FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	CM(2021) 734		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	
CONT.	SECTION	JOB	
0902	00	278	1

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT #: CM(2021) 734
PROJECT LENGTH : NO PROJECT LENGTH

TARRANT COUNTY

VA

LIMITS OF WORK: VARIOUS LOCATIONS ALONG SH 199 AND US 377
FOR THE CONSTRUCTION OF INTERSECTION AND OPERATIONAL IMPROVEMENTS
CONSISTING OF: THE INSTALLATION OF BROADBAND RADIOS AND CCTV IP CAMERAS

FINAL PLANS

LETTING DATE: _____

DATE CONTRACTOR BEGAN WORK: _____

DATE WORK WAS COMPLETED: _____

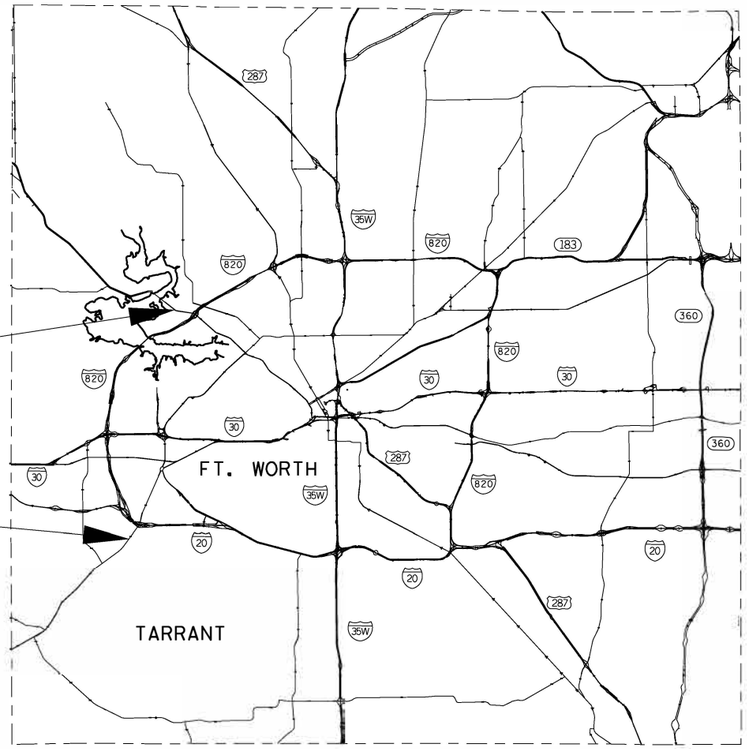
DATE WORK WAS ACCEPTED: _____

FINAL CONTRACT COST: $ _____

CONTRACTOR: _____

INDEX OF SHEETS

SEE SHEET 2



EXCEPTIONS: NONE
EQUATIONS: NONE
R.R. CROSSINGS: NONE

SCALE 0 3 6 MILES

Texas Department of Transportation

SUBMITTED FOR LETTING 4/19/2021
DocuSigned by:
Theresa Parr
7645CDCD25274F3...
DIRECTOR OF TRANSPORTATION OPERATIONS

RECOMMENDED FOR LETTING 4/23/2021
DocuSigned by:
7879B0B52B5D403...
DIRECTOR OF TRANSPORTATION, PLANNING, AND DEVELOPMENT

APPROVED FOR LETTING 4/23/2021
DocuSigned by:
Carl L. Johnson, PE
2FE36139F0614C3...
DISTRICT ENGINEER

PLANS PREPARED BY:

MALDONADO - BURKETT
Engineering | Surveying | Construction
TBPE # 10258 TBPLS # 10194235
www.maldonado-burkett.com

TRAF-IQ
14811 ST. MARY'S LANE, SUITE 180
HOUSTON, TEXAS 77079
832.399.1100
TEXAS PE FIRM REG # F-18726

NOTE:
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)

4/19/2021

INDEX OF SHEETS

SHEET DESCRIPTION

GENERAL

TRAFFIC CONTROL PLANS

TRAFFIC CONTROL STANDARDS

TRAFFIC LAYOUTS

TRAFFIC STANDARDS

ENVIRONMENTAL STANDARDS

STANDARDS SHEETS HAVE BEEN SPECIFICALLY SELECTED BY ME OR
UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT

Melanie B Young, P.E.

MELANIE B YOUNG, P.E. — 4/16/21 DATE

STATE OF TEXAS
MELANIE B. YOUNG
67775
REGISTERED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROVED

MALDONADO - BURKETT
Engineers | Surveyors | Contractors
TBPE # 10258 TBPLS # 10194235
www.maldonado-burkett.com

Texas Department of Transportation

INDEX OF SHEETS

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	2
CONTROL	SECTION	JOB	
0902	00	278	

General Notes – Intelligent Transportation Systems (ITS)

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

Theresa Poer, P.E. theresa.poer@txdot.gov
Carlos Molina, P.E. carlos.molina@txdot.gov

Contractor questions will be accepted through email and phone 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.

Existing communication systems (wireless or fiber) shall remain in operation throughout the project. A maximum 4-hour window for switch over at each location will be permitted. Contractor shall provide 72-hour advance notice to TxDOT Signal Shop at 817-370-3664, and receive approval for any outages in advance.

The major component of the ITS system consist of the installation of ITS radios, Closed Circuit Television CCTV, and Ethernet Switches.

Furnish and install all incidental work, material and services not explicitly called for in the specifications or not shown in the plans, which may be necessary for a complete and properly functioning ITS system.

The quantities provided in the sheet summary tables and general notes are estimates to be used for Contractor information only and may not reflect the actual quantities required to accomplish this project.

The contractor is responsible for picking up materials furnished by the State at 2501 SW Loop 820, Fort Worth, TX 76133. Contact the TxDOT Signal Shop at 817-370-3664 forty-eight (48) hours in advance.

Do not submit submittals for devices identified as end-of-life by the manufacturer.

Perform all work in this project in a manner acceptable to and approved by the Engineer.

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Highway: VA

Contact Texas excavation safety system at 1-800-dig-tess or 1-800-344-8377, and TxDOT Signal Shop at 817-370-3664 prior to beginning any excavation work in the area of existing utilities, to prevent any damage or interference with present facilities.

Provide TxDOT with confirmation tickets of utility and line locates.

Contact the utility companies or the utility coordinating committee for exact locations prior to any work that might interfere with or damage present facilities. Verify the locations of all existing underground installations that would be in conflict with the new conduit prior to construction to avoid conflict or damage to utilities. Contact the respective utility company 48 hours prior to excavating. Coordinate with the respective utility company for any adjustment necessary to the utility. Contractor shall pothole the locations that conflict with utilities. Contractor is responsible for utility coordination, locates, and potholing at no additional expense to the State.

Replace within 48 hours all existing underground and above ground installations damaged by Contractor's forces during construction at no cost to the state. If the damaged installation belongs to the Department and has not been repaired within 48 hours, the Contractor will be responsible to pay a third party or the Department for the repair.

Procure all permits and licenses. The electrical work will be inspected by the State.

The Engineer shall approve the starting date for system acceptance testing and, if required, shall terminate the system testing because of malfunctions or obvious unsuitability of the equipment.

Do not remove or relocate existing equipment in existing cabinets without the Engineer's approval. Install all necessary shelves, terminal panels, wiring, cabling, harnesses, etc. where new equipment is to be installed in existing cabinets. All costs associated with these cabinet modifications shall be considered subsidiary to the various bid items.

Maintain the median of the highway in a serviceable condition, free of obstructions, and acceptable to the Engineer. Take special care to eliminate hazards to the traveling public.

Remove any obstructions to existing drainage due to the Contractor's operation as required at the Contractor's entire expense.

Do not mix materials, store materials, store equipment, or repair equipment on top of concrete pavement or bridge decks. Remove all construction related debris from the R. O. W. to a dump site approved by the Engineer in writing.

Replace all pavement, shoulders, and metal beam guard fence damaged by Contractor's forces during construction at no cost to the state.

Ensure existing curb, and curb and gutter is not discolored or damaged during construction operations. In the event of discoloration or damage, clean, replace, or repair as directed, at no cost to the State.

All Contractor's vehicles shall be clearly identified with company name plates when working on the project.

Drilling, boring, and trenching through any type of rock or soil 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.

Seal all conduits in the cabinets and in the ground boxes with duct seal, expandable urethane foam, or by other methods approved by the Engineer.

Item 5. Control of the Work

When supplementary shop drawings, shop details, erection drawings, working drawings, forming plans, or other drawings are required, the drawings will be prepared and submitted on sheets 8 1/2 by 11 inches, 17 by 22 inches, or full size drawings reduced to half scale if completely legible. If, in the opinion of the Engineer, the drawings are not completely legible, they will be prepared and submitted on sheets 22 by 34 inches, with a 1 1/2 inch left margin, and 1/2 inch top, right, and bottom margins.

Submit all sheets with a title in the lower right hand corner. The title must include the sheet index data shown on the lower right corner of the project plans, name of the structure or element or stream, sheet numbering for the shop drawings, name of the fabricator and the name of the Contractor.

Item 7. Legal Relations and Responsibilities

No significant traffic events identified.

Item 8. Prosecution and Progress

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

The start of work will be delayed 90 calendar days after the authorization date to begin work to allow time for the procurement of materials.

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Highway: VA

Item 8.5. Project Schedules

Contractor shall submit Critical Path Method (CPM) schedule in bar chart format in accordance with 8.5.5.2. Submit preliminary schedule in accordance with 8.5.5.2.1. Submit progress schedule in accordance with 8.5.5.2.3. The Estimate will be held if monthly update is not submitted.

Item 502. Barricades, Signs and Traffic Handling

Do not close a lane, shoulder, or ramp during the peak hours of 6:00 a.m. to 9:00 a.m. and 3:00 p.m. to 7:00 p.m. weekdays.

Provide minimal interference to traffic during construction operations.

One week prior to any ramp or roadway lane closures, place message boards or sign panels, as shown on the plans or as directed by the Engineer, to inform the public of such closure.

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.

Do not reduce existing number of lanes open to traffic. Exceptions will only be made during off-peak hours as shown on the plans, or as approved by the Engineer. The Engineer may direct that operations be curtailed or halted out of consideration for traffic expected to and from public gatherings, which in his opinion may result in undue traffic congestion and delays to the traveling public.

Two weeks prior to any alterations of traffic patterns, provide the Engineer, for his approval, a layout showing all signs, barricades, striping and signalization.

The Engineer may request additional signing not shown and this will be considered subsidiary to the pertinent bid items.

A qualified flagger may be required during certain phases of construction, and shall be equipped with the proper reflective clothing and two-way radios, as directed by the Engineer. Notify the proper city traffic and transportation Department officials when major traffic changes are to be made. The notification must be made three days prior to the change. Use plastic drums in accordance with the plans and manufacturer's recommendations as approved by the Engineer.

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 plans but called for in the layout shall be as shown in the current “Standard Highway Sign Designs for Texas”.

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

The contractor force account “safety contingency” that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the traffic control plan that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the engineer and the contractor’s responsible person based on weekly or more frequent traffic management reviews on the project. The engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

Item 506. Temporary Erosion, Sedimentation, and Environmental Controls

It is not anticipated that any erosion, sedimentation, or environmental control devices will be needed on this project. However, in the event that such controls are necessary, the SW3P for this project shall consist of the use of any temporary erosion control measures deemed necessary by the Engineer and as provided under this item. Payment for this work will be determined in accordance with Article 4.4, “Changes in the Work”.

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Item 620. Electrical Conductors

Do not use non-certified persons to perform electrical work. Electrical certification for this project will be as per Item 7 of the current Texas Standard Specifications and any Special Provisions to Item 7.

All cable ties shall be securely fastened by rivet or other mechanical means. Do not use double-sided adhesive stick-ons or pressure clamps.

Include extra cable length in each run to provide adequate slack at each ground box or cabinet, as determined by the Engineer.

Furnish and attach compression type connectors with a compression mechanical release hand crimping tool to each individual conductor before making connections to all terminal strips.

All electrical work shall be in conformance with the latest edition of the National Electrical Code (NEC), and TxDOT Standards.

All power conductors, shielded twisted wire pair cables, coax cables, and control cables shall be color-coded consistently or permanently labeled between all connections and splices to ensure immediate identification. Submit a chart or list identifying all cables and conductors in a logical and sequential manner prior to installation for the Engineer's approval.

All conductors shall be continuous without splices from terminal point to terminal point or otherwise as directed by the Engineer.

When pulling cables, conductors or innerducts through conduit, lubricate the cables, conductors or innerducts with a lubricant generally used for this purpose. The lubricant shall be non-aqueous, non-toxic and non-conductive and shall not harm the conduit or the insulation of cable.

Test each wire of each cable or conductor before and after installation. Any incomplete circuit or damage to any wire or cable will be cause for immediate rejection of the entire cable being tested. Remove and replace the rejected cable at Contractor’s own expense.

Bond the grounding conductors that share the same conduit, junction box, ground box or structure together at every accessible point in accordance with the electrical detail sheets, and the latest edition of the National Electrical Code, and as per TxDOT Standards.

All circuits shall test clear of faults, grounds and open circuits.

Use ratchet type crimp tools to install connectors and terminations on all type of cables.

Item 6001. Portable Changeable Message Signs

Provide all portable changeable message signs and arrow panels with a photoelectric device to allow for automatic dimming of operations to approximately 50% of their normal brightness when ambient light drops to approximately five footcandles, and then increase back again for daytime operations.

Two electronic portable changeable message sign unit(s) will be required. Individual or collective use of signs will be required by the Engineer when deemed necessary to supplement the traffic control plan.

Each sign must have programmed in its permanent memory the following 15 messages:

1. Exit Closed Ahead
2. Use Other Routes
3. Right Lane
4. Left Lane
5. Closed Ahead
6. Two Lane
7. Detour Ahead
8. Thru Traffic
9. Prepare to Stop
10. Merging Traffic
11. Expect 15 Minute Delay
12. Max Speed ** MPH
13. Merge Right
14. Merge Left
15. No Exit Next ** Miles

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

It is the policy of the Department to require performance testing of all materials and equipment not previously tested and approved. If technical data is not considered adequate for approval, samples may be requested for test by the Engineer. The contract period will not be extended for time lost or delays caused by testing prior to final Department approval of any items.
Four (4) complete sets of operation and maintenance manuals shall be provided prior to the installation of the equipment. Schematics shall be updated at the end of the job to show "as-built" condition.

Item 6010. Closed Circuit Television (CCTV) Field Equipment

This item shall also include, but is not limited to the following subsidiary items:

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- Connecting harnesses of appropriate length and terminated with matching connectors for interconnection with communications system equipment
- PoE++ Injectors
- Cat6 Cables
- Field Line of Sight Survey
- Installation of Local/Remote Control Unit and Cat Cable at Stevens Dr.

Quantities for subsidiary items are shown on the plans.

Field verify all cable length requirement prior to purchase and installation as shown on the plans.

No payment shall be made directly for all the above mentioned work and for the subsidiary items furnished and installed, or other incidentals required to complete the work, but shall be considered subsidiary to this Item.

Item 6027. Preparation of Existing Conduits, Ground Boxes, or Manholes

The existing ground boxes are either welded shut, buried, or sealed with a concrete pad. The Contractor shall be responsible for access to the existing ground boxes and restoring to original photographically documented conditions (by the Contractor); this includes any removals necessary to access the ground box as well as concrete, welding, repairing galvanized welded areas in accordance with Item 445 “Galvanizing,” etc. to establish ground box lid to original conditions after fiber or conductor cable work is complete. The Contractor is responsible for the security of existing ground boxes and ground box contents such as wiring, fiber optic cables, splice closures, etc. while they are uncovered or not welded. ITS ground boxes will be sealed by tack welding two corners for at least two inches on each side after work is completed and the seals galvanized.

No payment shall be made directly for all the above mentioned work, materials, or other incidentals required to complete the work, but shall be considered subsidiary to this item.

Item 6062. Intelligent Transportation System (ITS) Radio

This item shall also include, but is not limited to the following subsidiary items:

- Connecting harnesses of appropriate length and terminated with matching connectors for interconnection with communications system equipment.
- Removal of ITS radios
- Removal of Antenna cables
- Removal of Antennas and Mounting
- Cat6 cables

- PoE Injectors
- PoE++ 56 V Injectors
- Extension Poles with Clamp Kits
- Flat Panel Kit Antennas (Dual Polarity)
- Parabolic Kit Antennas (Dual Polarity)
- Surge Protected Power Strips
- Installation of Hardened Ethernet Switches
- Field Line of Sight Survey, Interference, Obstruction, and other factors impacting RF Communications

Quantities for subsidiary items are shown on the plans.

Install the Hardened Ethernet Switches as shown in the plans or as directed by the Engineer and make the equipment functional.

Replace the equipment damaged or lost at no cost to the Department.

Make the radio systems fully operational to provide communications for the traffic control system. Integrate the communications system with the traffic control system software and hardware as directed by the Engineer.

All materials, which are deemed salvageable by the Engineer, shall be the property of the Department and shall be transported to, and stored at TxDOT's Traffic Management Maintenance Section, 2501 SW Loop 820, Fort Worth, TX 76133

No payment shall be made directly for all the above-mentioned work and for the subsidiary items furnished and installed, or other incidentals required to complete the work, but shall be considered subsidiary to this Item.

Item 6185. Truck Mounted Attenuators (TMA)

No additional shadow vehicle(s) with TMA other than those shown in the TCP Standard Sheets and as detailed on the General Note(s) of these Standard Sheets.

Therefore, 1 total shadow vehicles with TMA will be required for this type of work. The contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs needed for the project.

Miscellaneous

TxDOT personnel will verify network communications to the work site from an appropriate ITS cabinet, signal cabinet, satellite building, or from TransVision. If network communications fail,

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the Contractor will correct the fault so that successful communication is established. The Contractor will correct all problems related to his work which develop during the test at no additional cost to the state.

Reference to any specific manufacturer's name, make or number for any item of equipment or material necessary to meet the requirements of the specifications and the plans is intended to be descriptive but not mandatory and is intended to indicate the type of equipment or materials that will be acceptable. The type of equipment or materials that will be acceptable shall be subject to acceptable test results, by the Engineer or his named representative, at the time of product installation. However, provide all like items on this contract to be identical and from the same manufacturer.

Within thirty days after the authorization to begin work, provide four copies of descriptive manuals and brochures for each type of electronic equipment and apparatus proposed for this project. These documents shall contain sufficient technical data for complete evaluation. Incomplete submittals will not be accepted. Describe the quality, function and capability of each deliverable item. Submit originals or copies equal in quality to the originals manuals or brochures. Where a brochure describes several similar items, highlight the specific item being submitted. Where an item has several options or accessories, highlight the options or accessories he intends to deliver. Bond all manuals, brochures, and data sheets relating to a bid item together in a folder. Identify on the cover with the TxDOT contract number, title and bid item number.

Submit four copies of detailed equipment submittals and shop drawings for each fabricated item proposed for this project within thirty days after the authorization to begin work. Submit these equipment submittals and drawings to contain all information required for complete evaluation and fabrication in accordance with the plans and specifications. Stamp the drawings with Contractor's approval, sequentially numbered and identified as to TxDOT contract number, title and bid item number.

The Engineer, upon approval of the above submittals, will indicate any correction to the details in the submittals.

Correct any errors in the submittals, as directed by the Engineer, and if required, shall resubmit to the Engineer four copies of the same. Begin work upon approval of the corrected drawings and equipment. No change will be permitted in the list of equipment or shop drawings once approved, unless authorized by the Engineer in writing.

Equipment will not be accepted for delivery or any payment made until the equipment, materials lists and shop drawings have been approved by the Engineer. Approval by the Engineer does not relieve the Contractor of his responsibilities to meet the requirements of the specifications and plans.

The TxDOT, through its authorized representative, retains the right to inspect all structures, equipment and materials used in the project before, during and after installation, also the right to

inspect the work during the process of fabrication or manufacture for the purpose of determining if the plans and specifications upon which the award was made are being complied with and being satisfied as to quality of the material and workmanship. Such inspection will not release the manufacturer from strict compliance with specifications when the work is finally completed and offered for acceptance.

Provide each field cabinet with three copies of the final as-built cabinet wiring diagrams. Deliver a Mylar reproducible of the cabinet wiring diagrams showing all field changes incorporated by the Contractor to the Engineer.

Provide system support during the entire project. This includes any required design reviews, complete "parts and labor" on-site maintenance until final acceptance by the state, operational support during system integration and manufacturer's warranties and guarantees at no additional cost to the state.

Conduct design reviews of the ITS system within the scope of the project as required. Provide review comments within five business days to the Engineer, at no additional cost to the State. The Engineer will review and make recommendations and/or corrections as needed.

The Contractor is responsible for all new materials and equipment furnished and installed, as well as existing equipment modified as part of this contract, until final acceptance of the system. The Contractor is responsible for the replacement of equipment, cabinets, wire, and fiber optic cable that fails due to all causes including theft, vandalism, and "knock downs".

Designate an ITS supervisor who shall be responsible for the ITS project and serve as the Contractor's official contact with the Department. This ITS supervisor shall be on-site from the beginning of the ITS construction until final system acceptance. Supplement the ITS supervisor's support with the services of qualified Engineers and the services of vendor technical representatives for the duration of the project.

Upon final system acceptance, furnish a set of as-built plans which shall show the actual equipment installation and construction details.

Provide complete on-site parts and labor support for the furnishing and the installation of the Intelligent Transportation Systems for the duration of the entire project and during the warranty period. During the project, make any adjustments or repairs which may be required and correct any defects or damages that may occur at Contractor expense.

During the warranty period, furnish parts and labor required to repair, on-site, any manufacturer's defects (materials or workmanship), damage caused by manufacturer's defects and damage caused by the Contractor during the performance of warranty work. Natural disasters or other events not directly controllable by the Contractor are specifically exempted from warranty.

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During the test period, make any adjustments or repairs which may be required and remedy any defects or damages that may occur at Contractor expense.

No time charges will be assessed during the 90 days test period, provided all other work is completed to the satisfaction of the Engineer.

QUANTITY SHEET

CONTROLLING PROJECT ID 0902-00-278 **DISTRICT** Fort Worth **COUNTY** Tarrant
HIGHWAY Various

							TOTAL EST.	TOTAL FINAL
			CONTROL SECTION JOB		**0902-00-278**			
			PROJECT ID		**A00133242**			
			COUNTY		**Tarrant**			
			HIGHWAY		**Various**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL			
	500-6001	MOBILIZATION	LS	100.00%			100.00%	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	3.000			3.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	28.000			28.000	
	6010-6002	CCTV FIELD EQUIPMENT (DIGITAL)	EA	10.000			10.000	
	6010-6004	CCTV MOUNT (POLE)	EA	10.000			10.000	
	6027-6003	CONDUIT (PREPARE)	LF	1,260.000			1,260.000	
	6027-6008	GROUND BOX (PREPARE)	EA	33.000			33.000	
	6062-6018	ITS RADIO (SNGL)(5 GHZ)-I-U	EA	1.000			1.000	
	6062-6024	ITS RADIO (SNGL)(5 GHZ)-C-P	EA	2.000			2.000	
	6062-6034	ITS RADIO (DUAL)(5 GHZ/5 GHZ)-I-U	EA	8.000			8.000	
	6062-6043	REMOVE ITS RADIO	EA	9.000			9.000	
	6185-6002	TMA (STATIONARY)	DAY	14.000			14.000	
	16	MATERIAL FURNISHED BY THE STATE (PARTICIPATING)	LS	1.000			1.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000			1.000	
		LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000			1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000			1.000	

SUMMARY OF QUANTITIES															
ITEM NO.		500	502	6001	6010	6010	6010	6010	6027	6027	6062	6062	6062	6062	6062	6062
DESC. CODE		6001	6001	6001	6002	##	##	6004	6003	6008	6018	6024	6034	##	##	##
DESCRIPTION		MOBILIZATION	BARRICADES, SIGNS, AND TRAFFIC HANDLING	PORTABLE CHANGEABLE MESSAGE SIGN	CCTV FIELD EQUIPMENT (DIGITAL)	CCTV ETHERNET POE CABLE	CCTV POE INJECTOR	CCTV MOUNT (POLE)	CONDUIT (PREPARE)	GROUND BOX (PREPARE)	ITS RADIO (SNGL) (5GHZ)-I-U	ITS RADIO (SNGL) (5GHZ)-C-P	ITS RADIO (DUAL) (5GHZ/5GHZ)-I-U	PARABOLIC KIT ANTENNA (DUAL POLARITY)	FLAT PANEL KIT ANTENNA (DUAL POLARITY)	RADIO POE ENABLE INJECTOR, 56 VOLT
SHEET	LOCATION	LS	MO	DAY	EA	LF	EA	EA	LF	EA	EA	EA	EA	EA	EA	EA
26	SH 199 AT HODGKINS RD				1	90	1	1	30	2						
27	SH 199 AT AZLE				1	130	1	1	70	2						
28	SH 199 AT CHARBONNEAU				1	75	1	1	20	1						
29	SH 199 AT BOAT CLUB RD				1	200	1	1	135	3						
30	SH 199 AT ROBERTS CUT OFF				1	220	1	1	150	4						
31	US 377 AT HAWKINS HOME				1	90	1	1	35	1		1		1		
32	US 377 AT STEVENS								20	1			1		1	
33	US 377 AT RM 2871				1	175	1	1	120	3			1		1	1
34	US 377 AT WINSCOTT				1	105	1	1	190	4		1	1	1	1	1
35	US 377 AT WESTPARK DR				1	190	1	1	140	2			1		1	1
36	US 377 AT SPROLES								35	2			1		1	
37	US 377 AT MERCEDES ST				1	145	1	1	90	3			1		1	1
38	US 377 AT BENBROOK FIELD								140	3			1		1	1
39	US 377 AT I-820 EBFR								85	2	1		1		1	1
PROJECT TOTAL		1	3	28	10	1,420	10	10	1,260	33	1	2	8	2	8	6

THIS ITEM WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO PERTIENENT BID ITEM

SUMMARY OF QUANTITIES													
ITEM NO.		6062	6062	6062	6062	6062	6062	6062	6062	6062	6062	6062	6185
DESC. CODE		##	##	##	##	##	6043	##	##	##	##	##	6002
DESCRIPTION		RADIO POE INJECTOR	RADIO ETHERNET POE CABLE	EXTENSION POLE WITH CLAMP KIT	ETHERNET SWITCH (INSTALL ONLY)	15A, 120VAC, 8 RECEPTABLE, SURGE PROTECTED POWER STRIP	REMOVE ITS RADIO	REMOVAL OF EXISTING YAGI ANTENNA EXTENSION POLE, AND	REMOVAL OF EXISTING OMNI ANTENNA EXTENSION POLE, AND	REMOVAL OF EXISTING FLAT PANEL ANTENNA EXTENSION POLE, AND	REMOVE COAX CABLE	REMOVE ETHERNET CABLE	TMA (STATIONARY)
SHEET	LOCATION	EA	LF	EA	EA	EA	EA	EA	EA	EA	LF	LF	EA
26	SH 199 AT HODGKINS RD			1									
27	SH 199 AT AZLE			1									
28	SH 199 AT CHARBONNEAU			1									
29	SH 199 AT BOAT CLUB RD			1									
30	SH 199 AT ROBERTS CUT OFF			1									
31	US 377 AT HAWKINS HOME	1	90	1	1	1							
32	US 377 AT STEVENS	1	75	1	1	1	1			1		60	
33	US 377 AT RM 2871		175	1	1	1	1	1			130		
34	US 377 AT WINSCOTT	1	340	2	2	1	1	1			90		
35	US 377 AT WESTPARK DR		190	1	1	1	1	1			90		
36	US 377 AT SPROLES	1	90	1	1	1	2	1	1		150		
37	US 377 AT MERCEDES ST		145	1	1	1	1	1			130		
38	US 377 AT BENBROOK FIELD		192	1	1	1	1	1			75		
39	US 377 AT I-820 EBFR	1	200	2	1	1	1	1			125		
PROJECT TOTAL		5	1,497	16	10	9	9	7	1	1	790	60	14

THIS ITEM WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO PERTIENENT BID ITEM

NO.	DATE	REVISION	APPROVED

MALDONADO - BURKETT
Engineers | Surveyors | Contractors
TBPE # 10258 TBPLS # 10194235
www.maldonado-burkett.com

SUMMARY OF QUANTITIES

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	5
CONTROL	SECTION	JOB	
0902	00	278	

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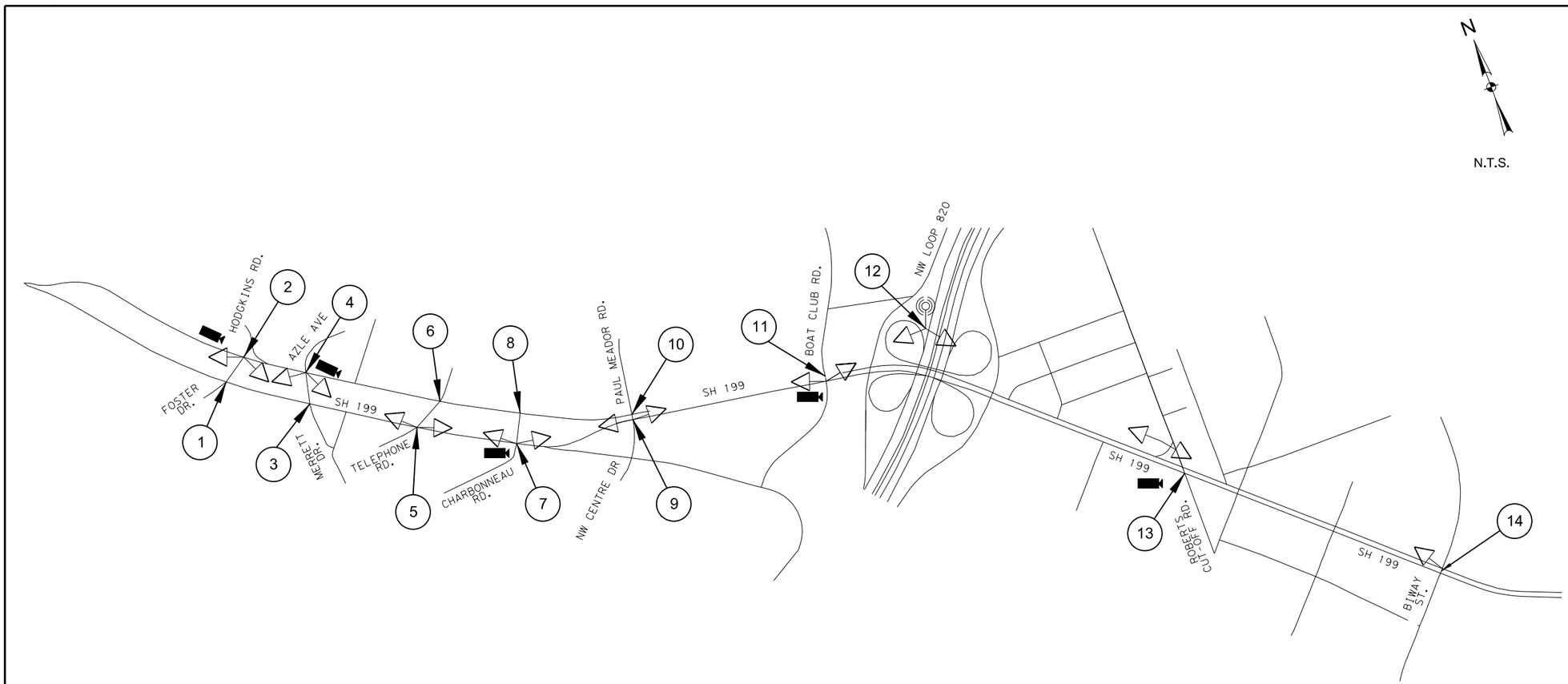

NOTES:

1. VERIFY LINE OF SIGHT FOR CCTV INSTALLATIONS AND OBTAIN TXDOT APPROVAL PRIOR TO INSTALLATION OF EQUIPMENT.
2. ITS RADIOS ARE EXISTING TO REMAIN.

INTERSECTION #	INTERSECTION NAME	PROPOSED IMPROVEMENTS	EXISTING COMMUNICATIONS
1	SH 199 AT FOSTER DRIVE		
2	SH 199 AT HODGKINS ROAD	CCTV	5.8 GHz ITS RADIO
3	SH 199 AT MERRETT DRIVE		
4	SH 199 AT AZLE AVENUE	CCTV	5.8 GHz ITS RADIO
5	SH 199 AT TELEPHONE ROAD (SW)		5.8 GHz ITS RADIO
6	SH 199 AT TELEPHONE ROAD (NE)		
7	SH 199 AT CHARBONNEAU ROAD (SW)	CCTV	5.8 GHz ITS RADIO
8	SH 199 AT CHARBONNEAU ROAD (NE)		
9	SH 199 AT NW CENTRE		
10	SH 199 AT PAUL MEADOR ROAD		5.8 GHz ITS RADIO
11	SH 199 AT BOAT CLUB ROAD	CCTV	5.8 GHz ITS RADIO
12	IH 820 SBFR/SH199		5.8 GHz ITS RADIO, OMNI
13	SH 199 AT ROBERTS CUT-OFF ROAD	CCTV	5.8 GHz ITS RADIO
14	SH 199 AT BIWAY STREET		5.8 GHz ITS RADIO

Melanie B. Young, P.E.

STATE OF TEXAS
MELANIE B. YOUNG
67775
REGISTERED
PROFESSIONAL ENGINEER

4/16/21

NO.	DATE	REVISION	APPROVED

MALDONADO - BURKETT
Engineers | Surveyors | Contractors
TBPE # 10258 TBPLS # 10194235
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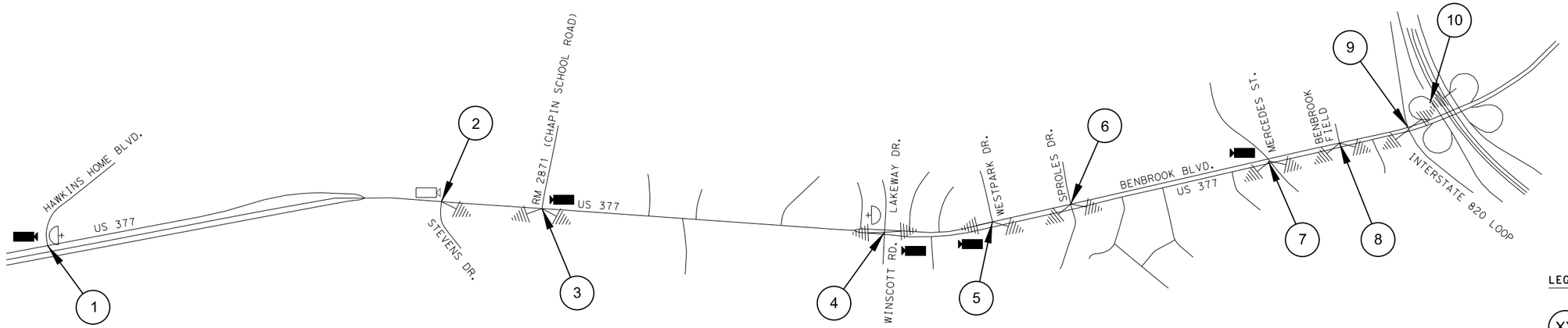
Texas Department of Transportation

SH 199
PROJECT LAYOUT

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	
CONTROL	SECTION	JOB	6
0902	00	278	

006 SH 199 PROJECT LAYOUT.dgn



N.T.S.

LEGEND

- XX — LOCATION #
- PROP. ETHERNET RADIO ANTENNA
- EXIST. ETHERNET RADIO ANTENNA
- PROP. CCTV
- EXIST. CCTV
- EXISTING OMNI ANTENNA
- PARABOLIC RADIO ANTENNA

NOTES:

1. PARABOLIC RADIO ANTENNAS ARE TO BE INSTALLED AT US 377 WITH HAWKINS HOME AND WINSCOTT ROAD.
2. VERIFY LINE OF SIGHT OF ALL RADIOS AND OBTAIN TXDOT APPROVAL PRIOR TO INSTALLATION OF EQUIPMENT.
3. VERIFY LINE OF SIGHT FOR CCTV INSTALLATIONS AND OBTAIN TXDOT APPROVAL PRIOR TO INSTALLATIONS OF EQUIPMENT.
4. CONTRACTOR SHALL REMOVE ALL EXISTING 900 MHZ RADIOS AND ASSOCIATED EQUIPMENT.
5. CONTRACTOR SHALL REMOVE THE EXISTING 5.8 GHZ RADIO ASSOCIATED EQUIPMENT AT STEVENS DRIVE.
6. ALL EXISTING EQUIPMENT SHALL BE SALVAGED AND REMAIN THE PROPERTY OF TXDOT.
7. EXISTING CCTV AT US 377 AT STEVENS SHALL REMAIN. CONTRACTOR SHALL PROVIDE AND/OR INSTALL ADDITIONAL HARDWARE PROVIDED AND MAKE CAMERA OPERATIONAL.

