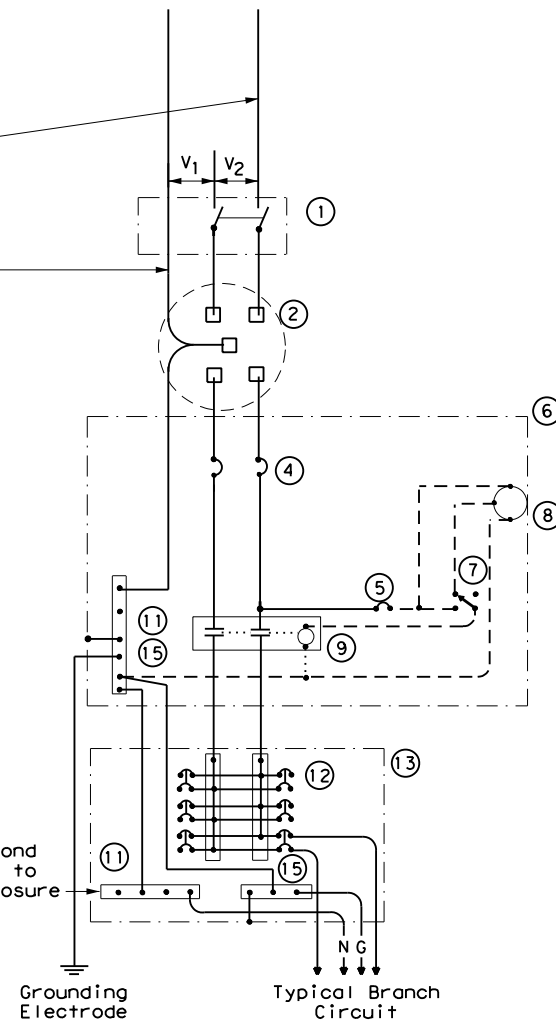
Red insulation or color code 6" length of Line 1 or Line 2 conductors' insulation with red tape where conductor exits the weatherhead.

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

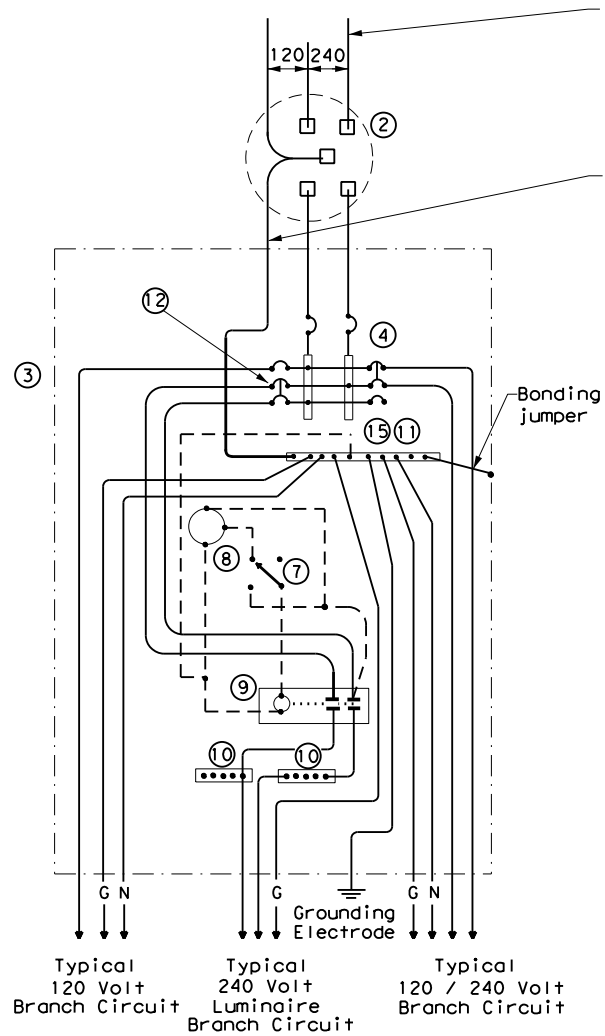
⑧ Two Photocell viewing windows not shown but required when photocell is listed as enclosure mounted. Windows not required when photocell is listed as pole top mounted.

Do not bond this bus to the enclosure

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



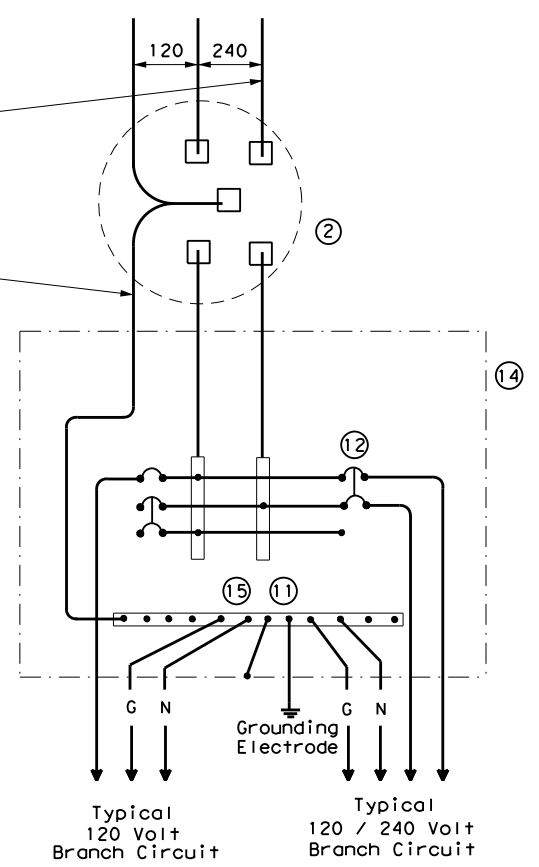
**SCHEMATIC TYPE C
THREE WIRE**



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

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

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



**SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE**
Galvanized steel-"Buy Off The Shelf" only. When required install photocell top of the pole or on luminaire only, no lighting contractor will be installed.

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

| | | | | | |
|---|--------------|-----------|-------|--------------------------------------|----------|
| | | | | Traffic Operations Division Standard | |
| ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES | | | | | |
| ED(6) - 14 | | | | | |
| FILE: | ed6-14.dgn | DN: | TxDOT | CK: | TxDOT |
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| DIST: | COUNTY: | SHEET NO. | | | |
| ELP | HUDSPETH | 56 | | | |

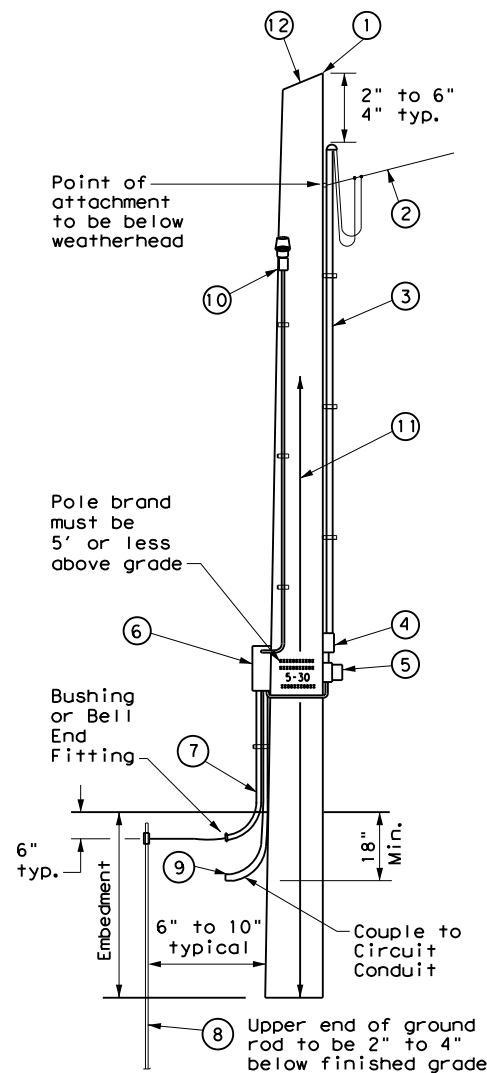
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TIMBER POLE (TP) SERVICE SUPPORT NOTES

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

- ① Class 5 pole, height as required
- ② Service drop from utility company (attached below weatherhead)
- ③ Service conduit (RMC) and service entrance conductors - One Red, One Black, One White (See Electrical Service Data)
- ④ Safety switch (when required)
- ⑤ Meter (when required)
- ⑥ Service enclosure
- ⑦ 6 AWG bare grounding electrode conductor in $\frac{1}{2}$ in. PVC to ground rod - extend $\frac{1}{2}$ in. PVC 6 in. underground.
- ⑧ $\frac{5}{8}$ in. x 8 ft. Copper clad ground rod - drive ground rod to a depth of 2 in. to 4 in. below grade.
- ⑨ RMC same size as branch circuit conduit.
- ⑩ See pole-top mounted photocell detail on ED(5).
- ⑪ When required by the serving utility provide bare 6 AWG copper conductor. Run wire from pole top to butt wrap or copper butt plate. Protect conductor with non-conductive material to a height of 8 ft. above finished grade.
- ⑫ When required by utility, cut top of pole at an angle to enhance rain run off.

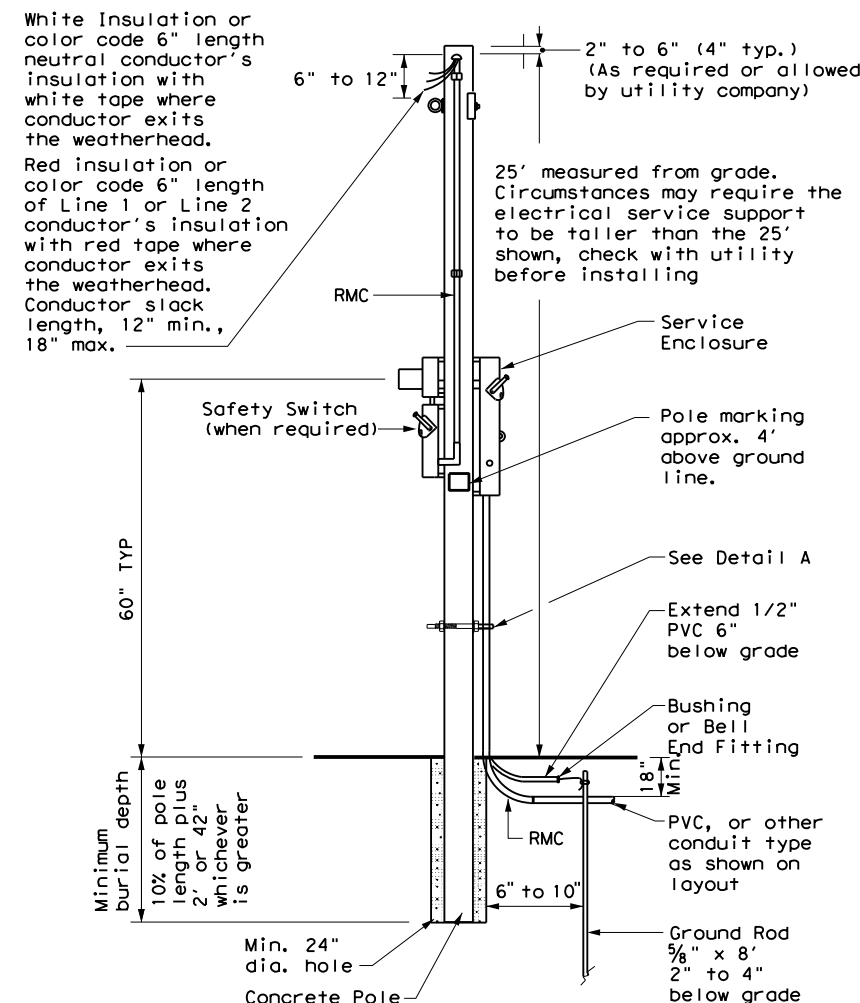


SERVICE SUPPORT TYPE TP (O)

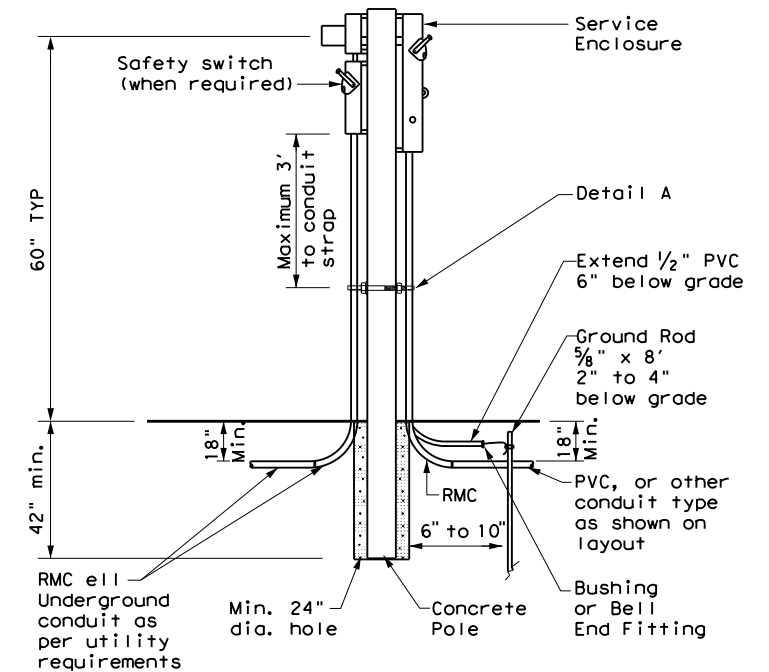
GRANITE CONCRETE (GC) & OTHER CONCRETE (OC) NOTES

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

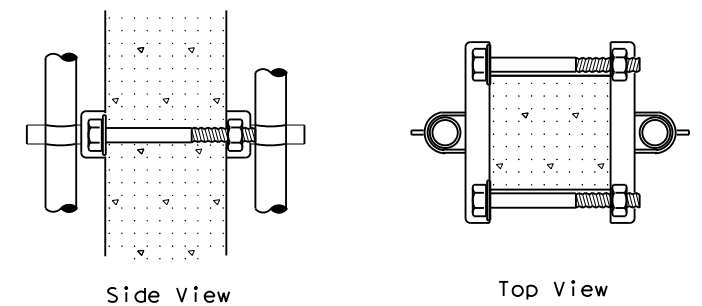
1. Provide GC and OC poles that meet the requirements of DMS 11080 "Electrical Services."
2. Provide prestressed concrete poles suitable for direct embedment into the ground without special foundations.
3. Verify poles are marked as required on DMS 11080. Location of marking should be approximately 4'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



CONCRETE SERVICE SUPPORT Overhead (O)



CONCRETE SERVICE SUPPORT Underground (U)



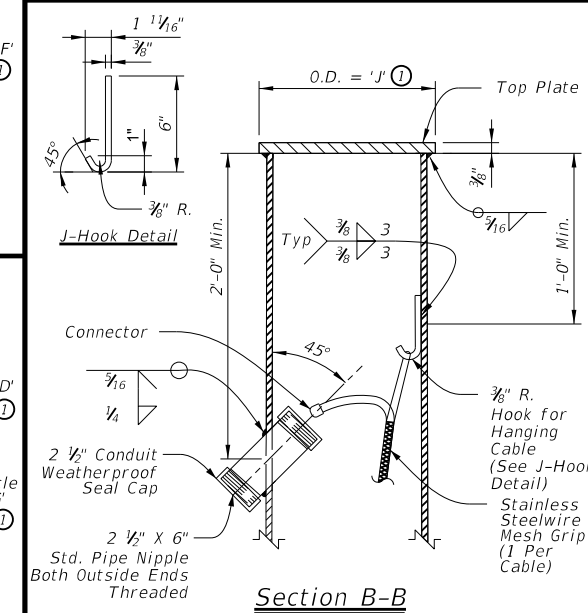
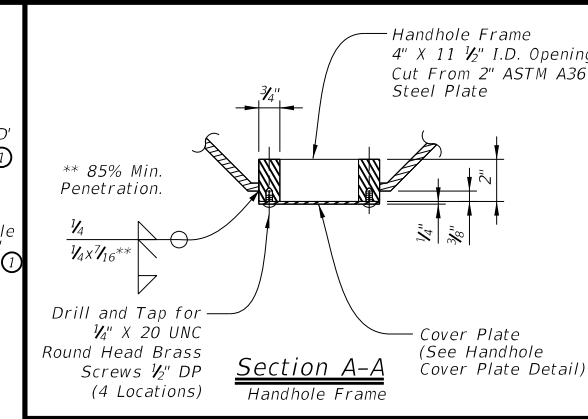
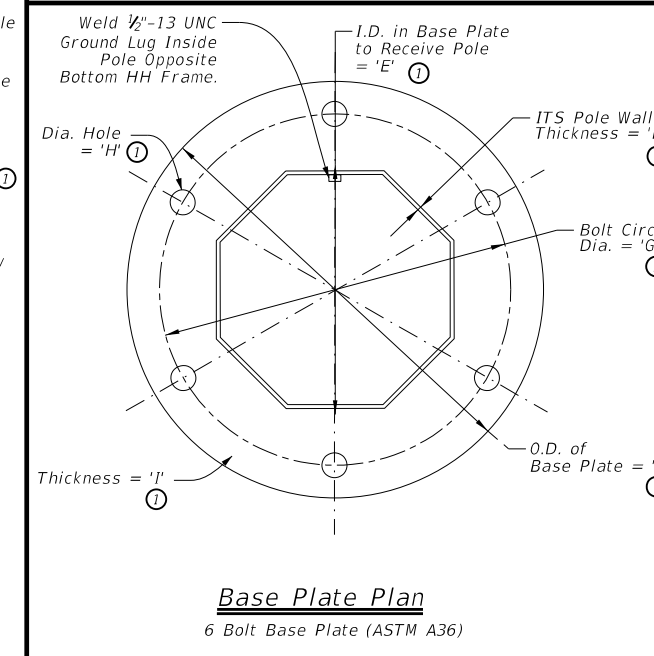
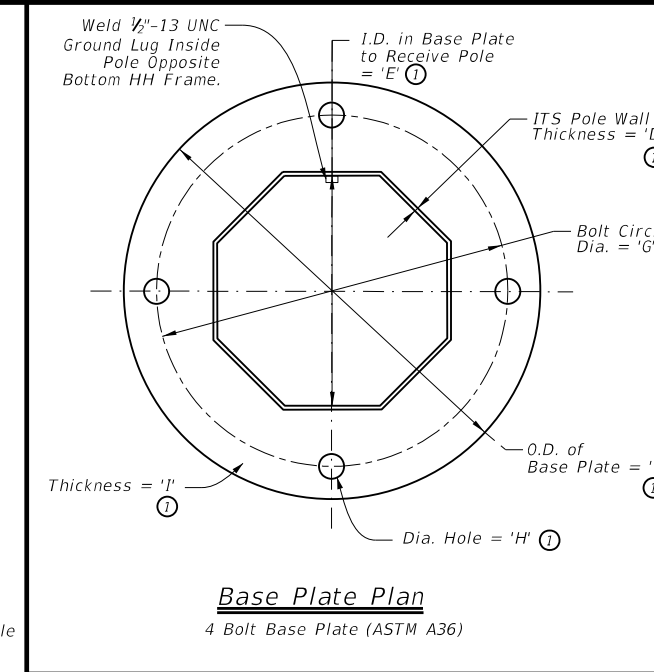
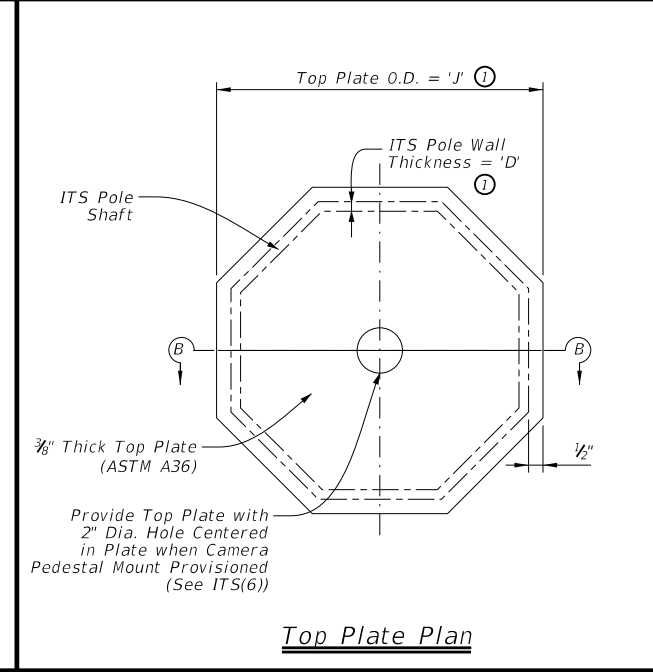
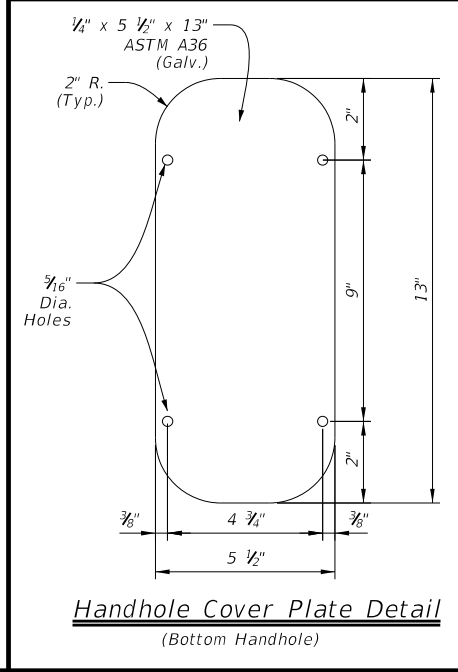
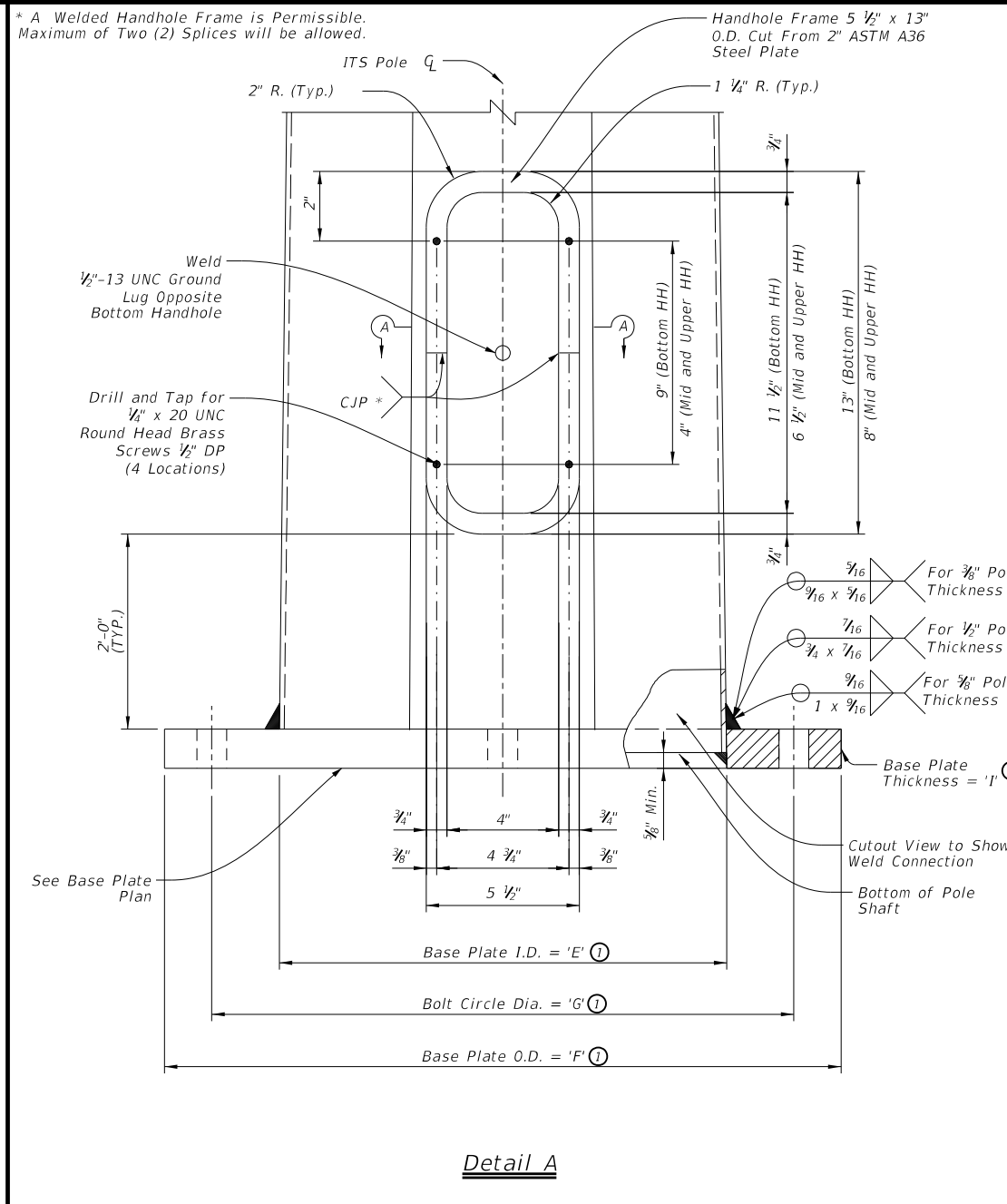
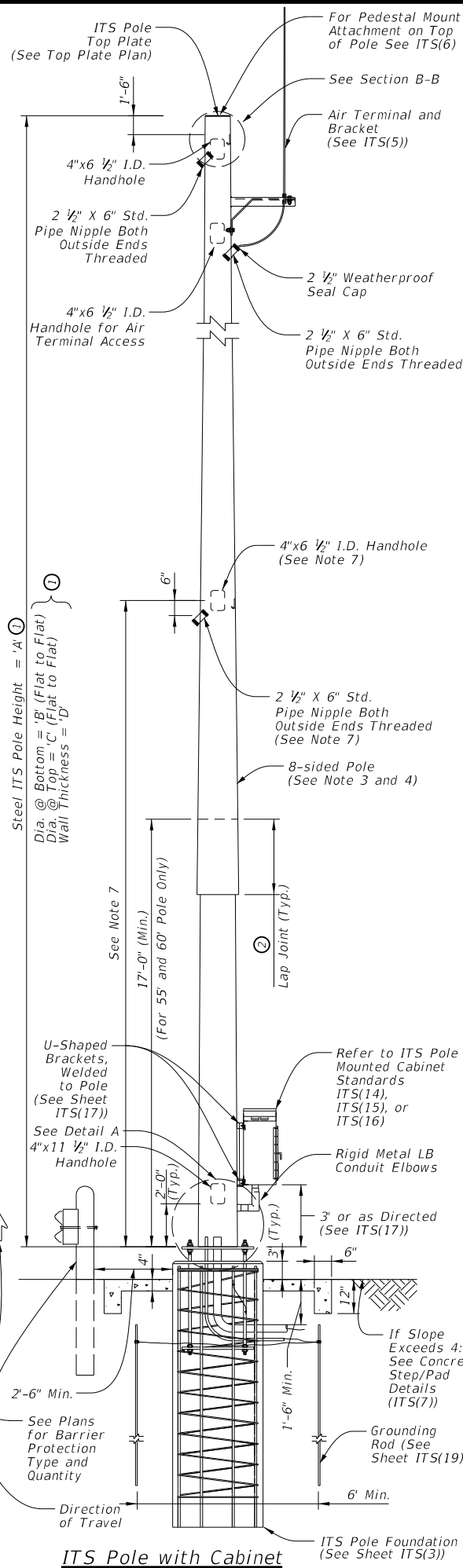
DETAIL A

See Note 7. Before installing channel that has been cut, file sharp edges and paint with zinc-rich paint. Ensure there is no paint splatter on the pole.

| | | | |
|--|-----------|--------------------------------------|----------------|
| | | Traffic Operations Division Standard | |
| ELECTRICAL DETAILS SERVICE SUPPORT TYPES GC, OC, & TP | | | |
| ED(10)-14 | | | |
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FILE: its(1)-15.dgn



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.

