CONT	SECT	JOB	HIGHWAY
0700	03	149	SH 71
DIST	COUNTY		SHEET NO.
AUS	TRAVIS		1

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT NUMBER

F 2024(143)

HWY: SH 71

CSJ: 0700-03-149

NET LENGTH OF PROJECT = 37,100 FEET = 7.02 MILES

DESIGN SPEED
N/A

TRAFFIC DATA
N/A

FINAL PLANS

DATE OF LETTING: _____

DATE WORK BEGAN: _____

DATE WORK COMPLETED AND ACCEPTED: _____

FINAL CONTRACT COST: $_____

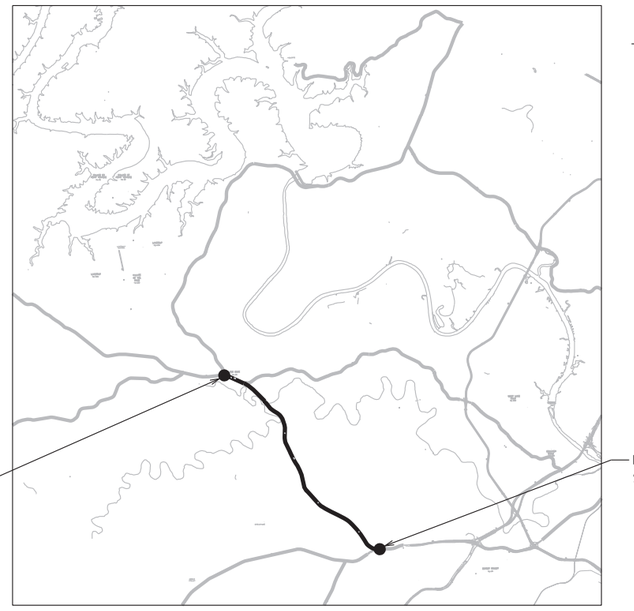
CONTRACTOR: _____

LIST OF APPROVED CHANGE ORDERS:

TRAVIS COUNTY

LIMITS: FROM RM 620 TO SILVERMINE DRIVE

FOR THE CONSTRUCTION OF INSTALLING ADVANCED TRAFFIC MANAGEMENT SYSTEMS CONSISTING OF ITS SIGNS AND DEVICES



LOCATION MAP NOT TO SCALE

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION ON NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, **OCTOBER 23, 2023**)

Texas Department of Transportation

I CERTIFY THAT THIS PROJECT WAS CONSTRUCTED IN SUBSTANTIAL COMPLIANCE WITH THE FINAL AS-BUILT PLANS AND SPECIFICATIONS.

_____ P.E. _____
AREA ENGINEER — DATE

Walter P. Moore and Associates, Inc.
TBPE Firm Registration No. 1856

STATE OF TEXAS
THOMAS D. DUNCAN
98353
LICENSED
PROFESSIONAL ENGINEER
7/5/2023

100% SUBMITTAL

SUBMITTED FOR LETTING: 8/3/2023

DocuSigned by:
C2754FBFB7A143C...
DIRECTOR OF TRANSPORTATION OPERATIONS

RECOMMENDED FOR LETTING: 8/3/2023

DocuSigned by:
Susana Ceballos P.E.
E1816167B5C7414...
DISTRICT DESIGN ENGINEER

RECOMMENDED FOR LETTING: 8/3/2023

DocuSigned by:
P.E.
917B7C376B3C4D5...
AREA ENGINEER

APPROVED FOR LETTING: 8/4/2023

DocuSigned by:
8912AF18F45A416...
DIRECTOR OF TRANSPORTATION, PLANNING & DEVELOPMENT

FILE: c:\users\time\appdata\local\bentley\projectwise\workingdir\wpm-pw.bentley.com#wpm-pw-01\tewing@walterpmoore.com\dms23623\0101*TITLESHEET*SH*71.dgn
DATE: 7/5/2023 9:05:51 AM

"THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN DELECTED BY ME AS BEING APPLICABLE TO THIS PROJECT."

THOMAS D. DUNCAN P.E. P.E. 7/5/2023 DATE

NO.	DATE	REVISION	APPROVED

Walter P. Moore and Associates, Inc.
TBPE Firm Registration No. 1856

STATE OF TEXAS
THOMAS D. DUNCAN
98353
LICENSED
PROFESSIONAL ENGINEER
7/5/2023

100% SUBMITTAL

® 2023 Texas Department of Transportation

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

INDEX OF SHEETS

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.			SHEET NO.
6				2
STATE	DIST.	COUNTY		
TX	AUS	TRAVIS		
CONT.	SECT.	JOB	STREET/ROAD:	
0700	03	149	SH 71	

DATE: 7/5/2023 9:43:19 AM $USER$
FILE: c:\users\time\appdata\local\bentley\projectwise\workingdir\wpm-pw-01\ewing@walterpmoore.com\dms23780\INDEX_SUB_71.dgn

GENERAL NOTES: Version: July 19, 2023

GENERAL
Contractor questions and requests for documents on this project are to be addressed to the following individual(s):
Traffic Office Cory.Jucius@txdot.gov
Traffic Office Mahendran.Thivakaran@txdot.gov

Questions and requests for documents will be accepted via the Letting Pre-Bid Q&A web page. All questions and any corresponding responses that are generated will be posted through the same 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

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.

References to manufacturer's trade name or catalog numbers are for the purpose of identification only. Similar materials from other manufacturers are permitted if they are of equal quality, comply with the specifications for this project, and are approved.

If work is performed at Contractor's option, when inclement weather is impending, and the work is damaged by subsequent precipitation, the Contractor is responsible for all costs associated with replacing the work, if required.

The roadbed will be free of organic material prior to placing any section of the pavement structure.

Contact the supervisor for the passenger facility at Capital Metro and request the relocation of Capital Metro signs. Contact the supervisor at (512) 385-0190.

Equip all construction equipment used in roadway work with highly visible omnidirectional flashing warning lights.

Provide a smooth, clean sawcut along the existing asphalt pavement structure, as directed. Consider subsidiary to the pertinent Items.

Construct all manholes/valves to final pavement elevations prior to the placement of final surface. If the manholes/valves are going to be exposed to traffic, place temporary asphalt around the manhole/valve to provide a 50:1 taper. The asphalt taper is subsidiary to the ACP work.

Supply litter barrels in enough numbers at locations as directed to control litter within the project. Consider subsidiary to pertinent Items.

Use a self-contained vacuum broom to sweep the roadway and keep it free of sediment as directed. The contractor will be responsible for any sweeping above and beyond the normal maintenance required to keep fugitive sediment off the roadway as directed by the Engineer.

Damage to existing pipes and SET's due to Contractor operations will be repaired at Contractor's expense.

All locations used for storing construction equipment, materials, and stockpiles of any type, within the right of way, will be as directed. Use of right of way for these purposes will be restricted to those locations where driver sight distance to businesses and side street intersections is not obstructed and at other locations where an unsightly appearance will not exist. The Contractor will not have exclusive use of right of way but will cooperate in the use of the right of way with the city/county and various public utility companies as required.

Coordinate and obtain approval for all bridgework over existing roadways.

During evacuation periods for Hurricane events the Contractor will cooperate with Department for the restricting of Lane Closures and arranging for Traffic Control to facilitate Coastal Evacuation Efforts.

ITEM 5 – CONTROL OF THE WORK
Provide a 72 hour advance email notice to AUS_Locate@TxDOT.gov to request illumination, traffic signal, ITS, or toll equipment utility locates. Provide the Engineer an electronic pdf of as-builts within 21 calendar days of illumination, traffic signal, ITS, or toll equipment being placed into operation. As-built shall include GPS coordinates of manholes and junction boxes. Include final version of RFI's and revised plan sheets.

Place construction stakes at intervals of no more than 100 ft. This work is subsidiary.

Electronic Shop Drawing Submittals.
Submit electronic shop drawing submittals according to the current Guide to Electronic Shop Drawing Submittal which can be found online at,
https://www.txdot.gov/business/resources/highway/bridge/shop-drawing-submittal-cycle.html.

Pre-approved producers can be found online at,
https://www.txdot.gov/business/resources/materials/material-producer-list.html.

Use the following contact list for all submittals that are not required to be sent to Bridge Division and to copy the Engineer for all submittals to the Bridge Division.

Submittal Contact List
Signal Shop Kevin.Plumlee@txdot.gov

ITEM 6 - CONTROL OF MATERIALS
For Federally Funded Contracts, comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, by submitting a notarized

original of the TxDOT Construction Material Buy America Certification Form for all items classified as construction materials. This form is not required for materials classified as a manufactured product. Refer to the Buy America Material Classification Sheet, located at the following link, for clarification on material categorization. Buy America material classification sheet (txdot.gov)

ITEM 7 – LEGAL RELATIONS AND RESPONSIBILITIES
Roadway closures during key dates and/or special events are prohibited. See notes for Item 502 for the key dates and/or special events.

Refer to the Environmental Permits, Issues and Commitments (EPIC) plan sheets for additional requirements and permits.
When any abandoned well is encountered, cease construction operations in this area and notify the Engineer who will coordinate the proper plugging procedures. A water well driller licensed in the State of Texas must be used to plug a well.

Perform maintenance of vehicles or equipment at designated maintenance sites. Keep a spill kit on-site during fueling and maintenance. This work is subsidiary.

Maintain positive drainage for permanent and temporary work for the duration of the project. Be responsible for any items associated with the temporary or interim drainage and all related maintenance. This work is subsidiary.

Suspend all activities near any significant recharge features, such as sinkholes, caves, or any other subterranean openings that are discovered during construction or core sampling. Do not proceed until the designated Geologist or TCEQ representative is present to evaluate and approve remedial action.

Locate aboveground storage tanks kept on-site for construction purposes in a contained area as to not allow any exposure to soils. The containment will be sized to capture 150% of the total capacity of the storage tanks.

PSL in Edwards Aquifer Recharge and Contributing Zone.
Obtain written approval from the Engineer for all on or off right of way PSLs not specifically addressed in the plans. Provide a signed sketch of the location 30 business days prior to use of the PSL. Include a list of materials, equipment and portable facilities that will be stored at the PSL. TxDOT will coordinate with the necessary agencies. Approval of the PSL is not guaranteed. Un approved PSL is not a compensable impact.
Work over or near Bodies of Water (lakes, rivers, ponds, creeks, dry waterways, etc.).
Keep on site a universal spill kit adequate for the body of water and the work being performed. Debris is not allowed to fall into the ordinary high-water level (OHWL). Debris that falls into the OHWL must be removed at the end of each workday. Debris that falls into the floodway must be removed at the end of each work week or prior to a rain event. Install and maintain traffic control devices to maintain a navigable corridor for water traffic, except during bridge demo and beam placement. This work is subsidiary.

Migratory Birds and Bats.
Migratory birds and bats may be nesting within the project limits and concentrated on roadway structures such as bridges and culverts. Remove all old and unoccupied migratory bird nests from any structures, trees, etc. between September 16 and February 28. Prevent migratory birds from re-nesting between March 1 and September 15. Prevention shall include all areas within 25 ft. of proposed work. All methods used for the removal of old nesting areas and the prevention of re-nesting must be submitted to TxDOT 30 business days prior to begin work. This work is subsidiary.

If active nests are encountered on-site during construction, all construction activity within 25 ft. of the nest must stop. Contact the Engineer to determine how to proceed.

Biological Commitments
On September 15, 2020, the U.S. Fish and Wildlife Service (USFWS) issued a Biological Opinion (BO) under consultation number 02ETAU00-2020-F-1924 for the project's effect on federally endangered species (BO is attached). TxDOT has committed to implementing the following conservation measures with the intent to avoid and minimize adverse effects to the Bone Cave harvestman, Kretschmarr Cave mold beetle, Tooth Cave ground beetle, Tooth Cave pseudoscorpion, and Tooth Cave spider resulting from the proposed project. The conditions and recommendations in the BO must be included in the Mitigation Notes in final plans, and in the Environmental Issues Permits & Commitments (EPIC) Sheet.

1. The project is designed to minimize excavation within the project and action areas. Where possible, cable for the ITS project will be hung on existing overhead lines to avoid trenching. Within Karst Zone 1, trenching will be restricted to a maximum depth of 2 feet where hanging lines from existing poles is not possible and limited to 2.47 miles.

2. Appropriate Best Management Practices (BMPs) to minimize construction phase erosion and sedimentation impacts will be incorporated into the proposed project and related notes and diagrams will be included in the required TCEQ permitting documents such as the Storm Water Pollution Prevention Plan (SWP3) and construction plans. The SWP3 will be prepared during the final design stages of the project. Erosion BMPs may include temporary vegetation, blanket/matting, mulch, sodding, interceptor swales, diversion dikes, mulch filter berms, and socks. Sedimentation BMPs may include silt fences, rock berms, and triangular filter dikes. Water quality controls will be in place before construction activities are initiated.

3. TxDOT will provide an information packet to staff and contractors to identify habitat for protected species and inform them of all applicable safety and legal requirements related to species habitat and protection.

4. It is possible that previously unknown karst features or caves may be revealed during excavation in previously undisturbed bedrock. Karst features encountered during bedrock excavation activities in karst zones 1 will be evaluated for the presence of karst invertebrate habitat and the potential biological significance of the void to the extent feasible. If a potential karst void is encountered during excavation activities, work within 50 ft. of the feature will cease until an evaluation is completed. The feature will be evaluated for potential karst invertebrate

habitat by a Professional Geoscientist or karst scientist holding an appropriate 10(a)(1)(A) permit following current USFWS karst survey guidelines.

a. In the case where voids are detected for drilled shafts, potential karst invertebrate habitat will be assessed to the extent feasible using a downhole camera or other similar means. If the feature meets the USFWS criteria for potential karst habitat, then it will be evaluated for its biological significance by a karst scientist holding an appropriate 10(a)(1)(A) permit on a case-by-case basis. If the feature does not meet the criteria for potential karst habitat, then work will continue.

b. While a feature is being evaluated, the surface expression will be covered to minimize the influence of diurnal variation in surface temperature. Protection of the feature may include a wood cover, plastic sheeting, and/or blanket that is weighted down with rocks around the perimeter. During periods of high temperatures (>100°F), a piece of insulation will be added to the cover. Hazard fencing or barricades may be used to protect the area if there is a fall hazard, such as the case of an open shaft. Appropriate BMPs will be implemented to minimize surface runoff from entering the feature.

5. If a discovered feature is determined to be occupied or presumed occupied by a listed karst invertebrate, then TxDOT will proceed in such a manner as to minimize impacts to the feature. Occupation by a listed karst invertebrate will be presumed if potentially listed karst invertebrates collected during surveying are immature and cannot be identified to species. If it is possible within the needs of the project, the feature will be capped to preserve as much of the void space as possible. If work must continue at the feature, disturbance to the feature will be minimized but the details will be determined on a case-by-case basis following recommendations from both a permitted scientist and an engineer. When features are closed, they will be closed in a condition as similar as possible to pre-excavation condition regarding water and nutrient inflow and void volume, while protecting the feature from contaminated runoff.

6. If standing, seeping, or flowing water is encountered in an excavation, work within 50 ft. will cease until an evaluation is completed. Appropriate BMPs will be implemented to minimize surface runoff from entering the excavation. A Professional Geoscientist will evaluate the excavation to determine the source of the water (whether it is connected to the Edwards Aquifer) and whether it represents a groundwater flow path for the Edwards Aquifer. If it is determined that the water is connected to the Edwards Aquifer, a site-specific groundwater mitigation plan will be developed before work can continue in the vicinity of the groundwater feature. Where an excavation contains standing or seeping groundwater, the groundwater mitigation plan will be designed to permanently seal off the excavation from the groundwater feature. Where an excavation contains flowing water that could be a groundwater flow path for the Edwards Aquifer, the mitigation plan will also include measures designed to maintain hydrologic connectivity across, under, or around the excavation. This will generally be accomplished with the use of clean, porous media such as clean washed rock, and PVC pipe of various sizes. The mitigation plan for excavations with flowing groundwater will also include measures designed to permanently isolate and seal off the groundwater flow path from the rest of the excavation.

a. If standing or seeping groundwater is encountered during the excavation of drilled shafts, the groundwater mitigation plan would generally involve the use of permanent casing to seal off the groundwater source and prevent contamination before pouring concrete. If flowing water is encountered during the excavation of drilled shafts, the mitigation plan would involve the permanent placement of casing in a manner that seals the drilled shaft off from the area of groundwater conductivity while allowing continuity of groundwater flow through the annular space surrounding the casing.

b. If groundwater is encountered during geotechnical boring activities, the groundwater mitigation plan would generally involve filling the borehole with clean washed 1-in rock to approximately 2 ft. above the groundwater level, placing a hole plug above the rock surface, capping the hole plug with a packed bentonite plug, and then sealing the top of the boring as per normal protocol. The protocol for sealing a boring on the TCEQ Edwards Aquifer Recharge requires plugging with non-shrink grout from the bottom of the hole (top of the bentonite plug in the case of groundwater presence) to within 3 ft. of the surface. The remainder of hole must be filled with cuttings or gravel.

7. All disturbed areas are re-vegetated according to the TxDOT's standard practices for urban areas and the Texas Commission on Environmental Quality Construction General Permit (CGP) to the extent practicable, in compliance with Executive Order 13112 on Invasive Species and the Executive Memorandum on Beneficial Landscaping. Re-vegetation efforts would provide appropriate and sustainable cover to prevent erosion and siltation.

8. Project monitoring reports will be prepared in January and July to document the number and location of voids encountered and at what depth, a summary of the results of any karst invertebrate survey conducted, any observations made with a down-hole camera, a summary of the work actions completed during the reporting period, and what actions are anticipated in the next reporting period.

9. TxDOT will contribute to the goals of the Balcones Canyonlands Conservation Plan (BCCP) through payment based on the anticipated disturbance within Karst Zone 1 (approximately 3.109 acres). TxDOT will complete payment to the BCCP prior to the start of construction for any unavoidable impacts to Bone Cave harvestman (Texella reyesi), Kretshmarr Cave mold beetle (Texamaurops reddelli), Tooth Cave ground beetle (Rhadine persephone), Tooth Cave pseudoscorpion (Tartarocreagris texana), and Tooth Cave spider (Tayshaneta [Neoleptoneta] myopica). Generally, the BCCP uses payments to secure preserves that aid in recovering listed species in Travis County. Specifically, this payment will focus on cave restoration activities at the Cuevas Preserve benefiting covered karst species under this BO.

Law Enforcement Personnel.
Submit charge summary and invoices using the Department forms.

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.

No payment will be made for law enforcement personnel needed for moving equipment or payment for drive time to/from the event site. A minimum number of hours is not guaranteed. Payment is for work performed. If the Contractor has a field office, provide an office location for a supervisory officer when event requires a supervising officer. This work is subsidiary.

A maximum combined rate of $70 per hour for the law enforcement personnel and the patrol vehicle will be allowed. Any scheduling fee is subsidiary per Standard Specification 502.4.2.

Cancel law enforcement personnel when the event is canceled. Cancellation, minimums or "show up" fees will not be paid when cancellation is made 12 hours prior to beginning of the event. Failure to cancel within 12 hours will not be cause for payment for cancellation, minimums, or "show up" time. Payment of actual "show up" time to the event site due to cancellation will be on a case by case basis at a maximum of 2 hours per officer.

Alterations to the cancellation and maximum rate must be approved by the Engineer or pre-determined by official policy of the officers governing authority.

ITEM 8 – PROSECUTION AND PROGRESS
Special Provision 008-004 has been included to amend Standard Article 8.1 to extend the begin work date due to ITS poles and equipment purchase.

ITEM 416 - DRILLED SHAFT FOUNDATIONS
Stake all Foundations, for approval, before beginning drilling operations.

Calculate the vertical signal head clearance before placing any signal pole foundation.

For pole anchor bolts, set two in tension and two in compression.

Obtain approval of placement prior to placing concrete.
Remove spoils from a flood plain at the end of each work day.

ITEM 432 - RIPRAP
Mow strip riprap will be 4 in. and all other riprap will be 5 in. unless otherwise shown on the plans. Mow strip for cable barrier may be placed monolithically with the barrier foundations if using concrete in accordance with Item 543. Fiber reinforcement is not allowed except in mow strip for cable barrier if foundation and mow strip are placed monolithically. GFRP is allowed reinforcement for all applications.

Saw-cut existing riprap then epoxy 12 in. long No. 3 or No. 4 bars 6 in. deep at a maximum spacing of 18 in. in each direction to tie new riprap to existing riprap. This work is subsidiary.

Provide Type A Grade 3 or 5 flexible base for cement stabilized riprap. Compressive strengths for flexible base are waived.

SGT approach taper, paid for using mow strip item, will be installed using concrete, flexible base coated with SS-1 at a rate of 0.12 GAL/SY, or HMA Type B/C/D. Placement will be ordinary compaction and does not require placement using an asphalt paver.

ITEM 502 - BARRICADES, SIGNS, AND TRAFFIC HANDLING

Table 1

Roadway	Limits	Allowable Closure Time
SH 71	US 290 W to RM 3238	8 P to 5 A
RM 620	All	8 P to 5 A
All	Within 200' of a signalized intersection	9 P to 5 A
All	All (Full Closure, see allowable work below)	11 P to 4 A

For roadways without defined allowable closure times, nighttime lane closures will be allowed from 8 P to 6 A. Unless stated, daytime or Friday night lane closures will not be allowed and one lane in each direction will remain open at all times for all roadways.

Full closures only allowed Friday night thru Monday morning for bridge beam installation, bridge demolition, or OSB truss removal/installation. Full closures only allowed for roadways with frontage roads or if a designated detour route is provided in the plans.

No closures will be allowed on the weekends, working day prior, and working day after the National Holidays defined in the Standard Specifications, Good Friday, and Easter weekend. Closures the Sunday of the Super Bowl will not be allowed from 1 P to 11 P. No closures will be allowed on Friday and the weekends for projects within 20 miles of Formula 1 at COTA, ACL Fest, SXSW, ROT Rally, UT home football games (includes games not on a Friday or weekend), sales tax holiday, Dell Match Play (includes Thursday), Rodeo Austin, or other special events that could be impacted by the construction. All lanes will be open by noon of the day before these special events.

To account for directional traffic volumes, begin and end times of closures may be shifted equally by the Engineer. The closure duration will remain. Added compensation is not allowed.

Submit an emailed request for a lane closure (LCN) to TxDOT. The email will be submitted in the format provided. Receive concurrence prior to implementation. Submit a cancellation of lane closures a minimum of 18 hours prior to implementation. Blanket requests for extended periods are not allowed. Max duration of a request is 2 weeks prior to requiring resubmittal.

Provide 2 hour notice prior to implementation and immediately upon removal of the closure.

For roadways listed in Table 1: Submit the request 96 hours prior to implementation.

For roadways not listed in Table 1: Submit the request a minimum of 48 hours prior to the closure and by the following deadline immediately prior to the closure: 11A on Tuesday or 11A on Friday. For all roadways: Submit request for traffic detours and full roadway closures 168

hours prior to implementation. Submit request for nighttime work 96 hours to implementation date.
Cancellations of accepted closures (not applicable to full closures or detours) due to weather will not require resubmission in accordance with the above restrictions if the work is completed during the next allowable closure time.

Closures that conflict with adjacent contractor will be prioritized according to critical path work per latest schedule. Conflicting critical path or non-critical work will be approved for first LCN submitted. Denial of a closure due to prioritization or other reasons will not be reason for time suspension, delay, overhead, etc.

Meet with the Engineer prior to lane closures to ensure that sufficient equipment, materials, devices, and workers will be used. Take immediate action to modify current and future traffic control, if at any time the queue becomes greater than 20 minutes.

Consider inclement weather prior to implementing the lane closures. Do not set up traffic control when the pavement is wet.

Cover, relocate, or remove existing small, large, and overhead signs that conflict with traffic control. This work is subsidiary.

Install all permanent signs, delineation, and object markers required for the operation of the roadway before opening to traffic. Use of temporary mounts is allowed or may be required until the permanent mounts are installed or not impacted by construction. Maintain the temporary mounts. This work is subsidiary.

Place a 28-inch cone, meeting requirements of BC (10) and Ty III barricades, on top of foundations that have protruding studs. This work is subsidiary.

Vertical panels used on roadways with speed limit 55mph or greater must be round in shape or have a self-righting mechanism. The “flat” or “oblong” shaped vertical panels are not allowed.

A series of sequential flashing warning lights, per BC(7), must be installed in a merging taper for long term stationary TCP. This includes all TCP setups, such as those shown on the plans or TCP setups per the standards.

Edge condition treatment types must be in accordance with the TxDOT standard. Installation and removal of a safety slope is subsidiary.

To determine a speed limit or an advisory speed limit, submit a request to TxDOT 60 business days prior to manufacture of the sign.

The Contractor Force Account “Safety Contingency” that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic Control Plan, that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor’s Responsible

Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

ITEM 506 - TEMPORARY EROSION, SEDIMENTATION, AND ENV CONTROLS
If SW3P plan sheets are not provided, place the control measures as directed.

Install, maintain, remove control measures in areas of the right of way utilized by the Contractor that are outside the limits of disturbance required for construction. Permanently stabilize the area. This work is subsidiary.

Erosion control measures must be initiated immediately in areas where construction activities have ceased and will not resume for a period exceeding 14 calendar days. Vertical track all exposed soil, stockpiles, and slopes. Re-track after each rain event or every 14 days, whichever occurs first. Sheep foot roller is allowed for vertical tracking. This work is subsidiary.

Unless a specific pay item is provided in the plans, the installation of the 6:1 or flatter for RFD side slopes in the safety zone will be subsidiary to pertinent bid items.

ITEMS 600s & 6000s – ITS, LIGHTING, SIGNING, MARKINGS, AND SIGNALS
Meet the requirements of the NEC, Texas MUTCD, TxDOT standards, and TxDOT Standard Specifications. Notify the Engineer if existing elements to remain do not meet code or specification.

Contractor shall provide all service, equipment and material required to provide a functional item and interface with existing equipment and software.

Use the TxDOT provided form to submit an electrical, illumination, and signal checklist prior to request for signal activation or a punch list.

Provide a 180 day advance email notice to the Engineer for equipment to be provided by TxDOT.
Provide equipment that requires TxDOT programming, etc. to TxDOT 180 day in advance.

Prior to relief of maintenance, a Test Period is required for signals and ITS equipment in accordance with Item 680.3.1.8. Response time to reported trouble calls shall be less than 2 hours. Complete repairs within 24 hours. Notify the Engineer and maintain a logbook in the controller cabinet of each trouble call. Do not clear the error log in the conflict monitor without approval.
Maintain the existing ITS equipment and HUB buildings operational during construction. ITS downtime is allowed from 12A to 4A. Downtime is restricted to one time per HUB or equipment.

Definitions of abbreviations used to designate ITS equipment, material, etc. can be provided by the Engineer.

Stakes or other physical method shall be installed to hold down conduit prior to placement of concrete/flow fill encasement.

Minimum distance between HDPE joints will be 200 ft.

For conduit mounted to bridges in hangers, fiberglass can be substituted for RMC. Furnish and install per Special Specification 6390.

ITEM 618 - CONDUIT
Shift the locations of conduit and ground boxes to accommodate field conditions. Install conduit not exceeding 2 feet in any direction from a straight line.
Install a high tension, non-metallic pull rope in all empty conduit runs. This work is subsidiary.
Use a coring device, not a hammer drill, when drilling holes through concrete structures.

For underground conduit, smooth wall schedule 40 equivalent HDPE can be substituted for schedule 40 PVC. HDPE must transition to RMC/PVC per ED (11)-14.

When using existing conduit, ensure that all conduits have bushings and cleaned of dirt, mud, grease, and other debris. Re-strap existing or relocated conduit per the specification. This work is subsidiary.

Abandoned underground conduit must have all conductors removed.
The locations of conduit and ground boxes are diagrammatic, shift as directed to accommodate field conditions.

If the conduit cannot be bored as shown on the plans, the contractor has the option to trench if approved by the Engineer in writing. For approved trench installation on pavement, the contractor shall replace pavement as directed by the Engineer. Pavement replacement will be considered incidental to conduit installation. Each conduit run installation will be paid as trench conduit installation.

The contractor has the option to bore at his discretion and convenience when an item calls for a trench. This work will be paid as a trench conduit installation.

ITEM 620 - ELECTRICAL CONDUCTORS
Provide 10 amp time delay fuses.

Install a minimum size 8 AWG equipment grounding conductor (EGC) in all conduit runs. Payment and the size of the EGC will be in accordance with standard ED (3)-14 note 12.

ITEM 624 – GROUND BOXES
Aggregate for fill under the box will be crushed, have a maximum size of 2 in., minimum size of ½ in., and requirements per Item 302 are waived.

ITEM 628 – ELECTRICAL SERVICES
Contact the utility company upon execution of contract and prior to the pre-construction meeting to make arrangements for all work and materials provided by the utility company. Contact AUS_Auditors@txdot.gov for account approval and information. Accounts shall be placed in the name of TxDOT.

ITEM 650 - OVERHEAD SIGN SUPPORTS
Use lengths of trusses, tower heights, and posts shown in the summaries for bidding purposes only. Verify these dimensions and vertical clearances prior to shop drawing production.

ITEM 6001 – PORTABLE CHANGEABLE MESSAGE SIGN
Engineer may request portable changeable message sign based on the lane closure impacts to the public. Provide the quantity of portable changeable message sign and duration as determined by the engineer.

ITEM 6010 - CCTV FIELD EQUIPMENT
Include all incidental work, material, and services not expressly called for in the specifications, or not shown on the plans, which may be necessary for a complete and properly functioning system. This work is subsidiary.

Provide one each of CCTV camera, lens, housing, pan/tilt, controller, and any necessary cables and incidentals necessary to produce a usable video image in conjunction with the acceptance inspection for special specification Item 6064 "ITS Pole with Cabinet". Furnish material identical to those supplied for this project, conforming to the plans and specifications, and becoming the property of the State. This work is subsidiary.

ITEM 6016 – MULTI-DUCT CONDUIT SYSTEM
In addition to PVC multi duct acceptable per the specification, HDPE from the pre-qualified Item 618 material list may be used by installing a 4 in. duct and field pull in 4-1 in. smooth wall innerducts. Blue Diamond 4 in. SDR 11.5 casing with 4-1 in. SDR 13.5 innerducts is an acceptable substitute for PVC multi duct.

ITEM 6028 – INSTALLATION OF DYNAMIC MESSAGE SIGN SYSTEM
Two 12 inch Yellow LED flashing beacons shall be installed and made operational on each DMS installed on this project. The beacons are included with the DMS and shall be configured to flash alternatively.

The LED dynamic message signs installed on this project shall be configured to operate using the existing master controllers located at Austin Traffic Management Center. Prior to completion of this project, the Contractor shall demonstrate complete operability of all DMS's installed on this project at the Austin Traffic Management Center.

If communication cannot be achieved from the DMS to Austin Traffic Management Center, due to existing fiber or telephone transmission or hardware issues, on items not provided by the Contractor, then the Contractor will, at a minimum, demonstrate local communication directly to the DMS.

The Contractor will ensure that, during construction, the attachment of the DMS to the truss structure will not interfere with the structure bolt heads.

Provide communication cables between the DMS and the DMS controller cabinet for the operation of the sign.

ITEM 6064 – ITS POLE WITH CABINET
Furnish cabinet containing a fiber optic communication interface panel accommodating 12 single mode fibers.

ITEM 6185 – TRUCK MOUNTED ATTENUATOR AND TRAILER ATTENUATOR
The TMA/TA used for installation/removal of traffic control for a work area will be subsidiary to the TMA/TA used to perform the work.

The contractor will be responsible for determining if one or more operations will be ongoing at the same time to determine the total number of TMA/TA required for the work. TMA/TAs paid by the day is full compensation for all worksite locations during an entire day.

ITEM 7251 – SUBSURFACE UTILITY LOCATE
This item is available to supplement 811 utility locate. Contractor must receive TxDOT approval prior to use. TxDOT will not be responsible for any damage to utilities regardless of locating method.

TESTING, TRAINING, DOCUMENTATION AND WARRANTY
Compile and furnish final "as built" working drawings, including an installation summary, for each field installation. The installation summary shall include the equipment component and cable lists for each location. Identify and label all termination and splice points as described in the plans and specifications. Furnish installation summary including all equipment settings to facilitate operation, maintenance, and modification. Reproduce approved submittal working drawings for inclusion in final "as built" working drawings. Provide all "as built" working drawings prior to any final acceptance or final acceptance test. Consider the cost of providing "as built" working drawings in accordance with Standard Specification Item 5.

When shown on the plans, provide "as built" working drawings establishing XY coordinates based on project control points and labels provided by the Engineer. Provide data to the Engineer in a spreadsheet compatible with the version of Microsoft Office in use by the Engineer.

MATERIAL FURNISHED BY THE STATE
Dynamic Message Signs (DMSs) will be provided by the state, but installed by the Contractor.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0700-03-149 **DISTRICT** Austin **COUNTY** Travis
HIGHWAY SH 71

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0700-03-149**			
		PROJECT ID		**A00063937**			
		COUNTY		**Travis**			
		HIGHWAY		**SH 71**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	416-6005	DRILL SHAFT (42 IN)	LF	23.000		23.000	
	416-6006	DRILL SHAFT (48 IN)	LF	231.000		231.000	
	432-6003	RIPRAP (CONC)(6 IN)	CY	10.000		10.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	9.000		9.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	10,000.000		10,000.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	10,000.000		10,000.000	
	618-6023	CONDT (PVC) (SCH 40) (2")	LF	1,705.000		1,705.000	
	618-6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	49,130.000		49,130.000	
	618-6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	1,240.000		1,240.000	
	618-6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	12,470.000		12,470.000	
	618-6074	CONDT (RM) (3")	LF	1,060.000		1,060.000	
	620-6002	ELEC CONDR (NO.14) INSULATED	LF	32,380.000		32,380.000	
	620-6007	ELEC CONDR (NO.8) BARE	LF	280.000		280.000	
	620-6008	ELEC CONDR (NO.8) INSULATED	LF	560.000		560.000	
	620-6009	ELEC CONDR (NO.6) BARE	LF	450.000		450.000	
	620-6010	ELEC CONDR (NO.6) INSULATED	LF	900.000		900.000	
	620-6011	ELEC CONDR (NO.4) BARE	LF	680.000		680.000	
	620-6012	ELEC CONDR (NO.4) INSULATED	LF	1,535.000		1,535.000	
	620-6015	ELEC CONDR (NO.2) BARE	LF	400.000		400.000	
	620-6016	ELEC CONDR (NO.2) INSULATED	LF	800.000		800.000	
	624-6002	GROUND BOX TY A (122311)W/APRON	EA	25.000		25.000	
	628-6131	ELC SRV TY D 120/240 060(NS)GS(N)SP(O)	EA	11.000		11.000	
	628-6334	ELC SRV TY D 120/240 125(NS)GS(N)SP(O)	EA	1.000		1.000	
	650-6042	INS OH SN SUP(40 FT BAL TEE)	EA	1.000		1.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	4.000		4.000	
	6007-6011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	2,160.000		2,160.000	
	6007-6017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	32,915.000		32,915.000	
	6007-6021	FIBER OPTIC SPLICE ENCLOSURE	EA	16.000		16.000	
	6007-6023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA	12.000		12.000	
	6007-6026	FIBER OPTIC CABLE ROAD MARKER	EA	16.000		16.000	
	6007-6027	FIBER OPTIC PATCH PANEL (144 POSITION)	EA	2.000		2.000	
	6008-6043	ITS GRND MNT CAB (TY 6) (CONF 2)	EA	1.000		1.000	
	6010-6001	CCTV FIELD EQUIPMENT (ANALOG)	EA	11.000		11.000	
	6010-6004	CCTV MOUNT (POLE)	EA	11.000		11.000	
	6016-6008	ITS MULTI-DUCT CND (PVC-40)(CONC ENCSE)	LF	49,130.000		49,130.000	
	6016-6011	ITS MULTI-DUCT CND (PVC-80)(BORE)	LF	12,470.000		12,470.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0700-03-149 **DISTRICT** Austin **COUNTY** Travis
HIGHWAY SH 71

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0700-03-149**			
		PROJECT ID		**A00063937**			
		COUNTY		**Travis**			
		HIGHWAY		**SH 71**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	6016-6013	ITS MULTI-DUCT CND (RMC)	LF	1,060.000		1,060.000	
	6027-6008	GROUND BOX (PREPARE)	EA	8.000		8.000	
	6028-6001	INSTALL DMS (POLE MTD CABINET)	EA	1.000		1.000	
	6064-6055	ITS POLE (60 FT)(90 MPH)	EA	11.000		11.000	
	6064-6080	ITS POLE MNT CAB (TY 2)(CONF 1)	EA	11.000		11.000	
	6123-6001	ETHERNET SWITCH (INSTALL ONLY)	EA	12.000		12.000	
	6124-6001	MPEG 4 VIDEO ENCODER (INSTALL ONLY)	EA	11.000		11.000	
	6125-6001	TERMINAL SERVER (INSTALL ONLY)	EA	12.000		12.000	
	6185-6002	TMA (STATIONARY)	DAY	160.000		160.000	
	6186-6006	ITS GND BOX(PCAST) TY 1 (243660)W/APRN	EA	42.000		42.000	
	6186-6012	ITS GND BOX(PCAST) TY 2 (366060)W/APRN	EA	16.000		16.000	
	6247-6005	INSTALL OF CELLULAR MODEM	EA	12.000		12.000	
	7251-6001	Subsurface Util Locate (Outside Rdbed)	EA	10.000		10.000	
	04	PRIMARY LINE EXTENSION, CONNECTION: PUBLIC UTILITY FORCE ACCOUNT (NON-PARTICIPATING)	LS	1.000		1.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		ITS: CONTRACTOR FORCE ACCOUNT WORK PARTICIPATING	LS	1.000		1.000	
		LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		ELECTRICAL: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

ITEM	CODE	DESCRIPTION	UNIT	TOTAL
416	6005	DRILL SHAFT (42 IN)	LF	23
416	6006	DRILL SHAFT (48 IN)	LF	231
432	6003	RIPRAP (CONC)(6 IN)	CY	10
500	6001	MOBILIZATION	LS	1
502	6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	9
506	6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	10000
506	6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	10000
618	6023	CONDT (PVC) (SCH 40) (2")	LF	1705
618	6031	CONDT (PVC) (SCH 40) (3")(CONC ENCSE)	LF	49130
618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	1240
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	12470
618	6074	CONDT (RM) (3")	LF	1060
620	6002	ELEC CONDR (NO.14) INSULATED	LF	32380
620	6007	ELEC CONDR (NO.8) BARE	LF	280
620	6008	ELEC CONDR (NO.8) INSULATED	LF	560
620	6009	ELEC CONDR (NO.6) BARE	LF	450
620	6010	ELEC CONDR (NO.6) INSULATED	LF	900
620	6011	ELEC CONDR (NO.4) BARE	LF	680
620	6012	ELEC CONDR (NO.4) INSULATED	LF	1535
620	6015	ELEC CONDR (NO.2) BARE	LF	400
620	6016	ELEC CONDR (NO.2) INSULATED	LF	800
624	6002	GROUND BOX TY A (122311)W/APRON	EA	25
628	6131	ELC SRV TY D 120/240 060(NS)GS(N)SP(O)	EA	11
628	6334	ELC SRV TY D 120/240 125(NS)GS(N)SP(O)	EA	1
650	6042	INS OH SN SUP(40 FT BAL TEE)	EA	1
6001	6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	4
6007	6011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	2160
6007	6017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	32915
6007	6021	FIBER OPTIC SPLICE ENCLOSURE	EA	16
6007	6023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA	12
6007	6026	FIBER OPTIC CABLE ROAD MARKER	EA	16
6007	6027	FIBER OPTIC PATCH PANEL (144 POSITION)	EA	2
6008	6043	ITS GRND MNT CAB (TY 6) (CONF 2)	EA	1
6010	6001	CCTV FIELD EQUIPMENT (ANALOG)	EA	11
6010	6004	CCTV MOUNT (POLE)	EA	11
6016	6008	ITS MULTI-DUCT CND (PVC-40)(CONC ENCSE)	LF	49130
6016	6011	ITS MULTI-DUCT CND (PVC-80)(BORE)	LF	12470
6016	6013	ITS MULTI-DUCT CND (RMC) 4"	LF	1060
6027	6008	GROUND BOX (PREPARE)	EA	8
6028	6001	INSTALL DMS (POLE MTD CABINET)	EA	1
6064	6055	ITS POLE (60 FT)(90 MPH)	EA	11
6064	6080	ITS POLE MNT CAB (TY 2)(CONF 1)	EA	11
6123	6001	ETHERNET SWITCH (INSTALL ONLY)	EA	12
6124	6001	MPEG 4 VIDEO ENCODER (INSTALL ONLY)	EA	11
6125	6001	TERMINAL SERVER (INSTALL ONLY)	EA	12
6185	6002	TMA (STATIONARY)	DAY	160
6186	6006	ITS GND BOX (PCAST) TY 1 (243660)W/APRN	EA	42
6186	6012	ITS GND BOX (PCAST) TY 2 (366060)W/APRN	EA	16
6247	6005	INSTALL OF CELLULAR MODEM	EA	12
7251	6001	SUBSURFACE UTIL LOCATE (OUTSIDE RDBED)	EA	10
ITEMS PROVIDED BY THE STATE VIA FORCE ACCOUNT				
****	****	LED DMS	EA	1
****	****	TERMINAL SERVER	EA	12
****	****	VIDEO ENCODER	EA	11
****	****	ETHERNET SWITCH	EA	12

NO.	DATE	REVISION	APPROVED

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® 2023

Texas Department of Transportation

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SUMMARY OF QUANTITIES

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		5

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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Elec. Service No.	Station No.	Sheet No.	Electrical Service Description (see ED (5) - 14)	Service Conduit Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amp	Two-Pole Contactor Amps	Panelbd/ Loadcenter Amp Rating	Circuit No.	ITS DEVICE POWERED	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
48	181+36	30	ELEC SERV TY D(120/240)060(NS)GS(N)SP(O)	1 1/2"	3/#6	N/A	2P/60	N/A	70	A	CCTV	1P/20	15	1.8
47	209+45	32	ELEC SERV TY D(120/240)060(NS)GS(N)SP(O)	1 1/2"	3/#6	N/A	2P/60	N/A	70	A	CCTV	1P/20	15	1.8
46	237+81	35	ELEC SERV TY D(120/240)060(NS)GS(N)SP(O)	1 1/2"	3/#6	N/A	2P/60	N/A	70	A	CCTV	1P/20	15	1.8
45	267+83	38	ELEC SERV TY D(120/240)060(NS)GS(N)SP(O)	1 1/2"	3/#6	N/A	2P/60	N/A	70	A	CCTV	1P/20	15	1.8
44	296+85	40	ELEC SERV TY D(120/240)060(NS)GS(N)SP(O)	1 1/2"	3/#6	N/A	2P/60	N/A	70	A	CCTV	1P/20	15	1.8
43	320+90	43	ELEC SERV TY D(120/240)060(NS)GS(N)SP(O)	1 1/2"	3/#6	N/A	2P/60	N/A	70	A	CCTV	1P/20	15	1.8
42	352+10	45	ELEC SERV TY D(120/240)060(NS)GS(N)SP(O)	1 1/2"	3/#6	N/A	2P/60	N/A	70	A	CCTV	1P/20	15	1.8

NO.	DATE	REVISION	APPROVED

Walter P. Moore and Associates, Inc.
TBPE Firm Registration No. 1856

STATE OF TEXAS
THOMAS D. DUNCAN
98353
LICENSED
PROFESSIONAL ENGINEER
05/09/2023

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Texas Department of Transportation

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

ELECTRICAL SERVICE SUMMARY

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			6
STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

Elec. Service No.	Station No.	Sheet No.	Electrical Service Description (see ED (5) - 14)	Service Conduit Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amp	Two-Pole Contactor Amps	Panelbd/ Loadcenter Amp Rating	Circuit No.	ITS DEVICE POWERED	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
41B	362+47	46	ELEC SERV TY D(120/240)125(NS)GS(N)SP(O)	2"	3/#0	N/A	2P/125	N/A	125	A	DMS	2P/100	50	12.0
41	377+12	48	ELEC SERV TY D(120/240)060(NS)GS(N)SP(O)	1 1/2"	3/#6	N/A	2P/60	N/A	70	A	CCTV	1P/20	15	1.8
40	430+43	50	ELEC SERV TY D(120/240)060(NS)GS(N)SP(O)	1 1/2"	3/#6	N/A	2P/60	N/A	70	A	CCTV	1P/20	15	1.8
39	431+00	53	ELEC SERV TY D(120/240)060(NS)GS(N)SP(O)	1 1/2"	3/#6	N/A	2P/60	N/A	70	A	CCTV	1P/20	15	1.8
38	464+00	56	ELEC SERV TY D(120/240)060(NS)GS(N)SP(O)	1 1/2"	3/#6	N/A	2P/60	N/A	70	A	CCTV	1P/20	15	1.8

NO.	DATE	REVISION	APPROVED

Walter P. Moore and Associates, Inc.
TBPE Firm Registration No. 1856

STATE OF TEXAS
THOMAS D. DUNCAN
98353
LICENSED
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05/09/2023

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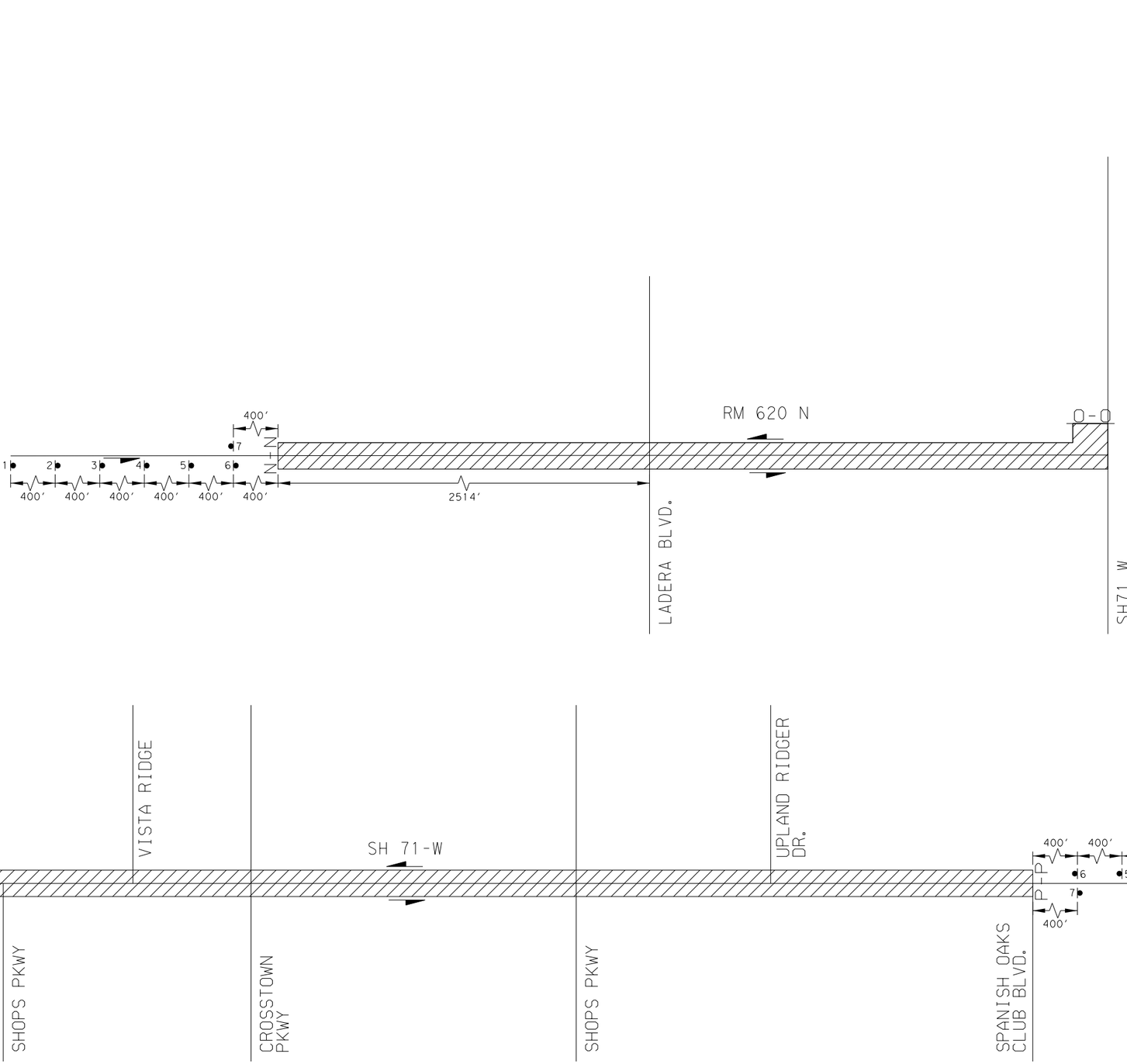
WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 600
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

ELECTRICAL SERVICE SUMMARY

SHEET 2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			7
STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71



NOTES:
1. FIELD CONDITION MAY DICTATE ADJUSTMENT OF SIGN LOCATIONS. OBTAIN APPROVAL FROM THE ENGINEER PRIOR TO INSTALLATION OF ANY SIGNS.
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, & TMUTCD FOR SIGN DETAILS, DIMENSIONS AND PLACEMENT.

(1) OBEY WARNING SIGNS STATE LAW — R20-3T 42"X48"

(2) STAY ALERT / TALK OR TEXT LATER — G20-10T 48"X60"

(3) BEGIN WORK ZONE — G20-9TP 24"X24"; TRAFFIC FINES DOUBLE — R20-5T 24"X30"; WHEN WORKERS ARE PRESENT — R20-5aTP PLAQUE 24"X12"

(4) SPEED LIMIT XX — R2-1 36"X30"

(5) ROAD WORK AHEAD — CW20-1D 48"X48"

(6) BEGIN ROAD WORK NEXT X FEET — G20-5T 24"X48"; NAME ADDRESS CITY STATE CONTRACTOR — G20-6T 30"X48"

(7) END WORK ZONE — G20-2bT 18"X36"

LEGEND:
- WORK ZONE
- TRAFFIC FLOW ARROW

NO.	DATE	REVISION	APPROVED

Walter P. Moore and Associates, Inc.
TBPE Firm Registration No. 1856

STATE OF TEXAS — THOMAS D. DUNCAN — 98353 — LICENSED PROFESSIONAL ENGINEER — 5/31/2023

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WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 850
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
TRAFFIC CONTROL PLAN
ADVANCE WARNING SIGN LAYOUT
SEGMENT 5

SHEET 1 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		8

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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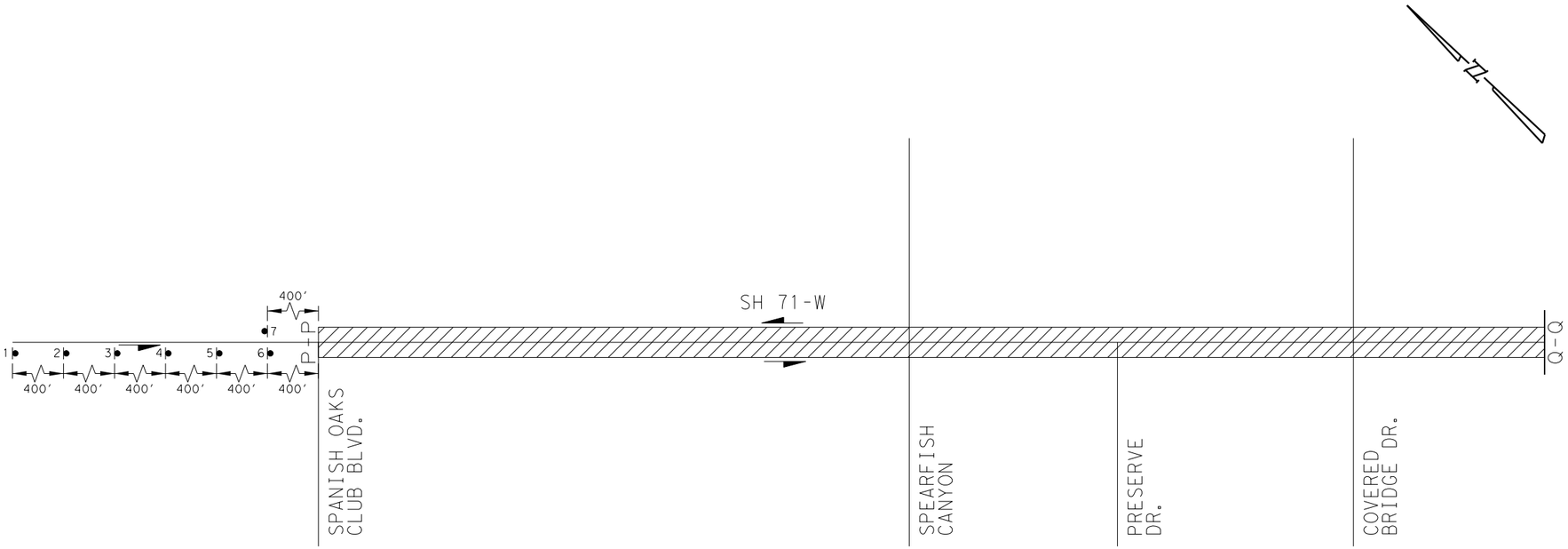

NOTES:
1. FIELD CONDITION MAY DICTATE ADJUSTMENT OF SIGN LOCATIONS. CONTRACTOR SHALL OBTAIN APPROVAL FROM THE ENGINEER PRIOR TO INSTALLATION OF ANY SIGNS.
2. REFER TO TRAFFIC CONTROL STANDARD SHEETS FOR OTHER REGULATORY AND WARNING SIGNS.
3. ADHERE AT ALL TIMES TO TXDOT STANDARDS BC(1)-21 THROUGH BC(12)-21, & TMUTCD FOR SIGN DETAILS, DIMENSIONS AND PLACEMENT.

(1) OBEY WARNING SIGNS STATE LAW — R20-3T 42"X48"

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(3) BEGIN WORK ZONE — G20-9TP 24"X24"
TRAFFIC FINES DOUBLE — R20-5T 24"X30"
WHEN WORKERS ARE PRESENT — R20-5aTP PLAQUE 24"X12"

(4) SPEED LIMIT XX — R2-1 36"X30"

(5) ROAD WORK AHEAD — CW20-1D 48"X48"

(6) BEGIN ROAD WORK NEXT X FEET — G20-5T 24"X48"
NAME ADDRESS CITY STATE CONTRACTOR — G20-6T 30"X48"

LEGEND:
- WORK ZONE
- TRAFFIC FLOW ARROW

(7) END WORK ZONE — G20-2bT 18"X36"

NO.	DATE	REVISION	APPROVED

Walter P. Moore and Associates, Inc.
TBPE Firm Registration No. 1856

STATE OF TEXAS
THOMAS D. DUNCAN
98353
PROFESSIONAL ENGINEER
5/31/2023

100% SUBMITTAL

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Texas Department of Transportation

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
TRAFFIC CONTROL PLAN
ADVANCE WARNING SIGN LAYOUT
SEGMENT 6

SHEET 2 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		9

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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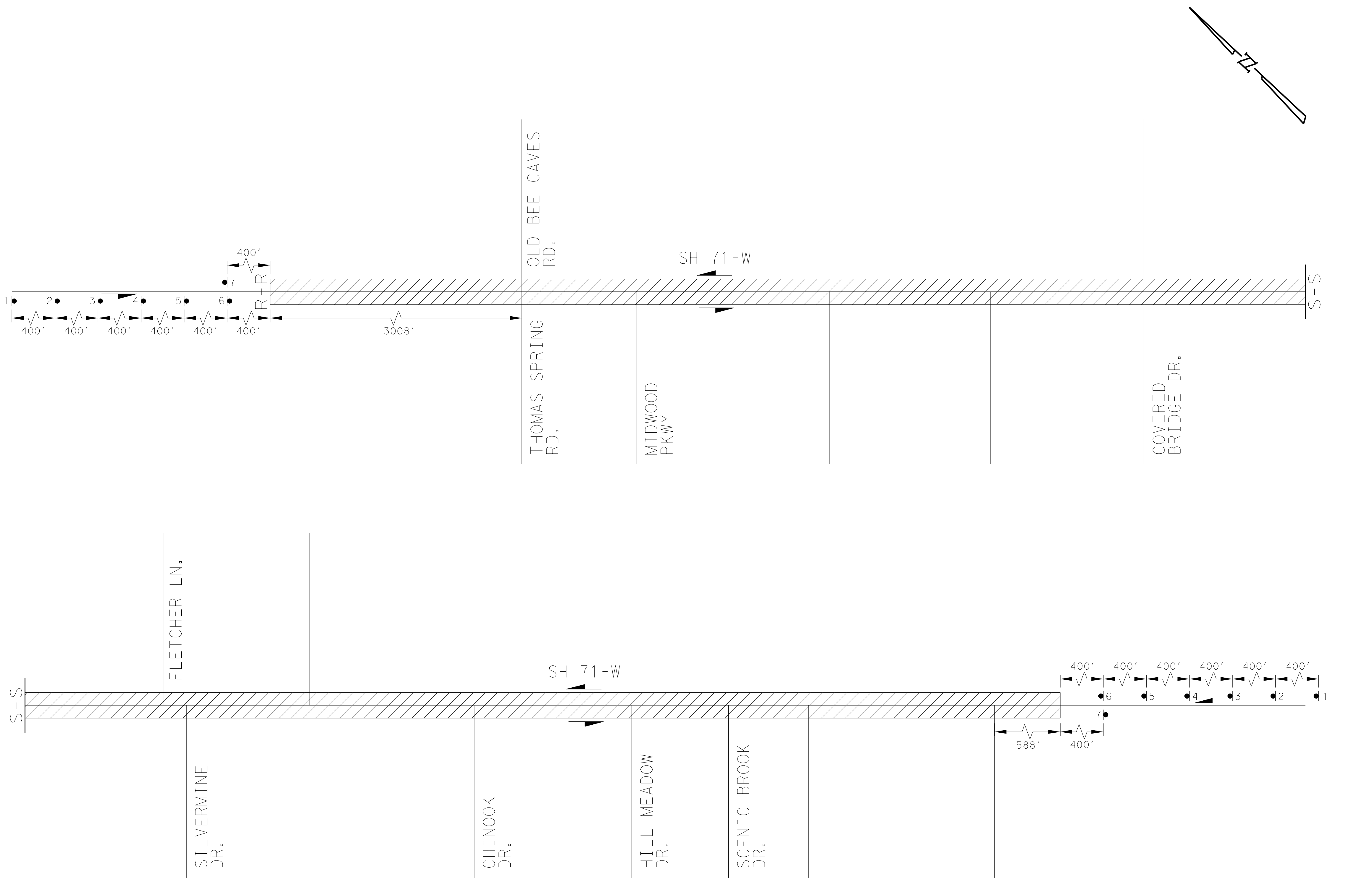
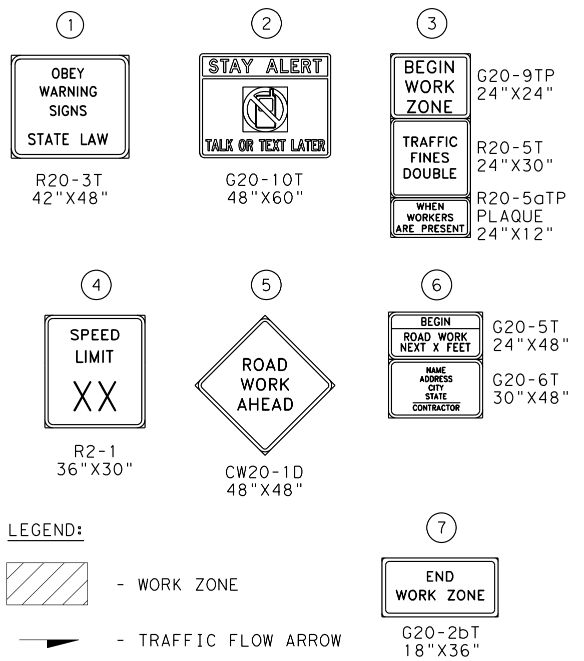
NOTES:

1. FIELD CONDITION MAY DICTATE ADJUSTMENT OF SIGN LOCATIONS. CONTRACTOR SHALL OBTAIN APPROVAL FROM THE ENGINEER PRIOR TO INSTALLATION OF ANY SIGNS.
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, & TMUTCD FOR SIGN DETAILS, DIMENSIONS AND PLACEMENT.





LEGEND:

- WORK ZONE
- TRAFFIC FLOW ARROW

NO.	DATE	REVISION	APPROVED

Walter P. Moore and Associates, Inc.
TBPE Firm Registration No. 1856

STATE OF TEXAS
THOMAS D. DUNCAN
98353
LICENSED PROFESSIONAL ENGINEER
5/31/2023

100% SUBMITTAL

® 2023
Texas Department of Transportation

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
TRAFFIC CONTROL PLAN
ADVANCE WARNING SIGN LAYOUT
SEGMENT 7

SHEET 3 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.			SHEET NO.
6				10
STATE	DIST.	COUNTY		
TX	AUS	TRAVIS		
CONT.	SECT.	JOB	STREET/ROAD:	
0700	03	149	SH 71	

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0700	03	149	SH71
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	AUS	TRAVIS		11
5-10 5-21				

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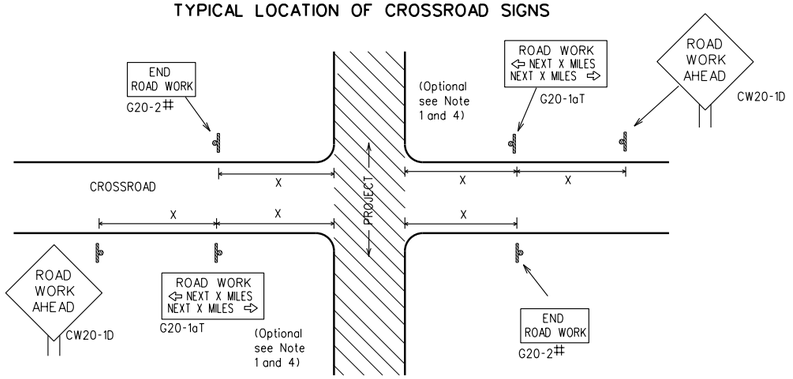
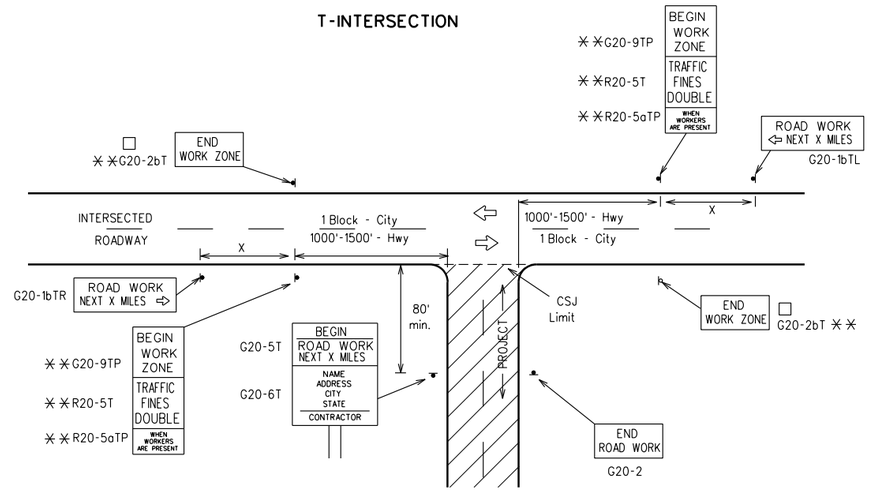
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING 1,5,6

SIZE

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

SPACING

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

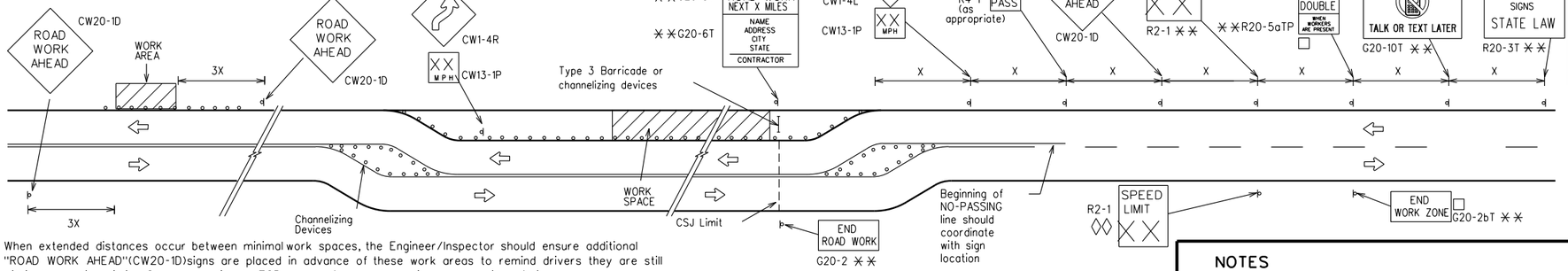
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

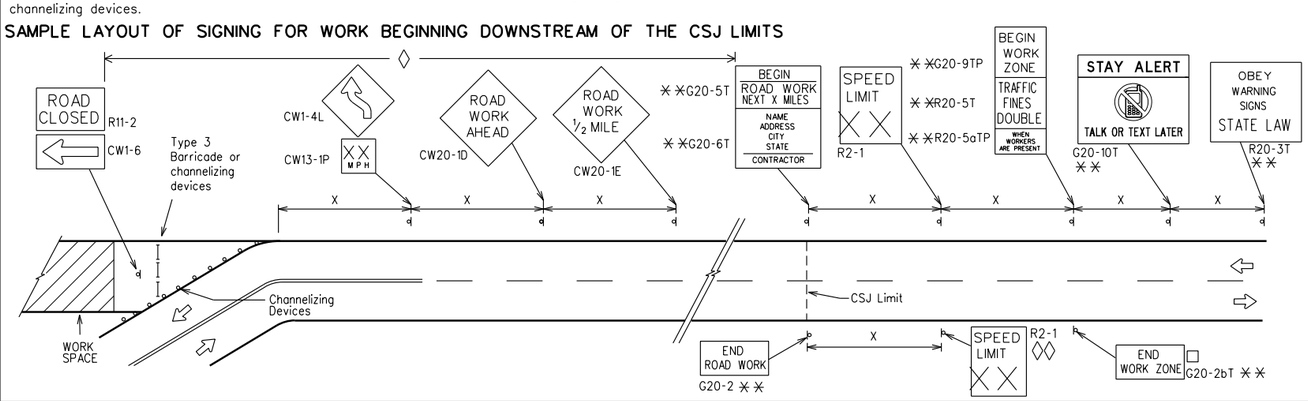
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

NOTES

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

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

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

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

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

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

SHEET 2 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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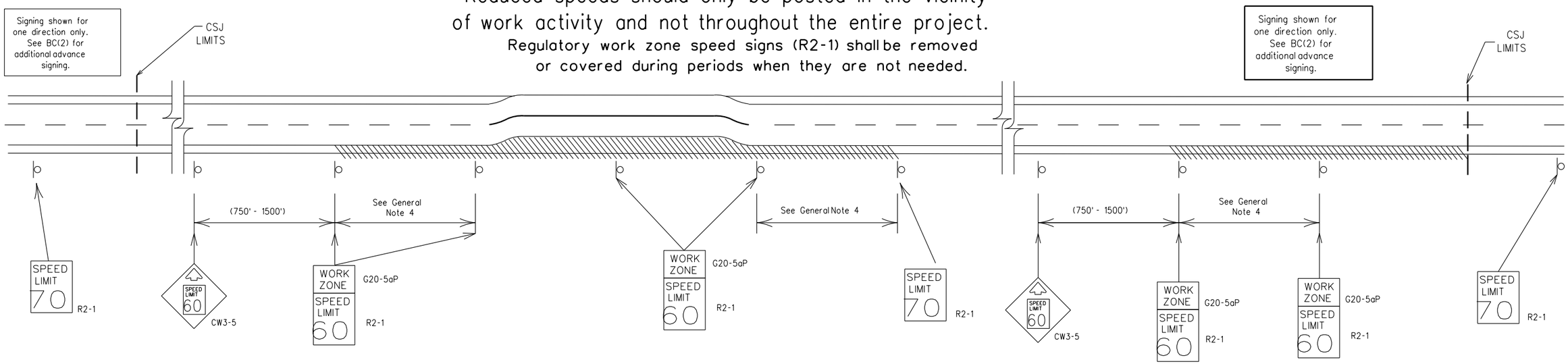
REVISIONS	0700	03	149	SH71
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	TRAVIS		12

96

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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7-13 5-21	AUS	TRAVIS		13

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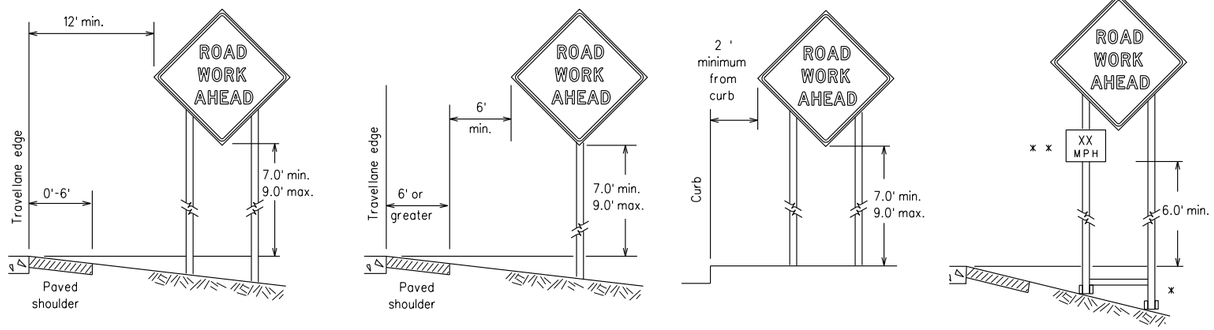
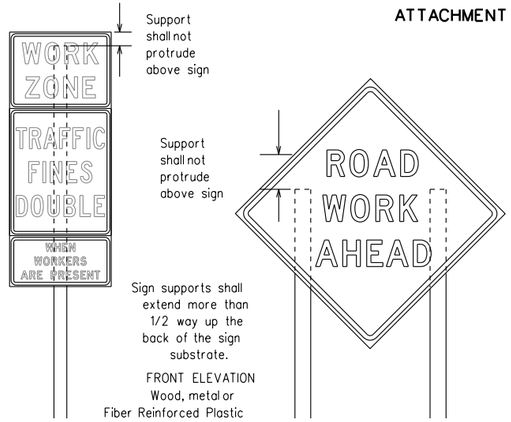
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

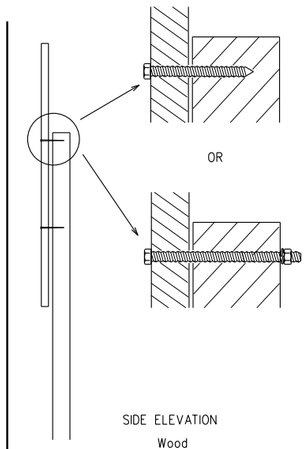


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





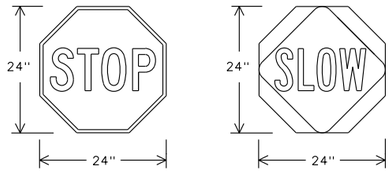
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0700	03	149	SH71
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	TRAVIS		14

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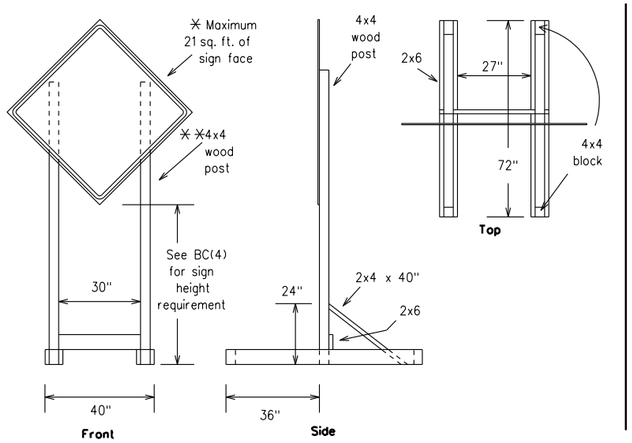
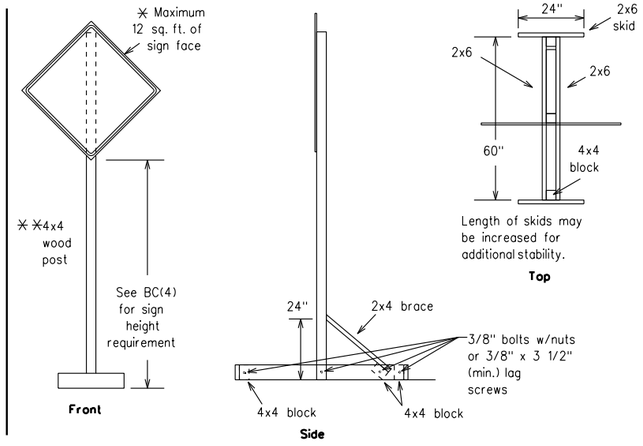
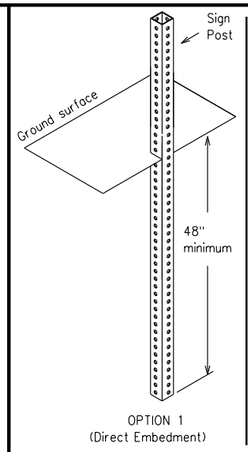
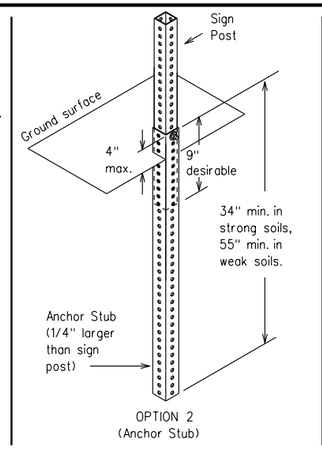


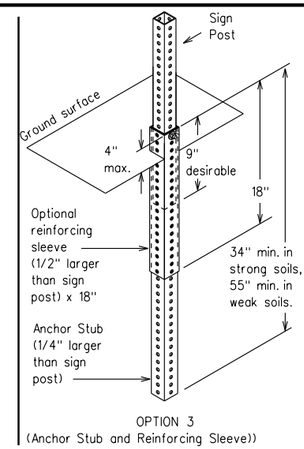


SKID MOUNTED WOOD SIGN SUPPORTS

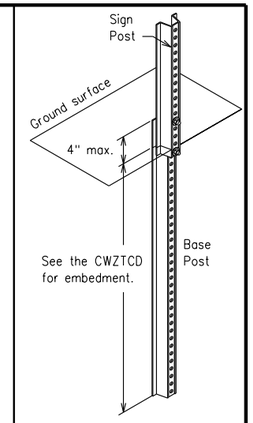
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







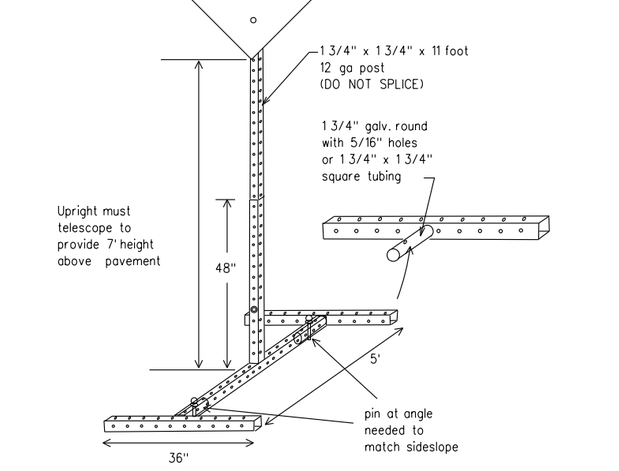
PERFORATED SQUARE METAL TUBING

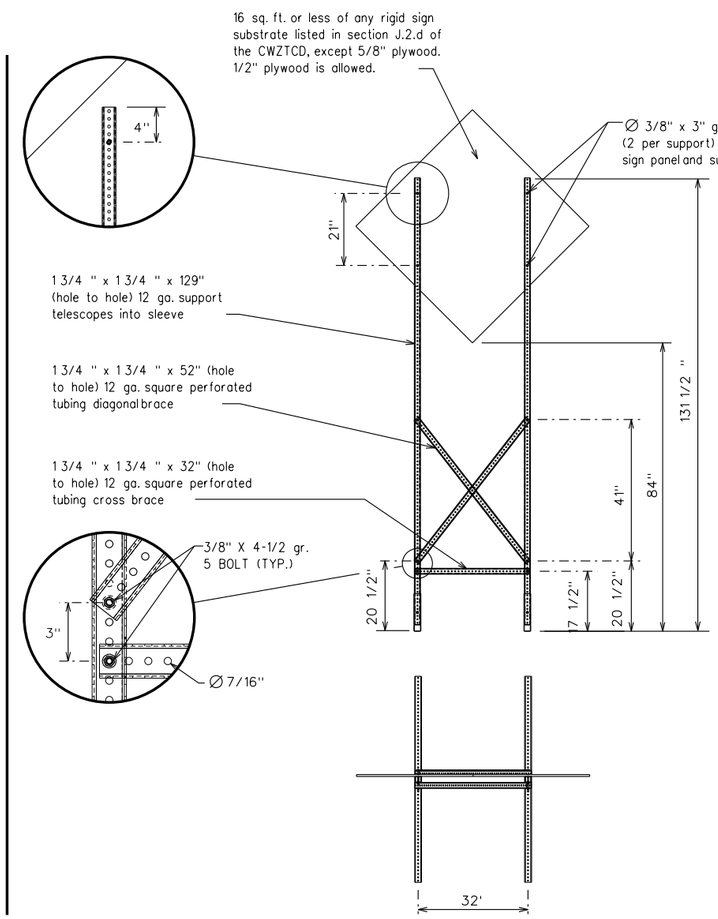


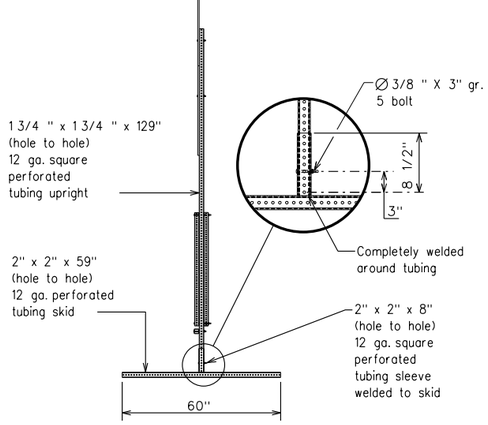
WING CHANNEL
Lap-splice/base bolted anchor

GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

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Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0700	03	149	SH71
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	TRAVIS		15

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

xx 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

xx See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	TRAVIS		16

100

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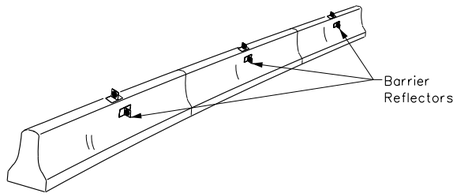
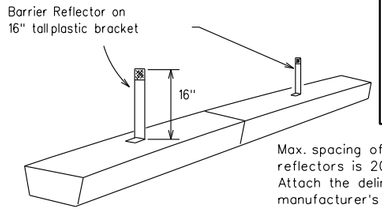
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



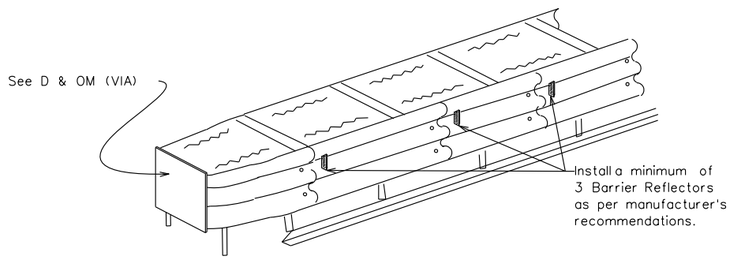
CONCRETE TRAFFIC BARRIER (CTB)

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



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

LOW PROFILE CONCRETE BARRIER (LPCB)



DELINEATION OF END TREATMENTS

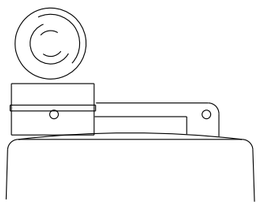
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

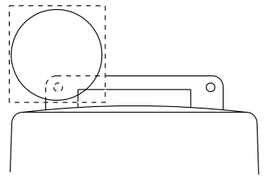
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

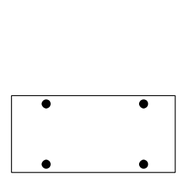
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

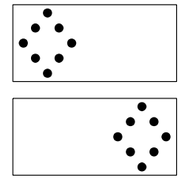
Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

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

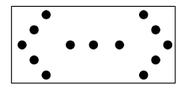


4 CORNER CAUTION

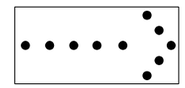
OR



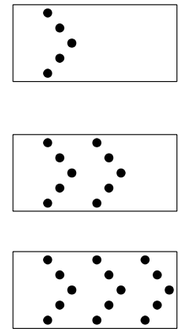
ALTERNATING DIAMOND CAUTION



DOUBLE ARROW



RIGHT/LEFT ARROW
(right arrow shown; left is similar)



RIGHT/LEFT SEQUENTIAL CHEVRON
(right chevron shown; left is similar)

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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0700	03	149	SH71
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	TRAVIS		17

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

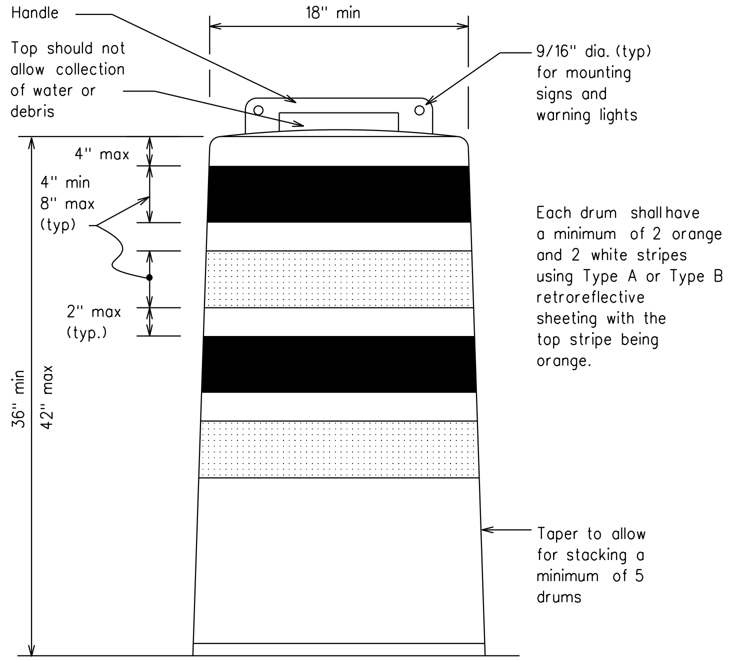
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

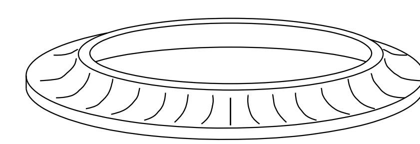
RETROREFLECTIVE SHEETING

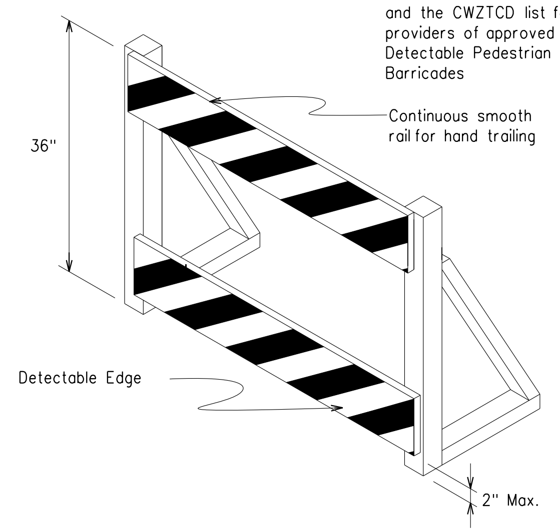
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

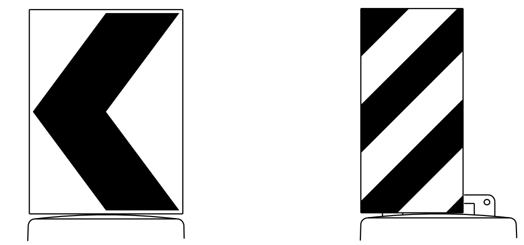






DETECTABLE PEDESTRIAN BARRICADES

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



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

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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

SHEET 8 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

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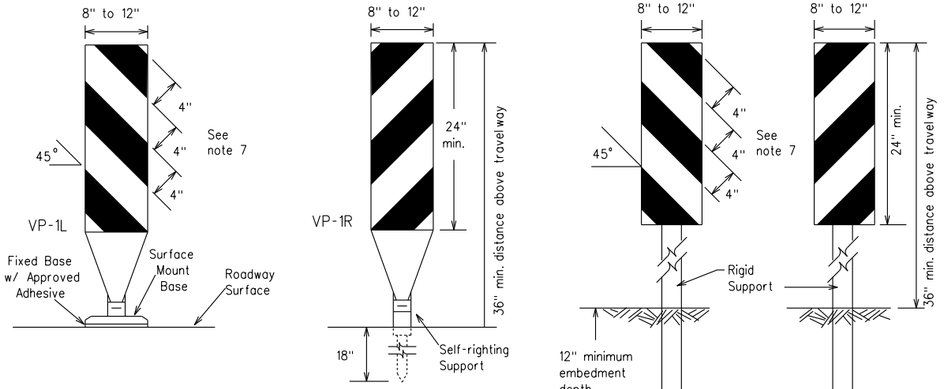
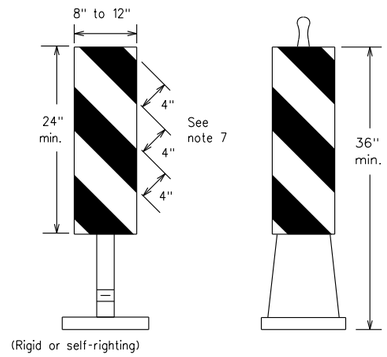


FIXED
(Rigid or self-righting)

DRIVEABLE

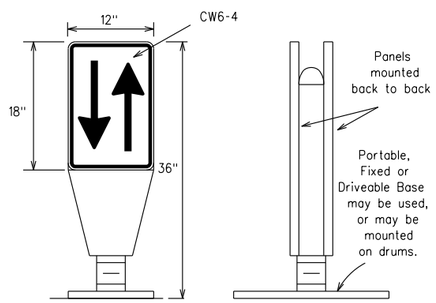


(Rigid or self-righting)

PORTABLE

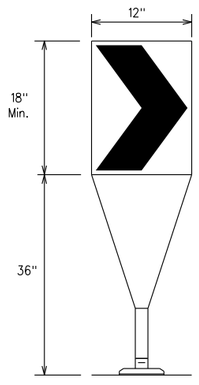
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



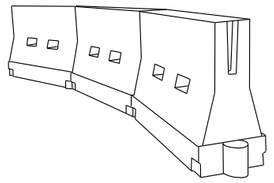
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

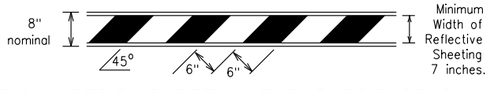
BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0700	03	149	SH71
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	TRAVIS		19

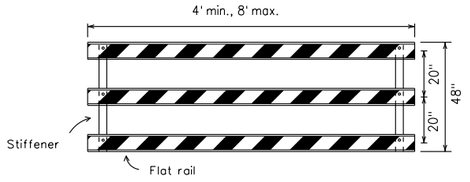
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



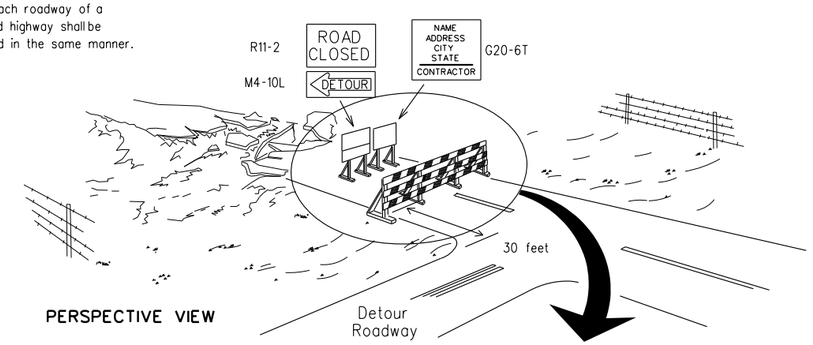
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

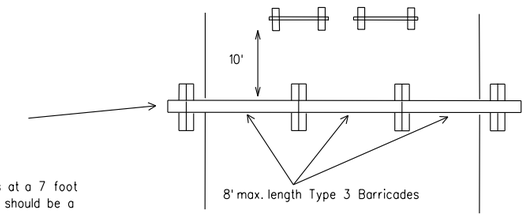
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.

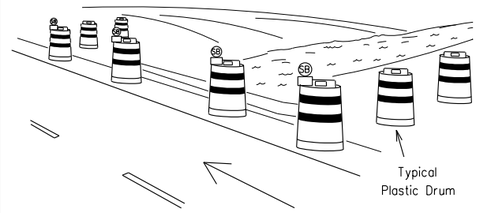
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

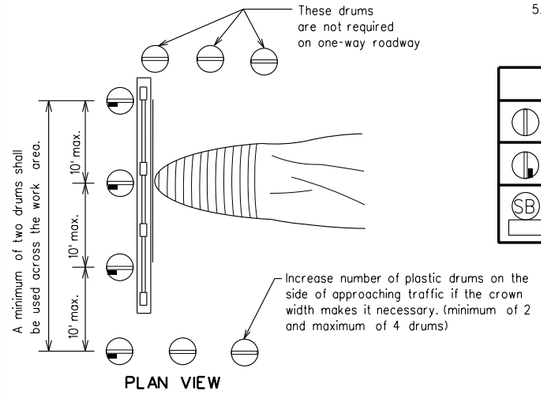
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

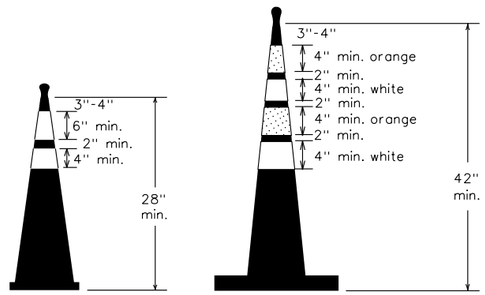
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



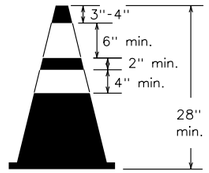
PLAN VIEW

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

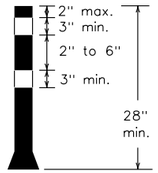
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

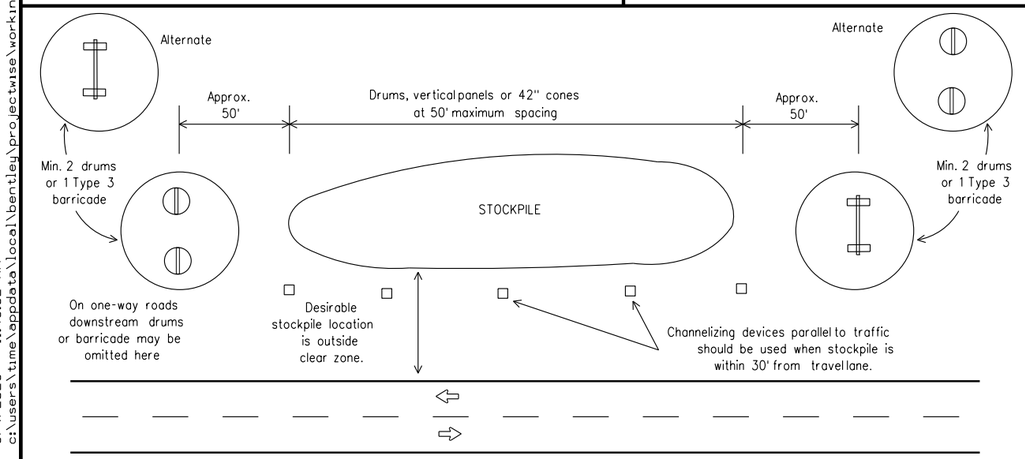


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0700	03	149	SH71
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	TRAVIS		21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

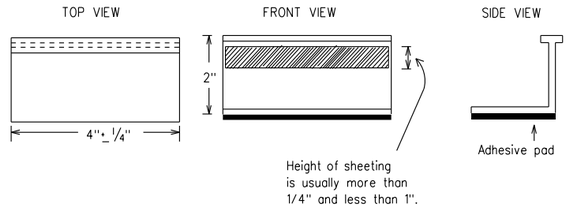
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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

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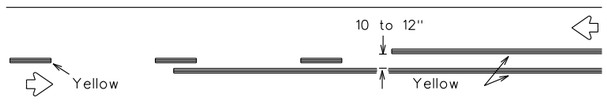
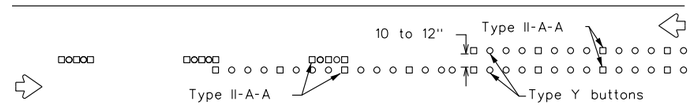
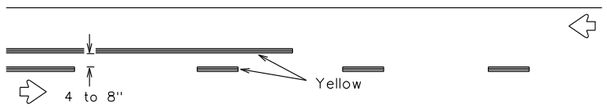
PAVEMENT MARKING PATTERNS



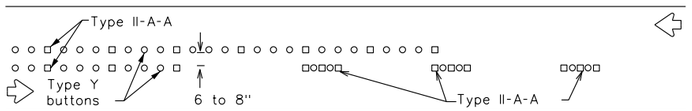
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



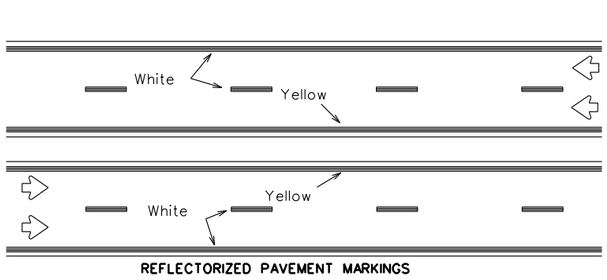
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



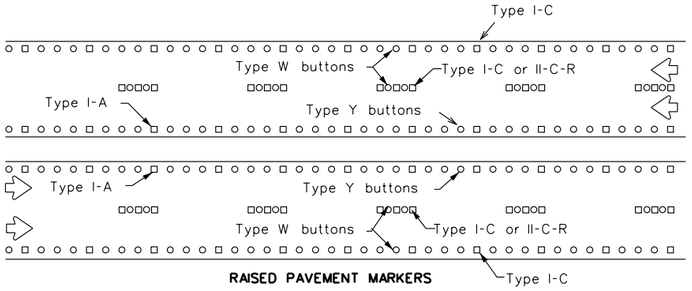
RAISED PAVEMENT MARKERS - PATTERN B

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

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



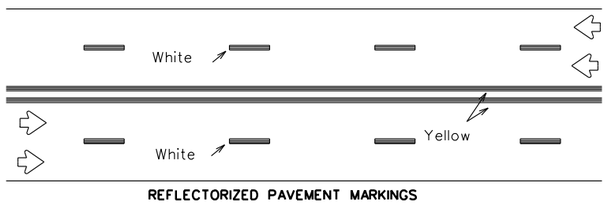
REFLECTORIZED PAVEMENT MARKINGS



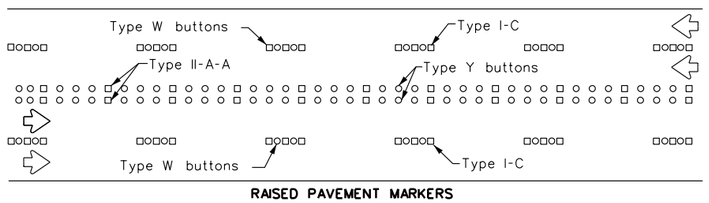
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



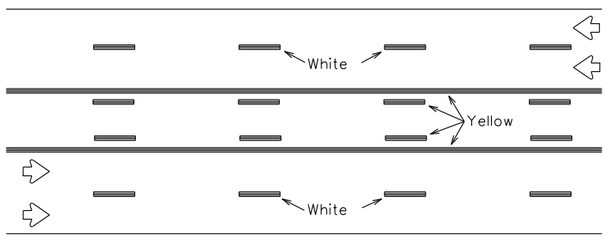
REFLECTORIZED PAVEMENT MARKINGS



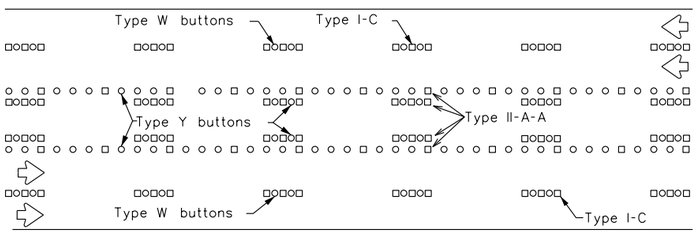
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

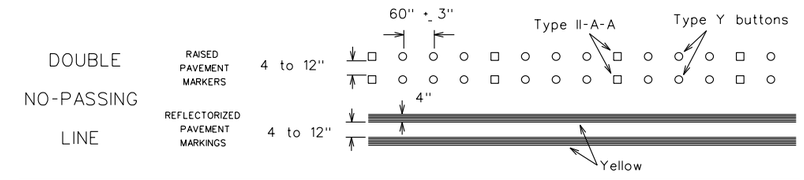
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

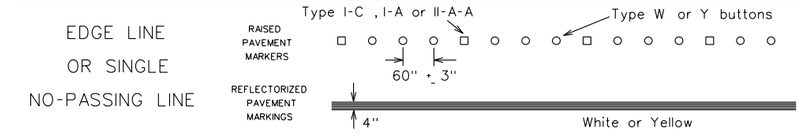
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

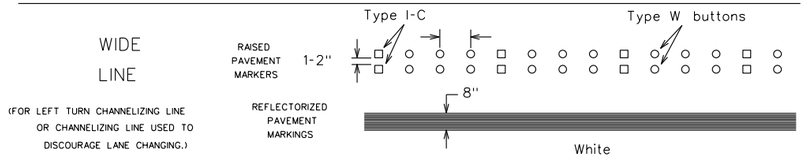


EDGE LINE OR SINGLE NO-PASSING LINE



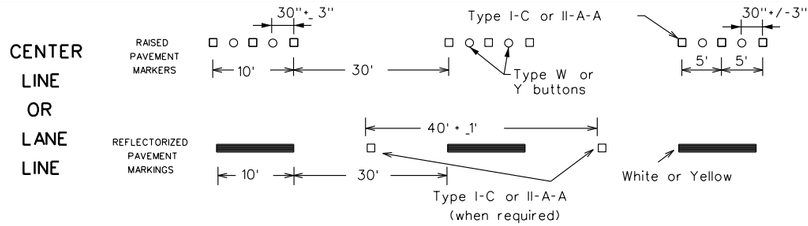
WIDE LINE

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

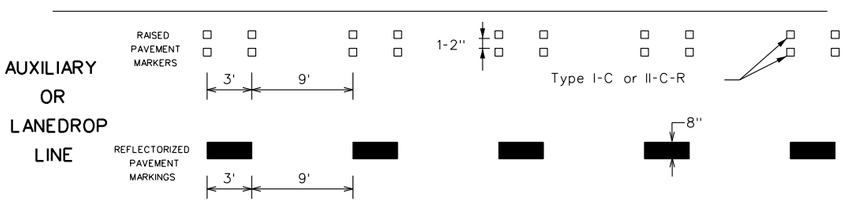


BROKEN LINES

CENTER LINE OR LANE LINE

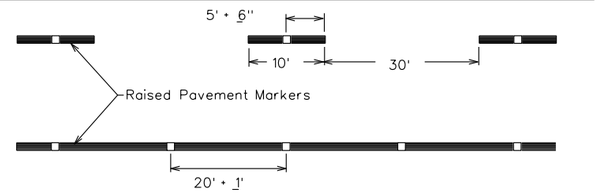


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

SHEET 12 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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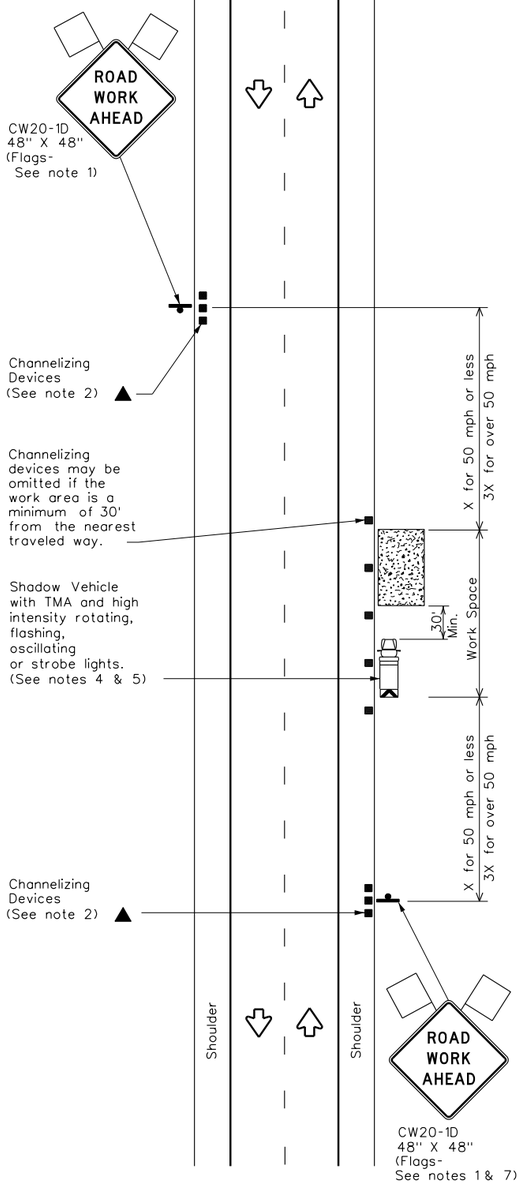
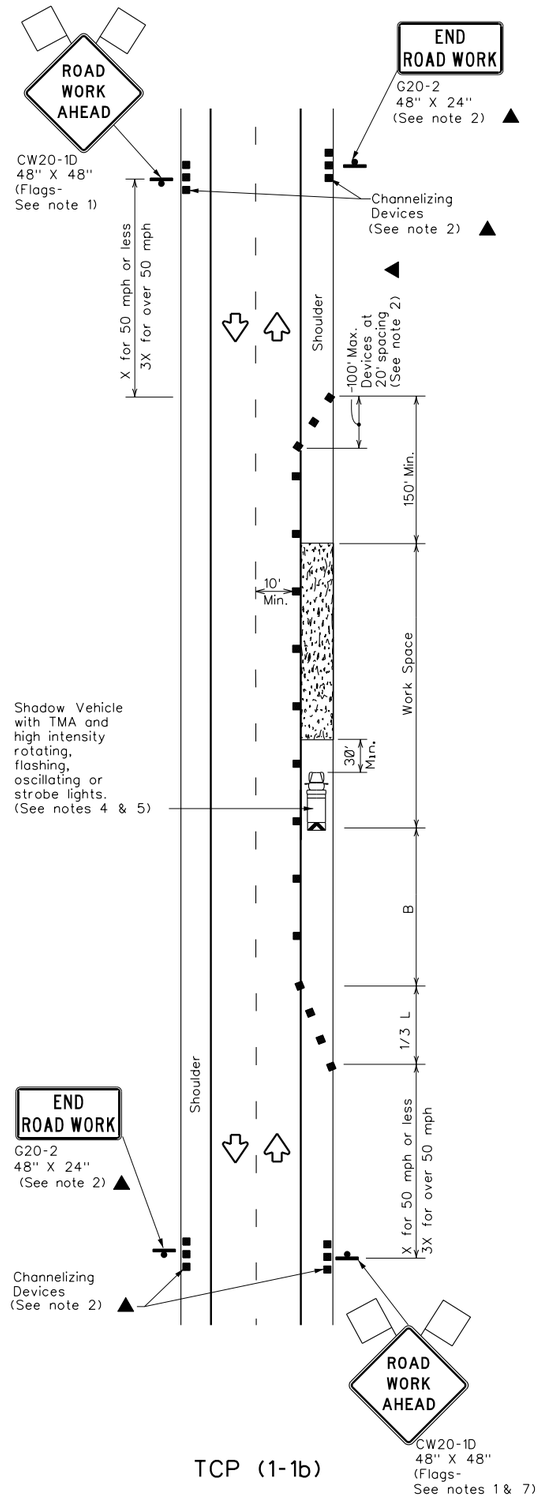


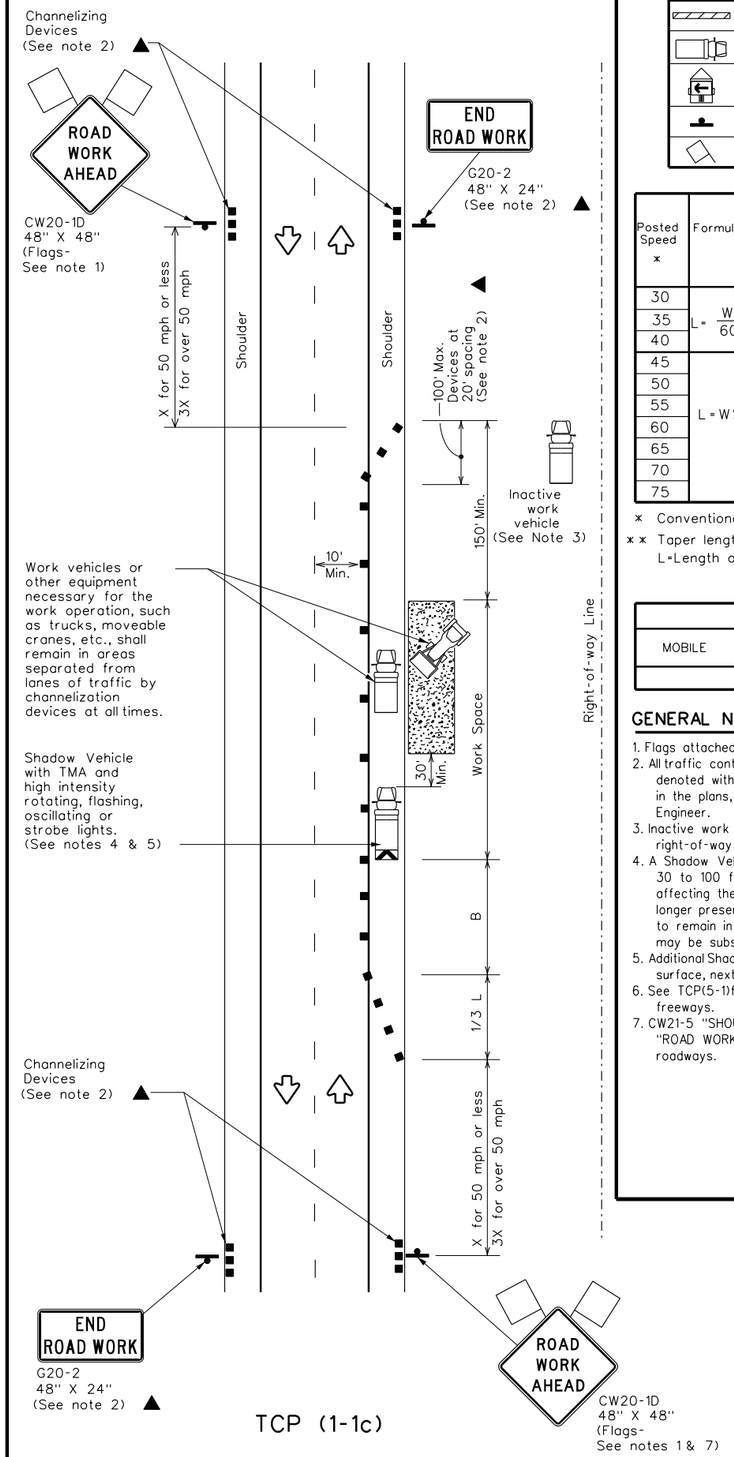
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0700	03	149	SH71
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	AUS	TRAVIS		23
1-97 2-18				

