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| | TEXAS | | 1 |
| DISTRICT | COUNTY | | |
| FTW | TARRANT | | |
| CONTROL | SECTION | JOB | HIGHWAY NO. |
| 0902 | 90 | 119 | McCART |

# STATE OF TEXAS
## DEPARTMENT OF TRANSPORTATION

## PLANS OF PROPOSED
## STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT. STP 2022 (870) HES, ETC

# (CS) McCART AVENUE AT ALTAMESA BOULEVARD
# TARRANT COUNTY

FINAL PLANS

LETTING DATE: _____

DATE CONTRACTOR BEGAN WORK: _____

DATE WORK WAS COMPLETED & ACCEPTED: _____

FINAL CONTRACT COST: $ _____

CONTRACTOR : _____

CSJ: 0902-90-119 - 897.80 FT = 0.170 MI
CSJ: 0902-90-192 - 403.70 FT = 0.076 MI
NET LENGTH OF PROJECT = 1301.50 FT = 0.246 MI

DESIGN CLASSIFICATION: ARTERIAL
DESIGN SPEED: McCART = 35 MPH
ALTAMESA = 40 MPH
TERRAIN: LEVEL

LIMITS: INTERSECTION OF McCART AND ALTAMESA
FOR THE CONSTRUCTION OF SAFETY IMPROVEMENT PROJECT

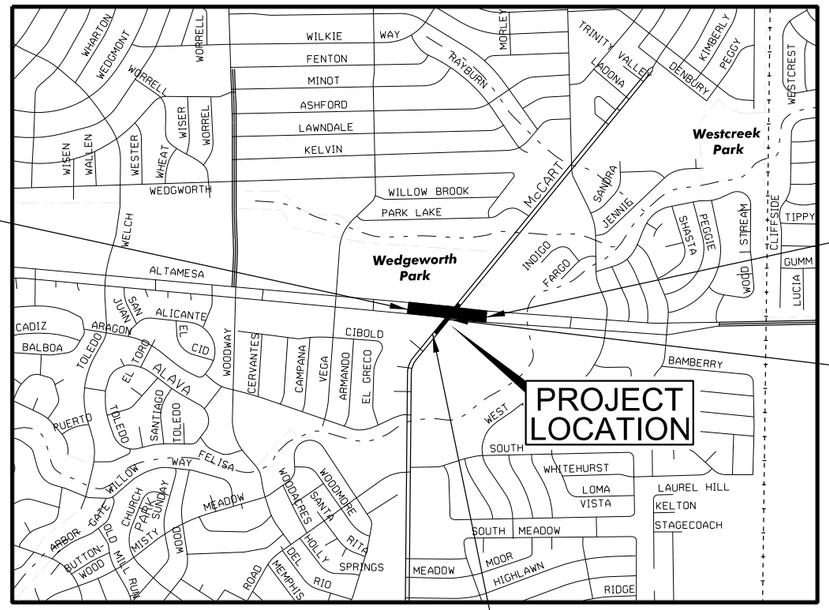
CONSISTING OF INSTALLATION OF A FULL TRAFFIC-ACTUATED TRAFFIC SIGNAL, PAVING, GRADING. SIGNNG AND PAVEMENT MARKINGS

BEGIN CSJ 0902-90-119
@ ALTAMESA STA 11+12.80

END CSJ 0902-90-119
@ ALTAMESA STA 20+10.60

END CSJ 0902-90-192
@ McCART STA 6+00.00

BEGIN CSJ 0902-90-192
@ McCART STA 1+96.30




REGISTERED ACCESSIBILITY SPECIALIST (RAS)
INSPECTION REQUIRED TDLR NO. TABS2021019921

FORT WORTH

STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED
PROFESSIONAL ENGINEER
07/07/2022



CONVENTIONAL SIGNS
STATE OR NATIONAL LINE
CITY OR VILLAGE LINE
COUNTY LINE
BASE OR SURVEY LINE
RIGHT OF WAY LINE
RIGHT OF WAY MARKERS
FENCE LINE
RAILROAD
TRAVELLED WAY
CULVERT OR BRIDGE
POWER LINE
TELEGRAPH OR TELEPHONE

MULTATECH ENGINEERING, INC.
2821 WEST 7TH ST. SUITE 400
FORT WORTH, TEXAS 76107
PH.: 817-877-5571
FAX: 817-877-4245
TBPE Reg #F351

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, MAY 2012)

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE



CONCURRENCE:
William Johnson (Jul 8, 2022 09:34 CDT) — Jul 8, 2022
DIRECTOR OF TRANSPORTATION & PUBLIC WORKS
CITY OF FORT WORTH

SUBMITTED FOR LETTING:
DocuSigned by: — 7/7/2022
AREA ENGINEER
2F552E37025E4A8...

RECOMMENDED FOR LETTING:
DocuSigned by: — 7/8/2022
DISTRICT DIRECTOR OF TRANSPORTATION
[illegible]

APPROVED FOR LETTING:
DocuSigned by: — 7/8/2022
Carl L. Johnson, PE
DISTRICT ENGINEER
2FE36139F0614C3...

FILE: K:\2017\17004.01\CFW_McCart_Altamesa_CFW\06_CAD\CIVIL\SHEETS\001_TITLE SHEET.dgn
DATE: 7/7/2022 3:28:08 PM

SHEET 9 IS OMITTED

## GENERAL

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| 2 | SHEET INDEX & LEGEND |
| 3 | PROJECT LAYOUT |
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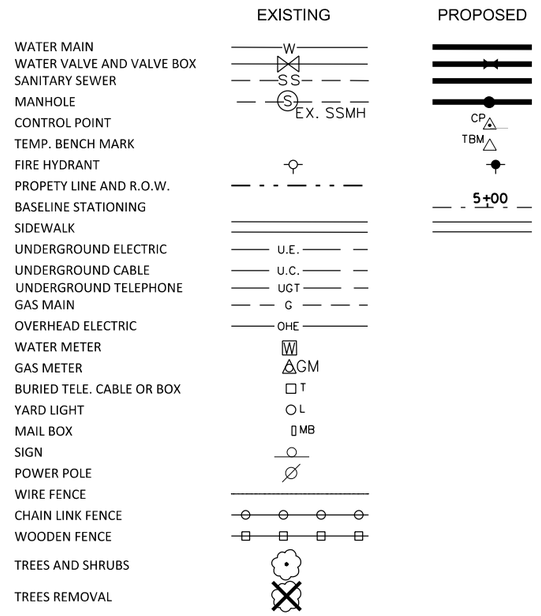
## LEGEND




ROW and Medians

1. Contractor will use clean top soil with no rocks to back fill before laying of sod or hydro seeding.
2. Rocks, larger than 1" shall be removed in areas to be grasses, if existing topsoil shall be used.
3. All dirt mounds shall be removed from ROWs, Corner Clips, and Traffic Dividers prior to seeding after construction is completed.
4. Any ROWs, Corner Clips, and Traffic Dividers that were disturbed during construction will be put back in their original state or better.
5. In the event, grass has been disturbed in the ROWs, Corner Clips, or Traffic Dividers contractor will restore grass. Grass will be established at 100% by the contractor.
6. ROWs, Corner Clips, and Traffic Dividers will be maintained and mowed by the contractor for high grass and weeds every 14 days.

(The department of park and recreation shall have jurisdiction, authority, control and supervision over all trees, plants and shrubs planted or growing in or upon the public highways and public places in the city, and the planting, removal, care, maintenance and protection thereof.)
(Code 1964, 36-1) (Ord. 11541, 1(c), passed 4-12-1994)


* THE STANDARD SHEETS SPECIFICALLY IDENTIFIED IN THIS INDEX OF SHEETS, HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BENG APPLICABLE TO THIS PROJECT.

E A Canales, P.E. , P.E. 07/07/2022

ERIC A. CANALES, PE — DATE

** THE STANDARD SHEETS SPECIFICALLY IDENTIFIED IN THIS INDEX OF SHEETS, HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BENG APPLICABLE TO THIS PROJECT.

Zegeye Kebede , P.E. 07/07/2022

ZEGEYE Z. KEBEDE, PE, PTOE — DATE



MULTATECH ARCHITECTS ENGINEERS
2821 WEST 7TH ST
SUITE 400
FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351

Texas Department of Transportation

# SHEET INDEX & LEGEND

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|---|---|---|---|---|
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| REVISIONS | STATE | DISTRICT | COUNTY | 2 |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |

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horizontal Alignment Name: ALTAMESA

| | STATION | NORTHING | EASTING |
|---|---|---|---|
| Element: Linear | | | |
| POB ( ) | 0+00.00 | 6921369.05 | 2315516.37 |
| PI ( ) | 15+63.62 | 6921213.86 | 2317072.28 |
| Tangent Direction: | S 84^18'14" E | | |
| Tangent Length: | 1563.62 | | |
| Element: Linear | | | |
| PI ( ) | 15+63.62 | 6921213.86 | 2317072.28 |
| POE ( ) | 29+94.20 | 6921071.87 | 2318495.79 |
| Tangent Direction: | S 84^18'14" E | | |
| Tangent Length: | 1430.58 | | |

Horizontal Alignment Name: MCCART

| | STATION | NORTHING | EASTING |
|---|---|---|---|
| Element: Linear | | | |
| POB ( ) | 0+00.00 | 6920668.09 | 2316621.84 |
| PI ( ) | 7+07.64 | 6921213.86 | 2317072.28 |
| Tangent Direction: | N 39^32'02" E | | |
| Tangent Length: | 707.64 | | |
| Element: Linear | | | |
| PI ( ) | 7+07.64 | 6921213.86 | 2317072.28 |
| POE ( ) | 19+58.10 | 6922175.85 | 2317871.16 |
| Tangent Direction: | N 39^42'29" E | | |
| Tangent Length: | 1250.46 | | |

PROJECT BENCHMARKS

CFW MON 8309
N 6919862.06
E 2318060.05
EL = 743.06

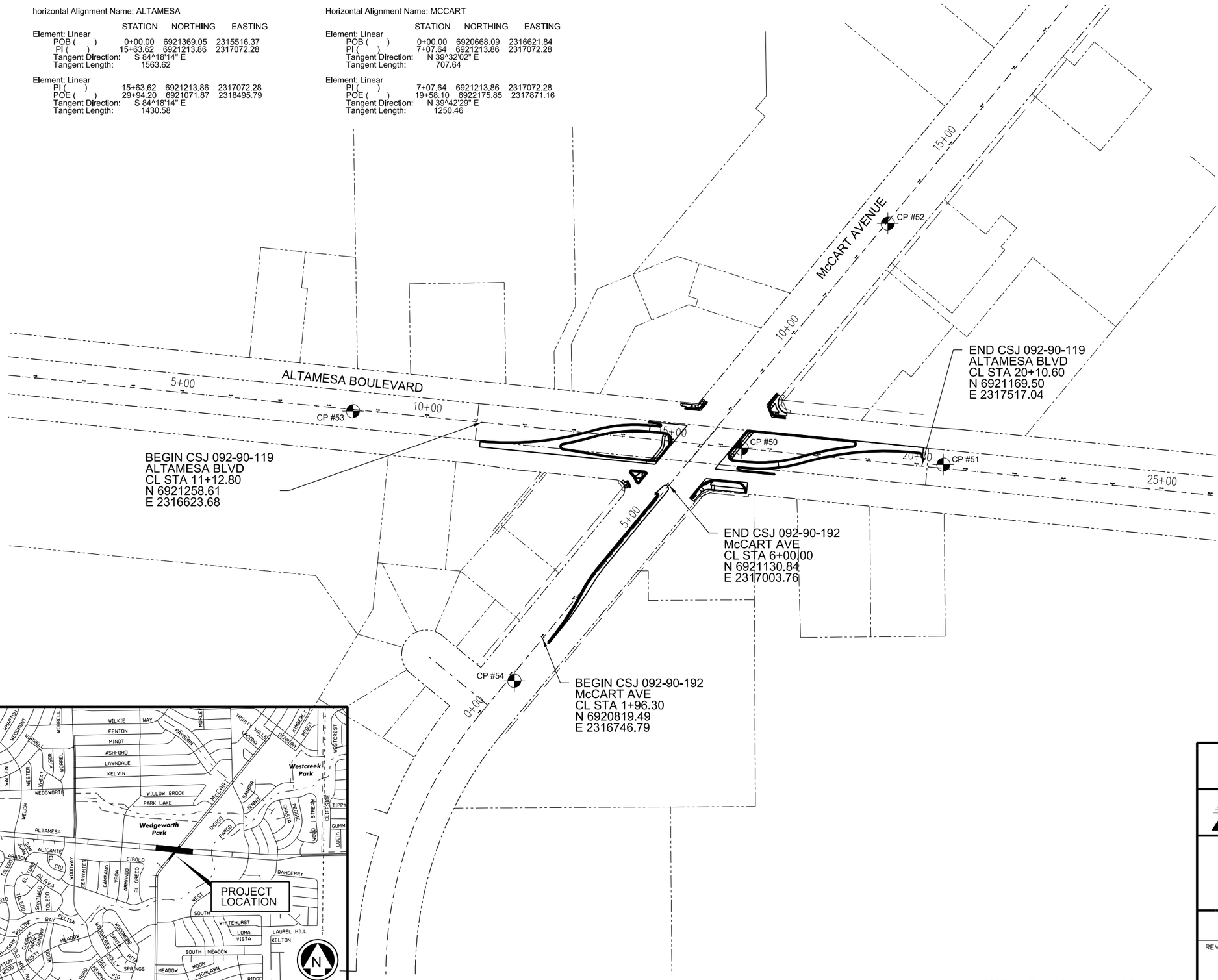
CP #50
CAPPED IRON ROD SET
N 6921186.877
E 2317156.838
EL = 749.04

CP #51
CAPPED IRON ROD SET
N 6921134.478
E 2317579.184
EL = 738.81

CP #52
CAPPED IRON ROD SET
N 6921682.871
E 2317470.295
EL = 745.02

CP #53
CAPPED IRON ROD SET
N 6921270.052
E 2316408.297
EL = 769.59

CP #54
CAPPED IRON ROD
N 6920747.072
E 2316690.133
758.90




0 100 200 300

GRAPHIC SCALE IN FEET




STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED PROFESSIONAL ENGINEER
07/07/2022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# PROJECT LAYOUT

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | |
| REVISIONS | STATE | DISTRICT | COUNTY | 3 |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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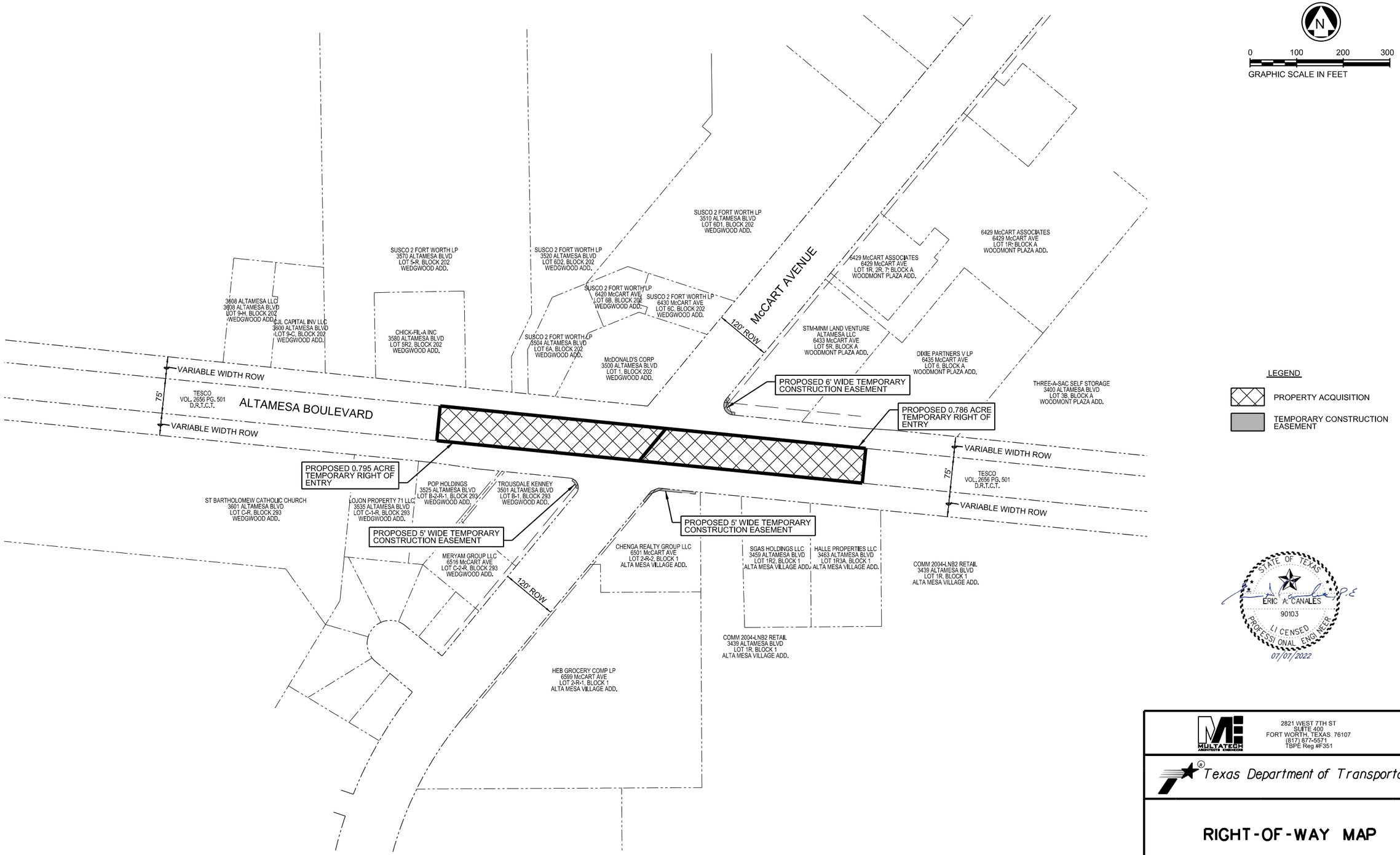


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# RIGHT-OF-WAY MAP

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | |
| REVISIONS | STATE | DISTRICT | COUNTY | 4 |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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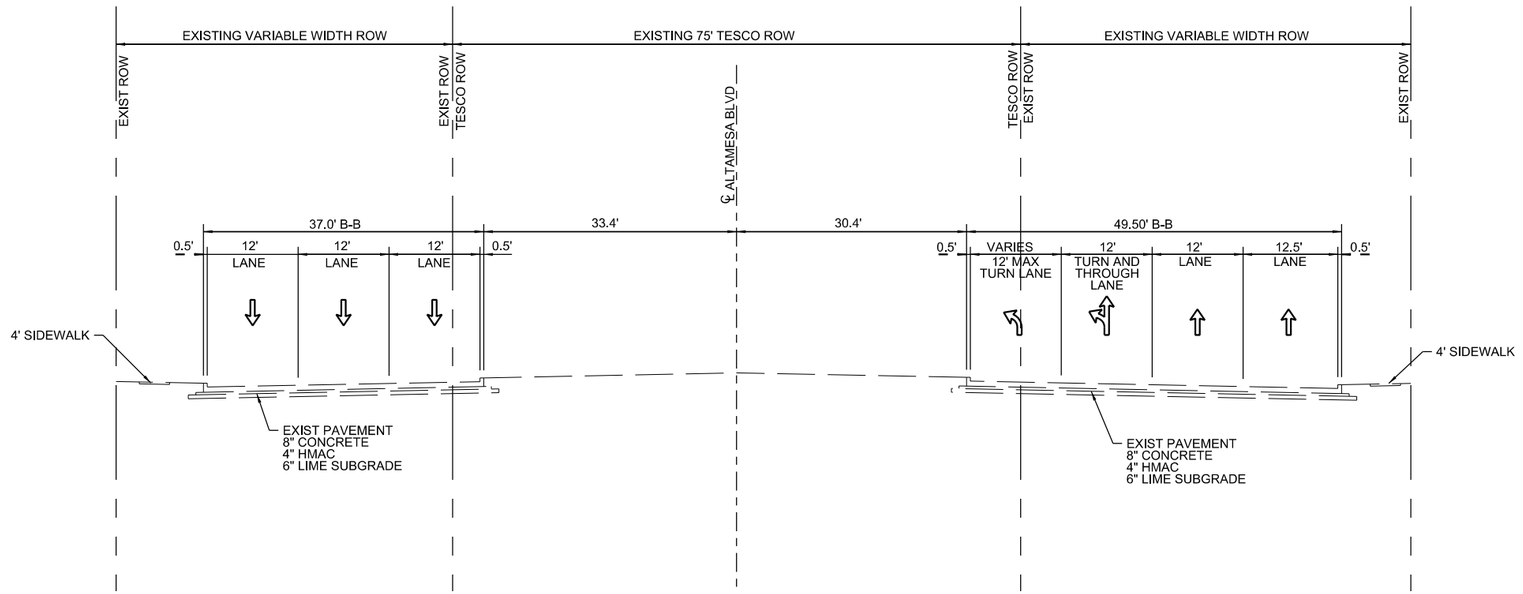
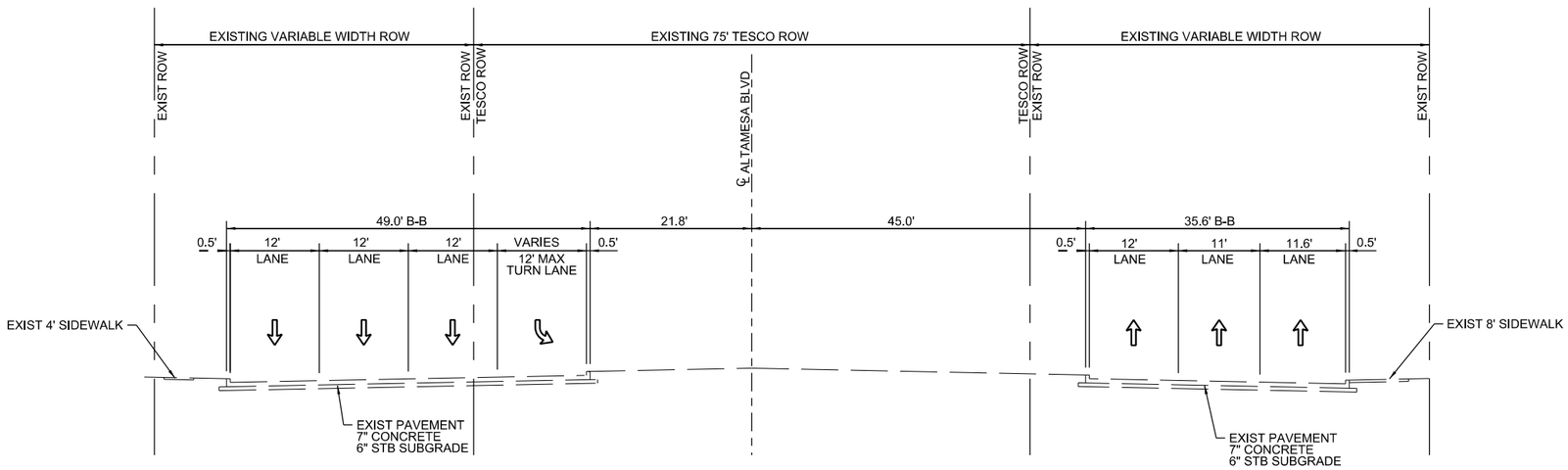



ALTAMESA BOULEVARD

STA 11+12.80 TO STA 14+49.09

NOTES:
1. TYPICAL SECTION STATIONS ARE FROM CENTERLINE ALTAMESA BLVD UNLESS OTHERWISE NOTED.




ALTAMESA BOULEVARD

STA 16+94.09 TO STA 20+10.60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# EXISTING TYPICAL SECTION ALTAMESA BLVD

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | |
| REVISIONS | STATE | DISTRICT | COUNTY | 5 |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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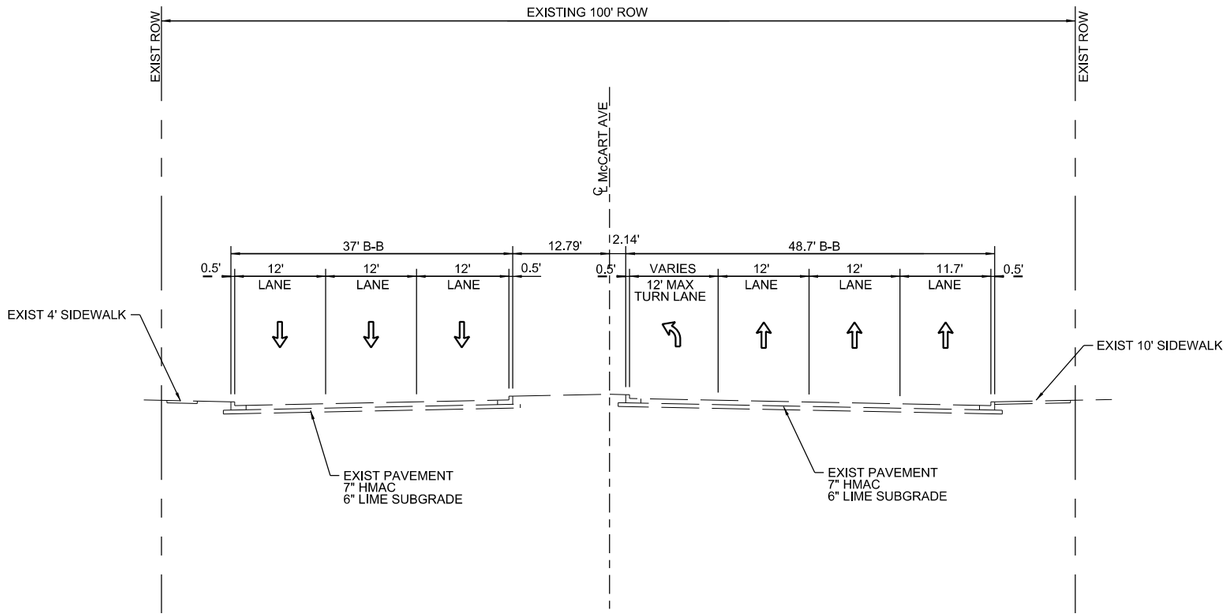


## McCART AVENUE

STA 1+96.30 TO STA 6+00.00

NOTES:
1. TYPICAL SECTION STATIONS ARE FROM CENTERLINE McCART AVE UNLESS OTHERWISE NOTED.

STATE OF TEXAS
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# EXISTING TYPICAL SECTION McCART AVE

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 6 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
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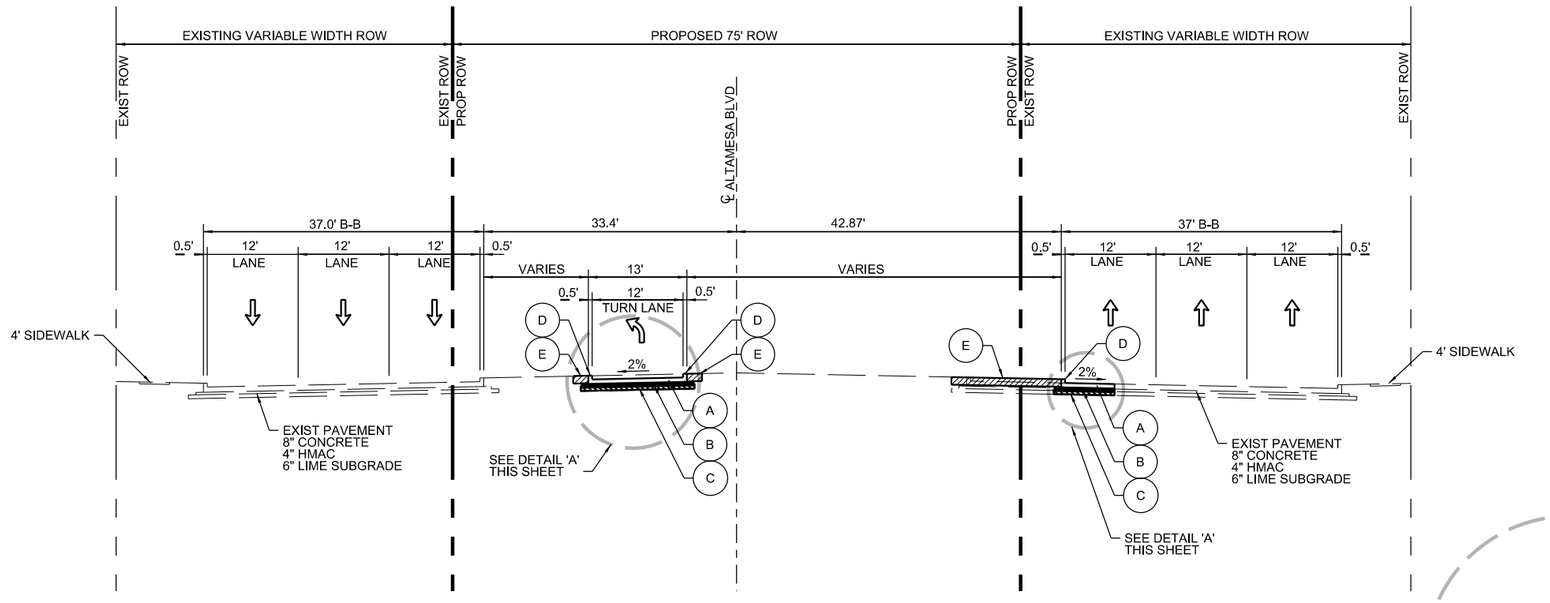



ALTAMESA BOULEVARD

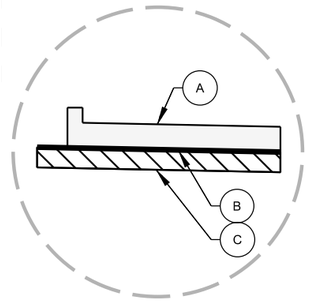
STA 11+12.80 TO STA 14+49.09

## LEGEND

| | |
|---|---|
| A | CONC PVMT (JOINTED-CPCD) (9") |
| B | PRIME COAT (310-6001, MULTI OPTION) |
| C | LIME STABILIZED SUBGRADE (8") 38 LBS/SY |
| D | CONC CURB (TY II) (6") (MONOLITHIC) |
| E | BLOCK SODDING |

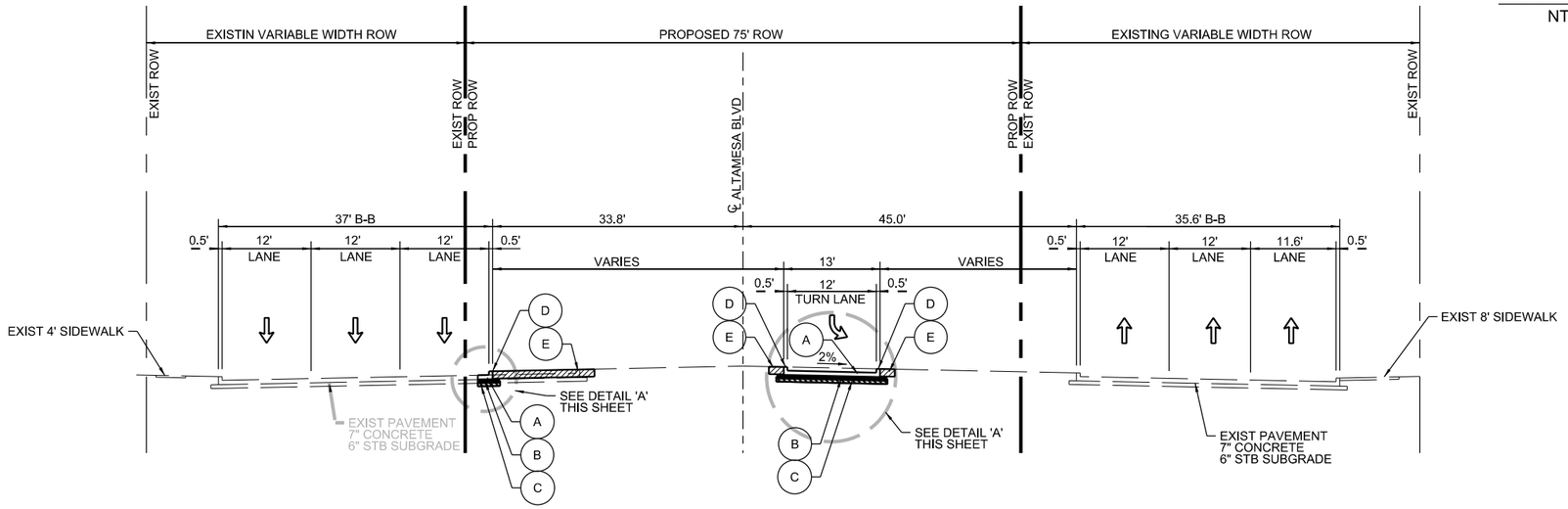
NOTE:
CONCRETE PAVEMENT IS TO HAVE 3600psi 28-DAY MIN. COMPRESSIVE STRENGTH WITH NO. 4 BARS SPACED ON 18-INCH INTERVALS IN BOTH DIRECTIONS.

NOTES:
1. TYPICAL SECTION STATIONS ARE FROM CENTERLINE ALTAMESA BLVD UNLESS OTHERWISE NOTED.




DETAIL 'A'

NTS




ALTAMESA BOULEVARD

STA 16+94.09 TO STA 20+10.60

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07/07/2022


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Texas Department of Transportation

# PROPOSED TYPICAL SECTIONS ALTAMESA BLVD

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | |
| REVISIONS | STATE | DISTRICT | COUNTY | 7 |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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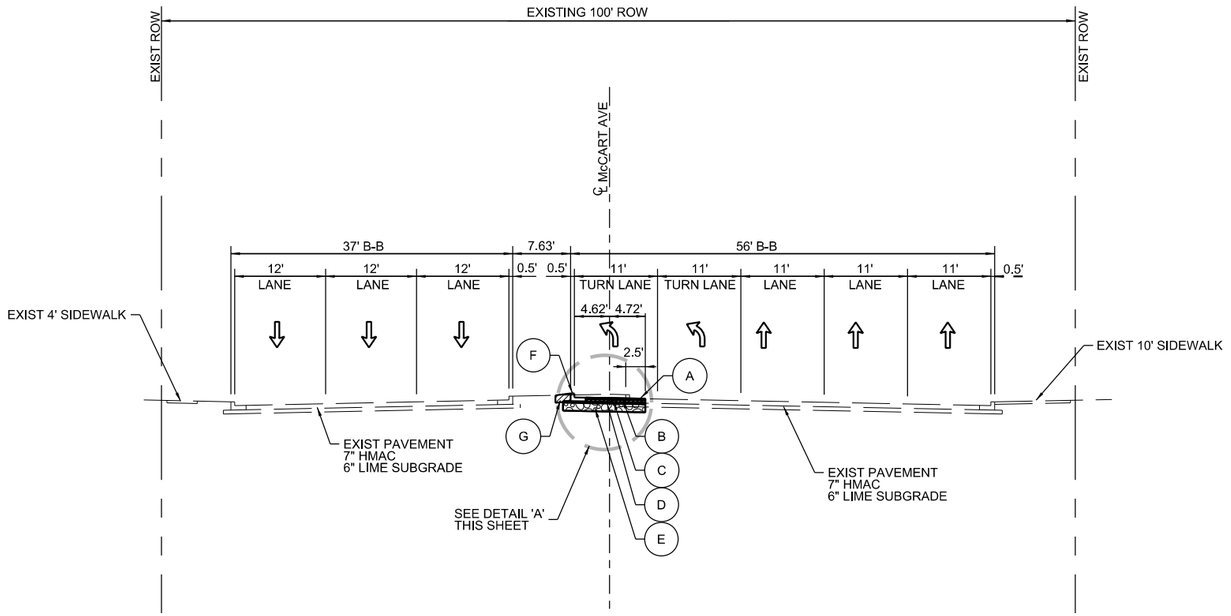
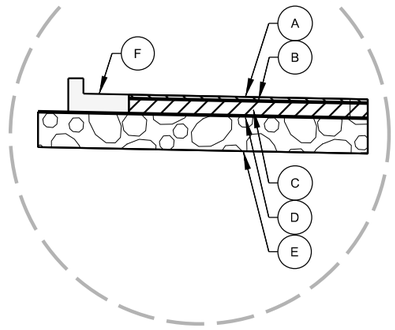



McCART AVENUE
STA 1+96.30 TO STA 6+00.00

## LEGEND

- (A) HMA 2" Ty-C PG70-28
- (B) TACK COAT
- (C) HMA 5" Ty-B PG64-22
- (D) PRIME COAT
- (E) FLEXBASE (14")
- (F) CONC CURB & GUTTER (TY IIA) (6")
- (G) BLOCK SODDING

NOTES:
1. TYPICAL SECTION STATIONS ARE FROM CENTERLINE McCART AVE UNLESS OTHERWISE NOTED.




DETAIL 'A'
NTS

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Texas Department of Transportation

# PROPOSED TYPICAL SECTION McCART AVE

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 8 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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**Project Number:** STP 2022(870)HES,ETC

**County:** TARRANT **Control:** 0902-90-119, ETC.

**Highway:** CS

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

Area Engineer's Email: David.Neelev@txdot.gov
Assistant Area Engineer's Email: Russell.poer@txdot.gov
Design Manager's Email: Sohrab.Islam@txdot.gov

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

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

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

**Special Notes:**

The TxDOT Signal Shop can be reached at 817-370-3661. Contact the Signal Shop in advance for notification of pre-construction meetings, delivery of equipment, request for electrical inspection, placing signals into flash or turn on, or set up of signal detection.

Provide a qualified technician, approved by the Engineer, on the project site to place the traffic signals in flash or in full operation. A qualified TxDOT signal technician must also be present.

Electronic submittal of shop drawings, working drawings, equipment manuals and product brochures is permitted for this project.

The contractor is responsible for notifying TxDOT project manager for picking up and dropping off materials furnished by the State. Contact the TxDOT Signal Shop 48 hours in advance of picking up to make arrangements.

No work will be permitted to commence on the road before sunrise or after sunset. Single lane closures, except as otherwise shown in the plans, will be restricted to off-peak hours as defined in the following table:

| Peak Hours | | Off-Peak Hours | |
|---|---|---|---|
| 6 to 9 AM Monday through Friday | 4 to 7 PM Monday through Friday | 9 AM to 4 PM and | All day Saturday and Sunday |



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Existing storm sewers and utilities are shown from the best available information. Verify the location of all underground facilities prior to starting work

For dimensions of right of way not shown on the plans, see right of way map on file at the TxDOT District Office.

Take care that existing curb and curb and gutter is not discolored or damaged during construction operations. In the event of discoloration or damage, clean or repair as directed.

Remove any obstructions to existing drainage due to the contractor's operations, as required, at the Contractor's expense.

**Item 4. Scope of Work**

Reimbursement for project overhead will not be considered until project completion has extended beyond the original Contract Time.

**Item 5. Control of Work**

The locations of all signal related items, pavement markings, signing, etc. are diagrammatic only and may be adjusted to accommodate field conditions or as directed by Engineer or Engineers designee.

**Item 7. Legal Relations and Responsibilities**

The following Holiday/Event lane closure restriction requirements apply to this project:
No work that restricts or interferes with traffic shall be allowed between 3 PM on the day preceding a Holiday or Event and 9 AM on the day after the Holiday or Event.

| **Holiday Lane Closure Restrictions** | |
|---|---|
| **New Year's Eve and New Year's Day** (December 31 through January 1) | 3 PM December 30 through 9 AM January 2 |
| **Easter Holiday Weekend** (Friday through Sunday) | 3PM Thursday through 9 AM Monday |
| **Memorial Day Weekend** (Friday through Monday) | 3 PM Thursday through 9 AM Tuesday |
| **Independence Day** (July 3 through July 5) | 3 PM July 2 through 9 AM July 6 |
| **Labor Day Weekend** (Friday through Monday) | 3 PM Thursday through 9 AM Tuesday |
| **Thanksgiving Holiday** (Wednesday through Sunday) | 3 PM Tuesday through 9 AM Monday |

| | |
|---|---|
| **Christmas Holiday** (December 23 through December 26) | 3 PM December 22 through 9 AM December 27 |

Plan work schedules around the appropriate dates above to ensure productive work is performed without lane closures.

**Item 8. Prosecution and Progress.**

Working days will be computed and charged in accordance with Section 8.3.1.1, 'Five-Day Workweek.'

Prepare the progress schedule as a bar chart, include all planned work activities and sequences, and show Contract completion within the number of working days specified. Submit an updated hard coy when changes to the schedule occur or when requested.

**Item 162. Sodding for Erosion Control.**

Furnish and place "Stenotaphrum secundatum" (St. Augustine) grass sod.

**Item 247. Flexible Base.**

Place material in two or more equal lifts unless otherwise directed.

Do not add field sand to modify the final material to meet the requirements.

Build and maintain a 5,000 cu. yd. stockpile of approved material before and during hauling operations.

(TY E, GR 4) Furnish aggregate conforming to the following requirements:

Gradation:

| Retained on Sieve Size | Percent (%) by Weight |
|---|---|
| 1-3/4 in. | 0–5 |
| No. 4 | 30–75 |
| No. 40 | 65–85 |

| | |
|---|---|
| Plasticity Index (PI) | 15 max. |
| Liquid Limit | 45 max. |



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| | |
|---|---|
| Wet Ball Mill | 50 max. |
| Wet Ball Mill, % (Increase Passing the No. 40) | 20 max. |

Place material in two or more equal lifts unless otherwise directed.

Do not add field sand to modify the final material to meet the requirements.

Cement treat in accordance with Item 275

**Item 310. Prime Coat.**

Provide an MC-30, EC-30, or CBSMS-1S for this Item. MC-30 is restricted to usage from September 16 through April 15.

**Item 360. Concrete Pavement.**

When using the Hardy Chair-Lok to support reinforcing steel, chair spacing may be increased to 1.67 sq. yd. per chair, placed in a diamond or square pattern. Do not exceed 60" longitudinal spacing.

The provisions of Article 360.6.2, "Deficient Thickness Adjustment," will not be a requirement and the pavement will not be cored.

Include the approved mix design number on each delivery ticket.

**Item 400. Excavation and Backfill for Structures**

Drilling, boring, and trenching through rock is subsidiary to the various bid items. No additional compensation will be paid to the contractor for the removal of rock or any other obstruction during excavation, trenching, jacking, boring, or drilling and for any additional equipment, materials, labor, tools, or incidentals required to complete the work.

**Item 416. Drilled Shaft Foundations**

Contractor shall stake foundation as shown on plans. Engineer or Engineers designee will verify and approve staked locations before installing foundations. Calculate signal head clearance and report to the Engineer or Engineers designee.

Obtain Engineer's approval of location before installing foundation.

**Item 421. Hydraulic Cement Concrete**

Notify the TxDOT Signal Shop 48 hours in advance of placing concrete. Do not place concrete without an inspector present unless approved.
Contractor personnel performing job-control (QC) testing on concrete must be ACI certified and maintain certification. Provide a copy of all personnel certification papers to the Engineer at the preconstruction meeting. The Engineer may require the Contractor's testers to provide the certification papers upon arrival and before testing at the job site. Certified testers will be required to participate with certified TxDOT personnel annually for slump (Tex-415-A), air content (Tex-416-A), compression testing (Tex-418-A), and capping cylinders (Tex-450-A) to retain their certification on TxDOT projects.

Contractor shall furnish a hard copy of all testing equipment calibration reports at the preconstruction meeting when non-TxDOT equipment is used to test concrete. Furnish updated reports as equipment is calibrated through the project contract. The calibration frequency will match TxDOT's and will apply for each piece of equipment as follows:

Slump Cone - Annual
Air Meter - Every 3 months
Compression Tester - Annual
Beam breaker - Annual

The Engineer may allow the use of local commercial laboratories under contract to provide these services. The Commercial Laboratory must fulfill requirements listed above prior to performing any work.

**Item 465. Junction Boxes, Manholes, and Inlets**

Concrete Class B invert shaping is required at all inlets, manholes and junction boxes in order to insure positive flow. The material and work performed for the placement of the inverts shall be considered subsidiary to this item.

**Item 502. Barricades, Signs, and Traffic Handling**

The contractor force account 'safety contingency' that has been established for this project is intended to be utilized for work zone enhancements to improve the effectiveness of the traffic control plan that could typically not be foreseen in the project's 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.

Permanent signs may be installed when construction in an area is complete and they will not conflict with the traffic control plan for the remainder of the job.



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Existing signs are to remain as long as they do not interfere with construction and they do not conflict with the traffic control plan.

Any sign not detailed in the summary of small signs but called for in the plan sheets will be as shown in the current "Standard Highway Sign Designs for Texas".

When traffic is obstructed, arrange warning devices in accordance with the latest edition of the "Texas Manual on Uniform Traffic Control Devices".

Cover or remove any work zone signs when work or condition referenced is not occurring.

Do not place barricades, signs, or any other traffic control devices where they interfere with sight distance at driveways or side streets. Provide access to all driveways during all phases of construction unless otherwise noted in the plans or as directed.

**Item 506. Temporary Erosion, Sedimentation, and Environmental Controls**

An Inspector will perform a regularly scheduled SWP3 inspection every 7 calendar days.

Failure to address items noted on the SW3P inspection report within two report cycles may result in the Department stopping all construction operations, exclusive of time charges, or withholding that month's estimate until the SW3P deficiencies are corrected unless the Engineer determines that the area is too wet to correct SW3P deficiencies.

Failure to correctly maintain daily monitoring reports and submitting to TxDOT on a daily/weekly basis may result in the monthly estimate being withheld.

**Item 529. Concrete Curb, Gutter, and Combined Curb and Gutter**

Class "C" concrete is required for machine extruded curb.

Curb inlets and extensions are based on an exposed curb height of 7 inches. The roadway curb height and shape will be transitioned to the inlet's curb with a 40: 1 taper.

**Item 531. Sidewalks**

The curb ramp locations shown in the plans have taken into account the geometric features of the intersection, traffic signals, and the pavement markings. If anything changes during construction, the location of curb ramps must be adjusted to ensure they meet TAS requirements.

**Item 610. Roadway Illumination Assemblies**

Fabricate steel roadway illumination poles in accordance with the RIP standards. Poles fabricated according to RIP require no shop drawings. Alternate designs or the use of aluminum to fabricate poles will require the submission of shop drawings electronically.

For instructions on submitting shop drawings electronically go to: http://www.txdot.gov/business/resources/specifications/shop-drawings.html File is titled: Guide to Electronic Shop Drawing Submittal.

Provide lamps from the pre-qualified Materials Producers List, Category is "Roadway Illumination and Electrical Supplies" located on the Construction Divisions (CST) web site.

Ballast/capacitors removed from the light assembly, will remain the property of the State. Assume all ballast/capacitors contain Polychlorinated Biphenyl (PCB), unless a notation appears on the outside of the unit that specifies it does not contain PCB's. All ballast/capacitors with PCB's shall be placed in 55 gallon open top drum in accordance with Department of Transportation (DOT) specifications. Place six (6) inches of sawdust or other absorbent material in the bottom of the drum. Furnish and place a DOT approved PCB warning label on the outside of the drum. Do not fill a drum more than ¾ of capacity. Avoid rupturing the ballast/capacitor(s). If a ballast/capacitor is ruptured, use proper procedures, specialist trained staff and personal protective equipment for the clean-up operations.

The lamps in light fixtures may contain hazardous levels of mercury, halide, and sodium vapors. Observe and comply with all federal, state and local laws, ordinances and regulations regarding the management of these lamps. Prevent the breakage of the lamps. At a minimum, package all lamps removed from the light fixture(s) in a container that minimizes the breakage of the lamps. Broken lamps shall be collected in a sealed plastic bag (i.e. Ziploc). Broken lamps shall be stored in separate containers from unbroken lamps. Furnish a suitable container and attach a label stating "Universal Waste Lamps" on the container. Write the date the first lamp was placed in the container on the "Universal Waste Lamp" label. Within one (1) week after the first lamp is placed in a container, notify the Engineer. The lamps and PCB containing ballast/capacitors, placed in properly labeled containers, will remain the property of the State. Place the container in an area where it is protected from damage and the elements. The Engineer will make arrangements to collect, transport, and dispose/recycle the container. The ballast/capacitor and lamp's removal and storage is subsidiary to this item.

Stencil each illumination assembly with the circuit, light and relay numbers in black paint on the roadway side of the pole at a 45 degree angle. The numbers shall be in 3" tall and begin 6' from the top of the foundation. This work will be considered subsidiary to this item.

Provide and install steel, locking, theft-deterrent doors on transformer bases to protect against copper theft. Return standard t-base doors to TxDOT.



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**Item 618. Conduit**

After installing conduit and pulling conductor, leave a high tensile strength polyester fiber pull tape in the conduit for future use.

**Item 620. Electrical Conductors**

Clearly and permanently mark each conductor installed in a signal pole where it can be clearly seen from the hand hole. Use plastic zip ties with labeling plate to mark conductor with appropriate designation.

**Item 624. Ground Boxes**

Slack conductors required by Standard Sheet ED(3)-14 will be subsidiary to Item 624.

Concrete removal required for installation of ground boxes will be subsidiary to Item 624.

Ground all junction boxes mounted on bridges and underpasses with a ground rod in the nearest ground box.

**Item 628. Electrical Services**

Before installing any electrical service, consult with the appropriate utility company before beginning work and verify all metering equipment requirements with the provider have been met. Provide a commercial grade, meter base with by-pass switch if required by the utility company.

Contractor shall obtain 911 address and EISD from electric utility company then contact the TXDOT Signal Shop to receive the Contract Request for Electrical Service Meter form to complete and return. TXDOT will make application to the Electric Utility Company for service, unless otherwise maintained by the following Cities: Arlington, Bedford, Colleyville, Euless, Fort Worth, Grand Prairie, Grapevine, Hurst, Mansfield, North Richland Hills, and Weatherford.

**Item 644. Small Roadside Sign Assemblies**

The wedge anchor system shown on State Standard Sheet SMD (TWT) is not allowed.

The set screw type for Triangular Slipbase Systems is not allowed. Use the following products for the Triangular Slipbase System.

Triangular Slip Base Systems
(For use with 10 BWG and Schedule 80 Round Posts)

| | | |
|---|---|---|
| Southern Plains Fabrication | SPF Triangular Slipbase Housing | Info@SouthernPlainsFabrication.com<br>http://SouthernPlainsFabrication.com<br>(806) 241-0060 |
| Structural and Steel Products | Triangular Slipbase Breakaway Support | CustServ@s-steel.com<br>http://s-steelcom<br>(800) 782-5804 |

**Item 656. Foundations for Traffic Control Devices**

Contractor shall stake foundation as shown on plans. Engineer or Engineers designee will verify and approve staked locations before installing foundations.

For traffic signal controller foundation, use reinforcing bars or deformed Welded Wire Reinforcing (WWR). Provide #3 reinforcing bars spaced at 16" Spaced Center-Center. Provide deformed Welded Wire Reinforcing (WWR) as 6x6-D3xD3. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars.

**Item 666. Reflectorized Pavement Markings with Retroreflective Requirements**

Notify Engineer 48 hours prior to installation of pavement markings.

All testing is waived from Type I Pavement Markings for locations with less than 1000 LF per bid item.

**Item 672. Raised Pavement Markers**

Place all adhesive material directly from the heated dispenser to the pavement. Do not use portable or non-heated containers. Use adhesive of sufficient thickness so that when the marker is pressed into the adhesive, 1/8" or more adhesive will remain under 100% of the marker. The adhesive should extend not less than 1/2" but not more than 1 1/2" beyond the perimeter of the marker.

**Item 677. Eliminating Existing Pavement Markings and Markers**

Obtain approval before using the mechanical method for the elimination of existing thermoplastic pavement markings.

**Item 680. Installation of Highway Traffic Signals**

Contractor shall contact Fort Worth District TMC 817-370-3661 prior to starting any signal modifications. Provide qualified personnel reachable by telephone and available to receive calls



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on a 24-hour basis. Respond to reported calls and make field assessment within 2 hours and make appropriate repairs within 24 hours.

Furnish and install all required materials, incidentals and equipment necessary for a fully operational traffic signal. The proposed equipment shall be compatible with the existing systems in the area.

Provide all illumination fixtures to be installed in this contract. Use 250W equivalent LED luminaires.

Where work requires the removal of power from the controller and cabinet assembly, erect temporary stop signs. Remove the stop signs after the traffic signals are in operation.

Deliver the cabinet, controller, accessories, and three complete sets of signal construction plans to the operating agency Signal Shop for testing. Notify the Signal Shop two working days prior to delivery of the cabinet.

Wire the signal installation to operate in accordance with phase diagrams in these plans. Timing and phasing will be maintained by the operating agency. Deliver a copy of all revisions to the original timing and phasing plans to the operating agency and TxDOT Signal Shop. One copy is to stay in the controller cabinet at the completion of the project and two supplied to the operating agency Signal Shop.

**Project Inspection**. Contact the TxDOT Signal Shop in advance of needed inspections. At the time of the final electrical inspection, the Inspector will create a discrepancy list to be corrected and repaired before signal is put into flash mode.

**Signal Flash**. Upon the satisfactory completion of repairs or corrections, contact the TxDOT Signal Shop at least one week prior to placing in flash. Schedule signal flash for Monday thru Thursday between 9:00 AM – 12:00 PM. Operate the signal in flash mode for 2-3 days prior to turning on to full actuation. The TxDOT signal inspector and technician must be present when the signals are placed in flash.

**Signal Turn-On**. Upon completion of the signal flash, schedule the date and time for the turn on of the traffic signal on Monday thru Thursday between 9:00 AM – 12:00 PM. Place the traffic signal into full operation only after all required striping is complete and all conflicting signing is removed. The TxDOT signal inspector and technician must be present when the signals are placed in full color operation.

**Test Period.** During the 30-day test period, the Contractor will be the first responders to all trouble calls. They will, in turn contact the TxDOT Signal Shop with information about problem and repairs made. Provide qualified personnel to respond to these and all trouble calls. Provide a local telephone number, not subject to frequent changes and available to receive calls on a 24-hour basis. Respond to reported calls within a maximum of two hours. Make appropriate repairs within 24 hours or at engineer's direction.

Place a logbook in each controller cabinet and keep a record of each trouble call reported. Notify the Engineer of each trouble call. The error log in the conflict monitor shall not be cleared during the thirty-day test period without approval. If it is necessary to replace equipment, such as a controller, in order to return the signals to normal operation, TxDOT will provide temporary replacement equipment until the original equipment is repaired and/or replaced at the Engineer's direction.

**Removal.** Salvageable signal controllers and related equipment shall remain the property of the City of Fort Worth. The Contractor shall contact Adrian Olguin, TPW Superintendent, at 817-392-7239 or Adrian.Olguin@fortworthtexas.gov at least one (1) week in advance of any disposal of material to coordinate any material that the city may need salvaged. Deliver to the City of Fort Worth, Signal Shop at 5001 James Ave.

**Item 682. Vehicle and Pedestrian Signal Heads**

Vehicle signal heads shall be yellow aluminum with 5 inch, black, aluminum, reflective border, vented back plates unless otherwise shown on plans.

Signal heads shall be installed level and plumb and aimed as directed. Cover all signal faces until placed in operation.

All new mast arm mounted signal heads to be mounted horizontally.

**Item 684. Traffic Signal Cables**

Clearly and permanently mark each cable as shown on the plans (CABLE 1, etc.) at each signal head, ground box, terminal block, pole base and controller. Use plastic zip ties with labeling plate to mark cable.

Provide an extra 10' for each cable terminating in the controller cabinet and coil an extra 5' of cable in each ground box.

Terminate all electrical conductors from the controller (including spares) at the termination block in the signal pole hand hole.

**Item 685. Roadside Flashing Beacon Assemblies**

Flashing beacons must pass a 12-day autonomous test as part of the 30-day test period. Equipment failure during this time will cause the entire test period to start over.



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**Item 686. Traffic Signal Pole Assemblies (Steel)**

Provide all signal poles for a project from the same manufacturer.

Install mast arm damping plates at the end of SMA and DMA standard poles in accordance with the details shown in the MA-DPD standard sheet. Dampers are not recommended for LMA poles.

Plug any unused openings in the mast arms or poles with an approved material.

Provide a 3-piece bracket assembly on strain poles or drill the pole and use thimble eyebolts to attach the strand vise for the span wire.

**Item 688. Pedestrian Detectors and Vehicle Loop Detectors**

For Accessible Pedestrian Signals. Provide a completed final system operational check list, completed schematic diagram for pushbutton station locations, and a completed default and field settings sheet as provided in the APS manufacturer's manual. Provide a qualified personnel for testing and set up of the equipment at the time of signal flash and turn on.

**Item 3076. Dense Grade Hot-Mix Asphalt**

Provide aggregate with a Surface Aggregate Classification (SAC) value of __A__ for the travel lanes and shoulders.

No blending, of the material retained on the No. 4 sieve, to meet SAC A will be allowed for surface mixes.

Natural (field) sands are not allowed.

Provide a PG 64-22 asphalt for the base course.

Provide a PG 70-28 asphalt for the surface course and levelup course, if applicable.
Furnish a CSS-1P with greater than 50% asphalt residue for the tack coat on this project. A trackless tack can be used in lieu of CSS-1P tack coat or as directed by the Engineer. The Engineer will set the rate at time of application.

Warm Mix Asphalt (WMA) is not permitted in any mix type on this project.

RAP and RAS are not permitted in any surface and levelup mixes on this project.

**City of Fort Worth Notes:**

**General:**

1. The Contractor shall be responsible for locating all utilities, whether public or private, prior to excavation. The information and data shown with respect to existing underground facilities at or contiguous to the site is approximate and based on information furnished by the owners of such underground facilities or on physical appurtenances observed in the field. The City and Engineer shall not be responsible for the accuracy or completeness of any such information or data. The Contractor shall have full responsibility for reviewing and checking all such information or data, for locating all underground facilities, for coordination of the work with the owners of such underground facilities during construction and for the safety and protection thereof and repairing any damage thereto resulting from the Work. This Work shall be considered as a subsidiary item of Work, the cost of which shall be included in the price bid in the Proposal for various bid items. The Contractor shall notify any affected owners (utility companies) or agencies in writing at least 48 hours prior to construction.

a. Notify TEXAS 811 (1-800-DIG-TESS or www.texas811.org) to locate existing utilities prior to construction.

b. Caution! Buried electric lines may exist along this project. Contact electrical providers 48 hours prior to excavation :

- ONCOR 817-215-5214

c. Caution! Buried gas lines may exist along this project. Contact gas company 48 hours prior to excavation, and within two (2) hours of encountering a gas line

- ATMOS 800-545-6005
- COWTOWN 817-665-8620
- ENERVEST 713-659-3500

d. Caution! Buried communication cables may exist along this project. Contact communication companies 48 hours prior to excavation:

- AT&T 800-395-0440
- VERIZON 800-344-8377
- ONE-SOURCE 817-745-3000

**Existing Conditions:**

1. No separate pay item will be made for the removal and disposal of existing public facilities (pipes, valves, etc.) within a proposed utility trench unless otherwise indicated within the project specifications.



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2. Contractor shall protect concrete curb and gutter, driveways, and sidewalks that are not designated for removal. Removal and replacement of these items shall be as designated.
3. The Contractor shall preserve and protect or remove and replace when shown on the plans (with prior approval of City Parks and Community Services and/or affected property owners) all trees, shrubs, hedges, retaining walls, landscaping, buildings, walks, etc. in or near proposed construction area. If specific bid item(s) are not included, this work shall be considered incidental and not a separate pay item.
4. Contractor shall not crack, break, mar, or otherwise damage tile street name markers. In the event a tile street name marker is located in an area of construction and cannot be protected, contractor should remove the section of curb and gutter containing the full tile street name marker. Contractor shall replace the full section of the curb and street marker.

**Park & Recreation Department (PARD) Notes:** Pertains to all work in and through City parkland, land managed and maintained by PARD including right-of-way, medians, roundabouts, corner cuts, parkways, and may pertain to work adjacent to City parkland

**City Parks** (Contact Park Planner 817-392-5764):

1. All proposed utility improvements outside of a recorded easement(s) and located in and/or through a park shall require parkland conversion in accordance to State of Texas, Parks and Wildlife Code Chapter 26.
2. **Construction equipment and/or staging, materials storage, and materials testing may not occur on City parkland without prior written approval from PARD.**
3. **Prior to beginning work on parkland, contact PARD at 817/392-5764, to schedule an on-site meeting to locate PARD utilities, tree protection, and parkland fencing. Provide 72-hours minimum notice.**
4. Install fencing at park property line to protect parkland. Fencing to remain until construction completed.
5. All disturbance to existing soil, vegetation, irrigation, or equipment on must be repaired or replaced to existing pre-construction conditions or better at no additional cost to PARD.
6. Soil shall be free of construction debris and rocks greater than 1-inch. Backfill with clean soil prior to seeding or sodding. (Refer to 32 91 19, 32 92 13 and 32 92 14)
7. Turf installation must comply with CFW Standard Construction Specification Documents 32 92 13-Sodding and/or 32 92 14-Non-Native Seeding.
8. Upon request, the contractor shall provide to PARD a copy of certifications on soil, sod, seeding, and hydromulching prior to installation; along with the delivery ticket. (Refer to 32 92 13 and 32 92 14
9. All erosion control materials and fencing to be removed, including silt fence and tree protection, at completion of project.

**City Trees** (Contact City Forester 817-392-5738):

10. Per Chapter 33, Park & Recreation-Forestry Section (PARD-Forestry) has jurisdiction over trees on city-owned property including right-of-way. **Approval of plans does not constitute**

**approval to proceed with work until corresponding permit has been issued.** Permits for removal, planting or pruning of city-owned trees shall be obtained from PARD-Forestry. Pruning required for preconstruction purposes requires the utilization of an ISA-Certified Arborist, as stated in the permit, at no expense to PARD. Contact PARD-Forestry: www.fortworthtexas.gov/departments/parks/services/forestry or CityTreePermits@fortworthtexas.gov or 817/392-5738 or 817/392-5729.

a. **Tree protection** shall be put in place **before grading/construction begins**, be inspected by City Forester and remain until completion of the project.
   i. 4-foot tall, chain link fencing installed at the tree dripline with bilingual sign on protective fencing in English and Spanish that reads, "Keep Out, Tree Protection Area" ("No Entre, Área de Protección de Árboles").
   ii. No entry, grading, excavation, parking or storing of equipment or supplies inside the protective tree fencing without City Forester approval.
   iii. All work inside protective tree fencing to be done by hand, unless prior approval given by City Forester.
   iv. Roots 2-inch or larger shall not be cut without City Forester approval. Roots shall be clean cut with a saw.
   v. All cuts on oak trees, including roots, shall be painted with general purpose spray paint within 30 minutes of exposure to prevent oak wilt spread.

b. **Assessment of Damages to Trees**
   i. The Contractor will check trees in the contract area before contract work begins, any damage will be noted and reported to the Contract Administrator.
   ii. The Contract Administrator will conduct random checks of the trees during the contract period.
   iii. A check of all trees may be made at the end of the contract period. City Forester, Contract Administrator, and Contractor will attend the inspection.
   iv. Damages shall be documented by memo to the City Forester with copy to contract file and the Contractor.
   v. Contractor may have the option of replacement or payment for severely damaged trees at a location to be designated by PARD. Replacement shall be made on a caliper inch per caliper inch basis with a minimum size of replacement tree of 2-inch in caliper for trees damaged or removed which are less than 30-inch DBH and 2-inch per inch for trees which are 30-inch DBH or greater. The Contractor shall be responsible for the planting, watering, mulching and maintenance of replacement trees for a period of not less than 2-years. Any tree that does not survive the 2-year establishment period shall be compensated for by the Contractor to Tree Fund at a rate of $200 per caliper inch.
   vi. Slight damage shall be defined, in the opinion of the City Forester, as damage that may compartmentalize. Examples include but are not limited to: scarring of the trunk into the cambial layer Y ' to 2-inch in width, but less than 1 /3 trunk circumference; or breaking of limbs less than 2-inch in diameter or limbs less than 1 /3 trunk caliper, whichever is less. Slight damage shall also include: removal or laying down of protective tree fencing prior to end of construction; storing



**Project Number:** STP 2022(870)HES,ETC

**County:** TARRANT **Control:** 0902-90-119, ETC.

**Highway:** CS

equipment or supplies within the critical root zone (CRZ); or disposing of paint or concrete within the CRZ, but not closer to the trunk than 50% radius of the CRZ. Slight damage to trees shall be assessed at a rate of $100.00 for each instance. Each day tree fencing is not properly placed, equipment or supplies are stored within CRZ, or fill is stored within the CRZ shall be considered one instance.

vii. Moderate damage shall be defined, in the opinion of the City Forester, as damage that contributes to the poor health and reduced longevity of the tree. Examples include, but are not limited to: scarring of the trunk into the cambial layer greater than 2-inch, but less than 1 /3 the trunk circumference; or breaking of limbs more than 2-inch in diameter, but less than 1/3 trunk caliper. Moderate damage shall also include: compaction of soil; grading or filling in 20% of the CRZ on 1 of 4 sides, but outside the 50% radius of the CRZ; or disposing of paint or concrete within 50% radius of the CRZ. Moderate damages shall be calculated at a rate of % the assessed value of the tree per each instance of damage.

viii. Severe damage or removal of trees is subject to penalty of $200 per diameter inch of trees removed or damaged for trees less than 30-inch DBH or $400 per diameter inch for trees 30-inch DBH or greater. Severe damage or removal shall include, but is not limited to: scarring of the trunk to the cambial layer greater than 1/3 the trunk circumference; uprooting or causing a tree to lean; or damage to a scaffolding branch or any branch greater than 1/3 of trunk caliper. Severe damage shall also include: compaction of soil, grading or filling more than 20% of the CRZ, or within 50% radius of the CRZ, or on more than one of 4 sides. Cutting 1 /3 of the buttress roots within 3 times the distance of the DBH of the trunk, or cutting 4 roots 4-inch or greater in diameter within 4-feet of the trunk shall also be considered severe damage.

ix. Branches shall be measured at the point of attachment or at the lateral to which the branch would be pruned back to according to ANSI standards. Trees caliper shall be measured according to accepted industry standards. Trees greater than 6-inch in caliper shall be measured using diameter at breast height (DBH). Trees that must be removed due to damage caused by the Contractor shall be removed by the Forestry Section's tree removal contractor at the Contractor's expense.

x. All damages shall be paid to the City Tree Fund. Failure to replace or pay for damaged trees shall result in a breach of contract and the Contractor will be automatically assessed damages. Damages as described herein shall be deduced from payments otherwise due the Contractor.

**Utilities:**

Storm Drain:

1. Maintain the existing storm drainage system until the proposed system is in service. In no case should the Contractor leave the existing storm drain out of service whereby runoff would cause damage to adjacent property.
2. Construct all drainage improvements from the downstream end to the upstream end to allow continued storm drain service.

# Estimate & Quantity Sheet

**CONTROLLING PROJECT ID** 0902-90-119 **DISTRICT** Fort Worth **COUNTY** Tarrant
**HIGHWAY** CS, MCCART AVE

| | | | | CONTROL SECTION JOB | 0902-90-119 | | 0902-90-192 | | TOTAL EST. | TOTAL FINAL |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PROJECT ID | A00066743 | | A00136707 | | | |
| | | | | COUNTY | Tarrant | | Tarrant | | | |
| | | | | HIGHWAY | CS | | MCCART AVE | | | |
| ALT | BID CODE | DESCRIPTION | UNIT | | EST. | FINAL | EST. | FINAL | | |
| | 100-6002 | PREPARING ROW | STA | | 9.000 | | 1.000 | | 10.000 | |
| | 100-6004 | PREPARING ROW(TREE)(12" TO 24" DIA) | EA | | 1.000 | | | | 1.000 | |
| | 104-6001 | REMOVING CONC (PAV) | SY | | 2,053.000 | | | | 2,053.000 | |
| | 104-6022 | REMOVING CONC (CURB AND GUTTER) | LF | | | | 873.000 | | 873.000 | |
| | 104-6028 | REMOVING CONC (MISC) | SY | | 3.100 | | | | 3.100 | |
| | 104-6036 | REMOVING CONC (SIDEWALK OR RAMP) | SY | | 193.000 | | 90.000 | | 283.000 | |
| | 105-6070 | REMOVING STAB BASE & ASPH PAV (6" - 8") | SY | | | | 49.000 | | 49.000 | |
| | 110-6001 | EXCAVATION (ROADWAY) | CY | | 598.000 | | 143.000 | | 741.000 | |
| | 160-6003 | FURNISHING AND PLACING TOPSOIL (4") | SY | | 1,357.000 | | 103.000 | | 1,460.000 | |
| | 162-6002 | BLOCK SODDING | SY | | 1,357.000 | | 103.000 | | 1,460.000 | |
| | 247-6041 | FL BS (CMP IN PLC)(TYA GR1-2)(FNAL POS) | CY | | 121.000 | | | | 121.000 | |
| | 260-6002 | LIME (HYDRATED LIME (SLURRY)) | TON | | 33.800 | | | | 33.800 | |
| | 260-6027 | LIME TRT (EXST MATL)(8") | SY | | 1,787.000 | | | | 1,787.000 | |
| | 310-6001 | PRIME COAT (MULTI OPTION) | GAL | | 537.000 | | | | 537.000 | |
| | 340-6272 | TACK COAT | GAL | | | | 32.000 | | 32.000 | |
| | 360-6019 | CONC PVMT (JOINTED - CPCD) (9") | SY | | 1,787.000 | | | | 1,787.000 | |
| | 416-6029 | DRILL SHAFT (RDWY ILL POLE) (30 IN) | LF | | 8.000 | | | | 8.000 | |
| | 416-6032 | DRILL SHAFT (TRF SIG POLE) (36 IN) | LF | | 26.000 | | | | 26.000 | |
| | 416-6034 | DRILL SHAFT (TRF SIG POLE) (48 IN) | LF | | 44.000 | | | | 44.000 | |
| | 465-6406 | CL C CONC (INLET) (TOP) | SY | | 4.000 | | | | 4.000 | |
| | 479-6005 | ADJUSTING MANHOLES (WATER VALVE BOX) | EA | | 5.000 | | | | 5.000 | |
| | 500-6001 | MOBILIZATION | LS | | 1.000 | | | | 1.000 | |
| | 502-6001 | BARRICADES, SIGNS AND TRAFFIC HANDLING | MO | | 11.000 | | | | 11.000 | |
| | 506-6020 | CONSTRUCTION EXITS (INSTALL) (TY 1) | SY | | 225.000 | | | | 225.000 | |
| | 506-6024 | CONSTRUCTION EXITS (REMOVE) | SY | | 225.000 | | | | 225.000 | |
| | 506-6035 | SANDBAGS FOR EROSION CONTROL | EA | | 10.000 | | | | 10.000 | |
| | 506-6038 | TEMP SEDMT CONT FENCE (INSTALL) | LF | | 325.000 | | | | 325.000 | |
| | 506-6039 | TEMP SEDMT CONT FENCE (REMOVE) | LF | | 325.000 | | | | 325.000 | |
| | 506-6040 | BIODEG EROSN CONT LOGS (INSTL) (8") | LF | | 75.000 | | | | 75.000 | |
| | 506-6043 | BIODEG EROSN CONT LOGS (REMOVE) | LF | | 75.000 | | | | 75.000 | |
| | 529-6005 | CONC CURB (MONO) (TY II) | LF | | 2,117.000 | | | | 2,117.000 | |
| | 529-6008 | CONC CURB & GUTTER (TY II) | LF | | | | 379.000 | | 379.000 | |
| | 531-6001 | CONC SIDEWALKS (4") | SY | | 148.000 | | | | 148.000 | |
| | 531-6004 | CURB RAMPS (TY 1) | EA | | 5.000 | | | | 5.000 | |
| | 531-6010 | CURB RAMPS (TY 7) | EA | | 4.000 | | | | 4.000 | |
| | 531-6031 | CURB RAMPS (TY 22) | SY | | 1.000 | | | | 1.000 | |
| | 540-6001 | MTL W-BEAM GD FEN (TIM POST) | LF | | 56.500 | | | | 56.500 | |

# Estimate & Quantity Sheet

**CONTROLLING PROJECT ID** 0902-90-119 **DISTRICT** Fort Worth **COUNTY** Tarrant
**HIGHWAY** CS, MCCART AVE

| | | | | **CONTROL SECTION JOB** | **0902-90-119** | | **0902-90-192** | | TOTAL EST. | TOTAL FINAL |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | **PROJECT ID** | **A00066743** | | **A00136707** | | | |
| | | | | **COUNTY** | **Tarrant** | | **Tarrant** | | | |
| | | | | **HIGHWAY** | **CS** | | **MCCART AVE** | | | |
| **ALT** | **BID CODE** | **DESCRIPTION** | **UNIT** | | EST. | FINAL | EST. | FINAL | | |
| | 540-6016 | DOWNSTREAM ANCHOR TERMINAL SECTION | EA | | 2.000 | | | | 2.000 | |
| | 544-6001 | GUARDRAIL END TREATMENT (INSTALL) | EA | | 2.000 | | | | 2.000 | |
| | 610-6002 | RELOCATE RD IL ASM (SHOE-BASE) | EA | | 1.000 | | | | 1.000 | |
| | 610-6102 | REPLACE LUMINAIRE W/LED (250W EQ) | EA | | 2.000 | | | | 2.000 | |
| | 618-6046 | CONDT (PVC) (SCH 80) (2") | LF | | 90.000 | | | | 90.000 | |
| | 618-6047 | CONDT (PVC) (SCH 80) (2") (BORE) | LF | | 710.000 | | | | 710.000 | |
| | 618-6053 | CONDT (PVC) (SCH 80) (3") | LF | | 380.000 | | | | 380.000 | |
| | 618-6059 | CONDT (PVC) (SCH 80) (4") (BORE) | LF | | 710.000 | | | | 710.000 | |
| | 620-6007 | ELEC CONDR (NO.8) BARE | LF | | 1,845.000 | | | | 1,845.000 | |
| | 620-6008 | ELEC CONDR (NO.8) INSULATED | LF | | 1,470.000 | | | | 1,470.000 | |
| | 620-6009 | ELEC CONDR (NO.6) BARE | LF | | 15.000 | | | | 15.000 | |
| | 620-6010 | ELEC CONDR (NO.6) INSULATED | LF | | 30.000 | | | | 30.000 | |
| | 624-6010 | GROUND BOX TY D (162922)W/APRON | EA | | 6.000 | | | | 6.000 | |
| | 628-6144 | ELC SRV TY D 120/240 060(NS)SS(E)PS(U) | EA | | 1.000 | | | | 1.000 | |
| | 644-6001 | IN SM RD SN SUP&AM TY10BWG(1)SA(P) | EA | | 20.000 | | 2.000 | | 22.000 | |
| | 644-6068 | RELOCATE SM RD SN SUP&AM TY 10BWG | EA | | 1.000 | | 2.000 | | 3.000 | |
| | 644-6076 | REMOVE SM RD SN SUP&AM | EA | | 2.000 | | | | 2.000 | |
| | 666-6004 | REFL PAV MRK TY I (W)4"(DOT)(060MIL) | LF | | 878.000 | | 513.000 | | 1,391.000 | |
| | 666-6030 | REFL PAV MRK TY I (W)8"(DOT)(100MIL) | LF | | 230.000 | | | | 230.000 | |
| | 666-6036 | REFL PAV MRK TY I (W)8"(SLD)(100MIL) | LF | | 552.000 | | 418.000 | | 970.000 | |
| | 666-6047 | REFL PAV MRK TY I (W)24"(SLD)(090MIL) | LF | | 787.000 | | 57.000 | | 844.000 | |
| | 666-6054 | REFL PAV MRK TY I (W)(ARROW)(100MIL) | EA | | 5.000 | | 4.000 | | 9.000 | |
| | 666-6078 | REFL PAV MRK TY I (W)(WORD)(100MIL) | EA | | 5.000 | | 4.000 | | 9.000 | |
| | 666-6099 | REF PAV MRK TY I(W)18"(YLD TRI)(100MIL) | EA | | 34.000 | | | | 34.000 | |
| | 666-6123 | REFL PAV MRK TY I (Y)4"(DOT)(100MIL) | LF | | 150.000 | | | | 150.000 | |
| | 666-6207 | REFL PAV MRK TY II (Y) 4" (SLD) | LF | | 110.000 | | | | 110.000 | |
| | 666-6224 | PAVEMENT SEALER 4" | LF | | 1,138.000 | | 513.000 | | 1,651.000 | |
| | 666-6226 | PAVEMENT SEALER 8" | LF | | 782.000 | | 418.000 | | 1,200.000 | |
| | 666-6230 | PAVEMENT SEALER 24" | LF | | 787.000 | | 57.000 | | 844.000 | |
| | 666-6231 | PAVEMENT SEALER (ARROW) | EA | | 5.000 | | 4.000 | | 9.000 | |
| | 666-6232 | PAVEMENT SEALER (WORD) | EA | | 5.000 | | 4.000 | | 9.000 | |
| | 666-6243 | PAVEMENT SEALER (YLD TRI) | EA | | 34.000 | | | | 34.000 | |
| | 672-6007 | REFL PAV MRKR TY I-C | EA | | 6.000 | | 20.000 | | 26.000 | |
| | 672-6010 | REFL PAV MRKR TY II-C-R | EA | | 26.000 | | 14.000 | | 40.000 | |
| | 677-6001 | ELIM EXT PAV MRK & MRKS (4") | LF | | 647.000 | | 792.000 | | 1,439.000 | |
| | 677-6003 | ELIM EXT PAV MRK & MRKS (8") | LF | | | | 205.000 | | 205.000 | |
| | 677-6007 | ELIM EXT PAV MRK & MRKS (24") | LF | | 598.000 | | 55.000 | | 653.000 | |

# Estimate & Quantity Sheet

**CONTROLLING PROJECT ID** 0902-90-119 **DISTRICT** Fort Worth **COUNTY** Tarrant
**HIGHWAY** CS, MCCART AVE

| | | | | **CONTROL SECTION JOB** | | **0902-90-119** | | **0902-90-192** | | TOTAL EST. | TOTAL FINAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | **PROJECT ID** | | **A00066743** | | **A00136707** | | | |
| | | | | **COUNTY** | | **Tarrant** | | **Tarrant** | | | |
| | | | | **HIGHWAY** | | **CS** | | **MCCART AVE** | | | |
| **ALT** | **BID CODE** | **DESCRIPTION** | **UNIT** | | EST. | FINAL | EST. | FINAL | | |
| | 678-6001 | PAV SURF PREP FOR MRK (4") | LF | | 1,138.000 | | 513.000 | | 1,651.000 | |
| | 678-6004 | PAV SURF PREP FOR MRK (8") | LF | | 782.000 | | 418.000 | | 1,200.000 | |
| | 678-6008 | PAV SURF PREP FOR MRK (24") | LF | | 787.000 | | 57.000 | | 844.000 | |
| | 678-6009 | PAV SURF PREP FOR MRK (ARROW) | EA | | 5.000 | | 4.000 | | 9.000 | |
| | 678-6016 | PAV SURF PREP FOR MRK (WORD) | EA | | 5.000 | | 4.000 | | 9.000 | |
| | 678-6022 | PAV SURF PREP FOR MRK (18")(YLD TRI) | EA | | 34.000 | | | | 34.000 | |
| | 680-6002 | INSTALL HWY TRF SIG (ISOLATED) | EA | | 1.000 | | | | 1.000 | |
| | 680-6004 | REMOVING TRAFFIC SIGNALS | EA | | 1.000 | | | | 1.000 | |
| | 682-6001 | VEH SIG SEC (12")LED(GRN) | EA | | 10.000 | | | | 10.000 | |
| | 682-6002 | VEH SIG SEC (12")LED(GRN ARW) | EA | | 9.000 | | | | 9.000 | |
| | 682-6003 | VEH SIG SEC (12")LED(YEL) | EA | | 12.000 | | | | 12.000 | |
| | 682-6004 | VEH SIG SEC (12")LED(YEL ARW) | EA | | 11.000 | | | | 11.000 | |
| | 682-6005 | VEH SIG SEC (12")LED(RED) | EA | | 12.000 | | | | 12.000 | |
| | 682-6006 | VEH SIG SEC (12")LED(RED ARW) | EA | | 7.000 | | | | 7.000 | |
| | 682-6018 | PED SIG SEC (LED)(COUNTDOWN) | EA | | 12.000 | | | | 12.000 | |
| | 682-6054 | BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM | EA | | 15.000 | | | | 15.000 | |
| | 682-6055 | BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM | EA | | 4.000 | | | | 4.000 | |
| | 684-6030 | TRF SIG CBL (TY A)(14 AWG)(4 CONDR) | LF | | 2,735.000 | | | | 2,735.000 | |
| | 684-6031 | TRF SIG CBL (TY A)(14 AWG)(5 CONDR) | LF | | 1,000.000 | | | | 1,000.000 | |
| | 684-6033 | TRF SIG CBL (TY A)(14 AWG)(7 CONDR) | LF | | 2,260.000 | | | | 2,260.000 | |
| | 684-6046 | TRF SIG CBL (TY A)(14 AWG)(20 CONDR) | LF | | 850.000 | | | | 850.000 | |
| | 686-6039 | INS TRF SIG PL AM(S)1 ARM(36')LUM | EA | | 1.000 | | | | 1.000 | |
| | 686-6043 | INS TRF SIG PL AM(S)1 ARM(40')LUM | EA | | 1.000 | | | | 1.000 | |
| | 686-6065 | INS TRF SIG PL AM(S)1 ARM(65') | EA | | 1.000 | | | | 1.000 | |
| | 686-6067 | INS TRF SIG PL AM(S)1 ARM(65')LUM | EA | | 1.000 | | | | 1.000 | |
| | 687-6001 | PED POLE ASSEMBLY | EA | | 10.000 | | | | 10.000 | |
| | 688-6001 | PED DETECT PUSH BUTTON (APS) | EA | | 12.000 | | | | 12.000 | |
| | 688-6003 | PED DETECTOR CONTROLLER UNIT | EA | | 1.000 | | | | 1.000 | |
| | 3076-6001 | D-GR HMA TY-B PG64-22 | TON | | | | 89.400 | | 89.400 | |
| | 3076-6028 | D-GR HMA TY-C SAC-A PG70-28 | TON | | | | 35.800 | | 35.800 | |
| | 6010-6002 | CCTV FIELD EQUIPMENT (DIGITAL) | EA | | 1.000 | | | | 1.000 | |
| | 6058-6001 | BBU SYSTEM (EXTERNAL BATT CABINET) | EA | | 1.000 | | | | 1.000 | |
| | 6089-6002 | CAT 5 ETHERNET CABLE | LF | | 160.000 | | | | 160.000 | |
| | 6292-6001 | RVDS(PRESENCE DETECTION ONLY) | EA | | 6.000 | | | | 6.000 | |
| | 6292-6002 | RVDS(ADVANCE DETECTION ONLY) | EA | | 6.000 | | | | 6.000 | |
| | 6396-6001 | COFW EMR VEH (EV) PREEMPT (INST ONLY) | EA | | 4.000 | | | | 4.000 | |
| | 6421-6001 | COFW CELLULAR ROUTER (INSTALL ONLY) | EA | | 1.000 | | | | 1.000 | |

# Estimate & Quantity Sheet

**CONTROLLING PROJECT ID** 0902-90-119 **DISTRICT** Fort Worth **COUNTY** Tarrant
**HIGHWAY** CS, MCCART AVE

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | **CONTROL SECTION JOB** | | **0902-90-119** | | **0902-90-192** | | TOTAL EST. | TOTAL FINAL |
| | | | **PROJECT ID** | | **A00066743** | | **A00136707** | | | |
| | | | **COUNTY** | | **Tarrant** | | **Tarrant** | | | |
| | | | **HIGHWAY** | | **CS** | | **MCCART AVE** | | | |
| **ALT** | **BID CODE** | **DESCRIPTION** | | **UNIT** | EST. | FINAL | EST. | FINAL | | |
| | 18 | EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART) | | LS | 1.000 | | | | 1.000 | |
| | | SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING) | | LS | 1.000 | | | | 1.000 | |

| CATEGORY OF WORK | Pavemarking(s) | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BID CODE | 666-6224 | 666-6036 | 666-6054 | 666-6004 | 666-6207 | 666-6226 | 666-6078 | 666-6099 | 666-6047 | 666-6232 | 666-6030 | 666-6231 | 666-6243 | 666-6123 | 666-6230 | 672-6010 | 672-6007 | 678-6001 |
| DESCRIPTION | PAVEMENT SEALER 4" | REFL PAV MRK TY I (W)8"(SLD)(100MIL) | REFL PAV MRK TY I (W)(ARROW)(100MIL) | REFL PAV MRK TY I (W)4"(DOT)(060MIL) | REFL PAV MRK TY II(Y) 4" (SLD) | PAVEMENT SEALER 8" | REFL PAV MRK TY I (W)(WORD)(100MIL) | REF PAV MRK TY I(W)16"(Y LD TRI)(130MIL) | REFL PAV MRK TY I (W)24"(SLD)(090MIL) | PAVEMENT SEALER (WORD) | REFL PAV MRK TY I (W)8"(DOT)(100MIL) | PAVEMENT SEALER (ARROW) | PAVEMENT SEALER (Y LD TRI) | REFL PAV MRK TY I (Y)4"(DOT)(100MIL) | PAVEMENT SEALER 24" | REFL PAV MRKR TY II-C-R | REFL PAV MRKR TY I-C | PAV SURF PREP FOR MRK (4") |
| ALTERNATE BID GROUP | | | | | | | | | | | | | | | | | | |
| PLAN SET LOCATION UNIT | LF Linear Feet | LF Linear Feet | EA Each | LF Linear Feet | LF Linear Feet | LF Linear Feet | EA Each | EA Each | LF Linear Feet | EA Each | LF Linear Feet | EA Each | EA Each | LF Linear Feet | LF Linear Feet | EA Each | EA Each | LF Linear Feet |
| Markings | 1,138.000 | 552.000 | 5.000 | 878.000 | 110.000 | 782.000 | 5.000 | 34.000 | 787.000 | 5.000 | 230.000 | 5.000 | 34.000 | 150.000 | 787.000 | 26.000 | 6.000 | 1,138.000 |
| MarkingsRemoval | | | | | | | | | | | | | | | | | | |
| Paving | | | | | | | | | | | | | | | | | | |
| Removal | | | | | | | | | | | | | | | | | | |
| SWPPP | | | | | | | | | | | | | | | | | | |
| Signing | | | | | | | | | | | | | | | | | | |
| TrafficSignal | | | | | | | | | | | | | | | | | | |
| TrafficSignal | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| **PROJECT TOTALS** | **1,138.000** | **552.000** | **5.000** | **878.000** | **110.000** | **782.000** | **5.000** | **34.000** | **787.000** | **5.000** | **230.000** | **5.000** | **34.000** | **150.000** | **787.000** | **26.000** | **6.000** | **1,138.000** |

| CATEGORY OF WORK | Pavemarking(s) | | | | |
|---|---|---|---|---|---|
| BID CODE | 678-6009 | 678-6016 | 678-6008 | 678-6022 | 678-6004 |
| DESCRIPTION | PAV SURF PREP FOR MRK (ARROW) | PAV SURF PREP FOR MRK (WORD) | PAV SURF PREP FOR MRK (24") | PAV SURF PREP FOR MRK (18")(Y LD TRI) | PAV SURF PREP FOR MRK (8") |
| ALTERNATE BID GROUP | | | | | |
| PLAN SET LOCATION UNIT | EA Each | EA Each | LF Linear Feet | EA Each | LF Linear Feet |
| Markings | 5.000 | 5.000 | 787.000 | 34.000 | 782.000 |
| MarkingsRemoval | | | | | |
| Paving | | | | | |
| Removal | | | | | |
| SWPPP | | | | | |
| Signing | | | | | |
| TrafficSignal | | | | | |
| TrafficSignal | | | | | |
| | | | | | |
| **PROJECT TOTALS** | **5.000** | **5.000** | **787.000** | **34.000** | **782.000** |

| CATEGORY OF WORK | Erosion | | | | | | |
|---|---|---|---|---|---|---|---|
| BID CODE | 506-6020 | 506-6038 | 506-6039 | 506-6040 | 506-6043 | 506-6035 | 506-6024 |
| DESCRIPTION | CONSTRUCTION EXITS (INSTALL) (TY 1) | TEMP SEDMT CONT FENCE (INSTALL) | TEMP SEDMT CONT FENCE (REMOVE) | BIODEG EROSN CONT LOGS (INSTL) (8") | BIODEG EROSN CONT LOGS (REMOVE) | SANDBAGS FOR EROSION CONTROL | CONSTRUCTION EXITS (REMOVE) |
| ALTERNATE BID GROUP | | | | | | | |
| PLAN SET LOCATION UNIT | SY Square Yards | LF Linear Feet | LF Linear Feet | LF Linear Feet | LF Linear Feet | EA Each | SY Square Yards |
| Markings | | | | | | | |
| MarkingsRemoval | | | | | | | |
| Paving | | | | | | | |
| Removal | | | | | | | |
| SWPPP | 225.000 | 325.000 | 325.000 | 75.000 | 75.000 | 10.000 | 225.000 |
| Signing | | | | | | | |
| TrafficSignal | | | | | | | |
| TrafficSignal | | | | | | | |
| | | | | | | | |
| **PROJECT TOTALS** | **225.000** | **325.000** | **325.000** | **75.000** | **75.000** | **10.000** | **225.000** |

| CATEGORY OF WORK | Mobilization |
|---|---|
| BID CODE | 500-6001 |
| DESCRIPTION | MOBILIZATION |
| ALTERNATE BID GROUP | |
| PLAN SET LOCATION UNIT | LS Lump Sum |
| Markings | |
| MarkingsRemoval | |
| Paving | |
| Removal | |
| SWPPP | |
| Signing | |
| TrafficSignal | |
| TrafficSignal | |
| | 1.000 |
| **PROJECT TOTALS** | **1.000** |

| CATEGORY OF WORK | Roadway | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BID CODE | 160-6003 | 162-6002 | 247-6041 | 260-6002 | 260-6027 | 310-6001 | 360-6019 | 465-6406 | 479-6005 | 529-6005 | 540-6001 | 540-6016 | 544-6001 |
| DESCRIPTION | FURNISHING AND PLACING TOPSOIL (4") | BLOCK SODDING | FL BS (CMP IN PLC)(TY A GR1-2)(FNAL POS) | LIME (HYDRATED LIME (SLURRY)) | LIME TRT (EXST MATL)(8") | PRIME COAT (MULTI OPTION) | CONC PVMT (JOINTED - CPCD) (9") | CL C CONC (INLET) (TOP) | ADJUSTING MANHOLES (WATER VALVE BOX) | CONC CURB (MONO) (TY II) | MTL W-BEAM GD FEN (TIM POST) | DOWNSTREAM ANCHOR TERMINAL SECTION | GUARDRAIL END TREATMENT (INSTALL) |
| ALTERNATE BID GROUP | | | | | | | | | | | | | |
| PLAN SET LOCATION UNIT | SY Square Yards | SY Square Yards | CY Cubic Yard | TON Ton | SY Square Yards | GAL Gallon | SY Square Yards | SY Square Yards | EA Each | LF Linear Feet | LF Linear Feet | EA Each | EA Each |
| Markings | | | | | | | | | | | | | |
| MarkingsRemoval | | | | | | | | | | | | | |
| Paving | 1,357.000 | 1,357.000 | 121.000 | 33.800 | 1,787.000 | | 1,787.000 | 4.000 | 5.000 | 2,117.000 | 56.500 | 2.000 | 2.000 |
| Removal | | | | | | | | | | | | | |
| SWPPP | | | | | | | | | | | | | |
| Signing | | | | | | | | | | | | | |
| TrafficSignal | | | | | | | | | | | | | |
| TrafficSignal | | | | | | | | | | | | | |
| | | | | | | 537.000 | | | | | | | |
| **PROJECT TOTALS** | **1,357.000** | **1,357.000** | **121.000** | **33.800** | **1,787.000** | **537.000** | **1,787.000** | **4.000** | **5.000** | **2,117.000** | **56.500** | **2.000** | **2.000** |

| CATEGORY OF WORK | Pedestrian | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| BID CODE | 531-6004 | 531-6010 | 531-6001 | 531-6031 | 682-6018 | 687-6001 | 688-6001 | 688-6003 |
| DESCRIPTION | CURB RAMPS (TY 1) | CURB RAMPS (TY 7) | CONC SIDEWALKS (4") | CURB RAMPS (TY 22) | PED SIG SEC (LED)(COUNTDOWN) | PED POLE ASSEMBLY | PED DETECT PUSH BUTTON (APS) | PED DETECTOR CONTROLLER UNIT |
| ALTERNATE BID GROUP | | | | | | | | |
| PLAN SET LOCATION UNIT | EA Each | EA Each | SY Square Yards | SY Square Yards | EA Each | EA Each | EA Each | EA Each |
| Markings | | | | | | | | |
| MarkingsRemoval | | | | | | | | |
| Paving | 5.000 | 4.000 | 148.000 | 1.000 | | | | |
| Removal | | | | | | | | |
| SWPPP | | | | | | | | |
| Signing | | | | | | | | |
| TrafficSignal | | | | | | | | |
| TrafficSignal | | | | | 12.000 | 10.000 | 12.000 | 1.000 |
| | | | | | | | | |
| **PROJECT TOTALS** | **5.000** | **4.000** | **148.000** | **1.000** | **12.000** | **10.000** | **12.000** | **1.000** |

| CATEGORY OF WORK | Barricades |
|---|---|
| BID CODE | 502-6001 |
| DESCRIPTION | BARRICADES, SIGNS AND TRAFFIC HANDLING |
| ALTERNATE BID GROUP | |
| PLAN SET LOCATION UNIT | MO Monthly |
| Markings | |
| MarkingsRemoval | |
| Paving | |
| Removal | |
| SWPPP | |
| Signing | |
| TrafficSignal | |
| TrafficSignal | |
| | 11.000 |
| **PROJECT TOTALS** | **11.000** |

STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED
PROFESSIONAL ENGINEER
07/07/2022


MULTATECH ARCHITECTS ENGINEERS
2821 WEST 7TH ST
SUITE 400
FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351


Texas Department of Transportation

# QUANTITY SUMMARY

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | |
| REVISIONS | STATE | DISTRICT | COUNTY | 20 |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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| CATEGORY OF WORK | Removal | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| BID CODE | 100-6002 | 100-6004 | 104-6001 | 104-6036 | 104-6028 | 110-6001 | 644-6076 | 677-6007 | 677-6001 | 680-6004 |
| DESCRIPTION | PREPARING ROW | PREPARING ROW(TREE)(12" TO 24" DIA) | REMOVING CONC (PAV) | REMOVING CONC (SIDEWALK OR RAMP) | REMOVING CONC (MISC) | EXCAVATION (ROADWAY) | REMOVE SM RD SN SUP&AM | ELIM EXT PAV MRK & MRKS (24") | ELIM EXT PAV MRK & MRKS (4") | REMOVING TRAFFIC SIGNALS |
| ALTERNATE BID GROUP | | | | | | | | | | |
| PLAN SET LOCATION UNIT | STA Station | EA Each | SY Square Yards | SY Square Yards | SY Square Yards | CY Cubic Yard | EA Each | LF Linear Feet | LF Linear Feet | EA Each |
| Markings | | | | | | | | | | |
| MarkingsRemoval | | | | | | | 2.000 | 598.000 | 647.000 | |
| Paving | | | | | | | | | | |
| Removal | 9.000 | 1.000 | 2,053.000 | 193.000 | 3.100 | 598.000 | | | | |
| SWPPP | | | | | | | | | | |
| Signing | | | | | | | | | | |
| TrafficSignal | | | | | | | | | | |
| TrafficSignal | | | | | | | | | | 1.000 |
| | | | | | | | | | | |
| **PROJECT TOTALS** | **9.000** | **1.000** | **2,053.000** | **193.000** | **3.100** | **598.000** | **2.000** | **598.000** | **647.000** | **1.000** |

| CATEGORY OF WORK | Signing | |
|---|---|---|
| BID CODE | 644-6001 | 644-6068 |
| DESCRIPTION | IN SM RD SN SUP&AM TY 10BWG(1)SA(P) | RELOCATE SM RD SN SUP&AM TY 10BWG |
| ALTERNATE BID GROUP | | |
| PLAN SET LOCATION UNIT | EA Each | EA Each |
| Markings | | |
| MarkingsRemoval | | |
| Paving | | |
| Removal | | |
| SWPPP | | |
| Signing | 20.000 | 1.000 |
| TrafficSignal | | |
| TrafficSignal | | |
| | | |
| **PROJECT TOTALS** | **20.000** | **1.000** |

STATE OF TEXAS
ERIC A. CANALES
90103
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FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351


Texas Department of Transportation

# QUANTITIES

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 20A |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |




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## UTILITY QUALITY LEVELS

(OBTAINED FROM ASCE PUBLICATION CI/ASCE STANDARD 38-02)

1. UTILITY QUALITY LEVEL D (QL D): INFORMATION DERIVED FROM EXISTING RECORDS OR ORAL RECOLLECTIONS.

2. UTILITY QUALITY LEVEL C (QL C): INFORMATION OBTAINED BY SURVEYING AND PLOTTING VISIBLE ABOVE-GROUND UTILITY FEATURES AND BY USING PROFESSIONAL JUDGEMENT IN CORRELATING THIS INFORMATION TO QUALITY LEVEL D INFORMATION.

3. UTILITY QUALITY LEVEL B (QL B): INFORMATION OBTAINED THROUGH THE APPLICATION OF APPROPRIATE SURFACE GEOPHYSICAL METHODS TO DETERMINE THE EXISTENCE AND APPROXIMATE HORIZONTAL POSITION OF SUBSURFACE UTILITIES. QUALITY LEVEL B DATA SHOULD BE REPRODUCIBLE BY SURFACE GEOPHYSICS AT ANY POINT OF THEIR DEPICTION. THIS INFORMATION IS SURVEYED TO APPLICABLE TOLERANCES DEFINED BY THE PROJECT AND REDUCED ONTO PLAN DOCUMENTS.

4. UTILITY QUALITY LEVEL A (QL A): PRECISE HORIZONTAL AND VERTICAL LOCATION OF UTILITIES OBTAINED BY THE ACTUAL EXPOSURE (OR VERIFICATION OF PREVIOUSLY EXPOSED AND SURVEYED UTILITIES) AND SUBSEQUENT MEASUREMENT OF SUBSURFACE UTILITIES, USUALLY AT A SPECIFIC POINT. MINIMALLY INTRUSIVE EXCAVATION EQUIPMENT IS TYPICALLY USED TO MINIMIZE THE POTENTIAL FOR UTILITY DAMAGE. A PRECISE HORIZONTAL AND VERTICAL LOCATION, AS WELL AS OTHER UTILITY ATTRIBUTES, IS SHOWN ON PLAN DOCUMENTS. ACCURACY IS TYPICALLY SET TO 15-MM VERTICAL AND TO APPLICABLE HORIZONTAL SURVEY AND MAPPING ACCURACY AS DEFINED OR EXPECTED BY THE PROJECT OWNER.

## GENERAL NOTES

1. THE UTILITIES DEPICTED WERE INVESTIGATED BY LAMB-STAR ENGINEERING, ALL OTHER PLAN INFORMATION, NOTABLY THE BACKGROUND INFORMATION WAS PROVIDED BY OTHERS AND LAMB-STAR ENGINEERING DISCLAIMS RESPONSIBILITY FOR ITS ACCURACY.

2. EXISTING SUBSURFACE UTILITY INVESTIGATIONS WERE COMPLETED ON 08/19/2019. LIMITS OF LAMB-STAR SUE INVESTIGATION ARE ALONG ALTAMESA BLVD FROM STA 7+00 TO 23+50 AND ALONG MCCART AVE FROM STA 3+00 TO STA 11+00. LAMB-STAR ENGINEERING EXPRESSLY DISCLAIMS ANY AND ALL RESPONSIBILITY FOR SUE DATA PROVIDED BY OTHERS AND NEW UTILITY INSTALLATIONS OR MODIFICATIONS, AND ADJUSTMENTS TO EXISTING UTILITIES AFTER THE COMPLETION DATE.

3. UTILITY LOCATIONS ON THESE DRAWINGS ARE INTENDED FOR DESIGN PURPOSES AND NOT CONSTRUCTION. THEY REFLECT SUBSURFACE UTILITIES AT THE TIME SURVEYED. CALL TEXAS 811 FOR UTILITY LOCATIONS 48-HOURS PRIOR TO ANY WORK.

4. UTILITIES ON THESE DRAWINGS HAVE BEEN IDENTIFIED TO ASCE STANDARD 38-02. QUALITY LEVEL D INFORMATION IS SHOWN AS NOTED IN THE LEGEND.

5. UTILITIES ON THESE DRAWINGS HAVE BEEN IDENTIFIED TO ASCE STANDARD 38-02. QUALITY LEVEL C INFORMATION IS SHOWN AS NOTED IN THE LEGEND.

6. UTILITIES ON THESE DRAWINGS HAVE BEEN IDENTIFIED TO ASCE STANDARD 38-02. QUALITY LEVEL B INFORMATION IS SHOWN AS NOTED IN THE LEGEND.

7. UTILITY LINES WERE DESIGNATED WHERE POSSIBLE. HOWEVER, SOME SERVICE LINES ARE CONSTRUCTED OF NON-CONDUCTIVE MATERIAL AND UTILITY COMPANY DRAWINGS DO NOT SHOW SERVICE LINE LOCATIONS. THEREFORE, NOT ALL SERVICE LINES MAY BE SHOWN.

## LEGEND OF UTILITY TYPES

GENERAL
- UTILITY CONTINUES
- UTILITY TERMINATES

COMMUNICATIONS
- FIBER - AT&T (QL-B) — FO1
- FIBER - AT&T (QL-D) — FO1(D)
- TELEPHONE - AT&T (QL-B) — T1
- OH TELEPHONE - AT&T (QL-C) — OHT1(C)
- TELEPHONE - AT&T (QL-D) — T1(D)
- CATV - CHARTER (QL-B) — CATV2
- OH CATV - CHARTER (QL-C) — OHCATV1(C)
- OH FIBER - MCI (QL-C) — OHFO1(C)
- OH TELEPHONE - MCI (QL-C) — OHT2(C)
- FIBER - CONTERRA (QL-D) — FO4(D)

ELECTRIC
- ELECTRIC - COFW (QL-B) — E1
- OH ELECTRIC - COFW (QL-C) — OHE1(C)
- ELECTRIC - ONCOR (QL-B) — E2
- OH ELECTRIC - ONCOR (QL-C) — OHE2(C)
- ELECTRIC - ONCOR (QL-D) — E2(D)
- OH ELECTRIC - UNKNOWN (QL-C) — OHE3(C)

GAS
- GAS - ATMOS (QL-B) — G1
- GAS - ATMOS (QL-D) — G1(D)

WATER
- WATER - COFW (QL-B) — W1
- WATER - COFW (QL-D) — W1(D)

WASTEWATER
- WASTEWATER - COFW (QL-B) — WW1
- WASTEWATER - COFW (QL-D) — WW1(D)

STORM SEWER
- STORM SEWER - COFW (QL-D) — STM1(D)

COMMUNICATIONS
- TELEPHONE - MANHOLE (T)
- TELEPHONE - MARKER (T)
- FIBER - MANHOLE (F)
- FIBER - HAND HOLE (F)

ELECTRIC
- ELECTRIC METER (EM)
- LIGHT POLE (LP)
- POWER POLE (WOOD) (PP)
- PULL BOX (PB)
- SIGNAL PEDESTAL (S)
- SIGNAL POLE TRAFFIC LIGHT (TSP)
- TRAFFIC CAMERA (TC)
- TRAFFIC CONTROL BOX (TCB)
- HIGH VOLTAGE TRANSMISSION TOWER LEG

GAS
- METER (GM)
- MANHOLE (G)

WATER
- FIRE HYDRANT
- METER (WM)
- VALVE (WV)

WASTEWATER
- CLEAN OUT (CO)
- MANHOLE (WW)

STORM SEWER
- CURB INLET (CI)
- MANHOLE (STM)



THE UTILITIES ON THE PLANS WERE COMPILED FROM VARIOUS SOURCES AND ARE INTENDED TO SHOW THE GENERAL EXISTENCE AND LOCATION OF UTILITIES IN THE AREA OF CONSTRUCTION.
THE ENGINEER ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE UTILITY INFORMATION SHOWN ON THE PLANS. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
THE CONTRACTOR SHALL CONTACT THE UTILITY COMPANIES AT LEAST 48 HOURS IN ADVANCE OF ANY CONSTRUCTION ACTIVITIES IN ORDER TO IDENTIFY ANY CONFLICTS WITH THE PROPOSED FACILITIES.
CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY WHEN CONFLICT WITH EXISTING UTILITIES ARE DISCOVERED.
THE FOLLOWING PHONE NUMBERS ARE PROVIDED FOR CONVENIENCE. CONSIDERATION OF OTHER UTILITIES MAYBE REQUIRED.

| | |
|---|---|
| CALL BEFORE YOU DIG | 1-800-336-9193 |
| AT&T | 1-800-878-8711 |
| FORT WORTH WATER DEPT. - FIELD OPERATIONS | 817-392-8296 |
| FORT WORTH T&PW | 817-392-8100 |
| ATMOS ENERGY | 817-215-4366 |
| ONCOR GAS & ELECTRIC | 817-215-6214 |
| TXU ENERGY | 1-800-233-2133 |
| TRI-COUNTY ELECTRIC | 817-444-3201 |
| SBC TELEPHONE | 817-338-6819 |
| CHARTER COMM. | 817-509-6272 X3363 |
| ALL OTHER FACILITIES | 1-800-DIG-TES |

**GENERAL NOTES:**
CONTRACTOR TO PROTECT EXISTING STRUCTURES. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR OR REPLACEMENT IN THE EVENT OF DAMAGE.

IN THE EVENT THAT AN EXISTING FENCE REQUIRES REMOVAL, THE CONTRACTOR SHALL REPLACE SAID FENCE TO EQUAL OR BETTER CONDITION.