Texas Department of Transportation Traffic Operations Division Standard

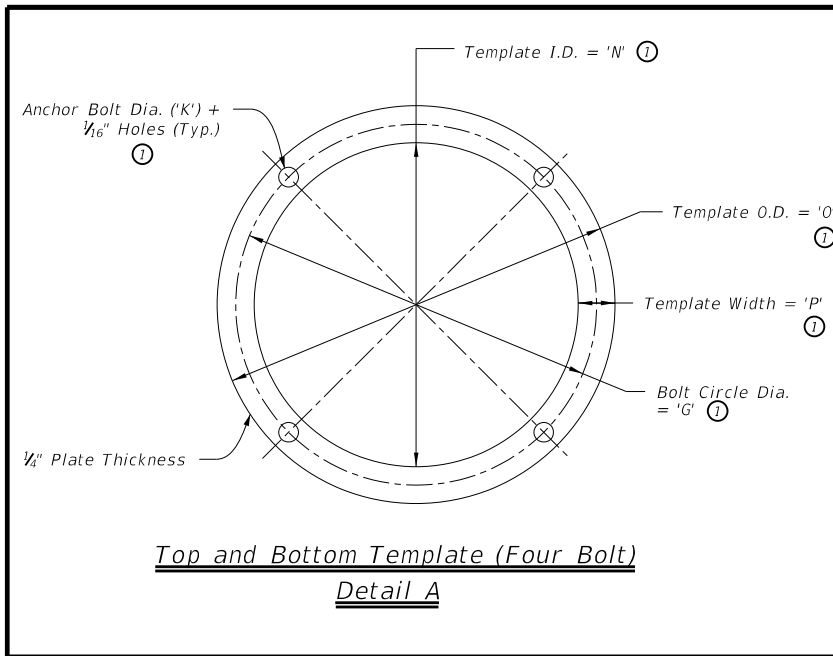
ITS POLE DETAILS OCTAGONAL POLE (EIGHT SIDED POLE)

ITS(1)-15

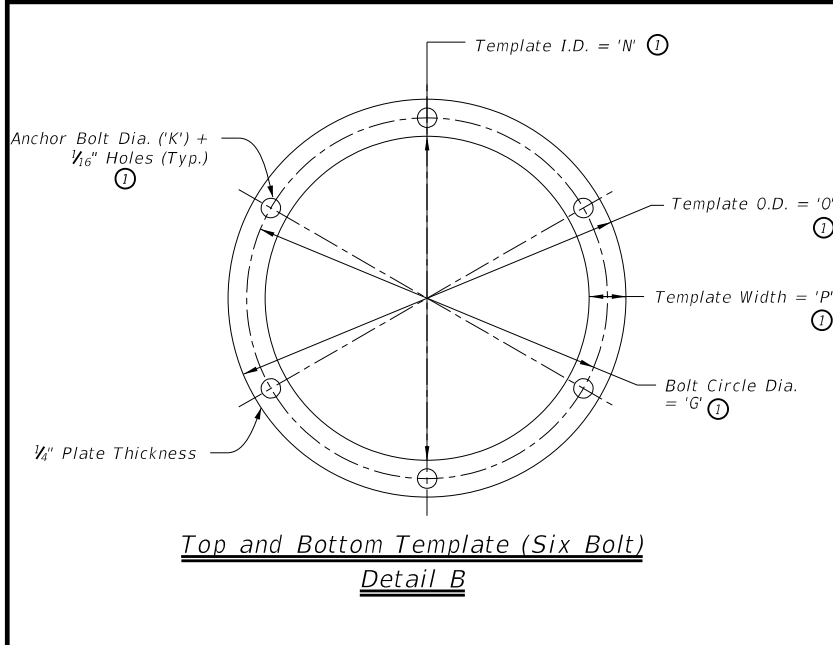
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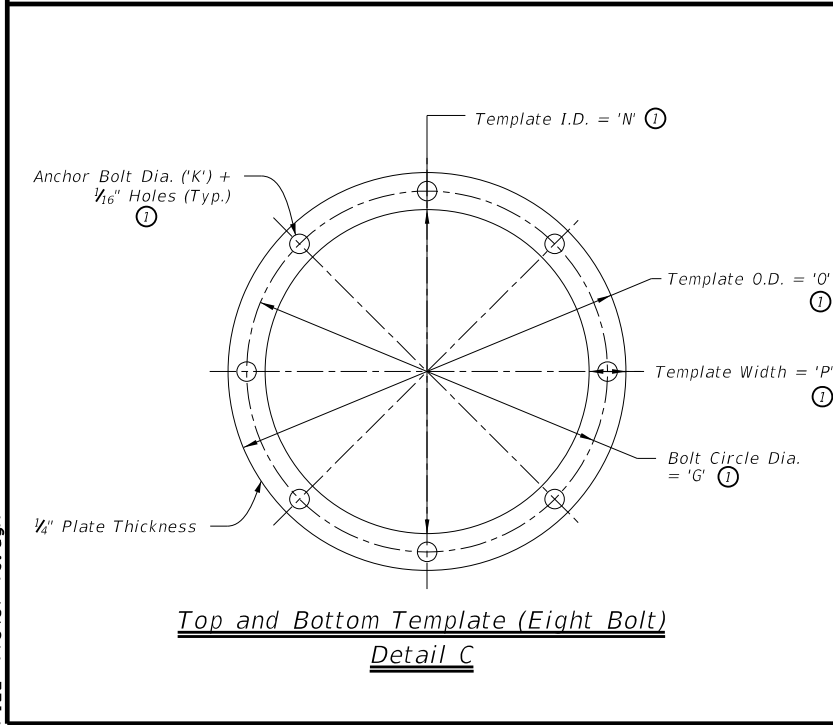
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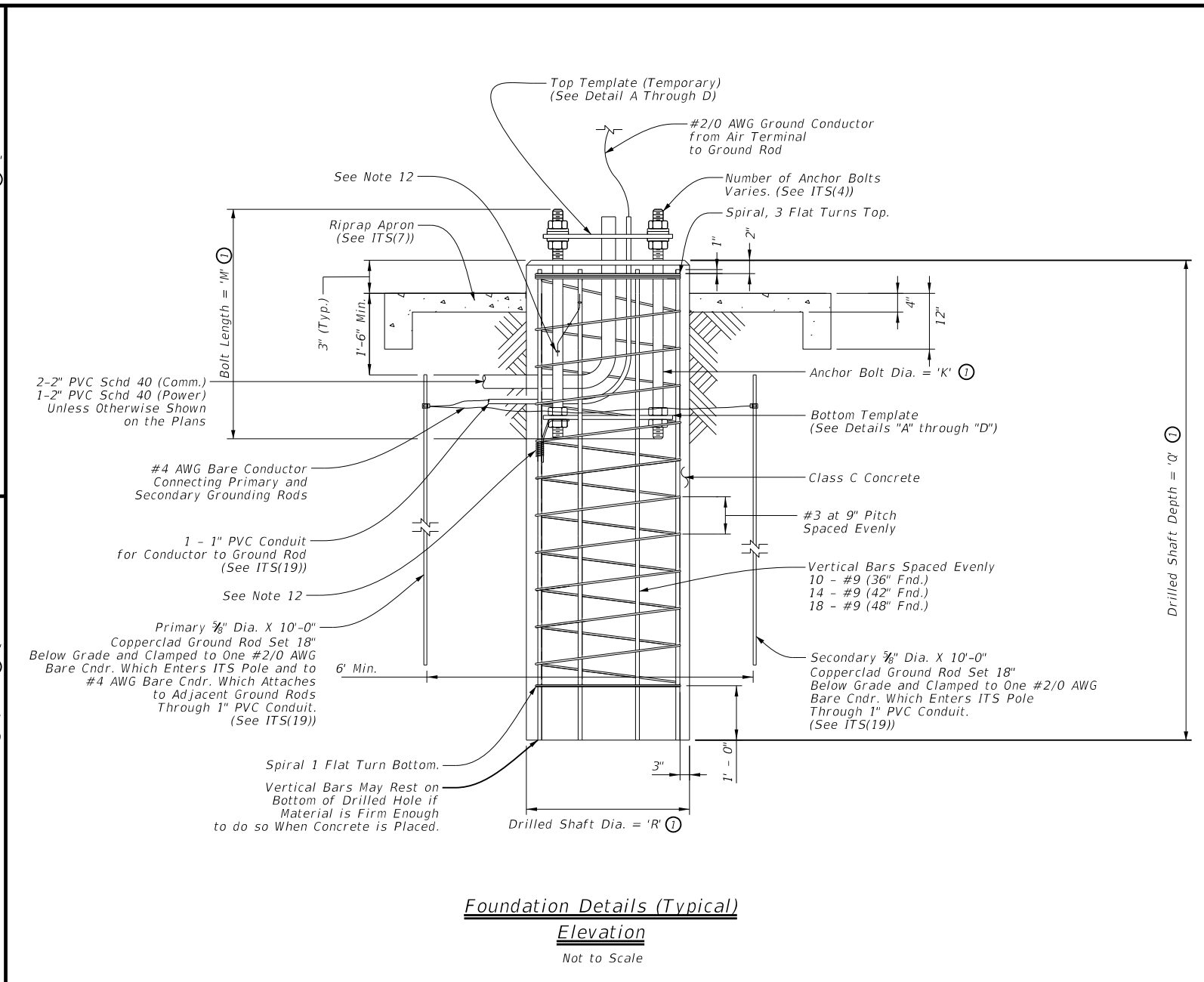
Top and Bottom Template (Four Bolt)
Detail A



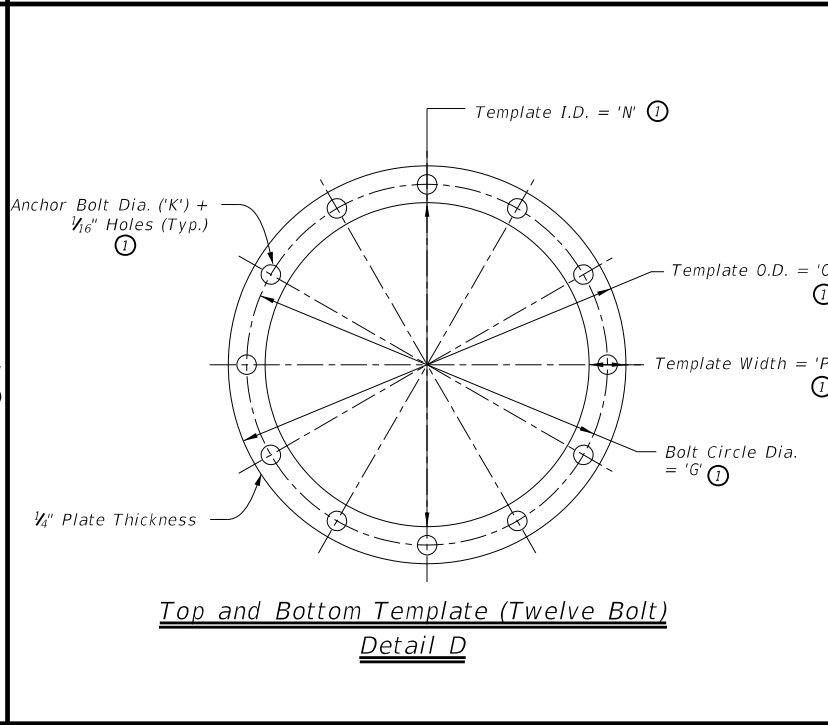
Top and Bottom Template (Six Bolt)
Detail B



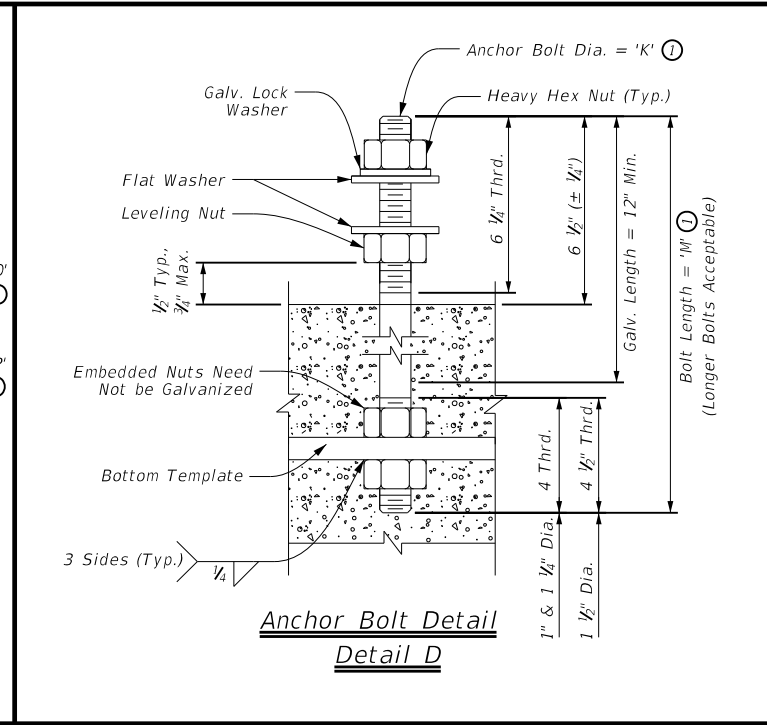
Top and Bottom Template (Eight Bolt)
Detail C



Foundation Details (Typical)
Elevation
Not to Scale



Top and Bottom Template (Twelve Bolt)
Detail D



Anchor Bolt Detail
Detail D

- 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.

- Reference Notes:**
- ① See tables on Sheet ITS(4) for values of dimension variables.



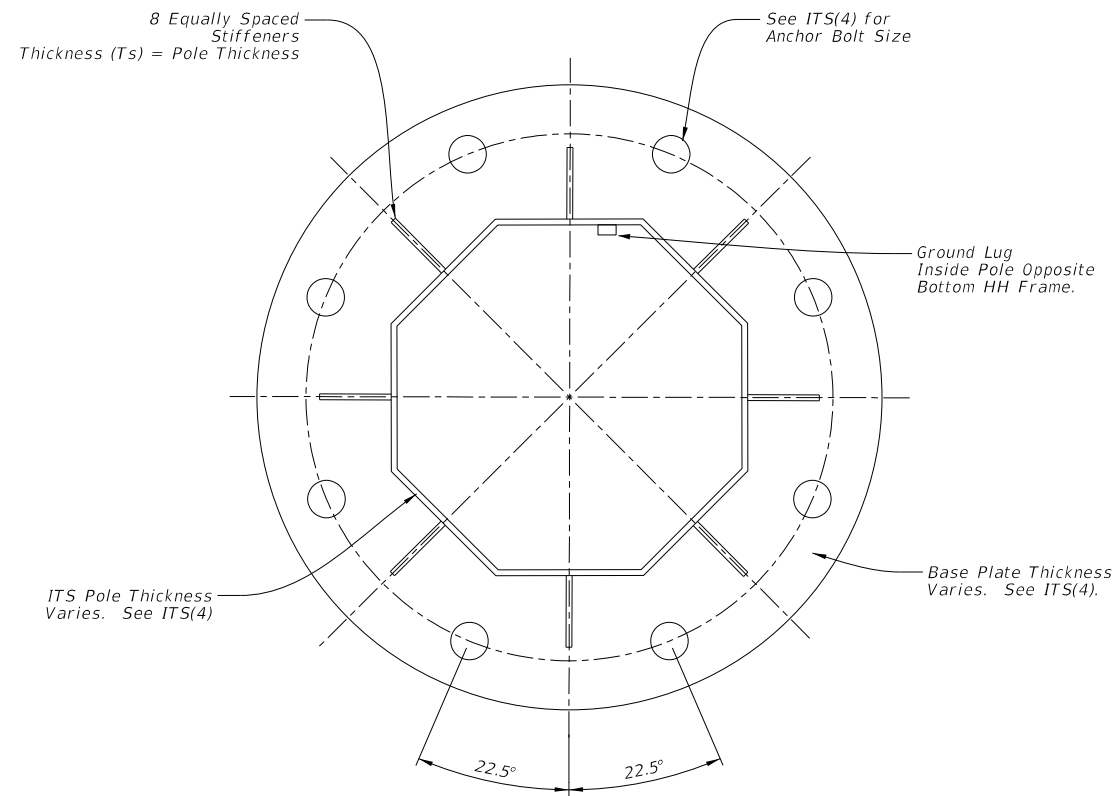
ITS POLE FOUNDATION DETAILS

ITS(3)-16

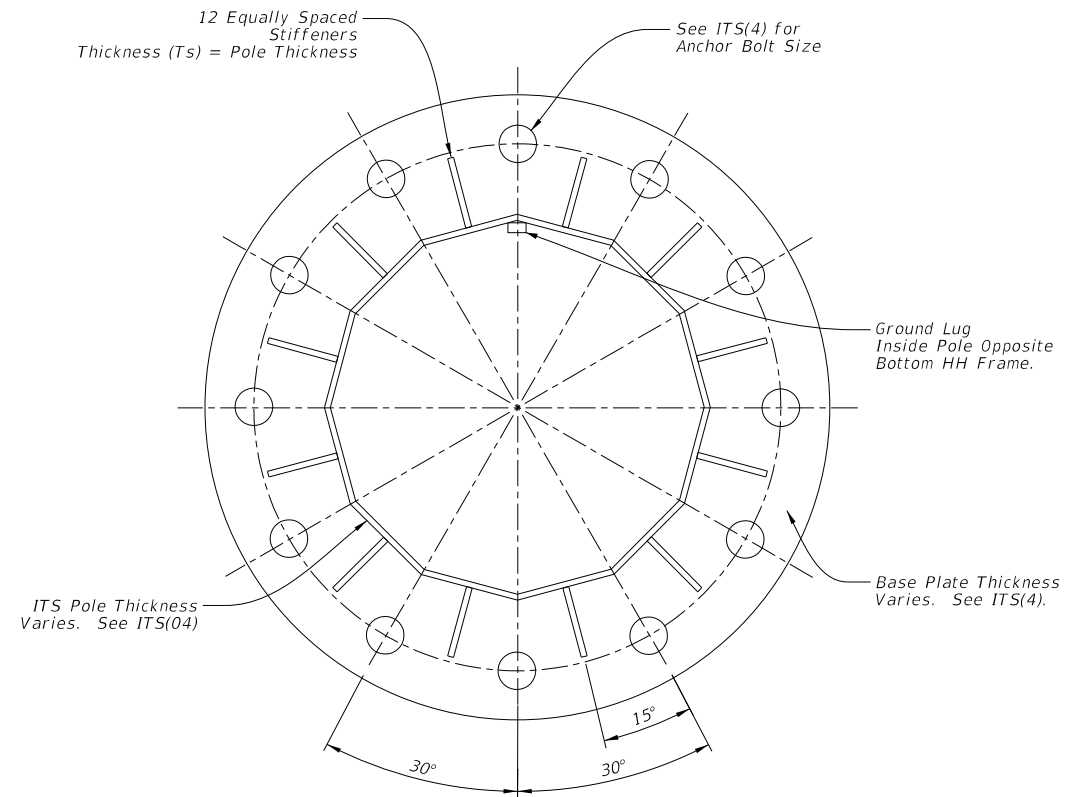
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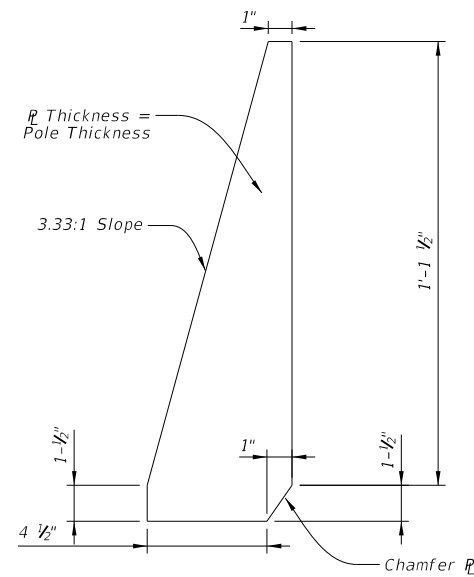
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8-sided Pole Base Plate Detail

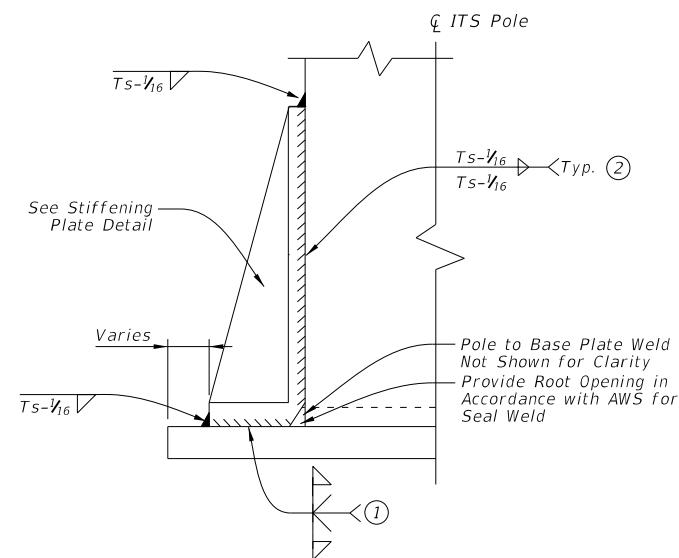


12-sided Pole Base Plate Detail



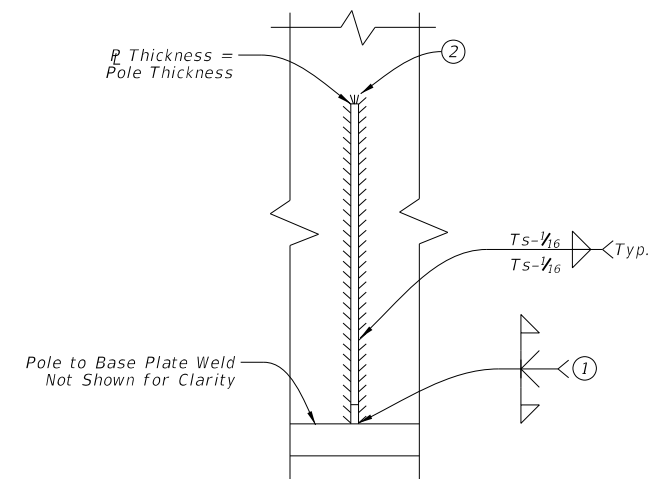
Stiffening Plate Detail

Not to Scale



Stiffening Detail - Elevation View

Not to Scale



Stiffening Detail - Front View

Not to Scale

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. Ts = Thickness

Reference Notes:

- ① Complete Joint Penetration Weld per AWS
- ② Wrap Fillet Weld Around Tip of Stiffener



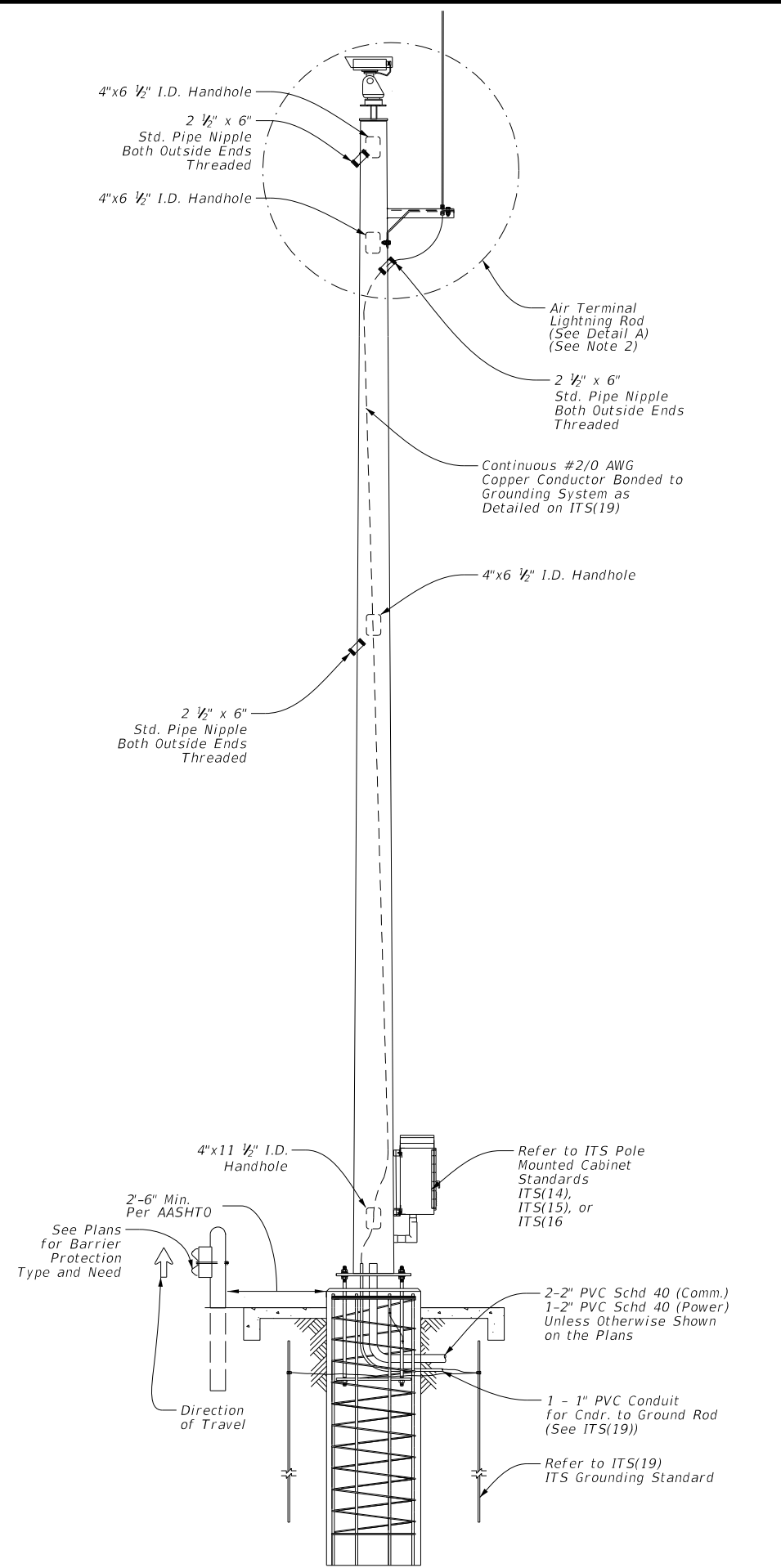
ITS POLE
STIFFENER PLATE
DETAILS

ITS(4A)-15

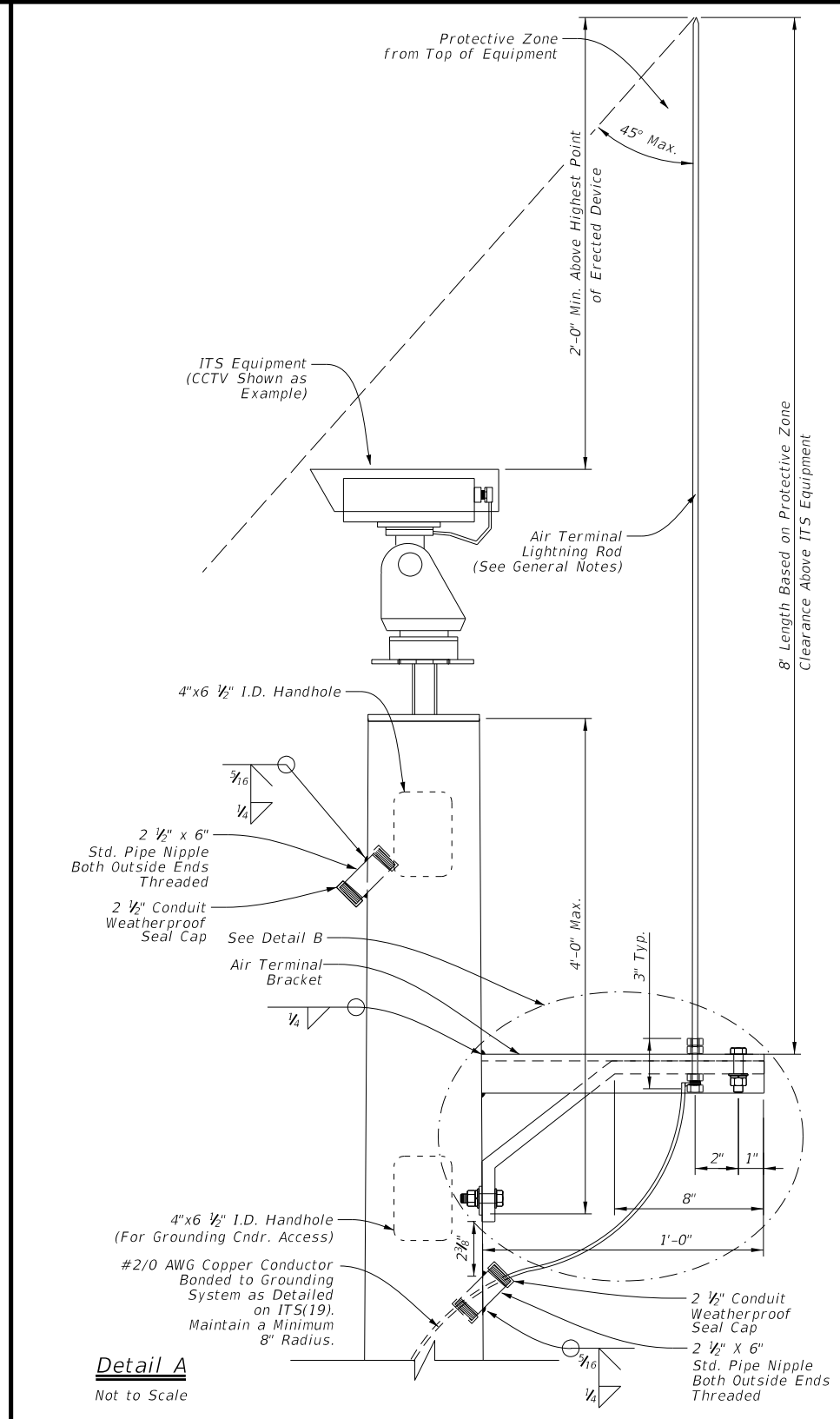
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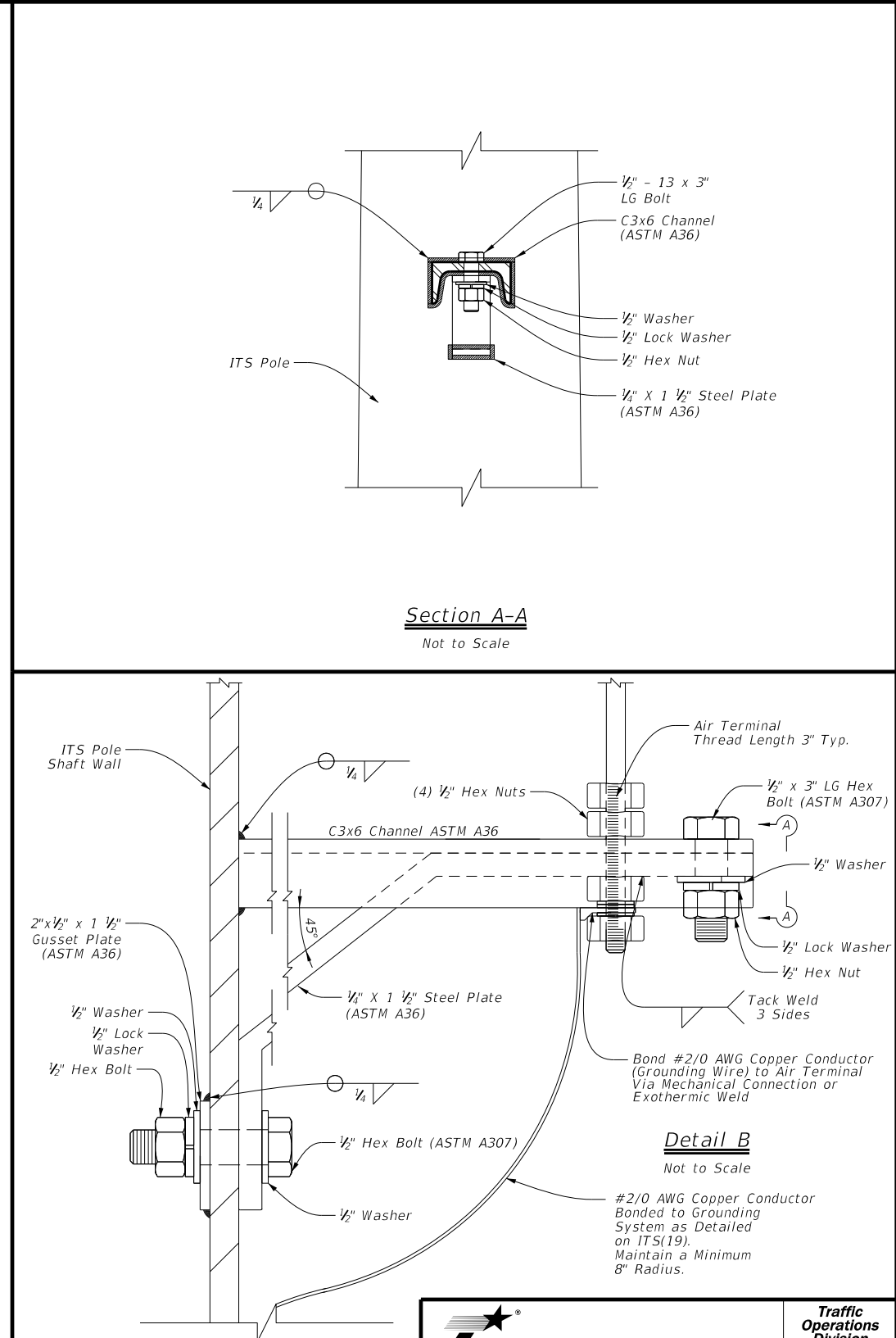
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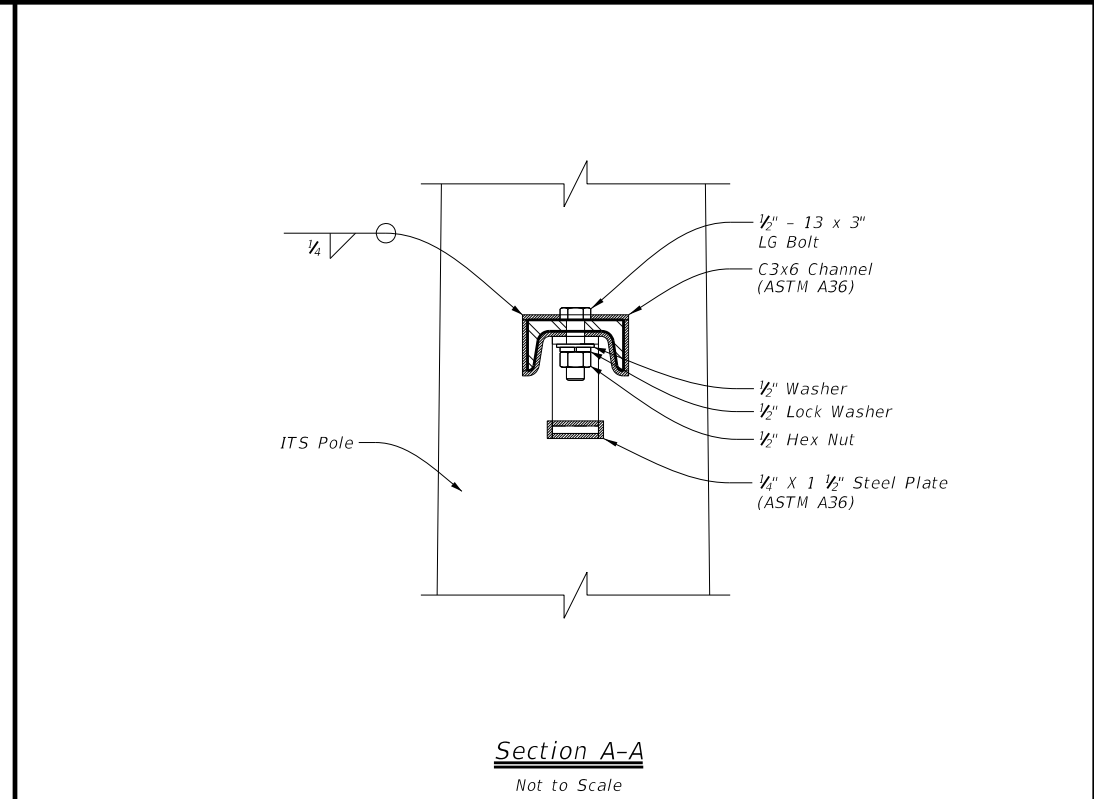
ITS Pole with Cabinet



Detail A
Not to Scale



Detail B
Not to Scale



Section A-A
Not to Scale

General Notes:

- 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:
 - Position - in center of least utilized field of view.
 - Height - camera equipment to be within 45 degree protective zone of air terminal.
 - Material - 1/2" ETP alloy 110 copper air terminal (Class II)
 - Clearance - 24" minimum height above highest point of ITS equipment.
 - Bonding - attach air terminal to bracket by exothermic weld or with approved clamping.
 - Structure wind rating in accordance with TxDOT WV & IZ (LTS2013).
 - Galvanize air terminal bracket in accordance with Item 445, "Galvanizing."
- 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.
- 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.