151

DATE: 5/9/2023 11:46:56 AM
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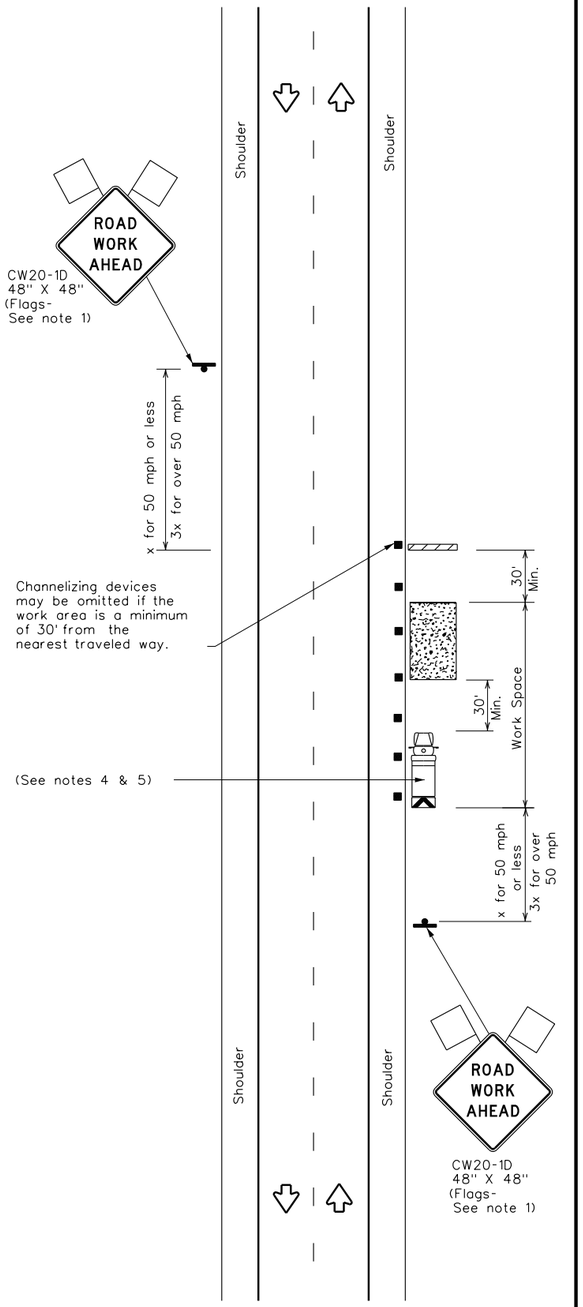
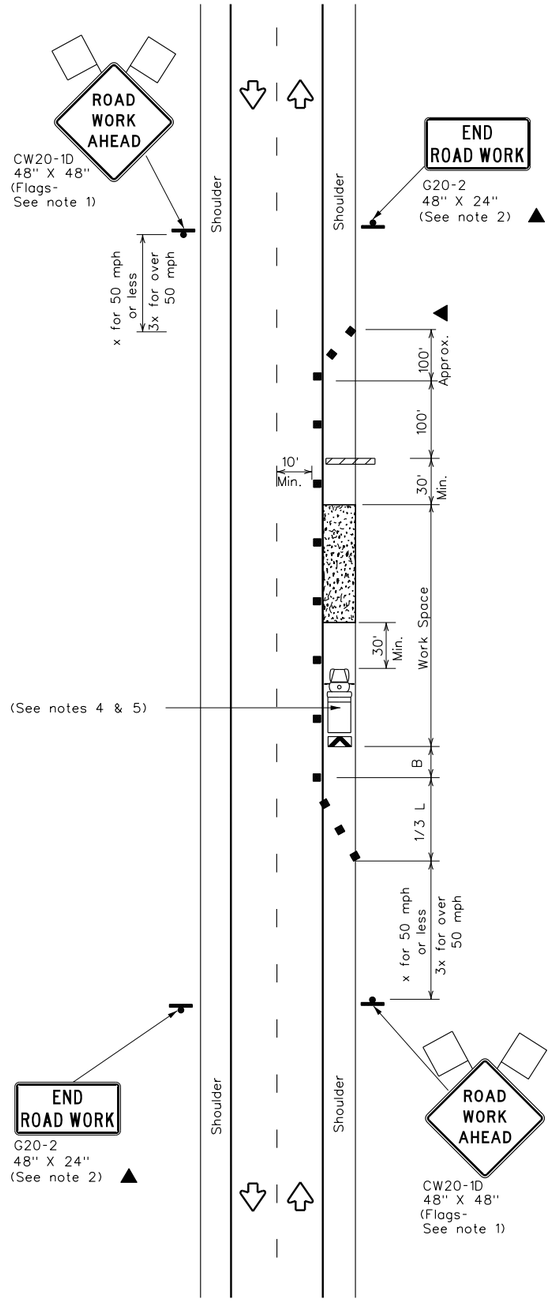


TCP (2-1a)

WORK SPACE NEAR SHOULDER

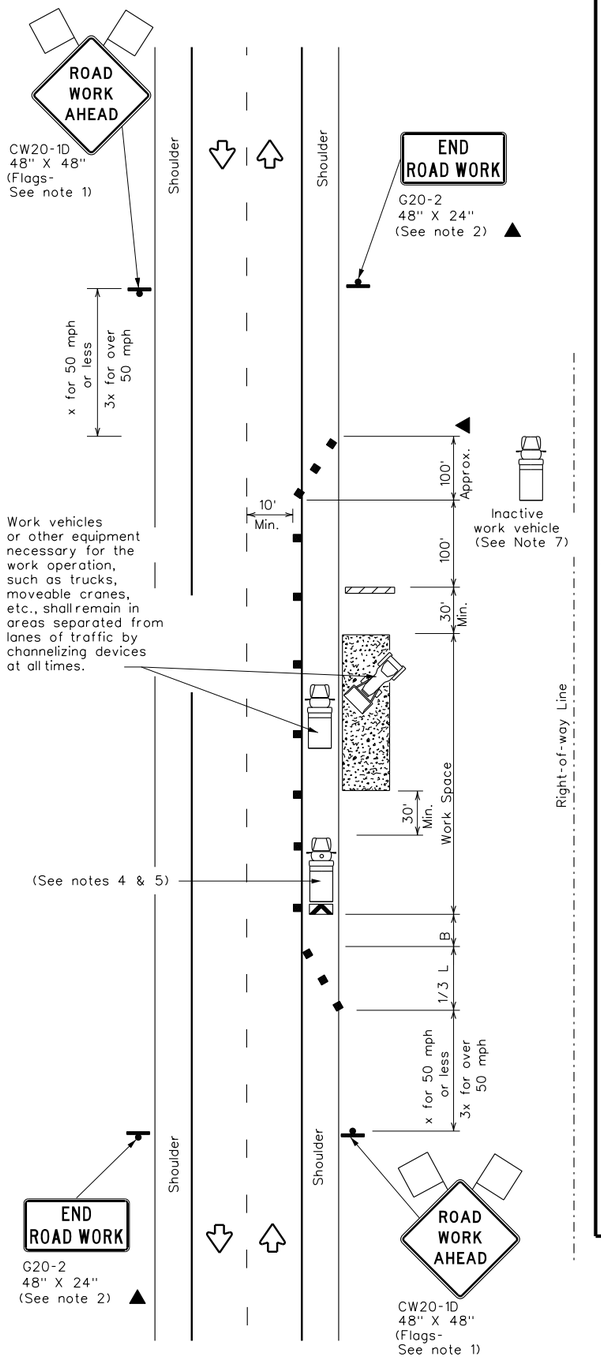
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER

Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER

Conventional Roads

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

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

x Conventional Roads Only

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

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

GENERAL NOTES

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

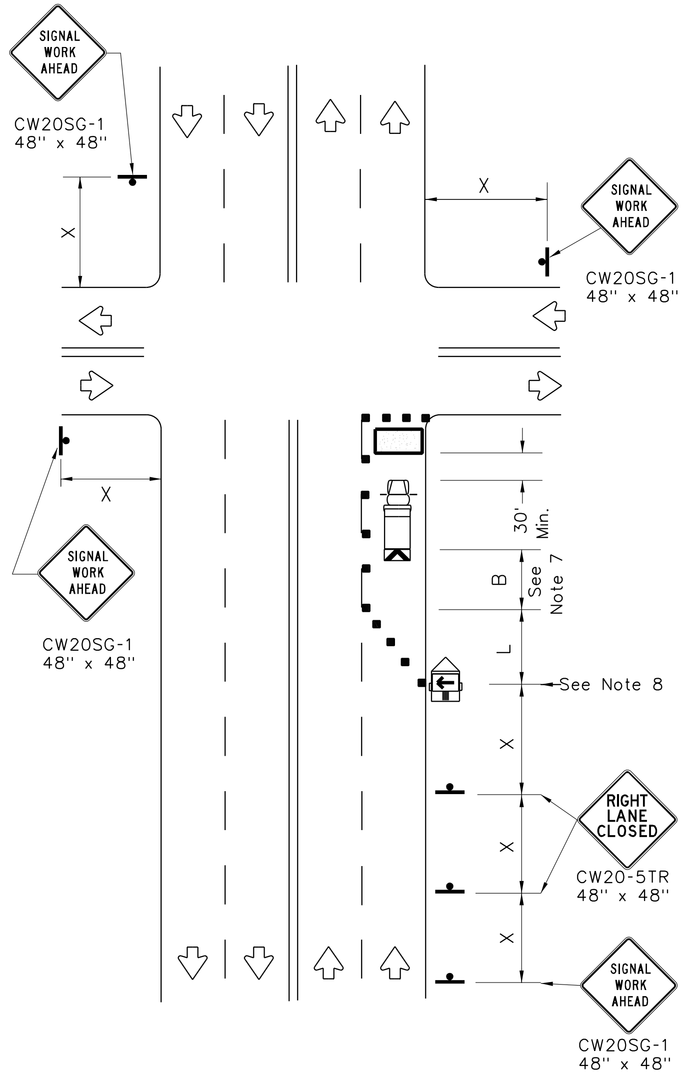
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

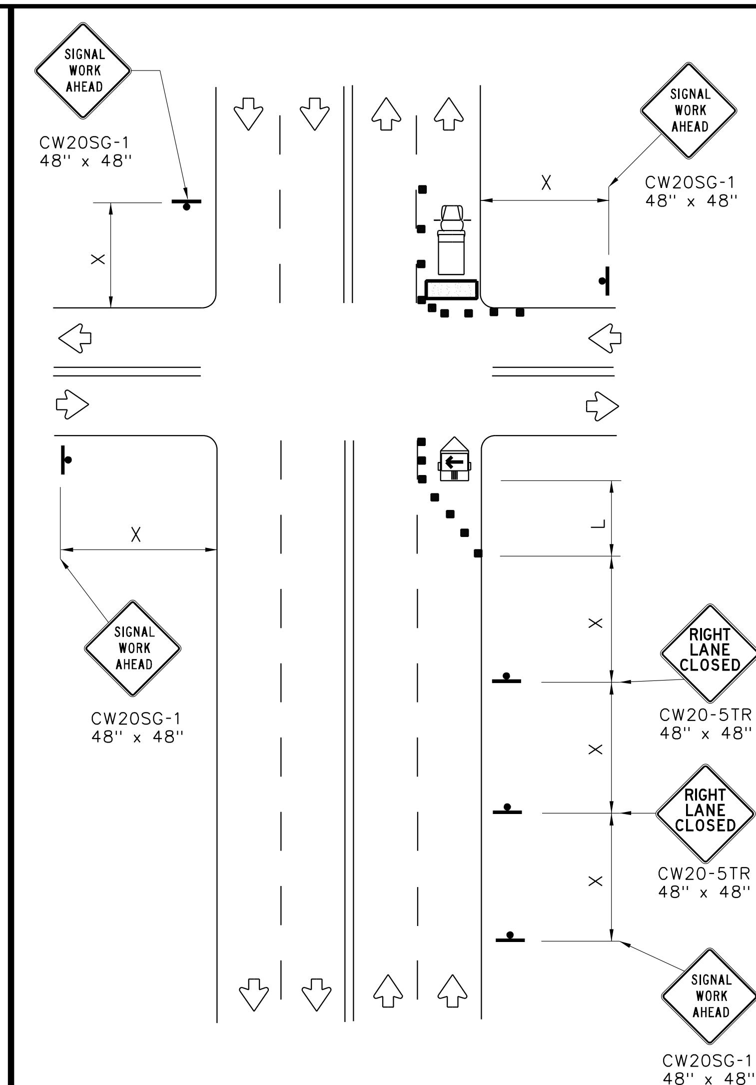
TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0700	03	149	SH71
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	AUS	TRAVIS		24
1-97 2-18				



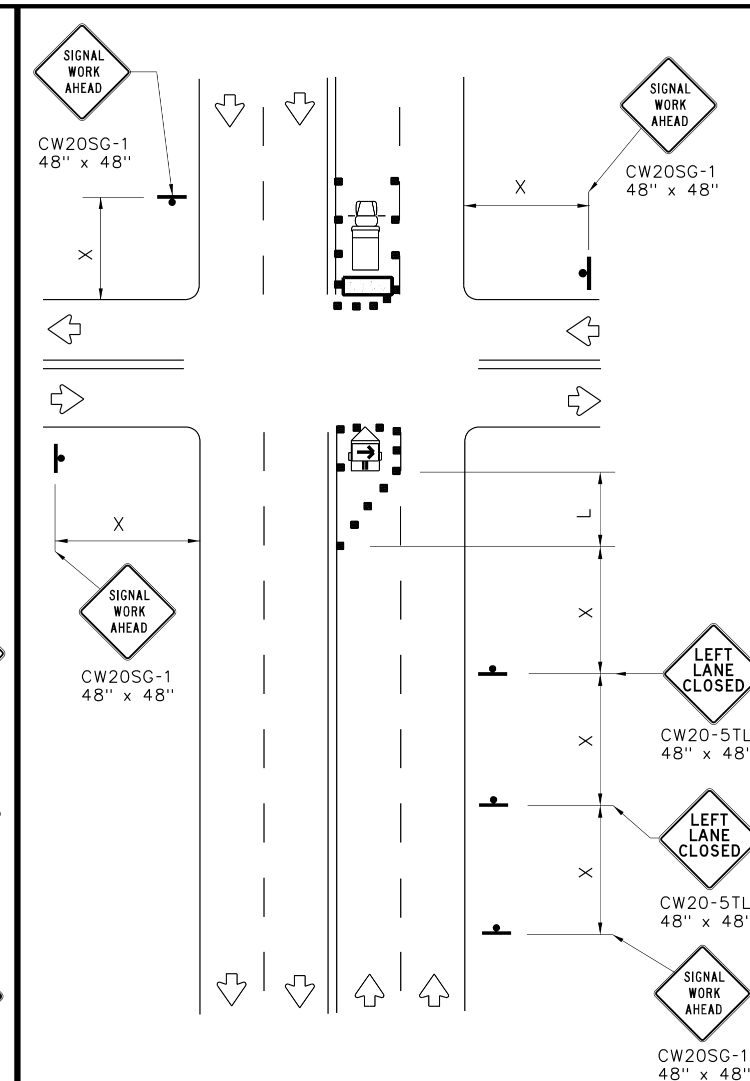
NEAR SIDE LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE RIGHT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE LEFT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY

LEGEND

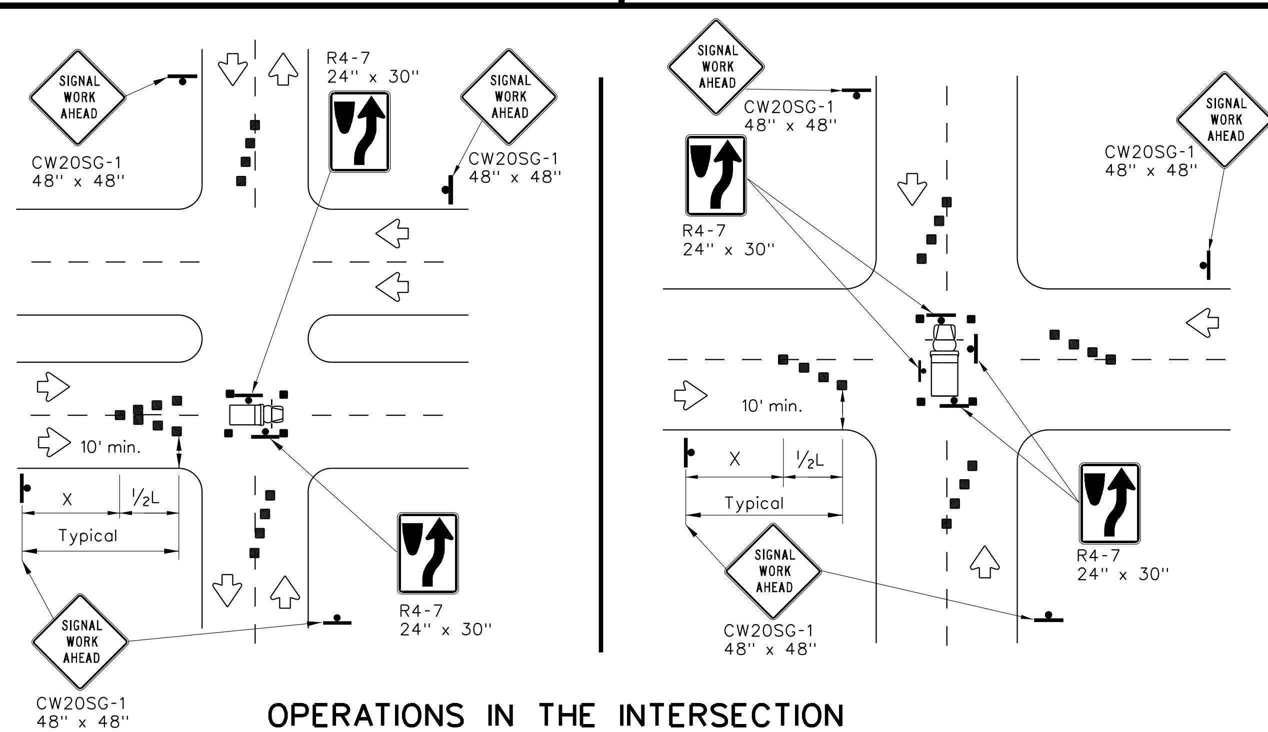
(symbol)	Type 3 Barricade	(symbol)	Channelizing Devices
(symbol)	Heavy Work Vehicle	(symbol)	Truck Mounted Attenuator (TMA)
(symbol)	Trailer Mounted Flashing Arrow Board	(symbol)	Portable Changeable Message Sign (PCMS)
(symbol)	Sign	(symbol)	Traffic Flow
(symbol)	Flag	(symbol)	Flagger

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

* Conventional Roads Only

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

WORKERS IN BUCKET TRUCKS SHALL NOT WORK ABOVE OPEN LANES OF TRAFFIC.



OPERATIONS IN THE INTERSECTION

SHORT DURATION

GENERAL NOTES

1. The minimum size channelizing device is the 28" cone. 42" Two-piece cones, drums, vertical panels or barricades will be required when the device must be left unattended at night.

2. Obstructions or hazards at the work area shall be clearly marked and delineated at all times.

3. Flaggers and Flagger Symbol (CW20-7) signs may be required according to field conditions.

4. Vehicles parked in roadway shall be equipped with at least two high intensity rotating, flashing, oscillating or strobe type lights.

5. High level warning devices (flag trees) may be used at corners of the vehicle.

6. When work operations are performed on existing signals, the signals may be placed in flashing red mode when approved by the engineer. If existing signals do not have power, All-Way Stop (R1-1 and R1-3P) signs may be implemented when approved by the engineer.

7. For Short-Term Stationary work the buffer space "B" from the above table should be used if field conditions permit. For Short Duration (less than 1 hour) any buffer space provided will enhance the safety of the setup.

8. The arrow board at this location may be omitted for Short Duration work if the work vehicle has an arrow board in operation. As an option, the arrow board may be placed at the end of the taper in the closed lane if space is not available at the beginning of the taper.

9. Signs and devices for the NEAR SIDE LANE CLOSURE may be altered for a left lane closure by using a LEFT LANE CLOSED (CW20-5TL) and adding channelizing devices on the centerline to protect the work space from opposing traffic.

SHEET 1 OF 2

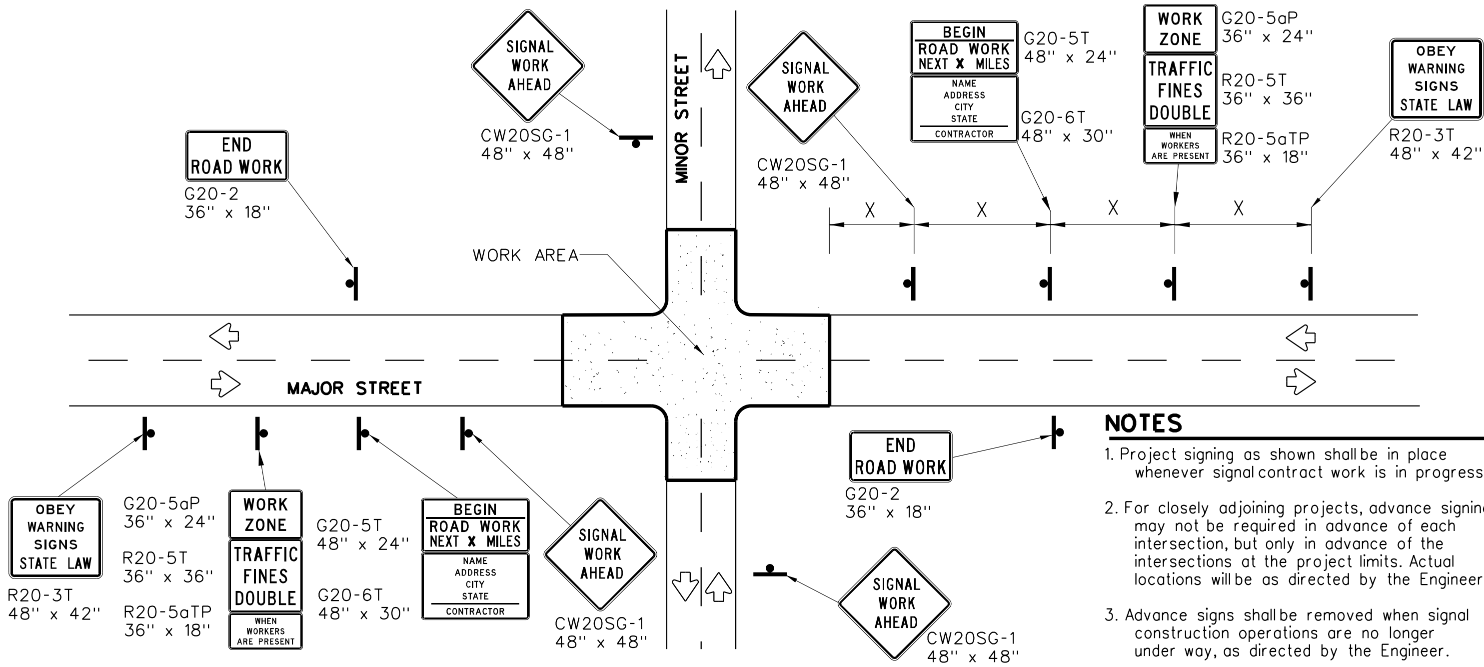
Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ(BTS-1)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0700	03	149	SH71
2-98 10-99 7-13 4-98 3-03	DIST		COUNTY	SHEET NO.
	AUS		TRAVIS	25

114



TYPICAL ADVANCE SIGNAL PROJECT SIGNING

FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS

NOTES

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

DURATION OF WORK

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

SIGN MOUNTING HEIGHT

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

REMOVING OR COVERING

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

REFLECTIVE SHEETING

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

SIGN SUPPORT WEIGHTS

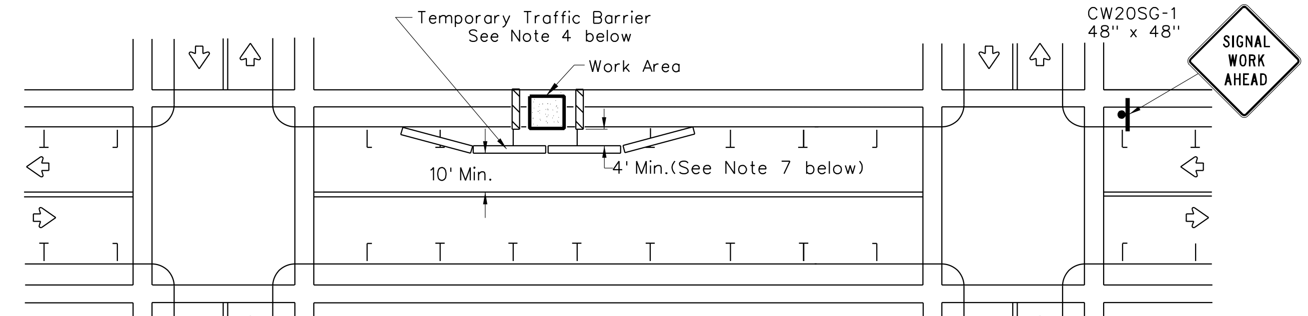
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support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

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

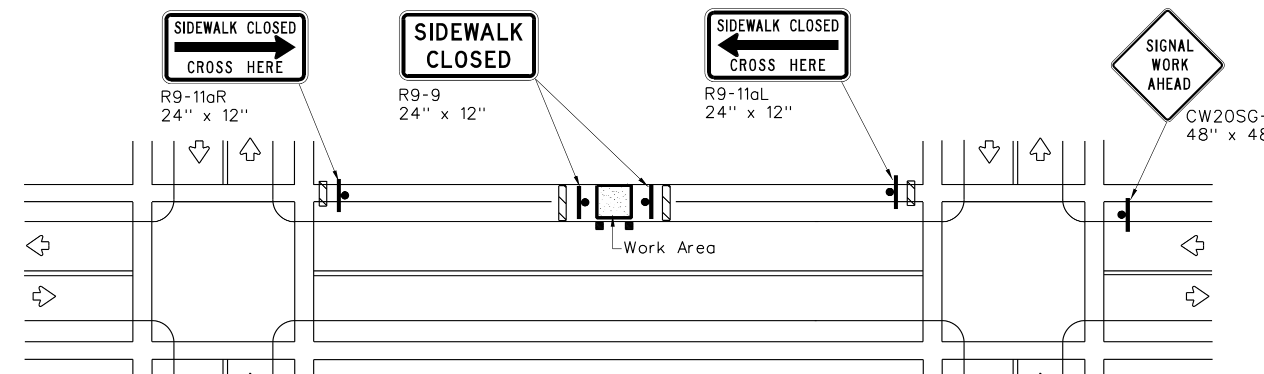
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

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

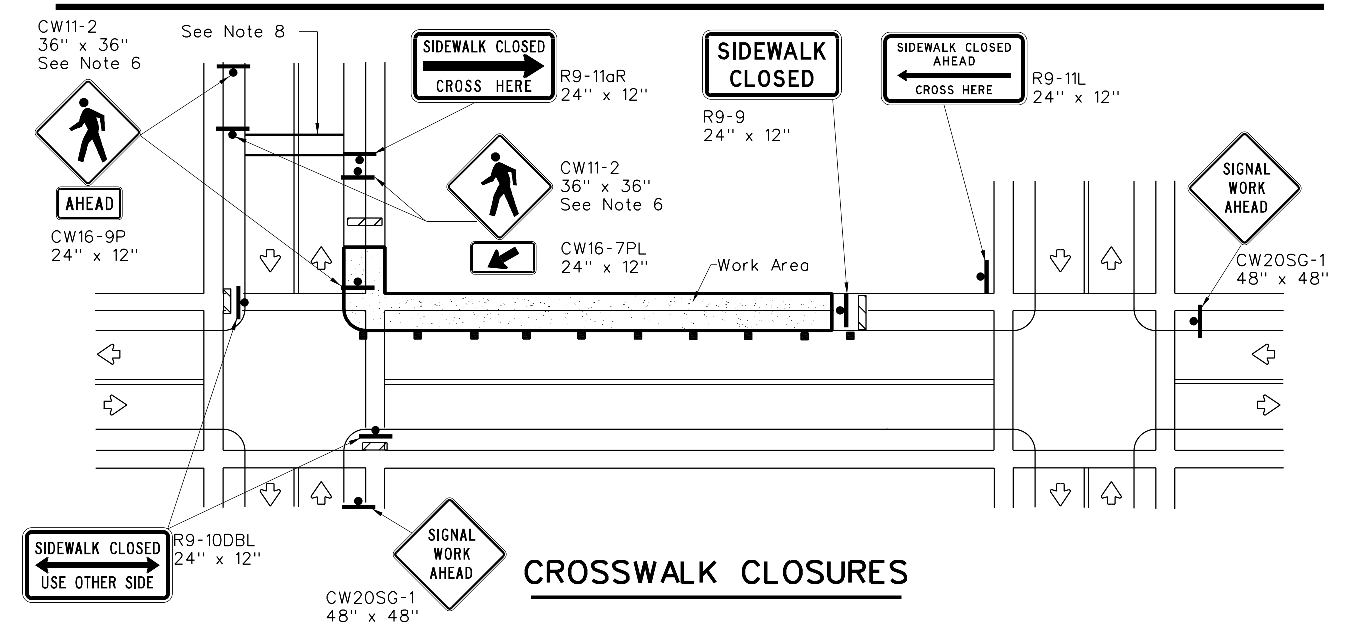
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



SIDEWALK DIVERSION



SIDEWALK DETOUR



CROSSWALK CLOSURES

PEDESTRIAN CONTROL

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

SHEET 2 OF 2

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

WZ(BTS-2)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0700	03	149	SH71
2-98 10-99 7-13 / 4-98 3-03	DIST		COUNTY	SHEET NO.
	AUS		TRAVIS	26

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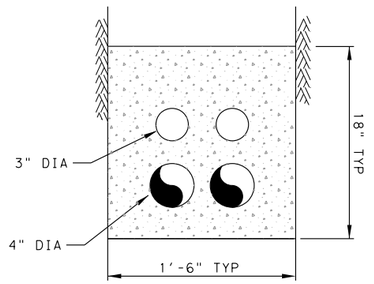
ABBREVIATIONS

BOC:	BACK OF CURB
CAB:	CABINET
CCTV:	CLOSED CIRCUIT TELEVISION
DLS:	DYNAMIC LANE SIGN
DMS:	DYNAMIC MESSAGE SIGN
ELEV:	ELEVATION
EOP:	EDGE OF PAVEMENT
EXIST:	EXISTING
FND:	FOUNDATION
FOC:	FIBER OPTIC CABLE
GB:	GROUND BOX
IA:	INTERMEDIATE AMPLIFIER
LCS:	LANE CONTROL SIGN
MOD:	MODIFIED
PROP:	PROPOSED
RMC:	RIGID METAL CONDUIT
RVSD:	RADAR VEHICLE SENSING DEVICE
SM:	SINGLE MODE
TEMP:	TEMPORARY
UCV:	UNDERGROUND CABLE VAULT

LEGEND

- EXIST TRAFFIC SIGNAL GROUND BOX
- EXIST GROUND BOX
- PROP GROUND BOX TY A W/APRON
- EXIST GB TY 1
- PROP GB TY 1 W/APRON
- PROP GB TY 2 W/APRON
- DB4 DB4 EXIST DUCT BANK
- DB4 DB4 PROP DUCT BANK (TRENCHED)
- DB4 DB4 PROP DUCT BANK (BORED)
- PROP DUCT BANK (RIGID METAL)
- EXIST CONDUIT
- EXIST AERIAL CONDUIT (CITY OF AUSTIN)
- PROP CONDUIT (TRENCH)
- PROP CONDUIT (BORE)
- PROP CONDUIT (AERIAL)
- EXIST ELECTRICAL SERVICE
- PROP ELECTRICAL SERVICE
- EXIST CCTV W/ CAB
- PROP CCTV W/ CAB
- PROP POLE W/ FND
- PROP PEDESTAL POLE
- EXIST DMS
- PROP DMS
- PROP BACK-TO-BACK DMS
- EXIST TRAFFIC SIGNAL CABINET
- PROP CAB W/ FND
- EXIST HUB BUILDING
- PROP RVSD
- PROP WEATHER STATION
- PROP NON-INTRUSIVE PAVEMENT CONDITION/TEMPERATURE SENSOR
- PROP DETECTION ZONE
- PROP LED WRONG WAY SIGN
- PROP LARGE SIGN
- DIRECTION OF TRAFFIC
- RUN NUMBER
- EXIST WOODEN POLE
- PROPOSED WOODEN POLE
- METAL BEAM GUARD FENCE
- PROPOSED FIBER MARKER

DUCT BANK



REFER TO 4 CONDUIT SYSTEM AS
SHOWN IN TXDOT STANDARD ITS(27)-16

NO.	DATE	REVISION	APPROVED

Walter P. Moore and Associates, Inc.
TBPE Firm Registration No. 1856

STATE OF TEXAS
THOMAS D. DUNCAN
98353
LICENSED PROFESSIONAL ENGINEER
05/09/2023

100% SUBMITTAL

Texas Department of Transportation

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No: F-1856

ITS LEGEND

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		27

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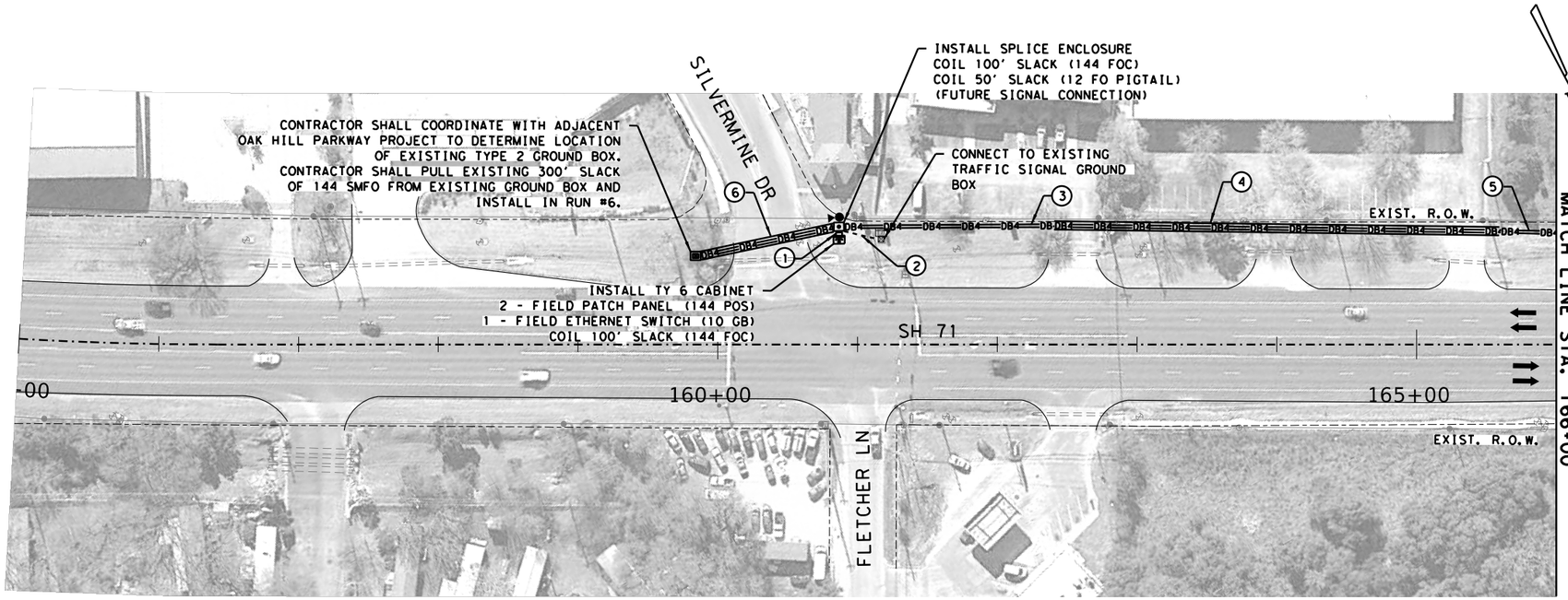
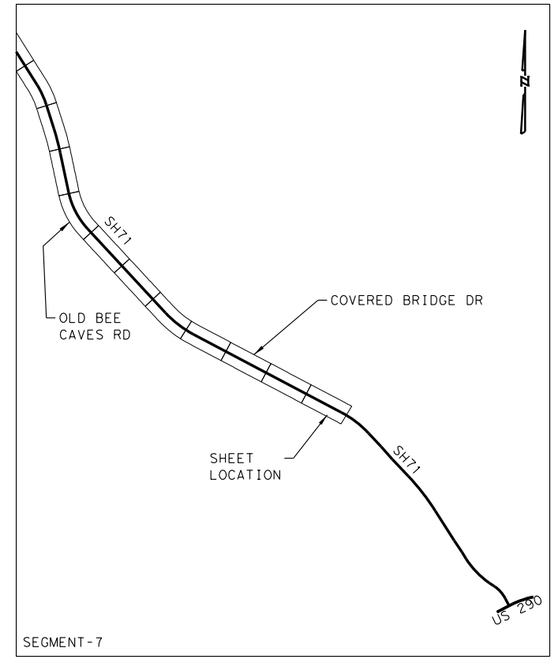
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH71





0 25 50 100 200

SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
618	6023	CONDT (PVC) (SCH 40) (2")	LF	35
618	6031	CONDT (PVC) (SCH 40) (3")(CONC ENCSE)	LF	410
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	860
620	6002	ELEC CONDR (NO.14) INSULATED	LF	670
6007	6011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	85
6007	6017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	730
6007	6021	FIBER OPTIC SPLICE ENCLOSURE	EA	1
6007	6026	FIBER OPTIC CABLE ROAD MARKER	EA	1
6007	6027	FIBER OPTIC PATCH PANEL (144 POSITION)	EA	2
6008	6043	ITS GRND MNT CAB (TY 6) (CONF 2)	EA	1
6016	6008	ITS MULTI-DUCT CND (PVC-40)(CONC ENCSE)	LF	410
6016	6011	ITS MULTI-DUCT CND (PVC-80)(BORE)	LF	860
6027	6008	GROUND BOX (PREPARE)	EA	1
6186	6012	ITS GND BOX (PCAST) TY 2 (366060)W/APRN	EA	1

CONDUIT AND CABLE SCHEDULE

RUN NO.	CONDUIT							CABLE	NUMBER OF CONDUCTORS				RUN NO.
	CONDUIT STATUS	ITEM 618 SIZE / TYPE CONDUIT			ITEM 6016 SIZE / TYPE			CABLE STATUS	ITEM 620	TELECOM CABLE		LENGTH OF RUN	
		TRENCHED		BORED									
		CONDT (PVC) (SCH 40) (2")	CONDT (PVC) (SCH 40) (3")(CONC ENCSE)	CONDT (PVC) (SCH 80) (3") (BORE)	ITS MULTI-DUCT CND (PVC-40) 4" (CONC ENCSE)	ITS MULTI-DUCT CND (PVC-80) 4" (BORE)			NO.14XHHW (INSULATED)	12 - SINGLE MODE FIBER	144 SINGLE MODE FIBER		
1	I		2		2			I	1		1	10	1
2	I	1						I	1	1		35	2
3	I		2		2			I	1		1	155	3
4	I			2		2		I	1		1	325	4
5	I		2		2			I	1		1	40	5
6	I			2		2		I	1			105	6
*SLACK										1		50	*SLACK
**SLACK											1	100	**SLACK
***SLACK											1	100	***SLACK
TOTAL		35	410	860	410	860			670	85	730		TOTAL

STATUS: E = EXISTING : I = INSTALL
* COIL 50' 12 SMFO SLACK FOR SIGNAL INTERCONNECT IN TY 2 GROUND BOX
** COIL 100' 144 SMFO SLACK IN TY 6 CABINET
*** COIL 100' 144 SMFO SLACK IN TY 2 GROUND BOX

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED PROFESSIONAL ENGINEER
Lacey L Hebert, PE
07/11/2023

100% SUBMITTAL

Texas Department of Transportation

ATKINS
TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
ITS LAYOUT SHEETS
(BEGIN TO STA 166+00)

SHEET 01 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		28

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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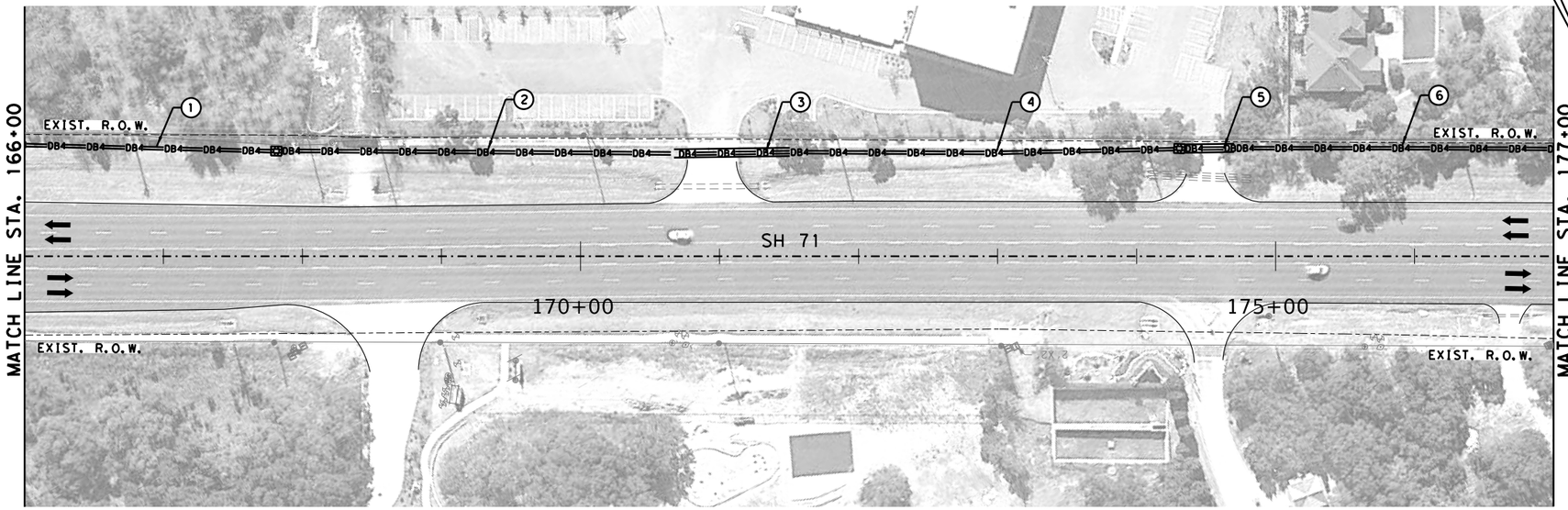

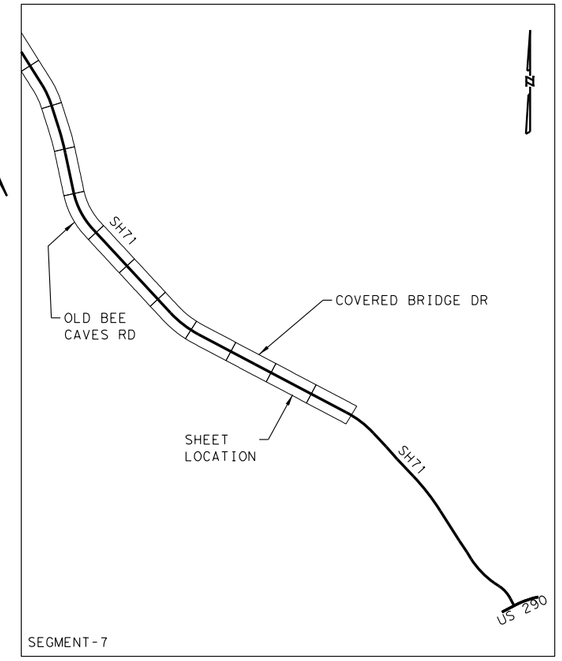

0 25 50 100 200

SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	1990
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	250
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1120
6007	6017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	1120
6016	6008	ITS MULTI-DUCT CND (PVC-40)(CONC ENCSE)	LF	1990
6016	6011	ITS MULTI-DUCT CND (PVC-80)(BORE)	LF	250
6186	6006	ITS GND BOX (PCAST) TY 1 (243660)W/APRN	EA	2

CONDUIT AND CABLE SCHEDULE										
RUN NO.	CONDUIT						NUMBER OF CONDUCTORS			
	CONDUIT STATUS	ITEM 618 SIZE / TYPE		ITEM 6016 SIZE / TYPE		CABLE STATUS	ITEM 620	TELE COM		RUN NO.
		TRENCH	BORED							
		CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDT (PVC) (SCH 80) (3") (BORE)	ITS MULTI-DUCT CND (PVC-40) 4" (CONC ENCSE)	ITS MULTI-DUCT CND (PVC-80) 4" (BORE)		NO. 14XHHW (INSULATED)	144 SINGLE MODE FIBER	LENGTH OF RUN	
1	I	2		2		I	1	1	185	1
2	I	2		2		I	1	1	290	2
3	I		2		2	I	1	1	85	3
4	I	2		2		I	1	1	285	4
5	I		2		2	I	1	1	40	5
6	I	2		2		I	1	1	235	6
TOTAL		1990	250	1990	250		1120	1120		TOTAL

STATUS: E = EXISTING : I = INSTALL

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED
PROFESSIONAL ENGINEER

Lacey L Hebert, PE 07/11/2023

100% SUBMITTAL

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ATKINS TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71

ITS LAYOUT SHEETS
(STA 166+00 TO STA 177+00)

SHEET 02 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		29

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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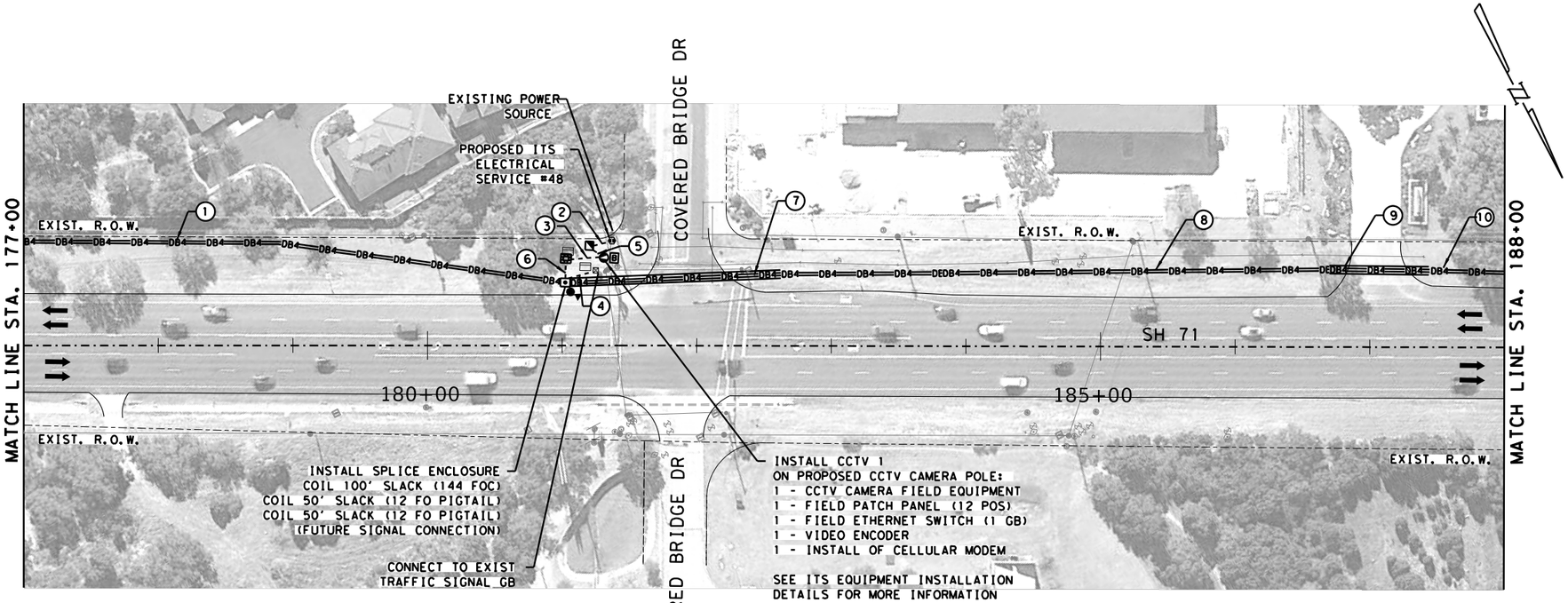

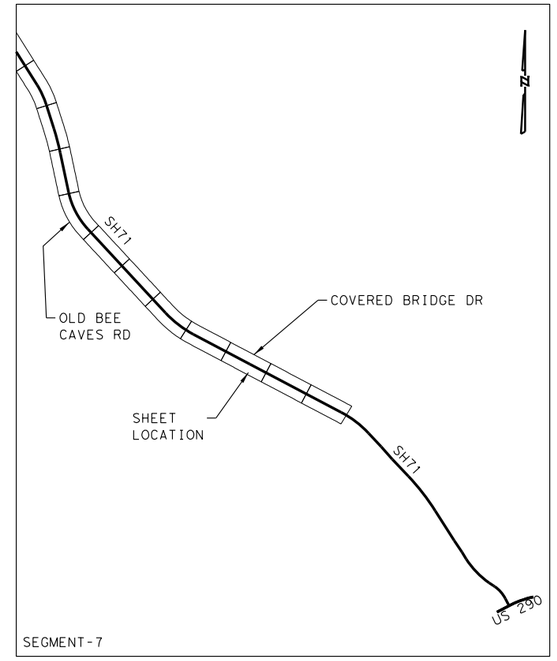

0 25 50 100 200

SCALE: 1"=100'

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED PROFESSIONAL ENGINEER

07/11/2023

Lacey L Hebert, PE

100% SUBMITTAL

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ATKINS
TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 600
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71

ITS LAYOUT SHEETS

(STA 177+00 TO STA 188+00)

SHEET 03 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		30

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

ESTIMATED QUANTITIES TABLE

ITEM	CODE	DESCRIPTION	UNIT	QTY
416	6006	DRILL SHAFT (48 IN)	LF	21
618	6023	CONDT (PVC) (SCH 40) (2")	LF	100
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	1750
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	470
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1175
620	6007	ELEC CONDR (NO.8) BARE	LF	35
620	6008	ELEC CONDR (NO.8) INSULATED	LF	70
624	6002	GROUND BOX TY A (122311)W/APRON	EA	1
628	6131	ELC SRV TY D 120/240 060(NS)GS(N)SP(O)	EA	1
6007	6011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	165
6007	6017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	1210
6007	6021	FIBER OPTIC SPLICE ENCLOSURE	EA	1
6007	6023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA	1
6007	6026	FIBER OPTIC CABLE ROAD MARKER	EA	1
6010	6001	CCTV FIELD EQUIPMENT (ANALOG)	EA	1
6010	6004	CCTV MOUNT (POLE)	EA	1
6016	6008	ITS MULTI-DUCT CND (PVC-40)(CONC ENCSE)	LF	1750
6016	6011	ITS MULTI-DUCT CND (PVC-80)(BORE)	LF	470
6027	6008	GROUND BOX (PREPARE)	EA	1
6064	6055	ITS POLE (60 FT)(90 MPH)	EA	1
6064	6080	ITS POLE MNT CAB (TY 2)(CONF 1)	EA	1
6123	6001	ETHERNET SWITCH (INSTALL ONLY)	EA	1
6124	6001	MPEG 4 VIDEO ENCODER (INSTALL ONLY)	EA	1
6125	6001	TERMINAL SERVER (INSTALL ONLY)	EA	1
6186	6006	ITS GND BOX (PCAST) TY 1 (243660)W/APRN	EA	1
6186	6012	ITS GND BOX (PCAST) TY 2 (366060)W/APRN	EA	1
6247	6005	INSTALL OF CELLULAR MODEM	EA	1
*		TERMINAL SERVER	EA	1
*		VIDEO ENCODER	EA	1
*		ETHERNET SWITCH	EA	1

*INDICATES ITEM WILL BE PAID FOR WITH FORCE ACCOUNT

CONDUIT AND CABLE SCHEDULE

RUN NO.	CONDUIT						CABLE STATUS	NUMBER OF CONDUCTORS						RUN NO.
	CONDUIT STATUS	ITEM 618 SIZE / TYPE CONDUIT			ITEM 6016 SIZE / TYPE			ITEM 620 ELECTRICAL CONDUCTORS			TELECOM CABLE		LENGTH OF RUN	
		TRENCHED		BORED										
		CONDT (PVC) (SCH 40) (2")	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDT (PVC) (SCH 80) (3") (BORE)	ITS MULTI-DUCT CND (PVC-40) 4" (CONC ENCSE)	ITS MULTI-DUCT CND (PVC-80) 4" (BORE)		NO. 8 XHHW (INSULATED) (POWER)	NO. 8 XHHW (BARE) (GROUND)	NO. 14XHHW (INSULATED)	12- SINGLE MODE FIBER	144 SINGLE MODE FIBER		
1	I		2		2		I			1		1	405	1
2	I	1					I	2	1				20	2
3	I	1					I			1	1		30	3
4	I	1					I			1	1		20	4
5	I	1					I	2	1				15	5
6	I	1					I			1	1		15	6
7	I			2		2	I			1		1	160	7
8	I		2		2		I			1		1	410	8
9	I			2		2	I			1		1	75	9
10	I		2		2		I			1		1	60	10
*SLACK							I				1		50	*SLACK
**SLACK							I				1		50	**SLACK
***SLACK							I					1	100	***SLACK
TOTAL		100	1750	470	1750	470		70	35	1175	165	1210		TOTAL

STATUS: E = EXISTING : I = INSTALL
* COIL 50' 12 SMFO SLACK FOR SIGNAL INTERCONNECT IN TY 2 GROUND BOX
** COIL 50' 12 SMFO SLACK FOR ITS POLE IN TY 2 GROUND BOX
*** COIL 100' 144 SMFO SLACK IN TY 2 GROUND BOX

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

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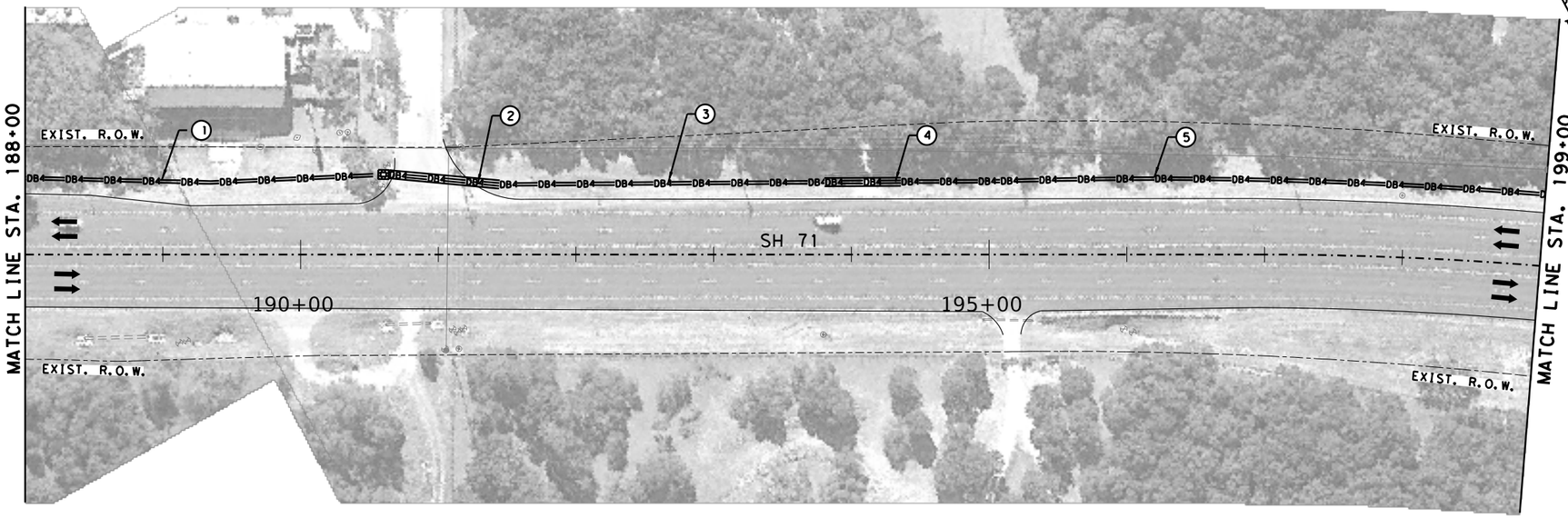

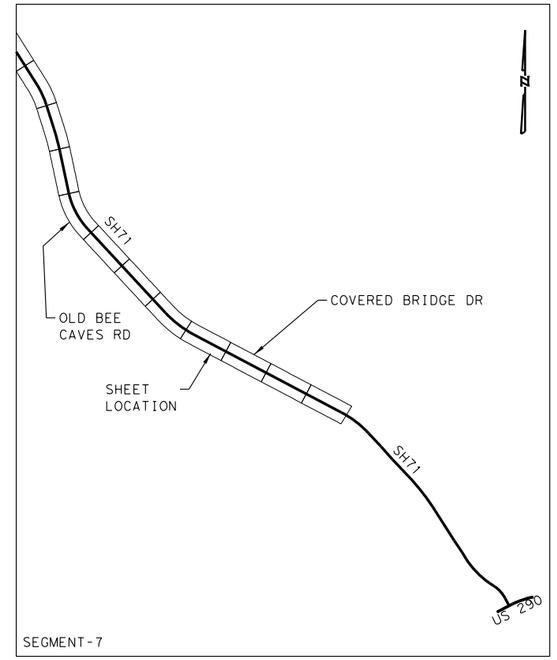

0 25 50 100 200

SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	1960
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	300
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1130
6007	6017	FIBER OPTIC CBL (SNGLE-MODE) (144 FIBER)	LF	1130
6016	6008	ITS MULTI-DUCT CND (PVC-40) (CONC ENCSE)	LF	1960
6016	6011	ITS MULTI-DUCT CND (PVC-80) (BORE)	LF	300
6186	6006	ITS GND BOX (PCAST) TY 1 (243660) W/APRN	EA	1

CONDUIT AND CABLE SCHEDULE											
RUN NO.	CONDUIT						CONDUCTORS				
	CONDUIT STATUS	ITEM 618 SIZE / TYPE CONDUIT		ITEM 6016 SIZE / TYPE		CABLE STATUS	ITEM 620	TELE COM	LENGTH OF RUN	RUN NO.
		TRENCH	BORED							
		CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDT (PVC) (SCH 80) (3") (BORE)	ITS MULTI-DUCT CND (PVC-40) 4" (CONC ENCSE)	ITS MULTI-DUCT CND (PVC-80) 4" (BORE)		NO. 14XHHW (INSULATED)	144 SINGLE MODE FIBER		
1	I	2		2		I	1	1	265	1
2	I		2		2	I	1	1	90	2
3	I	2		2		I	1	1	240	3
4	I		2		2	I	1	1	60	4
5	I	2		2		I	1	1	475	5
TOTAL		1960	300	1960	300		1130	1130		TOTAL

STATUS: E = EXISTING : I = INSTALL

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED PROFESSIONAL ENGINEER
07/11/2023
Lacey L Hebert, PE

100% SUBMITTAL

® 2023
Texas Department of Transportation

ATKINS
TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
ITS LAYOUT SHEETS
(STA 188+00 TO STA 199+00)

SHEET 04 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		31

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

DATE: 7/11/2023
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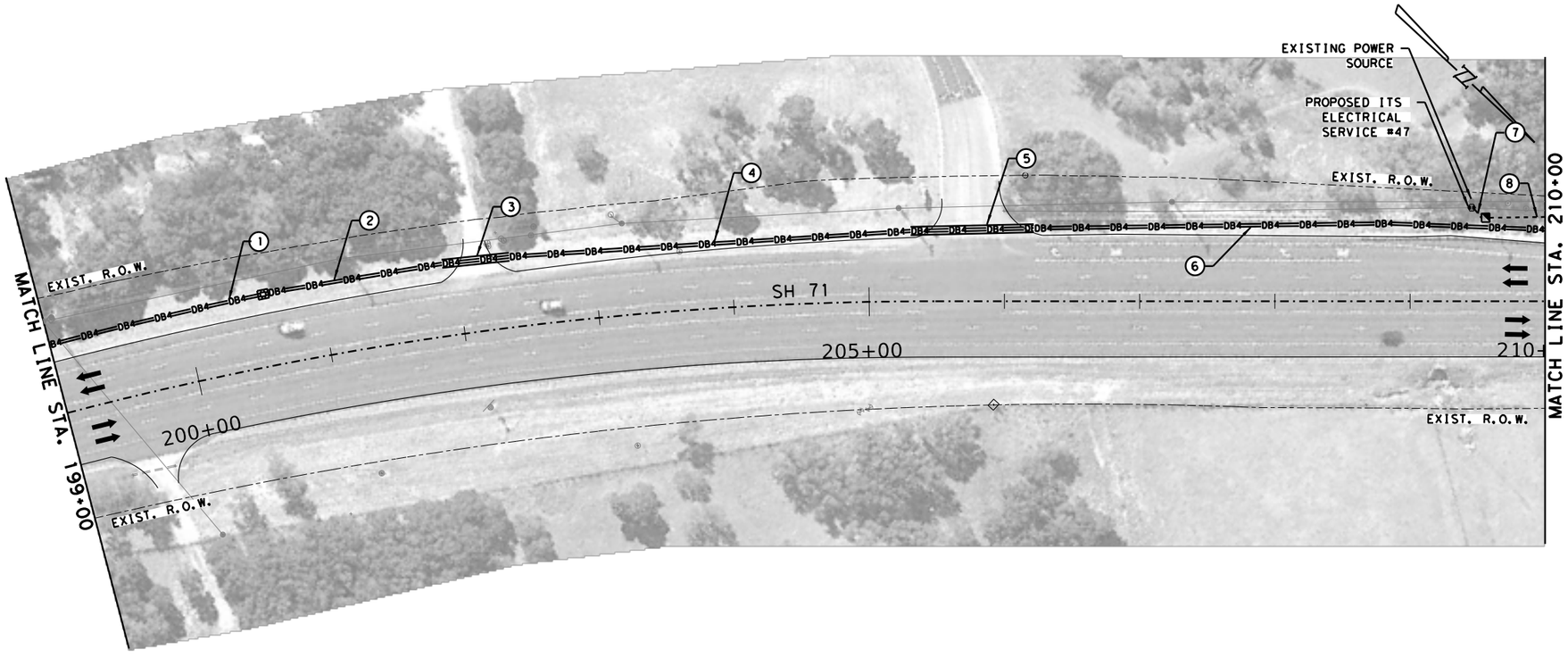

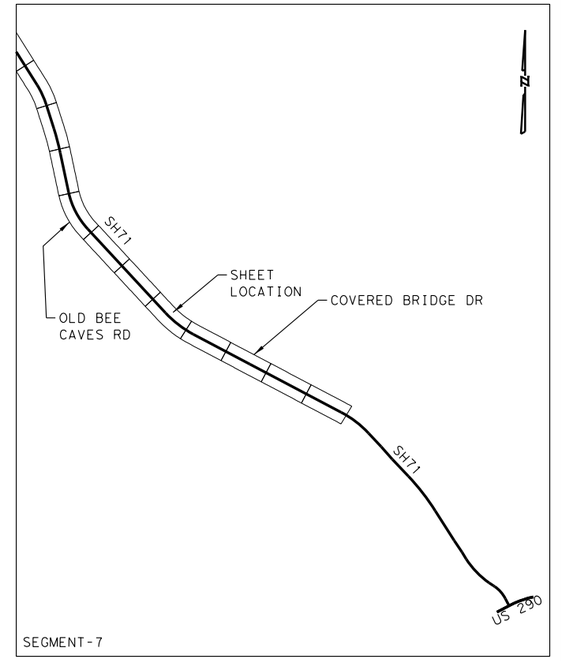

0 25 50 100 200

SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
618	6023	CONDT (PVC) (SCH 40) (2")	LF	65
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	1710
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	290
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1000
620	6007	ELEC CONDR (NO.8) BARE	LF	65
620	6008	ELEC CONDR (NO.8) INSULATED	LF	130
624	6002	GROUND BOX TY A (122311)W/APRON	EA	1
628	6131	ELC SRV TY D 120/240 060(NS)GS(N)SP(O)	EA	1
6007	6017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	1000
6016	6008	ITS MULTI-DUCT CND (PVC-40)(CONC ENCSE)	LF	1710
6016	6011	ITS MULTI-DUCT CND (PVC-80)(BORE)	LF	290
6186	6006	ITS GND BOX (PCAST) TY 1 (243660)W/APRN	EA	1

CONDUIT AND CABLE SCHEDULE													
	CONDUIT							CONDUCTORS					
		ITEM 618 SIZE / TYPE CONDUIT			ITEM 6016 SIZE / TYPE			ITEM 620 ELECTRICAL CONDUCTORS			TELE COM		
		TRENCHED		BORED									
RUN NO.	CONDUIT STATUS	CONDT (PVC) (SCH 40) (2")	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDT (PVC) (SCH 80) (3") (BORE)	ITS MULTI-DUCT CND (PVC-40) 4" (CONC ENCSE)	ITS MULTI-DUCT CND (PVC-80) 4" (BORE)	CABLE STATUS	NO. 8 XHHW (INSULATED) (POWER)	NO. 8 XHHW (BARE) (GROUND)	NO. 14XHHW (INSULATED)	144 SINGLE MODE FIBER	LENGTH OF RUN	RUN NO.
1	I		2		2		I			1	1	170	1
2	I		2		2		I			1	1	140	2
3	I			2		2	I			1	1	50	3
4	I		2		2		I			1	1	300	4
5	I			2		2	I			1	1	95	5
6	I		2		2		I			1	1	385	6
7	I	1					I	2	1			15	7
8	I	1					I	2	1			50	8
TOTAL		65	1710	290	1710	290		130	65	1000	1000		TOTAL

STATUS: E = EXISTING : I = INSTALL

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED
PROFESSIONAL ENGINEER

Lacey L Hebert, PE 07/11/2023

100% SUBMITTAL

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ATKINS TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71

ITS LAYOUT SHEETS
(STA 199+00 TO STA 210+00)

SHEET 05 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		32

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

DATE: 7/11/2023
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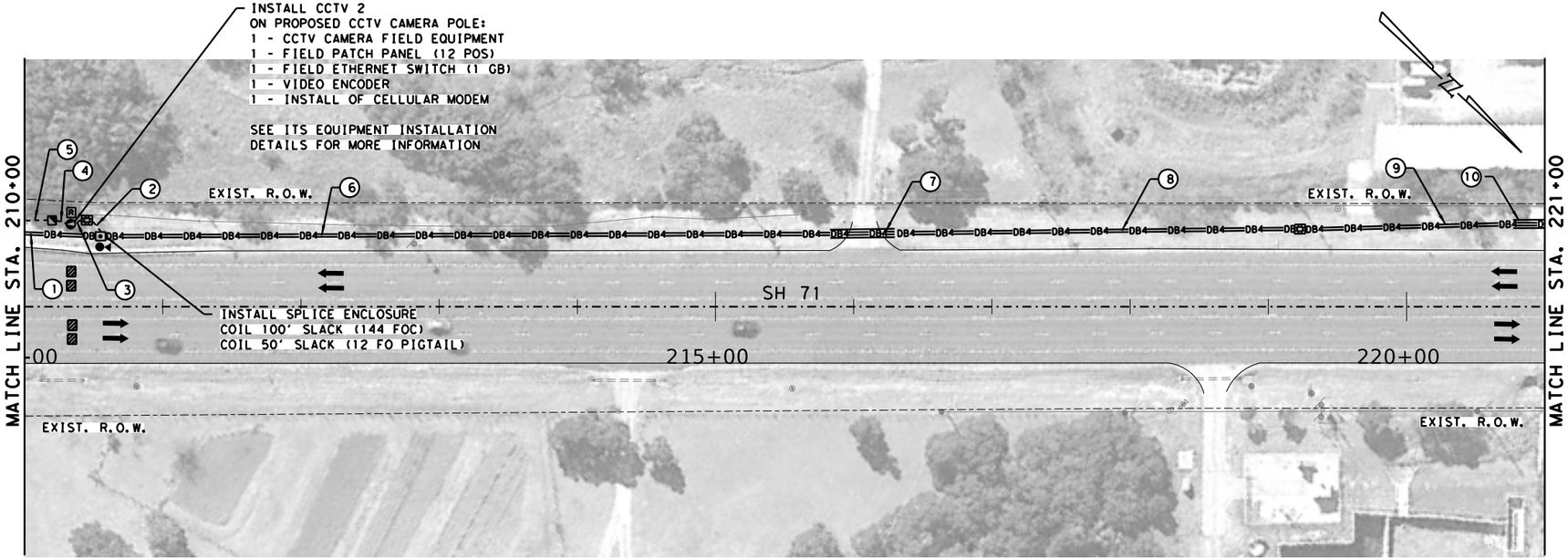

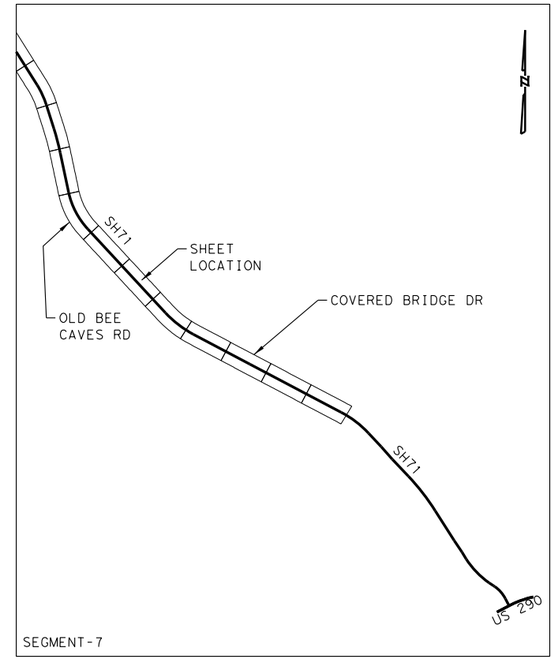

0 25 50 100 200

SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
416	6006	DRILL SHAFT (48 IN)	LF	21
618	6023	CONDT (PVC) (SCH 40) (2")	LF	75
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	2060
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	150
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1140
620	6007	ELEC CONDR (NO.8) BARE	LF	40
620	6008	ELEC CONDR (NO.8) INSULATED	LF	80
624	6002	GROUND BOX TY A (122311)W/APRON	EA	1
6007	6011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	85
6007	6017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	1205
6007	6021	FIBER OPTIC SPLICE ENCLOSURE	EA	1
6007	6023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA	1
6007	6026	FIBER OPTIC CABLE ROAD MARKER	EA	1
6010	6001	CCTV FIELD EQUIPMENT (ANALOG)	EA	1
6010	6004	CCTV MOUNT (POLE)	EA	1
6016	6008	ITS MULTI-DUCT CND (PVC-40)(CONC ENCSE)	LF	2060
6016	6011	ITS MULTI-DUCT CND (PVC-80)(BORE)	LF	150
6064	6055	ITS POLE (60 FT)(90 MPH)	EA	1
6064	6080	ITS POLE MNT CAB (TY 2)(CONF 1)	EA	1
6123	6001	ETHERNET SWITCH (INSTALL ONLY)	EA	1
6124	6001	MPEG 4 VIDEO ENCODER (INSTALL ONLY)	EA	1
6125	6001	TERMINAL SERVER (INSTALL ONLY)	EA	1
6186	6006	ITS GND BOX (PCAST) TY 1 (243660)W/APRN	EA	2
6186	6012	ITS GND BOX (PCAST) TY 2 (366060)W/APRN	EA	1
6247	6005	INSTALL OF CELLULAR MODEM	EA	1
*		TERMINAL SERVER	EA	1
*		VIDEO ENCODER	EA	1
*		ETHERNET SWITCH	EA	1

*INDICATES ITEM WILL BE PAID FOR WITH FORCE ACCOUNT

CONDUIT AND CABLE SCHEDULE														
RUN NO.	CONDUIT						CABLE	NUMBER OF CONDUCTORS					LENGTH OF RUN	RUN NO.
	CONDUIT STATUS	ITEM 618 SIZE / TYPE CONDUIT			ITEM 6016 SIZE / TYPE		CABLE STATUS	ITEM 620 ELECTRICAL CONDUCTORS			TELECOM CABLE			
		TRENCHED		BORED										
		CONDT (PVC) (SCH 40) (2")	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDT (PVC) (SCH 80) (3") (BORE)	ITS MULTI-DUCT CND (PVC-40) 4" (CONC ENCSE)	ITS MULTI-DUCT CND (PVC-80) 4" (BORE)		NO. 8 XHHW (INSULATED) (POWER)	NO. 8 XHHW (BARE) (GROUND)	NO. 14XHHW (INSULATED)	12 - SINGLE MODE FIBER	144 SINGLE MODE FIBER		
1	I		2		2		I			1		1	55	1
2	I	1					I			1	1		20	2
3	I	1					I			1	1		15	3
4	I	1					I	2	1				15	4
5	I	1					I	2	1				25	5
6	I		2		2		I			1		1	530	6
7	I			2		2	I			1		1	50	7
8	I		2		2		I			1		1	290	8
9	I		2		2		I			1		1	155	9
10	I			2		2	I			1		1	25	10
**SLACK							I				1		50	**SLACK
***SLACK							I					1	100	***SLACK
TOTAL		75	2060	150	2060	150		80	40	1140	85	1205		TOTAL

STATUS: E = EXISTING : I = INSTALL
** COIL 50' 12 SMFO SLACK FOR ITS POLE IN TY 2 GROUND BOX
*** COIL 100' 144 SMFO SLACK IN TY 2 GROUND BOX

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED PROFESSIONAL ENGINEER
Lacey L Hebert, PE
07/11/2023

100% SUBMITTAL

Texas Department of Transportation

ATKINS
TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
ITS LAYOUT SHEETS
(STA 210+00 TO STA 221+00)

SHEET 06 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		33

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

DATE: 7/11/2023
FILE: 0100SH71_06.dgn
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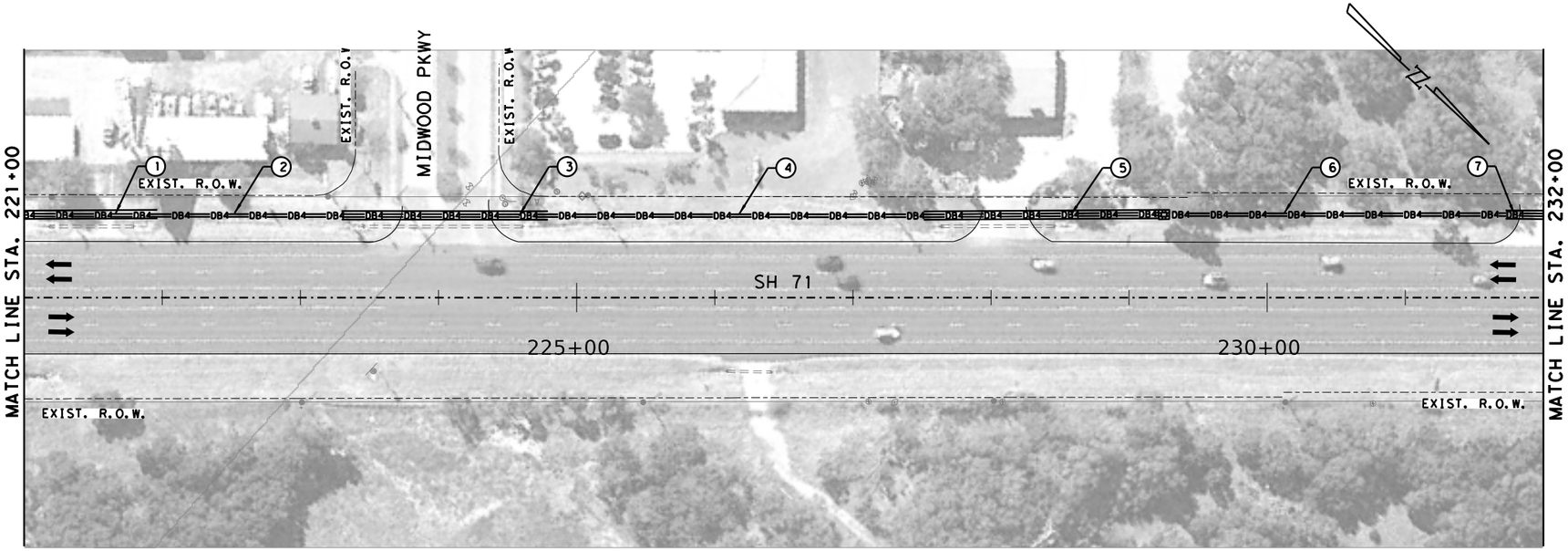

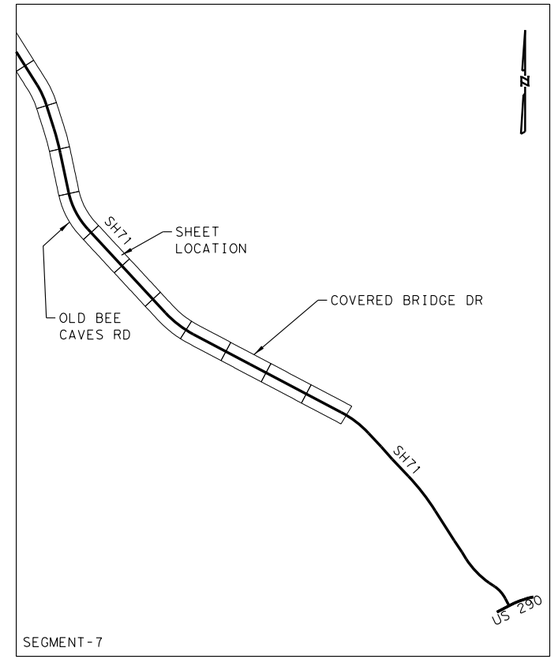

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SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	1320
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	910
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1115
6007	6017	FIBER OPTIC CBL (SNGLE-MODE) (144 FIBER)	LF	1115
6016	6008	ITS MULTI-DUCT CND (PVC-40) (CONC ENCSE)	LF	1320
6016	6011	ITS MULTI-DUCT CND (PVC-80) (BORE)	LF	910
6186	6006	ITS GND BOX (PCAST) TY 1 (243660) W/APRN	EA	1

CONDUIT AND CABLE SCHEDULE										
RUN NO.	CONDUIT					CABLE	NUMBER OF CONDUCTORS			RUN NO.
	CONDUIT STATUS	ITEM 618 SIZE / TYPE CONDUIT		ITEM 6016 SIZE / TYPE		CABLE STATUS	ITEM 620	TELE COM	LENGTH OF RUN	
		TRENCH	BORED	ITS MULTI-DUCT CND (PVC-40) 4" (CONC ENCSE)	ITS MULTI-DUCT CND (PVC-80) 4" (BORE)		NO. 14XHHW (INSULATED)	144 SINGLE MODE FIBER		
		CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDT (PVC) (SCH 80) (3") (BORE)							
1	I		2		2	I	1	1	100	1
2	I	2		2		I	1	1	135	2
3	I		2		2	I	1	1	150	3
4	I	2		2		I	1	1	275	4
5	I		2		2	I	1	1	175	5
6	I	2		2		I	1	1	250	6
7	I		2		2	I	1	1	30	7
TOTAL		1320	910	1320	910		1115	1115		TOTAL

STATUS: E = EXISTING : I = INSTALL

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED
PROFESSIONAL ENGINEER
07/11/2023
Lacey L Hebert, PE

100% SUBMITTAL

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ATKINS
TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
ITS LAYOUT SHEETS
(STA 221+00 TO STA 232+00)

SHEET 07 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		34

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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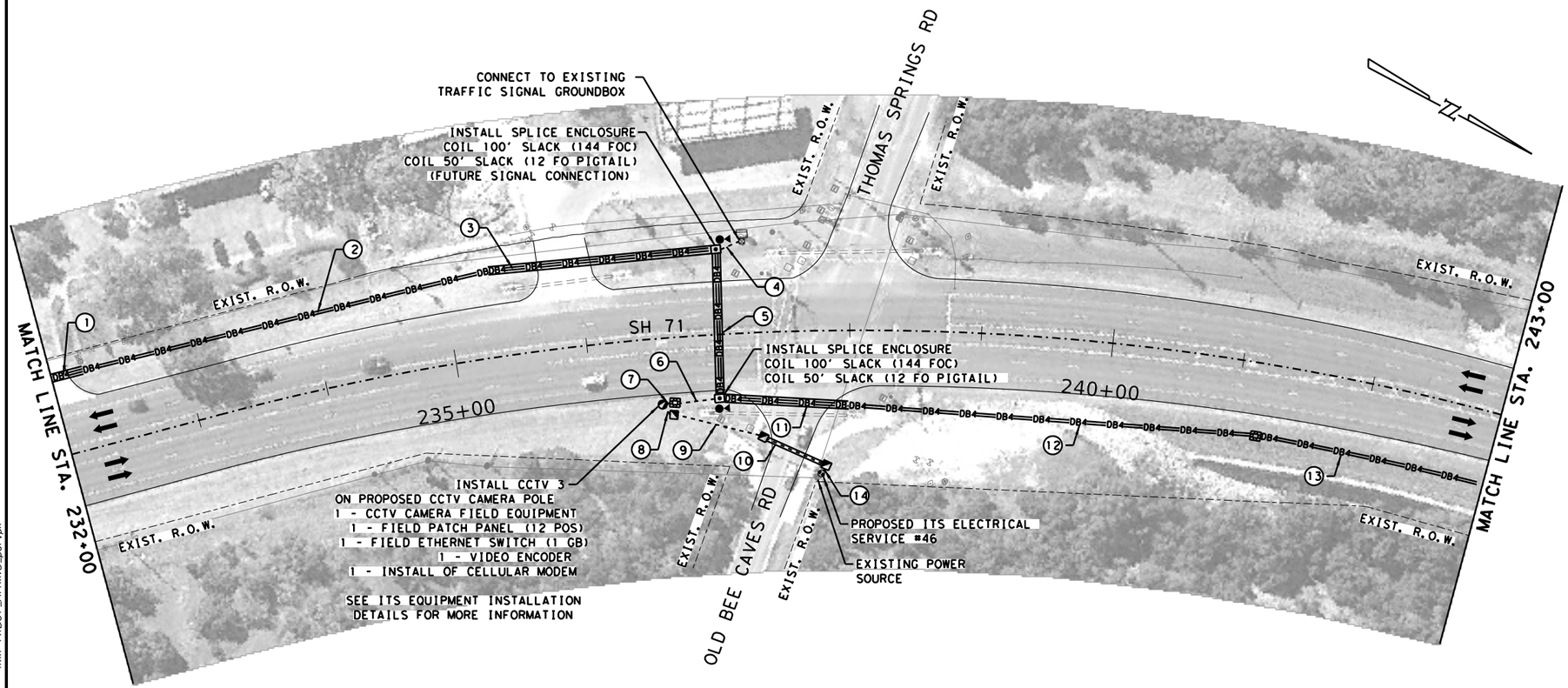

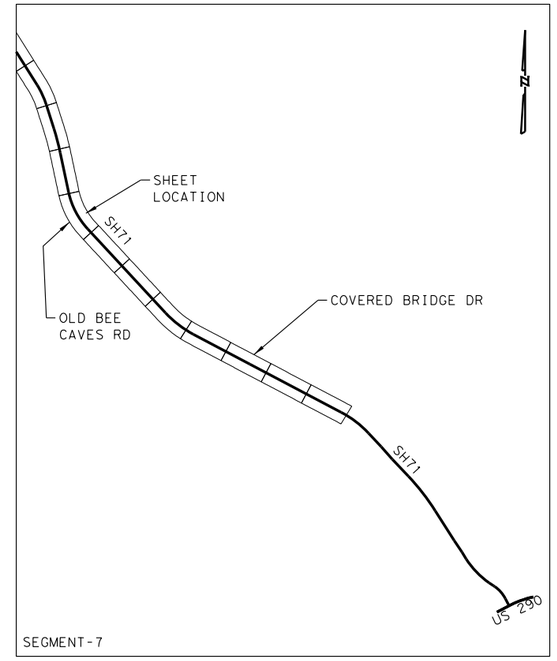

0 25 50 100 200

SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
416	6006	DRILL SHAFT (48 IN)	LF	21
618	6023	CONDT (PVC) (SCH 40) (2")	LF	165
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	1620
618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	55
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	840
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1300
620	6009	ELEC CONDR (NO.6) BARE	LF	150
620	6010	ELEC CONDR (NO.6) INSULATED	LF	300
624	6002	GROUND BOX TY A (122311)W/APRON	EA	3
628	6131	ELC SRV TY D 120/240 060(NS)GS(N)SP(O)	EA	1
6007	6011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	170
6007	6017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	1430
6007	6021	FIBER OPTIC SPLICE ENCLOSURE	EA	2
6007	6023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA	1
6007	6026	FIBER OPTIC CABLE ROAD MARKER	EA	2
6010	6001	CCTV FIELD EQUIPMENT (ANALOG)	EA	1
6010	6004	CCTV MOUNT (POLE)	EA	1
6016	6008	ITS MULTI-DUCT CND (PVC-40)(CONC ENCSE)	LF	1620
6016	6011	ITS MULTI-DUCT CND (PVC-80)(BORE)	LF	840
6027	6008	GROUND BOX (PREPARE)	EA	1
6064	6055	ITS POLE (60 FT)(90 MPH)	EA	1
6064	6080	ITS POLE MNT CAB (TY 2)(CONF 1)	EA	1
6123	6001	ETHERNET SWITCH (INSTALL ONLY)	EA	1
6124	6001	MPEG 4 VIDEO ENCODER (INSTALL ONLY)	EA	1
6125	6001	TERMINAL SERVER (INSTALL ONLY)	EA	1
6186	6006	ITS GND BOX (PCAST) TY 1 (243660)W/APRN	EA	2
6186	6012	ITS GND BOX (PCAST) TY 2 (366060)W/APRN	EA	2
6247	6005	INSTALL OF CELLULAR MODEM	EA	1
*		TERMINAL SERVER	EA	1
*		VIDEO ENCODER	EA	1
*		ETHERNET SWITCH	EA	1

*INDICATES ITEM WILL BE PAID FOR WITH FORCE ACCOUNT

CONDUIT AND CABLE SCHEDULE																
	CONDUIT								NUMBER OF CONDUCTORS							
		ITEM 618 SIZE / TYPE CONDUIT				ITEM 6016 SIZE / TYPE			ITEM 620 ELECTRICAL CONDUCTORS			TELECOM CABLE				
		TRENCHED		BORED												
RUN NO.	CONDUIT STATUS	CONDT (PVC) (SCH 40) (2")	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDT (PVC) (SCH 80) (2") (BORE)	CONDT (PVC) (SCH 80) (3") (BORE)	ITS MULTI-DUCT CND (PVC-40) 4" (CONC ENCSE)	ITS MULTI-DUCT CND (PVC-80) 4" (BORE)	CABLE STATUS	NO. 6 XHHW (INSULATED) (POWER)	NO. 6 XHHW (BARE) (GROUND)	NO. 14XHHW (INSULATED)	12 - SINGLE MODE FIBER	144 SINGLE MODE FIBER	LENGTH OF RUN	RUN NO.
1	I				2		2	I			1		1	30	1
2	I		2			2		I			1		1	320	2
3	I				2		2	I			1		1	175	3
4	I	1						I			1	1		25	4
5	I				2		2	I			1		1	115	5
6	I	1						I			1	1		35	6
7	I	1						I			1	1		10	7
8	I	1						I	2	1				15	8
9	I	1						I	2	1				70	9
10	I			1				I	2	1				55	10
11	I				2		2	I			1		1	100	11
12	I		2			2		I			1		1	310	12
13	I		2			2		I			1		1	180	13
14	I	1						I	2	1				10	14
*SLACK								I				1		50	*SLACK
**SLACK								I				1		50	**SLACK
***SLACK								I					2	100	***SLACK
TOTAL		165	1620	55	840	1620	840		300	150	1300	170	1430		TOTAL

STATUS: E = EXISTING : I = INSTALL
* COIL 50' 12 SMFO SLACK FOR SIGNAL INTERCONNECT IN TY 2 GROUND BOX
** COIL 50' 12 SMFO SLACK FOR ITS POLE IN TY 2 GROUND BOX
*** COIL 100' 144 SMFO SLACK IN TY 2 GROUND BOX

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED
PROFESSIONAL ENGINEER

Lacey L Hebert, PE 07/11/2023

100% SUBMITTAL

Texas Department of Transportation

ATKINS
TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
ITS LAYOUT SHEETS
(STA 232+00 TO STA 243+00)

SHEET 08 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		35

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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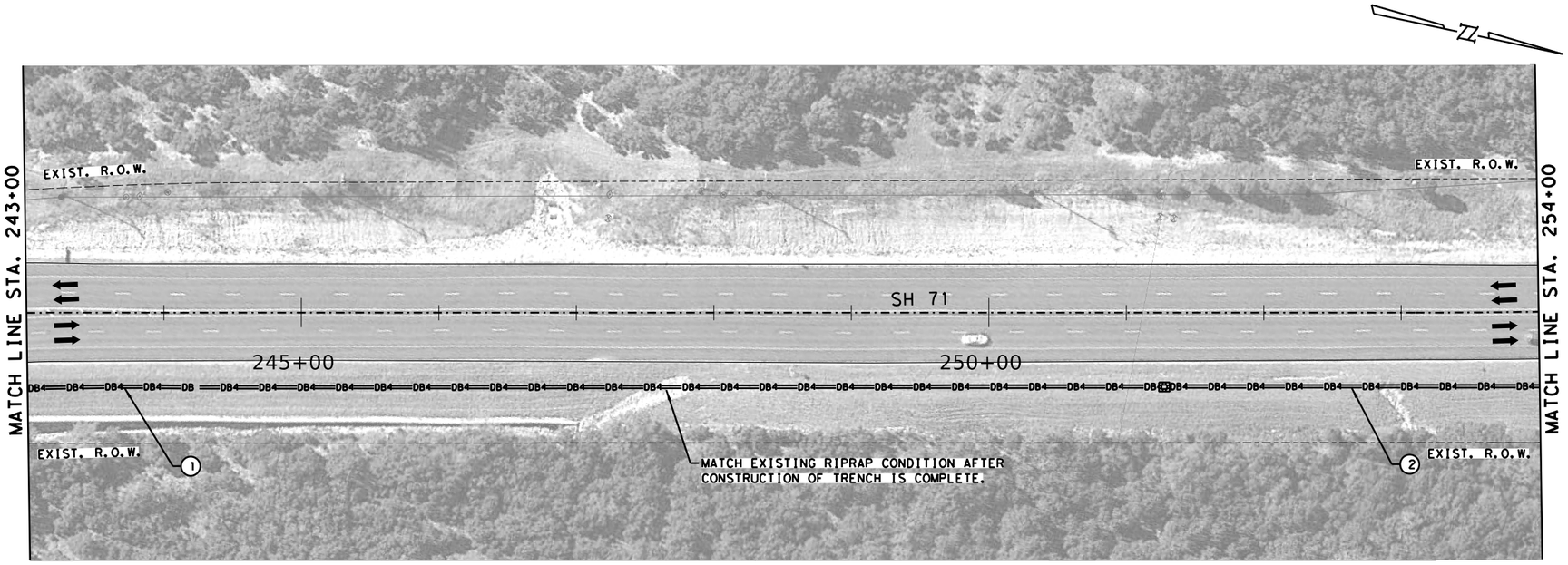

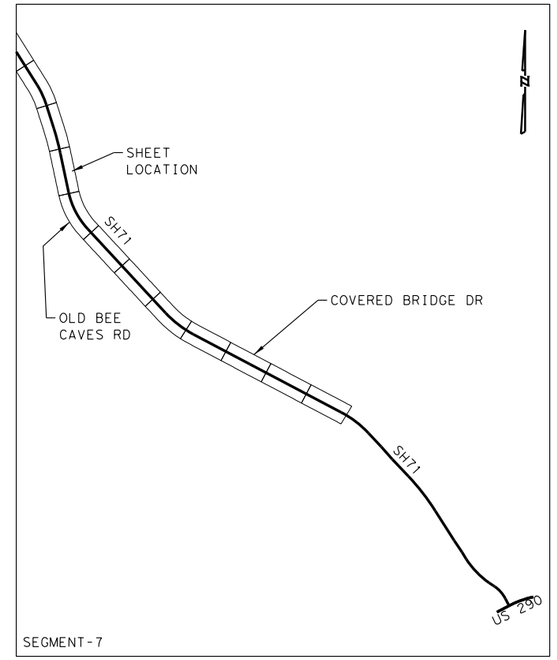

0 25 50 100 200

SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	2200
620	6002	ELEC CONDR (NO. 14) INSULATED	LF	1100
6007	6017	FIBER OPTIC CBL (SNGLE-MODE) (144 FIBER)	LF	1100
6016	6008	ITS MULTI-DUCT CND (PVC-40) (CONC ENCSE)	LF	2200
6186	6006	ITS GND BOX (PCAST) TY 1 (243660) W/APRN	EA	1

CONDUIT AND CABLE SCHEDULE								
RUN NO.	CONDUIT			CONDUCTORS				RUN NO.
	CONDUIT STATUS	ITEM 618 SIZE / TY TRENCH: CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	ITEM 6016 SIZE / : ITS MULTI-DUCT CND (PVC-40) 4" (CONC ENCSE)	CABLE STATUS	ITEM 620: NO. 14XHHW (INSULATED)	TELE COM: 144 SINGLE MODE FIBER	LENGTH OF RUN	
1	I	2	2	I	1	1	825	1
2	I	2	2	I	1	1	275	2
TOTAL		2200	2200		1100	1100		TOTAL

STATUS: E = EXISTING : I = INSTALL

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS — LACEY L. HEBERT — 134840 — LICENSED PROFESSIONAL ENGINEER

Lacey L Hebert, PE 07/11/2023

100% SUBMITTAL

Texas Department of Transportation

ATKINS TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71

ITS LAYOUT SHEETS

(STA 243+00 TO STA 254+00)

SHEET 09 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		36

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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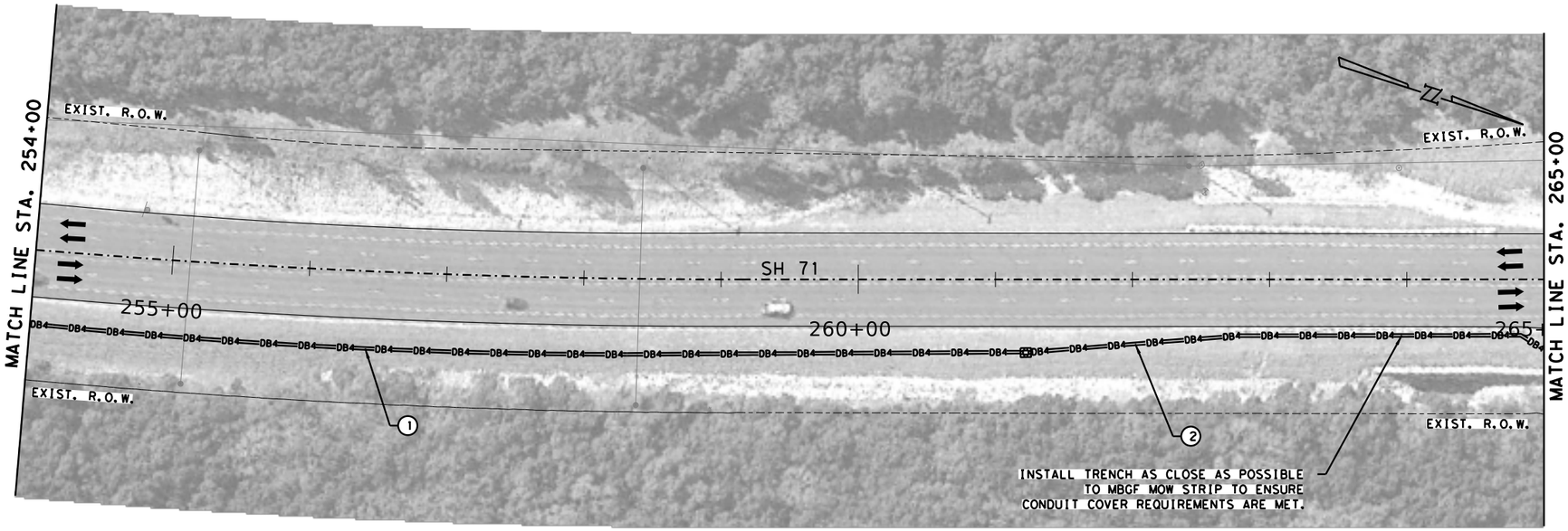

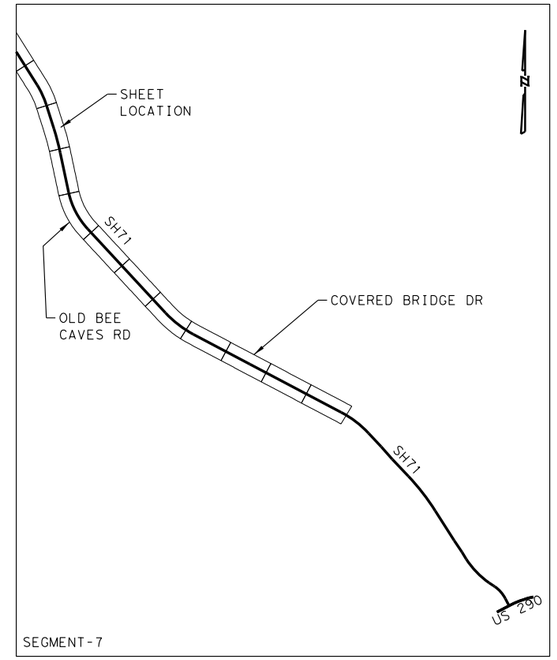

0 25 50 100 200

SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
618	6031	CONDT (PVC) (SCH 40) (3")(CONC ENCSE)	LF	2220
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1110
6007	6017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	1110
6016	6008	ITS MULTI-DUCT CND (PVC-40)(CONC ENCSE)	LF	2220
6186	6006	ITS GND BOX (PCAST) TY 1 (243660)W/APRN	EA	1

CONDUIT AND CABLE SCHEDULE

RUN NO.	CONDUIT			CABLE	NUMBER OF CONDUCTORS			RUN NO.
	CONDUIT STATUS	ITEM 618 SIZE / TY TRENCH: CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	ITEM 6016 SIZE / TY: ITS MULTI-DUCT CND (PVC-40) 4" (CONC ENCSE)	CABLE STATUS	ITEM 620: NO. 14XHHW (INSULATED)	TELECOM CABLE: 144 SINGLE MODE FIBER	LENGTH OF RUN	
1	I	2	2	I	1	1	730	1
2	I	2	2	I	1	1	380	2
TOTAL		2220	2220		1110	1110		TOTAL

STATUS: E = EXISTING : I = INSTALL

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED
PROFESSIONAL ENGINEER
07/11/2023
Lacey L Hebert, PE

100% SUBMITTAL

Texas Department of Transportation

ATKINS
TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
ITS LAYOUT SHEETS
(STA 254+00 TO STA 265+00)

SHEET 10 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		37

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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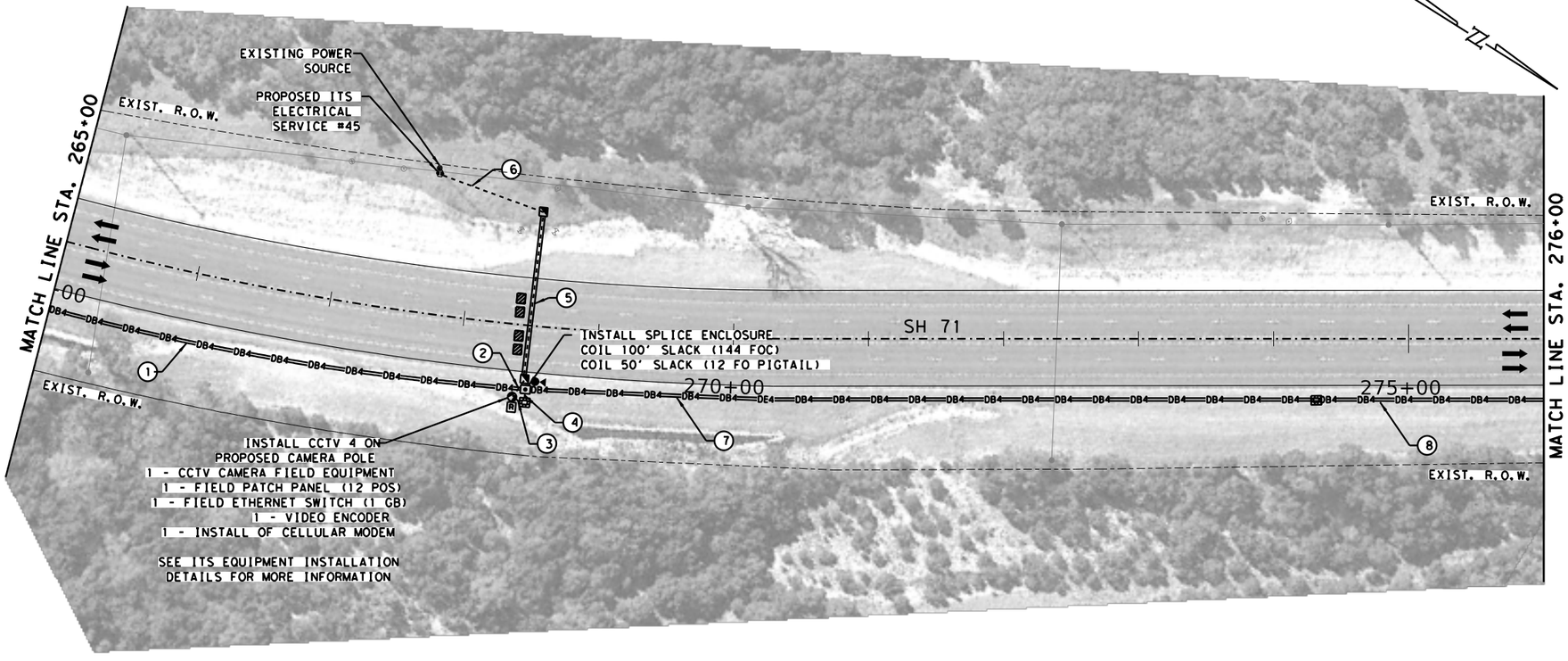

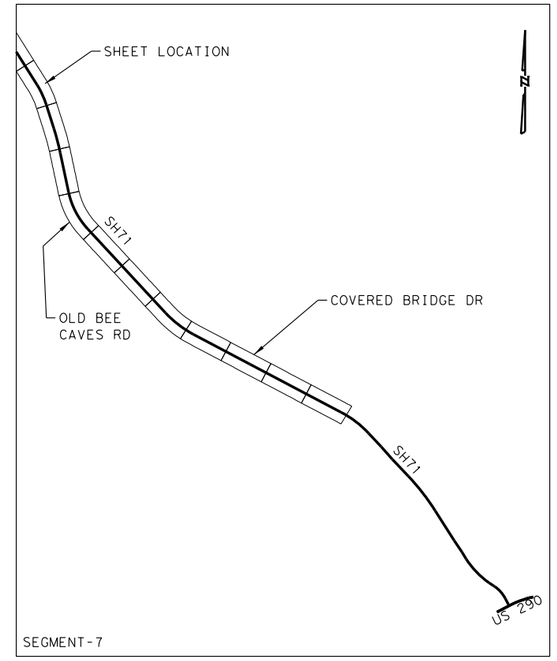

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SCALE: 1"=100'

NO.	DATE	REVISION	APPROVED

ESTIMATED QUANTITIES TABLE

ITEM	CODE	DESCRIPTION	UNIT	QTY
416	6006	DRILL SHAFT (48 IN)	LF	21
618	6023	CONDT (PVC) (SCH 40) (2")	LF	130
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	2240
618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	125
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1145
620	6011	ELEC CONDR (NO.4) BARE	LF	230
620	6012	ELEC CONDR (NO.4) INSULATED	LF	460
624	6002	GROUND BOX TY A (122311)W/APRON	EA	2
628	6131	ELC SRV TY D 120/240 060(NS)GS(N)SP(O)	EA	1
6007	6011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	75
6007	6017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	1220
6007	6021	FIBER OPTIC SPLICE ENCLOSURE	EA	1
6007	6023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA	1
6007	6026	FIBER OPTIC CABLE ROAD MARKER	EA	1
6010	6001	CCTV FIELD EQUIPMENT (ANALOG)	EA	1
6010	6004	CCTV MOUNT (POLE)	EA	1
6016	6008	ITS MULTI-DUCT CND (PVC-40)(CONC ENCSE)	LF	2240
6064	6055	ITS POLE (60 FT)(90 MPH)	EA	1
6064	6080	ITS POLE MNT CAB (TY 2)(CONF 1)	EA	1
6123	6001	ETHERNET SWITCH (INSTALL ONLY)	EA	1
6124	6001	MPEG 4 VIDEO ENCODER (INSTALL ONLY)	EA	1
6125	6001	TERMINAL SERVER (INSTALL ONLY)	EA	1
6186	6006	ITS GND BOX (PCAST) TY 1 (243660)W/APRN	EA	2
6186	6012	ITS GND BOX (PCAST) TY 2 (366060)W/APRN	EA	1
6247	6005	INSTALL OF CELLULAR MODEM	EA	1
*		TERMINAL SERVER	EA	1
*		VIDEO ENCODER	EA	1
*		ETHERNET SWITCH	EA	1

*INDICATES ITEM WILL BE PAID FOR WITH FORCE ACCOUNT

CONDUIT AND CABLE SCHEDULE

RUN NO.	CONDUIT					CABLE	NUMBER OF CONDUCTORS						RUN NO.
	CONDUIT STATUS	ITEM 618 SIZE / TYPE CONDUIT			ITEM 6016 SIZE /	CABLE STATUS	ITEM 620 ELECTRICAL CONDUCTORS			TELECOM CABLE		LENGTH OF RUN	
		TRENCHED		BORED			NO. 4 XHHW (INSULATED) (POWER)	NO. 4 XHHW (BARE) (GROUND)	NO. 14XHHW (INSULATED)	12 - SINGLE MODE FIBER	144 SINGLE MODE FIBER		
		CONDT (PVC) (SCH 40) (2")	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDT (PVC) (SCH 80) (2") (BORE)	ITS MULTI-DUCT CND (PVC-40) 4" (CONC ENCSE)								
1	I		2		2	I			1		1	360	1
2	I	1				I	2	1				20	2
3	I	1				I			1	1		15	3
4	I	1				I			1	1		10	4
5	I			1		I	2	1				125	5
6	I	1				I	2	1				85	6
7	I		2		2	I			1		1	590	7
8	I		2		2	I			1		1	170	8
**SLACK						I				1		50	**SLACK
***SLACK						I					1	100	***SLACK
TOTAL		130	2240	125	2240		460	230	1145	75	1220		TOTAL

STATUS: E = EXISTING : I = INSTALL
** COIL 50' 12 SMFO SLACK FOR ITS POLE IN TY 2 GROUND BOX
*** COIL 100' 144 SMFO SLACK IN TY 2 GROUND BOX

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED PROFESSIONAL ENGINEER
Lacey L Hebert, PE
07/11/2023

100% SUBMITTAL

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ATKINS
TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
ITS LAYOUT SHEETS
(STA 265+00 TO STA 276+00)

SHEET 11 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		38

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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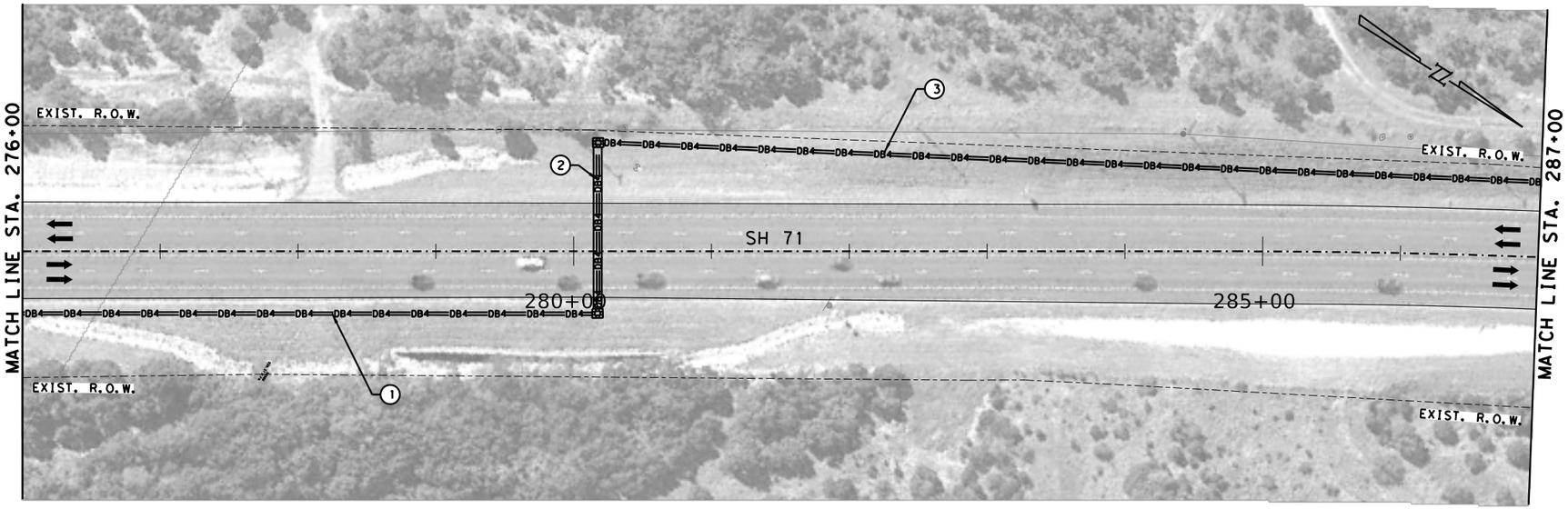