CFW MON 5990
N
E
EL = 661.77

CP #50
CAPPED IRON ROD
N 6934229.02
E 2342144.58
EL = 666.68

CP #51
CAPPED IRON ROD
N 6934515.63
E 2342238.47
EL = 665.03

CP #52
MAG NAIL SET
N 6934227.10
E 2342907.40
EL = 658.09

CP #53
CAPPED IRON ROD
N 6934305.68
E 2343218.41
EL = 655.95

CP #54
CAPPED IRON ROD
N 6933937.99
E 2343316.33
EL = 655.95

STATE OF TEXAS
JILL M. VAN HOEWYK
110940
LICENSED
PROFESSIONAL ENGINEER
3/24/2022

LAMB-STAR ENGINEERING, L.L.C.
5700 W. PLANO PARKWAY, SUITE 1000
PLANO, TEXAS 75093 (214) 440-3600
TEXAS REGISTERED ENGINEERING FIRM F-9073

Texas Department of Transportation

# EXISTING UTILITIES NOTES

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | | | 21 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |

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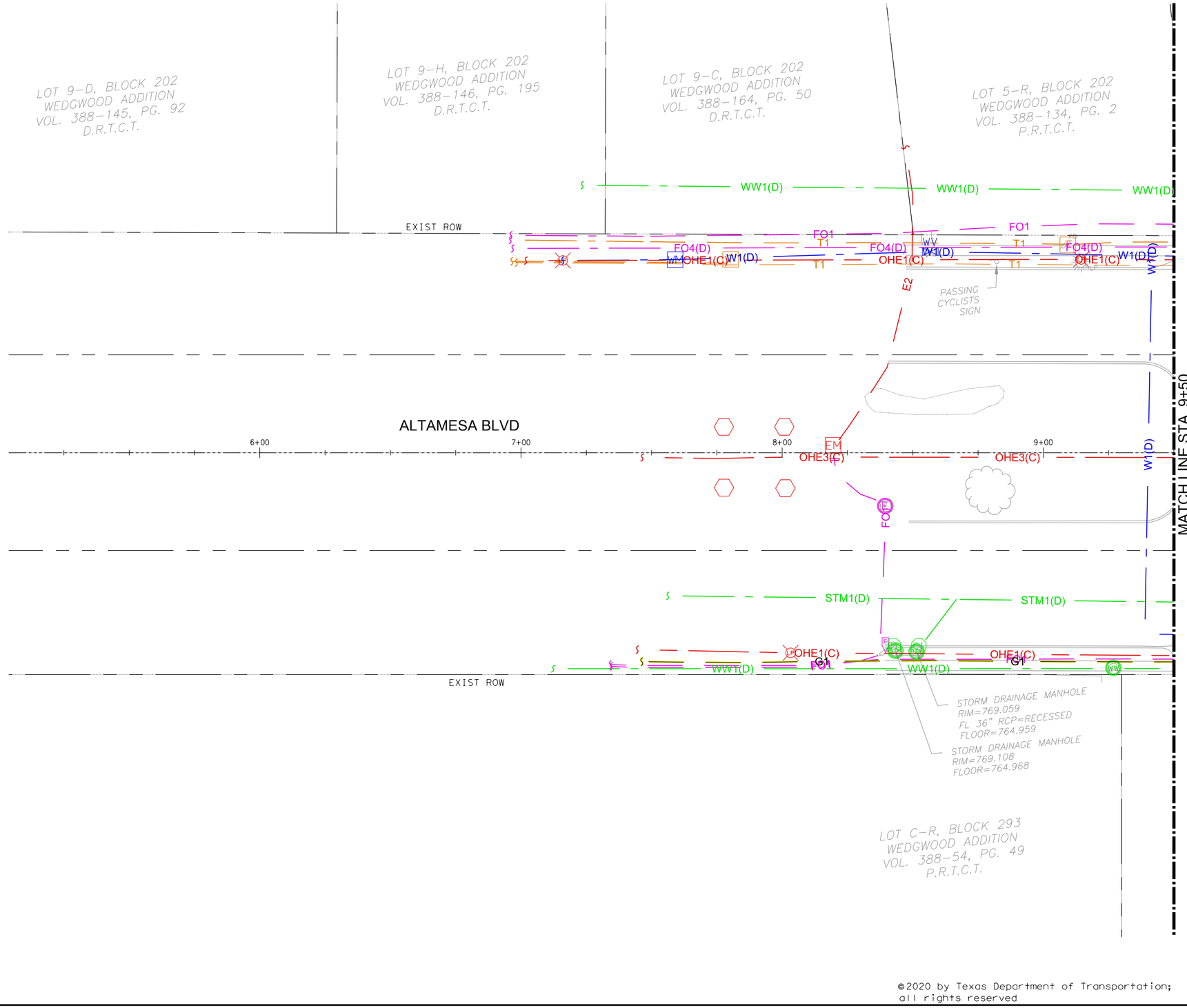




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GRAPHIC SCALE IN FEET

THE UTILITIES ON THE PLANS WERE COMPILED FROM VARIOUS SOURCES AND ARE INTENDED TO SHOW THE GENERAL EXISTENCE AND LOCATION OF UTILITIES IN THE AREA OF CONSTRUCTION.
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CP #50
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CP #51
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E 2342238.47
EL = 665.03

CP #52
MAG NAIL SET
N 6934227.10
E 2342907.40
EL = 658.09

CP #53
CAPPED IRON ROD
N 6934305.68
E 2343218.41
EL = 655.95

CP #54
CAPPED IRON ROD
N 6933937.99
E 2343316.33
EL = 655.95

STATE OF TEXAS
JILL M. VAN HOEWYK
110940
LICENSED
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3/24/2022

LAMB-STAR ENGINEERING, L.L.C.
5700 W. PLANO PARKWAY, SUITE 1000
PLANO, TEXAS 75093 (214) 440-3600
TEXAS REGISTERED ENGINEERING FIRM F-9073

Texas Department of Transportation

# EXISTING UTILITIES
# BEGIN PROJECT to STA. 9+50

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | | | 22 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |

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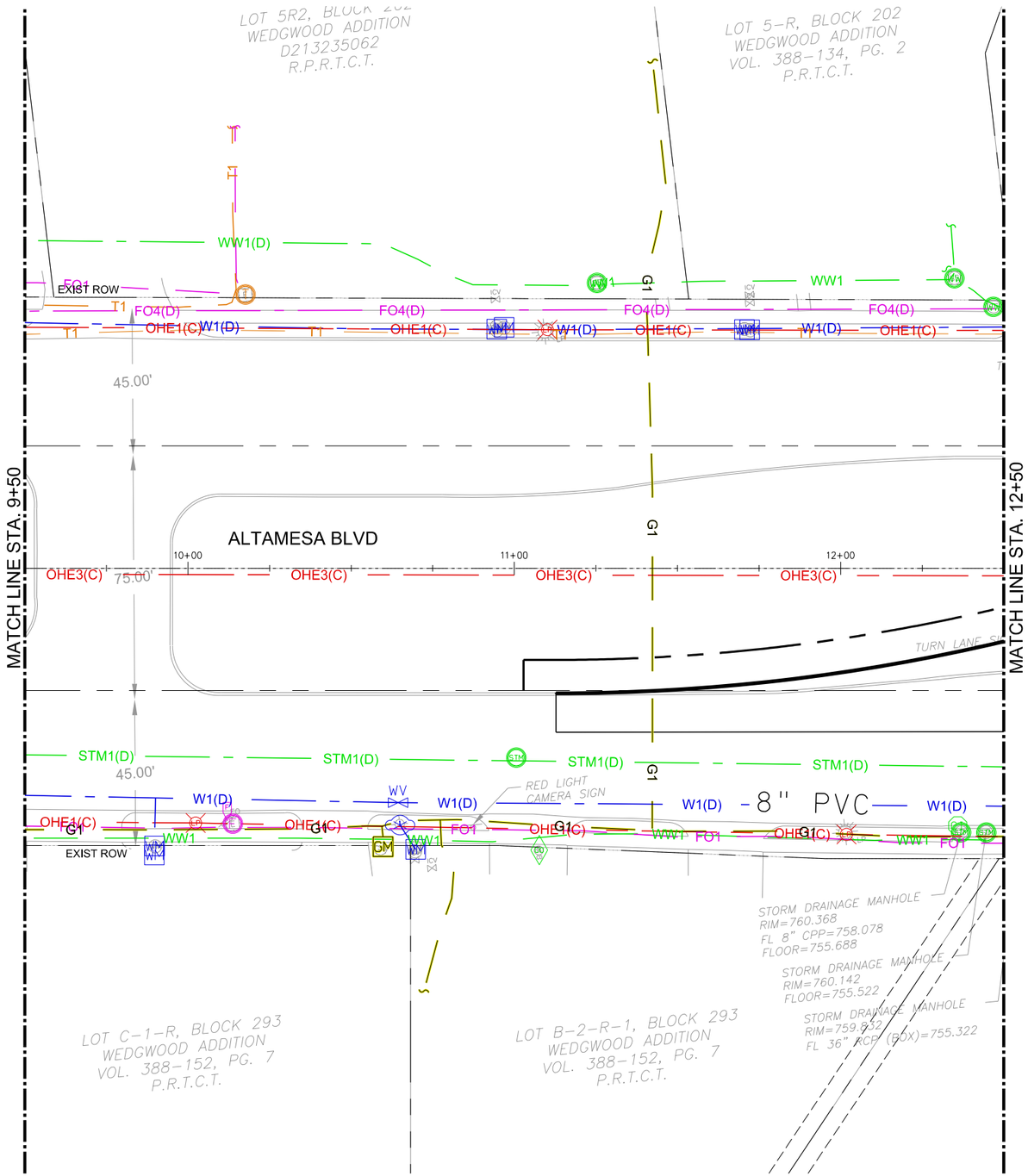


0 20 40 60

GRAPHIC SCALE IN FEET

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| TXU ENERGY | 1-800-233-2133 |
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| SBC TELEPHONE | 817-338-6819 |
| CHARTER COMM. | 817-509-6272 X3363 |
| ALL OTHER FACILITIES | 1-800-DIG-TES |

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PROJECT BENCHMARKS

| | |
|---|---|
| CFW MON 5990<br>N<br>E<br>EL = 661.77 | CP #52<br>MAG NAIL SET<br>N 6934227.10<br>E 2342907.40<br>EL = 658.09 |
| CP #50<br>CAPPED IRON ROD<br>N 6934229.02<br>E 2342144.58<br>EL = 666.68 | CP #53<br>CAPPED IRON ROD<br>N 6934305.68<br>E 2343218.41<br>EL = 655.95 |
| CP #51<br>CAPPED IRON ROD<br>N 6934515.63<br>E 2342238.47<br>EL = 665.03 | CP #54<br>CAPPED IRON ROD<br>N 6933937.99<br>E 2343316.33<br>EL = 655.95 |

STATE OF TEXAS
JILL M. VAN HOEWYK
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TEXAS REGISTERED ENGINEERING FIRM F-9073

Texas Department of Transportation

# EXISTING UTILITIES
# STA. 9+50 to STA. 12+50

| REVISIONS | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | | | 23 |
| | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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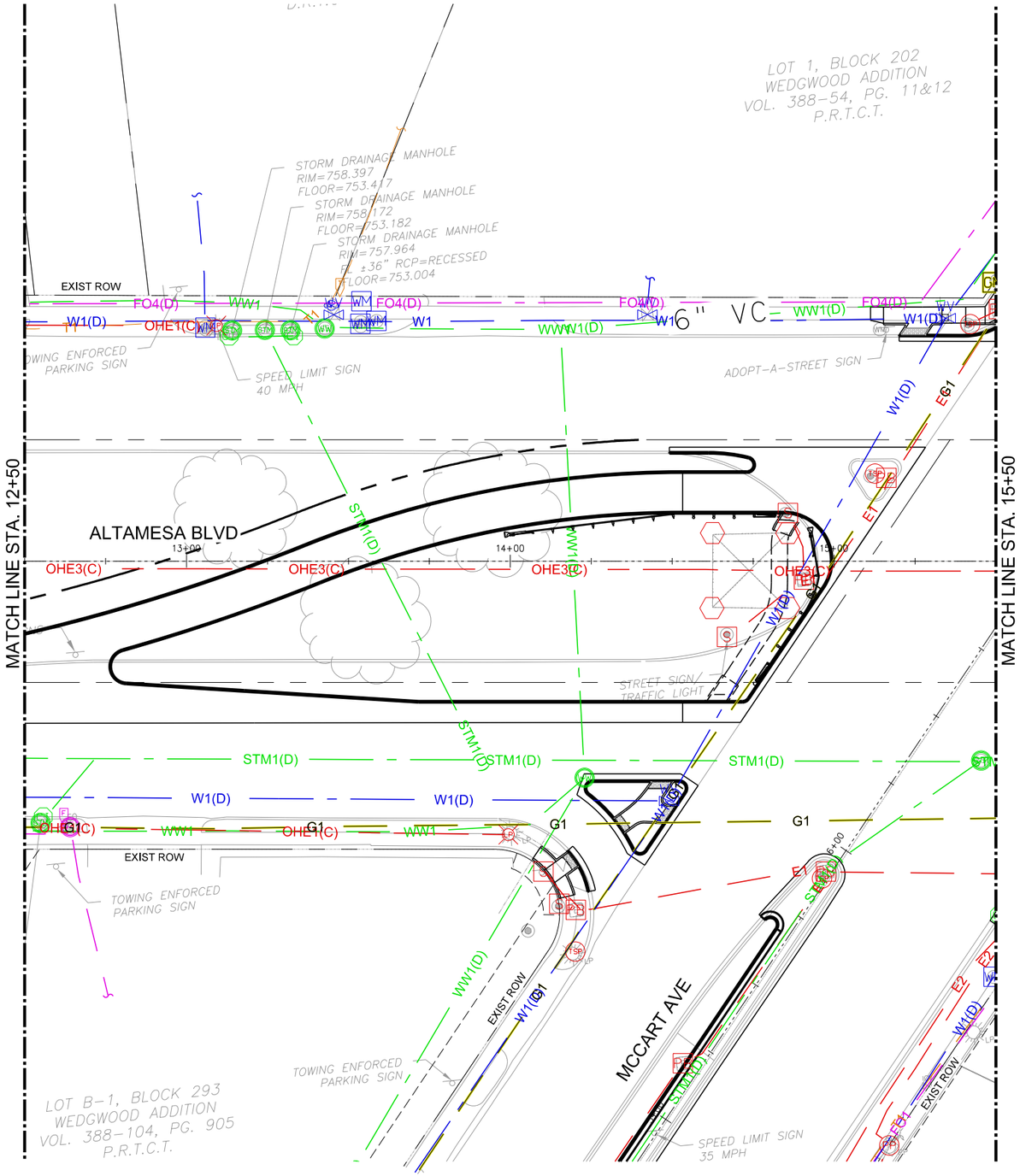


0 20 40 60

GRAPHIC SCALE IN FEET

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| | |
|---|---|
| CALL BEFORE YOU DIG | 1-800-336-9193 |
| AT&T | 1-800-878-8711 |
| FORT WORTH WATER DEPT. - FIELD OPERATIONS | 817-392-8296 |
| FORT WORTH T&PW | 817-392-8100 |
| ATMOS ENERGY | 817-215-4366 |
| ONCOR GAS & ELECTRIC | 817-215-6214 |
| TXU ENERGY | 1-800-233-2133 |
| TRI-COUNTY ELECTRIC | 817-444-3201 |
| SBC TELEPHONE | 817-338-6819 |
| CHARTER COMM. | 817-509-6272 X3363 |
| ALL OTHER FACILITIES | 1-800-DIG-TES |

**GENERAL NOTES:**
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| CFW MON 5990<br>N<br>E<br>EL = 661.77 | CP #52<br>MAG NAIL SET<br>N 6934227.10<br>E 2342907.40<br>EL = 658.09 |
| CP #50<br>CAPPED IRON ROD<br>N 6934229.02<br>E 2342144.58<br>EL = 666.68 | CP #53<br>CAPPED IRON ROD<br>N 6934305.68<br>E 2343218.41<br>EL = 655.95 |
| CP #51<br>CAPPED IRON ROD<br>N 6934515.63<br>E 2342238.47<br>EL = 665.03 | CP #54<br>CAPPED IRON ROD<br>N 6933937.99<br>E 2343316.33<br>EL = 655.95 |

STATE OF TEXAS
JILL M. VAN HOEWYK
110940
LICENSED PROFESSIONAL ENGINEER
3/24/2022

LAMB-STAR ENGINEERING, L.L.C.
5700 W. PLANO PARKWAY, SUITE 1000
PLANO, TEXAS 75093 (214) 440-3600
TEXAS REGISTERED ENGINEERING FIRM F-9073

Texas Department of Transportation

# EXISTING UTILITIES
# STA. 12+50 to STA. 15+50

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | | | 24 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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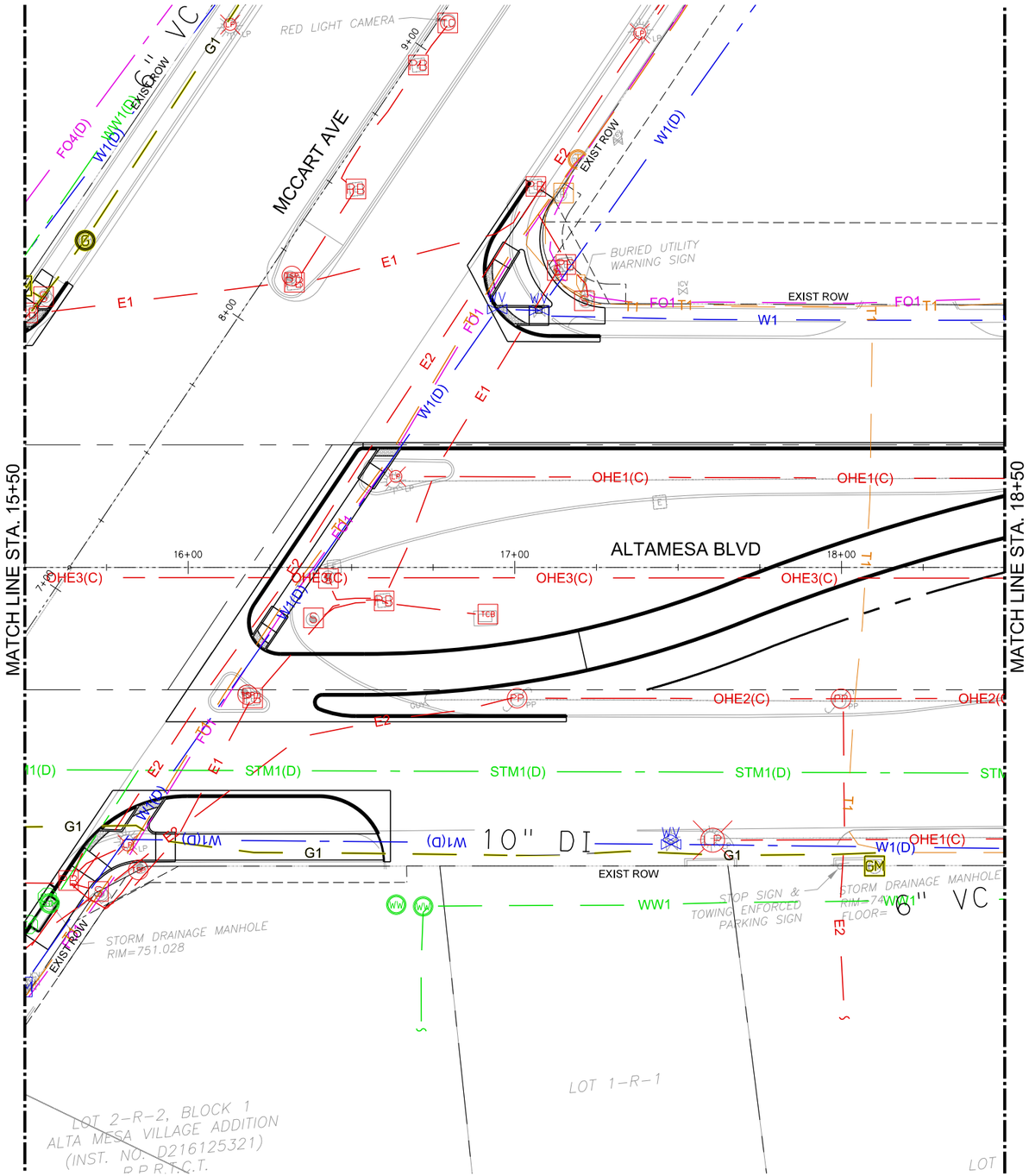


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| TXU ENERGY | 1-800-233-2133 |
| TRI-COUNTY ELECTRIC | 817-444-3201 |
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# EXISTING UTILITIES
# STA. 15+50 to STA. 18+50

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | | | 25 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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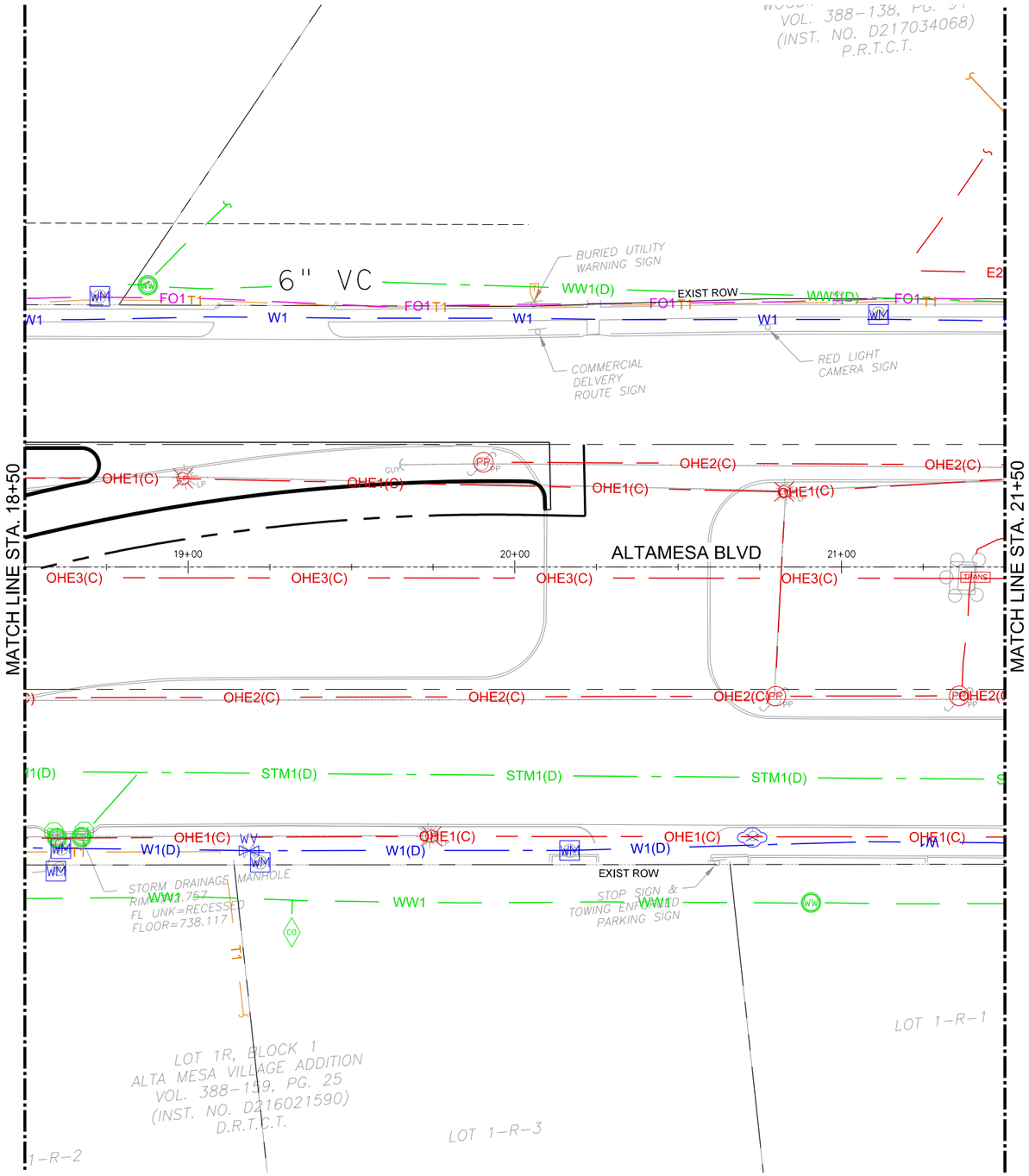


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# EXISTING UTILITIES
# STA. 18+50 to STA. 21+50

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|---|---|---|---|---|
| | 6 | | | 26 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
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| | 0902 | 90 | 119 | McCART |



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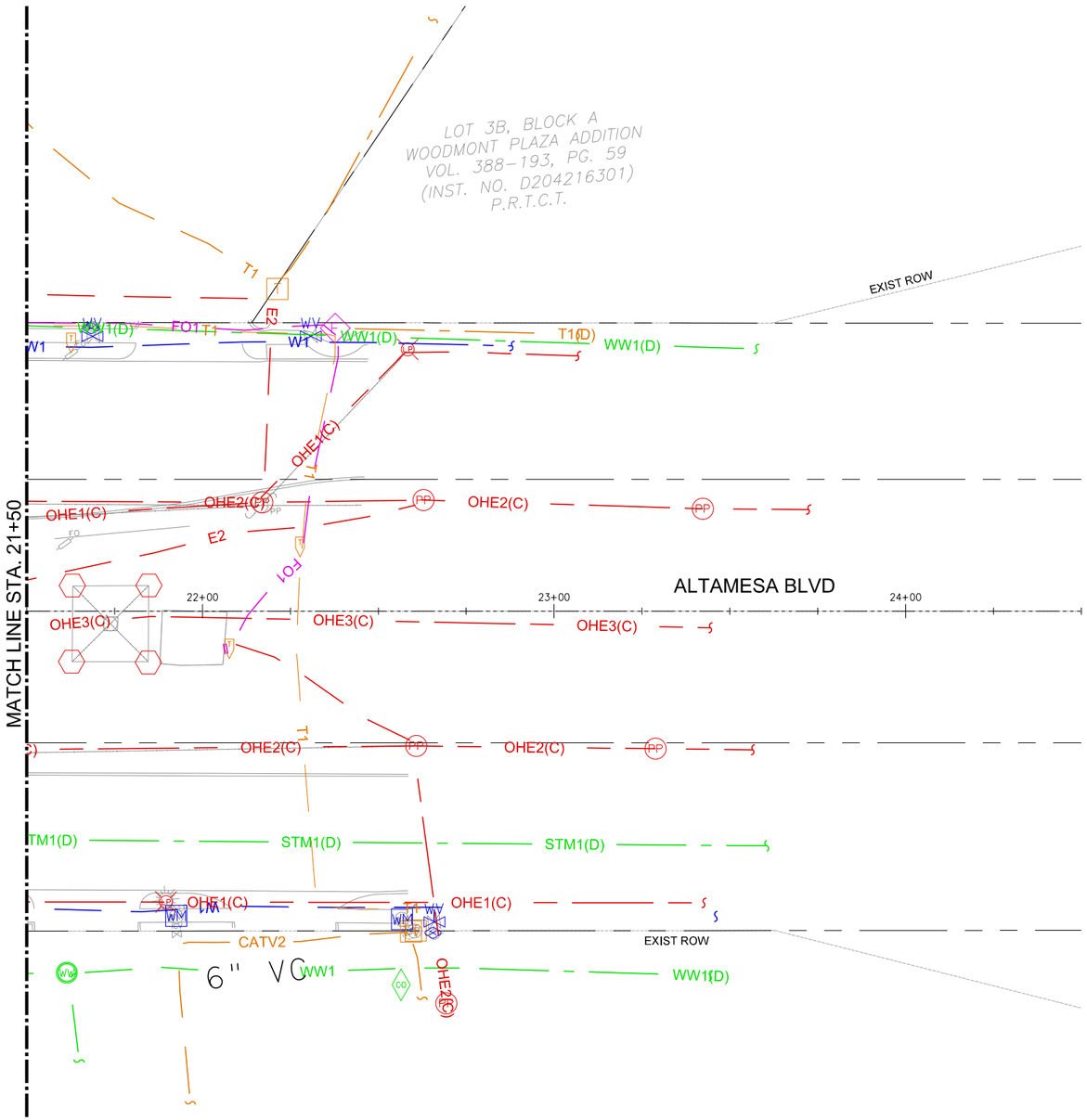


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Texas Department of Transportation

# EXISTING UTILITIES
# STA. 21+50 to STA. 24+50

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | | | 27 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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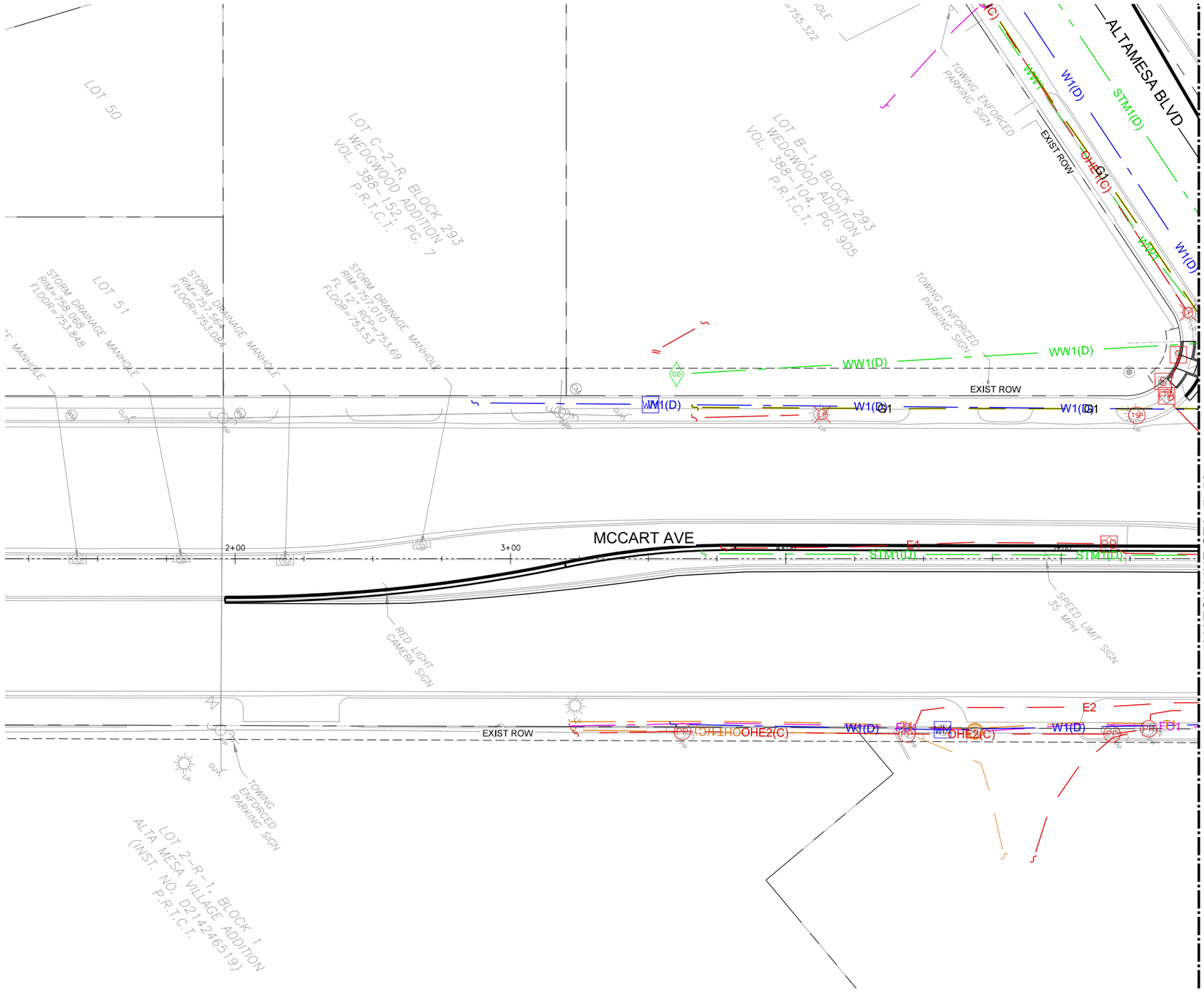


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# EXISTING UTILITIES
# STA. 2+50 to STA. 5+50

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | | | 28 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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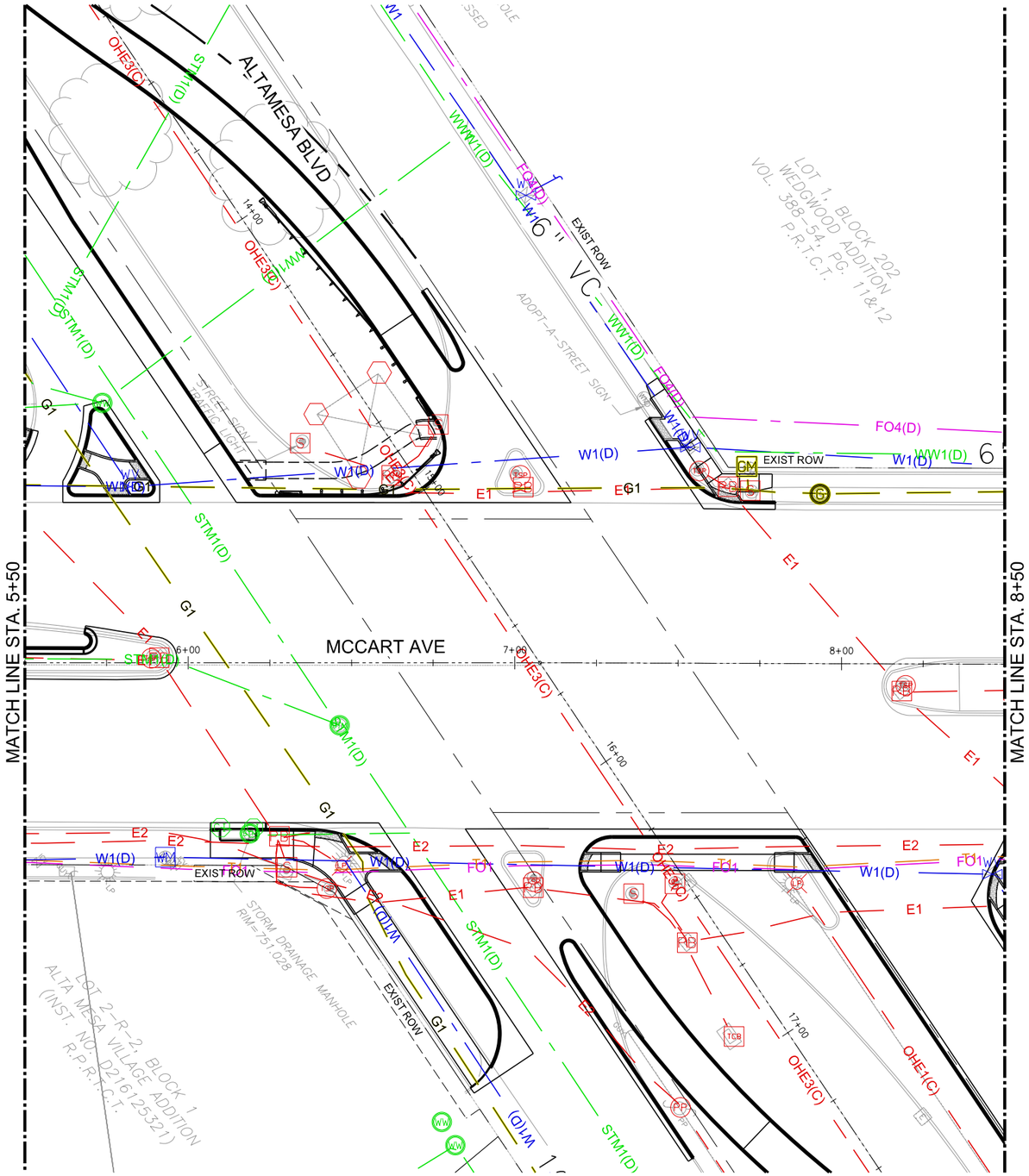


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# EXISTING UTILITIES
# STA. 5+50 to STA. 8+50

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | | | 29 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
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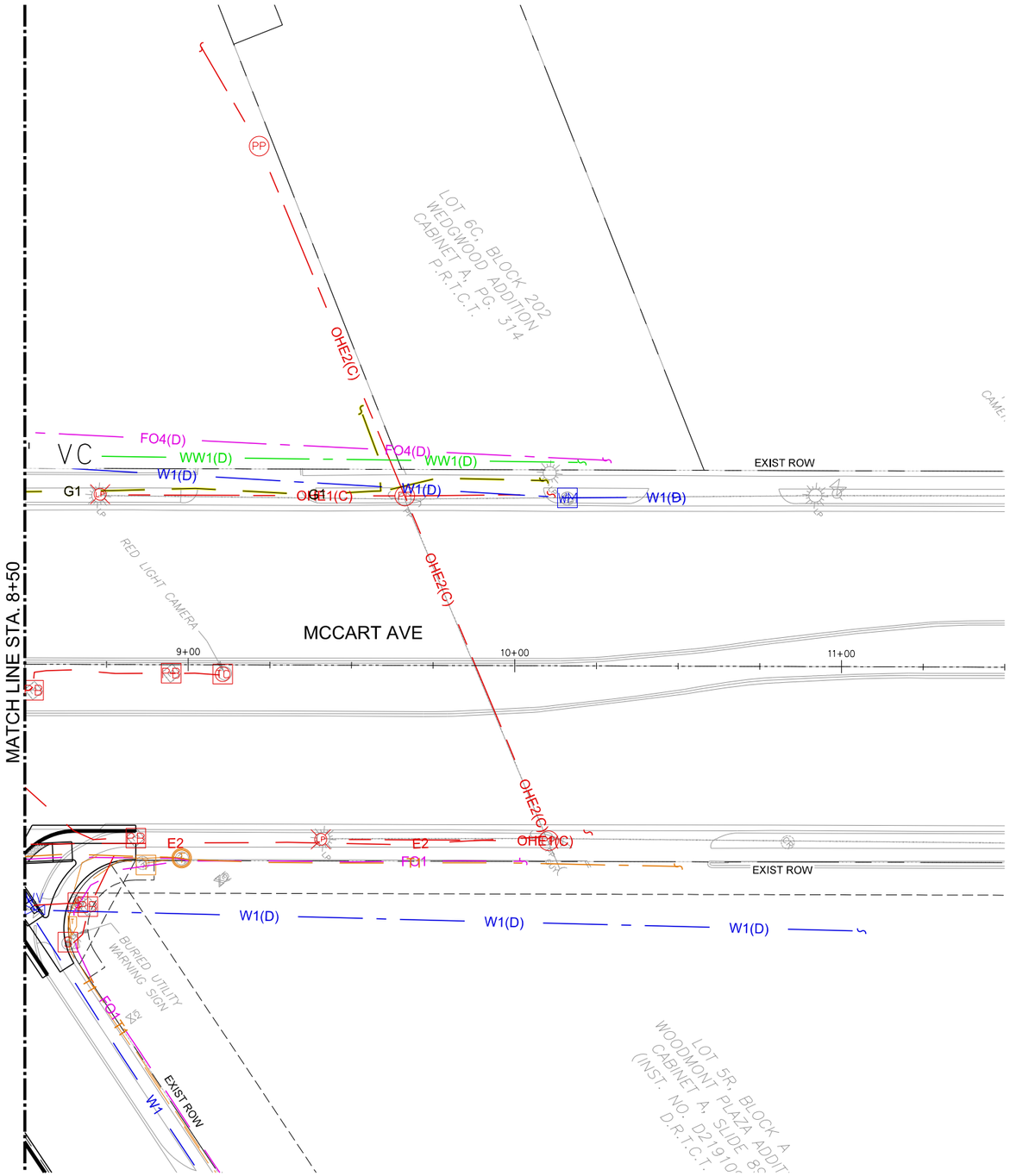


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CONTRACTOR TO PROTECT EXISTING STRUCTURES. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR OR REPLACEMENT IN THE EVENT OF DAMAGE.

IN THE EVENT THAT AN EXISTING FENCE REQUIRES REMOVAL, THE CONTRACTOR SHALL REPLACE SAID FENCE TO EQUAL OR BETTER CONDITION.

PROJECT BENCHMARKS

CFW MON 5990
N
E
EL = 661.77

CP #50
CAPPED IRON ROD
N 6934229.02
E 2342144.58
EL = 666.68

CP #51
CAPPED IRON ROD
N 6934515.63
E 2342238.47
EL = 665.03

CP #52
MAG NAIL SET
N 6934227.10
E 2342907.40
EL = 658.09

CP #53
CAPPED IRON ROD
N 6934305.68
E 2343218.41
EL = 655.95

CP #54
CAPPED IRON ROD
N 6933937.99
E 2343316.33
EL = 655.95

STATE OF TEXAS
JILL M. VAN HOEWYK
110940
LICENSED PROFESSIONAL ENGINEER
3/24/2022

LAMB-STAR ENGINEERING, L.L.C.
5700 W. PLANO PARKWAY, SUITE 1000
PLANO, TEXAS 75093 (214) 440-3600
TEXAS REGISTERED ENGINEERING FIRM F-9073

Texas Department of Transportation

# EXISTING UTILITIES
# STA. 8+50 to STA. 11+50

| REVISIONS | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | | | 30 |
| | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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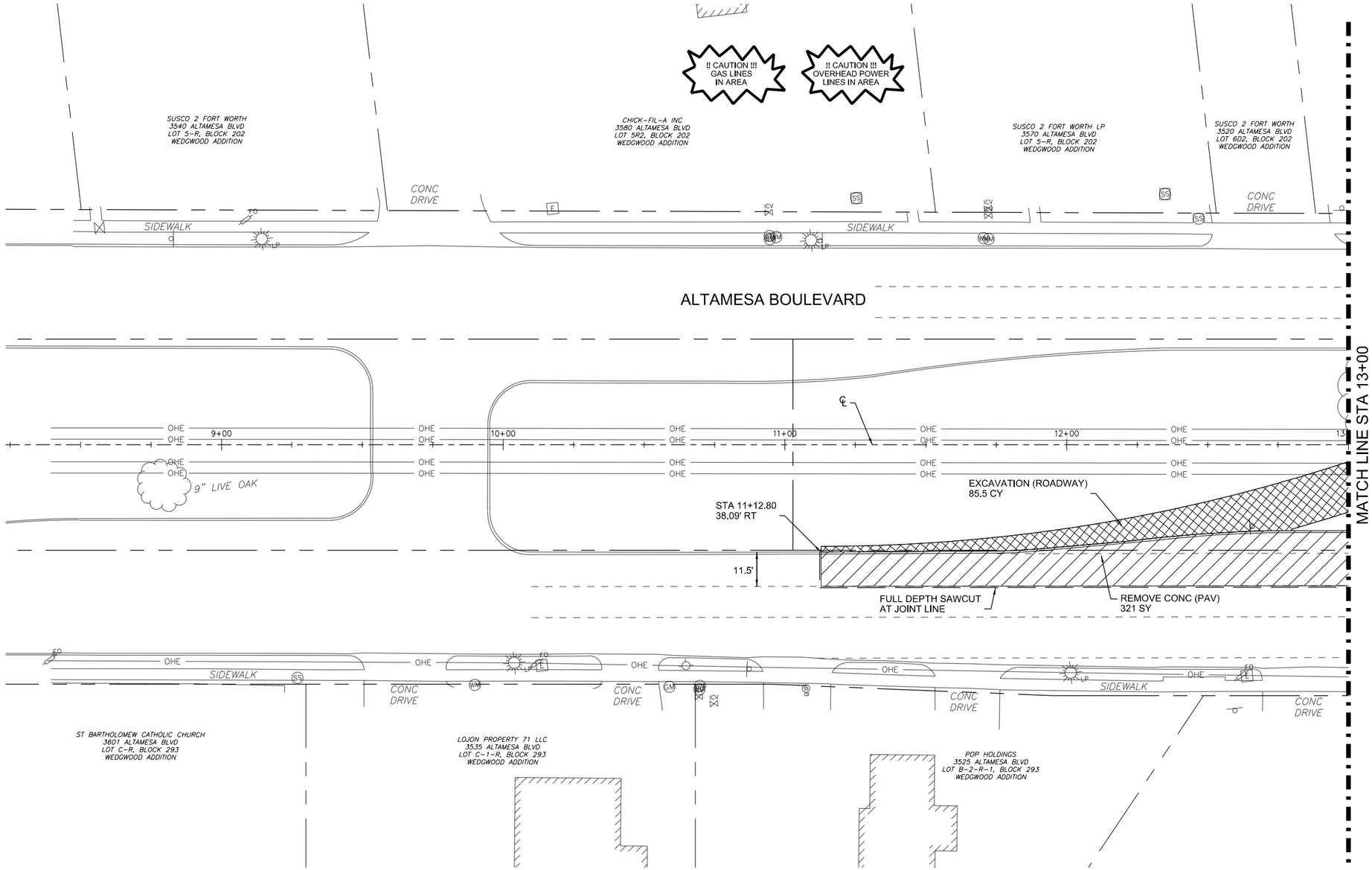
L:\Projects\B200625.01 - Multatech - CFW Intersections - McCart Ave Altamesa\CAD\Eng\Sheets\CFW*MCCART*SUE*03.dgn




PROJECT BENCHMARKS

| | |
|---|---|
| CFW MON 8309<br>N 6919862.06<br>E 2318060.05<br>EL = 743.06 | CP #52<br>CAPPED IRON ROD SET<br>N 6921682.871<br>E 2317470.295<br>EL = 745.02 |
| CP #50<br>CAPPED IRON ROD SET<br>N 6921186.877<br>E 2317156.838<br>EL = 749.04 | CP #53<br>CAPPED IRON ROD SET<br>N 6921270.052<br>E 2316408.297<br>EL = 769.59 |
| CP #51<br>CAPPED IRON ROD SET<br>N 6921134.478<br>E 2317579.184<br>EL = 738.81 | CP #54<br>CAPPED IRON ROD<br>N 6920747.072<br>E 2316690.133<br>758.90 |

0 20 40 60

GRAPHIC SCALE IN FEET

NOTES

1. CURB REMOVAL SUBSIDIARY TO CONCRETE PAVEMENT REMOVAL AND NOT A SEPARTE PAY ITEM.
2. REMOVAL STATIONS ARE FROM CENTERLINE ALTAMESA BLVD UNLESS OTHERWISE NOTED.
3. REFER TO PAVEMENT MARKING AND SIGNAGE REMOVAL SHEETS.
4. REFER TO TRAFFIC SIGNAL REMOVAL SHEETS.

LEGEND

- CONCRETE PAVEMENT REMOVAL
- SIDEWALK/RAMP REMOVAL
- UNCLASSIFIED EXCAVATION
- PAVEMENT JOINT LINE

STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED
PROFESSIONAL ENGINEER
07/07/2022


MULTATECH ARCHITECTS ENGINEERS
2821 WEST 7TH ST
SUITE 400
FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351


Texas Department of Transportation

# PAVEMENT REMOVAL PLAN ALTAMESA BLVD BEGIN PROJECT TO STA 13+00

SHEET 1 OF 4

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | |
| REVISIONS | STATE | DISTRICT | COUNTY | 31 |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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LEGEND

- CONCRETE PAVEMENT REMOVAL
- SIDEWALK/RAMP REMOVAL
- UNCLASSIFIED EXCAVATION
- PAVEMENT JOINT LINE
- TREE REMOVAL

PROJECT BENCHMARKS

CFW MON 8309
N 6919862.06
E 2318060.05
EL = 743.06

CP #50
CAPPED IRON ROD SET
N 6921186.877
E 2317156.838
EL = 749.04

CP #51
CAPPED IRON ROD SET
N 6921134.478
E 2317579.184
EL = 738.81

CP #52
CAPPED IRON ROD SET
N 6921682.871
E 2317470.295
EL = 745.02

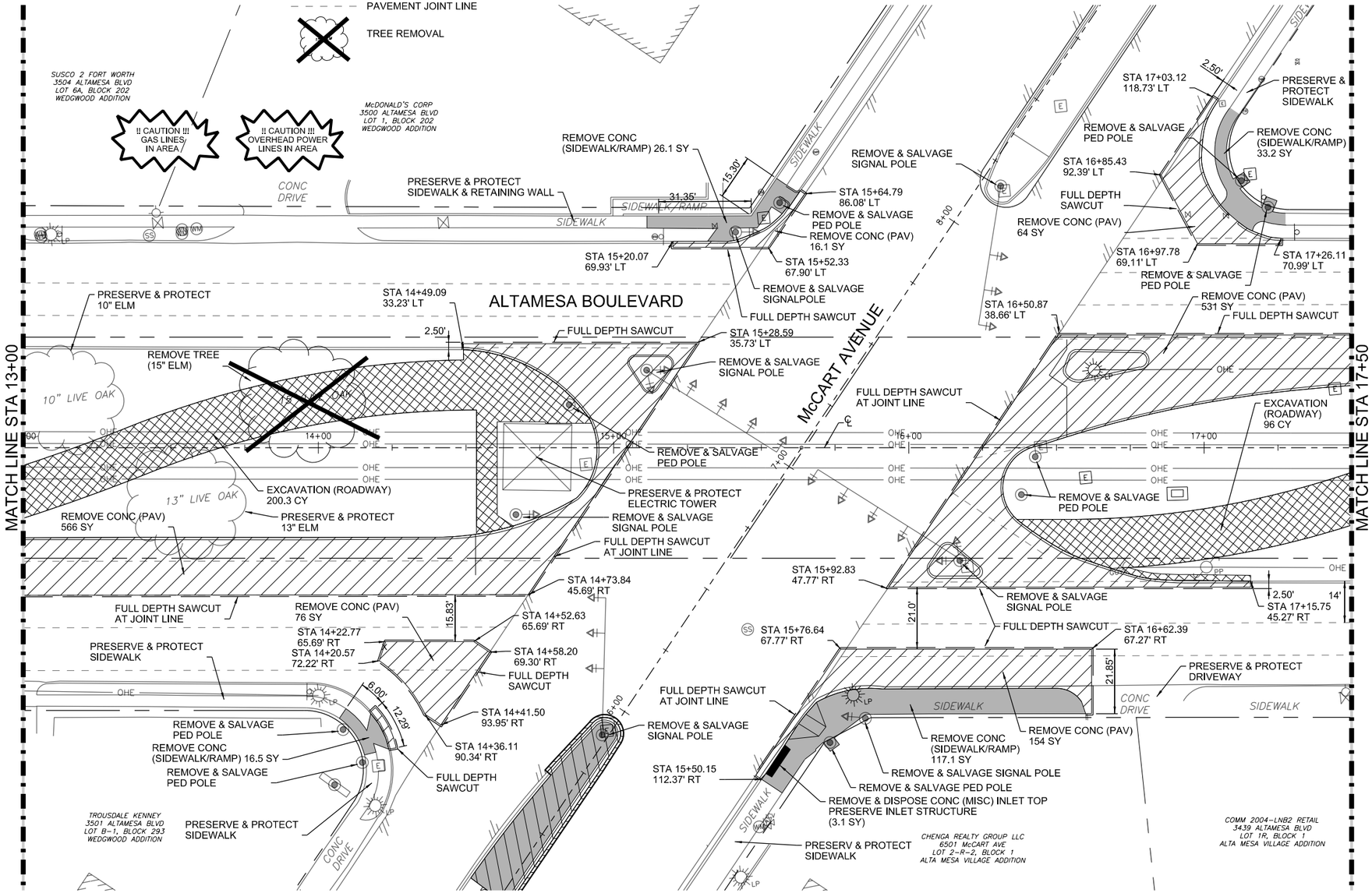
CP #53
CAPPED IRON ROD SET
N 6921270.052
E 2316408.297
EL = 769.59

CP #54
CAPPED IRON ROD
N 6920747.072
E 2316690.133
758.90

0 20 40 60
GRAPHIC SCALE IN FEET

NOTES

1. CURB REMOVAL SUBSIDIARY TO CONCRETE PAVEMENT REMOVAL AND NOT A SEPARTE PAY ITEM.
2. REMOVAL STATIONS ARE FROM CENTERLINE ALTAMESA BLVD UNLESS OTHERWISE NOTED.
3. REFER TO PAVEMENT MARKING AND SIGNAGE REMOVAL SHEETS.
4. REFER TO TRAFFIC CONTROL PHASING PLANS FOR ORDER OF SIGNBAL POLE/PED POLE REMOVAL.




SEE McCART AVE REMOVAL PLANS FOR ADDITIONAL INFORMATION

STATE OF TEXAS
ERIC A. CANALES
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LICENSED PROFESSIONAL ENGINEER
07/07/2022


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TBPE Reg #F351


Texas Department of Transportation

# PAVEMENT REMOVAL PLAN ALTAMESA BLVD STA 13+00 TO STA 17+50

SHEET 2 OF 4

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | |
| REVISIONS | STATE | DISTRICT | COUNTY | 32 |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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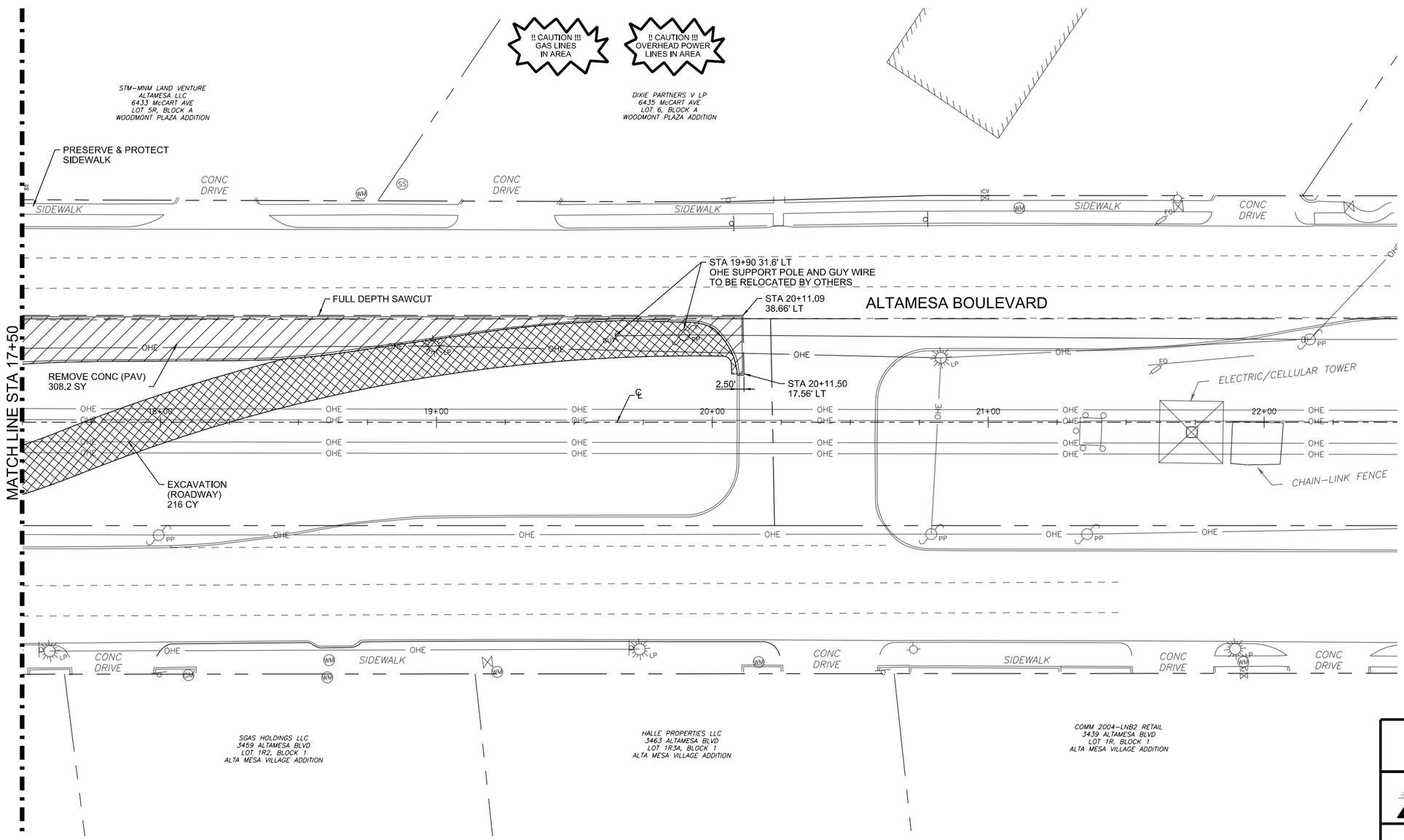


PROJECT BENCHMARKS

| | |
|---|---|
| CFW MON 8309<br>N 6919862.06<br>E 2318060.05<br>EL = 743.06 | CP #52<br>CAPPED IRON ROD SET<br>N 6921682.871<br>E 2317470.295<br>EL = 745.02 |
| CP #50<br>CAPPED IRON ROD SET<br>N 6921186.877<br>E 2317156.838<br>EL = 749.04 | CP #53<br>CAPPED IRON ROD SET<br>N 6921270.052<br>E 2316408.297<br>EL = 769.59 |
| CP #51<br>CAPPED IRON ROD SET<br>N 6921134.478<br>E 2317579.184<br>EL = 738.81 | CP #54<br>CAPPED IRON ROD<br>N 6920747.072<br>E 2316690.133<br>758.90 |

0 20 40 60

GRAPHIC SCALE IN FEET

NOTES

1. CURB REMOVAL SUBSIDIARY TO CONCRETE PAVEMENT REMOVAL AND NOT A SEPARTE PAY ITEM.
2. REMOVAL STATIONS ARE FROM CENTERLINE ALTAMESA BLVD UNLESS OTHERWISE NOTED.
3. REFER TO PAVEMENT MARKING AND SIGNAGE REMOVAL SHEETS.
4. REFER TO TRAFFIC SIGNAL REMOVAL SHEETS.

LEGEND

- CONCRETE PAVEMENT REMOVAL
- SIDEWALK/RAMP REMOVAL
- UNCLASSIFIED EXCAVATION
- PAVEMENT JOINT LINE

STATE OF TEXAS
ERIC A. CANALES
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LICENSED
PROFESSIONAL ENGINEER
07/07/2022

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FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351

Texas Department of Transportation

# PAVEMENT REMOVAL PLAN
# ALTAMESA BLVD
# STA 17+50 TO END PPROJECT

SHEET 3 OF 4

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 33 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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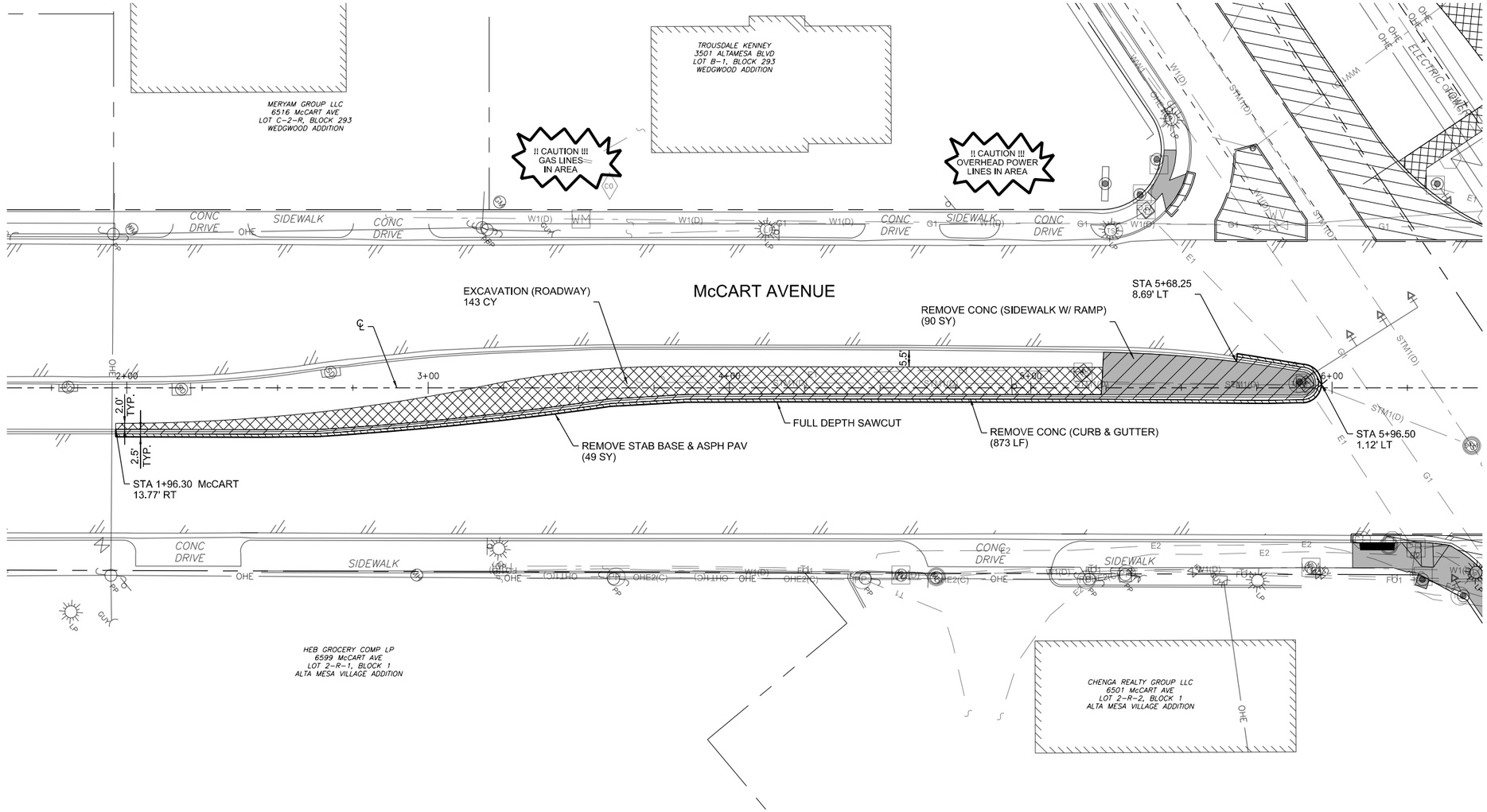


PROJECT BENCHMARKS

| | |
|---|---|
| CFW MON 8309<br>N 6919862.06<br>E 2318060.05<br>EL = 743.06 | CP #52<br>CAPPED IRON ROD SET<br>N 6921682.871<br>E 2317470.295<br>EL = 745.02 |
| CP #50<br>CAPPED IRON ROD SET<br>N 6921186.877<br>E 2317156.838<br>EL = 749.04 | CP #53<br>CAPPED IRON ROD SET<br>N 6921270.052<br>E 2316408.297<br>EL = 769.59 |
| CP #51<br>CAPPED IRON ROD SET<br>N 6921134.478<br>E 2317579.184<br>EL = 738.81 | CP #54<br>CAPPED IRON ROD<br>N 6920747.072<br>E 2316690.133<br>758.90 |

0 20 40 60

GRAPHIC SCALE IN FEET

NOTES

1. REMOVAL STATIONS ARE FROM CENTERLINE McCART AVE UNLESS OTHERWISE NOTED.
2. REFER TO PAVEMENT MARKING AND SIGNAGE REMOVAL SHEETS.
3. REFER TO TRAFFIC SIGNAL REMOVAL SHEETS.

LEGEND

- CONCRETE PAVEMENT REMOVAL
- SIDEWALK/RAMP REMOVAL
- UNCLASSIFIED EXCAVATION
- STAB BASE & ASPH PVT REMOVAL
- PAVEMENT JOINT LINE

STATE OF TEXAS
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LICENSED
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07/07/2022

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FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F-351

Texas Department of Transportation

# PAVEMENT REMOVAL PLAN McCART AVE

SHEET 4 OF 4

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 34 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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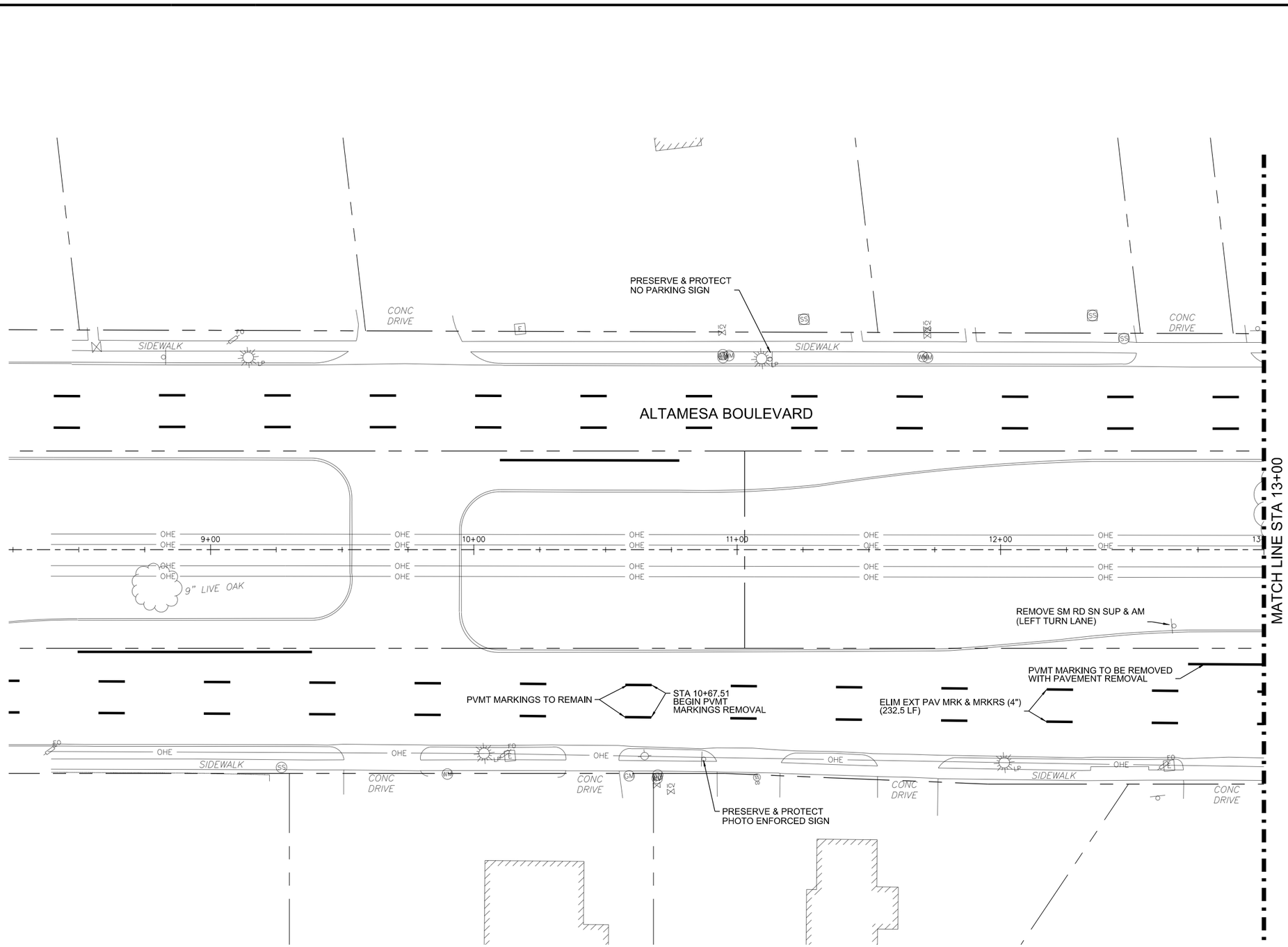
PROJECT BENCHMARKS

| | |
|---|---|
| CFW MON 8309<br>N 6919862.06<br>E 2318060.05<br>EL = 743.06 | CP #52<br>CAPPED IRON ROD SET<br>N 6921682.871<br>E 2317470.295<br>EL = 745.02 |
| CP #50<br>CAPPED IRON ROD SET<br>N 6921186.877<br>E 2317156.838<br>EL = 749.04 | CP #53<br>CAPPED IRON ROD SET<br>N 6921270.052<br>E 2316408.297<br>EL = 769.59 |
| CP #51<br>CAPPED IRON ROD SET<br>N 6921134.478<br>E 2317579.184<br>EL = 738.81 | CP #54<br>CAPPED IRON ROD<br>N 6920747.072<br>E 2316690.133<br>758.90 |




0 20 40 60

GRAPHIC SCALE IN FEET

NOTES

1. REMOVAL STATIONS ARE FROM CENTERLINE ALTAMESA BLVD UNLESS OTHERWISE NOTED.
2. REFER TO TRAFFIC SIGNAL REMOVAL SHEETS.
3. NO PAYMENT FOR PAVEMENT MARKINGS REMOVED WITH PAVEMENT REMOVAL.

STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED
PROFESSIONAL ENGINEER
07/07/2022


MULTATECH ARCHITECTS ENGINEERS
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SUITE 400
FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351


Texas Department of Transportation

# PAVEMENT MARKINGS & SIGNAGE REMOVAL PLAN ALTAMESA BLVD BEGIN PROJECT TO STA 13+00

SHEET 1 OF 5

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 35 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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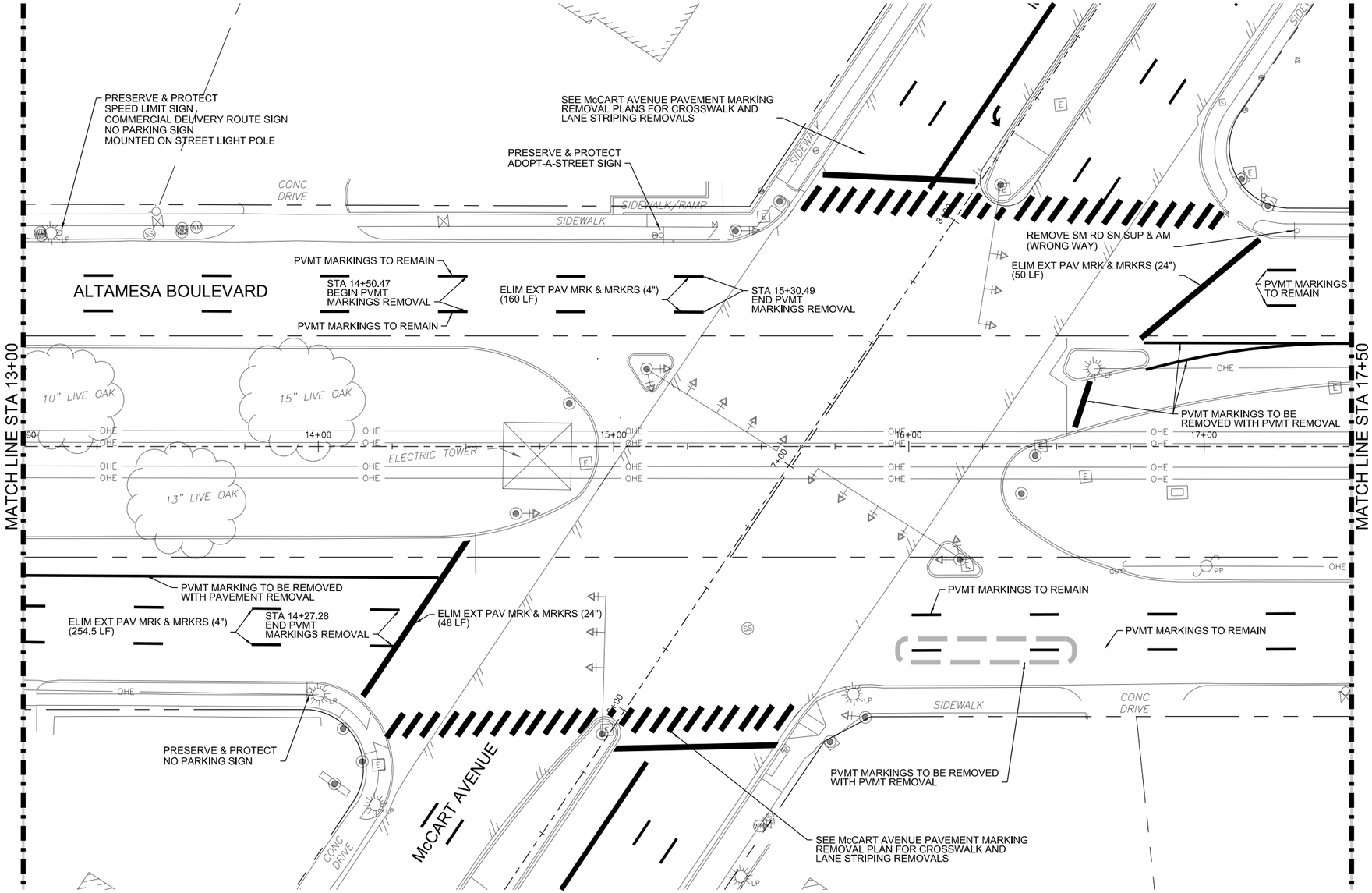


PROJECT BENCHMARKS

CFW MON 8309
N 6919862.06
E 2318060.05
EL = 743.06

CP #50
CAPPED IRON ROD SET
N 6921186.877
E 2317156.838
EL = 749.04

CP #51
CAPPED IRON ROD SET
N 6921134.478
E 2317579.184
EL = 738.81

CP #52
CAPPED IRON ROD SET
N 6921682.871
E 2317470.295
EL = 745.02

CP #53
CAPPED IRON ROD SET
N 6921270.052
E 2316408.297
EL = 769.59

CP #54
CAPPED IRON ROD
N 6920747.072
E 2316690.133
758.90

0 20 40 60
GRAPHIC SCALE IN FEET

NOTES

1. REMOVAL STATIONS ARE FROM CENTERLINE ALTAMESA BLVD UNLESS OTHERWISE NOTED.
2. REFER TO TRAFFIC SIGNAL REMOVAL SHEETS.
3. NO PAYMENT FOR PAVEMENT PARKINGS REMOVED WITH PAVEMENT REMOVAL.

STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED PROFESSIONAL ENGINEER
07/07/2022

MULTATECH ARCHITECTS ENGINEERS
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FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351

Texas Department of Transportation

# PAVEMENT MARKINGS & SIGNAGE REMOVAL PLAN ALTAMESA BLVD STA 13+00 TO STA 17+50

SHEET 2 OF 5

| REVISIONS | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 36 |
| | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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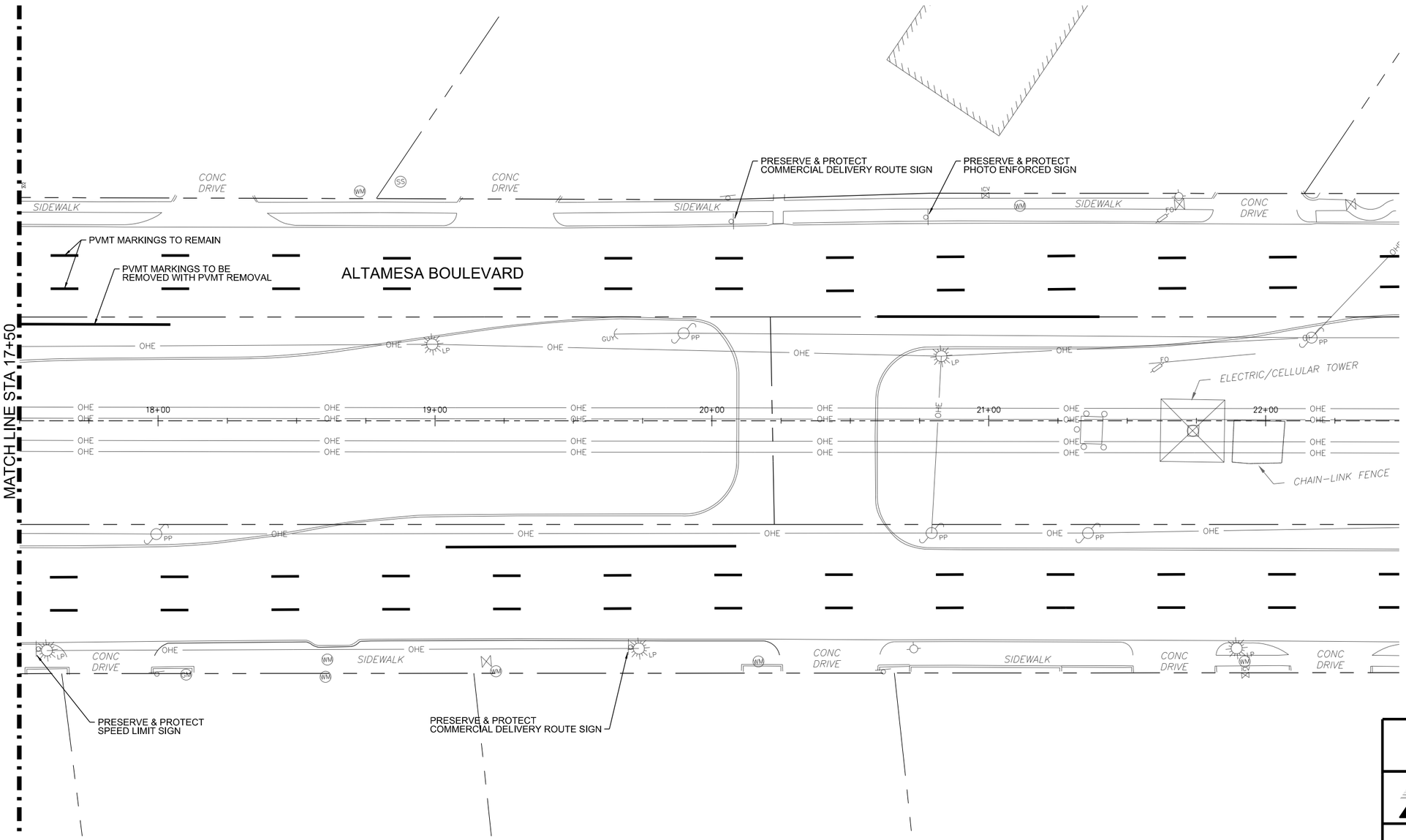


PROJECT BENCHMARKS

| | |
|---|---|
| CFW MON 8309<br>N 6919862.06<br>E 2318060.05<br>EL = 743.06 | CP #52<br>CAPPED IRON ROD SET<br>N 6921682.871<br>E 2317470.295<br>EL = 745.02 |
| CP #50<br>CAPPED IRON ROD SET<br>N 6921186.877<br>E 2317156.838<br>EL = 749.04 | CP #53<br>CAPPED IRON ROD SET<br>N 6921270.052<br>E 2316408.297<br>EL = 769.59 |
| CP #51<br>CAPPED IRON ROD SET<br>N 6921134.478<br>E 2317579.184<br>EL = 738.81 | CP #54<br>CAPPED IRON ROD<br>N 6920747.072<br>E 2316690.133<br>758.90 |

0 20 40 60

GRAPHIC SCALE IN FEET

NOTES

1. REMOVAL STATIONS ARE FROM CENTERLINE ALTAMESA BLVD UNLESS OTHERWISE NOTED.
2. REFER TO TRAFFIC SIGNAL REMOVAL SHEETS.
3. NO PAYMENT FOR PAVEMENT MARKINGS REMOVED WITH PAVEMENT REMOVAL.

STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED PROFESSIONAL ENGINEER
07/07/2022

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SUITE 400
FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351

Texas Department of Transportation

# PAVEMENT MARKINGS & SIGNAGE REMOVAL PLAN ALTAMESA BLVD STA 17+50 TO END PROJECT

SHEET 3 OF 5

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 37 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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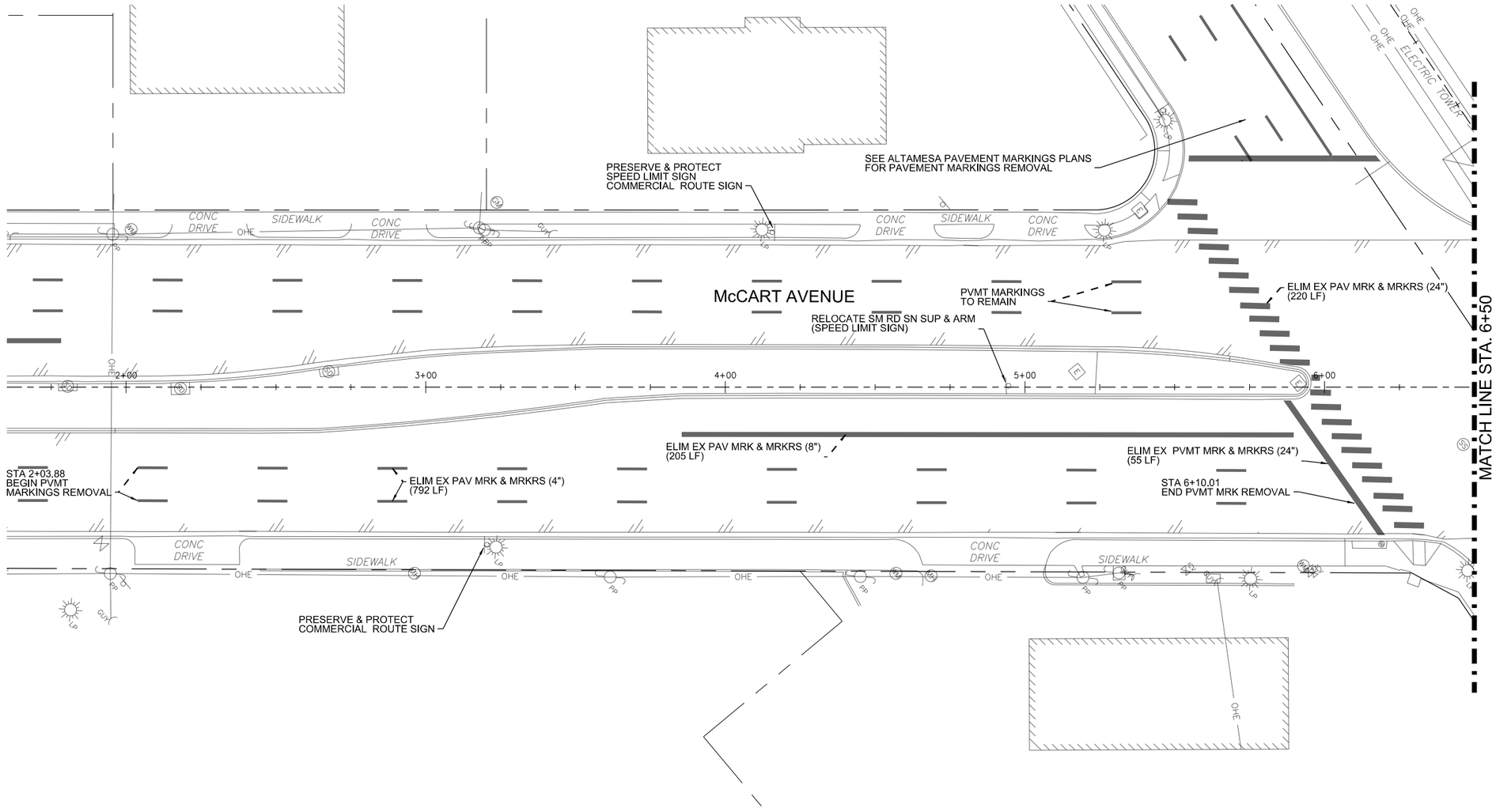


PROJECT BENCHMARKS

CFW MON 8309
N 6919862.06
E 2318060.05
EL = 743.06

CP #50
CAPPED IRON ROD SET
N 6921186.877
E 2317156.838
EL = 749.04

CP #51
CAPPED IRON ROD SET
N 6921134.478
E 2317579.184
EL = 738.81

CP #52
CAPPED IRON ROD SET
N 6921682.871
E 2317470.295
EL = 745.02

CP #53
CAPPED IRON ROD SET
N 6921270.052
E 2316408.297
EL = 769.59

CP #54
CAPPED IRON ROD
N 6920747.072
E 2316690.133
758.90

0 20 40 60
GRAPHIC SCALE IN FEET

NOTES

1. REMOVAL STATIONS ARE FROM CENTERLINE McCART AVENUE UNLESS OTHERWISE NOTED.
2. REFER TO TRAFFIC SIGNAL REMOVAL SHEETS.
3. NO PAYMENT FOR PAVEMENT MARKINGS REMOVAL WITH PAVEMENT REMOVAL.

STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED
PROFESSIONAL ENGINEER
07/07/2022


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FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351


Texas Department of Transportation

# PAVEMENT MARKINGS & SIGNAGE REMOVAL PLAN McCART AVE

SHEET 4 OF 5

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 38 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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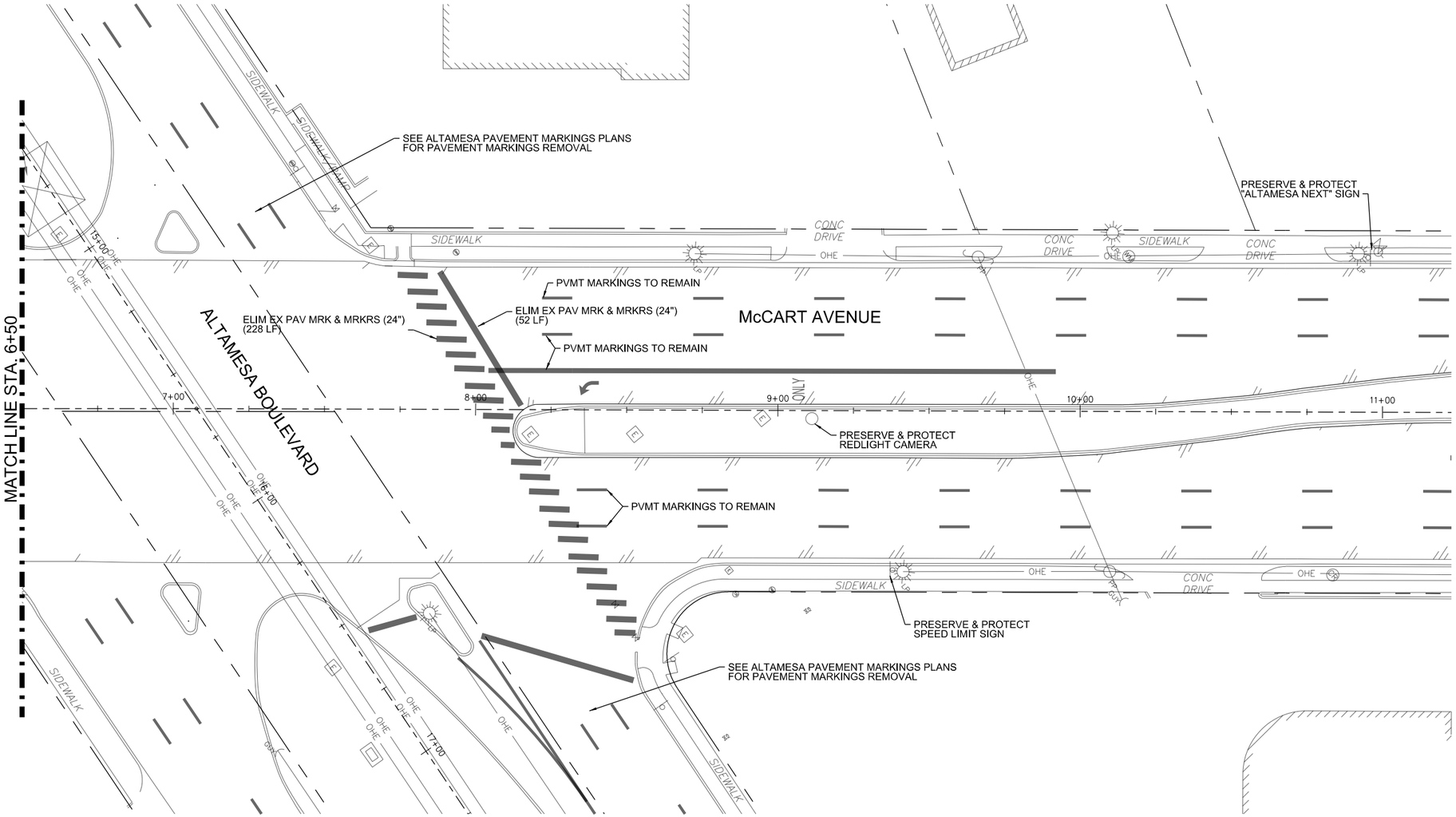


PROJECT BENCHMARKS

| | |
|---|---|
| CFW MON 8309<br>N 6919862.06<br>E 2318060.05<br>EL = 743.06 | CP #52<br>CAPPED IRON ROD SET<br>N 6921682.871<br>E 2317470.295<br>EL = 745.02 |
| CP #50<br>CAPPED IRON ROD SET<br>N 6921186.877<br>E 2317156.838<br>EL = 749.04 | CP #53<br>CAPPED IRON ROD SET<br>N 6921270.052<br>E 2316408.297<br>EL = 769.59 |
| CP #51<br>CAPPED IRON ROD SET<br>N 6921134.478<br>E 2317579.184<br>EL = 738.81 | CP #54<br>CAPPED IRON ROD<br>N 6920747.072<br>E 2316690.133<br>758.90 |

0 20 40 60

GRAPHIC SCALE IN FEET

NOTES

1. REMOVAL STATIONS ARE FROM CENTERLINE McCART AVENUE UNLESS OTHERWISE NOTED.
2. REFER TO TRAFFIC SIGNAL REMOVAL SHEETS
3. NO PAYMENT FOR PAVEMENT MARKINGS REMOVED WITH PAVEMENT REMOVAL.

STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED
PROFESSIONAL ENGINEER
07/07/2022


MULTATECH ARCHITECTS ENGINEERS
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FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351


Texas Department of Transportation

# PAVEMENT MARKINGS & SIGNAGE REMOVAL PLAN McCART AVE

SHEET 5 OF 5

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 39 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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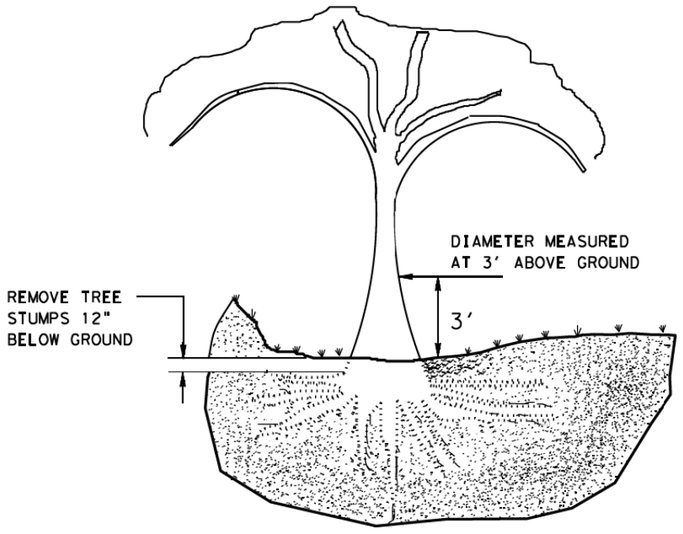
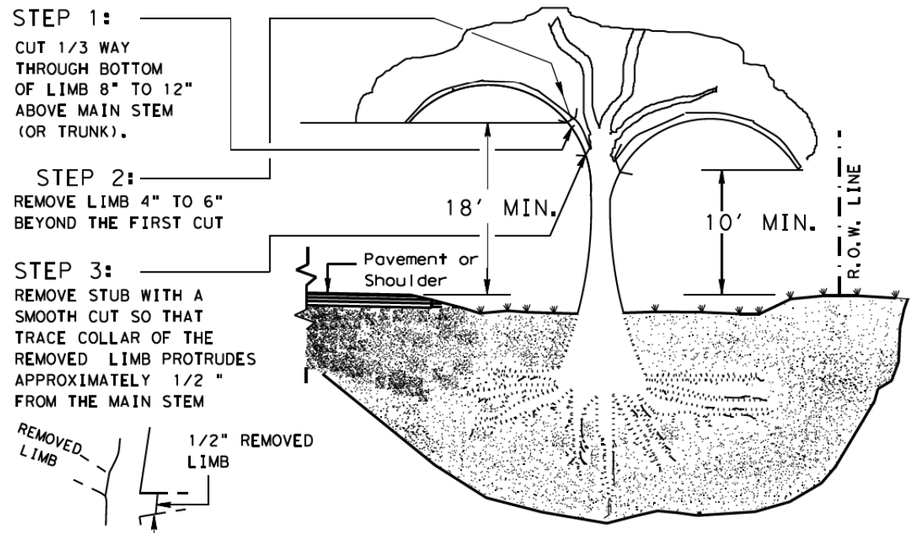
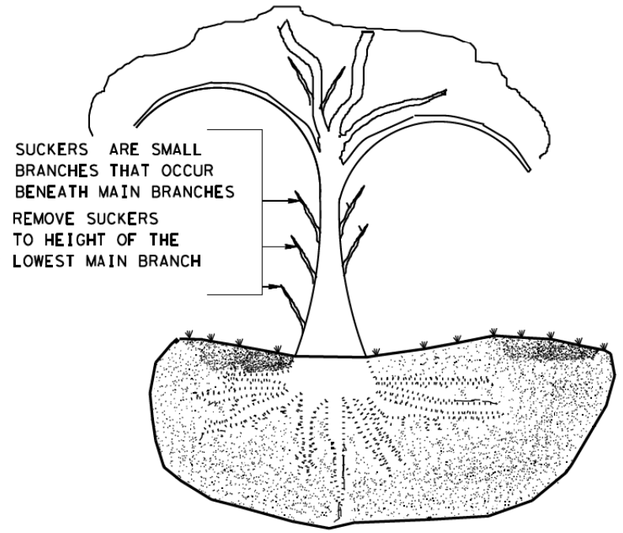


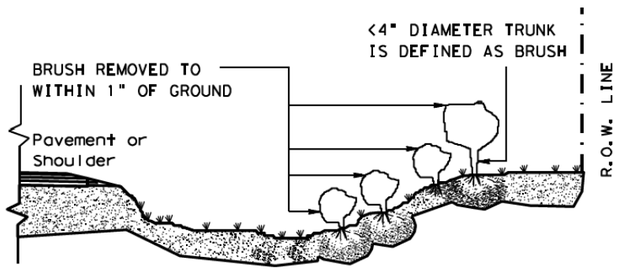

TREE REMOVAL



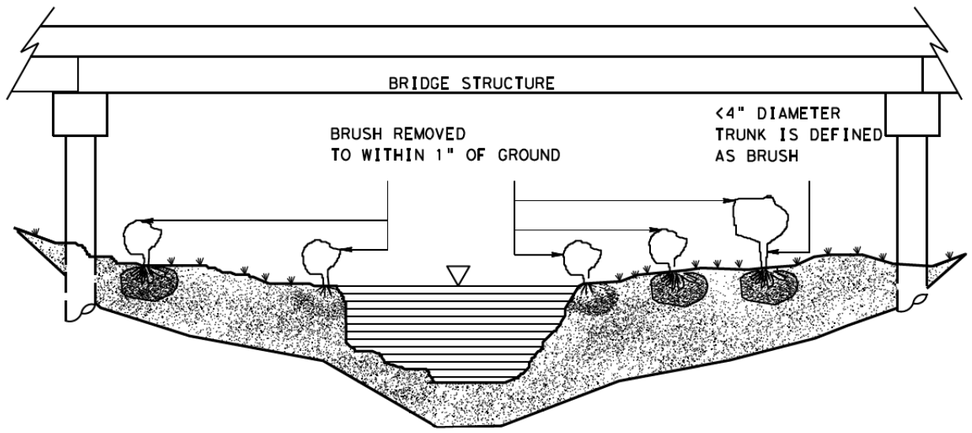

TREE TRIMMING




STEPS 1, 2 AND 3 APPLY WHEN REMOVING LIMBS 2" IN DIAMETER OR LARGER.




BRUSH REMOVAL




BRUSH REMOVAL UNDER BRIDGE AND IN CHANNEL

GENERAL NOTES:

TREE TRIMMING

1. TRIM AND REMOVE ALL TREE LIMBS ON THE PAVEMENT SIDE OF THE TRUNK 18' ABOVE THE PAVEMENT OR BRIDGE DECK ELEVATION, UNLESS OTHERWISE SHOWN ON THE PLANS.

2. TRIM AND REMOVE ALL TREE LIMBS BETWEEN THE TRUNK AND R.O.W. LINE 10' ABOVE NATURAL GROUND, TERRAIN OR OTHER STRUCTURE ELEVATION, UNLESS OTHERWISE SHOWN ON THE PLANS.

TREE REMOVAL

3. FOR TREES MARKED FOR REMOVAL, THE DIAMETER OF TREES ARE DETERMINED BY MEASUREMENT OF THE TRUNK CIRCUMFERENCE 3' ABOVE THE GROUND. TREES WITH TRUNKS OF LESS THAN 4" DIAMETER ARE CONSIDERED TO BE BRUSH. TREES WITH MULTIPLE TRUNKS AT THE POINT OF MEASUREMENT ARE MEASURED AND PAID FOR SEPARATELY.

4. MEASUREMENTS FOR PAYMENT OF TREE DIAMETERS ARE DIVIDED INTO THE RANGES SHOWN IN TABLE 1.

**TABLE 1**
**TREE TRUNK SIZE FOR TREE REMOVAL PAYMENT**

| PAY ITEM | RANGE FOR PAY ITEMS | | | |
|---|---|---|---|---|
| | TRUNK DIAMETER * | | TRUNK CIRCUMFERENCE | |
| | LOWER LIMIT IS GREATER THAN | UPPER LIMIT IS LESS THAN OR EQUAL TO | LOWER LIMIT IS GREATER THAN | UPPER LIMIT IS LESS THAN OR EQUAL TO |
| 752 6005 | 4 | 12 | 12 1/2 | 37 1/2 |
| 752 6006 | 12 | 18 | 37 1/2 | 56 1/2 |
| 752 6007 | 18 | 24 | 56 1/2 | 75 1/2 |
| 752 6008 | 24 | 30 | 75 1/2 | 94 |
| 752 6009 | 30 | 36 | 94 | 113 |
| 752 6010 | 36 | 42 | 113 | 132 |
| 752 6011 | 42 | 48 | 132 | 151 |
| 752 6012 | 48 | 60 | 151 | 188 1/2 |
| 752 6013 | 60 | 72 | 188 1/2 | 226 |
| 752 6019 | 72 | 84 | 226 | 264 |
| | 84 | GREATER THAN 84 | 264 | NOT APPLICABLE |

*SEE GENERAL NOTE *3.

Texas Department of Transportation — Maintenance Division Standard

# TREE AND BRUSH REMOVAL

## TRB-15(1)

| FILE: | DN: JEO | | CK: LJB | DW: JEO | CK: |
|---|---|---|---|---|---|
| ©TxDOT MARCH 2015 | CONT | SECT | JOB | HIGHWAY | |
| REVISIONS | 0902 | 90 | 119 | McCART | |
| Revised table 1 to 2014 Specification | DIST | COUNTY | | SHEET NO. | |
| | FTW | TARRANT | | 40 | |

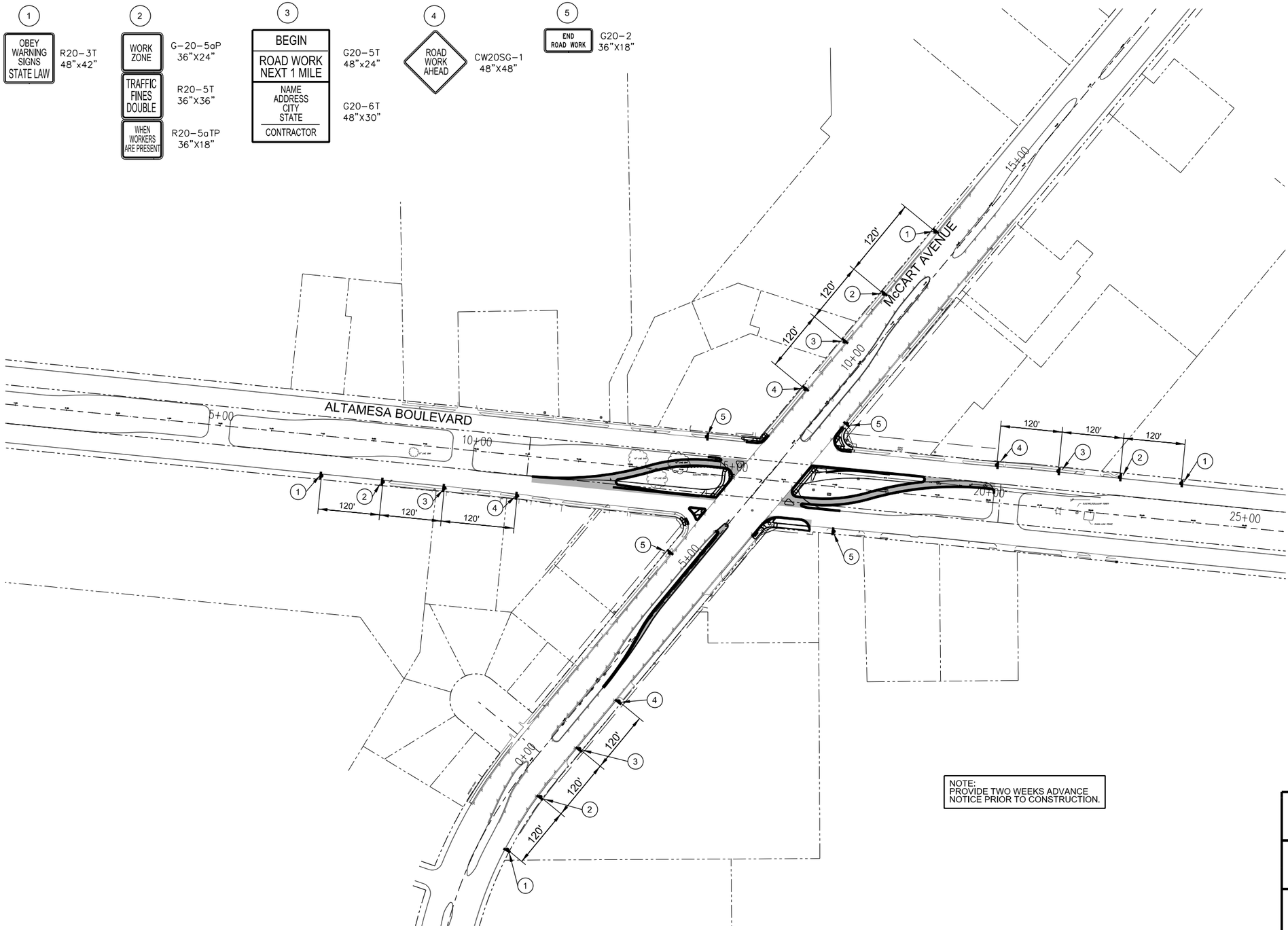
1 — OBEY WARNING SIGNS STATE LAW — R20-3T 48"x42"

2 — WORK ZONE — G-20-5aP 36"X24"
TRAFFIC FINES DOUBLE — R20-5T 36"X36"
WHEN WORKERS ARE PRESENT — R20-5aTP 36"X18"

3 — BEGIN / ROAD WORK NEXT 1 MILE — G20-5T 48"x24"
NAME / ADDRESS / CITY / STATE — G20-6T 48"X30"
CONTRACTOR

4 — ROAD WORK AHEAD — CW20SG-1 48"X48"

5 — END ROAD WORK — G20-2 36"X18"

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GRAPHIC SCALE IN FEET

NOTE:
PROVIDE TWO WEEKS ADVANCE NOTICE PRIOR TO CONSTRUCTION.

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07/07/2022


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Texas Department of Transportation

# TRAFFIC CONTROL PLAN ADVANCED WARNING SIGNS

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 41 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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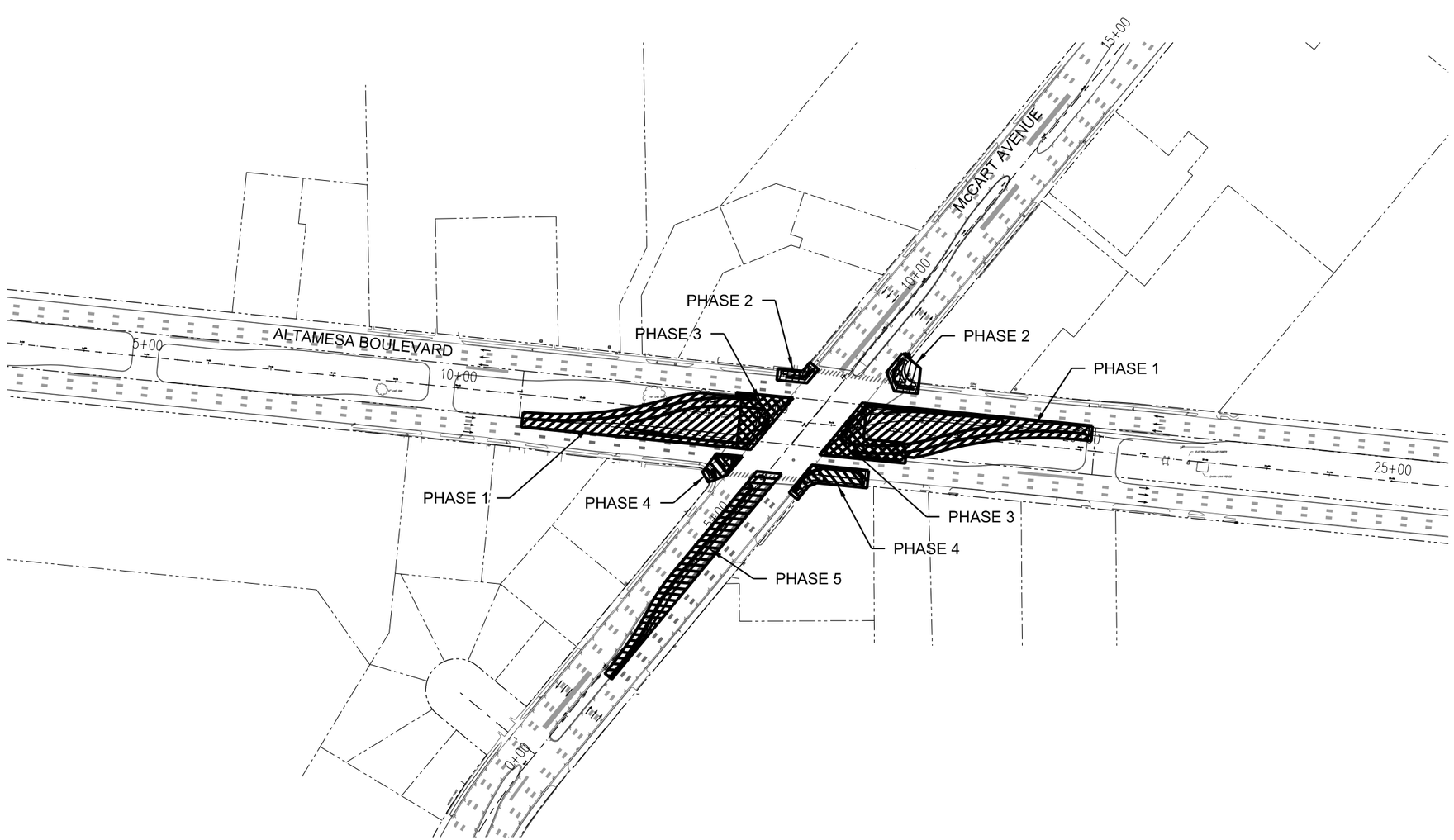


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GRAPHIC SCALE IN FEET

LEGEND

- TRAFFIC FLOW DIRECTION
- PHASE 1 WORK ZONE
- PHASE 2 WORK ZONE
- PHASE 3 WORK ZONE
- PHASE 4 WORK ZONE
- PHASE 5 WORK ZONE

PHASE 1 - ALTAMESA BLVD LEFT TURN LANE IMPROVEMENTS
1. INSTALL TEMPORARY EROSION CONTROL DEVICES.
2. INSTALL TEMPORARY TRAFFIC CONTROL DEVICES AS SHOWN ON TRAFFIC CONTROL PLAN LAYOUT - PHASE 1.
3. MERGE ALTAMESA BLVD LEFT LANES TO CENTER LANE.
4. PERFORM PHASE 1 WORK.
5. BARRICADE ALTAMESA BLVD NEW LEFT TURN LANES TO TRAFFIC.
5. OPEN ALTAMESA BLVD LEFT LANES TO TRAFFIC.

PHASE 2 - NORTHWEST AND NORTHEAST CORNER CURB RAMPS
1. INSTALL/ADJUST TEMPORARY EROSION CONTROL DEVICES.
2. INSTALL/ADJUST TEMPORARY TRAFFIC CONTROL DEVICES AND CHANNELIZATION DEVICES AS SHOWN ON TRAFFIC CONTROL PLAN LAYOUT - PHASE 2.
3. MERGE WESTBOUND ALTAMESA BLVD RIGHT LANE TO MIDDLE LANE.
4. MERGE McCART AVE RIGHT LANES TO MIDDLE LANE.
5. REMOVE EXIST SIGNAL POLE ON McCART AVE NORTH MEDIAN, EXIST SIGNAL POLE ON NORTHWEST CORNER AND ALL EXIST PED POLES ON THE NORTHWEST AND NORTHEAST CORNERS.
6. INSTALL NEW SIGNAL POLE AND NEW PED POLES ON NORTHWEST AND NORTHEAST CORNERS.
7. PERFORM PHASE 2 WORK.
8. OPEN WESTBOUND ALTAMESA BLVD RIGHT LANE TO TRAFFIC.
9. OPEN McCART AVE RIGHT LANES TO TRAFFIC.

PHASE 3 - ALTAMESA BLVD LEFT TURN LANE IMPROVEMENTS
1. INSTALL/ADJUST TEMPORARY EROSION CONTROL DEVICES.
2. INSTALL/ADJUST TEMPORARY TRAFFIC CONTROL DEVICES AND CHANNELIZATION DEVICES AS SHOWN ON TRAFFIC CONTROL PLAN LAYOUT - PHASE 3.
3. MERGE ALTAMESA BLVD LEFT LANES TO MIDDLE LANE.
4. MERGE McCART AVE RIGHT LANES TO MIDDLE LANE.
5. REMOVE EXIST SIGNAL POLES AND EXIST PED POLES ON ALTAMESA BLVD WEST AND EAST MEDIANS.
6. INSTALL NEW SIGNAL POLES AND NEW PED POLES ON ALTAMESA BLVD WEST AND EAST MEDIANS.
7. PERFORM PHASE 2 WORK.
8. OPEN ALTAMESA BLVD LEFT LANES TO TRAFFIC
9. OPEN ALTAMESA BLVD NEW LEFT TURN LANES TO TRAFFIC.
10. OPEN McCART RIGHT LANES TO TRAFFIC.

PHASE 4 - SOUTHWEST AND SOUTHEAST CORNER CURB RAMPS
1. INSTALL/ADJUST TEMPORARY EROSION CONTROL DEVICES.
2. INSTALL/ADJUST TEMPORARY TRAFFIC CONTROL DEVICES AND CHANNELIZATION DEVICES AS SHOWN ON TRAFFIC CONTROL PLAN LAYOUT - PHASE 4.
3. MERGE ALTAMESA BLVD EASTBOUND RIGHT LANE TO MIDDLE LANE.
4. MERGE McCART AVE RIGHT LANES TO MIDDLE LANE.
5. REMOVE EXIST SIGNAL POLE ON THE SOUTHWEST CORNER AND ALL EXIST PED POLES.
6. INSTALL NEW SIGNAL POLE AND NEW PED POLES.
7. PERFORM PHASE 4 WORK.
8. OPEN EASTBOUND ALTAMESA BLVD RIGHT LANE TO TRAFFIC.
9. OPEN McCART AVE RIGHT LANES TO TRAFFIC.

PHASE 5 - McCART LEFT TURN LANE IMPROVEMENTS
1. INSTALL/ADJUST TEMPORARY EROSION CONTROL DEVICES.
2. INSTALL/ADJUST TEMPORARY TRAFFIC CONTROL DEVICES AND CHANNELIZATION DEVICES AS SHOWN ON TRAFFIC CONTROL PLAN LAYOUT - PHASE 5.
3. MERGE NORTHBOUND McCART AVE LEFT LANE AND LEFT TURN LANE TO MIDDLE LANE
3. REMOVE EXIST SIGNAL POLE ON McCART SOUTH MEDIAN.
4. PERFORM PHASE 5 WORK.
5. OPEN NORTHBOUND McCART AVE LEFT LANE AND LEFT TURN LANES TO TRAFFIC.