INTERSECTION #	INTERSECTION NAME	PROPOSED IMPROVEMENTS	EXISTING COMMUNICATION
1	HAWKINS HOME BLVD.	5.8 GHz ITS RADIO, CCTV	
2	STEVENS DR.	5.8 GHz ITS RADIO	5.8 GHz ITS RADIO, CCTV
3	RM 2871 (CHAPIN SCHOOL ROAD)	5.8 GHz ITS RADIO, CCTV	900 MHZ RADIO
4	LAKEWAY DR. / WINSCOTT RD.	2 EA. 5.8 GHz ITS RADIO, CCTV	900 MHZ RADIO
5	WESTPARK DR.	5.8 GHz ITS RADIO, CCTV	900 MHZ RADIO
6	SPROLES DR.	5.8 GHz ITS RADIO	900 MHZ RADIO
7	MERCEDES ST.	5.8 GHz ITS RADIO, CCTV	900 MHZ RADIO
8	BENBROOK FIELD	5.8 GHz ITS RADIO	900 MHZ RADIO
9	INTERSTATE 820 LOOP EBFR	5.8 GHz ITS RADIO	900 MHZ RADIO
10	INTERSTATE 820	5.8 GHz ITS RADIO	

Melanie B Young, P.E.

STATE OF TEXAS
MELANIE B. YOUNG
67775
REGISTERED PROFESSIONAL ENGINEER

4/16/21

NO.	DATE	REVISION	APPROVED

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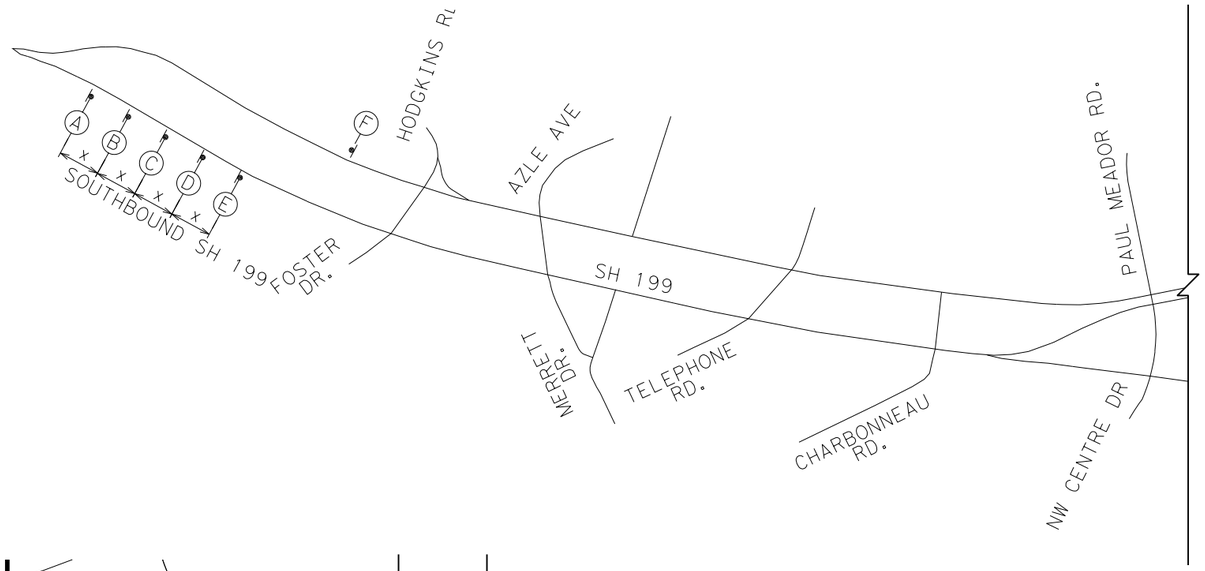
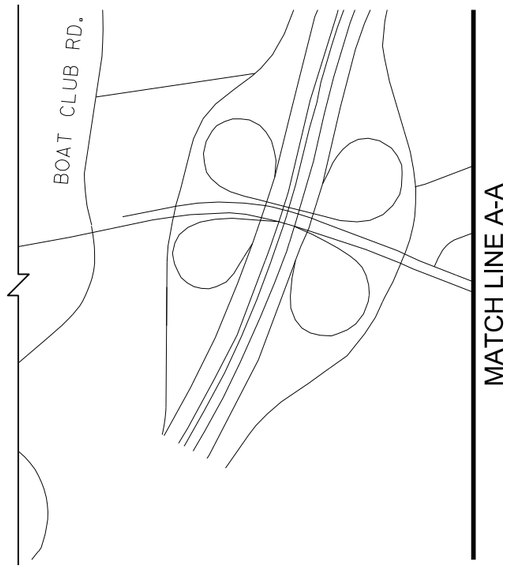
Texas Department of Transportation

US 377
PROJECT LAYOUT

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	7
CONTROL	SECTION	JOB	
0902	00	278	





Posted Speed	Sign Spacing
MPH	FEET (APPRX.)
40	240
45	320

LEGEND ADVANCE WARNING SIGNS

48"×42"
R20-3T
(A)

60"×48"
G20-10T
(B)

36"×24"
G20-5aP
36"×36"
R20-5T
36"×18"
R20-5aTP
(C)

G20-5T

48"×30"
G20-6T
(D)

48"×48"
CW20SG-1D
(E)

48"×24"
G20-2
(F)

NOTES:

1. FOR ADVANCE WARNING SIGN SIZES AND SPACING, SEE BARRICADE AND CONSTRUCTION PROJECT LIMIT STANDARDS BC(2)-14.

2. ALL ADVANCE TRAFFIC CONTROL DEVICES WITHIN PROJECT LIMITS SHALL REMAIN IN PLACE UNTIL PROJECT COMPLETION.

3. INSTALL DUPLICATE SIGNS ON THE MEDIAN SIDE OF DIVIDED HIGHWAYS WHERE MEDIAN WIDTH WILL PERMIT. CW20SG-1D AND G20-2 SHALL BE PLACED IN BOTH DIRECTIONS AT ALL TIMES AND AT ALL ACCESS POINTS TO/FROM THE ACTIVE CONSTRUCTION SITE, OR AS DIRECTED BY THE ENGINEER.

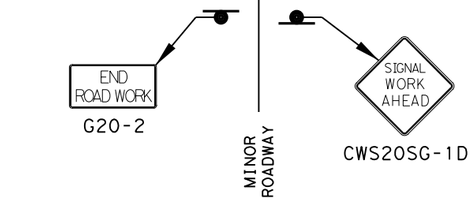
LEGEND

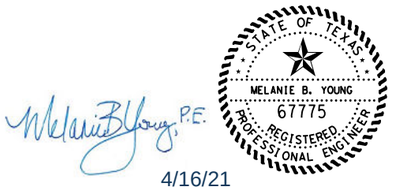
SIGN

(A) ADVANCED WARNING SIGN

MINOR ROADWAY SIGN PLACEMENT

ADVANCE WORK ZONE SIGNING FOR INTERSECTION ROAD APPROACH





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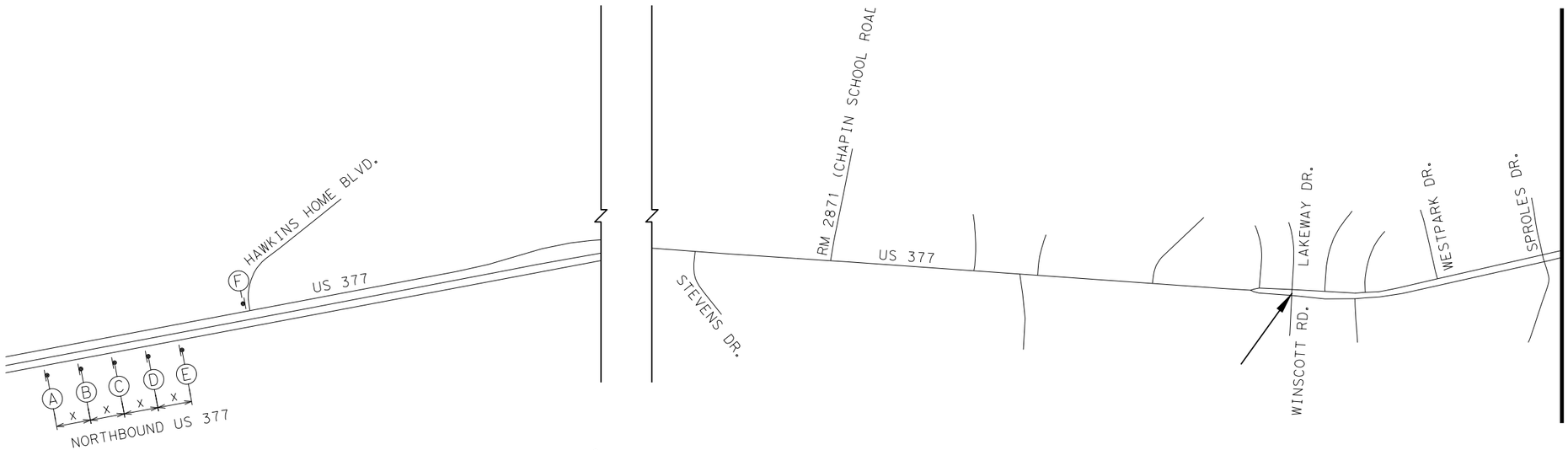
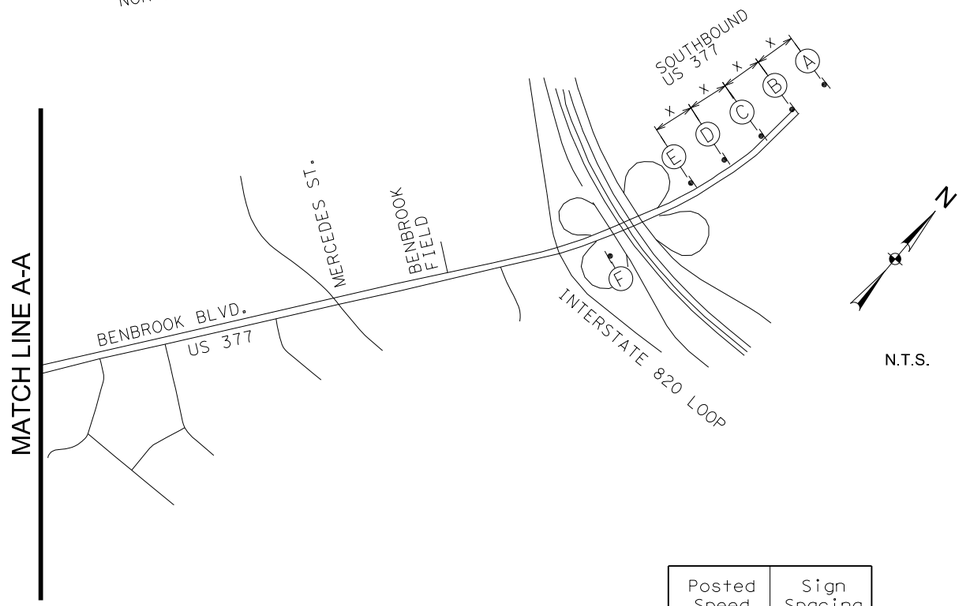
SH 199
TRAFFIC CONTROL PLAN

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	8
CONTROL	SECTION	JOB	
0902	00	278	





Posted Speed	Sign Spacing
MPH	FEET (APPRX.)
40	240
45	320
50	400
55	500
60	600

LEGEND ADVANCE WARNING SIGNS

OBEY WARNING SIGNS STATE LAW
48"x42"
R20-3T
(A)

STAY ALERT
TALK OR TEXT LATER
60"x48"
G20-10T
(B)

WORK ZONE
TRAFFIC FINES DOUBLE
WHEN WORKERS ARE PRESENT
36"x24" G20-5aP
36"x36" R20-5T
36"x18" R20-5aTP
(C)

G20-5T
BEGIN ROAD WORK NEXT X MILES
NAME
ADDRESS
CITY
STATE
CONTRACTOR
48"x30"
G20-6T
(D)

SIGNAL WORK AHEAD
48"x48"
CW20SG-1D
(E)

END ROAD WORK
48"x24"
G20-2
(F)

NOTES:

1. FOR ADVANCE WARNING SIGN SIZES AND SPACING, SEE BARRICADE AND CONSTRUCTION PROJECT LIMIT STANDARDS BC(2)-14.
2. ALL ADVANCE TRAFFIC CONTROL DEVICES WITHIN PROJECT LIMITS SHALL REMAIN IN PLACE UNTIL PROJECT COMPLETION.
3. INSTALL DUPLICATE SIGNS ON THE MEDIAN SIDE OF DIVIDED HIGHWAYS WHERE MEDIAN WIDTH WILL PERMIT. CW20SG-1D AND G20-2 SHALL BE PLACED IN BOTH DIRECTIONS AT ALL TIMES AND AT ALL ACCESS POINTS TO/FROM THE ACTIVE CONSTRUCTION SITE, OR AS DIRECTED BY THE ENGINEER.

N
N.T.S.

LEGEND

SIGN
(A) ADVANCED WARNING SIGN

MINOR ROADWAY SIGN PLACEMENT

ADVANCE WORK ZONE SIGNING FOR INTERSECTION ROAD APPROACH

US 377

END ROAD WORK
G20-2

SIGNAL WORK AHEAD
CW20SG-1D

MINOR ROADWAY

Melanie B. Young, P.E
4/20/21

NO.	DATE	REVISION	APPROVED

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Texas Department of Transportation

US 377 TRAFFIC CONTROL PLAN

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	
CONTROL	SECTION	JOB	9
0902	00	278	

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. As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.

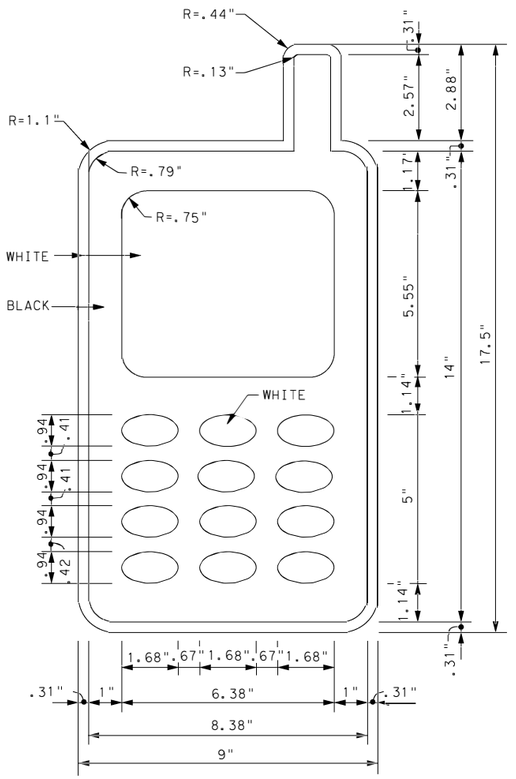
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

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 APPAREL 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.



3.0" Radius, 1.25" Border, 0.75" Indent, Black on Yellow;
[STAY ALERT] Font: D
3.0" Radius, 1.25" Border, 0.75" Indent, Black on Orange;
[TALK OR TEXT LATER] Font: C specified length;

SIGN DETAIL (G20-10T)

Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found on-line at the web address given below or by contacting:

Texas Department of Transportation
Traffic Operations Division - TE
Phone (512) 416-3118

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 Operations Division Standard

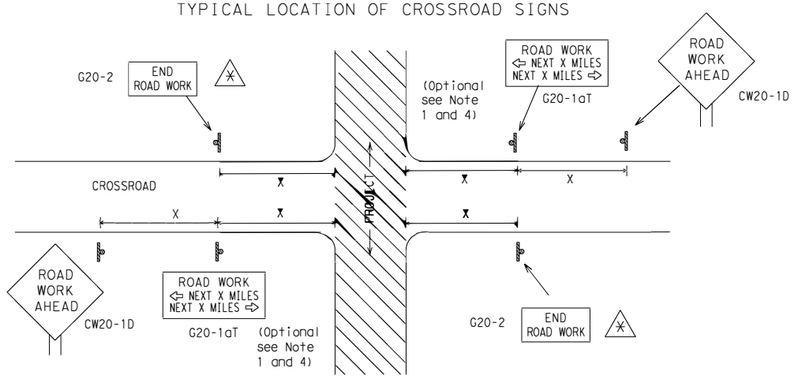
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	00	278	VA
4-03 5-10 8-14 9-07 7-13	DIST	COUNTY		SHEET NO.
	FW	TARRANT		10

DATE: 4/16/2021 12:16:44 PM
FILE: 010 BC(1)-14.dgn

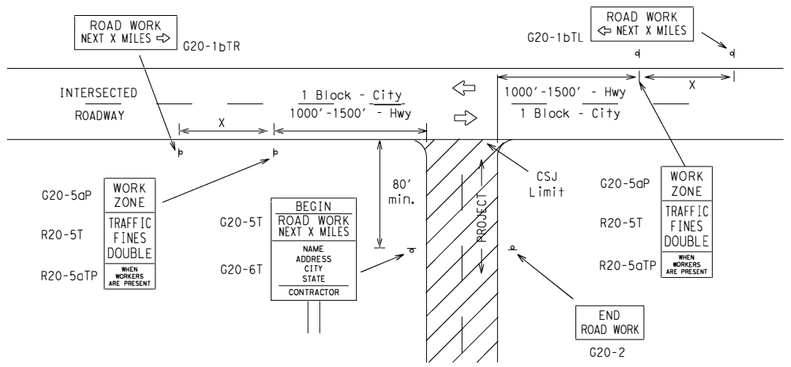
TYPICAL LOCATION OF CROSSROAD SIGNS



(*) 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. 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]

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

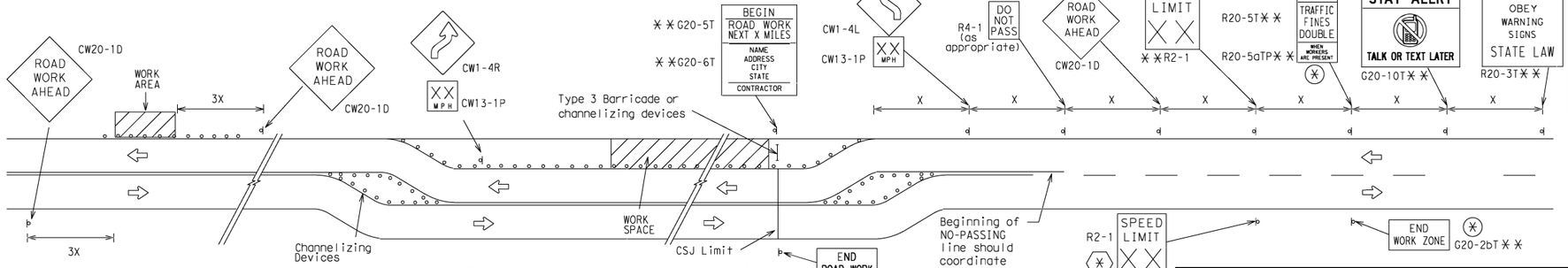
(*) For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

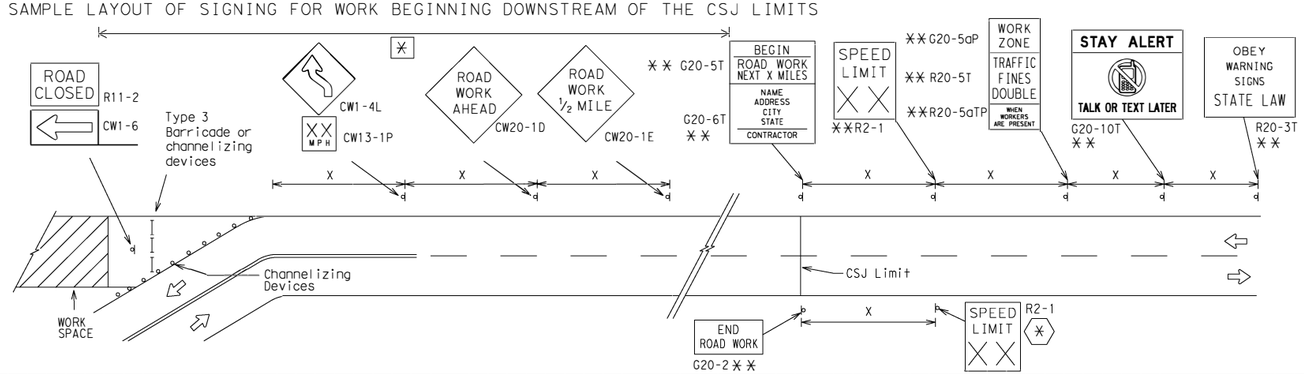
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



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.

(**) Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.

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

(*) Contractor will install a regulatory speed limit sign at the end of the work zone.

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

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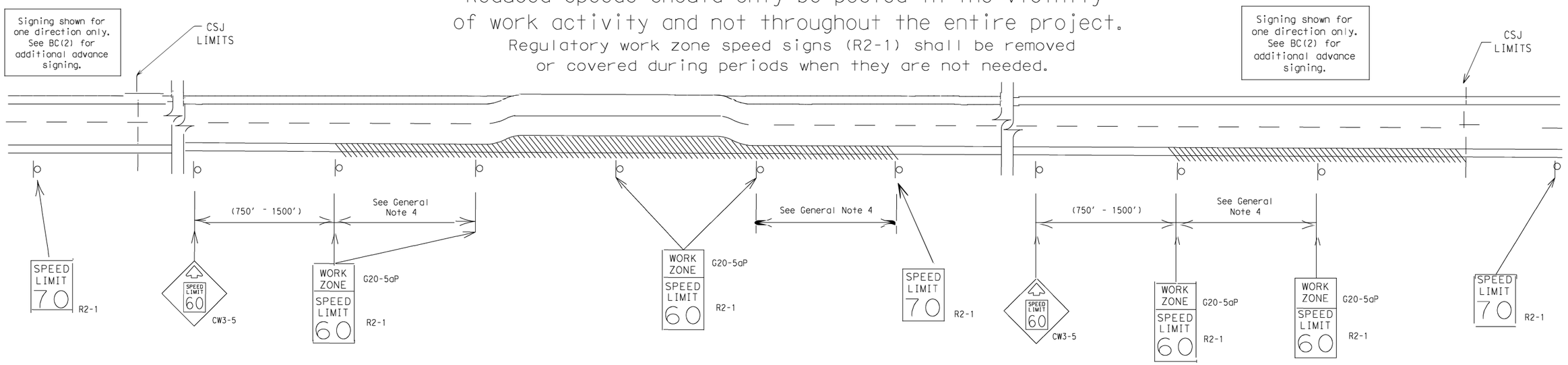
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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 travelled 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 Operations Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

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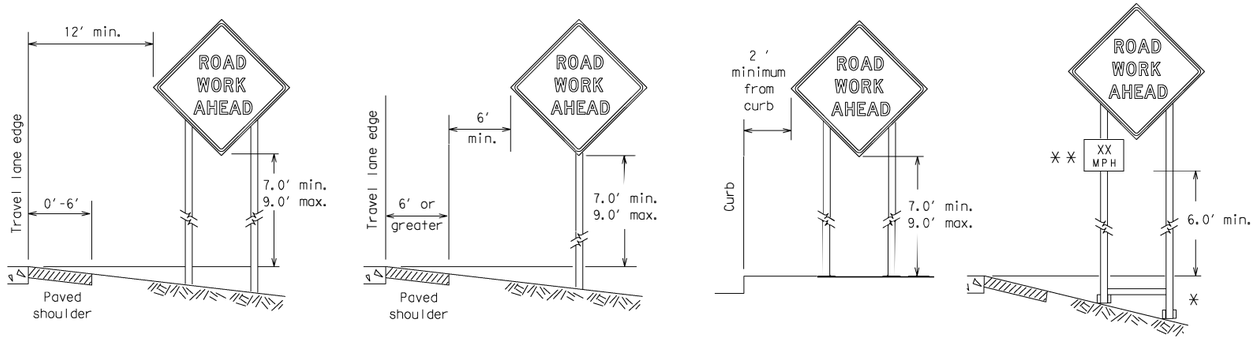
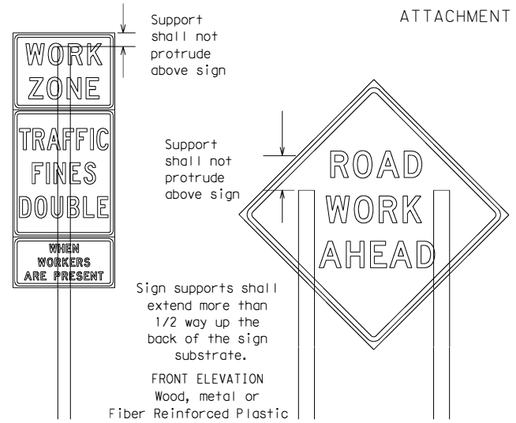
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



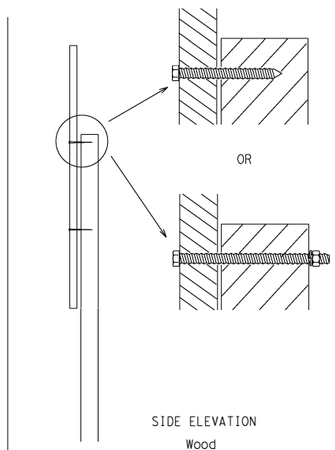
⁑ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS



Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two above and two below the 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.

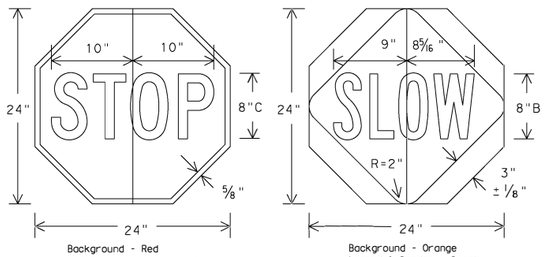


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.

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" as detailed below.
2. When used at night, the STOP/SLOW paddle shall be retroreflectorized.
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.



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, 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.
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 sheets or the CWZTCD. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards 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). 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 Operations Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

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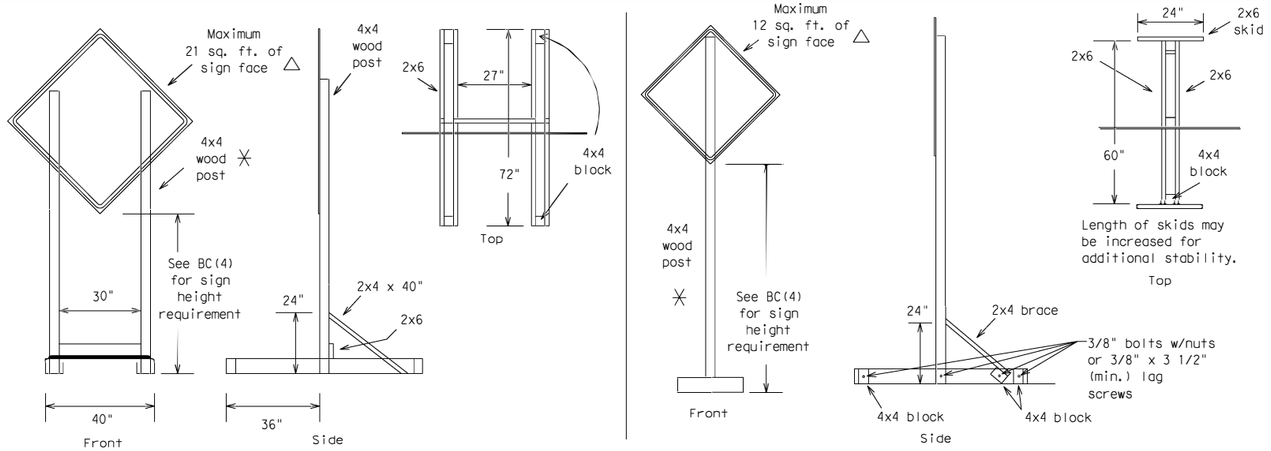
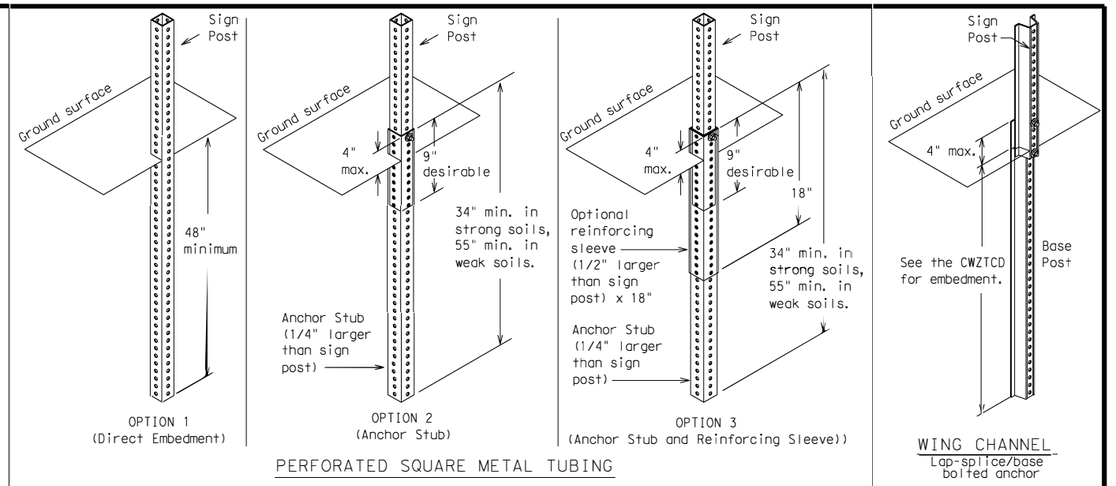


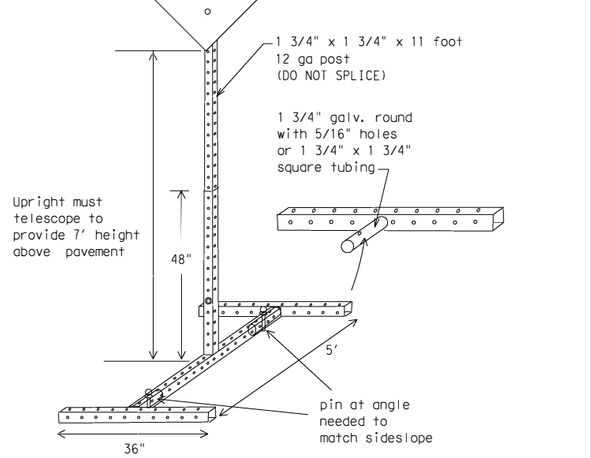
SKID MOUNTED WOOD SIGN SUPPORTS

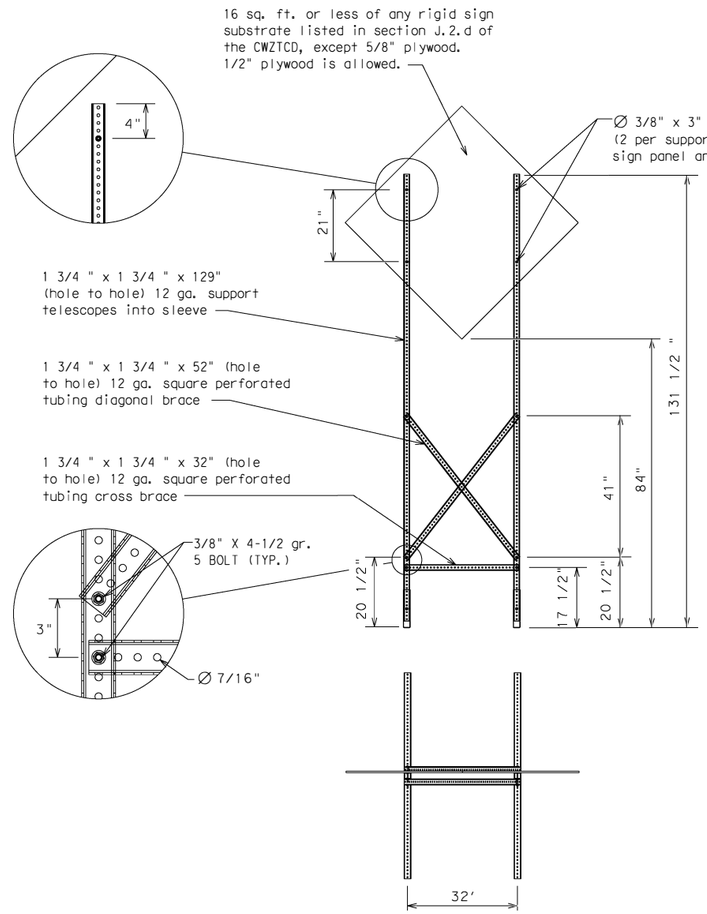
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □

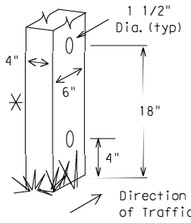


GROUND MOUNTED SIGN SUPPORTS

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

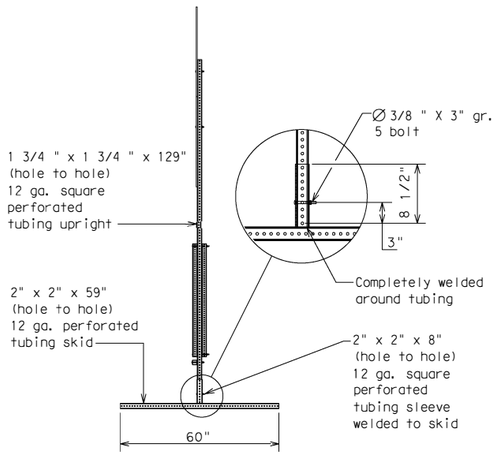






Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND 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.

SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

SHEET 5 OF 12

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	00	278	VA
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	FW	TARRANT		15

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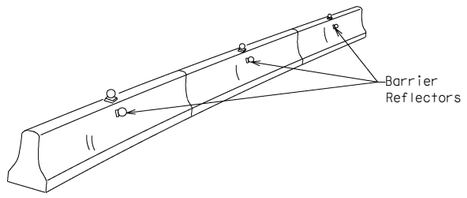
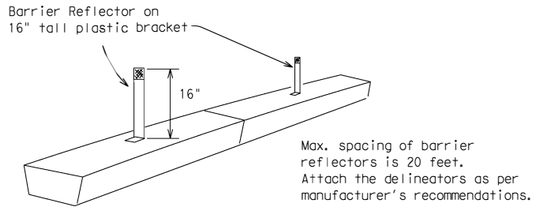
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

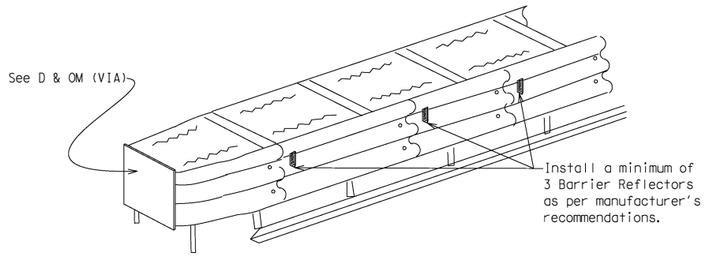


CONCRETE TRAFFIC BARRIER (CTB)

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



LOW PROFILE CONCRETE BARRIER (LPCB)

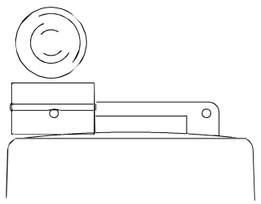


DELINEATION OF END TREATMENTS

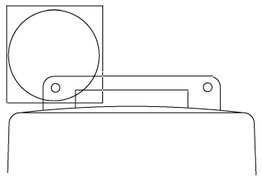
END TREATMENTS FOR
CTB'S USED
IN WORK ZONES

End treatments used on CTB's in work zones shall meet crashworthy standards as defined in the National Cooperative Highway Research Report 350. Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

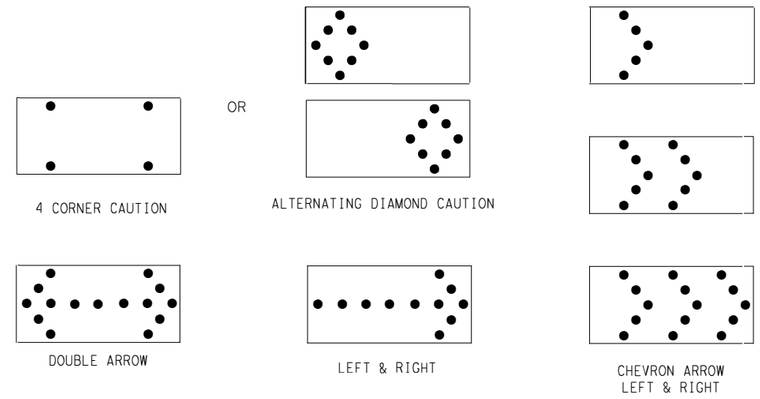
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

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

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350) or 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.