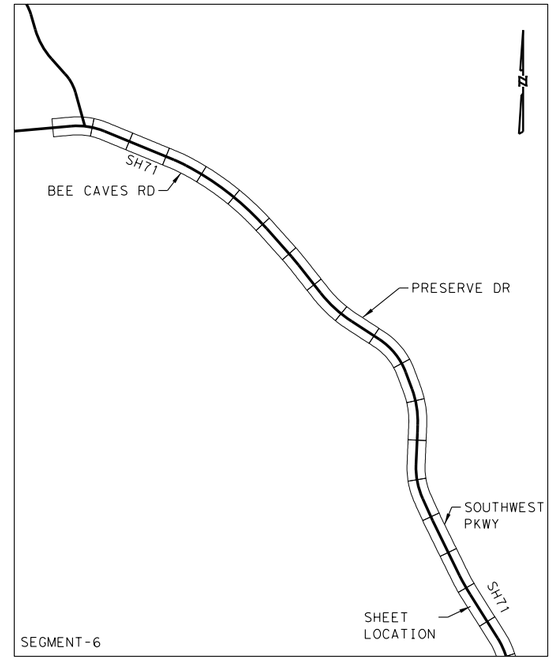

0 25 50 100 200

SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	2210
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	250
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1230
6007	6017	FIBER OPTIC CBL (SNGLE-MODE) (144 FIBER)	LF	1230
6016	6008	ITS MULTI-DUCT CND (PVC-40) (CONC ENCSE)	LF	2210
6016	6011	ITS MULTI-DUCT CND (PVC-80) (BORE)	LF	250
6186	6006	ITS GND BOX (PCAST) TY 1 (243660) W/APRN	EA	2

CONDUIT AND CABLE SCHEDULE										
RUN NO.	CONDUIT						CABLE	NUMBER OF CONDUCTORS			RUN NO.
	CONDUIT STATUS	ITEM 618 SIZE / TYPE		ITEM 6016 SIZE / TYPE			ITEM 620	TELE COM	LENGTH OF RUN	
		TRENCH	BORED			CABLE STATUS	NO. 14XHHW (INSULATED)	144 SINGLE MODE FIBER		
		CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDT (PVC) (SCH 80) (3") (BORE)	ITS MULTI-DUCT CND (PVC-40) 4" (CONC ENCSE)	ITS MULTI-DUCT CND (PVC-80) 4" (BORE)					
1	I	2		2		I	1	1	420	1
2	I		2		2	I	1	1	125	2
3	I	2		2		I	1	1	685	3
TOTAL		2210	250	2210	250		1230	1230		TOTAL

STATUS: E = EXISTING : I = INSTALL

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED PROFESSIONAL ENGINEER

Lacey L Hebert, PE 07/11/2023

100% SUBMITTAL

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ATKINS TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71

ITS LAYOUT SHEETS

(STA 276+00 TO STA 287+00)

SHEET 12 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		39

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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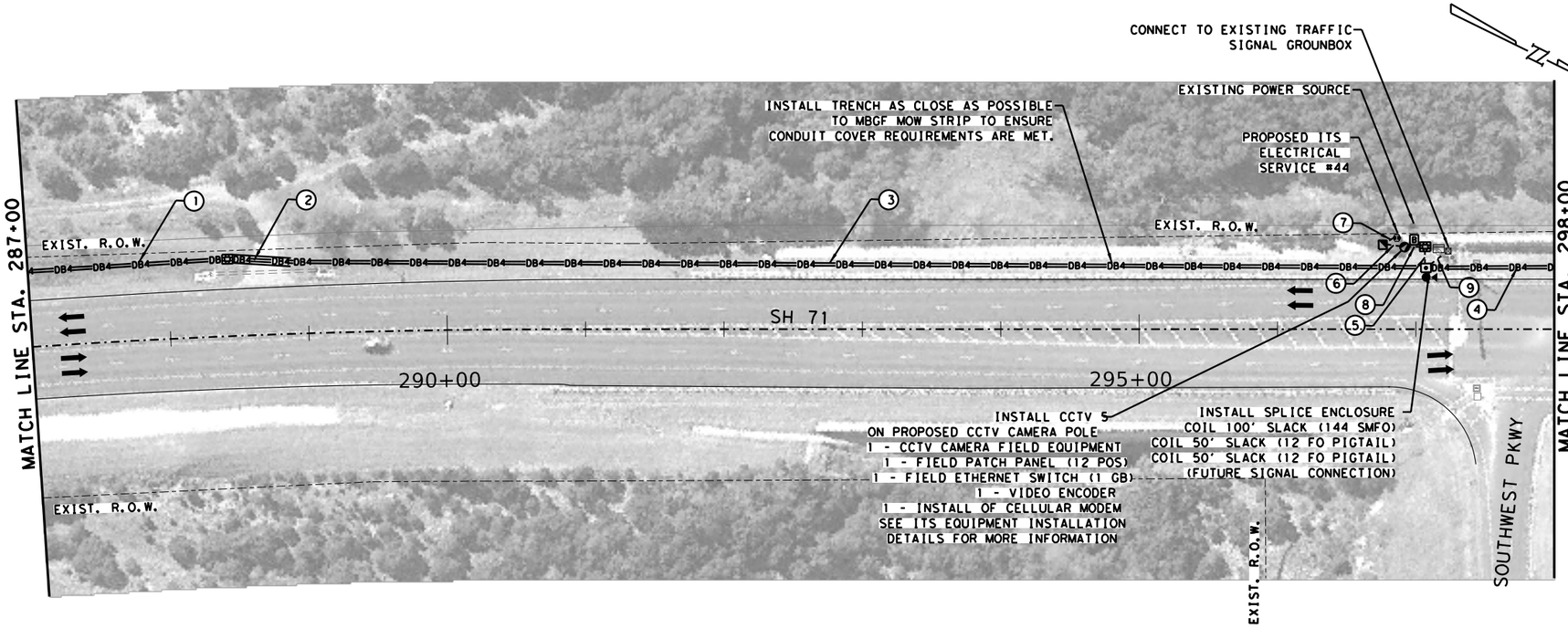
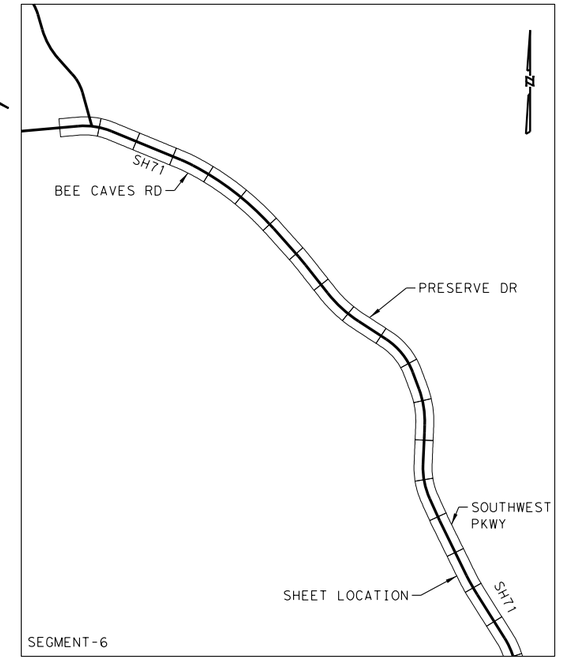




0 25 50 100 200

SCALE: 1"=100'

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED PROFESSIONAL ENGINEER
Lacey L Hebert, PE
07/11/2023

100% SUBMITTAL

® 2023 Texas Department of Transportation

ATKINS TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
ITS LAYOUT SHEETS
(STA 287+00 TO STA 298+00)

SHEET 13 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		40

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
416	6006	DRILL SHAFT (48 IN)	LF	21
618	6023	CONDT (PVC) (SCH 40) (2")	LF	60
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	2120
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	90
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1160
620	6007	ELEC CONDR (NO.8) BARE	LF	30
620	6008	ELEC CONDR (NO.8) INSULATED	LF	60
624	6002	GROUND BOX TY A (122311)W/APRON	EA	1
628	6131	ELC SRV TY D 120/240 060(NS)GS(N)SP(O)	EA	1
6007	6011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	155
6007	6017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	1205
6007	6021	FIBER OPTIC SPLICE ENCLOSURE	EA	1
6007	6023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA	1
6007	6026	FIBER OPTIC CABLE ROAD MARKER	EA	1
6010	6001	CCTV FIELD EQUIPMENT (ANALOG)	EA	1
6010	6004	CCTV MOUNT (POLE)	EA	1
6016	6008	ITS MULTI-DUCT CND (PVC-40)(CONC ENCSE)	LF	2120
6016	6011	ITS MULTI-DUCT CND (PVC-80)(BORE)	LF	90
6027	6008	GROUND BOX (PREPARE)	EA	1
6064	6055	ITS POLE (60 FT)(90 MPH)	EA	1
6064	6080	ITS POLE MNT CAB (TY 2)(CONF 1)	EA	1
6123	6001	ETHERNET SWITCH (INSTALL ONLY)	EA	1
6124	6001	MPEG 4 VIDEO ENCODER (INSTALL ONLY)	EA	1
6125	6001	TERMINAL SERVER (INSTALL ONLY)	EA	1
6186	6006	ITS GND BOX (PCAST) TY 1 (243660)W/APRN	EA	2
6186	6012	ITS GND BOX (PCAST) TY 2 (366060)W/APRN	EA	1
6247	6005	INSTALL OF CELLULAR MODEM	EA	1
*		TERMINAL SERVER	EA	1
*		VIDEO ENCODER	EA	1
*		ETHERNET SWITCH	EA	1

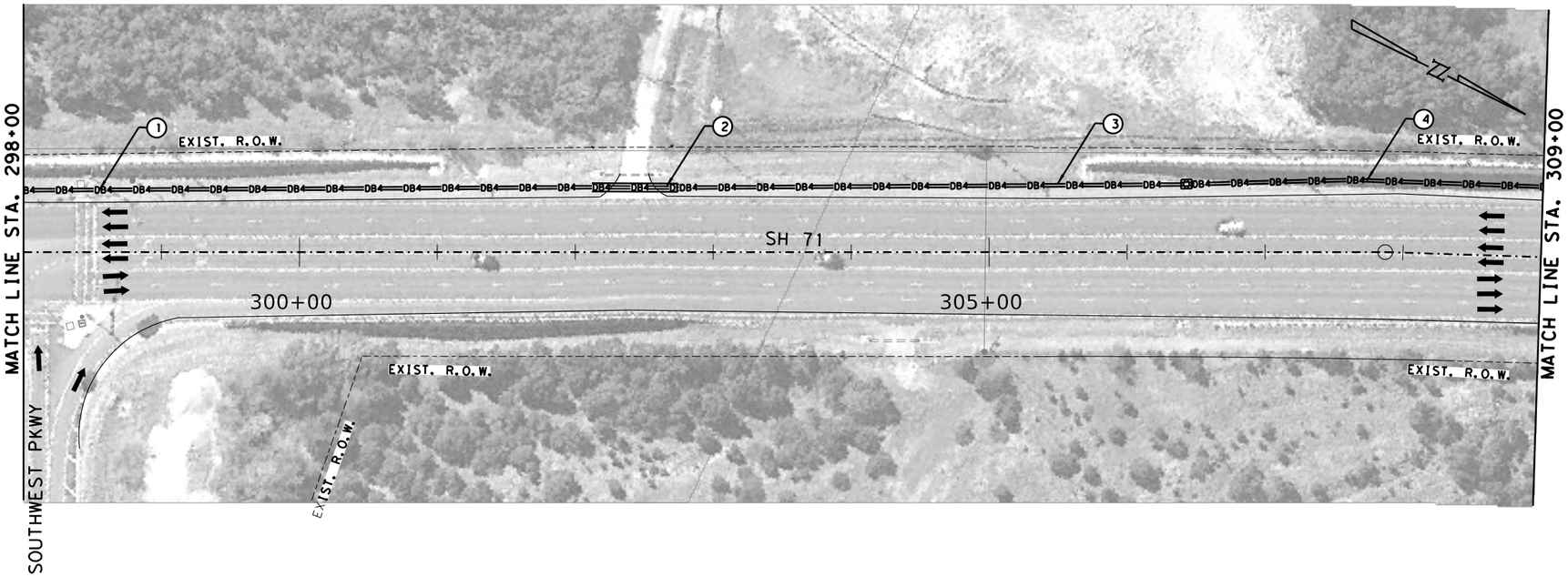
*INDICATES ITEM WILL BE PAID FOR WITH FORCE ACCOUNT

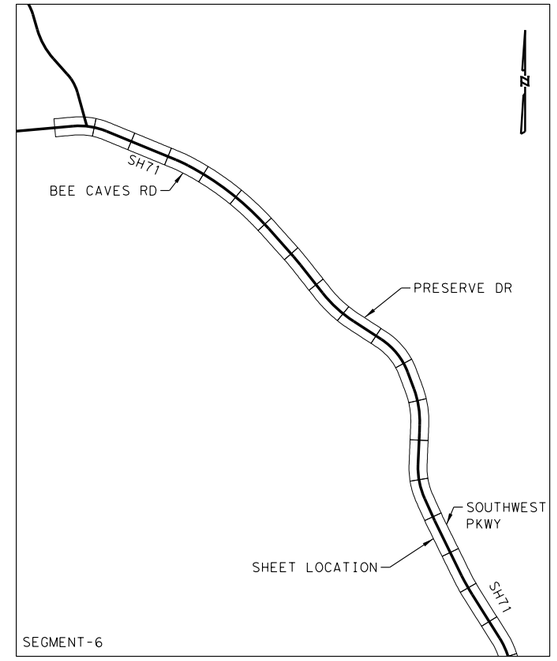
CONDUIT AND CABLE SCHEDULE

RUN NO.	CONDUIT STATUS	CONDUIT: ITEM 618 SIZE / TYPE CONDUIT: TRENCH: CONDT (PVC) (SCH 40) (2")	CONDUIT: ITEM 618 SIZE / TYPE CONDUIT: TRENCH: CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDUIT: ITEM 618 SIZE / TYPE CONDUIT: BORED: CONDT (PVC) (SCH 80) (3") (BORE)	CONDUIT: ITEM 6016 SIZE / TYPE: ITS MULTI-DUCT CND (PVC-40) 4" (CONC ENCSE)	CONDUIT: ITEM 6016 SIZE / TYPE: ITS MULTI-DUCT CND (PVC-80) 4" (BORE)	CABLE STATUS	NUMBER OF CONDUCTORS: ITEM 620 ELECTRICAL: NO. 8 XHHW (INSULATED) (POWER)	NUMBER OF CONDUCTORS: ITEM 620 ELECTRICAL: NO. 8 XHHW (BARE) (GROUND)	NUMBER OF CONDUCTORS: ITEM 620 ELECTRICAL: NO. 14XHHW (INSULATED)	NUMBER OF CONDUCTORS: TELECOM CABLE: 12 - SINGLE MODE FIBER	NUMBER OF CONDUCTORS: TELECOM CABLE: 144 SINGLE MODE FIBER	LENGTH OF RUN	RUN NO.
1	I		2		2		I			1		1	145	1
2	I			2		2	I			1		1	45	2
3	I		2		2		I			1		1	820	3
4	I		2		2		I			1		1	95	4
5	I	1					I			1	1		15	5
6	I	1					I	2	1				15	6
7	I	1					I	2	1				15	7
8	I	1					I			1	1		15	8
9	I						I			1	1		25	9
*SLACK							I				1		50	*SLACK
**SLACK							I				1		50	**SLACK
***SLACK							I					1	100	***SLACK
TOTAL		60	2120	90	2120	90		60	30	1160	155	1205		TOTAL

STATUS: E = EXISTING : I = INSTALL
* COIL 50' 12 SMFO SLACK FOR SIGNAL INTERCONNECT IN TY 2 GROUND BOX
** COIL 50' 12 SMFO SLACK FOR ITS POLE IN TY 2 GROUND BOX
*** COIL 100' 144 SMFO SLACK IN TY 2 GROUND BOX

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.





0 25 50 100 200

SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	2090
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	130
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1110
6007	6017	FIBER OPTIC CBL (SNGLE-MODE) (144 FIBER)	LF	1110
6016	6008	ITS MULTI-DUCT CND (PVC-40) (CONC ENCSE)	LF	2090
6016	6011	ITS MULTI-DUCT CND (PVC-80) (BORE)	LF	130
6186	6006	ITS GND BOX (PCAST) TY 1 (243660) W/APRN	EA	1

CONDUIT AND CABLE SCHEDULE										
RUN NO.	CONDUIT					CABLE	NUMBER OF CONDUCTORS			RUN NO.
	CONDUIT STATUS	ITEM 618 SIZE/TYPE CONDUIT		ITEM 6016 SIZE/TYPE		CABLE STATUS	ITEM 620	TELE COM	LENGTH OF RUN	
		TRENCH	BORED							
		CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDT (PVC) (SCH 80) (3") (BORE)	ITSMULTI-DUCTCND (PVC-40) 4" (CONC ENCSE)	ITSMULTI-DUCTCND (PVC-80) 4" (BORE)		NO. 14XHHW (INSULATED)	144 SINGLEMODE FIBER		
1	I	2		2		I	1	1	415	1
2	I		2		2	I	1	1	65	2
3	I	2		2		I	1	1	370	3
4	I	2		2		I	1	1	260	4
TOTAL		2090	130	2090	130		1110	1110		TOTAL

STATUS: E = EXISTING I = INSTALL

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED
PROFESSIONAL ENGINEER
07/11/2023
Lacey L Hebert, PE

100% SUBMITTAL

Texas Department of Transportation

ATKINS TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
ITS LAYOUT SHEETS
(STA 298+00 TO STA 309+00)

SHEET 14 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		41

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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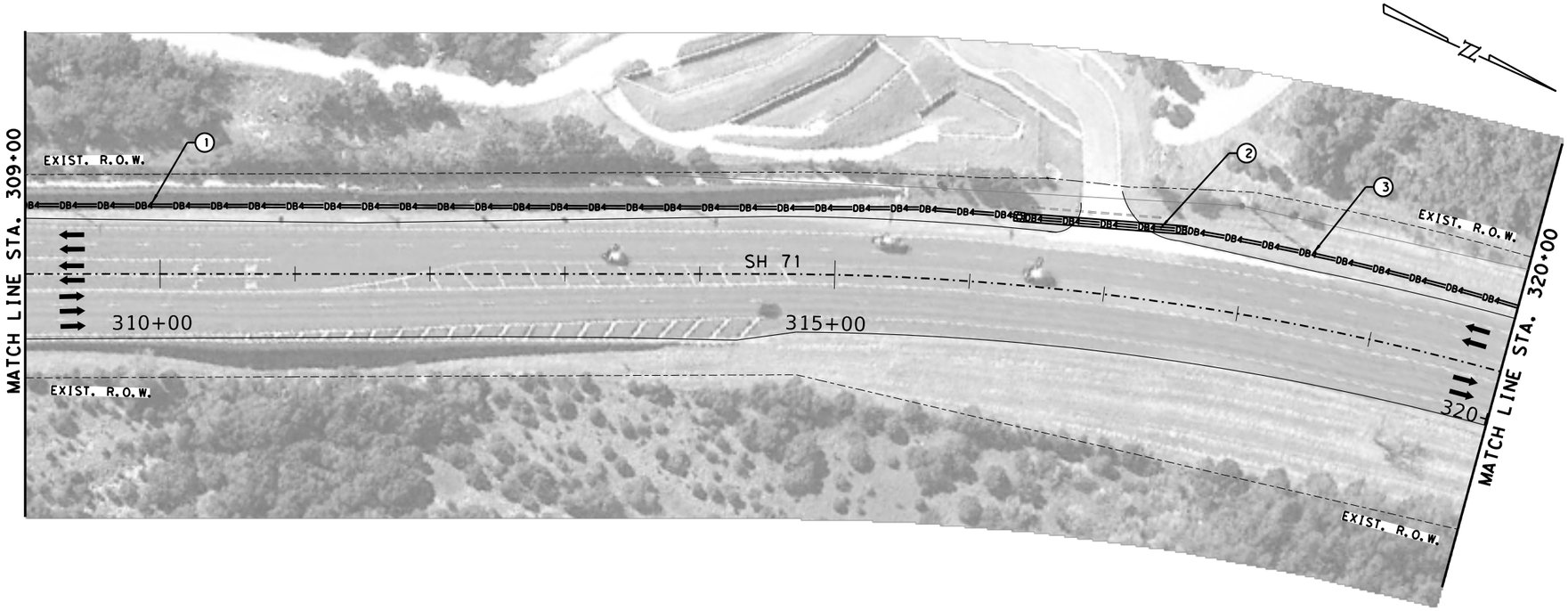

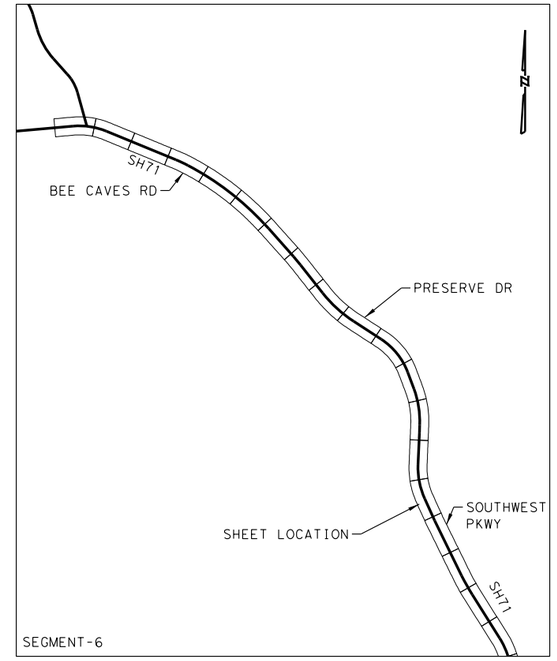

0 25 50 100 200

SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	2000
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	240
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1120
6007	6017	FIBER OPTIC CBL (SNGLE-MODE) (144 FIBER)	LF	1120
6016	6008	ITS MULTI-DUCT CND (PVC-40) (CONC ENCSE)	LF	2000
6016	6011	ITS MULTI-DUCT CND (PVC-80) (BORE)	LF	240
6186	6006	ITS GND BOX (PCAST) TY 1 (243660) W/APRN	EA	1

CONDUIT AND CABLE SCHEDULE										
RUN NO.	CONDUIT						NUMBER OF CONDUCTORS			RUN NO.
	CONDUIT STATUS	ITEM 618 SIZE / TYPE		ITEM 6016 SIZE / TYPE		CABLE STATUS	ITEM 620	TELE COM	LENGTH OF RUN	
		TRENCH	BORED				NO. 14XHHW (INSULATED)	144 SINGLE MODE FIBER		
		CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDT (PVC) (SCH 80) (3") (BORE)	ITS MULTI-DUCT CND (PVC-40) 4" (CONC ENCSE)	ITS MULTI-DUCT CND (PVC-80) 4" (BORE)					
1	I	2		2		I	1	1	740	1
2	I		2		2	I	1	1	120	2
3	I	2		2		I	1	1	260	3
TOTAL		2000	240	2000	240		1120	1120		TOTAL

STATUS: E = EXISTING : I = INSTALL

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED PROFESSIONAL ENGINEER
07/11/2023
Lacey L Hebert, PE

100% SUBMITTAL

Texas Department of Transportation ® 2023

ATKINS TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71

ITS LAYOUT SHEETS

(STA 309+00 TO STA 320+00)

SHEET 15 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		42

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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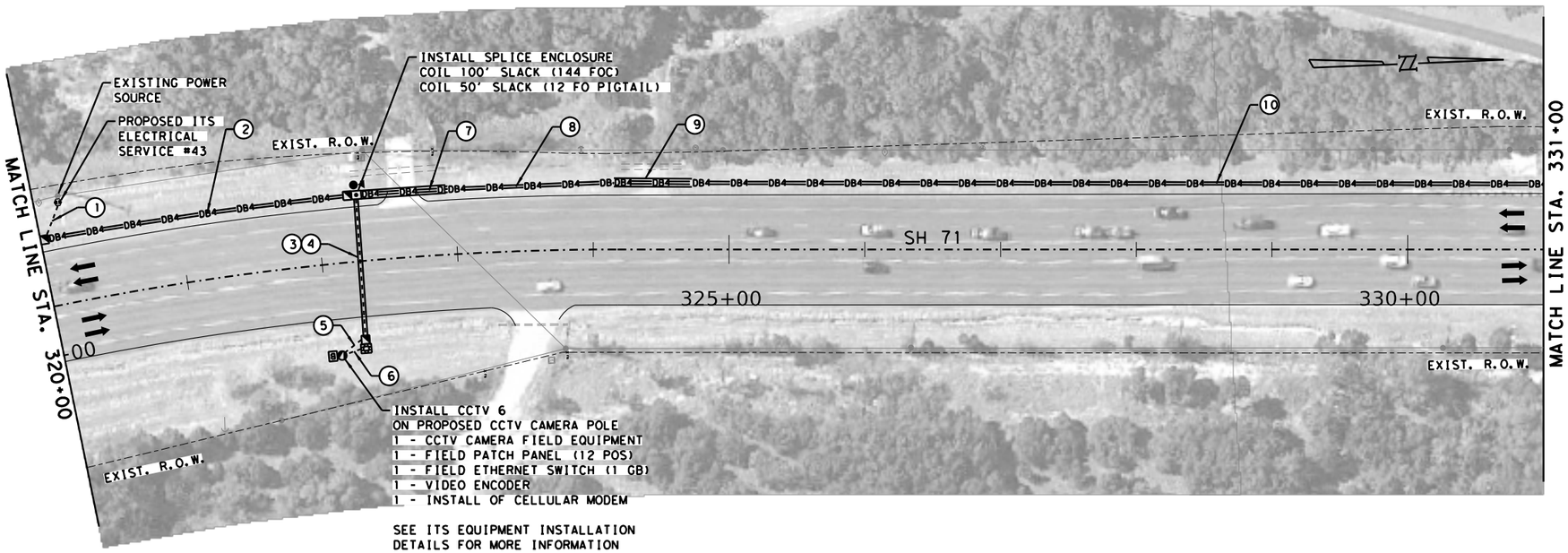

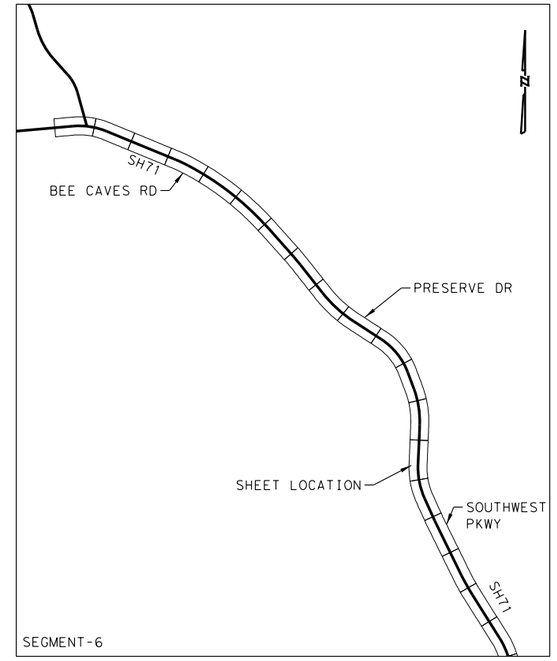

0 25 50 100 200

SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
416	6006	DRILL SHAFT (48 IN)	LF	21
618	6023	CONDT (PVC) (SCH 40) (2")	LF	310
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	1980
618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	220
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	480
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1250
620	6015	ELEC CONDR (NO.2) BARE	LF	400
620	6016	ELEC CONDR (NO.2) INSULATED	LF	800
624	6002	GROUND BOX TY A (122311)W/APRON	EA	3
628	6131	ELC SRV TY D 120/240 060(NS)GS(N)SP(O)	EA	1
6007	6011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	180
6007	6017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	1220
6007	6021	FIBER OPTIC SPLICE ENCLOSURE	EA	1
6007	6023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA	1
6007	6026	FIBER OPTIC CABLE ROAD MARKER	EA	1
6010	6001	CCTV FIELD EQUIPMENT (ANALOG)	EA	1
6010	6004	CCTV MOUNT (POLE)	EA	1
6016	6008	ITS MULTI-DUCT CND (PVC-40)(CONC ENCSE)	LF	1980
6016	6011	ITS MULTI-DUCT CND (PVC-80)(BORE)	LF	480
6064	6055	ITS POLE (60 FT)(90 MPH)	EA	1
6064	6080	ITS POLE MNT CAB (TY 2)(CONF 1)	EA	1
6123	6001	ETHERNET SWITCH (INSTALL ONLY)	EA	1
6124	6001	MPEG 4 VIDEO ENCODER (INSTALL ONLY)	EA	1
6125	6001	TERMINAL SERVER (INSTALL ONLY)	EA	1
6186	6006	ITS GND BOX (PCAST) TY 1 (243660)W/APRN	EA	1
6186	6012	ITS GND BOX (PCAST) TY 2 (366060)W/APRN	EA	1
6247	6005	INSTALL OF CELLULAR MODEM	EA	1
*		TERMINAL SERVER	EA	1
*		VIDEO ENCODER	EA	1
*		ETHERNET SWITCH	EA	1

*INDICATES ITEM WILL BE PAID FOR WITH FORCE ACCOUNT

CONDUIT AND CABLE SCHEDULE

RUN NO.	CONDUIT STATUS	CONDUIT: ITEM 618 SIZE / TYPE CONDUIT: TRENCHED: CONDT (PVC) (SCH 40) (2")	CONDUIT: ITEM 618 SIZE / TYPE CONDUIT: TRENCHED: CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDUIT: ITEM 618 SIZE / TYPE CONDUIT: BORED: CONDT (PVC) (SCH 80) (2") (BORE)	CONDUIT: ITEM 618 SIZE / TYPE CONDUIT: BORED: CONDT (PVC) (SCH 80) (3") (BORE)	CONDUIT: ITEM 6016 SIZE / TYPE: ITS MULTI-DUCT CND (PVC-40) 4" (CONC ENCSE)	CONDUIT: ITEM 6016 SIZE / TYPE: ITS MULTI-DUCT CND (PVC-80) 4" (BORE)	CABLE STATUS	NUMBER OF CONDUCTORS: ITEM 620 ELECTRICAL CONDUCTORS: NO. 2 XHHW (INSULATED) (POWER)	NO. 2 XHHW (BARE) (GROUND)	NO. 14XHHW (INSULATED)	NUMBER OF CONDUCTORS: TELECOM CABLE: 12 - SINGLE MODE FIBER	144 SINGLE MODE FIBER	LENGTH OF RUN	RUN NO.
1	I	1						I	2	1				30	1
2	I	1	2			2		I	2	1	1		1	235	2
3	I			1	2		2	I			1	1		110	3
4	I			1				I	2	1				110	4
5	I	1						I	2	1				25	5
6	I	1						I			1	1		20	6
7	I				2		2	I			1		1	70	7
8	I		2			2		I			1		1	125	8
9	I				2		2	I			1		1	60	9
10	I		2			2		I			1		1	630	10
**SLACK								I				1		50	**SLACK
***SLACK								I					1	100	***SLACK
TOTAL		310	1980	220	480	1980	480		800	400	1250	180	1220		TOTAL

STATUS: E = EXISTING : I = INSTALL
** COIL 50' 12 SMFO SLACK FOR ITS POLE IN TY 2 GROUND BOX
*** COIL 100' 144 SMFO SLACK IN TY 2 GROUND BOX

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED PROFESSIONAL ENGINEER
Lacey L Hebert, PE
07/11/2023

100% SUBMITTAL

Texas Department of Transportation

ATKINS TBPE REG. # F-474

WALTER P MOORE
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221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
ITS LAYOUT SHEETS
(STA 320+00 TO STA 331+00)

SHEET 16 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		43

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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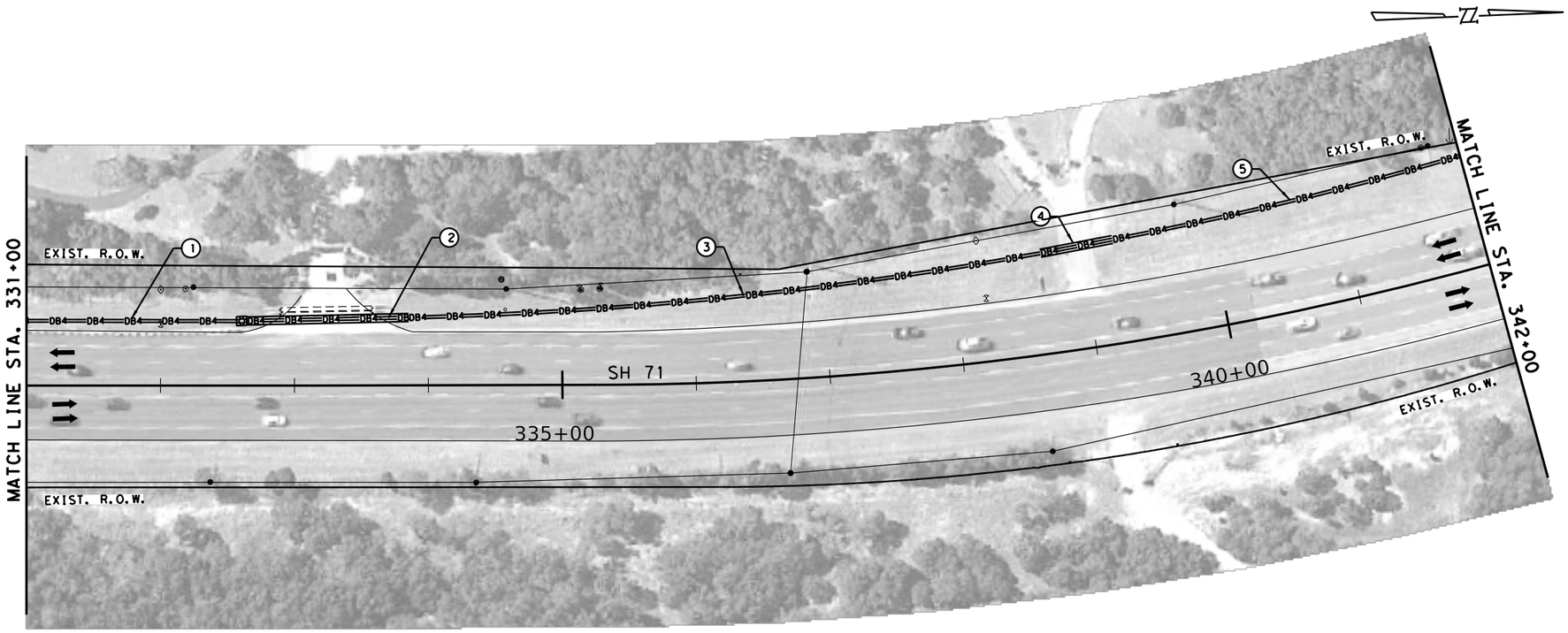

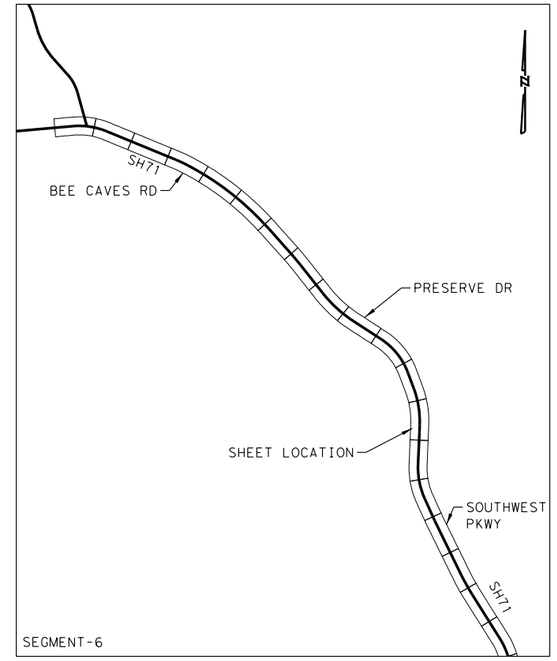

0 25 50 100 200

SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	1810
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	370
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1090
6007	6017	FIBER OPTIC CBL (SNGLE-MODE) (144 FIBER)	LF	1090
6016	6008	ITS MULTI-DUCT CND (PVC-40) (CONC ENCSE)	LF	1810
6016	6011	ITS MULTI-DUCT CND (PVC-80) (BORE)	LF	370
6186	6006	ITS GND BOX (PCAST) TY 1 (243660) W/APRN	EA	1

CONDUIT AND CABLE SCHEDULE										
RUN NO.	CONDUIT						CABLE	NUMBER OF CONDUCTORS			RUN NO.
	CONDUIT STATUS	ITEM 618 SIZE / TYPE CONDUIT		ITEM 6016 SIZE / TYPE			CABLE STATUS	ITEM 620	TELE COM		
		TRENCH	BORED								
		CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDT (PVC) (SCH 80) (3") (BORE)	ITS MULTI-DUCT CND (PVC-40) 4" (CONC ENCSE)	ITS MULTI-DUCT CND (PVC-80) 4" (BORE)			NO. 14XHHW (INSULATED)	144 SINGLE MODE FIBER	LENGTH OF RUN	
1	I	2		2			I	1	1	160	1
2	I		2		2		I	1	1	125	2
3	I	2		2			I	1	1	475	3
4	I		2		2		I	1	1	60	4
5	I	2		2			I	1	1	270	5
TOTAL		1810	370	1810	370			1090	1090		TOTAL

STATUS: E = EXISTING : I = INSTALL

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED PROFESSIONAL ENGINEER

Lacey L Hebert, PE 07/11/2023

100% SUBMITTAL

Texas Department of Transportation

ATKINS TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
ITS LAYOUT SHEETS
(STA 331+00 TO STA 342+00)

SHEET 17 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		44

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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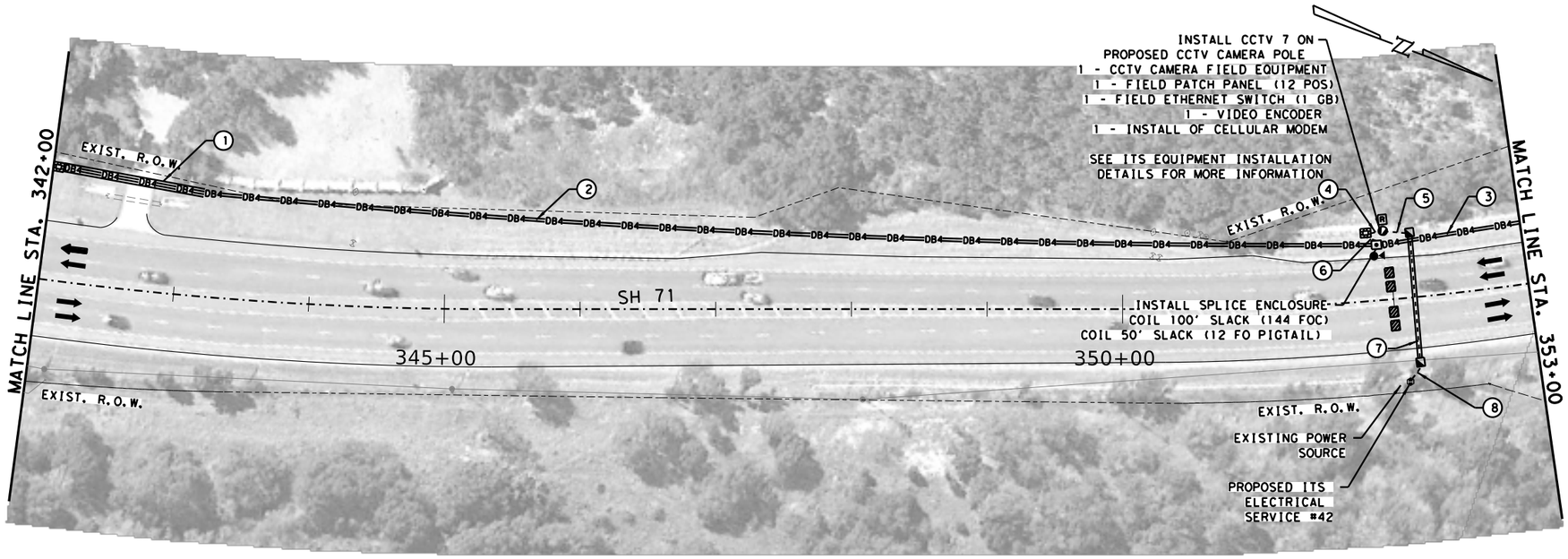

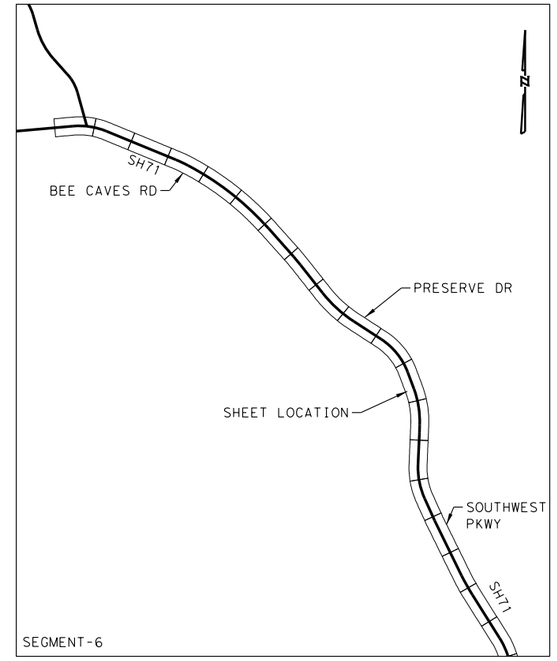

0 25 50 100 200
SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE

ITEM	CODE	DESCRIPTION	UNIT	QTY
416	6006	DRILL SHAFT (48 IN)	LF	21
618	6023	CONDT (PVC) (SCH 40) (2")	LF	70
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	1960
618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	100
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	220
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1120
620	6009	ELEC CONDR (NO.6) BARE	LF	140
620	6010	ELEC CONDR (NO.6) INSULATED	LF	280
624	6002	GROUND BOX TY A (122311) W/APRON	EA	2
628	6131	ELC SRV TY D 120/240 060(NS) GS(N) SP(O)	EA	1
6007	6011	FIBER OPTIC CBL (SNGLE-MODE) (12 FIBER)	LF	80
6007	6017	FIBER OPTIC CBL (SNGLE-MODE) (144 FIBER)	LF	1190
6007	6021	FIBER OPTIC SPLICE ENCLOSURE	EA	1
6007	6023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA	1
6007	6026	FIBER OPTIC CABLE ROAD MARKER	EA	1
6010	6001	CCTV FIELD EQUIPMENT (ANALOG)	EA	1
6010	6004	CCTV MOUNT (POLE)	EA	1
6016	6008	ITS MULTI-DUCT CND (PVC-40) (CONC ENCSE)	LF	1960
6016	6011	ITS MULTI-DUCT CND (PVC-80) (BORE)	LF	220
6064	6055	ITS POLE (60 FT) (90 MPH)	EA	1
6064	6080	ITS POLE MNT CAB (TY 2) (CONF 1)	EA	1
6123	6001	ETHERNET SWITCH (INSTALL ONLY)	EA	1
6124	6001	MPEG 4 VIDEO ENCODER (INSTALL ONLY)	EA	1
6125	6001	TERMINAL SERVER (INSTALL ONLY)	EA	1
6186	6006	ITS GND BOX (PCAST) TY 1 (243660) W/APRN	EA	2
6186	6012	ITS GND BOX (PCAST) TY 2 (366060) W/APRN	EA	1
6247	6005	INSTALL OF CELLULAR MODEM	EA	1
*		TERMINAL SERVER	EA	1
*		VIDEO ENCODER	EA	1
*		ETHERNET SWITCH	EA	1

*INDICATES ITEM WILL BE PAID FOR WITH FORCE ACCOUNT

CONDUIT AND CABLE SCHEDULE

RUN NO.	CONDUIT STATUS	CONDUIT: ITEM 618 SIZE / TYPE CONDUIT: TRENCHED: CONDT (PVC) (SCH 40) (2")	CONDUIT: ITEM 618 SIZE / TYPE CONDUIT: TRENCHED: CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDUIT: ITEM 618 SIZE / TYPE CONDUIT: BORED: CONDT (PVC) (SCH 80) (2") (BORE)	CONDUIT: ITEM 618 SIZE / TYPE CONDUIT: BORED: CONDT (PVC) (SCH 80) (3") (BORE)	CONDUIT: ITEM 6016 SIZE / TYPE: ITS MULTI-DUCT CND (PVC-40) 4" (CONC ENCSE)	CONDUIT: ITEM 6016 SIZE / TYPE: ITS MULTI-DUCT CND (PVC-80) 4" (BORE)	CABLE STATUS	NUMBER OF CONDUCTORS: ITEM 620 ELECTRICAL CONDUCTORS: NO. 6 XHHW (INSULATED) (POWER)	NUMBER OF CONDUCTORS: ITEM 620 ELECTRICAL CONDUCTORS: NO. 6 XHHW (BARE) (GROUND)	NUMBER OF CONDUCTORS: ITEM 620 ELECTRICAL CONDUCTORS: NO. 14XHHW (INSULATED)	NUMBER OF CONDUCTORS: TELECOM CABLE: 12 - SINGLE MODE FIBER	NUMBER OF CONDUCTORS: TELECOM CABLE: 144 SINGLE MODE FIBER	LENGTH OF RUN	RUN NO.
1	I				2		2	I			1		1	110	1
2	I		2			2		I			1		1	870	2
3	I		2			2		I			1		1	110	3
4	I	1						I			1	1		15	4
5	I	1						I	2	1				20	5
6	I	1						I			1	1		15	6
7	I			1				I	2	1				100	7
8	I	1						I	2	1				20	8
**SLACK								I				1		50	**SLACK
***SLACK								I					1	100	***SLACK
TOTAL		70	1960	100	220	1960	220		280	140	1120	80	1190		TOTAL

STATUS: E = EXISTING : I = INSTALL
** COIL 50' 12 SMFO SLACK FOR ITS POLE IN TY 2 GROUND BOX
*** COIL 100' 144 SMFO SLACK IN TY 2 GROUND BOX

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED PROFESSIONAL ENGINEER
07/11/2023
Lacey L Hebert, PE

100% SUBMITTAL

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ATKINS
TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
ITS LAYOUT SHEETS
(STA 342+00 TO STA 353+00)

SHEET 18 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		45

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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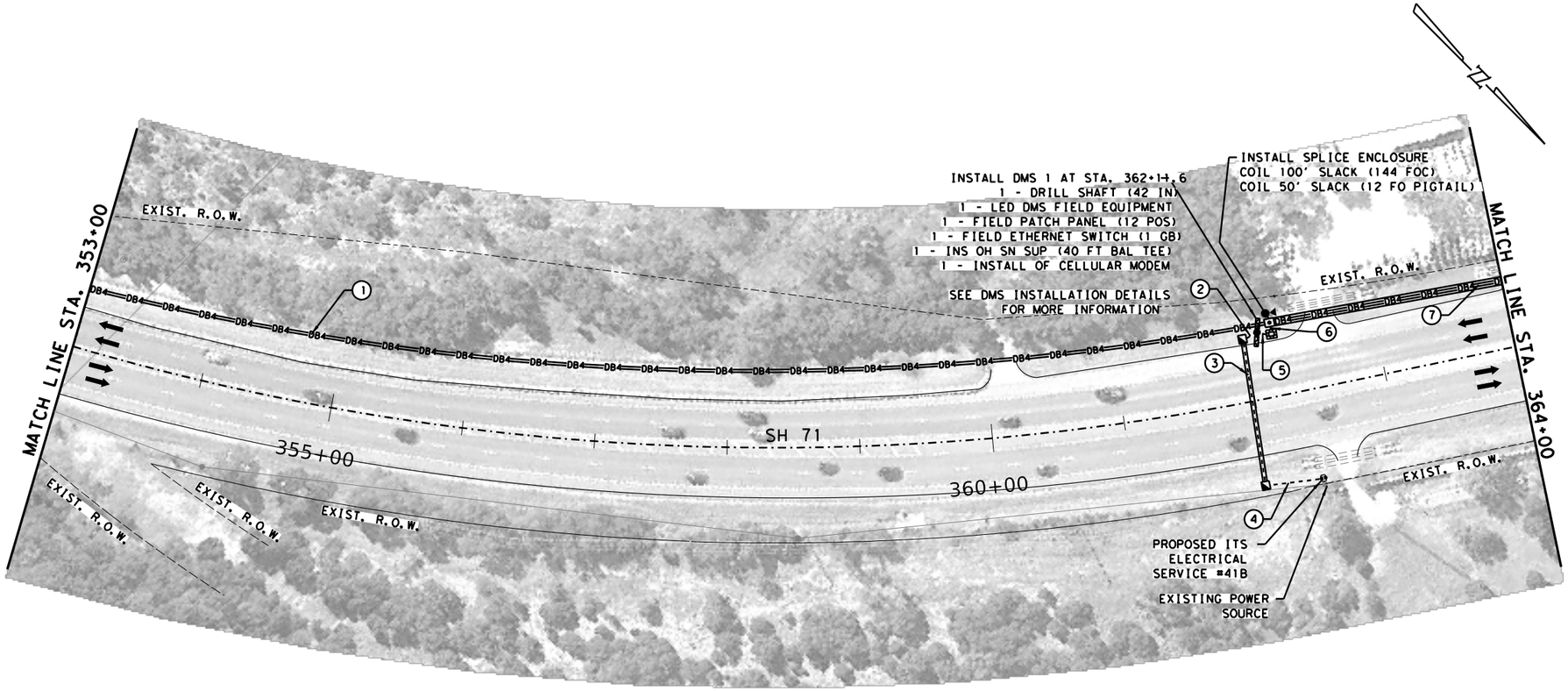

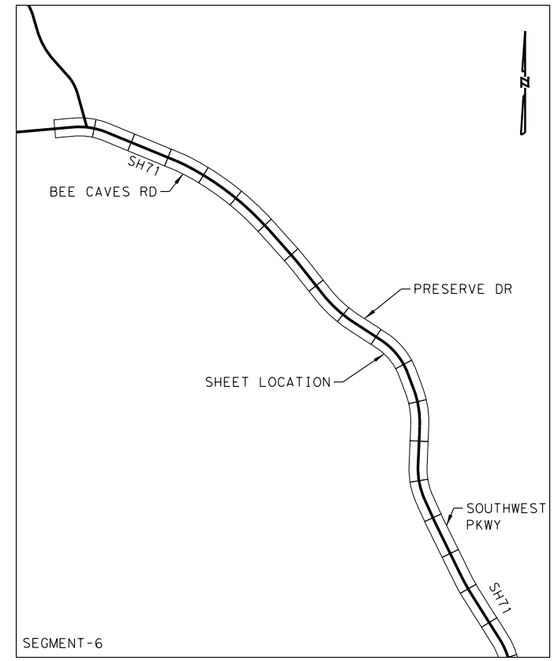

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SCALE: 1"=100'

NO.	DATE	REVISION	APPROVED

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
416	6005	DRILL SHAFT (42 IN)	LF	23
618	6023	CONDT (PVC) (SCH 40) (2")	LF	85
618	6031	CONDT (PVC) (SCH 40) (3")(CONC ENCSE)	LF	1790
618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	115
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	360
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1100
620	6011	ELEC CONDR (NO.4) BARE	LF	175
620	6012	ELEC CONDR (NO.4) INSULATED	LF	525
624	6002	GROUND BOX TY A (122311)W/APRON	EA	2
628	6334	ELC SRV TY D 120/240 125(NS)GS(N)SP(O)	EA	1
650	6042	INS OH SN SUP(40 FT BAL TEE)	EA	1
6007	6011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	75
6007	6017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	1175
6007	6021	FIBER OPTIC SPLICE ENCLOSURE	EA	1
6007	6023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA	1
6007	6026	FIBER OPTIC CABLE ROAD MARKER	EA	1
6016	6008	ITS MULTI-DUCT CND (PVC-40)(CONC ENCSE)	LF	1790
6016	6011	ITS MULTI-DUCT CND (PVC-80)(BORE)	LF	360
6028	6001	INSTALL DMS (POLE MTD CABINET)	EA	1
6123	6001	ETHERNET SWITCH (INSTALL ONLY)	EA	1
6125	6001	TERMINAL SERVER (INSTALL ONLY)	EA	1
6186	6006	ITS GND BOX (PCAST) TY 1 (243660)W/APRN	EA	1
6186	6012	ITS GND BOX (PCAST) TY 2 (366060)W/APRN	EA	1
6247	6005	INSTALL OF CELLULAR MODEM	EA	1
*		LED DMS	EA	1
*		TERMINAL SERVER	EA	1
*		ETHERNET SWITCH	EA	1

*INDICATES ITEM WILL BE PAID FOR WITH FORCE ACCOUNT

CONDUIT AND CABLE SCHEDULE																
	CONDUIT									NUMBER OF CONDUCTORS						
		ITEM 618 SIZE / TYPE CONDUIT				ITEM 6016 SIZE / TYPE				ITEM 620 ELECTRICAL			TELECOM CABLE			
		TRENCHED		BORED												
RUN NO.	CONDUIT STATUS	CONDT (PVC) (SCH 40) (2")	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDT (PVC) (SCH 80) (2") (BORE)	CONDT (PVC) (SCH 80) (3") (BORE)	ITS MULTI-DUCT CND (PVC-40) 4" (CONC ENCSE)	ITS MULTI-DUCT CND (PVC-80) 4" (BORE)	CABLE STATUS	NO. 4 XHHW (INSULATED) (POWER)	NO. 4 XHHW (BARE) (GROUND)	NO. 14XHHW (INSULATED)	12 - SINGLE MODE FIBER	144 SINGLE MODE FIBER	LENGTH OF RUN	RUN NO.
1	I		2			2		I			1		1	895	1
2	I	1						I	3	1				15	2
3	I			1				I	3	1				115	3
4	I	1						I	3	1				45	4
5	I	1						I			1	1		15	5
6	I	1						I			1	1		10	6
7	I				2		2	I			1		1	180	7
**SLACK								I				1		50	**SLACK
***SLACK								I					1	100	***SLACK
TOTAL		85	1790	115	360	1790	360		525	175	1100	75	1175		TOTAL

STATUS: E = EXISTING : I = INSTALL
** COIL 50' 12 SMFO SLACK FOR ITS POLE IN TY 2 GROUND BOX
*** COIL 100' 144 SMFO SLACK IN TY 2 GROUND BOX

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED PROFESSIONAL ENGINEER
Lacey Hebert, PE
07/11/2023

100% SUBMITTAL

Texas Department of Transportation

ATKINS
TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 600
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
ITS LAYOUT SHEETS
(STA 353+00 TO STA 364+00)

SHEET 19 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		46

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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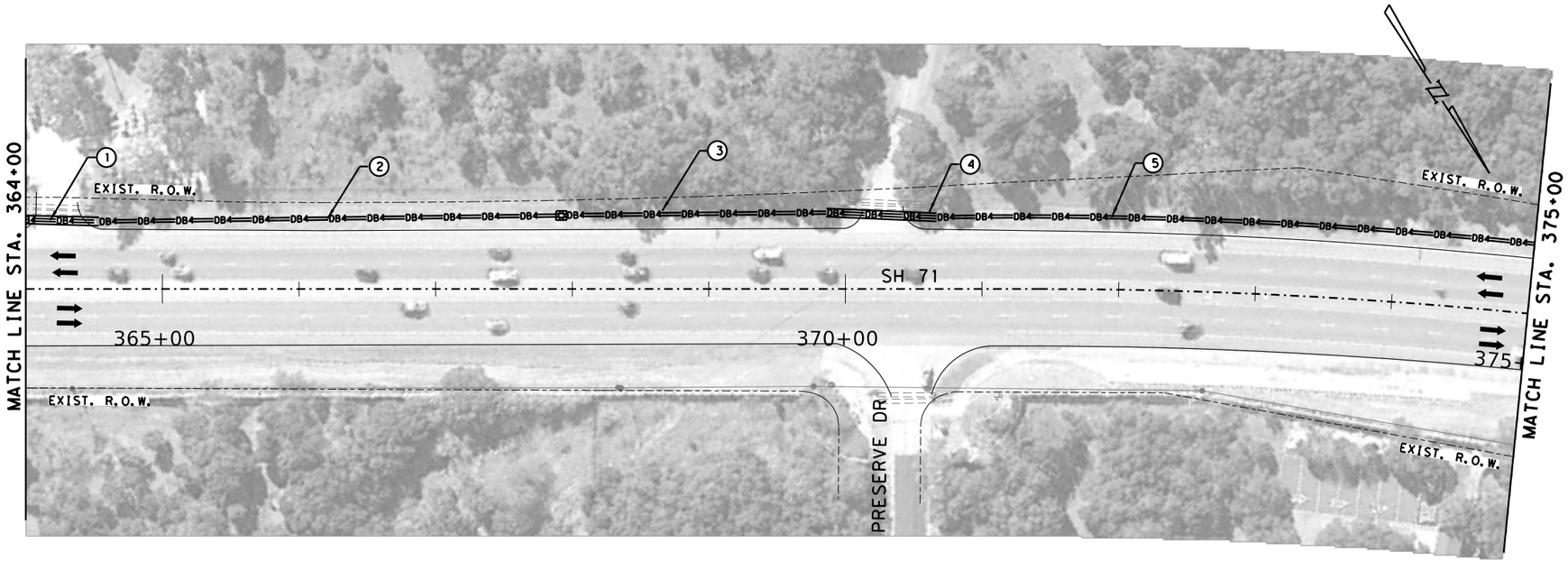

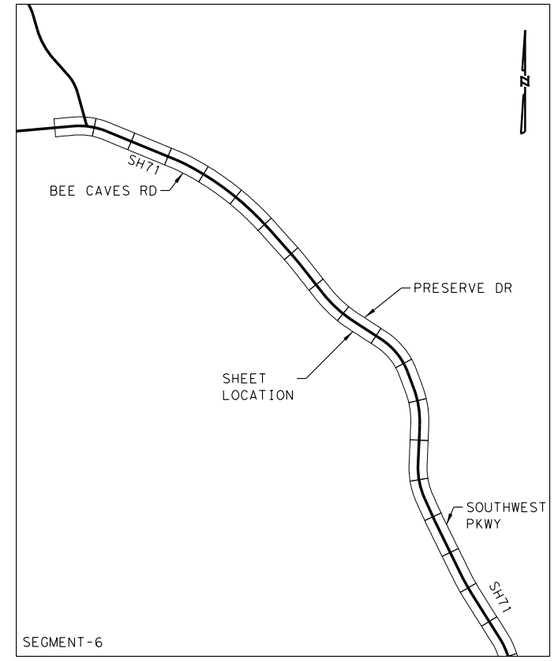

0 25 50 100 200

SCALE: 1"=100'

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED PROFESSIONAL ENGINEER

Lacey L Hebert, PE 07/11/2023

100% SUBMITTAL

Texas Department of Transportation

ATKINS TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71

ITS LAYOUT SHEETS

(STA 364+00 TO STA 375+00)

SHEET 20 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		47

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	1940
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	280
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1110
6007	6017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	1110
6016	6008	ITS MULTI-DUCT CND (PVC-40)(CONC ENCSE)	LF	1940
6016	6011	ITS MULTI-DUCT CND (PVC-80)(BORE)	LF	280
6186	6006	ITS GND BOX (PCAST) TY 1 (243660)W/APRN	EA	1

CONDUIT AND CABLE SCHEDULE										
RUN NO.	CONDUIT						NUMBER OF CONDUCTORS				
	CONDUIT STATUS	ITEM 618 SIZE/TYPE		ITEM 6016 SIZE / TYPE		CABLE STATUS	ITEM 620	TELE COM	LENGTH OF RUN	RUN NO.
		TRENCH	BORED							
		CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDT (PVC) (SCH 80) (3") (BORE)	ITS MULTI-DUCT CND (PVC-40) 4'' (CONC ENCSE)	ITS MULTI-DUCT CND (PVC-80) 4'' (BORE)		NO. 14XHHW (INSULATED)	144 SINGLE MODE FIBER		
1	I		2		2	I	1	1	55	1
2	I	2		2		I	1	1	335	2
3	I	2		2		I	1	1	195	3
4	I		2		2	I	1	1	85	4
5	I	2		2		I	1	1	440	5
TOTAL		1940	280	1940	280		1110	1110		TOTAL

STATUS: E = EXISTING : I = INSTALL

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

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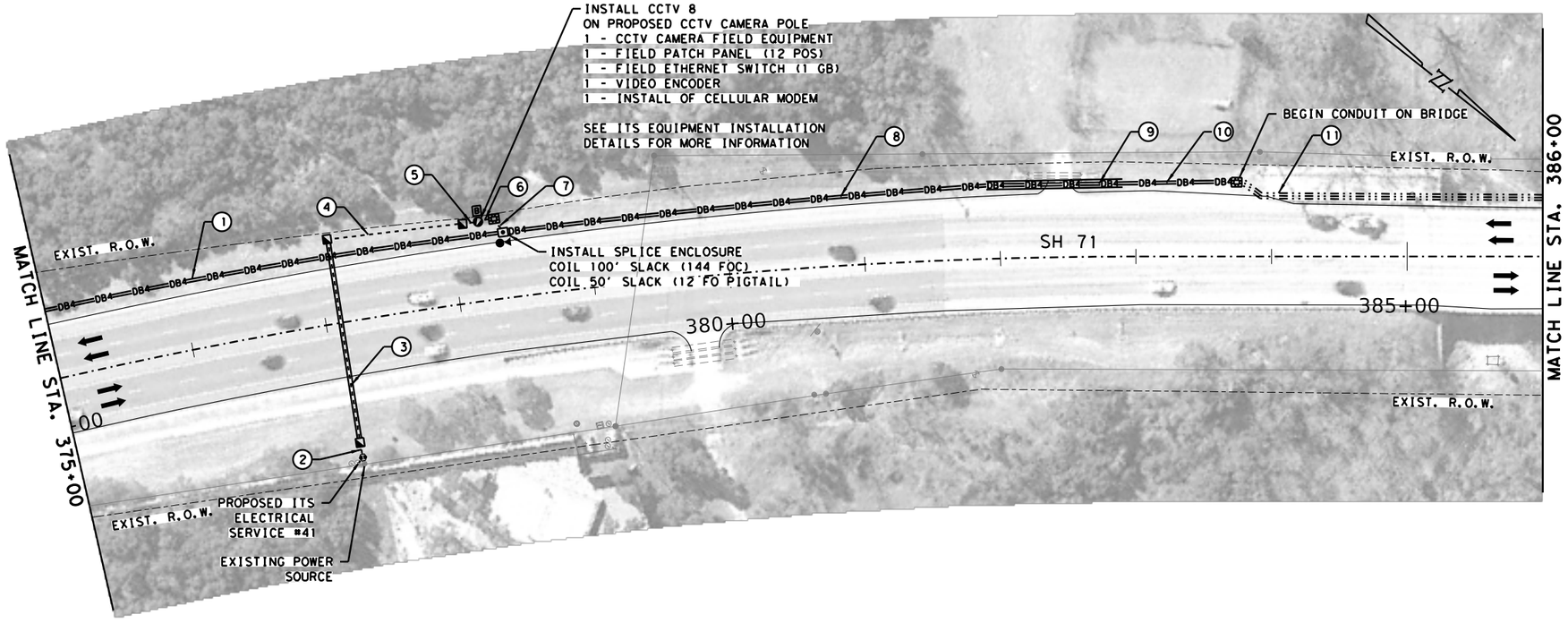

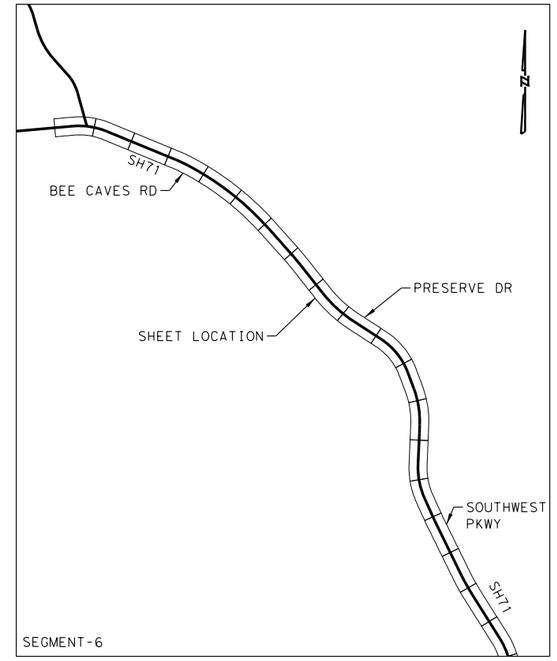

0 25 50 100 200

SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
416	6006	DRILL SHAFT (48 IN)	LF	21
618	6023	CONDT (PVC) (SCH 40) (2")	LF	155
618	6031	CONDT (PVC) (SCH 40) (3")(CONC ENCSE)	LF	1580
618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	150
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	210
618	6074	CONDT (RM) (3")	LF	460
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1155
620	6011	ELEC CONDR (NO.4) BARE	LF	275
620	6012	ELEC CONDR (NO.4) INSULATED	LF	550
624	6002	GROUND BOX TY A (122311)W/APRON	EA	3
628	6131	ELC SRV TY D 120/240 060(NS)GS(N)SP(O)	EA	1
6007	6011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	80
6007	6017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	1225
6007	6021	FIBER OPTIC SPLICE ENCLOSURE	EA	1
6007	6023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA	1
6007	6026	FIBER OPTIC CABLE ROAD MARKER	EA	1
6010	6001	CCTV FIELD EQUIPMENT (ANALOG)	EA	1
6010	6004	CCTV MOUNT (POLE)	EA	1
6016	6008	ITS MULTI-DUCT CND (PVC-40)(CONC ENCSE)	LF	1580
6016	6011	ITS MULTI-DUCT CND (PVC-80)(BORE)	LF	210
6016	6013	ITS MULTI-DUCT CND (RMC) 4''	LF	460
6064	6055	ITS POLE (60 FT)(90 MPH)	EA	1
6064	6080	ITS POLE MNT CAB (TY 2)(CONF 1)	EA	1
6123	6001	ETHERNET SWITCH (INSTALL ONLY)	EA	1
6124	6001	MPEG 4 VIDEO ENCODER (INSTALL ONLY)	EA	1
6125	6001	TERMINAL SERVER (INSTALL ONLY)	EA	1
6186	6006	ITS GND BOX (PCAST) TY 1 (243660)W/APRN	EA	2
6186	6012	ITS GND BOX (PCAST) TY 2 (366060)W/APRN	EA	1
6247	6005	INSTALL OF CELLULAR MODEM	EA	1
*		TERMINAL SERVER	EA	1
*		VIDEO ENCODER	EA	1
*		ETHERNET SWITCH	EA	1

*INDICATES ITEM WILL BE PAID FOR WITH FORCE ACCOUNT

CONDUIT AND CABLE SCHEDULE																	
RUN NO.	CONDUIT									CABLE	NUMBER OF CONDUCTORS						RUN NO.
	CONDUIT STATUS	ITEM 618 SIZE / TYPE CONDUIT					ITEM 6016 SIZE / TYPE CONDUIT			CABLE STATUS	ITEM 620 ELECTRICAL			TELECOM CABLE		LENGTH OF RUN	
		BRIDGE	TRENCHED		BORED												
		RIGID METAL (3")	CONDT (PVC) (SCH 40) (2")	CONDT (PVC) (SCH 40) (3")(CONC ENCSE)	CONDT (PVC) (SCH 80) (2") (BORE)	CONDT (PVC) (SCH 80) (3") (BORE)	ITS MULTI-DUCT CND (PVC-40) 4'' (CONC ENCSE)	ITS MULTI-DUCT CND (PVC-80) 4'' (BORE)	ITS MULTI-DUCT CND (RMC) 4''		NO. 4 XHHW (INSULATED) (POWER)	NO. 4 XHHW (BARE) (GROUND)	NO. 14XHHW (INSULATED)	12 - SINGLE MODE FIBER	144 SINGLE MODE FIBER		
1	I			2			2			I			1		1	345	1
2	I		1							I	2	1				10	2
3	I				1					I	2	1				150	3
4	I		1							I	2	1				100	4
5	I		1							I	2	1				15	5
6	I		1							I			1	1		15	6
7	I		1							I			1	1		15	7
8	I			2			2			I			1		1	360	8
9	I					2		2		I			1		1	105	9
10	I			2			2			I			1		1	85	10
11	I	2							2	I			1		1	230	11
**SLACK										I				1		50	**SLACK
***SLACK										I					1	100	***SLACK
TOTAL		460	155	1580	150	210	1580	210	460		550	275	1155	80	1225		TOTAL

STATUS: E = EXISTING : I = INSTALL
** COIL 50' 12 SMFO SLACK FOR ITS POLE IN TY 2 GROUND BOX
*** COIL 100' 144 SMFO SLACK IN TY 2 GROUND BOX

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED PROFESSIONAL ENGINEER
07/11/2023
Lacey L Hebert, PE

100% SUBMITTAL

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ATKINS
TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
ITS LAYOUT SHEETS
(STA 375+00 TO STA 386+00)

SHEET 21 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		48

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

DATE: 7/11/2023
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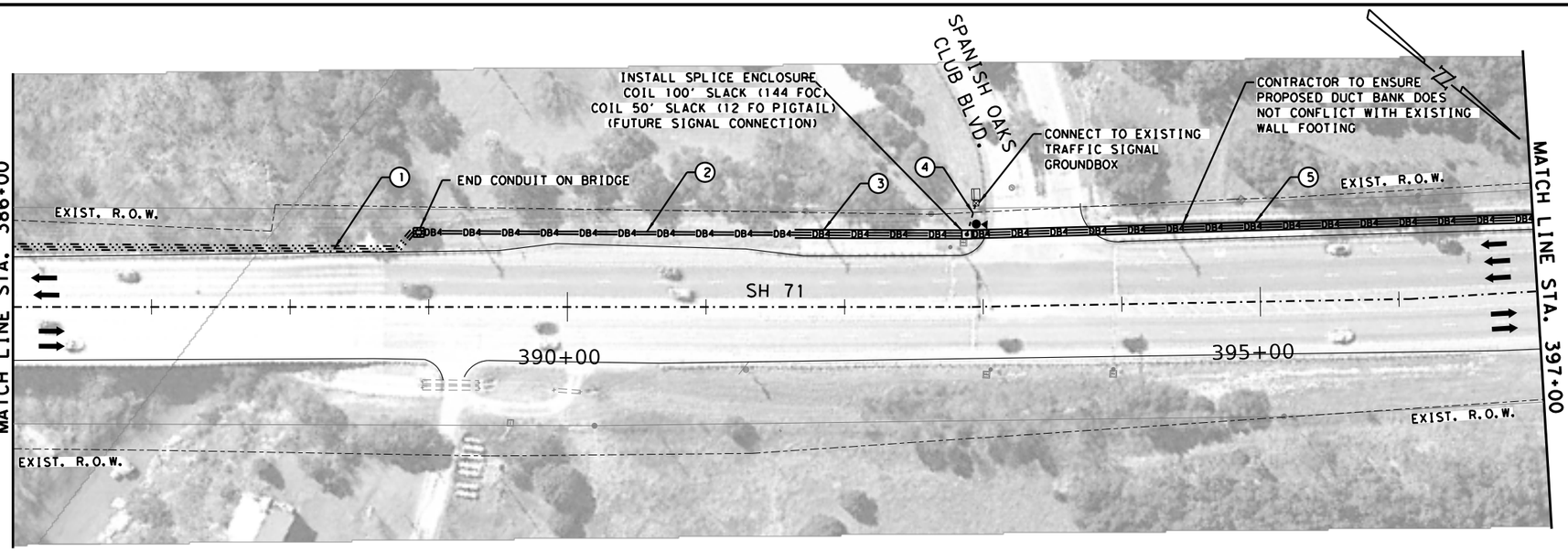

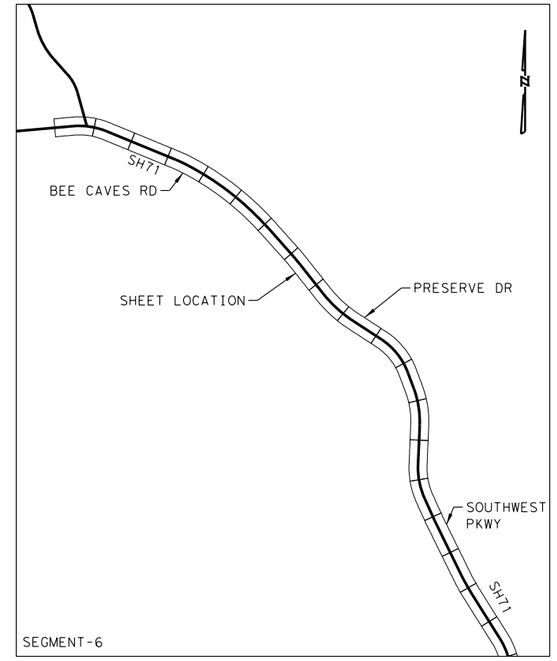

0 25 50 100 200

SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
618	6023	CONDT (PVC) (SCH 40) (2")	LF	25
618	6031	CONDT (PVC) (SCH 40) (3")(CONC ENCSE)	LF	550
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	1080
618	6074	CONDT (RM) (3")	LF	600
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1140
6007	6011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	75
6007	6017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	1215
6007	6021	FIBER OPTIC SPLICE ENCLOSURE	EA	1
6007	6026	FIBER OPTIC CABLE ROAD MARKER	EA	1
6016	6008	ITS MULTI-DUCT CND (PVC-40)(CONC ENCSE)	LF	550
6016	6011	ITS MULTI-DUCT CND (PVC-80)(BORE)	LF	1080
6016	6013	ITS MULTI-DUCT CND (RMC) 4''	LF	600
6027	6008	GROUND BOX (PREPARE)	EA	1
6186	6006	ITS GND BOX (PCAST) TY 1 (243660)W/APRN	EA	1
6186	6012	ITS GND BOX (PCAST) TY 2 (366060)W/APRN	EA	1

CONDUIT AND CABLE SCHEDULE															
	CONDUIT									NUMBER OF CONDUCTORS					
		ITEM 618 SIZE / TYPE CONDUIT				ITEM 6016 SIZE / TYPE CONDUIT				ITEM 620	TELECOM CABLE				
		BRIDGE	TRENCH		BORED										
RUN NO.	CONDUIT STATUS	RIGID METAL (3")	CONDT (PVC) (SCH 40) (2")	CONDT (PVC) (SCH 40) (3")(CONC ENCSE)	CONDT (PVC) (SCH 80) (3") (BORE)	ITS MULTI-DUCT CND (PVC-40) 4'' (CONC ENCSE)	ITS MULTI-DUCT CND (PVC-80) 4'' (BORE)	ITS MULTI-DUCT CND (RMC) 4''	CABLE STATUS	NO.14XHHW (INSULATED)	12 - SINGLE MODE FIBER	144 SINGLE MODE FIBER	LENGTH OF RUN	RUN NO.
1	I	2						2	I	1		1	300	1
2	I			2		2			I	1		1	275	2
3	I				2		2		I	1		1	130	3
4	I		1						I	1	1		25	4
5	I				2		2		I	1		1	410	5
*SLACK									I		1		50	*SLACK
***SLACK									I			1	100	***SLACK
TOTAL		600	25	550	1080	550	1080	600		1140	75	1215		TOTAL

STATUS: E = EXISTING : I = INSTALL
* COIL 50' 12 SMFO SLACK FOR SIGNAL INTERCONNECT IN TY 2 GROUND BOX
*** COIL 100' 144 SMFO SLACK IN TY 2 GROUND BOX

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

LACEY L. HEBERT 134840 LICENSED PROFESSIONAL ENGINEER
07/11/2023
Lacey L Hebert, PE

100% SUBMITTAL

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ATKINS TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
ITS LAYOUT SHEETS
(STA 386+00 TO STA 397+00)

SHEET 22 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		49

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

DATE: 7/11/2023
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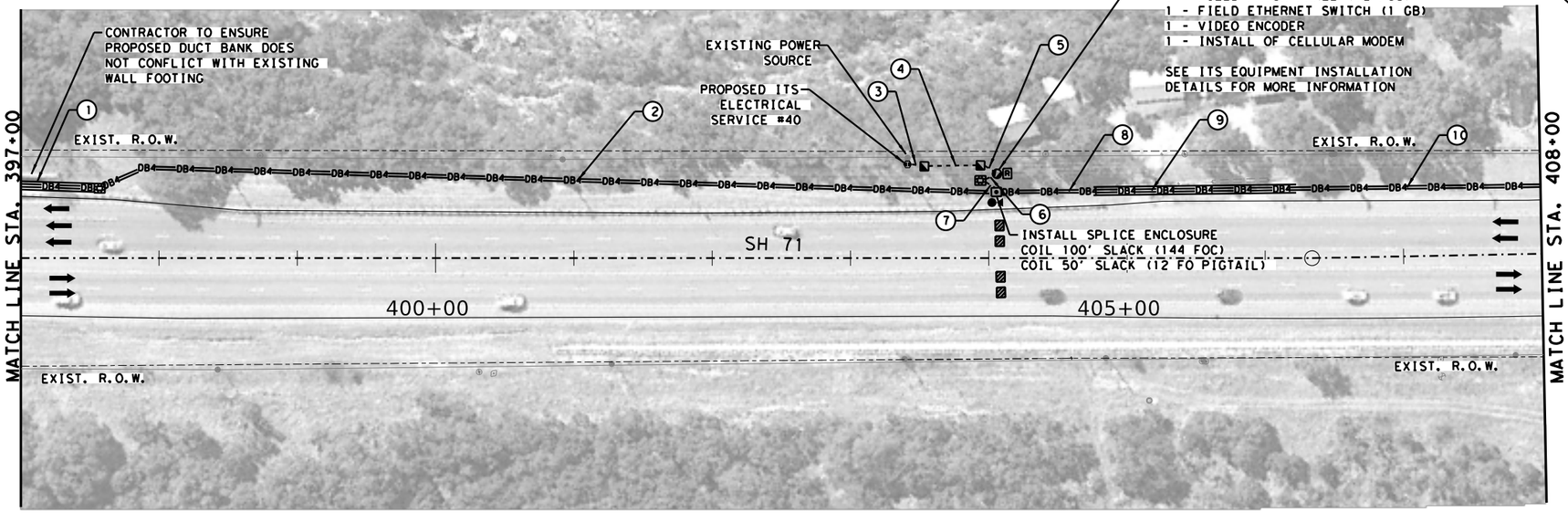

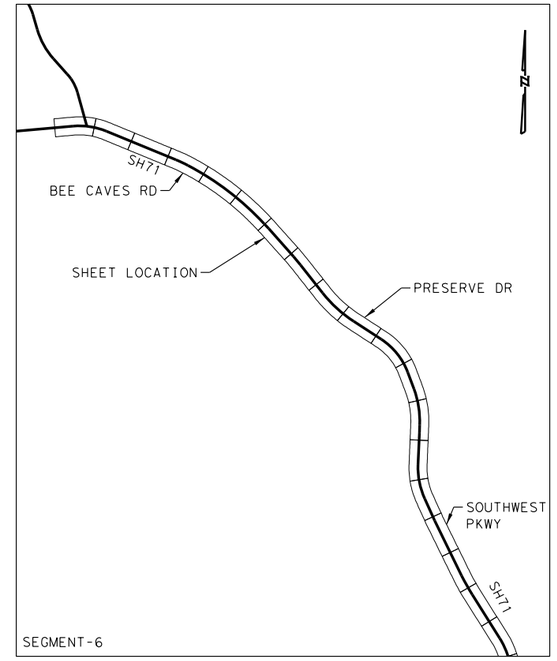

0 25 50 100 200

SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
416	6006	DRILL SHAFT (48 IN)	LF	21
618	6023	CONDT (PVC) (SCH 40) (2")	LF	95
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	1810
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	420
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1145
620	6007	ELEC CONDR (NO.8) BARE	LF	65
620	6008	ELEC CONDR (NO.8) INSULATED	LF	130
624	6002	GROUND BOX TY A (122311)W/APRON	EA	2
628	6131	ELC SRV TY D 120/240 060(NS)GS(N)SP(O)	EA	1
6007	6011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	80
6007	6017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	1215
6007	6021	FIBER OPTIC SPLICE ENCLOSURE	EA	1
6007	6023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA	1
6007	6026	FIBER OPTIC CABLE ROAD MARKER	EA	1
6010	6001	CCTV FIELD EQUIPMENT (ANALOG)	EA	1
6010	6004	CCTV MOUNT (POLE)	EA	1
6016	6008	ITS MULTI-DUCT CND (PVC-40)(CONC ENCSE)	LF	1810
6016	6011	ITS MULTI-DUCT CND (PVC-80)(BORE)	LF	420
6064	6055	ITS POLE (60 FT)(90 MPH)	EA	1
6064	6080	ITS POLE MNT CAB (TY 2)(CONF 1)	EA	1
6123	6001	ETHERNET SWITCH (INSTALL ONLY)	EA	1
6124	6001	MPEG 4 VIDEO ENCODER (INSTALL ONLY)	EA	1
6125	6001	TERMINAL SERVER (INSTALL ONLY)	EA	1
6186	6006	ITS GND BOX (PCAST) TY 1 (243660)W/APRN	EA	2
6186	6012	ITS GND BOX (PCAST) TY 2 (366060)W/APRN	EA	1
6247	6005	INSTALL OF CELLULAR MODEM	EA	1
*		TERMINAL SERVER	EA	1
*		VIDEO ENCODER	EA	1
*		ETHERNET SWITCH	EA	1

*INDICATES ITEM WILL BE PAID FOR WITH FORCE ACCOUNT

CONDUIT AND CABLE SCHEDULE														
RUN NO.	CONDUIT						CABLE	NUMBER OF CONDUCTORS						RUN NO.
	CONDUIT STATUS	ITEM 618 SIZE / TYPE CONDUIT			ITEM 6016 SIZE / TYPE		CABLE STATUS	ITEM 620 ELECTRICAL			TELECOM CABLE		LENGTH OF RUN	
		TRENCHED		BORED										
		CONDT (PVC) (SCH 40) (2")	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDT (PVC) (SCH 80) (3") (BORE)	ITS MULTI-DUCT CND (PVC-40) 4'' (CONC ENCSE)	ITS MULTI-DUCT CND (PVC-80) 4'' (BORE)		NO. 8 XHHW (INSULATED) (POWER)	NO. 8 XHHW (GROUND)	NO. 14XHHW (INSULATED)	12 - SINGLE MODE FIBER	144 SINGLE MODE FIBER		
1	I			2		2	I			1		1	60	1
2	I		2		2		I			1		1	655	2
3	I	1					I	2	1				10	3
4	I	1					I	2	1				40	4
5	I	1					I	2	1				15	5
6	I	1					I			1	1		15	6
7	I	1					I			1	1		15	7
8	I		2		2		I			1		1	70	8
9	I			2		2	I			1		1	150	9
10	I		2		2		I			1		1	180	10
**SLACK							I				1		50	**SLACK
***SLACK							I					1	100	***SLACK
TOTAL		95	1810	420	1810	420		130	65	1145	80	1215		TOTAL

STATUS: E = EXISTING : I = INSTALL
** COIL 50' 12 SMFO SLACK FOR ITS POLE IN TY 2 GROUND BOX
*** COIL 100' 144 SMFO SLACK IN TY 2 GROUND BOX

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED PROFESSIONAL ENGINEER
Lacey L Hebert, PE
07/11/2023

100% SUBMITTAL

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ATKINS TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
ITS LAYOUT SHEETS
(STA 397+00 TO STA 408+00)

SHEET 23 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		50

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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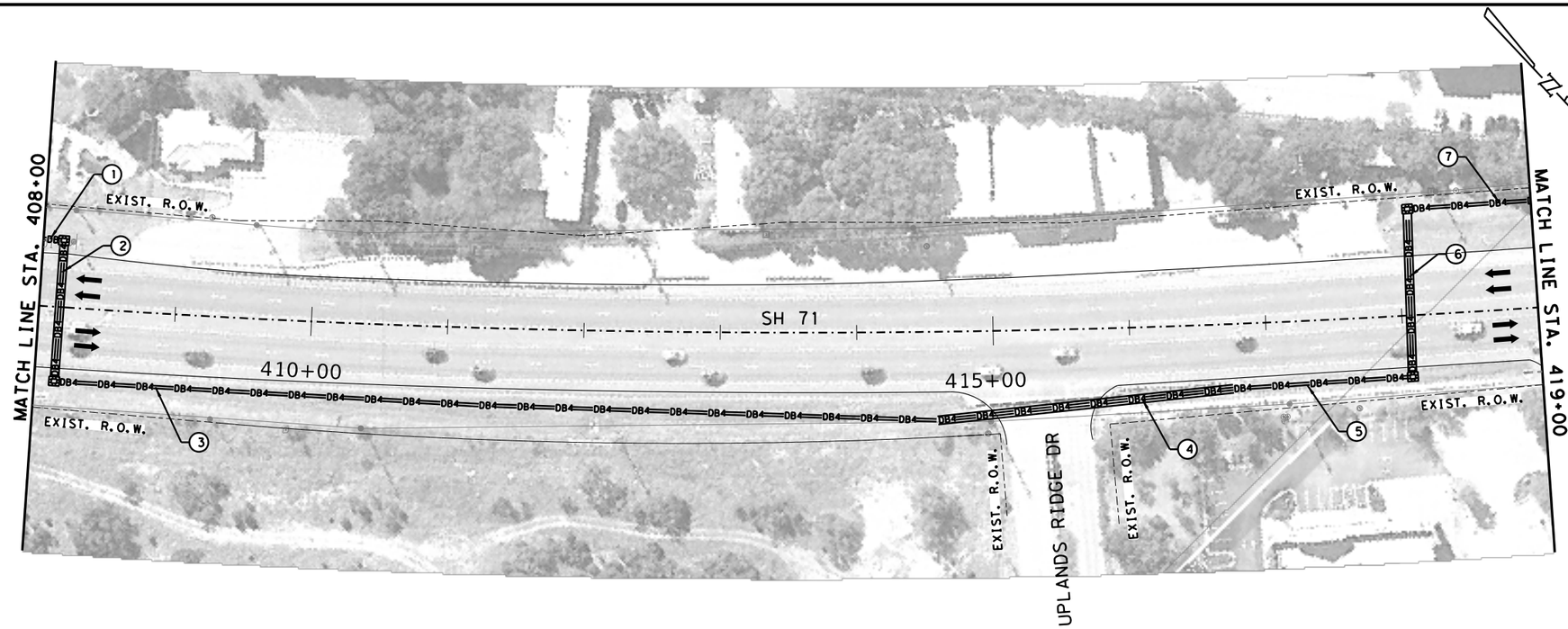

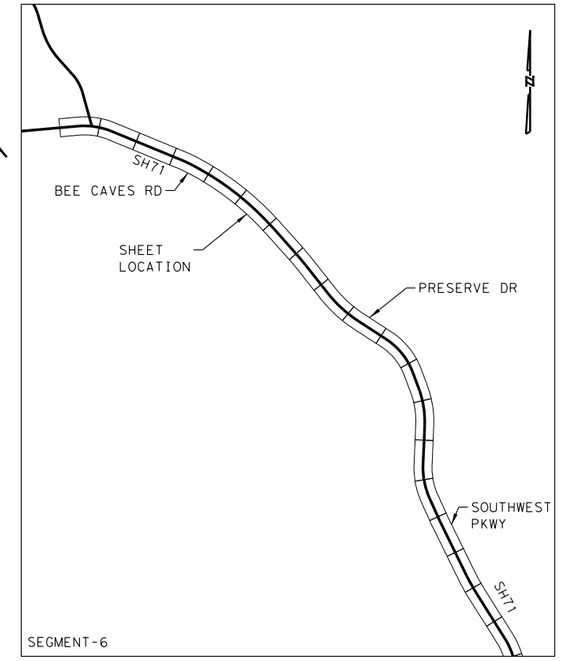

0 25 50 100 200

SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
618	6031	CONDT (PVC) (SCH 40) (3")(CONC ENCSE)	LF	1800
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	890
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1345
6007	6017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	1345
6016	6008	ITS MULTI-DUCT CND (PVC-40)(CONC ENCSE)	LF	1800
6016	6011	ITS MULTI-DUCT CND (PVC-80)(BORE)	LF	890
6186	6006	ITS GND BOX (PCAST) TY 1 (243660)W/APRN	EA	4

CONDUIT AND CABLE SCHEDULE										
RUN NO.	CONDUIT					CABLE	NUMBER OF CONDUCTORS			RUN NO.
	CONDUIT STATUS	ITEM 618 SIZE / TYPE		ITEM 6016 SIZE / TYPE		CABLE STATUS	ITEM 620	TELECOM CABLE	LENGTH OF RUN	
		TRENCH	BORED							
		CONDT (PVC) (SCH 40) (3")(CONC ENCSE)	CONDT (PVC) (SCH 80) (3") (BORE)	ITS MULTI-DUCT CND (PVC-40) 4" (CONC ENCSE)	ITS MULTI-DUCT CND (PVC-80) 4" (BORE)		NO. 14XHHW (INSULATED)	144 SINGLE MODE FIBER		
1	I	2		2		I	1	1	20	1
2	I		2		2	I	1	1	100	2
3	I	2		2		I	1	1	650	3
4	I		2		2	I	1	1	220	4
5	I	2		2		I	1	1	135	5
6	I		2		2	I	1	1	125	6
7	I	2		2		I	1	1	95	7
TOTAL		1800	890	1800	890		1345	1345		TOTAL

STATUS: E = EXISTING : I = INSTALL

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE.
FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED PROFESSIONAL ENGINEER
07/11/2023
Lacey L Hebert, PE

100% SUBMITTAL

® 2023
Texas Department of Transportation

ATKINS
TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
ITS LAYOUT SHEETS
(STA 408+00 TO STA 419+00)

SHEET 24 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		51

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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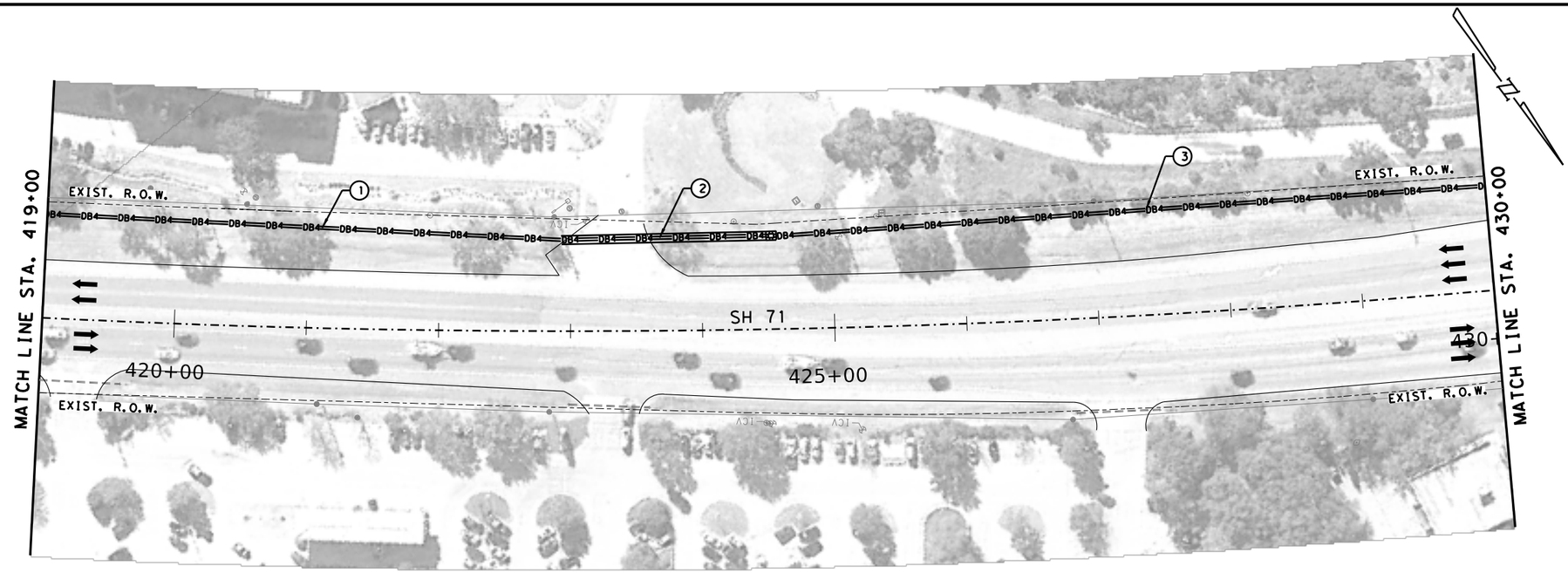

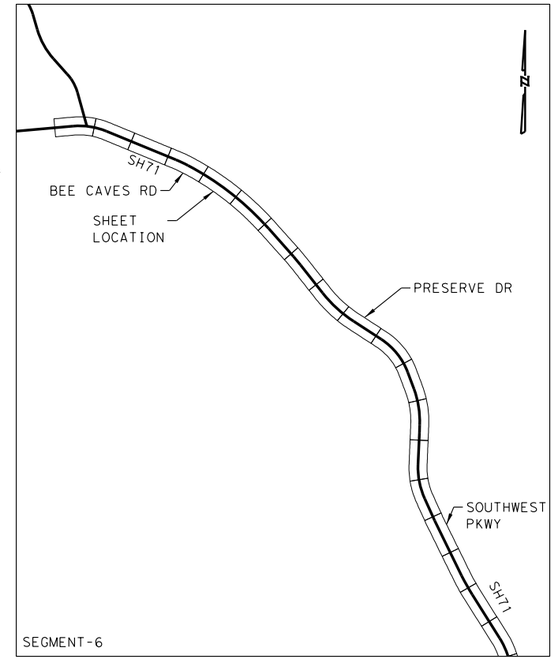

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SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	1870
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	320
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1095
6007	6017	FIBER OPTIC CBL (SNGLE-MODE) (144 FIBER)	LF	1095
6016	6008	ITS MULTI-DUCT CND (PVC-40) (CONC ENCSE)	LF	1870
6016	6011	ITS MULTI-DUCT CND (PVC-80) (BORE)	LF	320
6186	6006	ITS GND BOX (PCAST) TY 1 (243660) W/APRN	EA	1

CONDUIT AND CABLE SCHEDULE										
RUN NO.	CONDUIT						CONDUCTORS			RUN NO.
	CONDUIT STATUS	ITEM 618 SIZE / TYPE		ITEM 6016 SIZE / TYPE		CABLE STATUS	ITEM 620	TELECOM CABLE		
		TRENCH	BORED							
		CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDT (PVC) (SCH 80) (3") (BORE)	ITS MULTI-DUCT CND (PVC-40) 4'' (CONC ENCSE)	ITS MULTI-DUCT CND (PVC-80) 4'' (BORE)		NO. 14XHHW (INSULATED)	144 SINGLE MODE FIBER	LENGTH OF RUN	
1	1	2		2		I	1	1	390	1
2	1		2		2	I	1	1	160	2
3	1	2		2		I	1	1	545	3
TOTAL		1870	320	1870	320		1095	1095		TOTAL

STATUS: E = EXISTING : I = INSTALL

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED PROFESSIONAL ENGINEER
07/11/2023
Lacey L Hebert, PE

100% SUBMITTAL

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ATKINS
TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
ITS LAYOUT SHEETS
(STA 419+00 TO STA 430+00)

SHEET 25 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		52

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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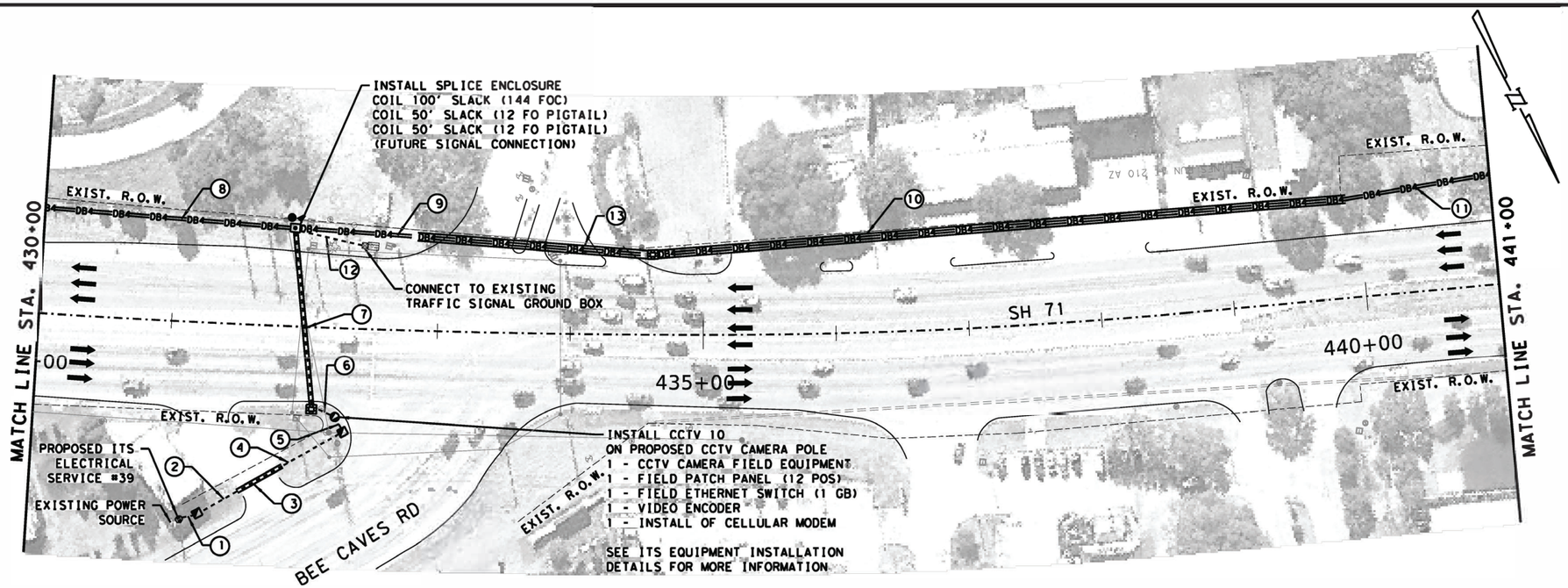

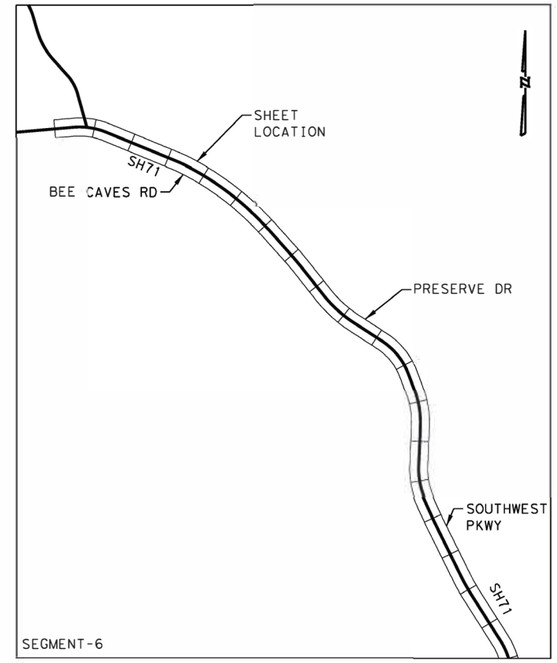

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SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
416	6006	DRILL SHAFT (48 IN)	LF	21
618	6023	CONDT (PVC) (SCH 40) (2")	LF	195
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	790
618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	180
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	1420
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1320
620	6009	ELEC CONDR (NO.6) BARE	LF	160
620	6010	ELEC CONDR (NO.6) INSULATED	LF	320
624	6002	GROUND BOX TY A (122311)W/APRON	EA	2
628	6131	ELC SRV TY D 120/240 060(NS)GS(N)SP(O)	EA	1
6007	6011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	315
6007	6017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	1205
6007	6021	FIBER OPTIC SPLICE ENCLOSURE	EA	1
6007	6023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA	1
6007	6026	FIBER OPTIC CABLE ROAD MARKER	EA	1
6010	6001	CCTV FIELD EQUIPMENT (ANALOG)	EA	1
6010	6004	CCTV MOUNT (POLE)	EA	1
6016	6008	ITS MULTI-DUCT CND (PVC-40)(CONC ENCSE)	LF	790
6016	6011	ITS MULTI-DUCT CND (PVC-80)(BORE)	LF	1420
6027	6008	GROUND BOX (PREPARE)	EA	1
6064	6055	ITS POLE (60 FT)(90 MPH)	EA	1
6064	6080	ITS POLE MNT CAB (TY 2)(CONF 1)	EA	1
6123	6001	ETHERNET SWITCH (INSTALL ONLY)	EA	1
6124	6001	MPEG 4 VIDEO ENCODER (INSTALL ONLY)	EA	1
6125	6001	TERMINAL SERVER (INSTALL ONLY)	EA	1
6186	6006	ITS GND BOX (PCAST) TY 1 (243660)W/APRN	EA	2
6186	6012	ITS GND BOX (PCAST) TY 2 (366060)W/APRN	EA	1
6247	6005	INSTALL OF CELLULAR MODEM	EA	1
*		TERMINAL SERVER	EA	1
*		VIDEO ENCODER	EA	1
*		ETHERNET SWITCH	EA	1

*INDICATES ITEM WILL BE PAID FOR WITH FORCE ACCOUNT

CONDUIT AND CABLE SCHEDULE

RUN NO.	CONDUIT								CABLE	NUMBER OF CONDUCTORS						RUN NO.
		ITEM 618 SIZE / TYPE CONDUIT				ITEM 6016 SIZE / TYPE				ITEM 620 ELECTRICAL CONDUCTORS			TELECOM CABLE			
		TRENCHED		BORED												
	CONDUIT STATUS	CONDT (PVC) (SCH 40) (2")	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDT (PVC) (SCH 80) (2") (BORE)	CONDT (PVC) (SCH 80) (3") (BORE)	ITS MULTI-DUCT CND (PVC-40) 4" (CONC ENCSE)	ITS MULTI-DUCT CND (PVC-80) 4" (BORE)		CABLE STATUS	NO. 6 XHHW (INSULATED) (POWER)	NO. 6 XHHW (BARE) (GROUND)	NO. 14XHHW (INSULATED)	12 - SINGLE MODE FIBER	144 SINGLE MODE FIBER	LENGTH OF RUN	
1	I	1							I	2	1				15	1
2	I	1							I	2	1				35	2
3	I			1					I	2	1				40	3
4	I	1							I	2	1				55	4
5	I	1							I	2	1				15	5
6	I	1							I			1	1		20	6
7	I			1					I			1	1		140	7
8	I		2			2			I			1		1	190	8
9	I		2			2			I			1		1	95	9
10	I				2		2		I			1		1	530	10
11	I		2			2			I			1		1	110	11
12	I	1							I			1	1		55	12
13					2		2		I			1		1	180	13
*SLACK									I				1		50	*SLACK
**SLACK									I				1		50	**SLACK
***SLACK									I					1	100	***SLACK
TOTAL		195	790	180	1420	790	1420			320	160	1320	315	1205		TOTAL

STATUS: E = EXISTING : I = INSTALL
* COIL 50' 12 SMFO SLACK FOR SIGNAL INTERCONNECT IN TY 2 GROUND BOX
** COIL 50' 12 SMFO SLACK FOR ITS POLE IN TY 2 GROUND BOX
*** COIL 100' 144 SMFO SLACK IN TY 2 GROUND BOX

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

LACEY L. HEBERT
134840
LICENSED PROFESSIONAL ENGINEER
07/11/2023
Lacey L Hebert, PE

100% SUBMITTAL

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ATKINS
TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
ITS LAYOUT SHEETS
(STA 430+00 TO STA 441+00)

SHEET 26 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		53

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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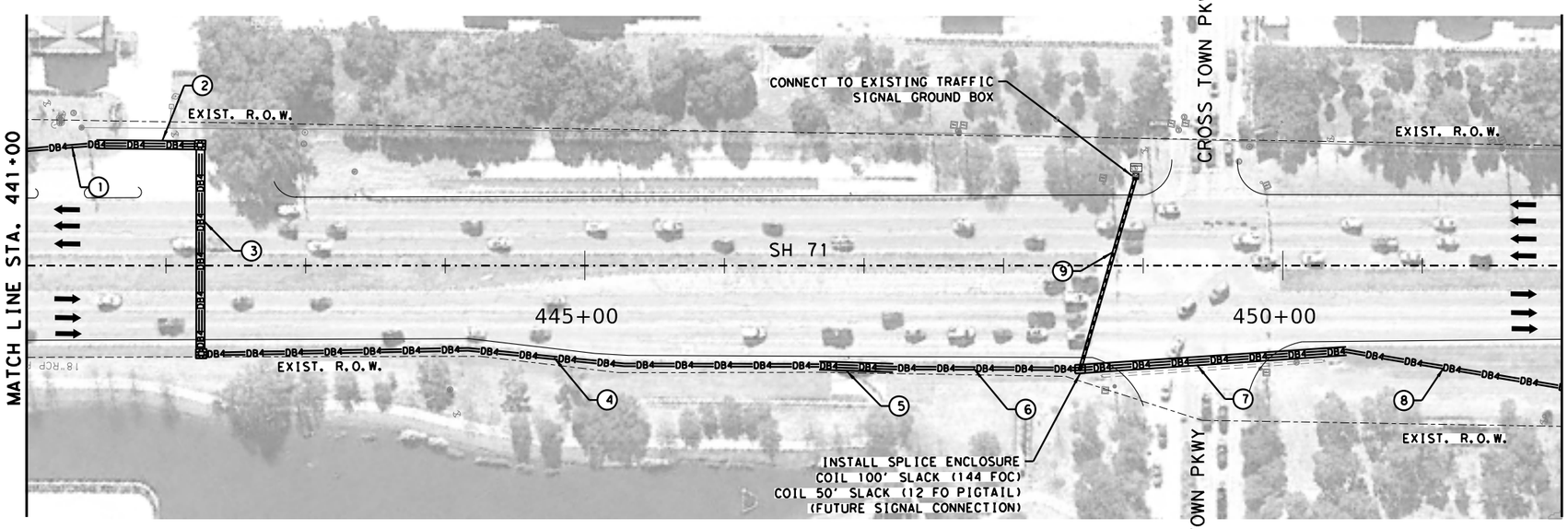

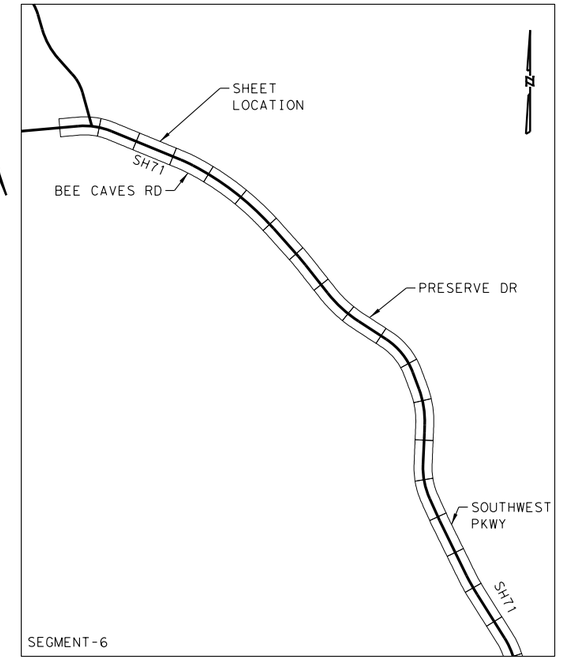

0 25 50 100 200

SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
618	6031	CONDT (PVC) (SCH 40) (3")(CONC ENCSE)	LF	1580
618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	145
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	960
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1415
6007	6011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	195
6007	6017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	1370
6007	6021	FIBER OPTIC SPLICE ENCLOSURE	EA	1
6007	6026	FIBER OPTIC CABLE ROAD MARKER	EA	1
6016	6008	ITS MULTI-DUCT CND (PVC-40)(CONC ENCSE)	LF	1580
6016	6011	ITS MULTI-DUCT CND (PVC-80)(BORE)	LF	960
6027	6008	GROUND BOX (PREPARE)	EA	1
6186	6006	ITS GND BOX (PCAST) TY 1 (243660)W/APRN	EA	2
6186	6012	ITS GND BOX (PCAST) TY 2 (366060)W/APRN	EA	1