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# TRAFFIC CONTROL PLAN OVERALL LAYOUT

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 42 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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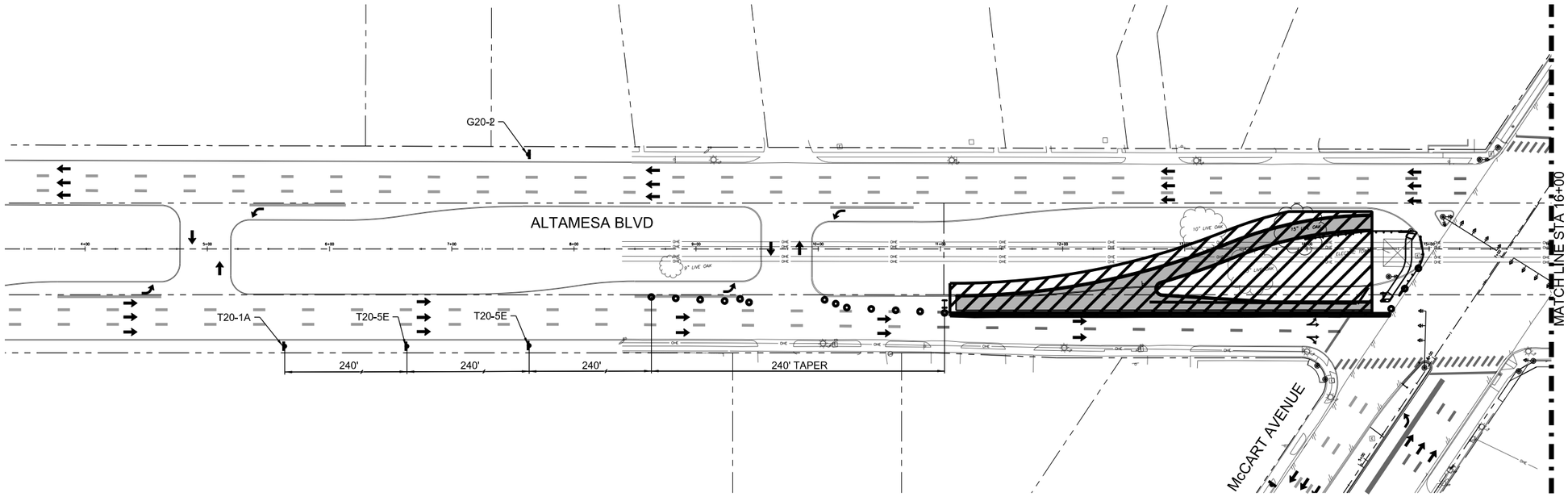
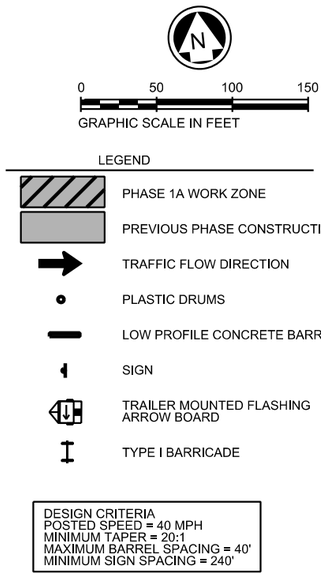
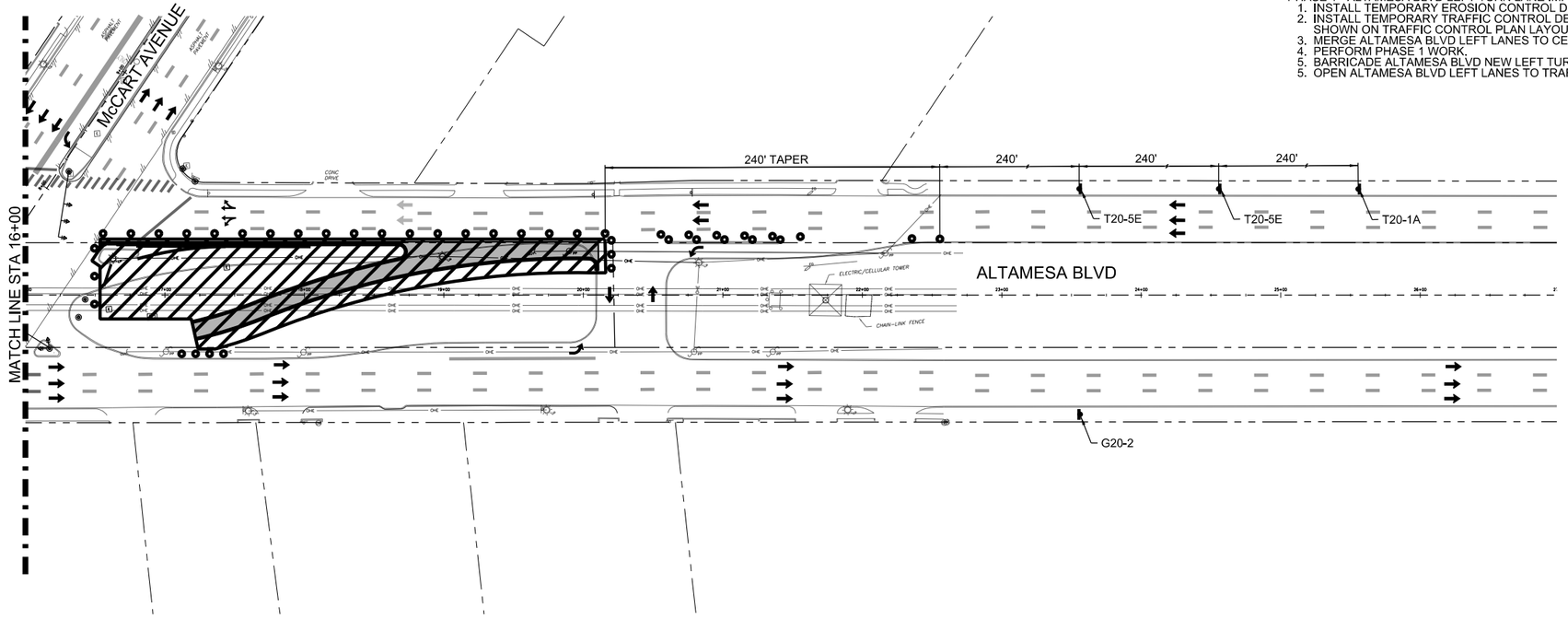



DESIGN CRITERIA
POSTED SPEED = 40 MPH
MINIMUM TAPER = 20:1
MAXIMUM BARREL SPACING = 40'
MINIMUM SIGN SPACING = 240'




PHASE 1 - ALTAMESA BLVD LEFT TURN LANE IMPROVEMENTS
1. INSTALL TEMPORARY EROSION CONTROL DEVICES.
2. INSTALL TEMPORARY TRAFFIC CONTROL DEVICES AS SHOWN ON TRAFFIC CONTROL PLAN LAYOUT - PHASE 1.
3. MERGE ALTAMESA BLVD LEFT LANES TO CENTER LANE.
4. PERFORM PHASE 1 WORK.
5. BARRICADE ALTAMESA BLVD NEW LEFT TURN LANES TO TRAFFIC.
5. OPEN ALTAMESA BLVD LEFT LANES TO TRAFFIC.



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# TRAFFIC CONTROL PLAN PHASE 1 LAYOUT

SHEET 1 OF 2

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 43 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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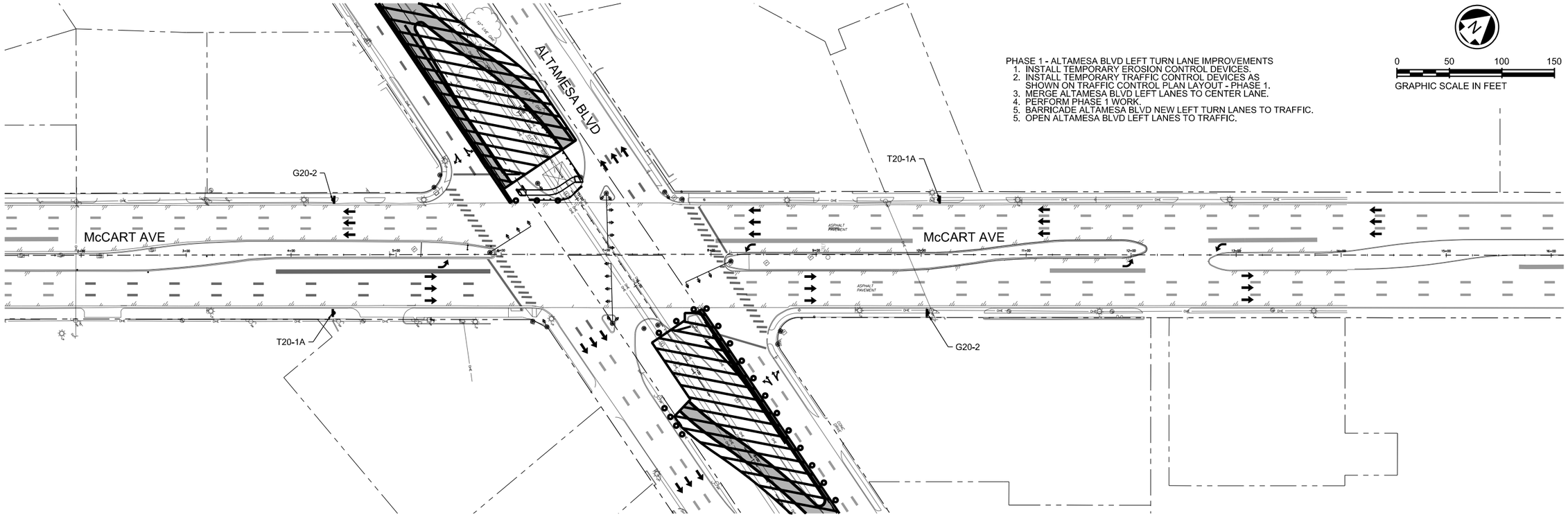


PHASE 1 - ALTAMESA BLVD LEFT TURN LANE IMPROVEMENTS
1. INSTALL TEMPORARY EROSION CONTROL DEVICES.
2. INSTALL TEMPORARY TRAFFIC CONTROL DEVICES AS SHOWN ON TRAFFIC CONTROL PLAN LAYOUT - PHASE 1.
3. MERGE ALTAMESA BLVD LEFT LANES TO CENTER LANE.
4. PERFORM PHASE 1 WORK.
5. BARRICADE ALTAMESA BLVD NEW LEFT TURN LANES TO TRAFFIC.
5. OPEN ALTAMESA BLVD LEFT LANES TO TRAFFIC.

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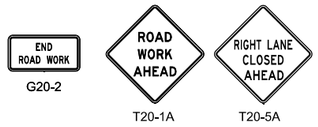
GRAPHIC SCALE IN FEET




LEGEND

- PHASE 1A WORK ZONE
- PREVIOUS PHASE CONSTRUCTION
- TRAFFIC FLOW DIRECTION
- PLASTIC DRUMS
- LOW PROFILE CONCRETE BARRIER
- SIGN
- TRAILER MOUNTED FLASHING ARROW BOARD
- TYPE I BARRICADE

DESIGN CRITERIA
POSTED SPEED = 40 MPH
MINIMUM TAPER = 20:1
MAXIMUM BARREL SPACING = 40'
MINIMUM SIGN SPACING = 240'

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# TRAFFIC CONTROL PLAN PHASE 1 LAYOUT

SHEET 2 OF 2

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 44 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |

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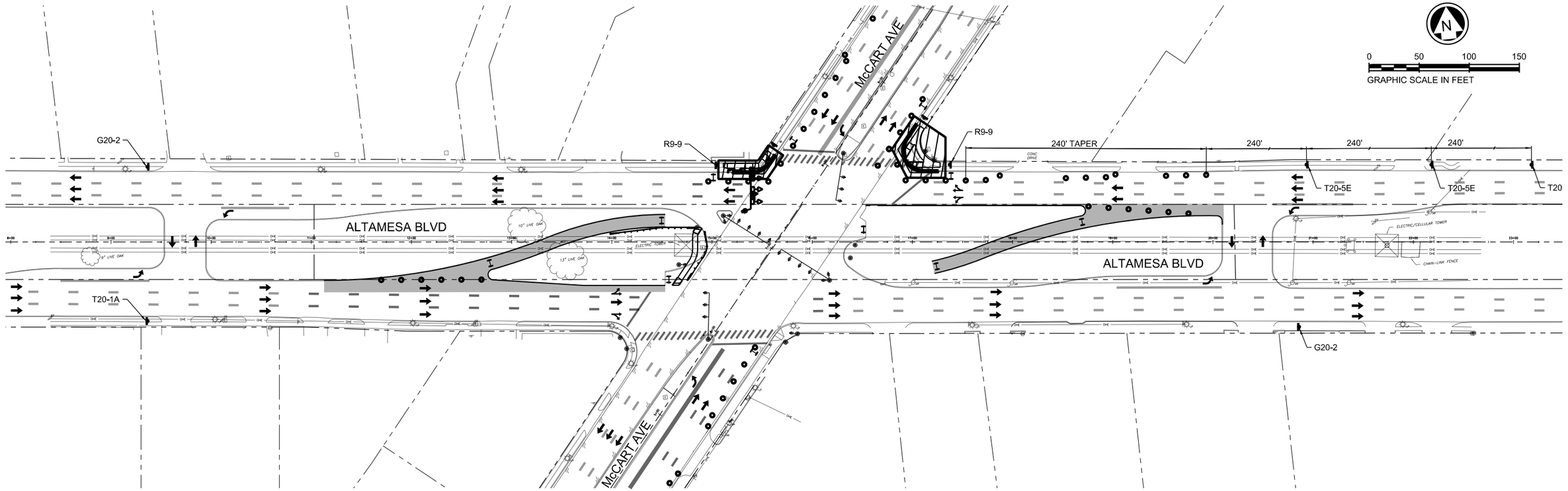



PHASE 2 - NORTHWEST AND NORTHEAST CORNER CURB RAMPS
1. INSTALL/ADJUST TEMPORARY EROSION CONTROL DEVICES.
2. INSTALL/ADJUST TEMPORARY TRAFFIC CONTROL DEVICES AND CHANNELIZATION DEVICES AS SHOWN ON TRAFFIC CONTROL PLAN LAYOUT - PHASE 2.
3. MERGE WESTBOUND ALTAMESA BLVD RIGHT LANE TO MIDDLE LANE.
4. MERGE McCART AVE RIGHT LANES TO MIDDLE LANE.
5. REMOVE EXIST SIGNAL POLE ON McCART AVE NORTH MEDIAN AND ALL EXIST PED POLES ON THE NORTHWEST AND NORTHEAST CORNERS.
6. INSTALL NEW SIGNAL POLE AND NEW PED POLES ON NORTHWEST AND NORTHEAST CORNERS.
7. PERFORM PHASE 2 WORK.
8. OPEN WESTBOUND ALTAMESA BLVD RIGHT LANE TO TRAFFIC.
9. OPEN McCART AVE RIGHT LANES TO TRAFFIC.

LEGEND

- PHASE 1A WORK ZONE
- PREVIOUS PHASE CONSTRUCTION
- TRAFFIC FLOW DIRECTION
- PLASTIC DRUMS
- LOW PROFILE CONCRETE BARRIER
- SIGN
- TRAILER MOUNTED FLASHING ARROW BOARD
- TYPE I BARRICADE

DESIGN CRITERIA
POSTED SPEED = 40 MPH
MINIMUM TAPER = 20:1
MAXIMUM BARREL SPACING = 40'
MINIMUM SIGN SPACING = 240'

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# TRAFFIC CONTROL PLAN PHASE 2 LAYOUT

SHEET 1 OF 2

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 45 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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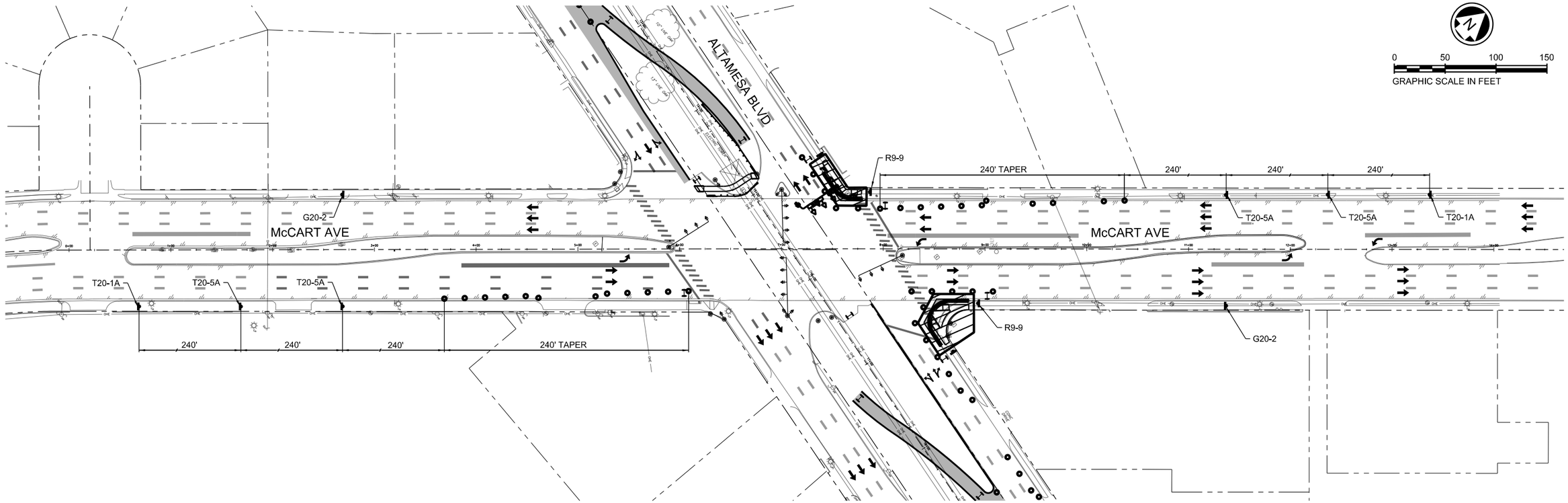


SIDEWALK CLOSED
R9-9

END ROAD WORK
G20-2

ROAD WORK AHEAD
T20-1A

RIGHT LANE CLOSED AHEAD
T20-5A

LEGEND

- PHASE 1A WORK ZONE
- PREVIOUS PHASE CONSTRUCTION
- TRAFFIC FLOW DIRECTION
- PLASTIC DRUMS
- LOW PROFILE CONCRETE BARRIER
- SIGN
- TRAILER MOUNTED FLASHING ARROW BOARD
- TYPE I BARRICADE

DESIGN CRITERIA
POSTED SPEED = 40 MPH
MINIMUM TAPER = 20:1
MAXIMUM BARREL SPACING = 40'
MINIMUM SIGN SPACING = 240'

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# TRAFFIC CONTROL PLAN PHASE 2 LAYOUT

SHEET 2 OF 2

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 46 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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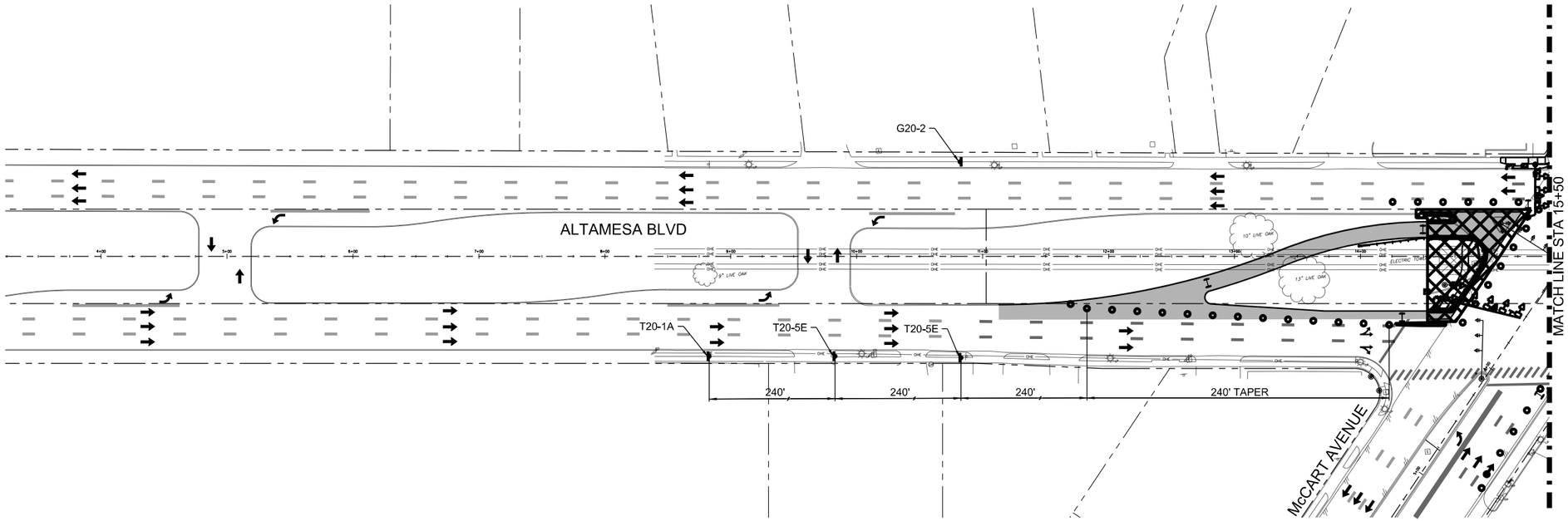
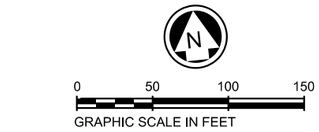
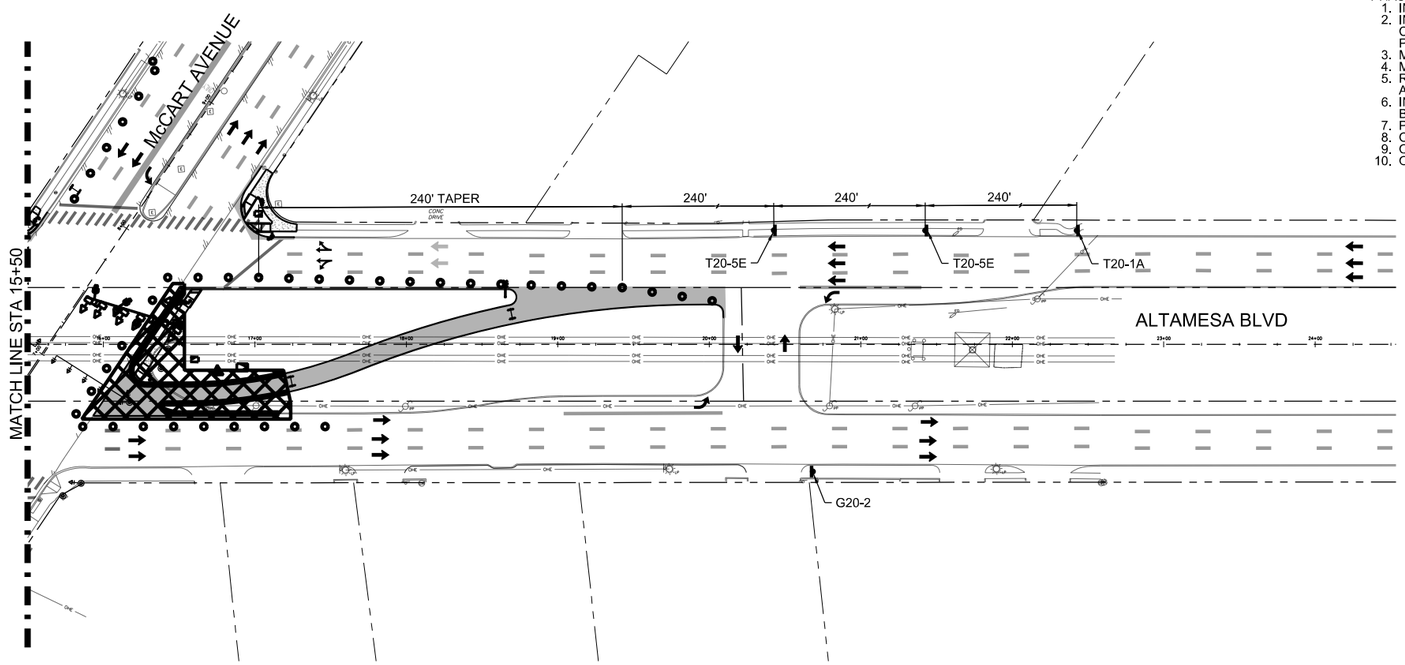



LEGEND

- PHASE 1A WORK ZONE
- PREVIOUS PHASE CONSTRUCTION
- TRAFFIC FLOW DIRECTION
- PLASTIC DRUMS
- LOW PROFILE CONCRETE BARRIER
- SIGN
- TRAILER MOUNTED FLASHING ARROW BOARD
- TYPE I BARRICADE

DESIGN CRITERIA
POSTED SPEED = 40 MPH
MINIMUM TAPER = 20:1
MAXIMUM BARREL SPACING = 40'
MINIMUM SIGN SPACING = 240'




PHASE 3 - ALTAMESA BLVD LEFT TURN LANE IMPROVEMENTS

1. INSTALL/ADJUST TEMPORARY EROSION CONTROL DEVICES.
2. INSTALL/ADJUST TEMPORARY TRAFFIC CONTROL DEVICES AND CHANNELIZATION DEVICES AS SHOWN ON TRAFFIC CONTROL PLAN LAYOUT - PHASE 3.
3. MERGE ALTAMESA BLVD LEFT LANES TO MIDDLE LANE.
4. MERGE McCART AVE RIGHT LANES TO MIDDLE LANE.
5. REMOVE EXIST SIGNAL POLES AND EXIST PED POLES ON ALTAMESA BLVD WEST AND EAST MEDIANS.
6. INSTALL NEW SIGNAL POLES AND NEW PED POLES ON ALTAMESA BLVD WEST AND EAST MEDIANS.
7. PERFORM PHASE 2 WORK.
8. OPEN ALTAMESA BLVD LEFT LANES TO TRAFFIC.
9. OPEN ALTAMESA BLVD NEW LEFT TURN LANES TO TRAFFIC.
10. OPEN McCART RIGHT LANES TO TRAFFIC.





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# TRAFFIC CONTROL PLAN
# PHASE 3 LAYOUT

SHEET 1 OF 2

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 47 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
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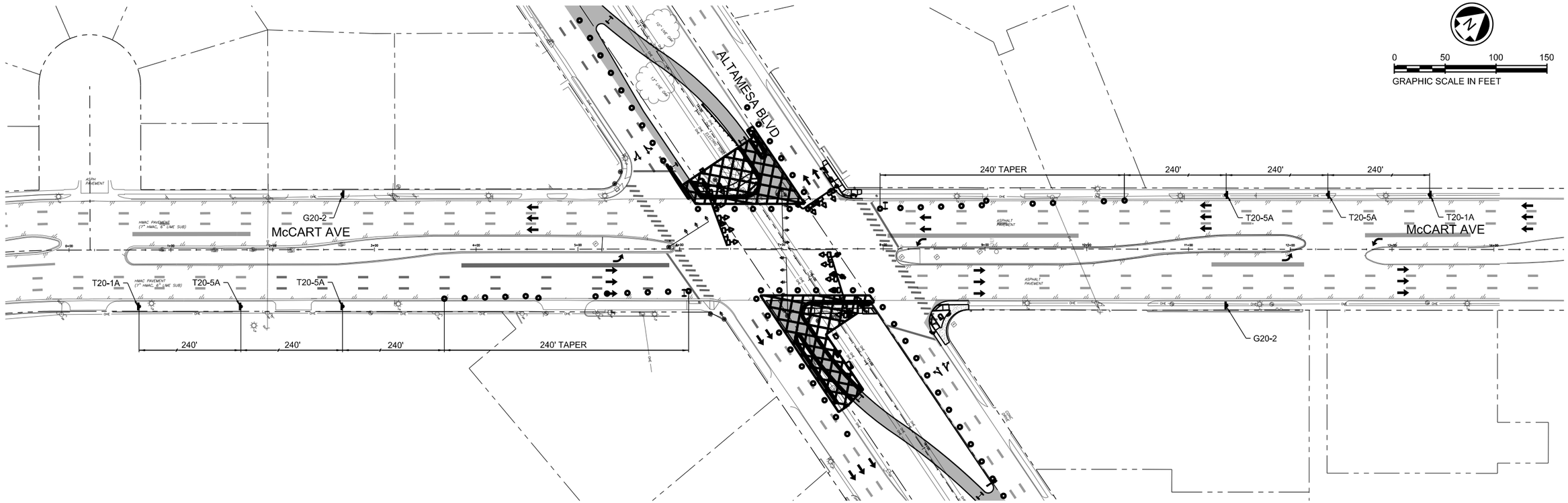


PHASE 3 - ALTAMESA BLVD LEFT TURN LANE IMPROVEMENTS

1. INSTALL/ADJUST TEMPORARY EROSION CONTROL DEVICES.
2. INSTALL/ADJUST TEMPORARY TRAFFIC CONTROL DEVICES AND CHANNELIZATION DEVICES AS SHOWN ON TRAFFIC CONTROL PLAN LAYOUT - PHASE 3.
3. MERGE ALTAMESA BLVD LEFT LANES TO MIDDLE LANE.
4. MERGE McCART AVE RIGHT LANES TO MIDDLE LANE.
5. REMOVE EXIST SIGNAL POLES AND EXIST PED POLES ON ALTAMESA BLVD WEST AND EAST MEDIANS.
6. INSTALL NEW SIGNAL POLES AND NEW PED POLES ON ALTAMESA BLVD WEST AND EAST MEDIANS.
7. PERFORM PHASE 2 WORK.
8. OPEN ALTAMESA BLVD LEFT LANES TO TRAFFIC
9. OPEN ALTAMESA BLVD NEW LEFT TURN LANES TO TRAFFIC.
10. OPEN McCART RIGHT LANES TO TRAFFIC.


LEGEND

- PHASE 1A WORK ZONE
- PREVIOUS PHASE CONSTRUCTION
- TRAFFIC FLOW DIRECTION
- PLASTIC DRUMS
- LOW PROFILE CONCRETE BARRIER
- SIGN
- TRAILER MOUNTED FLASHING ARROW BOARD
- TYPE I BARRICADE

DESIGN CRITERIA
POSTED SPEED = 40 MPH
MINIMUM TAPER = 20:1
MAXIMUM BARREL SPACING = 40'
MINIMUM SIGN SPACING = 240'




MULTATECH ARCHITECTS ENGINEERS
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TBPE Reg #F-351

Texas Department of Transportation

# TRAFFIC CONTROL PLAN PHASE 3 LAYOUT

SHEET 2 OF 2

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 48 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |

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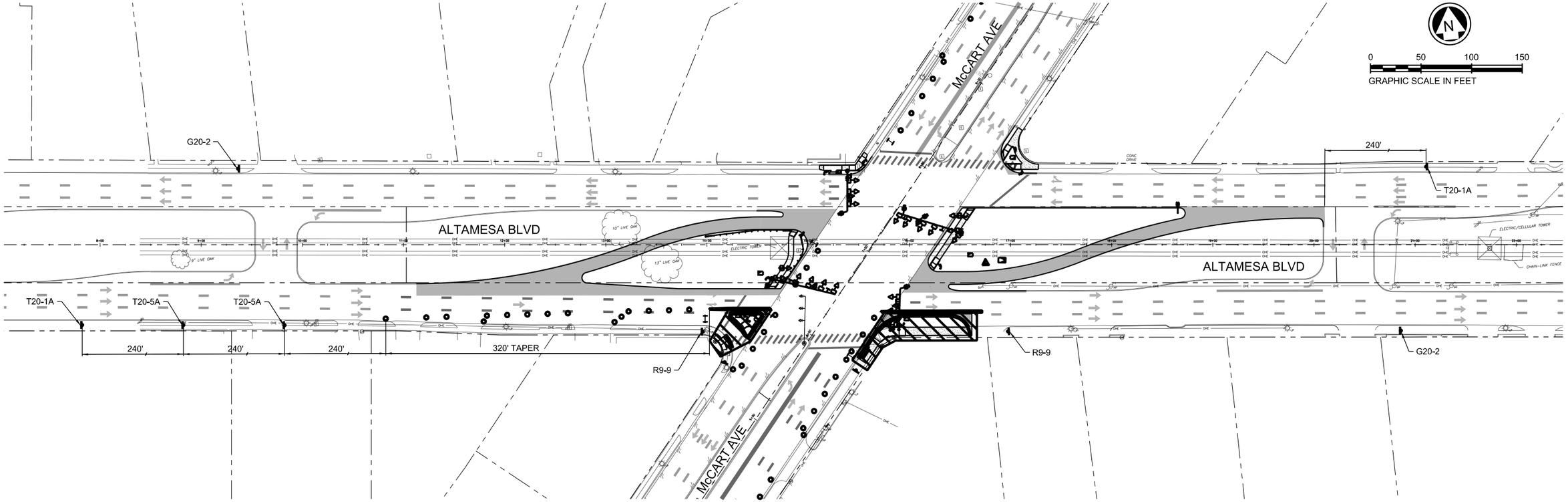


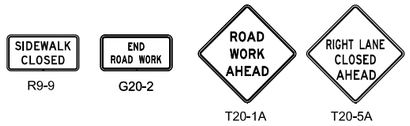


PHASE 4 - SOUTHWEST AND SOUTHEAST CORNER CURB RAMPS
1. INSTALL/ADJUST TEMPORARY EROSION CONTROL DEVICES.
2. INSTALL/ADJUST TEMPORARY TRAFFIC CONTROL DEVICES AND CHANNELIZATION DEVICES AS SHOWN ON TRAFFIC CONTROL PLAN LAYOUT - PHASE 4.
3. MERGE ALTAMESA BLVD EASTBOUND RIGHT LANE TO MIDDLE LANE.
4. MERGE McCART AVE RIGHT LANES TO MIDDLE LANE.
5. REMOVE EXIST PED POLES.
6. INSTALL NEW SIGNAL POLE AND NEW PED POLES.
7. PERFORM PHASE 4 WORK.
8. OPEN EASTBOUND ALTAMESA BLVD RIGHT LANE TO TRAFFIC.
9. OPEN McCART AVE RIGHT LANES TO TRAFFIC.

LEGEND

- PHASE 1A WORK ZONE
- PREVIOUS PHASE CONSTRUCTION
- TRAFFIC FLOW DIRECTION
- PLASTIC DRUMS
- LOW PROFILE CONCRETE BARRIER
- SIGN
- TRAILER MOUNTED FLASHING ARROW BOARD
- TYPE I BARRICADE

DESIGN CRITERIA
POSTED SPEED = 40 MPH
MINIMUM TAPER = 20:1
MAXIMUM BARREL SPACING = 40'
MINIMUM SIGN SPACING = 240'

STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED
PROFESSIONAL ENGINEER
07/07/2022



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# TRAFFIC CONTROL PLAN
# PHASE 4 LAYOUT

SHEET 1 OF 2

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 49 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |

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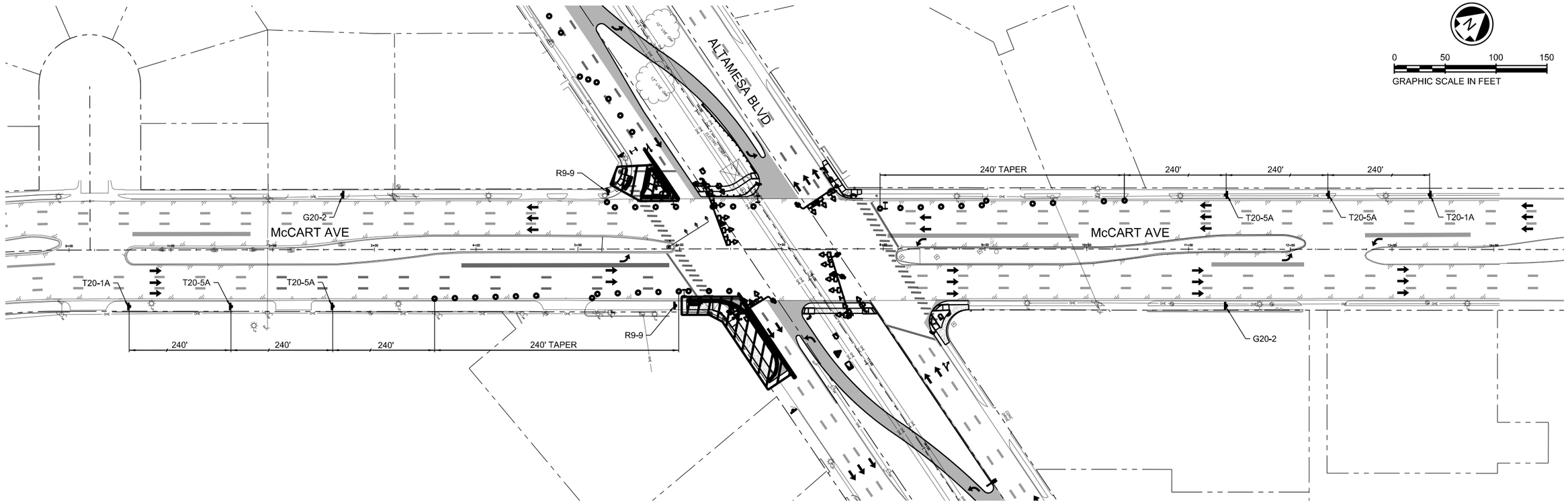


SIDEWALK CLOSED
R9-9

END ROAD WORK
G20-2

ROAD WORK AHEAD
T20-1A

RIGHT LANE CLOSED AHEAD
T20-5A

PHASE 4 - SOUTHWEST AND SOUTHEAST CORNER CURB RAMPS

1. INSTALL/ADJUST TEMPORARY EROSION CONTROL DEVICES.
2. INSTALL/ADJUST TEMPORARY TRAFFIC CONTROL DEVICES AND CHANNELIZATION DEVICES AS SHOWN ON TRAFFIC CONTROL PLAN LAYOUT - PHASE 4.
3. MERGE ALTAMESA BLVD EASTBOUND RIGHT LANE TO MIDDLE LANE.
4. MERGE McCART AVE RIGHT LANES TO MIDDLE LANE.
5. REMOVE EXIST PED POLES.
6. INSTALL NEW SIGNAL POLE AND NEW PED POLES.
7. PERFORM PHASE 4 WORK.
8. OPEN EASTBOUND ALTAMESA BLVD RIGHT LANE TO TRAFFIC.
9. OPEN McCART AVE RIGHT LANES TO TRAFFIC.

LEGEND

- PHASE 1A WORK ZONE
- PREVIOUS PHASE CONSTRUCTION
- TRAFFIC FLOW DIRECTION
- PLASTIC DRUMS
- LOW PROFILE CONCRETE BARRIER
- SIGN
- TRAILER MOUNTED FLASHING ARROW BOARD
- TYPE I BARRICADE

DESIGN CRITERIA
POSTED SPEED = 40 MPH
MINIMUM TAPER = 20:1
MAXIMUM BARREL SPACING = 40'
MINIMUM SIGN SPACING = 240'

STATE OF TEXAS
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07/07/2022


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# TRAFFIC CONTROL PLAN PHASE 4 LAYOUT

SHEET 2 OF 2

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 50 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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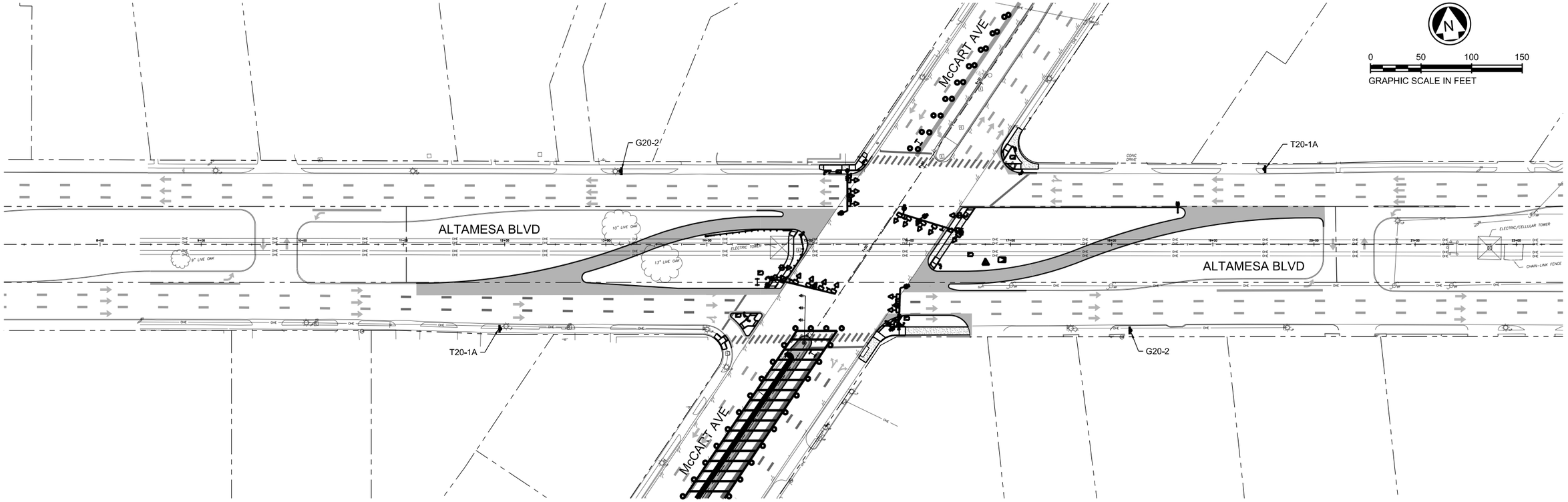



PHASE 5 - McCART LEFT TURN LANE IMPROVEMENTS
1. INSTALL/ADJUST TEMPORARY EROSION CONTROL DEVICES.
2. INSTALL/ADJUST TEMPORARY TRAFFIC CONTROL DEVICES AND CHANNELIZATION DEVICES AS SHOWN ON TRAFFIC CONTROL PLAN LAYOUT - PHASE 5.
3. MERGE NORTHBOUND McCART AVE LEFT LANE AND LEFT TURN LANE TO MIDDLE LANE
3. REMOVE EXIST SIGNAL POLE ON McCART SOUTH MEDIAN.
4. PERFORM PHASE 5 WORK.
5. OPEN NORTHBOUND McCART AVE LEFT LANE AND LEFT TURN LANES TO TRAFFIC.

LEGEND

- PHASE 1A WORK ZONE
- PREVIOUS PHASE CONSTRUCTION
- TRAFFIC FLOW DIRECTION
- PLASTIC DRUMS
- LOW PROFILE CONCRETE BARRIER
- SIGN
- TRAILER MOUNTED FLASHING ARROW BOARD
- TYPE I BARRICADE

DESIGN CRITERIA
POSTED SPEED = 40 MPH
MINIMUM TAPER = 20:1
MAXIMUM BARREL SPACING = 40'
MINIMUM SIGN SPACING = 240'



STATE OF TEXAS
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07/07/2022

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# TRAFFIC CONTROL PLAN
# PHASE 5 LAYOUT

SHEET 1 OF 2

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 51 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |

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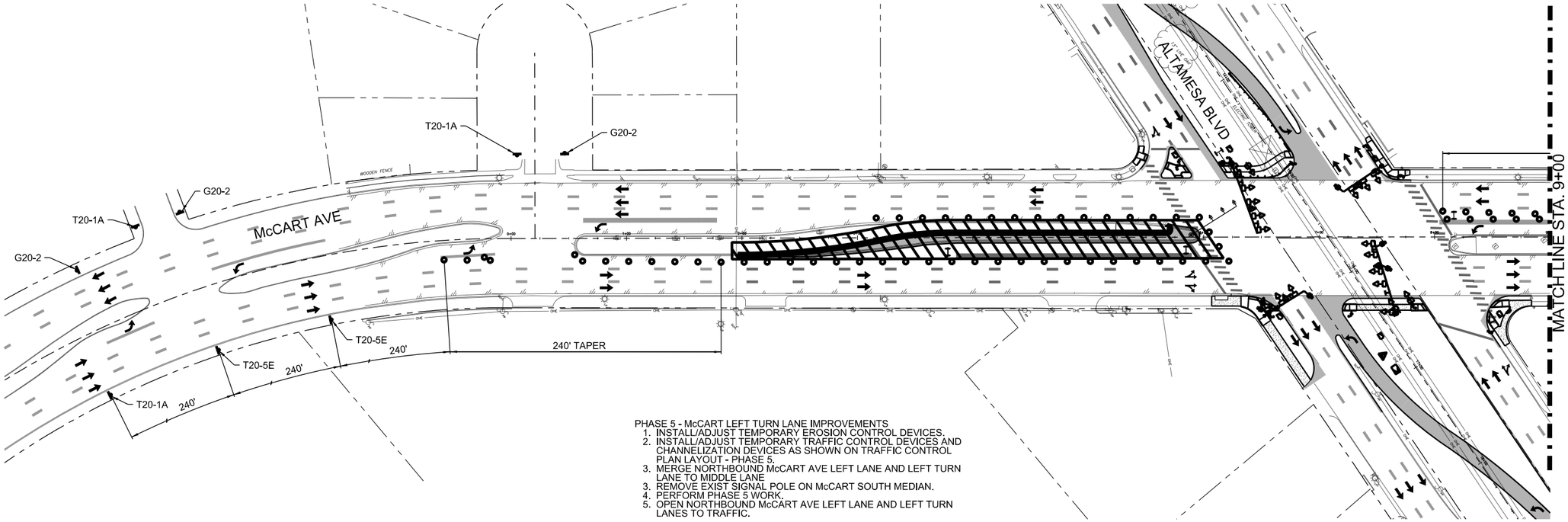


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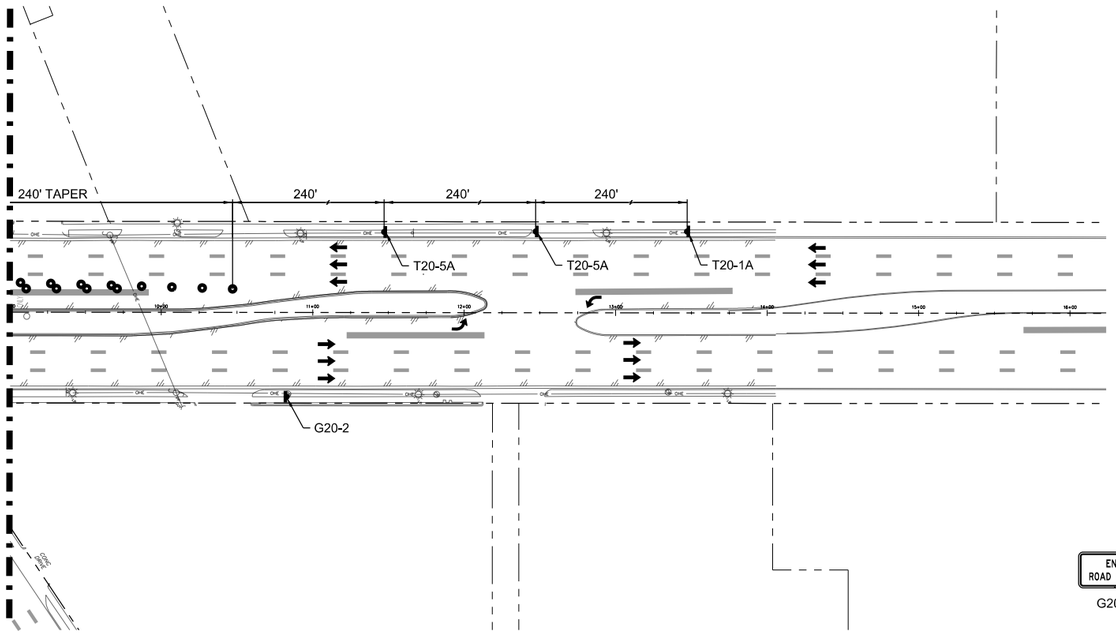
GRAPHIC SCALE IN FEET

PHASE 5 - McCART LEFT TURN LANE IMPROVEMENTS
1. INSTALL/ADJUST TEMPORARY EROSION CONTROL DEVICES.
2. INSTALL/ADJUST TEMPORARY TRAFFIC CONTROL DEVICES AND CHANNELIZATION DEVICES AS SHOWN ON TRAFFIC CONTROL PLAN LAYOUT - PHASE 5.
3. MERGE NORTHBOUND McCART AVE LEFT LANE AND LEFT TURN LANE TO MIDDLE LANE
3. REMOVE EXIST SIGNAL POLE ON McCART SOUTH MEDIAN.
4. PERFORM PHASE 5 WORK.
5. OPEN NORTHBOUND McCART AVE LEFT LANE AND LEFT TURN LANES TO TRAFFIC.




LEGEND

- PHASE 1A WORK ZONE
- PREVIOUS PHASE CONSTRUCTION
- TRAFFIC FLOW DIRECTION
- PLASTIC DRUMS
- LOW PROFILE CONCRETE BARRIER
- SIGN
- TRAILER MOUNTED FLASHING ARROW BOARD
- TYPE I BARRICADE

DESIGN CRITERIA
POSTED SPEED = 40 MPH
MINIMUM TAPER = 20:1
MAXIMUM BARREL SPACING = 40'
MINIMUM SIGN SPACING = 240'

END ROAD WORK
G20-2

ROAD WORK AHEAD
T20-1A

LEFT LANE CLOSED AHEAD
T20-5E

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# TRAFFIC CONTROL PLAN PHASE 5 LAYOUT

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 52 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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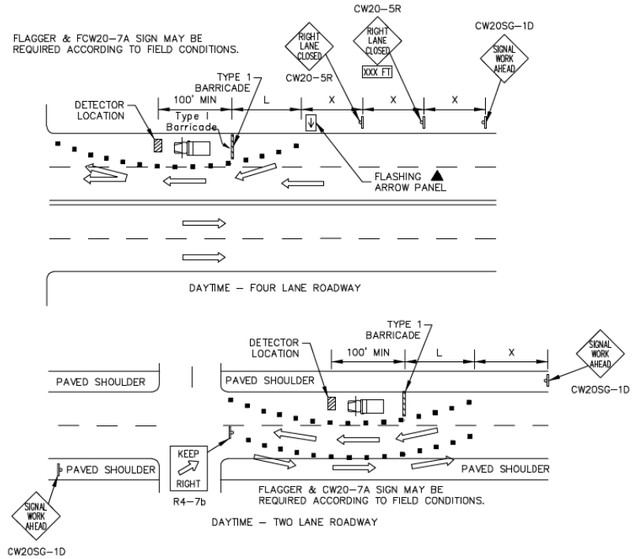
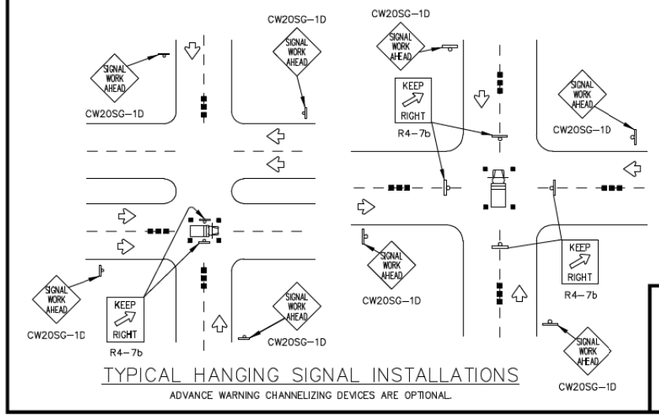



## TYPICAL DETECTOR INSTALLATION

NIGHTTIME - 1. CHANNELIZING DEVICES SHALL BE REFLECTORIZED.

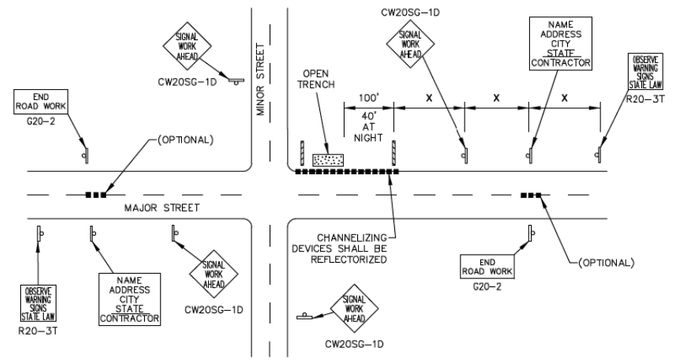



## TYPICAL HANGING SIGNAL INSTALLATIONS

ADVANCE WARNING CHANNELIZING DEVICES ARE OPTIONAL.

| POSTED SPEED | FORMULA | MINIMUM DESIRABLE TAPER LENGTHS** 10' OFFSET | 11' OFFSET | 12' OFFSET | SUGGESTED MAXIMUM SPACING OF DEVICE ON A TAPER | ON A TANGENT | MINIMUM SIGN SPACING X DISTANCE |
|---|---|---|---|---|---|---|---|
| 30 | $L = \frac{(W*S^2)}{60}$ | 150' | 165' | 180' | 30' | 60' | 120' |
| 35 | | 205' | 225' | 245' | 35' | 70' | 160' |
| 40 | | 265' | 295' | 320' | 40' | 80' | 240' |
| 45 | L = W*S | 450' | 495' | 540' | 45' | 90' | 320' |
| 50 | | 500' | 550' | 600' | 50' | 100' | 400' |
| 55 | | 550' | 605' | 660' | 55' | 110' | 500' |
| 60 | | 600' | 660' | 720' | 60' | 120' | 600' |
| 65 | | 650' | 715' | 780' | 65' | 130' | 700' |
| 70 | | 700' | 770' | 840' | 70' | 140' | 800' |
| 75 | | 750' | 825' | 900' | 75' | 150' | 900' |

** TAPER LENGTHS HAVE BEEN ROUNDED OFF.
L = LENGTH OF TAPER (FT.) W = WIDTH OF OFFSET (FT.)
S = POSTED SPEED (MPH)




## TYPICAL ADVANCE SIGNING

LEGEND
- HEAVY WORK VEHICLE
- TYPE 1 BARRICADE
- CHANNELIZING DEVICES
- FLASHING ARROW PANEL

NOTES:
1. THE FLASHING ARROW PANEL MAY BE OMITTED WHEN STATED ELSEWHERE IN THE PLANS.
2. TYPICAL CHANNELIZING DEVICE IS THE 28" CONE. PLASTIC DRUMS MAY BE USED IF APPROVED BY THE ENGINEER. METAL DRUMS SHALL NOT BE USED AS A CHANNELIZING DEVICE OR SIGN SUPPORT.
3. ADVANCE SIGNS AND BARRICADES SHALL BE IN PLACE WHEN SIGNAL CONSTRUCTION OPERATIONS ARE IN PROGRESS. THE CONTRACTOR MAY REMOVE ADVANCE SIGNS AND BARRICADES WHEN NO CONSTRUCTION OPERATIONS ARE UNDERWAY IF PERMITTED ELSEWHERE IN THE PLANS. OBSTRUCTIONS OR HAZARDS AT THE WORK AREA SHALL BE CLEARLY MARKED AND DELINEATED AT ALL TIMES.
4. ALL HOLES, TRENCHES OR OTHER HAZARDOUS AREAS SHALL BE ADEQUATELY PROTECTED BY BARRICADES, LIGHTS OR OTHER PROTECTIVE DEVICES. TRENCHES SHALL BE COVERED OR SURROUNDED WITH ORANGE PLASTIC CONSTRUCTION FENCE AS DIRECTED BY THE ENGINEER.
5. FLAGGER AND FCW20-7A SIGN MAY BE REQUIRED ACCORDING TO FIELD CONDITIONS. VEHICLES PARKED IN ROADWAY SHALL BE EQUIPPED WITH TWO STROBES. HIGH LEVEL FLAGS AT CORNERS OF VEHICLE MAY ALSO BE USED. WORK OPERATIONS THAT REQUIRE WORK VEHICLE IN TRAVELED WAY 20 MINUTES OR LESS MAY USE CONES, HIGH LEVEL FLAGS AND STROBES AS ADVANCE WARNING DEVICES. CONES SHOULD ONLY BE PLACED AROUND VEHICLE. FLAGGERS MAY BE USED ON HIGH SPEED RURAL INTERSECTIONS.
6. REFER TO THE LATEST EDITION OF THE TEXAS MUTCD FOR RESTRICTING PEDESTRIAN MOVEMENTS AROUND CONSTRUCTION ACTIVITIES. ANY METHOD USED TO DETOUR PEDESTRIAN AROUND OR THROUGH A CONSTRUCTION ZONE SHALL BE ADA COMPLIANT.

FORT WORTH

CITY OF FORT WORTH, TEXAS
**TRAFFIC CONTROL TYPICAL INSTALLATIONS**

REVISED: 08-31-2012

**34 71 13-D660**

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FORT WORTH, TEXAS 76107
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Texas Department of Transportation

CFW - DETAIL D660

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 53 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |

DATE:
FILE:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## WORKER SAFETY NOTES:

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

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

## COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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



Texas Department of Transportation

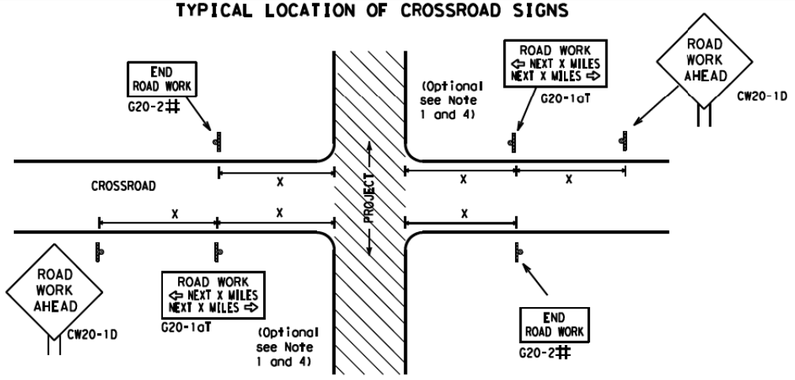
Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

# BC(1)-21

| FILE: bc-21.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT November 2002 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0902 | 90 | 119 | McCART |
| 4-03 7-13 | DIST | COUNTY | | SHEET NO. |
| 9-07 8-14 | FTW | TARRANT | | 54 |
| 5-10 5-21 | | | | |

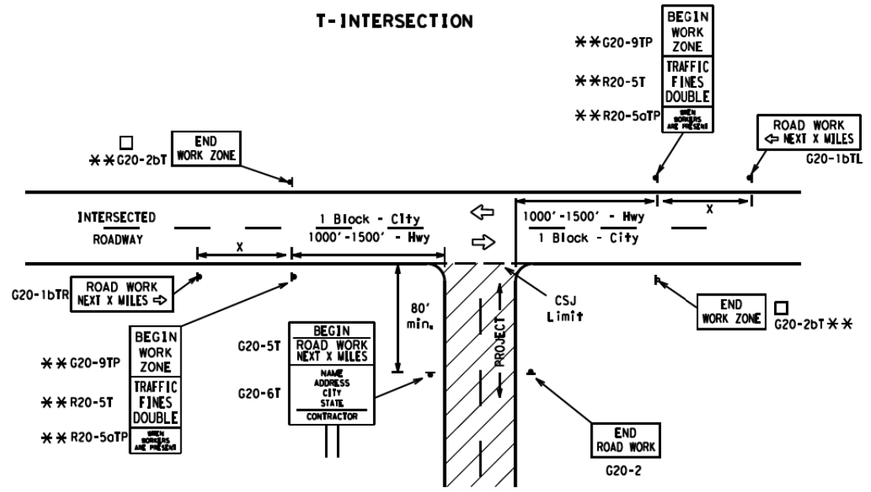
## TYPICAL LOCATION OF CROSSROAD SIGNS




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

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

## T-INTERSECTION




## CSJ LIMITS AT T-INTERSECTION

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

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

### SIZE

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

### SPACING

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

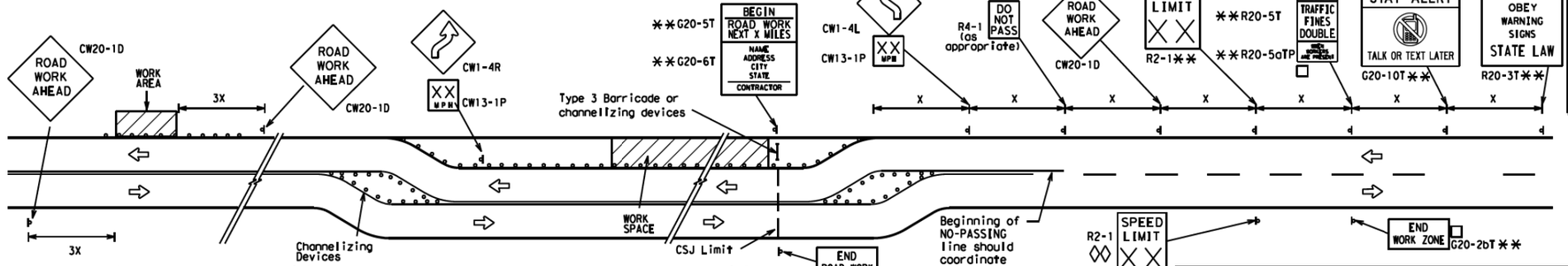
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

## GENERAL NOTES

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

## WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

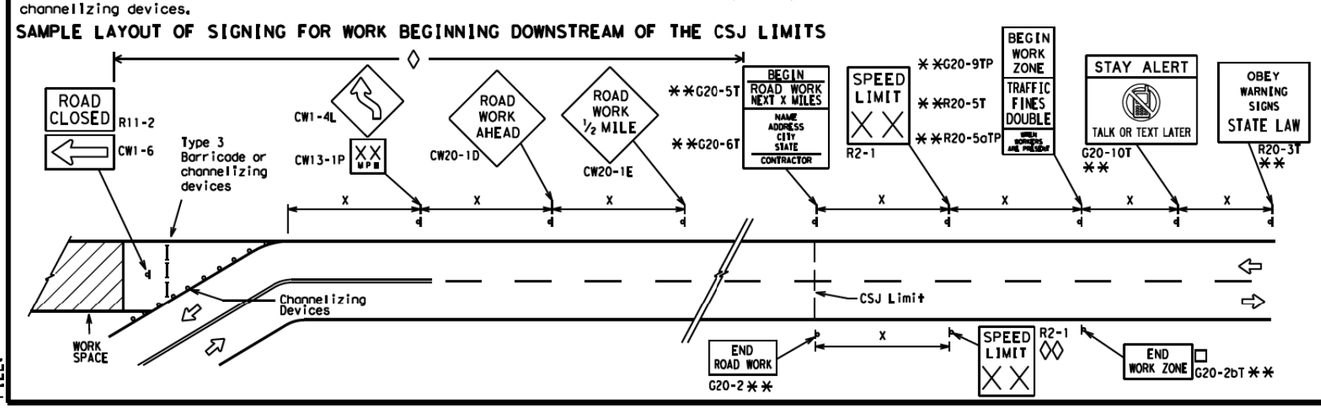



When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

## SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS




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




## NOTES

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

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

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

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

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

## LEGEND

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

SHEET 2 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION PROJECT LIMIT

# BC(2)-21

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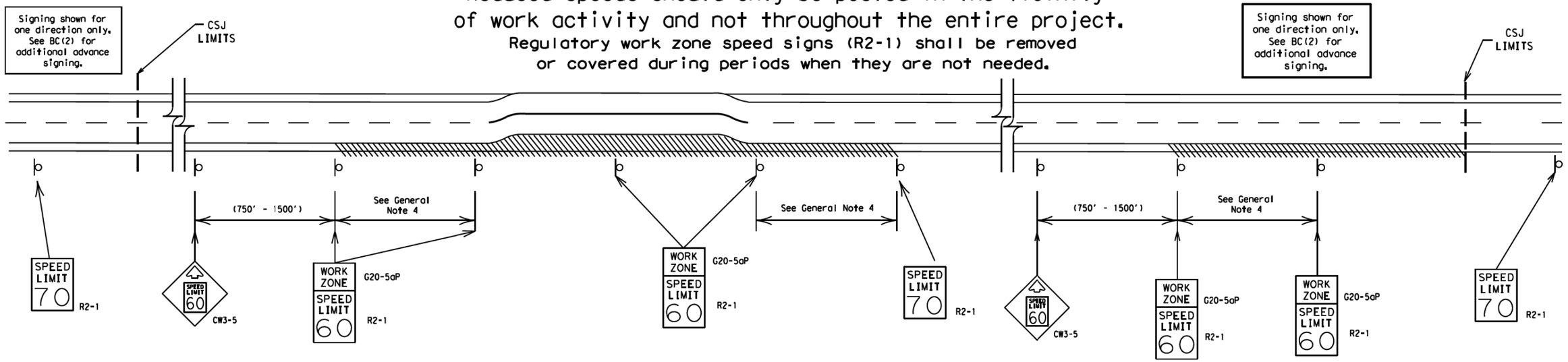
# TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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




## GUIDANCE FOR USE:

### LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

### SHORT TERM WORK ZONE SPEED LIMITS

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

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

### GENERAL NOTES

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



Texas Department of Transportation | Traffic Safety Division Standard

## BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

## BC(3)-21

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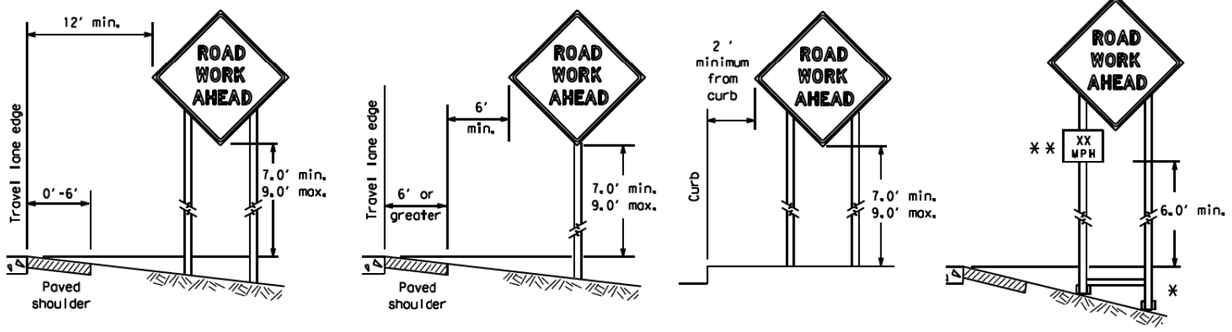
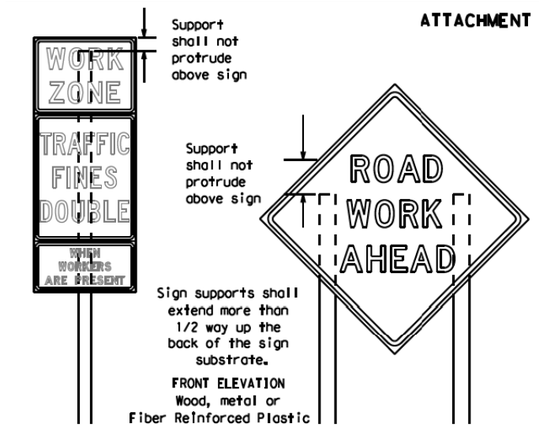
## TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

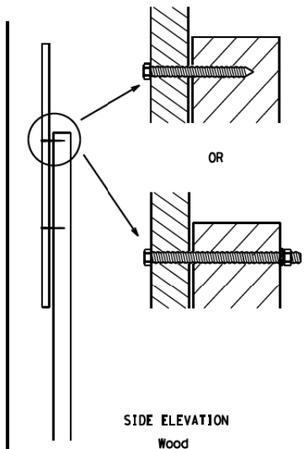



* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

* * 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



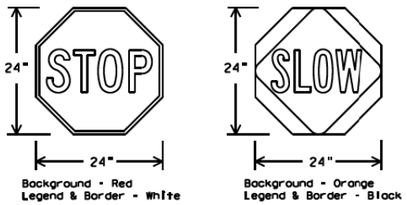

Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

**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.




Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

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

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

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

## GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

## SIGN MOUNTING HEIGHT

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

## SIZE OF SIGNS

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

## SIGN SUBSTRATES

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

## REFLECTIVE SHEETING

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

## SIGN LETTERS

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

## REMOVING OR COVERING

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

## SIGN SUPPORT WEIGHTS

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

## FLAGS ON SIGNS

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



Texas Department of Transportation

Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

# BC(4)-21

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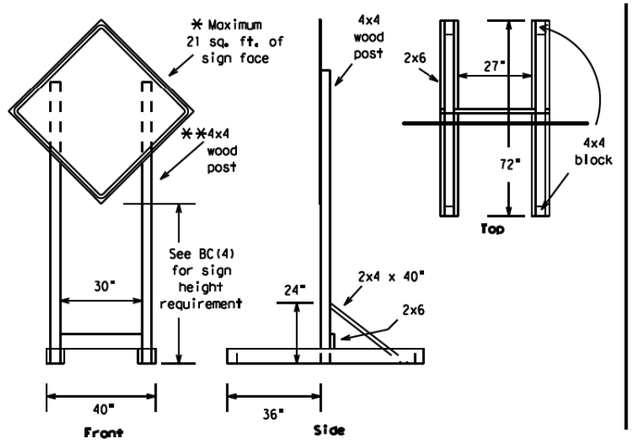
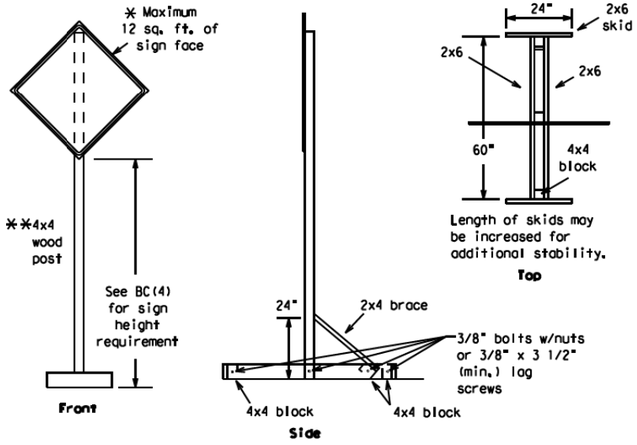
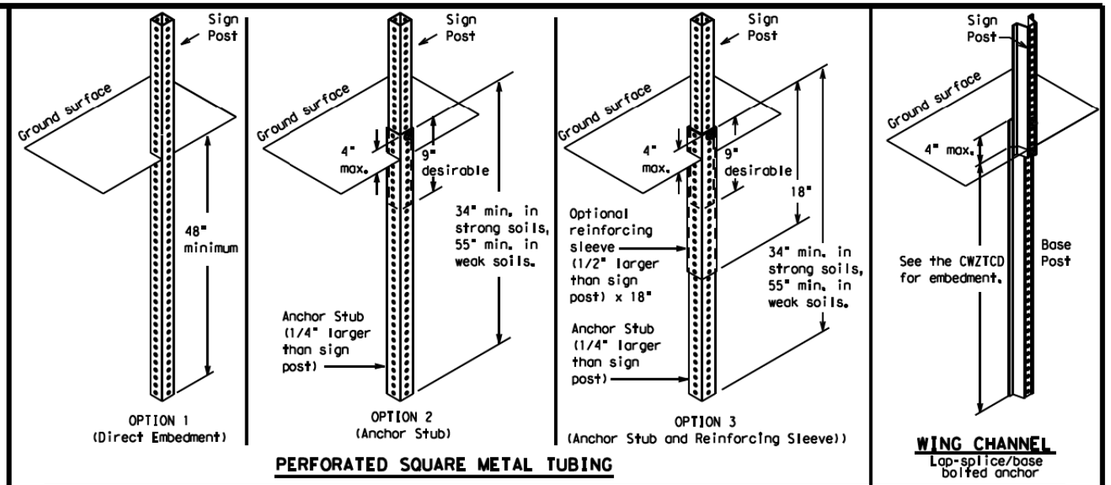



# SKID MOUNTED WOOD SIGN SUPPORTS

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

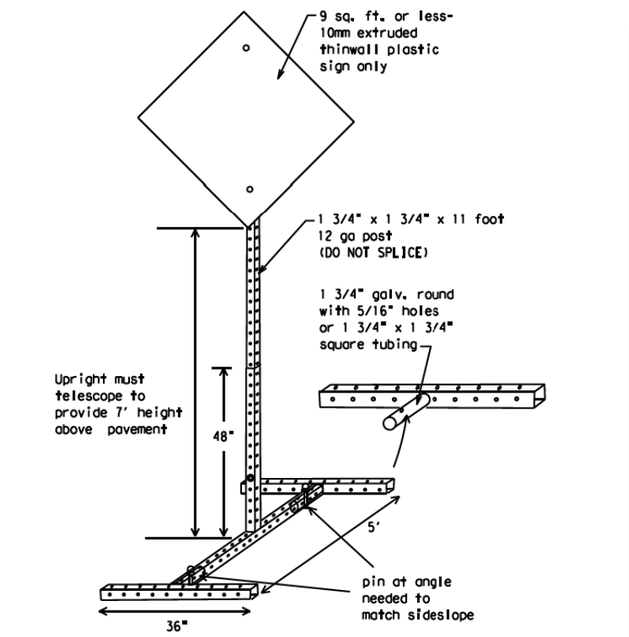


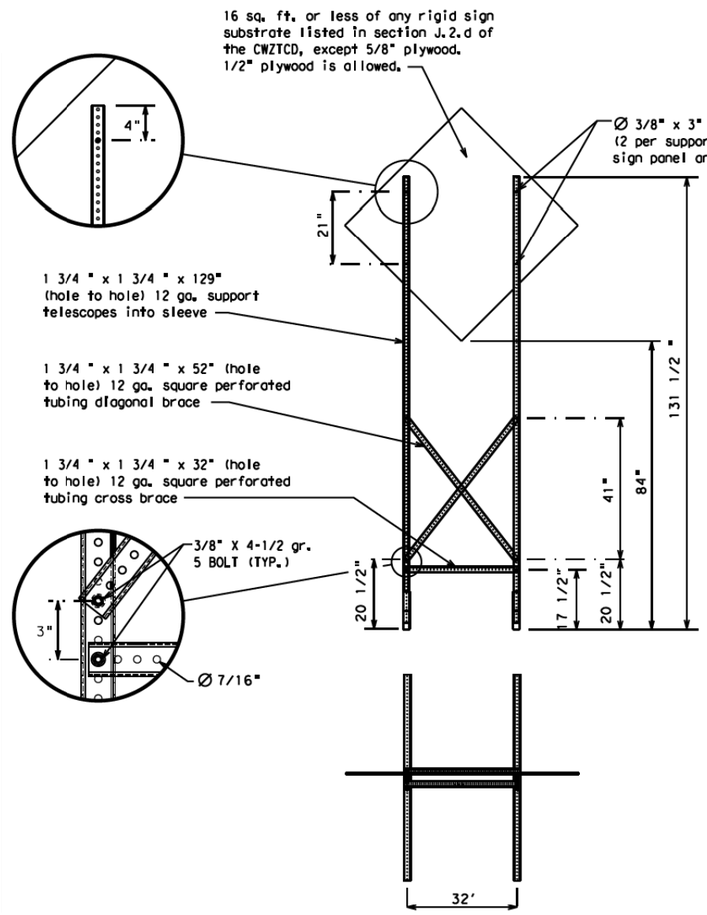

PERFORATED SQUARE METAL TUBING

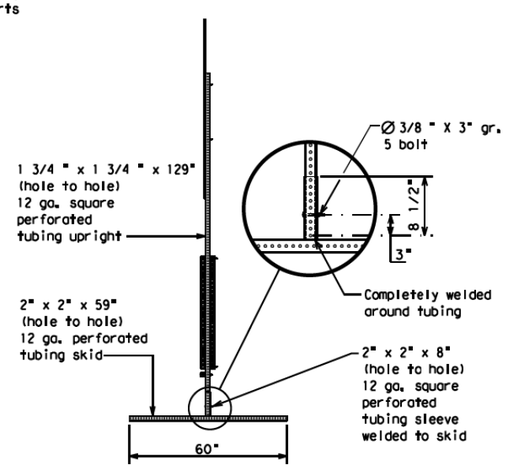
**WING CHANNEL**
Lap-splice/base bolted anchor

# 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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Texas Department of Transportation | Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

# BC(5)-21

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DATE:
FILE:

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

## PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

# RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

## Phase 1: Condition Lists

### Road/Lane/Ramp Closure List

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

### Other Condition List

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

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

## Phase 2: Possible Component Lists

| Action to Take/Effect on Travel List | | Location List | Warning List | ** Advance Notice List |
|---|---|---|---|---|
| MERGE RIGHT | FORM X LINES RIGHT | AT FM XXXX | SPEED LIMIT XX MPH | TUE-FRI XX AM- X PM |
| DETOUR NEXT X EXITS | USE XXXXX RD EXIT | BEFORE RAILROAD CROSSING | MAXIMUM SPEED XX MPH | APR XX-XX X PM-X AM |
| USE EXIT XXX | USE EXIT I-XX NORTH | NEXT X MILES | MINIMUM SPEED XX MPH | BEGINS MONDAY |
| STAY ON US XXX SOUTH | USE I-XX E TO I-XX N | PAST US XXX EXIT | ADVISORY SPEED XX MPH | BEGINS MAY XX |
| TRUCKS USE US XXX N | WATCH FOR TRUCKS | XXXXXXX TO XXXXXXX | RIGHT LANE EXIT | MAY X-X XX PM - XX AM |
| WATCH FOR TRUCKS | EXPECT DELAYS | US XXX TO FM XXXX | USE CAUTION | NEXT FRI-SUN |
| EXPECT DELAYS | PREPARE TO STOP | | DRIVE SAFELY | XX AM TO XX PM |
| REDUCE SPEED XXX FT | END SHOULDER USE | | DRIVE WITH CARE | NEXT TUE AUG XX |
| USE OTHER ROUTES | WATCH FOR WORKERS | | | TONIGHT XX PM-XX AM |
| STAY IN LANE * | | | | |

** See Application Guidelines Note 6.

### APPLICATION GUIDELINES

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

### WORDING ALTERNATIVES

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

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

### FULL MATRIX PCMS SIGNS

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



Texas Department of Transportation | Traffic Safety Division Standard

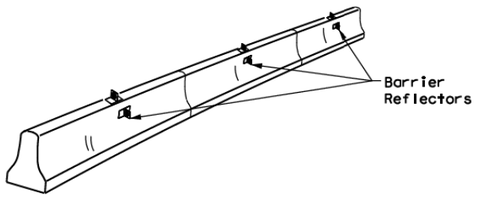
# BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

# BC(6)-21

| FILE: bc-21.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT November 2002 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0902 | 90 | 119 | McCART |
| 9-07 8-14 | DIST | COUNTY | | SHEET NO. |
| 7-13 5-21 | FTW | TARRANT | | 59 |

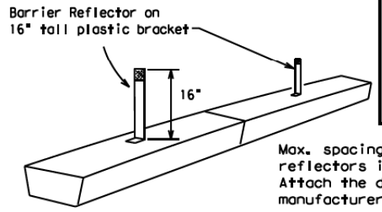
DATE:
FILE:

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.



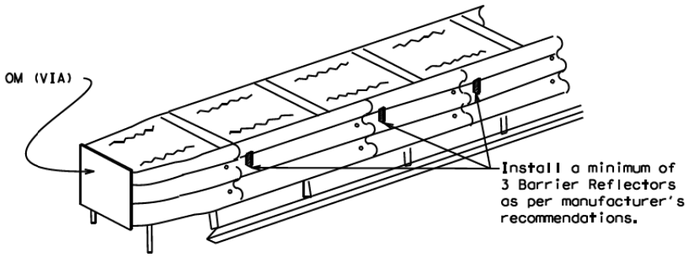

## CONCRETE TRAFFIC BARRIER (CTB)

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

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

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

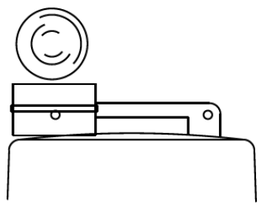
**LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES**

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

# BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

## WARNING LIGHTS

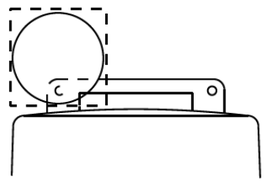
1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this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



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

## 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.



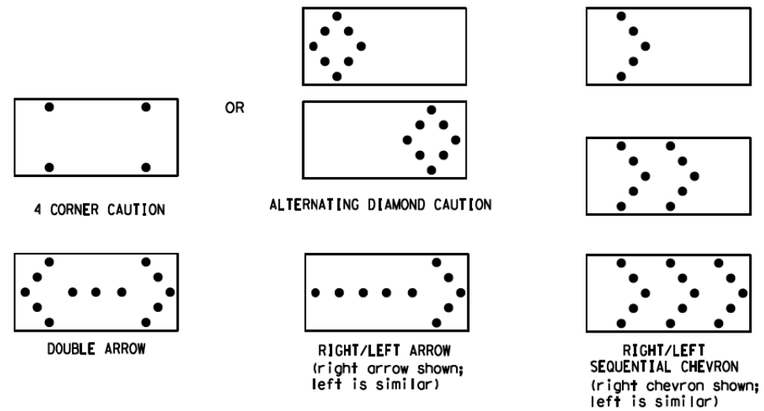
Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

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

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

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

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




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

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

**ATTENTION**

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

# FLASHING ARROW BOARDS



## TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

# BC(7)-21

| FILE: bc-21.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT November 2002 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0902 | 90 | 119 | McCART |
| 9-07 8-14 | DIST | COUNTY | | SHEET NO. |
| 7-13 5-21 | FTW | TARRANT | | 60 |

DATE:
FILE:

## GENERAL NOTES

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

## GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

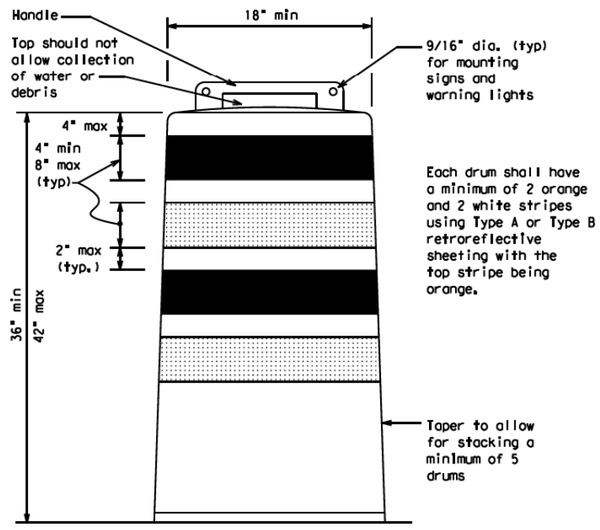
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

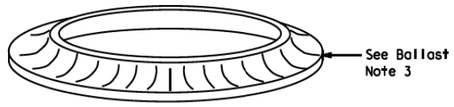
## RETROREFLECTIVE SHEETING

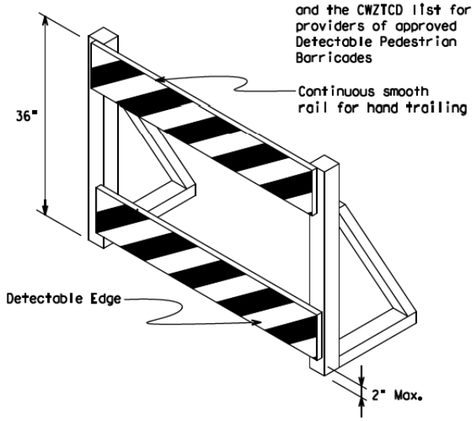
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

## BALLAST

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

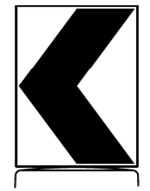


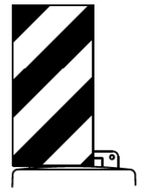




## DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

## SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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



Texas Department of Transportation

Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

# BC(8)-21

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| 9-07 5-21 | FTW | TARRANT | | 61 |
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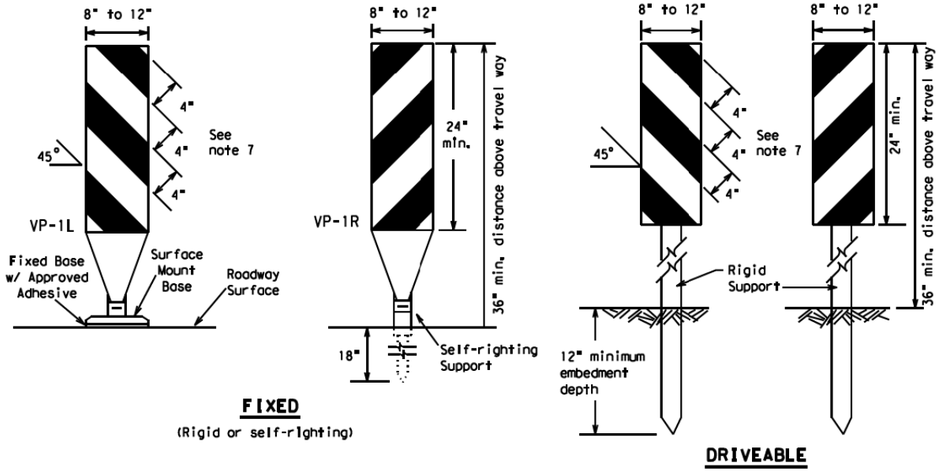
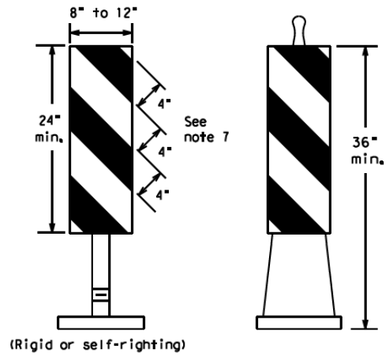



**FIXED**
(Rigid or self-righting)

**DRIVEABLE**

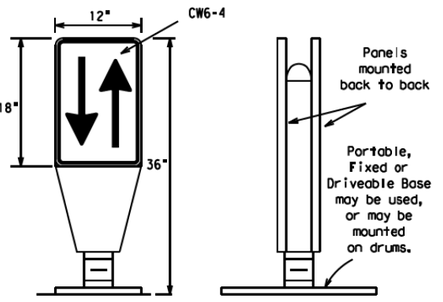



(Rigid or self-righting)

**PORTABLE**

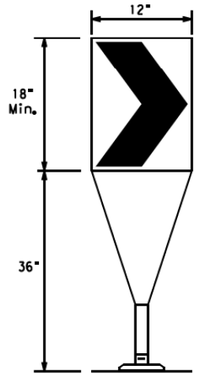
## VERTICAL PANELS (VPs)

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




## OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

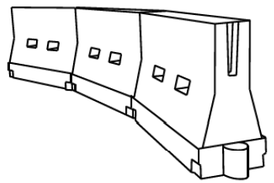
1. Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The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




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

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

## CHEVRONS



## 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

## 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 should 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.

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

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

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

SHEET 9 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

# BC(9)-21

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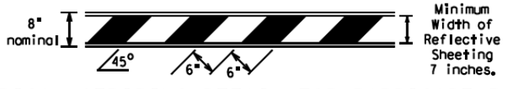
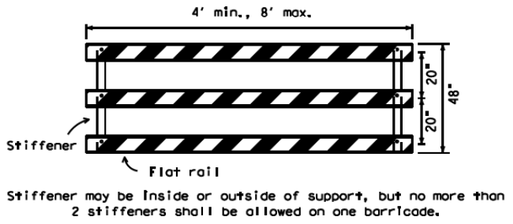
## TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



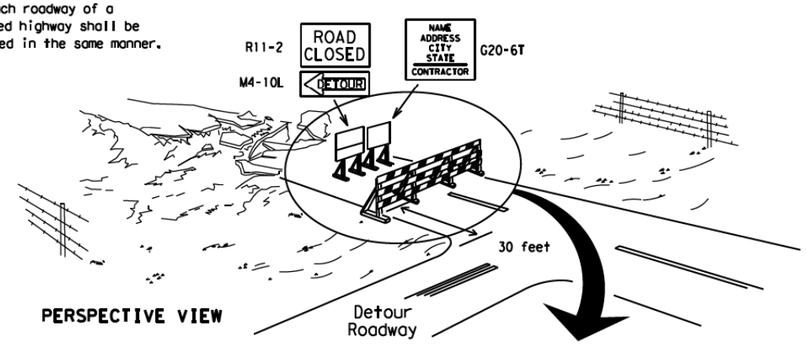

### TYPICAL STRIPING DETAIL FOR BARRICADE RAIL




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

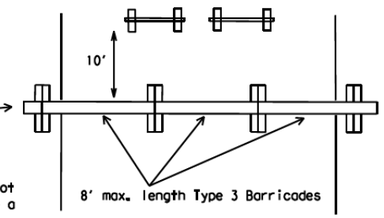
### TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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




PERSPECTIVE VIEW

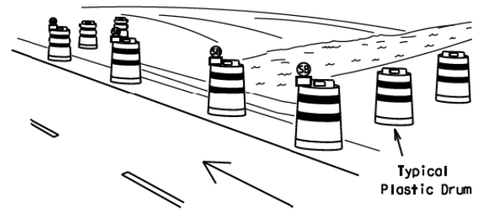
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.




PLAN VIEW

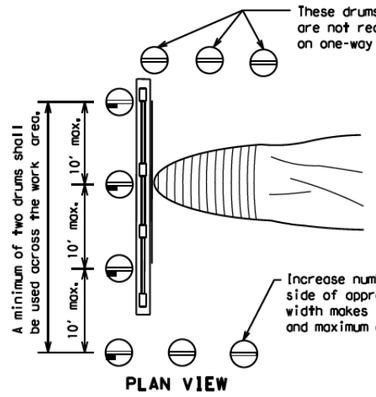
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

### TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION




PERSPECTIVE VIEW

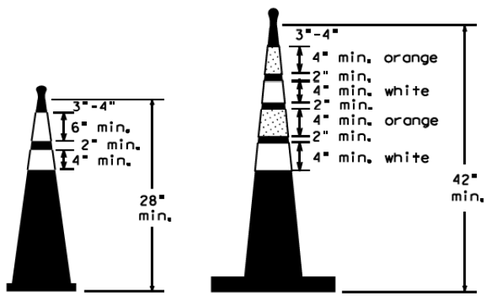
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



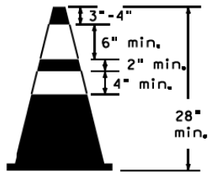

PLAN VIEW

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

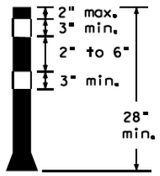
### CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS




Two-Piece cones




One-Piece cones

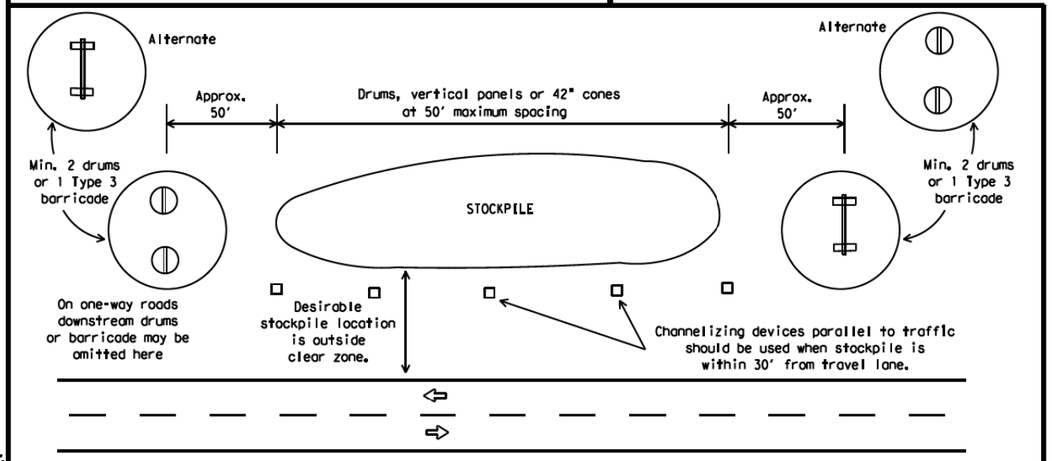



Tubular Marker

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

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

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




### TRAFFIC CONTROL FOR MATERIAL STOCKPILES

SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

# BC(10)-21

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| 7-13 5-21 | FTW | TARRANT | | 63 |

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DATE:
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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.

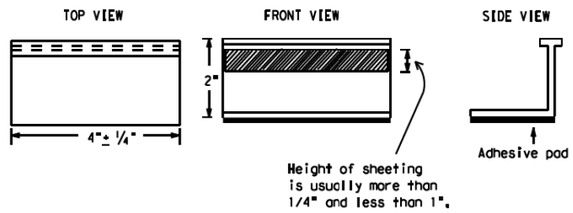
## MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

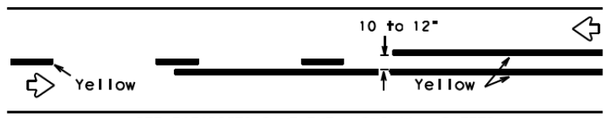
# BC(11)-21

| FILE: bc-21.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT February 1998 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0902 | 90 | 119 | McCART |
| 2-98 9-07 5-21 | DIST | COUNTY | | SHEET NO. |
| 1-02 7-13 | FTW | TARRANT | | 64 |
| 11-02 8-14 | | | | |

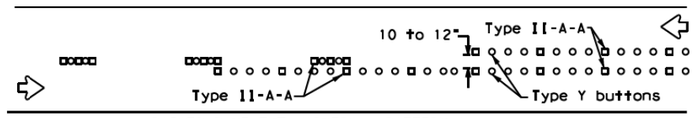
105

DATE:
FILE:

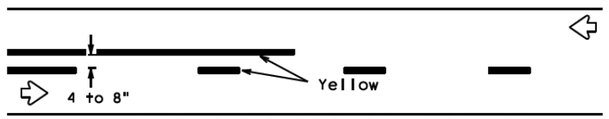
# PAVEMENT MARKING PATTERNS



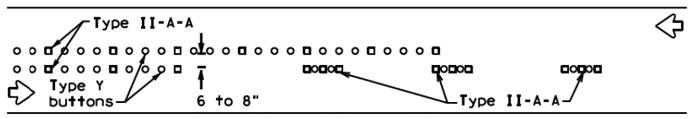

REFLECTORIZED PAVEMENT MARKINGS - PATTERN A




RAISED PAVEMENT MARKERS - PATTERN A



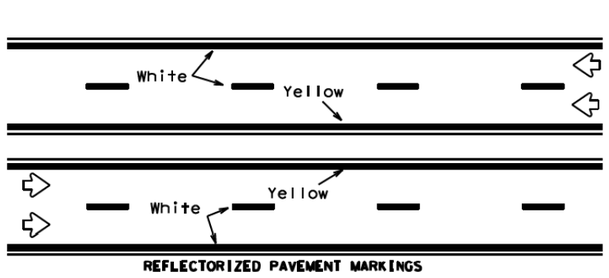

REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



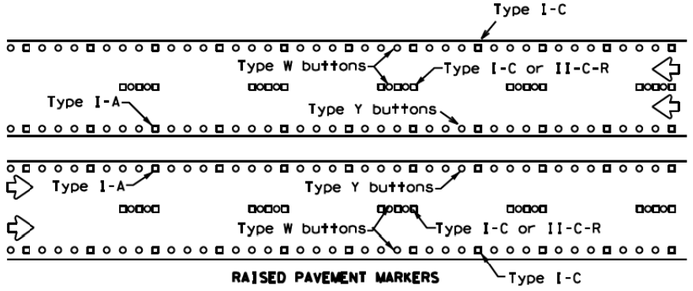

RAISED PAVEMENT MARKERS - PATTERN B

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

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



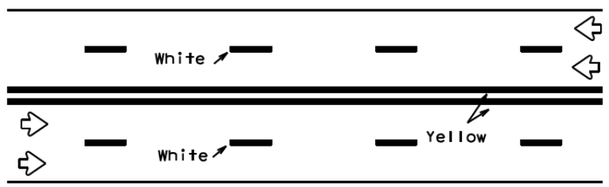

REFLECTORIZED PAVEMENT MARKINGS



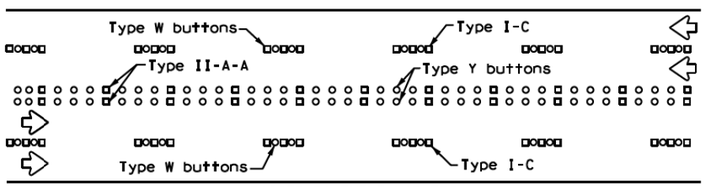

RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

## EDGE & LANE LINES FOR DIVIDED HIGHWAY



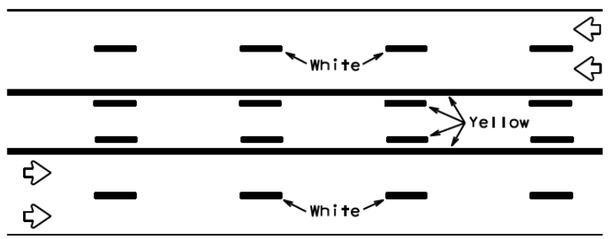

REFLECTORIZED PAVEMENT MARKINGS



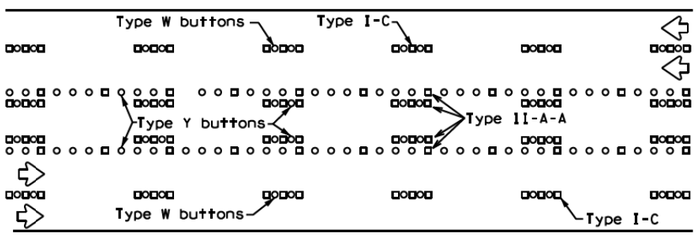

RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

## LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS




REFLECTORIZED PAVEMENT MARKINGS




RAISED PAVEMENT MARKERS

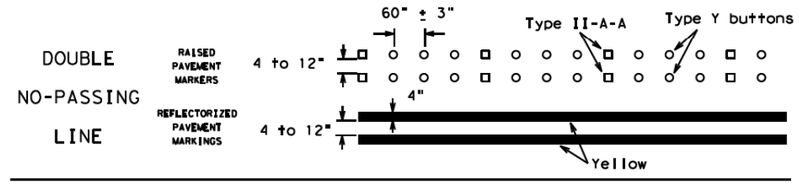
Prefabricated markings may be substituted for reflectorized pavement markings.

## TWO-WAY LEFT TURN LANE

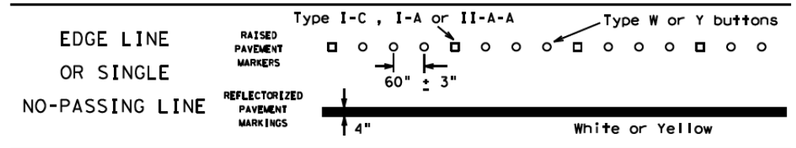
# STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

## SOLID LINES

DOUBLE NO-PASSING LINE

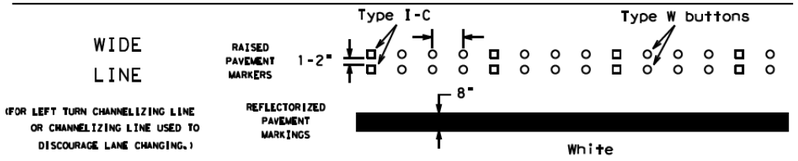



EDGE LINE OR SINGLE NO-PASSING LINE



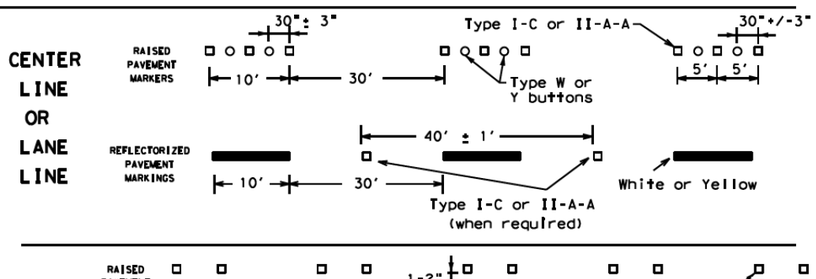

WIDE LINE

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

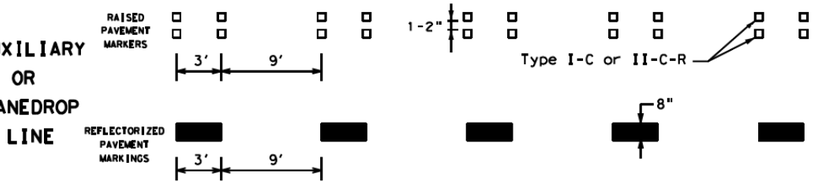



## BROKEN LINES

CENTER LINE OR LANE LINE

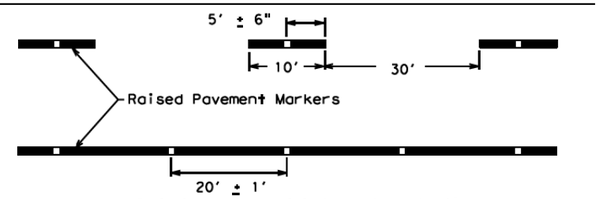



AUXILIARY OR LANEDROP LINE




### REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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




Centerline only - not to be used on edge lines

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



Texas Department of Transportation

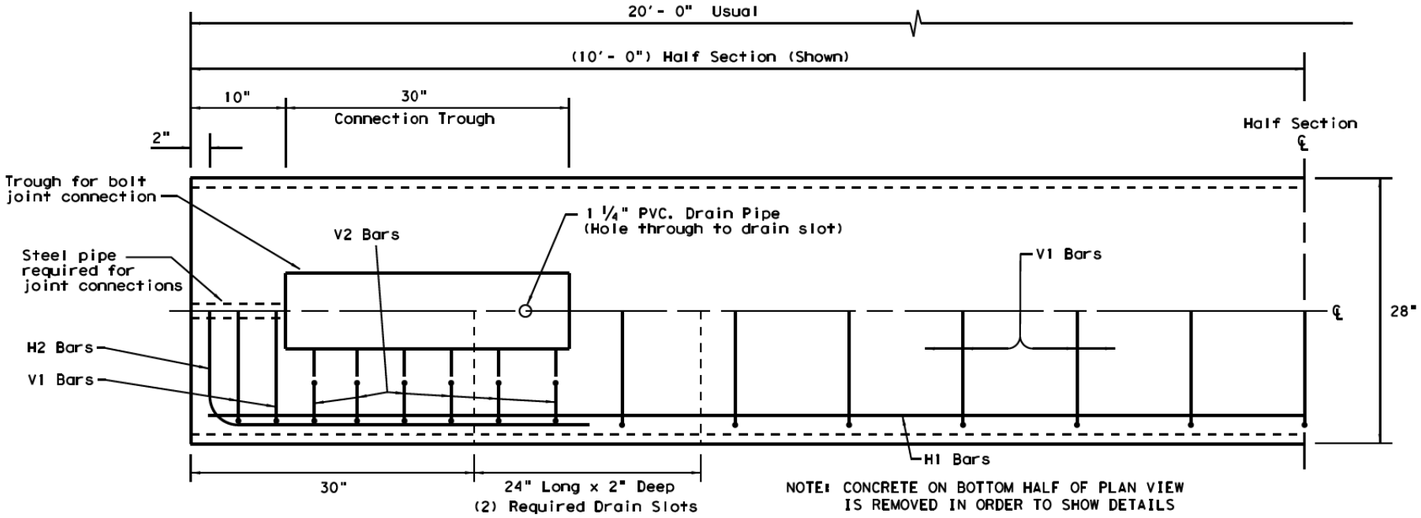
Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

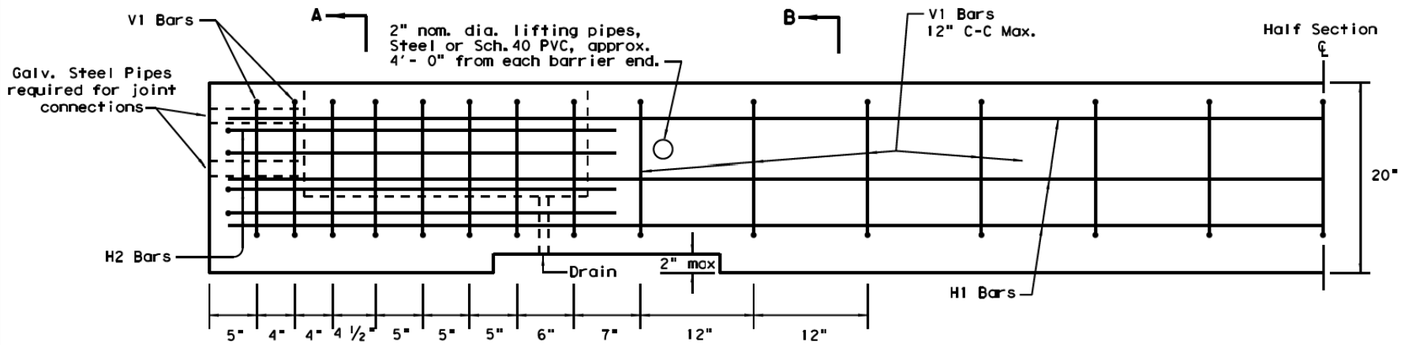
## BC(12)-21

| FILE: bc-21.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT February 1998 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14 | 0902 | 90 | 119 | McCART |
| | DIST | COUNTY | | SHEET NO. |
| | FTW | TARRANT | | 65 |

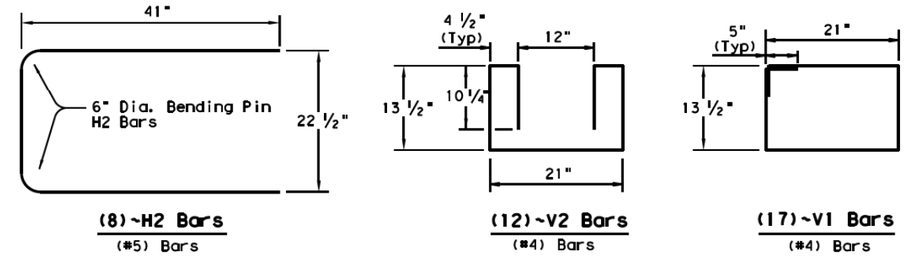
106




## PLAN
## (TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)




## ELEVATION
## (TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)



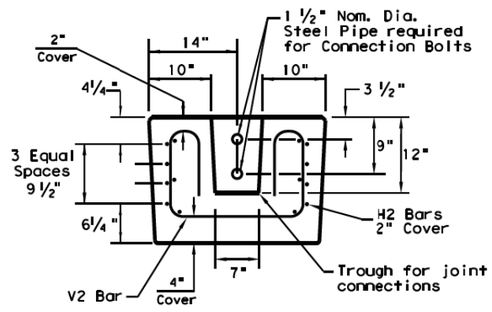

**(8)~H2 Bars** (#5) Bars

**(12)~V2 Bars** (#4) Bars

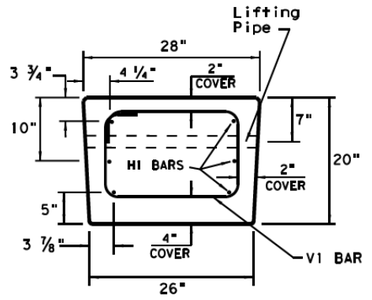
**(17)~V1 Bars** (#4) Bars

## REINFORCING STEEL DETAILS
TYPE 1 - BARRIER SEGMENT

Note: Use 2" Dia. Bending Pin, unless otherwise shown




**SECTION A-A**



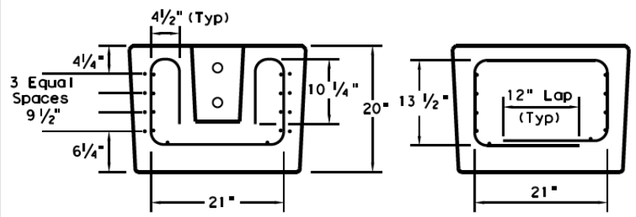

**SECTION B-B**

## GENERAL NOTES

1. Low Profile Concrete Barrier (LPCB), is approved for use in temporary work zone locations, where the posted speed is 45 mph, or less.
2. Concrete shall be Class H for precast barrier with a minimum compressive strength of 3,600 psi.
3. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
4. Precast LPCB barrier length shall be 20 ft.
5. All barrier edges shall have ¾" chamfer or a tooled radius.
6. Joint connection hardware shall be in accordance with Item 449, "Anchor Bolts." and is considered subsidiary.
7. Steel pipe required for joint connection bolts shall be galvanized in accordance with Item 445, "Galvanizing."
8. Welded wire reinforcement (WWR) may be used in lieu of conventional reinforcement for Type 1 barrier, and shall meet the requirements shown.

## FOR CONTRACTORS INFORMATION ONLY

| (TYPE 1) APPROX. QUANTITIES 20 FT. SECTION | | |
|---|---|---|
| CONCRETE | CY | 2.6 |
| REINFORCING STEEL | LBS | 330 |
| TOTAL BARRIER WT. | LBS | 11000 |



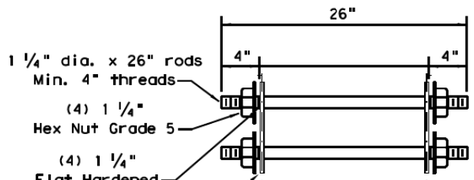

### (WWR) GENERAL NOTES

1. Deformed Welded Wire Reinforcement shall conform to ASTM A497.
2. Welded wire cage may be cut or bent, if necessary, but must be approved by the Engineer.
3. Combinations of reinforcing steel and WWR are permitted, as directed by the Engineer. The dimensions from the end of the barrier section to the first wire shall not exceed 3".

### REQUIRED (WWR) WIRE DESIGN

8 ~ (D31) Horizontal Wires (Equally spaced)
10 ~ (D20) Horizontal Wires (Equally spaced)
29 ~ (D20) Vertical Wires (Spaced as shown in Elevation View)

## WELDED WIRE REINFORCEMENT (WWR)- OPTIONAL REINFORCING




**(2) CONNECTION BOLTS**
ASTM A36

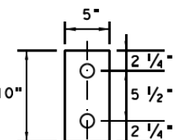



**PLATE WASHER**
5" x 10" x ⅜"

Note: Rods, Hex nuts and Washers shall be Galvanized.