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

BC(7)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0902	00	278	VA
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	FW	TARRANT		16

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

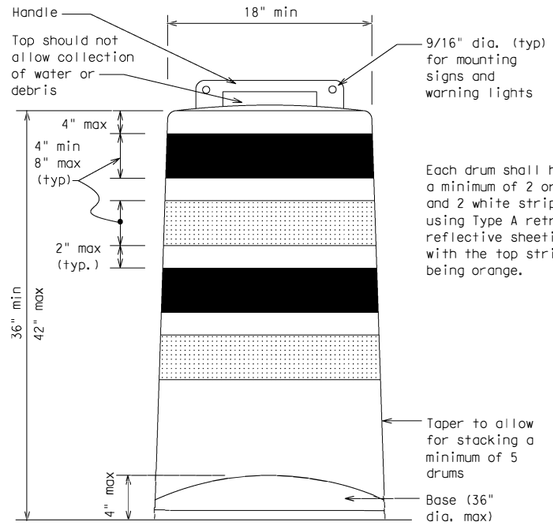
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

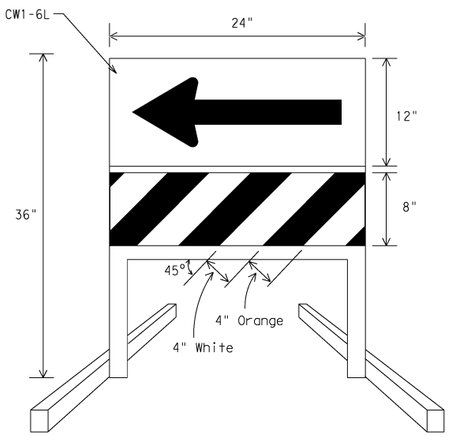
RETROREFLECTIVE SHEETING

1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A 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.

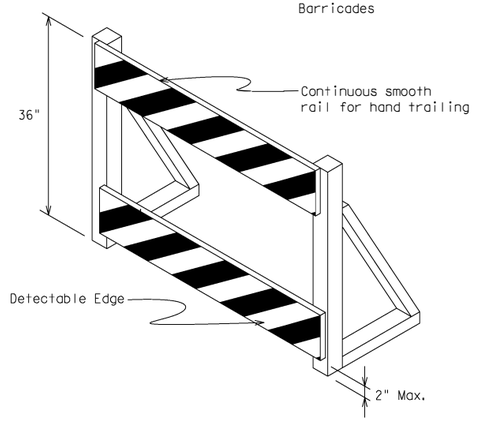




DIRECTION INDICATOR BARRICADE

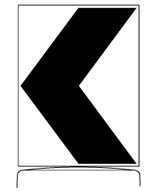
1. The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
2. If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
3. The Direction Indicator Barricade shall consist of One-Direction Large Arrow (CW1-6) sign in the size shown with a black arrow on a background of Type B_{FL} or Type C_{FL} Orange retroreflective sheeting above a rail with Type A retroreflective sheeting in alternating 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Sheeting types shall be as per DMS 8300.
4. Double arrows on the Direction Indicator Barricade will not be allowed.
5. Approved manufacturers are shown on the CWZTCD List. Ballast shall be as approved by the manufacturers instructions.

This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

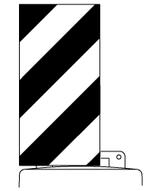


DETECTABLE PEDESTRIAN BARRICADES

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.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a device that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.
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 for Buildings and Facilities (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 may 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 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 Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	00	278	VA
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 **8-14**	FW	TARRANT		17

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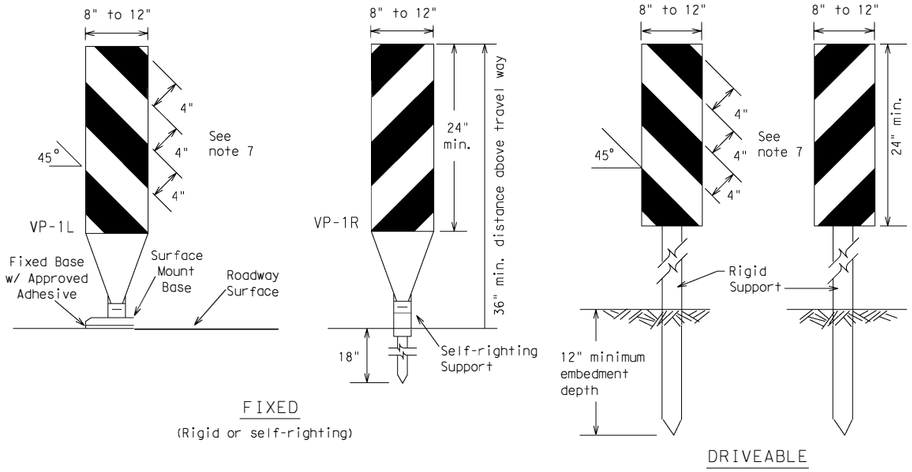
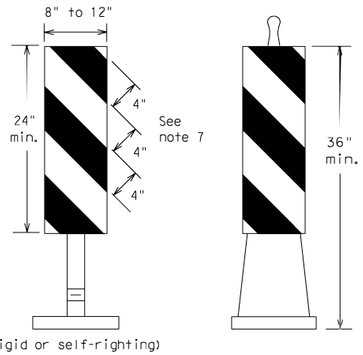


FIXED

(Rigid or self-righting)

DRIVEABLE

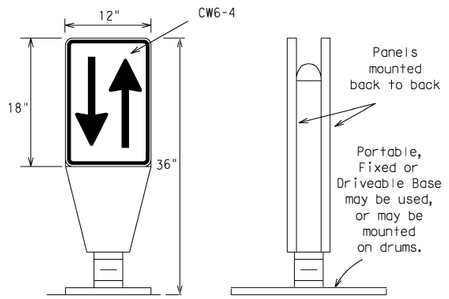


(Rigid or self-righting)

PORTABLE

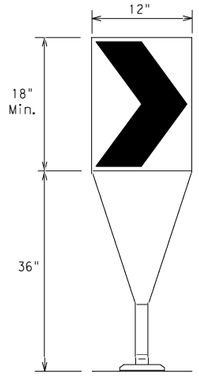
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual Appendix B "Treatment of Pavement Drop-offs in Work Zones" for additional guidelines on the use of 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 conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.

VERTICAL PANELS (VPs)



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

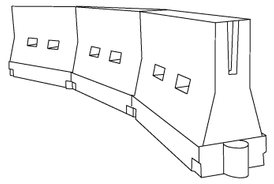
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



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

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

CHEVRONS



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) placed 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 NCHRP 350 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 shall be detailed elsewhere in the plans. These devices shall conform to the TMUTCD and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
4. The Contractor shall maintain devices in a clean condition and replace damaged, nonreflective, faded, or broken devices and bases as required by the Engineer/Inspector. The Contractor shall be required to maintain proper device spacing and alignment.
5. Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
6. Pavement surfaces shall be prepared in a manner that ensures proper bonding between the adhesives, the fixed mount bases and the pavement surface. Adhesives shall be prepared and applied according to the manufacturer's recommendations.
7. The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final pavement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.

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 Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-14

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7-13	FW	TARRANT		18

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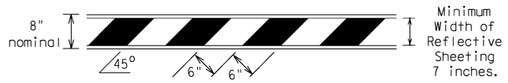
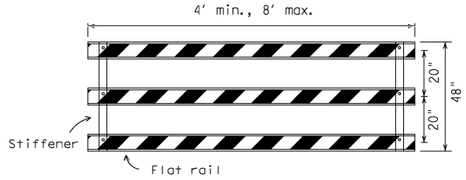
TYPE 3 BARRICADES

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 conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



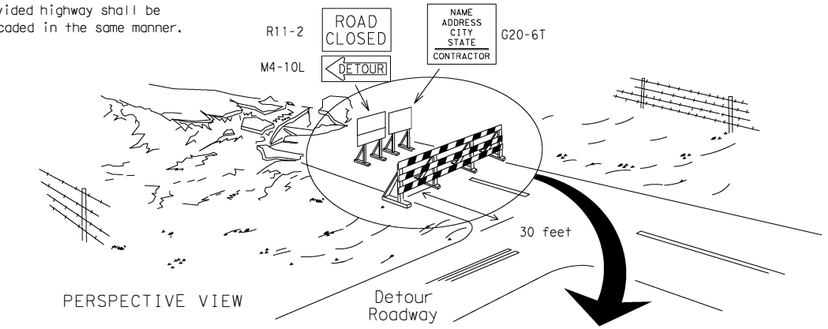
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

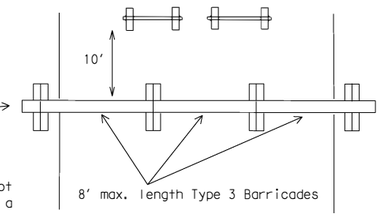
TYPICAL PANEL DETAIL
FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

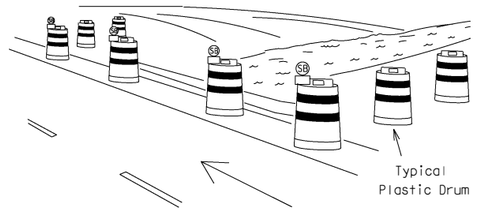
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

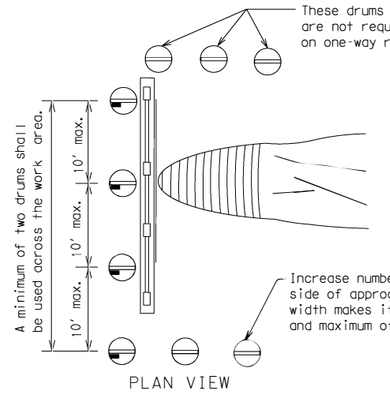
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

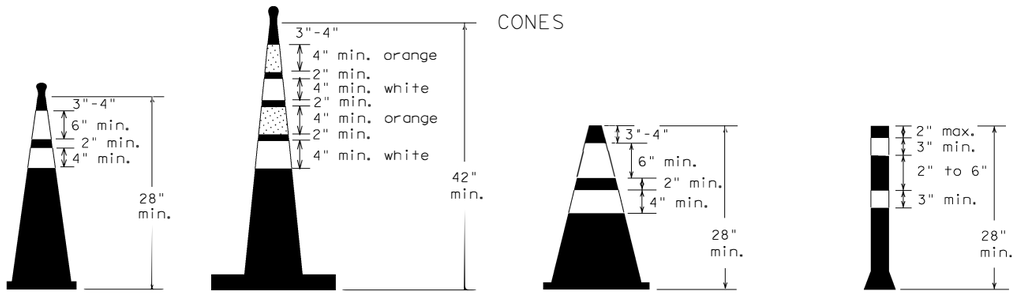
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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

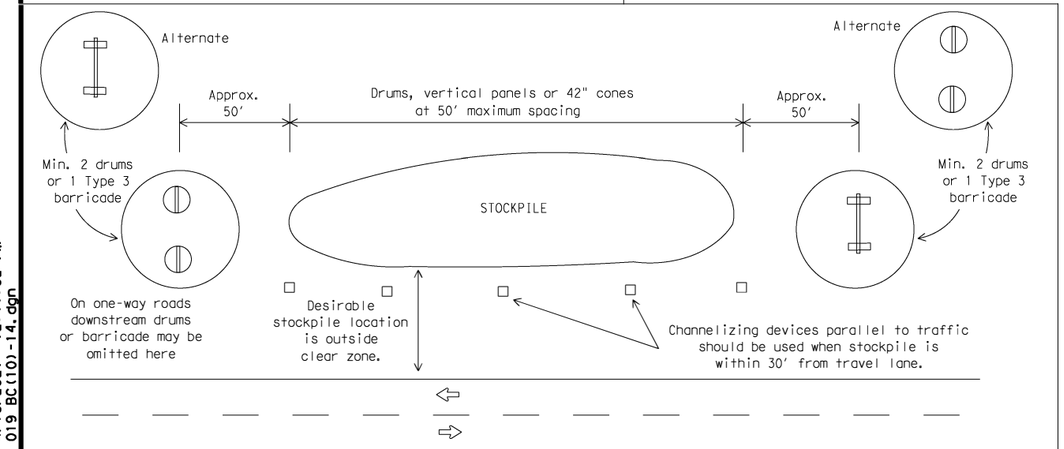


Two-Piece cones | One-Piece cones | Tubular Marker

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

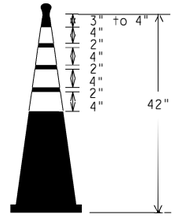
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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 used at night 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.
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

THIS DEVICE SHALL NOT BE USED ON PROJECTS LET AFTER MARCH 2014.



EDGELINE CHANNELIZER

1. This device is intended only for use in place of a vertical panel to channelize traffic by indicating the edge of the travel lane. It is not intended to be used in transitions or tapers.
2. This device shall not be used to separate lanes of traffic (opposing or otherwise) or warn of objects.
3. This device is based on a 42 inch, two-piece cone with an alternate striping pattern: four 4 inch retroreflective bands, with an approximate 2 inch gap between bands. The color of the band should correspond to the color of the edgeline (yellow for left edgeline, white for right edgeline) for which the device is substituted or for which it supplements. The reflectorized bands shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
4. The base must weigh a minimum of 30 lbs.

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

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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.

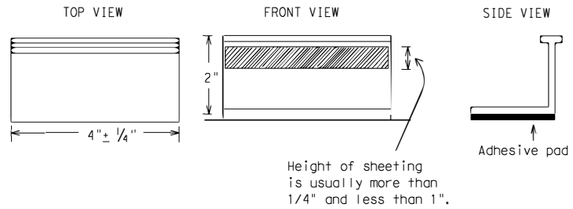
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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).

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Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14

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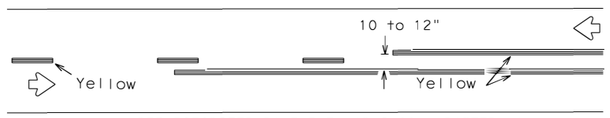
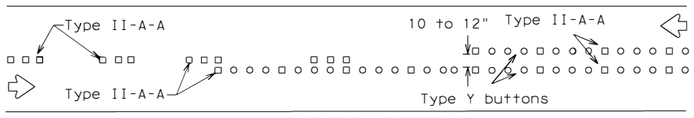
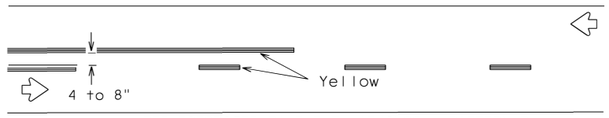
PAVEMENT MARKING PATTERNS



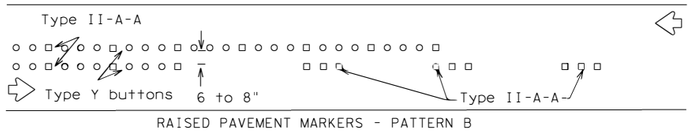
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



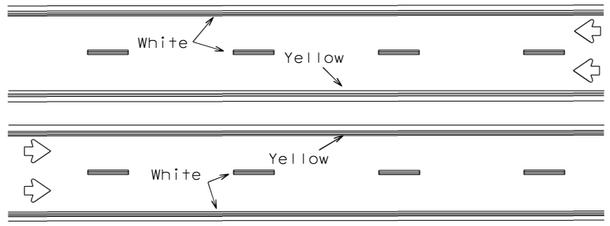
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



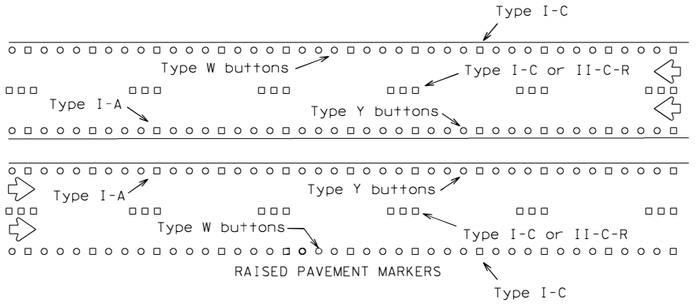
RAISED PAVEMENT MARKERS - PATTERN B

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

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

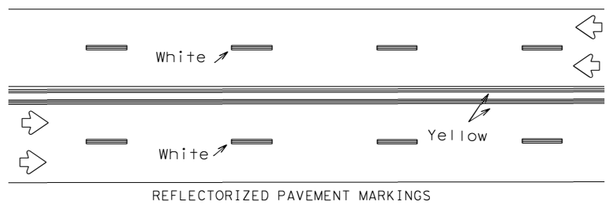


REFLECTORIZED PAVEMENT MARKINGS

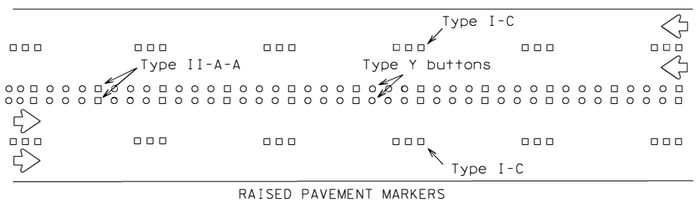


Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



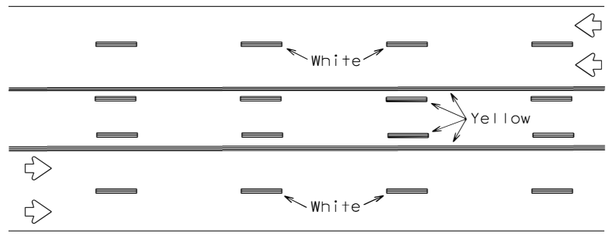
REFLECTORIZED PAVEMENT MARKINGS



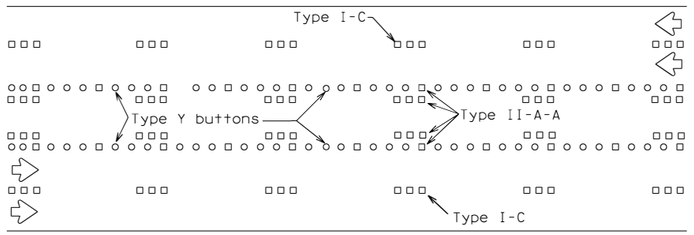
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

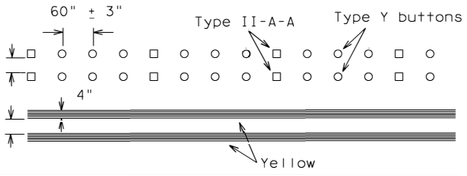
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

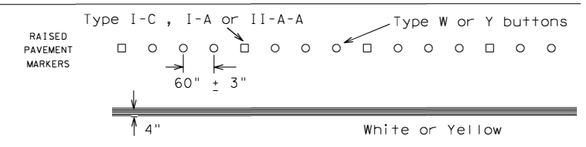
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

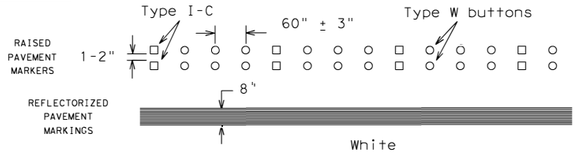


EDGE LINE OR SINGLE NO-PASSING LINE



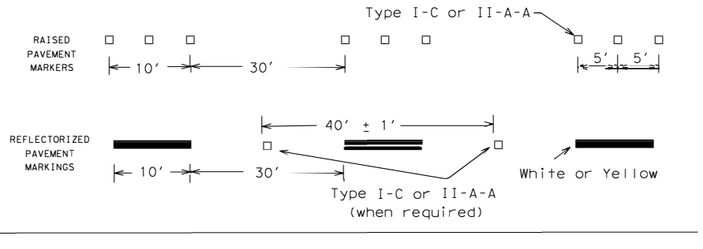
WIDE LINE

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



BROKEN LINES

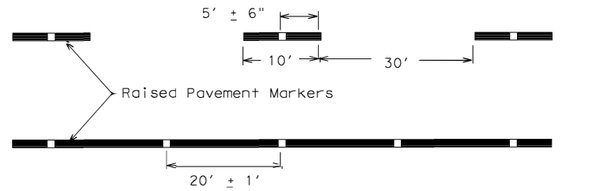
CENTER LINE OR LANE LINE



AUXILIARY OR LANEDROP LINE

REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

SHEET 12 OF 12

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	00	278	VA
1-97 9-07	DIST	COUNTY		SHEET NO.
2-98 7-13	FW	TARRANT		21
11-02 8-14				

DATE: 4/16/2021 12:17:06 PM
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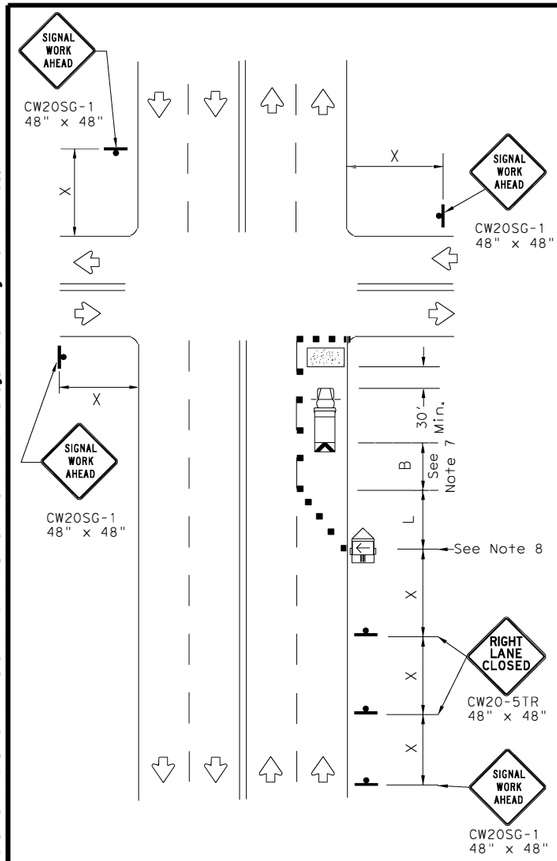
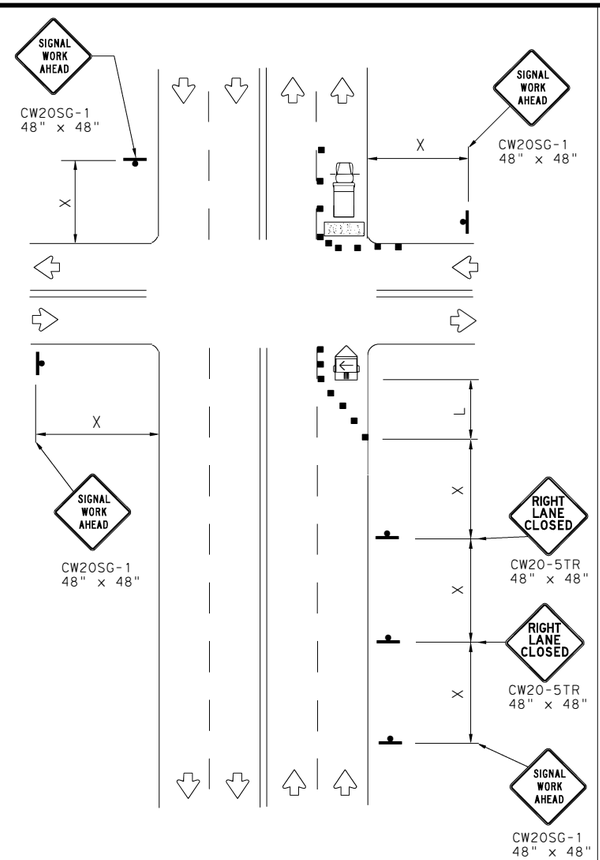


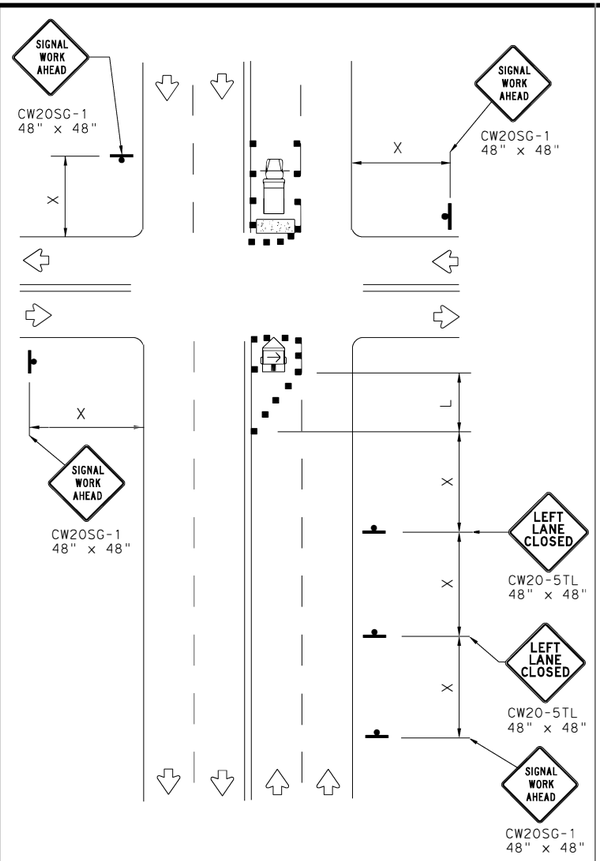
NEAR SIDE LANE CLOSURE

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

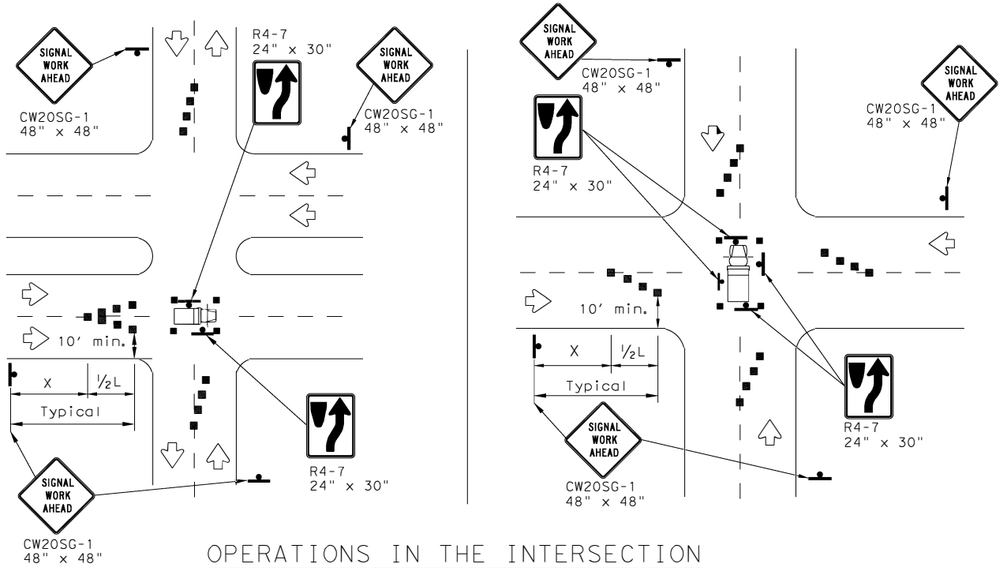
LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

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.



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.

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ(BTS-1)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
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2-98 10-99 7-13	DIST	COUNTY		SHEET NO.
4-98 3-03	FW	TARRANT		22

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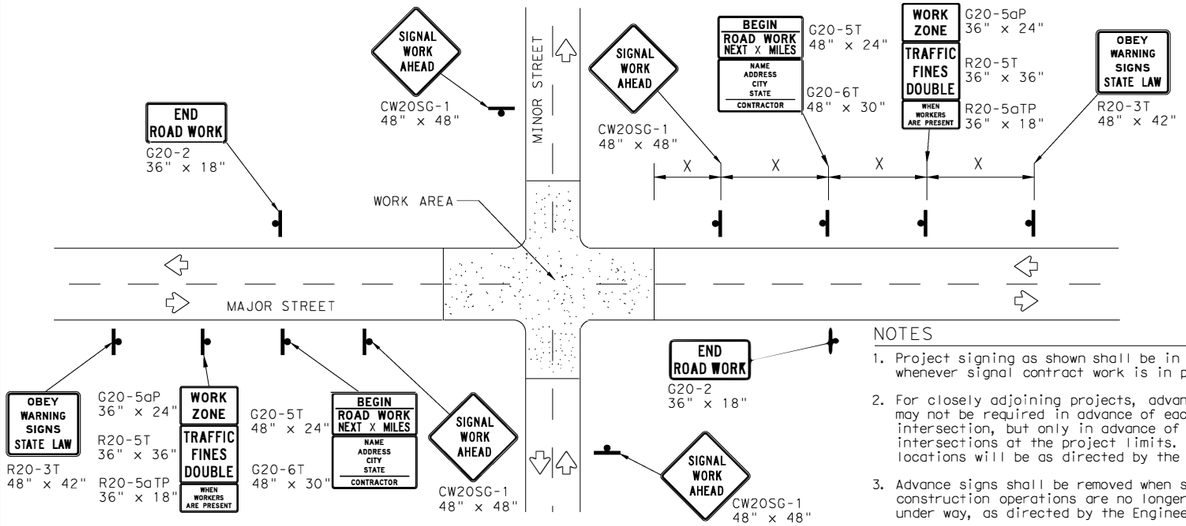


TYPICAL ADVANCE SIGNAL PROJECT SIGNING

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

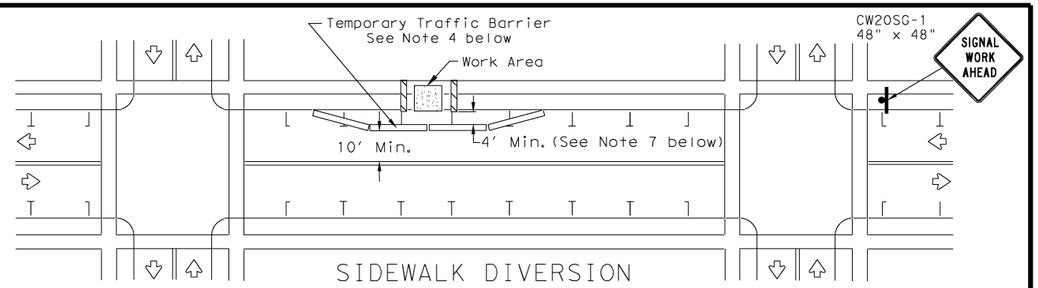
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support 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

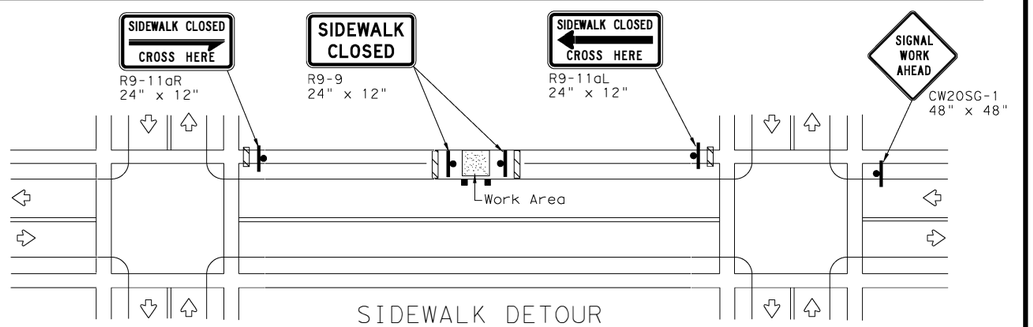
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

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

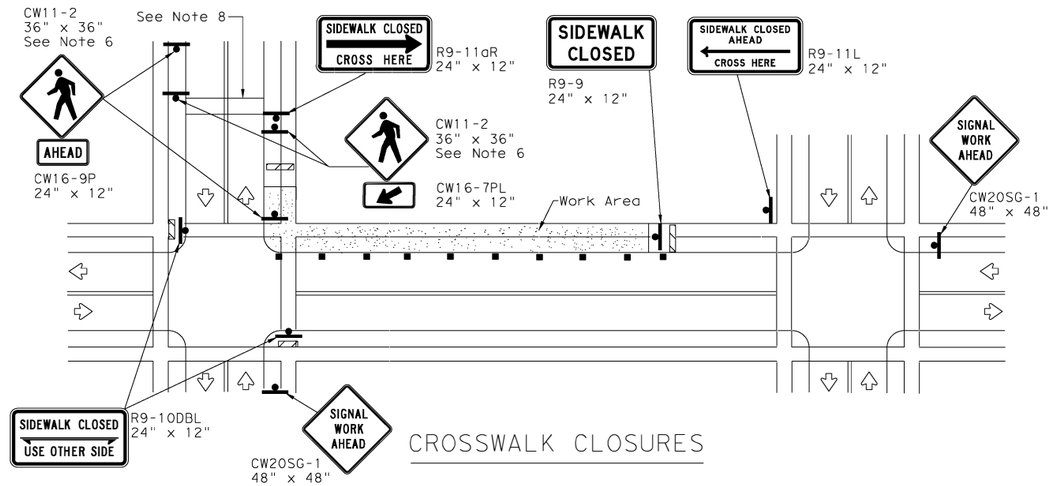
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



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

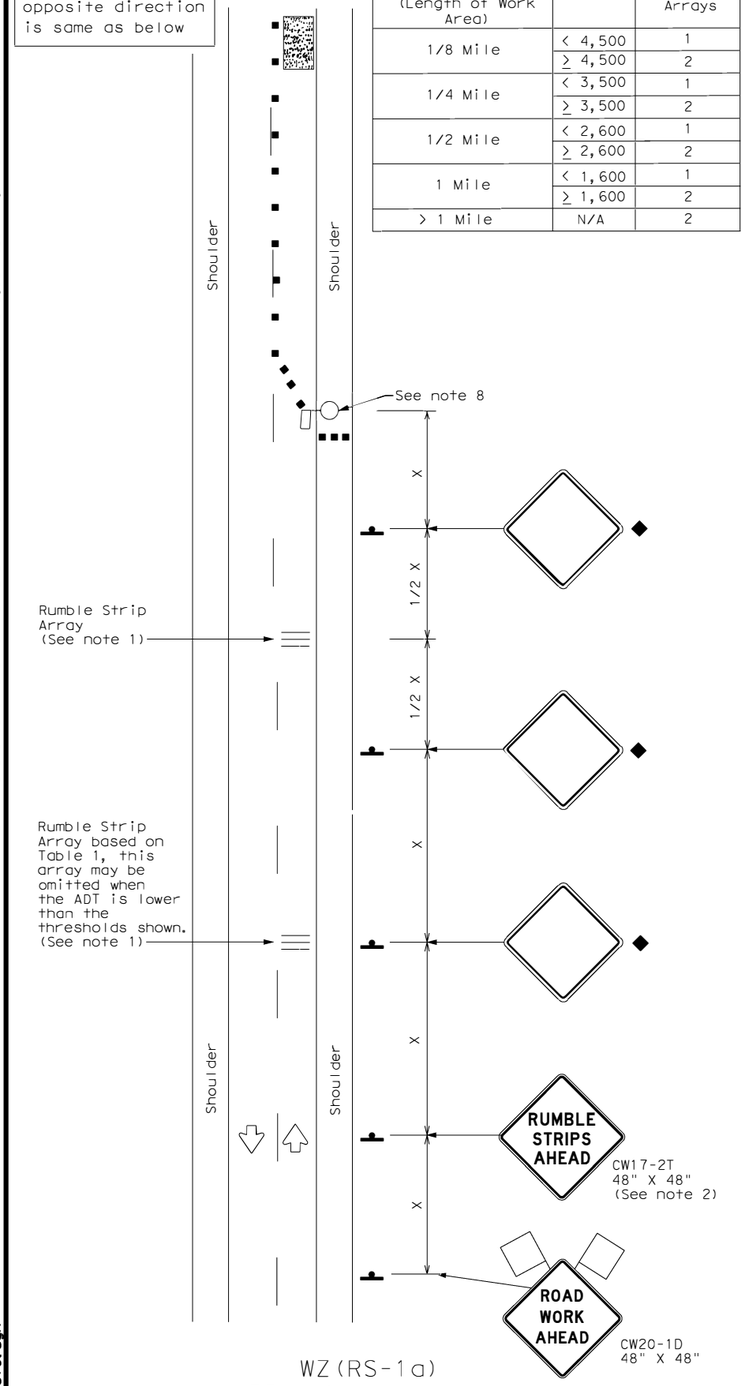
FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	902	00	278	VA
2-98 10-99 7-13	DIST	COUNTY		SHEET NO.
4-98 3-03	FW	TARRANT		23