CONDUIT AND CABLE SCHEDULE												
RUN NO.	CONDUIT							NUMBER OF CONDUCTORS				
	CONDUIT STATUS	ITEM 618 SIZE / TYPE CONDUIT			ITEM 6016 SIZE / TYPE		CABLE STATUS	ITEM 620	TELECOM CABLE		LENGTH OF RUN	RUN NO.
		TRENCH	BORED									
		CONDT (PVC) (SCH 40) (3")(CONC ENCSE)	CONDT (PVC) (SCH 80) (2") (BORE)	CONDT (PVC) (SCH 80) (3") (BORE)	ITS MULTI-DUCT CND (PVC-40) 4'' (CONC ENCSE)	ITS MULTI-DUCT CND (PVC-80) 4'' (BORE)		NO. 14XHHW (INSULATED)	12 - SINGLE MODE FIBER	144 SINGLE MODE FIBER		
1	I	2			2		I	1		1	50	1
2	I			2		2	I	1		1	80	2
3	I			2		2	I	1		1	150	3
4	I	2			2		I	1		1	445	4
5	I			2		2	I	1		1	55	5
6	I	2			2		I	1		1	135	6
7	I			2		2	I	1		1	195	7
8	I	2			2		I	1		1	160	8
9	I		1				I	1	1		145	9
*SLACK							I		1		50	*SLACK
***SLACK							I			1	100	***SLACK
TOTAL		1580	145	960	1580	960		1415	195	1370		TOTAL

STATUS: E = EXISTING : I = INSTALL
* COIL 50' 12 SMFO SLACK FOR SIGNAL INTERCONNECT IN TY 2 GROUND BOX
*** COIL 100' 144 SMFO SLACK IN TY 2 GROUND BOX

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED PROFESSIONAL ENGINEER
Lacey L Hebert, PE
07/11/2023

100% SUBMITTAL

® 2023 Texas Department of Transportation

ATKINS TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
ITS LAYOUT SHEETS
(STA 441+00 TO STA 452+00)

SHEET 27 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		54

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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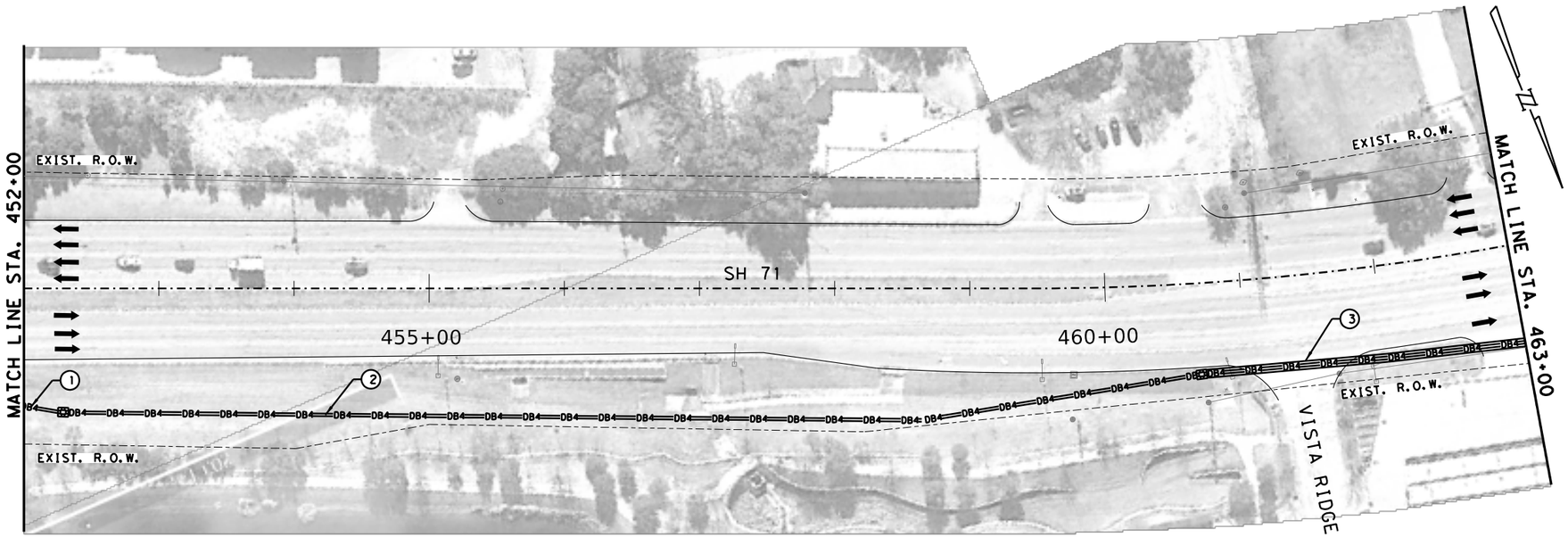

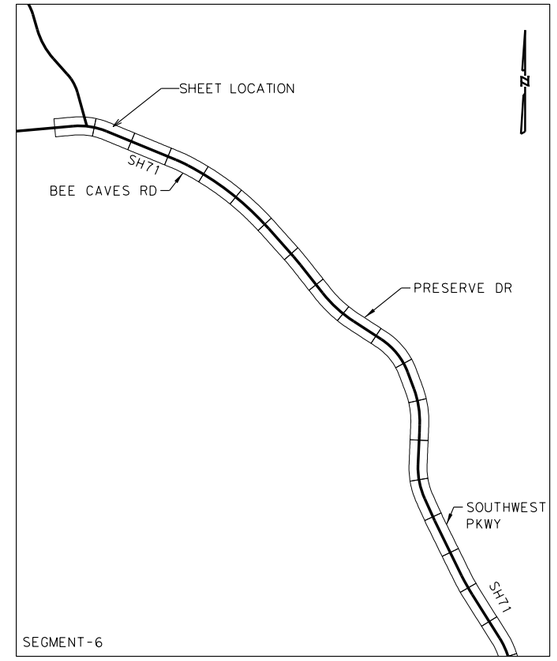

0 25 50 100 200

SCALE: 1"=100'

ESTIMATED QUANTITIES TABLE				
ITEM	CODE	DESCRIPTION	UNIT	QTY
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	1770
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	490
620	6002	ELEC CONDR (NO.14) INSULATED	LF	1130
6007	6017	FIBER OPTIC CBL (SNGLE-MODE) (144 FIBER)	LF	1130
6016	6008	ITS MULTI-DUCT CND (PVC-40) (CONC ENCSE)	LF	1770
6016	6011	ITS MULTI-DUCT CND (PVC-80) (BORE)	LF	490
6186	6006	ITS GND BOX (PCAST) TY 1 (243660) W/APRN	EA	2

CONDUIT AND CABLE SCHEDULE										
RUN NO.	CONDUIT						CABLE	NUMBER OF CONDUCTORS			RUN NO.
	CONDUIT STATUS	ITEM 618 SIZE / TYPE CONDUIT		ITEM 6016 SIZE / TYPE			CABLE STATUS	ITEM 620	TELE COM	LENGTH OF RUN	
		TRENCH	BORED	ITS MULTI-DUCT CND (PVC-40) 4'' (CONC ENCSE)	ITS MULTI-DUCT CND (PVC-80) 4'' (BORE)			NO. 14XHHW (INSULATED)	144 SINGLE MODE FIBER		
		CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDT (PVC) (SCH 80) (3") (BORE)								
1	I	2		2			I	1	1	30	1
2	I	2		2			I	1	1	855	2
3	I		2		2		I	1	1	245	3
TOTAL		1770	490	1770	490			1130	1130		TOTAL

STATUS: E = EXISTING : I = INSTALL

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED PROFESSIONAL ENGINEER
07/11/2023
Lacey L Hebert, PE

100% SUBMITTAL

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ATKINS
TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71

ITS LAYOUT SHEETS

(STA 452+00 TO STA 463+00)

SHEET 28 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		55

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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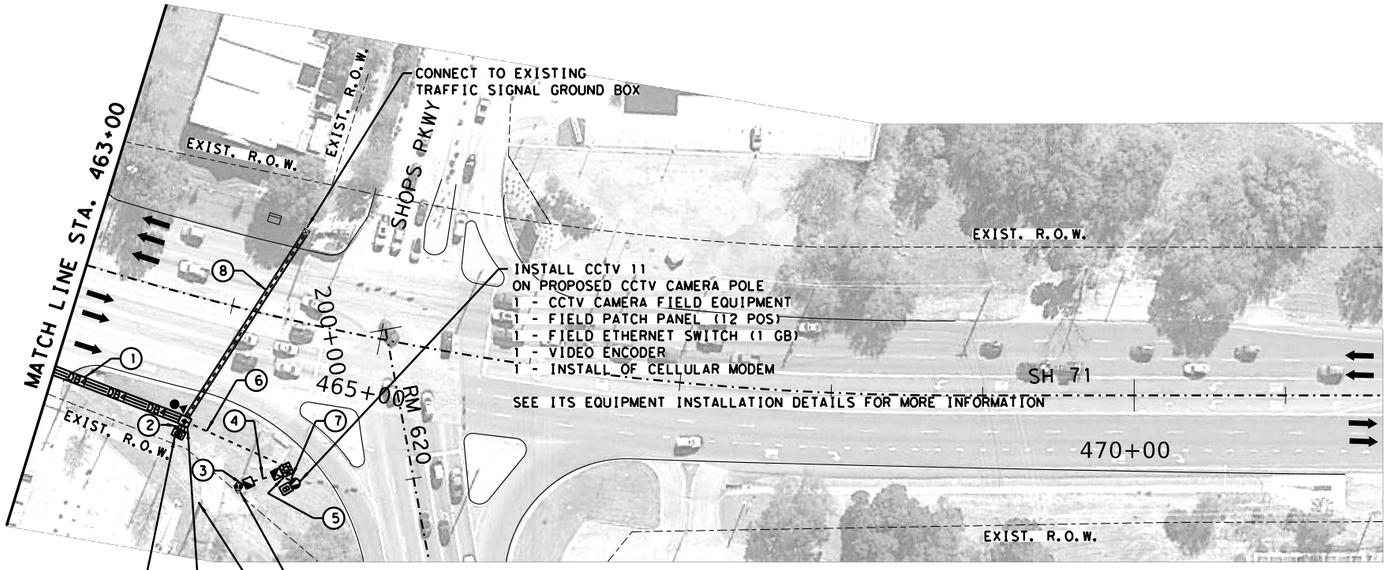

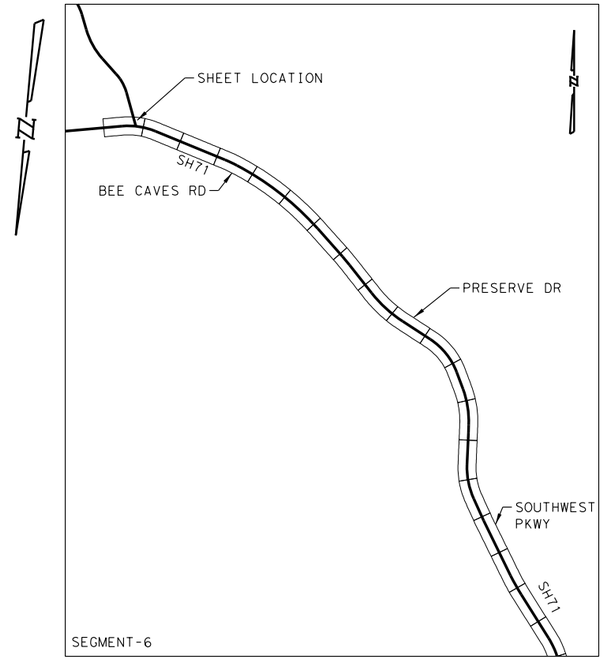

0 25 50 100 200

SCALE: 1"=100'

NO.	DATE	REVISION	APPROVED

ESTIMATED QUANTITIES TABLE

ITEM	CODE	DESCRIPTION	UNIT	QTY
416	6006	DRILL SHAFT (48 IN)	LF	21
618	6023	CONDT (PVC) (SCH 40) (2")	LF	140
618	6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	20
618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	150
618	6054	CONDT (PVC) (SCH 80) (3") (BORE)	LF	190
620	6002	ELEC CONDR (NO. 14) INSULATED	LF	350
620	6007	ELEC CONDR (NO. 8) BARE	LF	45
620	6008	ELEC CONDR (NO. 8) INSULATED	LF	90
624	6002	GROUND BOX TY A (122311) W/APRON	EA	2
628	6131	ELC SRV TY D 120/240 060 (NS) GS (N) SP (O)	EA	1
6007	6011	FIBEROPTIC CBL (SNGLE-MODE) (12 FIBER)	LF	345
6007	6017	FIBEROPTIC CBL (SNGLE-MODE) (144 FIBER)	LF	305
6007	6021	FIBEROPTIC SPLICE ENCLOSURE	EA	1
6007	6023	FIBEROPTIC PATCH PANEL (12 POSITION)	EA	1
6007	6026	FIBEROPTIC CABLE ROAD MARKER	EA	1
6007	6027	FIBEROPTIC PATCH PANEL (144 POSITION)	EA	2
6008	6043	ITS GRND MNT CAB (TY 6) (CONF 2)	EA	1
6010	6001	CCTV FIELD EQUIPMENT (ANALOG)	EA	1
6010	6004	CCTV MOUNT (POLE)	EA	1
6016	6008	ITS MULTI-DUCT CND (PVC-40) (CONCENCSE)	LF	20
6016	6011	ITS MULTI-DUCT CND (PVC-80) (BORE)	LF	190
6027	6008	GROUND BOX (PREPARE)	EA	1
6064	6055	ITS POLE (60 FT) (90 MPH)	EA	1
6064	6080	ITS POLE MNT CAB (TY 2) (CONF 1)	EA	1
6123	6001	ETHERNET SWITCH (INSTALL ONLY)	EA	1
6124	6001	MPEG 4 VIDEO ENCODER (INSTALL ONLY)	EA	1
6125	6001	TERMINAL SERVER (INSTALL ONLY)	EA	1
6186	6006	ITS GND BOX (PCAST) TY 1 (243660) W/APRN	EA	1
6186	6012	ITS GND BOX (PCAST) TY 2 (366060) W/APRN	EA	1
6247	6005	INSTALL OF CELLULAR MODEM	EA	1
*		TERMINAL SERVER	EA	1
*		VIDEO ENCODER	EA	1
*		ETHERNET SWITCH	EA	1

*INDICATES ITEM WILL BE PAID FOR WITH FORCE ACCOUNT

CONDUIT AND CABLE SCHEDULE

RUN NO.	CONDUIT STATUS	CONDUIT: ITEM 618 SIZE / TYPE CONDUIT: TRENCH: CONDT (PVC) (SCH 40) (2")	CONDUIT: ITEM 618 SIZE / TYPE CONDUIT: TRENCH: CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	CONDUIT: ITEM 618 SIZE / TYPE CONDUIT: BORED: CONDT (PVC) (SCH 80) (2") (BORE)	CONDUIT: ITEM 618 SIZE / TYPE CONDUIT: BORED: CONDT (PVC) (SCH 80) (3") (BORE)	CONDUIT: ITEM 6016 SIZE / TYPE: ITS MULTI-DUCT CND (PVC-40) 4'' (CONC ENCSE)	CONDUIT: ITEM 6016 SIZE / TYPE: ITS MULTI-DUCT CND (PVC-80) 4'' (BORE)	CABLE STATUS	NUMBER OF CONDUCTORS: ITEM 620 ELECTRICAL: NO. 8 XHHW (INSULATED) (POWER)	NUMBER OF CONDUCTORS: ITEM 620 ELECTRICAL: NO. 8 XHHW (BARE) (GROUND)	NUMBER OF CONDUCTORS: ITEM 620 ELECTRICAL: NO. 14 XHHW (INSULATED)	NUMBER OF CONDUCTORS: TELECOM: 12 - SINGLE MODE FIBER	NUMBER OF CONDUCTORS: TELECOM: 144 SINGLE MODE FIBER	LENGTH OF RUN	RUN NO.
1	I				2		2	I			1		1	95	1
2	I		2			2		I			1		1	10	2
3	I	1						I	2	1				10	3
4	I	1						I	2	1				20	4
5	I	1						I	2	1				15	5
6	I	1						I			1	1		75	6
7	I	1						I			1	1		20	7
8	I			1				I			1	1		150	8
*SLACK								I				1		50	*SLACK
**SLACK								I				1		50	**SLACK
***SLACK								I					2	100	***SLACK
TOTAL		140	20	150	190	20	190		90	45	350	345	305		TOTAL

STATUS: E = EXISTING : I = INSTALL
* COIL 50' 12 SMFO SLACK FOR SIGNAL INTERCONNECT IN TY 2 GROUND BOX
** COIL 50' 12 SMFO SLACK FOR ITS POLE IN TY 2 GROUND BOX
*** COIL 100' 144 SMFO SLACK IN TY 2 GROUND BOX, COIL 100' 144 SMFO IN TY 6 CABINET

NOTE:
1. DUCT BANK WIDTH NOT DRAWN TO SCALE
2. LOCATION OF UTILITIES IS APPROXIMATE. FIELD VERIFY BEFORE CONSTRUCTION.

STATE OF TEXAS
LACEY L. HEBERT
134840
LICENSED
PROFESSIONAL ENGINEER
07/11/2023
Lacey L Hebert, PE

100% SUBMITTAL

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ATKINS
TBPE REG. # F-474

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71
ITS LAYOUT SHEETS
(STA 463+00 TO END)

SHEET 29 OF 29

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		56

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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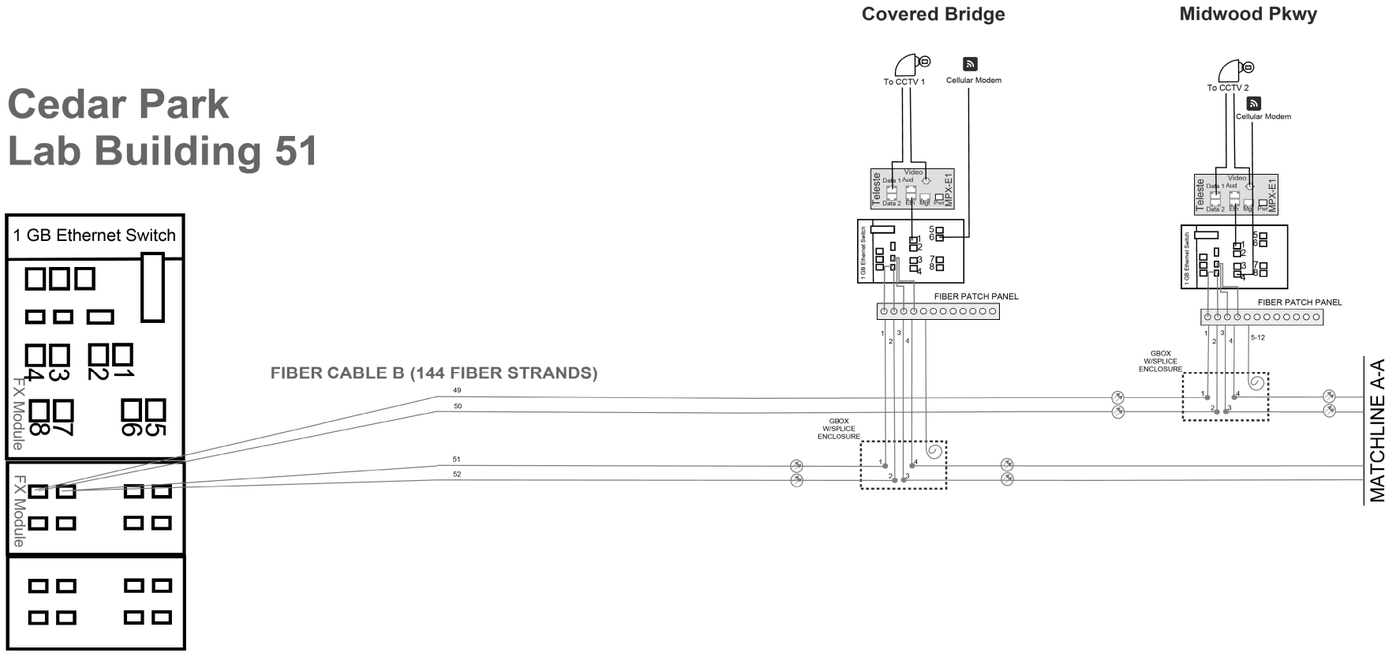
Cedar Park
Lab Building 51



NO.	DATE	REVISION	APPROVED

Walter P. Moore and Associates, Inc.
TBPE Firm Registration No. 1856

STATE OF TEXAS
CERI J. WARNIE
107838
LICENSED
PROFESSIONAL ENGINEER
05/09/2023

100% SUBMITTAL

Texas Department of Transportation

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 600
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71

COMMUNICATION SCHEMATICS

SHEET 1 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			57
STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
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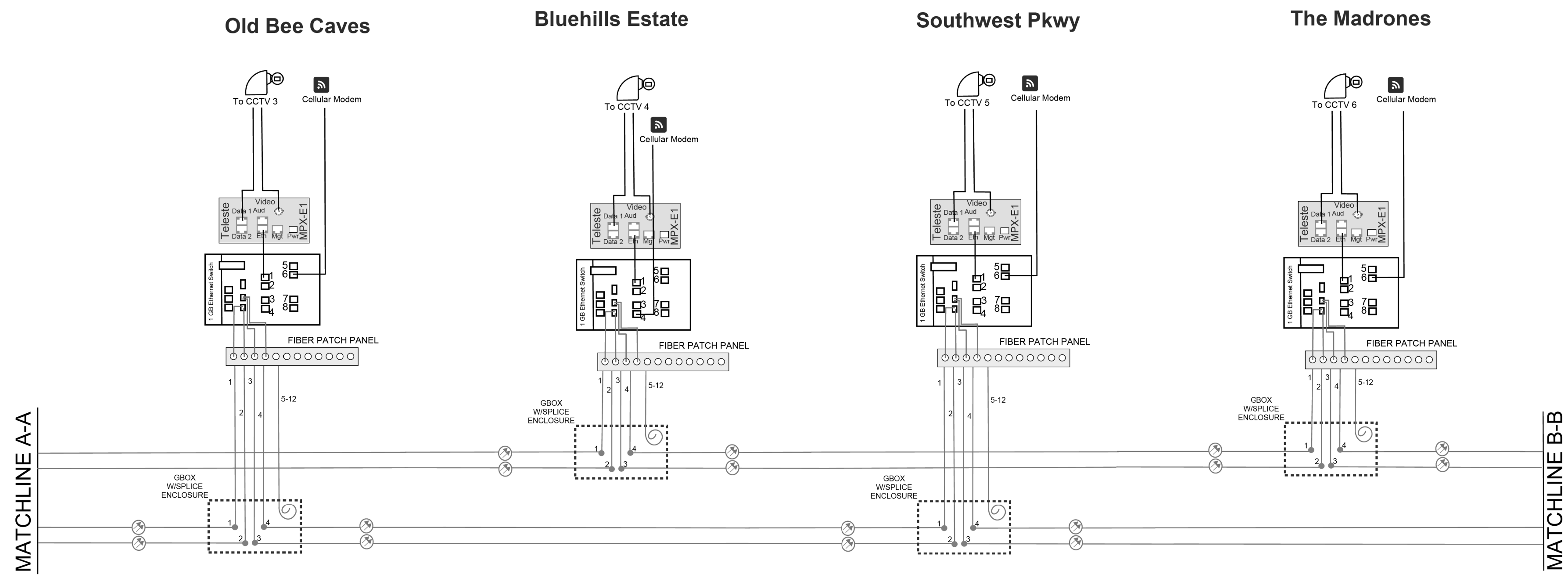

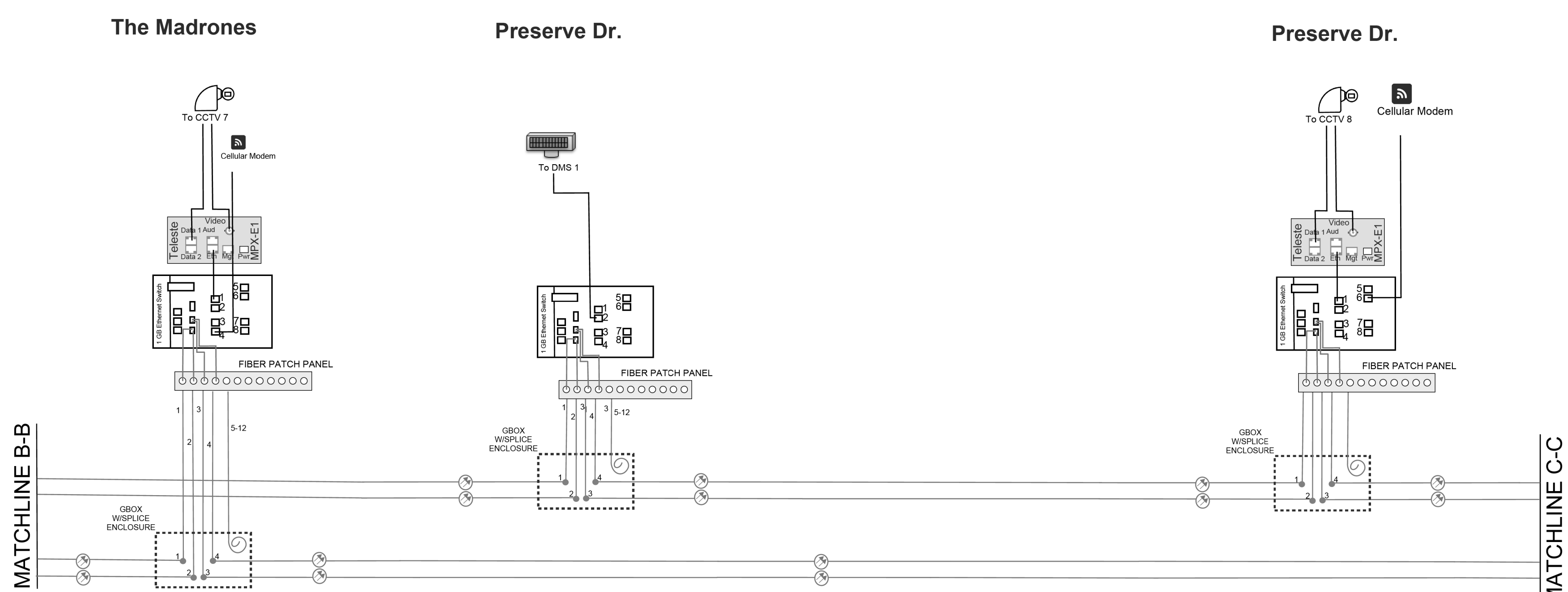

NO.	DATE	REVISION	APPROVED

Walter P. Moore and Associates, Inc.
TBPE Firm Registration No. 1856

STATE OF TEXAS
CERI J. WARNIE
107838
LICENSED
PROFESSIONAL ENGINEER

05/09/2023

100% SUBMITTAL

® 2023
Texas Department of Transportation

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71

COMMUNICATION SCHEMATICS

SHEET 2 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			58
STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
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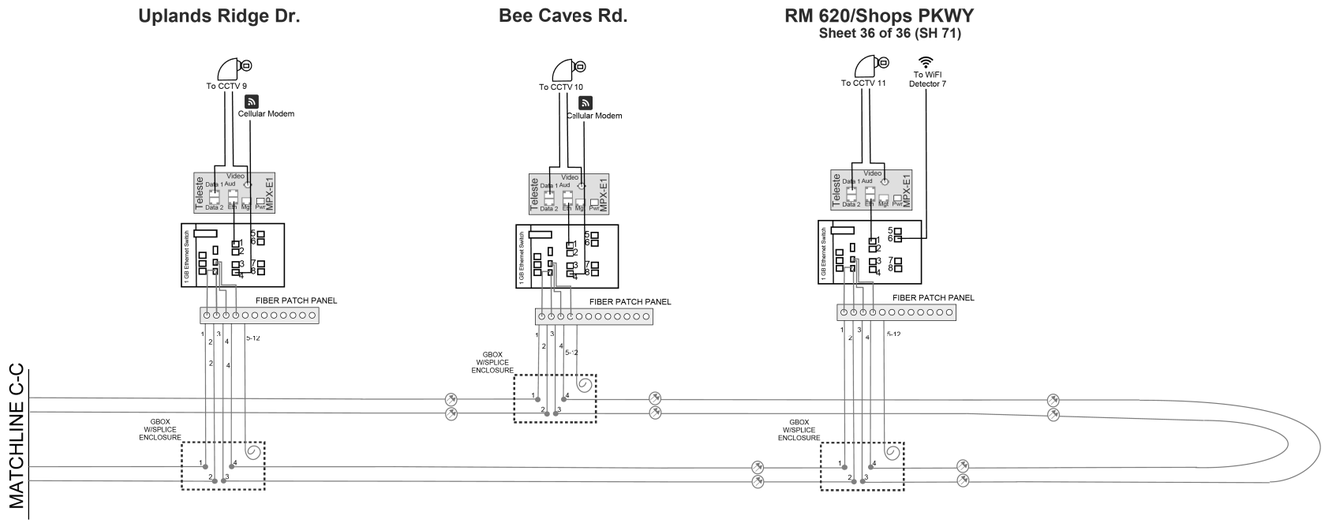

NO.	DATE	REVISION	APPROVED

Walter P. Moore and Associates, Inc.
TBPE Firm Registration No. 1856

STATE OF TEXAS
CERI J. WARNIE
107838
LICENSED PROFESSIONAL ENGINEER
05/09/2023

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WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

SH 71

COMMUNICATION SCHEMATICS

SHEET 3 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		59

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
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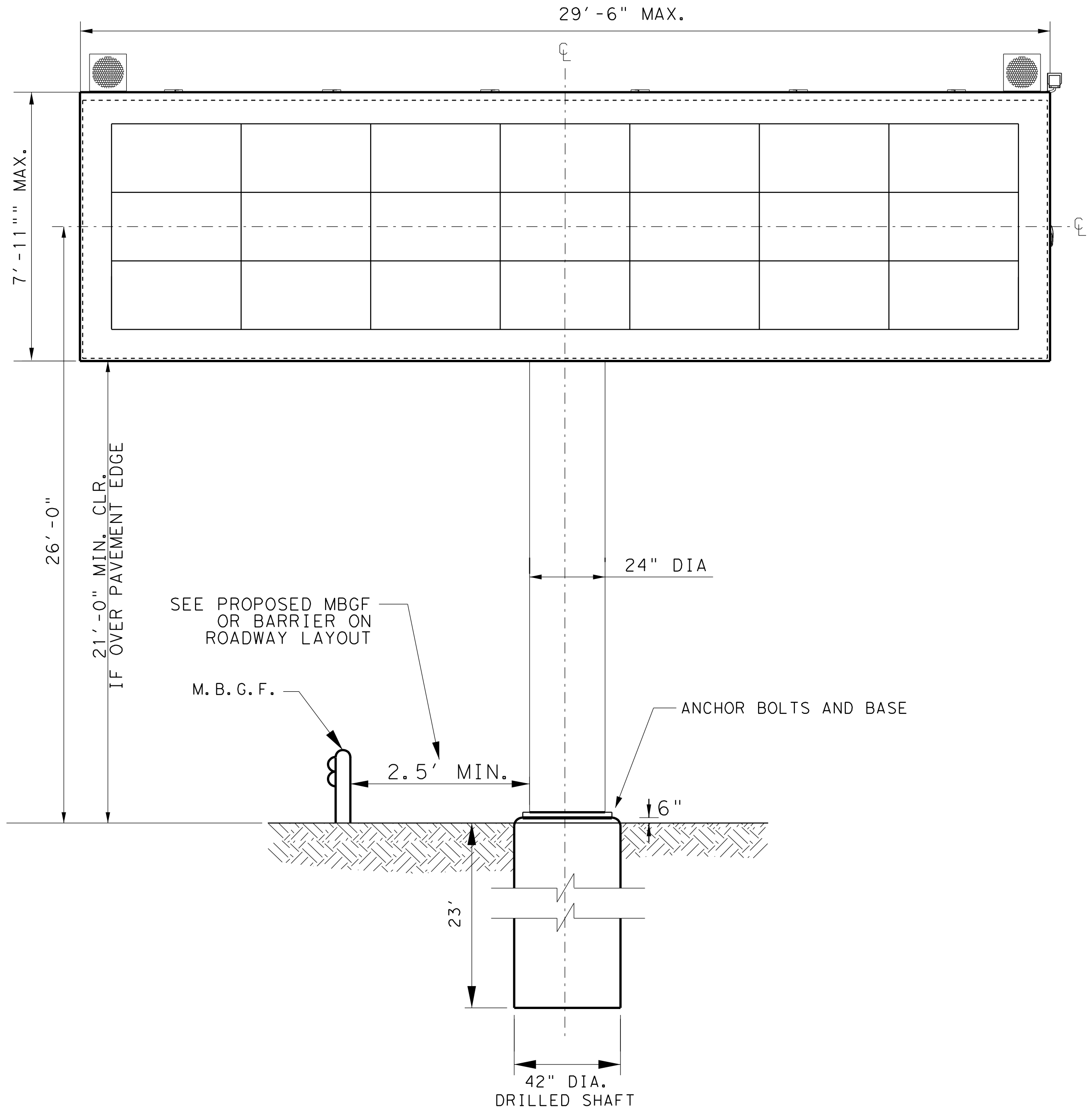

FRONT VIEW
NTS

NOTES:

1. ALL DIMENSIONS ARE IN FT/IN.
2. TOWER PIPE, ANCHOR BOLTS, BASE PLATE, TRUSS AND DRILLED SHAFTS SHALL MEET THE DESIGN REQUIREMENTS SPECIFIED IN THE COSS STANDARDS (OSB-Z4, OSBT, OSBC-SC-Z4 AND OSB-FD-SC AND DMS(TM-1, 2 & 3)-16).
3. WEIGHT OF DYNAMIC MESSAGE SIGN IS ASSUMED TO BE 4,000 POUNDS FOR DESIGN.
4. WALKWAY NOT REQUIRED.
5. REFER TO COSS & OSB-SZ TABLE FOR TRUSS, TOWER, AND FOUNDATION DETAILS.

Walter P. Moore and Associates, Inc.
TBPE Firm Registration No. 1856

STATE OF TEXAS
MARK ERIK WILLIAMS
94240
LICENSED
PROFESSIONAL ENGINEER

04/03/2023

DYNAMIC MESSAGE SIGNS TABLE A

	STRUCTURE NO.	(Back to Back DMS)	(Single DMS)
	DESIGN WIND HEIGHT (feet)	26	26
TRUSS DETAILS	LENGTH OF SPAN (feet)	29.5	29.5
	W X D & SIZE HS BOLTS	4.0x4.0 w/ 5/8" Dia HS Bolts	4.0x4.0 w/ 5/8" Dia HS Bolts
	LENGTH OF TRUSS PANELS	End = 3'-6" Interior = (2) x 5'-0" EA SIDE	End = 3'-6" Interior = (2) x 5'-0" EA SIDE
	CHORD	L 3 x 3 x 1/4	L 3 x 3 x 1/4
	DEAD LOAD DIAGONAL	L 2 x 2 x 3/16	L 2 x 2 x 3/16
	WIND LOAD DIAGONAL	L 2 1/2 x 2 1/2 x 3/16	L 2 1/2 x 2 1/2 x 3/16
	DEAD LOAD VERTICAL	L 2 x 2 x 3/16	L 2 x 2 x 3/16
	WIND LOAD STRUT	L 2 x 2 x 3/16	L 2 x 2 x 3/16
	TRUSS DEAD LOAD	43 lb/ft	43 lb/ft
TOWER DETAILS	TOWER HEIGHT AT TRUSS (feet)	25.5	25.5
	TOWER PIPE DIA & WALL THICKNESS	Dia = 24" Thick = 0.250"	Dia = 24" Thick = 0.250"
	NO. & SIZE OF ANCHOR BOLTS	(8) 1 3/4" ?* ?x ?3'-10" ?Lg.	(8) 1 3/4" ?* ?x ?3'-10" ?Lg.
	ANCHOR BOLT CIRCLE DIA	29 3/8"	29 3/8"
	BASE PLATE SIZE	33 3/4" x 1 5/8"	33 3/4" x 1 5/8"
	TRUSS TO TOWER CONNECTION	6 - 5/8" ?* ?AT ?EA ?CHORD	6 - 5/8" ?* ?AT ?EA ?CHORD
FOUNDATION	SIZE & LENGTH OF DR SHAFT	42" x 23'	42" x 23'
	MAIN SHAFT STEEL	(12) #10	(12) #10
	SHAFT SPIRAL REINFORCING	#4 @ 6" PITCH (Grade 60)	#4 @ 6" PITCH (Grade 60)

SCALE: NTS

NO.	DATE	REVISION	APPROVED

WALTER P MOORE
WALTER P MOORE AND ASSOCIATES, INCC
221 W 6TH ST, SUITE 800
AUSTIN, TX 78701
Texas Firm Registration No. F-1856

DYNAMIC MESSAGE SIGN
DETAILS

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6		60

STATE	DIST.	COUNTY	
TX	AUS	TRAVIS	
CONT.	SECT.	JOB	STREET/ROAD:
0700	03	149	SH 71

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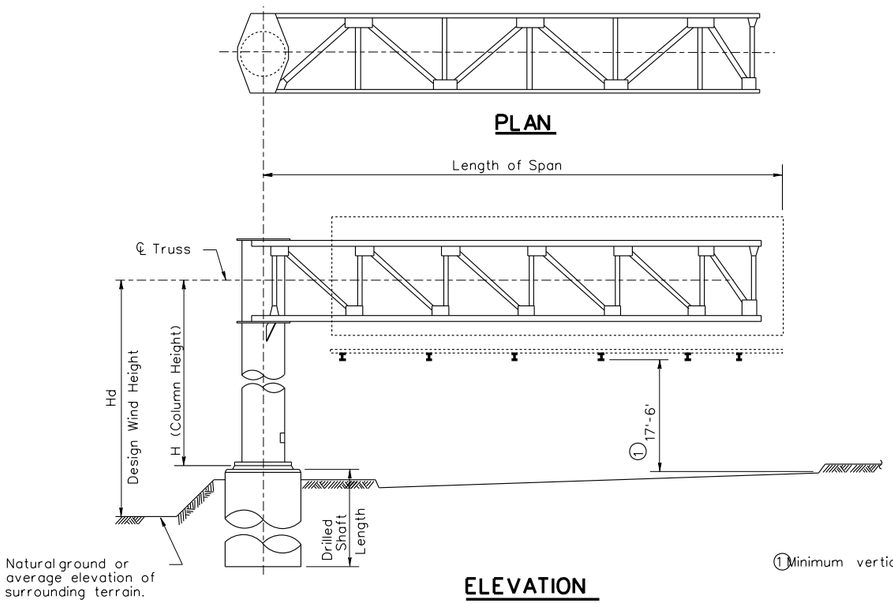
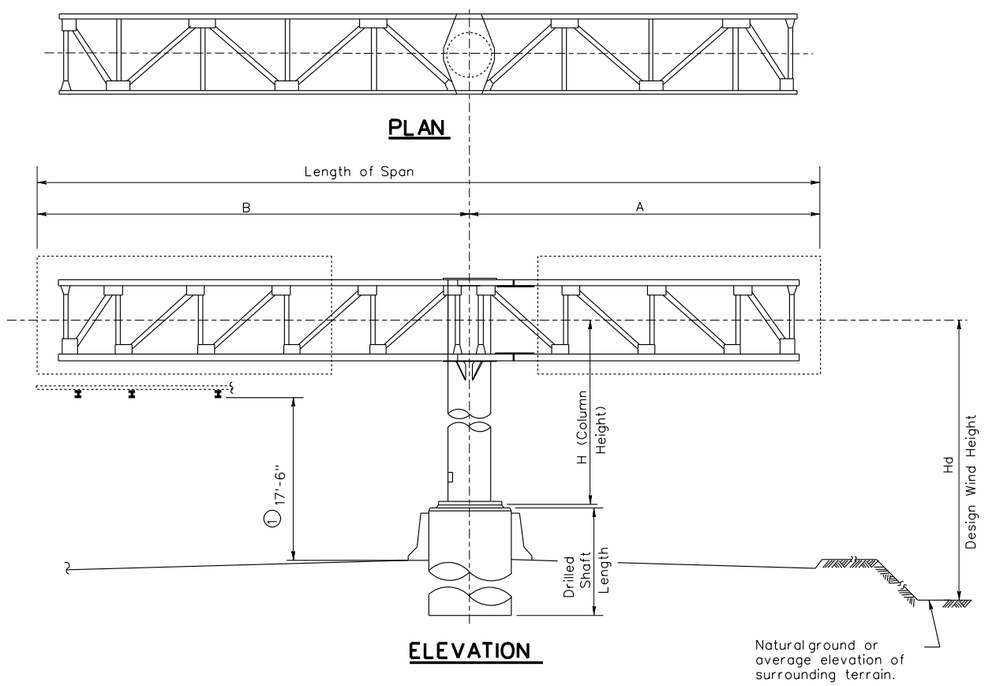


① Minimum vertical clearance



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 ¾" Dia x 1 ¾"
Anchor bolts 8~1 ¾" Dia on 29 ⅜" bolt circle
Horizontal deflection of tower at L 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 5/16(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 ⅝" Dia high strength with 5~¾" 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 ¾" Dia anchor bolts:
Anchor Bolts 1 ¾" 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'.

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 ½" Dia x 1 ¾"
Anchor bolts 8 ~ 2" Dia on 35 ¾" bolt circle
Horizontal deflection of tower at L 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 ⅝" 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 ⅝" Dia high strength with 3 ~ ¾" 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'.

Texas Department of Transportation
Traffic Operations Division

CANTILEVER OVERHEAD SIGN SUPPORTS SELECTION EXAMPLES

COSS-SE

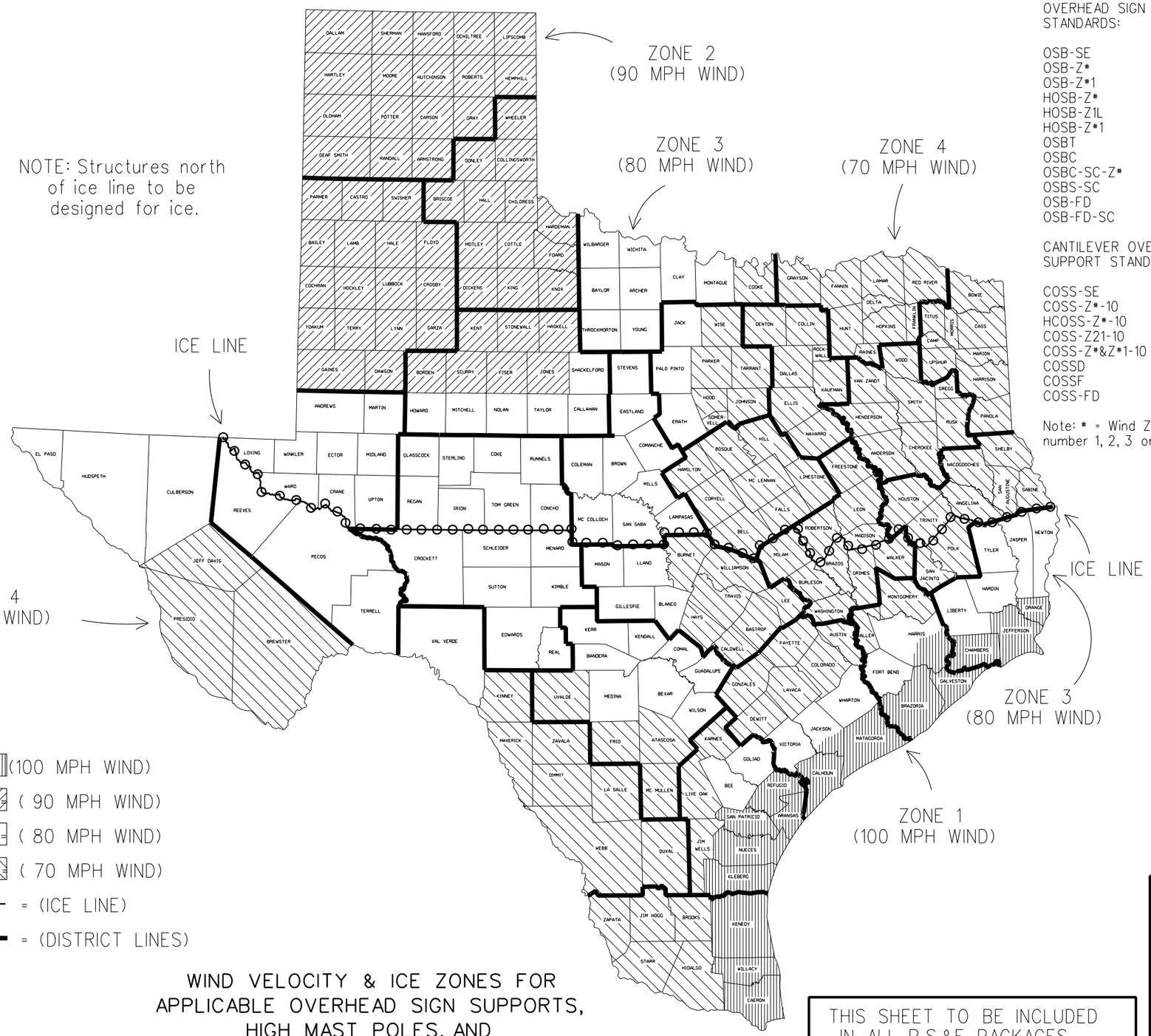
REVISIONS

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

CONT	SECT	JOB	HIGHWAY
0700	03	149	SH71
DIST	COUNTY		SHEET NO.
AUS	TRAVIS		61

DATE: 5/9/2023 11:47:01 AM
FILE: c:\users\time\appdata\local\bentley\projectwise\workingdir\wpm-pw.bentley.com_wpmpw01_dgn\windice.dgn

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



LEGEND

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

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

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

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

APPLICABLE STANDARDS SHEETS

OVERHEAD SIGN BRIDGE STANDARDS:

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

CANTILEVER OVERHEAD SIGN SUPPORT STANDARDS:

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

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

HIGH MAST ILLUMINATION POLE STANDARDS:

HMIP-98
HMIF-98

WALKWAYS AND BRACKETS STANDARDS:

SWW
SB(SWL-1)

TRAFFIC SIGNAL POLE STANDARDS:

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

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

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

Texas Department of Transportation
Traffic Operations Division Standard

WIND VELOCITY AND ICE ZONES

WV & IZ-14

FILE: windice.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1996	CONT	SECT	JOB	HIGHWAY
REVISIONS	0700	03	149	SH71
8-14- Added list of applicable standards, restricting use to structures designed for Fastest Mile wind speeds.	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		62

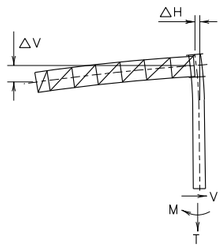
DATE: 5/9/2023 11:47:02 AM
FILE: c:\users\time\appdata\local\bentley\projectwise\workingdir\wpm-pw.bentley.com_wpm-pw-01\tewing@walterpmoore.com\dms23668\COSS-Z4&Z41-10.dgn

ZONE 4 WITH AND WITHOUT ICE 70 MPH WIND

TOWER HEIGHT (ft)	10' SPAN TOWER PIPE O.D. (in)	WALL TH CK (in)	DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	NO.	BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	DESIGN LOADS SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)	15' SPAN TOWER PIPE O.D. (in)	WALL TH CK (in)	DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	NO.	BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	DESIGN LOADS SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)	20' SPAN TOWER PIPE O.D. (in)	WALL TH CK (in)	DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	NO.	BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	DESIGN LOADS SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)	25' SPAN TOWER PIPE O.D. (in)	WALL TH CK (in)	DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	NO.	BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	DESIGN LOADS SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)	TOWER HEIGHT (ft)
14'	16	0.250	0.104	1 1/4	6	20 1/2"	24 x 1 1/4	0.2	2.75	12.39	38.53	16	0.250	0.234	1 3/8	6	20 3/4"	24 1/2x 1 1/4	0.5	4.13	28.76	59.63	16	0.250	0.419	1 3/4	6	21 1/2"	26 x 1 3/4	1.3	5.59	52.67	83.06	20	0.250	0.333	1 3/8	8	24 3/4"	28 1/2x 1 3/8	1.4	7.00	82.44	107.23	14'
15'			0.119						2.76		41.23			0.268				24 1/2x 1 1/4	0.6	4.14		63.62		0.250	0.481					1.4	5.61		88.34			0.382					1.5	7.02		113.64	15'
16'			0.136						2.77		43.94			0.305				24 1/2x 1 3/8	0.6	4.16		67.63		0.250	0.547					1.5	5.62		93.66			0.435					1.6	7.03		120.14	16'
17'			0.153						2.79		46.68			0.345	1 3/8		20 3/4"	24 1/2x 1 3/8	0.6	4.17		71.67		0.281	0.549					1.4	5.63		99.03			0.491					1.7	7.05		126.71	17'
18'			0.172						2.80		49.43			0.386	1 1/2		21"	25 x 1 3/8	0.7	4.18		75.74			0.615					1.5	5.64		104.44			0.550	1 3/8		24 3/4"	28 1/2x 1 3/8	1.7	7.07		133.34	18'
19'			0.191						2.81		52.20			0.431				25 x 1 1/2	0.7	4.20		79.83			0.685					1.5	5.66		109.88			0.613	1 1/2		25"	29 x 1 1/2	1.8	7.08		140.03	19'
20'			0.212						2.83		54.99			0.477					0.7	4.21		83.94		0.281	0.759				26 x 1 3/4	1.6	5.67		115.36			0.679					1.9	7.10		146.77	20'
21'			0.234						2.84		57.79			0.526					0.8	4.22		88.08		0.310	0.759				26 x 2	1.5	5.68		120.86		0.250	0.749					2.0	7.12		153.56	21'
22'			0.257					0.2	2.85		60.61			0.577		6		25 x 1 1/2	0.8	4.23		92.23			0.834					1.6	5.70		126.40		0.281	0.735				29 x 1 1/2		7.13		160.39	22'
23'			0.280					0.3	2.87		63.45			0.631		8		25 x 1 5/8	0.9	4.25		96.40			0.911		6			1.7	5.71		131.96			0.803				29 x 1 5/8		7.15		167.26	23'
24'			0.305						2.88		66.30			0.687					0.9	4.26		100.60		0.310	0.992		8				5.77		138.12			0.874	1 1/2		25"			7.16		174.17	24'
25'			0.331	1 1/4		20 1/2"	24 x 1 1/4		2.89		69.16			0.745					0.9	4.27		104.81		0.340	0.990						5.73		143.15		0.281	0.949	1 3/4		25 3/8"		2.0	7.18		181.12	25'
26'			0.358	1 3/8		20 3/4"	24 1/2x 1 3/8		2.90		72.04			0.806					1.0	4.29		109.03		0.340	1.071					1.7	5.75		148.78		0.312	0.920				29 x 1 5/8	2.1	7.20		188.02	26'
27'			0.386			21"	25 x 1 1/2		2.92		74.93			0.869						4.30		113.28		0.340	1.155					1.8	5.76		154.43			0.992				29 3/4x 1 3/4		7.21		195.03	27'
28'			0.416						2.93		77.84		0.250	0.935						4.31		117.54		0.375	1.139					1.7	5.77		160.10			1.067				29 3/4x 1 3/4		7.23		202.07	28'
29'			0.446						2.94		80.76		0.280	0.898						4.33		121.82		0.375	1.221					1.8	5.79		165.79		0.312	1.145				29 3/4x 1 3/4	2.1	7.24		209.14	29'
30'			0.477	1 3/8		20 3/4"	24 1/2x 1 3/8		2.96		83.69			0.961						4.34		126.11		0.375	1.307						5.80		171.49		0.344	1.119				29 3/4x 2	2.2	7.26		216.23	30'
31'			0.509	1 1/2		21"	25 x 1 1/2		2.97		86.64			1.026					1.0	4.35		130.42		0.410	1.297						5.81		177.22		0.344	1.194				29 3/4x 2	2.2	7.28		223.35	31'
32'	16	0.250	0.543	1 1/2	6	21"	25 x 1 1/2	0.3	2.98	12.39	89.61	16	0.280	1.094	1 1/2	8	21"	25 x 1 5/8	1.1	4.36	28.76	134.74	16	0.410	1.382	1 3/4	8	21 1/2"	26 x 2	1.8	5.83	52.67	182.97	20	0.344	1.273	1 3/4	8	25 3/8"	29 3/4x 2	2.2	7.29	82.44	230.50	32'

ZONE 4 WITH AND WITHOUT ICE 70 MPH WIND

TOWER HEIGHT (ft)	30' SPAN TOWER PIPE O.D. (in)	WALL TH CK (in)	DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	NO.	BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	DESIGN LOADS SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)	35' SPAN TOWER PIPE O.D. (in)	WALL TH CK (in)	DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	NO.	BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	DESIGN LOADS SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)	40' SPAN TOWER PIPE O.D. (in)	WALL TH CK (in)	DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	NO.	BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	DESIGN LOADS SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)	TOWER HEIGHT (ft)
14'	24	0.250	0.285	1 1/2	8	29"	33 x 1 1/2	1.6	8.42	119.01	134.48	24	0.250	0.406	1 3/4	8	29 3/8"	33 3/4x 1 1/2	2.6	9.77	161.98	165.20	30	0.250	0.280	1 3/4	8	35 3/8"	39 3/4x 1 1/2	2.4	11.22	211.94	200.44	14'
15'			0.327					1.6	8.44		141.90			0.467					2.7	9.79		173.37			0.322						2.5	11.24		209.33	15'
16'			0.372					1.7	8.46		149.44			0.531					2.8	9.81		181.71			0.366						2.6	11.27		218.45	16'
17'			0.420					1.8	8.48		157.10		0.250	0.599				33 3/4x 1 1/2	3.0	9.83		190.21			0.413						2.7	11.29		227.79	17'
18'			0.471					1.9	8.50		164.85		0.281	0.602				33 3/4x 1 5/8	2.9	9.85		198.85			0.463						2.8	11.32		237.32	18'
19'			0.524					2.0	8.52		172.68			0.671					3.0	9.87		207.61		0.250	0.516						2.9	11.34		247.01	19'
20'			0.581					2.1	8.54		180.60			0.743					3.1	9.89		216.48		0.281	0.510						2.8	11.37		256.86	20'
21'			0.641	1 1/2		29"	33 x 1 1/2	2.2	8.56		188.59			0.820					3.2	9.91		225.46			0.562						2.9	11.39		266.86	21'
22'			0.703	1 3/4		29 3/8"	33 3/4x 1 1/2	2.2	8.58		196.65		0.281	0.900				33 3/4x 1 3/4	3.4	9.93		234.52			0.617						3.0	11.41		276.98	22'
23'			0.768				33 3/4x 1 1/2	2.3	8.60		204.76		0.312	0.889				33 3/4x 1 3/4	3.2	9.95		243.67			0.675				39 3/4x 1 1/2		3.1	11.44		287.22	23'
24'			0.837				33 3/4x 1 5/8	2.4	8.62		212.93			0.968	1 3/4		29 3/8"	33 3/4x 1 3/4	3.3	9.96		252.90			0.735	1 3/4		35 3/8"	39 3/4x 1 5/8	3.2	11.46		297.57	24'
25'			0.908				33 3/4x 1 5/8	2.5	8.64		221.15			1.050	2		29 3/4"	34 1/2x 1 7/8	3.5	9.98		262.20			0.797	2		35 3/4"	40 1/2x 1 5/8	3.3	11.49		308.01	25'
26'		0.250	0.982				33 3/4x 1 5/8	2.6	8.66		229.42			1.136					3.6	10.00		271.57			0.862				40 1/2x 1 5/8	3.4	11.51		318.55	26'
27'		0.281	0.949				33 3/4x 1 3/4	2.4	8.67		237.74		0.312	1.225					3.7	10.02		280.99			0.930				40 1/2x 1 5/8	3.5	11.54		329.18	27'
28'			1.021				33 3/4x 1 3/4	2.5	8.69		246.10		0.340	1.200				34 1/2x 1 7/8	3.5	10.04		290.48			1.000				40 1/2x 1 3/4	3.6	11.56		339.89	28'
29'			1.095	1 3/4		29 3/8"	33 3/4x 1 3/4	2.6	8.71		254.49			1.287				34 1/2x 2	3.6	10.06		300.02			1.073						3.7	11.58		350.68	29'
30'			1.172	2		29 3/4"	34 1/2x 1 3/4	2.7	8.73		262.93			1.377					3.7	10.08		309.61			1.148						3.8	11.61		361.53	30'
31'			1.251	2		29 3/4"	34 1/2x 1 3/4	2.8	8.75		271.41			1.471					3.8	10.10		319.25			1.226						3.9	11.63		372.46	31'
32'	24	0.281	1.333	2	8	29 3/4"	34 1/2x 1 3/4	2.8	8.77	119.01	279.92	24	0.340	1.567	2	8	29 3/4"	34 1/2x 2	3.9	10.12	161.98	328.93	30	0.281	1.306	2	8	35 3/4"	40 1/2x 1 3/4	4.0	11.68	211.94	384.26	32'



ELEVATION

(SHOWING DESIGN LOADS AND DEAD LOAD DEFLECTIONS)

TRUSS DETAILS

SPAN	10', 15', & 20' 25'	30' 35'	40'		
W x D = WIDTH x DEPTH	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0
CHORD- ①, Unless Otherwise Shown	L 3 x 3 x 3/16 ②[4] L	x 3 x 3 3/16 4 1/2 ② x	x3 3 [6] 1/4 x x	3 [5] L 5/16 x x	3 9] 3 3/8
DEAD LOAD DIAGONAL- ②	L 2 x 2 x 3/16 [2] L	x 2 x 2 3/16 2] L x	x2 2 [2] 3/16 x x	2 [2] L 3/16 x x	2 1/2 3] 2 1/2 3/16
WIND LOAD DIAGONAL- ②	L 2 1/2 x 2 1/2 3/16 [2] L	x2 1/2 x2 1/2 3/16 2] L x	2x 1/2 2 1/2 [2] 3/16 x x	3 [3] L 3/16 x x	3 2] 3 3/16
DEAD LOAD VERTICAL- ②	L 2 x 2 x 3/16 [2] L	x 2 x 2 3/16 2] L x	x2 2 [2] 3/16 x x	2 [2] L 3/16 x x	2 2] 2 3/16
WIND LOAD STRUT- ②	L 2 x 2 x 3/16 [1] L	x 2 x 2 3/16 1] L x	x 2 2 [1] 3/16 x x	2 [1] 2 3/16 x	[1] 2 2 3/16
TRUSS DEAD LOAD	37 lb/ft	38 lb/ft 43 lb/ft	50 lb/ft	56 lb/ft	
SIZE H. S. BOLTS IN CONNECTION	5/8" DIA	5/8" DIA	5/8" DIA	5/8" DIA	5/8" DIA
NO. & SIZE OF H. S. BOLTS IN CHORD ANGLE TO TOWER CONNECTION PLATE	4 ~ 5/8" DIA ea	4 ~ 5/8" DIA or 3 ~ 3/4" DIA ea	6 ~ 5/8" DIA or 6 ~ 5 ~ 3/4" DIA ea	5/8" DIA or 9 ~ 5/8" DIA or 7 ~ 3/4" DIA ea	

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

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

GENERAL NOTES :

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

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

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

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

For truss details see standard drawing COSSD.

For base and foundation details see standard drawing COSSF.

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

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

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

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

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

Texas Department of Transportation
Traffic Operations Division

CANTILEVER OVERHEAD SIGN SUPPORTS

COSS-Z4 & Z41-10

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS	CONT	SECT	JOB	HIGHWAY
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	AUS	TRAVIS		63

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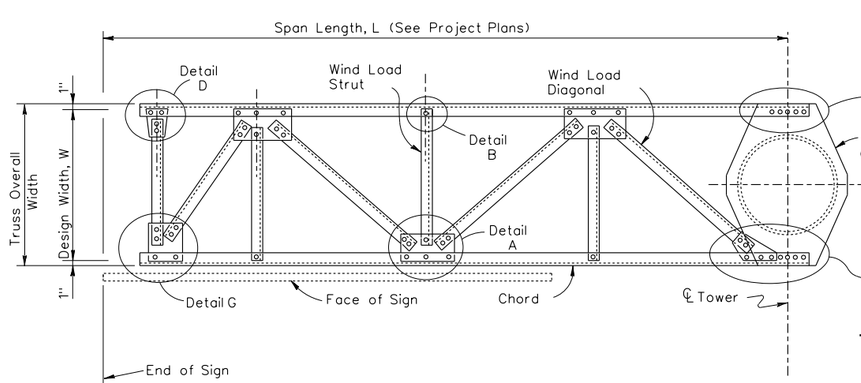
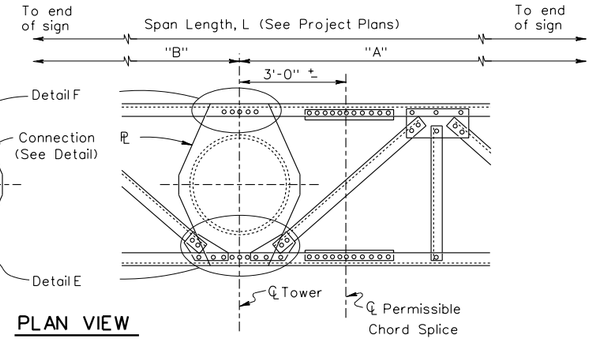


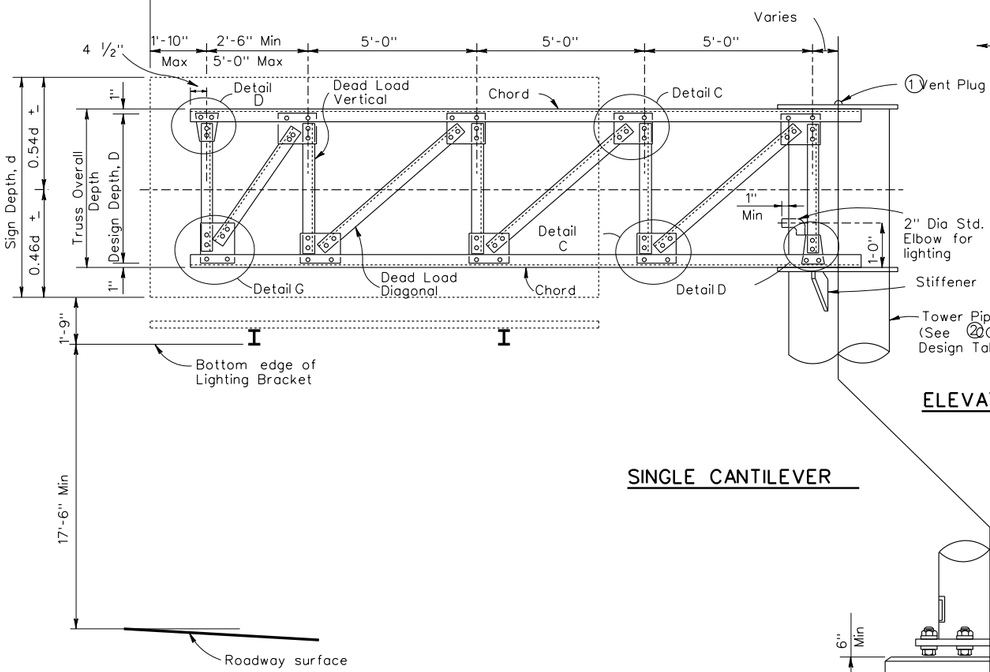


PLAN VIEW

GENERAL NOTES:

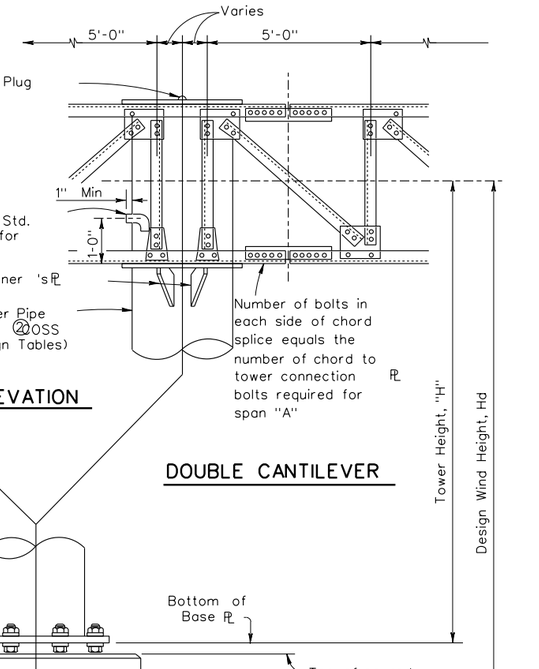
Design conforms to 1975 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and Interim revisions thereto. Connection details are typical only. Actual size of member and number of bolts will vary. The details on this sheet are intended as a guide only.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

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

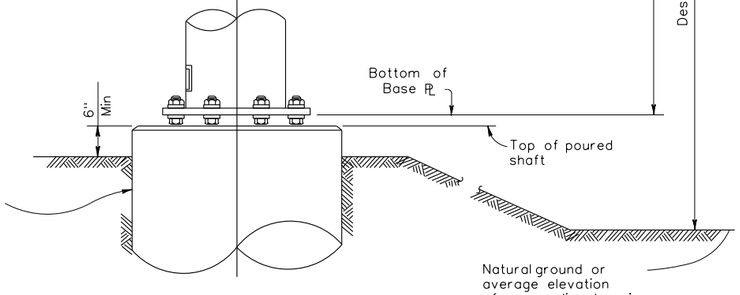


ELEVATION

SINGLE CANTILEVER



DOUBLE CANTILEVER



See standard drawing, COSSF for Hand Hole, Base ℄ Anchor Bolt and Foundation Details.

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

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

SHEET 1 OF 2

Texas Department of Transportation
Traffic Operations Division

CANTILEVER OVERHEAD SIGN SUPPORT DETAILS

COSSD

REVISIONS

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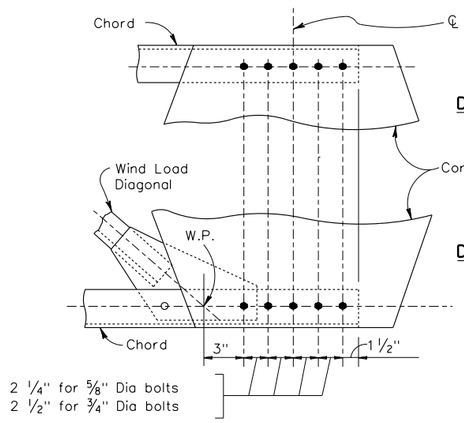
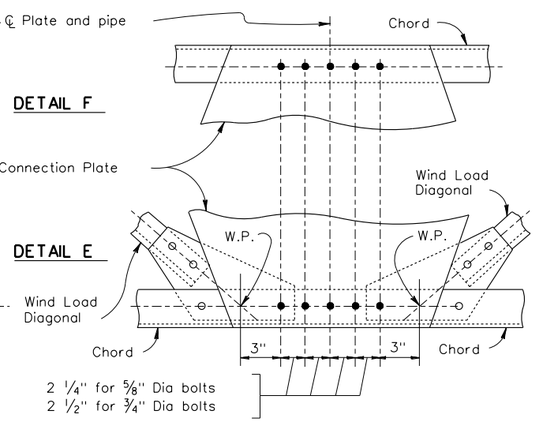


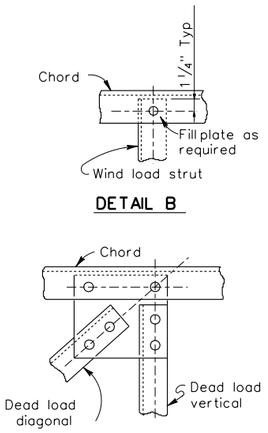
DETAIL F

DETAIL E

SINGLE CANTILEVER



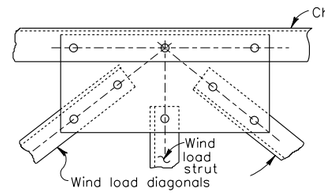
DOUBLE CANTILEVER



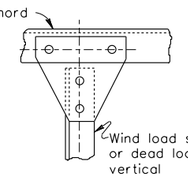
DETAIL B

DETAIL C

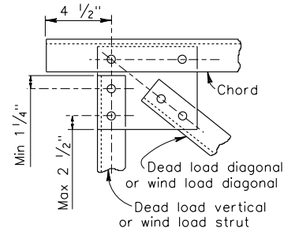
CONNECTION DETAILS



DETAIL A

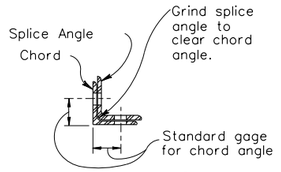


DETAIL D

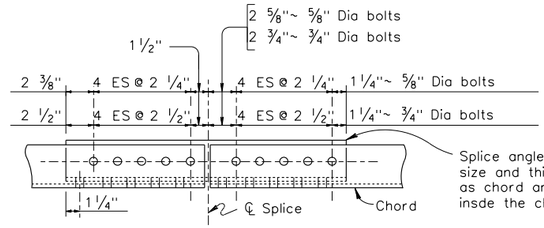


DETAIL G

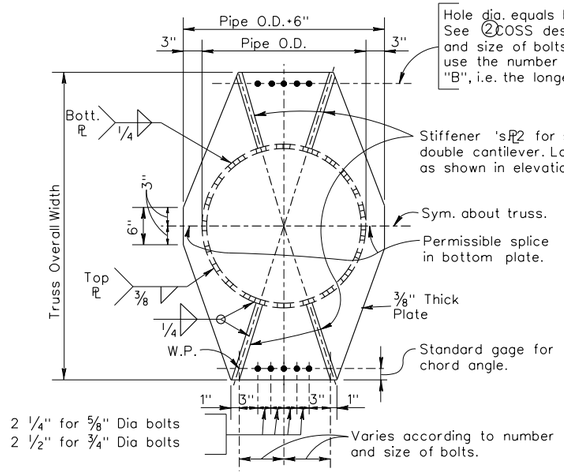
TOTAL NO. OF BOLTS IN DIAG'S. IN JOINT	NUMBER OF BOLTS REQD. IN GUSSET ℄ TO CHORD CONNECTION
0	2
2	2
3	3
4	3
5	4
6	4
8	5
10	6



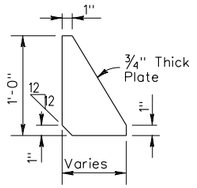
SECTION ON ℄SPLICE



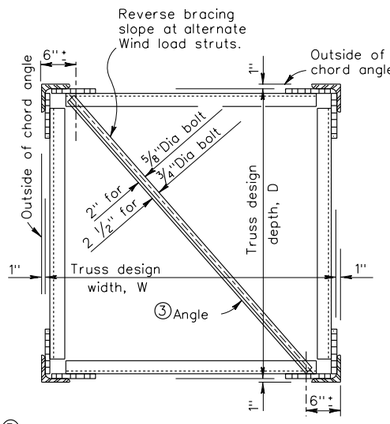
SINGLE SHEAR CHORD SPLICE



CONNECTION PLATE DETAIL



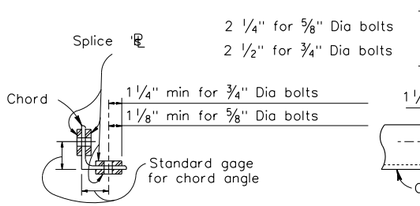
STIFFENER ℙ DETAIL



③2" x 2" x 3/16" angle for 5/8" Dia bolts [1]
2 1/2" x 2" x 3/16" angle for 3/4" Dia bolts [1]

TRUSS SECTION

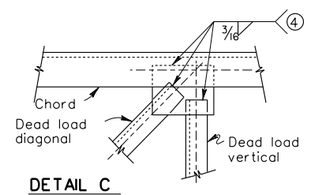
(DIAGONALS NOT SHOWN)



SECTION ON ℄SPLICE

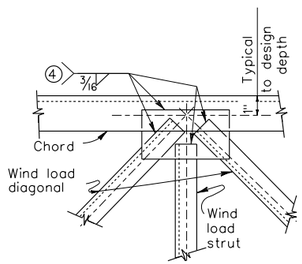
DOUBLE SHEAR CHORD SPLICE

SPLICE DETAILS



DETAIL C

(Gusset plates in other details to be similar)



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"

SHEET 2 OF 2

Texas Department of Transportation
Traffic Operations Division

CANTILEVER OVERHEAD SIGN SUPPORT DETAILS

COSSD

REVISIONS

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CONT	SECT	JOB	HIGHWAY
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AUS	TRAVIS		65

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Washers shall conform to ASTM F436.

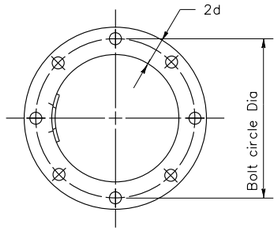
ANCHOR BOLT DIA.	WASHER DIMENSIONS				HOLE IN BASE PLATE
	OUTSIDE DIAMETER	HOLE DIAMETER	THICKNESS		
d			MIN.	MAX.	
1 1/2" or less	2d	d + 1/8"	0.136"	0.177"	d + 1/4"
1 3/4"	2d - 1/8"	d + 1/8"	0.178"	0.280"	d + 5/16"
2"	2d - 1/4"	d + 1/8"	0.178"	0.280"	d + 5/16"
Over 2"	2d - 1/2"	d + 1/8"	0.240"	0.340"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

ANCHOR BOLT SIZE				
DIA	BOLT ① LENGTH	THREAD ① LENGTH	PROJECTION LENGTH	GALVAN. ① 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"

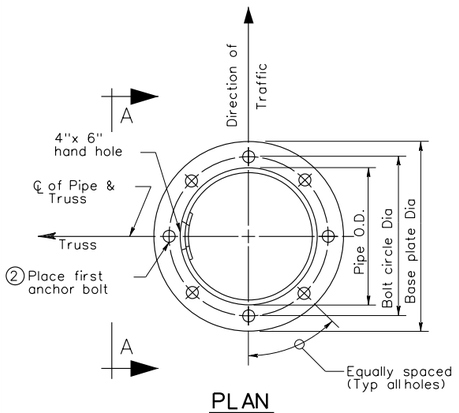
①Anchor Bolt Fabrication Tolerances:
Bolt Length ~ + -1/2"
Thread Length ~ + -1/2"
Galvanized Length ~ - 1/4"

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"	36" Dia	12-#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"	42" Dia	12-#10(C)	35 3/8"	48" Dia	16-#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"	36" Dia	10-#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)

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)

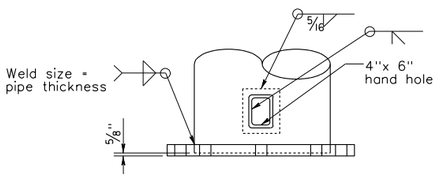


TOP VIEW OF TOP & BOTTOM TEMPLATES



PLAN

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

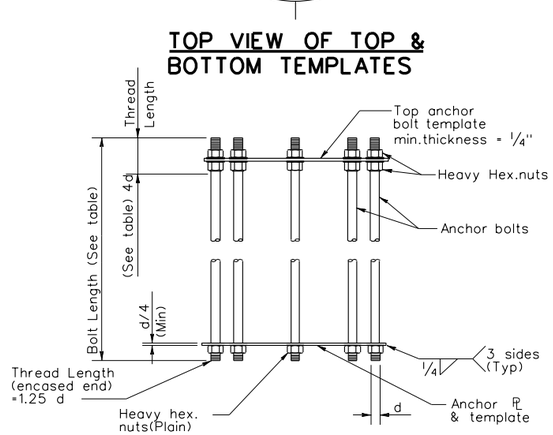


Cut 5" x 7" hole in pipe. Center 4" x 6" hand hole in 3/8" x 8" x 10" back up plate. Provide attachable cover made from section cut from pipe.

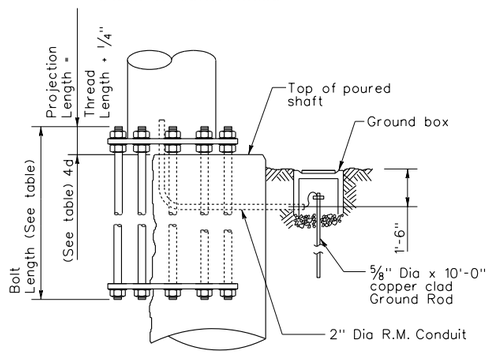
VIEW A-A

③ BASE PLATE & HANDHOLE DETAILS

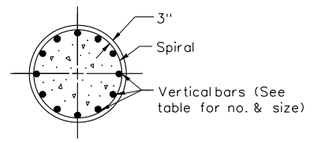
③ See "Cantilever Overhead Sign Support" or "High Level Cantilever Overhead Sign Support" sheets for Diameter and thickness of base plate.



ANCHOR BOLT ASSEMBLY
(PRIOR TO INSTALLATION)



BEARING SEAT ELEVATION



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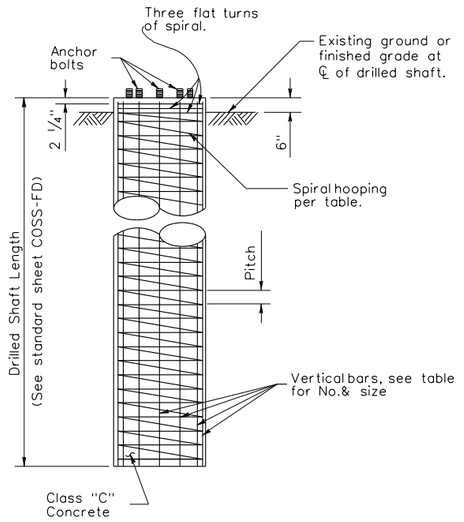

FOUNDATION DETAIL

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.

Texas Department of Transportation
Traffic Operations Division

CANTILEVER OVERHEAD SIGN SUPPORT FOUNDATION

COSSF

REVISIONS

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AUS	TRAVIS	66

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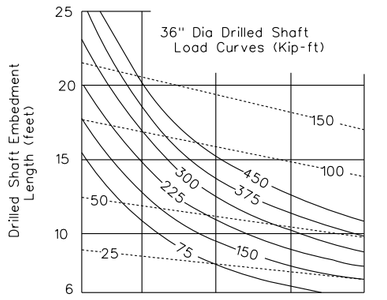
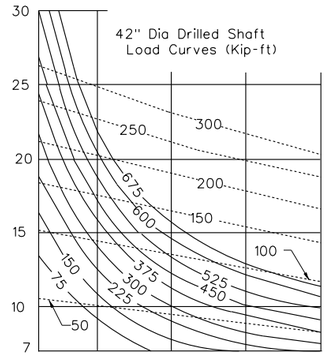
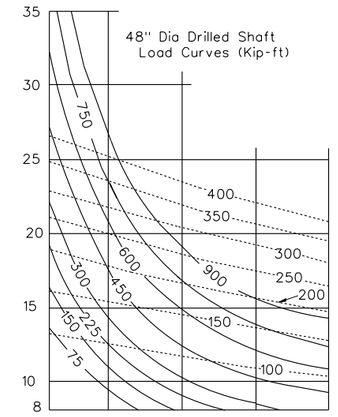
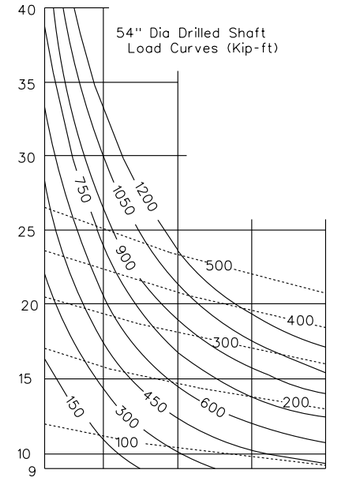








① θ = Angle of internal friction of soil (degrees)

② N = Texas cone penetrometer value (blows per ft)

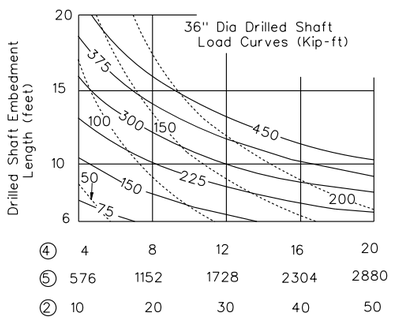
④ C(psi) = Cohesive shear strength of soil (psi)

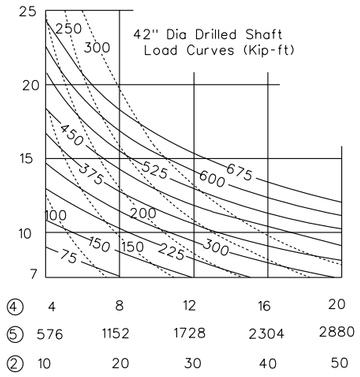
⑤ C(psf) = Cohesive shear strength of soil (psf)

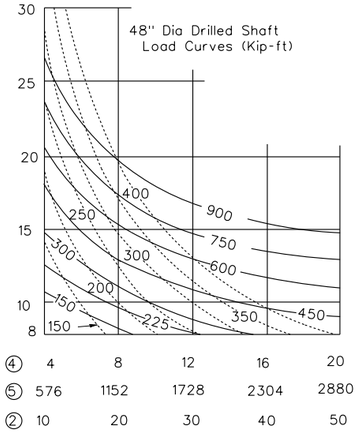
③ SUBMERGED SAND SOIL (COHESIONLESS)

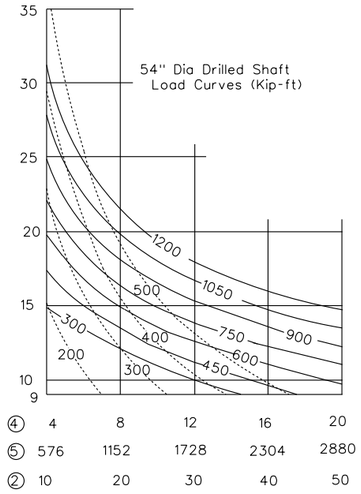
Moment ——————
Torsion .....

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



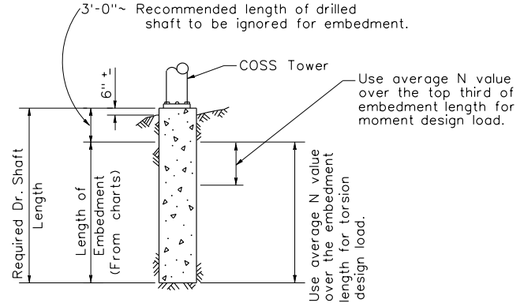






CLAY SOIL (COHESIVE)

Moment ——————
Torsion .....



PROCEDURE:

1. Determine design moment and torsion, and the required drilled shaft diameter as outlined in the selection example sheet COSS-SE.
2. Make an initial estimate of the required embedment length.
3. From soil exploration data determine type of soil and average N value or soil property along the upper third of the drilled shaft.
4. Enter chart (for the correct shaft diameter and soil type) from the bottom at the average N value or soil property determined in step 3.
5. Proceed vertically into chart and locate intersection with design moment. Interpolate between moment curves (solid lines) as needed.
6. From intersection point turn 90° to left and read embedment length along vertical scale.
7. If embedment length differs significantly from estimated value return to step 3 with the embedment length determined in step 6.
8. From soil exploration data determine average N value or soil property over the entire length of the embedment.
9. Enter chart (for correct shaft diameter and soil type) from the bottom at the average N value or soil property determined in step 8.
10. Proceed vertically into chart and locate intersection with design torsion. Interpolate between torsion curves (dashed lines) as needed.
11. From intersection point turn 90° to left and read embedment length along vertical scale.
12. Compute the required length of drilled shaft by adding 3'-0" to longer embedment length required for moment or torsion.

GENERAL NOTES:

These charts are for use with Cantilever Overhead Sign Supports with one shaft per tower.
Solid curves are base moment in Kip-ft.
Dash curves are base torsion in Kip-ft.
Minimum embedment of drilled shaft is two diameters.
Add 3'-0" to the required embedment length to determine the required length of drilled shaft.

Texas Department of Transportation
Traffic Operations Division

FOUNDATION EMBEDMENT SELECTION CHARTS

COSS-FD

REVISIONS

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

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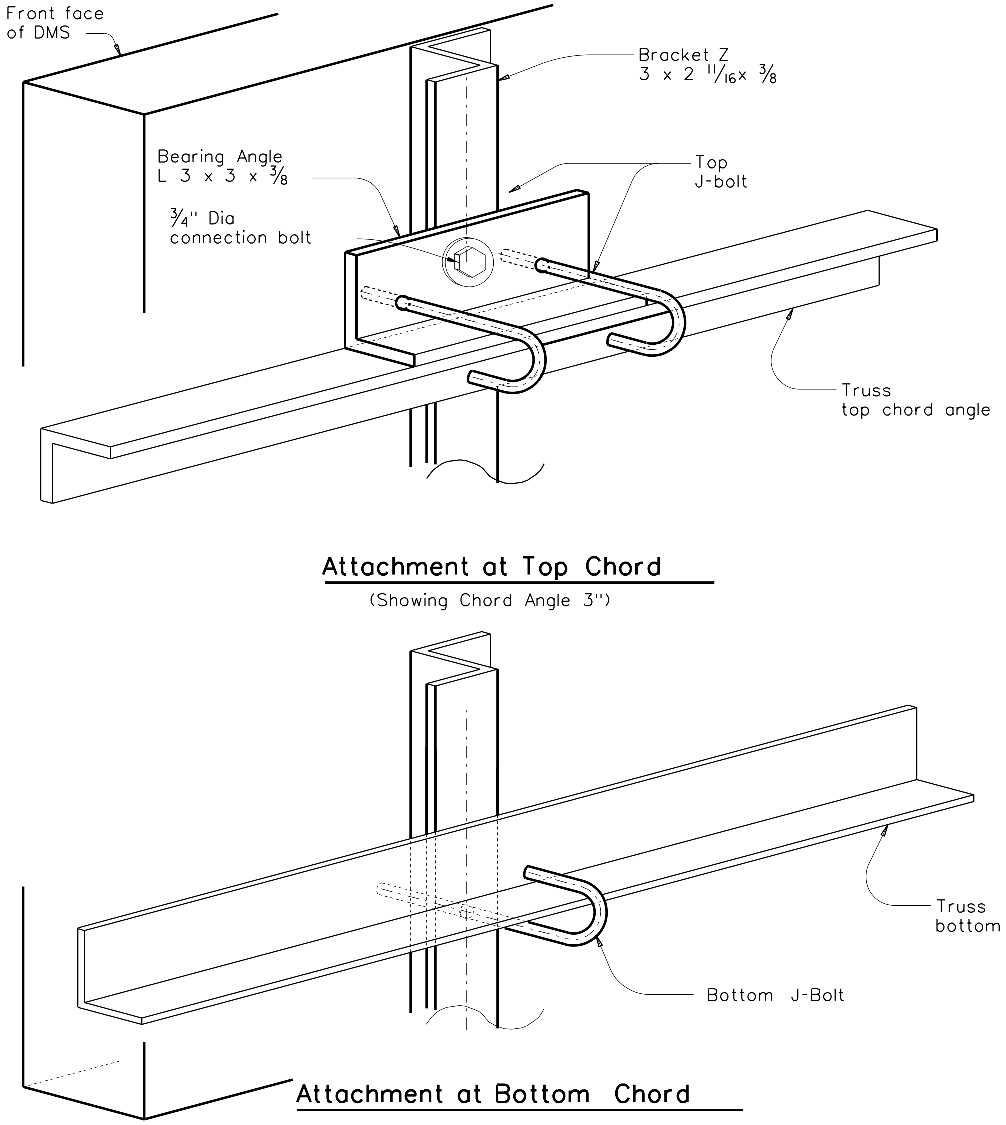
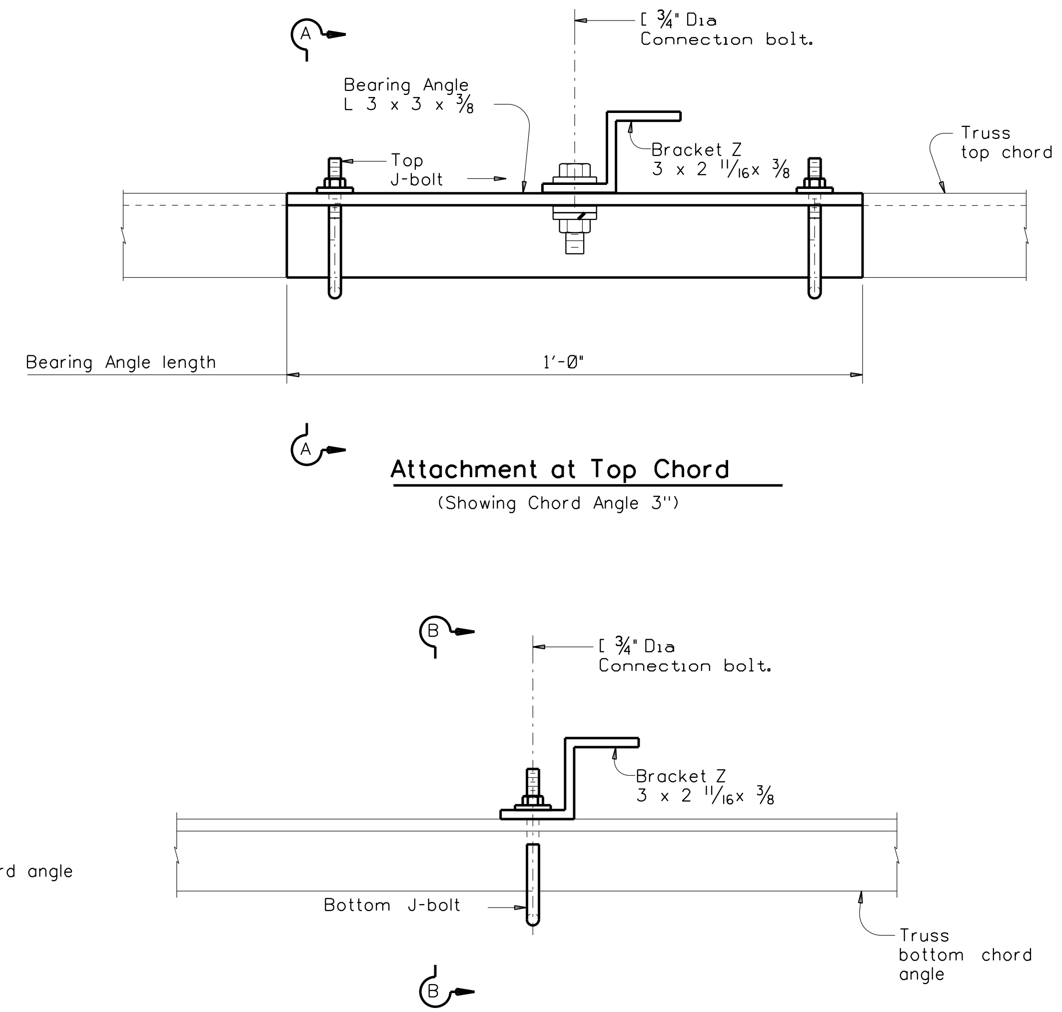
0700	03	149	SH71
DIST	COUNTY		SHEET NO.
AUS	TRAVIS		67



Attachment at Top Chord
(Showing Chord Angle 3")

Attachment at Bottom Chord

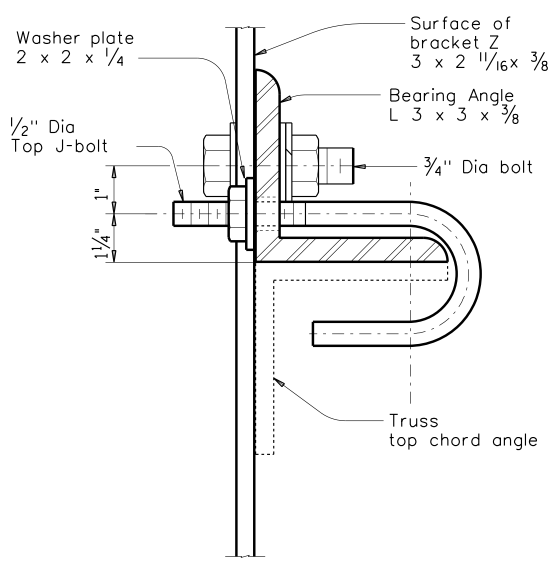
ISOMETRIC VIEW



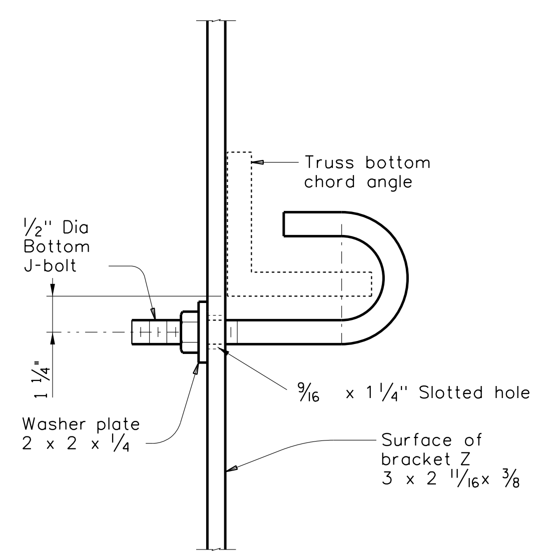
Attachment at Top Chord
(Showing Chord Angle 3")

Attachment at Bottom Chord

PLAN VIEW



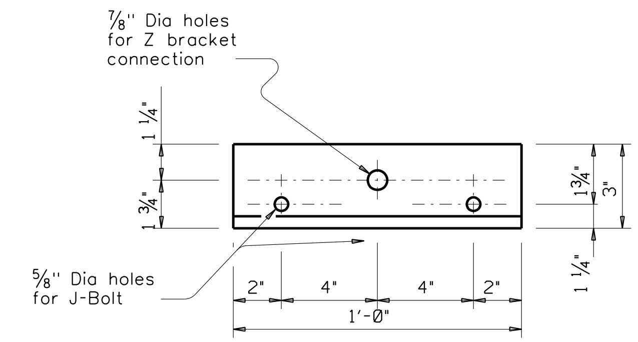
SECTION A-A



SECTION B-B

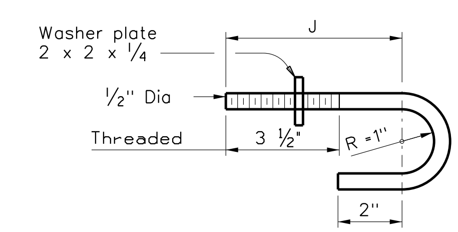
GENERAL NOTES:

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



BEARING ANGLE 3 x 3 x 3/8

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



TOP & BOTTOM J-BOLT

SHEET 1 OF 3

Texas Department of Transportation

Traffic Operations Division Standard

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

DMS(TM-1)-16

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REVISIONS	0700	03	149	SH71
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	AUS	TRAVIS		68

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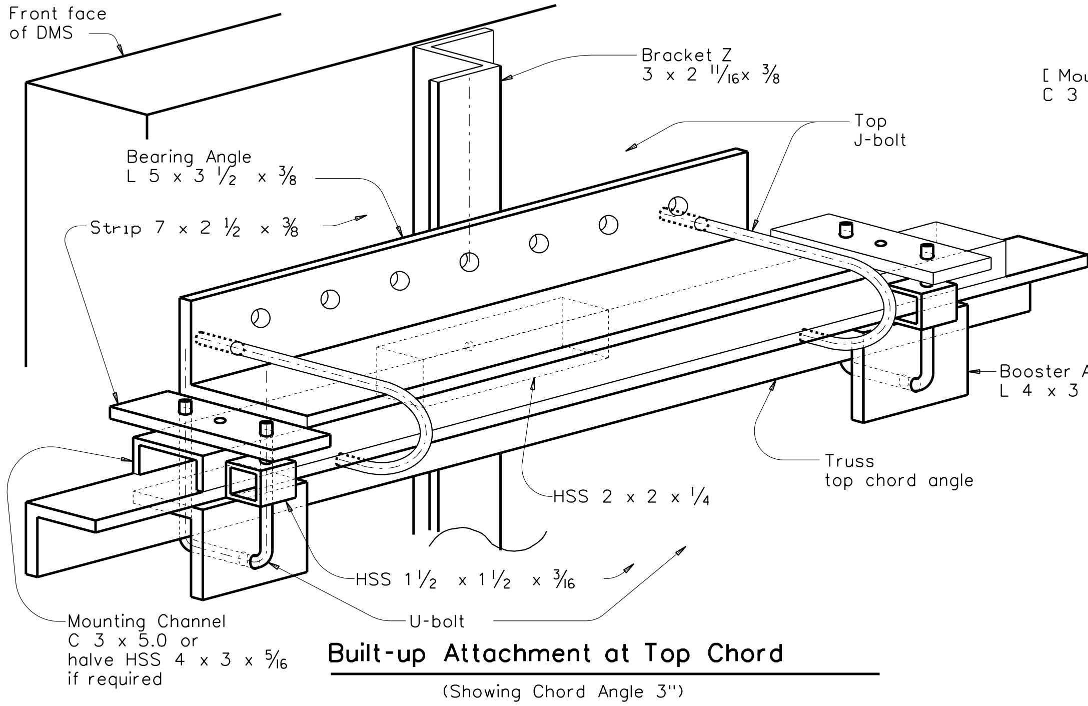
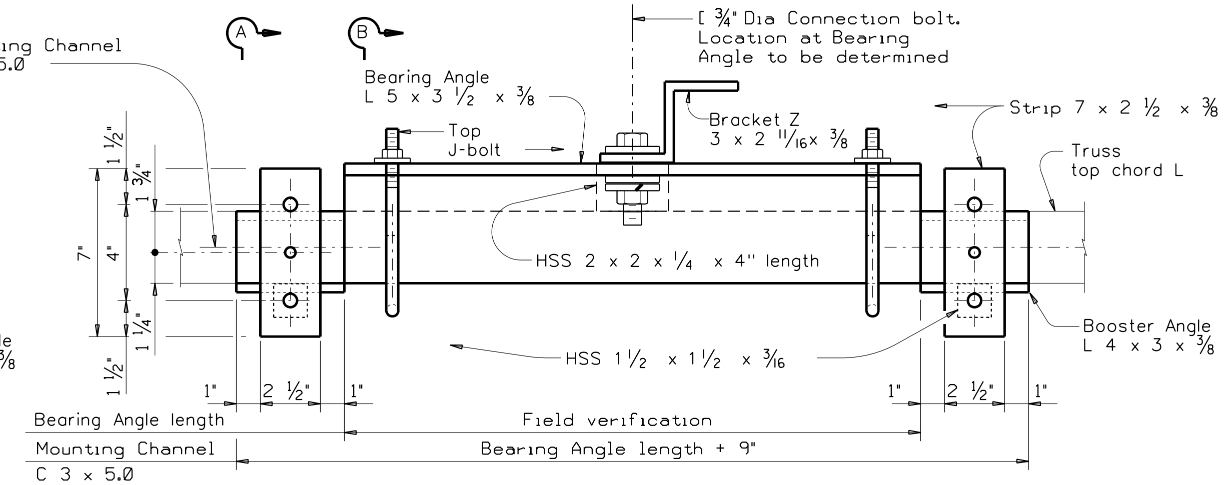


Built-up Attachment at Top Chord

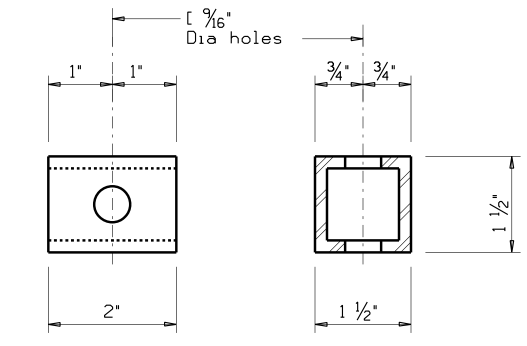
(Showing Chord Angle 3")

ISOMETRIC VIEW

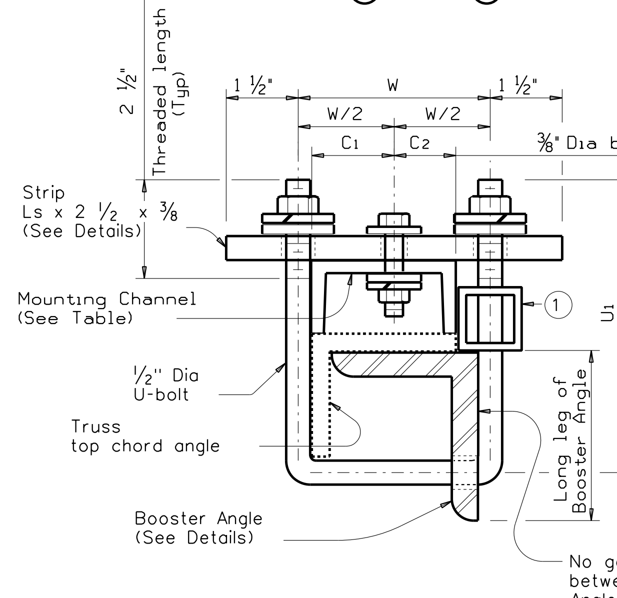


PLAN VIEW (AT TOP CHORD)

(Showing Chord Angle 3")



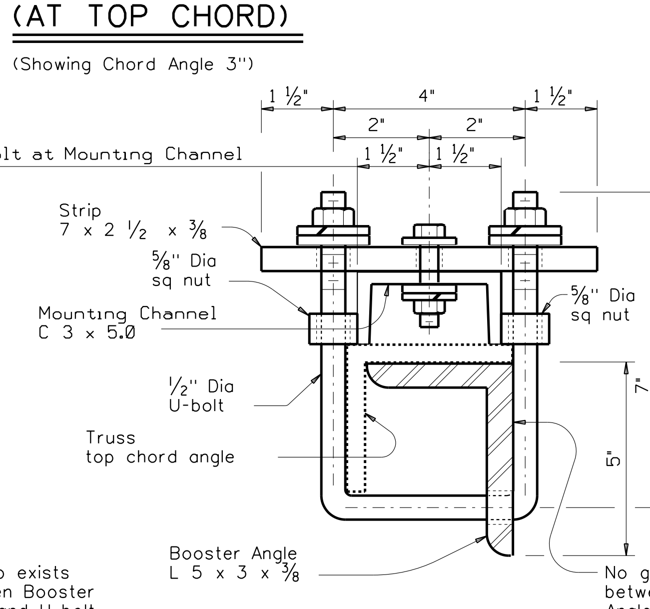
(1) HSS 1 1/2 x 1 1/2 x 3/16



SECTION A-A

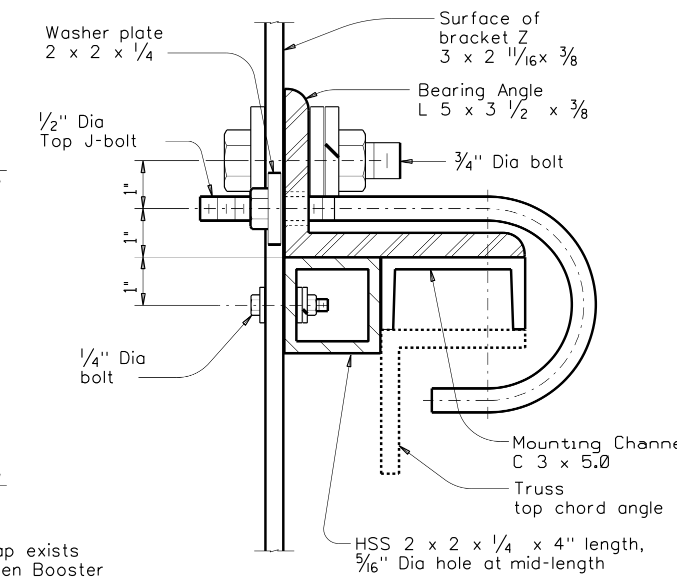
(Showing Chord Angle 3",4",5" & 6")

Chord Angle	U1	W	C1	C2	Mounting Channel
3"	7"	4"	1¾"	1¼"	C3 x 5.0
4"	8"	5"	2¼"	1¾"	C4 x 7.25
5"	9"	6"	2¾"	2¼"	C5 x 9.0
6"	10 ½"	7"	3¼"	2¾"	C6 x 13

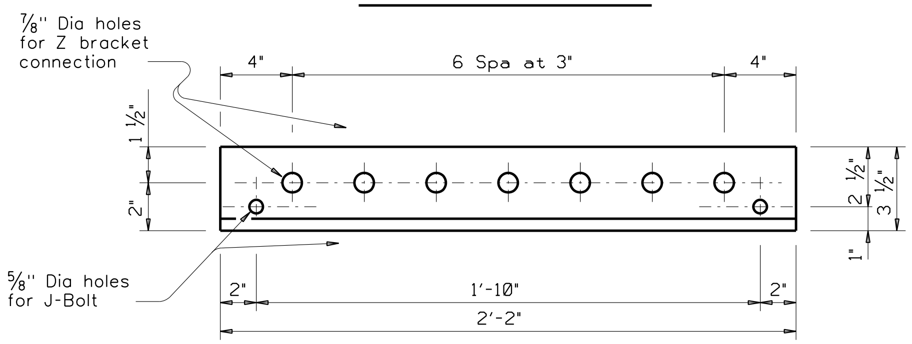


SECTION A-A

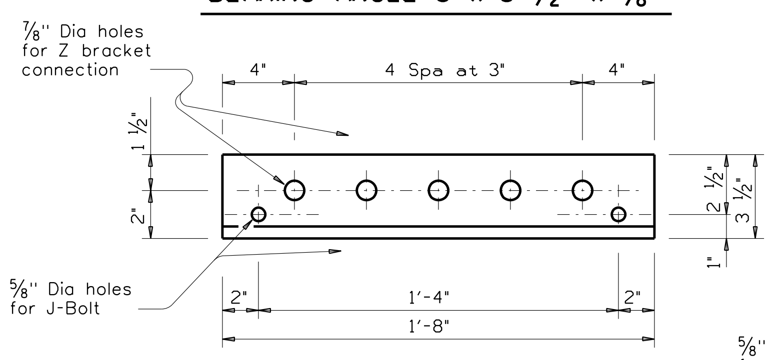
(Showing Chord Angle 3 1/2")



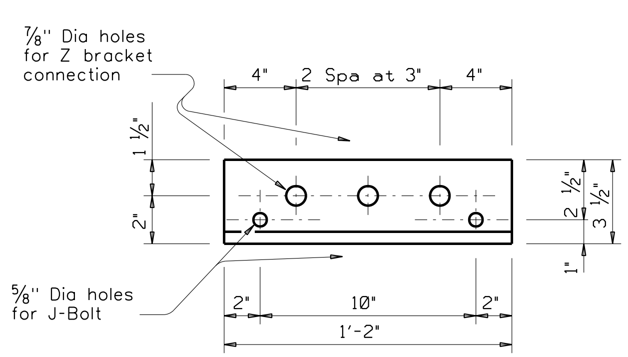
SECTION B-B



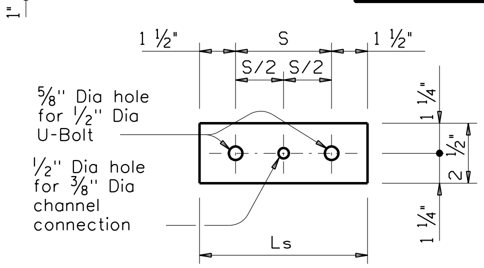
BEARING ANGLE 5 x 3 1/2 x 3/8



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

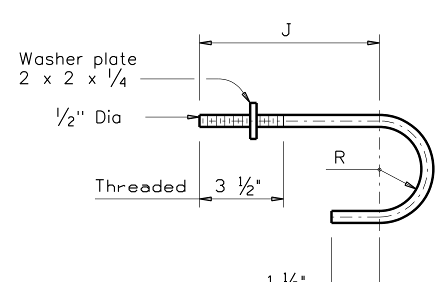


BEARING ANGLE 5 x 3 1/2 x 3/8



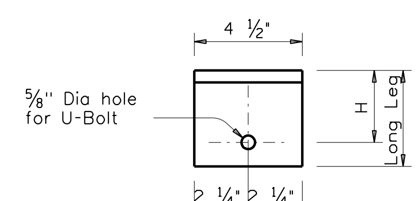
Strip Ls x 2 1/2 x 3/8

Chord Angle	S	Ls
3"	4"	7"
3 ½"	4"	7"
4"	5"	8"
5"	6"	9"
6"	7"	10"