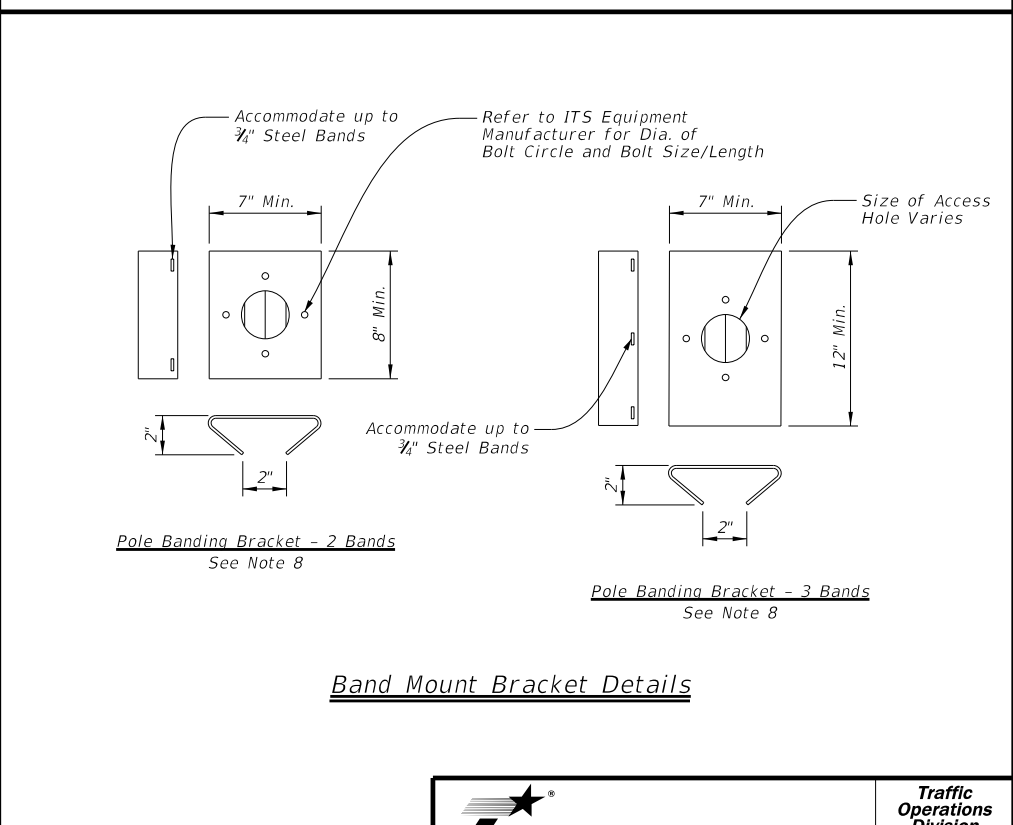
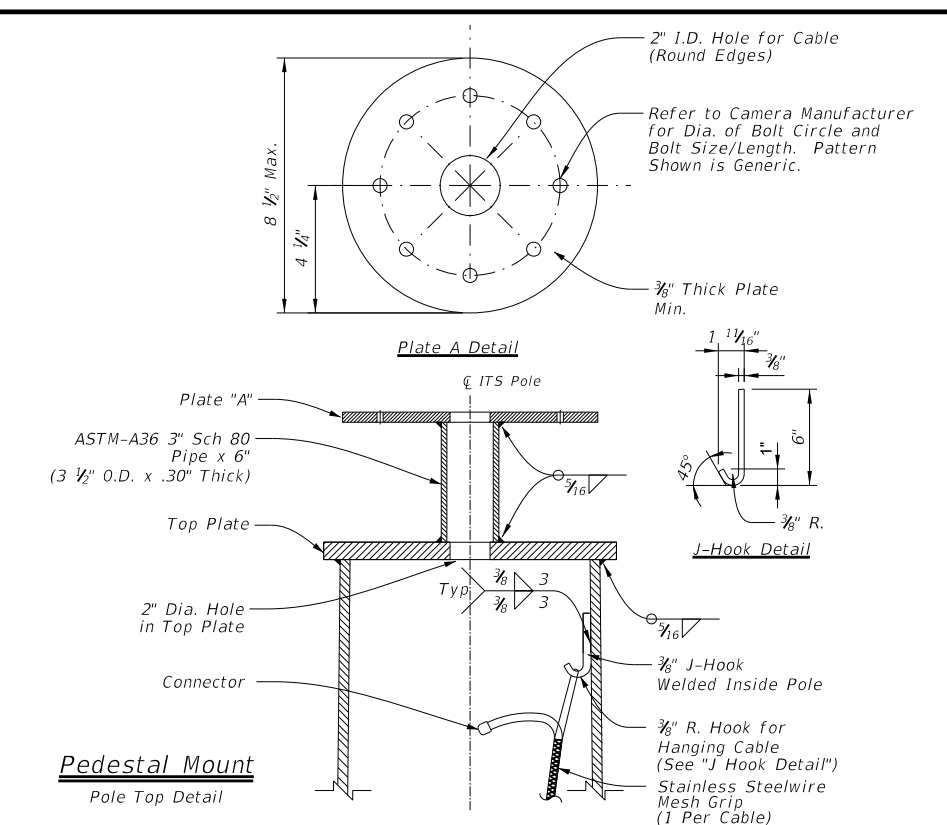
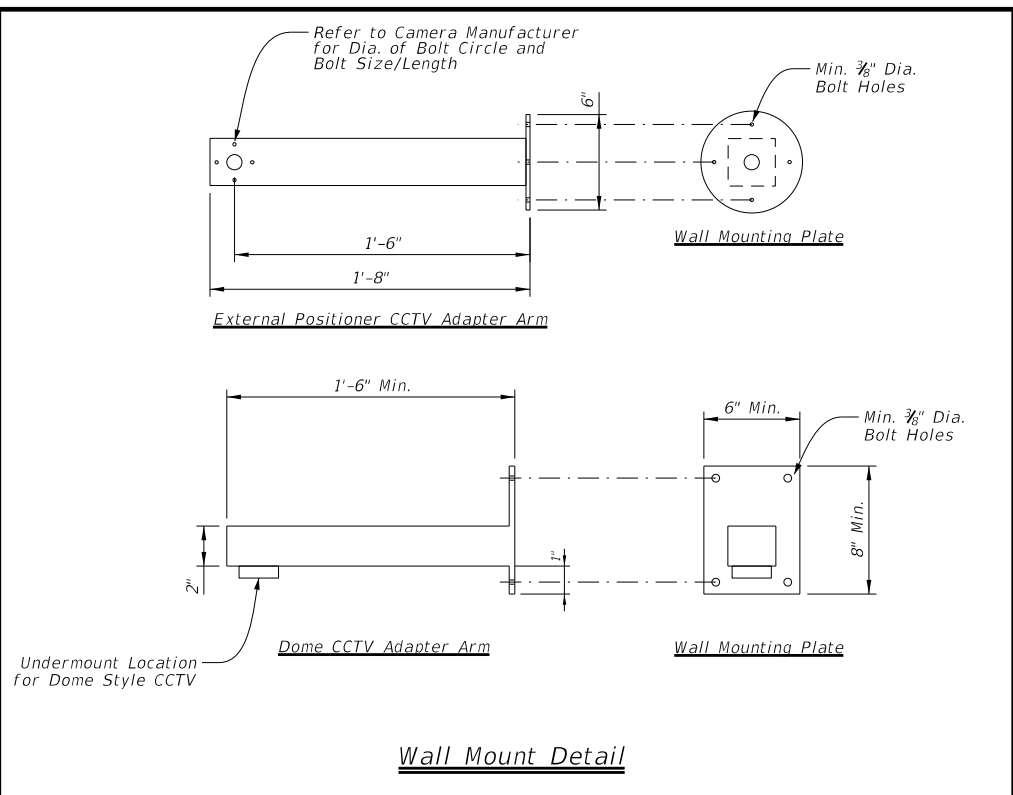
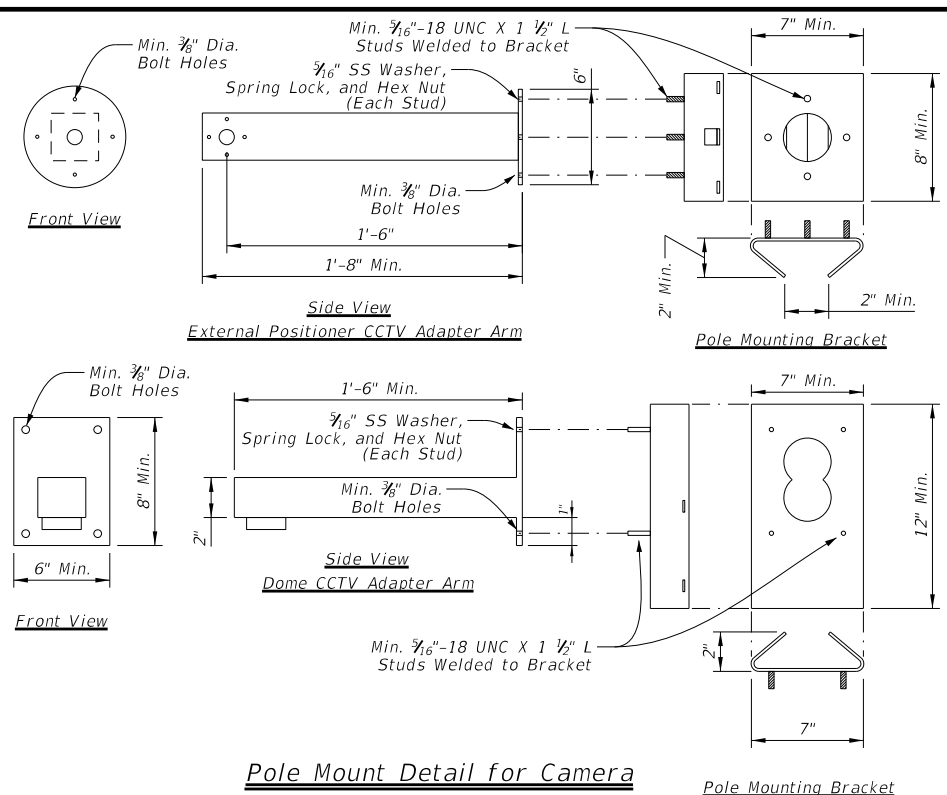
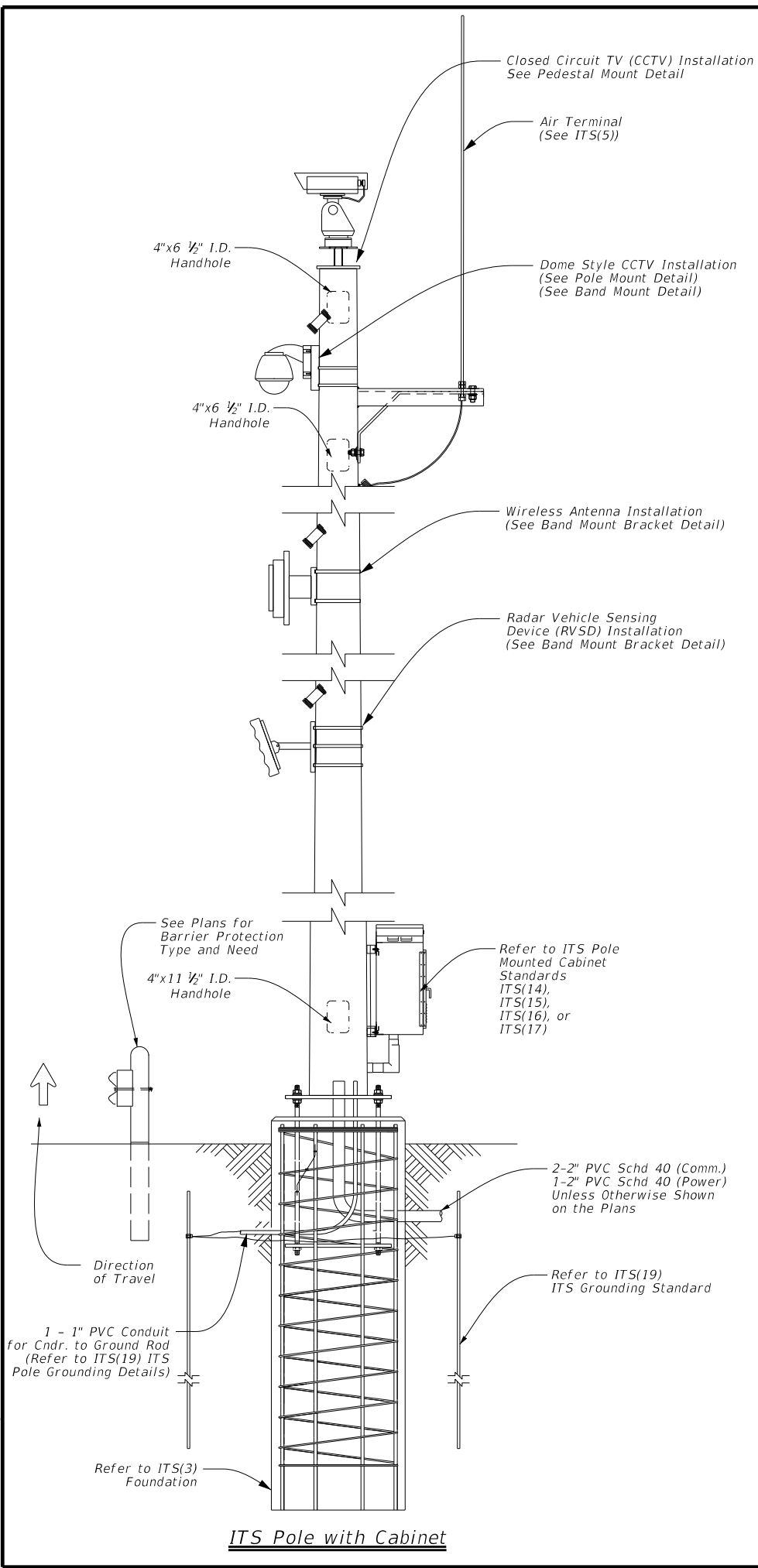
ITS POLE
AIR TERMINAL DETAILS

ITS(5) - 15

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General Notes:

- Designed according to Sixth Edition AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications.
- Hang all cabling inside ITS pole structure with stainless steel wire mesh grips.
- 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.
- Provide pedestal top plate and Plate "A" that conform to ASTM A36.
- Make all welds conform to Item 441 and AWS D1.1 (Structural Welding). Repair damaged galvanized coating per Item 445, "Galvanizing."
- Galvanize parts in accordance with Item 445, "Galvanizing" unless otherwise noted.
- 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.
- 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.
- Mounting heights to be determined in the field based on manufacturer recommendations.

Texas Department of Transportation
Traffic Operations Division Standard

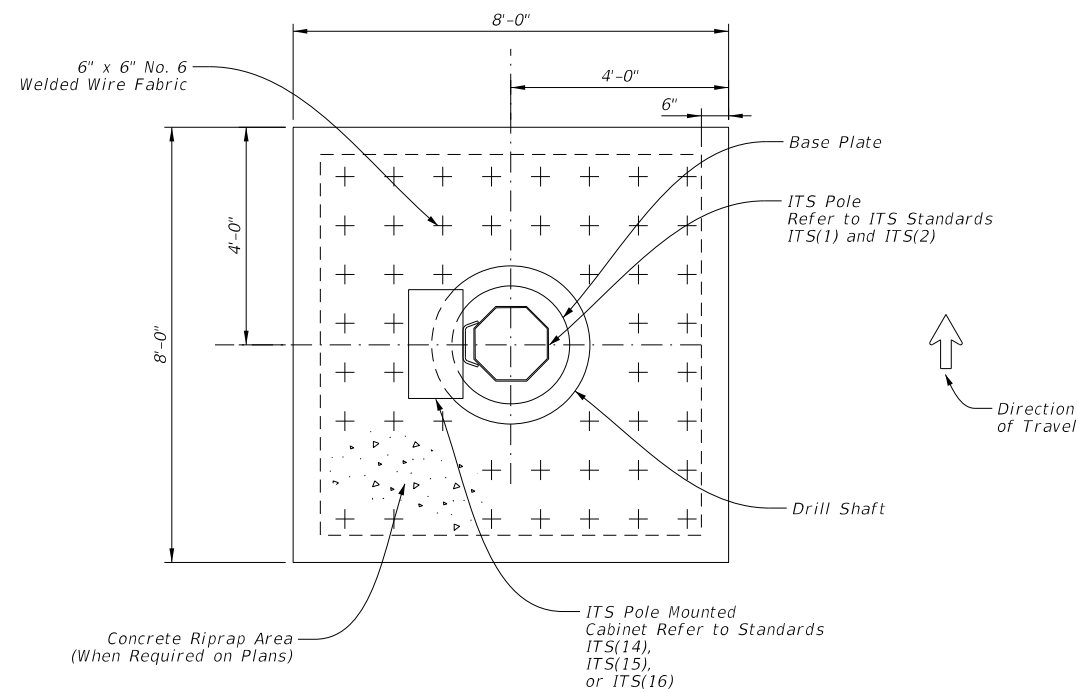
ITS POLE EQUIPMENT MOUNTING DETAILS

ITS(6) - 15

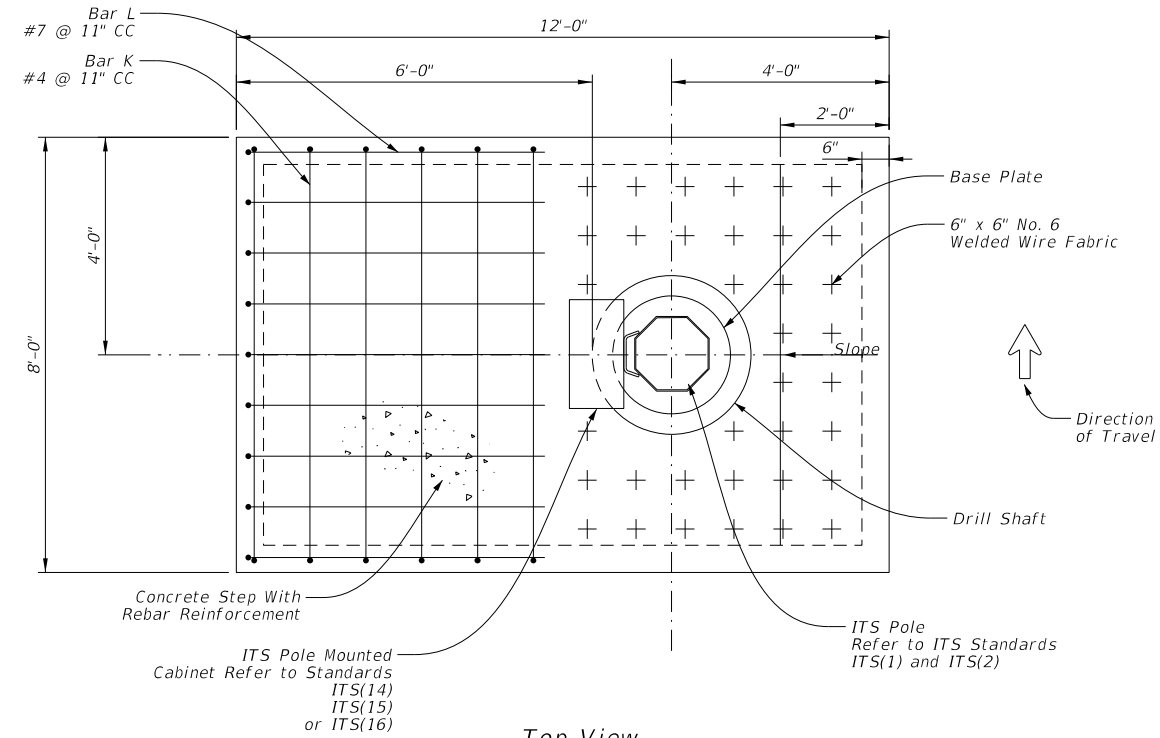
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| FILE: its(6) -15.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
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| | ELP | HUDSPETH | 63 | |

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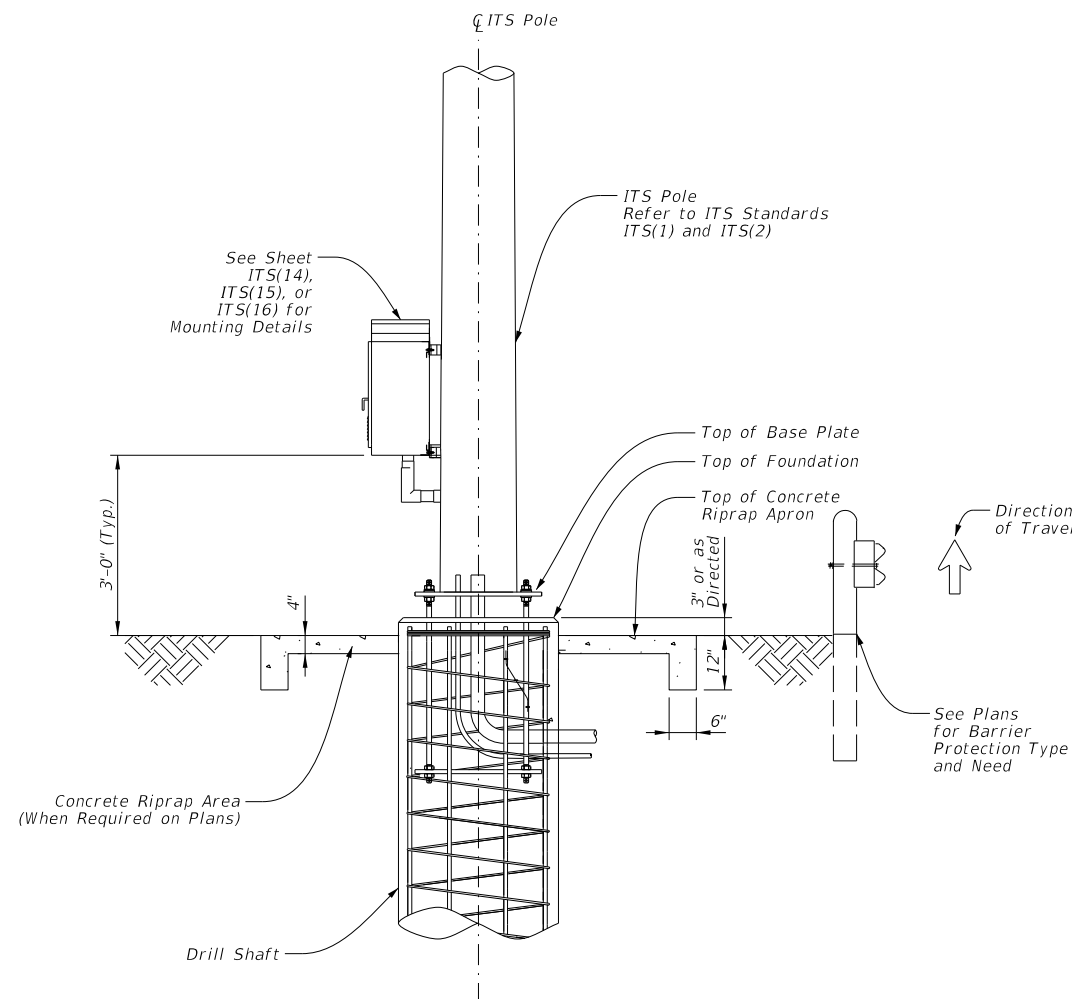
Top View
Riprap - Non-Sloped Conditions



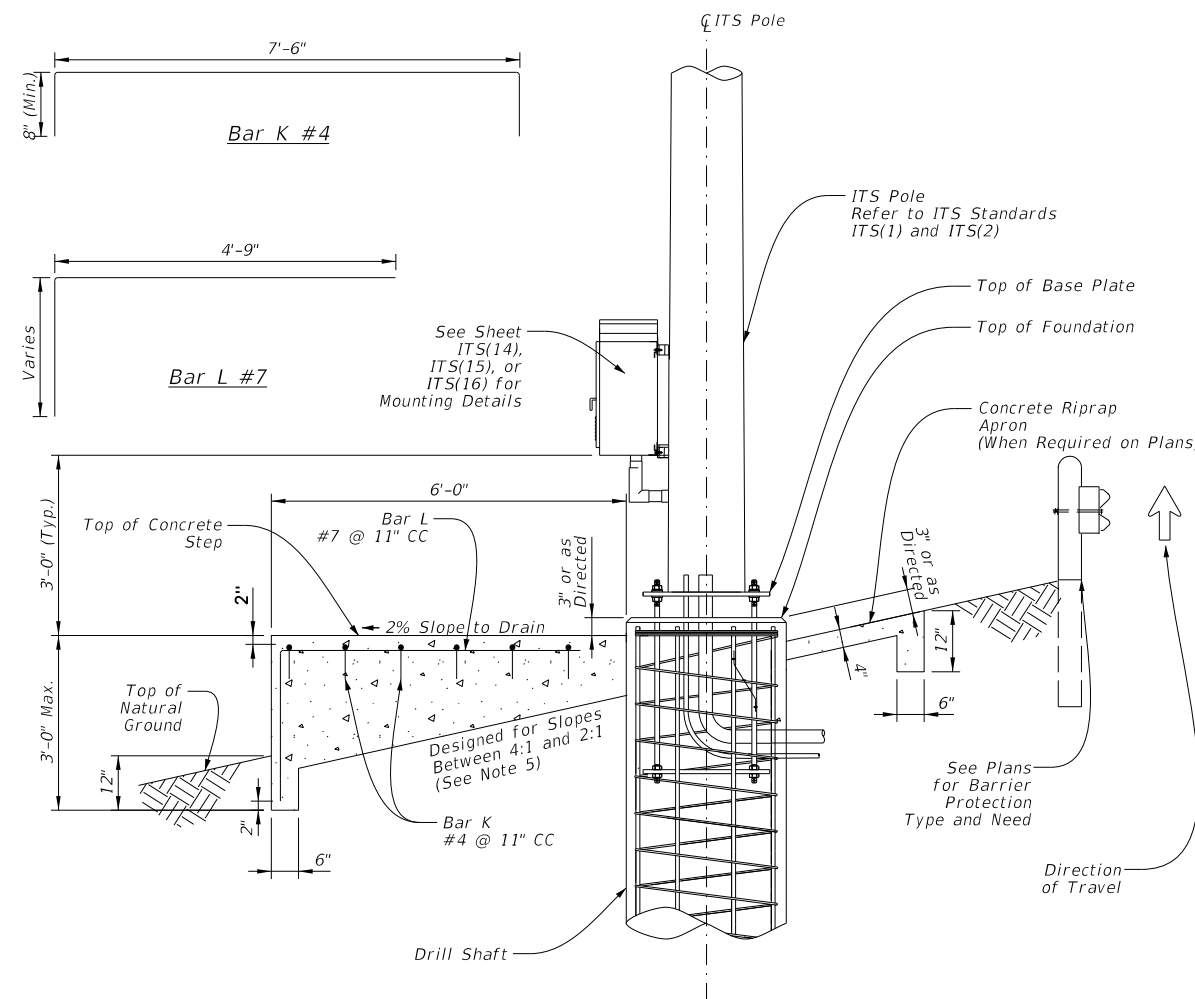
Top View
Step and Riprap - Sloped Conditions

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.