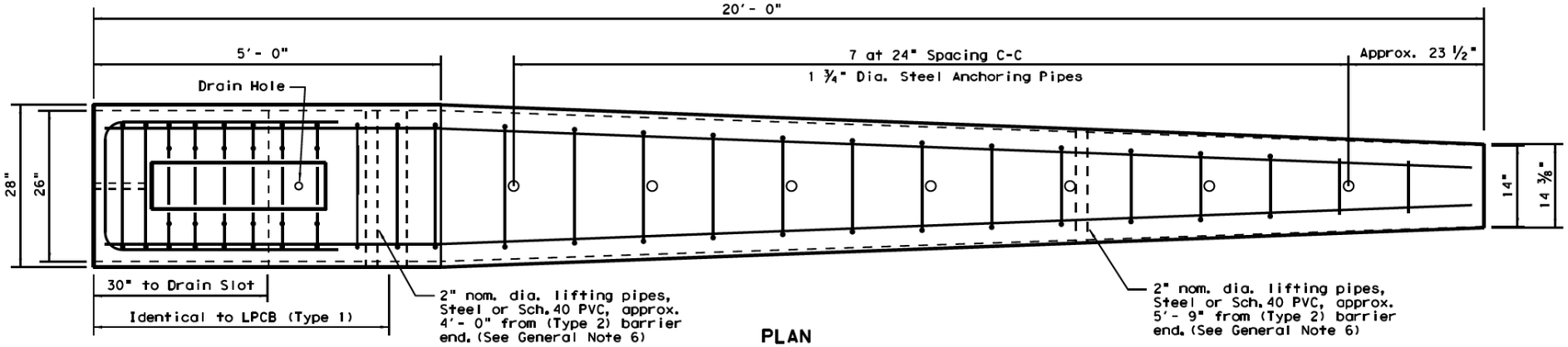
SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

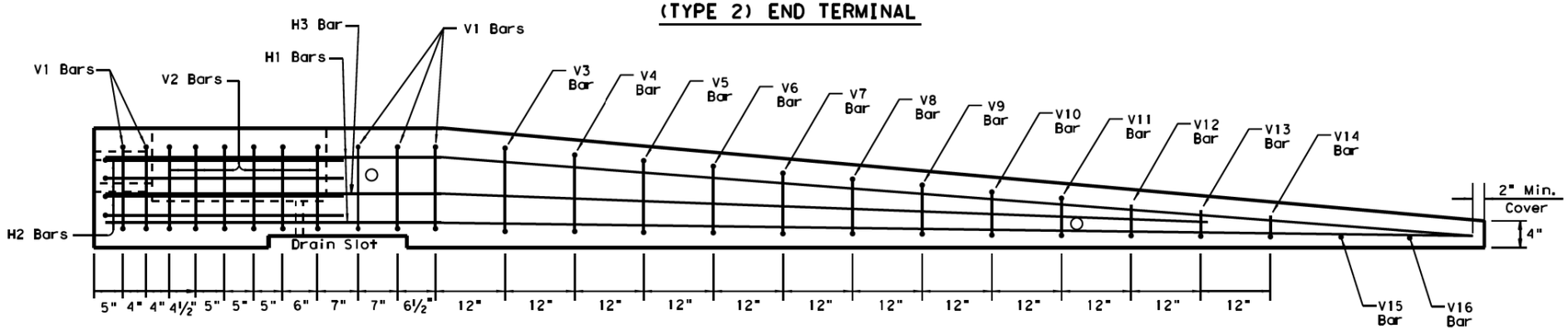
# LOW PROFILE CONCRETE BARRIER
## PRECAST BARRIER (TYPE 1)
## LPCB-13

| FILE: lpcb13.dgn | DN: TxDOT | CK: AM | DW: VP | CK: |
|---|---|---|---|---|
| ©TxDOT December 2010 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0902 | 90 | 119 | McCART |
| | DIST | COUNTY | | SHEET NO. |
| | FTW | TARRANT | | 66 |

DATE:
FILE:

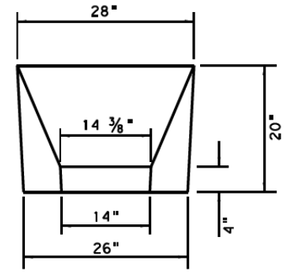



## PLAN
## (TYPE 2) END TERMINAL




## ELEVATION
## (TYPE 2) END TERMINAL

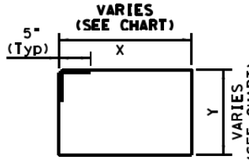
Note:
Anchoring pipes not shown in Elevation View




## APPROACH VIEW

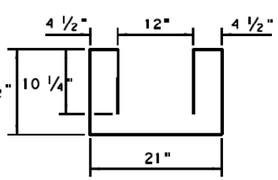
## TYPE 2 - NOTES

1. Welded wire reinforcment (WWR) is "not" an option for Type 2 Barrier.
2. Type 2 Barrier shall be used as an end treatment for the Type 1 barrier segments, when applicable.
3. The end treatment can be used without the anchor pins in locations that can accommodate approximately 4 ft. of lateral displacement of the end treatment. The use of non-pinned end treatment does not affect the performance or the deflection of the Low-Profile barrier system.
4. The anchor pins are all the same length and are to be driven flush with the top of the (Type 2) barrier surface.
5. The bends in the H3 and H1 bars are slight, no formal bend is necessary.
6. The Type 2 barrier segment must be lifted from the rear first, to prevent cracking of sloped section.
7. See LPCB sheet 1 for additional information.

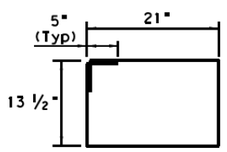



V3-V14 Bars

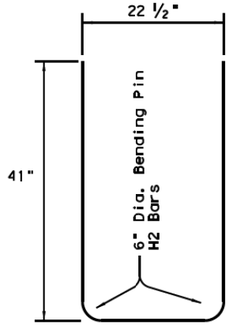
| BAR (#4) | X (IN.) | Y (IN.) |
|---|---|---|
| V3 BAR | 20 ¼ | 14 ½ |
| V4 BAR | 19 ½ | 13 ½ |
| V5 BAR | 18 ½ | 12 ¼ |
| V6 BAR | 17 ½ | 11 ¼ |
| V7 BAR | 17 | 10 ¼ |
| V8 BAR | 16 ¼ | 9 |
| V9 BAR | 15 ½ | 8 |
| V10 BAR | 14 ½ | 7 |
| V11 BAR | 13 ¾ | 6 |



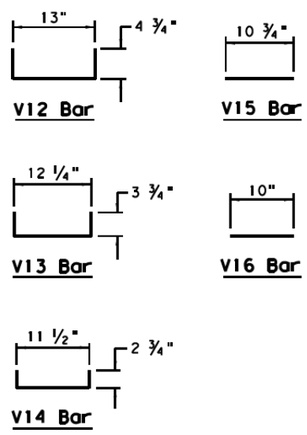

(6)-V2 Bars




(5)-V1 Bars

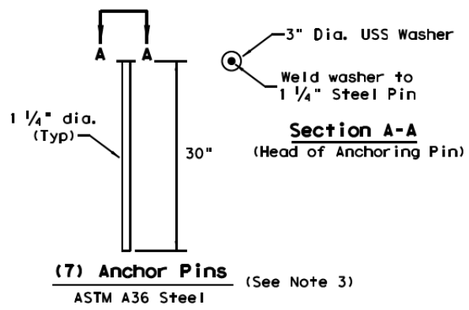



(4)-H2 Bars
(#5) Bars



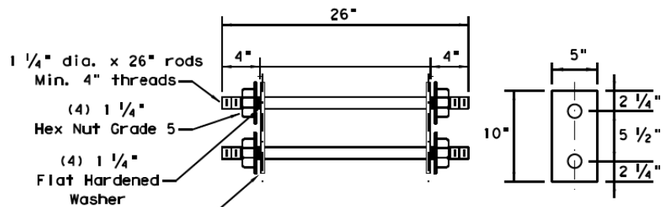

Note: All V Bars are (#4)

## REINFORCING STEEL DETAILS
TYPE 2 - END TERMINAL




Section A-A
(Head of Anchoring Pin)

(7) Anchor Pins
ASTM A36 Steel
(See Note 3)

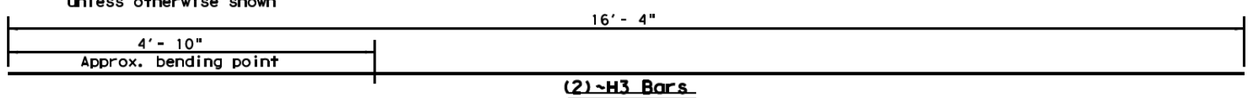



(2) CONNECTION BOLTS
ASTM A36

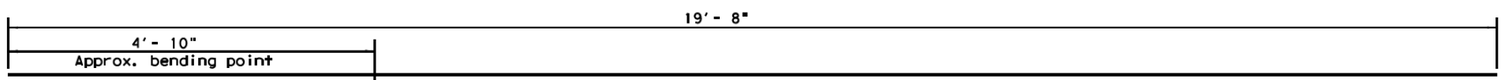
PLATE WASHER
5" x 10" x ⅜"

Note: Rods, Hex nuts and Washers shall be Galvanized.

Note: Use 2" Dia. Bending Pin, unless otherwise shown




(2)-H3 Bars
(#5) Bar




Note: Bends on H1 and H3 bars are slight and do not require formal bends.

(4)-H1 Bars
(#5) Bar

## FOR CONTRACTORS INFORMATION ONLY

| (TYPE 2) APPROX. QUANTITIES 20 FT. SECTION | | |
|---|---|---|
| CONCRETE | CY | 1.65 |
| REINFORCING STEEL | LBS | 240 |
| TOTAL BARRIER WT. | LBS | 7000 |

SHEET 2 OF 2

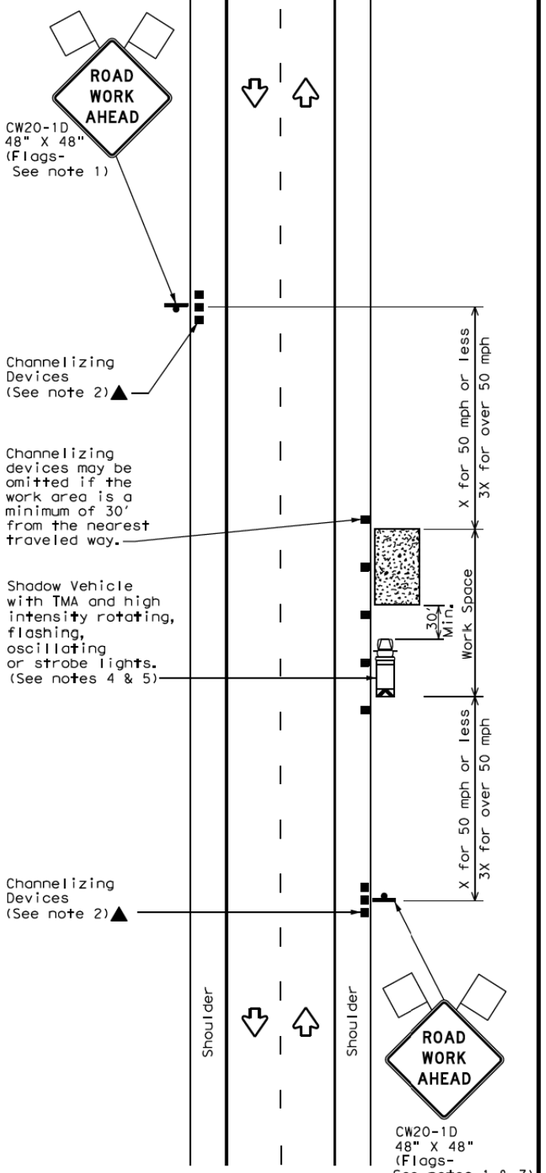
Texas Department of Transportation

Design Division Standard

# LOW PROFILE CONCRETE BARRIER
## PRECAST BARRIER (TYPE 2)
## LPCB-13

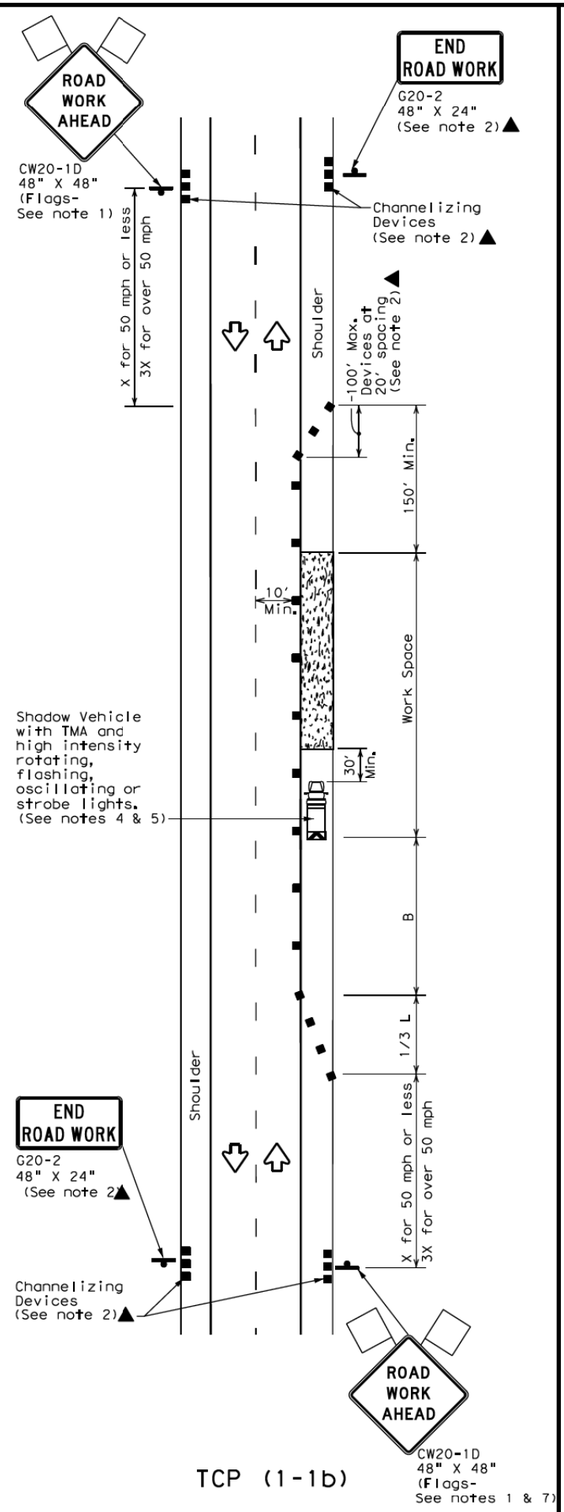
| FILE: lpcb13.dgn | DN: TxDOT | CK: AM | DW: VP | CK: |
|---|---|---|---|---|
| ©TxDOT December 2010 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0902 | 90 | 119 | McCART |
| | DIST | COUNTY | | SHEET NO. |
| | FTW | TARRANT | | 67 |

DATE:
FILE:



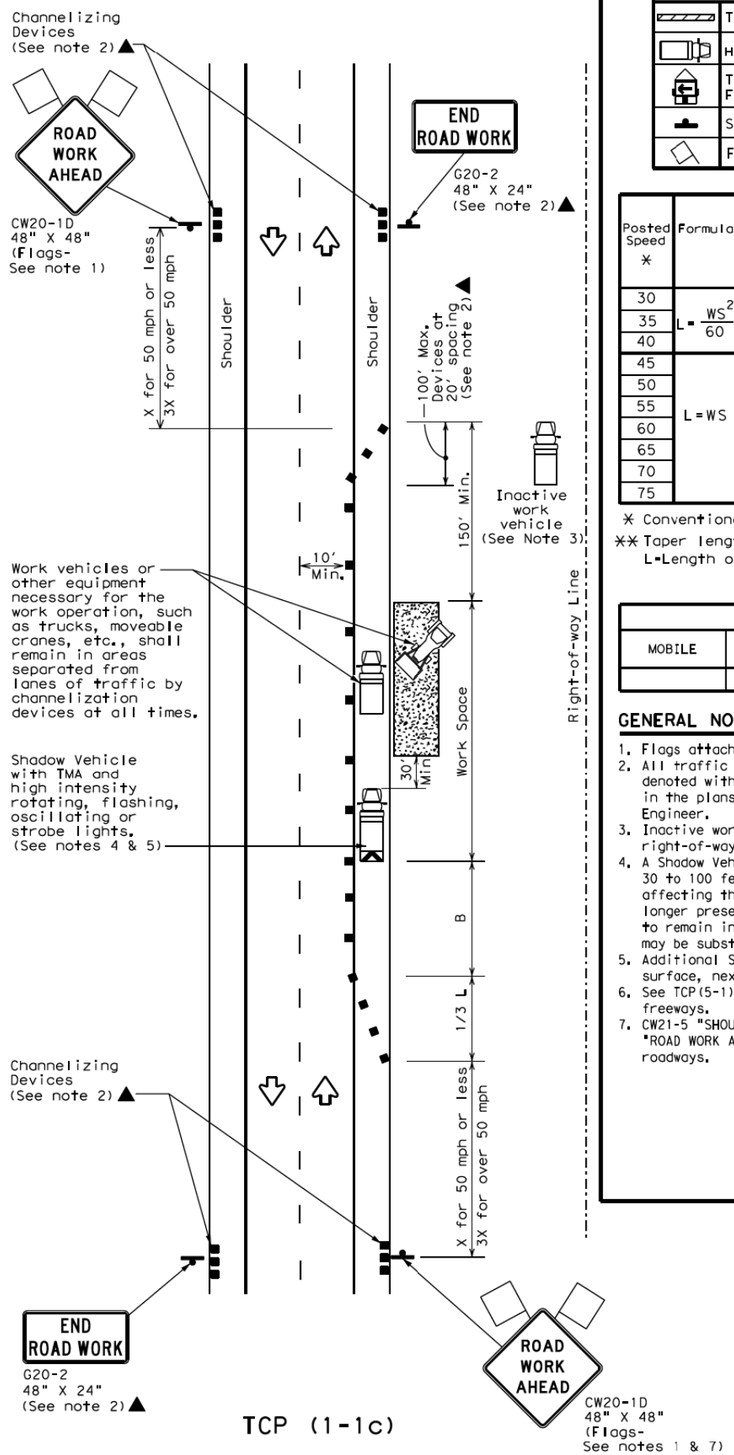

TCP (1-1a)

## WORK SPACE NEAR SHOULDER
Conventional Roads




TCP (1-1b)

## WORK SPACE ON SHOULDER
Conventional Roads




TCP (1-1c)

## WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

## GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

# TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

# TCP(1-1)-18

| FILE: tcp1-1-18.dgn | DN: | CK: | DW: | CK: |
|---|---|---|---|---|
| ©TxDOT December 1985 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0902 | 90 | 119 | McCART |
| 2-94 4-98 | DIST | COUNTY | | SHEET NO. |
| 8-95 2-12 | FTW | TARRANT | | 68 |
| 1-97 2-18 | | | | |

DATE:
FILE:

151

## LEGEND

- CONC PVMT (JOINTED-CPCD) (9")
- CONC SIDEWALK (4")
- BLOCK SODDING

NOTES:
1. TYPICAL SECTION STATIONS ARE FROM CENTERLINE McCART AVE UNLESS OTHERWISE NOTED.

NOTE:
CONCRETE PAVEMENT IS TO HAVE 3600 psi 28-DAY MIN. COMPRESSIVE STRENGTH WITH NO. 4 BARS SPACED ON 18-INCH INTERVALS IN BOTH DIRECTIONS.

CFW MON 8309
N 6919862.06
E 2318060.05
EL = 743.06

CP #50
CAPPED IRON ROD SET
N 6921187
E 2317157
EL = 749.04

CP #51
CAPPED IRON ROD SET
N 6921134
E 2317579
EL = 738.81

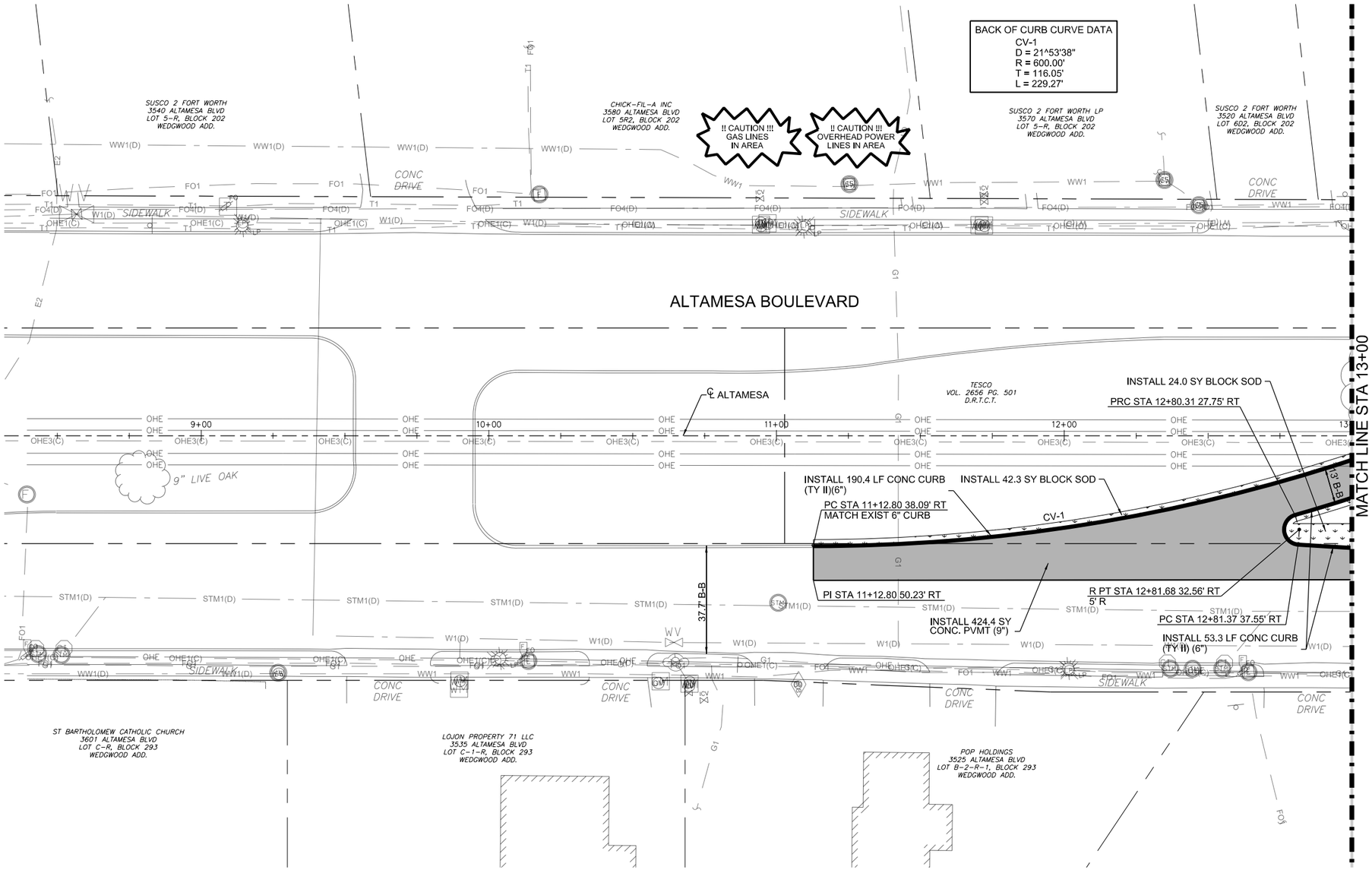
CP #52
CAPPED IRON ROD SET
N 6921683
E 2317470
EL = 745.02

CP #53
CAPPED IRON ROD SET
N 6921270
E 2316408
EL = 769.59

CP #54
CAPPED IRON ROD
N 6920747
E 2316690
758.90

BACK OF CURB CURVE DATA
CV-1
D = 21^53'38"
R = 600.00'
T = 116.05'
L = 229.27'

0 20 40 60
GRAPHIC SCALE IN FEET




ROW AND MEDIANS
1. CONTRACTOR WILL USE CLEAN TOP SOIL WITH NO ROCKS TO BACK FILL BEFORE LAYING SOD OR HYDRO SEEDING.
2. ROCKS LARGER THAN 1" SHALL BE REMOVED IN AREAS TO BE GRASSES, IF EXISTING TOP SOIL SHALL BE USED.
3. ALL DIRT MOUNDS SHALL BE REMOVED FROM ROWS, CORNER CLIPS AND TRAFFIC DIVIDERS PRIOR TO SEEDING AFTER CONSTRUCTION IS COMPLETE.
4. ANY ROWS, CORNER CLIPS AND TRAFIC DIVIDERS THAT WERE DISTURBED DURING CONSTRUCTION WILL BE PUT BACK IN THEIR ORIGINAL STATE OR BETTER.
5. IN THE EVENT GRASS HAS BEEN DISTURBED IN THE ROWS, CORNER CLIPS OR TRAFFIC DIVIDERS, CONTRACTOR WILL RESTORE GRASS. GRASS WILL BE ESTABLISHED AT 100% BY THE CONTRACTOR.
6. ROWS, CORNER CLIPS AND TRAFFIC DIVIDERS WILL BE MAINTAINED AND MOWED BY THE CONTRACTOR FOR HIGH GRASS AND WEEDS EVERY 14 DAYS.

(THE DEPARTMENT OF PARK AND RECREATION SHALL HAVE JURISDICTION AUTHORITY, CONTROL AND SUPERVISION OVER ALL TREES, PLANTS AND SHRUBS PLANTED OR GROWING IN OR UPON THE PUBLIC HIGHWAYS AND PUBLIC PLACES IN THE CITY, AND THE PLANTING, REMOVAL, CARE, MAINTENANCE AND PROTECTION THEREOF) (CODE 1964, 36-1) (ORD. 11541, 1(c), PASSED 4-12-1994)

STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED
PROFESSIONAL ENGINEER
07/07/2022


MULTATECH ARCHITECTS ENGINEERS
2821 WEST 7TH ST
SUITE 400
FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351


Texas Department of Transportation

# PAVING IMPROVEMENT PLAN
# ALTAMESA BLVD
# BEGIN PROJECT TO STA 13+00

SHEET 1 OF 4

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | |
| REVISIONS | STATE | DISTRICT | COUNTY | 69 |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



7/7/2022 5:20:15 PM
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## LEGEND

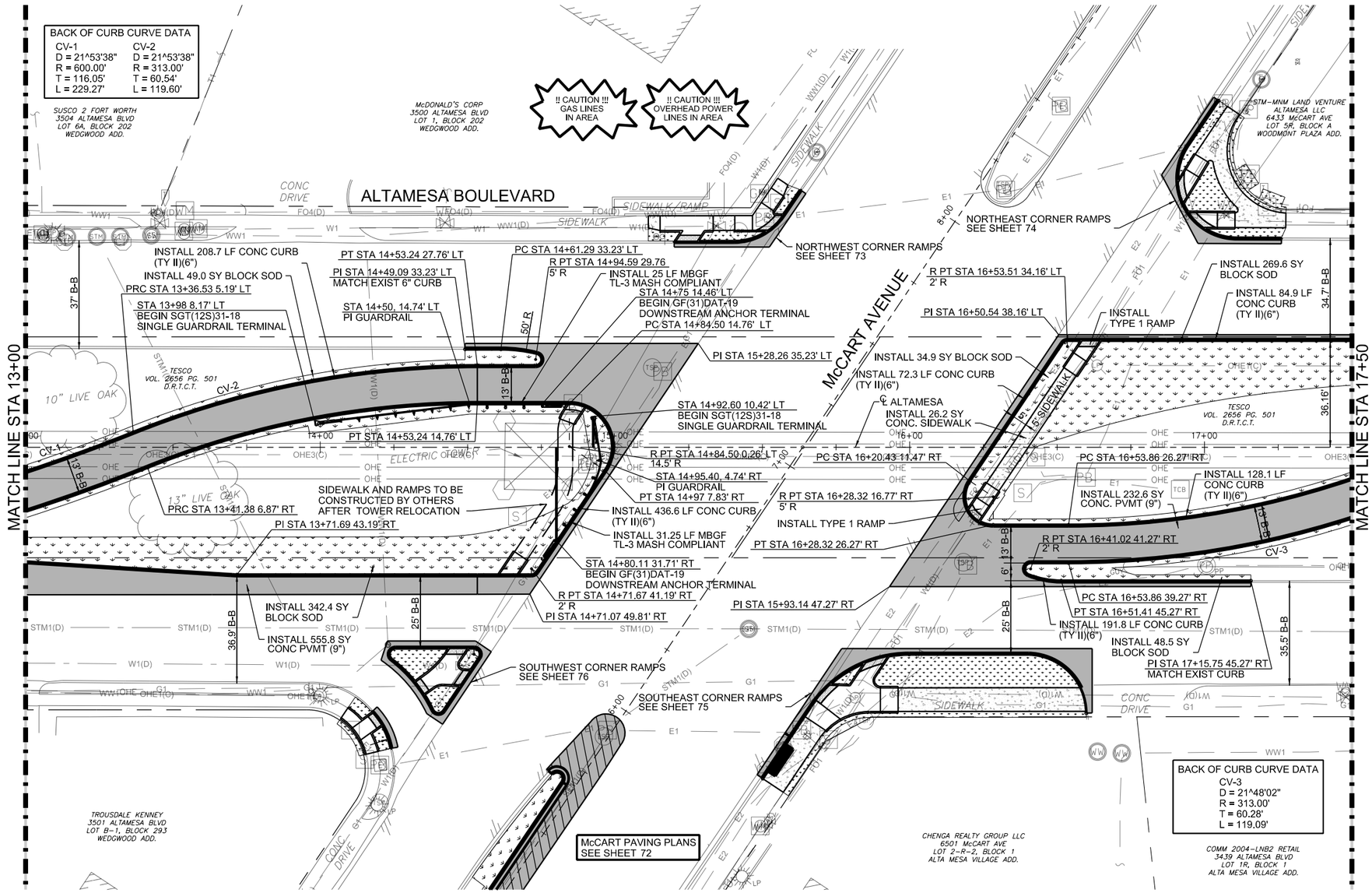
- CONC PVMT (JOINTED-CPCD) (9")
- CONC SIDEWALK (4")
- BLOCK SODDING PER CFW DETAIL 32 92 13 - 1.2

NOTES:
1. TYPICAL SECTION STATIONS ARE FROM CENTERLINE McCART AVE UNLESS OTHERWISE NOTED.

NOTE:
CONCRETE PAVEMENT IS TO HAVE 3600 psi 28-DAY MIN. COMPRESSIVE STRENGTH WITH NO. 4 BARS SPACED ON 18-INCH INTERVALS IN BOTH DIRECTIONS.

| | |
|---|---|
| CFW MON 8309<br>N 6919862.06<br>E 2318060.05<br>EL = 743.06 | CP #52<br>CAPPED IRON ROD SET<br>N 6921683<br>E 2317470<br>EL = 745.02 |
| CP #50<br>CAPPED IRON ROD SET<br>N 6921187<br>E 2317157<br>EL = 749.04 | CP #53<br>CAPPED IRON ROD SET<br>N 6921270<br>E 2316408<br>EL = 769.59 |
| CP #51<br>CAPPED IRON ROD SET<br>N 6921134<br>E 2317579<br>EL = 738.81 | CP #54<br>CAPPED IRON ROD<br>N 6920747<br>E 2316690<br>758.90 |

0 20 40 60
GRAPHIC SCALE IN FEET




ROW AND MEDIANS
1. CONTRACTOR WILL USE CLEAN TOP SOIL WITH NO ROCKS TO BACK FILL BEFORE LAYING SOD OR HYDRO SEEDING.
2. ROCKS LARGER THAN 1" SHALL BE REMOVED IN AREAS TO BE GRASSES, IF EXISTING TOP SOIL SHALL BE USED.
3. ALL DIRT MOUNDS SHALL BE REMOVED FROM ROWS, CORNER CLIPS AND TRAFFIC DIVIDERS PRIOR TO SEEDING AFTER CONSTRUCTION IS COMPLETE.
4. ANY ROWS, CORNER CLIPS AND TRAFIC DIVIDERS THAT WERE DISTURBED DURING CONSTRUCTION WILL BE PUT BACK IN THEIR ORIGINAL STATE OR BETTER.
5. IN THE EVENT GRASS HAS BEEN DISTURBED IN THE ROWS, CORNER CLIPS OR TRAFFIC DIVIDERS, CONTRACTOR WILL RESTORE GRASS. GRASS WILL BE ESTABLISHED AT 100% BY THE CONTRACTOR.
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STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED PROFESSIONAL ENGINEER
07/07/2022


MULTATECH ARCHITECTS ENGINEERS
2821 WEST 7TH ST
SUITE 400
FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351


Texas Department of Transportation

# PAVING IMPROVEMENT PLAN ALTAMESA BLVD STA 13+00 TO STA 17+50

SHEET 2 OF 4

| REVISIONS | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 70 |
| | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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## LEGEND

- CONC PVMT (JOINTED-CPCD) (9")
- CONC SIDEWALK (4")
- BLOCK SODDING

NOTES:
1. TYPICAL SECTION STATIONS ARE FROM CENTERLINE McCART AVE UNLESS OTHERWISE NOTED.

NOTE:
CONCRETE PAVEMENT IS TO HAVE 3600 psi 28-DAY MIN. COMPRESSIVE STRENGTH WITH NO. 4 BARS SPACED ON 18-INCH INTERVALS IN BOTH DIRECTIONS.

CFW MON 8309
N 6919862.06
E 2318060.05
EL = 743.06

CP #50
CAPPED IRON ROD SET
N 6921187
E 2317157
EL = 749.04

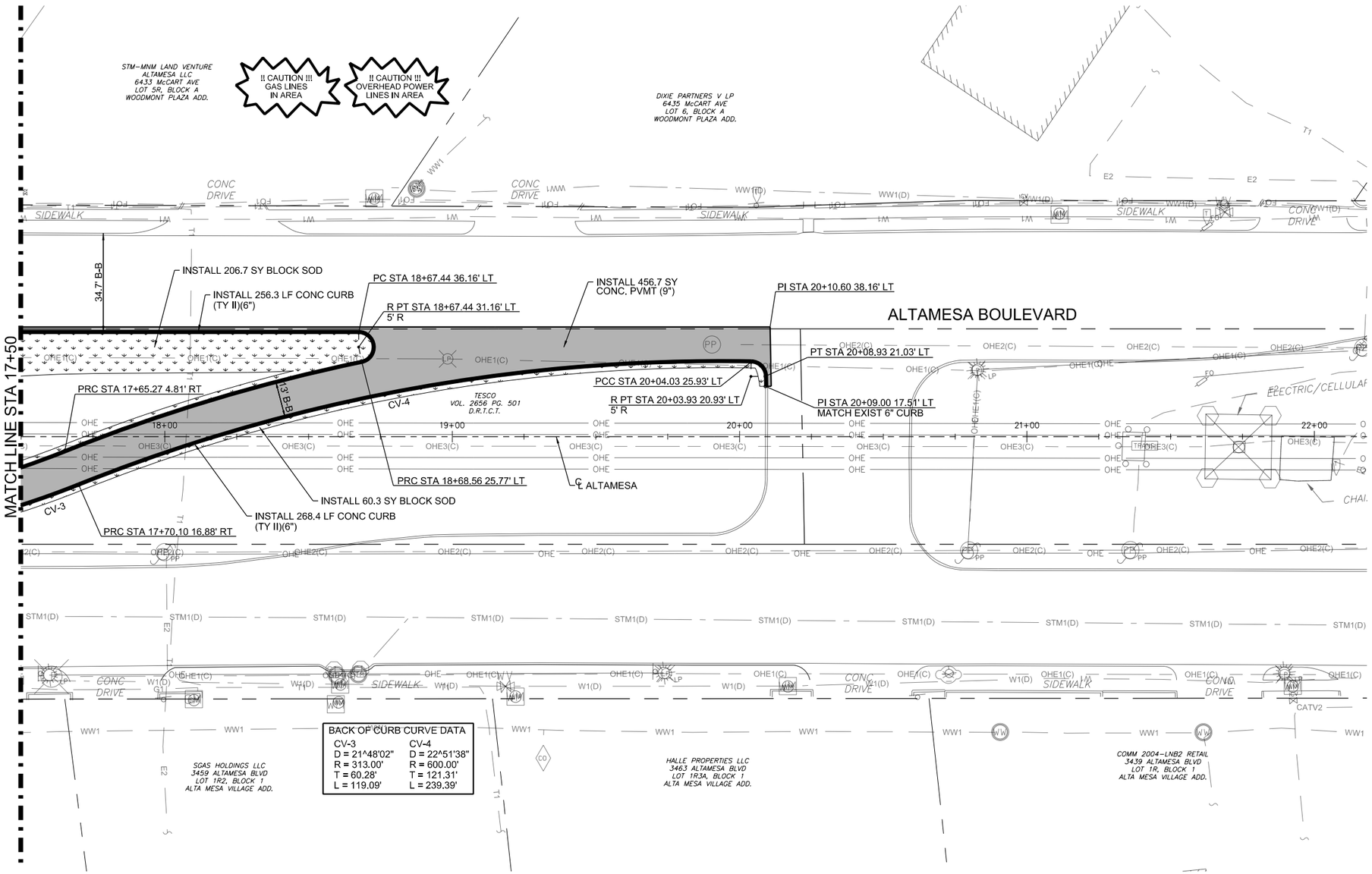
CP #51
CAPPED IRON ROD SET
N 6921134
E 2317579
EL = 738.81

CP #52
CAPPED IRON ROD SET
N 6921683
E 2317470
EL = 745.02

CP #53
CAPPED IRON ROD SET
N 6921270
E 2316408
EL = 769.59

CP #54
CAPPED IRON ROD
N 6920747
E 2316690
758.90

0 20 40 60
GRAPHIC SCALE IN FEET




BACK OF CURB CURVE DATA

| CV-3 | CV-4 |
|---|---|
| D = 21^48'02" | D = 22^51'38" |
| R = 313.00' | R = 600.00' |
| T = 60.28' | T = 121.31' |
| L = 119.09' | L = 239.39' |

ROW AND MEDIANS
1. CONTRACTOR WILL USE CLEAN TOP SOIL WITH NO ROCKS TO BACK FILL BEFORE LAYING SOD OR HYDRO SEEDING.
2. ROCKS LARGER THAN 1" SHALL BE REMOVED IN AREAS TO BE GRASSES, IF EXISTING TOP SOIL SHALL BE USED.
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STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED PROFESSIONAL ENGINEER
07/07/2022


MULTATECH ARCHITECTS ENGINEERS
2821 WEST 7TH ST
SUITE 400
FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351


Texas Department of Transportation

# PAVING IMPROVEMENT PLAN ALTAMESA BLVD STA 17+50 TO END PROJECT

SHEET 3 OF 4

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 71 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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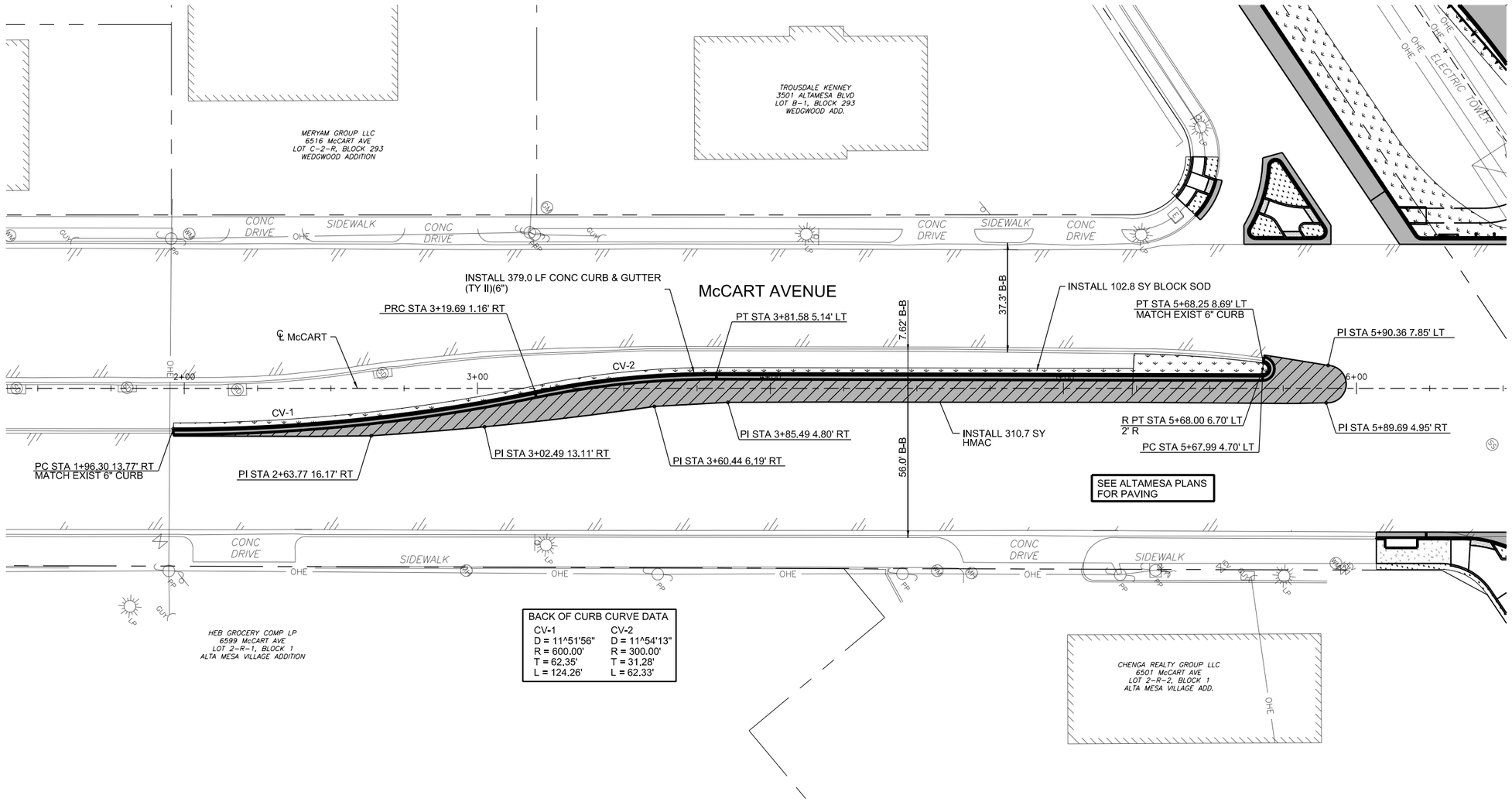


BACK OF CURB CURVE DATA

| CV-1 | CV-2 |
|---|---|
| D = 11^51'56" | D = 11^54'13" |
| R = 600.00' | R = 300.00' |
| T = 62.35' | T = 31.28' |
| L = 124.26' | L = 62.33' |

CFW MON 8309
N 6919862.06
E 2318060.05
EL = 743.06

CP #50
CAPPED IRON ROD SET
N 6921187
E 2317157
EL = 749.04

CP #51
CAPPED IRON ROD SET
N 6921134
E 2317579
EL = 738.81

CP #52
CAPPED IRON ROD SET
N 6921683
E 2317470
EL = 745.02

CP #53
CAPPED IRON ROD SET
N 6921270
E 2316408
EL = 769.59

CP #54
CAPPED IRON ROD
N 6920747
E 2316690
758.90

0 20 40 60
GRAPHIC SCALE IN FEET

ROW AND MEDIANS

1. CONTRACTOR WILL USE CLEAN TOP SOIL WITH NO ROCKS TO BACK FILL BEFORE LAYING SOD OR HYDRO SEEDING.
2. ROCKS LARGER THAN 1" SHALL BE REMOVED IN AREAS TO BE GRASSES, IF EXISTING TOP SOIL SHALL BE USED.
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LEGEND

- HMA 2" Ty-C PG70-28 / HMA 5" Ty-B PG64-22 / FLEXBASE (14")
- CONC SIDEWALK (4")
- BLOCK SODDING

STATE OF TEXAS
ERIC A CANALES
90103
LICENSED PROFESSIONAL ENGINEER
07/07/2022

MULTATECH ARCHITECTS ENGINEERS
2821 WEST 7TH ST
SUITE 400
FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F-351

Texas Department of Transportation

# PAVING IMPROVEMENT PLAN McCART AVE

SHEET 4 OF 4

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 72 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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## LEGEND

- CONC PVMT (JOINTED-CPCD) (9")
- CONC SIDEWALK/RAMP (4")
- BLOCK SODDING

NOTES:
1. TYPICAL SECTION STATIONS ARE FROM CENTERLINE McCART AVE UNLESS OTHERWISE NOTED.

NOTE:
CONCRETE PAVEMENT IS TO HAVE 3600 psi 28-DAY MIN. COMPRESSIVE STRENGTH WITH NO. 4 BARS SPACED ON 18-INCH INTERVALS IN BOTH DIRECTIONS.

CFW MON 8309
N 6919862.06
E 2318060.05
EL = 743.06

CP #50
CAPPED IRON ROD SET
N 6921187
E 2317157
EL = 749.04

CP #51
CAPPED IRON ROD SET
N 6921134
E 2317579
EL = 738.81

CP #52
CAPPED IRON ROD SET
N 6921683
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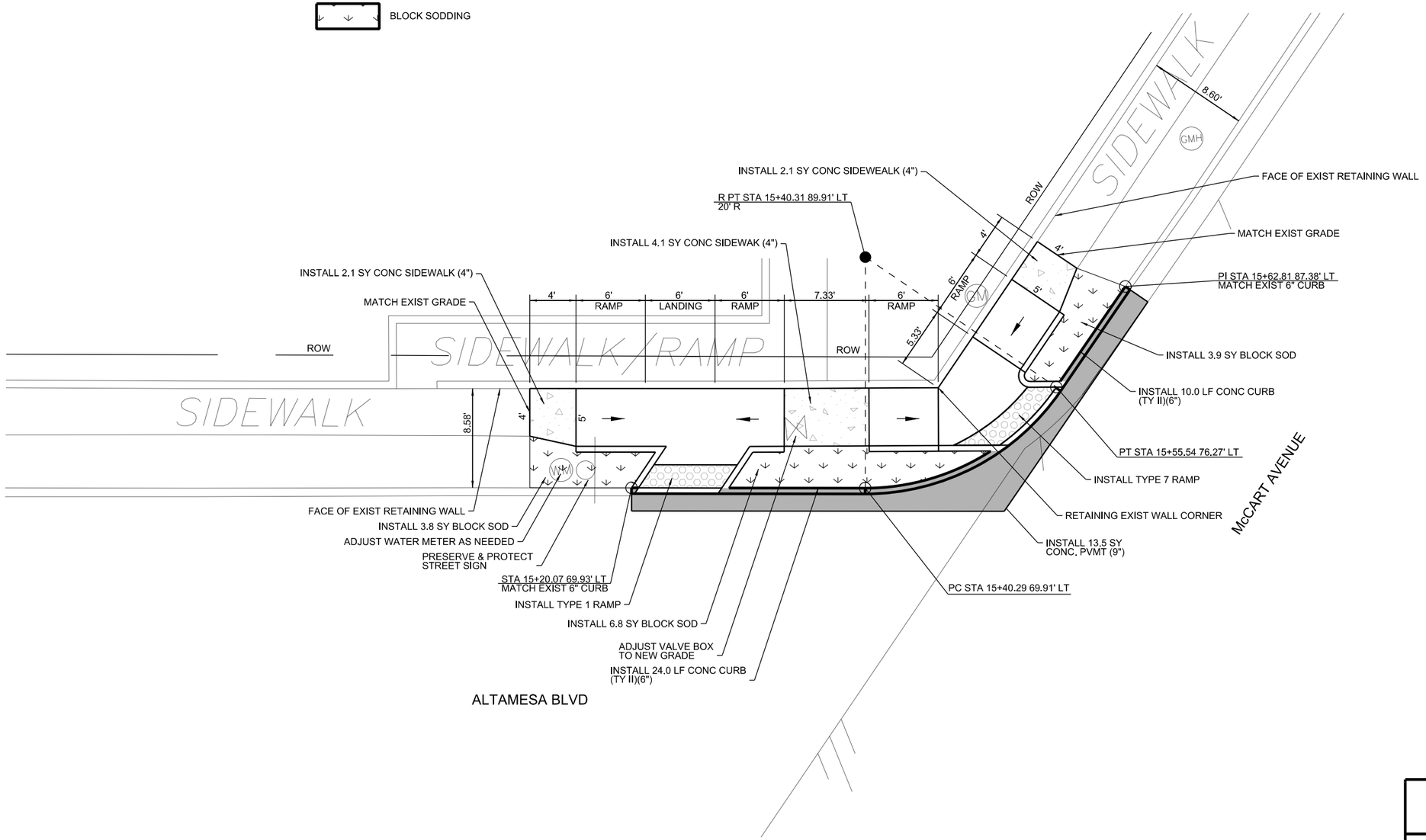
EL = 745.02

CP #53
CAPPED IRON ROD SET
N 6921270
E 2316408
EL = 769.59

CP #54
CAPPED IRON ROD
N 6920747
E 2316690
758.90




0 5 10 15
GRAPHIC SCALE IN FEET

STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED PROFESSIONAL ENGINEER
07/07/2022


MULTATECH ARCHITECTS ENGINEERS
2821 WEST 7TH ST
SUITE 400
FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351


Texas Department of Transportation

# SIDEWALK & RAMP DETAIL NORTHWEST CORNER

SHEET 1 OF 4

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | |
| REVISIONS | STATE | DISTRICT | COUNTY | 73 |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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## LEGEND

- CONC PVMT (JOINTED-CPCD) (9")
- CONC SIDEWALK/RAMP (4")
- BLOCK SODDING

NOTES:
1. TYPICAL SECTION STATIONS ARE FROM CENTERLINE McCART AVE UNLESS OTHERWISE NOTED.

NOTE:
CONCRETE PAVEMENT IS TO HAVE 3600 psi 28-DAY MIN. COMPRESSIVE STRENGTH WITH NO. 4 BARS SPACED ON 18-INCH INTERVALS IN BOTH DIRECTIONS.

CFW MON 8309
N 6919862.06
E 2318060.05
EL = 743.06

CP #50
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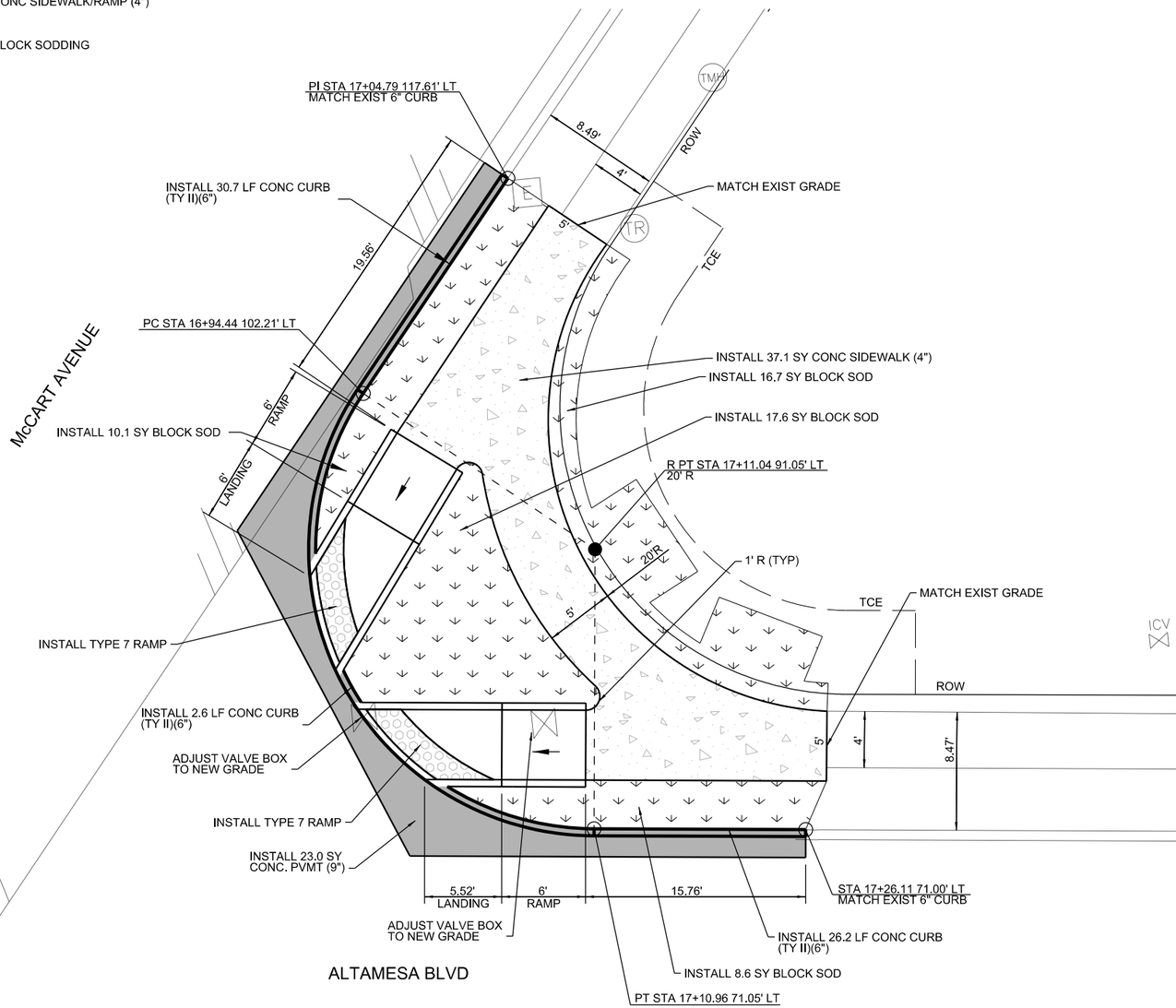
E 2317157
EL = 749.04

CP #51
CAPPED IRON ROD SET
N 6921134
E 2317579
EL = 738.81

CP #52
CAPPED IRON ROD SET
N 6921683
E 2317470
EL = 745.02

CP #53
CAPPED IRON ROD SET
N 6921270
E 2316408
EL = 769.59

CP #54
CAPPED IRON ROD
N 6920747
E 2316690
758.90




ICV

0 5 10 15
GRAPHIC SCALE IN FEET

STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED
PROFESSIONAL ENGINEER
07/07/2022


MULTATECH ARCHITECTS ENGINEERS
2821 WEST 7TH ST
SUITE 400
FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351


Texas Department of Transportation

# SIDEWALK & RAMP DETAIL NORTHEAST CORNER

SHEET 2 OF 4

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | |
| REVISIONS | STATE | DISTRICT | COUNTY | 74 |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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CFW MON 8309
N 6919862.06
E 2318060.05
EL = 743.06

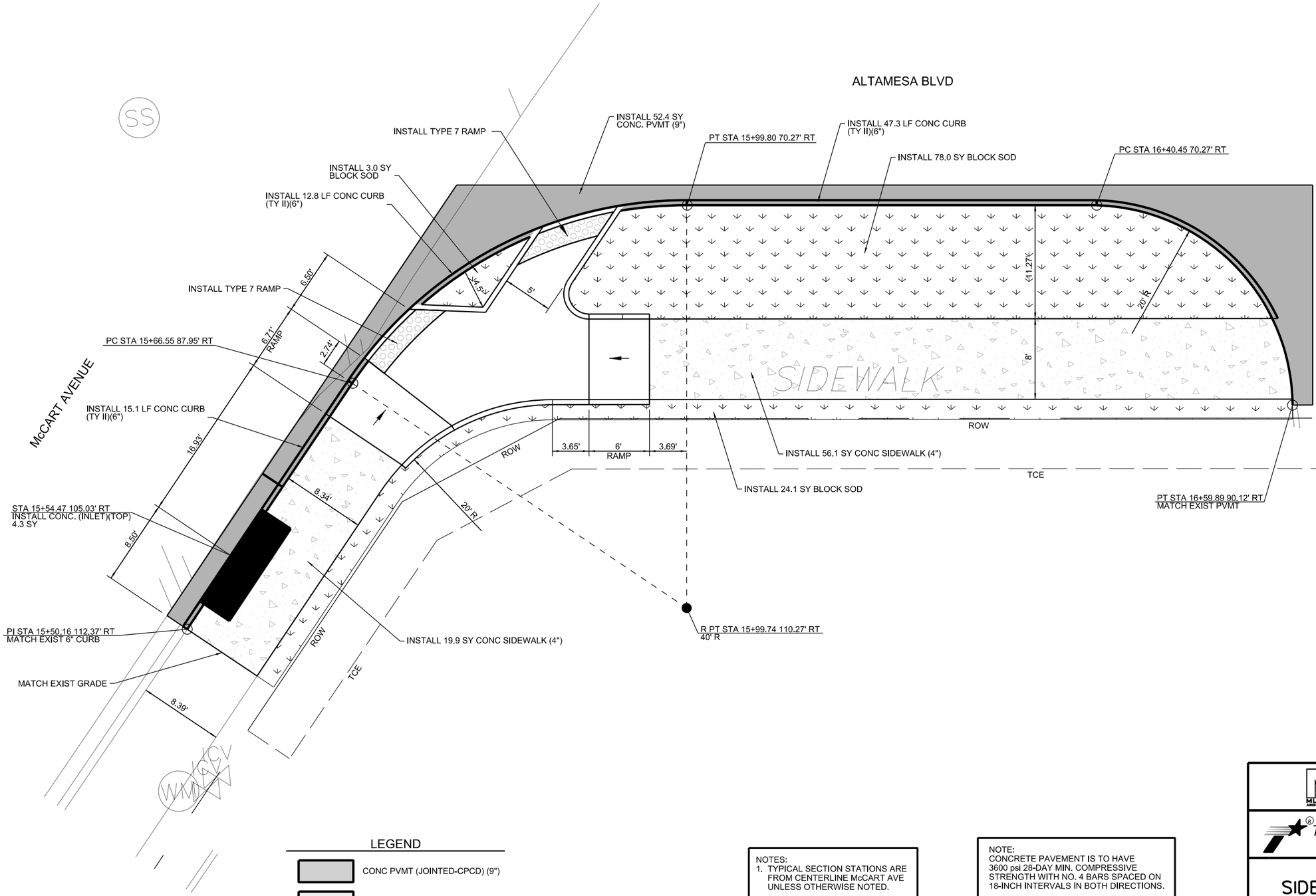
CP #50
CAPPED IRON ROD SET
N 6921187
E 2317157
EL = 749.04

CP #51
CAPPED IRON ROD SET
N 6921134
E 2317579
EL = 738.81

CP #52
CAPPED IRON ROD SET
N 6921683
E 2317470
EL = 745.02

CP #53
CAPPED IRON ROD SET
N 6921270
E 2316408
EL = 769.59

CP #54
CAPPED IRON ROD
N 6920747
E 2316690
758.90




0 5 10 15
GRAPHIC SCALE IN FEET

LEGEND

- CONC PVMT (JOINTED-CPCD) (9")
- CONC SIDEWALK/RAMP (4")
- BLOCK SODDING

NOTES:
1. TYPICAL SECTION STATIONS ARE FROM CENTERLINE McCART AVE UNLESS OTHERWISE NOTED.

NOTE:
CONCRETE PAVEMENT IS TO HAVE 3600 psi 28-DAY MIN. COMPRESSIVE STRENGTH WITH NO. 4 BARS SPACED ON 18-INCH INTERVALS IN BOTH DIRECTIONS.

STATE OF TEXAS
ERIC A. CANALES
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LICENSED
PROFESSIONAL ENGINEER
07/07/2022


MULTATECH ARCHITECTS ENGINEERS
2821 WEST 7TH ST
SUITE 400
FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351


Texas Department of Transportation

# SIDEWALK & RAMP DETAIL SOUTHEAST CORNER

SHEET 3 OF 4

| REVISIONS | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 75 |
| | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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NOTES:
1. TYPICAL SECTION STATIONS ARE FROM CENTERLINE McCART AVE UNLESS OTHERWISE NOTED.

NOTE:
CONCRETE PAVEMENT IS TO HAVE 3600 psi 28-DAY MIN. COMPRESSIVE STRENGTH WITH NO. 4 BARS SPACED ON 18-INCH INTERVALS IN BOTH DIRECTIONS.

CFW MON 8309
N 6919862.06
E 2318060.05
EL = 743.06

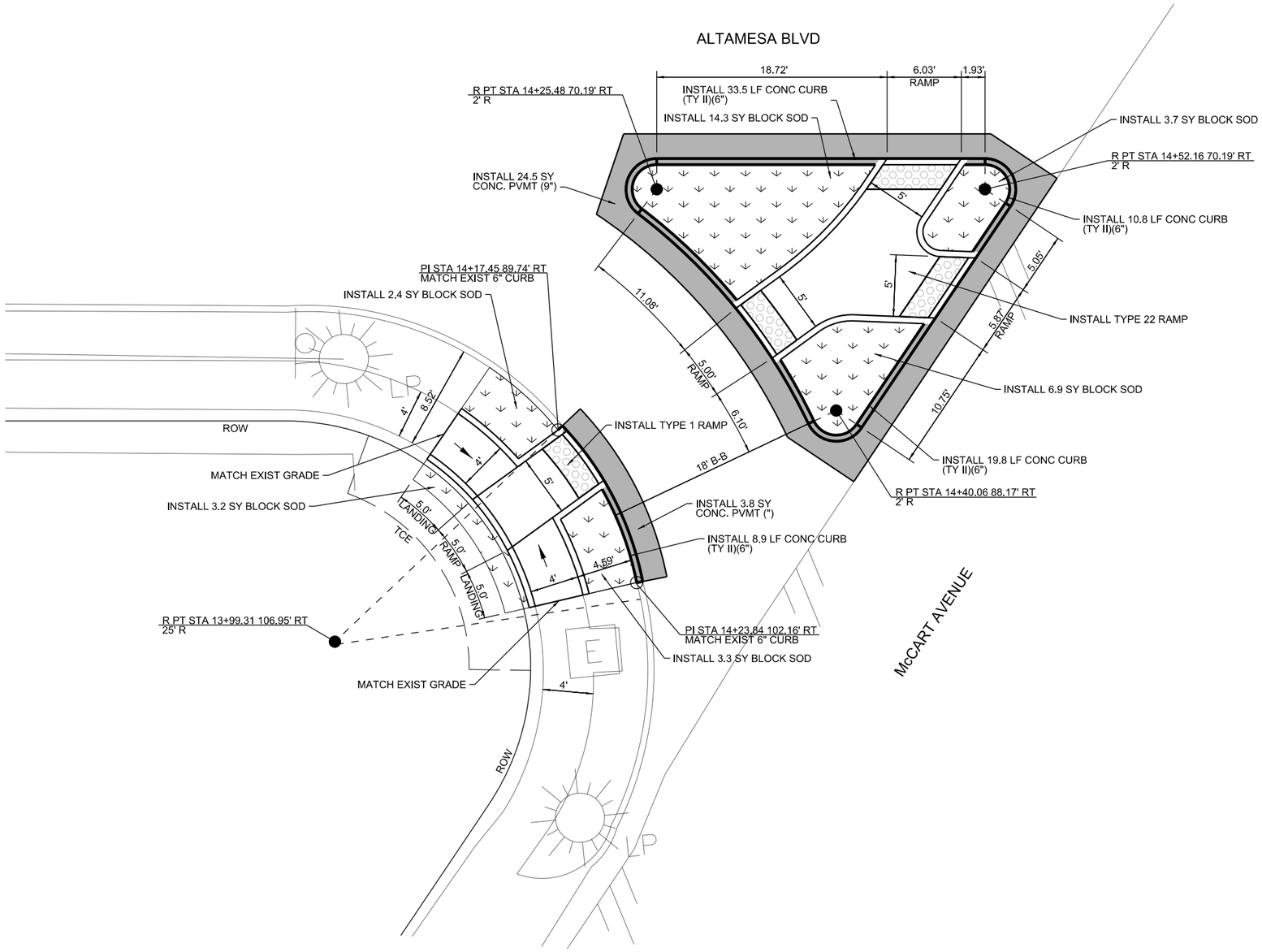
CP #50
CAPPED IRON ROD SET
N 6921187
E 2317157
EL = 749.04

CP #51
CAPPED IRON ROD SET
N 6921134
E 2317579
EL = 738.81

CP #52
CAPPED IRON ROD SET
N 6921683
E 2317470
EL = 745.02

CP #53
CAPPED IRON ROD SET
N 6921270
E 2316408
EL = 769.59

CP #54
CAPPED IRON ROD
N 6920747
E 2316690
758.90




0 5 10 15
GRAPHIC SCALE IN FEET

LEGEND
- CONC PVMT (JOINTED-CPCD) (9")
- CONC SIDEWALK/RAMP (4")
- BLOCK SODDING

STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED PROFESSIONAL ENGINEER
07/07/2022


MULTATECH ARCHITECTS ENGINEERS
2821 WEST 7TH ST
SUITE 400
FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351


Texas Department of Transportation

# SIDEWALK & RAMP DETAIL SOUTHWEST CORNER

SHEET 4 OF 4

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | |
| REVISIONS | STATE | DISTRICT | COUNTY | 76 |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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LEGEND

761 EXIST CONTOUR

761 PROP CONTOUR

CFW MON 8309
N 6919862.06
E 2318060.05
EL = 743.06

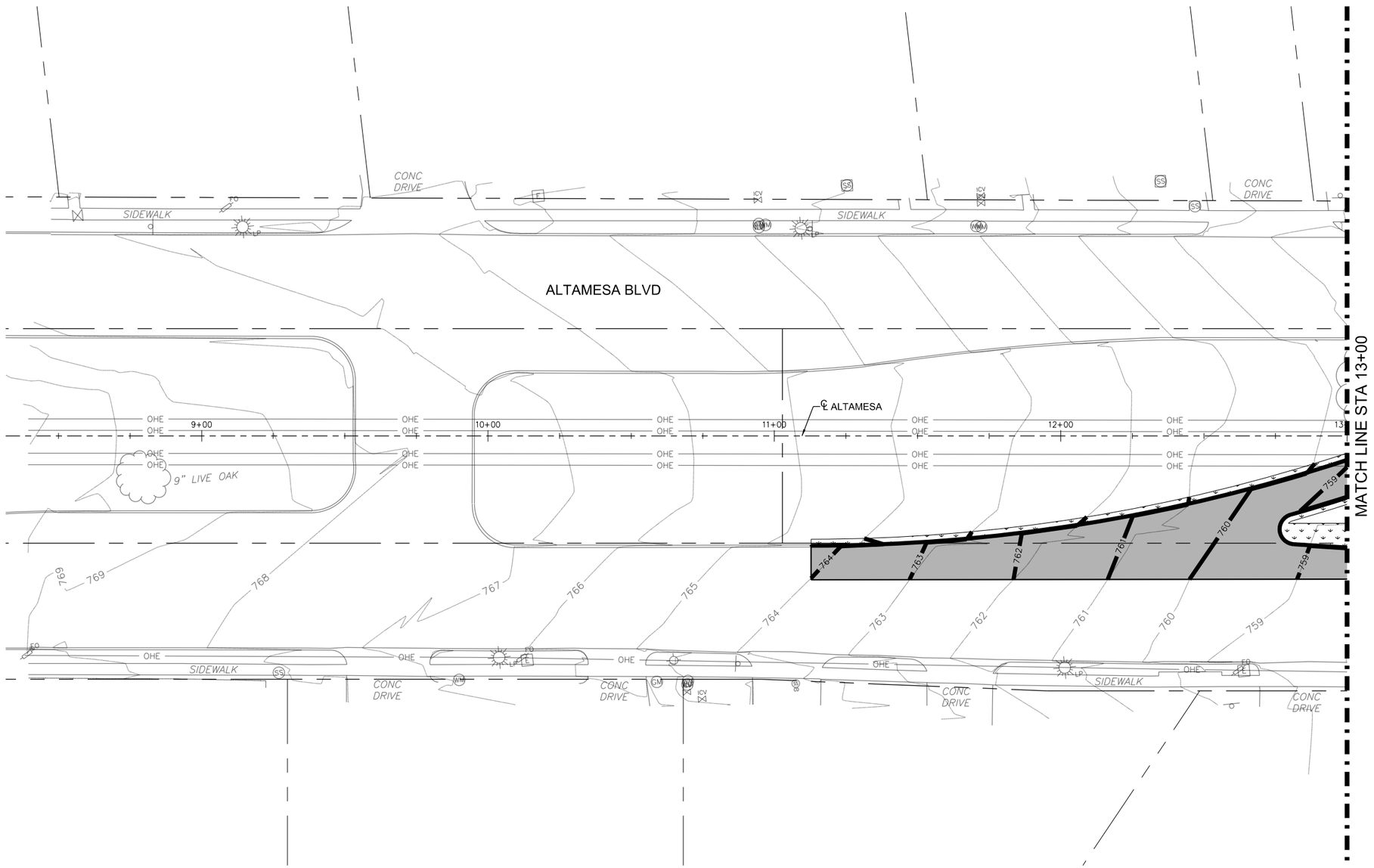
CP #50
CAPPED IRON ROD SET
N 6921187
E 2317157
EL = 749.04

CP #51
CAPPED IRON ROD SET
N 6921134
E 2317579
EL = 738.81

CP #52
CAPPED IRON ROD SET
N 6921683
E 2317470
EL = 745.02

CP #53
CAPPED IRON ROD SET
N 6921270
E 2316408
EL = 769.59

CP #54
CAPPED IRON ROD
N 6920747
E 2316690
758.90




0 20 40 60

GRAPHIC SCALE IN FEET

STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED
PROFESSIONAL ENGINEER
07/07/2022


MULTATECH ARCHITECTS ENGINEERS
2821 WEST 7TH ST
SUITE 400
FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351


Texas Department of Transportation

# GRADING PLAN
# ALTAMESA BLVD
# BEGIN PROJECT TO STA 13+00

SHEET 1 OF 4

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 77 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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LEGEND

761 EXIST CONTOUR

761 PROP CONTOUR

CFW MON 8309
N 6919862.06
E 2318060.05
EL = 743.06

CP #50
CAPPED IRON ROD SET
N 6921187
E 2317157
EL = 749.04

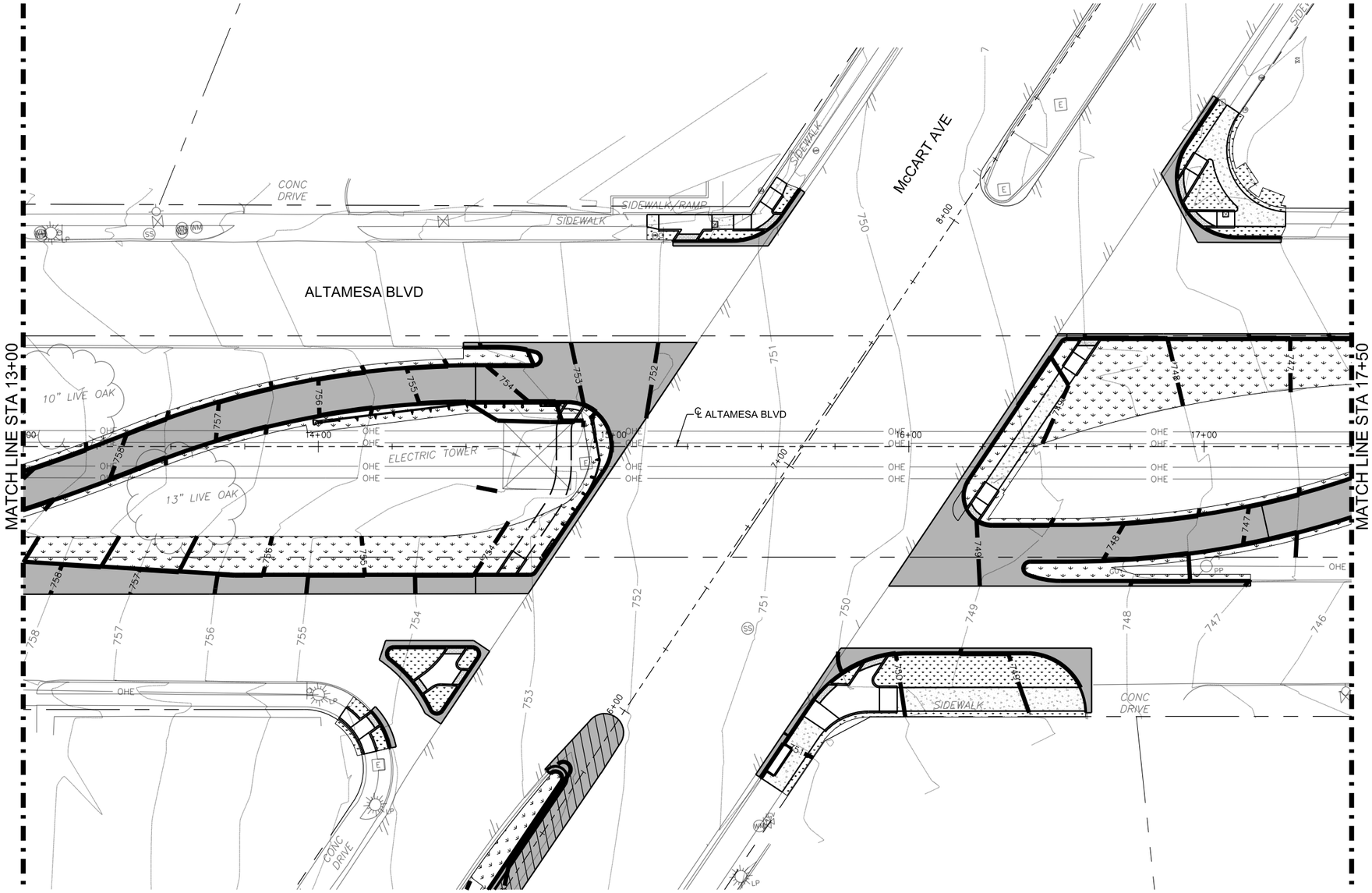
CP #51
CAPPED IRON ROD SET
N 6921134
E 2317579
EL = 738.81

CP #52
CAPPED IRON ROD SET
N 6921683
E 2317470
EL = 745.02

CP #53
CAPPED IRON ROD SET
N 6921270
E 2316408
EL = 769.59

CP #54
CAPPED IRON ROD
N 6920747
E 2316690
758.90

0 20 40 60
GRAPHIC SCALE IN FEET



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SUITE 400
FORT WORTH, TEXAS 76107
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TBPE Reg #F-351


Texas Department of Transportation

# GRADING PLAN
# ALTAMESA BLVD
# STA 13+00 TO STA 17+50

SHEET 2 OF 4

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 78 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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LEGEND

761 EXIST CONTOUR

761 PROP CONTOUR

CFW MON 8309
N 6919862.06
E 2318060.05
EL = 743.06

CP #50
CAPPED IRON ROD SET
N 6921187
E 2317157
EL = 749.04

CP #51
CAPPED IRON ROD SET
N 6921134
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EL = 745.02

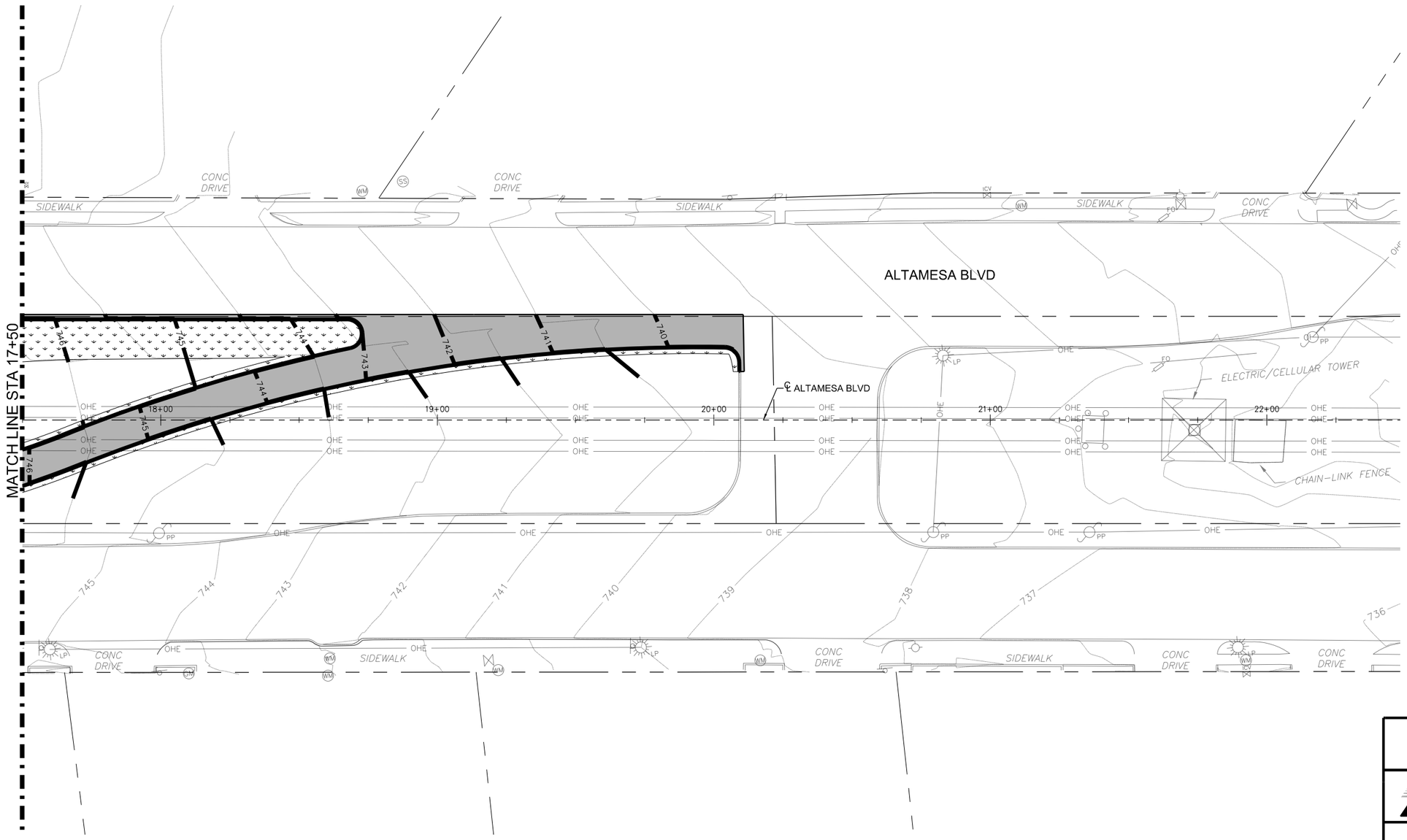
CP #53
CAPPED IRON ROD SET
N 6921270
E 2316408
EL = 769.59

CP #54
CAPPED IRON ROD
N 6920747
E 2316690
758.90

N

0 20 40 60

GRAPHIC SCALE IN FEET




STATE OF TEXAS
ERIC A CANALES
90103
LICENSED PROFESSIONAL ENGINEER
07/07/2022


MULTATECH ARCHITECTS ENGINEERS
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SUITE 400
FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351


Texas Department of Transportation

# GRADE PLAN
# ALTAMESA BLVD
# STA 17+50 TO END PROJECT

SHEET 3 OF 4

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 79 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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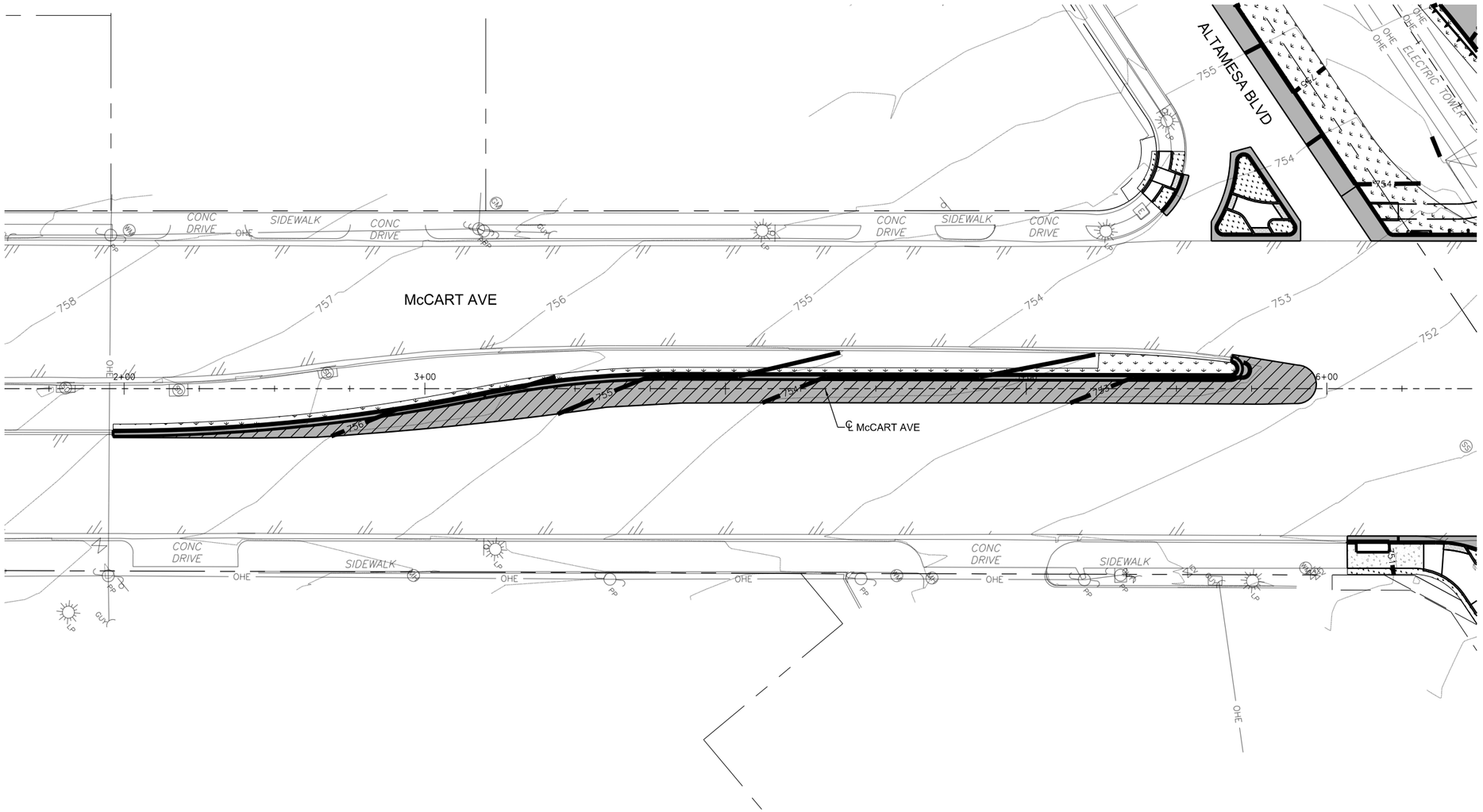


CFW MON 8309
N 6919862.06
E 2318060.05
EL = 743.06

CP #50
CAPPED IRON ROD SET
N 6921187
E 2317157
EL = 749.04

CP #51
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CP #52
CAPPED IRON ROD SET
N 6921683
E 2317470
EL = 745.02

CP #53
CAPPED IRON ROD SET
N 6921270
E 2316408
EL = 769.59

CP #54
CAPPED IRON ROD
N 6920747
E 2316690
758.90

0 20 40 60
GRAPHIC SCALE IN FEET

LEGEND
761 EXIST CONTOUR
761 PROP CONTOUR

STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED
PROFESSIONAL ENGINEER
07/07/2022


MULTATECH ARCHITECTS ENGINEERS
2821 WEST 7TH ST
SUITE 400
FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F-351


Texas Department of Transportation

# GRADING PLAN
# McCART AVE

SHEET 4 OF 4

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | |
| REVISIONS | STATE | DISTRICT | COUNTY | 80 |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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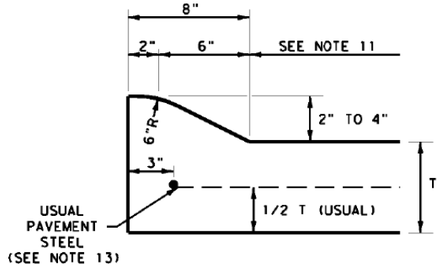
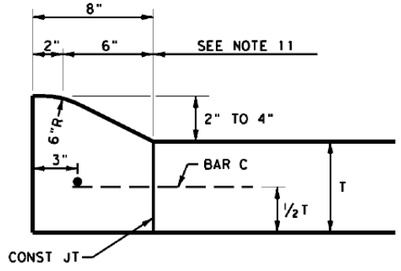
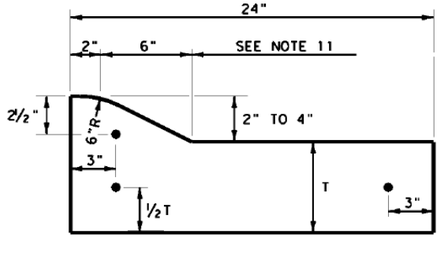


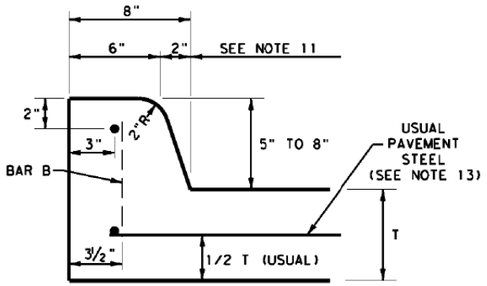

TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



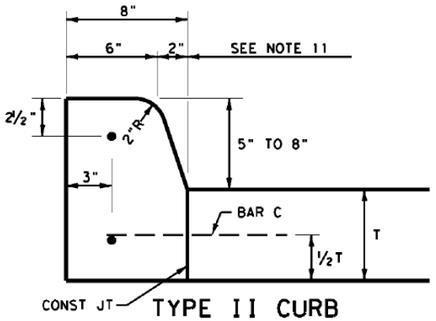

TYPE I CURB
2" - 4" HEIGHT



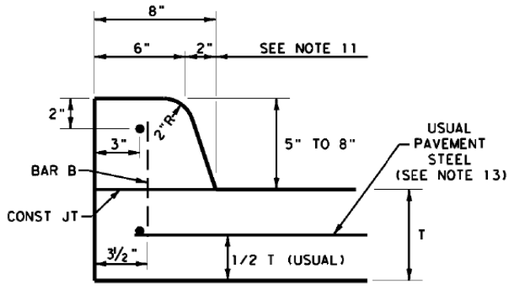

TYPE I CURB AND GUTTER
2" - 4" HEIGHT




TYPE II CURB (MONOLITHIC)
5" - 8" HEIGHT



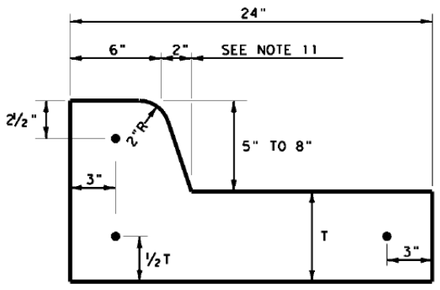

TYPE II CURB
5" - 8" HEIGHT
DOWELED VERTICAL JOINT



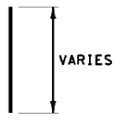

TYPE II CURB
5" - 8" HEIGHT
DOWELED HORIZONTAL JOINT

## GENERAL NOTES

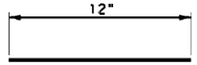
1. ALL MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH ITEM 529, "CONCRETE CURB, GUTTER, AND COMBINED CURB AND GUTTER".
2. ALL CONCRETE SHALL BE CLASS "A".
3. ALL REINFORCING BARS SHALL BE #4, UNLESS OTHERWISE SHOWN.
4. CURB HEIGHT SHALL BE AS SHOWN ON TYPICAL SECTIONS OR PLAN-PROFILE SHEETS.
5. ROUND EXPOSED SHARP EDGES WITH A ROUNDING TOOL, TO A MINIMUM RADIUS OF 1/4".
6. ALL EXISTING CURBS AND DRIVEWAYS TO BE REMOVED SHALL BE SAW CUT FULL DEPTH OR REMOVED AT EXISTING JOINTS.
7. WHERE CONCRETE CURB IS PLACED ON EXISTING CONCRETE PAVEMENT, THE PAVEMENT SHALL BE DRILLED AND THE REINFORCING BARS GROUTED OR EPOXIED IN PLACE.
8. EXPANSION AND CONTRACTION JOINTS SHALL BE CONSTRUCTED TO MATCH PAVEMENT JOINTS IN ALL CURBS OR CURB AND GUTTER ADJACENT TO JOINTED CONCRETE PAVEMENT. WHERE PLACEMENT OF CURB OR CURB AND GUTTER IS NOT ADJACENT TO CONCRETE PAVEMENT, EXPANSION JOINTS SHALL BE PROVIDED AT STRUCTURES, CURB RETURNS AT STREETS OR DRIVEWAYS, AND AT LOCATIONS DIRECTED BY THE ENGINEER.
9. VERTICAL AND HORIZONTAL DOWELS BARS AND TRANSVERSE REINFORCING BARS SHALL BE PLACED AT 4' C-C.
10. DIMENSION "T" SHOWN IS THE THICKNESS OF ADJACENT CONCRETE PAVEMENT, OR, WHEN CURB IS INSTALLED ADJACENT TO FLEXIBLE PAVEMENT, "T" IS 6" MINIMUM, 8" MAXIMUM.
11. USUAL PROFILE GRADE LINE. REFER TO TYPICAL SECTIONS AND PLAN-PROFILE SHEETS FOR EXACT LOCATIONS.
12. A SEALED, 1/2" EXPANSION JOINT SHALL BE PROVIDED WHERE CURB AND GUTTER IS ADJACENT TO SIDEWALK OR RIPRAP.
13. LONGITUDINAL AND TRANSVERSE PAVEMENT STEEL SHALL BE PLACED IN ACCORDANCE WITH PAVEMENT DETAILS SHOWN ELSEWHERE IN THE PLANS.



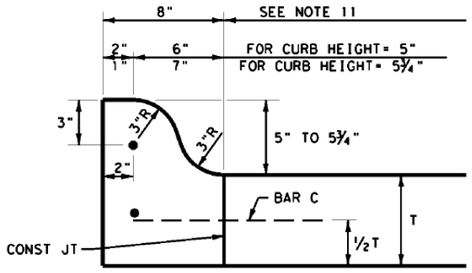

TYPE II CURB AND GUTTER
5" - 8" HEIGHT



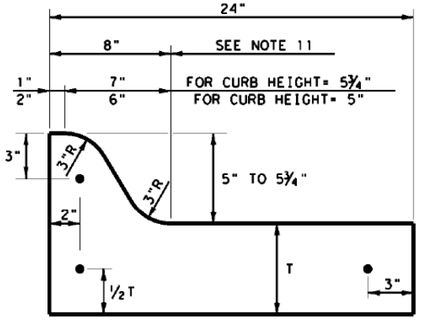

BAR B
L = (T/2) + (H- 1 1/2")
WHERE "H" = CURB HEIGHT
FOR NEW PAVEMENT, EMBED T/2 INTO FRESH CONCRETE.
FOR EXISTING PAVEMENT, DRILL 3/8" DIAM HOLE T/2 + 1/4" INTO PAVEMENT. SECURE WITH TY III EPOXY, CLASS "E" OR "F".



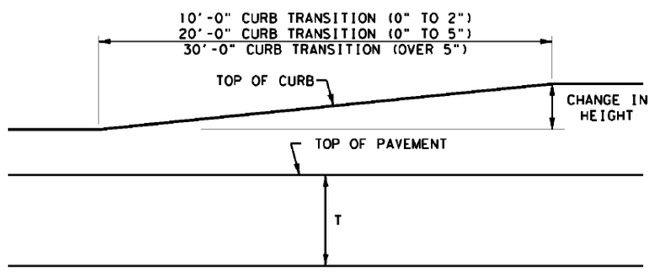

BAR C
EMBED 6" INTO EXISTING CONCRETE PAVEMENT.
DRILL 3/8" X 6 1/4" HOLE SECURE WITH TY III EPOXY, CLASS "E" OR "F".



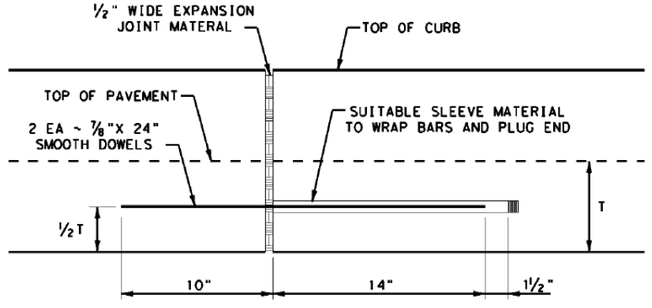

TYPE IIA CURB
5" - 5 3/4" HEIGHT




TYPE IIA CURB AND GUTTER
5" - 5 3/4" HEIGHT




CURB TRANSITION
NOTE: TO BE PAID FOR AS HIGHEST CURB




EXPANSION JOINT DETAIL



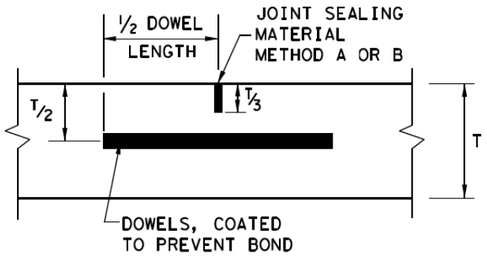
Texas Department of Transportation

Fort Worth District Standard

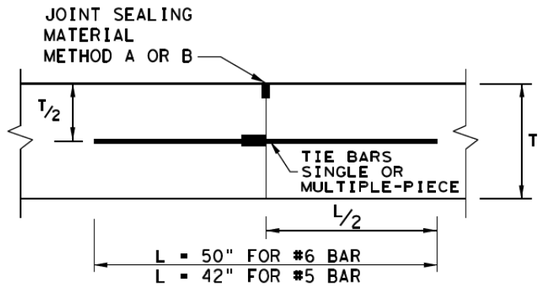
# CONCRETE CURB AND CURB AND GUTTER DETAILS

# CCCG (FTW)

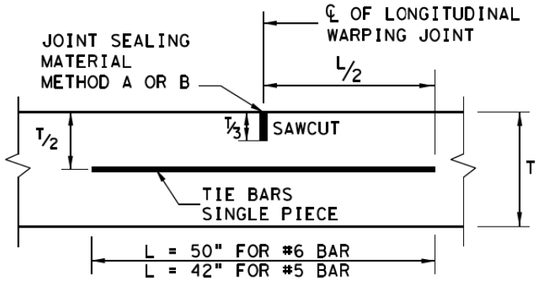
| ORIGINAL DRAWING: 05/2019 | cccg-ftw.dgn | FED.RD. DIV.NO. | PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|---|
| DATE | REVISIONS | 6 | SEE TITLE SHEET | | 81 |
| 05/2019 | REPLACES CC-CG(FW) | STATE | STATE DIST.NO. | COUNTY | |
| | | TEXAS | FTW | TARRANT | |
| | | CONT. | SECT. | JOB | HIGHWAY NO. |
| | | 0902 | 90 | 119 | McCART |



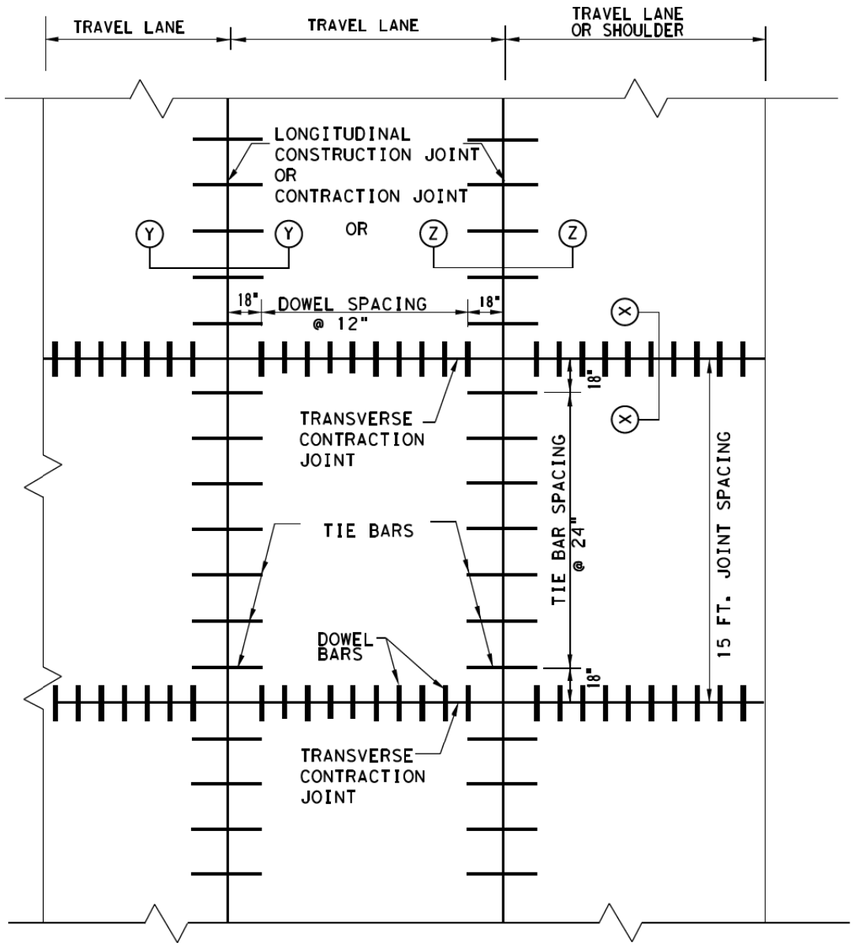

## TRANSVERSE CONTRACTION JOINT
SECTION X-X




## LONGITUDINAL CONSTRUCTION JOINT
SECTION Y-Y




## LONGITUDINAL CONTRACTION JOINT
SECTION Z-Z




## TYPICAL PAVEMENT LAYOUT
PLAN VIEW (NOT TO SCALE)

### GENERAL NOTES

1. DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS. PAVEMENTS WIDER THAN 100 FT. WITHOUT A FREE LONGITUDINAL JOINT ARE NOT COVERED BY THIS STANDARD.
2. FOR FURTHER INFORMATION REGARDING THE PLACEMENT OF CONCRETE AND LOAD TRANSFER DEVICES REFER TO THE GOVERNING SPECIFICATION FOR "CONCRETE PAVEMENT".
3. THE SPACING BETWEEN TRANSVERSE CONTRACTION JOINTS SHALL BE 15 FT. UNLESS OTHERWISE SHOWN IN THE PLANS.
4. TRANSVERSE CONSTRUCTION JOINTS MAY BE FORMED BY USE OF METAL OR WOOD FORMS EQUAL IN DEPTH TO THE DEPTH OF PAVEMENT, OR BY METHODS APPROVED BY THE ENGINEER.
5. USE HAND-OPERATED IMMERSION VIBRATORS TO CONSOLIDATE THE CONCRETE ADJACENT TO ALL THE FORMED JOINTS.
6. PAVEMENT WIDTHS OF MORE THAN 15 FT. SHALL HAVE A LONGITUDINAL JOINT (SECTION Z-Z OR SECTION Y-Y). THESE JOINTS SHALL BE LOCATED WITHIN 6 IN. OF THE LANE LINE UNLESS THE JOINT LOCATION IS SHOWN ELSEWHERE ON THE PLANS.
7. THE JOINT BETWEEN OUTSIDE LANE AND SHOULDER SHALL BE A LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z) UNLESS OTHERWISE SHOWN IN THE PLANS. THE SAW CUT DEPTH FOR THE LONGITUDIANL CONTRACTION JOINT (SECTION Z-Z) SHALL BE ONE THIRD OF THE SLABTHICKNESS (T/3).
8. WHEN TYING CONCRETE GUTTER AT A LONGITUDINAL JOINT, THE TIE BAR LENGTH OR POSITION MAY BE ADJUSTED. PROVIDE 3 IN. OF CONCRETE COVER FROM THE BACK OF GUTTER TO THE END OF TIE BAR.
9. REPLACE MISSING OR DAMAGED TIE BARS WITHOUT ADDITIONAL COMPENSATION BY DRILLING MIN. 10 IN. DEEP AND GROUTING TIE BARS WITH TYPE III, CLASS C EPOXY. MEET THE PULL-OUT TEST REQUIREMENTS IN ITEM 361.
10. WHEN AN MONOLITHIIC CURB IS SPECIFIED, THE JOINT IN THE CURB SHALL COINCIDE WITH PAVEMENT JOINTS AND MAY BE FORMED BY ANY MEANS APPROVED BY THE ENGINEER.
11. DOWEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1/4 IN. HORIZONTALLY AND VERTICALLY UNLESS OTHERWISE SPECIFIED. WHERE DOWEL BAR BASKETS ARE USED, REMOVE THE SHIPPING WIRES.
12. THE DETAIL FOR JOINT SEALANT AND RESERVOIR IS SHOWN ON STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."

| TABLE NO. 1 DOWELS (SMOOTH BARS) | | |
|---|---|---|
| SLAB THICKNESS T (IN.) | BAR DIA. AND LENGTH | AVERAGE SPACING (IN.) |
| 6 to 7.5 | 1" X 18" | 12 |
| 8 to 10 | 1 1/4" X 18" | 12 |
| >= 10.5 | 1 1/2" X 18" | 12 |

| TABLE NO. 2 TIE BARS (DEFORMED BARS) | | |
|---|---|---|
| SLAB THICKNESS T (IN.) | BAR SIZE | AVERAGE SPACING (IN.) |
| 6 to 7.5 | #5 | 24 |
| >= 8 | #6 | 24 |



Texas Department of Transportation — Design Division Standard

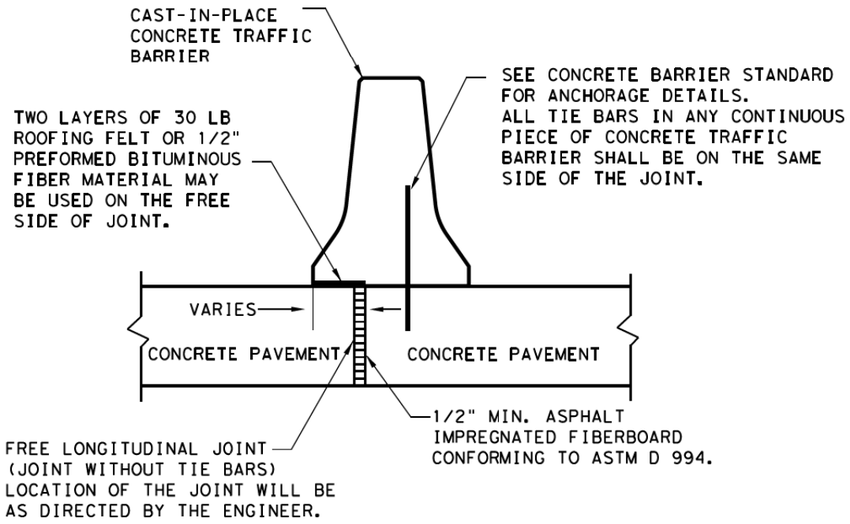
# CONCRETE PAVEMENT DETAILS
## CONTRACTION DESIGN
### T-6 to 12 INCHES

## CPCD-14

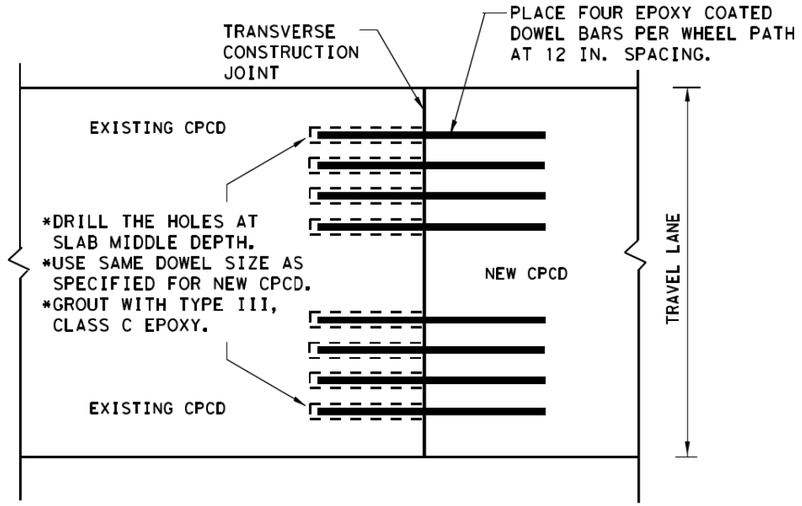
| FILE: cpcd14.dgn | DN: TxDOT | CK: HC | DW: HC | CK: AN |
|---|---|---|---|---|
| ©TxDOT: DECEMBER 2014 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0902 | 90 | 119 | McCART |
| | DIST | COUNTY | | SHEET NO. |
| | FTW | TARRANT | | 82 |

DATE:
FILE:

DATE:
FILE:



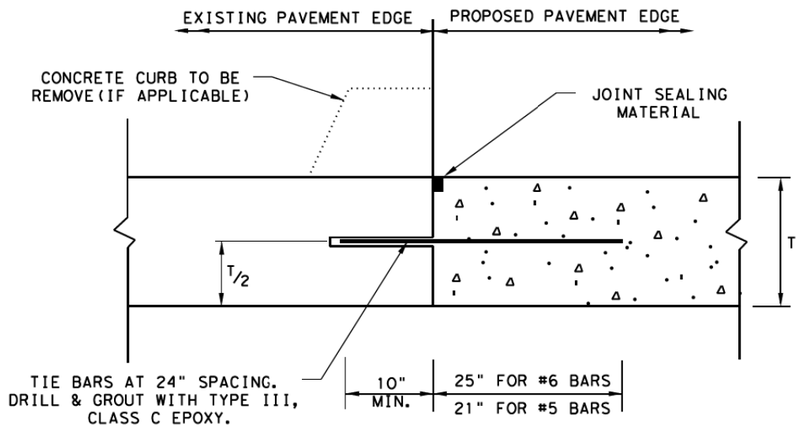

**FREE LONGITUDINAL JOINT DETAIL**




**TRANSVERSE JOINT DETAIL**

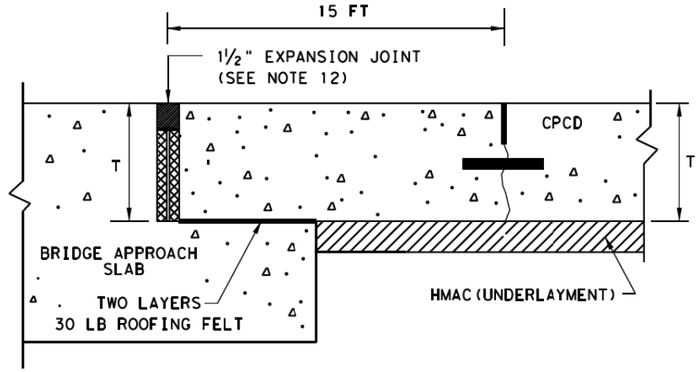
**EXISTING CPCD TO NEW CPCD**

PLAN VIEW (NOT TO SCALE)




1. BEFORE WIDENING WORK, DEMONSTRATE THAT THE BOND STRENGTH OF THE EPOXY-GROUTED TIE BARS MEETS THE REQUIREMENTS OF PULL-OUT TEST SPECIFIED IN ITEM 361.
2. SPACE TIE BARS AT 24" SPACING. USE #6 BARS FOR 8" AND THICKER SLABS, USE #5 BARS FOR LESS THAN 8" THICK SLABS.
3. THE TRANSVERSE JOINTS OF PROPOSED PAVEMENT SHALL COINCIDE WITH EXISTING PAVEMENT JOINTS UNLESS OTHERWISE SHOWN ON THE PLANS.

**LONGITUDINAL WIDENING JOINT DETAIL**




**TRANSVERSE EXPANSION JOINT DETAIL**

**AT BRIDGE APPROACH**



Texas Department of Transportation

Design Division Standard

# CONCRETE PAVEMENT DETAILS
## CONTRACTION DESIGN
### T-6 to 12 INCHES

## CPCD-14

| | | | | |
|---|---|---|---|---|
| FILE: cpcd14.dgn | DN: TxDOT | CK: HC | DW: HC | CK: AN |
| ©TxDOT: DECEMBER 2014 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0902 | 90 | 119 | McCART |
| | DIST | COUNTY | | SHEET NO. |
| | FTW | TARRANT | | 83 |

http://www.dot.state.tx.us/ftw/specinfo/standard.htm
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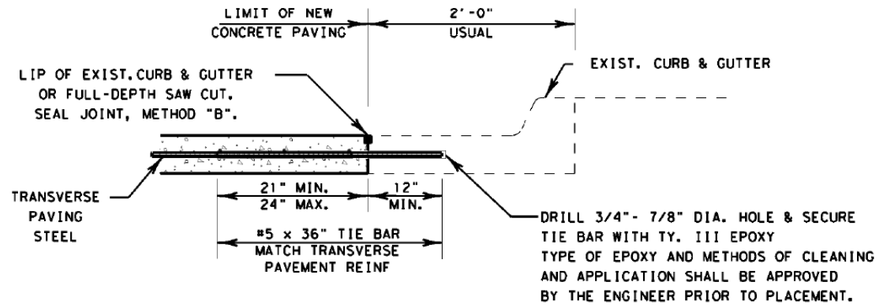
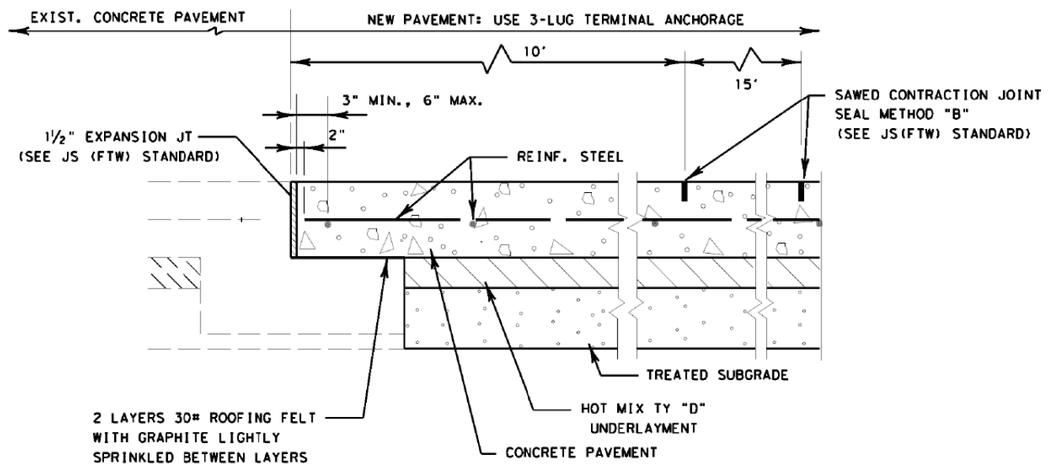



## TIE TO EXIST. CONC. CURB & GUTTER

N. T. S.

NOTE:
SAWING OF PAVEMENT AND REMOVAL OF EXISTING CONC. WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.




## TIE TO EXIST. CONCRETE PAVEMENT

(TRANSVERSE JOINTS W/EXISTING "SLEEPER" SLAB)
N. T. S.

## GENERAL NOTES

TIE BARS SHALL BE SECURED INTO THE EXISTING CONCRETE THE MINIMUM LENGTHS SHOWN, USING TY III EPOXY, CLASS "E" OR "F" AND MUST MEET THE REQUIREMENTS OF THE PULL-OUT TEST SPECIFIED IN ITEM 361.

ALL HOLES FOR TIE BARS OR CONCRETE ANCHORS SHALL BE DRILLED WITH A CORE OR ROTARY DRILL. THE USE OF HAMMER DRILLS WILL NOT BE PERMITTED.

SEE CRCP STANDARD FOR ADDITIONAL DETAILS.

SEE JS (FTW) STANDARD FOR JOINT DETAILS.