TOP J-BOLT

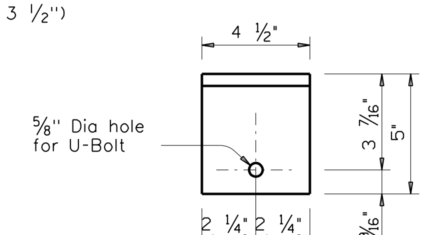
Chord Angle	J	R
3 & 3½"	7"	1 ¾"
4 & 5"	8"	2"
6"	9"	2 ¼"



BOOSTER ANGLE

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

Chord Angle	Booster Angle	H
3"	4 x 3 x ⅜	3"
4"	5 x 3 ½ x ⅜	3 13/16"
5"	6 x 4 x ⅜	4 13/16"
6"	7 x 4 x ⅜	5 ⅝"



BOOSTER ANGLE 5 x 3 x 3/8

(For Chord Angle 3 1/2")

SHEET 2 OF 3

Texas Department of Transportation — Traffic Operations Division Standard

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

DMS(TM-2)-16

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REVISIONS	DIST AUS		COUNTY TRAVIS	SHEET NO. 69

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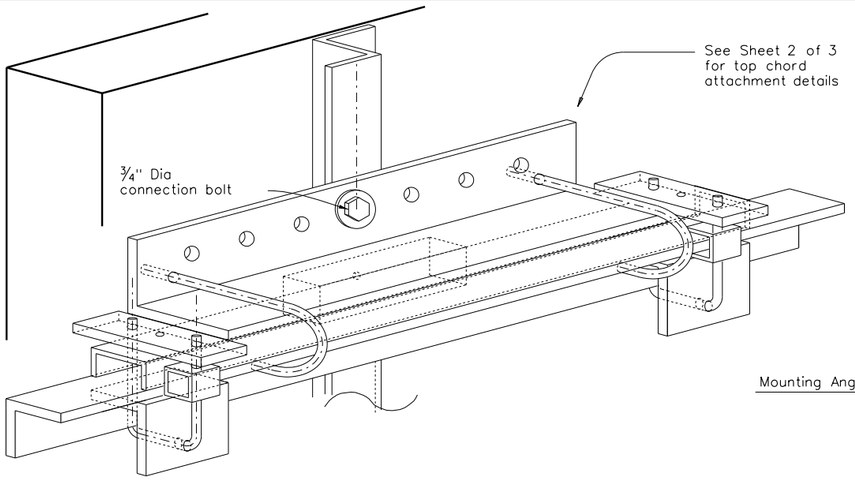
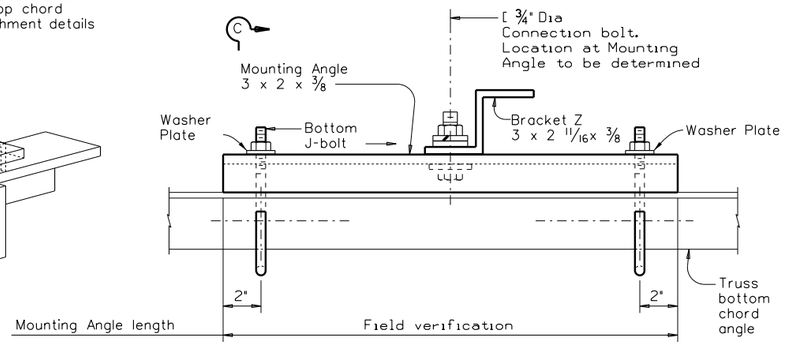
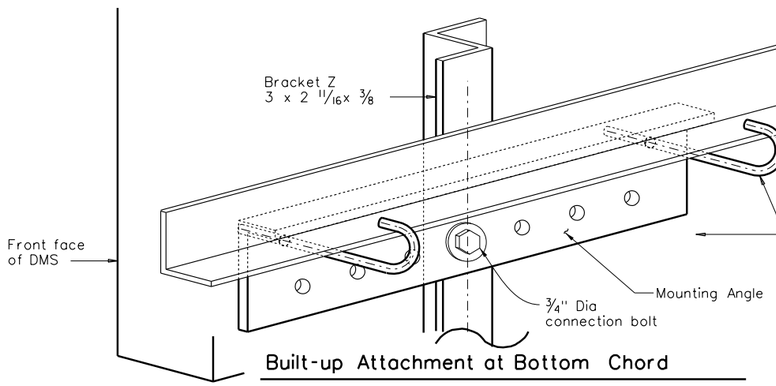


Built-up Attachment at Top Chord



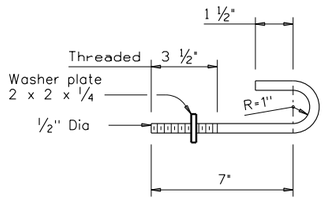


Built-up Attachment at Bottom Chord

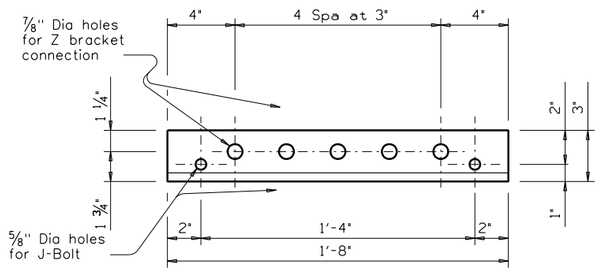
ISOMETRIC VIEW

C

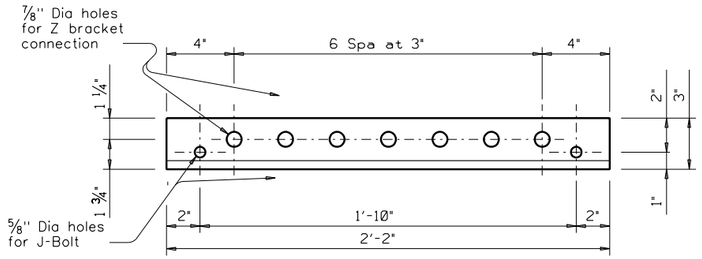
PLAN VIEW
(AT BOTTOM CHORD)



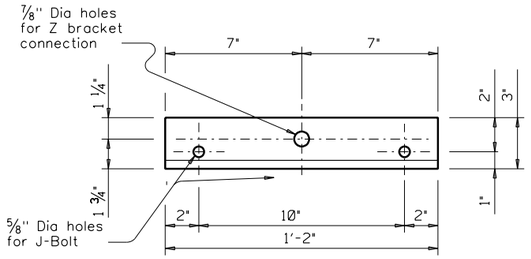
BOTTOM J-BOLT



MOUNTING ANGLE 3 x 2 x ⅜



MOUNTING ANGLE 3 x 2 x ⅜



MOUNTING ANGLE 3 x 2 x ⅜

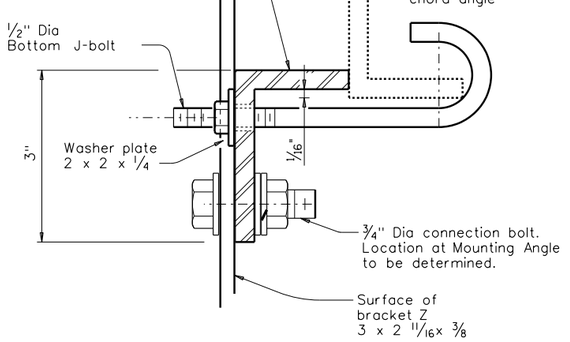
GENERAL NOTES:

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

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

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

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



SECTION C-C

SHEET 3 OF 3

Texas Department of Transportation

Traffic Operations Division Standard

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

DMS(TM-3)-16

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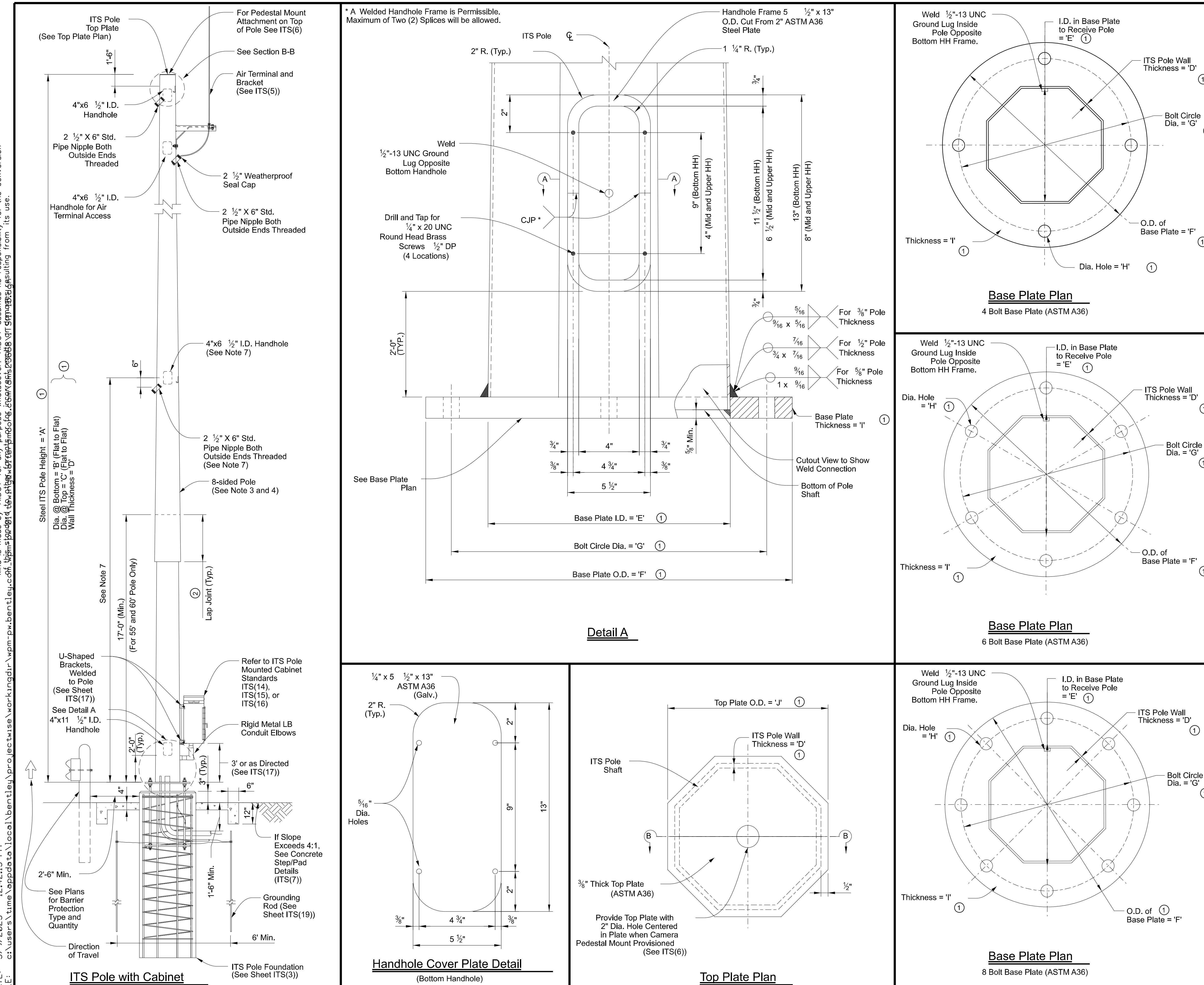

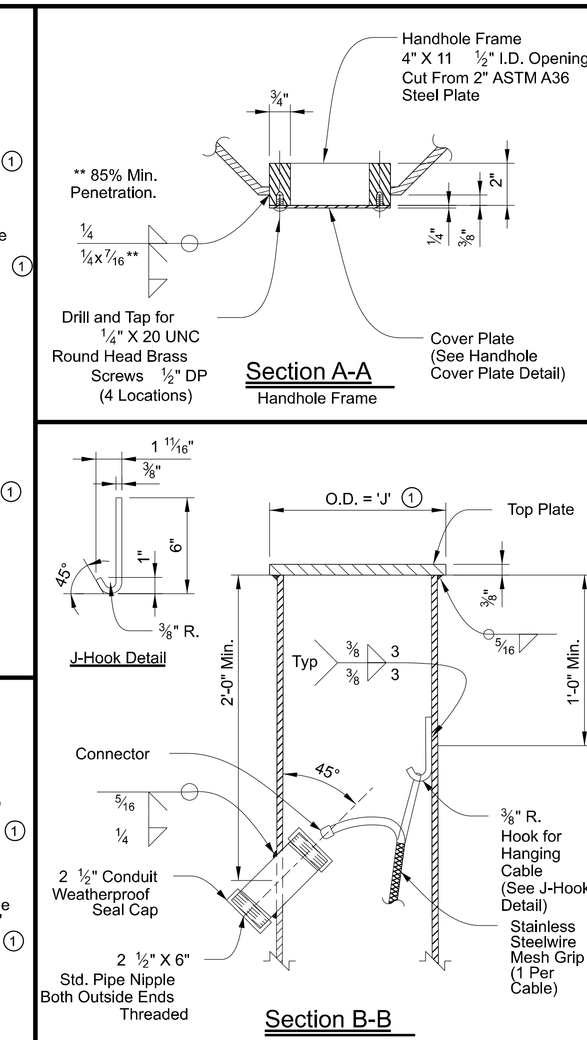

General Notes

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 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

FILE: its(1)-15.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT June 2015	CONT	SECT	JOB	HIGHWAY
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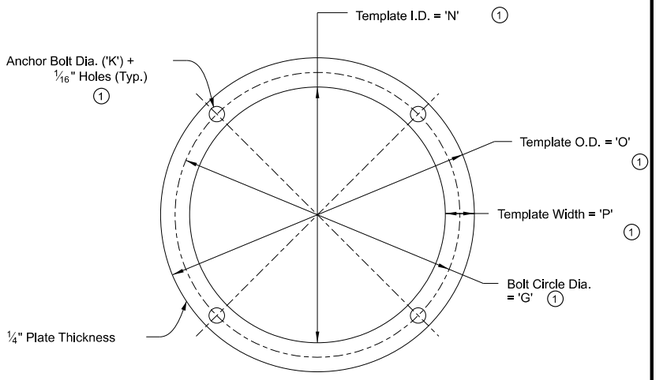
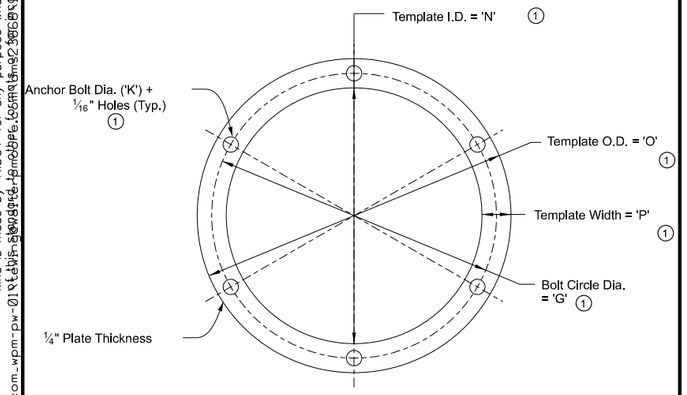


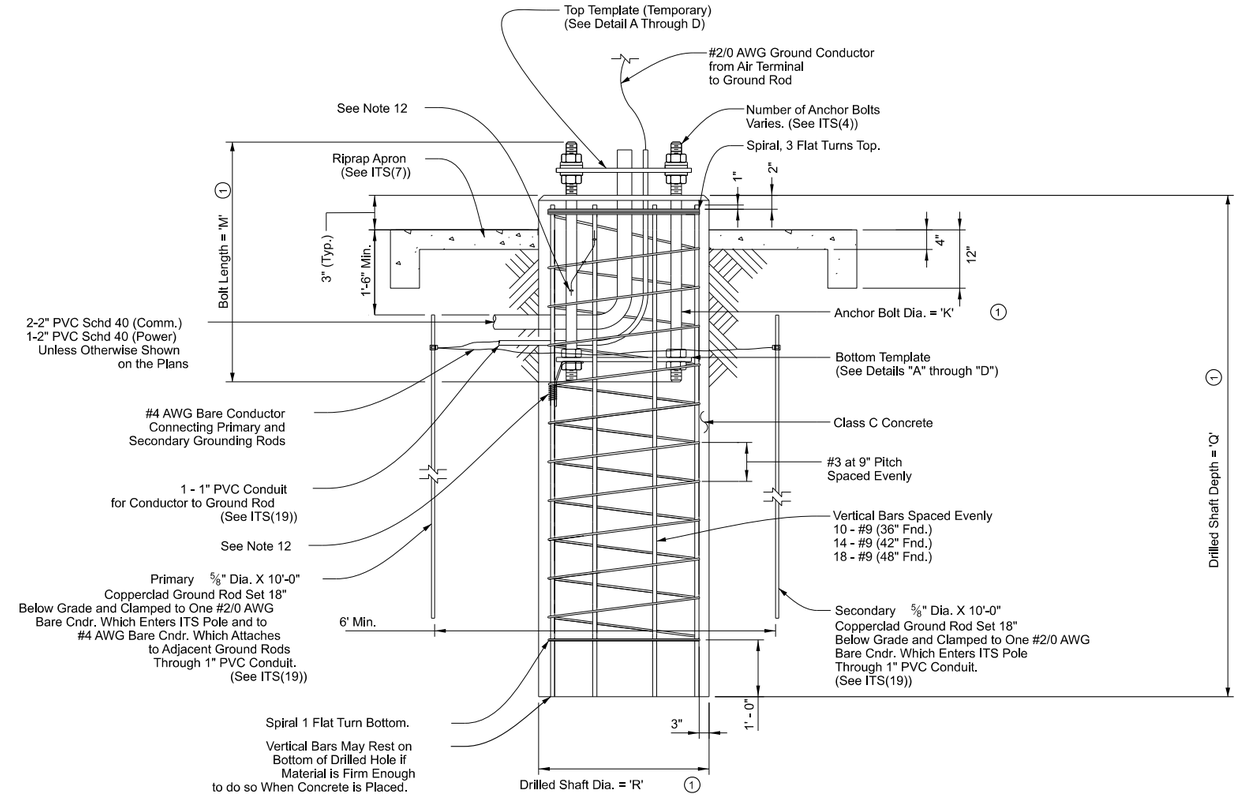
Top and Bottom Template (Four Bolt)

Detail A



Top and Bottom Template (Six Bolt)

Detail B



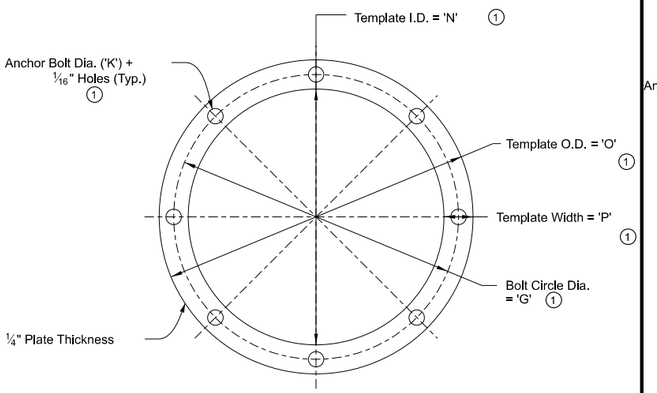
Foundation Details (Typical)

Elevation

Not to Scale

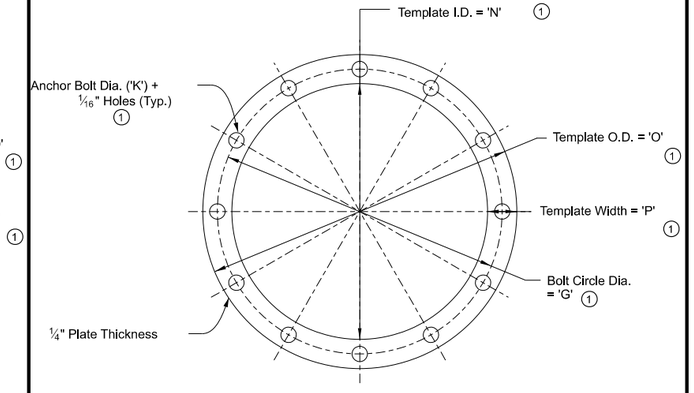
General Notes:

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



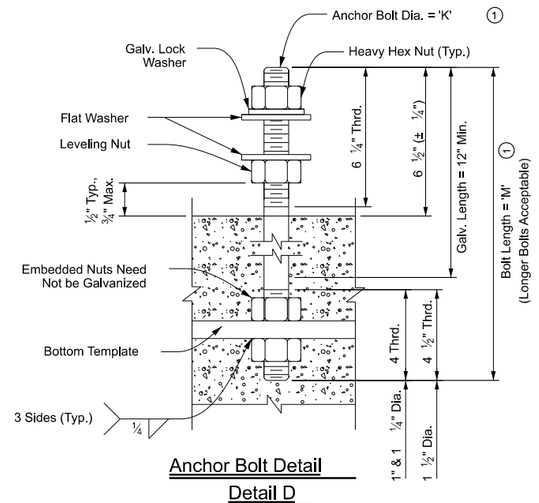
Top and Bottom Template (Eight Bolt)

Detail C



Top and Bottom Template (Twelve Bolt)

Detail D



Anchor Bolt Detail

Detail D

Reference Notes:

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

Texas Department of Transportation

Traffic Operations Division Standard

ITS POLE FOUNDATION DETAILS

ITS(3)-16

FILE: ITS(3)-16.DGN	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT June 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS April 2016	0700	03	149	SH71
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		72

DATE: 5/9/2023 12:42:17 PM
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TABLE 1: ITS POLE - 90 MPH (W/ 2 SOLAR PANELS) (4)

POLE TYPE (1)	POLE HEIGHT (FT)	POLE SHAFT (1) (10)			BASE PLATE (1)					TOP PLATE (2)	ANCHOR BOLT (3)						FOUNDATION (3)			
		BOTTOM OUTSIDE DIA. (IN)	TOP OUTSIDE DIA. (IN)	WALL THICKNESS (IN)	INSIDE DIA. (IN)	OUTSIDE DIA. (IN)	BOLT CIRCLE DIA. (IN)	BOLT HOLE DIA. (IN)	THICKNESS (IN)	OUTSIDE DIA. (IN)	DIA. (IN)	NO.OF BOLTS	LENGTH OF BOLT MIN. (IN)	TEMPLATE INSIDE DIA. (IN)	TEMPLATE OUTSIDE DIA. (IN)	TEMPLATE WIDTH (IN)	DRILL SHAFT DEPTH - TEXAS CONE PENETROMETER (N - BLOWS/FT.) (SEE NOTE 5) N = 10	N = 15	N = 40	DRILLED SHAFT DIA. (IN)
	'A'	'B'	'C'	'D'	'E'	'F'	'G'	'H'	'I'	'J'	'K'	'L'	'M'	'N'	'O'	'P'	'Q'			'R'
8 SIDED	20	10	8	1/2	10-1/16	21	16	1-1/4	1-1/2	9	1	4	29	14	18	2	12	11	10	36
	30	13	9	1/2	13-1/16	24	19	1-9/16	1-1/2	10	1-1/4	4	35	16-1/2	21-1/2	2-1/2	15	13	10	36
	40	15	9	1/2	15-1/16	26	21	1-9/16	1-1/2	10	1-1/4	6	35	18-1/2	23-1/2	2-1/2	17	14	11	42
	45	16	10	1/2	16-1/16	27	22	1-9/16	1-1/2	11	1-1/4	6	35	19-1/2	24-1/2	2-1/2	18	16	12	42
	50	17	10	1/2	17-1/16	28	23	1-9/16	1-1/2	11	1-1/4	6	35	20-1/2	25-1/2	2-1/2	19	16	12	42
	55 (6)(7)	19	11	5/8	19-1/16	30	25	1-13/16	2	12	1-1/2	6	40	22	28	3	21	18	13	42
	60 (6)(7)	20	11	5/8	20-1/16	31	26	1-13/16	2	12	1-1/2	6	40	23	29	3	21	19	14	48

TABLE 2: ITS POLE - 110 MPH (W/ 2 SOLAR PANELS) (4)

POLE TYPE (1)	POLE HEIGHT (FT)	POLE SHAFT (1) (10)			BASE PLATE (1)					TOP PLATE (2)	ANCHOR BOLT (3)						FOUNDATION (3)			
		BOTTOM OUTSIDE DIA. (IN)	TOP OUTSIDE DIA. (IN)	WALL THICKNESS (IN)	INSIDE DIA. (IN)	OUTSIDE DIA. (IN)	BOLT CIRCLE DIA. (IN)	BOLT HOLE DIA. (IN)	THICKNESS (IN)	OUTSIDE DIA. (IN)	DIA. (IN)	NO.OF BOLTS	LENGTH OF BOLT MIN. (IN)	TEMPLATE INSIDE DIA. (IN)	TEMPLATE OUTSIDE DIA. (IN)	TEMPLATE WIDTH (IN)	DRILL SHAFT DEPTH - TEXAS CONE PENETROMETER (N - BLOWS/FT.) (SEE NOTE 5) N = 10	N = 15	N = 40	DRILLED SHAFT DIA. (IN)
	'A'	'B'	'C'	'D'	'E'	'F'	'G'	'H'	'I'	'J'	'K'	'L'	'M'	'N'	'O'	'P'	'Q'			'R'
8 SIDED	20	10	8	1/2	10-1/16	21	16	1-1/4	1-1/2	9	1	4	29	14	18	2	14	12	10	36
	30	13	9	1/2	13-1/16	24	19	1-9/16	1-3/4	10	1-1/4	6	35	16-1/2	21-1/2	2-1/2	18	15	11	36
	40	15	9	1/2	15-1/16	25	21	1-9/16	1-3/4	10	1-1/4	6	35	18-1/2	23-1/2	2-1/2	20	17	12	42
	45	16	10	1/2	17-1/16	27	22	1-9/16	1-3/4	11	1-1/4	8	35	19-1/2	24-1/2	2-1/2	21	18	13	42
	50	17	10	1/2	18-1/16	28	23	1-9/16	1-3/4	11	1-1/4	8	35	20-1/2	25-1/2	2-1/2	22	19	14	42
	55 (7)	19	11	5/8	19-1/16	30	25	1-9/16	2	12	1-1/4	8	35	22-1/2	27-1/2	2-1/2	24	20	14	42
	60 (7)	20	11	5/8	20-1/16	31	26	1-13/16	2	12	1-1/2	6	40	23	29	3	25	21	15	48

TABLE 3: ITS POLE - 130 MPH (W/ 1 SOLAR PANEL) (5)

POLE TYPE (1)	POLE HEIGHT (FT)	POLE SHAFT (1) (10)			BASE PLATE (1)					TOP PLATE (2)	ANCHOR BOLT (3)						FOUNDATION (3)			
		BOTTOM OUTSIDE DIA. (IN)	TOP OUTSIDE DIA. (IN)	WALL THICKNESS (IN)	INSIDE DIA. (IN)	OUTSIDE DIA. (IN)	BOLT CIRCLE DIA. (IN)	BOLT HOLE DIA. (IN)	THICKNESS (IN)	OUTSIDE DIA. (IN)	DIA. (IN)	NO.OF BOLTS	LENGTH OF BOLT MIN. (IN)	TEMPLATE INSIDE DIA. (IN)	TEMPLATE OUTSIDE DIA. (IN)	TEMPLATE WIDTH (IN)	DRILL SHAFT DEPTH - TEXAS CONE PENETROMETER (N - BLOWS/FT.) (SEE NOTE 5) N = 10	N = 15	N = 40	DRILLED SHAFT DIA. (IN)
	'A'	'B'	'C'	'D'	'E'	'F'	'G'	'H'	'I'	'J'	'K'	'L'	'M'	'N'	'O'	'P'	'Q'			'R'
8 SIDED	20	10	8	1/2	10-1/16	21	16	1-9/16	1-3/4	9	1-1/4	4	35	13-1/2	18-1/2	2-1/2	16	14	10	36
	30	13	9	1/2	15-1/16	24	19	1-9/16	1-3/4	10	1-1/4	6	35	16-1/2	21-1/2	2-1/2	18	16	11	36
	40	15	9	1/2	15-1/16	26	21	1-9/16	1-3/4	10	1-1/4	6	35	18-1/2	23-1/2	2-1/2	21	18	13	42
	45	16	10	1/2	16-1/16	27	22	1-9/16	1-3/4	11	1-1/4	8	35	19-1/2	24-1/2	2-1/2	23	19	14	42
	50	17	10	1/2	17-1/16	28	23	1-9/16	2	11	1-1/2	8	40	20	26	3	24	20	14	42
	55 (7)	19	11	5/8	19-1/16	30	25	1-13/16	2	12	1-1/2	8	40	22	28	3	27	22	15	42
	60 (7)	20	11	5/8	20-1/16	31	26	1-13/16	2	12	1-1/2	8	40	23	29	3	28	23	16	48

TABLE 4: ITS POLE WITH STIFFENERS - 90 MPH (W/ 4 SOLAR PANELS) (8)

POLE TYPE (1)	POLE HEIGHT (FT)	POLE SHAFT (1)			BASE PLATE (1)					TOP PLATE (2)	ANCHOR BOLT (3)						FOUNDATION (3)			
		BOTTOM OUTSIDE DIA. (IN)	TOP OUTSIDE DIA. (IN)	WALL THICKNESS (IN)	INSIDE DIA. (IN)	OUTSIDE DIA. (IN)	BOLT CIRCLE DIA. (IN)	BOLT HOLE DIA. (IN)	THICKNESS (IN)	OUTSIDE DIA. (IN)	DIA. (IN)	NO.OF BOLTS	LENGTH OF BOLT MIN. (IN)	TEMPLATE INSIDE DIA. (IN)	TEMPLATE OUTSIDE DIA. (IN)	TEMPLATE WIDTH (IN)	DRILL SHAFT DEPTH - TEXAS CONE PENETROMETER (N - BLOWS/FT.) (SEE NOTE 5) N = 10	N = 15	N = 40	DRILLED SHAFT DIA. (IN)
	'A'	'B'	'C'	'D'	'E'	'F'	'G'	'H'	'I'	'J'	'K'	'L'	'M'	'N'	'O'	'P'	'Q'			'R'
8 SIDED	30	13	9	3/8	13-1/16	28	22	1-1/4	1-3/4	10	1	8	29	20	24	2	17	15	11	42
	40	15	9	1/2	15-1/16	30	24	1-1/4	2	10	1	8	29	22	26	2	20	17	12	42
	45	16	10	1/2	16-1/16	31	25	1-9/16	2	11	1-1/4	8	35	22-1/2	27-1/2	2-1/2	21	18	13	42
	50	17	10	1/2	17-1/16	32	26	1-9/16	2	11	1-1/4	8	35	23-1/2	28-1/2	2-1/2	21	18	13	42
12 sided	55 (7)	19	11	5/8	19-1/16	34	27	1-9/16	2	12	1-1/4	12	35	24-1/2	29-1/2	2-1/2	21	18	13	48
	60 (7)	20	12	5/8	20-1/16	35	28	1-9/16	2	13	1-1/4	12	35	25-1/2	30-1/2	2-1/2	22	19	14	48

TABLE 5: ITS POLE WITH STIFFENERS - 110 MPH (W/ 4 SOLAR PANELS) (8)

POLE TYPE (1)	POLE HEIGHT (FT)	POLE SHAFT (1)			BASE PLATE (1)					TOP PLATE (2)	ANCHOR BOLT (3)						FOUNDATION (3)			
		BOTTOM OUTSIDE DIA. (IN)	TOP OUTSIDE DIA. (IN)	WALL THICKNESS (IN)	INSIDE DIA. (IN)	OUTSIDE DIA. (IN)	BOLT CIRCLE DIA. (IN)	BOLT HOLE DIA. (IN)	THICKNESS (IN)	OUTSIDE DIA. (IN)	DIA. (IN)	NO.OF BOLTS	LENGTH OF BOLT MIN. (IN)	TEMPLATE INSIDE DIA. (IN)	TEMPLATE OUTSIDE DIA. (IN)	TEMPLATE WIDTH (IN)	DRILL SHAFT DEPTH - TEXAS CONE PENETROMETER (N - BLOWS/FT.) (SEE NOTE 5) N = 10	N = 15	N = 40	DRILLED SHAFT DIA. (IN)
	'A'	'B'	'C'	'D'	'E'	'F'	'G'	'H'	'I'	'J'	'K'	'L'	'M'	'N'	'O'	'P'	'Q'			'R'
8 SIDED	30	13	9	1/2	13-1/16	28	22	1-9/16	2-1/4	10	1-1/4	8	35	19-1/2	24-1/2	2-1/2	20	17	12	42
	40	16	10	1/2	16-1/16	31	25	1-9/16	2-1/4	11	1-1/4	8	35	22-1/2	27-1/2	2-1/2	24	20	14	42
	45	17	11	1/2	17-1/16	32	26	1-9/16	2-1/4	12	1-1/4	8	35	23-1/2	28-1/2	2-1/2	25	21	15	42
	50	18	11	1/2	18-1/16	32	26	1-13/16	2-1/2	12	1-1/2	8	40	23	29	3	25	21	15	48
12 SIDED	55 (7)	19	11	5/8	19-1/16	34	27	1-9/16	2-1/4	12	1-1/4	12	35	24-1/2	29-1/2	2-1/2	24	21	15	48
	60 (7)	20	12	5/8	20-1/16	35	28	1-9/16	2-1/4	13	1-1/4	12	35	25-1/2	30-1/2	2-1/2	25	22	15	48

TABLE 6: ITS POLE WITH STIFFENERS - 130 MPH (W/ 3 SOLAR PANELS) (9)

POLE TYPE (1)	POLE HEIGHT (FT)	POLE SHAFT (1)			BASE PLATE (1)					TOP PLATE (2)	ANCHOR BOLT (3)						FOUNDATION (3)			
		BOTTOM OUTSIDE DIA. (IN)	TOP OUTSIDE DIA. (IN)	WALL THICKNESS (IN)	INSIDE DIA. (IN)	OUTSIDE DIA. (IN)	BOLT CIRCLE DIA. (IN)	BOLT HOLE DIA. (IN)	THICKNESS (IN)	OUTSIDE DIA. (IN)	DIA. (IN)	NO.OF BOLTS	LENGTH OF BOLT MIN. (IN)	TEMPLATE INSIDE DIA. (IN)	TEMPLATE OUTSIDE DIA. (IN)	TEMPLATE WIDTH (IN)	DRILL SHAFT DEPTH - TEXAS CONE PENETROMETER (N - BLOWS/FT.) (SEE NOTE 5) N = 10	N = 15	N = 40	DRILLED SHAFT DIA. (IN)
	'A'	'B'	'C'	'D'	'E'	'F'	'G'	'H'	'I'	'J'	'K'	'L'	'M'	'N'	'O'	'P'	'Q'			'R'
8 SIDED	30	13	9	1/2	13-1/16	28	22	1-9/16	2-1/2	10	1-1/4	8	35	19-1/2	24-1/2	2-1/2	23	19	14	42
	40	16	10	1/2	16-1/16	31	25	1-9/16	2-1/2	11	1-1/2	8	40	22	28	3	25	21	14	42
	45	17	11	1/2	17-1/16	32	26	1-13/16	2-1/2	12	1-1/2	8	40	23	29	3	26	22	16	48
	50	18	11	1/2	18-1/16	33	27	1-13/16	2-1/2	12	1-1/2	8	40	24	30	3	27	23	16	48
12 SIDED	55 (7)	19	11	5/8	19-1/16	34	27	1-9/16	2-1/4	12	1-1/4	12	35	24-1/2	29-1/2	2-1/2	26	22	16	48
	60 (7)	20	12	5/8	20-1/16	35	28	1-9/16	2-1/4	13	1-1/4	12	35	25 1/2	30 1/2	2-1/2	27	23	16	48

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 thereto.

2. Table 1 and Table 4 design wind speed equals 90 MPH (3-Second Wind Gusts) with a 1.14 gust factor. A wind importance factor of 1.00 is applied to adjust the wind speed to a 50 year recurrence interval at 33 FT above the ground for Exposure C category in accordance with TxDOT WV&IZ(LTS2013). Design values listed in the table allow the base of the pole to be elevated above the surrounding ground level no more than 20 FT.

3. Table 2 and Table 5 design wind speed equals 110 MPH (3-Second Wind Gusts) with a 1.14 gust factor. A wind importance factor of 1.00 is applied to adjust the wind speed to a 50 year recurrence interval at 33 FT above the ground for Exposure C category in accordance with TxDOT WV&IZ(LTS2013). Design values listed in the table allow the base of the pole to be elevated above the surrounding ground level no more than 20 FT.

4. Table 3 and Table 6 design wind speed equals 130 MPH (3-Second Wind Gusts) with a 1.14 gust factor. A wind importance factor of 1.00 is applied to adjust the wind speed to a 50 year recurrence interval at 33 FT above the ground for Exposure C category in accordance with TxDOT WV&IZ(LTS2013). Design values listed in the table allow the base of the pole to be elevated above the surrounding ground level no more than 20 FT.

5. Recommended embedment lengths are for information purposes only. Foundation embedment depth is based off Texas Cone Penetrometer Value N = 10 blows/ft. for soft soils and up to 40 blows/ft. for hard soils. Foundation lengths shall be as shown on the plans, or as directed by the Engineer. Foundations will be paid for under Item 416, "Drilled Shaft Foundations" unless otherwise shown on the plans.

6. Deviation from the design criteria and values contained in the tables above constitute and alternative design and will require submission of shop drawings and calculations for approval, sealed by a Texas Professional Engineer.

7. 12-sided or round poles as a direct substitution for 8-sided and round poles as a direct substitution for 12-sided poles, meeting the design criteria and values contained in the tables above, require submission of shop drawings for approval.

Reference Notes

(1) See the following ITS Pole Standard sheets:
- 8-sided Pole - ITS(1)
- 12-sided Pole - ITS(2)

(2) Provision for 2" Dia. opening in top plate for poles requiring cameras mounted on top.
- See ITS Pole Mounting Details - ITS(6)

(3) See ITS Pole Foundation Details - ITS(3)

(4) Designed to support the following:
- Two Type 3 ITS pole mounted cabinets (280 LBS/EA and EPA = 14.50 sq. ft. per cabinet). See ITS(16).
- Two 250 W (50 LBS/EA and EPA = 30.70 sq. ft. per panel) solar panels (see ITS(24) "Solar Panel Matrix Table")
- Combined ITS equipment dead load of 170 LBS with an EPA = 6 sq. ft.

(5) Designed to support the following:
- Two Type 3 ITS pole mounted cabinets (280 LBS/EA and EPA = 14.50 sq. ft. per cabinet). See ITS(16).
- One 250 W (50 LBS/EA and EPA = 30.70 sq. ft. per panel) solar panels (see ITS(24) "Solar Panel Matrix Table")
- Combined ITS equipment dead load of 170 LBS with an EPA = 6 sq. ft.

(6) Pole heights at 55 Ft. and 60 Ft. located in the AMA, CHS, and LBB Districts, will require special design and design values shown shall not be used. Submit shop drawings for pole design and supporting calculations for 55 Ft. and 60 Ft. pole heights signed and sealed by a Texas Professional Engineer for approval.

(7) Ensure minimum nominal splice length is 1.5 times the average pole diameter at the splice to the nearest inch. Ensure longitudinal seam welds that will be in contact at a slip joint splice are ground smooth for the length of splice plus a minimum of six inches. Ensure a 100% longitudinal seam weld for a length of 1.5 pole diameter plus a minimum of 6 inches in outer sections at splices and at base plate. Provide 85% penetration in longitudinal seam welds at other pole sections.

(8) Designed to support the following:
- Two Type 3 ITS pole mounted cabinets (280 LBS/EA and EPA = 14.50 sq. ft. per cabinet). See ITS(16).
- Four 250 W (50 LBS/EA and EPA = 30.70 sq. ft. per panel) solar panels (see ITS(24) "Solar Panel Matrix Table")
- Combined ITS equipment dead load of 170 LBS with an EPA = 6 sq. ft.

Refer to ITS(4A) for stiffening plate details at the pole to base plate connection.

(9) Designed to support the following:
- Two Type 3 ITS pole mounted cabinets (280 LBS/EA and EPA = 14.50 sq. ft. per cabinet). See ITS(16).
- Three 250 W (50 LBS/EA and EPA = 30.70 sq. ft. per panel) solar panels (see ITS(24) "Solar Panel Matrix Table")
- Combined ITS equipment dead load of 170 LBS with an EPA = 6 sq. ft.

Refer to ITS(4A) for stiffening plate details at the pole to base plate connection.

(10) When solar panels are not provisioned in the plans, ITS pole wall thickness may be reduced by 1/8".

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Traffic Operations Division Standard

ITS POLE DESIGN DETAILS DATA LOOKUP TABLE

ITS(4)-15

FILE: its(4)-15.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT June 2015	CONT	SECT	JOB	HIGHWAY
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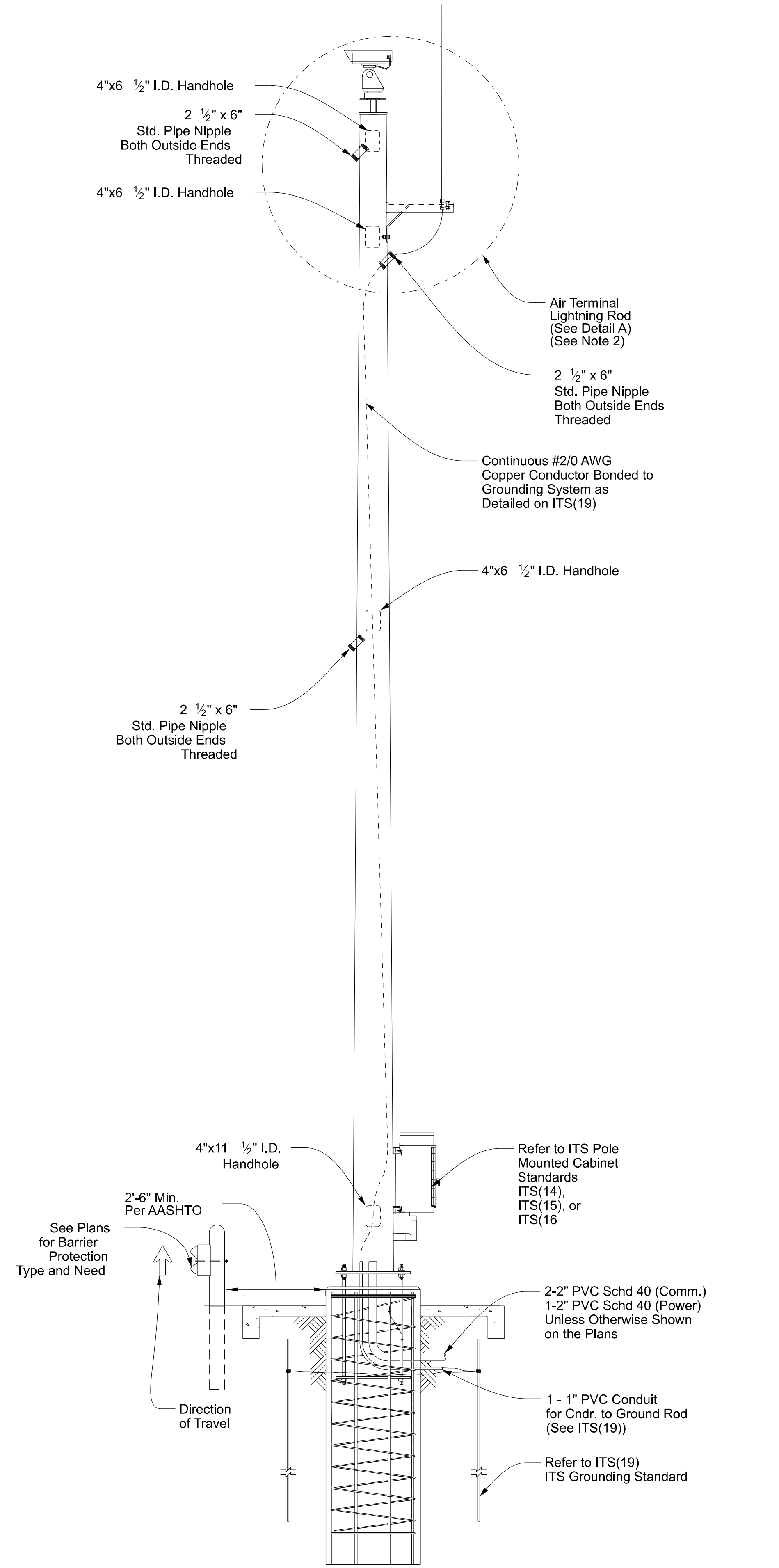
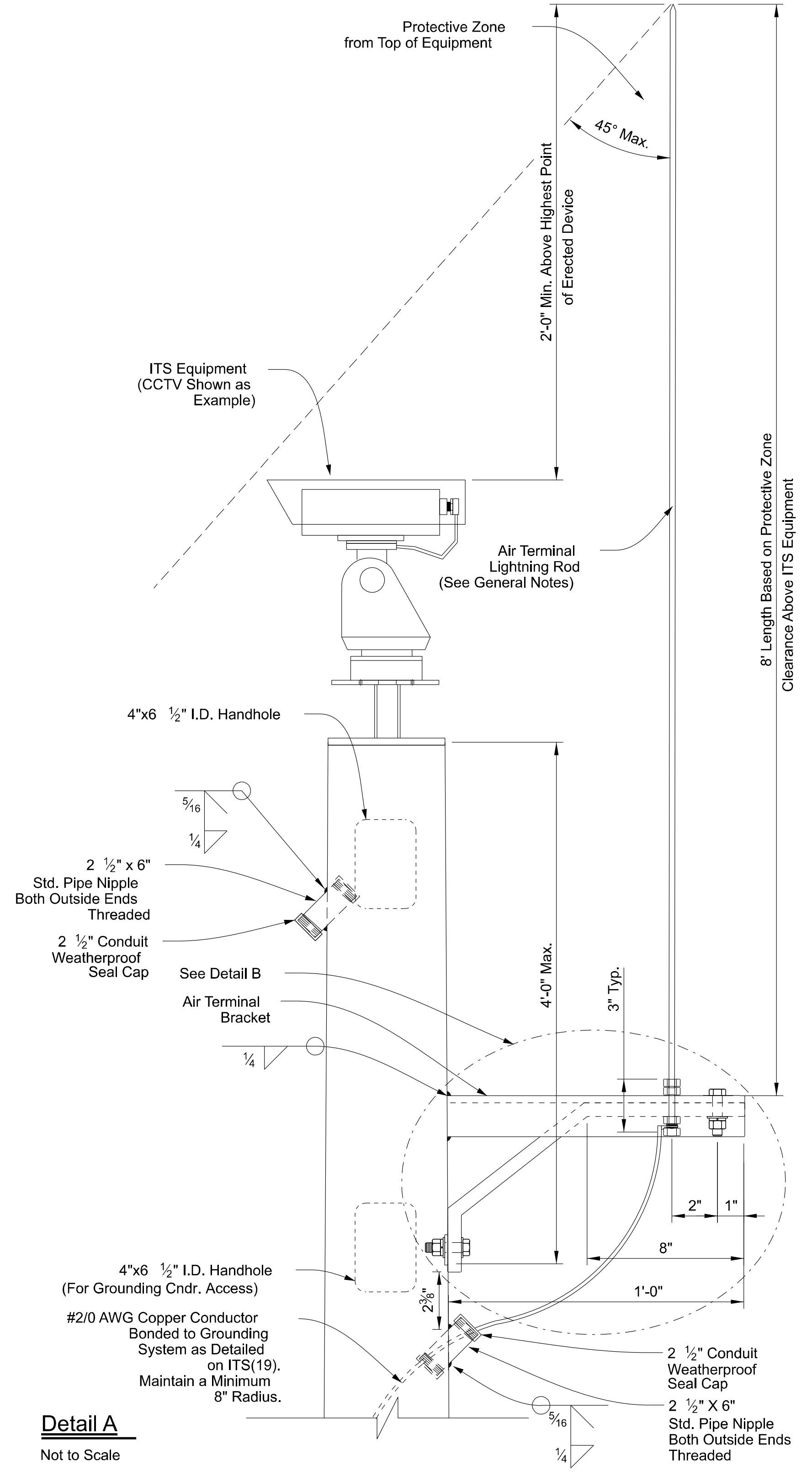
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		73

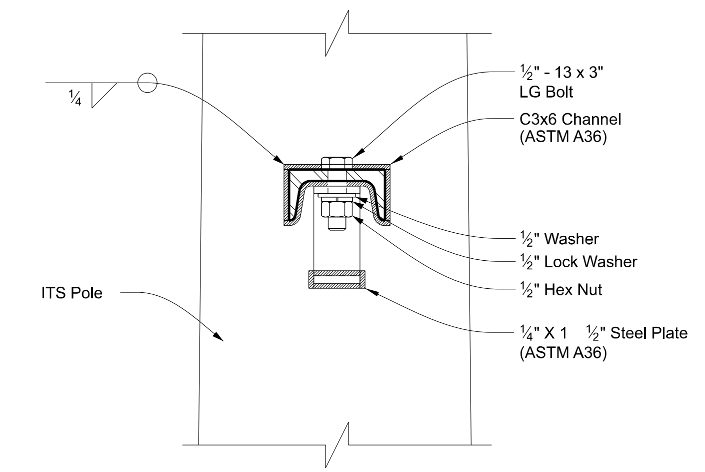


ITS Pole with Cabinet



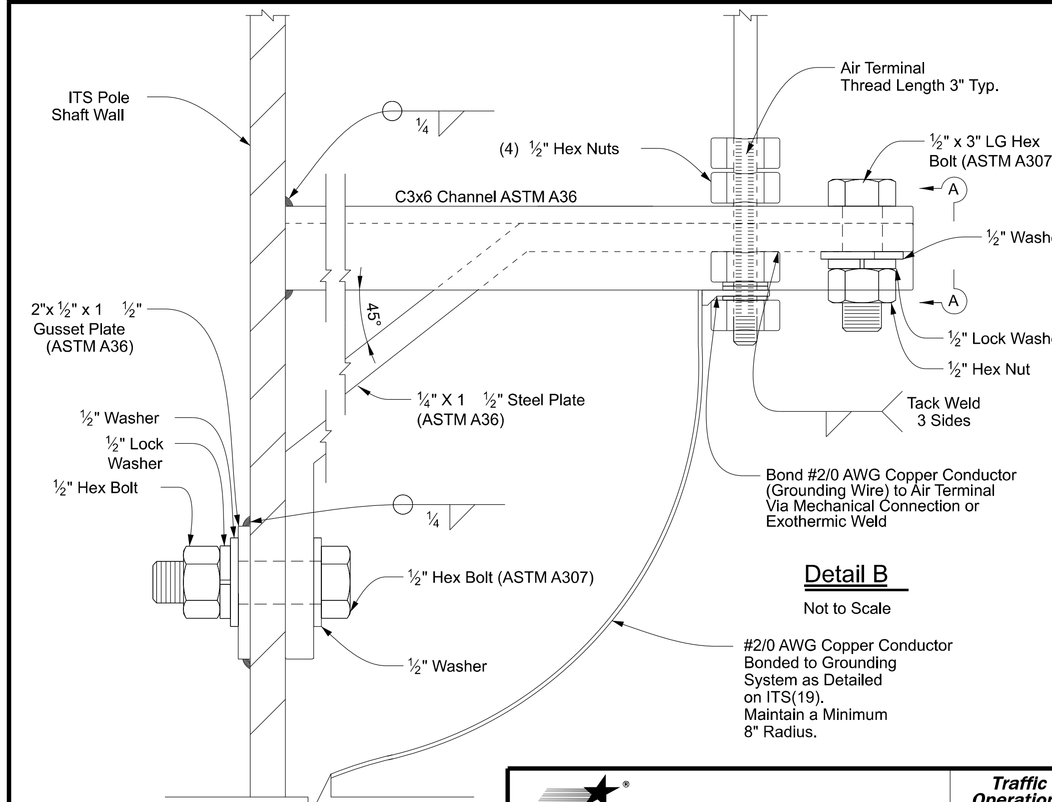
Detail A

Not to Scale



Section A-A

Not to Scale



Detail B

Not to Scale

General Notes:

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

Texas Department of Transportation

Traffic Operations Division Standard

ITS POLE AIR TERMINAL DETAILS

ITS(5)-15

FILE: its(5)-15.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT June 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0700	03	149	SH71
	DIST		COUNTY	SHEET NO.
	AUS		TRAVIS	74

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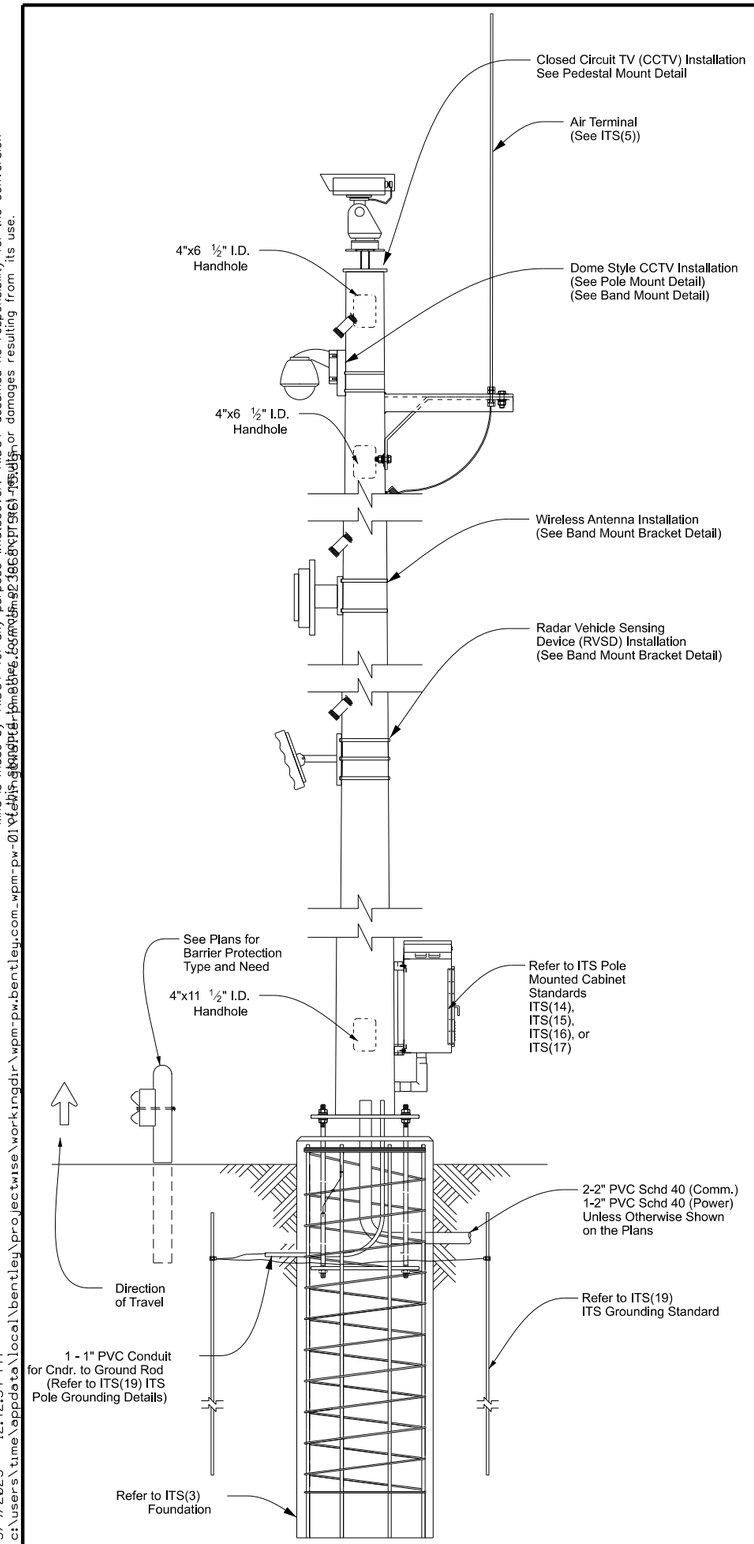
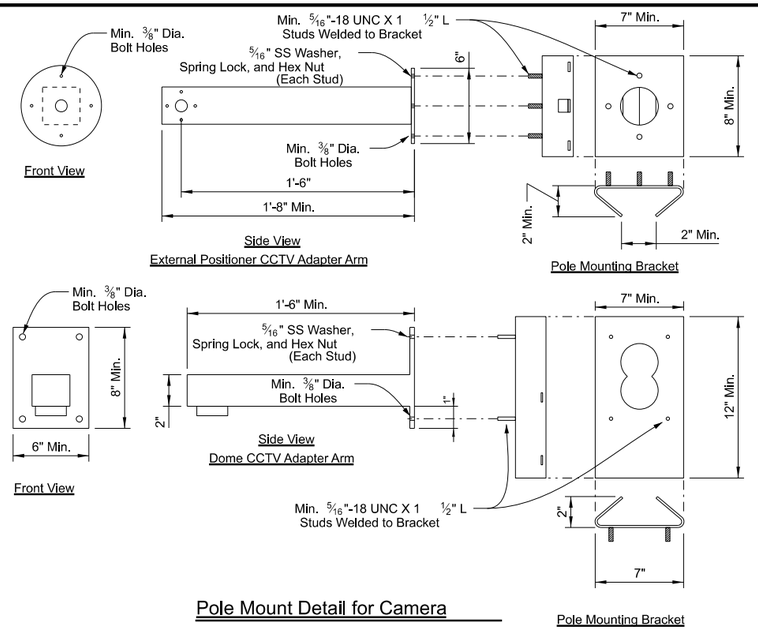
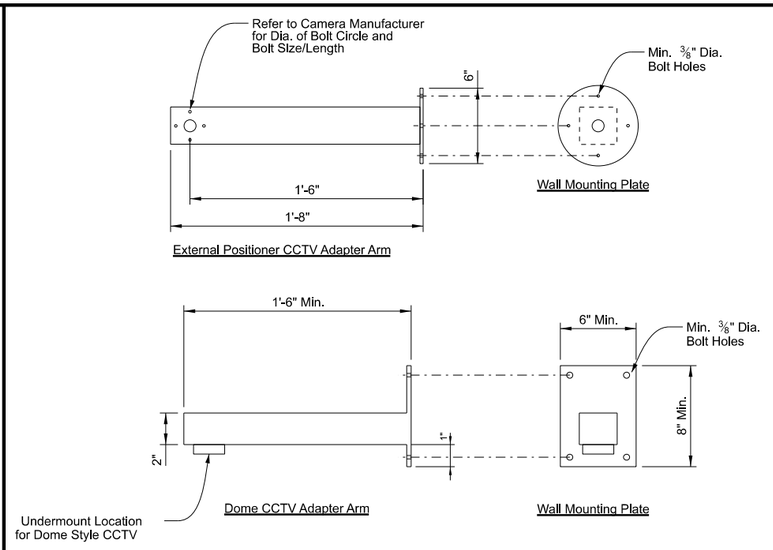


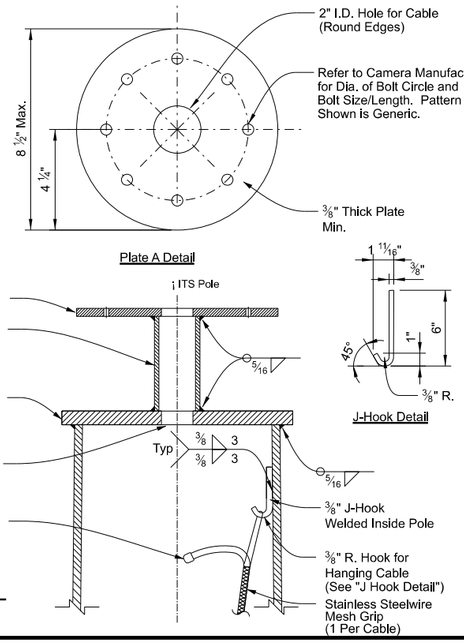
ITS Pole with Cabinet



Pole Mount Detail for Camera

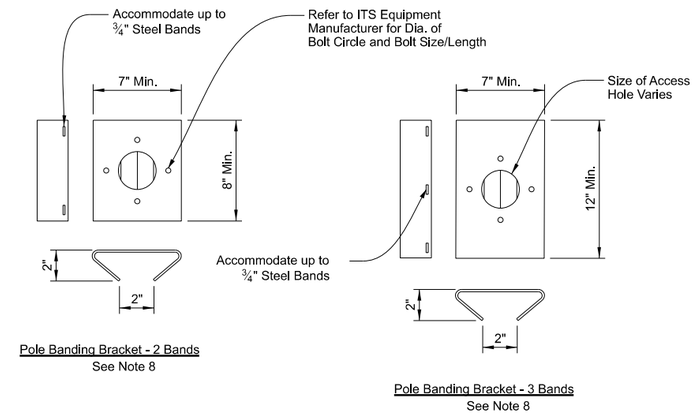


Wall Mount Detail



Pedestal Mount

Pole Top Detail



Band Mount Bracket Details

General Notes:

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

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Traffic Operations Division Standard

ITS POLE EQUIPMENT MOUNTING DETAILS

ITS(6)-15

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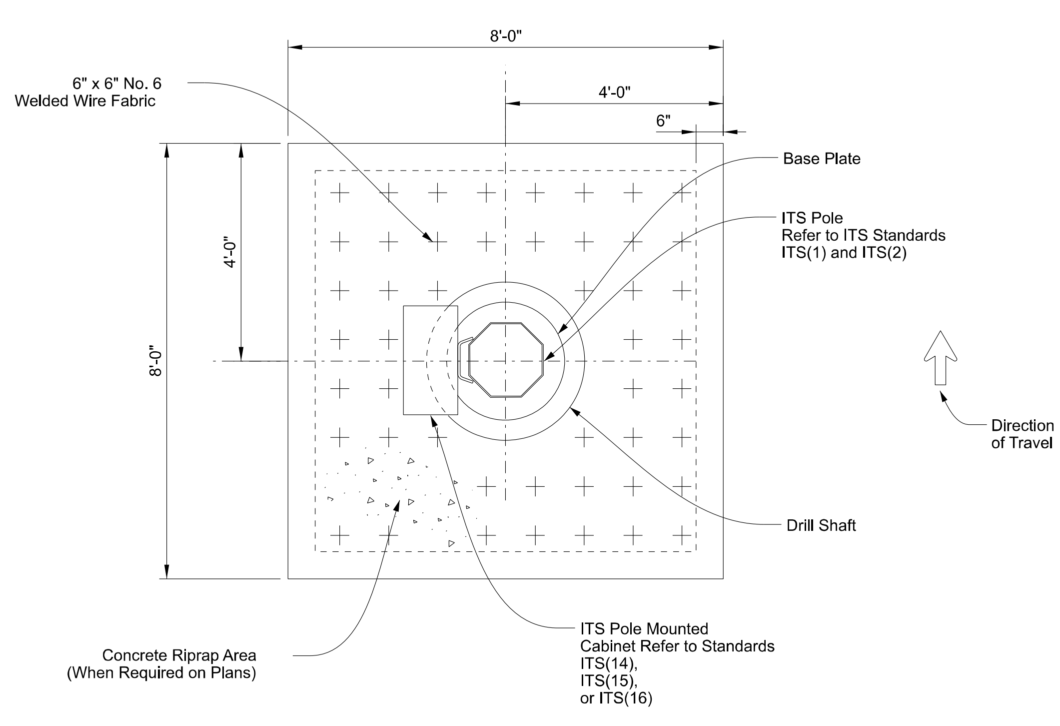
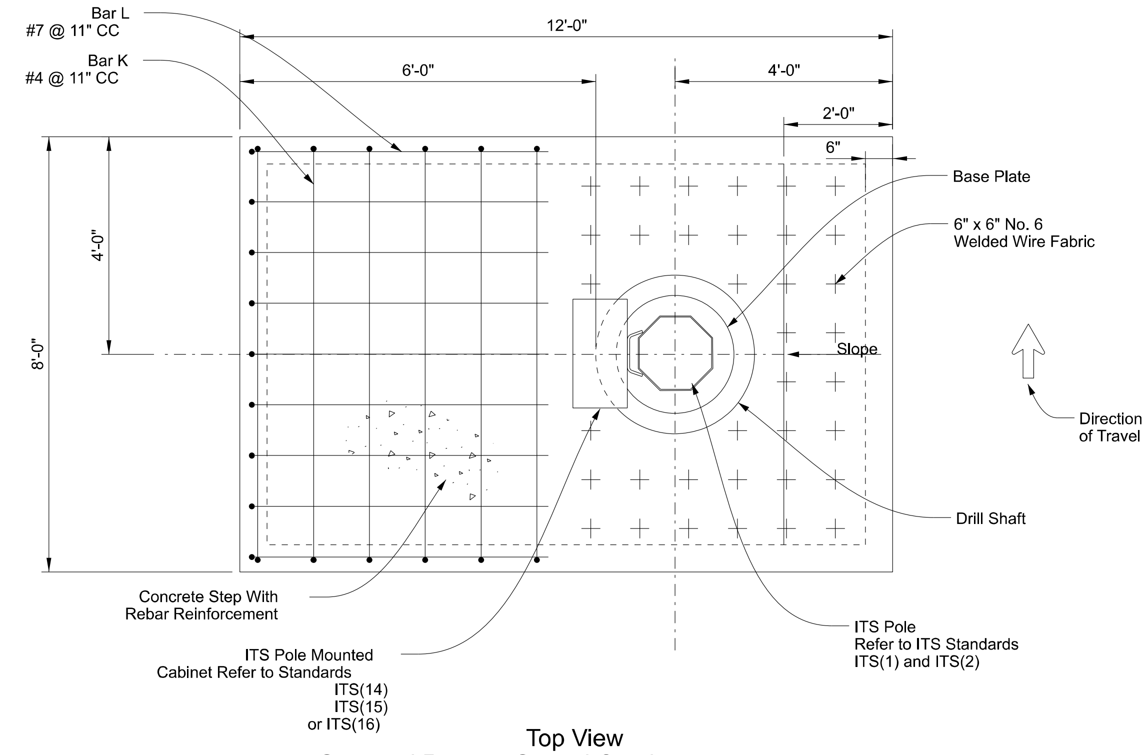
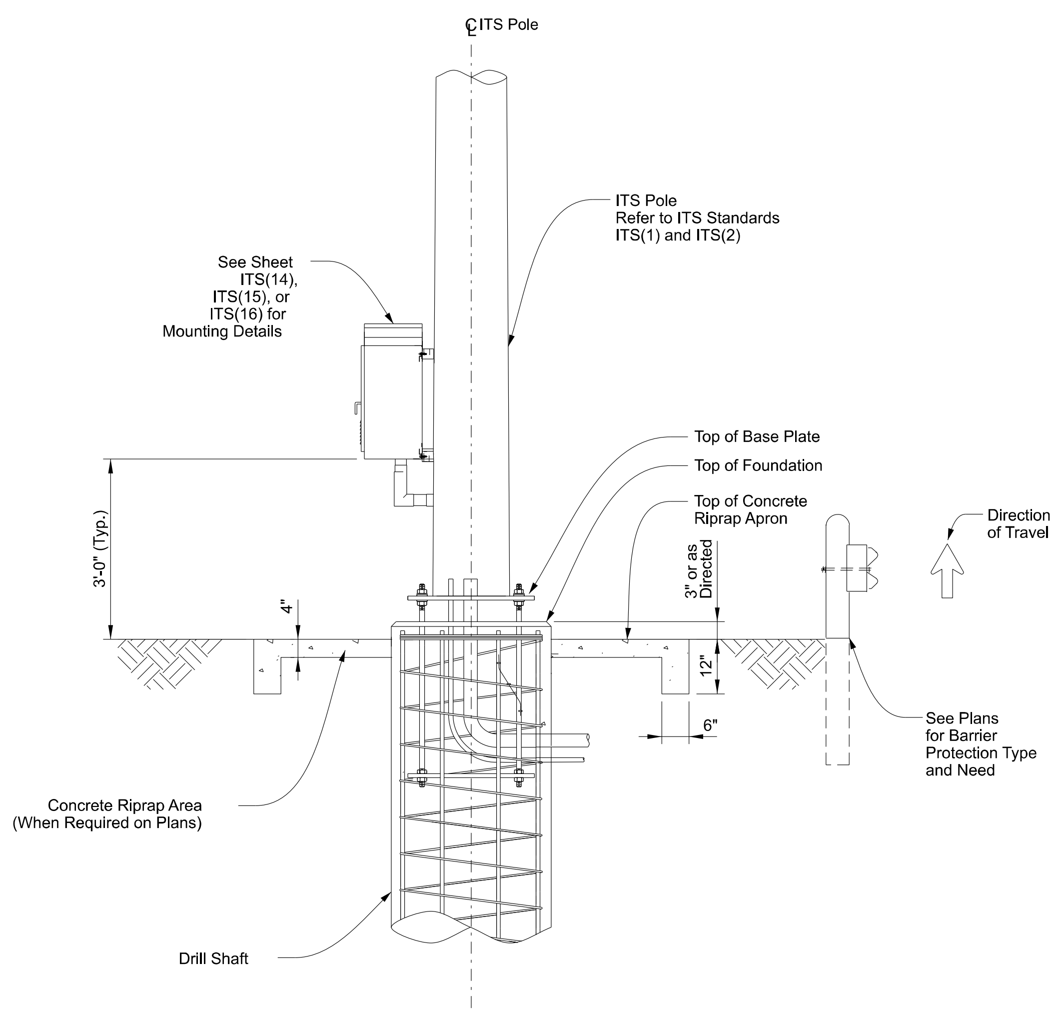


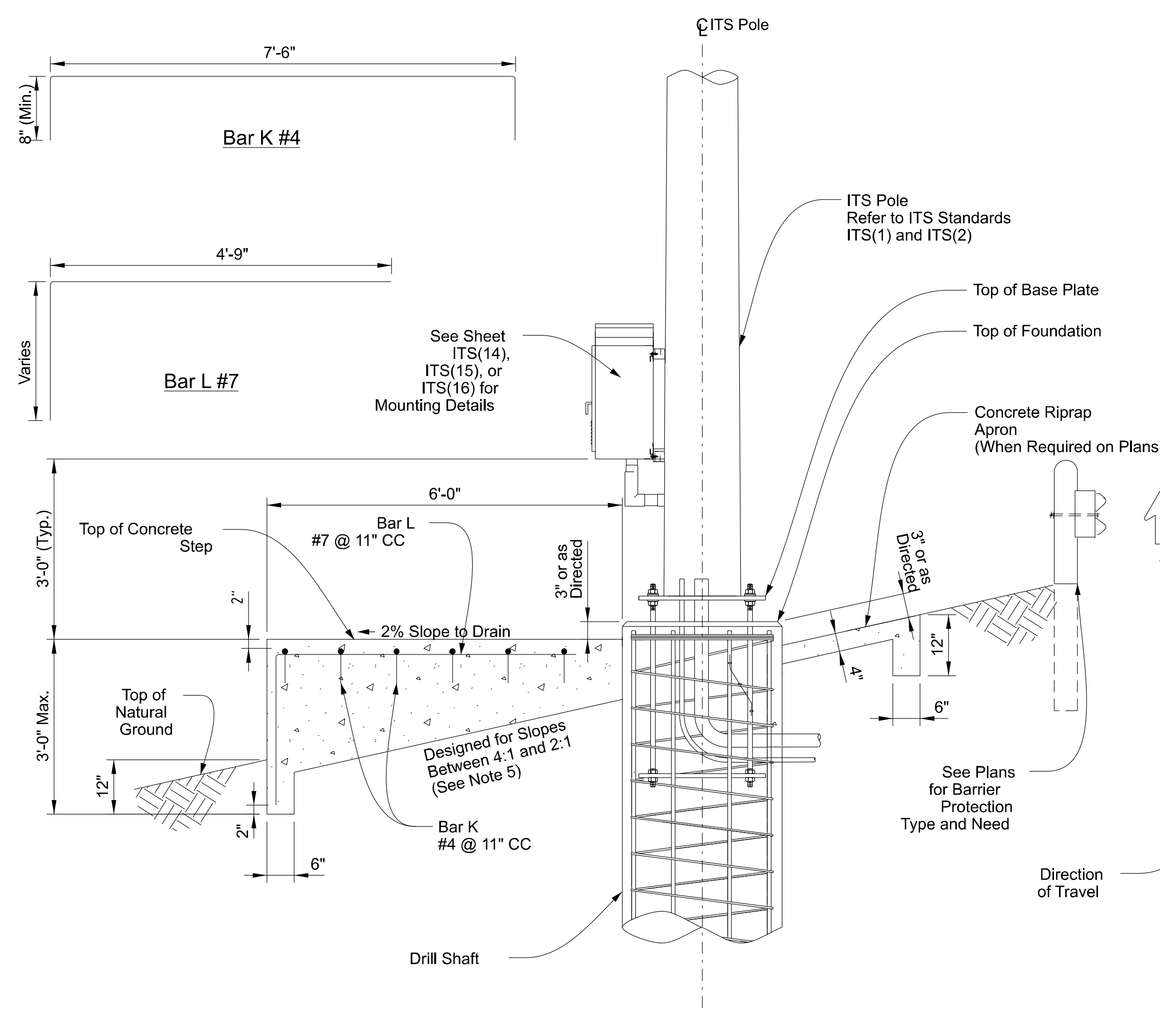
Top View
<u>Riprap - Non-Sloped Conditions</u>



Top View
<u>Step and Riprap - Sloped Conditions</u>



Elevation View
<u>Riprap Apron Detail - Non-Sloped Conditions</u>



Elevation View
<u>Riprap Apron/Step Detail - Sloped Conditions</u>

(Slopes Exceeding 4:1)

General Notes:

1. For non-sloped grassy areas, an 8' x 8' concrete riprap apron shall be poured around ITS pole foundations (see detail on this sheet), estimated at 1.25 CY per site, paid for under Item 432 "Riprap."

2. For sloped grassy areas, a concrete "step" (for maintenance personnel to access cabinet) shall be poured as part of the riprap apron. The step shall vary in height depending on slope, but shall extend 6' horizontally from ITS pole drilled shaft foundation and be the same width as riprap apron (8'). Step shall be poured at same time as riprap apron (see detail on this sheet). Any additional concrete necessary to fabricate step (over and above the 1.25 CY) shall be considered subsidiary to the various bid items and no direct payment shall be made.

3. For sloped areas where riprap exists, a 6' (horizontal from drilled shaft foundation) x 4' wide step shall be installed (see detail this sheet). Concrete for step shall be considered subsidiary to the various bid items and no direct payment shall be made.

4. Cabinet orientation may vary depending on field conditions or project constraints. Accommodate configuration of platform according to cabinet orientation.

5. Slopes greater than a 2:1 or when 3'-0" Max. step wall height is exceeded, an alternative design with safety railing is required and shall be detailed in the shop drawings for approval.

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Traffic Operations Division Standard

ITS POLE RIPRAP DETAILS

ITS(7)-15

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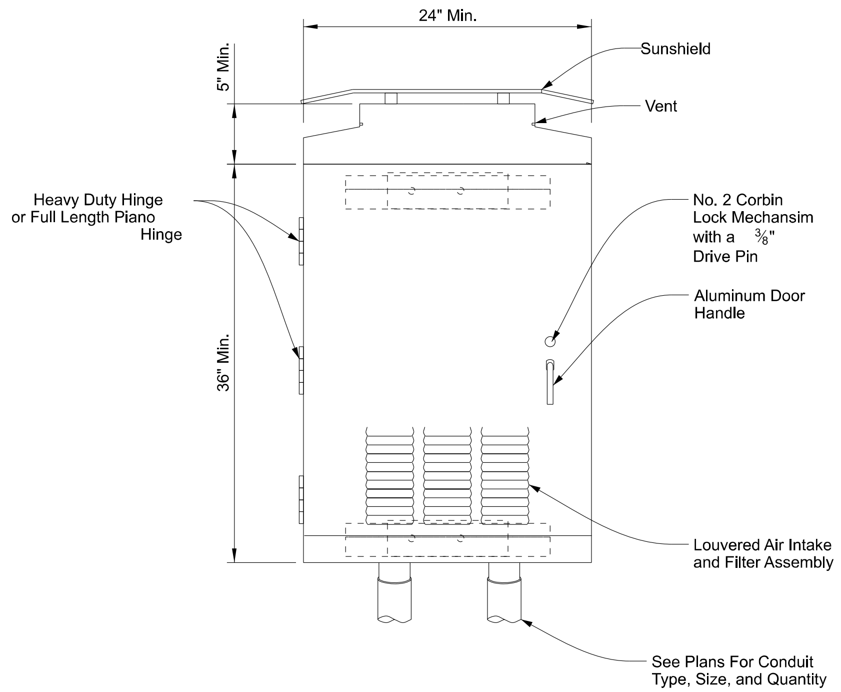
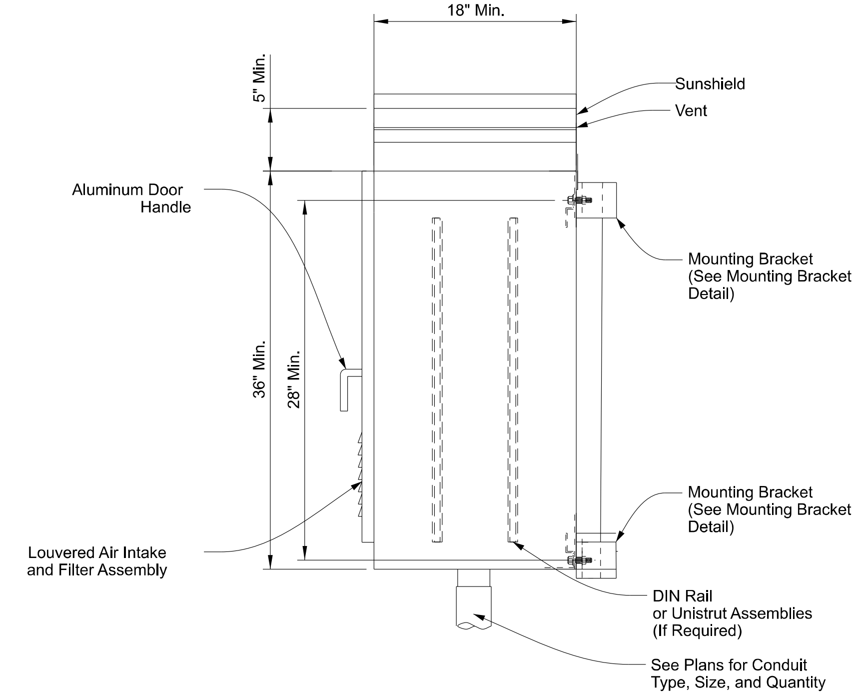


Pole Mounted Cabinet - Type 2 Front View

Not to Scale



Pole Mounted Cabinet - Type 2 Side View

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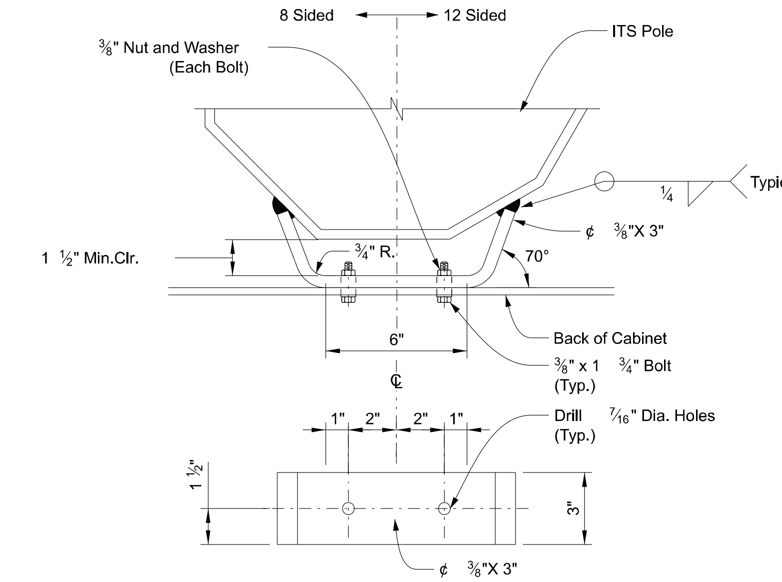
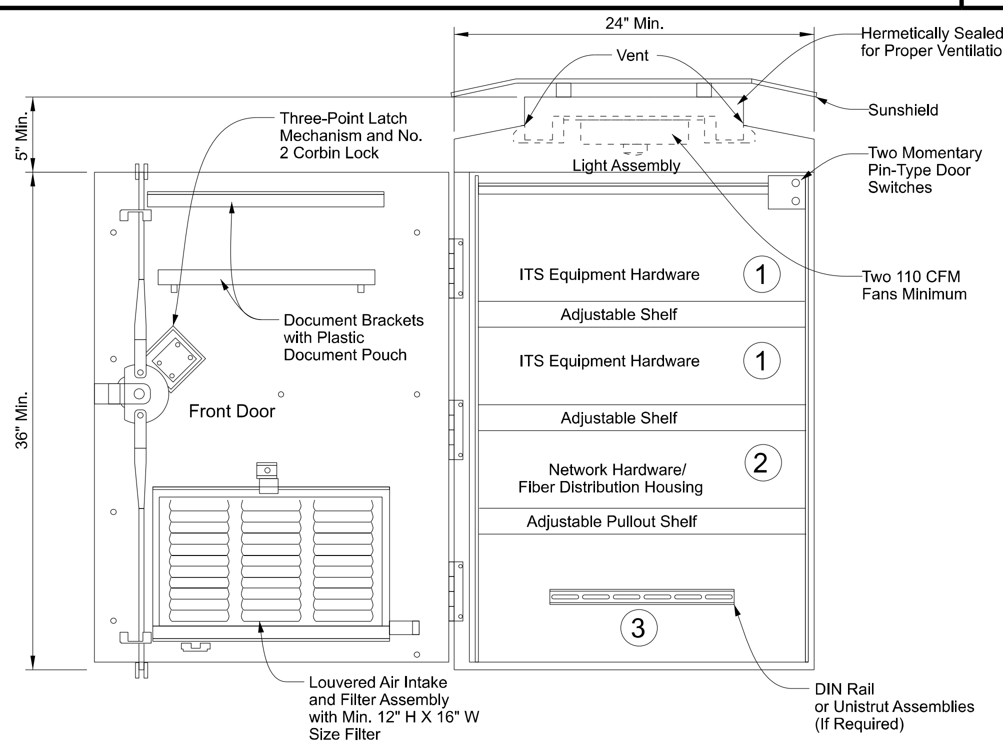


Note:
ITS Pole May be Round, Octagonal (8 Sided), or Dodecahedron (12 Sided).
See ITS(1), and ITS(2) for Details.

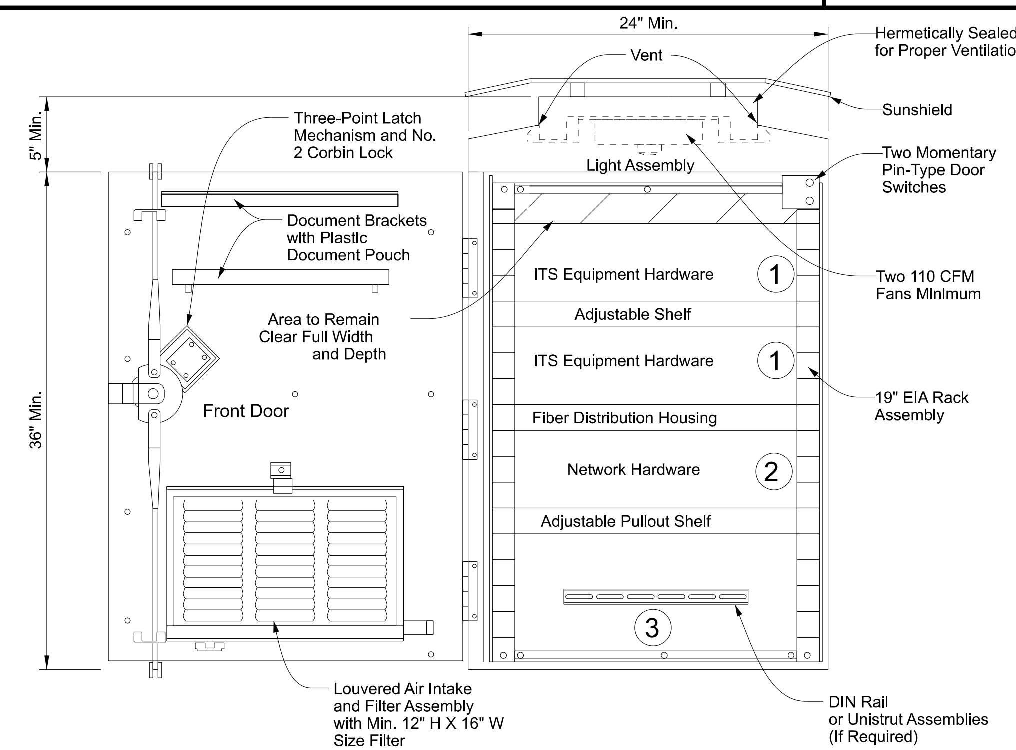
Mounting Bracket Detail

Not to Scale



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

Not to Scale



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

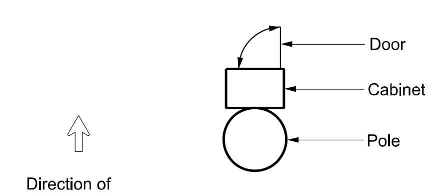
Not to Scale

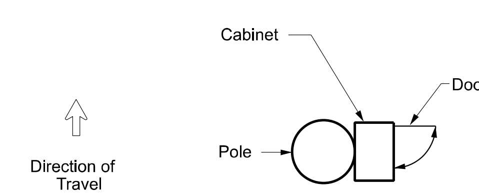
Typical Equipment Layout Legend

	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:

1. 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.
2. 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.
3. For ITS pole sites located on slopes greater than 4H:1V, mount the cabinet to the backside of the ITS pole as detailed on ITS(7). Mounting height to accommodate maintenance pad for easy access.
4. All dimensions are approximate and represent minimum cabinet dimensions.
5. Provide conduit entrances at the bottom of the cabinet.
6. Paid under Special Specification "ITS Pole with Cabinet" (Configuration 1) without 19" EIA rack.
   Paid under Special Specification "ITS Pole with Cabinet" (Configuration 2) with 19" EIA rack.





Orientation of Type 2 Cabinet on ITS Pole (Typical)

Not to Scale

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ITS POLE MOUNTED CABINET TYPE 2 DETAILS

ITS(15)-15

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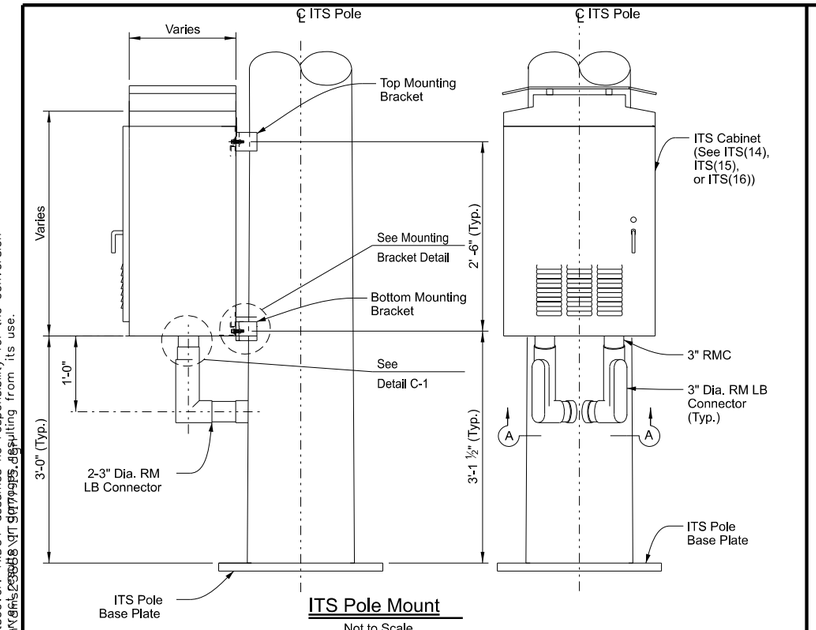
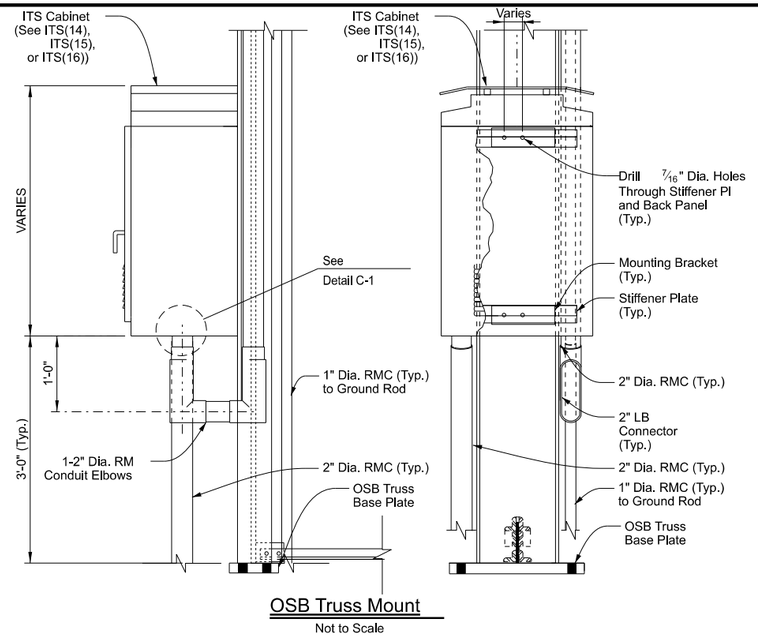


ITS Pole Mount

Not to Scale



OSB Truss Mount

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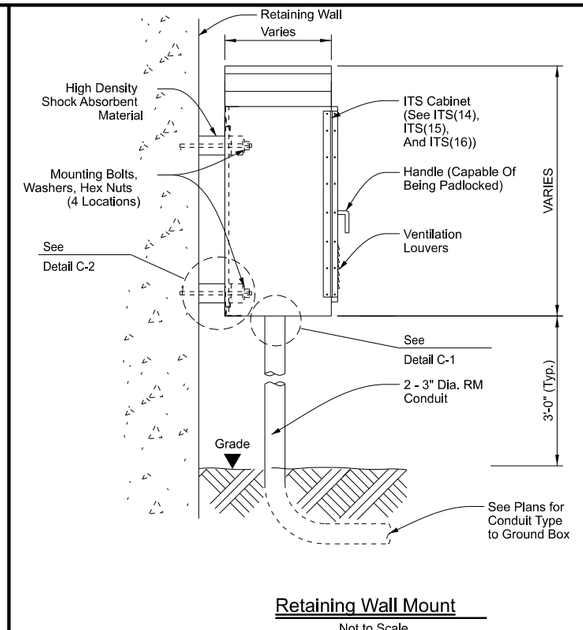

Retaining Wall Mount

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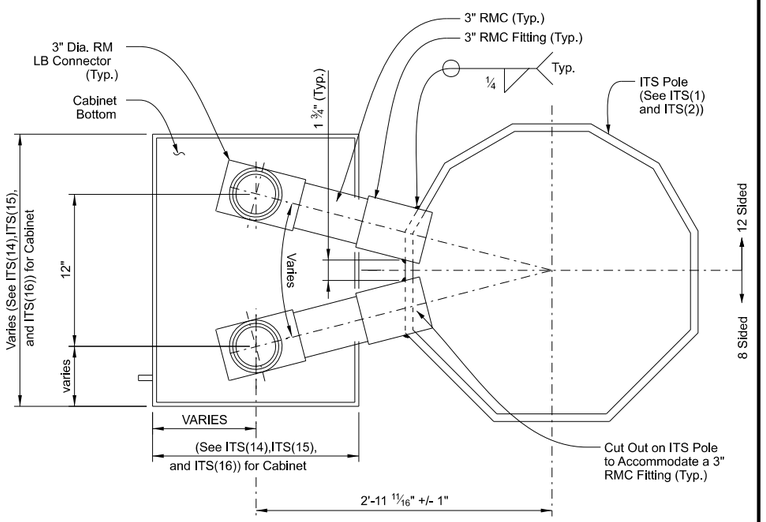

Section A-A

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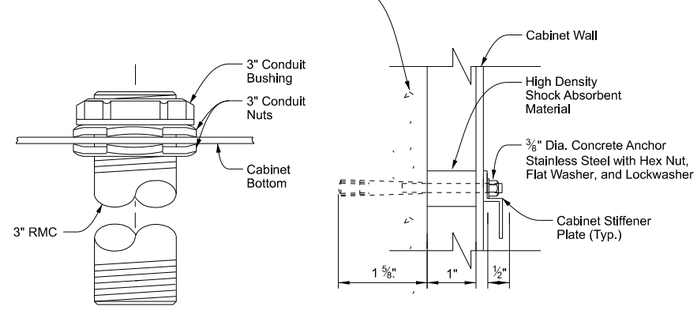

Detail C-1

Detail C-2

Detail C-1 and C-2

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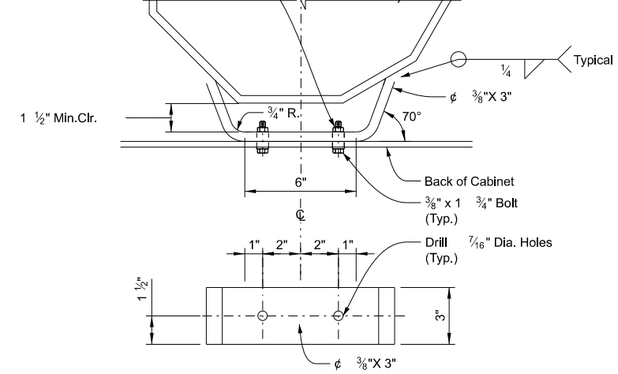

Note:
ITS Pole May be Round, Octagonal (8 Sided), or Dodecahedron (12 Sided).
See ITS(1), and ITS(2) for Details.

Mounting Bracket Detail

Not to Scale

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

ITS POLE MOUNTED CABINET MISC. MOUNTING DETAILS

ITS(17)-15

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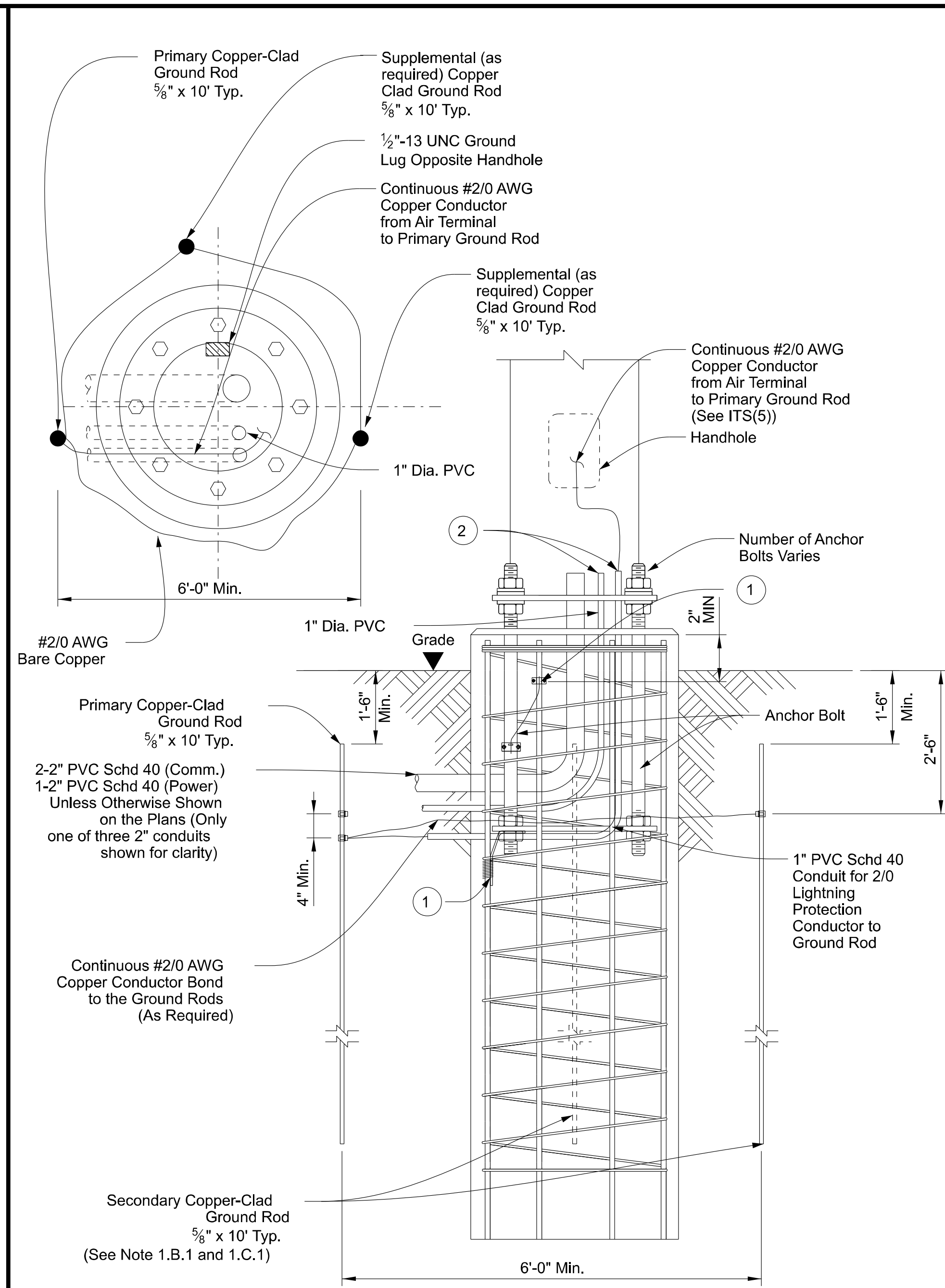
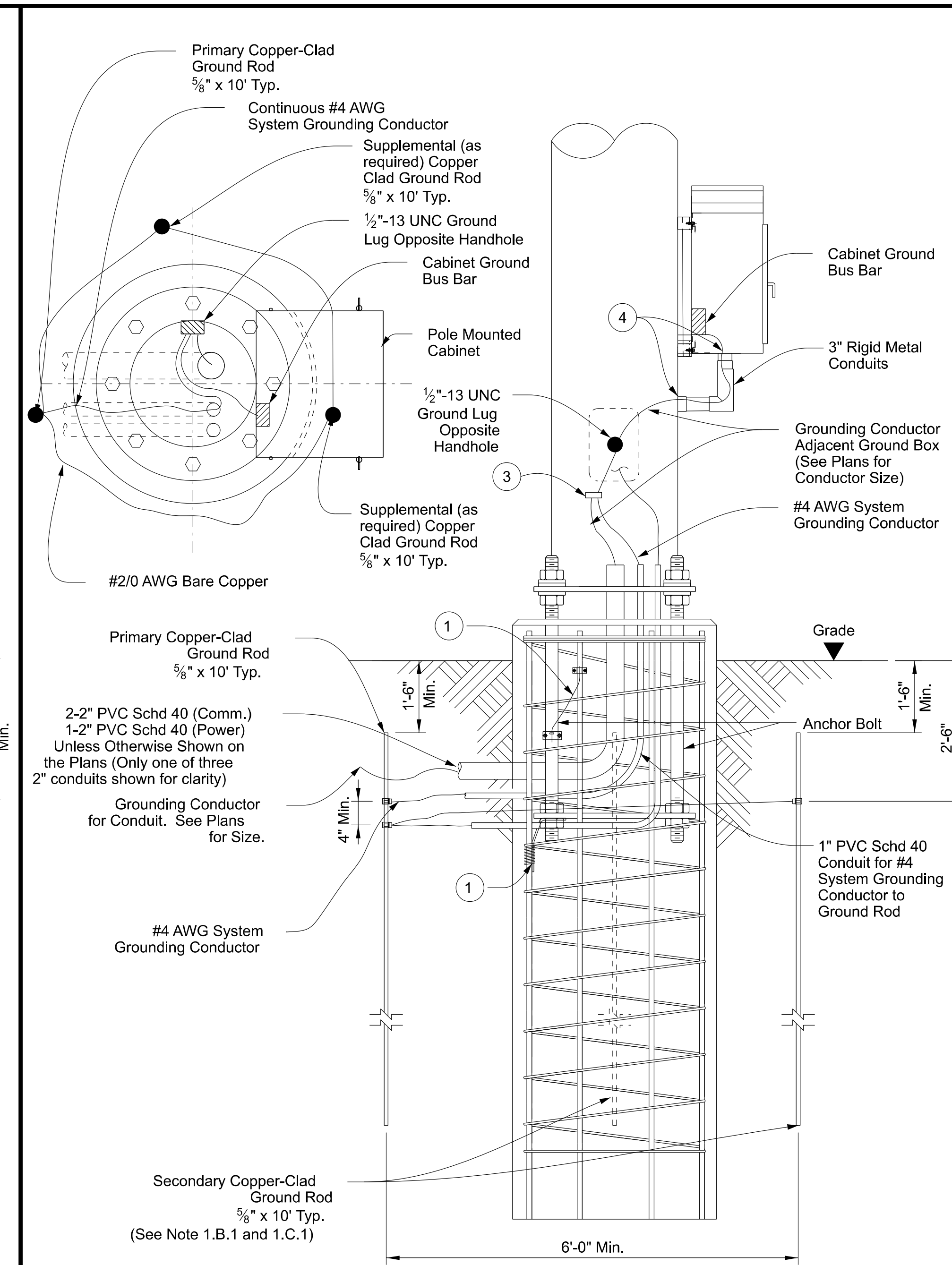
General Notes:

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



Grounding System

Not to Scale



Grounding System with Pole Mounted Cabinet

Not to Scale

Reference Notes:

(1) Bond anchor bolts to rebar with #2/0 AWG jumper and two mechanical connectors or by bending No. 3 bar on bottom template as shown and wire tightly with ten turns of No. 10 wire or one mechanical connector. Mechanical connectors shall be UL Listed for concrete encasement.

(2) Cut PVC approximately 1 in. above concrete and install bell or bushing. Align conduit as close as possible to point of attachment to base plate to minimize bends in #2/0 wire.

(3) Bond grounding conductors via cadweld or mechanical connector, rated for size and number of conductors.

(4) Provide and install a grounding type bushing on metal conduit terminations. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor.

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Traffic Operations Division Standard

ITS POLE GROUNDING DETAILS

ITS(19)-17

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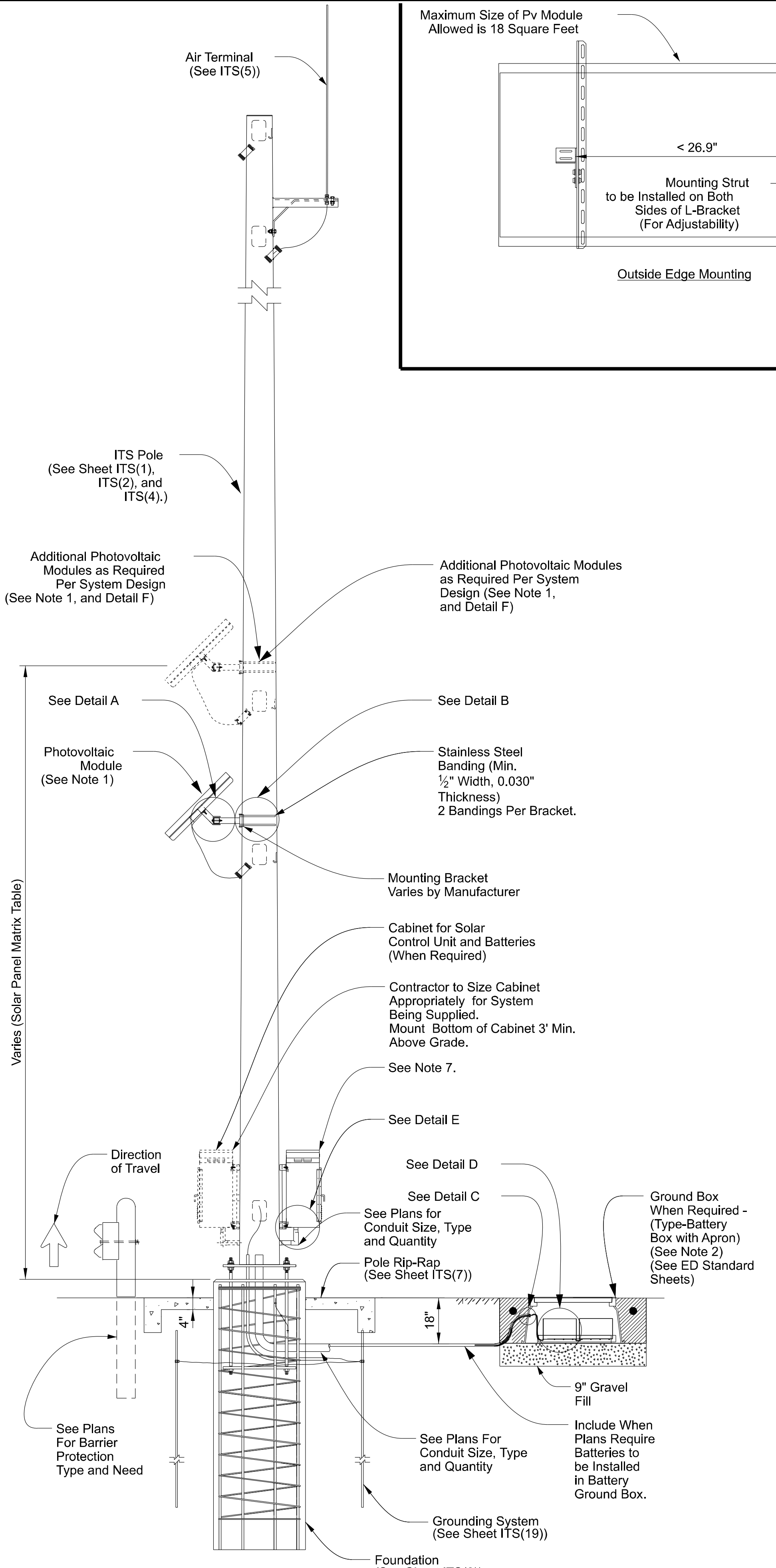

ITS Pole with Cabinet

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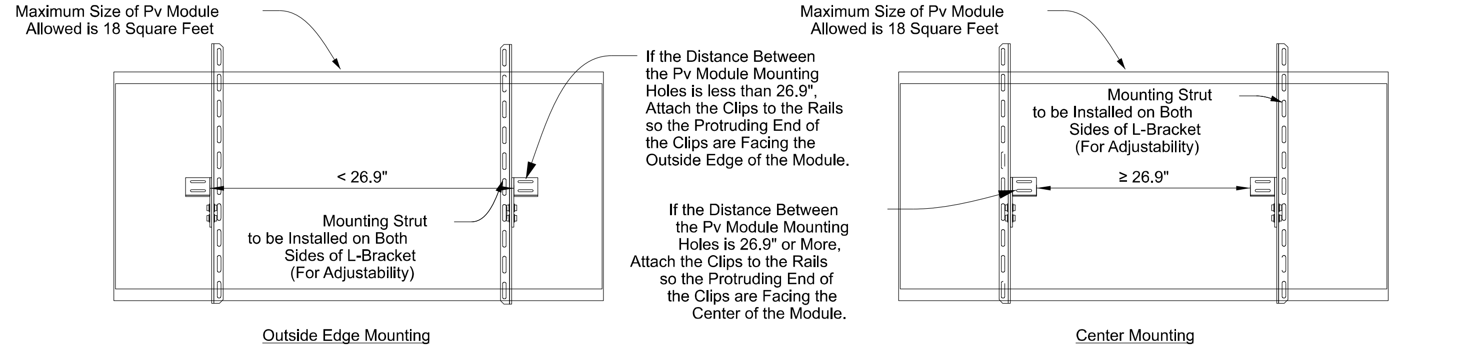
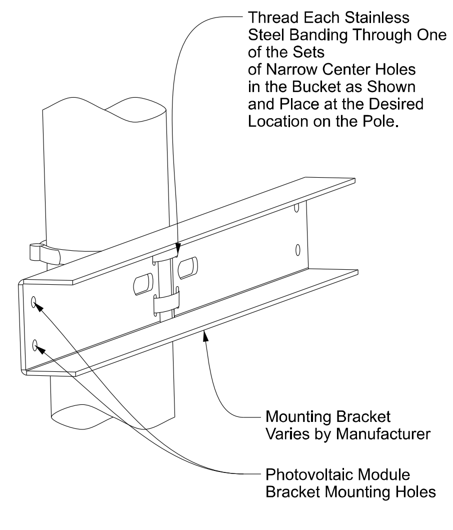


Detail A



Detail B

Explanation of ITS Solar Power System Descriptive Code

SPS X (X W) X W (X AH) X xX A (X)

Construction Application
INS = Install
REM = Remove
REL = Relocate

Total System Load Capacity (Watts)

Total Solar Panel Capacity (Watts)

Total Battery Capacity (Amp Hours)

No. of Charge Controllers (EA) x Amperage Capacity of Each (Amps)

Cabinet Installation Type
1 = ITS Pole Mounted Cabinet (Type 1, 2, or 3)
2 = Manufacturer Supplied on Pedestal Pole
3 = Manufacturer Supplied on Timber Pole

Example: SPS INS (60W) 1440W (750AH) 3x50A (1)

Solar Panel Mounting Table

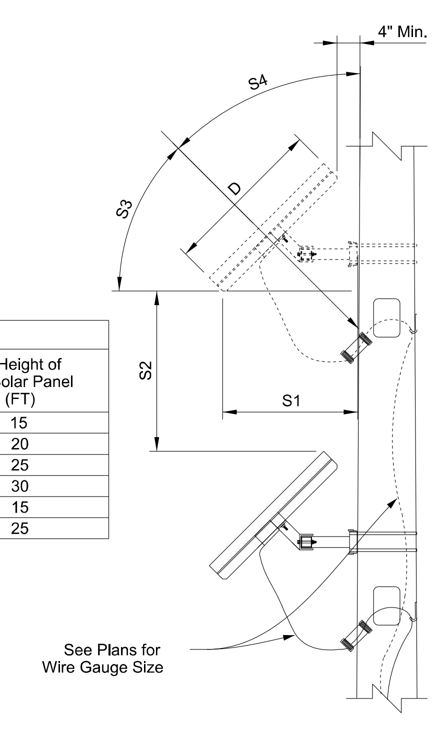
Dimension	Distance/Angle
S1	= D x (sin (S3)) + 4 (in.)
S2	= D x (sin(S3)) x (tan(S3)) (in.)
S3	= 90 deg. - S4 (zenith angle)
S4	Variable

S1 = Panel offset
S2 = Optimum vertical clearance between panels (in.)
S3 = Tilt angle (degrees), also sun elevation from horizon
S4 = Sun zenith angle (degrees) oriented for maximum exposure per National Renewable Energy Laboratory (NREL)
D = Depth of panel (in.)