Elevation View
Riprap Apron Detail - Non-Sloped Conditions



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



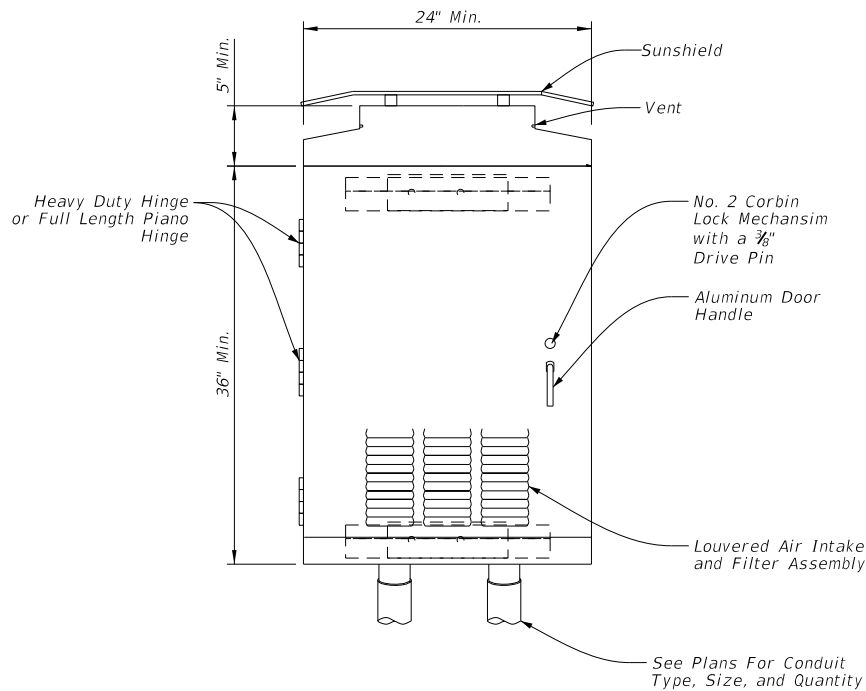
**ITS POLE
RIPRAP DETAILS**

ITS(7) - 15

| | | | | |
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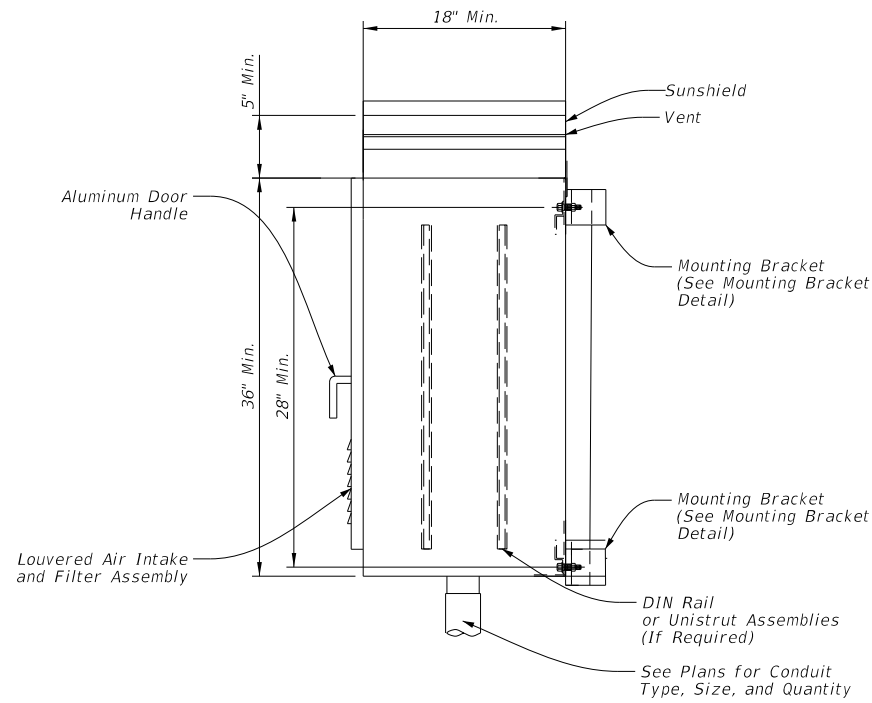
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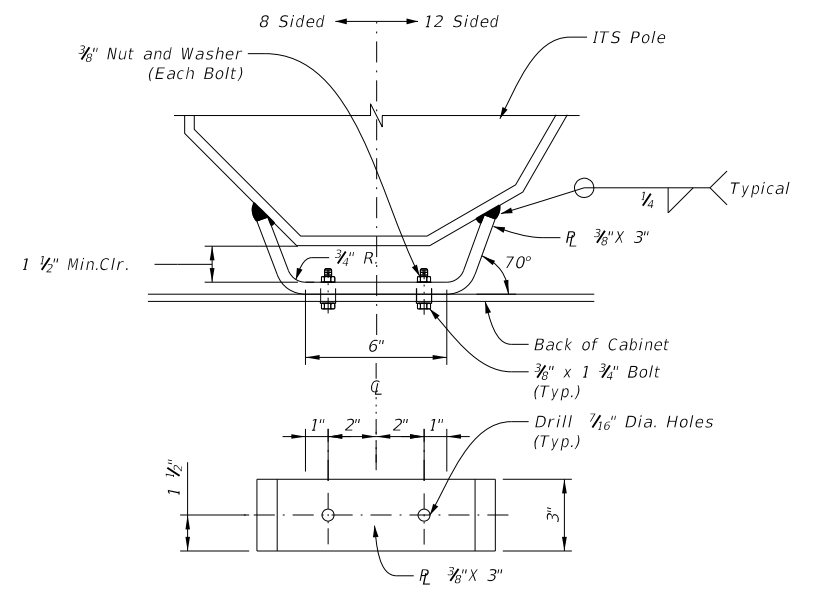
Pole Mounted Cabinet - Type 2 Front View

Not to Scale



Pole Mounted Cabinet - Type 2 Side View

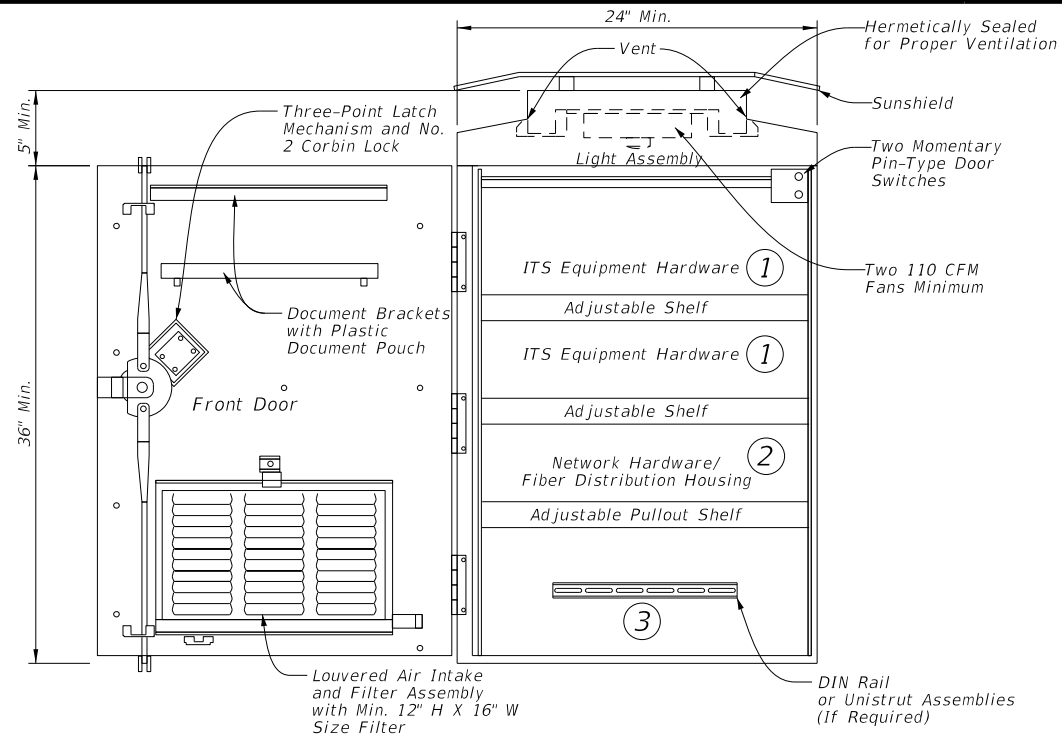
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Note: ITS Pole May be Round, Octagonal (8 Sided), or Dodecahedron (12 Sided). See ITS(1), and ITS(2) for Details.

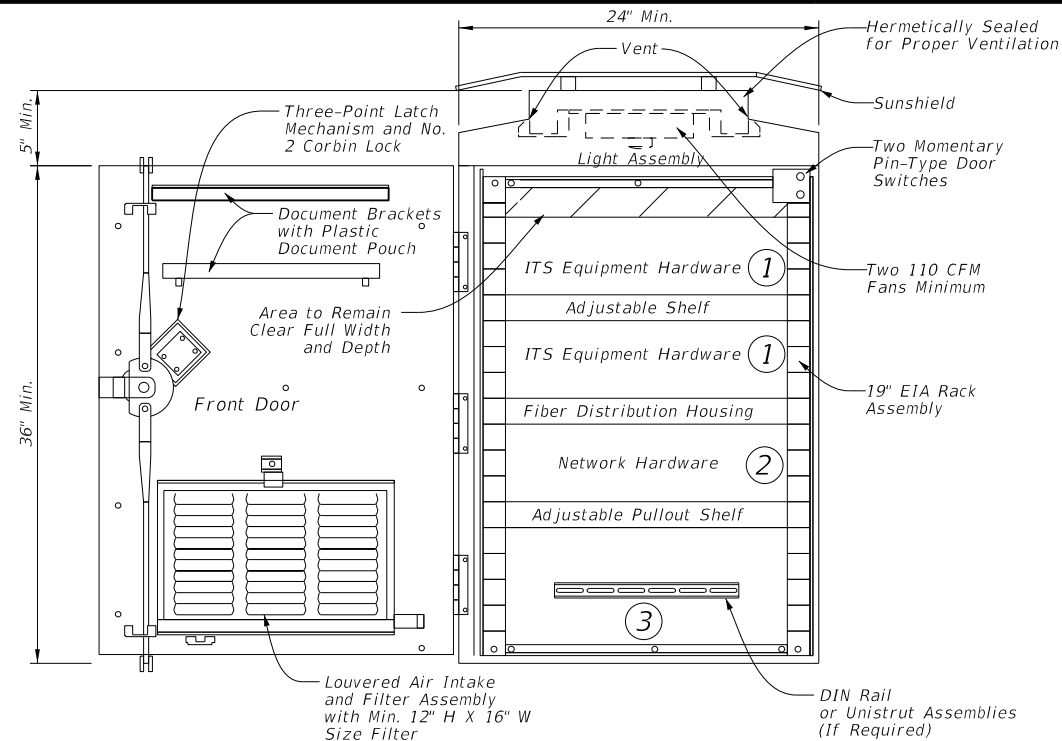
Mounting Bracket Detail

Not to Scale



Interior - Type 2 Without 19" EIA Rack - Front View

Not to Scale



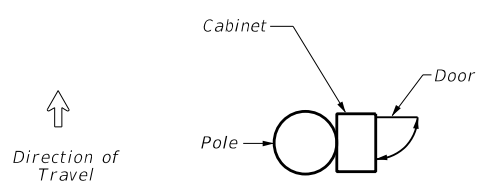
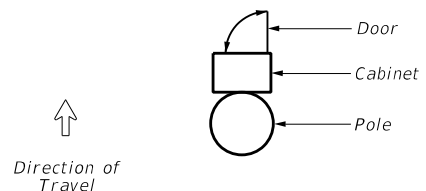
Interior - Type 2 With 19" EIA Rack - Front View

Not to Scale

| Typical Equipment Layout Legend | |
|---------------------------------|---|
| | Example Equipment |
| ① | CCTV Interface Panel, Radar Vehicle Sensing Device (RVSD) Equipment, DMS/LCS Controller, 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:

- Layout of hardware equipment and configuration shown is diagrammatic in nature and intended to represent a preferred Type 2 pole mounted cabinet setup. Hardware needed for each Type 2 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.
- Mount cabinet as detailed on ITS(15) 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.
- 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.
- All dimensions are approximate and represent minimum cabinet dimensions.
- Provide conduit entrances at the bottom of the cabinet.
- 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 2 Cabinet on ITS Pole (Typical)

Not to Scale

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Traffic Operations Division Standard

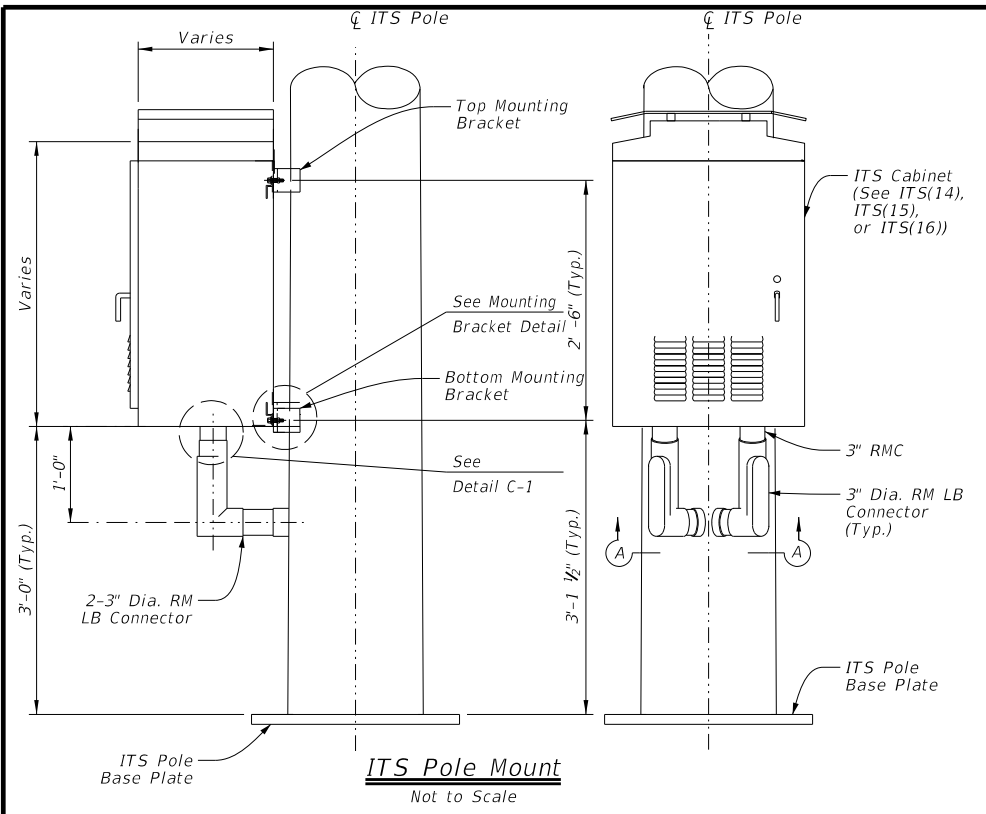
ITS POLE MOUNTED CABINET TYPE 2 DETAILS

ITS(15)-15

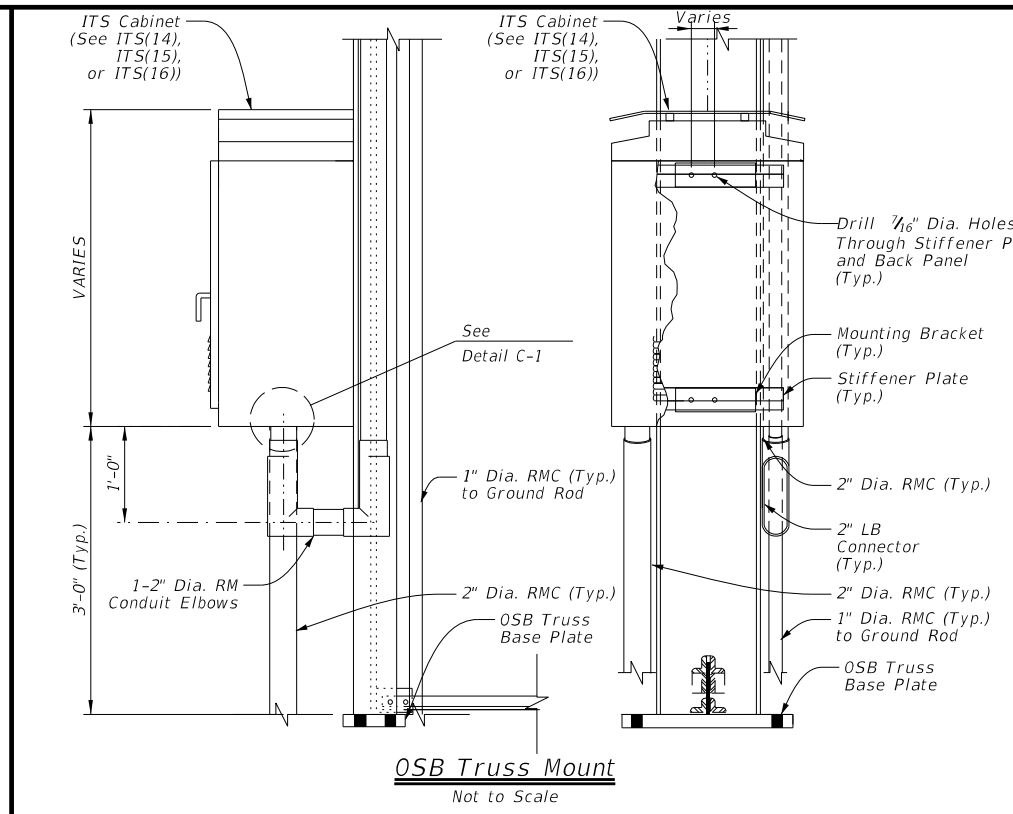
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| FILE: its(15)-15.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
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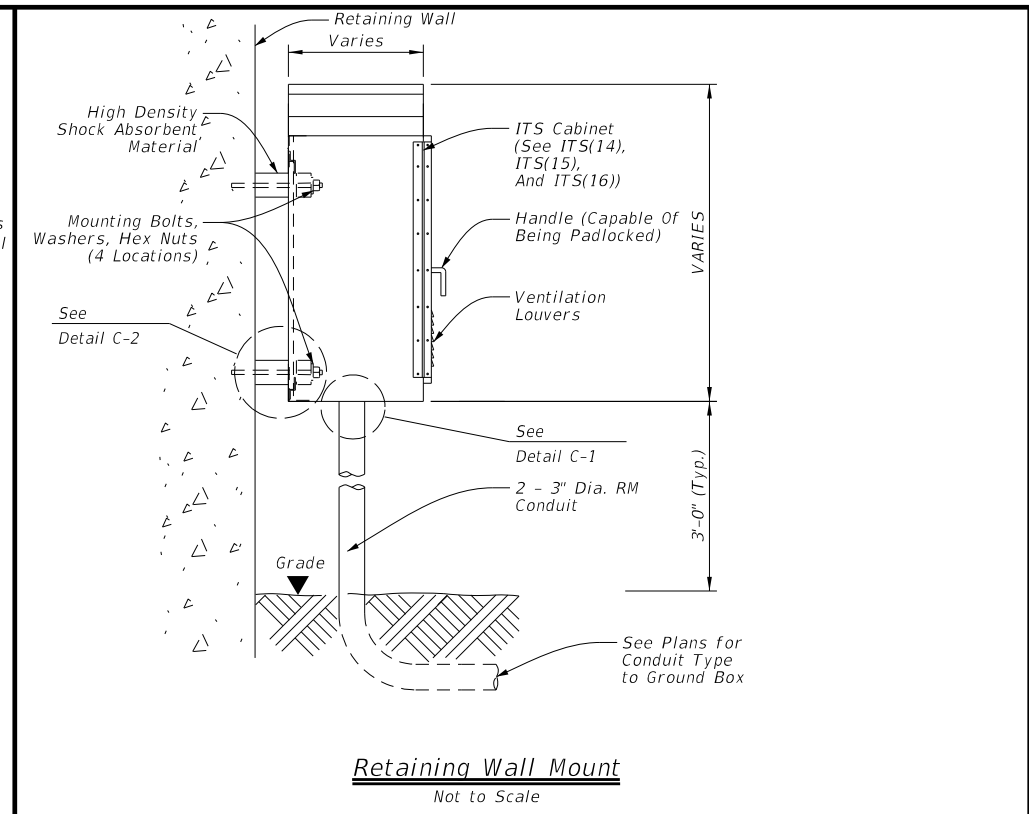
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FILE: its(17)-15.dgn



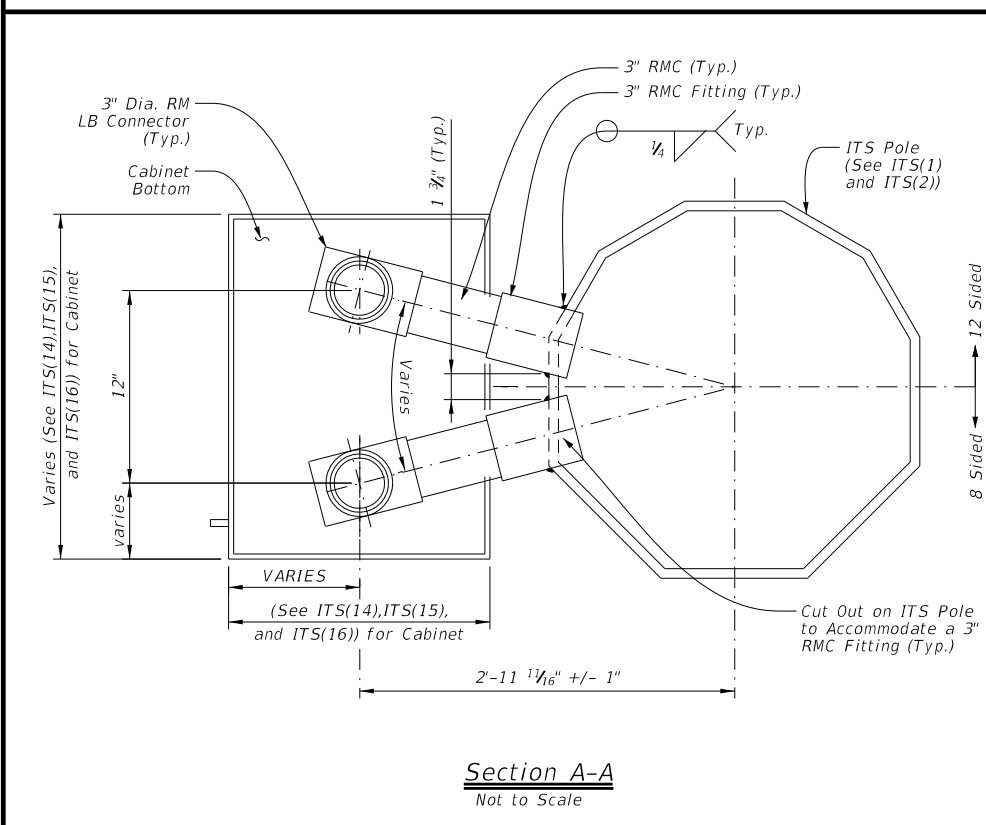
ITS Pole Mount
Not to Scale



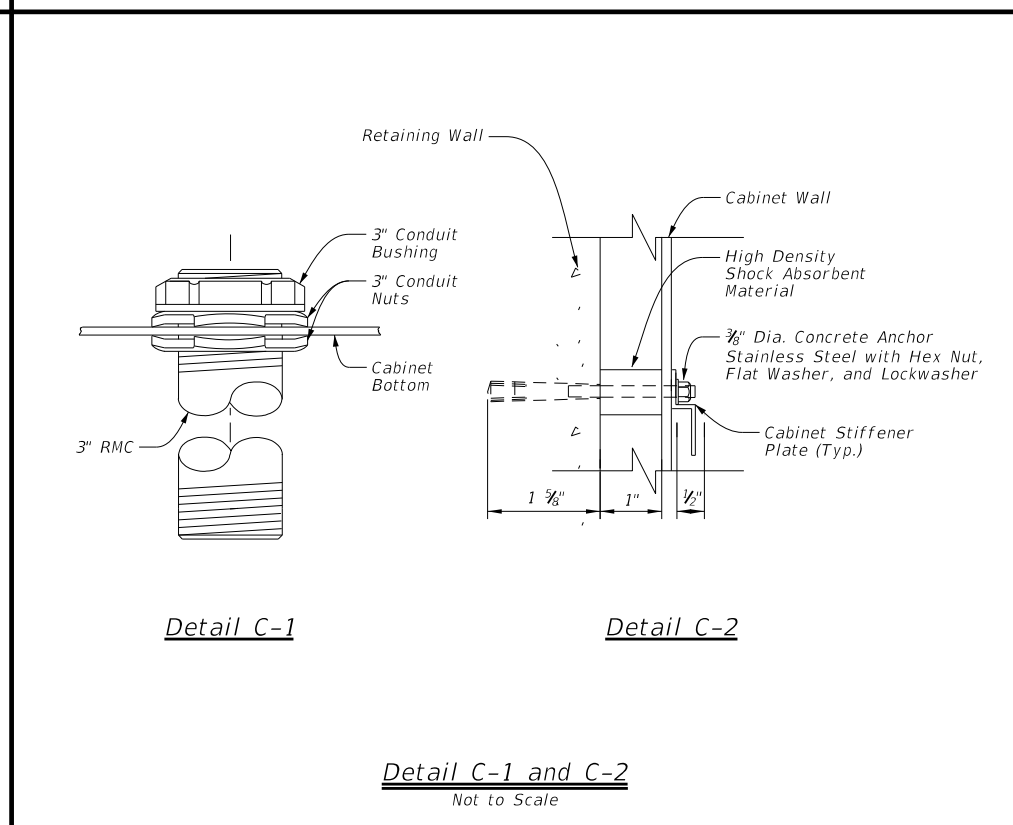
OSB Truss Mount
Not to Scale



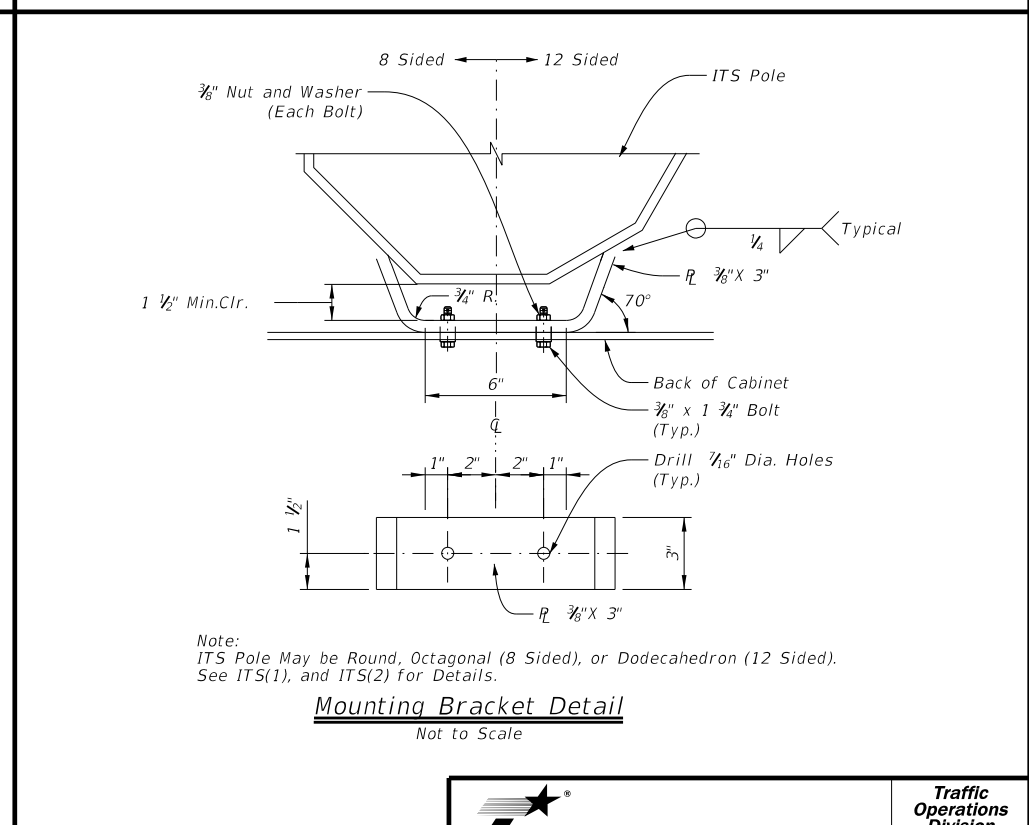
Retaining Wall Mount
Not to Scale



Section A-A
Not to Scale



Detail C-1 and C-2
Not to Scale



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.