DATE: 4/16/2021 12:17:11 PM
FILE: 023 wz(bts-2)-13.dgn

DATE: 4/16/2021 12:17:13 PM
FILE: 024 wzrs16.dgn

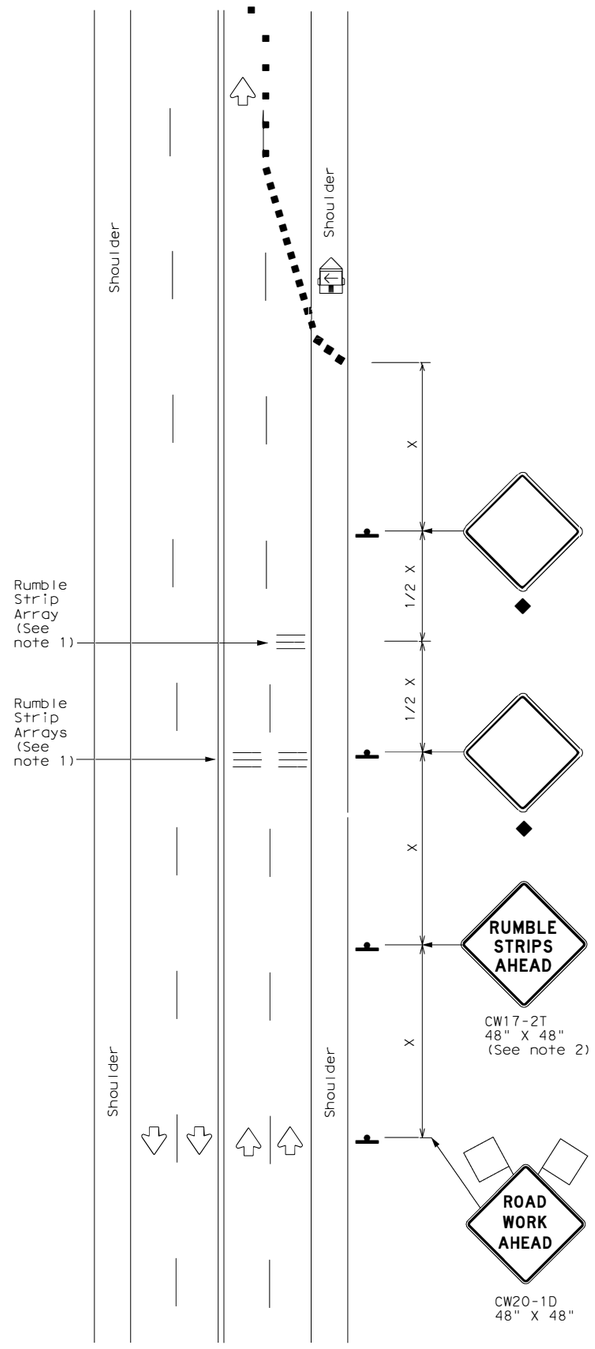
Warning sign and rumble strip sequence in opposite direction is same as below

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



WZ(RS-1a)
75 mph or Less

RUMBLE STRIPS ON ONE-LANE
TWO-WAY APPLICATION



WZ(RS-1b)
75 mph or Less

RUMBLE STRIPS FOR LANE CLOSURE
ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

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

TABLE 2	
Speed	Approximate distance between strips in an Array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
> 55 MPH	20'

Texas Department of Transportation — Traffic Operations Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-16

FILE: wzrs16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
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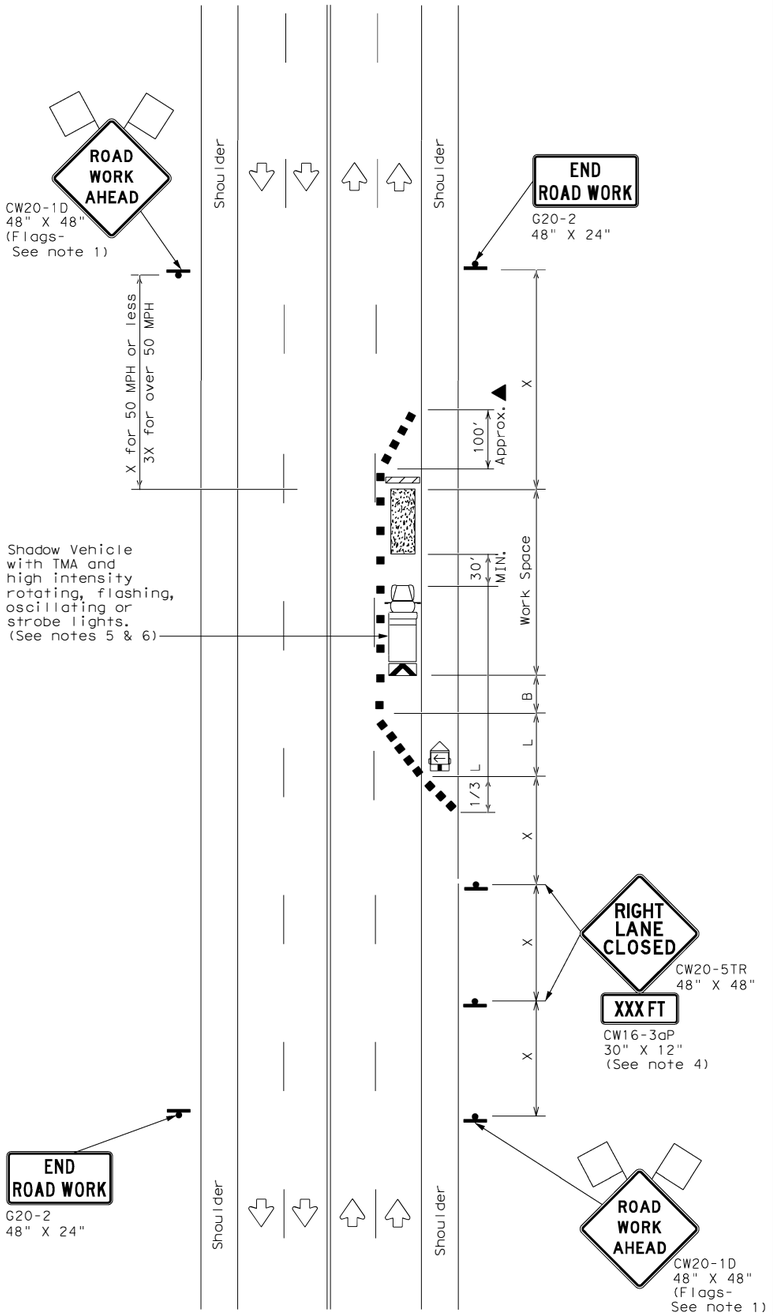
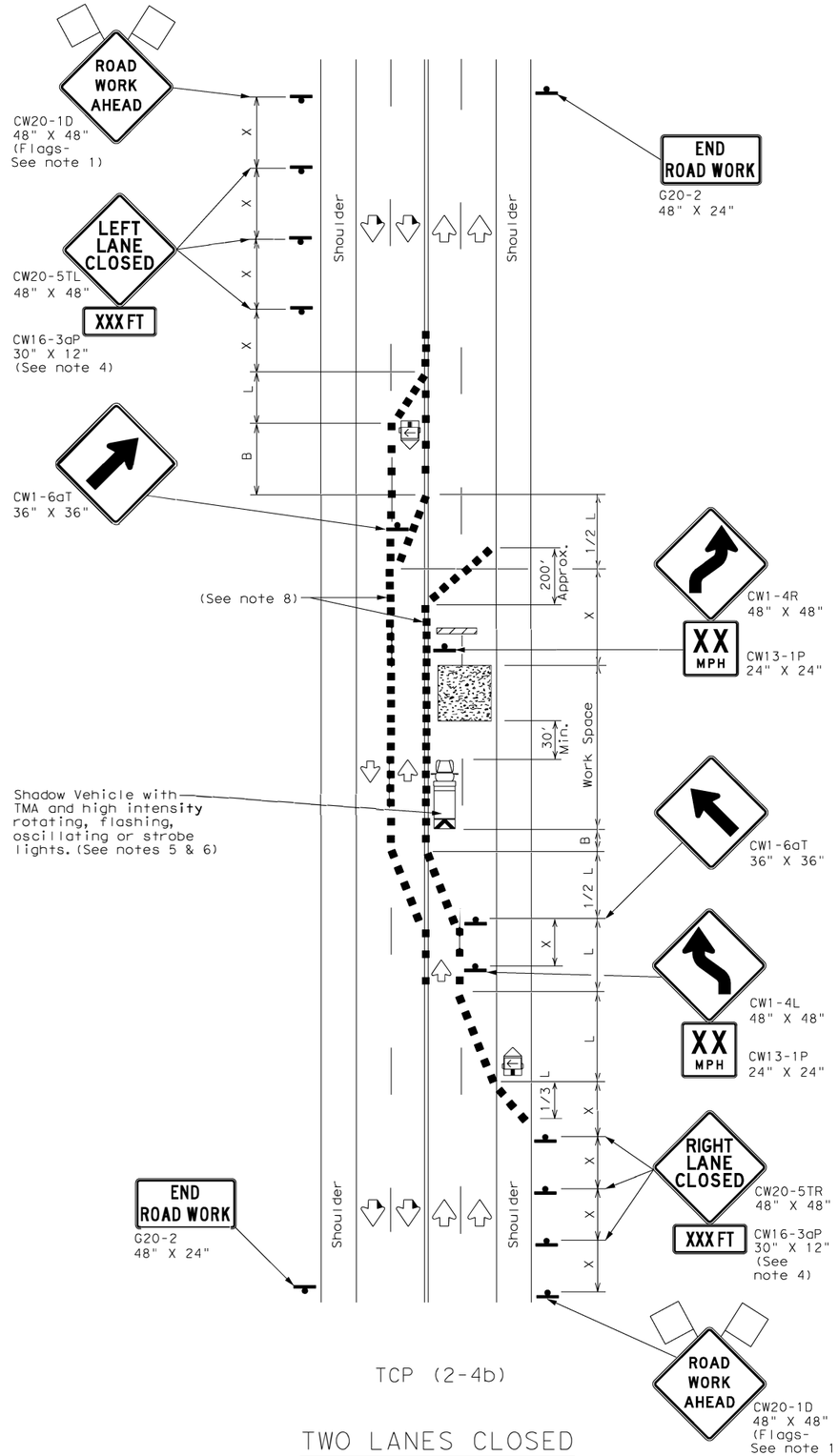
4-16	FW	TARRANT		24



TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 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. The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
4. For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-4a)

7. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED"signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic with the arrow board placed in the closed lane near the end of the merging taper.

TCP (2-4b)

8. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter devices spacing is intended for the area of conflicting markings, not the entire work zone.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

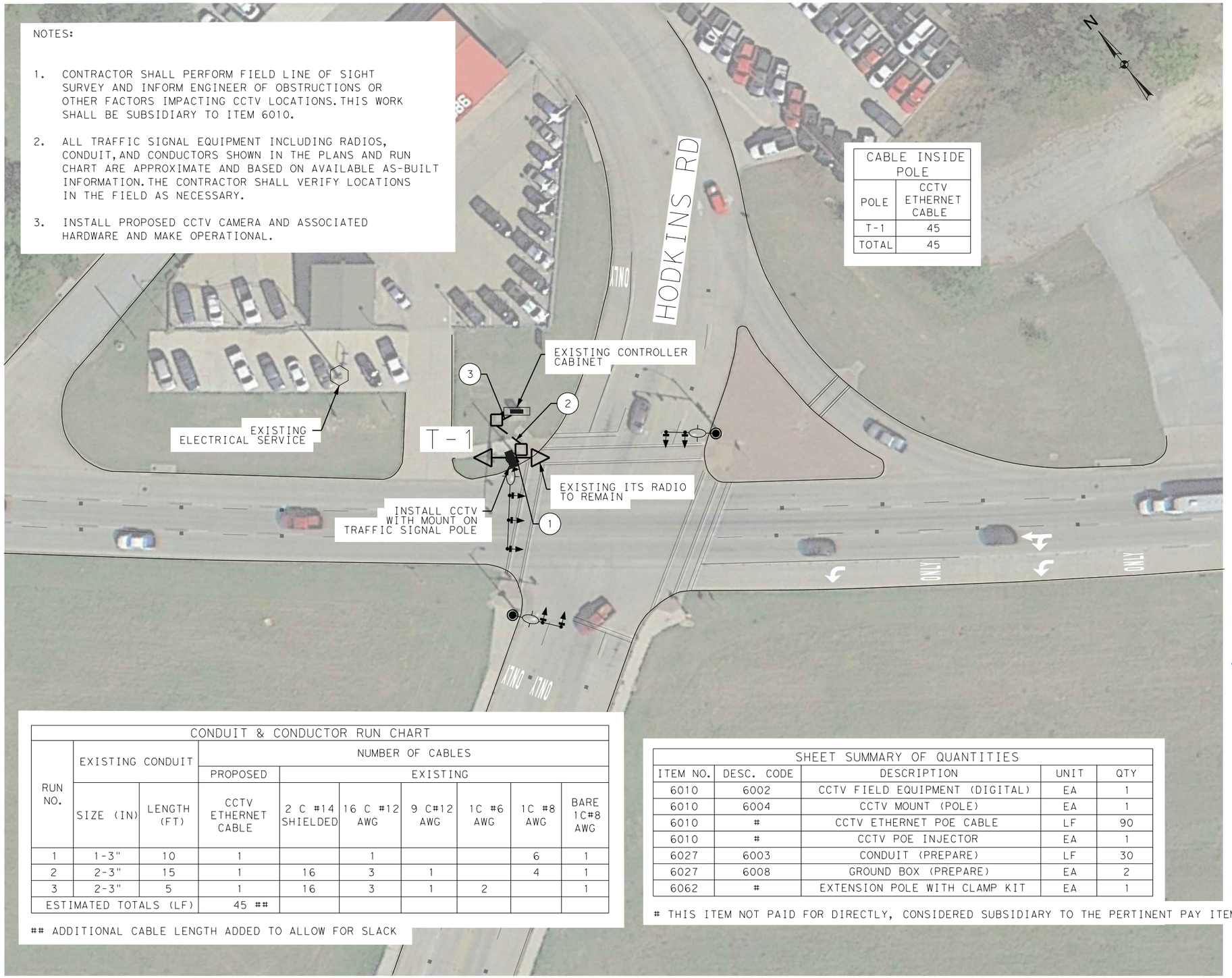
TCP(2-4)-18

FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	00	278	VA
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	FW	TARRANT		25
4-98 2-18				

DATE: 4/16/2021 12:17:15 PM
FILE: 025 tcp2-4-18.dgn

NOTES:

1. CONTRACTOR SHALL PERFORM FIELD LINE OF SIGHT SURVEY AND INFORM ENGINEER OF OBSTRUCTIONS OR OTHER FACTORS IMPACTING CCTV LOCATIONS. THIS WORK SHALL BE SUBSIDIARY TO ITEM 6010.
2. ALL TRAFFIC SIGNAL EQUIPMENT INCLUDING RADIOS, CONDUIT, AND CONDUCTORS SHOWN IN THE PLANS AND RUN CHART ARE APPROXIMATE AND BASED ON AVAILABLE AS-BUILT INFORMATION. THE CONTRACTOR SHALL VERIFY LOCATIONS IN THE FIELD AS NECESSARY.
3. INSTALL PROPOSED CCTV CAMERA AND ASSOCIATED HARDWARE AND MAKE OPERATIONAL.



CABLE INSIDE POLE	
POLE	CCTV ETHERNET CABLE
T-1	45
TOTAL	45

LEGEND

- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. GROUND BOX
- EXIST. ITS GROUND BOX
- PROP. GROUND BOX
- EXIST. TRAF SIGNAL CONTROLLER CABINET
- EXIST. CONDUIT
- EXIST. CONDUIT (BORED)
- EXIST. ELECTRICAL SERVICE
- EXIST. YAGI ANTENNA
- EXIST. RADIO ANTENNA
- EXIST. CAMERA
- PROP. ETHERNET RADIO ANTENNA
- PROP. PARABOLIC ANTENNA
- PROP. CCTV CAMERA

SCALE: 1" = 40'
20 0 20

CONDUIT & CONDUCTOR RUN CHART									
RUN NO.	EXISTING CONDUIT		NUMBER OF CABLES						
			PROPOSED	EXISTING					
	SIZE (IN)	LENGTH (FT)	CCTV ETHERNET CABLE	2 C #14 SHIELDED	16 C #12 AWG	9 C#12 AWG	1C #6 AWG	1C #8 AWG	BARE 1C#8 AWG
1	1-3"	10	1		1			6	1
2	2-3"	15	1	16	3	1		4	1
3	2-3"	5	1	16	3	1	2		1
ESTIMATED TOTALS (LF)			45 ##						

ADDITIONAL CABLE LENGTH ADDED TO ALLOW FOR SLACK

SHEET SUMMARY OF QUANTITIES				
ITEM NO.	DESC. CODE	DESCRIPTION	UNIT	QTY
6010	6002	CCTV FIELD EQUIPMENT (DIGITAL)	EA	1
6010	6004	CCTV MOUNT (POLE)	EA	1
6010	#	CCTV ETHERNET POE CABLE	LF	90
6010	#	CCTV POE INJECTOR	EA	1
6027	6003	CONDUIT (PREPARE)	LF	30
6027	6008	GROUND BOX (PREPARE)	EA	2
6062	#	EXTENSION POLE WITH CLAMP KIT	EA	1

THIS ITEM NOT PAID FOR DIRECTLY, CONSIDERED SUBSIDIARY TO THE PERTINENT PAY ITEM

STATE OF TEXAS
MELANIE B. YOUNG
67775
REGISTERED
PROFESSIONAL ENGINEER

Melanie B. Young, P.E.
4/16/21

NO.	DATE	REVISION	APPROVED

MALDONADO - BURKETT
Engineers | Surveyors | Contractors
TBPE # 10258 TBPLS # 10194235
www.maldonado-burkett.com

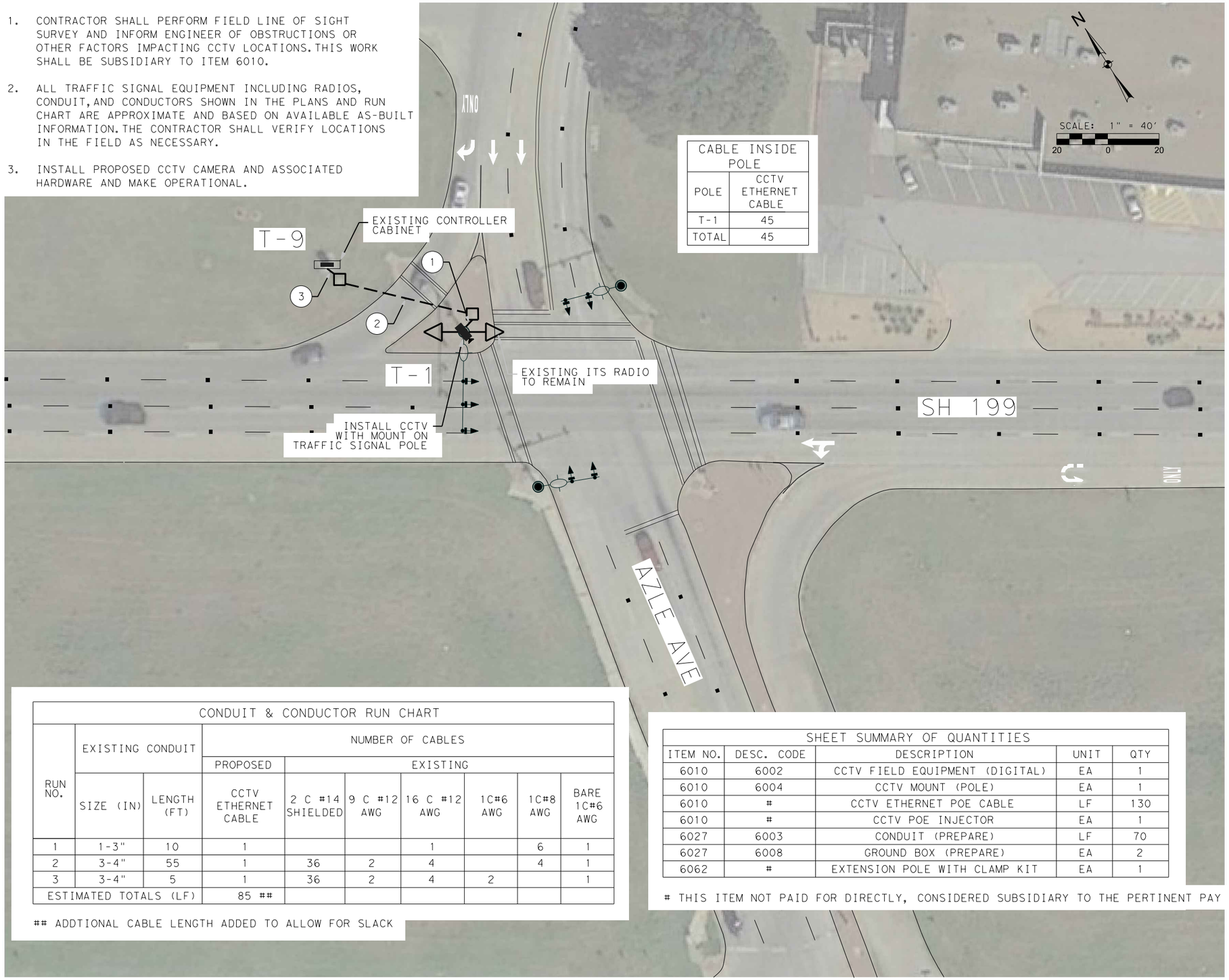
Texas Department of Transportation

SH 199 AT HODGKINS RD ITS LAYOUT

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	26
CONTROL	SECTION	JOB	
0902	00	278	

NOTES:

1. CONTRACTOR SHALL PERFORM FIELD LINE OF SIGHT SURVEY AND INFORM ENGINEER OF OBSTRUCTIONS OR OTHER FACTORS IMPACTING CCTV LOCATIONS. THIS WORK SHALL BE SUBSIDIARY TO ITEM 6010.
2. ALL TRAFFIC SIGNAL EQUIPMENT INCLUDING RADIOS, CONDUIT, AND CONDUCTORS SHOWN IN THE PLANS AND RUN CHART ARE APPROXIMATE AND BASED ON AVAILABLE AS-BUILT INFORMATION. THE CONTRACTOR SHALL VERIFY LOCATIONS IN THE FIELD AS NECESSARY.
3. INSTALL PROPOSED CCTV CAMERA AND ASSOCIATED HARDWARE AND MAKE OPERATIONAL.



CABLE INSIDE POLE	
POLE	CCTV ETHERNET CABLE
T-1	45
TOTAL	45

LEGEND

- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. GROUND BOX
- EXIST. ITS GROUND BOX
- PROP. GROUND BOX
- EXIST. TRAF SIGNAL CONTROLLER CABINET
- EXIST. CONDUIT
- EXIST. CONDUIT (BORED)
- EXIST. ELECTRICAL SERVICE
- EXIST. YAGI ANTENNA
- EXIST. RADIO ANTENNA
- EXIST. CAMERA
- PROP. ETHERNET RADIO ANTENNA
- PROP. PARABOLIC ANTENNA
- PROP. CCTV CAMERA

SCALE: 1" = 40'
20 0 20

CONDUIT & CONDUCTOR RUN CHART									
RUN NO.	EXISTING CONDUIT		NUMBER OF CABLES						
			PROPOSED	EXISTING					
	SIZE (IN)	LENGTH (FT)	CCTV ETHERNET CABLE	2 C #14 SHIELDED	9 C #12 AWG	16 C #12 AWG	1C#6 AWG	1C#8 AWG	BARE 1C#6 AWG
1	1-3"	10	1			1		6	1
2	3-4"	55	1	36	2	4		4	1
3	3-4"	5	1	36	2	4	2		1
ESTIMATED TOTALS (LF)			85 ##						

ADDTIONAL CABLE LENGTH ADDED TO ALLOW FOR SLACK

SHEET SUMMARY OF QUANTITIES				
ITEM NO.	DESC. CODE	DESCRIPTION	UNIT	QTY
6010	6002	CCTV FIELD EQUIPMENT (DIGITAL)	EA	1
6010	6004	CCTV MOUNT (POLE)	EA	1
6010	#	CCTV ETHERNET POE CABLE	LF	130
6010	#	CCTV POE INJECTOR	EA	1
6027	6003	CONDUIT (PREPARE)	LF	70
6027	6008	GROUND BOX (PREPARE)	EA	2
6062	#	EXTENSION POLE WITH CLAMP KIT	EA	1

THIS ITEM NOT PAID FOR DIRECTLY, CONSIDERED SUBSIDIARY TO THE PERTINENT PAY ITEM

Melanie B. Young, P.E.
4/16/21

STATE OF TEXAS
MELANIE B. YOUNG
67775
REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROVED

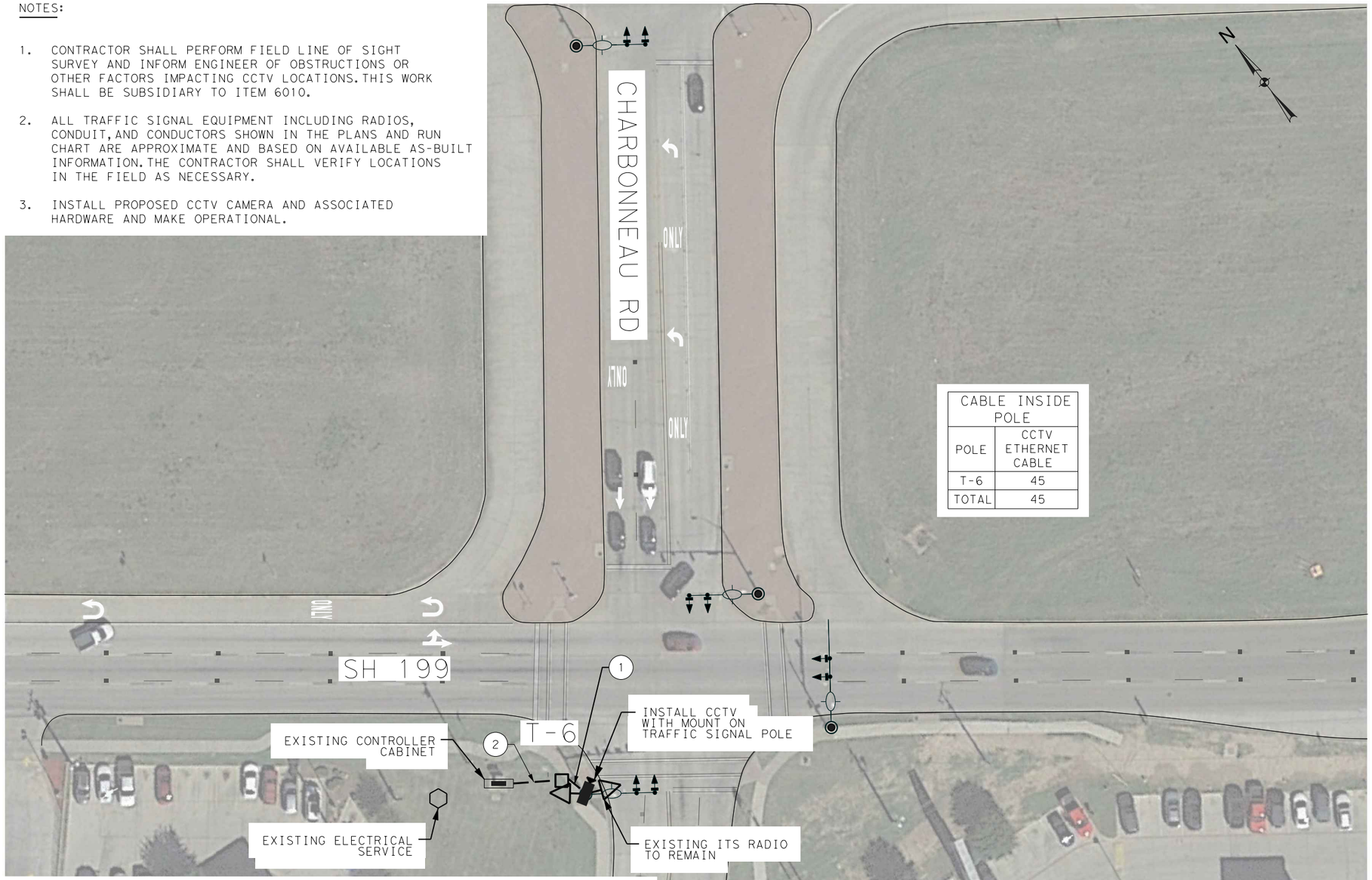
MALDONADO - BURKETT
Engineers | Surveyors | Contractors
TBPE # 10258 TBPLS # 10194235
www.maldonado-burkett.com

SH 199 AT AZLE AVENUE ITS LAYOUT

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	27
CONTROL	SECTION	JOB	
0902	00	278	

NOTES:

1. CONTRACTOR SHALL PERFORM FIELD LINE OF SIGHT SURVEY AND INFORM ENGINEER OF OBSTRUCTIONS OR OTHER FACTORS IMPACTING CCTV LOCATIONS. THIS WORK SHALL BE SUBSIDIARY TO ITEM 6010.
2. ALL TRAFFIC SIGNAL EQUIPMENT INCLUDING RADIOS, CONDUIT, AND CONDUCTORS SHOWN IN THE PLANS AND RUN CHART ARE APPROXIMATE AND BASED ON AVAILABLE AS-BUILT INFORMATION. THE CONTRACTOR SHALL VERIFY LOCATIONS IN THE FIELD AS NECESSARY.
3. INSTALL PROPOSED CCTV CAMERA AND ASSOCIATED HARDWARE AND MAKE OPERATIONAL.



CABLE INSIDE POLE	
POLE	CCTV ETHERNET CABLE
T-6	45
TOTAL	45

LEGEND

- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. GROUND BOX
- EXIST. ITS GROUND BOX
- PROP. GROUND BOX
- EXIST. TRAF SIGNAL CONTROLLER CABINET
- EXIST. CONDUIT
- EXIST. CONDUIT (BORED)
- EXIST. ELECTRICAL SERVICE
- EXIST. YAGI ANTENNA
- EXIST. RADIO ANTENNA
- EXIST. CAMERA
- PROP. ETHERNET RADIO ANTENNA
- PROP. PARABOLIC ANTENNA
- PROP. CCTV CAMERA

SCALE: 1" = 40'
20 0 20

CONDUIT & CONDUCTOR RUN CHART									
RUN NO.	EXISTING CONDUIT		NUMBER OF CABLES						
			PROPOSED	EXISTING					
	SIZE (IN)	LENGTH (FT)	CCTV ETHERNET CABLE	9 C #12 AWG	16 C #12 AWG	1C#6 AWG	1C#8 AWG	BARE 1C#8 AWG	VIVIDS CABLE
1	3"	5	1		1		4	1	1
2	4"	15	1	1	3			1	3
ESTIMATED TOTALS (LF)			30 ##						

ADDITIONAL CABLE LENGTH ADDED TO ALLOW FOR SLACK

SHEET SUMMARY OF QUANTITIES				
ITEM NO.	DESC. CODE	DESCRIPTION	UNIT	QTY
6010	6002	CCTV FIELD EQUIPMENT (DIGITAL)	EA	1
6010	6004	CCTV MOUNT (POLE)	EA	1
6010	#	CCTV ETHERNET POE CABLE	LF	75
6010	#	CCTV POE INJECTOR	EA	1
6027	6003	CONDUIT (PREPARE)	LF	20
6027	6008	GROUND BOX (PREPARE)	EA	1
6062	#	EXTENSION POLE WITH CLAMP KIT	EA	1

THIS ITEM NOT PAID FOR DIRECTLY, CONSIDERED SUBSIDIARY TO THE PERTINENT PAY ITEM

STATE OF TEXAS
MELANIE B. YOUNG
67775
REGISTERED
PROFESSIONAL ENGINEER

Melanie B. Young, P.E.
4/16/21

NO.	DATE	REVISION	APPROVED

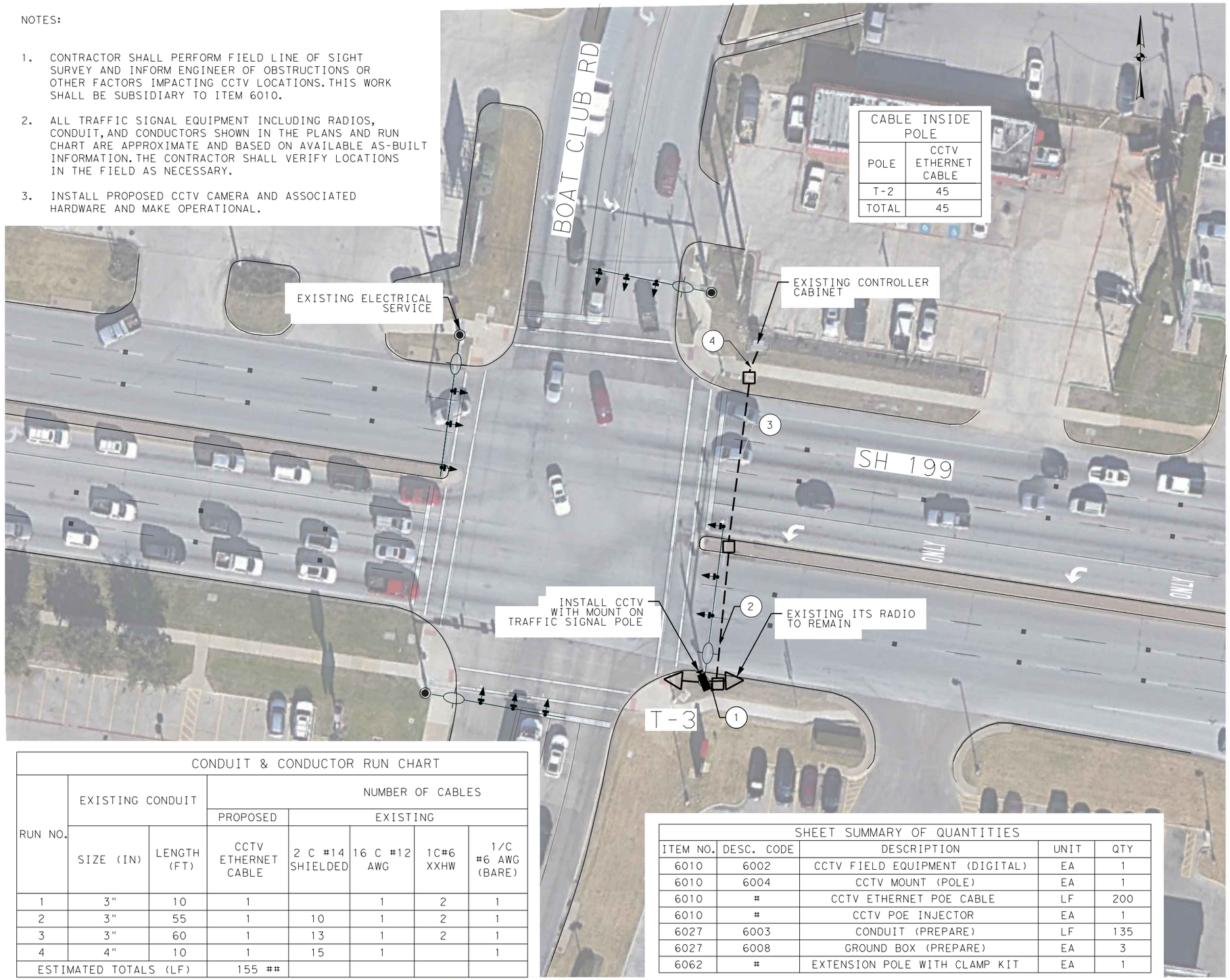
MALDONADO - BURKETT
Engineers | Surveyors | Contractors
TBPE # 10258 TBPLS # 10194235
www.maldonado-burkett.com

SH 199 AT CHARBONNEAU ITS LAYOUT

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	28
CONTROL	SECTION	JOB	
0902	00	278	

NOTES:

1. CONTRACTOR SHALL PERFORM FIELD LINE OF SIGHT SURVEY AND INFORM ENGINEER OF OBSTRUCTIONS OR OTHER FACTORS IMPACTING CCTV LOCATIONS. THIS WORK SHALL BE SUBSIDIARY TO ITEM 6010.
2. ALL TRAFFIC SIGNAL EQUIPMENT INCLUDING RADIOS, CONDUIT, AND CONDUCTORS SHOWN IN THE PLANS AND RUN CHART ARE APPROXIMATE AND BASED ON AVAILABLE AS-BUILT INFORMATION. THE CONTRACTOR SHALL VERIFY LOCATIONS IN THE FIELD AS NECESSARY.
3. INSTALL PROPOSED CCTV CAMERA AND ASSOCIATED HARDWARE AND MAKE OPERATIONAL.