Solar Panel Matrix Table *

Wind Zone (MPH)	Pole Height (FT)	Stiffeners	Max. No. of Solar Panels	Max. Height of Upper Solar Panel (FT)
90 or 110	20	Not Included	1	15
90 or 110	30-60	Not Included	2	20
90 or 110	30	Included	3	25
90 or 110	40-60	Included	4	30
130	20-60	Not Included	1	15
130	30-60	Included	3	25

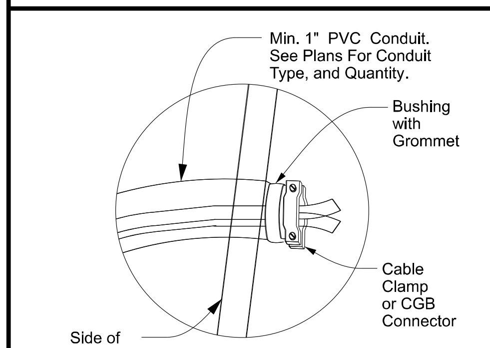
* - ITS pole height less than 20 ft. have not been designed to support solar panels



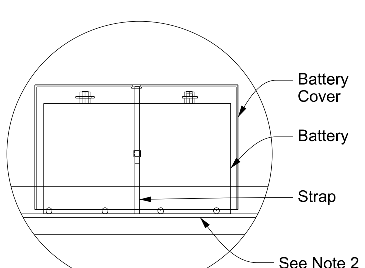
Detail F

General Notes:

1. Orient photovoltaic module (Pv) for optimum exposure to sunlight (face to the south) per National Renewable Energy Laboratory (NREL) guidelines. Prior to installation, check the location to ensure there is no overhead obstruction that would block the Photovoltaic Module from receiving full sunlight. Unless specified elsewhere, mount a minimum of 14' above grade.
2. When required for batteries to be installed in a battery ground box, place the batteries on a 3⁄16" thick plastic sheet and connect batteries together. Place a plastic cover (battery bell jar) over the top of each battery and secure the battery bell jar to the battery with a strap. The batteries, bell jars, straps and 3⁄16" thick plastic sheet will be subsidiary to special specification "ITS Solar Power System."
3. When required for batteries to be installed in an pole mounted cabinet, wire batteries according to manufacturer's recommendations. Provide the number of batteries as required by the manufacturer. Stack the batteries in the cabinet on shelves with 1" vertical separation.
4. See Electrical Details (ED) standard sheets for additional requirements regarding the installation of ground boxes/battery boxes, and conduit.
5. Use materials specifically designed for attaching cabinets, photovoltaic modules, etc., to poles.
6. See special specification "ITS Solar Power System" for further requirements.
7. When provisioned in the plans, solar controller and batteries are permitted to be installed along with ITS equipment inside ITS pole mounted cabinet for new installations. For existing conditions, solar controller and batteries are permitted if spare capacity exists. Engineer to verify existing cabinet type and spare capacity before sizing solar power system.
8. Pv = Photovoltaic
9. See sheets ITS(1), ITS(2), and ITS(4) "ITS Pole Details" for further information regarding the ITS pole assembly.
10. Use hardware specifically designed for attaching equipment (i.e., cabinet, photovoltaic module, etc.) to pole as recommended by equipment manufacturer. Provide mounting details for approval.



Detail C



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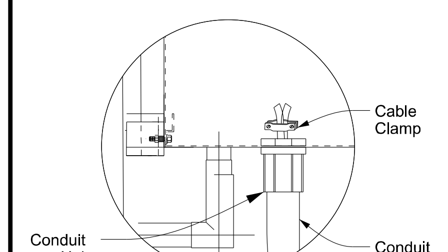

Detail E

Texas Department of Transportation

Traffic Operations Division Standard

ITS SOLAR POWER SYSTEM POLE MOUNTING DETAILS

ITS(24)-15

FILE: its(24)-15.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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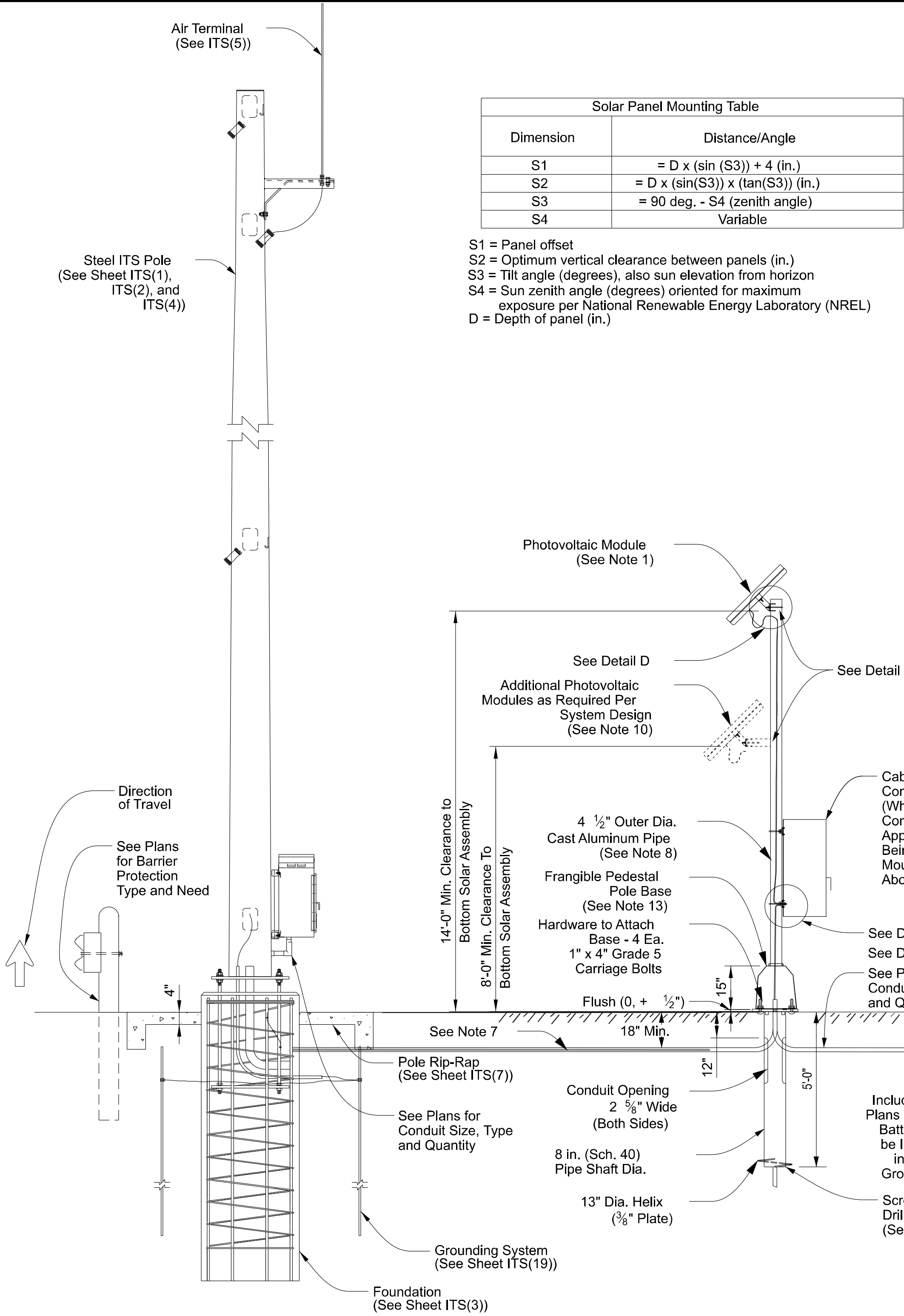
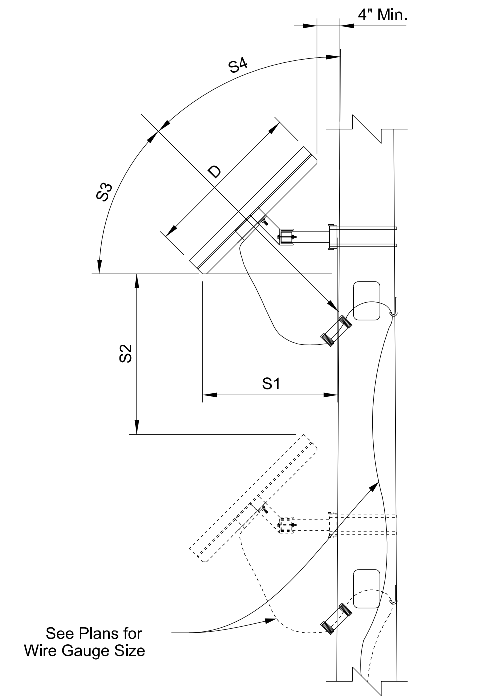


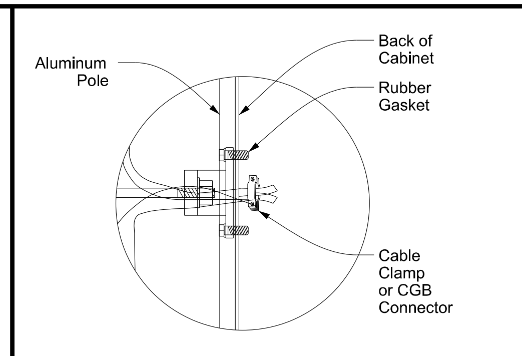
Detail For Photovoltaic Module, Cabinet, and Batteries Located
Out of Clear Zone on Aluminum Pole
Not to Scale

Solar Panel Mounting Table	
Dimension	Distance/Angle
S1	= D x (sin (S3)) + 4 (in.)
S2	= D x (sin(S3)) x (tan(S3)) (in.)
S3	= 90 deg. - S4 (zenith angle)
S4	Variable

S1 = Panel offset
S2 = Optimum vertical clearance between panels (in.)
S3 = Tilt angle (degrees), also sun elevation from horizon
S4 = Sun zenith angle (degrees) oriented for maximum exposure per National Renewable Energy Laboratory (NREL)
D = Depth of panel (in.)



Detail F



Detail A

Explanation of ITS Solar Power System Descriptive Code

SPS X (X W) X W (X AH) X xX A (X)

Construction Application
INS = Install
REM = Remove
REL = Relocate

Total System Load Capacity (Watts)

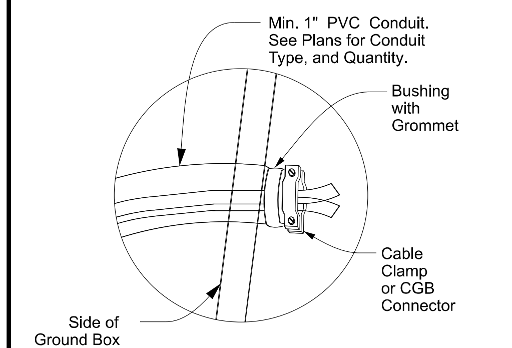
Total Solar Panel Capacity (Watts)

Total Battery Capacity (Amp Hours)

No. of Charge Controllers (EA) x Amperage Capacity of Each (Amps)

Cabinet Installation Type
1 = ITS Pole Mounted Cabinet (Type 1, 2, or 3)
2 = Manufacturer Supplied on Pedestal Pole
3 = Manufacturer Supplied on Timber Pole

Example: SPS INS (60W) 1440W (750AH) 3x50A (1)



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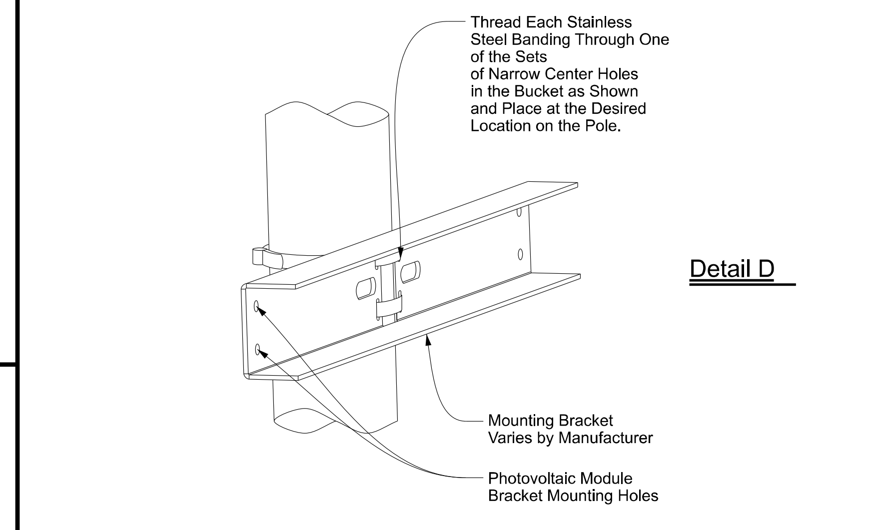

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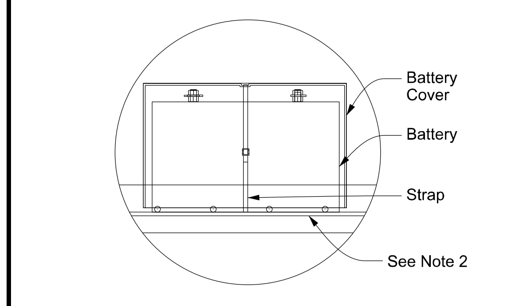

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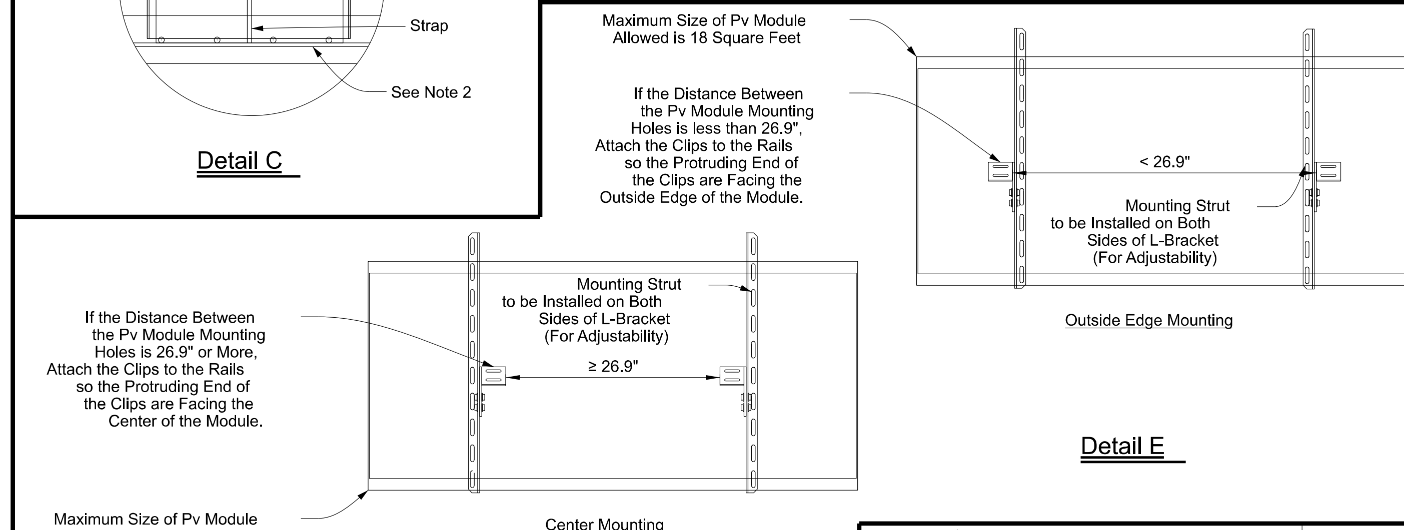

Detail E

General Notes:

1. Orient photovoltaic module for optimum exposure to sunlight (face to the south) per National Renewable Energy Laboratory (NREL) guidelines. Prior to installation, check the location to ensure there is no overhead obstruction that would block the Photovoltaic Module from receiving full sunlight. Unless specified elsewhere, mount a minimum of 14' above grade.
2. When required for batteries to be installed in a battery ground box, place the batteries on a 3/16" thick plastic sheet and connect batteries together. Place a plastic cover (battery bell jar) over the top of each battery and secure the battery bell jar to the battery with a strap. The batteries, bell jars, straps and 3/16" thick plastic sheet will be subsidiary to special specification "ITS Solar Power System."
3. When required for batteries to be installed in an pole mounted cabinet, wire batteries according to manufacturers recommendations. Provide the number of batteries as required by the manufacturer. Stack the batteries in the cabinet on shelves with 1" vertical separation.
4. See Electrical Details (ED) standard sheets for additional requirements regarding the installation of ground boxes/battery boxes, and conduit.
5. Use materials specifically designed for attaching cabinets, photovoltaic modules, etc., to poles.
6. See special specification "ITS Solar Power System" for further requirements.
7. See plans for electrical conductor circuit size from solar cabinet to ITS pole mounted cabinet. Circuit to be designed based off of ITS equipment design load and allowable 5% voltage drop over distance from the solar assembly to ITS cabinet.
8. Provide pedestal pole assembly in accordance with Item 687. Unless otherwise shown on the plans, pole shaft shall be one piece, Schedule 40 aluminum pipe, ASTM B429 or B221 (alloy 6061-T6 only). Aluminum conduit will not provide the necessary strength and will not be allowed.
9. Use either a screw-in type anchor foundation or a drilled shaft foundation as identified in the plans. When plans require a drilled shaft foundation, construct in accordance with Item 416 and standard sheet TS-FD. Install the screw-in type anchor foundation as per manufacturer's recommendations. On a slope, install one edge at ground level. Screw-in shaft foundation will be subsidiary to special specification "ITS Solar Power System."
10. If more than 2 photovoltaic modules are needed, a second pedestal pole assembly may be required.
11. See sheets ITS(1)-15, ITS(2), and ITS(4) "ITS Pole Details" for further information regarding the steel ITS pole assembly.
12. Pv = Photovoltaic
13. Per manufacturer's recommendations, engage all threads on the pedestal pole base and pipe unless the pipe is fully seated into base. In high winds, use a pole and base collar assembly to add strength and prevent loosening at connection.
14. Use hardware specifically designed for attaching equipment (i.e., cabinet, photovoltaic module, etc.) to pole as recommended by equipment manufacturer. Provide mounting details for approval.

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Texas Department of Transportation
Traffic Operations Division Standard

ITS SOLAR POWER SYSTEM ALUMINUM POLE MOUNTING DETAILS

ITS(25)-15

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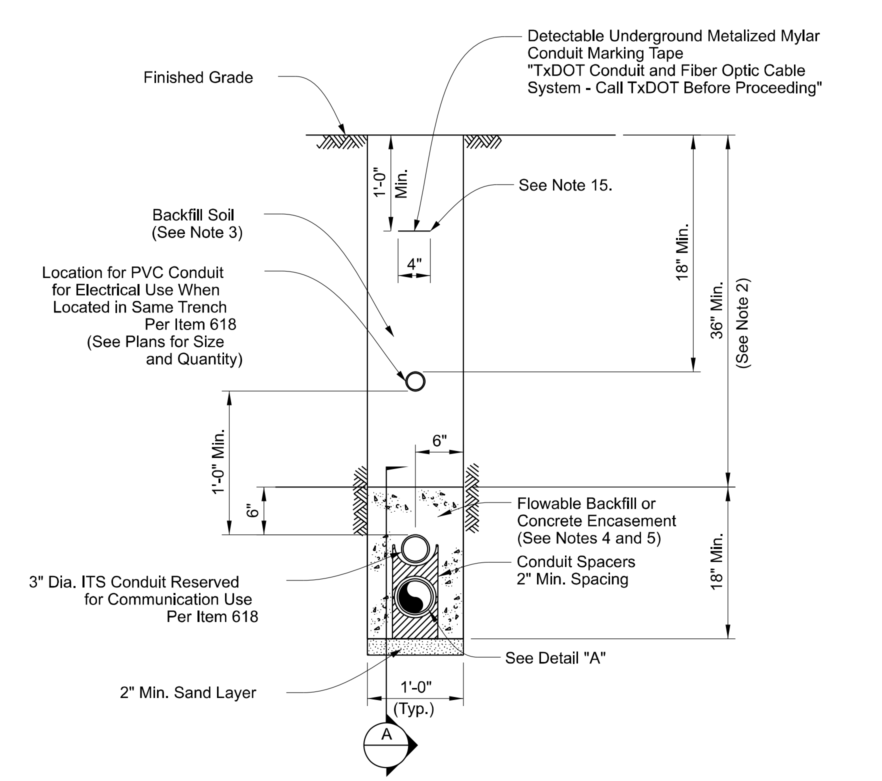
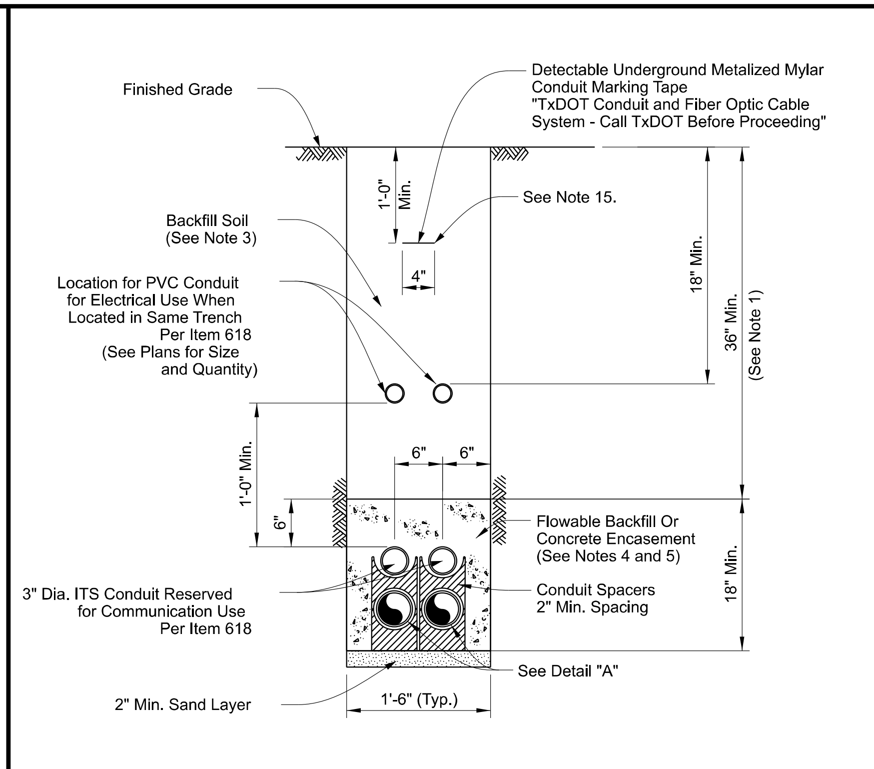


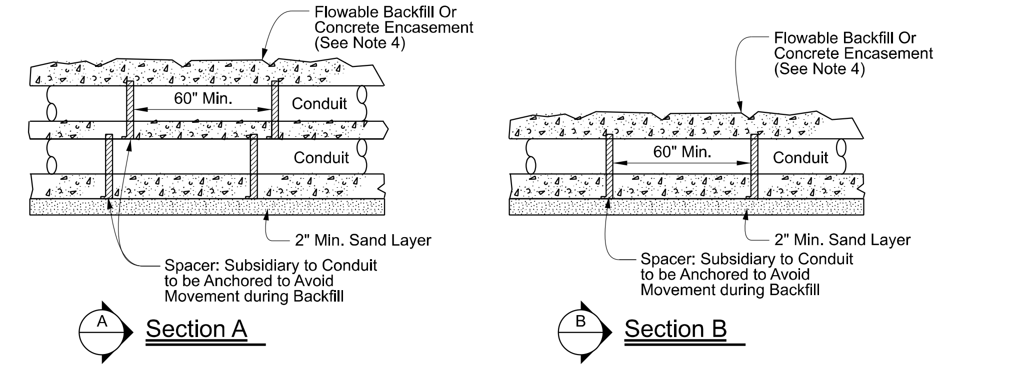
ITS Conduit Backbone Trench Vertical Spacing

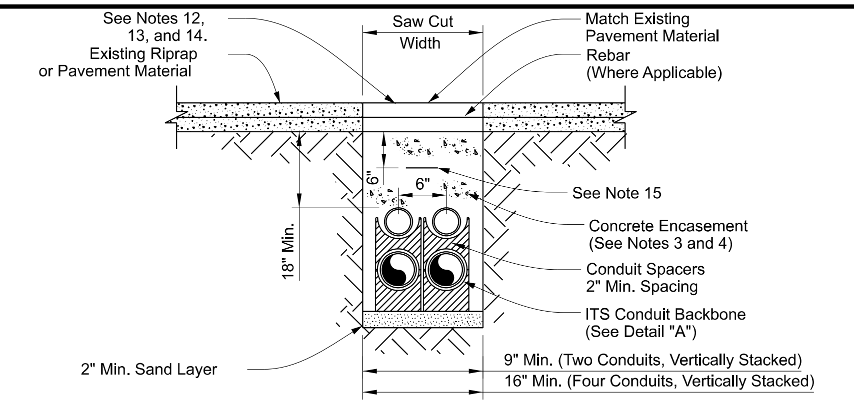
Two Conduit System



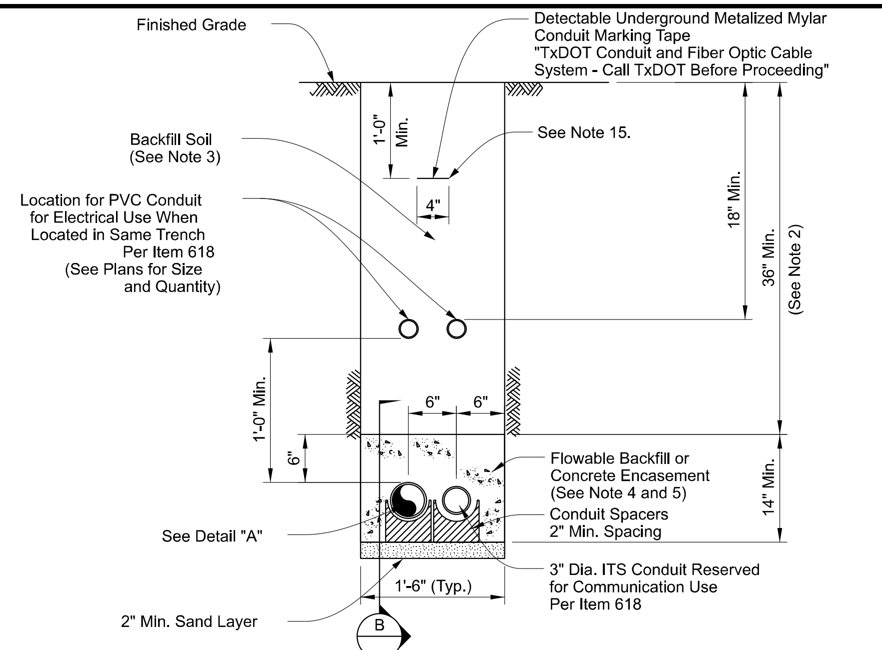
ITS Conduit Backbone Trench Vertical Spacing

Four Conduit System



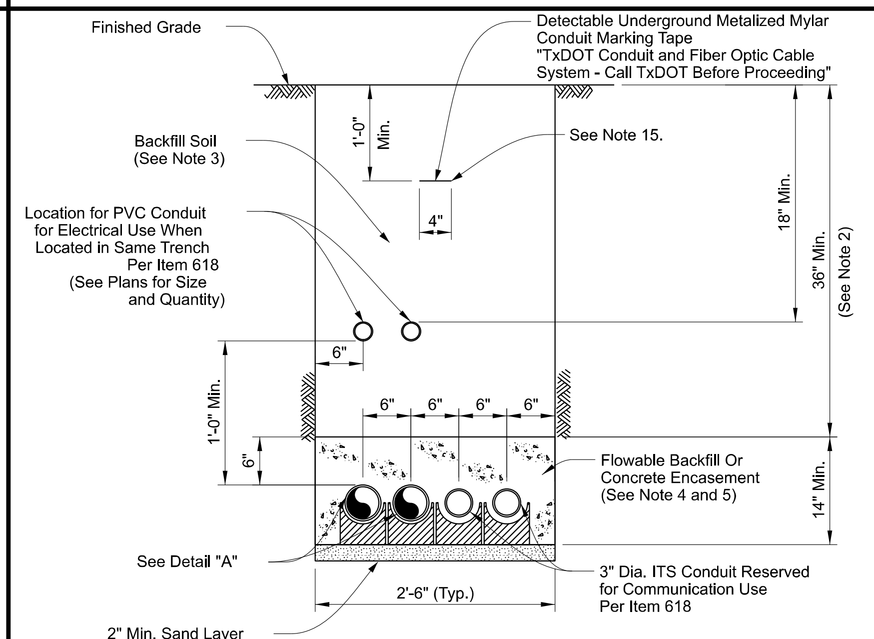


Open Cut Trenching Details



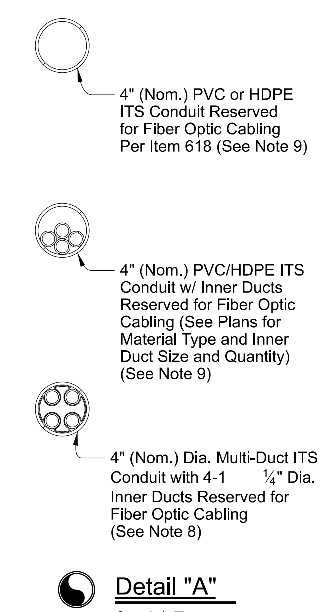
ITS Conduit Backbone Trench Horizontal Spacing (Alternative)

Two Conduit System



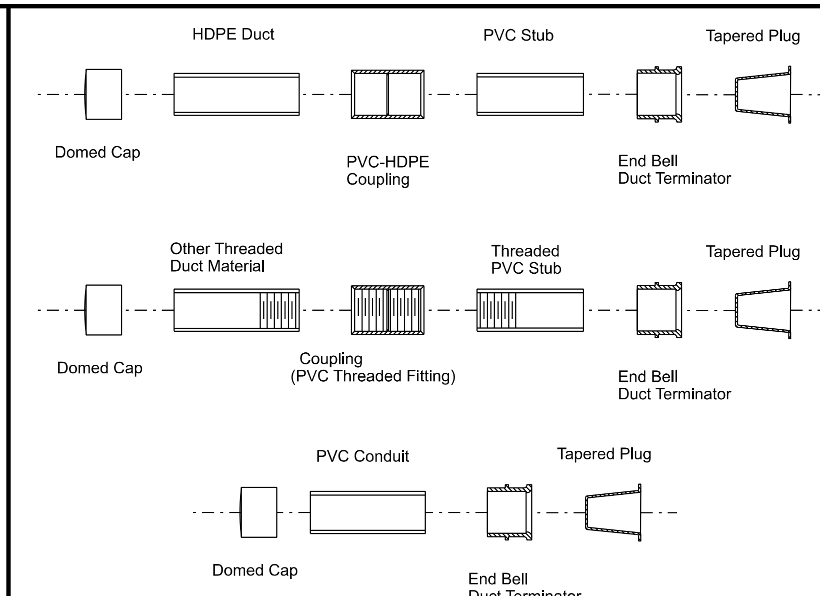
ITS Conduit Backbone Trench Horizontal Spacing (Alternative)

Four Conduit System



Detail "A"

Conduit Types
(See Plans for Type and Quantity)



Typical Conduit Fitting Combinations

2 Conduit and Single Conduit Configuration

SHEET 1 OF 2

General Notes:

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

Sheet Details
Not to Scale

Texas Department of Transportation
Traffic Operations Division Standard

ITS CONDUIT TRENCH DETAILS

ITS(27)-16

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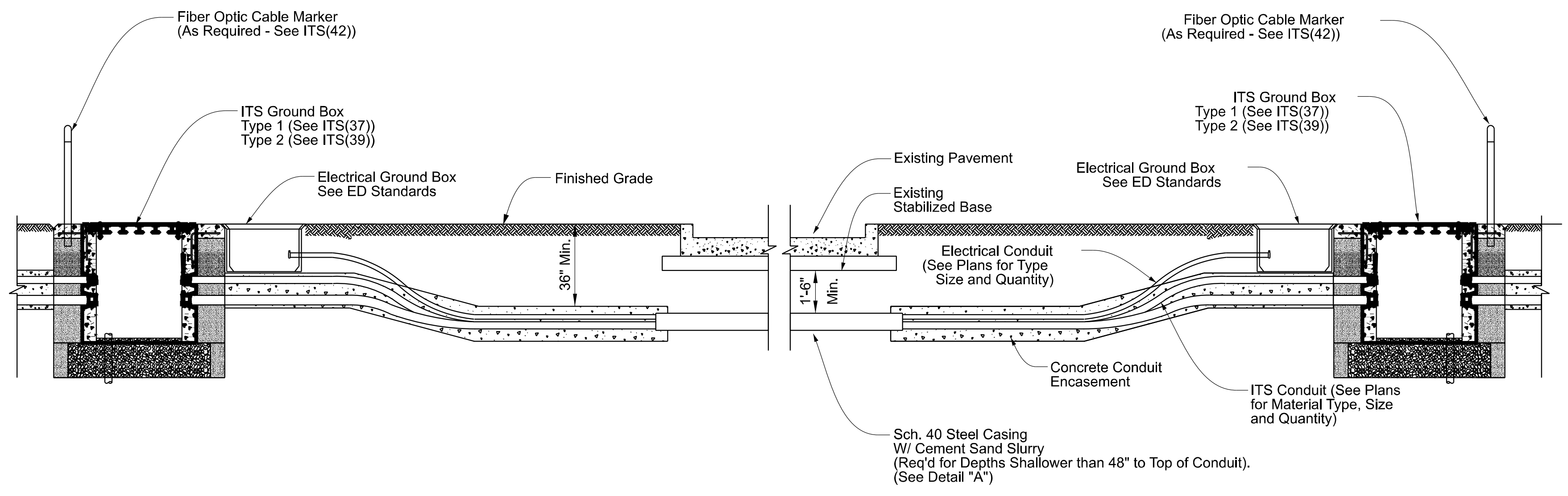
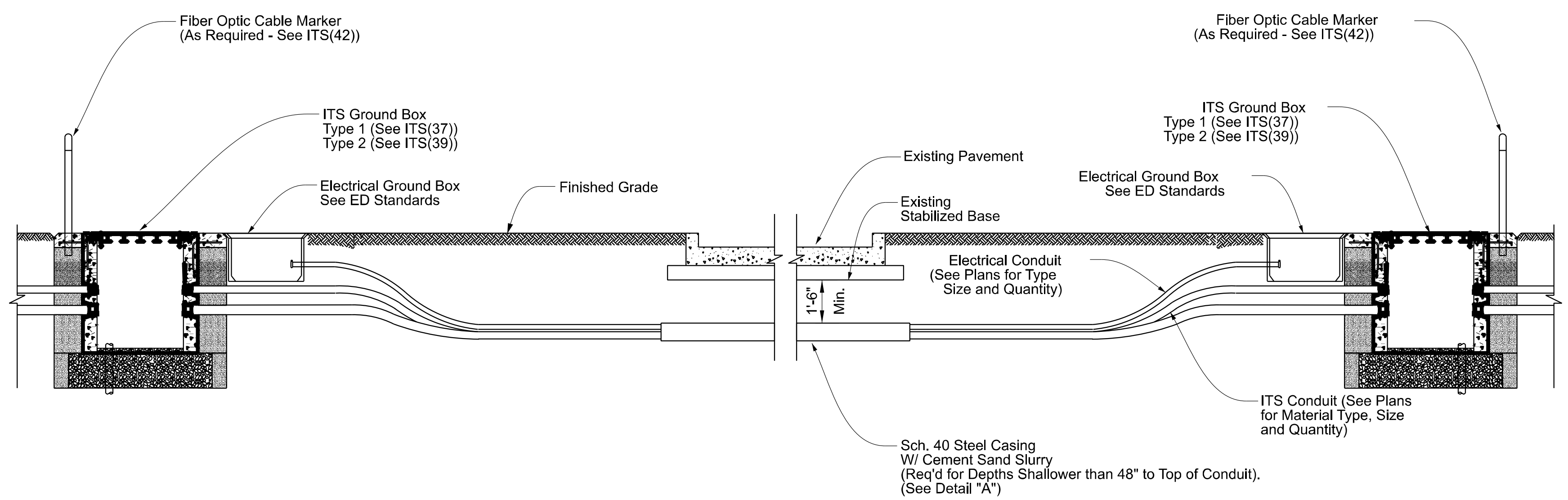
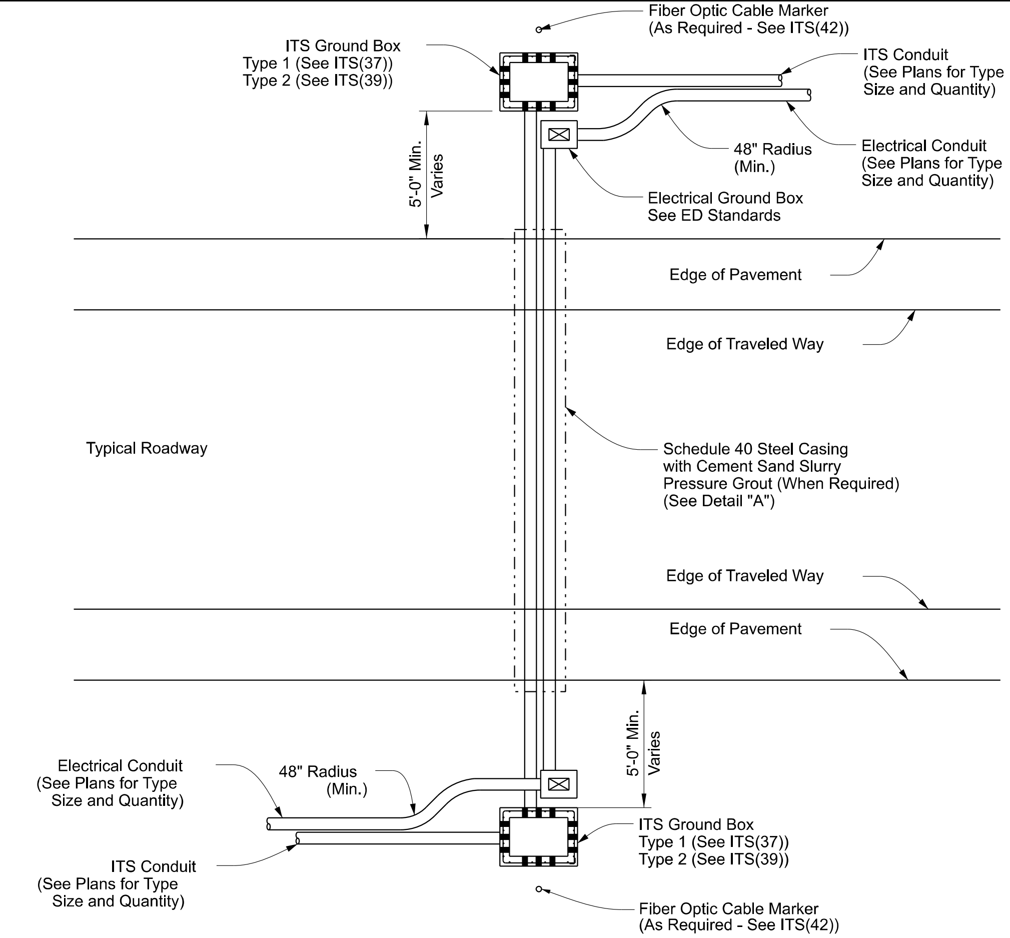


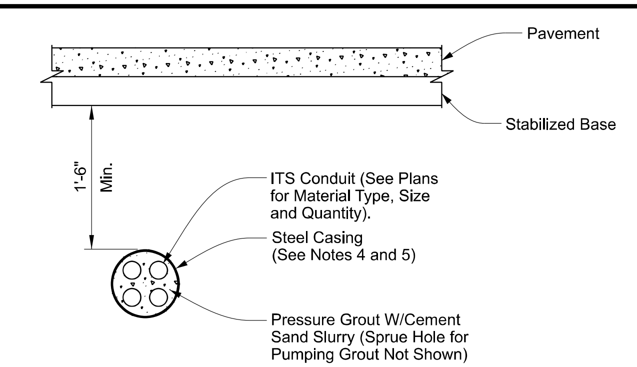
Typical Conduit Installation Jacking
or Boring Beneath Existing Roadway



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



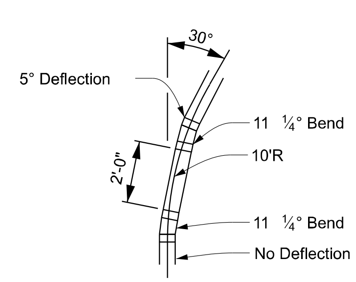
Bore Under Pavement



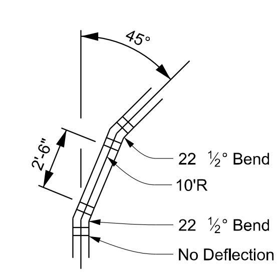
Steel Casing Detail "A"

General Notes:

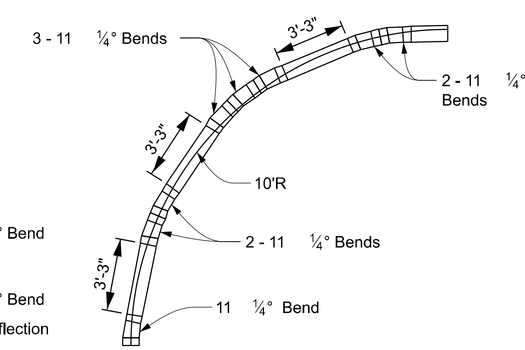
1. Typical conduit installation details for jacking or boring beneath existing roadway is diagrammatic in nature. Roadway cross-slopes may vary for each crossing.
2. Jack or bore in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box" except for measurement and payment.
3. Furnishing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



30° Turnout Detail



45° Turnout Detail



90° Turnout Detail

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

Sheet Details
Not to Scale

SHEET 2 OF 2

Texas Department of Transportation

Traffic Operations Division Standard

ITS CONDUIT BORE AND STEEL CASING DETAILS

ITS(28)-16

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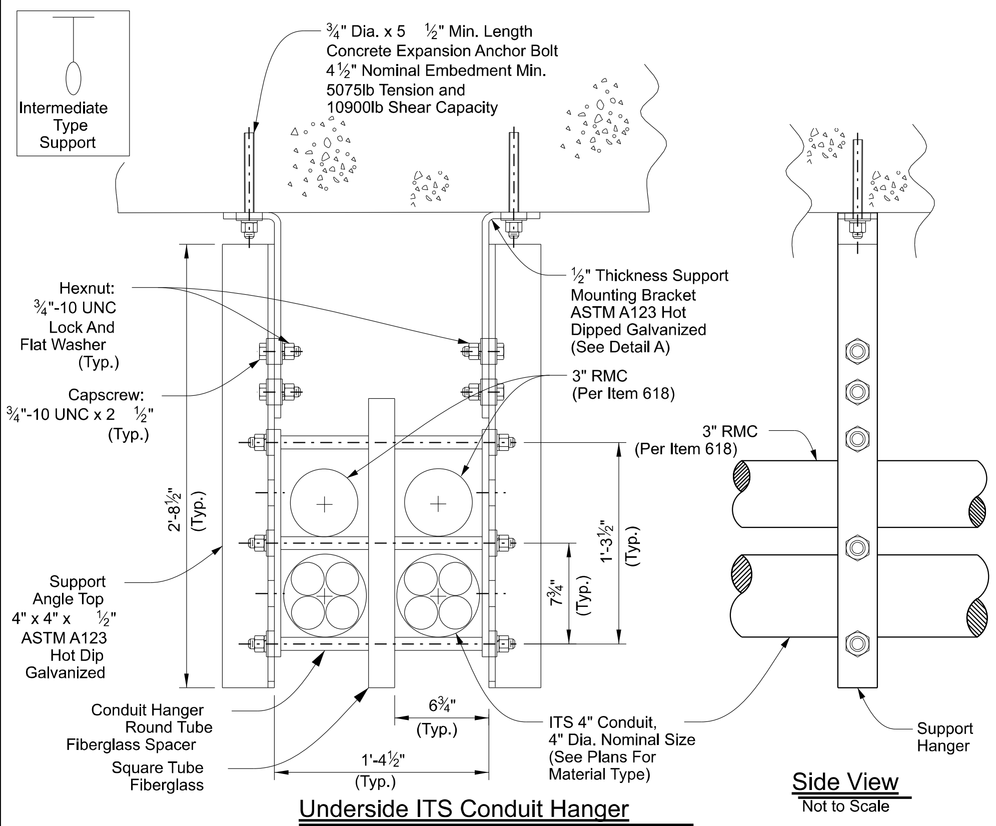
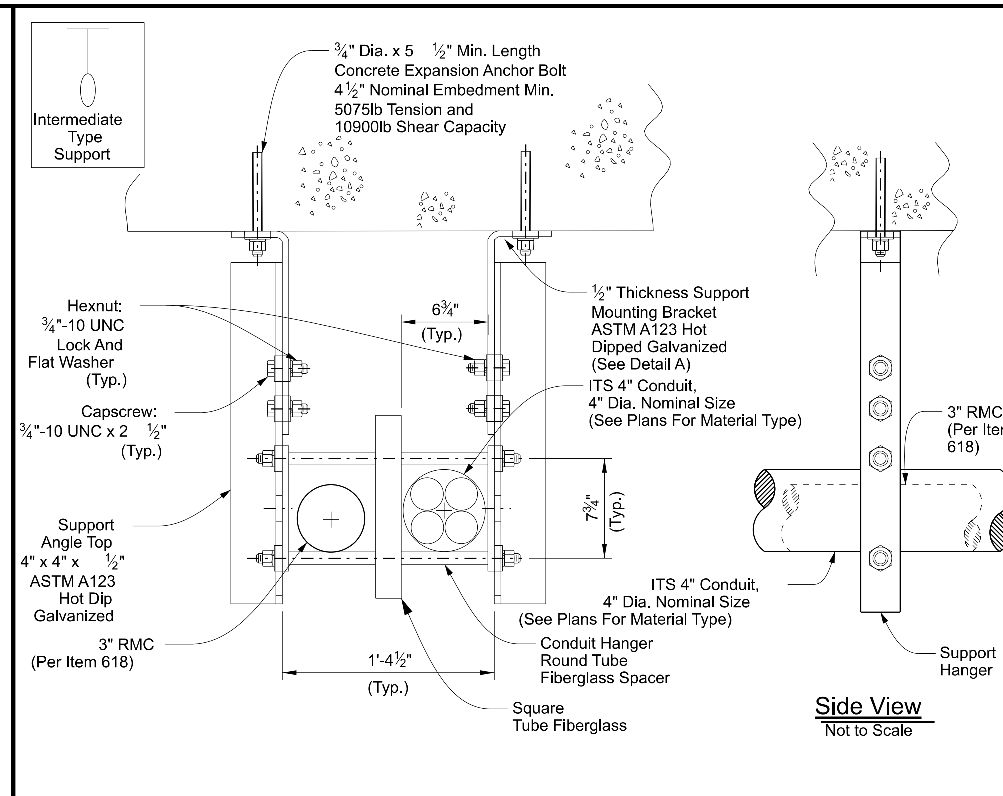
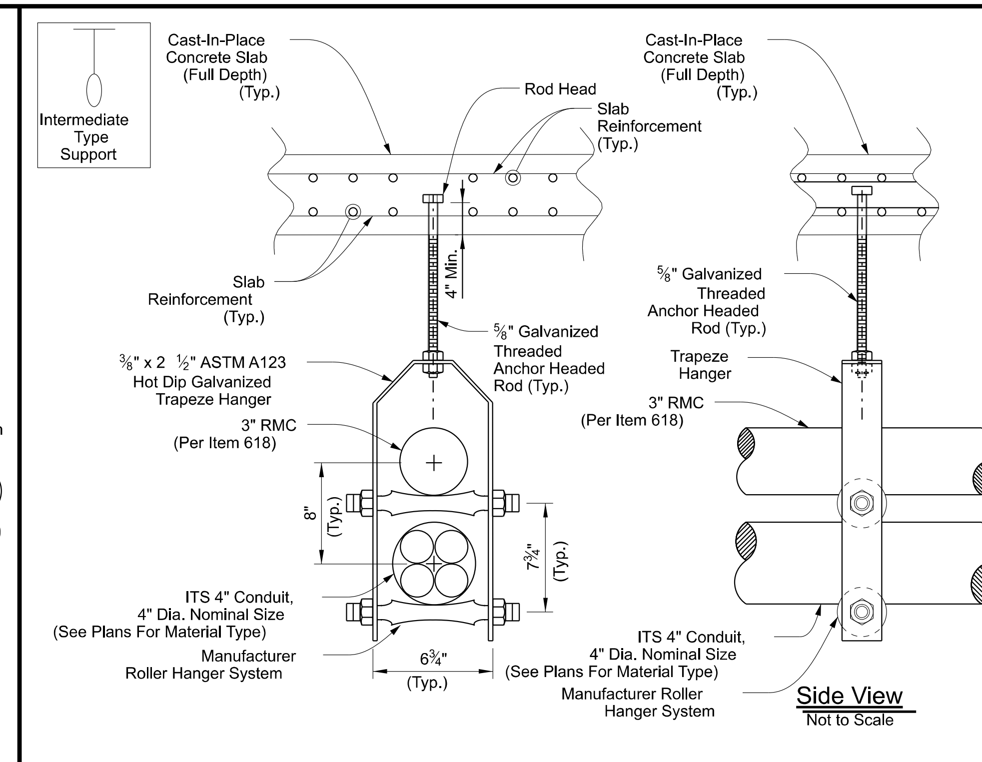


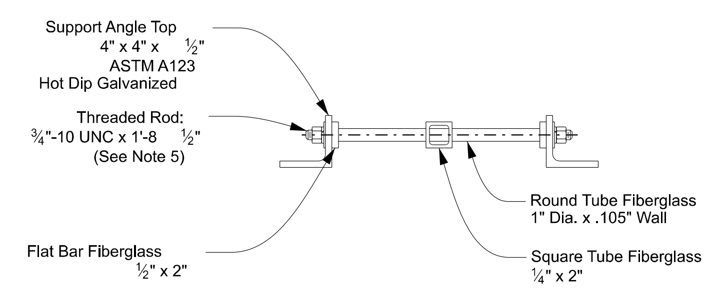
Underside ITS Conduit Hanger
(2x2 Conduit Configuration)



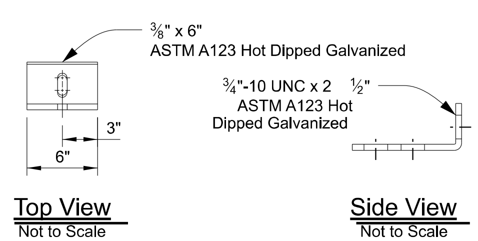
Underside ITS Conduit Hanger
(2x1 Conduit Configuration)



Underside ITS Conduit Roller Hanger
For New Construction
(1x2 Conduit Configuration)



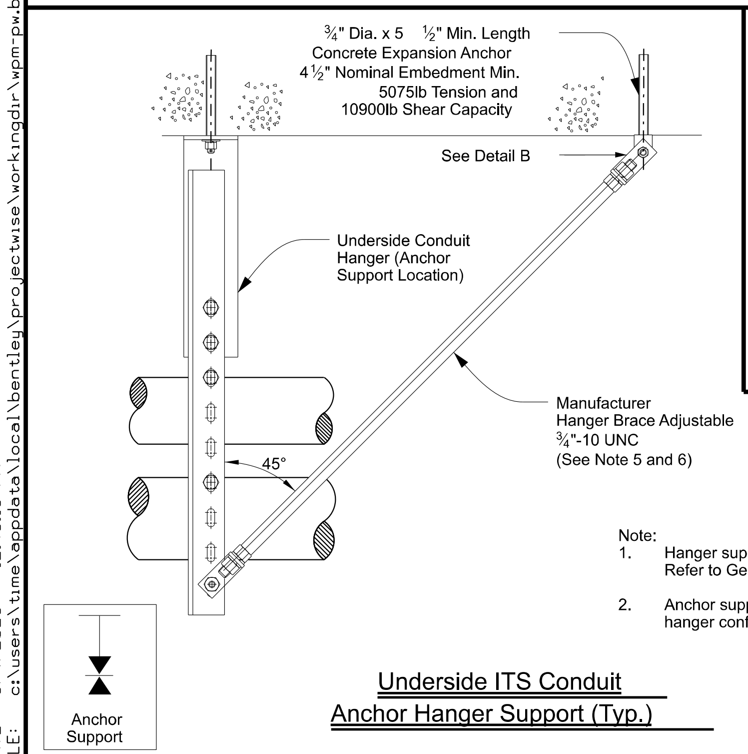
Underside ITS Conduit Hanger Spacer - Top View (Typ.)



Detail A
Support Mounting Bracket Detail

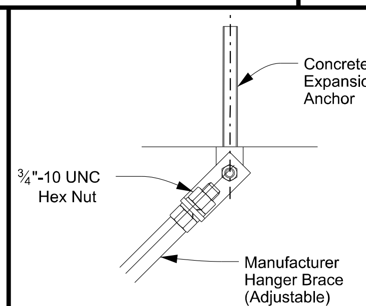
General Notes:

1. Use commercially designed multiple conduit support hangers as an alternative to the hanger details on this sheet, or standard sheet ED(2)-14 may be used. Verify sufficient tension and shear capacity before proposed substitution. Submit hanger details and specifications to the Engineer for approval prior to using on project.
2. Refer to the contract plans for conduit design and hanger configuration requirements. For two (2) conduit configurations, use the typical underside hanger or roller hanger system.
3. Maximum spacing of intermediate conduit hangers is 5'-0" C-C.
4. Hangers vary in length, but do not allow conduit to hang below bridge beams. Refer to ITS(30) for minimum clearance requirement below bridge deck.
5. Ensure all conduit hanger steel shapes conform to ASTM A36 and expansion anchors conform to ASTM A307 and are supplied with minimum of one nut and washer per bolt. Galvanize all steel plate, shapes, and hardware per Item 445, "Galvanizing".
6. Use angle bracing on both sides of conduit support for conduit anchor point hangers.
7. Refer to ITS(32) for expansion-deflection joint details.
8. Provide a minimum of two (2) expansion joints at all bridges. Ensure expansion joint spacing does not exceed manufacturer recommendations.
9. Select conduit lengths so that couplings do not coincide with conduit hanger locations.
10. Allowable types of outer duct material for above ground ITS conduit include rigid metallic conduit (RMC) and fiberglass.
11. Refer to ITS(30) for anchor details through pre-stressed concrete panels.
12. Bond all external structure conduit throughout entire length of run and ground at ground box locations according to ITS(38).

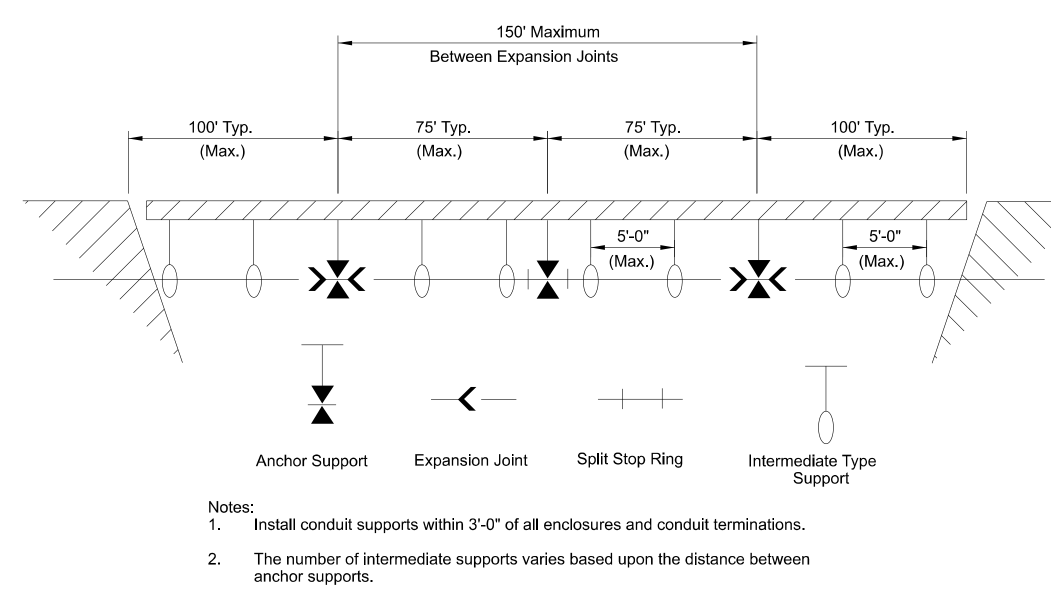


Note:
1. Hanger support shown is a typical configuration. Refer to General Note 1 on this sheet.
2. Anchor supports are required for all conduit hanger configurations.

Underside ITS Conduit
Anchor Hanger Support (Typ.)



Detail B
Brace Mounting Bracket Detail



Notes:
1. Install conduit supports within 3'-0" of all enclosures and conduit terminations.
2. The number of intermediate supports varies based upon the distance between anchor supports.

Underside Anchor Hanger Support Spacing (Typ.) *

* Refer To BICSI Outside Plant Design Reference Manual (OSPDRM) For Conduit Hanger Expansion Joint Placement

Sheet Details
Not to Scale

Texas Department of Transportation — Traffic Safety Division Standard

ITS CONDUIT HANGER DETAILS

ITS(29)-22

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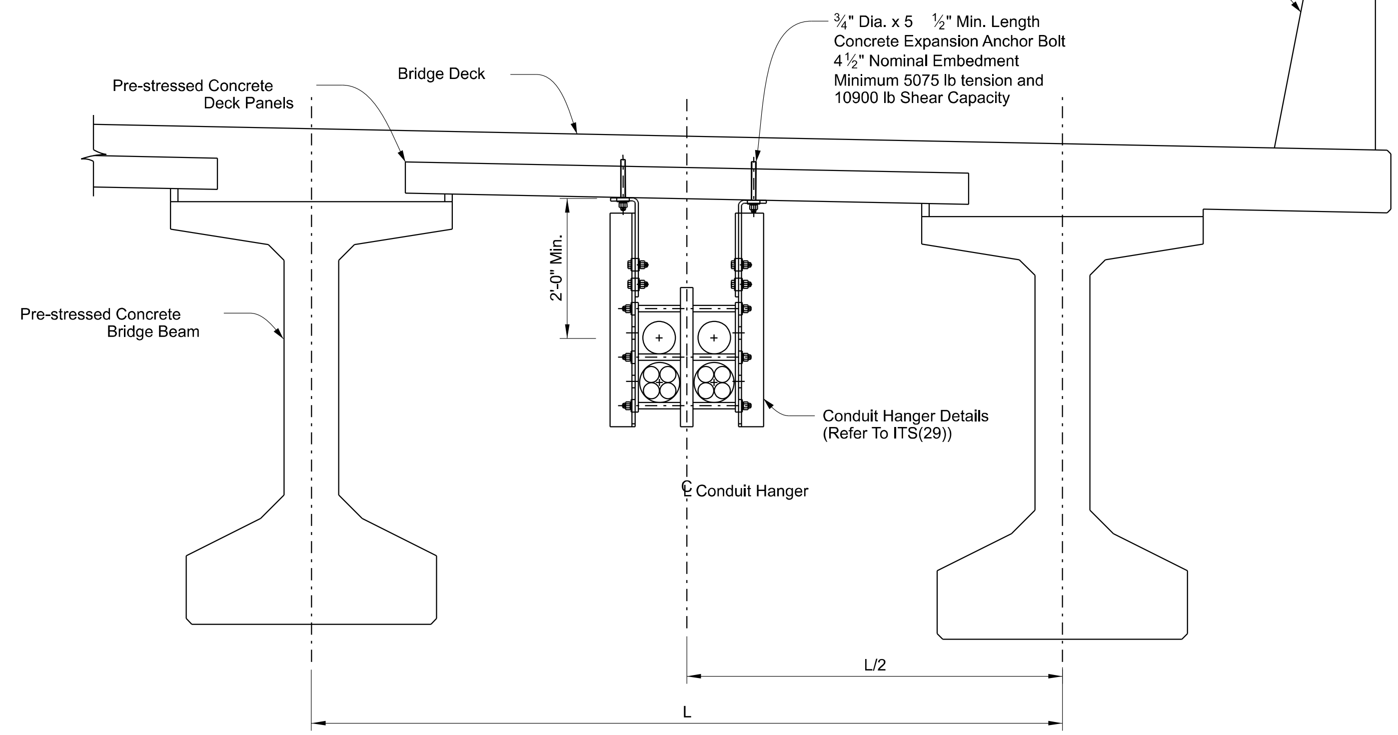
Note:

1. For installations on existing bridge decks using precast concrete panels (PCP), locate expansion anchor drilling locations to avoid pre-stressed strand in the precast panels. Refer to standards for precast concrete panels for strand layout details.

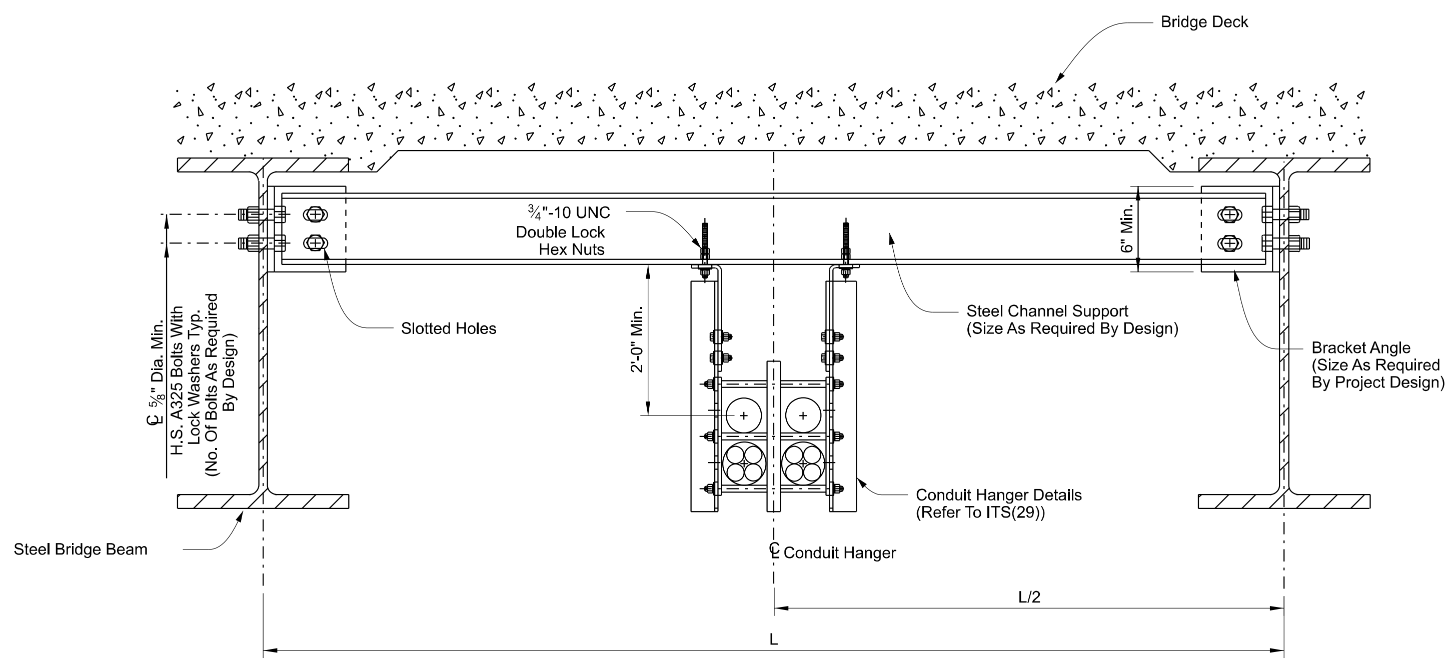


Structure Mounted ITS Conduit - Concrete Bridge Deck With Precast Panels

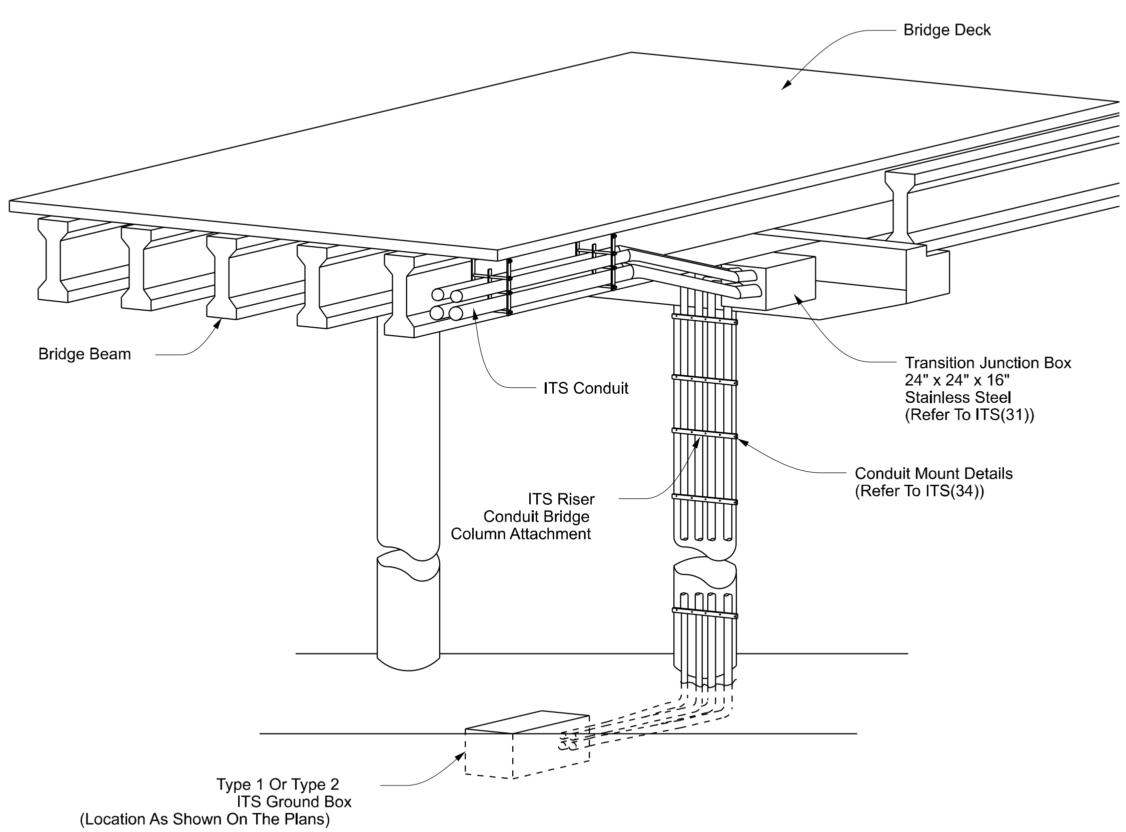
Refer To ITS(29) For General Notes

Note:

1. Position conduit hanger height to avoid conflicts with diaphragms in the conduit runs.



Typical Alternate Conduit Hanger Support (Steel I-Beam Mount)



Underside Conduit Hanger Transition Detail

General Notes:

1. The alternative mounting conduit hanger support mounting detail for steel I-Beam structures as shown is a suggested detail for steel structures. Submit details for the configuration shown on this sheet via shop drawings and include structural load analysis, support member and connection design. Seal all calculations and shop drawings by a Texas P.E.
2. Conduit hanger support mounting details for concrete bridge deck with precast panels as shown are a suggested method for pre-stressed concrete beam structures. Submit any deviation from these details via shop drawing and include structural load analysis, support member, and connection design. Seal all calculations and shop drawings by a Texas P.E.
3. Locate auxiliary conduit hanger supports for steel structures at a maximum 5'-0" spacing.
4. For conduit loads located between beams exceeding 5 lbs per ft, furnish structural load analysis calculations for adjacent beams in the shop drawing submission.
5. Submit design details for structure with cathodic protection in the shop drawing submission.
6. Do not extend conduit hangers below the bottom of the bridge beams (any exceptions at end spans are subject to approval).
7. Drilling in pre-stressed beams or field welding of steel beams is not permitted. Submit any exceptions on a case by case basis for evaluation and approval by the Engineer.
8. Ensure all conduit hanger assemblies are furnished and supplied by the conduit hanger manufacturer.
9. Galvanize all hardware and structural steel that is not stainless steel. Ensure all bolt hardware used to secure hangers to steel structures conforms to A325 for high strength. Ensure all expansion anchors conform to ASTM A307. Separate dissimilar materials for use of galvanized hardware with weathering steel girders.
10. Select conduit lengths so that couplings do no coincide with conduit hanger locations.
11. Refer to Special Specification, "ITS Multi-Duct Conduit" or Item 618 "Conduit", for details on conduit mandreling and other testing required upon conduit installation.
12. Provide a flat pull cord in each conduit and inner duct to allow for installation of future cables to match 1250 lbs-ft tension. Refer to ITS(27) for additional conduit details.
13. Provide a transition junction box for conduit access located outside the abutments for bridge spans < 800 ft. For bridge spans > 800 ft., locate an additional junction box for conduit access near the mid-span/pier.
14. Provide ITS conduit of the type and configuration shown on the plans in accordance with Special Specification, "ITS Multi-Duct Conduit" or Item 618 "Conduit". Ensure all other conduit is in accordance with Item 618 "Conduit" and as shown on the plans.
15. Bond all external structure mounted conduit throughout entire length of run and ground the run at ground box locations according to ITS(37) and ITS(39).

Sheet Details
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Traffic Operations Division Standard

STRUCTURE MOUNTED ITS CONDUIT

ITS(30)-16

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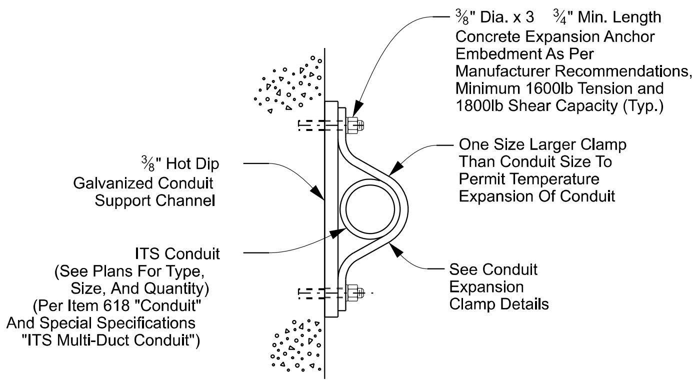
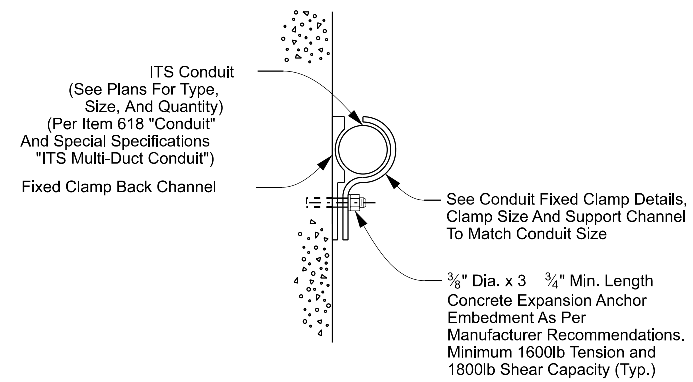
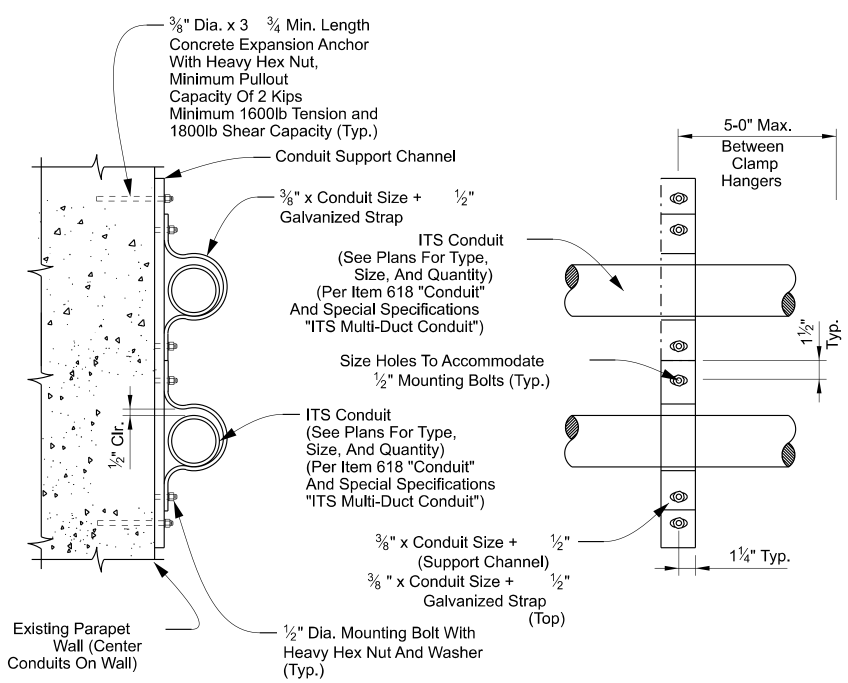


Conduit Expansion Clamp



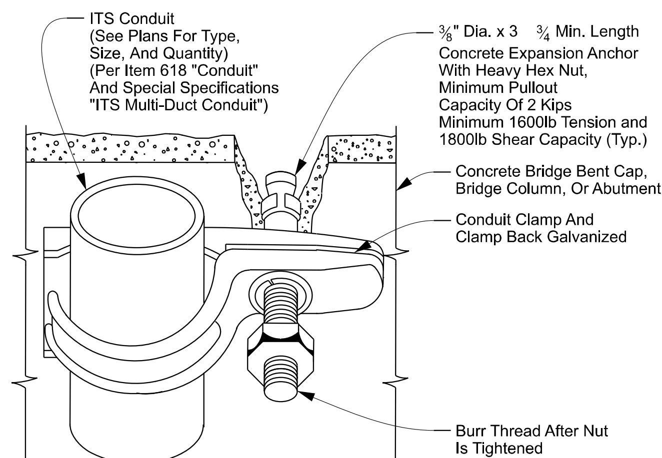
Conduit Fixed Clamp

Conduit Clamp Details (Typ.)

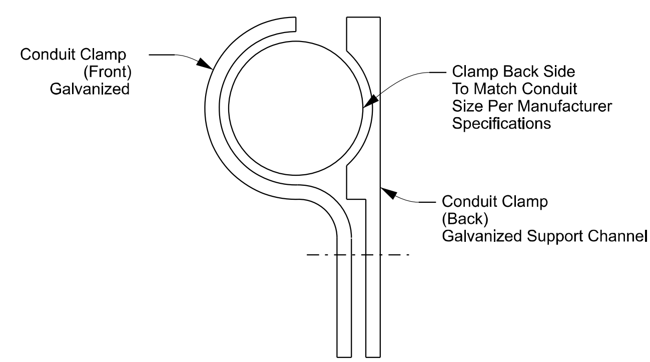


Elevation View

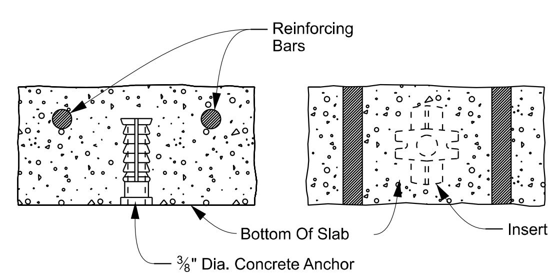
Conduit Expansion Clamp Details



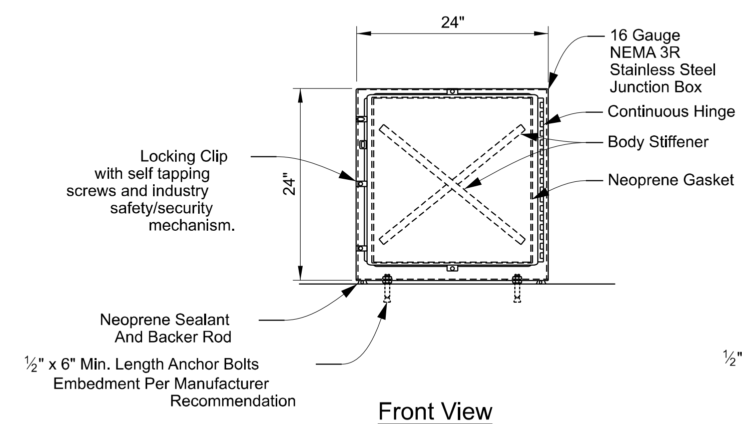
Conduit Fixed Clamp Back Channel



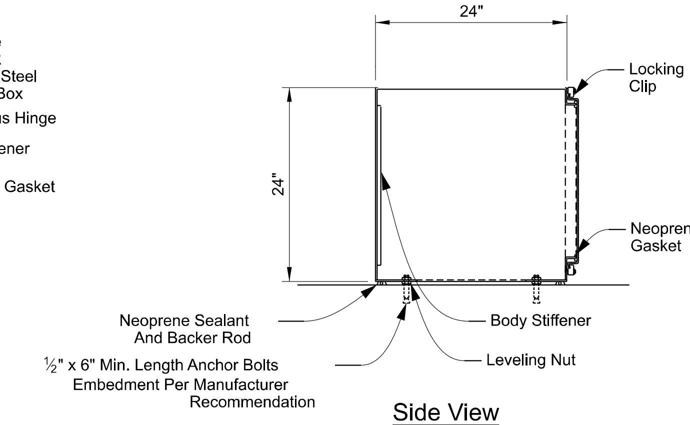
Conduit Fixed Clamp Details
Side View



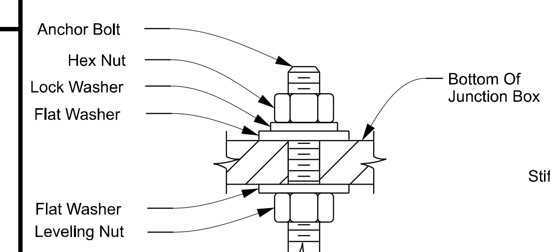
Conduit Fixed Clamp Concrete Insert Detail



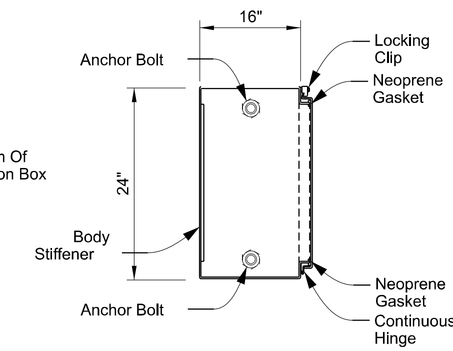
Front View



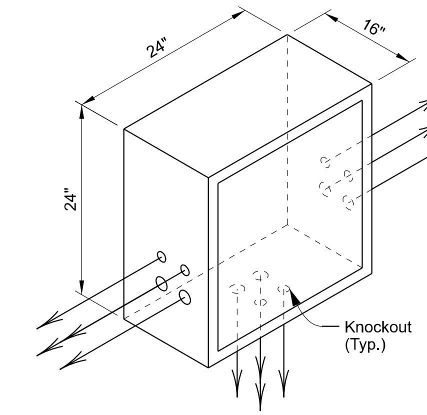
Side View



Anchor Bolt Detail
(May Vary On Mounting Scenario)



Top View



Isometric View

24" X 24" X 16" Stainless Steel Transition Junction Box Detail

Notes:
1. Transition box as depicted is top mount. Actual anchor fasteners and knockout location will vary based upon mount location and manufacturer recommendations.
2. Secure the transition box cover using self tapping screws with industry safety/security mechanism.
3. Typical knockout locations shown are for diagrammatic purposes only. The number of transition boxes required at a given location will vary depending on the number of conduits and cable storage requirements for cabling run(s).

General Notes:

1. Ensure all duct/conduit bends are in accordance with the latest version of the NFPA 70, National Electrical Code and as recommended by the manufacturer.
2. Utilize separate transition junction boxes for communications and electrical conduit runs.
3. Maintain constant slope in all duct/conduit runs.
4. Ensure maximum spacing of conduit clamps is 5'-0" C-C.
5. Galvanize all hardware, including anchor bolts, nuts, and washers per TxDOT Item 445, "Galvanizing". Ensure all expansion anchors conform to ASTM A307.
6. Provide a minimum NEMA 3R junction boxes. Construct all junction boxes in accordance with manufacturer specifications. Install junction boxes in accordance with the latest edition of NFPA 70, National Electrical Code.
7. Junction boxes and associated appurtenances are incidental to ITS conduit.
8. Install all conduit sweeps into junction boxes in accordance with allowable bend radius of the installed cable.
9. Install conduit support within 3'-0" of all enclosures and conduit terminations.
10. Refer to ED standard sheets for additional details on parapet mounted conduit.

Sheet Details
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Traffic Operations Division Standard

PARAPET MOUNTED ITS CONDUIT AND TRANSITION BOX DETAIL

ITS(31)-16

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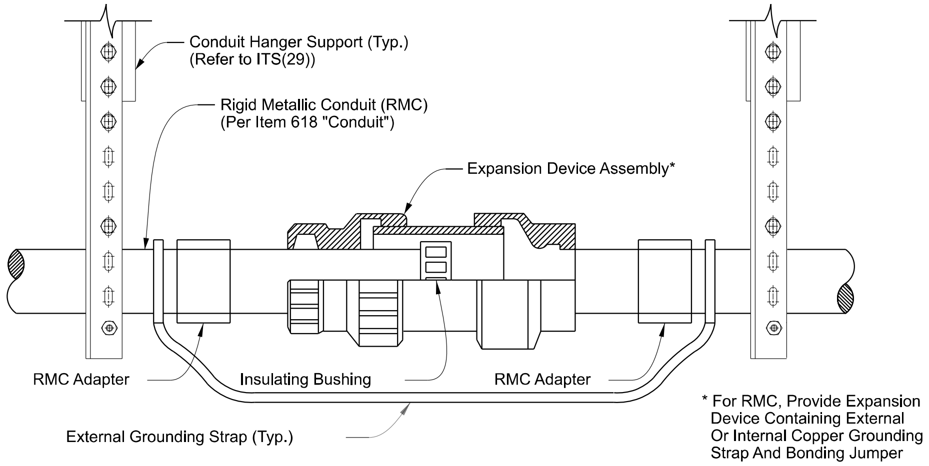
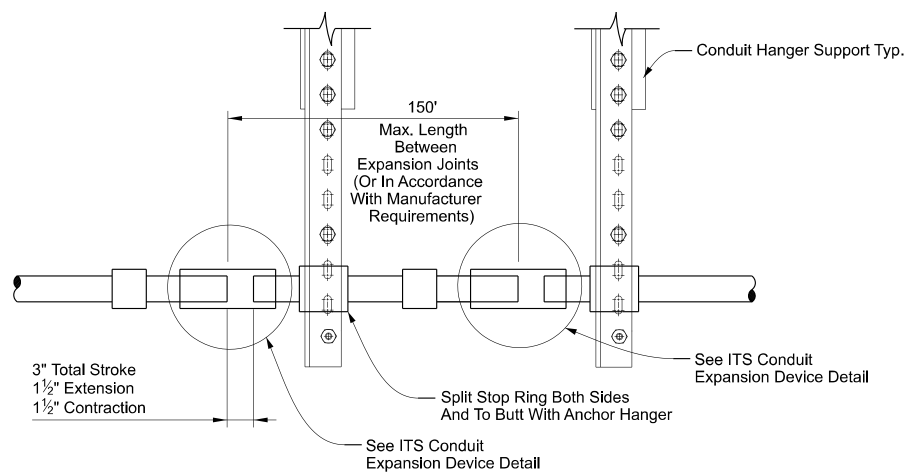
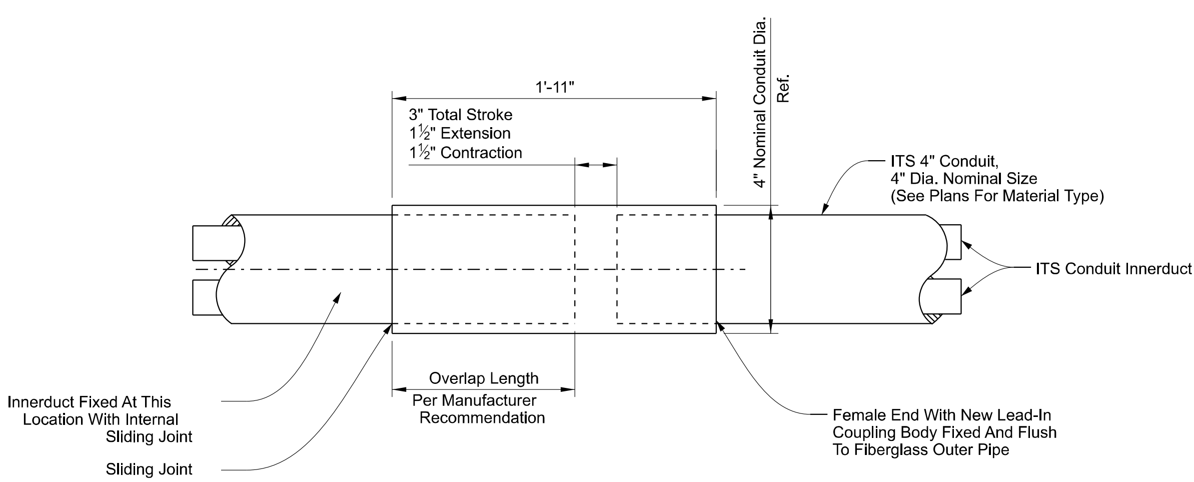


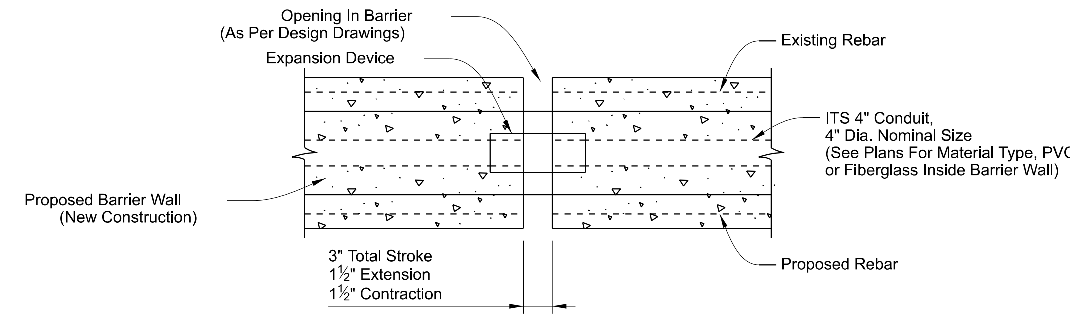
RMC Conduit Expansion Device Detail (Typ.)



ITS Conduit Expansion Device Placement (Typ.)



ITS Conduit Expansion Device Detail



ITS Conduit In New Construction Barrier Wall Expansion And Deflection Joint Fitting (Typ.)

General Notes:

1. Install expansion device at all open joints, at each end of bridge abutments and between bridge bents, allowing for 3" movement.
2. Provide a minimum of two (2) expansion joints at all bridges. Ensure expansion joint spacing does not exceed manufacturer recommendations.
3. Ensure conduit lengths are selected so that couplings do not coincide with hanger locations.
4. Ensure all rigid metallic conduit (RMC) expansion devices are constructed per manufacturer specifications.
5. Bond all external structure mounted conduit throughout entire length of run and ground the run at ground box locations according to ITS(37) and ITS(39).

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Traffic Operations Division Standard

EXPANSION / DEFLECTION JOINT

ITS(32)-16

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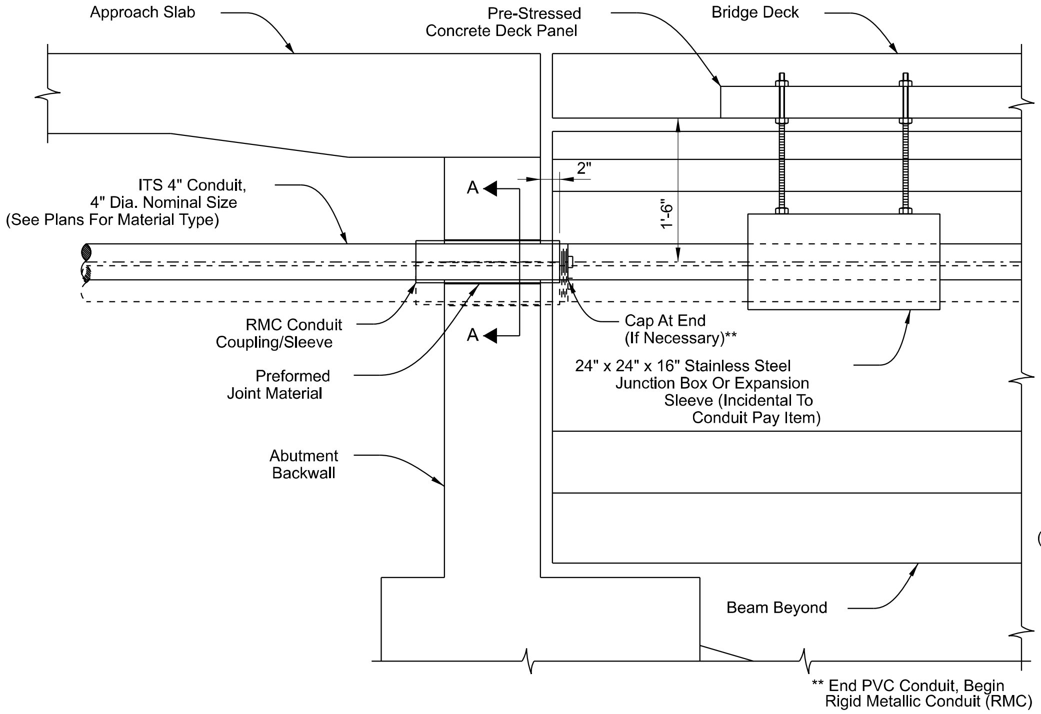
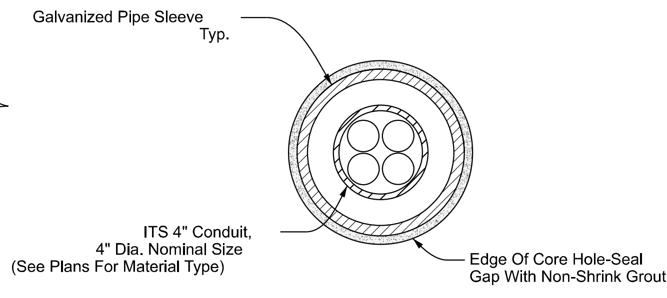


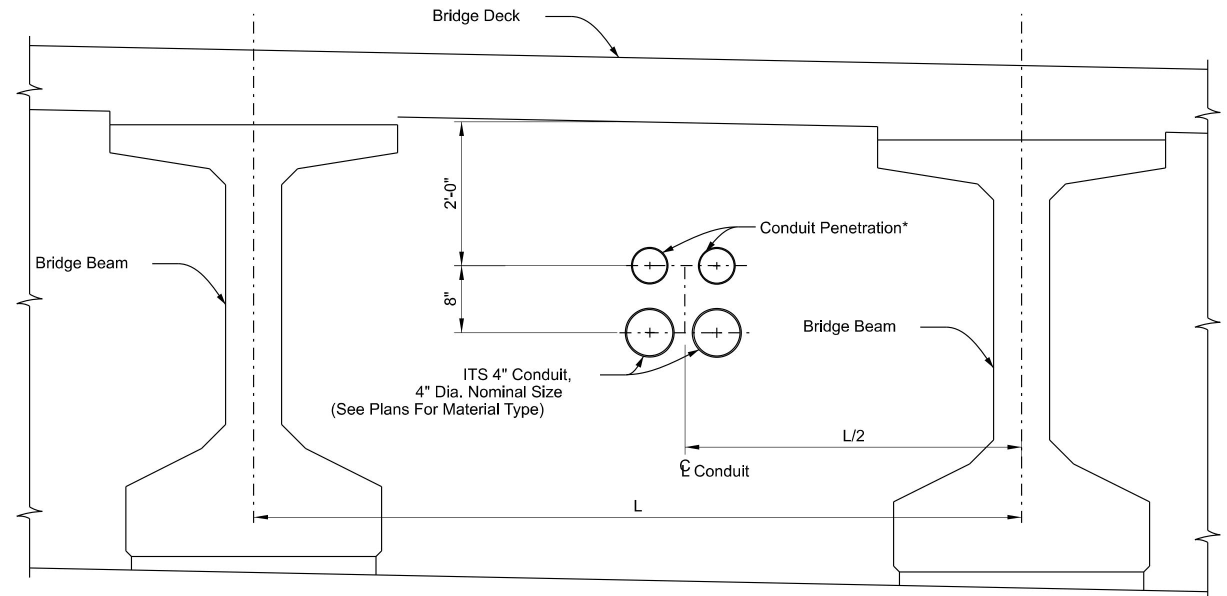
Section Through New Construction Abutment Backwall

Standard Notes:

1. If constant conduit elevation is maintained from the abutment backwall to the underside conduit hangers, provide an expansion joint sleeve (same size as conduit) with one travel overlap. If conduit elevation varies from the abutment backwall to the underside conduit hangers, provide an abutment wall mounted transition junction box (NEMA 3R rated).
2. Provide separate pipe sleeve for each conduit through abutment backwall. Size sleeve per manufacturer recommendations.



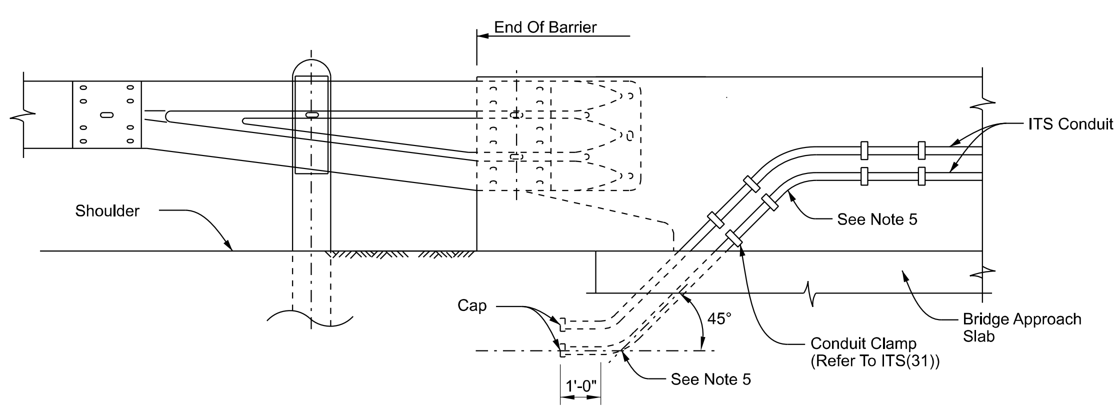
Section A-A (Typical Pipe Sleeve)



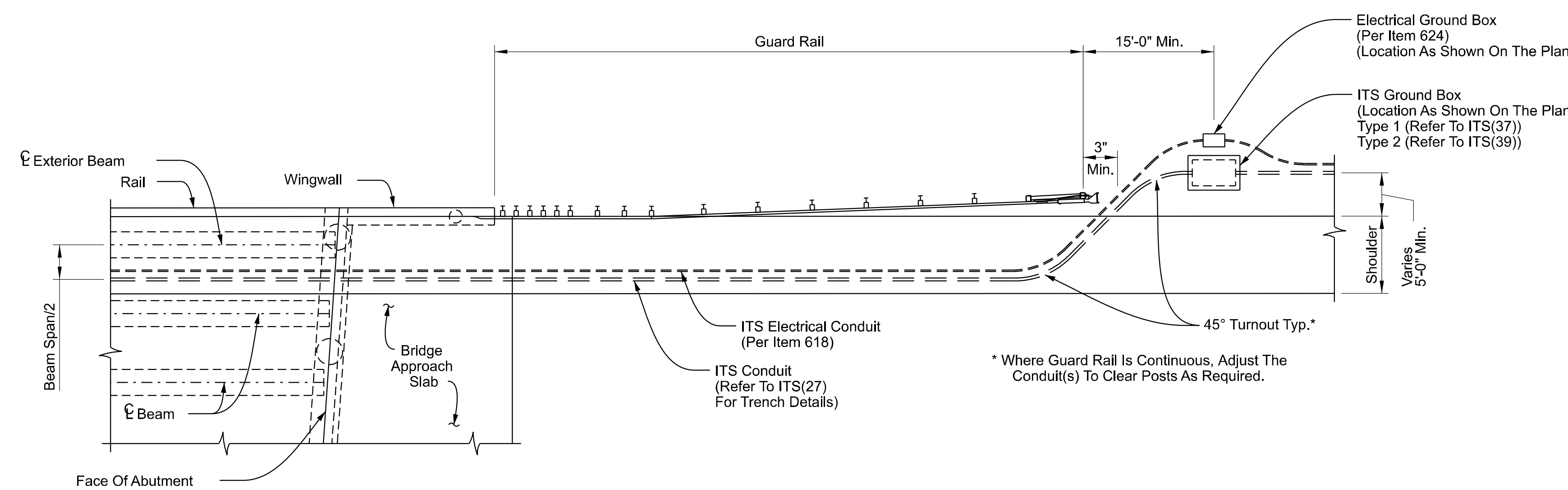
* Showing Control Dimensions For Conduits Thru Abutment Backwall. 2 x 2 Conduit Configuration Shown.

Abutment Elevation

ITS Conduit Transition At Bridge Abutment Detail



Parapet Mounted Conduit Transition To Ground Detail



* Where Guard Rail Is Continuous, Adjust The Conduit(s) To Clear Posts As Required.

Conduit Through Abutment Backwall Transition To Ground Box Detail

General Notes:

1. An alternative option to conduit mountings shown is conduit encased within parapet or bridge structure at crossings. Submit shop drawings and specifications to the engineer for approval.
2. Install expansion sleeves at bridge expansion joints and per manufacturer recommendations.
3. For conduit crossings over bridges, provide ITS communications junction boxes at 1000' maximum spacing and electrical junction boxes at 450' maximum spacing.
4. Keep all junction boxes sufficiently clear of guard rail or other obstructions to maintain clear access.
5. Install conduit sweep at an angle that accommodates cable bend radius. Do not exceed 45 degrees to the shoulder line. Refer to ITS(28) for conduit turn-out details.
6. Do not install junction boxes within paved shoulder area.
7. Ensure all work is in compliance with the latest edition of NFPA 70, National Electrical Code.
8. Junction boxes and associated appurtenances are incidental to ITS conduit.
9. For installation requiring ITS conduit transition within mechanically stabilized earth (MSE) walls with select fill, locate conduit to avoid reinforced straps. Refer to retaining wall standards for further details.
10. Bond all external structure mounted conduit throughout entire length of run and ground the run at ground box locations according to ITS(37) and ITS(39).

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ITS CONDUIT TRANSITION AT ABUTMENT

ITS(33)-16

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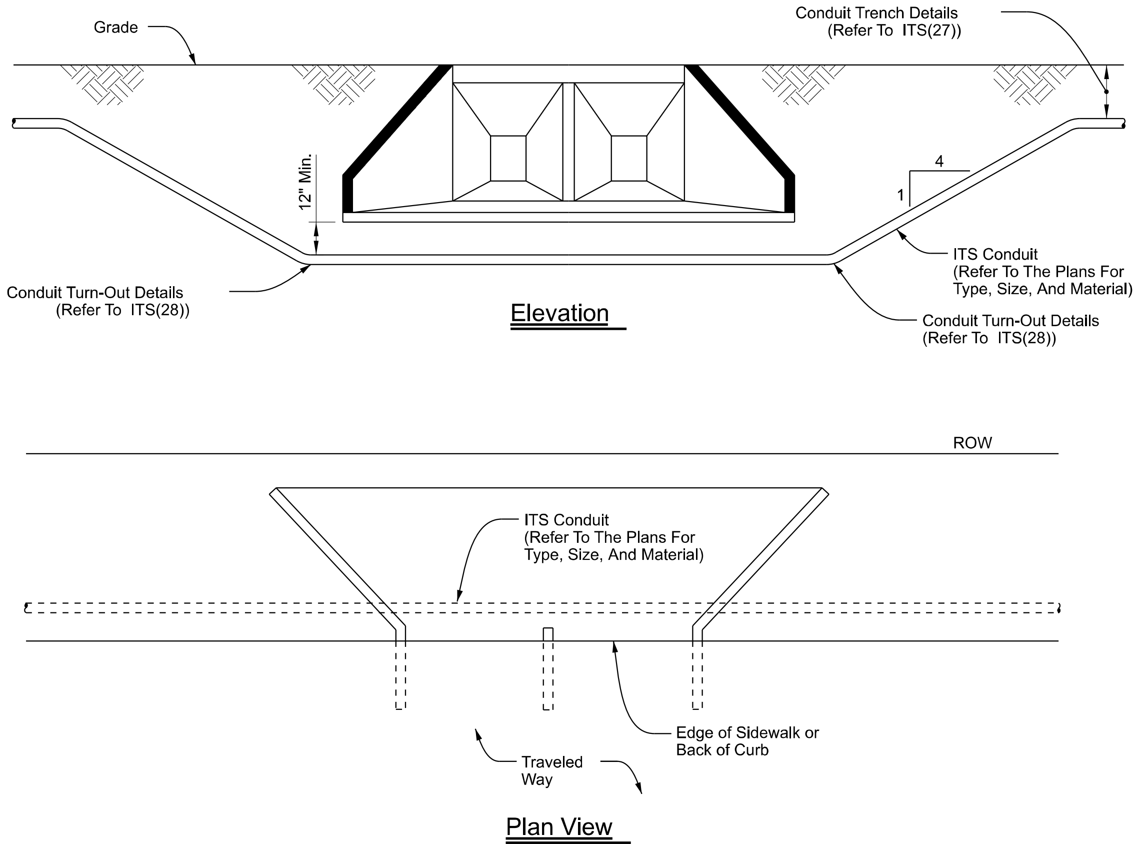
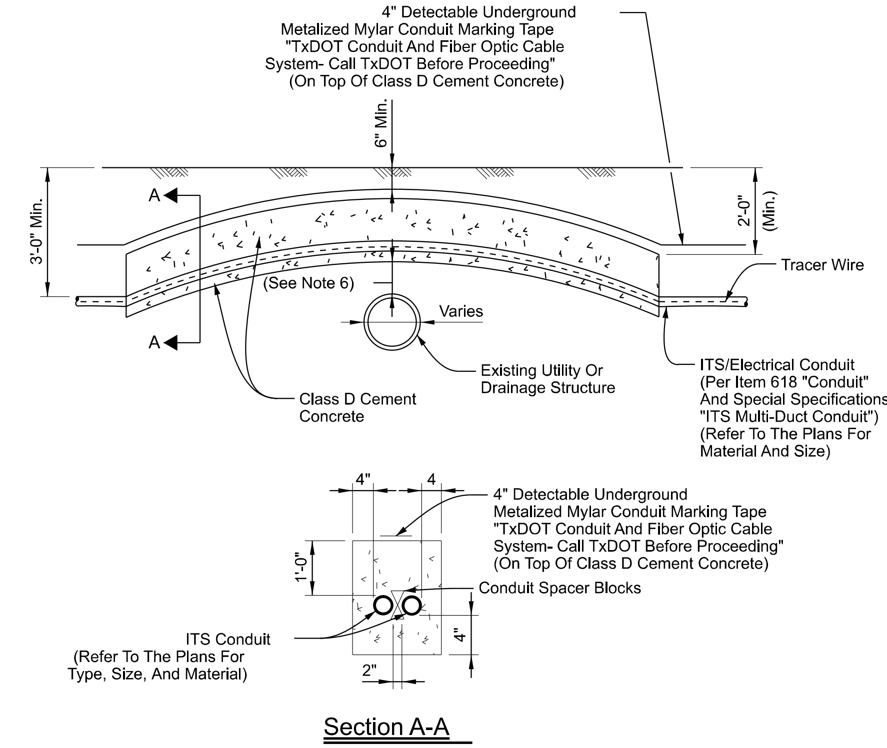
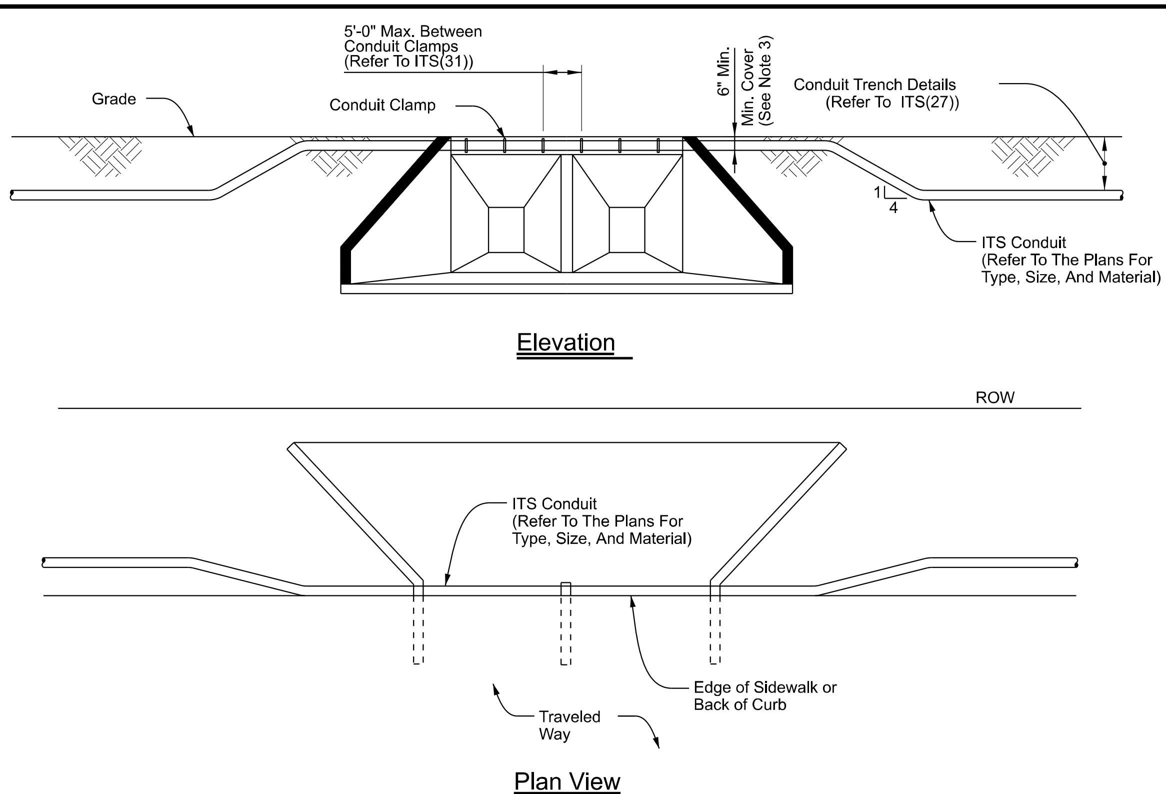


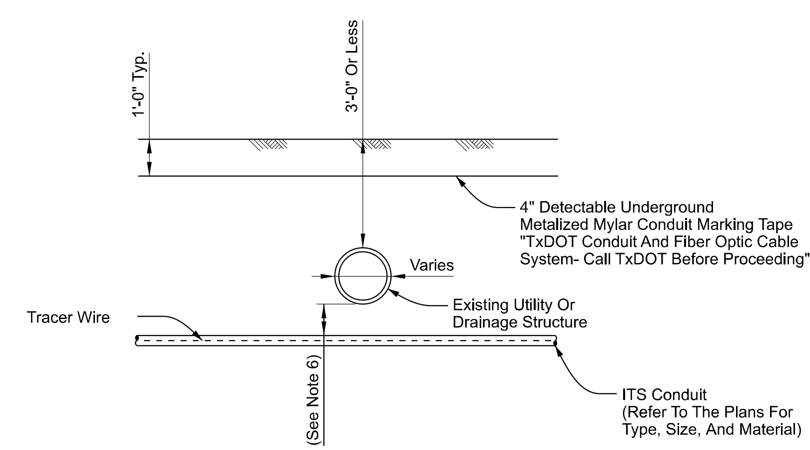
Conduit Bored Under Culvert



Conduit Installation Detail Above Existing Drain Pipes Or Utilities



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.