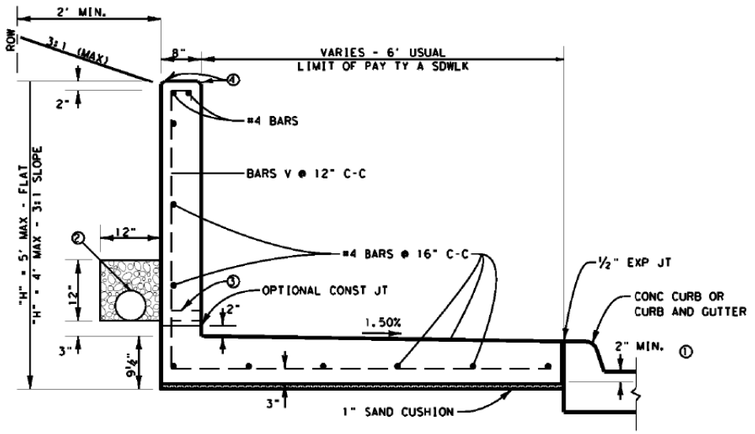
Texas Department of Transportation

Fort Worth District Standard

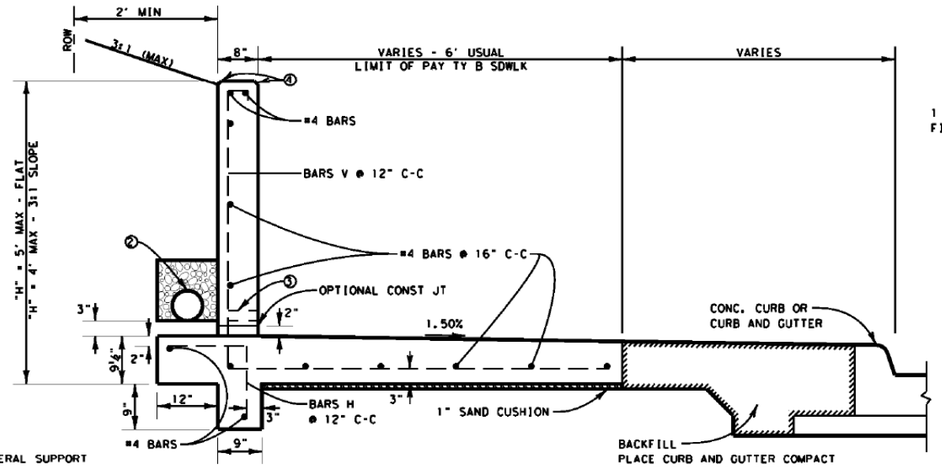
# CONCRETE PAVEMENT TIES TO EXISTING PAVEMENT

# CP-TEP (FTW)

| ORIGINAL DRAWING: 05/2019 | cptep-ftw.dgn | FED.RD. DIV. NO. | PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|---|
| DATE | REVISIONS | 6 | SEE TITLE SHEET | | 84 |
| 05/2019 | REPLACES CP-TEP-03(FW) | STATE | STATE DIST. NO. | COUNTY | |
| | | TEXAS | FTW | TARRANT | |
| | | CONT. | SECT. | JOB | HIGHWAY NO. |
| | | 0902 | 90 | 119 | McCART |

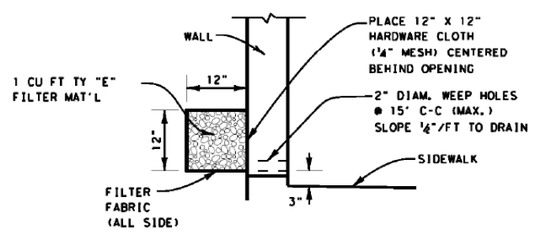



TYPE A SIDEWALK-ADJACENT TO CURB




TYPE B SIDEWALK-REMOTE FROM CURB

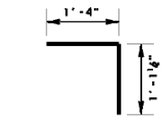
① 2" MINIMUM REQUIRED FOR LATERAL SUPPORT
② INSTALL 6" PIPE UNDERDRAIN (TY. 5, 6, 7, OR 8) ENTIRE LENGTH OF WALL. USE TY. "E" FILTER MATERIAL. SLOPE TO DRAIN AND CONNECT TO STORM DRAIN.
③ IF, IN THE OPINION OF THE ENGINEER, USE OF UNDERDRAIN IS IMPRACTICAL, INSTALL WEEP HOLES AS SHOWN.
④ ¾" CHAMFER



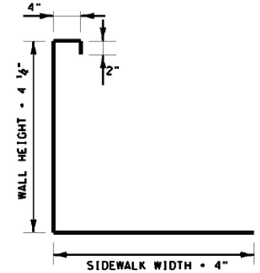

WEEP HOLE DETAIL

## SPECIAL CONCRETE SIDEWALK w/ INTEGRATED RETAINING WALL

N. T. S.

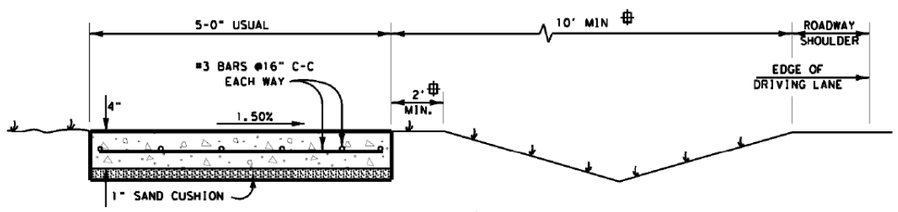



#4 BARS H @ 12" C-C



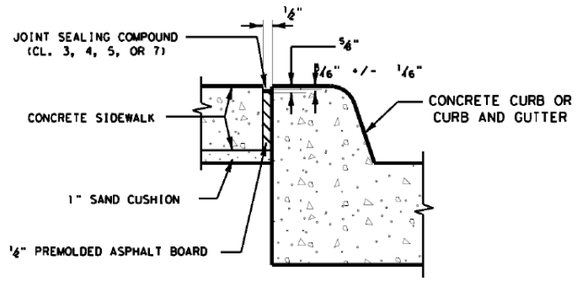

#4 BARS V @ 12" C-C

REINFORCING STEEL DETAILS




⊕ SIDEWALK TO BE 10' MIN. FROM EDGE OF SHOULDER OR 2' MIN. FROM TOP OF DITCH BACK SLOPE, WHICHEVER IS GREATER (10' MIN. FROM EDGE OF SHOULDER IF NO DITCH.)

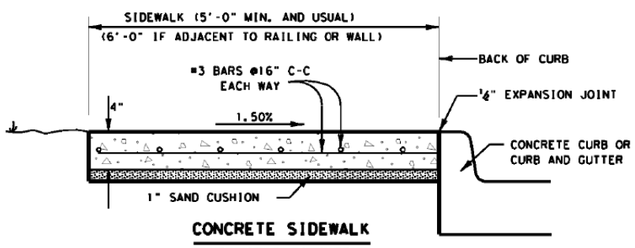
CONCRETE SIDEWALK
(ROADWAY W/O CURB)



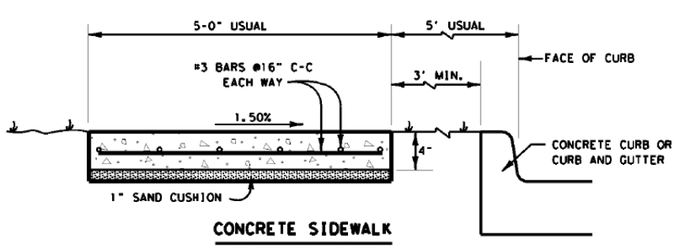

1=2" EXPANSION JOINT
(SIDEWALK ADJACENT TO CURB)

**GENERAL NOTES:**

1. ALL CONCRETE SHALL BE CLASS "C".
2. ALL REINFORCING STEEL SHALL BE GRADE 60, # 4 BARS UNLESS OTHERWISE INDICATED.
3. SEE PLAN SHEETS FOR LOCATIONS OF SIDEWALKS AND RETAINING WALLS.
4. LONGITUDINAL SLOPE OF SIDEWALKS SHALL NOT EXCEED 5% EXCEPT IN CASES WHERE THE ADJACENT ROADWAY SLOPE EXCEEDS 5%. IF ROADWAY SLOPE EXCEEDS 5%, LONGITUDINAL SLOPE OF SIDEWALK MAY MATCH THAT OF ROADWAY.
5. IF SIDEWALK WIDTH IS LESS THAN 5', PROVIDE 5' X 5' PASSING AREAS AT INTERVALS NOT TO EXCEED 200' SPACING.
6. RETAINING WALL WILL BE SUBSIDIARY TO THE ITEM, "CONC SIDEWALKS (SPECIAL) (TYPE A)" OR "CONC SIDEWALKS (SPECIAL)(TYPE B)", WITH LIMITS OF PAY AS SHOWN.
7. SURFACE TREATMENT OF RETAINING WALL FACE DETAILED ELSEWHERE IN THE PLANS.
8. SEE PED STANDARDS FOR TREATMENT AT INTERSECTIONS AND CROSSWALKS.



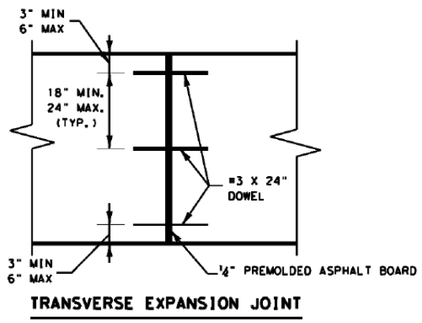

CONCRETE SIDEWALK
(ADJACENT TO CURB)




CONCRETE SIDEWALK
(REMOTE FROM CURB)

## CONCRETE SIDEWALK DETAILS

N. T. S.




TRANSVERSE EXPANSION JOINT

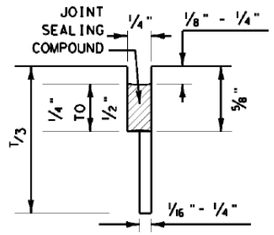
Texas Department of Transportation

Fort Worth District Standard

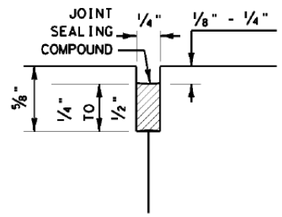
# CONCRETE SIDEWALK DETAILS
# CSWD (FTW)

| ORIGINAL DRAWING: 05/2019 | cswd-ftw.dgn | PROJECT NO. | | | SHEET NO. |
|---|---|---|---|---|---|
| DATE | REVISIONS | SEE TITLE SHEET | | | 85 |
| 05/2019 | NEW STANDARD | STATE | STATE DIST. NO. | COUNTY | |
| | | TEXAS | FTW | TARRANT | |
| | | CONT. | SECT. | JOB | HIGHWAY NO. |
| | | 0902 | 90 | 119 | McCART |

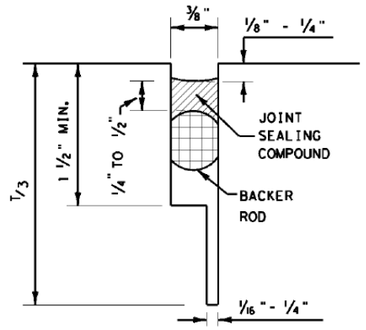
# METHOD B: JOINT SEALING COMPOUND



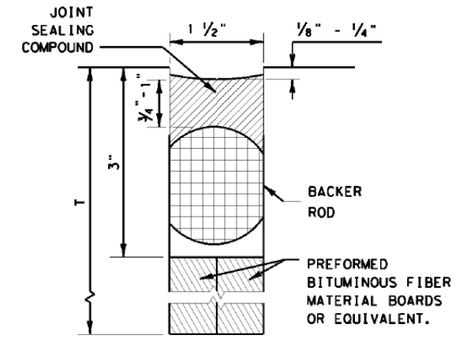

LONGITUDINAL SAWED CONTRACTION JOINT



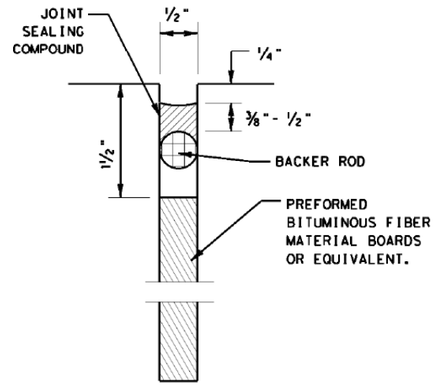

LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT




TRANSVERSE SAWED CONTRACTION JOINT




TRANSVERSE FORMED EXPANSION JOINT




FORMED ISOLATION/EXPANSION JOINT

## GENERAL NOTES

1. PREFORMED COMPRESSION SEALS (METHOD A) WILL NOT BE PERMITTED.
2. DIMENSION "T" IS THICKNESS OF CONCRETE PAVEMENT.
3. THE LOCATION OF JOINTS SHALL BE AS SHOWN ELSEWHERE IN THE PLANS.
4. THE JOINT RESERVOIR FOR SEALANT FOR THE LONGITUDINAL AND TRANSVERSE CONSTRUCTION JOINTS AND SAWED JOINTS SHALL BE SAWED UNLESS OTHERWISE SHOWN ON THE PLANS.
5. REFER TO DMS-6310 "JOINT SEALANTS AND FILLERS" FOR SEALANT CLASSIFICATIONS.
6. FOR SAWED LONGITUDINAL JOINTS, LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINTS, USE JOINT SEALANT CLASS 5 OR 8 UNLESS OTHERWISE SHOWN ON THE PLANS OR APPROVED.
7. FOR TRANSVERSE SAWED CONTRACTION JOINTS, TRANSVERSE FORMED EXPANSION JOINTS, AND ISOLATION/EXPANSION JOINTS, USE JOINT SEALANT CLASS 5 OR 8 AT NEW JOINTS. USE JOINT SEALANT CLASS 4, 5, 7, OR 8 FOR MAINTAINING EXISTING JOINTS.
8. THE JOINTS SHALL BE CLEANED IN ACCORDANCE WITH THE ITEM 438 "CLEANING AND SEALING JOINTS" OR ITEM 713 "CLEANING AND SEALING JOINTS AND CRACKS (CONCRETE PAVEMENT)".
9. ISOLATION/EXPANSION JOINTS ACCOMMODATE HORIZONTAL AND VERTICAL MOVEMENTS THAT OCCUR BETWEEN A PAVEMENT AND A STRUCTURE. ISOLATION/EXPANSION JOINTS MAY BE USED FOR BRIDGE ABUTMENTS, INTERSECTIONS, CURB AND GUTTER, OLD AND NEW PAVEMENTS, OR AROUND DRAINAGE INLETS, MANHOLES, FOOTINGS AND LIGHTING STRUCTURES.



Texas Department of Transportation

Fort Worth District Standard

# CONCRETE PAVING DETAILS
# JOINT SEALS
# JS (FTW)

| ORIGINAL DRAWING: 05/2019 | js-ftw.dgn | FED.RD. DIV.NO. | PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|---|
| DATE | REVISIONS | 6 | SEE TITLE SHEET | | 86 |
| 05/2019 | REPLACES JS-03(FW) | STATE | STATE DIST.NO. | COUNTY | |
| | | TEXAS | FTW | TARRANT | |
| | | CONT. | SECT. | JOB | HIGHWAY NO. |
| | | 0902 | 90 | 119 | McCART |

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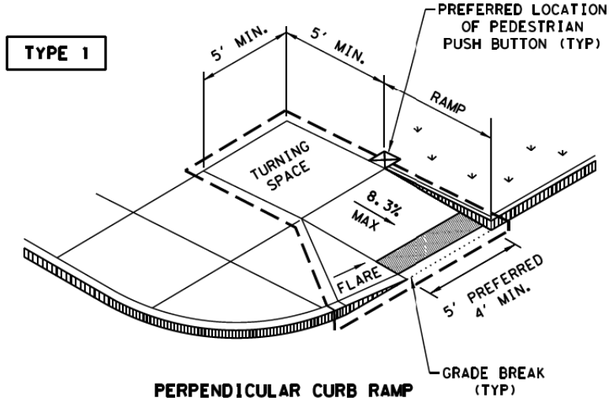
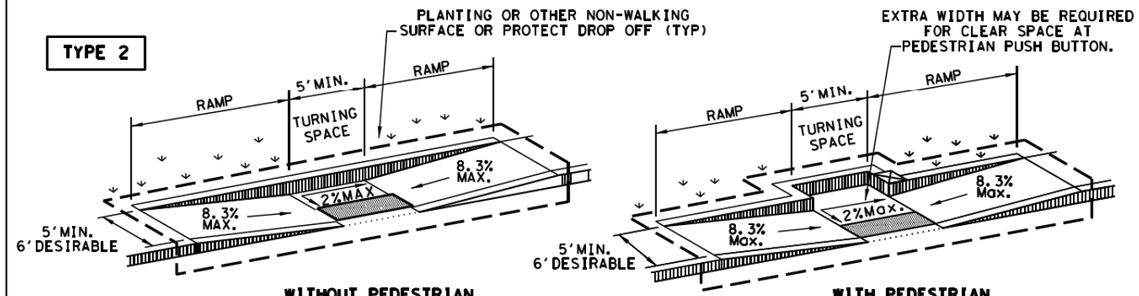



**PERPENDICULAR CURB RAMP**

## TYPE 2

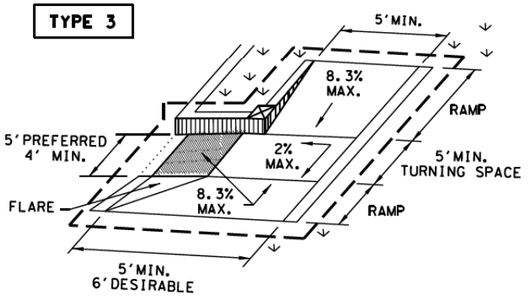



**WITHOUT PEDESTRIAN PUSH BUTTON**

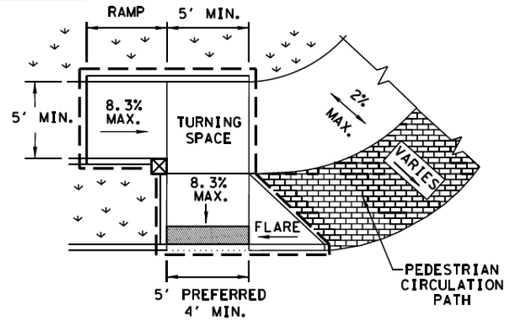
**WITH PEDESTRIAN PUSH BUTTON**

**PARALLEL CURB RAMP**

## TYPE 3

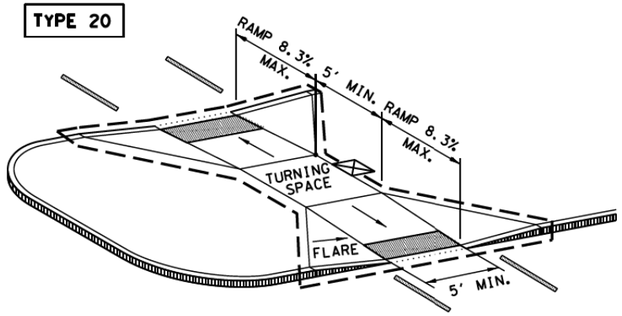



## TYPE 6




**COMBINATION CURB RAMPS**

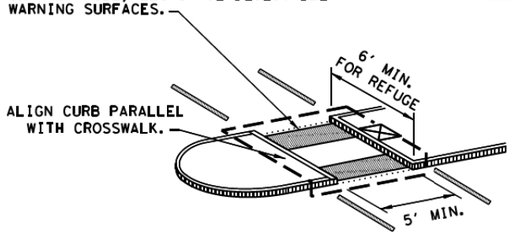
## TYPE 20




**CURB RAMPS AT MEDIAN ISLANDS**

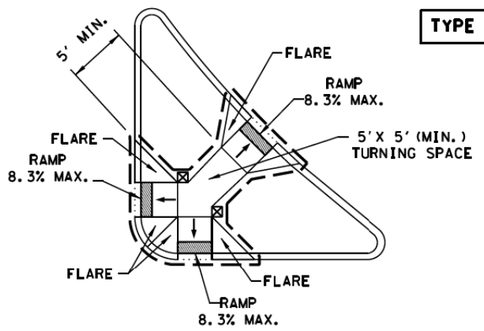
## TYPE 21

INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.




NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

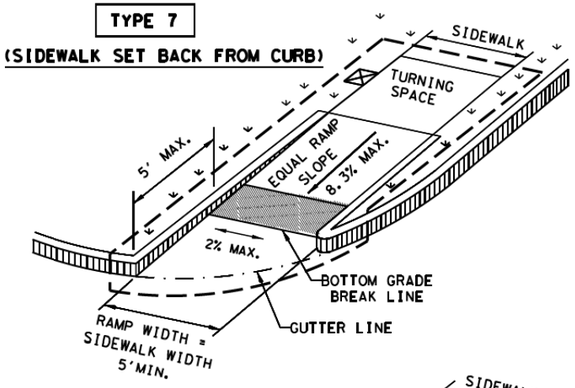
## TYPE 22



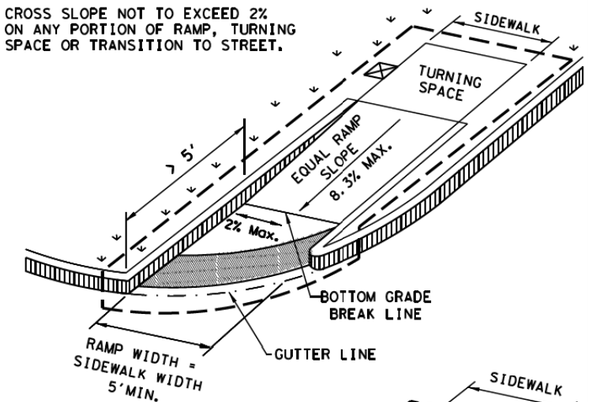

**COMBINATION ISLAND RAMPS**

## TYPE 7

**(SIDEWALK SET BACK FROM CURB)**

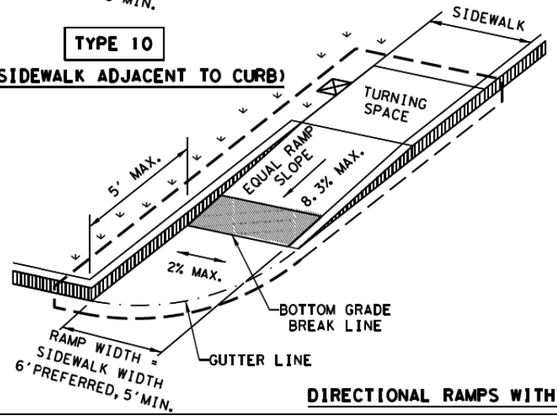



CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.

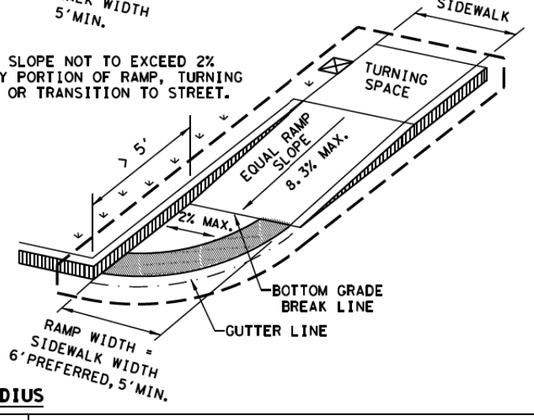



## TYPE 10

**(SIDEWALK ADJACENT TO CURB)**

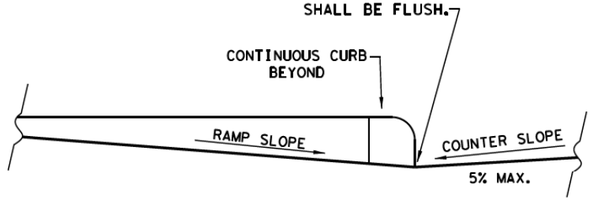



CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



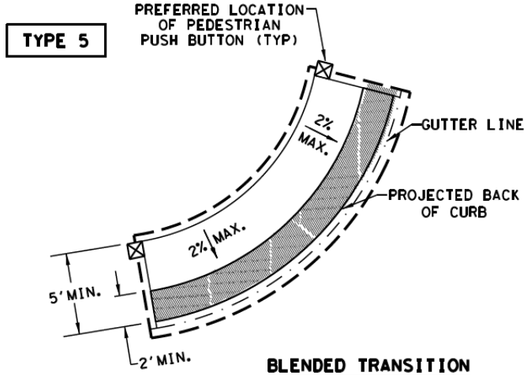

**DIRECTIONAL RAMPS WITHIN RADIUS**

BOTTOM GRADE BREAK OF CURB RAMP WILL NORMALLY BE AT GUTTER LINE. SURFACE SLOPES AT GRADE BREAKS SHALL BE FLUSH.




**TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY**

## TYPE 5




**BLENDED TRANSITION**
**(FLUSH LANDING)**

**NOTES / LEGEND:**

SEE GENERAL NOTES ON SHEET 2 OF 4 FOR MORE INFORMATION.

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

DETECTABLE WARNING SURFACE

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

GUTTER LINE

GRADE BREAK

RAMP LIMITS OF PAYMENT

SHEET 1 OF 4

Texas Department of Transportation

Design Division Standard

# PEDESTRIAN FACILITIES CURB RAMPS

# PED-18

| | | | | |
|---|---|---|---|---|
| FILE: ped18 | DN: TxDOT | DW: VP | CK: KM | CK: PK & JG |
| © TxDOT: MARCH, 2002 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0902 | 90 | 119 | McCART |
| REVISED 08, 2005<br>REVISED 06, 2012<br>REVISED 01, 2018 | DIST | COUNTY | | SHEET NO. |
| | FTW | TARRANT | | 87 |

DATE:
FILE:

# GENERAL NOTES

## CURB RAMPS

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
4. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5'x 5' passing areas at intervals not to exceed 200' are required.
5. Turning Spaces shall be 5'x 5' minimum. Cross slope shall be maximum 2%.
6. Clear space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
9. To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5'x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
16. Provide a smooth transition where the curb ramps connect to the street.
17. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
18. Existing features that comply with applicalble standards may remain in place unless otherwise shown on the plans.

## DETECTABLE WARNING MATERIAL

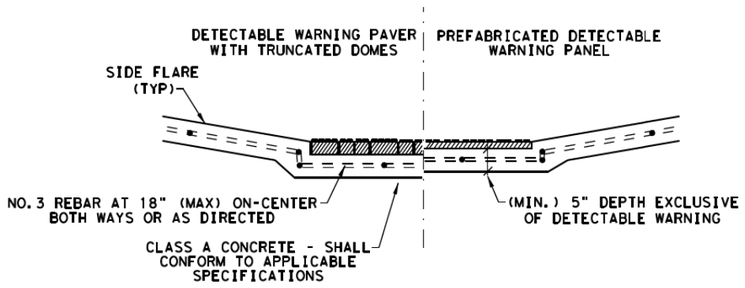
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
20. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
21. Detectable warning surfaces must be firm, stable and slip resistant.
22. Detectable warning surfaces shall be a minimum of 24 inches in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

## DETECTABLE WARNING PAVERS (IF USED)

25. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

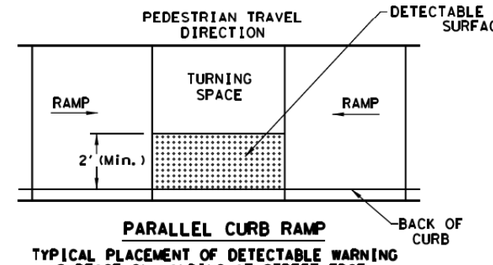
## SIDEWALKS

27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
28. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
29. Street grades and cross slopes shall be as shown elsewhere in the plans.
30. Changes in level greater than 1/4 inch are not permitted.
31. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than five percent (5%) must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with PROWAG R409.
32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
33. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
34. Sidewalk details are shown elsewhere in the plans.

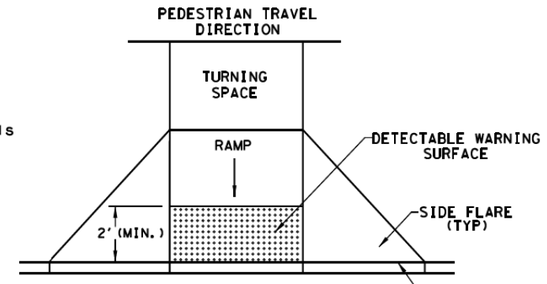



**SECTION VIEW DETAIL**
**CURB RAMP AT DETECTIBLE WARNINGS**

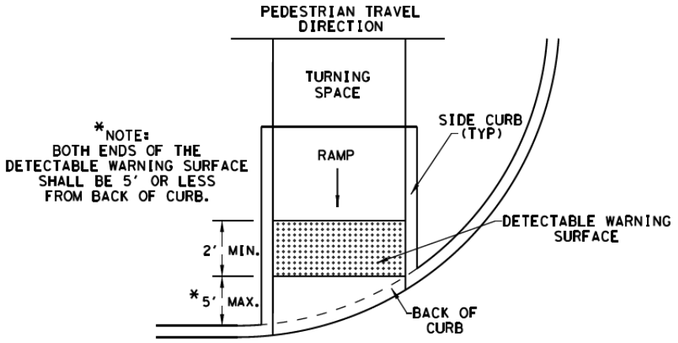
# DETECTABLE WARNING SURFACE DETAILS




**PARALLEL CURB RAMP**
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING AT STREET EDGE.




**PERPENDICULAR CURB RAMP**
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.




**DIRECTIONAL CURB RAMP**
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.



Texas Department of Transportation | Design Division Standard

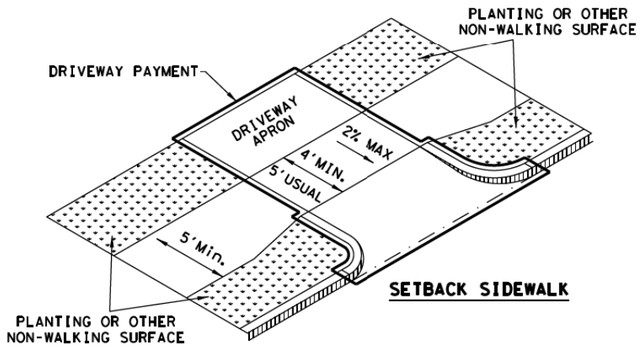
# PEDESTRIAN FACILITIES CURB RAMPS

# PED-18

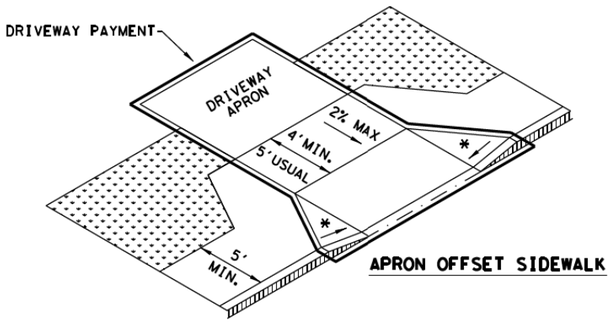
| | | | | | | |
|---|---|---|---|---|---|---|
| FILE: ped18 | DN: TxDOT | | DW: VP | CK: KM | CK: PK & JG | |
| © TxDOT: MARCH, 2002 | CONT | SECT | JOB | | HIGHWAY | |
| REVISIONS | 0902 | 90 | 119 | | McCART | |
| REVISED 08, 2005<br>REVISED 06, 2012<br>REVISED 01, 2018 | DIST | COUNTY | | | SHEET NO. | |
| | FTW | TARRANT | | | 88 | |

DATE:
FILE:

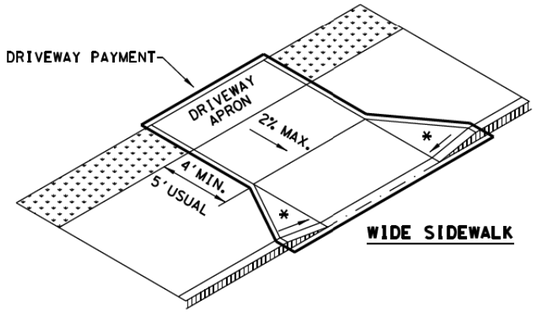
## SIDEWALK TREATMENT AT DRIVEWAYS



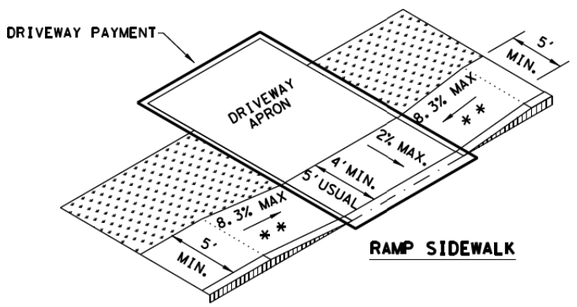

SETBACK SIDEWALK




APRON OFFSET SIDEWALK




WIDE SIDEWALK

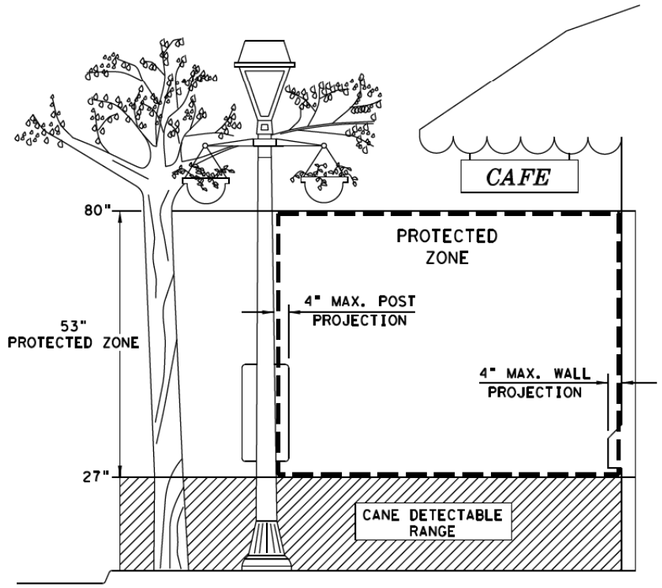



RAMP SIDEWALK

NOTES:

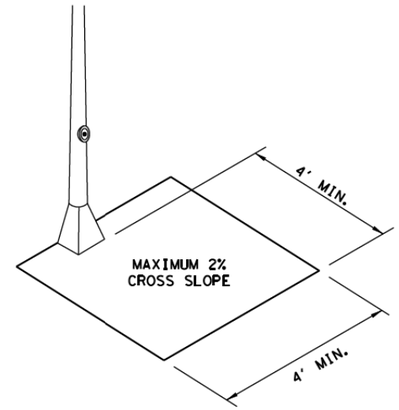
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

* * IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.

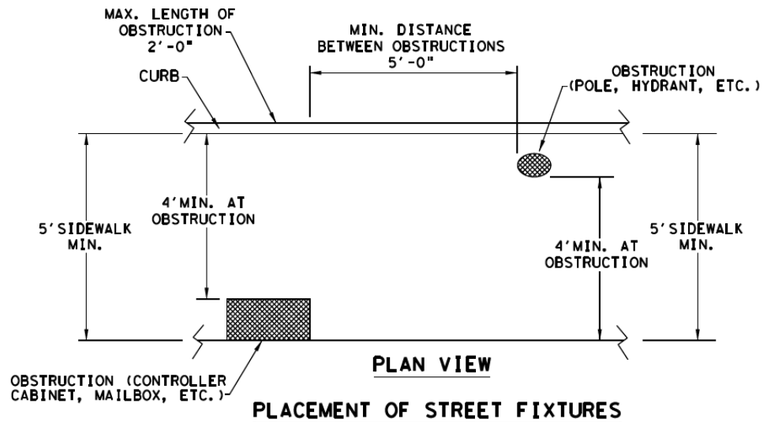



PROTECTED ZONE

NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



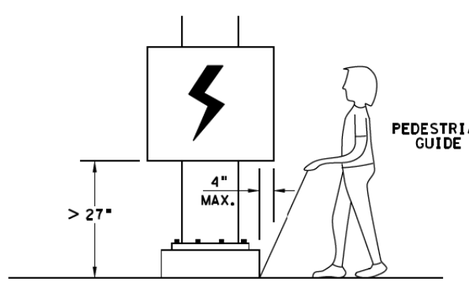

CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



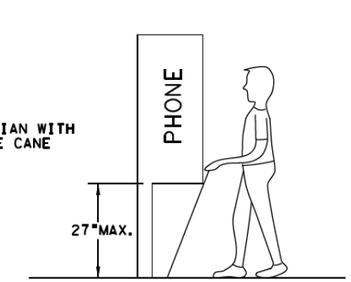

PLAN VIEW

PLACEMENT OF STREET FIXTURES

NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' X 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.




WHEN AN OBSTRUCTION OF A HEIGHT GREATER THAN 27" FROM THE SURFACE WOULD CREATE A PROTRUSION OF MORE THAN 4" INTO THE PEDESTRIAN CIRCULATION AREA, CONSTRUCT ADDITIONAL CURB OR FOUNDATION AT THE BOTTOM TO PROVIDE A MAXIMUM 4" OVERHANG.




PROTRUDING OBJECTS OF A HEIGHT ≤ 27" ARE DETECTABLE BY CANE AND DO NOT REQUIRE ADDITIONAL TREATMENT.

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"



Texas Department of Transportation

Design Division Standard

# PEDESTRIAN FACILITIES
# CURB RAMPS

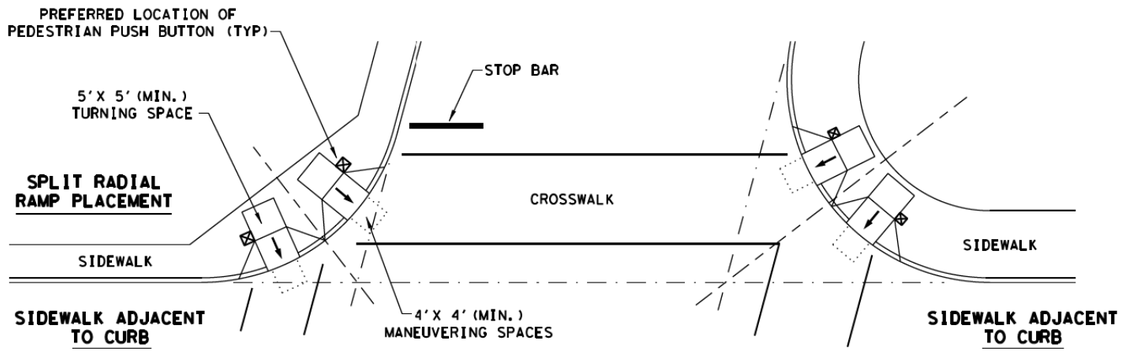
# PED-18

| | | | | | |
|---|---|---|---|---|---|
| FILE: ped18 | DN: TxDOT | | DW: VP | CK: KM | CK: PK & JG |
| © TxDOT: MARCH, 2002 | CONT | SECT | JOB | | HIGHWAY |
| REVISIONS | 0902 | 90 | 119 | | McCART |
| REVISED 08, 2005<br>REVISED 06, 2012<br>REVISED 01, 2018 | DIST | COUNTY | | | SHEET NO. |
| | FTW | TARRANT | | | 89 |

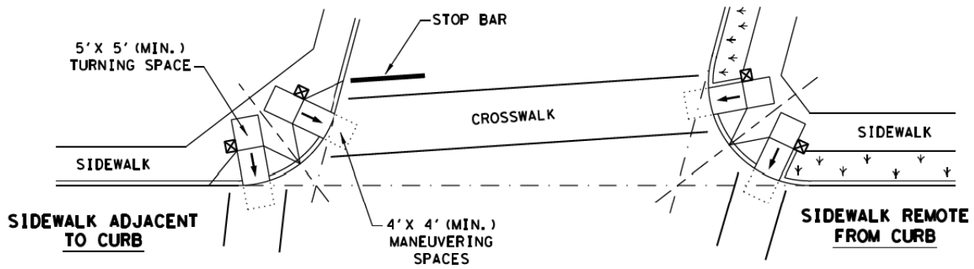
DATE:
FILE:

# TYPICAL CROSSING LAYOUTS

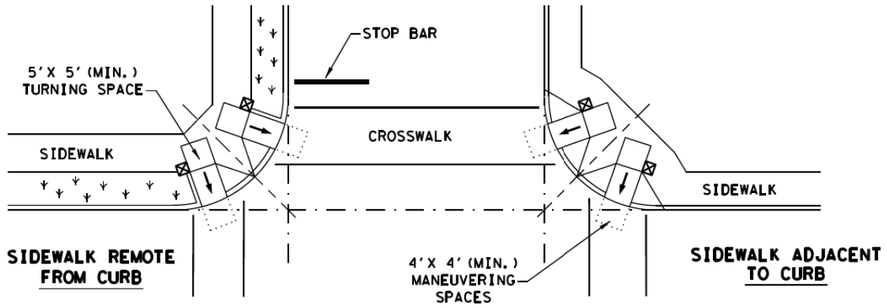
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



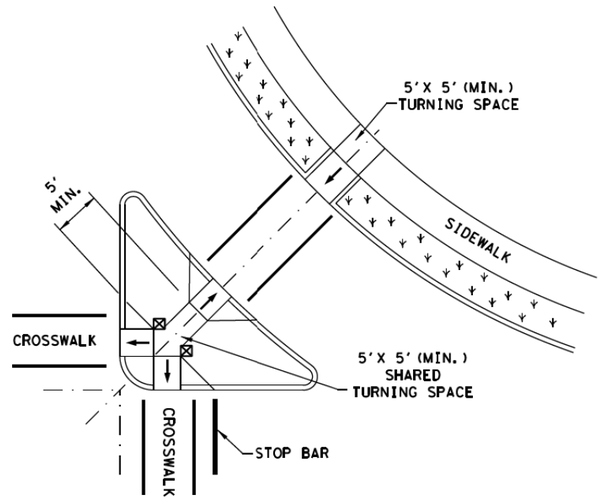

SKEWED INTERSECTION WITH "LARGE" RADIUS



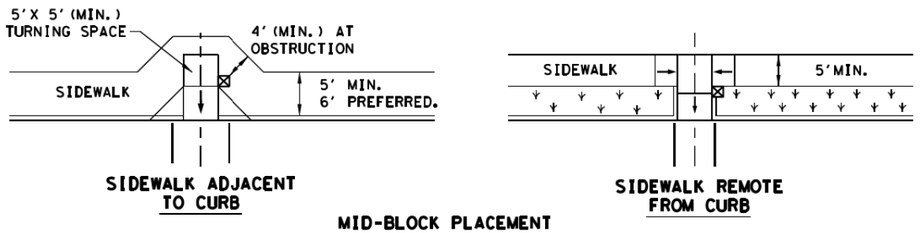

SKEWED INTERSECTION WITH "SMALL" RADIUS




NORMAL INTERSECTION WITH "SMALL" RADIUS




AT INTERSECTION
W/FREE RIGHT TURN & ISLAND




MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

**LEGEND:**

SHOWS DOWNWARD SLOPE. →

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (IF APPLICABLE). ☒

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.



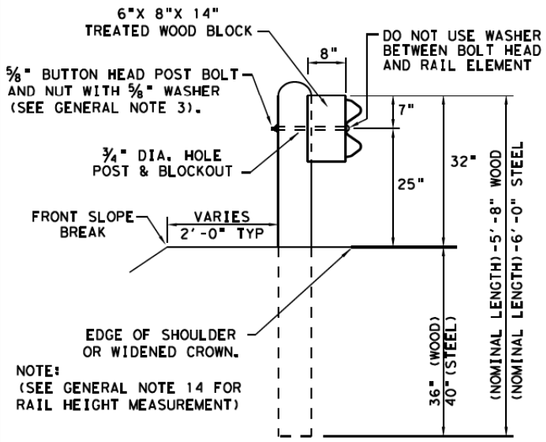
Texas Department of Transportation

Design Division Standard

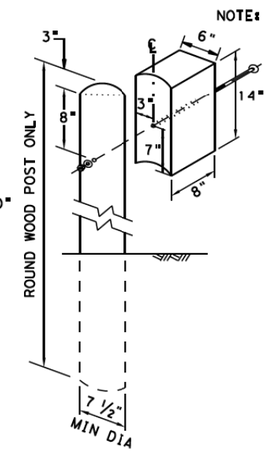
# PEDESTRIAN FACILITIES CURB RAMPS

# PED-18

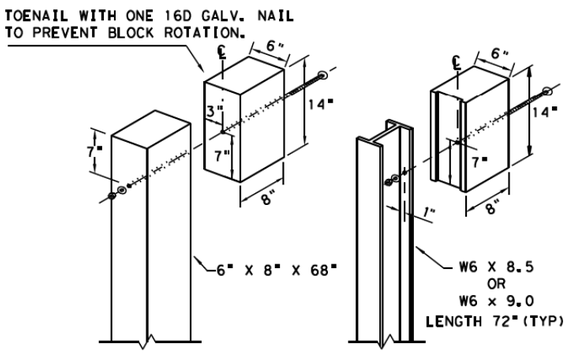
| | | | | | |
|---|---|---|---|---|---|
| FILE: ped18 | DN: TxDOT | | DW: VP | CK: KM | CK: PK & JG |
| © TxDOT: MARCH, 2002 | CONT | SECT | JOB | HIGHWAY | |
| REVISIONS | 0902 | 90 | 119 | McCART | |
| REVISED 08, 2005<br>REVISED 06, 2012<br>REVISED 01, 2018 | DIST | COUNTY | | SHEET NO. | |
| | FTW | TARRANT | | 90 | |




**TYPICAL POST PLACEMENT**

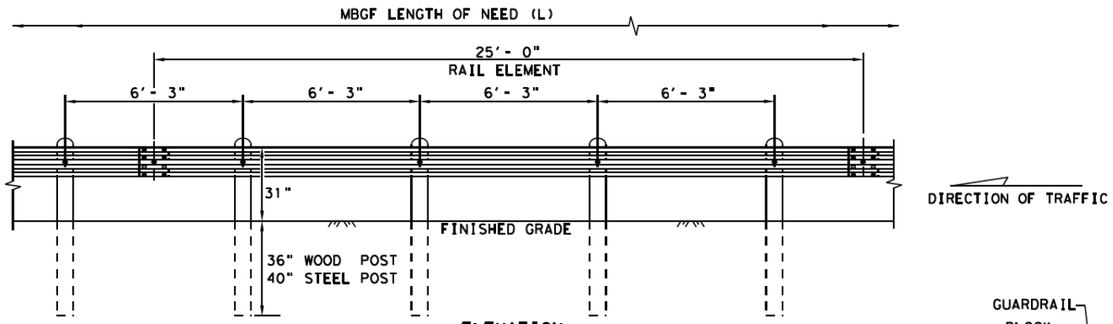



**WOOD BLOCK TO ROUND WOOD POST**



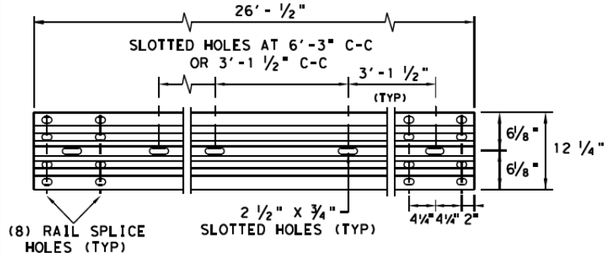

**WOOD BLOCK TO RECTANGULAR WOOD POST** | **ROUTED WOOD BLOCK TO I-BEAM STEEL POST**

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



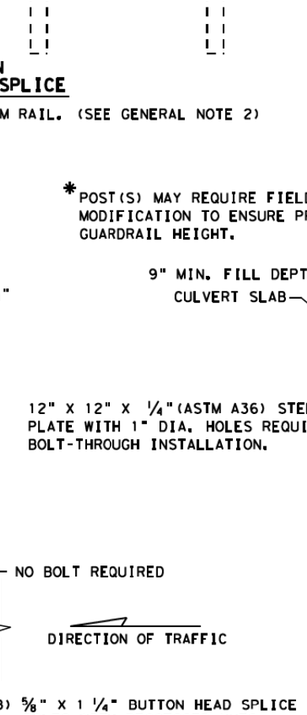

**ELEVATION MID-SPAN RAIL SPLICE**

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




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

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




* POST(S) MAY REQUIRE FIELD MODIFICATION TO ENSURE PROPER GUARDRAIL HEIGHT.

STEEL POST CONNECTION TO CULVERT SLAB (USE WHEN THERE IS LESS THAN 36" COVER OVER CULVERT SLAB).

12" X 12" X ¼" (ASTM A36) STEEL BOTTOM PLATE WITH 1" DIA. HOLES REQUIRED WITH BOLT-THROUGH INSTALLATION.

**LOW FILL CULVERT POST**

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

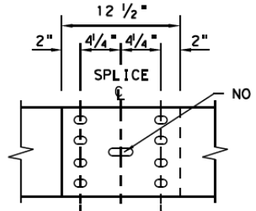
NOTE:
FOUR TYPES OF BUTTON-HEAD GUARD RAIL BOLTS COME WITH A RECCESSED NUT.

SPLICE BOLT LENGTH — VARIES
FBB01 = 1 ¼"
FBB02 = 2"
⅝"

POST & BLOCK LENGTH
FBB03 = 10"
FBB04 = 18"

**BUTTON HEAD BOLT**

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




**MID-SPAN RAIL SPLICE DETAIL**

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

## GENERAL NOTES

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

Texas Department of Transportation — Design Division Standard

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

| | | | | | |
|---|---|---|---|---|---|
| FILE: gf3119.dgn | DN: TxDOT | CK: KM | DW: VP | CK: CGL/AG | |
| ©TxDOT: NOVEMBER 2019 | CONT | SECT | JOB | HIGHWAY | |
| REVISIONS | 0902 | 90 | 119 | McCART | |
| | DIST | COUNTY | | SHEET NO. | |
| | FTW | TARRANT | | 90A | |

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DATE:
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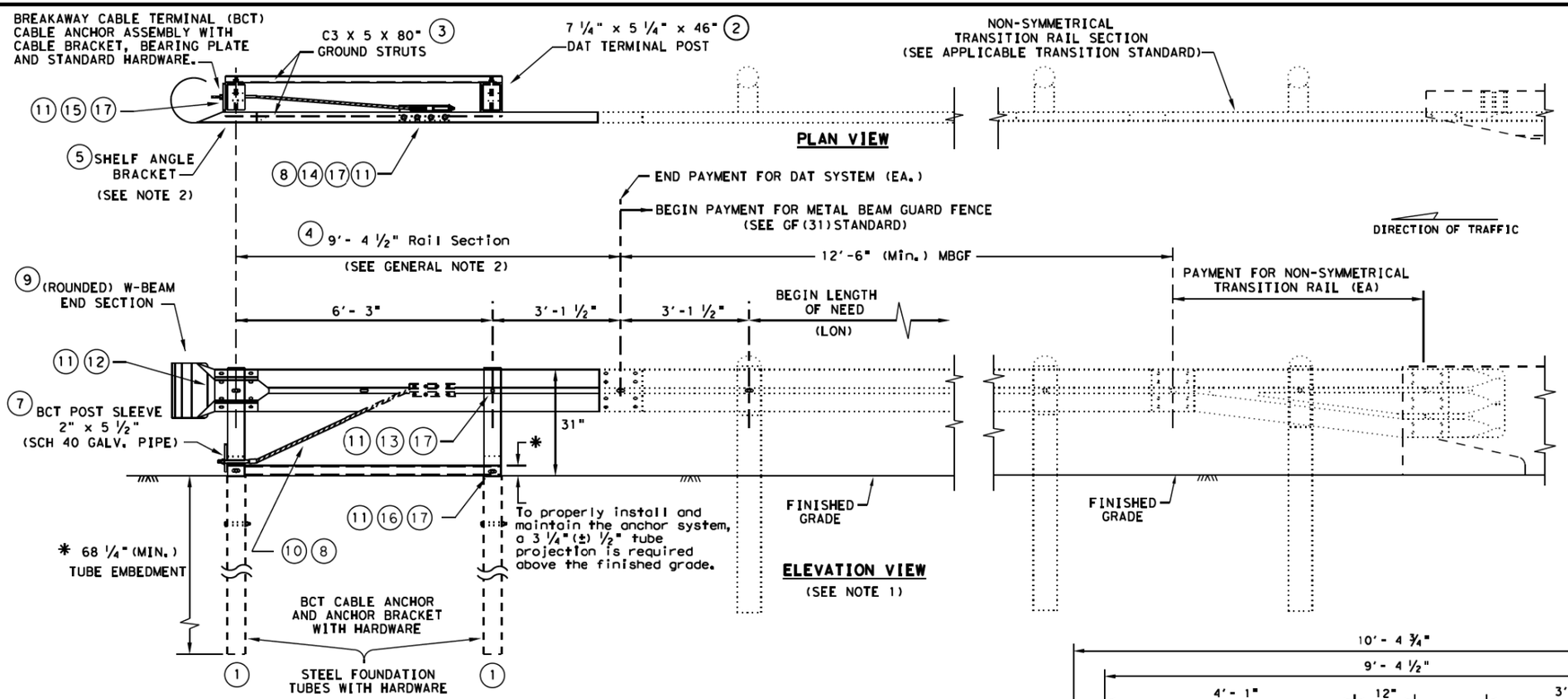



## DOWNSTREAM ANCHOR TERMINAL (DAT)

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

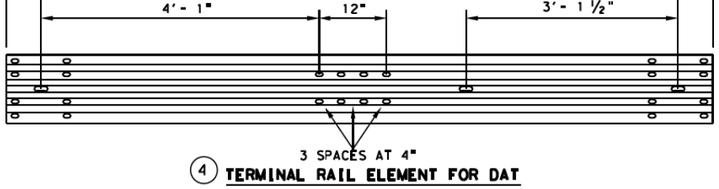
## GENERAL NOTES

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

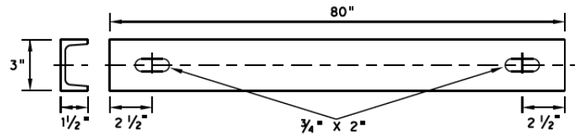
## MOW STRIP INSTALLATION

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

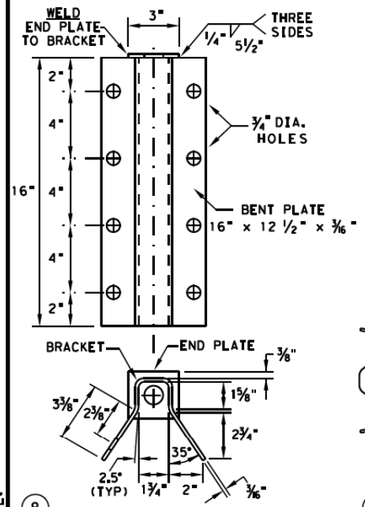
| # | (DAT) PARTS LIST | QTY |
|---|---|---|
| (1) | STEEL FOUNDATION TUBE | 2 |
| (2) | DAT TERMINAL POST | 2 |
| (3) | CHANNEL STRUT | 2 |
| (4) | TERMINAL RAIL ELEMENT | 1 |
| (5) | SHELF ANGLE BRACKET | 1 |
| (6) | BCT BEARING PLATE | 1 |
| (7) | BCT POST SLEEVE | 1 |
| (8) | GUARDRAIL ANCHOR BRACKET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



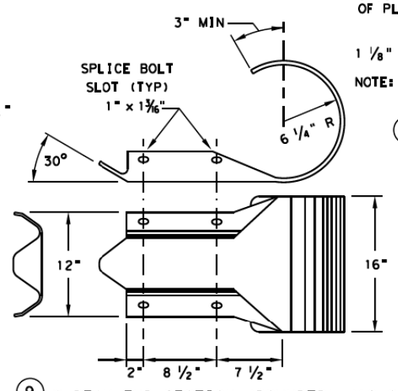

(4) TERMINAL RAIL ELEMENT FOR DAT



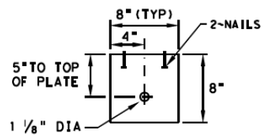

(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36




(8) GUARDRAIL ANCHOR BRACKET

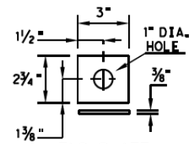



(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

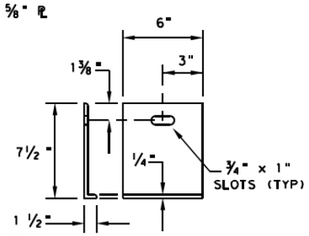



NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

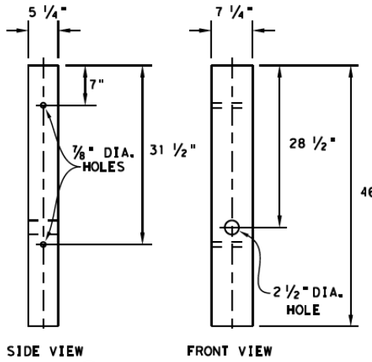
(6) BEARING PLATE
8"x 8"x 5/8" PL



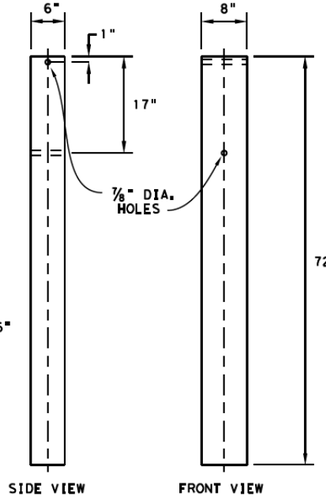

END PLATE




(5) SHELF ANGLE BRACKET




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




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

Texas Department of Transportation

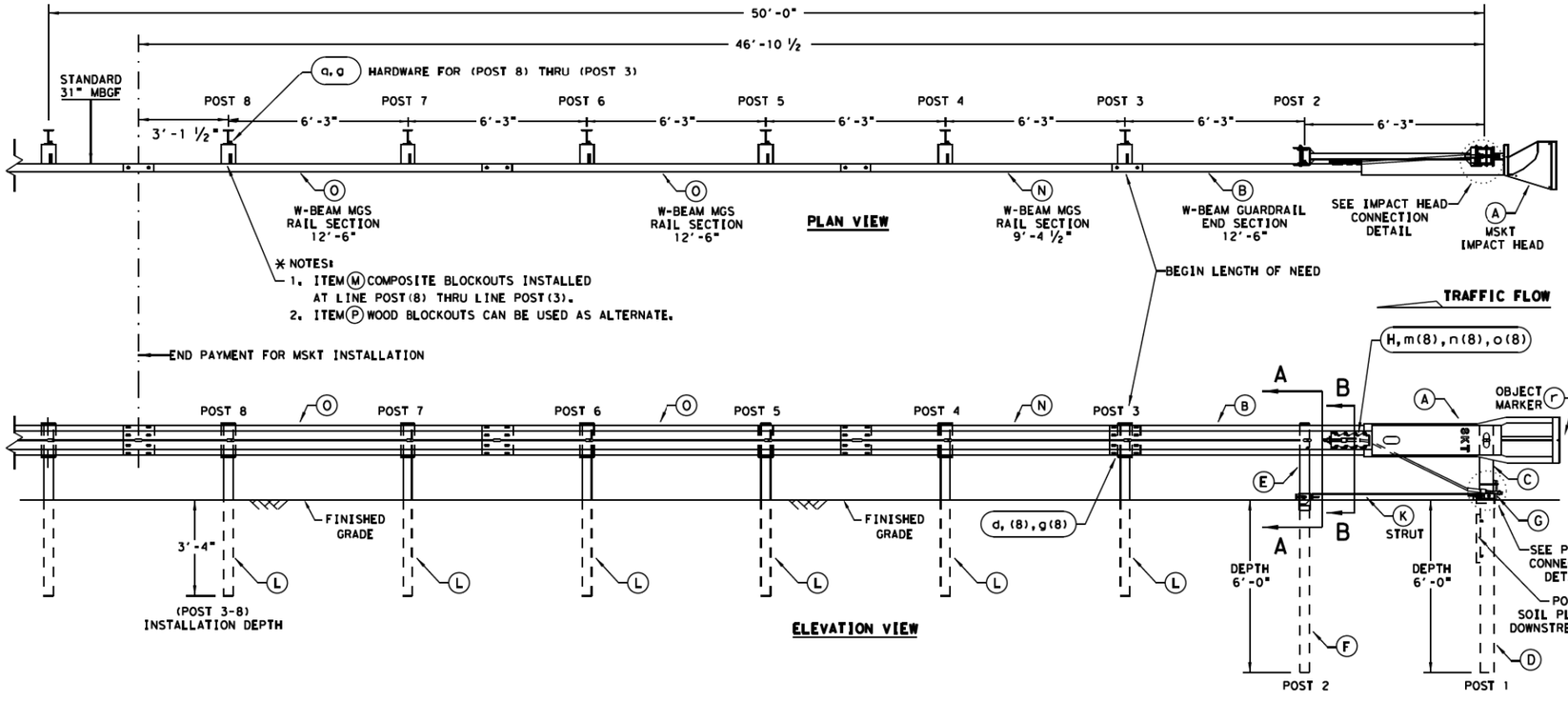
Design Division Standard

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

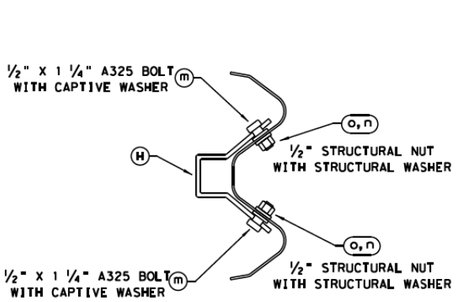
# GF(31)DAT-19

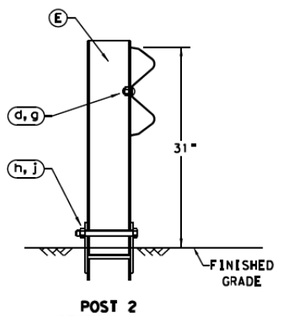
| | | | | | |
|---|---|---|---|---|---|
| FILE: gf31dat19.dgn | DN: TxDOT | CK: KM | DW: VP | CK: CGL/AG | |
| ©TxDOT: NOVEMBER 2019 | CONT | SECT | JOB | HIGHWAY | |
| REVISIONS | 0902 | 90 | 119 | McCART | |
| | DIST | COUNTY | | SHEET NO. | |
| | FTW | TARRANT | | 90B | |

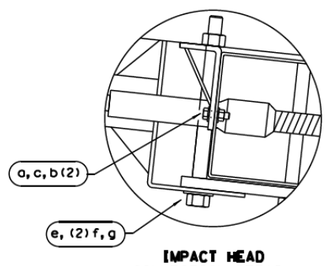
DATE:
FILE:

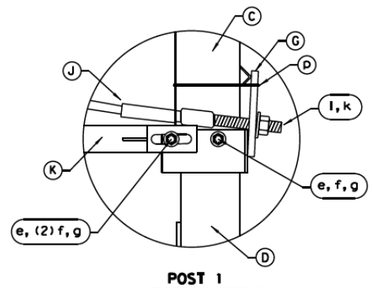


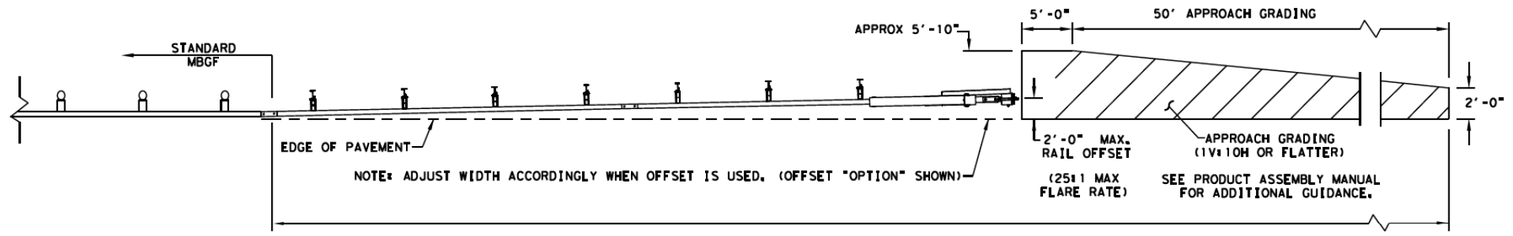

NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.




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

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

## GENERAL NOTES

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

| ITEM | QTY | MAIN SYSTEM COMPONENTS | ITEM NUMBERS |
|---|---|---|---|
| A | 1 | MSKT IMPACT HEAD | MS3000 |
| B | 1 | W-BEAM GUARDRAIL END SECTION, 12 Ga. | SF1303 |
| C | 1 | POST 1 - TOP (6" X 6" X ⅛" TUBE) | MTPHP1A |
| D | 1 | POST 1 - BOTTOM (6' W6X15) | MTPHP1B |
| E | 1 | POST 2 - ASSEMBLY TOP | UHP2A |
| F | 1 | POST 2 - ASSEMBLY BOTTOM (6' W6X9) | HP2B |
| G | 1 | BEARING PLATE | E750 |
| H | 1 | CABLE ANCHOR BOX | S760 |
| J | 1 | BCT CABLE ANCHOR ASSEMBLY | E770 |
| K | 1 | GROUND STRUT | MS785 |
| L | 6 | W6x9 OR W6x8.5 STEEL POST | P621 |
| M | 6 | COMPOSITE BLOCKOUTS | CBSP-14 |
| N | 1 | W-BEAM MGS RAIL SECTION (9'-4 ½") | G12025 |
| O | 2 | W-BEAM MGS RAIL SECTION (12'-6") | G1203A |
| P | 6 | WOOD BLOCKOUT 6" X 8" X 14" | P675 |
| Q | 1 | W-BEAM MGS RAIL SECTION (25'-0") | G1209 |
| | | SMALL HARDWARE | |
| a | 2 | ⅝" x 1" HEX BOLT (GRD 5) | B5160104A |
| b | 4 | ⅝" WASHER | W0516 |
| c | 2 | ⅝" HEX NUT | N0516 |
| d | 25 | ⅝" Dia. x 1 ¼" SPLICE BOLT (POST 2) | B580122 |
| e | 2 | ⅝" Dia. x 9" HEX BOLT (GRD A449) | B580904A |
| f | 3 | ⅝" WASHER | W050 |
| g | 33 | ⅝" Dia. H.G.R NUT | N050 |
| h | 1 | ¾" Dia. x 8 ½" HEX BOLT (GRD A449) | B340854A |
| j | 1 | ¾" Dia. HEX NUT | N030 |
| k | 2 | 1 ANCHOR CABLE HEX NUT | N100 |
| l | 2 | 1 ANCHOR CABLE WASHER | W100 |
| m | 8 | ½" x 1 ¼" A325 BOLT WITH CAPTIVE WASHER | SB12A |
| n | 8 | ½" STRUCTURAL NUTS | N012A |
| o | 8 | 1 1/16" O.D. x ⅝" I.D. STRUCTURAL WASHERS | W012A |
| p | 1 | BEARING PLATE RETAINER TIE | CT-100ST |
| q | 6 | ⅝" x 10" H.G.R. BOLT | B581002 |
| r | 1 | OBJECT MARKER 18" X 18" | E3151 |

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

Texas Department of Transportation — Design Division Standard

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

| FILE: sgt12s3118.dgn | DN:TxDOT | CK:KM | DW:VP | CK:CL |
|---|---|---|---|---|
| © TxDOT: APRIL 2018 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0902 | 90 | 119 | McCART |
| | DIST | COUNTY | | SHEET NO. |
| | FTW | TARRANT | | 90C |

| SUMMARY OF TRAFFIC SIGNAL ITEMS | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION | 416 6029 | 416 6032 | 416 6034 | 610 6002 | 610 6102 | 618 6046 | 618 6047 | 618 6053 | 618 6059 | 620 6007 | 620 6008 | 620 6009 | 620 6010 | 624 6010 | 628 6144 | 680 6002 |
| | DRILL SHAFT (RDWY ILL POLE) (30 IN) | DRILL SHAFT (TRF SIG POLE) (36 IN) | DRILL SHAFT (TRF SIG POLE) (48 IN) | RELOCATE RD IL ASM (SHOE-BASE) | REPLACE LUMINAIRE W/LED (250W EQ) | CONDT (PVC) (SCH 80) (2") | CONDT (PVC) (SCH 80) (2") (BORE) | CONDT (PVC) (SCH 80) (3") | CONDT (PVC) (SCH 80) (4") (BORE) | ELEC CONDR (NO. 8) BARE | ELEC CONDR (NO. 8) INSULATED | ELEC CONDR (NO. 6) BARE | ELEC CONDR (NO. 6) INSULATED | GROUND BOX TY D (162922) W/ APRON | ELC SRV TY D 120/240 060 (NS) SS (E) PS (U) | INSTALL HWY TRF SIG (ISOLATED) |
| | LF | LF | LF | EA | EA | LF | LF | LF | LF | LF | LF | LF | LF | EA | EA | EA |
| ALTAMESA & McCART SIGNAL | 8 | 26 | 44 | 1 | 2 | 90 | 710 | 380 | 710 | 1845 | 1470 | 15 | 30 | 6 | 1 | 1 |
| PROJECT TOTALS | 8 | 26 | 44 | 1 | 2 | 90 | 710 | 380 | 710 | 1,845 | 1,470 | 15 | 30 | 6 | 1 | 1 |

| SUMMARY OF TRAFFIC SIGNAL ITEMS | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION | 682 6001 | 682 6002 | 682 6003 | 682 6004 | 682 6005 | 682 6006 | 682 6018 | 682 6054 | 682 6055 | 684 6029 | 684 6031 | 684 6033 | 684 6046 | 686 6039 |
| | VEH SIG SEC (12") LED (GRN) | VEH SIG SEC (12") LED (GRN ARW) | VEH SIG SEC (12") LED (YEL) | VEH SIG SEC (12") LED (YEL ARW) | VEH SIG SEC (12") LED (RED) | VEH SIG SEC (12") LED (RED ARW) | PED SIG SEC (LED) (COUNTDOWN) | BACKPLATE W/REF BRDR (3 SEC) (VENT) ALUM | BACKPLATE W/REF BRDR (4 SEC) (VENT) ALUM | TRF SIG CBL (TY A) (14 AWG) (3 CONDR) | TRF SIG CBL (TY A) (14 AWG) (5 CONDR) | TRF SIG CBL (TY A) (14 AWG) (7 CONDR) | TRF SIG CBL (TY A) (14 AWG) (20 CONDR) | INS TRF SIG PL AM (S) 1 ARM (36') LUM |
| | EA | EA | EA | EA | EA | EA | EA | EA | EA | LF | LF | LF | LF | EA |
| ALTAMESA & McCART SIGNAL | 10 | 9 | 12 | 11 | 12 | 7 | 12 | 15 | 4 | 2735 | 1000 | 2260 | 850 | 1 |
| PROJECT TOTALS | 10 | 9 | 12 | 11 | 12 | 7 | 12 | 15 | 4 | 2,735 | 1,000 | 2,260 | 850 | 1 |

| SUMMARY OF TRAFFIC SIGNAL ITEMS | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION | 686 6043 | 686 6065 | 686 6067 | 687 6001 | 688 6001 | 688 6003 | 6010 6002 | 6058 6001 | 6089 6002 | 6292 6001 | 6292 6002 | 6396 6001 | 6421 6001 |
| | INS TRF SIG PL AM (S) 1 ARM (40') LUM | INS TRF SIG PL AM (S) 1 ARM (65') | INS TRF SIG PL AM (S) 1 ARM (65') LUM | PED POLE ASSEMBLY | PED DETECT PUSH BUTTON (APS) | PED DETECTOR CONTROLLER UNIT | CCTV FIELD EQUIP (DIGITAL) | BBU SYSTEM (EXTERNAL BATT CABINET) | CAT 5 ETHERNET CABLE | RVDS (PRESENCE DETECTION ONLY) | RVDS (ADVANCE DETECTION ONLY) | COFW EV PREEMPT (INSTALLATION ONLY) | COFW CELLAR ROUTER (INSTALLATION ONLY) |
| | EA | EA | EA | EA | EA | EA | EA | EA | LF | EA | EA | EA | EA |
| ALTAMESA & McCART SIGNAL | 1 | 1 | 1 | 10 | 12 | 1 | 1 | 1 | 160 | 6 | 4 | 4 | 1 |
| PROJECT TOTALS | 1 | 1 | 1 | 10 | 12 | 1 | 1 | 1 | 160 | 6 | 4 | 4 | 1 |

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE Firm No.2614
1320 S.UNIVERSITY DRIVE.
UNIVERSITY CENTER II, SUITE 450
FORT WORTH, TEXAS 76107
(817) 820-0420

Texas Department of Transportation

# SIGNAL QUANTITY SUMMARY

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 91 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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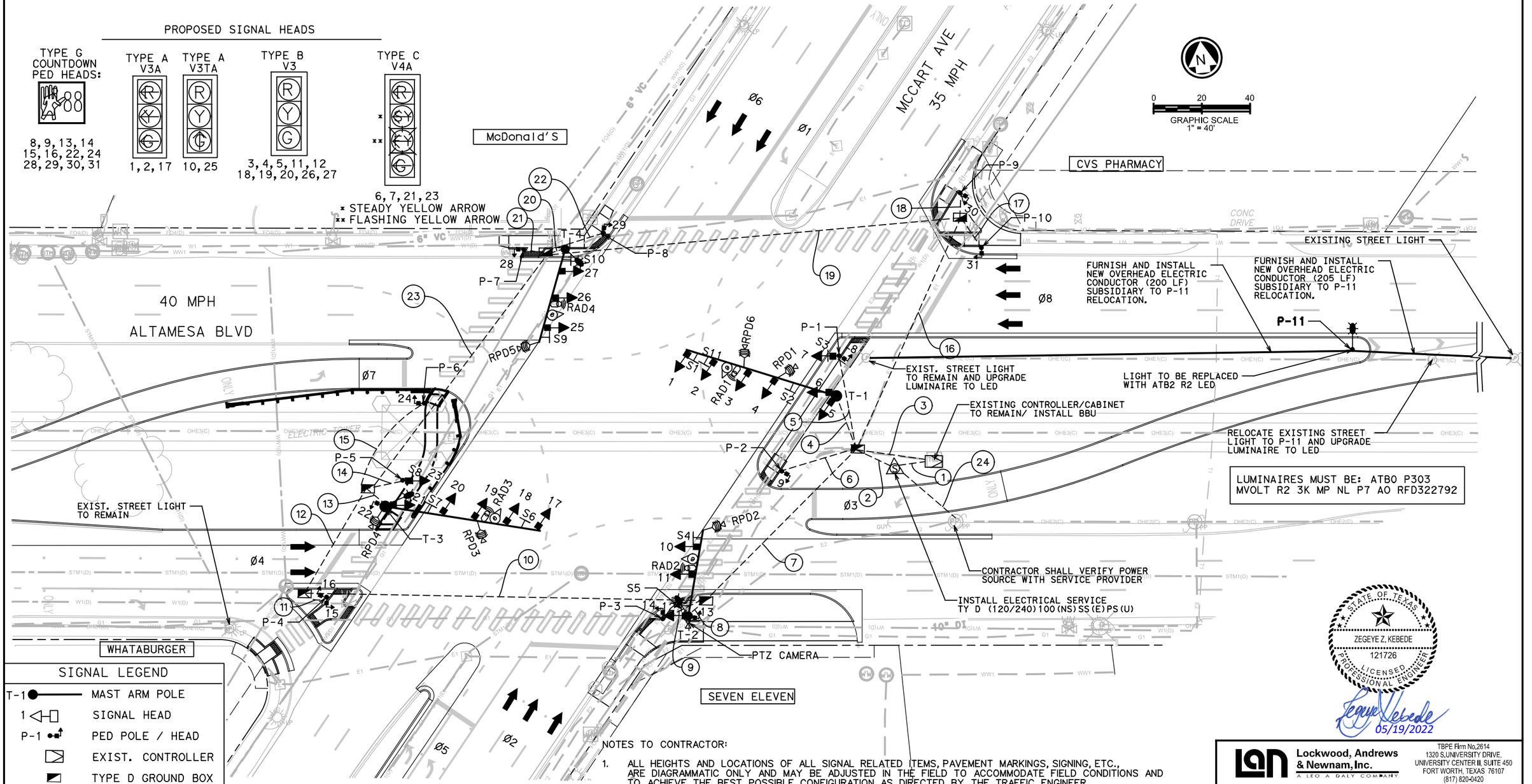



## SIGNAL LEGEND

| | |
|---|---|
| T-1 | MAST ARM POLE |
| 1 | SIGNAL HEAD |
| P-1 | PED POLE / HEAD |
| | EXIST. CONTROLLER |
| | TYPE D GROUND BOX |
| | PTZ CAMERA |
| | PEDESTAL SERVICE |
| | LED LUMINAIRE |
| RPD1 | RADAR PRESENCE DETECTOR |
| RAD1 | RADAR ADVANCE DETECTOR |
| | OPTICOM DETECTOR |
| 1 | CONDUIT RUN |
| S1 | OVERHEAD SIGN |
| Ø2 | PHASE NUMBER |
| | TRAFFIC FLOW ARROW |

PROPOSED SIGNS

S2, S7 — Altamesa Blvd

S5, S10 — McCart Ave

VERIFY STREET NAME SIGNS WITH CITY PRIOR TO FABRICATION

S4,S9 R3-2 36"X36"

S6,S11 R10-5L 30"X36"

S3,S8 R10-17T(MOD) 36"X42"

S1 R3-8LL 36"X36"

NOTES TO CONTRACTOR:

1. ALL HEIGHTS AND LOCATIONS OF ALL SIGNAL RELATED ITEMS, PAVEMENT MARKINGS, SIGNING, ETC., ARE DIAGRAMMATIC ONLY AND MAY BE ADJUSTED IN THE FIELD TO ACCOMMODATE FIELD CONDITIONS AND TO ACHIEVE THE BEST POSSIBLE CONFIGURATION AS DIRECTED BY THE TRAFFIC ENGINEER.
2. ALL TRAFFIC SIGNAL POLES, MAST ARMS, AND PEDESTRIAN POLES SHALL BE POWDER COATED BLACK (SUBSIDIARY TO ITEMS 686 AND 687, RESPECTIVELY).
3. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING UNDERGROUND AND AERIAL UTILITIES PRIOR TO THE INSTALLATION OF MAST ARM POLES, MAST ARMS, AND LUMINAIRE ARMS.
4. CITY WILL FURNISH OPTICOM DETECTORS, 4G MODEM, & COMMUNICATION GEAR.
5. CONTRACTOR WILL FURNISH AND INSTALL PTZ CAMERA. THIS ITEM WILL BE PAID UNDER PAY ITEM 6010.
6. CABLES FOR OPTICOM DETECTORS ARE SUBSIDIARY TO ITEM 6396.
7. CONDUCTORS FOR APS SHALL RUN DIRECTLY FROM CONTROLLER TO PUSHBUTTONS BYPASSING TERMINAL BLOCKS.
8. CONDUIT RUN TO POWER SOURCE IS SUBSIDIARY TO ELECTRCAL SERVICE INSTALLATION. EXACT LOCATION OF THE POWER SOURCE TO BE VERIFIED WITH SERVICE PROVIDER.
9. REFER TO EXISTING UTILITIES AND REMOVAL PLANS FOR EXISTING CONDITION INFORMATION.



STATE OF TEXAS — ZEGEYE Z. KEBEDE — 121726 — LICENSED PROFESSIONAL ENGINEER

05/19/2022

Lockwood, Andrews & Newnam, Inc. — A LEO A DALY COMPANY
TBPE Firm No.2614
1320 S.UNIVERSITY DRIVE, UNIVERSITY CENTER II, SUITE 450
FORT WORTH, TEXAS 76107
(817) 820-0420

Texas Department of Transportation

# TRAFFIC SIGNAL LAYOUT

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 92 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |

5/19/2022 3:56:07 PM
c:\projectwise\zzkebede@lan-inc.com\d0775534\McCart Signal Layout.dgn

LUMINAIRES MUST BE: ATBO P303
MVOLT R2 3K MP NL P7 AO RFD322792

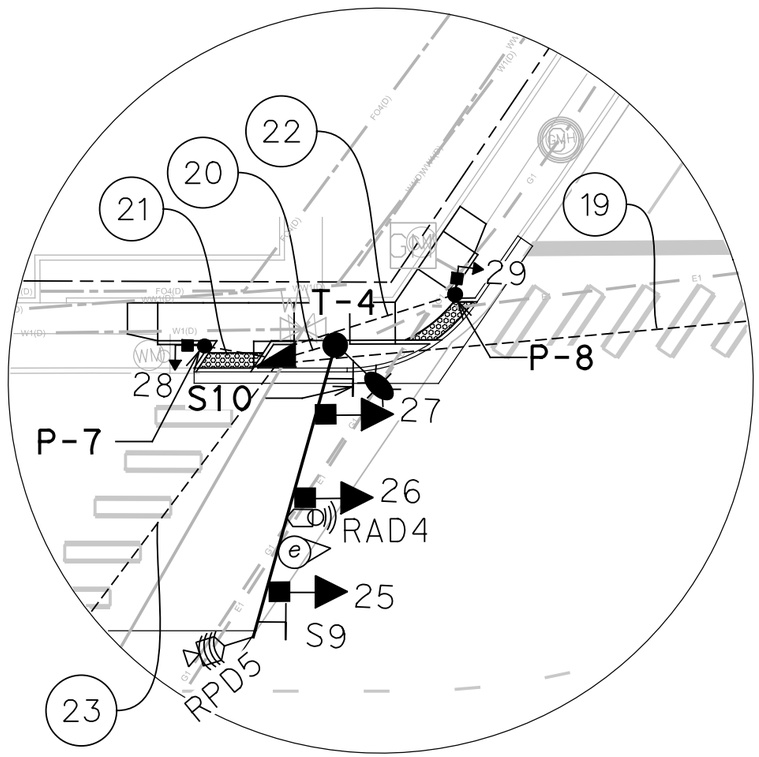
## SIGNAL LEGEND

| | |
|---|---|
| T-1 ● | MAST ARM POLE |
| 1 ◁ | SIGNAL HEAD |
| P-1 | PED POLE / HEAD |
| | EXIST. CONTROLLER |
| | TYPE D GROUND BOX |
| | PTZ CAMERA |
| | PEDESTAL SERVICE |
| | LED LUMINAIRE |
| RPD1 | RADAR PRESENCE DETECTOR |
| RAD1 | RADAR ADVANCE DETECTOR |
| | OPTICOM DETECTOR |
| (1) | CONDUIT RUN |
| S1 | OVERHEAD SIGN |
| Ø2 | PHASE NUMBER |
| | TRAFFIC FLOW ARROW |

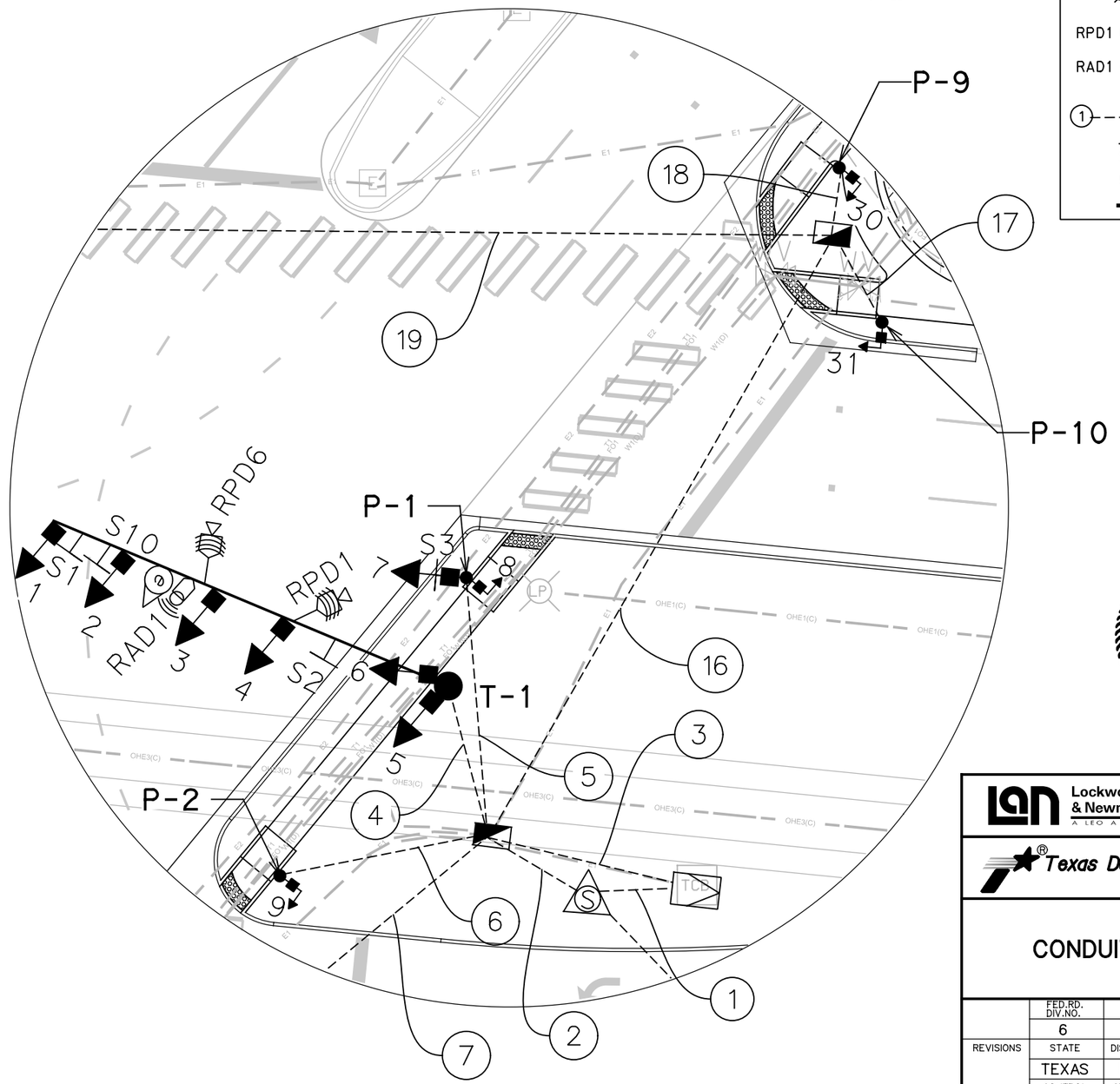
N

0 10 20
GRAPHIC SCALE
1" = 20'

## NORTHWEST CORNER




## NORTHEAST CORNER






STATE OF TEXAS
ZEGEYE Z. KEBEDE
121726
LICENSED PROFESSIONAL ENGINEER
05/19/2022

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE Firm No.2614
1320 S.UNIVERSITY DRIVE,
UNIVERSITY CENTER II, SUITE 450
FORT WORTH, TEXAS 76107
(817) 820-0420

Texas Department of Transportation

# CONDUIT RUN DETAILS

SHEET 1 OF 2

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 93 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |

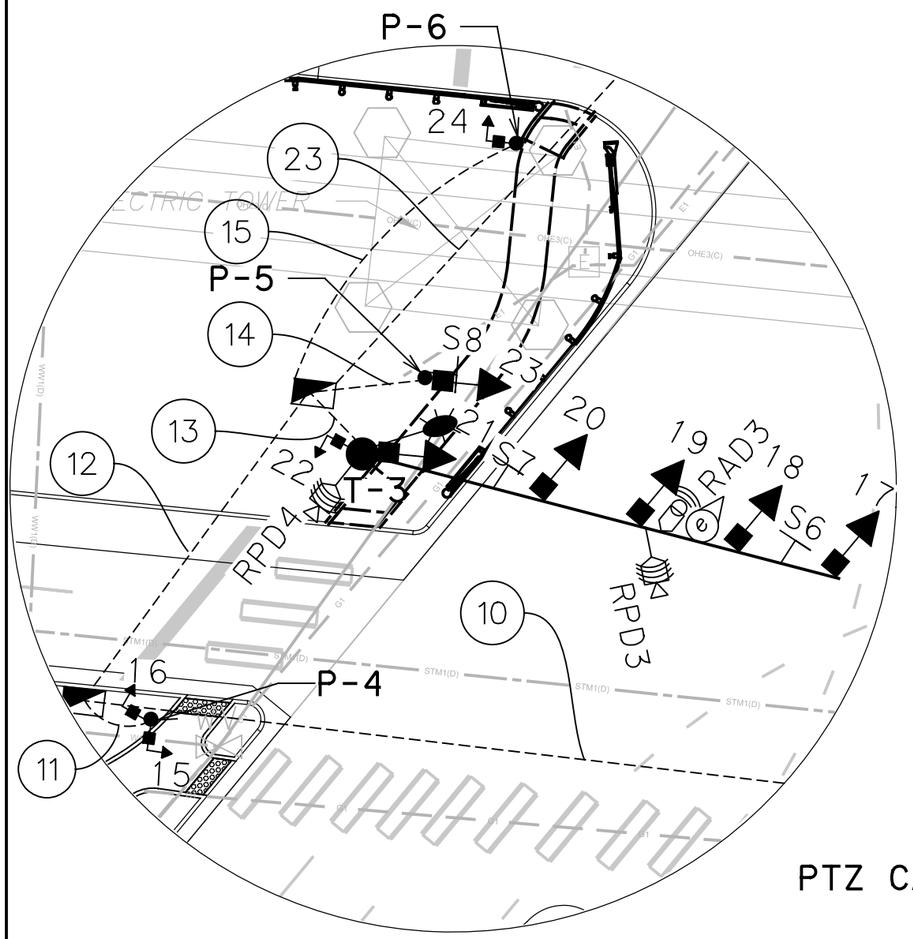
5/19/2022 3:56:19 PM
c:\projectwise\zzkebede@lan-inc.com\d0775534\McCart Signal Corner Details 1.dgn

LUMINAIRES MUST BE: ATBO P303
MVOLT R2 3K MP NL P7 AO RFD322792

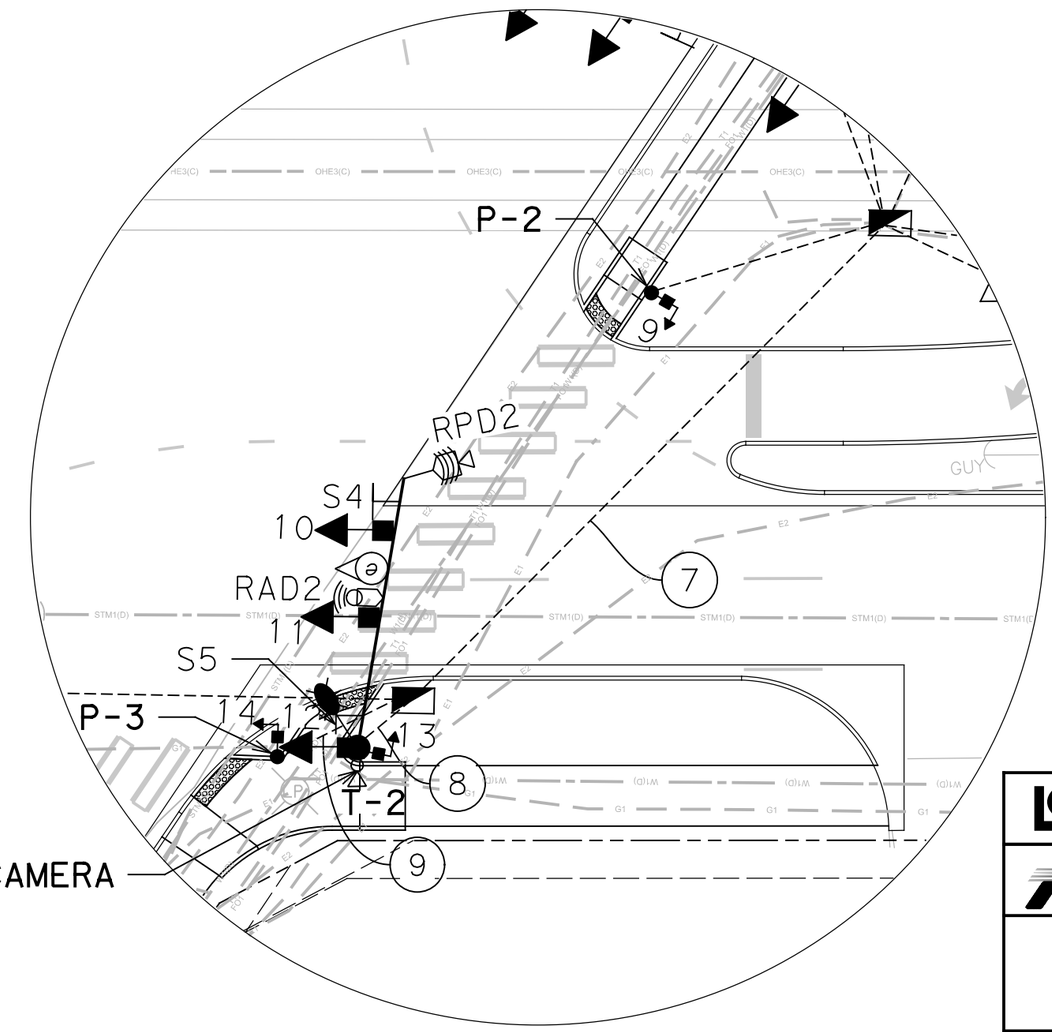
| SIGNAL LEGEND | |
|---|---|
| T-1 | MAST ARM POLE |
| 1 | SIGNAL HEAD |
| P-1 | PED POLE / HEAD |
| | EXIST. CONTROLLER |
| | TYPE D GROUND BOX |
| | PTZ CAMERA |
| | PEDESTAL SERVICE |
| | LED LUMINAIRE |
| RPD1 | RADAR PRESENCE DETECTOR |
| RAD1 | RADAR ADVANCE DETECTOR |
| | OPTICOM DETECTOR |
| 1 | CONDUIT RUN |
| S1 | OVERHEAD SIGN |
| Ø2 | PHASE NUMBER |
| | TRAFFIC FLOW ARROW |

0 10 20
GRAPHIC SCALE
1" = 20'

## SOUTHWEST CORNER




## SOUTHEAST CORNER

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# CONDUIT RUN DETAILS

SHEET 2 OF 2

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 94 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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## SUMMARY OF CONDUIT AND CABLES

| RUN NO. | CONDUIT SIZE & INSTALLATION T-TRENCH B-BORE | LENGTH (FT) | #6 AWG BARE | #6 XHHW (POWER) | #8 AWG BARE | #8 XHHW (ILLUM) | 20C 14 AWG SIGNAL | 7C 14 AWG SIGNAL /PED | 3C 14 AWG APS | RPD CABLE | RAD CABLE | OPTICOM CABLE | PTZ CABLE CAT5E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2"-T | 15 | 1 | 2 | | | | | | | | | |
| 2 | 2"-T | 15 | | | 1 | 4 | | | | | | | |
| 3 | 3"-T | 30 | | | 1 | | 2 | 5 | 6 | 3 | 2 | 2 | 1 |
| | 3"-T | 30 | | | 1 | | 2 | 5 | 6 | 3 | 2 | 2 | |
| | 3"-T | 30 | | | 1 | | | | | | | | |
| 4 | 3"-T | 25 | | | 1 | | 1 | | | 2 | 1 | 1 | |
| 5 | 3"-T | 40 | | | 1 | | | 1 | 1 | | | | |
| 6 | 3"-T | 30 | | | 1 | | | 1 | 1 | | | | |
| 7 | 4"-B | 90 | | | 1 | | 2 | 4 | 6 | 3 | 2 | 2 | 1 |
| | 2"-B | 90 | | | 1 | 2 | | | | | | | |
| 8 | 3"-T | 10 | | | 1 | | 1 | | 1 | 1 | 1 | 1 | 1 |
| | 2"-T | 10 | | | 1 | 4 | | | | | | | |
| 9 | 3"-T | 20 | | | 1 | | | 1 | 1 | | | | |
| 10 | 4"-B | 165 | | | 1 | | 1 | 3 | 4 | 2 | 1 | 1 | |
| | 2"-B | 165 | | | 1 | 2 | | | | | | | |
| 11 | 3"-T | 10 | | | 1 | | | 1 | 2 | | | | |
| 12 | 4"-B | 50 | | | 1 | | 1 | 2 | 2 | 2 | 1 | 1 | |
| | 2"-B | 50 | | | 1 | 2 | | | | | | | |
| 13 | 3"-T | 10 | | | 1 | | 1 | | 1 | 2 | 1 | 1 | |
| | 2"-T | 10 | | | 1 | 2 | | | | | | | |
| 14 | 3"-T | 20 | | | 1 | | | 1 | | | | | |
| 15 | 3"-T | 50 | | | 1 | | | 1 | 1 | | | | |
| 16 | 4"-B | 105 | | | 1 | | 1 | 4 | 4 | 1 | 1 | 1 | |
| | 2"-B | 105 | | | 1 | 2 | | | | | | | |
| 17 | 3"-T | 15 | | | 1 | | | 1 | 1 | | | | |
| 18 | 3"-T | 10 | | | 1 | | | 1 | 1 | | | | |
| 19 | 4"-B | 175 | | | 1 | | 1 | 2 | 2 | 1 | 1 | 1 | |
| | 2"-B | 175 | | | 1 | 2 | | | | | | | |
| 20 | 3"-T | 10 | | | 1 | | 1 | | | 1 | 1 | 1 | |
| | 2"-T | 10 | | | 1 | 2 | | | | | | | |
| 21 | 3"-T | 15 | | | 1 | | | 1 | 1 | | | | |
| 22 | 3"-T | 25 | | | 1 | | | 1 | 1 | | | | |
| 23 | 4"-B | 125 | | | 1 | | | | | | | | |
| | 2"-B | 125 | | | 1 | | | | | | | | |
| 24 | 2"-T | 30 | | | | | | | | | | | |
| | TOTAL (FT) | | 15 | 30 | 1845 | 1310 | 850 | 2260 | 2675 | 1250 | 850 | 850 | 130 |

## CABLE QUANTITIES INSIDE POLES (LF)

| POLE NO. | #6 AWG BARE | #6 XHHW (POWER) | #8 AWG BARE | #8 XHHW (ILLUM) | 5C 14 AWG SIGNAL | 5C 14 AWG PED | 3C 14 AWG APS | RPD CABLE | RAD CABLE | OPTICOM CABLE | PTZ CABLE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T-1 | - | - | - | - | 305 | - | - | 105 | 65 | 70 | - |
| T-2 | - | - | - | 80 | 110 | 10 | 5 | 60 | 40 | 40 | 30 |
| T-3 | - | - | - | 40 | 290 | 10 | 5 | 85 | 60 | 60 | - |
| T-4 | - | - | - | 40 | 135 | - | - | 60 | 45 | 40 | - |
| P-1 | - | - | - | - | 20 | 10 | 5 | - | - | - | - |
| P-2 | - | - | - | - | | 10 | 5 | - | - | - | - |
| P-3 | - | - | - | - | | 10 | 5 | - | - | - | - |
| P-4 | - | - | - | - | | 20 | 10 | - | - | - | - |
| P-5 | - | - | - | - | 20 | | | - | - | - | - |
| P-6 | - | - | - | - | | 10 | 5 | - | - | - | - |
| P-7 | - | - | - | - | | 10 | 5 | - | - | - | - |
| P-8 | - | - | - | - | | 10 | 5 | - | - | - | - |
| P-9 | - | - | - | - | | 10 | 5 | - | - | - | - |
| P-10 | - | - | - | - | - | 10 | 5 | - | - | - | - |
| TOTAL QTY INSIDE POLE | 0 | 0 | 0 | 160 | 880 | 120 | 60 | 310 | 210 | 210 | 30 |

NOTES: OPTICOM WIRING IS SUPPLIED BY THE CITY AND INSTALLED BY THE CONTRACTOR.
PTZ WIRING IS SUPPLIED AND INSTALLED BY THE CONTRACTOR SUBSIDIARY TO ITEM 6010.
RADAR CABLES ARE SUPPLIED AND INSTALLED BY THE CONTRACTOR SUBSIDIARY TO ITEM 6292.

| SUMMARY OF GROUND BOXES | |
|---|---|
| GROUND BOX | NUMBER (EA) |
| TYPE D W / APRON | 6 |
| | |
| TOTAL | 6 |

| CONDUIT SUMMARY | | |
|---|---|---|
| DESCRIPTION | UNIT | QTY |
| CONDT (PVC) (SCH80) (2") TRENCH | LF | 90 |
| CONDT (PVC) (SCH80) (3") TRENCH | LF | 380 |
| CONDT (PVC) (SCH80) (2") BORE | LF | 710 |
| CONDT (PVC) (SCH80) (4") BORE | LF | 710 |

## RADAR PRESENCE DETECTION ZONE

| RADAR NO. | MOUNTING LOCATION | MOUNTING HEIGHT (FT) | ZONE LOCATIONS | PHASE(S) SERVED |
|---|---|---|---|---|
| RPD1 | MAST ARM T-1 | 20 | STOP BAR | PH 8 |
| RPD2 | MAST ARM T-2 | 20 | STOP BAR | PH 3 |
| RPD3 | MAST ARM T-3 | 20 | STOP BAR | PH 5, PH 2 |
| RPD4 | SIGNAL POLE T-3 | 20 | STOP BAR | PH 4 |
| RPD5 | MAST ARM T-4 | 20 | STOP BAR | PH 7 |
| RPD6 | MAST ARM T-1 | 20 | STOP BAR | PH 6, 1 |

RPD PRESENCE DETECTION
click 656

| | |
|---|---|
| SENSOR 1 | PH 8 |
| SENSOR 2 | PH 3 |
| SENSOR 3 | PH 5, PH 2 |
| SENSOR 4 | PH 4 |
| SENSOR 5 | PH 7 |
| SENSOR 6 | PH 6, 1 |

CONTROLLER

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DETECTOR CHANNEL | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| PHASE ASSIGMENT | PH 1 | PH 2L,C | PH 3 | PH 4L,C | PH 5L | PH 6L,C | PH 7 | PH 8L,C |
| MATRIX OUTPUT CHANNEL | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| DETECTOR CHANNEL | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| PHASE ASSIGMENT | | PH 2R | | PH 4R | PH 5R | PH 6R | | PH 8R |
| MATRIX OUTPUT CHANNEL | | 10 | | 12 | 13 | 14 | | 16 |

## RADAR ADVANCE DETECTION ZONE

| RADAR NO. | MOUNTING LOCATION | MOUNTING HEIGHT (FT) | ZONE LOCATIONS | PHASE(S) SERVED |
|---|---|---|---|---|
| RAD1 | MAST ARM T-1 | 19 | SETBACK | PH 2 |
| RAD2 | MAST ARM T-2 | 19 | SETBACK | PH 4 |
| RAD3 | MAST ARM T-3 | 19 | SETBACK | PH 6 |
| RAD4 | MAST ARM T-4 | 19 | SETBACK | PH 8 |

RAD ADVANCE DETECTION
click 656

| | |
|---|---|
| SENSOR 1 | PH 2 |
| SENSOR 2 | PH 4 |
| SENSOR 3 | PH 6 |
| SENSOR 4 | PH 8 |

CONTROLLER

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DETECTOR CHANNEL | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| HIGH SPEED 150' TO 700' | | PH 2 | | PH 4 | | PH 6 | | PH 8 |
| MATRIX OUTPUT CHANNEL | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| DETECTOR CHANNEL | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 |
| LOW SPEED 50' TO 150' | | PH 2 | | PH 4 | | PH 6 | | PH 8 |
| MATRIX OUTPUT CHANNEL | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |

## RECOMMENDED MINIMUM PEDESTRIAN TIMING

MIN WALK TIME = 7 SEC (FOR ALL Øs)

| FLASHING DO NOT WALK | PHASE / TIME (SEC) | | | |
|---|---|---|---|---|
| | SIGNAL HEADS 14,15 | SIGNAL HEADS 16,22,24,28 | SIGNAL HEADS 29,31 | SIGNAL HEADS 8,9,13,30 |
| | Ø4 | Ø6 | Ø8 | Ø2 |
| | 34 | 16 | 41 | 16 |
| TOTAL TIME | 41 | 23 | 48 | 23 |



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FORT WORTH, TEXAS 76107
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Texas Department of Transportation

# TRAFFIC SIGNAL CHARTS

SHEET 1 OF 2

| REVISIONS | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 95 |
| | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |

| SIGNAL POLE CHART | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| POLE NUMBER | T-1 | | | | | | P-1 | | P-2 | T-2 | | | | P-3 | P-4 | | T-3 | | | | | | P-5 | P-6 | T-4 | | | P-7 | P-8 | P-9 | P-10 | P-11 |
| POLE HEIGHT | 19′ | | | | | | 15′ | | 10′ | 30′ | | | | 10′ | 10′ | | 30′ | | | | | | 15′ | 10′ | 30′ | | | 10′ | 10′ | 10′ | 10′ | 30′ |
| MAST ARM LENGTH | 65′ | | | | | | - | | - | 36′ | | | | - | - | | 65′ | | | | | | - | - | 40′ | | | - | - | - | - | - |
| TxDOT FOUNDATION TYPE | 48-A | | | | | | 24-A | | 24-A | 36-A | | | | 24-A | 24-A | | 48-A | | | | | | 24-A | 24-A | 36-A | | | 24-A | 24-A | 24-A | 24-A | 30-A |
| WITH LUMINAIRES | NO | | | | | | NO | | NO | YES | | | | NO | NO | | YES | | | | | | NO | NO | YES | | | NO | NO | NO | NO | YES |
| SIZE OF LENS | 12" | | | | | | 12" | | - | 12" | | | | - | - | | 12" | | | | | | 12" | - | 12" | | | - | - | - | - | - |
| SIGNS ON MAST ARM | S1, S2 | | | | | | - | | - | S4, S5 | | | | - | - | | S6, S7 | | | | | | - | - | S9, S10 | | | - | - | - | - | - |
| SIGNAL TYPE | V3A | V3A | V3 | V3 | V3 | V4A | V4A | G | G | V3 | V3 | V3 | G | G | G | G | V3A | V3 | V3 | V3 | V4A | G | V4A | G | V3 | V3 | V3 | G | G | G | G | |
| SIGNAL FACE NO. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | |
| LED SIGNAL INDICATIONS | <-R- | <-R- | R | R | R | <-R- | <-R- | DW | DW | R | R | R | DW | DW | DW | DW | <-R- | R | R | R | <-R- | DW | <-R- | DW | R | R | R | DW | DW | DW | DW | |
| | <-Y- | <-Y- | Y | Y | Y | <-SY- | <-SY- | | | Y | Y | Y | | | | | <-Y- | Y | Y | Y | <-SY- | | <-SY- | | Y | Y | Y | | | | | |
| | <-G- | <-G- | G | G | G | <-FY- | <-FY- | W | W | ⇧ | G | G | W | W | W | W | <-G- | G | G | G | <-FY- | W | <-FY- | W | ⇧ | G | G | W | W | W | W | |
| | | | | | | <-G- | <-G- | | | | | | | | | | | | | | <-G- | | <-G- | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

NOTE: P-11 IS RELOCATED LIGHTING POLE WITH 30" DIAMETER BY 8′ LONG DRILLED SHAFT FOUNDATIONS. FOUNDATION IS PAID UNDER PAY ITEM 416.
ANY ADDITIONAL WIRE REQUIRED FOR THE RELOCATION OF THE LIGHTING POLES SHALL BE SUBSIDIARY TO ITEM 610.

| SUGGESTED APS PROGRAMMING CHART | | | | |
|---|---|---|---|---|
| APS LOCATION | SIGN | STREET NAME BEING CROSSE | CROSS SIDE STREET NAM | APS UNIT PROGRAMMING SETTING |
| P-1 | R10-3eR | ALTAMESA BOULEVARD | McCART AVENUE | |
| P-2 | R10-3eR | ALTAMESA BOULEVARD | McCART AVENUE | REGULAR PUSH SPEECH MESSAGE = "WAIT" |
| T-2 | R10-3eL | ALTAMESA BOULEVARD | McCART AVENUE | WALK INDICATION SPEECH MESSAGE = " (STREET NAME BEING CROSSED ), |
| P-3 | R10-3eL | McCART AVENUE | ALTAMESA BOULEVARD | WALK SIGN IS ON TO CROSS ( STREET NAME BEING CROSSED )" |
| P-4 | R10-3eR | McCART AVENUE | ALTAMESA BOULEVARD | COUNTDOWN SPEECH MESSAGE = OFF |
| P-4 | R10-3eR | ALTAMESA BOULEVARD | McCART AVENUE | EXTENDED PUSH SPEECH MESSAGE = "WAIT TO CROSS ( STREET NAME |
| T-3 | R10-3eL | ALTAMESA BOULEVARD | McCART AVENUE | BEING CROSSED ) AT ( CROSS SIDE STREET NAME ) " |
| P-6 | R10-3eR | ALTAMESA BOULEVARD | McCART AVENUE | |
| P-7 | R10-3eL | ALTAMESA BOULEVARD | McCART AVENUE | |
| P-8 | R10-3eR | McCART AVENUE | ALTAMESA BOULEVARD | |
| P-9 | R10-3eR | ALTAMESA BOULEVARD | McCART AVENUE | |
| P-10 | R10-3eR | McCART AVENUE | ALTAMESA BOULEVARD | |

| ELECTRICAL SERVICE DATA | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEC. SERVICE ID | ELECTRICAL SERVICE DESCRIPTION | SERVICE CONDUIT SIZE | SERVICE CONDUCTORS NO./SIZE | SAFETY SWITCH AMPS | MAIN CKT. BRK. POLE/AMPS | TWO-POLE CONTACTOR AMPS | PANELBD/ LOADCENTER AMP RATING (MIN.) | BRANCH CIRCUIT ID | BRANCH CKT. BKR. POLE/AMPS | BRANCH CIRCUIT AMPS | KVA LOAD |
| 1 | ELC SRV TY D 120/240 060 (NS)SS(E)PS(U) | 2" | 3/#6 | N/A | 2P/60 | 30 | 100 | A-SIGNAL<br>B-LUMINAIRES | 1P/50<br>2P/20 | 40<br>2.13 | 5.8 |

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Texas Department of Transportation

# TRAFFIC SIGNAL CHARTS

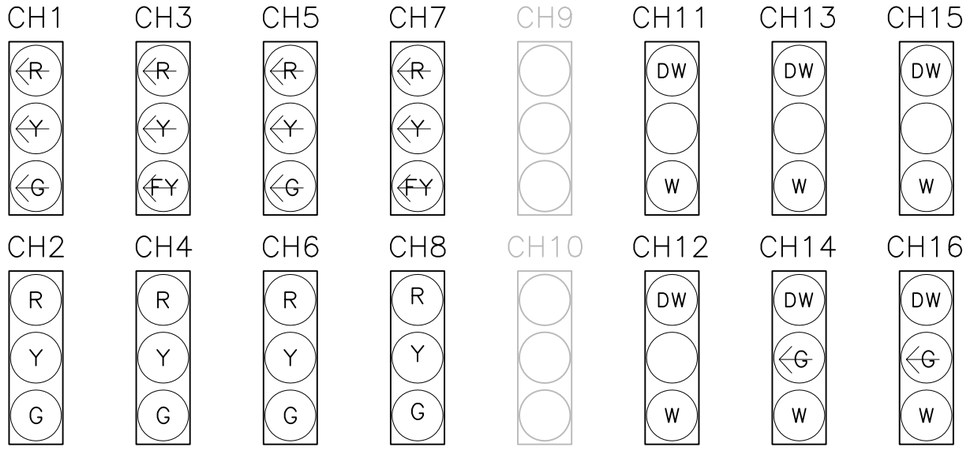
SHEET 2 OF 2

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | |
| REVISIONS | STATE | DISTRICT | COUNTY | 96 |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



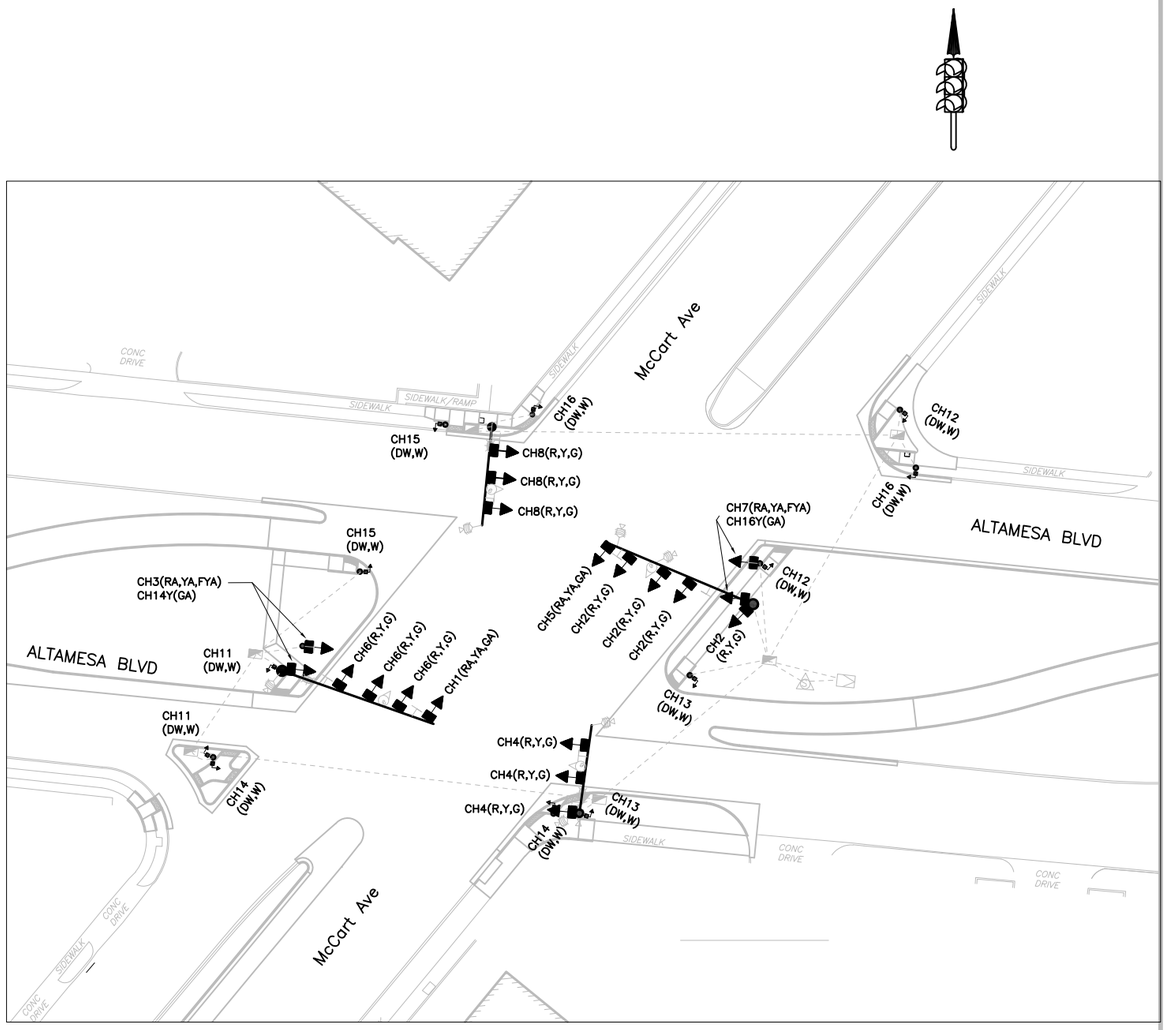
5/19/2022 3:56:56 PM
c:\projectwise\zzkebede@lan-inc.com\d0775534\Signal Charts 2 of 2.dgn

## LOAD SWITCH OUTPUT ASSIGNMENT




| SIGNAL DETECTOR ATTRIBUTE / CHANNEL | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 352i ATC | | | | | | | | PED OVL 11<br>DET 15 | PED OVL 13<br>DET 17 | PED OVL 15<br>DET 19 | EV NB<br>DET 21 | EV WB<br>DET 23 |
| | | | | | | | | PED OVL 12<br>DET 16 | PED OVL 14<br>DET 18 | PED OVL 16<br>DET 20 | EV SB<br>DET 22 | EV EB<br>DET 24 |

ALL VEHICULAR TRAFFIC DETECTION WILL BE ON SDLC




FORT WORTH

5001 JAMES AVENUE
FORT WORTH, TX 76115

PHONE: (817) 392-8656
FAX: (817) 392-2533

## LEGEND

SIGNAL HEAD
PED POLE
PED HEAD
MAST ARM

SCALE
0 30 60

STATE OF TEXAS
YANG JIN
108380
LICENSED PROFESSIONAL ENGINEER

# CITY OF FORT WORTH

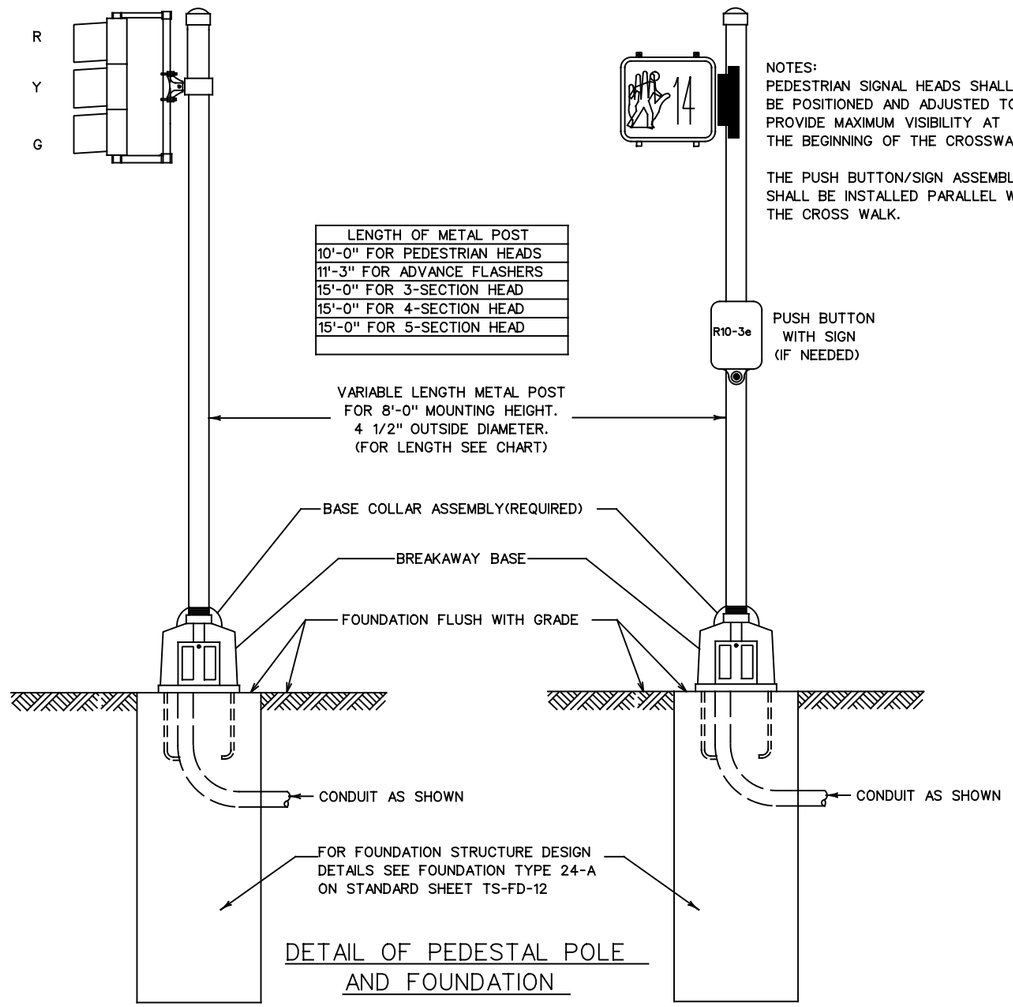
DEPARTMENT OF TRANSPORATION AND PUBLIC WORKS
TRAFFIC MANAGEMENT DIVISION

McCart Ave & Altamesa Blvd

CHANNEL ASSIGNMENT DRAWING

| NOTES | NAME | DATE |
|---|---|---|
| DRAWN BY: | SAMSON | 4-29-21 |
| CHECKED BY: | SHANNON | 4-29-21 |
| REVIEWED BY: | SHANNON | 4-29-21 |
| APPROVED BY: | YANG JIN | 4-29-21 |
| CAD FILE NO. : | | |
| SHEET NO. : | 97 | |

## TYPICAL SIGNAL HEADS MOUNTING
## ( ASTRO-BRAC TYPE OR EQUAL )

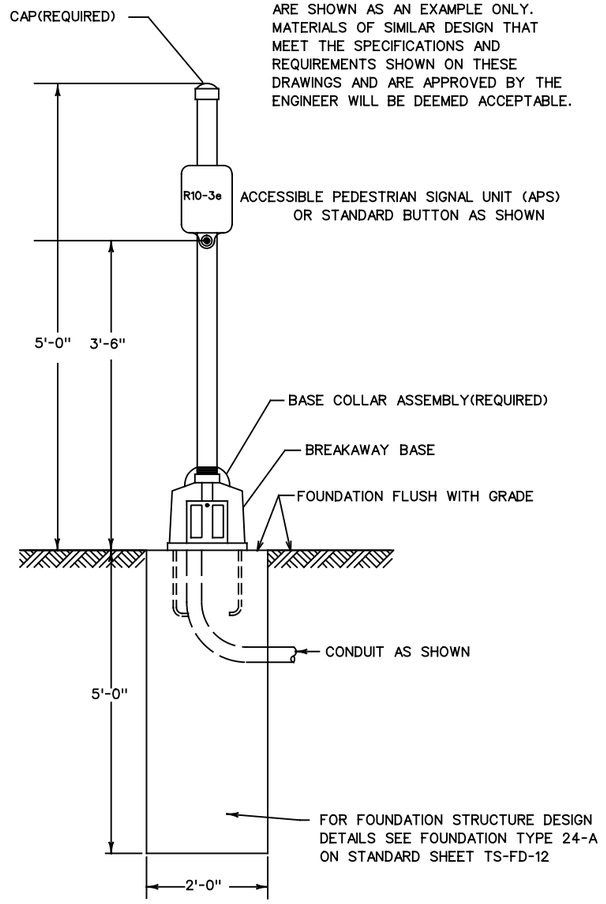



| LENGTH OF METAL POST |
|---|
| 10'-0" FOR PEDESTRIAN HEADS |
| 11'-3" FOR ADVANCE FLASHERS |
| 15'-0" FOR 3-SECTION HEAD |
| 15'-0" FOR 4-SECTION HEAD |
| 15'-0" FOR 5-SECTION HEAD |
| |

NOTES:
PEDESTRIAN SIGNAL HEADS SHALL BE POSITIONED AND ADJUSTED TO PROVIDE MAXIMUM VISIBILITY AT THE BEGINNING OF THE CROSSWALK.