CABLE INSIDE POLE	
POLE	CCTV ETHERNET CABLE
T-2	45
TOTAL	45

LEGEND

- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. GROUND BOX
- EXIST. ITS GROUND BOX
- PROP. GROUND BOX
- EXIST. TRAF SIGNAL CONTROLLER CABINET
- EXIST. CONDUIT
- EXIST. CONDUIT (BORED)
- EXIST. ELECTRICAL SERVICE
- EXIST. YAGI ANTENNA
- EXIST. RADIO ANTENNA
- EXIST. CAMERA
- PROP. ETHERNET RADIO ANTENNA
- PROP. PARABOLIC ANTENNA
- PROP. CCTV CAMERA

SCALE: 1" = 40'
20 0 20

CONDUIT & CONDUCTOR RUN CHART							
RUN NO.	EXISTING CONDUIT		NUMBER OF CABLES				
			PROPOSED	EXISTING			
	SIZE (IN)	LENGTH (FT)	CCTV ETHERNET CABLE	2 C #14 SHIELDED	16 C #12 AWG	1C#6 XXHW	1/C #6 AWG (BARE)
1	3"	10	1		1	2	1
2	3"	55	1	10	1	2	1
3	3"	60	1	13	1	2	1
4	4"	10	1	15	1		1
ESTIMATED TOTALS (LF)			155 ##				

ADDITIONAL CABLE LENGTH ADDED TO ALLOW FOR SLACK

SHEET SUMMARY OF QUANTITIES				
ITEM NO.	DESC. CODE	DESCRIPTION	UNIT	QTY
6010	6002	CCTV FIELD EQUIPMENT (DIGITAL)	EA	1
6010	6004	CCTV MOUNT (POLE)	EA	1
6010	#	CCTV ETHERNET POE CABLE	LF	200
6010	#	CCTV POE INJECTOR	EA	1
6027	6003	CONDUIT (PREPARE)	LF	135
6027	6008	GROUND BOX (PREPARE)	EA	3
6062	#	EXTENSION POLE WITH CLAMP KIT	EA	1

THIS ITEM NOT PAID FOR DIRECTLY, CONSIDERED SUBSIDIARY TO THE PERTINENT PAY ITEM

STATE OF TEXAS
MELANIE B. YOUNG
67775
REGISTERED
PROFESSIONAL ENGINEER

Melanie B Young, P.E.
4/16/21

NO.	DATE	REVISION	APPROVED

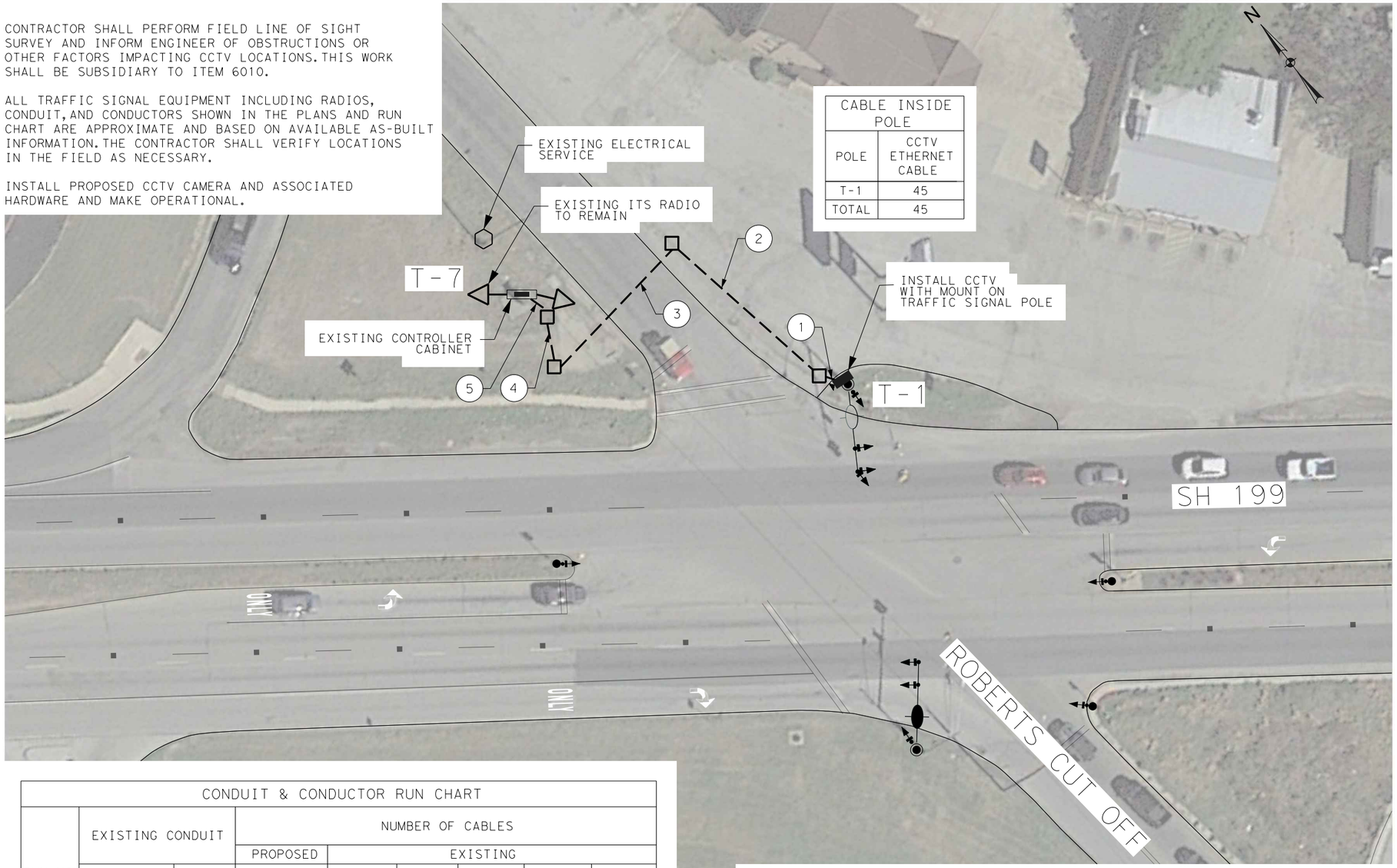
MALDONADO - BURKETT
Engineers | Surveyors | Contractors
TBPE # 10258 TBPLS # 10194235
www.maldonado-burkett.com

SH 199 AT BOAT CLUB ROAD ITS LAYOUT

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	29
CONTROL	SECTION	JOB	
0902	00	278	

NOTES:

1. CONTRACTOR SHALL PERFORM FIELD LINE OF SIGHT SURVEY AND INFORM ENGINEER OF OBSTRUCTIONS OR OTHER FACTORS IMPACTING CCTV LOCATIONS. THIS WORK SHALL BE SUBSIDIARY TO ITEM 6010.
2. ALL TRAFFIC SIGNAL EQUIPMENT INCLUDING RADIOS, CONDUIT, AND CONDUCTORS SHOWN IN THE PLANS AND RUN CHART ARE APPROXIMATE AND BASED ON AVAILABLE AS-BUILT INFORMATION. THE CONTRACTOR SHALL VERIFY LOCATIONS IN THE FIELD AS NECESSARY.
3. INSTALL PROPOSED CCTV CAMERA AND ASSOCIATED HARDWARE AND MAKE OPERATIONAL.



CABLE INSIDE POLE	
POLE	CCTV ETHERNET CABLE
T-1	45
TOTAL	45

LEGEND

- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. GROUND BOX
- EXIST. ITS GROUND BOX
- PROP. GROUND BOX
- EXIST. TRAF SIGNAL CONTROLLER CABINET
- EXIST. CONDUIT
- EXIST. CONDUIT (BORED)
- EXIST. ELECTRICAL SERVICE
- EXIST. YAGI ANTENNA
- EXIST. RADIO ANTENNA
- EXIST. CAMERA
- PROP. ETHERNET RADIO ANTENNA
- PROP. PARABOLIC ANTENNA
- PROP. CCTV CAMERA

SCALE: 1" = 40'
20 0 20

CONDUIT & CONDUCTOR RUN CHART								
RUN NO.	EXISTING CONDUIT		NUMBER OF CABLES					
			PROPOSED	EXISTING				
	SIZE (IN)	LENGTH (FT)	CCTV ETHERNET CABLE	2 C #14 SHIELDED	2C#12 AWG	6/C #12 AWG	9/C #12 AWG	BARE 1C#8 AWG
1	2"	10	1		1		2	2
2	4"	50	1	7	2	2	4	1
3	4"	50	1	7	2	2	4	1
4	5"	30	1	12	2	4	4	2
5	5"	10	1	12	2	4	4	2
ESTIMATED TOTALS (LF)			175 ##					

ADDITONAL CABLE LENGTH ADDED TO ALLOW FOR SLACK

SHEET SUMMARY OF QUANTITIES				
ITEM NO.	DESC. CODE	DESCRIPTION	UNIT	QTY
6010	6002	CCTV FIELD EQUIPMENT (DIGITAL)	EA	1
6010	6004	CCTV MOUNT (POLE)	EA	1
6010	#	CCTV ETHERNET POE CABLE	LF	220
6010	#	CCTV POE INJECTOR	EA	1
6027	6003	CONDUIT (PREPARE)	LF	150
6027	6008	GROUND BOX (PREPARE)	EA	4
6062	#	EXTENSION POLE WITH CLAMP KIT	EA	1

THIS ITEM NOT PAID FOR DIRECTLY, CONSIDERED SUBSIDIARY TO THE PERTINENT PAY ITEM

STATE OF TEXAS
MELANIE B. YOUNG
67775
REGISTERED
PROFESSIONAL ENGINEER

Melanie B. Young, P.E.
4/16/21

NO.	DATE	REVISION	APPROVED

MALDONADO - BURKETT
Engineers | Surveyors | Contractors
TBPE # 10258 TBPLS # 10194235
www.maldonado-burkett.com

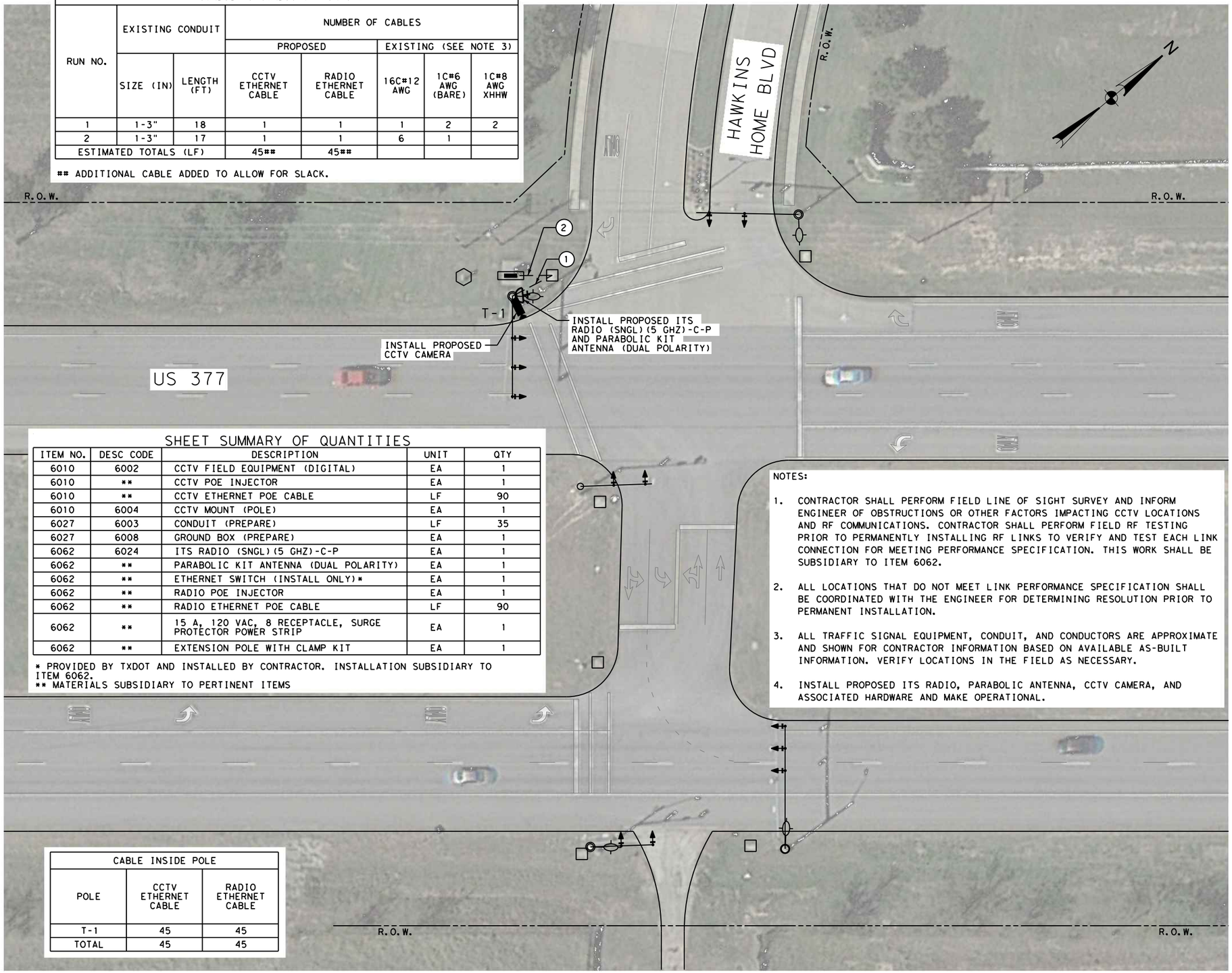
SH 199 AT ROBERTS CUT OFF ITS LAYOUT

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	30
CONTROL	SECTION	JOB	
0902	00	278	

DN: AC	CK: KT	DW: JC	CK: SN

CONDUIT & CONDUCTOR RUN CHART							
RUN NO.	EXISTING CONDUIT		NUMBER OF CABLES				
			PROPOSED		EXISTING (SEE NOTE 3)		
	SIZE (IN)	LENGTH (FT)	CCTV ETHERNET CABLE	RADIO ETHERNET CABLE	16C#12 AWG	1C#6 AWG (BARE)	1C#8 AWG XHHW
1	1-3"	18	1	1	1	2	2
2	1-3"	17	1	1	6	1	
ESTIMATED TOTALS (LF)			45##	45##			

ADDITIONAL CABLE ADDED TO ALLOW FOR SLACK.



SHEET SUMMARY OF QUANTITIES

ITEM NO.	DESC CODE	DESCRIPTION	UNIT	QTY
6010	6002	CCTV FIELD EQUIPMENT (DIGITAL)	EA	1
6010	**	CCTV POE INJECTOR	EA	1
6010	**	CCTV ETHERNET POE CABLE	LF	90
6010	6004	CCTV MOUNT (POLE)	EA	1
6027	6003	CONDUIT (PREPARE)	LF	35
6027	6008	GROUND BOX (PREPARE)	EA	1
6062	6024	ITS RADIO (SNGL)(5 GHZ)-C-P	EA	1
6062	**	PARABOLIC KIT ANTENNA (DUAL POLARITY)	EA	1
6062	**	ETHERNET SWITCH (INSTALL ONLY)*	EA	1
6062	**	RADIO POE INJECTOR	EA	1
6062	**	RADIO ETHERNET POE CABLE	LF	90
6062	**	15 A, 120 VAC, 8 RECEPTACLE, SURGE PROTECTOR POWER STRIP	EA	1
6062	**	EXTENSION POLE WITH CLAMP KIT	EA	1

* PROVIDED BY TXDOT AND INSTALLED BY CONTRACTOR. INSTALLATION SUBSIDIARY TO ITEM 6062.
** MATERIALS SUBSIDIARY TO PERTINENT ITEMS

CABLE INSIDE POLE		
POLE	CCTV ETHERNET CABLE	RADIO ETHERNET CABLE
T-1	45	45
TOTAL	45	45

NOTES:

1. CONTRACTOR SHALL PERFORM FIELD LINE OF SIGHT SURVEY AND INFORM ENGINEER OF OBSTRUCTIONS OR OTHER FACTORS IMPACTING CCTV LOCATIONS AND RF COMMUNICATIONS. CONTRACTOR SHALL PERFORM FIELD RF TESTING PRIOR TO PERMANENTLY INSTALLING RF LINKS TO VERIFY AND TEST EACH LINK CONNECTION FOR MEETING PERFORMANCE SPECIFICATION. THIS WORK SHALL BE SUBSIDIARY TO ITEM 6062.
2. ALL LOCATIONS THAT DO NOT MEET LINK PERFORMANCE SPECIFICATION SHALL BE COORDINATED WITH THE ENGINEER FOR DETERMINING RESOLUTION PRIOR TO PERMANENT INSTALLATION.
3. ALL TRAFFIC SIGNAL EQUIPMENT, CONDUIT, AND CONDUCTORS ARE APPROXIMATE AND SHOWN FOR CONTRACTOR INFORMATION BASED ON AVAILABLE AS-BUILT INFORMATION. VERIFY LOCATIONS IN THE FIELD AS NECESSARY.
4. INSTALL PROPOSED ITS RADIO, PARABOLIC ANTENNA, CCTV CAMERA, AND ASSOCIATED HARDWARE AND MAKE OPERATIONAL.

LEGEND

- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. GROUND BOX
- EXIST. ITS GROUND BOX
- PROP. GROUND BOX
- EXIST. TRAF SIGNAL CONTROLLER CABINET
- EXIST. CONDUIT
- EXIST. CONDUIT (BORED)
- EXIST. ELECTRICAL SERVICE
- EXIST. OMNI ANTENNA
- EXIST. YAGI ANTENNA
- EXIST. ETHERNET RADIO ANTENNA
- EXIST. CAMERA
- PROP. ETHERNET RADIO ANTENNA
- PROP. PARABOLIC ANTENNA
- PROP. CCTV CAMERA

SCALE: 1" = 40'
20 0 20

STATE OF TEXAS
KEVIN D. TYER
87924
LICENSED PROFESSIONAL ENGINEER
04/16/2021

TRAF-IQ
14811 ST. MARY'S LANE, SUITE 180
HOUSTON, TEXAS 77079
832.399.1100
TEXAS PE FIRM REG # F-18726

MALDONADO - BURKETT
Engineers | Surveyors | Contractors
TBPE # 10258 TBPLS # 10194235
www.maldonado-burkett.com

US 377 AT HAWKINS HOME BLVD ITS LAYOUT

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	31
CONTROL	SECTION	JOB	
0902	00	278	

DN: AC	CK: KT	DW: JC	CK: SN

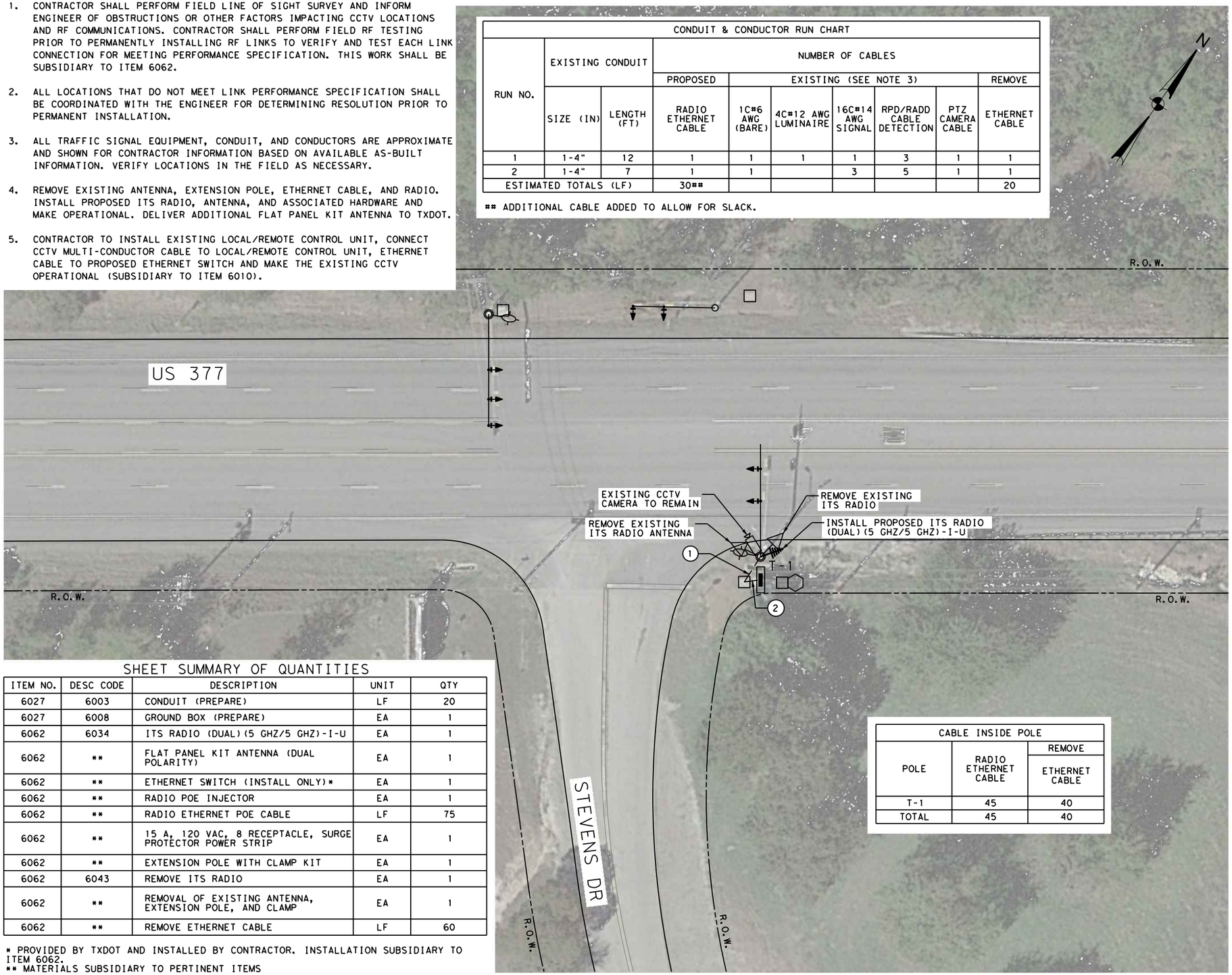
NOTES:

1. CONTRACTOR SHALL PERFORM FIELD LINE OF SIGHT SURVEY AND INFORM ENGINEER OF OBSTRUCTIONS OR OTHER FACTORS IMPACTING CCTV LOCATIONS AND RF COMMUNICATIONS. CONTRACTOR SHALL PERFORM FIELD RF TESTING PRIOR TO PERMANENTLY INSTALLING RF LINKS TO VERIFY AND TEST EACH LINK CONNECTION FOR MEETING PERFORMANCE SPECIFICATION. THIS WORK SHALL BE SUBSIDIARY TO ITEM 6062.
2. ALL LOCATIONS THAT DO NOT MEET LINK PERFORMANCE SPECIFICATION SHALL BE COORDINATED WITH THE ENGINEER FOR DETERMINING RESOLUTION PRIOR TO PERMANENT INSTALLATION.
3. ALL TRAFFIC SIGNAL EQUIPMENT, CONDUIT, AND CONDUCTORS ARE APPROXIMATE AND SHOWN FOR CONTRACTOR INFORMATION BASED ON AVAILABLE AS-BUILT INFORMATION. VERIFY LOCATIONS IN THE FIELD AS NECESSARY.
4. REMOVE EXISTING ANTENNA, EXTENSION POLE, ETHERNET CABLE, AND RADIO. INSTALL PROPOSED ITS RADIO, ANTENNA, AND ASSOCIATED HARDWARE AND MAKE OPERATIONAL. DELIVER ADDITIONAL FLAT PANEL KIT ANTENNA TO TXDOT.
5. CONTRACTOR TO INSTALL EXISTING LOCAL/REMOTE CONTROL UNIT, CONNECT CCTV MULTI-CONDUCTOR CABLE TO LOCAL/REMOTE CONTROL UNIT, ETHERNET CABLE TO PROPOSED ETHERNET SWITCH AND MAKE THE EXISTING CCTV OPERATIONAL (SUBSIDIARY TO ITEM 6010).

CONDUIT & CONDUCTOR RUN CHART

RUN NO.	EXISTING CONDUIT		NUMBER OF CABLES						
			PROPOSED	EXISTING (SEE NOTE 3)					REMOVE
	SIZE (IN)	LENGTH (FT)	RADIO ETHERNET CABLE	1C#6 AWG (BARE)	4C#12 AWG LUMINAIRE	16C#14 AWG SIGNAL	RPD/RADD CABLE DETECTION	PTZ CAMERA CABLE	ETHERNET CABLE
1	1-4"	12	1	1	1	1	3	1	1
2	1-4"	7	1	1		3	5	1	1
ESTIMATED TOTALS (LF)			30##						20

ADDITIONAL CABLE ADDED TO ALLOW FOR SLACK.



CABLE INSIDE POLE

POLE	RADIO ETHERNET CABLE	REMOVE ETHERNET CABLE
T-1	45	40
TOTAL	45	40

SHEET SUMMARY OF QUANTITIES

ITEM NO.	DESC CODE	DESCRIPTION	UNIT	QTY
6027	6003	CONDUIT (PREPARE)	LF	20
6027	6008	GROUND BOX (PREPARE)	EA	1
6062	6034	ITS RADIO (DUAL)(5 GHZ/5 GHZ)-I-U	EA	1
6062	**	FLAT PANEL KIT ANTENNA (DUAL POLARITY)	EA	1
6062	**	ETHERNET SWITCH (INSTALL ONLY)*	EA	1
6062	**	RADIO POE INJECTOR	EA	1
6062	**	RADIO ETHERNET POE CABLE	LF	75
6062	**	15 A, 120 VAC, 8 RECEPTACLE, SURGE PROTECTOR POWER STRIP	EA	1
6062	**	EXTENSION POLE WITH CLAMP KIT	EA	1
6062	6043	REMOVE ITS RADIO	EA	1
6062	**	REMOVAL OF EXISTING ANTENNA, EXTENSION POLE, AND CLAMP	EA	1
6062	**	REMOVE ETHERNET CABLE	LF	60

* PROVIDED BY TXDOT AND INSTALLED BY CONTRACTOR. INSTALLATION SUBSIDIARY TO ITEM 6062.
** MATERIALS SUBSIDIARY TO PERTINENT ITEMS

LEGEND

- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. GROUND BOX
- EXIST. ITS GROUND BOX
- PROP. GROUND BOX
- EXIST. TRAF SIGNAL CONTROLLER CABINET
- EXIST. CONDUIT
- EXIST. CONDUIT (BORED)
- EXIST. ELECTRICAL SERVICE
- EXIST. OMNI ANTENNA
- EXIST. YAGI ANTENNA
- EXIST. ETHERNET RADIO ANTENNA
- EXIST. CAMERA
- PROP. ETHERNET RADIO ANTENNA
- PROP. PARABOLIC ANTENNA
- PROP. CCTV CAMERA

SCALE: 1" = 40'
20 0 20

STATE OF TEXAS
KEVIN D. TYER
87924
LICENSED PROFESSIONAL ENGINEER
04/16/2021

TRAF-IQ
14811 ST. MARY'S LANE, SUITE 180
HOUSTON, TEXAS 77079
832.399.1100
TEXAS PE FIRM REG # F-18726

MALDONADO - BURKETT
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TBPE # 10258 TBPLS # 10194235
www.maldonado-burkett.com

US 377 AT STEVENS DR ITS LAYOUT

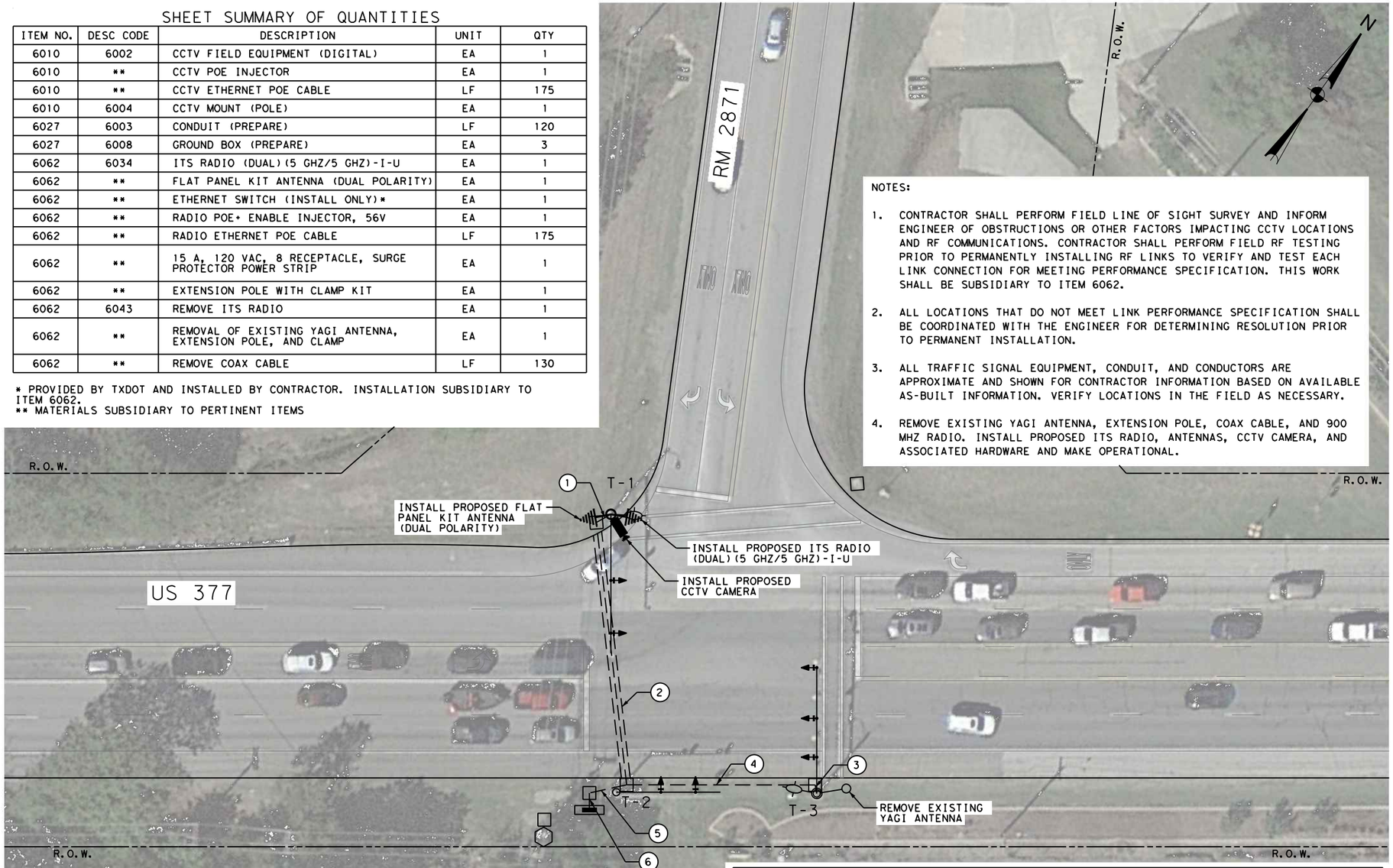
FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	32
CONTROL	SECTION	JOB	
0902	00	278	

DN: AC	CK: KT	DW: JC	CK: SN

SHEET SUMMARY OF QUANTITIES

ITEM NO.	DESC CODE	DESCRIPTION	UNIT	QTY
6010	6002	CCTV FIELD EQUIPMENT (DIGITAL)	EA	1
6010	**	CCTV POE INJECTOR	EA	1
6010	**	CCTV ETHERNET POE CABLE	LF	175
6010	6004	CCTV MOUNT (POLE)	EA	1
6027	6003	CONDUIT (PREPARE)	LF	120
6027	6008	GROUND BOX (PREPARE)	EA	3
6062	6034	ITS RADIO (DUAL)(5 GHZ/5 GHZ)-I-U	EA	1
6062	**	FLAT PANEL KIT ANTENNA (DUAL POLARITY)	EA	1
6062	**	ETHERNET SWITCH (INSTALL ONLY)*	EA	1
6062	**	RADIO POE+ ENABLE INJECTOR, 56V	EA	1
6062	**	RADIO ETHERNET POE CABLE	LF	175
6062	**	15 A, 120 VAC, 8 RECEPTACLE, SURGE PROTECTOR POWER STRIP	EA	1
6062	**	EXTENSION POLE WITH CLAMP KIT	EA	1
6062	6043	REMOVE ITS RADIO	EA	1
6062	**	REMOVAL OF EXISTING YAGI ANTENNA, EXTENSION POLE, AND CLAMP	EA	1
6062	**	REMOVE COAX CABLE	LF	130

* PROVIDED BY TXDOT AND INSTALLED BY CONTRACTOR. INSTALLATION SUBSIDIARY TO ITEM 6062.
** MATERIALS SUBSIDIARY TO PERTINENT ITEMS



NOTES:

1. CONTRACTOR SHALL PERFORM FIELD LINE OF SIGHT SURVEY AND INFORM ENGINEER OF OBSTRUCTIONS OR OTHER FACTORS IMPACTING CCTV LOCATIONS AND RF COMMUNICATIONS. CONTRACTOR SHALL PERFORM FIELD RF TESTING PRIOR TO PERMANENTLY INSTALLING RF LINKS TO VERIFY AND TEST EACH LINK CONNECTION FOR MEETING PERFORMANCE SPECIFICATION. THIS WORK SHALL BE SUBSIDIARY TO ITEM 6062.
2. ALL LOCATIONS THAT DO NOT MEET LINK PERFORMANCE SPECIFICATION SHALL BE COORDINATED WITH THE ENGINEER FOR DETERMINING RESOLUTION PRIOR TO PERMANENT INSTALLATION.
3. ALL TRAFFIC SIGNAL EQUIPMENT, CONDUIT, AND CONDUCTORS ARE APPROXIMATE AND SHOWN FOR CONTRACTOR INFORMATION BASED ON AVAILABLE AS-BUILT INFORMATION. VERIFY LOCATIONS IN THE FIELD AS NECESSARY.
4. REMOVE EXISTING YAGI ANTENNA, EXTENSION POLE, COAX CABLE, AND 900 MHZ RADIO. INSTALL PROPOSED ITS RADIO, ANTENNAS, CCTV CAMERA, AND ASSOCIATED HARDWARE AND MAKE OPERATIONAL.

LEGEND

- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. GROUND BOX
- EXIST. ITS GROUND BOX
- PROP. GROUND BOX
- EXIST. TRAF SIGNAL CONTROLLER CABINET
- EXIST. CONDUIT
- EXIST. CONDUIT (BORED)
- EXIST. ELECTRICAL SERVICE
- EXIST. OMNI ANTENNA
- EXIST. YAGI ANTENNA
- EXIST. ETHERNET RADIO ANTENNA
- EXIST. CAMERA
- PROP. ETHERNET RADIO ANTENNA
- PROP. PARABOLIC ANTENNA
- PROP. CCTV CAMERA

SCALE: 1" = 40'
20 0 20

CABLE INSIDE POLE			
POLE	CCTV ETHERNET CABLE	RADIO ETHERNET CABLE	REMOVE COAX CABLE
T-1	45	45	
T-3			40
TOTAL	45	45	40

CONDUIT & CONDUCTOR RUN CHART

RUN NO.	EXISTING CONDUIT		NUMBER OF CABLES							
			PROPOSED		EXISTING (SEE NOTE 3)					REMOVE
	SIZE (IN)	LENGTH (FT)	CCTV ETHERNET CABLE	RADIO ETHERNET CABLE	2C#14 SHIELD	16C#12 AWG	1C#6 AWG	2C#10 AWG	1C#8 AWG (BARE)	COAX CABLE
1	1-3"	6	1	1		1		1	2	
2	1-3"	92	1	1	11	2		1	1	
3	1-3"	3				1		2	1	1
4	1-2"	66				1		2	1	1
5	1-3"	14	1	1	4	2	3	2	1	1
6	2-4"	6	1	1	20	4	3	3	2	1
ESTIMATED TOTALS (LF)			130##	130##						90

ADDITIONAL CABLE ADDED TO ALLOW FOR SLACK.

STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER
04/16/2021

TRAF-IQ
14811 ST. MARY'S LANE, SUITE 180
HOUSTON, TEXAS 77079
832.399.1100
TEXAS PE FIRM REG # F-18726

MALDONADO - BURKETT
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TBPE # 10258 TBPLS # 10194235
www.maldonado-burkett.com

US 377 AT RM 2871
ITS LAYOUT

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	33
CONTROL	SECTION	JOB	
0902	00	278	

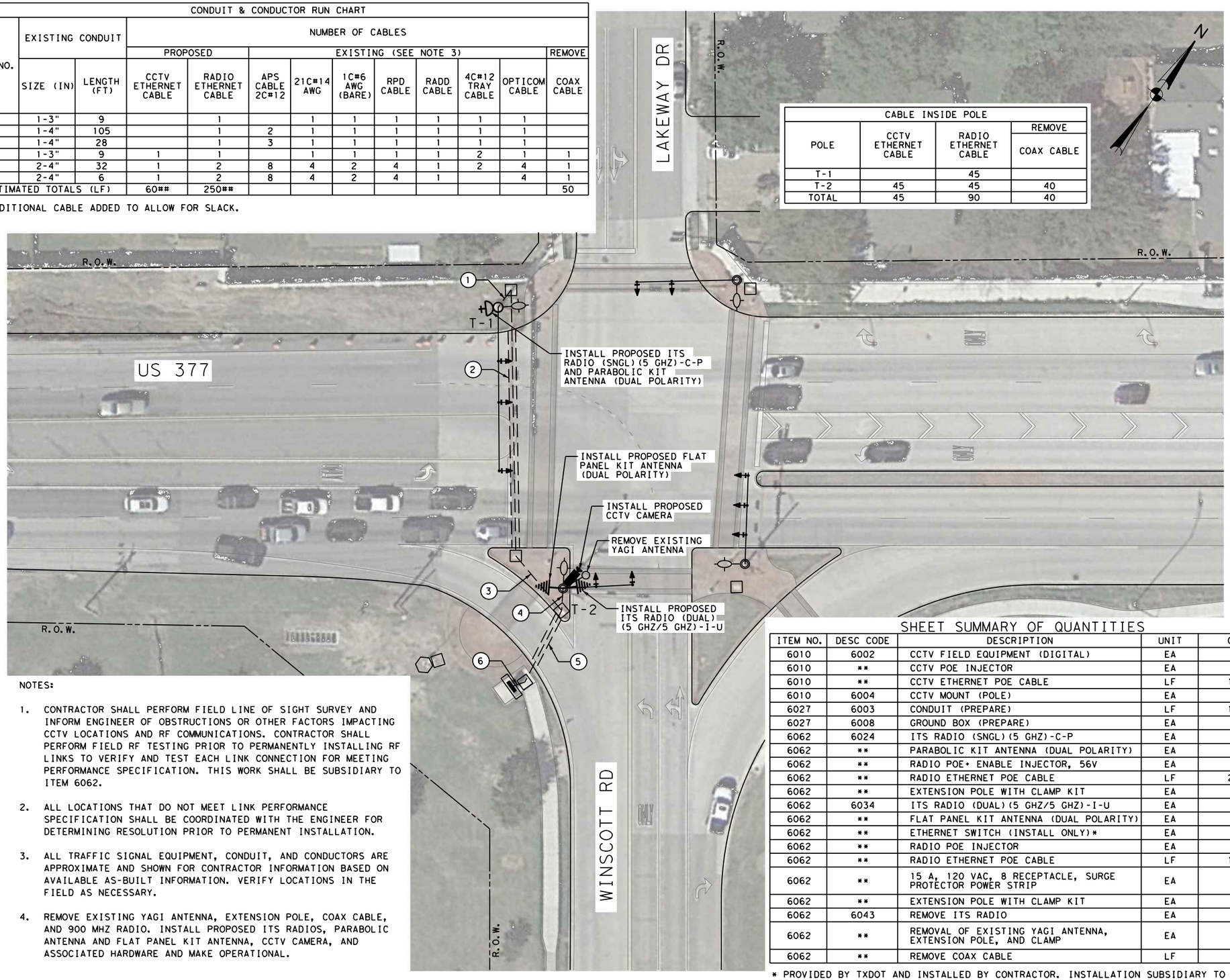
DN: AC	CK: KT	DW: JC	CK: SN

CONDUIT & CONDUCTOR RUN CHART

RUN NO.	EXISTING CONDUIT		NUMBER OF CABLES									
			PROPOSED		EXISTING (SEE NOTE 3)							REMOVE
	SIZE (IN)	LENGTH (FT)	CCTV ETHERNET CABLE	RADIO ETHERNET CABLE	APS CABLE 2C#12	21C#14 AWG	1C#6 AWG (BARE)	RPD CABLE	RADD CABLE	4C#12 TRAY CABLE	OPTICOM CABLE	COAX CABLE
1	1-3"	9		1		1	1	1	1	1	1	
2	1-4"	105		1	2	1	1	1	1	1	1	
3	1-4"	28		1	3	1	1	1	1	1	1	
4	1-3"	9	1	1		1	1	1	1	2	1	1
5	2-4"	32	1	2	8	4	2	4	1	2	4	1
6	2-4"	6	1	2	8	4	2	4	1		4	1
ESTIMATED TOTALS (LF)			60##	250##								50

ADDITIONAL CABLE ADDED TO ALLOW FOR SLACK.

CABLE INSIDE POLE			
POLE	CCTV ETHERNET CABLE	RADIO ETHERNET CABLE	REMOVE COAX CABLE
T-1		45	
T-2	45	45	40
TOTAL	45	90	40



LEGEND

- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. GROUND BOX
- EXIST. ITS GROUND BOX
- PROP. GROUND BOX
- EXIST. TRAF SIGNAL CONTROLLER CABINET
- EXIST. CONDUIT
- EXIST. CONDUIT (BORED)
- EXIST. ELECTRICAL SERVICE
- EXIST. OMNI ANTENNA
- EXIST. YAGI ANTENNA
- EXIST. ETHERNET RADIO ANTENNA
- EXIST. CAMERA
- PROP. ETHERNET RADIO ANTENNA
- PROP. PARABOLIC ANTENNA
- PROP. CCTV CAMERA

SCALE: 1" = 40'
20 0 20

NOTES:

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4. REMOVE EXISTING YAGI ANTENNA, EXTENSION POLE, COAX CABLE, AND 900 MHZ RADIO. INSTALL PROPOSED ITS RADIOS, PARABOLIC ANTENNA AND FLAT PANEL KIT ANTENNA, CCTV CAMERA, AND ASSOCIATED HARDWARE AND MAKE OPERATIONAL.

SHEET SUMMARY OF QUANTITIES

ITEM NO.	DESC CODE	DESCRIPTION	UNIT	QTY
6010	6002	CCTV FIELD EQUIPMENT (DIGITAL)	EA	1
6010	**	CCTV POE INJECTOR	EA	1
6010	**	CCTV ETHERNET POE CABLE	LF	105
6010	6004	CCTV MOUNT (POLE)	EA	1
6027	6003	CONDUIT (PREPARE)	LF	190
6027	6008	GROUND BOX (PREPARE)	EA	4
6062	6024	ITS RADIO (SNGL)(5 GHZ)-C-P	EA	1
6062	**	PARABOLIC KIT ANTENNA (DUAL POLARITY)	EA	1
6062	**	RADIO POE+ ENABLE INJECTOR, 56V	EA	1
6062	**	RADIO ETHERNET POE CABLE	LF	235
6062	**	EXTENSION POLE WITH CLAMP KIT	EA	1
6062	6034	ITS RADIO (DUAL)(5 GHZ/5 GHZ)-I-U	EA	1
6062	**	FLAT PANEL KIT ANTENNA (DUAL POLARITY)	EA	1
6062	**	ETHERNET SWITCH (INSTALL ONLY)*	EA	2
6062	**	RADIO POE INJECTOR	EA	1
6062	**	RADIO ETHERNET POE CABLE	LF	105
6062	**	15 A, 120 VAC, 8 RECEPTACLE, SURGE PROTECTOR POWER STRIP	EA	1
6062	**	EXTENSION POLE WITH CLAMP KIT	EA	1
6062	6043	REMOVE ITS RADIO	EA	1
6062	**	REMOVAL OF EXISTING YAGI ANTENNA, EXTENSION POLE, AND CLAMP	EA	1
6062	**	REMOVE COAX CABLE	LF	90

* PROVIDED BY TXDOT AND INSTALLED BY CONTRACTOR. INSTALLATION SUBSIDIARY TO ITEM 6062.
** MATERIALS SUBSIDIARY TO PERTINENT ITEMS

STATE OF TEXAS
KEVIN D. TYER
87924
LICENSED PROFESSIONAL ENGINEER
05/18/2021

TRAF-IQ
14811 ST. MARY'S LANE, SUITE 180
HOUSTON, TEXAS 77079
832.399.1100
TEXAS PE FIRM REG # F-18726

MALDONADO - BURKETT
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TBPE # 10258 TBPLS # 10194235
www.maldonado-burkett.com

US 377 AT LAKEWAY DR/WINSCOTT RD ITS LAYOUT

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	34
CONTROL	SECTION	JOB	
0902	00	278	

DN: AC	CK: KT	DW: JC	CK: SN

SHEET SUMMARY OF QUANTITIES

ITEM NO.	DESC CODE	DESCRIPTION	UNIT	QTY
6010	6002	CCTV FIELD EQUIPMENT (DIGITAL)	EA	1
6010	**	CCTV POE INJECTOR	EA	1
6010	**	CCTV ETHERNET POE CABLE	LF	190
6010	6004	CCTV MOUNT (POLE)	EA	1
6027	6003	CONDUIT (PREPARE)	LF	140
6027	6008	GROUND BOX (PREPARE)	EA	2
6062	6034	ITS RADIO (DUAL)(5 GHZ/5 GHZ)-I-U	EA	1
6062	**	FLAT PANEL KIT ANTENNA (DUAL POLARITY)	EA	1
6062	**	ETHERNET SWITCH (INSTALL ONLY)*	EA	1
6062	**	RADIO POE+ ENABLE INJECTOR, 56V	EA	1
6062	**	RADIO ETHERNET POE CABLE	LF	190
6062	**	15 A, 120 VAC, 8 RECEPTACLE, SURGE PROTECTOR POWER STRIP	EA	1
6062	**	EXTENSION POLE WITH CLAMP KIT	EA	1
6062	6043	REMOVE ITS RADIO	EA	1
6062	**	REMOVAL OF EXISTING YAGI ANTENNA, EXTENSION POLE, AND CLAMP	EA	1
6062	**	REMOVE COAX CABLE	LF	90

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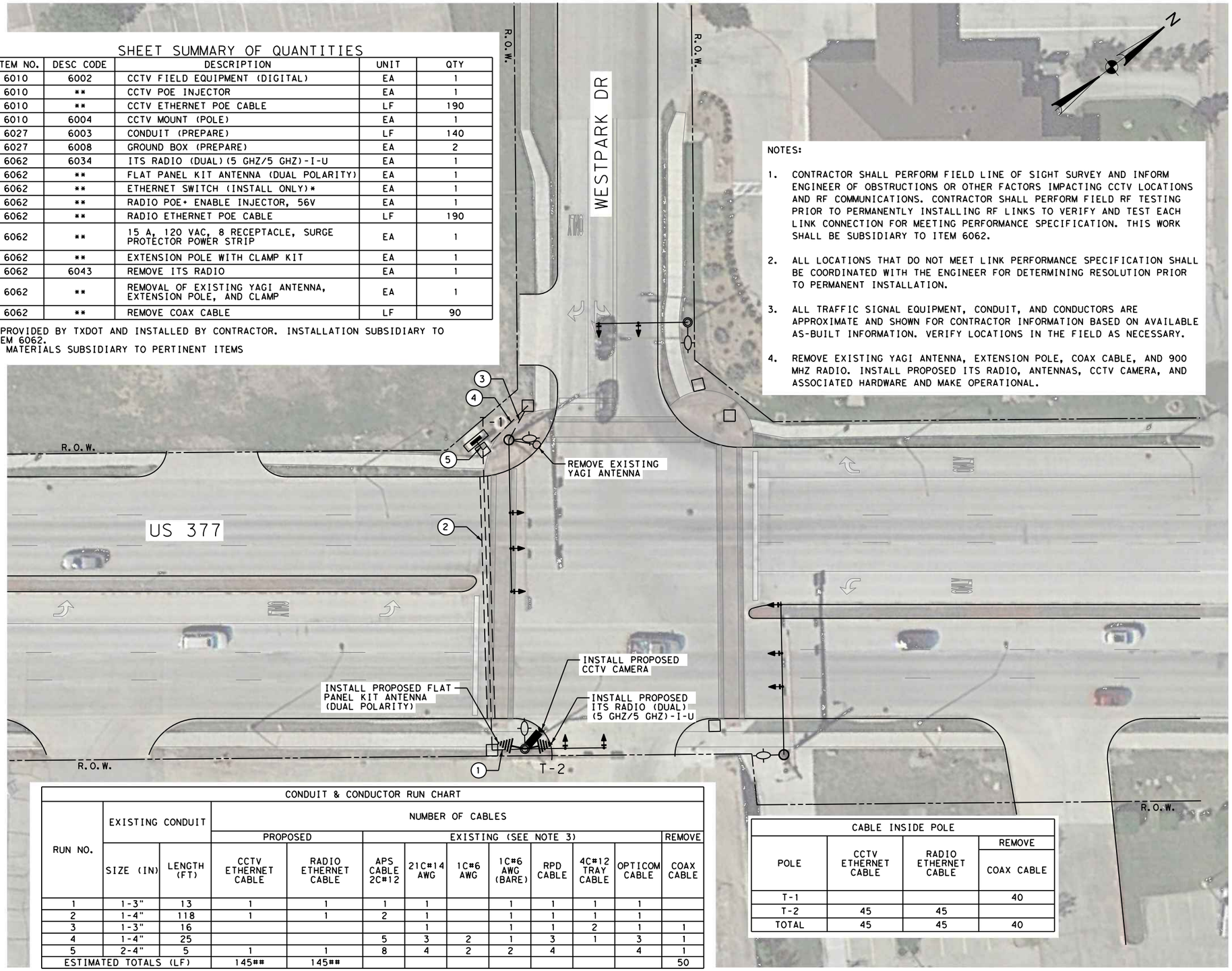
** MATERIALS SUBSIDIARY TO PERTINENT ITEMS



NOTES:

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LEGEND

- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. GROUND BOX
- EXIST. ITS GROUND BOX
- PROP. GROUND BOX
- EXIST. TRAF SIGNAL CONTROLLER CABINET
- EXIST. CONDUIT
- EXIST. CONDUIT (BORED)
- EXIST. ELECTRICAL SERVICE
- EXIST. OMNI ANTENNA
- EXIST. YAGI ANTENNA
- EXIST. ETHERNET RADIO ANTENNA
- EXIST. CAMERA
- PROP. ETHERNET RADIO ANTENNA
- PROP. PARABOLIC ANTENNA
- PROP. CCTV CAMERA

SCALE: 1" = 40'
20 0 20

CONDUIT & CONDUCTOR RUN CHART

RUN NO.	EXISTING CONDUIT		NUMBER OF CABLES									
			PROPOSED		EXISTING (SEE NOTE 3)							REMOVE
	SIZE (IN)	LENGTH (FT)	CCTV ETHERNET CABLE	RADIO ETHERNET CABLE	APS CABLE 2C#12	21C#14 AWG	1C#6 AWG	1C#6 AWG (BARE)	RPD CABLE	4C#12 TRAY CABLE	OPTICOM CABLE	COAX CABLE
1	1-3"	13	1	1	1	1		1	1	1	1	
2	1-4"	118	1	1	2	1		1	1	1	1	
3	1-3"	16				1		1	1	2	1	1
4	1-4"	25			5	3	2	1	3	1	3	1
5	2-4"	5	1	1	8	4	2	2	4		4	1
ESTIMATED TOTALS (LF)			145**	145**								50

** ADDITIONAL CABLE ADDED TO ALLOW FOR SLACK.

CABLE INSIDE POLE

POLE	CCTV ETHERNET CABLE	RADIO ETHERNET CABLE	REMOVE
			COAX CABLE
T-1			40
T-2	45	45	
TOTAL	45	45	40

STATE OF TEXAS
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US 377 AT WESTPARK DR ITS LAYOUT

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	35
CONTROL	SECTION	JOB	
0902	00	278	

DN: AC	CK: KT	DW: JC	CK: SN

SHEET SUMMARY OF QUANTITIES

ITEM NO.	DESC CODE	DESCRIPTION	UNIT	QTY
6027	6003	CONDUIT (PREPARE)	LF	35
6027	6008	GROUND BOX (PREPARE)	EA	2
6062	6034	ITS RADIO (DUAL)(5 GHZ/5 GHZ)-I-U	EA	1
6062	**	FLAT PANEL KIT ANTENNA (DUAL POLARITY)	EA	1
6062	**	ETHERNET SWITCH (INSTALL ONLY)*	EA	1
6062	**	RADIO POE INJECTOR	EA	1
6062	**	RADIO ETHERNET POE CABLE	LF	90
6062	**	15 A, 120 VAC, 8 RECEPTACLE, SURGE PROTECTOR POWER STRIP	EA	1
6062	**	EXTENSION POLE WITH CLAMP KIT	EA	1
6062	6043	REMOVE ITS RADIO	EA	2
6062	**	REMOVAL OF EXISTING YAGI ANTENNA, EXTENSION POLE, AND CLAMP	EA	1
6062	**	REMOVAL OF EXISTING OMNI ANTENNA, EXTENSION POLE, AND CLAMP	EA	1
6062	**	REMOVE COAX CABLE	LF	150

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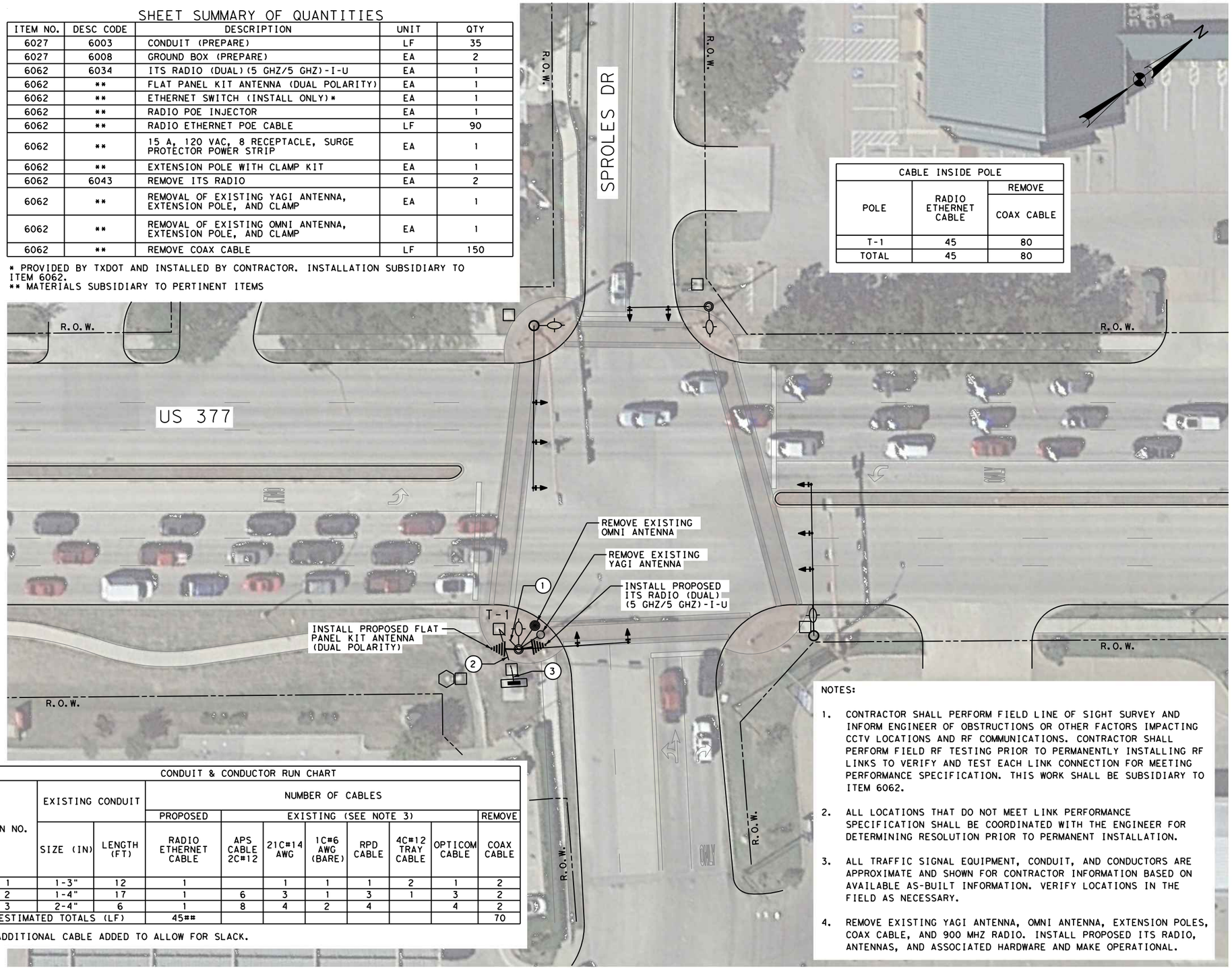
** MATERIALS SUBSIDIARY TO PERTINENT ITEMS



CABLE INSIDE POLE		
		REMOVE
POLE	RADIO ETHERNET CABLE	COAX CABLE
T-1	45	80
TOTAL	45	80

CONDUIT & CONDUCTOR RUN CHART

RUN NO.	EXISTING CONDUIT		NUMBER OF CABLES							
			PROPOSED	EXISTING (SEE NOTE 3)						REMOVE
	SIZE (IN)	LENGTH (FT)	RADIO ETHERNET CABLE	APS CABLE 2C#12	21C#14 AWG	1C#6 AWG (BARE)	RPD CABLE	4C#12 TRAY CABLE	OPTICOM CABLE	COAX CABLE
1	1-3"	12	1		1	1	1	2	1	2
2	1-4"	17	1	6	3	1	3	1	3	2
3	2-4"	6	1	8	4	2	4		4	2
ESTIMATED TOTALS (LF)			45**							70

** ADDITIONAL CABLE ADDED TO ALLOW FOR SLACK.

LEGEND

- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. GROUND BOX
- EXIST. ITS GROUND BOX
- PROP. GROUND BOX
- EXIST. TRAF SIGNAL CONTROLLER CABINET
- EXIST. CONDUIT
- EXIST. CONDUIT (BORED)
- EXIST. ELECTRICAL SERVICE
- EXIST. OMNI ANTENNA
- EXIST. YAGI ANTENNA
- EXIST. ETHERNET RADIO ANTENNA
- EXIST. CAMERA
- PROP. ETHERNET RADIO ANTENNA
- PROP. PARABOLIC ANTENNA
- PROP. CCTV CAMERA

SCALE: 1" = 40'
20 0 20

NOTES:

1. CONTRACTOR SHALL PERFORM FIELD LINE OF SIGHT SURVEY AND INFORM ENGINEER OF OBSTRUCTIONS OR OTHER FACTORS IMPACTING CCTV LOCATIONS AND RF COMMUNICATIONS. CONTRACTOR SHALL PERFORM FIELD RF TESTING PRIOR TO PERMANENTLY INSTALLING RF LINKS TO VERIFY AND TEST EACH LINK CONNECTION FOR MEETING PERFORMANCE SPECIFICATION. THIS WORK SHALL BE SUBSIDIARY TO ITEM 6062.
2. ALL LOCATIONS THAT DO NOT MEET LINK PERFORMANCE SPECIFICATION SHALL BE COORDINATED WITH THE ENGINEER FOR DETERMINING RESOLUTION PRIOR TO PERMANENT INSTALLATION.
3. ALL TRAFFIC SIGNAL EQUIPMENT, CONDUIT, AND CONDUCTORS ARE APPROXIMATE AND SHOWN FOR CONTRACTOR INFORMATION BASED ON AVAILABLE AS-BUILT INFORMATION. VERIFY LOCATIONS IN THE FIELD AS NECESSARY.
4. REMOVE EXISTING YAGI ANTENNA, OMNI ANTENNA, EXTENSION POLES, COAX CABLE, AND 900 MHZ RADIO. INSTALL PROPOSED ITS RADIO, ANTENNAS, AND ASSOCIATED HARDWARE AND MAKE OPERATIONAL.

STATE OF TEXAS
KEVIN D. TYER
87924
LICENSED PROFESSIONAL ENGINEER
04/16/2021

TRAF-IQ
14811 ST. MARY'S LANE, SUITE 180
HOUSTON, TEXAS 77079
832.399.1100
TEXAS PE FIRM REG # F-18726

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TBPE # 10258 TBPLS # 10194235
www.maldonado-burkett.com

US 377 AT SPROLES DR ITS LAYOUT

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	36
CONTROL	SECTION	JOB	
0902	00	278	

DN: AC	CK: KT	DW: JC	CK: SN

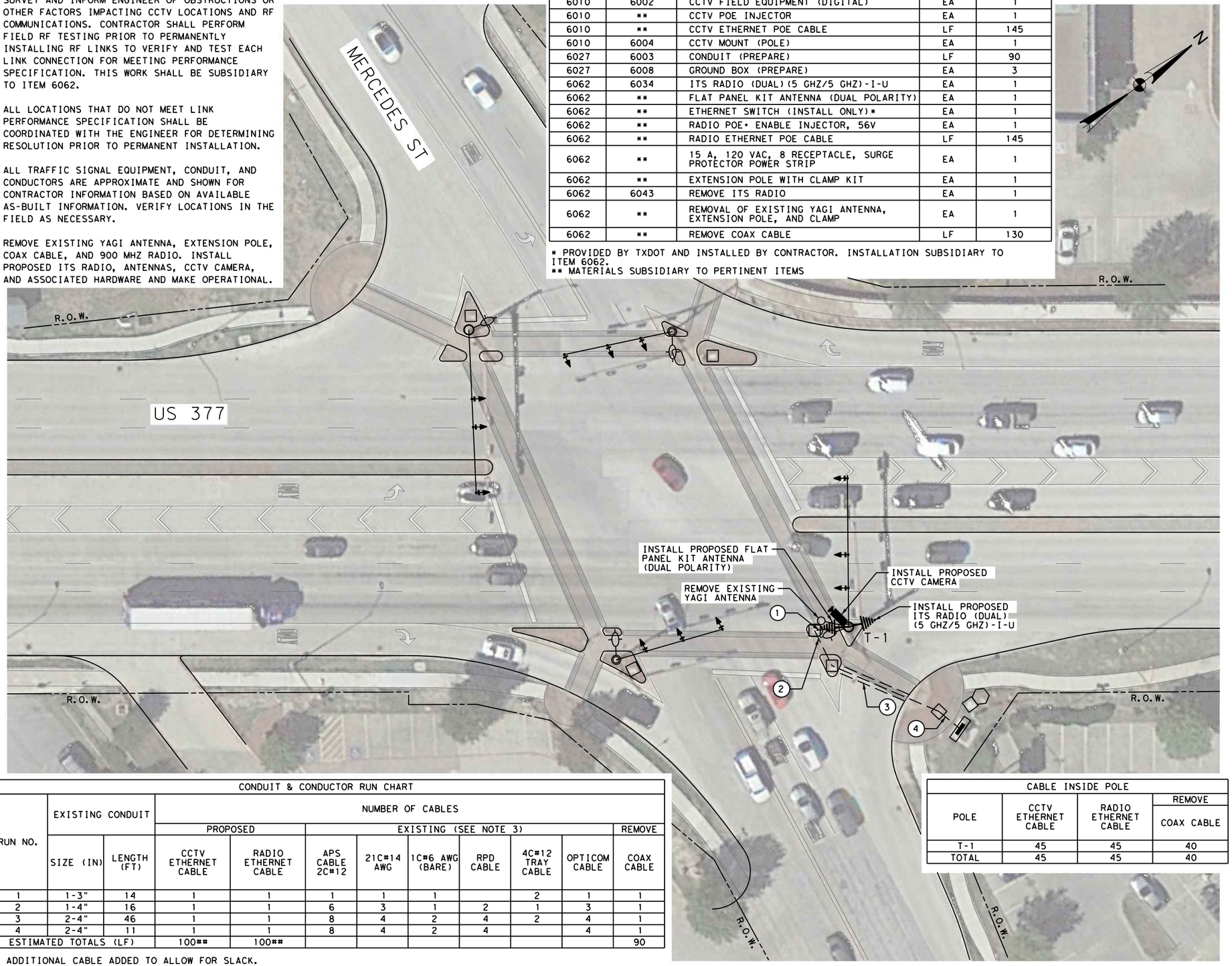
NOTES:

1. CONTRACTOR SHALL PERFORM FIELD LINE OF SIGHT SURVEY AND INFORM ENGINEER OF OBSTRUCTIONS OR OTHER FACTORS IMPACTING CCTV LOCATIONS AND RF COMMUNICATIONS. CONTRACTOR SHALL PERFORM FIELD RF TESTING PRIOR TO PERMANENTLY INSTALLING RF LINKS TO VERIFY AND TEST EACH LINK CONNECTION FOR MEETING PERFORMANCE SPECIFICATION. THIS WORK SHALL BE SUBSIDIARY TO ITEM 6062.
2. ALL LOCATIONS THAT DO NOT MEET LINK PERFORMANCE SPECIFICATION SHALL BE COORDINATED WITH THE ENGINEER FOR DETERMINING RESOLUTION PRIOR TO PERMANENT INSTALLATION.
3. ALL TRAFFIC SIGNAL EQUIPMENT, CONDUIT, AND CONDUCTORS ARE APPROXIMATE AND SHOWN FOR CONTRACTOR INFORMATION BASED ON AVAILABLE AS-BUILT INFORMATION. VERIFY LOCATIONS IN THE FIELD AS NECESSARY.
4. REMOVE EXISTING YAGI ANTENNA, EXTENSION POLE, COAX CABLE, AND 900 MHZ RADIO. INSTALL PROPOSED ITS RADIO, ANTENNAS, CCTV CAMERA, AND ASSOCIATED HARDWARE AND MAKE OPERATIONAL.

SHEET SUMMARY OF QUANTITIES

ITEM NO.	DESC CODE	DESCRIPTION	UNIT	QTY
6010	6002	CCTV FIELD EQUIPMENT (DIGITAL)	EA	1
6010	**	CCTV POE INJECTOR	EA	1
6010	**	CCTV ETHERNET POE CABLE	LF	145
6010	6004	CCTV MOUNT (POLE)	EA	1
6027	6003	CONDUIT (PREPARE)	LF	90
6027	6008	GROUND BOX (PREPARE)	EA	3
6062	6034	ITS RADIO (DUAL)(5 GHZ/5 GHZ)-I-U	EA	1
6062	**	FLAT PANEL KIT ANTENNA (DUAL POLARITY)	EA	1
6062	**	ETHERNET SWITCH (INSTALL ONLY)*	EA	1
6062	**	RADIO POE+ ENABLE INJECTOR, 56V	EA	1
6062	**	RADIO ETHERNET POE CABLE	LF	145
6062	**	15 A, 120 VAC, 8 RECEPTACLE, SURGE PROTECTOR POWER STRIP	EA	1
6062	**	EXTENSION POLE WITH CLAMP KIT	EA	1
6062	6043	REMOVE ITS RADIO	EA	1
6062	**	REMOVAL OF EXISTING YAGI ANTENNA, EXTENSION POLE, AND CLAMP	EA	1
6062	**	REMOVE COAX CABLE	LF	130

* PROVIDED BY TXDOT AND INSTALLED BY CONTRACTOR. INSTALLATION SUBSIDIARY TO ITEM 6062.
** MATERIALS SUBSIDIARY TO PERTINENT ITEMS



LEGEND

- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. GROUND BOX
- EXIST. ITS GROUND BOX
- PROP. GROUND BOX
- EXIST. TRAF SIGNAL CONTROLLER CABINET
- EXIST. CONDUIT
- EXIST. CONDUIT (BORED)
- EXIST. ELECTRICAL SERVICE
- EXIST. OMNI ANTENNA
- EXIST. YAGI ANTENNA
- EXIST. ETHERNET RADIO ANTENNA
- EXIST. CAMERA
- PROP. ETHERNET RADIO ANTENNA
- PROP. PARABOLIC ANTENNA
- PROP. CCTV CAMERA

SCALE: 1" = 40'
20 0 20

CONDUIT & CONDUCTOR RUN CHART											
RUN NO.	EXISTING CONDUIT		NUMBER OF CABLES								
			PROPOSED		EXISTING (SEE NOTE 3)						REMOVE
	SIZE (IN)	LENGTH (FT)	CCTV ETHERNET CABLE	RADIO ETHERNET CABLE	APS CABLE 2C#12	21C#14 AWG	1C#6 AWG (BARE)	RPD CABLE	4C#12 TRAY CABLE	OPTICOM CABLE	COAX CABLE
1	1-3"	14	1	1	1	1	1		2	1	1
2	1-4"	16	1	1	6	3	1	2	1	3	1
3	2-4"	46	1	1	8	4	2	4	2	4	1
4	2-4"	11	1	1	8	4	2	4		4	1
ESTIMATED TOTALS (LF)			100**	100**							90

** ADDITIONAL CABLE ADDED TO ALLOW FOR SLACK.

CABLE INSIDE POLE			
POLE	CCTV ETHERNET CABLE	RADIO ETHERNET CABLE	REMOVE COAX CABLE
T-1	45	45	40
TOTAL	45	45	40

STATE OF TEXAS
KEVIN D. TYER
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04/16/2021

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14811 ST. MARY'S LANE, SUITE 180
HOUSTON, TEXAS 77079
832.399.1100
TEXAS PE FIRM REG # F-18726

MALDONADO - BURKETT
Engineers | Surveyors | Contractors
TBPE # 10255 TBPLS # 10194235
www.maldonado-burkett.com

US 377 AT MERCEDES ST ITS LAYOUT

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	37
CONTROL	SECTION	JOB	
0902	00	278	

DN: AC	CK: KT	DW: JC	CK: SN

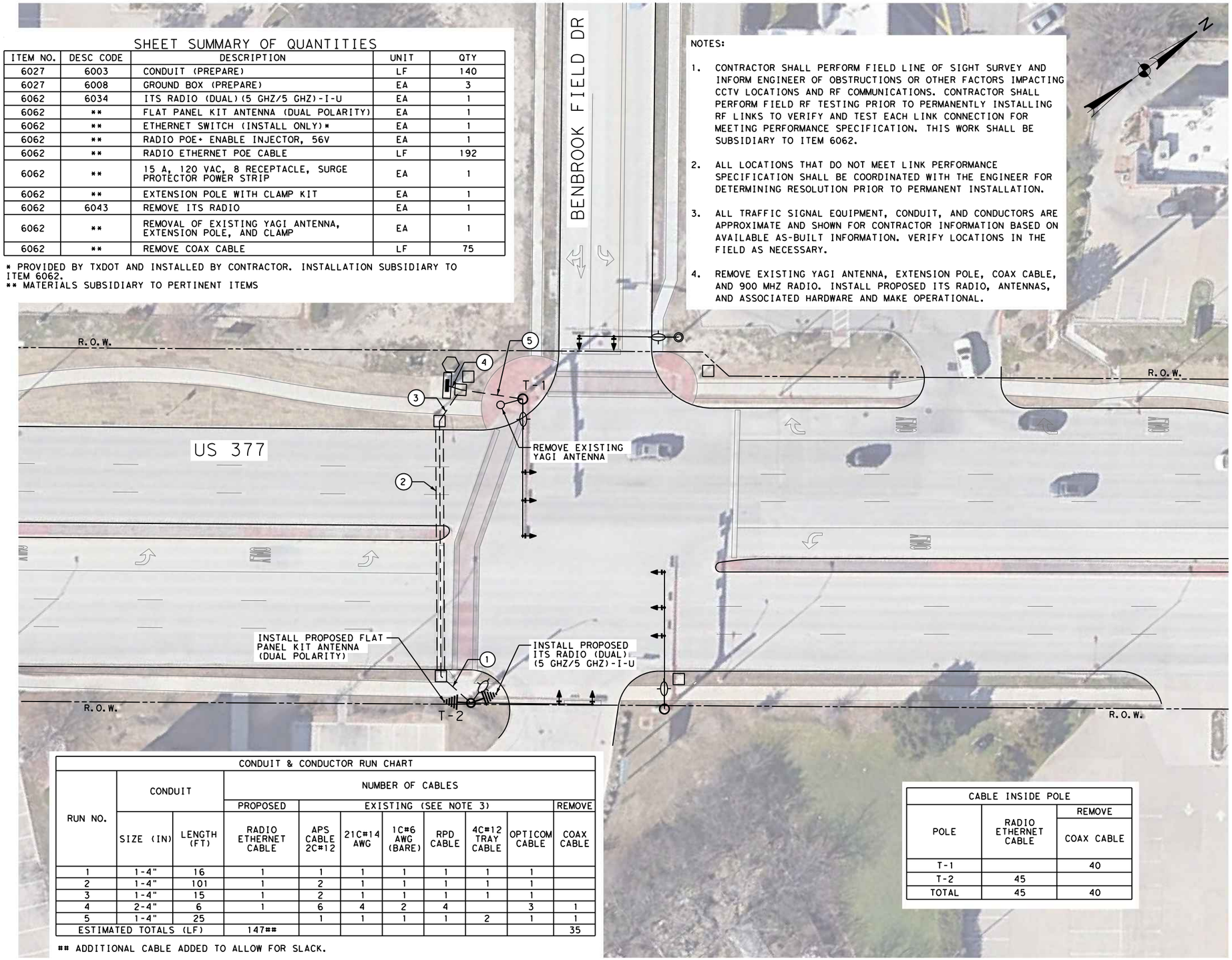
SHEET SUMMARY OF QUANTITIES

ITEM NO.	DESC CODE	DESCRIPTION	UNIT	QTY
6027	6003	CONDUIT (PREPARE)	LF	140
6027	6008	GROUND BOX (PREPARE)	EA	3
6062	6034	ITS RADIO (DUAL)(5 GHZ/5 GHZ)-I-U	EA	1
6062	**	FLAT PANEL KIT ANTENNA (DUAL POLARITY)	EA	1
6062	**	ETHERNET SWITCH (INSTALL ONLY)*	EA	1
6062	**	RADIO POE+ ENABLE INJECTOR, 56V	EA	1
6062	**	RADIO ETHERNET POE CABLE	LF	192
6062	**	15 A, 120 VAC, 8 RECEPTACLE, SURGE PROTECTOR POWER STRIP	EA	1
6062	**	EXTENSION POLE WITH CLAMP KIT	EA	1
6062	6043	REMOVE ITS RADIO	EA	1
6062	**	REMOVAL OF EXISTING YAGI ANTENNA, EXTENSION POLE, AND CLAMP	EA	1
6062	**	REMOVE COAX CABLE	LF	75

* PROVIDED BY TXDOT AND INSTALLED BY CONTRACTOR. INSTALLATION SUBSIDIARY TO ITEM 6062.
** MATERIALS SUBSIDIARY TO PERTINENT ITEMS

NOTES:

1. CONTRACTOR SHALL PERFORM FIELD LINE OF SIGHT SURVEY AND INFORM ENGINEER OF OBSTRUCTIONS OR OTHER FACTORS IMPACTING CCTV LOCATIONS AND RF COMMUNICATIONS. CONTRACTOR SHALL PERFORM FIELD RF TESTING PRIOR TO PERMANENTLY INSTALLING RF LINKS TO VERIFY AND TEST EACH LINK CONNECTION FOR MEETING PERFORMANCE SPECIFICATION. THIS WORK SHALL BE SUBSIDIARY TO ITEM 6062.
2. ALL LOCATIONS THAT DO NOT MEET LINK PERFORMANCE SPECIFICATION SHALL BE COORDINATED WITH THE ENGINEER FOR DETERMINING RESOLUTION PRIOR TO PERMANENT INSTALLATION.
3. ALL TRAFFIC SIGNAL EQUIPMENT, CONDUIT, AND CONDUCTORS ARE APPROXIMATE AND SHOWN FOR CONTRACTOR INFORMATION BASED ON AVAILABLE AS-BUILT INFORMATION. VERIFY LOCATIONS IN THE FIELD AS NECESSARY.
4. REMOVE EXISTING YAGI ANTENNA, EXTENSION POLE, COAX CABLE, AND 900 MHZ RADIO. INSTALL PROPOSED ITS RADIO, ANTENNAS, AND ASSOCIATED HARDWARE AND MAKE OPERATIONAL.