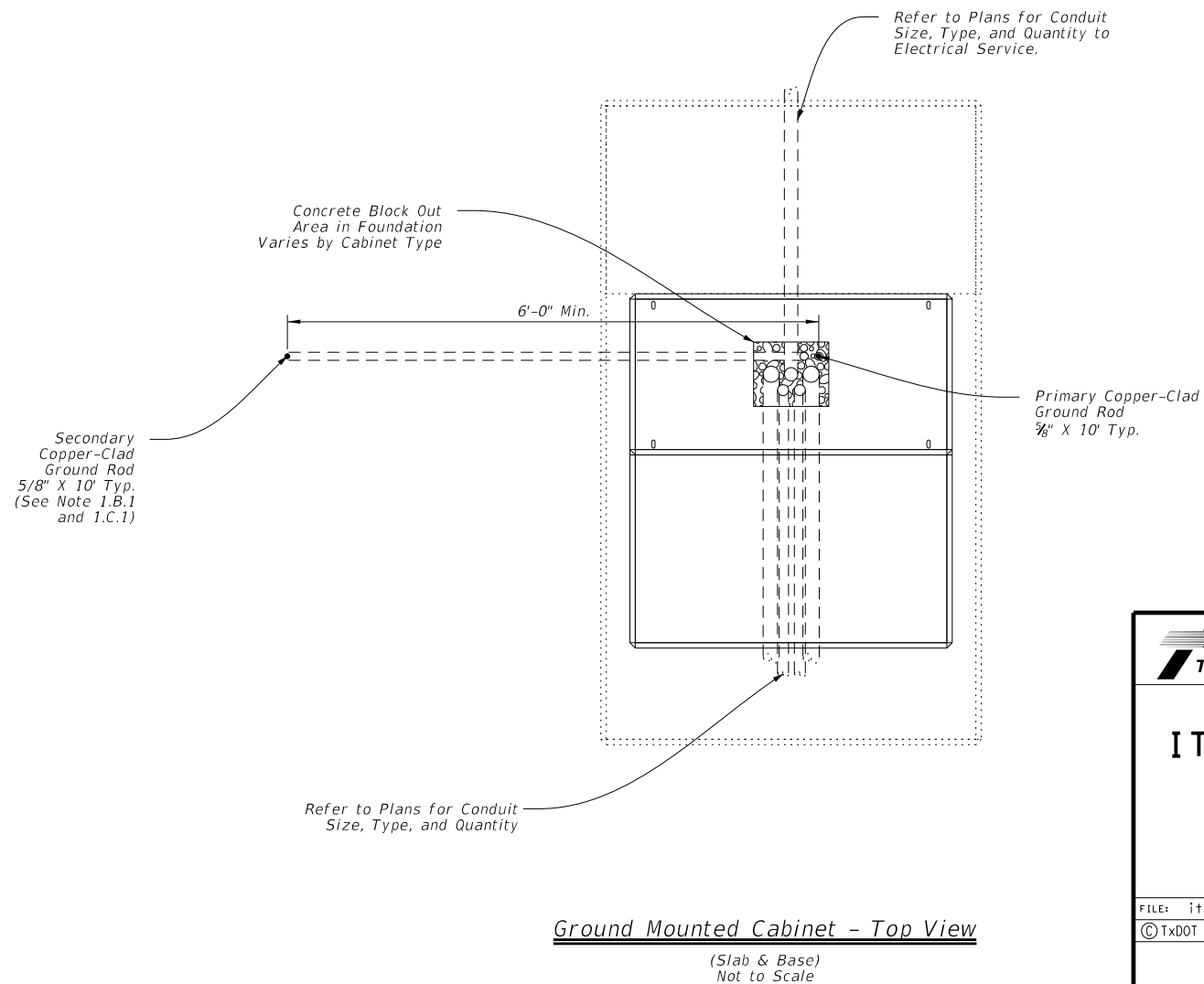
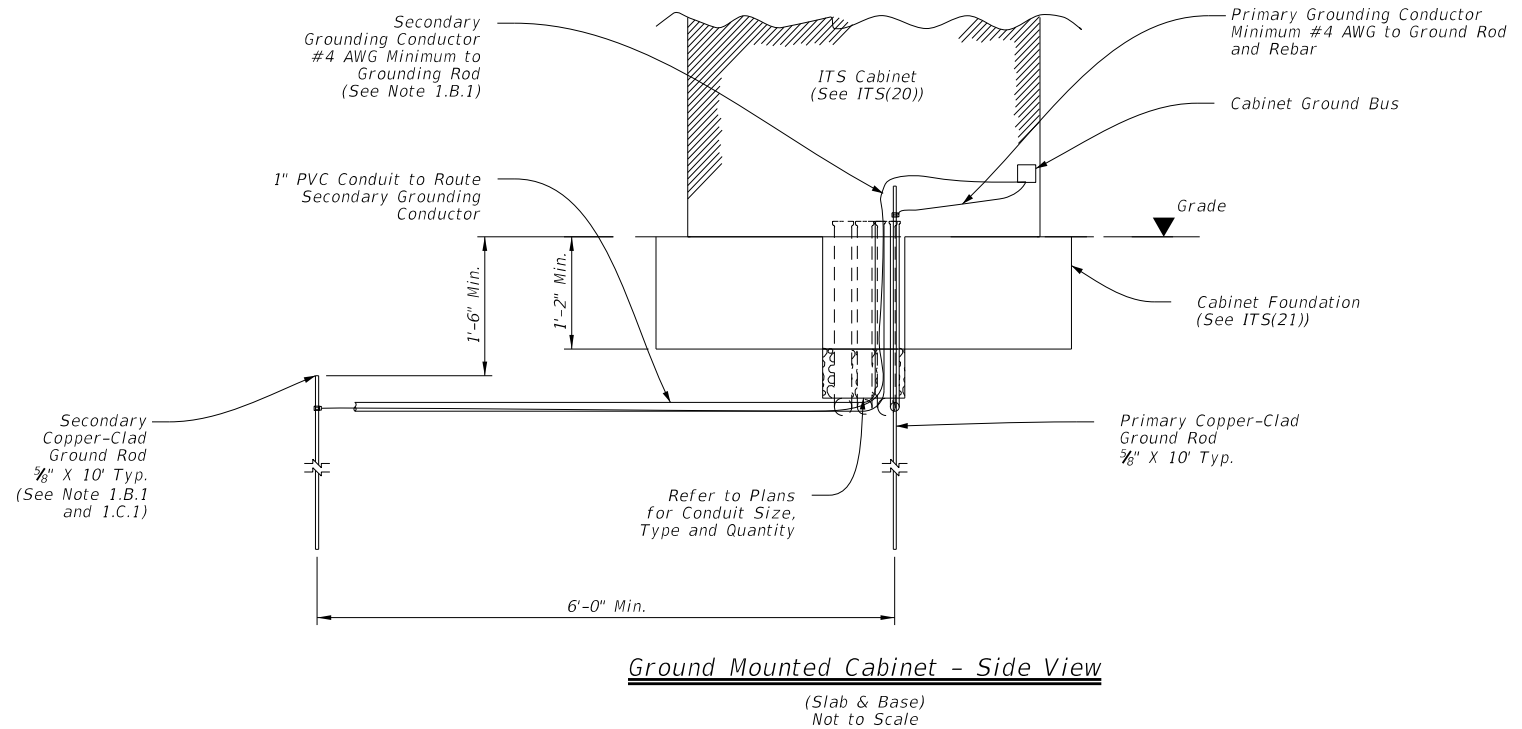
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| | | Traffic Operations Division Standard | |
| <h2>ITS POLE MOUNTED CABINET MISC. MOUNTING DETAILS</h2> <h3>ITS(17)-15</h3> | | | |
| FILE: its(17)-15.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT |
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 FILE: its(18)-15.dgn

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.
 - 2) 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: 5/8 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.
 - C. 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.



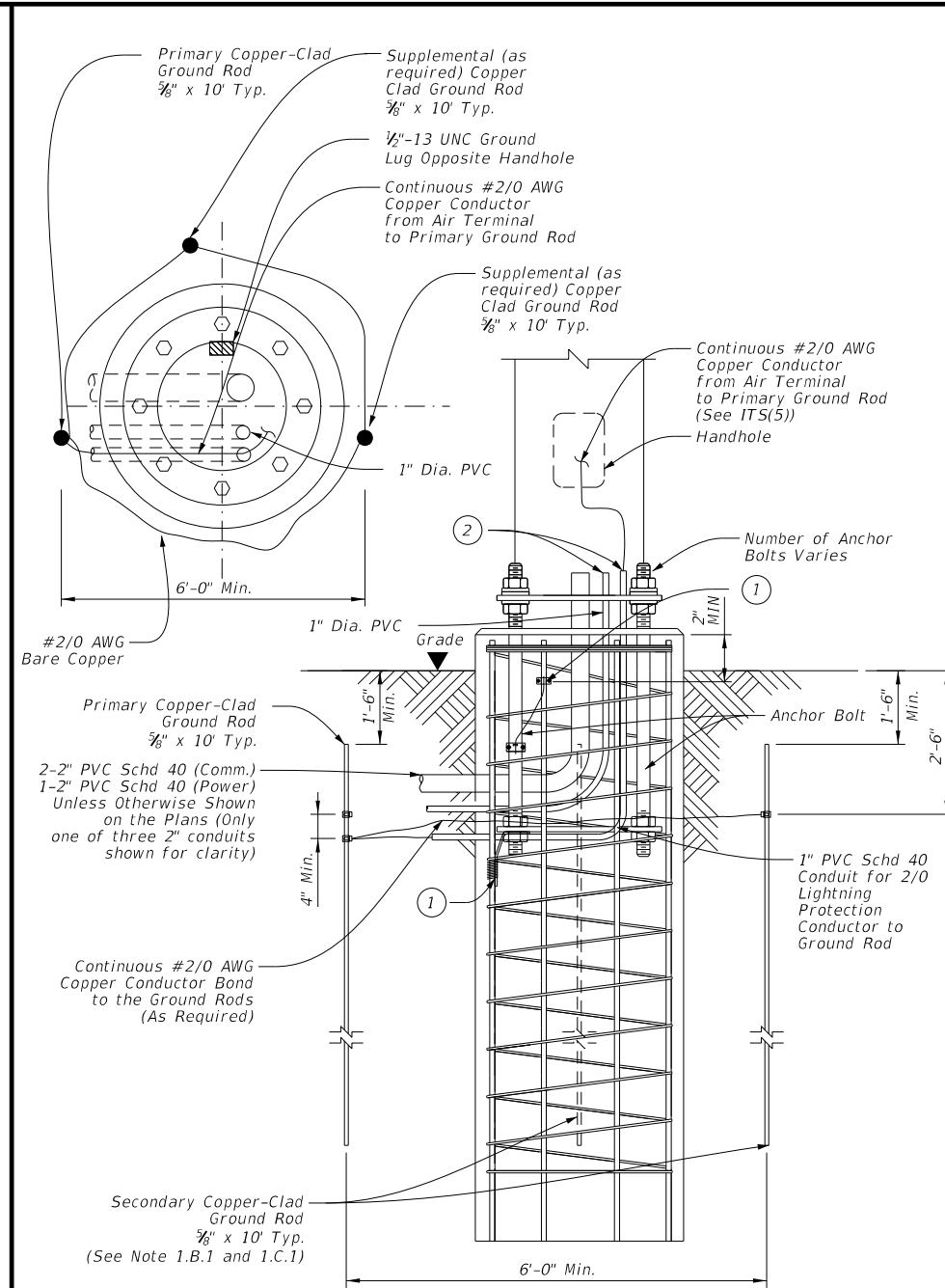
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| | | Traffic Operations Division Standard | |
| <h2>ITS CABINET GROUNDING DETAILS</h2> | | | |
| <h3>ITS(18)-15</h3> | | | |
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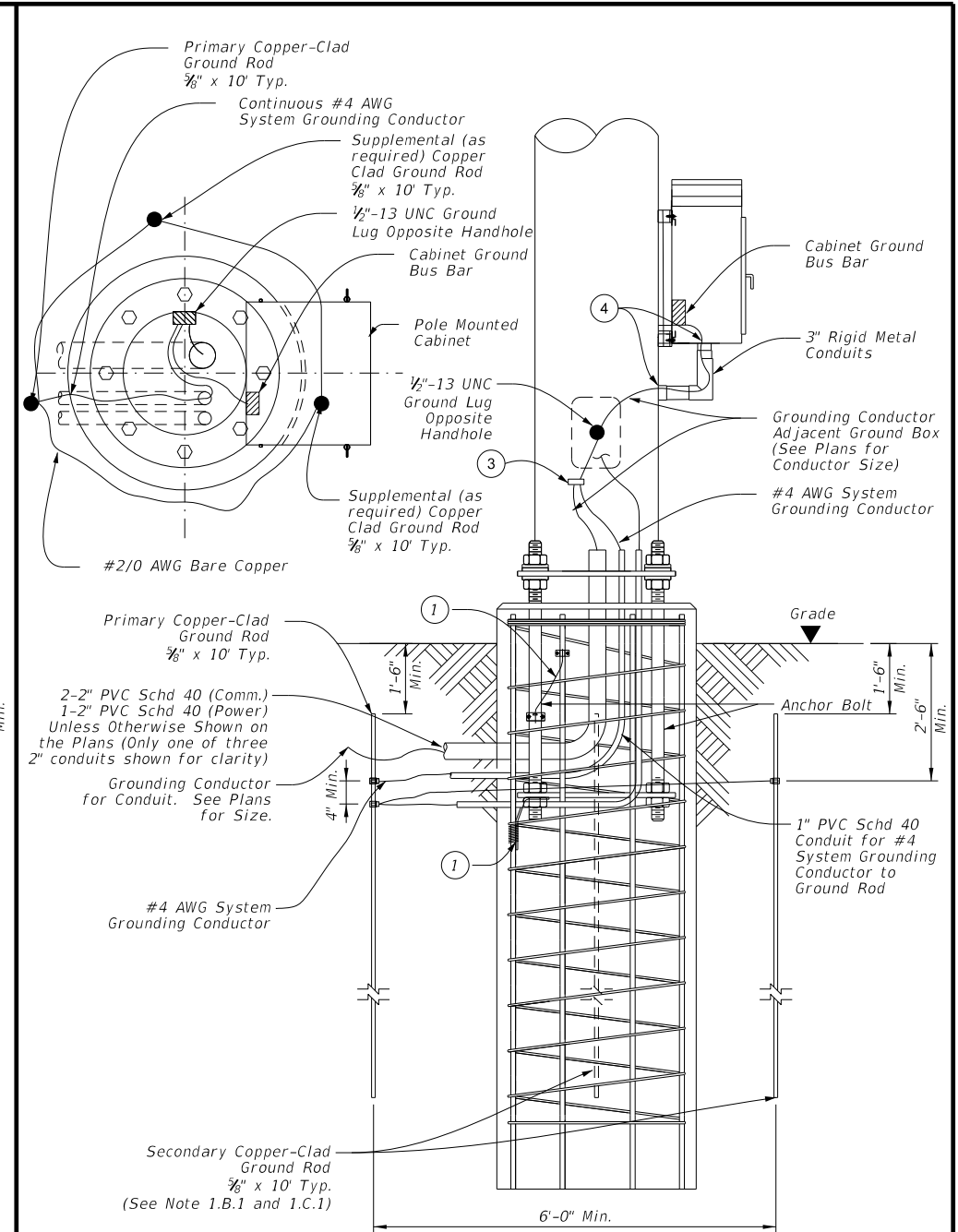
General Notes:

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 throughout the project.
 3. Ground Rods:
 - a. Provide copper-clad steel ground rods conforming to the requirements specified in DMS 11040.
 - 1) Diameter: 5/8 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

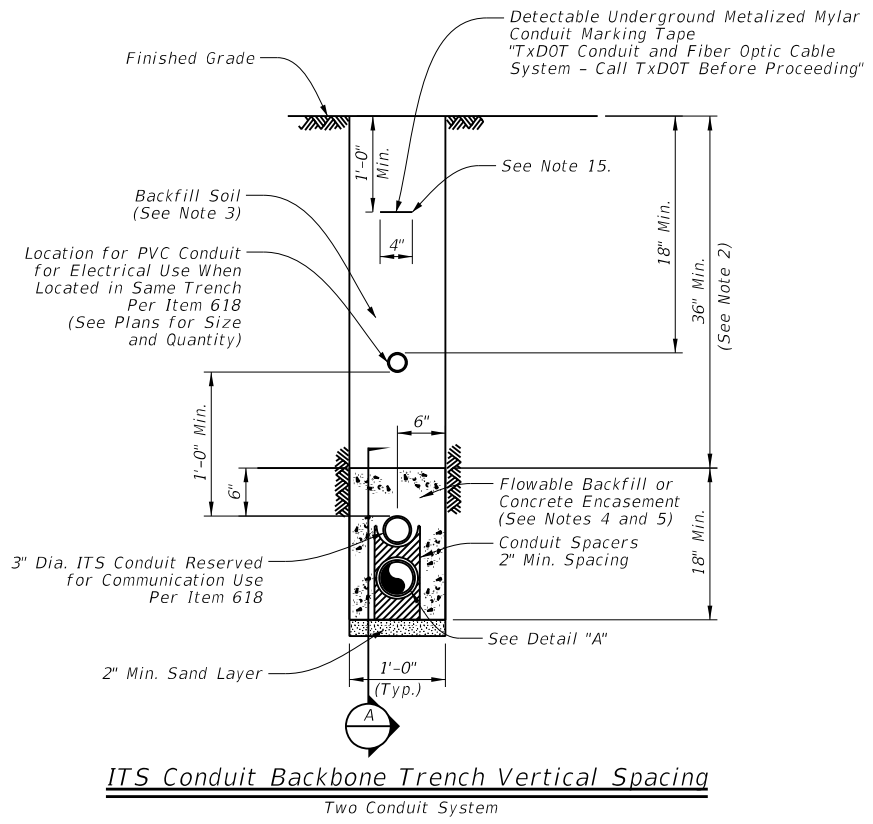
Reference Notes:

- 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.

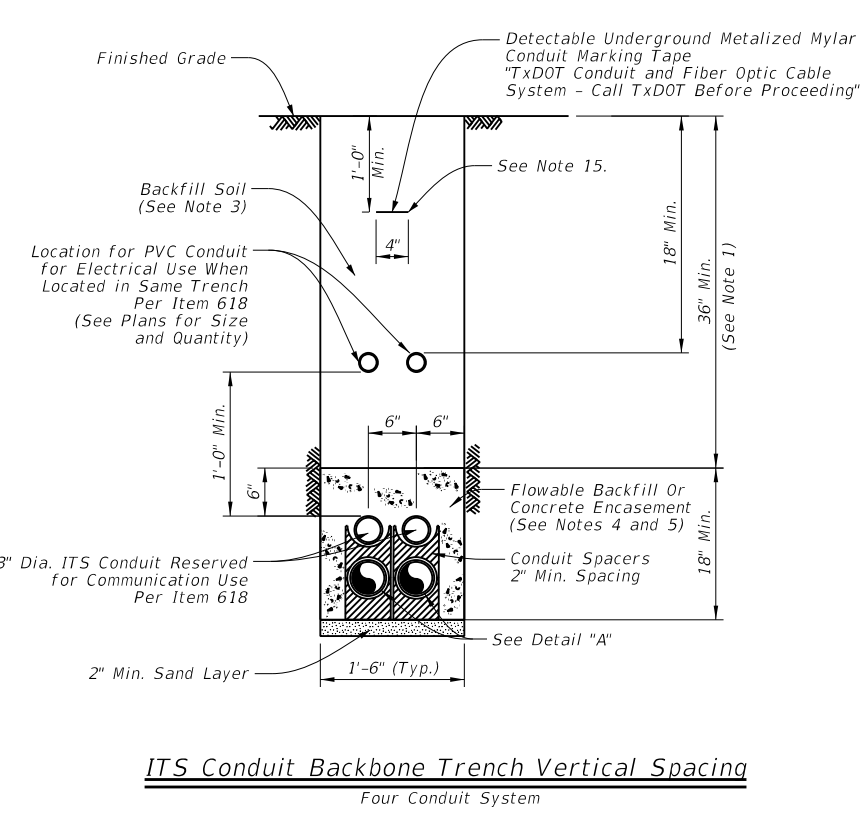
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| | | Traffic Operations Division Standard | |
| <h2 style="margin: 0;">ITS POLE GROUNDING DETAILS</h2> | | | |
| <h3 style="margin: 0;">ITS(19)-17</h3> | | | |
| FILE: its(19)-17.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT |
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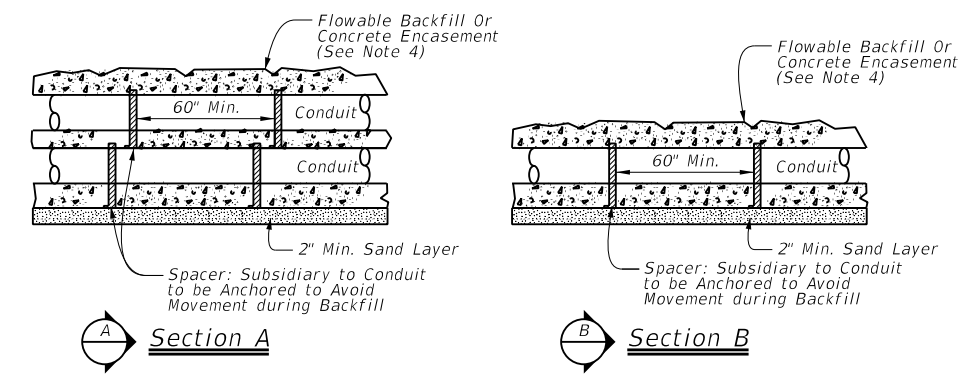
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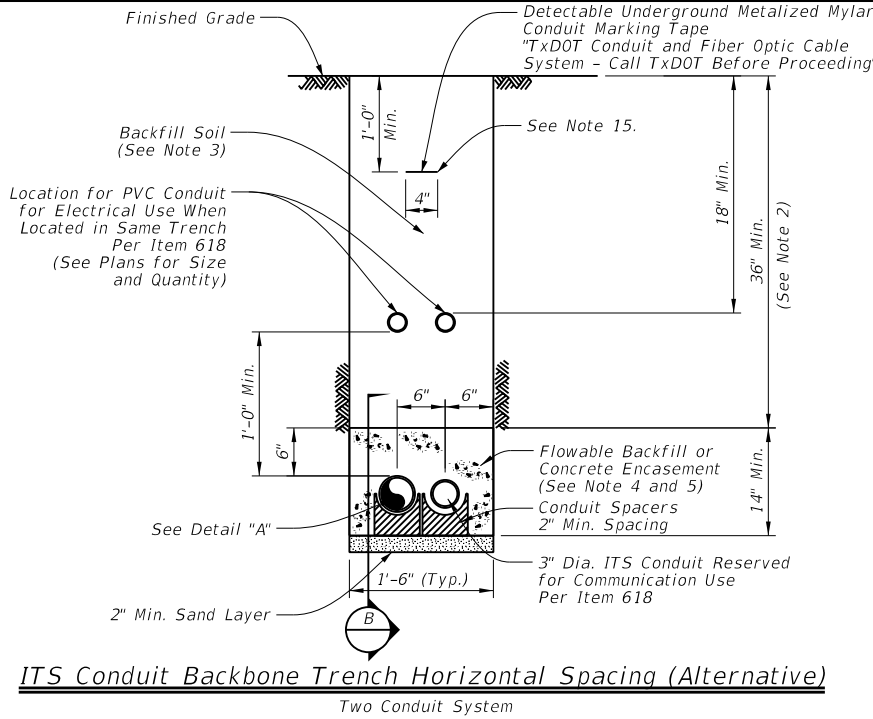
ITS Conduit Backbone Trench Vertical Spacing
Two Conduit System



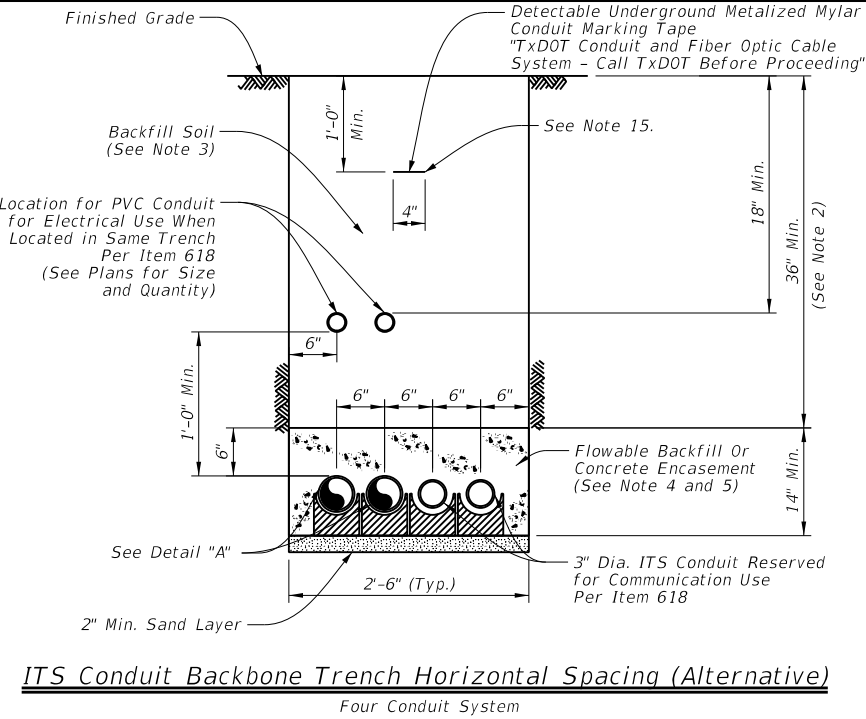
ITS Conduit Backbone Trench Vertical Spacing
Four Conduit System



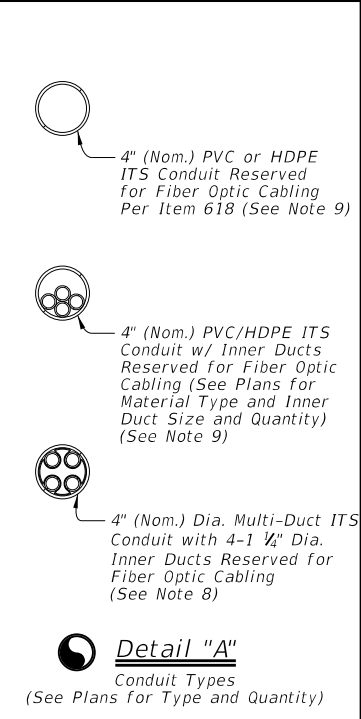
Open Cut Trenching Details



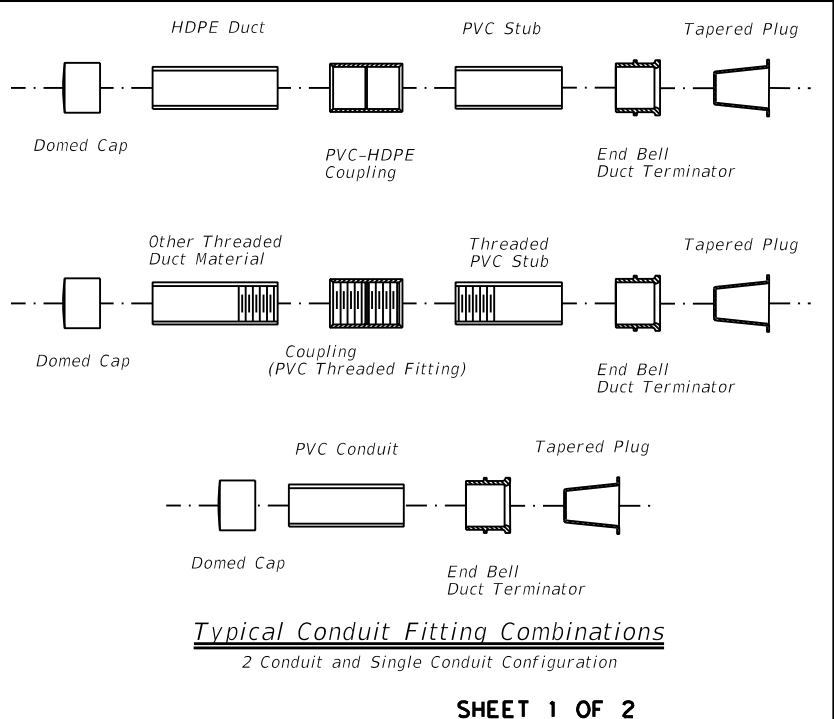
ITS Conduit Backbone Trench Horizontal Spacing (Alternative)
Two Conduit System



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

General Notes:

- 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.
- 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.
- Perform trench excavation and backfilling in accordance with Item 400, "Excavation and Backfill for Structures."
- 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.
- 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."
- Concrete encasement will be paid for under Special Specification "ITS Multi-Duct Conduit" or as shown on the plans.
- Provide ITS PVC conduit identified for electrical and communication use in accordance with Item 618, "Conduit."
- Provide ITS multi-duct conduit identified for fiber optic communication use in accordance with Special Specification "ITS Multi-Duct Conduit."

- Conduit per Item 618, "Conduit" (See Plans for Material Type and Quantity).
- Provide a single 1/8 #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."
- 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.
- Remove saw cut width to accommodate conduit installation.
- Replace rebar as necessary, lapped and tied a minimum of 3 inches to existing rebar.
- Replace broken pavement materials with similar materials to exact shape, and thickness of existing.
- 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.
- Provide a 1/8 #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.

Sheet Details
Not to Scale

Texas Department of Transportation
Traffic Operations Division Standard

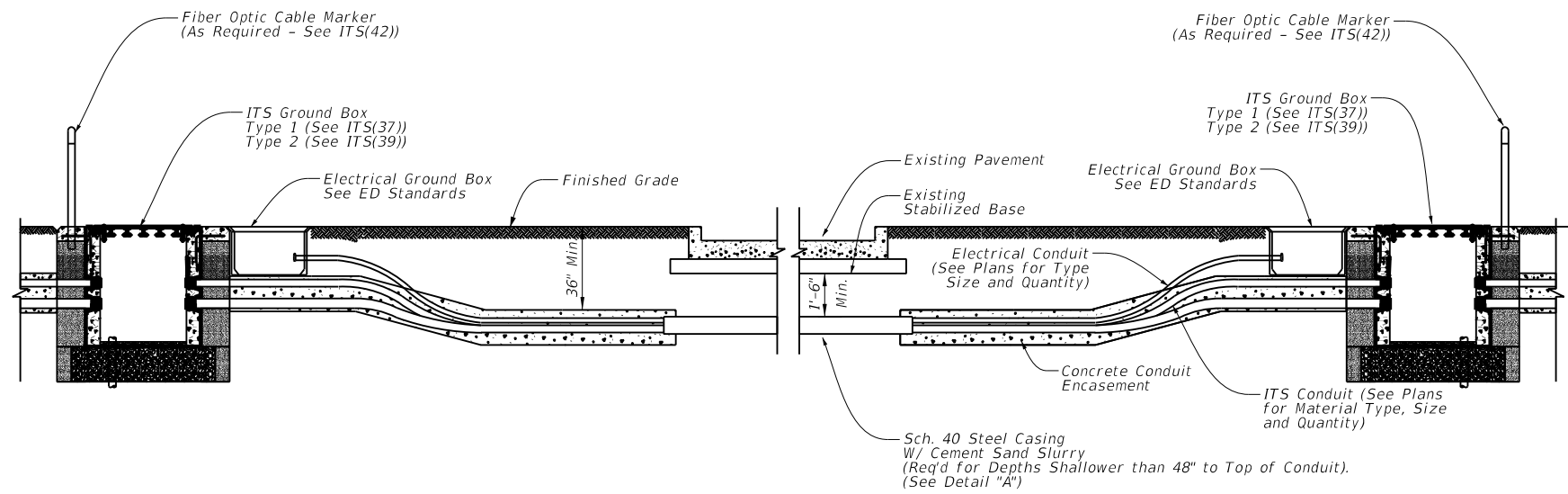
ITS CONDUIT TRENCH DETAILS

ITS(27)-16

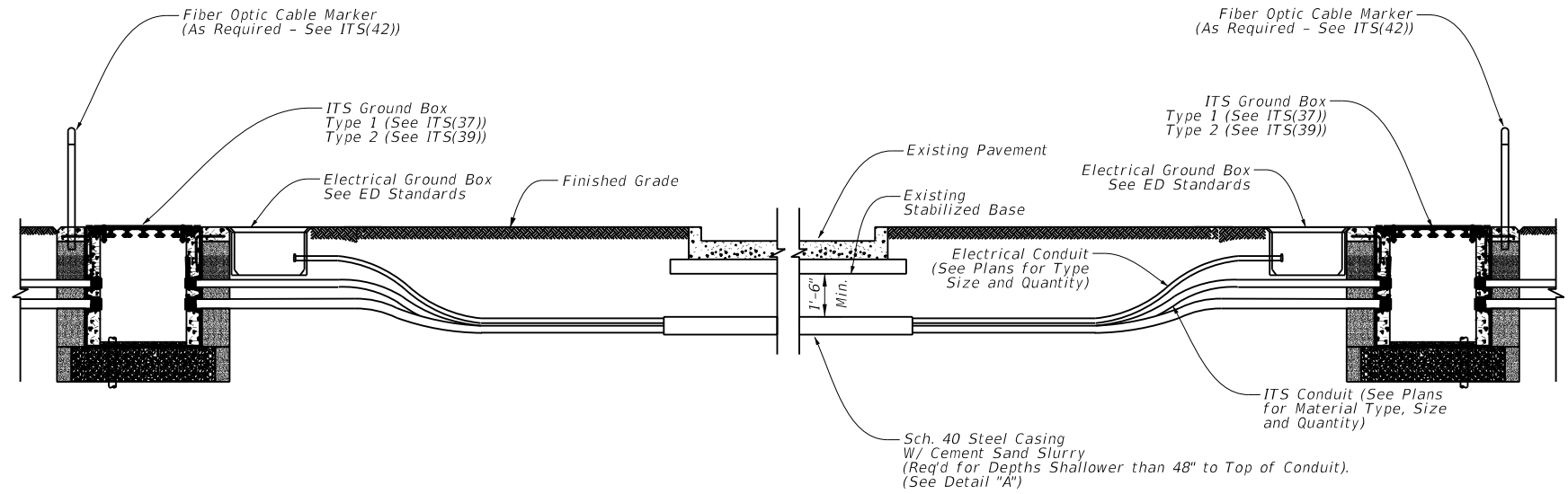
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| DIST | COUNTY | SHEET NO. | | |
| ELP | HUDSPETH | | | 69 |