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Traffic Operations Division Standard

ITS CONDUIT OBSTRUCTION CROSSING

ITS(35)-16

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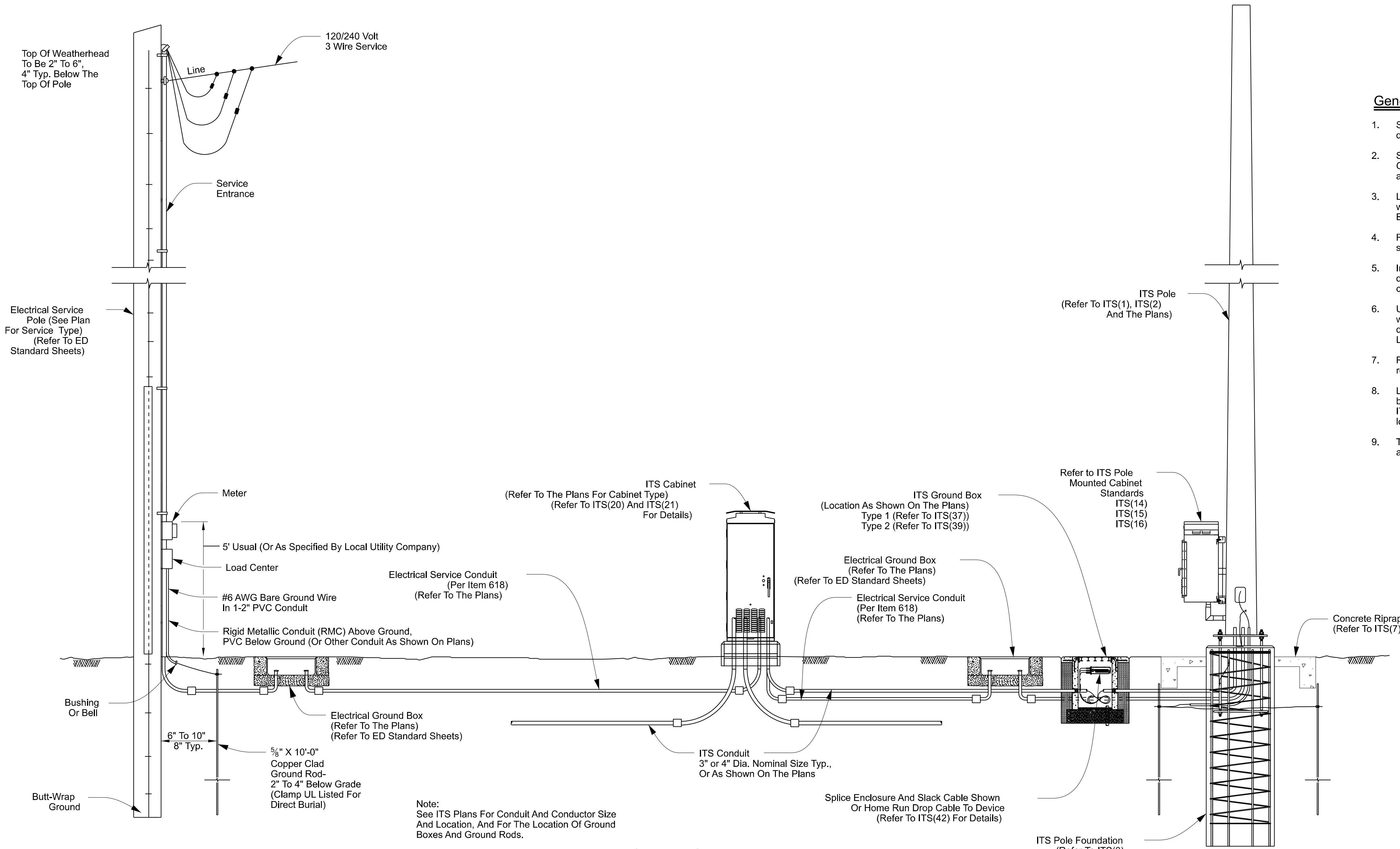

Typical ITS Device Site Layout

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.

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Traffic Operations Division Standard

TYPICAL ITS DEVICE SITE LAYOUT

ITS(36)-16

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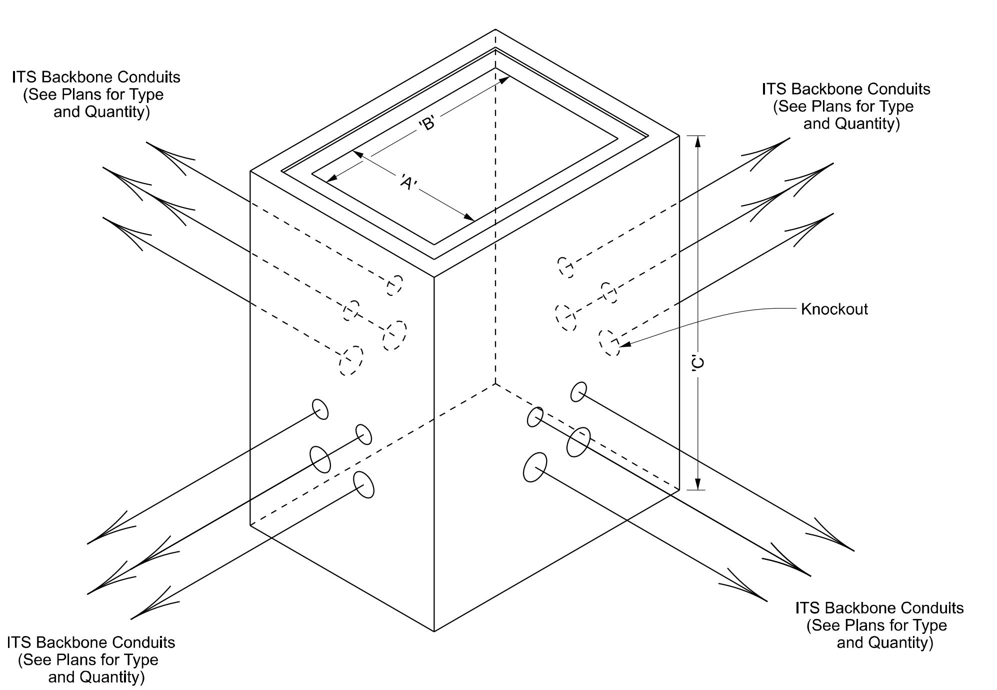
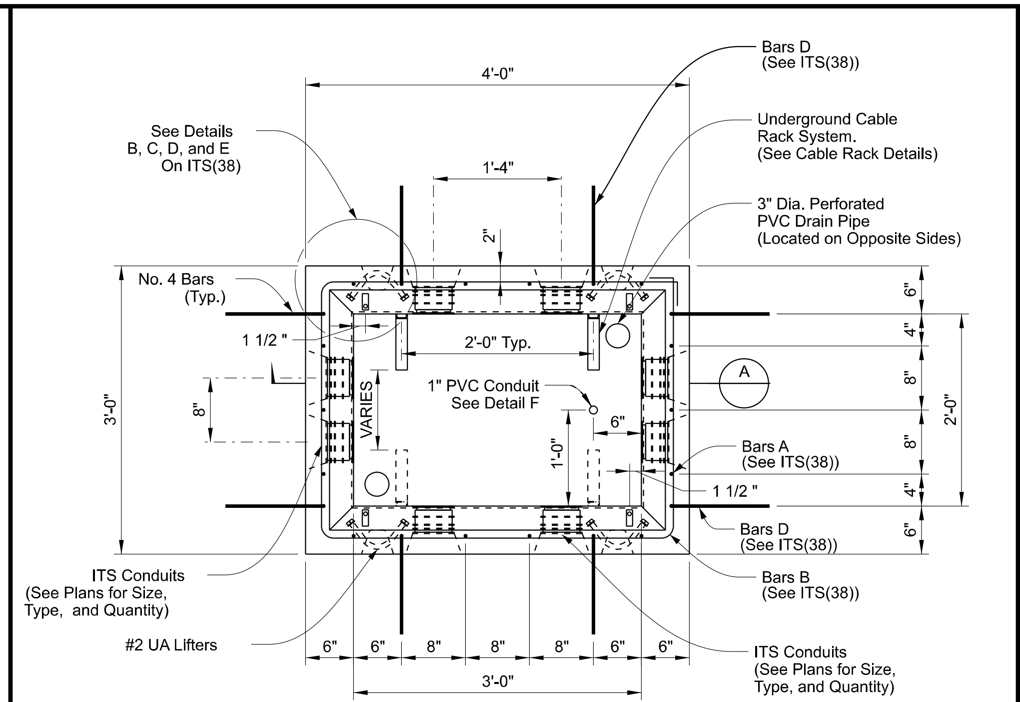


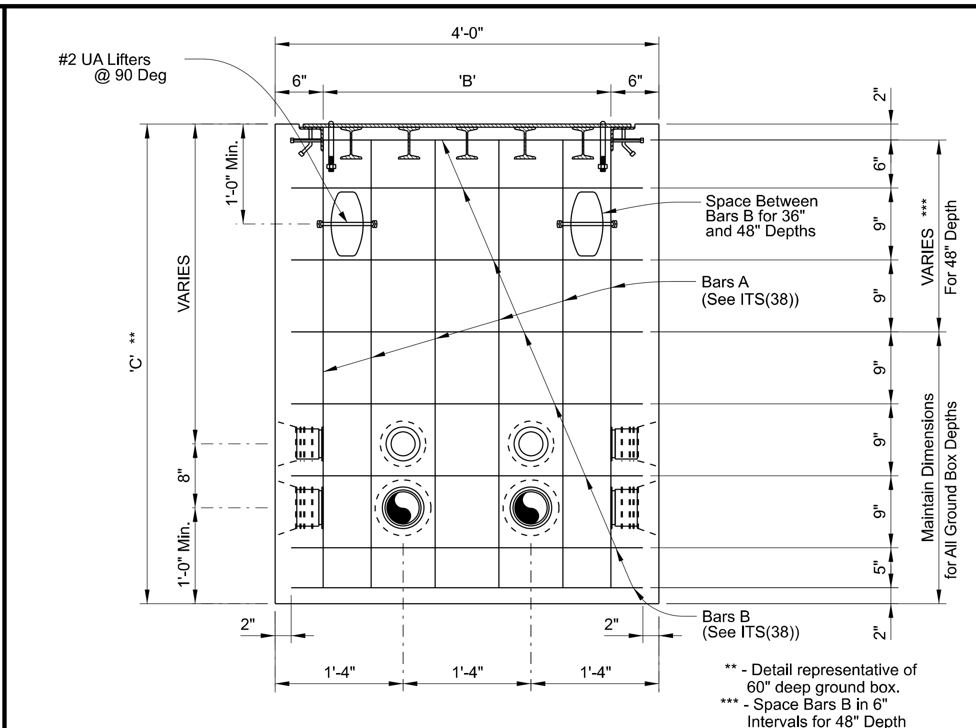
See Ground Box Schedule for A, B, and C Dimensions

Type 1 Ground Box Isometric View



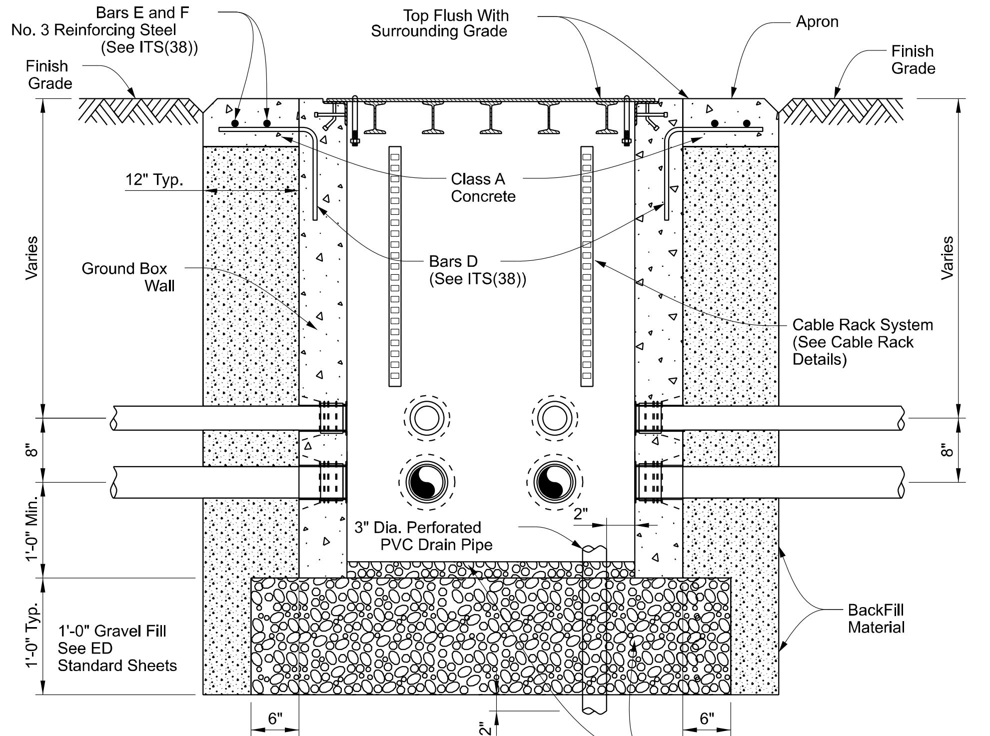
Note: Bar Spacing is The Same on Opposing Sides.

Type 1 Ground Box Plan View

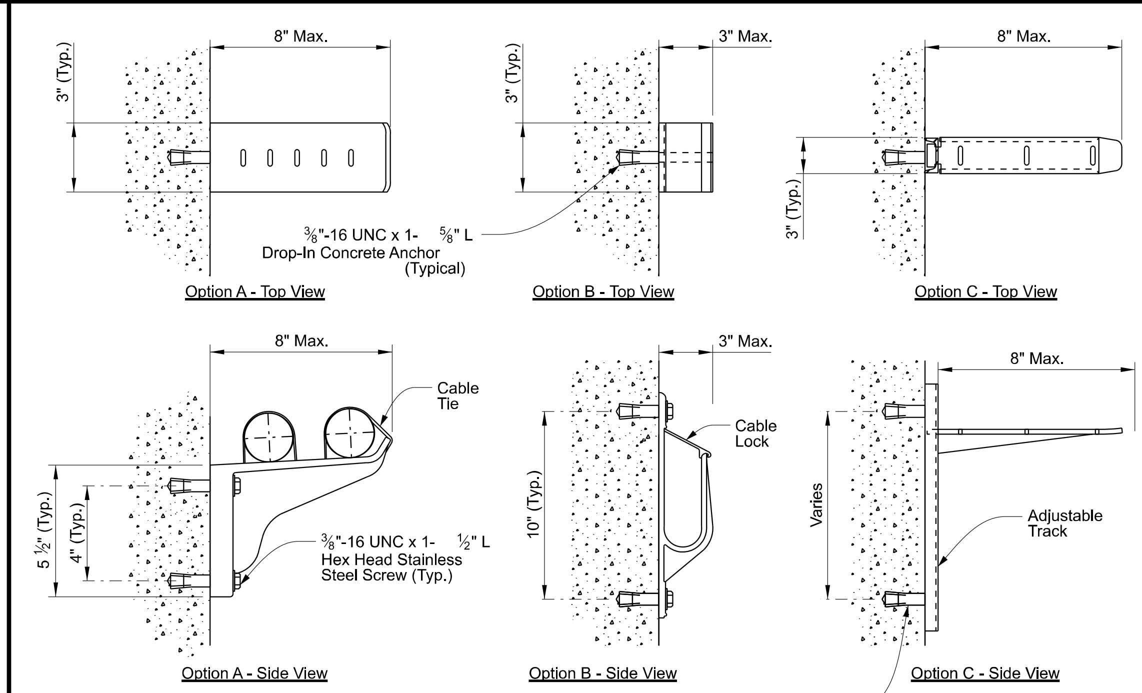


** - Detail representative of 60" deep ground box.
*** - Space Bars B in 6" Intervals for 48" Depth

Type 1 Ground Box Elevation View

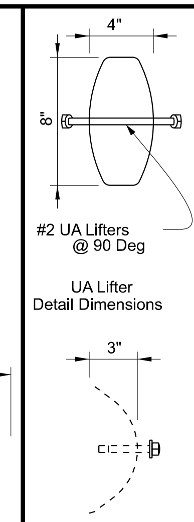


A Section A

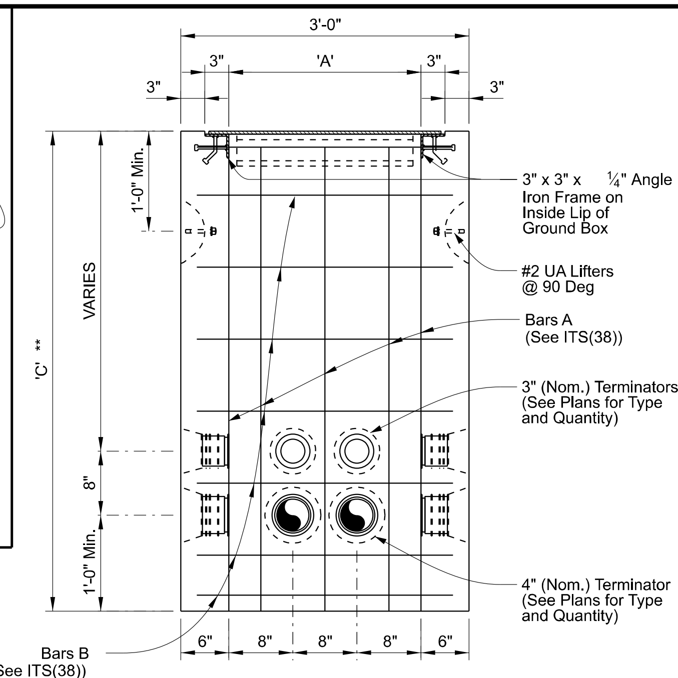


Note: Options Shown for Cable Racks and Attachment Methods. Furnish Shop Drawings of Cable Rack for Engineer Approval Prior to Installation.

Type 1 Cable Rack Details



UA Lifter Detail Dimensions



Type 1 Ground Box Side View

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

SHEET 1 OF 2

General Notes:

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

Ground Box Schedule

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

Sheet Details
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Texas Department of Transportation

Traffic Safety Division Standard

ITS GROUND BOX DETAILS TYPE "1" WITH STEEL COVER

ITS(37)-22

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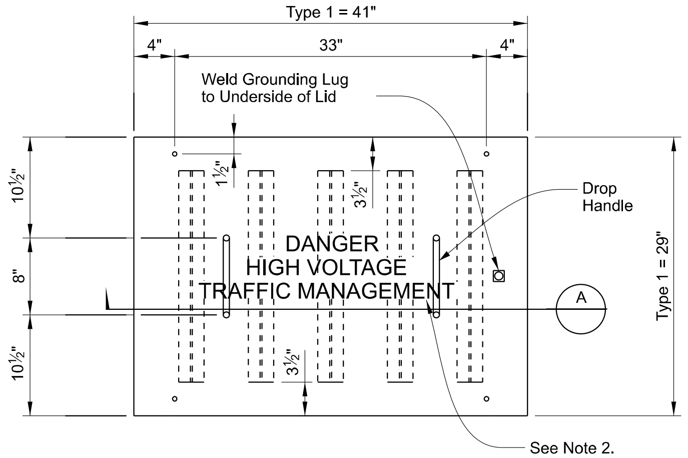
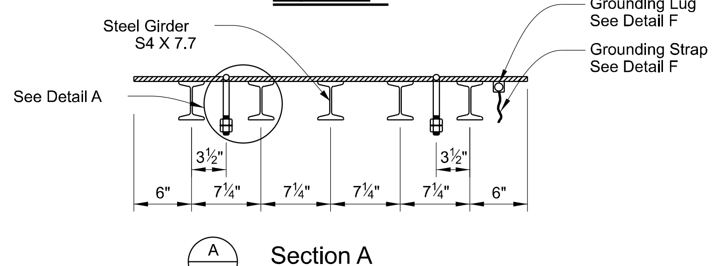
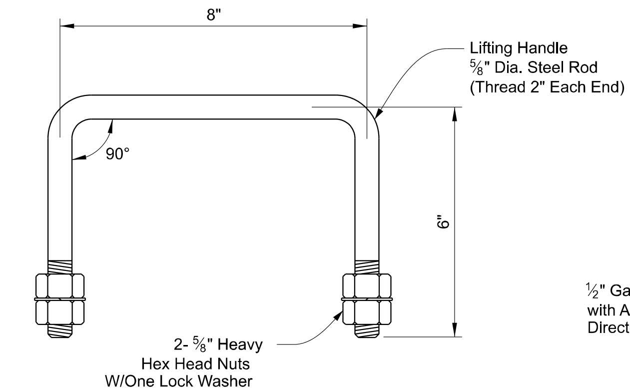


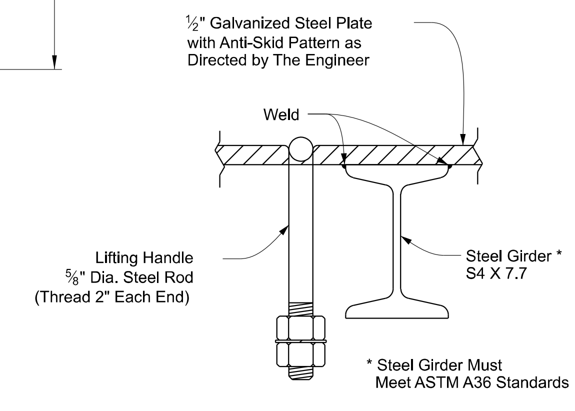
Type 1 Steel Cover Details
Top View



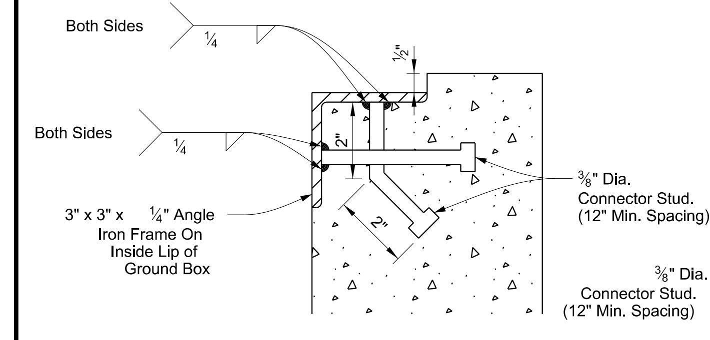
Section A



Drop Handle Detail



Detail A



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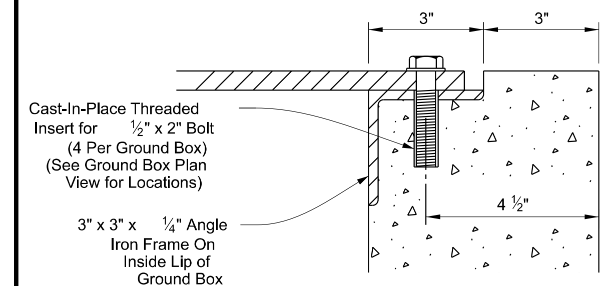
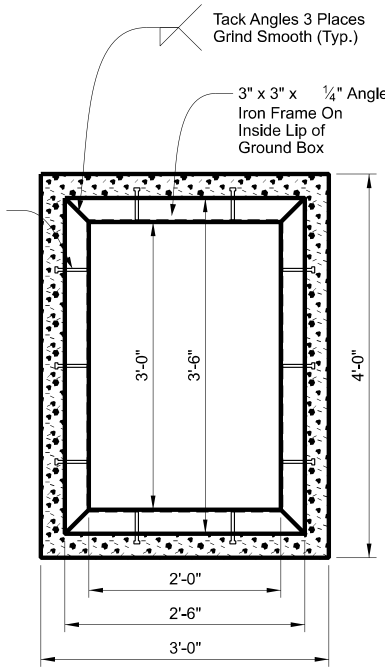


Detail C
Lid Attachment Detail



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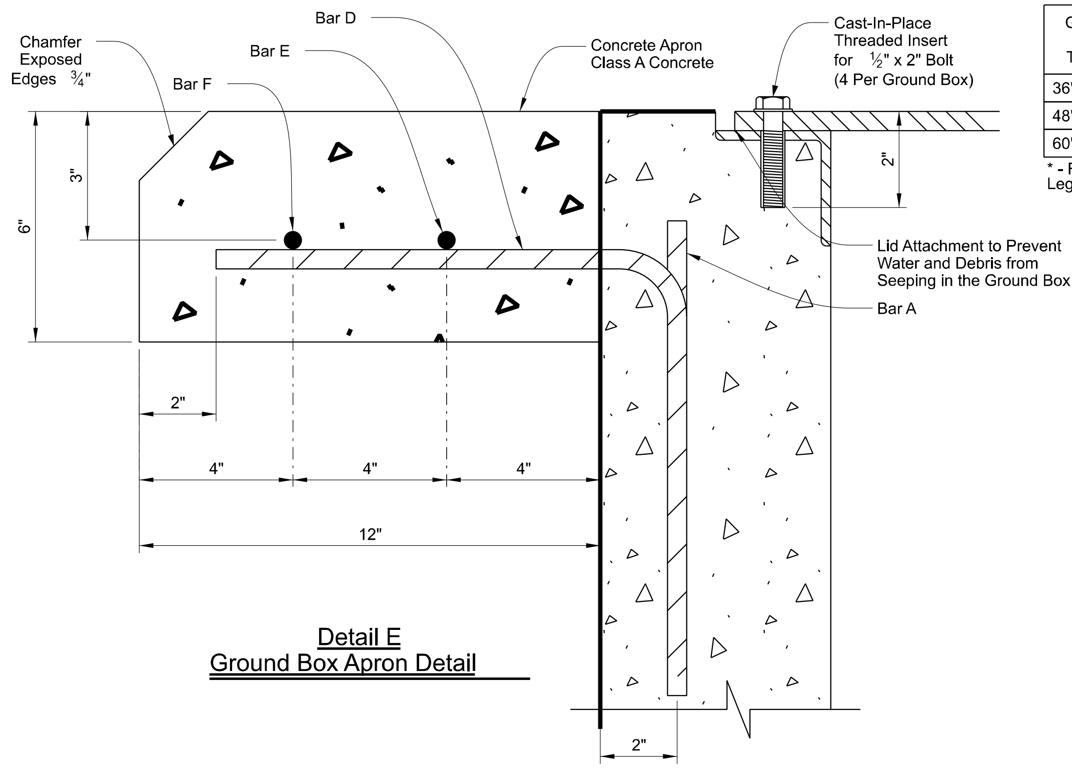
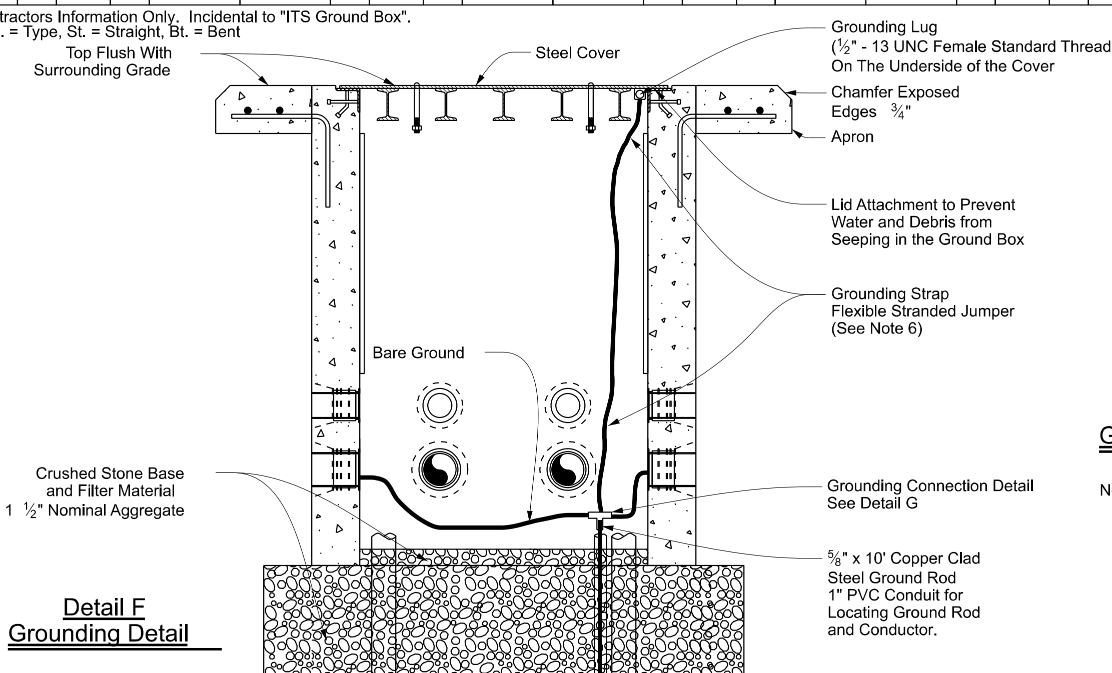


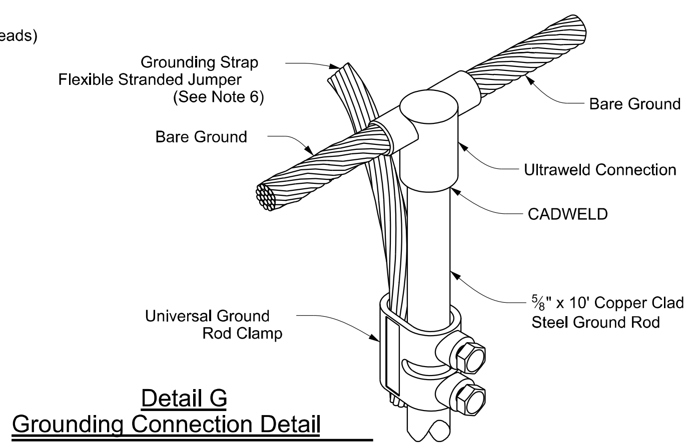
Detail E
Ground Box Apron Detail

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

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



Detail F
Grounding Detail



Detail G
Grounding Connection Detail

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

General Notes:

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

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SHEET 2 OF 2

Texas Department of Transportation

Traffic Operations Division Standard

ITS GROUND BOX DETAILS TYPE "1" WITH STEEL COVER

ITS(38)-17

FILE: its(38)-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS 5-17	0700	03	149	SH71
	DIST		COUNTY	SHEET NO.
	AUS		TRAVIS	92

Sheet Details
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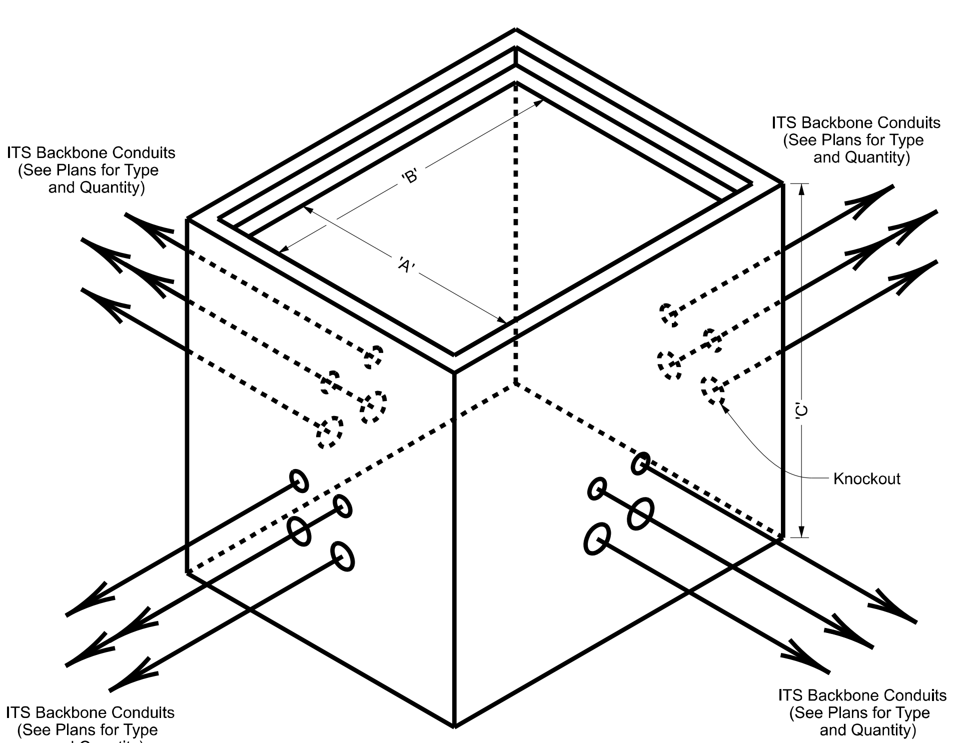
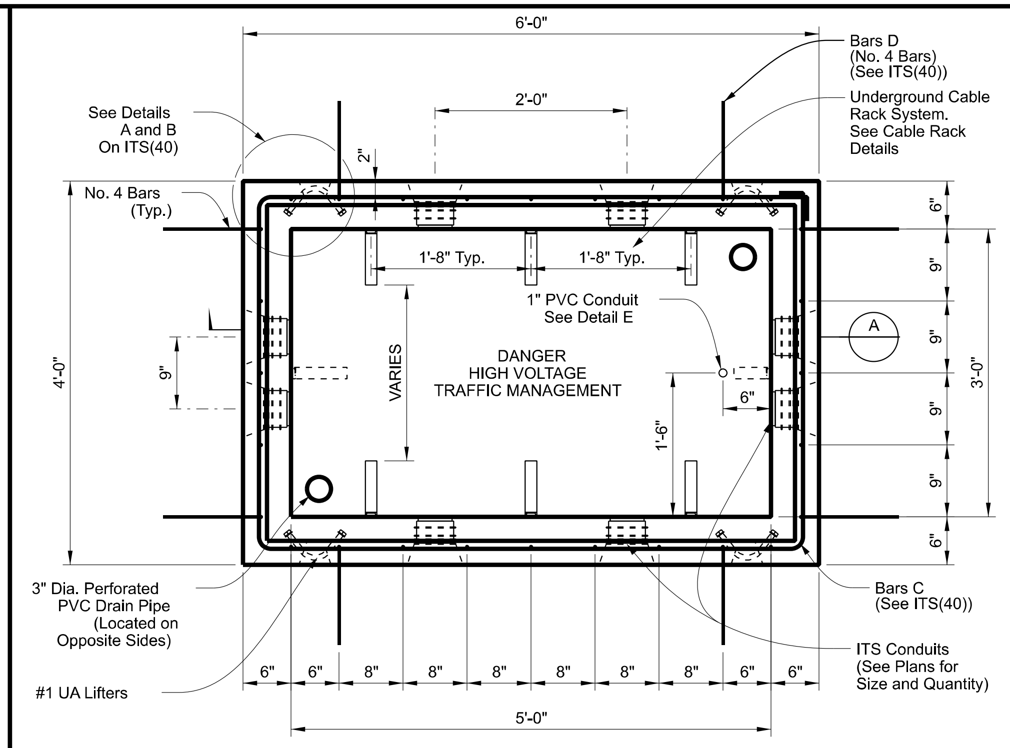
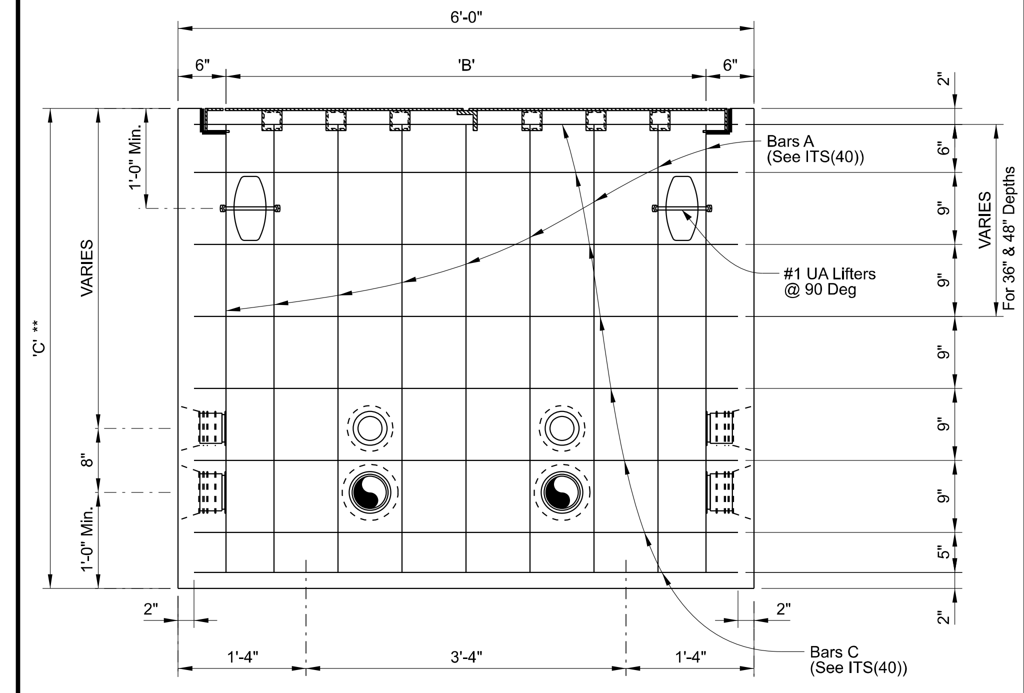


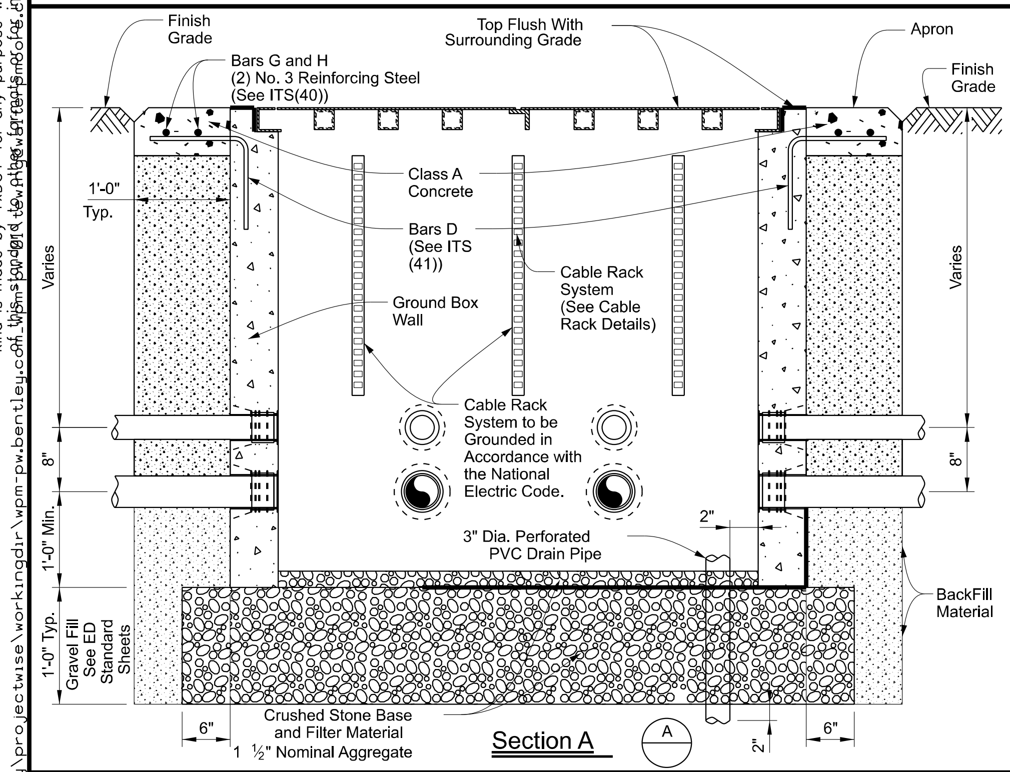
Type 2 Ground Box Isometric View



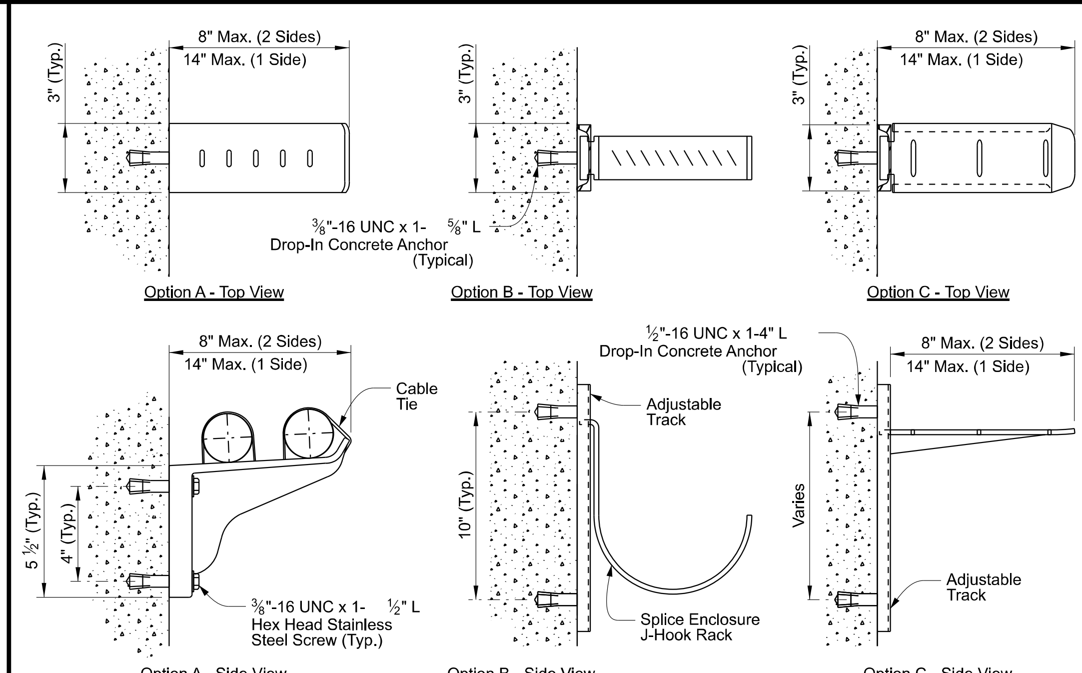
Type 2 Ground Box Plan View



Type 2 Ground Box Elevation View

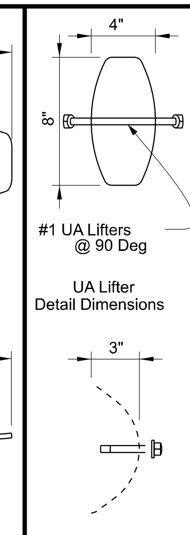


Section A

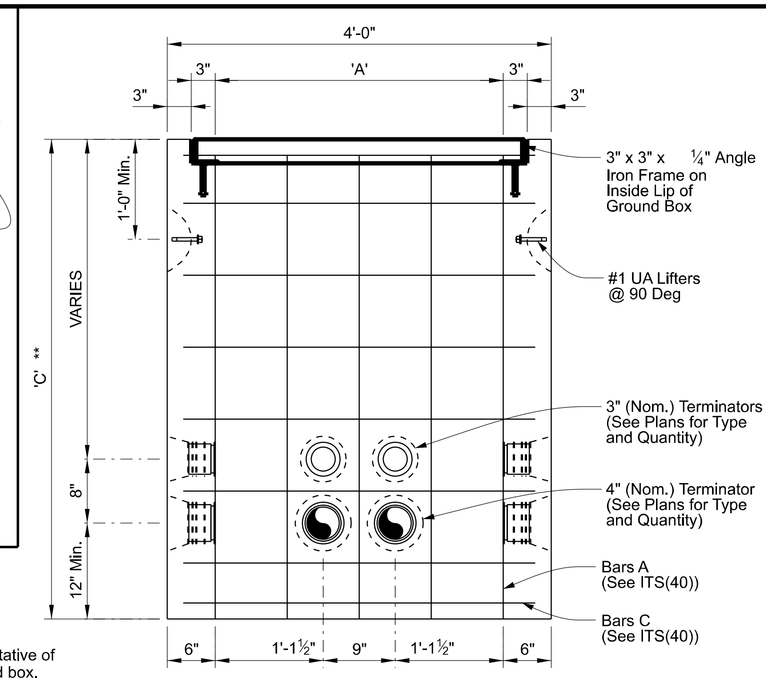


Note: Options Shown for Cable Racks and Attachment Methods Contractor to Supply Shop Drawings of Cable Rack and Cable Rack Grounding System (If Applicable) for Engineer Approval Prior to Installation.

Type 2 Cable Rack Details



UA Lifter Detail Dimensions



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

Type 2 Ground Box Side View

SHEET 1 OF 2

General Notes:

1. Conduit entry points shown represent the standard configuration for backbone conduit as detailed on ITS(27). Additional conduits may be required as shown on the plans.

2. Provide Class "A" concrete for Type "2" ground boxes.

3. Provide terminators for the PVC conduit cast in the walls and placed symmetrically about the centerline of the box at the depths shown, unless otherwise noted, for the number of conduits identified on the plans to enter the box.

4. Provide terminators appropriately sized for the conduits indicated on the plans. Provide terminators with an air tight and water tight connection.

5. Closed bottom Type "2" ground boxes are acceptable in lieu of open bottom boxes. Provide two 3" Dia. perforated PVC drain pipes on opposite corners to optimize water drainage. Provide closed bottom boxes with a 12-inch base of crushed stone which extends 6 inches in all directions from the perimeter of the box. Crushed stone will be subsidiary to Special Specification, "ITS Ground Box."

6. When additional conduit entry points are needed to accommodate existing conduit, core drill conduit knockouts in the field of the appropriate number and size of conduit at each location, as directed by the Engineer.

7. Provide a bell fitting on the end of each conduit to ensure a flush fit inside the ground box.

8. Concrete grout around the knockout (inside and out) and around the conduit and bell fitting to ensure a neat watertight fit after the conduit and bell fitting have been placed in a knockout. Ensure all openings in the ground box are sealed prior to grouting operations.

9. Install a nylon string and plug all unused conduits with tug-plugs sized for the particular conduits. Provide split innerduct plugs in conduits or innerducts with cables to seal the innerduct around the cables to prevent water and dirt from entering.

10. Install all open bottom Type "2" ground boxes on a 12-inch base of crushed stone which extends 6 inches in all directions from the perimeter of the box. Crushed stone will be subsidiary to special specification, "ITS Ground Box."

11. Cap and seal terminators that do not have conduits attached.

12. Backfill in accordance with Item 400, "Excavation and Backfill for Structures."

13. Provide steel (ASTM A-153), glass reinforced nylon, or equivalent cable rack assemblies designed to support the amount of cable storage slack and splice enclosures identified in the plans. Locate cable rack system on any side but allow for sufficient access to the inside of the ground box. Cable racks may be installed at the factory or in the field. When mounting cable racks in the field, seal all penetrations to the concrete side wall to prevent moisture penetration. Ground metallic cable rack systems to grounding system inside ground box in accordance with the National Electrical Code.

Ground Box Schedule

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

Sheet Details
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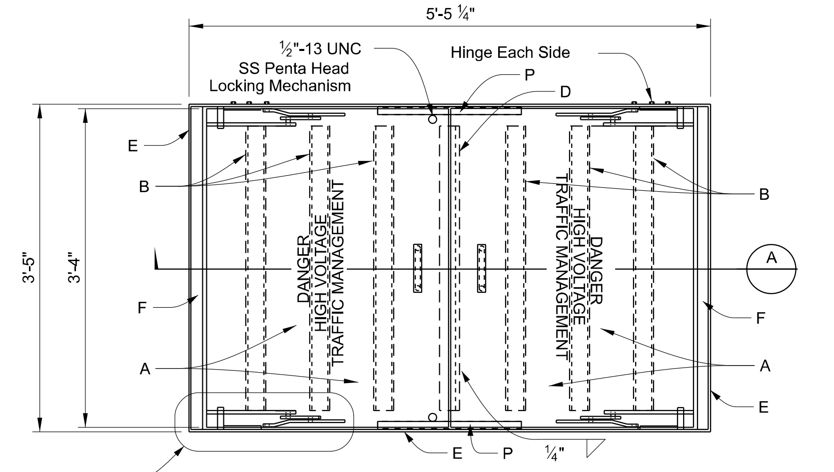
Texas Department of Transportation

Traffic Operations Division Standard

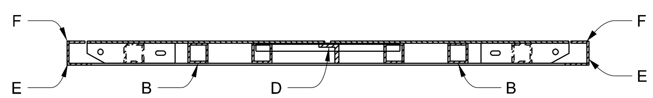
ITS GROUND BOX DETAILS TYPE "2" WITH STEEL COVER

ITS(39)-16

FILE: its(39)-16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0700	03	149	SH71
	DIST		COUNTY	SHEET NO.
	AUS		TRAVIS	93



Type 2 Steel Cover Details
Top View



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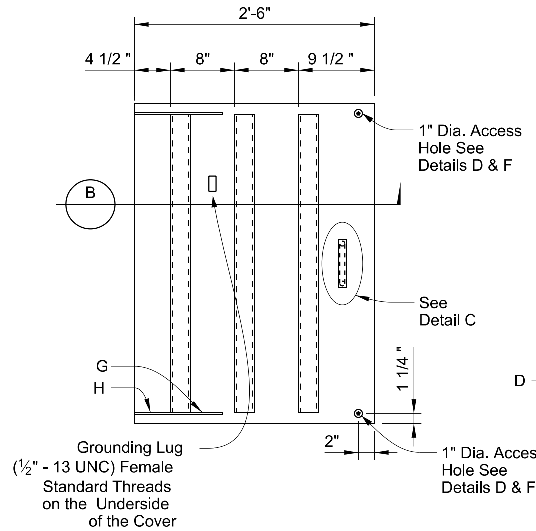
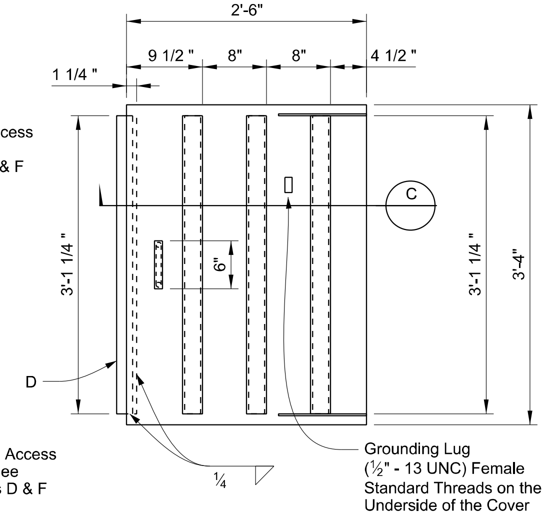
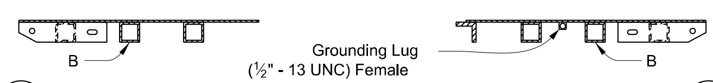


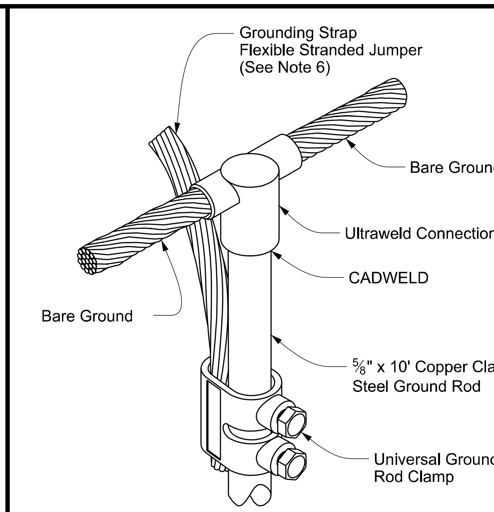
Type 2 Steel Cover Details
Bottom View (Left)



Type 2 Steel Cover Details
Bottom View (Right)



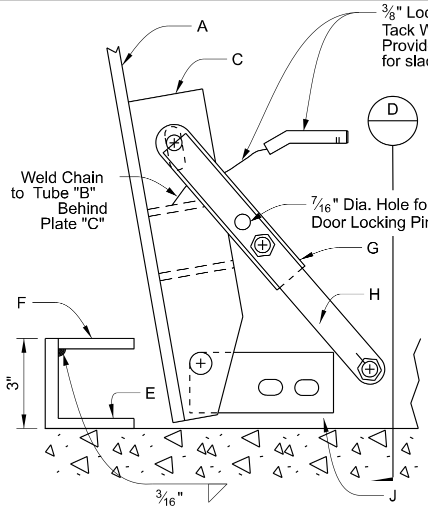
Section B   Section C



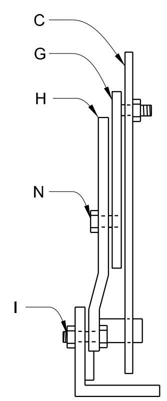
Detail G
Grounding Connection Detail

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

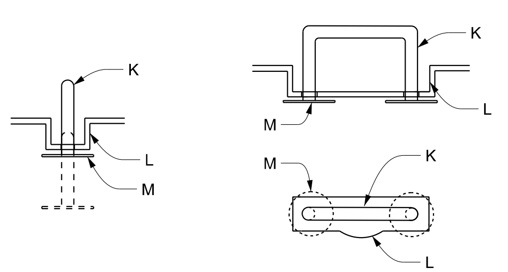
Item	Qty	Incidental "ITS Ground Box" Material
A	2	¼" Floor Plate 40" x 30"
B	6	2 ½" x 2 ½" x 37 ¼" Tube
C	4	11" x 2 ½" x ¼" Plate
D	1	2 ½" x 2 ½" x ½" x 37" ¼ Angle
E	4	3" x 3" x ¼" Angle
F	2	40 ½" x 2" x ¼" Plate
G	4	6 ½" x 1 ¼" x ¼" Plate
H	4	10 ½" x 1 ¼" x ¼" Plate
I	12	½" Bolt/Nut
J	4	4 ¾ x 2" x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



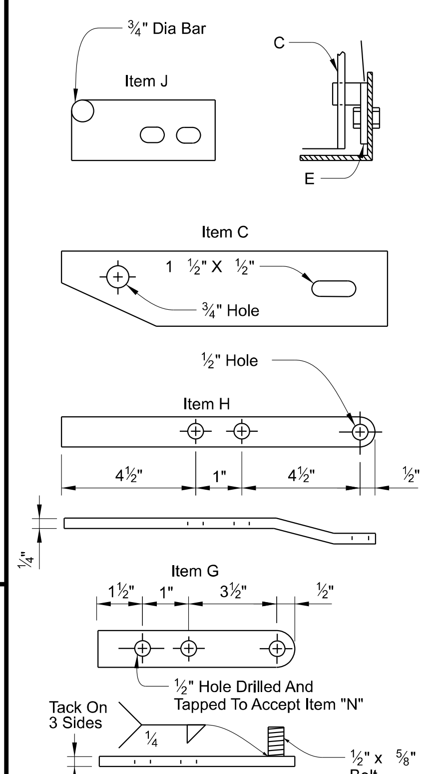
Detail A
Type 2 Cover Side View Detail



Section D



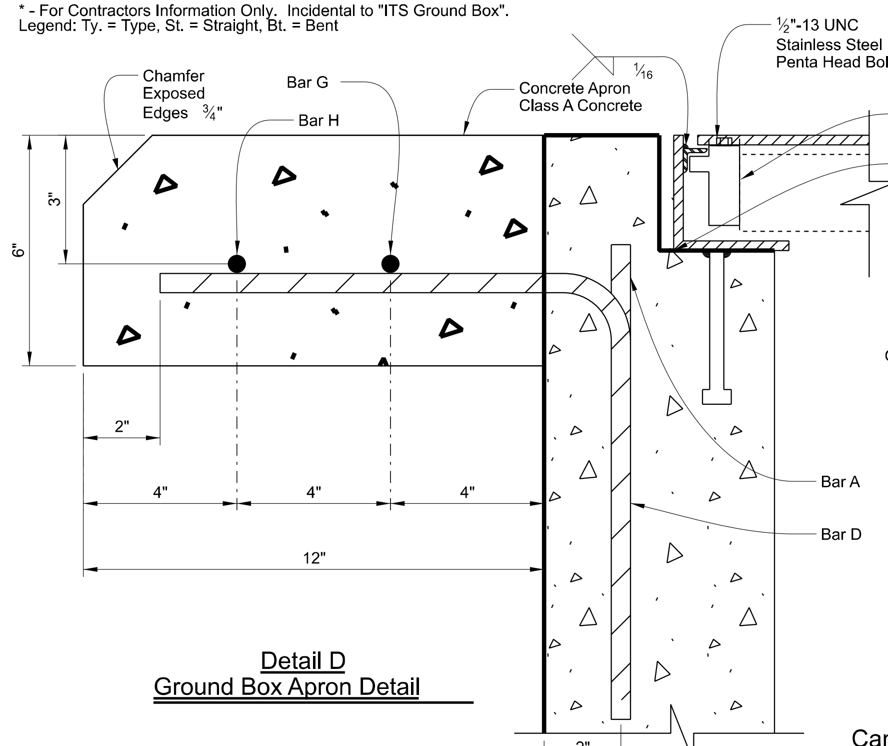
Detail C
Type 2 Drop Handle Details



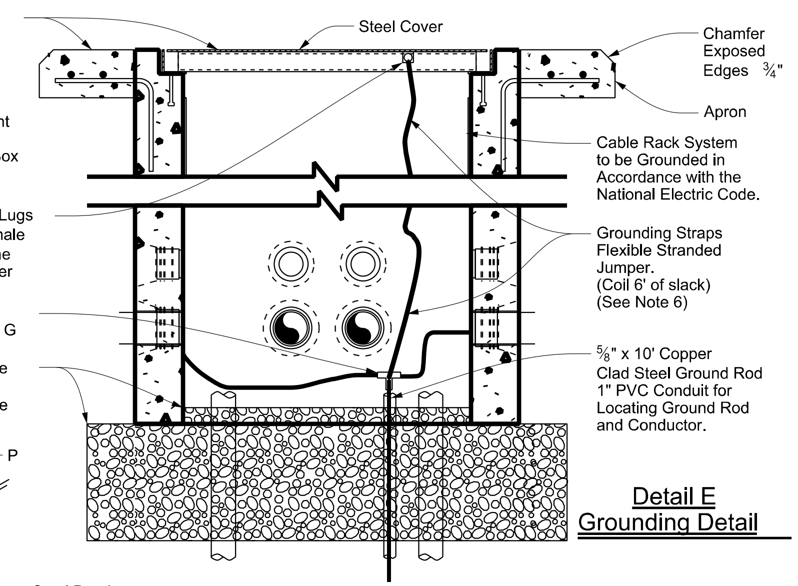
Detail B
Type 2 Hinge Details

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

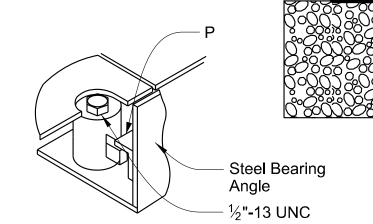
* - For Contractors Information Only. Incidental to "ITS Ground Box".
Legend: Ty. = Type, St. = Straight, Bt. = Bent



Detail D
Ground Box Apron Detail



Detail E
Grounding Detail



Detail F
Cam Locking Mechanism

SHEET 2 OF 2

General Notes:

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

Sheet Details
Not to Scale

Texas Department of Transportation

Traffic Operations Division Standard

ITS GROUND BOX DETAILS TYPE "2" WITH STEEL COVER

ITS(40)-17

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©TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
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5-17	DIST	COUNTY		SHEET NO.
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265

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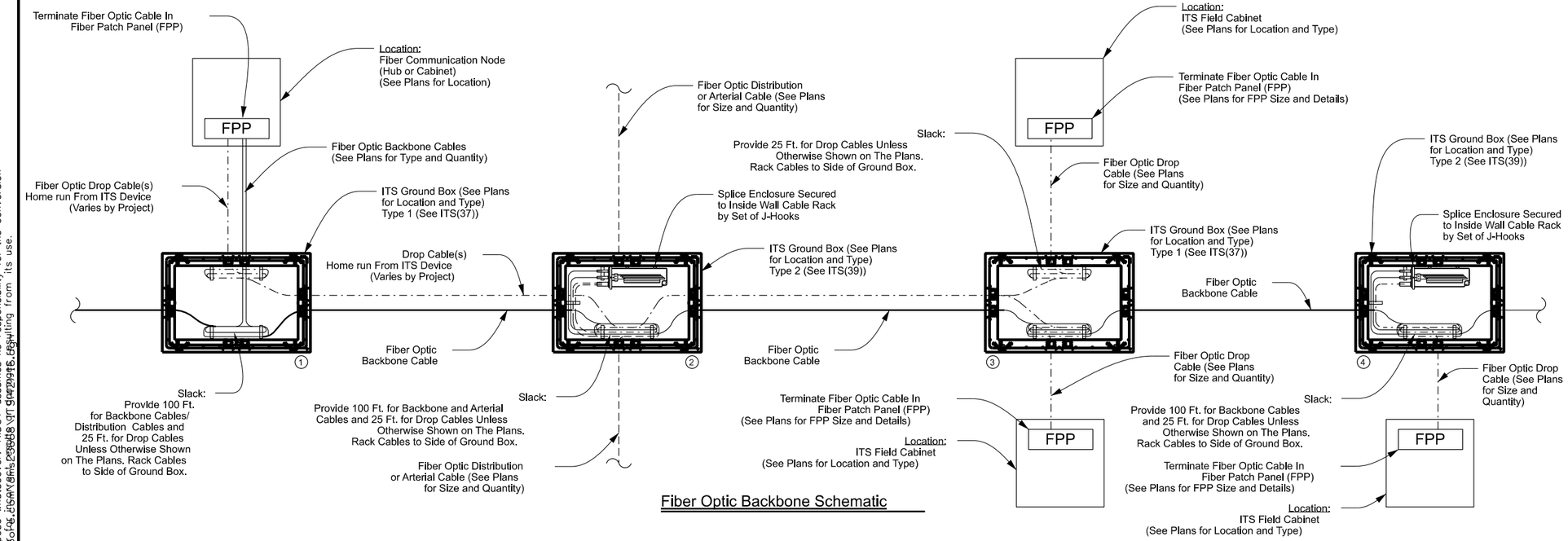
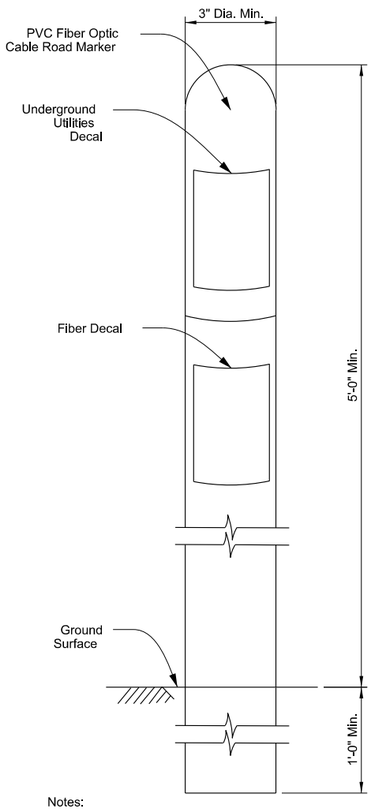
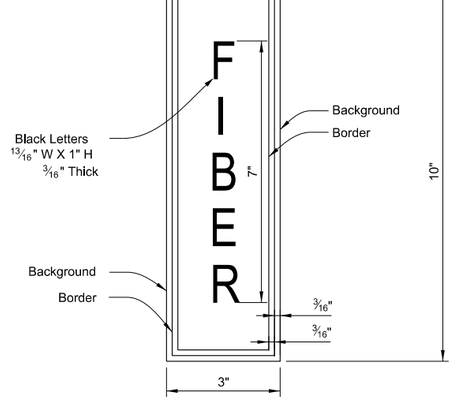


Fiber Optic Backbone Schematic



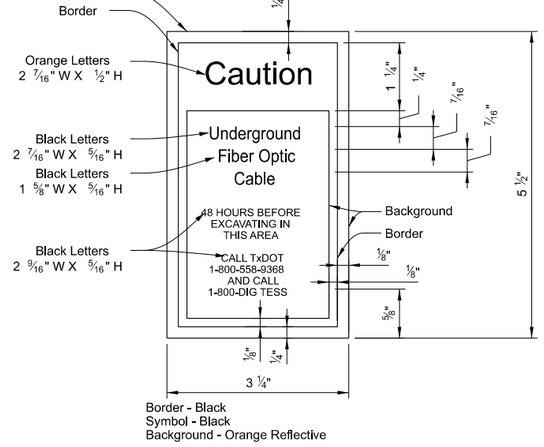
Notes:
1. Space fiber optic cable road markers at maximum 1000' intervals or at significant changes in direction such as a 90 degree turn.
2. Provide all orange fiber optic cable road markers for non-splice locations.
3. Provide orange fiber optic cable road markers with white dome for splice locations.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

Fiber Optic Cable Road Markers



Border - Black
Background - Orange Reflective

Fiber Decal Details



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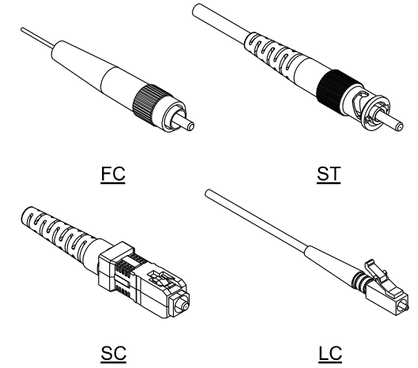
Background - Orange Reflective

Underground Utilities Decal Details



Fiber Optic Connectors

Note - Details are diagrammatic and may vary by manufacturer.

Reference Notes:

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

General Notes:

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

Sheet Details
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SHEET 1 OF 2

Texas Department of Transportation | Traffic Operations Division Standard

ITS FIBER OPTIC CABLE MISCELLANEOUS DETAILS

ITS(42)-16

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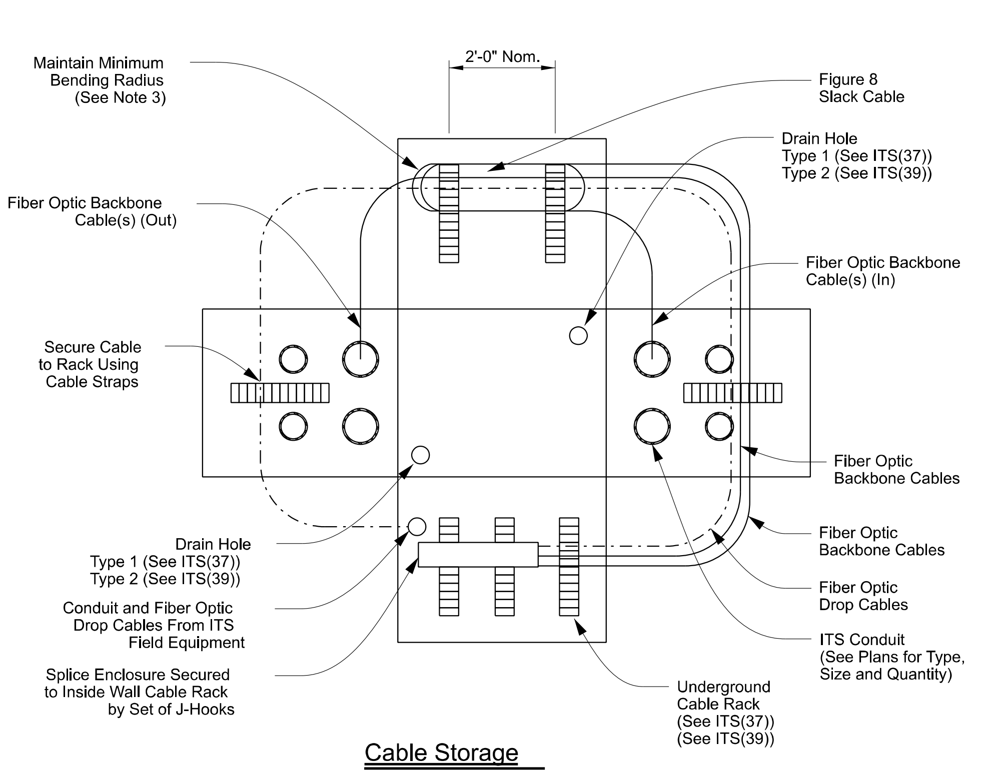
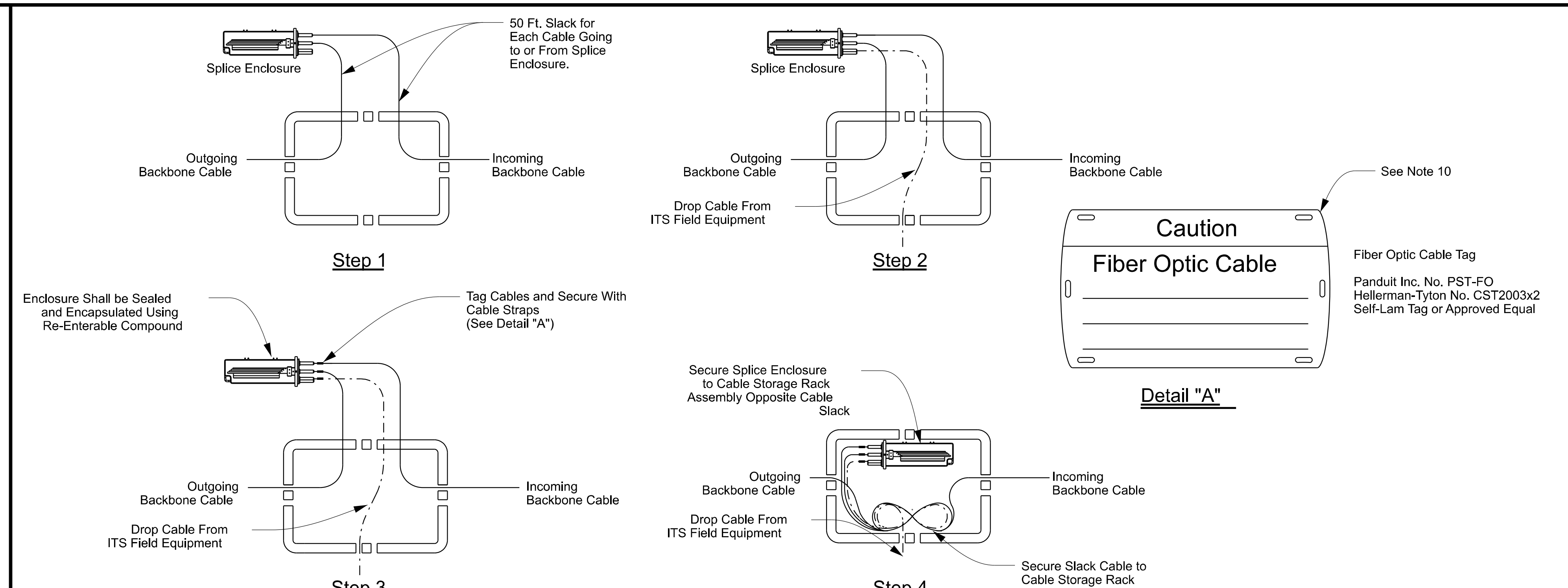
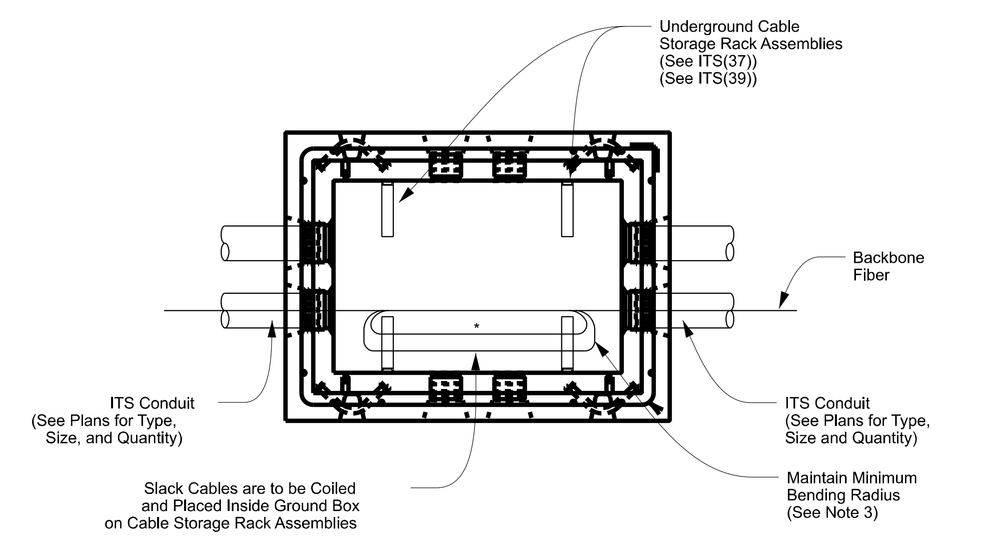


Cable Storage

Top View - Ground Box Walls Folded Down for Clarity

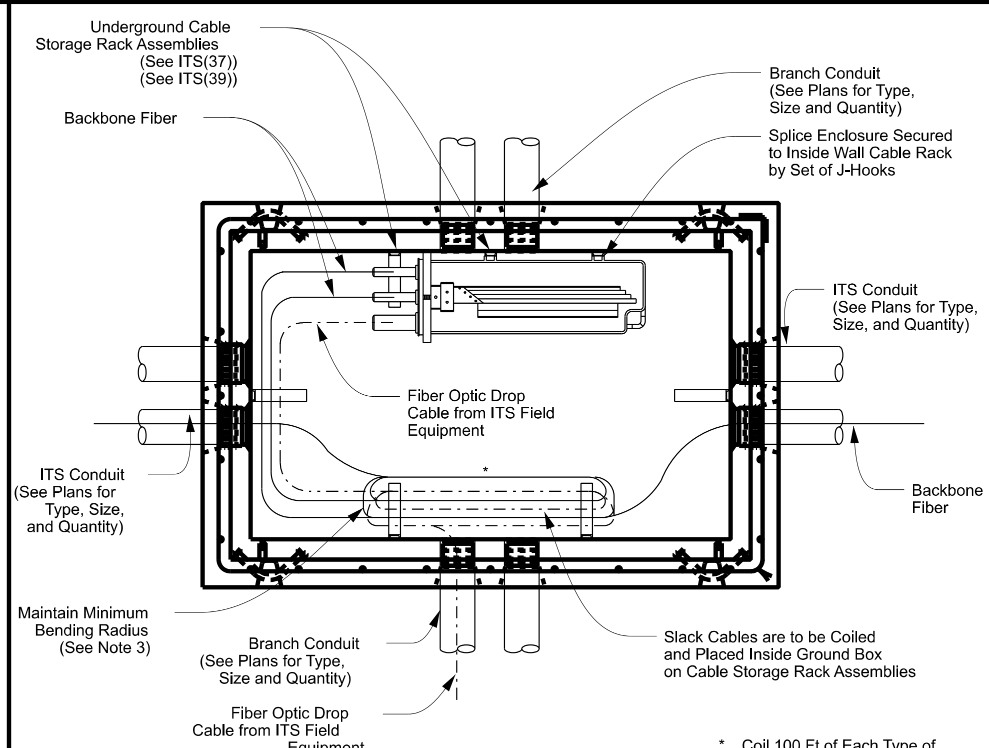


Splice Procedure Steps



* Coil 25 Ft of Fiber Optic Cable for Slack

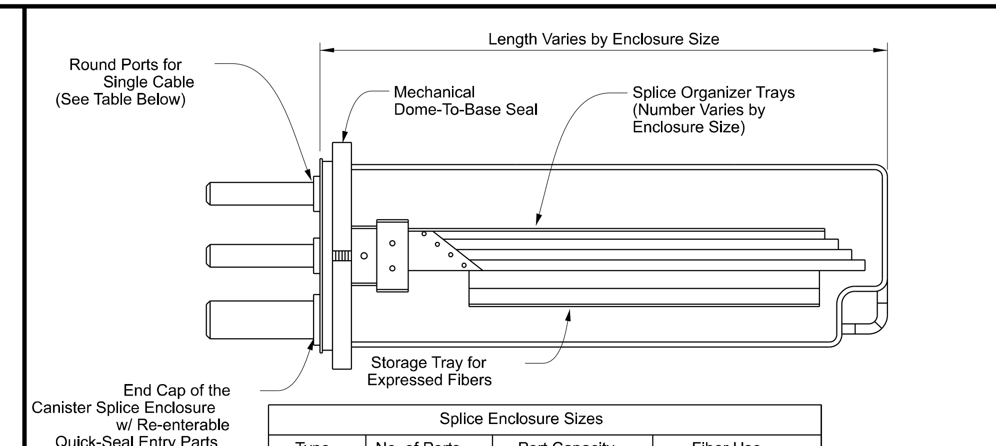
Type "1" Ground Box



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

Type "2" Ground Box

with Splice



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

Splice Enclosure Fiber Accommodations

General Notes:

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

Sheet Details

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Texas Department of Transportation

Traffic Operations Division Standard

ITS FIBER OPTIC CABLE MISCELLANEOUS DETAILS

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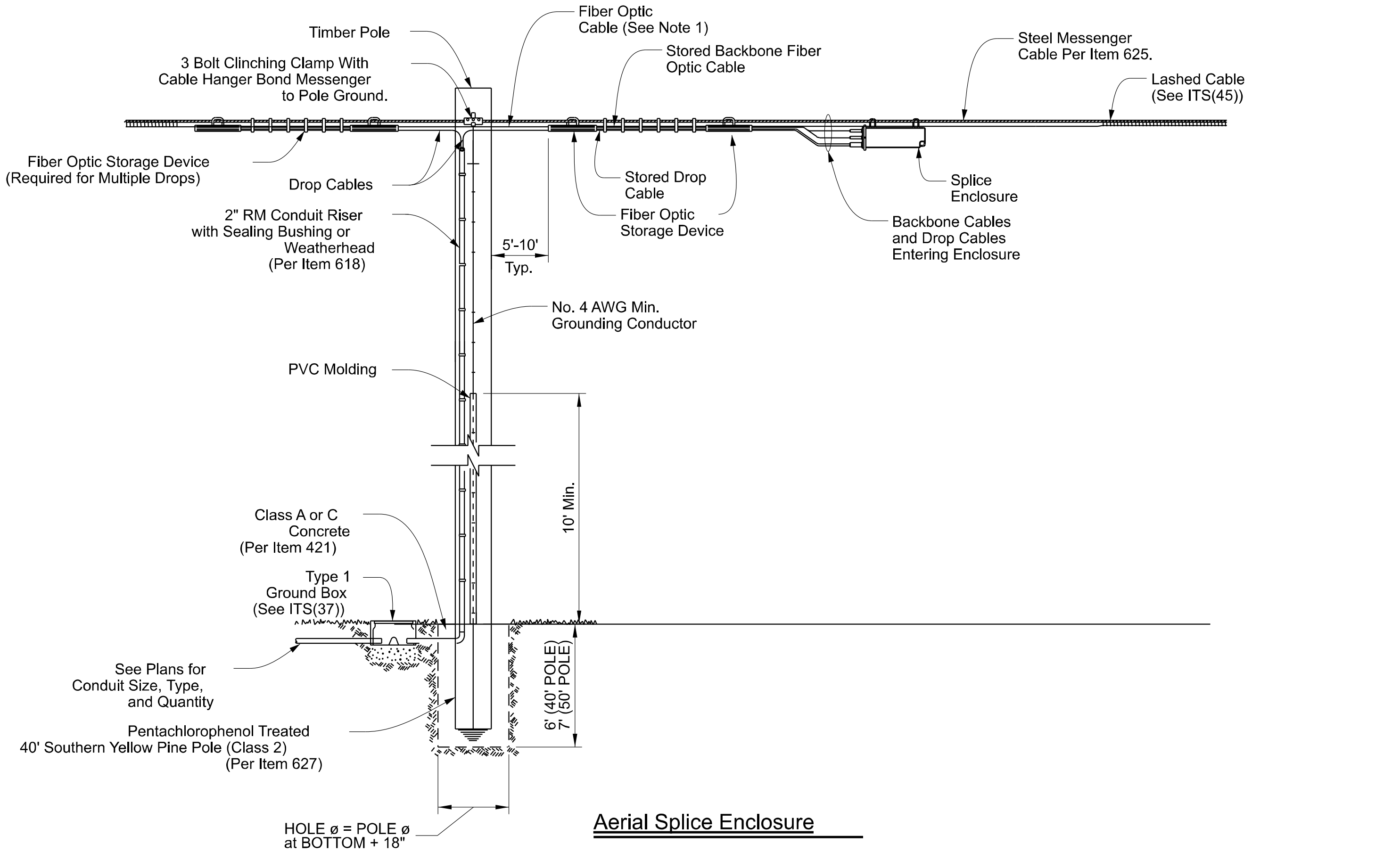
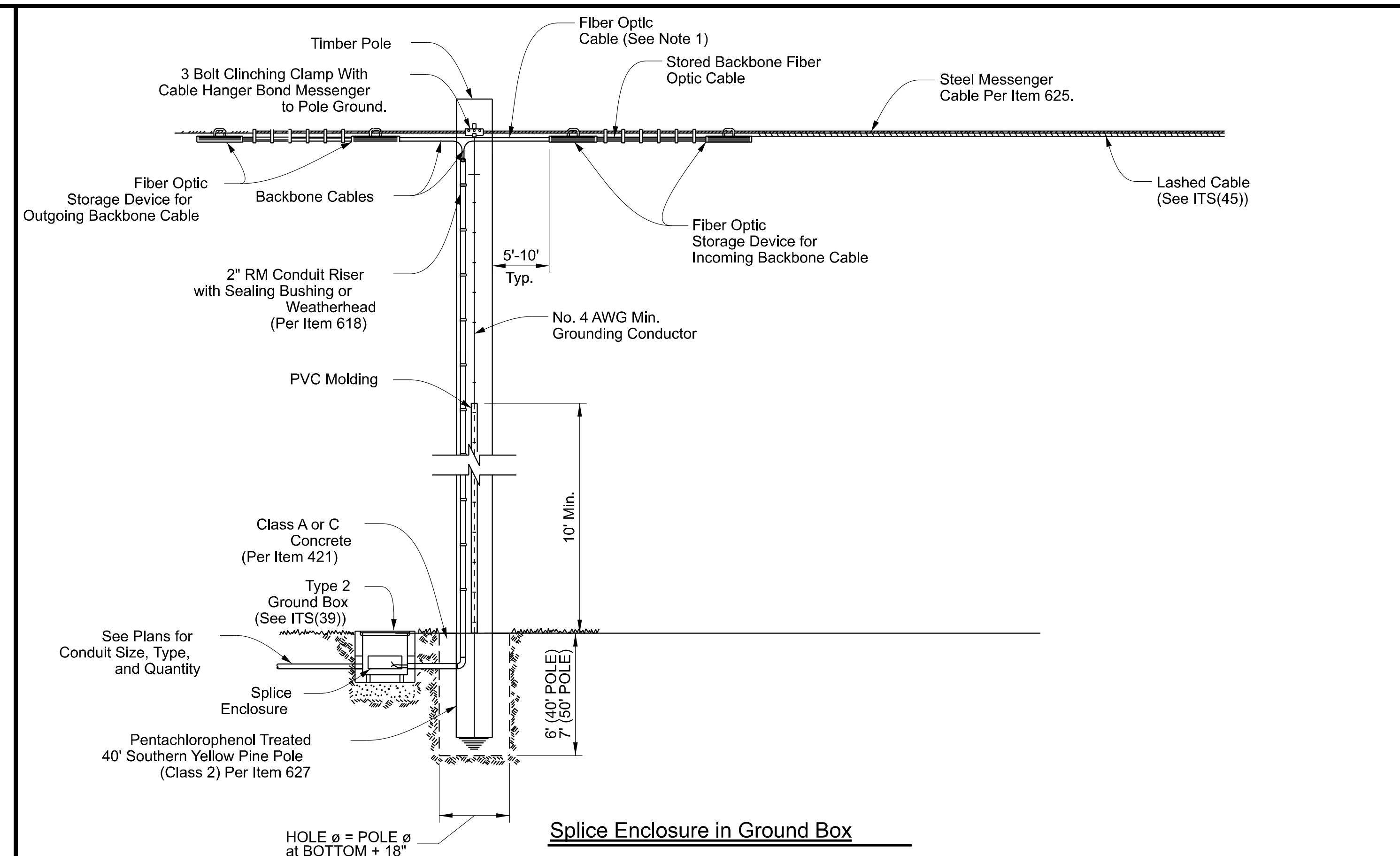
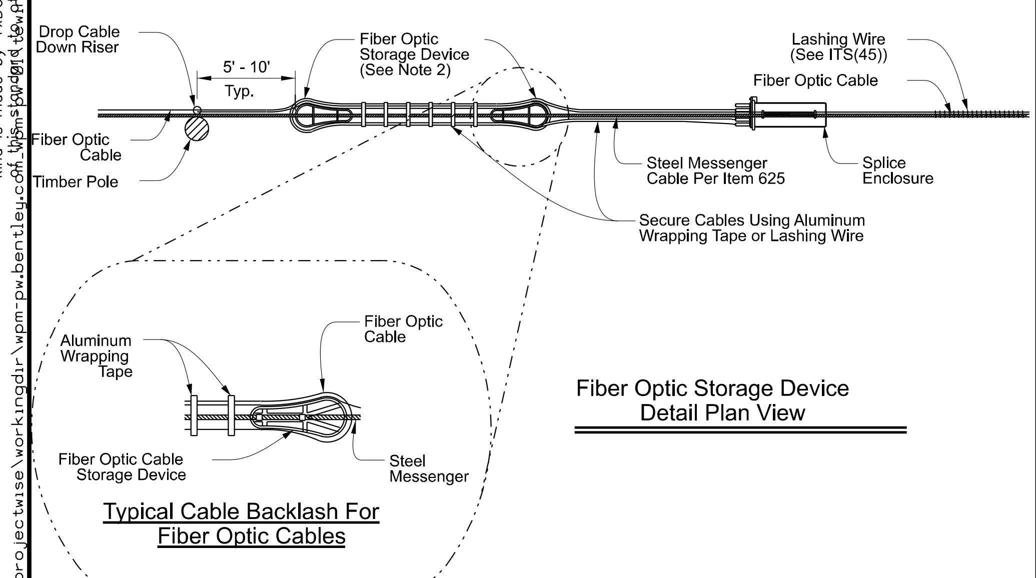


Aerial Splice Enclosure

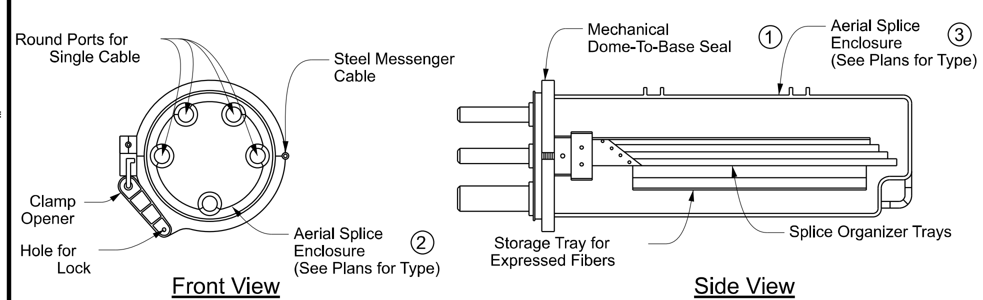


Splice Enclosure in Ground Box



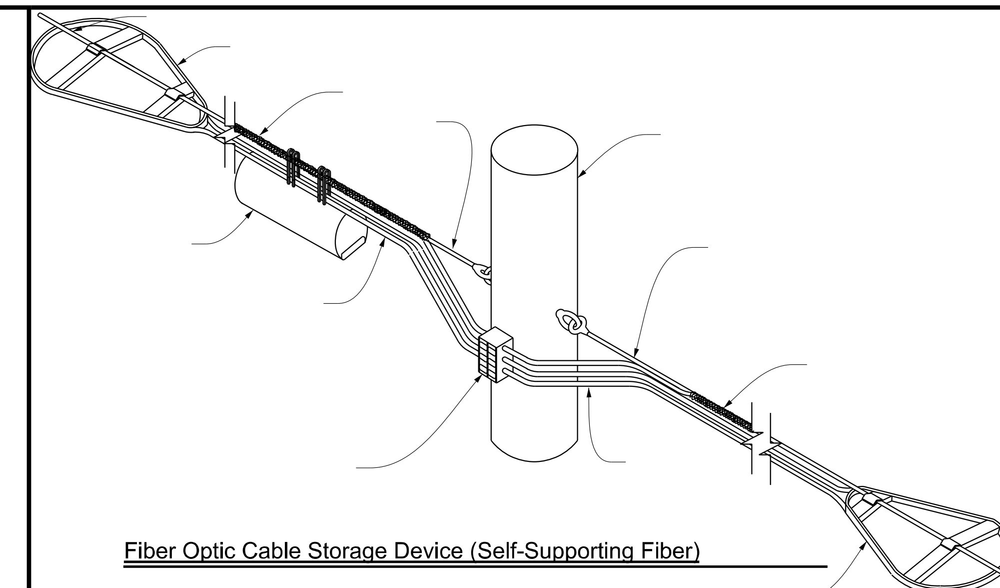
Typical Cable Backlash For Fiber Optic Cables

Fiber Optic Storage Device Detail Plan View



Fiber Optic Splice Enclosure

1. Apply a heat source, as recommended by the manufacturer, to shrink the heat shrinkable tubing to provide a secure fit around the cables and ports.
2. Perform a pressurization flash test upon conclusion of the splicing and prior to the final placement of the enclosure.
3. Refer to ITS(45) for splice enclosure type and size.



Fiber Optic Cable Storage Device (Self-Supporting Fiber)

General Notes:

1. Provide outdoor rated non-armored all-dielectric (requires steel messenger support) or non-armored all-dielectric self-supporting fiber optic cable designed for aerial installation. Fiber optic cable constructed with integrated steel messenger cable is acceptable.
2. See plans for location and amount of spare fiber optic cable slack. Determine the quantity of cable storage racks necessary to secure fiber optic cable slack identified and to accommodate the number of fiber optic cable drops as shown on the plans.
3. Do not store spare cable slack over roadways, driveways, railroads, or buildings.
4. Provide required clearance from electrical power lines and other cables in accordance with Section 23 of the National Electric Safety Code (NESC).
5. Use the lashing wire method for lashing non self-supporting fiber optic cable requiring lashing to a steel messenger cable.
6. Use a lasher to secure the fiber optic cable to the steel wire strand by wrapping the strand and cable in a spiral manner. The fiber optic cable must be installed without loose lashing, twisting, or weaving along the strand. Rippling, kinking, or any kind of deformation of the cable will lead to a required replacement of the cable by the contractor.
7. Ensure at least one wrap of lashing wire per linear foot is provided when lashing the fiber optic cable to the steel messenger cable.
8. Provide lasher of sufficient size to lash the fiber optic cable without damaging the cable.

Sheet Details
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ITS FIBER OPTIC CABLE AERIAL INSTALLATION DETAILS

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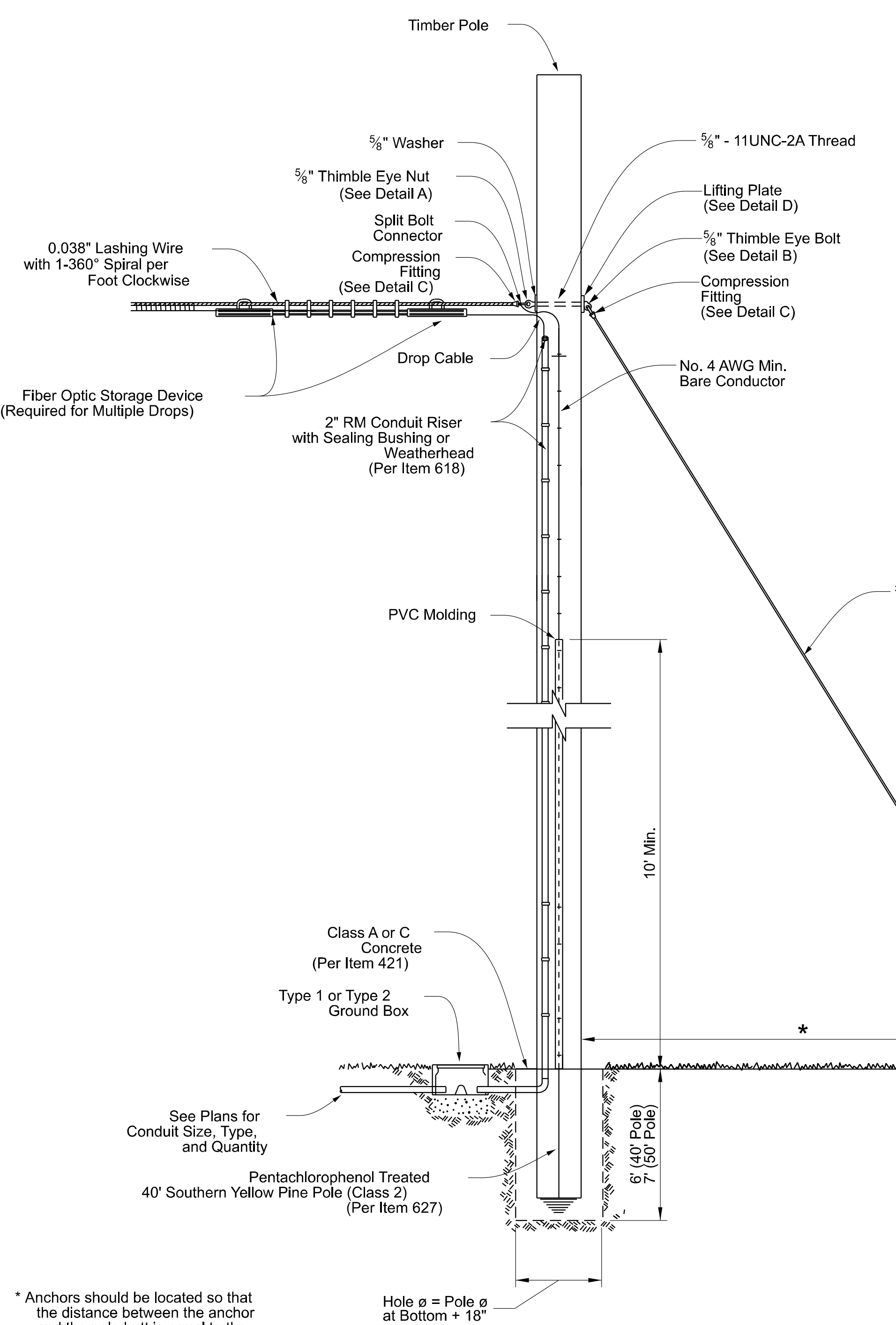
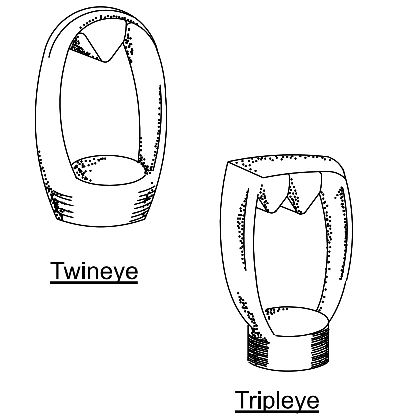
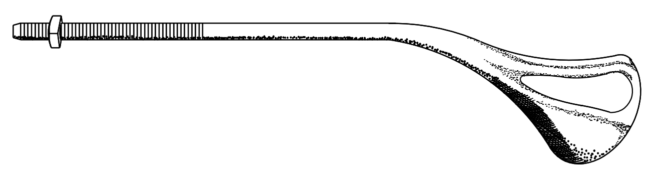


* Anchors should be located so that the distance between the anchor and the pole butt is equal to the distance from the ground to the point of guy attachment. In no case should the distance from the anchor to the pole butt be less than 1/3 of the distance from the ground to the point of guy attachment.

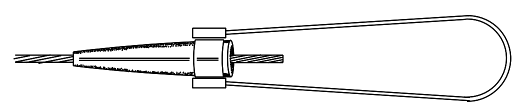
Typical Dead-End Anchor Detail



Detail A



Detail B



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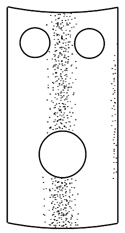

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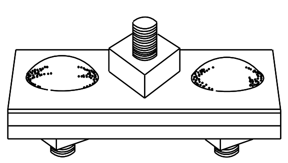

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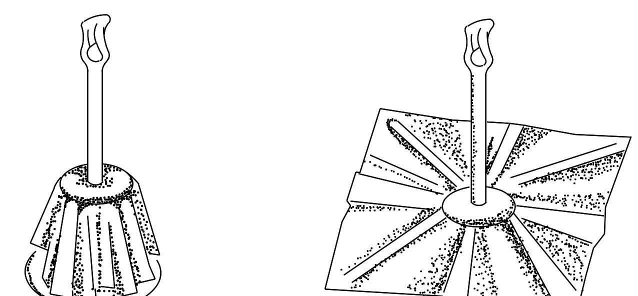
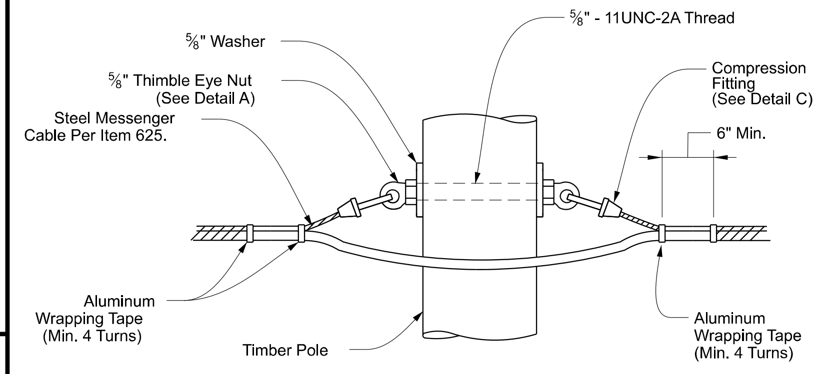
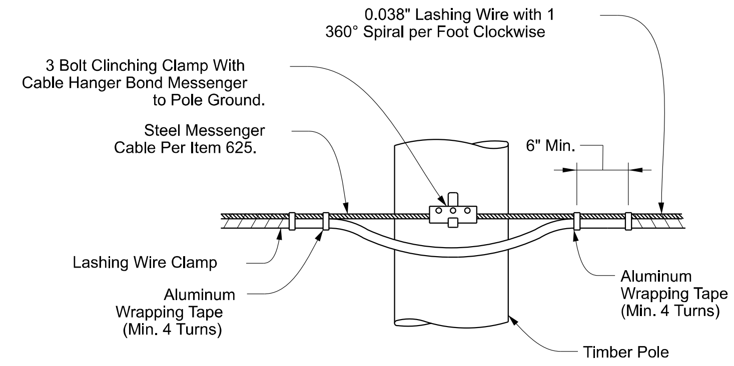


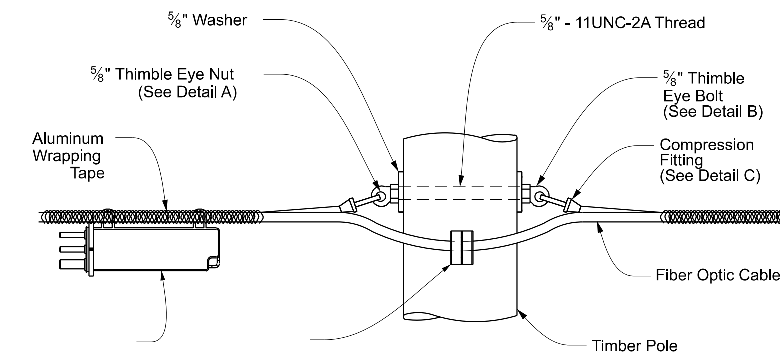
Detail F



Thimble Eye Bolt Method



Clinching Clamp Method



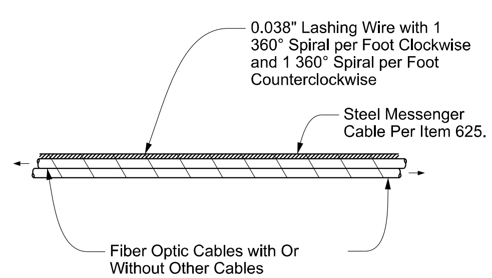
Typical Self Supporting Cable Method

Typical False Dead-End Details

SHEET 2 OF 2

General Notes:

1. Provide outdoor rated non-armored all-dielectric (requires steel messenger support) or non-armored all-dielectric self-supporting fiber optic cable designed for aerial installation. Fiber optic cable constructed with integrated steel messenger cable is acceptable.
2. See plans for location and amount of fiber optic cable slack. Contractor to determine the quantity of cable storage racks necessary to secure fiber optic cable slack identified and to accommodate the number of fiber optic cable drops as shown on the plans.
3. Do not store spare cable over roadways, driveways, railroads, or buildings.
4. Provide required clearance from electrical power lines and other cables in accordance with Section 23 of the National Electric Safety Code (NESC).
5. Use the lashing wire method for lashing non self-supporting fiber optic cable requiring lashing to a steel messenger cable.
6. Use a lasher to secure the fiber optic cable to the steel wire strand by wrapping the strand and cable in a spiral manner. The fiber optic cable must be installed without loose lashing, twisting, or weaving along the strand. Rippling, kinking, or any kind of deformation of the cable will lead to a required replacement of the cable by the contractor.
7. Ensure at least one wrap of lashing wire per linear foot is provided when lashing the fiber optic cable to the steel messenger cable.
8. Provide lasher of sufficient size to lash the fiber optic cable without damaging the cable.



Typical Cable Lashing Detail Double Lashing For Railroad Crossings

Sheet Details
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Traffic Operations Division Standard

ITS FIBER OPTIC CABLE AERIAL INSTALLATION DETAILS

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GENERAL NOTES FOR ALL ELECTRICAL WORK

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

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

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

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

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

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

CONDUIT

A. MATERIALS

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

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

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

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

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

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

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

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

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

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

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

B. CONSTRUCTION METHODS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

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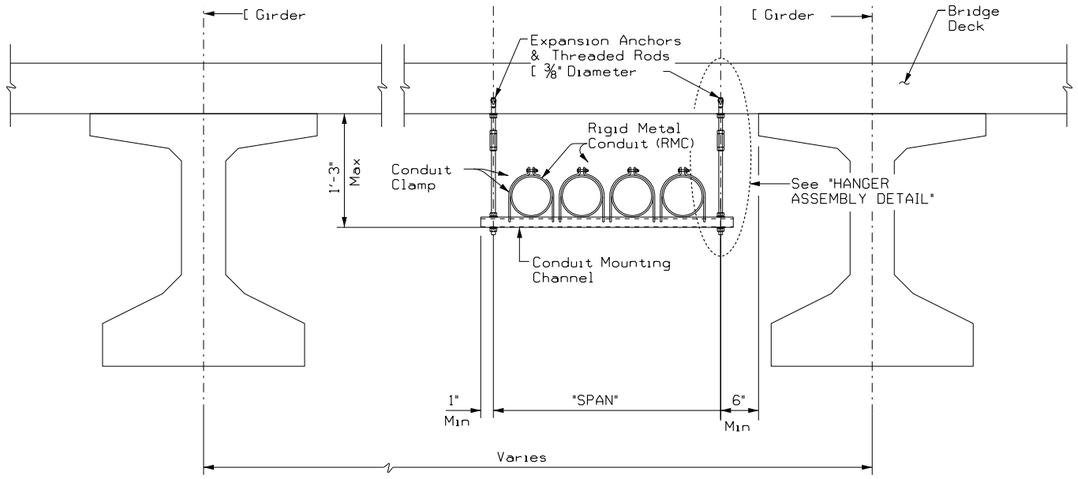
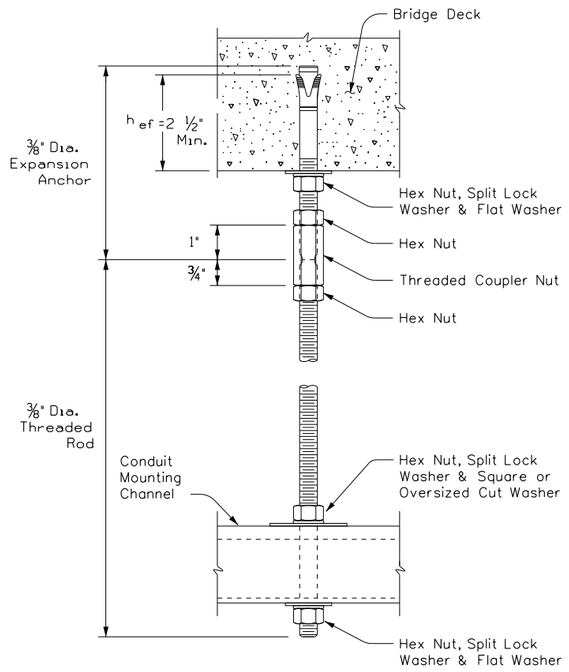


CONDUIT HANGING DETAIL

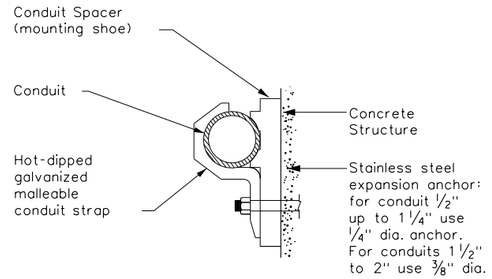
CONDUIT MOUNTING CHANNEL		
"SPAN"	"W" x "H"	"T"
less than 2'	1 5/8" x 1 3/8"	12 Ga.
2'-0" to 2'-6"	1 5/8" x 1 5/8"	12 Ga.
>2'-6" to 3'-0"	1 5/8" x 2 7/16"	12 Ga.

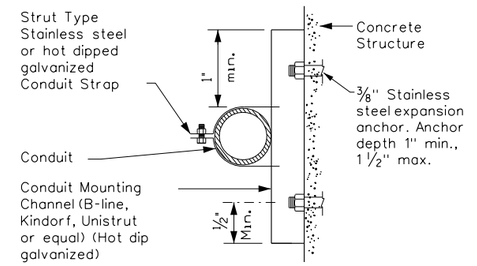
Channels with round or short slotted hole patterns are allowed, if the load carrying capacity is not reduced by more than 15%.