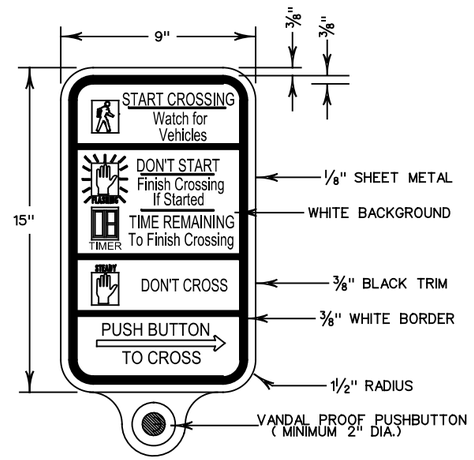
THE PUSH BUTTON/SIGN ASSEMBLY SHALL BE INSTALLED PARALLEL WITH THE CROSS WALK.

## DETAIL OF PEDESTAL POLE AND FOUNDATION




THE MATERIALS ON THIS DRAWING ARE SHOWN AS AN EXAMPLE ONLY. MATERIALS OF SIMILAR DESIGN THAT MEET THE SPECIFICATIONS AND REQUIREMENTS SHOWN ON THESE DRAWINGS AND ARE APPROVED BY THE ENGINEER WILL BE DEEMED ACCEPTABLE.

## DETAIL OF PEDESTRIAN POLE ASSEMBLY WITH ACCESSIBLE PEDESTRIAN SIGNAL UNIT(APS) OR STANDARD BUTTON



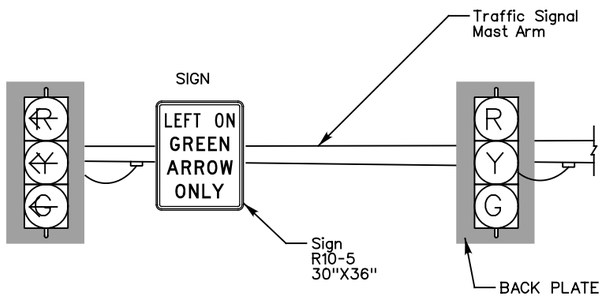

## PUSH BUTTON & SIGN(R10-3e)

THE 9"X15" SIGN SHOWN SHALL BE USED ON MAST ARM POLES AND ON PEDESTAL POLES. THE PUSH BUTTON SHALL BE INSTALLED 3'-6" ABOVE GROUND LEVEL.

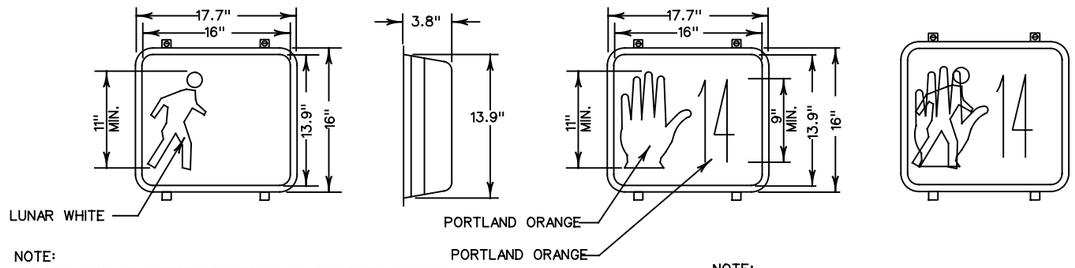
NOTES:

1. ALL SIGNAL HEADS SHALL BE FROM THE SAME MANUFACTURER, ALUMINUM WITH LED LENSES, AND BE MOUNTED WITH "ASTRO BRACS" UNLESS OTHERWISE SHOWN IN PLANS.
2. PROVIDE ALL LED TRAFFIC SIGNAL LAMP UNITS, AS WELL AS THE VARIOUS COMPONENTS OF THE SIGNAL HEADS TO BE INSTALLED WITHIN THIS PROJECT.
3. THE SIGNAL HEAD TO MAST ARM CONNECTION MUST ALLOW FOR ADJUSTMENT ABOUT THE HORIZONTAL AND VERTICAL AXIS.

## TYPICAL DETAIL OF SIGNAL HEAD AND SIGN MOUNTING
## SEE PROPOSED SIGNAL LAYOUT




## TYPICAL DETAIL LED COUNTDOWN PEDESTRIAN SIGNAL HEAD MODULE




NOTE:
OTHER UNITS OF DIFFERENT DESIGN/CONFIGURATION WHICH MEET THE SPECIFICATIONS AND ARE APPROVED BY THE ENGINEER WILL BE DEEMED ACCEPTABLE.

NOTE:
CLAM SHELL MOUNTING HARDWARE MAY BE USED, AS APPROVED BY THE ENGINEER.



STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER
05/19/2022

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(817) 820-0420

Texas Department of Transportation

# PEDESTRIAN SIGNAL DETAILS

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | |
| REVISIONS | STATE | DISTRICT | COUNTY | 98 |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |

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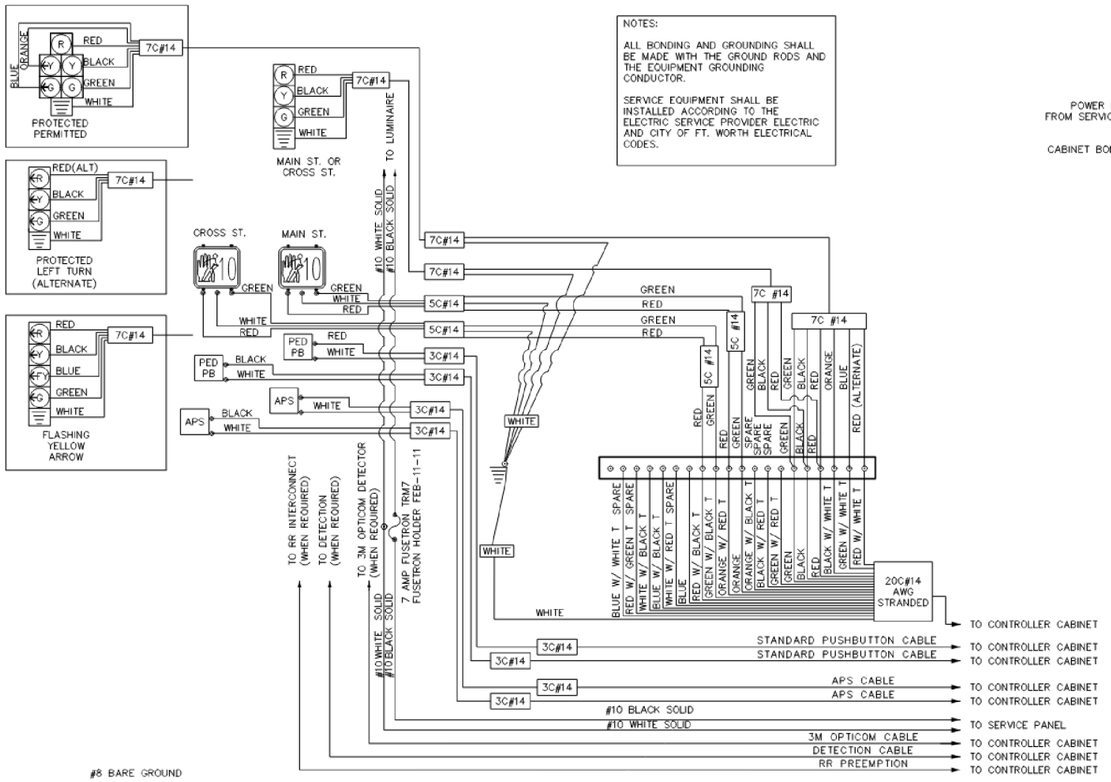
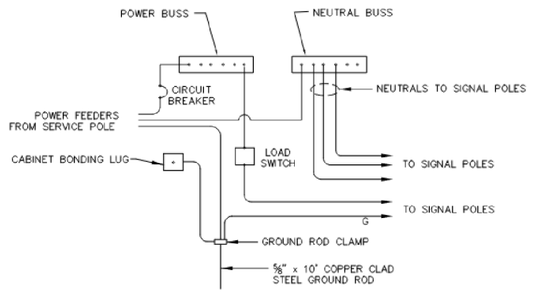



NOTES:

ALL BONDING AND GROUNDING SHALL BE MADE WITH THE GROUND RODS AND THE EQUIPMENT GROUNDING CONDUCTOR.

SERVICE EQUIPMENT SHALL BE INSTALLED ACCORDING TO THE ELECTRIC SERVICE PROVIDER ELECTRIC AND CITY OF FT. WORTH ELECTRICAL CODES.



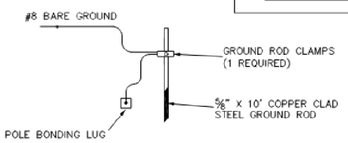

## CONNECTIONS AT SIGNAL CABINETS

POLE TO CABINET WIRING COLOR CHART
FOR 20 CONDUCTOR CABLE

| | |
|---|---|
| SIGNAL NEUTRAL | WHITE |
| MAIN ST. OR CROSS ST. – RED | RED |
| MAIN ST. OR CROSS ST. – YELLOW | BLACK |
| MAIN ST. OR CROSS ST. – GREEN | GREEN |
| MAIN ST. OR CROSS ST. – LEFT TURN RED | RED/WHITE |
| MAIN ST. OR CROSS ST. – LEFT TURN YELLOW ARROW | BLACK/WHITE |
| MAIN ST. OR CROSS ST. – LEFT TURN GREEN ARROW | GREEN/WHITE |
| DW – MAIN ST. | ORANGE/RED |
| W – MAIN ST. | ORANGE |
| DW – CROSS ST. | RED/BLACK |
| W – CROSS ST. | GREEN/BLACK |
| SPARE RED NEAR SIDE HEAD | RED/GREEN |
| SPARE YELLOW | BLACK/RED |
| SPARE GREEN | GREEN/RED |
| SPARE | ORANGE/BLACK |
| SPARE FLASHING YELLOW ARROW | BLUE/WHITE |

NOTE:

WRAP COLORED ELECTRICAL TAPE ON BOTH ENDS OF EACH 20 CONDUCTOR CABLE (AT CABINET AND AT SIGNAL POLE) AS FOLLOWS:
NORTH BOUND = GREEN,
SOUTH BOUND = RED,
WEST BOUND = BLUE, AND
EAST BOUND = YELLOW.




## CONNECTIONS AT POLE BASE

## TYPICAL POLE WIRING SCHEMATIC

NOTE:
1. ALL WIRING CABLES SHALL BE AS SHOWN UNLESS NOTED OTHERWISE IN THE DRAWINGS.
2. USE 2C#12 AWG FOR APS PUSH BUTTON FOR LARGER LENGTHS BETWEEN PUSH BUTTONS AND CONTROLLER TO MINIMIZE VOLTAGE DROP.

NO SPLICES ARE ALLOWED

FORT WORTH

CITY OF FORT WORTH, TEXAS

**TRAFFIC SIGNAL WIRING CONNECTION DETAILS**

REVISED: 03-07-2022

**34 41 10-D604**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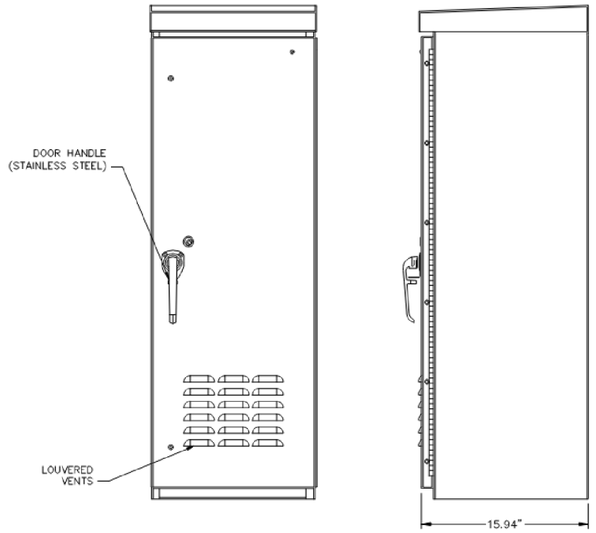
(817) 820-0420

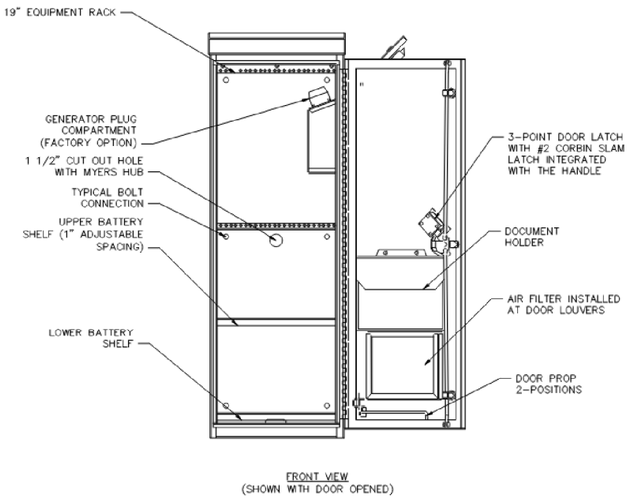

Texas Department of Transportation

# CFW TRAFFIC SIGNAL WIRING CONNECTION DETAILS

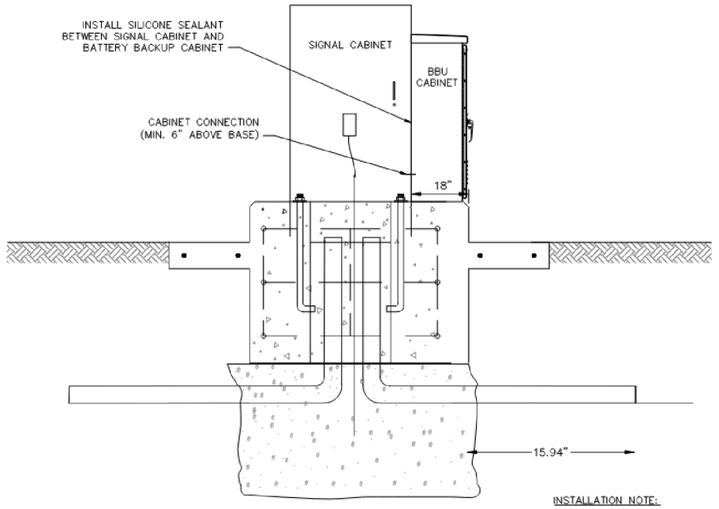
| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 99 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |




FRONT AND SIDE VIEW




FRONT VIEW
(SHOWN WITH DOOR OPENED)




CABINET MOUNTED TO TRAFFIC
SIGNAL CONTROLLER CABINET

NOTE:
INTERNAL BATTERY BACK UP SHALL BE ZINC 5 OR APPROVED EQUIVALENT. COORDINATE WITH CITY ON THE TYPE OF BATTERY BACK UP TO UTILIZE.

INSTALLATION NOTE:

1. MOUNTING HOLES MUST BE DRILLED ON SITE AND MOUNTED WITH 6 SETS OF 1/4"-20 18-8 STAINLESS STEEL HEX HEAD BOLTS AND NUTS ASSEMBLY (SUPPLIED WITH SYSTEM).
2. BOLT SPACING SHOWN IN FRONT VIEW SHOWS TYPICAL LOCATIONS. LOCATION OF BOLTS MAY VARY TO ACCOMMODATE CONFLICTS.
3. INSPECTOR MUST APPROVE MOUNTING PRIOR TO INSTALLATION TO ENSURE PEDESTRIAN PATHWAYS ARE NOT BLOCKED AND THE MINIMUM CLEARANCE FROM FACE OF CURB OR EDGE OF PAVEMENT IS MET.
4. REFER TO DETAIL D606 FOR CABINET FOUNDATION DETAILS.
5. INSTALL 3" HOLE SAW CUT WITH THREADED NIPPLE ON EACH SIDE FOR CONNECTION BETWEEN CABINETS. CONNECTION POITN SHALL BE A MINIMUM OF 6" ABOVE BOTTOM OF CABINET.

FORT WORTH

CITY OF FORT WORTH, TEXAS

**TRAFFIC SIGNAL**
**BATTERY BACK UP DETAIL**

DATE: 07-26-2021

**34 41 10-D620**



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(817) 820-0420

Texas Department of Transportation

# CFW TRAFFIC SIGNAL BATTERY BACK UP DETAIL

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 100 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |

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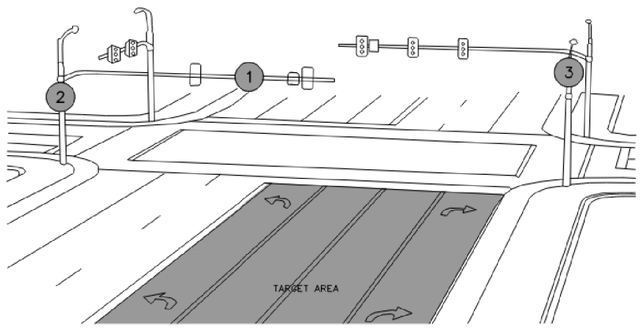
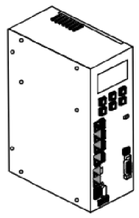
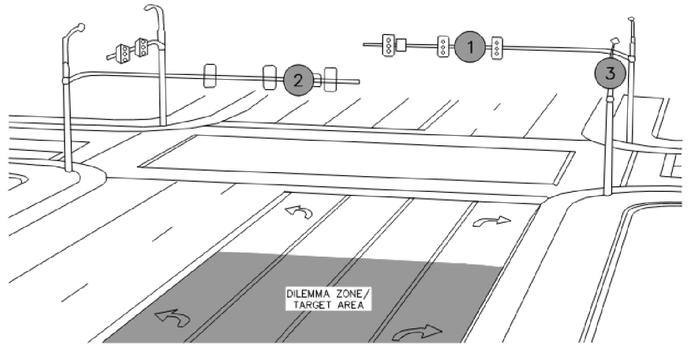



STOPBAR DETECTION MOUNTING

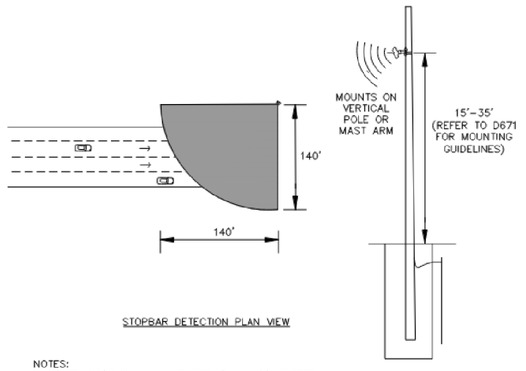
NOTE:
1. WHEN MOUNTING TO BACKSIDE OF MAST ARM, A MINIMUM 6' OFFSET IS RECOMMENDED FROM NEAREST LANE OF DETECTION.



WAVETRONIX CONTROL UNIT




ADVANCED DETECTION MOUNTING

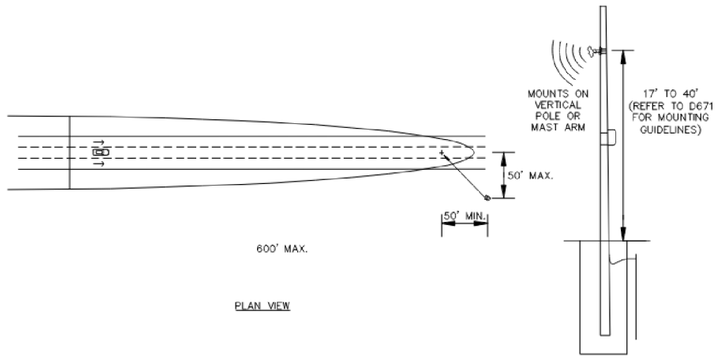



STOPBAR DETECTION PLAN VIEW

NOTES:
1. CONTRACTOR SHALL HAVE PREVIOUSLY COMPLETED INSTALLATION TRAINING PROVIDED BY THE RADAR DETECTION SYSTEM MANUFACTURER OR MAKE ARRANGEMENTS FOR THE MANUFACTURER TO INSTALL AND CALIBRATE THE SYSTEM.
2. ADVANCED DETECTION TO BE USED ON ROADWAYS WITH APPROACH SPEEDS OF 40 MPH OR GREATER.
3. A SELF MOUNT DETECTION CONTROL UNIT WITH SIX PORTS FOR ETHERNET CONNECTIVITY WILL BE REQUIRED.
4. THE DETECTION CONTROL UNIT WILL COMMUNICATE WITH CONTROLLERS VIA SDLC.

| ADVANCED DETECTION ZONE SETUP | | |
|---|---|---|
| SPEED LIMIT | ZONE BEGIN* | ZONE END* |
| 40 | 295' | 175' |
| 45 | 325' | 200' |
| 50 | 350' | 225' |
| 55 | 400' | 250' |
| 60 | 450' | 275' |
| 65 | 475' | 290' |

*ALL DISTANCES ARE FROM THE APPROACH STOP BAR




PLAN VIEW

FORT WORTH

CITY OF FORT WORTH, TEXAS
**TRAFFIC SIGNAL**
**RADAR DETECTION DETAILS**

DATE: 03-09-2022

**34 41 10-D670**

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Texas Department of Transportation

# CFW TRAFFIC SIGNAL RADAR DETECTION DETAILS

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 100A |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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DATE:
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## FOUNDATION DESIGN TABLE

| FDN TYPE | DRILLED SHAFT DIA | REINFORCING STEEL | | EMBEDDED DRILLED SHAFT LENGTH-ft ④, ⑤, ⑥ | | | ANCHOR BOLT DESIGN ① | | | | FOUNDATION DESIGN LOAD ② | | TYPICAL APPLICATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | VERT BARS | SPIRAL & PITCH | TEXAS CONE PENETROMETER N blows/ft | | | ANCHOR BOLT DIA | Fy (ksi) | BOLT CIR DIA | ANCHOR TYPE | MOMENT K-ft | SHEAR Kips | |
| | | | | 10 | 15 | 40 | | | | | | | |
| 24-A | 24" | 4- #5 | #2 at 12" | 5.7 | 5.3 | 4.5 | ¾" | 36 | 12 ¾" | 1 | 10 | 1 | Pedestal pole, pedestal mounted controller. |
| 30-A | 30" | 8- #9 | #3 at 6" | 11.3 | 10.3 | 8.0 | 1 ½" | 55 | 17" | 2 | 87 | 3 | Mast arm assembly. (see Selection Table) |
| 36-A | 36" | 10- #9 | #3 at 6" | 13.2 | 12.0 | 9.4 | 1 ¾" | 55 | 19" | 2 | 131 | 5 | Mast arm assembly. (see Selection Table) 30' strain pole with or without luminaire. |
| 36-B | 36" | 12- #9 | #3 at 6" | 15.2 | 13.6 | 10.4 | 2" | 55 | 21" | 2 | 190 | 7 | Mast arm assembly. (see Selection Table) Strain pole taller than 30' & strain pole with mast arm |
| 42-A | 42" | 14- #9 | #3 at 6" | 17.4 | 15.6 | 11.9 | 2 ¼" | 55 | 23" | 2 | 271 | 9 | Mast arm assembly. (see Selection Table) |

## NOTES:

① Anchor bolt design develops the foundation capacity given under Foundation Design Loads.

② Foundation Design Loads are the allowable moments and shears at the base of the structure.

③ Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.

④ Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

⑤ If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

⑥ Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

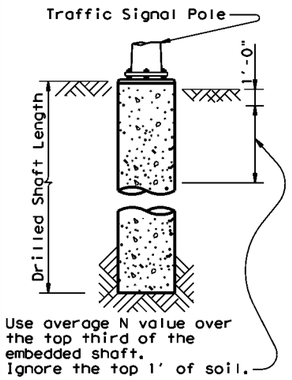
## FOUNDATION SUMMARY TABLE ③

| LOCATION IDENTIFICATION | AVG. N BLOW /ft. | FDN TYPE | NO. EA | DRILLED SHAFT LENGTH ⑥ (FEET) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 24-A | 30-A | 36-A | 36-B | 42-A |
| P-1 | 10 | 24-A | 1 | 6 | | | | |
| P-2 | 10 | 24-A | 1 | 6 | | | | |
| T-2 | 10 | 36-A | 1 | | | 13 | | |
| P-3 | 10 | 24-A | 1 | 6 | | | | |
| P-4 | 10 | 24-A | 1 | 6 | | | | |
| P-5 | 10 | 24-A | 1 | 6 | | | | |
| P-6 | 10 | 24-A | 1 | 6 | | | | |
| T-4 | 10 | 36-A | 1 | | | 13 | | |
| P-7 | 10 | 24-A | 1 | 6 | | | | |
| P-8 | 10 | 24-A | 1 | 6 | | | | |
| P-9 | 10 | 24-A | 1 | 6 | | | | |
| P-10 | 10 | 24-A | 1 | 6 | | | | |
| P-11 | SEE RID(2)-20 FOR ILLUMINATION FOUNDATION DETAIL | | | | | | | |
| TOTAL DRILLED SHAFT LENGTHS | | | | 60* | | 26 | | |

* PED POLE FOUNDATION IS SUBSIDIARY TO ITEM 687.

## FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM PLUS ILSN SUPPORT ASSEMBLIES (ft)

| | | FDN 30-A | FDN 36-A | FDN 36-B | FDN 42-A |
|---|---|---|---|---|---|
| 80 MPH DESIGN WIND SPEED | MAX SINGLE ARM LENGTH | 32' | 48' | | |
| | MAXIMUM DOUBLE ARM LENGTH COMBINATIONS | 24' X 24' | | | |
| | | 28' X 28' | | | |
| | | 32' X 28' | 32' X 32' | | |
| | | | 36' X 36' | | |
| | | | 40' X 36' | | |
| | | | 44' X 28' | 44' X 36' | |
| 100 MPH DESIGN WIND SPEED | MAX SINGLE ARM LENGTH | | 36' | 44' | |
| | MAXIMUM DOUBLE ARM LENGTH COMBINATIONS | | 24' X 24' | | |
| | | | 28' X 28' | | |
| | | | 32' X 24' | 32' X 32' | |
| | | | | 36' X 36' | |
| | | | | 40' x24' | 40' X 36' |
| | | | | | 44' x 36' |



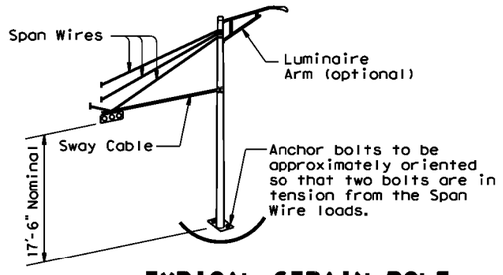

Use average N value over the top third of the embedded shaft. Ignore the top 1' of soil.

## ANCHOR BOLT & TEMPLATE SIZES

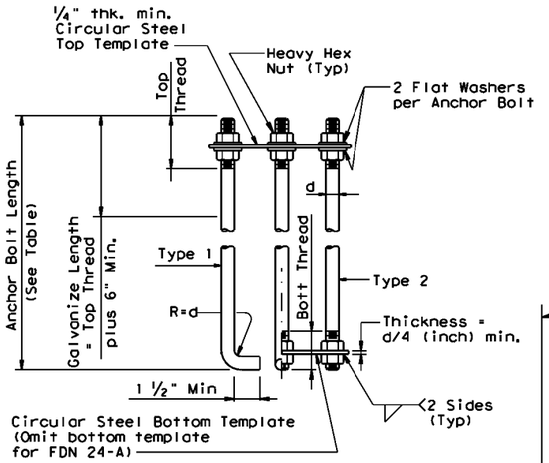
| BOLT DIA IN. | ⑦ BOLT LENGTH | TOP THREAD | BOTTOM THREAD | BOLT CIRCLE | R2 | R1 |
|---|---|---|---|---|---|---|
| ¾" | 1'-6" | 3" | — | 12 ¾" | 7 ⅛" | 5 ⅝" |
| 1 ½" | 3'-4" | 6" | 4" | 17" | 10" | 7" |
| 1 ¾" | 3'-10" | 7" | 4 ½" | 19" | 11 ¼" | 7 ¾" |
| 2" | 4'-3" | 8" | 5" | 21" | 12 ½" | 8 ½" |
| 2 ¼" | 4'-9" | 9" | 5 ½" | 23" | 13 ¾" | 9 ¼" |

⑦ Min dimensions given, longer bolts are acceptable.

EXAMPLE:
1. For 80mph design wind speed, foundation 30-A can support up to a 32' arm with another arm up to 28'
2. For 100mph design wind speed, foundation 36-A can support a single 36' mast arm.



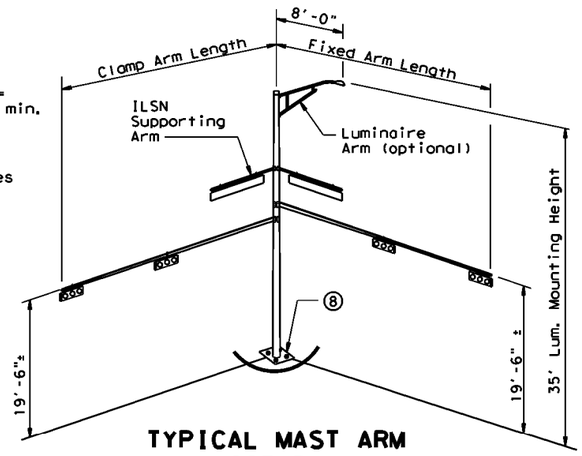

### TYPICAL STRAIN POLE ASSEMBLY



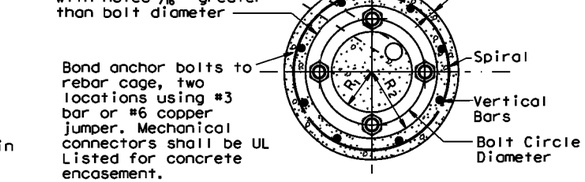

HOOKED ANCHOR (TYPE 1) NUT ANCHOR (TYPE 2)

### ANCHOR BOLT ASSEMBLY

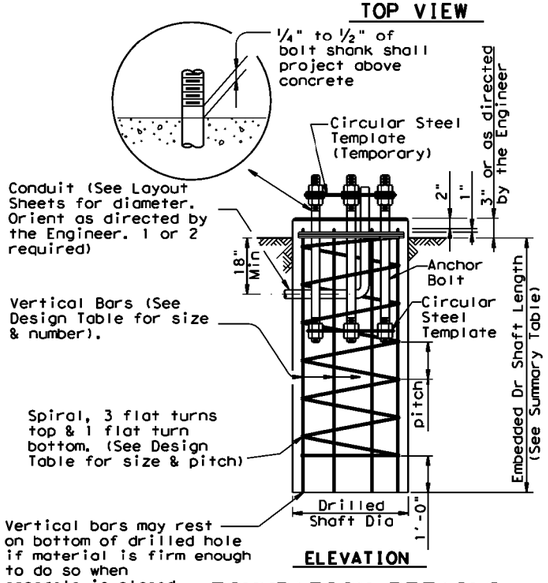
⑧ Orient anchor bolts orthogonal with the fixed arm direction to ensure that two bolts are in tension under dead load.




### TYPICAL MAST ARM ASSEMBLY




TOP VIEW




ELEVATION

### FOUNDATION DETAILS

## GENERAL NOTES:

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

Reinforcing steel shall conform to Item 440, "Reinforcing Steel".

Concrete shall be Class "C".

Threads for anchor bolts and nuts shall be rolled or cut threads of 8UN series up to 2" in diameter or UNC series for all sizes. Bolts and nuts shall have Class 2A and 2B fit tolerances. Galvanized nuts shall be tapped after galvanizing.

Anchor bolts that are larger than 1" in diameter shall conform to "alloy steel" or "medium-strength mild steel" per Item 449, "Anchor Bolts". Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Galvanize a minimum of the top end thread length plus 6" for all anchor bolts unless otherwise noted. Exposed washers and exposed nuts shall be galvanized. All galvanizing shall be in accordance with Item 445, "Galvanizing".

Templates and embedded nuts need not be galvanized. Lubricate and tighten anchor bolts when erecting the structure in accordance with Item 449, "Anchor Bolts".

STATE OF TEXAS
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121726
LICENSED PROFESSIONAL ENGINEER
05/19/2022

Texas Department of Transportation
Traffic Operations Division

# TRAFFIC SIGNAL POLE FOUNDATION

# TS-FD-12



| REVISIONS | DN: MS | CK: JSY | DW: MAO/MMF | CK: JSY/TEB |
|---|---|---|---|---|
| 5-95 11-98 1-12 | CONT | SECT | JOB | HIGHWAY |
| | 0902 | 90 | 119 | McCART |
| | DIST | COUNTY | | SHEET NO. |
| | FTW | TARRANT | | 101 |

DATE:
FILE:

## GENERAL NOTES FOR ALL ELECTRICAL WORK

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

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

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

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

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

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

## CONDUIT

A. MATERIALS

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

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

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

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

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

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

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

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

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

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

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

B. CONSTRUCTION METHODS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

# ELECTRICAL DETAILS CONDUITS & NOTES

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## ELECTRICAL CONDUCTORS

### A. MATERIAL INFORMATION

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

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

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

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

### B. CONSTRUCTION METHODS

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

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

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

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

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

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

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

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

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

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

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

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

### C. TEMPORARY WIRING

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

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

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

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

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

## GROUND RODS & GROUNDING ELECTRODES

### A. MATERIAL INFORMATION

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

### B. CONSTRUCTION METHODS

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

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

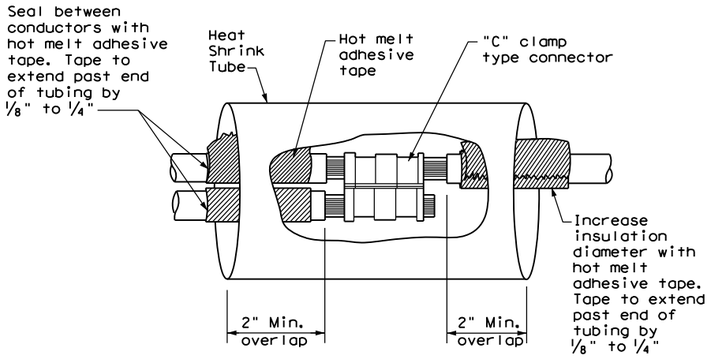
3. Install ground rods so the imprinted part number is at the upper end of the rod.

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

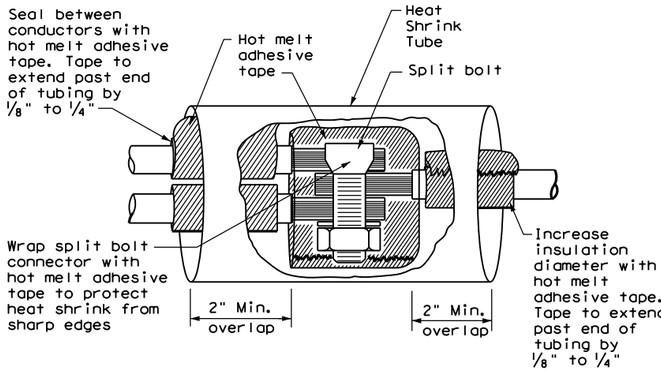
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

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

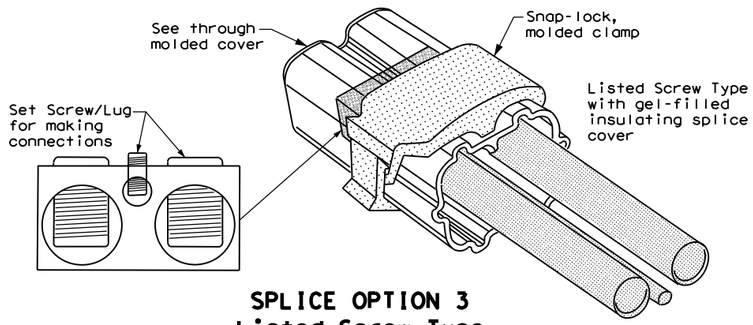
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.




**SPLICE OPTION 1**
**Compression Type**




**SPLICE OPTION 2**
**Split Bolt Type**




**SPLICE OPTION 3**
**Listed Screw Type**

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Traffic Operations Division Standard

# ELECTRICAL DETAILS CONDUCTORS

## ED(3)-14

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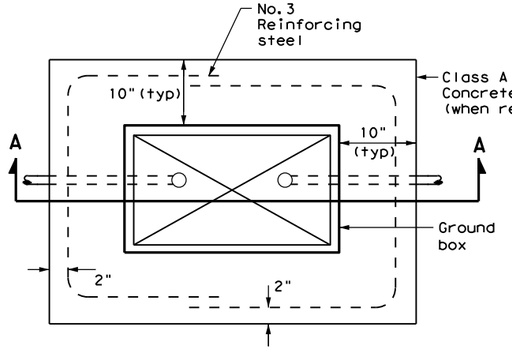
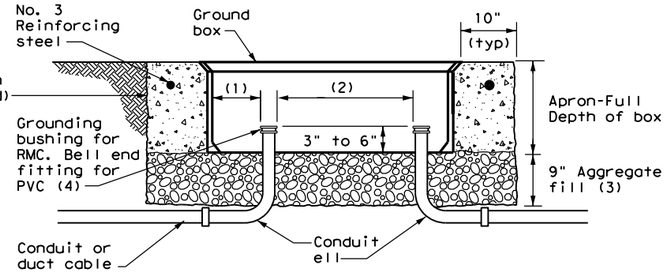



PLAN VIEW




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.

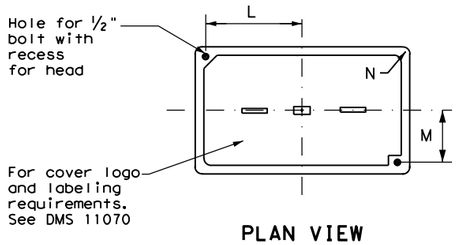
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

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

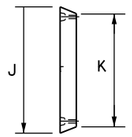
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

| 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

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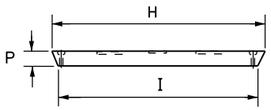


SIDE

GROUND BOX COVER

## GROUND BOXES

A. MATERIALS

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

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

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

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

B. CONSTRUCTION METHODS

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

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

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

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

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

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

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

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

# ELECTRICAL DETAILS
# GROUND BOXES

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## ELECTRICAL SERVICES NOTES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## SERVICE ASSEMBLY ENCLOSURE

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

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

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

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

## MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

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

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

## PHOTOELECTRIC CONTROL

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

## *ELECTRICAL SERVICE DATA

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

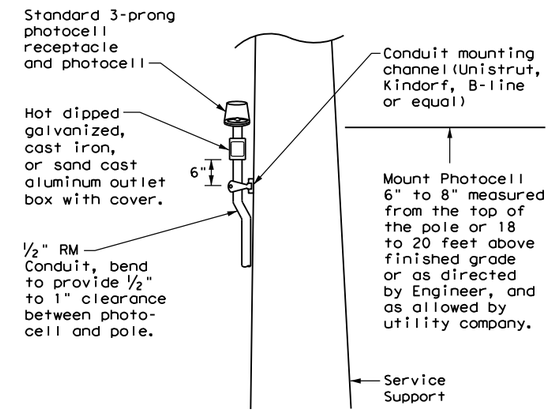
* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

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

## EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

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

- Schematic Type
- Service Voltage V / V
- Disconnect Amp Rating
  000 indicates main lug only/
  Typically Type T
- (SS)= Safety Switch Ahead of Meter-Check with Utility
- (NS)= No safety Switch Ahead of Meter-Check with Utility
- Enclosure Type
  - GS= Galvanized steel("off the shelf")
  - SS= Stainless steel(Custom Enclosure)See MPL
  - AL= Aluminum (Custom Enclosure)See MPL
- Photocell Mounting Location
  - (E)= Inside Service/Enclosure Mounted
  - (T)= Top of pole
  - (L)= Luminaire mounted
  - (N)= None/No Photocell or Lighting Contactor Required
- Service Support Type
  - GC= Granite concrete
  - OC= Other concrete
  - TP= Timber pole
  - SP= Steel pole
  - SF= Steel frame
  - OT= Pole by others or paid for separately
  - EX= Existing pole
  - TS= Service on traffic signal pole
  - PS= Pedestal Service
- O= Overhead Service Feed from Utility
- U= Underground Service Feed from Utility




## TOP MOUNTED PHOTOCELL

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

Texas Department of Transportation

Traffic Operations Division Standard

# ELECTRICAL DETAILS SERVICE NOTES & DATA

# ED(5)-14

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| ©TxDOT October 2014 | CONT | SECT | JOB | HIGHWAY |
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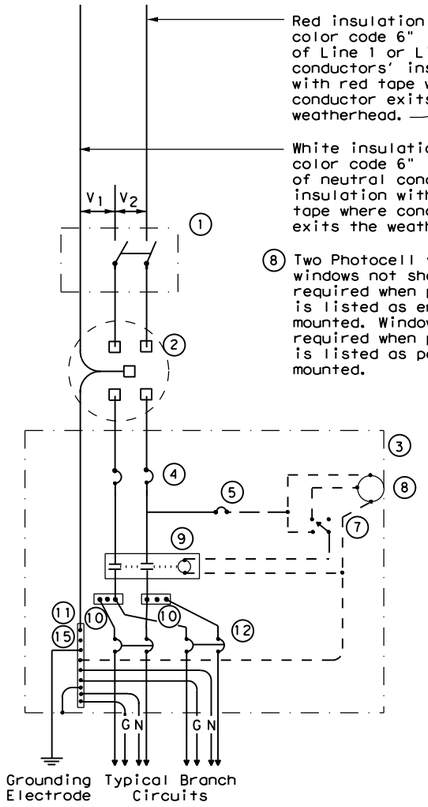
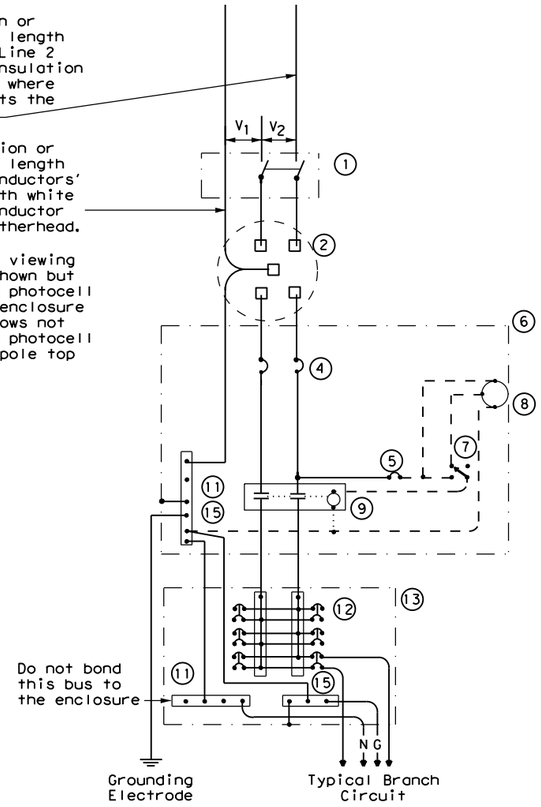
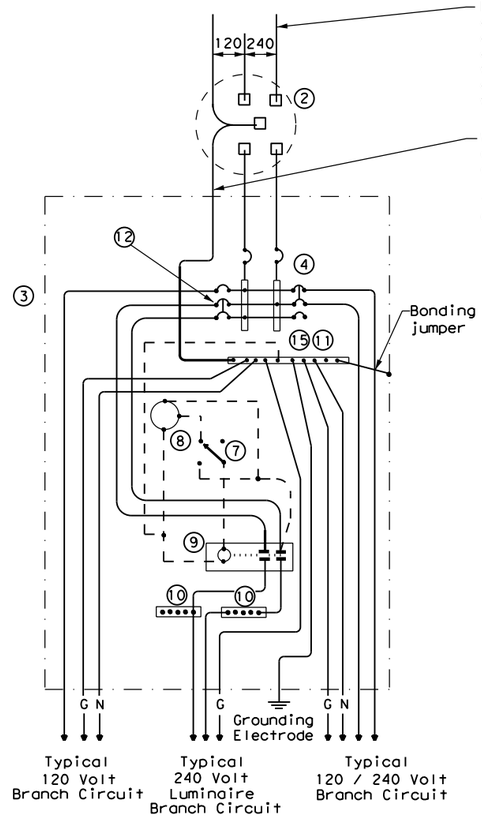


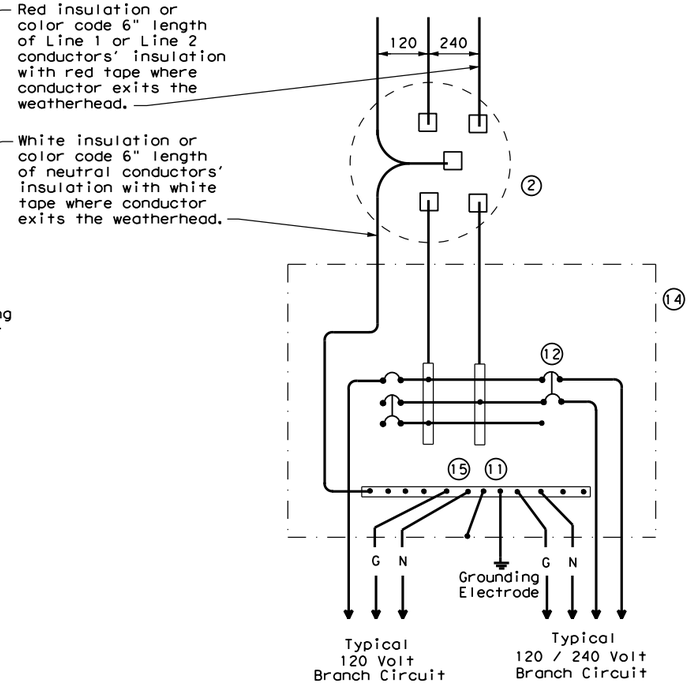

## SCHEMATIC TYPE A
## THREE WIRE




## SCHEMATIC TYPE C
## THREE WIRE




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




## SCHEMATIC TYPE T
## 120/240 VOLTS - THREE WIRE

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

# ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

# ED(6)-14

| FILE: ed6-14.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
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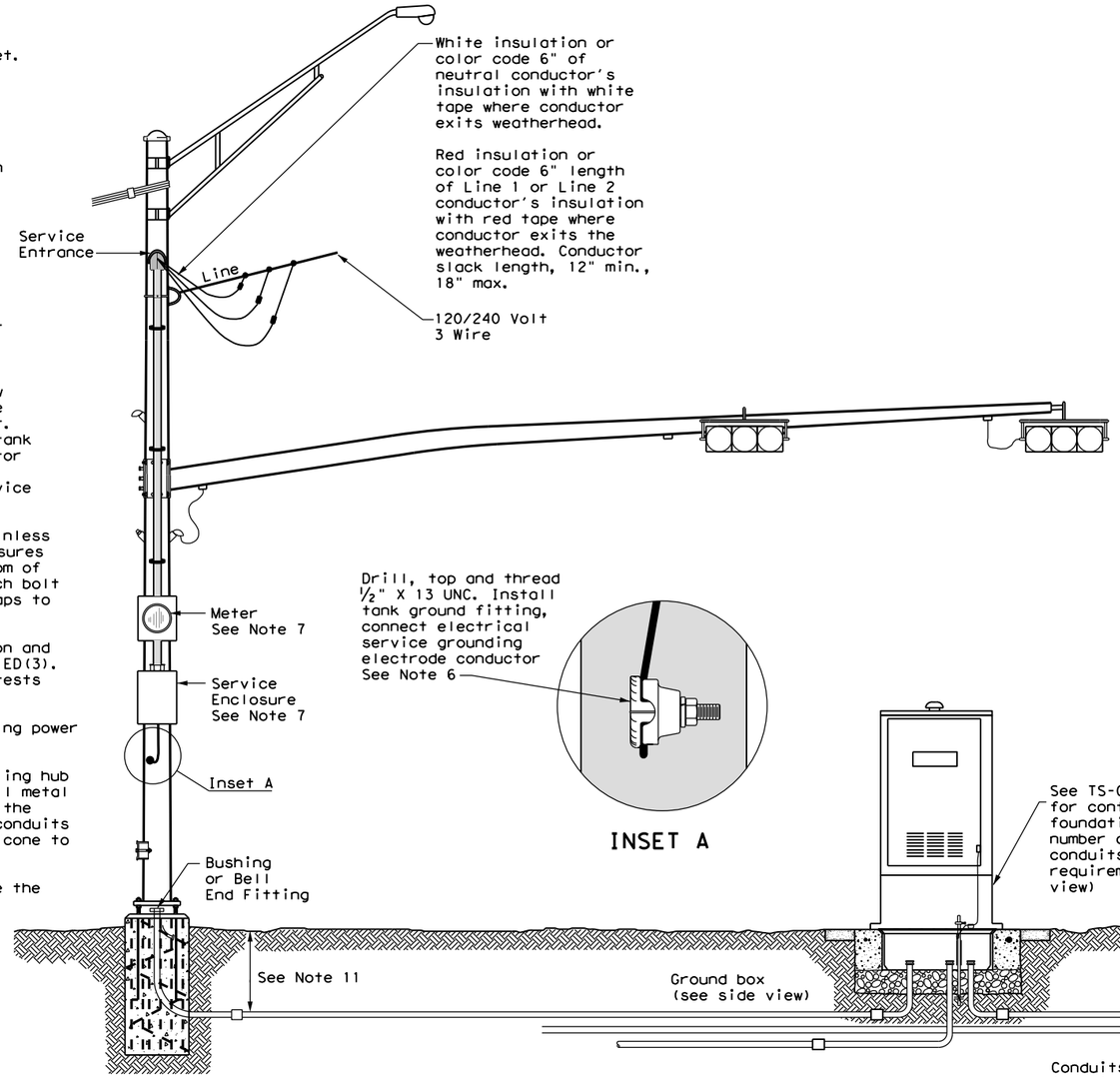
## TRAFFIC SIGNAL NOTES

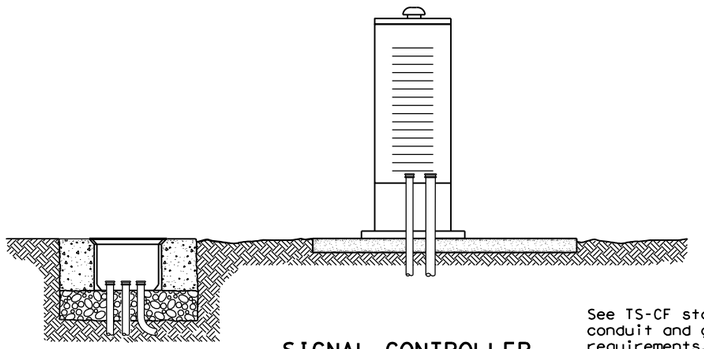
1. Do not pass luminaire conductors through the signal controller cabinet.
2. Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
3. Provide roadway luminaires, when required, in accordance with the material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




SIGNAL POLE WITH SERVICE

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

INSET A



SIGNAL CONTROLLER SIDE VIEW

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




SIGNAL CONTROLLER FRONT VIEW




SIGNAL POLE

Texas Department of Transportation

Traffic Operations Division Standard

# ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS

# ED(8)-14

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| | DIST | COUNTY | | SHEET NO. |
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## PEDESTAL SERVICE NOTES

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

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

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

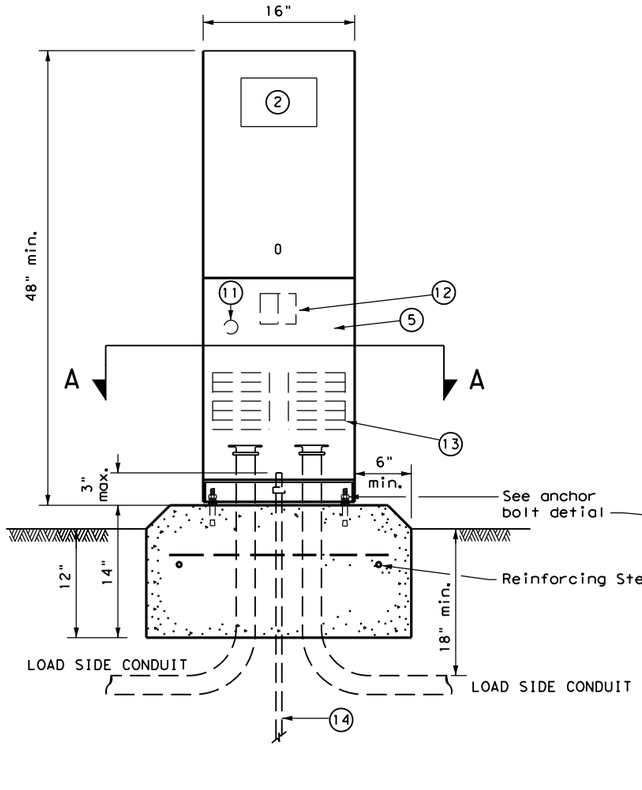
4. Provide #4 reinforcing steel for foundations in accordance with Item 440, "Reinforcement for Concrete."

5. Install ½ in. X 2 ⅛ in. minimum length concrete single expansion type anchors for mounting pedestal enclosure to foundation. Anchor location to match mounting holes in each corner of enclosure. Secure each of the four corners of the pedestal enclosure to the anchors in the foundation with a ½ in. galvanized or stainless steel machine thread bolt, a properly sized locknut and a flat washer.

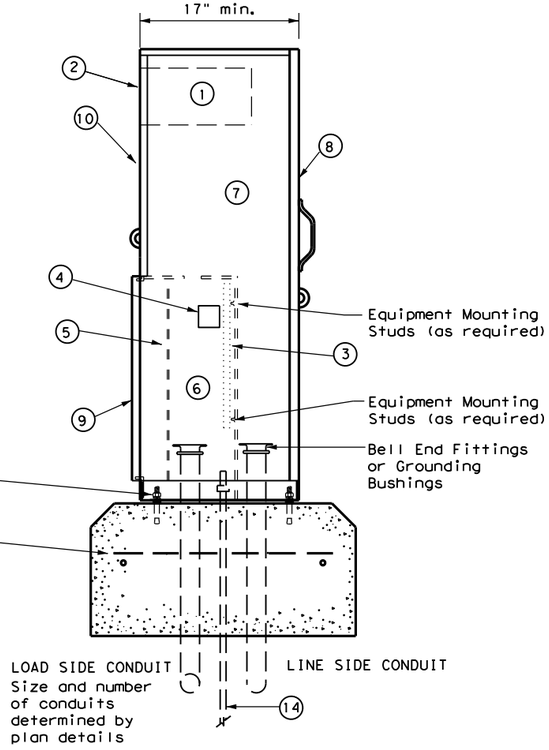
6. Finish top of concrete foundation in a neat and workmanlike manner. If leveling washers are used, ensure no more than ⅛ in. gap at any corner. Do not exceed a maximum dip or rise in the foundation of ⅛ in. per foot. When properly installed, ensure the top of the service enclosure is level front to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

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

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

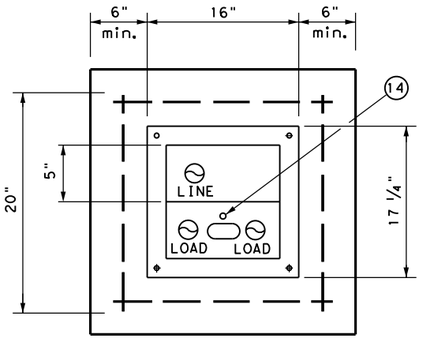



FRONT VIEW

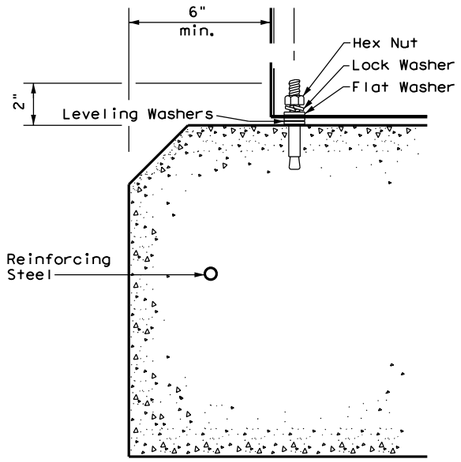



SIDE VIEW

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




SECTION A-A




ANCHOR BOLT DETAIL

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

Texas Department of Transportation

Traffic Operations Division Standard

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

# ED(9)-14

| | | | | | | | |
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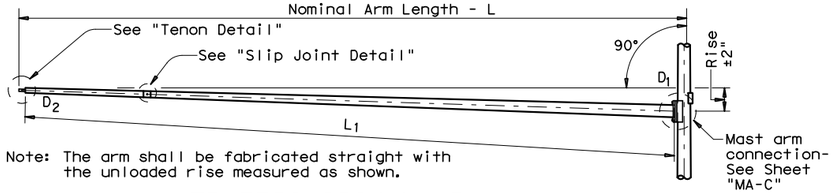
| Arm Length | ROUND POLES | | | | | POLYGONAL POLES | | | | | Foundation Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_B$ | $D_{19}$ | $D_{24}$ | $D_{30}$ | ① thk | $D_B$ | $D_{19}$ | $D_{24}$ | $D_{30}$ | ① thk | |
| ft. | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. | |
| 20 | 10.5 | 7.8 | 7.1 | 6.3 | .179 | 11.5 | 8.5 | 7.7 | 6.8 | .179 | 30-A |
| 24 | 11.0 | 8.3 | 7.6 | 6.8 | .179 | 12.0 | 9.0 | 8.2 | 7.3 | .179 | 30-A |
| 28 | 11.5 | 8.8 | 8.1 | 7.3 | .179 | 12.5 | 9.5 | 8.7 | 7.8 | .179 | 30-A |
| 32 | 12.5 | 9.8 | 9.1 | 8.3 | .179 | 12.0 | 9.0 | 8.2 | 7.3 | .239 | 30-A |
| 36 | 12.0 | 9.3 | 8.6 | 7.8 | .239 | 12.5 | 9.5 | 8.7 | 7.8 | .239 | 36-A |
| 40 | 12.0 | 9.3 | 8.6 | 7.8 | .239 | 13.5 | 10.5 | 9.7 | 8.8 | .239 | 36-A |
| 44 | 12.5 | 9.8 | 9.1 | 8.3 | .239 | 14.0 | 11.0 | 10.2 | 9.3 | .239 | 36-A |
| 48 | 13.0 | 10.3 | 9.6 | 8.8 | .239 | 15.0 | 12.0 | 11.2 | 10.3 | .239 | 36-A |

| Arm Length | ROUND ARMS | | | | | POLYGONAL ARMS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $L_1$ | $D_1$ | $D_2$ | ① thk | Rise | $L_1$ | $D_1$ | ② $D_2$ | ① thk | Rise |
| ft. | ft. | in. | in. | in. | | ft. | in. | in. | in. | |
| 20 | 19.1 | 6.5 | 3.8 | .179 | 1'-9" | 19.1 | 7.0 | 3.5 | .179 | 1'-8" |
| 24 | 23.1 | 7.5 | 4.3 | .179 | 1'-10" | 23.1 | 7.5 | 3.5 | .179 | 1'-9" |
| 28 | 27.1 | 8.0 | 4.2 | .179 | 1'-11" | 27.1 | 8.0 | 3.5 | .179 | 1'-10" |
| 32 | 31.0 | 9.0 | 4.7 | .179 | 2'-1" | 31.0 | 9.0 | 3.5 | .179 | 2'-0" |
| 36 | 35.0 | 9.5 | 4.6 | .179 | 2'-4" | 35.0 | 10.0 | 3.5 | .179 | 2'-1" |
| 40 | 39.0 | 9.5 | 4.1 | .239 | 2'-8" | 39.0 | 9.5 | 3.5 | .239 | 2'-3" |
| 44 | 43.0 | 10.0 | 4.1 | .239 | 2'-11" | 43.0 | 10.0 | 3.5 | .239 | 2'-6" |
| 48 | 47.0 | 10.5 | 4.1 | .239 | 3'-4" | 47.0 | 11.0 | 3.5 | .239 | 2'-9" |

$D_B$ = Pole Base O.D.
$D_{19}$ = Pole Top O.D. with no Luminaire and no ILSN
$D_{24}$ = Pole Top O.D. with ILSN w/out Luminaire
$D_{30}$ = Pole Top O.D. with Luminaire
$D_1$ = Arm Base O.D.
$D_2$ = Arm End O.D.
$L_1$ = Shaft Length
$L$ = Nominal Arm Length

① Thickness shown are minimums, thicker materials may be used.

② $D_2$ may be increased by up to 1" for polygonal arms.




Note: The arm shall be fabricated straight with the unloaded rise measured as shown.

## TRAFFIC SIGNAL ARM

(Fixed Mount)

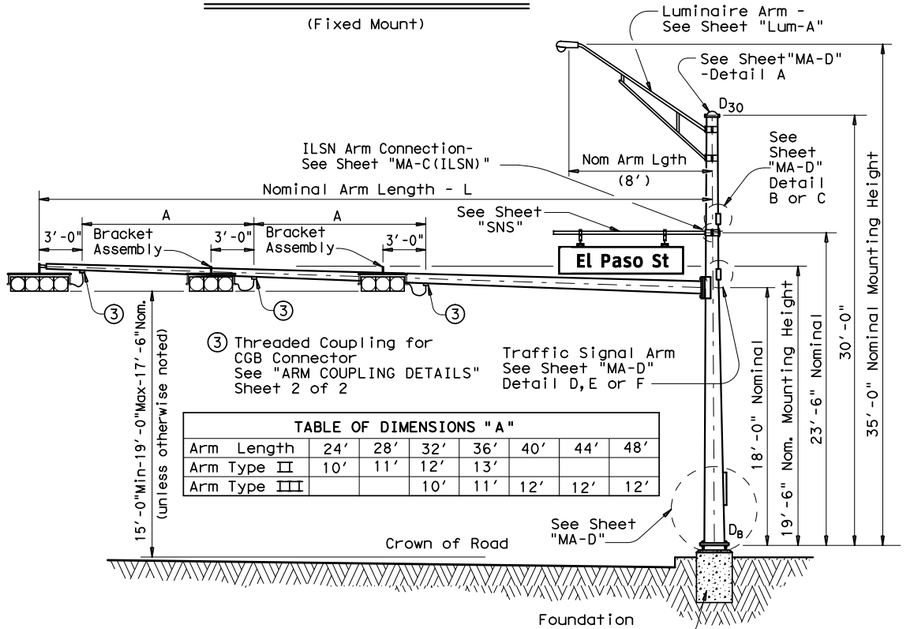



TABLE OF DIMENSIONS "A"

| Arm Length | 24' | 28' | 32' | 36' | 40' | 44' | 48' |
|---|---|---|---|---|---|---|---|
| Arm Type II | 10' | 11' | 12' | 13' | | | |
| Arm Type III | | | 10' | 11' | 12' | 12' | 12' |

## STRUCTURE ASSEMBLY

## SHIPPING PARTS LIST

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed-arm connection bolts and washers and any additional hardware listed in the table.

| Nominal Arm Length | 30' Poles With Luminaire | | 24' Poles With ILSN | | 19' Poles With No Luminaire and No ILSN | |
|---|---|---|---|---|---|---|
| | Above hardware plus: One (or two if ILSN attached) small hand hole, clamp-on simplex | | Above hardware plus one small hand hole | | See note above | |
| ft | Designation | Quantity | Designation | Quantity | Designation | Quantity |
| 20 | 20L-80 | | 20S-80 | | 20-80 | |
| 24 | 24L-80 | | 24S-80 | | 24-80 | |
| 28 | 28L-80 | | 28S-80 | | 28-80 | |
| 32 | 32L-80 | | 32S-80 | | 32-80 | |
| 36 | 36L-80 | 1 | 36S-80 | | 36-80 | |
| 40 | 40L-80 | 1 | 40S-80 | | 40-80 | |
| 44 | 44L-80 | | 44S-80 | | 44-80 | |
| 48 | 48L-80 | | 48S-80 | | 48-80 | |

Traffic Signal Arms (1 per Pole) Ship each arm with the listed equipment attached

| Nominal Arm Length | Type I Arm (1 Signal) | | Type II Arm (2 Signals) | | Type III Arm (3 Signals) | |
|---|---|---|---|---|---|---|
| | 1 CGB connector | | 1 Bracket Assembly and 2 CGB Connectors | | 2 Bracket Assemblies and 3 CGB Connectors | |
| ft | Designation | Quantity | Designation | Quantity | Designation | Quantity |
| 20 | 20I-80 | | | | | |
| 24 | 24I-80 | | 24II-80 | | | |
| 28 | 28I-80 | | 28II-80 | | | |
| 32 | | | 32II-80 | | 32III-80 | |
| 36 | | | 36II-80 | 1 | 36III-80 | |
| 40 | | | | | 40III-80 | 1 |
| 44 | | | | | 44III-80 | |
| 48 | | | | | 48III-80 | |

Luminaire Arms (1 per 30' pole)

| Nominal Arm Length | Quantity |
|---|---|
| 8' Arm | 2 |
| | |

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

| Nominal Arm Length | Quantity |
|---|---|
| 7' Arm | |
| 9' Arm | |
| | |

Anchor Bolt Assemblies (1 per pole)

| Anchor Bolt Diameter | Anchor Bolt Length | Quantity |
|---|---|---|
| 1 ½" | 3'-4" | |
| 1 ¾" | 3'-10" | 2 |
| | | |

Each anchor bolt assembly consists of the following: Top and Bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers, and 4 nut anchor devices (Type 2) per Standard Drawing "TS-FD".

Templates may be removed for shipment.

SHEET 1 OF 2

STATE OF TEXAS
ZEGEYE Z. KEBEDE
121726
LICENSED PROFESSIONAL ENGINEER
05/19/2022

Texas Department of Transportation
Traffic Operations Division

# TRAFFIC SIGNAL SUPPORT STRUCTURES

## SINGLE MAST ARM ASSEMBLY

## (80 MPH WIND ZONE)

## SMA-80(1)-12



| DN: MS | CK: JSY | DW: MMF | CK: JSY |
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| FTW | TARRANT | | 109 |

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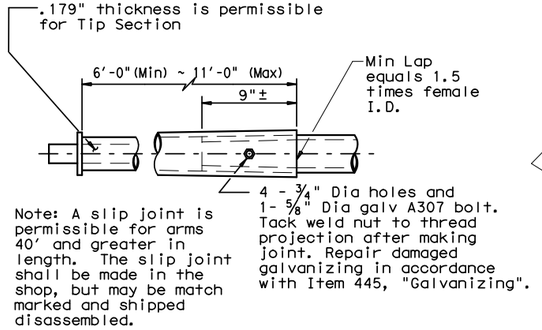
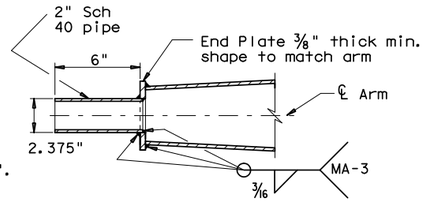


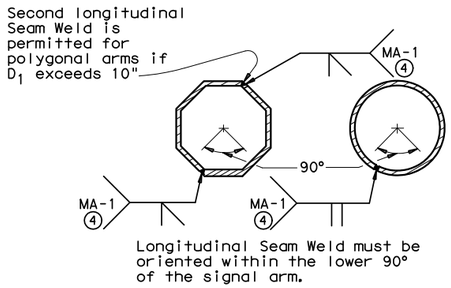

## SLIP JOINT DETAIL




## TENON DETAIL

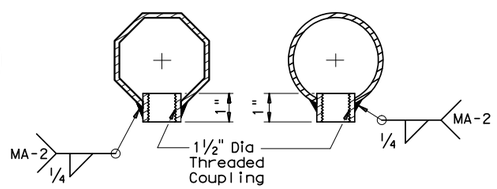
Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

## BRACKET ASSEMBLY




## ARM WELD DETAIL

④ 60% Min. penetration
100% pemetration within 6" of circumferential base welds.




## ARM COUPLING DETAILS

## VIBRATION WARNING

Mast Arms of SMA and DMA structures and clamp-on Arms of LMA structures of approximately 40 ft or longer are subject to harmonic vertical vibrations in light wind conditions due to the aeroelastic characteristics of a few of the myriads of possible combinations of the following: signal numbers, weights and positions; existence/solidity of backplates; presence of additional attachments to the arm, such as signs and cameras; arm-wind orientation; and arm-pole stiffness.

Such vibrations may cause fatigue damage to the structure and may lead to galloping in moderate wind conditions which may further damage the structure and alarm the public. Tests have indicated that when wind is blowing toward the back side of signal heads having un-vented backplates attached the probability of unacceptable harmonic vibration and/or galloping is rather high.

If backplates are not required for improved visibility they should not be applied to the signal heads or, if they must be applied, they should be vented as a first and inexpensive measure to mitigate vibrations.

The traffic signal mast arms shall be visually inspected in 5 to 20 mph wind conditions after installation of signal heads and any attachments, including any required backpates. If vertical movements with a total excursion (maximum upward excursion to maximum downward excursion) of more than approximately 8" are observed at the arm tip, a damping plate shall be fitted to the arm. See "Damping Plate Mounting Details" on standard sheet, MA-DPD-10.

This visual inspection shall be repeated after each modification of the structure that could affect its aeroelastic response. Excessive vibrations shall not be allowed to continue for more than two days.

## GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor.

Poles are designed to support one 8'-0" luminaire arm, one 9'-0" internally lighted street name sign and one traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 60 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.6 sq ft. The specified internally lighted street name sign load applied 4.5 ft from the centerline of the pole equals 85 lbs vertical dead load plus horizontal wind load on an effective projected area of 11.5 sq ft. The specified signal load applied at the end of the traffic signal arm equals 180 lbs vertical dead load plus the horizontal wind load on an effective projected area of 32.4 sq ft (actual area times drag coefficient).

See Standard Sheet "MA-D" for pole details, "MA-C" for traffic signal arm connection details, "MA-C (ILSN)" for internally lighted street name sign arm connection details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details. See "MA-C" for material specifications.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing", after fabrication.

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.



Texas Department of Transportation
Traffic Operations Division

# TRAFFIC SIGNAL SUPPORT STRUCTURES

## SINGLE MAST ARM ASSEMBLY

## (80 MPH WIND ZONE)

## SMA-80(2)-12



| DN: MS | CK: JSY | DW: MMF | CK: JSY |
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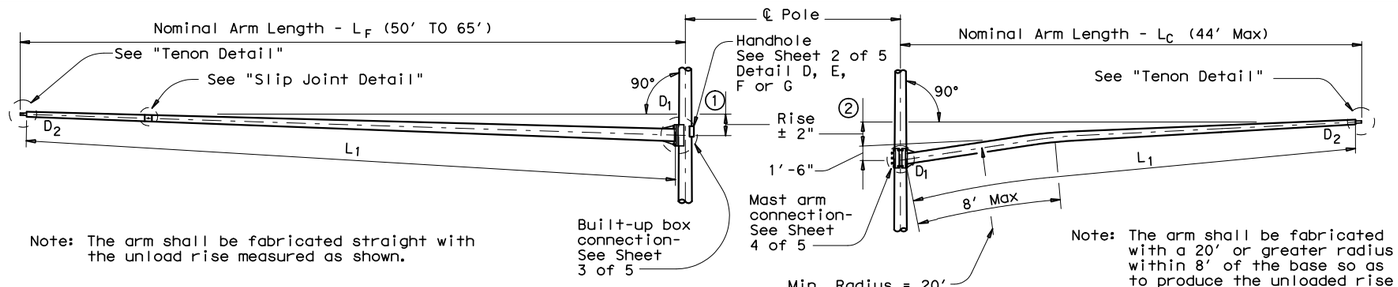



Note: The arm shall be fabricated straight with the unload rise measured as shown.

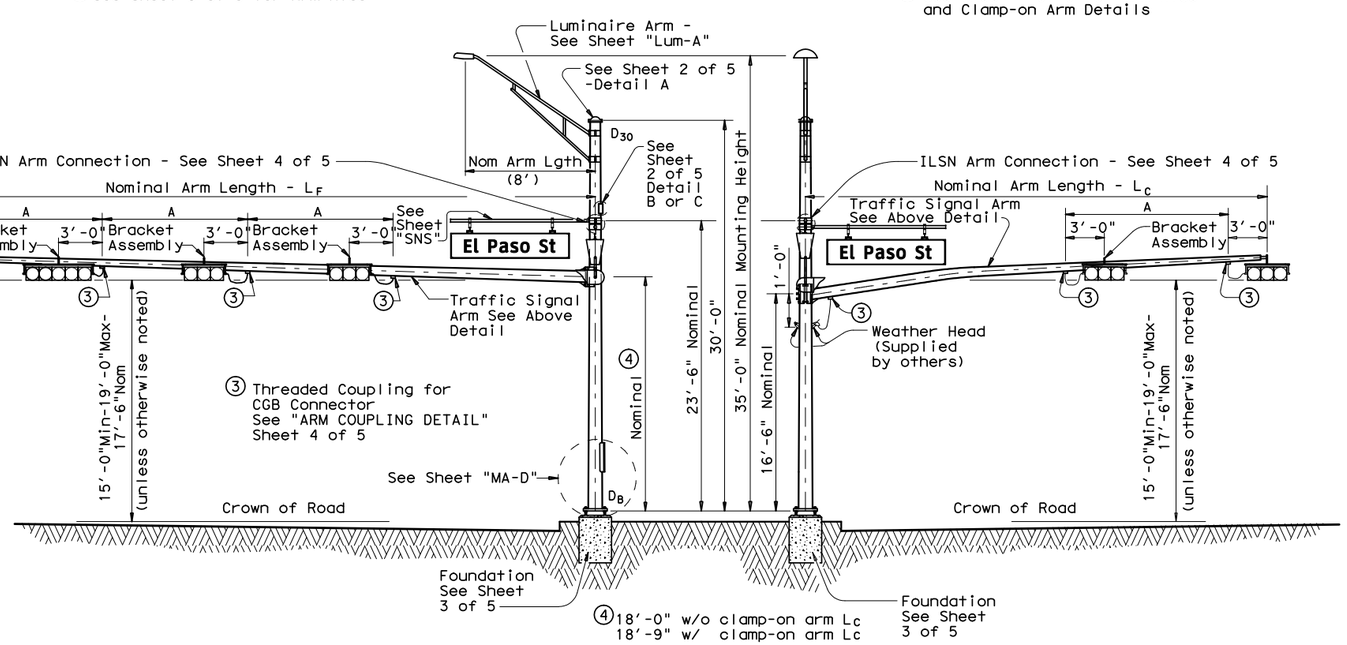
Note: The arm shall be fabricated with a 20' or greater radius within 8' of the base so as to produce the unloaded rise measured as shown.

## FIXED MOUNT TRAFFIC SIGNAL ARM

① See Sheet 3 of 5 for Arm Rise

## CLAMP-ON TRAFFIC SIGNAL ARM (IF REQUIRED)

② See Sheet 4 of 5 for Arm Rise and Clamp-on Arm Details




## ELEVATION

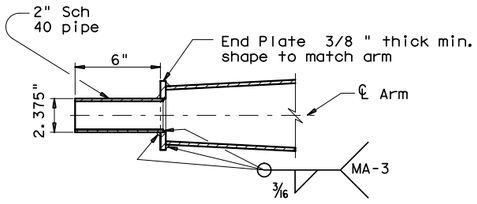
(Showing fixed mount arm)

## STRUCTURE ASSEMBLY

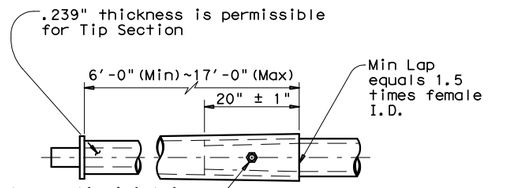
## ELEVATION

(Showing clamp-on arm)

| TABLE OF DIMENSIONS "A" | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Arm Length | 24' | 28' | 32' | 36' | 40' | 44' | 50' | 55' | 60' | 65' |
| Arm Type II | 10' | 11' | 12' | 13' | | | | | | |
| Arm Type III | | | 10' | 11' | 12' | 12' | | | | |
| Arm Type IV | | | | | | | 12' | 12' | 12' | 12' |




## TENON DETAIL




Note: A slip joint is permissible for arms 50' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

## SLIP JOINT DETAIL(FIXED MOUNT ARM)

## GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed can be either 100 mph or 80 mph plus a 1.3 gust factor. If clamp-on traffic signal is required, designs are based on an arm included angle of 90 degrees or more. Angles of less than approximately 75 degrees will require a special design.

Poles are designed to support one 8'-0" luminaire arm, two 9'-0" internally lighted street name (ILSN) signs and two traffic signal arms with limited length combinations.

Each arm with its related attachment is shown below

| Arm | Equivalent DL ⑤ | WL EPA ⑤⑥ |
|---|---|---|
| 8' Luminaire Arm | Luminaire 60 lbs | 1.6 sq ft |
| 9' ILSN Arm | Sign 85 lbs | 11.5 sq ft |
| 50' to 65' Fixed Mount Arm | Signal Loads 310 lbs | 52 sq ft |
| Up to 44' Clamp-on Arm | Signal Loads 180 lbs | 32.4 sq ft |

⑤ Equivalent dead load plus horizontal wind load applied at the end of arm except ILSN arm, which applied 4.5' from the centerline of the pole.

⑥ Effective projected area (actual area times drag coefficient) for the application of horizontal wind load.

Except as noted in Sheet 1 thru 5 of 5, other details not covered shall refer to Standard Sheet "MA-D" for pole details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Material, fabrication tolerances, and shipping practices shall also meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing" after fabrication.

Deviations from the details and dimensions shown herein require submission of shop drawings in accordance with the Item 441, "Steel Structures". Alternate designs are not acceptable.

Installation of damping plate for the long mast arm is not recommended.

Provision of the bracket assembly used to support the traffic signal heads shall be under the direction of the Engineer for approval.

Design also conforms to NCHRP Report 412 for fatigue resistance except that there are no stiffeners at the base plate. TxDOT is conducting tests to determine if stiffeners at the base plate will or will not result in optimal performance; depending upon the results of the tests, poles may need a retrofit to ensure optimal fatigue performance.

Texas Department of Transportation
Traffic Operations Division

# TRAFFIC SIGNAL SUPPORT STRUCTURES

## LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

LMA(1)-12

Sheet 1 of 5



| DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
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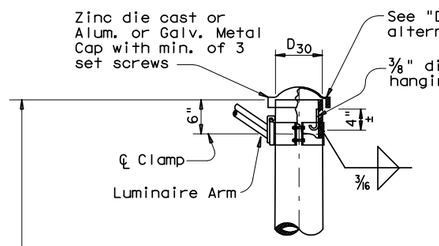
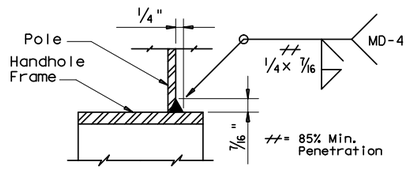
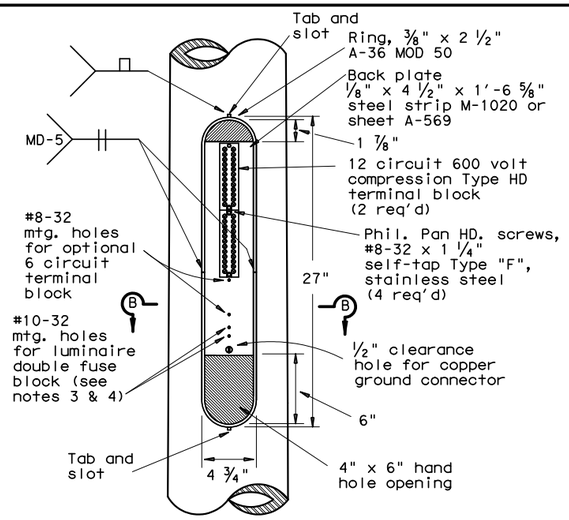



DETAIL A

(for pole with luminaire)




DETAIL H

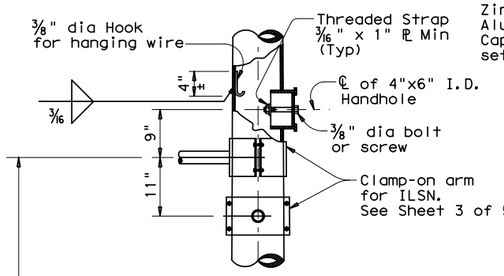



ACCESS COMPARTMENT

| MATERIALS | |
|---|---|
| Round Shafts or Polygonal Shafts (7) | ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 (8) |
| Plates (7) | ASTM A36, A588, or A572 Gr.50 |
| Connection Bolts | ASTM A325, or A449 except where noted |
| Pin Bolts | ASTM A325 |
| Pipe (7) | ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50 |
| Misc. Hardware | Galvanized steel or stainless steel or as noted |

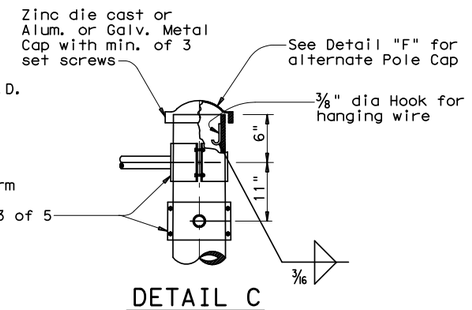
(7) ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F, or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

(8) ASTM A1011 SS Gr.50 shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

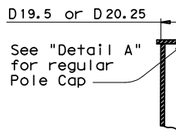



DETAIL B

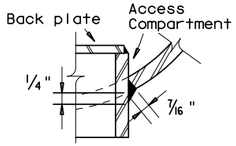
(If ILSN applied)



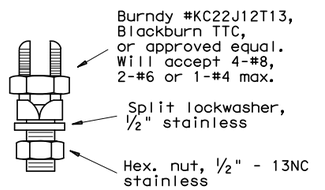

DETAIL C



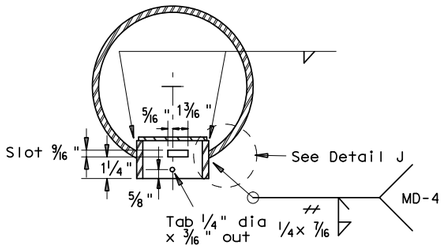

SECTION Y-Y




DETAIL J

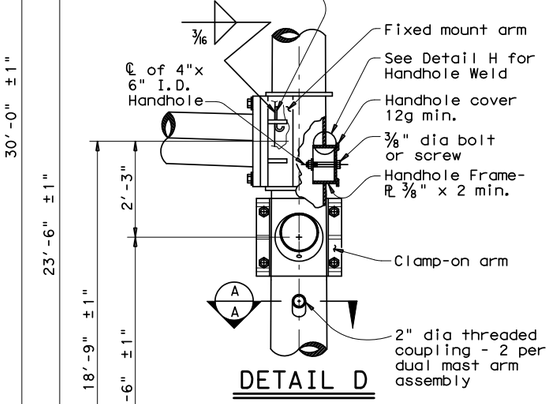



COPPER GROUND CONNECTOR



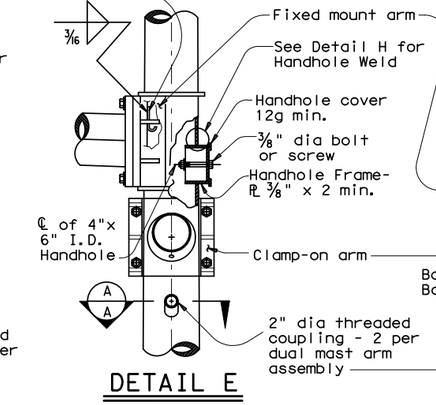

SECTION B-B // = 85% Min. Penetration

Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.



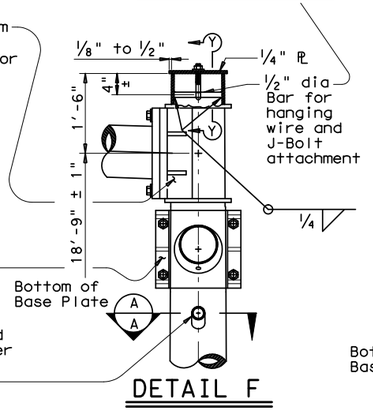

DETAIL D

(for 30' pole with luminaire and ILSN sign)



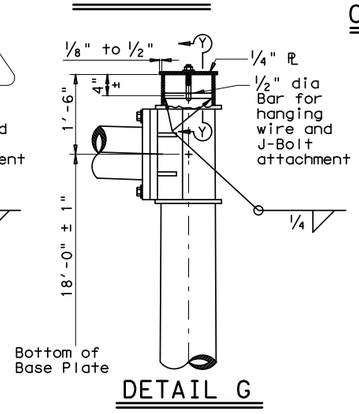

DETAIL E

(for 24' pole with ILSN sign and no luminaire, single or dual mast arm)




DETAIL F

(for 20.25' pole with no ILSN sign and no luminaire, dual mast arm)

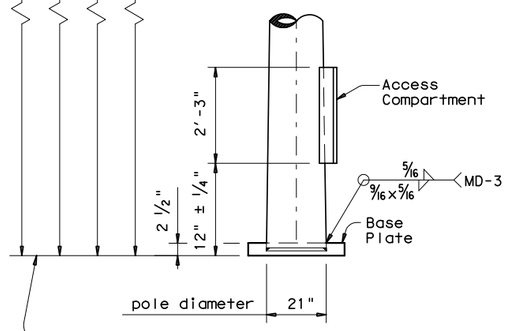



DETAIL G

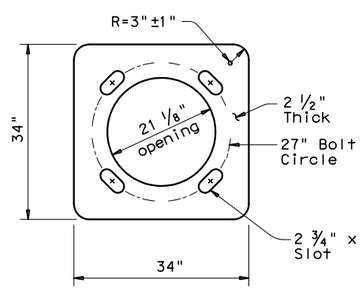
(for 19.5' pole with no ILSN sign and no luminaire, single mast arm)

ACCESS COMPARTMENT NOTES:

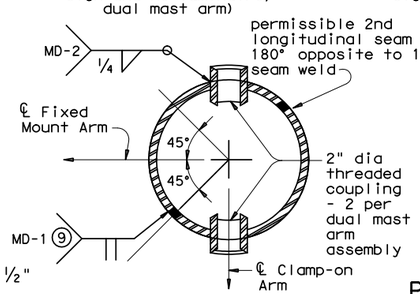
1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.



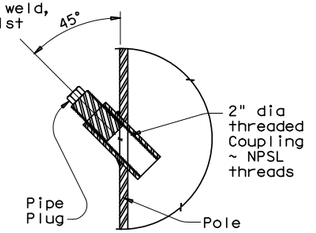

POLE ELEVATION




BASE PLATE




SECTION A-A




POLE COUPLING DETAIL

(9) Longitudinal seam weld must be oriented within 90° (45° rotation each side) along the fixed mount arm. 60% min penetration required, 100% penetration within 6" of circumferential base weld.

Texas Department of Transportation
Traffic Operations Division

# TRAFFIC SIGNAL SUPPORT STRUCTURES

## LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

LMA(2)-12

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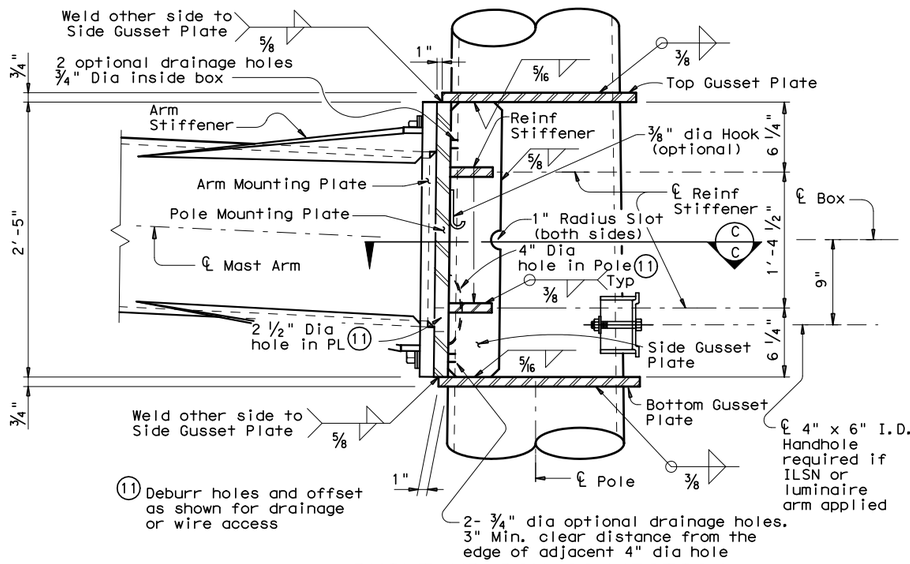
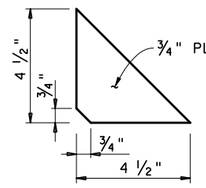
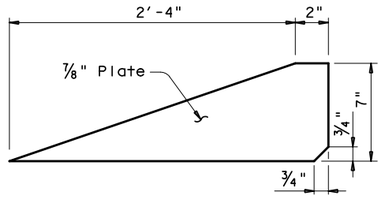



## BUILT-UP BOX CONNECTION

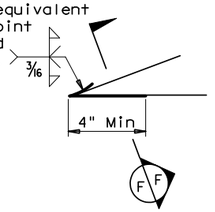



REINFORCING STIFFENER



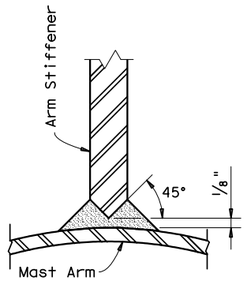

ARM STIFFENER
(Cut to match arm inclination and taper)

Provide Detail shown in SECTION F-F or equivalent 100% complete joint penetration weld from both sides.




Only 4" length at tip of Arm Stiffener requires a complete joint penetration weld. Smooth weld radius to connect Stiffener. Only a fillet weld is required for the remaining weld length.

## DETAIL "K"




## SECTION F-F

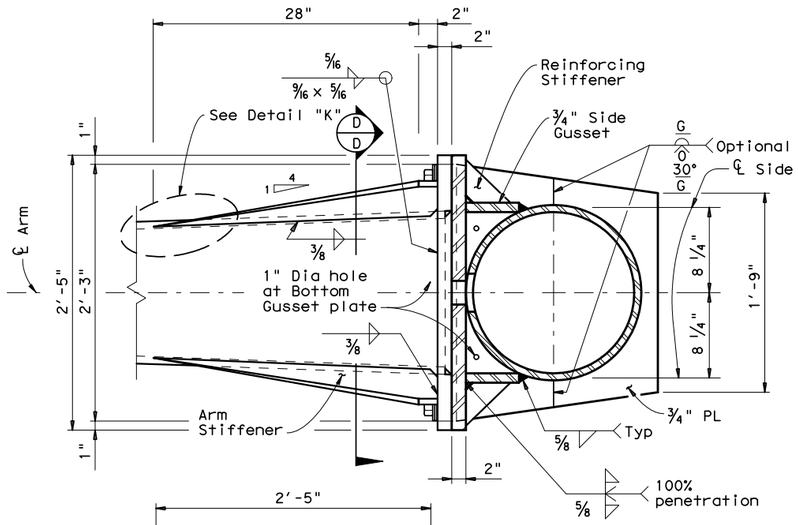
| Fixed Mount Arm $L_F$ | ROUND POLES (13) | | | | | Foundation Type |
|---|---|---|---|---|---|---|
| | $D_B$ | $D_{19.5}$ or $D_{20.25}$ | $D_{24}$ | $D_{30}$ | (12) thk | |
| ft. | in. | in. | in. | in. | in. | |
| 50', 55' 60', 65' | 21.0 | 18.2 | 17.6 | 16.8 | .3125 | 48-A |

| Fixed Mount Arm $L_F$ | ROUND ARMS (13) | | | | |
|---|---|---|---|---|---|
| | $L_1$ | $D_1$ | $D_2$ | (12) thk | Rise |
| ft. | ft. | in. | in. | in. | |
| 50 | 49 | 18.5 | 11.7 | .3125 | 3'- 3" |
| 55 | 54 | 18.5 | 11.0 | .3125 | 3'- 7" |
| 60 | 59 | 18.5 | 10.3 | .3125 | 3'-11" |
| 65 | 64 | 18.5 | 9.6 | .3125 | 4'- 4" |

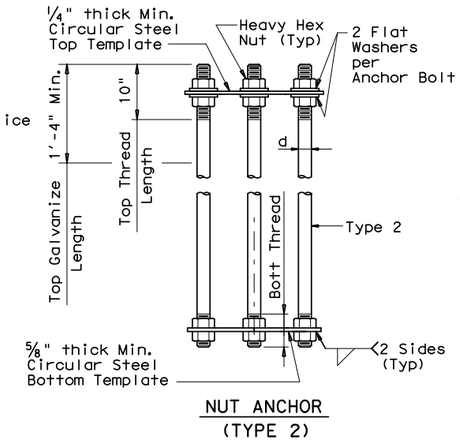
$D_B$ = Pole Base O.D.
$D_{19.5}$ = Pole Top O.D. with no Luminaire and no ILSN (single mast arm)
$D_{20.25}$ = Pole Top O.D. with no Luminaire and no ILSN (dual mast arm)
$D_{24}$ = Pole Top O.D. with ILSN w/out Luminaire
$D_{30}$ = Pole Top O.D. with Luminaire
$D_1$ = Arm Base O.D.
$D_2$ = Arm End O.D.
$L_1$ = Shaft Length
$L_F$ = Fixed Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

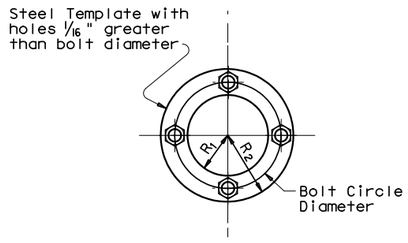
(13) Shaft profile 16-sided or 18-sided is considered to be equivalent to round section.




## SECTION C-C

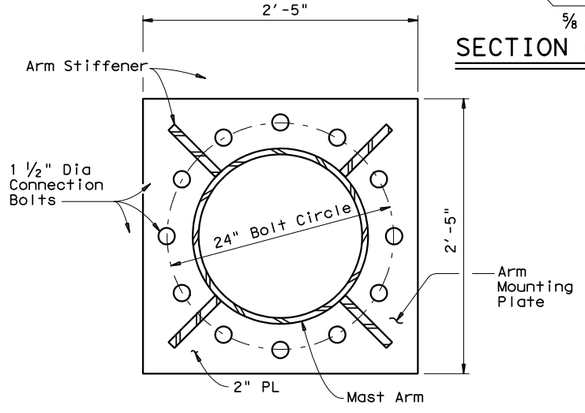



NUT ANCHOR
(TYPE 2)




## TEMPLATE DETAIL

## ANCHOR BOLT ASSEMBLY




## SECTION D-D

| FOUNDATION DESIGN TABLE | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FDN TYPE | DRILLED SHAFT DIA | REINFORCING STEEL | | DRILLED SHAFT LENGTH-ft (16), (17), (18) | | | ANCHOR BOLT DESIGN (14) | | | | FOUNDATION DESIGN LOAD (15) | | TYPICAL APPLICATION |
| | | VERT BARS | SPIRAL & PITCH | TEXAS CONE PENETROMETER N blows/ft | | | ANCHOR BOLT DIA | Fy (ksi) | BOLT CIR DIA | ANCHOR TYPE | MOMENT K-ft | SHEAR Kips | |
| | | | | 10 | 15 | 40 | | | | | | | |
| 48-A | 48" | 20 #9 | #4 at 6" | 21.9 | 19.5 | 14.7 | 2 1/2" | 55 | 27" | 2 | 490 | 10 | 50' to 65' Mast arm assembly. |

SEE SHEET "TS-FD" FOR ADDITIONAL DETAILS.

(14) Anchor bolt design develops the foundation capacity given under Foundation Design Laods.

(15) Foundation Design Loads are the allowable moments and shears at the base of the structure.

(16) Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

(17) If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

(18) Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

## GENERAL NOTES:

Built-up Box Connection: For the welded arm-to-pole connection as a build-up box configuration illustrated here is an example only, fabricators are required to submit a shop drawing of box connection for approval. The drawing shall specify the details of each box element, welds of arm-to-pole connection, arm-to-plate socket connection, and arm rise creation. Specify the proper location of drain holes along the pole. 2 1/2" dia hole in the pole mounting plate and 4" dia hole in the pole need to be aligned for wiring access or drainage. Arm stiffeners cut to match arm inclination and taper shall also be included.

The deviation from flat for either arm or pole mounting plate shall not exceed 1/32 in., which is measured along the center of mounting plate to a radial distance of 13.5 in. The deformed-from-flat connection between arm and pole mounting plates shall not be allowed if the center of both mounting plates cannot contact directly.

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

| ANCHOR BOLT & TEMPLATE SIZE | | | | | | |
|---|---|---|---|---|---|---|
| Bolt Dia in. | Length ‡ | Top Thread | Bottom Thread | Bolt Circle | $R_2$ | $R_1$ |
| 2 1/2" | 5'-2" | 10" | 6 1/2" | 27" | 16" | 11" |

‡ Min dimension given, longer bolts are acceptable.