LEGEND

- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. GROUND BOX
- EXIST. ITS GROUND BOX
- PROP. GROUND BOX
- EXIST. TRAF SIGNAL CONTROLLER CABINET
- EXIST. CONDUIT
- EXIST. CONDUIT (BORED)
- EXIST. ELECTRICAL SERVICE
- EXIST. OMNI ANTENNA
- EXIST. YAGI ANTENNA
- EXIST. ETHERNET RADIO ANTENNA
- EXIST. CAMERA
- PROP. ETHERNET RADIO ANTENNA
- PROP. PARABOLIC ANTENNA
- PROP. CCTV CAMERA

SCALE: 1" = 40'
20 0 20

CONDUIT & CONDUCTOR RUN CHART										
RUN NO.	CONDUIT		NUMBER OF CABLES							
			PROPOSED	EXISTING (SEE NOTE 3)						REMOVE
	SIZE (IN)	LENGTH (FT)	RADIO ETHERNET CABLE	APS CABLE 2C#12	21C#14 AWG	1C#6 AWG (BARE)	RPD CABLE	4C#12 TRAY CABLE	OPTICOM CABLE	COAX CABLE
1	1-4"	16	1	1	1	1	1	1	1	
2	1-4"	101	1	2	1	1	1	1	1	
3	1-4"	15	1	2	1	1	1	1	1	
4	2-4"	6	1	6	4	2	4		3	1
5	1-4"	25		1	1	1	1	2	1	1
ESTIMATED TOTALS (LF)			147##							35

ADDITIONAL CABLE ADDED TO ALLOW FOR SLACK.

CABLE INSIDE POLE		
POLE	RADIO ETHERNET CABLE	REMOVE COAX CABLE
T-1		40
T-2	45	
TOTAL	45	40

STATE OF TEXAS
KEVIN D. TYER
87924
LICENSED PROFESSIONAL ENGINEER
04/16/2021

TRAF-IQ
14811 ST. MARY'S LANE, SUITE 180
HOUSTON, TEXAS 77079
832.399.1100
TEXAS PE FIRM REG # F-18726

MALDONADO - BURKETT
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TBPE # 10258 TBPLS # 10194235
www.maldonado-burkett.com

US 377 AT BENBROOK FIELD DR ITS LAYOUT

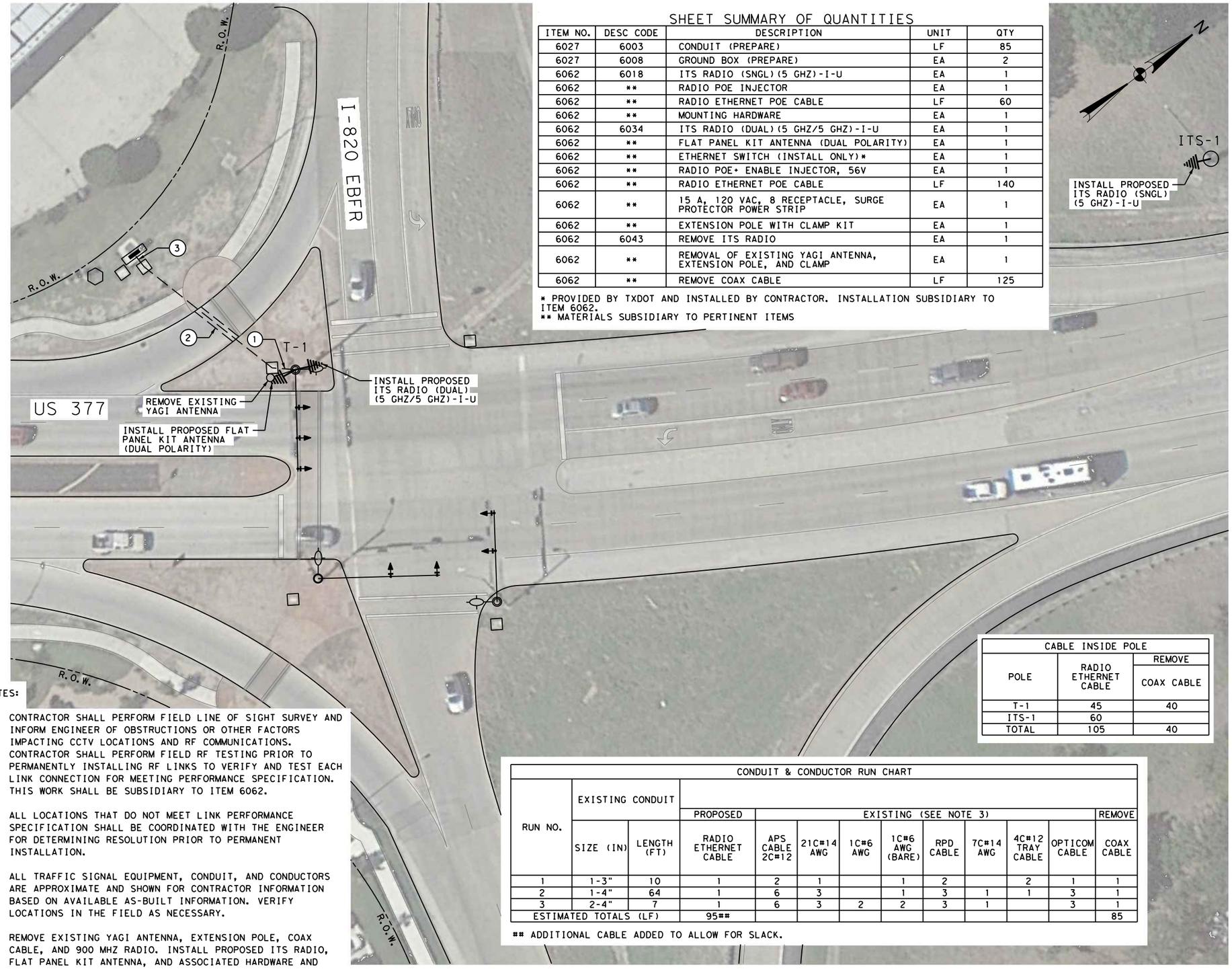
FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	38
CONTROL	SECTION	JOB	
0902	00	278	

DN: AC	CK: KT	DW: JC	CK: SN

SHEET SUMMARY OF QUANTITIES

ITEM NO.	DESC CODE	DESCRIPTION	UNIT	QTY
6027	6003	CONDUIT (PREPARE)	LF	85
6027	6008	GROUND BOX (PREPARE)	EA	2
6062	6018	ITS RADIO (SNGL)(5 GHZ)-I-U	EA	1
6062	**	RADIO POE INJECTOR	EA	1
6062	**	RADIO ETHERNET POE CABLE	LF	60
6062	**	MOUNTING HARDWARE	EA	1
6062	6034	ITS RADIO (DUAL)(5 GHZ/5 GHZ)-I-U	EA	1
6062	**	FLAT PANEL KIT ANTENNA (DUAL POLARITY)	EA	1
6062	**	ETHERNET SWITCH (INSTALL ONLY)*	EA	1
6062	**	RADIO POE+ ENABLE INJECTOR, 56V	EA	1
6062	**	RADIO ETHERNET POE CABLE	LF	140
6062	**	15 A, 120 VAC, 8 RECEPTACLE, SURGE PROTECTOR POWER STRIP	EA	1
6062	**	EXTENSION POLE WITH CLAMP KIT	EA	1
6062	6043	REMOVE ITS RADIO	EA	1
6062	**	REMOVAL OF EXISTING YAGI ANTENNA, EXTENSION POLE, AND CLAMP	EA	1
6062	**	REMOVE COAX CABLE	LF	125

* PROVIDED BY TXDOT AND INSTALLED BY CONTRACTOR. INSTALLATION SUBSIDIARY TO ITEM 6062.
** MATERIALS SUBSIDIARY TO PERTINENT ITEMS



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4. REMOVE EXISTING YAGI ANTENNA, EXTENSION POLE, COAX CABLE, AND 900 MHZ RADIO. INSTALL PROPOSED ITS RADIO, FLAT PANEL KIT ANTENNA, AND ASSOCIATED HARDWARE AND MAKE OPERATIONAL.
5. INSTALL ITS RADIO AND ANTENNA ON ITS-1.

CABLE INSIDE POLE		
POLE	RADIO ETHERNET CABLE	REMOVE COAX CABLE
T-1	45	40
ITS-1	60	
TOTAL	105	40

CONDUIT & CONDUCTOR RUN CHART												
RUN NO.	EXISTING CONDUIT		PROPOSED	EXISTING (SEE NOTE 3)								REMOVE
	SIZE (IN)	LENGTH (FT)	RADIO ETHERNET CABLE	APS CABLE 2C#12	21C#14 AWG	1C#6 AWG	1C#6 AWG (BARE)	RPD CABLE	7C#14 AWG	4C#12 TRAY CABLE	OPTICOM CABLE	COAX CABLE
1	1-3"	10	1	2	1		1	2		2	1	1
2	1-4"	64	1	6	3		1	3	1	1	3	1
3	2-4"	7	1	6	3	2	2	3	1		3	1
ESTIMATED TOTALS (LF)			95##									85

ADDITIONAL CABLE ADDED TO ALLOW FOR SLACK.

LEGEND

- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. GROUND BOX
- EXIST. ITS GROUND BOX
- PROP. GROUND BOX
- EXIST. TRAF SIGNAL CONTROLLER CABINET
- EXIST. CONDUIT
- EXIST. CONDUIT (BORED)
- EXIST. ELECTRICAL SERVICE
- EXIST. OMNI ANTENNA
- EXIST. YAGI ANTENNA
- EXIST. ETHERNET RADIO ANTENNA
- EXIST. CAMERA
- PROP. ETHERNET RADIO ANTENNA
- PROP. PARABOLIC ANTENNA
- PROP. CCTV CAMERA

SCALE: 1" = 40'
20 0 20

STATE OF TEXAS
KEVIN D. TYER
87924
LICENSED PROFESSIONAL ENGINEER
04/16/2021

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www.maldonado-burkett.com

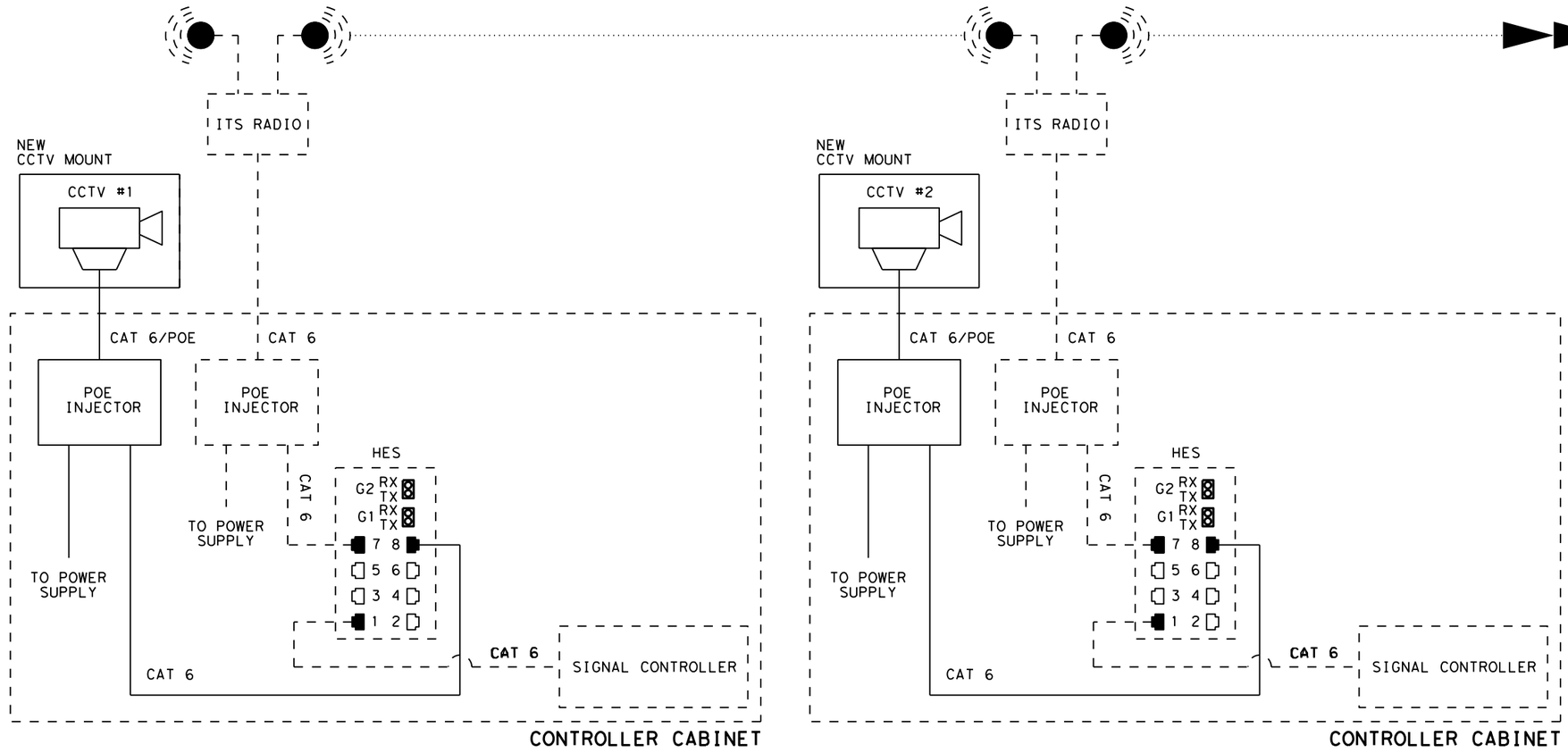
US 377 AT I-820 EBFR ITS LAYOUT

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	39
CONTROL	SECTION	JOB	
0902	00	278	

LEGEND:

- - - - EXISTING DEVICE

——— PROPOSED DEVICE



MATCHLINE A

SH 199 AT HODGKINS ROAD
EXISTING ITS RADIO
PROPOSED CCTV #1

SH 199 AT AZLE AVENUE
EXISTING ITS RADIO
PROPOSED CCTV #2

NOTES:

1. CONTRACTOR SHALL MAINTAIN THE INTEGRITY OF THE EQUIPMENT PROVIDED. IF THE EQUIPMENT IS DAMAGED DURING TRANSPORTATION OR WORK THE CONTRACTOR SHALL REPLACE THE EQUIPMENT AT THE CONTRACTOR'S EXPENSE, CONTACT THE TRAFFIC ENGINEERING INSPECTION AND MAINTENANCE SECTION AT (817) 370-3664 AT LEAST 48 HOURS IN ADVANCE TO COORDINATE PICK-UP AND INSTALLATION OF EQUIPMENT PROVIDED BY TXDOT.
2. CONTRACTOR SHALL FURNISH AND INSTALL ALL CABLING TO COMPLETE A FULLY FUNCTIONAL SYSTEM INCLUDING BUT NOT LIMITED TO CAT6 CABLES FOR ETHERNET CONNECTION.

STATE OF TEXAS
MELANIE B. YOUNG
67775
REGISTERED
PROFESSIONAL ENGINEER

Melanie B Young, P.E.
4/16/21

NO.	DATE	REVISION	APPROVED

MALDONADO - BURKETT
Engineers | Surveyors | Contractors
TBPE # 10258 TBPLS # 10194235
www.maldonado-burkett.com

SH 199
ITS BLOCK DIAGRAMS

SHEET 1 OF 5

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	40
CONTROL	SECTION	JOB	
0902	00	278	

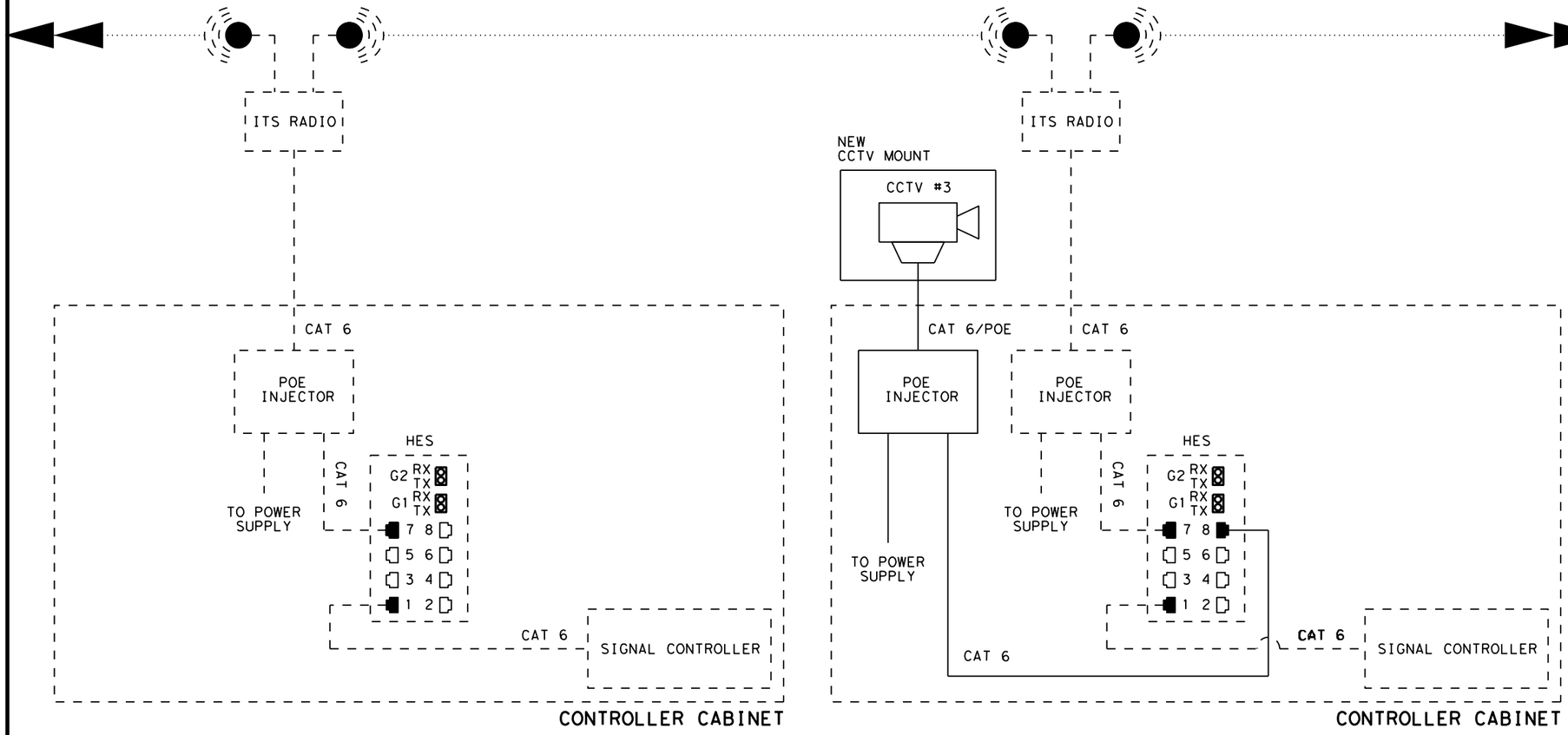
MATCHLINE A

MATCHLINE B

LEGEND:

- - - - EXISTING DEVICE

——— PROPOSED DEVICE

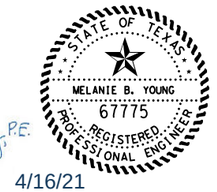


SH 199 AT TELEPHONE ROAD
EXISTING ITS RADIO

SH 199 AT CHARBONNEAU ROAD
EXISTING ITS RADIO
PROPOSED CCTV #3

NOTES:

1. CONTRACTOR SHALL MAINTAIN THE INTEGRITY OF THE EQUIPMENT PROVIDED. IF THE EQUIPMENT IS DAMAGED DURING TRANSPORTATION OR WORK THE CONTRACTOR SHALL REPLACE THE EQUIPMENT AT THE CONTRACTOR'S EXPENSE, CONTACT THE TRAFFIC ENGINEERING INSPECTION AND MAINTENANCE SECTION AT (817) 370-3664 AT LEAST 48 HOURS IN ADVANCE TO COORDINATE PICK-UP AND INSTALLATION OF EQUIPMENT PROVIDED BY TXDOT.
2. CONTRACTOR SHALL FURNISH AND INSTALL ALL CABLING TO COMPLETE A FULLY FUNCTIONAL SYSTEM INCLUDING BUT NOT LIMITED TO CAT6 CABLES FOR ETHERNET CONNECTION.



Melanie B. Young, P.E.
4/16/21

NO.	DATE	REVISION	APPROVED

MALDONADO - BURKETT
Engineers | Surveyors | Contractors
TBPE # 10258 TBPLS # 10194235
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SH 199
ITS BLOCK DIAGRAMS

SHEET 2 OF 5

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	
CONTROL	SECTION	JOB	41
0902	00	278	

041 SH 199 AT AZLE AVE-BLOCK DIAGRAM.dgn

LEGEND:

- - - - EXISTING DEVICE

——— PROPOSED DEVICE

MATCHLINE B

ITS RADIO

CAT 6

POE INJECTOR

TO POWER SUPPLY

CAT 6

HES

G2 RX TX
G1 RX TX
7 8
5 6
3 4
1 2

CAT 6

SIGNAL CONTROLLER

CONTROLLER CABINET

SH 199 AT PAUL MEADOR ROAD
EXISTING ITS RADIO

NEW CCTV MOUNT

CCTV #4

ITS RADIO

CAT 6/POE

POE INJECTOR

TO POWER SUPPLY

CAT 6

POE INJECTOR

TO POWER SUPPLY

CAT 6

HES

G2 RX TX
G1 RX TX
7 8
5 6
3 4
1 2

CAT 6

CAT 6

SIGNAL CONTROLLER

CONTROLLER CABINET

SH 199 AT BOAT CLUB ROAD
EXISTING ITS RADIO
PROPOSED CCTV #4

MATCHLINE C

NOTES:

1. CONTRACTOR SHALL MAINTAIN THE INTEGRITY OF THE EQUIPMENT PROVIDED. IF THE EQUIPMENT IS DAMAGED DURING TRANSPORTATION OR WORK THE CONTRACTOR SHALL REPLACE THE EQUIPMENT AT THE CONTRACTOR'S EXPENSE, CONTACT THE TRAFFIC ENGINEERING INSPECTION AND MAINTENANCE SECTION AT (817) 370-3664 AT LEAST 48 HOURS IN ADVANCE TO COORDINATE PICK-UP AND INSTALLATION OF EQUIPMENT PROVIDED BY TXDOT.
2. CONTRACTOR SHALL FURNISH AND INSTALL ALL CABLING TO COMPLETE A FULLY FUNCTIONAL SYSTEM INCLUDING BUT NOT LIMITED TO CAT6 CABLES FOR ETHERNET CONNECTION.

STATE OF TEXAS
MELANIE B. YOUNG
67775
REGISTERED
PROFESSIONAL ENGINEER

Melanie B Young, P.E.

4/16/21

NO.	DATE	REVISION	APPROVED

MALDONADO - BURKETT
Engineers | Surveyors | Contractors
TBPE # 10258 TBPLS # 10194235
www.maldonado-burkett.com

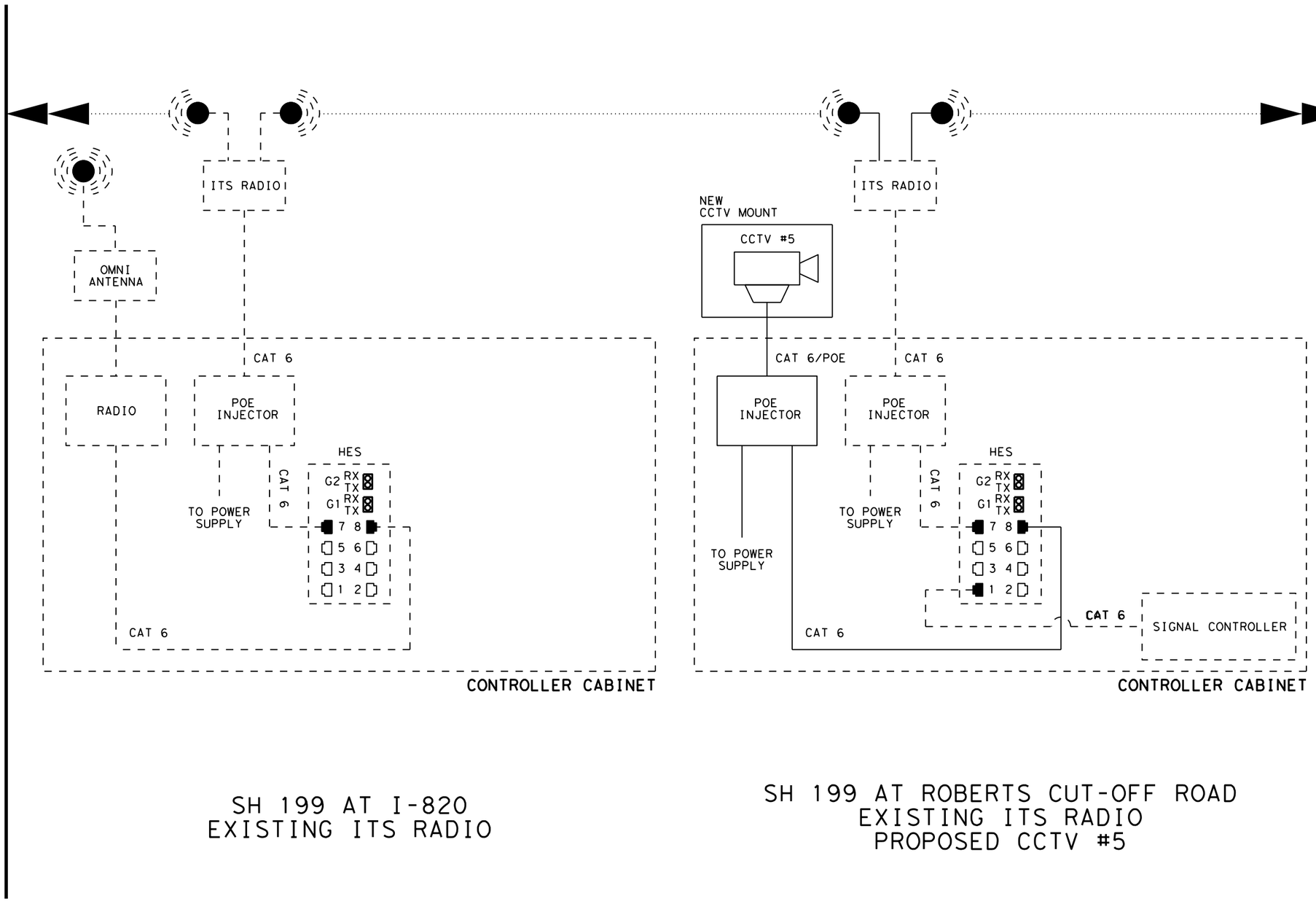
SH 199
ITS BLOCK DIAGRAMS

SHEET 3 OF 5

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	42
CONTROL	SECTION	JOB	
0902	00	278	

042 SH 199 AT TELEPHONE-BLOCK DIAGRAM.dgn

MATCHLINE C



MATCHLINE D

LEGEND:

- - - - EXISTING DEVICE

——— PROPOSED DEVICE

SH 199 AT I-820
EXISTING ITS RADIO

SH 199 AT ROBERTS CUT-OFF ROAD
EXISTING ITS RADIO
PROPOSED CCTV #5

NOTES:

1. CONTRACTOR SHALL MAINTAIN THE INTEGRITY OF THE EQUIPMENT PROVIDED. IF THE EQUIPMENT IS DAMAGED DURING TRANSPORTATION OR WORK THE CONTRACTOR SHALL REPLACE THE EQUIPMENT AT THE CONTRACTOR'S EXPENSE, CONTACT THE TRAFFIC ENGINEERING INSPECTION AND MAINTENANCE SECTION AT (817) 370-3664 AT LEAST 48 HOURS IN ADVANCE TO COORDINATE PICK-UP AND INSTALLATION OF EQUIPMENT PROVIDED BY TXDOT.
2. CONTRACTOR SHALL FURNISH AND INSTALL ALL CABLING TO COMPLETE A FULLY FUNCTIONAL SYSTEM INCLUDING BUT NOT LIMITED TO CAT6 CABLES FOR ETHERNET CONNECTION.

STATE OF TEXAS
MELANIE B. YOUNG
67775
REGISTERED PROFESSIONAL ENGINEER
Melanie B Young, P.E.
4/16/21

NO.	DATE	REVISION	APPROVED

MALDONADO - BURKETT
Engineers | Surveyors | Contractors
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SH 199
ITS BLOCK DIAGRAMS

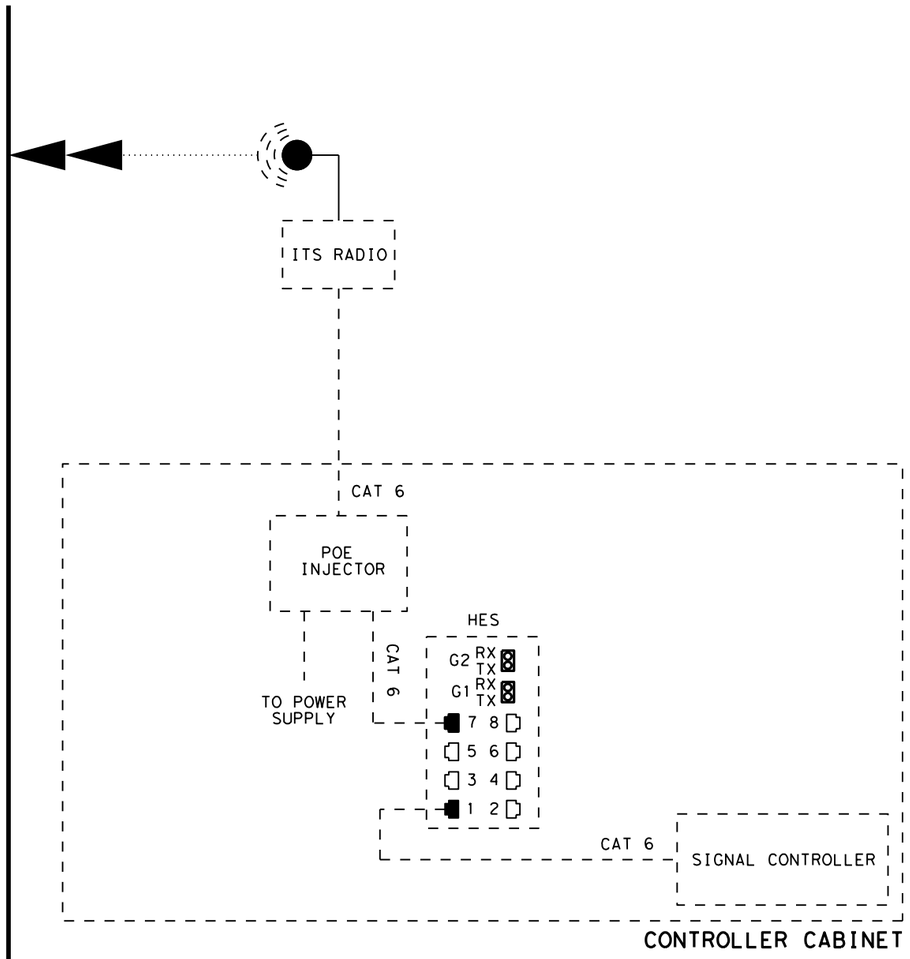
SHEET 4 OF 5

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	43
CONTROL	SECTION	JOB	
0902	00	278	

LEGEND:

- - - - EXISTING DEVICE

——— PROPOSED DEVICE



SH 199 AT BIWAY STREET
EXISTING ITS RADIO

NOTES:

1. CONTRACTOR SHALL MAINTAIN THE INTEGRITY OF THE EQUIPMENT PROVIDED. IF THE EQUIPMENT IS DAMAGED DURING TRANSPORTATION OR WORK THE CONTRACTOR SHALL REPLACE THE EQUIPMENT AT THE CONTRACTOR'S EXPENSE, CONTACT THE TRAFFIC ENGINEERING INSPECTION AND MAINTENANCE SECTION AT (817) 370-3664 AT LEAST 48 HOURS IN ADVANCE TO COORDINATE PICK-UP AND INSTALLATION OF EQUIPMENT PROVIDED BY TXDOT.
2. CONTRACTOR SHALL FURNISH AND INSTALL ALL CABLING TO COMPLETE A FULLY FUNCTIONAL SYSTEM INCLUDING BUT NOT LIMITED TO CAT6 CABLES FOR ETHERNET CONNECTION.