HANGER ASSEMBLY DETAIL

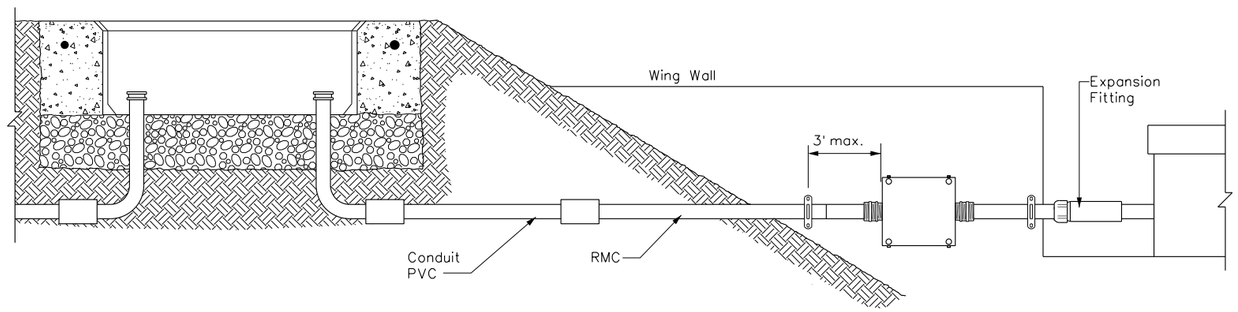
ELECTRIC CONDUIT TO BRIDGE DECK ATTACHMENT





CONDUIT MOUNTING OPTIONS

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



TYPICAL CONDUIT ENTRY TO BRIDGE STRUCTURE DETAIL

EXPANSION ANCHOR NOTES FOR BRIDGE DECK ATTACHMENT

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

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

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
CONDUIT SUPPORTS

ED(2)-14

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ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

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

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

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

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

B. CONSTRUCTION METHODS

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

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

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

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

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

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

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

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

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

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

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

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

C. TEMPORARY WIRING

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

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

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

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

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

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

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

B. CONSTRUCTION METHODS

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

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

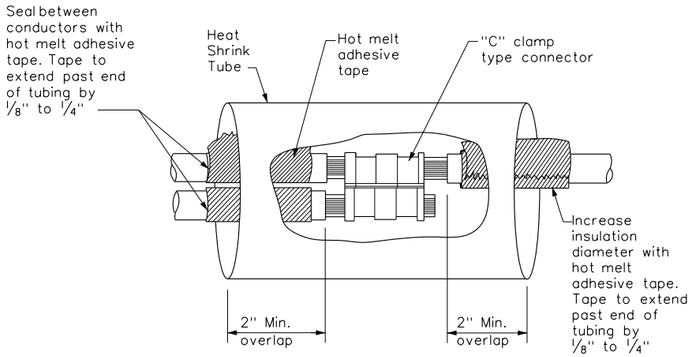
3. Install ground rods so the imprinted part number is at the upper end of the rod.

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

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

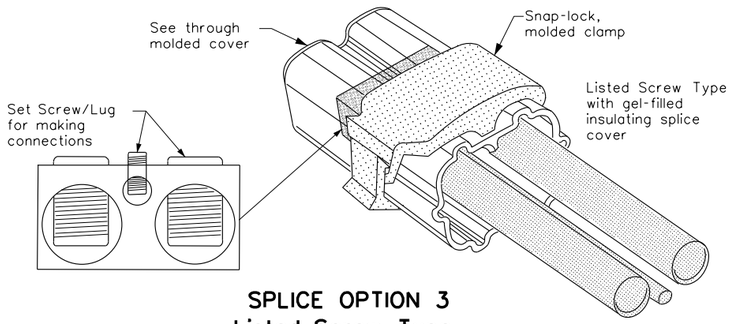
6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.

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



SPLICE OPTION 1
Compression Type

SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

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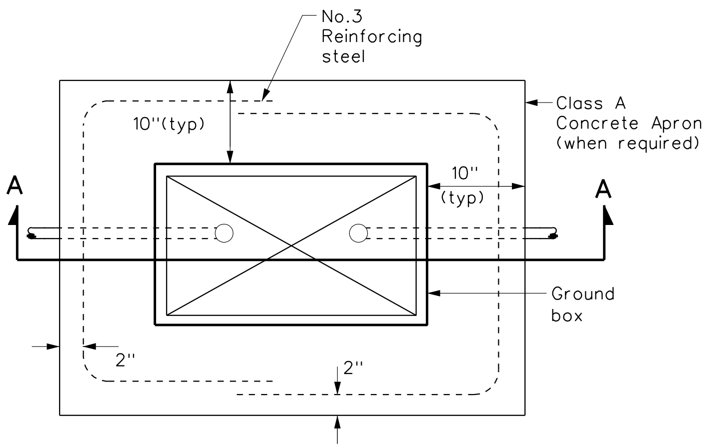
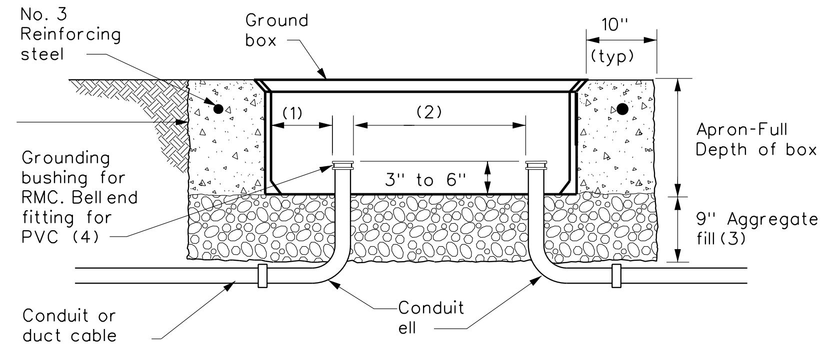


PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

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

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

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

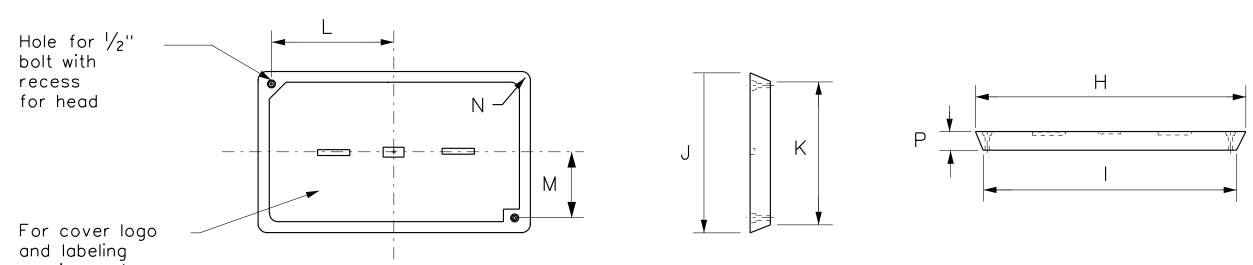
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOX DIMENSIONS

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

GROUND BOX COVER DIMENSIONS

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



PLAN VIEW   END   SIDE

GROUND BOX COVER

GROUND BOXES

A. MATERIALS

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

B. CONSTRUCTION METHODS

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

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS GROUND BOXES

ED(4)-14

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ELECTRICAL SERVICES NOTES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SERVICE ASSEMBLY ENCLOSURE

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

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

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

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

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

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

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

PHOTOELECTRIC CONTROL

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

* ELECTRICAL SERVICE DATA

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

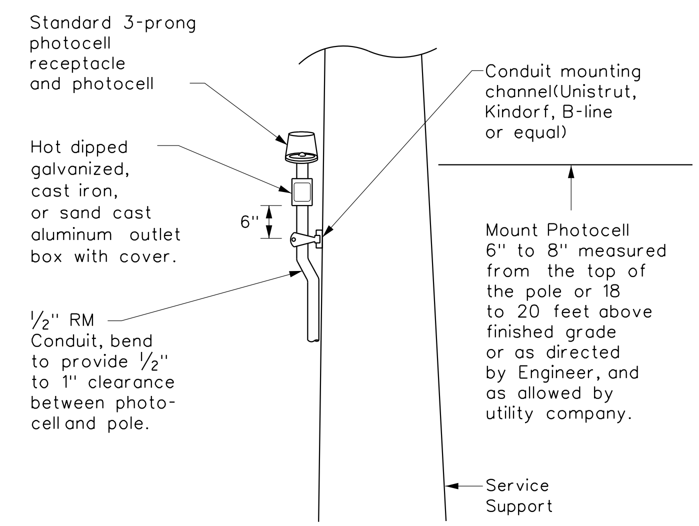
* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

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

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

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

- Schematic Type
- Service Voltage V / V
- Disconnect Amp Rating
  000 indicates main lug only/
  Typically Type T
- (SS)= Safety Switch Ahead of Meter-Check with Utility
  (NS)= No safety Switch Ahead of Meter-Check with Utility
- Enclosure Type
  GS= Galvanized steel("off the shelf")
  SS= Stainless steel(Custom Enclosure)See MPL
  AL= Aluminum (Custom Enclosure)See MPL
- Photocell Mounting Location
  (E)= Inside Service/Enclosure Mounted
  (T)= Top of pole
  (L)= Luminaire mounted
  (N)= None/No Photocell or Lighting Contactor Required
- Service Support Type
  GC= Granite concrete
  OC= Other concrete
  TP= Timber pole
  SP= Steel pole
  SF= Steel frame
  OT= Pole by others or paid for separately
  EX= Existing pole
  TS= Service on traffic signal pole
  PS= Pedestal Service
- O= Overhead Service Feed from Utility
  U= Underground Service Feed from Utility



TOP MOUNTED PHOTOCELL

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

Texas Department of Transportation — Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

ED(5)-14

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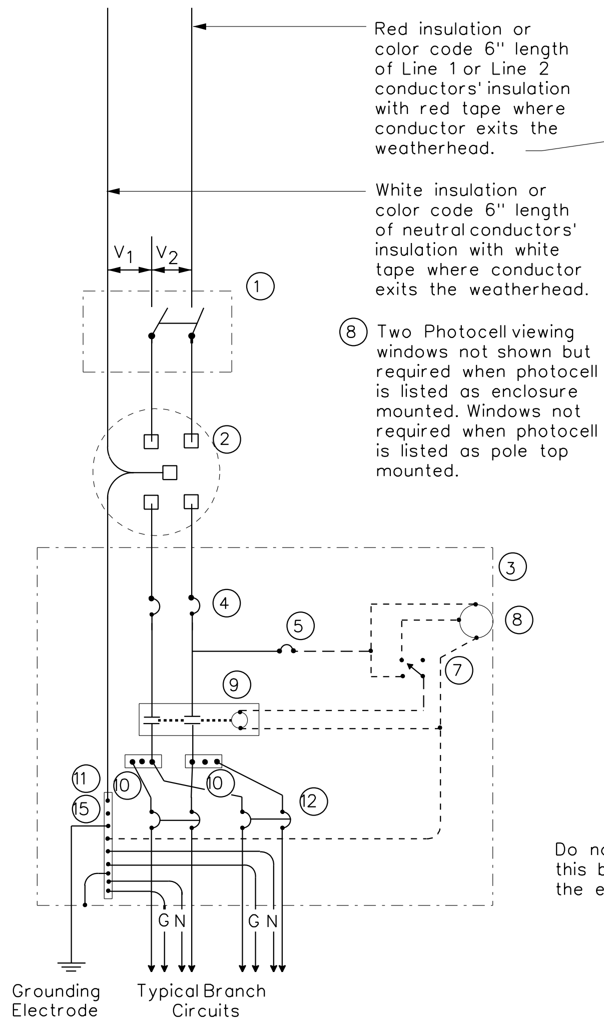
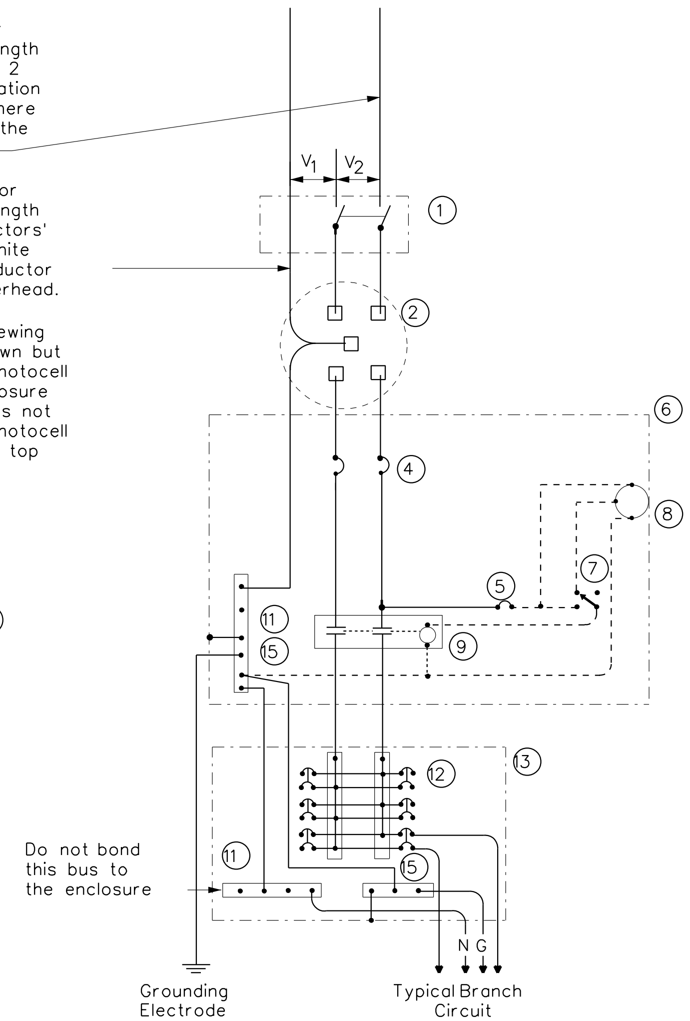
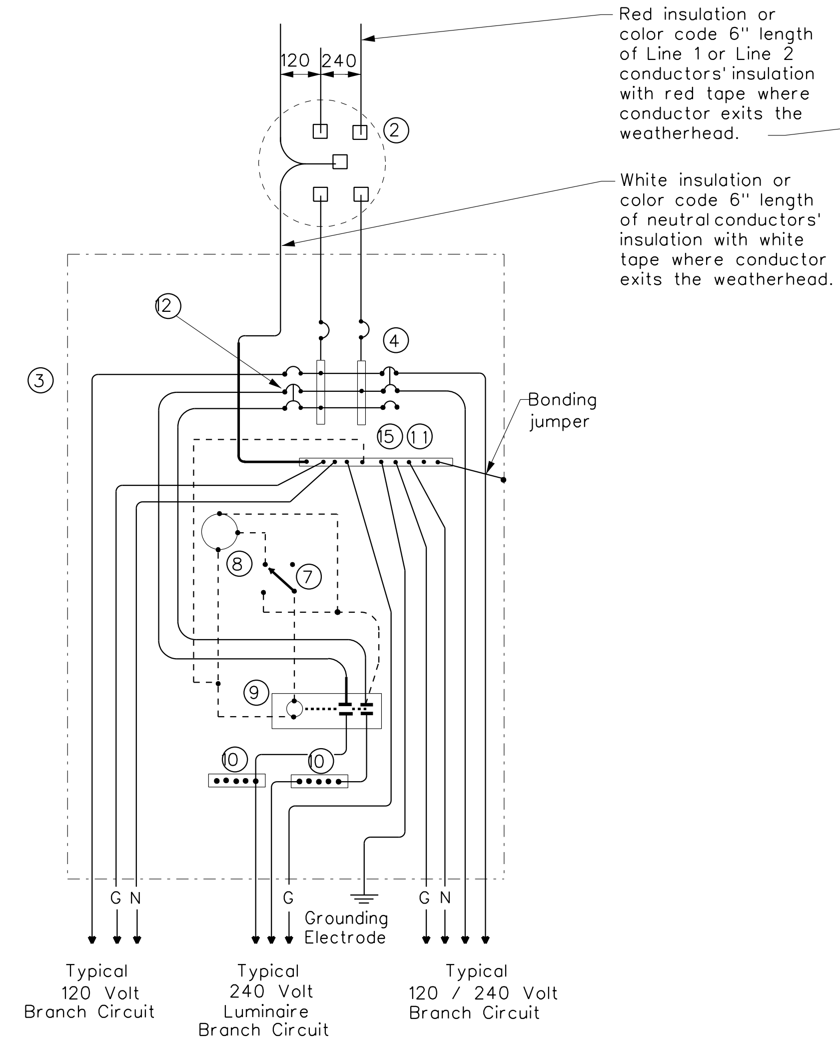


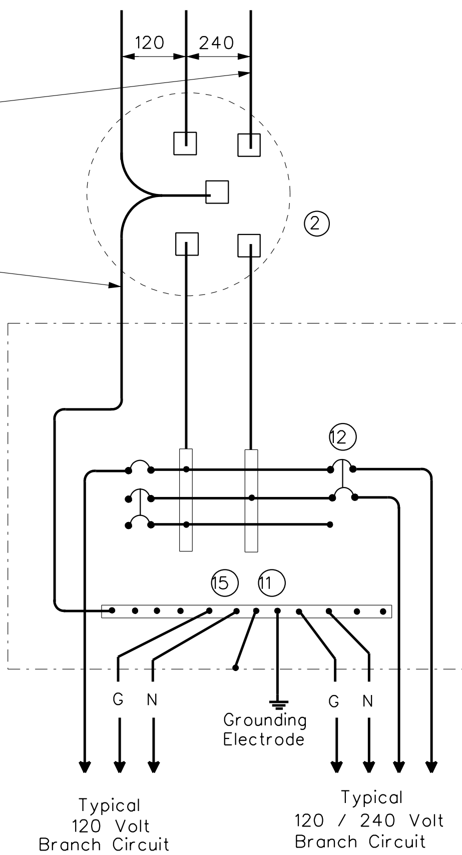
SCHEMATIC TYPE A
THREE WIRE



SCHEMATIC TYPE C
THREE WIRE



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



SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE

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

WIRING LEGEND

Symbol	Description
———	Power Wiring
- - - - - - -	Control Wiring
—N—	Neutral Conductor
—G—	Equipment grounding conductor-always required

SCHEMATIC LEGEND

No.	Item
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

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Texas Department of Transportation
Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

ED(6)-14

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©TxDOT October 2014	CONT 0700	SECT 03	JOB 149	HIGHWAY SH71
REVISIONS	DIST AUS		COUNTY TRAVIS	SHEET NO. 104

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

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

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

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

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

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

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

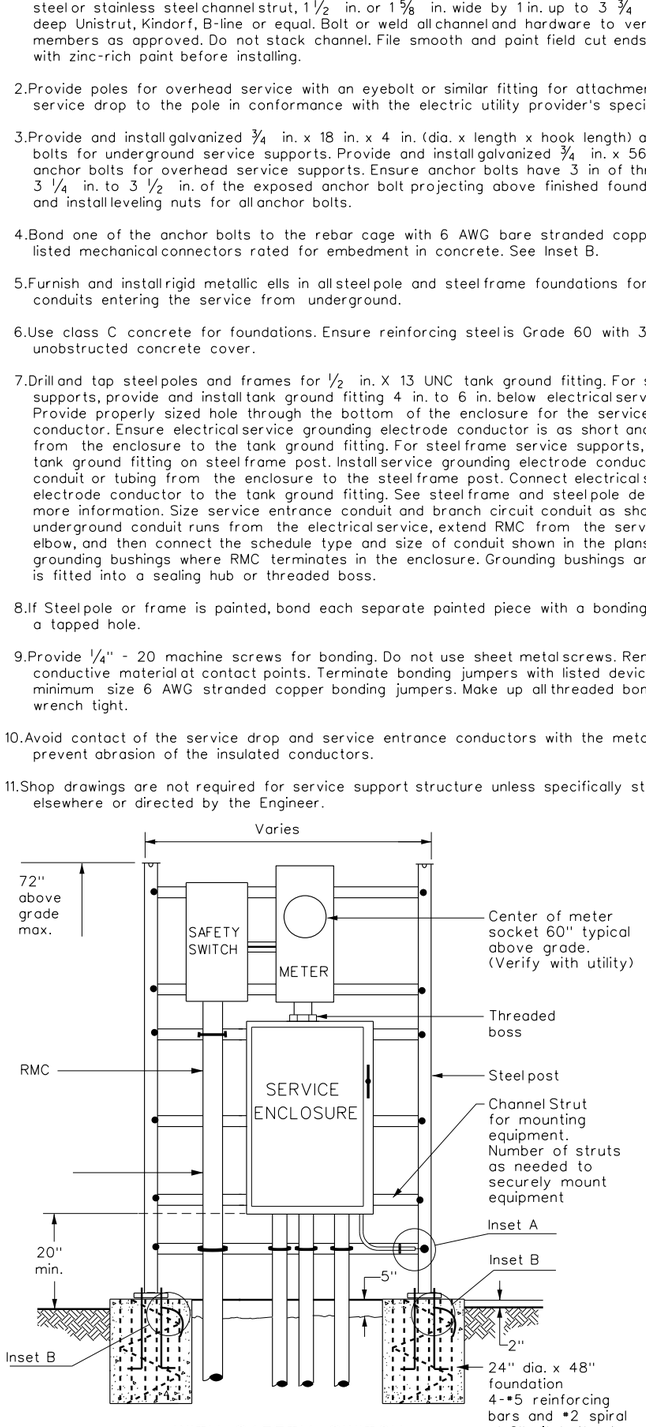
7. Drill and tap steel poles and frames for ½ in. X 13 UNC tank ground fitting. For steel pole service supports, provide and install tank ground fitting 4 in. to 6 in. below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode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

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

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

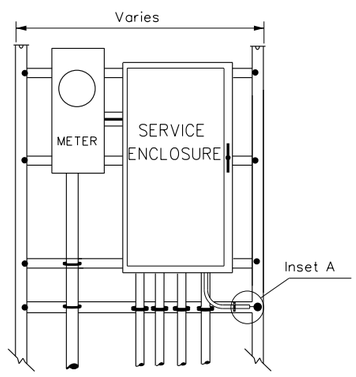
10. Avoid contact of the service drop and service entrance conductors with the metal pole to prevent abrasion of the insulated conductors.

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



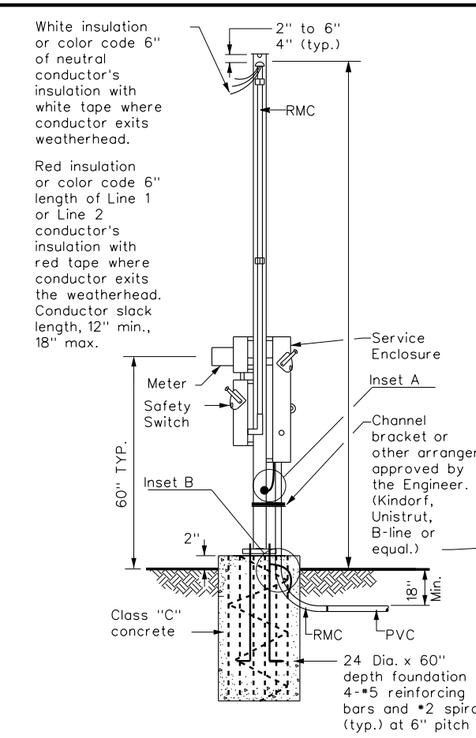
WITH SAFETY SWITCH

FRONT VIEW



WITHOUT SAFETY SWITCH

SERVICE SUPPORT TYPE SF(U) - UNDERGROUND SERVICE



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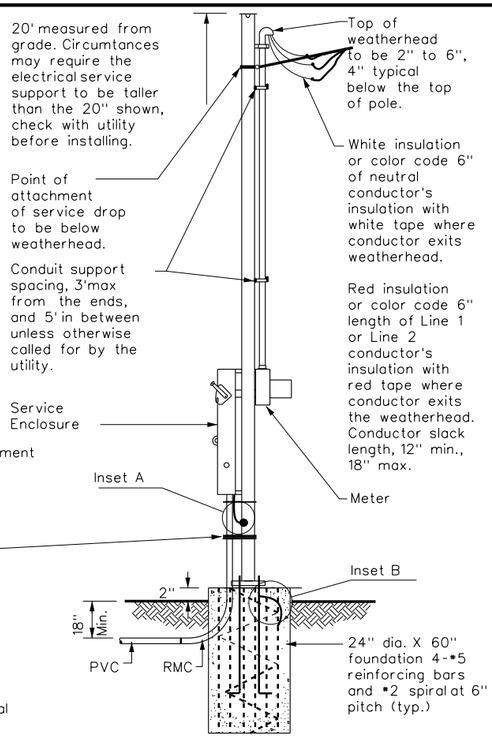
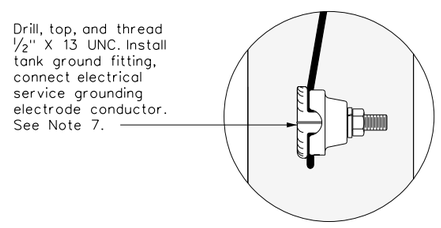


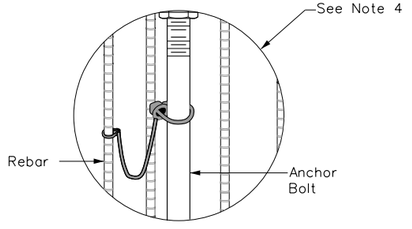
WITHOUT SAFETY SWITCH

SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE

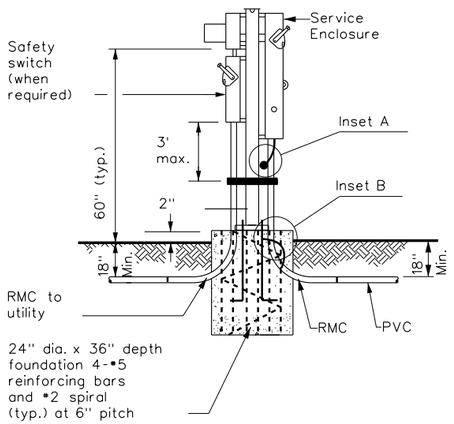


FRONT VIEW

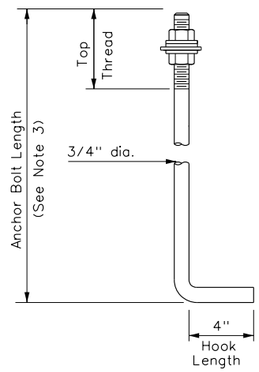
INSET A



INSET B

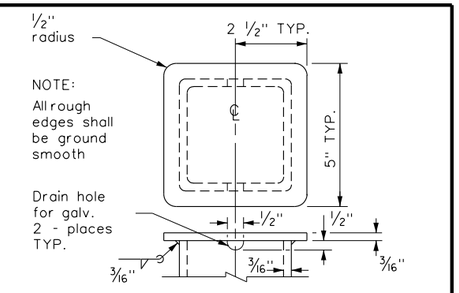


WITH SAFETY SWITCH

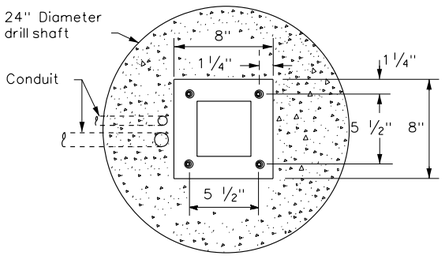


HOOKED ANCHOR DETAIL

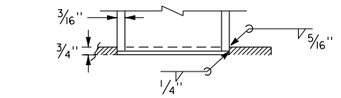
SERVICE SUPPORT TYPE SP(U) - UNDERGROUND SERVICE



POLE TOP PLATE

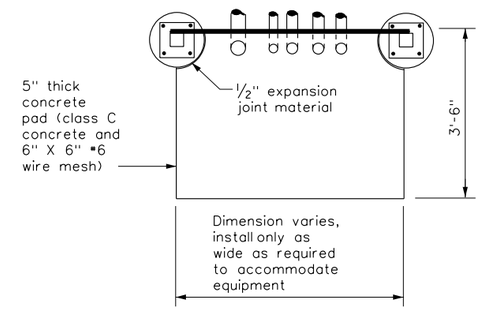


BASE PLATE DETAIL



BOTTOM OF POLE

SERVICE SUPPORT TYPE SF & SP



TOP VIEW

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

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES SF & SP

ED(7)-14

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TIMBER POLE(TP)SERVICE SUPPORT NOTES

1. Ensure electrical service support is a class 5 treated timber pole as per Item 627 "Treated Timber Poles." Embed timber pole to depth required in Item 627.

2. Conduit and electrical conductors attached to the electrical service pole and underground within 12 in. of service pole are not paid for directly but are subsidiary to the electrical service.

3. Install pole-top mounted photocell (T) on north side of pole, or in service enclosure (E) as required. See Electrical Service Data chart in plan set.

4. Gain pole as required to provide flat surface for each channel. Gain timber pole to 5/8 in. max. depth and 1 7/8 in. max. height. Gain pole in a neat and workmanlike manner.

5. Mount meter and service equipment on stainless steel or galvanized channel (Unistrut, Kindorf, or equal). Provide channel sized 1 in. to 3 3/4 in. maximum depth, and 1 1/2 in. to 1 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, 1/4 in. minimum diameter by 1 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.

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.

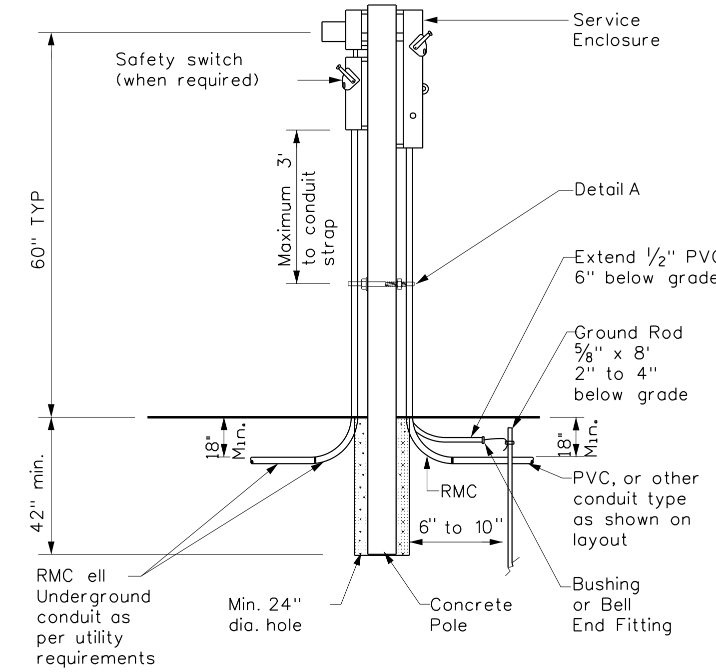
4. Embed poles 42 in. or 10% of the length plus 2 ft., whichever is greater.

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.

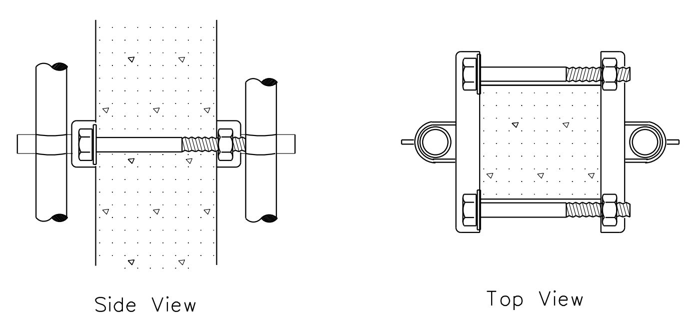
7. Furnish and install galvanized or stainless steel channel strut 1 1/2 in. or 1 5/8 in. wide by 1 in. up to 3 3/4 in. deep (Unistrut, Kindorf, B-line or equal). Attach channel strut with stainless steel concrete anchors (max. 1" depth), square U-bolts or back to back channel strut with long bolts, or other secure mounting as approved by the Engineer. Ensure bolts are galvanized in accordance with ASTM A153. Do not stack channel struts.

8. Backfill the holes thoroughly by tamping in 6 in. lifts. After tamping to grade, place additional backfill material in a 6 inch high cone around the pole to allow for settling. Use material equal in composition and density to the surrounding area. Backfilling will not be paid for directly but is subsidiary to various bid items.



CONCRETE SERVICE SUPPORT

Underground(U)



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.

(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 1/2 in. PVC to ground rod - extend 1/2 in. PVC 6 in. underground.

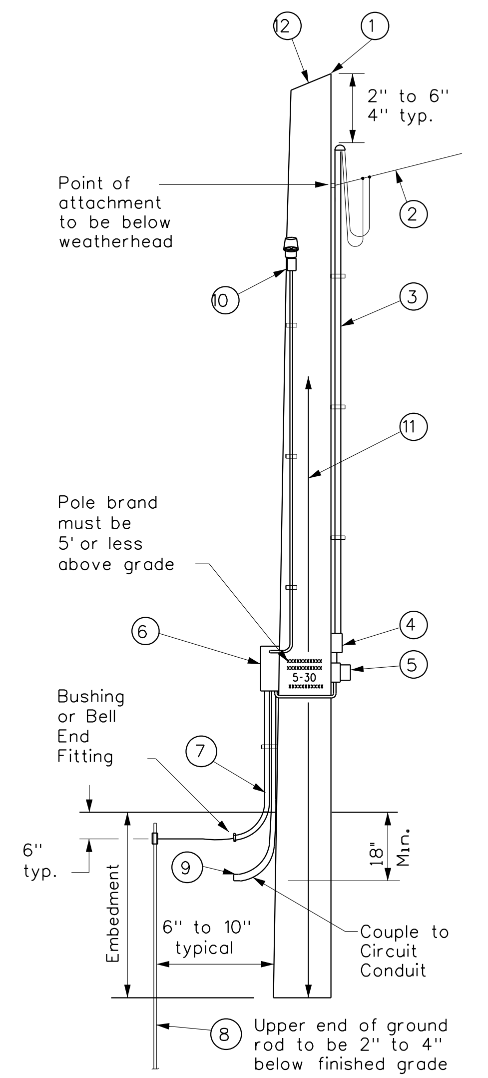
(8) 5/8 in. x 8 ft. Copper clad ground rod - drive ground rod to a depth of 2 in. to 4 in. below grade.

(9) RMC same size as branch circuit conduit.

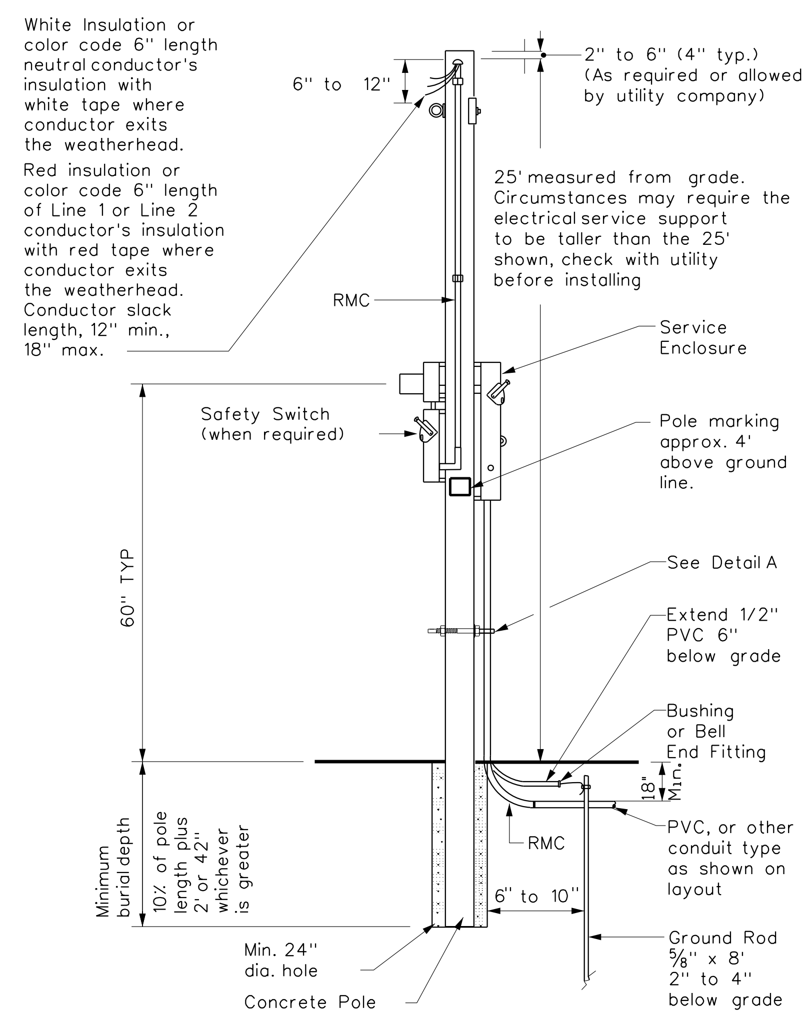
(10) See pole-top mounted photocell detail on ED(5).

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

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



SERVICE SUPPORT TYPE TP (O)



CONCRETE SERVICE SUPPORT

Overhead(O)

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Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES GC, OC, & TP

ED(10)-14

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DUCT CABLE & HDPE CONDUIT NOTES

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

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

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

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

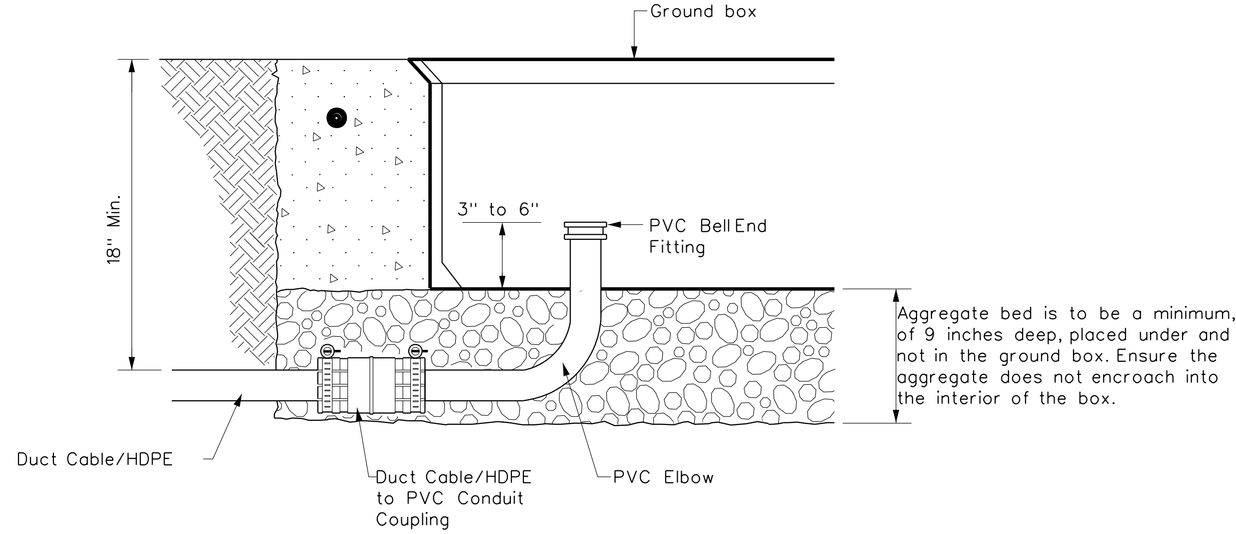
5. Furnish and install duct cable with factory installed conductors, sized as shown in the plans and as required by the National Electrical Code (NEC). The NEC contains specific requirements for duct cable in Article, "Nonmetallic Underground Conduit with Conductors: Type NUCC."

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

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

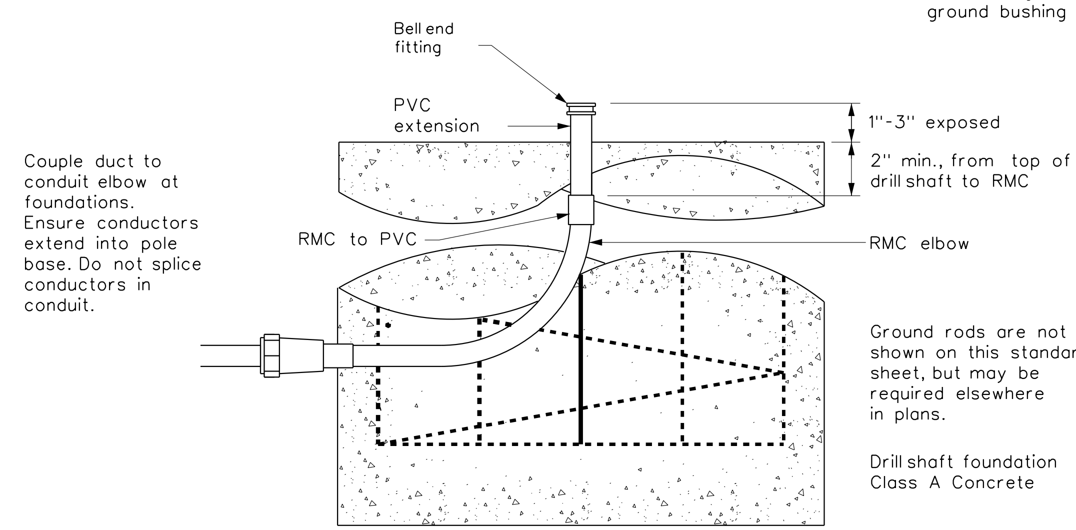
8. Provide minimum cover of 24 in. under roadways, 18 in. in other locations, or as shown on the plans.

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

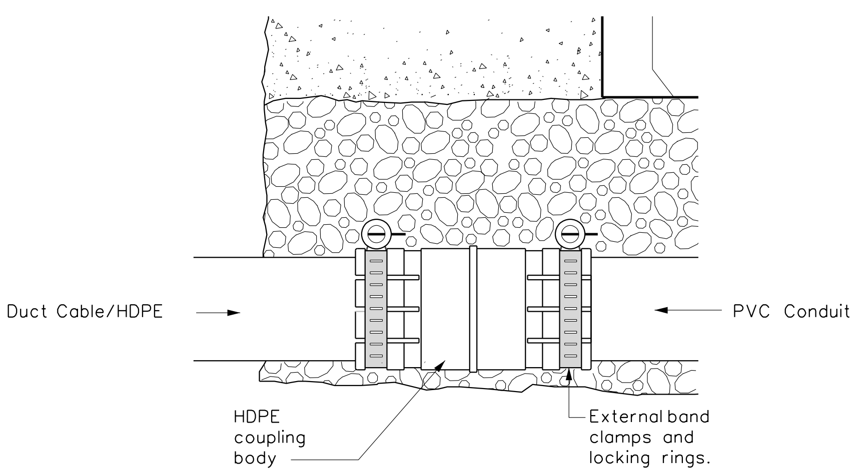


DUCT CABLE/HDPE AT GROUND BOX

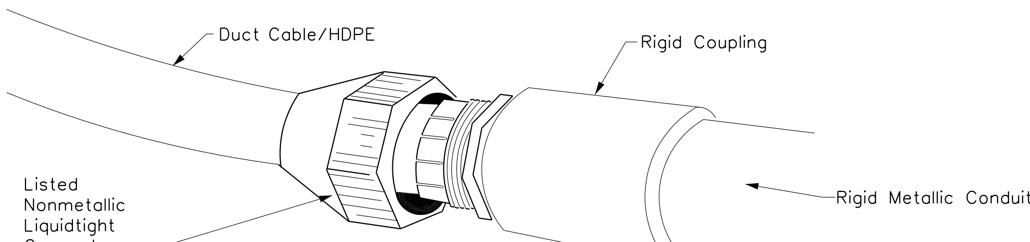
When the upper end of an RMC Ell does not enter the ground box, it may be extended with a SCH-40 PVC conduit nipple and bell end, provided there is a minimum of 18" of cover over all parts of the elbow. If not, a rigid extension and ground bushing is required.



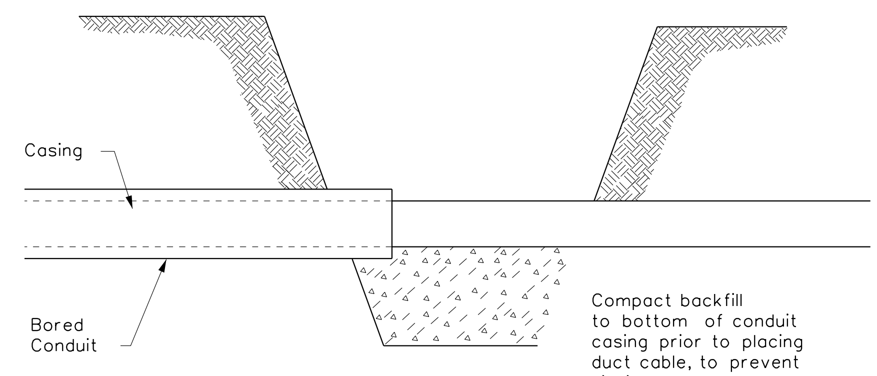
DUCT CABLE / HDPE AT FOUNDATION



DUCT CABLE/HDPE TO PVC



DUCT CABLE/HDPE TO RMC



BORE PIT DETAIL

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS DUCT CABLE/ HDPE CONDUIT

ED(11)-14

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BATTERY BOX GROUND BOXES NOTES

A. MATERIALS

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

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

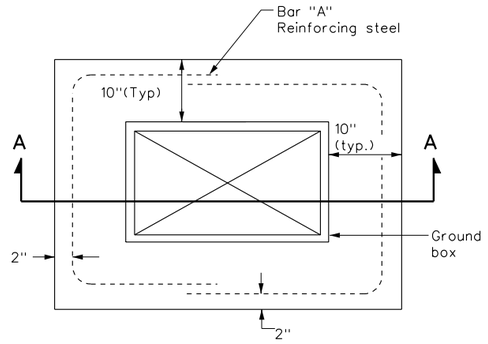
B. CONSTRUCTION METHODS

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

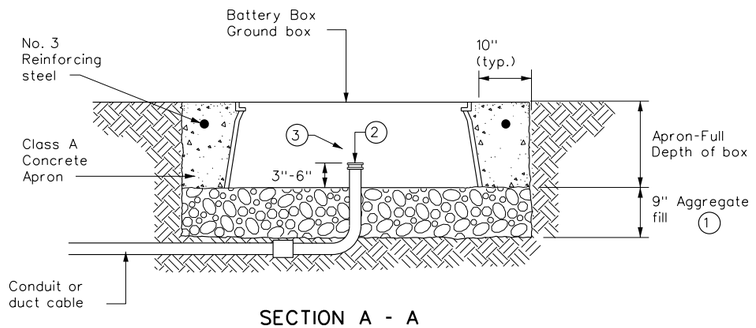
2. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting battery box ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure the aggregate bed is in place and is a minimum of 9 in. deep prior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

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

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



PLAN VIEW



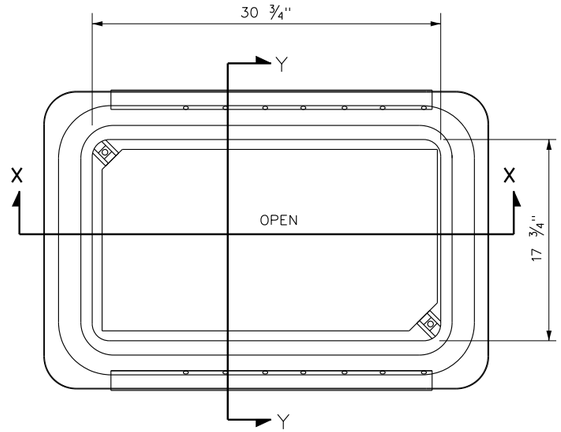
SECTION A - A

APRON FOR BATTERY BOX GROUND BOXES

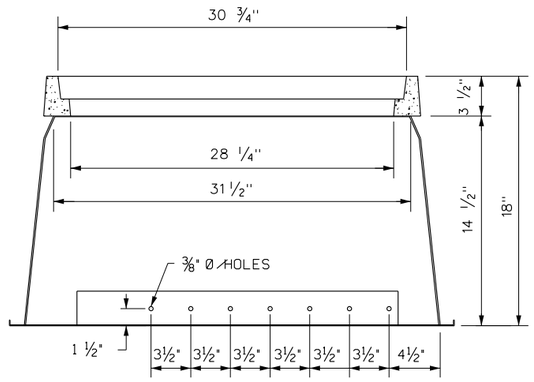
(1) Place aggregate under the box and not in the box. Aggregate should not encroach on the interior volume of the box.

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

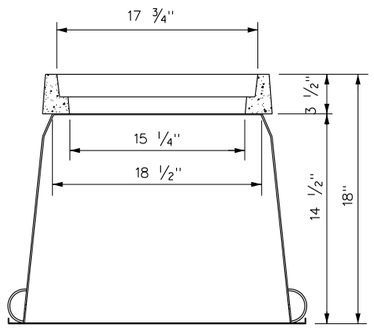
(3) Install all conduits in a neat and workmanlike manner.



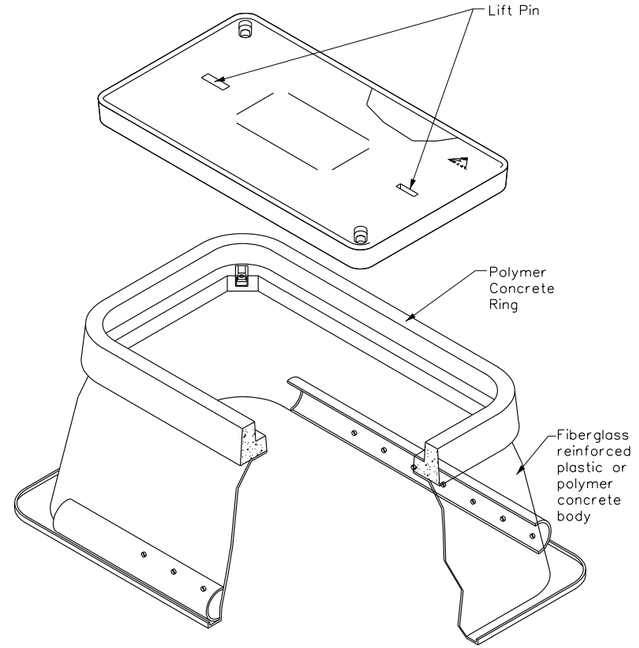
BATTERY BOX TOP VIEW



SECTION X-X



SECTION Y-Y



Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS BATTERY BOX GROUND BOXES

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I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1.

2.

[X] No Action Required [ ] Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

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

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

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

[X] No Permit Required
[ ] Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
[ ] Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
[ ] Individual 404 Permit Required
[ ] Other Nationwide Permit Required: NWP____

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

1.

2.

3.

4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

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

III. CULTURAL RESOURCES

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

[X] 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 [X] Required Action

Action No.

1. **All disturbed areas are re-vegetated according to the TxDOT's standard practices for urban areas and the TCEQ Construction General Permit to the extent practicable, in compliance with Executive Order 13112 on Invasive Species and the Executive Memorandum on Beneficial Landscaping. Re-vegetation efforts would provide appropriate and sustainable cover to prevent erosion and siltation.**

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

[ ] No Action Required [X] Required Action

Action No.

1. **The USFWS issued a Biological Opinion (BO) under consultation number 02ETAU00-2020-F-1924. TxDOT has committed to implementing conservation measures to avoid and minimize adverse effects to federal protected species (Bone Cave harvestman, Kretschmarr Cave mold beetle, Tooth Cave ground beetle, Tooth Cave pseudoscorpion, and Tooth Cave spider). Refer to the General Notes for the conditions and recommendations in the BO.**
2. **The contractor's attention is directed to the fact that there is the possibility that migratory birds may be nesting in any woody vegetation or existing structures within the project limits. The contractor shall remove all woody vegetation, and old migratory bird nests from any structures, between September 16 and February 28 while any nests are not occupied by a bird. In addition, the contractor must be prepared to prevent migratory birds from re-nesting on any structures between March 1 and September 15. All methods must be approved by a qualified professional well in advance of planned us.**
3. **AUS environmental staff shall be notified to attend the pre-construction meeting.**

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 [X] 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 [X] 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:

[X] 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 [X] Required Action

Action No.

1. **Project limits are within the Edwards Aquifer recharge zone and contributing zone, the Edwards Aquifer rules apply. While this project does not require a water pollution abatement plan or a contributing zone plan, voids encountered during construction are subject to review by the Texas Commission on Environmental Quality (TCEQ) per the requirements of the Edwards Aquifer Rules. Details regarding inspection of voids and coordination of closure plans with TCEQ are included in the Void Mitigation Diagrams (VMD-18).**

Texas Department of Transportation

Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

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©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
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05-07-14 ADDED NOTE SECTION IV.	AUS	TRAVIS		109
01-23-2015 SECTION I CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.				

DATE: 5/31/2023
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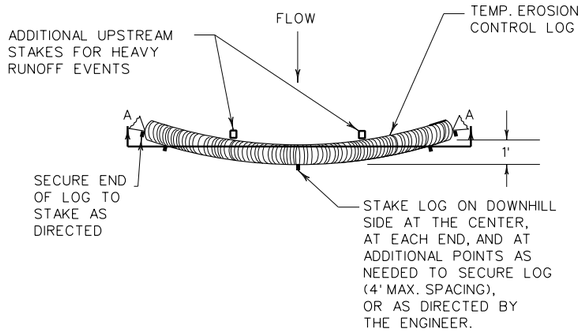
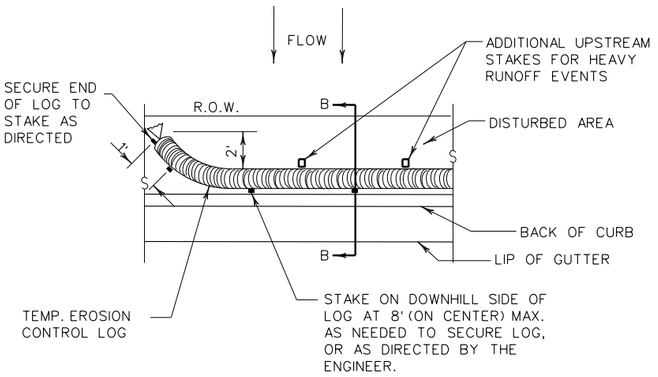


PLAN VIEW



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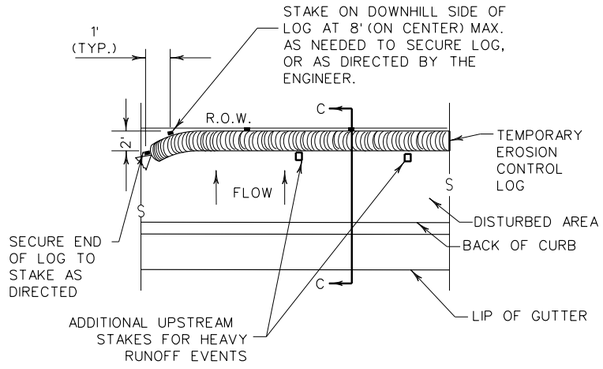

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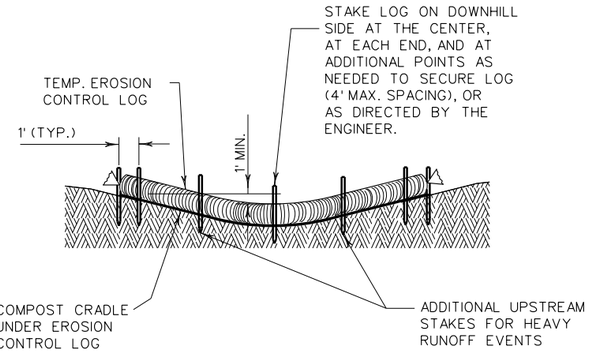
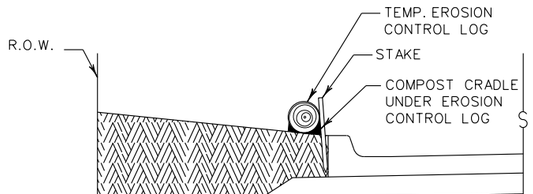


SECTION A-A

EROSION CONTROL LOG DAM

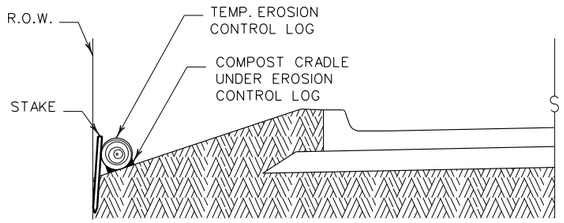
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

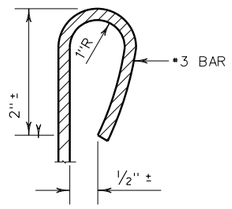
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL

LEGEND

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

GENERAL NOTES:

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

SEDIMENT BASIN & TRAP USAGE GUIDELINES

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

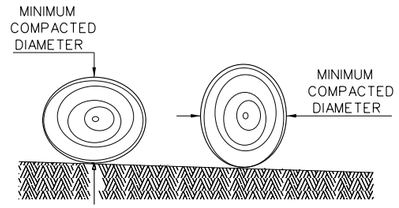
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

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

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

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



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

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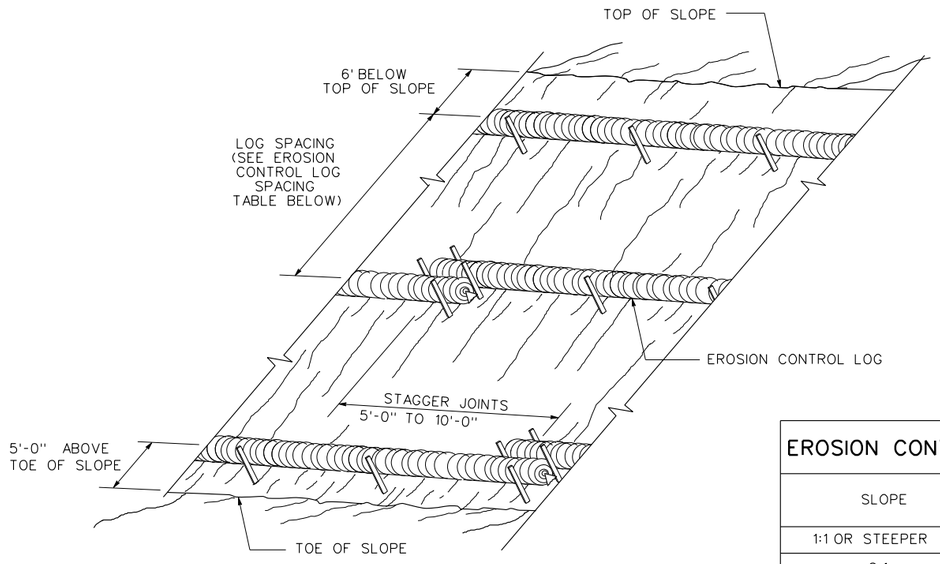
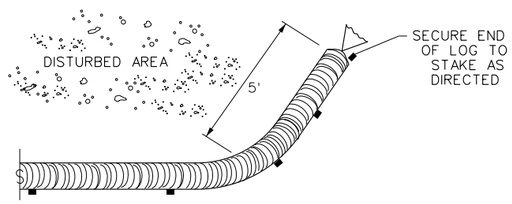


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

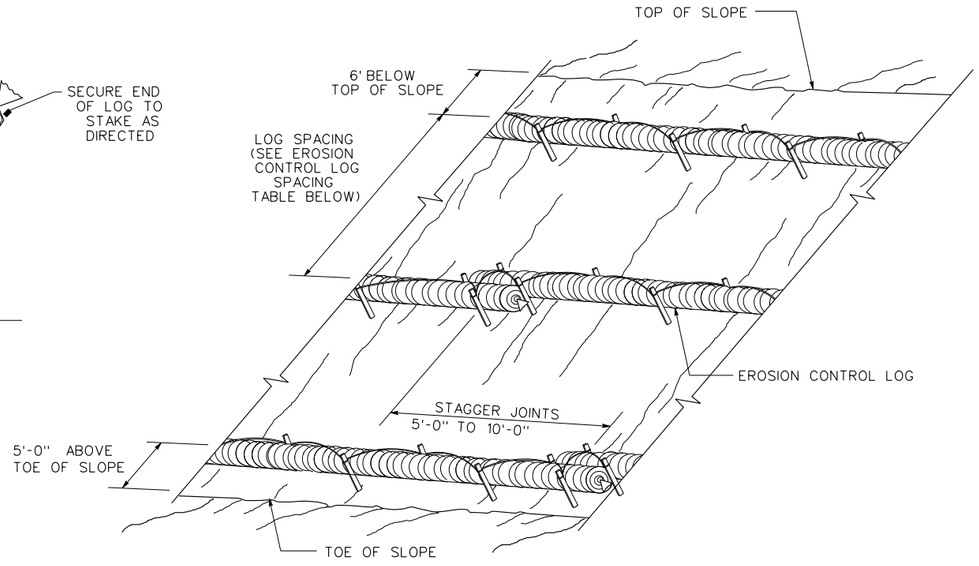
CL-SST



END SECTION RAP DETAIL

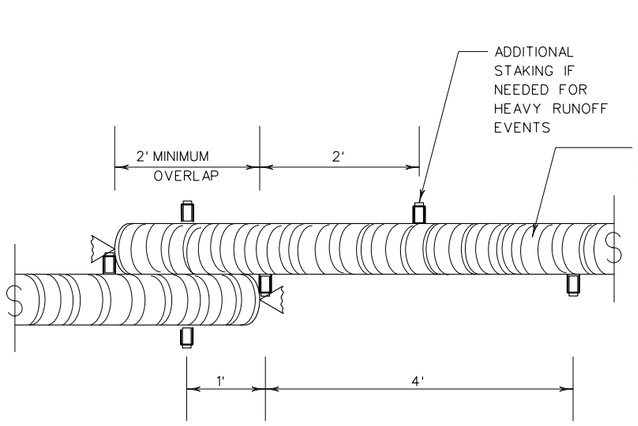
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

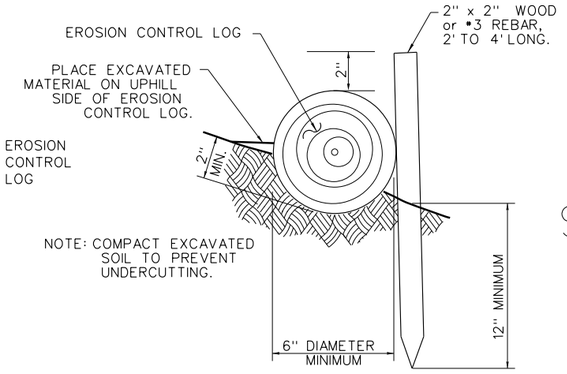
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

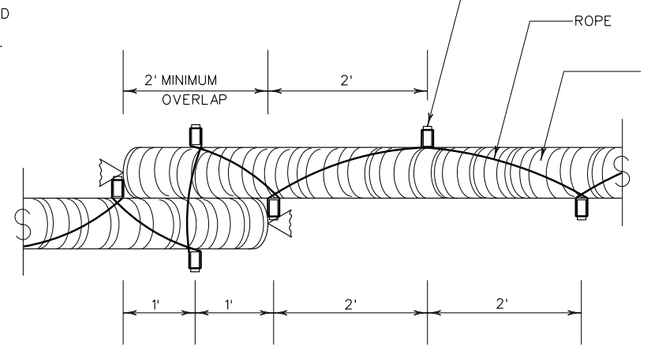


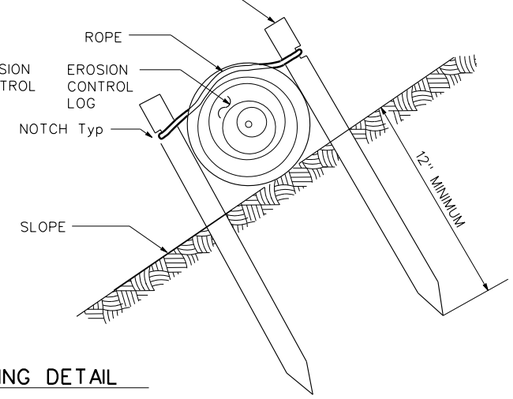


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

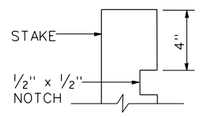
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation

Design Division Standard

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

FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
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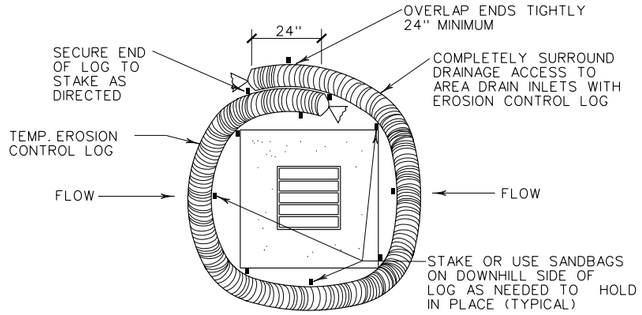
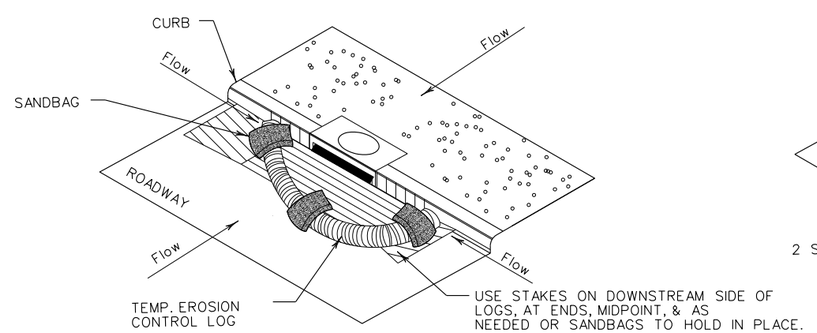


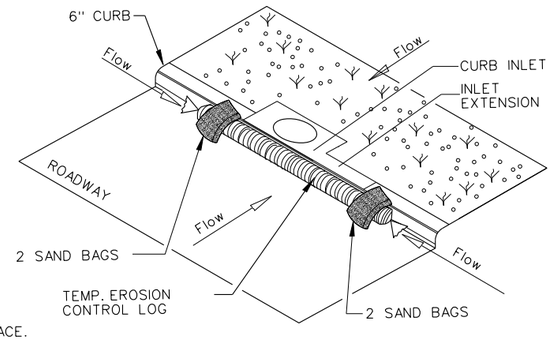
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

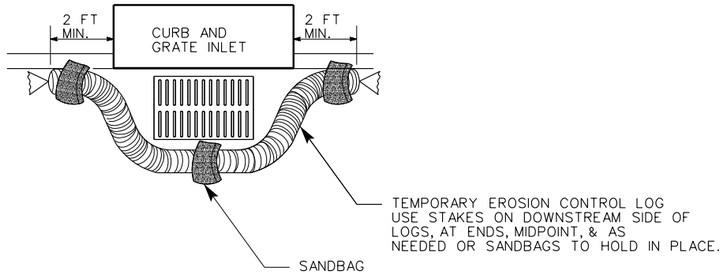
CL-CI



EROSION CONTROL LOG AT CURB INLET

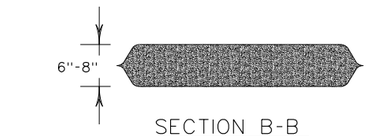
CL-CI

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.

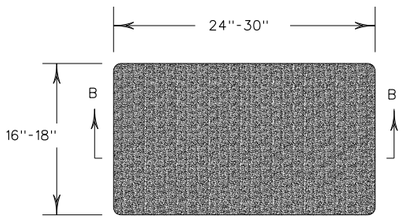


EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0700	03	149		SH71		
	DIST	COUNTY			SHEET NO.		
	AUS	TRAVIS			112		

VOIDS DEFINITION

- VOID GREATER THAN SIX INCHES ACROSS IN ANY DIRECTION AND/OR
- VOID IS GREATER THAN ONE SQUARE FOOT ALONG ANY PLANE AND/OR
- VOID BLOWS AIR AND/OR
- VOID CONTINUALLY RECEIVES WATER DURING A RAIN EVENT AND/OR
- VOID HAS WATER FLOWING THROUGH OR OUT OF IT AND/OR

GENERAL NOTES

1. USING EXPLOSIVES IS NOT ALLOWED.
2. THE PROJECT AREA IS A KNOWN KARST AREA. FRACTURED MATERIAL, BOULDERS,UNDERGROUND VOIDS, GROUNDWATER, UNSTABLE MATERIAL, AND DRASTICALLY VARYING STRATA CAN BE EXPECTED. THE CONTRACTOR SHALL WORK WITH TXDOT AND TXDOT'S PARTNERS TO ALLOW ACCESS AND ON-SITE MONITORING OF EXCAVATION.
3. THE VOID MITIGATION DETAILS ARE EXAMPLES. IMPLEMENTATION OF THE APPROVED MITIGATION PLAN SHOULD USE THE REFERENCED BID ITEMS.
4. CONCRETE USED FOR VOID MITIGATION SHALL BE 3,000 PSI IN ACCORDANCE WITH ITEM 420 CLASS A CONC (MISC). QUANTITIES UNDER 4 CY MAY BE HAND MIXED ON SITE USING 5,000 PSI RATED BAG MIX CONCRETE.
5. 3 IN. x 5 IN. ROCK SHALL BE IN ACCORDANCE WITH ITEM 506. LARGE ROCK > 1 FT. SHALL BE IN ACCORDANCE WITH 12 IN. ROCK PER ITEM 432.
6. FILTER FABRIC AND EROSION LOGS WILL BE IN ACCORDANCE WITH ITEM 506.
7. IMPERMEABLE LINER WILL BE IN ACCORDANCE WITH ITEM 5056. THE EDGE OF THE LINER SHALL BE ANCHORED IN A 6 IN. WIDE BY 18 IN. DEEP TRENCH.
8. STEEL CASING, USED FOR DRILL SHAFT CONSTRUCTION, SHALL BE IN ACCORDANCE WITH ITEM 416.
9. AGGREGATE OR OTHER BACKFILL WILL BE PAID FOR BY OVERRUN OF EXISTING EMBANKMENT ITEM. FILTER FABRIC OVER THE AGGREGATE IS SUBSIDIARY. SANDBAGS SHALL BE PAID USING SANDBAGS FOR EROSION CONTROL. THE SANDBAGS SHALL BE POLYPROPYLENE AND FILLED WITH PEA GRAVEL. CONNECTOR PIPE SHALL BE PAID USING PIPE(PVC)(SCH 80)(6 IN).
10. IF A SINGLE VOID IMPACT CAUSES DELAYS BY MORE THAN 20 WORKING DAYS, DELAY WILL BE CONSIDERED FOR THE IMPACT BEYOND THE INITIAL 20 DAYS. IF THE ACCUMULATION OF VOID IMPACTS CAUSE DELAYS BY MORE 40 WORKING DAYS, DELAY WILL BE CONSIDERED FOR THE IMPACT BEYOND THE 40 DAYS . OVERHEAD, BARRICADES AND DELAYS WILL BE EVALUATED AND PAID IN ACCORDANCE WITH THE CONTRACT. IMPACTS WILL NOT BE CONSIDERED IMPACT AFTER A RESPONSE PROCEDURE IS PROVIDED. ALL DELAYS CAUSED BY A VOID AND THE DURATION FOR IMPLEMENTATION OF A RESPONSE ARE NON-COMPENSABLE FOR LABOR, EQUIPMENT, STANDBY, MOBILIZATIONS, AND COST ESCALATIONS.

VOID MITIGATION AND PROTECTION MEASURES

REFER TO VOID MITIGATION DETAILS FOR ADDITIONAL INFORMATION. VOID MITIGATION DETAILS ARE TO BE APPROVED BY GEOSCIENTIST AND THE TCEQ (IF APPLICABLE) PRIOR TO IMPLEMENTATION.

1. IN THE EVENT THAT UNKNOWN KARST VOIDS ARE ENCOUNTERED, WORK AT THAT LOCATION WILL BE HALTED IMMEDIATELY AND THE FEATURE WILL BE INSPECTED PROMPTLY BY TXDOT.
2. WHEN REQUIRED, TXDOT WILL INSPECT ALL VOIDS TO DETERMINE THE POTENTIAL OF THE FEATURES TO PROVIDE SUITABLE HABITAT FOR ENDANGERED KARST INVERTEBRATES. WORK AT THAT LOCATION WILL NOT RESUME UNTIL AUTHORIZATION TO DISTURB THE FEATURE HAS BEEN OBTAINED. REFER TO THE EPIC SHEET FOR ADDITIONAL INFORMATION FOR THREATENED OR ENDANGERED SPECIES.

   TXDOT WILL INSPECT ALL VOIDS TO DETERMINE THE APPROPRIATE VOID MITIGATION PLAN.
3. ADDITIONAL EXCAVATION OF THE VOID MAY BE REQUIRED BY TXDOT OR THE GEOSCIENTIST TO FULLY EVALUATE THE VOID AND/OR MITIGATION PLAN PREPERATION. TXDOT APPROVAL IS REQUIRED PRIOR THE EXCAVATION. THIS WORK IS SUBSIDIARY.

VOID DISCOVERY PROTOCOL

IF A VOID IS DISCOVERED, THE FOLLOWING PROTOCOL WILL BE FOLLOWED:

1. ALL VOIDS REQUIRE AN EMAIL NOTIFICATION TO TXDOT DESIGNATED REPRESENTATIVE WITHIN 2 HOURS OF DISCOVERY. THE EMAIL WILL REQUIRE LOCATION INFORMATION (STATION, LATITUDE & LONGITUDE), DATES OF DISCOVERY, VIDEO/PICTURE DOCUMENTATION, SIZE, ETC. CONTRACTOR SHALL SUPPLY A CAMERA AND DIGITAL PICTURE/VIDEO DOCUMENTATION OF ALL VOIDS AND PROVIDE A MEASUREMENT OF THE SIZE OF THE VOID. FOR VOIDS THAT CANNOT BE SAFELY EXPLORED, ANOTHER DEVICE SHALL BE PROVIDED TO DOCUMENT THE VOID. CONTACT THE DISTRICT CONSTRUCTION OFFICE FOR AN EXAMPLE EMAIL THAT SHALL BE FOLLOWED. THIS WORK IS SUBSIDIARY.
2. ALL ACTIVITY WITHIN A 50-FOOT RADIUS OF THE VOID SHALL STOP. BLOCK TRAFFIC FROM DRIVING NEAR THE VOID AND PREVENT CONSTRUCTION EQUIPMENT FROM OPERATING IN THE VICINITY OF THE VOID USING BARRELS, ORANGE CONSTRUCTION FENCE OR OTHER APPROVED HIGHLY VISIBLE BARRIER.
3. A DRY VOID THAT IS LESS THAN 1 CF IN VOLUME OR LESS THAN 6 IN. IN ALL DIRECTIONS WILL NOT REQUIRE ACTION BEYOND NOTIFICATION. TXDOT SHALL BE NOTIFIED IMMEDIATELY VIA EMAIL AND PHONE WHEN A VOID IS FOUND THAT REQUIRES ACTION. TXDOT WILL RESPOND WITHIN 6 BUSINESS DAYS FROM TIME OF EMAIL NOTIFICATION TO PROVIDE GUIDANCE TO THE CONTRACTOR.
4. COVER THE VOID TO PREVENT CONTAMINATION AND CHANGES IN AMBIENT CONDITIONS (TARPS AND PLYWOOD, OR SIMILAR MATERIALS ARE APPROPRIATE AS AVAILABLE). WHERE COVERING THE VOID IS NOT FEASIBLE, CONTRACTOR SHALL OBTAIN APPROVAL FROM TXDOT OF ALTERNATE TEMPORARY PROTECTION MEASURES. BIODEGRADABLE EROSION CONTROL LOG (BECL) SHOULD WRAP THE SURFACE PERIMETER OF THE VOID. TEMPORARY PROTECTIONS SHOULD REMAIN IN PLACE UNTIL FINAL MITIGATION AND PROTECTION MEASURES ARE APPROVED AND IN PLACE. AN EARTHEN BERM WILL BE MAINTAINED ON THE UP-GRADIENT SIDE OF VOID TO PREVENT ANY CONSTRUCTION RUNOFF FROM ENTERING ANY PART OF THE FEATURE WHICH MAY REMAIN.THIS WORK IS SUBSIDIARY.
5. WHEN REQUIRED TXDOT SHALL IMMEDIATELY NOTIFY THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) AUSTIN REGIONAL OFFICE.
6. TXDOT WILL PROVIDE FOR THE EVALUATION OF THE VOID A QUALIFIED GEOSCIENTIST LICENSED BY THE TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS OR BY A PROFESSIONAL ENGINEER WHO QUALIFIES TO PRACTICE GEOSCIENCE ACCORDING TO THE TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS.
7. WHEN REQUIRED TXDOT WILL SUBMIT AND OBTAIN APPROVAL OF AN ENCOUNTERED FEATURE MITIGATION PLAN TO THE TCEQ AUSTIN REGION OFFICE.
8. WORK SHOULD CEASE IN THE AREA UNTIL ASSESSMENT OF THE VOID CAN BE COMPLETED, TCEQ APPROVES THE ENCOUNTERED FEATURE MITIGATION PLAN AND MITIGATION IS COMPLETED. WHEN THE VOID IS OUTSIDE TCEQ JURISDICTION, TXDOT WILL APPROVE THE ENCOUNTERED FEATURE MITIGATION PLAN.

VOIDS RELATED TO DRILLED SHAFTS, SOIL NAILS, ROCK NAILS AND OTHER SIMILAR FUNCTIONS

1. SUBMIT INSTALLATION PLAN FOR REVIEW NO LATER THAN 2 MONTHS BEFORE CONSTRUCTION.
2. THE USE OF DRILLING FLUIDS, UNDERWATER PLACEMENT, OR SLURRY METHOD WILL NOT BE ALLOWED IF A VOID IS EXPOSED DURING DRILLING OF SHAFTS OR NAILS. THE CONTRACTOR SHALL USE APPROPRIATE INDUSTRY APPROVED METHODS TO PROVIDE A PRODUCT IN COMPLIANCE WITH THE SPECIFICATIONS. ADDITIONAL TIME OR COMPENSATION WILL NOT BE ALLOWED FOR USE OF ALTERNATE METHODS OR CASING INSTALLATION.
3. DURING NON-WORK HOURS OPEN HOLES SHALL BE PROTECTED FOR SAFETY AND COVERED. SHAFTS SHALL BE SURROUNDED BY EROSION CONTROL LOGS AT AN OFFSET OF 10' FROM THE EDGE OF THE OPENING. THIS WORK IS SUBSIDIARY
4. VIDEO DOCUMENTATION SHALL BE CONDUCTED OF A DRILL SHAFT ONCE EXCAVATION IS COMPLETE AND PRIOR TO PLACING REINFORCEMENT. SUFFICIENT LIGHTING SHALL ACCOMPANY THE VIDEO CAMERA TO ENSURE THE SHAFT AND VOIDS ARE VISIBLE. THIS WORK IS SUBSIDIARY.
5. CONCRETE USED TO FILL THE VOIDS WILL BE PAID USING CLASS A CONC (MISC) ITEM BUT WILL USE THE CLASS OF CONCRETE AS REQUIRED BY THE SPECIFICATION. QUANTITY OF CONCRETE WILL BE BASED ON VISUAL INSPECTION PROVIDED BY THE CONTRACTOR. IF VISUAL INSPECTION IS UNABLE TO DETERMINE THE SIZE OF THE VOID THE CONCRETE FOR PAYMENT WILL BE MEASURED AS THE ADDITIONAL CONCRETE BEYOND THE AMOUNT REQUIRED TO PLACE A CLEAN SHAFT PLUS 10 PERCENT WASTE.
6. THE USE OF PERMANENT CASING SHALL BE IN ACCORDANCE WITH ITEM 416. MATERIAL COST FOR CASING THAT REMAINS WILL BE PAID BY INVOICE FROM SUPPLIER WITH MARK UP IN ACCORDANCE WITH MATERIAL FOR ITEM 9.7. ADDITIONAL LABOR, EQUIPMENT, TIME, ETC. FOR INSTALLATION OF THE CASING WILL NOT BE COMPENSABLE.
7. ADDITIONAL NAIL LENGTH WILL BE PAID BY OVERRUN OF EXISTING BID ITEM. ALTERNATE NAIL TYPE COST WILL BE PAID BY INVOICE FROM SUPPLIER WITH MARK UP IN ACCORDANCE WITH MATERIAL FOR ITEM 9.7. LABOR, EQUIPMENT, ADDITIONAL TIME, ETC. WILL NOT BE COMPENSABLE.
8. CORE HOLES ARE REQUIRED FOR ALL DRILLED SHAFTS.

PLEASE REFER TO VOID MITIGATION INFO FOUND IN THE APPENDIX OF THE AUSTIN DESIGNERS GUIDE. PLEASE DELETE THIS NOTE.

PLEASE CONTACT ZACH LANFEEAR AND ANDY BLAIR AT TXDOT AUS ENV OFFICE PRIOR TO USING THESE DETAILS. PLEASE DELETE THIS NOTE PRIOR TO PLACING THESE DETAILS IN THE PLANS.

Texas Department of Transportation

Austin District Standard

VOID MITIGATION NOTES

VMD-18(AUS)

CONT	SECT	JOB	HIGHWAY
0700	03	149	SH71
DIST	COUNTY		SHEET NO.
AUS	TRAVIS		113

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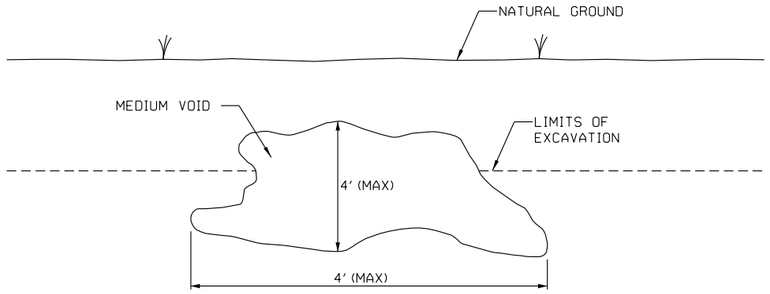
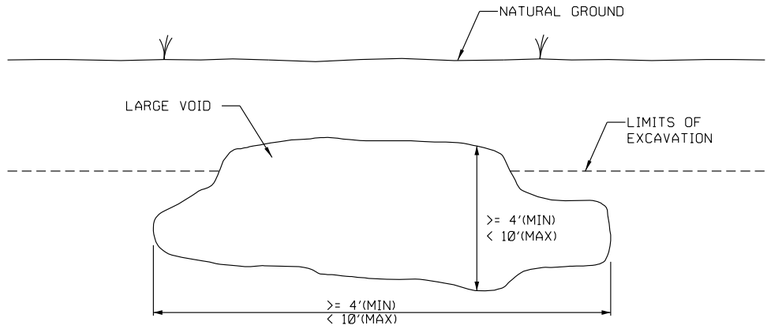
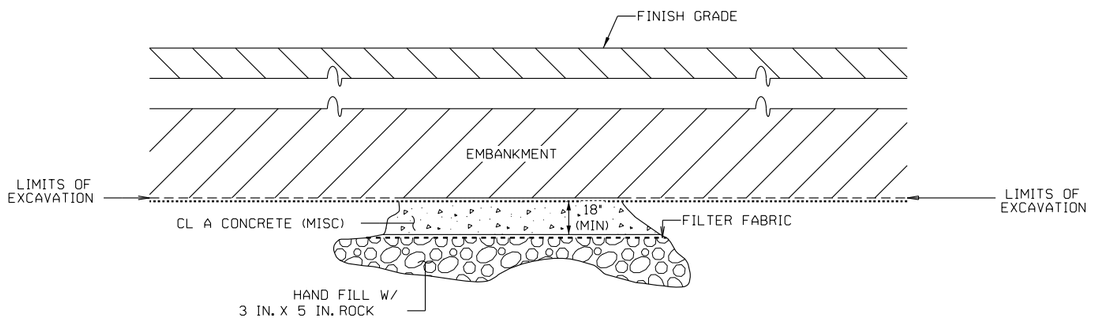
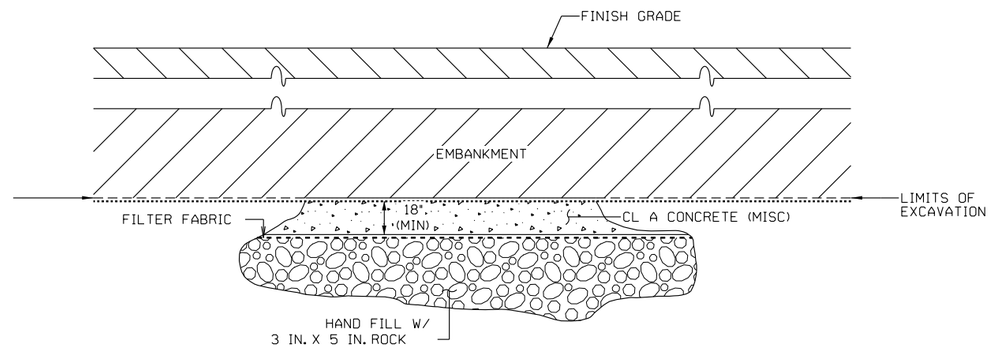






ROADWAY/S.U.P. GRADING OPERATIONS

MEDIUM (DRY VOID)
(<4' IN ANY DIRECTION)
(1 CF < 64 CF)



ROADWAY/S.U.P. GRADING OPERATIONS

LARGE (DRY VOID)
(>=4' <10' ANY DIRECTION)
(64 CF < 1000 CF)

Texas Department of Transportation

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VOID MITIGATION DETAILS

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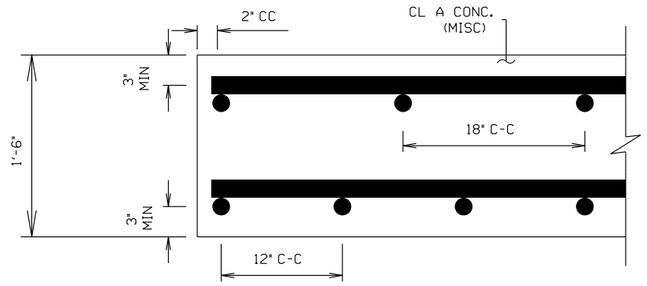

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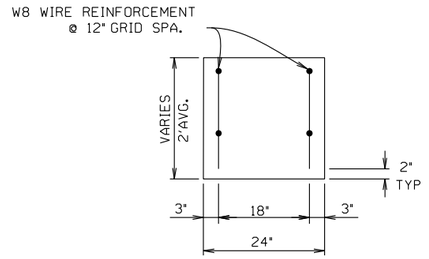


VARIABLE DEPTH CONCRETE WALL

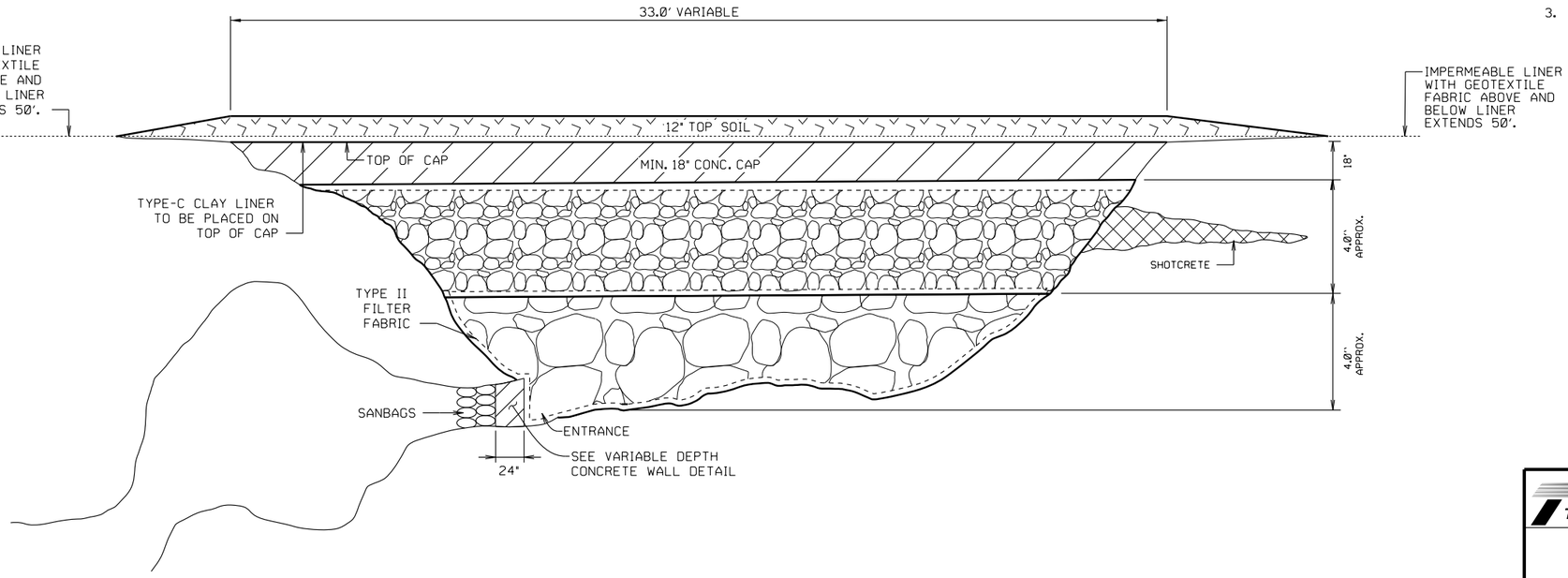
SCALE (IN FEET):
0 5

LEGEND

- CLASS A CONC. (MISC)
- 3 IN. × 5 IN. ROCK
- LARGE ROCK (>_1 FT)
- SHOTCRETE

NOTE:

1. CONCRETE WALL AND CONCRETE CAP SHALL BE PAID USING CLASS A CONC. (MISC).
2. SHOTCRETE WILL BE PAID USING CLASS A CONC. (MISC).
3. THE 12 IN. TOPSOIL AND LINER MAY NOT BE APPLICABLE IF THE VOID IS NOT IN A POND.



ELEVATION OF VOID IN A POND

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VOID MITIGATION DETAILS

VMD-18(AUS)

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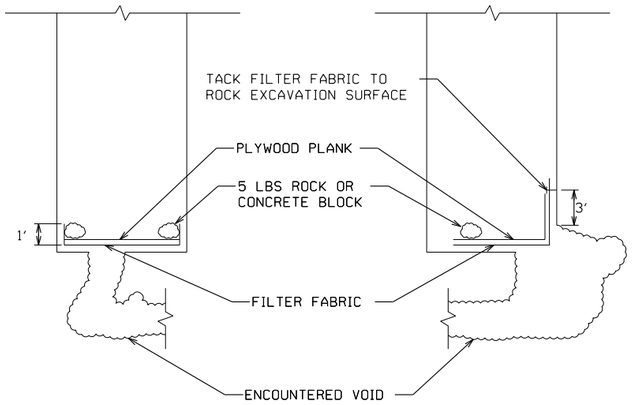

TEMPORARY PROTECTION
VOID AT BOTTOM OF TRENCH

NOTES:

1. PLACE TEMPORARY PROTECTION WITHIN TRENCH TO COVER VOID AS INDICATED. FABRIC SHALL EXTEND A MINIMUM OF 3 IN. BEYOND EDGE OF VOID. PLACE A PLYWOOD PLANK (MINIMUM Ø.75 IN. THICK) OVER FABRIC. PLANK AND FABRIC SHALL BE WEIGHTED AS REQUIRED BY 5 LBS ROCK OR CONCRETE BLOCK TO SECURE FILTER FABRIC.

2. TEMPORARY PROTECTION SHALL BE IN PLACE AT ALL TIMES THAT CONSTRUCTION OPERATIONS ARE NOT IN ACTUAL PROGRESS.

3. CONSTRUCTION OPERATIONS WITHIN 50' SHALL NOT PROGRESS DURING OCCURRENCE OF RAIN TO ALLOW FOR PROTECTION OF VOID DURING A RAIN EVENT.

4. LOCALIZED EROSION MEASURES (SILT FENCE, EROSION CONTROL LOG OR TRIANGULAR FILTER DIKES) SHALL BE INSTALLED ALONG THE TRENCH TO ENSURE THAT LOOSE SPOILS OR RUNOFF DO NOT ENTER THE TRENCH OR AFFECT PERFORMANCE OF TEMPORARY PROTECTION. USE EARTHEN BERN TO DIVERT WATER AWAY FROM THE TRENCH.

5. SPECIAL CARE SHALL BE TAKEN TO ENSURE THAT EROSION CONTROL MEASURES REQUIRED ALONG THE TRENCH ARE MAINTAINED, CLEANED AND FULLY FUNCTIONAL.

6. FILTER FABRIC AND ROCK OR CONCRETE BLOCKS AND PLYWOOD PLANK SHALL BE REMOVED FROM THE TRENCH WHEN PERMANENT VOID MITIGATION MEASURES ARE INSTALLED.

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VOID MITIGATION DETAILS

VMD-18(AUS)

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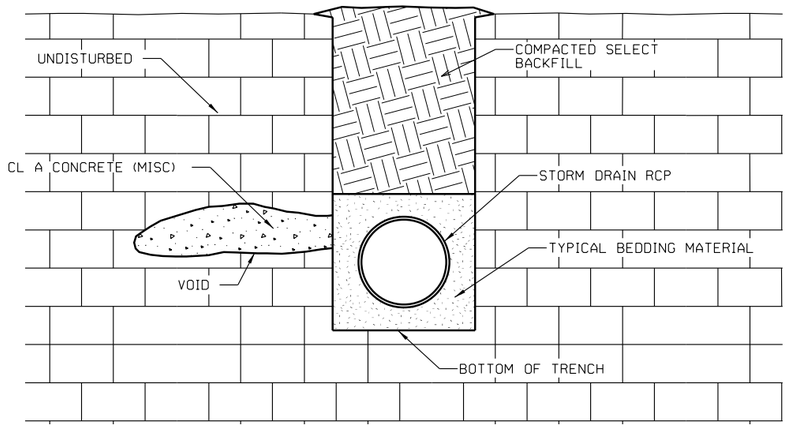
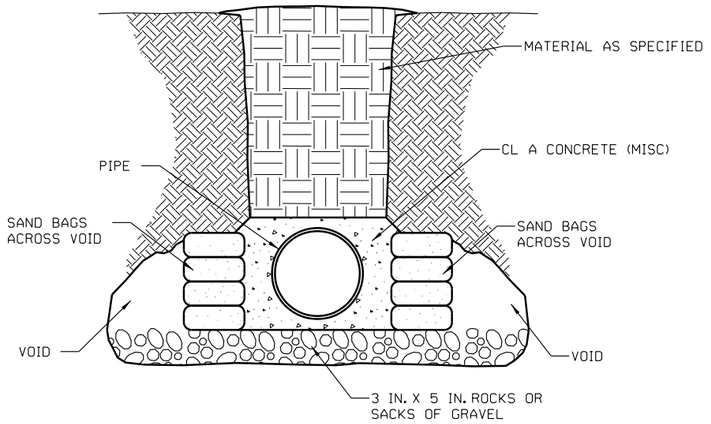


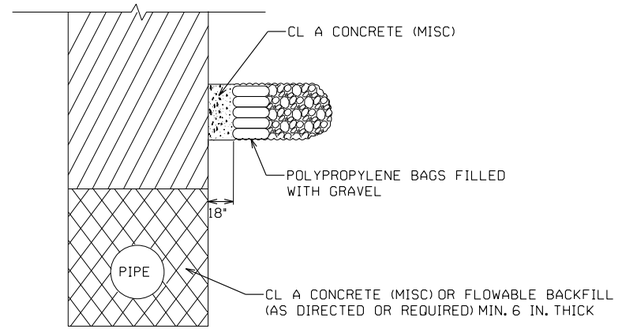
TRENCHING OPERATIONS
SMALL/MEDIUM (DRY VOID)
(<64 CF)

VOID IS EITHER LARGER THAN SIX (6) INCHES IN AT LEAST ONE DIRECTION OR IS LOCATED WITHIN THE LEVEL OF THE PIPE EMBEDMENT. ALL ROCK WITHIN AND SURROUNDING THE VOID IS SOUND.



TRENCHING OPERATIONS
LARGE (DRY VOID)
(64 CF < 1,000 CF)

VOID INTERSECTS THE PLANE OF THE TRENCH FLOOR AND ANY OPENING IN TRENCH FLOOR IS GREATER THAN FOUR (4) FEET IN ANY DIRECTION, OR THE TRENCH FLOOR IS UNSTABLE.

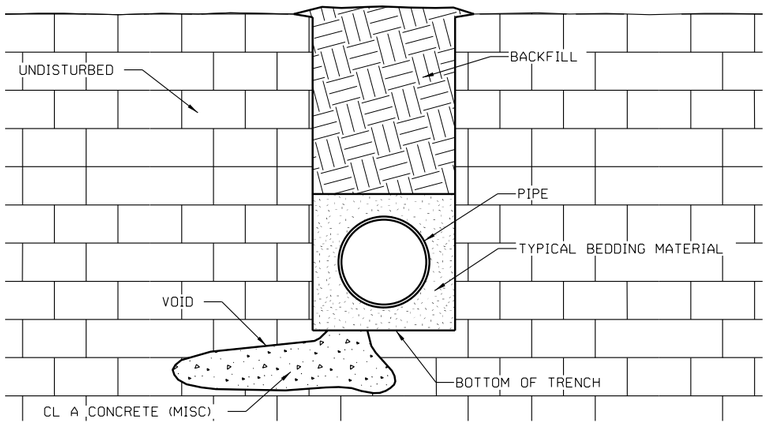


TRENCHING OPERATIONS
LARGE (DRY VOID)
(64 CF < 1,000 CF)

VOID IS ABOVE THE PLANE OF THE TRENCH FLOOR

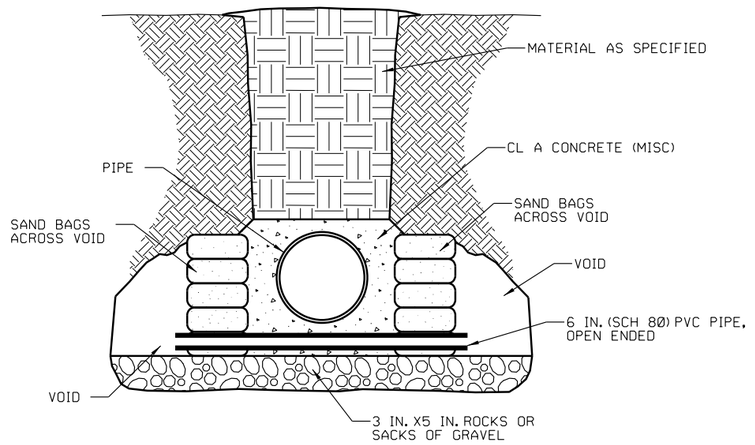
GENERAL NOTE:

1. ALL PIPES SHALL BE ENCASED WITH CLASS A CONCRETE THAT EXTENDS 5' BEYOND THE EDGE OF THE VOIDIN ALL DIRECTIONS. THE CONCRETE SHALL PROVIDE 6 IN. COVER AROUND THE PIPE.



TRENCHING OPERATIONS
SMALL/MEDIUM (DRY VOID)
(<64 CF)

VOID INTERSECTS THE PLANE OF THE TRENCH FLOOR AND IS LESS THAN FOUR (4) FEET IN ANY DIRECTION. ALL ROCK WITHIN AND SURROUNDING THE VOID IS SOUND.



TRENCHING OPERATIONS
LARGE (WET VOID)
(64 CF < 1,000 CF)

VOID INTERSECTS THE PLANE OF THE TRENCH FLOOR AND ANY OPENING IN TRENCH FLOOR IS GREATER THAN FOUR (4) FEET IN ANY DIRECTION, OR THE TRENCH FLOOR IS UNSTABLE.

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VOID MITIGATION DETAILS

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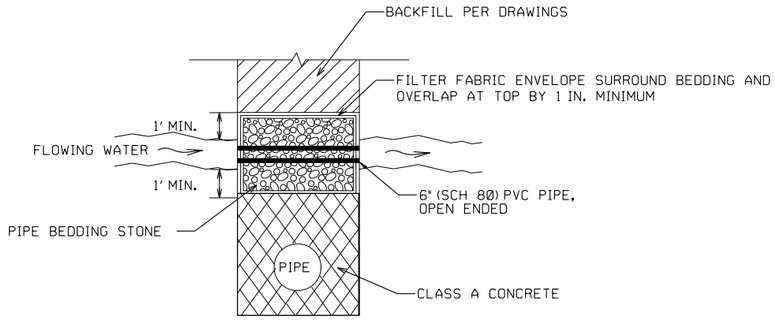

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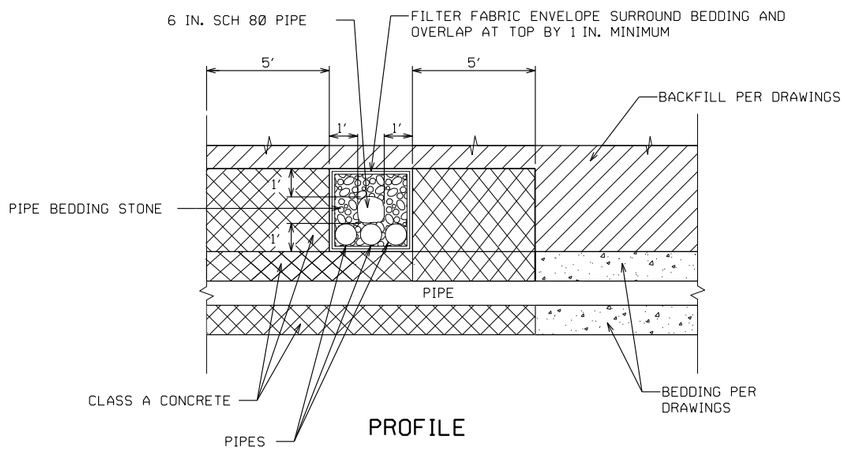

PROFILE

TRENCHING OPERATIONS
GROUNDWATER ABOVE
BEDDING MATERIAL

GENERAL NOTE:

1. ALL PIPES SHALL BE ENCASED WITH CLASS A CONCRETE THAT EXTENDS 5' BEYOND THE EDGE OF THE VOID IN ALL DIRECTIONS. THE CONCRETE SHALL PROVIDE 6 IN. COVER AROUND THE PIPE.

Texas Department of Transportation

Austin District Standard

VOID MITIGATION DETAILS

VMD-18(AUS)

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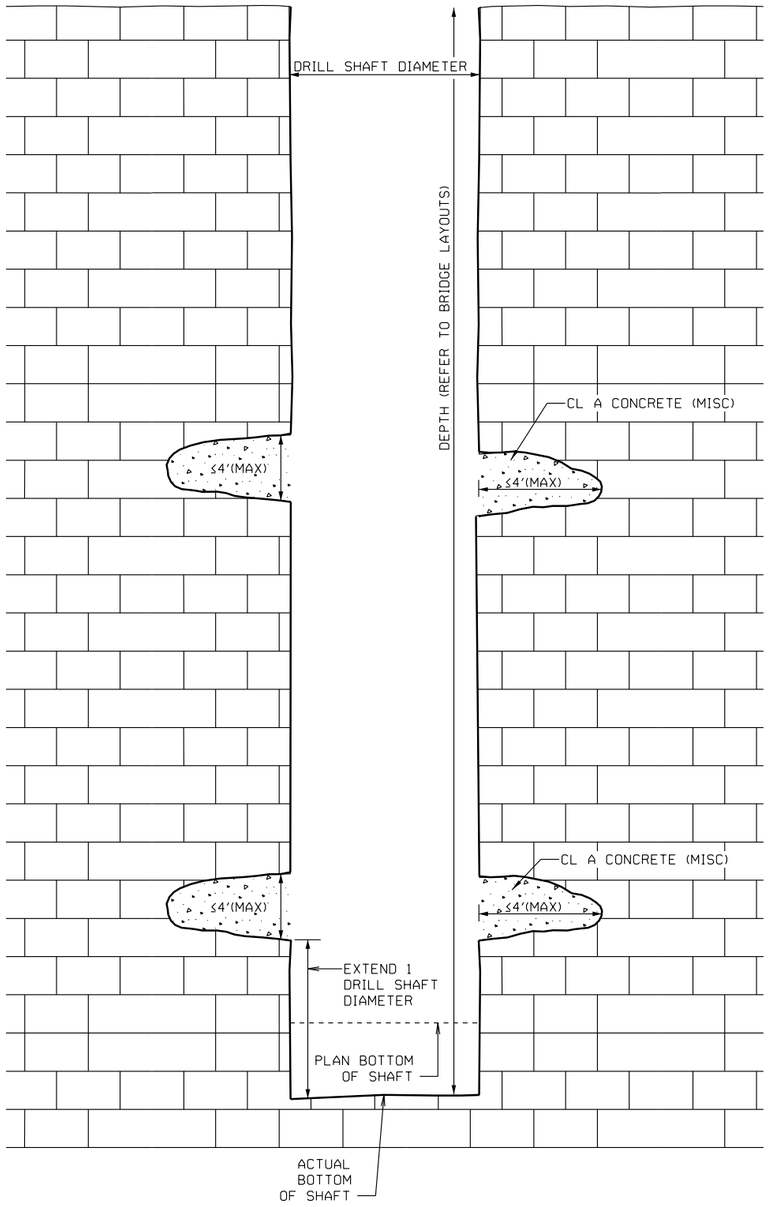
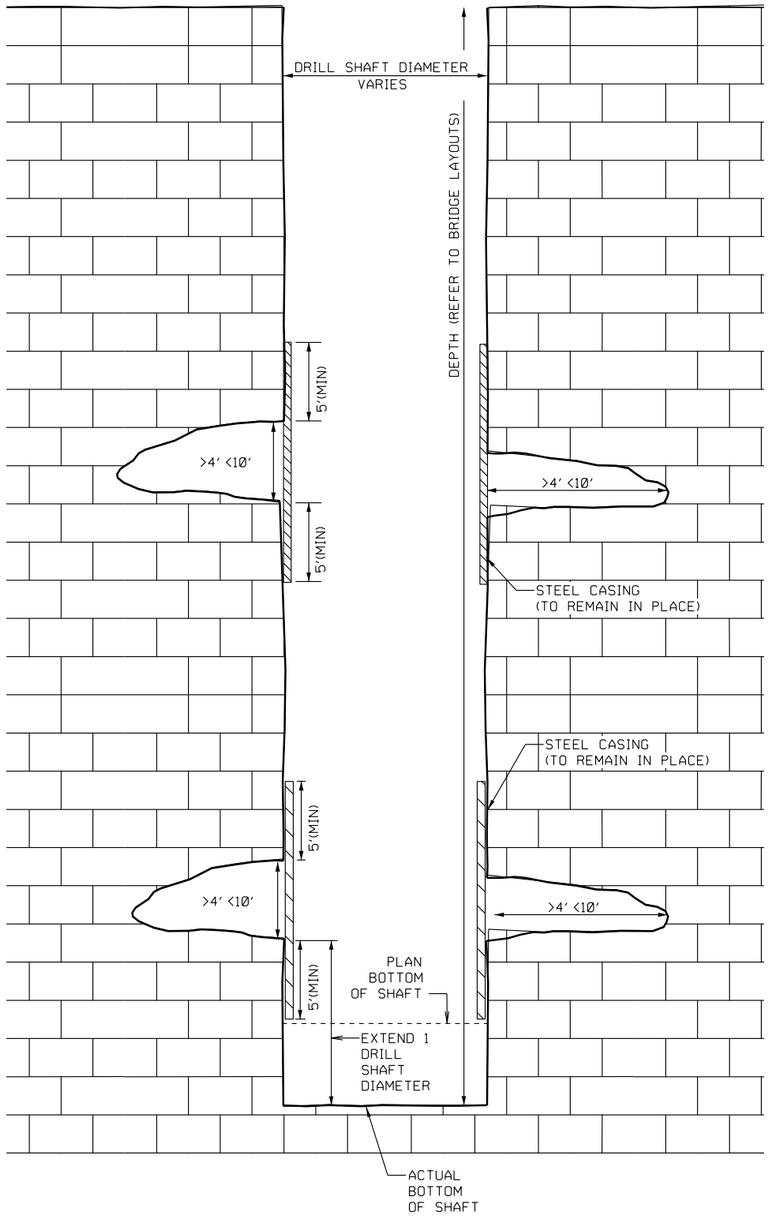


DRILL SHAFT OPERATIONS
SMALL/MEDIUM (DRY VOID)
(≤4' IN ANY DIRECTION)

CONCRETE FOR THE VOID SHALL BE PLACED CONTINUOUSLY WITH THE SHAFT

WHERE VOIDS ARE ENCOUNTERED, DRILL SHAFT LENGTHS MAY NEED TO BE INCREASED. APPROVAL FROM THE ENGINEER OF RECORD IS REQUIRED TO COMPLETE CONSTRUCTION OF THE DRILLED SHAFT.



DRILL SHAFT OPERATIONS
LARGE (DRY VOID)
(>4' <10' IN ANY DIRECTION)

WHERE VOIDS ARE ENCOUNTERED, DRILL SHAFT LENGTHS MAY NEED TO BE INCREASED. APPROVAL FROM THE ENGINEER OF RECORD IS REQUIRED TO COMPLETE CONSTRUCTION OF THE DRILL SHAFT.

NOTES:

1. STEEL CASING WILL BE USED FOR DRILL SHAFT CONSTRUCTION THAT ENCOUNTERS LARGE VOIDS, SO AS TO ALLOW A MINIMUM AMOUNT OF CONCRETE TO ENTER THE VOID.
2. STEEL CASING SHOULD EXTEND A MINIMUM OF FIVE FEET FROM THE EDGE OF THE VOID.
3. AS PART OF THE DRILL SHAFT INSTALLATION PLAN, CONTRACTOR SHALL PROVIDE MEANS AND METHODS FOR ANCHORING THE CASING.
4. REFER TO GENERAL NOTES FOR ADDITIONAL INFORMATION.
5. STEEL CASING MAYBE EXTENDED TO THE TOP OF THE SHAFT. THE ENTIRE LENGTH OF CASING INSTALLED IN A SHAFT WILL BE COMPENSATED IN ACCORDANCE WITH THE VOID MITIGATION NOTES.

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VOID MITIGATION DETAILS

VMD-18(AUS)

SHEET 7 OF 7

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