Texas Department of Transportation
Traffic Operations Division

# TRAFFIC SIGNAL SUPPORT STRUCTURES
## LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 3 of 5 LMA(3)-12



| DN: JSY | CK: ARC | DW: TGG | CK: JSY |
|---|---|---|---|

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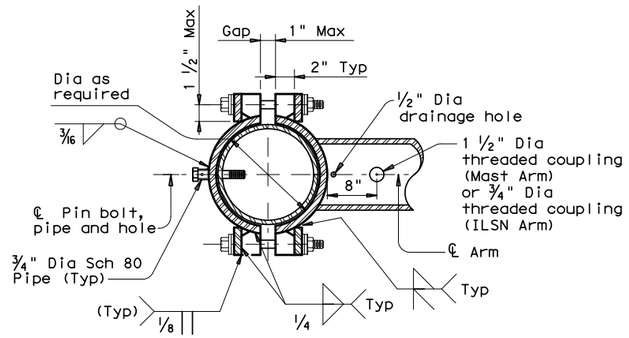
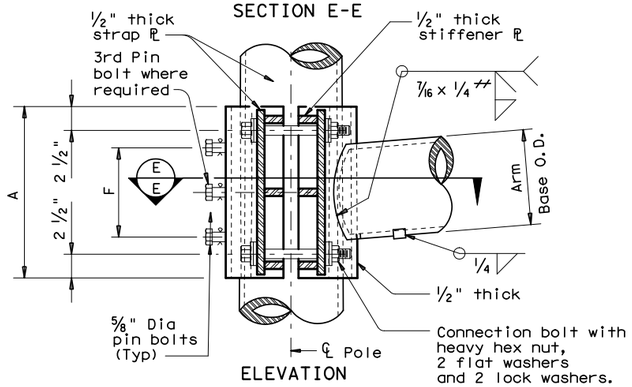
| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 0902 | 90 | 119 | McCART |
| DIST | COUNTY | | SHEET NO. |
| FTW | TARRANT | | 113 |

DATE:
FILE:

131C




SECTION E-E




ELEVATION
(Mast Arm or ILSN Arm to pole)

## ## = 85% Min. Penetration

# CLAMP-ON CONNECTION

## 80 MPH WIND

| Clamp-on Arm Lc | ROUND ARMS | | | | | POLYGONAL ARMS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $L_1$ | $D_1$ | $D_2$ | thk (12) | Rise | $L_1$ | $D_1$ | $D_2$ | thk (12) | Rise |
| ft. | ft. | in. | in. | in. | | ft. | in. | in. | in. | |
| 20 | 19.1 | 6.5 | 3.8 | .179 | 1'-9" | 19.1 | 7.0 | 3.5 | .179 | 1'-8" |
| 24 | 23.1 | 7.5 | 4.3 | .179 | 1'-10" | 23.1 | 7.5 | 3.5 | .179 | 1'-9" |
| 28 | 27.1 | 8.0 | 4.2 | .179 | 1'-11" | 27.1 | 8.0 | 3.5 | .179 | 1'-10" |
| 32 | 31.0 | 9.0 | 4.7 | .179 | 2'-1" | 31.0 | 9.0 | 3.5 | .179 | 2'-0" |
| 36 | 35.0 | 9.5 | 4.6 | .179 | 2'-4" | 35.0 | 10.0 | 3.5 | .179 | 2'-1" |
| 40 | 39.0 | 9.5 | 4.1 | .239 | 2'-8" | 39.0 | 9.5 | 3.5 | .239 | 2'-3" |
| 44 | 43.0 | 10.0 | 4.1 | .239 | 2'-11" | 43.0 | 10.0 | 3.5 | .239 | 2'-6" |

## 100 MPH WIND

| Clamp-on Arm Lc | ROUND ARMS | | | | | POLYGONAL ARMS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $L_1$ | $D_1$ | $D_2$ | thk (12) | Rise | $L_1$ | $D_1$ | $D_2$ | thk (12) | Rise |
| ft. | ft. | in. | in. | in. | | ft. | in. | in. | in. | |
| 20 | 19.1 | 8.0 | 5.3 | .179 | 1'-8" | 19.1 | 8.0 | 3.5 | .179 | 1'-7" |
| 24 | 23.1 | 9.0 | 5.8 | .179 | 1'-9" | 23.1 | 9.0 | 3.5 | .179 | 1'-8" |
| 28 | 27.1 | 9.5 | 5.7 | .179 | 1'-10" | 27.1 | 10.0 | 3.5 | .179 | 1'-9" |
| 32 | 31.0 | 9.5 | 5.2 | .239 | 1'-11" | 31.0 | 9.5 | 3.5 | .239 | 1'-10" |
| 36 | 35.0 | 10.0 | 5.1 | .239 | 2'-0" | 35.0 | 10.0 | 3.5 | .239 | 1'-11" |
| 40 | 39.0 | 10.5 | 5.1 | .239 | 2'-3" | 39.0 | 11.0 | 3.5 | .239 | 2'-1" |
| 44 | 43.0 | 11.0 | 5.1 | .239 | 2'-8" | 43.0 | 11.5 | 4.0 | .239 | 2'-3" |

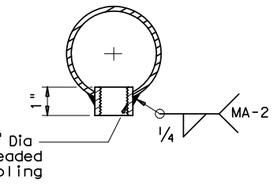
D1 = Arm Base O.D.
D2 = Arm End O.D.
L1 = Shaft Length
Lc = Clamp-on Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

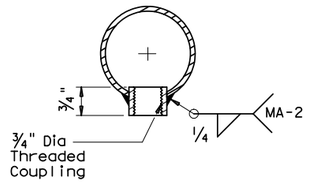
## CLAMP-ON ARM CONNECTION

| ILSN Arm Size | | A | F | 4 Conn. Bolts | 5/8" Dia. Pin Bolts |
|---|---|---|---|---|---|
| Sch 40 pipe Dia | Thick | | | Dia | No. |
| in. | in. | in. | in. | in. | ea |
| 3 | .216 | 10 | 4 | ¾ | 2 |

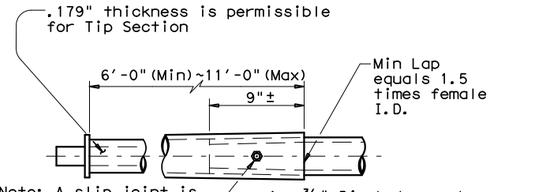
| Mast Arm Size | | A | F | 4 Conn. Bolts | 5/8" Dia. Pin Bolts |
|---|---|---|---|---|---|
| Base Dia | Thick | | | Dia | No. |
| in. | in. | in. | in. | in. | ea |
| 6.5 | .179 | 12 | 6 | 1 | 2 |
| 7.5 | .179 | 14 | 8 | 1 | 2 |
| 8.0 | .179 | 14 | 8 | 1 | 2 |
| 9.0 | .179 | 16 | 10 | 1 | 2 |
| 9.5 | .179 | 18 | 12 | 1 ¼ | 3 |
| 9.5 | .239 | 18 | 12 | 1 ¼ | 3 |
| 10.0 | .239 | 18 | 12 | 1 ¼ | 3 |
| 10.5 | .239 | 18 | 12 | 1 ¼ | 3 |
| 11.0 | .239 | 18 | 12 | 1 ¼ | 3 |
| 11.5 | .239 | 18 | 12 | 1 ¼ | 3 |




# ARM COUPLING DETAIL




# ILSN ARM COUPLING DETAIL

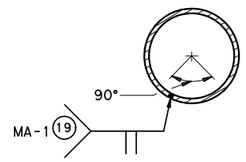



Note: A slip joint is permissible for arms 40' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

# SLIP JOINT DETAIL (CLAMP-ON ARM)

Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

# BRACKET ASSEMBLY




# ARM WELD DETAIL

(19) Longitudinal Seam Weld must be oriented within the lower 90° of the signal arm.
60% Min penetration
100% penetration within 6" of circumferential base welds.

## GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies or ILSN arm support. For a clamp-on mast arm, a maximum 1 ½" wide vertical slotted hole may be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1". For an ILSN arm, a 1 ½" diameter hole shall be cut in the front clamp plate for wire access. A matched hole shall be field drilled through the pole to provide wire access after arm is oriented. Deburr both holes.

Where duplicate parts occur on a detail, welds shown for part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces. Pin bolts shall be ASTM A325 with threads excluded from the shear plane. Pin bolt and ¾" diameter pipe shall have 3/16" diameter holes for a 1/8" diameter galvanized cotter pin. Back clamp plate shall be furnished with a ¾" diameter hole for each pin bolt. An 11/16" diameter hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

Texas Department of Transportation
Traffic Operations Division

# TRAFFIC SIGNAL SUPPORT STRUCTURES
## LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 4 of 5 LMA(4)-12



| DN: JK | CK: GRB | DW: FDN | CK: CAL |
|---|---|---|---|

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| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
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| DIST | COUNTY | | SHEET NO. |
| FTW | TARRANT | | 114 |

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## Shipping Parts List

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed arm connection bolts and washers, and any additional hardware listed in the table.

| Nominal Arm Length | 30′ Poles with Luminaire: See note above plus: one (or two if ILSN attached) small hand hole, clamp-on simplex | 24′ Poles with ILSN: See note above plus one small hand hole | 19.50′ (Single Mast Arm) 20.25′ (Dual Mast Arm) Poles with no Luminaire and no ILSN: See note above |
|---|---|---|---|

**Single Mast Arm**

| Lf ft. | Designation | Quantity | Designation | Quantity | Designation | Quantity |
|---|---|---|---|---|---|---|
| 50 | 50L | | 50S | | 50 | |
| 55 | 55L | | 55S | | 55 | |
| 60 | 60L | | 60S | | 60 | |
| 65 | 65L | 1 | 65S | | 65 | 1 |

**Dual Mast Arm**

| Lf ft. | Lc ft. | Designation | Quantity | Designation | Quantity | Designation | Quantity |
|---|---|---|---|---|---|---|---|
| 50 | 20 | 5020L | | 5020S | | 5020 | |
| | 24 | 5024L | | 5024S | | 5024 | |
| | 28 | 5028L | | 5028S | | 5028 | |
| | 32 | 5032L | | 5032S | | 5032 | |
| | 36 | 5036L | | 5036S | | 5036 | |
| | 40 | 5040L | | 5040S | | 5040 | |
| | 44 | 5044L | | 5044S | | 5044 | |
| 55 | 20 | 5520L | | 5520S | | 5520 | |
| | 24 | 5524L | | 5524S | | 5524 | |
| | 28 | 5528L | | 5528S | | 5528 | |
| | 32 | 5532L | | 5532S | | 5532 | |
| | 36 | 5536L | | 5536S | | 5536 | |
| | 40 | 5540L | | 5540S | | 5540 | |
| | 44 | 5544L | | 5544S | | 5544 | |
| 60 | 20 | 6020L | | 6020S | | 6020 | |
| | 24 | 6024L | | 6024S | | 6024 | |
| | 28 | 6028L | | 6028S | | 6028 | |
| | 32 | 6032L | | 6032S | | 6032 | |
| | 36 | 6036L | | 6036S | | 6036 | |
| | 40 | 6040L | | 6040S | | 6040 | |
| | 44 | 6044L | | 6044S | | 6044 | |
| 65 | 20 | 6520L | | 6520S | | 6520 | |
| | 24 | 6524L | | 6524S | | 6524 | |
| | 28 | 6528L | | 6528S | | 6528 | |
| | 32 | 6532L | | 6532S | | 6532 | |
| | 36 | 6536L | | 6536S | | 6536 | |
| | 40 | 6540L | | 6540S | | 6540 | |
| | 44 | 6544L | | 6544S | | 6544 | |

Foundation Summary Table **

| Location Ident. | Avg. N Blow/ft. | No. Each | Drill Shaft *** Length (feet) |
|---|---|---|---|
| | | | 48-A |
| T-1 | 10 | 1 | 22 |
| T-3 | 10 | 1 | 22 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| Total Drill Shaft Length | | | 44 |

## Shipping Parts List

Traffic Signal Arms (Fixed Mount) (1 per pole)
Ship each arm with listed equipment attached

| Nominal Arm Length | Type IV Arm (4 Signals) 3 Bracket Assembly and 4 CGB Connectors | |
|---|---|---|
| ft. | Designation | Quantity |
| 50 | 50IV | |
| 55 | 55IV | |
| 60 | 60IV | |
| 65 | 65IV | 2 |

Luminaire Arms (1 per 30′ pole)

| Nominal Arm Length | Quantity |
|---|---|
| 8′ Arm | 1 |

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

| Nominal Arm Length | Quantity |
|---|---|
| 7′ Arm | |
| 9′ Arm | |

Traffic Signal Arms (80 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached

| Nominal Arm Length | Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers | | Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp w/bolts and washers | | Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp w/bolts and washers | |
|---|---|---|---|---|---|---|
| ft. | Designation | Quantity | Designation | Quantity | Designation | Quantity |
| 20 | 20I-80 | | | | | |
| 24 | 24I-80 | | 24II-80 | | | |
| 28 | 28I-80 | | 28II-80 | | | |
| 32 | | | 32II-80 | | 32III-80 | |
| 36 | | | 36II-80 | | 36III-80 | |
| 40 | | | | | 40III-80 | |
| 44 | | | | | 44III-80 | |

Traffic Signal Arms (100 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached

| Nominal Arm | Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers | | Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp | | Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp | |
|---|---|---|---|---|---|---|
| ft. | Designation | Quantity | Designation | Quantity | Designation | Quantity |
| 20 | 20I-100 | | | | | |
| 24 | 24I-100 | | 24II-100 | | | |
| 28 | 28I-100 | | 28II-100 | | | |
| 32 | | | 32II-100 | | 32III-100 | |
| 36 | | | 36II-100 | | 36III-100 | |
| 40 | | | | | 40III-100 | |
| 44 | | | | | 44III-100 | |

Anchor Bolt Assemblies (1 per pole)

| Anchor Bolt Diameter | Anchor Bolt Length | Quantity |
|---|---|---|
| 2 1/2 " | 5′ - 3" | 2 |

Each anchor bolt assembly consists of the following: Top and bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers and 4 nut anchor devices (type 2) per Standard Drawing "TS-FD". Templates may be removed for shipment.

Notes

** Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.

*** Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

Abbreviations
Lf= Fixed Arm Length
Lc= Clamp-on Arm Length (44′ Max.)

STATE OF TEXAS
ZEGEYE Z. KEBEDE
121726
LICENSED PROFESSIONAL ENGINEER
05/19/2022

Texas Department of Transportation
Traffic Operations Division

# LONG MAST ARM ASSEMBLY PARTS LIST

LMA(5)-12

Sheet 5 of 5



| DN: JK | CK: GRB | DW: FDN | CK: CAL |
|---|---|---|---|

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| CONT | SECT | JOB | HIGHWAY |
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DATE:
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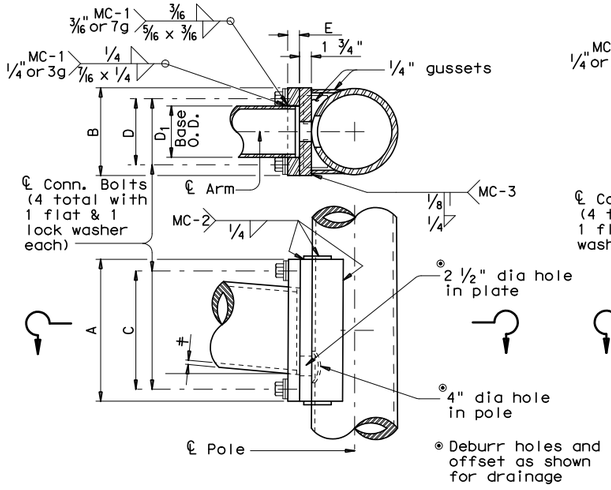
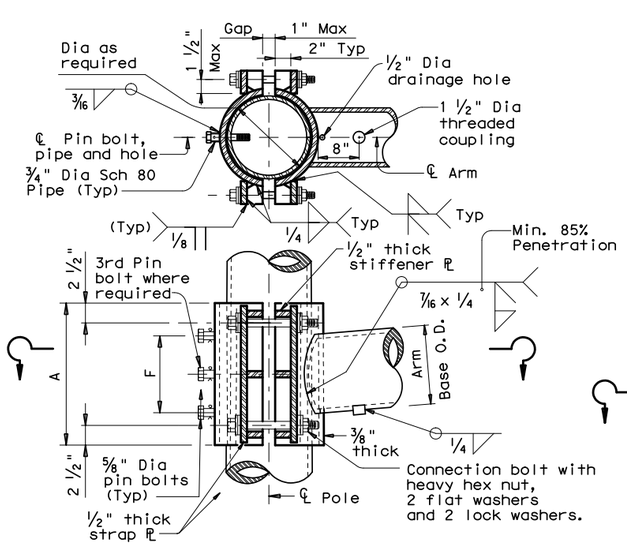
| ARM SIZE $D_1$ | ARM SIZE ǂ | A | B | C | D | E | CONN BOLT DIA |
|---|---|---|---|---|---|---|---|
| in. | in. | in. | in. | in. | in. | in. | in. |
| 6.5 | .179 | 12 | 9 | 9 | 6 | 1 ¾ | 1 |
| 7.5 | .179 | 13 | 9 | 10 | 6 | 1 ¾ | 1 |
| 8.0 | .179 | 14 | 10 | 11 | 7 | 2 | 1 ¼ |
| 9.0 | .179 | 16 | 11 | 13 | 8 | 2 | 1 ¼ |
| 9.5 | .179 | 17 | 12 | 14 | 9 | 2 | 1 ¼ |
| 9.5 | .239 | 18 | 12 | 15 | 9 | 2 | 1 ¼ |
| 10.0 | .239 | 18 | 12 | 15 | 9 | 2 | 1 ¼ |
| 10.5 | .239 | 18 | 13 | 15 | 10 | 3 | 1 ½ |
| 11.0 | .239 | 18 | 13 | 15 | 10 | 3 | 1 ½ |



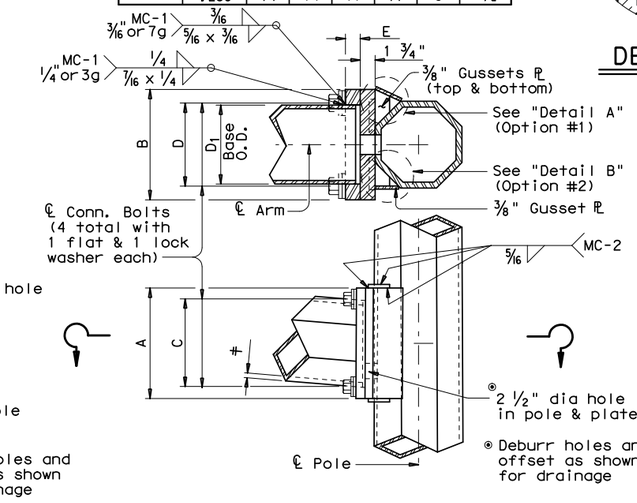

## FIXED MOUNT DETAIL 1

| ARM SIZE $D_1$ | ARM SIZE ǂ | A | F | CONN. BOLTS No. | CONN. BOLTS Dia | PIN BOLTS No. | PIN BOLTS Dia |
|---|---|---|---|---|---|---|---|
| in. | in. | in. | in. | ea. | in. | ea. | in. |
| 6.5 | .179 | 12 | 6 | 4 | 1 | 2 | ⅝ |
| 7.5 | .179 | 14 | 8 | 4 | 1 | 2 | ⅝ |
| 8.0 | .179 | 14 | 8 | 4 | 1 | 2 | ⅝ |
| 9.0 | .179 | 16 | 10 | 4 | 1 | 2 | ⅝ |
| 9.5 | .179 | 18 | 12 | 4 | 1 ¼ | 3 | ⅝ |
| 9.5 | .239 | 18 | 12 | 4 | 1 ¼ | 3 | ⅝ |
| 10.0 | .239 | 18 | 12 | 4 | 1 ¼ | 3 | ⅝ |

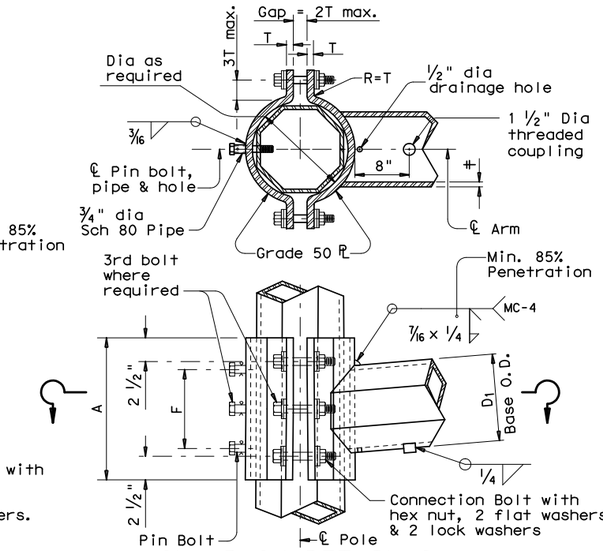



## CLAMP-ON DETAIL 1

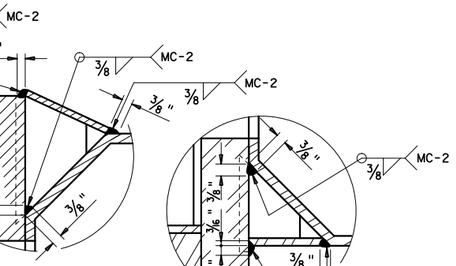
| ARM SIZE $D_1$ | ARM SIZE ǂ | A | F | T | CONN. BOLTS No. | CONN. BOLTS Dia | PIN BOLTS No. | PIN BOLTS Dia |
|---|---|---|---|---|---|---|---|---|
| in. | in. | in. | in. | in. | ea. | in. | ea. | in. |
| 7.0 | .179 | 12 | 6 | ¾ | 4 | ¾ | 2 | ⅝ |
| 7.5 | .179 | 14 | 8 | ¾ | 4 | ¾ | 2 | ⅝ |
| 8.0 | .179 | 14 | 8 | ¾ | 4 | ¾ | 2 | ⅝ |
| 9.0 | .179 | 16 | 10 | ⅞ | 4 | 1 | 2 | ⅝ |
| 10.0 | .179 | 18 | 10 | ⅞ | 4 | 1 | 2 | ⅝ |
| 9.5 | .239 | 18 | 10 | 1 | 6 | 1 | 3 | ⅝ |
| 10.0 | .239 | 18 | 10 | 1 | 6 | 1 | 3 | ⅝ |




## FIXED MOUNT DETAIL 2

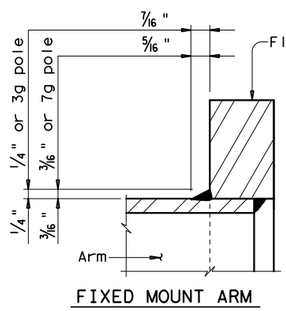



## CLAMP-ON DETAIL 2

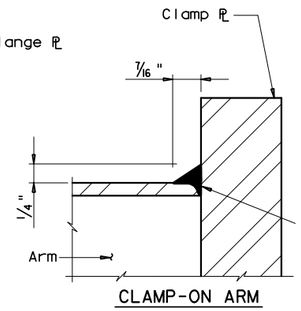








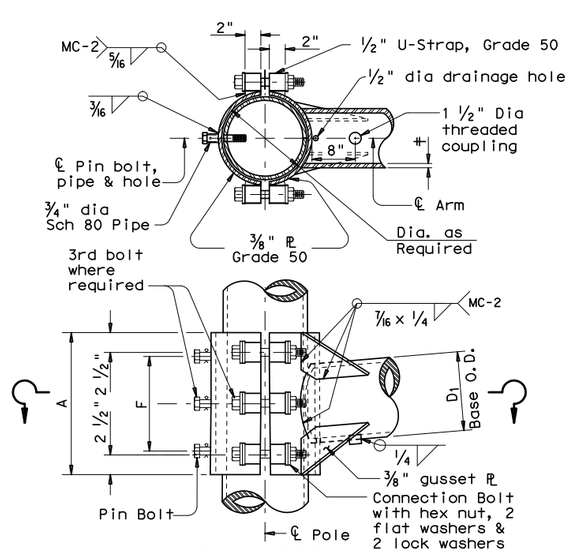

FIXED MOUNT ARM




CLAMP-ON ARM

## ARM BASE WELD DETAILS

| ARM SIZE $D_1$ | ARM SIZE ǂ | A | F | CONN. BOLTS No. | CONN. BOLTS Dia | PIN BOLTS No. | PIN BOLTS Dia |
|---|---|---|---|---|---|---|---|
| in. | in. | in. | in. | ea. | in. | ea. | in. |
| 6.5 | .179 | 12 | 6 | 4 | 1 | 2 | ⅝ |
| 7.5 | .179 | 14 | 8 | 4 | 1 | 2 | ⅝ |
| 8.0 | .179 | 14 | 8 | 4 | 1 | 2 | ⅝ |
| 9.0 | .179 | 16 | 10 | 4 | 1 | 2 | ⅝ |
| 9.5 | .179 | 18 | 12 | 6 | 1 | 3 | ⅝ |
| 9.5 | .239 | 18 | 12 | 6 | 1 | 3 | ⅝ |
| 10.0 | .239 | 18 | 12 | 6 | 1 | 3 | ⅝ |




## CLAMP-ON DETAIL 3

| MATERIALS | |
|---|---|
| Round Shafts or Polygonal Shafts ① | ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 ② |
| Plates ① | ASTM A36, A588, or A572 Gr.50 |
| Connection Bolts | ASTM A325 or A449, except where noted |
| Pin Bolts | ASTM A325 |
| Pipe ① | ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50 |
| Misc. Hardware | Galvanized steel or stainless steel or as noted |

① ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

② ASTM A1011 SS Gr.50 material shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

### GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies. A Maximum 1 ½" wide vertical slotted hole shall be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1"

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

### NOTE:

Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and ¾" dia pipe shall have 5/16" dia holes for a 1/8" dia galvanized cotter pin. Back clamp plate shall be furnished with a ¾" dia hole for each pin bolt. An 11/16" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

Texas Department of Transportation
Traffic Operations Division

# STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

## MAST ARM CONNECTIONS

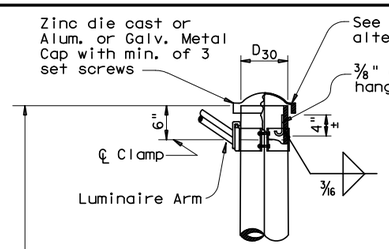
## MA-C-12



| REVISIONS | DN: MS | CK: JSY | DW: MMF | CK: JSY |
|---|---|---|---|---|
| 5-96 | CONT | SECT | JOB | HIGHWAY |
| 5-09 | 0902 | 90 | 119 | McCART |
| 1-12 | DIST | COUNTY | | SHEET NO. |
| | FTW | TARRANT | | 116 |

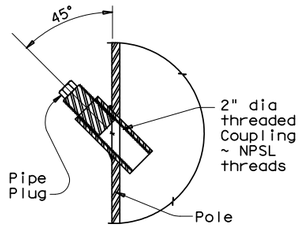
126A

DATE:
FILE:

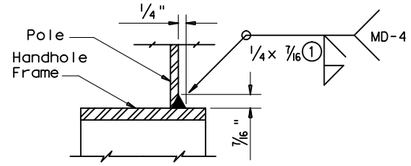



## DETAIL A

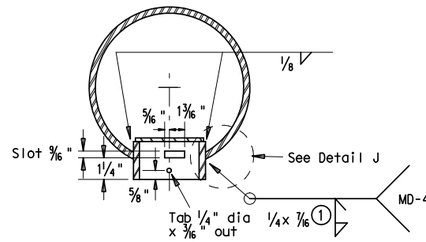
(for pole with luminaire)




## POLE COUPLING DETAIL

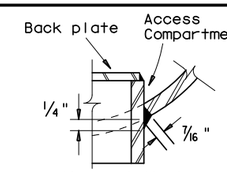



## DETAIL G

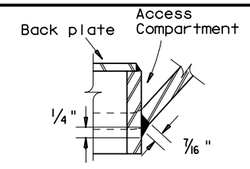



## SECTION X-X

Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.

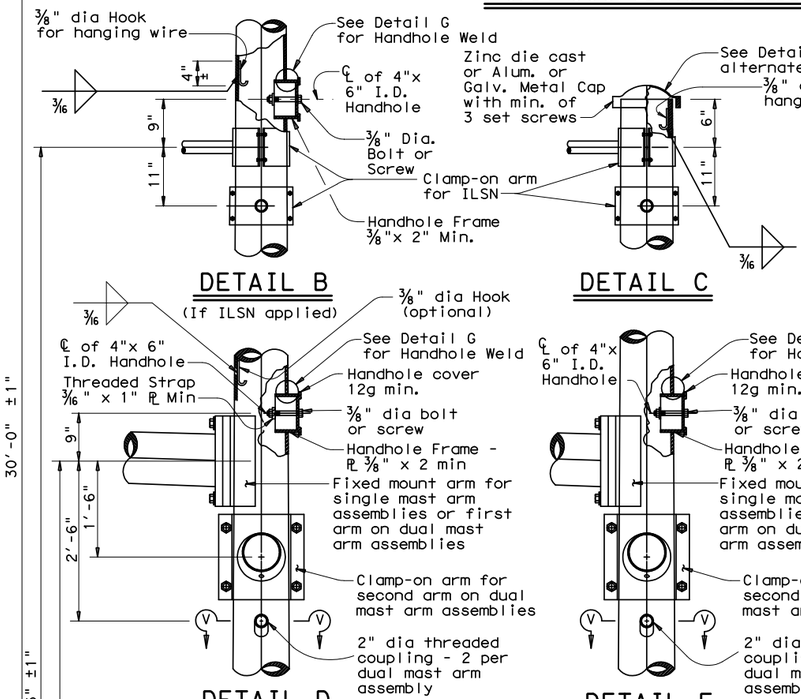



Round Pole




Polygonal Pole

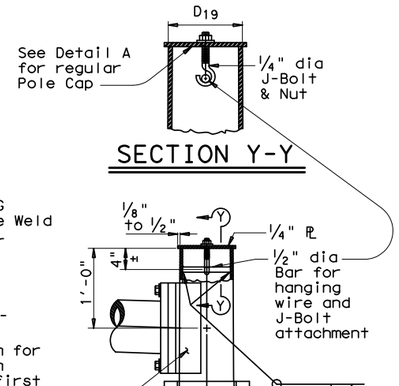
## DETAIL J



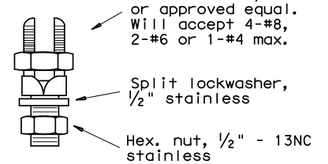

## DETAIL B




## DETAIL C




## SECTION Y-Y




## COPPER GROUND CONNECTOR




## ACCESS COMPARTMENT




## DETAIL D

(for 30' pole with luminaire and ILSN sign)



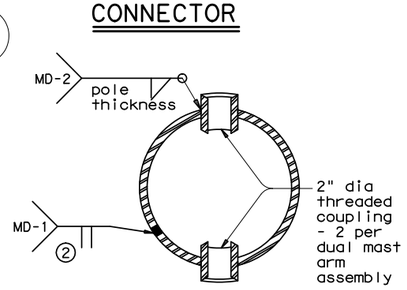

## DETAIL E

(for 24' pole with ILSN sign and no luminaire)




## DETAIL F

(for 19' pole with no ILSN sign and no luminaire)

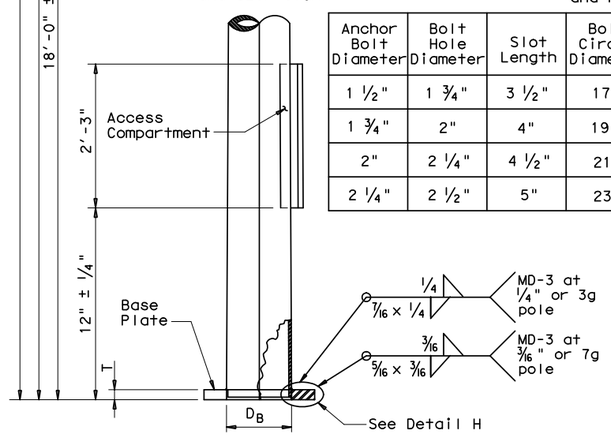



## SECTION V-V

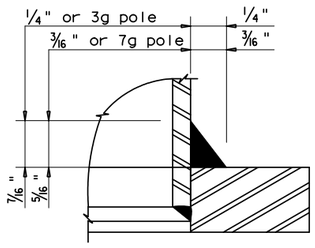
## NOTES:

1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

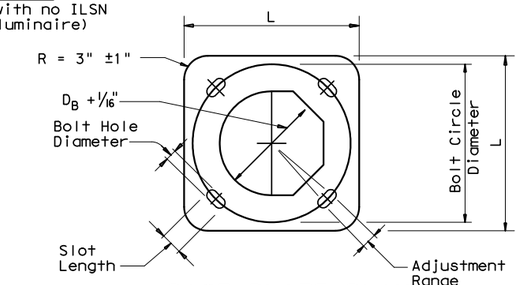
| Anchor Bolt Diameter | Bolt Hole Diameter | Slot Length | Bolt Circle Diameter | Base ℞ Dim. L x T | Adjust. Range |
|---|---|---|---|---|---|
| 1 1/2" | 1 3/4" | 3 1/2" | 17" | 18" x 1 1/2" | 13.4° |
| 1 3/4" | 2" | 4" | 19" | 20" x 1 3/4" | 13.5° |
| 2" | 2 1/4" | 4 1/2" | 21" | 22" x 2" | 13.6° |
| 2 1/4" | 2 1/2" | 5" | 23" | 24" x 2 1/4" | 13.7° |




## POLE ELEVATION




## DETAIL H




## BASE PLATE PLAN

(1) 85% Min. penetration

(2) 60% Min. penetration 100% pemetration within 6" of circumferential base welds.

*Texas Department of Transportation*
*Traffic Operations Division*

# TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM POLE DETAILS

MA-D-12



| DN: MS | CK: JSY | DW: FDN | CK: CAL |
|---|---|---|---|

REVISIONS
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| CONT | SECT | JOB | HIGHWAY |
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| 0902 | 90 | 119 | McCART |
| DIST | COUNTY | | SHEET NO. |
| FTW | TARRANT | | 117 |

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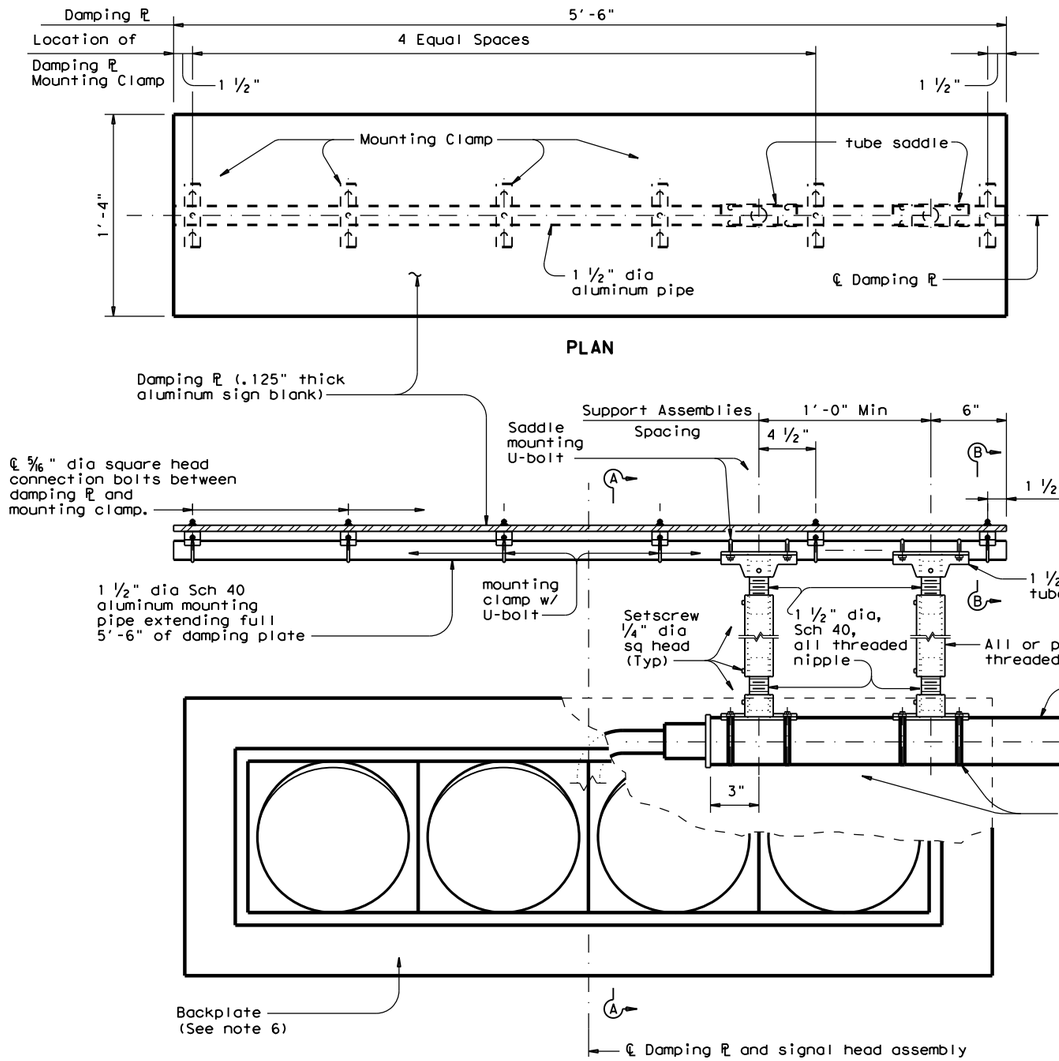
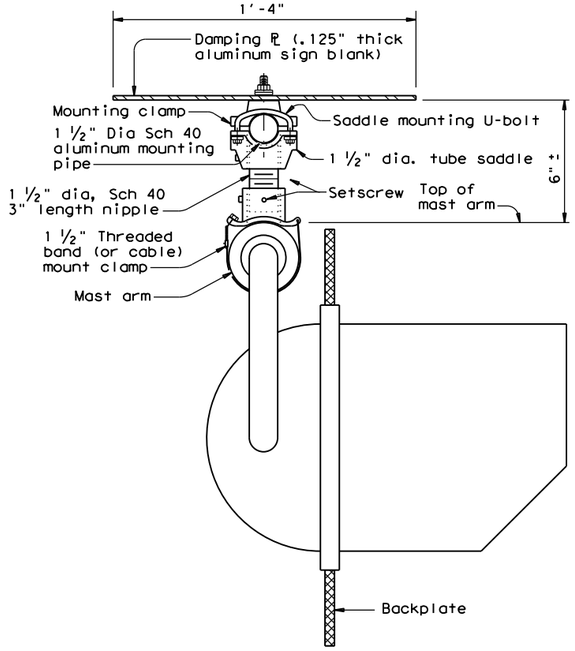


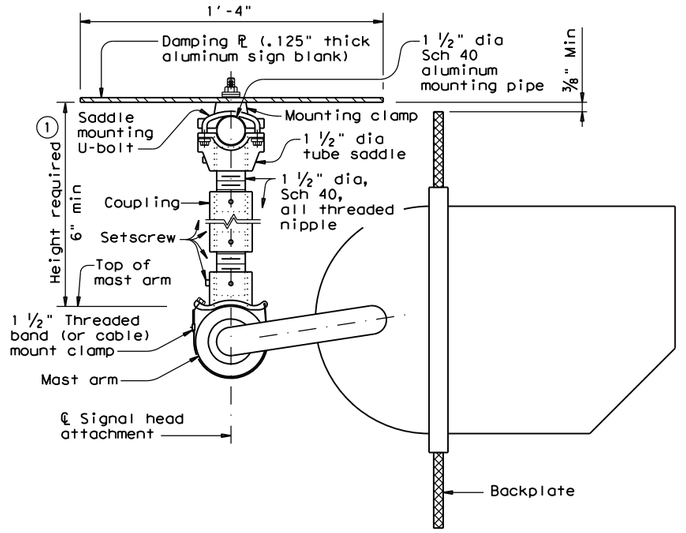

## DAMPING PLATE MOUNTING DETAILS

(Showing alternate placement of signal head)



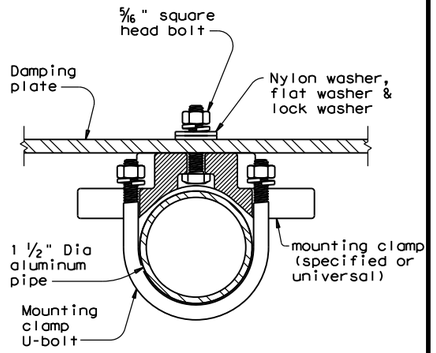

**SECTION A-A**

(Showing standard placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)




**SECTION A-A**

(Showing alternate placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)




**SECTION B-B**

(Showing damping plate attachment)

| ① Recommended supporting assemblies to achieve required height for horizontal section heads | | | |
|---|---|---|---|
| Height required | One nipple each length | Two nipples each length plus | One coupling each length |
| 6"-6 ¾" | 3" | - | - |
| 7"-8 ½" | 4" | - | - |
| 9"-10 ½" | 6" | - | - |
| 11"-15 ½" | - | 4" | 5" |
| 16"-24" | - | 6" | 10" |

## GENERAL NOTES:

1. In accordance with the findings of TxDOT sponsored research, the installation of a damping plate in accordance with the details shown here at the end of signal mast arms of SMA and DMA standard structures reduces excessive harmonic vertical vibration, and thus fatigue damage. Any deviation from these details may reduce the effectiveness of this damping device.
2. Aluminum sign blank for damping plate will conform to Departmental Material Specifications DMS-7110. Materials for mast arm mounting clamp and tube saddle will be aluminum castings or aluminum alloys as in accordance with manufacturers' stipulations. Mounting pipe, pipe nipple and coupling will be aluminum alloy 6061-T6 or 6063-T6. Damping plate mounting clamp and u-bolt assemblies will conform to Standard sheet SMD(GEN). U-bolts for saddle mounting will have a minimum yield strength of 36 ksi.
3. Damping plate will be mounted horizontally. Position centerline of damping plate to align with centerline of mast arm or horizontal signal head assembly. Vertical clearance between signal head (with or without backing plate)and bottom of damping plate will be maintained as shown. The attachments shown here are examples only, other supporting details which meet both alignment and vertical clearance requirements are also acceptable.
4. Unless stipulated by the manufacturers, all steel parts will be galvanized finish in accordance with Standard Specification Item 445, "Galvanizing".
5. Contractor will verify applicable field dimensions before the installation.
6. Backplates are optional for traffic signals. When backplates are used, Backplates will have a 2-inch fluorescent yellow AASHTO Type $B_{FL}$ or $C_{FL}$ retroreflective border conforming to TxDOT DMS-8300 "Sign Face Materials." See Sheet TS-BP-20 for backplate details.

Texas Department of Transportation

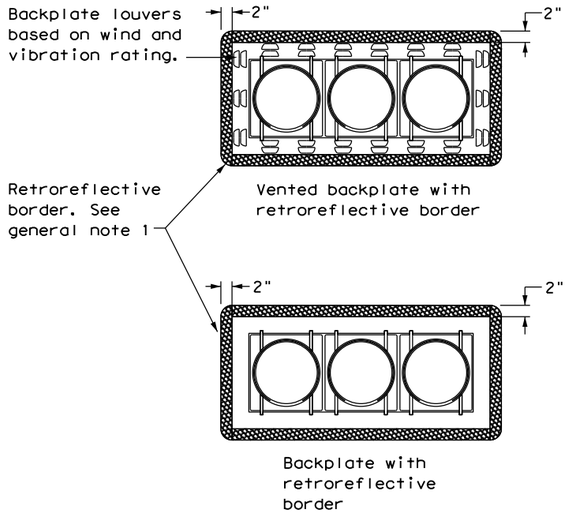
Traffic Safety Division Standard

# MAST ARM DAMPING PLATE DETAILS

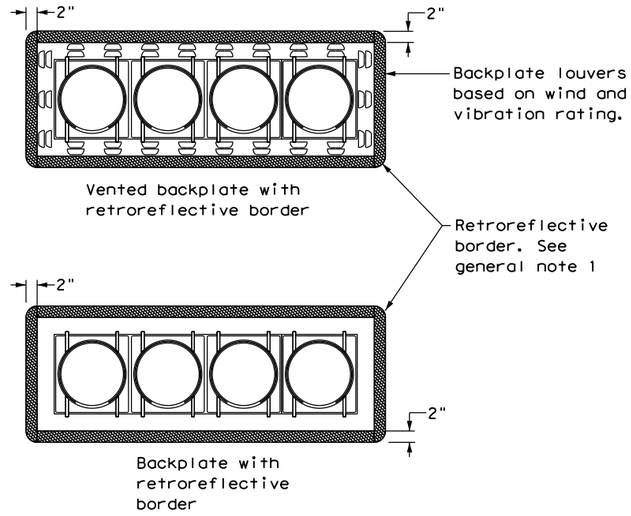
## MA-DPD-20

| FILE: ma-dpd-20.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT January 2012 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0902 | 90 | 119 | McCART |
| 6-20 | DIST | COUNTY | | SHEET NO. |
| | FTW | TARRANT | | 118 |

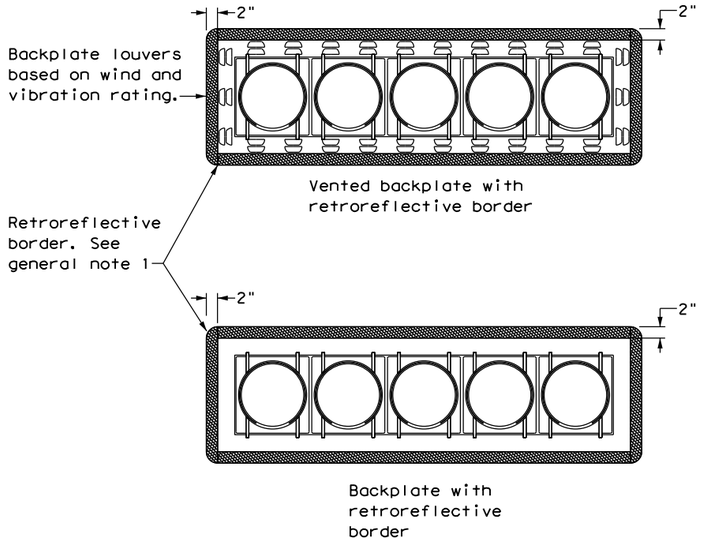
DATE:
FILE:



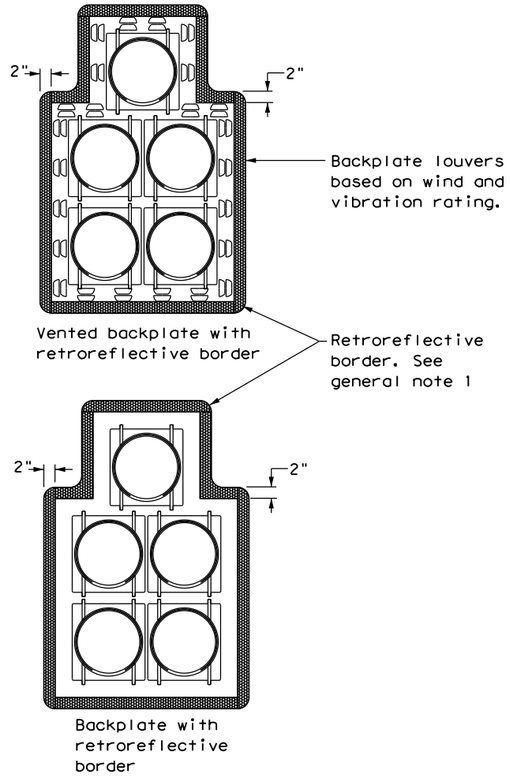

## THREE-SECTION HEAD
### HORIZONTAL OR VERTICAL



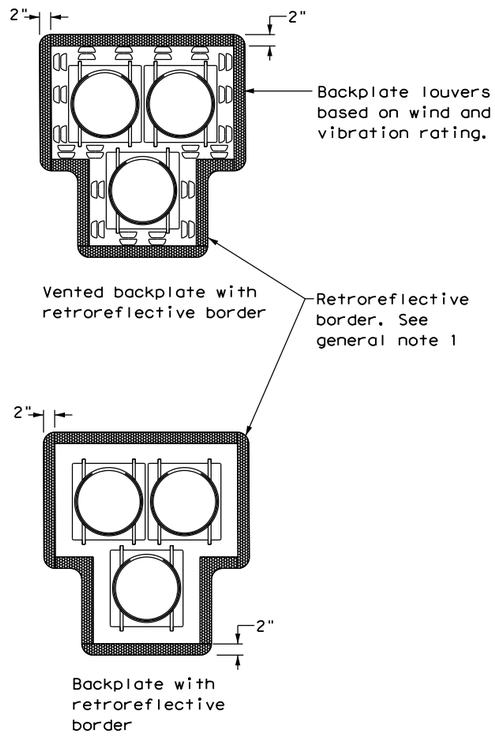

## FOUR-SECTION HEAD
### HORIZONTAL OR VERTICAL




## FIVE-SECTION HEAD
### HORIZONTAL OR VERTICAL




## FIVE-SECTION HEAD
### CLUSTER




## PEDESTRIAN HYBRID
### BEACON

## GENERAL NOTES:

1. Backplates are optional for traffic signals and pedestrian hybrid beacons. When backplates are used, a 2-inch wide fluorescent yellow AASHTO Type $B_{FL}$ or $C_{FL}$ retroreflective border conforming to TxDOT DMS-8300 is required. Place on all approaches when used.
2. Signal head and backplate compatability must be verified by the contractor prior to installation.
3. When using backplates on signal heads, venting is preferred to reduce cyclic vibration stress.
4. When a vented backplate is used, the retroreflective border must not be placed over the louvers.
5. This standard sheet applies to all signal heads with backplates, including but not limited to:
   - Pole mounted
   - Overhead mounted
   - Span wire mounted
   - Mast arm mounted
   - Vertical signal heads
   - Horizontal signal heads
   - Clustered signal heads
   - Pedestrian hybrid beacons

Texas Department of Transportation

Traffic Safety Division Standard

# TRAFFIC SIGNAL HEAD WITH BACKPLATE

# TS-BP-20

| FILE: ts-bp-20.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT June 2020 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0902 | 90 | 119 | McCART |
| | DIST | COUNTY | | SHEET NO. |
| | FTW | TARRANT | | 118A |

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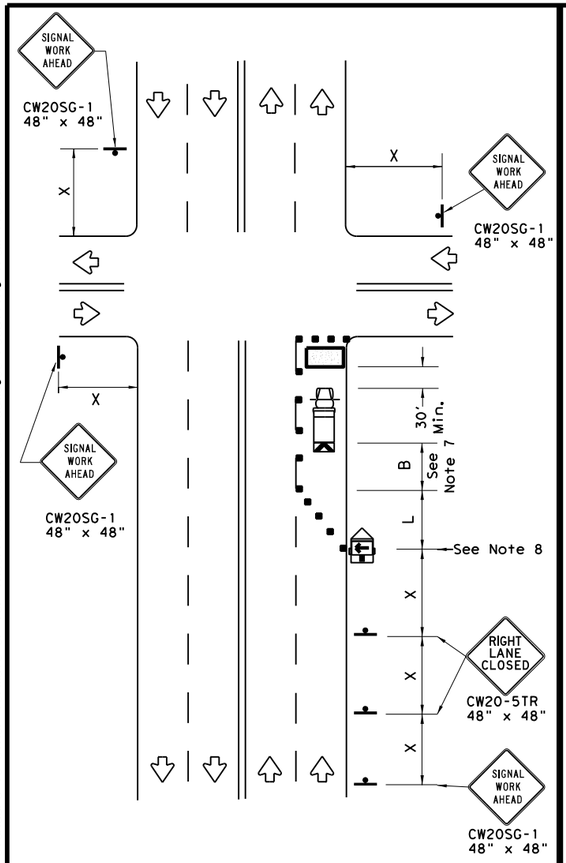
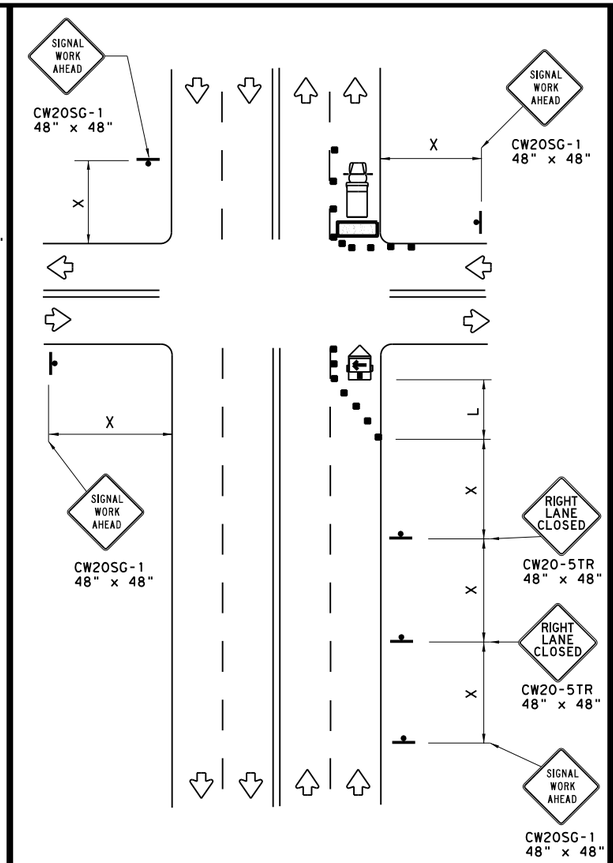


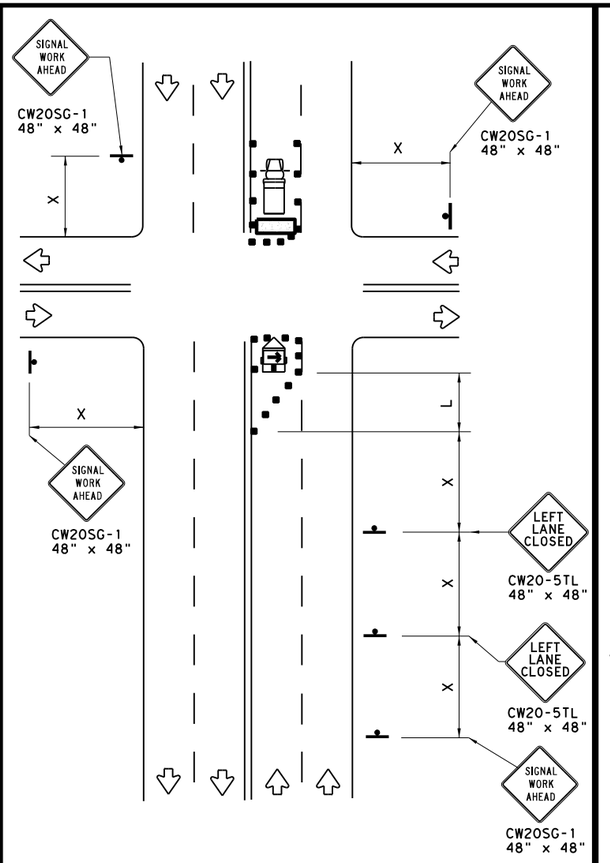

## NEAR SIDE LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



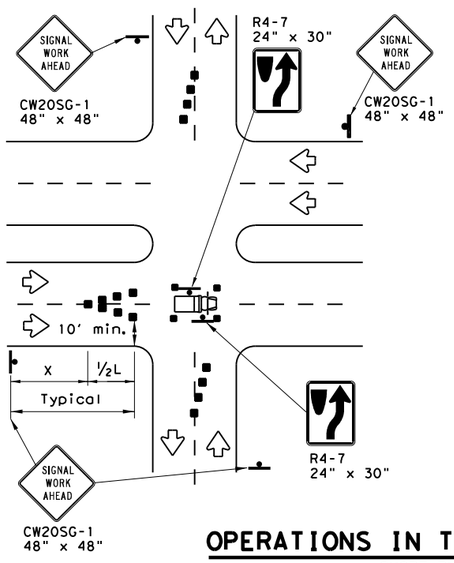

## FAR SIDE RIGHT LANE CLOSURE

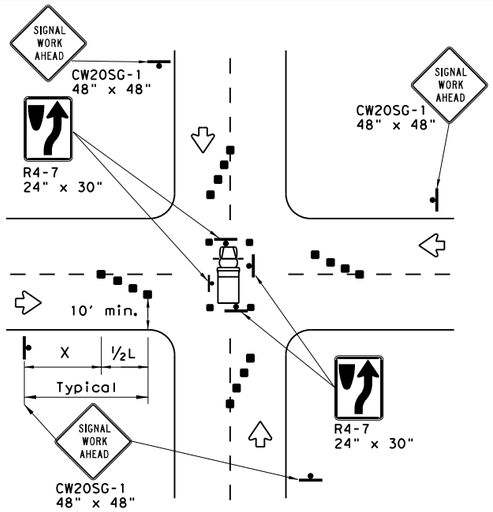
SHORT DURATION OR SHORT TERM STATIONARY




## FAR SIDE LEFT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY




## 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.

## 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)

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



Texas Department of Transportation

Traffic Operations Division Standard

# TRAFFIC SIGNAL WORK TYPICAL DETAILS

## WZ(BTS-1)-13

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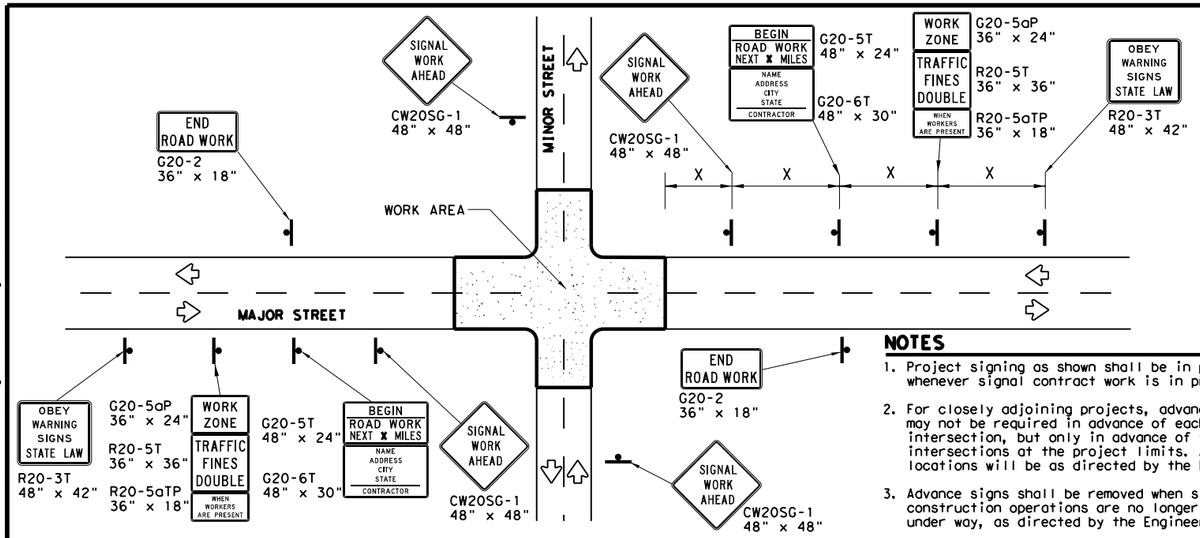



# TYPICAL ADVANCE SIGNAL PROJECT SIGNING

FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS

## NOTES

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

## GENERAL NOTES FOR WORK ZONE SIGNS

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

## DURATION OF WORK

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

## SIGN MOUNTING HEIGHT

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

## REMOVING OR COVERING

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

## REFLECTIVE SHEETING

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

## SIGN SUPPORT WEIGHTS

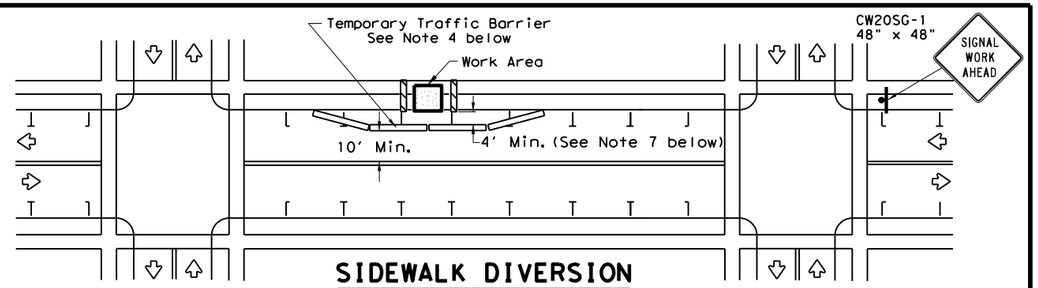
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support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

| LEGEND | |
|---|---|
| | Sign |
| | Channelizing Devices |
| | Type 3 Barricade |

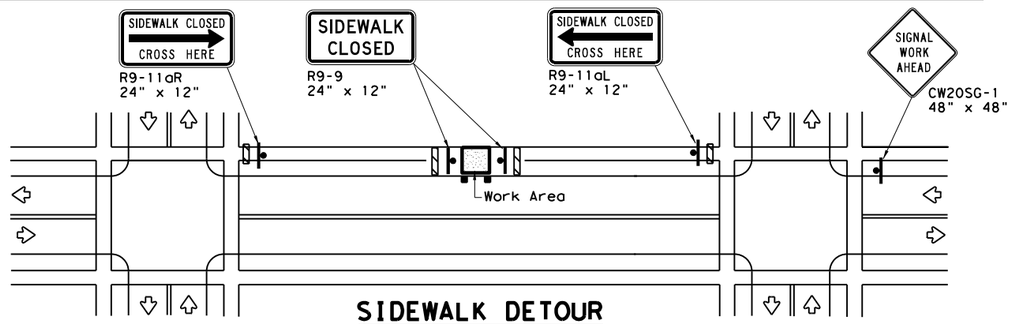
| DEPARTMENTAL MATERIAL SPECIFICATIONS | |
|---|---|
| SIGN FACE MATERIALS | DMS-8300 |
| FLEXIBLE ROLL-UP REFLECTIVE SIGNS | DMS-8310 |

| 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 |

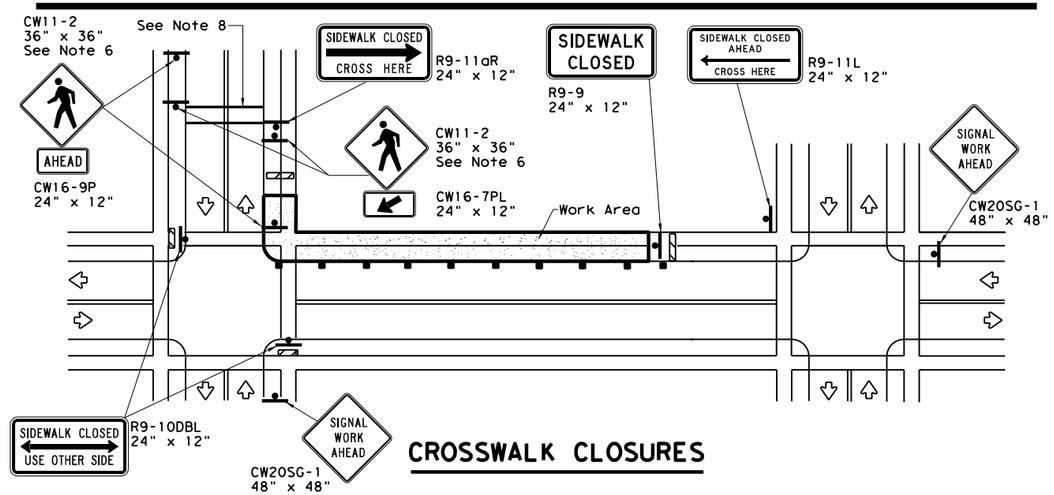
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm




## 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.



Texas Department of Transportation

Traffic Operations Division Standard

# TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

# WZ(BTS-2)-13

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| 2-98 10-99 7-13 | DIST | COUNTY | | SHEET NO. |
| 4-98 3-03 | FTW | TARRANT | | 120 |

# ROADWAY ILLUMINATION ASSEMBLY NOTES

1. Details apply to roadway lighting installations bid or referenced under Item 610, "Roadway Illumination Assemblies." Provide, furnish, and install all other materials not shown on the plans which may be necessary for complete and proper construction. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the State such warranties or guarantees.

2. The locations of poles and fixtures may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC),TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA),and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association, Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection.

4. Provide Roadway Illumination Light Fixtures as per TxDOT Departmental Material Specification (DMS) 11010, Item 610, and as shown on the Material Producers List (MPL) for Roadway Illumination and Electrical Supplies.

5. Fabricate steel roadway illumination poles in accordance with Roadway Illumination Poles (RIP) standards and Item 610. Poles fabricated according to RIP standards do not require shop drawing submittals.

   a. Alternate designs to RIP standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically. For instructions on submitting shop drawings electronically see "Guide to Electronic Shop Drawing Submittal" on the TxDOT web site.

   b. Limitations on use of the RIP standard: The RIP standard details were developed for installations in locations where the 3-second gust basic maximum wind speed is 110 mph, and where the elevation of the base of the pole is less than (i.e. not more than) 25' above the elevation of the surrounding terrain, in accordance with the "AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," 6th Edition (2013) of the AASHTO Design Specifications. For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25' above the surrounding terrain, provide poles meeting the following requirements:

      i. Submittals. Following the electronic shop drawing submittal process (see Guide to Electronic Shop Drawing Submittal on the TxDOT web site), submit to the Engineer for approval fabrication drawings and calculations for the poles, sealed by a Texas licensed professional engineer (P.E.).

      ii. Luminaire Structural Support Requirements. Provide light poles, arms, and anchor bolt assemblies with a 25 year design life to safely resist dead loads, ice loads and the required basic wind speeds at the location of installation in accordance with the 6th edition (2013) of the AASHTO Design Specifications. For transformer base poles, include transformer base and connecting hardware in calculations and shop drawing submittals. Structurally test all transformer bases to resist the theoretical plastic moment capacity of the pole. Submit certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished with the shop drawings. Show breakaway base model number, manufacturer's name, and logo on shop drawings. Include on manufacturer's shop drawings the ASTM designations for all materials to be used.

6. For both transformer and shoe-base type illumination poles, provide and install double-pole breakaway fuse holders as specified by DMS-11040. Breakaway fuse holders are listed on the MPL for Roadway Illumination and Electrical Supplies under Items 610 & 620. Provide 10 amp time delay fuses for breakaway connectors in light poles, or inside the light fixture for underpass luminaires. In each pole, connect luminaires to the breakaway connector with continuous stranded 12 AWG copper conductors as listed on the MPL. Bond all equipment grounding conductors together and to the ground lug in the transformer base or hand hole.

7. Tighten anchor bolts for shoe base, concrete traffic barrier base, and bridge mount roadway illumination poles, in accordance with Item 449.

8. Install T-Base with following procedure:

   a. Anchor Bolt Tightening.

      i. Coat the threads of the anchor bolts with electrically conductive lubricant.

      ii. Place the T-base over the anchor bolts. Foundation must be level and flat. The maximum permissible gap under any one corner of the t-base is 1/8" before nuts are tightened.

      iii. Coat the bearing surfaces of the nuts and washers with electrically conductive lubricant. Install (1) 1/2" hold down washer, (1) lock washer, and (1) nut on each anchor bolt. Turn the nuts onto the bolts so that each is hand-tight against the washer.

      iv. Using a torque wrench, tighten each nut to 150 ft-lb. Uniform contact is required between the foundation and the T-base in the corner regions of the T-base, and all corner gaps must be closed after applying torque. If a gap still exists after torquing to 150 ft-lbs, continue torquing each bolt incrementally until gap is closed or maximum allowable torque of 250 ft. pound is reached, whichever comes first. If 250 ft-lbs is not enough to close the gap the foundation must be leveled. Gaps along the straight sides of the T-bases and the foundation are permissible. Ensure that no high point of contact occurs between the straight sides of the T-base and the foundation.

      v. Check top of T-base for level. If not level then foundation must be leveled.

   b. Top Bolt Procedure

      i. Erect pole over T-base with crane. Coat bolts, nuts, washers, and lock washers with electrically conductive lubricant.

      ii. Install bolts and 1/2" connecting washers from the inside of the T-base, thread up through the pole base. Install flat washers, lock washers and nuts snug tight according to Item 447, "Structural Bolting."

      iii. Tighten each nut to 150 ft-lb. using a torque wrench.

   c. Level and Plumb

      i. Ensure pole is plumb and mast arm is perpendicular to the roadway according to plans to within 5 degrees.

9. Construct luminaire pole foundations in accordance with Item 416, "Drilled Shaft Foundations," and TxDOT standard sheet RID(2).

10. Provide and install underpass luminaires in accordance with Item 610, DMS-11010, and TxDOT standard sheet RID(3). Typical luminaire size for underpass luminaires is 150W HPS or 150W EQ LED.

11. Mount luminaires on arms level as shown by the luminaire level indicator.

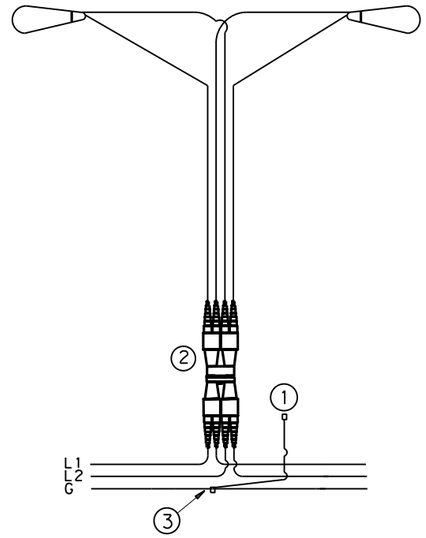
12. Orient luminaires perpendicular to the roadway intended to be lit unless otherwise shown on the plans.

## Wiring Diagram Notes:

(1) Use 1/2 in.-13 UNC threaded, copper or tin-plated copper, pole bonding connector, sized appropriately for conductors, bonded to T-base, or use ground lug in handhole as available.

(2) Use pre-qualified two-pole breakaway connectors for all luminaire pole installations. For luminaires fed by a circuit with a neutral conductor, use double pole breakaway connectors with the neutral side unfused and marked white.

(3) Split Bolt or other connector.




L1,L2 = Hot Conductors
G = Grounding Conductor

**TYPICAL WIRING DIAGRAM**

LUMINAIRES SERVED AT 480V ON 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR 120/240 VOLT SERVICE.

## Decorative LED Lighting Notes:

1. LED Drivers in Remote Outdoor enclosures (for drivers that do not include an enclosure as part of a factory assembly):

   a. Provide NEMA 3R outdoor enclosure or as approved.

   b. Install enclosure at least 12" above ground or other horizontal surface. Mount vertically or on ceiling, and avoid direct sun where possible.

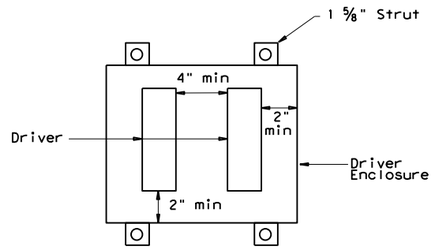
   c. Install drivers with at least 2 inches of space from enclosure walls.

   d. For multiple drivers in an enclosure, provide at least 4 inches side to side and 1 inch end to end from other drivers or electronic equipment

   e. For drivers mounted on back wall of enclosure, mount enclosure on 1 5/8" strut or other standoff to dissipate heat, or mount driver to side of the enclosure or to the metal cover.

   f. Provide remote drivers with a maximum of 100 watts

   g. Provide drivers with documentation of 100,000 hr lifetime at Tcase of 65C or higher.




Driver Spacing In Remote Enclosure

Texas Department of Transportation — Traffic Safety Division Standard

# ROADWAY ILLUMINATION DETAILS

# RID(1)-20

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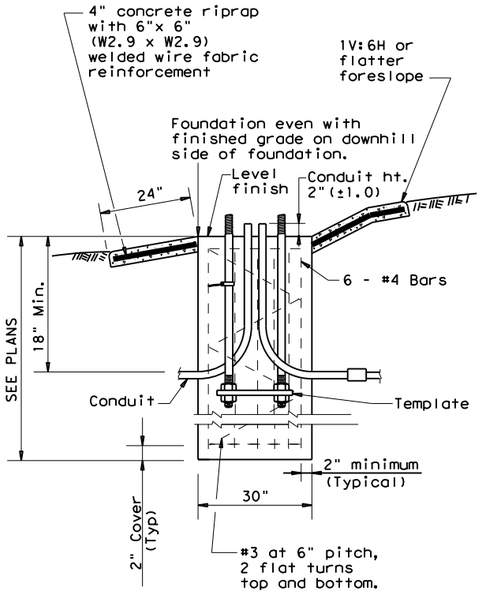
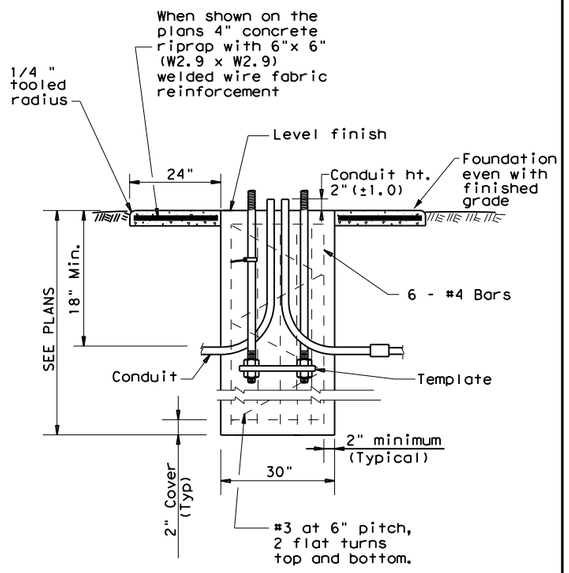



## SECTION A-A
SHOWING SLOPED GRADE




## SECTION A-A
SHOWING CONSTANT GRADE

**TABLE 1**

**ANCHOR BOLTS**

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

**TABLE 2**

RECOMMENDED FOUNDATION LENGTHS (See note 1)

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

**TABLE 3**

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

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

## GENERAL NOTES:

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

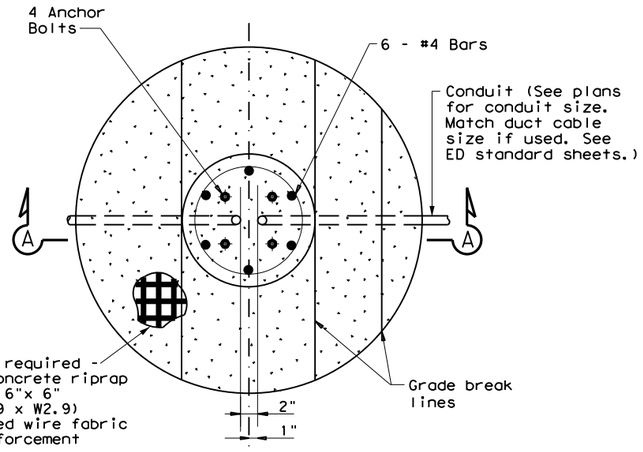
**TABLE 4**

**BREAKAWAY POLE PLACEMENT (See note 6)**

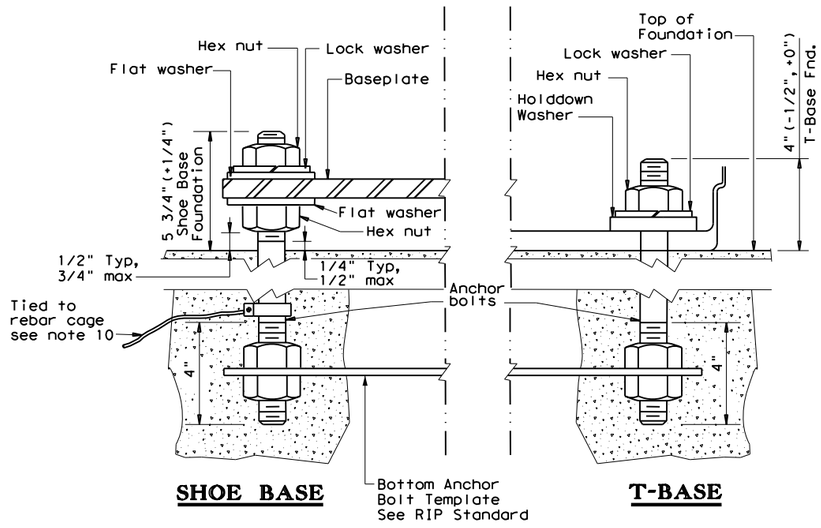
| ROADWAY FUNCTIONAL CLASSIFICATION | ** POLE OFFSET (DISTANCE TO FACE OF TRANSFORMER BASE) |
|---|---|
| Freeway Mainlanes (roadway with full control of access) | 15 ft. (minimum and typical) from lane edge |
| All curbed, 45 mph or less design speed | 2.5 ft. minimum (15 ft. desirable) from curb face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

* or as close to ROW line as is practical

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




## FOUNDATION DETAIL




SHOE BASE T-BASE

## ANCHOR BOLT DETAIL

Texas Department of Transportation

Traffic Safety Division Standard

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

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# SUMMARY OF SMALL SIGNS

| PLAN SHEET NO. | SIGN NO. | SIGN NOMENCLATURE | SIGN | DIMENSIONS | FLAT ALUMINUM (TYPE A) | EXAL ALUMINUM (TYPE G) | SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE | POSTS | ANCHOR TYPE | MOUNTING DESIGNATION PREFABRICATED | MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels | BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80 | 1 or 2 | UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic | P = "Plain" T = "T" U = "U" | | TY N TY S |
| 92 | S1 | R3-8LL | ONLY ONLY | 36"x36" | | | MAST ARM | | | U | EXAL | |
| 92 | S2 | | FORT WORTH ← 3500 Altamesa Blvd 3400 → | 120"X20" | | | MAST ARM | | | U | EXAL | |
| 92 | S3 | R10-17T(MOD) | LEFT TURN YIELD ON FLASHING | 36"X42" | | | 10BWG | 1 | SA | P | | |
| 92 | S4 | R3-2 | | 36"X36" | | | MAST ARM | | | U | EXAL | |
| 92 | S5 | | FORT WORTH ← 6400 McCart Ave 6500 → | 120"X20" | | | MAST ARM | | | U | EXAL | |
| 92 | S6 | R10-5L | LEFT ON GREEN ARROW ONLY | 30"X36" | | | MAST ARM | | | U | EXAL | |
| 92 | S7 | | FORT WORTH ← 3400 Altamesa Blvd 3500 → | 120"X20" | | | MAST ARM | | | U | EXAL | |
| 92 | S8 | R10-17T(MOD) | LEFT TURN YIELD ON FLASHING | 36"X42" | | | 10BWG | 1 | SA | P | | |
| 92 | S9 | R3-2 | | 36"X36" | | | MAST ARM | | | U | EXAL | |
| 92 | S10 | | FORT WORTH ← 6500 McCart Ave 6400 → | 120"X20" | | | MAST ARM | | | U | EXAL | |
| 92 | S11 | R10-5L | LEFT ON GREEN ARROW ONLY | 30"X36" | | | MAST ARM | | | U | EXAL | |

| ALUMINUM SIGN BLANKS THICKNESS | |
|---|---|
| | Minimum Thickness |
| | 0.080" |
| | 0.100" |
| | 0.125" |

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
http://www.txdot.gov/

Sqare Feet
Less than 7.5
7.5 to 15
Greater than 15

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED
PROFESSIONAL ENGINEER
07/07/2022

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

DATE:
FILE:

Texas Department of Transportation

Traffic Operations Division Standard

# SUMMARY OF SMALL SIGNS

## SOSS

| FILE: | sums16.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|---|
| © TxDOT | May 1987 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | | 0902 | 90 | 119 | McCART |
| 4-16 | | DIST | COUNTY | | SHEET NO. |
| 8-16 | | FTW | TARRANT | | 123 |

# SUMMARY OF SMALL SIGNS

| PLAN SHEET NO. | SIGN NO. | SIGN NOMENCLATURE | SIGN | DIMENSIONS | FLAT ALUMINUM (TYPE A) | EXAL ALUMINUM (TYPE G) | SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE | POSTS | ANCHOR TYPE | MOUNTING DESIGNATION PREFABRICATED | MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels | BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80 | 1 or 2 | UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic | P = "Plain" T = "T" U = "U" | | |
| 125 | S12 | R3-5L |   | 30"X30" | | | 10BWG | 1 | SA | P | | |
| 125 | S13 | W23-2 |   | 36"X36" | | | 10BWG | 1 | SA | P | | |
| 125 | S14 | |   | 24"X36" | | | 10BWG | 1 | SA | P | | |
| 126 | S15 | R3-2 |  | 36"X36" | | | 10BWG | 1 | SA | P | | |
| 126 | S16 | R5-1 |   | 36"X36" | | | 10BWG | 1 | SA | P | | |
| 126 | S17 | R3-5L |   | 30"X36" | | | 10BWG | 1 | SA | P | | |
| 126 | S18 | R4-7L |  | 24"X30" | | | 10BWG | 1 | SA | P | | |
| 126 | S19 | R3-7R |   | 36"X36" | | | 10BWG | 1 | SA | P | | |
| 126 | S20 | R1-5B |   | 36"X36" | | | 10BWG | 1 | SA | P | | |
| 127 | S21 | R3-5L |   | 30"X36" | | | 10BWG | 1 | SA | P | | |
| 127 | S22 | W23-2 |   | 36"X36" | | | 10BWG | 1 | SA | P | | |
| 127 | S23 | |   | 24"X36" | | | 10BWG | 1 | SA | P | | |

| ALUMINUM SIGN BLANKS THICKNESS | |
|---|---|
| | Minimum Thickness |
| | 0.080" |
| | 0.100" |
| | 0.125" |

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
http://www.txdot.gov/

| Square Feet |
|---|
| Less than 7.5 |
| 7.5 to 15 |
| Greater than 15 |

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED PROFESSIONAL ENGINEER
07/07/2022

Texas Department of Transportation

Traffic Operations Division Standard

# SUMMARY OF SMALL SIGNS

## SOSS

| FILE: sums16.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT May 1987 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0902 | 90 | 119 | McCART |
| 4-16 | DIST | COUNTY | | SHEET NO. |
| 8-16 | FTW | TARRANT | | 124 |

18



DATE:
FILE:

# SUMMARY OF SMALL SIGNS

| PLAN SHEET NO. | SIGN NO. | SIGN NOMENCLATURE | SIGN | DIMENSIONS | FLAT ALUMINUM (TYPE A) | EXAL ALUMINUM (TYPE G) | SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE | POSTS | ANCHOR TYPE | MOUNTING DESIGNATION PREFABRICATED | MOUNTING DESIGNATION 1EXT or 2EXT | BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | FRP = Fiberglass<br>TWT = Thin-Wall<br>10BWG = 10 BWG<br>S80 = Sch 80 | 1 or 2 | UA=Universal Conc<br>UB=Universal Bolt<br>SA=Slipbase-Conc<br>SB=Slipbase-Bolt<br>WS=Wedge Steel<br>WP=Wedge Plastic | P = "Plain"<br>T = "T"<br>U = "U" | 1EXT or 2EXT = # of Ext<br>BM = Extruded Wind Beam<br>WC = 1.12 #/ft Wing Channel<br>EXAL= Extruded Alum Sign Panels | TY N<br>TY S |
| 127 | S24 | R1-1 |  | 30"X30" | | | 10BWG | 1 | SA | P | | |
| 128 | S25 | R3-8 |  | 36"X36" | | | 10BWG | 1 | SA | P | | |



DATE:
FILE:

| ALUMINUM SIGN BLANKS THICKNESS | |
|---|---|
| | Minimum Thickness |
| | 0.080" |
| | 0.100" |
| | 0.125" |

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
http://www.txdot.gov/

Square Feet
Less than 7.5
7.5 to 15
Greater than 15

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
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3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).


Texas Department of Transportation

Traffic Operations Division Standard

# SUMMARY OF SMALL SIGNS

## SOSS

| FILE: sums16.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| © TxDOT May 1987 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0902 | 90 | 119 | McCART |
| 4-16<br>8-16 | DIST | COUNTY | | SHEET NO. |
| | FTW | TARRANT | | 124A |

S12


R3-5L
(30"x36")

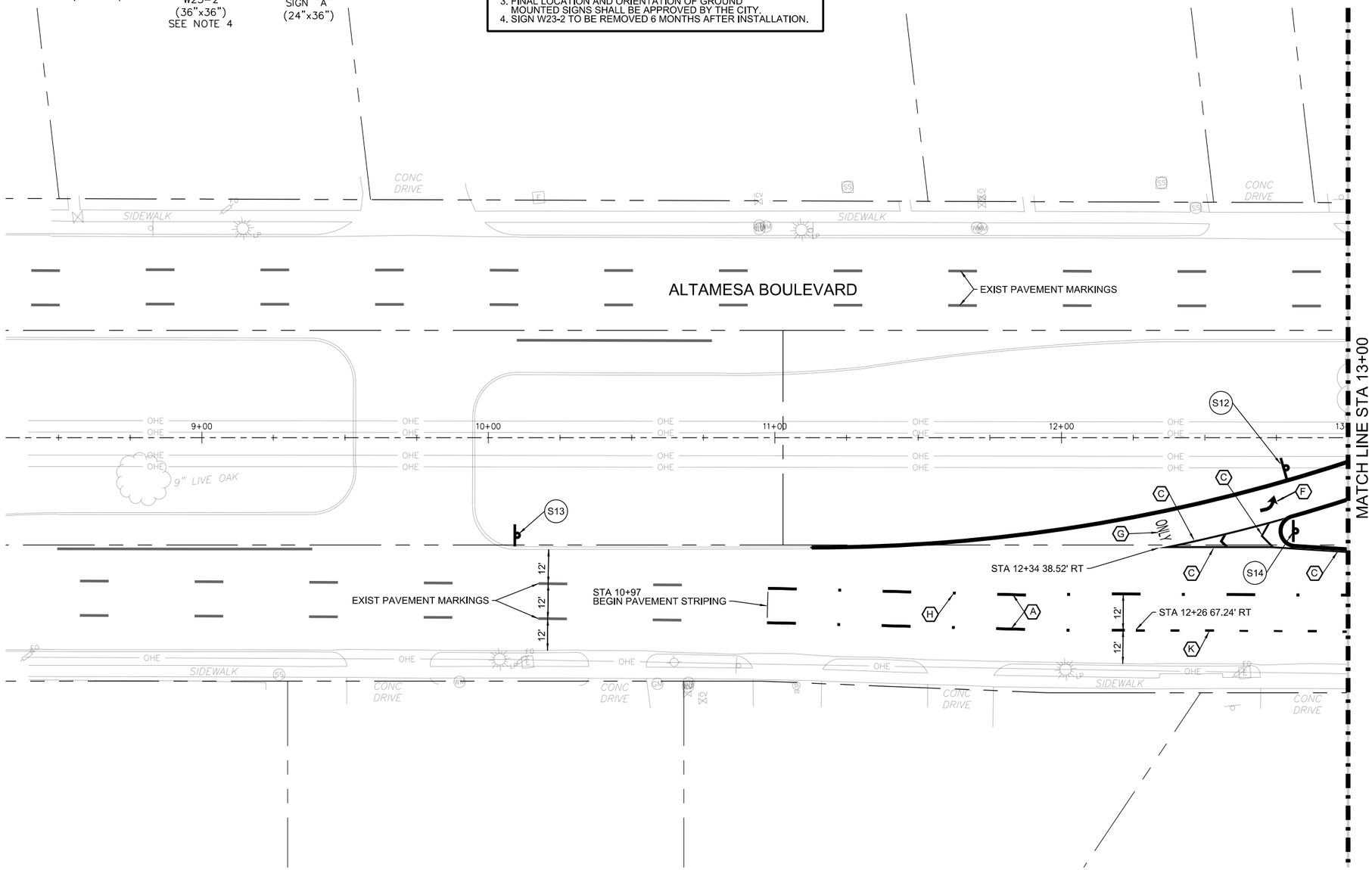
S13


W23-2
(36"x36")
SEE NOTE 4

S14


SIGN "A"
(24"x36")

NOTES:
1. ALL SIGNS SHALL BE FABRICATED AND INSTALLED IN ACCORDANCE WITH THE LATEST VERSION OF TxMUTCD.
2. THE EDGE OF SIGN CLOSEST TO THE ROADWAY SHALL BE AT LEAST 1.5' FROM BACK OF CURB.
3. FINAL LOCATION AND ORIENTATION OF GROUND MOUNTED SIGNS SHALL BE APPROVED BY THE CITY.
4. SIGN W23-2 TO BE REMOVED 6 MONTHS AFTER INSTALLATION.




0 20 40 60
GRAPHIC SCALE IN FEET

## PAVEMENT MARKINGS LEGEND

- (A) REFL PAV MAR TY I (W) 6" (BRK)
- (B) REFL PAV MAR TY I (W) 24" (SLD)
- (C) REFL PAV MAR TY I (W) 8" (SLD)
- (D) REFL PAV MAR TY I (W) 12" (SLD)
- (E) REFL PAV MAR TY I (Y) 6" (SLD)
- (F) REFL PAV MAR TY I (W) (ARROW)
- (G) REFL PAV MAR TY I (W) (WORD)
- (H) REFL PAV MRKR TY II-C-R
- (I) PAV MRKR TY II-A-A
- (J) NOT USED
- (K) REFL PAV MAR TY I (W) 8" (DOT)
- (L) CROSSWALK LINE (W) (24"x10')
- (M) REFL PAV MAR TY I (Y) 6" (DOT)

STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED
PROFESSIONAL ENGINEER
07/07/2022

MULTATECH ARCHITECTS ENGINEERS
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SUITE 400
FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351

Texas Department of Transportation

# PAVEMENT MARKINGS & SIGNAGE PLAN ALTAMESA BLVD BEGIN PROJECT TO STA 13+00

SHEET 1 OF 4

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | |
| REVISIONS | STATE | DISTRICT | COUNTY | 125 |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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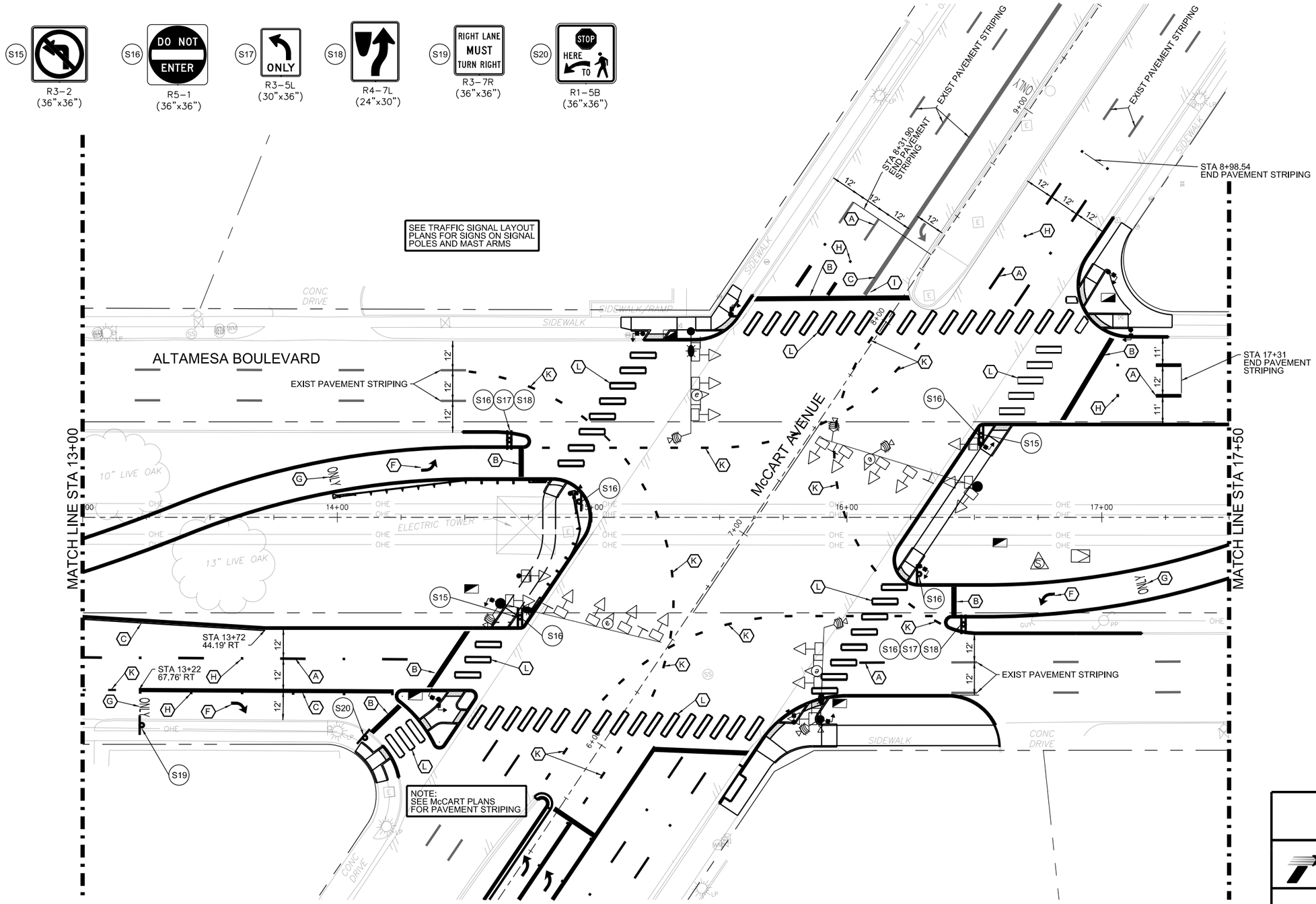


## PAVEMENT MARKINGS LEGEND

- (A) REFL PAV MAR TY I (W) 6" (BRK)
- (B) REFL PAV MAR TY I (W) 24" (SLD)
- (C) REFL PAV MAR TY I (W) 8" (SLD)
- (D) REFL PAV MAR TY I (W) 12" (SLD)
- (E) REFL PAV MAR TY I (Y) 6" (SLD)
- (F) REFL PAV MAR TY I (W) (ARROW)
- (G) REFL PAV MAR TY I (W) (WORD)
- (H) REFL PAV MRKR TY II-C-R
- (I) PAV MRKR TY II-A-A
- (J) NOT USED
- (K) REFL PAV MAR TY I (W) 8" (DOT)
- (L) CONTRAST CROSSWALK LINE (CFW DETAIL D642)
- (M) REFL PAV MAR TY I (Y) 6" (DOT)

NOTES:
1. ALL SIGNS SHALL BE FABRICATED AND INSTALLED IN ACCORDANCE WITH THE LATEST VERSION OF TxMUTCD.
2. THE EDGE OF SIGN CLOSEST TO THE ROADWAY SHALL BE AT LEAST 1.5' FROM BACK OF CURB.
3. FINAL LOCATION AND ORIENTATION OF GROUND MOUNTED SIGNS SHALL BE APPROVED BY THE CITY.
4. SIGN W23-2 TO BE REMOVED 6 MONTHS AFTER INSTALLATION.

STATE OF TEXAS
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07/07/2022


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TBPE Reg #F351


Texas Department of Transportation

# PAVEMENT MARKINGS & SIGNAGE PLAN ALTAMESA BLVD STA 13+00 TO STA 17+50

SHEET 2 OF 4

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 126 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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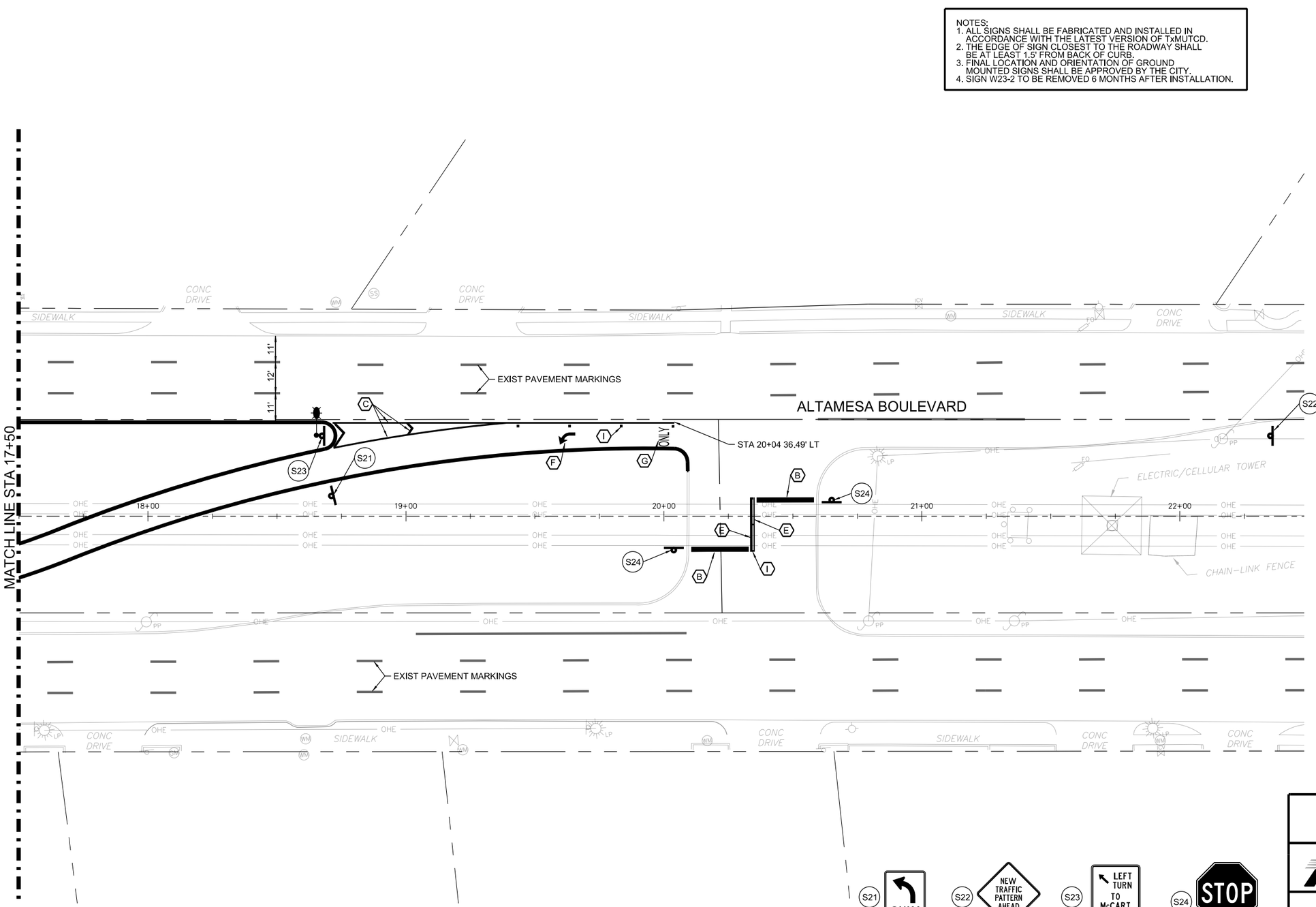
NOTES:
1. ALL SIGNS SHALL BE FABRICATED AND INSTALLED IN ACCORDANCE WITH THE LATEST VERSION OF TxMUTCD.
2. THE EDGE OF SIGN CLOSEST TO THE ROADWAY SHALL BE AT LEAST 1.5' FROM BACK OF CURB.
3. FINAL LOCATION AND ORIENTATION OF GROUND MOUNTED SIGNS SHALL BE APPROVED BY THE CITY.
4. SIGN W23-2 TO BE REMOVED 6 MONTHS AFTER INSTALLATION.




0 20 40 60
GRAPHIC SCALE IN FEET

## PAVEMENT MARKINGS LEGEND

- (A) REFL PAV MAR TY I (W) 4" (BRK)
- (B) REFL PAV MAR TY I (W) 24" (SLD)
- (C) REFL PAV MAR TY I (W) 8" (SLD)
- (D) REFL PAV MAR TY I (W) 12" (SLD)
- (E) REFL PAV MAR TY I (Y) 4" (SLD)
- (F) REFL PAV MAR TY I (W) (ARROW)
- (G) REFL PAV MAR TY I (W) (WORD)
- (H) REFL PAV MRKR TY II-C-R
- (I) PAV MRKR TY II-A-A
- (J) NOT USED
- (K) REFL PAV MAR TY I (W) 8" (DOT)
- (L) CROSSWALK LINE (W) (24"x10')
- (M) REFL PAV MAR TY I (Y) 4" (DOT)

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PROFESSIONAL ENGINEER
07/07/2022


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FORT WORTH, TEXAS 76107
(817) 877-5571
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# PAVEMENT MARKINGS & SIGNAGE PLAN ALTAMESA BLVD STA 17+50 TO END PROJECT

SHEET 3 OF 4

| REVISIONS | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | |
| | STATE | DISTRICT | COUNTY | 127 |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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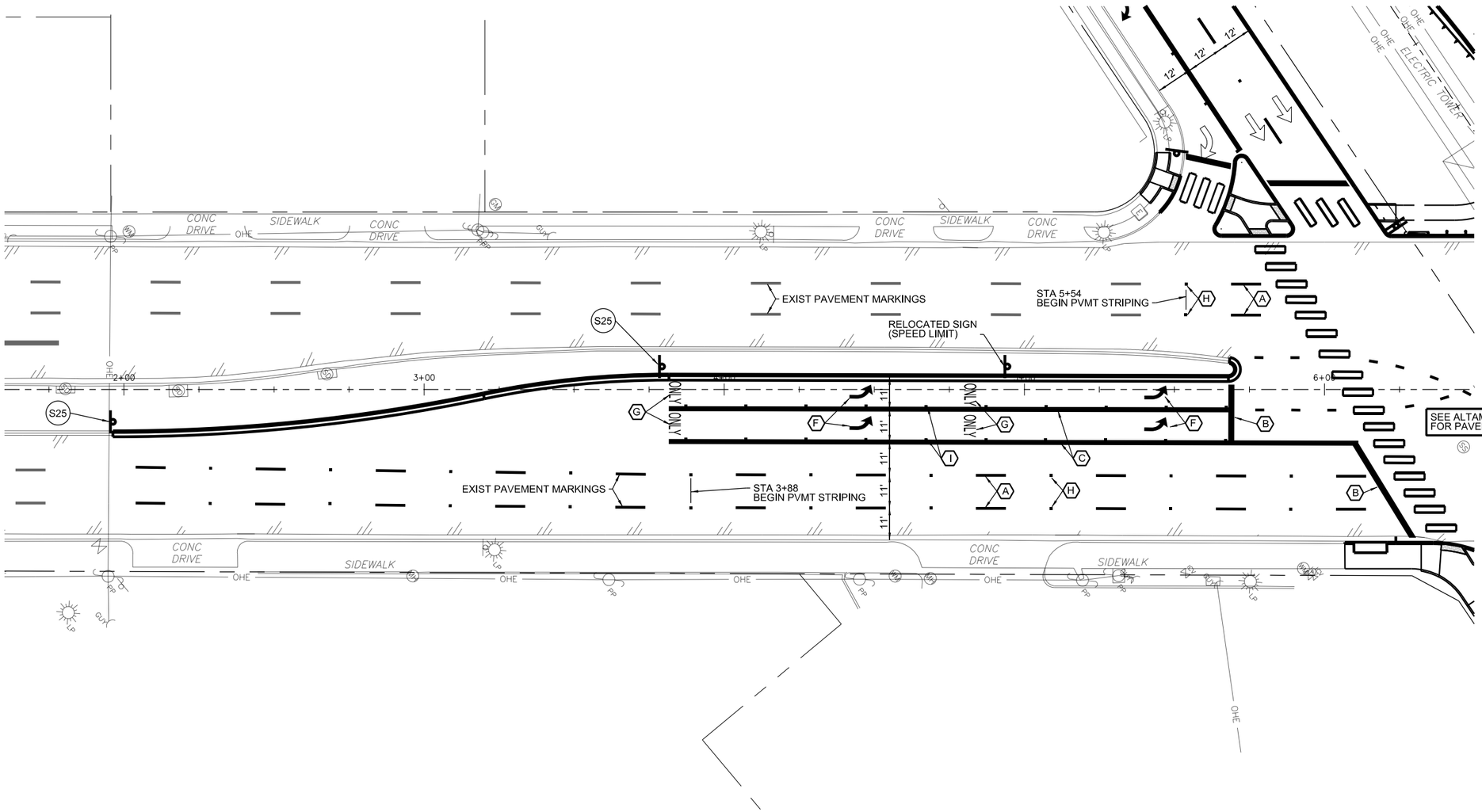


0 20 40 60
GRAPHIC SCALE IN FEET

## PAVEMENT MARKINGS LEGEND

- (A) REFL PAV MAR TY I (W) 4" (BRK)
- (B) REFL PAV MAR TY I (W) 24" (SLD)
- (C) REFL PAV MAR TY I (W) 8" (SLD)
- (D) REFL PAV MAR TY I (W) 12" (SLD)
- (E) REFL PAV MAR TY I (Y) 4" (SLD)
- (F) REFL PAV MAR TY I (W) (ARROW)
- (G) REFL PAV MAR TY I (W) (WORD)
- (H) REFL PAV MRKR TY II-C-R
- (I) REFL PAV MRKR TY I-C
- (J) REFL PAV MAR TY I (W) 18" (YLD TRI)
- (K) REFL PAV MAR TY I (W) 8" (DOT)
- (L) CROSSWALK LINE (W) (24"x10')
- (M) REFL PAV MAR TY I (Y) 4" (DOT)

NOTES:
1. ALL SIGNS SHALL BE FABRICATED AND INSTALLED IN ACCORDANCE WITH THE LATEST VERSION OF TxMUTCD.
2. THE EDGE OF SIGN CLOSEST TO THE ROADWAY SHALL BE AT LEAST 1.5' FROM BACK OF CURB.
3. FINAL LOCATION AND ORIENTATION OF GROUND MOUNTED SIGNS SHALL BE APPROVED BY THE CITY.
4. SIGN W23-2 TO BE REMOVED 6 MONTHS AFTER INSTALLATION.

S25 — ONLY | ONLY
R3-8
(36"x36")

STATE OF TEXAS
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PROFESSIONAL ENGINEER
07/07/2022


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(817) 877-5571
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# PAVEMENT MARKINGS & SIGNAGE PLAN McCART AVE

SHEET 4 OF 4

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 128 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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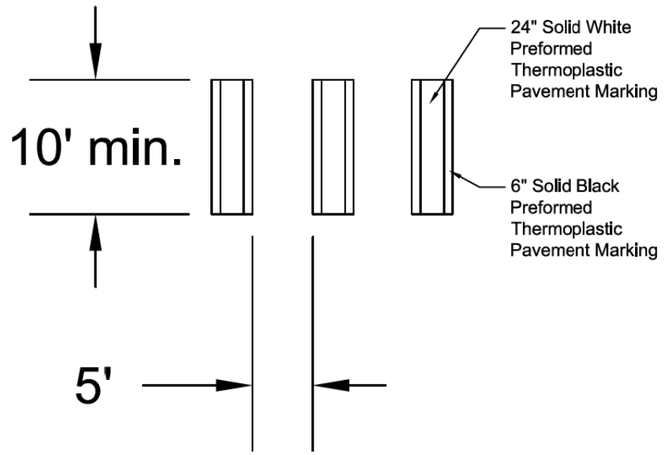
# CONTRAST CROSSWALK

NOTES:

1. CROSSWALKS AND STOP BARS SHALL BE WHITE.
2. PREFORMED THERMOPLASTIC SHALL BE USED FOR ALL CROSSWALK PAVEMENT MARKINGS.
3. PREFORMED THERMOPLASTIC MATERIAL SHALL BE SUPPLIED BY A MANUFACTURER LISTED ON TxDOT'S MATERIAL PRODUCER LIST (MPL).




FORT WORTH

CITY OF FORT WORTH, TEXAS

**PAVEMENT MARKINGS DETAILS**

**SHEET 5 of 6**

REVISED: 12-18-2020

**32 17 23-D642**

STATE OF TEXAS
ERIC A. CANALES
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05/19/2022


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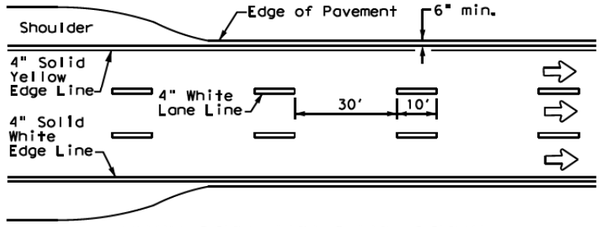
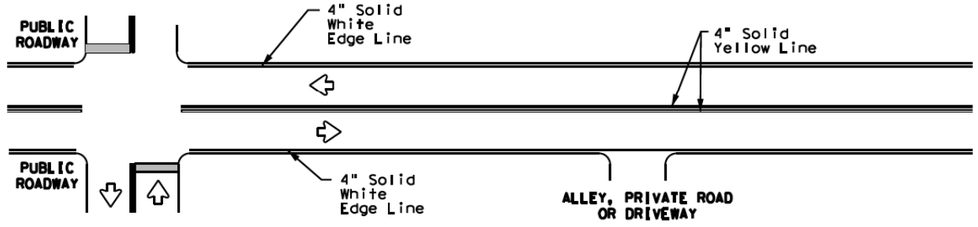
Texas Department of Transportation

CFW - DETAIL D642

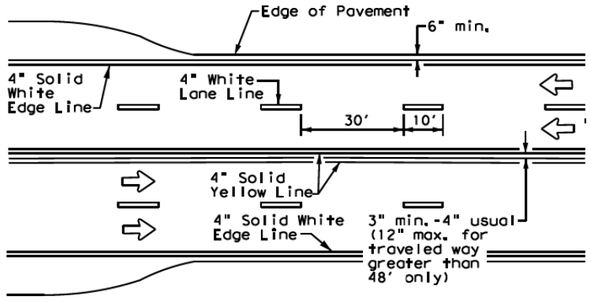
| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | |
| REVISIONS | STATE | DISTRICT | COUNTY | 128A |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



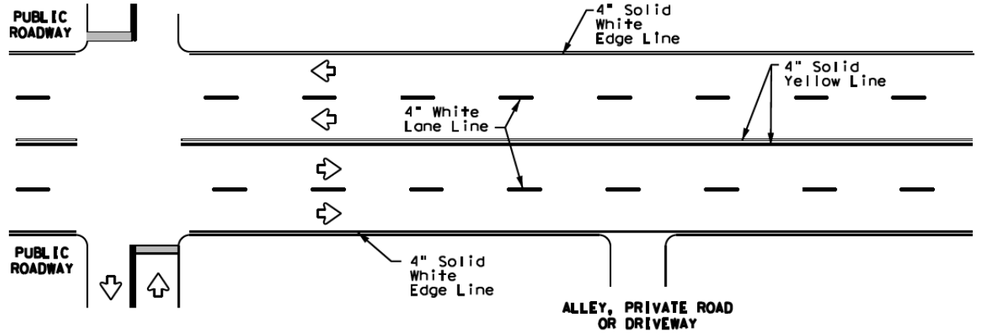

## EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



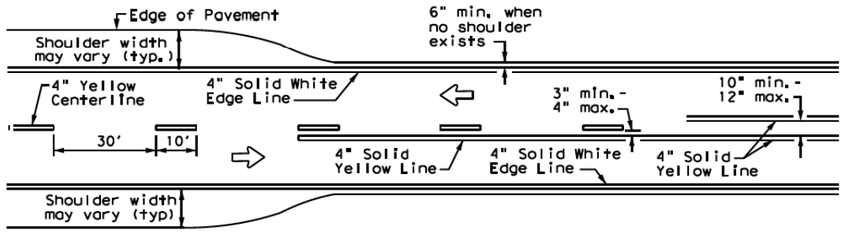

## TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



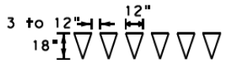

## CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



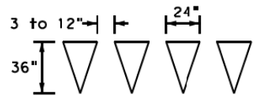

## TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS




## TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

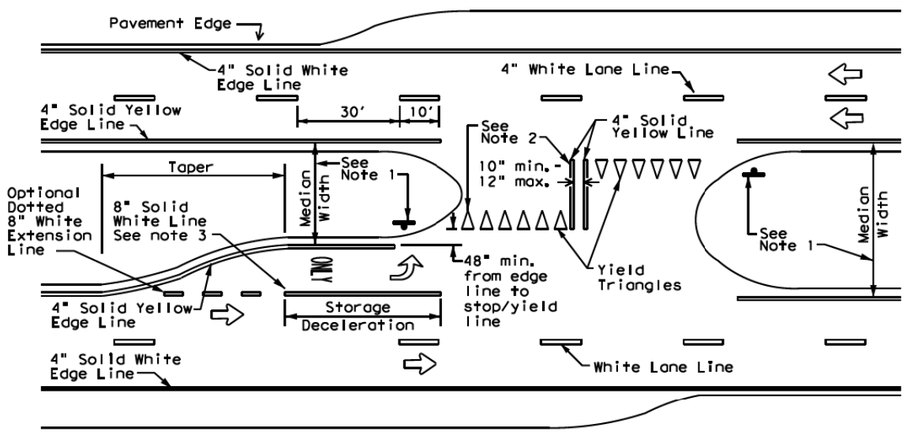



For posted speed on road being marked equal to or less than 40 MPH.