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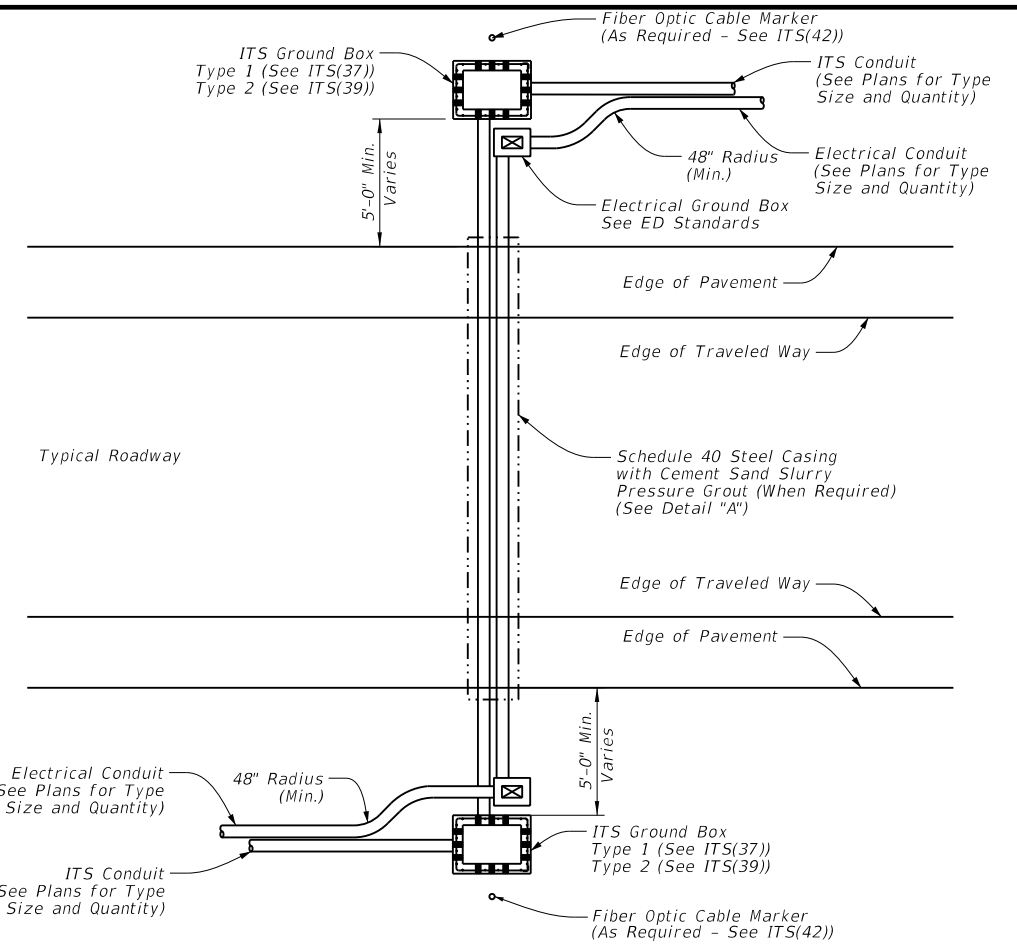
DATE: 1/4/2024
 FILE: its(28)-16.dgn



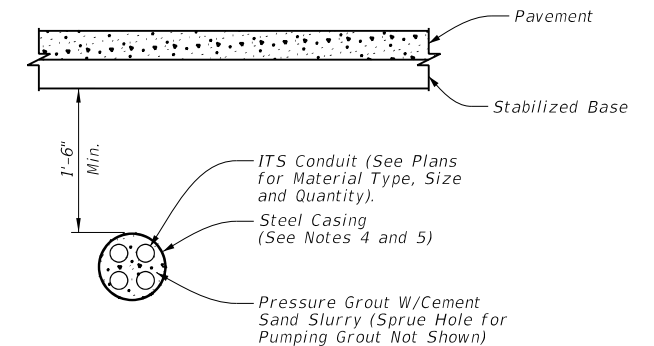
Typical Conduit Installation Jacking or Boring Beneath Existing Roadway



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



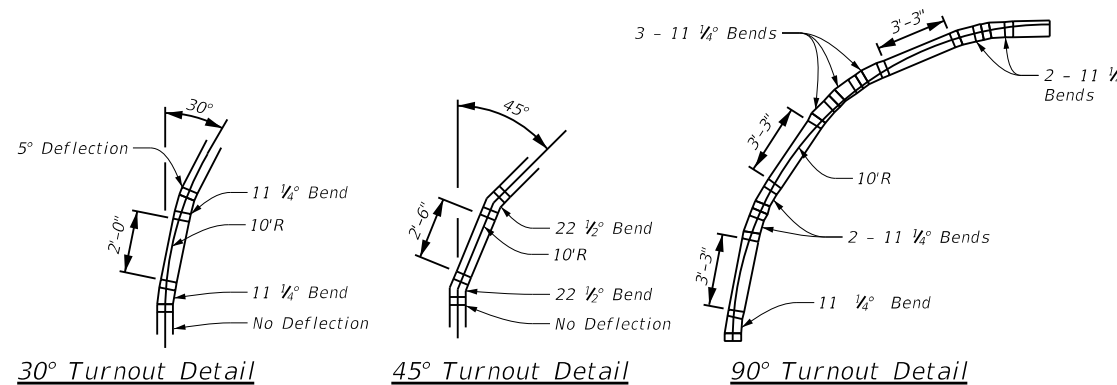
Bore Under Pavement



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
Not to Scale

SHEET 2 OF 2



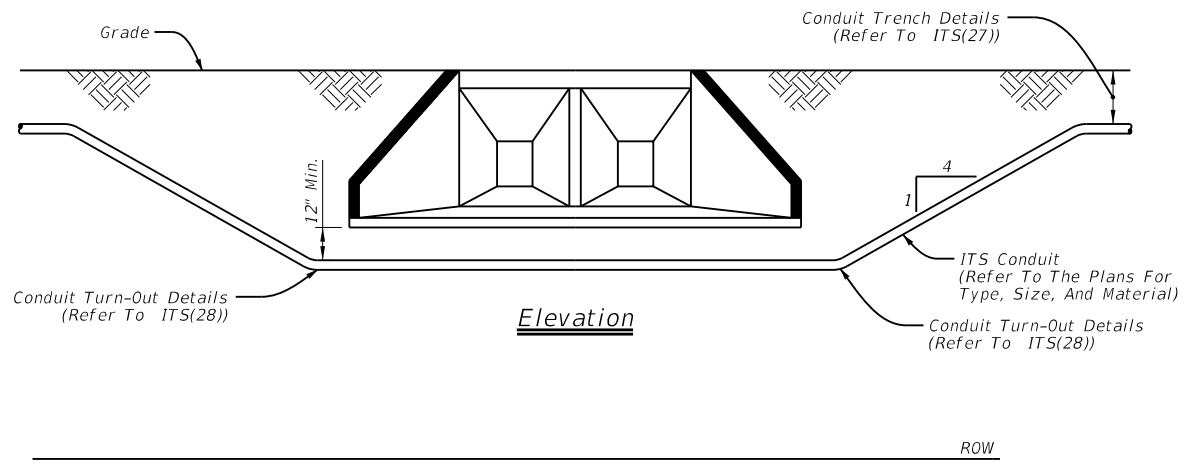
ITS CONDUIT BORE AND STEEL CASING DETAILS

ITS(28)-16

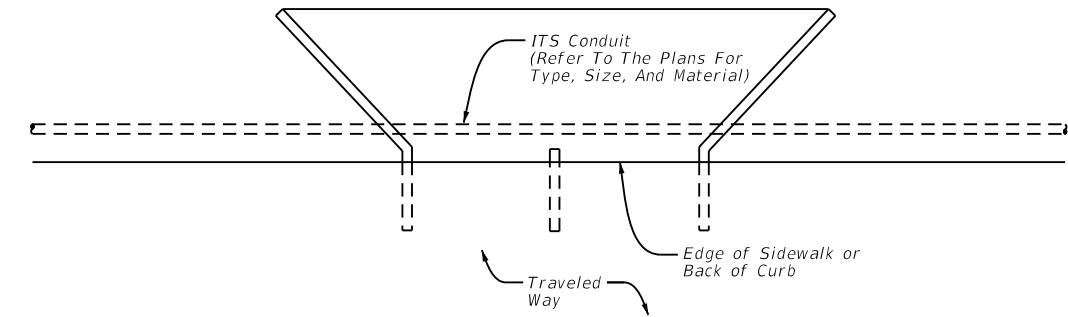
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| | ELP | HUDSPETH | 70 | |

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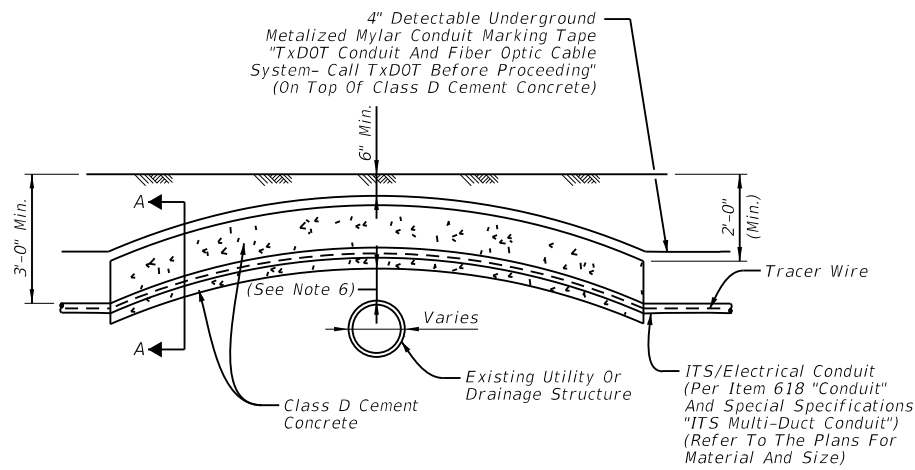


Elevation



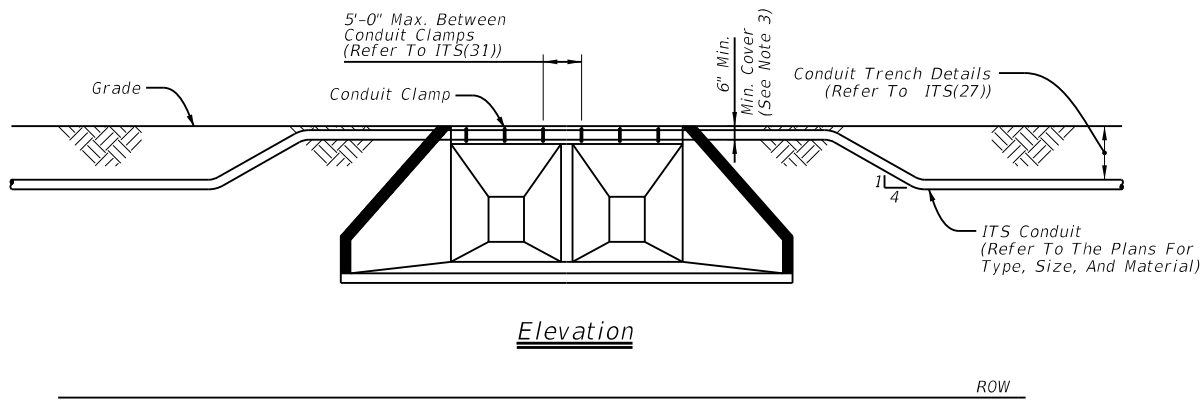
Plan View

Conduit Bored Under Culvert

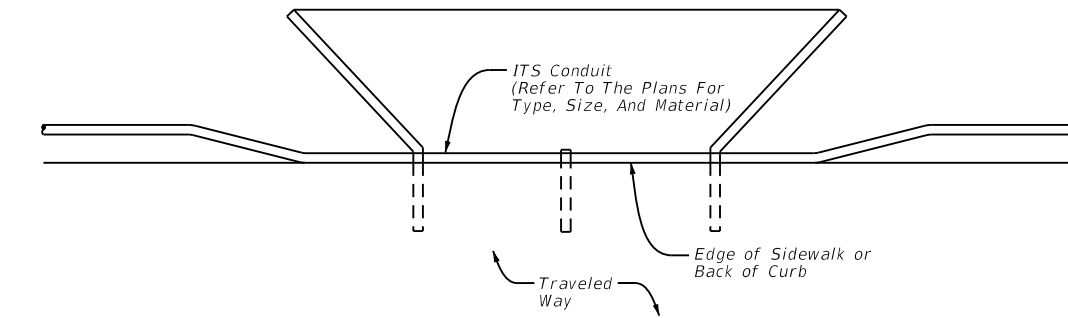


Section A-A

Conduit Installation Detail Above Existing Drain Pipes Or Utilities

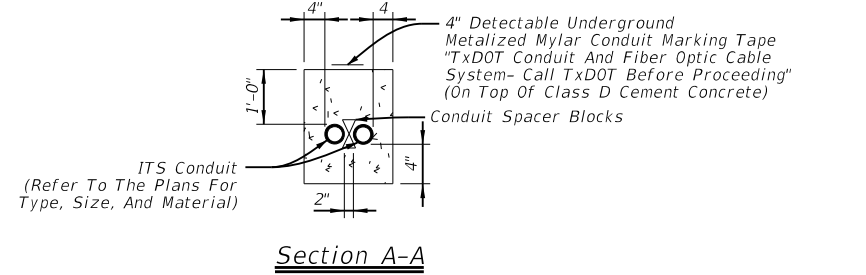


Elevation



Plan View

Conduit Attached To Culvert Headwall



Conduit Installation Detail Below Existing Drain Pipes Or Utilities

General Notes:

1. With approval from the field engineer adjust the final burial depth of conduit(s) in circumstances requiring traversal of non-movable object conflicts.
2. Where conduits are to be installed over existing underground infrastructure (i.e., existing utility or drainage structure) which are less than 3'-0" deep, encase conduit in Class D cement concrete in accordance with Item 421, "Hydraulic Cement Concrete", for the entire length of the conduit that is installed at a depth of less than 3'-0".
3. If depth of cover over encasement is less than 6", install the conduit to pass beneath the underground infrastructure.
4. Refer to the plans for type, size and configuration of all conduits. Refer to ITS(27) and ITS(28) for further installation details.
5. It is the responsibility of the contractor to verify all existing underground infrastructure. The contractor is responsible for any damage to any underground infrastructure during construction. Verify all utility locations at least 100' in advance of trenches, plowing or boring, and make changes in conduit placement in the event of conflict.
6. If proposed conduit is crossing or in close proximity to an existing underground utility, maintain a minimum clearance of 1'-6" vertical, 1'-6" horizontal or a clearance dictated by municipal code and or utility owner.
7. Install underground warning tape directly above all conduits per ITS(27) standard.
8. Do not install communications and electric cables in the same conduit. Separate conduits installed within the same trench based on NFPA 70, National Electrical Code. Refer to ITS(27) for additional conduit installation details.
9. Ensure all work is in compliance with the latest edition of NFPA 70, National Electrical Code.
10. Utilize PVC conduit for all underground applications as required by design. Transition with a conduit coupling to RMC conduit or other as required by design that is approved for above ground applications.
11. Do not exceed a rise:run ratio of 1:4 for conduit sloped through increases or decreases in elevation.



ITS CONDUIT OBSTRUCTION CROSSING

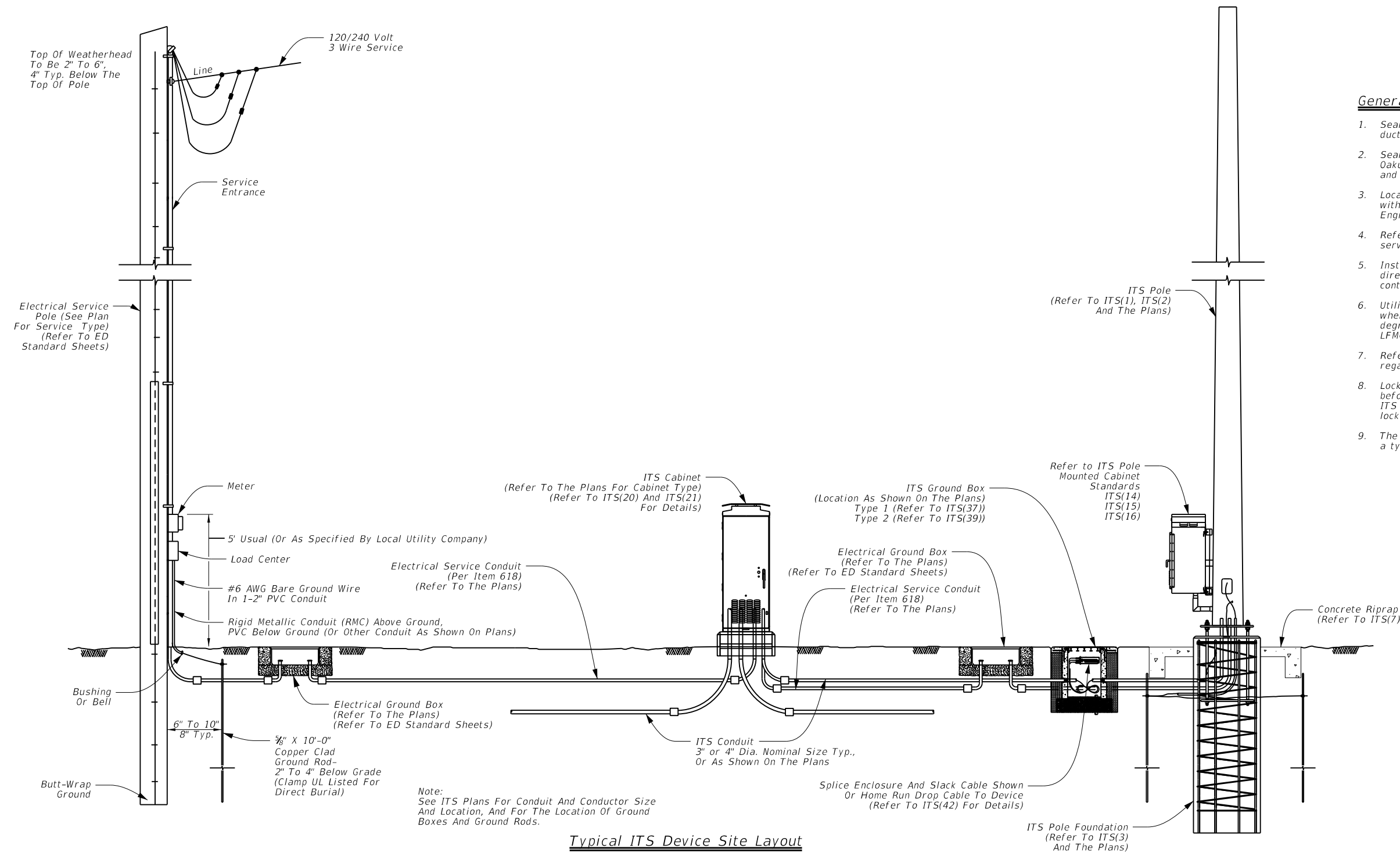
ITS(35)-16

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FILE: its(36)-16.dgn



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.

| | | | |
|---|------------------|---|----------------|
| | | Traffic Operations Division Standard | |
| <h2>TYPICAL ITS DEVICE SITE LAYOUT</h2> | | | |
| <h3>ITS(36)-16</h3> | | | |
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| REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS | | | | DELINEATORS | | | | D & OM DESCRIPTIVE CODES | | |
|---|---|--------|--------|-------------|--|-----|------------|--------------------------|---|------------|
| DEVICE | SIZE 1 | SIZE 2 | SIZE 3 | SIZE 4 | SINGLE | | DOUBLE | | INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX (XX) NUMBER OF REFLECTORS S = Single D = Double COLOR OF REFLECTORS W = White Y = Yellow R = Red REFLECTOR UNIT SIZE 1 or 2 TYPE OF POST OR DELINEATOR WC = Wing Channel Post YFLX = Yellow Flexible Post WFLX = White Flexible Post BRF = Barrier Reflector TYPE OF MOUNT GND = Embedded (drivable or set in concrete) CTB = Concrete Barrier Mount GF1 or GF2 = Guard Fence Attachment SRF = Surface Mount DIRECTION If Required BI = Bi-Directional BR = Bi-Directional with red on back | |
| | | | | | | | | | | |
| SHEETING | Yellow, White or Red Type B or C reflective sheeting | | | | Yellow, White or Red Type B or C Reflective Sheeting | | | | INSTL OM ASSM (OM-XX) (XXXX)XXX (XX) TYPE OF OBJECT MARKER 1, 2, 3, or 4 NUMBER OF REFLECTORS OR DIRECTION X = 3-Size 2 reflector units (Type 2 only) Y = 1-Size 3 reflector unit (Type 2 only) Z = 3-Size 1 or 1-Size 4 reflector units (Type 2 only) L = Left Side (Type 3 Object Marker only) R = Right Side (Type 3 Object Marker only) C = Center (Type 3 Object Marker only) TYPE OF POST WC = Wing Channel Post WFLX = White Flexible Post TWT = Thin Walled Tubing TYPE OF MOUNT GND = Embedded (drivable) SRF = Surface Mount WAS = Wedge Anchor Steel WAP = Wedge Anchor Plastic DIRECTION If Required BI = Bi-Directional | |
| NOTE | 1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes. | | | | POST TYPE | WC | YFLX, WFLX | WC | | YFLX, WFLX |
| | | | | | MOUNT TYPE | GND | GND, SRF | GND | | GND, SRF |

| OBJECT MARKERS | | | | | | | | |
|----------------|---|-------------------------------|-------|----------|---|-------|-------|---|
| DEVICE | Type 1 (OM-1) | Type 2 (OM-2) | | | Type 3 (OM-3) | | | Type 4 (OM-4) |
| | OM-1 | OM-2X | OM-2Y | OM-2Z | OM-3L | OM-3R | OM-3C | OM-4 |
| | | | | | | | | |
| SHEETING | Yellow-Type B _{FL} or C _{FL} Sheeting | Yellow - Type B or C Sheeting | | | Alternating acrylic black and retroreflective yellow - Type B _{FL} or C _{FL} Sheeting | | | Red -Type B _{FL} or C _{FL} Sheeting |
| POST TYPE | TWT | WC | WC | WFLX | TWT | | | TWT |
| MOUNT TYPE | WAS, WAP | GND | GND | GND, SRF | WAS, WAP | | | WAS, WAP |

| DEPARTMENTAL MATERIAL SPECIFICATIONS | |
|--|----------|
| FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES) | DMS-4400 |
| SIGN FACE MATERIALS | DMS-8300 |
| DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS | DMS-8600 |

| BARRIER REFLECTORS (BRF) | | | CHEVRONS | | | | ONE DIRECTION LARGE ARROW | | NOTE: Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative. | | |
|--------------------------|---|-----|----------|--|--------------------------|-----------------------------------|---------------------------|---------------------|--|--------------------------|----------------------------------|
| DEVICE | GF1 | GF2 | CTB | W1-8 | | | | W1-6 | | | |
| | | | | | | | | | | | |
| SHEETING | Yellow, White, Red | | | | | | | | | | |
| NOTE | 1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov. | | | 1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6). | | | | | | | |
| | | | | SIZE (W x L) | 18" x 24" (Conventional) | 24" x 30" (Conventional Oversize) | 30" x 36" (Expressway) | 36" x 48" (Freeway) | SIZE (W x L) | 48" x 24" (Conventional) | 60" x 30" (Expressway & Freeway) |
| | | | | MOUNTING HEIGHT | 4'-0" or 7'-0" | | 7'-0" Only | | MOUNTING HEIGHT | 7'-0" | |

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION
D & OM(1)-20

| | | | | |
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| 10-09 3-15 | DIST | COUNTY | SHEET NO. | |
| 4-10 7-20 | ELP | HUDSPETH | 73 | |

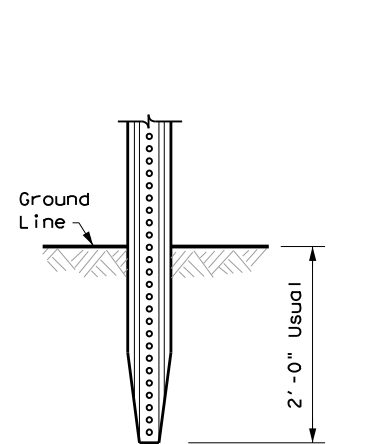
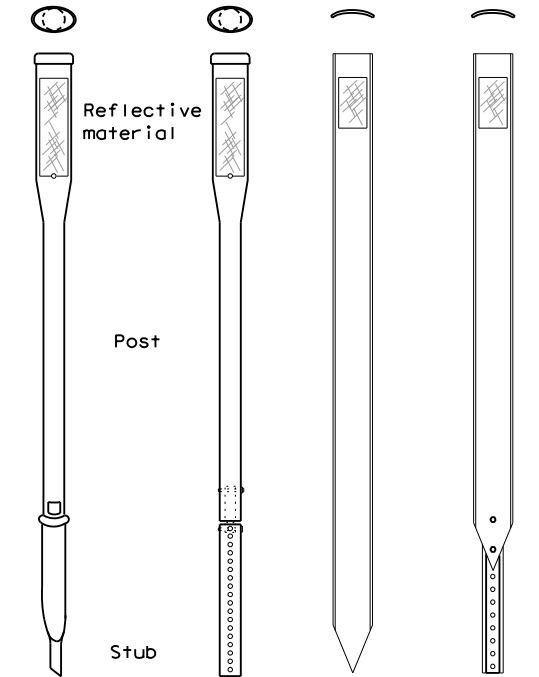
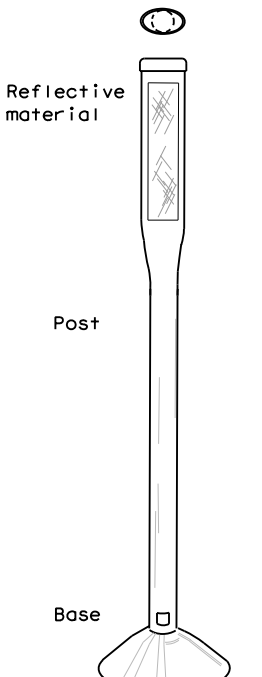
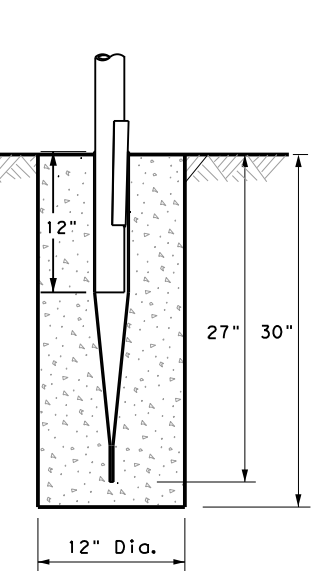
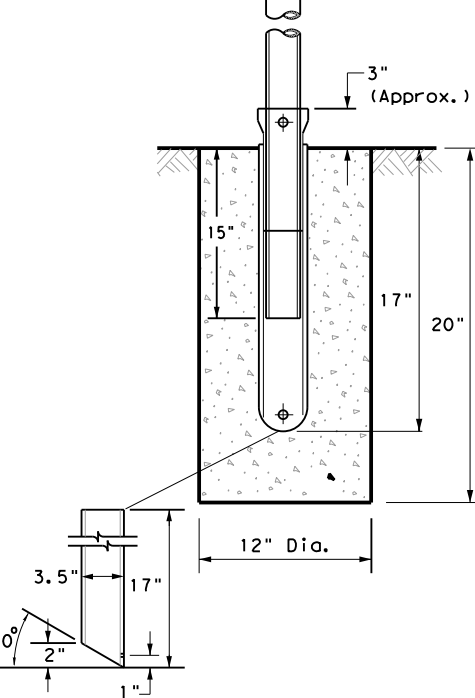
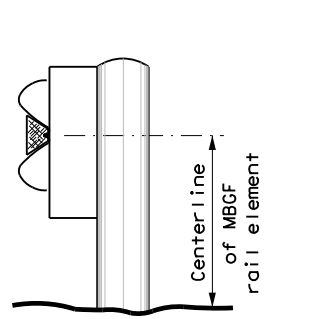
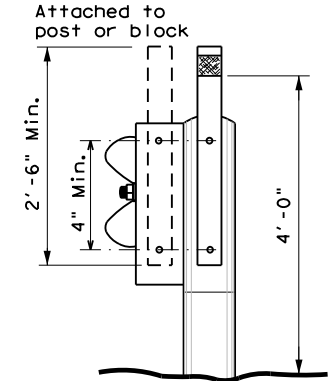
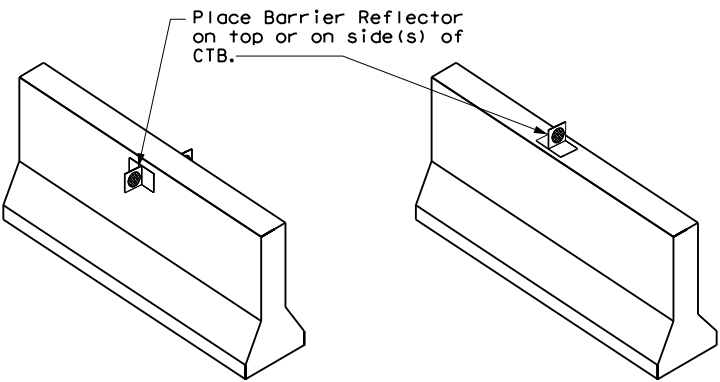
20A

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POST TYPE AND SUPPORT FOUNDATION DETAILS

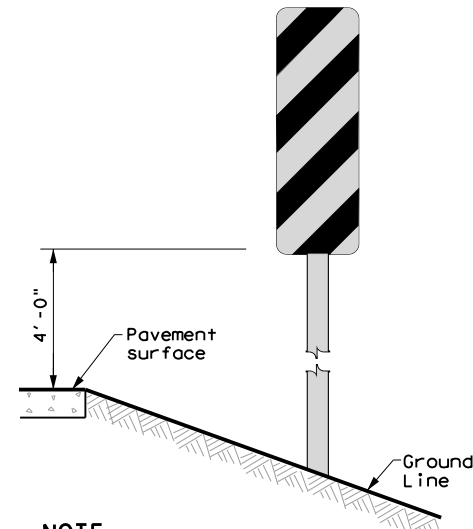
TYPE OF BARRIER MOUNTS

| WING CHANNEL (WC) | FLEXIBLE POSTS (YFLX, WFLX) | | WEDGE ANCHOR SYSTEMS | | GUARD FENCE ATTACHMENT |
|--|--|---|---|---|---|
| GND | GND | SRF | WAS | WAP | GF 1 |
|  |  |  |  |  |  |
| | EMBEDDED | SURFACE MOUNT | STEEL | PLASTIC | GF 2 |
| NOTES 1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only. 2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499. | NOTES 1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices. 2. Install per manufacturer's recommendations. 3. Post length may vary to meet field conditions. 4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow. | | NOTE 1. Install per manufacturer's recommendations. | |  |
| CONCRETE TRAFFIC BARRIER (CTB) | | | | | |
|  | | | | | |
| GENERAL NOTES 1. Place delineators on a section of roadway at a consistent distance from the edge of pavement. 2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction. 3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible. 4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation. 5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface. 6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane. | | | | | |

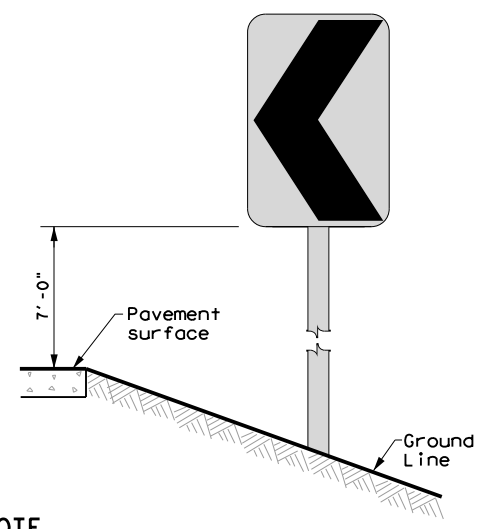
TYPES 1,3, AND 4 OBJECT MARKERS AND CHEVRONS

CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN

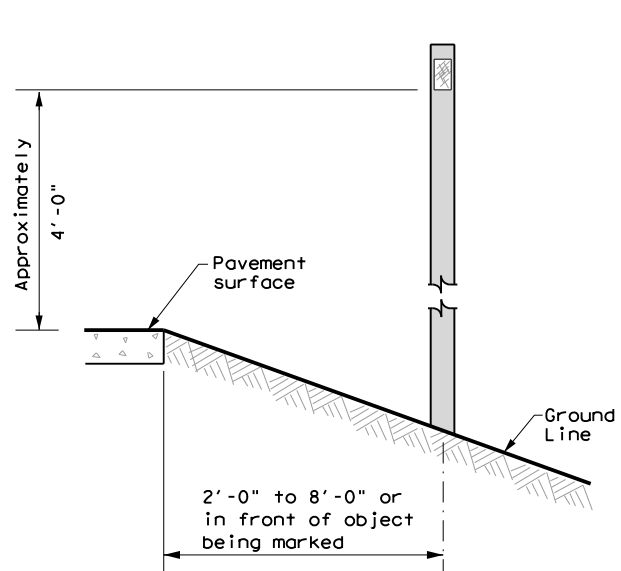
DELINEATORS AND TYPE 2 OBJECT MARKERS




NOTE
 Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)



NOTE
 Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.