MELANIE B. YOUNG
67775
REGISTERED PROFESSIONAL ENGINEER
STATE OF TEXAS
Melanie B. Young, P.E.
4/16/21

NO.	DATE	REVISION	APPROVED

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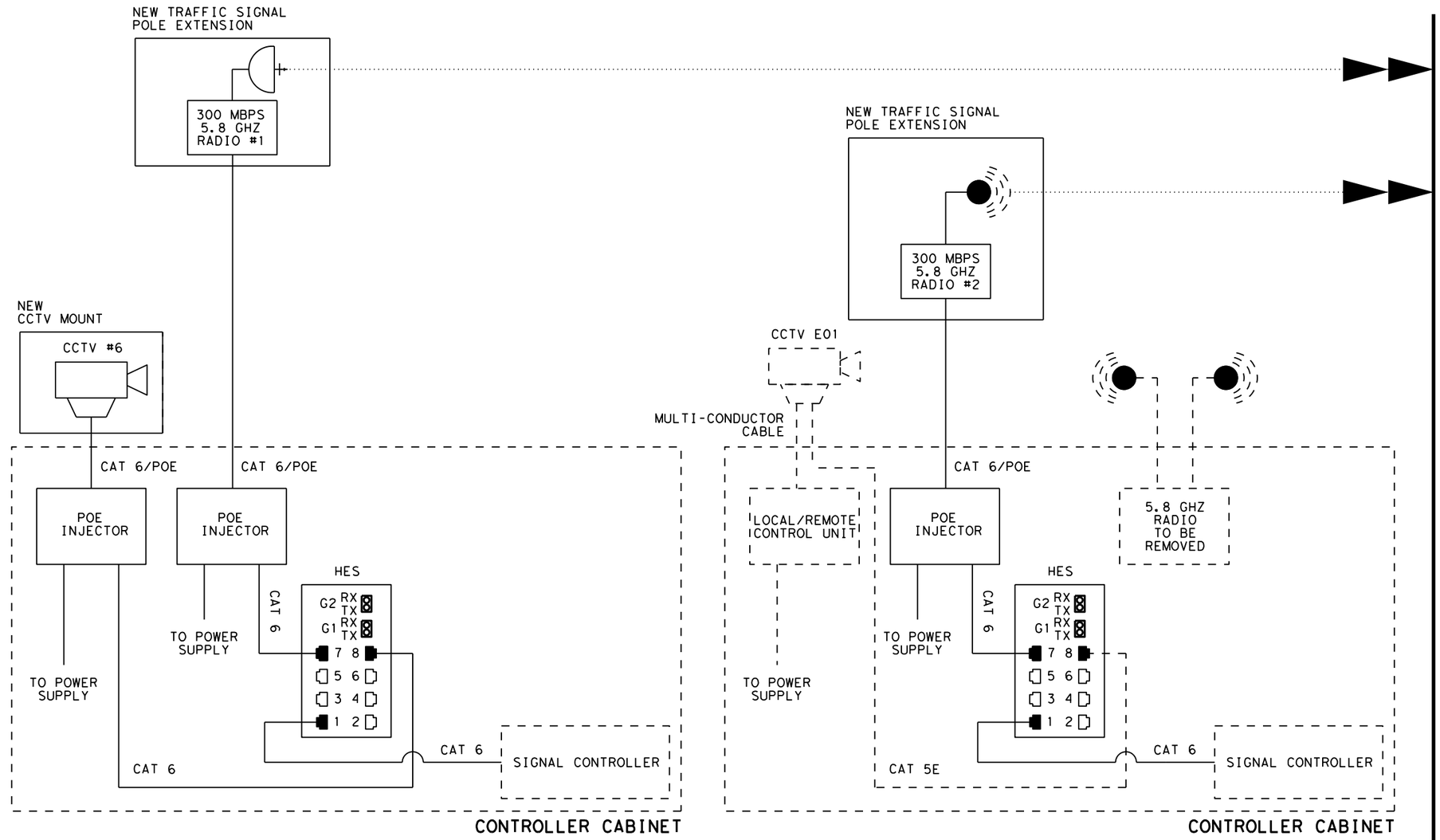
www.maldonado-burkett.com

SH 199
ITS BLOCK DIAGRAMS

SHEET 5 OF 5

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	44
CONTROL	SECTION	JOB	
0902	00	278	



LEGEND:

- - - - EXISTING DEVICE

——— PROPOSED DEVICE

MATCHLINE A

US 377 AT HAWKINS HOME BOULEVARD
PROPOSED ITS RADIO #1
PROPOSED CCTV #6

US 377 AT STEVENS DRIVE
PROPOSED ITS RADIO #2
EXISTING CCTV E01

NOTES:

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3. POWER STRIP (PS) SHALL BE PLUGGED INTO SOCKET IN CABINET THAT IS NOT ON THE SAME CIRCUIT BREAKER CIRCUIT AS THE TRAFFIC CONTROLLER OR A GFCI CIRCUIT.
4. HES TO BE PROVIDED BY TXDOT AND INSTALLED BY CONTRACTOR

STATE OF TEXAS
MELANIE B. YOUNG
67775
REGISTERED
PROFESSIONAL ENGINEER

4/20/21

Melanie B. Young, P.E

NO.	DATE	REVISION	APPROVED

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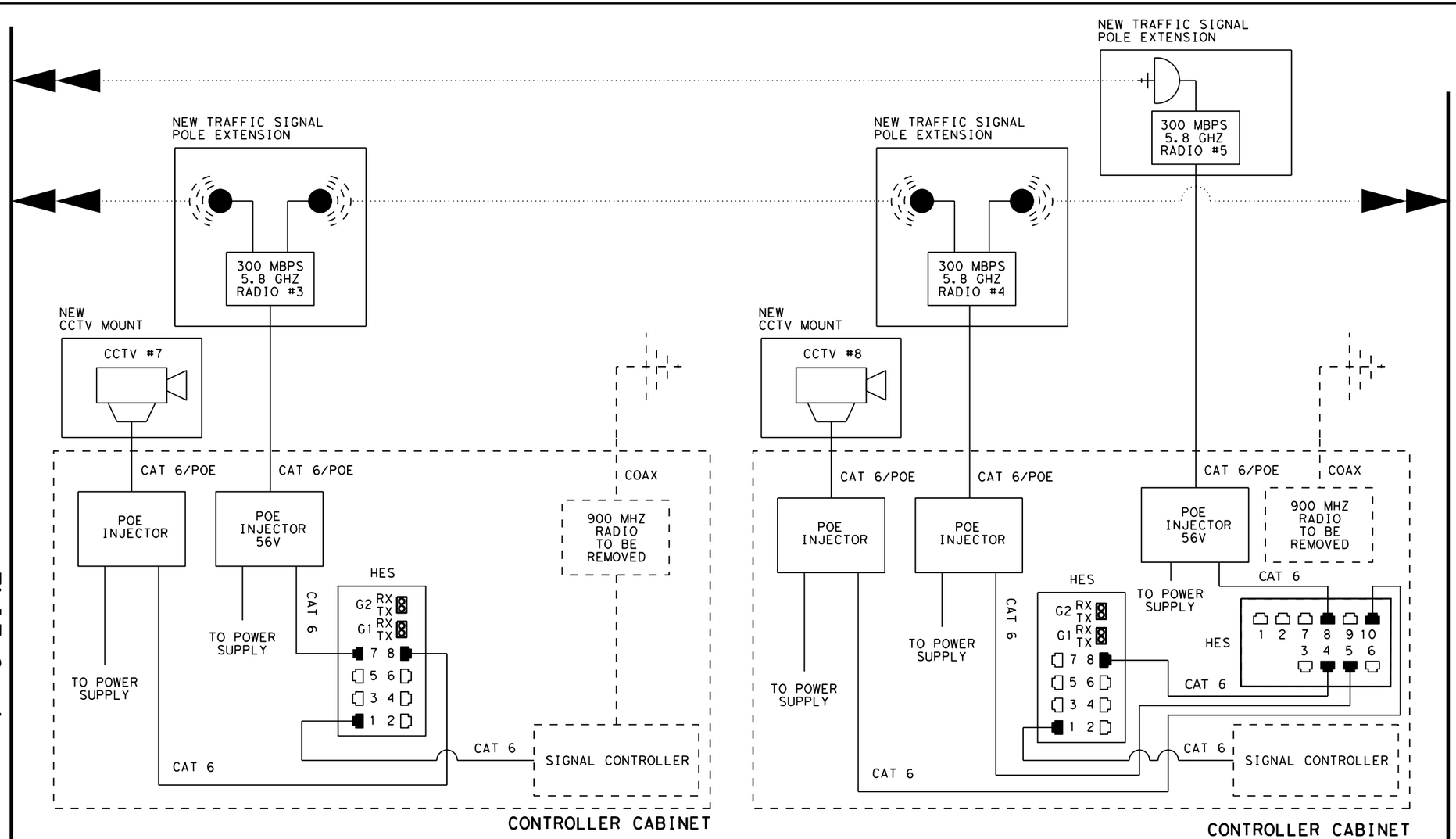
US 377
ITS BLOCK DIAGRAMS

SHEET 1 OF 5

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		US 377
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	45
CONTROL	SECTION	JOB	
0902	00	278	



LEGEND:

- - - - EXISTING DEVICE

——— PROPOSED DEVICE

US 377 AT RM 2871 (CHAPIN SCHOOL ROAD)
PROPOSED ITS RADIO #3
PROPOSED CCTV #7

US 377 AT LAKEWAY/WINSCOTT DRIVE
PROPOSED ITS RADIOS #4 & #5
PROPOSED CCTV #8

NOTES:

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4. CONTRACTOR SHALL REMOVE THE EXISTING 900 MHZ RADIOS WHEN 5.8 GHZ RADIO IS OPERATIONAL AND ALL EXISTING FUNCTIONS, INCLUDING SIGNAL COORDINATION, ARE TRANSFERRED OVER TO THE NEW WIRELESS RADIO COMMUNICATION SYSTEM.
5. HES TO BE PROVIDED BY TXDOT AND INSTALLED BY CONTRACTOR

Melanie B. Young P.E.
5/19/2021

STATE OF TEXAS
MELANIE B. YOUNG
67775
REGISTERED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROVED

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TBPE # 10258 TBPLS # 10194235
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US 377
ITS BLOCK DIAGRAMS

SHEET 2 OF 5

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		US 377
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	46
CONTROL	SECTION	JOB	
0902	00	278	

LEGEND:

- - - - EXISTING DEVICE

——— PROPOSED DEVICE

MATCHLINE B

NEW TRAFFIC SIGNAL POLE EXTENSION

300 MBPS 5.8 GHZ RADIO #6

NEW CCTV MOUNT

CCTV #9

CAT 6/POE

CAT 6/POE

POE INJECTOR

POE INJECTOR 56V

TO POWER SUPPLY

TO POWER SUPPLY

CAT 6

HES

G2 RX TX

G1 RX TX

7 8

5 6

3 4

1 2

COAX

900 MHZ RADIO TO BE REMOVED

CAT 6

CAT 6

SIGNAL CONTROLLER

CONTROLLER CABINET

NEW TRAFFIC SIGNAL POLE EXTENSION

300 MBPS 5.8 GHZ RADIO #7

CAT 6/POE

POE INJECTOR

TO POWER SUPPLY

CAT 6

HES

G2 RX TX

G1 RX TX

7 8

5 6

3 4

1 2

COAX

900 MHZ RADIO TO BE REMOVED

CAT 6

SIGNAL CONTROLLER

CONTROLLER CABINET

MATCHLINE C

US 377 AT WESTPARK DRIVE
PROPOSED ITS RADIO #6
PROPOSED CCTV #9

US 377 AT SPROLES DRIVE
PROPOSED ITS RADIO #7

NOTES:

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5. HES TO BE PROVIDED BY TXDOT AND INSTALLED BY CONTRACTOR

STATE OF TEXAS
MELANIE B. YOUNG
67775
REGISTERED PROFESSIONAL ENGINEER

Melanie B. Young, P.E.
4/16/21

NO.	DATE	REVISION	APPROVED

MALDONADO - BURKETT
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Texas Department of Transportation

US 377
ITS BLOCK DIAGRAMS

SHEET 3 OF 5

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		US 377
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	
CONTROL	SECTION	JOB	47
0902	00	278	

LEGEND:

- - - - EXISTING DEVICE

——— PROPOSED DEVICE

MATCHLINE C

NEW TRAFFIC SIGNAL POLE EXTENSION

300 MBPS 5.8 GHZ RADIO #8

NEW CCTV MOUNT

CCTV #10

CAT 6/POE

CAT 6/POE

COAX

POE INJECTOR

POE INJECTOR 56V

900 MHZ RADIO TO BE REMOVED

HES

G2 RX TX

G1 RX TX

7 8

5 6

3 4

1 2

CAT 6

TO POWER SUPPLY

TO POWER SUPPLY

CAT 6

CAT 6

SIGNAL CONTROLLER

CONTROLLER CABINET

MATCHLINE D

NEW TRAFFIC SIGNAL POLE EXTENSION

300 MBPS 5.8 GHZ RADIO #9

CAT 6/POE

COAX

POE INJECTOR 56V

900 MHZ RADIO TO BE REMOVED

HES

G2 RX TX

G1 RX TX

7 8

5 6

3 4

1 2

CAT 6

TO POWER SUPPLY

CAT 6

SIGNAL CONTROLLER

CONTROLLER CABINET

US 377 AT MERCEDES STREET
PROPOSED ITS RADIO #8
PROPOSED CCTV #10

US 377 AT BENBROOK FIELD
PROPOSED ITS RADIO #9

NOTES:

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5. HES TO BE PROVIDED BY TXDOT AND INSTALLED BY CONTRACTOR

STATE OF TEXAS
MELANIE B. YOUNG
67775
REGISTERED PROFESSIONAL ENGINEER

Melanie B. Young, P.E.
4/16/21

NO.	DATE	REVISION	APPROVED

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Texas Department of Transportation

US 377
ITS BLOCK DIAGRAMS

SHEET 4 OF 5

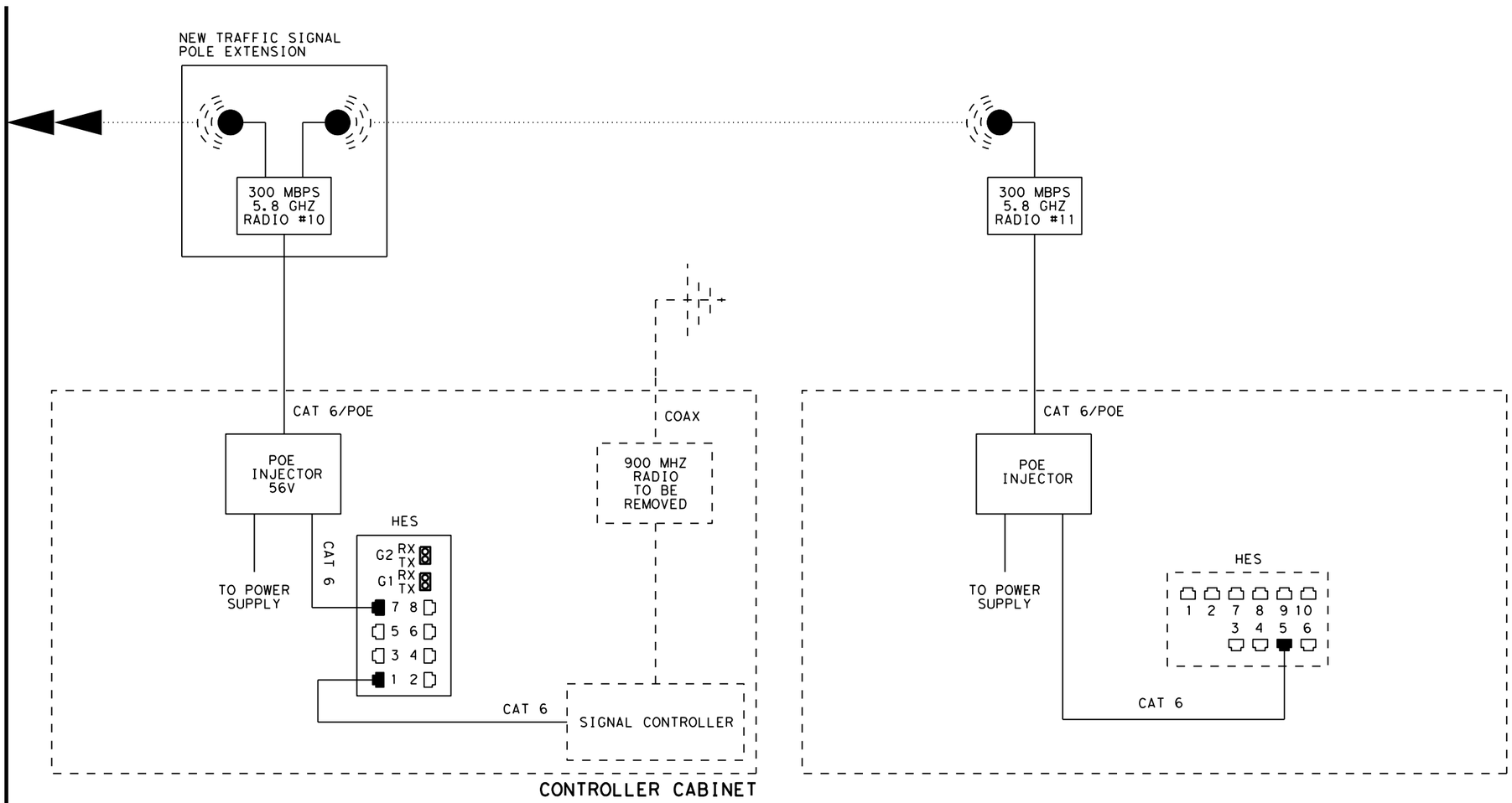
FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		US 377
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	
CONTROL	SECTION	JOB	48
0902	00	278	

MATCHLINE D

LEGEND:

- - - - EXISTING DEVICE

——— PROPOSED DEVICE



US 377 AT I-820 EBFR
PROPOSED ITS RADIO #10

EB I-820 AT US 377 - EXISTING ITS POLE
PROPOSED ITS RADIO #11

NOTES:

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5. HES TO BE PROVIDED BY TXDOT AND INSTALLED BY CONTRACTOR

Melanie B. Young P.E.
5/19/2021

STATE OF TEXAS
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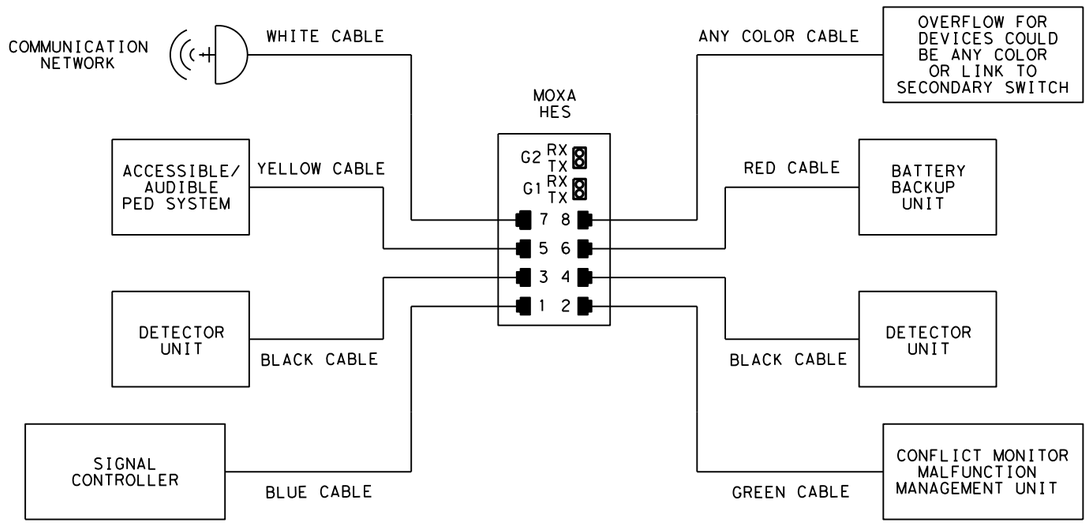
US 377
ITS BLOCK DIAGRAMS

SHEET 5 OF 5

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		US 377
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	49
CONTROL	SECTION	JOB	
0902	00	278	



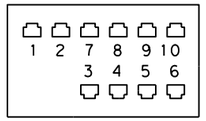
CAT 6 CABLE COLOR CODING

NOTES:

1. PORT ASSIGNMENT ARE SUBJECT TO CHANGE BASED ON LOCATION EQUIPMENT USED, AS DIRECTED BY THE ENGINEER.
2. CONTRACTOR SHALL FURNISH AND INSTALL ALL CAT 6 CABLES (AS SHOWN), IN THE SIGNAL CABINETS AND CONNECT TO THE ETHERNET SWITCH AND MAKE IT OPERATIONAL. ALL MATERIALS AND LABOR SHALL BE SUBSIDIARY TO ITEM 6062.
3. NOT ALL THE CAT CABLE CONNECTIONS ARE SHOWN IN THE ITS BLOCK DIAGRAMS FOR CLARITY.

MOXA
LINK CONFIGURATION DETAIL
FOR TRAFFIC SIGNAL CABINET

TELESTE MES-110
HES



1. TO NEXT CABINET AWAY FROM SATELLITE/MAIN NETWORK
2. BACK TO SATELLITE/MAIN NETWORK
3. DMS CONTROLLER
4. SWITCH TO SWITCH COPPER CONNECTION OR RADIO TO NEXT CABINET AWAY FROM SATELLITE/MAIN NETWORK
5. VIDEO OR RADIO TO NEXT CABINET AWAY FROM SATELLITE/MAIN NETWORK
6. SERIAL TO ETHERNET CONVERTER
7.
8. VIDEO OR RADIO TO NEXT CABINET AWAY FROM SATELLITE/MAIN NETWORK
9. RADIO BACK TO SATELLITE/MAIN NETWORK
10. CCTV POE

TELESTE MES-110 HES
LINK CONFIGURATION
FOR EXISTING ITS POLE

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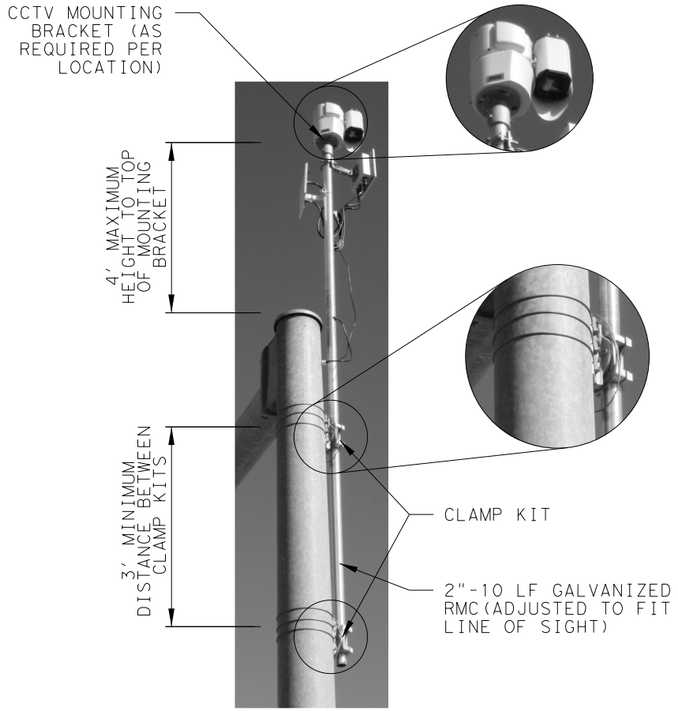
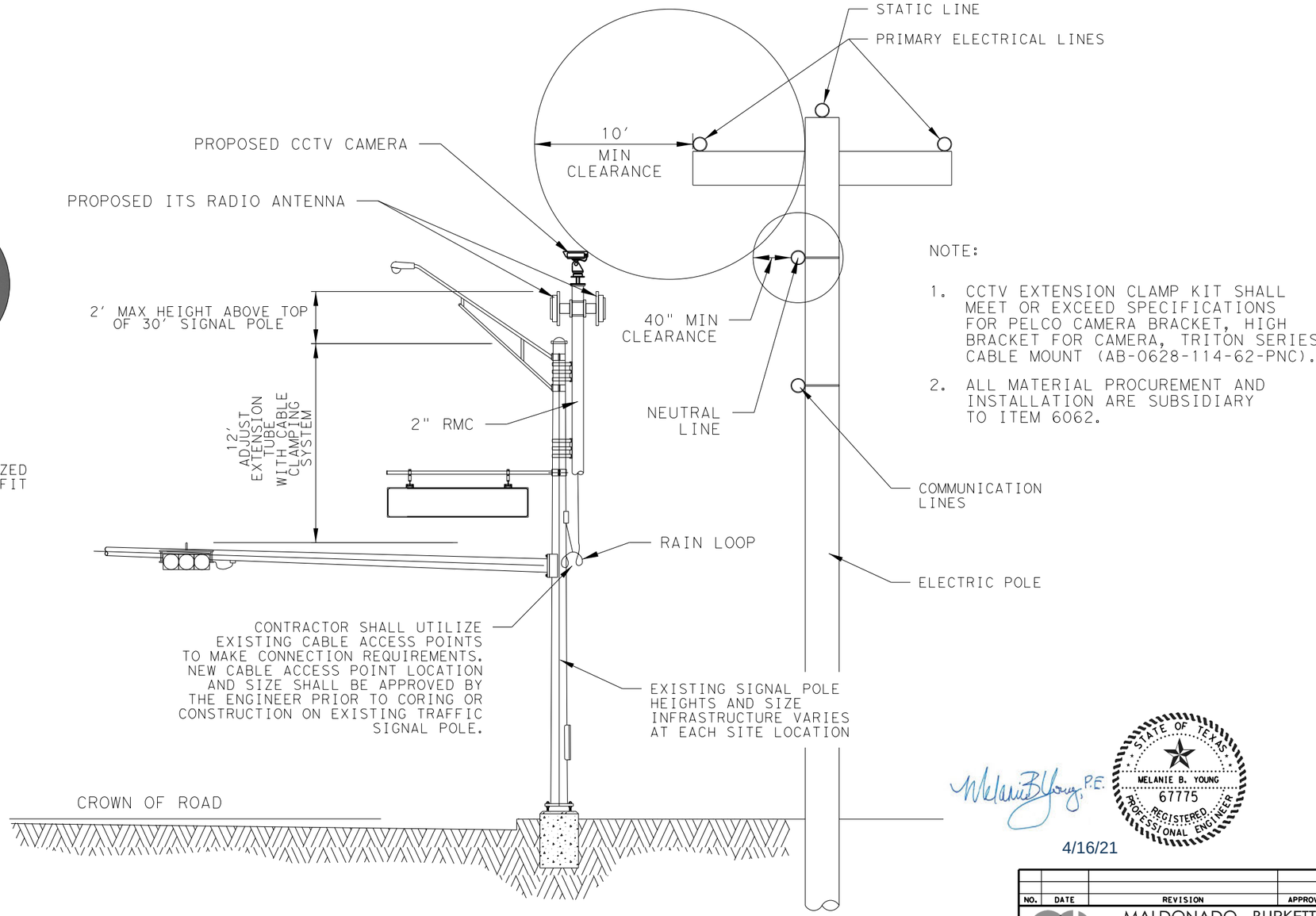
LINK CONFIGURATION DETAILS

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		US 377
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	50
CONTROL	SECTION	JOB	
0902	00	278	



2" RMC EXTENSION DETAIL



EXTENSION ON TRAFFIC SIGNAL POLE DETAIL

NOTE:

1. CCTV EXTENSION CLAMP KIT SHALL MEET OR EXCEED SPECIFICATIONS FOR PELCO CAMERA BRACKET, HIGH BRACKET FOR CAMERA, TRITON SERIES CABLE MOUNT (AB-0628-114-62-PNC).
2. ALL MATERIAL PROCUREMENT AND INSTALLATION ARE SUBSIDIARY TO ITEM 6062.

Melanie B. Young, P.E.

STATE OF TEXAS
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EXTENSION POLE DETAIL

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
06	SEE TITLE SHEET		VA
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	51
CONTROL	SECTION	JOB	
0902	00	278	

GENERAL NOTES FOR ALL ELECTRICAL WORK

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

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

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

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

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

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

CONDUIT

A. MATERIALS

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

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

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

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

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

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

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

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

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

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

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

B. CONSTRUCTION METHODS

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

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

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

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

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

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

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

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.

10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

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		FW	TARRANT		52

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ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

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

B. CONSTRUCTION METHODS

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

C. TEMPORARY WIRING

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

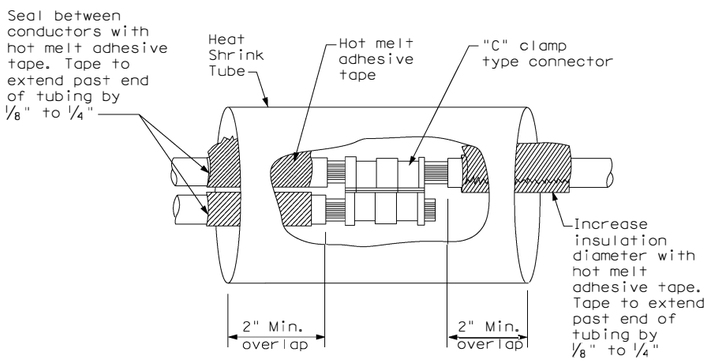
GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

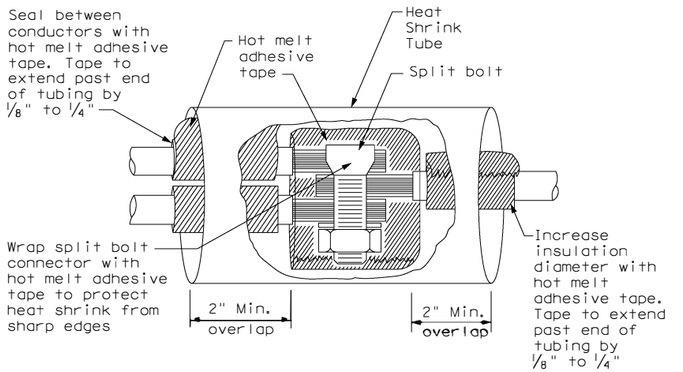
1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in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

B. CONSTRUCTION METHODS

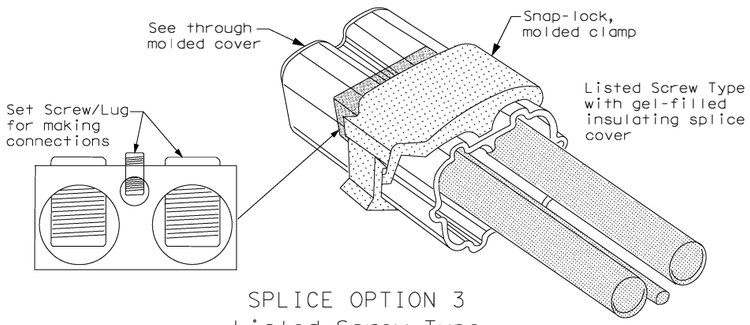
1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil,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



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

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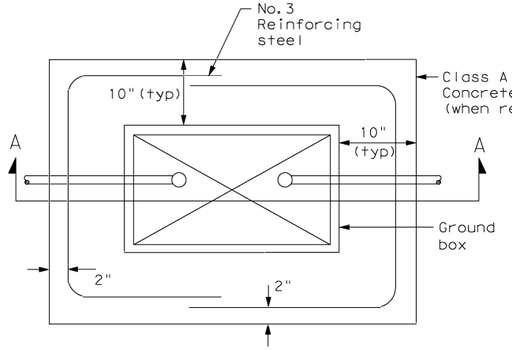
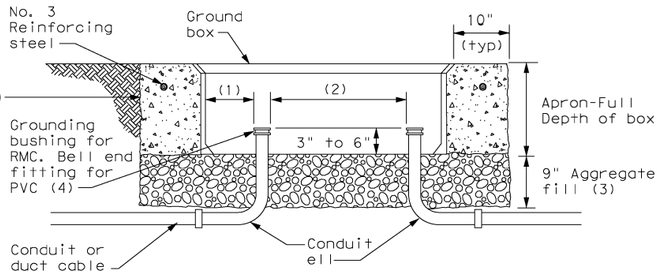


PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

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

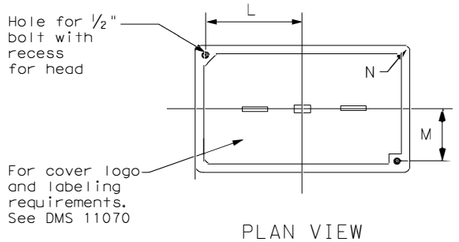
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

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

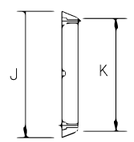
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

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

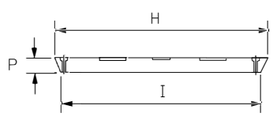
GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



PLAN VIEW



END



SIDE

GROUND BOX COVER

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."

2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

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

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

B. CONSTRUCTION METHODS

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

2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.

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

4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.

5. Temporarily seal all conduits in the ground box until conductors are installed.

6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.

7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.

8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.

9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.

10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.

11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

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Traffic Operations Division Standard

ELECTRICAL DETAILS
GROUND BOXES

ED(4)-14

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I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1.

2.

☒ No Action Required ☐ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☒ No Permit Required

☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1.

2.

3.

4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☐ Temporary Vegetation	☐ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☐ Erosion Control Logs	☐ Retention/Irrigation Systems
☐ Mulch	☐ Rock Berm	☐ Extended Detention Basin
☐ Sodding	☐ Triangular Filter Dike	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Sand Bag Berm	☐ Wet Basin
☐ Diversion Dike	☐ Straw Bale Dike	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Brush Berms	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Erosion Control Compost	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Vegetation Lined Ditches
☐ Erosion Control Logs	☐ Compost Filter Berm and Socks	☐ Sand Filter Systems
	☐ Stone Outlet Sediment Traps	☐ Grassy Swales
	☐ Sediment Basins	

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.

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. No landscaping will be a part of the proposed project activities. Re-vegetation of disturbed areas will be in compliance with the Executive Memorandum on Beneficial Landscaping (26Apr94) and the Executive Order on Invasive Species (EO 13112). Regionally native and non-invasive plants will be used to the extent practicable in landscaping and re-vegetation.
2. During construction, efforts will be taken to avoid and minimize disturbance of vegetation and soils. Areas within the existing ROW, but outside the limits of construction, will not be disturbed. Every effort will be made to preserve trees where they will neither compromise safety nor substantially interfere with the proposed projects.

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. No disturbing, destroying, or removing active nests of Bald Eagles, including ground nesting birds, during the nesting season. Avoid the removal of unoccupied, inactive nest as practicable. Prevent the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair. No collecting, capturing, relocating or transporting birds, eggs, young or active nests without a permit. The Eagle Protection Act prohibits the taking or possession of and commerce in eagles, parts, feathers, nests, or eggs with limited exceptions. The definition of take includes pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb. Eagles may not be taken for any purpose unless a permit is issued prior to the taking.
2. The contractor and/or TxDOT personnel will be advised of the potential for Whooping Cranes to occur within the project limits. Construction personnel will be advised to avoid adverse impacts to this species and to report any signtings to TxDOT District Environmental staff. Drainage modifications will be limited to the extent practical to accommodate the additional paved surface needed to bring the roadway up to current TxDOT safety standards. The construction personel will report all sightings to TxDOT Fort Worth District Environmental staff. Reports should include the time, date, and location and any available photos.
3. Between October 1 and February 15, the contractor will remove all old migratory bird nests from any structure that will be affected by the proposed project, and complete any bridge work/demolition and/or vegetation clearing. In addition, the contractor will be prepared to prevent migratory birds from building nests by utilizing nest prevention methods, such as bird-deterrent netting and bird-repelling sprays and/or gels, between February 15 and October 1. In the event that migratory birds are encountered on-site during project construction, adverse impacts on protected birds, active nests, eggs, and/or young will be avoided.

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.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☐ No Action Required ☒ Required Action

Action No.

1. Contractor will be advised of potential occurence of the Western burrowing Owl. The contractor would be prepared to take appropriate measures to avoid disturbing, destroying, or removing active nests, including ground nesting birds, during the nesting season. Avoid the removal of unoccupied, inactive nests, as practicable. As necessary, take appropriate measures to prevent the establishment of active nests during the nesting season on facilities and structures proposed for replacement or repair. Collecting, capturing, relocation, or transporting birds, eggs, young, or active nests without a permit is prohibited.

2.

3.

STATE OF TEXAS
MELANIE B. YOUNG
67775
LICENSED
PROFESSIONAL ENGINEER

Melanie B. Young, P.E.
4/16/21

Texas Department of Transportation — Design Division Standard

SH 199 AND US 377 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	00	278		VA		
12-12-2011 (DS)	DIST	COUNTY			SHEET NO.		
05-07-14 ADDED NOTE SECTION IV.	FW	TARRANT			55		
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.							