For posted speed on road being marked equal to or greater than 45 MPH.

## YIELD LINES




## FOUR LANE DIVIDED ROADWAY CROSSOVERS

### NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.

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

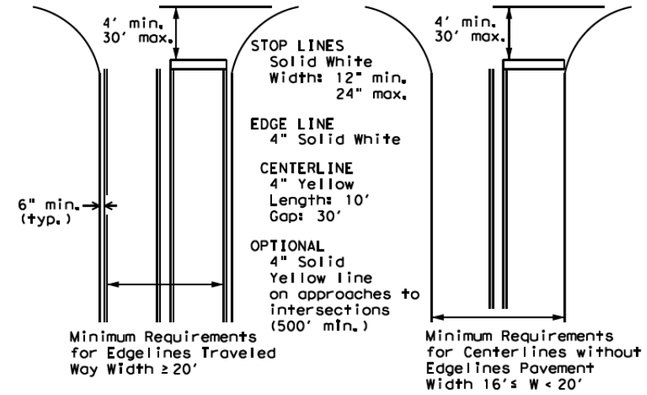
### GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.

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

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

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




## GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

# TYPICAL STANDARD PAVEMENT MARKINGS

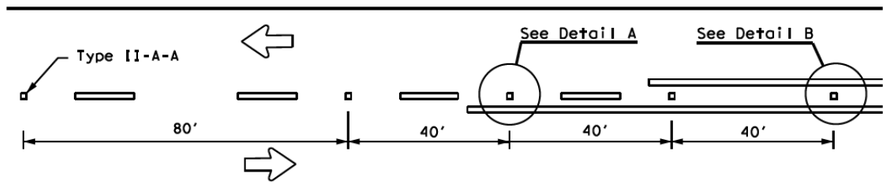
# PM(1)-20

| FILE: pm1-20.dgn | DN: | CK: | DW: | CK: |
|---|---|---|---|---|
| ©TxDOT November 1978 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS 8-95 3-03 | 0902 | 90 | 119 | McCART |
| 5-00 2-12 | DIST | COUNTY | | SHEET NO. |
| 8-00 6-20 | FTW | TARRANT | | 129 |

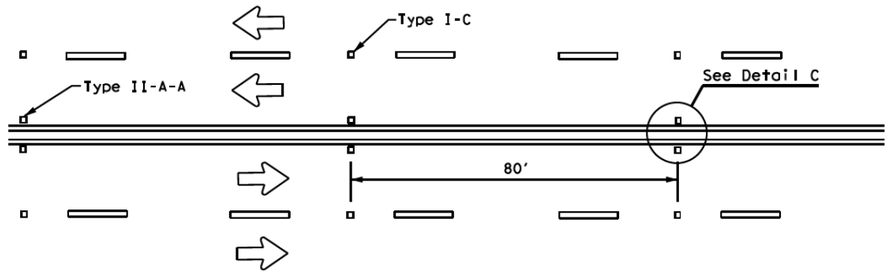
22A

DATE:
FILE:

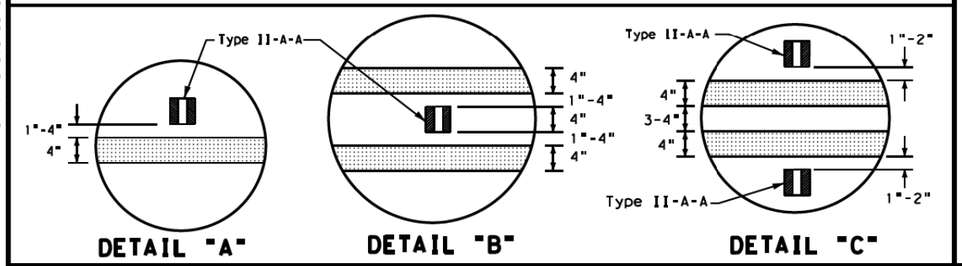
# REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



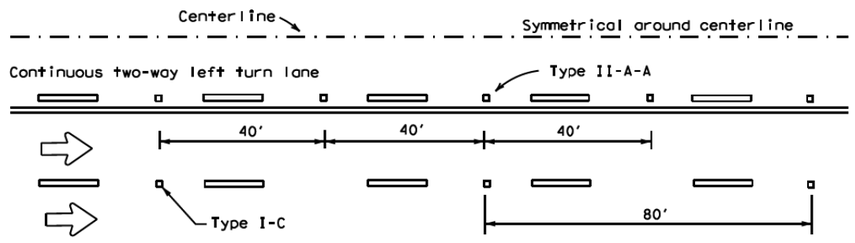

## CENTERLINE FOR ALL TWO LANE ROADWAYS



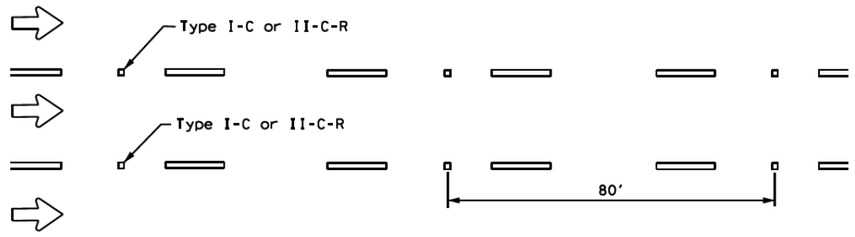

## CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS




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

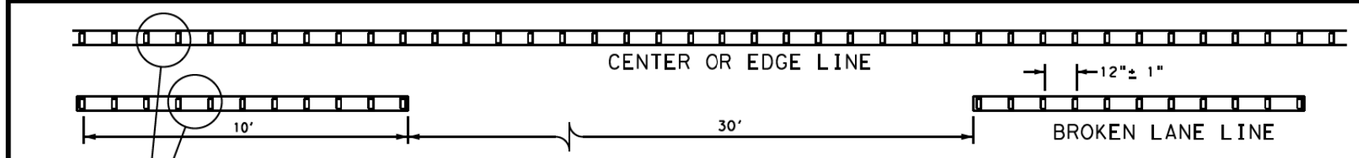



## CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



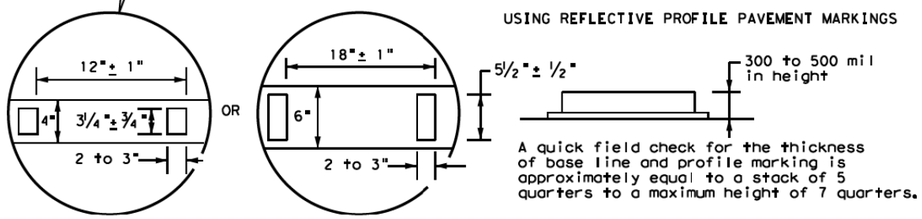

## LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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




## REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS




4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

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

**NOTE**

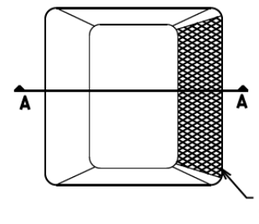
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

## GENERAL NOTES

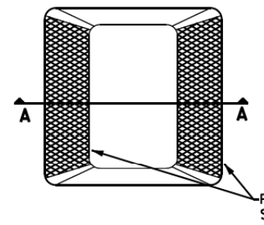
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

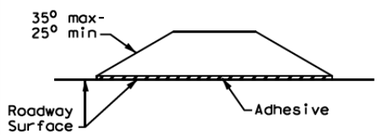
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.




**Type I (Top View)**




**Type II (Top View)**




**SECTION A**

## RAISED PAVEMENT MARKERS

Texas Department of Transportation

Traffic Safety Division Standard

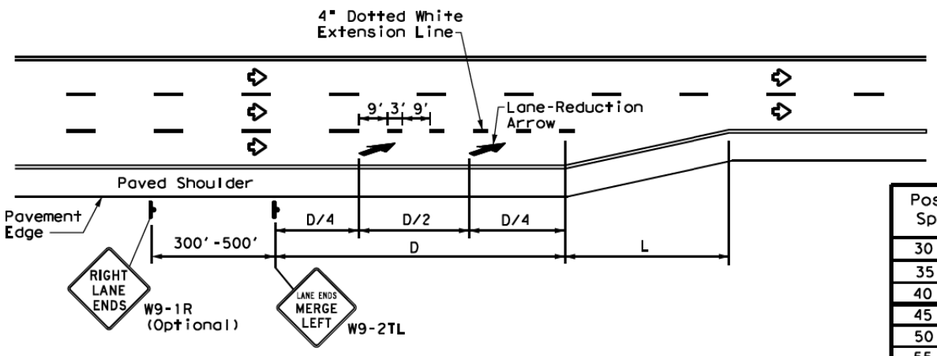
# POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-20

| FILE: pm2-20.dgn | DN: | CK: | DW: | CK: |
|---|---|---|---|---|
| ©TxDOT April 1977 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS 4-92 2-10 5-00 2-12 8-00 6-20 | 0902 | 90 | 119 | McCART |
| | DIST | COUNTY | | SHEET NO. |
| | FTW | TARRANT | | 130 |

228

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

DATE:
FILE:

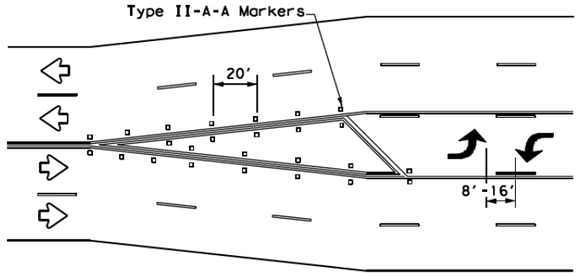



## LANE REDUCTION

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

## NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional W9-1R "RIGHT LANE ENDS" sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.




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

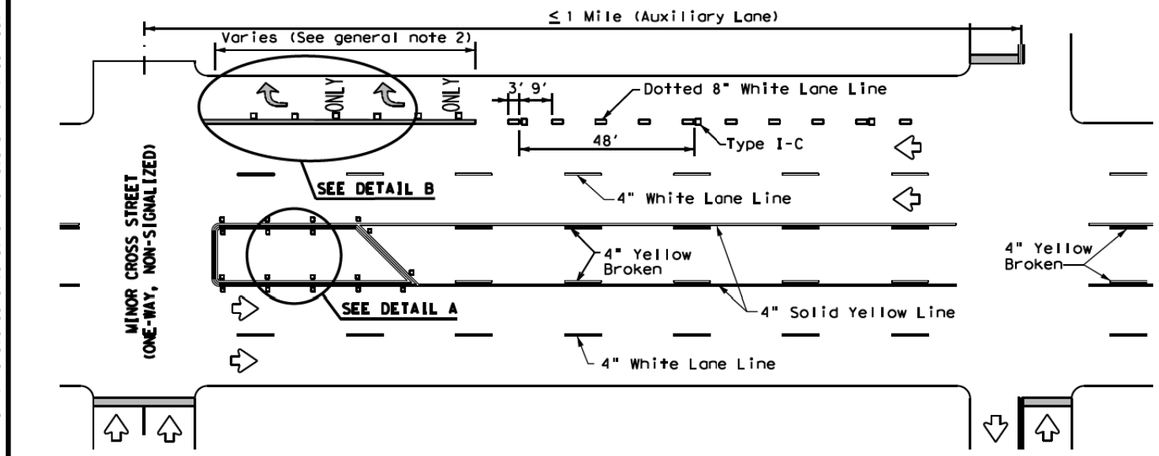
## TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

## GENERAL NOTES

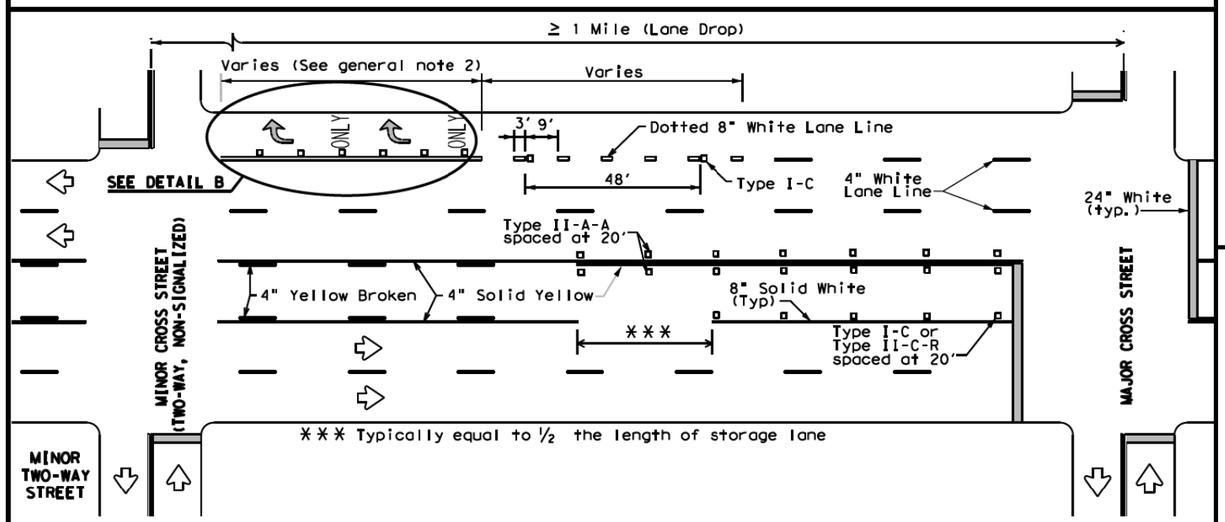
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

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

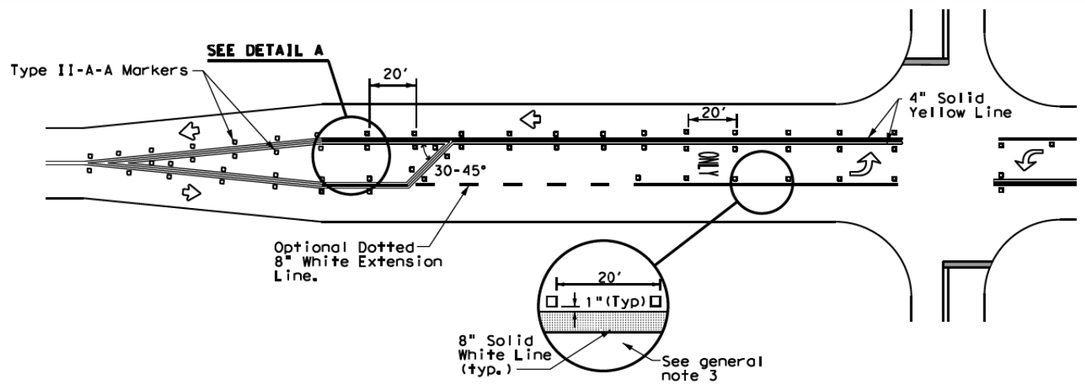
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



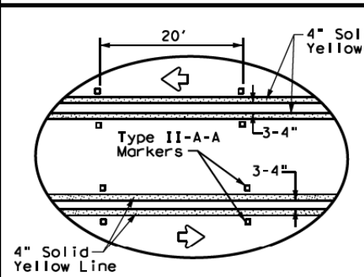

## TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



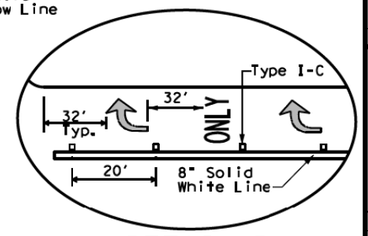

## TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP




## TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS




DETAIL A




DETAIL B

Texas Department of Transportation

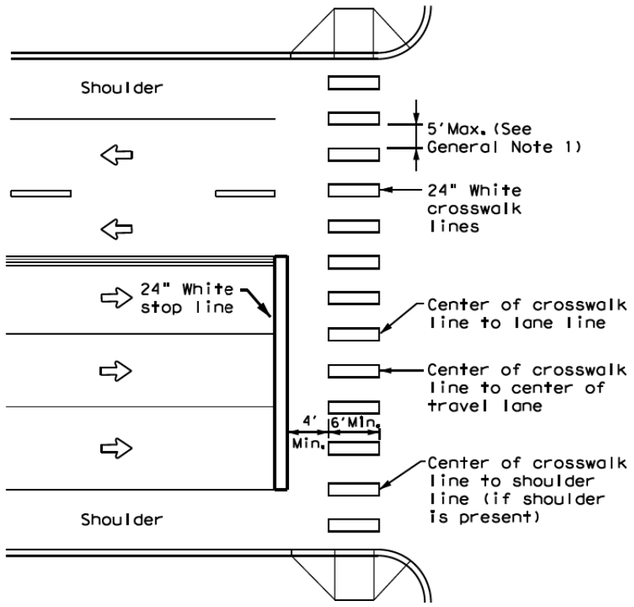
Traffic Safety Division Standard

# TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-20

| FILE: pm3-20.dgn | DN: | CK: | DW: | CK: |
|---|---|---|---|---|
| ©TxDOT April 1998 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0902 | 90 | 119 | McCART |
| 5-00 2-10 | DIST | COUNTY | | SHEET NO. |
| 8-00 2-12 | FTW | TARRANT | | 131 |
| 3-03 6-20 | | | | |

22C

DATE:
FILE:



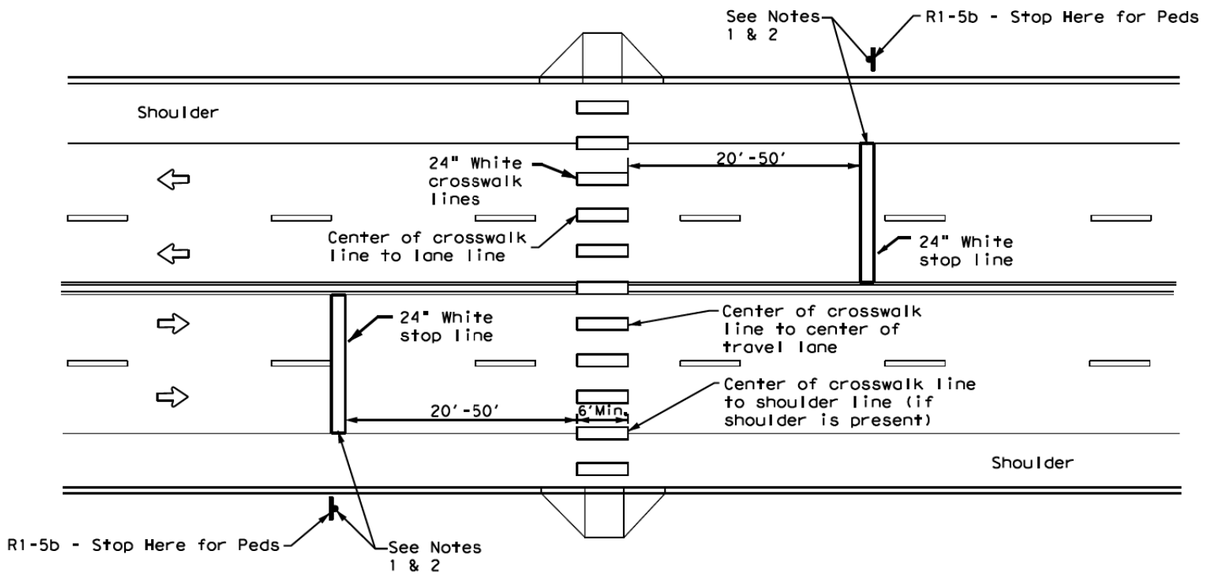

**HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH**

## GENERAL NOTES

1. Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
2. A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
3. For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
5. Each crosswalk shall be a minimum of 6' wide.
6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
7. Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

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

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




**UNSIGNALIZED MID BLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK**

## NOTES:

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

Texas Department of Transportation

Traffic Safety Division Standard

# CROSSWALK PAVEMENT MARKINGS

## PM(4)-22

| FILE: pm4-22.dgn | DN: | CK: | DW: | CK: |
|---|---|---|---|---|
| ©TxDOT June 2020 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 0902 | 90 | 119 | McCART |
| 3-22 | DIST | COUNTY | | SHEET NO. |
| | FTW | TARRANT | | 132 |

DATE:
FILE:

220

# SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

**Post Type**

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

**Number of Posts (1 or 2)**

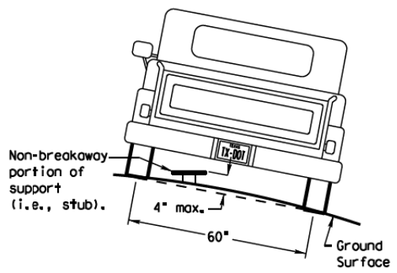
**Anchor Type**

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

**Sign Mounting Designation**

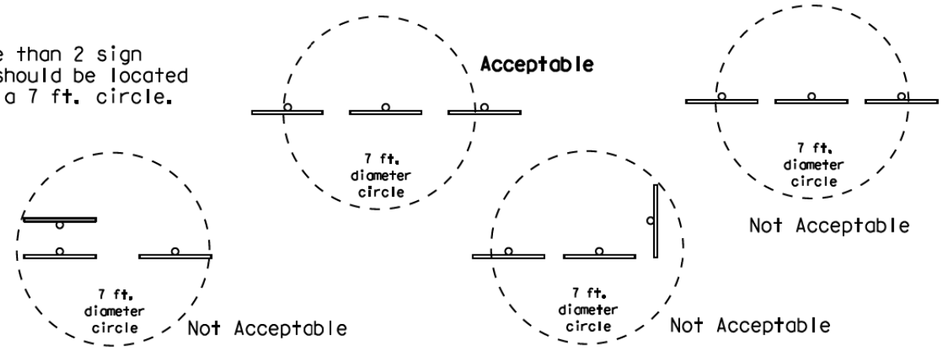
P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1) to (SLIP-3))

# REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



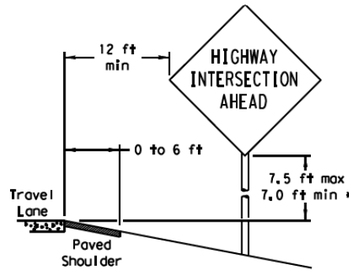

To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

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



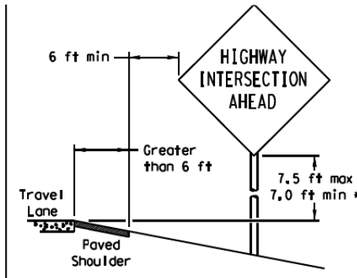

# SIGN LOCATION

## PAVED SHOULDERS




**LESS THAN 6 FT. WIDE**

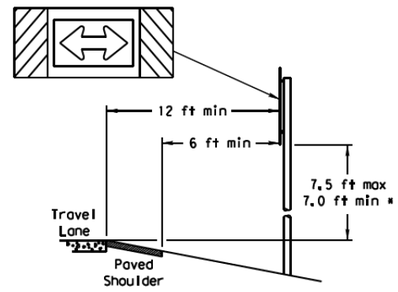
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



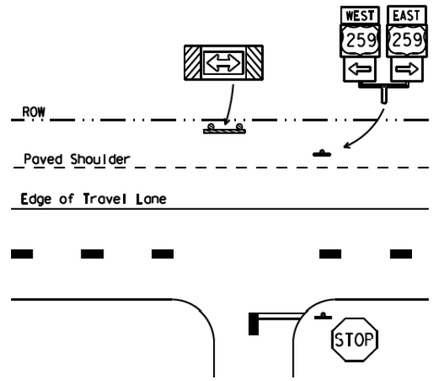

**GREATER THAN 6 FT. WIDE**

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

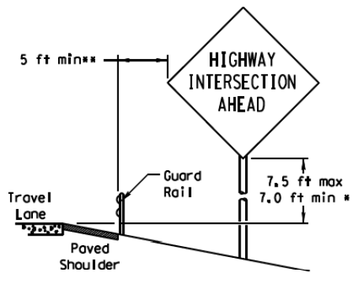
## T-INTERSECTION



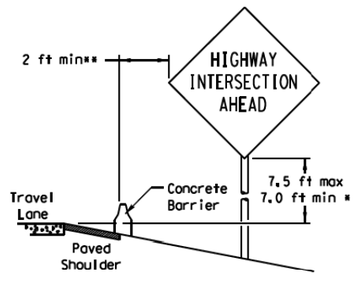

When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.




## BEHIND BARRIER




**BEHIND GUARDRAIL**




**BEHIND CONCRETE BARRIER**

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

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

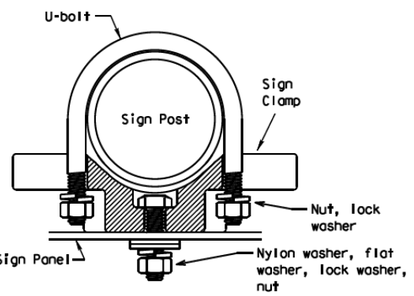
The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

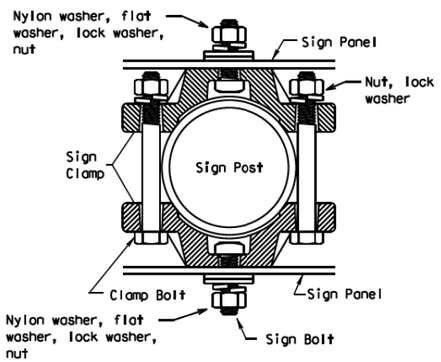
The website address is:
http://www.txdot.gov/publications/traffic.htm

# TYPICAL SIGN ATTACHMENT DETAIL

## Single Signs




## Back-to-Back Signs



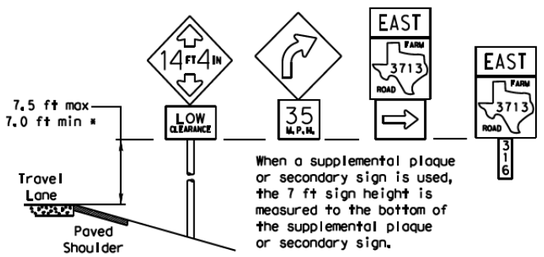

Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

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

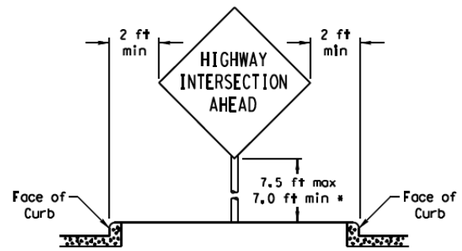
| Pipe Diameter | Approximate Bolt Length | |
|---|---|---|
| | Specific Clamp | Universal Clamp |
| 2" nominal | 3" | 3 or 3 1/2" |
| 2 1/2" nominal | 3 or 3 1/2" | 3 1/2 or 4" |
| 3" nominal | 3 1/2 or 4" | 4 1/2" |

## SIGNS WITH PLAQUES



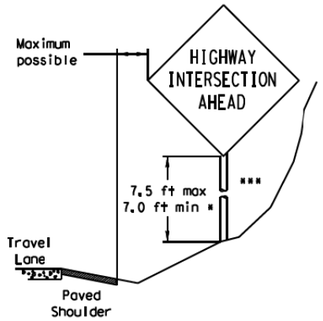

When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

## CURB & GUTTER OR RAISED ISLAND




## RESTRICTED RIGHT-OF-WAY

**(When 6 ft min. is not possible.)**




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

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

# SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

## SMD(GEN)-08

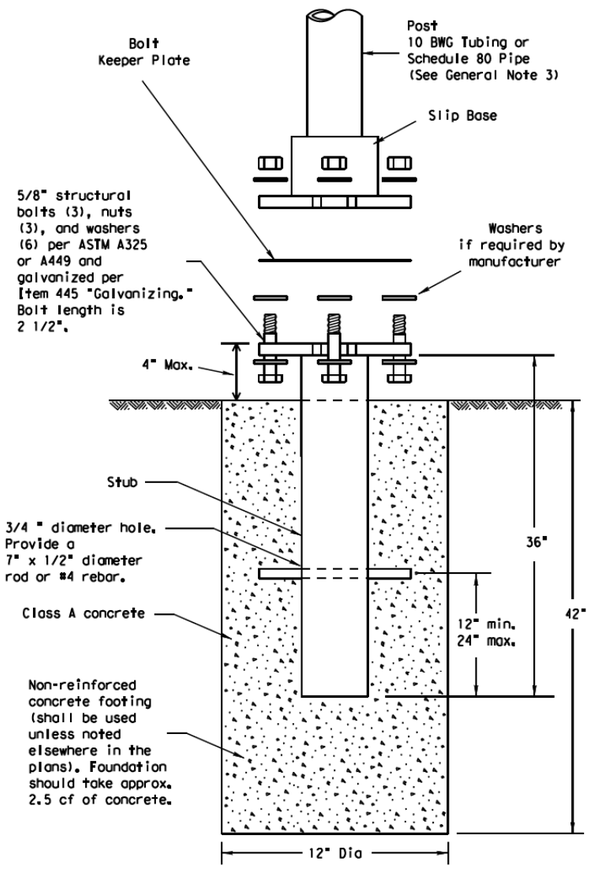


| DN: TXDOT | CK: TXDOT | DW: TXDOT | CK: TXDOT |
|---|---|---|---|
| CONT | SECT | JOB | HIGHWAY |
| 0902 | 90 | 119 | McCART |
| DIST | COUNTY | | SHEET NO. |
| FTW | TARRANT | | 133 |

9-08 REVISIONS

DATE:
FILE:

# TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS




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

**NOTE**

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

GENERAL NOTES:

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

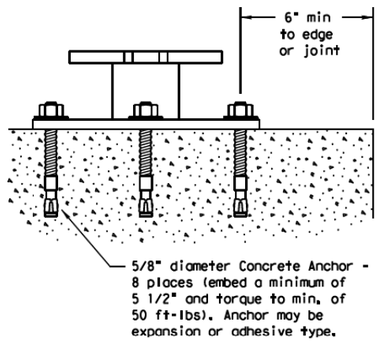
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: https://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

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

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

## CONCRETE ANCHOR




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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

# SIGN MOUNTING DETAILS
# SMALL ROADSIDE SIGNS
# TRIANGULAR SLIPBASE SYSTEM

## SMD(SLIP-1)-08



| DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|
| CONT | SECT | JOB | HIGHWAY |
| 0902 | 90 | 119 | McCART |
| DIST | COUNTY | | SHEET NO. |
| FTW | TARRANT | | 134 |

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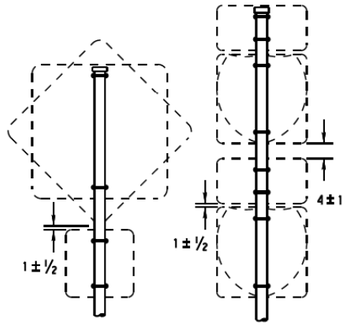
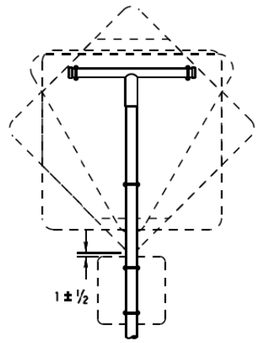
DATE:
FILE:

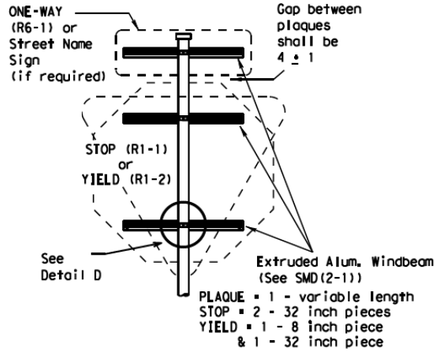
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



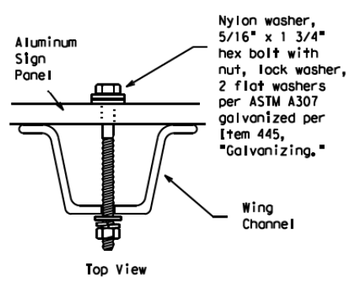
SM RD SGN ASSM TY XXXXX(1)XX(P)



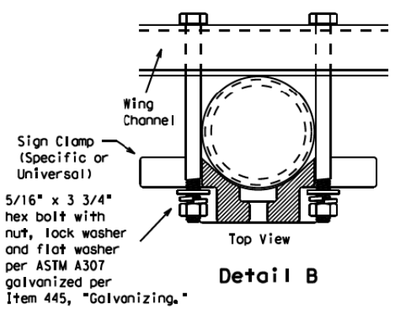
SM RD SGN ASSM TY XXXXX(1)XX(T)



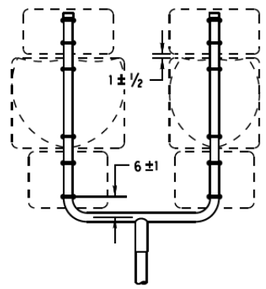
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



Top View
Detail A



Top View
Detail B



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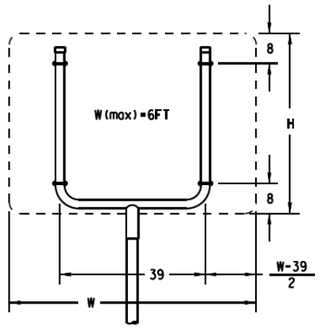
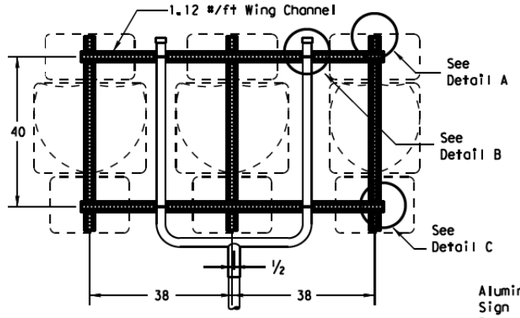
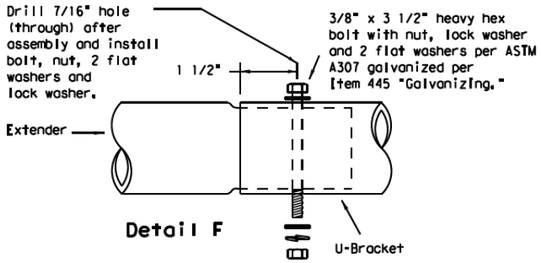


SM RD SGN ASSM TY XXXXX(1)XX(U)

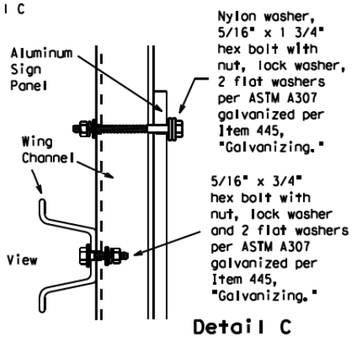


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

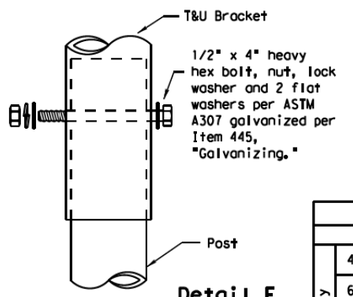


Detail F

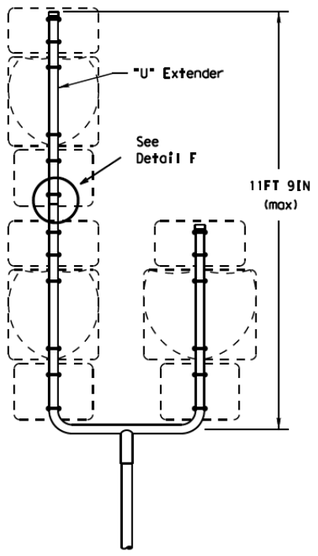
Splices shall only be allowed behind the sign substrate.



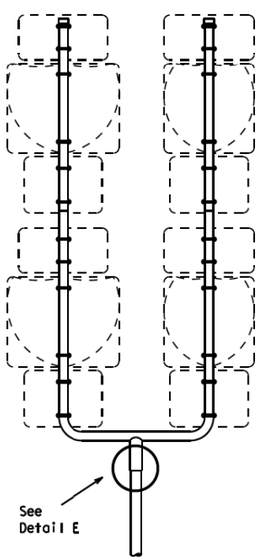
Detail C



Detail E



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



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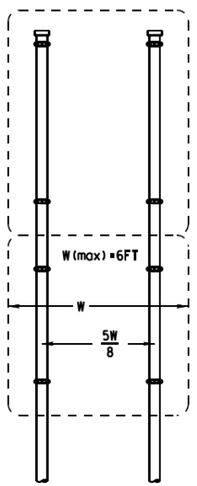
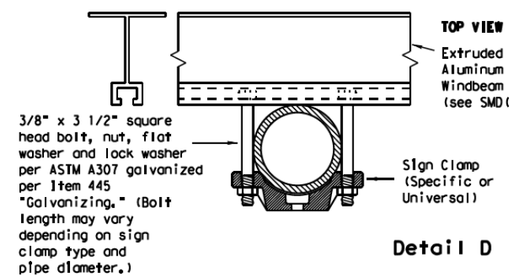
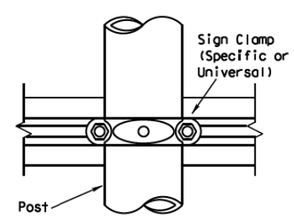


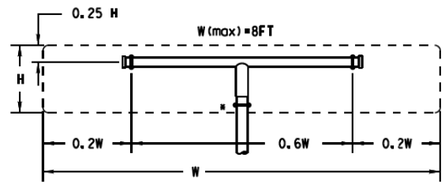
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

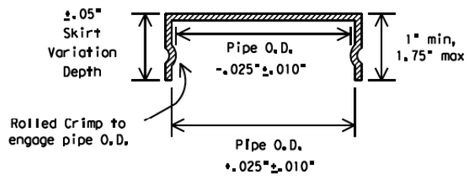


SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

## FRICTION CAP DETAIL




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

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

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

**GENERAL NOTES:**

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

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

**REQUIRED SUPPORT**

| | SIGN DESCRIPTION | SUPPORT |
|---|---|---|
| Regulatory | 48-inch STOP sign (R1-1) | TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM) |
| | 60-inch YIELD sign (R1-2) | TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM) |
| | 48x16-inch ONE-WAY sign (R6-1) | TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM) |
| | 36x48, 48x36, and 48x48-inch signs | TY 10BWG(1)XX(T) |
| | 48x60-inch signs | TY S80(1)XX(T) |
| Warning | 48x48-inch signs (diamond or square) | TY 10BWG(1)XX(T) |
| | 48x60-inch signs | TY S80(1)XX(T) |
| | 48-inch Advance School X-ing sign (S1-1) | TY 10BWG(1)XX(T) |
| | 48-inch School X-ing sign (S2-1) | TY 10BWG(1)XX(T) |
| | Large Arrow sign (W1-6 & W1-7) | TY 10BWG(1)XX(T) |

Texas Department of Transportation
Traffic Operations Division

# SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

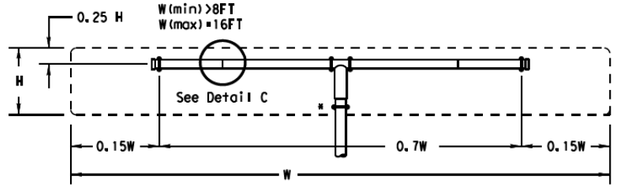
## SMD(SLIP-2)-08



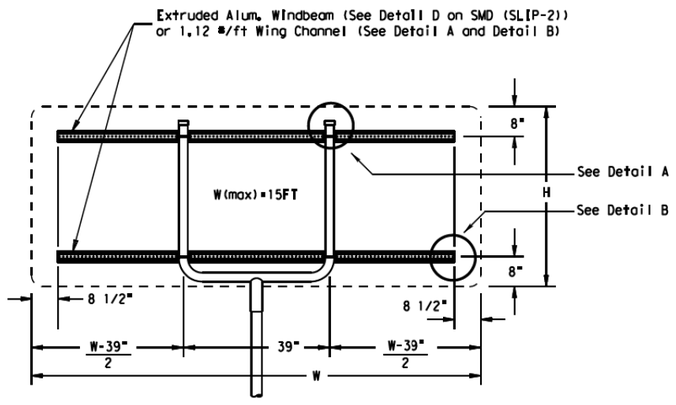
| DWN TXDOT | CK: TXDOT | DWN TXDOT | CK: TXDOT |
|---|---|---|---|
| CONT | SECT | JOB | HIGHWAY |
| 0902 | 90 | 119 | McCART |
| DIST | COUNTY | | SHEET NO. |
| FTW | TARRANT | | 135 |

9-08 REVISIONS

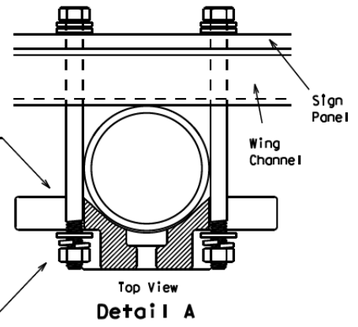
DATE:
FILE:



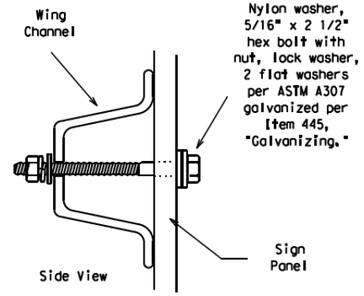

SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



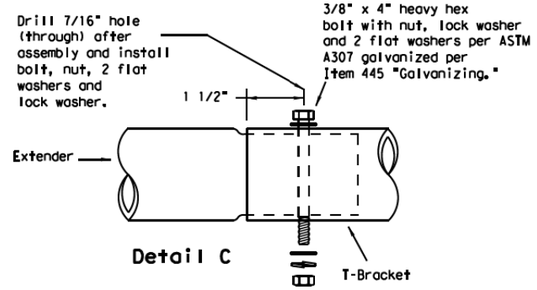

SM RD SGN ASSM TY XXXXX(1)XX(U-XX)




**Detail A**

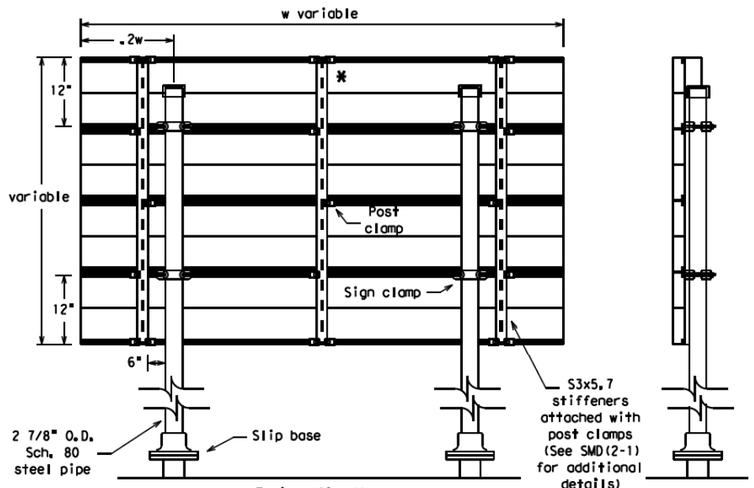



**Detail B**




**Detail C**

Splices shall only be allowed behind the sign substrate.



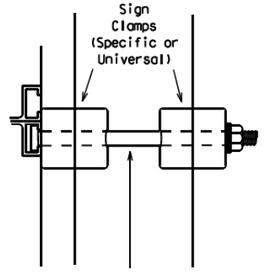

**Typical Sign Mount**

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

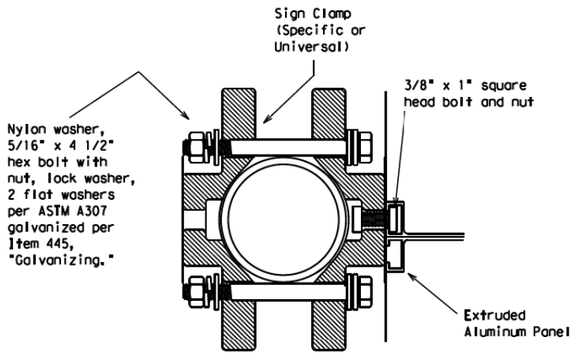
* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



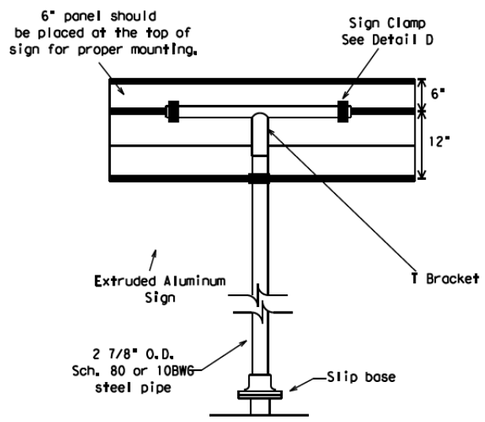
See Detail E
for clamp installation



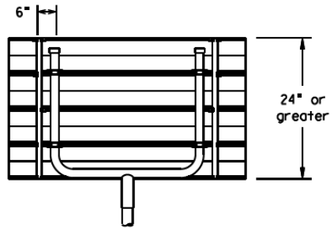

**Detail E**




**Detail D**
**EXTRUDED ALUMINUM SIGN WITH T BRACKET**




Extruded Aluminum Sign
With T Bracket




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

See Detail E
for clamp installation

**GENERAL NOTES:**

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

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

**REQUIRED SUPPORT**

| | SIGN DESCRIPTION | SUPPORT |
|---|---|---|
| Regulatory | 48-inch STOP sign (R1-1) | TY 10BWG(1)XX(T)<br>TY 10BWG(1)XX(P-BM) |
| | 60-inch YIELD sign (R1-2) | TY 10BWG(1)XX(T)<br>TY 10BWG(1)XX(P-BM) |
| | 48x16-inch ONE-WAY sign (R6-1) | TY 10BWG(1)XX(T)<br>TY 10BWG(1)XX(P-BM) |
| | 36x48, 48x36, and 48x48-inch signs | TY 10BWG(1)XX(T) |
| | 48x60-inch signs | TY S80(1)XX(T) |
| Warning | 48x48-inch signs (diamond or square) | TY 10BWG(1)XX(T) |
| | 48x60-inch signs | TY S80(1)XX(T) |
| | 48-inch Advance School X-ing sign (S1-1) | TY 10BWG(1)XX(T) |
| | 48-inch School X-ing sign (S2-1) | TY 10BWG(1)XX(T) |
| | Large Arrow sign (W1-6 & W1-7) | TY 10BWG(1)XX(T) |

Texas Department of Transportation
Traffic Operations Division

# SIGN MOUNTING DETAILS
# SMALL ROADSIDE SIGNS
# TRIANGULAR SLIPBASE SYSTEM

## SMD(SLIP-3)-08



| DN: TXDOT | CK: TXDOT | DW: TXDOT | CK: TXDOT |
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| 0902 | 90 | 119 | McCART |

| DIST | COUNTY | SHEET NO. |
|---|---|---|
| FTW | TARRANT | 136 |

REVISIONS
9-08

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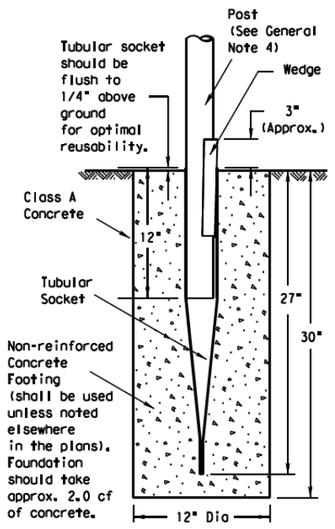
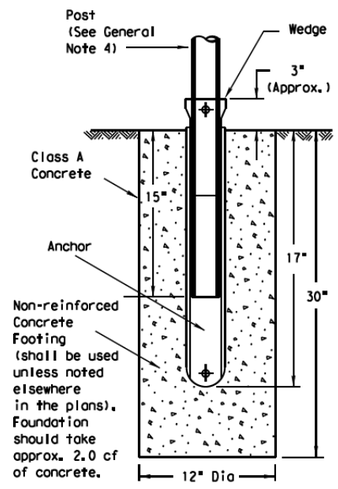
## Wedge Anchor Steel System



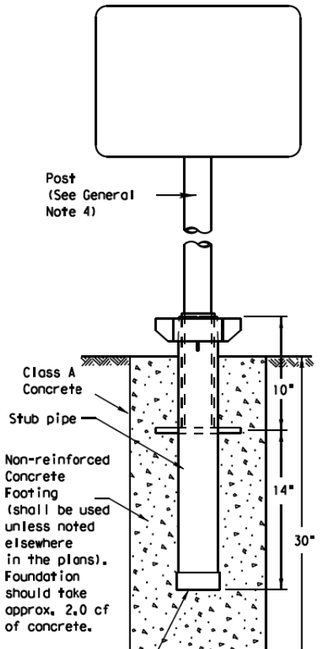

SM RD SGN ASSM TY TWT(X)WS(X)

## Wedge Anchor High Density Polyethylene (HDPE) System

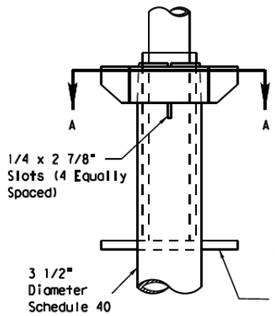


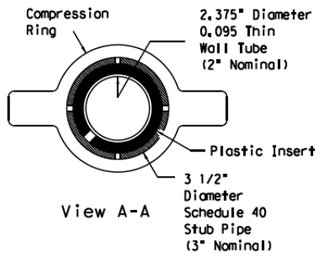

SMD RD SGN ASSM TY TWT(X)WP(X)

## Universal Anchor System with Thin-Walled Tubing Post



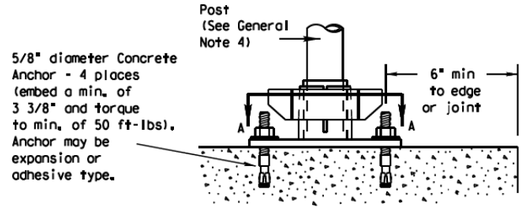

SM RD SGN ASSM TY TWT(X)UA(P)



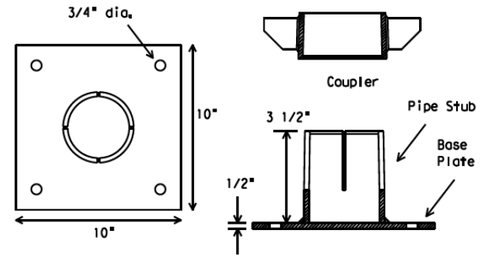




View A-A

Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

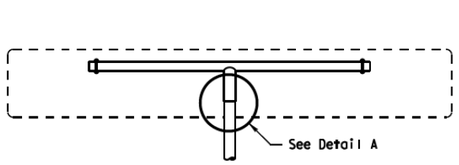


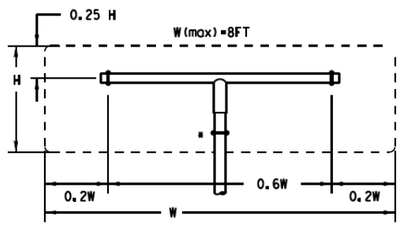

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.



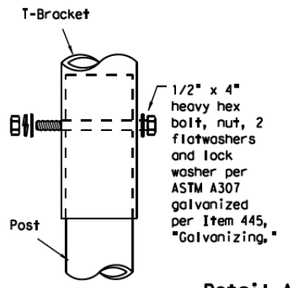

SM RD SGN ASSM TY TWT(X)UB(P)

### Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post




SM RD SGN ASSM TY TWT(X)XX(T)
(* - See General Note 6)




Detail A

9/16" hole may need to be drilled through post to accommodate bolt.

NOTE

The devices shall be installed per manufacturer's recommendations.
Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
2. The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
3. Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is: https://www.txdot.gov/business/producer list.htm
4. Material used as post with this system shall conform to the following specifications:
   13 BWG Tubing (2.375" outside diameter) (TWT)
   0.095" nominal wall thickness
   Seamless or electric-resistance welded steel tubing
   Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   Other steels may be used if they meet the following:
   55,000 PSI minimum yield strength
   70,000 PSI minimum tensile strength
   18% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of .083" to .099"
   Outside diameter (uncoated) shall be within the range of 2.369" to 2.381"
   Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
5. Sign blanks shall be the sizes and shapes shown on the plans.
6. Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
8. See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is: https://www.txdot.gov/publications/traffic.htm

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
3. Insert tubular socket into concrete until top of socket is approximaely 1/4 " above the concrete footing.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer..
5. Attach the sign to the sign post.
6. Insert the sign post into socket and align sign face with roadway.
7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. Insert base post in hole to depths shown and backfill hole with concrete.
3. Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
4. Attach the sign to the sign post.
5. Install plastic insert around bottom of post.
6. Insert sign post into base post. Lower until the post comes to rest on steel rod.
7. Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
8. Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.

Texas Department of Transportation
Traffic Operations Division

# SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

## SMD(TWT)-08



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| CONT | SECT | JOB | HIGHWAY |
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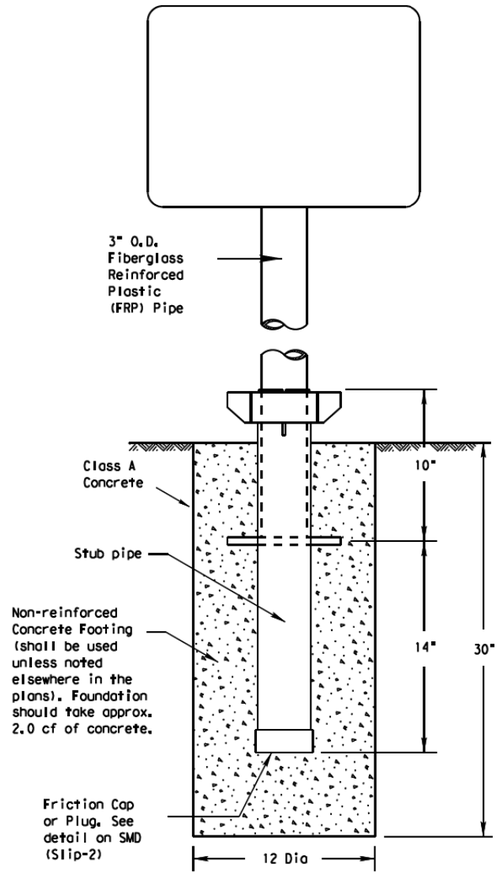
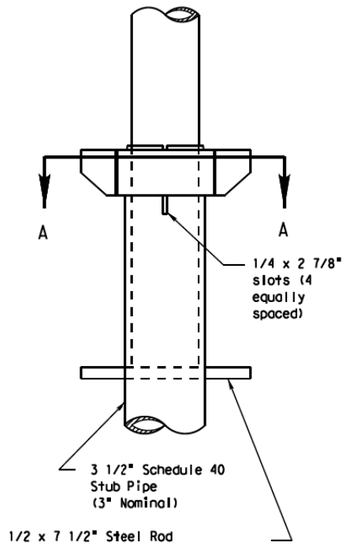
| 0902 | 90 | 119 | McCART |
| DIST | COUNTY | | SHEET NO. |
| FTW | TARRANT | | 137 |

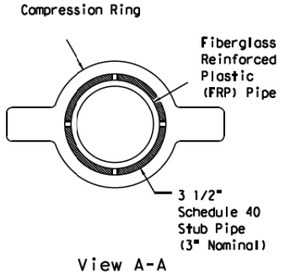
9-08 REVISIONS

# Universal Anchor System with Fiberglass Reinforced Plastic (FRP) Post

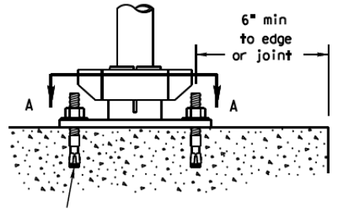



SM RD SGN ASSM TY FRP(X)UA(P)




View A-A




Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.

## BOLT-DOWN DETAILS




SM RD SGN ASSM TY FRP(X)UB(P)

GENERAL NOTES:

1. FRP sign supports for a single type sign support may be used for signs up to and including 16 square feet. Dual post installation may be used for signs up to and including 32 square feet.
2. All nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing."
3. See the Traffic Operations Division website for detailed drawings of sign clamps. The website address is: http://www.txdot.gov/publications/traffic.htm

FRP POST REQUIREMENTS

1. Materials shall conform to the requirements of Departmental Material Specification DMS-4410 and will be furnished in a yellow or gray color as specified elsewhere in the plans.
2. Thickness of FRP sign support is 0.125" + 0.031", - 0.0".
3. FRP sign supports are prequalified by the Traffic Operations Division. Prequalification procedures are obtained by writing:
   Texas Department of Transportation
   Traffic Operations Division
   125 East 11th Street
   Austin, Texas 78701-2483

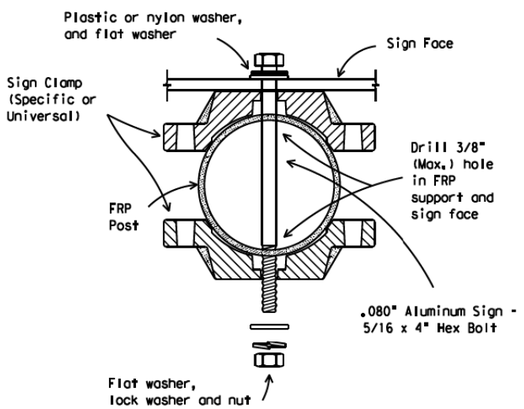
UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURES

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Insert base post in foundation hole to depths shown and fill hole with concrete. Cut base post from bottom and ensure a minimum of 18" embedment if installed in solid rock.
4. Level and plumb the base post with coupler using a torpedo level and let concrete set a minimum of 4 days, unless otherwise directed by Engineer. Bottom of base post slots shall be above the concrete footing.
5. Attach sign to FRP post.
6. Insert sign post into base post. Lower until the post comes to rest on the steel rod.
7. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
8. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

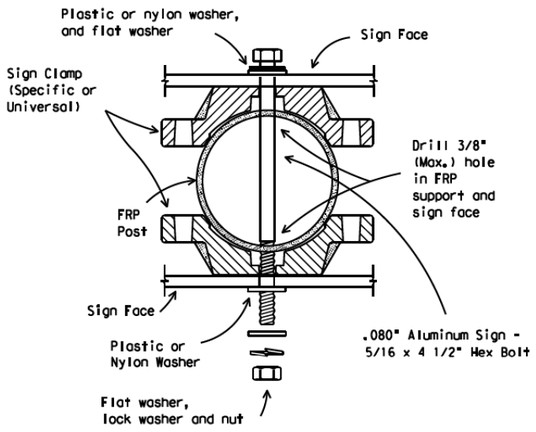
BOLT DOWN SIGN SUPPORT

1. Position base plate with coupler on existing concrete.
2. Drill holes into concrete and insert the 5/8" diameter bolts with wedge anchors, and tighten nuts.
3. Attach sign to FRP post.
4. Insert bottom of sign post into pipe stub.
5. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
6. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

## Typical Sign Mounting Detail for FRP Support with Single Sign




## Typical Sign Mounting Detail for FRP Support with Back-to-Back Signs

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Texas Department of Transportation
Traffic Operations Division

# SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS UNIVERSAL ANCHOR SYSTEM WITH FRP POST

## SMD(FRP)-08



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9-08

| CONT | SECT | JOB | HIGHWAY |
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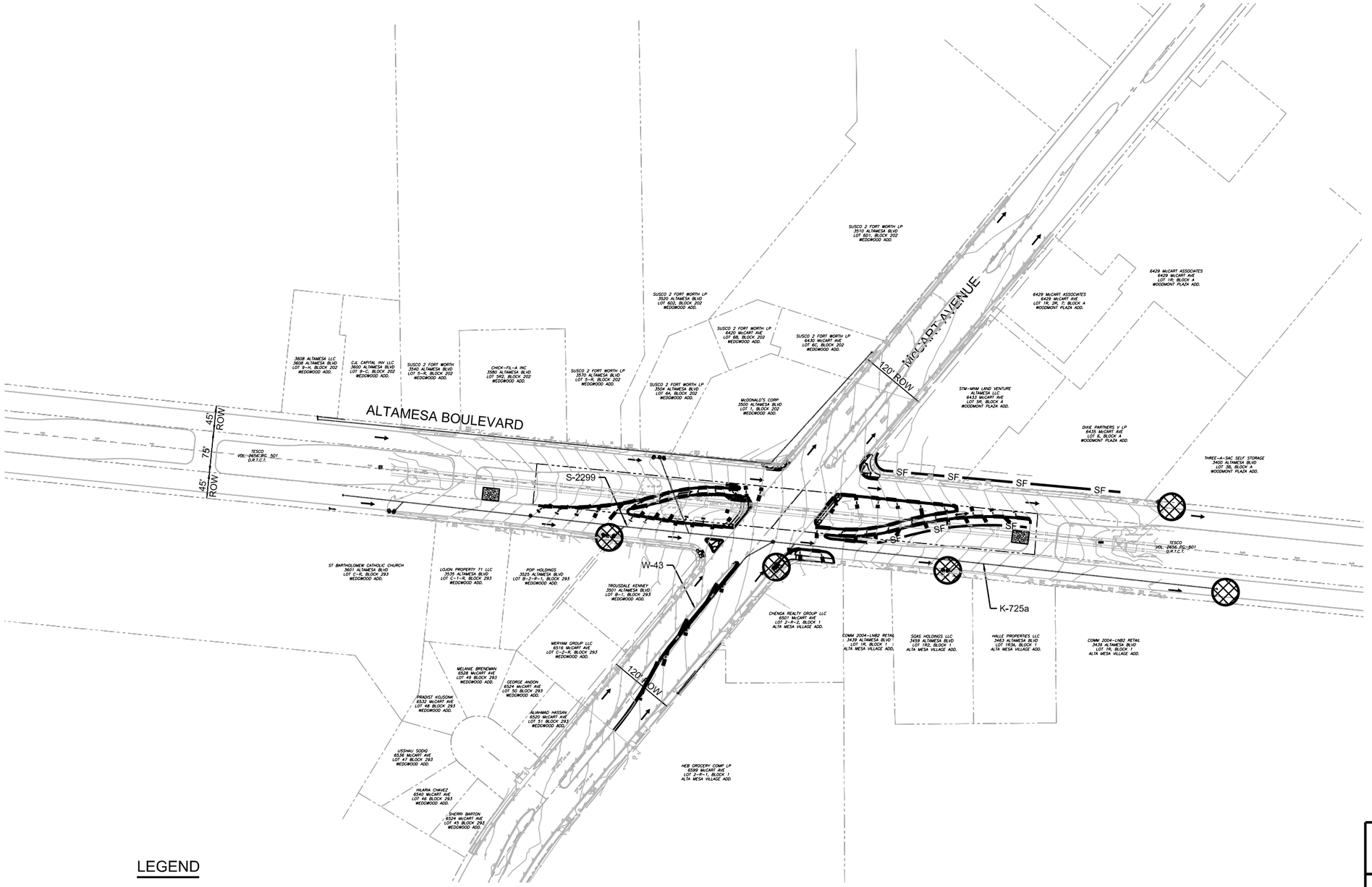
| DIST | COUNTY | | SHEET NO. |
| FTW | TARRANT | | 138 |




CFW MON 8309
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E 2318060.05
EL = 743.06

CP #50
CAPPED IRON ROD SET
N 6921186.88
E 2317156.84
EL = 749.04

CP #51
CAPPED IRON ROD SET
N 6921134.48
E 2317579.18
EL = 738.81

CP #52
CAPPED IRON ROD SET
N 6921682.87
E 2317470.30
EL = 745.02

CP #53
CAPPED IRON ROD SET
N 6921270.05
E 2316408.30
EL = 769.59

CP #54
CAPPED IRON ROD
N 6920747.07
E 2316690.13
758.90

N

0 100 200 300

GRAPHIC SCALE IN FEET

## LEGEND

- CONSTRUCTION ENTRANCE
- INLET PROTECTION
- FLOW ARROW
- SF — SILT FENCE
- EXISTING STORM DRAIN SYSTEM AND INLET

STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED
PROFESSIONAL ENGINEER
07/07/2022


MULTATECH ARCHITECTS ENGINEERS
2821 WEST 7TH ST
SUITE 400
FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F-351


Texas Department of Transportation

# STORM WATER POLLUTION PREVENTION PLAN

| | FED.RD. DIV.NO. | STATE AID PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|
| | 6 | SEE TITLE SHEET | | 139 |
| REVISIONS | STATE | DISTRICT | COUNTY | |
| | TEXAS | FTW | TARRANT | |
| | CONTROL | SECTION | JOB | HIGHWAY NO. |
| | 0902 | 90 | 119 | McCART |



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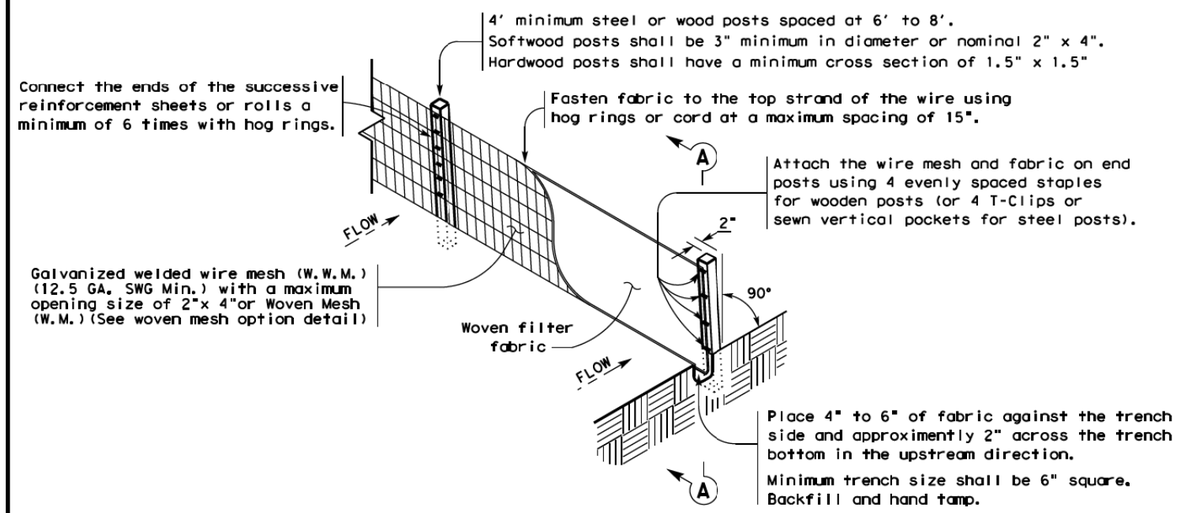
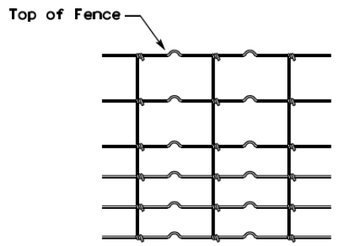
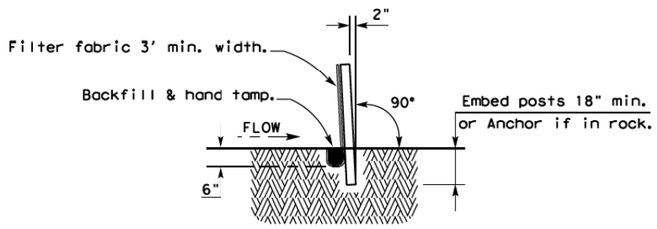



## TEMPORARY SEDIMENT CONTROL FENCE

SCF




## SECTION A-A

## HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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

### SEDIMENT CONTROL FENCE USAGE GUIDELINES

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

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

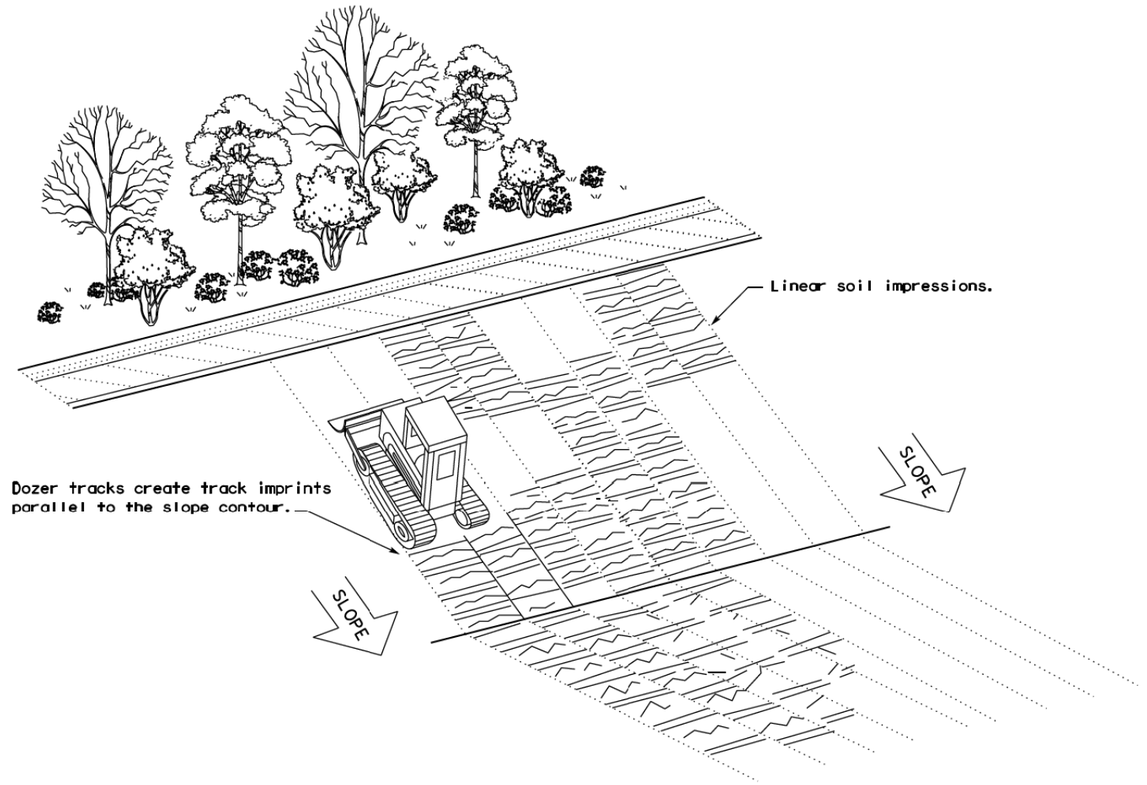
### LEGEND

Sediment Control Fence

SCF

## GENERAL NOTES

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




## VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

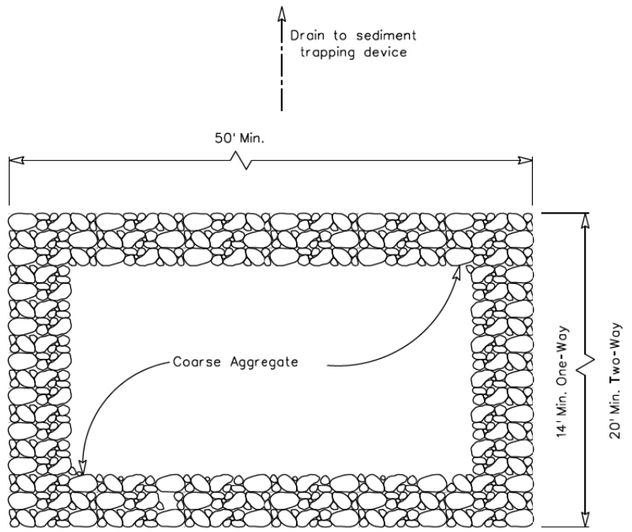
# TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

## FENCE & VERTICAL TRACKING

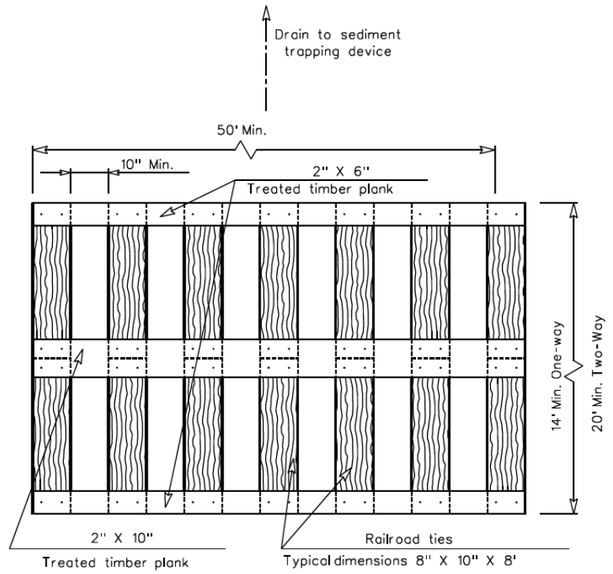
## EC(1)-16

| | | | | | | |
|---|---|---|---|---|---|---|
| FILE: ec116 | DN: TxDOT | CK: KM | DW: VP | DN/CK: LS | | |
| © TxDOT: JULY 2016 | CONT | SECT | JOB | HIGHWAY | | |
| REVISIONS | 0902 | 90 | 119 | McCART | | |
| | DIST | COUNTY | | SHEET NO. | | |
| | FTW | TARRANT | | 140 | | |

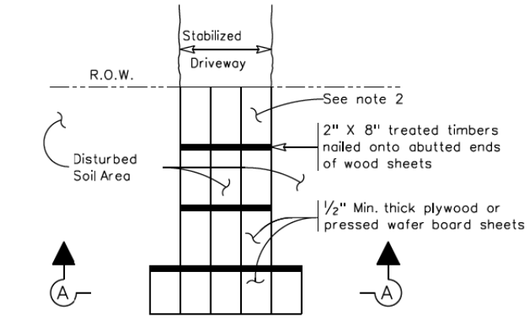
DATE
FILE



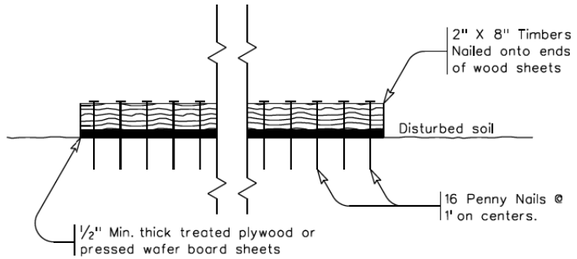

PLAN VIEW




PLAN VIEW



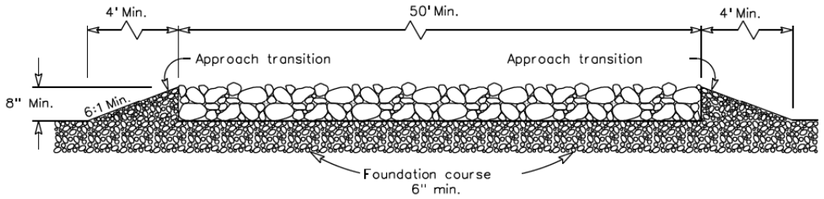

PLAN VIEW




SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

SHORT TERM



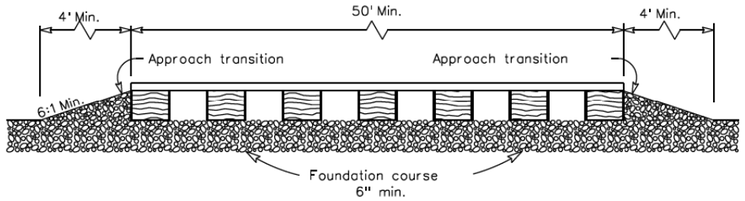

ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.




ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

# TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

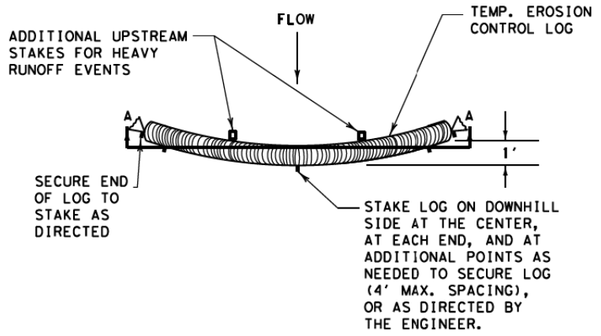
## CONSTRUCTION EXITS

## EC(3)-16

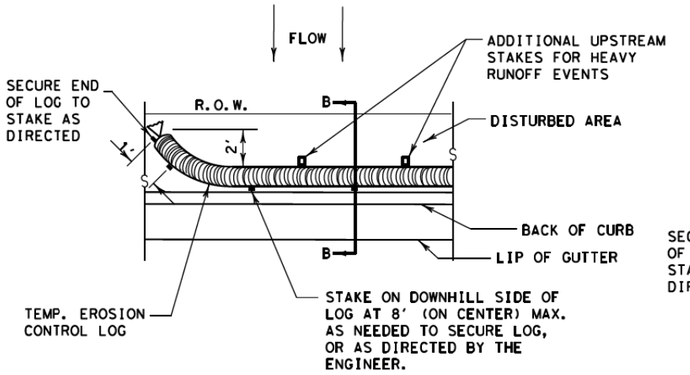
| | | | | | |
|---|---|---|---|---|---|
| FILE: ec316 | DN: TxDOT | CK: KM | DW: VP | DN/CK: LS | |
| ©TxDOT: JULY 2016 | CONT | SECT | JOB | HIGHWAY | |
| REVISIONS | 0902 | 90 | 119 | McCART | |
| | DIST | COUNTY | | SHEET NO. | |
| | FTW | TARRANT | | 141 | |

DATE: 5/4/2021
FILE: $FILE$

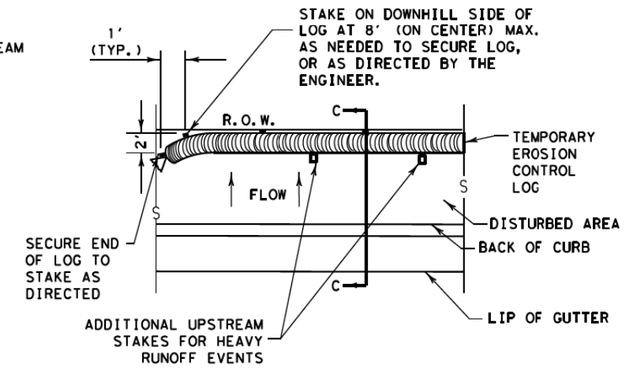
DATE:
FILE:



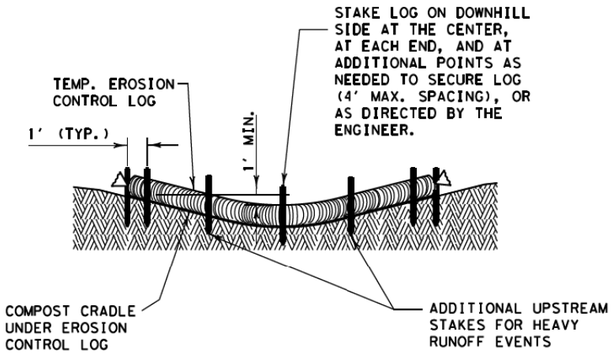

PLAN VIEW




PLAN VIEW



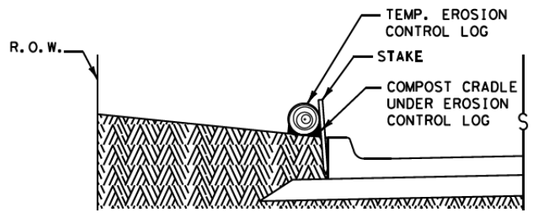

PLAN VIEW




SECTION A-A

## EROSION CONTROL LOG DAM

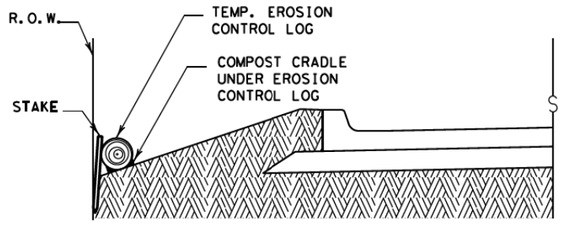
CL-D




SECTION B-B

## EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



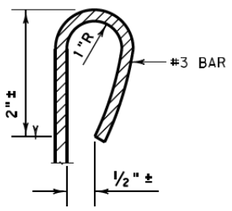

SECTION C-C

## EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW

### LEGEND

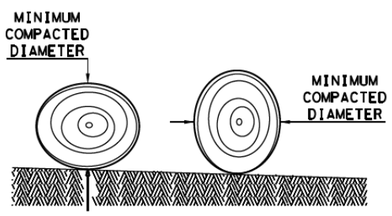
- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL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




REBAR STAKE DETAIL

## GENERAL NOTES:

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




DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

## 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.



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 | | 0902 | 90 | 119 | McCART | | |
| | | DIST | COUNTY | | SHEET NO. | | |
| | | FTW | TARRANT | | 142 | | |

DATE:
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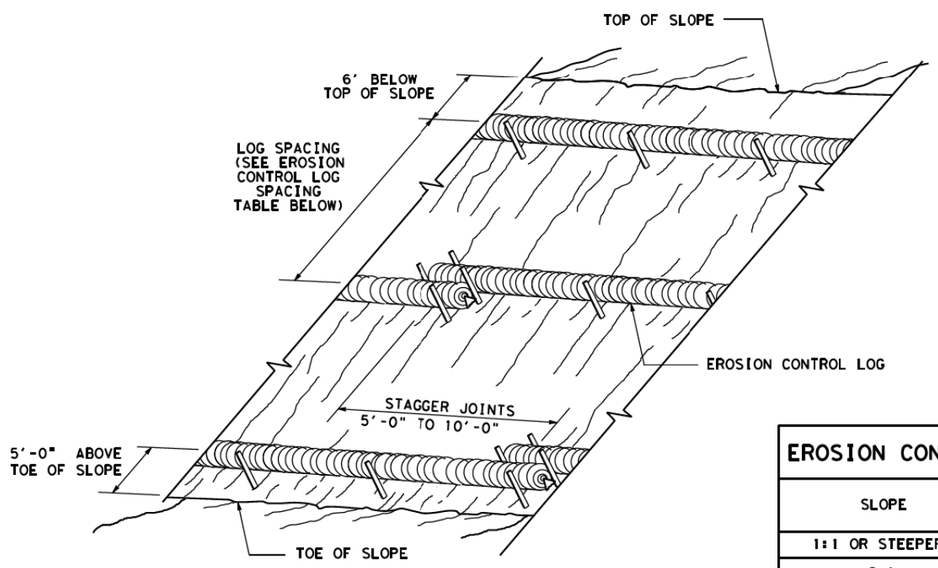
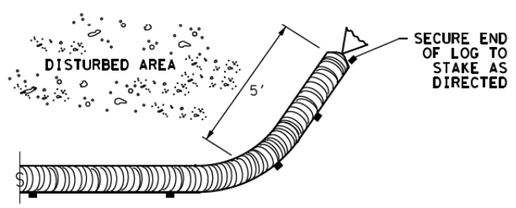



## EROSION CONTROL LOGS ON SLOPES
## STAKE AND TRENCHING ANCHORING

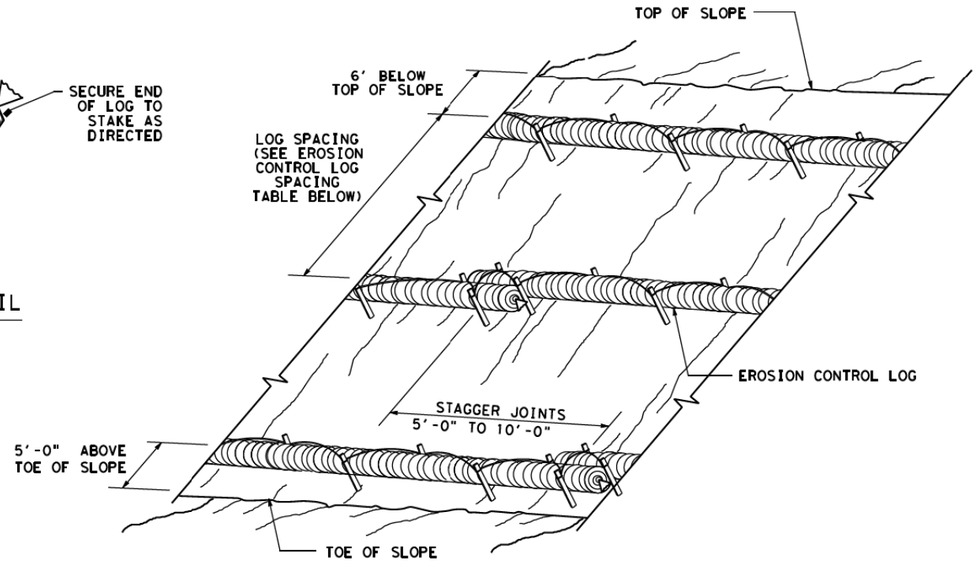
CL-SST




END SECTION RAP DETAIL

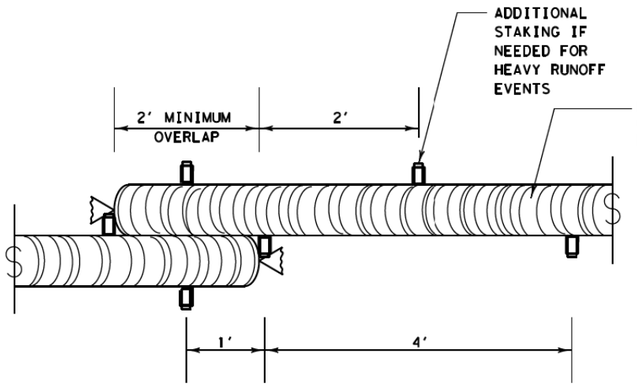
| EROSION CONTROL LOG SPACING TABLE | | | | |
|---|---|---|---|---|
| SLOPE | LOG DIAMETER | | | |
| | 6" | 8" | 12" | 18" |
| 1:1 OR STEEPER | 5' | 10' | 15' | 20' |
| 2:1 | 10' | 20' | 30' | 40' |
| 3:1 | 15' | 30' | 45' | 60' |
| 4:1 OR FLATTER | 20' | 40' | 60' | 80' |

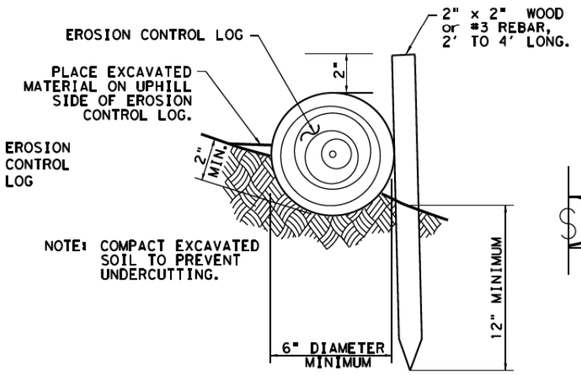
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART




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

CL-SSL

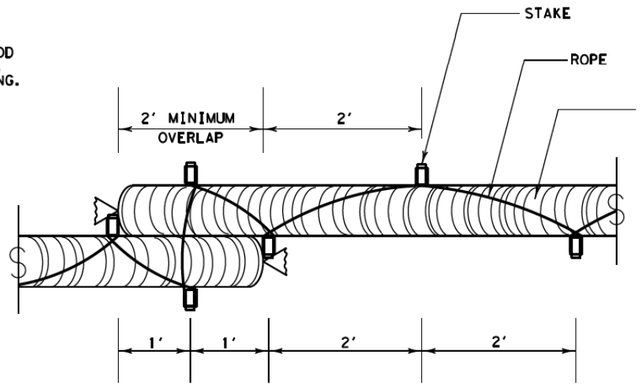


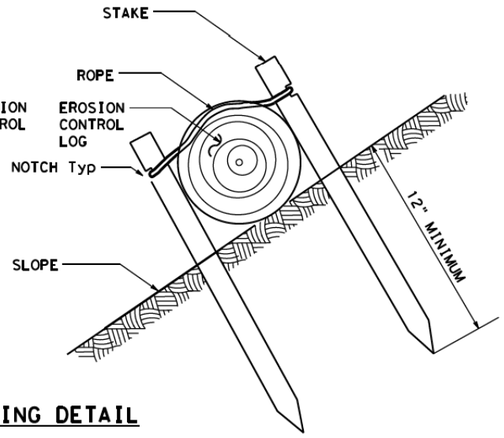




## STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

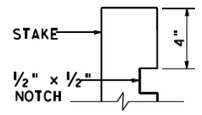
| TRENCH DEPTH TABLE | |
|---|---|
| LOG DIAMETER | DEPTH |
| 6" | 2" |
| 8" | 3" |
| 12" | 4" |
| 18" | 5" |




## STAKE AND LASHING ANCHORING DETAIL

CL-SSL




## STAKE NOTCH DETAIL



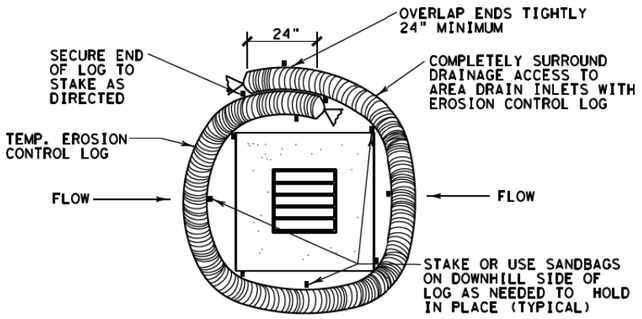
Texas Department of Transportation

Design Division Standard

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

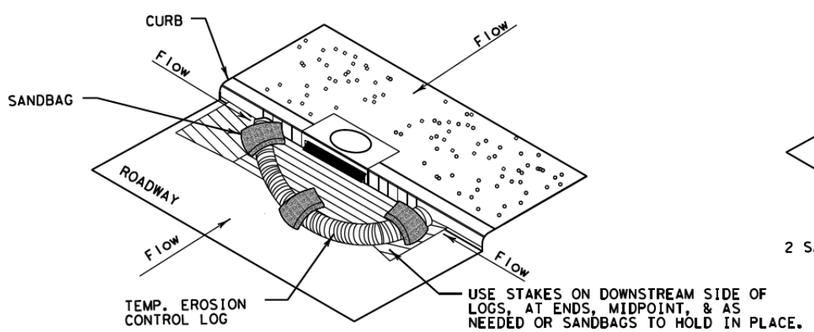
| | | | | | | |
|---|---|---|---|---|---|---|
| FILE: ec116 | DN: TxDOT | | CK: KM | DW: LS/PT | | CK: LS |
| © TxDOT: JULY 2016 | CONT | SECT | JOB | | HIGHWAY | |
| REVISIONS | 0902 | 90 | 119 | | McCART | |
| | DIST | COUNTY | | | SHEET NO. | |
| | FTW | TARRANT | | | 143 | |

DATE:
FILE:



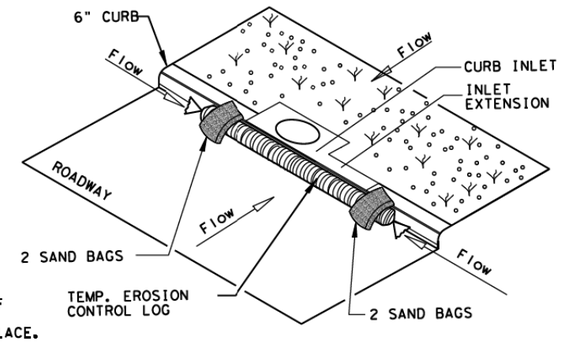

## EROSION CONTROL LOG AT DROP INLET

CL-DI




## EROSION CONTROL LOG AT CURB INLET

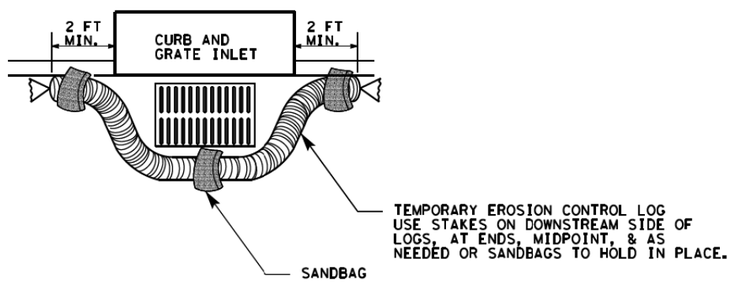
CL-CI




## EROSION CONTROL LOG AT CURB INLET

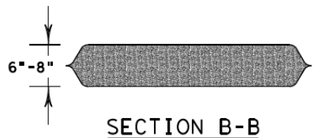
CL-CI

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

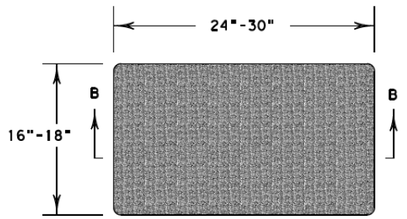



## EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI




SECTION B-B




SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

# TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

## EROSION CONTROL LOG

## EC(9)-16

| | | | | | | |
|---|---|---|---|---|---|---|
| FILE: ec916 | DN: TxDOT | | CK: KM | DW: LS/PT | CK: LS | |
| © TxDOT: JULY 2016 | CONT | SECT | JOB | HIGHWAY | | |
| REVISIONS | 0902 | 90 | 119 | McCART | | |
| | DIST | COUNTY | | SHEET NO. | | |
| | FTW | TARRANT | | 144 | | |

# A. GENERAL SITE DATA

1. PROJECT LIMITS: *Highway: McCART dVE*
*From: Altamesa Blvd Intersection*
*To: Altamesa Blvd Intersection*

LATTITUDE: 32°58'59.19"N LONGITUDE: 97°22'02.79W

2. PROJECT SITE MAPS:

- *Project Location Map: Title Sheet (Sheet 1)*
- *Drainage Patterns: Drainage Area Maps (SHEETS 77-80*
- *Approx. Slopes Anticipated After Major Gradings and Areas of Soil Disturbance: Typical Sections (Sheets 7-8)*
- *Major Controls and Locations of Stabilization Practices: (Sheets 139) SW3P Site Map Sheets*
- *Project Specific Locations: To be specified by Project Field Office and located in the Project SW3P File*
- *Surface Waters and Discharge Locations: Drainage and Culvert Layout Sheets (Sheets 77-80)*

3. PROJECT DESCRIPTION:
*For the construction of traffic signal intersection.*

4. MAJOR SOIL DISTURBING ACTIVITIES:
*Grading and paving.*

5. EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:
*10% native Texas Grasses, 90% no vegitation - pavement, walks and drives.*

6. TOTAL PROJECT AREA: *2.4* Acres

7. TOTAL AREA TO BE DISTURBED: *0.3* Acres ( *14%* OF TOTAL PROJECT AREA)

8. WEIGHTED RUNOFF COEFFICIENT
BEFORE CONSTRUCTION: *0.90*
AFTER CONSTRUCTION: *0.90*

9. NAME OF RECEIVING WATERS:
*Channelized to Edgecliff Branch*

10. ENDANGERED SPECIES, DESIGNATED CRITICAL HABITAT AND HISTORIC PROPERTY:
*No Endangered Species, Designated Critical Habitat or Historic Property has been found on this project site.*

# B. EROSION AND SEDIMENT CONTROLS

1. SOIL STABILIZATION PRACTICES:
(Select T = Temporary or P = Permanent, as applicable)

| | |
|---|---|
| ___ TEMPORARY SEEDING | ___ PRESERVATION OF NATURAL RESOURCES |
| ___ MULCHING (Hay or Straw) | ___ FLEXIBLE CHANNEL LINER |
| ___ BUFFER ZONES | ___ RIGID CHANNEL LINER |
| ___ PLANTING | ___ SOIL RETENTION BLANKET |
| ___ SEEDING | ___ COMPOST MANUFACTURED TOPSOIL |
| P SODDING | ___ OTHER: (Specify Practice) |

2. STRUCTURAL PRACTICES:
(Select T = Temporary or P = Permanent, as applicable)

| | |
|---|---|
| T SILT FENCES | ___ DIVERSION, INTERCEPTOR, OR PERIMETER DIKES |
| ___ HAY BALES | ___ DIVERSION, INTERCEPTOR, OR PERIMETER SWALES |
| ___ ROCK FILTER DAMS | ___ DIVERSION DIKE AND SWALE COMBINATIONS |
| ___ PIPE SLOPE DRAINS | T ROCK BEDDING AT CONSTRUCTION EXIT |
| ___ PAVED FLUMES | ___ TIMBER MATTING AT CONSTRUCTION EXIT |
| ___ CHANNEL LINERS | ___ STONE OUTLET STRUCTURES |
| ___ SEDIMENT TRAPS | ___ VELOCITY CONTROL DEVICES |
| ___ SEDIMENT BASINS | P CURBS AND GUTTERS |
| ___ STORM SEWERS | T STORM INLET SEDIMENT TRAP |
| T OTHER:(EROSION CONTROL LOGS) | |
| ___ | |
| ___ | |
| ___ | |
| ___ | |
| ___ | |

3. STORM WATER MANAGEMENT: *(Example Below - May be used as applicable, revised or expanded)*

*1. Storm water drainage will be provided by the ditches, inlets and storm water systems that will carry drainage within the R.O.W. to the low points within the roadway and project site which drain to natural facilities.*

*2. Other permanent erosion controls include hydraulic design to limit structure outlet velocities and grading design generally consisting of 4:1 or flatter slopes with permanent vegetative cover.*

4. STORM WATER MANAGEMENT ACTIVITIES: (Sequence of Construction)

*1. Install erosion control devices (silt fence and inlet protection).*
*2. Construct roadway and install signals as shown on TCP.*
*3. Place sodding at disturbed areas.*
*4. Upon substantial completion temporary erosion control devices will be removed.*

5. NON-STORM WATER DISCHARGES:
*Non-storm water discharges should be filtered, or held in retention basins, before being allowed to mix with storm water. These discharges consist of non-polluted ground water, spring water, foundation and/or footing drain water, and water used for dust control, pavement washing and vehicle washwater containing no detergents.*



STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED
PROFESSIONAL ENGINEER
07/07/2022

MULTATECH ARCHITECTS + ENGINEERS
2821 WEST 7TH ST
SUITE 400
FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351

Texas Department of Transportation

Fort Worth District Standard

# STORM WATER POLLUTION PREVENTION PLAN (SW3P)

SHEET 1 OF 2 SHEETS

| ORIGINAL DRAWING: 09/2002 | sw3p-ftw.dgn | FED.RD. DIV.NO. | PROJECT NO. | | SHEET NO. |
|---|---|---|---|---|---|
| DATE | REVISIONS | 6 | SEE TITLE SHEET | | 145 |
| 09/2008 | NPDES TO TPDES | STATE | STATE DIST.NO. | COUNTY | |
| 01/2012 | CLARIFY NOTE C.2. | TEXAS | FTW | TARRANT | |
| 08/2013 | ADDED SIGN | CONT. | SECT. | JOB | HIGHWAY NO. |
| 05/2019 | 2-SHEET FORMAT | 0902 | 90 | 119 | McCART |

# C. OTHER REQUIREMENTS & PRACTICES

1. MAINTENANCE:

*All erosion and sediment controls shall be maintained in good working order. If a repair is necessary, it shall be performed at the earliest date possible but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from heavy equipment. Disturbed areas on which construction activities have ceased, temporarily or permanently, shall be stabilized within 14 calendar days unless they are scheduled to and do resume within 21 calendar days. The areas adjacent to creeks and drainageways shall have priority followed by devices protecting storm sewer inlets.*

2. INSPECTION:

*An inspection shall be performed by a TxDOT inspector every 14 calendar days as well as within 24 hours after any rainfall of one-half inch or more is recorded on a non-freezing rain gauge to be located at the project site, or every 7 calendar days. An inspection and Maintenance Report shall be filed for each inspection. Based on the inspection results, the controls shall be revised in accordance with the inspection report.*

3. WASTE MATERIALS:

*Except as noted below, all waste materials shall be collected in a metal dumpster having a secure cover. The dumpster shall meet all state and local solid waste management regulations. All trash and debris from construction shall be deposited in the dumpster. The dumpster shall be emptied, as necessary or as required by local regulation, and hauled to a local approved land fill site. The burying of construction waste on the project site shall not be permitted.*

*Concrete washout areas shall be required and shall consist of a pit, lined with an impervious material, of sufficient size to contain, until evaporation, all water used and washout material produced during concrete washout operations. The concrete washout locations shall be as directed by the engineer.*

*Lime slaking tanks shall be surrounded by an earthen berm, capable of containing any overflow.*

4. HAZARDOUS WASTE (INCLUDING SPILL REPORTING):

*As a minimum, any products in the following categories are considered to be hazardous: paints, acids, solvents, asphalt products, chemical additives for soil staibilization, and concrete curing compounds or additvives. In the event of a spill which may be hazardous, the spill coordinator shall be contacted immediately.*

5. SANITARY WASTE:

*All sanitary waste shall be collected from the portable units, as necessary or as required by local regulation, by a licensed sanitary waste management contractor.*

6. OFFSITE VEHICLE TRACKING:

*The Contractor shall be required, on a regular basis or as may be directed by the Engineer, to dampen haul roads for dust control, stabilize construction entrances and to remove excess dirt from the roadway.*

7. MANAGEMENT PRACTICES: *(Example Below - May be used as applicable, revised or expanded)*

*1. Disposal areas, stockpiles and haul roads shall be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas shall not be located in any wetland, waterbody or streambed.*

*2. Construction staging areas and vehicle maintenance areas shall be constructed by the Contractor in a manner to minimize the runoff of pollutants.*

*3. All temporary fills placed in waterways shall be built of erosion resistant material. (NWP 14)*

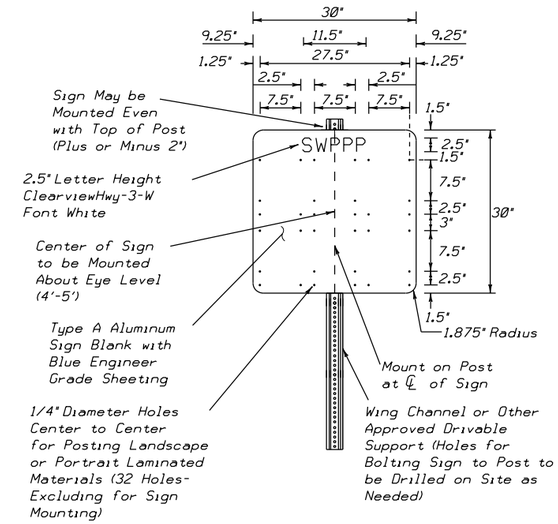
*4. All waterways shall be cleared as soon as practicable of temporary embankment, temporary bridges, matting, falsework, piling, debris or other obstructions placed during construction operations that are not a part of the finished work.*

8. OTHER:

*1. Listing of construction materials stored on site to be provided by Project Field Office.*

*2. The Project SW3P File located at the project field office shall contain the N.O.I., CGP Coverage Notice, TCEQ TPDES Form, Signature Authorization, Certification/Qualification Statements, Inspection Reports, Required Maps, and a copy of the TPDES General Permit No. TXR150000.*

## STORM WATER POLLUTION PREVENTION PLAN PERMIT POSTING




*No Permanent Installation Allowed.*
*Sign to be Removed After Project Completion.*



MULTATECH ARCHITECTS-ENGINEERS
2821 WEST 7TH ST
SUITE 400
FORT WORTH, TEXAS 76107
(817) 877-5571
TBPE Reg #F351

Texas Department of Transportation

**Fort Worth District Standard**

# STORM WATER POLLUTION PREVENTION PLAN (SW3P)

STATE OF TEXAS
ERIC A. CANALES
90103
LICENSED PROFESSIONAL ENGINEER
07/07/2022

SHEET 2 OF 2 SHEETS

| ORIGINAL DRAWING: 09/2002 | sw3p-ftw.dgn | FED.RD. DIV.NO. | PROJECT NO. | SHEET NO. |
|---|---|---|---|---|
| DATE | REVISIONS | 6 | SEE TITLE SHEET | 146 |
| 09/2008 | NPDES TO TPDES | STATE | STATE DIST.NO. | COUNTY |
| 01/2012 | CLARIFY NOTE C.2. | TEXAS | FTW | TARRANT |
| 08/2013 | ADDED SIGN | CONT. | SECT. | JOB | HIGHWAY NO. |
| 05/2019 | 2-SHEET FORMAT | 0902 | 90 | 119 | McCART |

DATE:
FILE:

## I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1.

2.

☐ No Action Required ■ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000

2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.

3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.

4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

## II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

■ No Permit Required

☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP• _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1.

2.

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4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

| Erosion | Sedimentation | Post-Construction TSS |
|---|---|---|
| ☐ Temporary Vegetation | ■ Silt Fence | ☐ Vegetative Filter Strips |
| ☐ Blankets/Matting | ☐ Rock Berm | ☐ Retention/Irrigation Systems |
| ☐ Mulch | ☐ Triangular Filter Dike | ☐ Extended Detention Basin |
| ■ Sodding | ☐ Sand Bag Berm | ☐ Constructed Wetlands |
| ☐ Interceptor Swale | ☐ Straw Bale Dike | ☐ Wet Basin |
| ☐ Diversion Dike | ☐ Brush Berms | ☐ Erosion Control Compost |
| ☐ Erosion Control Compost | ☐ Erosion Control Compost | ☐ Mulch Filter Berm and Socks |
| ☐ Mulch Filter Berm and Socks | ☐ Mulch Filter Berm and Socks | ☐ Compost Filter Berm and Socks |
| ☐ Compost Filter Berm and Socks | ☐ Compost Filter Berm and Socks | ☐ Vegetation Lined Ditches |
| | ☐ Stone Outlet Sediment Traps | ☐ Sand Filter Systems |
| | ☐ Sediment Basins | ☐ Grassy Swales |

## III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

■ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

## IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

■ No Action Required ☐ Required Action

Action No.

1.

2.

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4.

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

■ No Action Required ☐ Required Action

Action No.

1.

2.

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4.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

### LIST OF ABBREVIATIONS

| | | | |
|---|---|---|---|
| BMP: | Best Management Practice | SPCC: | Spill Prevention Control and Countermeasure |
| CGP: | Construction General Permit | SW3P: | Storm Water Pollution Prevention Plan |
| DSHS: | Texas Department of State Health Services | PCN: | Pre-Construction Notification |
| FHWA: | Federal Highway Administration | PSL: | Project Specific Location |
| MOA: | Memorandum of Agreement | TCEQ: | Texas Commission on Environmental Quality |
| MOU: | Memorandum of Understanding | TPDES: | Texas Pollutant Discharge Elimination System |
| MS4: | Municipal Separate Stormwater Sewer System | TPWD: | Texas Parks and Wildlife Department |
| MBTA: | Migratory Bird Treaty Act | TxDOT: | Texas Department of Transportation |
| NOT: | Notice of Termination | T&E: | Threatened and Endangered Species |
| NWP: | Nationwide Permit | USACE: | U.S. Army Corps of Engineers |
| NOI: | Notice of Intent | USFWS: | U.S. Fish and Wildlife Service |

## VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

- Dead or distressed vegetation (not identified as normal)
- Trash piles, drums, canister, barrels, etc.
- Undesirable smells or odors
- Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ■ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☐ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

■ No Action Required ☐ Required Action

Action No.

1.

2.

3.

## VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

■ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Texas Department of Transportation — Design Division Standard

# ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

# EPIC

| | | | | | | |
|---|---|---|---|---|---|---|
| FILE: epic.dgn | DN: TxDOT | CK: RG | DW: VP | CK: AR | | |
| ©TxDOT: February 2015 | CONT | SECT | JOB | HIGHWAY | | |
| REVISIONS | 0902 | 90 | 119 | McCART | | |
| 12-12-2011 (DS) | DIST | COUNTY | | SHEET NO. | | |
| 05-07-14 ADDED NOTE SECTION IV. | FTW | TARRANT | | 147 | | |
| 01-23-2015 SECTION II CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES. | | | | | | |