See general notes 1, 2 and 3.



Texas Department of Transportation
 Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

| | | | | |
|---------------------|-----------|-----------|-----------|-----------|
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| 10-09 3-15 | DIST | COUNTY | SHEET NO. | |
| 4-10 7-20 | ELP | HUDSPETH | 74 | |

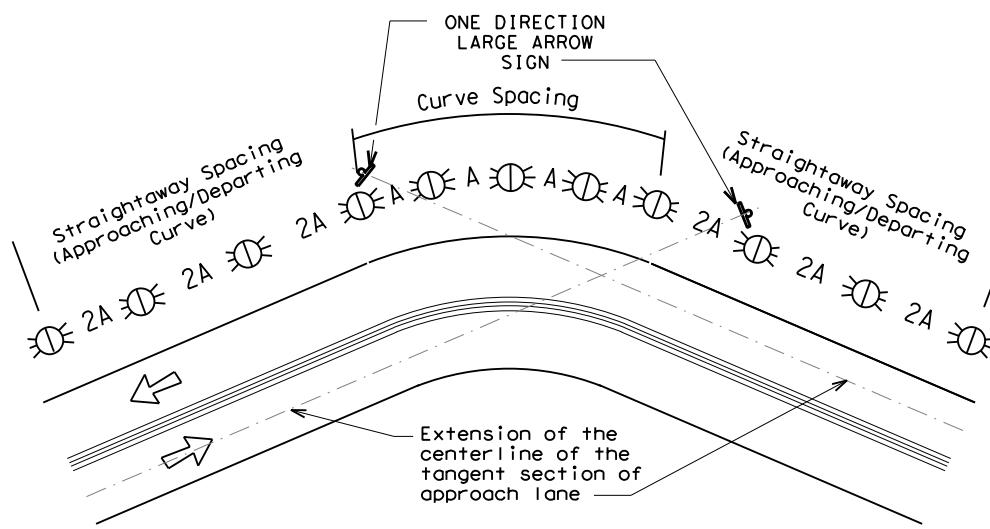
20B

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MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

| Amount by which Advisory Speed is less than Posted Speed | Curve Advisory Speed | |
|--|--|---|
| | Turn (30 MPH or less) | Curve (35 MPH or more) |
| 5 MPH & 10 MPH | • RPMs | • RPMs |
| 15 MPH & 20 MPH | • RPMs and One Direction Large Arrow sign | • RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons. |
| 25 MPH & more | • RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons | • RPMs and Chevrons |

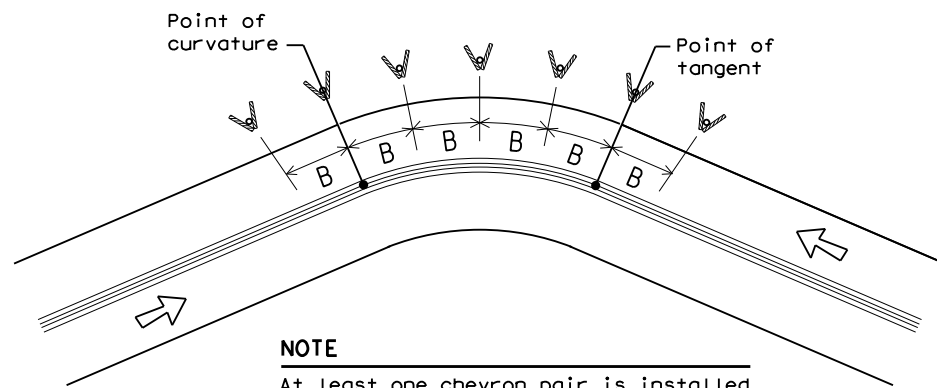
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

| WHEN DEGREE OF CURVE OR RADIUS IS KNOWN | | | | |
|---|-----------------|------------------|-------------------------|--------------------------|
| Degree of Curve | FEET | | | |
| | Radius of Curve | Spacing in Curve | Spacing in Straightaway | Chevron Spacing in Curve |
| | | A | 2A | B |
| 1 | 5730 | 225 | 450 | — |
| 2 | 2865 | 160 | 320 | — |
| 3 | 1910 | 130 | 260 | 200 |
| 4 | 1433 | 110 | 220 | 160 |
| 5 | 1146 | 100 | 200 | 160 |
| 6 | 955 | 90 | 180 | 160 |
| 7 | 819 | 85 | 170 | 160 |
| 8 | 716 | 75 | 150 | 160 |
| 9 | 637 | 75 | 150 | 120 |
| 10 | 573 | 70 | 140 | 120 |
| 11 | 521 | 65 | 130 | 120 |
| 12 | 478 | 60 | 120 | 120 |
| 13 | 441 | 60 | 120 | 120 |
| 14 | 409 | 55 | 110 | 80 |
| 15 | 382 | 55 | 110 | 80 |
| 16 | 358 | 55 | 110 | 80 |
| 19 | 302 | 50 | 100 | 80 |
| 23 | 249 | 40 | 80 | 80 |
| 29 | 198 | 35 | 70 | 40 |
| 38 | 151 | 30 | 60 | 40 |
| 57 | 101 | 20 | 40 | 40 |

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

| WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN | | | |
|---|------------------|-------------------------|--------------------------|
| Advisory Speed (MPH) | Spacing in Curve | Spacing in Straightaway | Chevron Spacing in Curve |
| | A | 2xA | B |
| 65 | 130 | 260 | 200 |
| 60 | 110 | 220 | 160 |
| 55 | 100 | 200 | 160 |
| 50 | 85 | 170 | 160 |
| 45 | 75 | 150 | 120 |
| 40 | 70 | 140 | 120 |
| 35 | 60 | 120 | 120 |
| 30 | 55 | 110 | 80 |
| 25 | 50 | 100 | 80 |
| 20 | 40 | 80 | 80 |
| 15 | 35 | 70 | 40 |

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

| CONDITION | REQUIRED TREATMENT | MINIMUM SPACING |
|--|---|---|
| Frwy./Exp. Tangent | RPMs | See PM-series and FPM-series standard sheets |
| Frwy./Exp. Curve | Single delineators on right side | See delineator spacing table |
| Frwy/Exp. Ramp | Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4)) | 100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves) |
| Acceleration/Deceleration Lane | Double delineators (see Detail 3 on D&OM(4)) | 100 feet (See Detail 3 on D & OM (4)) |
| Truck Escape Ramp | Single red delineators on both sides | 50 feet |
| Bridge Rail (steel or concrete) and Metal Beam Guard Fence | Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction | Equal spacing (100' max) but not less than 3 delineators |
| Concrete Traffic Barrier (CTB) or Steel Traffic Barrier | Barrier reflectors matching the color of the edge line | Equal spacing 100' max |
| Cable Barrier | Reflectors matching the color of the edge line | Every 5th cable barrier post (up to 100' max) |
| Guard Rail Terminus/Impact Head | Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end | Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6) |
| Bridges with no Approach Rail | Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail | See D & OM(5) |
| Reduced Width Approaches to Bridge Rail | Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge | Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) |
| Culverts without MBGF | Type 2 Object Markers | See Detail 2 on D & OM(4) |
| Crossovers | Double yellow delineators and RPMs | See Detail 1 on D & OM (4) |
| Pavement Narrowing (lane merge) on Freeways/Expressway | Single delineators adjacent to affected lane for full length of transition | 100 feet |

NOTES

- Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
- Barrier reflectors may be used to replace required delineators.
- Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

| | |
|--|---------------------------|
| | Bi-directional Delineator |
| | Delineator |
| | Sign |



DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

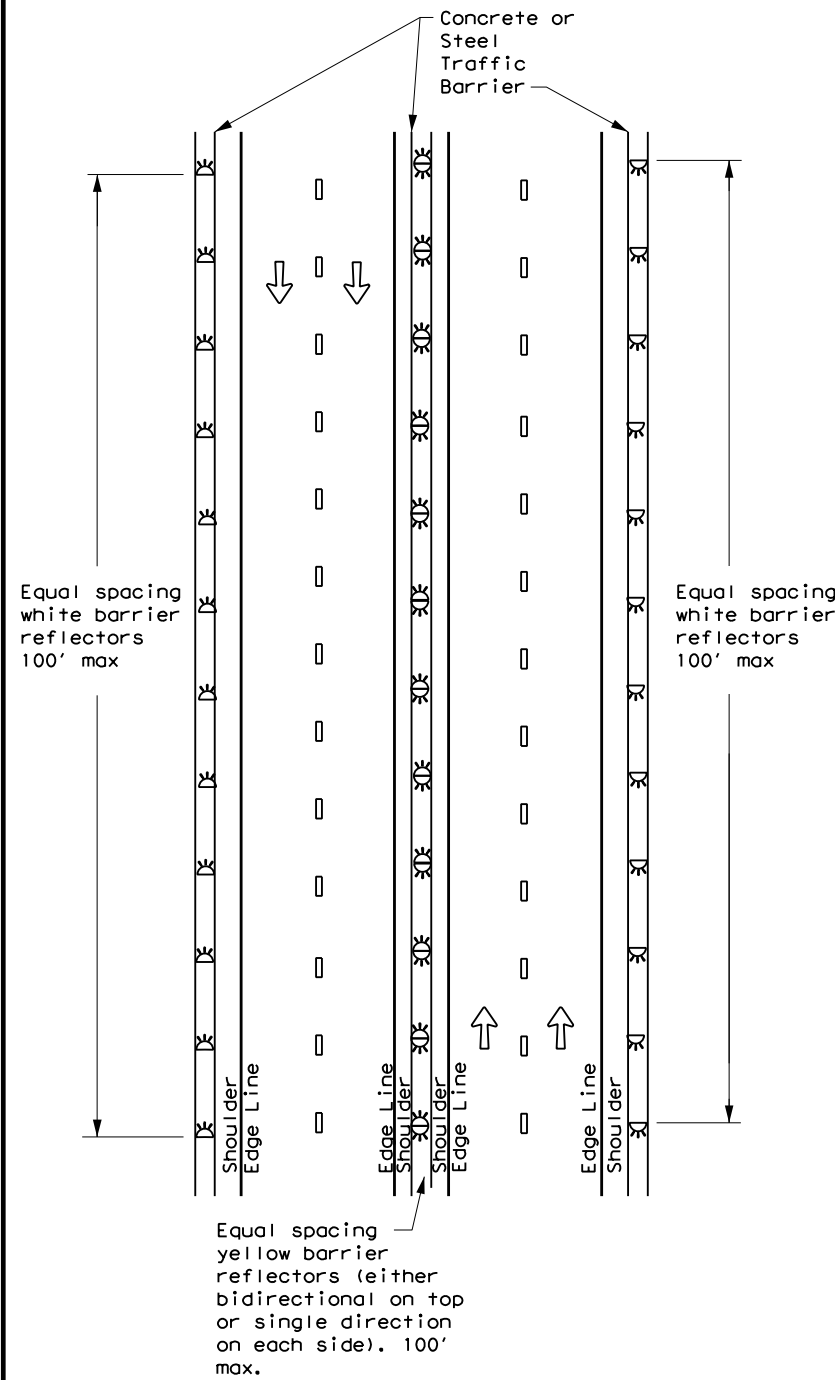
D & OM(3) -20

| | | | | |
|---------------------|-----------|-----------|-----------|-----------|
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| © TxDOT August 2004 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0002 | 07 | 057, ETC | IH-10 |
| 3-15 8-15 | DIST | COUNTY | SHEET NO. | |
| 8-15 7-20 | ELP | HUDSPETH | 75 | |

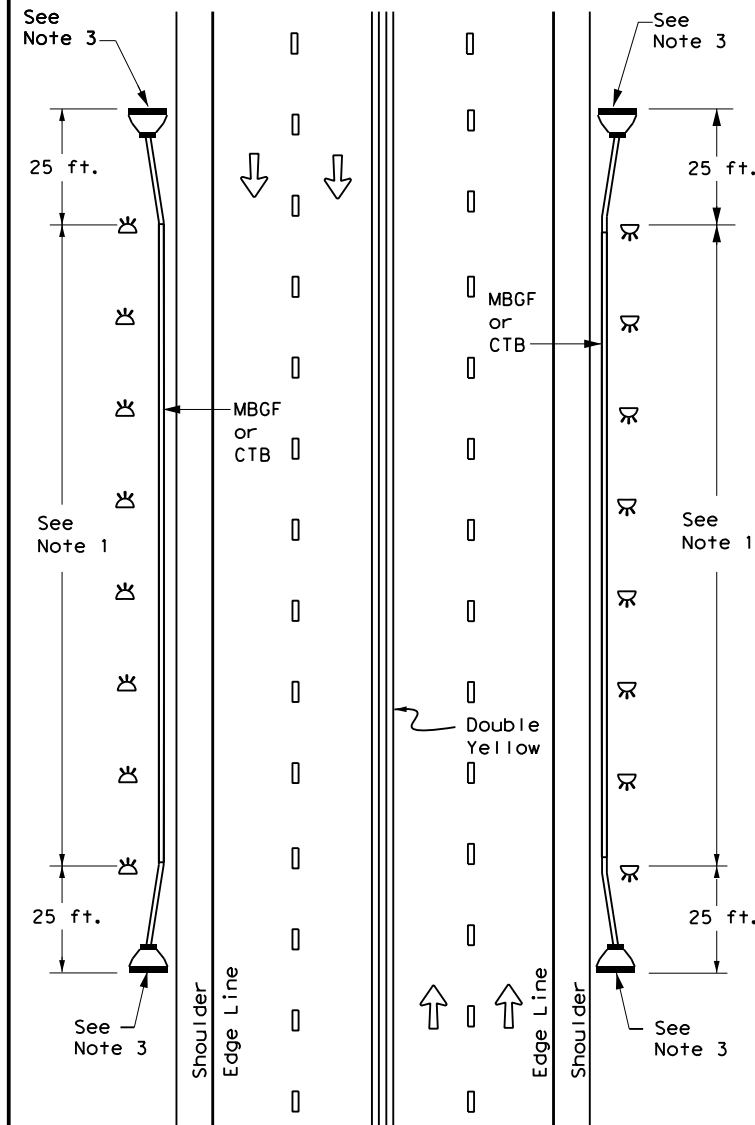
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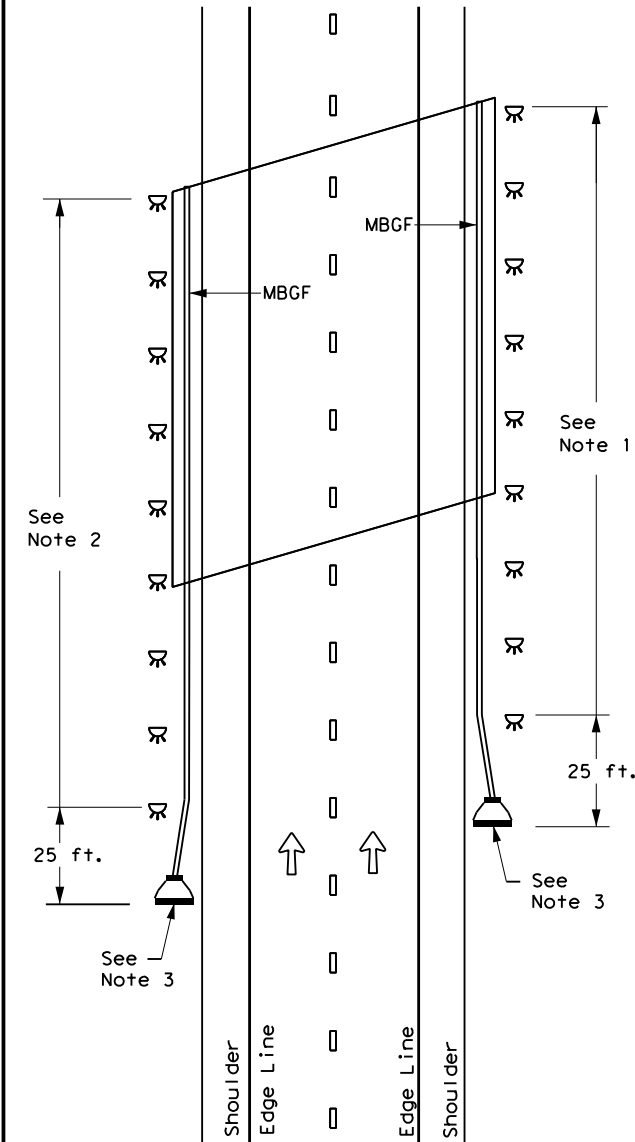
CONTINUOUS CONCRETE OR STEEL BARRIER



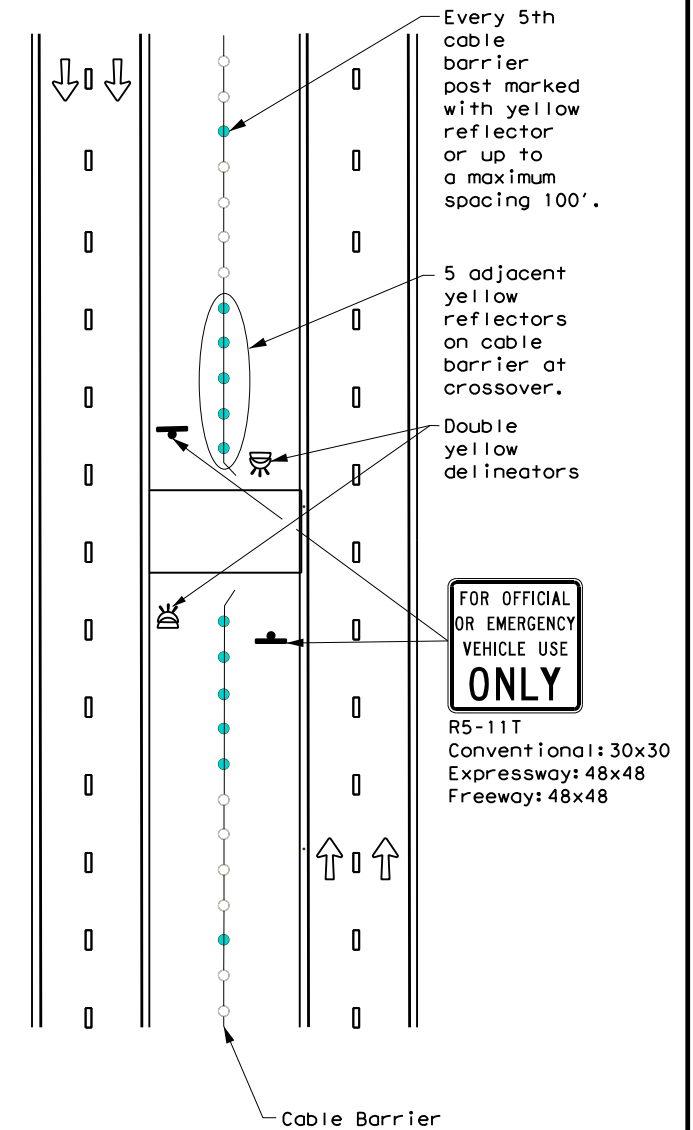
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100' max), but not less than 3 single directional white barrier reflectors or delineators. On Continuous Barrier, equal spacing (100' max.)
2. Equal spacing (100' max), but not less than 3 single directional yellow barrier reflectors or delineators.
3. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

LEGEND

| | |
|--|--------------------------|
| | Bidirectional Delineator |
| | Delineator |
| | OM-3 |
| | OM-2 |
| | Terminal End |
| | Traffic Flow |

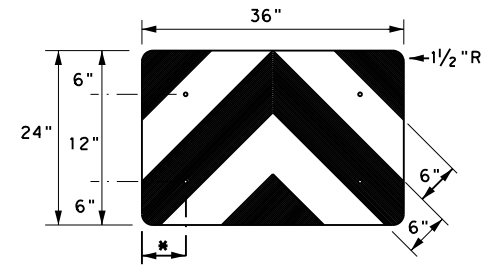
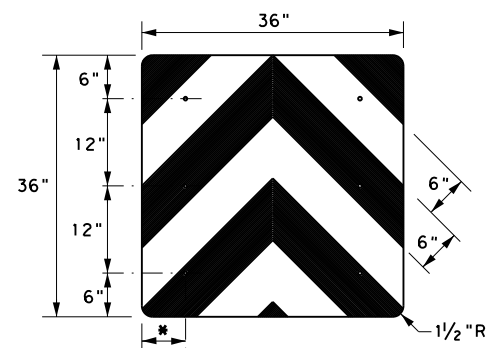
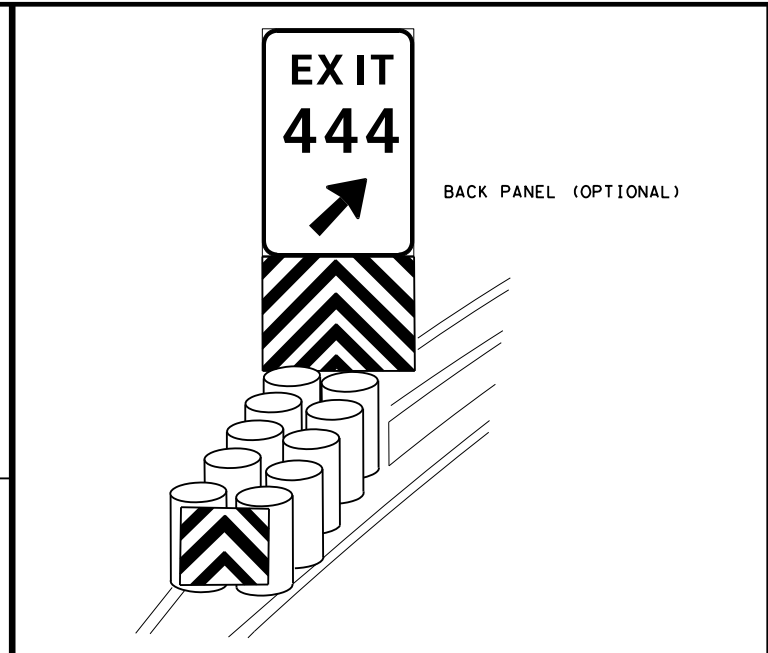
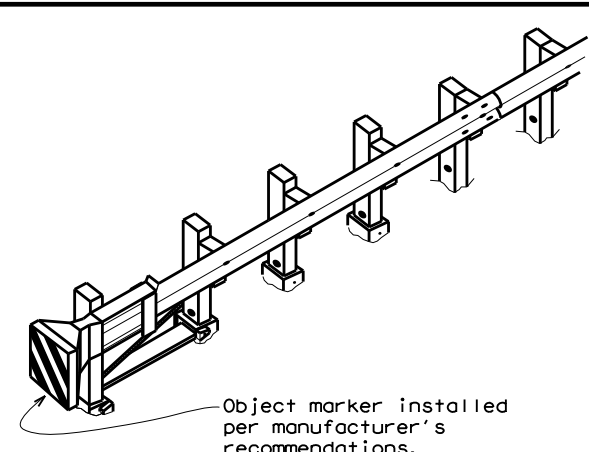
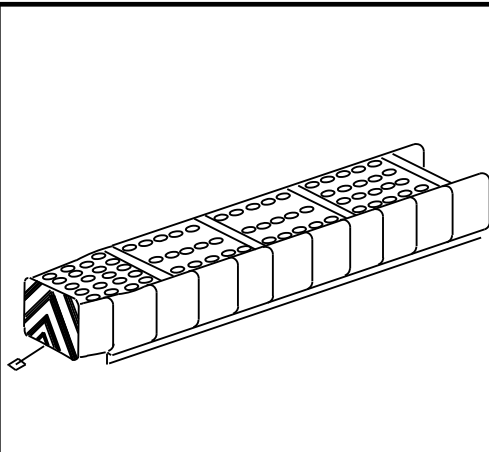
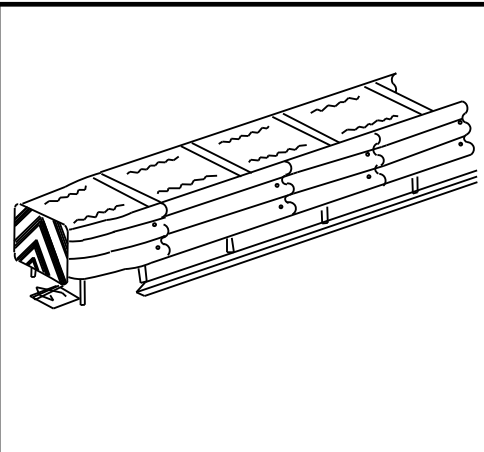
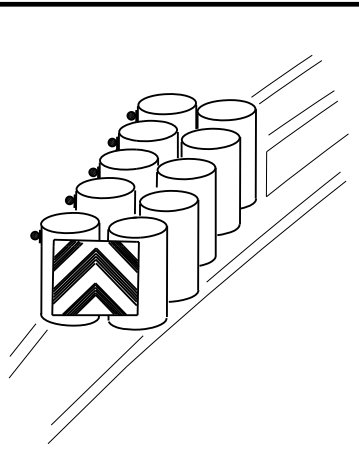


DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

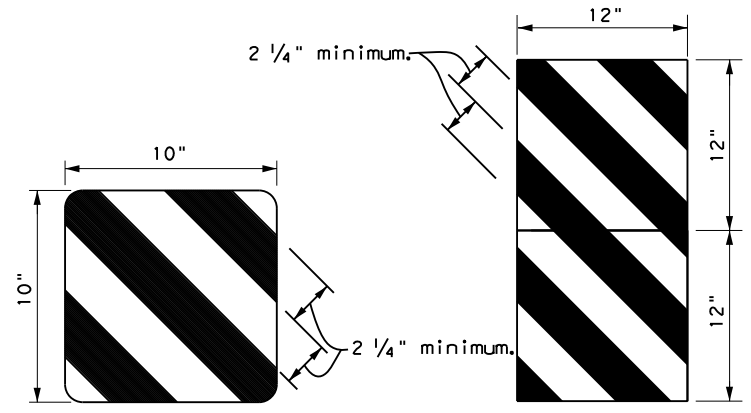
D & OM(6) - 20

| | | | | |
|---------------------|-----------|-----------|-----------|-----------|
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| © TxDOT August 2015 | CONT | SECT | JOB | HIGHWAY |
| 7-20 | 0002 | 07 | 057, ETC | IH-10 |
| | DIST | COUNTY | SHEET NO. | |
| | ELP | HUDSPETH | 76 | |

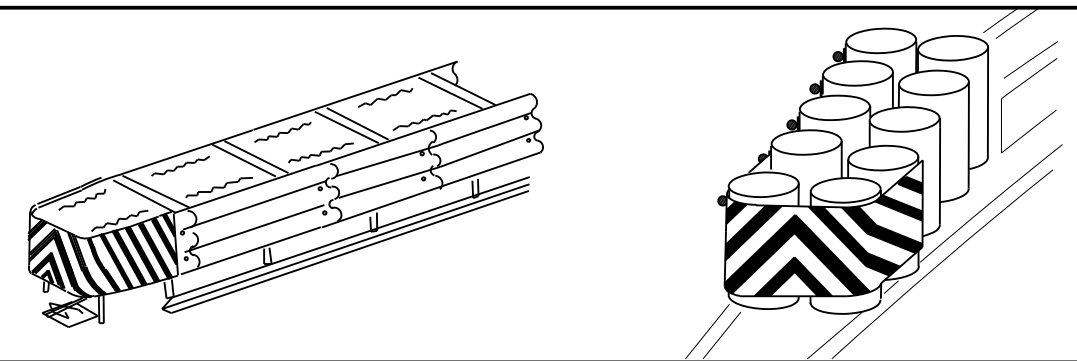
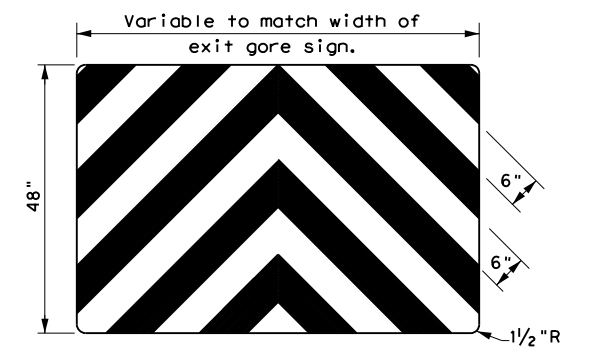
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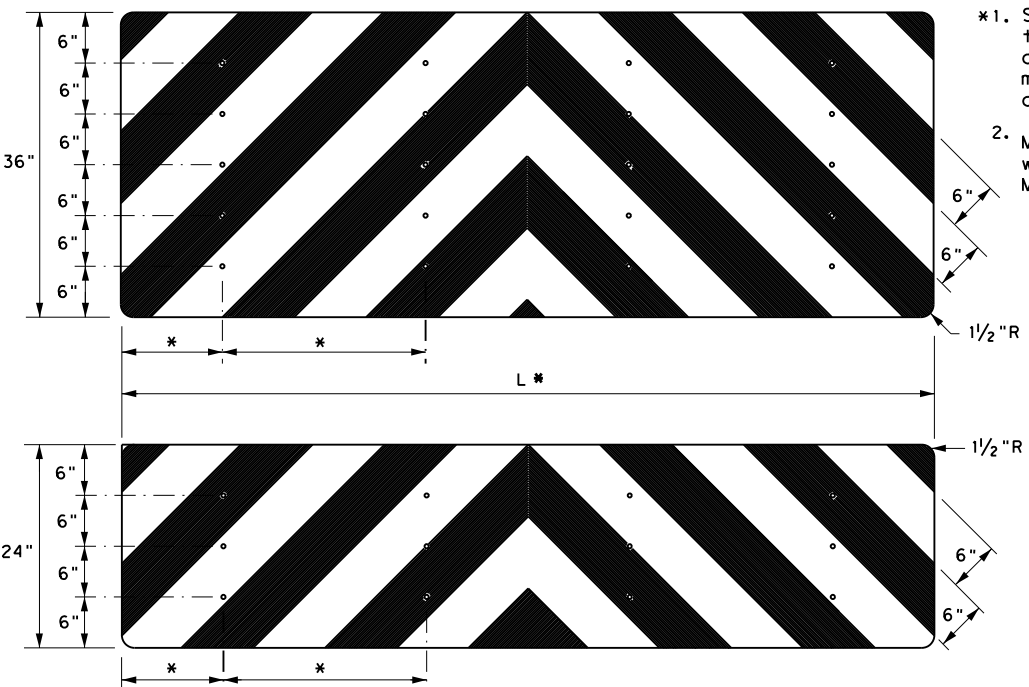
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer



OBJECT MARKERS SMALLER THAN 3 FT²



- NOTES**
1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturer's recommendation, or as directed by the Engineer.
 2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".



NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.
2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.
3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 1/4".
4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.
5. Object Marker at nose of attenuator is subsidiary to the attenuator.
6. See D & OM (1-4) for required barrier reflectors.

DATE: 1/4/2024 1:45:29 PM
FILE: domvia-20.dgn

| | | | | | |
|--|-----------|-----------|-----------|----------------------------------|-------|
| | | | | Traffic Safety Division Standard | |
| DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS D & OM(VIA) -20 | | | | | |
| FILE: domvia20.dgn | DW: TxDOT | CK: TxDOT | DN: TxDOT | CK: TxDOT | |
| © TxDOT December 1989 | CONT | SECT | JOB | HIGHWAY | |
| REVISIONS | | | 0002 07 | 057, ETC | IH-10 |
| 4-92 8-04 | | | | | |
| 8-95 3-15 | | | | | |
| 4-98 7-20 | | | | | |
| ELP | COUNTY | HUDSPETH | SHEET NO. | | 77 |
| 20G | | | | | |

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

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

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

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):

0002-07-057, ETC STATE AID PROJECT NO: C-2-7-57

1.2 PROJECT LIMITS:

From: 2.2 MILES WEST OF RANCH RD 1111

To: 6.0 MILES EAST OF RANCH RD 1111

1.3 PROJECT COORDINATES:

BEGIN: (Lat) 31.182611, (Long) -105.390425

END: (Lat) 31.1468884, (Long) -105.2616018

1.4 TOTAL PROJECT AREA (Acres): 256.2

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.35

1.6 NATURE OF CONSTRUCTION ACTIVITY:

CTM - CORRIDOR TRAFFIC MANAGEMENT

CONSISTING OF INTELLIGENT TRANSPORTATION SYSTEM WORK

1.7 MAJOR SOIL TYPES:

| Soil Type | Description |
|-----------|--|
| SAND | FINE TO MEDIUM, GRAVELY, SILTY, CLAYEY |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):

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

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

| Type | Sheet #s |
|------|----------|
| N/A | |
| | |
| | |
| | |
| | |

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

1.9 CONSTRUCTION ACTIVITIES:

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

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

Other: _____

Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

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

Other: _____

Other: _____

Other: _____

1.11 RECEIVING WATERS:

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

| Tributaries | Classified Waterbody |
|--|--|
| RUNOFF PLUS SURROUNDING WATERSHED TO BE HANDLED PRIMARILY BY SURFACE FLOWS DISCHARGING IN TO CATCH BASINS CONVEYED BY CULVERTS | RIO GRANDE, LOCATED APPROX. 14 MILES SW OF THE PROJECT |
| | |
| | |
| | |

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

1.12 ROLES AND RESPONSIBILITIES: TxDOT

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

Other: _____

Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

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

Other: _____

Other: _____



Cesar R. Nevarez, P.E.

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

| | | | | |
|-------------------|-------------|-----------|-------------|-----------|
| FED. RD. DIV. NO. | PROJECT NO. | | | SHEET NO. |
| | | | | 78 |
| STATE | STATE DIST. | COUNTY | | |
| TEXAS | ELP | HUDESPETH | | |
| CONT. | SECT. | JOB | HIGHWAY NO. | |
| 0002 | 07 | 057, ETC | IH-10 | |

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

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

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

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

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

2.2 SEDIMENT CONTROL BMPs:

T / P

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

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

2.3 PERMANENT CONTROLS:

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

BMPs To Be Left In Place Post Construction:

| Type | Stationing | |
|------|------------|----|
| | From | To |
| N/A | | |
| | | |
| | | |
| | | |
| | | |
| | | |

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

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

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

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

2.5 POLLUTION PREVENTION MEASURES:

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

2.6 VEGETATED BUFFER ZONES:

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

| Type | Stationing | |
|------|------------|----|
| | From | To |
| N/A | | |
| | | |
| | | |
| | | |
| | | |
| | | |

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

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

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

2.8 DEWATERING:

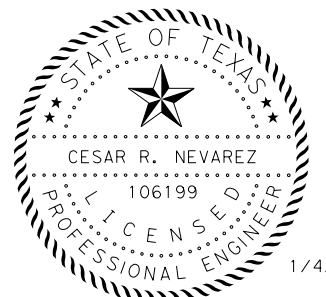
Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

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

2.10 MAINTENANCE:

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



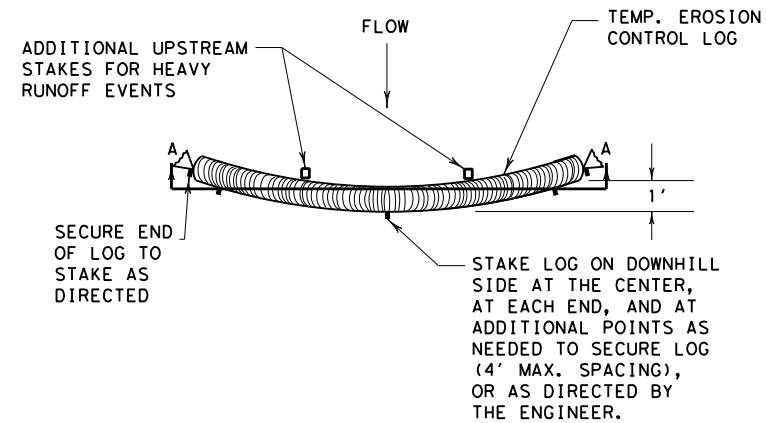
Cesar R. Nevarez, P.E.

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

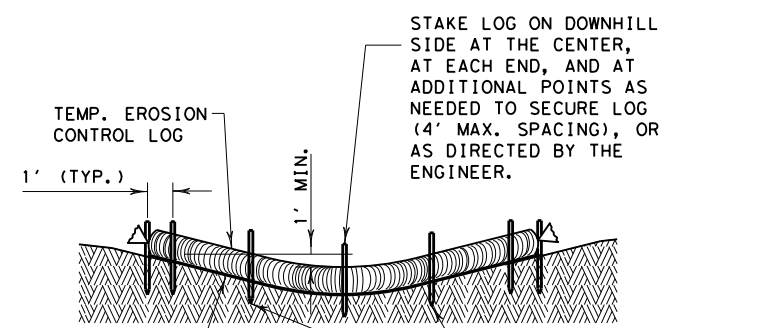
| | | | | |
|-------------------|-------------|-----------|-------------|-----------|
| FED. RD. DIV. NO. | PROJECT NO. | | | SHEET NO. |
| | | | | 79 |
| STATE | STATE DIST. | COUNTY | | |
| TEXAS | ELP | HUDESPETH | | |
| CONT. | SECT. | JOB | HIGHWAY NO. | |
| 0002 | 07 | 057, ETC | IH-10 | |

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PLAN VIEW

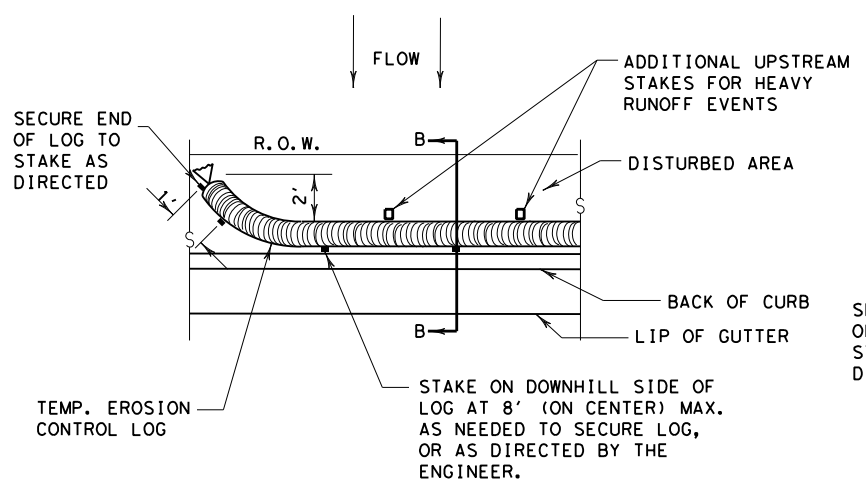


SECTION A-A
EROSION CONTROL LOG DAM

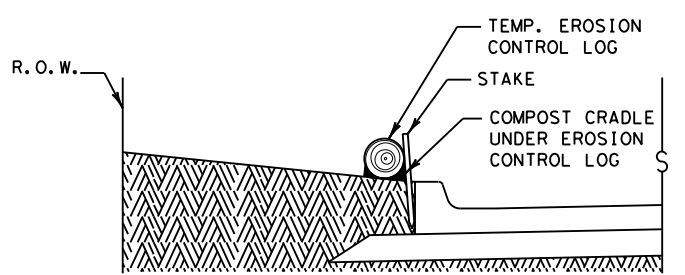
CL-D

LEGEND

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



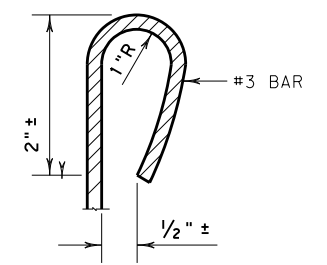
PLAN VIEW



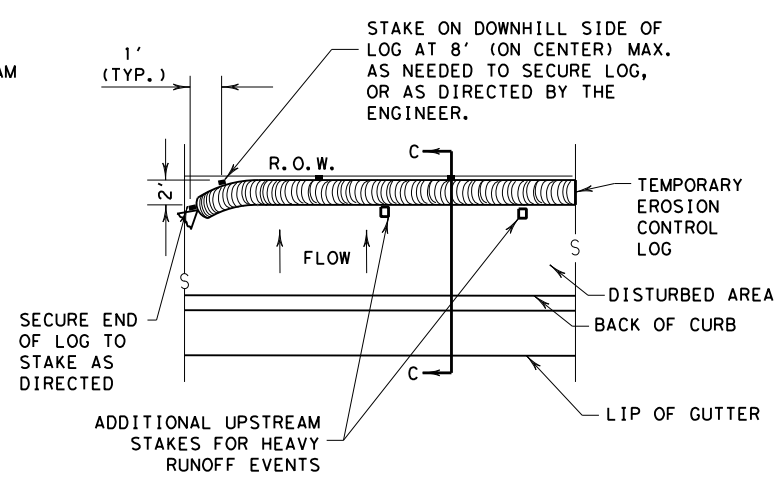
SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

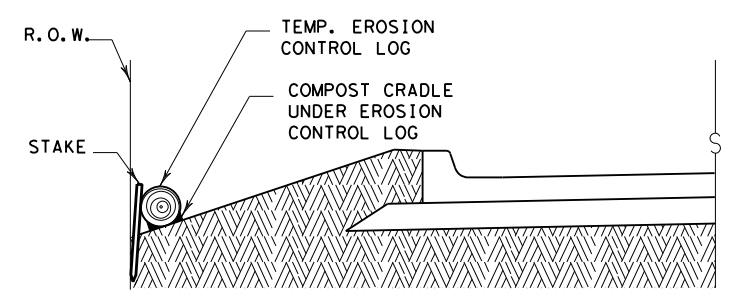
CL-BOC



REBAR STAKE DETAIL



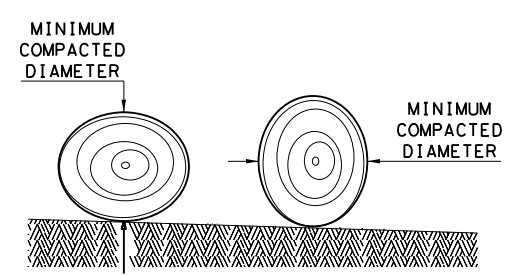
PLAN VIEW



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

SEDIMENT BASIN & TRAP USAGE GUIDELINES

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

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

Control logs should be placed in the following locations:

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

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

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

GENERAL NOTES:

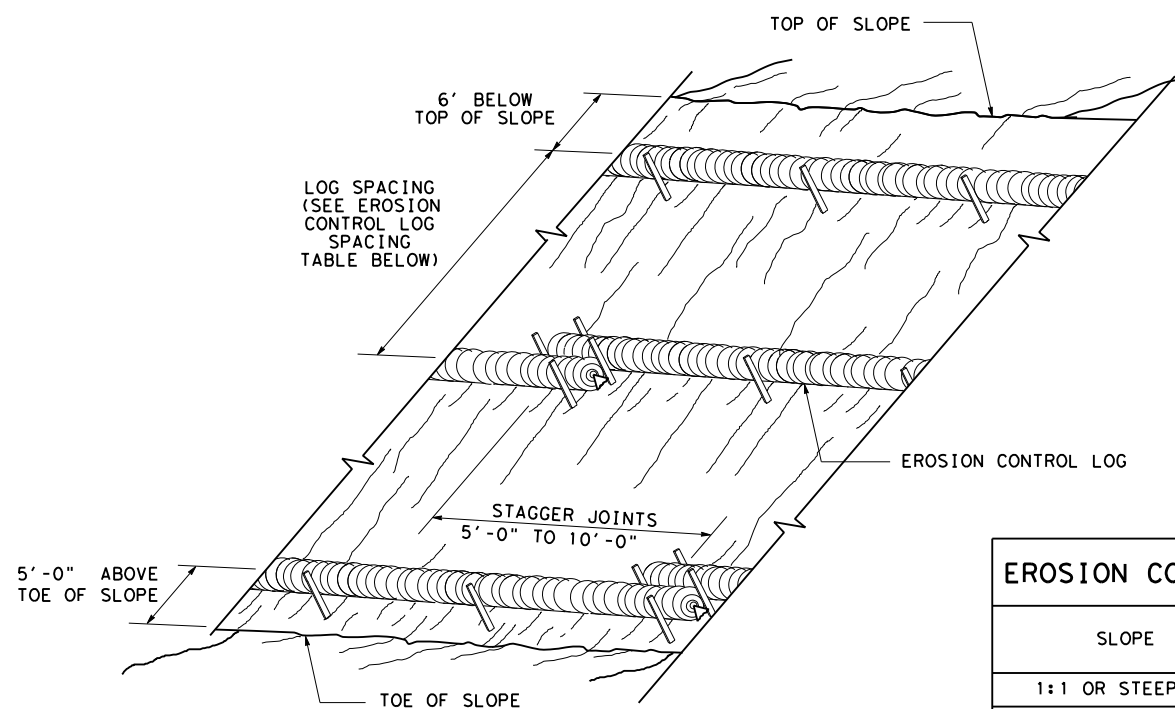
1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE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

SHEET 1 OF 3

| | | | |
|---|-----------|---------------------------------|-----------|
| | | Design Division Standard | |
| TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES | | | |
| EROSION CONTROL LOG | | | |
| EC (9) - 16 | | | |
| FILE: ec916 | DN: TxDOT | CK: KM | DW: LS/PT |
| © TxDOT: JULY 2016 | CONT SECT | JOB | HIGHWAY |
| REVISIONS | 0002 07 | 057, ETC | IH-10 |
| | DIST | COUNTY | SHEET NO. |
| | ELP | HUDSPETH | 80 |

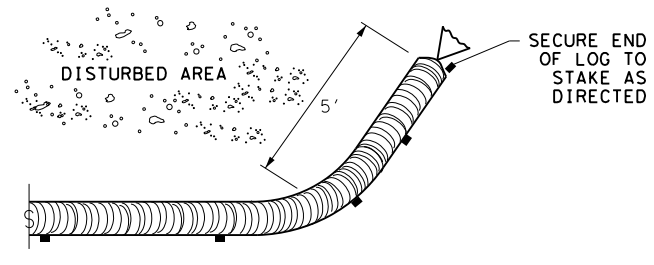
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**EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING**

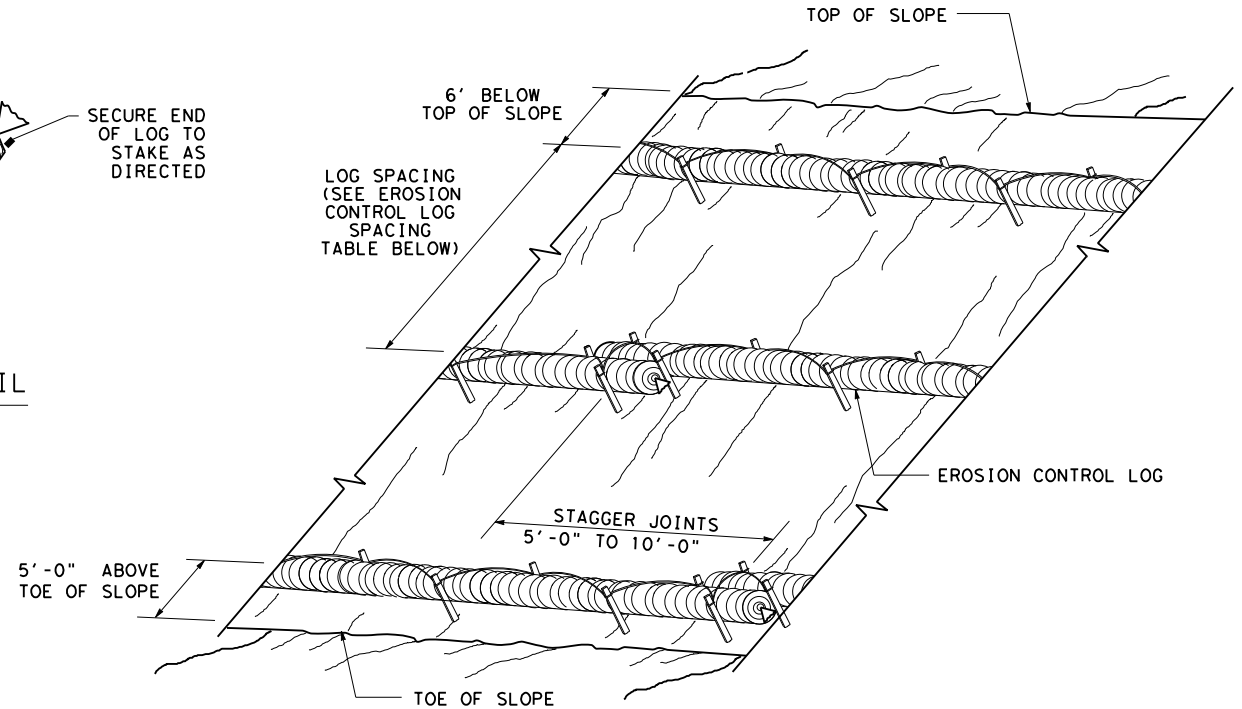
CL-SST



END SECTION RAP DETAIL

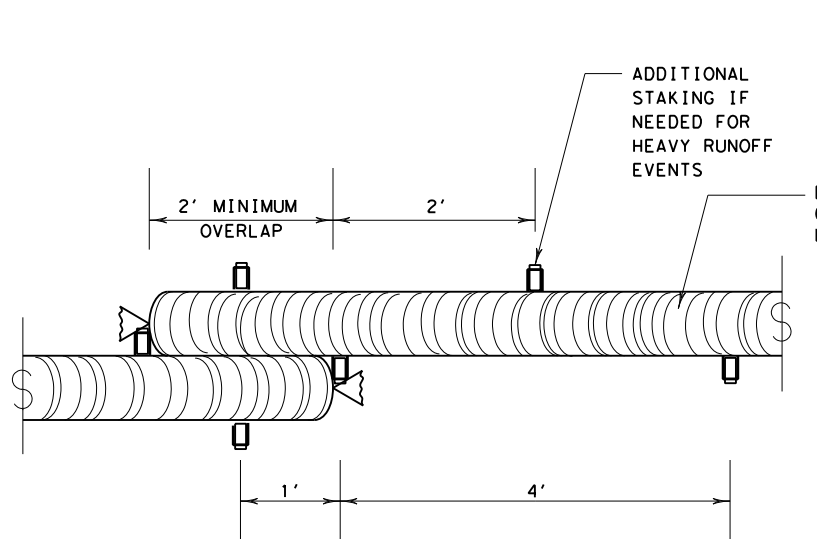
| SLOPE | LOG DIAMETER | | | |
|----------------|--------------|-----|-----|-----|
| | 6" | 8" | 12" | 18" |
| 1:1 OR STEEPER | 5' | 10' | 15' | 20' |
| 2:1 | 10' | 20' | 30' | 40' |
| 3:1 | 15' | 30' | 45' | 60' |
| 4:1 OR FLATTER | 20' | 40' | 60' | 80' |

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



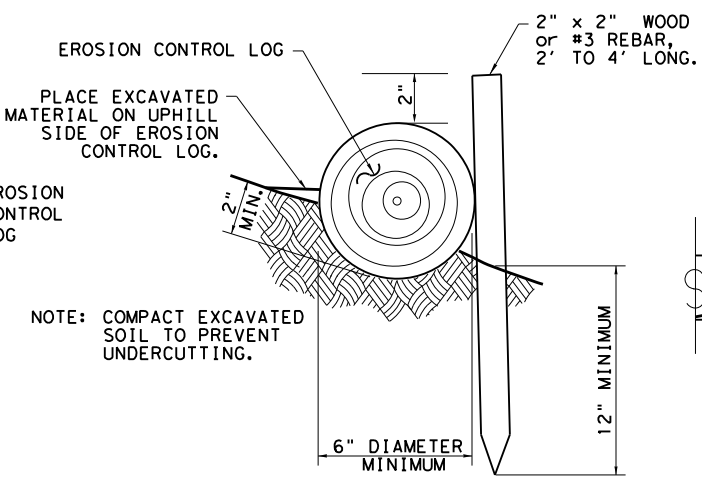
**EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING**

CL-SSL

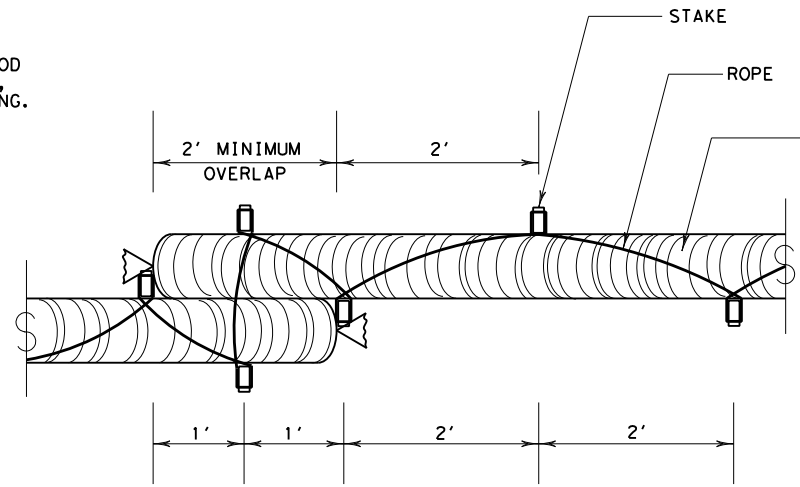


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST



NOTE: COMPACT EXCAVATED SOIL TO PREVENT UNDERCUTTING.

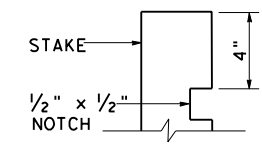


STAKE AND LASHING ANCHORING DETAIL

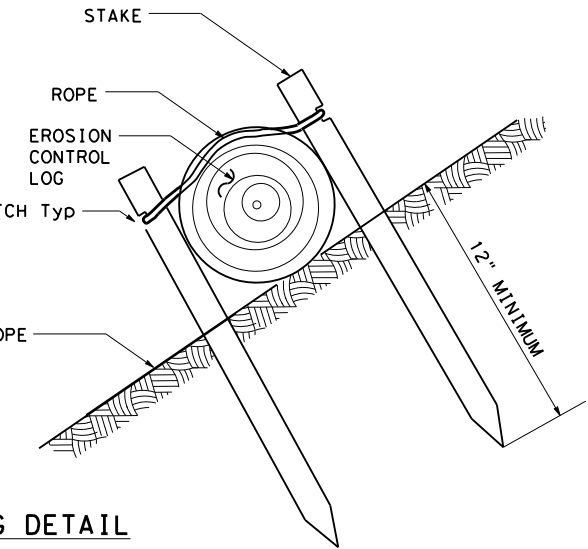
CL-SSL

| LOG DIAMETER | DEPTH |
|--------------|-------|
| 6" | 2" |
| 8" | 3" |
| 12" | 4" |
| 18" | 5" |

TRENCH DEPTH TABLE



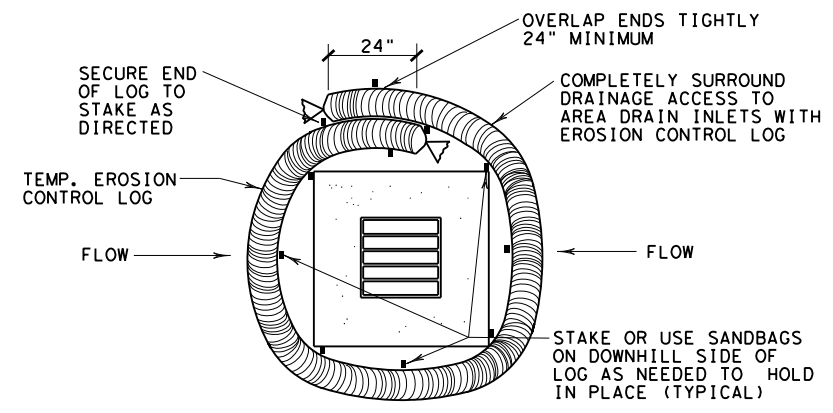
STAKE NOTCH DETAIL



SHEET 2 OF 3

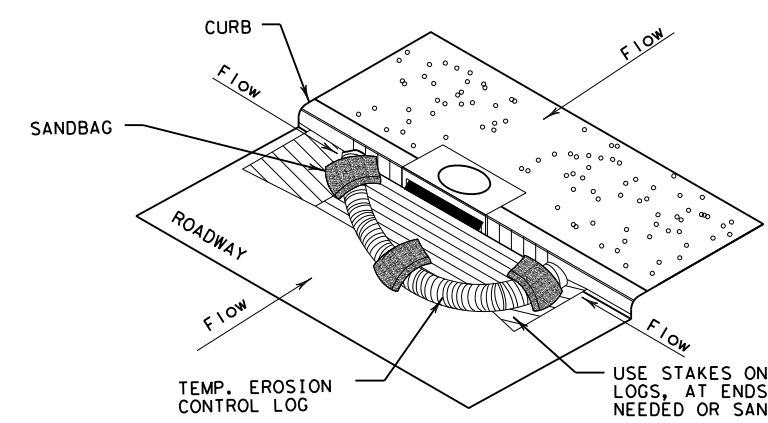
| | | | |
|---|-----------|--------------------------|-----------|
| | | Design Division Standard | |
| TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES EROSION CONTROL LOG EC (9) - 16 | | | |
| FILE: ec116 | DN: TxDOT | CK: KM | DW: LS/PT |
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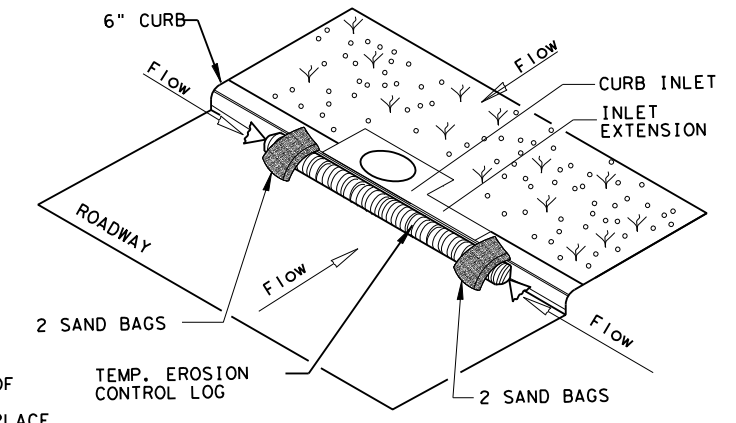
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

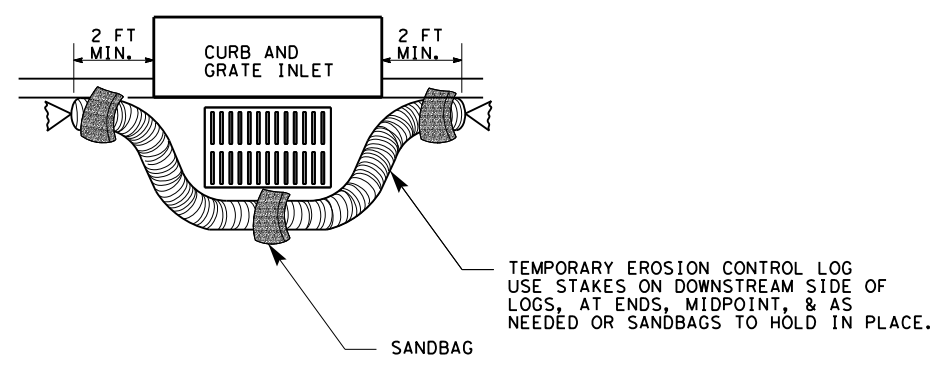
CL-CI



EROSION CONTROL LOG AT CURB INLET

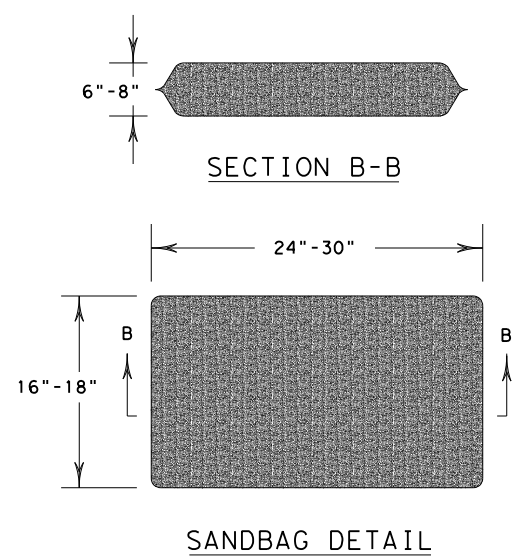
CL-CI

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



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SHEET 3 OF 3

Texas Department of Transportation
Design Division Standard

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

| | | | | |
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